

TRANSPORTATION IMPACT STUDY

2055 BROCK ROAD
PROPOSED RESIDENTIAL DEVELOPMENT
CITY OF PICKERING, REGIONAL MUNICIPALITY
OF DURHAM

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Rev. 0	November 2019	Issued for coordination
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1.0 Executive Summary

CF Crozier & Associates Inc. (Crozier) was retained by Brock Road Duffins Forest Inc. to undertake a Transportation Impact Study in support of a Zoning By-Law Amendment (ZBA) and Site Plan Application (SPA) for a proposed residential development located at 2055 Brock Road, in the City of Pickering, Regional Municipality of Durham.

The purpose of the study is to assess the impacts of the proposed development on the boundary road network and to recommend any required mitigation measures, if warranted.

The Transportation Impact Study was completed in accordance with the agreed upon Terms of Reference with the City of Pickering and Regional Municipality of Durham's (Durham Region) staff.

The proposed development suggests a 20-storey residential tower with 307 units, 9 units of street townhouses, and 64 units of stacked townhouses. 502 parking spaces are proposed at-grade and underground to facilitate the residential subdivision, and a full-moves site access is also proposed at Usman Road.

Existing Conditions

Although the boundary road network is currently operating at capacity with a level of service (LOS) "D" or better with a maximum control delay of 35.7 seconds, it was determined that the analysis can be considered conservative as it did not consider drivers proceeding through Brock Road (RR1) and Finch Avenue (RR37) intersection during intergreen phases. The analysis also did not consider "slip through" drivers in queued traffic at Major Oaks Road intersection. These maneuvers were consistently observed during existing peak period traffic conditions, thus, marginally improve traffic capacity.

The high volume-to-capacity ratios of the boundary road network is primarily attributed to the shared turning and through movement configurations. The boundary road network can marginally improve during existing and immediate short-term future via signal optimization and lost time adjustments. However, a road widening along Brock Road (as identified in Durham Region's Transportation Master Plan) will be required in the short to medium term future to accommodate continued traffic growth in the area.

Future Background Conditions

Per correspondence with the City of Pickering and Durham Region staff, future background traffic volumes at the study intersections were determined using a 2% annual compounded growth rate, as well as background trips generated by future development at 2071 Brock Road.

As expected, intersection analyses of the 2024 future background traffic volumes indicate the boundary road network will continue to operate at capacity with a level of service "E" or better during all weekday peak periods. Signal optimization and lost time adjustments, as warranted in existing conditions, cannot sufficiently improve traffic operations. Accordingly, Brock Road widening improvement as identified by Durham Region should be considered by 2024. At a minimum, an interim (non-intrusive) improvement is recommended to accommodate background traffic growth in the area.

2024 Interim Conditions (Prior to Road Widening)

Should the Brock Road widening not implemented by 2024, an interim improvement with signal optimization and overlapping northbound left-turn and eastbound right-turn phases can improve maximum volume-to-capacity ratios to 1.13 at Brock Road (RR1) and Finch

Avenue (RR37). Northbound left-turn queue is expected to continue to exceed the available storage length, however, it is not expected to affect downstream intersection operations. These conditions are acceptable in the short term, for arterial roadway intersections, prior to a road widening improvement.

The following improvements are therefore recommended for consideration due to the existing and future background conditions:

By 2024 (without the advancing of Brock Road widening to six-lanes)

- Optimize signal timing at Brock Road and Finch Ave
- Eastbound right turn overlap phase with northbound left-turn protected phase Brock Road and Finch Ave
- Optimize signal timing at Brock Road and Major Oaks Road/Usman Drive including the eastbound right turn slip lane via revised pavement markings

By 2029

- Widening to Brock Road to a six-lane cross section
- Signal Optimization

Ultimate Condition

Upon road widening of Brock Road (RR1), intersection analyses indicate that the boundary road network can operate acceptably in 2024 and 2029 future background traffic conditions.

Intersection analyses of the 2029 future background traffic volumes indicate the signalized intersection of Brock Road (RR1) at Finch Avenue (RR37) will operate at a level of service "B", "D" and "C" during the weekday a.m., p.m. and mid-day peak periods, respectively. The signalized intersection is expected to operate at moderate control delays of 35 seconds or less, and a maximum volume-to-capacity ratios of 0.96 (EBL) or better. Although the volume-to-capacity ratios remain near capacity for eastbound left turn volumes, the intersection is still operating acceptably without a road widening along Finch Avenue as there are little to no opposing westbound volumes.

The signalized intersection of Brock Road (RR1) at Major Oaks Road/Usman Road and the one-way stop-controlled intersection of Brock Road (RR1) at Usman Road are expected to operate at a level of service "C" or better with low control delays and maximum volume-to-capacity ratios of 0.83 or better. These metrics indicate that the intersections are expected to continue to operate at an efficient level of service with reserve capacity to accommodate future increases in traffic volumes.

Future Total Conditions

The proposed residential development is expected to add 125 and 146 unadjusted two-way trips to the boundary road network in the weekday a.m. and p.m. peak periods, respectively.

As Friday mid-day period between 12:00 p.m. to 4:00 p.m. is not typically associated with residential peak period nor commuter peak period, trips generated in weekday p.m. peak (146 two-way trips) are conservatively applied to all future total mid-day traffic analysis.

Intersection analyses of the 2029 future total traffic volumes (with road widening) indicate that the signalized intersection of Brock Road (RR1) and Finch Avenue (RR37) is anticipated to operate at an unchanged level of service "B", "D" and "C" during the weekday a.m., p.m. and Friday mid-day peak periods, respectively, with maximum volume-to-capacity ratios of 0.97 (EBLT) or better. In comparison

to 2029 future background conditions (with road widening), the subject development does not materially alter the traffic operations at the intersection.

Likewise at the signalized intersection of Brock Road (RR1) and Major Oaks Road/Usman Road, as well as at the stop-controlled intersection of Brock Road (RR1) and Usman Road, the intersection analyses indicate that the intersections are anticipated to operate at an unchanged level of service with minor increase in control delays and maximum volume-to-capacity ratios. When compared to the 2029 future background conditions, the development increases the study intersections' control delays by a maximum of 3.4 seconds or less and increases the maximum volume-to-capacity ratios by 0.07 or less. These metrics indicate that the development does not materially alter the intersection operations. Accordingly, the development can be supported from a traffic operations perspective.

The proposed site access is expected to operate efficiently at a level of service "B" or better during weekday a.m., p.m. and mid-day peak periods, with a maximum control delays of 10.6 seconds or less. The proposed site access is supportable from a traffic operations perspective.

2024 Interim Conditions Without Road Widening

Should Brock Road widening not implemented by 2024, an interim improvement with signal optimization and overlapping northbound left-turn and eastbound right-turn phases can improve maximum volume-to-capacity ratios to 1.16 at Brock Road (RR1) and Finch Avenue (RR37). Northbound left-turn queue is expected to continue to exceed the available storage length, however, it is not expected to affect downstream intersection operations. Similar to the interim 2024 future background conditions, these traffic operations are acceptable for an arterial roadway intersection prior to a road widening improvement.

The future traffic operations analysis can be considered conservative as it did not account for left-turn vehicles during intergreen phases (no lost time adjustment). The aggressive driving behaviour were observed in the existing turning movement counts, and accounts for approximately 72 vehicles per hour for the intersection of Brock Road (RR1) at Finch Avenue (RR37). Accordingly, the actual traffic operations are expected to be better than indicated above.

Regardless of the improvements, future total conditions are not expected to materially change from future background conditions. The traffic generated by the development does not materially change the traffic operations of the boundary road network. Thus, the proposed development is supportable from a traffic operations perspective, even prior to the planned Brock Road widening.

Assessment of sight distance at the site access indicate that there is sufficient sight distance for vehicles entering and exiting the Subject Property. The sight distance analysis can be considered conservative as the site access is located at the 90-degree bend of Usman Road, forming the third approach of a T-intersection. Vehicles approaching from both directions are not expected to travel at or above the posted speed, towards and exiting the turn. Regardless of the speed reduction, adequate sight distance is achieved.

Minimum Parking and Loading Requirements

According to the City of Pickering's Site-specific Zoning By-Law 7085/10 and City of Pickering Area-specific Zoning By-Law 3036, 484 vehicle parking spaces and no loading space are required. As the Site Plan proposes 502 parking spaces and a loading space, the City of Pickering's Zoning By-Law is satisfied.

As no bicycle parking requirement is listed in the Site-specific nor Area-specific Zoning By-Laws, the City of Pickering's Central Area Area-specific Zoning By-Law was used as a comparison. Per the City's Central Area Zoning By-Law, 186 bicycle spaces are required for the high-rise and stacked

townhouses. As 218 bicycle parking spaces are provided, the proposed development supplies a surplus of bicycle spaces.

The analysis contained within this report was prepared using the information received from the proponent, as well as the Site Plan dated March 2020. Any minor changes to the Site Plan are not expected to affect the conclusions contained within this report.

In conclusion, the proposed residential development at 2055 Brock Road can be supported from a transportation operations and safety perspective regardless of the road widening improvement.

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2.0 Introduction

2.1 Background

CF Crozier & Associates Inc. (Crozier) was retained by Brock Road Duffins Forest Inc. to undertake a Transportation Impact Study in support of a Zoning By-Law Amendment (ZBA) and Site Plan Application (SPA) for a proposed residential development located at 2055 Brock Road, in the City of Pickering, Regional Municipality of Durham.

The purpose of the study is to assess the impacts of the proposed development on the boundary road network and to recommend any required mitigation measures, if warranted.

The study has been completed in accordance with the agreed upon Terms of Reference with the City of Pickering's and Regional Municipality of Durham's (Durham Region) staff, as well as general conformance with Durham Region's Transportation Impact Study Guidelines, with the associated analyses and findings outlined herein. The Terms of Reference for the study can be found in correspondence included in **Appendix A**.

2.2 Development Proposal

According to the Site Plan dated March 2020, the proposed residential development will consist of a 20-storey tower with 307 residential units, 9 street townhouses, and 64 stacked townhouses. A total of 502 parking spaces are proposed at-grade and underground to facilitate the overall residential subdivision. A full-moves site access is also proposed at Usman Road. The full buildout is estimated to occur within five years (2024).

Table 1 summarizes the proposed development statistics. The most recent Site Plan and the site location are illustrated in **Figure 1** and **Figure 2**, respectively.

**Table 1
Development Statistics**

Proposed Development	Number of Units
Block A Residential Tower High Rise w. 4 storey podium	307
Block B Street Townhouse 3 storeys	9
Block C & D Stacked Townhouse 3 storeys	64
Total	380
Parking & Loading Supply	
Surface	32
Driveway & Garages	18
Underground P1	310
Underground P2	142
Total Vehicle Parking	502
Loading Space	Type G – 1 Provided
Bicycle Parking	218

3.0 Existing Conditions

3.1 Development Lands

The Subject Property covers an area of approximately 1.3 ha and currently consists of an open, vacant field. The site lies within a residential neighbourhood and is bound by Usman Road to the north, empty greenfield to the east, forest areas to the south, and Brock Road (Regional Road RR1) to the west.

3.2 Study Area

The study area encompasses the boundary road network surrounding the Subject Property as described in **Section 3.3**. The Transportation Impact Study analyzes the following intersections as agreed upon in the Terms of Reference with the City of Pickering and Durham Region, attached in **Appendix A**.

- Brock Road (RR 1) at Usman Road
- Brock Road (RR1) at Major Oaks Road/Usman Road
- Brock Road (RR1) at Finch Avenue (RR 37)
- Usman Road at Site Access

3.3 Boundary Road Network

The boundary road network is described in **Table 2**.

Table 2
Boundary Road Network

Feature	Roadway			
	Major Oaks Road	Finch Avenue (RR37)	Usman Road	Brock Road (RR 1)
Direction	Two-Way (East-West)	Two-Way (East-West)	Two-Way (East-West)	Two-Way (North-South)
Classification	Collector	Major Arterial (Local to the east of Brock)	Local (Prop. Collector)	Major Arterial
Jurisdiction	City of Pickering	West of Brock: Durham Region East of Brock: City of Pickering	City of Pickering	Durham Region
Speed Limit	50 km/h (assumed)	West of Brock: 60 km/h (posted) East of Brock: 40 km/h (posted)	40 km/h (posted)	60 km/h (posted)
Span	Usman Road to Meriadoc Drive	Scarborough Pickering Townline (City Boundary) to Bluebird Crescent	Brock Road (RR1) to Brock Road (RR1) at Major Oaks Road	Uxbridge Pickering Townline (City Boundary) to Private Property at Montgomery Parks Road

Table 2
Boundary Road Network (Continued)

Feature	Major Oaks Road	Finch Avenue (RR37)	Usman Road	Brock Road (RR 1)
Major Arterial Intersections	Brock Road (RR1)	Brock Road (RR1), Whites Road (RR38), Glendale Drive (RR29), Alton Road (RR27), Scarborough Pickering Townline (RR30)	Brock Road (RR1)	Central St/Ninth Concession Rd (RR5), Seventh Concession Rd (RR31), Highway 7, Fifth Concession Road, Taunton Road (RR4), Peter Matthews Drive, Finch Avenue (RR37), Kingston Rd (Hwy 2), Bayly St (RR22)
Number of lanes total	Two travel lanes	Four Travel lanes East of Brock: Two travel lanes	Two travel lanes	Four travel lanes
Median type	None	None	None	Concrete Median
Pedestrian Facilities	Yes	Yes (South side)	Yes	Yes
Cycling Facilities	No	No	No	No
On-Street Parking	Yes	No	Yes	No

3.4 Existing Pedestrian and Cycling Movements

According to the City of Pickering's Zoning map, the Subject Property is located in the eastern limits of the City, in a residential neighbourhood abutting open space (recreational) areas. Sidewalks are provided on majority of the roadways while no cycling facility is provided.

3.5 Transit Operations

Durham Region Transit (DRT) operates local and regional transit services for Durham Region. Specifically, DRT provides services to the City of Oshawa, Municipality of Clarington, Town of Whitby, Town of Ajax, City of Pickering, Townships of Brock, Scugog and Uxbridge. GO Transit is a regional transit services offered by Metrolinx (Province of Ontario) connecting passengers across the Golden Horseshoe region of Ontario.

Major transit hubs near the Subject Property includes Pickering GO Station, Pickering Parkway Terminal, Pickering Golf Club and Ajax GO station. **Table 3** below outlines the existing transit routes, direction, days of operation, peak hour headways, and the location of bus stops in the study area.

Table 3
Existing Transit Services

Route	Direction	Span	Days of Operation	Peak Hour Headways (min)	Bus Stops in Study Area
111 East Pickering	East-West	Pickering Parkway Terminal to Pickering Parkway Terminal (Loop services)	Monday to Sunday	20-33	Brock Rd at Finch Ave (350 metres south; 5 min walk)
112 Brock	North-South	Pickering GO to William Jackson at Brock Road	Monday to Sunday	13-16	Bus Stop #1846 (Fronting Subject Property)
193B Pickering Community Route	n/a	Pickering Town Centre to Pickering Town Centre (Loop Services)	Monday to Saturday	n/a	Brock Rd. at Kingston Rd. (650 metres south; 8 min walk)
291 Ajax Community Route	North-South	Pickering Town Centre To Westney at Harwood	Monday to Sunday	60	Brock Rd. at Kingston Rd. (650 metres south; 8 min walk)
603 Pickering - Port Perry	North-South	Pickering Parkway Terminal to Port Perry Terminal	Monday to Friday	26 - 30	Bus Stop #1846 (Fronting Subject Property)
900 PULSE Highway 2	East-West	Centennial Circle to Richmond at Ontario	Monday to Sunday	10	Brock Rd. at Kingston Rd. (650 metres south; 8 min walk)
916 Rossland	East-West	Pickering Parkway Terminal to Harmony Terminal	Monday to Sunday	15-20	Bus Stop #1846 (Fronting Subject Property)
GO Transit 92 Oshawa/Yorkdale	East-West	Yorkdale Bus Terminal to Oshawa Bus Terminal	Monday to Sunday	30	Brock Rd. at Kingston Rd. (650 metres south; 8 min walk)

The transit services described above, provide residents and visitors in the City of Pickering frequent, easily accessible and direct transit services throughout the City and Region. In addition, major employment, commercial and tourist attractions such as Downtown Toronto, Oshawa, or greater Toronto areas can be accessed using GO Transit, via direct bus connection at Pickering GO or Ajax GO. As such, transit is a convenient mode of transport for both residents and visitors of this proposed development.

Appendix B contains relevant transit information.

3.6 Traffic Data

Turning movement counts for the study intersections were conducted by Spectrum Traffic Data Inc. staff on Tuesday October 8th, 2019 between 7:00 a.m. to 9:00 a.m., 4:30 p.m. to 7:00 p.m., as well as on Friday October 18th, 2019 between 12:00 p.m. to 4:00 p.m. to reflect the typical commuter peak periods of the roadway and the peak periods of a residential property. Signal timing plans were provided by Durham Region staff for modelling purposes.

Intersection analysis was conducted utilizing peak hour factors (PHFs) calculated for each intersection for each peak period. **Table 4** below outlines the calculated peak hour factors at each intersection.

Table 4
Peak Hour Factors

Intersection	Peak Hour	Intersection Peak Hour Factor
Brock Road (RR1) at Finch Avenue (RR37)	Weekday A.M. 7:30 a.m. – 8:30 a.m.	0.97
	Weekday P.M. 4:45 p.m. – 5:45 p.m.	0.98
	Friday Mid-day 3:00 p.m. to 4:00 p.m.	0.89
Brock Road (RR1) at Major Oaks Road/Usman Road	Weekday A.M. 7:30 a.m. – 8:30 a.m.	0.95
	Weekday P.M. 4:45 p.m. – 5:45 p.m.	0.97
	Friday Mid-day 3:00 p.m. to 4:00 p.m.	0.84
Brock Road (RR1) at Usman Road	Weekday A.M. 7:30 a.m. – 8:30 a.m.	0.97
	Weekday P.M. 4:45 p.m. – 5:45 p.m.	0.96
	Friday Mid-day 3:00 p.m. to 4:00 p.m.	0.90

The traffic count data and signal timing cards are provided in **Appendix D. Figure 3** illustrates the 2019 existing traffic volumes.

3.7 Intersection Modelling

The intersection operations are modelled based on default parameters provided by Synchro 10 and Sim Traffic 10, as well as in general conformance with Durham Region's Transportation Impact Study Guidelines.

3.8 Intersection Operations

The operations of the critical intersections were analyzed based on the traffic volumes illustrated in **Figure 3**, 2019 Existing Traffic Volumes. Analysis of all intersections were based on signal timings as provided by Durham Region. Level of Service definitions are included in **Appendix C**. Signal timing plans have been included in **Appendix D**.

Table 5 outlines 2019 existing traffic level of service for the counts taken at the study intersections under existing conditions and geometric configurations. Intersection PHFs as outlined in **Table 3**, are applied. Detailed capacity analyses are included in **Appendix E**.

Table 5
2019 Existing Level of Service

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile Queue > Storage Length
Brock Road (RR1) at Finch Avenue (RR37)	Signalized	A.M.	C	29.0 s	1.02 (SBTR)	None
		P.M.	C	30.2 s	1.11 (EBLT) ³	84.0 m > 63.0 m (NBL)
		Friday Mid-day	C	27.8 s	0.99 (EBLT) ³	73.0 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized	A.M.	C	24.7 s	1.10 (WBL)	33.2 m > 20.0 m (WBL)
		P.M.	A	8.4 s	0.72 (WBL)	24.4 m > 20.0 m (WBL)
		Friday Mid-day	B	15.8 s	0.96 (WBL)	36.9 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	10.8 s	0.01 (WBR)	None
		P.M.	B	10.9 s	0.03 (WBR)	None
		Friday Mid-day	B	12.5 s	0.16 (WBR)	None

Note₁: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of Service of a stop-controlled intersection is based on the minor (stopped) approach control delay per vehicle.

Note₂: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

Note₃: A lost time adjustment of -3.0 seconds was added to the eastbound left turn movement at Finch Avenue as aggressive driving behaviour was consistently observed at the intersection during the weekday p.m. and mid-day peak periods.

Without Lost Time Adjustments:

The signalized intersection of Brock Road (RR1) and Finch Avenue (RR37) is currently operating at a level of service "D" during the weekday a.m., p.m. peak periods, and level of service "C" during Friday mid-day peak period. The intersection's maximum control delay is 35.7 seconds or less, and the theoretical maximum volume-to-capacity ratios are 1.02 (SBTR), 1.24 (EBLT) and 1.11 (EBLT) in the weekday a.m., p.m. and Friday mid-day peak hours, respectively.

With Lost Time Adjustments:

As eastbound left-turn drivers were consistently observed to proceed through the intersection during the intergreen phases, a -3.0 seconds lost time adjustment was applied to the intersection of Brock Road (RR1) at Finch Avenue (RR37) left turn movement during the weekday p.m. and Friday mid-day peak periods. A reduced maximum volume-to-capacity ratios of 1.02 (SBTR; unchanged), 1.11 (EBLT) and 0.99 (EBLT) in the weekday a.m., p.m. and Friday mid-day peak hours, respectively, was yielded in the revised operations analysis. Regardless of the lost time adjustments, these metrics indicate that the intersection is currently operating near/at capacity with moderate delays.

While the intersection is operating at capacity, the intersection's and the eastbound left turn delays are still acceptable and are typical for major arterials roadways during commuter peak periods. Due to the low opposing westbound and pedestrian volumes, all eastbound traffic can proceed through the intersection within one or a maximum of two cycle lengths. Likewise, northbound left turn vehicles can proceed through the intersection within one or two cycles.

The signalized intersection of Brock Road (RR1) at Major Oaks Road/Usman Road is currently operating at a level of service "C" or better during the weekday a.m., p.m. and Friday mid-day peak periods. The intersection is operating at a moderate control delay of 24.7 seconds or less and a theoretical maximum volume-to-capacity ratio 1.10 (WBL) or less.

Although the signalized intersection of Brock Road (RR1) at Major Oaks/Usman Road also appears to be operating at capacity, the analysis above can be considered conservative as a single eastbound lane was assumed. As Major Oaks and Usman Road have more than 5.7 metres in width for both directions of traffic, right turn vehicles have adequate room to slip through queued left-turn and through traffic. These slip through maneuvers were consistently observed during the turning movement counts.

Lastly, the one-way stop-controlled intersection of Brock Road (RR1) at Usman Road is currently operating at a level of service B during all weekday peak periods. The intersection is operating at a low control delays of 12.5 seconds or less, and a maximum volume-to-capacity of 0.16 (WBR) or less. These metrics indicate that the stop-controlled intersection is operating efficiently with acceptable delays and reserve capacity to accommodate future traffic growth.

Recommended Improvements

Signal optimization can reduce maximum volume-to-capacity ratios for the signalized intersection of Brock Road (RR1) at Finch Avenue (RR37). The high volume-to-capacity ratios shown above is associated with the high eastbound left-turn volumes, coupled with high eastbound right-turn volumes, as well as the geometric constraints of the intersection (i.e. shared left-through eastbound configuration). Accordingly, to minimize aggressive driving behaviour and to improve existing traffic operations, a signal optimization is recommended.

Next, although the signalized intersection of Brock Road (RR1) at Major Oaks Road/Usman Road appears to operate at capacity during the peak periods, signal optimization is not required as the analysis above can be considered conservative. Eastbound vehicles can slip through queued vehicles, thus effectively reducing the intersection's control delay, as well as improving eastbound and westbound operations to well below a volume-to-capacity ratios of 1.0. Hence, all future analysis scenarios simulate the signalized intersection of Brock Road (RR1) at Major Oaks Road/Usman Road with an exclusive eastbound right-turn lane consistent with observed driver behaviour.

Table 6 outlines the revised 2019 existing traffic operations should the intersections be operated at an optimized signal timing plans with separate right-turn lane at Major Oaks Road. The analysis below conservatively **does not** account for lost time adjustments. Intersection PHFs, as outlined in **Table 4**, are applied.

Detailed capacity analysis is further outlined in **Appendix E**.

Table 6
2019 Existing Level of Service (Optimized)

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Max V/C Ratios ²	95 th Percentile Queue > Storage Length
Brock Road (RR1) at Finch Avenue (RR37)	Signalized (Optimized)	A.M.	C	28.0 s	1.00 (SBTR)	None
		P.M.	C	32.4 s	0.94 (EBLT) 0.92 (NBTR)	100.2 m > 63.0 m (NBL)
		Friday Mid-day	C	32.5 s	0.93 (EBLT) 0.91 (NBTR)	87.7 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured)	A.M.	B	19.5 s	0.84 (SBT)	31.5 m > 20.0 m (WBL)
		P.M.	A	7.7 s	0.70 (NBT)	23.1 m > 20.0 m (WBL)
		Friday Mid-day	B	13.4 s	0.76 (NBT)	36.7 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road (No change)						

Note₁: The Level of Service of a signalized intersection is based on the average control delay per vehicle.

Note₂: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

As outlined in **Table 6**, the signal optimization at Brock Road (RR1) and Finch Avenue (RR37), and the simulated dedicated right-turn lanes at Major Oaks Road effectively increased capacity in the boundary road network. Particularly for the signalized intersection of Brock Road (RR1) and Finch Avenue (RR37), the signal optimization reduces maximum volume-to-capacity ratio to 1.00. The 95th

percentile queue length for northbound left turn is expected to increase as a result of the signal timing optimization. However, it is not expected to impede the intersection downstream. While these low impact improvements are acceptable for existing peak period conditions, a more extensive road network improvements (i.e. Brock road widening) will be required in the future to increase capacity. **Section 4.3** summarizes planned Regional and City road improvements.

4.0 Future Background Conditions

4.1 Horizon Years

The Subject Development is anticipated to be fully build out and operational prior to 2024; therefore, horizon year of 2024 and 2029 are assumed, as agreed upon in the Terms of Reference with the City of Pickering and Durham Region.

4.2 Growth Rate

Due to inconclusive historical AADT data obtained from Durham Region, per discussion with Region staff, a 2% annual compounded growth rate is assumed for all traffic movements in future traffic analysis.

4.3 Proposed Road Improvements

Based on a review of recommended capital works, future road improvements are being planned in order to accommodate further traffic growth in the Region and to improve traffic safety and efficiency. Per Durham Region's Transportation Master Plans, Brock Road (RR1) is proposed to be widened from 5 to 7 lanes in the medium to long term future (est. 2027-2031). Similarly, Finch Avenue (RR37) is proposed to be widened from two lanes to three lanes throughout the corridor between Brock Road (RR1) and Altona Road in 2022-2026. These improvements are expected to increase the boundary road network capacity, improve traffic flow and ultimately reducing delays and queue throughout the network.

Relevant excerpts of the Transportation Master Plan is included in **Appendix F**. 2029 traffic operations analysis below account for Brock Road widening.

4.4 Background Developments

Aside from 2065-2071 Brock Road building addition, no significant background developments have been identified within the study area per the City of Pickering's development application map. Accordingly, in consultation with the City and Region, it is assumed that any other developments in the area will be accounted for in the assumed annual compounded growth rate of 2%.

2065-2071 Brock Road Development

The adjacent property to the north, 2065-2071 Brock Road, proposes a three-storey building addition of 3,419.24 square metres. The background trip generation and trip assignments are included in future traffic operations analysis per the background Traffic Impact Study provided.

Relevant excerpt of the background Traffic Impact Study is included in **Appendix G. Figure 5** summarizes the trip assignment as provided by the background Traffic Impact Study.

4.5 Intersection Operations

Table 7, 8 and 9 outline 2024 and 2029 future background's level of service associated with the boundary road network based on the future background traffic volumes illustrated in **Figures 6 and Figure 7**, with detailed capacity analyses included in **Appendix E**. It is noted that future traffic analysis does not account for lost time adjustments, and a PHF of 1.0 is assumed for weekday a.m. and p.m. peak hours; existing PHF for Friday midday peak hour were maintained for future analysis.

Table 7
2024 Future Background Level of Service

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Maximum V/C Ratios ²	95 th Percentile Queue > Storage Length
Brock Road (RR1) at Finch Avenue (RR37)	Signalized (Optimized)	A.M.	E	64.8 s	1.16 (SBTR)	None
		P.M.	D	47.4 s	1.41 (EBLT) 0.94 (NBL) 0.91 (NBTR)	103.8 m > 63.0 m (NBL)
		Friday Mid-day	C	33.5 s	1.17 (EBLT) 0.90 (NBL)	96.2 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured)	A.M.	C	26.3 s	0.95 (SBTR)	47.5 m > 20.0 m (WBL)
		P.M.	B	15.6 s	0.87 (NBTR)	46.4 m > 20.0 m (WBL)
		Friday Mid-day	B	14.6 s	0.82 (SBL)	51.3 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	10.9 s	0.02 (WBR)	None
		P.M.	B	12.9 s	0.07 (WBR)	None
		Friday Mid-day	B	12.6 s	0.15 (WBR)	None

As shown in **Table 7**, the signalized intersection of Brock Road (RR1) and Finch Avenue (RR37) is expected to continue to operate at capacity, at level of service "E", "D" and "C" during the weekday a.m., p.m., and Friday mid-day peak periods, respectively, under 2024 future background traffic conditions. Despite the signal optimization as recommended and identified in 2019 existing conditions (See: **Table 5** and **6**), the intersection is expected to operate at a maximum theoretical volume-to-capacity of 1.16 (SBTR), 1.41 (EBLT), and 1.17 (EBT) during the weekday a.m., p.m., and Friday Mid-day peak periods, respectively. Accordingly, due to the high volume-to-capacity ratios and the high turning movement volumes in the existing and future background traffic, Brock Road improvement and road widening as identified in Durham Region's Transportation Master Plan, should be considered being advanced by the Region, in light of ongoing development in the City. However, even in the absence of advancing the Brock Road widening control delay is still considered acceptable and queued vehicles are expected to clear the intersection within two cycles. Moreover, these results can be considered somewhat conservative as 1-2 left turning vehicles during permissive phases were observed clearing the intersection during the intergreen period and left turn on intergreen reductions were not accounted for within the analysis.

2024 Interim Conditions

As the planned Brock Road widening is not anticipated to occur by 2024 (per the current Region road widening plan), several interim improvements may be considered to reduce the volume-to-capacity ratio and improve traffic operations at the intersection of Brock Road (RR1) at Finch Avenue (RR37).

Should the road widening not occur by 2024, several interim improvements may be considered to mitigate traffic operations at the intersection of Brock Road (RR1) at Finch Avenue (RR37).

Table 8 outlines 2024 future background traffic conditions with existing lane configurations (without widening) and accounting for the following improvements to signal timing:

- Signal Timing Optimization (existing cycle length maintained) at the intersection of Brock Road (RR1) and Finch Avenue (RR37).
- Implementation of an overlapping eastbound right-turn phase with the northbound left-turn phases at the intersection of Brock Road (RR1) and Finch Avenue (RR37).

Table 8
2024 Future Background Level of Service (Interim Conditions optimized without Road Widening)

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile Queue > Storage Length
Brock Road (RR1) Finch Avenue (RR37)	Signalized Intersection	A.M.	E	56.7 s	1.13 (SBTR)	None
	(Optimized with overlapping phase)	P.M.	D	51.3 s	1.07 (EBLT) 0.97 (NBL) 1.04 (NBTR) 0.92 (SBTR)	105.6 m > 63.0 m (NBL)
		Friday Mid-day	D	37.1 s	0.96 (EBLT) 0.96 (NBTR) 0.91 (NBL)	83.6 m > 63.0 m (NBL)
Brock Road (RR1) at Usman Road (No change proposed)						

As described in **Table 8**, the implementation of signal optimization as well as overlapping eastbound right-turn green phase (during northbound protected left turn phase) can reduce the maximum volume-to-capacity ratios. Although the signalized intersection of Brock Road (RR1) at Finch Avenue (RR37) is still operating near capacity, with maximum volume-to-capacity ratios of 1.13, these conditions are consistent with 2019 existing traffic operations. In comparison to the 2024 future background conditions without improvements, the maximum volume-to-capacity ratios are expected to improve from 1.16 to 1.13, 1.41 to 1.07 and 1.17 to 0.97 during the weekday a.m., p.m., and Friday mid-day peak periods, respectively. The control delays are expected to remain high and northbound left turn queued vehicles are expected to continue to exceed the storage length provided. Nevertheless, vehicles are not expected to impede downstream intersection and the vehicles are expected to proceed through the intersection within two cycle delays. These delays are observed and warranted by existing conditions, worsen by future background traffic growth in the area.

It is also noted that the future background analysis herein, did not account for left turns during intergreen as observed in the existing turning movement counts. As an average of two left-turn vehicles proceed during each cycle's intergreen phases, increase in northbound left turn capacity by approximately 72 left-turns per hour were not accounted for in the operation analysis above (using existing 100 seconds per cycle length, 36 cycles per hour). Thus, the above analysis can be considered conservative.

Alternatively, the signalized intersection of Brock Road (RR1) at Finch Avenue (RR37) may be re-configured to dedicated eastbound left turn with shared eastbound through-right turn (instead of shared left-through with dedicated eastbound right-turn). Such improvement can also improve maximum volume-to-capacity ratios; however, the intersection is still expected to operate near capacity. As this improvement may requires a physical realignment of the receiving eastbound lane and modification to the south-east intersection curb radius, such interim improvement is not ideal. Accordingly, signal optimization with overlapping eastbound right-turn protected green phase is recommended in the interim scenario should the road widening not occur by 2024 as this is the least intrusive and cost-effective method of improving traffic operations temporarily.

2024 and 2029 Traffic Conditions with Road Widening

**Table 9
Future Background Level of Service with Road Widening**

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile Queue > Storage Length
2024 Future Background Level of Service with Road Widening						
Brock Road (RR1) at Finch Avenue (RR37)	Signalized (Optimized)	A.M.	B	16.9 s	0.78 (SBTR)	None
		P.M.	C	29.1	0.92 (EBLT)	96.7 m > 63.0 m (NBL)
		Friday Mid-day	C	25.7 s	0.88 (EBLT)	81.0 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured & Optimized)	A.M.	C	20.3 s	0.78 (EBR)	43.4 m > 20.0 m (WBL)
		P.M.	B	18.5 s	0.75 (WBL)	55.4 m > 20.0 m (WBL)
		Friday Mid-day	B	13.2 s	0.72 (WBL)	50.8 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	10.3 s	0.02 (WBR)	None
		P.M.	B	10.1 s	0.05 (WBR)	None
		Friday Mid-day	B	10.1 s	0.11 (WBR)	None

**Table 9
Future Background Level of Service with Road Widening (Continued)**

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Max V/C Ratios ²	95 th Percentile Queue > Storage Length
2029 Future Background Level of Service with Road Widening						
Brock Road (RR1) at Finch Avenue (RR37)	Signalized (Optimized)	A.M.	B	19.3 s	0.88 (SBT)	None
		P.M.	D	35.5 s	0.96 (EBLT) 0.92 (NBL) 0.91 (NBTR) 0.90 (SBTR)	103.0 m > 63.0 m (NBL)
		Friday Mid-day	C	29.8 s	0.91 (EBLT)	96.5 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured & Optimized)	A.M.	C	22.8 s	0.83 (EBR)	51.7 m > 20.0 m (WBL)
		P.M.	B	20.0 s	0.80 (NBTR)	48.1 m > 20.0 m (WBL) 81.1m > 72.0 m (NBL)
		Friday Mid-day	B	14.7 s	0.74 (WBL)	48.3 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	10.6 s	0.02 (WBR)	None
		P.M.	B	10.8 s	0.05 (WBR)	None
		Friday Mid-day	B	10.8 s	0.13 (WBR)	None

Note₁: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of Service of a stop-controlled intersection is based on the minor (stopped) approach control delay per vehicle.

Note₂: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

With the road widening improvement, as shown in **Table 9**, the signalized intersection of Brock Road (RR1) and Finch Avenue (RR37) is expected to operate at an improved level of service “B”, “D”, and “C” during the weekday a.m., p.m., and Friday mid-day peak periods, respectively, under 2029 future background traffic conditions. The intersection is expected to experience a maximum control delays of 35.5 seconds or less, and a maximum volume to-capacity ratios of 0.88 (SBT), 0.96 (EBLT), and 0.91 (EBLT) during the weekday a.m., p.m. and Friday mid-day peak periods, respectively. All these metrics indicate that the intersection is expected to improve upon the road widening, with reserve capacity to accommodate future increases in traffic volumes through long term horizon of 2029.

Similarly, for the signalized intersection of Brock Road (RR1) at Major Oaks Road/Usman Road, it is expected to operate at a level of service "C" or better during the weekday a.m., p.m. and Friday mid-day peak hours in 2029 future background traffic conditions. The intersection is expected to operate efficiently at a control delay of 22.8 seconds or less, and a maximum volume-to-capacity ratio of 0.83 (NBTR) or less. These metrics indicate that the intersection is expected to operate efficiently with low delays and reserve capacity to accommodate future increases in traffic volume.

The one-way stop-controlled intersection of Brock Road (RR1) at Usman Road is expected to operate efficiently at a level of service "B" during all weekday peak periods. The intersection is expected to operate a control delays of 10.8 seconds or less and a maximum volume-to-capacity ratio of 0.13 (WBR) or less. These metrics indicate that the intersection is expected to continue to operate efficiently with low control delays and reserve capacity to accommodate future increases in traffic volume.

Accordingly, traffic operations are expected to improve significantly upon the road widening of Brock Road (RR1) as recommended in the Region's Transportation Master Plan. The road widening is not required by 2024 future background conditions but may be considered and can effectively reduce maximum volume-to-capacity ratios below 0.90.

It is also noted that the future background analysis herein, did not account for left turns during intergreen as observed in the existing turning movement counts. As an average of two left-turn vehicles proceed during each cycle's intergreen phases, increase in northbound left turn capacity by approximately 72 left-turns per hour were not accounted for in the operation analysis above (using existing 100 seconds per cycle length, 36 cycles per hour). Thus, the above analysis can be considered conservative.

5.0 Site Generated Traffic

5.1 Trip Generation

The proposed residential development will result in additional vehicles on the boundary road network that previously did not exist. The proposed development will also create additional turning movements at the study intersections.

The trip generation of the street townhouse, stacked townhouse and high-rise residential tower were forecasted using Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, under the Land Use Category 221 "Multi-family Housing (Mid-Rise)" and Land Use Category 222 "Multi-family Housing (High-Rise)". These land use categories include apartments, townhouses, and condominiums. Mid-rise multi-family housing is defined as residential housing with three dwelling units or more, between three (3) to ten (10) levels/floors while a high-rise is defined similarly with more than 10 levels. The trip generation forecast is based on the fitted curves (if available) established by ITE data for the number of dwelling units provided, in a general urban and suburban setting.

The forecasted trips are tabulated in **Table 10**.

**Table 10
Trip Generation**

Use	Units	Roadway Peak Hour	Number of Trips		
			Inbound	Outbound	Total
LUC 221 Multifamily Housing (Mid-Rise)	73	Weekday A.M.	7	19	26
		Weekday P.M.	20	13	33
		Friday Mid-Day ¹	20	13	33
LUC 222 Multifamily Housing (High-Rise)	307	Weekday A.M.	24	75	99
		Weekday P.M.	69	44	113
		Friday Mid-day ¹	69	44	113
Total		Weekday A.M.	31	94	125
		Weekday P.M.	89	57	146
		Friday Mid- day¹	89	57	146

Note 1: As requested by Region Staff, Friday Mid-day period between 12:00 p.m. to 4:00 p.m. is included into traffic analysis. As ITE Trip Generation Manual does not provide residential trips generated during Friday mid-day, weekday p.m. trips generation were conservatively assumed for analysis.

According to the ITE Trip Generation Manual, the residential development is forecasted to generate an upper bound of 125 and 146 two-way trips in the weekday a.m. and p.m. peak hours, respectively. As Friday mid-day is not a peak period for residential developments, weekday p.m. peak period's trip generation is conservatively assumed and applied to future total mid-day traffic analysis.

5.2 Trip Distribution

The trips generated by the proposed development were assigned to the boundary road network based on Transportation Tomorrow Survey (TTS) data. TTS is a comprehensive survey of transportation characteristics of households in the Golden Horseshoe, Simcoe County and surrounding areas.

For the proposed development, TTS results were filtered to auto trips exiting 2006 GTA Zone 1033, a primary residential zone in which the subject property is located in. Trips were filtered to the a.m., peak period. From this query, trip destinations were determined, and percentage of trips assigned to each destination was accounted for. Trips were assumed to travel to and from their destination based on the most convenient route possible. Based on the existing traffic volumes, the assumed trip distribution per TTS results are in general conformance with commuter travel patterns.

The trip distribution that was applied for the a.m. peak period was inversely applied to the p.m. peak

period. **Table 11** below outlines the assumed trip distribution for the proposed development. The trip distributions and trip assignments are illustrated in **Figure 8** and **Figure 9**, respectively.

Table 11
Trip Distributions

Departing To/Arriving From	Percentage
Brock Road (North)	30%
Brock Road (South)	60%
Finch Avenue (South)	10%

6.0 Future Total Conditions

6.1 Basis of Assessment

The traffic impacts arising from the proposed development were assessed on the basis of the site generated traffic illustrated in **Figures 9**, superimposed on the future background traffic volumes in **Figure 6** and **Figure 7** using the same optimized signal timing plans. The resulting future total traffic volumes for the weekday a.m. and p.m. and peak hours are illustrated in **Figures 10** and **Figure 11** for the 2024 and 2029 horizon year.

6.2 Intersection Operations

2024 Interim Conditions

Again, road widening improvements warranted by existing and future background conditions are recommended by 2024 to alleviate delays and capacity issues but is not required. Should the improvement not occur by 2024, interim, non-intrusive improvements may be considered to mitigate traffic operations specifically at the intersection of Brock Road (RR1) and Finch Avenue (RR37).

Consistent with the future background analysis and recommendations, **Table 12** outlines 2024 future total traffic conditions with existing lane configurations (without road widening) and accounting for the following improvements to signal timing as identified in future background conditions:

- Signal Timing Optimization (existing cycle length maintained) at the intersection of Brock Road (RR1) and Finch Avenue (RR37).
- Implementation of an overlapping eastbound right-turn phase with the northbound left-turn phases at the intersection of Brock Road (RR1) and Finch Avenue (RR37).

Similar to the above table, lost time adjustment was not accounted for, and a PHF of 1.0 was applied to all future total traffic analysis. Detailed capacity analyses are included in **Appendix E**.

Table 12
2024 Future Total Level of Service (Interim Conditions without Road Widening)

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile Queue > Storage Length
Brock Road (RR1) Finch Avenue (RR37)	Signalized Intersection (Optimized with overlapping phase)	A.M.	E	64.0 s	1.16 (SBT)	None
		P.M.	E	58.0 s	1.09 (EBLT) 1.07 (NBTR) 0.97 (NBL) 0.95 (SBTR)	104.7 m > 63.0 m (NBL)
		Friday Mid-day	D	42.0 s	0.97 (EBLT) 1.00 (NBTR) 0.93 (NBL) 0.91 (SBTR)	104.7 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured)	A.M.	C	34.7 s	1.01 (SBT)	57.8 m > 20.0 (WBL) 91.4 m > 60.0 m (SBL)
		P.M.	B	17.8 s	0.91 (NBT)	120.1 m > 72.0 m (NBL) 99.9 m > 60.0 m (SBL)
		Friday Mid-day	B	17.2 s	0.99 (SBL)	135.8 m > 72.0 m (NBL) 159.3 m > 60.0 m (SBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	11.2 s	0.06 (WBR)	106.7 m > 60.0 m (SBL)
		P.M.	B	12.7 s	0.10 (WBR)	159.0 m > 60.0 m (SBL)
		Friday Mid-day	B	14.0 s	0.20 (WBR)	64.4 m > 38.0 m (NBR) 175.4 m > 60.0 m (SBL)

Table 12
2024 Future Total Level of Service (Interim; continued)

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile Queue > Storage Length
Usman Road Site Access	One-Way Stop Controlled	A.M.	A	9.1 s	0.02 (NBLR)	None
		P.M.	B	10.6 s	0.09 (NBLR)	None
		Friday Mid-day	B	10.2 s	0.08 (NBLR)	None

Without road widening, the signalized intersection of Brock Road (RR1) and Finch Avenue (RR37) is expected to continue to operate near capacity during all weekday peak periods. In comparison to 2024 future background conditions (optimization without road widening, see **Table 8**), the signalized intersection is expected to operate at an increased delay of 7.3 seconds or less and an increased maximum volume-to-capacity ratios of 0.03. The 95th percentile queue length for northbound left turn is expected to continue to exceed the provided storage length. However, it is not expected to impede into downstream intersection and traffic is expected to proceed through the intersection within two cycle lengths. These metrics indicate that the subject development does not materially affect traffic conditions. Accordingly, the development is supportable from a traffic operations perspective.

The remaining boundary road network is expected to operate at an unchanged level of service, with an acceptable maximum level of service “C” or better. When compared to the 2024 future background traffic conditions, the remaining boundary road network is expected to operate at an increased control delay of 8.4 seconds or less. Although the intersection of Brock Road at Major Oaks Road/Usman Road is operating at capacity, the intersection is still operating efficiently and is expected to improve significantly upon Brock Road widening.

The proposed site access is expected to operate efficiently with a level of service “B” or better, and a maximum control delay of 10.6 seconds or less.

2024 and 2029 Future Total Conditions with Road Widening

Table 13 and **Table 14** outline the 2024 and 2029 future total traffic conditions (with Brock Road widening) associated with the boundary road network.

Similar to the above table, lost time adjustment was not accounted for, and a PHF of 1.0 was applied to all future total traffic analysis. Signal timings were kept consistent with 2024 and 2029 future background conditions, respectively, with road widening included.

Table 13
2024 Future Total Level of Service with Road Widening

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile > Storage Length
Brock Road (RR1) at Finch Avenue (RR37)	Signalized (Optimized)	A.M.	B	16.7 s	0.81 (SBTR)	None
		P.M.	C	29.9 s	0.93 (EBLT)	95.9 m > 63.0 m (NBL) 13.3 m > 13.0 m (SBL)
		Friday Mid-day	C	26.2 s	0.89 (EBLT)	84.8 m > 63.0 m (NBL) 14.6 m > 13.0 m (SBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured & Optimized)	A.M.	C	22.7 s	0.82 (WBL)	63.7m > 20.0 m (WBL)
		P.M.	C	20.5 s	0.82 (WBL)	65.3 m > 20.0 m (WBL)
		Friday Mid-day	B	15.4 s	0.78 (WBL)	58.7 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	10.5 s	0.06 (WBR)	None
		P.M.	B	10.3 s	0.07 (WBR)	None
		Friday Mid-day	B	10.3 s	0.13 (WBR)	64.9 m > 60.0 m (SBL)
Usman Road Site Access	One-Way Stop Controlled	A.M.	A	9.1 s	0.02 (NBLR)	None
		P.M.	B	10.6 s	0.09 (NBLR)	None
		Friday Mid-day	B	10.2 s	0.08 (NBLR)	None

Note₁: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of Service of a stop-controlled intersection is based on the minor (stopped) approach control delay per vehicle.

Note₂: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

Table 14
2029 Future Total Level of Service with Road Widening

Intersection	Control	Peak Hour	Level of Service ¹	Control Delay	Maximum V/C Ratios ²	95 th Percentile > Storage Length
Brock Road (RR1) at Finch Avenue (RR37)	Signalized (Optimized)	A.M.	B	19.5 s	0.90 (SBTR)	None
		P.M.	D	37.7 s	0.97 (EBLT) 0.94 (NBTR) 0.93 (SBTR) 0.92 (NBL)	103.6 m > 63.0 m (NBL) 15.2 m > 13.0 m (SBL)
		Friday Mid-day	C	30.4 s	0.92 (EBLT)	99.6 m > 63.0 m (NBL)
Brock Road (RR1) at Major Oaks Road/Usman Road	Signalized (Reconfigured & Optimized)	A.M.	C	25.1 s	0.84 (WBL)	64.1 m > 20.0 m (WBL)
		P.M.	C	23.4 s	0.87 (WBL)	63.9 m > 20.0 m (WBL)
		Friday Mid-day	B	17.0 s	0.81 (WBL)	66.1 m > 20.0 m (WBL)
Brock Road (RR1) at Usman Road	One-Way Stop Controlled	A.M.	B	10.8 s	0.06 (WBR)	None
		P.M.	B	11.1 s	0.08 (WBR)	72.7 m > 60.0 m (SBL)
		Friday Mid-day	B	11.1 s	0.16 (WBR)	125.1 m > 60.0 m (SBL)
Usman Road Site Access	One-Way Stop Controlled	A.M.	A	9.7 s	0.12 (NBLR)	None
		P.M.	B	10.6 s	0.09 (NBLR)	None
		Friday Mid-day	B	10.0 s	0.08 (NBLR)	None

Note₁: The Level of Service of a signalized intersection is based on the average control delay per vehicle. The level of Service of a stop-controlled intersection is based on the minor (stopped) approach control delay per vehicle.

Note₂: The critical v/c ratio is considered to be the maximum v/c ratio at the intersection. All v/c ratios greater than 0.90 are outlined and highlighted.

The signalized intersection of Brock Road (RR1) and Finch Avenue (RR37) is expected to operate at an unchanged level of service "B", "D", and "C" during the weekday a.m., p.m. and Friday mid-day peak hours under 2029 future total traffic conditions. In comparison to the 2029 future background traffic conditions, the intersection is expected to experience a minor increase in control delays of 2.4 seconds or less. The maximum volume-to-capacity ratio is expected to increase by 0.02 or less. All these metrics indicate that the Subject Development does not generate material amount of traffic in the boundary road network, and there is reserve capacity for further increases in traffic volumes.

The signalized intersection of Brock Road (RR1) and Major Oaks Road/Usman Road is expected to operate at a level of service "C" or better during the weekday a.m., p.m. and Friday mid-day peak hours under 2029 future total traffic conditions. In comparison to the 2029 future background traffic conditions, the intersection is expected to experience a minor increase in control delays of 3.4 seconds or less. The maximum volume-to-capacity ratio is expected to increase by 0.07 or less. All these metrics indicate that the Subject Development does not generate material amount of traffic in the boundary road network, and there is reserve capacity for further increases in traffic volumes.

The one-way stop-controlled intersection of Brock Road (RR1) and Usman Road is expected to continue to operate at a level of service "B" with low control delays and low maximum volume-to-capacity ratios under 2029 future total traffic conditions. In comparison to the 2029 future background conditions, the intersection is expected to operate at a negligible increase in control delays of 0.3 seconds or less and an increase of maximum volume-to-capacity ratios of 0.04 or less. All these metrics indicate that the Subject Development generates insignificant amount of traffic in the boundary road networks, and there is reserve capacity for further increases in traffic volumes.

The proposed site access is expected to operate at a level of service "B" or better during the weekday a.m., p.m. and Friday mid-day peak hours under 2029 future total traffic conditions. The site access is expected to experience a low maximum control delays of 10.6 seconds or less, and a low maximum volume-to-capacity ratios of 0.12 or less. All these metrics indicate that the Subject Development generates insignificant amount of traffic, and there is reserve capacity for further increases in traffic volumes. Accordingly, the proposed site access is supportable from a transportation operations perspective.

Summary of Recommended Improvements

The future total conditions herein did not account for left turns during intergreen phases, as observed in 2019 existing traffic operations. Thus, an increased left turning capacity of 72 vehicles per hour were not accounted for at the intersection of Brock Road (RR1) and Finch Avenue (RR37), and the analysis above can be considered conservative.

Regardless of the improvements, future total traffic operations are not materially different from future background conditions with or without the road widening being brought forward. The traffic generated by the development does not materially change the traffic operations of the boundary road network as summarized in **Table 15**. Moreover, there are no future improvements needed beyond those recommended and warranted by existing and future background conditions. Thus, the proposed development is supportable from a traffic operations perspective.

Table 15 provides a summary of the recommended improvements in the study area.

Table 15
Recommendation Summary

Horizon	Recommended Improvements
2024	<p>Interim: Optimize signal timing at Brock Road and Finch Ave EBR overlapping Phase with NBL</p> <p>Optimize signal timing at Brock Road and Major Oaks Road/Usman Drive EBR slip lane via pavement marking</p>
	<p>Ultimate: Advance Brock Road Widening to 6 Lane Cross-section Signal Optimization</p>
2029	Brock Road Widening to 6 Lane Cross-section

Again, as mentioned above, Brock Road (RR1) widening may be considered by the Region. By 2024 future background conditions without road widening, the traffic operations are expected to operate at capacity with moderate delays.

With the noted interim improvements, the traffic operations can be improved to an acceptable level of service, as well as to a maximum volume-to-capacity ratios consistent with existing conditions in 2019. Thus, Brock Road widening may be considered by 2024, however not necessary. Regardless of the improvements, the proposed development is supportable from a traffic operations perspective as the site generated traffic does not materially alter future traffic conditions with or without the road widening.

7.0 Sight Distance Assessment

The available sightlines at the proposed site access on Usman Road was measured and compared to the standards set out in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR). Sight distances were measured from the proposed site access using the following assumptions:

- A standard driver eye height of 1.08 metres for a passenger car
- A 4.4-5.4 metre setback from the approximate extension of the outer curb to represent a vehicle waiting to exit the site

Intersection sight distance is calculated using equation 9.9.1 from the GDGCR as outlined below:

$$ISD = 0.278 * V \text{ major} * tg$$

Where,

ISD = Intersection Sight Distance

V major = design speed of roadway (km/h)

tg = assumed time gap for vehicles to turn from stop onto roadway (s)

The design speed of a roadway in an urban environment is typically 10 km/h greater than the posted speed limit. As 40 km/h is currently posted along the site frontage, a design speed of 50 km/h was conservatively assumed for the sight distance analysis.

Table 16 below outlines the sight distance analysis for the proposed site access.

Table 16
Sight Distance Analysis

Parameter	Site Access (Usman Road)
Access Type	Full Moves
Posted Speed Limit of Roadway	40 km/h
Assumed Design Speed	50 km/h
Base Time Gap (Passenger Cars)	Left Turn: 7.5 s Right Turn: 6.5 s
Additional Time Gap	n/a
Grade of Roadway	Less than 3%
Horizontal Alignment of Roadway	Straight left and right of the site access (Site Access forms a T-intersection)
Sight Stopping Distance (TAC GDGCR Table 2.5.2)	65 m
Sight Distance Required (TAC GDGCR Eqn. 9.9.1)	Left Turn: 105 m Right Turn: 95 m
Measured Sight Distance	Left: 110 m Right: 200 m
Minimum Sight Distance Satisfied	Yes

As outlined in **Table 16**, 105 metres of sight distance is required at the site access. As more than 110 metres of sight distance can be observed in both directions, adequate sight distance is provided.

Although Usman Road has a 90-degree bend, adequate sight distance is achieved as the site access is located at the “elbow” of the roadway, forming the third leg of a T-intersection. The above analysis

is also considered conservative as cars approaching from either direction will not be travelling at the design speed towards and exiting the turn.

Appendix H contains sight distance analysis excerpts.

8.0 Parking and Loading Requirements

The City of Pickering's Site-specific Zoning By-Law (ZBL) 7085/10 and Brock Ridge Area-specific Zoning By-Law (ZBL) 3036 were reviewed to determine the parking and loading requirements of the Subject Development. **Table 17** below summarizes the requirements per the Zoning By-Laws.

Table 17
Parking and Loading Requirements per City of Pickering Zoning By-Law

Requirement	Land Use	Units	Minimum Requirement		Spaces Required	Spaces Provided
			Tenant	Visitors		
Vehicle Parking (Site-specific ZBL 7085/10)	Multiple Dwelling-Vertical Uses	371	1 space per unit	0.25 space per unit	463.75 spaces	502 spaces
	Multiple Dwelling-Horizontal Uses	9	2 spaces per unit	0.25 space per unit	20.25	
Total Parking					484	502 (+18)
Bicycle DRAFT City Centre ZBL ¹	Residential	371 ²	0.5 spaces per dwelling unit WITHOUT GARAGE		186	218 (+32)
Loading (Site-specific ZBL 7085/10) & (Area-specific ZBL 3036)	Residential	380	--	--	0	12 m x 3.5 m Loading Space is provided.

Note 1: As the Site-specific and Brock Ridge Area-specific ZBL did not provide minimum bicycle parking rates, the City of Pickering's DRAFT City Centre ZBL was examined.

Note 2: Per the City Centre DRAFT ZBL, 0.5 bicycle spaces are required for each residential dwelling unit without attached garage. Accordingly, no bicycle parking space is required for back-to-back townhouses.

As outlined in **Table 17**, a total of 484 vehicle parking spaces, and zero (0) loading space are required for the Subject Development per the site-specific Zoning By-Law 7085/10. As the development proposes 502 parking spaces and a single loading space, the parking and loading requirements are satisfied.

Bicycle Parking Spaces

The Site-specific Zoning By-Law 7085/10 and Brock Ridge Area-specific Zoning By-Law 3036 did not provide minimum bicycle parking requirements. As such, for comparative purposes, the City of Pickering's City Centre DRAFT Zoning By-Law was reviewed.

The City's Centre Zoning By-Law for bicycle parking requirements can be considered conservative as the area within City Centre is much more pedestrian and bicycle friendly; increasing the bicycle parking demand. As the Subject Property and the study area are less dense and not as bicycle and pedestrian friendly, it is expected that the bicycle parking demand would be marginally less than the requirements shown here.

Based on the City Centre DRAFT Zoning By-Law, 0.5 bicycle parking spaces per unit is required for residential dwellings without detached garage. As the nine back-to-back townhouses have attached garage provided, a total of 186 bicycle parking spaces are required for the proposed remaining condominium and stacked townhouses. The Site Plan proposes 218 bicycle parking spaces, therefore, the bicycle requirements based on City Centre's Zoning By-Law is satisfied.

The requirement based on the City Centre DRAFT Zoning By-Law is considered conservative as the area is much more pedestrian, cycling and transit friendly. The area is served by high frequency transit with major transit hub located within the area, and it is served by many trails, and multi-use paths nearby. As such, it is expected that the mode split at the Central Area has a higher cycling percentage than Brock Ridge area; consequently, requiring more bicycle spaces than the Subject Property area.

Loading Requirement

Furthermore, to determine the adequacy of the proposed loading space, the City of Pickering's Brock Ridge Area-specific Zoning By-Law 3036 was reviewed. Based on clause 5.21 "Off-street Loading Requirements", no loading space is required for a residential building. Accordingly, the proposed single loading space is supportable.

Per further discussion with the City Zoning Examiner, should a loading space be provided, the loading space must have a minimum size of 20 ft by 10 ft with a vertical clearance of 14 ft. As the proposed Site Plan illustrates an outside loading area of 12 m by 3.5 m (39 ft x 11 ft), the loading area satisfies the loading dimensions requirement.

Appendix I contains the City of Pickering's Site-specific, Area-specific and City Centre's Draft Zoning By-Law excerpts.

9.0 Truck Turning Assessment

The development proposes waste to be collected along the internal access provided. Curb side pick-up is proposed at the front of each townhouse dwelling, while the condominium waste is proposed

to be collected at the designated loading space. A “T-turnaround” is proposed at the cul-de-sac of the townhouse portion of the development while a full roundabout is proposed for the condominium, west limits of the development.

The loading operations analysis indicates that the proposed site layout accommodates a standard Durham Region’s rear load waste collection vehicle, standard pumper and aerial fire trucks, as well as Medium Single Unit Truck (MSU). A rear load waste collection vehicle was used as it is the most conservative design vehicle for waste collection vehicles in Durham Region.

The truck turning diagrams are attached in **Appendix J**.

10.0 TDM Opportunities

A number of TDM opportunities currently exist for the proposed development, primarily due to the site’s proximity to a commercial attractions, employment and institutional areas, facilitate by a comprehensive transit and active transportation network. The existing TDM opportunities, as well as future opportunities proposed by the City of Pickering and Durham Region are summarised below.

10.1 Existing Modal Split

The Transportation Tomorrow Survey (TTS) was once again used to determine the preferred mode of transportation in the study area. TTS data was used to forecast the number of trips made into and out of the local area via different modes of transportation, in order to approximate the modal split.

TTS data was selected for trips to and from City of Pickering in order to capture the predominant mode of transportation for travellers in the City. TTS results are outlined in **Table 18**. The TTS data has been provided in **Appendix D**.

Table 18
TTS Data for Primary Mode of Transportation for Trips to and from the City of Pickering

Mode of Transportation	Modal Split	
	Weekday A.M.	Weekday P.M.
Auto Driver	74%	73%
Carpooling	14%	14%
Public Transit	6%	6%
Walk	4%	4%
Other	2%	3%
<i>Total</i>	<i>100%</i>	<i>100%</i>

As illustrated in **Table 18** above, approximately 75% of trips made to, from, and within the study area are done via auto drivers. Accordingly, the remaining 25% of trips are made via carpool, transit and active transportation modes.

The TTS survey data illustrates that although the predominant mode of transportation is auto driver, over 25% of travellers in the study area use alternate primary modes of transportation. These results indicate a strong existing willingness by residents of the area to utilize alternate modes of

transportation, especially during typical commuter peak period where higher level of congestions is experienced, thereby reducing the barriers of entry for further TDM initiatives aimed at reducing SOV trips.

10.2 Transit Network

The development is located in close proximity to multiple Durham Region Transit and GO transit routes as mentioned in **Section 3.5**.

The high level of transit services described above, provide residents and visitors in the City of Pickering with quick, easily accessible and direct transit services throughout the City and Region. As Pickering Supercentre is 1.4 km directly south of the Subject Property, also on Brock Road (RR1), transit is a convenient alternative option. Likewise, as Pickering Town Centre is 9 minutes away by transit, residents and visitors of the Subject Property can easily access these large but local commercial attractions by transit.

In addition, major employment, commercial and tourist attractions outside of the Region, such as Downtown Toronto, Oshawa, or greater Toronto areas can be accessed using GO transit, via direct bus connection at Pickering GO or Ajax GO. As such, transit is a convenient mode of transport for both residents and visitors of this proposed development.

Finally, as Bus Rapid Transit (BRT) is proposed on Brock Road by 2026 with high frequency of 5 to 10 minutes headway, transit services will improve significantly, reducing the need for personal vehicles on a day-to-day basis and subsequently, improving traffic operations in the area.

10.3 Transit Incentives

Inter-Transit Connections

Durham Region, Metrolinx and other municipalities currently offers numerous transit discounted fares, promotions, and incentives to encourage transit use.

For instance, riders to and from GO Transit will receive a discounted fare of \$0.80 per trip when connecting to and from GO transit. Similar transit transfer discounts are also offered for York Regional Transit, Brampton Transit (including Züm Express), Mississauga Transit (MiWay), Oakville Transit, Burlington Transit and Hamilton Street Railway (HSR) as long as the maximum transfer period have not expired.

Discounted fares are also offered for transit users under the age of 12 (Child fare), youth between the ages of 13 to 19, or those over the age of 65 through senior discounts and Ontario Seniors' Public Transit Tax Credit. Alternatively, children at age 12 or under can ride for free with a fare paying passenger.

Frequent Transit Users Discount

Durham Region Transit also offers discounted monthly passes between September and June (Y10) to employees and students. The monthly discount can be uploaded directly onto Presto card, a smart contactless payment system used throughout GTHA, and provide savings of up to \$200 in 10 months.

GO Transit and other transit agencies also offer regular monthly and GTA weekly discounted passes

for frequent transit users and commuters working outside of Durham Region.

Lastly, Durham Region also offers Universal Transit Pass (U-Pass) for eligible students at participating colleges and universities with unlimited travel on DRT and OneFare DRT-GO Transit routes.

10.4 Active Transportation Network

As described in **Table 2**, sidewalks are provided in all roadways within the study area. Pedestrian may connect directly between residential neighbourhoods to transit stops, schools and local commercial facilities.

Aside from Trans Canada Trail, West Duffins Trail, and local multi-use trails within City's recreational parks, separate cycling facility is currently not provided within the study area. Cycling in the City of Pickering is permitted on all roadways within the City Centre and on local residential roads. Motorists and cyclists are required to share the road where specific facilities have not been provided.

Based on modal split data, cycling is currently under utilized in the City of Pickering. Nevertheless, the City and Region have additional cycling proposals in place for the near- and medium-term future to improve safety and to promote active transportation within the City and Region.

Per Durham Region's Regional Cycling Plan dated November 2012, 218.6 km of new cycling facilities are proposed for Durham Region between 2012 to 2032. Of the 218.6 km of recommended cycling network, 112.4 km of which are multi-use boulevard path, 11.4 km road cycling lanes and 16.7 km of buffered cycling lanes. These improvements are all proposed for implementation between 2017 to 2032. Specifically, within the study area, multi-use paths are proposed along Brock Road (RR1), and Finch Avenue (RR32) between 2017 to 2032. Each of the mentioned categories illustrates the Region's commitment in cycling initiatives.

Per City of Pickering's Urban Design Guidelines dated April 3rd, 2017, buffered cycle lane is currently proposed for Kingston Road (RR1). Additional multi-use trails, as well as at-grade cycling lanes are also proposed within the City Centre area. Accordingly, with the future multi-use paths along Brock Road (RR1), residents may directly access large commercial attractions to the south, City Centre area, as well as to local recreational parks and schools safely via walking and cycling.

11.0 Proposed TDM Measures

11.1 Site Plan Design

The Site Plan configuration promotes medium density residential dwellings as well as increased non-auto mode share among future residents. The higher density residential townhouses and high-rise residential tower (in comparison to the existing low density, single detached residential houses nearby) are proposed in close proximity to Brock Road Street (Regional Road 1), with existing sidewalks, and bus stops. A range of large commercial attractions, institutional and recreational facilities are also located within 15 minutes transit, reducing the day-to-day need for automobile.

11.2 Education/Promotion and Incentives

There are several low impact opportunities for the development to promote TDM measures in support of reduced automobile use.

The provision of trail and cycling signs and route maps should be provided to new residential owners in order to increase awareness of nearby pedestrian and cycling routes, as well as to provide incentives for residents and visitors to utilize the existing network. Prior to occupancy, prospective buyers can be informed of the active transportation and TDM opportunities of the proposed development.

It is similarly anticipated that provision of up-to-date transit maps and schedules will educate residents and visitors on the range of bus routes offered by DRT and connecting GO Transit services. This increased awareness of convenient transit options has been historically shown to increase transit mode share in similar developments and may provide similar benefit to the subject development.

Upon occupancy, it is recommended that a TDM information package is provided to the residents. The package can comprise of active transportation network maps, transit maps and schedules and a pre-loaded PRESTO card. Information on carpool, rideshare, and other TDM measures for persons employed in Durham Region and Greater Toronto Areas may also educate residents of alternative transportation modes for their existing and future areas of employment.

Finally, periodic TDM newsletters, reminders and updates can also be sent to each tenant's mailbox or displayed in a bulletin board of the high-rise tower hallways. Transit schedule updates, pedestrian friendly and cycling network changes can also be sent periodically to remind, encourage and attract new users.

11.3 Responsibilities of the Landowner

Since bicycles are expected to be stored within residential tower and within an individual's townhouse unit or property (i.e. garage), each owner will be responsible for the purchase, storage and maintenance of their personal bicycle. To promote TDM and to encourage cycling as an alternative transportation mode, a credit reimbursement for first time bicycle buyers may be provided as an incentive.

It is understood that some assistance for the provision of "soft" TDM measures such as pre-loaded PRESTO cards, bike share, information packages or performance monitoring may be provided to encourage alternative modes of transportation.

Lastly, as discussed above, weekly passes, and discounted monthly passes may be provided by businesses and employers throughout Durham Region. Landowners should educate individual tenants, to explore various alternative transportation incentives offered by the Region and or employers.

11.4 Responsibilities of Other Stakeholders

In order for the TDM measures to function effectively, the implementation must be supported by local and regional governments, existing neighbouring property owners, as well as future developers. Continuous monitoring efforts must be made by all stakeholders to ensure the TDM strategies are operating as planned, and to advice should improvements or repairs are required.

11.5 Projected Trip Generation Reductions

The proposed active transportation and TDM measures are expected to reduce single occupant vehicle (SOV) trips during the peak hour. **Appendix K** lists expected trip reductions based on various literature studies in North America.

12.0 Performance Monitoring

Performance of the TDM measures can be monitored via questionnaire surveys as well as periodic field observations (i.e. traffic movement counts to and from the proposed site access). Surveys is an effective performance measurement tool as it provides direct feedback from tenants living in the proposed development. Their feedback may indicate challenges and constraints that are specific to the property, experienced only by the residents in the area.

DRT can also monitor transit ridership in the area over the years to determine the effectiveness of the TDM strategies. Periodic traffic movement counts can indicate traffic volume changes over the years, as well as bicycle and pedestrian volumes and usage along the corridor.

It is important to note that TDM performance can vary significantly due to a variety of factors (i.e. gas price, cost of vehicle ownership etc.). It is equally important to note the external changes that may influence the internal TDM performance.

13.0 Conclusions & Recommendations

Brock Road Duffins Forest Inc. proposes a new residential development at 2055 Brock Road in the City of Pickering, Durham Region. The analysis contained within this report has resulted in the following key findings:

Existing Conditions

- Examination of the 2019 existing traffic conditions indicate that the boundary road network is currently operating at capacity at a level of service “D” or better during the weekday a.m., p.m. and Friday mid-day peak periods. The high theoretical volume-to-capacity ratios of 1.24 or less is primarily due to the shared turning and through movement configurations of Finch Avenue, as well as on Major Oaks Road.
- As Major Oaks Road and Usman Road have more than 5.7 metres of laneway, right turn vehicles were consistently observed to “slip-through” queued left turn and through traffic. Accordingly, all eastbound traffic analysis (existing and future analysis) assumes a dedicated right-turn configuration to simulate the slip through traffic maneuver.
- Likewise, although the intersection of Brock Road (RR1) and Finch Avenue is operating at capacity during all weekday peak periods, aggressive maneuvers were consistently observed with vehicles proceeding through the intersection during intergreen phases (amber and all red). As Synchro analysis does not account for such maneuver, the traffic analysis can be considered conservative.
- With signal optimization, and accounting for driving behaviours observed with a lost time adjustment, the boundary road network operates at capacity in 2019 existing conditions with a maximum volume-to-capacity ratio of 1.00.

Future Background Conditions

- Examinations of 2024 future background traffic conditions indicate that the intersection of Brock Road at Finch Avenue is expected to continue to operate at capacity with a level of service “E” or better. As signal optimization and cannot sufficiently reduce maximum volume-to-capacity ratios below 1.00 at the intersection of Brock Road and Finch Avenue, advancing the planned Brock Road widening should be considered by 2024.
- Should the road widening not occur prior to 2024, signal optimization and implementation of overlapping northbound left turn and eastbound right-turn phases at the intersection of Brock Road and Finch Avenue can improve 2024 future background traffic operations to a maximum theoretical volume-to-capacity of 1.13 (similar to existing traffic operations). The future analysis can be considered conservative as it did not consider a lost time adjustment.
- Additionally, although the intersection of Brock Road (RR1) at Finch Avenue (RR37) is still operating at capacity with northbound queue extended beyond the available storage length, the condition is consistent with 2019 existing traffic conditions and is acceptable temporarily prior to a comprehensive road widening improvement scheduled for 2029. The intersection is expected to operate with moderate control delay with queued vehicles expected to clear the intersection within two cycles.
- Should the Brock Road widening be brought forward, traffic operations are expected to improve materially in 2024 through 2029 future background traffic condition.
- Upon road widening, examination of the 2029 future background traffic conditions indicate that the boundary road network is anticipated to operate acceptably with a level of service “D” or better, close to capacity at a maximum volume-to-capacity ratio of 0.96 or less, with a maximum control delays of 35.2 seconds or less.

Future Total Conditions

- The proposed development is expected to conservatively add 125 and 146 unadjusted two-way trips to the boundary road network in the weekday a.m. and p.m. peak hours, respectively.
- As Friday mid-day period between 12:00 p.m. to 4:00 p.m. is not typically associated with residential peak period, weekday p.m. trips generated are conservatively assumed and applied to future total traffic analysis.
- Should the road widening not occur prior to 2024, improvements recommended for future background conditions (as noted above) can improve 2024 future total traffic operations to a maximum theoretical volume-to-capacity of 1.16. As mentioned above, the interim improvements include:
 - 2024 (without the advancing of Brock Road widening to six-lanes)
 - Optimize signal timing at Brock Road and Finch Ave
 - Addition of an eastbound right turn overlap phase with the northbound left turn protected phase.
 - Optimize signal timing at Brock Road and Major Oaks Road/Usman Drive including the eastbound right turn slip lane via revised pavement markings.
 - By 2029
 - Widening to Brock Road to a six-lane cross section
 - Signal Optimization
- Again, without widening, although the intersection of Finch Avenue is still operating at capacity, the condition is acceptable as the future total analysis did not account for left-turns during intergreen (no lost time adjustments) and the traffic operations are consistent with existing conditions. Vehicles can proceed through the intersection within two cycle lengths and are not expected to impact downstream intersection. In comparison to 2024 future background traffic operations the site generated traffic does not materially impact traffic operations. Thus, the proposed development is supportable from a traffic operations perspective and can be supported prior to the planned widening of Brock Road.
- Examination of the 2029 future total traffic conditions (with Brock Road widening) indicate that the additional traffic volumes generated by the proposed development are expected to have no material impact on the boundary road network when compared to 2029 future background traffic conditions. All intersections in the study area are forecasted to operate acceptably, at an unchanged level of service with a maximum increase of 3.4 seconds or less in control delays.
- The proposed site access is expected to operate at a level of service "B" or better during all peak periods. The site access is expected to operate at a maximum control delay of 10.6 seconds or less, and at a low volume-to-capacity ratio of 0.12 or less. Accordingly, the proposed site access is supportable from a traffic operations perspective.
- The proposed site access is supportable from a sight distance perspective.

Minimum Parking and Loading Requirements

- The parking and loading spaces supplied satisfy the City of Pickering's Area-specific and Site-Specific Zoning By-Laws.

- As bicycle parking requirement is not listed in the Site-specific nor Area-specific Zoning By-Laws, the City of Pickering's Central Area Area-specific Zoning By-Law was used as a comparison.
- Per the City's Central Area Zoning By-Law, 186 bicycle spaces are required for the high-rise and stacked townhouses. As 218 bicycle parking spaces are provided, the proposed development supplies a surplus of bicycle spaces.

Accordingly, the development can be supported from a transportation operations and safety perspective based on current conditions with the noted signal optimization and an implementation of an overlapping signal phase at Brock Road and Finch Avenue.

The road widening of Brock Road, as identified by Durham Region's Transportation Master Plan and warranted in existing and future background conditions can significantly improve traffic operations through 2024 and 2029 future total traffic conditions. However, interim improvements is acceptable in 2024.

The analysis contained within this report was prepared using the Site Plan dated March 2020. Any minor revisions to the Site Plan are not expected to affect the conclusions contained with this report.

In conclusion, the development can be supported from a traffic operational and traffic safety perspective.

Respectfully submitted by,

C.F. CROZIER & ASSOCIATES INC.



Michael A. Linton, M.A.Sc., P.Eng.
Associate, Transportation

C.F. CROZIER & ASSOCIATES INC.



Martin Chan, E.I.T.
EIT, Transportation

/MC
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APPENDIX A

Correspondence

Martin Chan

From: Zahoor, Nadeem <nzahoor@pickering.ca>
Sent: October 4, 2019 3:16 PM
To: Martin Chan; doug.robertson@durham.ca
Cc: Michael Linton
Subject: RE: Terms of Reference: 2055 Brock Road TIS

Hi Martin,

Thanks for sending the TOR for the City review. This development is at the Regional intersection and most of the comments will come from Doug. Overall it looks good to me. However, I have the following couple of comments:

- For the background development information, please contact Nilesh Surti, Manager Urban Design, at nsurti@pickering.ca. His extension is 2035
- Add a discussion on active transportation network (cycling and pedestrian)

Thanks Nad

From: Martin Chan <mchan@cfcrozier.ca>
Sent: Wednesday, October 2, 2019 9:52 AM
To: doug.robertson@durham.ca; Zahoor, Nadeem <nzahoor@pickering.ca>
Cc: Michael Linton <mlinton@cfcrozier.ca>
Subject: Terms of Reference: 2055 Brock Road TIS

Good Morning Nadeem & Doug,

Crozier & Associates has been retained to conduct a Traffic Impact Study for a residential development located at 2055 Brock Road in the City of Pickering, Region Municipality of Durham. As you may recall, a Traffic letter was previously prepared by BA Group based on an older site stats. The revised proposal suggests a 299 units 20-storey high-rise condominium/apartment, 9 street townhouses and 28 stacked townhouses.

The development is anticipated to generate 139 unadjusted two-way trips or less, during the weekday peak periods. On that basis, we proposed the following scope for the Traffic Impact Study;

- The intersections to be analyzed are:
 - Brock Road at Usman Road
 - Brock Road at Major Oaks Road/Usman Road
 - Brock Road at Finch Avenue
 - Usman Road Site Access
- The weekday a.m. (7:00 a.m. – 9:00 a.m.) and weekday p.m. (4:00 pm – 7:00 pm) peak hours will be analyzed.
- As the development is proposed to be built by 2023, five- and ten- year study horizons of 2024 and 2029 are proposed.
- A few background developments have been identified along Brock Road per the City's development application webpage. As they are located relatively far from the proposed development, only the background development

at 2071 Brock will be considered for analysis as any other development is assumed to be represented within the background growth rate. Is this supportable from the City and Region?

- Furthermore, does the City or Region have any projected traffic growth rate for this area? Based on the review of the background TIS reports, 2% was previously used. Is this acceptable for us to assume as well? The AADT data available only covers 2016-2018 (during which construction occurred) and the data on various Brock Road segments is not consistent.
- Trip generation for the proposed development will be calculated using published data from the ITE Trip Generation Manual, 10th Edition
- Trip distribution will be based on existing travel patterns or TTS data.
- Conduct a safety review of the proposed site access including sight distance review for ingressing and egressing vehicles using TAC GDGCR.
- Confirm the parking supply proposed by the development satisfies the City of Pickering's site specific Zoning By-Law
- Evaluate Transportation Demand Management Opportunities for the Site.
- Confirm loading supply proposed by the development satisfies the City of Pickering's Zoning By-Law; truck turning diagrams will be provided for waste collection and fire trucks. Fire trucks dimensions will be based on standard fire truck per TAC GDGCR manual and waste collection dimensions will be based on the below excerpt from Durham's By-law.

Appendix “A”

Waste Collection Vehicles and Container Dimension

The following table illustrates typical vehicle dimensions for typical waste collection vehicles. The dimensions are approximate and may vary from actual. All measurements are in meters.

Vehicle Type	Length	Width	Height	Turning Radius
1. Recycling	10.76 m	2.77 m	3.69 m 5.08 m with bucket up	11.50 m
2. Front-end	9.85 m	2.77 m	4.31 m 6.15 m with forks extended	11.50 m
3. Rear Packer	11.54 m	2.77 m	3.69 m	13.00 m
4. Side Packer	10.46 m	2.98 m	3.85 m	13.00 m

I trust that the above covers all the elements required for the study. If you have any questions or comments, please feel free to contact me or my colleague, Michael Linton, included in this email. You can reach us by email or our office number 416-477-3392.

Thank you,

Martin

Martin Chan EIT | Transportation
C.F. Crozier & Associates Consulting Engineers
211 Yonge Street, Suite 301 | Toronto, ON M5B 1M4
cfcrozier.ca | mchan@cfcrozier.ca
tel: 416.477.3392 ext: 512



Martin Chan

From: Lynda Motschenbacher <Lynda.Motschenbacher@Durham.ca>
Sent: October 9, 2019 9:12 AM
To: Martin Chan
Subject: FW: Terms of Reference: 2055 Brock Road TIS

Good morning Martin,

A growth rate of 2% is acceptable.

Please include in your analysis, in addition to the weekday am and pm peak hours, Friday afternoons from 12:00 pm to 4:00 pm.

Please contact me if you have any questions.

Regards,

Lynda Motschenbacher
Project Coordinator- Transportation Infrastructure
Works Department
Regional Municipality of Durham
605 Rossland Road East, Level 5
PO Box 623
Whitby, ON L1N 6A3
Phone: 905-668-4113 ext 3492
Fax: 905-668-2051
Lynda.motschenbacher@durham.ca

From: Martin Chan <mchan@cfcrozier.ca>
Sent: Wednesday, October 02, 2019 9:52 AM
To: Doug Robertson <Doug.Robertson@Durham.ca>; nzahoor@pickering.ca
Cc: Michael Linton <mlinton@cfcrozier.ca>
Subject: Terms of Reference: 2055 Brock Road TIS

Good Morning Nadeem & Doug,

Crozier & Associates has been retained to conduct a Traffic Impact Study for a residential development located at 2055 Brock Road in the City of Pickering, Region Municipality of Durham. As you may recall, a Traffic letter was previously prepared by BA Group based on an older site stats. The revised proposal suggests a 299 units 20-storey high-rise condominium/apartment, 9 street townhouses and 28 stacked townhouses.

The development is anticipated to generate 139 unadjusted two-way trips or less, during the weekday peak periods. On that basis, we proposed the following scope for the Traffic Impact Study;

- The intersections to be analyzed are:

- Brock Road at Usman Road
 - Brock Road at Major Oaks Road/Usman Road
 - Brock Road at Finch Avenue
 - Usman Road Site Access
- The weekday a.m. (7:00 a.m. – 9:00 a.m.) and weekday p.m. (4:00 pm – 7:00 pm) peak hours will be analyzed.
 - As the development is proposed to be built by 2023, five- and ten- year study horizons of 2024 and 2029 are proposed.
 - A few background developments have been identified along Brock Road per the City’s development application webpage. As they are located relatively far from the proposed development, only the background development at 2071 Brock will be considered for analysis as any other development is assumed to be represented within the background growth rate. Is this supportable from the City and Region?
 - Furthermore, does the City or Region have any projected traffic growth rate for this area? Based on the review of the background TIS reports, 2% was previously used. Is this acceptable for us to assume as well? The AADT data available only covers 2016-2018 (during which construction occurred) and the data on various Brock Road segments is not consistent.
 - Trip generation for the proposed development will be calculated using published data from the ITE Trip Generation Manual, 10th Edition
 - Trip distribution will be based on existing travel patterns or TTS data.
 - Conduct a safety review of the proposed site access including sight distance review for ingressing and egressing vehicles using TAC GDGCR.
 - Confirm the parking supply proposed by the development satisfies the City of Pickering’s site specific Zoning By-Law
 - Evaluate Transportation Demand Management Opportunities for the Site.
 - Confirm loading supply proposed by the development satisfies the City of Pickering’s Zoning By-Law; truck turning diagrams will be provided for waste collection and fire trucks. Fire trucks dimensions will be based on standard fire truck per TAC GDGCR manual and waste collection dimensions will be based on the below excerpt from Durham’s By-law.

Appendix “A”

Waste Collection Vehicles and Container Dimension

The following table illustrates typical vehicle dimensions for typical waste collection vehicles. The dimensions are approximate and may vary from actual. All measurements are in meters.

Vehicle Type	Length	Width	Height	Turning Radius
1. Recycling	10.76 m	2.77 m	3.69 m 5.08 m with bucket up	11.50 m
2. Front-end	9.85 m	2.77 m	4.31 m 6.15 m with forks extended	11.50 m
3. Rear Packer	11.54 m	2.77 m	3.69 m	13.00 m
4. Side Packer	10.46 m	2.98 m	3.85 m	13.00 m

I trust that the above covers all the elements required for the study. If you have any questions or comments, please feel free to contact me or my colleague, Michael Linton, included in this email. You can reach us by email or our office number 416-477-3392.

Thank you,

Martin

Martin Chan EIT | Transportation
C.F. Crozier & Associates Consulting Engineers
211 Yonge Street, Suite 301 | Toronto, ON M5B 1M4
cfcrozier.ca | mchan@cfcrozier.ca
tel: 416.477.3392 ext: 512



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Martin Chan

From: Surti, Nilesch <nsurti@pickering.ca>
Sent: October 17, 2019 9:22 AM
To: Martin Chan
Subject: RE: Terms of Reference: 2055 Brock Road TIS

Good Morning Martin,

Sorry for the delay in responding to your email. There is no other active development applications within the immediate area that should be included in your study. However, we have had couple of pre-consultation meetings for the future redevelopment of the Smart Centre lands to the south and the lands municipally known as 2177 and 2185 Brock Road. Let me know if you would like any additional information for these two potential developments to be included in your study.

Regards,

Nilesch Surti, MCIP, RPP
Manager, Development Review & Urban Design | City Development Department
905.420.4660 ext. 2035 | 1.866.683.2760
nsurti@pickering.ca



From: Martin Chan <mchan@cfcrozier.ca>
Sent: Wednesday, October 9, 2019 9:27 AM
To: Surti, Nilesch <nsurti@pickering.ca>
Subject: RE: Terms of Reference: 2055 Brock Road TIS

Good morning Nilesch,

Just following up on the below request.

We have recently been provided a 2% growth rate for our TIS study. In addition to the growth rate and the expansion at 2071 Brock Road, are there any other relevant background developments that the City would like us to include for future background analysis?

Thanks

Martin

Martin Chan EIT | Transportation
C.F. Crozier & Associates Consulting Engineers

APPENDIX B

Transit Information

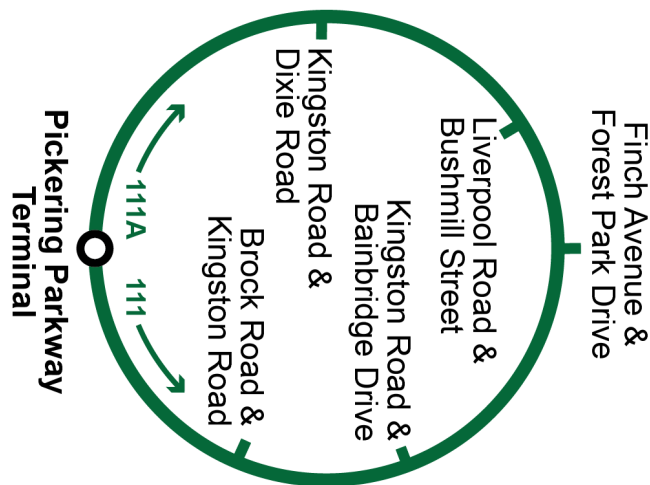
Sunday		Clockwise		
Pickering Parkway Terminal Stop #93112	Kingston Westbound @ Dixie Stop #1611	Finch Eastbound @ Forest Park Stop #1893	Bainbridge Southbound @ Kingston Stop #1941	Pickering Parkway Terminal Stop #93112
A 9:35	9:38	9:45	9:48	10:01
A 10:35	10:38	10:45	10:48	11:01
A 11:35	11:38	11:45	11:48	12:01
A 12:35	12:38	12:45	12:48	13:01
A 13:35	13:38	13:45	13:48	14:01
A 14:35	14:38	14:45	14:48	15:01
A 15:35	15:38	15:45	15:48	16:01
A 16:35	16:38	16:45	16:48	17:01
A 17:35	17:38	17:45	17:48	18:01
A 18:35	18:38	18:45	18:48	19:01
A 19:35	19:38	19:45	19:48	20:01
A To Pickering Parkway Terminal clockwise				

Sunday		Counter-clockwise		
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Kingston Stop #1724	Finch Westbound @ Forest Park Stop #1867	Dixie Southbound @ Kingston Stop #1979	Pickering Parkway Terminal Stop #93112
9:05	9:16	9:21	9:29	9:35
10:05	10:16	10:21	10:29	10:35
11:05	11:16	11:21	11:29	11:35
12:05	12:16	12:21	12:29	12:35
13:05	13:16	13:21	13:29	13:35
14:05	14:16	14:21	14:29	14:35
15:05	15:16	15:21	15:29	15:35
16:05	16:16	16:21	16:29	16:35
17:05	17:16	17:21	17:29	17:35
18:05	18:16	18:21	18:29	18:35
19:05	19:16	19:21	19:29	19:35

181 Late night shuttle from Pickering Station		
Weekday	Saturday	Sunday
23:00	23:05	21:05
00:00	00:05	22:05
01:00		

Late night shuttle service is available to regular bus stops in Pickering. Once on board, inform the operator of your intended bus stop, who will then create a customized route.

Dashes indicate the stop is not served by a trip. Trip notes are indicated by a letter or symbol and explained at the bottom of each timetable. Schedule times are shown in 24-hour clock. If you require this information in an accessible format, please contact Customer Service at 1-866-247-0055. See durhamregiontransit.com for more information.



Weekday		Clockwise			
Pickering Parkway Terminal Stop #93112	Kingston Westbound @ Dixie Stop #1611	Finch Eastbound @ Forest Park Stop #1893	Bainbridge Southbound @ Kingston Stop #1941	Pickering Parkway Terminal Stop #93112	
—	—	—	5:35	5:47	
—	—	—	5:58	6:10	
A 6:12	6:16	6:24	6:28	6:40	
A 6:42	6:46	6:54	6:58	7:10	
A 7:12	7:16	7:24	7:28	7:40	
A 7:45	7:48	7:55	7:58	8:11	
A 8:15	8:18	8:25	8:28	8:41	
A 9:15	9:18	9:25	9:28	9:41	
A 10:15	10:18	10:25	10:28	10:41	
A 11:15	11:18	11:25	11:28	11:41	
A 12:15	12:18	12:25	12:28	12:41	
A 13:15	13:18	13:25	13:28	13:41	
A 14:15	14:18	14:25	14:28	14:41	
A 15:15	15:18	15:25	15:28	15:41	
A 15:45	15:48	15:55	15:58	16:11	
A 16:00	16:04	16:12	16:19	16:31	
A 16:40	16:44	16:52	16:59	17:11	
A 17:10	17:14	17:22	17:29	17:41	
A 17:40	17:44	17:52	17:59	18:11	
A 18:10	18:14	18:22	18:29	18:41	
A 18:40	18:44	18:52	18:59	19:11	
A 19:05	19:09	19:17	19:24	19:36	
A To Pickering Parkway Terminal clockwise					

Saturday		Clockwise			
Pickering Parkway Terminal Stop #93112	Kingston Westbound @ Dixie Stop #1611	Finch Eastbound @ Forest Park Stop #1893	Bainbridge Southbound @ Kingston Stop #1941	Pickering Parkway Terminal Stop #93112	
A 9:35	9:38	9:45	9:48	10:01	
A 10:35	10:38	10:45	10:48	11:01	
A 11:35	11:38	11:45	11:48	12:01	
A 12:35	12:38	12:45	12:48	13:01	
A 13:35	13:38	13:45	13:48	14:01	
A 14:35	14:38	14:45	14:48	15:01	
A 15:35	15:38	15:45	15:48	16:01	
A 16:35	16:38	16:45	16:48	17:01	
A 17:35	17:38	17:45	17:48	18:01	
A 18:35	18:38	18:45	18:48	19:01	
A 19:35	19:38	19:45	19:48	20:01	
A To Pickering Parkway Terminal clockwise					

Weekday		Counter-clockwise			
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Kingston Stop #1724	Finch Westbound @ Forest Park Stop #1867	Dixie Southbound @ Kingston Stop #1979	Pickering Parkway Terminal Stop #93112	
—	—	5:55	6:03	6:09	
6:10	6:21	6:26	6:34	6:40	
6:40	6:51	6:56	7:04	7:10	
7:15	7:26	7:31	7:39	7:45	
7:45	7:56	8:01	8:09	8:15	
8:15	8:26	8:31	8:39	8:45	
8:45	8:56	9:01	9:09	9:15	
9:45	9:56	10:01	10:09	10:15	
10:45	10:56	11:01	11:09	11:15	
11:45	11:56	12:01	12:09	12:15	
12:45	12:56	13:01	13:09	13:15	
13:45	13:56	14:01	14:09	14:15	
14:45	14:56	15:01	15:09	15:15	
15:45	15:56	16:01	16:09	16:15	
16:15	16:28	16:33	16:40	16:48	
16:36	16:49	16:54	17:01	17:09	
17:10	17:23	17:28	17:35	17:43	
17:40	17:53	17:58	18:05	18:13	
18:15	18:28	18:33	18:40	18:48	
18:40	18:53	18:58	19:05	19:13	
19:05	19:18	19:23	19:30	19:38	
19:35	19:46	19:51	19:59	20:05	

Saturday		Counter-clockwise			
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Kingston Stop #1724	Finch Westbound @ Forest Park Stop #1867	Dixie Southbound @ Kingston Stop #1979	Pickering Parkway Terminal Stop #93112	
9:05	9:16	9:21	9:29	9:35	
10:05	10:16	10:21	10:29	10:35	
11:05	11:16	11:21	11:29	11:35	
12:05	12:16	12:21	12:29	12:35	
13:05	13:16	13:21	13:29	13:35	
14:05	14:16	14:21	14:29	14:35	
15:05	15:16	15:21	15:29	15:35	
16:05	16:16	16:21	16:29	16:35	
17:05	17:16	17:21	17:29	17:35	
18:05	18:16	18:21	18:29	18:35	
19:05	19:16	19:21	19:29	19:35	

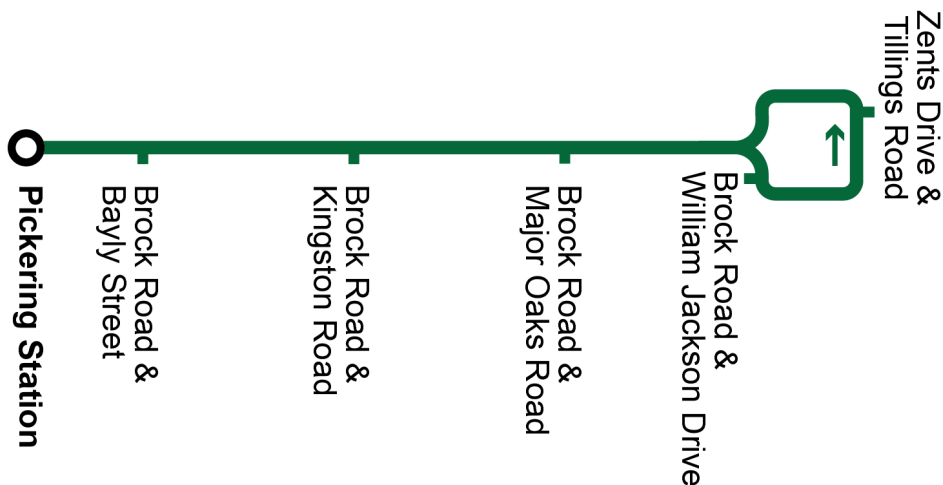
Sunday	North			
Pickering Station Stop #2549	Brock Road Northbound @ Kingston Stop #1724	Brock Road Northbound @ Major Oaks Stop #1847	Dellbrook Eastbound @ Melman Stop #93435	William Jackson Eastbound @ Brock Road Stop #93279
10:00	10:08	10:09	10:14	10:18
11:00	11:08	11:09	11:14	11:18
12:00	12:08	12:09	12:14	12:18
13:00	13:08	13:09	13:14	13:18
14:00	14:08	14:09	14:14	14:18
15:00	15:08	15:09	15:14	15:18
16:00	16:08	16:09	16:14	16:18
17:00	17:08	17:09	17:14	17:18
18:00	18:07	18:08	18:13	18:17
19:00	19:07	19:08	19:13	19:17
20:00	20:07	20:08	20:13	20:17

Sunday	South			
William Jackson Eastbound @ Brock Road Stop #93279	Dellbrook Westbound @ Melman Stop #1849	Brock Road Southbound @ Kingston Stop #1726	Brock Road Southbound @ Pickering Parkway Stop #1727	Pickering Station Stop #2549
9:19	9:28	9:35	9:36	9:40
10:18	10:27	10:34	10:35	10:39
11:18	11:27	11:34	11:35	11:39
12:18	12:27	12:34	12:35	12:39
13:18	13:27	13:34	13:35	13:39
14:18	14:27	14:34	14:35	14:39
15:18	15:27	15:34	15:35	15:39
16:18	16:27	16:34	16:35	16:39
17:18	17:27	17:34	17:35	17:39
18:17	18:26	18:33	18:34	18:38
19:17	19:26	19:33	19:34	19:38
20:17	20:26	20:33	20:34	20:38

181 Late night shuttle from Pickering Station		
Weekday	Saturday	Sunday
23:00	23:05	21:05
00:00	00:05	22:05
01:00		

Late night shuttle service is available to regular bus stops in Pickering. Once on board, inform the operator of your intended bus stop, who will then create a customized route.

Dashes indicate the stop is not served by a trip. Trip notes are indicated by a letter or symbol and explained at the bottom of each timetable. Schedule times are shown in 24-hour clock. If you require this information in an accessible format, please contact Customer Service at 1-866-247-0055. See durhamregiontransit.com for more information.



**DurhamRegion
Transit**
112 Brock
 Effective September 2, 2019

Weekday		North			
Pickering Station Stop #2549	Brock Road Northbound @ Kingston Stop #1724	Brock Road Northbound @ Major Oaks Stop #1847	Dellbrook Eastbound @ Melman Stop #93435	William Jackson Eastbound @ Brock Road Stop #93279	
6:06	6:14	6:15	6:20	6:24	
6:36	6:44	6:45	6:50	6:54	
6:46	6:54	6:55	7:00	7:04	
7:04	7:12	7:13	7:18	7:22	
7:20	7:28	7:29	7:34	7:38	
7:33	7:41	7:42	7:47	7:51	
7:46	7:54	7:55	8:00	8:04	
7:59	8:07	8:08	8:13	8:17	
8:15	8:23	8:24	8:29	8:33	
8:40	8:48	8:49	8:54	8:58	
9:10	9:18	9:19	9:24	9:28	
9:40	9:48	9:49	9:54	9:58	
10:10	10:18	10:19	10:24	10:28	
10:40	10:48	10:49	10:54	10:58	
11:10	11:18	11:19	11:24	11:28	
11:40	11:48	11:49	11:54	11:58	
12:10	12:18	12:19	12:24	12:28	
12:40	12:48	12:49	12:54	12:58	
13:10	13:18	13:19	13:24	13:28	
13:40	13:48	13:49	13:54	13:58	
14:10	14:18	14:19	14:24	14:28	
14:40	14:49	14:51	14:56	15:00	
15:10	15:19	15:21	15:26	15:30	
15:30	15:39	15:41	15:46	15:50	
16:00	16:09	16:11	16:16	16:20	
16:20	16:29	16:31	16:36	16:40	
16:35	16:44	16:46	16:51	16:55	
16:55	17:04	17:06	17:11	17:15	
17:10	17:19	17:21	17:26	17:30	
17:30	17:39	17:41	17:46	17:50	
17:40	17:49	17:51	17:56	18:00	
17:50	17:59	18:01	18:06	18:10	
18:15	18:24	18:26	18:31	18:35	
18:40	18:47	18:48	18:53	18:57	
19:05	19:12	19:13	19:18	19:22	
19:30	19:37	19:38	19:43	19:47	
20:05	20:12	20:13	20:18	20:22	
21:00	21:07	21:08	21:13	21:17	
22:00	22:07	22:08	22:13	22:17	

Weekday		South			
William Jackson Eastbound @ Brock Road Stop #93279	Dellbrook Westbound @ Melman Stop #1849	Brock Road Southbound @ Kingston Stop #1726	Brock Road Southbound @ Pickering Parkway Stop #1727	Pickering Station Stop #2549	
5:25	5:34	5:41	5:42	5:46	
5:50	5:59	6:06	6:07	6:11	
6:24	6:33	6:40	6:41	6:45	
6:54	7:03	7:10	7:11	7:15	
7:04	7:13	7:20	7:21	7:25	
7:22	7:31	7:38	7:39	7:43	
7:38	7:47	7:54	7:55	7:59	
7:51	8:00	8:07	8:08	8:12	
8:04	8:13	8:20	8:21	8:25	
8:17	8:26	8:33	8:34	8:38	
8:33	8:42	8:49	8:50	8:54	
8:58	9:07	9:14	9:15	9:19	
9:28	9:37	9:44	9:45	9:49	
9:58	10:07	10:14	10:15	10:19	
10:28	10:37	10:44	10:45	10:49	
10:58	11:07	11:14	11:15	11:19	
11:28	11:37	11:44	11:45	11:49	
11:58	12:07	12:14	12:15	12:19	
12:28	12:37	12:44	12:45	12:49	
12:58	13:07	13:14	13:15	13:19	
13:28	13:37	13:44	13:45	13:49	
13:58	14:07	14:14	14:15	14:19	
14:28	14:37	14:44	14:45	14:49	
15:00	15:09	15:16	15:17	15:21	
15:30	15:39	15:46	15:47	15:51	
15:50	15:59	16:06	16:07	16:11	
16:20	16:29	16:36	16:37	16:41	
16:40	16:49	16:56	16:57	17:04	
16:55	17:04	17:11	17:12	17:19	
17:15	17:24	17:31	17:32	17:39	
17:30	17:39	17:46	17:47	17:54	
18:00	18:09	18:16	18:17	18:24	
18:35	18:44	18:51	18:52	18:59	
18:57	19:06	19:13	19:14	19:18	
19:23	19:32	19:39	19:40	19:44	
20:22	20:31	20:38	20:39	20:43	
21:17	21:26	21:33	21:34	21:38	
22:18	22:27	22:34	22:35	22:39	

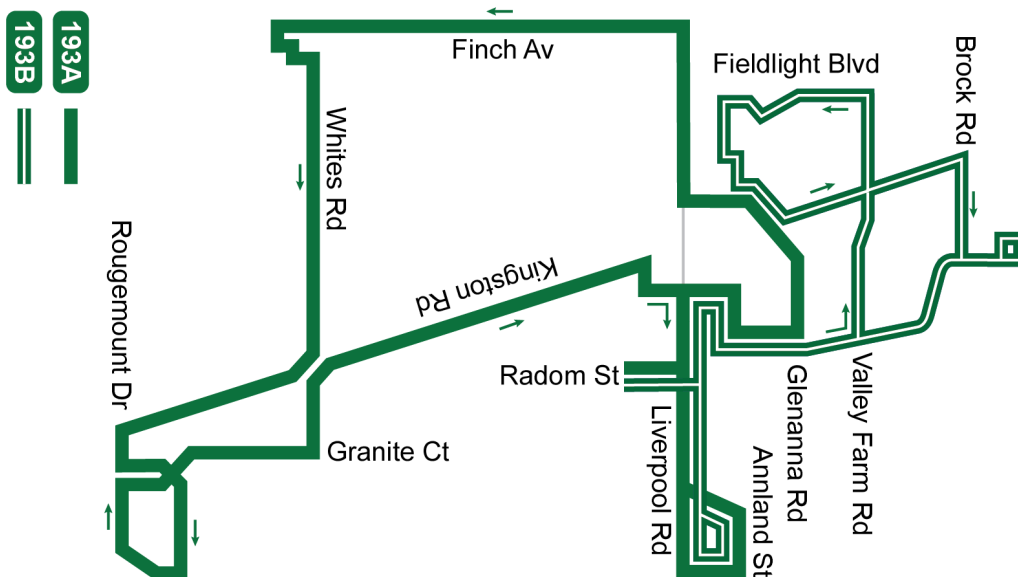
Saturday		North		
Pickering Station Stop #2549	Brock Road Northbound @ Kingston	Brock Road Northbound @ Major Oaks	Dellbrook Eastbound @ Melman	William Jackson Eastbound @ Brock Road Stop #93279
7:30	7:38	7:39	7:44	7:48
8:00	8:08	8:09	8:14	8:18
8:30	8:38	8:39	8:44	8:48
9:00	9:08	9:09	9:14	9:18
9:30	9:38	9:39	9:44	9:48
10:00	10:08	10:09	10:14	10:18
10:30	10:38	10:39	10:44	10:48
11:00	11:08	11:09	11:14	11:18
11:30	11:38	11:39	11:44	11:48
12:00	12:08	12:09	12:14	12:18
12:30	12:38	12:39	12:44	12:48
13:00	13:08	13:09	13:14	13:18
13:30	13:38	13:39	13:44	13:48
14:00	14:08	14:09	14:14	14:18
14:30	14:38	14:39	14:44	14:48
15:00	15:08	15:09	15:14	15:18
15:30	15:38	15:39	15:44	15:48
16:00	16:08	16:09	16:14	16:18
16:30	16:38	16:39	16:44	16:48
17:00	17:08	17:09	17:14	17:18
17:30	17:38	17:39	17:44	17:48
18:00	18:07	18:08	18:13	18:17
18:33	18:40	18:41	18:46	18:50
19:00	19:07	19:08	19:13	19:17
20:00	20:07	20:08	20:13	20:17
21:00	21:07	21:08	21:13	21:17
22:03	22:10	22:11	22:16	22:20

Saturday		South		
William Jackson Eastbound @ Brock Road Stop #93279	Dellbrook Westbound @ Melman	Brock Road Southbound @ Kingston	Brock Road Southbound @ Pickering Parkway Stop #1727	Pickering Station Stop #2549
7:19	7:28	7:35	7:36	7:40
7:48	7:57	8:04	8:05	8:09
8:18	8:27	8:34	8:35	8:39
8:48	8:57	9:04	9:05	9:09
9:18	9:27	9:34	9:35	9:39
9:48	9:57	10:04	10:05	10:09
10:18	10:27	10:34	10:35	10:39
10:48	10:57	11:04	11:05	11:09
11:18	11:27	11:34	11:35	11:39
11:48	11:57	12:04	12:05	12:09
12:18	12:27	12:34	12:35	12:39
12:48	12:57	13:04	13:05	13:09
13:18	13:27	13:34	13:35	13:39
13:48	13:57	14:04	14:05	14:09
14:18	14:27	14:34	14:35	14:39
14:48	14:57	15:04	15:05	15:09
15:18	15:27	15:34	15:35	15:39
15:48	15:57	16:04	16:05	16:09
16:18	16:27	16:34	16:35	16:39
16:48	16:57	17:04	17:05	17:09
17:18	17:27	17:34	17:35	17:39
17:48	17:57	18:04	18:05	18:09
18:17	18:26	18:33	18:34	18:38
18:50	18:59	19:06	19:07	19:11
19:17	19:26	19:33	19:34	19:38
20:17	20:26	20:33	20:34	20:38
21:17	21:26	21:33	21:34	21:38
22:20	22:29	22:36	22:37	22:41

Weekday and Saturday										193A
Pickering Town Centre Stop #1909	Liverpool Northbound @ Glenanna Stop #1732	Finch Westbound @ Whites Stop #93420	Whites Southbound @ Kingston Stop #93216	Rosebank Southbound @ Rougemount Stop #1634	Kingston Eastbound @ Whites Stop #1779	Kingston Eastbound @ Dixie Stop #1782	Radom Westbound @ St Martins Stop #1996	Southbound @ 725 Krosno Stop #1832	Pickering Town Centre Stop #1909	
10:30	10:33	10:38	10:44	10:51	10:58	11:01	11:10	11:15	11:26	
12:30	12:33	12:38	12:44	12:51	12:58	13:01	13:10	13:15	13:26	
14:30	14:33	14:38	14:44	14:51	14:58	15:01	15:10	15:15	15:26	

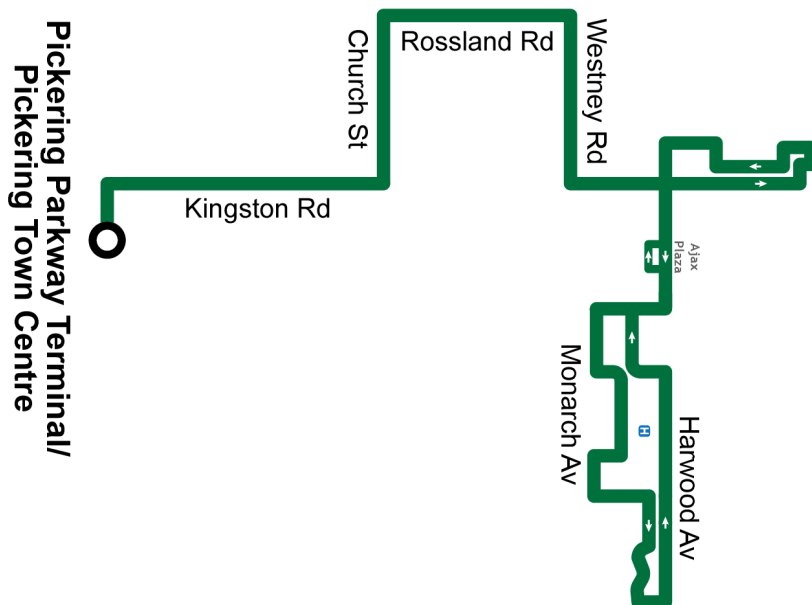
Weekday and Saturday										193B
Pickering Town Centre Stop #1909	Valley Farm Northbound @ Avonmore Stop #1907	Fieldlight Southbound @ Faylee Stop #1899	Kingston Eastbound @ Glenanna Stop #1786	Walmart Northbound @ Pickering Parkway Stop #1948	Pickering Parkway Terminal Stop #93112	Radom Westbound @ St Martins Stop #1996	Southbound @ 725 Krosno Stop #1832	Pickering Town Centre Stop #1909		
11:30	11:33	11:37	11:40	11:48	11:56	12:02	12:07	12:18		
13:30	13:33	13:37	13:40	13:48	13:56	14:02	14:07	14:18		
15:30	15:33	15:37	15:40	15:48	15:56	16:02	16:07	16:18		

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Sunday West								Sunday East							
Westney Eastbound @ Harwood Stop #2276	Clover Ridge Southbound @ Pittmann Stop #2059	Northbound @ 655 Harwood Stop #2068	Harwood Plaza Eastbound Stop #3327	Durham Centre Westbound @ Harwood Stop #90003	Rossland Westbound @ Ravenscroft Stop #93016	Church Southbound @ Kingston Stop #2209	Pickering Town Centre Stop #1909	Pickering Town Centre Stop #1909	Church Northbound @ Sherwood Stop #3229	Rossland Eastbound @ Ravenscroft Stop #92017	Kingston Eastbound @ Westney Heights Plaza Stop #3029	Durham Centre Westbound @ Harwood Stop #90003	Harwood Plaza Westbound Stop #3332	Bayly Eastbound @ Kitney Stop #2305	Westney Eastbound @ Harwood Stop #2276
11:21	11:23	11:28	11:36	11:54	12:04	12:10	12:19	12:30	12:39	12:45	12:52	13:06	13:12	13:15	13:20
13:21	13:23	13:28	13:36	13:54	14:04	14:10	14:19	14:30	14:39	14:45	14:52	15:06	15:12	15:15	15:20
15:21	15:23	15:28	15:36	15:54	16:04	16:10	16:19	16:30	16:39	16:45	16:52	17:06	17:12	17:15	17:20
17:21	17:23	17:28	—	—	—	—	—								

Dashes indicate the stop is not served by a trip. Trip notes are indicated by a letter or symbol and explained at the bottom of each timetable. Schedule times are shown in 24-hour clock. If you require this information in an accessible format, please contact Customer Service at 1-866-247-0055. See durhamregiontransit.com for more information.



Weekday										West
Westney Eastbound @ Harwood Stop #2276	Clover Ridge Southbound @ Pittmann Stop #2059	Northbound @ 655 Harwood Stop #2068	Harwood Plaza Eastbound Stop #3327	Walmart Westbound @ Kingston Stop #1940	Durham Centre Westbound @ Harwood Stop #90003	Kingston Westbound @ Westney Heights Plaza Stop #1597	Rossland Westbound @ Ravenscroft Stop #93016	Church Southbound @ Kingston Stop #2209	Pickering Town Centre Stop #1909	
—	—	* 8:35	8:42	8:58	9:05	9:09	9:15	9:20	9:31	
9:24	9:26	9:32	9:39	9:55	10:02	10:06	10:12	10:17	10:28	
10:24	10:26	10:32	10:39	10:55	11:02	11:06	11:12	11:17	11:28	
11:24	11:26	11:32	11:39	11:55	12:02	12:06	12:12	12:17	12:28	
12:24	12:26	12:32	12:39	12:55	13:02	13:06	13:12	13:17	13:28	
13:24	13:26	13:32	13:39	13:55	14:02	14:06	14:12	14:17	14:28	
14:24	14:26	14:32	14:39	14:55	15:02	15:06	15:12	15:17	15:28	
15:24	15:26	15:32	15:39	15:55	16:02	16:06	16:12	16:17	16:28	
16:24	16:26	16:32	16:39	16:55	17:02	17:06	17:12	17:17	17:28	
17:24	17:26	17:31	—	—	—	—	—	—	—	
18:24	18:26	18:31	—	—	—	—	—	—	—	

* On school days this trip begins at Lake Driveway & Walker at 8:26

Weekday										East
Pickering Town Centre Stop #1909	Church Northbound @ Sherwood Stop #3229	Rossland Eastbound @ Ravenscroft Stop #92017	Kingston Eastbound @ Westney Heights Plaza Stop #3029	Walmart Westbound @ Kingston Stop #1940	Durham Centre Westbound @ Harwood Stop #90003	Harwood Plaza Westbound Stop #3332	Bayly Eastbound @ Kitney Stop #2305	Westney Eastbound @ Harwood Stop #2276		
—	8:40	8:46	8:53	9:02	9:07	9:13	9:16	9:21		
9:30	9:39	9:45	9:52	10:01	10:06	10:12	10:15	10:20		
10:30	10:39	10:45	10:52	11:01	11:06	11:12	11:15	11:20		
11:30	11:40	11:46	11:53	12:02	12:07	12:15	12:18	12:23		
12:30	12:40	12:46	12:53	13:02	13:07	13:15	13:18	13:23		
13:30	13:40	13:46	13:53	14:02	14:07	14:15	14:18	14:23		
14:30	14:40	14:46	14:53	15:02	15:07	15:15	15:18	15:23		
15:30	15:40	15:46	15:53	16:02	16:07	16:15	16:18	16:23		
16:30	16:40	16:46	16:53	17:02	17:07	17:15	17:18	17:23		
17:30	17:40	17:46	17:53	18:02	18:07	18:15	18:18	18:23		

Saturday										West
Westney Eastbound @ Harwood Stop #2276	Clover Ridge Southbound @ Pittmann Stop #2059	Northbound @ 655 Harwood Stop #2068	Harwood Plaza Eastbound Stop #3327	Walmart Westbound @ Kingston Stop #1940	Durham Centre Westbound @ Harwood Stop #90003	Kingston Westbound @ Westney Heights Plaza Stop #1597	Rossland Westbound @ Ravenscroft Stop #93016	Church Southbound @ Kingston Stop #2209	Pickering Town Centre Stop #1909	
8:21	8:23	8:28	8:36	8:49	8:54	8:58	9:04	9:10	9:19	
9:21	9:23	9:29	9:36	9:52	9:59	10:03	10:09	10:14	10:25	
10:21	10:23	10:29	10:36	10:52	10:59	11:03	11:09	11:14	11:25	
11:21	11:23	11:29	11:36	11:52	11:59	12:03	12:09	12:14	12:25	
12:21	12:23	12:29	12:36	12:52	12:59	13:03	13:09	13:14	13:25	
13:21	13:23	13:29	13:36	13:52	13:59	14:03	14:09	14:14	14:25	
14:21	14:23	14:29	14:36	14:52	14:59	15:03	15:09	15:14	15:25	
15:21	15:23	15:29	15:36	15:52	15:59	16:03	16:09	16:14	16:25	
16:21	16:23	16:29	16:36	16:52	16:59	17:03	17:09	17:14	17:25	
17:21	17:23	17:28	—	—	—	—	—	—	—	
18:21	18:23	18:28	—	—	—	—	—	—	—	

Saturday										East
Pickering Town Centre Stop #1909	Church Northbound @ Sherwood Stop #3229	Rossland Eastbound @ Ravenscroft Stop #92017	Kingston Eastbound @ Westney Heights Plaza Stop #3029	Walmart Westbound @ Kingston Stop #1940	Durham Centre Westbound @ Harwood Stop #90003	Harwood Plaza Westbound Stop #3332	Bayly Eastbound @ Kitney Stop #2305	Westney Eastbound @ Harwood Stop #2276		
—	8:40	8:46	8:53	9:02	9:07	9:13	9:16	9:21		
9:30	9:39	9:45	9:52	10:01	10:06	10:12	10:15	10:20		
10:30	10:39	10:45	10:52	11:01	11:06	11:12	11:15	11:20		
11:30	11:39	11:45	11:52	12:01	12:06	12:12	12:15	12:20		
12:30	12:39	12:45	12:52	13:01	13:06	13:12	13:15	13:20		
13:30	13:39	13:45	13:52	14:01	14:06	14:12	14:15	14:20		
14:30	14:39	14:45	14:52	15:01	15:06	15:12	15:15	15:20		
15:30	15:39	15:45	15:52	16:01	16:06	16:12	16:15	16:20		
16:30	16:39	16:45	16:52	17:01	17:06	17:12	17:15	17:20		
17:30	17:39	17:45	17:52	18:01	18:06	18:12	18:15	18:20		

Weekday North								Weekday South							
Glenanna Southbound @ The Esplanade (South side stop) Stop #1915	Pickering Parkway Terminal Stop #93112	Brock Road & Highway 407 Park and Ride Platform 6 Stop #3376	Old Brock Northbound @ Central Stop #3385	Eastbound @ 6 Welwood Stop #2416	Toronto Northbound @ Brock Street (South side stop) Stop #93018	Reach Eastbound @ East Stop #2428	Curts Eastbound @ Port Perry Terminal Stop #2491	Curts Eastbound @ Port Perry Terminal Stop #2491	Reach Westbound @ Simcoe Stop #2454	Franklin Northbound @ Reach Stop #3224	Toronto Southbound @ Brock Street (South side stop) Stop #2438	Eastbound @ 6 Welwood Stop #2416	Old Brock Southbound @ Central Stop #3386	Brock Road & Highway 407 Park and Ride Platform 5 Stop #3377	Pickering Parkway Terminal Stop #93112
10:31	10:32	10:47	10:55	11:10	—	—	—	6:08	6:17	6:29	6:30	6:35	6:50	6:58	7:15
14:01	14:02	14:17	14:25	14:40	—	—	—	7:08	7:17	7:29	7:30	7:35	7:50	7:58	8:15
16:01	16:02	16:17	16:25	16:45	16:50	17:06	17:17	—	—	—	—	11:15	11:30	11:38	11:55
17:01	17:02	17:17	17:25	17:45	17:50	18:06	18:17	—	—	—	—	15:45	16:00	16:08	16:25
18:01	18:02	18:17	18:25	18:45	18:50	19:06	19:17	—	—	—	—	17:15	17:30	17:38	17:55

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Weekday							East
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Concession 3 Stop #93442	Rossland Eastbound @ Westney Stop #2169	Rossland Eastbound @ Brock Street Stop #476	Rossland Eastbound @ Simcoe Stop #573	Terrace Northbound @ Mayfair Stop #579	Harmony Terminal Stop #812	
—	—	5:10	5:21	5:33	—	5:42	
—	—	5:40	5:51	6:03	—	6:12	
5:55	6:05	6:11	6:23	6:36	—	6:47	
6:15	6:25	6:31	6:43	6:56	—	7:07	
6:45	6:55	7:01	7:13	7:26	—	7:37	
C 7:00	7:10	7:16	7:28	7:41	7:45	7:54	
7:15	7:25	7:31	7:43	7:56	—	8:07	
C 7:30	7:40	7:46	7:58	8:11	8:15	8:24	
7:45	7:55	8:01	8:13	8:26	—	8:37	
C 8:05	8:15	8:21	8:33	8:46	8:50	8:59	
8:20	8:30	8:36	8:48	9:01	—	9:12	
C 8:35	8:45	8:51	9:03	9:16	9:20	9:29	
8:50	9:00	9:05	9:16	9:28	—	9:37	
C 9:05	9:15	9:20	9:31	9:43	9:46	9:54	
C 9:35	9:45	9:50	10:01	10:13	10:16	10:24	
C 10:05	10:15	10:21	10:33	10:46	10:50	10:59	
C 10:35	10:45	10:51	11:03	11:16	11:20	11:29	
C 11:05	11:15	11:21	11:33	11:46	11:50	11:59	
C 11:35	11:45	11:51	12:03	12:16	12:20	12:29	
C 12:05	12:15	12:21	12:33	12:46	12:50	12:59	
C 12:35	12:45	12:51	13:03	13:16	13:20	13:29	
C 13:05	13:15	13:21	13:33	13:46	13:50	13:59	
C 13:35	13:47	13:55	14:08	14:22	14:26	14:35	
C 14:05	14:17	14:25	14:38	14:52	14:56	15:05	
14:20	14:30	14:40	14:53	15:07	—	15:18	
C 14:35	14:47	14:55	15:08	15:22	15:26	15:35	
C To Harmony Terminal via Terrace Drive							

Weekday							East
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Concession 3 Stop #93442	Rossland Eastbound @ Westney Stop #2169	Rossland Eastbound @ Brock Street Stop #476	Rossland Eastbound @ Simcoe Stop #573	Terrace Northbound @ Mayfair Stop #579	Harmony Terminal Stop #812	
14:50	15:00	15:10	15:23	15:37	—	15:48	
C 15:05	15:17	15:25	15:38	15:52	15:56	16:05	
15:20	15:30	15:40	15:53	16:07	—	16:18	
C 15:35	15:47	15:55	16:08	16:22	16:26	16:35	
15:50	16:00	16:10	16:23	16:37	—	16:48	
C 16:05	16:17	16:25	16:38	16:52	16:56	17:05	
16:20	16:32	16:40	16:53	17:07	—	17:18	
C 16:40	16:52	17:00	17:13	17:27	17:31	17:40	
17:00	17:12	17:20	17:33	17:47	—	17:58	
C 17:15	17:27	17:35	17:48	18:02	18:06	18:15	
17:30	17:42	17:50	18:03	18:17	—	18:28	
C 17:45	17:55	18:00	18:11	18:23	18:26	18:34	
18:00	18:10	18:15	18:26	18:38	—	18:47	
C 18:15	18:25	18:30	18:41	18:53	18:56	19:04	
18:30	18:40	18:45	18:56	19:08	—	19:17	
C 18:45	18:55	19:00	19:11	19:23	19:26	19:34	
19:05	19:15	19:20	19:31	19:43	—	19:52	
19:35	19:45	19:50	20:01	20:13	—	20:22	
20:05	20:15	20:20	20:31	20:43	—	20:52	
20:35	20:45	20:50	21:01	21:13	—	21:22	
21:00	21:10	21:15	21:26	21:38	—	21:47	
21:30	21:40	21:45	21:56	22:08	—	22:17	
22:00	22:10	22:15	22:26	22:38	—	22:47	
23:00	23:10	23:15	23:26	23:38	—	23:47	
0:00	0:10	0:15	0:26	0:38	—	0:47	
C To Harmony Terminal via Terrace Drive							

Weekday							West
Harmony Terminal Stop #812	Terrace Southbound @ Mayfair Stop #590	Rossland Westbound @ Simcoe Stop #597	Rossland Westbound @ Brock Street Stop #465	Rossland Westbound @ Westney Stop #93143	Brock Road Southbound @ Clearside Stop #93441	Pickering Parkway Terminal Stop #93112	
4:55	—	5:05	5:19	5:30	5:36	5:45	
5:18	—	5:28	5:42	5:53	5:59	6:08	
5:48	—	5:58	6:12	6:23	6:29	6:38	
C 5:58	6:05	6:10	6:24	6:35	6:41	6:50	
6:18	—	6:28	6:42	6:53	6:59	7:08	
C 6:30	6:37	6:42	6:56	7:07	7:13	7:22	
6:50	—	7:00	7:14	7:25	7:31	7:40	
C 7:05	7:12	7:17	7:31	7:42	7:48	7:57	
7:20	—	7:30	7:44	7:55	8:01	8:10	
C 7:30	7:37	7:42	7:56	8:07	8:13	8:22	
7:45	—	7:55	8:09	8:20	8:26	8:35	
C 8:00	8:07	8:12	8:26	8:37	8:43	8:52	
8:20	—	8:30	8:44	8:55	9:01	9:10	
C 8:40	8:47	8:52	9:06	9:17	9:23	9:32	
C 9:10	9:17	9:22	9:36	9:47	9:53	10:02	
C 9:40	9:47	9:52	10:06	10:17	10:23	10:32	
C 10:10	10:17	10:22	10:36	10:47	10:53	11:02	
C 10:40	10:47	10:52	11:06	11:17	11:23	11:32	
C 11:10	11:17	11:22	11:36	11:47	11:53	12:02	
C 11:40	11:47	11:52	12:06	12:17	12:23	12:32	
C 12:10	12:17	12:22	12:36	12:47	12:53	13:02	
C 12:40	12:47	12:52	13:06	13:17	13:23	13:32	
C 13:10	13:17	13:22	13:36	13:47	13:53	14:02	
C 13:40	13:48	13:53	14:07	14:19	14:25	14:34	
C 14:10	14:18	14:23	14:37	14:49	14:55	15:04	
C							To Pickering Parkway Terminal via Terrace Drive

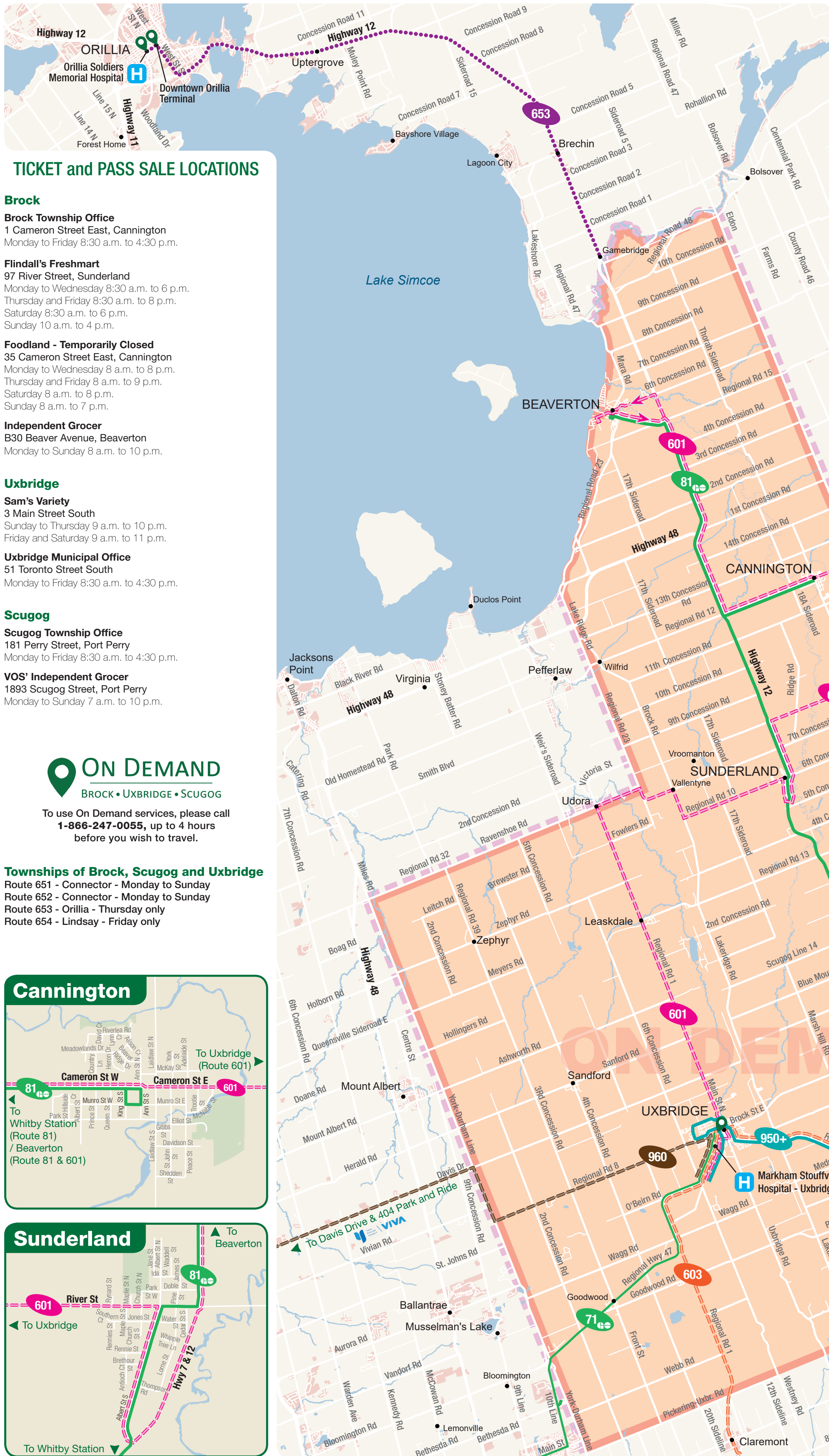
Weekday							West
Harmony Terminal Stop #812	Terrace Southbound @ Mayfair Stop #590	Rossland Westbound @ Simcoe Stop #597	Rossland Westbound @ Brock Street Stop #465	Rossland Westbound @ Westney Stop #93143	Brock Road Southbound @ Clearside Stop #93441	Pickering Parkway Terminal Stop #93112	
14:30	—	14:41	14:55	15:07	15:13	15:22	
C 14:45	14:53	14:58	15:12	15:24	15:30	15:39	
15:00	—	15:11	15:25	15:37	15:43	15:52	
C 15:15	15:23	15:28	15:42	15:54	16:00	16:09	
15:30	—	15:41	15:55	16:07	16:13	16:22	
C 15:45	15:53	15:58	16:12	16:24	16:30	16:39	
C 16:00	16:08	16:13	16:27	16:39	16:45	16:54	
16:15	—	16:26	16:40	16:52	16:58	17:07	
C 16:30	16:38	16:43	16:57	17:09	17:15	17:24	
16:45	—	16:56	17:10	17:22	17:28	17:37	
C 17:00	17:08	17:13	17:27	17:39	17:45	17:54	
17:15	—	17:25	17:37	17:49	17:54	18:01	
C 17:30	17:37	17:42	17:54	18:06	18:11	18:18	
17:50	—	18:00	18:12	18:24	18:29	18:36	
C 18:10	18:17	18:22	18:34	18:46	18:51	18:58	
18:33	—	18:43	18:55	19:07	19:12	19:19	
19:03	—	19:13	19:25	19:37	19:42	19:49	
19:33	—	19:43	19:55	20:07	20:12	20:19	
20:03	—	20:13	20:25	20:37	20:42	20:49	
20:33	—	20:43	20:55	21:07	21:12	21:19	
21:03	—	21:13	21:25	21:37	21:42	21:49	
21:33	—	21:43	21:55	22:07	22:12	22:19	
22:03	—	22:13	22:25	22:37	22:42	22:49	
22:33	—	22:43	22:55	23:07	23:12	23:19	
23:03	—	23:13	23:25	23:37	23:42	23:49	
C							To Pickering Parkway Terminal via Terrace Drive

Saturday							West
Harmony Terminal Stop #812	Terrace Southbound @ Mayfair Stop #590	Rossland Westbound @ Simcoe Stop #597	Rossland Westbound @ Brock Street Stop #465	Rossland Westbound @ Westney Stop #93143	Brock Road Southbound @ Clearside Stop #93441	Pickering Parkway Terminal Stop #93112	
5:03	—	5:13	5:25	5:37	5:42	5:49	
5:33	—	5:43	5:55	6:07	6:12	6:19	
6:03	—	6:13	6:25	6:37	6:42	6:49	
6:33	—	6:43	6:55	7:07	7:12	7:19	
7:03	—	7:13	7:25	7:37	7:42	7:49	
C 7:33	7:40	7:45	7:57	8:09	8:14	8:21	
8:03	—	8:13	8:25	8:37	8:42	8:49	
C 8:33	8:40	8:45	8:57	9:09	9:14	9:21	
9:03	—	9:13	9:25	9:37	9:42	9:49	
C 9:33	9:40	9:45	9:57	10:09	10:14	10:21	
10:10	—	10:20	10:34	10:45	10:51	11:00	
C 10:40	10:47	10:52	11:06	11:17	11:23	11:32	
11:10	—	11:20	11:34	11:45	11:51	12:00	
C 11:40	11:47	11:52	12:06	12:17	12:23	12:32	
12:10	—	12:20	12:34	12:47	12:53	13:02	
C 12:40	12:48	12:52	13:06	13:19	13:25	13:34	
13:10	—	13:20	13:34	13:47	13:53	14:02	
C 13:40	13:48	13:52	14:06	14:19	14:25	14:34	
14:10	—	14:20	14:34	14:47	14:53	15:02	
C 14:40	14:48	14:52	15:06	15:19	15:25	15:34	
15:10	—	15:20	15:34	15:47	15:53	16:02	
C 15:40	15:48	15:52	16:06	16:19	16:25	16:34	
16:10	—	16:20	16:34	16:47	16:53	17:02	
C 16:40	16:48	16:52	17:06	17:19	17:25	17:34	
17:10	—	17:20	17:34	17:47	17:53	18:02	
C 17:40	17:48	17:52	18:06	18:19	18:25	18:34	
18:10	—	18:20	18:34	18:47	18:53	19:02	
18:40	—	18:50	19:04	19:17	19:23	19:32	
19:03	—	19:13	19:25	19:37	19:42	19:49	
19:33	—	19:43	19:55	20:07	20:12	20:19	
20:03	—	20:13	20:25	20:37	20:42	20:49	
21:03	—	21:13	21:25	21:37	21:42	21:49	
22:03	—	22:13	22:25	22:37	22:42	22:49	
23:03	—	23:13	23:25	23:37	23:42	23:49	
C							To Pickering Parkway Terminal via Terrace Drive

Saturday							East
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Concession 3 Stop #93442	Rossland Eastbound @ Westney Stop #2169	Rossland Eastbound @ Brock Street Stop #476	Rossland Eastbound @ Simcoe Stop #573	Terrace Northbound @ Mayfair Stop #579	Harmony Terminal Stop #812	
—	—	5:20	5:31	5:43	—	5:52	
—	—	5:50	6:01	6:13	—	6:22	
6:05	6:13	6:20	6:31	6:43	—	6:52	
6:35	6:43	6:50	7:01	7:13	—	7:22	
7:05	7:13	7:20	7:31	7:43	—	7:52	
7:35	7:43	7:50	8:01	8:13	—	8:22	
8:05	8:13	8:20	8:31	8:43	—	8:52	
C 8:35	8:43	8:50	9:01	9:13	9:16	9:24	
9:05	9:13	9:21	9:32	9:45	—	9:56	
C 9:35	9:43	9:51	10:02	10:15	10:19	10:28	
10:05	10:13	10:21	10:32	10:45	—	10:56	
C 10:35	10:43	10:51	11:02	11:15	11:19	11:28	
11:05	11:13	11:21	11:32	11:45	—	11:56	
C 11:35	11:43	11:51	12:02	12:15	12:19	12:28	
12:05	12:15	12:21	12:33	12:46	—	12:57	
C 12:35	12:46	12:53	13:04	13:16	13:20	13:29	
13:05	13:15	13:21	13:33	13:46	—	13:57	
C 13:35	13:46	13:53	14:04	14:16	14:20	14:29	
14:05	14:15	14:21	14:33	14:46	—	14:57	
C 14:35	14:46	14:53	15:04	15:16	15:20	15:29	
15:05	15:15	15:21	15:33	15:46	—	15:57	
C 15:35	15:46	15:53	16:04	16:16	16:20	16:29	
16:05	16:15	16:21	16:33	16:46	—	16:57	
C 16:35	16:46	16:53	17:04	17:16	17:20	17:29	
17:05	17:15	17:21	17:33	17:46	—	17:57	
C 17:35	17:46	17:53	18:04	18:16	18:20	18:29	
18:05	18:13	18:21	18:32	18:45	—	18:56	
C 18:35	18:43	18:51	19:02	19:15	19:19	19:28	
19:05	19:13	19:21	19:32	19:45	—	19:56	
19:35	19:43	19:51	20:02	20:15	—	20:26	
20:05	20:13	20:20	20:31	20:43	—	20:52	
21:05	21:13	21:20	21:31	21:43	—	21:52	
22:00	22:08	22:15	22:26	22:38	—	22:47	
23:00	23:08	23:15	23:26	23:38	—	23:47	
0:00	0:08	0:15	0:26	0:38	—	0:47	
C							To Harmony Terminal via Terrace Drive

Sunday							West
Harmony Terminal Stop #812	Terrace Southbound @ Mayfair Stop #590	Rossland Westbound @ Simcoe Stop #597	Rossland Westbound @ Brock Street Stop #465	Rossland Westbound @ Westney Stop #93143	Brock Road Southbound @ Clearside Stop #93441	Pickering Parkway Terminal Stop #93112	
7:03	—	7:13	7:25	7:37	7:42	7:49	
C 7:33	7:40	7:45	7:57	8:09	8:14	8:21	
8:03	—	8:13	8:25	8:37	8:42	8:49	
C 8:33	8:40	8:45	8:57	9:09	9:14	9:21	
9:03	—	9:13	9:25	9:37	9:42	9:49	
C 9:33	9:40	9:45	9:57	10:09	10:14	10:21	
10:10	—	10:20	10:34	10:45	10:51	11:00	
C 10:40	10:47	10:52	11:06	11:17	11:23	11:32	
11:10	—	11:20	11:34	11:45	11:51	12:00	
C 11:40	11:47	11:52	12:06	12:17	12:23	12:32	
12:10	—	12:20	12:34	12:47	12:53	13:02	
C 12:40	12:48	12:52	13:06	13:19	13:25	13:34	
13:10	—	13:20	13:34	13:47	13:53	14:02	
C 13:40	13:48	13:52	14:06	14:19	14:25	14:34	
14:10	—	14:20	14:34	14:47	14:53	15:02	
C 14:40	14:48	14:52	15:06	15:19	15:25	15:34	
15:10	—	15:20	15:34	15:47	15:53	16:02	
C 15:40	15:48	15:52	16:06	16:19	16:25	16:34	
16:10	—	16:20	16:34	16:47	16:53	17:02	
C 16:40	16:48	16:52	17:06	17:19	17:25	17:34	
17:10	—	17:20	17:34	17:47	17:53	18:02	
C 17:40	17:48	17:52	18:06	18:19	18:25	18:34	
18:10	—	18:20	18:34	18:47	18:53	19:02	
19:03	—	19:13	19:25	19:37	19:42	19:49	
20:03	—	20:13	20:25	20:37	20:42	20:49	
21:03	—	21:13	21:25	21:37	21:42	21:49	
22:03	—	22:13	22:25	22:37	22:42	22:49	
C							To Pickering Parkway Terminal via Terrace Drive

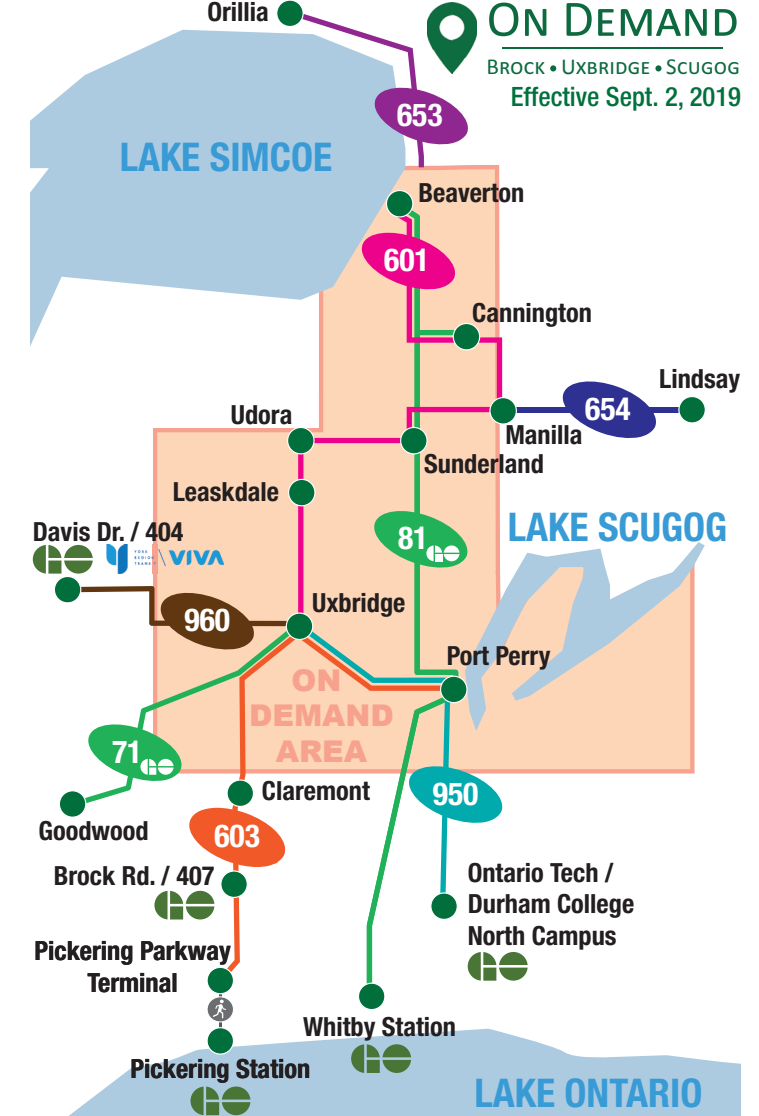
Sunday							East
Pickering Parkway Terminal Stop #93112	Brock Road Northbound @ Concession 3 Stop #93442	Rossland Eastbound @ Westney Stop #2169	Rossland Eastbound @ Brock Street Stop #476	Rossland Eastbound @ Simcoe Stop #573	Terrace Northbound @ Mayfair Stop #579	Harmony Terminal Stop #812	
—	—	6:15	6:26	6:38	—	6:47	
—	—	6:45	6:56	7:08	—	7:17	
—	—	7:15	7:26	7:38	—	7:47	
7:35	7:43	7:50	8:01	8:13	—	8:22	
8:05	8:13	8:20	8:31	8:43	—	8:52	
C 8:35	8:43	8:50	9:01	9:13	9:16	9:24	
9:05	9:13	9:21	9:32	9:45	—	9:56	
C 9:35	9:43	9:51	10:02	10:15	10:19	10:28	
10:05	10:13	10:21	10:32	10:45	—	10:56	
C 10:35	10:43	10:51	11:02	11:15	11:19	11:28	
11:05	11:13	11:21	11:32	11:45	—	11:56	
C 11:35	11:43	11:51	12:02	12:15	12:19	12:28	
12:05	12:15	12:21	12:33	12:46	—	12:57	
C 12:35	12:46	12:53	13:04	13:16	13:20	13:29	
13:05	13:15	13:21	13:33	13:46	—	13:57	
C 13:35	13:46	13:53	14:04	14:16	14:20	14:29	
14:05	14:15	14:21	14:33	14:46	—	14:57	
C 14:35	14:46	14:53	15:04	15:16	15:20	15:29	
15:05	15:15	15:21	15:33	15:46	—	15:57	
C 15:35	15:46	15:53	16:04	16:16	16:20	16:29	
16:05	16:15	16:21	16:33	16:46	—	16:57	
C 16:35	16:46	16:53	17:04	17:16	17:20	17:29	
17:05	17:15	17:21	17:33	17:46	—	17:57	
C 17:35	17:46	17:53	18:04	18:16	18:20	18:29	
18:05	18:13	18:21	18:32	18:45	—	18:56	
C 18:35	18:43	18:51	19:02	19:15	19:19	19:28	
19:05	19:13	19:21	19:32	19:45	—	19:56	
20:05	20:13	20:20	20:31	20:43	—	20:52	
21:05	21:13	21:20	21:31	21:43	—	21:52	
22:00	22:08	22:15	22:26	22:38	—	22:47	
23:00	23:08	23:15	23:26	23:38	—	23:47	
C							To Harmony Terminal via Terrace Drive



LEGEND

- 950+** Regular DRT Route
Service operates Monday to Sunday during the daytime or longer.
 - 71, 81** DRT-GO One Fare Route
Board GO Transit for travel within Durham Region with a valid DRT ticket, pass or transfer. Presto and cash not available. Contact us for full details.
 - 601, 603, 960** Limited Route
Service operates only part of the day. Limited number of trips. Consult the schedule for complete details.
 - 653, 654** On Demand Route
Service operates on certain days only, and must be pre-booked. Outside Durham Region, service stops only at On Demand bus stops.
 - 601, 652** Route 651 and 652 On Demand Connector Area
Pick up and drop off at Curb. May include transfer to scheduled service for part of your trip.
 - 110+** Durham Region Boundary
 - H** On Demand Stop
Stop with scheduled pick up and drop off times
 - H** Hospital
- Route Number
 Branch (+ is all branches)
 Direction of Travel
 Service Type

Brock - Uxbridge - Scugog Network Map



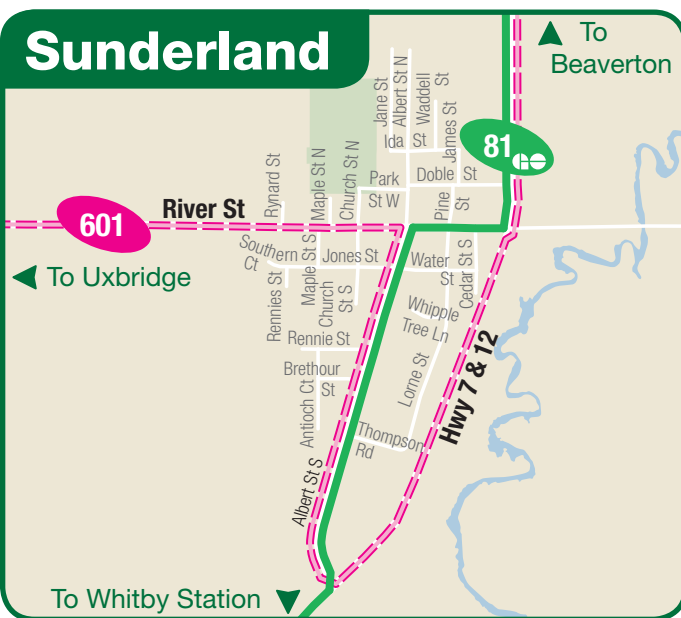
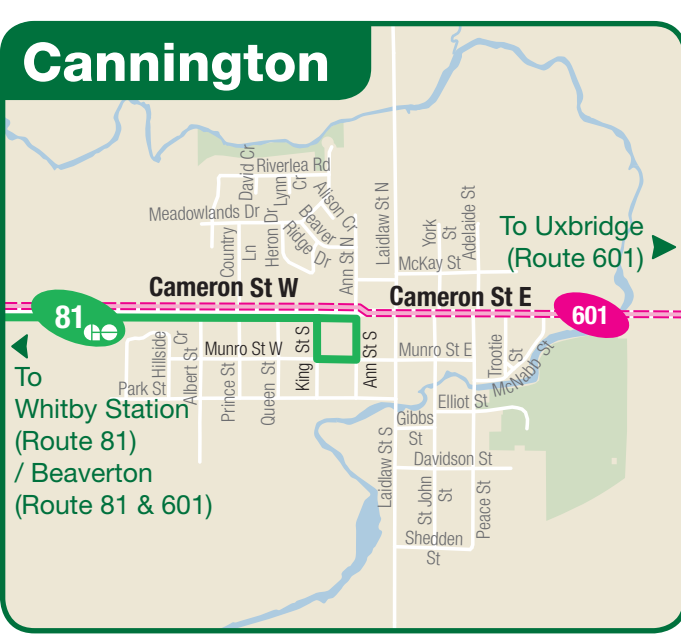
TICKET and PASS SALE LOCATIONS

- Brock**
Brock Township Office
 1 Cameron Street East, Cannington
 Monday to Friday 8:30 a.m. to 4:30 p.m.
Flindall's Freshmart
 97 River Street, Sunderland
 Monday to Wednesday 8:30 a.m. to 6 p.m.
 Thursday and Friday 8:30 a.m. to 8 p.m.
 Saturday 8:30 a.m. to 6 p.m.
 Sunday 10 a.m. to 4 p.m.
Foodland - Temporarily Closed
 35 Cameron Street East, Cannington
 Monday to Wednesday 8 a.m. to 8 p.m.
 Thursday and Friday 8 a.m. to 9 p.m.
 Saturday 8 a.m. to 8 p.m.
 Sunday 8 a.m. to 7 p.m.
Independent Grocer
 B30 Beaver Avenue, Beaverton
 Monday to Sunday 8 a.m. to 10 p.m.
- Uxbridge**
Sam's Variety
 3 Main Street South
 Sunday to Thursday 9 a.m. to 10 p.m.
 Friday and Saturday 9 a.m. to 11 p.m.
Uxbridge Municipal Office
 51 Toronto Street South
 Monday to Friday 8:30 a.m. to 4:30 p.m.
- Scugog**
Scugog Township Office
 181 Perry Street, Port Perry
 Monday to Friday 8:30 a.m. to 4:30 p.m.
VOS' Independent Grocer
 1893 Scugog Street, Port Perry
 Monday to Sunday 7 a.m. to 10 p.m.

ON DEMAND BROCK • UXBRIDGE • SCUGOG

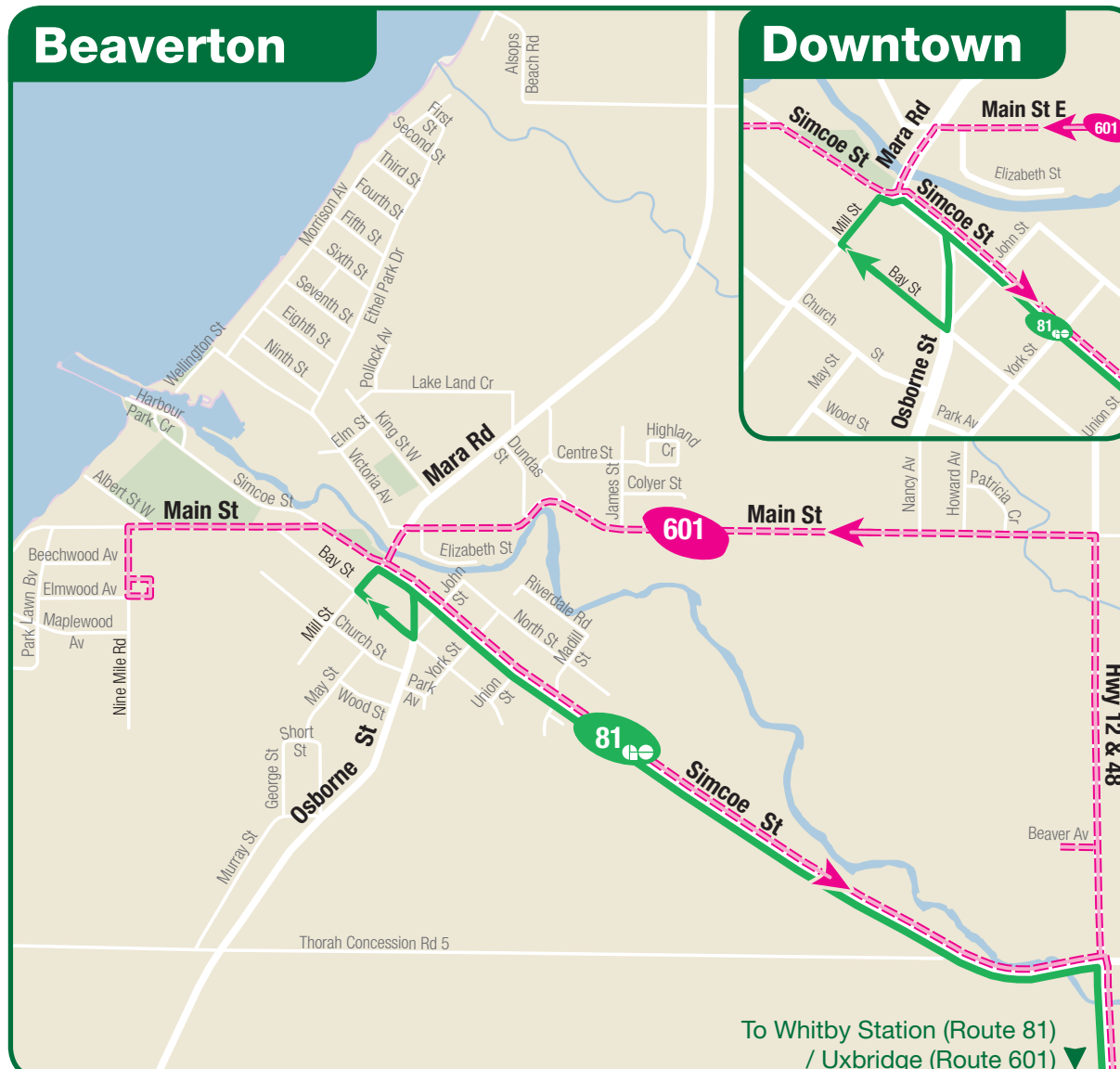
To use On Demand services, please call **1-866-247-0055**, up to 4 hours before you wish to travel.

Townships of Brock, Scugog and Uxbridge
 Route 651 - Connector - Monday to Sunday
 Route 652 - Connector - Monday to Sunday
 Route 653 - Orillia - Thursday only
 Route 654 - Lindsay - Friday only



ROUTE 950 - REACH - SIMCOE NORTH

South to Ontario Tech / Durham College North Campus Terminal								North to Uxbridge								
Branch	Eastbound @ 6 Welwood Stop #2416	Toronto Northbound @ Brock Street (North side stop) Stop #2422	Brock Street Westbound @ Quaker Village Stop #3547	Eastbound @ 462 Peaton (Lakeview Health Port Perry) Stop #3506	Curtis Eastbound @ Port Perry Terminal Stop #2491	Highway 7A Westbound @ SmartCentres Port Perry Stop #3300	Ontario Tech / Durham College North Campus Stop #698	Branch	Ontario Tech / Durham College North Campus Stop #698	Highway 7A Westbound @ SmartCentres Port Perry Stop #3300	Curtis Eastbound @ Port Perry Terminal Stop #2491	Water Northbound @ Queen Stop #2493	Reach Westbound @ Simcoe Stop #2454	Quaker Village Southbound @ Colonel Sharpe Stop #3212	Toronto Southbound @ Brock Street (South side stop) Stop #2438	Eastbound @ 6 Welwood Stop #2416
Monday to Friday								Monday to Friday								
950H	-	06:15	06:18	-	06:46	-	07:15	950B	06:35	-	07:03	-	-	-	-	
950H	-	07:15	07:18	-	07:46	-	08:15	950C	07:25	-	07:53	-	07:59	-	08:13	
950F	08:30	08:35	08:38	09:04	09:09	09:15	09:41	950F	08:30	08:55	09:02	09:05	09:12	9:33	09:39	
950F	09:45	09:50	09:53	10:19	10:24	10:30	10:56	950F	10:00	10:25	10:32	10:35	10:42	11:03	11:14	
950F	11:15	11:20	11:23	11:49	11:54	12:00	12:26	950F	11:55	12:20	12:27	12:30	12:37	12:58	13:04	
950F	13:15	13:20	13:23	13:49	13:54	14:00	14:26	950F	14:30	14:55	15:02	15:05	15:12	15:33	15:39	
950F	14:45	14:50	14:53	15:19	15:24	15:30	15:56	950F	16:00	16:25	16:32	16:35	16:42	17:03	17:14	
950	-	-	-	-	17:20	17:26	17:52	950F	17:00	17:25	17:32	17:35	17:42	18:03	18:09	
950	-	-	-	-	18:20	18:26	18:52	950F	18:00	18:25	18:32	18:35	18:42	19:03	19:09	
950	-	-	-	-	19:20	19:26	19:52	950	19:00	19:25	19:32	-	19:38	19:59	20:05	
950	21:10	21:15	21:18	-	21:46	21:52	22:18	950G	20:00	20:22	20:28	-	20:37	-	20:59	
950	-	-	-	-	-	-	-	950D	22:25	22:47	22:53	-	22:59	23:16	23:22	
Saturday								Saturday								
950	06:50	06:55	06:58	-	07:22	07:28	07:51	950	09:35	09:57	10:03	-	10:09	10:26	10:32	
950	08:25	08:30	08:33	-	08:57	09:03	09:26	950	11:55	12:17	12:23	-	12:29	12:46	12:52	
950	10:45	10:50	10:53	-	11:17	11:23	11:46	950	14:15	14:37	14:43	-	14:49	15:06	15:12	
950	13:05	13:10	13:13	-	13:37	13:43	14:06	950	16:35	16:57	17:03	-	17:09	17:26	17:32	
950	15:25	15:30	15:33	-	15:57	16:03	16:26	950	18:50	19:12	19:18	-	19:24	19:41	19:47	
950	17:45	17:50	17:53	-	18:17	18:23	18:46	950	19:55	20:17	20:23	-	20:29	20:46	20:52	
Sunday								Sunday								
950	08:25	08:30	08:33	-	08:57	09:03	09:26	950	09:35	09:57	10:03	-	10:09	10:26	10:32	
950	10:45	10:50	10:53	-	11:17	11:23	11:46	950	11:55	12:17	12:23	-	12:29	12:46	12:52	
950	13:05	13:10	13:13	-	13:37	13:43	14:06	950	14:15	14:37	14:43	-	14:49	15:06	15:12	
950	15:25	15:30	15:33	-	15:57	16:03	16:26	950	16:35	16:57	17:03	-	17:09	17:26	17:32	
950	17:45	17:50	17:53	-	18:17	18:23	18:46	950	18:50	19:12	19:18	-	19:24	19:41	19:47	



ROUTE 960 - NEWMARKET - UXBRIDGE

West to Newmarket					East to Uxbridge					
Branch	Eastbound @ 6 Welwood Stop #2416	Toronto Northbound @ Brock Street (North side stop) Stop #2422	Brock Street Westbound @ Quaker Village Stop #3547	Regional Road 8 Westbound @ Mill Run Gate (Stoam) Stop #3237	Davis Drive & Highway 404 Park and Ride Stop #3241	Davis Drive & Highway 404 Park and Ride Stop #3241	Regional Road 8 Eastbound @ Mill Run Gate (Stoam) Stop #3238	Brock Street Eastbound @ South Belsam Stop #3210	Toronto Southbound @ Brock Street (North side stop) Stop #2424	Eastbound @ 6 Welwood Stop #2416
Monday to Friday					Monday to Friday					
6:25	06:30	06:33	06:38	06:54	07:00	07:16	07:21	07:25	-	
-	07:30	07:33	07:38	07:54	08:00	08:16	08:21	08:25	08:30	
14:40	14:45	14:48	14:53	15:09	15:15	15:31	15:36	15:40	15:45	
-	16:50	16:53	16:58	17:14	17:20	17:36	17:41	17:45	-	
-	17:50	17:53	17:58	18:14	18:20	18:36	18:41	18:45	18:50	

ROUTE 601 - BEAVERTON - UXBRIDGE

North to Beaverton					South to Uxbridge										
Branch	Eastbound @ 6 Welwood Stop #2416	Regional Road 1 Northbound @ Harrison (Leasdale) Stop #3198	Regional Road 1 Northbound @ Ravenshoe (Udora) Stop #3194	Albert Southbound @ Jones (Sunderland) Stop #3193	Simcoe Northbound @ Highway 7 (Menilla) Stop #3192	Cameron Southbound @ Ann Carrington Stop #3549	Highway 12 Northbound @ Beaver Stop #3528	Branch	Highway 12 Northbound @ Beaver Stop #3528	Southbound @ 661 Simcoe Stop #2539	Highway 12 Northbound @ Beaver Stop #3528	Simcoe Southbound @ Highway 7 (Menilla) Stop #3191	Regional Road 1 Southbound @ Ravenshoe (Udora) Stop #3195	Toronto Southbound @ Campbell Stop #2427	Eastbound @ 6 Welwood Stop #2416
Monday to Friday					Monday to Friday										
601B	13:30	13:45	13:50	14:01	-	-	-	601	12:05	12:17	12:46	13:06	13:19	13:23	
601	15:50	16:05	16:10	16:21	16:33	16:42	16:57	601	-	-	-	14:16	14:29	14:33	
-	-	-	-	-	-	-	-	601	16:57	17:09	-	-	-	-	

Port Perry



ON DEMAND

BROCK • UXBRIDGE • SCUGOG

To use On Demand services, please call 1-866-247-0055, up to 4 hours before you wish to travel.

Provide your start and end location, and a Booking Agent will confirm your trip plan. Trips may include connections to scheduled services where available.

ROUTE 603 - PICKERING - PORT PERRY

South to Pickering							North to Port Perry										
Branch	Curtis Eastbound @ Port Perry Terminal Stop #2491	Reach Westbound @ Simcoe Stop #2454	Franklin Northbound @ Reach Stop #3224	Toronto Southbound @ Brock Street (South side stop) Stop #2438	Eastbound @ 6 Welwood Stop #2416	Old Brock Southbound @ Central Stop #3386	Brock Road & Highway 407 Park and Ride Platform 5 Stop #3377	Pickering Parkway Terminal Stop #3112	Branch	Genama Southbound @ The Esplanade (South side stop) Stop #1915	Pickering Parkway Terminal Stop #3112	Brock Road & Highway 407 Park and Ride Platform 6 Stop #3376	Old Brock Northbound @ Central Stop #3385	Eastbound @ 6 Welwood Stop #2416	Toronto Northbound @ Brock Street (South side stop) Stop #3018	Reach Eastbound @ East Stop #2428	Curtis Eastbound @ Port Perry Terminal Stop #2491
Monday to Friday							Monday to Friday										
06:08	06:17	06:29	06:30	06:35	06:50	06:58	07:15	10:31	10:32	10:47	10:55	11:10	-	-	-	-	
07:08	07:17	07:29	07:30	07:35	07:50	07:58	08:15	14:01	14:02	14:17	14:25	14:40	-	-	-	-	
-	-	-	-	11:15	11:30	11:38	11:55	16:01	16:02	16:17	16:25	16:45	16:50	17:06	17:17	-	
-	-	-	-	15:45	16:00	16:08	16:25	17:01	17:02	17:17	17:25	17:45	17:50	18:06	18:17	-	
-	-	-	-	17:15	17:30	17:38	17:55	18:01	18:02	18:17	18:25	18:45	18:50	19:06	19:17	-	

ROUTE 652 - CONNECTOR

Arrival time in Port Perry		Departure time from Port Perry	
Monday to Friday		Monday to Friday	
Curtis & Water (Port Perry) Arrive Stop #2491		Curtis & Water (Port Perry) Depart Stop #2491	
6:00	6:55 - 7:10		
6:36	8:00		
7:00	9:15 - 9:40		
7:36	10:40		
8:55	12:00 - 12:35		
10:15 - 10:25	14:00		
11:45 - 12:15	15:10 - 15:30		
13:45	16:40		
14:55 - 15:15	17:25 - 17:40		
16:00 - 16:20	18:25 - 18:40		
17:10 - 17:20	19:25 - 19:40		
18:10 - 18:20	-		
Saturday and Sunday		Saturday and Sunday	
7:12	10:10		
8:47	12:05 - 12:30		
9:37	14:50		
11:07	16:30		
13:27	17:10		
14:07	19:25		
15:47	-		
18:07	-		

ROUTE 651 - CONNECTOR

Arrival time in Uxbridge		Departure time from Uxbridge	
Monday to Friday		Monday to Friday	
Toronto & Brock (Uxbridge) Arrive Stop #2422		Toronto & Brock (Uxbridge) Depart Stop #2422	
6:05 - 6:20	6:25 - 6:40		
7:05 - 7:20	7:30 - 7:40		
8:05 - 8:20	8:30 - 8:40		
9:30 - 9:40	9:45 - 10:00		
11:00 - 11:10	11:15 - 11:30		
12:55 - 13:10	13:10 - 13:30		
14:35	15:00		
15:30 - 15:50	15:50		
16:40 - 17:00	17:00 - 17:15		
17:40	17:50 - 18:15		
-	18:50 - 19:15		
Saturday and Sunday		Saturday and Sunday	
6:45	10:40		
8:20	13:00		
10:40	15:20		
13:00	17:40		
15:20	19:55		
17:40	-		

ROUTE 653 - ORILLIA

Arrival time in Orillia		Departure time from Orillia	
Thursday Only		Thursday Only	
Mission @ West / Orillia Transit Terminal (Orillia) Stop #3423	12:11	Soldiers Memorial Hospital (Orillia) Stop #3426	15:32
Soldiers Memorial Hospital (Orillia) Stop #3426	12:16	Mission @ West / Orillia Transit Terminal (Orillia) Stop #3423	15:37

ROUTE 654 - LINDSAY

Arrival time in Lindsay			Departure time from Lindsay		
Friday Only			Friday Only		
Lindsay Square Terminal (Lindsay) Stop #3427	11:43	Soldiers Memorial Hospital (Lindsay) Stop #3428	11:48	Lindsay Square Terminal (Lindsay) Stop #3427	16:08
Adele @ Auk Trail (Lindsay Rec Centre) Stop #3634	11:54	Adele @ Auk Trail (Lindsay Rec Centre) Stop #3634	15:55	Soldiers Memorial Hospital (Lindsay) Stop #3428	16:03

Uxbridge



CONTACT US

durhamregiontransit.com

DRTHelps@durham.ca

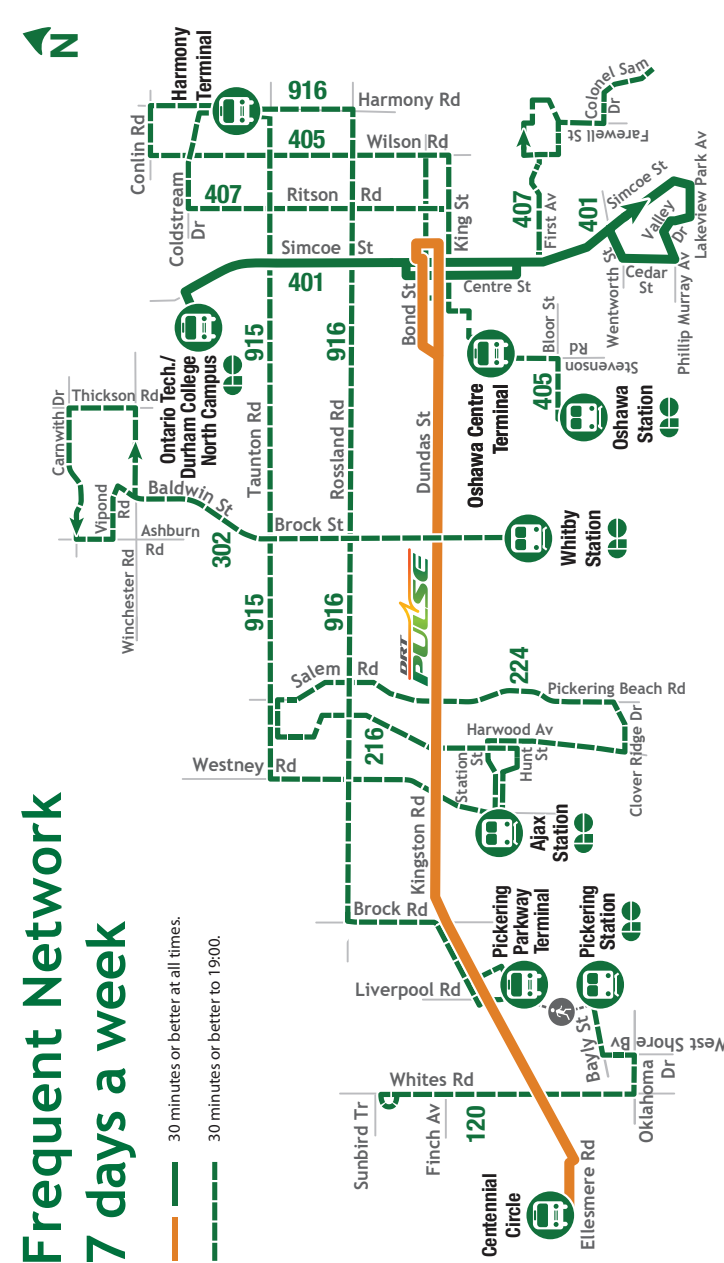
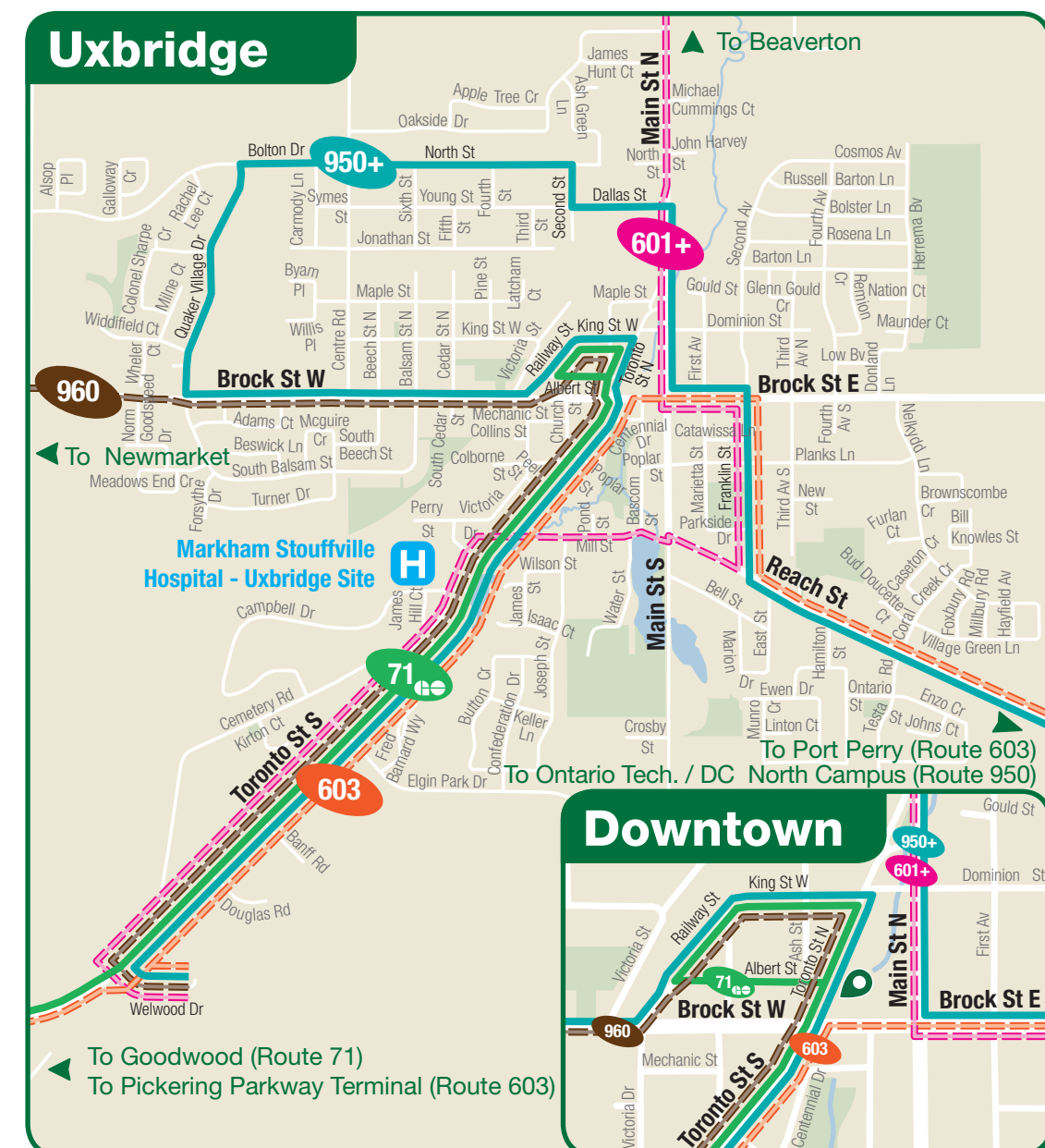
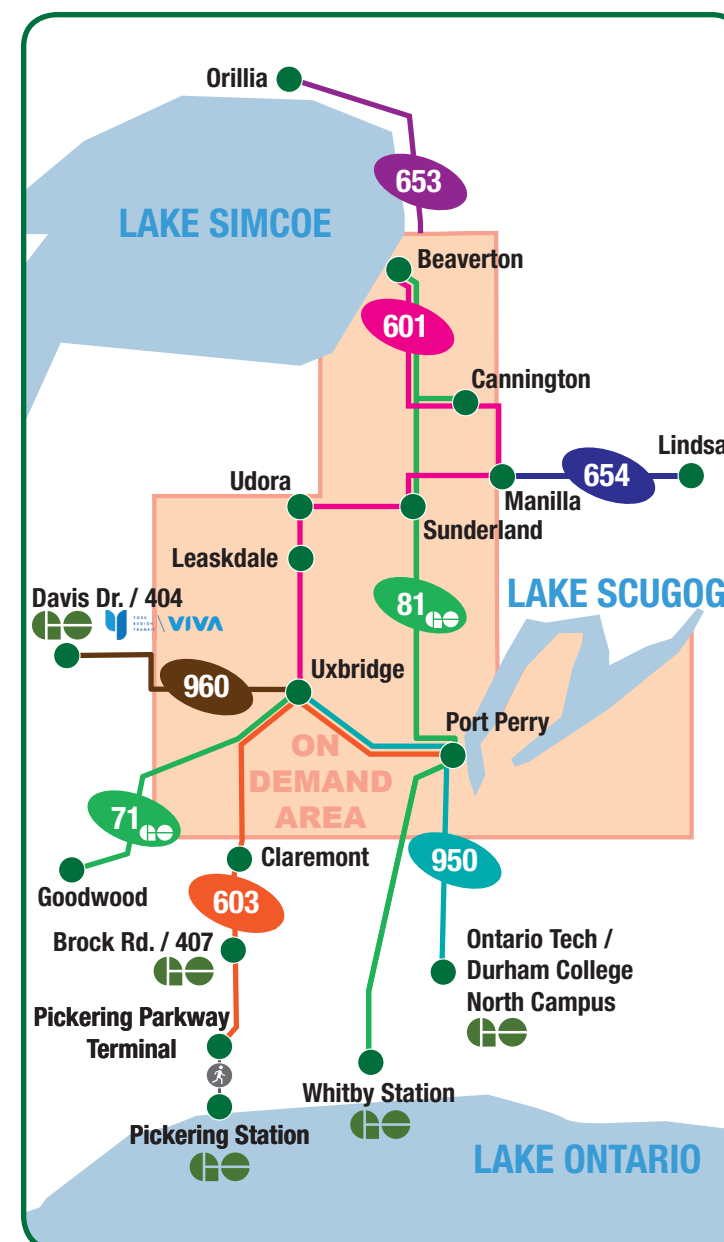
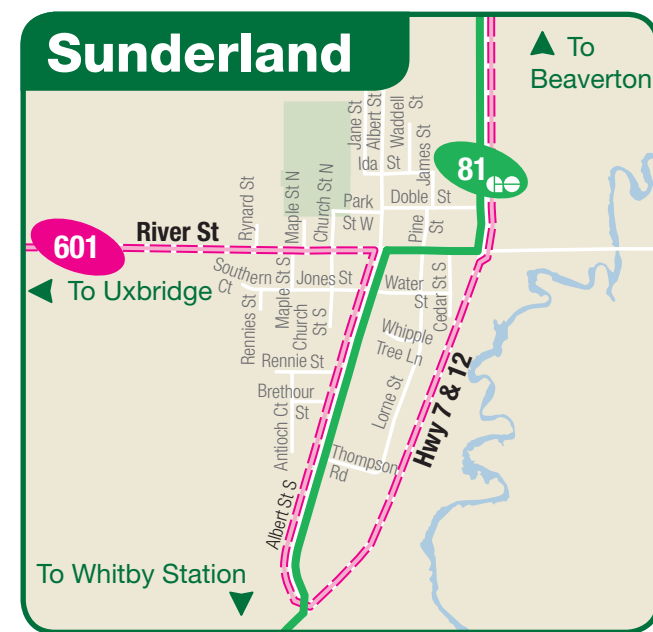
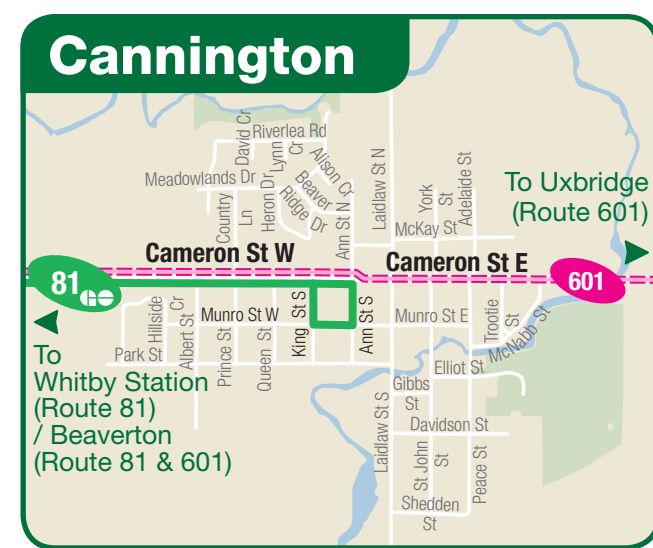
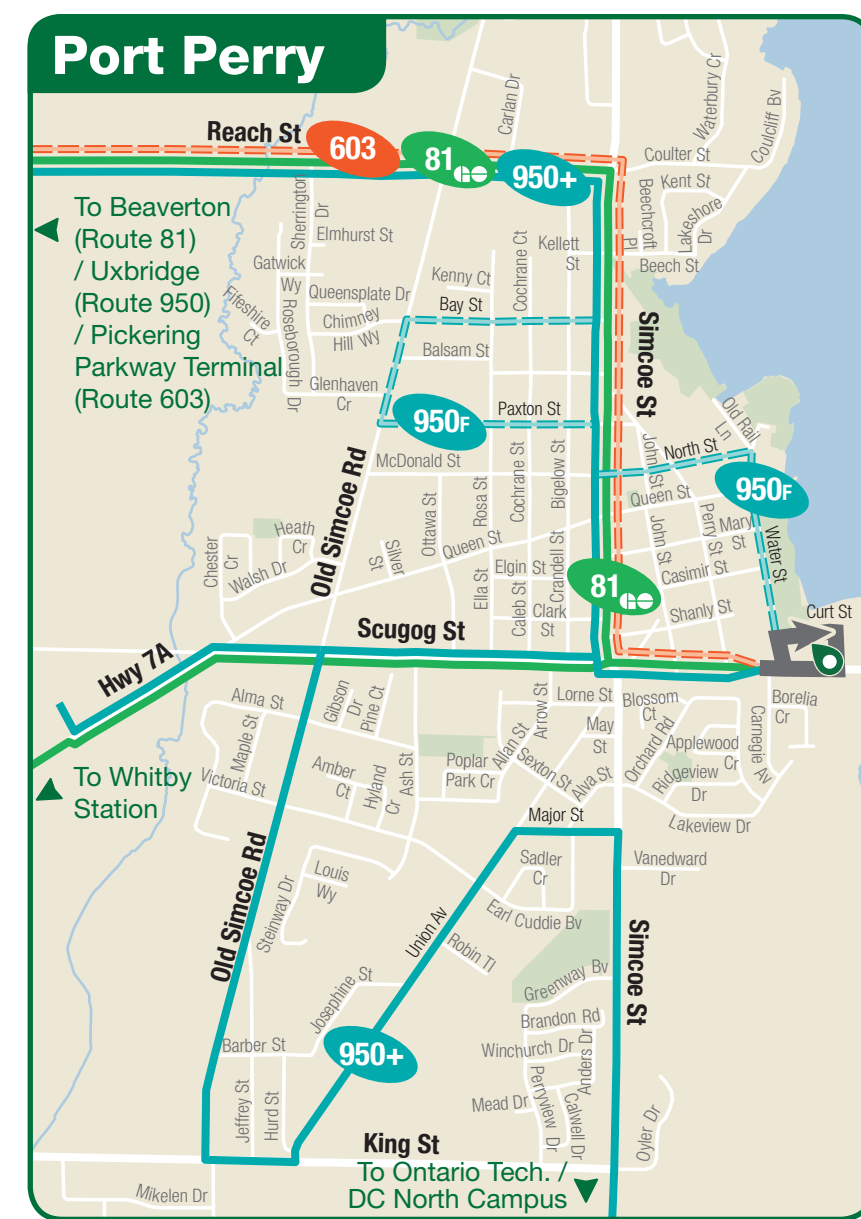
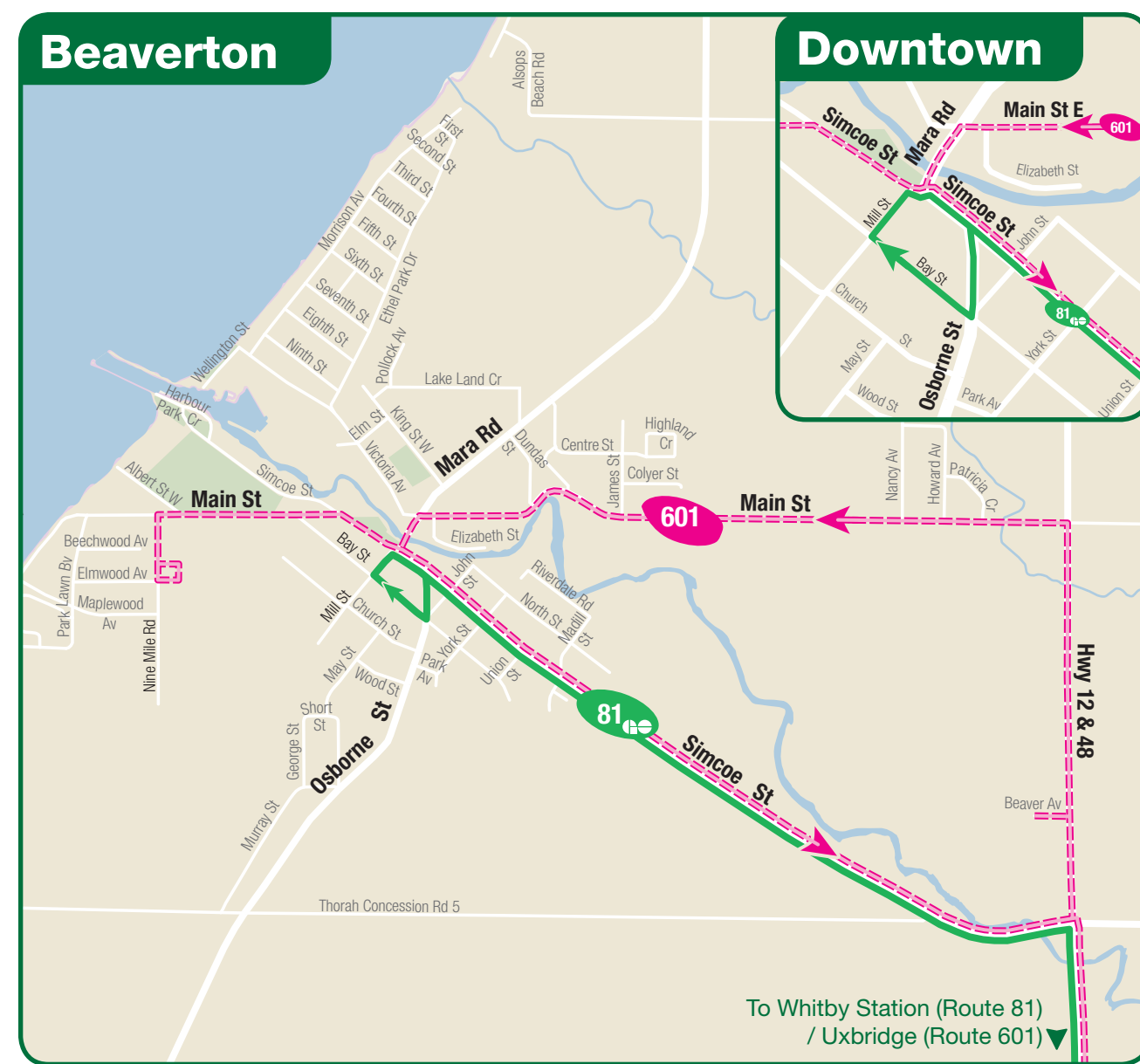
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1-866-247-0055

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Mobile Apps

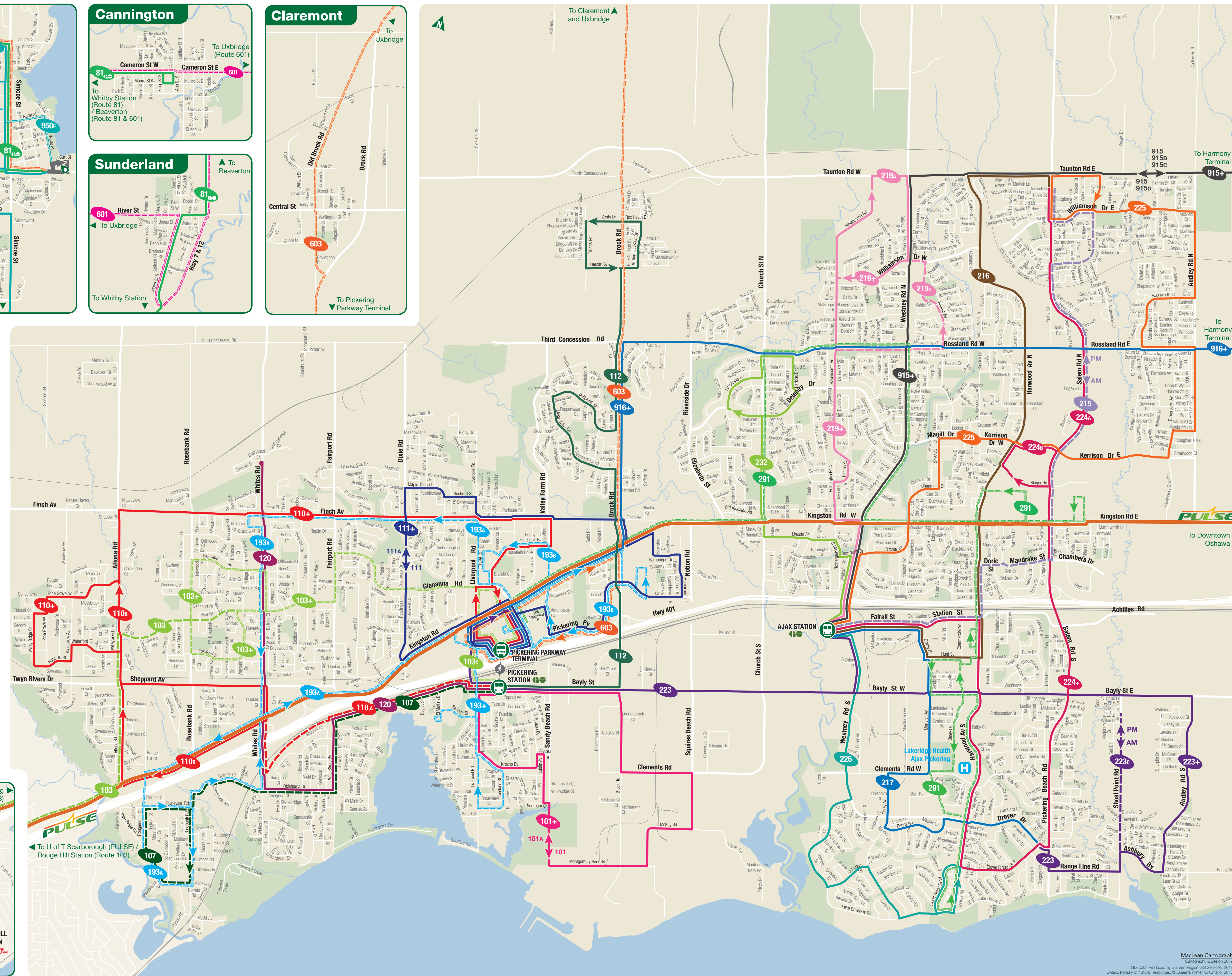
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MAPS | ROUTES | INFO

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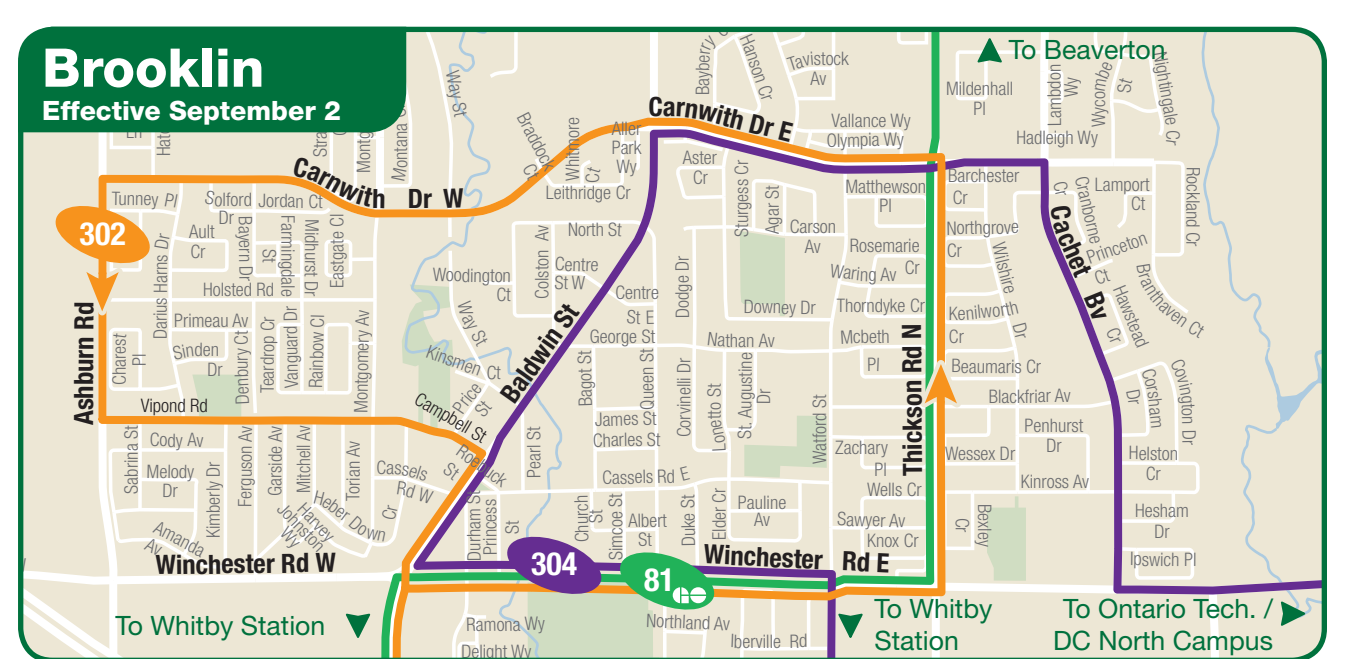
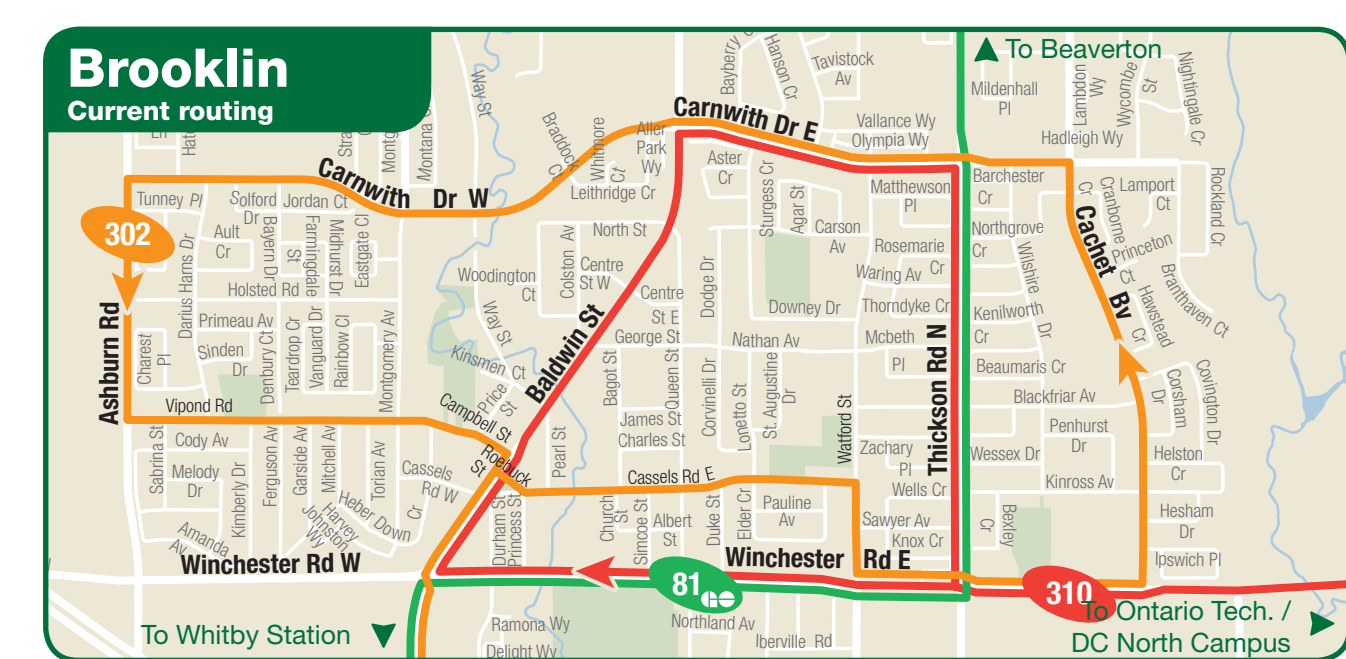
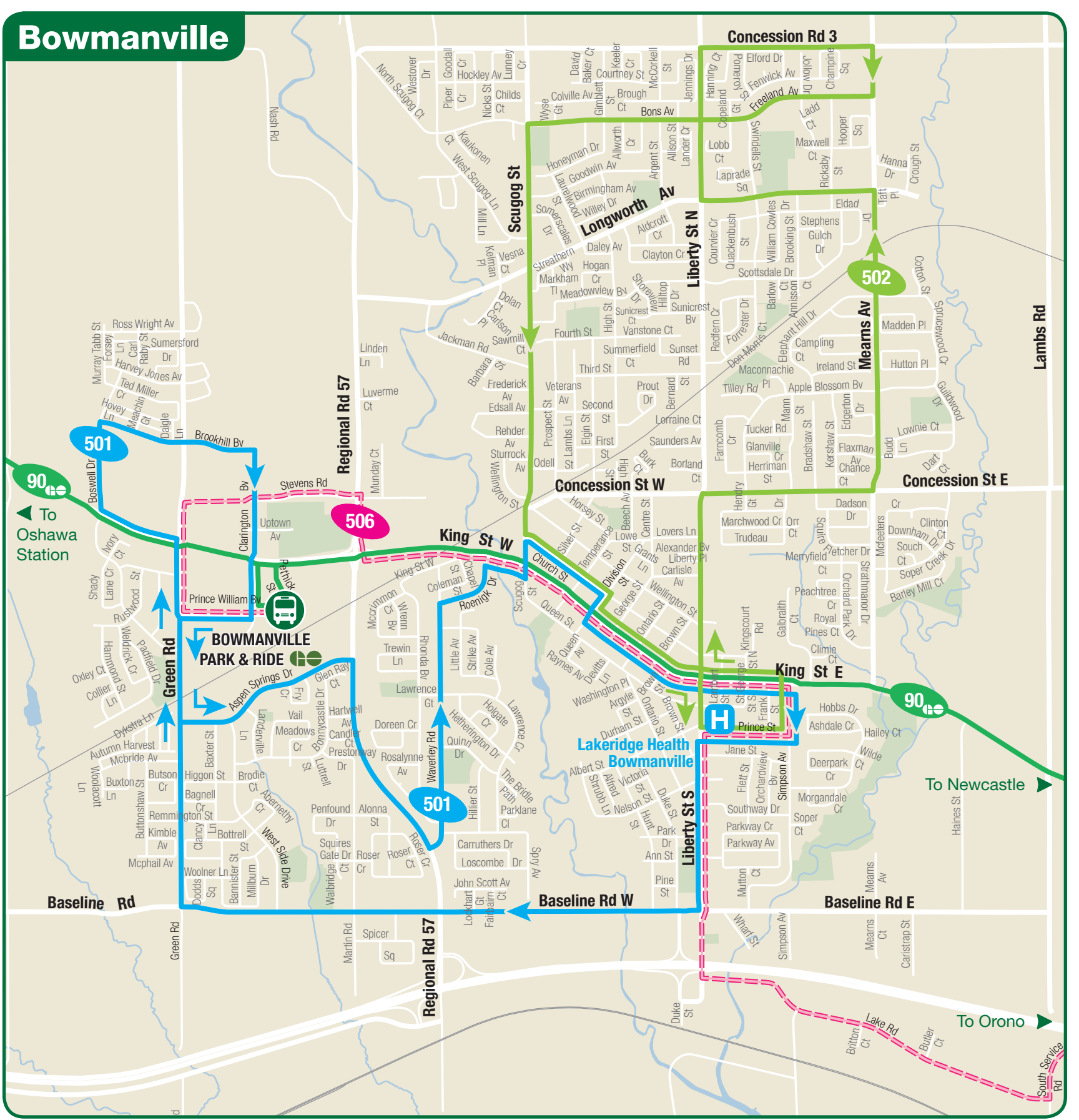
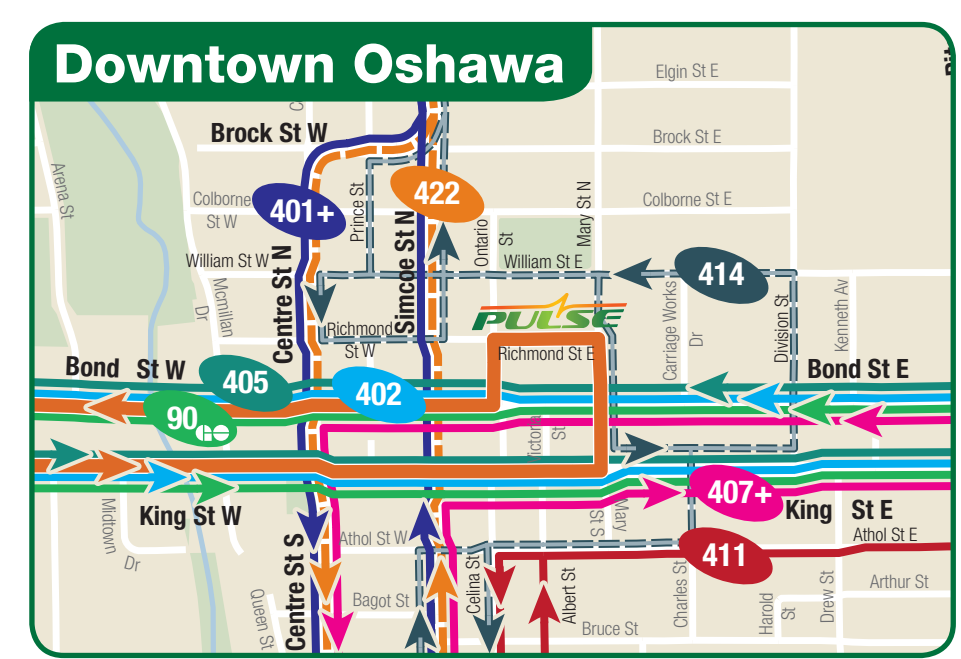
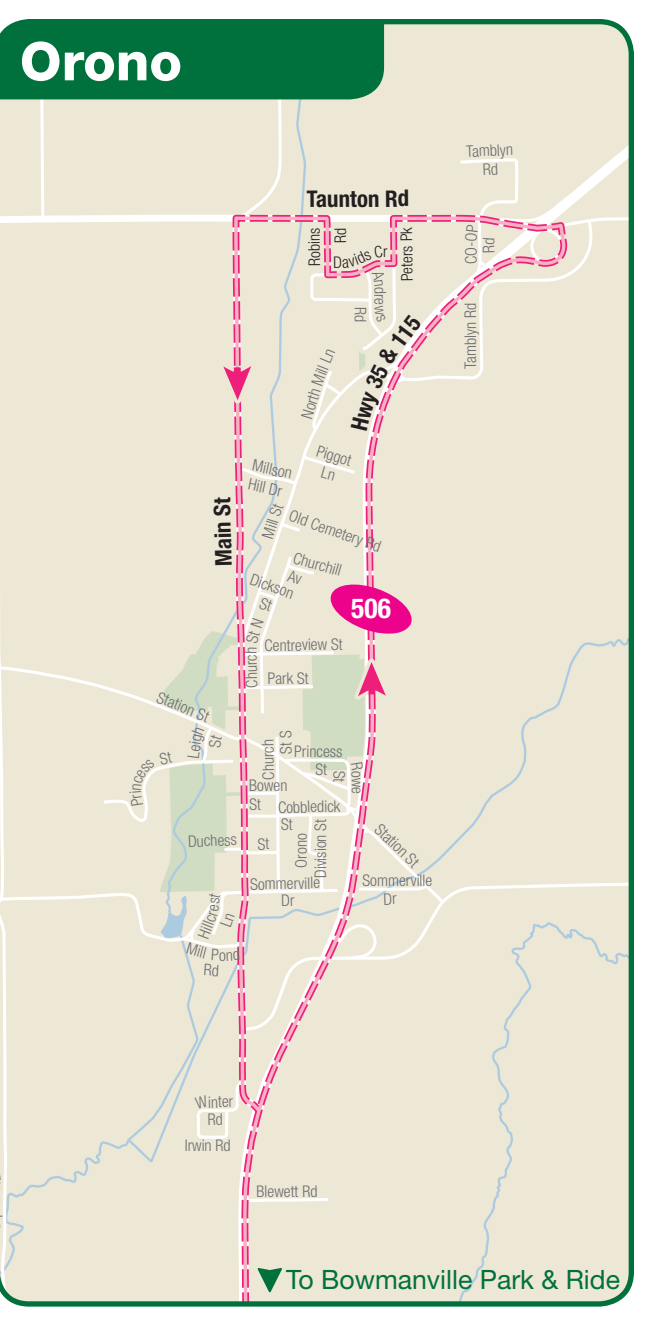
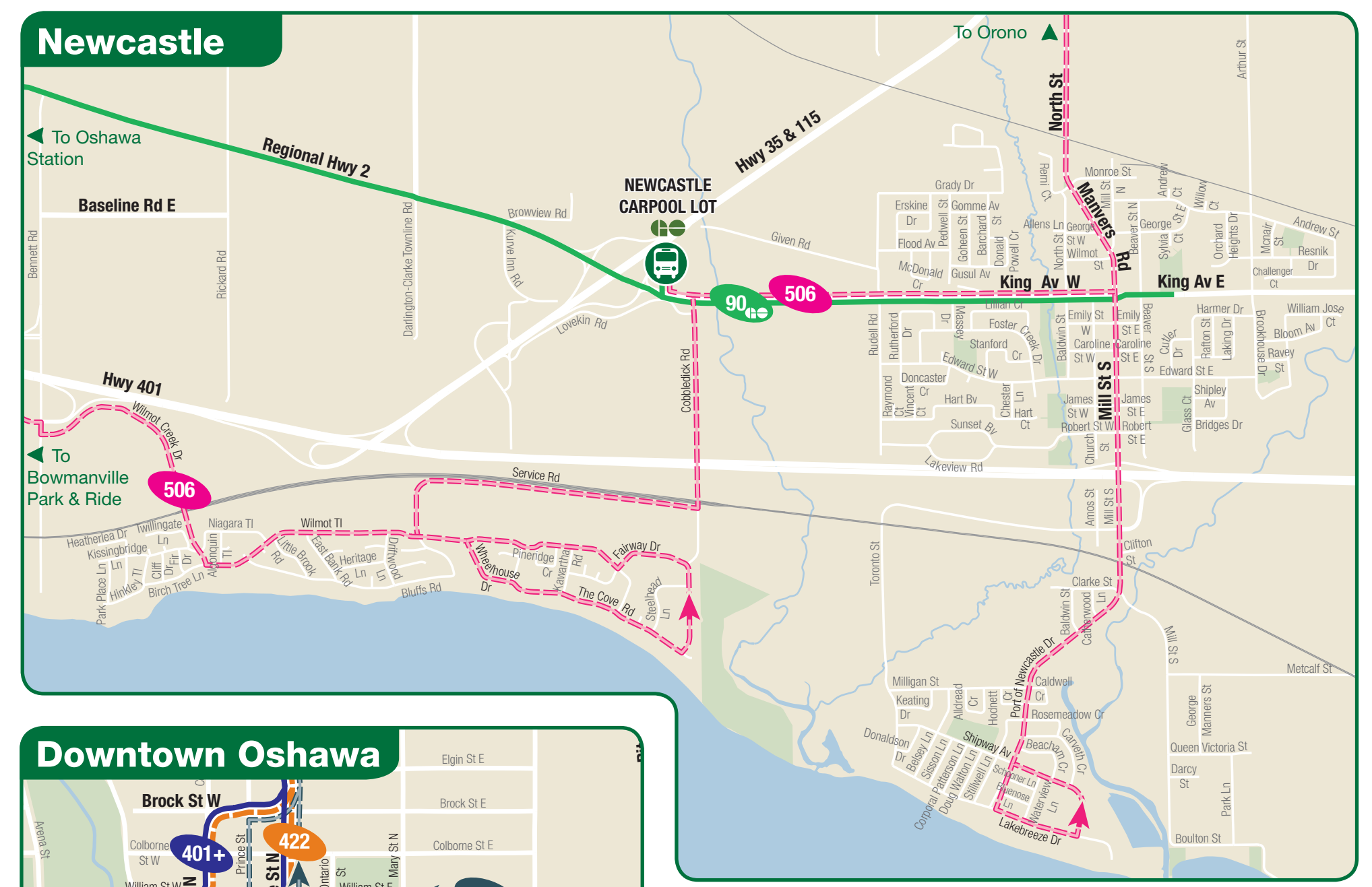
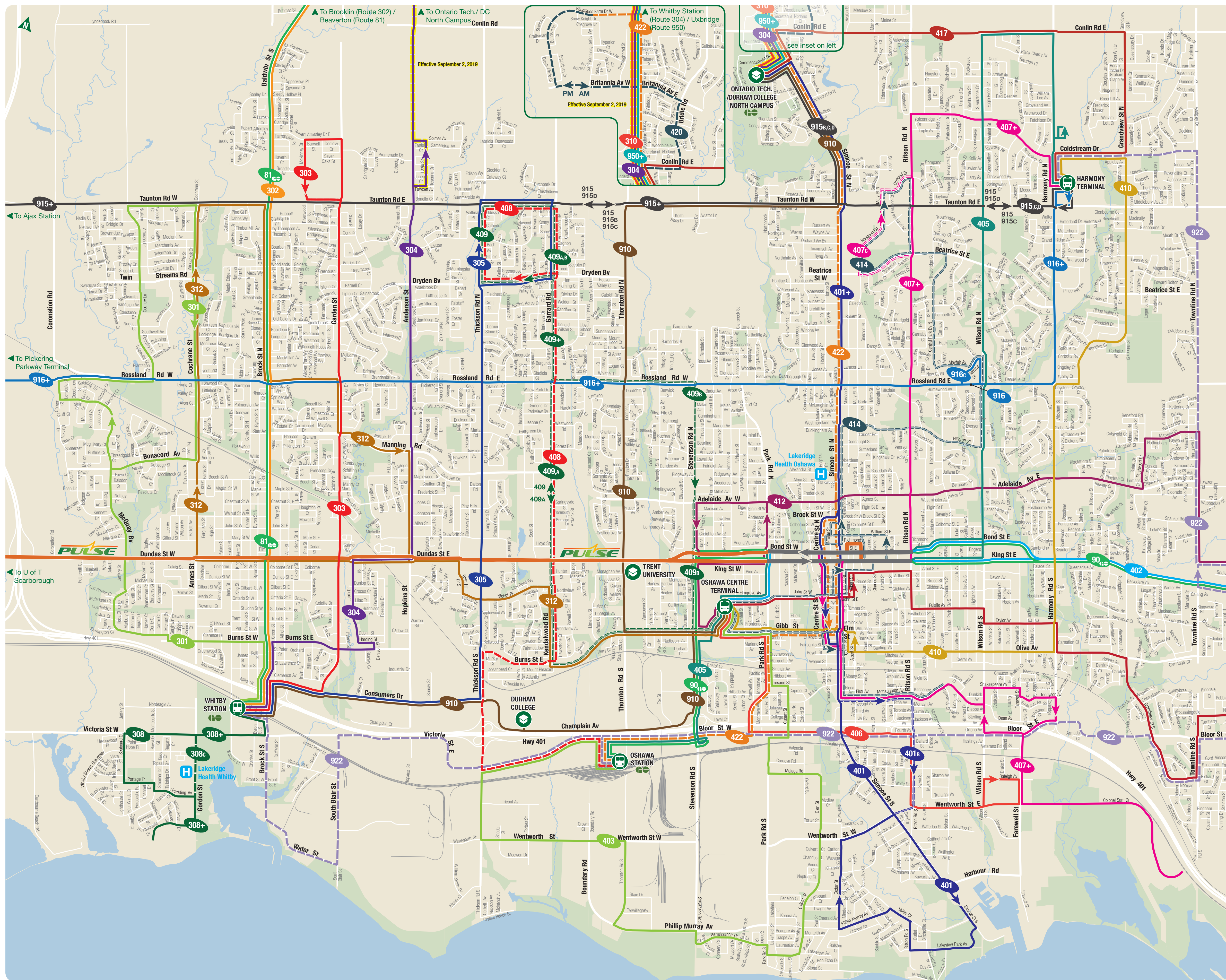
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Mobile Apps

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92 Route number
Nombre d'itinéraire

Oshawa/Yorkdale



CONTACT US

1-888-438-6646
416-869-3200
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1-800-387-3652

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gotransit.com/OnTheGO

Oshawa/ Yorkdale



GO Bus Schedule/
Horaire des autobus GO



92

- Oshawa
- Whitby
- Ajax
- Pickering
- Scarborough
- Toronto

Daily / Quotidiennement
Includes GO Bus routes 92/ Inclut
les routes 92 d'autobus GO

Effective / À partir de:
6 APRIL
AVRIL **2019**



How to read our schedules

Step 1

Find the station or terminal you are departing from. Stops are listed across the top in the order they are served.

Step 2

The upper left corner tells you what day the schedule is for and the direction of travel.

Step 3

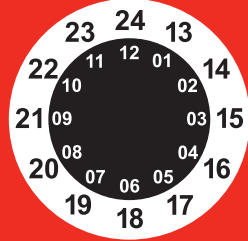
Look across the rows for available departure times.

Step 4

Not all trains or buses stop at every station. If you see → the train or bus will not stop at that station.

Schedule times shown in 24-hour clock

Midnight to noon
00 01 - 12 00
Noon to midnight
12 01 - 24 00



Legend

 Bus trips

→ Trip does not serve this location.



GO Bus service is accessible to passengers using mobility devices at this location.

Notes

For the latest schedule information and updates, please visit gotransit.com.

Bicycles

1. Bicycles are not allowed in Union Station or on-board trains during morning rush hour (6:30-9:30) and evening rush hour (15:30-18:30), Monday to Friday.
2. Foldable bicycles are allowed on-board trains at all times.

Comment lire nos horaires

Étape 1

Trouvez votre gare ou terminus de départ. La liste des arrêts est donnée en haut dans l'ordre dans lequel ils sont desservis.

Étape 2

Le coin supérieur gauche vous indique le jour pour lequel l'horaire est donné et la direction de circulation.

Étape 3

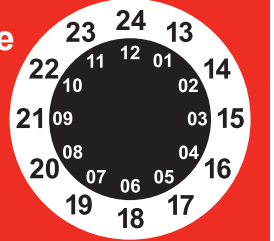
Regardez dans les rangées pour obtenir les heures de départ offertes.

Étape 4

Les trains ou les autobus ne s'arrêtent pas tous à chaque gare. Si vous voyez le symbole → le train ou l'autobus ne s'arrêtera pas à cette gare.

Indications selon un système horaire de 24 heures

De minuit à midi:
00 01 - 12 00
De midi à minuit:
12 01 - 24 00



Légende

 Horaire des autobus

→ Trajet ne sert pas cette station.



Service d'autobus GO accessible aux personnes utilisant des aides à la mobilité à cet endroit.

Notes

Pour consulter les horaires les plus récents et les mises à jour, veuillez visiter gotransit.com.

Vélos

1. Les vélos ne sont pas autorisés dans la gare Union ou à bord des trains du lundi au vendredi, pendant l'heure de pointe (6:30-9:30) et pendant l'heure de pointe du soir (15:30-18:30).
2. Les vélos pliables sont permis à bord des trains en tout temps.

Monday to Friday (except holidays)
Du lundi au vendredi (sauf les jours fériés)

WESTBOUND / EN DIRECTION OUEST

Route Number Nombre d'itinéraire	Trip Number N° du trajet	Zone →		Dp.	Ar.	Dp.	Ar.	Dp.	Ar.	Dp.	Ar.	Dp.	Ar.	
		Oshawa 94	Whitby 93											Whitby 93
92	92010	Oshawa Bus Terminal	Whitby	04 10	04 18	04 22	→	04 30	04 38	04 41	04 46	04 55	05 10	05 20
92	92030			04 40	04 48	04 52	→	05 00	05 08	05 11	05 16	05 25	05 40	05 50
92	92040			05 05	05 13	05 17	→	05 25	05 33	05 36	05 42	05 55	06 10	06 20
92A	92052					05 35		05 40	05 48	05 51	05 57	06 10	06 30	06 40
92	92050			05 30	05 38	05 42	→	05 50	05 59	06 02	06 09	06 25	06 45	06 55
92A	92062					06 00		06 05	06 14	06 17	06 24	06 40	07 05	07 15
92	92070			06 00	06 08	06 12	→	06 20	06 29	06 32	06 39	06 55	07 20	07 30
92A	92072					06 30		06 35	06 44	06 47	06 54	07 10	07 40	07 50
92	92090			06 25	06 33	06 37	→	06 45	06 54	06 57	07 04	07 25	07 55	08 05
92A	92112					06 54		06 59	07 09	07 12	07 19	07 40	07 10	08 20
92	92130			06 50	06 58	07 03	→	07 14	07 24	07 27	07 34	07 55	08 25	08 35
92A	92152					07 24		07 29	07 39	07 42	07 49	08 10	08 40	08 50
92	92150			07 20	07 28	07 33	→	07 44	07 54	07 57	08 04	08 25	08 55	09 05
92A	92172					07 54		07 59	08 09	08 12	08 19	08 40	09 05	09 15
92	92170			07 50	07 58	08 03	→	08 14	08 24	08 27	08 34	08 55	09 20	09 30
92	92220			08 25	08 33	08 38	→	08 49	08 59	09 02	09 09	09 25	09 50	10 00
92	92230			08 55	09 03	09 08	→	09 19	09 29	09 32	09 39	09 55	10 15	10 25
92	92250			09 25	09 33	09 38	→	09 49	09 59	10 02	10 09	10 25	10 40	10 50
92	92270			09 55	10 03	10 08	→	10 19	10 29	10 32	10 39	10 55	11 10	11 20
92	92290			10 25	10 33	10 38	→	10 49	10 59	11 02	11 09	11 25	11 40	11 50
92	92310			10 55	11 03	11 08	→	11 19	11 29	11 32	11 39	11 55	12 10	12 20
92	92330			11 25	11 33	11 38	→	11 49	11 59	12 02	12 09	12 25	12 40	12 50
92	92350			11 55	12 03	12 08	→	12 19	12 29	12 32	12 39	12 55	13 10	13 20

Monday to Friday (except holidays)
Du lundi au vendredi (sauf les jours fériés)

WESTBOUND / EN DIRECTION OUEST

Route Number Nombre d'itinéraire	Trip Number N° du trajet	Zone →		Dp.	Ar.	Dp.	Ar.	Dp.	Ar.	Dp.	Ar.	Dp.	Ar.	
		Oshawa 94	Whitby 93											Whitby 93
92	92370	Oshawa Bus Terminal	Whitby	12 25	12 33	12 38	→	12 49	12 59	13 02	13 09	13 25	13 45	13 55
92	92390			12 55	13 03	13 08	→	13 19	13 29	13 32	13 39	13 55	14 15	14 25
92	92410			13 25	13 33	13 38	→	13 49	13 59	14 02	14 09	14 25	14 45	14 55
92	92430			13 55	14 03	14 08	→	14 19	14 29	14 32	14 39	14 55	15 15	15 30
92	92450			14 25	14 33	14 38	→	14 49	14 59	15 02	15 09	15 25	15 45	16 00
92	92470			14 55	15 03	15 08	→	15 19	15 29	15 32	15 39	15 55	16 15	16 30
92	92500			15 25	15 33	15 38	→	15 49	15 59	16 02	16 09	16 25	16 45	17 00
92	92530			15 55	16 03	16 08	→	16 19	16 29	16 32	16 39	16 55	17 15	17 30
92	92560			16 25	16 33	16 38	→	16 49	16 59	17 02	17 09	17 25	17 45	18 00
92	92590			16 55	17 03	17 08	→	17 19	17 29	17 32	17 39	17 55	18 15	18 25
92	92620			17 25	17 33	17 38	→	17 49	17 59	18 02	18 09	18 25	18 45	18 55
92	92650			18 00	18 08	18 12	→	18 20	18 29	18 32	18 39	18 55	19 15	19 25
92	92670			18 30	18 38	18 42	→	18 50	18 59	19 02	19 09	19 25	19 40	19 50
92	92700			19 00	19 08	19 12	→	19 20	19 29	19 32	19 39	19 55	20 10	20 20
92	92720			19 35	19 43	19 47	→	19 55	20 04	20 07	20 12	20 25	20 40	20 50
92	92740			20 05	20 13	20 17	→	20 25	20 34	20 37	20 42	20 55	21 10	21 20
92	92760			20 35	20 43	20 47	→	20 55	21 04	21 07	21 12	21 25	21 40	21 50
92	92780			21 05	21 13	21 17	→	21 25	21 34	21 37	21 42	21 55	22 10	22 20
92	92800			21 40	21 46	21 49	→	21 57	22 05	22 08	22 13	22 25	22 40	22 50
92	92820			22 10	22 16	22 19	→	22 27	22 35	22 38	22 43	22 55	23 10	23 20
92	92830			22 40	22 46	22 49	→	22 57	23 05	23 08	23 13	23 25	23 40	23 50
92	92860			23 40	23 46	23 49	→	23 57	00 05	00 08	00 13	00 25	00 40	00 50
92	92890			00 40	00 46	00 49	→	00 57	01 05	01 08	01 13	01 25	01 40	01 50

Monday to Friday (except holidays)
Du lundi au vendredi (sauf les jours fériés)

EASTBOUND / EN DIRECTION EST

Route Number Nombre d'itinéraire	Zone →		Dp.	5	5	7	90	91	91	92	93	93	93	94	Ar.
	Trip Number N° du trajet	North York													
92	92021	04 50	05 00	05 15	05 24	05 29	05 32	05 40	→	05 48	05 52	06 00			
92	92041	05 20	05 30	05 45	05 54	05 59	06 02	06 10	→	06 18	06 22	06 30			
92	92061	05 50	06 00	06 15	06 25	06 30	06 33	06 41	→	06 49	06 53	07 05			
92	92091	06 20	06 30	06 45	06 55	07 00	07 03	07 11	→	07 19	07 23	07 35			
92	92121	06 50	07 00	07 15	07 25	07 30	07 35	07 44	→	07 54	07 58	08 10			
92	92151	07 20	07 30	07 45	07 55	08 00	08 05	08 14	→	08 24	08 28	08 40			
92	92171	07 45	07 55	08 15	08 25	08 30	08 35	08 44	→	08 54	08 58	09 10			
92	92201	08 15	08 25	08 45	08 55	09 00	09 05	09 14	→	09 24	09 28	09 40			
92	92231	08 45	08 55	09 15	09 25	09 30	09 35	09 44	→	09 54	09 58	10 10			
92	92251	09 20	09 30	09 45	09 55	10 00	10 05	10 14	→	10 24	10 28	10 40			
92	92271	09 50	10 00	10 15	10 25	10 30	10 35	10 44	→	10 54	10 58	11 10			
92	92291	10 20	10 30	10 45	10 55	11 00	11 05	11 14	→	11 24	11 28	11 40			
92	92311	10 50	11 00	11 15	11 25	11 30	11 35	11 44	→	11 54	11 58	12 10			
92	92331	11 20	11 30	11 45	11 55	12 00	12 05	12 14	→	12 24	12 28	12 40			
92	92351	11 50	12 00	12 15	12 25	12 30	12 35	12 44	→	12 54	12 58	13 10			
92	92371	12 20	12 30	12 45	12 55	13 00	13 05	13 14	→	13 24	13 28	13 40			
92	92391	12 50	13 00	13 15	13 25	13 30	13 35	13 44	→	13 54	13 58	14 10			
92	92401	13 20	13 30	13 45	13 55	14 00	14 05	14 14	→	14 24	14 28	14 40			
92	92431	13 50	14 00	14 15	14 25	14 30	14 35	14 44	→	14 54	14 58	15 10			
92	92441	14 20	14 30	14 45	14 55	15 01	15 06	15 16	→	15 28	15 30	15 45			
92	92471	14 45	14 55	15 15	15 25	15 31	15 36	15 46	→	15 56	16 00	16 15			
92A	92483	15 00	15 10	15 30	15 40	15 46	15 51	16 01	16 11						
92	92481	15 15	15 25	15 45	15 55	16 01	16 06	16 17	→	16 28	16 34	16 50			

Monday to Friday (except holidays)
Du lundi au vendredi (sauf les jours fériés)

EASTBOUND / EN DIRECTION EST

Route Number Nombre d'itinéraire	Zone →		Dp.	5	7	90	91	91	92	93	93	93	94	Ar.
	Trip Number N° du trajet	North York												
92A	92523	15 30	15 40	16 00	16 10	16 16	16 21	16 32	16 49					
92	92521	15 40	15 50	16 15	16 25	16 31	16 36	16 47	→	16 58	17 04	17 20		
92A	92543	15 55	16 05	16 30	16 40	16 46	16 51	17 02	17 19					
92	92561	16 05	16 15	16 45	16 55	17 01	17 06	17 17	→	17 28	17 34	17 50		
92A	92573	16 20	16 30	17 00	17 12	17 19	17 24	17 35	17 49					
92	92571	16 35	16 45	17 15	17 27	17 34	17 39	17 50	→	18 01	18 07	18 25		
92A	92593	16 50	17 00	17 30	17 42	17 49	17 54	18 05	18 19					
92	92591	17 05	17 15	17 45	17 55	18 01	18 06	18 17	→	18 28	18 34	18 50		
92A	92613	17 20	17 30	18 00	18 10	18 16	18 21	18 32	18 44					
92	92631	17 40	17 50	18 15	18 25	18 31	18 36	18 47	→	18 58	19 04	19 20		
92A	92633	17 55	18 05	18 30	18 40	18 46	18 49	18 59	19 09					
92	92651	18 10	18 20	18 45	18 55	19 01	19 04	19 14	→	19 23	19 29	19 45		
92A	92653	18 30	18 40	19 00	19 10	19 16	19 19	19 29	19 39					
92	92681	18 45	18 55	19 15	19 25	19 31	19 34	19 43	→	19 52	19 56	20 10		
92	92701	19 15	19 25	19 45	19 55	20 01	20 04	20 13	→	20 22	20 26	20 40		
92	92731	19 50	20 00	20 15	20 25	20 31	20 34	20 43	→	20 52	20 56	21 10		
92	92751	20 20	20 30	20 45	20 55	21 00	21 03	21 11	→	21 19	21 23	21 35		
92	92771	20 50	21 00	21 15	21 25	21 30	21 33	21 41	→	21 49	21 53	22 05		
92	92791	21 20	21 30	21 45	21 55	22 00	22 03	22 11	→	22 19	22 23	22 35		
92	92811	21 50	22 00	22 15	22 25	22 30	22 33	22 41	→	22 49	22 53	23 05		
92	92831	22 20	22 30	22 45	22 55	23 00	23 03	23 11	→	23 19	23 23	23 35		
92	92841	22 50	23 00	23 15	23 25	23 30	23 33	23 41	→	23 49	23 53	00 05		
92	92871	23 50	24 00	00 15	00 24	00 29	00 32	00 40	→	00 48	00 52	01 00		
92	92901	00 50	01 00	01 15	01 24	01 29	01 32	01 40	→	01 48	01 52	02 00		

**Saturday and Sunday
Samedi et dimanche**

WESTBOUND / EN DIRECTION OUEST

Route Number Nombre d'itinéraire	Zone →		Oshawa Bus Terminal	Whitby Dundas St. @ Thicksen Rd.	Whitby Dundas St. @ Brock St.	Ajax Kingston Rd. @ Harwood Ave.	Pickering Kingston Rd. @ Glenanna Rd.	Pickering Kingston Rd. @ Fairport Rd.	Scarborough Kingston Rd. @ Sheppard Ave. E	7 Scarborough Centre Bus Terminal	Ar.	5 North York Mills Bus Terminal	Ar.	5 North York Bus Terminal	Ar.
	Trip Number N° du trajet	Dp.													
92	92050	05 35	05 43	05 47	05 55	06 04	06 07	06 12	06 25	06 40	06 50				
92	92070	06 05	06 13	06 17	06 25	06 34	06 37	06 42	06 55	07 10	07 20				
92	92100	06 35	06 43	06 47	06 55	07 04	07 07	07 12	07 25	07 40	07 50				
92	92130	07 05	07 13	07 17	07 25	07 34	07 37	07 42	07 55	08 10	08 20				
92	92160	07 35	07 43	07 47	07 55	08 04	08 07	08 12	08 25	08 40	08 50				
92	92190	08 05	08 13	08 17	08 25	08 34	08 37	08 42	08 55	09 10	09 20				
92	92220	08 35	08 43	08 47	08 55	09 04	09 07	09 12	09 25	09 40	09 50				
92	92240	09 00	09 08	09 12	09 20	09 29	09 32	09 39	09 55	10 10	10 20				
92	92260	09 30	09 38	09 42	09 50	09 59	10 02	10 09	10 25	10 40	10 55				
92	92280	10 00	10 08	10 12	10 20	10 29	10 32	10 39	10 55	11 10	11 25				
92	92300	10 30	10 38	10 42	10 50	11 00	11 03	11 10	11 25	11 40	11 55				
92	92310	11 00	11 08	11 12	11 20	11 30	11 33	11 40	11 55	12 10	12 25				
92	92330	11 30	11 38	11 42	11 50	12 00	12 03	12 10	12 25	12 40	12 55				
92	92350	12 00	12 08	12 12	12 20	12 30	12 33	12 40	12 55	13 10	13 25				
92	92370	12 25	12 33	12 37	12 45	12 55	13 00	13 10	13 25	13 40	13 55				
92	92390	12 55	13 03	13 07	13 15	13 25	13 30	13 40	13 55	14 12	14 30				
92	92410	13 25	13 33	13 37	13 45	13 55	14 00	14 10	14 25	14 42	15 00				

**Saturday and Sunday
Samedi et dimanche**

WESTBOUND / EN DIRECTION OUEST

Route Number Nombre d'itinéraire	Zone →		Oshawa Bus Terminal	Whitby Dundas St. @ Thicksen Rd.	Whitby Dundas St. @ Brock St.	Ajax Kingston Rd. @ Harwood Ave.	Pickering Kingston Rd. @ Glenanna Rd.	Pickering Kingston Rd. @ Fairport Rd.	Scarborough Kingston Rd. @ Sheppard Ave. E	7 Scarborough Centre Bus Terminal	Ar.	5 North York Mills Bus Terminal	Ar.	5 North York Bus Terminal	Ar.
	Trip Number N° du trajet	Dp.													
92	92430	13 55	14 03	14 07	14 15	14 25	14 30	14 40	14 55	15 12	15 30				
92	92450	14 25	14 33	14 37	14 45	14 55	15 00	15 10	15 25	15 42	16 00				
92	92470	14 55	15 03	15 07	15 15	15 25	15 30	15 40	15 55	16 12	16 30				
92	92510	15 25	15 33	15 37	15 45	15 55	16 00	16 10	16 25	16 42	17 00				
92	92530	16 00	16 08	16 12	16 20	16 30	16 33	16 40	16 55	17 12	17 30				
92	92560	16 30	16 38	16 42	16 50	17 00	17 03	17 10	17 25	17 42	18 00				
92	92590	17 00	17 08	17 12	17 20	17 30	17 33	17 40	17 55	18 12	18 30				
92	92620	17 30	17 38	17 42	17 50	18 00	18 03	18 10	18 25	18 40	18 55				
92	92660	18 00	18 08	18 12	18 20	18 30	18 33	18 40	18 55	19 10	19 25				
92	92680	18 35	18 43	18 47	18 55	19 05	19 08	19 13	19 25	19 40	19 55				
92	92700	19 05	19 13	19 17	19 25	19 35	19 38	19 43	19 55	20 10	20 25				
92	92720	19 35	19 43	19 47	19 55	20 05	20 08	20 13	20 25	20 40	20 50				
92	92740	20 05	20 13	20 17	20 25	20 35	20 38	20 43	20 55	21 10	21 20				
92	92760	20 35	20 43	20 47	20 55	21 05	21 08	21 13	21 25	21 40	21 50				
92	92800	21 35	21 43	21 47	21 55	22 05	22 08	22 13	22 25	22 40	22 50				
92	92830	22 35	22 43	22 47	22 55	23 05	23 08	23 13	23 25	23 40	23 50				
92	92860	23 35	23 43	23 47	23 55	00 05	00 08	00 13	00 25	00 40	00 50				

**Saturday and Sunday
Samedi et dimanche**

EASTBOUND / EN DIRECTION EST

Route Number Nombre d'itinéraire	Zone →		Yorkdale Bus Terminal	York Mills Bus Terminal	Scarborough Centre Bus Terminal	Kingston Rd. @ Port Union Rd.	Kingston Rd. @ Fairport Rd.	Kingston Rd. @ Glenanna Rd.	Kingston Rd. @ Harwood Ave.	Dundas St. @ Brock St.	Dundas St. @ Thicksion Rd.	Oshawa Bus Terminal	Ar.						
	Trip Number N° du trajet	Dp.																	
92	92121	5	06 50	5	07 15	90	07 24	91	07 29	91	07 32	92	07 40	93	07 48	93	07 52	94	08 00
92	92151	5	07 20	5	07 45	90	07 55	91	08 00	91	08 03	92	08 11	93	08 19	93	08 23	94	08 35
92	92181	5	07 50	5	08 15	90	08 25	91	08 30	91	08 33	92	08 41	93	08 49	93	08 53	94	09 05
92	92211	5	08 20	5	08 45	90	08 55	91	09 00	91	09 03	92	09 11	93	09 19	93	09 23	94	09 35
92	92231	5	08 50	5	09 15	90	09 25	91	09 30	91	09 33	92	09 41	93	09 49	93	09 53	94	10 05
92	92251	5	09 20	5	09 45	90	09 55	91	10 00	91	10 03	92	10 11	93	10 19	93	10 23	94	10 35
92	92271	5	09 50	5	10 15	90	10 25	91	10 30	91	10 33	92	10 41	93	10 49	93	10 53	94	11 05
92	92291	5	10 20	5	10 45	90	10 55	91	11 00	91	11 03	92	11 11	93	11 19	93	11 23	94	11 35
92	92311	5	10 50	5	11 15	90	11 25	91	11 30	91	11 33	92	11 42	93	11 52	93	11 56	94	12 10
92	92331	5	11 20	5	11 45	90	11 55	91	12 00	91	12 03	92	12 12	93	12 22	93	12 26	94	12 40
92	92351	5	11 50	5	12 15	90	12 25	91	12 30	91	12 33	92	12 42	93	12 52	93	12 56	94	13 10
92	92371	5	12 20	5	12 45	90	12 55	91	13 00	91	13 03	92	13 12	93	13 22	93	13 26	94	13 40
92	92391	5	12 50	5	13 15	90	13 25	91	13 30	91	13 33	92	13 42	93	13 52	93	13 56	94	14 10
92	92411	5	13 20	5	13 45	90	13 55	91	14 00	91	14 03	92	14 12	93	14 22	93	14 26	94	14 40
92	92431	5	13 50	5	14 15	90	14 25	91	14 30	91	14 33	92	14 42	93	14 52	93	14 56	94	15 10
92	92451	5	14 20	5	14 45	90	14 55	91	15 00	91	15 03	92	15 12	93	15 22	93	15 26	94	15 40
92	92471	5	14 50	5	15 15	90	15 25	91	15 30	91	15 33	92	15 42	93	15 52	93	15 56	94	16 10

**Saturday and Sunday
Samedi et dimanche**

EASTBOUND / EN DIRECTION EST

Route Number Nombre d'itinéraire	Zone →		Yorkdale Bus Terminal	York Mills Bus Terminal	Scarborough Centre Bus Terminal	Kingston Rd. @ Port Union Rd.	Kingston Rd. @ Fairport Rd.	Kingston Rd. @ Glenanna Rd.	Kingston Rd. @ Harwood Ave.	Dundas St. @ Brock St.	Dundas St. @ Thicksion Rd.	Oshawa Bus Terminal	Ar.						
	Trip Number N° du trajet	Dp.																	
92	92491	5	15 20	5	15 45	90	15 55	91	16 00	91	16 03	92	16 12	93	16 22	93	16 26	94	16 40
92	92521	5	15 50	5	16 15	90	16 25	91	16 30	91	16 33	92	16 42	93	16 52	93	16 56	94	17 10
92	92551	5	16 20	5	16 45	90	16 57	91	17 03	91	17 07	92	17 16	93	17 26	93	17 31	94	17 45
92	92581	5	16 50	5	17 15	90	17 27	91	17 33	91	17 37	92	17 45	93	17 56	93	18 01	94	18 15
92	92611	5	17 20	5	17 45	90	17 55	91	18 00	91	18 03	92	18 12	93	18 22	93	18 26	94	18 40
92	92641	5	17 50	5	18 15	90	18 25	91	18 30	91	18 33	92	18 42	93	18 52	93	18 56	94	19 10
92	92671	5	18 20	5	18 45	90	18 55	91	19 00	91	19 03	92	19 12	93	19 22	93	19 26	94	19 40
92	92691	5	18 50	5	19 15	90	19 25	91	19 30	91	19 33	92	19 42	93	19 52	93	19 56	94	20 10
92	92711	5	19 20	5	19 45	90	19 55	91	20 00	91	20 03	92	20 12	93	20 22	93	20 26	94	20 40
92	92731	5	19 50	5	20 15	90	20 25	91	20 30	91	20 33	92	20 41	93	20 49	93	20 53	94	21 05
92	92751	5	20 20	5	20 45	90	20 55	91	21 00	91	21 03	92	21 11	93	21 19	93	21 23	94	21 35
92	92771	5	20 50	5	21 15	90	21 25	91	21 30	91	21 33	92	21 41	93	21 49	93	21 53	94	22 05
92	92791	5	21 20	5	21 45	90	21 55	91	22 00	91	22 03	92	22 11	93	22 19	93	22 23	94	22 35
92	92811	5	21 50	5	22 15	90	22 25	91	22 30	91	22 33	92	22 41	93	22 48	93	22 53	94	23 05
92	92841	5	22 50	5	23 15	90	23 24	91	23 29	91	23 32	92	23 40	93	23 48	93	23 52	94	24 00
92	92871	5	23 50	5	00 15	90	00 24	91	00 29	91	00 32	92	00 40	93	00 48	93	00 52	94	01 00
92	92901	5	00 50	5	01 15	90	01 24	91	01 29	91	01 32	92	01 40	93	01 48	93	01 52	94	02 00

APPENDIX C

Level of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX D

Traffic Data



Turning Movement Count (1 . BROCK RD & FINCH AVE)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:30:00	17	346	0	0	0	363	1	1	4	0	0	6	0	113	15	0	1	128	25	0	12	0	2	37	534	
06:45:00	32	358	2	0	0	392	1	0	2	0	0	3	1	116	17	0	0	134	34	0	14	0	1	48	577	
07:00:00	35	337	0	0	0	372	0	0	3	0	0	3	1	158	20	0	0	179	31	1	21	0	3	53	607	
07:15:00	35	408	0	0	0	443	0	1	5	0	1	6	2	139	20	0	0	161	45	0	26	0	1	71	681	2399
07:30:00	54	419	0	0	0	473	2	2	4	0	1	8	0	164	31	0	1	195	54	0	27	0	3	81	757	2622
07:45:00	40	486	0	0	1	526	3	0	4	0	2	7	0	162	24	0	1	186	54	1	38	0	4	93	812	2857
08:00:00	31	458	0	0	0	489	0	0	4	0	0	4	3	170	30	0	0	203	53	2	38	0	0	93	789	3039
08:15:00	54	414	1	0	0	469	0	2	7	0	0	9	0	176	34	0	0	210	63	0	37	0	2	100	788	3146
08:30:00	50	402	0	0	0	452	2	3	1	0	1	6	2	151	38	0	0	191	40	3	34	0	4	77	726	3115
08:45:00	45	414	2	0	0	461	2	0	1	0	1	3	0	166	28	0	0	194	73	1	51	0	1	125	783	3086
BREAK																										
15:30:00	42	188	0	0	1	230	3	1	1	0	1	5	2	368	41	0	0	411	55	1	76	0	1	132	778	
15:45:00	40	192	3	0	1	235	1	2	4	0	1	7	2	330	54	0	0	386	64	3	72	0	3	139	767	
16:00:00	63	218	0	0	1	281	2	1	3	0	1	6	4	379	53	0	1	436	52	3	81	0	0	136	859	
16:15:00	45	193	0	0	3	238	2	0	4	0	2	6	4	358	50	0	2	412	60	2	82	0	0	144	800	3204
16:30:00	35	241	1	0	2	277	2	2	2	0	0	6	4	385	65	0	0	454	57	4	89	0	9	150	887	3313
16:45:00	34	202	1	0	1	237	1	2	3	0	3	6	4	416	57	0	0	477	65	2	93	0	6	160	880	3426
17:00:00	32	242	3	0	0	277	2	1	2	0	1	5	2	422	58	0	0	482	54	4	102	0	2	160	924	3491
17:15:00	46	216	1	0	1	263	2	0	2	0	2	4	7	437	49	0	0	493	66	3	98	0	0	167	927	3618
17:30:00	45	232	0	0	0	277	2	1	7	0	0	10	7	412	61	1	0	481	54	6	89	0	0	149	917	3648
17:45:00	50	226	1	0	0	277	1	1	3	0	2	5	3	380	57	0	0	440	70	3	68	0	2	141	863	3631
18:00:00	33	236	0	0	0	269	3	3	2	0	1	8	3	368	49	0	0	420	63	2	54	0	5	119	816	3523
18:15:00	39	201	1	0	0	241	1	3	3	0	4	7	3	378	62	0	0	443	75	4	71	0	7	150	841	3437
Grand Total	897	6629	16	0	11	7542	33	26	71	0	24	130	54	6148	913	1	6	7116	1207	45	1273	0	56	2525	17313	-
Approach %	11.9%	87.9%	0.2%	0%	-	-	25.4%	20%	54.6%	0%	-	-	0.8%	86.4%	12.8%	0%	-	-	47.8%	1.8%	50.4%	0%	-	-	-	-
Totals %	5.2%	38.3%	0.1%	0%	-	43.6%	0.2%	0.2%	0.4%	0%	0.8%	0.3%	35.5%	5.3%	0%	-	41.1%	7%	0.3%	7.4%	0%	-	14.6%	-	-	-
Heavy	35	365	3	0	-	-	5	3	4	0	-	-	3	385	25	0	-	-	45	4	31	0	-	-	-	-
Heavy %	3.9%	5.5%	18.8%	0%	-	-	15.2%	11.5%	5.6%	0%	-	-	5.6%	6.3%	2.7%	0%	-	-	3.7%	8.9%	2.4%	0%	-	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Clear Sky (6.1 °C)

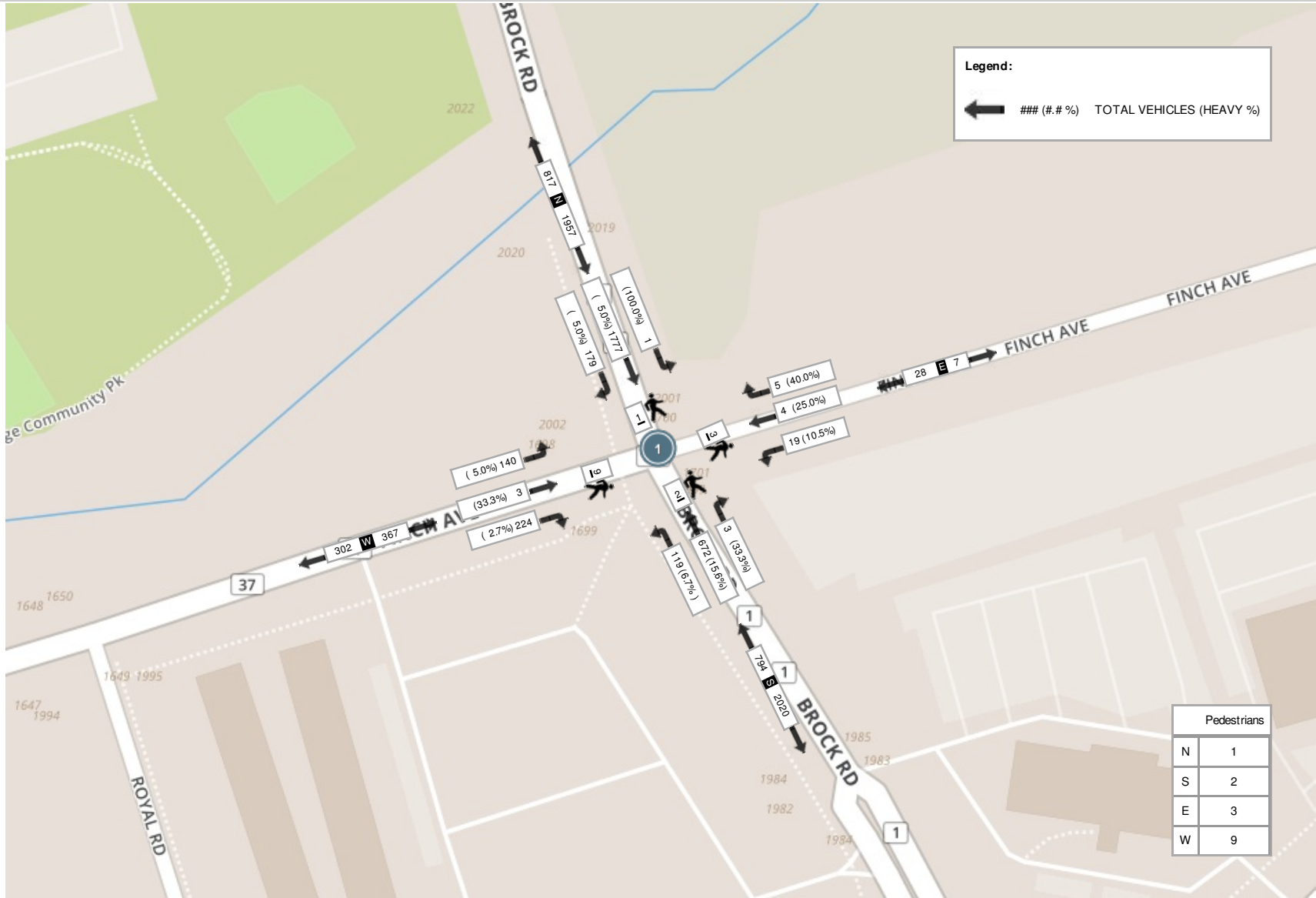
Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	54	419	0	0	0	473	2	2	4	0	1	8	0	164	31	0	1	195	54	0	27	0	3	81	757
07:45:00	40	486	0	0	1	526	3	0	4	0	2	7	0	162	24	0	1	186	54	1	38	0	4	93	812
08:00:00	31	458	0	0	0	489	0	0	4	0	0	4	3	170	30	0	0	203	53	2	38	0	0	93	789
08:15:00	54	414	1	0	0	469	0	2	7	0	0	9	0	176	34	0	0	210	63	0	37	0	2	100	788
Grand Total	179	1777	1	0	1	1957	5	4	19	0	3	28	3	672	119	0	2	794	224	3	140	0	9	367	3146
Approach%	9.1%	90.8%	0.1%	0%		-	17.9%	14.3%	67.9%	0%		-	0.4%	84.6%	15%	0%		-	61%	0.8%	38.1%	0%		-	-
Totals %	5.7%	56.5%	0%	0%		62.2%	0.2%	0.1%	0.6%	0%		0.9%	0.1%	21.4%	3.8%	0%		25.2%	7.1%	0.1%	4.5%	0%		11.7%	-
PHF	0.83	0.91	0.25	0		0.93	0.42	0.5	0.68	0		0.78	0.25	0.95	0.88	0		0.95	0.89	0.38	0.92	0		0.92	-
Heavy	9	88	1	0		98	2	1	2	0		5	1	105	8	0		114	6	1	7	0		14	-
Heavy %	5%	5%	100%	0%		5%	40%	25%	10.5%	0%		17.9%	33.3%	15.6%	6.7%	0%		14.4%	2.7%	33.3%	5%	0%		3.8%	-
Lights	170	1689	0	0		1859	3	3	17	0		23	2	567	111	0		680	218	2	133	0		353	-
Lights %	95%	95%	0%	0%		95%	60%	75%	89.5%	0%		82.1%	66.7%	84.4%	93.3%	0%		85.6%	97.3%	66.7%	95%	0%		96.2%	-
Single-Unit Trucks	3	52	0	0		55	0	1	0	0		1	0	68	3	0		71	0	0	1	0		1	-
Single-Unit Trucks %	1.7%	2.9%	0%	0%		2.8%	0%	25%	0%	0%		3.6%	0%	10.1%	2.5%	0%		8.9%	0%	0%	0.7%	0%		0.3%	-
Buses	6	18	1	0		25	2	0	2	0		4	1	18	5	0		24	6	1	6	0		13	-
Buses %	3.4%	1%	100%	0%		1.3%	40%	0%	10.5%	0%		14.3%	33.3%	2.7%	4.2%	0%		3%	2.7%	33.3%	4.3%	0%		3.5%	-
Articulated Trucks	0	18	0	0		18	0	0	0	0		0	0	19	0	0		19	0	0	0	0		0	-
Articulated Trucks %	0%	1%	0%	0%		0.9%	0%	0%	0%	0%		0%	0%	2.8%	0%	0%		2.4%	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	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-	-	9	-	-
Pedestrians%	-	-	-	-	6.7%	-	-	-	-	-	20%	-	-	-	-	13.3%	-	-	-	-	-	60%	-	-	-



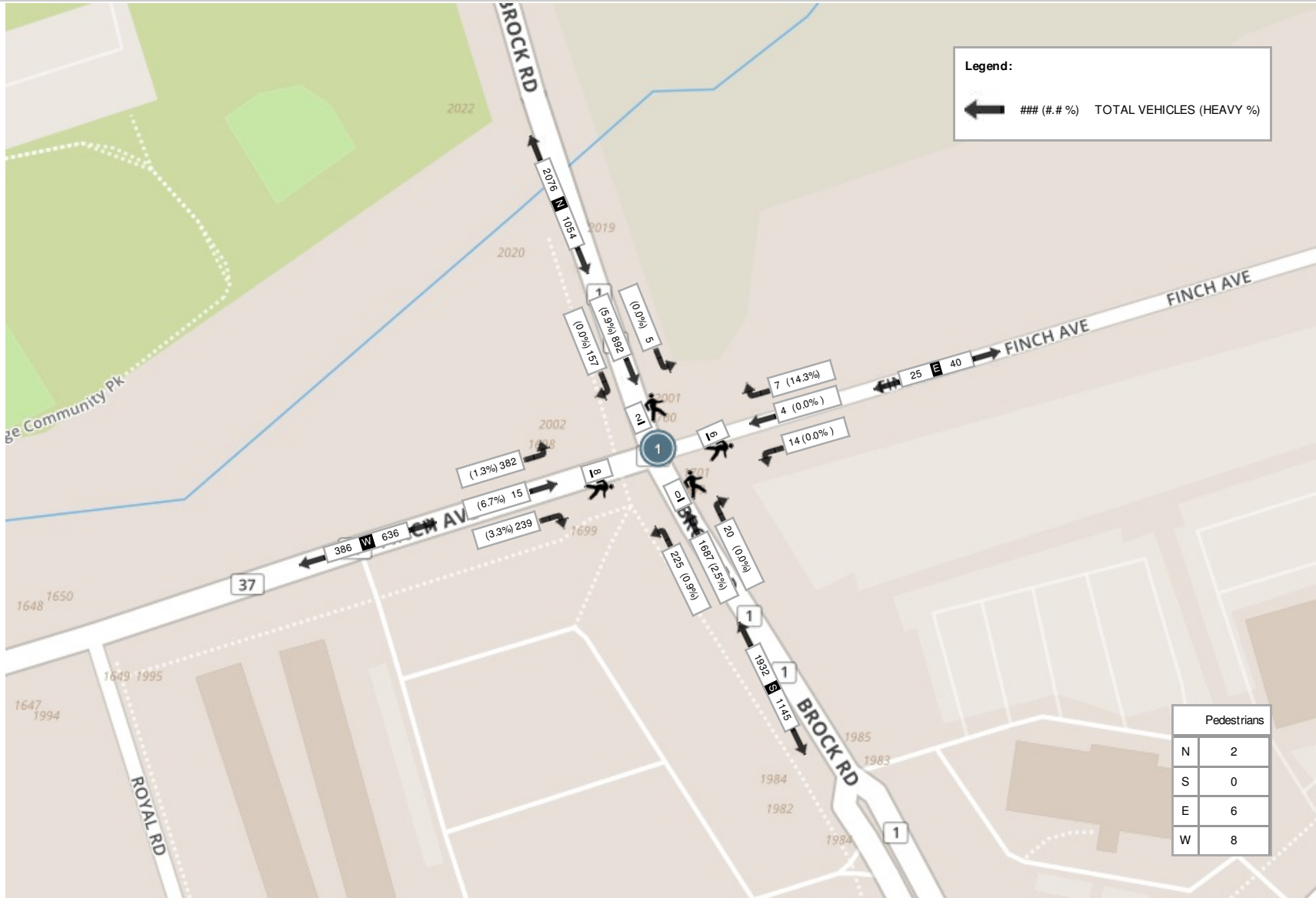
Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (16.41 °C)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	34	202	1	0	1	237	1	2	3	0	3	6	4	416	57	0	0	477	65	2	93	0	6	160	880
17:00:00	32	242	3	0	0	277	2	1	2	0	1	5	2	422	58	0	0	482	54	4	102	0	2	160	924
17:15:00	46	216	1	0	1	263	2	0	2	0	2	4	7	437	49	0	0	493	66	3	98	0	0	167	927
17:30:00	45	232	0	0	0	277	2	1	7	0	0	10	7	412	61	1	0	481	54	6	89	0	0	149	917
Grand Total	157	892	5	0	2	1054	7	4	14	0	6	25	20	1687	225	1	0	1933	239	15	382	0	8	636	3648
Approach%	14.9%	84.6%	0.5%	0%	-	-	28%	16%	56%	0%	-	-	1%	87.3%	11.6%	0.1%	-	37.6%	2.4%	60.1%	0%	-	-	-	
Totals %	4.3%	24.5%	0.1%	0%	28.9%	0.7%	0.2%	0.1%	0.4%	0%	0.7%	0.7%	0.5%	46.2%	6.2%	0%	53%	6.6%	0.4%	10.5%	0%	17.4%	17.4%	-	
PHF	0.85	0.92	0.42	0	0.95	0.63	0.88	0.5	0.5	0	0.63	0.63	0.71	0.97	0.92	0.25	0.98	0.91	0.63	0.94	0	0.95	0.95	-	
Heavy	0	53	0	0	53	1	0	0	0	0	1	1	0	43	2	0	45	8	1	5	0	14	14	-	
Heavy %	0%	5.9%	0%	0%	5%	4%	14.3%	0%	0%	0%	4%	4%	0%	2.5%	0.9%	0%	2.3%	3.3%	6.7%	1.3%	0%	2.2%	2.2%	-	
Lights	157	839	5	0	1001	6	4	14	0	24	24	20	1643	223	1	1887	231	14	377	0	622	622	-		
Lights %	100%	94.1%	100%	0%	95%	96%	85.7%	100%	100%	0%	96%	96%	100%	97.4%	99.1%	100%	97.6%	96.7%	93.3%	98.7%	0%	97.8%	97.8%	-	
Single-Unit Trucks	0	33	0	0	33	1	0	0	0	1	1	0	24	0	0	24	2	1	5	0	8	8	-		
Single-Unit Trucks %	0%	3.7%	0%	0%	3.1%	4%	14.3%	0%	0%	0%	4%	4%	0%	1.4%	0%	0%	1.2%	0.8%	6.7%	1.3%	0%	1.3%	1.3%	-	
Buses	0	10	0	0	10	0	0	0	0	0	0	0	11	2	0	13	5	0	0	0	5	5	-		
Buses %	0%	1.1%	0%	0%	0.9%	0%	0%	0%	0%	0%	0%	0%	0.7%	0.9%	0%	0.7%	2.1%	0%	0%	0%	0.8%	0.8%	-		
Articulated Trucks	0	10	0	0	10	0	0	0	0	0	0	0	8	0	0	8	1	0	0	0	1	1	-		
Articulated Trucks %	0%	1.1%	0%	0%	0.9%	0%	0%	0%	0%	0%	0%	0%	0.5%	0%	0%	0.4%	0.4%	0%	0%	0%	0.2%	0.2%	-		
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	-		
Bicycles on Road %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%	0%	0%	0.1%	0%	0%	0%	0%	0%	0%	-		
Pedestrians	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-	0	-	-	-	-	-	8	-	-
Pedestrians%	-	-	-	-	12.5%	-	-	-	-	-	37.5%	-	-	-	-	-	0%	-	-	-	-	-	50%	-	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Clear Sky (6.1 °C)



Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (16.41 °C)





Turning Movement Count (3 . BROCK RD & USMAN RD / MAJOR OAKS RD)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:30:00	1	315	0	0	1	316	0	0	11	0	1	11	0	106	7	0	0	113	64	0	3	0	2	67	507	
06:45:00	2	319	0	0	0	321	0	1	16	0	0	17	2	128	17	0	0	147	59	0	4	0	0	63	548	
07:00:00	0	310	0	0	3	310	0	0	12	0	0	12	1	147	20	0	0	168	49	0	5	0	1	54	544	
07:15:00	1	365	0	0	0	366	3	0	13	0	0	16	2	153	19	0	0	174	71	0	4	0	1	75	631	2230
07:30:00	2	424	0	0	1	426	1	1	12	0	0	14	0	171	23	0	0	194	62	0	8	0	1	70	704	2427
07:45:00	4	438	0	0	5	442	1	0	22	0	0	23	1	184	21	0	1	206	68	2	13	0	0	83	754	2633
08:00:00	7	409	1	0	0	417	3	2	28	0	0	33	4	161	32	0	0	197	55	0	5	0	1	60	707	2796
08:15:00	4	389	1	0	0	394	2	2	24	0	1	28	4	180	34	0	0	218	53	2	9	0	1	64	704	2869
08:30:00	4	379	1	0	0	384	4	2	18	0	0	24	5	154	19	0	0	178	85	1	11	0	2	97	683	2848
08:45:00	3	368	2	0	1	373	6	1	6	0	1	13	4	200	22	0	0	226	56	0	5	0	3	61	673	2767
BREAK																										
15:30:00	5	186	2	0	2	193	5	0	17	0	0	22	0	404	46	0	1	450	27	0	8	0	2	35	700	
15:45:00	4	195	6	0	0	205	1	1	12	0	0	14	0	336	47	0	1	383	32	0	14	0	1	46	648	
16:00:00	7	238	2	0	0	247	2	0	6	0	0	8	0	396	63	0	0	459	42	3	2	0	2	47	761	
16:15:00	8	201	4	0	0	213	3	0	5	0	0	8	4	394	55	0	0	453	32	1	8	0	0	41	715	2824
16:30:00	10	229	1	0	0	240	6	0	5	0	2	11	4	407	61	0	1	472	44	1	3	0	1	48	771	2895
16:45:00	10	190	2	0	2	202	8	0	3	0	0	11	5	442	70	0	1	517	37	0	3	0	2	40	770	3017
17:00:00	6	231	2	0	0	239	2	1	7	0	0	10	4	459	62	0	5	525	38	0	4	0	4	42	816	3072
17:15:00	4	222	6	0	1	232	2	2	18	0	0	22	6	452	64	0	1	522	46	9	7	0	0	62	838	3195
17:30:00	11	216	11	0	0	238	4	3	31	0	1	38	10	436	63	0	9	509	50	1	6	0	4	57	842	3266
17:45:00	5	214	0	0	0	219	0	1	19	0	2	20	2	371	72	0	1	445	48	0	1	0	3	49	733	3229
18:00:00	9	225	2	0	0	236	3	0	7	0	0	10	5	375	68	0	0	448	45	0	8	0	0	53	747	3160
18:15:00	10	188	3	0	0	201	4	2	6	0	1	12	3	378	76	0	2	457	48	1	11	0	8	60	730	3052
Grand Total	117	6251	46	0	16	6414	60	19	298	0	9	377	66	6434	961	0	23	7461	1111	21	142	0	39	1274	15526	-
Approach %	1.8%	97.5%	0.7%	0%	-	-	15.9%	5%	79%	0%	-	-	0.9%	86.2%	12.9%	0%	-	-	87.2%	1.6%	11.1%	0%	-	-	-	-
Totals %	0.8%	40.3%	0.3%	0%	41.3%	0.4%	0.1%	1.9%	0%	2.4%	0.4%	41.4%	6.2%	0%	48.1%	7.2%	0.1%	0.9%	0%	8.2%	-	-	-	-	-	-
Heavy	7	364	0	0	-	3	3	10	0	-	1	401	29	0	-	31	2	4	0	-	-	-	-	-	-	-
Heavy %	6%	5.8%	0%	0%	-	5%	15.8%	3.4%	0%	-	1.5%	6.2%	3%	0%	-	2.8%	9.5%	2.8%	0%	-	-	-	-	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Clear Sky (6.1 °C)

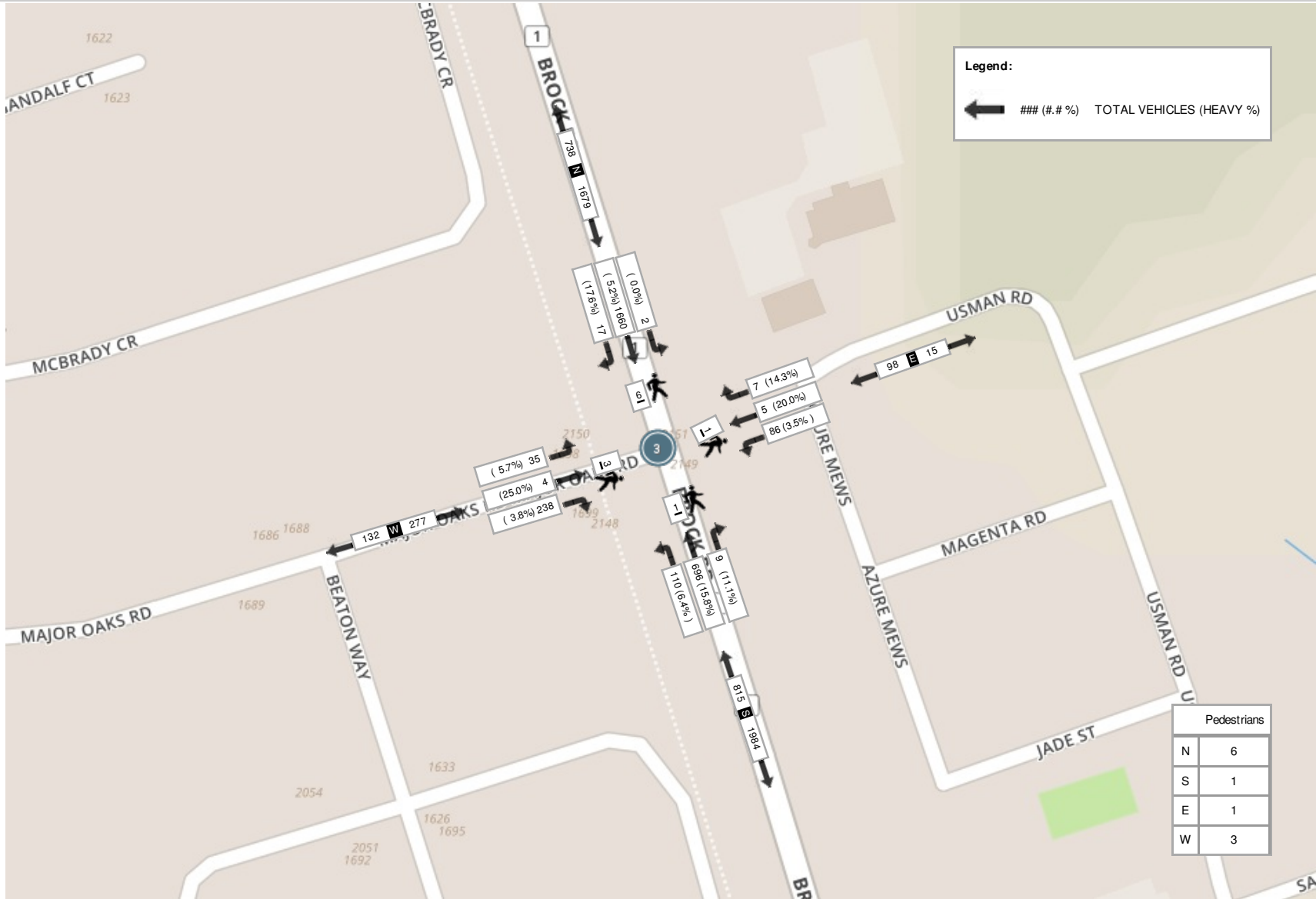
Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	2	424	0	0	1	426	1	1	12	0	0	14	0	171	23	0	0	194	62	0	8	0	1	70	704
07:45:00	4	438	0	0	5	442	1	0	22	0	0	23	1	184	21	0	1	206	68	2	13	0	0	83	754
08:00:00	7	409	1	0	0	417	3	2	28	0	0	33	4	161	32	0	0	197	55	0	5	0	1	60	707
08:15:00	4	389	1	0	0	394	2	2	24	0	1	28	4	180	34	0	0	218	53	2	9	0	1	64	704
Grand Total	17	1660	2	0	6	1679	7	5	86	0	1	98	9	696	110	0	1	815	238	4	35	0	3	277	2869
Approach%	1%	98.9%	0.1%	0%	-	-	7.1%	5.1%	87.8%	0%	-	-	1.1%	85.4%	13.5%	0%	-	-	85.9%	1.4%	12.6%	0%	-	-	-
Totals %	0.6%	57.9%	0.1%	0%	58.5%	3.4%	0.2%	0.2%	3%	0%	3.4%	0.3%	24.3%	3.8%	0%	28.4%	8.3%	0.1%	1.2%	0%	9.7%	-	-	-	
PHF	0.61	0.95	0.5	0	0.95	0.74	0.58	0.63	0.77	0	0.74	0.56	0.95	0.81	0	0.93	0.88	0.5	0.67	0	0.83	-	-	-	
Heavy	3	87	0	0	90	5	1	1	3	0	5	1	110	7	0	118	9	1	2	0	12	-	-	-	
Heavy %	17.6%	5.2%	0%	0%	5.4%	5.1%	14.3%	20%	3.5%	0%	5.1%	11.1%	15.8%	6.4%	0%	14.5%	3.8%	25%	5.7%	0%	4.3%	-	-	-	
Lights	14	1573	2	0	1589	93	6	4	83	0	93	8	586	103	0	697	228	3	33	0	264	-	-	-	
Lights %	82.4%	94.8%	100%	0%	94.6%	94.9%	85.7%	80%	96.5%	0%	94.9%	88.9%	84.2%	93.6%	0%	85.5%	95.8%	75%	94.3%	0%	95.3%	-	-	-	
Single-Unit Trucks	0	52	0	0	52	0	0	0	0	0	0	1	70	1	0	72	0	0	0	0	0	-	-	-	
Single-Unit Trucks %	0%	3.1%	0%	0%	3.1%	0%	0%	0%	0%	0%	0%	11.1%	10.1%	0.9%	0%	8.8%	0%	0%	0%	0%	0%	-	-	-	
Buses	3	15	0	0	18	5	1	1	3	0	5	0	17	6	0	23	9	1	2	0	12	-	-	-	
Buses %	17.6%	0.9%	0%	0%	1.1%	5.1%	14.3%	20%	3.5%	0%	5.1%	0%	2.4%	5.5%	0%	2.8%	3.8%	25%	5.7%	0%	4.3%	-	-	-	
Articulated Trucks	0	20	0	0	20	0	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	-	-	-	
Articulated Trucks %	0%	1.2%	0%	0%	1.2%	0%	0%	0%	0%	0%	0%	0%	3.3%	0%	0%	2.8%	0%	0%	0%	0%	0%	-	-	-	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	-	-	-	
Bicycles on Road %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.4%	0%	0%	0%	0%	-	-	-	
Pedestrians	-	-	-	-	6	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	3	-	-	-	
Pedestrians%	-	-	-	-	54.5%	-	-	-	-	-	9.1%	-	-	-	-	9.1%	-	-	-	-	27.3%	-	-	-	



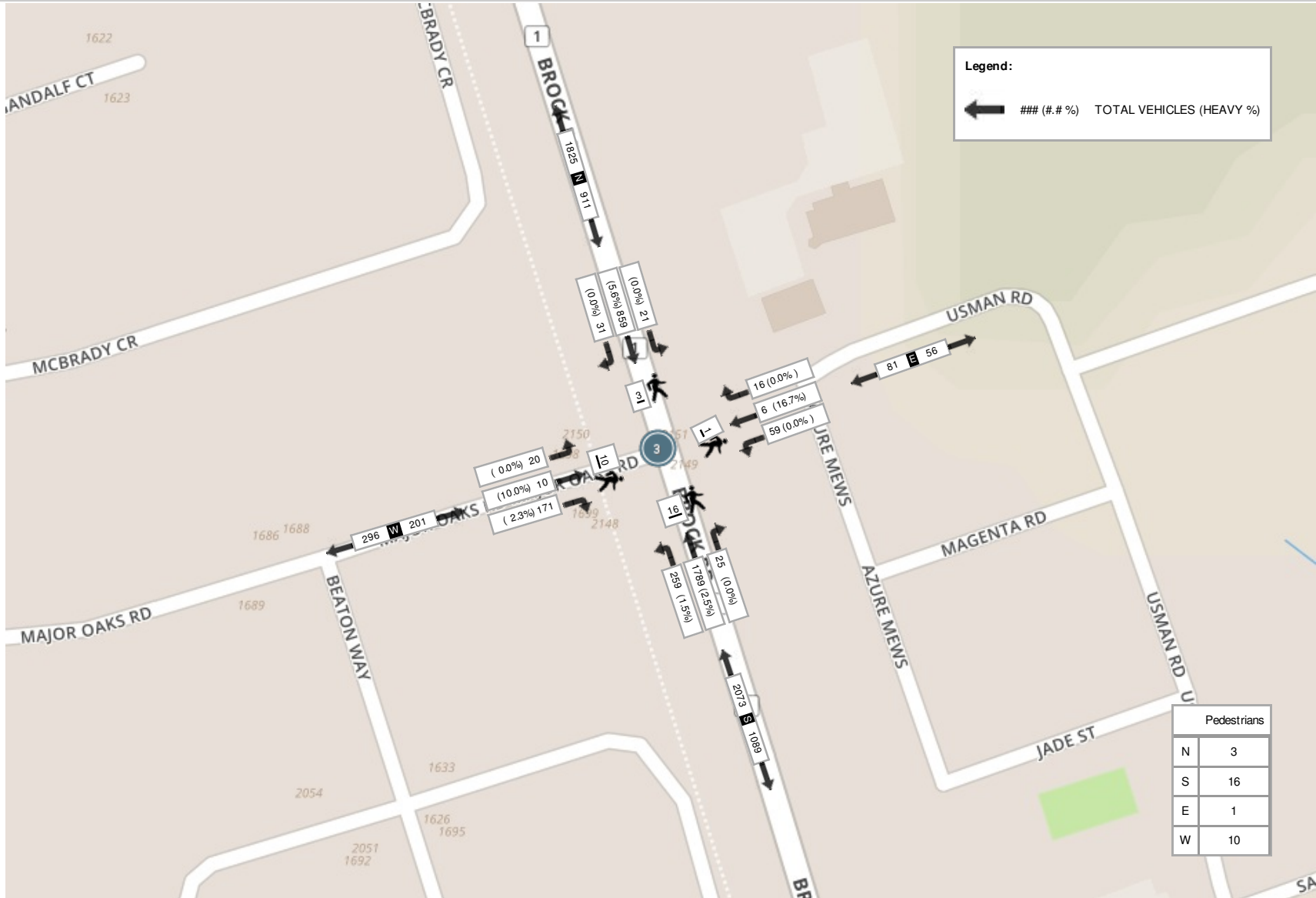
Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (16.41 °C)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:45:00	10	190	2	0	2	202	8	0	3	0	0	11	5	442	70	0	1	517	37	0	3	0	2	40	770
17:00:00	6	231	2	0	0	239	2	1	7	0	0	10	4	459	62	0	5	525	38	0	4	0	4	42	816
17:15:00	4	222	6	0	1	232	2	2	18	0	0	22	6	452	64	0	1	522	46	9	7	0	0	62	838
17:30:00	11	216	11	0	0	238	4	3	31	0	1	38	10	436	63	0	9	509	50	1	6	0	4	57	842
Grand Total	31	859	21	0	3	911	16	6	59	0	1	81	25	1789	259	0	16	2073	171	10	20	0	10	201	3266
Approach%	3.4%	94.3%	2.3%	0%	-	-	19.8%	7.4%	72.8%	0%	-	-	1.2%	86.3%	12.5%	0%	-	-	85.1%	5%	10%	0%	-	-	-
Totals %	0.9%	26.3%	0.6%	0%	-	27.9%	0.5%	0.2%	1.8%	0%	-	2.5%	0.8%	54.8%	7.9%	0%	-	63.5%	5.2%	0.3%	0.6%	0%	-	6.2%	-
PHF	0.7	0.93	0.48	0	-	0.95	0.5	0.5	0.48	0	-	0.53	0.63	0.97	0.93	0	-	0.99	0.86	0.28	0.71	0	-	0.81	-
Heavy	0	48	0	0	-	48	0	1	0	0	-	1	0	45	4	0	-	49	4	1	0	0	-	5	-
Heavy %	0%	5.6%	0%	0%	-	5.3%	0%	16.7%	0%	0%	-	1.2%	0%	2.5%	1.5%	0%	-	2.4%	2.3%	10%	0%	0%	-	2.5%	-
Lights	31	811	21	0	-	863	16	5	59	0	-	80	25	1744	255	0	-	2024	167	6	20	0	-	193	-
Lights %	100%	94.4%	100%	0%	-	94.7%	100%	83.3%	100%	0%	-	98.8%	100%	97.5%	98.5%	0%	-	97.6%	97.7%	60%	100%	0%	-	96%	-
Single-Unit Trucks	0	32	0	0	-	32	0	1	0	0	-	1	0	31	0	0	-	31	0	1	0	0	-	1	-
Single-Unit Trucks %	0%	3.7%	0%	0%	-	3.5%	0%	16.7%	0%	0%	-	1.2%	0%	1.7%	0%	0%	-	1.5%	0%	10%	0%	0%	-	0.5%	-
Buses	0	6	0	0	-	6	0	0	0	0	-	0	0	5	4	0	-	9	4	0	0	0	-	4	-
Buses %	0%	0.7%	0%	0%	-	0.7%	0%	0%	0%	0%	-	0%	0%	0.3%	1.5%	0%	-	0.4%	2.3%	0%	0%	0%	-	2%	-
Articulated Trucks	0	10	0	0	-	10	0	0	0	0	-	0	0	9	0	0	-	9	0	0	0	0	-	0	-
Articulated Trucks %	0%	1.2%	0%	0%	-	1.1%	0%	0%	0%	0%	-	0%	0%	0.5%	0%	0%	-	0.4%	0%	0%	0%	0%	-	0%	-
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	3	0	0	-	3	-
Bicycles on Road %	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	30%	0%	0%	-	1.5%	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	16	-	-	-	-	-	10	-	-
Pedestrians%	-	-	-	-	10%	-	-	-	-	-	3.3%	-	-	-	-	-	53.3%	-	-	-	-	-	33.3%	-	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Clear Sky (6.1 °C)



Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (16.41 °C)





Turning Movement Count (4 . BROCK RD & USMAN RD (ATR))

Start Time	W Approach			E Approach			Int. Total (15 min)	Int. Total (1 hr)
	Thru W:E	UTurn W:W	Approach Total	Thru E:W	UTurn E:E	Approach Total		
06:30:00	13	0	13	0	0	0	13	
06:45:00	7	0	7	0	0	0	7	
07:00:00	8	0	8	0	0	0	8	
07:15:00	4	0	4	0	0	0	4	32
07:30:00	3	0	3	0	0	0	3	22
07:45:00	4	0	4	1	0	1	5	20
08:00:00	8	0	8	2	0	2	10	22
08:15:00	20	0	20	1	0	1	21	39
08:30:00	14	0	14	0	0	0	14	50
08:45:00	1	0	1	1	0	1	2	47
BREAK								
15:30:00	22	0	22	0	0	0	22	
15:45:00	13	0	13	0	0	0	13	
16:00:00	13	0	13	0	0	0	13	
16:15:00	7	0	7	0	0	0	7	55
16:30:00	11	0	11	0	0	0	11	44
16:45:00	5	0	5	0	0	0	5	36
17:00:00	7	0	7	2	0	2	9	32
17:15:00	22	0	22	9	0	9	31	56
17:30:00	29	0	29	8	0	8	37	82
17:45:00	11	0	11	1	0	1	12	89
18:00:00	20	0	20	0	0	0	20	100
18:15:00	5	0	5	1	0	1	6	75
Grand Total	247	0	247	26	0	26	273	-



Approach%	100%	0%	-	100%	0%	-	-	-
Totals %	90.5%	0%	90.5%	9.5%	0%	9.5%	-	-
Heavy	13	0	-	1	0	-	-	-
Heavy %	5.3%	0%	-	3.8%	0%	-	-	-
Bicycles	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-



Peak Hour: 07:45 AM - 08:45 AM Weather: Clear Sky (6.1 °C)

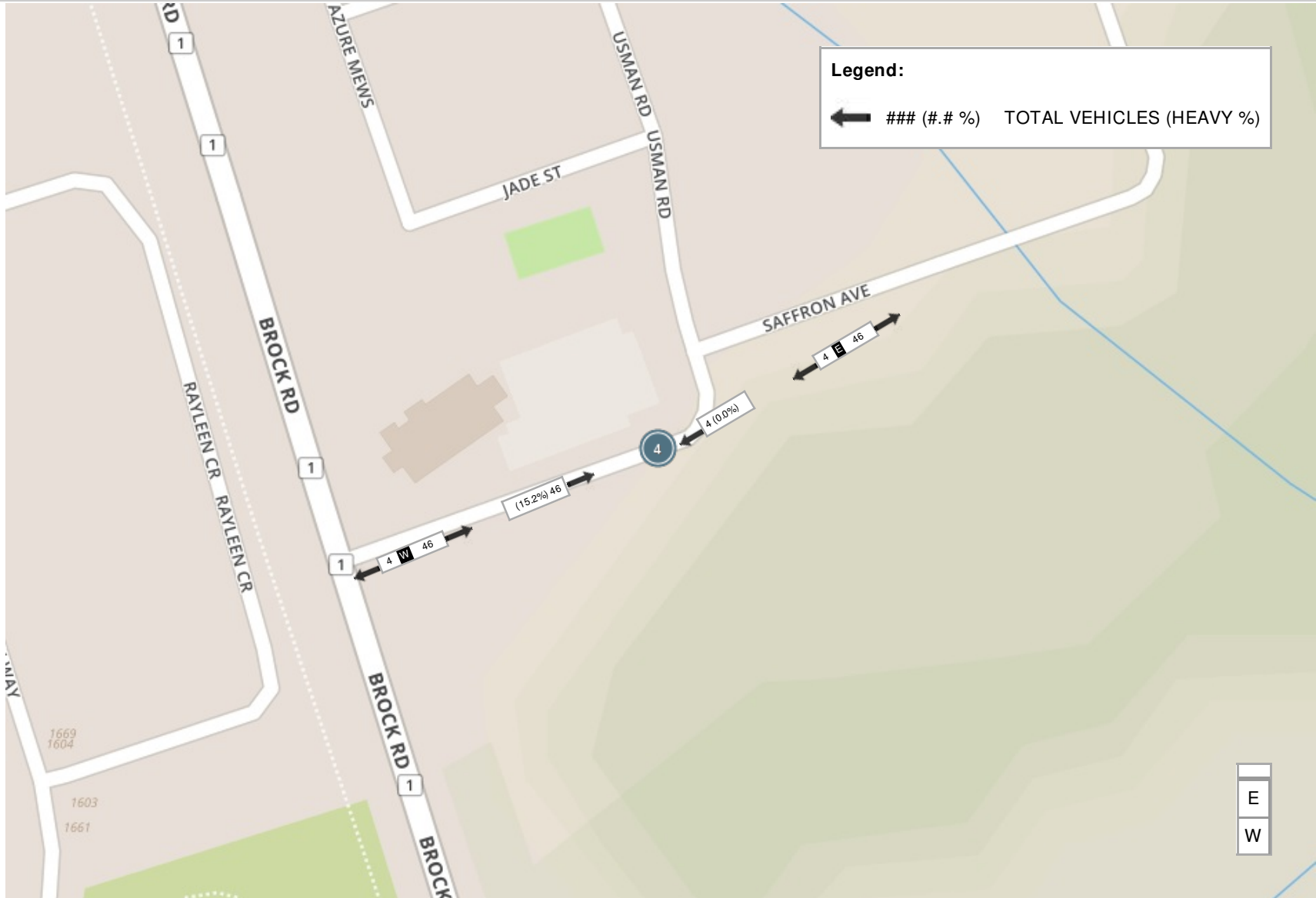
Start Time	W Approach			E Approach			Int. Total (15 min)
	Thru	UTurn	Approach Total	Thru	UTurn	Approach Total	
07:45:00	4	0	4	1	0	1	5
08:00:00	8	0	8	2	0	2	10
08:15:00	20	0	20	1	0	1	21
08:30:00	14	0	14	0	0	0	14
Grand Total	46	0	46	4	0	4	50
Approach%	100%	0%	-	100%	0%	-	-
Totals %	92%	0%	92%	8%	0%	8%	-
PHF	0.58	0	0.58	0.5	0	0.5	-
Heavy	7	0	7	0	0	0	-
Heavy %	15.2%	0%	15.2%	0%	0%	0%	-
Lights	39	0	39	4	0	4	-
Lights %	84.8%	0%	84.8%	100%	0%	100%	-
Single-Unit Trucks	1	0	1	0	0	0	-
Single-Unit Trucks %	2.2%	0%	2.2%	0%	0%	0%	-
Buses	6	0	6	0	0	0	-
Buses %	13%	0%	13%	0%	0%	0%	-



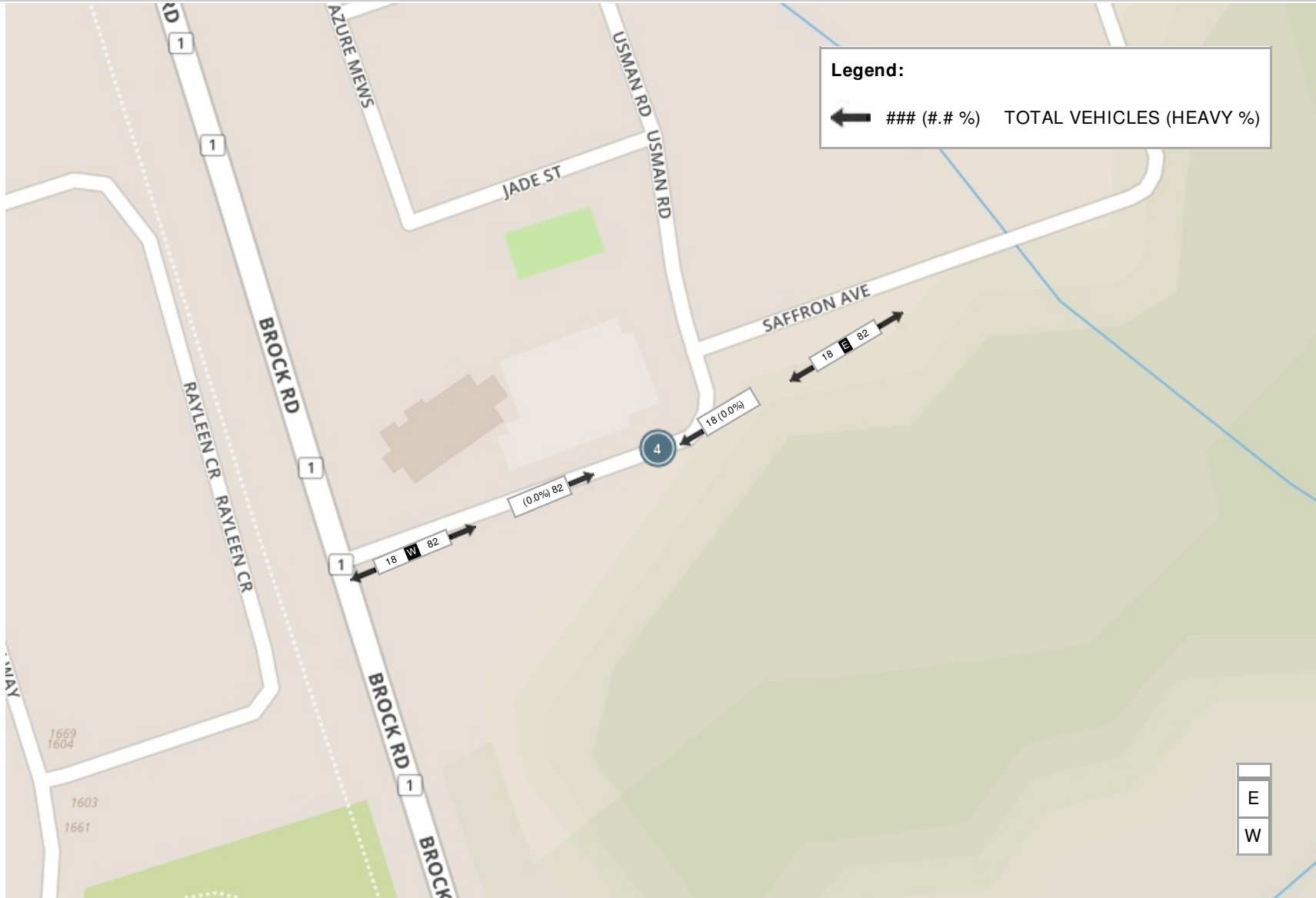
Peak Hour: 05:15 PM - 06:15 PM Weather: Clear Sky (16.41 °C)

Start Time	W Approach			E Approach			Int. Total (15 min)
	Thru	UTurn	Approach Total	Thru	UTurn	Approach Total	
17:15:00	22	0	22	9	0	9	31
17:30:00	29	0	29	8	0	8	37
17:45:00	11	0	11	1	0	1	12
18:00:00	20	0	20	0	0	0	20
Grand Total	82	0	82	18	0	18	100
Approach%	100%	0%	-	100%	0%	-	-
Totals %	82%	0%	82%	18%	0%	18%	-
PHF	0.71	0	0.71	0.5	0	0.5	-
Heavy	0	0	0	0	0	0	-
Heavy %	0%	0%	0%	0%	0%	0%	-
Lights	82	0	82	18	0	18	-
Lights %	100%	0%	100%	100%	0%	100%	-
Single-Unit Trucks	0	0	0	0	0	0	-
Single-Unit Trucks %	0%	0%	0%	0%	0%	0%	-
Buses	0	0	0	0	0	0	-
Buses %	0%	0%	0%	0%	0%	0%	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Clear Sky (6.1 °C)



Peak Hour: 05:15 PM - 06:15 PM Weather: Clear Sky (16.41 °C)





Turning Movement Count (2 . BROCK RD & USMAN RD)

Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
06:30:00	387	5	0	0	392	2	0	0	1	2	10	120	0	0	130	524	
06:45:00	391	0	0	1	391	3	0	0	0	3	0	140	0	1	140	534	
07:00:00	377	0	0	0	377	2	0	0	0	2	5	166	0	0	171	550	
07:15:00	449	0	1	0	450	2	0	0	0	2	4	171	0	0	175	627	2235
07:30:00	491	1	1	0	493	1	0	0	1	1	2	194	0	0	196	690	2401
07:45:00	522	3	0	0	525	0	0	0	0	0	4	206	0	0	210	735	2602
08:00:00	492	6	0	0	498	1	0	0	1	1	9	211	0	0	220	719	2771
08:15:00	456	7	0	0	463	3	0	0	2	3	13	218	0	0	231	697	2841
08:30:00	480	1	0	0	481	1	0	0	0	1	11	177	0	0	188	670	2821
08:45:00	427	0	0	0	427	1	0	0	0	1	2	219	0	0	221	649	2735
BREAK																	
15:30:00	236	0	0	0	236	0	0	0	0	0	11	451	0	0	462	698	
15:45:00	233	0	0	0	233	1	0	0	0	1	13	391	0	0	404	638	
16:00:00	301	1	0	0	302	0	0	0	2	0	12	455	0	0	467	769	
16:15:00	250	0	0	0	250	1	0	0	0	1	5	452	0	2	457	708	2813
16:30:00	283	1	0	0	284	2	0	0	0	2	7	479	0	0	486	772	2887
16:45:00	236	1	1	0	238	0	0	0	2	0	8	505	0	0	513	751	3000
17:00:00	279	2	0	0	281	1	0	0	0	1	10	530	0	0	540	822	3053
17:15:00	271	21	0	0	292	4	0	0	2	4	25	521	0	0	546	842	3187
17:30:00	281	12	0	1	293	13	0	0	2	13	22	494	0	1	516	822	3237
17:45:00	275	2	0	0	277	2	0	0	0	2	11	446	0	0	457	736	3222
18:00:00	268	1	0	0	269	0	0	0	0	0	15	446	0	0	461	730	3130
18:15:00	239	3	1	0	243	1	0	0	0	1	10	436	0	0	446	690	2978
Grand Total	7624	67	4	2	7695	41	0	0	13	41	209	7428	0	4	7637	15373	-



Approach%	99.1%	0.9%	0.1%	-	100%	0%	0%	-	2.7%	97.3%	0%	-	-	-
Totals %	49.6%	0.4%	0%	50.1%	0.3%	0%	0%	0.3%	1.4%	48.3%	0%	49.7%	-	-
Heavy	405	3	0	-	1	0	0	-	12	411	0	-	-	-
Heavy %	5.3%	4.5%	0%	-	2.4%	0%	0%	-	5.7%	5.5%	0%	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Clear Sky (6.1 °C)

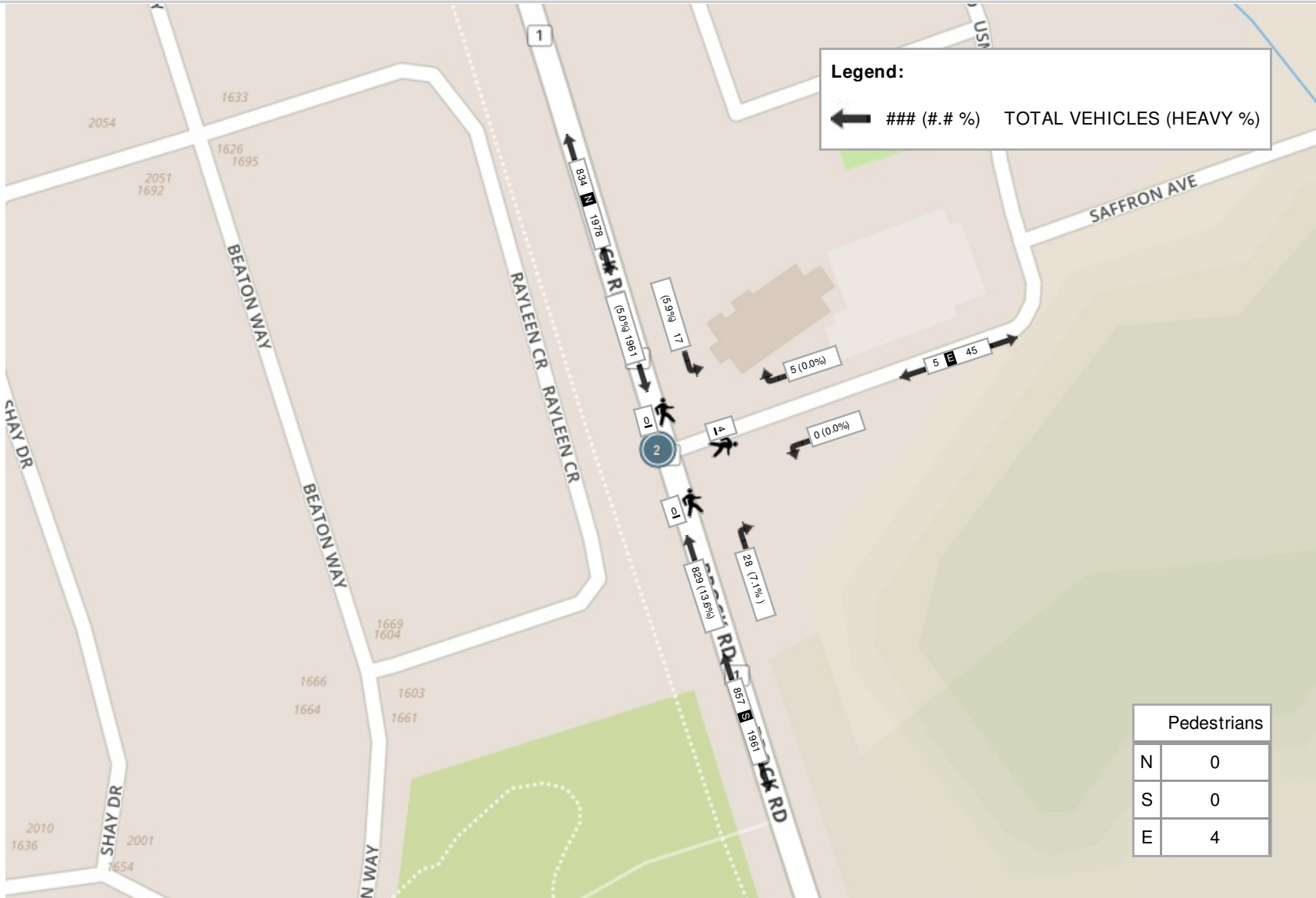
Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:30:00	491	1	1	0	493	1	0	0	1	1	2	194	0	0	196	690
07:45:00	522	3	0	0	525	0	0	0	0	0	4	206	0	0	210	735
08:00:00	492	6	0	0	498	1	0	0	1	1	9	211	0	0	220	719
08:15:00	456	7	0	0	463	3	0	0	2	3	13	218	0	0	231	697
Grand Total	1961	17	1	0	1979	5	0	0	4	5	28	829	0	0	857	2841
Approach%	99.1%	0.9%	0.1%	-	-	100%	0%	0%	-	-	3.3%	96.7%	0%	-	-	-
Totals %	69%	0.6%	0%	69.7%	0.2%	0%	0%	0.2%	1%	29.2%	0%	30.2%	-	-	-	-
PHF	0.94	0.61	0.25	0.94	0.42	0	0	0.42	0.54	0.95	0	0.93	-	-	-	-
Heavy	98	1	0	99	0	0	0	0	2	113	0	115	-	-	-	-
Heavy %	5%	5.9%	0%	5%	0%	0%	0%	0%	7.1%	13.6%	0%	13.4%	-	-	-	-
Lights	1863	16	1	1880	5	0	0	5	26	716	0	742	-	-	-	-
Lights %	95%	94.1%	100%	95%	100%	0%	0%	100%	92.9%	86.4%	0%	86.6%	-	-	-	-
Single-Unit Trucks	54	0	0	54	0	0	0	0	0	71	0	71	-	-	-	-
Single-Unit Trucks %	2.8%	0%	0%	2.7%	0%	0%	0%	0%	0%	8.6%	0%	8.3%	-	-	-	-
Buses	26	1	0	27	0	0	0	0	2	23	0	25	-	-	-	-
Buses %	1.3%	5.9%	0%	1.4%	0%	0%	0%	0%	7.1%	2.8%	0%	2.9%	-	-	-	-
Articulated Trucks	18	0	0	18	0	0	0	0	0	19	0	19	-	-	-	-
Articulated Trucks %	0.9%	0%	0%	0.9%	0%	0%	0%	0%	0%	2.3%	0%	2.2%	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	4	-	-	-	0	-	-	-	-
Pedestrians%	-	-	-	0%	-	-	-	100%	-	-	-	0%	-	-	-	-



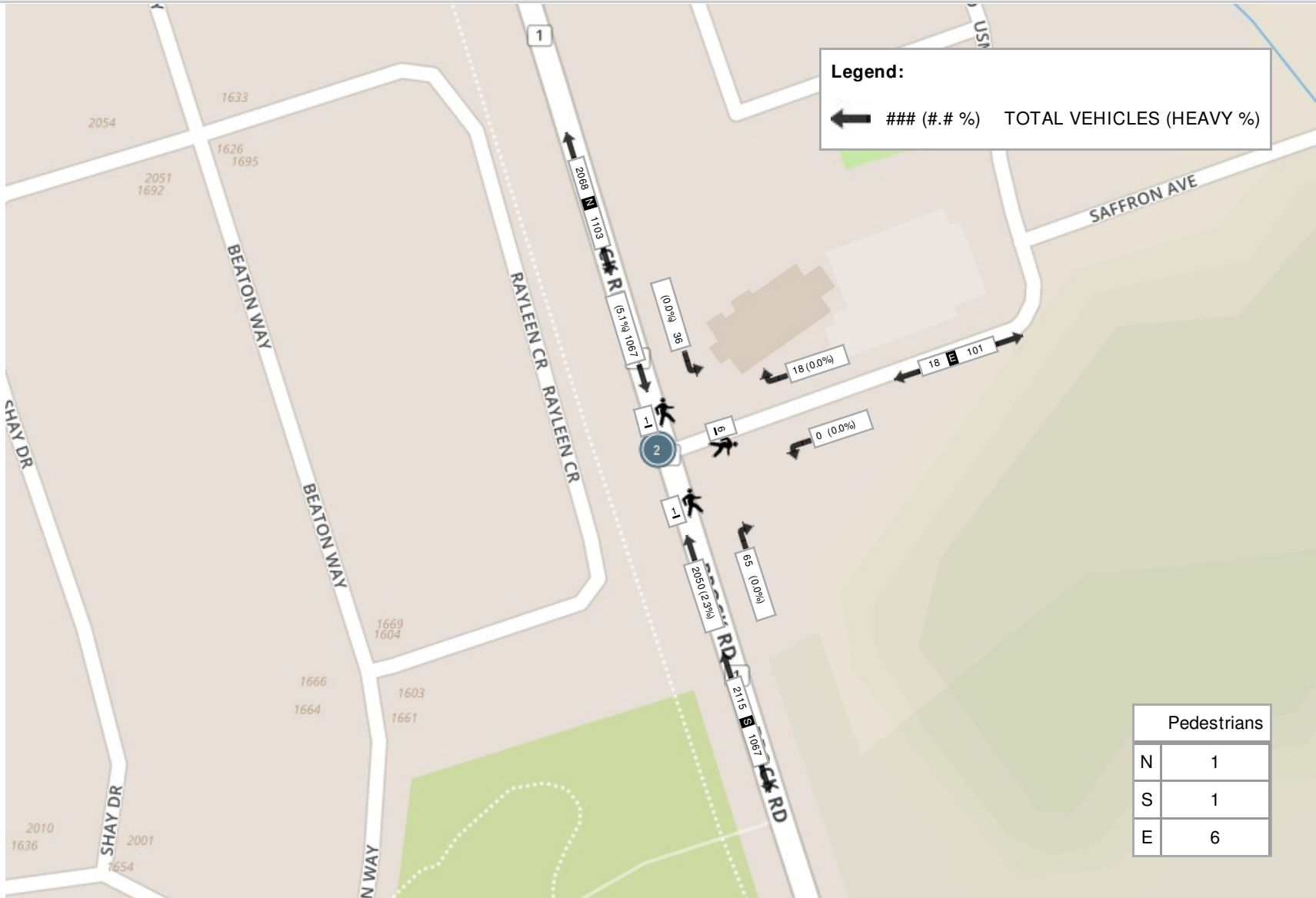
Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (16.41 °C)

Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:45:00	236	1	1	0	238	0	0	0	2	0	8	505	0	0	513	751
17:00:00	279	2	0	0	281	1	0	0	0	1	10	530	0	0	540	822
17:15:00	271	21	0	0	292	4	0	0	2	4	25	521	0	0	546	842
17:30:00	281	12	0	1	293	13	0	0	2	13	22	494	0	1	516	822
Grand Total	1067	36	1	1	1104	18	0	0	6	18	65	2050	0	1	2115	3237
Approach%	96.6%	3.3%	0.1%	-	-	100%	0%	0%	-	-	3.1%	96.9%	0%	-	-	-
Totals %	33%	1.1%	0%	34.1%	0.6%	0%	0%	0.6%	2%	63.3%	0%	65.3%	-	-	-	-
PHF	0.95	0.43	0.25	0.94	0.35	0	0	0.35	0.65	0.97	0	0.97	-	-	-	-
Heavy	54	0	0	54	0	0	0	0	0	47	0	47	-	-	-	-
Heavy %	5.1%	0%	0%	4.9%	0%	0%	0%	0%	0%	2.3%	0%	2.2%	-	-	-	-
Lights	1013	36	1	1050	18	0	0	18	65	2003	0	2068	-	-	-	-
Lights %	94.9%	100%	100%	95.1%	100%	0%	0%	100%	100%	97.7%	0%	97.8%	-	-	-	-
Single-Unit Trucks	31	0	0	31	0	0	0	0	0	30	0	30	-	-	-	-
Single-Unit Trucks %	2.9%	0%	0%	2.8%	0%	0%	0%	0%	0%	1.5%	0%	1.4%	-	-	-	-
Buses	11	0	0	11	0	0	0	0	0	9	0	9	-	-	-	-
Buses %	1%	0%	0%	1%	0%	0%	0%	0%	0%	0.4%	0%	0.4%	-	-	-	-
Articulated Trucks	12	0	0	12	0	0	0	0	0	8	0	8	-	-	-	-
Articulated Trucks %	1.1%	0%	0%	1.1%	0%	0%	0%	0%	0%	0.4%	0%	0.4%	-	-	-	-
Pedestrians	-	-	-	1	-	-	-	6	-	-	-	-	1	-	-	-
Pedestrians%	-	-	-	12.5%	-	-	-	75%	-	-	-	-	12.5%	-	-	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Clear Sky (6.1 °C)



Peak Hour: 04:45 PM - 05:45 PM Weather: Clear Sky (16.41 °C)





Turning Movement Count (1 . BROCK RD & FINCH AVE)

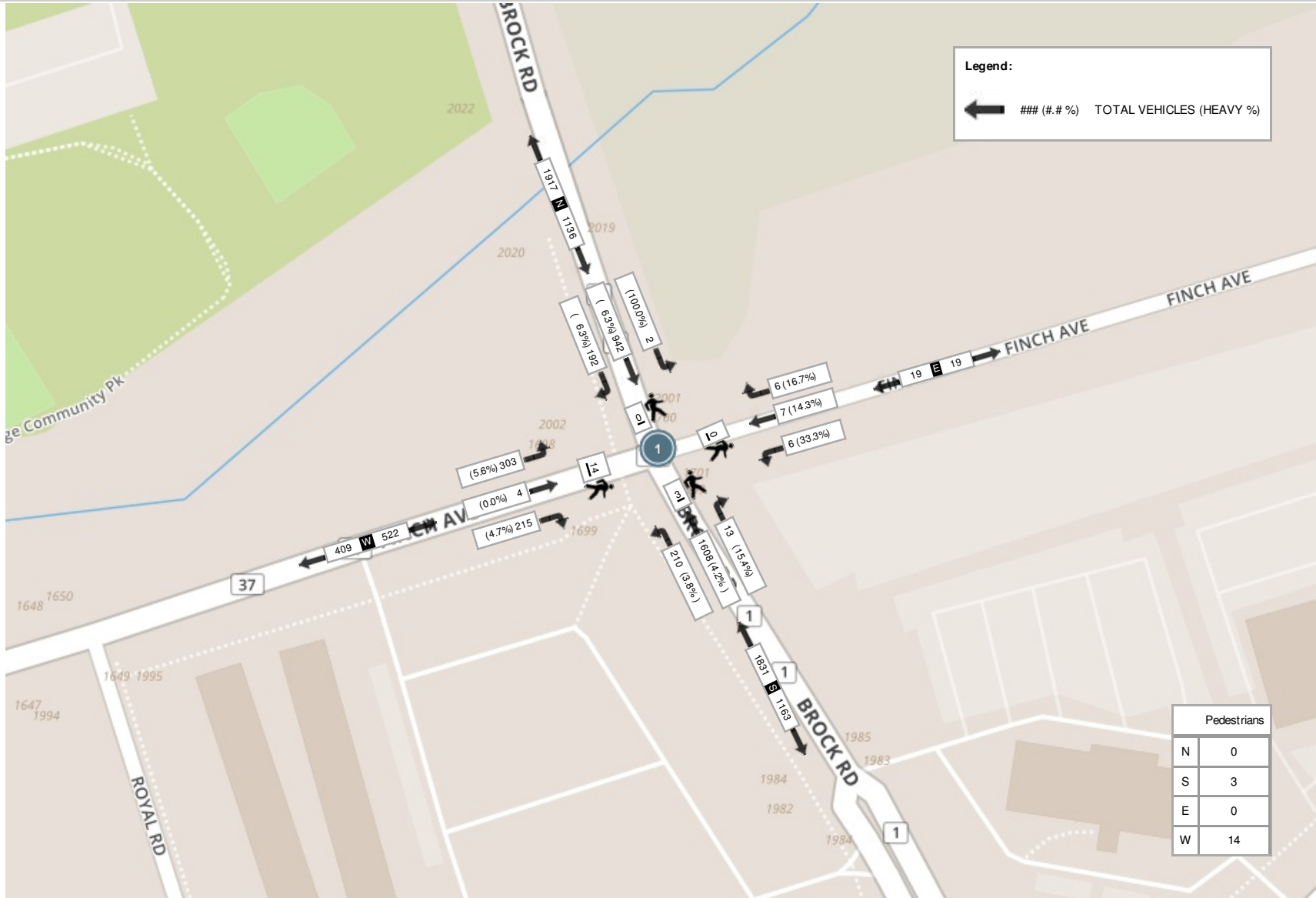
Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
12:00:00	14	173	0	0	0	187	1	2	3	0	0	6	3	214	53	2	2	272	49	0	33	0	1	82	547	
12:15:00	23	207	0	0	0	230	1	0	1	0	0	2	4	215	41	1	0	261	65	0	47	0	1	112	605	
12:30:00	23	132	0	0	0	155	2	2	5	0	0	9	6	207	65	0	0	278	63	2	45	0	0	110	552	
12:45:00	21	158	0	0	0	179	0	0	6	0	0	6	7	216	60	0	0	283	52	0	42	0	0	94	562	2266
13:00:00	16	214	0	0	0	230	1	0	4	0	0	5	3	242	51	0	0	296	48	0	64	0	0	112	643	2362
13:15:00	24	220	0	0	0	244	0	1	1	0	2	2	4	267	54	0	0	325	48	1	55	0	1	104	675	2432
13:30:00	20	192	0	0	0	212	1	1	5	0	0	7	1	242	51	0	1	294	57	3	54	0	2	114	627	2507
13:45:00	30	188	0	0	0	218	0	1	1	0	1	2	2	273	50	0	2	325	54	0	74	0	3	128	673	2618
14:00:00	21	182	0	0	0	203	2	0	3	0	1	5	4	284	56	0	0	344	68	4	55	0	2	127	679	2654
14:15:00	34	229	3	0	0	266	1	0	0	0	2	1	3	241	62	0	0	306	54	0	56	0	3	110	683	2662
14:30:00	67	324	3	0	0	394	2	1	6	0	2	9	4	330	53	0	8	387	61	1	66	0	10	128	918	2953
14:45:00	60	244	2	0	0	306	1	1	4	0	3	6	1	338	61	0	0	400	48	1	82	0	2	131	843	3123
15:00:00	40	208	0	0	0	248	3	1	1	0	0	5	2	385	46	0	1	433	40	3	91	0	5	134	820	3264
15:15:00	49	204	0	0	0	253	0	1	3	0	0	4	3	396	51	0	0	450	54	0	70	0	2	124	831	3412
15:30:00	41	232	0	0	0	273	1	2	1	0	0	4	6	417	59	0	2	482	49	1	63	0	6	113	872	3366
15:45:00	62	298	2	0	0	362	2	3	1	0	0	6	2	410	54	0	0	466	72	0	79	0	1	151	985	3508
Grand Total	545	3405	10	0	0	3960	18	16	45	0	11	79	55	4677	867	3	16	5602	882	16	976	0	39	1874	11515	-
Approach%	13.8%	86%	0.3%	0%	-	-	22.8%	20.3%	57%	0%	-	-	1%	83.5%	15.5%	0.1%	-	-	47.1%	0.9%	52.1%	0%	-	-	-	-
Totals %	4.7%	29.6%	0.1%	0%	-	34.4%	0.2%	0.1%	0.4%	0%	0.7%	0.7%	0.5%	40.6%	7.5%	0%	48.6%	7.7%	0.1%	8.5%	0%	-	16.3%	-	-	-
Heavy	26	227	3	0	-	-	1	1	4	0	-	-	4	259	26	0	-	-	26	0	33	0	-	-	-	-
Heavy %	4.8%	6.7%	30%	0%	-	-	5.6%	6.3%	8.9%	0%	-	-	7.3%	5.5%	3%	0%	-	-	2.9%	0%	3.4%	0%	-	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 03:00 PM - 04:00 PM Weather: Broken Clouds (8.01 °C)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
15:00:00	40	208	0	0	0	248	3	1	1	0	0	5	2	385	46	0	1	433	40	3	91	0	5	134	820
15:15:00	49	204	0	0	0	253	0	1	3	0	0	4	3	396	51	0	0	450	54	0	70	0	2	124	831
15:30:00	41	232	0	0	0	273	1	2	1	0	0	4	6	417	59	0	2	482	49	1	63	0	6	113	872
15:45:00	62	298	2	0	0	362	2	3	1	0	0	6	2	410	54	0	0	466	72	0	79	0	1	151	985
Grand Total	192	942	2	0	0	1136	6	7	6	0	0	19	13	1608	210	0	3	1831	215	4	303	0	14	522	3508
Approach%	16.9%	82.9%	0.2%	0%		-	31.6%	36.8%	31.6%	0%		-	0.7%	87.8%	11.5%	0%		-	41.2%	0.8%	58%	0%		-	-
Totals %	5.5%	26.9%	0.1%	0%		32.4%	0.2%	0.2%	0.2%	0%		0.5%	0.4%	45.8%	6%	0%		52.2%	6.1%	0.1%	8.6%	0%		14.9%	-
PHF	0.77	0.79	0.25	0		0.78	0.5	0.58	0.5	0		0.79	0.54	0.96	0.89	0		0.95	0.75	0.33	0.83	0		0.86	-
Heavy	12	59	2	0		73	1	1	2	0		4	2	67	8	0		77	10	0	17	0		27	-
Heavy %	6.3%	6.3%	100%	0%		6.4%	16.7%	14.3%	33.3%	0%		21.1%	15.4%	4.2%	3.8%	0%		4.2%	4.7%	0%	5.6%	0%		5.2%	-
Lights	180	883	0	0		1063	5	6	4	0		15	11	1541	202	0		1754	205	4	286	0		495	-
Lights %	93.8%	93.7%	0%	0%		93.6%	83.3%	85.7%	66.7%	0%		78.9%	84.6%	95.8%	96.2%	0%		95.8%	95.3%	100%	94.4%	0%		94.8%	-
Single-Unit Trucks	1	24	0	0		25	0	0	0	0		0	0	25	3	0		28	5	0	5	0		10	-
Single-Unit Trucks %	0.5%	2.5%	0%	0%		2.2%	0%	0%	0%	0%		0%	0%	1.6%	1.4%	0%		1.5%	2.3%	0%	1.7%	0%		1.9%	-
Buses	11	19	2	0		32	1	1	2	0		4	2	24	4	0		30	5	0	12	0		17	-
Buses %	5.7%	2%	100%	0%		2.8%	16.7%	14.3%	33.3%	0%		21.1%	15.4%	1.5%	1.9%	0%		1.6%	2.3%	0%	4%	0%		3.3%	-
Articulated Trucks	0	16	0	0		16	0	0	0	0		0	0	18	1	0		19	0	0	0	0		0	-
Articulated Trucks %	0%	1.7%	0%	0%		1.4%	0%	0%	0%	0%		0%	0%	1.1%	0.5%	0%		1%	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	-
Bicycles on Road %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	14	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	17.6%	-	-	-	-	-	82.4%	-	-

Peak Hour: 03:00 PM - 04:00 PM Weather: Broken Clouds (8.01 °C)





Turning Movement Count (3 . BROCK RD & USMAN RD / MAJOR OAKS RD)

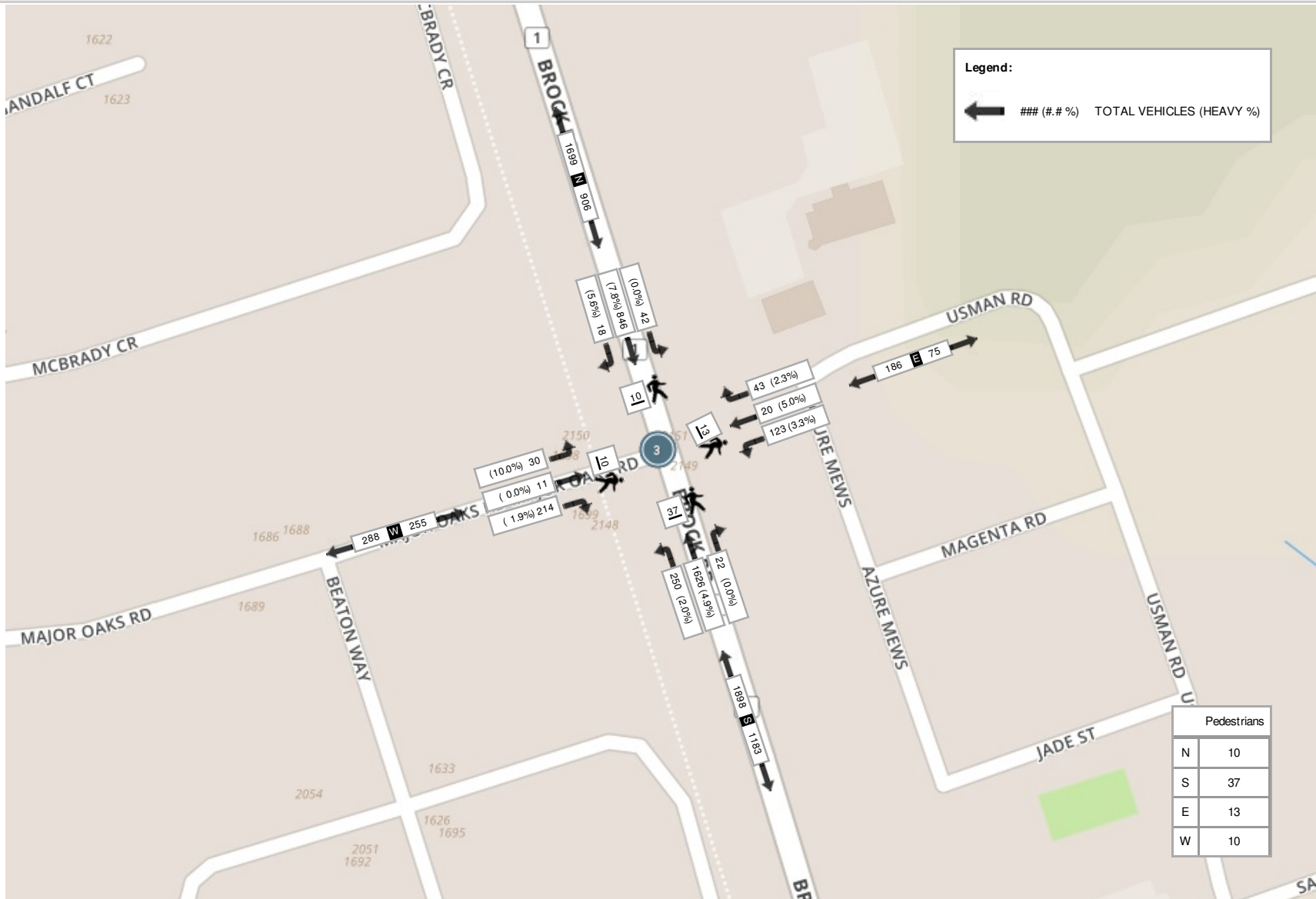
Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
12:00:00	6	158	2	0	4	166	3	0	6	0	0	9	4	182	45	0	1	231	43	0	4	0	1	47	453		
12:15:00	2	175	1	0	1	178	3	1	11	0	0	15	4	208	47	0	1	259	36	3	5	0	1	44	496		
12:30:00	4	212	1	0	0	217	4	0	5	0	0	9	1	180	44	0	1	225	43	0	3	0	0	46	497		
12:45:00	6	183	7	0	3	196	4	0	6	0	1	10	3	198	37	0	6	238	32	2	3	0	0	37	481	1927	
13:00:00	2	200	1	0	1	203	4	2	15	0	3	21	3	210	47	0	7	260	42	1	8	0	1	51	535	2009	
13:15:00	2	171	11	0	2	184	3	0	7	0	5	10	4	234	46	0	9	284	64	1	5	0	1	70	548	2061	
13:30:00	7	172	7	0	1	186	3	0	10	0	8	13	4	191	36	0	16	231	44	1	3	0	5	48	478	2042	
13:45:00	9	183	10	0	1	202	4	4	10	0	9	18	7	217	41	0	10	265	43	1	9	0	1	53	538	2099	
14:00:00	2	150	9	0	2	161	0	5	10	0	3	15	8	248	45	0	4	301	42	3	2	0	0	47	524	2088	
14:15:00	1	188	2	0	4	191	9	3	24	0	11	36	5	292	45	0	14	342	52	0	7	0	4	59	628	2168	
14:30:00	10	230	4	0	9	244	25	3	56	0	22	84	7	401	83	0	42	491	92	5	13	0	3	110	929	2619	
14:45:00	6	197	15	0	2	218	13	4	43	0	6	60	6	344	83	0	7	433	59	4	5	0	4	68	779	2860	
15:00:00	6	226	21	0	0	253	8	1	14	0	1	23	3	347	49	0	8	399	52	7	7	0	5	66	741	3077	
15:15:00	7	209	16	0	1	232	4	6	8	0	1	18	6	368	58	0	4	432	50	3	6	0	3	59	741	3190	
15:30:00	3	181	1	0	6	185	10	5	30	0	10	45	5	443	64	1	18	513	45	0	9	0	0	54	797	3058	
15:45:00	2	230	4	0	3	236	21	8	71	0	1	100	8	468	79	1	7	556	67	1	8	0	2	76	968	3247	
Grand Total	75	3065	112	0	40	3252	118	42	326	0	81	486	78	4531	849	2	155	5460	806	32	97	0	31	935	10133	-	
Approach%	2.3%	94.2%	3.4%	0%	-	-	24.3%	8.6%	67.1%	0%	-	-	1.4%	83%	15.5%	0%	-	-	86.2%	3.4%	10.4%	0%	-	-	-	-	
Totals %	0.7%	30.2%	1.1%	0%	-	32.1%	1.2%	0.4%	3.2%	0%	-	4.8%	0.8%	44.7%	8.4%	0%	-	53.9%	8%	0.3%	1%	0%	-	9.2%	-	-	
Heavy	3	241	5	0	-	-	2	3	5	0	-	-	0	266	20	0	-	-	21	2	4	0	-	-	-	-	
Heavy %	4%	7.9%	4.5%	0%	-	-	1.7%	7.1%	1.5%	0%	-	-	0%	5.9%	2.4%	0%	-	-	2.6%	6.3%	4.1%	0%	-	-	-	-	
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 03:00 PM - 04:00 PM Weather: Broken Clouds (8.01 °C)

Start Time	N Approach						E Approach						S Approach						W Approach						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
15:00:00	6	226	21	0	0	253	8	1	14	0	1	23	3	347	49	0	8	399	52	7	7	0	5	66	741
15:15:00	7	209	16	0	1	232	4	6	8	0	1	18	6	368	58	0	4	432	50	3	6	0	3	59	741
15:30:00	3	181	1	0	6	185	10	5	30	0	10	45	5	443	64	1	18	513	45	0	9	0	0	54	797
15:45:00	2	230	4	0	3	236	21	8	71	0	1	100	8	468	79	1	7	556	67	1	8	0	2	76	968
Grand Total	18	846	42	0	10	906	43	20	123	0	13	186	22	1626	250	2	37	1900	214	11	30	0	10	255	3247
Approach%	2%	93.4%	4.6%	0%	-	-	23.1%	10.8%	66.1%	0%	-	-	1.2%	85.6%	13.2%	0.1%	-	-	83.9%	4.3%	11.8%	0%	-	-	-
Totals %	0.6%	26.1%	1.3%	0%	-	27.9%	1.3%	0.6%	3.8%	0%	-	5.7%	0.7%	50.1%	7.7%	0.1%	-	58.5%	6.6%	0.3%	0.9%	0%	-	7.9%	-
PHF	0.64	0.92	0.5	0	-	0.9	0.51	0.63	0.43	0	-	0.47	0.69	0.87	0.79	0.5	-	0.85	0.8	0.39	0.83	0	-	0.84	-
Heavy	1	66	0	0	-	67	1	1	4	0	-	6	0	80	5	0	-	85	4	0	3	0	-	7	-
Heavy %	5.6%	7.8%	0%	0%	-	7.4%	2.3%	5%	3.3%	0%	-	3.2%	0%	4.9%	2%	0%	-	4.5%	1.9%	0%	10%	0%	-	2.7%	-
Lights	17	780	42	0	-	839	42	19	119	0	-	180	22	1546	245	2	-	1815	210	11	27	0	-	248	-
Lights %	94.4%	92.2%	100%	0%	-	92.6%	97.7%	95%	96.7%	0%	-	96.8%	100%	95.1%	98%	100%	-	95.5%	98.1%	100%	90%	0%	-	97.3%	-
Single-Unit Trucks	0	30	0	0	-	30	0	0	0	0	-	0	0	34	1	0	-	35	1	0	1	0	-	2	-
Single-Unit Trucks %	0%	3.5%	0%	0%	-	3.3%	0%	0%	0%	0%	-	0%	0%	2.1%	0.4%	0%	-	1.8%	0.5%	0%	3.3%	0%	-	0.8%	-
Buses	1	23	0	0	-	24	0	1	4	0	-	5	0	31	4	0	-	35	3	0	2	0	-	5	-
Buses %	5.6%	2.7%	0%	0%	-	2.6%	0%	5%	3.3%	0%	-	2.7%	0%	1.9%	1.6%	0%	-	1.8%	1.4%	0%	6.7%	0%	-	2%	-
Articulated Trucks	0	13	0	0	-	13	1	0	0	0	-	1	0	15	0	0	-	15	0	0	0	0	-	0	-
Articulated Trucks %	0%	1.5%	0%	0%	-	1.4%	2.3%	0%	0%	0%	-	0.5%	0%	0.9%	0%	0%	-	0.8%	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	-
Bicycles on Road %	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	-	0%	-
Pedestrians	-	-	-	-	10	-	-	-	-	-	13	-	-	-	-	-	37	-	-	-	-	-	10	-	-
Pedestrians%	-	-	-	-	14.3%	-	-	-	-	-	18.6%	-	-	-	-	-	52.9%	-	-	-	-	-	14.3%	-	-

Peak Hour: 03:00 PM - 04:00 PM Weather: Broken Clouds (8.01 °C)





Turning Movement Count (4 . BROCK RD & USMAN RD (ATR))

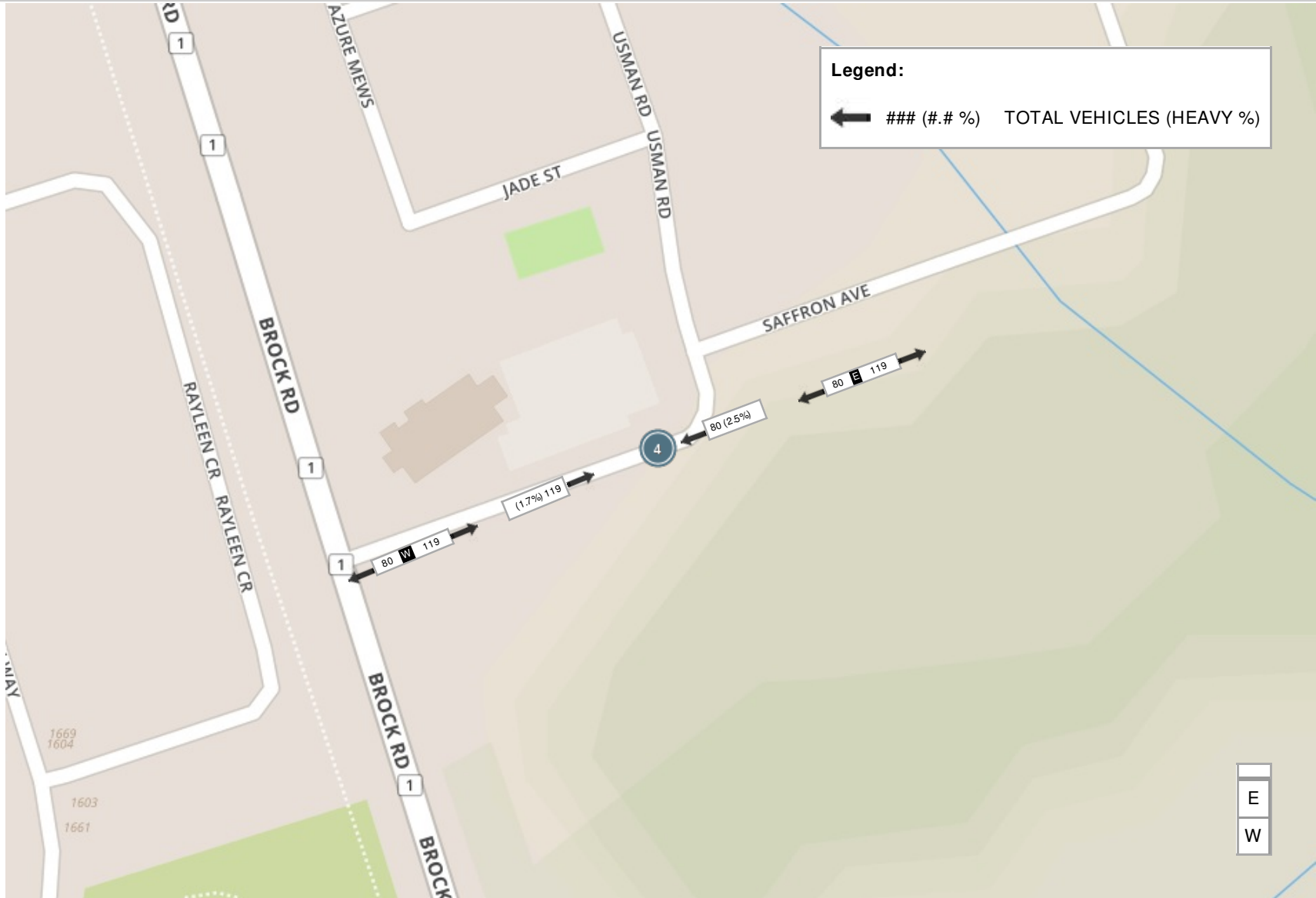
Start Time	W Approach			E Approach			Int. Total (15 min)	Int. Total (1 hr)
	Thru W:E	UTurn W:W	Approach Total	Thru E:W	UTurn E:E	Approach Total		
12:00:00	6	0	6	1	0	1	7	
12:15:00	4	0	4	3	0	3	7	
12:30:00	9	0	9	3	0	3	12	
12:45:00	14	0	14	4	0	4	18	44
13:00:00	24	0	24	1	0	1	25	62
13:15:00	19	0	19	4	0	4	23	78
13:30:00	28	0	28	1	0	1	29	95
13:45:00	44	0	44	5	0	5	49	126
14:00:00	19	0	19	5	0	5	24	125
14:15:00	20	0	20	19	0	19	39	141
14:30:00	43	1	44	31	0	31	75	187
14:45:00	20	0	20	19	0	19	39	177
15:00:00	36	0	36	11	0	11	47	200
15:15:00	20	0	20	8	0	8	28	189
15:30:00	42	0	42	13	0	13	55	169
15:45:00	48	0	48	20	0	20	68	198
Grand Total	396	1	397	148	0	148	545	-
Approach%	99.7%	0.3%	-	100%	0%	-	-	-
Totals %	72.7%	0.2%	72.8%	27.2%	0%	27.2%	-	-
Heavy	7	0	-	2	0	-	-	-
Heavy %	1.8%	0%	-	1.4%	0%	-	-	-
Bicycles	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-



Peak Hour: 02:15 PM - 03:15 PM Weather: Broken Clouds (8.01 °C)

Start Time	W Approach			E Approach			Int. Total (15 min)
	Thru	UTurn	Approach Total	Thru	UTurn	Approach Total	
14:15:00	20	0	20	19	0	19	39
14:30:00	43	1	44	31	0	31	75
14:45:00	20	0	20	19	0	19	39
15:00:00	36	0	36	11	0	11	47
Grand Total	119	1	120	80	0	80	200
Approach%	99.2%	0.8%	-	100%	0%	-	-
Totals %	59.5%	0.5%	60%	40%	0%	40%	-
PHF	0.69	0.25	0.68	0.65	0	0.65	-
Heavy	2	0	2	2	0	2	-
Heavy %	1.7%	0%	1.7%	2.5%	0%	2.5%	-
Lights	117	1	118	78	0	78	-
Lights %	98.3%	100%	98.3%	97.5%	0%	97.5%	-
Single-Unit Trucks	1	0	1	2	0	2	-
Single-Unit Trucks %	0.8%	0%	0.8%	2.5%	0%	2.5%	-
Buses	1	0	1	0	0	0	-
Buses %	0.8%	0%	0.8%	0%	0%	0%	-

Peak Hour: 02:15 PM - 03:15 PM Weather: Broken Clouds (8.01 °C)





Turning Movement Count (2 . BROCK RD & USMAN RD)

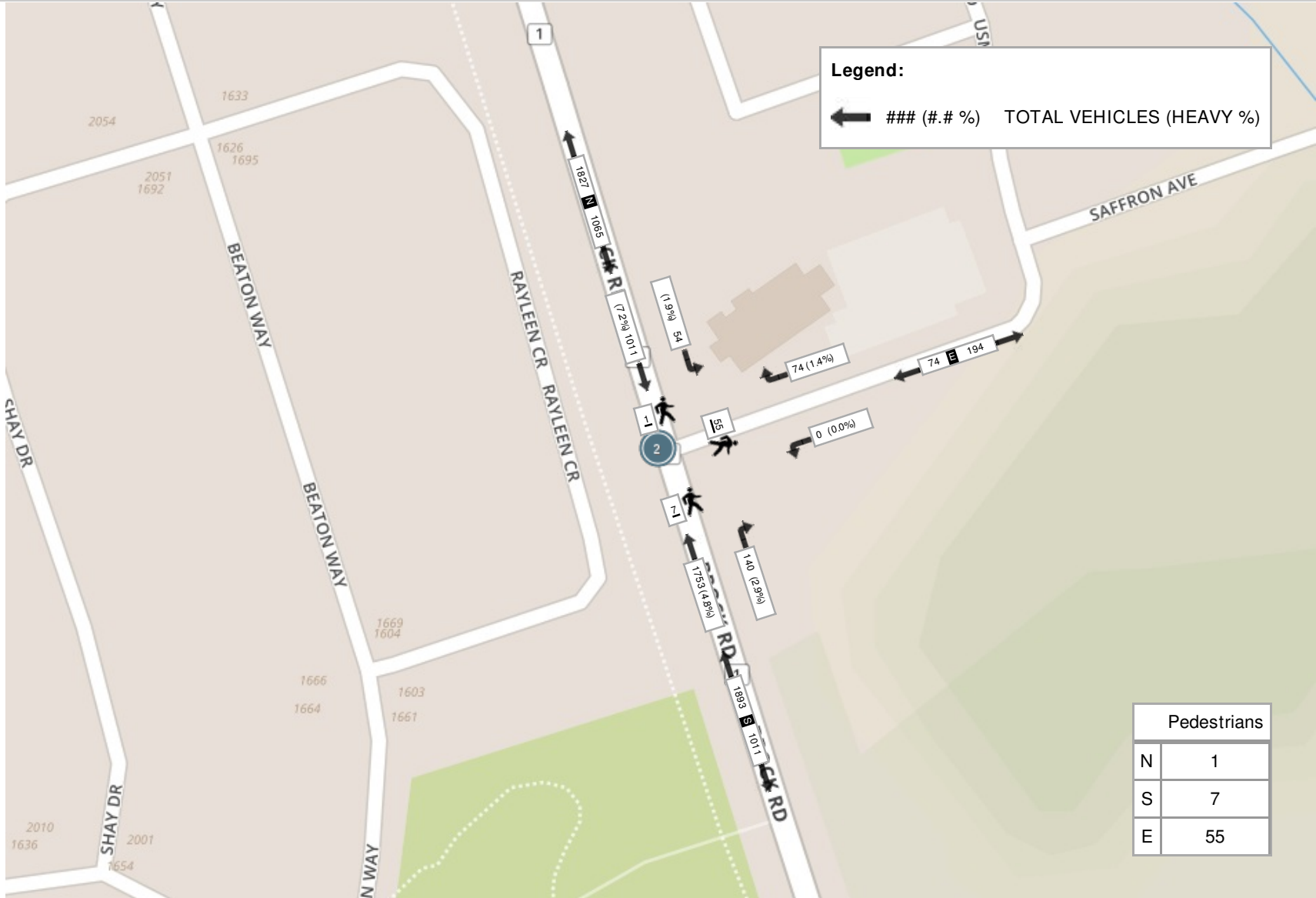
Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
12:00:00	208	1	0	0	209	0	0	0	2	0	7	314	0	0	321	530	
12:15:00	220	3	0	1	223	3	0	0	3	3	10	250	0	0	260	486	
12:30:00	248	9	1	2	258	1	0	0	1	1	17	221	0	0	238	497	
12:45:00	199	9	0	0	208	3	0	0	0	3	24	235	0	0	259	470	1983
13:00:00	230	16	0	1	246	5	0	0	5	5	44	259	0	0	303	554	2007
13:15:00	233	10	0	1	243	5	0	0	4	5	43	268	0	0	311	559	2080
13:30:00	194	14	1	3	209	1	0	0	20	1	62	233	0	6	295	505	2088
13:45:00	216	17	0	0	233	1	0	0	30	1	75	256	0	13	331	565	2183
14:00:00	194	7	0	2	201	5	0	0	30	5	27	298	0	0	325	531	2160
14:15:00	243	0	0	0	243	28	0	0	58	28	63	235	0	23	298	569	2170
14:30:00	334	2	0	0	336	73	0	0	24	73	16	435	0	3	451	860	2525
14:45:00	261	12	0	0	273	24	0	0	6	24	52	369	0	3	421	718	2678
15:00:00	228	25	0	0	253	2	0	0	12	2	74	401	0	0	475	730	2877
15:15:00	231	21	0	1	252	5	0	0	12	5	40	419	0	3	459	716	3024
15:30:00	233	0	0	0	233	37	0	0	27	37	16	462	0	3	478	748	2912
15:45:00	319	8	0	0	327	30	0	0	4	30	10	471	0	1	481	838	3032
Grand Total	3791	154	2	11	3947	223	0	0	238	223	580	5126	0	55	5706	9876	-
Approach%	96%	3.9%	0.1%		-	100%	0%	0%		-	10.2%	89.8%	0%		-	-	-
Totals %	38.4%	1.6%	0%		40%	2.3%	0%	0%		2.3%	5.9%	51.9%	0%		57.8%	-	-
Heavy	280	2	0		-	3	0	0		-	9	311	0		-	-	-
Heavy %	7.4%	1.3%	0%		-	1.3%	0%	0%		-	1.6%	6.1%	0%		-	-	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	-	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	-	-



Peak Hour: 03:00 PM - 04:00 PM Weather: Broken Clouds (8.01 °C)

Start Time	N Approach					E Approach					S Approach					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
15:00:00	228	25	0	0	253	2	0	0	12	2	74	401	0	0	475	730
15:15:00	231	21	0	1	252	5	0	0	12	5	40	419	0	3	459	716
15:30:00	233	0	0	0	233	37	0	0	27	37	16	462	0	3	478	748
15:45:00	319	8	0	0	327	30	0	0	4	30	10	471	0	1	481	838
Grand Total	1011	54	0	1	1065	74	0	0	55	74	140	1753	0	7	1893	3032
Approach%	94.9%	5.1%	0%		-	100%	0%	0%		-	7.4%	92.6%	0%		-	-
Totals %	33.3%	1.8%	0%		35.1%	2.4%	0%	0%		2.4%	4.6%	57.8%	0%		62.4%	-
PHF	0.79	0.54	0		0.81	0.5	0	0		0.5	0.47	0.93	0		0.98	-
Heavy	73	1	0		74	1	0	0		1	4	84	0		88	-
Heavy %	7.2%	1.9%	0%		6.9%	1.4%	0%	0%		1.4%	2.9%	4.8%	0%		4.6%	-
Lights	938	53	0		991	73	0	0		73	136	1669	0		1805	-
Lights %	92.8%	98.1%	0%		93.1%	98.6%	0%	0%		98.6%	97.1%	95.2%	0%		95.4%	-
Single-Unit Trucks	32	1	0		33	1	0	0		1	0	33	0		33	-
Single-Unit Trucks %	3.2%	1.9%	0%		3.1%	1.4%	0%	0%		1.4%	0%	1.9%	0%		1.7%	-
Buses	31	0	0		31	0	0	0		0	4	34	0		38	-
Buses %	3.1%	0%	0%		2.9%	0%	0%	0%		0%	2.9%	1.9%	0%		2%	-
Articulated Trucks	10	0	0		10	0	0	0		0	0	17	0		17	-
Articulated Trucks %	1%	0%	0%		0.9%	0%	0%	0%		0%	0%	1%	0%		0.9%	-
Bicycles on Road	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%	-
Pedestrians	-	-	-	1	-	-	-	-	55	-	-	-	-	7	-	-
Pedestrians%	-	-	-	1.6%	-	-	-	-	87.3%	-	-	-	-	11.1%	-	-

Peak Hour: 03:00 PM - 04:00 PM Weather: Broken Clouds (8.01 °C)



Cross Tabulation Query Form - Trip - 2016 v1.1

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest
 Column: Primary travel mode of trip - mode_prime

Row: Planning district of destination - pd_dest
 Column: Primary travel mode of trip - mode_prime

Filters:
 (2006 GTA zone of origin - gta06_orig In 1033
 and
 Start time of trip - start_time In 0600-0900
 and
 Primary travel mode of trip - mode_prime In 1033)

Filters:
 (2006 GTA zone of origin - gta06_orig In 1033
 and
 Start time of trip - start_time In 0600-0900)

Trip 2016
 Table:

Trip 2016		Auto driver	GO rail only	Joint GO rail and local tr	Auto passenger	School bus	Walk	
Table:		PD 1 of Toronto	23	21	48	0	0	0
Auto driver		PD 4 of Toronto	16	0	0	0	0	0
32	23	PD 6 of Toronto	0	0	0	0	37	0
202	16	PD 8 of Toronto	17	0	0	0	0	0
345	17	PD 9 of Toronto	23	0	0	0	0	0
371	23	PD 10 of Toronto	23	0	0	0	0	0
405	23	PD 11 of Toronto	11	0	0	0	0	0
430	11	PD 13 of Toronto	26	0	0	0	0	0
493	16	Pickering	258	0	0	65	47	78
521	10	Ajax	46	0	0	0	16	0
1029	26	Whitby	48	0	0	0	0	0
1040	45	Oshawa	79	0	0	16	0	0
1042	37	Richmond Hill	10	0	0	0	0	0
1046	32	Markham	100	0	0	0	0	0
1047	31	Vaughan	13	0	0	0	0	0
1048	44	Mississauga	15	0	0	0	0	0
1051	16							
1056	26							
1068	10							
1075	12							
1076	25							
1134	11							
1155	37							
1184	16							
1187	40							
1205	23							
2083	13							
2249	10							
2384	28							
2390	12							
2396	23							
2454	37							
3699	15							
Total	708							



INTERSECTION SIGNAL TIMING REPORT

Location	Brock Rd. (RR 1) and Finch Ave. (RR 37)				
Date	10/23/2019	C&E No.	27292906	Prepared by	K.Patel
Prepared for	C.F.Crozier				

AM Peak 05:30-09:00

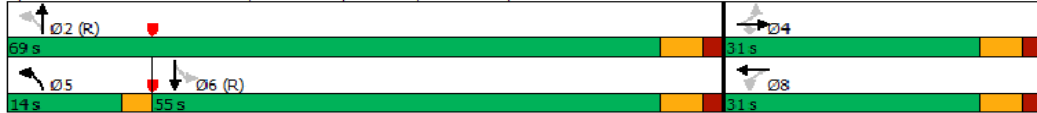


Phase Number	2	4	5	6	8
Movement	NBTL	EBTL	NBL	SBTL	WBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize			Yes	Yes	
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	69	31	14	55	31
Maximum Split (%)	69.0%	31.0%	14.0%	55.0%	31.0%
Minimum Split (s)	28	29	9	28	29
Yellow Time (s)	4.2	4.2	3	4.2	4.2
All-Red Time (s)	2	2.2	0	2	2.2
Minimum Initial (s)	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	14	16		14	16
Flash Dont Walk (s)	5	5		5	5

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	75
Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 235: RR 1 (BROCK RD) & RR37 (FINCH AVE)



PM Peak 14:30-21:00



Phase Number	2	4	5	6	8
Movement	NBTL	EBTL	NBL	SBTL	WBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize			Yes	Yes	
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	69	31	11	58	31
Maximum Split (%)	69.0%	31.0%	11.0%	58.0%	31.0%
Minimum Split (s)	28	29	9	28	29
Yellow Time (s)	4.2	4.2	3	4.2	4.2
All-Red Time (s)	2	2.2	0	2	2.2
Minimum Initial (s)	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	14	16		14	16
Flash Dont Walk (s)	5	5		5	5

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	70
Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 235: RR 1 (BROCK RD) & RR37 (FINCH AVE)



Weekend Peak 09:00-21:00

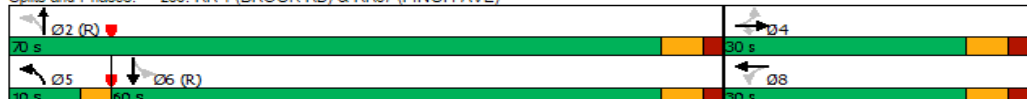


Phase Number	2	4	5	6	8
Movement	NBTL	EBTL	NBL	SBTL	WBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize			Yes	Yes	
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	70	30	10	60	30
Maximum Split (%)	70.0%	30.0%	10.0%	60.0%	30.0%
Minimum Split (s)	28	29	9	28	29
Yellow Time (s)	4.2	4.2	3	4.2	4.2
All-Red Time (s)	2	2.2	0	2	2.2
Minimum Initial (s)	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	14	16		14	16
Flash Dont Walk (s)	5	5		5	5

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 92.5 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 235: RR 1 (BROCK RD) & RR37 (FINCH AVE)



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*



INTERSECTION SIGNAL TIMING REPORT

Location	Brock Rd. (RR 1) and Major Oaks Dr./Usman Rd.				
Date	10/23/2019	C&E No.	27292906	Prepared by	K Patel
Prepared for	C F Crozier				

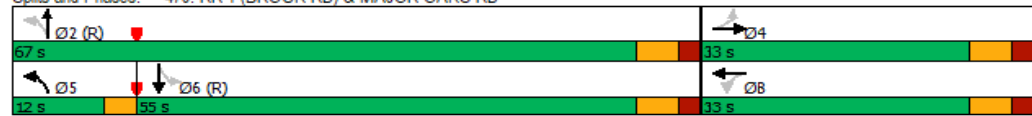
AM Peak 05:30-09:00



Phase Number	2	4	5	6	8
Movement	NBTL	EBTL	NBL	SBTL	WBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize			Yes	Yes	
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	67	33	12	55	33
Maximum Split (%)	67.0%	33.0%	12.0%	55.0%	33.0%
Minimum Split (s)	29	32	8	29	32
Yellow Time (s)	4.2	4.1	3	4.2	4.1
All-Red Time (s)	2.2	2.9	0	2.2	2.9
Minimum Initial (s)	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	7	7	7	7	7
Flash Dont Walk (s)	14	18	14	18	18

Intersection Summary	
Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 470: RR 1 (BROCK RD) & MAJOR OAKS RD



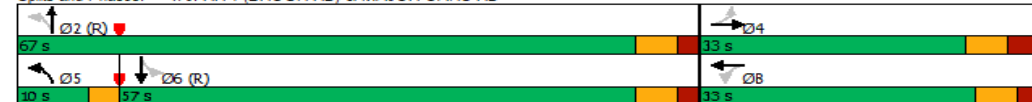
PM Peak 14:30-21:00



Phase Number	2	4	5	6	8
Movement	NBTL	EBTL	NBL	SBTL	WBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize			Yes	Yes	
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	67	33	10	57	33
Maximum Split (%)	67.0%	33.0%	10.0%	57.0%	33.0%
Minimum Split (s)	29	32	8	29	32
Yellow Time (s)	4.2	4.1	3	4.2	4
All-Red Time (s)	2.2	2.9	0	2.2	2
Minimum Initial (s)	20	8	5	20	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	7	7	7	7	7
Flash Dont Walk (s)	14	18	14	18	18

Intersection Summary	
Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 470: RR 1 (BROCK RD) & MAJOR OAKS RD



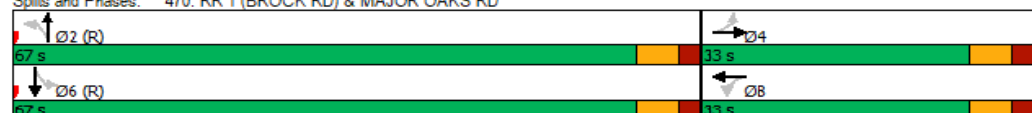
Weekend Peak 08:00-19:00



Phase Number	2	4	6	8
Movement	NBTL	EBTL	SBTL	WBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	67	33	67	33
Maximum Split (%)	67.0%	33.0%	67.0%	33.0%
Minimum Split (s)	29	32	29	32
Yellow Time (s)	4.2	4.1	4.2	4.1
All-Red Time (s)	2.2	2.9	2.2	2.9
Minimum Initial (s)	20	8	20	4
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	14	18	14	18

Intersection Summary	
Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	65
Offset: 55 (55%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 470: RR 1 (BROCK RD) & MAJOR OAKS RD



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

APPENDIX E

Detailed Capacity Analysis

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	140	3	224	19	4	5	119	672	3	1	1777	179
Future Volume (vph)	140	3	224	19	4	5	119	672	3	1	1777	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.977			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1696	1551	0	1502	0	1668	3072	0	892	3339	0
Flt Permitted		0.709			0.755		0.064			0.387		
Satd. Flow (perm)	0	1260	1528	0	1171	0	112	3072	0	362	3339	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			205		5			1			15	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	144	3	231	20	4	5	123	693	3	1	1832	185
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	147	231	0	29	0	123	696	0	1	2017	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

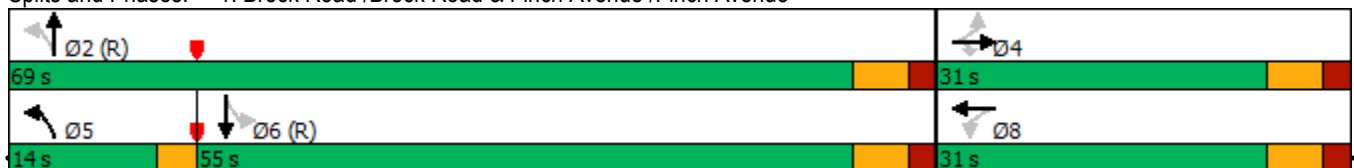


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0		14.0	69.0		55.0	55.0	
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		14.0%	69.0%		55.0%	55.0%	
Maximum Green (s)	24.6	24.6	24.6	24.6	24.6		11.0	62.8		48.8	48.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		16.8	16.8		16.8		73.8	70.6		59.3	59.3	
Actuated g/C Ratio		0.17	0.17		0.17		0.74	0.71		0.59	0.59	
v/c Ratio		0.69	0.54		0.14		0.58	0.32		0.00	1.02	
Control Delay		55.3	11.8		29.9		25.4	6.7		6.0	36.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		55.3	11.8		29.9		25.4	6.7		6.0	36.9	
LOS		E	B		C		C	A		A	D	
Approach Delay		28.7			29.9			9.5			36.9	
Approach LOS		C			C			A			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 29.0
 Intersection LOS: C
 Intersection Capacity Utilization 92.1%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↖	↕	↗		↖	↕
Traffic Volume (vph)	0	5	829	28	1	17	1961
Future Volume (vph)	0	5	829	28	1	17	1961
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	3167	1509	0	1708	3438
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	3167	1509	0	1708	3438
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)				4		4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	14%	7%	0%	6%	5%
Adj. Flow (vph)	0	5	855	29	1	18	2022
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	5	855	29	0	19	2022
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.5%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↗		↖	↕
Traffic Volume (veh/h)	0	5	829	28	1	17	1961
Future Volume (Veh/h)	0	5	829	28	1	17	1961
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	5	855	29	0	18	2022
Pedestrians	4						
Lane Width (m)	3.6						
Walking Speed (m/s)	1.2						
Percent Blockage	0						
Right turn flare (veh)							
Median type	None			None			
Median storage (veh)							
Upstream signal (m)	367			225			
pX, platoon unblocked	0.56	0.97			0.00	0.97	
vC, conflicting volume	1906	432			0	888	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	819	363			0	832	
tC, single (s)	6.8	6.9			0.0	4.2	
tC, 2 stage (s)							
tF (s)	3.5	3.3			0.0	2.3	
p0 queue free %	100	99			0	98	
cM capacity (veh/h)	172	621			0	749	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	428	428	29	18	1011	1011
Volume Left	0	0	0	0	18	0	0
Volume Right	5	0	0	29	0	0	0
cSH	621	1700	1700	1700	749	1700	1700
Volume to Capacity	0.01	0.25	0.25	0.02	0.02	0.59	0.59
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.6	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	9.9	0.0	0.0
Lane LOS	B			A			
Approach Delay (s)	10.8	0.0			0.1		
Approach LOS	B						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			57.5%		ICU Level of Service		B
Analysis Period (min)	15						

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↙	↘		↙	↕	↘	↙	↕	↘
Traffic Volume (vph)	35	4	238	86	5	7	110	696	9	2	1660	17
Future Volume (vph)	35	4	238	86	5	7	110	696	9	2	1660	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		9.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.99		1.00	0.99				0.98	1.00	1.00	
Frt		0.884			0.912				0.850		0.998	
Flt Protected		0.994		0.950			0.950			0.950		
Satd. Flow (prot)	0	1789	0	1986	1667	0	1684	3077	1439	1785	3388	0
Flt Permitted		0.953		0.263			0.063			0.373		
Satd. Flow (perm)	0	1714	0	549	1667	0	112	3077	1407	700	3388	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		177			7				44			1
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	37	4	251	91	5	7	116	733	9	2	1747	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	292	0	91	12	0	116	733	9	2	1765	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1		2
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0		10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0		0.6
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

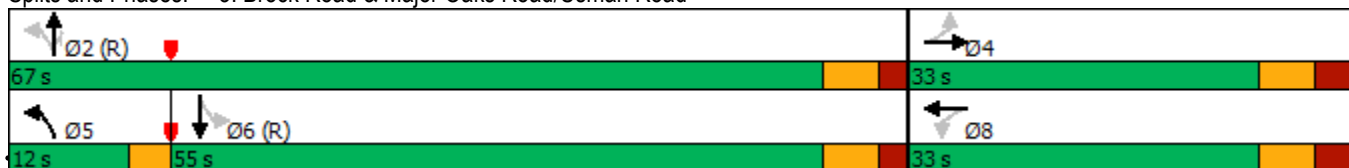


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0		32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0		33.0	33.0		12.0	67.0	67.0	55.0	55.0	
Total Split (%)	33.0%	33.0%		33.0%	33.0%		12.0%	67.0%	67.0%	55.0%	55.0%	
Maximum Green (s)	26.0	26.0		26.0	26.0		9.0	60.6	60.6	48.6	48.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9		2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0		7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0	0	0	
Act Effct Green (s)		15.2		15.2	15.2		74.8	71.4	71.4	60.3	60.3	
Actuated g/C Ratio		0.15		0.15	0.15		0.75	0.71	0.71	0.60	0.60	
v/c Ratio		0.71		1.10	0.05		0.55	0.33	0.01	0.00	0.86	
Control Delay		25.1		167.8	25.2		19.5	9.3	1.7	12.0	24.2	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		25.1		167.8	25.2		19.5	9.3	1.7	12.0	24.2	
LOS		C		F	C		B	A	A	B	C	
Approach Delay		25.1			151.2			10.6			24.2	
Approach LOS		C			F			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 24.7
 Intersection LOS: C
 Intersection Capacity Utilization 91.7%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	47.2	64.2	23.7	51.1	69.3	45.5	7.4	311.6	315.9
Average Queue (m)	26.3	33.9	6.5	21.8	28.1	15.8	0.2	186.9	195.7
95th Queue (m)	43.3	58.0	17.5	40.0	50.6	37.3	3.4	364.3	370.9
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)								1	1
Queuing Penalty (veh)								6	10
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				0	0		0	37	
Queuing Penalty (veh)				0	0		0	0	

Intersection: 2: Brock Road & Usman Road

Movement	SB	SB	SB
Directions Served	UL	T	T
Maximum Queue (m)	11.9	30.8	25.5
Average Queue (m)	2.6	3.0	3.4
95th Queue (m)	9.4	21.7	21.9
Link Distance (m)		207.4	207.4
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	60.0		
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	77.4	40.6	24.8	39.4	64.1	75.7	9.4	6.2	179.2	169.3
Average Queue (m)	43.6	16.9	4.3	18.5	31.4	35.9	0.9	0.3	113.5	99.3
95th Queue (m)	70.9	33.0	15.6	33.5	55.9	64.0	5.1	2.9	176.2	161.1
Link Distance (m)	279.1		97.3		207.4	207.4			168.6	168.6
Upstream Blk Time (%)									2	1
Queuing Penalty (veh)									0	0
Storage Bay Dist (m)		20.0		72.0			70.0	60.0		
Storage Blk Time (%)		14	0		0	0			25	
Queuing Penalty (veh)		2	0		0	0			1	




















Network Summary

Network wide Queuing Penalty: 19

Lanes, Volumes, Timings

1:

03-17-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	382	15	239	14	4	7	1	225	1687	20	5	892
Future Volume (vph)	382	15	239	14	4	7	1	225	1687	20	5	892
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0		63.0		0.0	13.0	
Storage Lanes	0		1	0		0		1		0	1	
Taper Length (m)	7.5			7.5				20.0			41.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor		1.00			1.00			1.00	1.00			0.99
Frt			0.850		0.962				0.998			0.978
Flt Protected		0.954			0.973			0.950			0.950	
Satd. Flow (prot)	0	1771	1551	0	1685	0	0	1767	3459	0	1785	3302
Flt Permitted		0.716			0.538			0.176			0.080	
Satd. Flow (perm)	0	1326	1551	0	932	0	0	327	3459	0	150	3302
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			201		7				2			30
Link Speed (k/h)		60			60				60			60
Link Distance (m)		416.8			328.7				124.4			367.1
Travel Time (s)		25.0			19.7				7.5			22.0
Confl. Peds. (#/hr)	2					2		8		6	6	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	0%	1%	3%	0%	0%	6%
Adj. Flow (vph)	390	15	244	14	4	7	1	230	1721	20	5	910
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	405	244	0	25	0	0	231	1741	0	5	1070
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		0.0			0.0				3.5			3.5
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2		1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru		Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4			9.4				9.4			9.4
Detector 2 Size(m)		0.6			0.6				0.6			0.6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings

1:

03-17-2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	157
Future Volume (vph)	157
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.95
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	8
Peak Hour Factor	0.98
Heavy Vehicles (%)	0%
Adj. Flow (vph)	160
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings

1:

03-17-2020

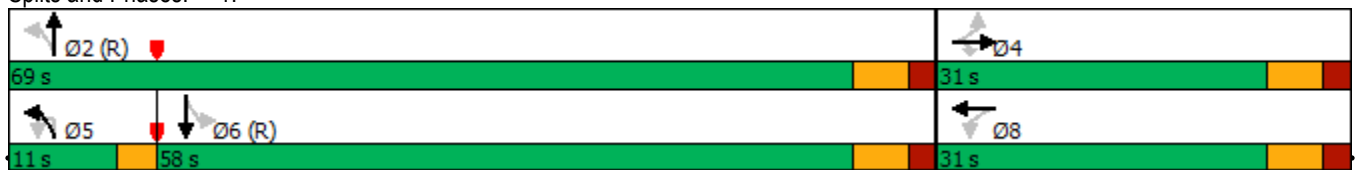


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA		Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2			6	
Detector Phase	4	4	4	8	8		5	5	2		6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	5.0	20.0		20.0	20.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	9.0	28.0		28.0	28.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0		11.0	11.0	69.0		58.0	58.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		11.0%	11.0%	69.0%		58.0%	58.0%
Maximum Green (s)	24.6	24.6	24.6	24.6	24.6		8.0	8.0	62.8		51.8	51.8
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0	4.2		4.2	4.2
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	0.0	2.0		2.0	2.0
Lost Time Adjust (s)		-3.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		3.4	6.4		6.4			3.0	6.2		6.2	6.2
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max
Walk Time (s)	16.0	16.0	16.0	16.0	16.0				14.0		14.0	14.0
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0				5.0		5.0	5.0
Pedestrian Calls (#/hr)	2	2	2	2	2				0		0	0
Act Effct Green (s)		27.6	24.6		24.6			66.0	62.8		51.8	51.8
Actuated g/C Ratio		0.28	0.25		0.25			0.66	0.63		0.52	0.52
v/c Ratio		1.11	0.46		0.11			0.70	0.80		0.06	0.62
Control Delay		115.7	10.5		24.6			19.2	17.6		16.6	25.3
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		115.7	10.5		24.6			19.2	17.6		16.6	25.3
LOS		F	B		C			B	B		B	C
Approach Delay		76.1			24.6				17.8			25.3
Approach LOS		E			C				B			C

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.11
 Intersection Signal Delay: 30.2
 Intersection LOS: C
 Intersection Capacity Utilization 106.2%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1:



Lanes, Volumes, Timings

1:

03-17-2020

↙

Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕↕	↘		↘	↕↕
Traffic Volume (vph)	0	18	2050	65	1	36	1067
Future Volume (vph)	0	18	2050	65	1	36	1067
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	3539	1615	0	1805	3438
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	3539	1615	0	1805	3438
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)	1	1		6		6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	5%
Adj. Flow (vph)	0	19	2135	68	1	38	1111
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	19	2135	68	0	39	1111
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	67.0%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↗		↘	↕
Traffic Volume (veh/h)	0	18	2050	65	1	36	1067
Future Volume (Veh/h)	0	18	2050	65	1	36	1067
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	19	2135	68	0	38	1111
Pedestrians	6		1				1
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	1		0			0	
Right turn flare (veh)							
Median type	None			None			
Median storage (veh)							
Upstream signal (m)	367			225			
pX, platoon unblocked	0.64	0.58			0.00	0.58	
vC, conflicting volume	2774	1074			0	2209	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1769	0			0	1640	
tC, single (s)	6.8	6.9			0.0	4.1	
tC, 2 stage (s)							
tF (s)	3.5	3.3			0.0	2.2	
p0 queue free %	100	97			0	84	
cM capacity (veh/h)	41	631			0	232	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	19	1068	1068	68	38	556	556
Volume Left	0	0	0	0	38	0	0
Volume Right	19	0	0	68	0	0	0
cSH	631	1700	1700	1700	232	1700	1700
Volume to Capacity	0.03	0.63	0.63	0.04	0.16	0.33	0.33
Queue Length 95th (m)	0.7	0.0	0.0	0.0	4.6	0.0	0.0
Control Delay (s)	10.9	0.0	0.0	0.0	23.6	0.0	0.0
Lane LOS	B			C			
Approach Delay (s)	10.9	0.0			0.8		
Approach LOS	B						
Intersection Summary							
Average Delay			0.3				
Intersection Capacity Utilization			67.0%		ICU Level of Service		C
Analysis Period (min)			15				

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↙	↘		↙	↕	↘	↙	↕	↘
Traffic Volume (vph)	20	10	171	59	6	16	259	1789	25	21	859	31
Future Volume (vph)	20	10	171	59	6	16	259	1789	25	21	859	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		9.0	20.0		9.0	72.0		70.0	60.0		0.0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.97		0.99	0.99		1.00		0.98		1.00	
Frt		0.885			0.891				0.850		0.995	
Flt Protected		0.995		0.950			0.950			0.950		
Satd. Flow (prot)	0	1807	0	2046	1813	0	1750	3466	1597	1785	3353	0
Flt Permitted		0.960		0.364			0.262			0.104		
Satd. Flow (perm)	0	1743	0	774	1813	0	481	3466	1561	195	3353	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		176			16				44			5
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	21	10	176	61	6	16	267	1844	26	22	886	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	207	0	61	22	0	267	1844	26	22	918	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1		2
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left		Thru
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0	2.0	2.0		10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6	2.0	2.0		0.6
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

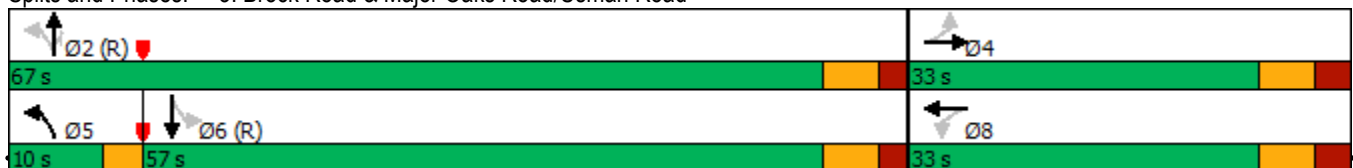


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		4.0	4.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0		32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0		33.0	33.0		10.0	67.0	67.0	57.0	57.0	
Total Split (%)	33.0%	33.0%		33.0%	33.0%		10.0%	67.0%	67.0%	57.0%	57.0%	
Maximum Green (s)	26.0	26.0		26.0	26.0		7.0	60.6	60.6	50.6	50.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9		2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0		7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0	0	0	
Act Effct Green (s)		11.0		11.0	11.0		79.0	75.6	75.6	62.6	62.6	
Actuated g/C Ratio		0.11		0.11	0.11		0.79	0.76	0.76	0.63	0.63	
v/c Ratio		0.59		0.72	0.10		0.53	0.70	0.02	0.18	0.44	
Control Delay		16.9		81.5	19.5		4.7	4.2	0.0	14.5	11.1	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		16.9		81.5	19.5		4.7	4.2	0.0	14.5	11.1	
LOS		B		F	B		A	A	A	B	B	
Approach Delay		16.9			65.1			4.2			11.1	
Approach LOS		B			E			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 8.4
 Intersection LOS: A
 Intersection Capacity Utilization 103.1%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
4: Prop. Site Access & Usman Road

03-17-2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	82	0	0	0	0	18
Future Volume (vph)	82	0	0	0	0	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.2	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected	0.950					
Satd. Flow (prot)	1805	0	0	1816	1644	0
Flt Permitted	0.950					
Satd. Flow (perm)	1805	0	0	1816	1644	0
Link Speed (k/h)	40			30	40	
Link Distance (m)	119.8			40.0	219.7	
Travel Time (s)	10.8			4.8	19.8	
Peak Hour Factor	0.25	0.25	0.25	0.25	0.25	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	328	0	0	0	0	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	328	0	0	0	72	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			-7.5	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.06	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Free			Stop	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	14.5%
Analysis Period (min)	15
	ICU Level of Service A

Intersection Sign configuration not allowed in HCM analysis.

Queuing and Blocking Report
Baseline

03-17-2020

Intersection: 1:

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	UL	T	TR	L	T	TR
Maximum Queue (m)	149.3	46.6	17.3	82.8	123.4	117.8	21.8	92.8	93.5
Average Queue (m)	82.6	23.6	5.2	41.8	83.8	70.8	2.8	52.8	59.0
95th Queue (m)	151.7	40.6	14.2	84.0	127.2	113.6	12.9	83.1	88.5
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		351.0	351.0
Upstream Blk Time (%)					3	1			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				0	11		1	24	
Queuing Penalty (veh)				4	25		4	1	

Intersection: 2: Brock Road & Usman Road

Movement	NB	NB	NB	SB	SB	SB
Directions Served	T	T	R	UL	T	T
Maximum Queue (m)	5.2	3.9	1.7	21.7	2.3	8.2
Average Queue (m)	0.2	0.2	0.1	7.2	0.1	0.4
95th Queue (m)	3.6	2.8	1.5	17.6	1.5	5.9
Link Distance (m)	351.0	351.0			207.2	207.2
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			38.0	60.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	58.7	29.6	14.1	70.7	70.9	76.7	7.4	18.5	88.4	82.3
Average Queue (m)	25.2	12.0	3.5	29.3	33.4	38.3	0.8	5.2	45.5	33.8
95th Queue (m)	46.0	24.4	10.7	55.0	61.7	67.6	4.6	14.1	75.3	65.0
Link Distance (m)	279.1		97.3		207.2	207.2			168.6	168.6
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)		20.0		72.0			70.0	60.0		
Storage Blk Time (%)		6	0	1	0	1			3	
Queuing Penalty (veh)		1	0	5	0	0			1	

Intersection: 4: Prop. Site Access & Usman Road

Movement

Directions Served

Maximum Queue (m)

Average Queue (m)

95th Queue (m)

Link Distance (m)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (m)

Storage Blk Time (%)

Queuing Penalty (veh)





















Network Summary

Network wide Queuing Penalty: 41

Lanes, Volumes, Timings

1:

03-17-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	303	4	215	6	7	6	210	1608	13	2	942	192
Future Volume (vph)	303	4	215	6	7	6	210	1608	13	2	942	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.975	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	3426	0	892	3252	0
Flt Permitted		0.713			0.814		0.117			0.077		
Satd. Flow (perm)	0	1265	1496	0	1209	0	211	3426	0	72	3252	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			203		7			2			35	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	340	4	242	7	8	7	236	1807	15	2	1058	216
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	344	242	0	22	0	236	1822	0	2	1274	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1:

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0		11.0	69.0		58.0	58.0	
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		11.0%	69.0%		58.0%	58.0%	
Maximum Green (s)	24.6	24.6	24.6	24.6	24.6		8.0	62.8		51.8	51.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		-3.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		3.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		27.6	24.6		24.6		66.0	62.8		51.8	51.8	
Actuated g/C Ratio		0.28	0.25		0.25		0.66	0.63		0.52	0.52	
v/c Ratio		0.99	0.46		0.07		0.91	0.85		0.05	0.75	
Control Delay		82.5	10.4		23.2		53.2	19.7		14.5	23.2	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		82.5	10.4		23.2		53.2	19.7		14.5	23.2	
LOS		F	B		C		D	B		B	C	
Approach Delay		52.7			23.2			23.5			23.2	
Approach LOS		D			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 27.8
 Intersection LOS: C
 Intersection Capacity Utilization 98.9%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1:



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑	↗	↘	↓↓
Traffic Volume (vph)	0	74	1753	140	54	1011
Future Volume (vph)	0	74	1753	140	54	1011
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	3438	1568	1770	3374
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	3438	1568	1770	3374
Link Speed (k/h)	40		60			60
Link Distance (m)	119.8		367.1			224.5
Travel Time (s)	10.8		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	88	2087	167	64	1204
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	88	2087	167	64	1204
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.1%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↖	↑↑	↗	↖	↑↑	
Traffic Volume (veh/h)	0	74	1753	140	54	1011	
Future Volume (Veh/h)	0	74	1753	140	54	1011	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	
Hourly flow rate (vph)	0	88	2087	167	64	1204	
Pedestrians	55		7			1	
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	5		1			0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)			367			225	
pX, platoon unblocked	0.63	0.55			0.55		
vC, conflicting volume	2879	1100			2309		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1630	0			1737		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	84			66		
cM capacity (veh/h)	37	567			187		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	88	1044	1044	167	64	602	602
Volume Left	0	0	0	0	64	0	0
Volume Right	88	0	0	167	0	0	0
cSH	567	1700	1700	1700	187	1700	1700
Volume to Capacity	0.16	0.61	0.61	0.10	0.34	0.35	0.35
Queue Length 95th (m)	4.4	0.0	0.0	0.0	11.4	0.0	0.0
Control Delay (s)	12.5	0.0	0.0	0.0	33.9	0.0	0.0
Lane LOS	B				D		
Approach Delay (s)	12.5	0.0			1.7		
Approach LOS	B						
Intersection Summary							
Average Delay			0.9				
Intersection Capacity Utilization			60.1%		ICU Level of Service		B
Analysis Period (min)			15				

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕		↙	↘			↙	↕	↘	↙	↕
Traffic Volume (vph)	30	11	214	123	20	43	2	250	1626	22	42	846
Future Volume (vph)	30	11	214	123	20	43	2	250	1626	22	42	846
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		9.0	20.0		9.0		72.0		70.0	60.0	
Storage Lanes	0		0	1		0		1		1	1	
Taper Length (m)	7.5			48.0				72.0			92.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor		0.95		0.98	0.98			1.00		0.95		1.00
Frt		0.886			0.897					0.850		0.997
Flt Protected		0.994		0.950				0.950			0.950	
Satd. Flow (prot)	0	1758	0	1986	1846	0	0	1750	3400	1597	1785	3294
Flt Permitted		0.951		0.361				0.224			0.086	
Satd. Flow (perm)	0	1680	0	737	1846	0	0	411	3400	1517	162	3294
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)		208			18					44		3
Link Speed (k/h)		50			40				60			60
Link Distance (m)		292.9			123.2				224.5			180.3
Travel Time (s)		21.1			11.1				13.5			10.8
Confl. Peds. (#/hr)	10		37	37		10		10		13	13	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	0%	2%	5%	0%	0%	8%
Adj. Flow (vph)	33	12	238	137	22	48	2	278	1807	24	47	940
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	283	0	137	70	0	0	280	1807	24	47	960
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		4.8			4.8				3.6			3.6
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2		1	2		1	1	2	1	1	2
Detector Template	Left	Thru		Left	Thru		Left	Left	Thru	Right	Left	Thru
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	2.0	0.6	2.0	2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4				9.4			9.4
Detector 2 Size(m)		0.6			0.6				0.6			0.6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	18
Future Volume (vph)	18
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.95
Ped Bike Factor	
Flt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	10
Peak Hour Factor	0.90
Heavy Vehicles (%)	6%
Adj. Flow (vph)	20
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

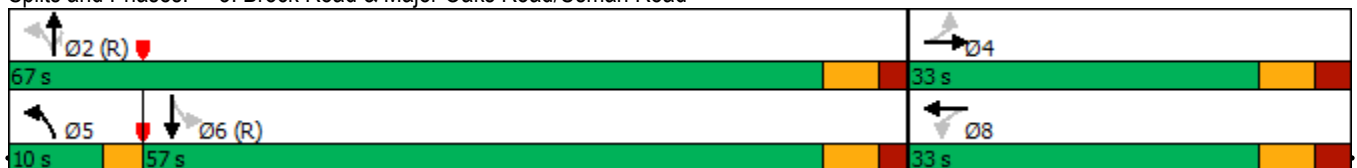


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA		Perm	NA			pm+pt	NA	Perm	Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4			8				2		2	6	
Detector Phase	4	4		8	8			5	2	2	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		4.0	4.0			5.0	20.0	20.0	20.0	20.0
Minimum Split (s)	32.0	32.0		32.0	32.0			8.0	29.0	29.0	29.0	29.0
Total Split (s)	33.0	33.0		33.0	33.0			10.0	67.0	67.0	57.0	57.0
Total Split (%)	33.0%	33.0%		33.0%	33.0%			10.0%	67.0%	67.0%	57.0%	57.0%
Maximum Green (s)	26.0	26.0		26.0	26.0			7.0	60.6	60.6	50.6	50.6
Yellow Time (s)	4.1	4.1		4.1	4.1			3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	2.9	2.9		2.9	2.9			0.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0		7.0	7.0			3.0	6.4	6.4	6.4	6.4
Lead/Lag								Lead			Lag	Lag
Lead-Lag Optimize?								Yes			Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None			None	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			14.0	14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0		0	0			0	0	0	0	0
Act Effct Green (s)		19.3		19.3	19.3			70.7	67.3	67.3	54.7	54.7
Actuated g/C Ratio		0.19		0.19	0.19			0.71	0.67	0.67	0.55	0.55
v/c Ratio		0.58		0.96	0.19			0.67	0.79	0.02	0.53	0.53
Control Delay		14.6		86.5	18.7			11.8	10.0	0.1	44.7	16.7
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay		14.6		86.5	18.7			11.8	10.0	0.1	44.7	16.7
LOS		B		F	B			B	B	A	D	B
Approach Delay		14.6			63.6				10.2			18.0
Approach LOS		B			E				B			B

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 15.8
 Intersection LOS: B
 Intersection Capacity Utilization 114.8%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Queuing and Blocking Report

Baseline

03-17-2020

Intersection: 1:

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	112.7	44.0	18.9	82.7	117.8	111.2	11.6	94.6	107.3
Average Queue (m)	61.9	20.4	4.9	37.3	68.1	55.1	0.5	53.4	60.6
95th Queue (m)	98.2	34.9	14.5	73.0	109.0	91.5	4.8	87.6	96.5
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					1	0			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				1	6		1	25	
Queuing Penalty (veh)				7	13		5	0	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	L	T	T
Maximum Queue (m)	14.9	24.3	13.9	9.0	27.4	12.7	29.8
Average Queue (m)	2.5	2.5	1.5	1.0	10.2	1.2	1.8
95th Queue (m)	10.7	13.4	7.8	5.3	22.3	7.7	12.0
Link Distance (m)	92.2	350.8	350.8			207.4	207.4
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	UL	T	T	R	L	T	TR
Maximum Queue (m)	83.4	42.9	34.3	63.4	71.3	78.8	7.9	31.1	82.2	74.2
Average Queue (m)	34.2	20.5	10.3	31.3	38.8	43.9	1.7	13.0	50.2	38.0
95th Queue (m)	64.2	36.9	23.8	55.5	63.7	70.5	6.5	26.3	76.7	65.9
Link Distance (m)	279.1		97.3		207.4	207.4			168.6	168.6
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)		20.0		72.0			70.0	60.0		
Storage Blk Time (%)		20	3	0	0	0			3	
Queuing Penalty (veh)		12	4	4	0	0			1	

Network Summary

Network wide Queuing Penalty: 47

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	140	3	224	19	4	5	119	672	3	1	1777	179
Future Volume (vph)	140	3	224	19	4	5	119	672	3	1	1777	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.977			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1696	1551	0	1502	0	1668	3072	0	892	3339	0
Flt Permitted		0.709			0.754		0.063			0.387		
Satd. Flow (perm)	0	1260	1528	0	1169	0	111	3072	0	362	3339	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			116		5			1			17	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	144	3	231	20	4	5	123	693	3	1	1832	185
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	147	231	0	29	0	123	696	0	1	2017	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

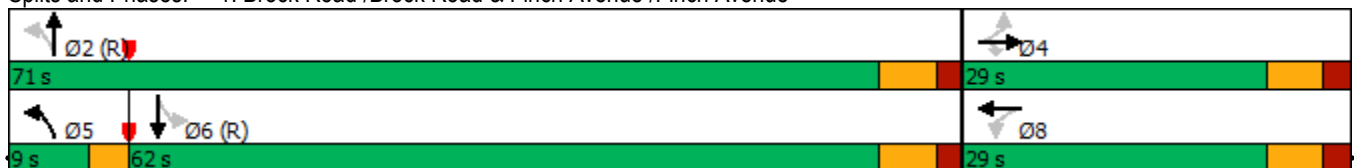


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	22.6	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		16.6	16.6		16.6		74.0	70.8		60.5	60.5	
Actuated g/C Ratio		0.17	0.17		0.17		0.74	0.71		0.60	0.60	
v/c Ratio		0.71	0.66		0.15		0.63	0.32		0.00	1.00	
Control Delay		56.8	27.8		30.4		29.9	6.5		3.0	33.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		56.8	27.8		30.4		29.9	6.5		3.0	33.1	
LOS		E	C		C		C	A		A	C	
Approach Delay		39.1			30.4			10.0			33.1	
Approach LOS		D			C			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 28.0
 Intersection LOS: C
 Intersection Capacity Utilization 92.1%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕↕	↘		↘	↕↕
Traffic Volume (vph)	0	5	829	28	1	17	1961
Future Volume (vph)	0	5	829	28	1	17	1961
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	3167	1509	0	1708	3438
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	3167	1509	0	1708	3438
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)				4		4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	14%	7%	0%	6%	5%
Adj. Flow (vph)	0	5	855	29	1	18	2022
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	5	855	29	0	19	2022
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	57.5%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↘		↙	↕
Traffic Volume (veh/h)	0	5	829	28	1	17	1961
Future Volume (Veh/h)	0	5	829	28	1	17	1961
Sign Control	Stop		Free				Free
Grade	0%		0%				0%
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	5	855	29	0	18	2022
Pedestrians	4						
Lane Width (m)	3.6						
Walking Speed (m/s)	1.2						
Percent Blockage	0						
Right turn flare (veh)							
Median type			None				None
Median storage veh							
Upstream signal (m)			367				225
pX, platoon unblocked	0.57	0.97			0.00	0.97	
vC, conflicting volume	1906	432			0	888	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	894	366			0	834	
tC, single (s)	6.8	6.9			0.0	4.2	
tC, 2 stage (s)							
tF (s)	3.5	3.3			0.0	2.3	
p0 queue free %	100	99			0	98	
cM capacity (veh/h)	158	619			0	748	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	428	428	29	18	1011	1011
Volume Left	0	0	0	0	18	0	0
Volume Right	5	0	0	29	0	0	0
cSH	619	1700	1700	1700	748	1700	1700
Volume to Capacity	0.01	0.25	0.25	0.02	0.02	0.59	0.59
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.6	0.0	0.0
Control Delay (s)	10.9	0.0	0.0	0.0	9.9	0.0	0.0
Lane LOS	B				A		
Approach Delay (s)	10.9	0.0			0.1		
Approach LOS	B						
Intersection Summary							
Average Delay			0.1				
Intersection Capacity Utilization			57.5%		ICU Level of Service		B
Analysis Period (min)			15				

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	35	4	238	86	5	7	110	696	9	2	1660	17
Future Volume (vph)	35	4	238	86	5	7	110	696	9	2	1660	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		15.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.99	0.99	1.00	0.99				0.98	1.00	1.00	
Frt			0.850		0.912				0.850		0.998	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1574	1398	1636	1373	0	1684	3077	1439	1785	3388	0
Flt Permitted		0.738		0.730			0.062			0.373		
Satd. Flow (perm)	0	1206	1379	1255	1373	0	110	3077	1407	700	3388	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			177		7				44			1
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	37	4	251	91	5	7	116	733	9	2	1747	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	41	251	91	12	0	116	733	9	2	1765	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

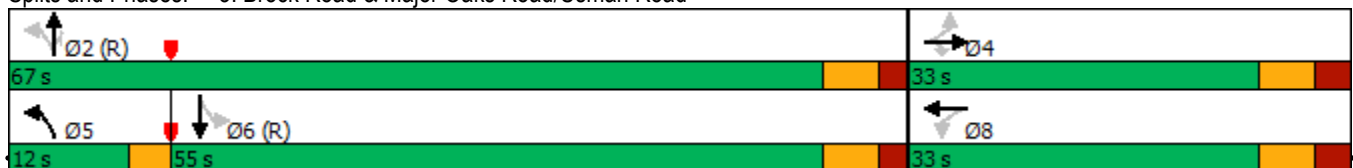


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		12.0	67.0	67.0	55.0	55.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		12.0%	67.0%	67.0%	55.0%	55.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		9.0	60.6	60.6	48.6	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		13.6	13.6	13.6	13.6		76.4	73.0	73.0	62.0	62.0	
Actuated g/C Ratio		0.14	0.14	0.14	0.14		0.76	0.73	0.73	0.62	0.62	
v/c Ratio		0.25	0.74	0.54	0.06		0.56	0.33	0.01	0.00	0.84	
Control Delay		40.1	26.3	52.2	26.5		18.1	7.0	0.9	11.0	21.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		40.1	26.3	52.2	26.5		18.1	7.0	0.9	11.0	21.7	
LOS		D	C	D	C		B	A	A	B	C	
Approach Delay		28.3			49.2			8.4			21.6	
Approach LOS		C			D			A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 19.5
 Intersection LOS: B
 Intersection Capacity Utilization 87.7%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Queuing and Blocking Report
Baseline

03-17-2020

Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	63.2	62.0	25.0	55.1	59.6	50.3	4.1	291.3	292.5
Average Queue (m)	29.0	33.0	6.4	24.9	27.5	18.3	0.1	147.3	154.3
95th Queue (m)	52.9	55.5	17.9	44.0	52.2	40.1	2.6	295.5	303.1
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)								0	1
Queuing Penalty (veh)								4	6
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				0	0		0	34	
Queuing Penalty (veh)				0	0		1	0	

Intersection: 2: Brock Road & Usman Road

Movement	NB	SB	SB	SB
Directions Served	R	UL	T	T
Maximum Queue (m)	1.7	10.6	20.2	22.5
Average Queue (m)	0.1	2.5	2.6	3.2
95th Queue (m)	1.1	9.2	22.8	26.9
Link Distance (m)			207.4	207.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	38.0	60.0		
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	24.4	77.1	38.1	24.8	46.2	52.1	57.6	15.5	4.1	174.3	174.3
Average Queue (m)	8.5	36.9	17.2	4.3	18.9	21.6	26.3	1.0	0.2	93.0	80.9
95th Queue (m)	20.8	64.3	31.5	15.9	37.2	42.5	50.4	6.2	2.0	163.3	149.9
Link Distance (m)	279.0			97.2		207.4	207.4			170.3	170.3
Upstream Blk Time (%)										2	1
Queuing Penalty (veh)										0	0
Storage Bay Dist (m)		15.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	8	44	15	1			0			18	
Queuing Penalty (veh)	19	17	2	1			0			0	

Network Summary

Network wide Queuing Penalty: 50

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	382	15	239	14	4	7	1	225	1687	20	5	892
Future Volume (vph)	382	15	239	14	4	7	1	225	1687	20	5	892
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0		63.0		0.0	13.0	
Storage Lanes	0		1	0		0		1		0	1	
Taper Length (m)	7.5			7.5				20.0			41.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor		1.00			1.00				1.00			0.99
Frt			0.850		0.962				0.998			0.978
Flt Protected		0.954			0.973			0.950			0.950	
Satd. Flow (prot)	0	1771	1551	0	1685	0	0	1767	3459	0	1785	3302
Flt Permitted		0.716			0.782			0.119			0.099	
Satd. Flow (perm)	0	1326	1551	0	1355	0	0	221	3459	0	186	3302
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			244		7				2			23
Link Speed (k/h)		60			60				60			60
Link Distance (m)		416.8			328.7				124.4			367.1
Travel Time (s)		25.0			19.7				7.5			22.0
Confl. Peds. (#/hr)	2						2		8		6	6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	0%	1%	3%	0%	0%	6%
Adj. Flow (vph)	390	15	244	14	4	7	1	230	1721	20	5	910
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	405	244	0	25	0	0	231	1741	0	5	1070
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		0.0			0.0				3.5			3.5
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2		1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru		Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4			9.4				9.4			9.4
Detector 2 Size(m)		0.6			0.6				0.6			0.6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	157
Future Volume (vph)	157
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.95
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	8
Peak Hour Factor	0.98
Heavy Vehicles (%)	0%
Adj. Flow (vph)	160
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA		Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2			6	
Detector Phase	4	4	4	8	8		5	5	2		6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	5.0	20.0		20.0	20.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	9.0	28.0		28.0	28.0
Total Split (s)	40.0	40.0	40.0	40.0	40.0		16.0	16.0	60.0		44.0	44.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%		16.0%	16.0%	60.0%		44.0%	44.0%
Maximum Green (s)	33.6	33.6	33.6	33.6	33.6		13.0	13.0	53.8		37.8	37.8
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0	4.2		4.2	4.2
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	0.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		6.4	6.4		6.4			3.0	6.2		6.2	6.2
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max
Walk Time (s)	16.0	16.0	16.0	16.0	16.0				14.0		14.0	14.0
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0				5.0		5.0	5.0
Pedestrian Calls (#/hr)	0	0	0	0	0				0		0	0
Act Effct Green (s)		32.4	32.4		32.4			58.2	55.0		40.3	40.3
Actuated g/C Ratio		0.32	0.32		0.32			0.58	0.55		0.40	0.40
v/c Ratio		0.94	0.37		0.06			0.75	0.92		0.07	0.80
Control Delay		65.2	4.8		18.4			31.7	30.0		19.8	30.8
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		65.2	4.8		18.4			31.7	30.0		19.8	30.8
LOS		E	A		B			C	C		B	C
Approach Delay		42.5			18.4				30.2			30.7
Approach LOS		D			B				C			C

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 32.4
 Intersection LOS: C
 Intersection Capacity Utilization 108.2%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↘		↗	↕
Traffic Volume (vph)	0	18	2050	65	1	36	1067
Future Volume (vph)	0	18	2050	65	1	36	1067
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	3539	1615	0	1805	3438
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	3539	1615	0	1805	3438
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)	1	1		6		6	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	5%
Adj. Flow (vph)	0	19	2135	68	1	38	1111
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	19	2135	68	0	39	1111
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	67.0%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↗		↖	↕
Traffic Volume (veh/h)	0	18	2050	65	1	36	1067
Future Volume (Veh/h)	0	18	2050	65	1	36	1067
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	19	2135	68	0	38	1111
Pedestrians	6		1				1
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	1		0			0	
Right turn flare (veh)							
Median type	None			None			
Median storage (veh)							
Upstream signal (m)	367			225			
pX, platoon unblocked	0.57	0.51			0.00	0.51	
vC, conflicting volume	2774	1074			0	2209	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1619	0			0	1438	
tC, single (s)	6.8	6.9			0.0	4.1	
tC, 2 stage (s)							
tF (s)	3.5	3.3			0.0	2.2	
p0 queue free %	100	97			0	84	
cM capacity (veh/h)	46	549			0	241	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	19	1068	1068	68	38	556	556
Volume Left	0	0	0	0	38	0	0
Volume Right	19	0	0	68	0	0	0
cSH	549	1700	1700	1700	241	1700	1700
Volume to Capacity	0.03	0.63	0.63	0.04	0.16	0.33	0.33
Queue Length 95th (m)	0.9	0.0	0.0	0.0	4.4	0.0	0.0
Control Delay (s)	11.8	0.0	0.0	0.0	22.7	0.0	0.0
Lane LOS	B			C			
Approach Delay (s)	11.8	0.0			0.8		
Approach LOS	B						
Intersection Summary							
Average Delay			0.3				
Intersection Capacity Utilization			67.0%		ICU Level of Service		C
Analysis Period (min)	15						

Lanes, Volumes, Timings 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	20	10	171	59	6	16	259	1789	25	21	859	31
Future Volume (vph)	20	10	171	59	6	16	259	1789	25	21	859	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		15.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00	0.97	0.98	0.99		1.00		0.98		1.00	
Frt			0.850		0.891				0.850		0.995	
Flt Protected		0.967		0.950			0.950			0.950		
Satd. Flow (prot)	0	1661	1425	1685	1493	0	1750	3466	1597	1785	3353	0
Flt Permitted		0.783		0.737			0.263			0.105		
Satd. Flow (perm)	0	1342	1381	1283	1493	0	482	3466	1561	197	3353	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			176		16				44		5	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	21	10	176	61	6	16	267	1844	26	22	886	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	31	176	61	22	0	267	1844	26	22	918	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

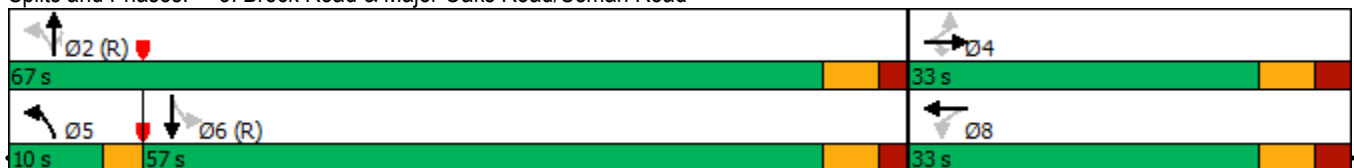


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		10.0	67.0	67.0	57.0	57.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		10.0%	67.0%	67.0%	57.0%	57.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		7.0	60.6	60.6	50.6	50.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		10.6	10.6	10.6	10.6		79.4	76.0	76.0	63.1	63.1	
Actuated g/C Ratio		0.11	0.11	0.11	0.11		0.79	0.76	0.76	0.63	0.63	
v/c Ratio		0.22	0.58	0.45	0.13		0.53	0.70	0.02	0.18	0.43	
Control Delay		43.3	14.4	42.1	16.4		4.1	4.2	0.0	14.0	10.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		43.3	14.4	42.1	16.4		4.1	4.2	0.0	14.0	10.7	
LOS		D	B	D	B		A	A	A	B	B	
Approach Delay		18.7			35.3			4.1			10.8	
Approach LOS		B			D			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 7.7
 Intersection LOS: A
 Intersection Capacity Utilization 96.1%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	UL	T	TR	L	T	TR
Maximum Queue (m)	113.0	45.0	17.7	82.9	123.6	121.8	20.3	101.4	113.0
Average Queue (m)	62.9	21.0	4.5	57.6	98.2	89.2	1.8	55.2	62.8
95th Queue (m)	101.5	36.4	13.6	100.2	139.6	132.1	11.2	92.8	101.1
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					11	6			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				0	21		0	30	
Queuing Penalty (veh)				3	47		0	1	

Intersection: 2: Brock Road & Usman Road

Movement	NB	NB	SB	SB	SB
Directions Served	T	T	UL	T	T
Maximum Queue (m)	12.1	4.2	19.9	4.6	9.6
Average Queue (m)	0.4	0.3	7.0	0.2	0.3
95th Queue (m)	4.8	3.8	15.8	2.1	3.7
Link Distance (m)	350.8	350.8		207.4	207.4
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)			60.0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	36.0	22.5	24.3	13.0	59.9	64.9	75.4	8.0	18.4	79.3	68.7
Average Queue (m)	11.0	16.9	12.1	2.8	28.4	30.3	36.1	1.2	6.3	41.8	30.4
95th Queue (m)	27.0	24.2	23.1	9.1	49.4	55.7	62.4	5.3	16.4	69.8	60.3
Link Distance (m)	279.0			97.2		207.4	207.4			170.3	170.3
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)		15.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	7	10	6	0		0	0			2	
Queuing Penalty (veh)	12	3	1	0		0	0			0	

Network Summary

Network wide Queuing Penalty: 68

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

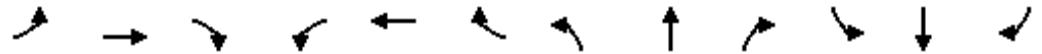


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔		↔	↕	↕	↔	↕	↕
Traffic Volume (vph)	303	4	215	6	7	6	210	1608	13	2	942	192
Future Volume (vph)	303	4	215	6	7	6	210	1608	13	2	942	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.975	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	3426	0	892	3252	0
Flt Permitted		0.713			0.886		0.085			0.090		
Satd. Flow (perm)	0	1265	1496	0	1316	0	154	3426	0	85	3252	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242		7			1			30	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	340	4	242	7	8	7	236	1807	15	2	1058	216
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	344	242	0	22	0	236	1822	0	2	1274	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

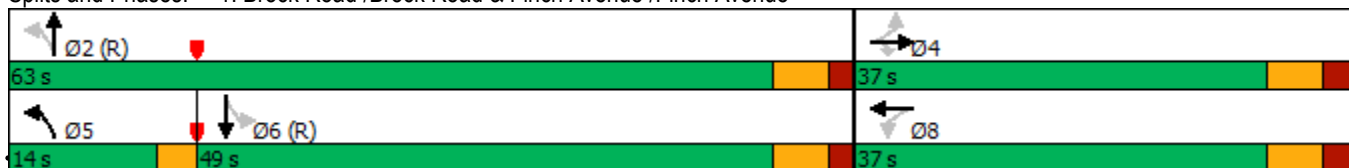


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	37.0	37.0	37.0	37.0	37.0		14.0	63.0		49.0	49.0	
Total Split (%)	37.0%	37.0%	37.0%	37.0%	37.0%		14.0%	63.0%		49.0%	49.0%	
Maximum Green (s)	30.6	30.6	30.6	30.6	30.6		11.0	56.8		42.8	42.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		29.3	29.3		29.3		61.3	58.1		44.2	44.2	
Actuated g/C Ratio		0.29	0.29		0.29		0.61	0.58		0.44	0.44	
v/c Ratio		0.93	0.40		0.06		0.89	0.91		0.05	0.88	
Control Delay		67.5	5.6		19.5		57.2	27.9		17.5	30.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		67.5	5.6		19.5		57.2	27.9		17.5	30.4	
LOS		E	A		B		E	C		B	C	
Approach Delay		41.9			19.5			31.3			30.4	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 32.5
 Intersection LOS: C
 Intersection Capacity Utilization 100.9%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



2019 Existing Friday Mid-day Opt 5:00 pm 10-02-2019 Baseline

Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↘	↙	↗
Traffic Volume (vph)	0	74	1753	140	54	1011
Future Volume (vph)	0	74	1753	140	54	1011
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	3438	1568	1770	3374
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	3438	1568	1770	3374
Link Speed (k/h)	40		60			60
Link Distance (m)	119.8		367.1			224.5
Travel Time (s)	10.8		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	88	2087	167	64	1204
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	88	2087	167	64	1204
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.1%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕	↗	↘	↕	
Traffic Volume (veh/h)	0	74	1753	140	54	1011	
Future Volume (Veh/h)	0	74	1753	140	54	1011	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	
Hourly flow rate (vph)	0	88	2087	167	64	1204	
Pedestrians	55		7			1	
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	5		1			0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)			367			225	
pX, platoon unblocked	0.57	0.49			0.49		
vC, conflicting volume	2879	1100			2309		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1549	0			1600		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	83			66		
cM capacity (veh/h)	39	512			191		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	88	1044	1044	167	64	602	602
Volume Left	0	0	0	0	64	0	0
Volume Right	88	0	0	167	0	0	0
cSH	512	1700	1700	1700	191	1700	1700
Volume to Capacity	0.17	0.61	0.61	0.10	0.34	0.35	0.35
Queue Length 95th (m)	4.9	0.0	0.0	0.0	11.1	0.0	0.0
Control Delay (s)	13.5	0.0	0.0	0.0	33.1	0.0	0.0
Lane LOS	B				D		
Approach Delay (s)	13.5	0.0			1.7		
Approach LOS	B						
Intersection Summary							
Average Delay			0.9				
Intersection Capacity Utilization			60.1%		ICU Level of Service		B
Analysis Period (min)			15				

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↖	↗	↖	↗			↖	↑↑	↗	↖	↗
Traffic Volume (vph)	30	11	214	123	20	43	2	250	1626	22	42	846
Future Volume (vph)	30	11	214	123	20	43	2	250	1626	22	42	846
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		15.0	20.0		15.0		72.0		70.0	60.0	
Storage Lanes	0		1	1		0		1		1	1	
Taper Length (m)	7.5			48.0				72.0			92.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor		0.99	0.94	0.96	0.98			1.00		0.95		1.00
Frt			0.850		0.897					0.850		0.997
Flt Protected		0.965		0.950				0.950			0.950	
Satd. Flow (prot)	0	1594	1425	1636	1520	0	0	1750	3400	1597	1785	3294
Flt Permitted		0.744		0.728				0.230			0.096	
Satd. Flow (perm)	0	1219	1346	1201	1520	0	0	422	3400	1517	180	3294
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			168		18					44		3
Link Speed (k/h)		50		40				60				60
Link Distance (m)		292.9		123.2				224.5				180.3
Travel Time (s)		21.1		11.1				13.5				10.8
Confl. Peds. (#/hr)	10		37	37		10		10		13	13	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	0%	2%	5%	0%	0%	8%
Adj. Flow (vph)	33	12	238	137	22	48	2	278	1807	24	47	940
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	238	137	70	0	0	280	1807	24	47	960
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		3.0		3.0				3.6				3.6
Link Offset(m)		0.0		0.0				0.0				0.0
Crosswalk Width(m)		4.8		4.8				4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2	1	1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru	Right	Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6	2.0	2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4		9.4				9.4				9.4
Detector 2 Size(m)		0.6		0.6				0.6				0.6
Detector 2 Type		Cl+Ex		Cl+Ex				Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	18
Future Volume (vph)	18
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.95
Ped Bike Factor	
Flt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	10
Peak Hour Factor	0.90
Heavy Vehicles (%)	6%
Adj. Flow (vph)	20
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

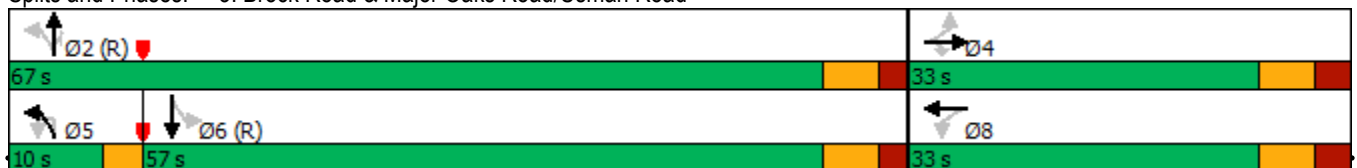


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA	Perm	Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2		2	6	
Detector Phase	4	4	4	8	8		5	5	2	2	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	5.0	20.0	20.0	20.0	20.0
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	8.0	29.0	29.0	29.0	29.0
Total Split (s)	33.0	33.0	33.0	33.0	33.0		10.0	10.0	67.0	67.0	57.0	57.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		10.0%	10.0%	67.0%	67.0%	57.0%	57.0%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		7.0	7.0	60.6	60.6	50.6	50.6
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	0.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)		0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.0	7.0	7.0			3.0	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
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
Recall Mode	None	None	None	None	None		None	None	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0				7.0	7.0	7.0	7.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0				14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0				0	0	0	0
Act Effct Green (s)		16.6	16.6	16.6	16.6			73.4	70.0	70.0	56.3	56.3
Actuated g/C Ratio		0.17	0.17	0.17	0.17			0.73	0.70	0.70	0.56	0.56
v/c Ratio		0.22	0.65	0.69	0.26			0.62	0.76	0.02	0.47	0.52
Control Delay		36.3	20.8	43.9	22.1			8.8	8.3	0.1	35.4	15.7
Queue Delay		0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay		36.3	20.8	43.9	22.1			8.8	8.3	0.1	35.4	15.7
LOS		D	C	D	C			A	A	A	D	B
Approach Delay		23.2			36.5				8.3			16.6
Approach LOS		C			D				A			B

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 13.4
 Intersection LOS: B
 Intersection Capacity Utilization 95.5%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Queuing and Blocking Report
Baseline

03-17-2020

Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	115.2	102.0	20.9	82.9	132.4	117.8	16.5	86.4	109.2
Average Queue (m)	60.1	24.1	5.0	46.4	83.5	73.3	1.5	57.3	66.1
95th Queue (m)	95.8	52.9	15.7	87.7	131.1	122.0	9.0	91.7	109.1
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					3	3			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)					13		2	33	
Queuing Penalty (veh)					28		11	1	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	L	T	T
Maximum Queue (m)	14.0	15.9	21.4	9.2	20.4	9.0	15.7
Average Queue (m)	1.9	2.1	1.5	1.1	7.5	0.3	0.8
95th Queue (m)	8.9	9.6	9.6	5.9	16.4	3.0	6.0
Link Distance (m)	92.2	350.8	350.8			207.4	207.4
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	UL	T	T	R	L	T	TR
Maximum Queue (m)	60.3	23.5	36.9	38.1	60.7	75.3	88.0	6.2	39.4	89.7	72.0
Average Queue (m)	17.9	17.8	21.0	6.9	27.3	40.7	44.5	1.2	12.9	50.0	34.4
95th Queue (m)	45.5	25.7	36.7	20.4	45.7	70.1	72.1	5.1	27.5	79.6	62.0
Link Distance (m)	279.0			97.2		207.4	207.4			170.3	170.3
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)		15.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	8	19	20	2		0	1			3	
Queuing Penalty (veh)	16	8	12	2		1	0			1	

Network Summary

Network wide Queuing Penalty: 81

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Future Volume (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.974			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1697	1551	0	1491	0	1668	3072	0	892	3339	0
Flt Permitted		0.707			0.754		0.066			0.353		
Satd. Flow (perm)	0	1258	1528	0	1160	0	116	3072	0	331	3339	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			203		6			1			15	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	173	247	0	31	0	131	789	0	1	2229	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

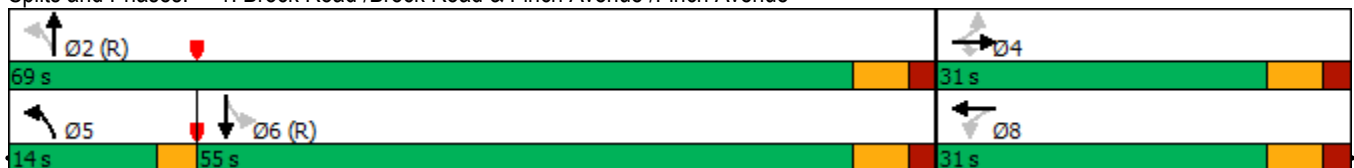


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0		14.0	69.0		55.0	55.0	
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		14.0%	69.0%		55.0%	55.0%	
Maximum Green (s)	24.6	24.6	24.6	24.6	24.6		11.0	62.8		48.8	48.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		18.5	18.5		18.5		72.1	68.9		57.5	57.5	
Actuated g/C Ratio		0.18	0.18		0.18		0.72	0.69		0.58	0.58	
v/c Ratio		0.75	0.55		0.14		0.61	0.37		0.01	1.16	
Control Delay		57.1	12.9		28.3		27.3	7.7		8.0	94.0	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		57.1	12.9		28.3		27.3	7.7		8.0	94.0	
LOS		E	B		C		C	A		A	F	
Approach Delay		31.1			28.3			10.5			94.0	
Approach LOS		C			C			B			F	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.16
 Intersection Signal Delay: 64.8
 Intersection LOS: E
 Intersection Capacity Utilization 101.1%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↘		↗	↕
Traffic Volume (vph)	0	12	915	90	1	67	2234
Future Volume (vph)	0	12	915	90	1	67	2234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	3167	1509	0	1704	3438
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	3167	1509	0	1704	3438
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)				4		4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	14%	7%	0%	6%	5%
Adj. Flow (vph)	0	12	915	90	1	67	2234
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	12	915	90	0	68	2234
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	65.1%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↗		↖	↕
Traffic Volume (veh/h)	0	12	915	90	1	67	2234
Future Volume (Veh/h)	0	12	915	90	1	67	2234
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	915	90	0	67	2234
Pedestrians	4						
Lane Width (m)	3.6						
Walking Speed (m/s)	1.2						
Percent Blockage	0						
Right turn flare (veh)							
Median type	None			None			
Median storage veh							
Upstream signal (m)	367			225			
pX, platoon unblocked	0.47	0.96			0.00	0.96	
vC, conflicting volume	2170	462			0	1009	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	819	350			0	922	
tC, single (s)	6.8	6.9			0.0	4.2	
tC, 2 stage (s)							
tF (s)	3.5	3.3			0.0	2.3	
p0 queue free %	100	98			0	90	
cM capacity (veh/h)	133	622			0	680	
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	12	458	458	90	67	1117	1117
Volume Left	0	0	0	0	67	0	0
Volume Right	12	0	0	90	0	0	0
cSH	622	1700	1700	1700	680	1700	1700
Volume to Capacity	0.02	0.27	0.27	0.05	0.10	0.66	0.66
Queue Length 95th (m)	0.5	0.0	0.0	0.0	2.6	0.0	0.0
Control Delay (s)	10.9	0.0	0.0	0.0	10.9	0.0	0.0
Lane LOS	B			B			
Approach Delay (s)	10.9	0.0			0.3		
Approach LOS	B						
Intersection Summary							
Average Delay	0.3						
Intersection Capacity Utilization	65.1%			ICU Level of Service			C
Analysis Period (min)	15						

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	39	4	268	164	12	8	127	802	10	18	1876	19
Future Volume (vph)	39	4	268	164	12	8	127	802	10	18	1876	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.99	0.99	1.00	0.99				0.98	1.00	1.00	
Frt			0.850		0.940				0.850		0.998	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1912	1760	1986	1708	0	1684	3077	1439	1785	3388	0
Flt Permitted		0.731		0.729			0.064			0.349		
Satd. Flow (perm)	0	1451	1737	1522	1708	0	113	3077	1407	655	3388	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175		8				44			1
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	39	4	268	164	12	8	127	802	10	18	1876	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	268	164	20	0	127	802	10	18	1895	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0		10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0		0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

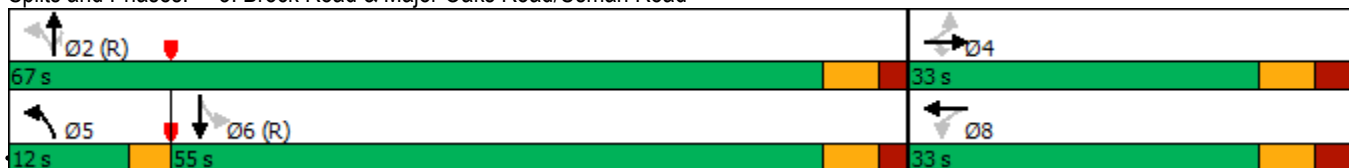


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		12.0	67.0	67.0	55.0	55.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		12.0%	67.0%	67.0%	55.0%	55.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		9.0	60.6	60.6	48.6	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		16.0	16.0	16.0	16.0		74.0	70.6	70.6	59.1	59.1	
Actuated g/C Ratio		0.16	0.16	0.16	0.16		0.74	0.71	0.71	0.59	0.59	
v/c Ratio		0.19	0.63	0.67	0.07		0.59	0.37	0.01	0.05	0.95	
Control Delay		36.0	20.4	53.8	28.6		20.9	9.6	1.5	12.0	32.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		36.0	20.4	53.8	28.6		20.9	9.6	1.5	12.0	32.3	
LOS		D	C	D	C		C	A	A	B	C	
Approach Delay		22.6			51.0			11.0			32.1	
Approach LOS		C			D			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 26.3
 Intersection LOS: C
 Intersection Capacity Utilization 97.5%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	72.6	69.0	23.8	47.1	69.6	59.3	7.4	359.0	360.2
Average Queue (m)	31.6	33.2	5.5	21.4	34.2	23.2	0.2	281.5	284.3
95th Queue (m)	55.7	57.7	16.5	37.0	61.2	47.8	3.4	448.1	448.6
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)								7	10
Queuing Penalty (veh)								80	108
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)					0		0	39	
Queuing Penalty (veh)					0		1	0	

Intersection: 2: Brock Road & Usman Road

Movement	NB	NB	SB	SB	SB
Directions Served	T	R	UL	T	T
Maximum Queue (m)	1.7	4.0	134.8	198.1	201.8
Average Queue (m)	0.1	0.2	27.5	86.1	88.3
95th Queue (m)	1.1	2.2	104.7	218.4	222.8
Link Distance (m)	350.8			202.4	202.4
Upstream Blk Time (%)				0	0
Queuing Penalty (veh)				2	1
Storage Bay Dist (m)		38.0	60.0		
Storage Blk Time (%)				25	
Queuing Penalty (veh)				17	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	93.0	37.5	58.3	28.5	46.2	65.9	73.3	4.6	151.8	183.4	184.3
Average Queue (m)	33.9	32.5	27.7	4.4	19.1	32.6	35.5	0.3	16.7	161.4	157.6
95th Queue (m)	81.2	42.4	47.5	15.9	36.4	60.2	63.8	2.2	87.8	208.9	213.8
Link Distance (m)	279.1			97.3		202.4	202.4			168.6	168.6
Upstream Blk Time (%)										39	38
Queuing Penalty (veh)										0	0
Storage Bay Dist (m)		30.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	0	23	31	0		0	0			46	
Queuing Penalty (veh)	1	10	6	1		0	0			8	

Network Summary

Network wide Queuing Penalty: 235

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	442	17	264	15	4	8	1	248	1945	22	6	1082
Future Volume (vph)	442	17	264	15	4	8	1	248	1945	22	6	1082
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0		63.0		0.0	13.0	
Storage Lanes	0		1	0		0		1		0	1	
Taper Length (m)	7.5			7.5				20.0			41.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor		1.00			1.00				1.00			0.99
Frt			0.850		0.960				0.998			0.976
Flt Protected		0.954			0.973			0.950			0.950	
Satd. Flow (prot)	0	1771	1551	0	1678	0	0	1767	3459	0	1785	3295
Flt Permitted		0.714			0.475			0.114			0.077	
Satd. Flow (perm)	0	1322	1551	0	819	0	0	212	3459	0	145	3295
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			168		8				2			32
Link Speed (k/h)		60			60				60			60
Link Distance (m)		416.8			328.7				124.4			367.1
Travel Time (s)		25.0			19.7				7.5			22.0
Confl. Peds. (#/hr)	2					2		8		6	6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	0%	1%	3%	0%	0%	6%
Adj. Flow (vph)	442	17	264	15	4	8	1	248	1945	22	6	1082
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	459	264	0	27	0	0	249	1967	0	6	1284
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		0.0			0.0				3.5			3.5
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2		1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru		Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4			9.4				9.4			9.4
Detector 2 Size(m)		0.6			0.6				0.6			0.6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	202
Future Volume (vph)	202
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.95
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	8
Peak Hour Factor	1.00
Heavy Vehicles (%)	0%
Adj. Flow (vph)	202
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

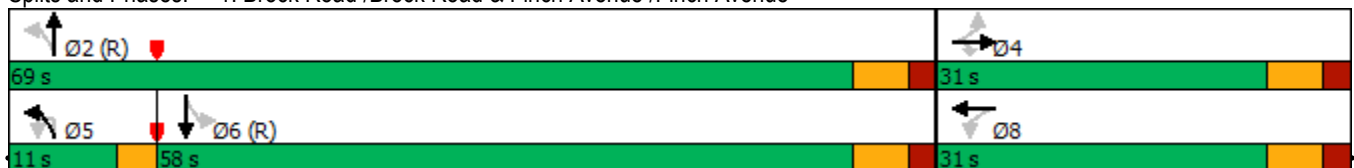


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA		Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2			6	
Detector Phase	4	4	4	8	8		5	5	2		6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	5.0	20.0		20.0	20.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	9.0	28.0		28.0	28.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0		11.0	11.0	69.0		58.0	58.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		11.0%	11.0%	69.0%		58.0%	58.0%
Maximum Green (s)	24.6	24.6	24.6	24.6	24.6		8.0	8.0	62.8		51.8	51.8
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0	4.2		4.2	4.2
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	0.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		6.4	6.4		6.4			3.0	6.2		6.2	6.2
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max
Walk Time (s)	16.0	16.0	16.0	16.0	16.0				14.0		14.0	14.0
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0				5.0		5.0	5.0
Pedestrian Calls (#/hr)	0	0	0	0	0				0		0	0
Act Effct Green (s)		24.6	24.6		24.6			66.0	62.8		51.8	51.8
Actuated g/C Ratio		0.25	0.25		0.25			0.66	0.63		0.52	0.52
v/c Ratio		1.41	0.52		0.13			0.94	0.91		0.08	0.75
Control Delay		234.3	16.2		24.9			59.8	23.6		11.8	21.5
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		234.3	16.2		24.9			59.8	23.6		11.8	21.5
LOS		F	B		C			E	C		B	C
Approach Delay		154.6			24.9				27.7			21.5
Approach LOS		F			C				C			C

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	130
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.41
Intersection Signal Delay:	47.4
Intersection LOS:	D
Intersection Capacity Utilization	118.9%
ICU Level of Service	H
Analysis Period (min)	15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↘		↗	↕
Traffic Volume (vph)	0	34	2263	174	1	112	1304
Future Volume (vph)	0	34	2263	174	1	112	1304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	1.00	0.95
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	3539	1615	0	1805	3438
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	3539	1615	0	1805	3438
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)	1	1		6		6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	5%
Adj. Flow (vph)	0	34	2263	174	1	112	1304
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	34	2263	174	0	113	1304
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	82.5%
ICU Level of Service	E
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road























03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↕	↗		↖	↕
Traffic Volume (veh/h)	0	34	2263	174	1	112	1304
Future Volume (Veh/h)	0	34	2263	174	1	112	1304
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	34	2263	174	0	112	1304
Pedestrians	6		1			1	
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	1		0			0	
Right turn flare (veh)							
Median type	None			None			
Median storage (veh)							
Upstream signal (m)	367			225			
pX, platoon unblocked	0.55	0.45				0.00	0.45
vC, conflicting volume	3146	1138				0	2443
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1663	0				0	1762
tC, single (s)	6.8	6.9				0.0	4.1
tC, 2 stage (s)							
tF (s)	3.5	3.3				0.0	2.2
p0 queue free %	100	93				0	30
cM capacity (veh/h)	15	488				0	161
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	34	1132	1132	174	112	652	652
Volume Left	0	0	0	0	112	0	0
Volume Right	34	0	0	174	0	0	0
cSH	488	1700	1700	1700	161	1700	1700
Volume to Capacity	0.07	0.67	0.67	0.10	0.70	0.38	0.38
Queue Length 95th (m)	1.8	0.0	0.0	0.0	32.9	0.0	0.0
Control Delay (s)	12.9	0.0	0.0	0.0	67.2	0.0	0.0
Lane LOS	B			F			
Approach Delay (s)	12.9	0.0				5.3	
Approach LOS	B						
Intersection Summary							
Average Delay			2.0				
Intersection Capacity Utilization			82.5%		ICU Level of Service		E
Analysis Period (min)			15				

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	11	199	185	21	18	308	2092	28	54	1009	34
Future Volume (vph)	22	11	199	185	21	18	308	2092	28	54	1009	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00	0.97	0.98	0.99		1.00		0.98		1.00	
Frt			0.850		0.931				0.850		0.995	
Flt Protected		0.968		0.950			0.950			0.950		
Satd. Flow (prot)	0	2017	1794	2046	1823	0	1750	3466	1597	1785	3352	0
Flt Permitted		0.803		0.736			0.189			0.076		
Satd. Flow (perm)	0	1670	1739	1556	1823	0	347	3466	1561	143	3352	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			196		9				44			5
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	22	11	199	185	21	18	308	2092	28	54	1009	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	199	185	39	0	308	2092	28	54	1043	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

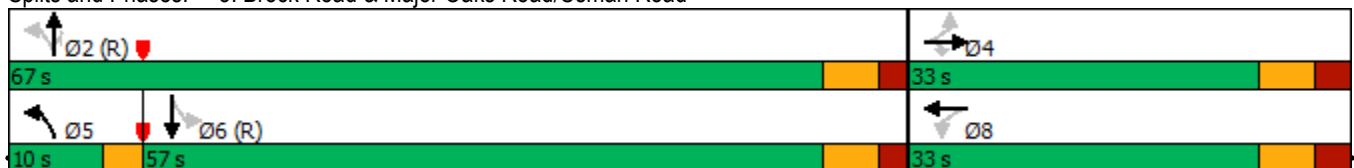


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		10.0	67.0	67.0	57.0	57.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		10.0%	67.0%	67.0%	57.0%	57.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		7.0	60.6	60.6	50.6	50.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		17.1	17.1	17.1	17.1		72.9	69.5	69.5	52.7	52.7	
Actuated g/C Ratio		0.17	0.17	0.17	0.17		0.73	0.70	0.70	0.53	0.53	
v/c Ratio		0.12	0.43	0.70	0.12		0.69	0.87	0.03	0.72	0.59	
Control Delay		33.5	8.2	40.1	21.5		15.0	11.3	0.3	73.7	18.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		33.5	8.2	40.1	21.5		15.0	11.3	0.3	73.7	18.3	
LOS		C	A	D	C		B	B	A	E	B	
Approach Delay		11.8			36.8			11.6			21.0	
Approach LOS		B			D			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 15.6
 Intersection LOS: B
 Intersection Capacity Utilization 108.3%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Queuing and Blocking Report
Baseline

03-17-2020

Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	UL	T	TR	L	T	TR
Maximum Queue (m)	274.9	124.0	21.1	82.9	125.0	128.6	24.5	99.4	101.8
Average Queue (m)	159.1	34.2	5.1	68.7	109.9	103.6	3.8	57.3	65.7
95th Queue (m)	284.6	100.4	14.7	103.8	137.8	143.3	18.4	86.8	92.0
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					22	13			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				23	21		3	26	
Queuing Penalty (veh)				224	53		15	2	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	UL	T	T
Maximum Queue (m)	7.2	16.6	13.5	11.2	119.7	156.3	140.9
Average Queue (m)	0.6	0.8	0.8	0.9	58.2	35.2	21.5
95th Queue (m)	5.2	9.1	9.2	5.2	123.5	137.4	118.7
Link Distance (m)	92.2	350.8	350.8			202.4	202.4
Upstream Blk Time (%)						1	0
Queuing Penalty (veh)						5	2
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)			0		36	0	
Queuing Penalty (veh)			0		233	0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	48.4	36.7	54.8	51.6	112.2	120.5	120.0	31.8	62.2	113.6	102.4
Average Queue (m)	8.4	21.2	29.6	9.1	55.6	59.5	64.0	1.7	28.6	62.3	52.2
95th Queue (m)	27.5	34.8	46.4	28.1	102.0	102.3	107.6	17.5	58.7	95.8	82.8
Link Distance (m)	279.1			97.3		202.4	202.4			168.6	168.6
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)		30.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	0	5	40	2	13	4	6		6	9	
Queuing Penalty (veh)	0	2	16	5	135	13	2		28	5	

Network Summary

Network wide Queuing Penalty: 738

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Future Volume (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.974	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	3426	0	892	3249	0
Flt Permitted		0.713			0.841		0.117			0.077		
Satd. Flow (perm)	0	1265	1496	0	1249	0	211	3426	0	72	3249	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			203		7			1			36	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	364	237	0	22	0	232	1890	0	2	1275	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0		11.0	69.0		58.0	58.0	
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		11.0%	69.0%		58.0%	58.0%	
Maximum Green (s)	24.6	24.6	24.6	24.6	24.6		8.0	62.8		51.8	51.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		24.6	24.6		24.6		66.0	62.8		51.8	51.8	
Actuated g/C Ratio		0.25	0.25		0.25		0.66	0.63		0.52	0.52	
v/c Ratio		1.17	0.45		0.07		0.90	0.88		0.05	0.75	
Control Delay		141.2	9.9		23.1		50.3	21.6		13.5	21.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		141.2	9.9		23.1		50.3	21.6		13.5	21.8	
LOS		F	A		C		D	C		B	C	
Approach Delay		89.4			23.1			24.7			21.8	
Approach LOS		F			C			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.17
 Intersection Signal Delay: 33.5
 Intersection LOS: C
 Intersection Capacity Utilization 111.5%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↕	↗	↖	↕
Traffic Volume (vph)	0	85	1935	282	149	1139
Future Volume (vph)	0	85	1935	282	149	1139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	3438	1568	1770	3374
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	3438	1568	1770	3374
Link Speed (k/h)	40		60			60
Link Distance (m)	119.8		367.1			224.5
Travel Time (s)	10.8		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	85	1935	282	149	1139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	85	1935	282	149	1139
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	75.4%
Analysis Period (min)	15
	ICU Level of Service D

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↶	↶↶	↷	↷	↶↶	
Traffic Volume (veh/h)	0	85	1935	282	149	1139	
Future Volume (Veh/h)	0	85	1935	282	149	1139	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	85	1935	282	149	1139	
Pedestrians	55		7			1	
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	5		1			0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)			367			225	
pX, platoon unblocked	0.62	0.54			0.54		
vC, conflicting volume	2864	1024			2272		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1620	0			1643		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	85			25		
cM capacity (veh/h)	14	556			200		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	85	968	968	282	149	570	570
Volume Left	0	0	0	0	149	0	0
Volume Right	85	0	0	282	0	0	0
cSH	556	1700	1700	1700	200	1700	1700
Volume to Capacity	0.15	0.57	0.57	0.17	0.75	0.34	0.34
Queue Length 95th (m)	4.3	0.0	0.0	0.0	39.6	0.0	0.0
Control Delay (s)	12.6	0.0	0.0	0.0	62.5	0.0	0.0
Lane LOS	B				F		
Approach Delay (s)	12.6	0.0			7.2		
Approach LOS	B						
Intersection Summary							
Average Delay			2.9				
Intersection Capacity Utilization			75.4%		ICU Level of Service		D
Analysis Period (min)			15				

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↖	↗	↖	↗			↖	↕	↗	↖	↕
Traffic Volume (vph)	33	12	249	159	25	47	2	280	1817	24	84	1010
Future Volume (vph)	33	12	249	159	25	47	2	280	1817	24	84	1010
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	0.0		30.0		72.0		70.0	60.0	
Storage Lanes	0		1	1		0		1		1	1	
Taper Length (m)	7.5			7.5				72.0			92.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor		0.99	0.94	0.96	0.98			1.00		0.95		1.00
Frt			0.850		0.902					0.850		0.997
Flt Protected		0.965		0.950				0.950			0.950	
Satd. Flow (prot)	0	1936	1794	1986	1856	0	0	1750	3400	1597	1785	3294
Flt Permitted		0.740		0.728				0.203			0.098	
Satd. Flow (perm)	0	1473	1695	1458	1856	0	0	373	3400	1517	184	3294
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			154		17					44		3
Link Speed (k/h)		50		40				60				60
Link Distance (m)		292.9		123.2				224.5				180.3
Travel Time (s)		21.1		11.1				13.5				10.8
Confl. Peds. (#/hr)	10		37	37		10		10		13	13	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	0%	2%	5%	0%	0%	8%
Adj. Flow (vph)	33	12	249	159	25	47	2	280	1817	24	84	1010
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	249	159	72	0	0	282	1817	24	84	1030
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		4.8		4.8				3.6				3.6
Link Offset(m)		0.0		0.0				0.0				0.0
Crosswalk Width(m)		4.8		4.8				4.8				4.8
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2	1	1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru	Right	Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6	2.0	2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4		9.4				9.4				9.4
Detector 2 Size(m)		0.6		0.6				0.6				0.6
Detector 2 Type		Cl+Ex		Cl+Ex				Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	20
Future Volume (vph)	20
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.95
Ped Bike Factor	
Flt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	10
Peak Hour Factor	1.00
Heavy Vehicles (%)	6%
Adj. Flow (vph)	20
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

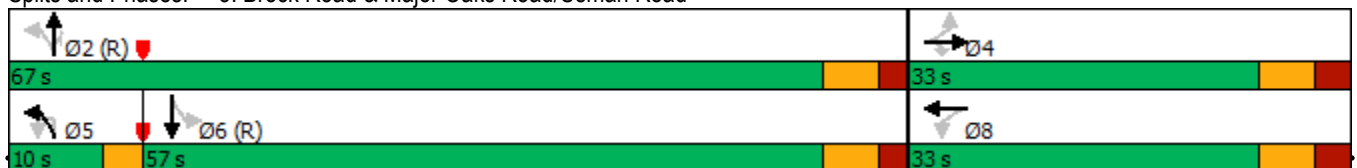


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA	Perm	Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2		2	6	
Detector Phase	4	4	4	8	8		5	5	2	2	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	5.0	20.0	20.0	20.0	20.0
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	8.0	29.0	29.0	29.0	29.0
Total Split (s)	33.0	33.0	33.0	33.0	33.0		10.0	10.0	67.0	67.0	57.0	57.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		10.0%	10.0%	67.0%	67.0%	57.0%	57.0%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		7.0	7.0	60.6	60.6	50.6	50.6
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	3.0	4.2	4.2	4.2	4.2
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	0.0	2.2	2.2	2.2	2.2
Lost Time Adjust (s)		0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.0	7.0	7.0			3.0	6.4	6.4	6.4	6.4
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
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
Recall Mode	None	None	None	None	None		None	None	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0				7.0	7.0	7.0	7.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0				14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0				0	0	0	0
Act Effct Green (s)		16.2	16.2	16.2	16.2			73.8	70.4	70.4	55.7	55.7
Actuated g/C Ratio		0.16	0.16	0.16	0.16			0.74	0.70	0.70	0.56	0.56
v/c Ratio		0.19	0.62	0.68	0.23			0.65	0.76	0.02	0.82	0.56
Control Delay		35.9	21.5	40.4	21.5			11.7	7.0	0.0	78.5	16.7
Queue Delay		0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0
Total Delay		35.9	21.5	40.4	21.5			11.7	7.0	0.0	78.5	16.7
LOS		D	C	D	C			B	A	A	E	B
Approach Delay		23.7			34.5				7.6			21.3
Approach LOS		C			C				A			C

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 14.6
 Intersection LOS: B
 Intersection Capacity Utilization 100.8%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	115.9	47.9	19.5	82.9	129.1	129.1	53.9	86.1	98.1
Average Queue (m)	71.4	23.3	5.0	60.5	109.1	106.9	2.8	55.4	66.5
95th Queue (m)	106.3	39.6	15.0	96.2	145.3	142.0	19.8	83.7	97.6
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					15	14			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				8	20		4	28	
Queuing Penalty (veh)				80	47		22	1	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	L	T	T
Maximum Queue (m)	16.4	16.4	29.2	27.2	134.9	205.5	209.7
Average Queue (m)	4.3	3.2	3.4	7.2	96.5	68.9	37.4
95th Queue (m)	13.8	12.4	15.8	19.9	145.4	192.3	156.6
Link Distance (m)	92.2	350.8	350.8			202.4	202.4
Upstream Blk Time (%)						0	0
Queuing Penalty (veh)						2	2
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)					71	0	
Queuing Penalty (veh)					404	0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	UL	T	T	R	L	T	TR
Maximum Queue (m)	72.3	37.5	56.4	37.4	73.5	100.5	110.6	3.5	151.9	173.2	173.1
Average Queue (m)	24.9	27.6	32.1	9.9	43.3	54.7	59.5	0.9	87.8	98.0	74.6
95th Queue (m)	60.3	43.3	51.3	23.1	72.1	86.7	95.2	3.1	153.9	161.7	141.0
Link Distance (m)	279.1			97.3		202.4	202.4			168.6	168.6
Upstream Blk Time (%)										8	0
Queuing Penalty (veh)										0	0
Storage Bay Dist (m)		30.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	1	13	44	5	2	2	3		66	12	
Queuing Penalty (veh)	2	6	32	7	15	5	1		336	10	

Network Summary

Network wide Queuing Penalty: 970

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↑↑↑		↗	↑↑↑	
Traffic Volume (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Future Volume (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.974			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1697	1551	0	1491	0	1668	4415	0	892	4797	0
Flt Permitted		0.707			0.751		0.064			0.341		
Satd. Flow (perm)	0	1258	1528	0	1156	0	112	4415	0	320	4797	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			112		6			1			28	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	173	247	0	31	0	131	789	0	1	2229	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020

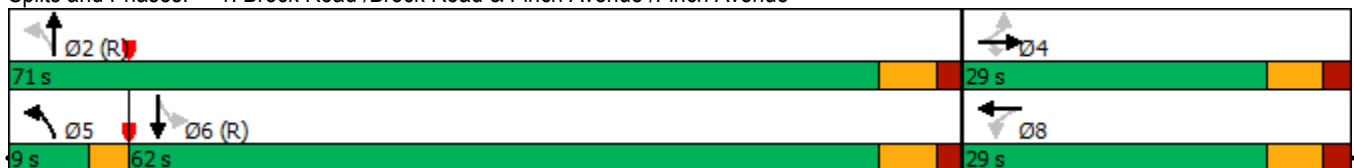


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	22.6	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		18.0	18.0		18.0		72.6	69.4		59.1	59.1	
Actuated g/C Ratio		0.18	0.18		0.18		0.73	0.69		0.59	0.59	
v/c Ratio		0.77	0.67		0.15		0.68	0.26		0.01	0.78	
Control Delay		59.8	29.3		29.0		34.5	6.4		5.0	14.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		59.8	29.3		29.0		34.5	6.4		5.0	14.8	
LOS		E	C		C		C	A		A	B	
Approach Delay		41.9			29.0			10.4			14.7	
Approach LOS		D			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 16.9
 Intersection LOS: B
 Intersection Capacity Utilization 82.3%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑↑	↗	↘	↓↓↓
Traffic Volume (vph)	0	12	915	90	67	2234
Future Volume (vph)	0	12	915	90	67	2234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1644	4550	1509	1703	4940
Flt Permitted					0.950	
Satd. Flow (perm)	0	1644	4550	1509	1703	4940
Link Speed (k/h)	40		60			60
Link Distance (m)	119.8		367.1			224.5
Travel Time (s)	10.8		22.0			13.5
Confl. Peds. (#/hr)				4	4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	14%	7%	6%	5%
Adj. Flow (vph)	0	12	915	90	67	2234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	12	915	90	67	2234
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	46.5%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT				
Lane Configurations		↗	↕↕↕	↗	↘	↕↕↕				
Traffic Volume (veh/h)	0	12	915	90	67	2234				
Future Volume (Veh/h)	0	12	915	90	67	2234				
Sign Control	Stop		Free			Free				
Grade	0%		0%			0%				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Hourly flow rate (vph)	0	12	915	90	67	2234				
Pedestrians	4									
Lane Width (m)	3.6									
Walking Speed (m/s)	1.2									
Percent Blockage	0									
Right turn flare (veh)										
Median type			None			None				
Median storage veh										
Upstream signal (m)			367			225				
pX, platoon unblocked	0.73									
vC, conflicting volume	1798	309				1009				
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	818	309				1009				
tC, single (s)	6.8	6.9				4.2				
tC, 2 stage (s)										
tF (s)	3.5	3.3				2.3				
p0 queue free %	100	98				90				
cM capacity (veh/h)	209	691				657				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4	
Volume Total	12	305	305	305	90	67	745	745	745	
Volume Left	0	0	0	0	0	67	0	0	0	
Volume Right	12	0	0	0	90	0	0	0	0	
cSH	691	1700	1700	1700	1700	657	1700	1700	1700	
Volume to Capacity	0.02	0.18	0.18	0.18	0.05	0.10	0.44	0.44	0.44	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	
Lane LOS	B					B				
Approach Delay (s)	10.3	0.0				0.3				
Approach LOS	B									
Intersection Summary										
Average Delay			0.3							
Intersection Capacity Utilization			46.5%	ICU Level of Service		A				
Analysis Period (min)			15							

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	39	4	268	164	12	8	127	802	10	18	1876	19
Future Volume (vph)	39	4	268	164	12	8	127	802	10	18	1876	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.99	1.00	0.99			1.00		1.00	1.00	
Frt			0.850		0.940			0.998			0.998	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1575	1398	1636	1407	0	1684	4414	0	1785	4868	0
Flt Permitted		0.739		0.729			0.066			0.333		
Satd. Flow (perm)	0	1208	1379	1254	1407	0	117	4414	0	625	4868	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			108		8			3			2	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	39	4	268	164	12	8	127	802	10	18	1876	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	268	164	20	0	127	812	0	18	1895	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

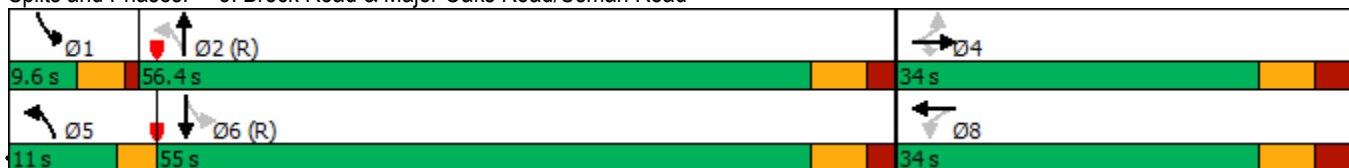


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		11.0	56.4		9.6	55.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		11.0%	56.4%		9.6%	55.0%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0		8.0	50.0		5.1	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		18.6	18.6	18.6	18.6		71.0	64.0		64.8	57.3	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.71	0.64		0.65	0.57	
v/c Ratio		0.19	0.78	0.71	0.07		0.62	0.29		0.04	0.68	
Control Delay		33.6	37.9	54.0	24.8		25.1	12.4		6.6	17.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		33.6	37.9	54.0	24.8		25.1	12.4		6.6	17.7	
LOS		C	D	D	C		C	B		A	B	
Approach Delay		37.3			50.8			14.1			17.6	
Approach LOS		D			D			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 20.3
 Intersection LOS: C
 Intersection Capacity Utilization 81.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	63.0	55.9	22.6	54.4	64.9	48.0	25.7	7.2	85.7	93.6	96.2
Average Queue (m)	32.7	26.0	6.3	24.2	29.0	13.8	7.4	0.3	29.7	41.4	44.5
95th Queue (m)	53.8	46.1	17.2	44.8	51.8	32.9	19.6	3.8	64.4	77.6	80.7
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				0	0			0	12		
Queuing Penalty (veh)				0	0			1	0		

Intersection: 2: Brock Road & Usman Road

Movement	NB	SB	SB
Directions Served	R	L	T
Maximum Queue (m)	4.8	22.4	4.0
Average Queue (m)	0.4	7.4	0.1
95th Queue (m)	2.9	18.2	2.5
Link Distance (m)			207.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	38.0	60.0	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	66.5	37.5	48.5	28.6	42.4	40.3	51.1	44.4	47.4	124.5	113.4	82.2
Average Queue (m)	18.8	27.9	27.0	5.7	20.2	20.5	23.1	19.8	4.6	76.9	64.7	41.1
95th Queue (m)	50.4	41.7	43.4	17.4	34.9	38.6	42.1	38.3	27.9	117.2	105.9	72.8
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	0	11	28	0						14		
Queuing Penalty (veh)	1	5	6	1						3		

Network Summary

Network wide Queuing Penalty: 17

Lanes, Volumes, Timings
1: Finch Avenue & Brock Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔			↖	↑↑↑		↖	↑↑↑
Traffic Volume (vph)	442	17	264	15	4	8	1	248	1945	22	6	1082
Future Volume (vph)	442	17	264	15	4	8	1	248	1945	22	6	1082
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0		63.0		0.0	13.0	
Storage Lanes	0		1	0		0		1		0	1	
Taper Length (m)	7.5			7.5				20.0			41.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	0.91	1.00	0.91
Ped Bike Factor		1.00			1.00				1.00		1.00	0.99
Frt			0.850		0.960				0.998			0.976
Flt Protected		0.954			0.973			0.950			0.950	
Satd. Flow (prot)	0	1771	1551	0	1678	0	0	1767	4970	0	1785	4735
Flt Permitted		0.714			0.775			0.106			0.115	
Satd. Flow (perm)	0	1322	1551	0	1336	0	0	197	4970	0	216	4735
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			257		3				2			40
Link Speed (k/h)		60			60				60			60
Link Distance (m)		416.8			328.7				124.4			367.1
Travel Time (s)		25.0			19.7				7.5			22.0
Confl. Peds. (#/hr)	2					2		8		6	6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	0%	1%	3%	0%	0%	6%
Adj. Flow (vph)	442	17	264	15	4	8	1	248	1945	22	6	1082
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	459	264	0	27	0	0	249	1967	0	6	1284
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		0.0			0.0				3.5			3.5
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2		1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru		Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4			9.4				9.4			9.4
Detector 2 Size(m)		0.6			0.6				0.6			0.6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings

1: Finch Avenue & Brock Road

03-17-2020



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	202
Future Volume (vph)	202
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.91
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	8
Peak Hour Factor	1.00
Heavy Vehicles (%)	0%
Adj. Flow (vph)	202
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings

1: Finch Avenue & Brock Road

03-17-2020

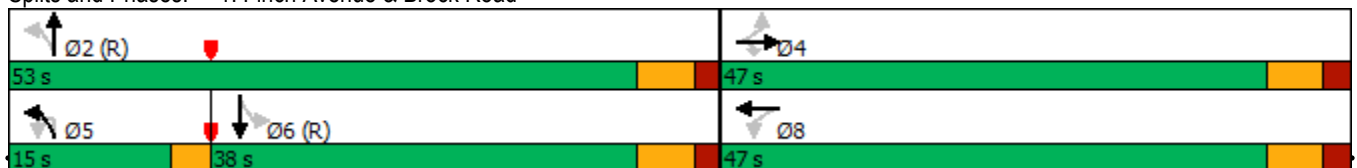


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA		Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2			6	
Detector Phase	4	4	4	8	8		5	5	2		6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	5.0	20.0		20.0	20.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	9.0	28.0		28.0	28.0
Total Split (s)	47.0	47.0	47.0	47.0	47.0		15.0	15.0	53.0		38.0	38.0
Total Split (%)	47.0%	47.0%	47.0%	47.0%	47.0%		15.0%	15.0%	53.0%		38.0%	38.0%
Maximum Green (s)	40.6	40.6	40.6	40.6	40.6		12.0	12.0	46.8		31.8	31.8
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0	4.2		4.2	4.2
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	0.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		6.4	6.4		6.4			3.0	6.2		6.2	6.2
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max
Walk Time (s)	16.0	16.0	16.0	16.0	16.0				14.0		14.0	14.0
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0				5.0		5.0	5.0
Pedestrian Calls (#/hr)	0	0	0	0	0				0		0	0
Act Effct Green (s)		37.7	37.7		37.7			52.9	49.7		34.8	34.8
Actuated g/C Ratio		0.38	0.38		0.38			0.53	0.50		0.35	0.35
v/c Ratio		0.92	0.35		0.05			0.86	0.80		0.08	0.77
Control Delay		55.0	4.2		17.1			49.6	24.7		18.3	27.9
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		55.0	4.2		17.1			49.6	24.7		18.3	27.9
LOS		D	A		B			D	C		B	C
Approach Delay		36.4			17.1			27.5				27.8
Approach LOS		D			B			C				C

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 29.1
 Intersection LOS: C
 Intersection Capacity Utilization 102.5%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Finch Avenue & Brock Road





Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↗	↑↑↑	↘		↘	↑↑↑
Traffic Volume (vph)	0	34	2263	174	1	112	1304
Future Volume (vph)	0	34	2263	174	1	112	1304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	5085	1615	0	1805	4940
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	5085	1615	0	1805	4940
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)	1	1		6		6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	5%
Adj. Flow (vph)	0	34	2263	174	1	112	1304
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	34	2263	174	0	113	1304
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.6%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT		
Lane Configurations		↗	↗↗↗	↗		↘	↗↗↗		
Traffic Volume (veh/h)	0	34	2263	174	1	112	1304		
Future Volume (Veh/h)	0	34	2263	174	1	112	1304		
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly flow rate (vph)	0	34	2263	174	0	112	1304		
Pedestrians	6		1				1		
Lane Width (m)	3.6		3.6				3.6		
Walking Speed (m/s)	1.2		1.2				1.2		
Percent Blockage	1		0				0		
Right turn flare (veh)									
Median type	None							None	
Median storage (veh)									
Upstream signal (m)	367							225	
pX, platoon unblocked	0.74	0.69				0.00	0.69		
vC, conflicting volume	2929	761				0	2443		
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1392	0				0	1499		
tC, single (s)	6.8	6.9				0.0	4.1		
tC, 2 stage (s)									
tF (s)	3.5	3.3				0.0	2.2		
p0 queue free %	100	95				0	64		
cM capacity (veh/h)	63	743				0	309		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	34	754	754	754	174	112	435	435	435
Volume Left	0	0	0	0	0	112	0	0	0
Volume Right	34	0	0	0	174	0	0	0	0
cSH	743	1700	1700	1700	1700	309	1700	1700	1700
Volume to Capacity	0.05	0.44	0.44	0.44	0.10	0.36	0.26	0.26	0.26
Queue Length 95th (m)	1.1	0.0	0.0	0.0	0.0	12.8	0.0	0.0	0.0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0	23.1	0.0	0.0	0.0
Lane LOS	B			C					
Approach Delay (s)	10.1	0.0					1.8		
Approach LOS	B								
Intersection Summary									
Average Delay			0.8						
Intersection Capacity Utilization			63.6%			ICU Level of Service		B	
Analysis Period (min)			15						

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	22	11	199	185	21	18	308	2092	28	54	1009	34
Future Volume (vph)	22	11	199	185	21	18	308	2092	28	54	1009	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.97	0.98	0.99		1.00	1.00		1.00	1.00	
Frt			0.850		0.931			0.998			0.995	
Flt Protected		0.968		0.950			0.950			0.950		
Satd. Flow (prot)	0	1661	1425	1685	1502	0	1750	4970	0	1785	4817	0
Flt Permitted		0.814		0.736			0.213			0.080		
Satd. Flow (perm)	0	1394	1381	1281	1502	0	391	4970	0	150	4817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			199		18			3			5	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	22	11	199	185	21	18	308	2092	28	54	1009	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	199	185	39	0	308	2120	0	54	1043	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

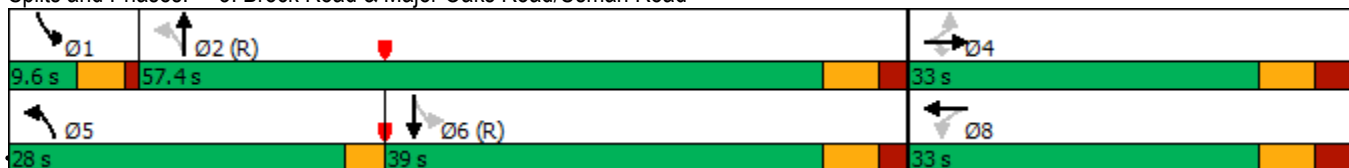


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		28.0	57.4		9.6	39.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		28.0%	57.4%		9.6%	39.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		25.0	51.0		5.1	32.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		19.3	19.3	19.3	19.3		70.6	58.8		58.0	50.1	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.71	0.59		0.58	0.50	
v/c Ratio		0.12	0.47	0.75	0.13		0.66	0.73		0.29	0.43	
Control Delay		31.8	8.3	50.4	20.5		9.6	17.9		15.2	18.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		31.8	8.3	50.4	20.5		9.6	17.9		15.2	18.5	
LOS		C	A	D	C		A	B		B	B	
Approach Delay		11.6			45.2			16.8			18.4	
Approach LOS		B			D			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 18.5
 Intersection LOS: B
 Intersection Capacity Utilization 77.4%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Queuing and Blocking Report

Baseline

03-17-2020

Intersection: 1: Finch Avenue & Brock Road

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	UL	T	T	TR	L	T	T	TR
Maximum Queue (m)	125.4	42.6	14.4	82.9	119.6	118.1	99.4	21.9	72.7	79.6	84.6
Average Queue (m)	70.8	20.4	4.5	54.0	94.7	77.2	56.9	2.7	35.8	43.3	48.2
95th Queue (m)	108.4	36.1	12.9	96.7	136.0	118.8	93.0	12.6	65.0	74.1	79.0
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)					7	1	0				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				2	19			0	26		
Queuing Penalty (veh)				12	47			1	2		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	R	T	T	T	R	UL	T	T	T
Maximum Queue (m)	6.2	13.5	5.9	2.3	9.9	42.0	12.6	2.3	2.3
Average Queue (m)	0.2	0.6	0.2	0.1	0.7	18.3	0.5	0.1	0.1
95th Queue (m)	2.9	6.0	2.8	1.5	4.6	33.9	4.6	1.5	1.4
Link Distance (m)	88.5	350.9	350.9	350.9			207.2	207.2	207.2
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)					38.0	60.0			
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	24.9	35.4	59.1	71.3	68.5	75.6	88.9	87.1	26.5	101.4	99.8	52.6
Average Queue (m)	7.1	17.1	34.6	12.4	35.4	39.3	46.5	50.9	11.1	58.3	40.8	23.3
95th Queue (m)	18.5	29.2	55.4	37.8	59.9	72.1	83.3	85.7	21.6	89.2	75.0	46.1
Link Distance (m)	275.4			97.4			207.2	207.2	207.2		170.3	170.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)		1	38	2	0	0				6		
Queuing Penalty (veh)		0	15	4	1	1				3		

Network Summary

Network wide Queuing Penalty: 87

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↕↕		↗	↕↕↕	
Traffic Volume (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Future Volume (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.974	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	4923	0	892	4668	0
Flt Permitted		0.713			0.888		0.119			0.101		
Satd. Flow (perm)	0	1265	1496	0	1319	0	215	4923	0	95	4668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			237		6			1			46	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	364	237	0	22	0	232	1890	0	2	1275	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-17-2020

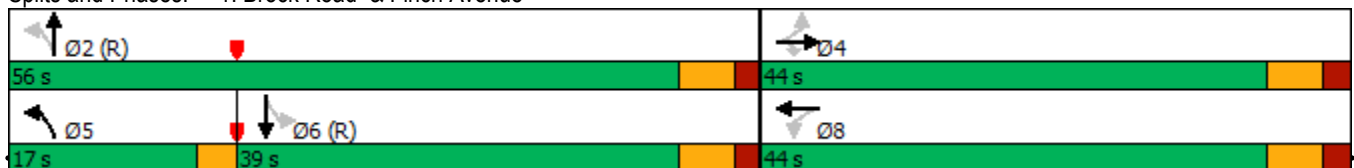


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0		17.0	56.0		39.0	39.0	
Total Split (%)	44.0%	44.0%	44.0%	44.0%	44.0%		17.0%	56.0%		39.0%	39.0%	
Maximum Green (s)	37.6	37.6	37.6	37.6	37.6		14.0	49.8		32.8	32.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		32.7	32.7		32.7		57.9	54.7		39.5	39.5	
Actuated g/C Ratio		0.33	0.33		0.33		0.58	0.55		0.40	0.40	
v/c Ratio		0.88	0.37		0.05		0.76	0.70		0.05	0.68	
Control Delay		54.3	4.5		16.7		33.5	19.4		25.5	29.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		54.3	4.5		16.7		33.5	19.4		25.5	29.5	
LOS		D	A		B		C	B		C	C	
Approach Delay		34.7			16.7			20.9			29.5	
Approach LOS		C			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 25.7
 Intersection LOS: C
 Intersection Capacity Utilization 95.7%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-17-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑↑	↗	↖	↑↑↑
Traffic Volume (vph)	0	85	1935	282	149	1139
Future Volume (vph)	0	85	1935	282	149	1139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	4940	1568	1770	4848
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	4940	1568	1770	4848
Link Speed (k/h)	40		60			60
Link Distance (m)	119.8		367.1			224.5
Travel Time (s)	10.8		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	85	1935	282	149	1139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	85	1935	282	149	1139
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	59.3%
Analysis Period (min)	15
	ICU Level of Service B

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-17-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations		↗	↑↑↑	↘	↘	↑↑↑			
Traffic Volume (veh/h)	0	85	1935	282	149	1139			
Future Volume (Veh/h)	0	85	1935	282	149	1139			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Hourly flow rate (vph)	0	85	1935	282	149	1139			
Pedestrians	55		7			1			
Lane Width (m)	3.6		3.6			3.6			
Walking Speed (m/s)	1.2		1.2			1.2			
Percent Blockage	5		1			0			
Right turn flare (veh)									
Median type			None			None			
Median storage veh									
Upstream signal (m)			367			225			
pX, platoon unblocked	0.79	0.76			0.76				
vC, conflicting volume	2675	701			2272				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1557	0			1556				
tC, single (s)	6.8	6.9			4.1				
tC, 2 stage (s)									
tF (s)	3.5	3.3			2.2				
p0 queue free %	100	89			51				
cM capacity (veh/h)	41	785			304				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	85	645	645	645	282	149	380	380	380
Volume Left	0	0	0	0	0	149	0	0	0
Volume Right	85	0	0	0	282	0	0	0	0
cSH	785	1700	1700	1700	1700	304	1700	1700	1700
Volume to Capacity	0.11	0.38	0.38	0.38	0.17	0.49	0.22	0.22	0.22
Queue Length 95th (m)	2.9	0.0	0.0	0.0	0.0	20.4	0.0	0.0	0.0
Control Delay (s)	10.1	0.0	0.0	0.0	0.0	27.7	0.0	0.0	0.0
Lane LOS	B					D			
Approach Delay (s)	10.1	0.0				3.2			
Approach LOS	B								
Intersection Summary									
Average Delay			1.4						
Intersection Capacity Utilization			59.3%		ICU Level of Service				B
Analysis Period (min)			15						

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↘		↖	↗↘↙		↖	↗↘↙	
Traffic Volume (vph)	33	12	249	159	25	47	280	1817	24	84	1010	20
Future Volume (vph)	33	12	249	159	25	47	280	1817	24	84	1010	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.94	0.96	0.98		1.00	1.00		1.00	1.00	
Frt			0.850		0.902			0.998				0.997
Flt Protected		0.965		0.950			0.950			0.950		
Satd. Flow (prot)	0	1594	1425	1636	1528	0	1750	4875	0	1785	4733	0
Flt Permitted		0.755		0.728			0.222			0.084		
Satd. Flow (perm)	0	1237	1346	1201	1528	0	407	4875	0	158	4733	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			249		47			3			3	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	10		37	37		10	10		13	13		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	2%	5%	0%	0%	8%	6%
Adj. Flow (vph)	33	12	249	159	25	47	280	1817	24	84	1010	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	249	159	72	0	280	1841	0	84	1030	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-17-2020

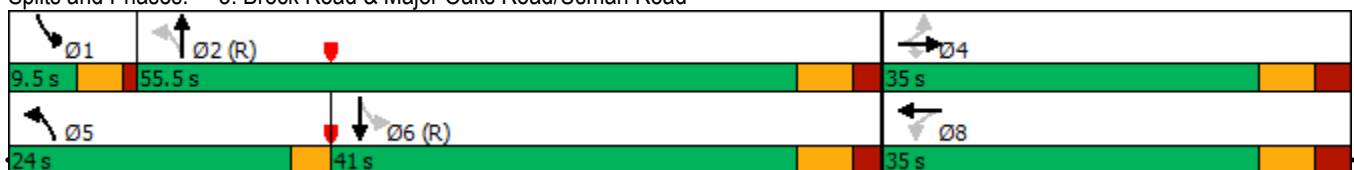


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	35.0	35.0	35.0	35.0	35.0		24.0	55.5		9.5	41.0	
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		24.0%	55.5%		9.5%	41.0%	
Maximum Green (s)	28.0	28.0	28.0	28.0	28.0		21.0	49.1		5.0	34.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		18.5	18.5	18.5	18.5		71.1	59.0		61.3	52.8	
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.71	0.59		0.61	0.53	
v/c Ratio		0.20	0.55	0.72	0.23		0.62	0.64		0.41	0.41	
Control Delay		33.9	9.1	43.8	9.7		15.8	8.1		17.7	16.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		33.9	9.1	43.8	9.7		15.8	8.1		17.7	16.7	
LOS		C	A	D	A		B	A		B	B	
Approach Delay		12.9			33.2			9.1			16.8	
Approach LOS		B			C			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 76 (76%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 13.2
 Intersection LOS: B
 Intersection Capacity Utilization 72.7%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	108.3	47.3	19.8	82.8	119.9	96.4	87.8	11.3	93.2	95.9	98.8
Average Queue (m)	60.2	19.4	4.7	41.2	76.2	57.5	46.0	0.8	52.5	58.4	63.1
95th Queue (m)	92.8	33.5	14.7	81.0	120.7	90.1	74.6	6.2	84.6	89.2	91.6
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)					2						
Queuing Penalty (veh)					0						
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				1	9			1	28		
Queuing Penalty (veh)				4	21			5	1		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	R	T	T	T	R	L	T	T	T
Maximum Queue (m)	15.1	15.8	15.3	10.3	18.0	49.3	13.5	13.6	12.4
Average Queue (m)	1.4	1.7	1.7	0.6	4.8	22.4	0.9	0.7	0.6
95th Queue (m)	8.1	8.7	8.6	5.1	13.9	38.6	6.8	6.0	6.1
Link Distance (m)	88.5	350.9	350.9	350.9			207.2	207.2	207.2
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)					38.0	60.0			
Storage Blk Time (%)						0			
Queuing Penalty (veh)						0			

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	52.1	37.5	56.2	63.3	66.4	58.0	71.5	78.3	29.4	101.3	86.6	52.7
Average Queue (m)	12.1	21.2	29.3	16.4	34.3	28.6	34.0	35.4	13.2	57.4	42.4	24.4
95th Queue (m)	30.9	35.4	50.8	39.6	58.7	51.0	59.5	64.3	24.4	87.6	70.9	47.1
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	1	4	31	4	0					6		
Queuing Penalty (veh)	1	2	22	6	0					5		

Network Summary

Network wide Queuing Penalty: 67

Lanes, Volumes, Timings
1: Finch Avenue & Brock Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Future Volume (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.974			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1697	1551	0	1491	0	1668	3072	0	892	3339	0
Flt Permitted		0.707			0.751		0.064			0.353		
Satd. Flow (perm)	0	1258	1528	0	1156	0	112	3072	0	331	3339	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			35		6			1				18
Link Speed (k/h)		60			60			60				60
Link Distance (m)		416.8			328.7			124.4				367.1
Travel Time (s)		25.0			19.7			7.5				22.0
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	170	3	247	21	4	6	131	786	3	1	2019	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	173	247	0	31	0	131	789	0	1	2229	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5				3.5
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings

1: Finch Avenue & Brock Road

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	5	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	5.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	9.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	6.0	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	3.0	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	0.0	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	3.0		6.4		3.0	6.2		6.2	6.2	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0		16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		18.0	28.7		18.0		72.6	69.4		59.1	59.1	
Actuated g/C Ratio		0.18	0.29		0.18		0.73	0.69		0.59	0.59	
v/c Ratio		0.77	0.53		0.15		0.68	0.37		0.01	1.13	
Control Delay		59.8	27.3		29.0		34.5	7.4		4.0	78.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		59.8	27.3		29.0		34.5	7.4		4.0	78.8	
LOS		E	C		C		C	A		A	E	
Approach Delay		40.7			29.0			11.3			78.8	
Approach LOS		D			C			B			E	

Intersection Summary






















Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.13
 Intersection Signal Delay: 56.7
 Intersection LOS: E
 Intersection Capacity Utilization 99.0%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: Finch Avenue & Brock Road



Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-17-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	442	17	264	15	4	8	248	1945	22	6	1082	202
Future Volume (vph)	442	17	264	15	4	8	248	1945	22	6	1082	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00			1.00			0.99	
Frt			0.850		0.960			0.998			0.976	
Flt Protected		0.954			0.973		0.950			0.950		
Satd. Flow (prot)	0	1771	1551	0	1678	0	1767	3459	0	1785	3295	0
Flt Permitted		0.714			0.705		0.089			0.096		
Satd. Flow (perm)	0	1322	1551	0	1216	0	166	3459	0	180	3295	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			35		8			2			26	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)	2					2	8		6	6		8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	1%	3%	0%	0%	6%	0%
Adj. Flow (vph)	442	17	264	15	4	8	248	1945	22	6	1082	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	459	264	0	27	0	248	1967	0	6	1284	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-17-2020

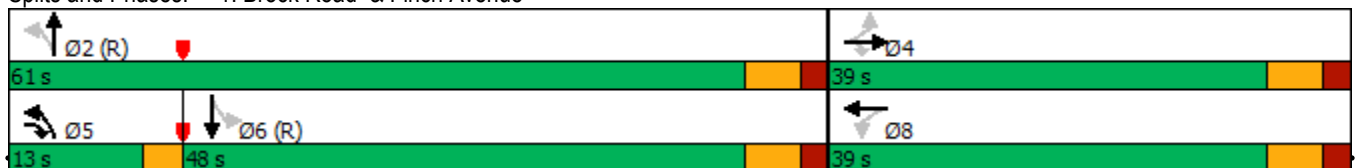


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	5	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	5.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	39.0	39.0	13.0	39.0	39.0		13.0	61.0		48.0	48.0	
Total Split (%)	39.0%	39.0%	13.0%	39.0%	39.0%		13.0%	61.0%		48.0%	48.0%	
Maximum Green (s)	32.6	32.6	10.0	32.6	32.6		10.0	54.8		41.8	41.8	
Yellow Time (s)	4.2	4.2	3.0	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	0.0	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	3.0		6.4		3.0	6.2		6.2	6.2	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0		16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		32.6	49.0		32.6		58.0	54.8		41.8	41.8	
Actuated g/C Ratio		0.33	0.49		0.33		0.58	0.55		0.42	0.42	
v/c Ratio		1.07	0.34		0.07		0.97	1.04		0.08	0.92	
Control Delay		96.7	14.9		18.8		73.6	54.7		15.7	33.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		96.7	14.9		18.8		73.6	54.7		15.7	33.9	
LOS		F	B		B		E	D		B	C	
Approach Delay		66.8			18.8		56.8				33.8	
Approach LOS		E			B		E				C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 51.3
 Intersection LOS: D
 Intersection Capacity Utilization 118.9%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Future Volume (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.974	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	3426	0	892	3249	0
Flt Permitted		0.713			0.884		0.085			0.091		
Satd. Flow (perm)	0	1265	1496	0	1313	0	154	3426	0	85	3249	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			39		7			1			31	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	360	4	237	7	8	7	232	1876	14	2	1058	217
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	364	237	0	22	0	232	1890	0	2	1275	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

03-17-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	5	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	5.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	37.0	37.0	13.0	37.0	37.0		13.0	63.0		50.0	50.0	
Total Split (%)	37.0%	37.0%	13.0%	37.0%	37.0%		13.0%	63.0%		50.0%	50.0%	
Maximum Green (s)	30.6	30.6	10.0	30.6	30.6		10.0	56.8		43.8	43.8	
Yellow Time (s)	4.2	4.2	3.0	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	0.0	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	3.0		6.4		3.0	6.2		6.2	6.2	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0		16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		30.0	43.8		30.0		60.6	57.4		44.0	44.0	
Actuated g/C Ratio		0.30	0.44		0.30		0.61	0.57		0.44	0.44	
v/c Ratio		0.96	0.35		0.06		0.91	0.96		0.05	0.88	
Control Delay		72.8	15.5		19.5		61.6	34.3		16.5	30.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		72.8	15.5		19.5		61.6	34.3		16.5	30.9	
LOS		E	B		B		E	C		B	C	
Approach Delay		50.2			19.5			37.3			30.8	
Approach LOS		D			B			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 37.1
 Intersection LOS: D
 Intersection Capacity Utilization 111.5%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue



Queuing and Blocking Report
Baseline

11-06-2019

Intersection: 1: Finch Avenue & Brock Road

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	67.9	66.7	29.1	59.1	63.3	50.1	4.1	275.3	279.2
Average Queue (m)	31.6	32.9	6.3	24.2	27.5	18.5	0.1	139.6	146.7
95th Queue (m)	53.8	58.0	18.6	45.1	53.0	40.3	2.6	293.3	298.6
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)								1	1
Queuing Penalty (veh)								10	12
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				0	0		0	34	
Queuing Penalty (veh)				0	0		0	0	

Intersection: 2: Brock Road & Usman Road

Movement	NB	NB	NB	SB	SB	SB
Directions Served	T	T	R	UL	T	T
Maximum Queue (m)	88.2	86.5	27.0	38.5	23.2	28.0
Average Queue (m)	7.9	8.1	4.5	9.8	4.3	4.4
95th Queue (m)	60.6	61.1	28.1	28.6	30.4	33.8
Link Distance (m)	350.8	350.8			204.7	204.7
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)			38.0	60.0		
Storage Blk Time (%)		6	4	2	0	
Queuing Penalty (veh)		6	20	18	0	

Queuing and Blocking Report
Baseline

02-24-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	165.9	66.3	20.4	82.9	127.6	129.0	23.2	123.7	130.2
Average Queue (m)	86.3	23.5	5.3	70.1	118.1	116.9	2.7	77.8	87.4
95th Queue (m)	143.8	47.2	15.2	105.6	127.5	131.6	12.6	120.8	128.7
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					35	30			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				12	34		1	44	
Queuing Penalty (veh)				121	84		3	3	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	UL	T	T
Maximum Queue (m)	13.0	14.0	19.6	10.1	80.9	80.5	34.4
Average Queue (m)	0.6	0.5	1.1	1.5	38.1	10.4	1.1
95th Queue (m)	5.1	4.7	8.5	6.6	74.4	52.3	16.6
Link Distance (m)	92.2	350.8	350.8			204.7	204.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)					12	0	
Queuing Penalty (veh)					78	0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	TR
Maximum Queue (m)	40.4	35.7	85.3	36.4	88.1	100.1	102.4	3.2	38.6	93.9	96.7
Average Queue (m)	9.8	20.1	38.8	4.8	44.2	52.8	58.4	0.6	16.6	58.5	48.1
95th Queue (m)	25.6	33.8	66.0	21.3	81.6	87.2	93.1	2.4	36.9	89.7	82.1
Link Distance (m)	278.9		97.4			204.7	204.7			165.9	165.9
Upstream Blk Time (%)			0								
Queuing Penalty (veh)			1								
Storage Bay Dist (m)		30.0		30.0	72.0			70.0	60.0		
Storage Blk Time (%)		3	23	0	4	2	3			6	
Queuing Penalty (veh)		1	4	0	38	5	1			3	

Network Summary

Network wide Queuing Penalty: 340

Queuing and Blocking Report
Baseline

02-24-2020

Intersection: 1: Brock Road /Brock Road & Finch Avenue /Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	404.1	397.5	60.2	82.9	124.6	125.8	4.1	75.1	86.8
Average Queue (m)	219.9	174.0	17.4	27.2	105.5	104.8	0.1	29.1	32.1
95th Queue (m)	488.8	472.4	55.7	83.6	137.5	139.2	2.6	63.4	76.1
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)	38	27			50	64			
Queuing Penalty (veh)	0	0			0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				0	67		0	16	
Queuing Penalty (veh)				3	155		1	0	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	L	T	T
Maximum Queue (m)	11.5	362.6	354.3	85.8	131.8	210.2	211.6
Average Queue (m)	0.9	191.9	242.9	62.8	96.6	128.4	19.0
95th Queue (m)	6.9	470.8	497.7	119.0	172.3	281.7	110.7
Link Distance (m)	92.2	350.8	350.8			204.7	204.7
Upstream Blk Time (%)		40	55			51	0
Queuing Penalty (veh)		449	613			365	2
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)			15	72	69	0	
Queuing Penalty (veh)			42	691	392	0	

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	186	4	273	23	5	6	145	863	4	1	2223	230
Future Volume (vph)	186	4	273	23	5	6	145	863	4	1	2223	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.976			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1696	1551	0	1497	0	1668	4414	0	892	4797	0
Flt Permitted		0.706			0.743		0.065			0.315		
Satd. Flow (perm)	0	1255	1528	0	1149	0	114	4414	0	295	4797	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			110		6			1			28	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	186	4	273	23	5	6	145	863	4	1	2223	230
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	190	273	0	34	0	145	867	0	1	2453	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020

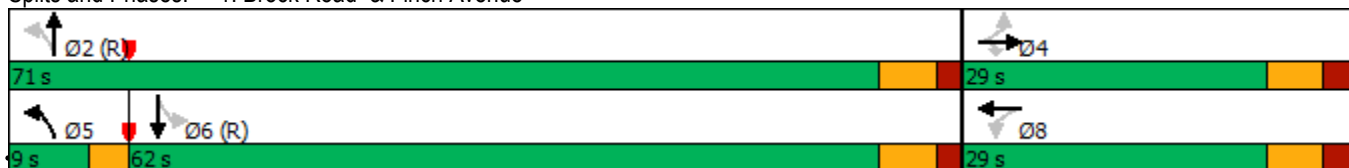


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	22.6	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		19.0	19.0		19.0		71.6	68.4		58.0	58.0	
Actuated g/C Ratio		0.19	0.19		0.19		0.72	0.68		0.58	0.58	
v/c Ratio		0.80	0.72		0.15		0.74	0.29		0.01	0.88	
Control Delay		62.0	33.1		29.2		41.8	6.9		5.0	17.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		62.0	33.1		29.2		41.8	6.9		5.0	17.3	
LOS		E	C		C		D	A		A	B	
Approach Delay		44.9			29.2			11.9			17.3	
Approach LOS		D			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 19.3
 Intersection LOS: B
 Intersection Capacity Utilization 88.2%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↖	↑↑↑	↗		↘	↓↓↓
Traffic Volume (vph)	0	12	1011	93	1	69	2459
Future Volume (vph)	0	12	1011	93	1	69	2459
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	4550	1509	0	1704	4940
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	4550	1509	0	1704	4940
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)				4		4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	14%	7%	0%	6%	5%
Adj. Flow (vph)	0	12	1011	93	1	69	2459
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	12	1011	93	0	70	2459
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	50.8%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-18-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT		
Lane Configurations		↗	↑↑↑	↘		↘	↑↑↑		
Traffic Volume (veh/h)	0	12	1011	93	1	69	2459		
Future Volume (Veh/h)	0	12	1011	93	1	69	2459		
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly flow rate (vph)	0	12	1011	93	0	69	2459		
Pedestrians	4								
Lane Width (m)	3.6								
Walking Speed (m/s)	1.2								
Percent Blockage	0								
Right turn flare (veh)									
Median type	None			None					
Median storage (veh)									
Upstream signal (m)	367			225					
pX, platoon unblocked	0.67				0.00				
vC, conflicting volume	1973	341			0	1108			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	718	341			0	1108			
tC, single (s)	6.8	6.9			0.0	4.2			
tC, 2 stage (s)									
tF (s)	3.5	3.3			0.0	2.3			
p0 queue free %	100	98			0	89			
cM capacity (veh/h)	217	659			0	601			
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	12	337	337	337	93	69	820	820	820
Volume Left	0	0	0	0	0	69	0	0	0
Volume Right	12	0	0	0	93	0	0	0	0
cSH	659	1700	1700	1700	1700	601	1700	1700	1700
Volume to Capacity	0.02	0.20	0.20	0.20	0.05	0.11	0.48	0.48	0.48
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0
Control Delay (s)	10.6	0.0	0.0	0.0	0.0	11.8	0.0	0.0	0.0
Lane LOS	B					B			
Approach Delay (s)	10.6	0.0				0.3			
Approach LOS	B								
Intersection Summary									
Average Delay			0.3						
Intersection Capacity Utilization			50.8%			ICU Level of Service		A	
Analysis Period (min)	15								

Lanes, Volumes, Timings

3: Brock Road & Major Oaks Road/Usman Road

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↗		↖	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	43	5	295	174	12	9	140	882	11	18	2067	21
Future Volume (vph)	43	5	295	174	12	9	140	882	11	18	2067	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.99	1.00	0.99			1.00		1.00	1.00	
Frt			0.850		0.936			0.998			0.998	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1572	1398	1636	1402	0	1684	4414	0	1785	4868	0
Flt Permitted		0.740		0.726			0.068			0.307		
Satd. Flow (perm)	0	1208	1379	1249	1402	0	121	4414	0	576	4868	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			106		9			3			2	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	43	5	295	174	12	9	140	882	11	18	2067	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	295	174	21	0	140	893	0	18	2088	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

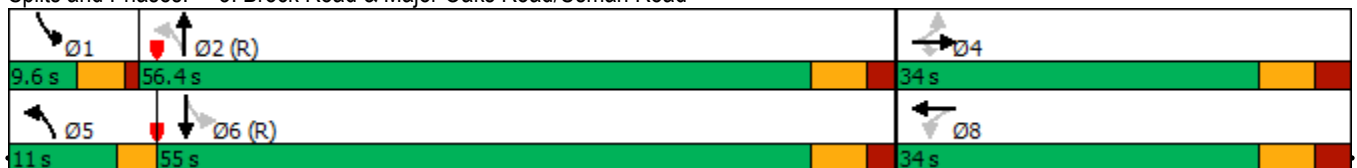


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		11.0	56.4		9.6	55.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		11.0%	56.4%		9.6%	55.0%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0		8.0	50.0		5.1	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		19.7	19.7	19.7	19.7		70.0	62.9		63.2	55.7	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.70	0.63		0.63	0.56	
v/c Ratio		0.20	0.83	0.71	0.07		0.66	0.32		0.04	0.77	
Control Delay		33.0	43.3	53.4	24.6		27.1	13.3		7.1	21.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		33.0	43.3	53.4	24.6		27.1	13.3		7.1	21.1	
LOS		C	D	D	C		C	B		A	C	
Approach Delay		41.8			50.3			15.2			21.0	
Approach LOS		D			D			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 22.8
 Intersection LOS: C
 Intersection Capacity Utilization 87.5%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Queuing and Blocking Report

Baseline

03-18-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR	
Maximum Queue (m)	68.9	91.0	36.0	53.7	68.5	54.2	23.5	11.3	98.5	116.0	125.9	
Average Queue (m)	33.4	32.4	8.2	26.1	32.4	17.3	8.3	0.7	42.1	51.9	56.2	
95th Queue (m)	57.0	61.4	22.7	45.7	56.6	38.8	20.1	6.0	82.6	94.4	100.6	
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)					63.0				13.0			
Storage Blk Time (%)					0	0				0	20	
Queuing Penalty (veh)					0	0				3	0	

Intersection: 2: Brock Road & Usman Road

Movement	NB	NB	SB	SB
Directions Served	T	R	UL	T
Maximum Queue (m)	1.6	9.1	24.8	1.6
Average Queue (m)	0.1	0.5	9.7	0.1
95th Queue (m)	1.0	4.0	20.4	1.0
Link Distance (m)	350.9			207.2
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		38.0	60.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR	
Maximum Queue (m)	74.2	37.5	58.8	32.8	50.2	54.2	61.3	66.0	10.1	147.8	127.3	96.1	
Average Queue (m)	25.4	29.3	32.3	6.2	22.6	24.1	26.6	25.3	3.0	93.6	80.9	54.7	
95th Queue (m)	62.3	43.3	51.7	20.7	40.2	44.5	47.2	48.2	9.7	137.9	123.7	91.4	
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3	
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)		30.0	20.0		72.0				60.0				
Storage Blk Time (%)	1	15	34	1							20		
Queuing Penalty (veh)	2	7	7	1							4		

Network Summary

Network wide Queuing Penalty: 25

Lanes, Volumes, Timings
 1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔			↖	↑↑↑		↖	↑↑↑
Traffic Volume (vph)	486	18	291	17	5	9	1	274	2138	24	6	1184
Future Volume (vph)	486	18	291	17	5	9	1	274	2138	24	6	1184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.6	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0		63.0		0.0	13.0	
Storage Lanes	0		1	0		0		1		0	1	
Taper Length (m)	7.5			7.5				20.0			41.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.91	0.91	1.00	0.91
Ped Bike Factor		1.00			1.00				1.00			0.99
Frt			0.850		0.961				0.998			0.976
Flt Protected		0.954			0.973			0.950			0.950	
Satd. Flow (prot)	0	1771	1551	0	1681	0	0	1767	4970	0	1785	4735
Flt Permitted		0.711			0.756			0.113			0.123	
Satd. Flow (perm)	0	1316	1551	0	1306	0	0	210	4970	0	231	4735
Right Turn on Red			Yes			Yes				Yes		
Satd. Flow (RTOR)			254		2				2			39
Link Speed (k/h)		60			40				60			60
Link Distance (m)		416.8			328.7				124.4			367.1
Travel Time (s)		25.0			29.6				7.5			22.0
Confl. Peds. (#/hr)	2						2	8		6	6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	0%	1%	3%	0%	0%	6%
Adj. Flow (vph)	486	18	291	17	5	9	1	274	2138	24	6	1184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	504	291	0	31	0	0	275	2162	0	6	1404
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	Left	Left
Median Width(m)		0.0			0.0				3.5			3.5
Link Offset(m)		0.0			0.0				0.0			0.0
Crosswalk Width(m)		4.8			4.8				4.8			4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	15	25		15	25	
Number of Detectors	1	2	1	1	2		1	1	2		1	2
Detector Template	Left	Thru	Right	Left	Thru		Left	Left	Thru		Left	Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	2.0	10.0		2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	2.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4			9.4				9.4			9.4
Detector 2 Size(m)		0.6			0.6				0.6			0.6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
 1: Brock Road & Finch Avenue

03-18-2020



Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	220
Future Volume (vph)	220
Ideal Flow (vphpl)	1900
Lane Width (m)	3.5
Storage Length (m)	0.0
Storage Lanes	0
Taper Length (m)	
Lane Util. Factor	0.91
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	Yes
Satd. Flow (RTOR)	
Link Speed (k/h)	
Link Distance (m)	
Travel Time (s)	
Confl. Peds. (#/hr)	8
Peak Hour Factor	1.00
Heavy Vehicles (%)	0%
Adj. Flow (vph)	220
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(m)	
Link Offset(m)	
Crosswalk Width(m)	
Two way Left Turn Lane	
Headway Factor	1.01
Turning Speed (k/h)	15
Number of Detectors	
Detector Template	
Leading Detector (m)	
Trailing Detector (m)	
Detector 1 Position(m)	
Detector 1 Size(m)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(m)	
Detector 2 Size(m)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020

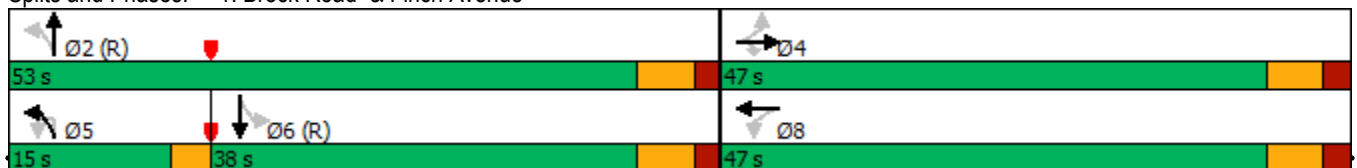


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	Perm	NA	Perm	Perm	NA		custom	pm+pt	NA		Perm	NA
Protected Phases		4			8			5	2			6
Permitted Phases	4		4	8			5	2			6	
Detector Phase	4	4	4	8	8		5	5	2		6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	5.0	20.0		20.0	20.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	9.0	28.0		28.0	28.0
Total Split (s)	47.0	47.0	47.0	47.0	47.0		15.0	15.0	53.0		38.0	38.0
Total Split (%)	47.0%	47.0%	47.0%	47.0%	47.0%		15.0%	15.0%	53.0%		38.0%	38.0%
Maximum Green (s)	40.6	40.6	40.6	40.6	40.6		12.0	12.0	46.8		31.8	31.8
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	3.0	4.2		4.2	4.2
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	0.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)		6.4	6.4		6.4			3.0	6.2		6.2	6.2
Lead/Lag							Lead	Lead			Lag	Lag
Lead-Lag Optimize?							Yes	Yes			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None	None	None		None	None	C-Max		C-Max	C-Max
Walk Time (s)	16.0	16.0	16.0	16.0	16.0				14.0		14.0	14.0
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0				5.0		5.0	5.0
Pedestrian Calls (#/hr)	0	0	0	0	0				0		0	0
Act Effct Green (s)		39.7	39.7		39.7			50.9	47.7		32.4	32.4
Actuated g/C Ratio		0.40	0.40		0.40			0.51	0.48		0.32	0.32
v/c Ratio		0.96	0.38		0.06			0.92	0.91		0.08	0.90
Control Delay		62.2	5.4		17.7			60.4	31.7		16.5	33.5
Queue Delay		0.0	0.0		0.0			0.0	0.0		0.0	0.0
Total Delay		62.2	5.4		17.7			60.4	31.7		16.5	33.5
LOS		E	A		B			E	C		B	C
Approach Delay		41.4			17.7			35.0				33.5
Approach LOS		D			B			C				C

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 35.5
 Intersection LOS: D
 Intersection Capacity Utilization 108.7%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue





Lane Group	SBR
Detector 2 Extend (s)	
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBU	SBL	SBT
Lane Configurations		↖	↕	↗		↖	↕
Traffic Volume (vph)	0	36	2499	181	1	116	1427
Future Volume (vph)	0	36	2499	181	1	116	1427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0		60.0	
Storage Lanes	0	1		1		1	
Taper Length (m)	7.5					75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	0.91	1.00	0.91
Ped Bike Factor							
Fr _t		0.865		0.850			
Fl _t Protected						0.950	
Satd. Flow (prot)	0	1644	5085	1615	0	1805	4940
Fl _t Permitted						0.950	
Satd. Flow (perm)	0	1644	5085	1615	0	1805	4940
Link Speed (k/h)	40		60				60
Link Distance (m)	119.8		367.1				224.5
Travel Time (s)	10.8		22.0				13.5
Confl. Peds. (#/hr)	1	1		6		6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	5%
Adj. Flow (vph)	0	36	2499	181	1	116	1427
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	36	2499	181	0	117	1427
Enter Blocked Intersection	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	R NA	Left	Left
Median Width(m)	0.0		3.6				3.6
Link Offset(m)	0.0		0.0				0.0
Crosswalk Width(m)	4.8		4.8				4.8
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	15	25	
Sign Control	Stop		Free				Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	68.4%
ICU Level of Service	C
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-18-2020



Movement	WBL	WBR	NBT	NBR	SBU	SBL	SBT		
Lane Configurations		↗	↕↕↕	↗		↖	↕↕↕		
Traffic Volume (veh/h)	0	36	2499	181	1	116	1427		
Future Volume (Veh/h)	0	36	2499	181	1	116	1427		
Sign Control	Stop		Free				Free		
Grade	0%		0%				0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly flow rate (vph)	0	36	2499	181	0	116	1427		
Pedestrians	6		1				1		
Lane Width (m)	3.6		3.6				3.6		
Walking Speed (m/s)	1.2		1.2				1.2		
Percent Blockage	1		0				0		
Right turn flare (veh)									
Median type			None				None		
Median storage veh									
Upstream signal (m)			367				225		
pX, platoon unblocked	0.67	0.60			0.00	0.60			
vC, conflicting volume	3214	840			0	2686			
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1211	0			0	1501			
tC, single (s)	6.8	6.9			0.0	4.1			
tC, 2 stage (s)									
tF (s)	3.5	3.3			0.0	2.2			
p0 queue free %	100	95			0	57			
cM capacity (veh/h)	68	656			0	272			
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	36	833	833	833	181	116	476	476	476
Volume Left	0	0	0	0	0	116	0	0	0
Volume Right	36	0	0	0	181	0	0	0	0
cSH	656	1700	1700	1700	1700	272	1700	1700	1700
Volume to Capacity	0.05	0.49	0.49	0.49	0.11	0.43	0.28	0.28	0.28
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.0	16.1	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	27.7	0.0	0.0	0.0
Lane LOS	B					D			
Approach Delay (s)	10.8	0.0				2.1			
Approach LOS	B								
Intersection Summary									
Average Delay			0.8						
Intersection Capacity Utilization			68.4%		ICU Level of Service				C
Analysis Period (min)			15						

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↗	↖	↗	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	24	12	218	192	21	20	338	2298	30	57	1108	38
Future Volume (vph)	24	12	218	192	21	20	338	2298	30	57	1108	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		1	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.97	0.98	1.00	0.98	1.00	1.00		1.00	1.00	
Frt			0.850		0.987	0.850		0.998			0.995	
Flt Protected		0.968		0.950			0.950			0.950		
Satd. Flow (prot)	0	1661	1425	1685	1437	1381	1750	4970	0	1785	4817	0
Flt Permitted		0.819		0.734			0.175			0.085		
Satd. Flow (perm)	0	1402	1381	1278	1437	1359	321	4970	0	160	4817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			218		2	119		3			5	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	24	12	218	192	21	20	338	2298	30	57	1108	38
Shared Lane Traffic (%)						10%						
Lane Group Flow (vph)	0	36	218	192	23	18	338	2328	0	57	1146	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

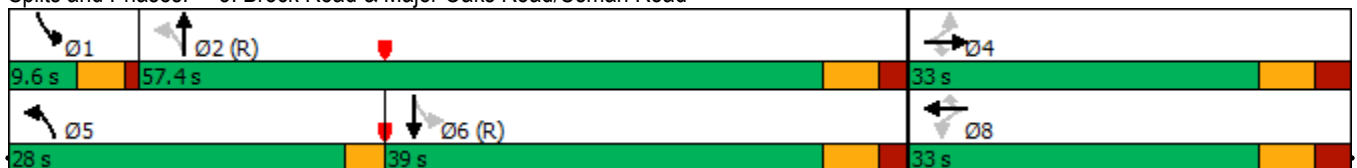


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0	4.0	5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0	32.0	8.0	29.0		9.5	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	28.0	57.4		9.6	39.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	28.0%	57.4%		9.6%	39.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0	26.0	25.0	51.0		5.1	32.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9	2.9	0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0	7.0	3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0	18.0		14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		19.7	19.7	19.7	19.7	19.7	70.3	58.4		54.9	46.9	
Actuated g/C Ratio		0.20	0.20	0.20	0.20	0.20	0.70	0.58		0.55	0.47	
v/c Ratio		0.13	0.49	0.76	0.08	0.05	0.72	0.80		0.31	0.51	
Control Delay		31.6	8.3	50.2	30.1	0.2	12.1	18.8		16.6	21.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		31.6	8.3	50.2	30.1	0.2	12.1	18.8		16.6	21.7	
LOS		C	A	D	C	A	B	B		B	C	
Approach Delay		11.6			44.4			18.0			21.4	
Approach LOS		B			D			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 20.0
 Intersection LOS: B
 Intersection Capacity Utilization 81.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
 4: Prop. Site Access & Usman Road

03-18-2020



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	240	0	0	0	0	53
Future Volume (vph)	240	0	0	0	0	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.2	3.6	3.6
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt					0.865	
Flt Protected	0.950					
Satd. Flow (prot)	1805	0	0	1816	1644	0
Flt Permitted	0.950					
Satd. Flow (perm)	1805	0	0	1816	1644	0
Link Speed (k/h)	40			30	40	
Link Distance (m)	119.8			40.0	219.7	
Travel Time (s)	10.8			4.8	19.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	240	0	0	0	0	53
Shared Lane Traffic (%)						
Lane Group Flow (vph)	240	0	0	0	53	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			-7.5	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.06	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Free			Stop	Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.3%
Analysis Period (min)	15
	ICU Level of Service A

Intersection Sign configuration not allowed in HCM analysis.

Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	127.0	58.4	14.5	83.0	129.2	122.9	121.4	9.0	83.4	89.7	86.6
Average Queue (m)	83.9	27.6	5.0	70.4	111.5	95.6	76.9	0.6	46.1	56.9	57.7
95th Queue (m)	124.9	49.9	14.7	103.0	137.0	128.0	117.3	4.1	74.1	88.8	86.8
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		347.3	347.3	347.3
Upstream Blk Time (%)					16	4	2				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				8	28			0	39		
Queuing Penalty (veh)				56	78			0	2		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB
Directions Served	R	T	T	T	R	UL
Maximum Queue (m)	12.6	22.5	9.0	9.0	8.1	47.3
Average Queue (m)	0.4	0.8	0.3	0.3	0.5	20.8
95th Queue (m)	4.2	7.4	3.0	3.0	3.6	35.4
Link Distance (m)	90.2	347.3	347.3	347.3		
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				38.0	60.0	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB	
Directions Served	LT	R	L	TR	R	L	T	T	TR	L	T	T	
Maximum Queue (m)	21.4	31.7	59.7	49.4	14.8	85.5	85.2	88.8	108.7	27.0	110.3	97.2	
Average Queue (m)	9.1	18.5	32.2	10.8	3.1	48.0	45.7	49.2	54.7	10.9	66.0	49.2	
95th Queue (m)	18.7	28.7	48.1	29.7	10.6	81.1	77.6	78.1	85.6	20.7	93.8	83.7	
Link Distance (m)	275.4				97.4	97.4			207.2	207.2	207.2	168.6	168.6
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)	30.0		20.0				72.0				60.0		
Storage Blk Time (%)	1		40		0		3		1		11		
Queuing Penalty (veh)	0		12		0		26		2		6		

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	SB
Directions Served	TR
Maximum Queue (m)	65.1
Average Queue (m)	30.0
95th Queue (m)	60.4
Link Distance (m)	168.6
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 185

Lanes, Volumes, Timings

1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↑↑↑		↘	↑↑↑	
Traffic Volume (vph)	394	5	262	7	9	7	256	2061	16	2	1166	239
Future Volume (vph)	394	5	262	7	9	7	256	2061	16	2	1166	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.959			0.999			0.974	
Flt Protected		0.953			0.985		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1470	0	1716	4923	0	892	4668	0
Flt Permitted		0.712			0.889		0.100			0.108		
Satd. Flow (perm)	0	1263	1496	0	1326	0	181	4923	0	101	4668	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			262		3			2			46	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	394	5	262	7	9	7	256	2061	16	2	1166	239
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	399	262	0	23	0	256	2077	0	2	1405	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0		17.0	56.0		39.0	39.0	
Total Split (%)	44.0%	44.0%	44.0%	44.0%	44.0%		17.0%	56.0%		39.0%	39.0%	
Maximum Green (s)	37.6	37.6	37.6	37.6	37.6		14.0	49.8		32.8	32.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		34.6	34.6		34.6		56.0	52.8		37.0	37.0	
Actuated g/C Ratio		0.35	0.35		0.35		0.56	0.53		0.37	0.37	
v/c Ratio		0.91	0.38		0.05		0.86	0.80		0.05	0.80	
Control Delay		57.8	4.5		18.5		49.6	23.0		23.0	33.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		57.8	4.5		18.5		49.6	23.0		23.0	33.1	
LOS		E	A		B		D	C		C	C	
Approach Delay		36.7			18.5			25.9			33.1	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 29.8
 Intersection LOS: C
 Intersection Capacity Utilization 101.3%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↕	↗	↖	↕
Traffic Volume (vph)	0	93	2137	298	155	1255
Future Volume (vph)	0	93	2137	298	155	1255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	4940	1568	1770	4848
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	4940	1568	1770	4848
Link Speed (k/h)	40		60			60
Link Distance (m)	119.8		367.1			224.5
Travel Time (s)	10.8		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	93	2137	298	155	1255
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	93	2137	298	155	1255
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	63.5%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road























03-18-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations		↗	↗↗↗	↗	↘	↗↗↗			
Traffic Volume (veh/h)	0	93	2137	298	155	1255			
Future Volume (Veh/h)	0	93	2137	298	155	1255			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Hourly flow rate (vph)	0	93	2137	298	155	1255			
Pedestrians	55		7			1			
Lane Width (m)	3.6		3.6			3.6			
Walking Speed (m/s)	1.2		1.2			1.2			
Percent Blockage	5		1			0			
Right turn flare (veh)									
Median type			None			None			
Median storage veh									
Upstream signal (m)			367			225			
pX, platoon unblocked	0.74	0.69			0.69				
vC, conflicting volume	2927	768			2490				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1420	0			1580				
tC, single (s)	6.8	6.9			4.1				
tC, 2 stage (s)									
tF (s)	3.5	3.3			2.2				
p0 queue free %	100	87			43				
cM capacity (veh/h)	39	714			271				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	93	712	712	712	298	155	418	418	418
Volume Left	0	0	0	0	0	155	0	0	0
Volume Right	93	0	0	0	298	0	0	0	0
cSH	714	1700	1700	1700	1700	271	1700	1700	1700
Volume to Capacity	0.13	0.42	0.42	0.42	0.18	0.57	0.25	0.25	0.25
Queue Length 95th (m)	3.6	0.0	0.0	0.0	0.0	26.2	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	34.7	0.0	0.0	0.0
Lane LOS	B					D			
Approach Delay (s)	10.8	0.0				3.8			
Approach LOS	B								
Intersection Summary									
Average Delay			1.6						
Intersection Capacity Utilization			63.5%		ICU Level of Service				B
Analysis Period (min)			15						

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	13	274	173	27	52	309	2004	27	89	1107	22
Future Volume (vph)	37	13	274	173	27	52	309	2004	27	89	1107	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.94	0.96	0.98		1.00	1.00		1.00	1.00	
Frt			0.850		0.901			0.998			0.997	
Flt Protected		0.964		0.950			0.950			0.950		
Satd. Flow (prot)	0	1592	1425	1636	1527	0	1750	4875	0	1785	4733	0
Flt Permitted		0.748		0.724			0.187			0.081		
Satd. Flow (perm)	0	1225	1346	1195	1527	0	343	4875	0	152	4733	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			274		52			3			3	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	10		37	37		10	10		13	13		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	2%	5%	0%	0%	8%	6%
Adj. Flow (vph)	37	13	274	173	27	52	309	2004	27	89	1107	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	50	274	173	79	0	309	2031	0	89	1129	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

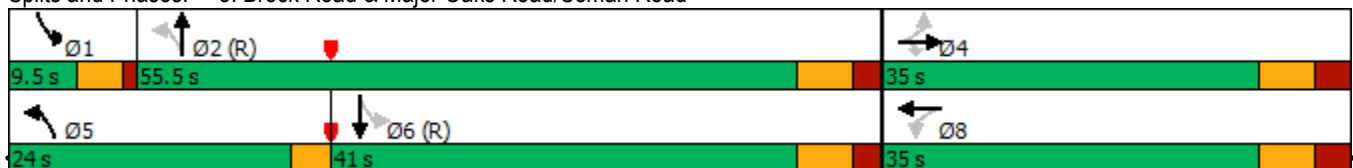


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	35.0	35.0	35.0	35.0	35.0		24.0	55.5		9.5	41.0	
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		24.0%	55.5%		9.5%	41.0%	
Maximum Green (s)	28.0	28.0	28.0	28.0	28.0		21.0	49.1		5.0	34.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		19.7	19.7	19.7	19.7		70.3	58.0		57.9	49.5	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.70	0.58		0.58	0.50	
v/c Ratio		0.21	0.57	0.74	0.23		0.70	0.72		0.46	0.48	
Control Delay		33.1	8.7	41.9	9.1		23.3	8.6		22.6	19.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		33.1	8.7	41.9	9.1		23.3	8.6		22.6	19.7	
LOS		C	A	D	A		C	A		C	B	
Approach Delay		12.4			31.6			10.5			19.9	
Approach LOS		B			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 76 (76%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 14.7
 Intersection LOS: B
 Intersection Capacity Utilization 76.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	117.9	53.2	22.8	82.8	123.7	117.0	115.7	7.4	103.9	113.9	121.5
Average Queue (m)	66.9	22.0	4.8	55.0	91.5	71.3	58.4	0.4	60.6	69.1	75.1
95th Queue (m)	103.5	41.5	15.5	96.5	134.7	110.3	97.5	4.3	99.3	108.7	116.6
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)					5	0	1				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				3	15			1	33		
Queuing Penalty (veh)				21	39			5	1		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	R	T	T	T	R	L	T	T	T
Maximum Queue (m)	14.3	26.4	22.9	22.2	23.9	64.5	41.8	17.6	8.5
Average Queue (m)	1.2	1.9	2.0	1.3	5.2	28.9	2.8	0.7	0.5
95th Queue (m)	7.3	12.4	11.1	8.9	16.6	56.9	20.5	9.2	4.2
Link Distance (m)	88.5	350.9	350.9	350.9			207.2	207.2	207.2
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)					38.0	60.0			
Storage Blk Time (%)						3			
Queuing Penalty (veh)						13			

Intersection: 3: Brock Road & Major Oaks Road/Usman Road






















Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	41.7	37.2	56.2	51.2	83.1	85.7	90.4	88.0	30.8	122.8	109.0	69.9
Average Queue (m)	10.2	22.8	30.3	16.0	43.2	35.6	40.2	43.2	14.9	70.8	56.3	32.8
95th Queue (m)	25.0	36.7	48.3	34.2	72.0	62.8	67.7	71.9	26.2	104.8	90.9	59.7
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)		5	34	5	2	0				12		
Queuing Penalty (veh)		2	27	9	15	1				11		

Network Summary

Network wide Queuing Penalty: 144

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	3	247	21	4	6	131	805	3	1	2075	219
Future Volume (vph)	173	3	247	21	4	6	131	805	3	1	2075	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.974			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1698	1551	0	1491	0	1668	4415	0	892	4797	0
Flt Permitted		0.707			0.751		0.065			0.335		
Satd. Flow (perm)	0	1258	1528	0	1156	0	114	4415	0	314	4797	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			111		6			1				29
Link Speed (k/h)		60			40			60				60
Link Distance (m)		416.8			328.7			124.4				367.1
Travel Time (s)		25.0			29.6			7.5				22.0
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	173	3	247	21	4	6	131	805	3	1	2075	219
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	176	247	0	31	0	131	808	0	1	2294	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5				3.5
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020

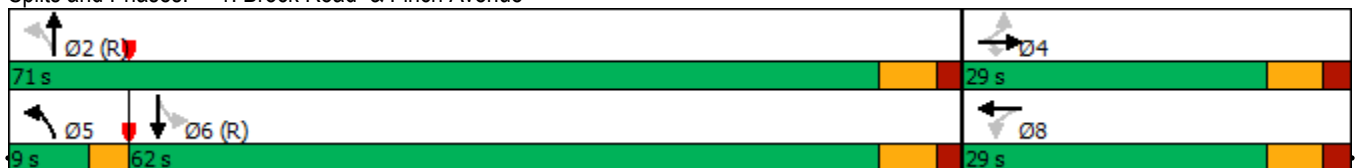


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	22.6	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		18.2	18.2		18.2		72.4	69.2		58.9	58.9	
Actuated g/C Ratio		0.18	0.18		0.18		0.72	0.69		0.59	0.59	
v/c Ratio		0.77	0.67		0.14		0.67	0.26		0.01	0.81	
Control Delay		60.0	29.3		28.9		33.9	6.5		5.0	14.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		60.0	29.3		28.9		33.9	6.5		5.0	14.5	
LOS		E	C		C		C	A		A	B	
Approach Delay		42.1			28.9			10.3			14.5	
Approach LOS		D			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 16.7
 Intersection LOS: B
 Intersection Capacity Utilization 83.6%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑↑	↗	↘	↓↓↓
Traffic Volume (vph)	0	40	915	112	76	2300
Future Volume (vph)	0	40	915	112	76	2300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1644	4550	1509	1703	4940
Flt Permitted					0.950	
Satd. Flow (perm)	0	1644	4550	1509	1703	4940
Link Speed (k/h)	40		60			60
Link Distance (m)	81.4		367.1			224.5
Travel Time (s)	7.3		22.0			13.5
Confl. Peds. (#/hr)				4	4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	14%	7%	6%	5%
Adj. Flow (vph)	0	40	915	112	76	2300
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	40	915	112	76	2300
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.8%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-18-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT				
Lane Configurations		↗	↗↗↗	↗	↘	↗↗↗				
Traffic Volume (veh/h)	0	40	915	112	76	2300				
Future Volume (Veh/h)	0	40	915	112	76	2300				
Sign Control	Stop		Free			Free				
Grade	0%		0%			0%				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Hourly flow rate (vph)	0	40	915	112	76	2300				
Pedestrians	4									
Lane Width (m)	3.6									
Walking Speed (m/s)	1.2									
Percent Blockage	0									
Right turn flare (veh)										
Median type			None			None				
Median storage veh										
Upstream signal (m)			367			225				
pX, platoon unblocked	0.71									
vC, conflicting volume	1838	309				1031				
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	747	309				1031				
tC, single (s)	6.8	6.9				4.2				
tC, 2 stage (s)										
tF (s)	3.5	3.3				2.3				
p0 queue free %	100	94				88				
cM capacity (veh/h)	220	691				644				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4	
Volume Total	40	305	305	305	112	76	767	767	767	
Volume Left	0	0	0	0	0	76	0	0	0	
Volume Right	40	0	0	0	112	0	0	0	0	
cSH	691	1700	1700	1700	1700	644	1700	1700	1700	
Volume to Capacity	0.06	0.18	0.18	0.18	0.07	0.12	0.45	0.45	0.45	
Queue Length 95th (m)	1.5	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	
Control Delay (s)	10.5	0.0	0.0	0.0	0.0	11.3	0.0	0.0	0.0	
Lane LOS	B					B				
Approach Delay (s)	10.5	0.0				0.4				
Approach LOS	B									
Intersection Summary										
Average Delay			0.4							
Intersection Capacity Utilization			47.8%	ICU Level of Service		A				
Analysis Period (min)			15							

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	39	4	268	230	12	8	127	830	10	18	1885	19
Future Volume (vph)	39	4	268	230	12	8	127	830	10	18	1885	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.99	1.00	0.99			1.00		1.00	1.00	
Frt			0.850		0.940			0.998			0.999	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1575	1398	1636	1407	0	1684	4414	0	1785	4873	0
Flt Permitted		0.756		0.729			0.071			0.324		
Satd. Flow (perm)	0	1236	1379	1254	1407	0	126	4414	0	608	4873	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			108		8			2			2	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	39	4	268	230	12	8	127	830	10	18	1885	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	268	230	20	0	127	840	0	18	1904	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

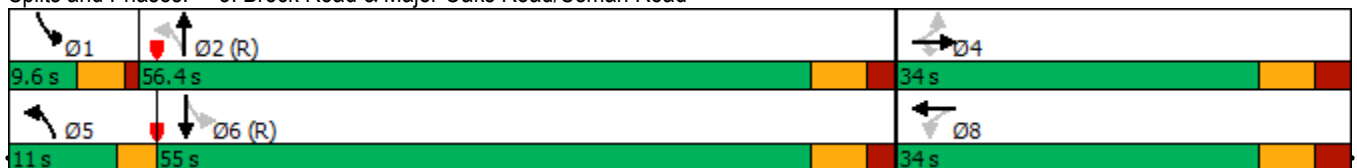


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		11.0	56.4		9.6	55.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		11.0%	56.4%		9.6%	55.0%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0		8.0	50.0		5.1	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		22.4	22.4	22.4	22.4		67.0	60.4		61.0	53.7	
Actuated g/C Ratio		0.22	0.22	0.22	0.22		0.67	0.60		0.61	0.54	
v/c Ratio		0.16	0.68	0.82	0.06		0.63	0.32		0.04	0.73	
Control Delay		30.4	29.4	59.8	22.5		26.1	14.3		7.6	20.6	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		30.4	29.4	59.8	22.5		26.1	14.3		7.6	20.6	
LOS		C	C	E	C		C	B		A	C	
Approach Delay		29.6			56.8			15.9			20.5	
Approach LOS		C			E			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 22.7
 Intersection LOS: C
 Intersection Capacity Utilization 84.9%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Site Access & Usman Road

03-18-2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	126	31	28	66	0	20
Future Volume (vph)	126	31	28	66	0	20
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.973			0.865		
Fl _t Protected				0.986		
Satd. Flow (prot)	1812	0	0	1837	1611	0
Fl _t Permitted				0.986		
Satd. Flow (perm)	1812	0	0	1837	1611	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	81.4			39.9	39.5	
Travel Time (s)	7.3			3.6	2.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	34	30	72	0	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	0	0	102	22	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Usman Road

03-18-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Traffic Volume (veh/h)	126	31	28	66	0	20
Future Volume (Veh/h)	126	31	28	66	0	20
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)	137	34	30	72	0	22
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	383					
pX, platoon unblocked						
vC, conflicting volume			171		286	154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			171		286	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		100	98
cM capacity (veh/h)			1406		689	892
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	171	102	22			
Volume Left	0	30	0			
Volume Right	34	0	22			
cSH	1700	1406	892			
Volume to Capacity	0.10	0.02	0.02			
Queue Length 95th (m)	0.0	0.5	0.6			
Control Delay (s)	0.0	2.4	9.1			
Lane LOS		A	A			
Approach Delay (s)	0.0	2.4	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			26.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR	
Maximum Queue (m)	63.2	57.4	26.7	48.4	61.0	46.3	27.9	7.8	103.6	113.2	114.8	
Average Queue (m)	33.5	27.1	7.0	23.5	29.3	15.5	9.9	0.8	35.8	43.8	48.3	
95th Queue (m)	54.8	46.5	18.5	40.2	52.5	35.4	23.1	6.2	75.0	85.0	91.3	
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.8	350.8	350.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)					63.0				13.0			
Storage Blk Time (%)						0				1	20	
Queuing Penalty (veh)						0				3	0	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	SB
Directions Served	R	R	L
Maximum Queue (m)	2.4	3.3	25.7
Average Queue (m)	0.1	0.4	10.2
95th Queue (m)	1.5	2.9	20.2
Link Distance (m)	48.6		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		38.0	60.0
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	73.7	37.5	66.5	59.0	43.2	53.8	54.4	46.9	11.8	139.9	128.9	88.5
Average Queue (m)	16.4	25.9	42.8	11.4	20.2	25.7	28.5	22.8	2.4	89.2	76.2	49.2
95th Queue (m)	49.0	39.8	63.7	44.4	35.8	47.5	49.1	42.6	8.8	130.3	116.6	83.6
Link Distance (m)	275.4			97.5		207.3	207.3	207.3		170.3	170.3	170.3
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					0							
Storage Bay Dist (m)			30.0	20.0				72.0			60.0	
Storage Blk Time (%)	0	9	51	1				0			19	
Queuing Penalty (veh)	0	4	10	1				0			3	

Intersection: 6: Site Access & Usman Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	9.1	12.7
Average Queue (m)	1.0	5.4
95th Queue (m)	5.7	13.0
Link Distance (m)	23.8	29.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 23

Lanes, Volumes, Timings

1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↑↑↑		↖	↑↑↑	
Traffic Volume (vph)	451	17	264	15	4	8	248	1998	22	6	1116	208
Future Volume (vph)	451	17	264	15	4	8	248	1998	22	6	1116	208
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00			1.00			1.00		1.00	0.99	
Frt			0.850		0.960			0.998			0.976	
Flt Protected		0.954			0.973		0.950			0.950		
Satd. Flow (prot)	0	1771	1551	0	1678	0	1767	4970	0	1785	4735	0
Flt Permitted		0.714			0.773		0.107			0.116		
Satd. Flow (perm)	0	1322	1551	0	1333	0	199	4970	0	218	4735	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			264		3			2			40	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)	2					2	8		6	6		8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	1%	3%	0%	0%	6%	0%
Adj. Flow (vph)	451	17	264	15	4	8	248	1998	22	6	1116	208
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	468	264	0	27	0	248	2020	0	6	1324	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road & Finch Avenue

03-18-2020

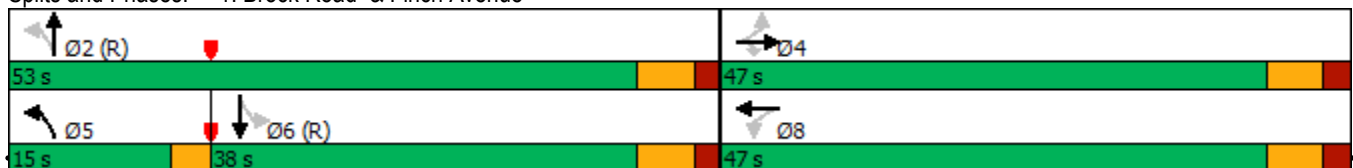


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	47.0	47.0	47.0	47.0	47.0		15.0	53.0		38.0	38.0	
Total Split (%)	47.0%	47.0%	47.0%	47.0%	47.0%		15.0%	53.0%		38.0%	38.0%	
Maximum Green (s)	40.6	40.6	40.6	40.6	40.6		12.0	46.8		31.8	31.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		38.1	38.1		38.1		52.5	49.3		34.4	34.4	
Actuated g/C Ratio		0.38	0.38		0.38		0.52	0.49		0.34	0.34	
v/c Ratio		0.93	0.35		0.05		0.86	0.82		0.08	0.80	
Control Delay		56.2	3.8		17.1		48.9	26.0		17.8	28.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		56.2	3.8		17.1		48.9	26.0		17.8	28.6	
LOS		E	A		B		D	C		B	C	
Approach Delay		37.3			17.1			28.5			28.5	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 29.9
 Intersection LOS: C
 Intersection Capacity Utilization 104.0%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↑↑↑	↘	↙	↑↑↑
Traffic Volume (vph)	0	51	2263	236	139	1344
Future Volume (vph)	0	51	2263	236	139	1344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1644	5085	1615	1805	4940
Flt Permitted					0.950	
Satd. Flow (perm)	0	1644	5085	1615	1805	4940
Link Speed (k/h)	40		60			60
Link Distance (m)	65.1		367.1			224.5
Travel Time (s)	5.9		22.0			13.5
Confl. Peds. (#/hr)	1	1		6	6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	2%	0%	0%	5%
Adj. Flow (vph)	0	51	2263	236	139	1344
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	51	2263	236	139	1344
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	65.1%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-18-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations		↗	↕↕↕	↗	↘	↕↕↕			
Traffic Volume (veh/h)	0	51	2263	236	139	1344			
Future Volume (Veh/h)	0	51	2263	236	139	1344			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Hourly flow rate (vph)	0	51	2263	236	139	1344			
Pedestrians	6		1			1			
Lane Width (m)	3.6		3.6			3.6			
Walking Speed (m/s)	1.2		1.2			1.2			
Percent Blockage	1		0			0			
Right turn flare (veh)									
Median type			None			None			
Median storage (veh)									
Upstream signal (m)			367			225			
pX, platoon unblocked	0.73	0.67			0.67				
vC, conflicting volume	2996	761			2505				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	1349	0			1537				
tC, single (s)	6.8	6.9			4.1				
tC, 2 stage (s)									
tF (s)	3.5	3.3			2.2				
p0 queue free %	100	93			53				
cM capacity (veh/h)	55	730			294				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	51	754	754	754	236	139	448	448	448
Volume Left	0	0	0	0	0	139	0	0	0
Volume Right	51	0	0	0	236	0	0	0	0
cSH	730	1700	1700	1700	1700	294	1700	1700	1700
Volume to Capacity	0.07	0.44	0.44	0.44	0.14	0.47	0.26	0.26	0.26
Queue Length 95th (m)	1.8	0.0	0.0	0.0	0.0	19.2	0.0	0.0	0.0
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	27.8	0.0	0.0	0.0
Lane LOS	B					D			
Approach Delay (s)	10.3	0.0				2.6			
Approach LOS	B								
Intersection Summary									
Average Delay			1.1						
Intersection Capacity Utilization			65.1%		ICU Level of Service				C
Analysis Period (min)			15						

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↘		↖	↕↕↕		↖	↕↕↕	
Traffic Volume (vph)	22	11	199	225	21	18	308	2109	28	54	1036	34
Future Volume (vph)	22	11	199	225	21	18	308	2109	28	54	1036	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.97	0.98	0.99		1.00	1.00		1.00	1.00	
Frt			0.850		0.931			0.998				0.995
Flt Protected		0.968		0.950			0.950			0.950		
Satd. Flow (prot)	0	1661	1425	1685	1502	0	1750	4970	0	1785	4817	0
Flt Permitted		0.822		0.736			0.197			0.085		
Satd. Flow (perm)	0	1407	1381	1281	1502	0	362	4970	0	160	4817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			199		18			3			5	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	22	11	199	225	21	18	308	2109	28	54	1036	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	199	225	39	0	308	2137	0	54	1070	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

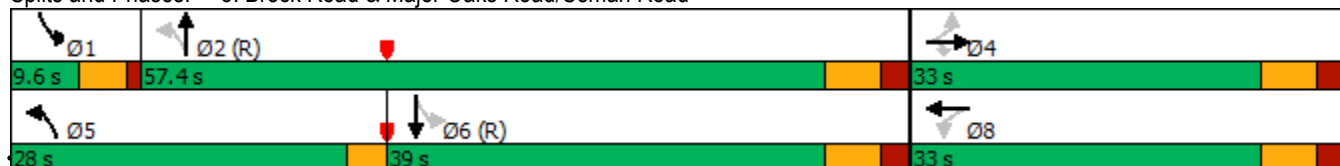


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		28.0	57.4		9.6	39.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		28.0%	57.4%		9.6%	39.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		25.0	51.0		5.1	32.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		21.6	21.6	21.6	21.6		68.4	56.9		54.7	47.1	
Actuated g/C Ratio		0.22	0.22	0.22	0.22		0.68	0.57		0.55	0.47	
v/c Ratio		0.11	0.44	0.82	0.12		0.68	0.76		0.30	0.47	
Control Delay		30.1	7.6	55.4	20.3		10.6	19.4		15.9	20.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		30.1	7.6	55.4	20.3		10.6	19.4		15.9	20.7	
LOS		C	A	E	C		B	B		B	C	
Approach Delay		10.8			50.2			18.3			20.5	
Approach LOS		B			D			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	20.5
Intersection LOS:	C
Intersection Capacity Utilization	79.7%
ICU Level of Service	D
Analysis Period (min)	15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Usman Road

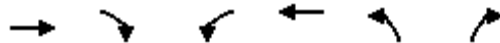
03-18-2020

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Traffic Volume (vph)	231	89	0	51	17	40
Future Volume (vph)	231	89	0	51	17	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.962			0.905		
Fl _t Protected				0.985		
Satd. Flow (prot)	1792	0	0	1863	1660	0
Fl _t Permitted				0.985		
Satd. Flow (perm)	1792	0	0	1863	1660	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	65.1			54.7	38.3	
Travel Time (s)	5.9			4.9	2.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	251	97	0	55	18	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	348	0	0	55	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	27.6%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

6: Usman Road

03-18-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Traffic Volume (veh/h)	231	89	0	51	17	40
Future Volume (Veh/h)	231	89	0	51	17	40
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)	251	97	0	55	18	43
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	397					
pX, platoon unblocked						
vC, conflicting volume			348		354	300
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			348		354	300
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	94
cM capacity (veh/h)			1211		643	740
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	348	55	61			
Volume Left	0	0	18			
Volume Right	97	0	43			
cSH	1700	1211	709			
Volume to Capacity	0.20	0.00	0.09			
Queue Length 95th (m)	0.0	0.0	2.3			
Control Delay (s)	0.0	0.0	10.6			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.6			
Approach LOS			B			
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			27.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	120.2	41.4	17.5	82.9	123.3	120.6	111.4	21.7	82.4	89.6	96.4
Average Queue (m)	70.2	21.4	5.3	53.5	90.8	74.1	57.2	3.0	39.2	46.9	51.1
95th Queue (m)	107.0	36.4	13.9	95.9	133.5	117.9	98.1	13.3	69.6	78.6	83.0
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		351.0	351.0	351.0
Upstream Blk Time (%)					6	1	0				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				3	17			1	28		
Queuing Penalty (veh)				19	43			3	2		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	R	T	T	T	R	L	T	T	T
Maximum Queue (m)	6.9	7.7	6.1	6.3	17.4	48.5	28.0	8.0	6.2
Average Queue (m)	0.3	0.5	0.5	0.3	2.5	24.7	1.1	0.3	0.2
95th Queue (m)	3.7	4.8	4.5	3.3	10.2	44.4	11.6	4.0	3.9
Link Distance (m)	31.9	351.0	351.0	351.0			207.2	207.2	207.2
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)					38.0	60.0			
Storage Blk Time (%)						1			
Queuing Penalty (veh)						2			

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	30.7	33.5	67.5	74.7	88.6	89.3	95.0	98.3	21.6	98.2	80.8	64.2
Average Queue (m)	7.2	16.6	42.2	12.8	36.7	44.5	48.4	52.5	9.9	59.8	44.2	25.8
95th Queue (m)	20.7	28.6	65.3	44.2	69.1	76.2	81.0	84.9	19.9	89.8	75.2	51.2
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)				0								
Queuing Penalty (veh)				0								
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	0	2	48	2	2	1				8		
Queuing Penalty (veh)	0	1	19	3	11	2				4		

Intersection: 6: Usman Road

Movement	NB
Directions Served	LR
Maximum Queue (m)	20.3
Average Queue (m)	9.1
95th Queue (m)	16.6
Link Distance (m)	29.8
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 108

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗↘		↗	↕↗↘	
Traffic Volume (vph)	369	4	237	7	8	7	232	1929	14	2	1092	223
Future Volume (vph)	369	4	237	7	8	7	232	1929	14	2	1092	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.975	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	4923	0	892	4673	0
Flt Permitted		0.712			0.888		0.108			0.103		
Satd. Flow (perm)	0	1263	1496	0	1319	0	195	4923	0	97	4673	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			237		5			1			46	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	369	4	237	7	8	7	232	1929	14	2	1092	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	373	237	0	22	0	232	1943	0	2	1315	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0		17.0	56.0		39.0	39.0	
Total Split (%)	44.0%	44.0%	44.0%	44.0%	44.0%		17.0%	56.0%		39.0%	39.0%	
Maximum Green (s)	37.6	37.6	37.6	37.6	37.6		14.0	49.8		32.8	32.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		33.2	33.2		33.2		57.4	54.2		39.0	39.0	
Actuated g/C Ratio		0.33	0.33		0.33		0.57	0.54		0.39	0.39	
v/c Ratio		0.89	0.36		0.05		0.78	0.73		0.05	0.71	
Control Delay		55.2	4.5		17.3		37.6	20.3		24.5	28.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		55.2	4.5		17.3		37.6	20.3		24.5	28.9	
LOS		E	A		B		D	C		C	C	
Approach Delay		35.5			17.3			22.1			28.9	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 26.2 Intersection LOS: C
 Intersection Capacity Utilization 97.2% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑↑	↗	↘	↑↑↑
Traffic Volume (vph)	0	102	1935	344	176	1179
Future Volume (vph)	0	102	1935	344	176	1179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	4940	1568	1770	4848
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	4940	1568	1770	4848
Link Speed (k/h)	40		60			60
Link Distance (m)	69.2		367.1			224.5
Travel Time (s)	6.2		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	102	1935	344	176	1179
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	102	1935	344	176	1179
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	60.8%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road























03-18-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT				
Lane Configurations		↖	↑↑↑	↗	↖	↑↑↑				
Traffic Volume (veh/h)	0	102	1935	344	176	1179				
Future Volume (Veh/h)	0	102	1935	344	176	1179				
Sign Control	Stop		Free			Free				
Grade	0%		0%			0%				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Hourly flow rate (vph)	0	102	1935	344	176	1179				
Pedestrians	55		7			1				
Lane Width (m)	3.6		3.6			3.6				
Walking Speed (m/s)	1.2		1.2			1.2				
Percent Blockage	5		1			0				
Right turn flare (veh)										
Median type	None			None						
Median storage (veh)										
Upstream signal (m)	367			225						
pX, platoon unblocked	0.79	0.75				0.75				
vC, conflicting volume	2742	701				2334				
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	1526	0				1601				
tC, single (s)	6.8	6.9				4.1				
tC, 2 stage (s)										
tF (s)	3.5	3.3				2.2				
p0 queue free %	100	87				39				
cM capacity (veh/h)	32	775				289				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4	
Volume Total	102	645	645	645	344	176	393	393	393	
Volume Left	0	0	0	0	0	176	0	0	0	
Volume Right	102	0	0	0	344	0	0	0	0	
cSH	775	1700	1700	1700	1700	289	1700	1700	1700	
Volume to Capacity	0.13	0.38	0.38	0.38	0.20	0.61	0.23	0.23	0.23	
Queue Length 95th (m)	3.6	0.0	0.0	0.0	0.0	29.7	0.0	0.0	0.0	
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	35.2	0.0	0.0	0.0	
Lane LOS	B					E				
Approach Delay (s)	10.3	0.0				4.6				
Approach LOS	B									
Intersection Summary										
Average Delay			1.9							
Intersection Capacity Utilization			60.8%			ICU Level of Service			B	
Analysis Period (min)	15									

Lanes, Volumes, Timings 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	12	249	199	25	47	280	1834	24	84	1037	20
Future Volume (vph)	33	12	249	199	25	47	280	1834	24	84	1037	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.94	0.96	0.98		1.00	1.00		1.00	1.00	
Frt			0.850		0.902			0.998			0.997	
Flt Protected		0.965		0.950			0.950			0.950		
Satd. Flow (prot)	0	1594	1425	1636	1528	0	1750	4875	0	1785	4733	0
Flt Permitted		0.767		0.728			0.207			0.081		
Satd. Flow (perm)	0	1257	1346	1201	1528	0	380	4875	0	152	4733	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			249		47			3			3	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	10		37	37		10	10		13	13		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	2%	5%	0%	0%	8%	6%
Adj. Flow (vph)	33	12	249	199	25	47	280	1834	24	84	1037	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	249	199	72	0	280	1858	0	84	1057	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

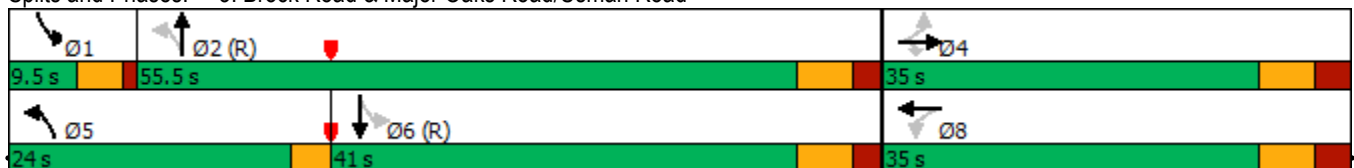


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	35.0	35.0	35.0	35.0	35.0		24.0	55.5		9.5	41.0	
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		24.0%	55.5%		9.5%	41.0%	
Maximum Green (s)	28.0	28.0	28.0	28.0	28.0		21.0	49.1		5.0	34.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		21.2	21.2	21.2	21.2		68.5	56.5		57.6	49.4	
Actuated g/C Ratio		0.21	0.21	0.21	0.21		0.68	0.56		0.58	0.49	
v/c Ratio		0.17	0.52	0.78	0.20		0.64	0.67		0.44	0.45	
Control Delay		31.2	7.9	51.5	10.9		17.6	9.6		21.5	19.2	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		31.2	7.9	51.5	10.9		17.6	9.6		21.5	19.2	
LOS		C	A	D	B		B	A		C	B	
Approach Delay		11.5			40.7			10.7			19.4	
Approach LOS		B			D			B			B	

Intersection Summary










Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 76 (76%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 15.4
 Intersection LOS: B
 Intersection Capacity Utilization 74.1%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Usman Road

03-18-2020

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	157	89	0	126	17	40
Future Volume (vph)	157	89	0	126	17	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.951			0.905		
Flt Protected				0.985		
Satd. Flow (prot)	1771	0	0	1863	1660	0
Flt Permitted				0.985		
Satd. Flow (perm)	1771	0	0	1863	1660	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	69.2			50.6	30.2	
Travel Time (s)	6.2			4.6	2.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	97	0	137	18	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	268	0	0	137	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	23.8%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

6: Usman Road

03-18-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	157	89	0	126	17	40
Future Volume (Veh/h)	157	89	0	126	17	40
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)	171	97	0	137	18	43
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	393					
pX, platoon unblocked						
vC, conflicting volume			268		356	220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			268		356	220
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	95
cM capacity (veh/h)			1296		642	820
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	268	137	61			
Volume Left	0	0	18			
Volume Right	97	0	43			
cSH	1700	1700	758			
Volume to Capacity	0.16	0.08	0.08			
Queue Length 95th (m)	0.0	0.0	2.1			
Control Delay (s)	0.0	0.0	10.2			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.2			
Approach LOS			B			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			23.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	117.9	59.9	17.5	82.9	120.6	105.9	98.4	22.7	97.4	106.3	111.0
Average Queue (m)	65.8	19.5	4.0	44.9	79.5	63.5	54.8	1.8	55.7	62.2	66.5
95th Queue (m)	104.4	39.6	13.3	84.8	122.7	97.4	89.7	14.6	87.1	94.4	101.4
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)					2	0	0				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				0	11			3	31		
Queuing Penalty (veh)				1	27			10	1		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	R	T	T	T	R	L	T	T	T
Maximum Queue (m)	22.6	17.3	21.6	16.0	25.3	78.3	33.6	18.3	15.6
Average Queue (m)	2.5	1.9	1.8	1.2	7.2	33.8	1.5	0.8	0.9
95th Queue (m)	12.2	9.6	10.6	7.4	19.6	64.9	13.3	8.3	7.5
Link Distance (m)	36.2	350.9	350.9	350.9			207.2	207.2	207.2
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)					38.0	60.0			
Storage Blk Time (%)						4	0		
Queuing Penalty (veh)						16	0		

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	44.9	36.9	63.9	68.2	74.4	88.4	63.0	69.0	27.6	100.3	90.5	58.5
Average Queue (m)	11.3	21.1	35.9	18.7	36.3	28.8	32.8	34.9	12.9	59.9	46.5	26.4
95th Queue (m)	30.0	34.9	58.7	42.3	61.6	60.7	56.0	60.8	23.9	90.0	77.1	51.3
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)				0								
Queuing Penalty (veh)				0								
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	1	3	42	5	0					7		
Queuing Penalty (veh)	2	1	31	9	3					6		

Intersection: 6: Usman Road

Movement	EB	NB
Directions Served	TR	LR
Maximum Queue (m)	2.1	15.5
Average Queue (m)	0.1	7.9
95th Queue (m)	1.4	14.6
Link Distance (m)	36.2	21.3
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 107

Lanes, Volumes, Timings
 1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↑↑↑		↗	↑↑↑	
Traffic Volume (vph)	189	4	273	23	5	6	145	882	4	1	2279	239
Future Volume (vph)	189	4	273	23	5	6	145	882	4	1	2279	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.976			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1696	1551	0	1497	0	1668	4414	0	892	4797	0
Flt Permitted		0.706			0.743		0.066			0.309		
Satd. Flow (perm)	0	1255	1528	0	1149	0	116	4414	0	290	4797	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		6			1			29	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	189	4	273	23	5	6	145	882	4	1	2279	239
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	193	273	0	34	0	145	886	0	1	2518	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020

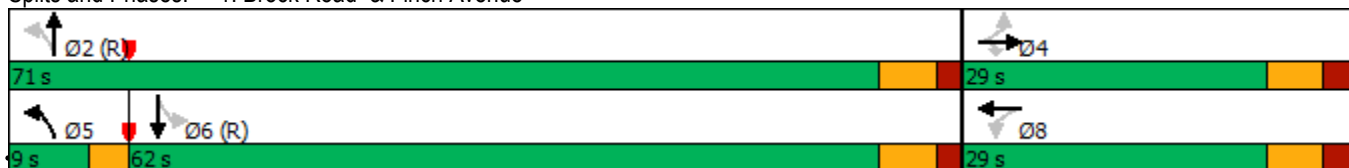


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	22.6	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		19.2	19.2		19.2		71.4	68.2		57.9	57.9	
Actuated g/C Ratio		0.19	0.19		0.19		0.71	0.68		0.58	0.58	
v/c Ratio		0.80	0.72		0.15		0.74	0.29		0.01	0.90	
Control Delay		62.6	33.0		29.1		41.0	7.0		5.0	17.7	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		62.6	33.0		29.1		41.0	7.0		5.0	17.7	
LOS		E	C		C		D	A		A	B	
Approach Delay		45.3			29.1			11.8			17.7	
Approach LOS		D			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 19.5
 Intersection LOS: B
 Intersection Capacity Utilization 89.4%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗↗	↗	↘	↗↗↗
Traffic Volume (vph)	0	40	1011	115	78	2525
Future Volume (vph)	0	40	1011	115	78	2525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1644	4550	1509	1703	4940
Flt Permitted					0.950	
Satd. Flow (perm)	0	1644	4550	1509	1703	4940
Link Speed (k/h)	40		60			60
Link Distance (m)	66.7		367.1			224.5
Travel Time (s)	6.0		22.0			13.5
Confl. Peds. (#/hr)				4	4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	14%	7%	6%	5%
Adj. Flow (vph)	0	40	1011	115	78	2525
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	40	1011	115	78	2525
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	52.1%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-18-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT			
Lane Configurations		↗	↗↗↗	↗	↘	↗↗↗			
Traffic Volume (veh/h)	0	40	1011	115	78	2525			
Future Volume (Veh/h)	0	40	1011	115	78	2525			
Sign Control	Stop		Free			Free			
Grade	0%		0%			0%			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00			
Hourly flow rate (vph)	0	40	1011	115	78	2525			
Pedestrians	4								
Lane Width (m)	3.6								
Walking Speed (m/s)	1.2								
Percent Blockage	0								
Right turn flare (veh)									
Median type			None			None			
Median storage veh									
Upstream signal (m)			367			225			
pX, platoon unblocked	0.64								
vC, conflicting volume	2013	341			1130				
vC1, stage 1 conf vol									
vC2, stage 2 conf vol									
vCu, unblocked vol	642	341			1130				
tC, single (s)	6.8	6.9			4.2				
tC, 2 stage (s)									
tF (s)	3.5	3.3			2.3				
p0 queue free %	100	94			87				
cM capacity (veh/h)	229	659			589				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	40	337	337	337	115	78	842	842	842
Volume Left	0	0	0	0	0	78	0	0	0
Volume Right	40	0	0	0	115	0	0	0	0
cSH	659	1700	1700	1700	1700	589	1700	1700	1700
Volume to Capacity	0.06	0.20	0.20	0.20	0.07	0.13	0.50	0.50	0.50
Queue Length 95th (m)	1.5	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0
Lane LOS	B					B			
Approach Delay (s)	10.8	0.0				0.4			
Approach LOS	B								
Intersection Summary									
Average Delay			0.4						
Intersection Capacity Utilization			52.1%		ICU Level of Service				A
Analysis Period (min)			15						

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↗		↖	↕↕↕		↖	↕↕↕	
Traffic Volume (vph)	43	5	295	240	12	9	140	910	11	18	2076	21
Future Volume (vph)	43	5	295	240	12	9	140	910	11	18	2076	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.99	1.00	0.99			1.00		1.00	1.00	
Frt			0.850		0.936			0.998			0.998	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1572	1398	1636	1402	0	1684	4414	0	1785	4868	0
Flt Permitted		0.754		0.726			0.072			0.298		
Satd. Flow (perm)	0	1230	1379	1249	1402	0	128	4414	0	560	4868	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			106		9			2			2	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	43	5	295	240	12	9	140	910	11	18	2076	21
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	295	240	21	0	140	921	0	18	2097	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

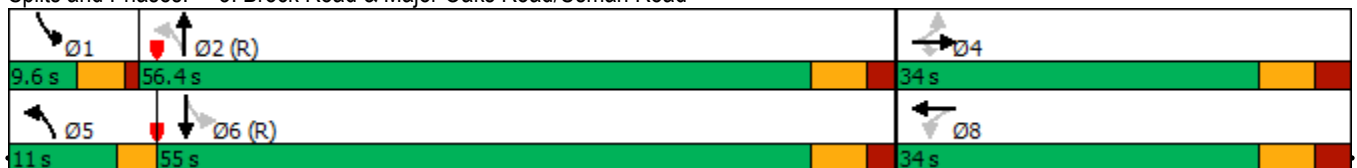


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		11.0	56.4		9.6	55.0	
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		11.0%	56.4%		9.6%	55.0%	
Maximum Green (s)	27.0	27.0	27.0	27.0	27.0		8.0	50.0		5.1	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		23.0	23.0	23.0	23.0		66.4	59.8		60.1	52.8	
Actuated g/C Ratio		0.23	0.23	0.23	0.23		0.66	0.60		0.60	0.53	
v/c Ratio		0.17	0.74	0.84	0.06		0.68	0.35		0.04	0.82	
Control Delay		30.5	33.8	61.5	22.5		29.4	14.9		7.7	23.9	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		30.5	33.8	61.5	22.5		29.4	14.9		7.7	23.9	
LOS		C	C	E	C		C	B		A	C	
Approach Delay		33.3			58.3			16.8			23.8	
Approach LOS		C			E			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 25.1
 Intersection LOS: C
 Intersection Capacity Utilization 90.7%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Usman Road

03-18-2020

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	↗
Traffic Volume (vph)	131	31	0	21	28	66
Future Volume (vph)	131	31	0	21	28	66
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.974			0.905		
Flt Protected				0.986		
Satd. Flow (prot)	1814	0	0	1863	1662	0
Flt Permitted				0.986		
Satd. Flow (perm)	1814	0	0	1863	1662	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	66.7			53.1	34.4	
Travel Time (s)	6.0			4.8	2.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	142	34	0	23	30	72
Shared Lane Traffic (%)						
Lane Group Flow (vph)	176	0	0	23	102	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	21.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

6: Usman Road

03-18-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Traffic Volume (veh/h)	131	31	0	21	28	66
Future Volume (Veh/h)	131	31	0	21	28	66
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)	142	34	0	23	30	72
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	396					
pX, platoon unblocked						
vC, conflicting volume			176		182	159
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			176		182	159
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	92
cM capacity (veh/h)			1400		807	886
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	176	23	102			
Volume Left	0	0	30			
Volume Right	34	0	72			
cSH	1700	1400	862			
Volume to Capacity	0.10	0.00	0.12			
Queue Length 95th (m)	0.0	0.0	3.2			
Control Delay (s)	0.0	0.0	9.7			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.7			
Approach LOS			A			
Intersection Summary						
Average Delay			3.3			
Intersection Capacity Utilization			21.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB		
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR		
Maximum Queue (m)	76.8	63.1	20.4	68.9	73.9	44.2	29.0	4.1	106.8	117.9	121.2		
Average Queue (m)	37.4	33.4	7.0	26.0	31.3	17.2	9.6	0.1	48.0	57.3	63.6		
95th Queue (m)	62.5	57.2	17.1	49.3	58.5	38.3	22.6	2.6	88.4	98.7	107.2		
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.7	350.7	350.7		
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)					63.0				13.0				
Storage Blk Time (%)					1	0				0	27		
Queuing Penalty (veh)					2	0				0	0		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	SB	SB
Directions Served	R	R	L	T
Maximum Queue (m)	3.1	8.8	25.2	4.2
Average Queue (m)	0.1	0.9	10.3	0.1
95th Queue (m)	1.9	4.9	20.6	2.7
Link Distance (m)	34.0			207.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		38.0	60.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	95.2	37.5	65.0	78.7	53.8	57.8	64.1	63.6	83.4	167.8	137.7	103.0
Average Queue (m)	34.4	32.3	42.4	10.9	23.1	29.4	33.8	29.2	5.5	113.5	96.3	66.6
95th Queue (m)	80.6	43.5	64.1	42.3	42.1	52.5	56.5	53.1	37.7	164.1	136.6	98.4
Link Distance (m)	275.4			97.4		207.4	207.4	207.4		170.3	170.3	170.3
Upstream Blk Time (%)					0							0
Queuing Penalty (veh)					0							0
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	1	22	48	1				0				28
Queuing Penalty (veh)	2	10	10	3				0				5

Intersection: 6: Usman Road

Movement	NB
Directions Served	LR
Maximum Queue (m)	22.2
Average Queue (m)	10.4
95th Queue (m)	17.5
Link Distance (m)	24.6
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	






















Network Summary

Network wide Queuing Penalty: 32

Lanes, Volumes, Timings

1:

03-18-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	495	18	291	17	5	9	274	2191	24	6	1218	226
Future Volume (vph)	495	18	291	17	5	9	274	2191	24	6	1218	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		1.00			1.00			1.00			0.99	
Frt			0.850		0.961			0.998			0.977	
Flt Protected		0.954			0.973		0.950			0.950		
Satd. Flow (prot)	0	1771	1551	0	1681	0	1767	4970	0	1785	4740	0
Flt Permitted		0.711			0.750		0.114			0.125		
Satd. Flow (perm)	0	1316	1551	0	1296	0	212	4970	0	235	4740	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			291		1			2			39	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)	2					2	8		6	6		8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	1%	3%	0%	0%	6%	0%
Adj. Flow (vph)	495	18	291	17	5	9	274	2191	24	6	1218	226
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	513	291	0	31	0	274	2215	0	6	1444	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1:

03-18-2020

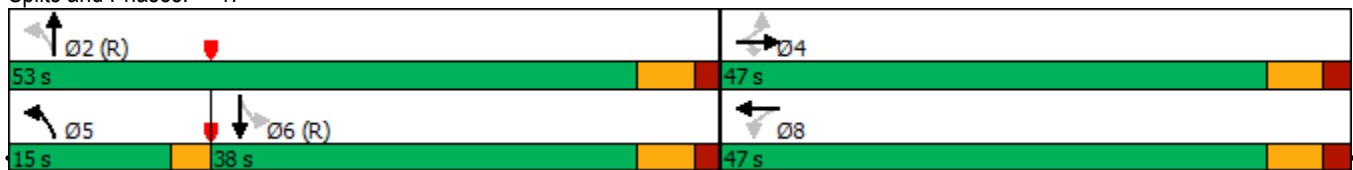


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	47.0	47.0	47.0	47.0	47.0		15.0	53.0		38.0	38.0	
Total Split (%)	47.0%	47.0%	47.0%	47.0%	47.0%		15.0%	53.0%		38.0%	38.0%	
Maximum Green (s)	40.6	40.6	40.6	40.6	40.6		12.0	46.8		31.8	31.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		40.0	40.0		40.0		50.6	47.4		32.1	32.1	
Actuated g/C Ratio		0.40	0.40		0.40		0.51	0.47		0.32	0.32	
v/c Ratio		0.97	0.37		0.06		0.92	0.94		0.08	0.93	
Control Delay		64.2	3.8		18.2		59.5	34.7		16.2	36.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		64.2	3.8		18.2		59.5	34.7		16.2	36.1	
LOS		E	A		B		E	C		B	D	
Approach Delay		42.3			18.2			37.5			36.1	
Approach LOS		D			B			D			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 37.7
 Intersection LOS: D
 Intersection Capacity Utilization 110.2%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1:



Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 1:

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	144.7	56.9	24.0	82.9	125.5	124.4	121.4	21.8	91.9	94.9	99.7
Average Queue (m)	79.3	23.9	5.8	67.8	110.1	92.9	78.0	2.8	47.4	54.4	62.1
95th Queue (m)	122.7	43.9	16.1	103.6	136.9	127.0	119.8	15.2	83.9	90.7	98.7
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)					16	4	4				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				7	27			1	40		
Queuing Penalty (veh)				50	75			2	2		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB
Directions Served	R	T	T	T	R	L	T
Maximum Queue (m)	14.6	7.8	82.4	6.2	12.1	84.2	52.8
Average Queue (m)	0.9	0.3	2.8	0.2	1.5	36.2	2.6
95th Queue (m)	6.4	3.6	50.9	2.9	7.2	72.7	23.7
Link Distance (m)	37.6	350.9	350.9	350.9			207.2
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)					9	0	
Queuing Penalty (veh)					45	0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	32.1	35.5	65.0	63.2	83.7	105.0	134.6	104.3	26.0	113.9	111.3	64.4
Average Queue (m)	9.4	19.2	41.1	13.2	45.2	45.7	54.9	56.5	10.9	67.9	53.3	30.9
95th Queue (m)	23.1	31.3	63.9	40.3	71.5	82.8	100.3	93.4	21.8	100.7	91.9	56.5
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)								0				
Queuing Penalty (veh)								0				
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	0	2	49	2	1	1				12		
Queuing Penalty (veh)	0	1	20	5	10	4				7		

Intersection: 6: Site Access & Usman Road

Movement	NB
Directions Served	LR
Maximum Queue (m)	18.7
Average Queue (m)	8.3
95th Queue (m)	15.0
Link Distance (m)	22.3
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 220

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↔		↖	↑↑↑		↘	↑↑↑	
Traffic Volume (vph)	403	5	262	7	9	7	256	2114	16	2	1200	245
Future Volume (vph)	403	5	262	7	9	7	256	2114	16	2	1200	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.959			0.999			0.975	
Flt Protected		0.953			0.985		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1470	0	1716	4923	0	892	4673	0
Flt Permitted		0.712			0.888		0.101			0.110		
Satd. Flow (perm)	0	1263	1496	0	1325	0	182	4923	0	103	4673	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			262		3			2			46	
Link Speed (k/h)		60			40			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			29.6			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	403	5	262	7	9	7	256	2114	16	2	1200	245
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	408	262	0	23	0	256	2130	0	2	1445	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

03-18-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	44.0	44.0	44.0	44.0	44.0		17.0	56.0		39.0	39.0	
Total Split (%)	44.0%	44.0%	44.0%	44.0%	44.0%		17.0%	56.0%		39.0%	39.0%	
Maximum Green (s)	37.6	37.6	37.6	37.6	37.6		14.0	49.8		32.8	32.8	
Yellow Time (s)	4.2	4.2	4.2	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	6.4		6.4		3.0	6.2		6.2	6.2	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0	16.0	16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0	5.0	5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effct Green (s)		35.1	35.1		35.1		55.5	52.3		36.5	36.5	
Actuated g/C Ratio		0.35	0.35		0.35		0.56	0.52		0.36	0.36	
v/c Ratio		0.92	0.38		0.05		0.86	0.83		0.05	0.83	
Control Delay		59.0	4.4		18.5		49.3	24.2		23.0	33.0	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		59.0	4.4		18.5		49.3	24.2		23.0	33.0	
LOS		E	A		B		D	C		C	C	
Approach Delay		37.7			18.5			26.9			33.0	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 30.4
 Intersection LOS: C
 Intersection Capacity Utilization 102.8%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

03-18-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑↑	↗	↘	↑↑↑
Traffic Volume (vph)	0	110	2137	360	182	1295
Future Volume (vph)	0	110	2137	360	182	1295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	4940	1568	1770	4848
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	4940	1568	1770	4848
Link Speed (k/h)	40		60			60
Link Distance (m)	74.6		367.1			224.5
Travel Time (s)	6.7		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	110	2137	360	182	1295
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	110	2137	360	182	1295
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	65.0%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

03-18-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT				
Lane Configurations		↗	↗↗↗	↗	↘	↗↗↗				
Traffic Volume (veh/h)	0	110	2137	360	182	1295				
Future Volume (Veh/h)	0	110	2137	360	182	1295				
Sign Control	Stop		Free			Free				
Grade	0%		0%			0%				
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00				
Hourly flow rate (vph)	0	110	2137	360	182	1295				
Pedestrians	55		7			1				
Lane Width (m)	3.6		3.6			3.6				
Walking Speed (m/s)	1.2		1.2			1.2				
Percent Blockage	5		1			0				
Right turn flare (veh)										
Median type	None			None						
Median storage (veh)										
Upstream signal (m)	367			225						
pX, platoon unblocked	0.73	0.68				0.68				
vC, conflicting volume	2995	768				2552				
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	1364	0				1616				
tC, single (s)	6.8	6.9				4.1				
tC, 2 stage (s)										
tF (s)	3.5	3.3				2.2				
p0 queue free %	100	84				29				
cM capacity (veh/h)	29	700				257				
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4	
Volume Total	110	712	712	712	360	182	432	432	432	
Volume Left	0	0	0	0	0	182	0	0	0	
Volume Right	110	0	0	0	360	0	0	0	0	
cSH	700	1700	1700	1700	1700	257	1700	1700	1700	
Volume to Capacity	0.16	0.42	0.42	0.42	0.21	0.71	0.25	0.25	0.25	
Queue Length 95th (m)	4.4	0.0	0.0	0.0	0.0	38.4	0.0	0.0	0.0	
Control Delay (s)	11.1	0.0	0.0	0.0	0.0	46.9	0.0	0.0	0.0	
Lane LOS	B			E						
Approach Delay (s)	11.1	0.0				5.8				
Approach LOS	B									
Intersection Summary										
Average Delay			2.4							
Intersection Capacity Utilization			65.0%			ICU Level of Service		C		
Analysis Period (min)			15							

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	13	274	213	27	52	309	2021	27	89	1134	22
Future Volume (vph)	37	13	274	213	27	52	309	2021	27	89	1134	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.0	2.7	3.0	3.0	2.7	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99	0.94	0.96	0.98		1.00	1.00		1.00	1.00	
Frt			0.850		0.901			0.998			0.997	
Flt Protected		0.964		0.950			0.950			0.950		
Satd. Flow (prot)	0	1592	1425	1636	1527	0	1750	4875	0	1785	4733	0
Flt Permitted		0.758		0.724			0.171			0.086		
Satd. Flow (perm)	0	1242	1346	1195	1527	0	314	4875	0	161	4733	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			274		52			3			3	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	10		37	37		10	10		13	13		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	2%	5%	0%	0%	8%	6%
Adj. Flow (vph)	37	13	274	213	27	52	309	2021	27	89	1134	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	50	274	213	79	0	309	2048	0	89	1156	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.0			3.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.09	1.09	1.14	1.09	1.09	1.14	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

03-18-2020

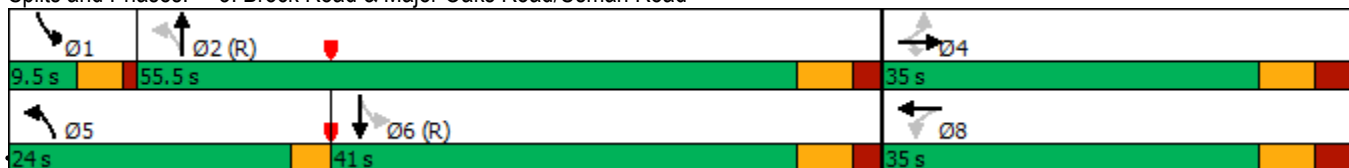


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0		5.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0		9.5	29.0	
Total Split (s)	35.0	35.0	35.0	35.0	35.0		24.0	55.5		9.5	41.0	
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		24.0%	55.5%		9.5%	41.0%	
Maximum Green (s)	28.0	28.0	28.0	28.0	28.0		21.0	49.1		5.0	34.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2		3.5	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2		1.0	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4		4.5	6.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0			7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0			14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0			0	
Act Effct Green (s)		22.1	22.1	22.1	22.1		67.9	55.8		54.5	46.4	
Actuated g/C Ratio		0.22	0.22	0.22	0.22		0.68	0.56		0.54	0.46	
v/c Ratio		0.18	0.54	0.81	0.21		0.72	0.75		0.47	0.53	
Control Delay		30.9	7.8	52.3	10.6		25.8	10.0		24.0	22.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		30.9	7.8	52.3	10.6		25.8	10.0		24.0	22.1	
LOS		C	A	D	B		C	B		C	C	
Approach Delay		11.4			41.0			12.1			22.2	
Approach LOS		B			D			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 76 (76%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 17.0
 Intersection LOS: B
 Intersection Capacity Utilization 78.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Site Access & Usman Road

03-18-2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	171	89	0	136	17	40
Future Volume (vph)	171	89	0	136	17	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.954			0.905		
Flt Protected				0.985		
Satd. Flow (prot)	1777	0	0	1863	1660	0
Flt Permitted				0.985		
Satd. Flow (perm)	1777	0	0	1863	1660	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	74.6			45.2	44.9	
Travel Time (s)	6.7			4.1	3.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	186	97	0	148	18	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	283	0	0	148	61	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	24.5%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Usman Road

03-18-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Traffic Volume (veh/h)	171	89	0	136	17	40
Future Volume (Veh/h)	171	89	0	136	17	40
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)	186	97	0	148	18	43
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	388					
pX, platoon unblocked						
vC, conflicting volume			283		382	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			283		382	234
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	95
cM capacity (veh/h)			1279		620	805
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	283	148	61			
Volume Left	0	0	18			
Volume Right	97	0	43			
cSH	1700	1279	740			
Volume to Capacity	0.17	0.00	0.08			
Queue Length 95th (m)	0.0	0.0	2.2			
Control Delay (s)	0.0	0.0	10.3			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			24.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Baseline

03-18-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	125.8	49.1	20.8	82.9	122.8	117.6	115.9	12.8	102.5	119.1	115.9
Average Queue (m)	68.7	21.7	4.8	60.1	92.0	76.4	66.5	0.5	63.4	74.2	78.6
95th Queue (m)	108.4	38.2	15.7	99.6	129.7	114.6	108.8	5.3	100.4	114.1	117.3
Link Distance (m)	399.7	399.7	309.6		112.5	112.5	112.5		350.9	350.9	350.9
Upstream Blk Time (%)					5	1	1				
Queuing Penalty (veh)					0	0	0				
Storage Bay Dist (m)				63.0				13.0			
Storage Blk Time (%)				4	17			1	37		
Queuing Penalty (veh)				27	43			3	1		

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	R	T	T	T	R	L	T	T	T
Maximum Queue (m)	16.4	20.7	23.3	20.9	25.4	123.6	141.7	60.4	66.1
Average Queue (m)	2.7	2.2	2.3	1.6	6.8	61.4	31.8	14.4	2.9
95th Queue (m)	11.4	10.8	12.0	9.8	19.9	125.1	130.7	95.5	34.2
Link Distance (m)	41.5	350.9	350.9	350.9			207.2	207.2	207.2
Upstream Blk Time (%)							0	0	0
Queuing Penalty (veh)							1	0	0
Storage Bay Dist (m)					38.0	60.0			
Storage Blk Time (%)						31	0		
Queuing Penalty (veh)						134	0		

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	63.8	37.5	64.6	85.2	75.6	68.4	78.6	74.5	35.6	111.3	109.7	70.1
Average Queue (m)	15.5	24.8	39.8	22.1	41.6	34.3	40.5	42.3	15.6	71.6	57.3	35.1
95th Queue (m)	42.1	39.1	66.1	58.8	67.1	59.8	67.0	68.7	29.8	106.6	93.9	62.9
Link Distance (m)	275.4			97.4		207.2	207.2	207.2		170.3	170.3	170.3
Upstream Blk Time (%)				0								
Queuing Penalty (veh)				0								
Storage Bay Dist (m)		30.0	20.0		72.0				60.0			
Storage Blk Time (%)	1	7	45	4	1	0				15		
Queuing Penalty (veh)	3	3	35	8	5	1				13		

Intersection: 6: Site Access & Usman Road

Movement	EB	NB
Directions Served	TR	LR
Maximum Queue (m)	2.1	21.2
Average Queue (m)	0.1	9.1
95th Queue (m)	1.3	16.5
Link Distance (m)	41.5	36.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 279

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

04-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	3	247	21	4	6	131	805	3	1	2075	219
Future Volume (vph)	173	3	247	21	4	6	131	805	3	1	2075	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00	0.99		1.00			1.00		1.00	1.00	
Frt			0.850		0.974			0.999			0.986	
Flt Protected		0.953			0.967		0.950			0.950		
Satd. Flow (prot)	0	1698	1551	0	1491	0	1668	3072	0	892	3338	0
Flt Permitted		0.707			0.751		0.065			0.347		
Satd. Flow (perm)	0	1258	1528	0	1156	0	114	3072	0	325	3338	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			35		6			1			18	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)	1		2	2		1	9		3	3		9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	33%	3%	11%	25%	40%	7%	16%	33%	100%	5%	5%
Adj. Flow (vph)	173	3	247	21	4	6	131	805	3	1	2075	219
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	176	247	0	31	0	131	808	0	1	2294	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

04-02-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	5	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	5.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	71.0		62.0	62.0	
Total Split (%)	29.0%	29.0%	9.0%	29.0%	29.0%		9.0%	71.0%		62.0%	62.0%	
Maximum Green (s)	22.6	22.6	6.0	22.6	22.6		6.0	64.8		55.8	55.8	
Yellow Time (s)	4.2	4.2	3.0	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	0.0	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	3.0		6.4		3.0	6.2		6.2	6.2	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0		16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		18.2	28.9		18.2		72.4	69.2		58.9	58.9	
Actuated g/C Ratio		0.18	0.29		0.18		0.72	0.69		0.59	0.59	
v/c Ratio		0.77	0.53		0.14		0.67	0.38		0.01	1.16	
Control Delay		60.0	27.1		28.9		33.9	7.6		5.0	93.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		60.0	27.1		28.9		33.9	7.6		5.0	93.6	
LOS		E	C		C		C	A		A	F	
Approach Delay		40.8			28.9			11.3			93.5	
Approach LOS		D			C			B			F	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 2 (2%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.16
 Intersection Signal Delay: 66.0
 Intersection LOS: E
 Intersection Capacity Utilization 100.8%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

04-02-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑↑	↗	↘	↓↓
Traffic Volume (vph)	0	40	915	112	76	2300
Future Volume (vph)	0	40	915	112	76	2300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1644	3167	1509	1703	3438
Flt Permitted					0.950	
Satd. Flow (perm)	0	1644	3167	1509	1703	3438
Link Speed (k/h)	40		60			60
Link Distance (m)	71.8		367.1			224.5
Travel Time (s)	6.5		22.0			13.5
Confl. Peds. (#/hr)				4	4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	14%	7%	6%	5%
Adj. Flow (vph)	0	40	915	112	76	2300
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	40	915	112	76	2300
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	66.9%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

04-02-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕	↗	↘	↕	
Traffic Volume (veh/h)	0	40	915	112	76	2300	
Future Volume (Veh/h)	0	40	915	112	76	2300	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	40	915	112	76	2300	
Pedestrians	4						
Lane Width (m)	3.6						
Walking Speed (m/s)	1.2						
Percent Blockage	0						
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)			367			225	
pX, platoon unblocked	0.48	0.96			0.96		
vC, conflicting volume	2221	462			1031		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1009	357			950		
tC, single (s)	6.8	6.9			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.3		
p0 queue free %	100	94			89		
cM capacity (veh/h)	102	618			665		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	40	458	458	112	76	1150	1150
Volume Left	0	0	0	0	76	0	0
Volume Right	40	0	0	112	0	0	0
cSH	618	1700	1700	1700	665	1700	1700
Volume to Capacity	0.06	0.27	0.27	0.07	0.11	0.68	0.68
Queue Length 95th (m)	1.7	0.0	0.0	0.0	3.1	0.0	0.0
Control Delay (s)	11.2	0.0	0.0	0.0	11.1	0.0	0.0
Lane LOS	B				B		
Approach Delay (s)	11.2	0.0			0.4		
Approach LOS	B						
Intersection Summary							
Average Delay			0.4				
Intersection Capacity Utilization			66.9%		ICU Level of Service		C
Analysis Period (min)			15				

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

04-02-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	39	4	268	230	12	8	127	830	10	18	1885	19
Future Volume (vph)	39	4	268	230	12	8	127	830	10	18	1885	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.99	0.99	1.00	0.99				0.98	1.00	1.00	
Frt			0.850		0.940				0.850		0.999	
Flt Protected		0.957		0.950			0.950			0.950		
Satd. Flow (prot)	0	1912	1760	1986	1708	0	1684	3077	1439	1785	3391	0
Flt Permitted		0.746		0.729			0.068			0.339		
Satd. Flow (perm)	0	1481	1737	1522	1708	0	121	3077	1407	636	3391	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175		8				44		1	
Link Speed (k/h)		50			40			60			60	
Link Distance (m)		292.9			123.2			224.5			180.3	
Travel Time (s)		21.1			11.1			13.5			10.8	
Confl. Peds. (#/hr)	6		1	1		6	3		1	1		3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	25%	4%	3%	20%	14%	6%	16%	11%	0%	5%	18%
Adj. Flow (vph)	39	4	268	230	12	8	127	830	10	18	1885	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	43	268	230	20	0	127	830	10	18	1904	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

04-02-2020

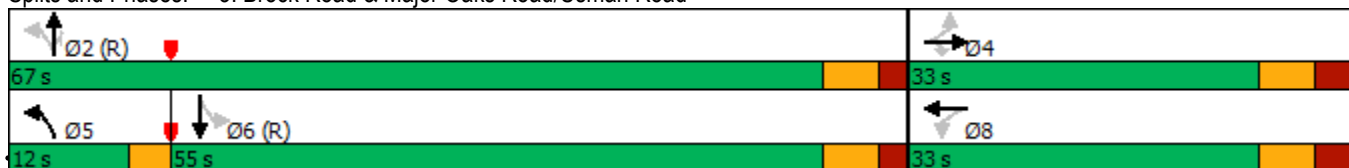


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		12.0	67.0	67.0	55.0	55.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		12.0%	67.0%	67.0%	55.0%	55.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		9.0	60.6	60.6	48.6	48.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		19.9	19.9	19.9	19.9		70.1	66.7	66.7	55.7	55.7	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.70	0.67	0.67	0.56	0.56	
v/c Ratio		0.15	0.55	0.76	0.06		0.61	0.40	0.01	0.05	1.01	
Control Delay		31.9	16.6	55.0	24.4		22.0	10.9	1.2	13.2	46.6	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		31.9	16.6	55.0	24.4		22.0	10.9	1.2	13.2	46.6	
LOS		C	B	D	C		C	B	A	B	D	
Approach Delay		18.7			52.5			12.3			46.3	
Approach LOS		B			D			B			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 59 (59%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 34.7
 Intersection LOS: C
 Intersection Capacity Utilization 100.8%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Site Access & Usman Road

04-02-2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	126	31	28	66	0	20
Future Volume (vph)	126	31	28	66	0	20
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.973			0.865		
Fl _t Protected				0.985		
Satd. Flow (prot)	1812	0	0	1835	1611	0
Fl _t Permitted				0.985		
Satd. Flow (perm)	1812	0	0	1835	1611	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	71.8			48.0	46.9	
Travel Time (s)	6.5			4.3	3.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	31	28	66	0	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	157	0	0	94	20	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	26.9%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Usman Road

04-02-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	126	31	28	66	0	20
Future Volume (Veh/h)	126	31	28	66	0	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	126	31	28	66	0	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	391					
pX, platoon unblocked						
vC, conflicting volume			157		264	142
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			157		264	142
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		100	98
cM capacity (veh/h)			1423		711	906
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	157	94	20			
Volume Left	0	28	0			
Volume Right	31	0	20			
cSH	1700	1423	906			
Volume to Capacity	0.09	0.02	0.02			
Queue Length 95th (m)	0.0	0.5	0.5			
Control Delay (s)	0.0	2.4	9.1			
Lane LOS		A	A			
Approach Delay (s)	0.0	2.4	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			26.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Baseline

04-02-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	TR
Maximum Queue (m)	60.1	72.5	26.7	66.6	65.4	56.3	357.2	362.6
Average Queue (m)	36.3	34.8	7.0	26.5	30.2	20.1	284.4	288.6
95th Queue (m)	54.9	57.7	17.4	47.4	56.7	42.7	461.8	464.4
Link Distance (m)	403.2	403.2	313.2		113.2	113.2	350.6	350.6
Upstream Blk Time (%)							7	10
Queuing Penalty (veh)							86	113
Storage Bay Dist (m)				63.0				
Storage Blk Time (%)				0	0		40	
Queuing Penalty (veh)				2	0		0	

Intersection: 2: Brock Road & Usman Road

Movement	NB	SB	SB	SB
Directions Served	R	L	T	T
Maximum Queue (m)	17.9	134.9	202.2	202.6
Average Queue (m)	0.6	28.6	94.2	99.4
95th Queue (m)	5.9	106.7	229.0	235.1
Link Distance (m)			202.6	202.6
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			1	0
Storage Bay Dist (m)	38.0	60.0		
Storage Blk Time (%)			27	
Queuing Penalty (veh)			20	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	83.8	37.5	67.3	43.0	50.6	74.4	86.4	2.5	151.7	184.4	184.4
Average Queue (m)	33.0	31.8	36.5	6.6	25.8	35.5	37.0	0.1	18.9	173.7	170.2
95th Queue (m)	73.7	43.7	57.8	21.4	43.9	61.9	66.0	0.8	91.4	195.1	197.3
Link Distance (m)	279.1			97.3		202.6	202.6			168.6	168.6
Upstream Blk Time (%)										55	54
Queuing Penalty (veh)										0	0
Storage Bay Dist (m)		30.0	20.0		72.0			70.0	60.0		
Storage Blk Time (%)	0	20	44	0		0	0			52	
Queuing Penalty (veh)	0	9	9	1		0	0			9	

Intersection: 6: Site Access & Usman Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	9.3	15.8
Average Queue (m)	1.8	4.6
95th Queue (m)	7.8	12.5
Link Distance (m)	33.3	38.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 250

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

04-02-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	451	17	264	15	4	8	248	1998	22	6	1116	208
Future Volume (vph)	451	17	264	15	4	8	248	1998	22	6	1116	208
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00			1.00			0.99	
Frt			0.850		0.960			0.998			0.976	
Flt Protected		0.954			0.973		0.950			0.950		
Satd. Flow (prot)	0	1771	1551	0	1678	0	1767	3459	0	1785	3295	0
Flt Permitted		0.714			0.692		0.089			0.096		
Satd. Flow (perm)	0	1322	1551	0	1193	0	166	3459	0	180	3295	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			35		7			2			26	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)	2					2	8		6	6		8
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	7%	3%	0%	0%	14%	1%	3%	0%	0%	6%	0%
Adj. Flow (vph)	451	17	264	15	4	8	248	1998	22	6	1116	208
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	468	264	0	27	0	248	2020	0	6	1324	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: Brock Road & Finch Avenue

04-02-2020

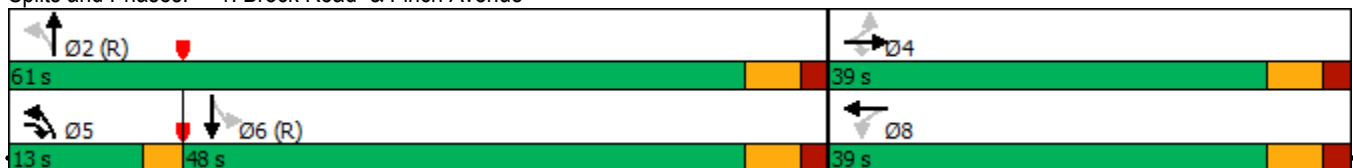


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	5	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	5.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	39.0	39.0	13.0	39.0	39.0		13.0	61.0		48.0	48.0	
Total Split (%)	39.0%	39.0%	13.0%	39.0%	39.0%		13.0%	61.0%		48.0%	48.0%	
Maximum Green (s)	32.6	32.6	10.0	32.6	32.6		10.0	54.8		41.8	41.8	
Yellow Time (s)	4.2	4.2	3.0	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	0.0	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	3.0		6.4		3.0	6.2		6.2	6.2	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0		16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		32.6	49.0		32.6		58.0	54.8		41.8	41.8	
Actuated g/C Ratio		0.33	0.49		0.33		0.58	0.55		0.42	0.42	
v/c Ratio		1.09	0.34		0.07		0.97	1.07		0.08	0.95	
Control Delay		103.2	14.9		19.4		73.6	64.3		16.5	37.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		103.2	14.9		19.4		73.6	64.3		16.5	37.6	
LOS		F	B		B		E	E		B	D	
Approach Delay		71.3			19.4			65.3			37.5	
Approach LOS		E			B			E			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.09
 Intersection Signal Delay: 57.6
 Intersection LOS: E
 Intersection Capacity Utilization 120.8%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

04-02-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↘	↙	↕
Traffic Volume (vph)	0	51	2263	236	139	1344
Future Volume (vph)	0	51	2263	236	139	1344
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1644	3539	1615	1805	3438
Flt Permitted					0.950	
Satd. Flow (perm)	0	1644	3539	1615	1805	3438
Link Speed (k/h)	40		60			60
Link Distance (m)	73.4		367.1			224.5
Travel Time (s)	6.6		22.0			13.5
Confl. Peds. (#/hr)	1	1		6	6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	2%	0%	0%	5%
Adj. Flow (vph)	0	51	2263	236	139	1344
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	51	2263	236	139	1344
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	83.9%
Analysis Period (min)	15
	ICU Level of Service E

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road

04-02-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕	↗	↘	↕	
Traffic Volume (veh/h)	0	51	2263	236	139	1344	
Future Volume (Veh/h)	0	51	2263	236	139	1344	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	51	2263	236	139	1344	
Pedestrians	6		1			1	
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	1		0			0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)			367			225	
pX, platoon unblocked	0.58	0.48			0.48		
vC, conflicting volume	3220	1138			2505		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1764	0			1966		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	90			3		
cM capacity (veh/h)	1	519			143		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	51	1132	1132	236	139	672	672
Volume Left	0	0	0	0	139	0	0
Volume Right	51	0	0	236	0	0	0
cSH	519	1700	1700	1700	143	1700	1700
Volume to Capacity	0.10	0.67	0.67	0.14	0.97	0.40	0.40
Queue Length 95th (m)	2.6	0.0	0.0	0.0	55.9	0.0	0.0
Control Delay (s)	12.7	0.0	0.0	0.0	129.7	0.0	0.0
Lane LOS	B				F		
Approach Delay (s)	12.7	0.0			12.2		
Approach LOS	B						
Intersection Summary							
Average Delay			4.6				
Intersection Capacity Utilization			83.9%		ICU Level of Service		E
Analysis Period (min)			15				

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

04-02-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗	↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	22	11	199	225	21	18	308	2109	28	54	1036	34
Future Volume (vph)	22	11	199	225	21	18	308	2109	28	54	1036	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00	0.97	0.98	0.99		1.00		0.98		1.00	
Frt			0.850		0.931				0.850		0.995	
Flt Protected		0.968		0.950			0.950			0.950		
Satd. Flow (prot)	0	2017	1794	2046	1823	0	1750	3466	1597	1785	3352	0
Flt Permitted		0.814		0.736			0.174			0.078		
Satd. Flow (perm)	0	1692	1739	1556	1823	0	320	3466	1561	147	3352	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			192		9				44			5
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	3		16	16		3	10		1	1		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	10%	2%	0%	17%	0%	2%	3%	0%	0%	6%	0%
Adj. Flow (vph)	22	11	199	225	21	18	308	2109	28	54	1036	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	199	225	39	0	308	2109	28	54	1070	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

04-02-2020

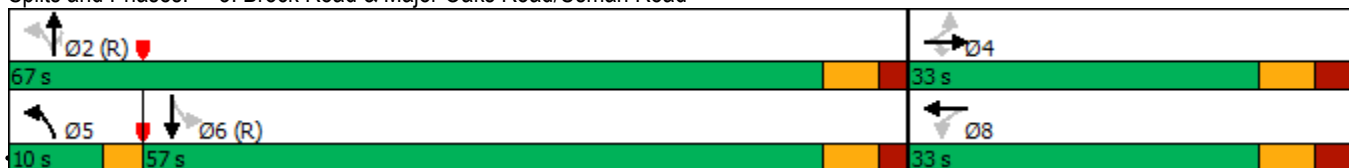


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		10.0	67.0	67.0	57.0	57.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		10.0%	67.0%	67.0%	57.0%	57.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		7.0	60.6	60.6	50.6	50.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		19.5	19.5	19.5	19.5		70.5	67.1	67.1	51.1	51.1	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.70	0.67	0.67	0.51	0.51	
v/c Ratio		0.10	0.40	0.75	0.11		0.75	0.91	0.03	0.72	0.62	
Control Delay		31.2	7.7	42.7	21.3		18.2	14.1	0.1	73.4	19.6	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		31.2	7.7	42.7	21.3		18.2	14.1	0.1	73.4	19.6	
LOS		C	A	D	C		B	B	A	E	B	
Approach Delay		11.1			39.6			14.4			22.2	
Approach LOS		B			D			B			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.91
 Intersection Signal Delay: 18.0
 Intersection LOS: B
 Intersection Capacity Utilization 110.8%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Site Access & Usman Road

04-02-2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	231	89	0	51	17	40
Future Volume (vph)	231	89	0	51	17	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.962			0.905		
Fl _t Protected				0.985		
Satd. Flow (prot)	1792	0	0	1863	1660	0
Fl _t Permitted				0.985		
Satd. Flow (perm)	1792	0	0	1863	1660	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	73.4			46.4	24.9	
Travel Time (s)	6.6			4.2	1.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	231	89	0	51	17	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	320	0	0	51	57	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	27.6%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Usman Road

04-02-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↘	↙
Traffic Volume (veh/h)	231	89	0	51	17	40
Future Volume (Veh/h)	231	89	0	51	17	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	231	89	0	51	17	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	389					
pX, platoon unblocked						
vC, conflicting volume			320		326	276
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			320		326	276
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	95
cM capacity (veh/h)			1240		668	763
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	320	51	57			
Volume Left	0	0	17			
Volume Right	89	0	40			
cSH	1700	1240	732			
Volume to Capacity	0.19	0.00	0.08			
Queue Length 95th (m)	0.0	0.0	2.0			
Control Delay (s)	0.0	0.0	10.3			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization			27.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (m)	135.8	50.4	22.5	82.9	125.0	127.5	21.9	140.2	145.2
Average Queue (m)	81.1	22.4	5.6	69.8	118.4	118.3	2.2	75.2	83.1
95th Queue (m)	123.7	40.6	16.2	105.5	121.6	126.9	11.9	118.0	124.0
Link Distance (m)	403.2	403.2	313.2		113.2	113.2		350.8	350.8
Upstream Blk Time (%)					36	35			
Queuing Penalty (veh)					0	0			
Storage Bay Dist (m)				63.0			13.0		
Storage Blk Time (%)				7	37		1	45	
Queuing Penalty (veh)				66	91		3	3	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	L	T	T
Maximum Queue (m)	17.5	190.7	187.4	69.6	128.6	181.7	169.0
Average Queue (m)	1.8	32.7	32.0	12.5	95.7	89.4	71.5
95th Queue (m)	10.5	171.3	172.5	58.1	160.0	239.8	230.4
Link Distance (m)	44.3	350.8	350.8			202.4	202.4
Upstream Blk Time (%)		0	0			8	2
Queuing Penalty (veh)		1	1			57	17
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)			7		69	0	
Queuing Penalty (veh)			16		461	0	

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	B11	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	TR	T	L	T	T	R	L	T	TR
Maximum Queue (m)	55.8	37.3	67.1	91.1	7.5	143.9	210.5	218.8	40.0	81.2	143.2	131.4
Average Queue (m)	13.4	23.9	41.5	15.3	0.4	89.1	96.6	96.3	1.7	42.6	87.7	76.0
95th Queue (m)	39.9	39.4	67.2	58.8	4.9	160.5	197.9	203.5	23.1	109.4	157.1	152.7
Link Distance (m)	279.1			97.3	200.6		202.4	202.4			168.6	168.6
Upstream Blk Time (%)				2			4	12			12	10
Queuing Penalty (veh)				5			49	137			0	0
Storage Bay Dist (m)		30.0	20.0			72.0			70.0	60.0		
Storage Blk Time (%)		8	56	2		46	4	6		1	27	
Queuing Penalty (veh)		2	22	4		486	12	2		6	15	

Intersection: 6: Site Access & Usman Road

Movement	EB	NB
Directions Served	TR	LR
Maximum Queue (m)	2.0	19.9
Average Queue (m)	0.1	8.4
95th Queue (m)	1.2	16.2
Link Distance (m)	44.3	15.4
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1456

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

04-02-2020



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	369	4	237	7	8	7	232	1929	14	2	1092	223
Future Volume (vph)	369	4	237	7	8	7	232	1929	14	2	1092	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		0.0	0.0		0.0	63.0		0.0	13.0		0.0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (m)	7.5			7.5			20.0			41.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		1.00						0.99	
Frt			0.850		0.957			0.999			0.975	
Flt Protected		0.953			0.984		0.950			0.950		
Satd. Flow (prot)	0	1690	1521	0	1462	0	1716	3427	0	892	3252	0
Flt Permitted		0.712			0.883		0.085			0.091		
Satd. Flow (perm)	0	1263	1496	0	1311	0	154	3427	0	85	3252	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			35		7			1			30	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		416.8			328.7			124.4			367.1	
Travel Time (s)		25.0			19.7			7.5			22.0	
Confl. Peds. (#/hr)			3	3			14					14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	0%	5%	33%	14%	17%	4%	4%	15%	100%	6%	6%
Adj. Flow (vph)	369	4	237	7	8	7	232	1929	14	2	1092	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	373	237	0	22	0	232	1943	0	2	1315	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
1: Brock Road & Finch Avenue

04-02-2020

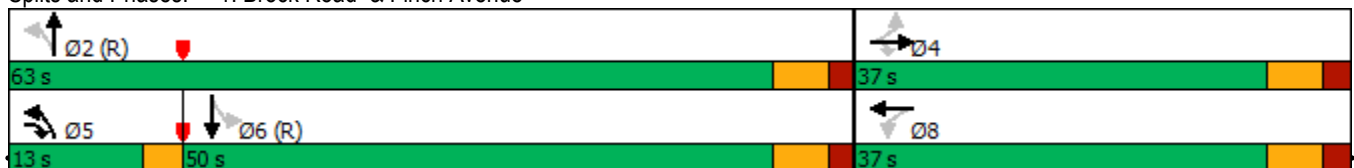


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	pm+ov	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4	5		8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	5	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	5.0	8.0	8.0		5.0	20.0		20.0	20.0	
Minimum Split (s)	29.0	29.0	9.0	29.0	29.0		9.0	28.0		28.0	28.0	
Total Split (s)	37.0	37.0	13.0	37.0	37.0		13.0	63.0		50.0	50.0	
Total Split (%)	37.0%	37.0%	13.0%	37.0%	37.0%		13.0%	63.0%		50.0%	50.0%	
Maximum Green (s)	30.6	30.6	10.0	30.6	30.6		10.0	56.8		43.8	43.8	
Yellow Time (s)	4.2	4.2	3.0	4.2	4.2		3.0	4.2		4.2	4.2	
All-Red Time (s)	2.2	2.2	0.0	2.2	2.2		0.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.4	3.0		6.4		3.0	6.2		6.2	6.2	
Lead/Lag			Lead				Lead			Lag	Lag	
Lead-Lag Optimize?			Yes				Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	16.0	16.0		16.0	16.0			14.0		14.0	14.0	
Flash Dont Walk (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)		30.6	44.0		30.6		60.0	56.8		43.8	43.8	
Actuated g/C Ratio		0.31	0.44		0.31		0.60	0.57		0.44	0.44	
v/c Ratio		0.97	0.35		0.05		0.93	1.00		0.05	0.91	
Control Delay		74.4	15.8		19.5		66.2	42.2		17.0	32.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		74.4	15.8		19.5		66.2	42.2		17.0	32.4	
LOS		E	B		B		E	D		B	C	
Approach Delay		51.6			19.5			44.8			32.4	
Approach LOS		D			B			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 40 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 41.7
 Intersection LOS: D
 Intersection Capacity Utilization 113.4%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 1: Brock Road & Finch Avenue



Lanes, Volumes, Timings
2: Brock Road & Usman Road

04-02-2020



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕	↘	↖	↗
Traffic Volume (vph)	0	102	1935	344	176	1179
Future Volume (vph)	0	102	1935	344	176	1179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		38.0	60.0	
Storage Lanes	0	1		1	1	
Taper Length (m)	7.5				75.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.865		0.850		
Flt Protected					0.950	
Satd. Flow (prot)	0	1627	3438	1568	1770	3374
Flt Permitted					0.950	
Satd. Flow (perm)	0	1627	3438	1568	1770	3374
Link Speed (k/h)	40		60			60
Link Distance (m)	62.6		367.1			224.5
Travel Time (s)	5.6		22.0			13.5
Confl. Peds. (#/hr)	7	1		55	55	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	5%	3%	2%	7%
Adj. Flow (vph)	0	102	1935	344	176	1179
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	102	1935	344	176	1179
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	76.9%
Analysis Period (min)	15
	ICU Level of Service D

HCM Unsignalized Intersection Capacity Analysis

2: Brock Road & Usman Road























04-02-2020



Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕	↘	↙	↕	
Traffic Volume (veh/h)	0	102	1935	344	176	1179	
Future Volume (Veh/h)	0	102	1935	344	176	1179	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Hourly flow rate (vph)	0	102	1935	344	176	1179	
Pedestrians	55		7			1	
Lane Width (m)	3.6		3.6			3.6	
Walking Speed (m/s)	1.2		1.2			1.2	
Percent Blockage	5		1			0	
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (m)			367			225	
pX, platoon unblocked	0.57	0.49			0.49		
vC, conflicting volume	2938	1024			2334		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1525	0			1628		
tC, single (s)	6.8	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	80			4		
cM capacity (veh/h)	2	503			183		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	102	968	968	344	176	590	590
Volume Left	0	0	0	0	176	0	0
Volume Right	102	0	0	344	0	0	0
cSH	503	1700	1700	1700	183	1700	1700
Volume to Capacity	0.20	0.57	0.57	0.20	0.96	0.35	0.35
Queue Length 95th (m)	6.0	0.0	0.0	0.0	61.6	0.0	0.0
Control Delay (s)	14.0	0.0	0.0	0.0	108.7	0.0	0.0
Lane LOS	B				F		
Approach Delay (s)	14.0	0.0			14.1		
Approach LOS	B						
Intersection Summary							
Average Delay			5.5				
Intersection Capacity Utilization			76.9%		ICU Level of Service		D
Analysis Period (min)			15				

Lanes, Volumes, Timings
3: Brock Road & Major Oaks Road/Usman Road

04-02-2020

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	12	249	199	25	47	280	1834	24	84	1037	20
Future Volume (vph)	33	12	249	199	25	47	280	1834	24	84	1037	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.8	4.8	4.8	4.8	4.8	4.8	3.5	3.5	3.5	3.5	3.5	3.5
Storage Length (m)	0.0		30.0	20.0		0.0	72.0		70.0	60.0		0.0
Storage Lanes	0		1	1		0	1		1	1		0
Taper Length (m)	7.5			48.0			72.0			92.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.99	0.94	0.96	0.98		1.00		0.95		1.00	
Frt			0.850		0.902				0.850		0.997	
Flt Protected		0.965		0.950			0.950			0.950		
Satd. Flow (prot)	0	1936	1794	1986	1856	0	1750	3400	1597	1785	3294	0
Flt Permitted		0.756		0.728			0.188			0.085		
Satd. Flow (perm)	0	1505	1695	1458	1856	0	345	3400	1517	160	3294	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191		17				44			3
Link Speed (k/h)		50			40			60				60
Link Distance (m)		292.9			123.2			224.5				180.3
Travel Time (s)		21.1			11.1			13.5				10.8
Confl. Peds. (#/hr)	10		37	37		10	10		13	13		10
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	10%	0%	2%	3%	5%	2%	2%	5%	0%	0%	8%	6%
Adj. Flow (vph)	33	12	249	199	25	47	280	1834	24	84	1037	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	45	249	199	72	0	280	1834	24	84	1057	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.8			4.8			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.85	0.85	0.85	0.85	0.85	0.85	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2	1	1		2
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0	2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: Brock Road & Major Oaks Road/Usman Road

04-02-2020

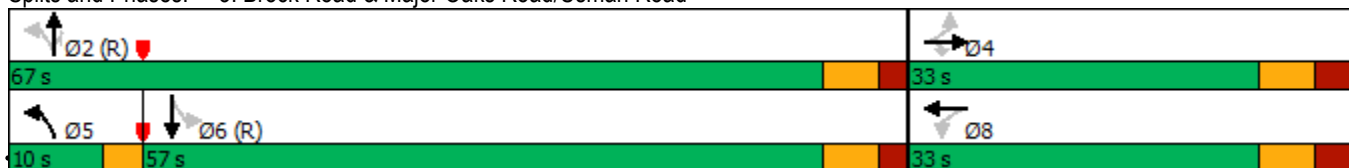


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2		2	6		
Detector Phase	4	4	4	8	8		5	2	2	6	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	4.0	4.0		5.0	20.0	20.0	20.0	20.0	
Minimum Split (s)	32.0	32.0	32.0	32.0	32.0		8.0	29.0	29.0	29.0	29.0	
Total Split (s)	33.0	33.0	33.0	33.0	33.0		10.0	67.0	67.0	57.0	57.0	
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		10.0%	67.0%	67.0%	57.0%	57.0%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		7.0	60.6	60.6	50.6	50.6	
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1		3.0	4.2	4.2	4.2	4.2	
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		0.0	2.2	2.2	2.2	2.2	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		7.0	7.0	7.0	7.0		3.0	6.4	6.4	6.4	6.4	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			14.0	14.0	14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	
Act Effct Green (s)		18.8	18.8	18.8	18.8		71.2	67.8	67.8	53.7	53.7	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.71	0.68	0.68	0.54	0.54	
v/c Ratio		0.16	0.53	0.73	0.20		0.70	0.80	0.02	0.99	0.60	
Control Delay		32.8	13.3	47.8	23.2		14.6	9.8	0.1	125.0	18.2	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		32.8	13.3	47.8	23.2		14.6	9.8	0.1	125.0	18.2	
LOS		C	B	D	C		B	A	A	F	B	
Approach Delay		16.3			41.3			10.3			26.1	
Approach LOS		B			D			B			C	

Intersection Summary

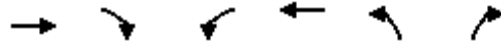
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 80 (80%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 17.6
 Intersection LOS: B
 Intersection Capacity Utilization 102.4%
 ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 3: Brock Road & Major Oaks Road/Usman Road



Lanes, Volumes, Timings
6: Site Access & Usman Road

04-02-2020



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	157	89	0	126	17	40
Future Volume (vph)	157	89	0	126	17	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	0.951			0.905		
Fl _t Protected				0.985		
Satd. Flow (prot)	1771	0	0	1863	1660	0
Fl _t Permitted				0.985		
Satd. Flow (perm)	1771	0	0	1863	1660	0
Link Speed (k/h)	40			40	50	
Link Distance (m)	62.6			57.2	46.3	
Travel Time (s)	5.6			5.1	3.3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	157	89	0	126	17	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	246	0	0	126	57	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	15		25	25		15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.8%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Usman Road

04-02-2020



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→	↘	↙	←	↘	↙
Traffic Volume (veh/h)	157	89	0	126	17	40
Future Volume (Veh/h)	157	89	0	126	17	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	157	89	0	126	17	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	400					
pX, platoon unblocked						
vC, conflicting volume			246		328	202
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			246		328	202
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	95
cM capacity (veh/h)			1320		667	839
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	246	126	57			
Volume Left	0	0	17			
Volume Right	89	0	40			
cSH	1700	1320	779			
Volume to Capacity	0.14	0.00	0.07			
Queue Length 95th (m)	0.0	0.0	1.9			
Control Delay (s)	0.0	0.0	10.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	10.0			
Approach LOS			A			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			23.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Queuing and Blocking Report
Baseline

04-02-2020

Intersection: 1: Brock Road & Finch Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	TR
Maximum Queue (m)	128.2	76.0	32.6	82.9	132.4	129.1	98.0	107.2
Average Queue (m)	72.2	21.3	3.0	69.2	118.3	118.1	53.6	63.1
95th Queue (m)	116.1	46.9	14.9	109.4	128.0	130.6	92.3	107.8
Link Distance (m)	403.2	403.2	313.2		113.2	113.2	350.7	350.7
Upstream Blk Time (%)					27	32		
Queuing Penalty (veh)					0	0		
Storage Bay Dist (m)				63.0				
Storage Blk Time (%)				3	31		33	
Queuing Penalty (veh)				26	71		1	

Intersection: 2: Brock Road & Usman Road

Movement	WB	NB	NB	NB	SB	SB	SB
Directions Served	R	T	T	R	L	T	T
Maximum Queue (m)	23.3	354.8	353.1	88.0	134.9	209.2	220.1
Average Queue (m)	5.1	35.4	38.0	14.5	112.7	148.8	68.8
95th Queue (m)	17.3	189.2	199.6	61.2	172.4	295.2	228.8
Link Distance (m)	33.4	350.7	350.7			202.4	202.4
Upstream Blk Time (%)		0	0			50	1
Queuing Penalty (veh)		2	5			372	11
Storage Bay Dist (m)				38.0	60.0		
Storage Blk Time (%)				12	79		
Queuing Penalty (veh)				113	468		

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	EB	EB	WB	WB	B11	B4	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	T	T	L	T	T	R	L	T
Maximum Queue (m)	283.6	37.5	68.0	122.1	220.7	63.3	143.9	202.5	221.8	3.0	151.8	180.5
Average Queue (m)	99.8	33.3	52.2	64.8	72.6	11.5	82.3	81.4	87.6	0.4	72.3	130.2
95th Queue (m)	255.6	43.6	81.4	150.8	235.2	45.4	154.0	175.0	191.2	2.0	155.4	217.5
Link Distance (m)	279.1			97.3	200.6	41.6		202.4	202.4			168.6
Upstream Blk Time (%)	1			43	27	16		0	8			50
Queuing Penalty (veh)	0			84	52	31		4	82			0
Storage Bay Dist (m)		30.0	20.0				72.0			70.0	60.0	
Storage Blk Time (%)	0	56	75	3			42	3	6		27	66
Queuing Penalty (veh)	0	25	54	6			384	9	1		141	55

Intersection: 3: Brock Road & Major Oaks Road/Usman Road

Movement	SB
Directions Served	TR
Maximum Queue (m)	180.5
Average Queue (m)	127.9
95th Queue (m)	217.1
Link Distance (m)	168.6
Upstream Blk Time (%)	41
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Site Access & Usman Road

Movement	EB	NB
Directions Served	TR	LR
Maximum Queue (m)	39.5	40.1
Average Queue (m)	6.0	11.2
95th Queue (m)	28.0	23.9
Link Distance (m)	33.4	37.1
Upstream Blk Time (%)	14	2
Queuing Penalty (veh)	71	0
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 2068

APPENDIX F

Road Improvement Excerpts

APPENDIX B

Proposed Regional Road Intersection Modification Projects (2017 Capital Budget and Nine Year Forecast)

Intersection	Municipality	Estimated Cost	Proposed Year of Construction
Brock Road #1 / 7th Concession	Pickering	\$2,700,000	2022
Brock Road #1 / Goodwood Road #21	Uxbridge	\$3,000,000	2020
Regional Road #3 / Regional Road #57	Clarington	\$2,600,000	2019
Taunton Road #4 / Anderson Street	Whitby	\$1,000,000	2021
Taunton Road #4 / Enfield Road #34	Clarington	\$5,000,000	2017
Taunton Road #4 / Courtice Road #34	Clarington	\$3,400,000	2021
Taunton Road #4 / Regional Road #57	Clarington	\$7,000,000	2021
Regional Road #12 / Lake Ridge Road #23	Brock	\$3,700,000	2018
Ritson Road #16 / Beatrice Street	Oshawa	\$1,100,000	2023
Bayly Street #22 / Sandy Beach Road	Pickering	\$1,050,000	2023
Bayly Street #22 / Church Street #24	Pickering	\$6,550,000	2020
Bayly Street #22 / Westney Road #31	Ajax	\$700,000	2017
Victoria Street #2 / Brock Street #46	Whitby	\$4,320,000	2023
Thickson Road #26 / Burns Street	Whitby	\$700,000	2021
Thickson Road #26 / Rossland Road #28	Whitby	\$3,900,000	2022
Rossland Road #28 / Cochrane Street #43	Whitby	\$275,000	2021
Rossland Road #28 / Garden Street	Whitby	\$2,500,000	2020
Salem Road #41 / Rossland Road #28	Ajax	\$1,800,000	2022
Stevenson Road #53 / Phillip Murray Avenue #52	Oshawa	\$520,000	2023
Townline Road #55 / Pebblestone Road	Oshawa/Clarington	\$1,000,000	2018
Regional Road #57 / Concession 7	Clarington	\$2,060,000	2023
Manning Road #58 / Brock Street	Whitby	\$3,250,000	2019
King Street #Hwy 2 / Maple Grove Road	Clarington	\$2,970,000	2017
King Street #Hwy 2 / Lambs Road	Clarington	\$1,400,000	2023
Regional Highway #47 / Concession 6	Uxbridge	\$1,450,000	2022

APPENDIX C

Proposed Regional Road Expansion Projects to 2031

ID #	Corridor	Limits	Description	Recommended Phasing	EA Status
1.2	Brock Road	Finch Avenue to Taunton Road	Widen from 5 to 7 lanes	2027-2031	Completed
1.3a	Brock Road	Taunton Road to Whitevale Road	Widen from 2 to 4 lanes	2017-2021	Completed
1.3b	Brock Road	Taunton Road to Whitevale Road	Widen from 4 to 6 lanes	2027-2031	Completed
1.5	Brock Road	Whitevale Road to Highway 7	Widen from 4 to 6 lanes	2027-2031	Completed
2.1	Simcoe Street	Conlin Road to Winchester Road	Widen from 2/4 to 5 lanes	2017-2021	Completed
2.2	Simcoe Street	King Street to Greenway Boulevard	Widen from 2 to 3 lanes	2027-2031	Completed
3.1a	Winchester Road	Baldwin Street to Anderson Street/Watford Street	Widening from 2 to 3 lanes	2017-2021	Completed
3.1b	Winchester Road	Anderson Street/Watford Street to Garrard Road	Widening from 2 to 5 lanes	2017-2021	Completed
4.1	Taunton Road	York-Durham Line to Brock Road	Widen from 4 to 6/7 lanes	2027-2031	Completed
4.2	Taunton Road	Brock Road to Brock Street	Widen from 5 to 6/7 lanes	2027-2031	Not started
4.3	Taunton Road	Brock Street to Simcoe Street	Widen from 5 to 6/7 lanes	2027-2031	Not started
5.1	Central Street	Canso Drive/William Street to Brock Road	Urbanize and improve corridor	2022-2026	Not started
14.1	Liberty Street	Baseline Road to King Street	Widen from 2 to 3 lanes	2017-2021	Not started
16.1	Ritson Road	Taunton Road to Conlin Road	Widen from 2/3 to 5 lanes	2022-2026	Not started
16.2	Ritson Road	Conlin Road to Britannia Avenue	Widen from 2 to 4 lanes	2027-2031	Not started
17.1	North Street	North of the CPR to Concession Road 3	Construct new alignment and widen from 2 to 3 lanes	2027-2031	Not started
22.1	Bayly Street	Liverpool Road to Brock Road	Widen from 5 to 6/7 lanes	2022-2026	Not started

Regional Municipality of Durham
Transportation Master Plan

ID #	Corridor	Limits	Description	Recommended Phasing	EA Status
22.2a	Bayly Street	Brock Road to Westney Road	Widen from 5 to 7 lanes	2027-2031	Not started
22.2b	Bayly Street	Westney Road to Harwood Avenue	Widen from 5 to 7 lanes	2022-2026	Not started
22.3	Bayly Street	Harwood Avenue to Salem Road	Widen from 4 to 6 lanes	2027-2031	Not started
22.5	Victoria Street	South Blair Street to west of Thickson Road	Construct new alignment and widen from 2 to 5 lanes	2017-2021	Completed
22.6	Victoria Street	East of Thickson Road to west of Stevenson Road	Widen from 2/3 to 4/5 lanes	2017-2021	Completed
22.8	Bloor Street	Ritson Road to Farewell Street	Widen from 3 to 5 lanes	2027-2031	Not started
22.10	Bloor Street	Harmony Road to Grandview Drive	Construct new alignment to 4 lanes, with new CPR grade separation and bridge crossing of Farewell Creek	2022-2026	Not started
22.12	Bloor Street	Prestonvale Road to Courtice Road	Widen from 2 to 3 lanes and improve profile	2022-2026	Not started
23.1	Lake Ridge Road	Bayly Street/Victoria Street to Kingston Road/Dundas Street	Widen from 2 to 4/5 lanes	2017-2021	In progress
23.2	Lake Ridge Road	Kingston Road/Dundas Street to Rossland Road	Widen from 2 to 4/5 lanes	2022-2026	Not started
25.1	Consumers Drive	East of Thickson Road to Thornton Road	Construct new 3 lane connection	2017-2021	Completed
26.1	Thickson Road	Wentworth Street to CNR Kingston	Widen from 2 to 4 lanes	2017-2021	Completed
26.2	Thickson Road	Consumers Drive to Dundas Street	Widen from 5 to 7 lanes	2022-2026	Not started
26.3	Thickson Road	Taunton Road to Highway 407	Widen from 2 to 4/5 lanes	2022-2026	Not started
26.4	Thickson Road	Winchester Road to Baldwin Street	Widen from 2 to 4/5 lanes	2022-2026	Not started
27.1	Altona Road	Strouds Lane to Finch Avenue	Widen from 2 to 3 lanes	2027-2031	Completed

Regional Municipality of Durham
Transportation Master Plan

ID #	Corridor	Limits	Description	Recommended Phasing	EA Status
28.4	Rossland Road	Ritson Road to Harmony Road	Widen from 3 to 5 lanes	2022-2026	Not started
28.5	Rossland Road	Harmony Road to east of Townline Road	Construct new alignment to 3 lanes including new bridge crossing of Harmony Creek tributary	2027-2031	10 Year Time Lapse: Review & Addendum Required
28.6a	Rossland Road	Brock Road to Sideline 24	Construct new alignment to 4 lanes with CPR grade separation	2017-2021	Completed
28.6b	Rossland Road	Sideline 24 to Whitevale Road Realignment	Construct new alignment to 5 lanes	2017-2021	Completed
28.7	Rossland Road	Whitevale Road Realignment to Highway 7	Construct new alignment to 5 lanes	2022-2026	Completed
29.1	Liverpool Road	Highway 401 to Kingston Road	Widen from 5 to 6 lanes	2022-2026	Not started
31.1	Westney Road	Bayly Street to Highway 401	Widen from 5 to 7 lanes	2022-2026	Not started
31.2	Westney Road	Highway 401 to Kingston Road	Widen from 5 to 7 lanes	2022-2026	Not started
31.4	Westney Road	Rossland Road to Taunton Road	Widen from 2 to 5 lanes	2017-2021	Completed
31.5	Westney Road	Hamlet of Greenwood	Construct new Greenwood Bypass to 2 lanes south of Highway 7 and 4 lanes to Highway 407	2022-2026	Completed
33.1	Harmony Road	Rossland Road to Taunton Road	Widen from 3 to 5 lanes	2017-2021	Completed
33.2	Harmony Road	Taunton Road to Conlin Road	Widen from 2/3 to 5 lanes	2017-2021	Completed
33.3	Harmony Road	Conlin Road to Britannia Avenue	Widen from 2 to 4 lanes	2027-2031	Not started
35.1	Wilson Road	Bloor Street to Olive Avenue	Widen from 2/3 to 4 lanes	2027-2031	Not started
36.1	Hopkins Street	Victoria Street to Consumers Drive	Construct new 4-lane overpass of Highway 401	2022-2026	Completed
36.2	Hopkins Street	Consumers Drive to Dundas Street	Widen from 2 to 3 lanes, with new CPR grade separation	2027-2031	Not started

Regional Municipality of Durham
Transportation Master Plan

ID #	Corridor	Limits	Description	Recommended Phasing	EA Status
37.1	Finch Avenue	Altona Road to Brock Road	Widen from 2 to 3 lanes	2022-2026	Not started
38.2	Whites Road	Kingston Road to Finch Avenue	Widen from 5 to 6 lanes including structure widening	2022-2026	Not started
38.3	Whites Road	Finch Avenue to Third Concession Road	Widen from 2 to 6 lanes, with new CPR grade separation	2022-2026	Completed
38.4	Whites Road	Third Concession Road to Taunton Road	Construct new alignment to Sideline 26 (future Whites Rd connection) and widen from 2 to 6 lanes across West Duffins Creek (1.1 km)	2022-2026	Completed
38.5	Whites Road	Taunton Road to Whitevale Road	Construct new connection to 6 lanes	2017-2021	Completed
38.6a	Whites Road	Whitevale Road to Highway 7	Construct new alignment to 4 lanes	2017-2021	Completed
38.6b	Whites Road	Whitevale Road to Highway 7	Widen from 4 to 6 lanes	2027-2031	Completed
52.1a	Thornton Road	Champlain Avenue to north of Consumers Drive Extension	Widen from 2 to 3 lanes	2017-2021	Completed
52.1b	Thornton Road	North of Consumers Drive Extension to King Street	Widen from 2 to 4 lanes, with new CPR grade separation	2022-2026	Not started
53.1	Stevenson Road	CPR Belleville to Bond Street	Widen from 4 to 5 lanes	2027-2031	Not started
53.2	Stevenson Road	Bond Street to Rossland Road	Widen from 3/4 to 5 lanes	2027-2031	Not started
57.1	Regional Road 57	Baseline Road to south of King Street	Widen from 2 to 4 lanes	2017-2021	In progress
57.2	Regional Road 57	South of King Street to north of Stevens Road	Widen from 2 to 4 lanes	2017-2021	In progress
57.3	Regional Road 57	North of Stevens Road to north of Nash Road	Widen from 2 to 4 lanes	2022-2026	In progress
58.1	Manning Road/Adelaide Ave	Garrard Road to Thornton Road	Construct new connection to 3 lanes, with new crossing of Corbett Creek	2017-2021	Completed

Regional Municipality of Durham
Transportation Master Plan

ID #	Corridor	Limits	Description	Recommended Phasing	EA Status
58.2	Adelaide Avenue	Townline Road to Trulls Road	Construct new bridge crossing of Farewell Creek and new 3-lane connection	2022-2026	Completed
59.1	Gibb Street	East of Stevenson Road to Simcoe Street	Widen from 3 to 4/5 lanes	2017-2021	Completed
59.2	Gibb Street / Olive Avenue	Simcoe Street to Ritson Road	Construct new connection and widen from 2/3 lanes to 4/5 lanes	2022-2026	Completed
99.1a	Whitevale Road	Brock Road to West limit of Phase 1	Construct new connection to 4/5 lanes. Widen existing portion from 2 to 4 lanes.	2017-2021	Completed
99.1b	Whitevale Road	West limit of Phase 1 to east of West Duffins Creek	Construct new connection to 4/5 lanes	2017-2021	Completed
99.2	Whitevale Road	York-Durham Line to east of West Duffins Creek	Construct new 2-lane connection	2027-2031	Completed
99.3	Whitevale Road	East of Sideline 16 to Brock Road	Widen from 2 to 4 lanes	2022-2026	Completed
102.7	Regional Highway 2	East of Newcastle	Widen railway overpass tunnel from 1 to 2 lanes (bridge replacement)	2027-2031	Not started
112.1	Brock Street (Regional Highway 12)	Rossland Road to Taunton Road	Widen from 3 to 5 lanes	2017-2021	Completed
112.2	Baldwin Street (Regional Highway 12)	Taunton Road to Highway 407	Widen from 2 to 4/5 lanes	2022-2026	Not started
147.1	Regional Highway 47	York-Durham Line to Goodwood Road	Road Widening from 2 to 4 lanes with intersection modifications	2022-2026	Not started

Proposed Road Expansion Projects Beyond 2031

RR	Corridor	Limits	Description	Recommended Phasing	EA Status
1	Brock Road	Highway 7 to Seventh Concession Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
1	Brock Road	Bridges over Highway 401 and CNR/GO Rail corridor	Widen bridges to 6/7 lanes	Beyond 2031	Not started
2	Simcoe Street	Winchester Road to Howden Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
3	Winchester Road	Garrard Road to Simcoe Street	Widen from 2 to 4 lanes	Beyond 2031	Not started
4	Taunton Road	Simcoe Street to Townline Road	Widen from 5 to 6/7 lanes	Beyond 2031	Not started
22	Bloor Street	Grandview Drive to Prestonvale Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
23	Lake Ridge Road	Highway 7 to Brawley Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
27	Altona Road	Finch Avenue to Taunton Road	Widen from 2 to 4 lanes, with new CPR grade separation	Beyond 2031	Not started
27	Altona Road	Taunton Road to Whitevale Road Extension	Widen from 2 to 4 lanes	Beyond 2031	Not started
29	Liverpool Road	Bridge over Highway 401 and CNR/GO Rail corridor	Widen bridge over Highway 401 to accommodate cycling facilities	Beyond 2031	Not started
33	Seventh Concession Road	Brock Road to Westney Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
31	Westney Road	Bridges under Highway 401 and CNR/GO Rail corridor	Widen bridges to 6/7 lanes	Beyond 2031	Not started
31	Westney Road	Highway 407 to Seventh Concession Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
33	Harmony Road	Britannia Avenue to Winchester Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started

Regional Municipality of Durham
Transportation Master Plan

RR	Corridor	Limits	Description	Recommended Phasing	EA Status
34	Courtice Road	Taunton Road to Enfield Road	Construct new connection and realignment north of Taunton Road	Beyond 2031	Not started
34	Courtice Road	Bloor Street to Highway 401	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
35	Wilson Road	Olive Avenue to Bond Street	Widen from 3 to 4 lanes	Beyond 2031	Not started
42	Darlington-Clarke Townline	Regional Highway 2 to Concession Street	Widen from 2 to 3 lanes	Beyond 2031	Not started
55	Townline Road	Olive Avenue to Bloor Street	Construct new bridge crossing of Farewell Creek, with widening of approach roads from 2 to 3 lanes	Beyond 2031	Not started
55	Townline Road	Adelaide Avenue to Pebblestone Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
55	Townline Road	Pebblestone Road to Taunton Road	Widen from 2 to 3 lanes	Beyond 2031	Not started
59	Gibb Street	Stevenson Road to Thornton Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
RHwy2	King Street	Townline Road to Highway 418	Widen from 4/5 lanes to 7 lanes	Beyond 2031	Not started
RHwy2	King Street / Regional Highway 2	Mearns Avenue to Highway 35/115	Widen from 2 to 4 lanes	Beyond 2031	Not started

Non-Regional Roads					
	Baseline Road	Holt Road to Regional Road 57	Widen from 2 to 4 lanes	Beyond 2031	Not started
	Baseline Road	Lambs Road to Regional Highway 2	Construct new 4 lane road.	Beyond 2031	Not started
	Bloor Street	Courtice Road to Holt Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Brawley Road	Lake Ridge Road to Highway 7/12	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Brawley Road	Highway 7/12 to Thornton Road	Construct new 4 lane road.	Beyond 2031	Not started

Regional Municipality of Durham
Transportation Master Plan

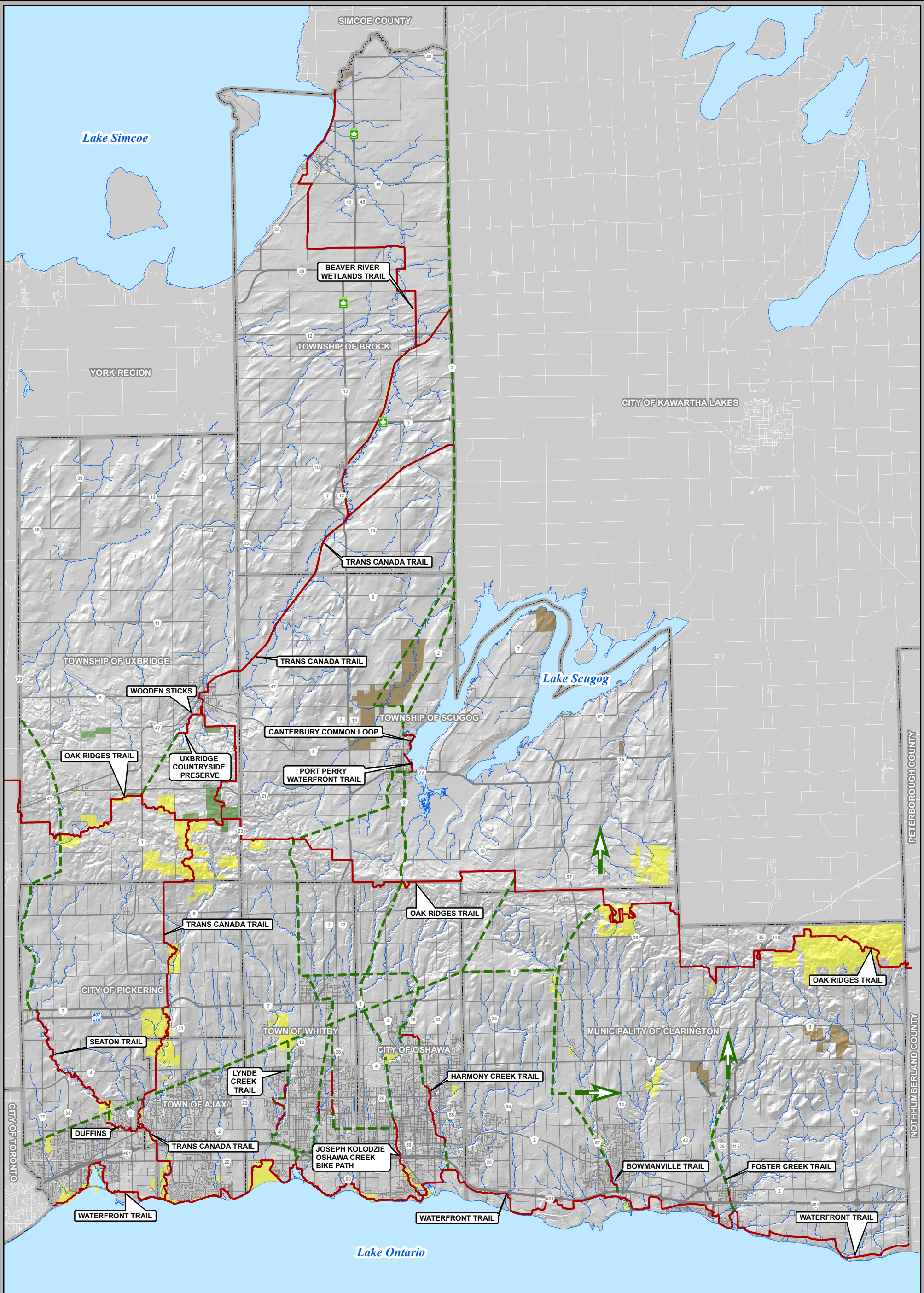
RR	Corridor	Limits	Description	Recommended Phasing	EA Status
	Brock Concession Road 8	Lake Ridge Road to Highway 12	Upgrade to Type A Arterial standard and realign to Ravenshoe Road	Beyond 2031	Not started
	Clements Road	Church Street to west of Westney Road	New 2-lane arterial over Duffins Creek	Beyond 2031	Not started
	Cochrane Street extension and new east-west midblock arterial	Highway 7 to Garrard Road	New 4-lane arterial	Beyond 2031	Not started
	Columbus Road	Lake Ridge Road to Whitby/Oshawa boundary	Widen from 2 to 4/5 lanes and realign to connect to Seventh Concession Road	Beyond 2031	Not started
	Columbus Road	Whitby/Oshawa boundary to Grandview Street	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Consumers Drive Extension	Thornton Road to Fox Street (at Laval Drive)	Construct new 2 lane or 4 lane connection to Stevenson Road (via Laval Drive) with grade separation at CP Rail spur line	Beyond 2031	Not started
	Eighth Concession Road	Brock Road to Lake Ridge Road	Widen from 2 to 4 lanes	Beyond 2031	Not started
	Harmony Road	Winchester Road to Highway 407	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Harmony Road	Highway 407 to Columbus Road	Upgrade to Type A Arterial standard when assumed by the Region	Beyond 2031	Not started
	Holt Road	Regional Highway 2 to Bloor Street	Widen from 2 to 3 lanes	Beyond 2031	Not started
	Holt Road	Bloor Street to Highway 401	Widen from 2 to 3 lanes with grade separation at CP Rail	Beyond 2031	Not started

Regional Municipality of Durham
Transportation Master Plan

RR	Corridor	Limits	Description	Recommended Phasing	EA Status
	Highway 7	York-Durham Line to Brock Road	Widen 2 to 4 lanes	Beyond 2031	Not started
	King Street	Harmony Road to Townline Road	Widen from 4/5 lanes to 7 lanes	Beyond 2031	Not started
	Kingston-Bayly Connector (Downtown Pickering, hydro corridor west of Brock Road)	Kingston Road to Bayly Street	Construct new connection, including grade separations at Highway 401 and CN/GO rail corridor	Beyond 2031	Not started
	Lambs Road	Durham Highway 2 to Highway 401	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	New arterial road extension of Garden Street	North of Robert Attersley Drive to east-west mid-block arterial	New 2/4-lane arterial	Beyond 2031	Not started
	Notion Road-Squires Beach Road connection across Highway 401	Pickering Parkway to Kellino Street	New crossing of Highway 401 with grade separation at CN/GO Rail corridor	Beyond 2031	Not started
	Salem Road	Highway 7 to Eighth Concession Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Scugog Line 2	Highway 7/12 to Simcoe Street	Upgrade and extend across missing section between Old Simcoe Road and Simcoe Street	Beyond 2031	Not started
	Seventh Concession Road	Westney Road to Lake Ridge Road	Widen from 2 to 4/5 lanes and connect to realigned Columbus Road	Beyond 2031	Not started

Regional Municipality of Durham
Transportation Master Plan

RR	Corridor	Limits	Description	Recommended Phasing	EA Status
	Stevenson Road	North of Rossland Road to Taunton Road	Construct new 4/5-lane connection and widen existing section from 2 to 4/5 lanes (if Oshawa Executive Airport closes)	Beyond 2031	Not started
	Thornton Road	Taunton Road to Howden Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Townline Road	Taunton Road to Conlin Road	Widen from 2 to 3 lanes	Beyond 2031	Not started
	Townline Road	Conlin Road to Winchester Road	Construct new 3-lane road and grade separation over Highway 407	Beyond 2031	Not started
	Westney Road	Seventh Concession Road to Eighth Concession Road	Widen from 2 to 4/5 lanes	Beyond 2031	Not started
	Highway 48	Lake Ridge Road to Highway 12	Widen as part of future Highway 404 extension	Beyond 2031	Complete



DURHAM REGIONAL TRAIL NETWORK (2015)



- REGIONAL TRAIL NETWORK**
- Existing Trail
 - Proposed Linkage
 - ➔ Potential Trail Need
- NATURAL AREAS**
- Conservation Area
 - Regional Forest
 - MNR Owned Land

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Map 3 Network Phasing

Legend

Network Phasing

- 2012-2016
- 2017-2032
- Completed

Other Primary Cycling Network

Provision for Cycling Facilities to be Considered with Future MTO Interchange/Bridge Projects

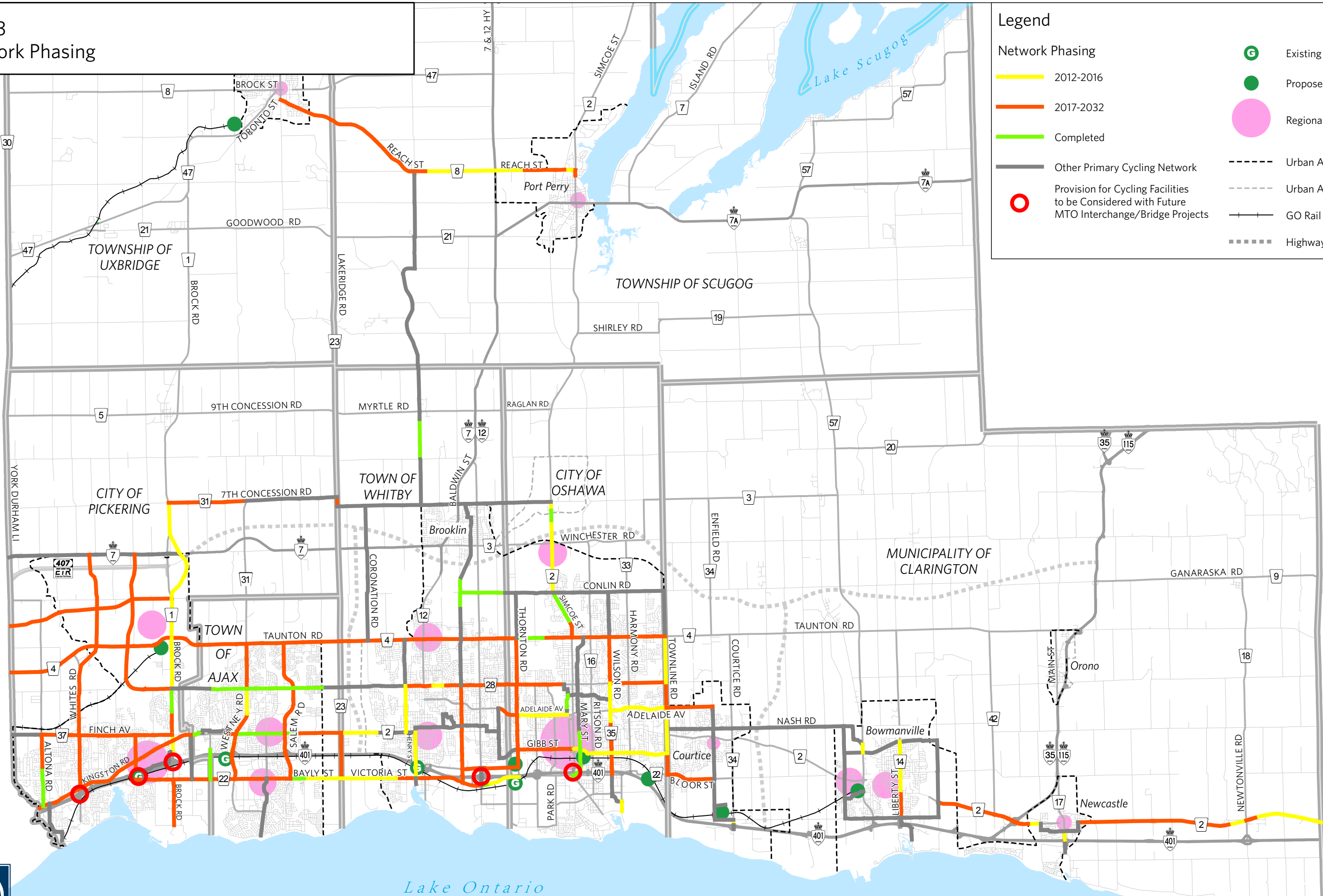
- Existing GO Station
- Proposed GO Station
- Regional Centre

Urban Area Boundary

Urban Area Boundary (Deferred)

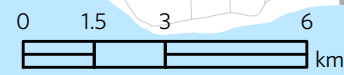
GO Rail

Highway 407 (Future)



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Lake Ontario



Map 1 Primary Cycling Network

Legend

Primary Cycling Network

Region

Local

Provincial

Provision for Cycling Facilities to be Considered with Future MTO Interchange/Bridge Projects

Existing GO Station

Proposed GO Station

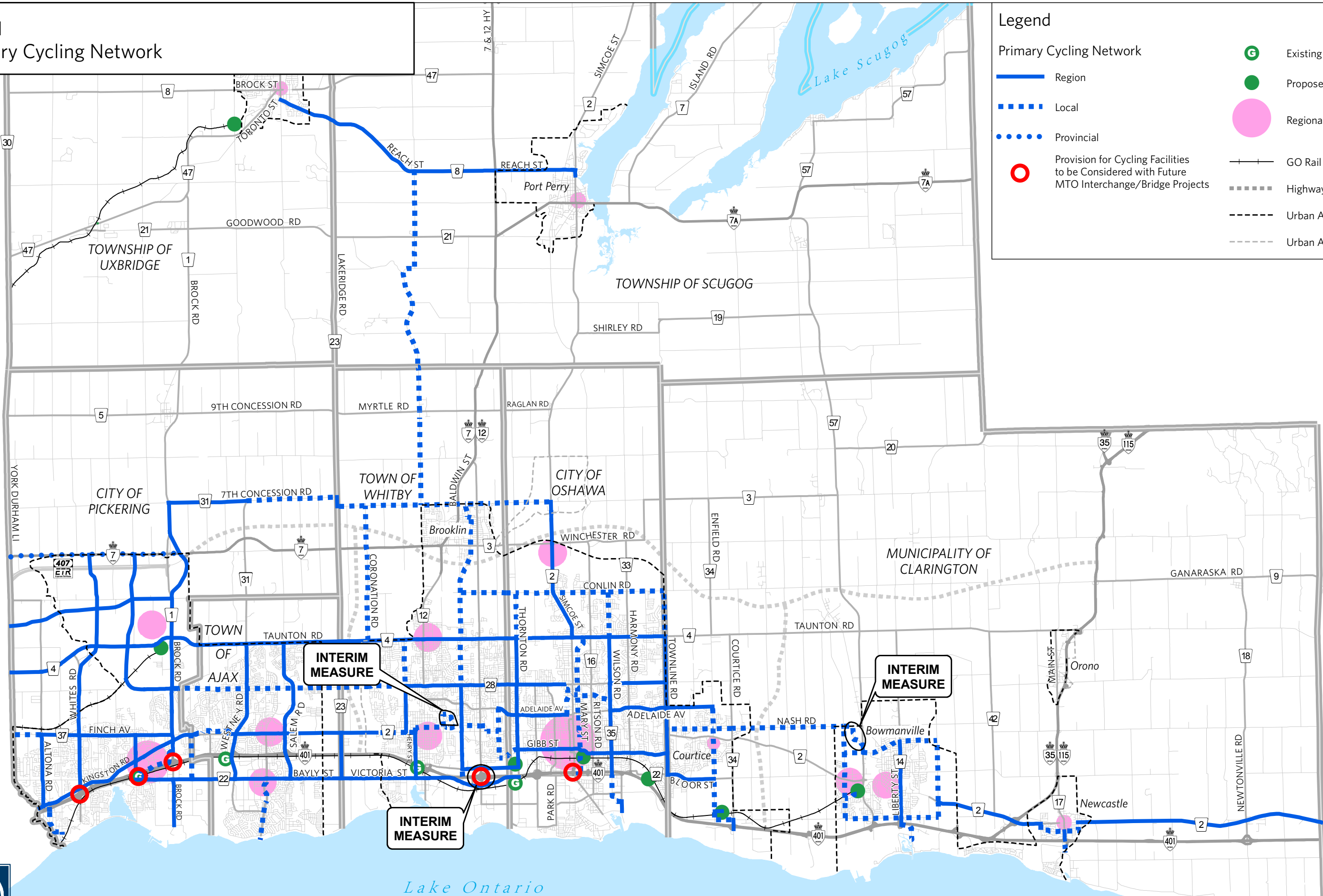
Regional Centre

GO Rail

Highway 407 (Future)

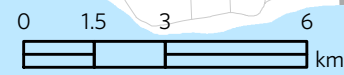
Urban Area Boundary

Urban Area Boundary (Deferred)



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Lake Ontario







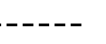

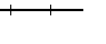

MAP 2 FACILITY TREATMENT TYPES

LEGEND

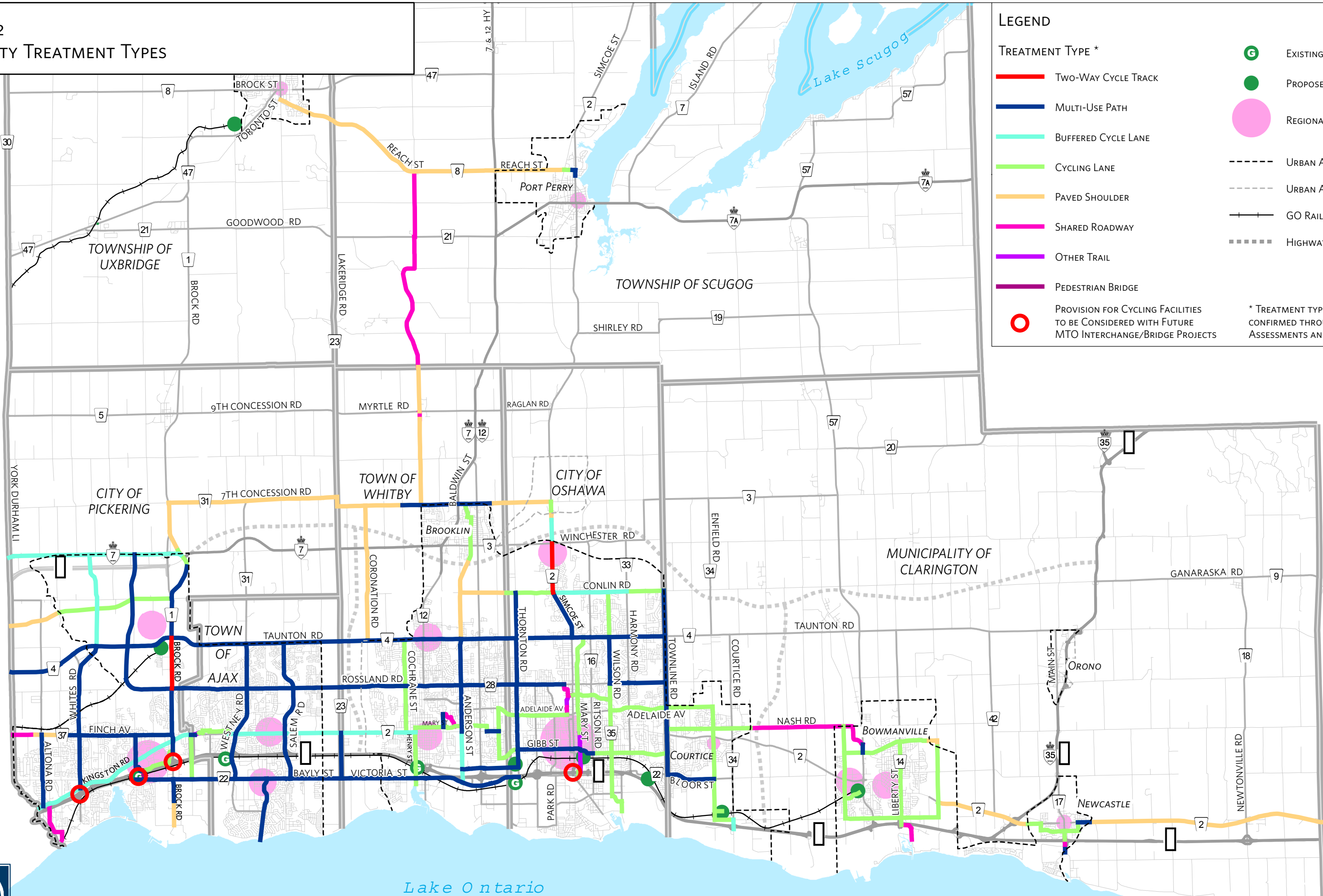
TREATMENT TYPE *

-  TWO-WAY CYCLE TRACK
-  MULTI-USE PATH
-  BUFFERED CYCLE LANE
-  CYCLING LANE
-  PAVED SHOULDER
-  SHARED ROADWAY
-  OTHER TRAIL
-  PEDESTRIAN BRIDGE

 PROVISION FOR CYCLING FACILITIES TO BE CONSIDERED WITH FUTURE MTO INTERCHANGE/BRIDGE PROJECTS

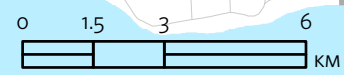
-  EXISTING GO STATION
-  PROPOSED GO STATION
-  REGIONAL CENTRE
-  URBAN AREA BOUNDARY
-  URBAN AREA BOUNDARY (DEFERRED)
-  GO RAIL
-  HIGHWAY 407 (FUTURE)

* TREATMENT TYPES ARE TO BE CONFIRMED THROUGH ENVIRONMENTAL ASSESSMENTS AND OTHER DESIGN STUDIES.



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Lake Ontario



APPENDIX G

Background Development Excerpt



**TRAFFIC IMPACT STUDY, PARKING STUDY, SITE
CIRCULATION REVIEW & TDM PLAN
(Update as per Region Comments)**

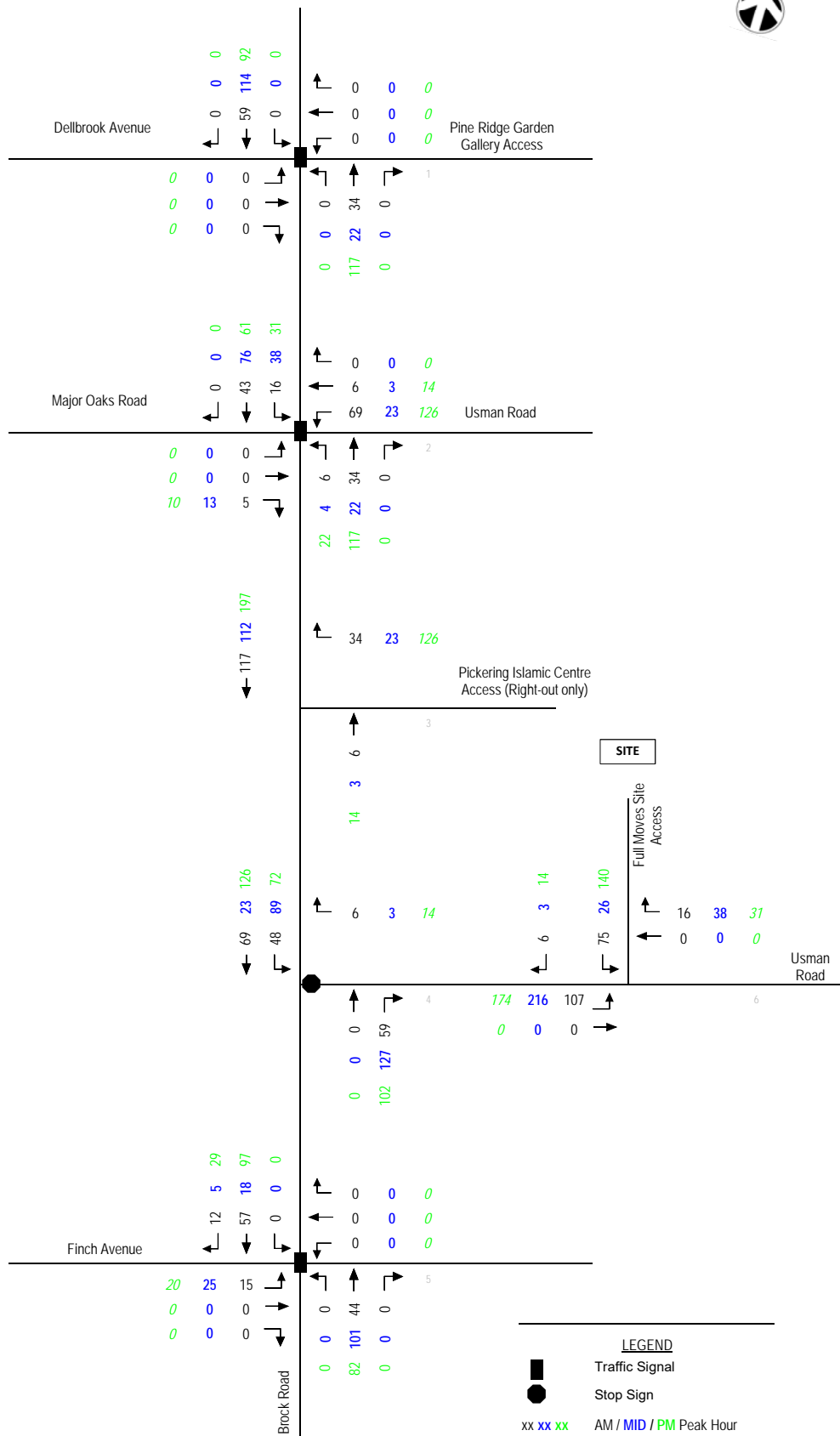
**Proposed Addition to Pickering Islamic Centre
2065 Brock Road
City of Pickering, Ontario**

Prepared for: Pickering Islamic Centre – Masjid Usman

July 2018



Figure 7: Site Traffic Assignment, Weekday AM, Midday and PM Peak Hours

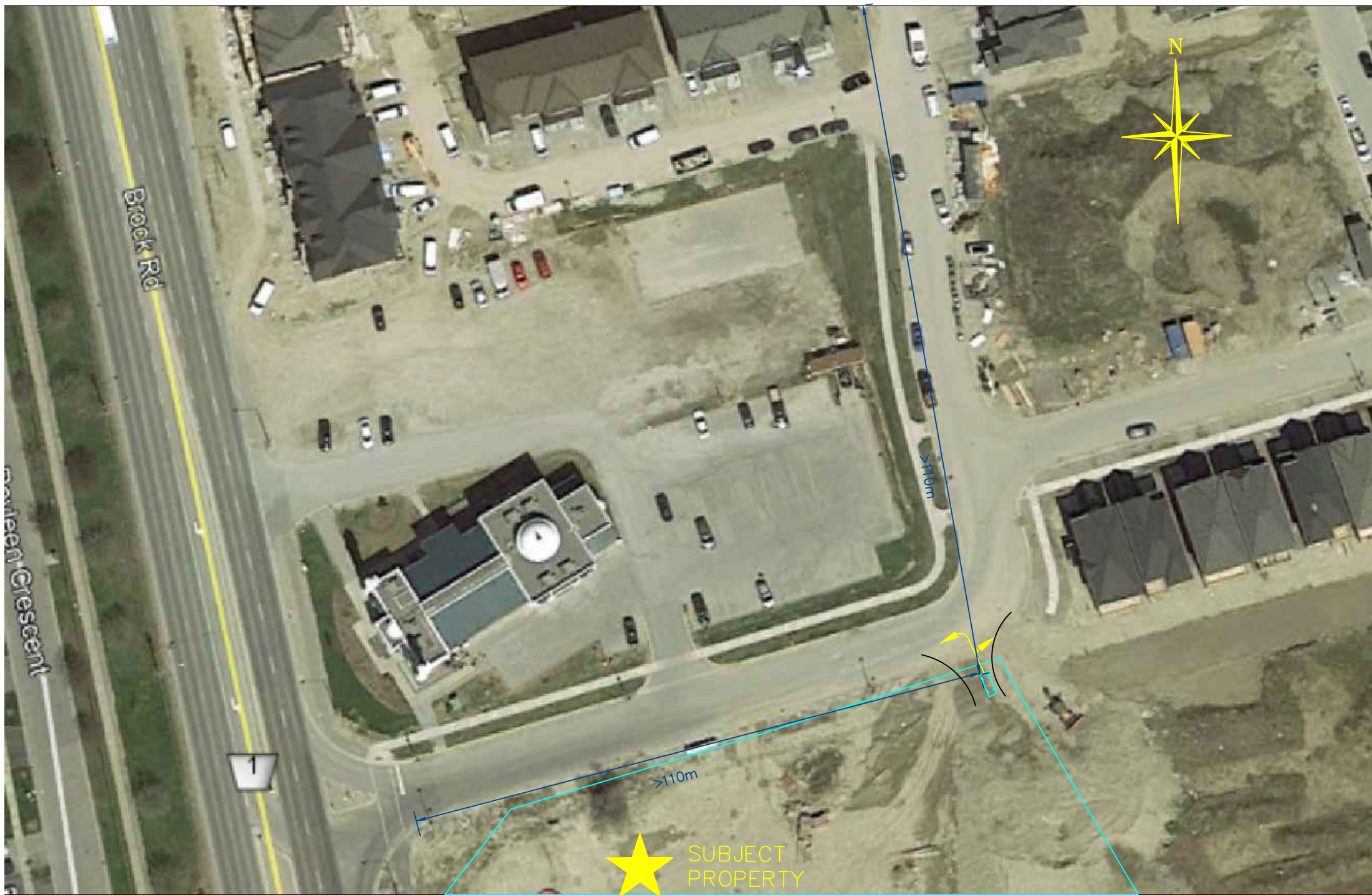


APPENDIX H

Sight Distance Analysis

APPENDIX I

City of Pickering Zoning By-Law



More than 110 m of sight distance can be observed on both sides of the site access.
In addition, vehicles approaching from the west are not expected to travel at design speed after turning onto Usman Road

NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

THE TOWNSHIP OF PICKERING

BY-LAW NO. ~~3037~~ 3036

A ZONING BY-LAW

(Highway No. 2 Area)

AUGUST, 1965

THE TOWNSHIP OF PICKERING

BY-LAW NO. 30.37.36

A ZONING BY-LAW

(Highway No. 2 Area)

Section	Symbol	Title	Page No.
		Introduction	3
1		Title	4
2		Definitions	5
3		Schedule	19
4		Zones	20
5		General Provisions for All Zones .	22
6		General Provisions for All Residential Zones	31
7	A	Rural Agricultural Zone	34
8	R1	One-Family Detached Dwelling First Density Zone	39
9	R3	One-Family Detached Dwelling Third Density Zone	40
10	R4	One-Family Detached Dwelling Fourth Density Zone	41
11	C1	Local Commercial Zone	43
12	C2	General Commercial Zone	45
13	C3	Highway Commercial Zone	47
14	M1	Storage and Light Manufacturing Zone	48
15	O1	Public Open Space Zone	50
16	O2	Public and Private Open Space Zone	51
17	G	Greenbelt-Conservation Zone	52
18	Q	Pit and Quarry Zone	53
19		Administration	56
20		Conflict and Validity	58

THE TOWNSHIP OF PICKERING

BY-LAW NO. 3036

Being a By-law for prohibiting the use of land, for or except for such purposes as may be set out in this By-law; and for prohibiting the erection or use of buildings or structures for or except for such purposes as may be set out in this By-law; and for prohibiting the erection of a building or structure for residential or commercial purposes on land that is subject to flooding or on land where by reason of its rocky, low-lying, marshy or unstable character, the cost of construction of satisfactory waterworks, sewage or drainage facilities is prohibitive; and for regulating the height, bulk, location, size, floor area, spacing, character and use of buildings or structures to be erected, and the minimum frontage and depth of parcels of land, and the proportion of the area thereof that any buildings or structures may occupy; and for requiring the owners or occupants of buildings or structures to be erected or used for purposes named in this By-law to provide and maintain loading or parking facilities on land that is not part of a highway; and for prohibiting the making or establishment of pits and quarries, except within certain defined areas of the Township,

WHEREAS it is considered desirable to regulate the use of land and the character and use of buildings and structures within certain areas of the Township of Pickering, and;

WHEREAS authority is granted under Section 30 of the Planning Act, subject to the approval of the Ontario Municipal Board, to the Council of the Township of Pickering to exercise such powers;

THEREFORE the Council of the Corporation of the Township of Pickering enacts as follows:

SECTION 1 - TITLE

This By-law shall be known as the
"Highway No. 2 Area Zoning By-law"
of the Township of Pickering

SECTION 2 - DEFINITIONS

For the purpose of this By-law, the definitions and interpretations given in this section shall govern unless a contrary intention appears:

ACCESSORY BUILDING

- 2.1 "Accessory Building" shall mean a subordinate building, or structure on the same lot with the main building, or a part of the main building, devoted exclusively to an accessory use;

ACCESSORY USE

- 2.2 "Accessory Use" shall mean a use customarily incidental and subordinate to the principal use or building and located on the same lot as such principal use or building;

ALTERATIONS, STRUCTURAL

- 2.3 "Alterations, Structural" shall mean any change in the supporting members of a building and "structurally altered" shall have a corresponding meaning;

ANIMAL HOSPITAL

- 2.4 "Animal Hospital" shall include the premises of a veterinary surgeon where animals, birds or other livestock are treated or kept;

AUTOMOBILE SERVICE STATION

- 2.5 "Automobile Service Station" shall mean a building or place where gasoline, oil, grease, anti-freeze, tires, tubes, tire accessories, electric light bulbs, spark-plugs and batteries for motor vehicles are stored or kept for sale, or where motor vehicles may be oiled, greased, or washed, or have their ignition adjusted, tires inflated or batteries charged, or where only minor or running repairs essential to the actual operation of motor vehicles are executed or performed;

BAKE SHOP

- 2.6 "Bake Shop" shall mean a shop where products of a bakery are sold or offered for sale by retail, including incidental baking;

BLOCK

- 2.7 "Block" shall mean all the land abutting on one side of a street between the nearest streets intersecting, meeting or crossing the aforesaid street;

BUILDING HEIGHT

- 2.8 "Building Height" shall mean the vertical distance between the established grade, and in the case of a flat roof, the highest point of the roof surface or parapet wall, or in the case of a mansard roof, the deck line, or in the case of a gabled, hip or gambrel roof, the mean height level between eaves and ridge. A penthouse, tower, cupola, steeple or other roof structure which is used only as an ornament upon or to house the mechanical equipment of any building shall be disregarded in calculating the height of such building;

BUILDING MAIN

- 2.9 "Building Main" shall mean a building in which is conducted the principal uses of the lot on which it is situated. In any residential zone, a building containing one or more dwelling unit shall be deemed to be the main building;

BUSINESS OFFICE

- 2.10 "Business Office" shall mean any building or part of a building in which one or more persons are employed in the management direction or conducting of an agency, business, brokerage, labour or fraternal organization, and shall include a telegraph office, newspaper plant and a radio or television broadcasting station and its studios or theatres;

CAR WASHING ESTABLISHMENT

- 2.11 "Car Washing Establishment" shall mean a public garage for washing or cleaning motor vehicles for gain;

CHURCH

- 2.12 "Church" shall mean a building dedicated to religious worship, and may include a Sunday School or parish hall as an accessory use;

CLINIC

- 2.13 "Clinic" shall mean a public or private medical, surgical, physiotherapeutic or other human health clinic, except when accessory to a private or public hospital;

CORPORATION

- 2.14 "Corporation" shall mean the Corporation of the Township of Pickering;

COUNCIL

- 2.15 "Council" shall mean the Council of the Corporation of the Township of Pickering;

COVERAGE

- 2.16 "Coverage" shall mean the proportion of the ground floor area of all the buildings and structures on the lot to the lot area expressed as a percentage;

DRESSMAKER'S SHOP

- 2.17 "Dressmaker's Shop" shall mean a building where the business of individual custom tailoring for females is carried on, including remodelling, hemstitching and buttonhole making, but does not include a shop where clothing manufacture, other than individual custom tailoring for females, is carried on;

DRY CLEANER'S DISTRIBUTING STATION

- 2.18 "Dry Cleaner's Distributing Station" shall mean a building used for the purpose of receiving articles or goods of fabric to be subjected to the process of dry-cleaning, dry-dyeing or cleaning elsewhere and for the pressing and distribution of any such articles or goods which have been subjected to any such process;

.....

DRY CLEANING ESTABLISHMENT

- 2.19 "Dry-Cleaning Establishment" shall mean a building where dry-cleaning, dry-dyeing, cleaning or pressing of articles or goods of fabric is carried on, but does not include a spotting and stain removing establishment, hand laundry, machine laundry, or a wholesale dyeing plant;

DWELLING

- 2.20 "Dwelling" shall mean any building or part thereof used, or capable of being used, in whole or in part as the home, residence or sleeping place of one or more persons;

DWELLING APARTMENT HOUSE

- 2.21 "Dwelling Apartment House" shall mean a building containing more than four (4) dwelling units, each unit having access only from an internal corridor system;

DWELLING, DUPLEX

- 2.22 "Dwelling Duplex" shall mean the whole of a two storey building divided horizontally into two separate dwelling units, each of which has an independent entrance;

DWELLING, MULTIPLE-ATTACHED

- 2.23 "Dwelling, Multiple-Attached" shall mean a building consisting of a series of one-family dwelling units, each having access from the outside and possibly from an internal corridor system as well;

DWELLING, ONE-FAMILY DETACHED

- 2.24 "Dwelling, One-Family Detached" shall mean a building containing one dwelling unit only, and having a front, rear and two (2) side yards;

DWELLING SEMI-DETACHED

- 2.25 "Dwelling, Semi-Detached" shall mean the whole of a building divided vertically into two separate dwelling units;
-

DWELLING UNIT

- 2.26 "Dwelling Unit" shall mean a room or suite of two or more rooms designed or intended for use by an individual or family in which culinary and sanitary conveniences are provided for the exclusive use of such individual or family, and with a private entrance from outside the building or from a common hallway or stairway inside;

DWELLING UNIT AREA

- 2.27 "Dwelling Unit Area" shall mean the floor area of a dwelling unit measured within the interior faces of the exterior walls of the dwelling unit;

EATING ESTABLISHMENT

- 2.28 "Eating Establishment" shall mean a building where food is offered for sale or sold to the public for immediate consumption therein and includes a restaurant, cafe, tea or lunch room, dairy bar, and refreshment room or stand; but does not include a boarding or lodging house;

ERECT

- 2.29 "Erect" shall mean (with reference to a building or structure) build, construct or reconstruct and shall include the removal of a structure from one lot and relocating it on another lot and any physical operation, such as excavating, filling or draining, preparatory to building, construction or reconstruction;

EXISTING

- 2.30 "Existing" shall mean existing as of the date of the passing of this By-law;

FAMILY

- 2.31 "Family" shall mean one person or two or more persons who are interrelated by bonds of consanguinity, marriage or legal adoption, or a group of not more than five unrelated persons occupying, with or without one or more domestic servants, a dwelling unit;

FIRST FLOOR

- 2.32 "First Floor" shall mean the floor of a building approximately at or first above grade;

FLOOR AREA

- 2.33 "Floor Area" shall mean the maximum habitable area contained within the outside walls or outside finished furred partitions thereof, excluding, in the case of a dwelling, any private garage, porch, verandah, sunroom, balcony, unfinished attic or basement and shall not include a basement recreation room;

FRONTAGE

- 2.34 "Frontage" shall mean all property abutting on one side of a street measured along the street line;

GARAGE COMMERCIAL

- 2.35 "Garage Commercial" shall mean a building or part of a building other than a private garage used for the storage, care, repair or equipment of self-propelled vehicles and/or trailers, or where such vehicles are kept for remuneration, hire or sale;

GARAGE PRIVATE

- 2.36 "Garage Private" shall mean a building or part thereof used for the storage of private passenger motor vehicles wherein neither servicing for profit is conducted nor storage of commercial vehicles is permitted, and shall include a carport;

GARAGE PUBLIC

- 2.37 "Garage Public" shall mean a public garage within the meaning of the "Municipal Act", R. S. O. 1960, Chap. 247, Sec. 397, S. S. 127A, but shall not include car sales lot or car washing establishment;

GRADE

- 2.38 "Grade" shall mean, when used with reference to a building, the average elevation of the finished surface of the ground where it meets the exterior of the front of such building and

CONTINUED.....

CONTINUED

when used with reference to a structure shall mean the average elevation of the finished surface of the ground immediately surrounding such structure, exclusive in both cases of any artificial embankment;

GROUND FLOOR AREA

- 2.39 "Ground Floor Area" shall mean the area of that portion of a lot occupied by a building or structure, exclusive of any porch, private garage, verandah or sunroom, unless such sunroom is habitable at all seasons;

HEREAFTER

- 2.40 "Hereafter" shall mean after the date of the passing of the By-law;

HEREIN

- 2.41 "Herein" shall mean in this By-law and shall not be limited to any particular section of this By-law;

HOTEL

- 2.42 "Hotel" shall mean a building or part of a building that contains a general kitchen and dining and other public rooms, the remaining rooms of which contain no provision for cooking, and are usually hired by transients as places of abode; and includes a hostel for men or women;

LANE

- 2.43 "Lane" shall mean a public thoroughfare or way, not more than thirty (30) feet wide and which affords only a secondary means of access to abutting property;

LANDSCAPED OPEN AREA

- 2.44 "Landscaped Open Area" shall mean an open and unobstructed space on a lot which is suitable for the growth and maintenance of grass, flowers, bushes and other landscaping and includes the part of the lot unoccupied by any buildings or structures, but does not include any surfaced walk or any driveway, ramp or motor vehicle parking area, whether surfaced or not;

.....

LOADING SPACE

- 2.45 "Loading Space" shall mean an off-street space or berth on the same lot with a building or contiguous to a group of buildings for the temporary parking of a commercial vehicle while loading or unloading merchandise or materials and which abuts upon a street, lane or other appropriate means of access;

LOT

- 2.46 "Lot" shall mean a parcel of land fronting on a street, whether or not occupied by a building or structure;

- (a) "Corner Lot" shall mean a lot situated at the intersection of two streets or two parts of the same street of which the two adjacent sides upon the street line or street lines include an angle of not more than one hundred and thirty-five (135) degrees and where such adjacent sides are curved, the angle included by the adjacent sides shall be deemed to be the angle formed by the intersection of the tangents to the street lines drawn through the extremities of the interior lot lines, provided that (1) in the latter case the corner of the lot shall be deemed to be that point on the street line nearest to the point of intersection of the said tangents, and (2) any portion of a corner lot distant more than one hundred (100) feet from the corner, measured along the street line, shall be deemed to be an inside lot;
- (b) "Inside Lot" shall mean a lot other than a corner lot;
- (c) Lot lines have the following meanings:
- i. "Front Lot Line" shall mean the line that divides a lot from the street provided that in the case of a corner lot the shorter lot line that abuts a street shall be deemed to be the front line and the longer lot line that so abuts shall be termed the "flank" of the lot;
 - ii. "Rear Lot Line" shall mean the lot line opposite the front lot line;
 - iii. "Side Lot Line" shall mean a lot line other than a front lot line or rear

CONTINUED.....

CONTINUED

lot line;

LOT AREA

2.47 "Lot Area" shall mean the total horizontal area within the lot lines of a lot;

LOT COVERAGE

2.48 "Lot Coverage" shall mean the combined areas of all the buildings on the lot measured at the level of the first floor and expressed as a percentage of the lot area;

LOT DEPTH

2.49 "Lot Depth" shall mean the horizontal distance between the front and rear lot lines. Where these lines are not parallel, it shall be the length of a line joining the mid points of the front and rear lot lines;

LOT FRONTAGE

2.50 "Lot Frontage" shall mean the horizontal distance between the side lot lines. Where such lot lines are not parallel, the lot frontage shall be the distance between the side lot lines measured on a line twenty-five (25) feet back from the front lot line and parallel to it;

LOT REGISTERED

2.51 "Lot Registered" shall mean a lot described in accordance with and within a registered plan of subdivision;

LOT RESIDENTIAL

2.52 "Lot Residential" shall mean a lot situated in a residential zone and having a lot frontage and lot area in accordance with the requirements of the zone in which the same is situated;

MOTEL, MOTOR COURT, AUTO COURT

2.53 "Motel, Motor Court, Auto Court" shall mean a hotel in one building or in two or more connected or detached buildings used twelve (12) months each year for the purpose of catering to the needs of the travelling public by furnishing sleeping accommodation with or without supplying food and shall include

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all buildings operating under the Liquor License Act, the Act respecting Tourist Establishments, and the Act respecting the Regulation of Tourist Camps;

MOTOR VEHICLE REPAIR SHOP

2.54 "Motor Vehicle Repair Shop" shall mean a public garage used as a motor vehicle repair shop;

NON-CONFORMING

2.55 "Non-Conforming" shall mean that which does not conform, comply or agree with the regulations of this By-law as of the date of final passing thereof,

PARKING LOT, PUBLIC

2.56 "Parking Lot Public" shall mean a lot or portion thereof other than an automobile sales lot, used for the temporary storage or parking of six (6) or more motor vehicles for hire and gain;

PARKING SPACE

2.57 "Parking Space" shall mean an area of not less than two hundred (200) square feet, exclusive of driveways or aisles, for the temporary parking or storage of motor vehicles;

PARKING STATION

2.58 "Parking Station" shall mean a lot or portion thereof, required in accordance with the provisions of this By-law for the temporary storage or parking of motor vehicles accessory or incidental to uses in all zones, and shall not include the storage or parking of motor vehicles for hire and gain, display or for sale;

PERSON

2.59 "Person" shall include individual, association, firm, partnership or incorporated company;

PLACE OF AMUSEMENT

2.60 "Place of Amusement" shall include a motion picture or other theatre, arena, auditorium, public dance hall, public hall (including

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premises for wedding receptions, banquets and other social gatherings), music hall, billiard and pool room, bowling alley, exhibition, ice or roller skating rink;

PLAYLOT

2.61 "Playlot" shall mean a lot used for the purposes of a nonprofit playlot for children under the age of nine years and managed and controlled by the Corporation or by a neighbourhood association, church or other similar organization;

PUBLIC HOSPITAL

2.62 "Public Hospital" shall include a convalescent home, a rest home, a nursing home, a clinic and a boarding home but does not include-- (i) a sanatorium, within the meaning of The Sanatoria for Consumptives Act, R. S. O., 1960, Chapter 359, (ii) a sanitarium for mental defectives or any institution in respect of which a License under The Private Sanitaria Act, R. S. O. 1960, Chapter 307, is in force, (iii) a mental hospital within the meaning of The Mental Hospitals Act, R. S. O., 1960, Chapter 235, (iv) an institution for the reclamation and care of habitual drunkards or education of drug or drink addicts or the insane, or of persons suffering from psychiatric disabilities or from mental or nervous diseases or disorders, (v) an animal hospital;

RELIGIOUS INSTITUTIONS

2.63 "Religious Institution" shall include a bible institute, a Christian Science reading room, a religious library, a religious school, but shall not include a church or Synagogue,

RETAIL STORE

2.64 "Retail Store" shall mean a building where goods, wares, merchandise, substances, articles or things are stored, offered or kept for sale at retail and includes storage on or about the store premises of limited quantities of such goods, wares, merchandise, substances, articles or things sufficient only to service such store but does not include any retail outlet otherwise classified or defined in the By-law;

.....

SHELTER

2.65 "Shelter" shall mean a building or structure used solely for the purposes of providing temporary shelter and not be used for human habitation;

SAMPLE OR SHOWROOM

2.66 "Sample or Showroom" shall mean a building where samples or patterns are displayed and orders taken for goods, wares and merchandise for future delivery and includes the display room of a wholesale merchant;

SCHOOL

2.67 "School" shall mean a public or separate school, a high school, a continuation school, a nursery school, a technical school, a vocational school, a college or university or any other school established and maintained at public expense;

PRIVATE SCHOOL

2.68 "Private School" shall mean a school other than a school included under Section 2.67 and shall include a commercial school;

SERVICE AND REPAIR SHOP

2.69 "Service and Repair Shop" shall mean a building or part of a building whether conducted in conjunction with a retail shop or not for the repair, sale or servicing of articles or materials as opposed to the manufacturing of the same and includes the regular place of business of a master electrician plumber and mechanic including a motor vehicle repair shop;

SERVICE STORE

2.70 "Service Store" shall mean a building or part of a building where services are provided such as a barber shop, a ladies hairdressing establishment, a shoe clinic and repair shop and other similar services;

STOREY

2.71 "Storey" shall mean that portion of a building

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other than a basement, cellar or attic, included between the surface of any floor and the surface of the floor, roof deck or ridge next above it;

STOREY, HALF

- 2.72 "Storey, Half" shall mean that portion of a building situated within the roof or having its floor level not lower than four feet (4') below the line where the roof and outer walls meet and having a roof not steeper than forty-five (45) degrees above the horizontal;

STREET

- 2.73 "Street" shall mean a Public highway;

STREET LINE

- 2.74 "Street Line" shall mean the dividing line between a lot and a street;

TAILOR'S SHOP

- 2.75 "Tailor's Shop" shall mean a building or part of a building where individual custom tailoring is carried on, but does not include a shop where clothing manufacture other than individual custom tailoring is carried on;

TRAILER

- 2.75.1 "Trailer" shall mean any vehicle so constructed that it is suitable for being attached to a motor vehicle for the purpose of being drawn or propelled by the motor vehicle, and capable of being used for the living, sleeping or eating accommodation of persons, notwithstanding that such vehicle is jacked up or that its running gear is removed;

YARD

- 2.76 "Yard" shall mean any open uncovered, unoccupied space appurtenant to a building;

YARD FRONT

- 2.77 "Yard Front" shall mean a yard extending across

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the full width of the lot between the front lot line and the nearest wall of any main building or structure on the lot for which the yard is required;

YARD REAR

2.78 "Yard Rear" shall mean a yard extending across the full width of the lot between the rear lot line and the nearest wall of any main building on the lot for which the yard is required;

YARD SIDE

2.79 "Yard Side" shall mean a yard extending from the front yard to the rear yard between side lot line and the nearest wall of any building or structure on the lot for which the yard is required.

In this By-law the word "Shall" is mandatory and not directory.

SECTION 3 - SCHEDULE

SCHEDULE "A", a Zoning Map at the scale of 1" -- 1000' together with notations and references thereon is hereby declared to be part of this By-law.

SECTION 4 - ZONES

4.1

CLASSIFICATION

For the purpose of this By-law, that part of the Township of Pickering lying south of the centre line of the road allowance between Concession II and Concession III, but excluding that part of the Township lying west of the westerly boundary of the Town of Ajax and south of the southerly limit of Highway 401, is divided into the following Zones and their extent, location and boundaries are shown on the Zoning Map which forms Schedule "A" of this By-law.

Zone	Symbol
Rural Agricultural Zone	A
One-family Detached Dwelling	
First Density Zone	R1
One-Family Detached Dwelling	
Third Density Zone	R3
One-Family Detached Dwelling	
Fourth Density Zone	R4
Local Commercial Zone	C1
General Commercial Zone	C2
Highway Commercial Zone	C3
Storage and Light Manufacturing Zone	M1
Public Open Space Zone	O1
Public and Private Open Space Zone	O2
Greenbelt Conservation Zone	G
Pit and Quarry Zone	Q

4.2

INTERPRETATION OF ZONING MAP

4.2.1

Symbols of the Zones:

The buildings and structures and uses of buildings, structures and land permitted by this By-law in the said Zones may be referred to as A, R1, R3, R4, C1, C2, C3, M1, O1, O2, G and Q buildings, structures and uses respectively; and the expression A Zone, R1 Zone, etc., when used in this By-law, shall mean, respectively, an area of the Township of Pickering delineated on the Zoning Map and designated thereon by the symbols A, R1, etc.

4.2.2 **Boundaries of the Zones:**

Where the boundary of any Zone is uncertain and

- (a) the boundary is shown in Schedule "A" as following a street, lane, railway right-of-way, electric transmission line right-of-way or watercourse, the centre line of the street, lane, railway right-of-way, electric transmission line right-of-way or watercourse is the boundary;
- (b) the boundary is shown in Schedule "A" as substantially following lot lines shown on a registered plan of subdivision, the lot lines are the boundary; and
- (c) the boundary is shown in Schedule "A" as running substantially parallel to a street line and the distance from the street line is not indicated, the boundary is parallel to the street line and the distance from the street line shall be determined according to the scale shown in Schedule "A".

4.2.3 **Street or Right-of-Way Division:**

A street, lane, railway right-of-way, electrical transmission line right-of-way or watercourse shown on Schedule "A" unless otherwise indicated shall be included within the Zone of adjoining property on either side thereof.

4.2.4 **Closed Street or Lane:**

In the event of any street or lane shown on Schedule "A" being closed, the property formerly in said closed street or lane shall be included in the zone of the adjoining property of either side on the said closed street or lane. In the event of the said street or lane having been a boundary between two or more different zones, the new boundary shall be the former centre line of the said closed street or lane.

SECTION 5 - GENERAL PROVISIONS FOR ALL ZONES

5.1 SCOPE

No person shall, within any zone in that part of the Township of Pickering lying south of the centre line of the road allowance between Concession II and Concession III, but excluding that part of the Township lying west of the westerly boundary of the Town of Ajax and south of the southerly limit of Highway 401, change the use of any building, structure or land or erect or use any building or structure except in conformity with the provisions of this By-law.

5.2 NON-CONFORMING USES

Nothing in this By-law shall apply:

- (a) to prevent the use of any land, building or structure for any purpose prohibited by this By-law if such land, building or structure was lawfully used for such purpose on the day of passing of the By-law, so long as it continues to be used for that purpose; or
- (b) to prevent the erection or use for a purpose prohibited by this By-law of any building or structure the plans for which have, prior to the day of the passing of this By-law, been approved by the building inspector, so long as the building or structure when erected is used and continues to be used for the purpose for which it was erected and provided the erection of such building or structure is commenced within two years after the day of the passing of this By-law and such building or structure is completed within a reasonable time after the erection thereof is commenced.

5.3 RESTORATION TO A SAFE CONDITION

This By-law shall not prevent the strengthening or restoration to a safe condition of any building or structure provided such alteration or repair does not increase the height or size or change the use of such building or structure.

5.4 PARTIAL DESTRUCTION OF EXISTING BUILDINGS

A building destroyed to the extent of more than sixty (60) per cent of its value (inclusive of walls below grade) as at the date of damage and as determined by a qualified appraiser and which does not conform with the requirements of this By-law in respect to use, lot coverage or height shall not be restored except in conformity with the regulations of the zone in which the said structure or building is located.

5.5 DISCONTINUED USE

Any non-conforming use of a building or structure

1. That Section 5.5 be and the same is hereby deleted in its entirety.
to any other non-conforming use.

5.6 FRONTAGE ON A STREET

Notwithstanding any other provision in this By-law no person shall erect or use any building or structure on a lot which does not front on a street.

5.7 OBSTRUCTION OF YARDS

No person shall obstruct in any manner whatsoever any front yard, side yard or rear yard required to be provided by this By-law, but this provision shall not apply to:

- (a) main eaves, belt courses, chimney breasts, sills or cornices not projecting more than twenty-four (24) inches into any required yard;
- (b) uncovered steps, or platforms not exceeding three (3) feet in height above grade and not projecting more than five (5) feet into any required front or rear yard and not more than two (2) feet in any required side yard;
- (c) awnings, clothes poles, recreational equipment, garden trellises or similar accessories;
- (d) fire escapes projecting not more than five (5) feet into a side or rear yard;
- (e) fences in a side or rear yard;
- (f) hedges or ornamental fences not exceeding three and one half (3 1/2) feet in height in a front yard;

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(g) accessory uses permitted by this By-law.

5.8 REDUCTION OF LOT AREA

No lot shall be reduced in area, either by the conveyance or alienation of any portion thereof or otherwise, so that any building or structure on such lot shall have a lot coverage that exceeds, or a front yard, rear yard, frontage or lot area that is less than that permitted by this By-law for the zone in which such lot is located.

5.9 HEIGHT REQUIREMENTS

No building or structure shall exceed sixty (60) feet in height except nothing in this By-law shall limit the height of any belfry, chimney, flag pole, church, ornamental dome, cupola, clock tower, water storage tank, wireless receiving or transmitting antennae, or any silo, windmill or other farm building.

5.10 THROUGH LOTS

Where a lot which is not a corner lot has frontage on more than one street, such lot shall have a front yard on each street in accordance with the provisions of the Zone or Zones in which each front yard is located.

5.11 SPECIAL USES PERMITTED

Nothing in this By-law shall prevent the use of land or the use or erection of a building or structure for:

- (a) a scaffold or other temporary building or structure incidental to construction in progress on premises for which a building permit has been granted, until such time as the work has been finished or abandoned;
- (b) a sign having an area of not more than fifty (50) square feet incidental to construction in progress on premises for which a building permit has been granted, until such time as the work has been finished or abandoned.

5.12 PUBLIC UTILITIES

The Township of Pickering or any "local board" thereof as defined in "The Department of Municipal Affairs Act", any telephone or telegraph company, a transportation system owned or operated by or for the Township, any railway or any Department of the Federal or Provincial Government including the Hydro-Electric Power Commission of the Province of Ontario may for the purpose of public service, use any land or any building or structure in any zone, notwithstanding that such building or structure or proposed use does not conform with the provisions of this By-law for such zone. However, such building or structure shall be as far as possible, in substantial compliance with the regulations for such zone as approved by Council on the recommendation of the Planning Board.

Nothing in this By-law shall prevent the use of any land or a right-of-way for any oil, gas or other liquid pipe line and appurtenance thereto.

5.13 USES OF LOTS WITHOUT BUILDINGS

Where a lot is used for a permitted purpose other than for garden purposes or as a public playground, and there are no buildings or structures thereon, the minimum front yard and side yard requirements of the zone within which the lot is situated shall be complied with as if there were a dwelling or structure on the lot.

5.14 IRREGULAR LOTS

Where by reason of topography, general layout or otherwise the side lot lines of a lot are not parallel, but the minimum lot area for the respective zone is provided, the lot frontage shall be measured between the side lot lines on a line twenty-five (25) feet back from the front lot line and parallel to it.

5.15 AREA REQUIREMENTS FOR INSTITUTIONAL USES

Except as otherwise required in this By-law for any church, church hall, hospital, school, public or institutional building, or any other similar building or structure, the following yards shall be provided:

Front yard	-	minimum 30 feet
Rear yard	-	minimum 25 feet
Side yard	-	minimum 25 feet

5.16 **PARKS AND PLAYGROUNDS**

Nothing in this By-law shall prevent the establishment of public or private parks, playlots, or playgrounds in any Residential, Commercial or Industrial Zone provided that such parks or playgrounds are not operated for commercial purposes and provided further that such parks or playgrounds conform to the requirements of the Public and Private Open Space Zone (02).

5.17 **AUTOMOBILE SERVICE STATION**

2. **That Section 5.17 (b) be and the same is hereby amended by adding thereto the words:**

"in a "C3" zone and the minimum distance of any main building or structure from any street line shall be sixty (60) feet in a "C2" zone."

so that the section shall now read as follows:

5.17 (b) The minimum distance of any building or structure from any street line shall be forty (40) feet in a "C3" zone and the minimum distance of any main building or structure from any street line shall be sixty (60) feet in a "C2" zone.

(d) The width of any entrance or exit or combined entrance and exit measured at the lot line shall be not greater than thirty-five (35) feet.

5.18 **ACCESSORY BUILDINGS AND USES**

(a) **Location:** Except as may be provided herein, all accessory buildings which are not part of the main building shall be erected in the rear yard and shall be not less than three (3) feet from any lot line, save and except where a mutual garage is erected on the common property line;

(b) **Coverage:** The total lot coverage of accessory buildings excluding private garages shall not exceed five (5) per cent;

CONTINUED

- 5.18
- (c) **Contiguous to rear lane:** Where the entrance to a private garage is from a lane, such building shall be a minimum of three (3) feet from the rear lot line, but shall be no closer than twenty-five (25) feet from the opposite boundary of the lane;
 - (d) **Attached accessory buildings:** Any accessory building may be erected as part of the main building, provided that all yard and area requirements of the zone are complied with. Notwithstanding any other provision in this By-law where a garage is erected as part of a one-family detached dwelling, the minimum required side yard for a Residential R1 or R3 Zone shall be six (6) feet and for any other residential zone shall be five (5) feet;
 - (e) **Height:** No accessory building shall exceed a height of twelve (12) feet in any Residential Zone nor fifteen (15) feet in any Commercial Zone;
 - (f) **Human habitation:** The use of any accessory building for human habitation is not permitted.

5.19

OFF-STREET PARKING

5.19.1

Requirements:

For every building or structure erected, altered or enlarged there shall be provided and maintained off-street parking in conformity with the following schedule and except in the case of one and two family dwellings, each parking space shall be made accessible for ingress and egress by means of a hard surfaced lane or right-of-way or street at least eight (8) feet in width. Parking required in a Residential Zone shall be provided on the same lot as the dwelling unit or the main building. In a Commercial Zone parking spaces shall be provided within the limits of the Commercial Zone in which the commercial use is situated and not more than five hundred (500) feet distant from the principal buildings. Where more than one use occurs in a building the minimum required parking facilities shall be computed for each different use in conformity with the following schedule.

5.19.2

Schedule:

Type or Nature of Building Usage	Minimum Required Parking Facilities
(a) A dwelling	1 parking space for each dwelling unit
(b) A hotel, private hotel or hospital	1 parking space for each two bedrooms
(c) A motel	1 parking space for each living unit,
(d) An eating establishment	1 parking space for each ten (10) persons that can be accommodated at any time
(e) A retail or service store, and similar establishments	1 parking space for each one hundred (100) square feet of retail floor area and in the case of individual retail stores shall not be less than two (2) parking spaces
(f) An office or office building	1 parking space for each five hundred (500) square feet of floor area
(g) A church, church hall, theatre or other place of assembly or place of amusement	1 parking space for each twelve (12) seats, or where the seating is provided by open benches, every twenty (20) inches of bench space shall be considered as one seat for the purposes of this By-law
(h) A factory or other use permitted in an M1 or M2 Zone	1 parking space for each four hundred (400) square feet of floor area
(i) For every building or structure not specified above	1 parking space for every three hundred (300) square feet of floor area.

5.20

SUPPLEMENTARY PARKING REGULATIONS

Wherein this By-law parking facilities other than parking space for one vehicle for a one-family detached or semi-detached dwelling are required or permitted:

- (a) the parking area shall be maintained with a stable surface that is treated to prevent the raising of dust or loose particles;
- (b) the lights used for illumination of the parking lot or parking station shall be so arranged as to divert the light away from adjacent lots;
- (c) a shelter, not more than fifteen (15) feet in height and not more than fifty (50) square feet in area may be erected in the parking area for the use of attendants; in the area;
- (d) no gasoline pump or other service equipment intended for public use shall be located or maintained on a parking station.

5.21

OFF-STREET LOADING REQUIREMENTS

For every building or structure hereafter erected for an Industrial or Commercial use, involving the frequent shipping, loading or unloading of persons, animals, goods, wares or merchandise, there shall be provided and maintained for the premises, loading facilities on land that is not part of a street, comprised of one or more loading spaces thirty (30) feet long, twelve (12) feet wide and having a vertical clearance of at least fourteen (14) feet, with access to a lane of minimum width twenty (20) feet, or a street, and in accordance with the floor area of the building or structure as follows:

Floor Area	Number of Loading Spaces
4,500 square feet or less	None
from 4,501 square feet to 25,000 square feet inclusive	1
over 25,000 square feet	2

Any loading space or any lane, which is a private lane, required or provided under this Section, shall be hard surfaced. No loading space shall be located at the front of any Industrial or Commercial building or structure.

5.22

YARD REQUIREMENTS WITH RESPECT TO CERTAIN STREETS

Notwithstanding the yard requirements established in this By-law for any zone, no building or structure shall be erected closer than sixty-five (65) feet to the centre line of the following streets:

- 1) King's Highway No. 2;
- 2) Finch Avenue extension between west limit of the Township and its intersection with King's Highway No. 2;
- 3) Road along Township Line west side, from Finch Avenue extension to the road separating Concessions II and III;
- 4) Altona Road from Finch Avenue extension to King's Highway No. 2;
- 5) White Side Road from Finch Avenue extension to King's Highway No. 401;
- 6) Liverpool Road from Finch Avenue extension to King's Highway No. 401;
- 7) Brock Road from the road separating Concessions II and III to King's Highway No. 401,

5.23

RESIDENTIAL ZONE

In Section 5, General Provisions for All Zones and in Section 6, General Provisions for Residential Zones, the term "Residential Zone" when used shall include; R1, R3 and R4 Zones.

SECTION 6 - GENERAL PROVISIONS FOR ALL RESIDENTIAL ZONES

6.1 RESIDENTIAL LOT OCCUPANCY

No person shall erect more than one main building on any Residential lot.

6.2 LOTS IN RESIDENTIAL ZONES - UNSERVICED

Nothing in this By-law shall prevent the erection of a one-family dwelling on a lot located in any residential zone, provided that the dwelling to be so erected complies with the requirements of that particular zone, but where there is neither a municipal sewer nor piped municipal water supply available, then such lot shall not be less than 15,000 square feet in area, or where a piped water supply only is available, then the lot shall not be less than 8,000 square feet in area.

6.2.1 Existing Lots in Residential Zones:

Notwithstanding the provisions of Section 6.2 where a lot in a Residential Zone on the date that this By-law was passed by Council, has insufficient frontage and area to permit the owner thereof, (or any person who purchases or acquires such lot from the owner), to comply with the provisions of Section 6.2 for such lot, and such owner is not on the day of passing of this By-law (and such purchaser is not on the date of such purchase or acquisition) the owner of such area of vacant land abutting such lot, as together with the area of said lot, would permit compliance with this By-law for such lot, this By-law shall not prevent the erection of one, one-family dwelling thereon provided that such lot meets with the requirements for a lot serviced with a municipal water supply and a sanitary sewer system for the zone in which the lot is located, and approval of the Medical Officer of Health is obtained.

6.3 HOME OCCUPATION

In any Residential Zone the offices of physicians may be located in the one-family dwellings used by such physicians as their private residence, but such offices shall only be used for consultation and emergency treatment, and shall not be used in the nature of a clinic or private hospital, and further such offices shall not ~~exceed~~ in excess of twenty-five (25) per cent of the total floor area of such one-family detached dwelling.

6.4

CORNER LOTS

Subject to the requirements of Section 5.22 and notwithstanding any other provision in this By-law on a corner lot in a residential zone no part of any main building shall be erected closer to the lot line of the flanking street than fifteen (15) feet or one half of the required front yard, whichever is the greater. No part of any accessory building detached from the main building shall be erected closer to the lot line of the flanking street than the required front yard of the abutting lot on the flanking street. The yard opposite the flank lot line may be deemed a rear yard, in which case the minimum depth of such rear yard shall be twenty-five (25) feet and the yard opposite the front lot line, formerly the rear yard may be deemed a side yard.

6.5

VEHICLE PARKING

No person shall, in any Residential Zone, use any lot, building or structure for the parking or storage of motor vehicles or trailers except in accordance with the following provisions:

(a) Definition:

For the purpose of this section a station-wagon or one-half (1/2) ton truck shall not be deemed to be a commercial vehicle;

(b) Within Enclosed Buildings:

The owner or occupant of a lot, building or structure in any Residential Zone may use any enclosed building or structure accessory to the main building or structure erected on the same lot, for the housing of one (1) trailer, one (1) commercial vehicle and not more than three (3) privately owned motor vehicles;

(c) Exterior Parking:

A maximum of three (3) privately owned motor vehicles and one (1) trailer not exceeding eighteen (18) feet in length may be temporarily parked on any lot in a Residential Zone;

(d) Commercial Vehicles:

The temporary parking of any commercial vehicle shall be permitted in a Residential Zone for the purpose of delivering to or servicing the premises.

6.6 . INSTITUTIONAL USES IN RESIDENTIAL AREAS

3. That Section 6.6 be and the same is hereby deleted and the following inserted therefore:

6.6 INSTITUTIONAL USES IN RESIDENTIAL AREAS

Nothing contained in this By-law shall prevent the use of any land, building or structure, in any Residential Zone for a church.

6.7

structure for a church unless the lot on which such building is located has a minimum area of one and one-quarter (1 1/4) acres, but where such church is located within five hundred (500) feet of a Commercial Zone having an area of at least four (4) acres, required minimum area shall be three-quarters (3/4) of an acre.

SECTION 7 - RURAL AGRICULTURAL ZONE A

The following provisions shall apply in all RURAL AGRICULTURAL ZONES A:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

7.1 USES PERMITTED

7.1.1 Residential:

A one-family detached dwelling, subject to the requirements of Section 7.2.1.

A one-family detached dwelling as an accessory use to uses permitted under Sections 7.1.2, 7.1.3 and 7.1.4 in accordance with the requirements of Section 7.3 and provided that such dwelling is occupied by a full-time employee engaged in one of the permitted uses.

7.1.2 Agricultural:

Agricultural uses including forestry and re-forestation, conservation uses and uses connected with the conservation of wild life, field crops, truck gardening, berry or bush crops, flower gardening, nurseries, greenhouses, orchards, aviaries, apiaries and mushroom farms, farms for grazing, breeding, raising or training of horses or cattle; or other similar uses or enterprises customarily carried on in the field of general agriculture and not obnoxious to the public welfare. Facilities for the raising of fur-bearing animals, kennels and swill fed pigs shall not be permitted.

7.1.3 Recreational:

All uses permitted in an O2 Zone subject to the requirements thereof.

7.1.4 Other Uses:

A hospital, a church, a cemetery, a veterinary establishment, a country club, an open-air farmer's market and an agricultural implement repair depot, including the sale of fuel oil, gasoline and lubricants for agricultural purposes.

7.2 AREA REQUIREMENTS

7.2.1 Residential:

Lot Frontage	-	Minimum	200 feet
Lot Area	-	Minimum	2 acres
Front Yard	-	Minimum	40 feet
Rear Yard	-	Minimum	40 feet
Side Yard	-	Minimum	10 feet
Floor Area	-	Minimum	2,000 square feet
Lot Coverage	-	Maximum	10 per cent

For lots in excess of two (2) acres the frontage shall be increased by ten (10) feet for each additional quarter (1/4) acre or nearest quarter acre to a maximum frontage of five hundred (500) feet.

7.2.2 Agricultural, Recreational and Other Uses:

Lot Frontage	-	Minimum	200 feet
Lot Area	-	Minimum	2 acres
Front Yard	-	Minimum	50 feet
Rear Yard	-	Minimum	50 feet
Side Yard	-	Minimum	20 feet
Floor Area	-	Minimum	Nil
Lot Coverage	-	Maximum	20 per cent

7.3 ACCESSORY DWELLING UNITS

A one-family detached dwelling may be erected as an accessory use to any of the foregoing uses subject to the following requirements:

Lot Frontage	-	Minimum	75 feet
Lot Area	-	Minimum	15,000 square feet
Front Yard	-	Minimum	40 feet
Rear Yard	-	Minimum	40 feet
Side Yard	-	Minimum	10 feet
Floor Area	-	Minimum	1,050 square feet
Lot Coverage	-	Maximum	20 per cent

No such dwelling shall be located closer than seventy-five (75) feet to any other dwelling.

7.4 EXISTING LOTS

Nothing in Section 7.2 shall prevent the erection of a one-family detached dwelling on a lot in any Rural Agricultural Zone provided that such lot was under separate ownership on the 26th day of December, 1962 and provided further that the following requirements are complied with:

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CONTINUED

Lot Frontage	-	Minimum	75 feet
Lot Area	-	Minimum	15,000 square feet
Front Yard	-	Minimum	40 feet
Rear Yard	-	Minimum	40 feet
Side Yard	-	Minimum	10 feet
Floor Area	-	Minimum	1,150 square feet for lots of less than 10 acres in area and 2,000 square feet for lots of 10 acres or more in area
Lot Coverage	-	Maximum	20 per cent

Notwithstanding the foregoing where the owner of such existing lot does not own any abutting land and where the lots abutting on either side have already been built upon then no minimum frontage shall be required for the erection of a one family dwelling.

7.5

EXCEPTION

7.5.1

Part Lot 33, Concession 1:

Notwithstanding the provisions of Section 7.1.2, the following property may be used for the purpose of a chinchilla ranch, in accordance with Section 7.2.2:

All and singular that certain parcel or tract of land and premises situate, lying and being in the Township of Pickering, County of Ontario, Province of Ontario, being composed of part of Lot 33 in the First Concession of said Township, said parcel or tract being more particularly described as follows:

COMMENCING at a point in the Easterly limit of said Lot 33 distant North 17 degrees 06 minutes West 934 feet 8 inches in said limit from the South-easterly angle of the said lot;

THENCE NORTH 17 degrees 06 minutes West in said Easterly limit 414 feet 3 inches;

THENCE SOUTH 72 degrees 54 minutes West 200 feet;

THENCE NORTH 17 degrees 06 minutes West 510.6 feet;

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THENCE NORTH 72 degrees 54 minutes East
200 feet to a point in the said Easterly
limit of Lot 33;

THENCE NORTH 17 degrees 06 minutes West
in said Easterly limit 924 feet 9 1/2 inches;

THENCE SOUTH 72 degrees 54 minutes West
343 feet 8 inches;

THENCE NORTH 17 degrees 06 minutes West
150 feet;

THENCE NORTH 72 degrees 54 minutes East
343 feet 8 inches to a point in the said
Easterly limit of Lot 33;

THENCE NORTH 17 degrees 06 minutes West in
said Easterly limit 344 feet 10 inches to a
point in line with a fence running Westerly;

THENCE SOUTH 70 degrees 31 minutes West in
and along said fence 690 feet 4 inches to a
point in line with a fence running Southerly;

THENCE SOUTHERLY in an along said fence
2,230 feet 5 1/4 inches to a point distant
South 72 degrees 38 minutes West 658 feet
4 1/2 inches from the said Easterly limit of
Lot 33;

THENCE NORTH 72 degrees 38 minutes East 378
feet 2 inches;

THENCE SOUTH 17 degrees 06 minutes 90 feet;

THENCE NORTH 72 degrees 38 minutes East 280
feet 2 1/2 inches more or less to the place
of COMMENCEMENT.

SAVING AND EXCEPTING thereout ALL AND SINGULAR
that certain parcel or tract of land and
premises situate, lying and being in the Town-
ship of Pickering, in the County and Province
of Ontario, being composed of part of Lot
33 in the First Concession of said Township,
said parcel or tract containing by admeasurement
one acre more or less and may be more partic-
ularly described as follows:

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COMMENCING at a point in the Easterly limit of said Lot 33 distant Northerly in said limit 934 feet 8 inches from the South-east angle of the said lot;

THENCE SOUTH 72 degrees 38 minutes West 280 feet 2 1/2 inches;

THENCE NORTH 17 degrees 06 minutes West parallel with the said Easterly limit of the Lot 205 feet to a point being the PLACE OF BEGINNING of the parcel hereinafter described;

THENCE SOUTH 17 degrees 06 minutes East 115 feet;

THENCE SOUTH 72 degrees 38 minutes West 378 feet 2 inches to a point in the line of a fence running Northerly and Southerly;

THENCE NORTH 17 degrees 06 minutes West 115 feet;

THENCE NORTH 72 degrees 38 minutes East 378 feet 2 inches more or less to the PLACE OF BEGINNING.

7.5.2 Part Lot 30, Concession 1:

Notwithstanding the provisions of Section 7.1.2, the following property may be used for the purpose of a dog kennel in accordance with Section 7.2.2:

All and singular that certain parcel or tract of land and premises situate, lying and being in the Township of Pickering, County of Ontario, Province of Ontario, being composed of part of Lot 30, Concession 1.

Said parcel being more particularly described as the Easterly 170 feet of the Westerly 445 feet of the Northerly 632 feet of said Lot 30.

SECTION 8 - ONE-FAMILY DETACHED DWELLING

FIRST DENSITY ZONE - R1

The following provisions shall apply in all ONE-FAMILY DETACHED DWELLING FIRST DENSITY ZONES R1:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

8.1 USES PERMITTED

A one-family detached dwelling.

8.2 AREA REQUIREMENTS

Where both a municipal piped water supply and sanitary sewers are available.

8.2.1 Lot Frontage:

Minimum - 70 feet

8.2.2 Lot Area:

Minimum - 8,000 square feet

8.2.3 Yard Requirements:

Front Yard - Minimum 30 feet - Subject to the requirements of Section 5.22
Rear Yard - Minimum 25 feet
Side Yard - Minimum one side six (6) feet, other side ten (10) feet except as provided in Section 5.18 (d)

8.2.4 Ground Floor Area:

Minimum - 1,100 square feet

8.2.5 Floor Area:

Minimum - 1,500 square feet

8.2.6 Lot Coverage:

Maximum - 33 per cent

SECTION 9 - ONE-FAMILY DETACHED DWELLING

THIRD DENSITY ZONE - R3

The following provisions shall apply in all ONE-FAMILY DETACHED DWELLING THIRD DENSITY ZONES R3:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

9.1 USES PERMITTED

A one-family detached dwelling.

9.2 AREA REQUIREMENTS

Where both a municipal piped water supply and sanitary sewers are available.

9.2.1 Lot Frontage:

Minimum - 60 feet

9.2.2 Lot Area:

Minimum - 6,000 square feet

9.2.3 Yard Requirements:

Front Yard - Minimum 25 feet - Subject to the requirements of Section 5.22
Rear Yard - Minimum 25 feet
Side Yard - Minimum one side six (6) feet, other side ten (10) feet except as provided in Section 5.18 (d)

9.2.4 Ground Floor Area:

Minimum - 800 square feet

9.2.5 Floor Area:

Minimum - 1,200 square feet

9.2.6 Lot Coverage:

Maximum - 33 per cent

SECTION 10 - ONE-FAMILY DETACHED DWELLING

FOURTH DENSITY ZONE - R4

The following provisions shall apply in all ONE-FAMILY DETACHED DWELLING FOURTH DENSITY ZONES R4:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

10.1 USES PERMITTED

A one-family detached dwelling.

10.2 AREA REQUIREMENTS

Where both a municipal piped water supply and sanitary sewers are available.

10.2.1 Lot Frontage:

Minimum - 50 feet

10.2.2 Lot Area:

Minimum - 5,000 square feet

10.2.3 Yard Requirements:

Front Yard - Minimum 25 feet - Subject to the requirements of Section 5.22
Rear Yard - Minimum 25 feet
Side Yard - Minimum one side five (5) feet, other side eight (8) feet except as provided in Section 5.18 (d)

10.2.4 Ground Floor Area:

Minimum for a one-storey or split-level dwelling	1,050 square feet
Minimum for a one and one-half storey dwelling	750 square feet
Minimum for a two-storey dwelling	650 square feet

10.2.5 Floor Area:

Minimum - 1,050 square feet

10.2.6

Lot Coverage:

Maximum - 33 per cent

SECTION 11 - LOCAL COMMERCIAL ZONE C1

The following provisions shall apply in all LOCAL COMMERCIAL ZONES C1:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

11.1 USES PERMITTED

A retail store, a service store, an eating establishment, a business office, including a clinic and similar uses, a club or meeting hall and uses accessory to the foregoing.

11.2 AREA REQUIREMENTS

11.2.1 Lot Area:

Minimum - 7,500 square feet except where municipal sanitary sewers are available, no minimum shall be required.

11.2.2 Yard Requirements:

Front Yard - Minimum 40 feet
Rear Yard - Minimum 25 feet except where a Local Commercial Zone C1 rear yard abuts a street or Residential Zone, the minimum rear yard shall be forty (40) feet.
Side Yard - No side yard required except where a Local Commercial Zone C1 flanks a street or Residential Zone, the minimum side yard shall be forty (40) feet and fifteen (15) feet respectively, and such side yard shall be set aside for landscape purposes.

11.2.3 Lot Coverage:

Maximum - 33 per cent

LANDSCAPED OPEN AREA

11.3

Minimum - 50 per cent of the area of the lot where no municipal sanitary sewers or municipal piped water supply are available

Minimum - 35 per cent of the area of the lot where no municipal sanitary sewers are available.

SECTION 12 - GENERAL COMMERCIAL ZONE C2

The following provisions shall apply in all GENERAL COMMERCIAL ZONES C2:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

12.1 USES PERMITTED

12.1.1 Commercial:

A retail store, an eating establishment, a bake shop, a service store, a dry cleaning and laundry collecting station, a business office, a parking station, an automobile service station, a photographer's, a tailor's and dressmaker's shop, a taxicab stand or station, a place of amusement, a sample or showroom, a public parking lot, a clinic, a laundromat, a hotel and other similar uses.

12.1.2 Institutional Uses:

Use of a community, social or cultural nature such as a club, a lodge, a museum, a fraternal organization, a religious institution and other social uses.

12.2 AREA REQUIREMENTS

For Automobile Service Stations, the provisions of Section 5.17 shall apply.

12.2.1 Lot Area:

Minimum - 7,500 square feet except where municipal sanitary sewers are available, no minimum shall be required.

12.2.2 Yard Requirements:

- Front Yard - Minimum 60 feet
- Rear Yard - Minimum 25 feet except where a General Commercial Zone C2 rear yard abuts a street or Residential Zone. Minimum rear yard shall be sixty (60) feet.
- Side Yard - No minimum side yard shall be required except where a General Commercial Zone flanks a street or Residential Zone, the minimum side yard shall be sixty (60) feet and twenty-five

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(25) feet respectively and such side yard shall be set aside for landscape purposes.

12.2.3 **Lot Coverage:**
 Maximum - 33 percent

12.3 **LANDSCAPED OPEN AREA**

 Minimum - 50 per cent of the area of the lot where no municipal sanitary sewers or municipal piped water supply are available.
 Minimum - 35 per cent of the area of the lot where no municipal sanitary sewers are available.

SECTION 13 - HIGHWAY COMMERCIAL ZONE C3

The following provisions shall apply in all HIGHWAY COMMERCIAL ZONES C3:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

13.1 USES PERMITTED

13.1.1 Commercial:
An automobile service station, a motel, a hotel, a drive-in theatre, an open-air farmer's market, an eating establishment and a parking station.

13.2 AREA REQUIREMENTS

For automobile service stations, the requirements of section 5.17 shall apply.

13.2.1 Lot Area:
Minimum - 10,000 square feet

13.2.2 Yard Requirements:
Front Yard - Minimum 40 feet
Rear Yard - Minimum 25 feet
except where a Highway Commercial Zone C3 rear yard abuts a street or Residential Zone, the minimum rear yard shall be forty (40) feet.
Side Yard - No side yard required except where a Highway-Commercial Zone C3 flanks a street or a Residential Zone, the minimum side yard shall be forty (40) feet and twenty-five (25) feet respectively and such side yard shall be set aside for landscaped purposes.

13.2.3 Lot Coverage:
Maximum - 33 per cent

13.2.4 Lot Frontage:
Minimum - 125 feet

13.3 LANDSCAPED OPEN AREA

Minimum - 50 per cent of the area of the lot where no municipal sanitary sewers or municipal piped water supply are available.
Minimum - 35 per cent of the area of the lot where no municipal sanitary sewers are available.

SECTION 14 - STORAGE AND
LIGHT MANUFACTURING ZONE M1

The following provisions shall apply in all STORAGE AND LIGHT MANUFACTURING ZONES M1:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

14.1 USES PERMITTED

14.1.1 Recreational:

Uses permitted in O1 and O2 Zones and in compliance with the provisions thereof and only when planned and constructed as integrated parts of an industrial subdivision and not intended to be a commercial establishment.

14.1.2 Commercial:

An automobile service station and a business office.

14.1.3 Storage and Light Manufacturing:

The following uses shall be permitted only when carried on within enclosed structures:

A service or repair shop, a warehouse or distributing depot, a garage, a dry cleaning, pressing, laundry establishment, a creamery, a printing or duplicating shop, a bakery or a dairy.

Light manufacturing or assembly of manufactured products such as:

- (a) apparel and finished textile or fabric product;
- (b) paper and allied products;
- (c) furniture and finished lumber products;
- (d) light metal products such as precision instruments, watches, and radios.

14.1.4 Railway:

Railway trackage and loading facilities.

14.2 AREA REQUIREMENTS

14.2.1 Yard Requirements:

- | | | |
|------------|---|--|
| Front Yard | - | Minimum 40 feet |
| | - | Minimum 100 feet when fronting a King's Highway or when on the opposite side of the street is a residential zone |
| Rear Yard | - | Minimum 25 feet |
| | - | Minimum 100 feet when contiguous to a residential zone |

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- Side Yard - Minimum 15 feet
- Minimum 100 feet when contiguous to a residential zone or when flanking a King's Highway or when on the opposite side of the street to the flank lot line in a residential zone. No parking shall be permitted closer than 25 feet to any side lot line.

SECTION 15 - PUBLIC OPEN SPACE ZONE 01

The following provisions shall apply in all PUBLIC OPEN SPACE ZONES 01:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

15.1 USES PERMITTED

15.1.1 Recreational:
Parks, walks, statues, fountains, play lots, wading pools, playing fields and buildings or structures accessory to the foregoing.

15.2 AREA REQUIREMENTS

15.2.1 Yard Requirements:
Minimum distance of buildings or structures from all lot lines shall be thirty (30) feet, subject to the provisions of Section 5.22, except where a lot line abuts a lake or river, no yard shall be required on the side that so abuts.

No building or structure shall be located closer than 200 feet from the high water level, the spring flood limits or the top of the bank of any river, creek or lake except buildings of a public utility, a marina or such similar uses as may be determined appropriate by the Board of Adjustment upon specific application thereto.

SECTION 16 - PUBLIC AND PRIVATE OPEN SPACE ZONE 02

The following provisions shall apply in all PUBLIC AND PRIVATE OPEN SPACE ZONES 02:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

16.1 USES PERMITTED

16.1.1 Recreational:

All uses permitted in an O1 Zone and the following: Playfields, playgrounds, athletic field, field houses, community centres, bleachers, open or closed swimming pools, bandstands, skating rinks, bowling greens, tennis courts, badminton clubs, bathing station, golf courses, driving range and a parking station when serving one of the foregoing uses.

16.1.2 Commercial:

Refreshment pavilion or booth in conjunction with one of the permitted uses in Section 16.1.1.

16.2 AREA REQUIREMENTS

16.2.1 Yard Requirements:

Minimum clearance of buildings and structures from all lot lines shall be 10 feet, except where a lot frontage is less than 25 feet, or where a lot frontage is less than 25 feet on a river, or where a lot frontage is less than 25 feet on a lake.

16.2.2

16.2.3

No building or structure shall be erected within 200 feet from the high water mark, the spring flood limits or the top of the bank of any river, creek or lake except buildings of a public utility, marina or such similar use as considered appropriate by the Committee of Adjustment upon specific application thereto.

SECTION 17 - GREENBELT-CONSERVATION ZONE G

The following provisions shall apply in all GREENBELT-CONSERVATION ZONES G:

No person shall hereafter change the use of any building, structure or land nor erect and use any building or structure except in accordance with the following provisions:

17.1 USES PERMITTED

All uses permitted in the O1 and O2 Zones and forestry, reforestation, conservation activities and agricultural uses. Buildings or structures designed to be used in connection with parks and recreational purposes and the conservation of soil and wildlife.

17.2 AREA REQUIREMENTS

17.2.1 Lot Area:
Minimum - 2 acres

17.2.2 Yard Requirements:
Front Yard - Minimum 75 feet
Rear Yard - Minimum 75 feet
Side Yard - Minimum 50 feet

17.2.3 Lot Coverage:
Maximum - 5 per cent

17.2.4 No building or structure shall be located closer than 200 feet from the high water level, the spring flood limits or the top of the bank of any river, creek or lake except buildings of a public utility, a marina or such similar use as considered appropriate by the Committee of Adjustment upon specific application thereto.

17.3 RESIDENTIAL AND COMMERCIAL USES

4. That Section 17.3 be and the same is hereby amended by deleting therefrom the last sentence thereof, so that Section 17.3 shall now read as follows:

17.3 RESIDENTIAL AND COMMERCIAL USES

Subject to the requirements of the Metropolitan Toronto and Region Conservation Authority and notwithstanding the requirements of Section 17.1, no person shall change the use of any building, structure or land nor erect and use any building or structure in a Greenbelt-Conservation Zone G for any residential or commercial purpose.

SECTION 18 - PIT AND QUARRY ZONE "Q"

The following provisions shall apply in all PIT AND QUARRY ZONES "Q"

18.1 DEFINITIONS

In this Section whenever the terms hereinafter defined are used they shall have the meaning ascribed to them.

18.1.1 GRAVEL PIT

"Gravel Pit" shall mean a Pit or Quarry from which sand, gravel, stone or other similar aggregate is, or is proposed to be removed.

18.1.2 PERCHED PONDS

"Perched Ponds" shall mean ponds resulting from Pit and Quarry excavations above the natural water table in excess of eighteen (18) inches in depth or covering a minimum area of ten thousand (10,000) square feet.

18.1.3 SCRAP

"Scrap" shall mean all waste material such as rejected metal, lumber and tree stumps.

18.1.4 WAYSIDE PITS

"Wayside Pits" shall mean a temporary pit, quarry, borrow or fill removal operation, carried on by or for a public authority engaged in highway construction or re-construction.

18.2 No person shall hereafter use any building, structure or land in any "Q" zone except in accordance with the following provisions.

18.3 USES PERMITTED

18.3.1 Gravel Pits

Pits and Quarries and the excavation, washing, screening, crushing and storage of sand, gravel, ballast and other surface and sub-surface materials.

18.3.2 General Accessory Uses

Buildings, structures and uses normally incidental and accessory to the uses permitted in Section 18.3.1, such as office accommodation, machinery houses and garages.

18.3.3 Residential Accessory Uses

No residential uses shall be permitted except for one dwelling unit for a caretaker, watchman or other similar person employed on the premises concerned. Temporary mobile accommodation may be permitted in accordance with the Pickering Township Trailer By-law 3030 and amendments thereto.

18.3.4 Agricultural

Agricultural uses including forestry and re-forestation, conservation uses and uses connected with the conservation of wild life, field crops, truck gardening, berry or bush crops, flower gardening, nurseries, greenhouses, orchards, aviaries, apiaries, and mushroom farms, farms for grazing, breeding, raising or training of horses or cattle; or other similar uses or enterprises customarily carried on in the field of general agriculture and not obnoxious to the public welfare. Facilities for the raising of fur-bearing animals, kennels and swill fed pigs shall not be permitted.

18.4 AREA REQUIREMENTS

18.4.1 Gravel Pits

No parcel of land having an area of less than one acre and a frontage on a public highway of less than one hundred (100) feet shall be used for the making or establishment of a Gravel Pit.

18.4.2 General Accessory Uses

- Lot Area - Minimum Nil
- Floor Area - Minimum Nil

18.4.3 Residential Accessory Uses

- Lot Area - Minimum 1,000 square feet
- Floor Area - Minimum 750 square feet

18.4.4 Agricultural

- Lot Area - Minimum 10 acres
- Lot Frontage - Minimum 500 feet
- Lot Coverage - Maximum 20 per cent

18.5 YARD REQUIREMENTS

18.5.1 Gravel Pits

(a) Creeks, Lakes or Rivers

No Gravel Pit or Quarry operations shall be

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conducted closer than fifty (50) feet from any creek, lake or river;

(b) Other Development

No Gravel Pit or Quarry shall be opened, established or maintained closer to any land zoned for Residential, Commercial or Village uses than a distance equal to one-half (1/2) of the height of the highest face of the said Gravel Pit or Quarry.

18.5.2 Accessory Uses

Front Yard	-	Minimum 50 feet
Rear Yard	-	Minimum 50 feet
Side Yard	-	Minimum 20 feet

18.5.3 Residential

Front Yard	-	Minimum 40 feet
Rear Yard	-	Minimum 40 feet
Side Yard	-	Minimum 10 feet

18.5.4 Agricultural

Front Yard	-	Minimum 50 feet
Rear Yard	-	Minimum 50 feet
Side Yard	-	Minimum 20 feet

18.6 EXEMPTION - TEMPORARY WAYSIDE PITS

Notwithstanding the general zoning provisions of this By-law, the operation of temporary wayside or borrow pits, may be permitted for a period not exceeding six (6) months upon application to, and approval of, the council of the Corporation of the Township of Pickering.

SECTION 19 - ADMINISTRATION

19.1 LICENSES AND PERMITS

Nothing in this By-law shall exempt any person from complying with requirements of the Building By-law or any other By-law in force within the Township of Pickering or from obtaining any permit, license, permission, authority or approval required by this or any other By-law of the Township or by any other law in force at this time.

19.2 INSPECTION OF LAND, BUILDINGS, STRUCTURES

The authority from time to time having jurisdiction to enforce this By-law is hereby authorized to enter at all reasonable hours for purpose of inspection upon any property or premises.

19.3 APPLICATION AND PLANS

In addition to the requirements of the Building By-law, every application for a building permit shall be accompanied by plans, in duplicate, drawn to a scale of either eight (8) feet to the inch or ten (10) feet to the inch, based upon an actual survey by an Ontario Land Surveyor, showing the true shape and dimension of the lot to be used, or upon which it is proposed to erect any building or structure, and showing the proposed location, height and dimensions of the building or structure or work, in respect of which the permit is applied for, and the location of every building or structure already erected on or partly on such lot, together with a block plan and a statement signed by the owner or his agent duly authorized thereunto in writing filed with the Inspector of Buildings, which statement shall set forth in detail the current and intended use of each building and structure or part thereof and all information necessary to determine whether or not every such building and structure conforms with the aforesaid requirements of this By-law.

19.4 CHANGE IN USE

No person shall change the type of use of any land or of any building or structure on the land without having first applied for and obtained a certificate of occupancy from the Inspector of Buildings.

19.5 CERTIFICATE OF OCCUPANCY

(a) No building hereafter erected or structurally altered shall be occupied or used until a certificate of occupancy has been issued by

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the Inspector of Buildings.

- (b) All applications for a certificate of occupancy shall be made on a printed form to be furnished by the Inspector of Buildings.
- (c) A certificate of occupancy shall be issued after the request for same has been made in writing to the Inspector of Buildings after the erection or structural alteration of such building or part thereof has been completed in conformity with the provisions of this By-law and such certificate shall state that the building or proposed use of the building complies with the provisions thereof.
- (d) A record of all certificates shall be kept on file in the office of the Inspector of Buildings and copies shall be furnished on request to any person having a proprietary or tenancy interest in the building affected. A fee shall be charged for each original certificate of occupancy and an additional fee shall be charged for duplicate copies of the certificate.

19.6 ZONING ADMINISTRATOR

This By-law shall be administered by a person designated from time to time by the Council as the Zoning Administrator.

19.7 PENALTY

Every person who contravenes this By-law is guilty of an offence and liable upon summary conviction to a penalty not exceeding three hundred dollars (\$300.00), exclusive of costs.

19.8 REPEAL

With the passing of this By-law, the following restrictive area By-laws of the Township of Pickering are hereby repealed:

By-law numbers	2073	2572	2866
	2210	2777	3011

SECTION 20 - CONFLICT AND VALIDITY

20.1 CONFLICT WITH OTHER BY-LAWS

In the event of conflict between this By-law and any general or specified By-law, this By-law shall prevail.

20.2 VALIDITY

Should any section, or part of a section of this By-law be declared by a court of competent jurisdiction to be invalid, the same shall not affect the provisions of this By-law, as a whole or any part thereof, other than the part so declared to be invalid.

20.3 EFFECTIVE DATE

No part of this By-law shall come into force without the approval of the Ontario Municipal Board, but, subject to such approval, this By-law shall take effect from the passing thereof.

READ A FIRST AND SECOND TIME THIS ...*THIRD*... day of

.....*August 7*..... 1965.

.....*[Signature]*.....
Reeve

.....*[Signature]*.....
Clerk

READ A THIRD TIME AND FINALLY PASSED THIS ...*THIRD*... day of

.....*August 7*..... 1965.

.....*[Signature]*.....
Reeve

.....*[Signature]*.....
Clerk

B - SCHEDULE "A" AMENDMENTS

1. That Schedule "A" of By-law 3036 be and the same is hereby amended by altering the "O1" designation on Lots 1 to 6, Plan 380 to read "R4", as shown on Schedule "A" attached hereto.

C - That By-law Number 3036 be and the same is hereby repealed and amended only to the extent necessary to give effect to the provisions of this By-law.

D - No part of this By-law shall come into force without the approval of the Ontario Municipal Board, but subject to such approval, the By-law shall take effect from the day of passing thereof.

READ A FIRST AND SECOND TIME THIS 11th day of July, 1966.

C. W. Laycox
Reeve

D. J. Plitz
Clerk

READ A THIRD TIME AND FINALLY PASSED THIS 11 day of July 1966.

C. W. Laycox
Reeve

D. J. Plitz
Clerk

APPROVED BY ONTARIO MUNICIPAL BOARD October 7, 1966.

The Corporation of the City of Pickering

By-law No. 7085/10

Being a By-law to amend Restricted Area (Zoning) By-law 3036, as amended, to implement the Official Plan of the City of Pickering, Region of Durham in Part of Lot 18, Concession 2, in the City of Pickering. (A 19/09)

Whereas the Council of The Corporation of the City of Pickering deems it desirable to permit a mixed use development for townhouse dwelling units, apartment buildings and commercial uses on the subject lands, being Part of Lot 18, Concession 2, in the City of Pickering;

And whereas an amendment to By-law 3036, as amended, is therefore deemed necessary;

Now therefore the Council of The Corporation of the City of Pickering hereby enacts as follows:

1. **Schedules I and II**

Schedules I and II attached hereto with notations and references shown thereon are hereby declared to be part of this By-law.

2. **Area Restricted**

The provisions of this By-law shall only apply to those lands in Part of Lot 18, Concession 2, Pickering, designated "RH/MU-3", and "OS-HL" on Schedule I attached hereto.

3. **Definitions**

In this By-law,

- (1) "Adult Entertainment Parlour" shall mean a building or part of a building in which is provided, in pursuance of a trade, calling, business or occupation, services appealing to or designed to appeal to erotic or sexual appetites or inclinations;
- (2) "Bakery" shall mean a building or part of a building in which food products are baked, prepared and offered for retail sale, or in which food products baked and prepared elsewhere are offered for retail sale;

- (3) "Body Rub Parlour" includes any premises or part thereof where a body rub is performed, offered or solicited in pursuance of a trade, calling, business or occupation, but does not include any premises or part thereof where the body rubs performed are for the purpose of medical or therapeutic treatment and are performed or offered by persons otherwise duly qualified, licensed or registered so to do under the laws of the Province of Ontario;
- (4) "Build-to-zone" shall mean an area of land in which all or part of a building elevation of one or more buildings is to be located;
- (5) "Business Office" shall mean a building or part of a building in which the management or direction of a business, a public or private agency, a brokerage or a labour or fraternal organization is carried on and which may include a telegraph office, a data processing establishment, a newspaper publishing office, the premises of a real estate or insurance agent, or a radio or television broadcasting station and related studios or theatres, but shall not include a retail store;
- (6) "Commercial Club" shall mean an athletic or recreational club operated for gain or profit and having public or private membership, but shall not include an adult entertainment parlour;
- (7) "Commercial Music School" shall mean a school which is operated for gain or profit and contains the studio of a music teacher;
- (8) "Commercial School" shall mean a school which is operated for gain or profit and may include the studio of a dancing teacher, or an art school, a golf school or any other such school operated for gain or profit, but shall not include any other school defined herein;
- (9) "Convenience Store" shall mean a retail store in which food, drugs, periodicals or similar items of day-to-day household necessities are kept for retail sale primarily to residents of, or persons employed in, the immediate neighbourhood;
- (10) "Day Nursery" shall mean lands and premises duly licensed pursuant to the provisions of *The Day Nurseries Act*, or any successor thereto, and for the use as a facility for the daytime care of children;
- (11) "Dry Cleaning Depot" shall mean a building or part of a building used for the purpose of receiving articles, goods, or fabrics to be subjected to dry cleaning and related processes elsewhere, and of distributing articles, goods or fabrics which have been subjected to any such processes;
- (12) "Dwelling" shall mean a building or part of a building containing one or more dwelling units, but does not include a mobile home or trailer;

- (13) "Dwelling Unit" shall mean one or more habitable rooms occupied or capable of being occupied as a single, independent, and separate housekeeping unit containing a separate kitchen and sanitary facilities;
- (14) "Dwelling, Single Attached or Single Attached Dwelling" shall mean one of a group of not less than three adjacent dwellings attached together horizontally by an above grade common wall;
- (15) "Financial Institution" shall mean a building or part of a building in which money is deposited, kept, lent or exchanged;
- (16) "Floor Area - Residential" shall mean the area of the floor surface contained within the outside walls of a storey or part of a storey;
- (17) "Food Store" shall mean a building or part of a building in which food, produce, and other items or merchandise of day-to-day household necessity are stored, offered or kept for retail sale to the public;
- (18) "Gross Floor Area - Residential" shall mean the aggregate of the floor areas of all storeys of a building or structure, or part thereof as the case may be, other than a private garage, an attic, or a cellar;
- (19) "Gross Leasable Floor Area" shall mean the aggregate of the floor areas of all storeys above or below established grade, designed for owner or tenant occupancy or exclusive use only, but excluding storage areas below established grade;
- (20) "Laundromat" shall mean a self-serve clothes washing establishment containing washing, drying, ironing, finishing or other incidental equipment;
- (21) "Lot" shall mean an area of land fronting on a street which is used or intended to be used as the site of a building, or group of buildings, as the case may be, together with any accessory buildings or structures, or a public park or open space area, regardless of whether or not such lot constitutes the whole of a lot or block on a registered plan of subdivision;
- (22) "Multiple Dwelling-Horizontal" shall mean a building containing three or more dwelling units attached horizontally, not vertically, by an above-grade wall or walls;
- (23) "Multiple Dwelling-Vertical" shall mean a building containing three or more dwelling units attached horizontally and vertically by an above-grade wall or walls, or an above-grade floor or floors, or both;

- (24) "Parking Space, Tandem" shall mean two parking spaces with one parking space located immediately behind another parking space and where both spaces are for the exclusive use of one dwelling unit;
- (25) "Personal Service Shop" shall mean an establishment in which a personal service is performed and which may include a barber shop, a beauty salon, a shoe repair shop, a tailor or dressmaking shop or a photographic studio, but shall not include a body-rub parlour as defined in the *Municipal Act, R.S.O. 1980, Chapter 302*, as amended from time-to-time, or any successor thereto;
- (26) "Private Garage" shall mean an enclosed or partially enclosed structure for the storage of one or more vehicles, in which structure no business or service is conducted for profit or otherwise;
- (27) "Professional Office" shall mean a building or part of a building in which medical, legal or other professional service is performed or consultation given, and which may include a clinic, the offices of an architect, a chartered accountant, an engineer, a lawyer or a physician, but shall not include a body-rub parlour as defined in the *Municipal Act, R.S.O. 1980, Chapter 302*, as amended from time-to-time, or any successor thereto;
- (28) "Restaurant - Type A" shall mean a building or part of a building where food is prepared and offered or kept for retail sale to the public for immediate consumption on the premises or off the premises, or both, but shall not include an adult entertainment parlour as defined herein;
- (29) "Retail Store" shall mean a building or part of a building in which goods; wares, merchandise, substances, articles or things are stored, kept and offered for retail sale to the public;
- (30) "Storey" shall mean that portion of a building other than a basement, cellar or attic, included between the surface of any floor and the surface of the floor, roof deck or ridge next above it;
- (31) "Yard" shall mean an area of land which is appurtenant to and located on the same lot as a building or structure and is open, uncovered, and unoccupied above ground except for such accessory buildings, structures, or other uses as are specifically permitted thereon.

4. Provisions ("RH/MU-3" Zone)**(1) Uses Permitted ("RH/MU-3" Zone)**

(a) No person shall within the lands designated "RH/MU-3" on Schedule I attached hereto, use any lot or erect, alter, or use any building or structure for any purpose except the following:

- (i) bakery;
- (ii) business office;
- (iii) convenience store;
- (iv) commercial club;
- (v) commercial music school;
- (vi) commercial school;
- (vii) day nursery;
- (viii) dry cleaning depot;
- (ix) financial institution;
- (x) food store;
- (xi) laundromat;
- (xii) multiple dwelling-horizontal;
- (xiii) multiple dwelling-vertical;
- (xiv) personal service shop;
- (xv) professional office;
- (xvi) restaurant - type A;
- (xvii) retail store.

(b) In buildings containing multiple dwelling-horizontal and multiple dwelling-vertical uses, only the following commercial uses will be permitted:

- (i) business office;
- (ii) commercial school;
- (iii) personal service shop;
- (iv) professional office;
- (v) retail store.

(2) Zone Requirements ("RH/MU-3" Zone)

No person shall within the lands designated "RH/MU-3" on Schedule I attached hereto, use any lot or erect, alter, or use any building except in accordance with the following provisions:

(a) Floor Space Areas:

- (i) In buildings containing multiple dwelling-horizontal and commercial uses or multiple dwelling-vertical and commercial uses, the commercial uses may only be located on the ground floor and each individual commercial enterprise shall provide a minimum gross leasable floor area of 70 square metres;

- (ii) The maximum gross leasable floor area for any individual convenience store, food store, or retail store shall be 500 square metres;

(b) Building Height:

Within and at 70.0 metres of Brock Road Right of Way:

Minimum	3 Storeys and 12.0 metres
Maximum	8 Storeys and 26.0 metres

Beyond 70.0 metres of Brock Road Right of Way:

Minimum	3 Storeys
Maximum	4 Storeys

(c) Building Location and Setbacks:

- (i) Buildings and structures shall be located entirely within the building envelope shown on Schedule II attached hereto;
- (ii) No building, part of a building, or structure shall be erected within the "RH/MU-3" Zone, unless a minimum of 85% of the length of the build-to-zone, contains a building or part of a building;
- (iii) For any building in excess of five storeys in height having a front wall located within the build-to-zone, any portion of a building or structure in excess of two storeys in height, shall be set back a minimum of 3.0 metres from the main wall of the building or structure at grade;
- (iv) Notwithstanding Section 4(2)(c)(i) above, below grade parking structures shall be permitted beyond the limits of the building envelope identified on Schedule II attached hereto, but no closer than 0.5 metres from the limits of the lands;
- (v) The horizontal distance between multiple dwelling-horizontal buildings shall be a minimum of 1.8 metres;

(d) Parking Requirements:

- (i) There shall be provided and maintained a minimum of 4.0 parking spaces per 100 square metres of gross leasable floor area for all permitted uses listed in Section 4(1) of this By-law, except for multiple dwelling-vertical, multiple dwelling-horizontal uses. Non-resident parking shall be provided at grade, in a below grade structure, or both;

- (ii) For multiple dwelling-vertical uses, there shall be provided and maintained a minimum of 1.0 parking space per dwelling unit for residents, and 0.25 of a parking space per dwelling unit for visitors. Parking spaces for residents shall be provided in a below grade structure, at grade or both. Visitor parking shall be provided at grade;
 - (iii) For multiple dwelling-horizontal uses, there shall be provided and maintained a minimum of 2.0 parking spaces per dwelling unit for residents, and 0.25 of a parking space per dwelling unit for visitors. Parking spaces shall be provided at grade, in a below grade structure, or both. Parking spaces may also be provided in a private garage attached to the rear of the dwelling unit it serves. Visitor parking shall be provided at grade;
 - (iv) All entrances and exits to parking areas and all parking areas shall be surfaced with brick, asphalt or concrete, or any combination thereof;
 - (v) At grade parking lots shall be permitted no closer than 3.0 metres from the limits of the "RH/MU-3" Zone identified on Schedule I attached hereto, or any road;
 - (vi) Clauses 5.21.2(a), 5.21.2(b), 5.21.2(e), 5.21.2(f), 5.21.2(g), and 5.21.2(k) of By-law 3036, as amended, shall not apply to lands designated "RH/MU-3", on Schedule I attached hereto.
- (e) Special Regulations:
- (i) The maximum aggregate gross leasable floor area for all restaurant-type A uses shall be 500 square metres;
 - (ii) No drive-thru facilities are permitted on lands designated "RH/MU-3";
 - (iii) Despite Section 4(2)(c)(i) of this By-law, outdoor patios associated with a restaurant-type A are permitted to encroach beyond the building envelope as illustrated on Schedule II of this By-law;
 - (iv) Despite Section 4(2)(d)(i) of this By-law, covered walkways with supporting structures, are permitted to encroach beyond the building envelope as illustrated on Schedule II of this By-law;
 - (v) Despite Section 4(2)(a)(ii) outdoor patios associated with a restaurant type "A" will not be included within the aggregate gross leasable floor area requirements of subclause (i) above; and

- (vi) For residential uses, the lands shall be developed at a density of over 30 units per net hectare and up to and including 80 units per net hectare, up to a maximum of 60 units.

5. **Provisions** (“(H) RH/MU-3” Zone)

(a) **Uses Permitted** (“(H) RH/MU-3” Zone)

Until such time as the “(H)” Holding Provision is lifted, the lands shall not be used for any purpose other than any use as permitted by the Section 7 provisions of Rural Agricultural Zone “A” of Zoning By-law 3036.

(b) **Removal of the “(H)” Holding Symbol**

The “(H)” Holding Symbol shall not be removed from the “RH/MU-3” zone until the completion of the following:

- acceptance of an updated Master Environmental Servicing Plan (MESP) by the City and the TRCA
- acceptance of a Stormwater Management and Hydrogeological Report, consistent with the updated MESP, by the City and the TRCA
- acceptance of a revised Environmental Impact Study by the City and the TRCA
- receipt of an acceptance letter from the Ministry of Culture of the Stage 1 and 2 Archaeological Report
- acceptance of a Noise Impact Study by the Region
- acceptance of an updated Phase I Environmental Site Assessment by the Region of Durham
- execution and registration of a Development Agreement with the City of Pickering containing the provisions that:
 - (i) the owner agrees to convey lands as may be required through the recommendation of the Update to the Master Environmental Servicing Report for the construction of a stormwater management facility and open space lands;
 - (ii) appropriate arrangements have been made to the satisfaction of the City of Pickering that all the requirements for the development of the mixed use project have been complied with, including but not limited to the conveyance and construction of the municipal road right-of-way required for access to the subject site, payment of the owner's proportionate share of costs associated with the preparation of required area-wide studies, and the cost of off-site works, the sharing of commercial parking spaces with residential visitor parking, pedestrian enhancements along Brock Road, sustainable site and building design, parkland dedication, entering into a site plan agreement, environmental and engineering requirements, securities and insurance;

- (iii) appropriate arrangements have been made to the satisfaction of the Region of Durham for the conveyance of the road widening and sight triangle, and the provision of sanitary, water and transportation services and environmental and engineering requirements; and
- (iv) appropriate arrangements have been made to the satisfaction of the City (in consultation with the TRCA) for the conveyance of open space hazard lands to a public authority and TRCA's approval of the provision of environmental and engineering requirements.

6. Provisions ("OS-HL" Zone)

(1) Uses Permitted ("OS-HL" Zone)

No person shall within the lands designated "OS-HL" on Schedule I attached hereto use any lot or erect, alter or use any building or structure for any purpose except the following:

- (a) preservation and conservation of the natural environment, soil and wildlife; and
- (b) resource management.

(2) Zone Requirements ("OS-HL" Zone)

- (a) No buildings or structures shall be permitted to be erected, nor shall the placing or removal of fill be permitted, except where buildings or structures are used only for purposes of flood and erosion control, resource management, or pedestrian trail and walkway purposes.

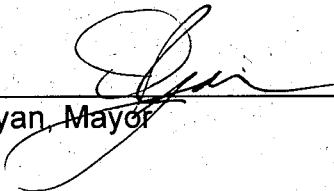
7. By-law 3036

By-law 3036, as amended, is hereby further amended only to the extent necessary to give effect to the provisions of this By-law as it applies to the area set out in Schedule I attached hereto. Definitions and subject matters not specifically dealt with in this By-law shall be governed by relevant provisions of By-law 3036, as amended.


8. **Effective Date**

This By-law shall come into force in accordance with the provisions of the *Planning Act*.

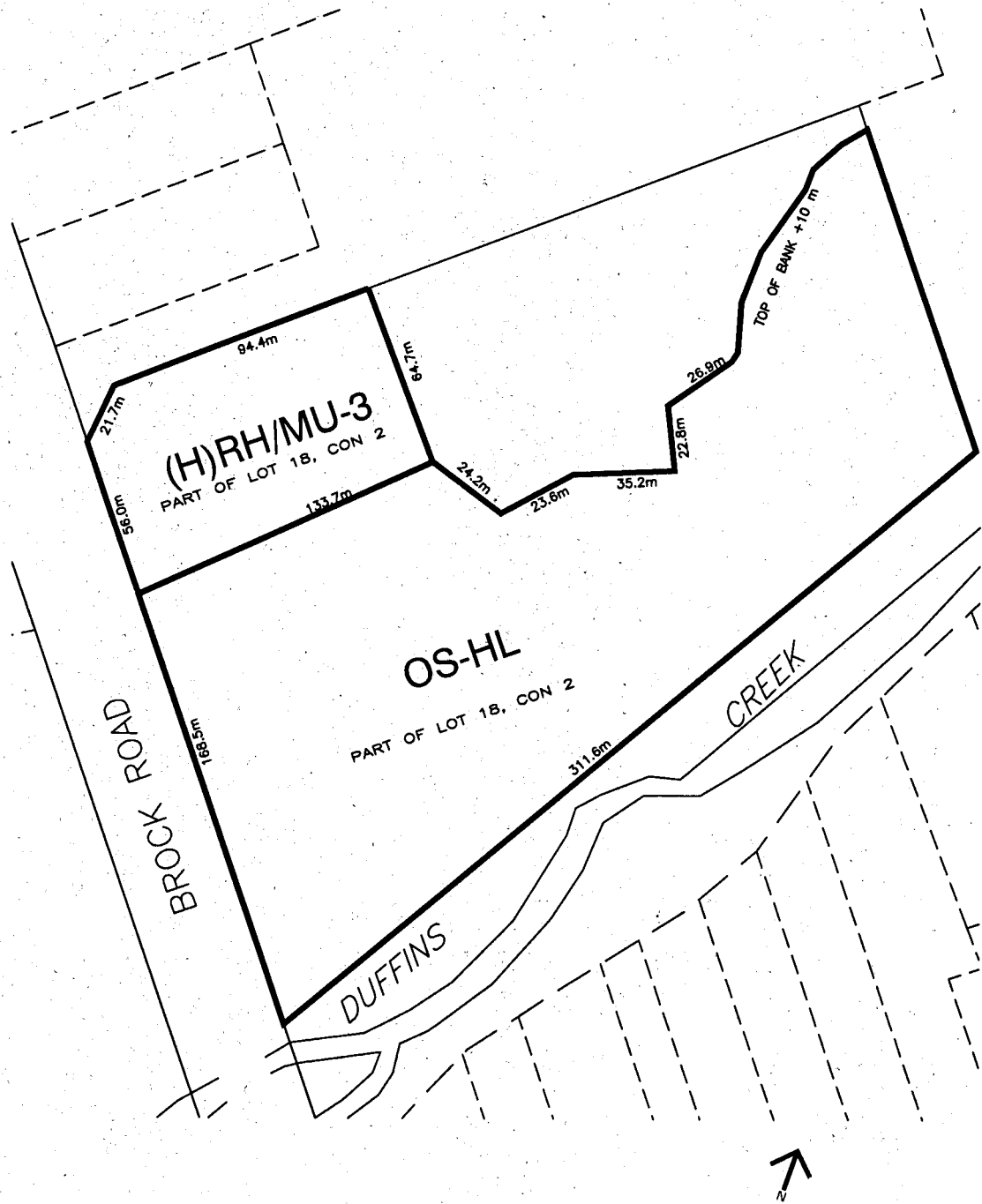
By-law read a first, second and third time and finally passed this 13th day of September, 2010.



David Ryan, Mayor



Debbie Shields, City Clerk



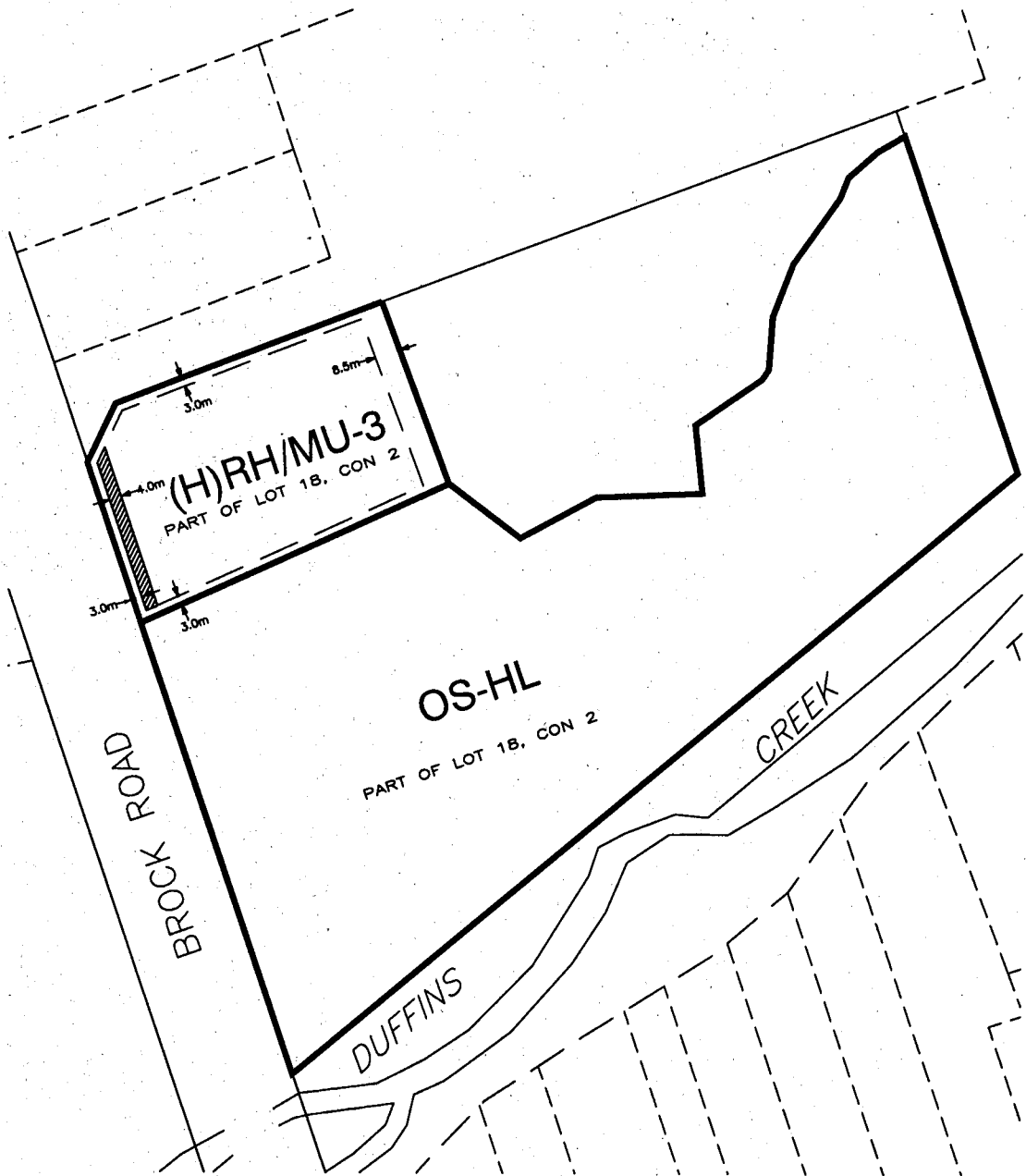
SCHEDULE I TO BY-LAW 7085/10

PASSED THIS 13th

DAY OF SEPT 2010

 MAYOR

D. Shields
 CLERK



BUILDING ENVELOPE
 BUILD-TO ZONE



SCHEDULE II TO BY-LAW 7085/10

PASSED THIS 13th

DAY OF SEPT. 2010

 MAYOR

D. Shields
 CLERK

Martin Chan

From: Ho, Doris <dho@pickering.ca>
Sent: November 4, 2019 10:48 AM
To: Martin Chan
Subject: RE: Pickering Zoning By-Law (Brock Ridge)
Attachments: Section 5.21.2 – Supplementary Parking Regulations.pdf

Hi Martin,

Thanks for your email.

There is no parking rate for loading spaces applicable to this property. However, I can advise that a loading space should have a minimum rectangular size of 20ft by 10ft with a vertical clearance of 14ft. And, I have also attached an excerpt from the By-law outlining the supplementary parking provisions to adhere to.

For your information again, you can find By-laws through Corporate Records found in the following link: <https://www.pickering.ca/en/city-hall/bylaws.aspx>

Regards,

Doris Ho

(Acting) Zoning Examiner | City Development Department

905.420.4660 ext 2140 | 1.866.683.2760

dho@pickering.ca



From: Martin Chan <mchan@cfcrozier.ca>
Sent: Friday, November 1, 2019 2:42 PM
To: Ho, Doris <dho@pickering.ca>
Subject: RE: Pickering Zoning By-Law (Brock Ridge)

Hi Doris,

I hope all is well. For the property at 2055 Brock Road, does the site specific Zoning By-Law mention anything about the minimum number of loading spaces? If not, can you sent a link or PDF copy of the applicable Zoning By-law for reference? I tried using the link below, however none of our computers (Chrome and Explorer) can open the webpage (Error: Cookies need to be enabled; but it is enabled).

Thanks for your help,

Martin

Martin Chan EIT | Transportation
C.F. Crozier & Associates Consulting Engineers
211 Yonge Street, Suite 301 | Toronto, ON M5B 1M4
cfcrozier.ca | mchan@cfcrozier.ca
tel: 416.477.3392 ext: 512



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From: Martin Chan
Sent: September 30, 2019 10:48 AM
To: Ho, Doris <dho@pickering.ca>
Subject: RE: Pickering Zoning By-Law (Brock Ridge)

Great, thanks for all the help Doris!

Martin

From: Ho, Doris <dho@pickering.ca>
Sent: September 30, 2019 10:41 AM
To: Martin Chan <mchan@cfcrozier.ca>
Subject: RE: Pickering Zoning By-Law (Brock Ridge)

Hi Martin,

For 2055 Brock Rd, the site specific Zoning By-law 7085/10 applies (see attached). Parking provisions are under Section 4(2)(d).

If you know the By-law number, you can look it up in our Corporate Records:
<https://corporate.pickering.ca/weblink/Browse.aspx?startid=53657&cr=1>.

Our City Centre Zoning By-law and Seaton Zoning By-law are available online:
<https://www.pickering.ca/en/city-hall/resources/city-centre-zoning-by-law-7553-17.pdf>
<https://www.pickering.ca/en/city-hall/resources/SeatonZoningBylaw7364-14.pdf>

Otherwise, you may contact me directly and I would be glad to confirm the zoning designation and provide you with the applicable By-law. We are working on consolidating our Zoning By-laws so that one day it should be all available online to the public.

Thanks,

Doris Ho
(Acting) Zoning Examiner | City Development Department
905.420.4660 ext 2140 | 1.866.683.2760
dho@pickering.ca

From: Martin Chan <mchan@cfcrozier.ca>
Sent: Monday, September 30, 2019 9:33 AM
To: Ho, Doris <dho@pickering.ca>
Subject: RE: Pickering Zoning By-Law (Brock Ridge)

Hi Doris,

Thanks for the quick response. My client's property is located at 2055 Brock Road.

Just for future reference, is Pickering's site specific zoning-bylaw available on the open data webpage (I didn't see anything there)?

Thanks again,

Martin

Martin Chan EIT | Transportation
C.F. Crozier & Associates Consulting Engineers
211 Yonge Street, Suite 301 | Toronto, ON M5B 1M4
cfcrozier.ca | mchan@cfcrozier.ca
tel: 416.477.3392 ext: 512



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From: Ho, Doris <dho@pickering.ca>
Sent: September 30, 2019 9:16 AM
To: Martin Chan <mchan@cfcrozier.ca>
Subject: RE: Pickering Zoning By-Law (Brock Ridge)

Good Morning Martin,

Thank you for your inquiry with the City of Pickering.

The applicable Zoning By-law for the Brock Ridge neighbourhood is By-law 3036. I have attached the parking provisions under this By-law for your reference. On the other hand, if you can provide an address for the development you are inquiring about, I can confirm if a site specific By-law may apply.

Please let me know if you have any further questions.

Regards,

Doris Ho

(Acting) Zoning Examiner | City Development Department

905.420.4660 ext 2140 | 1.866.683.2760

dho@pickering.ca



Your City. Right Now. pickering.ca



-----Original Message-----

From: noreply@pickering.ca <noreply@pickering.ca> On Behalf Of Martin Chan

Sent: Friday, September 27, 2019 12:29 PM

To: Planning Web Email <planning@pickering.ca>

Subject: Pickering Zoning By-Law (Brock Ridge)

Hi, I would like to request an electronic copy of the existing Zoning By-Law applicable to the Brock Ridge area. I would like to find out the minimum parking requirements for a residential development there.

Thanks,

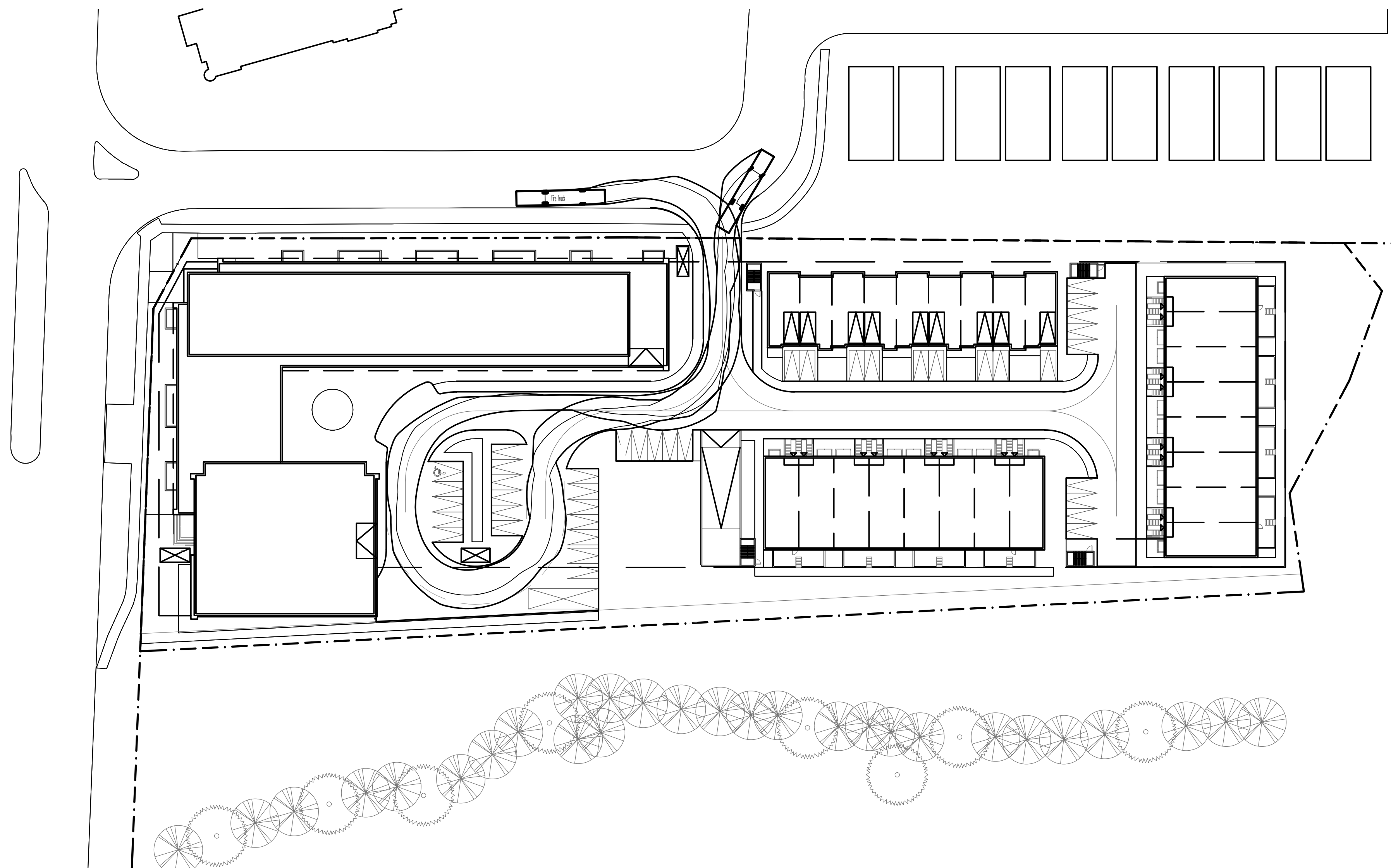
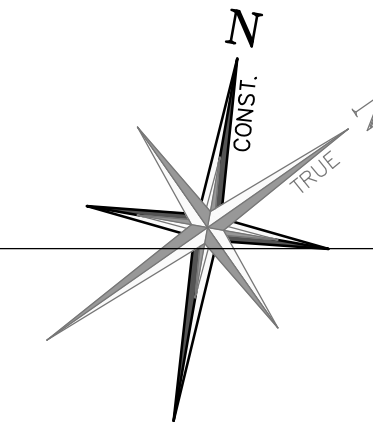
Martin

Origin: <https://www.pickering.ca/en/city-hall/officialplan.aspx>

This email was sent to you by Martin Chan<mchan@cfcrozier.ca> through <https://www.pickering.ca>.

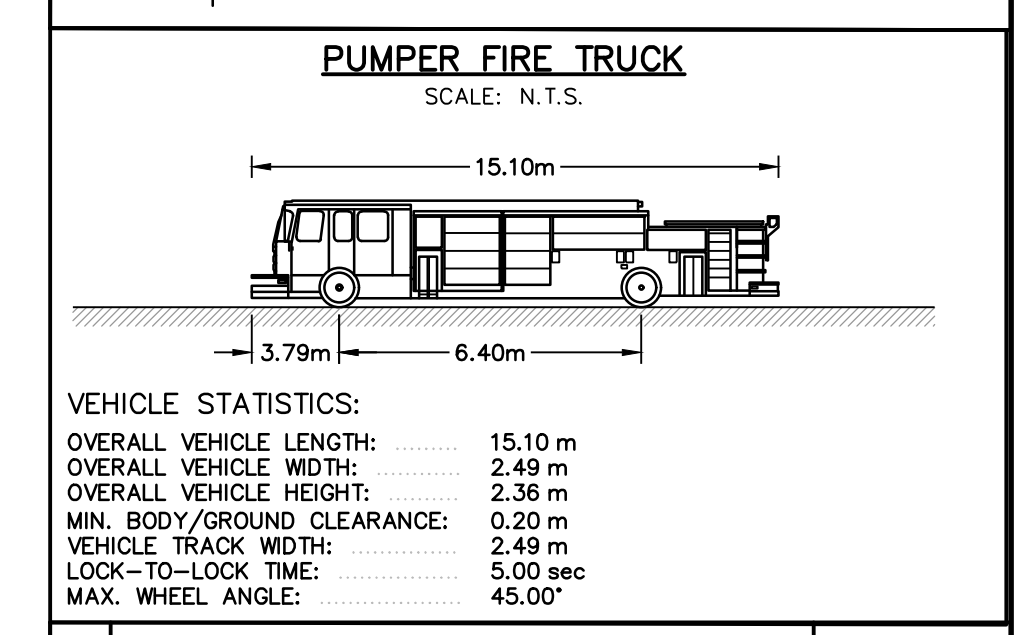
APPENDIX J

Truck Turning Diagrams



LEGEND

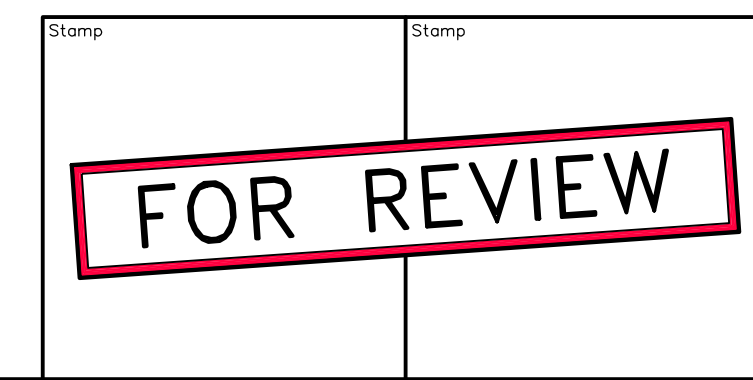
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	FIRE TRUCK
	DIRECTION OF TRUCK MOVEMENT
	PROPOSED FIRE HYDRANT LOCATION



A FIRST SUBMISSION		2019/OCT/21
No.	ISSUE / REVISION	YYYY/MMM/DD
Project BROCK ROAD DUFFINS FOREST INC. 2055 BROCK ROAD CITY OF PICKERING		

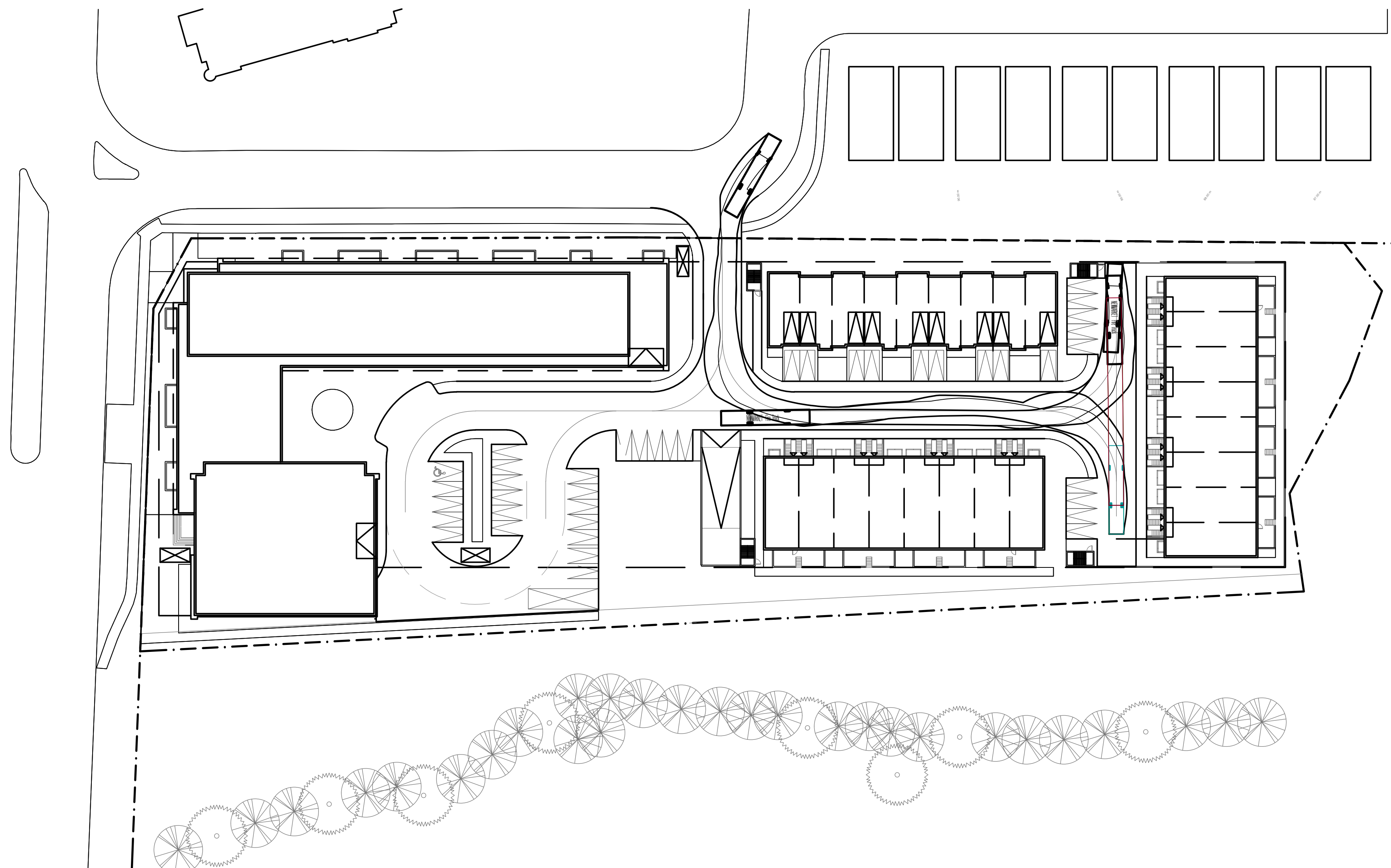
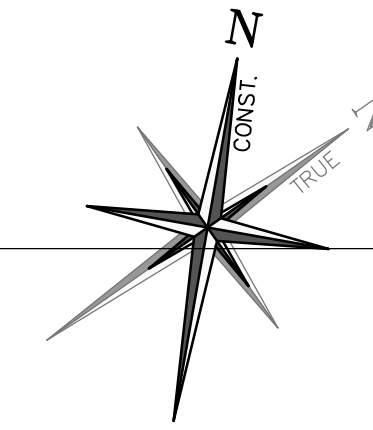
Drawing
**2055 BROCK ROAD
TRUCK TURNING PLAN**

NOT FOR CONSTRUCTION



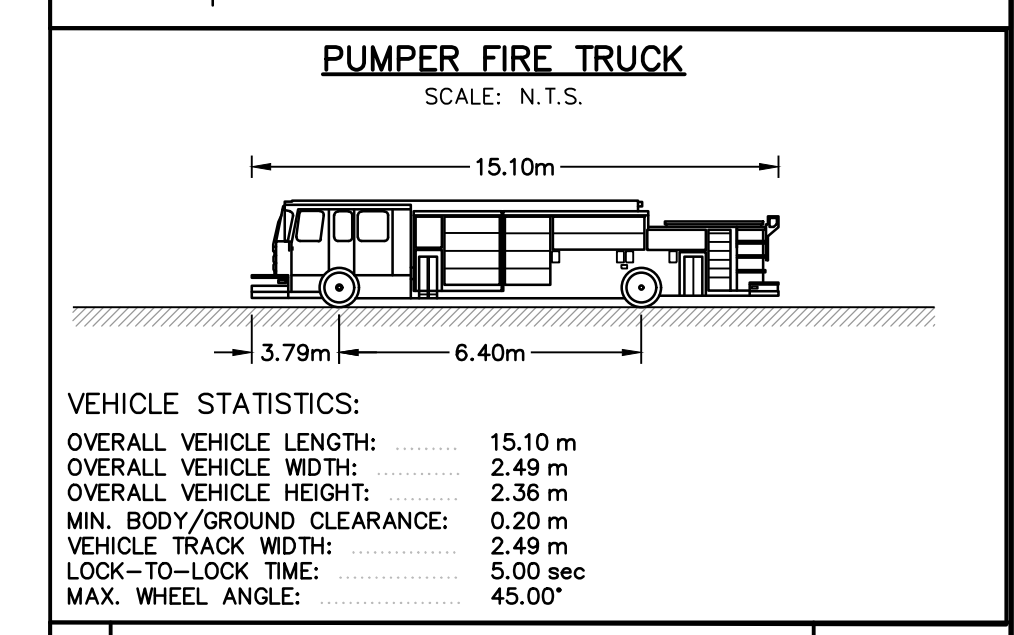
		2800 High Point Drive Suite 100 Milton, ON L9T 6P4 905-875-0026 T 905-875-4915 F www.cfcrozier.ca	
Drawn	M.C.	Design	M.C.
Check	M.L.	Check	M.L.
Project No. 1807-5430		Scale	Dwg. T.300
		Scale	1:500





LEGEND

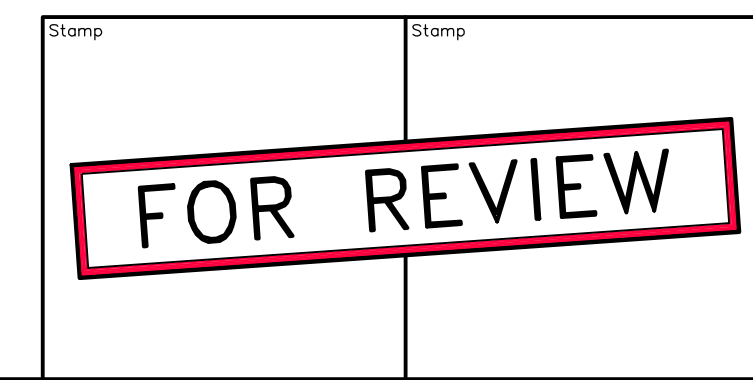
	PROPERTY LINE
	FIRE TRUCK
	DIRECTION OF TRUCK MOVEMENT
	PROPOSED FIRE HYDRANT LOCATION



A FIRST SUBMISSION		2019/OCT/21
No.	ISSUE / REVISION	YYYY/MMM/DD
Project BROCK ROAD DUFFINS FOREST INC. 2055 BROCK ROAD CITY OF PICKERING		

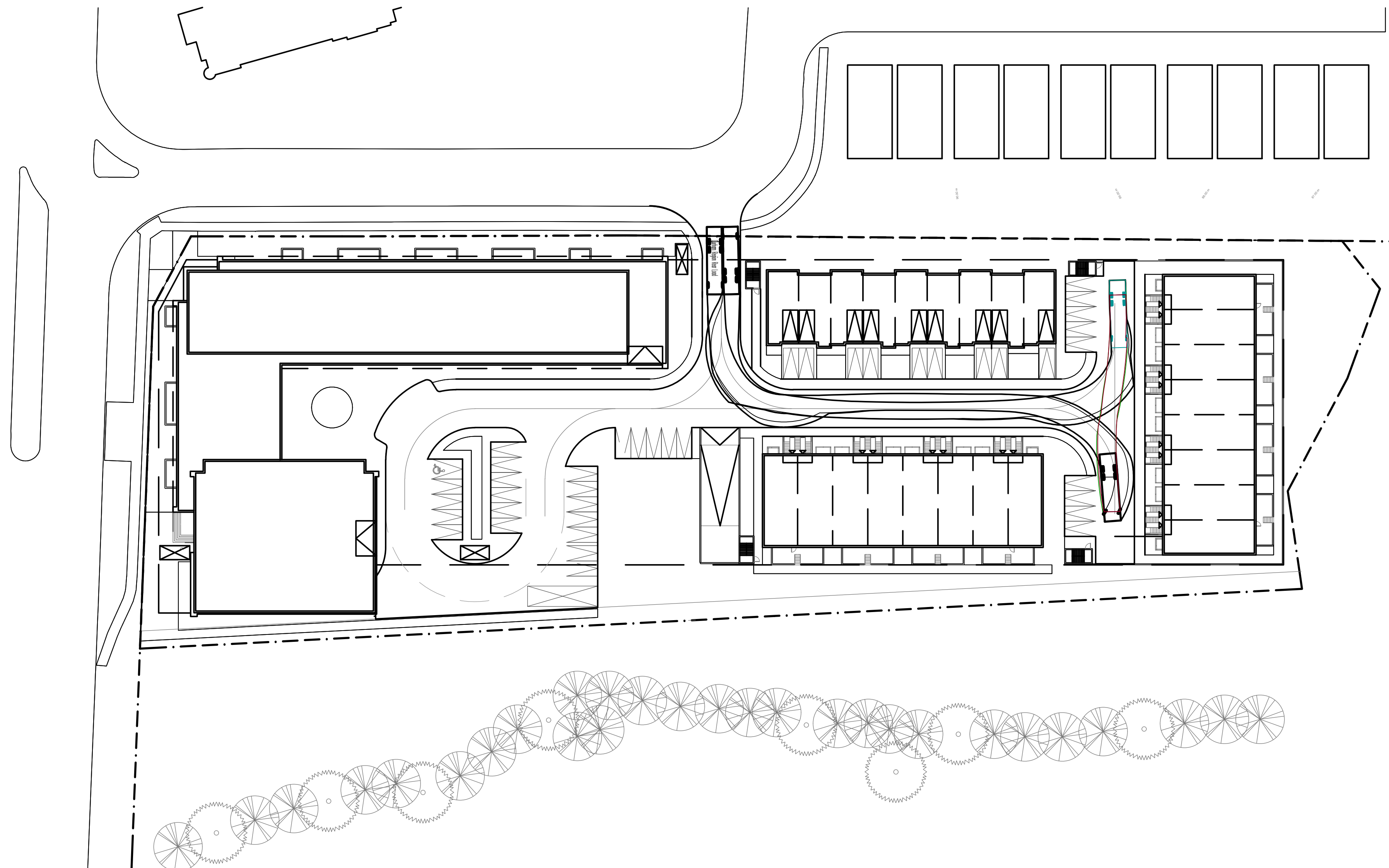
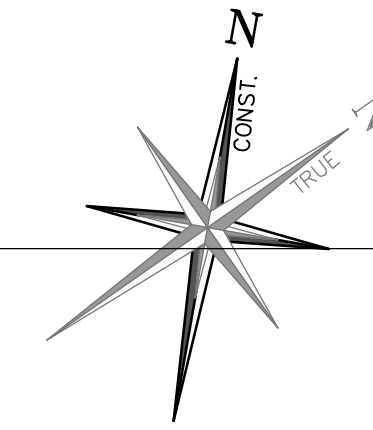
Drawing
**2055 BROCK ROAD
TRUCK TURNING PLAN**

NOT FOR CONSTRUCTION



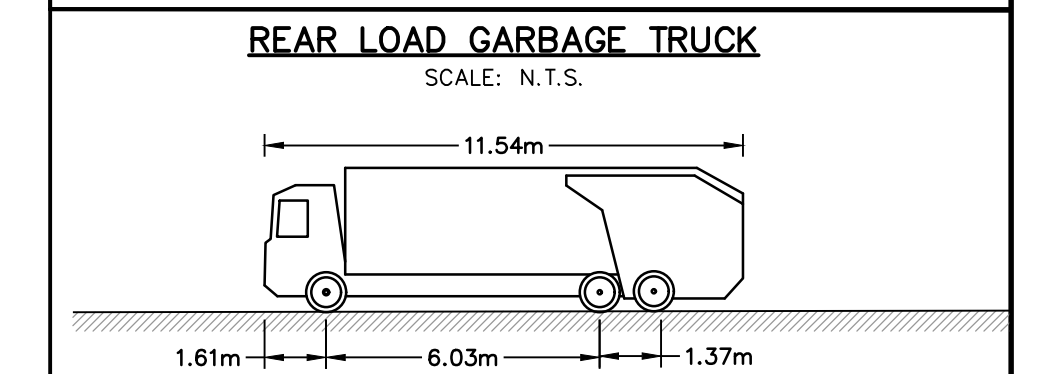
		2800 High Point Drive Suite 100 Milton, ON L9T 6P4 905-875-0026 T 905-875-4915 F www.cfcrozier.ca	
Drawn	M.C.	Design	M.C.
Check	M.L.	Check	M.L.
Project No. 1807-5430		Scale	Dwg. T.301
		Scale	1:500





LEGEND

	PROPERTY LINE
	REAR LOAD GARBAGE TRUCK
	DIRECTION OF TRUCK MOVEMENT



VEHICLE STATISTICS:

OVERALL VEHICLE LENGTH:	11.54 m
OVERALL VEHICLE WIDTH:	2.77 m
OVERALL VEHICLE HEIGHT:	3.68 m
MIN. BODY/GROUND CLEARANCE:	0.30 m
VEHICLE TRACK WIDTH:	2.77 m
LOCK-TO-LOCK TIME:	6.00 sec
CURB TO CURB TURNING RADIUS:	13.00 m

No.	ISSUE / REVISION	YYYY/MM/DD
A	FIRST SUBMISSION	2019/OCT/21

Project
BROCK ROAD DUFFINS FOREST INC.
 2055 BROCK ROAD
 CITY OF PICKERING

Drawing
 2055 BROCK ROAD
 GARBAGE TRUCK TURNING PLAN

NOT FOR CONSTRUCTION

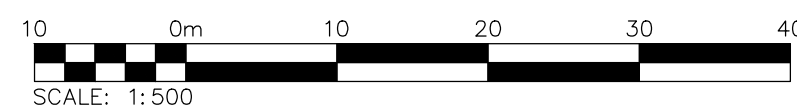
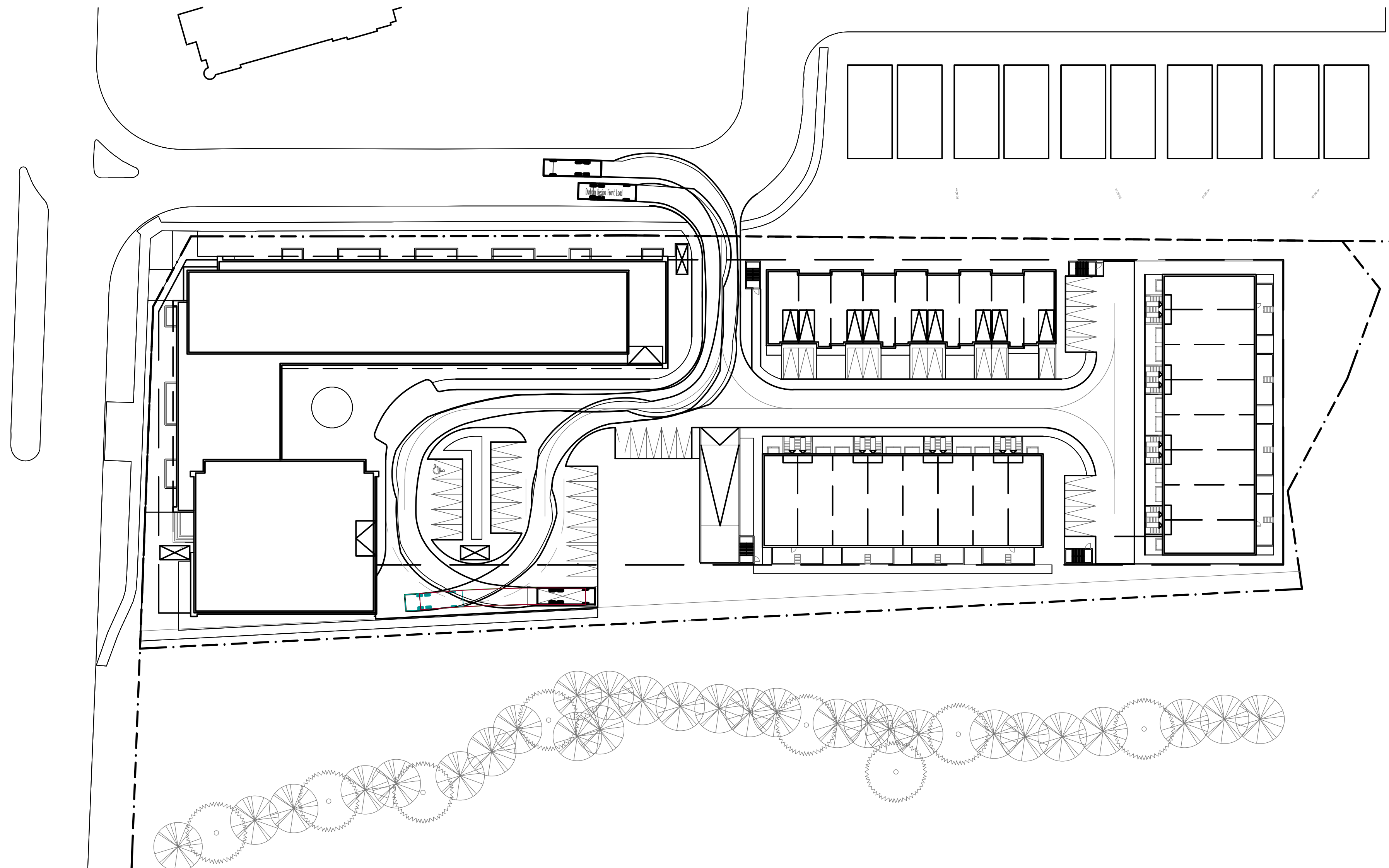
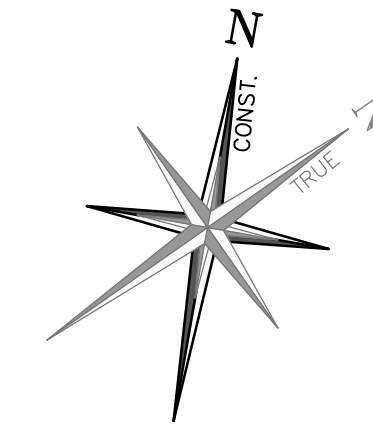
PRELIMINARY

CROZIER
CONSULTING ENGINEERS

2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca

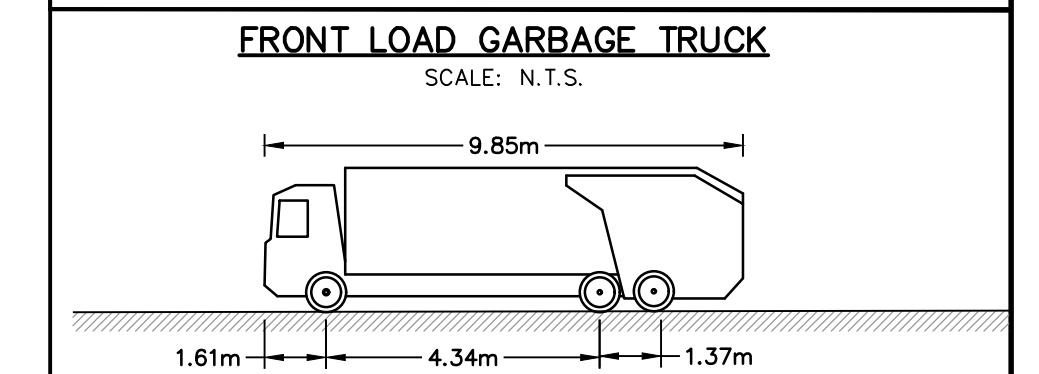
Drawn	M.C.	Design	M.C.	Project No.	1807-5430	
Check	M.L.	Check	M.L.	Scale	1:500	
					Dwg.	T.302





LEGEND

	PROPERTY LINE
	REAR LOAD GARBAGE TRUCK
	DIRECTION OF TRUCK MOVEMENT



VEHICLE STATISTICS:

OVERALL VEHICLE LENGTH:	9.85 m
OVERALL VEHICLE WIDTH:	2.77 m
OVERALL VEHICLE HEIGHT:	4.31 m
MIN. BODY/GROUND CLEARANCE:	0.30 m
VEHICLE TRACK WIDTH:	2.77 m
LOCK-TO-LOCK TIME:	6.00 sec
CURB TO CURB TURNING RADIUS:	11.50 m

No.	ISSUE / REVISION	YYYY/MM/DD
A	FIRST SUBMISSION	2019/OCT/21

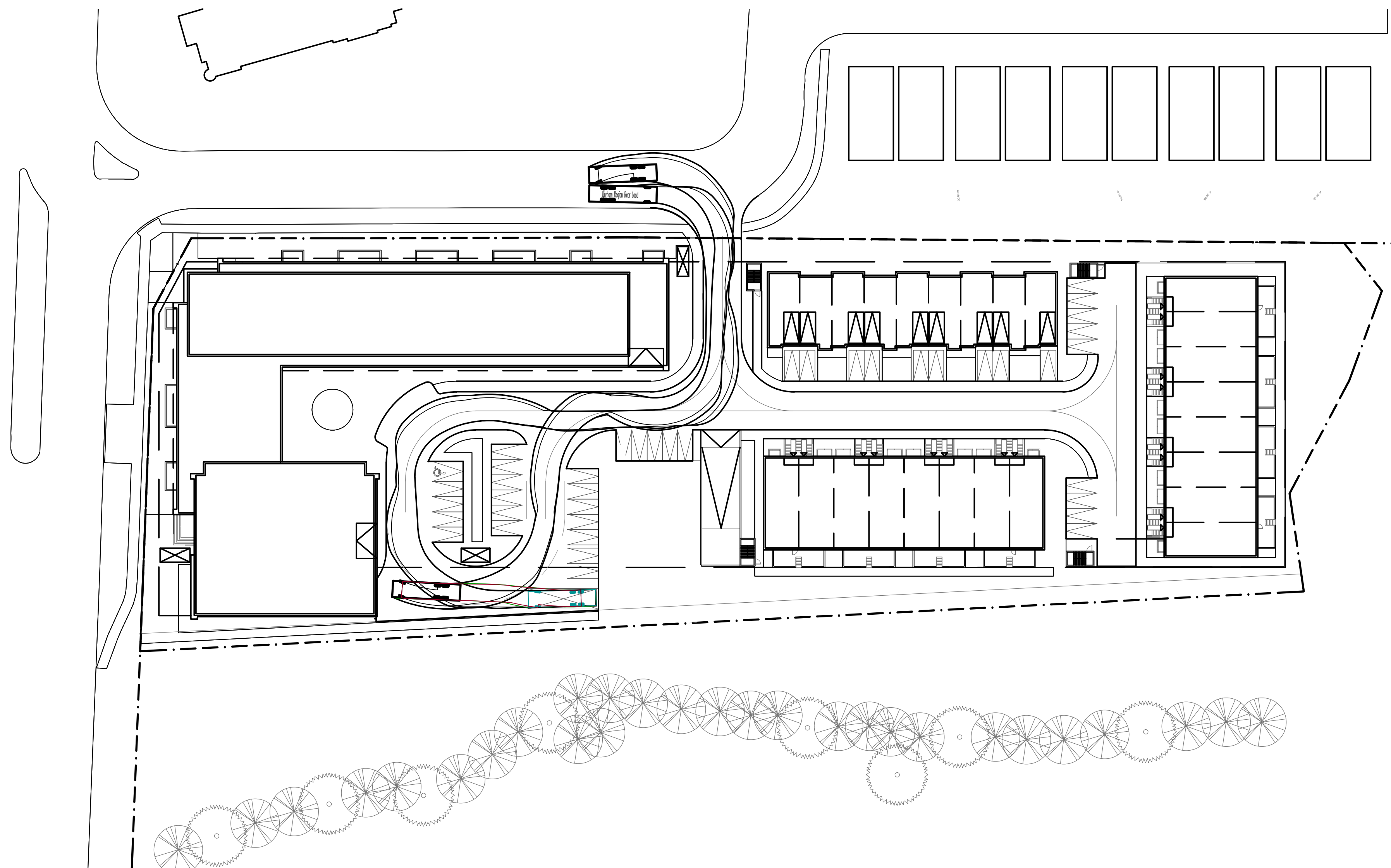
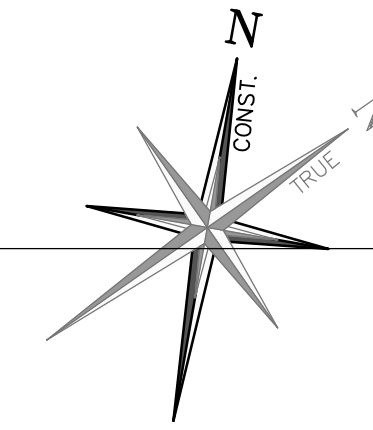
Project
BROCK ROAD DUFFINS FOREST INC.
 2055 BROCK ROAD
 CITY OF PICKERING

Drawing
2055 BROCK ROAD
GARBAGE TRUCK TURNING PLAN

NOT FOR CONSTRUCTION

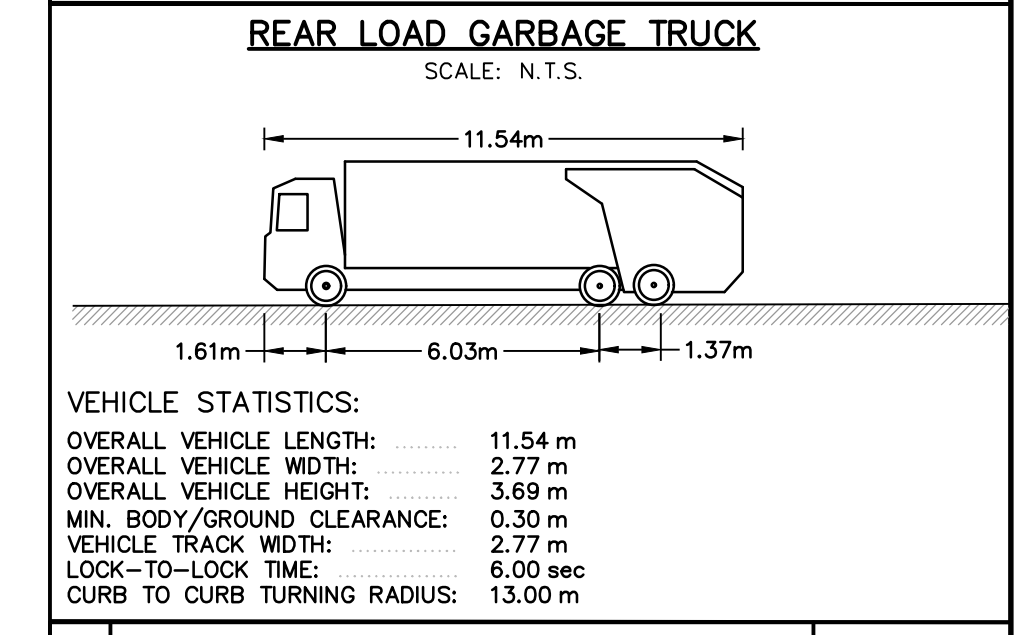
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	Project No.	1807-5430			
Drawn	M.C.	Design	M.C.	Project No.	1807-5430
Check	M.L.	Check	M.L.	Scale	1:500
				Dwg.	T.303



LEGEND

	PROPERTY LINE
	MSU TRUCK
	DIRECTION OF TRUCK MOVEMENT



No.	ISSUE / REVISION	YYYY/MM/DD
A	FIRST SUBMISSION	2019/OCT/21

Project: **BROCK ROAD DUFFINS FOREST INC.
2055 BROCK ROAD
CITY OF PICKERING**

Drawing: **2055 BROCK ROAD
GARBAGE TRUCK TURNING PLAN**

NOT FOR CONSTRUCTION

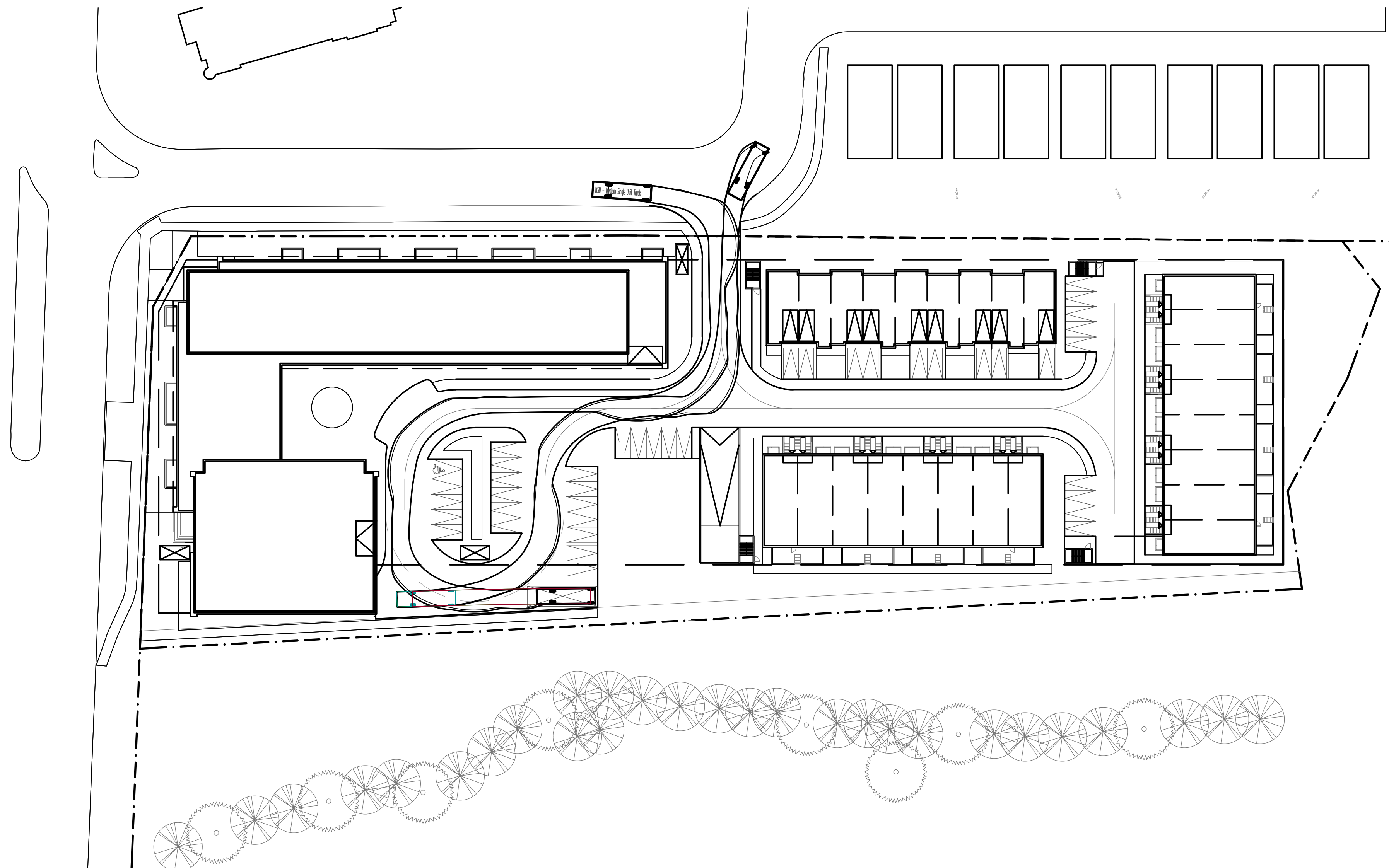
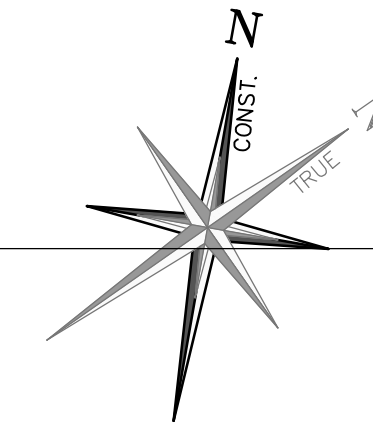
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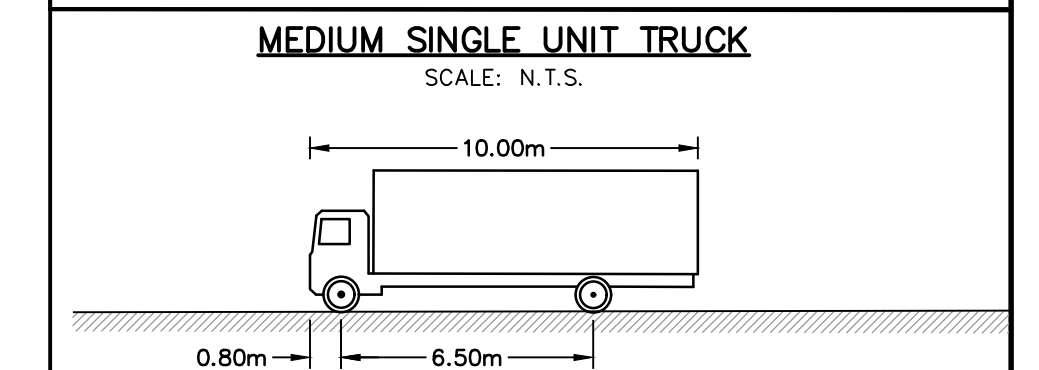
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					Dwg.	T.304





LEGEND	
	PROPERTY LINE
	MSU TRUCK
	DIRECTION OF TRUCK MOVEMENT



VEHICLE STATISTICS:

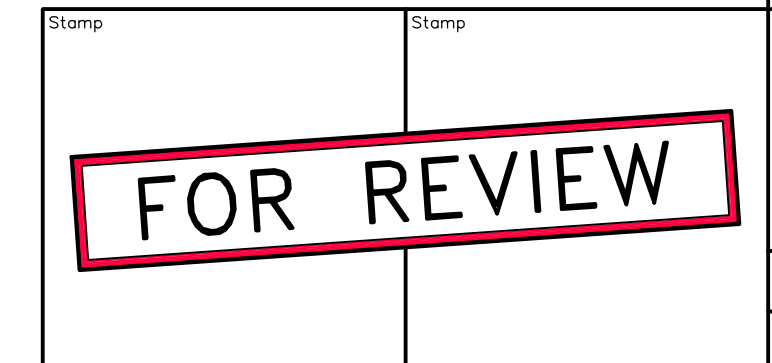
OVERALL VEHICLE LENGTH:	10.00 m
OVERALL VEHICLE WIDTH:	2.60 m
OVERALL VEHICLE HEIGHT:	3.65 m
MIN. BODY/GROUND CLEARANCE:	0.45 m
VEHICLE TRACK WIDTH:	2.60 m
LOCK-TO-LOCK TIME:	4.00 sec
CURB TO CURB TURNING RADIUS:	11.10 m

No.	ISSUE / REVISION	DATE
A	FIRST SUBMISSION	2019/OCT/21

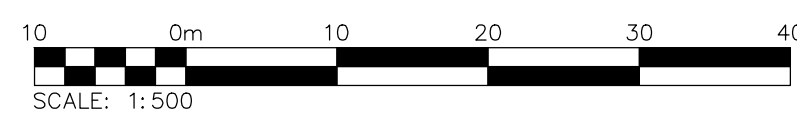
Project
BROCK ROAD DUFFINS FOREST INC.
 2055 BROCK ROAD
 CITY OF PICKERING

Drawing
2055 BROCK ROAD
MSU TRUCK TURNING PLAN

NOT FOR CONSTRUCTION



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Drawn	M.C.	Design	M.C.
Check	M.L.	Check	M.L.
Project No. 1807-5430		Scale	1:500
		Dwg.	T.305



Appendix K

TDM Reductions

**Table K1
TDM Expected Trip Reductions**

TDM Measure	Expected Trip Reductions	Reference
Promotions, Marketing	3% - 5%	(Vermont Agency of Transportation, February 2016)
Design site to support transit and walk access	1% - 2% for moderate transit services	(Vermont Agency of Transportation, February 2016)
Secure Bicycle Parking	0.5% - 1%	(Vermont Agency of Transportation, February 2016)
Bicycle Path	0.5% - 1%	(Vermont Agency of Transportation, February 2016)
Financial Incentives (Presto Card, Transit Discounts)	Basic Financial Incentives: 1% - 5%	(Vermont Agency of Transportation, February 2016)
Comprehensive (Combination of) TDM Measures	10% – 30%	(Victoria Transport Policy Institute, March 2016) (Vermont Agency of Transportation, February 2016)

Each TDM strategy's effectiveness has historically varied between studies and locations due to a range of factors. It is noted that a comprehensive suite of TDM measures will not equate to the sum of the above indicated trip reductions. It is generally expected that a simple information and promotional strategy will reduce auto trips of approximately 3% to 5% while a combination of TDM strategy is expected to reduce auto trips of 10% to 30%.

FIGURES

Site Information & Density	
Official Plan Designation:	"Urban Residential Area - Medium Density Area"
Zoning Designation:	RH/MU-3 & OS-HL
Survey Information	
Plan Survey of Part of Lot 19, Concession 2	Registered Plan 29297
City of Pickering	Prepared by:
VERHAEGEN STUBBERFIELD HARTLEY BREWER	BEZAIRE INC.
944 OTTAWA STREET	WINDSOR ON
T: 519-258-1772	

Lot / Site Area	
Total Lot Area:	50,478 sm
Developable Area:	13,115 sm
Area to be Conveyed:	37,363 sm
Proposed Density	
Units per hectare:	289.74
FSI:	2.28
Coverage	
Building Coverage:	36% 4745 sm
Softscape:	25% 3285 sm
Hardscape:	39% 5085 sm
Gross Floor Area	
Proposed Building A:	21,867 sm
Proposed Building B:	1,662 sm
Proposed Building C:	3,207 sm
Proposed Building D:	3,207 sm
Total GFA:	29,942 sm

Building Heights		
Proposed Height of Building A		
Stores	Height	
Podium / Tower	4 / 20	61.60 m
Established Grade:		91.22 m
Proposed Height of Building B		
Stores	Height	
	3	10.38 m
Established Grade:		90.05 m
Proposed Height of Building C		
Stores	Height	
	3	15.30 m
Established Grade:		88.92 m
Proposed Height of Building D		
Stores	Height	
	3	15.30 m
Established Grade:		88.92 m

Residential Unit Count			
Proposed Total Unit Count			
380			
Proposed Building A Unit Count			
'Apartment Dwelling'			
Bachelor	1 Bed	2 Bed	3 Bed
0	186	97	24
0%	61%	32%	8%
Total Building A Unit Count: 307			
Proposed Building B Unit Count			
'Street Townhouse Dwelling'			
Bachelor	1 Bed	2 Bed	3 Bed
0	0	0	9
100%			
Total Building B Unit Count: 9			

Proposed Building C Unit Count			
'Stacked Dwelling'			
Bachelor	1 Bed	2 Bed	3 Bed
0	0	32	0
100%			
Total Building C Unit Count: 32			
Proposed Building D Unit Count			
'Stacked Dwelling'			
Bachelor	1 Bed	2 Bed	3 Bed
0	0	28	0
88%			
Total Building D Unit Count: 32			

Vehicular Parking			
As per Zoning Bylaw 7085/10			
	Rate	Required	Proposed
Apartment Dwelling:	1.0 / unit	307	307
Apartment Visitor:	0.25 / unit	77	77
Stacked TH Dwelling:	1.25 / unit	80	80
Stacked Visitor:	0.25 / unit	16	16
Townhouse Dwelling:	2.0 / unit	18	18
Townhouse Visitor:	0.25 / unit	3	3
Surplus:			1
Total:		501	502
Vehicular Parking Summary			
Surface			Proposed
Townhouse	Attached Garage		9
	Driveway		9
U/G Garage	P1 Level		310
	P2 Level		142
TOTAL:			502

Bicycle Parking			
As per Zoning Bylaw 7553/17			
	Rate	Required	Proposed
Apartment Dwelling:	0.5 / unit	154	154
Stacked TH Dwelling:	1.0 / unit	64	64
Total:		218	218
Loading Spaces			
As per Zoning Bylaw 7553/17			
	Rate	Required	Proposed
Total:		1	1

Amenity Area			
*As per Zoning Bylaw 7553/17			
	Rate	Required	Proposed
Indoor	2sm / unit	614 sm	617 sm
Outdoor	2sm / unit	614 sm	1,152 sm

Kohn
 Kohn Partnership Architects Inc.
 116 Spadina Avenue, Suite 501, Toronto ON M5V 2K6
 Tel 416.703.6700 www.kohnarchitects.com

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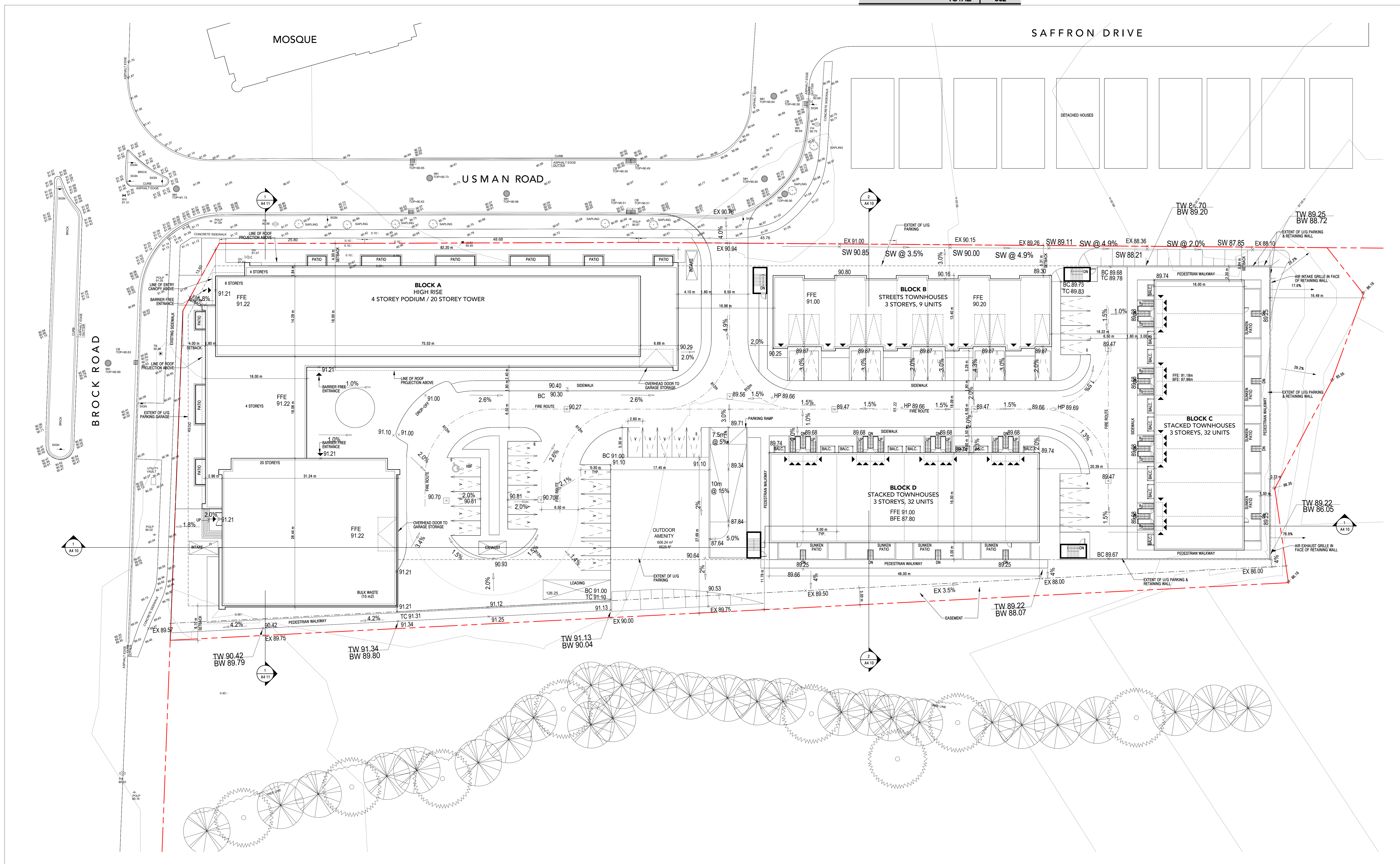
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ISSUE DATES AND DISTRIBUTION LOG

No.	Date	Note
1	2019-08-28	ISSUED FOR COORDINATION
2	2019-10-30	ISSUED FOR COORDINATION
3	2019-11-21	ISSUED FOR COORDINATION
4	2020-02-20	ISSUED FOR COORDINATION



SITE PLAN SYMBOL AND SIGN LEGEND:

- PRINCIPLE ENTRANCE (FOR FIRE FIGHTING)
- ENTRANCE TO RETAIL OR GRADE RELATED RES. UNIT
- CATCH BASIN (REFER TO CIVIL DWGS.)
- AREA DRAIN (REFER TO CIVIL DWGS.)
- TRENCH DRAIN (REFER TO CIVIL DWGS.)
- MANHOLE (REFER TO CIVIL DWGS.)
- FIRE HYDRANT
- SIAMASEE (STANDPIPE) CONNECTION
- ACCESSIBLE PARKING SIGNAGE
- FIRE ROUTE SIGNAGE
- LIGHT STANDARD (EXTERIOR POLE FIXTURE)
- LIGHT MOUNTED EXTERIOR LIGHT FIXTURE
- ACCESSIBLE CURB CUT
- BARRIER FREE PARKING SPACE

PROJECT NORTH **TRUE NORTH**

ONTARIO ASSOCIATION OF ARCHITECTS
 HARRY KOHN LICENCE 5337 SEAL

Project: **2055 BROCK ROAD**
 BROCK RD DUFFINS FOREST INC.

PICKERING ON

Drawing Title: **ENLARGED SITE PLAN & STATISTICS**

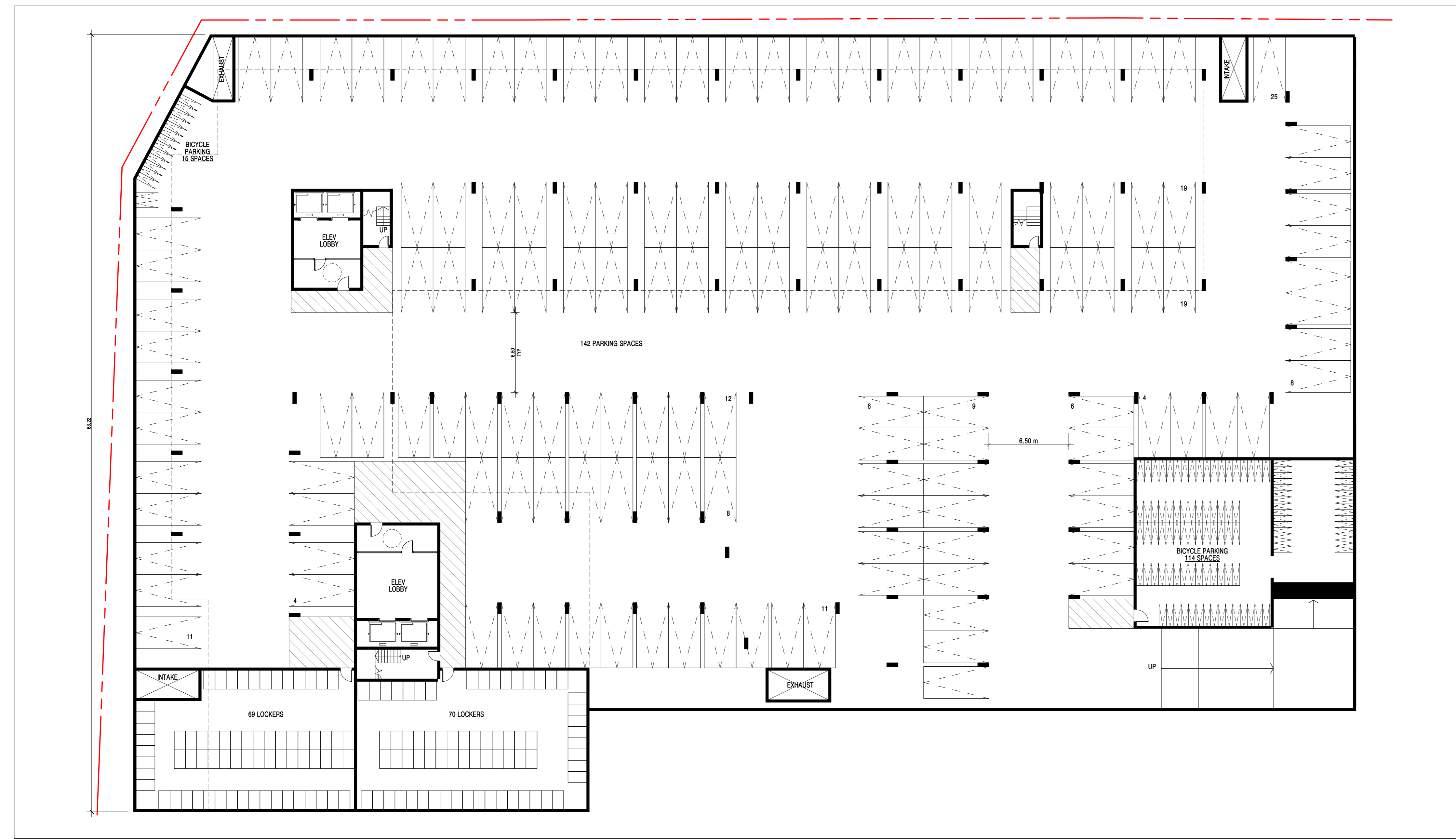
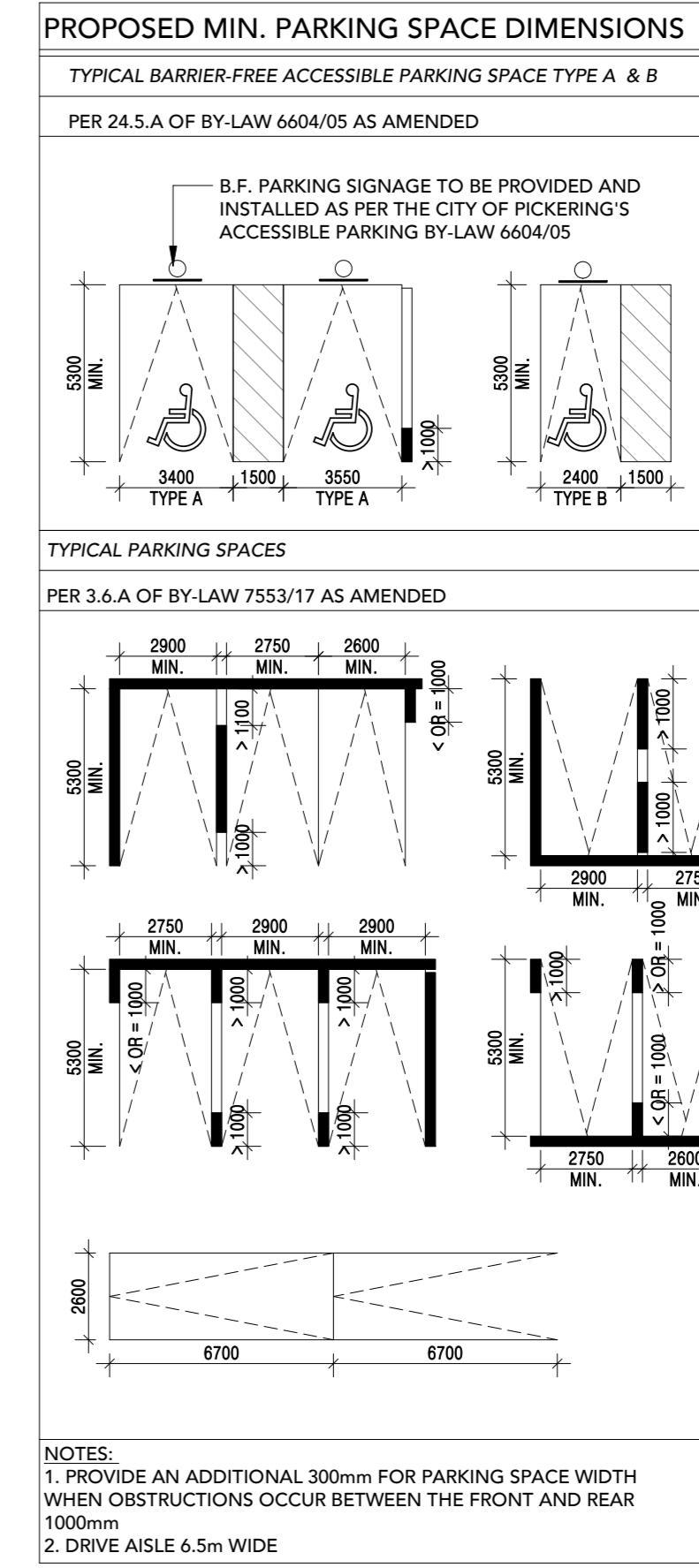
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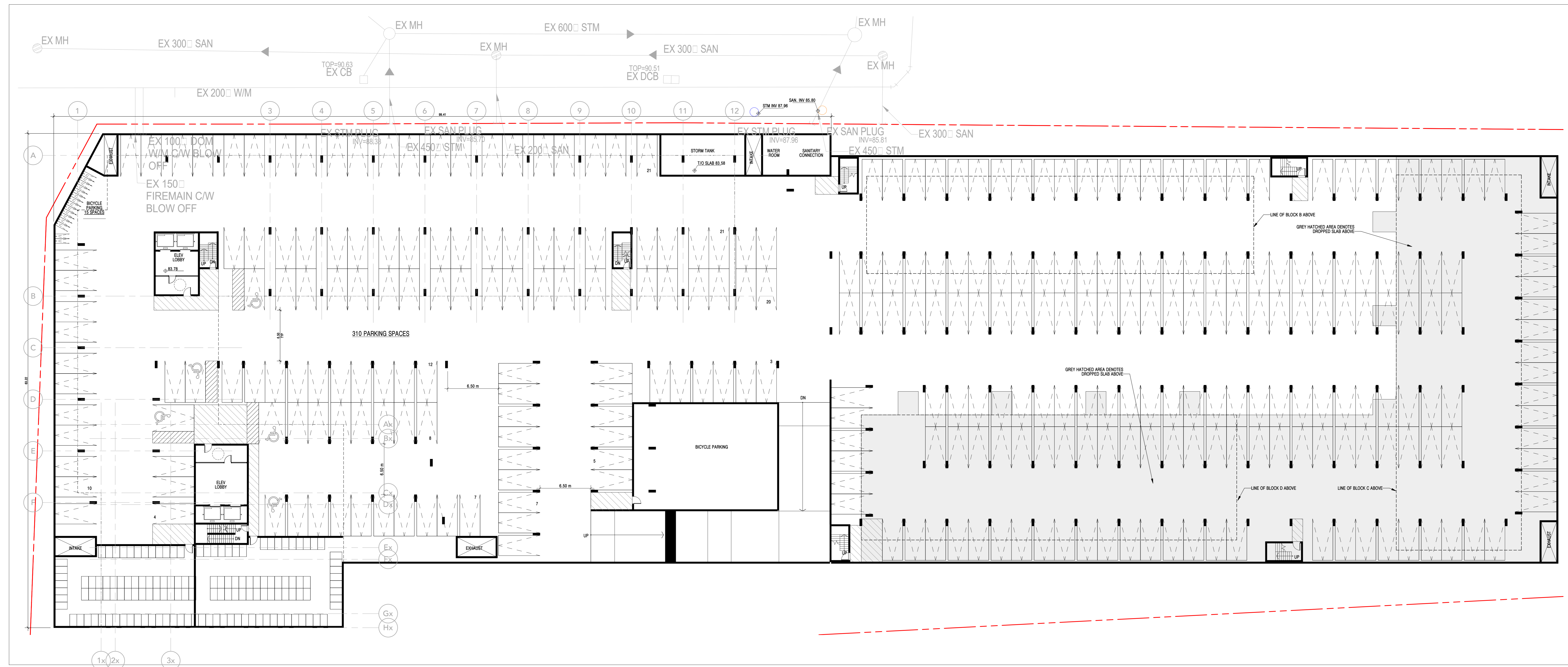
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2	2019-10-30	ISSUED FOR COORDINATION
3	2019-11-21	ISSUED FOR COORDINATION
4	2020-02-20	ISSUED FOR COORDINATION



FLOOR PLAN - LEVEL P2
 SCALE: 1 : 200



FLOOR PLAN - LEVEL P1
 SCALE: 1 : 200

PARKING FLOOR PLAN (BELOW GRADE) LEGEND:

- CATCH BASIN (REFER TO CIVIL DWGS.)
- AREA DRAIN (REFER TO CIVIL DWGS.)
- TRENCH DRAIN (REFER TO CIVIL DWGS.)
- ELECTRIC VEHICLE CHARGING STATION
- WARNING SYSTEM FOR MOTORISTS
- CONVEX MIRROR
- FIRE HOSE CABINET
- PAINTED YELLOW LINES (PEDESTRIAN PATHWAYS)
- PAINTED PARKING SPACE NUMBERING
- BICYCLE STORAGE (LONG TERM PARKING SPACE)
- STORAGE LOCKER
- ACCESSIBLE PARKING SIGNAGE
- BARRIER FREE PARKING SPACE



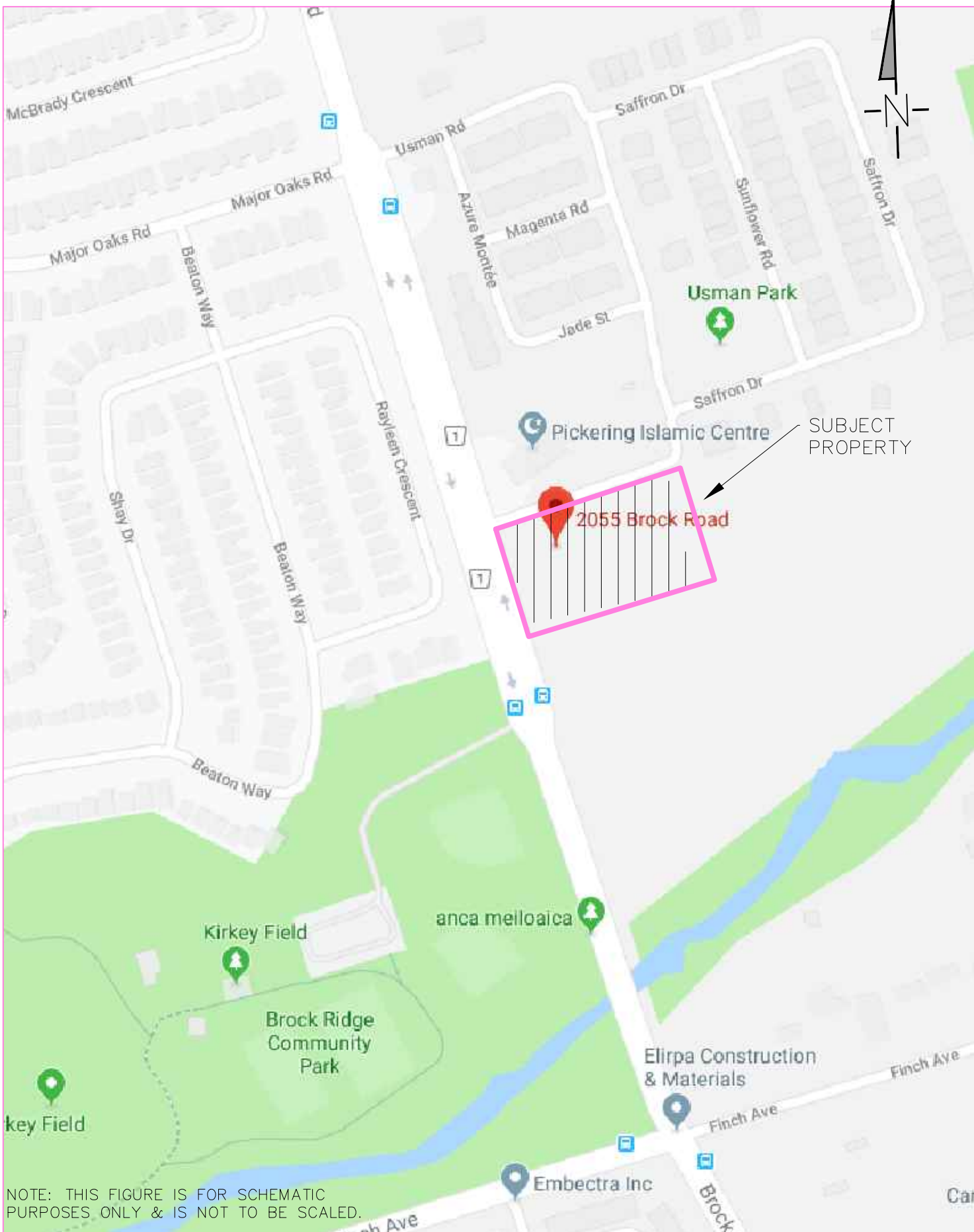
PROJECT NORTH
 TRUE NORTH

PICKERING ON


LEVEL P1 & P2
 FLOOR PLAN

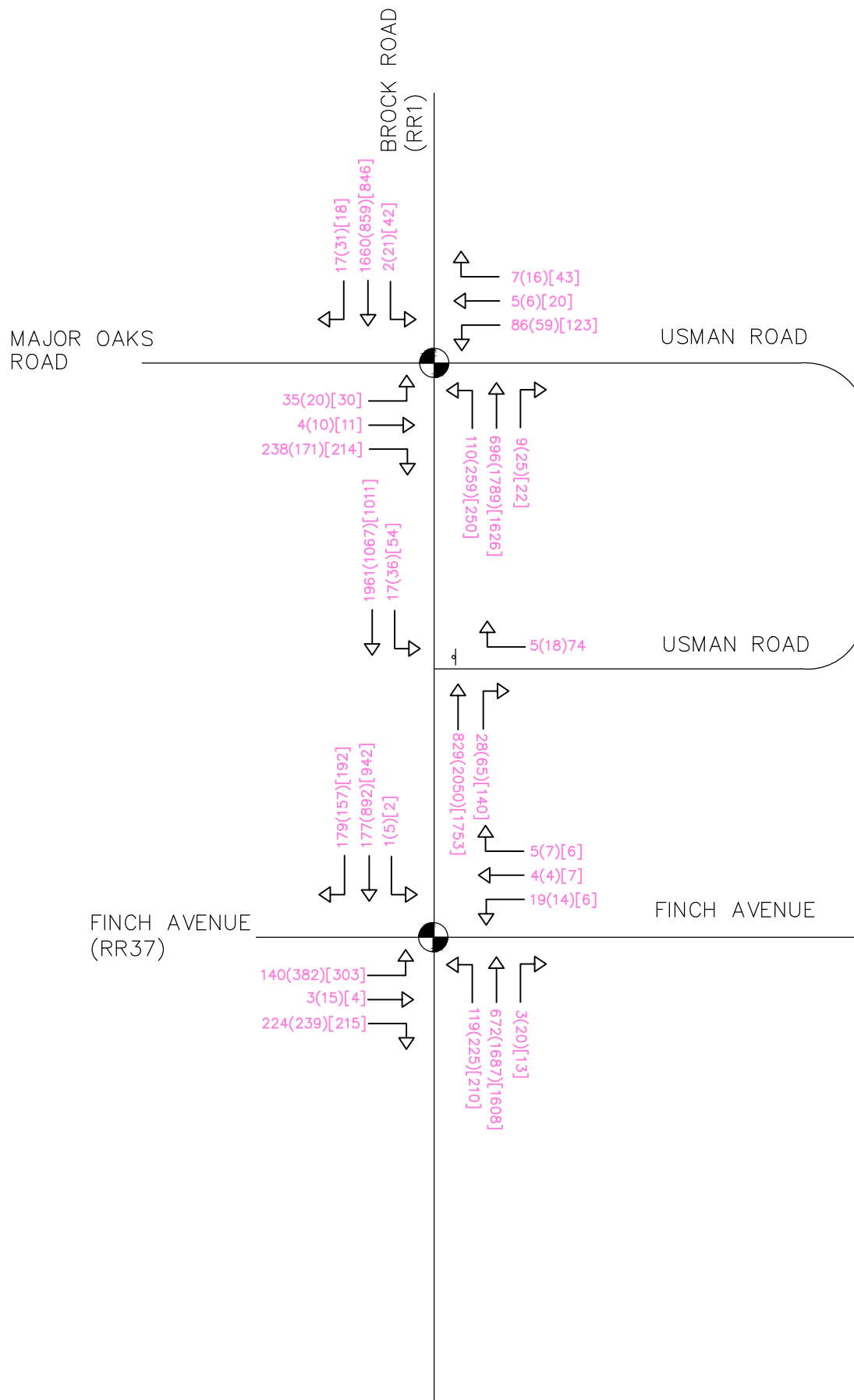
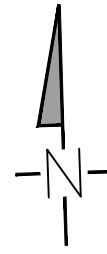
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 Building No.:
 Project No.: 17-119
 Scale: As indicated
 Drawing No.:

A2 00



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Legend	Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road		 CROZIER & ASSOCIATES Consulting Engineers <small>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA</small>				
	Drawing	SITE LOCATION						
Drawn By		M.J.	Design By	M.J.	Project	1807-5430		
Scale		N.T.S.	Date	OCT 4, 2019	Check By	M.C.	Drawing	FIG. 2



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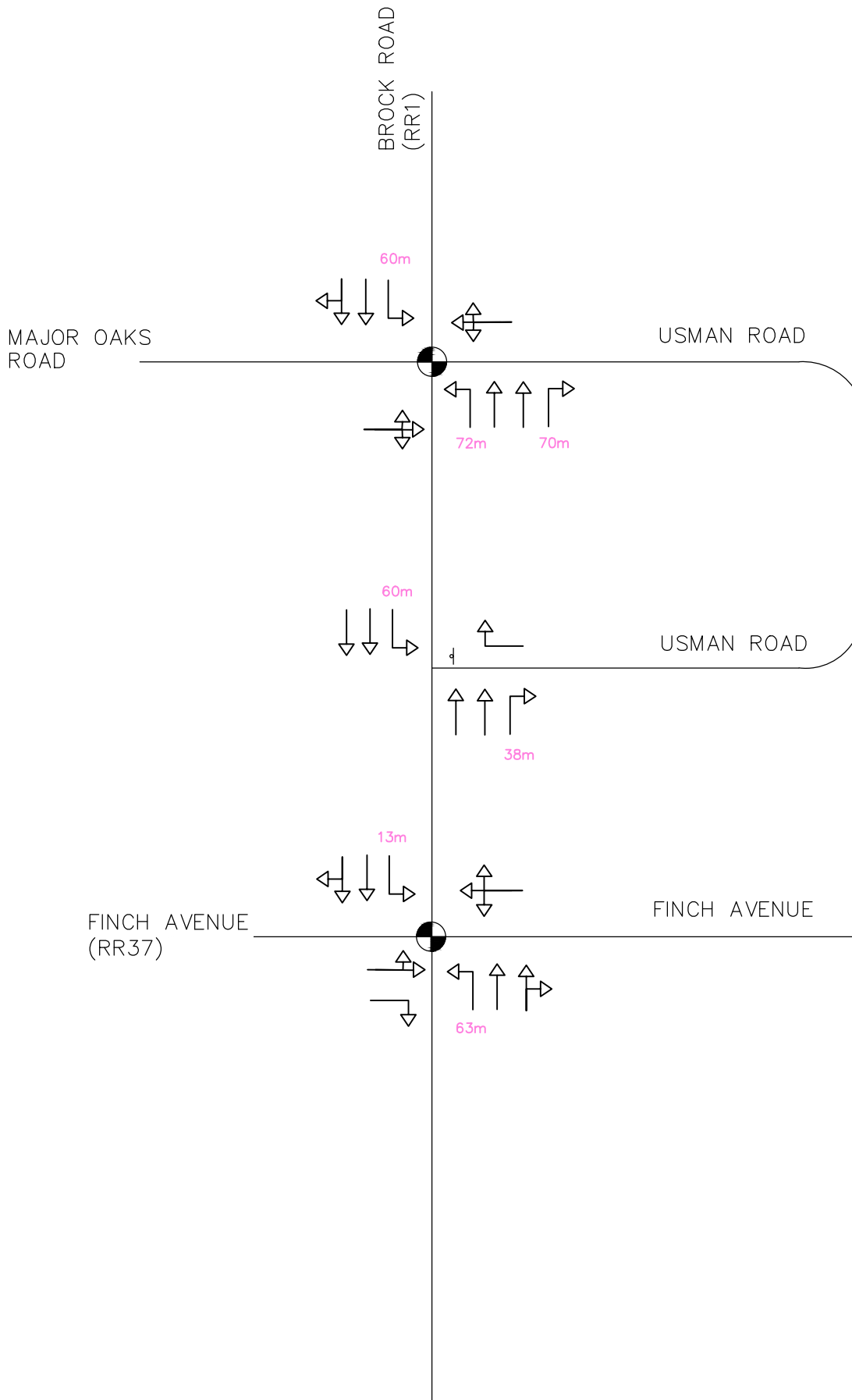
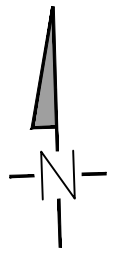
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	STOP CONTROL
XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	2019 Existing Traffic	

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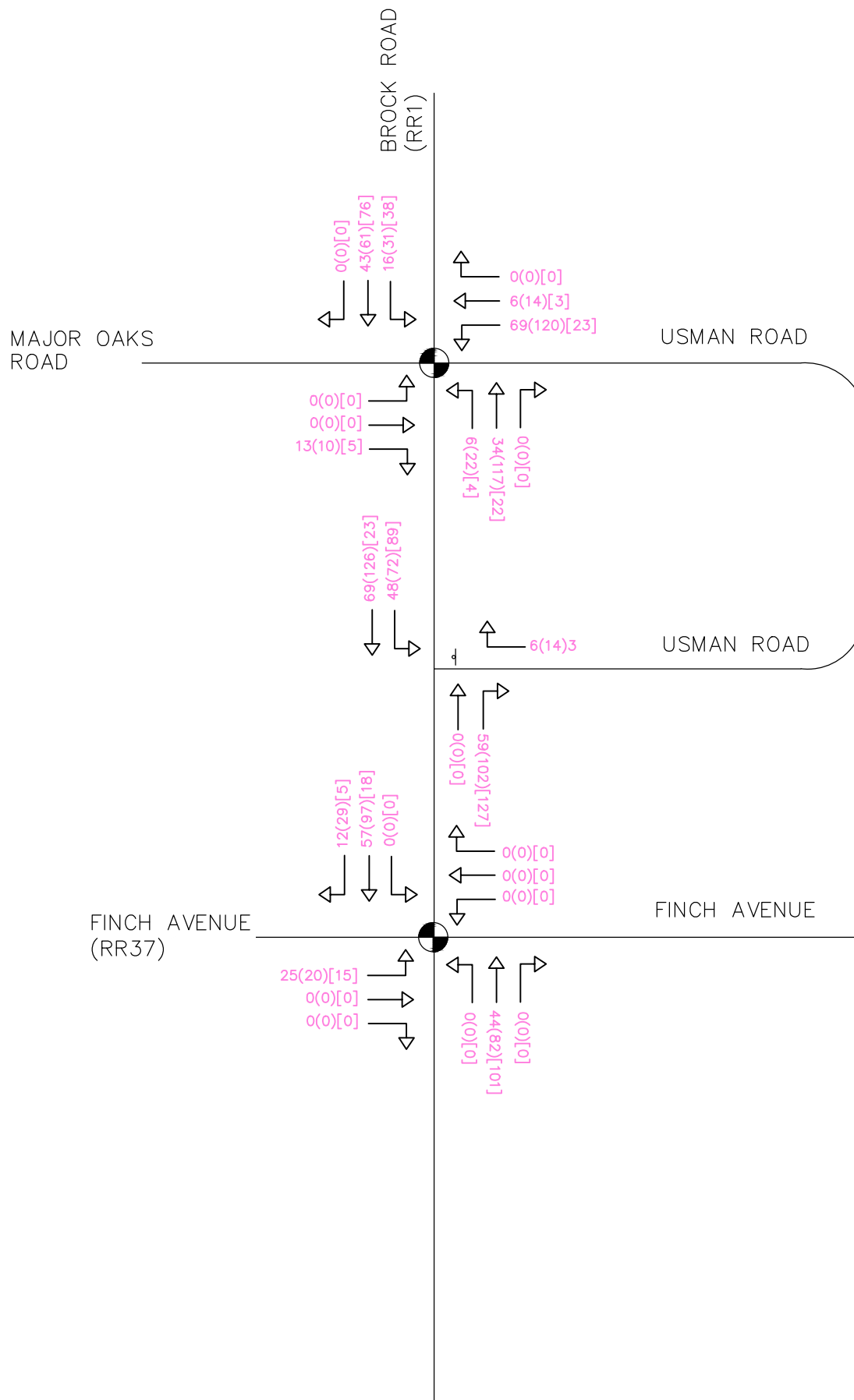
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Drawn By	M.J.	Design By	M.J.	Project	1807-5430	
Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.	
					Drawing	FIG. 3



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Legend	Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road		 CROZIER & ASSOCIATES Consulting Engineers <small>The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3 705 446-3510 T 705 446-3520 F www.ccrozier.ca info@ccrozier.ca</small>				
	Drawing	Boundary Road Network						
Drawn By		S.A.	Design By	M.J.	Project	1807-5430		
Scale		N.T.S.	Date	OCT 4, 2019	Check By	M.C.	Drawing	FIG. 4



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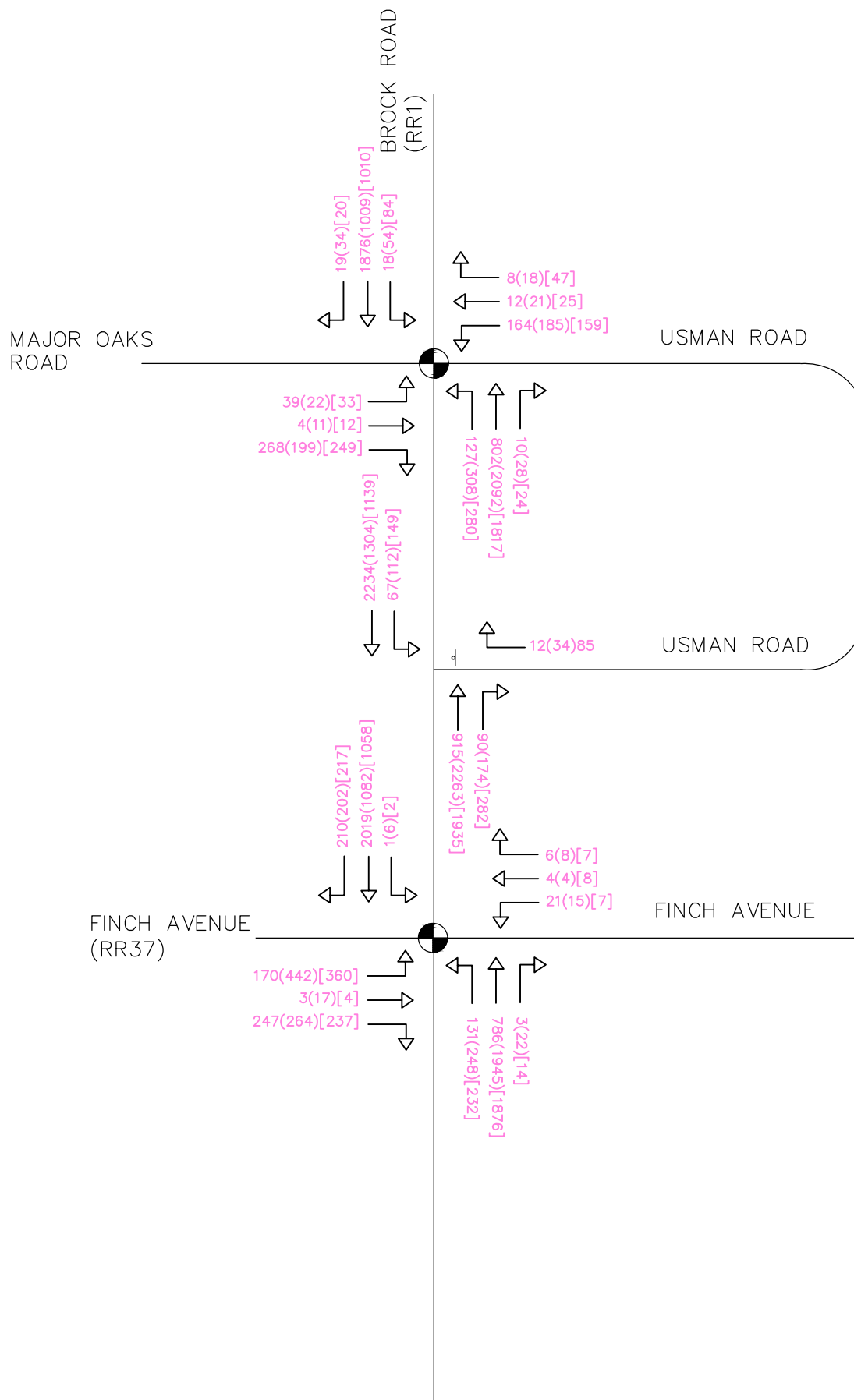
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	STOP CONTROL
XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	Background Development: 2071 Brock Road	

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Drawn By	S.A.	Design By	M.J.	Project	1807-5430
Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.

Drawing FIG. 5



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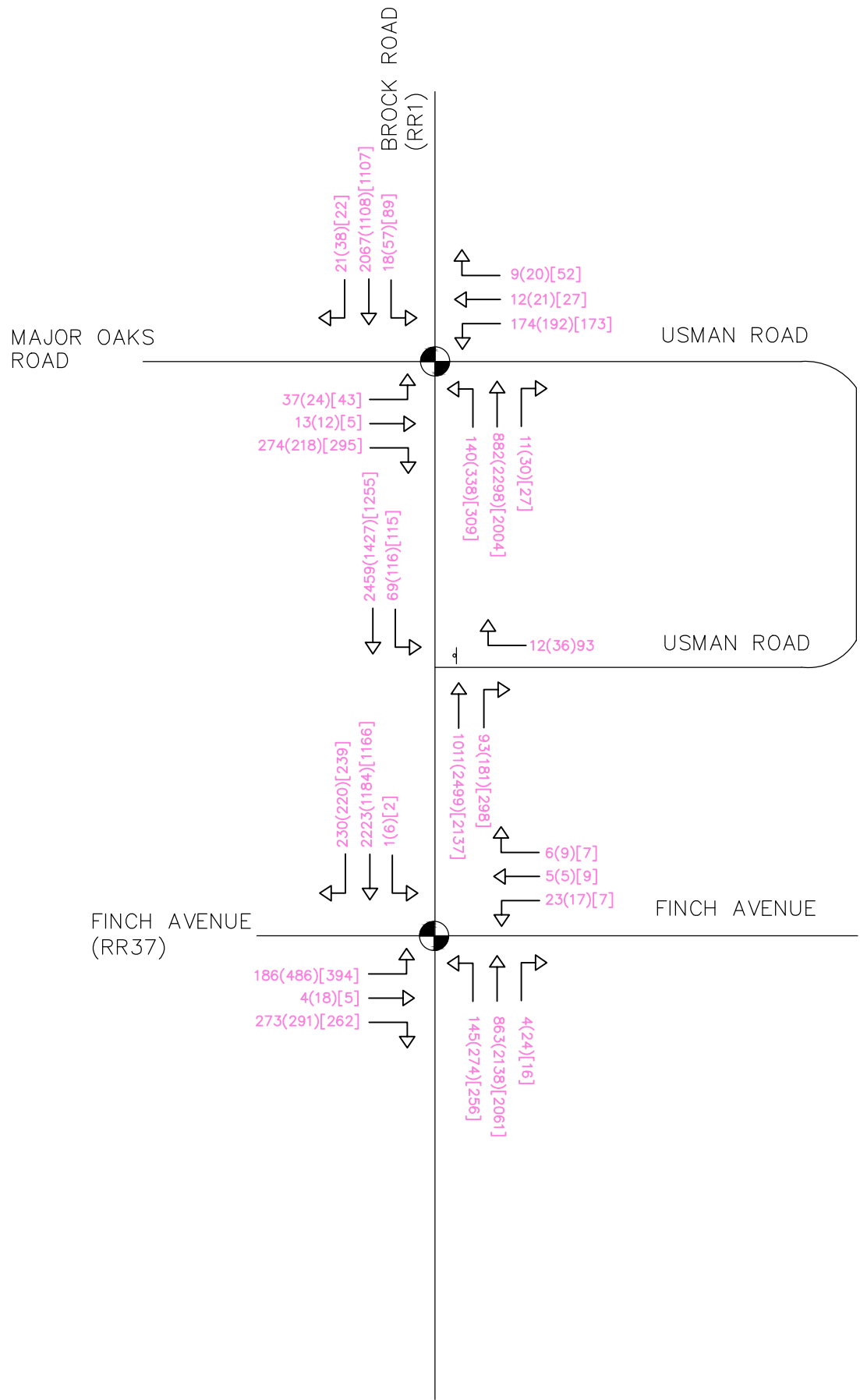
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XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	2024 Future Background	

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Drawn By	S.A.	Design By	M.J.	Project	1807-5430
Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.
					Drawing FIG. 6



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	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	2029 Future Background	

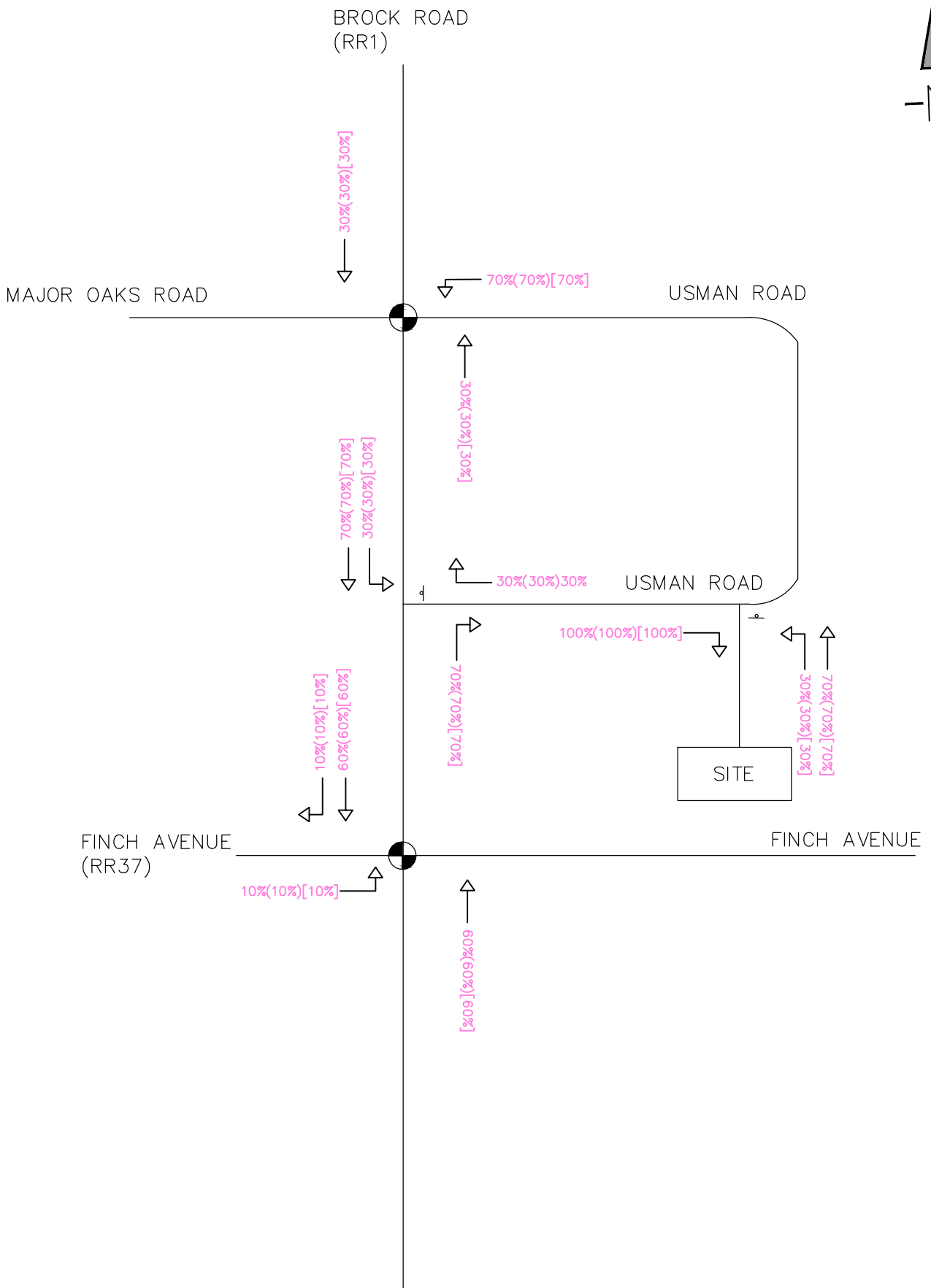
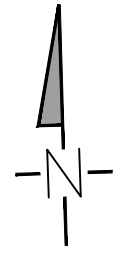


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Drawn By	S.A.	Design By	M.J.	Project	1807-5430
Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.

DRAWING FIG. 7



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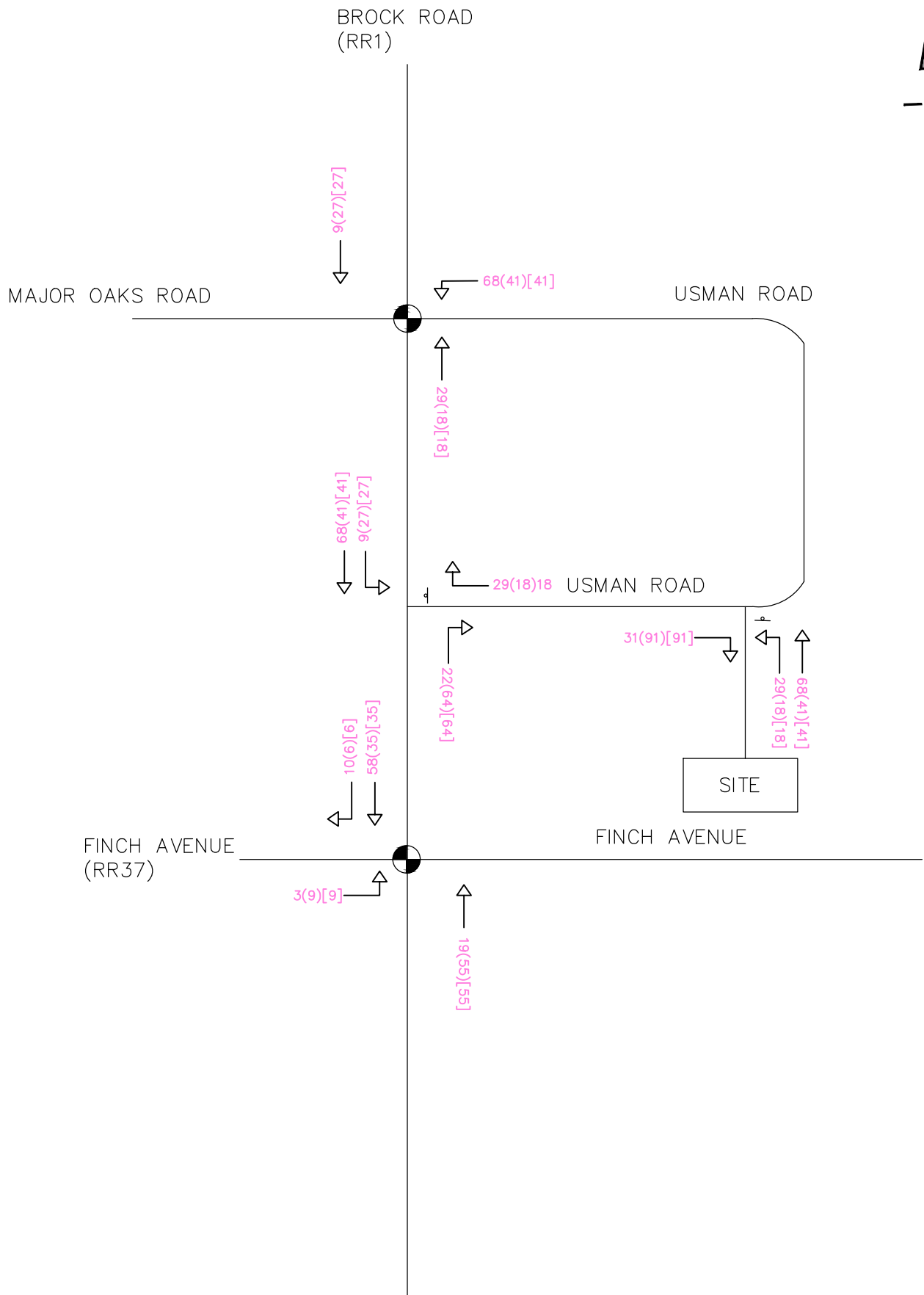
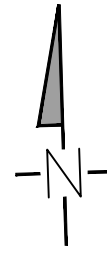
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	STOP CONTROL
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Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	Trip Distribution	

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Drawn By	S.A.	Design By	M.J.	Project	1807-5430
Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.
					Drawing FIG. 8



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	Trip Assignment	

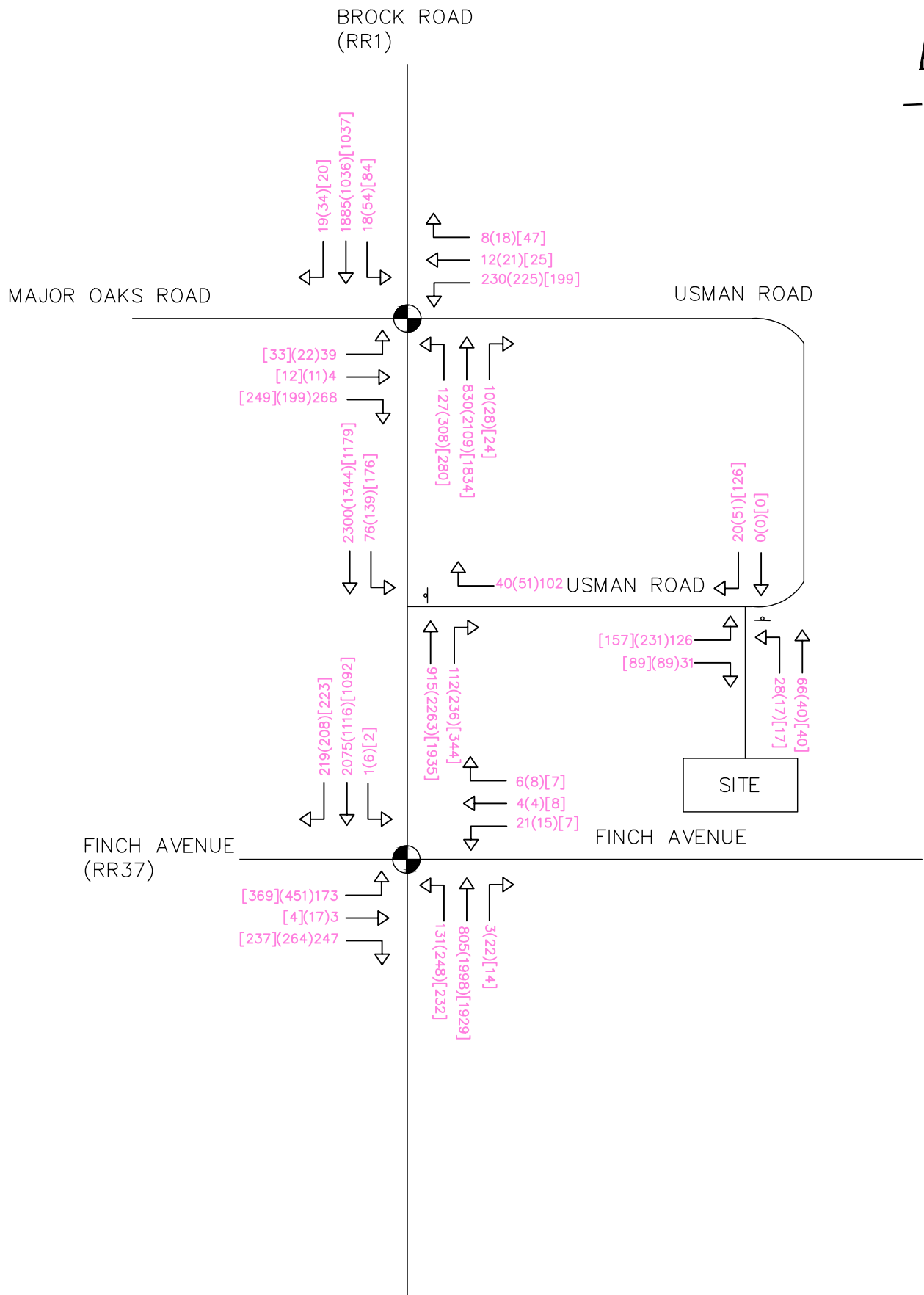
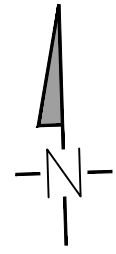


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Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.

FIG. 9



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

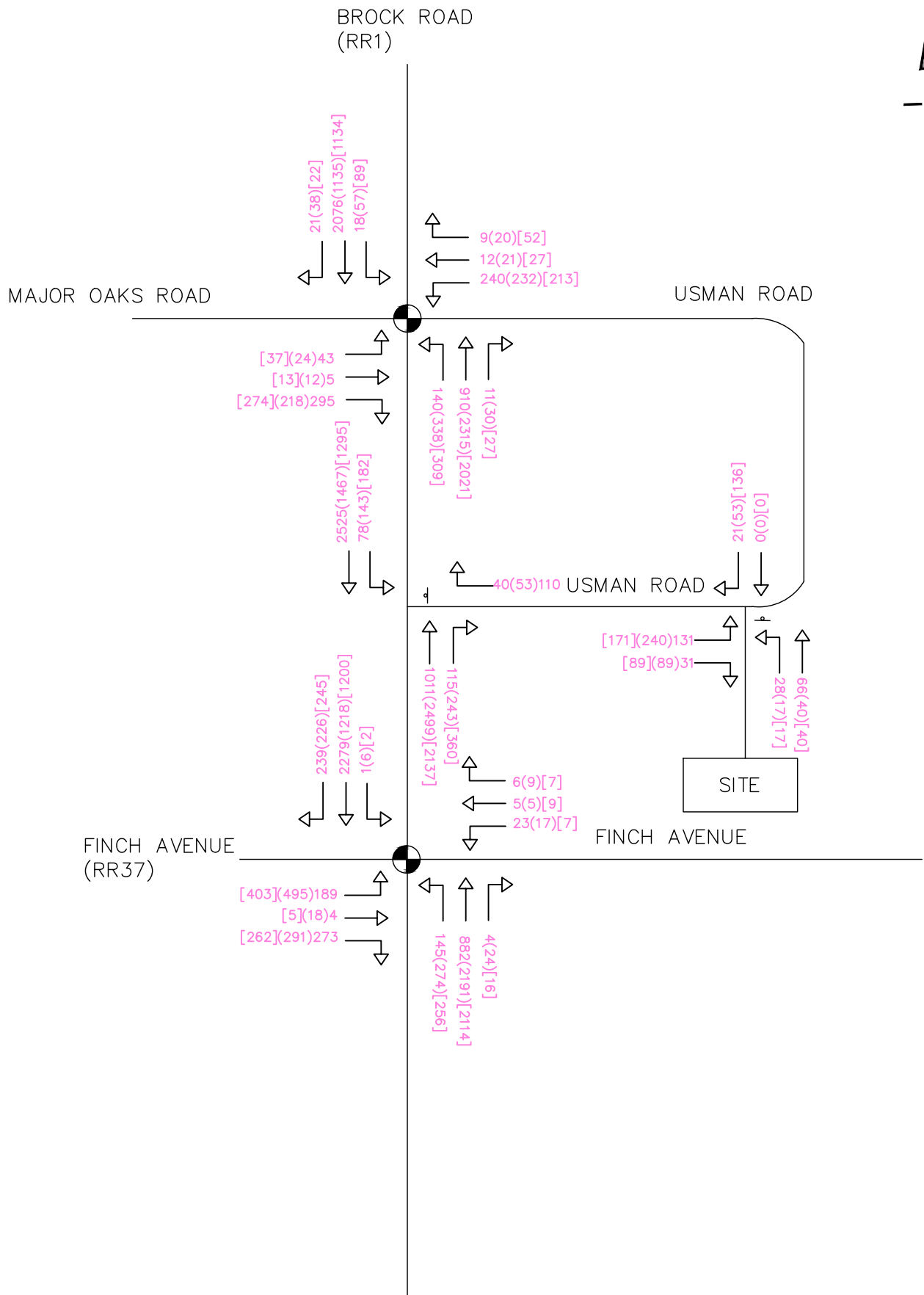
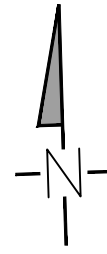
Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	2024 Future Total	

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Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.

FIG. 10



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

	SIGNAL CONTROL
	STOP CONTROL
XX(YY)	A.M. (P.M.) [FRIDAY] PEAK HOUR TRAFFIC VOLUMES

Project	2055 Brock Road Duffins Forest Inc. 2055 Brock Road	
Drawing	2029 Future Total	

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Scale	N.T.S.	Date	OCT 4, 2019	Check By	M.C.

FIG. 11