TRANSPORTATION STUDY

- Traffic Impact Study
- Parking Justification Study
- Site Circulation / Waste Management Plan
- Transportation Demand Management Plan

Proposed Residential Development
2660, 2670, 2680 Brock Road
City of Pickering, ON

October 2022

Prepared for
The Brock Zents Partnership

TRANS-PLAN
Transportation Engineering

785 Dundas St W
Toronto, ON, M6J 1V2

1 (647) 931 7383
1 (877) 668 8784

trans-plan.com
admin@trans-plan.com

TRANS-PLAN

785 Dundas St W
Toronto, ON M6J 1V2

1 (877) 668 8784
1 (647) 931 7383

admin@trans-plan.com
trans-plan.com

October 26, 2022

The Brock Zents Partnership
Mr. Jack Greenberg
181 Eglinton Avenue East, Suite #204
Toronto, Ontario M4P 1J4

Re: 2660 – 2680 Brock Road, City of Pickering, Ontario, Proposed Residential Development – Transportation Study

TRANS-PLAN is pleased to submit this Transportation Study in support of the proposed residential development to be located at 2660 – 2680 Brock Road, in the southwest quadrant of Brock Road and Zents Drive in the City of Pickering, Ontario.

The proposed development consists of 195 residential stacked townhome units, with 434 parking spaces provided on-site. Access to the site is proposed through a full-moves access along the future north-south local road at the west limit of the site as well as a RIRO access connection. Both accesses connect to the internal driveway within the site.

Our traffic impact study findings indicate that the proposed development is acceptable for traffic operations, with no roadway improvements required to support the subject site, other than construction of the new north-south roadway to the west of the subject site. Implementation of a protected northbound left turn phase at the intersection of Brock Road and Dersan Street / William Jackson Drive is recommended by 2025 to support the increase in traffic along the roadway.

The proposed parking supply of 434 parking spaces meet the City of Pickering Zoning By-law 3037 requirement of 391 parking spaces. An on-site vehicle circulation review was completed to demonstrate the proper circulation of waste collection vehicles, loading trucks, and fire trucks within the site.

A transportation demand management plan is included, discussing the active transportation within the study area and to encourage alternative modes of travel to and from the site for residents and visitors.

Sincerely,

Anil Seegobin, P.Eng.
Partner, Engineer

Trans-Plan Transportation Inc.
Transportation Consultants

Charles Chung
Traffic Analyst

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

Trans-Plan has been retained by The Brock Zents Partnership to complete a Transportation Study for a proposed residential development located at 2660 – 2680 Brock Road, in the City of Pickering. This report includes the following study components:

Traffic Impact Study

- a review and assessment of the existing road network
- an assessment of future background conditions based on anticipated traffic growth, area developments and planned transportation improvements in the study area
- an assessment of the impact of site-generated traffic on the study area intersections and proposed boundary roadway connections under future traffic conditions
- recommendations of roadway and intersection improvements, as required, to accommodate the proposed development and mitigate any identified traffic impacts on the boundary roadways

Parking Justification Study

- a review of site parking supply and requirements based on the City of Pickering's current Zoning By-law
- a review of modal split and auto ownership within the study area
- recommendations to accommodate the future parking demand

Site Circulation Review / Waste Management Plan

- a vehicle turning template review for the circulation of design vehicles expected to use the site
- a review of the proposed site access, and the internal driveway design dimensions
- discussion on how a waste collection vehicle can accomplish waste collection for the residential development

Transportation Demand Management Plan

- a discussion of active transportation in the study area and for the site
- a plan to encourage a reduction in single-occupant vehicle travel to and from the site and increase residents' awareness of alternative travel options

Prior to commencing this study, Transportation and Planning staff at Durham Region and the City of Pickering were contacted to further discuss our scope and methodology and were provided with a study Terms of Reference. This report follows Durham Region Traffic Impact Study Guidelines, and comments received from City and Region staff were incorporated in our study.

2. SITE LOCATION

The site location, shown in Figure 1, is municipally known as 2660 – 2680 Brock Road, in the City of Pickering. The lot is located at the southwest quadrant of Brock Road and Zents Drive. The site is located within the Duffin Heights Neighbourhood, which has been developing several residential subdivisions

since 2012.

Surrounding land uses in the study area are mainly residential areas with green space. A number of residential use developments are currently being constructed / planned along Brock Road. The Devi Mandir Hindu Temple is located south of the subject site, and the Pickering Golf Club is located east of the site. The Canadian Pacific rail line runs north of the subject site.

3. PROPOSED DEVELOPMENT

A site plan of the proposed residential development is provided in Figure 2. The proposed development consists of 195 residential units through 17 blocks of 3-storey stacked townhomes. 434 parking spaces are provided on the ground level, with 390 spaces provided for residents through two driveway spaces each, and 44 spaces provided for visitors.

Access to the subject site is proposed through a full-moves access along the future north-south local road at the west limit of the site, as well as a right-in and right-out access at the north-west limit of the site.

4. EXISTING CONDITIONS

4.1 Road Network

The boundary roadways located in the study area are described as follows:

Brock Road (Regional Road 1) is a major arterial road (Type "A" Arterial), and a major transit spine, under the jurisdiction of the Region of Durham. The road generally runs in a north-south direction, with four travel lanes: two per direction. As per the Regional Official Plan, Type A arterials have strict control of access placements with accesses/minor intersections generally to be located at least 200m apart. The posted speed limit on Brock Road within the study area is 70 km/h.

Zents Drive / Rex Heath Drive is a local roadway under the jurisdiction of the City of Pickering and connects with Brock Road. The roadway runs in an east-west direction with one lane per direction, with both roadways connecting residents from Brock Road to residential areas. Rex Heath Drive, the east leg, was recently completed to connect Brock Road to William Jackson Drive. The posted speed limit on Zents Drive within the study area is 40 km/h.

Dersan Street / William Jackson Drive is a local roadway under the jurisdiction of the City of Pickering and connects with Brock Road. Dersan Street (west leg) runs in an east-west direction and connects to other residential streets. William Jackson Drive (east leg) generally runs in a north-south direction, connecting riders from Brock Road to Taunton Road to the north, with connections to residential streets. The speed limit on Dersan Street within the study area is assumed to be 40 km/h.

Brock Road and Zents Drive / Rex Heath Drive form a signalized intersection, which was energized on October 26, 2017. An exclusive left turn lane is provided at Rex Heath Drive, with exclusive left and right turn lanes provided on Zents Drive and both Brock Road approaches. Brock Road and Dersan Street / William Jackson Drive form a signalized intersection with exclusive left and right turn lanes provided on all approaches. Figure 3 reflects the existing roadway characteristics for the study area roadways and intersections.

4.2 Traffic Counts

To determine existing operating conditions in the study area, Trans-Plan conducted a site visit and conducted Turning Movement Counts (TMCs) where counts were not readily available or current from Durham Region's open database.

A summary of the count date, count hours and peak hours obtained for each intersection counted is shown in Table 1. Detailed TMC data and current signal timing plans provided by Durham Region are provided in Appendix A.

Table 1 – Intersection Turning Movement Count Details

Intersection	Count Date	Count Hours	Peak Hours
Brock Road at Zents Drive / Rex Heath Drive	Thursday May 30, 2019	7:00am - 9:30am 4:00pm - 6:30pm	7:30am - 8:30am 4:30pm – 5:30pm
Brock Road at Dersan Street / William Jackson Drive	Thursday May 30, 2019	6:00am – 9:00am 3:00pm – 6:00pm	7:30am - 8:30am 4:30pm – 5:30pm

Due to the COVID pandemic, current counts may not properly reflect the typical traffic volumes and patterns. 2019 counts were utilized, and applied a 2 percent growth rate per annum along Brock Road for three years to reflect 2022 conditions. The adjusted existing traffic volumes for the weekday AM and PM peak hour are shown in Figure 4.

4.3 Transit Service

The site is served by Durham Region Transit (DRT), connecting transit riders to major locations and transit connections, including the Pickering GO Station and the DRT Pulse rapid transit route connecting to Toronto. DRT operates the following bus routes within the study area:

Route 112, Brock is mainly a north-south transit route operating generally along Bayly Street and Brock Road, connecting riders from Pickering GO Station and DRT Pulse to Zents Drive in the north. The route operates at a frequency of 15 minutes during peak weekday periods. The nearest stop is located at the Brock Road and Zents Drive intersection, northeast of the subject site. A late-night bus service runs north from the Pickering GO Station to the subject site, between 11:00pm and 1:00am at hourly intervals.

Route 603, Pickering-Uxbridge is mainly a north-south transit route operating generally along Brock Road, connecting riders from Pickering Parkway Terminal (walking distance to Pickering GO Station) and Uxbridge. The route has a set vehicle schedule, with four southbound and four northbound buses throughout the day, Monday to Friday. With the limited service times, the route does not provide great accessibility for visitors, but residents of the subject site may potentially plan their mornings around this schedule. Although Route 112 provides more frequent service, Route 603 travels further north to connect riders to Uxbridge.

Details for the route and nearest bus stops to the site are shown in Table 2. Figure 5 shows the transit provided within the study area.

Table 2 – Transit Service in the Study Area

Route	No.	Nearest Bus Stop to the Site	Approximate Service Times	Approximate Peak Service Frequency (min)	
			Weekdays	AM	PM
Brock	112	Brock Road & Zents Drive	Weekday: 05:30 – 22:27 Saturday: 07:24 – 22:24	15	15
Pickering – Uxbridge	603	Brock Road & Zents Drive	NB: 10:32, 12:32, 15:40, 17:45 SB: 06:30, 07:55, 11:15, 13:15	-	-

Source: Durham Region Transit website

5. FUTURE BACKGROUND CONDITIONS

Future background traffic volumes were determined based on a review of planned developments, road improvements and future traffic volume growth in the study area. Planned roadway improvements are also reviewed in this section.

5.1 Background Growth Rate

Based on discussion with Regional staff, a typical two percent growth rate per annum was applied to the study area roadways to determine future background traffic volumes. A horizon year of 2025 was analyzed for full build-out of the site, and a horizon year of 2030 was analyzed for five-years after full build-out.

5.2 Planned Background Developments

Based on a review of the development applications of the City of Pickering and correspondence with Regional and City staff, there are ten notable background developments in the study area planned and / or currently under construction within the study horizon. Table 3 provides details for the location and size of each background development considered within our review.

Table 3 – Background Developments in the Study Area

No.	Location	Land Use Description	Study Reference
1	2675-2725 Brock Road, Pickering Averton (Brock) Limited	436 townhouse units 351 apartment units 808 sq.m. of retail GFA	Traffic Impact Study, July 2013 & Addendum, June 2017, by BA Group
2	2540-2550 Brock Road, Pickering Brock Dersan Developments Inc.	176 condo-apartment units 235 townhouse units	Traffic Impact Study, November 2017, by GHD
3	2510 Brock Road, Pickering Madison Brock Limited	194 townhouse units	Traffic Impact Study, June 2017, by DevTrans Engineering Inc.
4	2810 William Jackson Drive, Pickering Avonmore Ventures Inc.	178 stacked townhouse units	Transportation Impact Study, November 2017, by TMIG
5	Brock Road, Pickering Concession 3 Part of Lot 18 Now RP 40R6962 Part 2	35 condo-apartment units 598 sq.m. of retail GFA	Traffic Impact Study, October 2018, by Trans-Plan

6	Tillings Road, Pickering Parts of Lots 19 & 20, Conc.3, Plan 40R-28764, Stonepay 7603860 Canada Inc.	726 townhouse units	Traffic Impact Study, January 2018, by Candevcon Limited
7	William Jackson Drive & Earl Grey Avenue, Pickering Trillium Housing Oak Non-Profit Corp.	264 stacked townhouse units	Transportation Study, June 2018, by R.J. Burnside & Associates Limited
8	2620 Brock Road, Pickering 2545633 Ontario Inc.	30 stacked townhouse units	Traffic Impact Brief, September 2018, by GHD
9	William Jackson Drive, Pickering CP2018-05, Gironde Community Development	104 townhouse units	City of Pickering Current Development Map
10	Brock Road, Pickering SP2014-01, CP2014-01, S08/17, Lebovic Enterprises	156 row townhouse units	City of Pickering Current Development Map

Site traffic generation and assignment of trip volumes for the first eight developments were obtained from their respective traffic studies, obtained through the City of Pickering website and staff. The ninth and tenth developments are conceptual at the moment and a formal application has not yet been made. Site trips are to be generated from the Institute of Transportation Engineers (ITE) Trip Generation manuals, with the land use descriptions from the City of Pickering website provided in Appendix B.

Estimates of site traffic generation and assignment of volumes for the background developments, including their respective source information, are provided in Appendix B. The above noted developments have been incorporated into our analysis of future background traffic conditions.

5.3 Planned Roadway and Transit Improvements

As per discussions with Durham Region staff, Brock Road, a major transit spine, is to be widened to six lanes for dedicated High Occupancy Vehicles (HOV) / high-frequency transit service. The widening is beyond the Region's nine-year capital forecast (2031) and was not included in this study.

Based on the Durham Region Transportation Master Plan, dated May 2016, the proposed 2031 Higher Order Transit Network includes a future Seaton GO Station, located just north of the site near the Brock Road and Taunton Road intersection.

As previously noted, a new north-south road, Four Seasons Lane, is proposed at the west limits of the site, providing a new roadway to connect the subject site to Zents Drive to the north, and Dersan Street to the south. The Lebovic background development is responsible for the southern portion of Four Seasons Lane, with the subject site providing the northern portion of the roadway adjacent the subject lot. Appendix B contains the proposed grading plan for the roadway, prepared by TYLin, which notes a 20.0m right-of-way and 9.75m pavement width. A 1.5m concrete sidewalk is illustrated on the east side of the roadway, and a 3.0m multi-use pathway is illustrated on the west side of the roadway.

The future 2025 and 2030 background traffic volumes, for the weekday AM and PM peak hours are shown in Figure 6 and Figure 7.

6. SITE TRAFFIC

6.1 Trip Generation

Site trips for the proposed residential and retail components of the site were generated using the Institute of Transportation Engineers (ITE) Trip Generation manuals, 11th Edition. The ITE Land Use Code (LUC) 220 for Multifamily Housing (Low-Rise) was utilized for trip rates.

Table 4 – Site Trip Generation

Dwelling Type	Size (Units)		AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) 220	195	Distribution	24%	76%	100%	63%	37%	100%
		Equation	T= 0.31(X)+22.85			T= 0.43(X)+20.55		
		Rate	0.10	0.32	0.43	0.34	0.20	0.53
		Trips	**20**	**63**	**83**	**65**	**39**	**104**

The subject site is expected to generate approximately 83 and 104 new two-way trips during the weekday AM and PM peak hours, respectively.

6.2 Trip Distribution and Assignment

Site trips for the proposed development (residential uses) were distributed to / from the site and the boundary roadways using 2016 Transportation Tomorrow Survey (TTS) data. Details are provided in Appendix C.

The resulting trip distribution for home-origin trips travelling from the City of Pickering, Ward 3, to surrounding municipalities in the morning and evening peak periods is shown in below in Table 5.

Table 5 – Trip Distribution Exiting the City of Pickering, Ward 3

		North 7%		
West	**63%**	**SITE**	**8%**	**East**
		22% South		

According to the above TTS trip distribution, site trips were distributed and assigned to / from the boundary roadways and the subject site using the existing traffic patterns obtained from our traffic counts. Major travel routes such as the Highway 401 and Kingston Road is south of the site, with Highway 407 and Highway 7 north of the site.

The existing traffic volume percent split along Brock Road is approximately 20 percent northbound / 80 percent southbound in the weekday AM peak hour and approximately 80 percent northbound / 20 percent southbound in the weekday PM peak hour.

For this analysis, the two proposed accesses were consolidated into one due to their close proximity and minimal volumes currently estimated for the new north-south roadway. The site traffic assignment for the weekday AM and PM peak hours are shown in Figure 8.

7. FUTURE TOTAL TRAFFIC CONDITIONS

Site traffic volumes were added to the future background traffic volumes to obtain future total traffic volumes for the peak hours. The future total traffic volumes for the 2025 and 2030 horizon years, weekday AM and PM peak hours, are shown in Figure 9 and Figure 10.

8. CAPACITY ANALYSIS

A capacity analysis was performed for the site access using Synchro analysis software. The capacity analysis results of the weekday AM and PM peak hours are shown in Table 6 and Table 7. Capacity Analysis Sheets and Level of Service Definitions are provided in Appendix D and Appendix E, respectively.

The Durham Region Traffic Impact Study Guidelines state that a level of service (LOS) of D or better considered acceptable in urban areas. The results of the capacity analysis are summarized as follows:

Brock Road & Zents Drive / Rex Heath Drive

Under existing conditions, during the weekday AM and PM peak hour, the intersection operates at an overall good LOS of A and a v/c ratio of 0.37 – 0.38 with average delays of about 4 to 6 seconds. The eastbound and westbound approaches operate at an LOS of D, and the northbound and southbound approaches operate at an LOS of A.

Under future 2025 and 2030 conditions, the intersection is expected to operate similarly to the existing conditions. During the weekday AM peak hour, the intersection is expected to operate at an overall good LOS of B and a v/c ratio of 0.56, with average delays of 12 seconds. During the weekday PM peak hour, the intersection is expected to operate at an overall good LOS of A and a v/c ratio of 0.55, with average delays of 8 seconds. The northbound and southbound approaches continue to operate at a good LOS of A and B. The westbound and eastbound approaches operate at an acceptable LOS of C and D.

Brock Road & Dersan Street / William Jackson Drive

Under existing conditions, during the weekday AM peak hour, the intersection operates at an overall good LOS of B and a v/c ratio of 0.55 with average delays of about 15 seconds. During the weekday PM peak hour, the intersection operates at an overall good LOS of A and a v/c ratio of 0.50 with average delays of about 9 seconds. The northbound and southbound approaches on Brock Road all operate at a good LOS of A and B with minimal delays. The eastbound and westbound approaches operate at an acceptable LOS of C and D with delays of about 40 seconds.

Under future 2025 conditions, the intersection is expected to operate at an overall acceptable LOS of C, with a v/c ratio of 0.88 during the weekday AM peak hour. The westbound left movement is expected to operate overcapacity, however our site traffic does not have a direct impact to those turning volumes as seen through the comparison between the background and total conditions. All other movements operate at an acceptable LOS of D or better and with reserve capacity.

During the weekday PM peak hour, it is recommended that a protected northbound left turn phase is implemented due to the high number of turning volumes at the intersection. This analysis applied a 15 total split for a protected northbound left turn phase, to provide reserve capacity for the lane. With the improvement, the intersection is expected to operate at an overall good LOS of B, with a v/c ratio of 0.87.

Under future 2030 conditions, the intersection is expected to operate at an overall acceptable LOS of C during the weekday AM and PM peak hours, with a v/c ratio of 0.99 and 0.93, respectively. The westbound left movement remains overcapacity during the weekday AM peak hour. The northbound left movement is expected to operate at an LOS of E, with a v/c ratio of 0.93. All other movements operate at an acceptable LOS of D or better.

New North-South Road Connections at Zents Drive and Dersan Street

Under future conditions, all movements are expected to operate at a good LOS of B or better, with minimal delays.

Brock Road & Proposed Site Access (Consolidated)

Under future conditions, the exiting traffic at the two accesses, consolidated into one for this analysis due to the minor roadway volumes, are expected to operate well, with a good LOS of A and minimal delays of 9 seconds.

Due to the similar operating capacities between the existing and future conditions, the subject site is not expected to create any significant traffic impacts on the study area roadways. To account for the increased northbound left background and site traffic at the Brock Road and Dersan Street intersection, a protected northbound left turn phase is recommended to be implemented.

Table 6 - Capacity Analysis Results, Existing and 2025 Conditions

Intersection	Existing Traffic Conditions						2025 Background Traffic Conditions						2025 Total Traffic Conditions					
Movement	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Brock Road & Zents Drive/Rex Heath Drive	**0.37**	**6**	**A**	**0.38**	**4**	**A**	**0.52**	**12**	**B**	**0.51**	**8**	**A**	**0.53**	**12**	**B**	**0.51**	**8**	**A**
Eastbound Left	0.35	39	D	0.22	41	D	0.27	32	C	0.20	35	D	0.33	33	C	0.25	35	D
Eastbound Through	0.01	36	D	0.04	39	D	0.00	30	C	0.02	34	C	0.00	30	C	0.02	34	C
Eastbound Right	0.01	36	D	0.00	39	D	0.01	30	C	0.00	34	C	0.03	30	C	0.02	34	C
Westbound Left	0.21	38	D	0.23	41	D	0.67	41	D	0.63	45	D	0.67	41	D	0.63	45	D
Westbound Through / Right	0.11	37	D	0.09	40	D	0.21	32	C	0.07	34	C	0.21	32	C	0.07	34	C
Northbound Left	0.03	3	A	0.03	2	A	0.03	5	A	0.03	3	A	0.03	5	A	0.05	4	A
Northbound Through	0.34	4	A	0.39	3	A	0.48	8	A	0.49	6	A	0.49	8	A	0.49	6	A
Northbound Right	0.01	2	A	0.03	2	A	0.04	5	A	0.11	4	A	0.04	5	A	0.11	4	A
Southbound Left	0.04	3	A	0.09	3	A	0.12	6	A	0.38	8	A	0.12	6	A	0.38	8	A
Southbound Through	0.37	4	A	0.35	3	A	0.46	7	A	0.46	5	A	0.46	7	A	0.46	5	A
Southbound Right	0.01	2	A	0.03	2	A	0.02	5	A	0.04	3	A	0.02	5	A	0.05	3	A
Brock Road & Dersan Street/William Jackson Drive	**0.55**	**15**	**B**	**0.50**	**9**	**A**	**0.79**	**30**	**C**	**0.75**	**18**	**B**	**0.88**	**31**	**C**	**0.87**	**19**	**B**
Eastbound Left	0.06	31	C	0.01	34	C	0.08	29	C	0.03	37	D	0.10	29	C	0.03	37	D
Eastbound Through	0.01	30	C	0.01	34	C	0.00	28	C	0.01	37	D	0.00	28	C	0.01	37	D
Eastbound Right	0.30	33	C	0.05	34	C	0.51	34	C	0.07	37	D	0.57	35	C	0.08	38	D
Westbound Left	0.79	49	D	0.61	42	D	1.16	138	F	0.82	61	E	1.16	138	F	0.82	61	E
Westbound Through	0.00	30	C	0.02	34	C	0.00	28	C	0.01	37	D	0.00	28	C	0.01	37	D
Westbound Right	0.01	30	C	0.01	34	C	0.03	29	C	0.02	37	D	0.03	29	C	0.02	37	D
Northbound Left	0.36	11	B	0.48	11	B	0.65	29	C	0.71	19	B	0.77	42	D	0.85	37	D
Northbound Through	0.42	9	A	0.45	6	A	0.56	12	B	0.59	10	B	0.56	12	B	0.59	10	B
Northbound Right	0.03	6	A	0.06	4	A	0.06	8	A	0.17	6	A	0.06	8	A	0.17	6	A
Southbound Left	0.05	6	A	0.04	4	A	0.12	9	A	0.21	15	B	0.12	9	A	0.22	15	B
Southbound Through	0.47	9	A	0.42	6	A	0.61	13	B	0.66	19	B	0.63	13	B	0.67	19	B
Southbound Right	0.00	6	A	0.00	4	A	0.00	7	A	0.01	11	B	0.00	7	A	0.01	11	B
New Road & Zents Drive																		
Eastbound Through / Right								0	A		0	A		0	A		0	A
Westbound Through / Left								1	A		2	A		2	A		3	A
Northbound Left / Right								9	A		9	A		9	A		9	A
Dersan Street & New Road																		
Eastbound Through / Left								0	A		0	A		0	A		0	A
Westbound Through / Right								0	A		0	A		0	A		0	A
Southbound Left / Right								11	B		10	B		11	B		11	B
New Road & Site Access																		
Westbound Left / Right														9	A		9	A
Northbound Through / Right														0	A		0	A
Southbound Through / Left														3	A		4	A

Table 7 - Capacity Analysis Results, 2030 Conditions

Intersection	2030 Background Traffic Conditions						2030 Total Traffic Conditions					
Movement	AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Brock Road & Zents Drive/Rex Heath Drive	**0.56**	**12**	**B**	**0.55**	**8**	**A**	**0.56**	**12**	**B**	**0.55**	**8**	**A**
Eastbound Left	0.27	32	C	0.20	35	D	0.33	33	C	0.25	35	D
Eastbound Through	0.00	30	C	0.02	34	C	0.00	30	C	0.02	34	C
Eastbound Right	0.01	30	C	0.00	34	C	0.03	30	C	0.02	34	C
Westbound Left	0.67	41	D	0.63	45	D	0.67	41	D	0.63	45	D
Westbound Through / Right	0.27	32	C	0.14	35	C	0.27	32	C	0.14	34	C
Northbound Left	0.03	5	A	0.03	4	A	0.04	5	A	0.06	4	A
Northbound Through	0.53	8	A	0.54	6	A	0.53	8	A	0.54	6	A
Northbound Right	0.04	5	A	0.11	4	A	0.04	5	A	0.11	4	A
Southbound Left	0.13	6	A	0.44	11	B	0.13	6	A	0.44	11	B
Southbound Through	0.50	8	A	0.51	6	A	0.50	8	A	0.51	6	A
Southbound Right	0.02	5	A	0.04	3	A	0.02	5	A	0.05	3	A
Brock Road & Dersan Street/William Jackson Drive	**0.89**	**31**	**C**	**0.81**	**19**	**B**	**0.99**	**32**	**C**	**0.93**	**22**	**C**
Eastbound Left	0.08	29	C	0.03	37	D	0.10	29	C	0.03	37	D
Eastbound Through	0.00	28	C	0.01	37	D	0.00	28	C	0.01	37	D
Eastbound Right	0.55	34	C	0.07	37	D	0.60	36	D	0.08	38	D
Westbound Left	1.16	138	F	0.82	61	E	1.16	138	F	0.82	61	E
Westbound Through	0.00	28	C	0.01	37	D	0.00	28	C	0.01	37	D
Westbound Right	0.03	29	C	0.02	37	D	0.03	29	C	0.02	37	D
Northbound Left	0.78	47	D	0.78	30	C	0.93	76	E	0.93	60	E
Northbound Through	0.61	13	B	0.64	11	B	0.61	13	B	0.64	11	B
Northbound Right	0.06	8	A	0.17	6	A	0.06	8	A	0.17	6	A
Southbound Left	0.14	10	A	0.26	16	B	0.14	10	A	0.26	17	B
Southbound Through	0.66	14	B	0.72	20	C	0.68	15	B	0.74	21	C
Southbound Right	0.00	7	A	0.01	11	B	0.00	7	A	0.01	11	B
New Road & Zents Drive												
Eastbound Through / Right		0	A		0	A		0	A		0	A
Westbound Through / Left		1	A		2	A		2	A		3	A
Northbound Left / Right		9	A		9	A		9	A		9	A
Dersan Street & New Road												
Eastbound Through / Left		0	A		0	A		0	A		0	A
Westbound Through / Right		0	A		0	A		0	A		0	A
Southbound Left / Right		11	B		10	B		11	B		11	B
New Road & Site Access												
Westbound Left / Right								9	A		9	A
Northbound Through / Right								0	A		0	A
Southbound Through / Left								3	A		4	A

9. PARKING JUSTIFICATION STUDY

From the pre-consultation summary comments, dated January 25, 2022, it was advised that a parking rate of 2 resident spaces per unit, and 0.25 visitor spaces per unit, should be provided on-site. 390 resident parking spaces, and 44 visitor parking spaces are proposed on-site to support the 195 residential units. The resident parking rate is met, whereas the proposed 44 visitor spaces are provided at a rate of 0.225 spaces per unit, just below the 0.25 rate requested by the City (49 spaces). To gain a better understanding of the parking requirements, a review of the City By-laws was completed.

9.1 Parking Requirements, City of Pickering Zoning By-law 3037

The parking requirements for the proposed development are based on the City of Pickering Zoning By-law 3037 and are shown in Table 8, in comparison to the parking supply. Source information is provided in Appendix G.

Table 8 – Parking Requirements (City of Pickering Zoning By-law 3037)

Land Use	Site Stats	Parking Requirement		Proposed Parking Supply	
		Rate	Spaces	Rate	Spaces
Multiple family horizontal, without attached garage	195 units	Residents: 1.75 spaces per unit	342	Resident: 2.0	390
		Visitors: 0.25 spaces per unit	49	Visitor: 0.225	44
		Total	391		434

The subject site requires a resident parking supply of 342 spaces, whereas 390 spaces are provided, for a surplus of 48 spaces. 49 visitor parking spaces are required, whereas 44 are provided, for a minor shortfall of 5 spaces. The overall parking requirement is 391 spaces and the proposed parking supply is 434 spaces, which indicates an overall surplus of 43 spaces.

9.2 Parking Requirements, Draft Comprehensive Zoning By-law

The City's By-law 3037 is quite outdated when compared with common urban parking standards utilized by the more recent By-laws within Pickering. The City is currently undergoing a comprehensive Zoning By-law review to consolidate their existing By-laws and to reflect their current policies and guidelines.

The first draft of the Comprehensive Zoning By-law was released May 2022 and are currently in the process of reviewing feedback from the public/stakeholders. Although the By-law is not currently in effect, it provides a basis on the direction the City of Pickering is looking to achieve in regards to the new developments and parking requirements. An excerpt of the draft By-law is provided in Appendix G, with Table 9 provided a summary of the parking requirements.

Table 9 – Parking Requirements (Draft Comprehensive Zoning By-law)

Land Use	Site Stats	Parking Requirement		Proposed Parking Supply	
		Rate	Spaces	Rate	Spaces
Stacked Townhouse Dwelling	195 units	Residents: 1.25 spaces per unit	244	Resident: 2.0	390
		Visitors: 0.25 spaces per unit	49	Visitor: 0.225	44
		Total	293		434

Based on the draft By-law, a total of 293 parking spaces are required for the subject site, whereas 434 parking spaces are required. Similar to By-law 3037, the required visitor parking rate is 0.25, resulting in a shortfall of 5 visitor parking spaces.

Although the visitor parking space is just under the requirement, Trans-Plan believes that the surplus of resident parking spaces would allow visitors to utilize their visiting home parking spaces if all visitor parking spaces are occupied.

9.3 Transit Use and Auto Ownership

The subject site is located in Ward 3 of the City of Pickering. Using 2006, 2011 and 2016 Transportation Tomorrow Survey (TTS) data, the transit modal split within the ward was analyzed. Source information is provided in Appendix C and the results are summarized in Table 10.

Table 10 – Transit Split Comparison

Area	Transit Modal Split		
	2006 TTS Data	2011 TTS Data	2016 TTS Data
Ward 3	7%	8%	10%

Based on the TTS data, transit use has been increasing over the years in the study area. With the future Brock Road widening for high frequency transit service and the future GO Station north of the subject site, transit use along Brock Road is expected to increase. Providing the minimum parking requirements would further encourage residents and visitors of the site to utilize transit to travel to and from the proposed development.

The auto ownership per residential units was also analyzed within Ward 3. Source information is provided in Appendix C and the results are summarized in Table 11.

Table 11 – Auto Ownership in Pickering Ward 3

Household type	Average Number of Vehicles per Household in Pickering, Ward 3		
	2006 TTS Data	2011 TTS Data	2016 TTS Data
Apartments	0.91	0.99	1.00
Townhouses	1.36	1.37	1.56

The results indicate that the average vehicles per apartment within the subject site ward is one vehicle per household and the average vehicles per townhouse within the subject site ward is 1.56 vehicles per household. The provided resident parking supply of 2.00 spaces per unit is expected to be more than

sufficient to support the subject site, while also potentially serving as visitor spaces for the respective household visitors.

10. SITE PLAN REVIEW

10.1 Access Review

As discussed in Section 5.3, the new north-south roadway, Four Seasons Lane, provides a 20m ROW and a 9.75m pavement width. Based on the City of Pickering Engineering Design Criteria (see Appendix F), a local residential roadway should provide a 20m ROW and pavement width of 8.5m, which is met by the proposed design.

The internal roadway within the subject site has been designed with a 6.5m width and 12m centreline turn radius at the four corners of the site, which are typical design dimensions that can accommodate the intended design vehicles for residential developments. The grading plan prepared by TYLin (Appendix B), indicates curb radii of 7.5m at both site accesses on Four Seasons Lane, which meets the City's Engineering Design Criteria.

The City's Design Criteria indicates an intersection spacing for a 20m ROW to be a minimum of 60m. An illustration of the proposed access spacing is provided in Appendix F, measured between roadway centrelines. The proposed spacing between the south limits of the site to the proposed full-moves access, and the spacing between the full-moves access and RIRO access, exceed the minimum required spacing of 60m. The distance between the proposed RIRO access and Zents Drive is approximately 42m, which is just below the 60m minimum spacing for a 20m ROW, but meets the 40m minimum spacing for an 18m ROW. Although the spacing requirement is not met, the access is proposed to be a RIRO access and is to mainly serve as a secondary access for larger design vehicles. The Transportation Association of Canada Geometric Design Guide for Canadian Roads, Chapter 8 – Access, indicates a minimum corner clearance of 15m between accesses and local roadways.

10.2 Site Circulation Review

A site circulation review was completed using AutoTurn vehicle turning template software, demonstrating design vehicles circulating the private roadway.

Figure 11 illustrates an 11.5m loading vehicle (represented by a TAC heavy single-unit vehicle) circulating the site around both the inner and outer laneways.

Figure 12 illustrates a 12.8m emergency vehicle (fire truck) circulating the site, similar to the loading vehicle.

Figure 13 illustrates a 12.0m waste collection vehicle circulating the site in both directions, demonstrating that curb-side pickup for waste is achievable for all units.

Our review demonstrates that all design vehicles can properly circulate the proposed site without conflict.

11. WASTE MANAGEMENT PLAN

This Waste Management Plan has been prepared in accordance with the Region of Durham Zoning By-law 46-2011, To Regulate the Provision of the Waste Management Services Under the Jurisdiction of The Regional Municipality of Durham. All waste collection within the City of Pickering is under the

responsibility of the Region.

Waste collection for the subject site is to be served through individual curbside collection, and each dwelling unit is to be provided adequate space to function as the waste storage area where blue boxes, green bins, garbage containers, and yard waste is stored in between collection days. On the collection days, the appropriate bins would be placed onto each unit's frontage/driveway, allowing for the individual curbside collection to occur. Receptacles must be placed prior to 7:00am on a collection day, with recycling and green bins collected weekly, and garbage collected bi-weekly.

Schedule "P" within By-law 46-2011 is the Technical and Risk Management Guidelines for Waste Collection Services on Private Property. Attached within Schedule "P" is Appendix D – Application for Waste Collection Services on Private Property and Indemnification Form. The owner must submit this form to the Region's Waste Management Division for their review, prior to any waste collection services are provided. The development must be more than 75% occupied and construction completed. Once the Region approves the application, waste collection services would begin in approximately 4 to 6 weeks at the beginning of a new month.

Based on By-law 46-2011, an access route must have a minimum width of 6.5m, minimum turning radius of 13m, and an overhead clearance of 7m. The proposed private road meets the minimum width of 6.5m, but has a slightly smaller turning radius of 12m. Although the requirement is not met, our site circulation review demonstrates that the 12m centre turning radii is sufficient to support the waste collection vehicle when circulating the subject site.

Durham Region provides a Waste app for mobile phone use, which provides schedules, reminders, and booking special pickups. It is recommended that new residents be made aware of the app to ensure waste pickup can be handled smoothly without any incidents.

12. TRANSPORTATION DEMAND MANAGEMENT PLAN

A TDM plan is provided as part of the proposed development in an effort to assist minimize congestion, improve air quality, reduce greenhouse gas emissions, reduce parking demand, and improve public health in the long-term.

This TDM plan for the proposed development, along with the Durham Region transportation policies and initiatives for the surrounding road network, will help provide the public greater choice, incentives and opportunities to choose travel modes other than single-occupant vehicles. Our proposed TDM plan for the site is outlined as follows:

Transit

Increasing public transit use has many benefits such as protecting the environment, reducing traffic congestion on Regional roads, providing convenience, saving energy, strengthening communities and improving liveability.

The site is currently well served by transit with DRT route 112 operating along Brock Road at service frequencies of approximately 15 to 20 minutes in the weekday AM and PM peak hours, respectively. Transit stops are located nearby at the Brock Road and Zents Drive intersection.

Metrolinx is proposing Bus rapid transit (BRT) to be implemented on Kingston Road, with a stop on Brock Road. Construction is planned to begin in 2027 and it will be supplemented with a HOV lane to maintain

a high frequency of 5-minute headways. The BRT would encourage residents and visitors of the site to consider transit as an alternative from driving.

To encourage new residents of the site to travel by transit, they should be provided with DRT information packages containing route maps, schedules and other useful information.

Cycling & Walking

Encouraging more people to cycle would result in taking more cars off the road during peak hours, helping to reduce traffic congestion, and is more environmentally friendly.

Within the study area, there are available multi-use pathways (MUP) for cyclists and pedestrians along both sides of Brock Road. The MUPs provide added safety for cyclists by reducing auto and cycle conflicts.

Sidewalks and crosswalks are provided throughout the site for safe pedestrian travel. Units fronting onto the main roads have entrances to connect to the existing sidewalks. A direct pedestrian connection from the Brock Road and Zents Drive intersection is provided for ease of access for residents and visitors of the internal stacked townhouse blocks. Sidewalks and multi-use pathways are also proposed along the new future north-south roadway.

New residents should be introduced to Durham Region's Cycle Durham communication strategy which supports and encourages cycling. Active Switch is an online program where residents can set goals for their walking and cycling progress. Users of the program can enter monthly raffle prizes, which further incentivizes residents to log their active transportation activity.

Smart Commute Durham

Smart Commute Durham offers services and tools to help commuting easier for local commuters in the Durham and Greater Toronto and Hamilton Area. The programs of Smart Commute Durham includes carpooling, cycling and walking, Emergency Ride Home (ERH), PRESTO Card and alternative work arrangements. One of the services that are offered by Smart Commute Durham is connecting users to carpool through an online match making service. The program can provide residents a network to arrange carpooling. In addition, Smart commute Durham also provides trip planners and maps to users to help find other form of transportation options.

Communication Strategy

The aforementioned information packages (for transit, cycling and trails, and Smart Commute) are to be distributed when the residential units first become occupied.

13. CONCLUSIONS AND RECOMMENDATIONS

This Transportation Study for the proposed residential development located at 2660 – 2680 Brock Road in the City of Pickering is summarized as follows:

Traffic Impact Study

- The proposed residential development consists of 195 stacked townhouse units, with 434 parking spaces provided on the ground level. Access to the site is proposed through access connections to the new north-south road being built to the immediate west of the subject site.

- The study area has seen a number of development applications for residential and mixed-use developments. Ten background developments have been included within our analysis.
- A two percent growth rate per annum was applied along Brock Road for the horizon years of 2025 and 2030. Sidestreet growth has been implemented through the background developments in the study area.
- The Region of Durham planned improvements for the study area include a widening of Brock Road to include HOV / high-frequency transit service. The widening is beyond the Region's nine-year capital forecast (2031) and was not included in this study.
- The traffic analysis indicates that the site accesses would operate well in future conditions with no roadway improvements necessary to accommodate the subject site, other than the construction of the north-south roadway. The intersection of Brock Road and Zents Drive is expected to operate well in future conditions, similar to the current operations.
- A protected northbound left turn phase at the Brock Road and Dersan Street intersection is recommended by 2025, due to the increase in traffic from background developments and site traffic.

Parking Justification Study

- The proposed residential development provides 390 resident parking spaces, at a rate of 2.0 spaces per unit, and 44 visitor parking spaces, at a rate of 0.225 spaces per unit, for an overall 434 parking spaces.
- Although the parking supply meets the overall parking requirement of 391 parking spaces from the City of Pickering By-law 3037, the visitor parking rate of 0.25, or 49 spaces, is not met through the proposed 44 visitor spaces.
- The City is undergoing a comprehensive Zoning By-law review to reflect current policies and guidelines. A draft was released May 2022, with an overall total parking requirement of 244 resident parking spaces, and 49 visitor parking spaces. Again, the overall parking requirement is met, but the visitor parking requirement has a minimal deficiency of 5 spaces. Based on the surplus of resident parking, visitors of a dwelling unit could potentially use the additional space provided for the unit.
- Transit use has been steadily increasing in the subject area and likely to further increase with the future Brock Road widening for high-frequency transit and Seaton GO Station. Providing reduced parking rates would further encourage residents and visitors of the site to explore alternative modes of travel within the study area.

Site Circulation Review / Waste Management Plan

- The proposed north-south roadway design and internal roadway design meet the City of Pickering Engineering Design Criteria.
- A site circulation review was completed for a waste collection vehicle, heavy single-unit truck and fire truck. All vehicle movements can properly circulate the subject site, based on our review of the concept plans. With details not shown for the new north-south roadway, access connections to the roadway have not been illustrated. Based on the City's Engineering Design Criteria, it is recommended that a minimum curb radii of 7.5m is provided for the access design.

- A Waste Management Plan has been discussed based on our review of the Region of Durham Zoning By-law 46-2011 - To Regulate the Provision of the Waste Management Services Under the Jurisdiction of The Regional Municipality of Durham.
- Waste collection is to be serviced through individual curbside collection, with each unit receiving their own receptacles. The Owner must submit the Application for Waste Collection Services on Private Property and Indemnification Form to the Region, before the Region's waste collection services can begin. To be considered for approval, the development must be 75% occupied and completed construction.

Transportation Demand Management Plan

- 15 minute transit headways are provided adjacent the subject site during peak weekday AM and PM peak hours, providing good connectivity to the Pickering GO Station.
- Multi-use pathways are provided along both sides of Brock Road for cyclist and pedestrian use. Internal pedestrian connections from the subject site connect to Brock Road for ease of accessibility and safe pedestrian use.
- Information packages containing transit and cycling maps, and Durham Region Smart Commute and other TDM programs, should be provided to new residents of the subject site.

Respectfully submitted,

Anil Seegobin, P.Eng.
Partner, Engineer

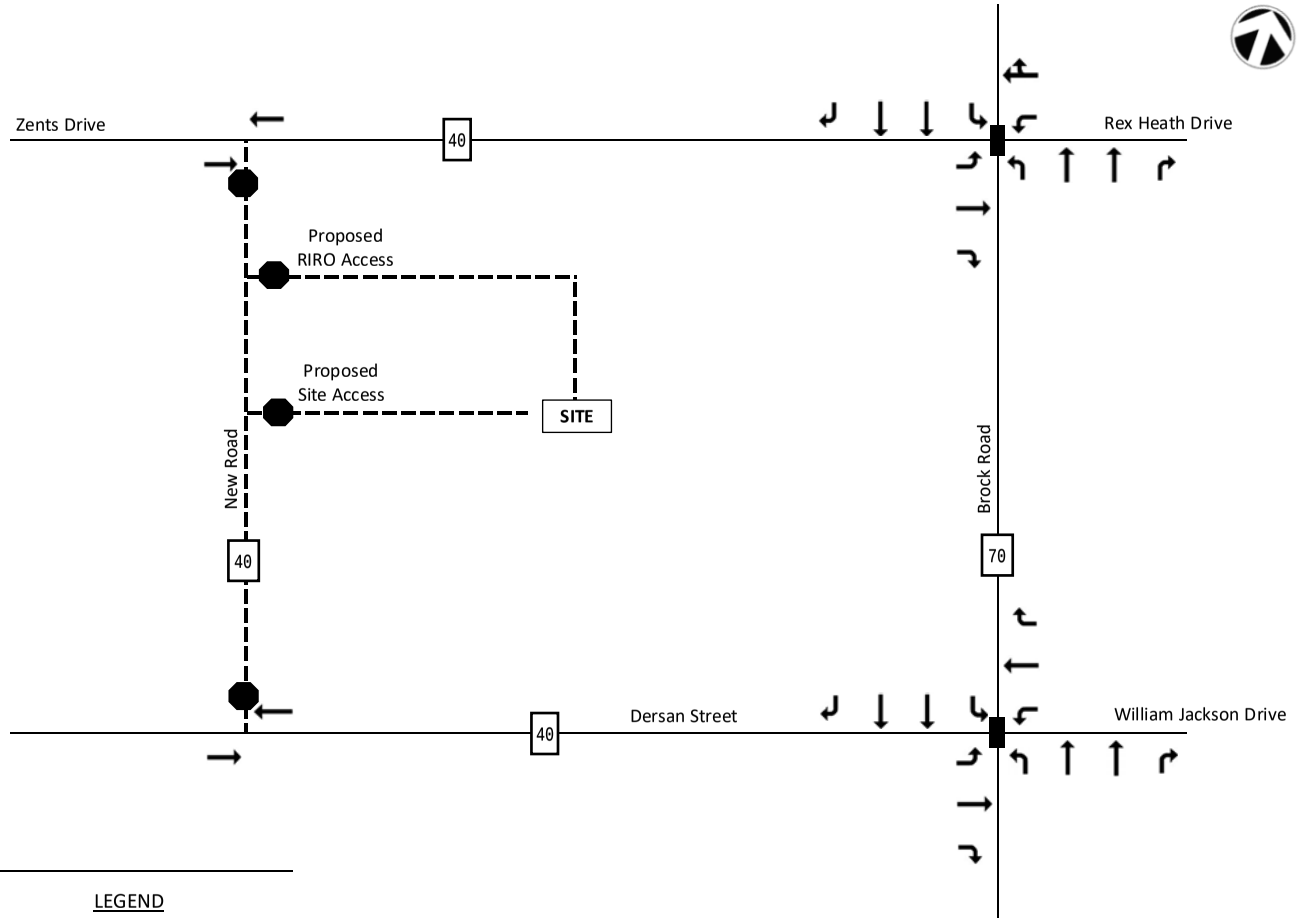
Charles Chung
Traffic Analyst

Trans-Plan Transportation Inc.
Transportation Consultants

Figure 1 – Site Location

Source: Google Maps

Figure 3: Existing Roadway Characteristics



LEGEND

- Traffic Signal
- Stop Sign
- 60 Posted Speed Limit
- Lane Configuration

Schematic; Not To Scale

Figure 4: Existing Traffic Volumes, Weekday AM and PM Peak Hours

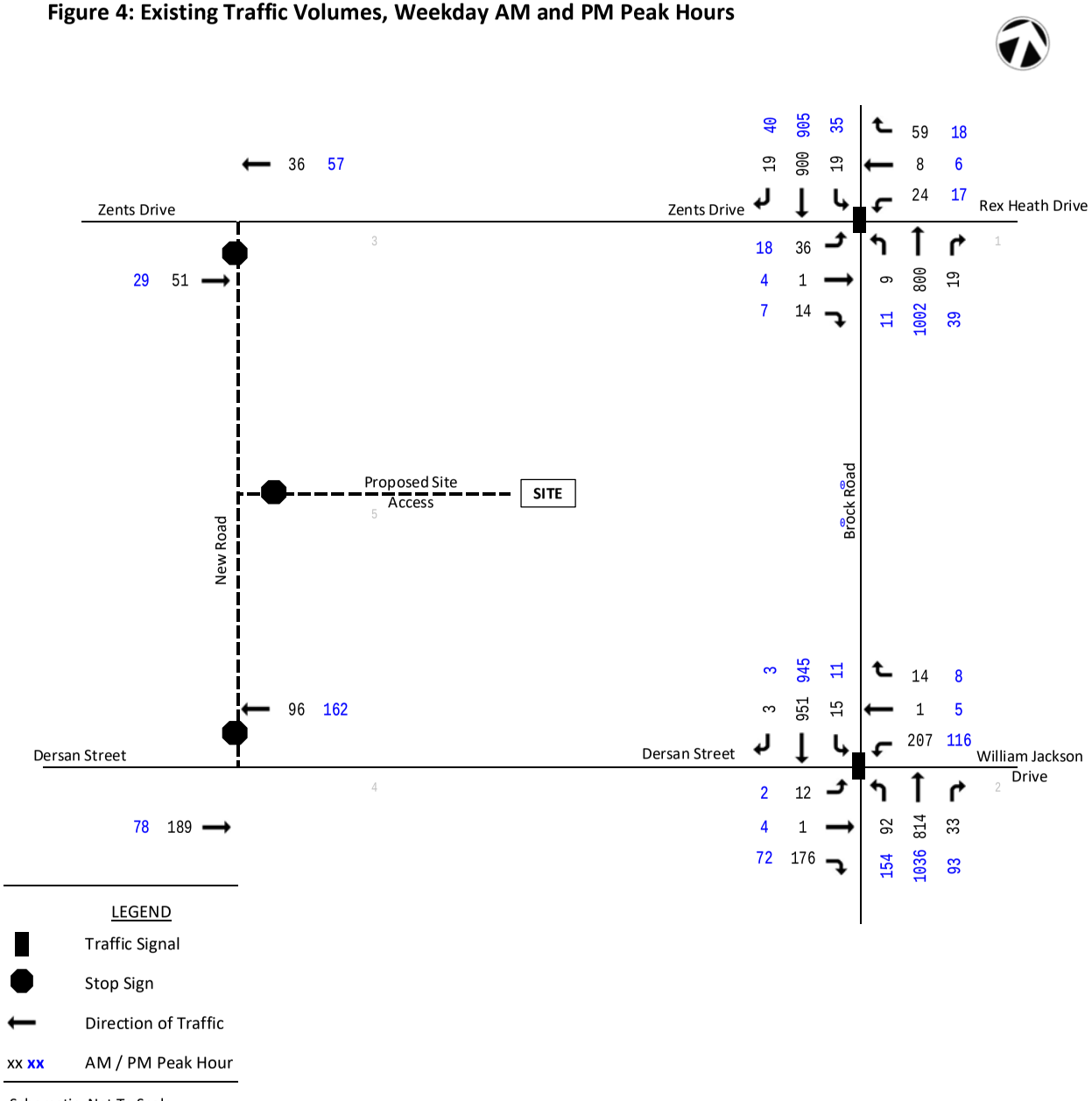


Figure 5 – Study Area Transit Service

Source: Durham Region Transit Map

Figure 6: 2025 Background Traffic Volumes, Weekday AM and PM Peak Hours

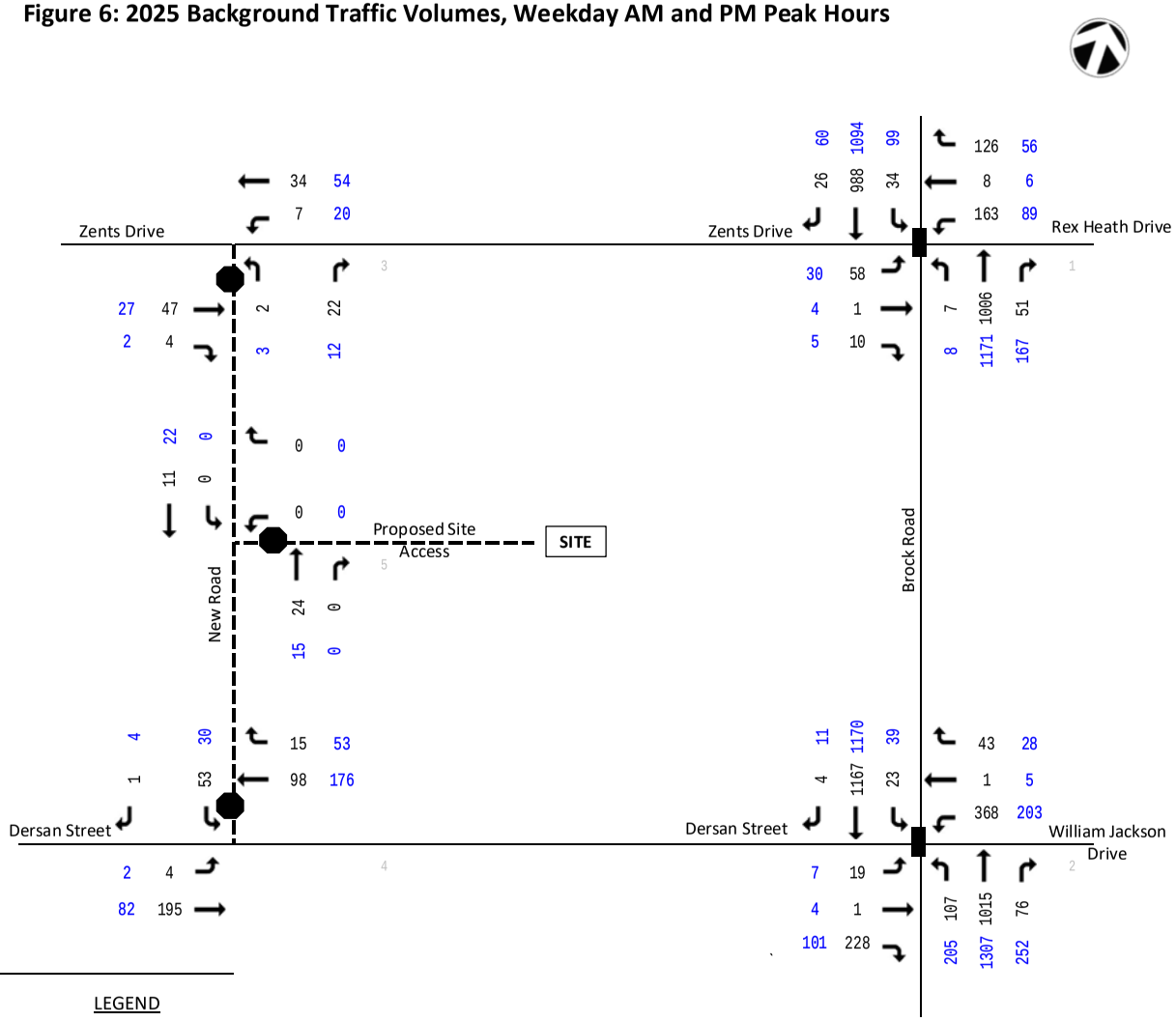


Figure 7: 2030 Background Traffic Volumes, Weekday AM and PM Peak Hours

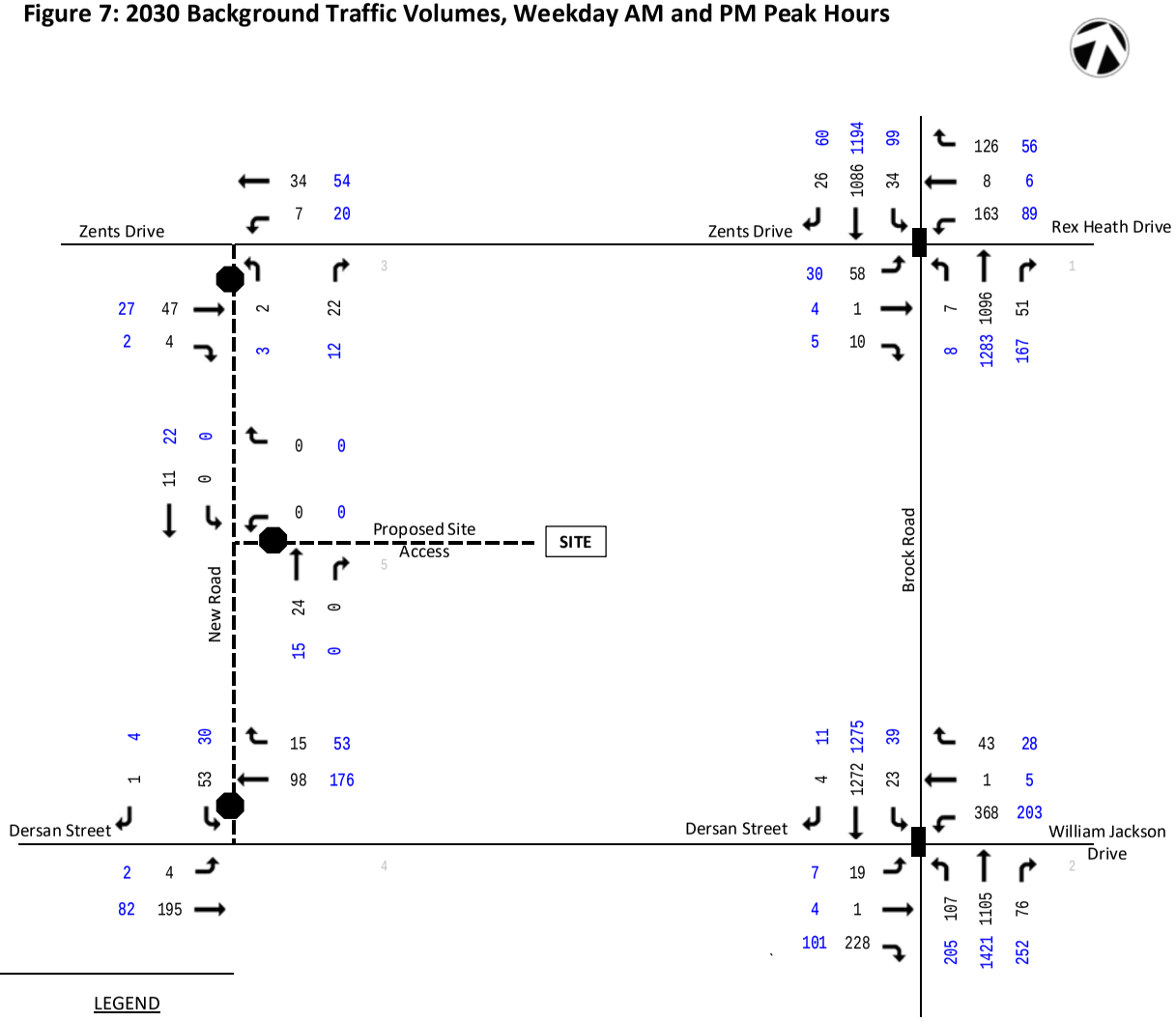


Figure 8: Site Traffic Assignment, Weekday AM and PM Peak Hours

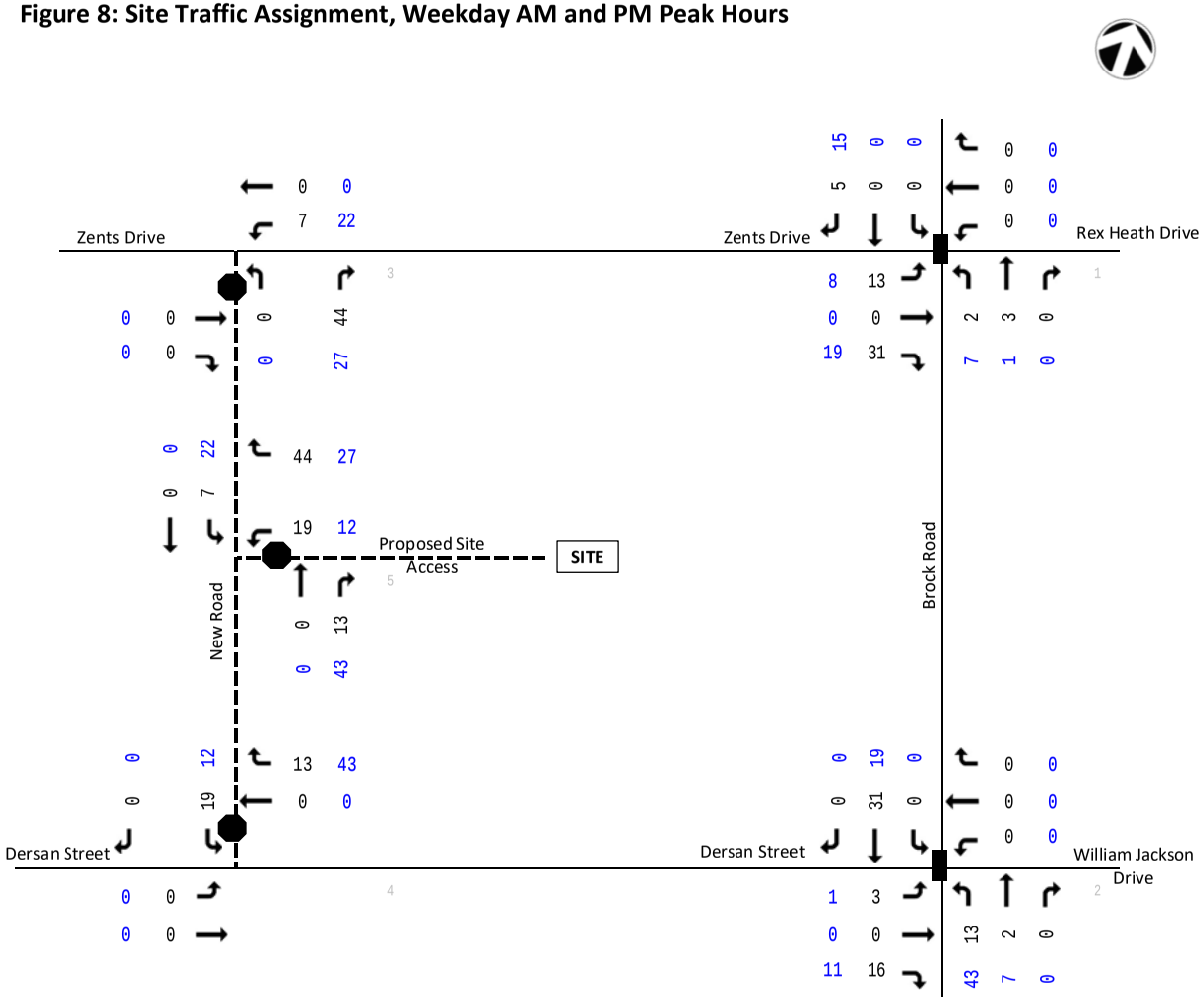


Figure 9: 2025 Total Traffic Volumes, Weekday AM and PM Peak Hours

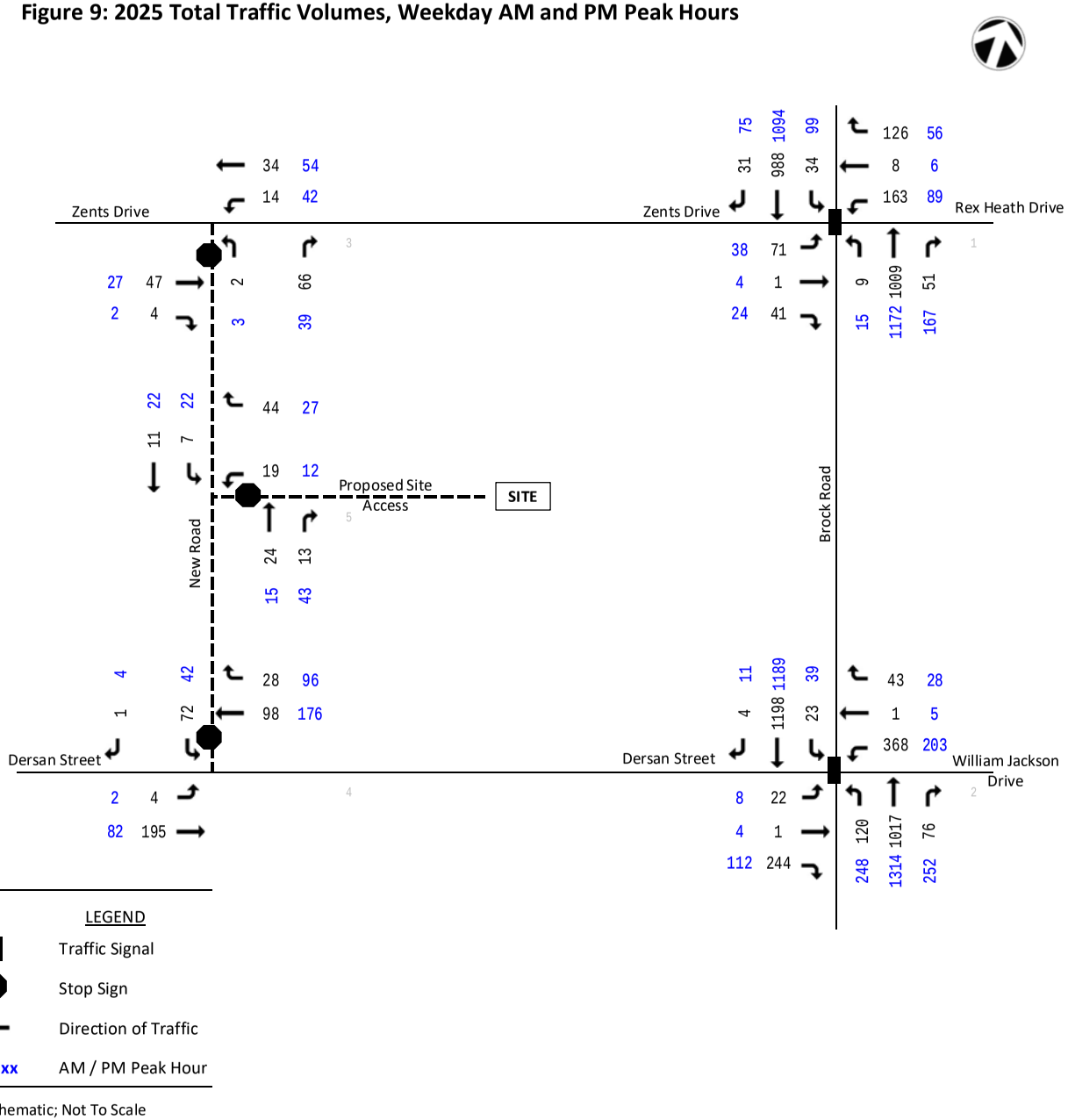
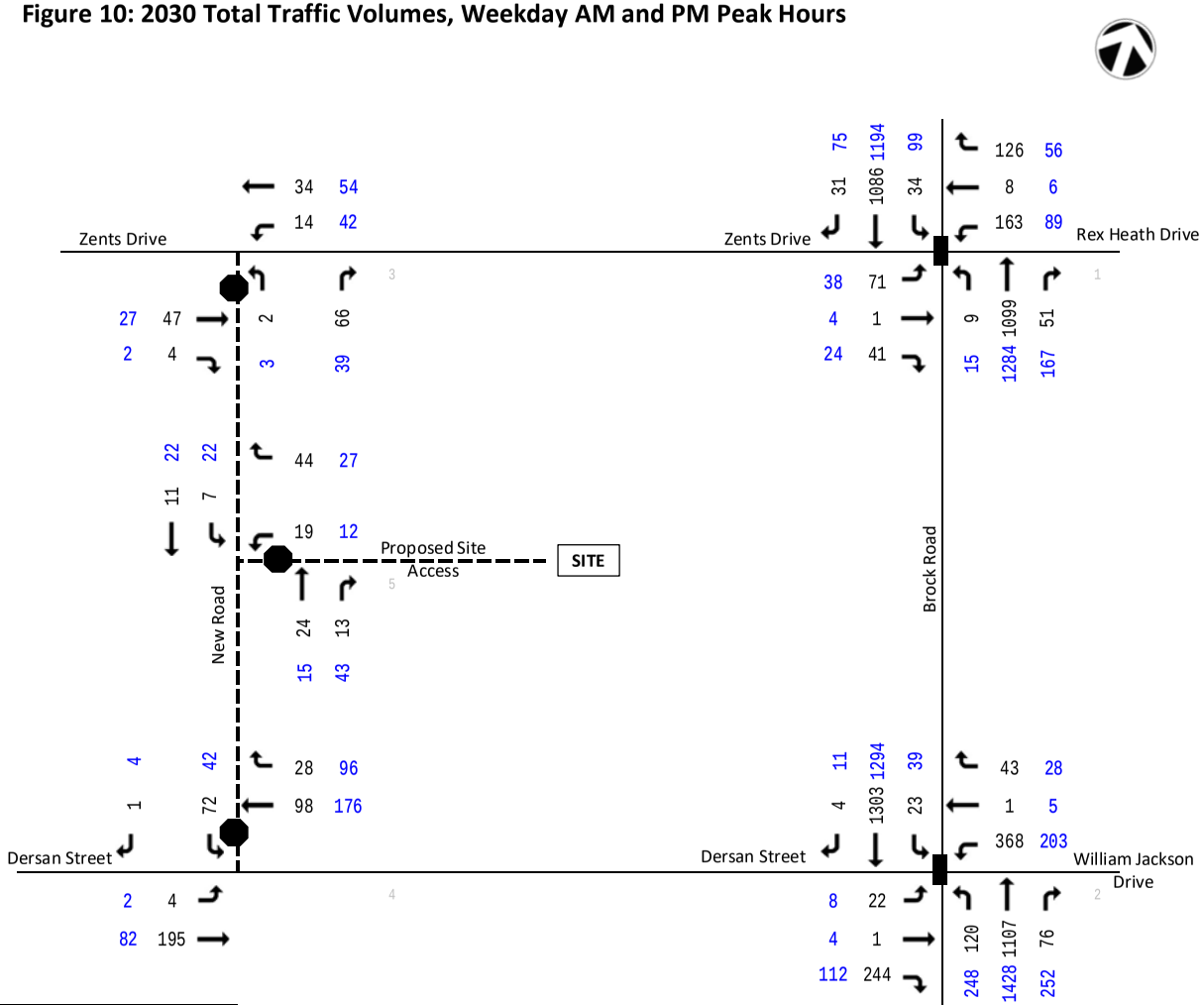
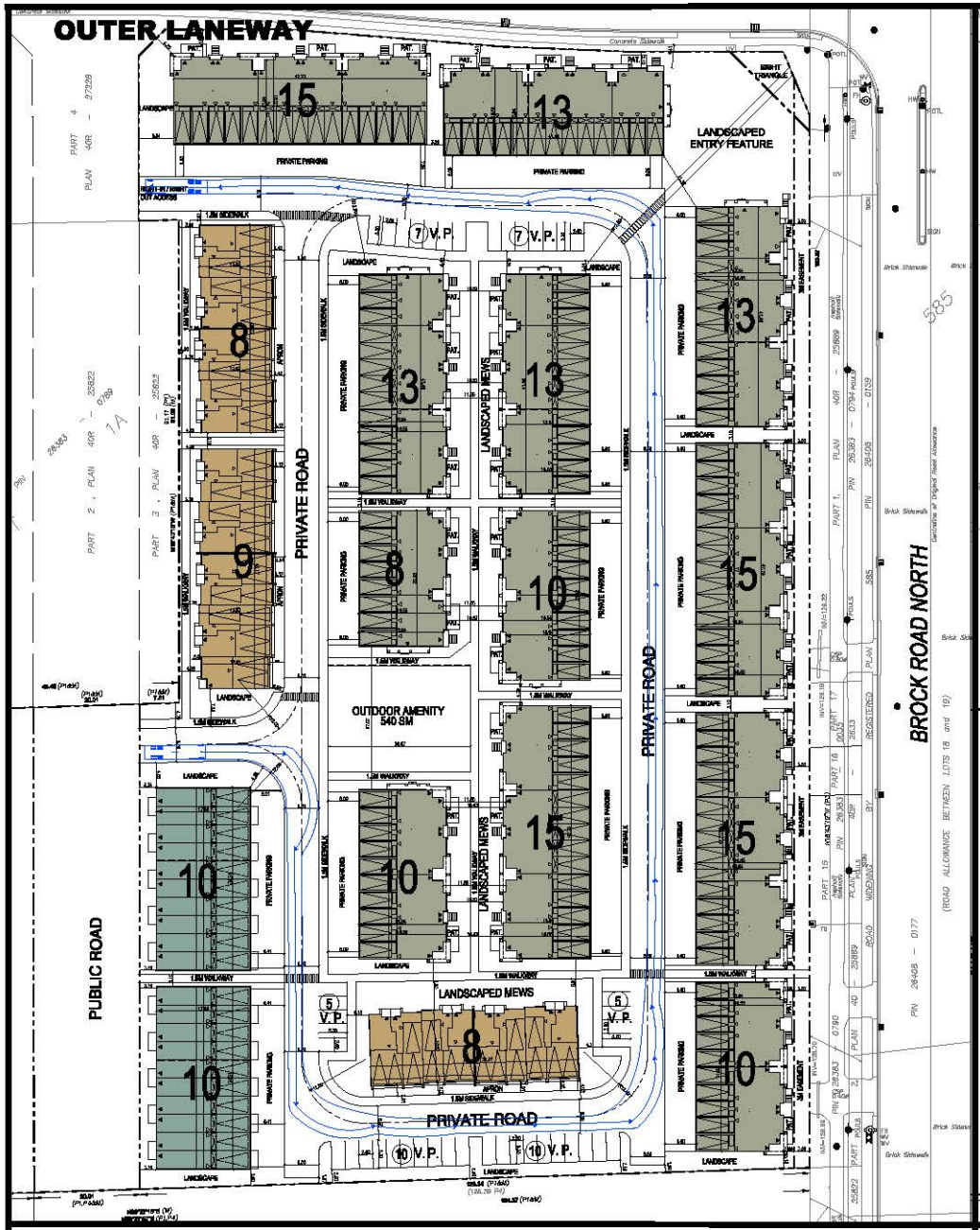


Figure 10: 2030 Total Traffic Volumes, Weekday AM and PM Peak Hours





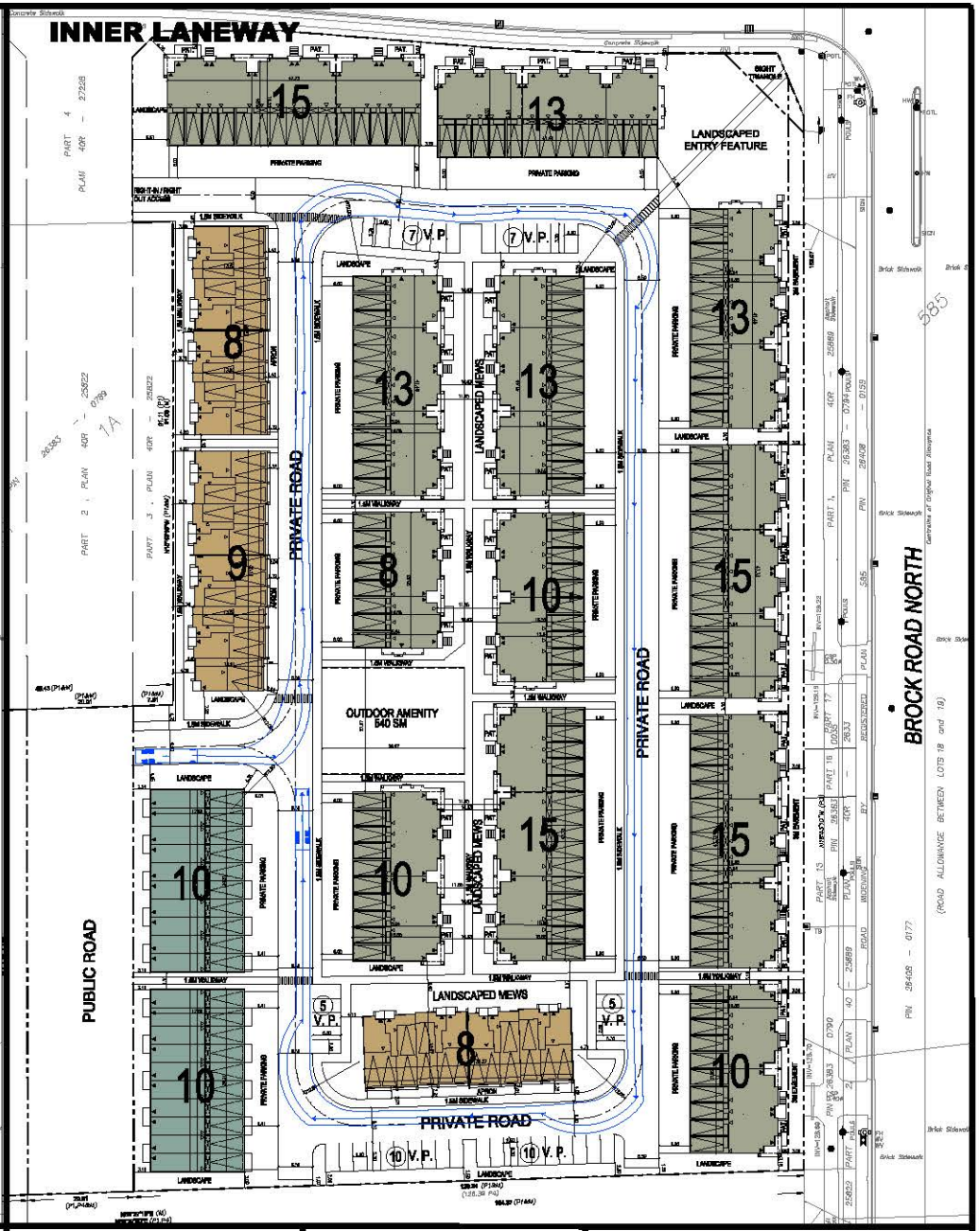
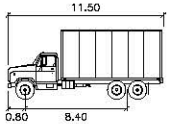


Figure 11 - Loading Vehicle Site Circulation

Proposed Residential Development
2660 - 2680 Brock Road
City of Pickering, ON



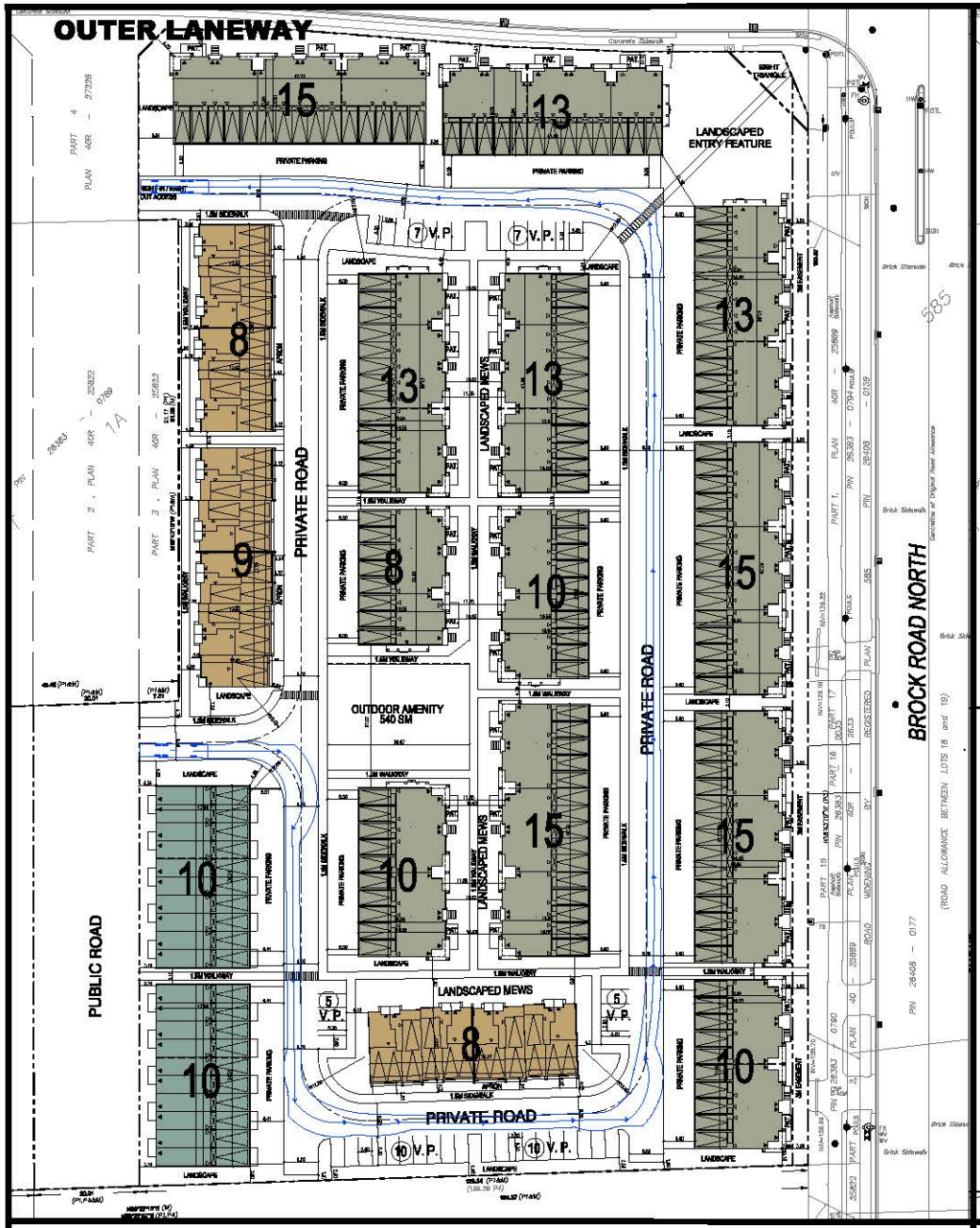
HSU	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 39.7

CONSTRUCTION NORTH

SCALE: NTS UNITS: m

Source: Site Plan by Guthrie Muscovitch Architects, May 2022

TRANS-PLAN™
transportation engineering consultants
785 Dundas Street West
Toronto, Ontario, M6J 1V2
tel: (647) 931-7383
website: www.trans-plan.com



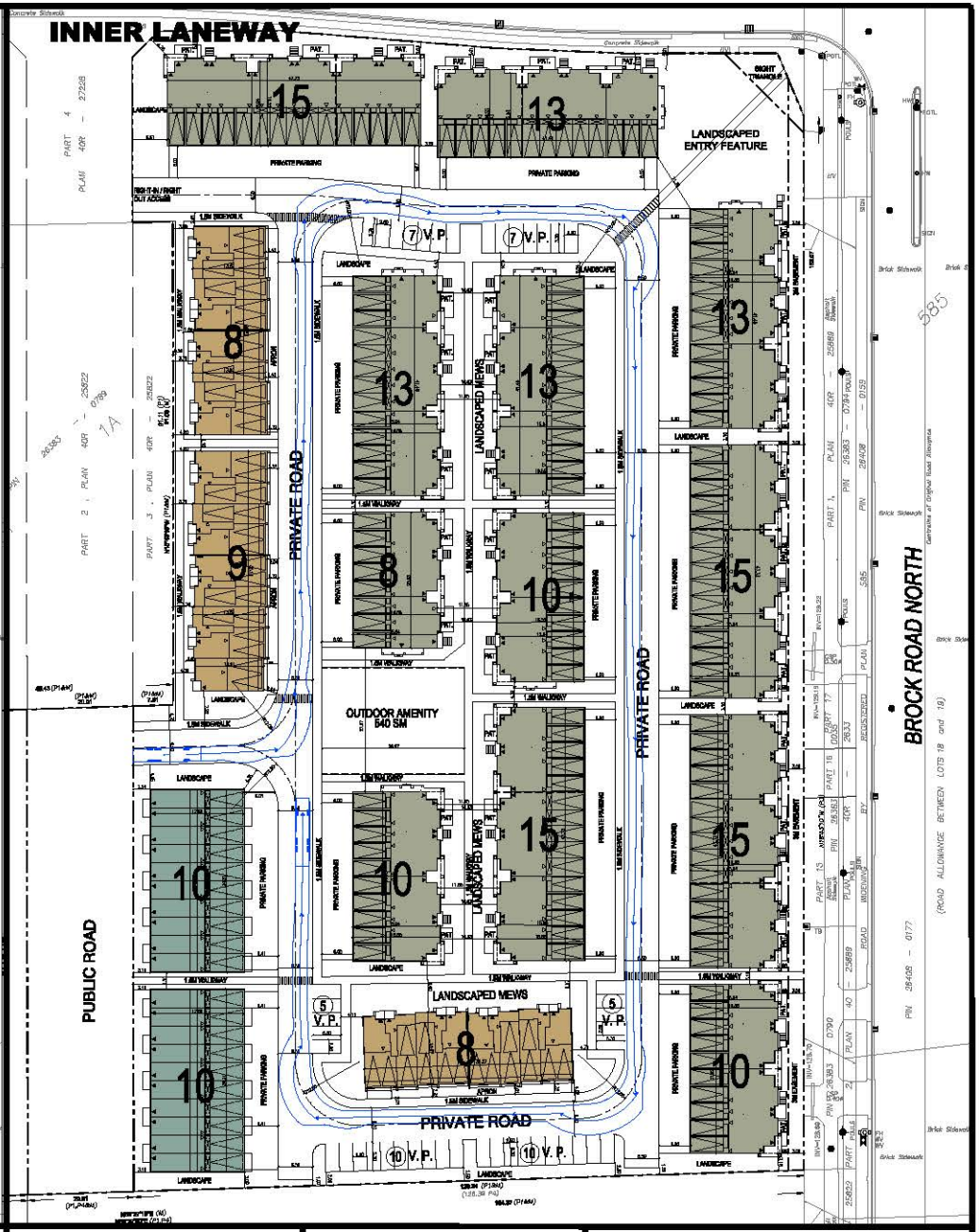
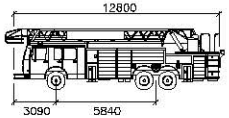


Figure 12 - Emergency (Fire) Vehicle Site Circulation

Proposed Residential Development
2660 - 2680 Brock Road
City of Pickering, ON



Aerial Fire mm

Width	: 2540
Track	: 2540
Lock to Lock Time	: 6.0
Steering Angle	: 37.0

CONSTRUCTION NORTH

SCALE: NTS UNITS: m

Source: Site Plan by Guthrie Muscovitch Architects, May 2022

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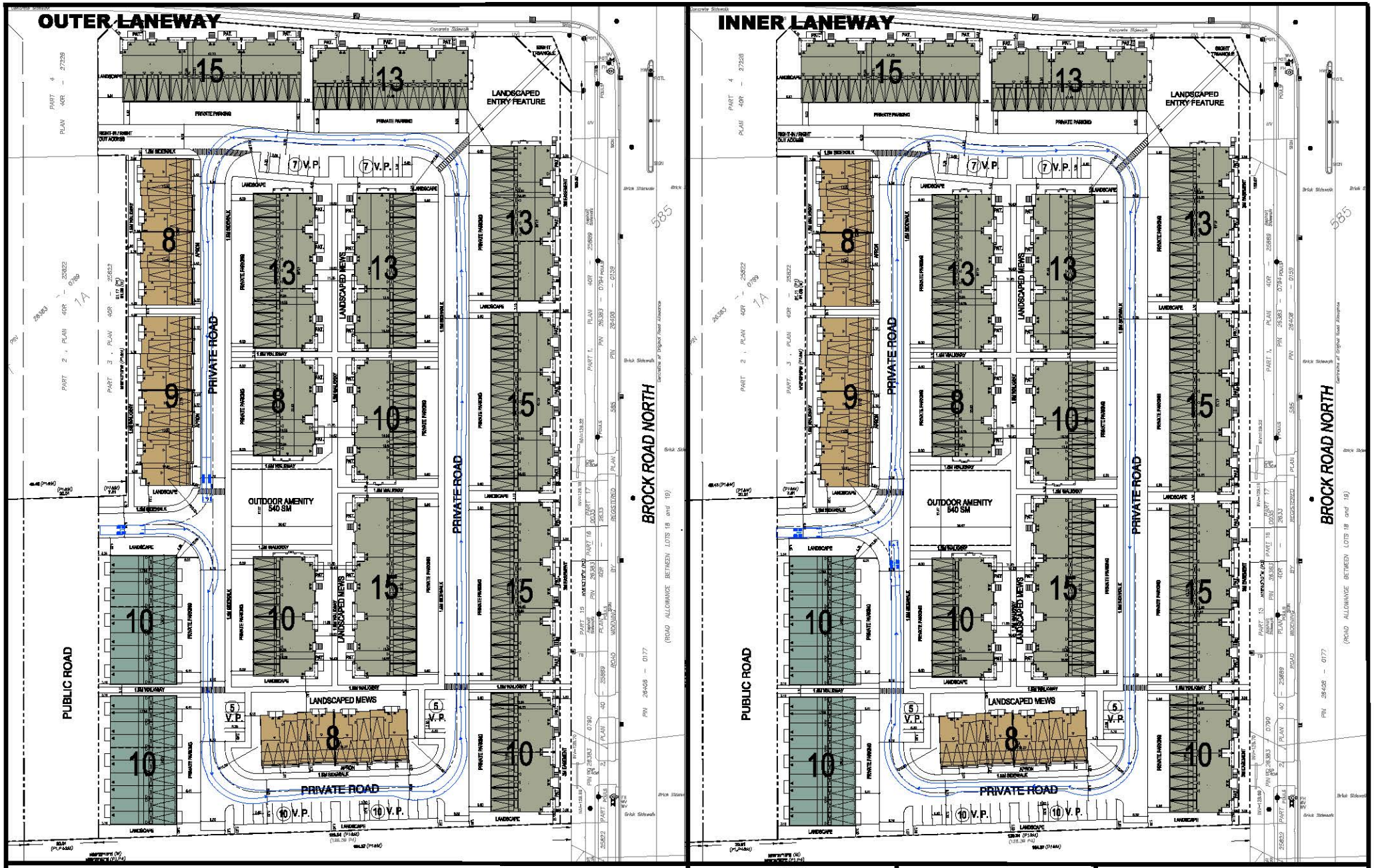
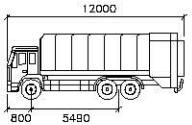


Figure 13 - Waste Collection Vehicle Site Circulation

Proposed Residential Development
2660 - 2680 Brock Road
City of Pickering, ON



CONSTRUCTION NORTH

Source: Site Plan by Guthrie Muscovitch Architects, May 2022

SCALE: NTS UNITS: m

TRANS-PLAN
transportation engineering consultants
785 Dundas Street West
Toronto, Ontario, M6J 1V2
tel: (647) 931-7383
website: www.trans-plan.com

APPENDICES

APPENDIX A

Turning Movement Counts and Signal Timing Plans

Trans-Plan Transportation Inc.

Site ID Code:
Intersection Location: Brock Rd at Dersan St./William Jackson Dr.
Municipality: Pickering, Ontario
Count Date: Thursday May 30, 2019
Weather and Temperature:
Surveyor:

AM	NORTH APPROACH										Total	EAST APPROACH										Total	SOUTH APPROACH										Total	WEST APPROACH										Total	Grand Total
	CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		
	L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			
7:00	1	138	8	0	14	1	0	0	0	0	162	36	1	2	0	0	0	0	0	0	0	39	7	129	24	1	26	1	0	0	0	0	188	1	1	21	0	0	2	0	0	0	0	25	414
7:15	1	158	10	0	14	0	0	0	0	0	183	39	2	2	0	0	0	0	0	0	0	43	14	181	45	3	23	3	0	0	0	0	269	1	1	28	0	0	1	0	0	0	0	31	526
7:30	3	186	0	3	15	2	0	0	0	0	209	45	1	1	3	0	0	0	0	0	0	50	8	179	5	3	30	2	0	0	0	0	227	2	0	36	0	1	5	0	0	0	0	44	530
7:45	5	231	0	0	12	0	0	0	0	0	248	70	0	4	1	0	0	0	0	0	0	75	21	175	6	1	25	2	0	0	0	0	230	1	0	41	0	0	3	0	0	0	1	46	599
8:00	3	212	1	0	18	0	0	0	0	0	234	34	0	7	0	0	0	0	0	0	0	41	34	159	5	3	30	1	0	0	0	0	232	1	0	45	1	0	1	0	0	0	0	48	555
8:15	1	193	0	0	29	0	0	0	0	0	223	50	0	2	4	0	0	0	0	0	0	56	19	145	11	3	24	1	0	0	0	0	203	3	0	41	4	0	4	0	0	0	0	52	534
8:30	2	220	2	0	28	0	0	0	0	0	252	40	0	3	1	0	0	0	0	0	0	44	18	137	10	1	30	3	0	0	0	0	199	2	0	27	1	0	2	0	0	0	0	32	527
8:45	2	193	3	0	29	0	0	0	0	0	227	33	0	2	1	0	0	0	0	0	0	36	22	117	12	0	29	1	0	0	0	0	181	3	1	37	5	0	1	0	0	0	0	47	491
9:00	0	141	1	0	18	0	0	0	0	0	160	28	0	5	0	0	0	0	0	0	0	33	17	116	10	1	41	2	0	0	0	0	187	0	1	19	2	0	4	0	0	0	0	26	406
9:15	1	131	1	0	33	0	0	0	0	0	166	26	0	3	0	0	0	0	0	0	0	29	16	119	15	0	17	0	0	0	0	0	167	3	0	25	0	0	1	0	0	0	0	29	391
PM																																													
16:00	0	123	0	0	13	0	0	0	0	0	136	22	1	4	2	1	0	0	0	0	0	30	24	230	17	1	23	0	0	0	0	0	295	2	0	20	0	0	3	0	0	0	0	25	486
16:15	0	151	1	0	17	0	0	0	0	0	169	22	0	4	0	0	0	0	0	0	0	26	28	234	30	2	25	0	0	0	0	0	319	2	1	18	0	0	0	0	0	0	0	21	535
16:30	6	175	1	0	17	0	0	0	0	0	199	24	2	2	0	0	0	0	0	0	0	28	32	218	15	2	14	0	0	0	0	0	281	1	2	11	0	0	2	0	0	0	0	16	524
16:45	0	210	1	0	19	0	0	0	0	0	230	40	1	1	0	0	0	0	0	0	0	42	34	241	18	2	4	0	0	0	0	0	299	0	0	16	0	0	2	0	0	0	0	18	589
17:00	4	240	1	0	9	0	0	0	0	0	254	23	0	2	0	0	0	0	0	0	0	25	46	235	31	0	12	0	0	0	0	0	324	1	1	21	0	0	1	0	0	0	0	24	627
17:15	1	209	0	0	11	0	0	0	0	1	222	29	2	3	0	0	0	0	0	0	0	34	37	243	29	1	9	0	0	0	0	0	319	0	1	18	0	0	1	0	0	0	0	20	595
17:30	2	168	1	0	5	0	0	0	0	0	176	20	2	0	0	0	0	0	0	0	0	22	38	195	31	1	13	2	0	0	0	0	280	0	0	22	0	0	0	0	0	0	0	22	500
17:45	2	185	2	0	15	0	0	0	0	0	204	29	0	3	0	0	0	0	0	0	0	32	49	218	27	1	4	0	0	0	0	0	299	1	1	22	0	0	2	0	0	0	0	26	561
18:00	3	149	0	0	8	0	0	0	0	0	160	27	1	0	0	0	0	0	0	0	0	28	49	175	31	2	7	0	0	0	0	1	265	0	1	25	0	0	1	0	0	0	0	27	480
18:15	1	143	1	0	4	0	0	0	0	0	149	18	1	0	0	0	0	1	0	0	2	22	44	165	26	0	8	0	0	0	0	0	243	2	1	20	0	0	2	0	0	0	1	26	440

TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

Intersection: Brock Rd at Dersan St./William Jackson Dr.
Intersection ID:
Municipality: Pickering, Ontario
Date: Thursday May 30, 2019

AM Peak Hour: 7:30 to 8:30

Brock Road

North Total	###					East Total	271	
North Entering	914	Cyclists	0	0	0	East Entering	222	
North Receiving	793	Truck	2	74	3	East Receiving	49	
North Peds	0	Cars	1	822	12	East Peds	0	
Dersan Street	0	5	7			14	0	0
	0	1	0			1	0	0
	0	13	163			199	8	0
West Total	285			82	658	27	South Total	2171
West Entering	189			10	109	6	South Entering	892
West Receiving	96			0	0	0	South Receiving	1279
West Peds	1						South Peds	0

MD Peak Hour: - to -

Brock Road

North Total	0					East Total	0	
North Entering	0	Cyclists	0	0	0	East Entering	0	
North Receiving	0	Truck	0	0	0	East Receiving	0	
North Peds	0	Cars	0	0	0	East Peds	0	
Dersan Street	0	0	0			0	0	0
	0	0	0			0	0	0
	0	0	0			0	0	0
West Total	0			0	0	0	South Total	0
West Entering	0			0	0	0	South Entering	0
West Receiving	0			0	0	0	South Receiving	0
West Peds	0						South Peds	0

PM Peak Hour: 16:30 to 17:30

Brock Road

North Total	###					East Total	237	
North Entering	904	Cyclists	0	0	0	East Entering	129	
North Receiving	986	Truck	0	56	0	East Receiving	108	
North Peds	1	Cars	3	834	11	East Peds	0	
Dersan Street	0	0	2			8	0	0
	0	0	4			5	0	0
	0	6	66			116	0	0
West Total	240			149	937	93	South Total	2301
West Entering	78			5	39	0	South Entering	1223
West Receiving	162			0	0	0	South Receiving	1078
West Peds	0						South Peds	0

Total 5-Hour Count

Brock Road

North Total	8056					East Total	1203	
North Entering	3962	Cyclists	0	0	0	East Entering	733	
North Receiving	4094	Truck	3	328	3	East Receiving	470	
North Peds	1	Cars	34	3556	38	East Peds	2	
Dersan Street	0	13	26			50	0	0
	0	1	12			14	1	0
	0	38	513			655	12	1
West Total	1240			557	3611	398	South Total	10109
West Entering	603			28	394	18	South Entering	5006
West Receiving	637			0	0	0	South Receiving	5103
West Peds	2						South Peds	1

Trans-Plan Transportation Inc.

Site ID Code:
Intersection Location: Brock Road at Zents Drive/Rex Heath Drive
Municipality: Pickering, Ontario
Count Date: Thursday May 30, 2019
Weather and Temperature:
Surveyor:

AM	NORTH APPROACH										Total	EAST APPROACH										Total	SOUTH APPROACH										Total	WEST APPROACH										Total	Grand Total
	CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		
	L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			
7:00	7	133	2	2	14	0	0	0	0	0	158	3	1	14	0	1	0	0	0	0	0	19	1	133	3	0	26	0	0	0	0	0	163	7	1	0	0	0	0	0	0	0	0	8	348
7:15	4	158	1	0	12	0	0	0	0	0	175	4	0	11	0	1	0	0	0	0	0	16	2	174	8	0	22	2	0	0	0	0	208	11	0	2	0	0	0	0	0	0	0	13	412
7:30	3	180	3	0	18	1	0	0	0	0	205	6	0	16	0	1	1	0	0	0	0	24	1	173	9	0	24	0	0	0	0	0	207	10	1	7	0	0	0	0	0	0	0	18	454
7:45	9	215	5	0	8	2	0	0	0	0	239	9	0	12	0	1	0	0	0	0	0	22	0	172	1	0	21	2	0	0	0	0	196	9	0	3	0	0	0	0	0	0	1	13	470
8:00	1	199	2	0	16	1	0	0	0	0	219	6	1	12	0	2	0	0	0	0	0	21	5	163	4	2	27	0	0	0	0	0	201	13	0	2	0	0	0	0	0	0	0	15	456
8:15	5	187	5	1	25	0	0	0	0	0	223	3	2	17	0	1	1	0	0	0	0	24	1	145	1	0	28	2	0	0	0	0	177	4	0	2	0	0	0	0	0	0	0	6	430
8:30	2	214	6	0	21	0	0	0	0	0	243	0	0	7	1	1	0	0	0	0	0	9	4	138	4	0	29	0	0	0	0	0	175	14	0	3	0	0	0	0	0	0	0	17	444
8:45	2	195	1	0	26	0	0	0	0	0	224	0	0	7	0	0	0	0	0	0	0	7	1	128	5	0	30	0	0	0	0	0	164	6	2	0	0	0	0	0	0	0	0	8	403
9:00	6	145	4	0	24	0	0	0	0	0	179	0	0	3	0	1	0	0	0	0	0	4	1	129	1	0	38	0	0	0	0	0	169	8	0	4	0	0	0	0	0	0	0	12	364
9:15	5	123	4	0	26	0	0	0	0	0	158	7	0	5	1	0	0	0	0	0	0	13	1	122	2	0	18	2	0	0	0	0	145	10	0	1	0	0	0	0	0	0	0	11	327
PM																																													
16:00	3	118	9	0	12	0	0	0	0	0	142	2	1	9	0	2	0	0	0	0	0	14	1	239	10	4	24	0	0	0	0	0	278	7	0	3	0	0	0	0	0	0	0	10	444
16:15	15	161	12	0	14	0	0	0	0	0	202	1	0	7	4	1	0	0	0	0	0	13	3	229	9	0	21	1	0	0	0	0	263	6	0	3	0	0	0	0	0	0	0	9	487
16:30	8	165	10	0	10	0	0	0	0	0	193	4	0	6	0	2	0	0	0	0	0	12	1	219	11	0	13	0	0	0	0	0	244	5	1	3	0	0	0	0	0	0	0	9	458
16:45	7	215	11	0	18	0	0	0	0	0	251	3	1	4	0	0	0	0	0	0	0	8	3	227	6	0	5	0	0	0	0	2	243	4	1	2	0	0	0	0	0	0	0	7	509
17:00	8	229	9	0	8	0	0	0	0	0	254	5	1	5	2	1	0	0	0	0	0	14	2	234	6	0	12	0	0	0	0	0	254	4	1	1	0	0	0	0	0	0	0	6	528
17:15	12	198	10	0	9	0	0	0	0	0	229	3	0	3	0	1	0	0	0	0	0	7	5	227	16	0	7	0	0	0	0	0	255	5	1	1	0	0	0	0	0	0	0	7	498
17:30	11	159	11	0	9	0	0	0	0	0	190	5	1	4	0	1	0	0	0	0	0	11	6	188	12	0	11	0	0	0	0	1	218	3	1	4	0	0	0	0	0	0	0	8	427
17:45	11	171	9	0	11	0	0	0	0	0	202	1	1	5	0	1	0	0	0	0	0	8	8	188	6	0	5	0	0	0	0	0	207	3	2	6	0	0	0	0	0	0	0	11	428
18:00	13	156	15	0	7	0	0	0	0	0	191	3	0	5	0	2	0	0	0	0	0	10	4	167	12	0	8	0	0	0	0	0	191	2	1	0	0	0	0	0	0	0	1	4	396
18:15	9	130	9	1	5	0	0	0	0	0	154	2	0	5	0	0	0	0	0	0	0	7	3	159	7	0	8	0	0	0	0	0	177	7	0	2	0	0	0	0	0	0	0	9	347

TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

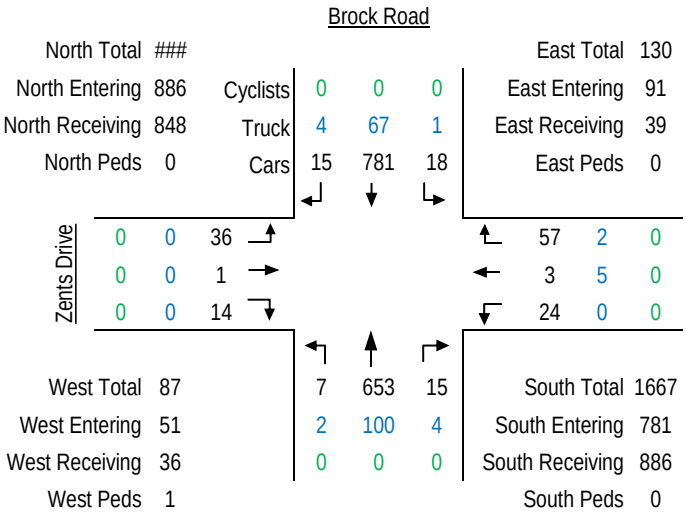
Intersection: Brock Road at Zents Drive/Rex Heath Drive

Intersection ID:

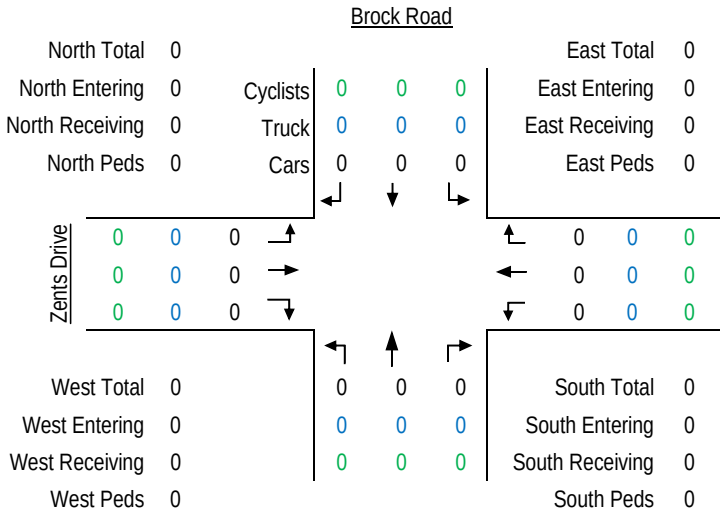
Municipality: Pickering, Ontario

Date: Thursday May 30, 2019

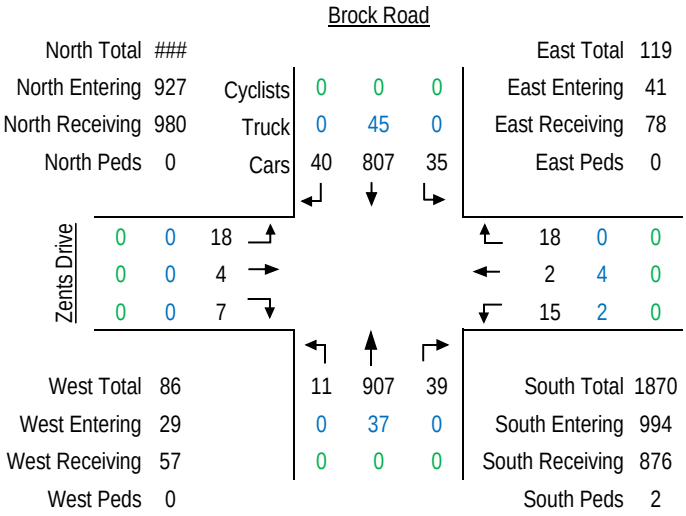
AM Peak Hour: 7:30 to 8:30



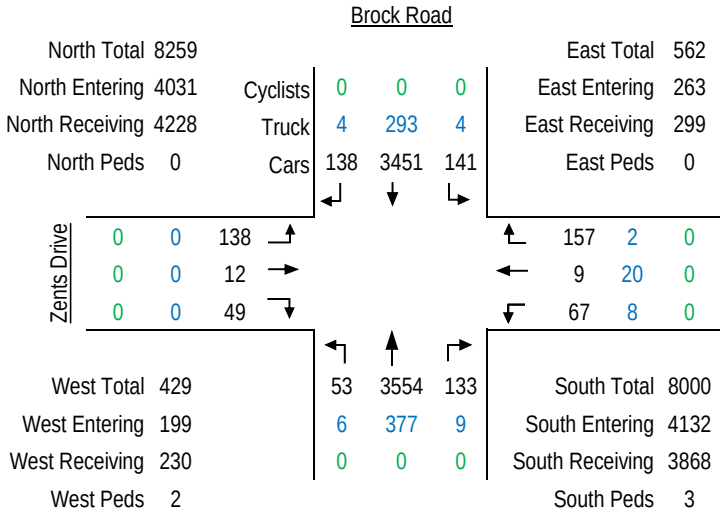
MD Peak Hour: - to -



PM Peak Hour: 16:30 to 17:30



Total 5-Hour Count



Signal Timings – AM, PM and Saturday Peaks

Brock Road (RR1) & Zents Drive / Rex Health Drive

This intersection operates in a semi-actuated mode of control with Brock Road assigned as the main street.

Weekday Program

Time Of Day	Cycle Length (sec.)	Brock Rd. N/S (sec.)		Zents Dr/Rex Health Dr E/W (sec.)	
05:30 to 09:00 **AM Peak**	100	Green Amber All Red	58.3 4.6 2.1	Min Green Max Green Amber All Red Veh Ext.	8.0 28.5 3.7 2.8 3.0
14:30 to 19:00 **PM Peak**	100	Green Amber All Red	58.3 4.6 2.1	Min Green Max Green Amber All Red Veh Ext.	8.0 28.5 3.7 2.8 3.0

Weekend Program

Time Of Day	Cycle Length (sec.)	Brock Rd. N/S (sec.)		Zents Dr/Rex Health Dr E/W (sec.)	
08:00 to 19:00	100	Green Amber All Red	59.3 4.6 2.1	Min Green Max Green Amber All Red Veh Ext.	8.0 27.5 3.7 2.8 3.0

Signal Timings – AM, PM and Saturday Peaks

Brock Road & Dersan Street

This intersection operates in a Semi-Actuated mode of control with Brock Road assigned as the main street.

Time Of Day	Cycle Length (sec.)		Brock Road NB/SB (sec.)		Dersan St EB/WB (sec.)	
			NB	SB	EB	WB
		Min Green	N/A	N/A	8.0	8.0
		Amber	5.0	5.0	3.7	3.7
		All Red	2.4	2.4	2.6	2.6
		Veh Ext	N/A	N/A	3.0	3.0
AM Peak 5:30 to 9:00	100	Max Green	61.6	61.6	24.7	24.7
PM Peak 14:30 to 19:00	100	Max Green	61.6	61.6	24.7	24.7
Saturday 8:00 to 19:00	100	Max Green	61.6	61.6	24.7	24.7

APPENDIX B

Background Traffic Information

Background Developments

1 2675-2725 Brock Road, Pickering

Land Use	Units/GLA	AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
Residential Townhouse (LUC 230)	436 units	35	135	170	135	65	200
Residential Apartment (LUC 232)	351 units	25	105	130	85	50	135
11% Residential Modal Split Reduction		*5*	*30*	*35*	*25*	*10*	*35*
Total Net Residential		**55**	**210**	**265**	**195**	**105**	**300**
Retail (LUC 820)	808 sq. m. (8,697 sq. ft.)	20	15	35	55	60	115
25% Retail Linked (Internal) Trips Reduction[1]		*5*	*5*	*10*	*15*	*15*	*30*
Net Retail		15	10	25	40	45	85
60% Retail Pass-By Trips Reduction[2]		*10*	*5*	*15*	*25*	*25*	*50*
Total Net Retail		**5**	**5**	**10**	**15**	**20**	**35**
Total Traffic[3]		**55**	**215**	**270**	**210**	**125**	**335**

Notes:
1. Percentage reduction adopted from Duffin Heights ESP assumptions (Table 10.4)
2. Percentage reduction adopted from ITE Trip Generation Manual (Chapter 5)
3. Rounded to the nearest 5 trips

Source: Traffic Impact Study, July 2013 & Addendum, June 2017, By BA Group

2 2540-2550 Brock Road, Pickering

Land Use	Units	Parameter	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Townhouse/ Condo-Apartment Residential (LUC 230)	411	Rate	0.08	0.37	0.44	0.35	0.17	0.52
Total New Trips			31	150	181	143	71	214

Source: Traffic Impact Study, November 2017, By GHD

3 2510 Brock Road, Pickering

Land Use (ITE Trip Generation Manual, 9th Edition)	Number of Dwelling Units (X)	AM Peak Hour			PM Peak Hour		
		Ln(T) = 0.80 Ln(X) + 0.26			Ln(T) = 0.82 Ln(X) + 0.32		
#230: Proposed Condominium/Townhouse Residential Units	194	Trips In	Trips Out	Total	Trip In	Trips Out	Total
		17%	83%	100%	67%	33%	100%
		15	73	88	70	34	104
Transit Reduction		33%	33%	33%	33%	33%	33%
Transit reduction (trips)		4	24	28	23	11	34
Total Net Generated Trips		11	49	60	47	23	70

Source: Traffic Impact Study, June 2017, By DevTrans Engineering Inc

4 2810 William Jackson Drive, Pickering

Parameters	Peak Hour Trip Generation					
	Weekday AM			Weekday PM		
	In	Out	Total	In	Out	Total
Trip Rate	0.106	0.355	0.461	0.350	0.206	0.556
Trip Ratio	23%	77%	-	63%	37%	-
Total Trips	19	63	82	62	37	99

Source: Transportation Impact Study, November 2017, By TMIG

5 Concession 3 Part of Lot 18 Now RP 40R6962 Part 2

Land Use			Weekday AM Peak Hou			Weekday PM Peak Hou		
			In	Out	Total	In	Out	Total
Residential Condominium	Units:	35						
ITE Code 230		Distribution	17%	83%	100%	67%	33%	100%
		Equation	Ln(T)= 0.80Ln(X)+0.26			Ln(T)= 0.82Ln(X)+0.32		
		Rate	0.11	0.52	0.63	0.48	0.24	0.71
		Trips	4	18	22	17	8	25
Shopping Centre	Sq Ft.	6,435						
ITE Code 820		Distribution	62%	38%	100%	48%	52%	100%
		Equation	Ln(T)= 0.61Ln(X)+2.24			Ln(T)= 0.67Ln(X)+3.31		
		Rate	2.80	1.71	4.51	7.15	7.61	14.76
		Trips	18	11	29	46	49	95
	10%	Trip Reduction	2	1	3	5	5	10
		Reduced Trips	16	10	26	41	44	86
	25%	Pass-by Trips	4	4	8	11	11	22
		New Trips	12	6	19	30	33	63
		Total Pass-by Trips	4	4	8	11	11	22
		Total New Site Trips	16	24	41	47	41	88

6 Stonepay Lands - Duffin Heights

Table 7: Site-Generated Trips

Interim / Horizon Year	ITE Land Use	No. of Units	A.M. Peak Hour (Adj. Street)			P.M. Peak Hour (Adj. Street)		
			Trips In	Trips Out	Total	Trips In	Trips Out	Total
	Proposed Condominium/ Townhouse Residential Units	726	44	217	261	212	105	317
2022	Transit Reduction (20%)		9	43	52	42	21	63
	Net Trips		**35**	**174**	**209**	**170**	**84**	**254**
2027	Transit Reduction (25%)		11	54	65	53	26	79
	Net Trips		**33**	**163**	**196**	**159**	**79**	**238**

Source: Traffic Impact Study, January 2018, By Candevcon Ltd

7 Trillium Housing Oak Non-Profit Corp.

Table 1: Site Trips

Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
Trip Rates	0.07	0.35	0.42	0.34	0.17	0.51
Site Trips	19	93	112	89	44	133
10% Modal Split	-2	-9	-11	-9	-4	-13
Total Trips	**17**	**84**	**101**	**80**	**40**	**120**

Source: Transportation Study, June 2018, by R.J. Burnside & Associates Ltd.

8 2620 Brock Road (Tenkey)

Table 1: Site Development Trip Generation

Land Use	Units	Parameter	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Residential Condominium / Townhouses (LUC 230)	30	Rate	0.07	0.37	0.44	0.35	0.17	0.52
		New Trips	2	11	13	11	5	16

Source: Traffic Impact Brief, September 2018, by GHD

9 Gironde Community Development

Land Use			Weekday AM Peak Hou			Weekday PM Peak Hou		
			In	Out	Total	In	Out	Total
Residential Condominium	Units:	104						
Multifamily Housing (Low-Rise) 220		Distribution	23%	77%	100%	63%	37%	100%
		Equation	Ln(T)= 0.95Ln(X)-0.51			Ln(T)= 0.89Ln(X)-0.02		
		Rate	0.11	0.37	0.48	0.37	0.22	0.59
		Trips	11	39	50	38	23	61

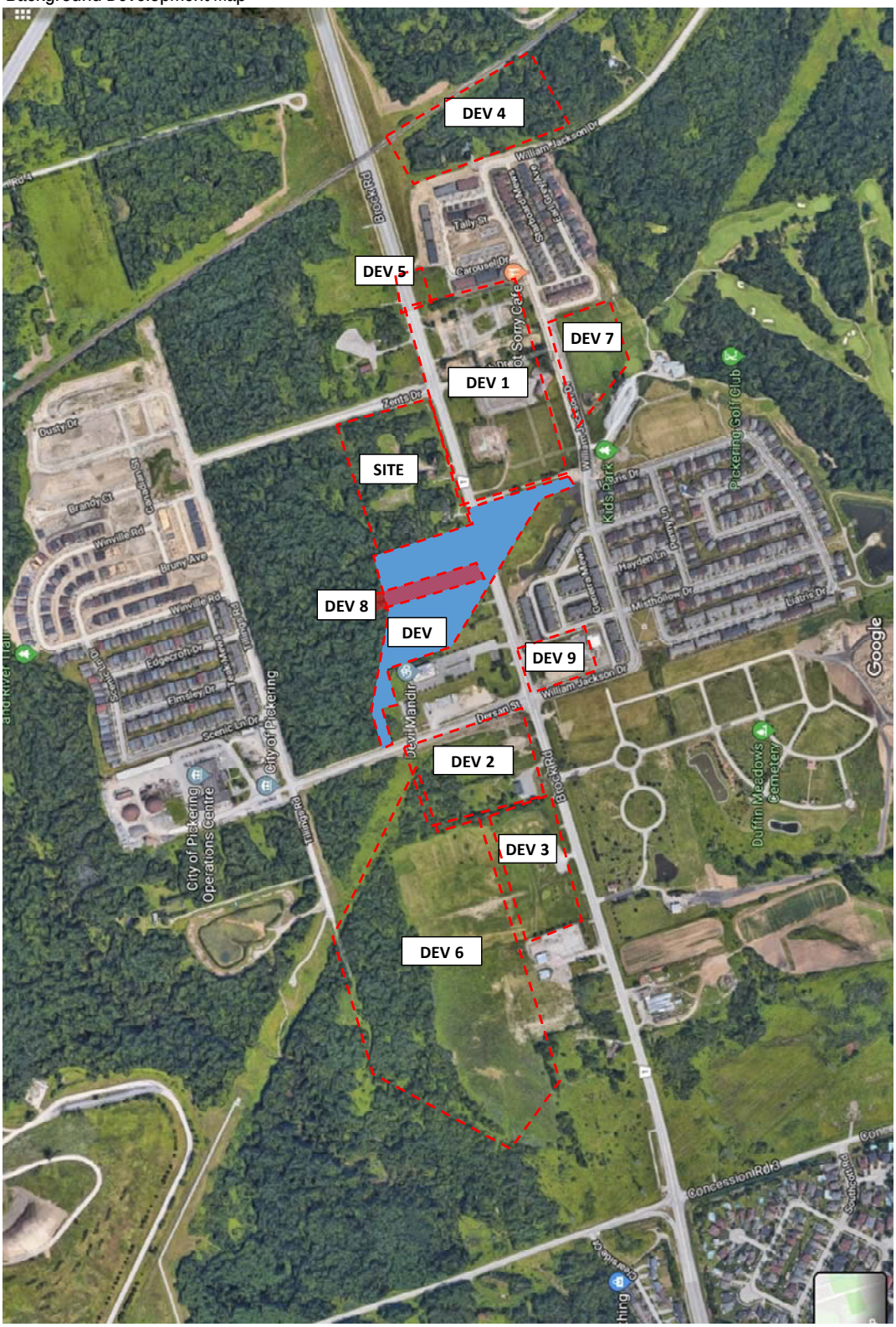
Source: Trip Gen

10 Lebovic Lands

Land Use			Weekday AM Peak Hou			Weekday PM Peak Hou		
			In	Out	Total	In	Out	Total
Residential Condominium	Units:	156						
Multifamily Housing (Low-Rise) 220		Distribution	23%	77%	100%	63%	37%	100%
		Equation	Ln(T)= 0.95Ln(X)-0.51			Ln(T)= 0.89Ln(X)-0.02		
		Rate	0.11	0.36	0.47	0.36	0.21	0.56
		Trips	17	56	73	55	33	88

Source: Trip Gen

Background Development Map



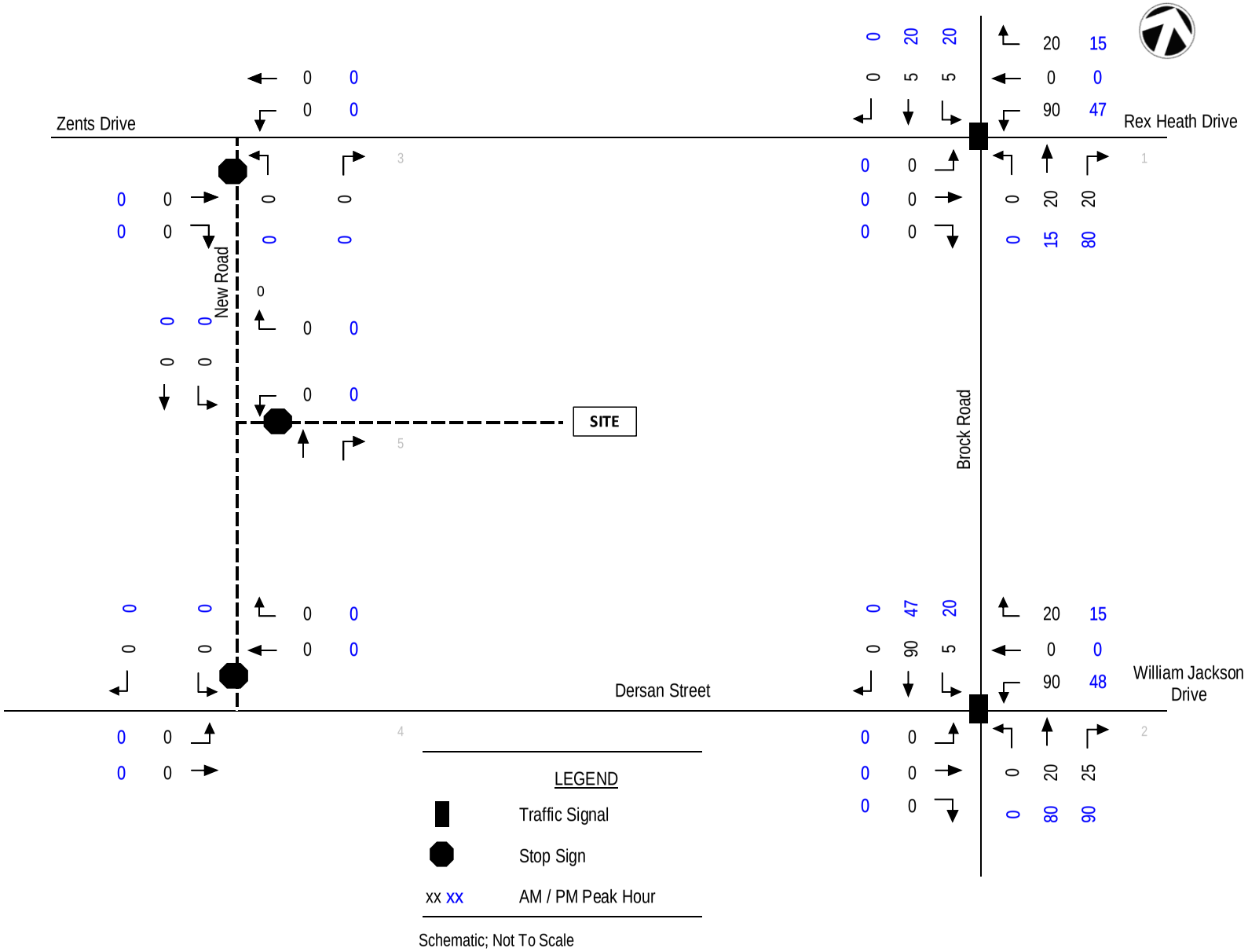
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 1 - 2675-2725 Brock Road, Pickering

Source: Traffic Impact Study, July 2013 & Addendum, June 2017, By BA Group



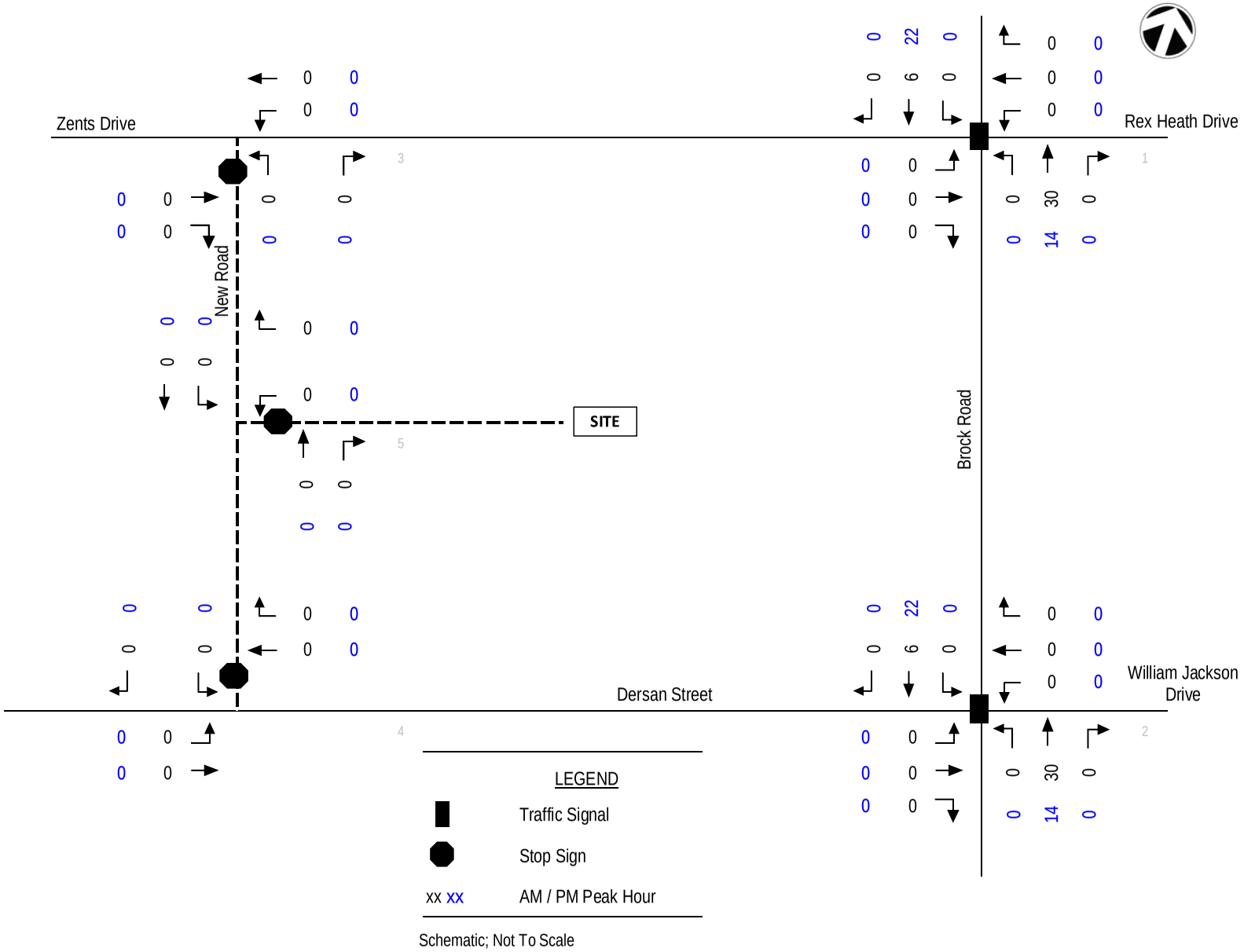
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 2 - 2540-2550 Brock Road, Pickering

Source: Traffic Impact Study, November 2017, By GHD



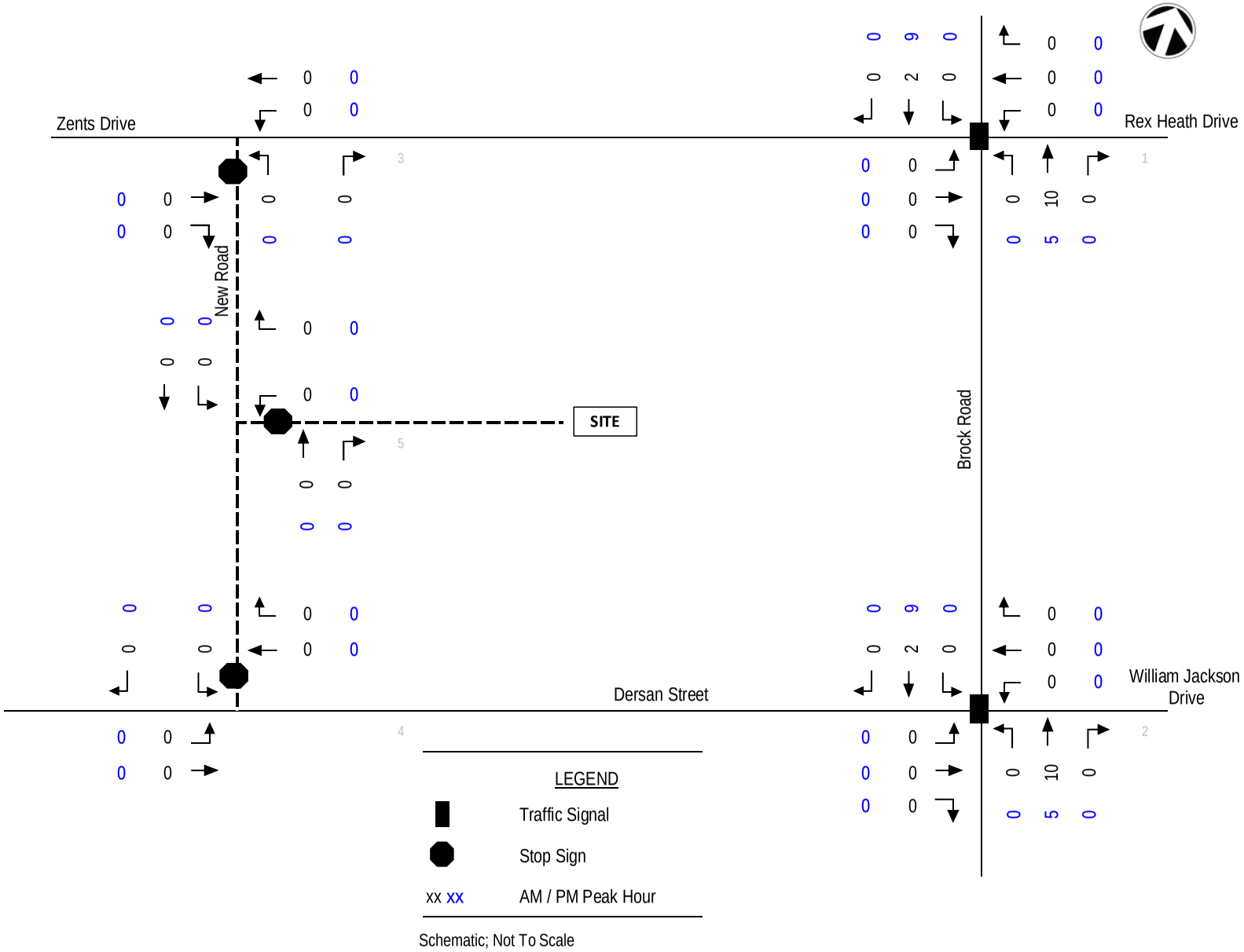
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 3 - 2510 Brock Road, Pickering

Source: Traffic Impact Study, June 2017, By DevTrans Engineering Inc



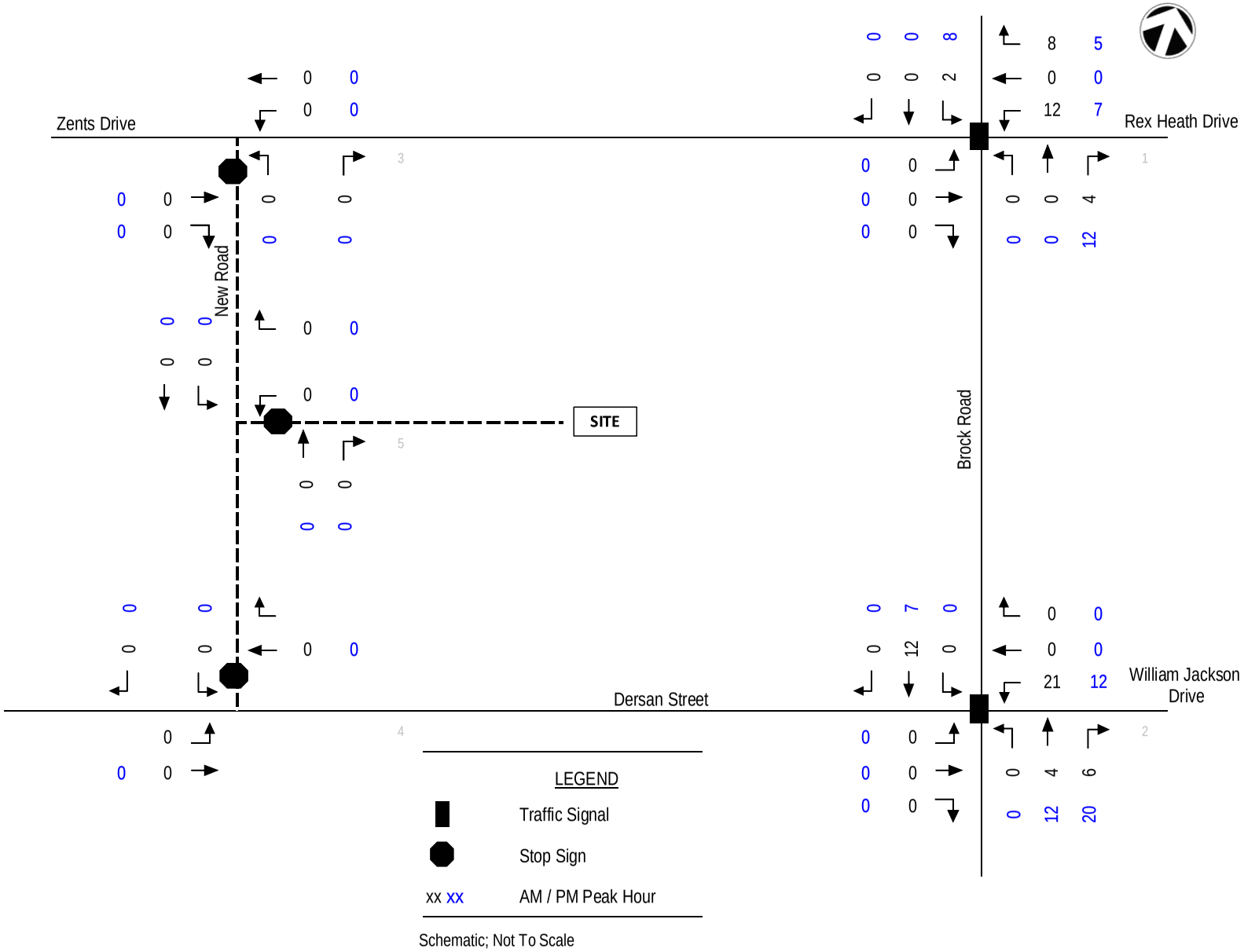
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 4 - 2810 William Jackson Drive, Pickering

Source: Transportation Impact Study, November 2017, By TMIG



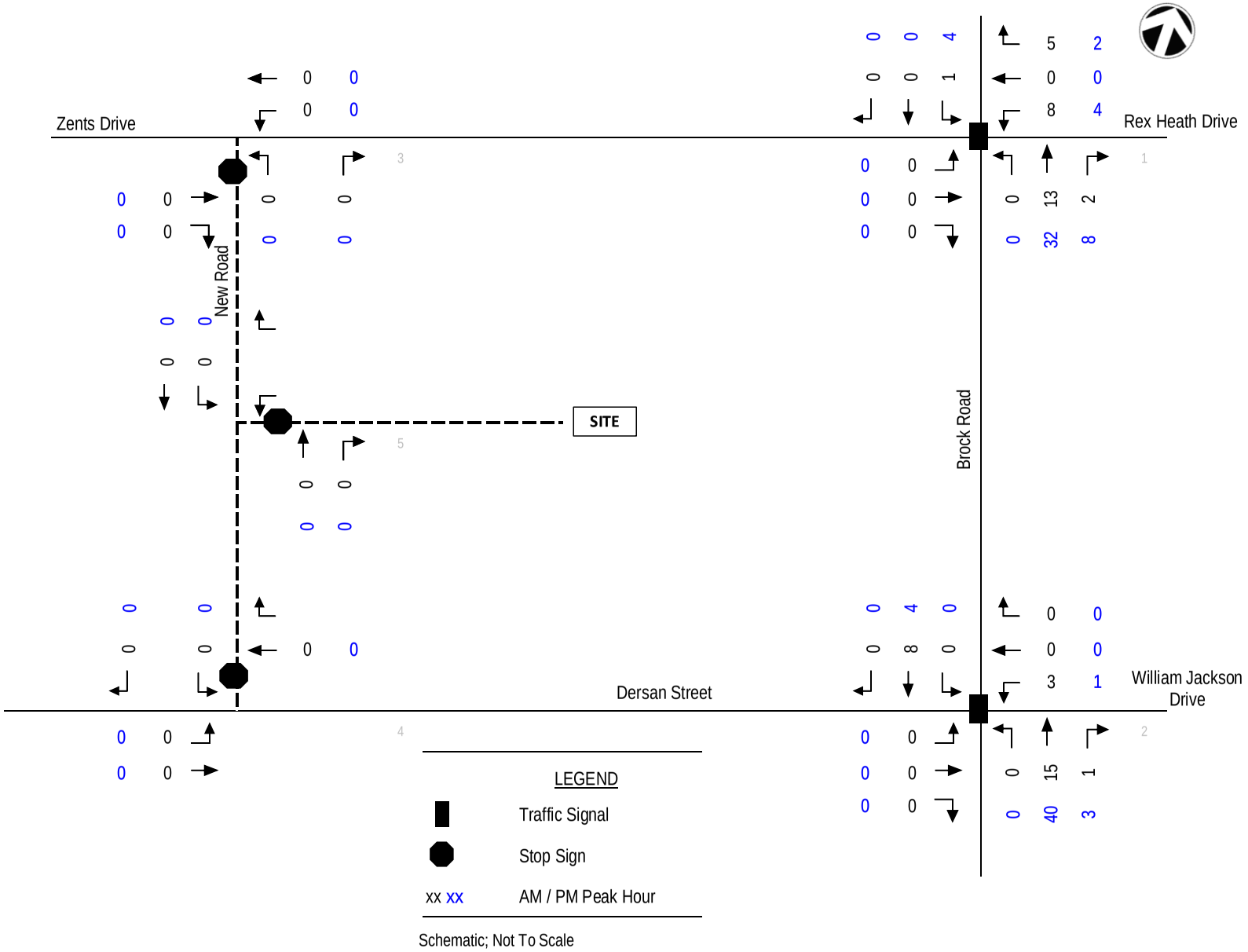
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 5 - Concession 3 Part of Lot 18 Now RP 40R6962 Part 2

Source: Traffic Impact Study, October 2018, By Trans-Plan



Schematic; Not To Scale

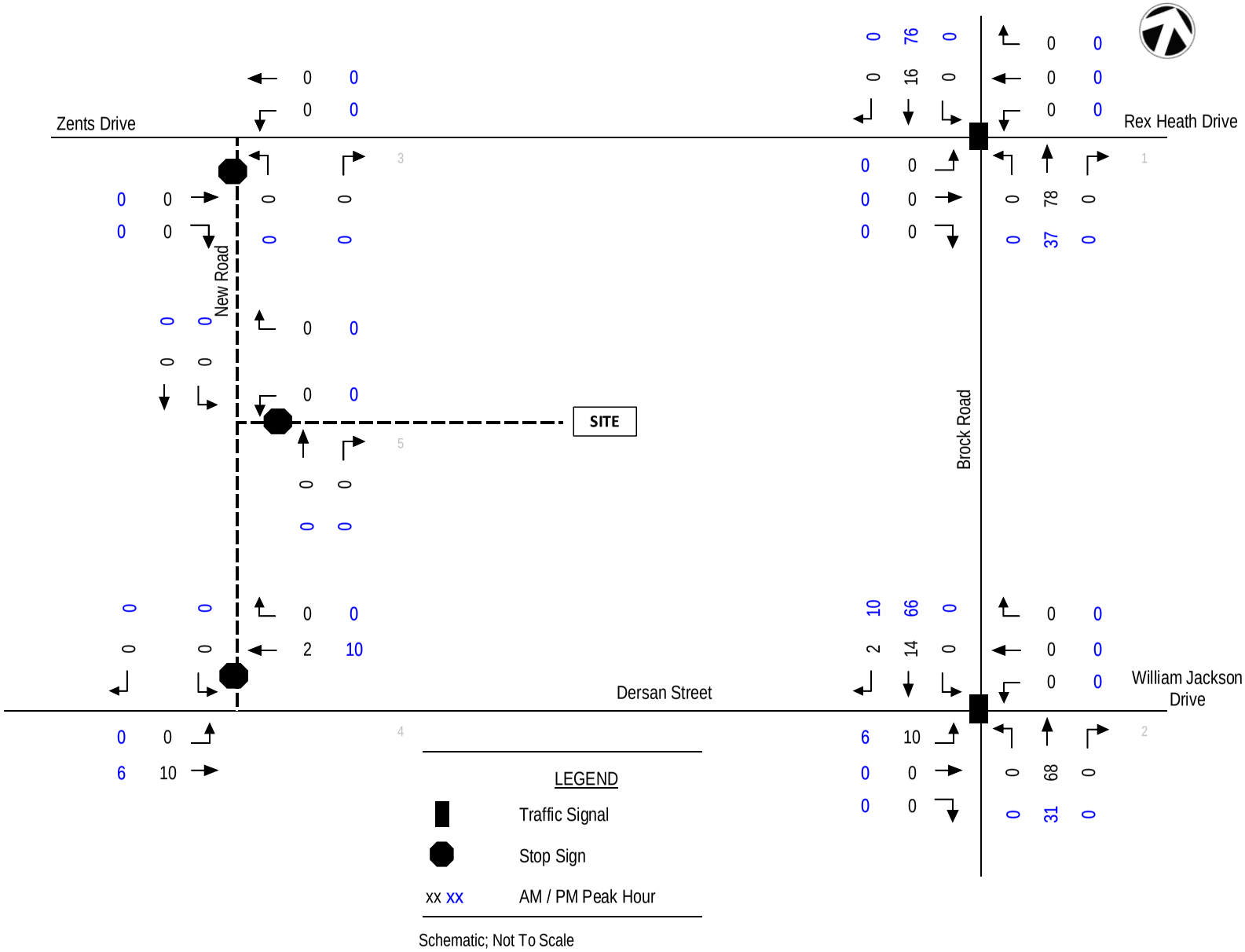
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 6 - Stonepay Lands - Duffin Heights

Source: Traffic Impact Study, January 2018, By Candevcon Ltd



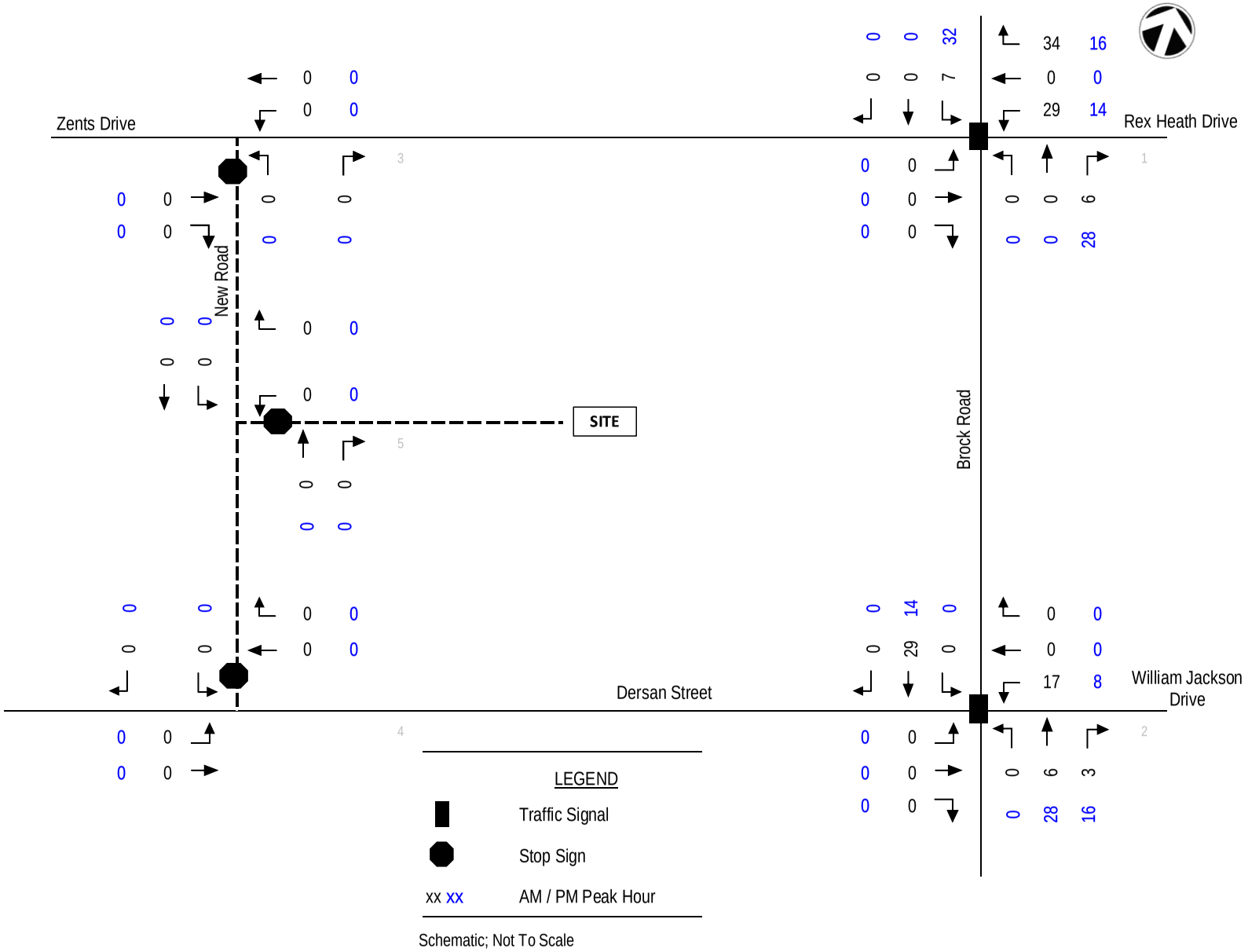
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 7 - Trillium Housing Oak Non-Profit Corp.

Source: Transportation Study, June 2018, by R.J. Burnside & Associates Ltd.



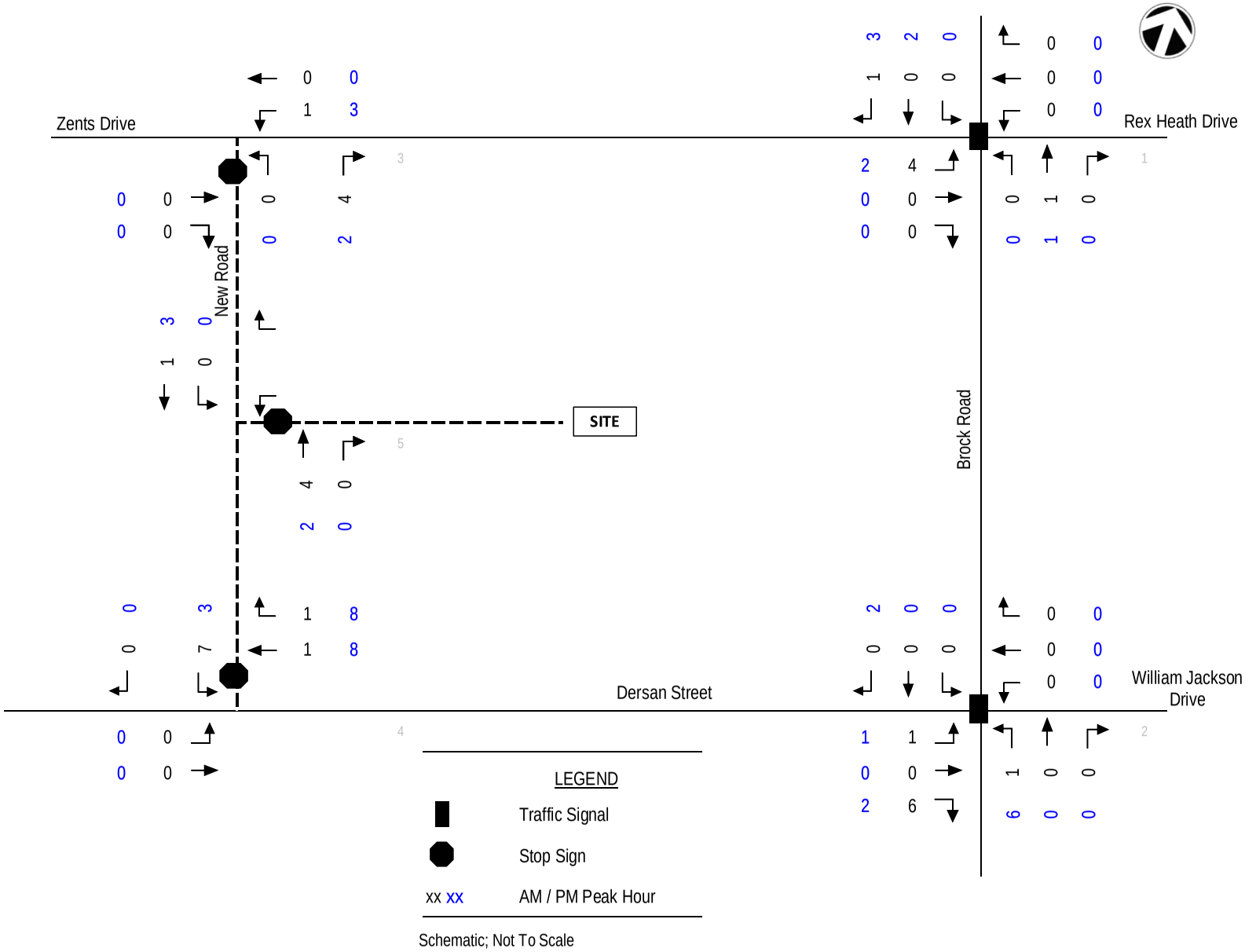
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 8 - 2620 Brock Road (Tenkey)

Source: Traffic Impact Brief, September 2018, by GHD



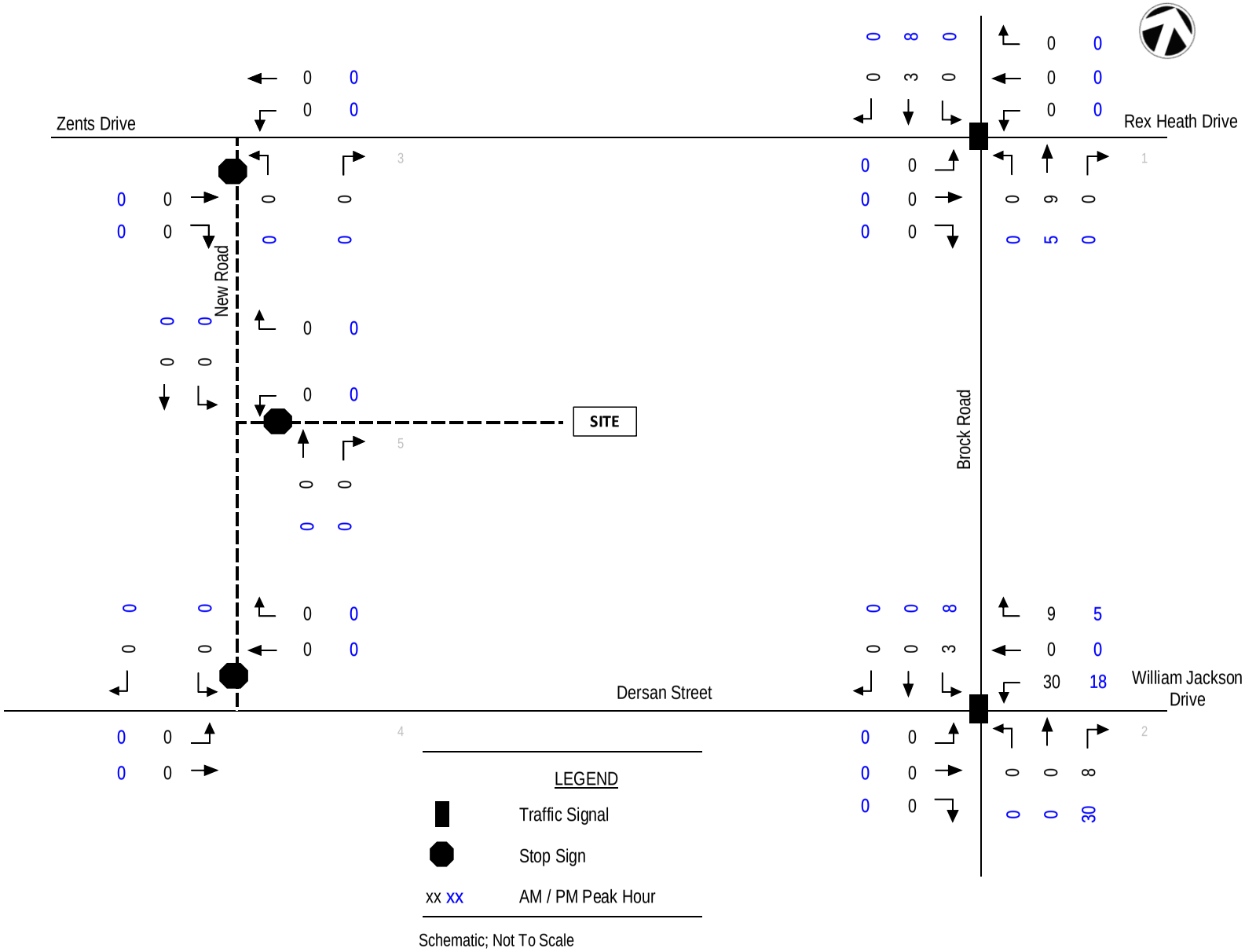
Transportation Study

Proposed Residential Development

2660-2680 Brock Road, City of Pickering, Ontario

DEV 9 - Gironde Community Development

Source: Trip Gen



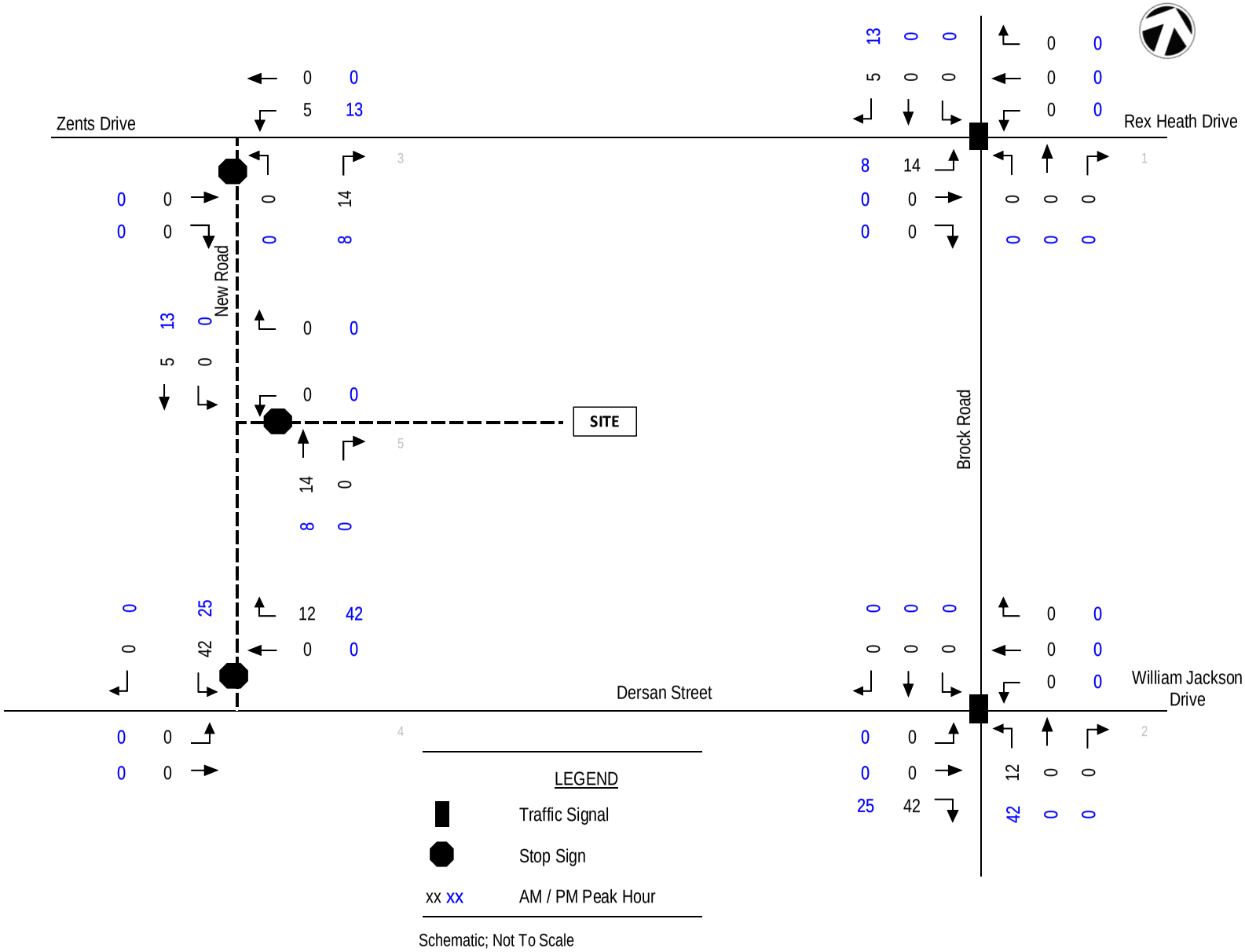
Transportation Study

Proposed Residential Development

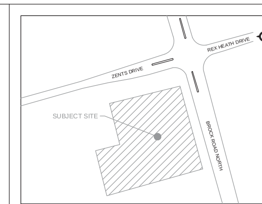
2660-2680 Brock Road, City of Pickering, Ontario

DEV 10 - Lebovic Lands

Source: Trip Gen



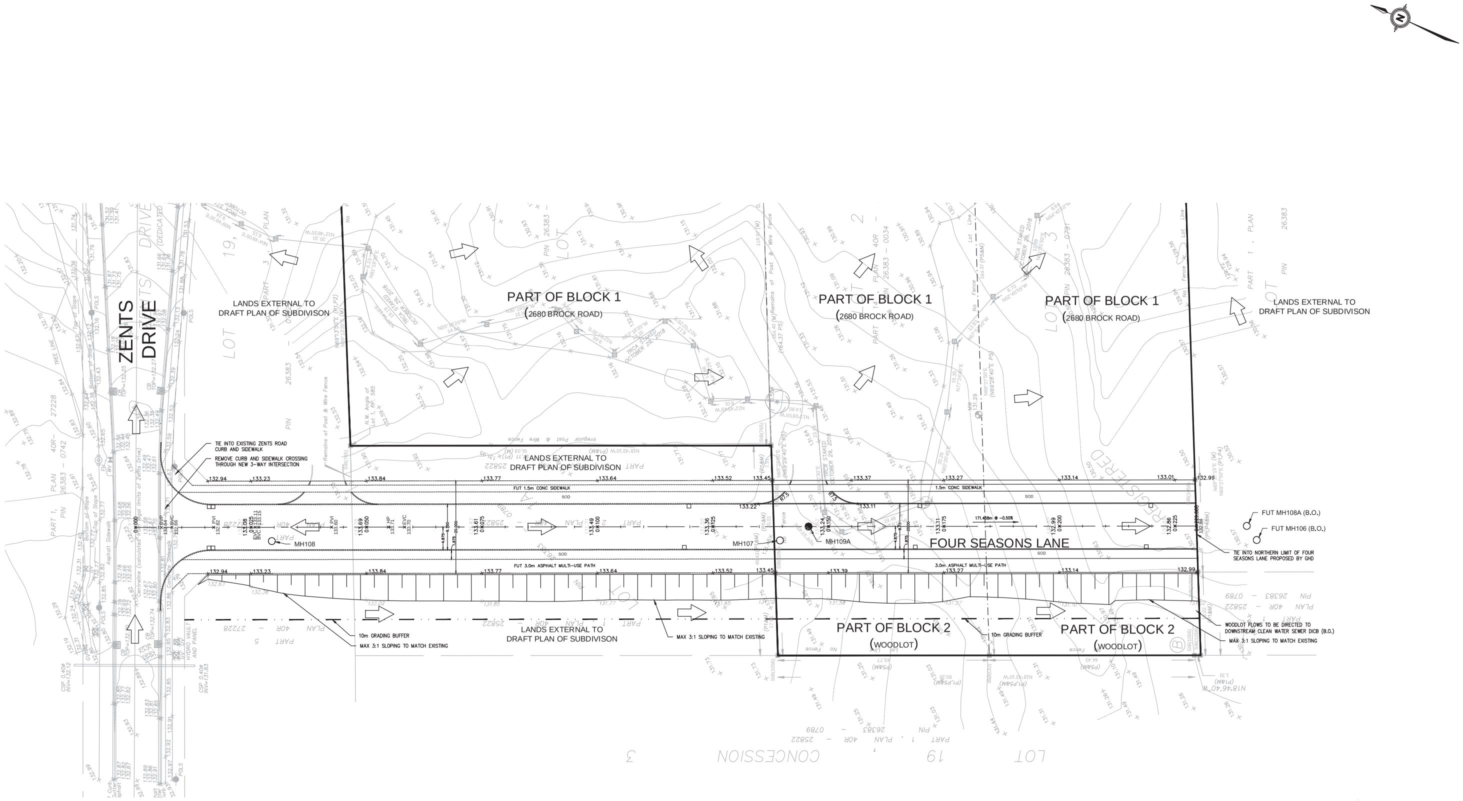
Schematic; Not To Scale



KEY PLAN N.T.S. | ADDRESS: 2680 BROCK ROAD PICKERING, ONTARIO

LEGEND | SEE ABBREVIATIONS BELOW

- 200.00 0.5% MH 1A — PROPOSED ITEMS
- 200.00 — PROP ELEVATION TO MATCH EXISTING
- EMERGENCY OVERLAND FLOW ROUTE
- SANITARY MH
- STM MH
- CB / DCB
- 3:1 SLOPING
- LIMIT OF SUBDIVISION



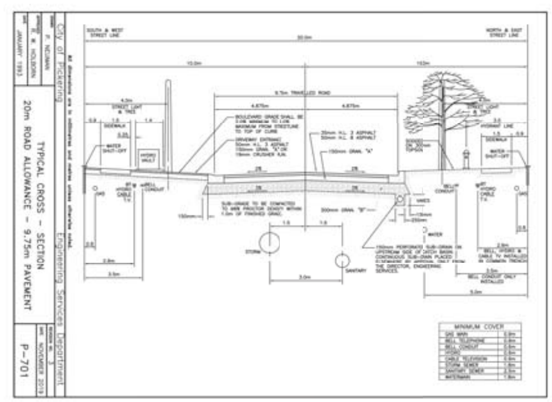
VERTICAL CURVE DATA

FOUR SEASONS LANE – HIGH POINT

LVC: 31.53
K: 7.00
PVI STA: 0+042.44
PVI ELEV: 133.778
HI POINT STA: 0+054.70
HI POINT ELEV: 133.71
BVCS: 0+026.68
BVCE: 133.15
EVCS: 0+058.21
EVCE: 135.70

FOUR SEASONS LANE – LOW POINT

LVC: 18.00
K: 6.00
PVI STA: 0+016.88
PVI ELEV: 132.75
LOW POINT STA: 0+007.88
LOW POINT ELEV: 132.66
BVCS: 0+007.88
BVCE: 132.66
EVCS: 0+025.86
EVCE: 133.11



BENCHMARK:	ELEVATIONS ARE GEODETIC AND ARE RELATED TO TOWN OF AJAX BENCH MARK No. 437, HAVING AN ELEVATION OF 90.79 METRES.
BEARING:	BEARINGS ARE GRID BEARINGS DERIVED FROM GPS OBSERVATIONS OF OBSERVED REFERENCE POINTS 'A' AND 'B', USING THE LEICA SMARTNET RTK NETWORK, AND ARE REFERRED TO THE 6° UTM COORDINATE SYSTEM, ZONE 17, CENTRAL MERIDIAN 81°00' WEST LONGITUDE. (NAD 83 (CSRS)(2010)).
SITE PLAN:	GUTHRIE MUSCOVITCH ARCHITECTS, 220725
SURVEY:	KRCMAR SURVEYORS ITD., 181112

NO.	ISSUE	DATE	BY
1	ISSUED FOR 1ST ZBA	2022-09-29	M.R.

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2. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER DRAWINGS AND DOCUMENTS APPLICABLE TO THIS PROJECT.
3. THIS DRAWING IS NOT TO BE ISSUED FOR CONSTRUCTION UNTIL ALL REQUIRED PERMITS HAVE BEEN ISSUED.
4. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, INVERTS AND DATA ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO TYLIN 48 HOURS PRIOR TO ANY CONSTRUCTION.

ABBREVIATIONS

GENERAL:
PROP = PROPOSED
EX = EXISTING

ELEVATIONS:
TC = TOP OF CURB
BC = BOTTOM OF CURB
TW = TOP OF WALL
BW = BOTTOM OF WALL

SERVICING:
STM = STORM
SAN = SANITARY
WAT = WATER
PVC = POLYVINYL CHLORIDE
HDPE = HIGH DENSITY POLYETHYLENE
CONC = CONCRETE
MH = MAINTENANCE HOLE
CB = CATCH BASIN
DCB = DOUBLE CATCH BASIN
AD = AREA DRAIN
TD = TRENCH DRAIN

LICENSED PROFESSIONAL ENGINEER M. P. RUIZ 100144060 October 07, 2022 PROVINCE OF ONTARIO

TYLin
8800 DUFFERIN STREET, SUITE 200
VAUGHAN, ON L4K 0C5
p: 905.738.5700
f: 905.738.0065

THE BROCK ZENTS PARTNERSHIP
2680 BROCK ROAD

FOUR SEASONS LANE
GRADING PLAN

SCALE:	1:500	PROJECT #	18138
DATE:	JULY 2022		
DRAWN BY:	C.D.	DRAWING #	GR1
DESIGNED BY:	C.D.		
CHECKED BY:	M.R.		

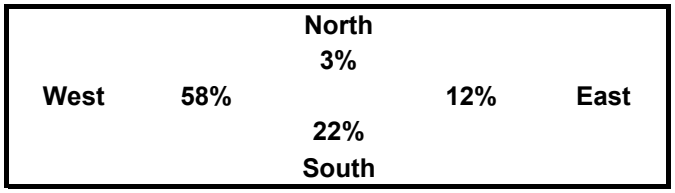
File : G:\Projects\2018\18138 - Complex - Brock Zents\3. Drawings\3. Design Drawings\Four Seasons Lane\18138 - Four Seasons Lane - GRADING.dwg Layout : G1 Date : Oct 07, 2022 - 2:27pm Edit By : caleb.donald

APPENDIX C

Transportation Tomorrow Survey Data

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Planning district of destination - pd_dest
Column: Ward number of household - ward_hhld
Table: Trip purpose of origin - purp_orig
Filters:
(Ward number of household - ward_hhld In 62
Trip purpose of origin - purp_orig In H
Start time of trip - start_time In 600-900)



Destination Zone	No. of Trips from City of Pickering Ward 3 (62 on TTS)	Percent of Trips from City of Pickering Ward 3 (62 on TTS)	Location respect to site
PD 1 of Toronto	2376	15%	W
PD 2 of Toronto	88	1%	W
PD 3 of Toronto	175	1%	W
PD 4 of Toronto	464	3%	W
PD 5 of Toronto	288	2%	W
PD 6 of Toronto	161	1%	W
PD 8 of Toronto	104	1%	W
PD 9 of Toronto	134	1%	W
PD 10 of Toronto	266	2%	W
PD 11 of Toronto	370	2%	W
PD 12 of Toronto	349	2%	W
PD 13 of Toronto	1085	7%	W
PD 14 of Toronto	108	1%	W
PD 15 of Toronto	397	3%	W
PD 16 of Toronto	1187	8%	W
Uxbridge	188	1%	N
Scugog	86	1%	N
Pickering			
Ward 60	2045	13%	S
Ward 61	1352	9%	S
Ward 62	2740	-	Internal
Ajax	705	5%	E
Whitby	500	3%	E
Oshawa	679	4%	E
Clarington	34	0%	E
Newmarket	55	0%	N
Aurora	85	1%	N
Richmond Hill	117	1%	W
Whitchurch-Stouffvil	13	0%	N
Markham	1356	9%	W
King	12	0%	W
Vaughan	215	1%	W
Brampton	121	1%	W
Mississauga	230	1%	W
Milton	11	0%	W
Niagara Falls	8	0%	S
Cambridge	12	0%	W
City of Guelph	15	0%	W
Barrie	20	0%	N
Kawartha Lakes	98	1%	N
Peterborough	47	0%	E
Northumberland	22	0%	E
Rest of Peterboroug	25	0%	E
Total	**15603**	**100%**	

2006, 2011 and 2016 TTS

City of Pickering, Auto Ownership Data, Apartments

Ward 3

Row: Type of dwelling unit - dwell_type

Column: No. of vehicles in household - n_vehicle

Household 2006

# of Vehicles	0	1	2	3	4	5+	Total	Ave
# of Households	348	146	275	0	0	0	769	0.90507

Household 2011

# of Vehicles	0	1	2	3	4	5+	Total	Ave
# of Households	456	1638	269	85	0	0	2448	0.99306

Household 2016

# of Vehicles	0	1	2	3	4	5+	Total	Ave
# of Households	581	1626	620	0	0	0	2827	1.01380

TRANS-PLAN™
transportation engineering

2006, 2011 and 2016 TTS
City of Pickering Ward 3, Transport Split

Cross Tabulation Query Form - Trip - 2006,2011,2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Ward number of household - ward_hhld
(Ward number of household - ward_hhld In 62)

Trip 2006

Transit excludin	2154
Cycle	104
Auto driver	50416
GO rail only	1929
Joint GO rail and	988
Other	142
Auto passenger	13313
School bus	2584
Taxi passenger	298
Walk	3515

Trip 2011

Transit excludin	3481
Cycle	181
Auto driver	55396
GO rail only	2393
Joint GO rail and	1004
Auto passenger	15133
School bus	2242
Taxi passenger	113
Walk	2843

Trip 2016

Transit excludin	3849
Cycle	41
Auto driver	54567
GO rail only	2206
Joint GO rail and	2227
Motorcycle	73
Other	8
Auto passenger	9215
School bus	4316
Taxi passenger	118
Paid rideshare	57
Walk	2197

Year	2006	
Ward	3	
Walk	3515	5%
Cycle	104	0%
Auto Driver	50416	67%
Auto Passenge	16195	21%
Transit	5071	7%
Other	142	0%
Total	75443	100%

Year	2011	
Ward	3	
Walk	2843	3%
Cycle	181	0%
Auto Driver	55396	67%
Auto Passenge	17488	21%
Transit	6878	8%
Total	82786	100%

Year	2016	
Ward	3	
Walk	2197	3%
Cycle	41	0%
Auto Driver	54640	69%
Auto Passenge	13706	17%
Transit	8282	11%
Other	8	0%
Total	78874	100%

APPENDIX D

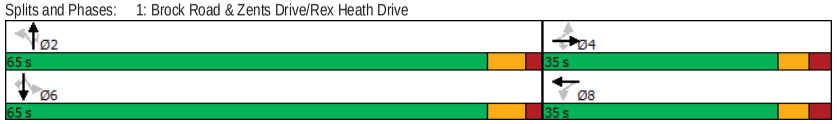
Capacity Analysis Sheets

Existing Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	36	1	14	24	8	9	800	19	19	900	19
Future Volume (vph)	36	1	14	24	8	9	800	19	19	900	19
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	8.7	8.7	8.7	8.7	8.7	66.7	66.7	66.7	66.7	66.7	66.7
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10	0.79	0.79	0.79	0.79	0.79	0.79
v/c Ratio	0.27	0.01	0.07	0.17	0.33	0.02	0.33	0.02	0.04	0.35	0.02
Control Delay	39.2	32.0	3.4	36.1	15.9	3.4	3.9	0.6	3.5	4.0	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	32.0	3.4	36.1	15.9	3.4	3.9	0.6	3.5	4.0	0.6
LOS	D	C	A	D	B	A	A	A	A	A	A
Approach Delay		29.1			21.3		3.8			3.9	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 84.2			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.35			
Intersection Signal Delay: 5.4		Intersection LOS: A	
Intersection Capacity Utilization 120.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



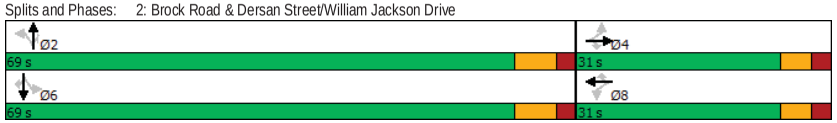
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1	14	24	8	59	9	800	19	19	900	19
Future Volume (vph)	36	1	14	24	8	59	9	800	19	19	900	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1805	1499		1480	3195	1335	1719	3343	1335
Flt Permitted	0.71	1.00	1.00	0.76	1.00		0.30	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	1353	1900	1615	1439	1499		468	3195	1335	612	3343	1335
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	38	1	15	25	8	61	9	833	20	20	938	20
RTOR Reduction (vph)	0	0	14	0	56	0	0	0	5	0	0	5
Lane Group Flow (vph)	38	1	1	25	13	0	9	833	15	20	938	15
Heavy Vehicles (%)	0%	0%	0%	0%	63%	3%	22%	13%	21%	5%	8%	21%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	7.0	7.0	7.0	7.0	7.0		65.3	65.3	65.3	65.3	65.3	65.3
Effective Green, g (s)	7.0	7.0	7.0	7.0	7.0		65.3	65.3	65.3	65.3	65.3	65.3
Actuated g/C Ratio	0.08	0.08	0.08	0.08	0.08		0.76	0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	110	155	132	117	122		357	2440	1019	467	2553	1019
v/s Ratio Prot		0.00			0.01			0.26			c0.28	
v/s Ratio Perm	c0.03		0.00	0.02			0.02		0.01	0.03		0.01
v/c Ratio	0.35	0.01	0.01	0.21	0.11		0.03	0.34	0.01	0.04	0.37	0.01
Uniform Delay, d1	37.1	36.1	36.1	36.7	36.4		2.4	3.2	2.4	2.5	3.3	2.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	0.0	0.0	0.9	0.4		0.1	0.4	0.0	0.2	0.4	0.0
Delay (s)	39.0	36.1	36.1	37.6	36.7		2.6	3.6	2.4	2.6	3.7	2.4
Level of Service	D	D	D	D	D		A	A	A	A	A	A
Approach Delay (s)		38.1			37.0			3.6			3.7	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A		
HCM 2000 Volume to Capacity ratio	0.37				
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	13.2		
Intersection Capacity Utilization	120.4%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	1	176	207	1	14	92	814	33	15	951	3
Future Volume (vph)	12	1	176	207	1	14	92	814	33	15	951	3
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	61.6	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	19.5	19.5	19.5	19.5	19.5	19.5	62.1	62.1	62.1	62.1	62.1	62.1
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.20	0.65	0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.06	0.01	0.47	0.79	0.00	0.04	0.36	0.42	0.04	0.05	0.47	0.00
Control Delay	30.1	29.0	16.4	55.7	29.0	0.2	13.3	9.4	2.6	7.9	9.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	29.0	16.4	55.7	29.0	0.2	13.3	9.4	2.6	7.9	9.8	0.0
LOS	C	C	B	E	C	A	B	A	A	A	A	A
Approach Delay		17.3			52.1			9.5			9.8	
Approach LOS		B			D			A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 95.3			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 14.4		Intersection LOS: B	
Intersection Capacity Utilization 126.9%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



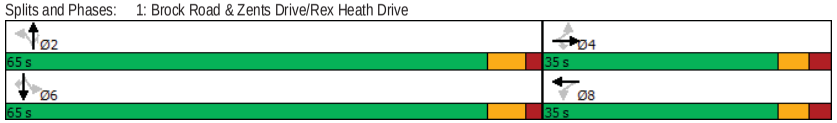
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	1	176	207	1	14	92	814	33	15	951	3
Future Volume (vph)	12	1	176	207	1	14	92	814	33	15	951	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1271	950	1509	1736	1900	1615	1626	3167	1369	1504	3343	967
Flt Permitted	0.76	1.00	1.00	0.76	1.00	1.00	0.25	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	1013	950	1509	1383	1900	1615	427	3167	1369	480	3343	967
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	13	1	189	223	1	15	99	875	35	16	1023	3
RTOR Reduction (vph)	0	0	97	0	0	12	0	0	12	0	0	1
Lane Group Flow (vph)	13	1	92	223	1	3	99	875	23	16	1023	2
Heavy Vehicles (%)	42%	100%	7%	4%	0%	0%	11%	14%	18%	20%	8%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	19.5	19.5	19.5	19.5	19.5	19.5	62.0	62.0	62.0	62.0	62.0	62.0
Effective Green, g (s)	19.5	19.5	19.5	19.5	19.5	19.5	62.0	62.0	62.0	62.0	62.0	62.0
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.20	0.65	0.65	0.65	0.65	0.65	0.65
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	207	194	309	283	389	330	278	2062	891	312	2177	629
v/s Ratio Prot		0.00			0.00			0.28			c0.31	
v/s Ratio Perm	0.01		0.06	c0.16		0.00	0.23		0.02	0.03		0.00
v/c Ratio	0.06	0.01	0.30	0.79	0.00	0.01	0.36	0.42	0.03	0.05	0.47	0.00
Uniform Delay, d1	30.5	30.1	32.1	35.9	30.1	30.2	7.5	8.0	5.9	6.0	8.3	5.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	0.5	13.5	0.0	0.0	3.5	0.6	0.1	0.3	0.7	0.0
Delay (s)	30.6	30.1	32.6	49.4	30.1	30.2	11.1	8.6	5.9	6.3	9.1	5.8
Level of Service	C	C	C	D	C	C	B	A	A	A	A	A
Approach Delay (s)		32.5			48.1			8.8			9.0	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.55				
Actuated Cycle Length (s)	95.2	Sum of lost time (s)		13.7	
Intersection Capacity Utilization	126.9%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	18	4	7	17	6	11	1002	39	35	905	40
Future Volume (vph)	18	4	7	17	6	11	1002	39	35	905	40
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	8.1	8.1	8.1	8.1	8.1	71.7	71.7	71.7	71.7	71.7	71.7
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10	0.85	0.85	0.85	0.85	0.85	0.85
v/c Ratio	0.12	0.02	0.04	0.13	0.16	0.03	0.36	0.03	0.09	0.33	0.03
Control Delay	36.9	34.5	0.3	37.4	21.1	3.0	3.1	1.1	3.3	3.0	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.9	34.5	0.3	37.4	21.1	3.0	3.1	1.1	3.3	3.0	1.1
LOS	D	C	A	D	C	A	A	A	A	A	A
Approach Delay		28.1			27.9		3.0			2.9	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 84.2			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.36			
Intersection Signal Delay: 3.8		Intersection LOS: A	
Intersection Capacity Utilization 120.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



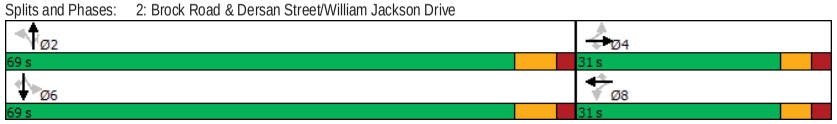
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	4	7	17	6	18	11	1002	39	35	905	40
Future Volume (vph)	18	4	7	17	6	18	11	1002	39	35	905	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1612	1450		1805	3471	1615	1805	3438	1615
Flt Permitted	0.83	1.00	1.00	0.83	1.00		0.30	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	1583	1900	1615	1414	1450		562	3471	1615	499	3438	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	19	4	7	18	6	19	12	1066	41	37	963	43
RTOR Reduction (vph)	0	0	7	0	18	0	0	0	8	0	0	9
Lane Group Flow (vph)	19	4	0	18	7	0	12	1066	33	37	963	34
Heavy Vehicles (%)	0%	0%	0%	12%	67%	0%	0%	4%	0%	0%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	4.8	4.8	4.8	4.8	4.8		68.9	68.9	68.9	68.9	68.9	68.9
Effective Green, g (s)	4.8	4.8	4.8	4.8	4.8		68.9	68.9	68.9	68.9	68.9	68.9
Actuated g/C Ratio	0.06	0.06	0.06	0.06	0.06		0.79	0.79	0.79	0.79	0.79	0.79
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	87	104	89	78	80		445	2752	1280	395	2725	1280
v/s Ratio Prot		0.00			0.00			c0.31			0.28	
v/s Ratio Perm	0.01		0.00	c0.01			0.02		0.02	0.07		0.02
v/c Ratio	0.22	0.04	0.00	0.23	0.09		0.03	0.39	0.03	0.09	0.35	0.03
Uniform Delay, d1	39.3	38.9	38.8	39.3	39.0		1.9	2.7	1.9	2.0	2.6	1.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.2	0.0	1.5	0.5		0.1	0.4	0.0	0.5	0.4	0.0
Delay (s)	40.5	39.0	38.8	40.8	39.5		2.0	3.1	1.9	2.5	3.0	1.9
Level of Service	D	D	D	D	D		A	A	A	A	A	A
Approach Delay (s)		39.9			40.0			3.0			2.9	
Approach LOS		D			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.38				
Actuated Cycle Length (s)	86.9	Sum of lost time (s)		13.2	
Intersection Capacity Utilization	120.4%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	72	116	5	8	154	1036	93	11	945	3
Future Volume (vph)	2	4	72	116	5	8	154	1036	93	11	945	3
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	61.6	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	13.3	13.3	13.3	13.3	13.3	13.3	65.8	65.8	65.8	65.8	65.8	65.8
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.71	0.71	0.71	0.71	0.71	0.71
v/c Ratio	0.01	0.01	0.28	0.61	0.02	0.03	0.48	0.45	0.09	0.04	0.42	0.00
Control Delay	31.0	31.0	10.6	49.0	31.0	0.2	12.8	7.0	1.4	5.6	6.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	31.0	10.6	49.0	31.0	0.2	12.8	7.0	1.4	5.6	6.7	0.0
LOS	C	C	B	D	C	A	B	A	A	A	A	A
Approach Delay		12.0			45.2			7.3			6.7	
Approach LOS		B			D			A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 92.8			
Natural Cycle: 85			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 9.2		Intersection LOS: A	
Intersection Capacity Utilization 133.3%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	72	116	5	8	154	1036	93	11	945	3
Future Volume (vph)	2	4	72	116	5	8	154	1036	93	11	945	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1495	1805	1900	1615	1752	3471	1615	1805	3406	1615
Flt Permitted	0.75	1.00	1.00	0.76	1.00	1.00	0.26	1.00	1.00	0.23	1.00	1.00
Satd. Flow (perm)	1434	1900	1495	1435	1900	1615	489	3471	1615	444	3406	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	2	4	77	125	5	9	166	1114	100	12	1016	3
RTOR Reduction (vph)	0	0	66	0	0	8	0	0	29	0	0	1
Lane Group Flow (vph)	2	4	11	125	5	1	166	1114	71	12	1016	2
Heavy Vehicles (%)	0%	0%	8%	0%	0%	0%	3%	4%	0%	0%	6%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	13.3	13.3	13.3	13.3	13.3	13.3	65.8	65.8	65.8	65.8	65.8	65.8
Effective Green, g (s)	13.3	13.3	13.3	13.3	13.3	13.3	65.8	65.8	65.8	65.8	65.8	65.8
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.14	0.71	0.71	0.71	0.71	0.71	0.71
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	205	272	214	205	272	231	346	2461	1145	314	2415	1145
v/s Ratio Prot		0.00			0.00			0.32			0.30	
v/s Ratio Perm	0.00		0.01	c0.09		0.00	c0.34		0.04	0.03		0.00
v/c Ratio	0.01	0.01	0.05	0.61	0.02	0.01	0.48	0.45	0.06	0.04	0.42	0.00
Uniform Delay, d1	34.1	34.1	34.3	37.3	34.1	34.1	6.0	5.8	4.1	4.0	5.6	3.9
Progression 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
Incremental Delay, d2	0.0	0.0	0.1	5.1	0.0	0.0	4.7	0.6	0.1	0.2	0.5	0.0
Delay (s)	34.1	34.1	34.4	42.4	34.2	34.1	10.7	6.4	4.2	4.3	6.1	3.9
Level of Service	C	C	C	D	C	C	B	A	A	A	A	A
Approach Delay (s)		34.4			41.5			6.7			6.1	
Approach LOS		C			D			A			A	

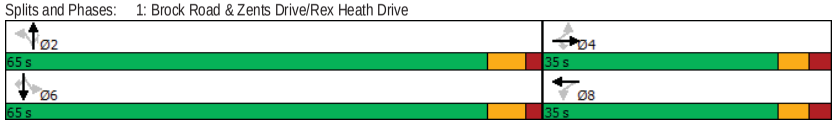
Intersection Summary					
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.50				
Actuated Cycle Length (s)	92.8	Sum of lost time (s)		13.7	
Intersection Capacity Utilization	133.3%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

2025 Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	58	1	10	163	8	7	1006	51	34	988	26
Future Volume (vph)	58	1	10	163	8	7	1006	51	34	988	26
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	15.6	15.6	15.6	15.6	15.6	60.1	60.1	60.1	60.1	60.1	60.1
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.27	0.00	0.03	0.67	0.39	0.03	0.49	0.06	0.12	0.46	0.03
Control Delay	33.4	28.0	0.2	47.3	14.0	6.7	8.5	2.2	7.6	8.2	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	28.0	0.2	47.3	14.0	6.7	8.5	2.2	7.6	8.2	1.7
LOS	C	C	A	D	B	A	A	A	A	A	A
Approach Delay		28.7			32.3		8.2			8.0	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 89			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 122.0%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



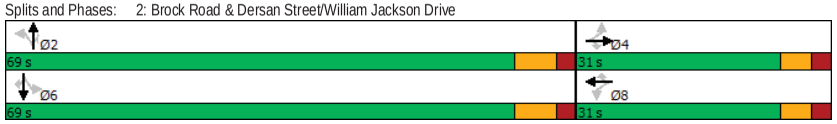
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	1	10	163	8	126	7	1006	51	34	988	26
Future Volume (vph)	58	1	10	163	8	126	7	1006	51	34	988	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1805	1533		1480	3195	1335	1719	3343	1335
Flt Permitted	0.67	1.00	1.00	0.76	1.00		0.25	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	1270	1900	1615	1439	1533		393	3195	1335	445	3343	1335
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	60	1	10	170	8	131	7	1048	53	35	1029	27
RTOR Reduction (vph)	0	0	8	0	83	0	0	0	17	0	0	9
Lane Group Flow (vph)	60	1	2	170	56	0	7	1048	36	35	1029	18
Heavy Vehicles (%)	0%	0%	0%	0%	63%	3%	22%	13%	21%	5%	8%	21%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	15.6	15.6	15.6	15.6	15.6		60.2	60.2	60.2	60.2	60.2	60.2
Effective Green, g (s)	15.6	15.6	15.6	15.6	15.6		60.2	60.2	60.2	60.2	60.2	60.2
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	222	333	283	252	268		265	2161	903	301	2261	903
v/s Ratio Prot		0.00			0.04			c0.33			0.31	
v/s Ratio Perm	0.05		0.00	c0.12			0.02		0.03	0.08		0.01
v/c Ratio	0.27	0.00	0.01	0.67	0.21		0.03	0.48	0.04	0.12	0.46	0.02
Uniform Delay, d1	31.8	30.3	30.3	34.3	31.4		4.7	6.9	4.8	5.1	6.7	4.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.0	0.0	7.0	0.4		0.2	0.8	0.1	0.8	0.7	0.0
Delay (s)	32.4	30.3	30.3	41.3	31.8		4.9	7.7	4.9	5.8	7.4	4.8
Level of Service	C	C	C	D	C		A	A	A	A	A	A
Approach Delay (s)		32.1			37.0			7.6			7.3	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.52				
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	13.2		
Intersection Capacity Utilization	122.0%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1	228	368	1	43	107	1015	76	23	1167	4
Future Volume (vph)	19	1	228	368	1	43	107	1015	76	23	1167	4
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	61.6	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio	0.08	0.00	0.58	1.16	0.00	0.11	0.65	0.56	0.09	0.12	0.61	0.01
Control Delay	30.1	29.0	29.1	135.8	28.0	9.0	32.9	12.6	2.1	9.7	13.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	29.0	29.1	135.8	28.0	9.0	32.9	12.6	2.1	9.7	13.4	0.0
LOS	C	C	C	F	C	A	C	B	A	A	B	A
Approach Delay		29.2			122.4			13.8			13.3	
Approach LOS		C			F			B			B	

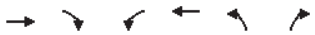
Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Natural Cycle: 105			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 127.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1	228	368	1	43	107	1015	76	23	1167	4
Future Volume (vph)	19	1	228	368	1	43	107	1015	76	23	1167	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1271	950	1509	1736	1900	1615	1626	3167	1369	1504	3343	967
Flt Permitted	0.76	1.00	1.00	0.76	1.00	1.00	0.17	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1013	950	1509	1383	1900	1615	288	3167	1369	343	3343	967
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	1	245	396	1	46	115	1091	82	25	1255	4
RTOR Reduction (vph)	0	0	54	0	0	35	0	0	31	0	0	2
Lane Group Flow (vph)	20	1	191	396	1	11	115	1091	51	25	1255	2
Heavy Vehicles (%)	42%	100%	7%	4%	0%	0%	11%	14%	18%	20%	8%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Effective Green, g (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	250	234	372	341	469	398	177	1950	843	211	2059	595
v/s Ratio Prot		0.00			0.00			0.34			0.38	
v/s Ratio Perm	0.02		0.13	c0.29		0.01	c0.40		0.04	0.07		0.00
v/c Ratio	0.08	0.00	0.51	1.16	0.00	0.03	0.65	0.56	0.06	0.12	0.61	0.00
Uniform Delay, d1	28.9	28.4	32.5	37.6	28.4	28.6	12.3	11.3	7.7	8.0	11.8	7.4
Progression 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
Incremental Delay, d2	0.1	0.0	1.2	100.1	0.0	0.0	17.0	1.2	0.1	1.1	1.4	0.0
Delay (s)	29.1	28.4	33.7	137.8	28.4	28.6	29.3	12.4	7.8	9.1	13.2	7.4
Level of Service	C	C	C	F	C	C	C	B	A	A	B	A
Approach Delay (s)		33.3			126.2			13.6			13.1	
Approach LOS		C			F			B			B	

Intersection Summary					
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.79				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.7	
Intersection Capacity Utilization	127.4%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	47	4	7	34	2	22
Future Volume (Veh/h)	47	4	7	34	2	22
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)	51	4	8	37	2	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume			55		106	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			55		106	53
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1550		887	1014

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	55	45	26
Volume Left	0	8	2
Volume Right	4	0	24
cSH	1700	1550	1003
Volume to Capacity	0.03	0.01	0.03
Queue Length 95th (m)	0.0	0.1	0.6
Control Delay (s)	0.0	1.3	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	1.3	8.7
Approach LOS			A

Intersection Summary				
Average Delay		2.3		
Intersection Capacity Utilization	17.8%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	195	98	15	53	1
Future Volume (Veh/h)	4	195	98	15	53	1
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)	4	212	107	16	58	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked						
vC, conflicting volume	123				335	115
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	123				335	115
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				91	100
cM capacity (veh/h)	1464				658	937

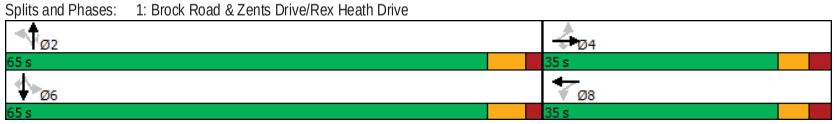
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	216	123	59
Volume Left	4	0	58
Volume Right	0	16	1
cSH	1464	1700	662
Volume to Capacity	0.00	0.07	0.09
Queue Length 95th (m)	0.1	0.0	2.3
Control Delay (s)	0.2	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.0
Approach LOS			B

Intersection Summary				
Average Delay		1.7		
Intersection Capacity Utilization	23.5%	ICU Level of Service		A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	30	4	5	89	6	8	1171	167	99	1094	60
Future Volume (vph)	30	4	5	89	6	8	1171	167	99	1094	60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	11.9	11.9	11.9	11.9	11.9	64.8	64.8	64.8	64.8	64.8	64.8
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.76	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.17	0.02	0.02	0.54	0.25	0.03	0.47	0.14	0.36	0.45	0.05
Control Delay	33.4	30.0	0.2	45.1	12.6	5.1	6.3	1.1	10.5	6.1	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	30.0	0.2	45.1	12.6	5.1	6.3	1.1	10.5	6.1	1.9
LOS	C	C	A	D	B	A	A	A	B	A	A
Approach Delay		29.0			31.8		5.7			6.2	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 85.4			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 7.6		Intersection LOS: A	
Intersection Capacity Utilization 120.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



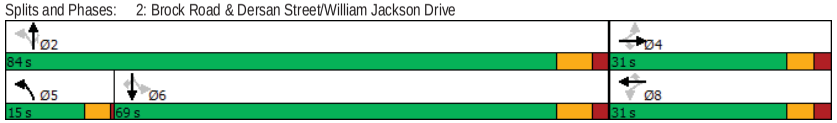
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	4	5	89	6	56	8	1171	167	99	1094	60
Future Volume (vph)	30	4	5	89	6	56	8	1171	167	99	1094	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1612	1547		1805	3471	1615	1805	3438	1615
Flt Permitted	0.71	1.00	1.00	0.76	1.00		0.22	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1357	1900	1615	1281	1547		423	3471	1615	381	3438	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	4	5	95	6	60	9	1246	178	105	1164	64
RTOR Reduction (vph)	0	0	4	0	53	0	0	0	48	0	0	15
Lane Group Flow (vph)	32	4	1	95	13	0	9	1246	130	105	1164	49
Heavy Vehicles (%)	0%	0%	0%	12%	67%	0%	0%	4%	0%	0%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	10.2	10.2	10.2	10.2	10.2		63.4	63.4	63.4	63.4	63.4	63.4
Effective Green, g (s)	10.2	10.2	10.2	10.2	10.2		63.4	63.4	63.4	63.4	63.4	63.4
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	159	223	189	150	181		308	2535	1179	278	2511	1179
v/s Ratio Prot		0.00			0.01			c0.36			0.34	
v/s Ratio Perm	0.02		0.00	c0.07			0.02		0.08	0.28		0.03
v/c Ratio	0.20	0.02	0.00	0.63	0.07		0.03	0.49	0.11	0.38	0.46	0.04
Uniform Delay, d1	34.6	33.9	33.8	36.5	34.1		3.2	4.9	3.4	4.4	4.8	3.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.0	0.0	8.4	0.2		0.2	0.7	0.2	3.9	0.6	0.1
Delay (s)	35.2	33.9	33.8	45.0	34.3		3.4	5.6	3.6	8.2	5.4	3.3
Level of Service	D	C	C	D	C		A	A	A	A	A	A
Approach Delay (s)		34.9			40.6			5.3			5.5	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A		
HCM 2000 Volume to Capacity ratio	0.51				
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	13.2		
Intersection Capacity Utilization	120.4%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	4	101	203	5	28	205	1307	252	39	1170	11
Future Volume (vph)	7	4	101	203	5	28	205	1307	252	39	1170	11
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	4.0	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	8.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	15.0	84.0	84.0	69.0	69.0	69.0
Total Split (%)	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	13.0%	73.0%	73.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.5	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	0.5	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	20.7	20.7	20.7	20.7	20.7	20.7	80.1	76.7	76.7	62.6	62.6	62.6
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.72	0.69	0.69	0.56	0.56	0.56
v/c Ratio	0.03	0.01	0.30	0.82	0.01	0.08	0.69	0.59	0.23	0.21	0.66	0.01
Control Delay	36.3	35.8	9.3	67.2	36.0	0.4	20.4	10.7	1.3	17.3	19.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	35.8	9.3	67.2	36.0	0.4	20.4	10.7	1.3	17.3	19.7	0.0
LOS	D	D	A	E	D	A	C	B	A	B	B	A
Approach Delay		12.0			58.6			10.5			19.4	
Approach LOS		B			E			B			B	

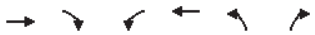
Intersection Summary			
Cycle Length: 115			
Actuated Cycle Length: 111.2			
Natural Cycle: 95			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 17.2		Intersection LOS: B	
Intersection Capacity Utilization 138.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	4	101	203	5	28	205	1307	252	39	1170	11
Future Volume (vph)	7	4	101	203	5	28	205	1307	252	39	1170	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1495	1805	1900	1615	1752	3471	1615	1805	3406	1615
Flt Permitted	0.75	1.00	1.00	0.76	1.00	1.00	0.14	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1434	1900	1495	1435	1900	1615	256	3471	1615	348	3406	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	8	4	109	218	5	30	220	1405	271	42	1258	12
RTOR Reduction (vph)	0	0	89	0	0	24	0	0	84	0	0	5
Lane Group Flow (vph)	8	4	20	218	5	6	220	1405	187	42	1258	7
Heavy Vehicles (%)	0%	0%	8%	0%	0%	0%	3%	4%	0%	0%	6%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	62.6	62.6	62.6
Effective Green, g (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	62.6	62.6	62.6
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.69	0.69	0.69	0.56	0.56	0.56
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	267	354	278	267	354	300	312	2396	1114	196	1919	909
v/s Ratio Prot		0.00			0.00		c0.06	0.40			0.37	
v/s Ratio Perm	0.01		0.01	c0.15		0.00	c0.42		0.12	0.12		0.00
v/c Ratio	0.03	0.01	0.07	0.82	0.01	0.02	0.71	0.59	0.17	0.21	0.66	0.01
Uniform Delay, d1	37.0	36.9	37.3	43.4	36.9	36.9	12.1	8.9	6.0	12.0	16.8	10.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.0	0.1	17.3	0.0	0.0	7.1	1.1	0.3	2.5	1.8	0.0
Delay (s)	37.0	36.9	37.4	60.6	36.9	36.9	19.2	10.0	6.3	14.5	18.6	10.6
Level of Service	D	D	D	E	D	D	B	B	A	B	B	B
Approach Delay (s)		37.4			57.4			10.5			18.4	
Approach LOS		D			E			B			B	

Intersection Summary					
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.75				
Actuated Cycle Length (s)	111.1	Sum of lost time (s)		17.7	
Intersection Capacity Utilization	138.2%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	2	20	54	3	12
Future Volume (Veh/h)	27	2	20	54	3	12
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)	29	2	22	59	3	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume			31		133	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			31		133	30
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1582		849	1044

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	31	81	16
Volume Left	0	22	3
Volume Right	2	0	13
cSH	1700	1582	1001
Volume to Capacity	0.02	0.01	0.02
Queue Length 95th (m)	0.0	0.3	0.4
Control Delay (s)	0.0	2.1	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	2.1	8.7
Approach LOS			A

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	82	176	53	30	4
Future Volume (Veh/h)	2	82	176	53	30	4
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)	2	89	191	58	33	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked	0.98				0.98	0.98
vC, conflicting volume	249				313	220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				292	198
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				95	100
cM capacity (veh/h)	1318				686	829

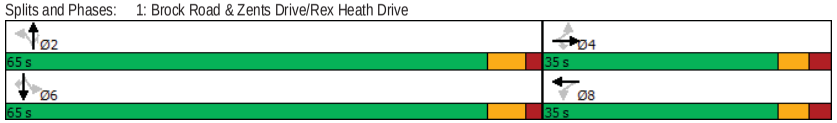
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	91	249	37
Volume Left	2	0	33
Volume Right	0	58	4
cSH	1318	1700	699
Volume to Capacity	0.00	0.15	0.05
Queue Length 95th (m)	0.0	0.0	1.3
Control Delay (s)	0.2	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.4
Approach LOS			B

Intersection Summary				
Average Delay		1.1		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	71	1	41	163	8	9	1009	51	34	988	31
Future Volume (vph)	71	1	41	163	8	9	1009	51	34	988	31
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	15.6	15.6	15.6	15.6	15.6	59.9	59.9	59.9	59.9	59.9	59.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.33	0.00	0.13	0.67	0.40	0.03	0.49	0.06	0.12	0.46	0.04
Control Delay	35.0	28.0	10.3	47.2	14.1	6.8	8.6	2.2	7.6	8.2	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	28.0	10.3	47.2	14.1	6.8	8.6	2.2	7.6	8.2	2.1
LOS	C	C	B	D	B	A	A	A	A	A	A
Approach Delay		25.9			32.3		8.2			8.0	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 88.7			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 11.7		Intersection LOS: B	
Intersection Capacity Utilization 122.0%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



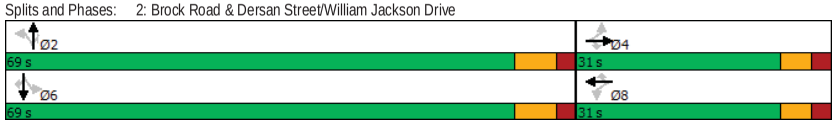
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	1	41	163	8	126	9	1009	51	34	988	31
Future Volume (vph)	71	1	41	163	8	126	9	1009	51	34	988	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1805	1533		1480	3195	1335	1719	3343	1335
Flt Permitted	0.67	1.00	1.00	0.76	1.00		0.25	1.00	1.00	0.24	1.00	1.00
Satd. Flow (perm)	1270	1900	1615	1439	1533		392	3195	1335	443	3343	1335
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	74	1	43	170	8	131	9	1051	53	35	1029	32
RTOR Reduction (vph)	0	0	35	0	82	0	0	0	17	0	0	10
Lane Group Flow (vph)	74	1	8	170	57	0	9	1051	36	35	1029	22
Heavy Vehicles (%)	0%	0%	0%	0%	63%	3%	22%	13%	21%	5%	8%	21%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	15.6	15.6	15.6	15.6	15.6		59.9	59.9	59.9	59.9	59.9	59.9
Effective Green, g (s)	15.6	15.6	15.6	15.6	15.6		59.9	59.9	59.9	59.9	59.9	59.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	223	334	284	253	269		264	2157	901	299	2257	901
v/s Ratio Prot		0.00			0.04			c0.33			0.31	
v/s Ratio Perm	0.06		0.00	c0.12			0.02		0.03	0.08		0.02
v/c Ratio	0.33	0.00	0.03	0.67	0.21		0.03	0.49	0.04	0.12	0.46	0.02
Uniform Delay, d1	32.0	30.1	30.3	34.2	31.3		4.8	7.0	4.8	5.1	6.8	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.0	0.0	6.9	0.4		0.2	0.8	0.1	0.8	0.7	0.0
Delay (s)	32.9	30.1	30.3	41.0	31.7		5.0	7.8	4.9	5.9	7.4	4.8
Level of Service	C	C	C	D	C		A	A	A	A	A	A
Approach Delay (s)		31.9			36.8			7.6			7.3	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.53				
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	13.2		
Intersection Capacity Utilization	122.0%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	244	368	1	43	120	1017	76	23	1198	4
Future Volume (vph)	22	1	244	368	1	43	120	1017	76	23	1198	4
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	61.6	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio	0.10	0.00	0.62	1.16	0.00	0.11	0.77	0.56	0.09	0.12	0.63	0.01
Control Delay	30.5	29.0	31.9	135.8	28.0	9.0	47.1	12.7	2.1	9.7	13.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	29.0	31.9	135.8	28.0	9.0	47.1	12.7	2.1	9.7	13.7	0.0
LOS	C	C	C	F	C	A	D	B	A	A	B	A
Approach Delay		31.8			122.4			15.4			13.6	
Approach LOS		C			F			B			B	

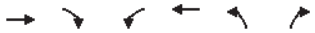
Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Natural Cycle: 105			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 30.2		Intersection LOS: C	
Intersection Capacity Utilization 138.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	244	368	1	43	120	1017	76	23	1198	4
Future Volume (vph)	22	1	244	368	1	43	120	1017	76	23	1198	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1271	950	1509	1736	1900	1615	1626	3167	1369	1504	3343	967
Flt Permitted	0.76	1.00	1.00	0.76	1.00	1.00	0.16	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1013	950	1509	1383	1900	1615	273	3167	1369	342	3343	967
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	24	1	262	396	1	46	129	1094	82	25	1288	4
RTOR Reduction (vph)	0	0	50	0	0	35	0	0	31	0	0	2
Lane Group Flow (vph)	24	1	212	396	1	11	129	1094	51	25	1288	2
Heavy Vehicles (%)	42%	100%	7%	4%	0%	0%	11%	14%	18%	20%	8%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Effective Green, g (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	250	234	372	341	469	398	168	1950	843	210	2059	595
v/s Ratio Prot		0.00			0.00			0.35			0.39	
v/s Ratio Perm	0.02		0.14	c0.29		0.01	c0.47		0.04	0.07		0.00
v/c Ratio	0.10	0.00	0.57	1.16	0.00	0.03	0.77	0.56	0.06	0.12	0.63	0.00
Uniform Delay, d1	29.0	28.4	33.0	37.6	28.4	28.6	14.0	11.3	7.7	8.0	12.0	7.4
Progression 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
Incremental Delay, d2	0.2	0.0	2.0	100.1	0.0	0.0	28.0	1.2	0.1	1.2	1.4	0.0
Delay (s)	29.2	28.4	35.0	137.8	28.4	28.6	41.9	12.4	7.8	9.1	13.4	7.4
Level of Service	C	C	C	F	C	C	D	B	A	A	B	A
Approach Delay (s)		34.5			126.2			15.1			13.3	
Approach LOS		C			F			B			B	

Intersection Summary					
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.88				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.7	
Intersection Capacity Utilization	138.2%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	47	4	14	34	2	66
Future Volume (Veh/h)	47	4	14	34	2	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)	51	4	15	37	2	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)				154		
pX, platoon unblocked						
vC, conflicting volume			55		120	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			55		120	53
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	93
cM capacity (veh/h)			1550		867	1014

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	55	52	74
Volume Left	0	15	2
Volume Right	4	0	72
cSH	1700	1550	1010
Volume to Capacity	0.03	0.01	0.07
Queue Length 95th (m)	0.0	0.2	1.9
Control Delay (s)	0.0	2.2	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	2.2	8.8
Approach LOS			A

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	20.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	195	98	28	72	1
Future Volume (Veh/h)	4	195	98	28	72	1
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)	4	212	107	30	78	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked						
vC, conflicting volume	137				342	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	137				342	122
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				88	100
cM capacity (veh/h)	1447				652	929

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	216	137	79
Volume Left	4	0	78
Volume Right	0	30	1
cSH	1447	1700	655
Volume to Capacity	0.00	0.08	0.12
Queue Length 95th (m)	0.1	0.0	3.3
Control Delay (s)	0.2	0.0	11.3
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.3
Approach LOS			B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	24.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	44	24	13	7	11
Future Volume (Veh/h)	19	44	24	13	7	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	48	26	14	8	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	61	33			40	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	61	33			40	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	95			99	
cM capacity (veh/h)	941	1041			1570	

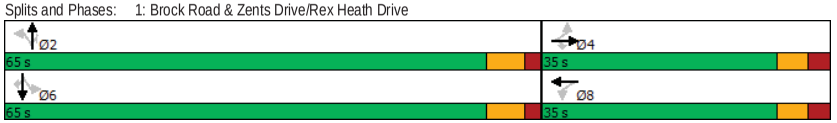
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	40	20
Volume Left	21	0	8
Volume Right	48	14	0
cSH	1008	1700	1570
Volume to Capacity	0.07	0.02	0.01
Queue Length 95th (m)	1.8	0.0	0.1
Control Delay (s)	8.8	0.0	2.9
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	2.9
Approach LOS	A		

Intersection Summary				
Average Delay		5.2		
Intersection Capacity Utilization		17.2%	ICU Level of Service	A
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	38	4	24	89	6	15	1172	167	99	1094	75
Future Volume (vph)	38	4	24	89	6	15	1172	167	99	1094	75
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	11.8	11.8	11.8	11.8	11.8	64.3	64.3	64.3	64.3	64.3	64.3
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.76	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.21	0.02	0.10	0.53	0.25	0.05	0.47	0.14	0.37	0.45	0.06
Control Delay	34.2	30.0	7.0	44.8	12.6	5.3	6.3	1.1	10.5	6.1	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	30.0	7.0	44.8	12.6	5.3	6.3	1.1	10.5	6.1	1.8
LOS	C	C	A	D	B	A	A	A	B	A	A
Approach Delay		23.9			31.6		5.7			6.2	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 84.8			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.53			
Intersection Signal Delay: 7.7		Intersection LOS: A	
Intersection Capacity Utilization 120.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



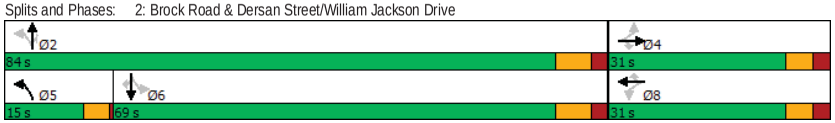
M												
Lane Configurations												
T												
Future Volume (vph)	38	4	24	89	6	56	15	1172	167	99	1094	75
Id												
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
L												
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
F												
Satd. Flow (prot)	1805	1900	1615	1612	1547		1805	3471	1615	1805	3438	1615
F												
Satd. Flow (perm)	1357	1900	1615	1281	1547		423	3471	1615	380	3438	1615
P												
Adj. Flow (vph)	40	4	26	95	6	60	16	1247	178	105	1164	80
R												
Lane Group Flow (vph)	40	4	3	95	13	0	16	1247	130	105	1164	61
H												
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
P												
Permitted Phases	4		4	8			2		2	6		6
A												
Effective Green, g (s)	10.1	10.1	10.1	10.1	10.1		62.8	62.8	62.8	62.8	62.8	62.8
A												
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
V												
Lane Grp Cap (vph)	159	222	189	150	181		308	2531	1177	277	2507	1177
v												
v/s Ratio Perm	0.03		0.00	c0.07			0.04		0.08	0.28		0.04
v												
Uniform Delay, d1	34.6	33.6	33.6	36.2	33.8		3.3	4.9	3.4	4.4	4.8	3.3
P												
Incremental Delay, d2	0.8	0.0	0.0	8.4	0.2		0.3	0.7	0.2	3.9	0.6	0.1
D												
Level of Service	D	C	C	D	C		A	A	A	A	A	A
A												
Approach LOS		C			D			A			A	
In												

HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
H			
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	13.2
In			
Analysis Period (min)	15		
c			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	4	112	203	5	28	248	1314	252	39	1189	11
Future Volume (vph)	8	4	112	203	5	28	248	1314	252	39	1189	11
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	4.0	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	8.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	15.0	84.0	84.0	69.0	69.0	69.0
Total Split (%)	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	13.0%	73.0%	73.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.5	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	0.5	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	20.7	20.7	20.7	20.7	20.7	20.7	80.1	76.7	76.7	61.9	61.9	61.9
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.72	0.69	0.69	0.56	0.56	0.56
v/c Ratio	0.03	0.01	0.32	0.82	0.01	0.08	0.83	0.59	0.23	0.22	0.67	0.01
Control Delay	36.4	35.8	9.2	67.2	36.0	0.4	35.9	10.8	1.3	17.5	20.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	35.8	9.2	67.2	36.0	0.4	35.9	10.8	1.3	17.5	20.3	0.0
LOS	D	D	A	E	D	A	D	B	A	B	C	A
Approach Delay		11.8			58.6			12.9			20.1	
Approach LOS		B			E			B			C	

Intersection Summary			
Cycle Length: 115			
Actuated Cycle Length: 111.2			
Natural Cycle: 95			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 138.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



HCM Signalized Intersection Capacity Analysis <Total> PM Peak Hour
2: Brock Road & Dersan Street/William Jackson Drive 10-20-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	4	112	203	5	28	248	1314	252	39	1189	11
Future Volume (vph)	8	4	112	203	5	28	248	1314	252	39	1189	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1495	1805	1900	1615	1752	3471	1615	1805	3406	1615
Flt Permitted	0.75	1.00	1.00	0.76	1.00	1.00	0.13	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1434	1900	1495	1435	1900	1615	243	3471	1615	348	3406	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	9	4	120	218	5	30	267	1413	271	42	1278	12
RTOR Reduction (vph)	0	0	98	0	0	24	0	0	84	0	0	5
Lane Group Flow (vph)	9	4	22	218	5	6	267	1413	187	42	1278	7
Heavy Vehicles (%)	0%	0%	8%	0%	0%	0%	3%	4%	0%	0%	6%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	61.9	61.9	61.9
Effective Green, g (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	61.9	61.9	61.9
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.69	0.69	0.69	0.56	0.56	0.56
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	267	354	278	267	354	300	314	2396	1114	193	1897	899
v/s Ratio Prot		0.00			0.00		c0.08	0.41			0.38	
v/s Ratio Perm	0.01		0.01	c0.15		0.00	c0.50		0.12	0.12		0.00
v/c Ratio	0.03	0.01	0.08	0.82	0.01	0.02	0.85	0.59	0.17	0.22	0.67	0.01
Uniform Delay, d1	37.0	36.9	37.3	43.4	36.9	36.9	17.3	9.0	6.0	12.4	17.4	10.9
Progression 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
Incremental Delay, d2	0.1	0.0	0.1	17.3	0.0	0.0	19.2	1.1	0.3	2.6	1.9	0.0
Delay (s)	37.1	36.9	37.5	60.6	36.9	36.9	36.5	10.1	6.3	15.0	19.4	11.0
Level of Service	D	D	D	E	D	D	D	B	A	B	B	B
Approach Delay (s)		37.4			57.4			13.2			19.2	
Approach LOS		D			E			B			B	

Intersection Summary				
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.87			
Actuated Cycle Length (s)	111.1	Sum of lost time (s)	17.7	
Intersection Capacity Utilization	138.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis <Total> PM Peak Hour
3: New Road & Zents Drive 10-20-2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	2	42	54	3	39
Future Volume (Veh/h)	27	2	42	54	3	39
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)	29	2	46	59	3	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume			31		181	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			31		181	30
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	96
cM capacity (veh/h)			1582		785	1044

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	31	105	45
Volume Left	0	46	3
Volume Right	2	0	42
cSH	1700	1582	1022
Volume to Capacity	0.02	0.03	0.04
Queue Length 95th (m)	0.0	0.7	1.1
Control Delay (s)	0.0	3.3	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	8.7
Approach LOS			A

Intersection Summary					
Average Delay	4.1				
Intersection Capacity Utilization	21.8%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	82	176	96	42	4
Future Volume (Veh/h)	2	82	176	96	42	4
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)	2	89	191	104	46	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	295				336	243
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	251				294	197
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				93	100
cM capacity (veh/h)	1268				672	814

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	91	295	50
Volume Left	2	0	46
Volume Right	0	104	4
cSH	1268	1700	681
Volume to Capacity	0.00	0.17	0.07
Queue Length 95th (m)	0.0	0.0	1.9
Control Delay (s)	0.2	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.7
Approach LOS			B

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	25.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	27	15	43	22	22
Future Volume (Veh/h)	12	27	15	43	22	22
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	29	16	47	24	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	112	40			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112	40			63	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			98	
cM capacity (veh/h)	872	1032			1540	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	42	63	48
Volume Left	13	0	24
Volume Right	29	47	0
cSH	976	1700	1540
Volume to Capacity	0.04	0.04	0.02
Queue Length 95th (m)	1.1	0.0	0.4
Control Delay (s)	8.9	0.0	3.7
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	3.7
Approach LOS	A		

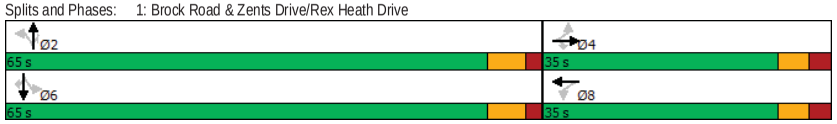
Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	19.0%	ICU Level of Service		A
Analysis Period (min)	15			

2030 Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	58	1	10	163	8	7	1096	51	34	1086	26
Future Volume (vph)	58	1	10	163	8	7	1096	51	34	1086	26
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	15.6	15.6	15.6	15.6	15.6	60.1	60.1	60.1	60.1	60.1	60.1
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.27	0.00	0.03	0.67	0.41	0.03	0.53	0.06	0.13	0.50	0.03
Control Delay	33.4	28.0	0.2	47.3	18.2	6.7	9.1	2.2	8.0	8.7	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	28.0	0.2	47.3	18.2	6.7	9.1	2.2	8.0	8.7	1.7
LOS	C	C	A	D	B	A	A	A	A	A	A
Approach Delay		28.7			34.2		8.7			8.5	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 89			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 122.0%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



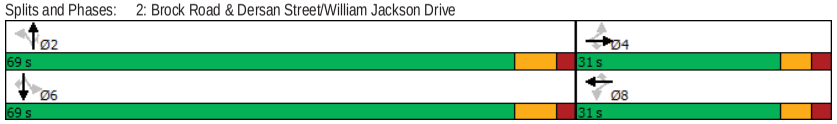
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	1	10	163	8	126	7	1096	51	34	1086	26
Future Volume (vph)	58	1	10	163	8	126	7	1096	51	34	1086	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1805	1533		1480	3195	1335	1719	3343	1335
Flt Permitted	0.67	1.00	1.00	0.76	1.00		0.22	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1270	1900	1615	1439	1533		343	3195	1335	392	3343	1335
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	60	1	10	170	8	131	7	1142	53	35	1131	27
RTOR Reduction (vph)	0	0	8	0	66	0	0	0	17	0	0	9
Lane Group Flow (vph)	60	1	2	170	73	0	7	1142	36	35	1131	18
Heavy Vehicles (%)	0%	0%	0%	0%	63%	3%	22%	13%	21%	5%	8%	21%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	15.6	15.6	15.6	15.6	15.6		60.2	60.2	60.2	60.2	60.2	60.2
Effective Green, g (s)	15.6	15.6	15.6	15.6	15.6		60.2	60.2	60.2	60.2	60.2	60.2
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	222	333	283	252	268		232	2161	903	265	2261	903
v/s Ratio Prot		0.00			0.05			c0.36			0.34	
v/s Ratio Perm	0.05		0.00	c0.12			0.02		0.03	0.09		0.01
v/c Ratio	0.27	0.00	0.01	0.67	0.27		0.03	0.53	0.04	0.13	0.50	0.02
Uniform Delay, d1	31.8	30.3	30.3	34.3	31.8		4.8	7.3	4.8	5.1	7.0	4.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.0	0.0	7.0	0.6		0.2	0.9	0.1	1.0	0.8	0.0
Delay (s)	32.4	30.3	30.3	41.3	32.3		5.0	8.2	4.9	6.1	7.8	4.8
Level of Service	C	C	C	D	C		A	A	A	A	A	A
Approach Delay (s)		32.1			37.3			8.0			7.7	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	89.0	Sum of lost time (s)		13.2	
Intersection Capacity Utilization	122.0%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1	228	368	1	43	107	1105	76	23	1272	4
Future Volume (vph)	19	1	228	368	1	43	107	1105	76	23	1272	4
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	61.6	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio	0.08	0.00	0.59	1.16	0.00	0.11	0.78	0.61	0.09	0.14	0.66	0.01
Control Delay	30.1	29.0	32.0	135.8	28.0	9.0	53.0	13.5	2.1	10.3	14.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	29.0	32.0	135.8	28.0	9.0	53.0	13.5	2.1	10.3	14.5	0.0
LOS	C	C	C	F	C	A	D	B	A	B	B	A
Approach Delay		31.9			122.4			16.1			14.4	
Approach LOS		C			F			B			B	

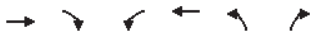
Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Natural Cycle: 105			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 30.1		Intersection LOS: C	
Intersection Capacity Utilization 127.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1	228	368	1	43	107	1105	76	23	1272	4
Future Volume (vph)	19	1	228	368	1	43	107	1105	76	23	1272	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1271	950	1509	1736	1900	1615	1626	3167	1369	1504	3343	967
Flt Permitted	0.76	1.00	1.00	0.76	1.00	1.00	0.14	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1013	950	1509	1383	1900	1615	239	3167	1369	297	3343	967
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	1	245	396	1	46	115	1188	82	25	1368	4
RTOR Reduction (vph)	0	0	42	0	0	35	0	0	31	0	0	2
Lane Group Flow (vph)	20	1	203	396	1	11	115	1188	51	25	1368	2
Heavy Vehicles (%)	42%	100%	7%	4%	0%	0%	11%	14%	18%	20%	8%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Effective Green, g (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	250	234	372	341	469	398	147	1950	843	182	2059	595
v/s Ratio Prot		0.00			0.00			0.38			0.41	
v/s Ratio Perm	0.02		0.13	c0.29		0.01	c0.48		0.04	0.08		0.00
v/c Ratio	0.08	0.00	0.55	1.16	0.00	0.03	0.78	0.61	0.06	0.14	0.66	0.00
Uniform Delay, d1	28.9	28.4	32.8	37.6	28.4	28.6	14.2	11.8	7.7	8.1	12.5	7.4
Progression 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
Incremental Delay, d2	0.1	0.0	1.6	100.1	0.0	0.0	32.9	1.4	0.1	1.6	1.7	0.0
Delay (s)	29.1	28.4	34.4	137.8	28.4	28.6	47.2	13.2	7.8	9.6	14.2	7.4
Level of Service	C	C	C	F	C	C	D	B	A	A	B	A
Approach Delay (s)		34.0			126.2			15.7			14.1	
Approach LOS		C			F			B			B	

Intersection Summary					
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.89				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.7	
Intersection Capacity Utilization	127.4%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	47	4	7	34	2	22
Future Volume (Veh/h)	47	4	7	34	2	22
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)	51	4	8	37	2	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume			55		106	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			55		106	53
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	98
cM capacity (veh/h)			1550		887	1014

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	55	45	26
Volume Left	0	8	2
Volume Right	4	0	24
cSH	1700	1550	1003
Volume to Capacity	0.03	0.01	0.03
Queue Length 95th (m)	0.0	0.1	0.6
Control Delay (s)	0.0	1.3	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	1.3	8.7
Approach LOS			A

Intersection Summary				
Average Delay		2.3		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	195	98	15	53	1
Future Volume (Veh/h)	4	195	98	15	53	1
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)	4	212	107	16	58	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked						
vC, conflicting volume	123				335	115
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	123				335	115
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				91	100
cM capacity (veh/h)	1464				658	937

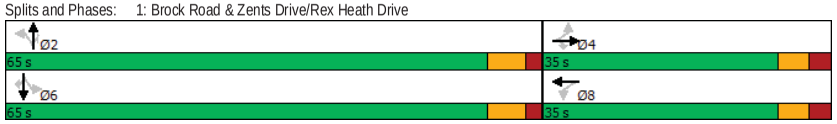
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	216	123	59
Volume Left	4	0	58
Volume Right	0	16	1
cSH	1464	1700	662
Volume to Capacity	0.00	0.07	0.09
Queue Length 95th (m)	0.1	0.0	2.3
Control Delay (s)	0.2	0.0	11.0
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.0
Approach LOS			B

Intersection Summary				
Average Delay		1.7		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	30	4	5	89	6	8	1283	167	99	1194	60
Future Volume (vph)	30	4	5	89	6	8	1283	167	99	1194	60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	11.9	11.9	11.9	11.9	11.9	64.8	64.8	64.8	64.8	64.8	64.8
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.76	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.17	0.02	0.02	0.54	0.26	0.03	0.52	0.14	0.43	0.49	0.05
Control Delay	33.4	30.0	0.2	45.1	16.6	5.2	6.8	1.1	13.3	6.4	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	30.0	0.2	45.1	16.6	5.2	6.8	1.1	13.3	6.4	2.1
LOS	C	C	A	D	B	A	A	A	B	A	A
Approach Delay		29.0			33.4		6.1			6.8	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 85.4			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.54			
Intersection Signal Delay: 8.1		Intersection LOS: A	
Intersection Capacity Utilization 120.4%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



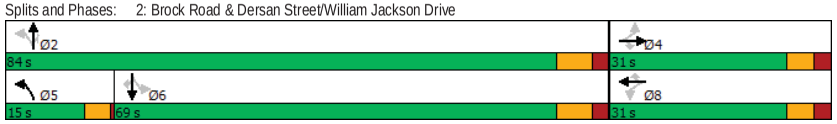
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	4	5	89	6	56	8	1283	167	99	1194	60
Future Volume (vph)	30	4	5	89	6	56	8	1283	167	99	1194	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1612	1547		1805	3471	1615	1805	3438	1615
Flt Permitted	0.71	1.00	1.00	0.76	1.00		0.19	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1357	1900	1615	1281	1547		369	3471	1615	325	3438	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	4	5	95	6	60	9	1365	178	105	1270	64
RTOR Reduction (vph)	0	0	4	0	41	0	0	0	48	0	0	14
Lane Group Flow (vph)	32	4	1	95	25	0	9	1365	130	105	1270	50
Heavy Vehicles (%)	0%	0%	0%	12%	67%	0%	0%	4%	0%	0%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	10.2	10.2	10.2	10.2	10.2		63.4	63.4	63.4	63.4	63.4	63.4
Effective Green, g (s)	10.2	10.2	10.2	10.2	10.2		63.4	63.4	63.4	63.4	63.4	63.4
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	159	223	189	150	181		269	2535	1179	237	2511	1179
v/s Ratio Prot		0.00			0.02			c0.39			0.37	
v/s Ratio Perm	0.02		0.00	c0.07			0.02		0.08	0.32		0.03
v/c Ratio	0.20	0.02	0.00	0.63	0.14		0.03	0.54	0.11	0.44	0.51	0.04
Uniform Delay, d1	34.6	33.9	33.8	36.5	34.3		3.2	5.2	3.4	4.7	5.0	3.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.0	0.0	8.4	0.3		0.2	0.8	0.2	5.9	0.7	0.1
Delay (s)	35.2	33.9	33.8	45.0	34.7		3.5	6.0	3.6	10.6	5.7	3.3
Level of Service	D	C	C	D	C		A	A	A	B	A	A
Approach Delay (s)		34.9			40.7			5.7			6.0	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.55				
Actuated Cycle Length (s)	86.8	Sum of lost time (s)		13.2	
Intersection Capacity Utilization	120.4%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	4	101	203	5	28	205	1421	252	39	1275	11
Future Volume (vph)	7	4	101	203	5	28	205	1421	252	39	1275	11
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	4.0	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	8.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	15.0	84.0	84.0	69.0	69.0	69.0
Total Split (%)	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	13.0%	73.0%	73.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.5	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	0.5	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	20.7	20.7	20.7	20.7	20.7	20.7	80.1	76.7	76.7	62.6	62.6	62.6
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.72	0.69	0.69	0.56	0.56	0.56
v/c Ratio	0.03	0.01	0.30	0.82	0.01	0.08	0.76	0.64	0.23	0.26	0.72	0.01
Control Delay	36.3	35.8	9.3	67.2	36.0	0.4	31.2	11.6	1.3	19.5	21.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	35.8	9.3	67.2	36.0	0.4	31.2	11.6	1.3	19.5	21.3	0.0
LOS	D	D	A	E	D	A	C	B	A	B	C	A
Approach Delay		12.0			58.6			12.3			21.1	
Approach LOS		B			E			B			C	

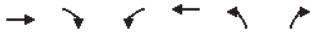
Intersection Summary			
Cycle Length: 115			
Actuated Cycle Length: 111.2			
Natural Cycle: 95			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 18.7		Intersection LOS: B	
Intersection Capacity Utilization 138.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	4	101	203	5	28	205	1421	252	39	1275	11
Future Volume (vph)	7	4	101	203	5	28	205	1421	252	39	1275	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1495	1805	1900	1615	1752	3471	1615	1805	3406	1615
Flt Permitted	0.75	1.00	1.00	0.76	1.00	1.00	0.11	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	1434	1900	1495	1435	1900	1615	205	3471	1615	289	3406	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	8	4	109	218	5	30	220	1528	271	42	1371	12
RTOR Reduction (vph)	0	0	89	0	0	24	0	0	84	0	0	5
Lane Group Flow (vph)	8	4	20	218	5	6	220	1528	187	42	1371	7
Heavy Vehicles (%)	0%	0%	8%	0%	0%	0%	3%	4%	0%	0%	6%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	62.5	62.5	62.5
Effective Green, g (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	62.5	62.5	62.5
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.69	0.69	0.69	0.56	0.56	0.56
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	267	354	278	267	354	300	283	2396	1114	162	1916	908
v/s Ratio Prot		0.00			0.00		c0.07	0.44			0.40	
v/s Ratio Perm	0.01		0.01	c0.15		0.00	c0.46		0.12	0.15		0.00
v/c Ratio	0.03	0.01	0.07	0.82	0.01	0.02	0.78	0.64	0.17	0.26	0.72	0.01
Uniform Delay, d1	37.0	36.9	37.3	43.4	36.9	36.9	17.2	9.5	6.0	12.4	17.8	10.7
Progression 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
Incremental Delay, d2	0.0	0.0	0.1	17.3	0.0	0.0	12.6	1.3	0.3	3.8	2.3	0.0
Delay (s)	37.0	36.9	37.4	60.6	36.9	36.9	29.8	10.8	6.3	16.3	20.1	10.7
Level of Service	D	D	D	E	D	D	C	B	A	B	C	B
Approach Delay (s)		37.4			57.4			12.3			19.9	
Approach LOS		D			E			B			B	

Intersection Summary					
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	111.1	Sum of lost time (s)		17.7	
Intersection Capacity Utilization	138.2%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	2	20	54	3	12
Future Volume (Veh/h)	27	2	20	54	3	12
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)	29	2	22	59	3	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume			31		133	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			31		133	30
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	99
cM capacity (veh/h)			1582		849	1044

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	31	81	16
Volume Left	0	22	3
Volume Right	2	0	13
cSH	1700	1582	1001
Volume to Capacity	0.02	0.01	0.02
Queue Length 95th (m)	0.0	0.3	0.4
Control Delay (s)	0.0	2.1	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	2.1	8.7
Approach LOS			A

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization	20.6%	ICU Level of Service		A
Analysis Period (min)		15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	82	176	53	30	4
Future Volume (Veh/h)	2	82	176	53	30	4
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)	2	89	191	58	33	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked	0.98				0.98	0.98
vC, conflicting volume	249				313	220
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				292	198
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				95	100
cM capacity (veh/h)	1318				686	829

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	91	249	37
Volume Left	2	0	33
Volume Right	0	58	4
cSH	1318	1700	699
Volume to Capacity	0.00	0.15	0.05
Queue Length 95th (m)	0.0	0.0	1.3
Control Delay (s)	0.2	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.4
Approach LOS			B

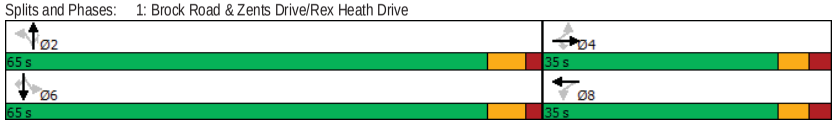
Intersection Summary				
Average Delay		1.1		
Intersection Capacity Utilization	22.5%	ICU Level of Service		A
Analysis Period (min)		15		

Timings <Total> AM Peak Hour
1: Brock Road & Zents Drive/Rex Heath Drive 10-20-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	71	1	41	163	8	9	1099	51	34	1086	31
Future Volume (vph)	71	1	41	163	8	9	1099	51	34	1086	31
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	15.6	15.6	15.6	15.6	15.6	59.9	59.9	59.9	59.9	59.9	59.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.68	0.68	0.68	0.68	0.68	0.68
v/c Ratio	0.33	0.00	0.13	0.67	0.41	0.04	0.53	0.06	0.13	0.50	0.04
Control Delay	35.0	28.0	10.3	47.2	18.2	6.9	9.1	2.2	8.0	8.7	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	28.0	10.3	47.2	18.2	6.9	9.1	2.2	8.0	8.7	2.1
LOS	C	C	B	D	B	A	A	A	A	A	A
Approach Delay		25.9			34.2		8.8			8.5	
Approach LOS		C			C		A			A	

Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 88.7			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 12.1		Intersection LOS: B	
Intersection Capacity Utilization 122.0%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



HCM Signalized Intersection Capacity Analysis <Total> AM Peak Hour
1: Brock Road & Zents Drive/Rex Heath Drive 10-20-2022

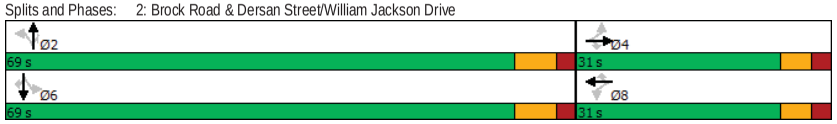
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	71	1	41	163	8	126	9	1099	51	34	1086	31
Future Volume (vph)	71	1	41	163	8	126	9	1099	51	34	1086	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1805	1533		1480	3195	1335	1719	3343	1335
Flt Permitted	0.67	1.00	1.00	0.76	1.00		0.22	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	1270	1900	1615	1439	1533		342	3195	1335	390	3343	1335
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	74	1	43	170	8	131	9	1145	53	35	1131	32
RTOR Reduction (vph)	0	0	35	0	66	0	0	0	17	0	0	10
Lane Group Flow (vph)	74	1	8	170	73	0	9	1145	36	35	1131	22
Heavy Vehicles (%)	0%	0%	0%	0%	63%	3%	22%	13%	21%	5%	8%	21%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	15.6	15.6	15.6	15.6	15.6		59.9	59.9	59.9	59.9	59.9	59.9
Effective Green, g (s)	15.6	15.6	15.6	15.6	15.6		59.9	59.9	59.9	59.9	59.9	59.9
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.68	0.68	0.68	0.68	0.68	0.68
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	223	334	284	253	269		230	2157	901	263	2257	901
v/s Ratio Prot		0.00			0.05			c0.36			0.34	
v/s Ratio Perm	0.06		0.00	c0.12			0.03		0.03	0.09		0.02
v/c Ratio	0.33	0.00	0.03	0.67	0.27		0.04	0.53	0.04	0.13	0.50	0.02
Uniform Delay, d1	32.0	30.1	30.3	34.2	31.6		4.8	7.3	4.8	5.1	7.1	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.0	0.0	6.9	0.5		0.3	0.9	0.1	1.0	0.8	0.0
Delay (s)	32.9	30.1	30.3	41.0	32.2		5.1	8.2	4.9	6.2	7.9	4.8
Level of Service	C	C	C	D	C		A	A	A	A	A	A
Approach Delay (s)		31.9			37.0			8.1			7.7	
Approach LOS		C			D			A			A	

Intersection Summary					
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B		
HCM 2000 Volume to Capacity ratio	0.56				
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	13.2		
Intersection Capacity Utilization	122.0%	ICU Level of Service	H		
Analysis Period (min)	15				
c Critical Lane Group					

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	244	368	1	43	120	1107	76	23	1303	4
Future Volume (vph)	22	1	244	368	1	43	120	1107	76	23	1303	4
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	61.6	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	69.0	69.0	69.0	69.0	69.0	69.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio	0.10	0.00	0.64	1.16	0.00	0.11	0.93	0.61	0.09	0.14	0.68	0.01
Control Delay	30.5	29.0	34.8	135.8	28.0	9.0	82.8	13.5	2.1	10.3	14.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.5	29.0	34.8	135.8	28.0	9.0	82.8	13.5	2.1	10.3	14.8	0.0
LOS	C	C	C	F	C	A	F	B	A	B	B	A
Approach Delay		34.4			122.4			19.2			14.7	
Approach LOS		C			F			B			B	

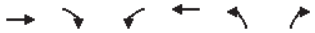
Intersection Summary			
Cycle Length: 100			
Actuated Cycle Length: 100			
Natural Cycle: 105			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 31.5		Intersection LOS: C	
Intersection Capacity Utilization 138.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1	244	368	1	43	120	1107	76	23	1303	4
Future Volume (vph)	22	1	244	368	1	43	120	1107	76	23	1303	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1271	950	1509	1736	1900	1615	1626	3167	1369	1504	3343	967
Flt Permitted	0.76	1.00	1.00	0.76	1.00	1.00	0.13	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1013	950	1509	1383	1900	1615	226	3167	1369	296	3343	967
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	24	1	262	396	1	46	129	1190	82	25	1401	4
RTOR Reduction (vph)	0	0	39	0	0	35	0	0	31	0	0	2
Lane Group Flow (vph)	24	1	223	396	1	11	129	1190	51	25	1401	2
Heavy Vehicles (%)	42%	100%	7%	4%	0%	0%	11%	14%	18%	20%	8%	67%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Effective Green, g (s)	24.7	24.7	24.7	24.7	24.7	24.7	61.6	61.6	61.6	61.6	61.6	61.6
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.62	0.62	0.62	0.62	0.62	0.62
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	250	234	372	341	469	398	139	1950	843	182	2059	595
v/s Ratio Prot		0.00			0.00			0.38			0.42	
v/s Ratio Perm	0.02		0.15	c0.29		0.01	c0.57		0.04	0.08		0.00
v/c Ratio	0.10	0.00	0.60	1.16	0.00	0.03	0.93	0.61	0.06	0.14	0.68	0.00
Uniform Delay, d1	29.0	28.4	33.3	37.6	28.4	28.6	17.2	11.8	7.7	8.1	12.7	7.4
Progression 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
Incremental Delay, d2	0.2	0.0	2.6	100.1	0.0	0.0	59.1	1.4	0.1	1.6	1.8	0.0
Delay (s)	29.2	28.4	35.9	137.8	28.4	28.6	76.3	13.2	7.8	9.6	14.5	7.4
Level of Service	C	C	D	F	C	C	E	B	A	A	B	A
Approach Delay (s)		35.3			126.2			18.7			14.4	
Approach LOS		D			F			B			B	

Intersection Summary					
HCM 2000 Control Delay	31.7	HCM 2000 Level of Service		C	
HCM 2000 Volume to Capacity ratio	0.99				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)		13.7	
Intersection Capacity Utilization	138.2%	ICU Level of Service		H	
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	47	4	14	34	2	66
Future Volume (Veh/h)	47	4	14	34	2	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)	51	4	15	37	2	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)				154		
pX, platoon unblocked						
vC, conflicting volume			55		120	53
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			55		120	53
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	93
cM capacity (veh/h)			1550		867	1014

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	55	52	74
Volume Left	0	15	2
Volume Right	4	0	72
cSH	1700	1550	1010
Volume to Capacity	0.03	0.01	0.07
Queue Length 95th (m)	0.0	0.2	1.9
Control Delay (s)	0.0	2.2	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	2.2	8.8
Approach LOS			A

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	20.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	195	98	28	72	1
Future Volume (Veh/h)	4	195	98	28	72	1
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)	4	212	107	30	78	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked						
vC, conflicting volume	137				342	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	137				342	122
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				88	100
cM capacity (veh/h)	1447				652	929

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	216	137	79
Volume Left	4	0	78
Volume Right	0	30	1
cSH	1447	1700	655
Volume to Capacity	0.00	0.08	0.12
Queue Length 95th (m)	0.1	0.0	3.3
Control Delay (s)	0.2	0.0	11.3
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.3
Approach LOS			B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	24.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	19	44	24	13	7	11
Future Volume (Veh/h)	19	44	24	13	7	11
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	48	26	14	8	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	61	33			40	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	61	33			40	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	95			99	
cM capacity (veh/h)	941	1041			1570	

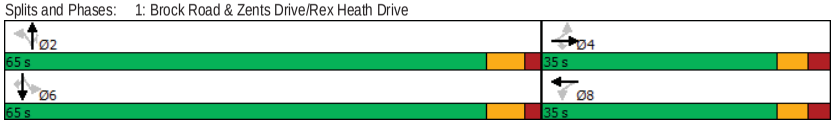
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	40	20
Volume Left	21	0	8
Volume Right	48	14	0
cSH	1008	1700	1570
Volume to Capacity	0.07	0.02	0.01
Queue Length 95th (m)	1.8	0.0	0.1
Control Delay (s)	8.8	0.0	2.9
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	2.9
Approach LOS	A		

Intersection Summary			
Average Delay		5.2	
Intersection Capacity Utilization		17.2%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	38	4	24	89	6	15	1284	167	99	1194	75
Future Volume (vph)	38	4	24	89	6	15	1284	167	99	1194	75
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		2			6	
Permitted Phases	4		4	8		2		2	6		6
Detector Phase	4	4	4	8	8	2	2	2	6	6	6
Switch Phase											
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	58.3	58.3	58.3	58.3	58.3	58.3
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (s)	35.0	35.0	35.0	35.0	35.0	65.0	65.0	65.0	65.0	65.0	65.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%	65.0%	65.0%	65.0%	65.0%	65.0%	65.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.8	2.8	2.8	2.8	2.8	2.1	2.1	2.1	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.7	6.7	6.7	6.7	6.7	6.7
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None	None	None	Max	Max	Max	Max	Max	Max
Act Effct Green (s)	11.8	11.8	11.8	11.8	11.8	64.3	64.3	64.3	64.3	64.3	64.3
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14	0.76	0.76	0.76	0.76	0.76	0.76
v/c Ratio	0.21	0.02	0.10	0.53	0.26	0.06	0.52	0.14	0.43	0.49	0.06
Control Delay	34.2	30.0	7.0	44.8	16.6	5.4	6.8	1.1	13.3	6.5	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	30.0	7.0	44.8	16.6	5.4	6.8	1.1	13.3	6.5	2.0
LOS	C	C	A	D	B	A	A	A	B	A	A
Approach Delay		23.9			33.2		6.1			6.7	
Approach LOS		C			C		A			A	

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 84.8		
Natural Cycle: 80		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.53		
Intersection Signal Delay: 8.1	Intersection LOS: A	
Intersection Capacity Utilization 120.4%	ICU Level of Service H	
Analysis Period (min) 15		

Splits and Phases: 1: Brock Road & Zents Drive/Rex Heath Drive



HCM Signalized Intersection Capacity Analysis
1: Brock Road & Zents Drive/Rex Heath Drive

<Total> PM Peak Hour
10-20-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	4	24	89	6	56	15	1284	167	99	1194	75
Future Volume (vph)	38	4	24	89	6	56	15	1284	167	99	1194	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1615	1612	1547		1805	3471	1615	1805	3438	1615
Flt Permitted	0.71	1.00	1.00	0.76	1.00		0.19	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1357	1900	1615	1281	1547		369	3471	1615	324	3438	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	40	4	26	95	6	60	16	1366	178	105	1270	80
RTOR Reduction (vph)	0	0	23	0	41	0	0	0	48	0	0	17
Lane Group Flow (vph)	40	4	3	95	25	0	16	1366	130	105	1270	63
Heavy Vehicles (%)	0%	0%	0%	12%	67%	0%	0%	4%	0%	0%	5%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	10.1	10.1	10.1	10.1	10.1		62.8	62.8	62.8	62.8	62.8	62.8
Effective Green, g (s)	10.1	10.1	10.1	10.1	10.1		62.8	62.8	62.8	62.8	62.8	62.8
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.73	0.73	0.73	0.73	0.73	0.73
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5		6.7	6.7	6.7	6.7	6.7	6.7
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	159	222	189	150	181		269	2531	1177	236	2507	1177
v/s Ratio Prot		0.00			0.02			c0.39			0.37	
v/s Ratio Perm	0.03		0.00	c0.07			0.04		0.08	0.32		0.04
v/c Ratio	0.25	0.02	0.02	0.63	0.14		0.06	0.54	0.11	0.44	0.51	0.05
Uniform Delay, d1	34.6	33.6	33.6	36.2	34.1		3.3	5.2	3.4	4.7	5.0	3.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.0	0.0	8.4	0.3		0.4	0.8	0.2	6.0	0.7	0.1
Delay (s)	35.4	33.6	33.6	44.7	34.4		3.7	6.0	3.6	10.6	5.7	3.4
Level of Service	D	C	C	D	C		A	A	A	B	A	A
Approach Delay (s)		34.6			40.5			5.7			6.0	
Approach LOS		C			D			A			A	

Intersection Summary				
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	13.2	
Intersection Capacity Utilization	120.4%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

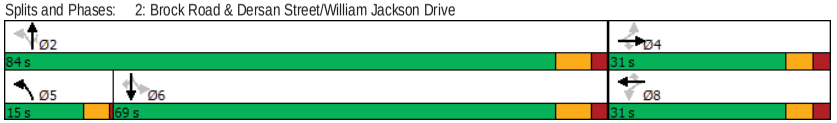
Timings
2: Brock Road & Dersan Street/William Jackson Drive

<Total> PM Peak Hour
10-20-2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	4	112	203	5	28	248	1428	252	39	1294	11
Future Volume (vph)	8	4	112	203	5	28	248	1428	252	39	1294	11
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	4.0	61.6	61.6	61.6	61.6	61.6
Minimum Split (s)	14.3	14.3	14.3	14.3	14.3	14.3	8.0	69.0	69.0	69.0	69.0	69.0
Total Split (s)	31.0	31.0	31.0	31.0	31.0	31.0	15.0	84.0	84.0	69.0	69.0	69.0
Total Split (%)	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	13.0%	73.0%	73.0%	60.0%	60.0%	60.0%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.5	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.6	2.6	2.6	2.6	2.6	2.6	0.5	2.4	2.4	2.4	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	20.7	20.7	20.7	20.7	20.7	20.7	80.1	76.7	76.7	61.7	61.7	61.7
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.72	0.69	0.69	0.55	0.55	0.55
v/c Ratio	0.03	0.01	0.32	0.82	0.01	0.08	0.91	0.64	0.23	0.26	0.74	0.01
Control Delay	36.4	35.8	9.2	67.2	36.0	0.4	55.2	11.6	1.3	19.6	22.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	35.8	9.2	67.2	36.0	0.4	55.2	11.6	1.3	19.6	22.2	0.0
LOS	D	D	A	E	D	A	E	B	A	B	C	A
Approach Delay		11.8			58.6			15.9			21.9	
Approach LOS		B			E			B			C	

Intersection Summary			
Cycle Length: 115			
Actuated Cycle Length: 111.2			
Natural Cycle: 105			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 20.8		Intersection LOS: C	
Intersection Capacity Utilization 138.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 2: Brock Road & Dersan Street/William Jackson Drive



HCM Signalized Intersection Capacity Analysis
2: Brock Road & Dersan Street/William Jackson Drive

<Total> PM Peak Hour
10-20-2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	4	112	203	5	28	248	1428	252	39	1294	11
Future Volume (vph)	8	4	112	203	5	28	248	1428	252	39	1294	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	1495	1805	1900	1615	1752	3471	1615	1805	3406	1615
Flt Permitted	0.75	1.00	1.00	0.76	1.00	1.00	0.10	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	1434	1900	1495	1435	1900	1615	192	3471	1615	289	3406	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	9	4	120	218	5	30	267	1535	271	42	1391	12
RTOR Reduction (vph)	0	0	98	0	0	24	0	0	84	0	0	5
Lane Group Flow (vph)	9	4	22	218	5	6	267	1535	187	42	1391	7
Heavy Vehicles (%)	0%	0%	8%	0%	0%	0%	3%	4%	0%	0%	6%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	61.7	61.7	61.7
Effective Green, g (s)	20.7	20.7	20.7	20.7	20.7	20.7	76.7	76.7	76.7	61.7	61.7	61.7
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.69	0.69	0.69	0.56	0.56	0.56
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	4.0	7.4	7.4	7.4	7.4	7.4
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	3.0
Lane Grp Cap (vph)	267	354	278	267	354	300	287	2396	1114	160	1891	896
v/s Ratio Prot		0.00			0.00		c0.09	0.44			0.41	
v/s Ratio Perm	0.01		0.01	c0.15		0.00	c0.55		0.12	0.15		0.00
v/c Ratio	0.03	0.01	0.08	0.82	0.01	0.02	0.93	0.64	0.17	0.26	0.74	0.01
Uniform Delay, d1	37.0	36.9	37.3	43.4	36.9	36.9	25.3	9.5	6.0	12.9	18.6	11.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.0	0.1	17.3	0.0	0.0	35.1	1.3	0.3	4.0	2.6	0.0
Delay (s)	37.1	36.9	37.5	60.6	36.9	36.9	60.4	10.9	6.3	16.8	21.2	11.0
Level of Service	D	D	D	E	D	D	E	B	A	B	C	B
Approach Delay (s)		37.4			57.4			16.7			20.9	
Approach LOS		D			E			B			C	

Intersection Summary				
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.93			
Actuated Cycle Length (s)	111.1	Sum of lost time (s)	17.7	
Intersection Capacity Utilization	138.2%	ICU Level of Service	H	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Unsignalized Intersection Capacity Analysis
3: New Road & Zents Drive

<Total> PM Peak Hour
10-20-2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	2	42	54	3	39
Future Volume (Veh/h)	27	2	42	54	3	39
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)	29	2	46	59	3	42
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				154		
pX, platoon unblocked						
vC, conflicting volume			31		181	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			31		181	30
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	96
cM capacity (veh/h)			1582		785	1044

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	31	105	45
Volume Left	0	46	3
Volume Right	2	0	42
cSH	1700	1582	1022
Volume to Capacity	0.02	0.03	0.04
Queue Length 95th (m)	0.0	0.7	1.1
Control Delay (s)	0.0	3.3	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	8.7
Approach LOS			A

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	21.8%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	82	176	96	42	4
Future Volume (Veh/h)	2	82	176	96	42	4
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)	2	89	191	104	46	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)			159			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	295				336	243
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	251				294	197
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				93	100
cM capacity (veh/h)	1268				672	814

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	91	295	50
Volume Left	2	0	46
Volume Right	0	104	4
cSH	1268	1700	681
Volume to Capacity	0.00	0.17	0.07
Queue Length 95th (m)	0.0	0.0	1.9
Control Delay (s)	0.2	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.7
Approach LOS			B

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	25.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	27	15	43	22	22
Future Volume (Veh/h)	12	27	15	43	22	22
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	29	16	47	24	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	112	40			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	112	40			63	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	97			98	
cM capacity (veh/h)	872	1032			1540	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	42	63	48
Volume Left	13	0	24
Volume Right	29	47	0
cSH	976	1700	1540
Volume to Capacity	0.04	0.04	0.02
Queue Length 95th (m)	1.1	0.0	0.4
Control Delay (s)	8.9	0.0	3.7
Lane LOS	A		A
Approach Delay (s)	8.9	0.0	3.7
Approach LOS	A		

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	19.0%	ICU Level of Service		A
Analysis Period (min)	15			

APPENDIX E

Level of Service Definitions

LEVEL OF SERVICE ANALYSIS AT SIGNALIZED INTERSECTIONS

To assist in clarifying the arithmetic analysis associated with traffic engineering, it is often useful to refer to "Level of Service". The term Level of Service implies a qualitative measure of traffic flow at an intersection. It is dependent upon vehicle delay and vehicle queue lengths at the approaches. Specifically, Level of Service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The following table describes the characteristics of each level:

Level of Service	Features	Stopped Delay per Vehicle (sec)
A	At this level of service, almost no signal phase is fully utilized by traffic. Very seldom does a vehicle wait longer than one red indication. The approach appears open, turning movements are easily made and drivers have freedom of operation.	≤ 5.0
B	At this level, an occasional signal phase is fully utilized and many phases approach full use. Many drivers begin to feel somewhat restricted within platoons of vehicles approaching the intersection.	> 5.0 and ≤ 15.0
C	At this level, the operation is stable though with more frequent fully utilized signal phases. Drivers feel more restricted and occasionally may have to wait more than one red signal indication, and queues may develop behind turning vehicles. This level is normally employed in urban intersection design.	> 15.0 and ≤ 25.0
D	At this level, the motorist experiences increasing restriction and instability of flow. There are substantial delays to approaching vehicles during short peaks within the peak period, but there are enough cycles with lower demand to permit occasional clearance of developing queues and prevent excessive backups.	> 25.0 and ≤ 40.0
E	At this level, capacity is reached. There are long queues of vehicles waiting upstream of the intersection and delays to vehicles may extend to several signal cycles.	> 40.0 and ≤ 60.0
F	At this level, saturation occurs, with vehicle demand exceeding the available capacity.	> 60.0

LEVEL OF SERVICE ANALYSIS AT UNSIGNALIZED INTERSECTIONS[1]

The term "level of service" implies a qualitative measure of traffic flow at an intersection. It is dependent upon the vehicle delay and vehicle queue lengths at approaches. The level of service at unsignalized intersections is often related to the delay accumulated by flows on the minor streets, caused by all other conflicting movements. The following table describes the characteristics of each level.

Level of Service	Features
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.
E	Very long traffic delays occur. Operations approach the capacity of the intersection.
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.

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(1) Highway Capacity Manual - Special Report No. 209, Transportation Research Board, 1985.

APPENDIX F

Pickering Design Standards

2.0 Geometric Design

2.1 Generally, the geometrics in this table are intended for urban design situations: (all distances are in metres)

Geometric Detail	Type 'C' Arterial		Collector					Local		
	5 Lane	4 Lane	Industrial /Commercial		Residential			Industrial/ Commercial	Residential	
			Major	Minor	Major	Minor				
Right-of Way Width	27	27	27	22	27	22	20	22	20/ 18.5	18
Pavement Width	18	15.25	15.25	11	13.5	11	9.75	11	8.5	8
No. of Lanes	5	4	4	2	4	2	2	2	2	2
Min. Horizontal Radius	350	350	130	85	130	130	85	N/A	N/A	N/A
Minimum Intersection Spacing	200	200	60	60	60	60	60	60	60	40
Intersection Angle	80-90º	80-90º	70-90º	70-90º	70-90º	70-90º	70-90º	70-90º	70-90º	70-90º
Design Speed	70	70	60	60	60	60	60	50	50	50
Min. Stopping Sight Distance	105	105	85	85	85	85	80	65	65	65
Min. Tangent Length Between Curves	120	120	75	45	75	75	45	45	45	45
Min. Tangent Length Through Intersections	120	120	75	45	75	75	45	45	45	45
Max. Grade (%)	6	6	6	6	6	6	8	6	8	8
Minimum Sag Curve Factor, Ksag	16	12	10	10	9	9	9	8	6	6
Minimum Crest Curve Factor, Kcrest	17	17	11	11	10	10	10	8	7	7
Traffic Lane Width	3.5-3.75	3.5-3.75	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Parking Lane Width	N/A	N/A	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Turning Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	N/A	N/A	N/A

3.0 Concrete Curb and Gutter

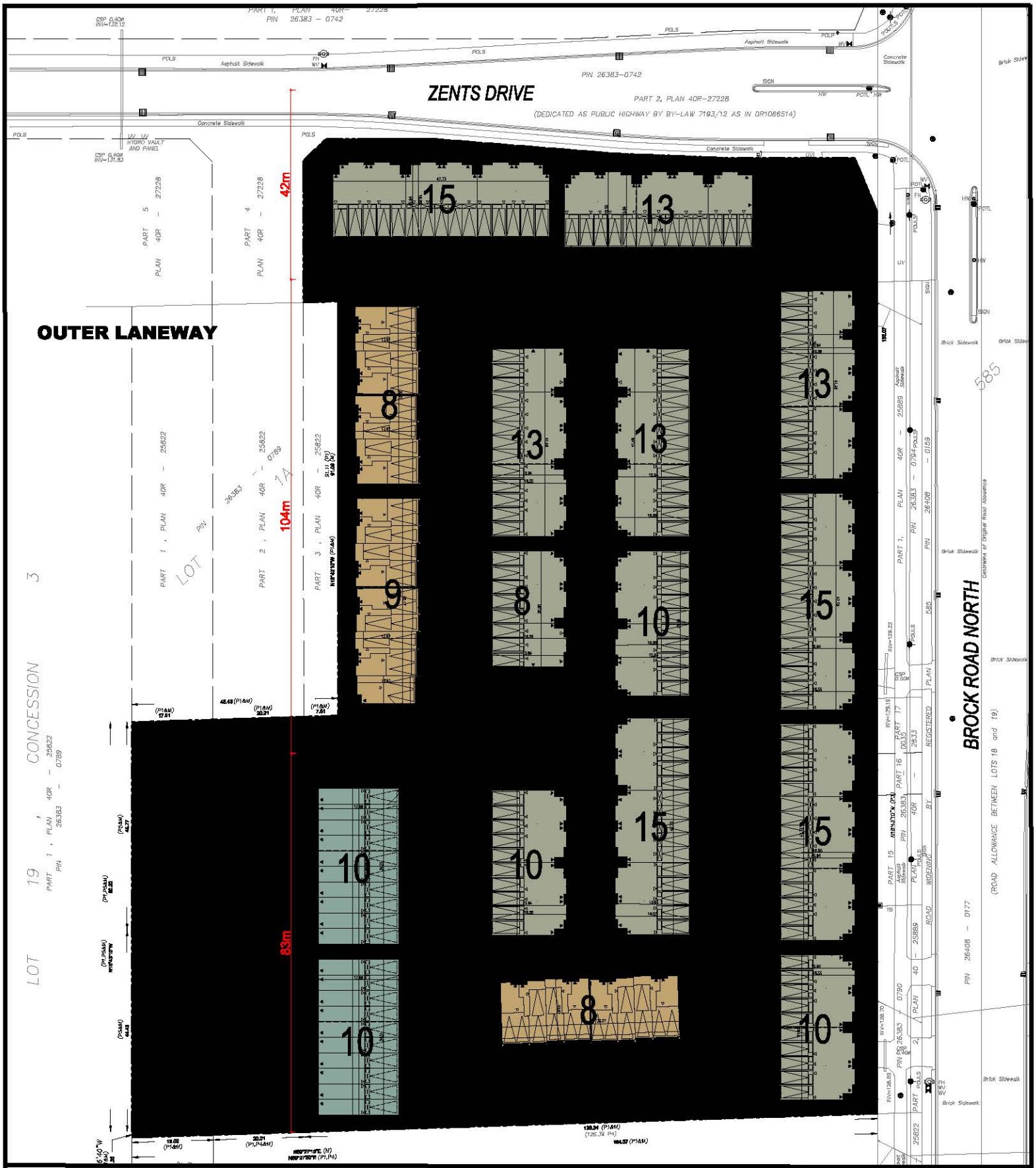
3.1 Concrete curb and gutter shall be constructed as per OPSD Standards.

3.2 Curb depressions are required across private residential and commercial driveways as per City Standard Drawings P-605 or P-606.

3.3 Where a weir is required to provide for overland flow, the full curb height may be reduced by 60 millimetres to provide a total height of 90 millimetres above gutter elevation for the length of the weir.

3.4 All radii for curbs at intersections of 8.5 metre pavements (20 metre road allowance) are to be 7.5 metres. The minimum allowable curb radius is 7.5 metres. Other pavement widths have curb radii as follows for intersections at right angles, and must be shown. Any intersection pavement widths not provided in the table below will be reviewed on an individual basis.

Widths of Intersection Pavements (in metres)	**Curb Radius (in metres)**
7.0 and 8.5	7.5
8.0 and 8.5	7.5
8.5 and 8.5	7.5
8.5 and 9.75	7.5
8.5 and 11.0	11.0
8.5 and 13.5	11.0
9.75 and 9.75	11.0
9.75 and 11.0	11.0
9.75 and 13.5	11.0
11.0 and 13.5	17.0
13.5 and 13.5	17.0
13.5 and 15.25	17.0



Proposed Access Spacing

Proposed Residential Development
2660 - 2680 Brock Road
City of Pickering, ON

Source: Site Plan by Guthrie Muscovitch Architects, May 2022

CONSTRUCTION NORTH

SCALE: NTS UNITS: m

TRANS-PLAN
transportation engineering consultants
785 Dundas Street West
Toronto, Ontario, M6J 1V2
tel: (647) 931-7383
website: www.trans-plan.com

(c) commercial-recreational establishment shall mean a commercial establishment in which indoor recreational facilities such as bowling alleys, miniature golf courses, roller skating rinks, squash courts, swimming pools and other similar indoor recreational facilities are provided and operated for gain or profit, and which may include an arena or stadium, but shall not include a place of amusement or entertainment as defined herein;

(d) dating/escort service shall mean a service providing companionship for and by individuals for profit or personal gain;

(e) funeral home or parlour shall mean a building or part of a building where funerals are conducted and shall be limited to such facilities as chapels, visitation rooms, administrative offices, rooms for the preparation of the deceased, display rooms for the storage of caskets, and garages for hearses and other equipment, but shall not include a single detached dwelling;

(f) heavy machinery repair, sales, service shall mean the service, repair, or sales of machinery or mechanical equipment of an industrial nature;

(g) kennel/animal boarding service shall mean the keeping, accommodation, or boarding of domestic animals, livestock, or birds;

(h) public bath/whirlpool shall mean indoor or outdoor premises where people may bathe, swim, or lounge within pools or tanks of water;

(i) restaurant shall mean any type of eating or drinking establishment where food or drinks are prepared or distributed for consumption on the premises or off the premises;

(j) taxi service shall mean the operation of a service providing taxicab motor vehicles with drivers used for hire for the conveyance of goods and passengers;

(k) vehicle (including vehicle audio) repair, sales, service, installations shall mean land or premises where motor vehicles or trailers are repaired, fueled, serviced, painted, kept for sale, rent, lease, or hire, or where motor vehicle parts or accessories are kept or displayed for rent, retail sale, or installation;

(l) warehousing shall mean the housing or storage of goods, wares, merchandise, food-stuffs, substances, articles, or things before wholesale distribution to a retailer;

(m) wholesaling shall mean the distribution of goods, wares, merchandise, food-stuffs, substances, articles, or things, in large quantities, to a business or retailer for eventual or further distribution, processing, assembly, or retail sale.

5.19.1 **MINIMUM OFF STREET PARKING REQUIREMENTS**

Minimum off street parking for any lot in any zone shall be provided on the same lot in accordance with the following table:

All of 5.19.1 as inserted by By-law 711/77 Oct.3/77

Further amended by By-law 1604/82

USE OF BUILDING OR /SITE	MINIMUM NO. OF PARKING SPACES
1. Residential	
detached dwelling accessory dwelling	1 space per dwelling unit
permitted businesses, except home occupations	1 space per 28 square metres gross floor area devoted to permitted businesses for customers
multiple family horizontal: without attached garage	2 spaces per unit, for occupants and visitors

Use	City Centre	Other Areas of the City
Rooming Home	0.20 resident spaces per bedroom plus 0.05 visitor spaces per bedroom	0.30 resident spaces per bedroom plus 0.05 visitor spaces per bedroom
Stacked Townhouse Dwelling	1.25 resident spaces per unit plus 0.15 visitor spaces per unit	1.25 resident spaces per unit plus 0.25 visitor spaces per unit
Street Townhouse Dwelling	2.0 spaces per unit plus 0.15 visitor spaces per unit	2.0 spaces per unit plus 0.25 visitor spaces per unit
Triplex Dwelling	2.0 spaces per unit plus 0.15 visitor spaces per unit	2.0 spaces per unit plus 0.25 visitor spaces per unit
Commercial Uses		
Arena	-	18.0 spaces per 100 m^2 area used for assembly plus 5.5 spaces per 100 m^2 **floor area** used for sports, entertainment, **restaurant** (excluding snack bar) and other ancillary **uses**
Art Gallery/Studio	3.5 spaces per 100 m^2 GLFA	4.0 spaces per 100 m^2 GLFA
Assembly, Convention Centre or Conference Hall	3.5 spaces per 100 m^2 GLFA	10.0 spaces per 100 m^2 GLFA
Automobile Service Station	-	4.5 spaces per 100 m^2 GLFA
Boat Mooring	-	1.2 spaces per mooring
Car Washing Establishment	-	4.5 spaces per 100 m^2 GLFA
Cinema	3.5 spaces per 100 m^2 GLFA	10.0 spaces per 100 m^2 GLFA
Commercial Fitness/ Recreation Centre	4.5 spaces per 100 m^2 GLFA	5.0 spaces per 100 m^2 GLFA
Commercial School	3.5 spaces per 100 m^2 GLFA	4.5 spaces per 100 m^2 GLFA
Convenience Store	-	4.5 spaces per 100 m^2 GLFA
Dry-Cleaning Distributing Centre	3.5 spaces per 100 m^2 GLFA	4.5 spaces per 100 m^2 GLFA