TRAFFIC IMPACT STUDY
(RESPONSE TO COMMENTS)

Proposed Residential and Commercial Development
Greenly Drive
Town of Cobourg, ON

September 2020

Prepared for
VANDYK Group of Companies

TRANS-PLAN
Transportation Engineering

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September 29, 2020

Mr. Justin Mamone, BES, MCIP, RPP
VANDYK Group of Companies
1944 Fowler Drive
Mississauga, ON L5K 0A1

Re: Proposed Residential and Commercial Development, Greenly Drive, Cobourg, ON – Traffic Impact Study, Response to Comments

Dear Mr. Mamone,

TRANS-PLAN is pleased to submit this Traffic Impact Study in support of the proposed residential and commercial development located at Greenly Drive in the Town of Cobourg. The proposed development consists of two land parcels, consisting of residential dwellings on the south parcel and a commercial plaza on the north parcel.

The study findings indicate that the surrounding road network can accommodate the traffic generated by the proposed development. The residential parcel is expected to have minimal impacts on the surrounding road network and the future traffic at Greenly Drive at Carlisle Street is acceptable. We recommend the east and west approaches of the private condominium laneway intersection (south of the site) on Greenly Drive to operate as a minor road (stop-controlled); and the north and south approaches operate as a major road (free-flow). Additionally, "no parking" signage should be installed on Greenly Drive between Carlisle Street and the site.

The future commercial site traffic can be accommodated by the proposed driveway and surrounding road network. Traffic activity at Elgin Street West and Rogers Road is expected function acceptably after build-out of the proposed development. No roadway improvements on Elgin Street West (other than the proposed design features) or signal timing adjustments are necessary. Details are provided herein.

Sincerely,

Anil Seegobin, P.Eng.
Partner, Engineer

Jonathan Li, B.Eng.
Transportation E.I.T.

Trans-Plan Transportation Inc.
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1. INTRODUCTION

Trans-Plan has been retained by VANDYK Group of Companies to complete a Traffic Impact Study for a proposed residential and commercial development located at Greenly Drive in the Town of Cobourg. This Traffic Impact Study includes the following study components:

- A review and assessment of the existing road network
- An assessment of boundary roadway operations under future background conditions, including a review of traffic growth, area developments and planned roadway improvements in the study area
- An assessment of site-generated traffic impacts on the study area intersections under future background and total traffic conditions
- Recommendations to mitigate any identified traffic impacts on the boundary roadways, resulting from the proposed development
- The determination of roadway and intersection improvements, as required, to accommodate the proposed development

This study responds to the submission comments received from our previous Traffic Impact Study, dated April 21, 2020, prepared by Trans-Plan.

2. RESPONSE TO COMMENTS

Submission comments were received from the Town of Cobourg and Northumberland County in the letter dated August 27, 2020 from the Town's Building & Planning Department. The comments are shown below in bold along with our responses:

Town of Cobourg:

"Update all traffic counts (dated 2013) and provide analysis; review impacts to Rogers Road/Carlisle Street, Carlisle/Greenly, Wilkins Gate/Carlisle, Wilkins Gate/Elgin Street West and Rogers Road/Elgin Street West including traffic count and LOS review to 5 year future time horizon and include future traffic from re-development of Northumberland Mall."

Response: New (2020) traffic counts were conducted at the study area intersection and driveways for our analysis, including the Carlisle Road at Rogers Road, and Carlisle Road at Wilkins Gate intersections. Details of the new traffic counts are provided in Section 5.2. The future traffic from the Northumberland Mall redevelopment was also included in our analysis, based on its Transportation Impact Study dated July 17th, 2019, prepared by LEA Consulting Ltd, to be discussed in Section 6.3.

Northumberland County:

"Section 3.0 – refers to Husson Site plan – is there a new one under the new consultant's name and are there any changes? – I don't think there are, but just confirming they are relying on the most up to date Site Plan."

Response: The attached site plan showing 72 proposed townhouse units is the most recent version.

"Section 4.3 – Growth Adjustment Factor – Relying on data from LEA consulting from 2019, and shows lower Saturday peak on May 25, 2019 compared to 2013. This doesn't seem correct. Elgin Street construction may have been started at this time and it was also a long weekend, so that could be the

reason for less traffic. Some increase in the Saturday peak hour should be applied. The traffic counts on Elgin at Burnham that the County completed were 16,200 in 2013 and 17,200 in 2018 so there's definitely an increase in traffic, and I would expect an increase in turning movements at this intersection."

Response: New (2020) traffic counts for existing conditions were conducted, but LEA's counts were referenced to determine if adjustment due to the COVID-19 pandemic was required. We note that Victoria Day was on Monday May 20, 2019 and thus LEA's Saturday count did not fall on the long weekend. Also, based on the "Public Notice: 2019 Road Construction Program" from the Northumberland County website, the 2019 construction on County Road 2 did not affected the study area. Details of the updated traffic counts and pre-pandemic vs. pandemic volume comparisons are provided in Section 5.2 and 5.3.

"Page 9 – Elgin Street W and Canadian Tire Driveway – will be LOS F in future conditions, provide how you propose to get vehicles to use Elgin and Rogers instead of this entrance? Would require vehicles to drive through parking lot to get to Rogers Road. Does not seem like a viable solution."

Response: While higher delays are expected at the driveway, it is typical of driveway connections to arterial roads. We recommend the driveway to remain as is (i.e. no improvements) because improvements such as signalization would not be warranted based on OTM Book 12 and TAC 2017 recommendations. As delays increase, drivers are likely to use the available alternative routes such as the Rogers Road signal despite the detour, which is acceptable.

"Page 10 – in paragraph for future condition – horizon year 2025 says LOS of 0.67 and should be LOS B, based on the table."

Response: The discrepancy is corrected and an updated capacity analysis based on our new (2020) counts is discussed in Section 9.

3. STUDY AREA CONTEXT

3.1 Site Location

The subject site, shown in Figure 1, is a vacant parcel of land located along the south side of Elgin Street West. It is located approximately 300m west of the Elgin Street West and Rogers Road major intersection. The site is bounded by private residential laneways and local municipal roadways to the south. Greenly Drive currently forms a termination point at the southern site boundary.

The surrounding land uses mainly consist of low-density residential dwellings, located south and west of the site. Adjacent east of the site is a Canadian Tire retail (commercial) store. The lands north of the site, opposite from Elgin Street West, are vacant.

3.2 Road Network

The study area roadways in the immediate vicinity of the site are described as follows:

Elgin Street West, also known as **County Road 2**, is an arterial road under the jurisdiction of Northumberland County. It runs in an east-west direction and has four travel lanes: two in each direction. The posted speed limit within the vicinity of the study area is 50km/h.

Wilkins Gate, Greenly Drive, and Carlisle Street are local roadways under the jurisdiction of the Town of Cobourg. Wilkins Gate and Greenly Drive run in north-south directions and Carlisle Street runs in an east-west direction. Both roadways have two travel lanes: one in each direction. The speed limit is not posted and is assumed to be 50km/h.

Rogers Road is a local roadway under the jurisdiction of the Town of Cobourg. It runs in a north-south direction and has two travel lanes: one in each direction, plus a two-way centre left turn lane. The speed limit is not posted and is assumed to be 50km/h.

4. PROPOSED DEVELOPMENT

The site plans, prepared by Husson Engineering + Management, are shown in Figure 2 and Figure 3. The proposed development consists of two land parcels: one for low-density residential dwellings and one for a commercial plaza. The proposed commercial plaza is located on the north parcel, along Elgin Road West, and the proposed residential dwellings are on the south parcel.

The development statistics are as follows:

- 72 residential dwelling units, provided by 13 townhouse buildings and 5 semi-detached buildings
- Three (3) commercial buildings, as follows:
  - Building A (Retail Use): 2,900 sq.ft. of GFA
  - Building B (Retail Use): 6,300 sq.ft. of GFA
  - Building C (Fast-Food Restaurant with Drive-Thru): 2,200 sq.ft. of GFA
- One (1) new municipal roadway, known as Cowin Circle, that is designed as a ring road

The residential dwelling driveways are proposed on Cowin Circle. Greenly Drive is proposed to be extended beyond its existing northerly termination point to connect with Cowin Circle. The proposed commercial plaza is accessed via two driveways: one proposed right-in / right-out ("RIRO") access on Elgin Street West and an internal connection with the adjacent Canadian Tire property.

An auxiliary eastbound right turn lane is proposed on Elgin Street West to serve the proposed RIRO driveway and the adjacent Canadian Tire driveway. The auxiliary lane will begin prior to the RIRO driveway and terminate at the Canadian Tire driveway.

The laneway connecting the residential and commercial parcels (shown as "access lane" on the site plan) is intended to be an emergency access only and regular vehicular traffic is not permitted. It can be utilized as a pedestrian connection, however.

5. EXISTING CONDITIONS

5.1 Study Area Intersections and Driveways

The study area intersections and driveways reviewed in our analysis are as follows:

1. Elgin Street West and Wilkins Gate (unsignalized / stop-controlled intersection)
2. Elgin Street West and Proposed Commercial Site Driveway (unsignalized / stop-controlled driveway)
3. Elgin Street West and Canadian Tire Driveway (unsignalized / stop-controlled driveway)
4. Elgin Street West and Rogers Road (signalized intersection)

5. Carlisle Street and Rogers Road (unsignalized / stop-controlled intersection)
6. Carlisle Street and Greenly Drive / Cowin Circle (unsignalized / stop-controlled driveway)
7. Carlisle Street and Wilkins Gate (unsignalized / stop-controlled intersection)

The existing roadway characteristics of the study area are shown in Figure 4, and were confirmed based on a site visit conducted by Trans-Plan on Wednesday March 18, 2020.

5.2 Traffic Counts

Trans-Plan conducted new (2020) turning movement counts (TMC) at the study area intersections and driveways, during the Phase 3 Provincial Reopening of the current COVID-19 pandemic. The count dates, times and peak hours are shown in Table 1. The detailed TMC data is provided in Appendix A.

Table 1 – Intersection Turning Movement Count Details

Location	Count Date	Count Hours	Peak Hours
Intersections			
Elgin Street West and Wilkins Gate	Wednesday September 16, 2020	7:00am – 9:30am 3:00pm – 6:00pm	8:15am – 9:15am 4:00pm – 5:00pm
	Saturday September 19, 2020	11:00am – 3:00pm	1:00pm – 2:00pm
Elgin Street West and Rogers Road	Wednesday September 16, 2020	7:00am – 9:30am 3:00pm – 6:00pm	8:30am – 9:30am 3:15pm – 4:15pm
	Saturday September 19, 2020	11:00am – 3:00pm	12:00pm – 1:00pm
Carlisle Street and Rogers Road	Wednesday September 16, 2020	7:00am – 9:30am 3:00pm – 6:00pm	8:00am – 9:00am 4:00pm – 5:00pm
	Saturday September 19, 2020	11:00am – 3:00pm	12:30pm – 1:30pm
Carlisle Street and Greenly Drive	Wednesday September 16, 2020	7:00am – 9:30am 3:00pm – 6:00pm	8:00am – 9:00am 4:00pm – 5:00pm
	Saturday September 19, 2020	11:00am – 3:00pm	12:45pm – 1:45pm
Carlisle Street and Wilkins Gate	Wednesday September 16, 2020	7:00am – 9:30am 3:00pm – 6:00pm	7:30am – 8:30am 3:30pm – 4:30pm
	Saturday September 19, 2020	11:00am – 3:00pm	11:15pm – 12:15pm
Driveways			
Elgin Street West and Canadian Tire Driveway	Wednesday September 16, 2020	7:00am – 9:30am 3:00pm – 6:00pm	8:15am – 9:15am 3:00am – 4:00pm
	Saturday September 26, 2020	11:00am – 3:00pm	1:15pm – 2:15pm

The surveyed existing traffic volumes, for the weekday AM, PM, and Saturday peak hours, are shown in Figure 5.

5.3 Traffic Adjustment for Pandemic

Since our 2020 TMC volumes may be affected by the pandemic, adjustment factors to scale-up the surveyed volumes were evaluated, based on past comparisons of pre-pandemic vs. pandemic TMCs. From

our experience, there is a wide variance depending on the municipality, as demonstrated by the comparisons shown in Table 2.

Table 2 – Pre-Pandemic vs. Pandemic Traffic Volumes

Municipality & Location	Peak Hour	Traffic Volumes, All Movements		% Difference
		Pre-pandemic	Pandemic	
City of Richmond Hill, Yonge Street at Bostwick Crescent	AM	2112 (1)	1320 (2)	Pre-pandemic count is 60% higher
	PM	2452 (1)	2060 (2)	Pre-pandemic count is 19% higher
City of Hamilton, Barton Street East at Chapple Street	AM	871 (3)	736 (4)	Pre-pandemic count is 18% higher
	PM	1243 (3)	1275 (4)	Pre-pandemic count is 3% lower
Town of Cobourg, Elgin Street West at Rogers Road	PM	1768 (5)	1556 (6)	Pre-pandemic count is 14% higher
	SAT	1617 (5)	1801 (6)	Pre-pandemic count is 10% lower
Town of Cobourg, Carlisle Street at Rogers Road	PM	718 (5)	561 (6)	Pre-pandemic count is 28% higher
	SAT	560 (5)	593 (6)	Pre-pandemic count is 6% lower

Sources:
(1) TMC from York Region, dated February 4, 2020
(2) TMC by Trans-Plan, dated August 11, 2020
(3) TMC from City of Hamilton, dated September 25, 2018
(4) TMC by Trans-Plan, dated May 7, 2020
(5) TMCs by LEA Consulting Ltd., dated May 24 & 25, 2019
(6) TMCs by Trans-Plan, dated September 16 & 19, 2020

Based on the above comparisons, the following adjustment factors were applied:

- **Weekday AM Peak Hour:** An adjustment factor of +39% was applied to the Elgin Street West corridor, taken at the average percent difference during the AM from the City of Richmond Hill and City of Hamilton.
- **Weekday PM Peak Hour:** Adjustment factors of +14% and +28% were applied to the Elgin Street West and Carlisle Street corridors, respectively, based on the comparisons between our pandemic TMCs and LEA's pre-pandemic TMCs (from TIS for Northumberland Mall dated July 17th, 2019, prepared by LEA Consulting Ltd.) during the PM.
- **Saturday Peak Hour:** No adjustment factor was applied for the SAT peak hour because the pre-pandemic volumes are lower than the pandemic volumes.

While there were concerns regarding LEA's pre-pandemic TMC on Saturday May 25, 2019, we note that Victoria Day was on Monday May 20, 2019 and thus it did not fall on the long weekend. Also, based on review of "Public Notice: 2019 Road Construction Program" from the Northumberland County website, the County Road 2 construction in 2019 was between Colton Street and Union Road (approximately 28km east of the site) which does not impact the study area. Therefore, the volumes should be valid.

The adjusted existing traffic volumes, for the weekday AM, PM, and SAT peak hours, are shown in Figure 6 and were balanced (increased) for corridor volume consistency, where appropriate.

5.4 Signal Timing Plans

The signal timing plan for Elgin Street West and Rogers Road was obtained from Northumberland County.

5.5 Peak Hour Factors

The peak hour factors (PHF) are based on Trans-Plan's 2020 TMCs at the study area intersections and driveways, and are shown below in Table 3. The PHF of the proposed commercial site driveway was assumed to be 0.92.

Table 3 – Peak Hour Factors, Study Area Intersections and Driveways

No.	Study Area Intersections and Driveways	Weekday AM Peak Hour	Weekday PM Peak Hour	Saturday Peak Hour
1	Elgin Street West and Wilkins Gate	0.92	0.98	0.88
2	Elgin Street West and Proposed Commercial Site Driveway	0.92	0.92	0.92
3	Elgin Street West and Canadian Tire Driveway	0.95	0.90	0.99
4	Elgin Street West and Rogers Road	0.89	0.91	0.98
5	Carlisle Street and Rogers Road	0.96	0.92	0.92
6	Carlisle Street and Greenly Drive / Cowin Circle	0.88	0.79	0.93
7	Carlisle Street and Wilkins Gate	0.92	0.91	0.82

6. FUTURE BACKGROUND CONDITIONS

The future study area roadway characteristics, with the inclusion of the proposed auxiliary lane on Elgin Street West, is shown in Figure 7. The future background traffic volumes, for the weekday AM and PM and SAT peak hours, are shown in Figure 8 and were determined based on review of the following:

- Horizon Year(s)
- Background Growth Rate along the Elgin Street West Corridor
- Background Developments within or nearby the study area
- Planned Roadway Improvements within the study area

6.1 Horizon Years

A 5-year horizon period (i.e. year 2025) was utilized for our analysis of future traffic conditions.

6.2 Background Growth Rate

The County Road 2 Class EA for Hamilton Road to William Street / Burnham Street ("EA Study"), dated May 2016 and prepared by HDR Inc., indicated a growth rate of 1.8 percent per annum for the Elgin Street West corridor. An excerpt of the EA Study is provided in Appendix B. The growth rate (compounded annually) was applied to the Elgin Street West corridor in our analysis of future conditions.

6.3 Background Developments

To address the Town's comments, the future traffic of the proposed commercial addition and driveway relocation at Northumberland Mall is included into our analysis, based on trips from its Transportation Impact Study (TIS), dated July 17th, 2019; prepared by LEA Consulting Ltd. The background trips affecting the study area intersections and LEA's TIS excerpts are provided in Appendix C.

6.4 Roadway Improvements

The Elgin Road West corridor (County Road 2), within the study area and beyond, is planned to undergo roadway improvements. The construction timeline is unavailable, based on review of the Northumberland County website, but the roadway improvements were included into our analysis of future conditions. The conceptual plan and profile drawings provided in the County Road 2 Class EA for Hamilton Road to William Street / Burnham Street ("EA Study"), dated May 2016 and prepared by HDR Inc., were reviewed. The drawing excerpts are provided in Appendix B.

Based on the drawings in the EA Study, in contrast to the existing roadway characteristics, the following design features are planned:

- **Elgin Street West and Wilkins Gate:** The addition of an exclusive eastbound right-turn lane, compared to a shared through / right turn lane in existing conditions.
- **Elgin Street West beyond 75m west of Wilkins Gate:** An additional through lane for each direction (two through lanes total per direction), compared to the one through lane per direction in existing conditions.

As shown in the site plan, an auxiliary eastbound right-turn lane is also proposed on Elgin Street West at the proposed commercial site driveway and the adjacent Canadian Tire driveway. The future study area roadway characteristics are shown in Figure 7 and were included into our analysis of future traffic conditions.

7. SITE TRAFFIC

7.1 Trip Generation

The site trips for the proposed development were generated using the Institute of Transportation Engineers ("ITE") Trip Generation manuals, 10th Edition. The site trip generation using the applicable ITE Land Use Codes ("LUC") are shown in Table 4.

Table 4 – Site Trip Generation, Residential and Commercial Parcels

Land Use	Size	Weekday AM Peak Hour			Weekday PM Peak Hour			SAT Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
Residential Parcel										
Multifamily Housing (Low-Rise) LUC 220	72 units									
	Distribution	23%	77%	100%	63%	37%	100%	50%(1)	50%(1)	100%
	Equation	Ln(T) = 0.95Ln(X) – 0.51			Ln(T) = 0.89Ln(X) – 0.02			T = 1.08(X) – 33.24		
	Rate	0.12	0.37	0.49	0.38	0.23	0.61	0.31	0.32	0.63
	Residential Trips	**8**	**27**	**35**	**28**	**16**	**44**	**22**	**23**	**45**
Commercial Parcel										
Shopping Centre LUC 820 *(Buildings A & B)*	9.2 x 1,000 sq.ft.									
	Distribution	54%	46%	100%	50%	50%	100%	52%	48%	100%
	Equation	T = 2.76(X) + 77.28(2)			Ln(T) = 0.72Ln(X) + 3.02			Ln(T) = 0.79Ln(X) + 2.79		
	Rate	6.05	5.15	11.20	5.49	5.49	10.98	5.31	4.91	10.22
	Total Trips	56	47	103	50	51	101	49	45	94
	Trip Reduction (5%)	-3	-2	-4	-2	-3	-4	-3	-2	-5
	Reduced Trips	53	45	98	48	48	96	46	43	89
	Pass-by Trips (25%)	12	12	24	12	12	24	11	11	22
	New Trips	41	33	74	36	36	72	35	32	67
Fast-Food with Drive-Thru LUC 934 *(Building C)*	2.2 x 1,000 sq.ft.									
	Distribution	51%	49%	100%	52%	48%	100%	51%	49%	100%
	Equation	Not Given			Not Given			Not Given		
	Rate	20.50	19.69	40.19	16.99	15.68	32.67	27.98	26.88	54.86
	Total Trips	45	43	88	37	35	72	62	59	121
	Trip Reduction (5%)	-2	-2	-4	-2	-2	-4	-3	-3	-6
	Reduced Trips	43	41	84	35	33	68	59	56	115
	Pass-by Trips (50%)	21	21	42	17	17	34	29	29	58
	New Trips	22	20	42	18	16	34	30	27	57
Total New Commercial Trips		**63**	**53**	**116**	**54**	**52**	**106**	**65**	**59**	**124**
Total Pass-by Commercial Trips		**33**	**33**	**66**	**29**	**29**	**58**	**40**	**40**	**80**

Note:

(1) Directional distribution was unavailable in the ITE Manual and was assumed
(2) Based on the equation provided for the "Peak Hour of Generator"

The residential parcel is expected to generate approximately 35, 44 and 45 two-way trips in the weekday AM, PM, and SAT peak hours, respectively, as shown in Figure 9.

A minor trip reduction of 5 percent was applied due to internal interactions with the proposed residential dwelling units and the adjacent commercial properties. The commercial parcel is expected to generate approximately 116, 106 and 124 new two-way trips in the weekday AM and PM and SAT peak hours, respectively, as shown in Figure 10.

Pass-by trip percentages of 25 percent and 50 percent, respectively, were applied to LUC 820 (i.e. Buildings A & B) and LUC 934 (i.e. Building C). The percentages were approximated based on the pass-by trip data in the ITE Trip Generation Handbook, 3rd Edition. The commercial parcel is expected to generate approximately 66, 58 and 80 two-way pass-by trips in the weekday AM and PM and SAT peak hours, respectively, as shown in Figure 11.

7.2 Trip Distribution and Assignment

The residential and commercial site trips were distributed to the surrounding road network based on existing travel patterns. Most traffic from the proposed residential dwellings are expected to access to / from the east leg of the intersection, based on existing turning volumes at Greenly Drive and Carlisle Street.

For the commercial parcel, a portion of the trips were distributed to the adjacent Canadian Tire driveways, due to the proposed internal connection. The existing directional split on Elgin Street West at the proposed commercial site driveway is approximately 50% eastbound / 50% westbound during the weekday AM and PM peak hours, and approximately 53% eastbound / 47% westbound during the SAT peak hour.

8. FUTURE TOTAL TRAFFIC CONDITIONS

The future 2025 total traffic volumes for the weekday AM, PM, and SAT peak hours, shown in Figure 12, were obtained by adding the site trips and pass-by trips to the future 2025 background volumes.

9. CAPACITY ANALYSIS

9.1 Analysis Methodology

A capacity analysis was performed for the study area intersections and driveways using Synchro 10 analysis software. The following traffic conditions, during the weekday AM, PM, and SAT peak hours, were analyzed:

- Existing Traffic Conditions (2020)
- Future Background Traffic Conditions (2025)
- Future Total Traffic Conditions (2025)

According to the Northumberland County Transportation Master Plan (TMP), dated March 2017, a v/c ratio of 0.7 or LOS of D is generally considered as the threshold for traffic congestion. The congested movements, if any, are identified.

9.2 Analysis Results

The detailed capacity analysis results are shown in Table 5 and the congested movements (if any) are noted below. The Synchro 10 output sheets and level of service (LOS) definitions are provided in Appendix D and Appendix E, respectively.

The results for each study area intersection and driveway are summarized as follows:

Elgin Street West & Wilkins Gate

Existing Conditions

The northbound left movement (stop-controlled approach) currently operates acceptably with a LOS of C or better and delays of up to 20 seconds, during the peak hours.

Future Conditions – Horizon Year 2025

The northbound left movement (stop-controlled approach) is expected to continue operating acceptably with a LOS of C and delays of up to 24 seconds under future total conditions. The Elgin Street West and New Amherst Boulevard / Loveshin Road traffic signal can provide a more efficient alternative route for left turn vehicles as the delays increase.

Elgin Street West & Proposed Commercial Site Driveway

Future Conditions – Horizon Year 2025

The proposed commercial site driveway is expected to operate with a good LOS of B and minimal delays of up to 11 seconds for outbound vehicles.

Elgin Street West & Canadian Tire Driveway

Existing Conditions

The northbound left movement (outbound approach) currently operates acceptably with a LOS of C and delays up to 23 seconds, during the weekday AM and SAT peak hours. It operates with a LOS of D and a delay of 28 seconds, during the weekday PM peak hour.

Future Conditions – Horizon Year 2025

Under future total conditions, the northbound left movement (outbound approach) is expected to operate acceptably with a LOS of C during the weekday AM peak hour. It is expected to operate with LOS's of E and F, during the SAT and weekday PM peak hours, respectively, and delays of 42 and 56 seconds. While higher delays are expected, it is typical of unsignalized driveway connections to arterial roadways.

We recommend leaving the driveway as is (i.e. no improvements) because improvements such as signalization would not be warranted based on OTM Book 12 and TAC 2017 recommendations. OTM Book 12 states that the minimum distance between signalized intersections for roads with a posted speed limit of 60km/h (or less) is 215m, whereas the distance between the driveway and the Elgin Street West at Rogers Road signal is approximately 195m. TAC 2017 also recommends spacing of 400m between signals for arterial roads with a speed of 50km/h. As delays increase, drivers are likely to use the available alternative routes such as the Rogers Road signal despite the detour, which is acceptable.

Elgin Street West & Rogers Road

Existing Conditions

The overall intersection currently operates acceptably during the peak hours, with an overall LOS of A and v/c ratios of up to 0.56. All individual movements operate with reserve capacity.

Future Conditions – Horizon Year 2025

The intersection is expected to continue operating acceptably in the weekday AM, PM, and SAT peak hours, under future total traffic conditions. In the weekday PM and SAT peak hours, the overall intersection is expected to operate with a v/c ratio of 0.65 and the westbound left turn movement is expected to operate with a v/c ratio of 0.70.

While the movement is considered congested according to the Northumberland County TMP, a v/c ratio of 0.70 is generally acceptable and well under the critical threshold of other municipalities and counties (e.g. v/c ratio of 0.85).

Carlisle Street & Rogers Road

Existing Conditions

The intersection currently operates acceptably with a LOS of B or better across all movements, during the weekday AM, PM, and SAT peak hours.

Future Conditions – Horizon Year 2025

The intersection is expected to continue operating acceptably with a LOS of C or better, and delays of up to 16 seconds across all movements, during the weekday AM, PM, and SAT peak hours.

Carlisle Street & Greenly Drive / Cowin Circle

Existing Conditions

The intersection currently operates well with a LOS of A and minimal delays across all movements, during the weekday AM, PM, and SAT peak hours.

Future Conditions – Horizon Year 2025

With the inclusion of future site traffic, the intersection is expected to continue operating with minimal delays and a LOS of A for all movements, during the peak hours. Overall, the proposed townhouses are expected to have minimal traffic impacts on the intersection and the surrounding road network.

Carlisle Street & Wilkins Gate

Existing Conditions

The intersection currently operates well with a LOS of A and minimal delays across all movements, during the weekday AM, PM, and SAT peak hours.

Future Conditions – Horizon Year 2025

The intersection is expected to continue operating with minimal delays and a LOS of A for all movements, during the peak hours.

Table 5 - Capacity Analysis Results, Existing and Future Traffic Conditions

Intersection	Existing Traffic Conditions									2025 Background Traffic Conditions									2025 Total Traffic Conditions								
Movement	AM Peak Hour			PM Peak Hour			SAT Peak Hour			AM Peak Hour			PM Peak Hour			SAT Peak Hour			AM Peak Hour			PM Peak Hour			SAT 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	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Elgin Street West & Wilkins Gate																											
Eastbound Through		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Eastbound Through / Right		0	A		0	A		0	A		-	-		-	-		-	-		-	-		-	-		-	-
Eastbound Right		-	-		-	-		-	-		0	A		0	A		0	A		0	A		0	A		0	A
Westbound Through		1	A		1	A		1	A		1	A		1	A		1	A		1	A		1	A		1	A
Westbound Through / Left		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Northbound Left		16	C		20	C		20	C		18	C		22	C		22	C		19	C		23	C		24	C
Northbound Right		10	A		10	B		11	B		10	B		11	B		11	B		10	B		11	B		11	B
Elgin Street West & Proposed Commercial Site Driveway																											
Eastbound Through		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Eastbound Right		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Westbound Through		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Northbound Right		0	A		0	A		0	A		0	A		0	A		0	A		10	B		11	B		11	B
Elgin Street West & Canadian Tire Driveway																											
Eastbound Through		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Eastbound Through / Right		0	A		0	A		0	A		-	-		-	-		-	-		-	-		-	-		-	-
Eastbound Right		-	-		-	-		-	-		0	A		0	A		0	A		0	A		0	A		0	A
Westbound Left		8	A		9	A		9	A		8	A		9	A		9	A		9	A		10	A		10	A
Westbound Through		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A		0	A
Northbound Left		17	C		28	D		23	C		17	C		30	D		25	C		24	C		56	F		42	E
Northbound Right		10	A		11	B		11	B		10	A		11	B		11	B		10	A		11	B		11	B
Elgin Street West & Rogers Road	**0.49**	**10**	**A**	**0.56**	**9**	**A**	**0.56**	**10**	**A**	**0.51**	**10**	**A**	**0.60**	**9**	**A**	**0.60**	**10**	**A**	**0.53**	**10**	**B**	**0.65**	**10**	**A**	**0.65**	**10**	**B**
Eastbound Through	0.19	4	A	0.23	5	A	0.20	4	A	0.21	4	A	0.25	5	A	0.22	5	A	0.23	5	A	0.26	5	A	0.24	5	A
Eastbound Right	0.04	4	A	0.08	4	A	0.07	4	A	0.04	4	A	0.08	4	A	0.07	4	A	0.04	4	A	0.08	4	A	0.07	4	A
Westbound Left	0.53	9	A	0.60	11	B	0.60	10	B	0.55	9	A	0.65	12	B	0.65	12	B	0.57	10	B	0.70	14	B	0.70	14	B
Westbound Through	0.18	4	A	0.27	5	A	0.21	4	A	0.20	4	A	0.29	5	A	0.24	5	A	0.21	5	A	0.31	5	A	0.25	5	A
Northbound Left	0.30	24	C	0.37	25	C	0.36	24	C	0.30	24	C	0.38	25	C	0.37	24	C	0.34	24	C	0.42	25	C	0.40	25	C
Northbound Right	0.21	24	C	0.17	23	C	0.20	23	C	0.21	24	C	0.17	23	C	0.21	23	C	0.22	24	C	0.18	23	C	0.21	23	C
Carlisle Street & Rogers Road																											
Eastbound Through / Left		9	A		10	A		9	A		9	A		10	A		9	A		9	A		10	B		9	A
Westbound Through / Right		8	A		10	A		9	A		8	A		10	A		9	A		9	A		10	B		9	A
Southbound Left / Right		9	A		14	B		10	B		9	A		15	B		11	B		9	A		16	C		11	B
Carlisle Street & Greenly Drive																											
Eastbound Through / Left / Right		0	A		1	A		0	A		0	A		1	A		0	A		1	A		2	A		1	A
Westbound Through / Left / Right		0	A		1	A		2	A		0	A		1	A		2	A		0	A		1	A		1	A
Northbound Through / Left / Right		8	A		9	A		9	A		8	A		9	A		9	A		8	A		9	A		9	A
Southbound Through / Left / Right		9	A		9	A		9	A		9	A		9	A		9	A		9	A		10	A		9	A
Wilkins Gate & Carlisle Street																											
Eastbound Through / Left / Right		8	A		7	A		7	A		8	A		7	A		7	A		8	A		7	A		7	A
Westbound Through / Left / Right		7	A		7	A		7	A		7	A		7	A		7	A		7	A		7	A		7	A
Northbound Through / Left / Right		7	A		7	A		7	A		7	A		7	A		7	A		7	A		7	A		7	A
Southbound Through / Left / Right		7	A		7	A		7	A		7	A		7	A		7	A		7	A		8	A		7	A

10. TRANSPORTATION IMPROVEMENT RECOMMENDATIONS

10.1 Stop Control of Private Condominium Laneway Approaches

We recommend the east and west approaches of the private condominium laneway intersection with Greenly Drive (located between the southerly site boundary and Carlisle Street) to operate as a minor street (stop-controlled). The north and south approaches at the intersection should operate as the major street (free-flow).

10.2 No Parking Signage on Greenly Avenue

Concerns were expressed from the local community in the letter dated July 30, 2020, regarding the lack of a second exit for fire trucks / emergency vehicles from the private condominium laneway. As a result, we recommend “no parking” signage to be installed along Greenly Drive, between the site and Carlisle Street, to prevent potential obstructions if truck reverse movements are required from the laneway.

10.3 Concerns of Increased Traffic from Local Community

Another concern expressed from the local community was regarding increased traffic on Greenly Drive and Carlisle Street due to the proposed development. The letter suggested that a direct connection from the proposed townhouses to Elgin Street West would be beneficial.

However, we do not recommend a new roadway connection because the new intersection on Elgin Street West would not meet the minimum spacing requirements in the Transportation Association of Canada (TAC) Geometric Design Guide 2017, due to the proximity to Wilkins Gate and the adjacent Canadian Tire driveway. The lack of spacing would result in deficient storage and deceleration distance for left turning vehicles from Elgin Street West. The proposed commercial site driveway is acceptable because it is restricted to right-in / right-out movements, instead of full-moves.

As per TAC, the typical minimum intersection spacing on minor arterial roads is 200m, generally only applicable in areas of intense existing development or restrictive physical controls where feasible alternative do not exist. Major arterials would require an even greater distance. Elgin Street West is identified as a County Arterial Road in the Northumberland County Official Plan (OP) and better matches the characteristics of a major arterial. The distance from the new potential road to Wilkins Gate is approximately 190m (assuming an extension of Greenly Drive) which is not adequate for a major arterial. The existing Canadian Tire full-moves driveway, with greater traffic volumes than Wilkins Gate, is also approximately 80m east of the new potential road, so it is not recommended to shift the new potential intersection further east to meet the requirement.

We also do not recommend a potential vehicular connection between the commercial and residential parcels because the connection would increase traffic on Greenly Drive rather than decrease it. Because the commercial parcel generates about 4 to 5 times more traffic than the proposed townhouse units (new and pass-by trips combined, see Section 7.1), a vehicular connection would attract traffic from south of the site. The current proposal of separating the commercial and residential parcels restricts the high commercial traffic volumes to Elgin Street West, minimizing impacts to Greenly Drive and Carlisle Street.

Lastly, our capacity analysis (from Section 9) indicates that the Carlisle Street and Greenly Drive intersection is expected to operate well (LOS of A) under future conditions, with minimal delays for all

approaches. We conclude that the future traffic volumes on Greenly Drive and Carlisle Street with the proposed townhouses are acceptable for the local residential roadways.

11. SUMMARY AND CONCLUSIONS

11.1 Summary

This Traffic Impact Study prepared in support of the proposed residential and commercial development at Greenly Drive, Cobourg, is summarized as follows:

Proposed Development & Site Statistics

- Two (2) land parcels are proposed; the south parcel consists of low-density residential dwellings and the north parcel consists of a commercial plaza.
- 72 residential dwelling units, provided by 13 townhouse buildings and 5 semi-detached buildings, are proposed on the residential parcel.
- Three (3) commercial buildings are proposed on the commercial parcel, as follows:
  - Building A (Retail Use): 2,900 sq.ft. of GFA
  - Building B (Retail Use): 6,300 sq.ft. of GFA
  - Building C (Fast-Food Restaurant with Drive-Thru): 2,200 sq.ft. of GFA
- One (1) new municipal roadway, known as Cowin Circle, is designed as a ring road on the residential parcel. The dwelling unit driveways are proposed on Cowin Circle. The new municipal roadway is proposed to connect with the existing northerly termination point of Greenly Drive.
- One (1) right-in / right-out driveway is proposed on Elgin Street West to provide vehicular access to the proposed commercial plaza. An internal connection is also proposed to connect the commercial plaza with the adjacent Canadian Tire property.
- An auxiliary eastbound right turn lane is proposed on Elgin Street West to serve the proposed RIRO driveway and the adjacent Canadian Tire driveway. The auxiliary lane will begin prior to the RIRO driveway and terminate at the Canadian Tire driveway.

Traffic Impact Study

- New (2020) study area TMCs were conducted at the study area intersections and driveways, during the Phase 3 Provincial Reopening of the current COVID-19 pandemic. Adjustment factors were applied to scale up the surveyed volumes, where appropriate.
- A background growth rate of 1.8 percent per annum was applied to the Elgin Street West (also known as County Road 2) corridor, based on review of the County Road 2 Class EA from Hamilton Road to William Street / Burnham Street.
- The future traffic from the proposed Northumberland Mall redevelopment was included into our analysis as a background development.
- The planned roadway improvements noted in the County Road 2 Class EA for Hamilton Road to William Street / Burnham Street were incorporated into the analysis of future traffic conditions. The proposed eastbound right-turn auxiliary lane at the proposed commercial site driveway and the adjacent Canadian Tire driveway was also included.

- The site trips were generated utilizing the formulas in the Institute of Transportation Engineers (ITE) Trip Generation manuals, 10th Edition. Pass-by trip adjustments were applied to the proposed commercial buildings. The trips were distributed to the surrounding road network based on existing travel patterns.
- The proposed residential dwellings are expected to have minimal traffic impacts on the surrounding road network. The Carlisle Street and Greenly Drive intersection is expected to operate with minimal delays under future traffic conditions.
- The proposed right-in / right-out commercial site driveway is expected to operate with minimal delays under future traffic conditions.
- The Elgin Street West and Rogers Road intersection is expected to operate acceptably under future traffic conditions. The westbound left movement is expected to approach the threshold for congestion (i.e. v/c ratio of 0.70) in the weekday PM and SAT peak hours. However, a v/c ratio of 0.70 is generally acceptable and well under the critical threshold in other municipalities and counties (i.e. a v/c ratio of 0.85).
- The northbound left movement (outbound approach) at the Elgin Street West and Canadian Tire driveway is expected to operate with higher delays in the weekday PM and SAT peak hours, but it is typical of full-moves driveway connections to arterial roadways. We recommend the driveway to remain as is (i.e. no improvements) because improvements such as signalization would not be warranted, due to signal spacing requirements not being met. As delays increase, drivers are likely to use available alternative routes, which is acceptable.
- It is recommended that the east and west approaches of the Greenly Drive and private condominium laneway (south of the site) operate as a minor street (stop-controlled).
- “No parking” signage is recommended on Greenly Drive, to prevent obstructions if fire trucks / emergency vehicles are required to reverse from the private condominium laneways.
- A new roadway connection from the residential parcel to Elgin Street West is not recommended, because the new intersection on Elgin Street West would not meet the TAC 2017 spacing requirements.

11.2 Conclusions

Overall, the surrounding road network can accommodate the additional site traffic under future traffic conditions. We recommend the east and west approaches of the Greenly Drive and private condominium laneway intersection (south of the site) to operate as a minor street (stop-controlled) in the future, and “no parking” signage to be installed on Greenly Drive between the site and Carlisle Street.

Respectfully submitted,

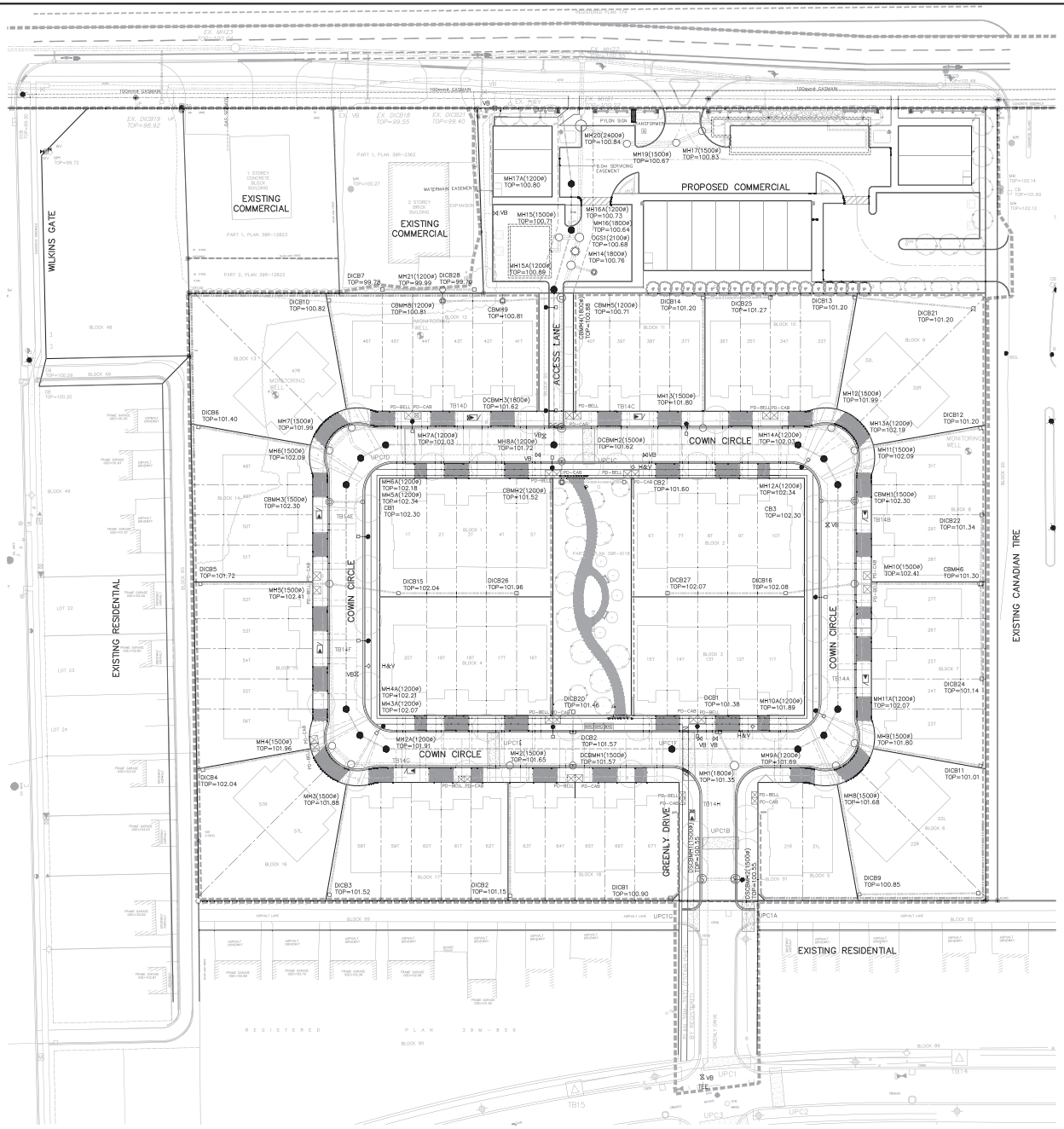
Anil Seegobin, P.Eng.
Partner, Engineer

Jonathan Li, B.Eng.
Transportation E.I.T.

Trans-Plan Transportation Inc.
Transportation Consultants

Figure 1 – Site Location

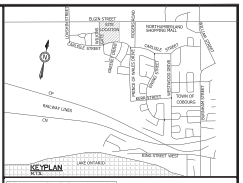
Source: Google Earth



UNDER PAVEMENT CROSSING TABLE		
UPC #	NO. OF 100mm	NO. OF 75mm
UPC1A	DUCTS 1 LATERAL 2 BELL 1 CATV 1 SPARE ** GAS	DUCTS 0 SEC 0 LTG.* 1 SPARE
UPC1B	0 LATERAL 3 BELL 0 CATV 1 SPARE ** GAS	0 SEC 1 LTG.* 1 SPARE
UPC1C	0 LATERAL 2 BELL 0 CATV 1 SPARE ** GAS	6 SEC 0 LTG.* 1 SPARE
UPC1D	0 LATERAL 2 BELL 1 CATV 1 SPARE ** GAS	5 SEC 2 LTG.* 1 SPARE
UPC1E	0 LATERAL 2 BELL 1 CATV 1 SPARE ** GAS	5 SEC 0 LTG.* 1 SPARE
UPC1F	0 LATERAL 2 BELL 0 CATV 1 SPARE ** GAS	5 SEC 2 LTG.* 1 SPARE
UPC1G	1 LATERAL 2 BELL 1 CATV 1 SPARE ** GAS	0 SEC 0 LTG.* 1 SPARE

* 75mm SLEEVE FOR 50mm FLEXIBLE RACEWAY.
** QAUNTITIES HAVE YET TO BE DETERMINED.

ALL DRIVEWAYS TO BE 1.0m CLEAR FROM ALL ABOVE GROUND UTILITY STRUCTURES



BENCH MARK ELEV. 104.662m
COBOURG BENCHMARK 18 - LOCATED AT TERRY FOX SCH. ON THE NORTH SIDE,0.3m EAST OF MAIN ENTRANCE, 0.3m ABOVE GRADE.

SITE BENCH MARK ELEV. 100.656m
SPIKE ON TOP OF FENCE POST LOCATED AT SOUTH EAST CORNER OF EXISTING CARPET SUPERSTORE PROPERTY.

SITE BENCH MARK ELEV. 102.059m
SPIKE LOCATED IN MORTAR CRACK ON PILLAR LOCATED AT NORTH-WEST CORNER OF CANADIAN TIRE GARDEN CENTRE

LEGEND

- LIGHT STANDARD
- VB — VALVE BOX
- HYDRANT & VALVE
- TB14E — TRANSFORMER (TW)
- UPC1C — UNDERGROUNG PAVEMENT CROSSING (UPC)
- UPC2 — EXISTING UNDERGROUND PAVEMENT CROSSING (EX. UPC)
- STORM MANHOLE
- CATCHBASIN MANHOLE
- CATCHBASIN
- SANITARY MANHOLE
- SUPER CATCHBASIN INLET
- MAIL — PROPOSED COMMUNITY MAILBOX LOCATION

CLIENT: VANDYK group of companies

No.	DATE	REVISIONS	BY
10.	2018-03-01	UPDATED AS PER LATEST COMMENTS	EJM
9.	2017-12-19	UPDATED AS PER LATEST COMMENTS	JSH
8.	2017-09-08	FINAL SUBMISSION	JSH
7.	2017-08-30	ISSUED FOR TENDER	JSH
6.	2017-06-09	SIXTH SUBMISSION	JSH
5.	2017-03-10	FIFTH SUBMISSION	JSH
4.	2016-01-06	FOURTH SUBMISSION	JSH
3.	2014-08-14	THIRD SUBMISSION	JSH
2.	2014-01-23	SECOND SUBMISSION	JSH
1.	2013-07-15	FIRST SUBMISSION	JSH

REGIONAL APPROVAL:

MUNICIPAL APPROVAL:

STAMP: LICENSED PROFESSIONAL ENGINEER E.J. MCGRISKIN 100151243 Mar. 8, 2018 PROVINCE OF ONTARIO

CONSULTANT: HUSSON ENGINEERING + MANAGEMENT

PROJECT TITLE:

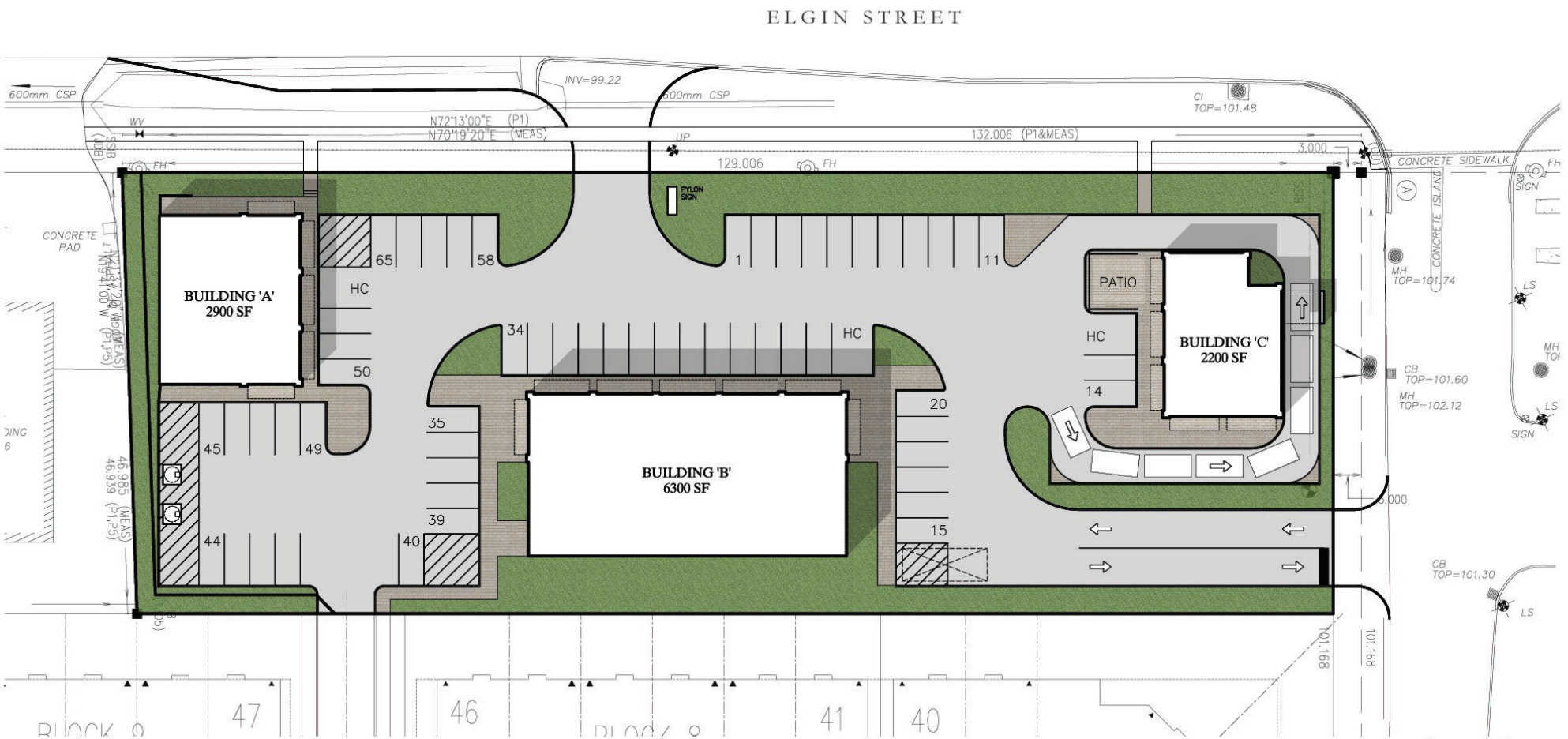
TOWN OF COBOURG
COBOURG CT LANDS
CONTRACT No.

DRAWING TITLE:

FURNITURE PLAN

SCALE: 1:500	DESIGN BY: E.J.M.	CHECKED BY: J.S.H.
	DRAWN BY: E.J.M.	CHECKED BY: D.P.H.
CONSULTANT FILE No. 12617	DRAWING No. 103	
DATE DRAWN JULY 2013	SHEET No. SHEET 4 OF 26	

Figure 3 - Site Plan 2



Westpark Plaza

Cobourg, Ontario - September 26, 2013

Figure 4 – Existing Study Area Roadway Characteristics

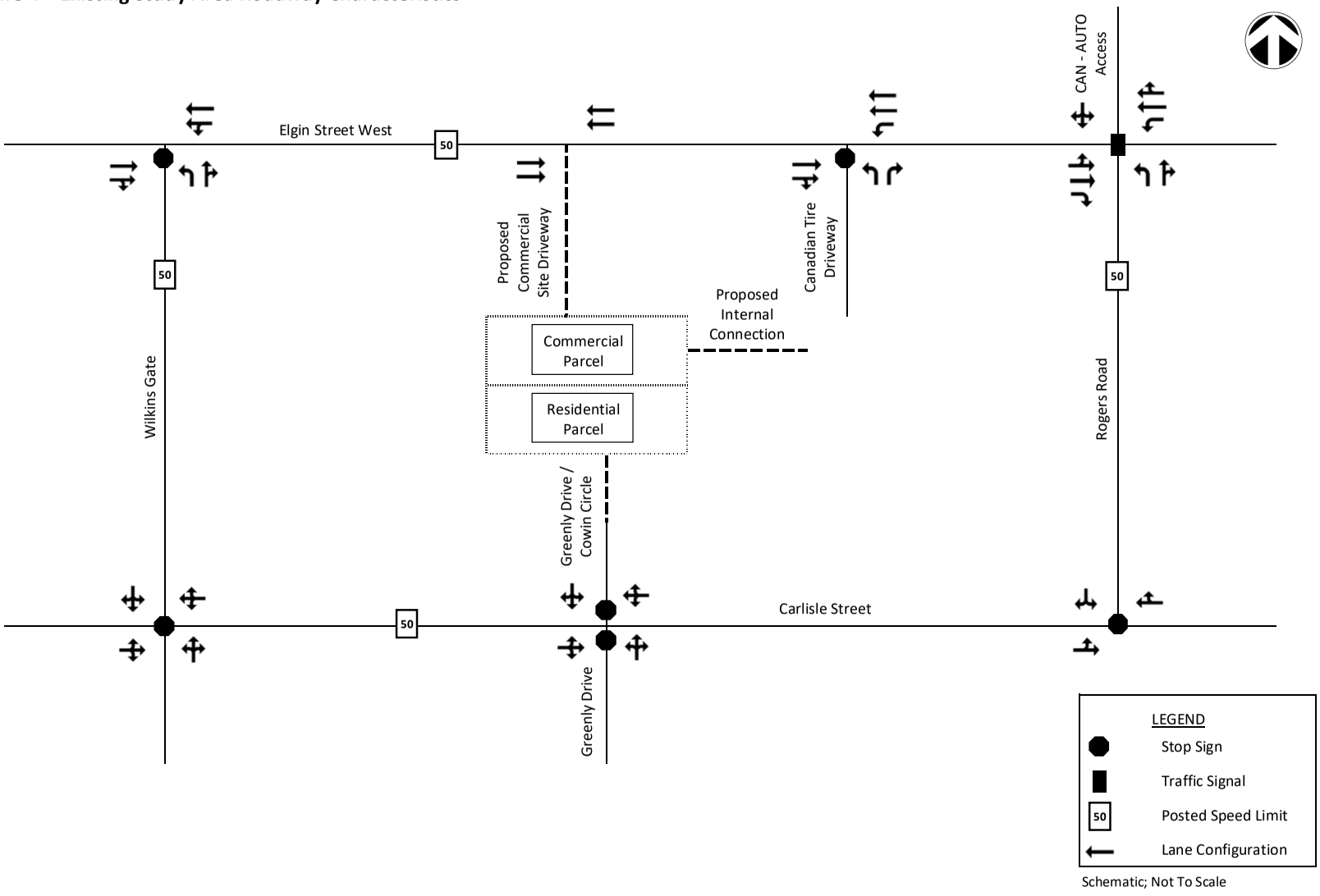


Figure 5 – Surveyed Existing Traffic Volumes, Weekday AM and PM and SAT Peak Hours

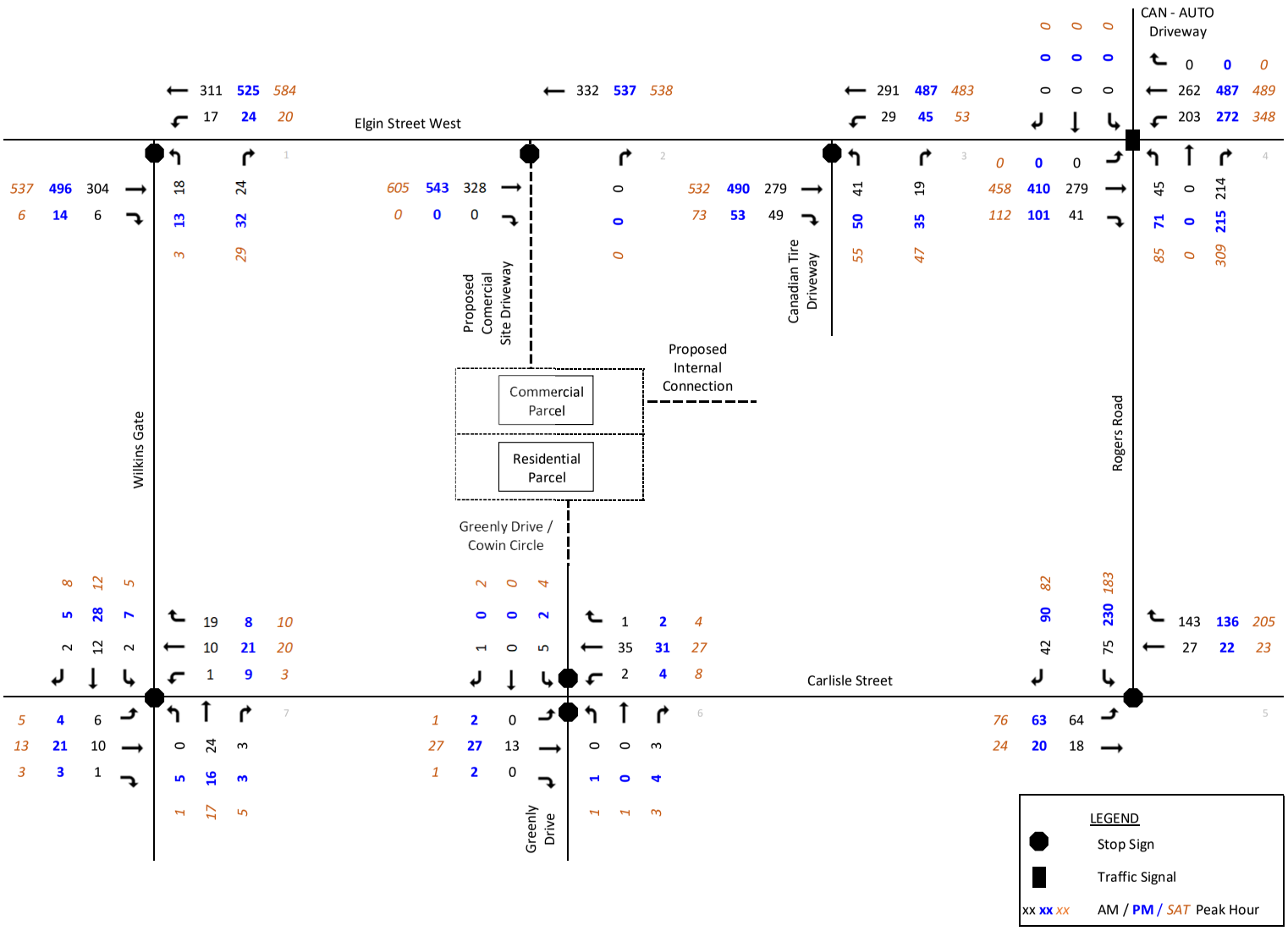


Figure 6 – Adjusted Existing Traffic Volumes, Weekday AM and PM and SAT Peak Hours

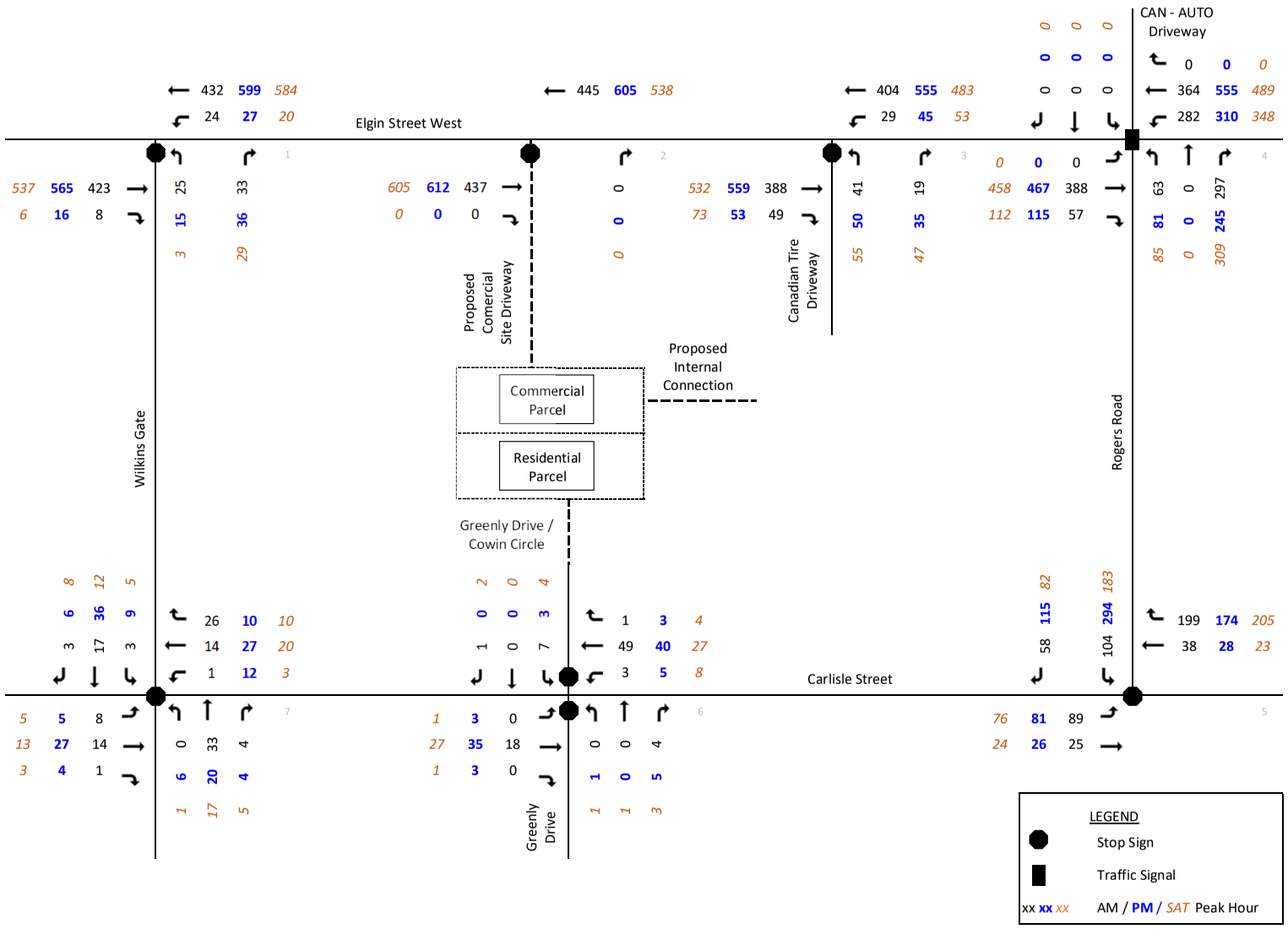


Figure 7 – Future Study Area Roadway Characteristics

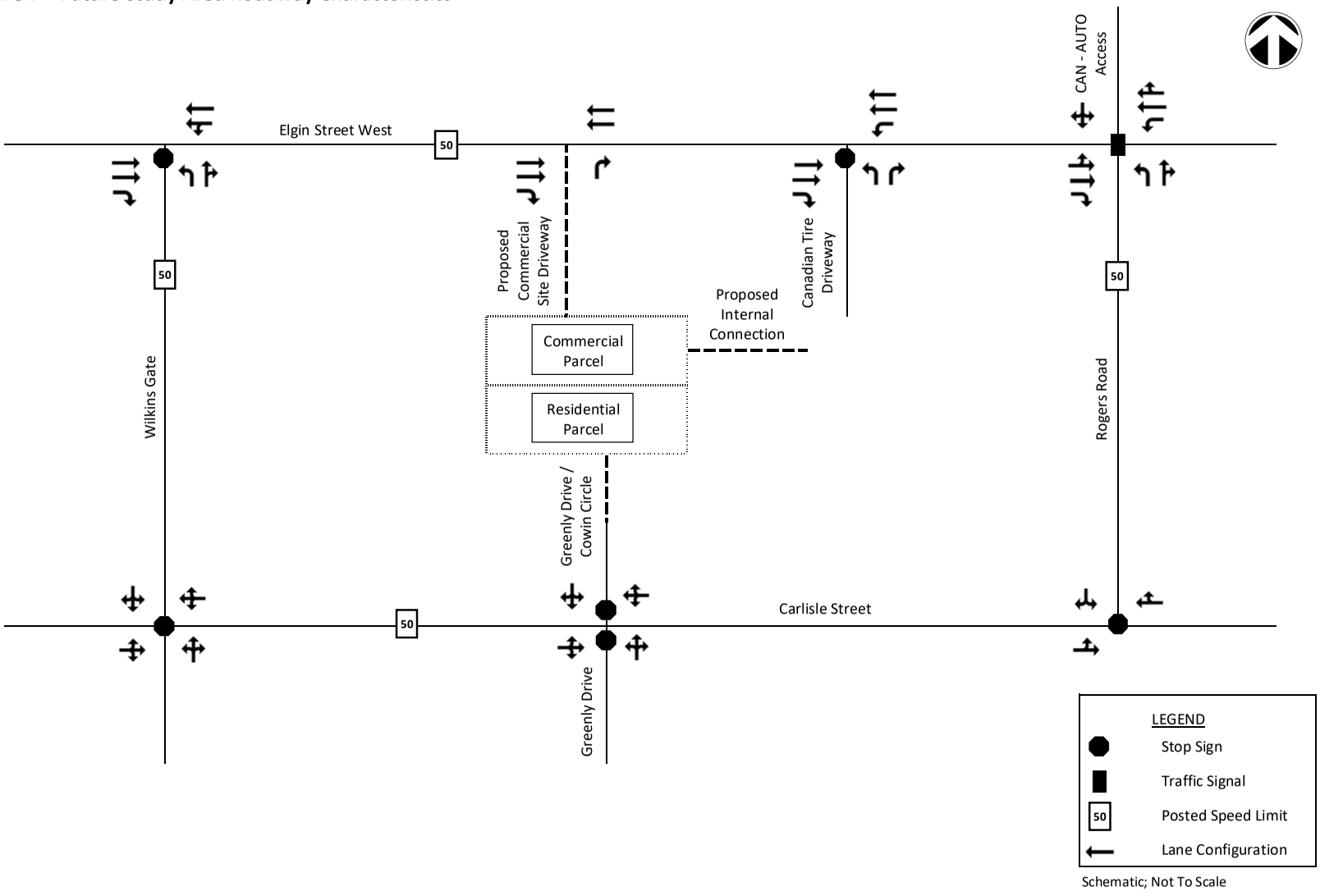


Figure 8 – 2025 Background Traffic Volumes, Weekday AM and PM and SAT Peak Hours

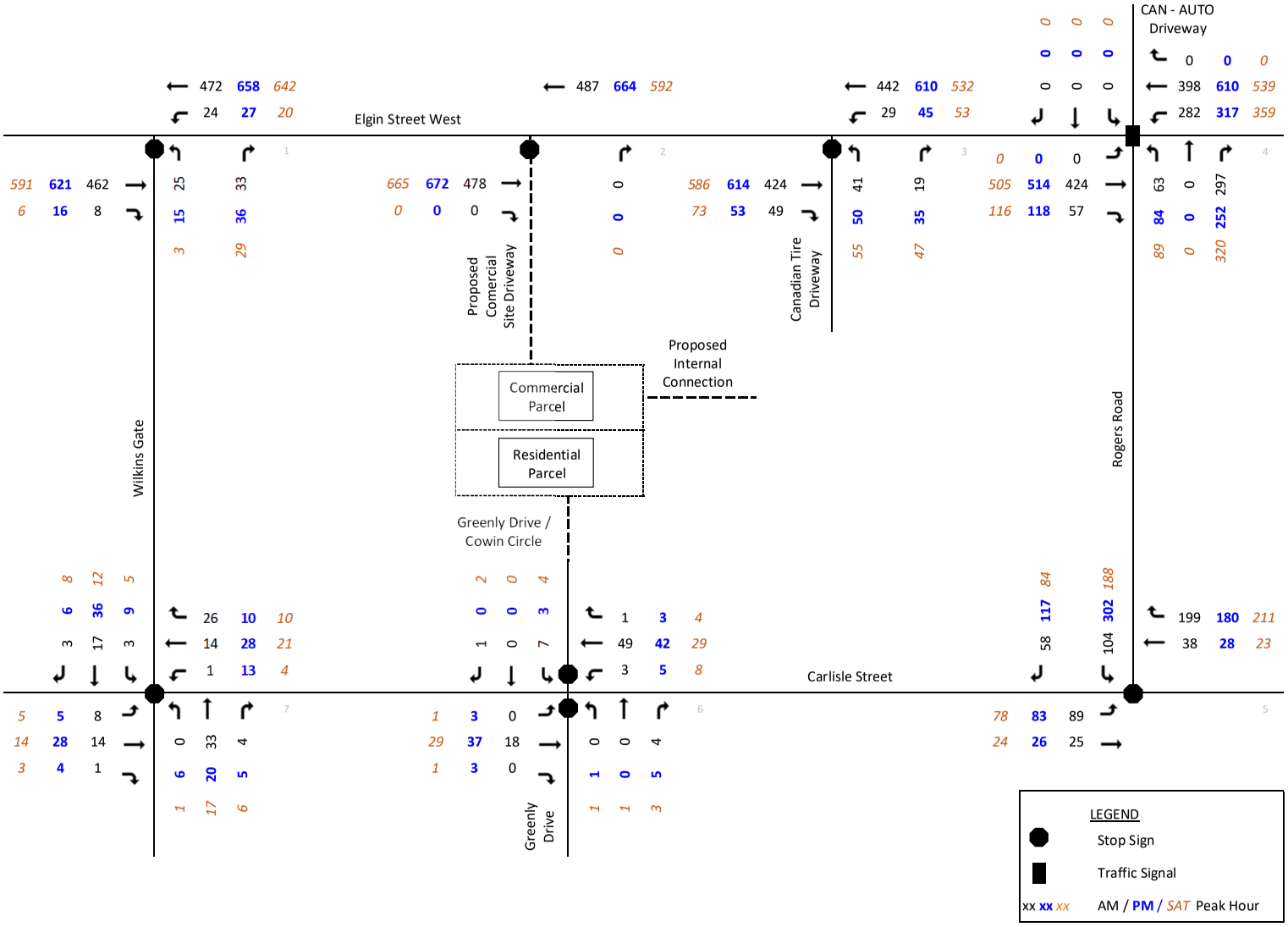


Figure 9 – Residential Site Traffic Assignment, Weekday AM and PM and SAT Peak Hours

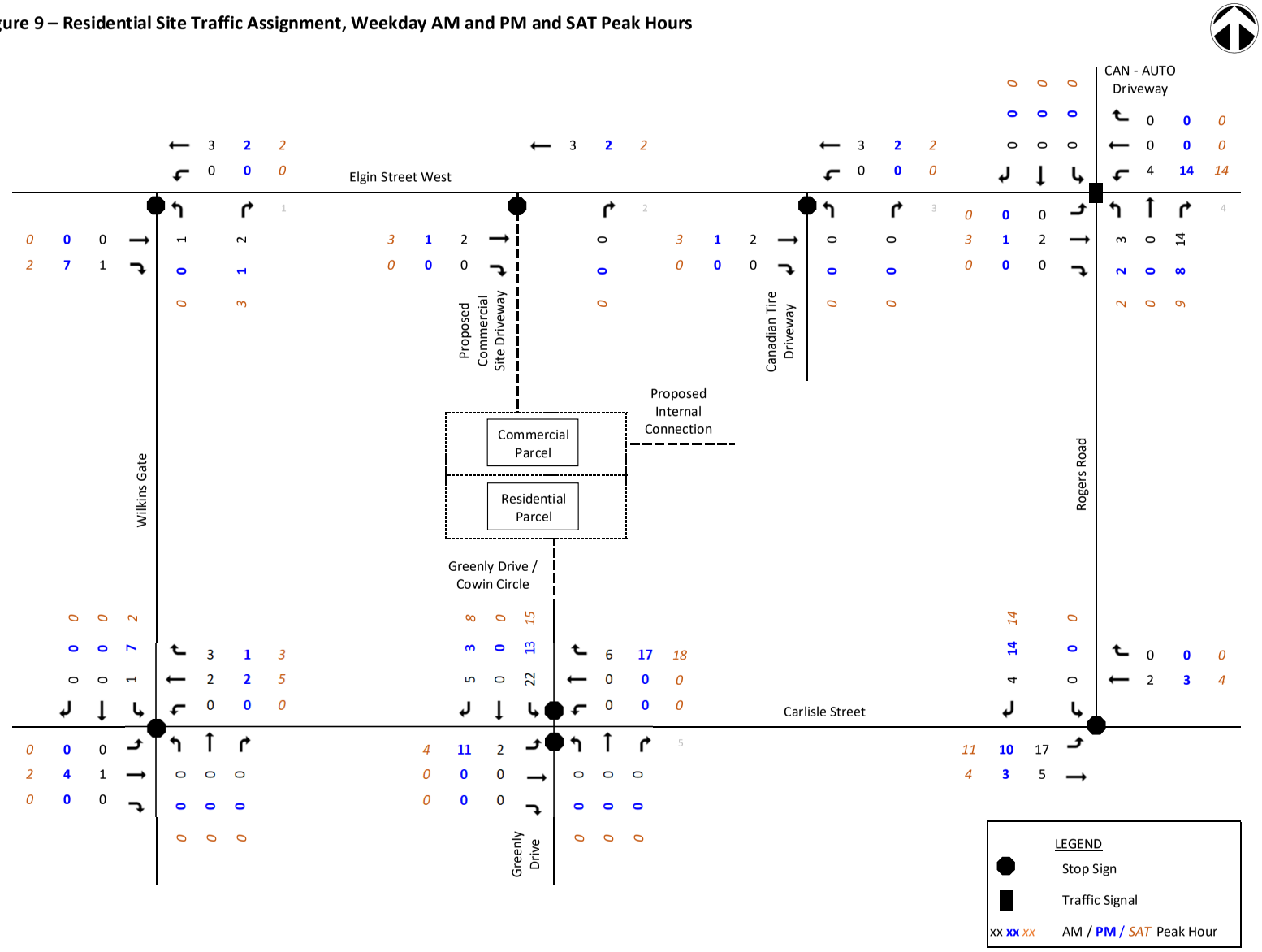


Figure 10 – Commercial New Site Traffic Assignment, Weekday AM and PM and SAT Peak Hours

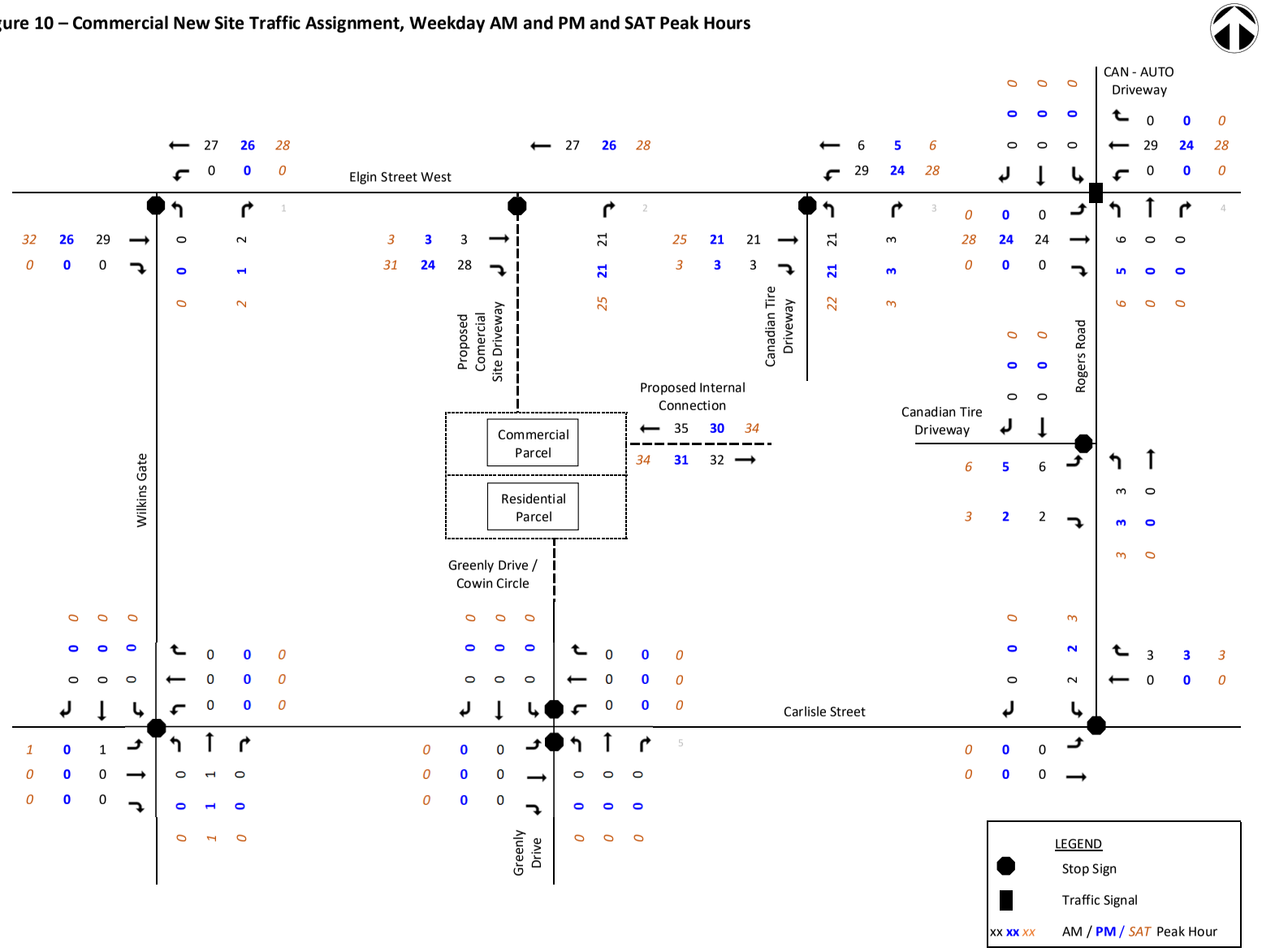


Figure 11 – Commercial Pass-by Trip Adjustment, Weekday AM and PM and SAT Peak Hours

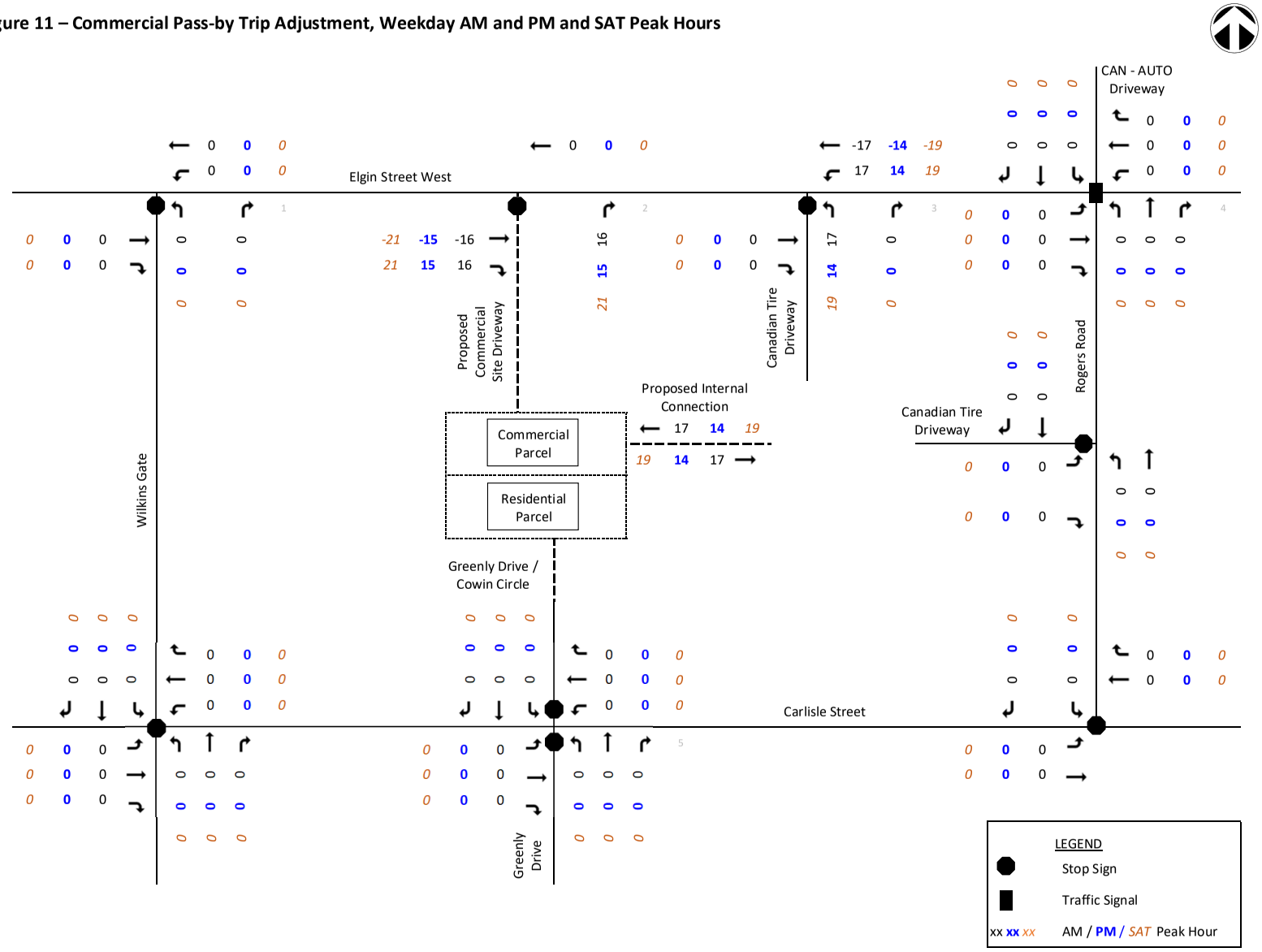
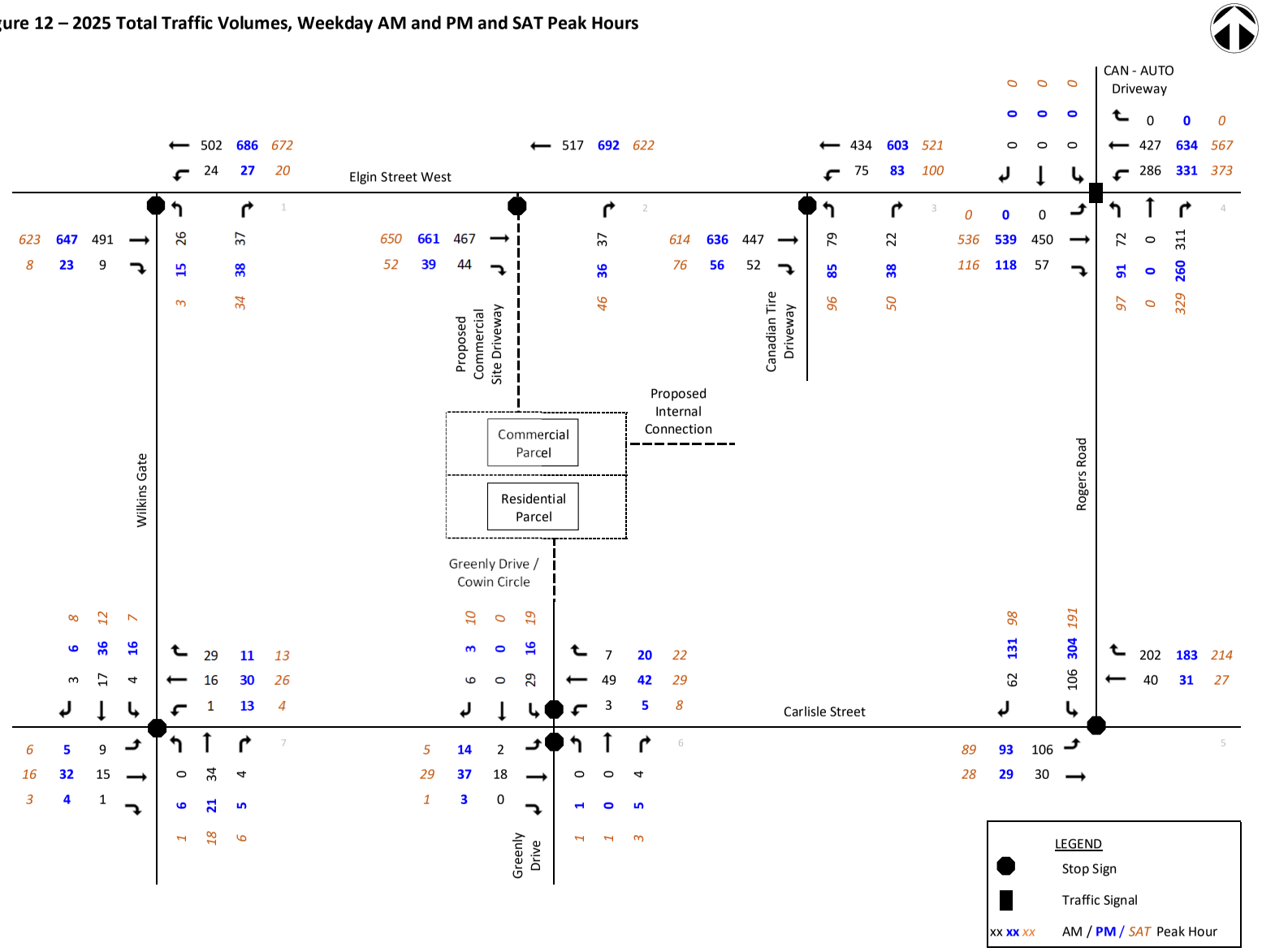


Figure 12 – 2025 Total Traffic Volumes, Weekday AM and PM and SAT Peak Hours



APPENDICES

Appendix A – Turning Movement Counts and Signal Timing Plans

Appendix B – County Road 2 Class EA, Excerpts

Appendix C – Background Development Information

Appendix D – Capacity Analysis Sheets

Appendix E – Level of Service Definitions

APPENDIX A

Turning Movement Counts and Signal Timing Plans

TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

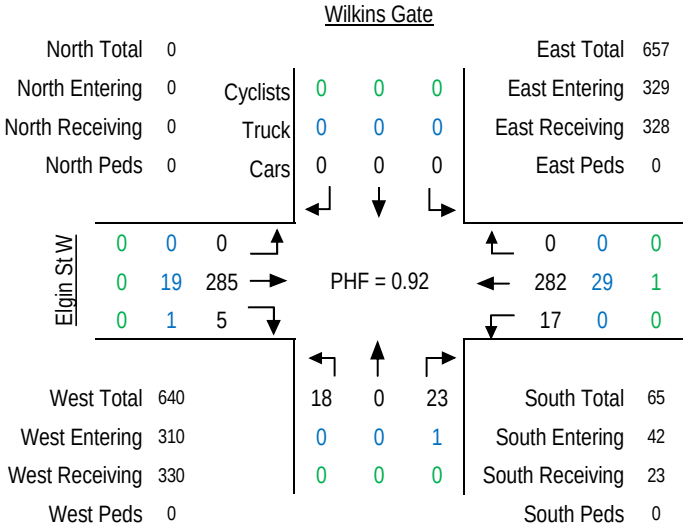
Intersection: Elgin St W & Wilkins Gate

Intersection ID:

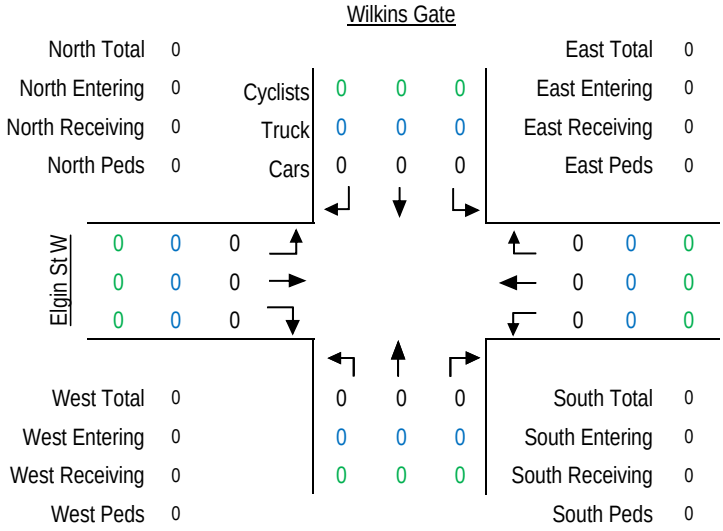
Municipality: Cobourg, Ontario

Date: Wednesday September 16, 2020

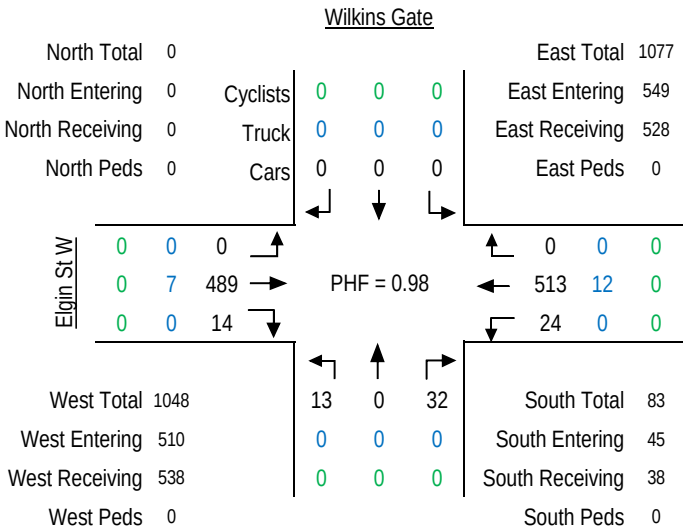
AM Peak Hour: 8:15 to 9:15



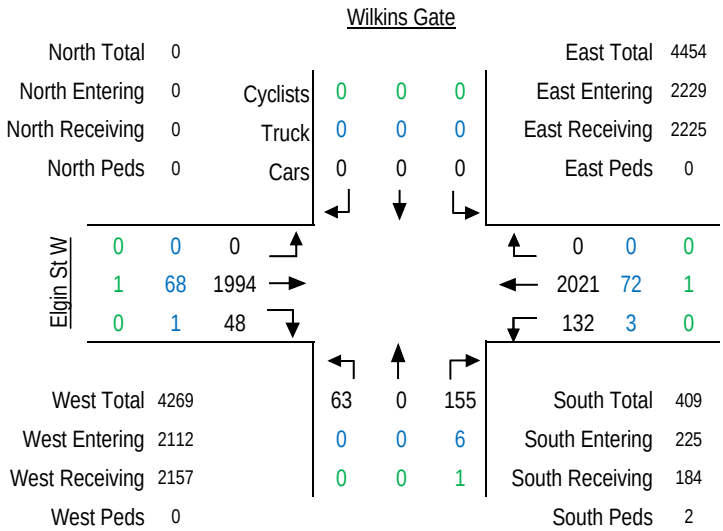
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 5-Hour Count



Turning Movement Count Diagram

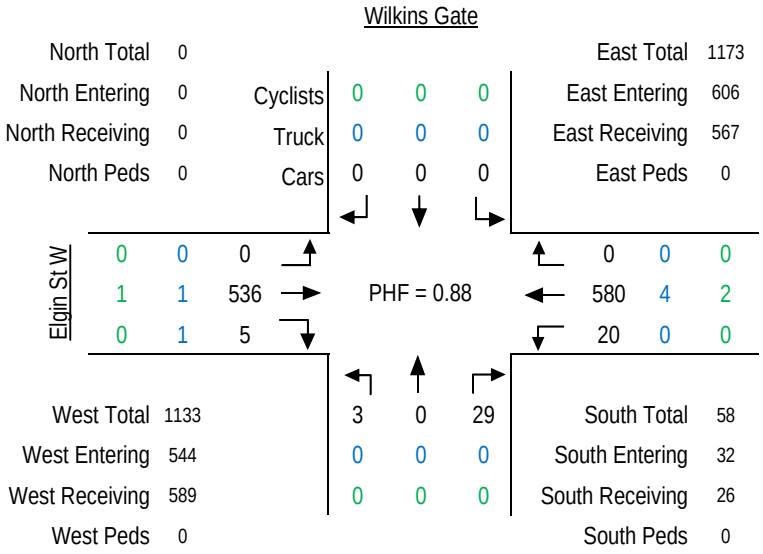
Intersection: Elgin St W & Wilkins Gate

Municipality: Cobourg, Ontario

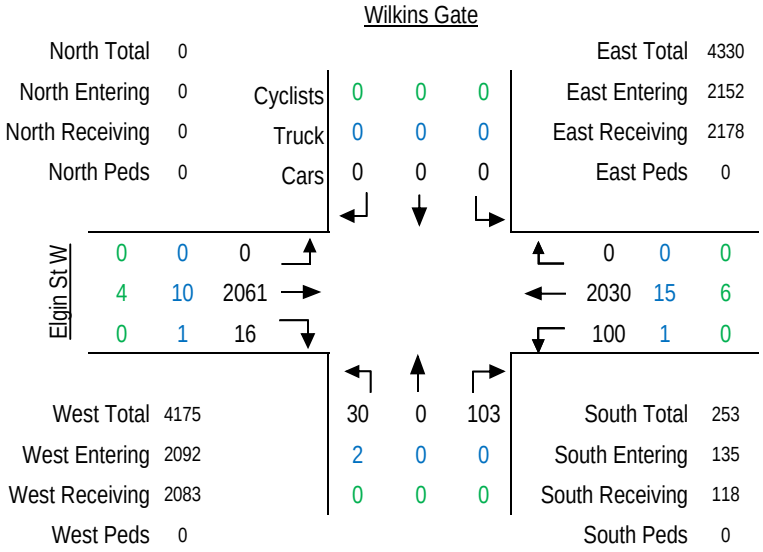
Count Time: 11:00pm - 3:00pm

Date: Saturday September 19, 2020

SAT Peak Hour: 13:00 to 14:00



Total 4-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

Intersection: Elgin St W & Canadian Tire Driveway

Intersection ID:

Municipality: Cobourg, Ontario

Date: Wednesday September 16, 2020

AM Peak Hour: 8:15 to 9:15

Canadian Tire Driveway

North Total	0							East Total	619	
North Entering	0		Cyclists	0	0	0		East Entering	321	
North Receiving	0		Truck	0	0	0		East Receiving	298	
North Peds	0		Cars	0	0	0		East Peds	0	
				0	0	0				
Elgin St W	0	0	0					0	0	0
	0	20	259	PHF = 0.95				265	26	1
	0	1	48					29	0	0
				39	0	18				
West Total	661							South Total	138	
West Entering	328			2	0	1		South Entering	60	
West Receiving	333			0	0	0		South Receiving	78	
West Peds	0							South Peds	1	

MD Peak Hour: - to -

Canadian Tire Driveway

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	
				0	0	0				
Elgin St W	0	0	0					0	0	0
	0	0	0					0	0	0
	0	0	0					0	0	0
				0	0	0				
West Total	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: 15:00 to 16:00

Canadian Tire Driveway

North Total	0							East Total	1058	
North Entering	0		Cyclists	0	0	0		East Entering	532	
North Receiving	0		Truck	0	0	0		East Receiving	526	
North Peds	0		Cars	0	0	0		East Peds	0	
				0	0	0				
Elgin St W	0	0	0					0	0	0
	1	18	472	PHF = 0.9				476	11	0
	1	0	53					44	1	0
				50	0	35				
West Total	1082							South Total	184	
West Entering	545			0	0	0		South Entering	85	
West Receiving	537			0	0	0		South Receiving	99	
West Peds	0							South Peds	0	

Total 5-Hour Count

Canadian Tire Driveway

North Total	0							East Total	4285	
North Entering	0		Cyclists	0	0	0		East Entering	2174	
North Receiving	0		Truck	0	0	0		East Receiving	2111	
North Peds	0		Cars	0	0	0		East Peds	0	
				0	0	0				
Elgin St W	0	0	0					0	0	0
	2	73	1917					1954	64	1
	1	3	237					153	2	0
				227	0	118				
West Total	4483							South Total	746	
West Entering	2233			4	0	1		South Entering	350	
West Receiving	2250			0	0	0		South Receiving	396	
West Peds	0							South Peds	5	

Turning Movement Count Diagram

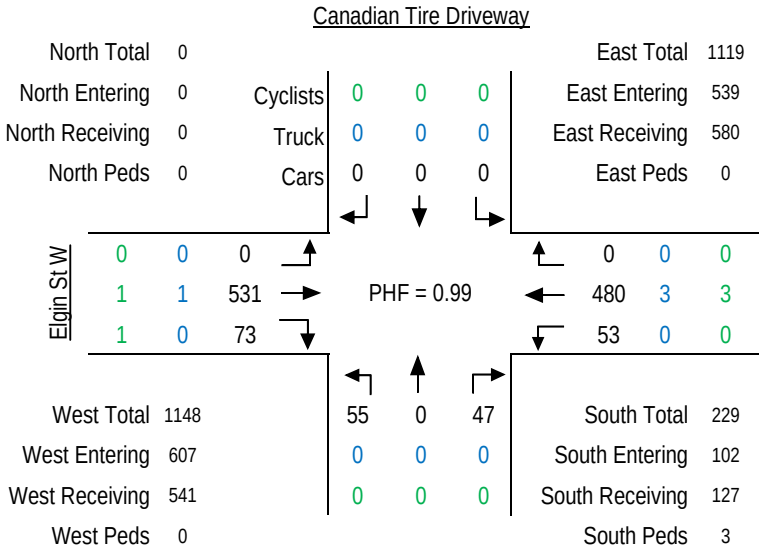
Intersection: Elgin Street West & Canadian Tire Driveway

Municipality: Cobourg, Ontario

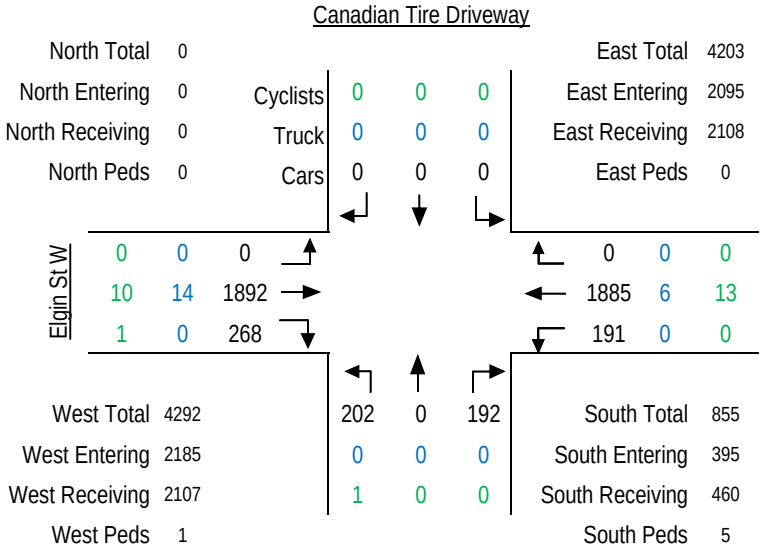
Count Time: 11:00pm - 3:00pm

Date: Saturday September 26, 2020

SAT Peak Hour: 13:15 to 14:15



Total 4-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

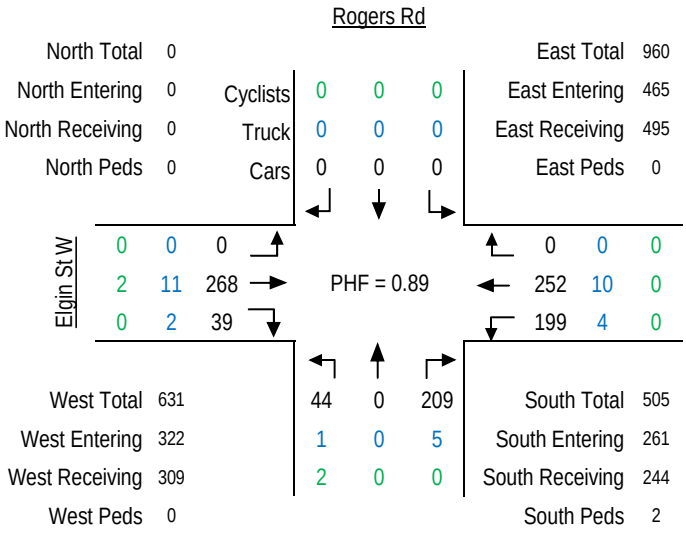
Intersection: Elgin St W & Rogers Rd

Intersection ID:

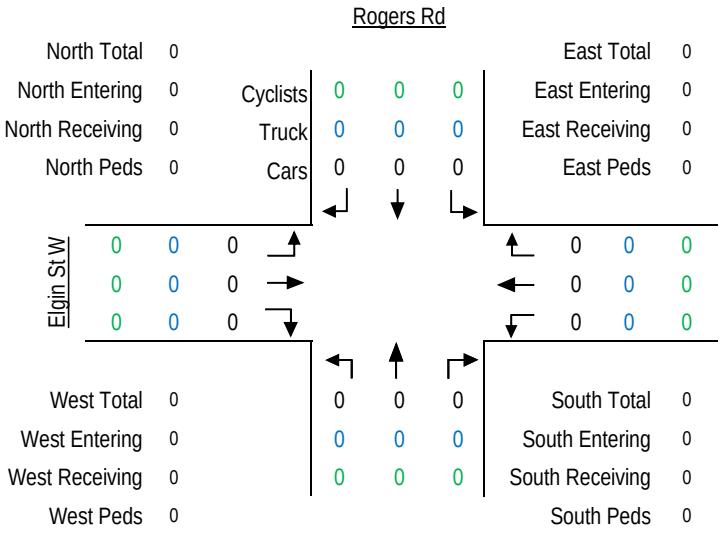
Municipality: Cobourg, Ontario

Date: Wednesday September 16, 2020

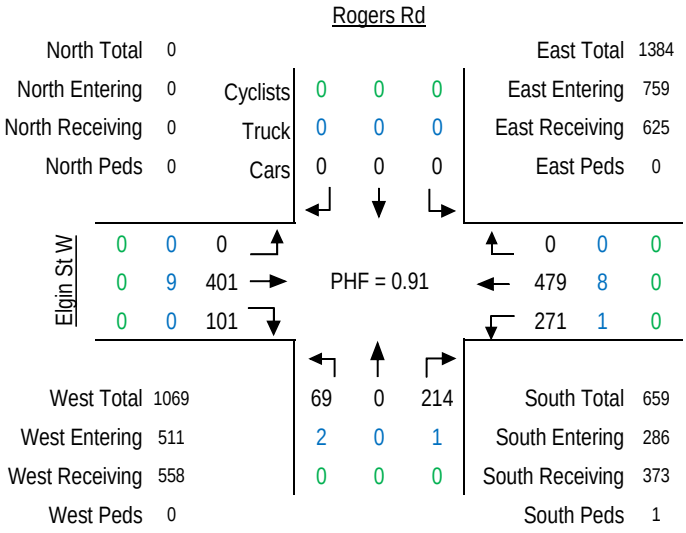
AM Peak Hour: 8:30 to 9:30



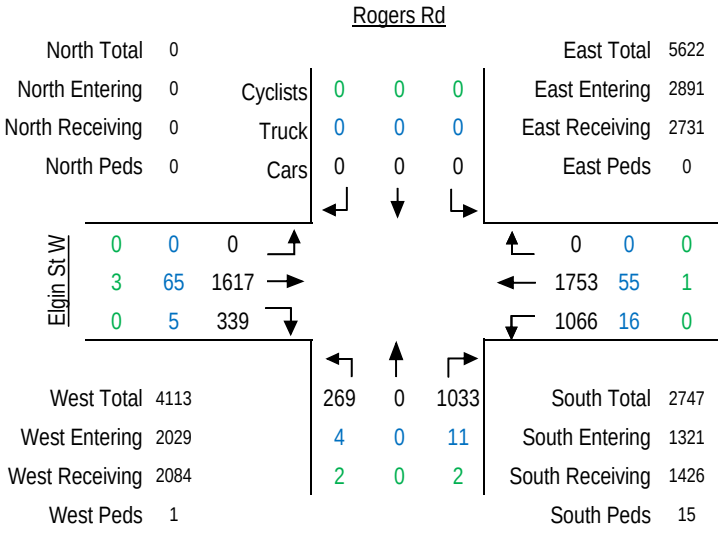
MD Peak Hour: - to -



PM Peak Hour: 15:15 to 16:15



Total 5-Hour Count



Turning Movement Count Diagram

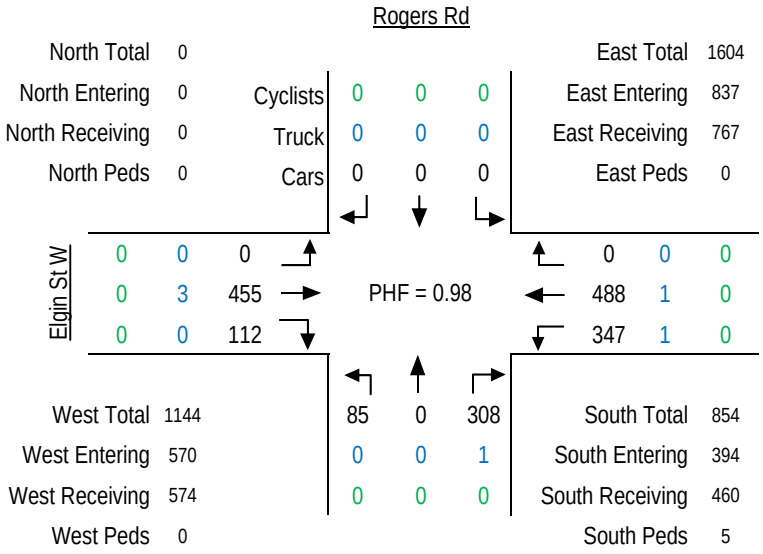
Intersection: Elgin St W & Rogers Rd

Municipality: Cobourg, Ontario

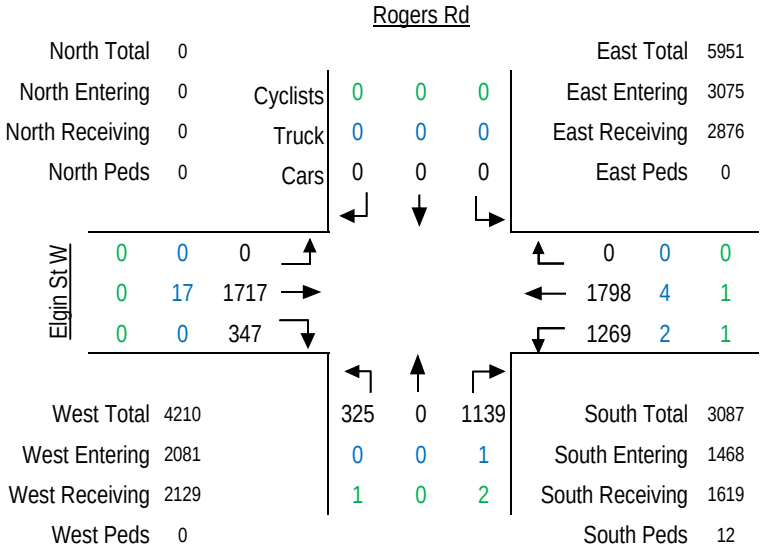
Count Time: 11:00pm - 3:00pm

Date: Saturday September 19, 2020

SAT Peak Hour: 12:00 to 13:00



Total 4-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

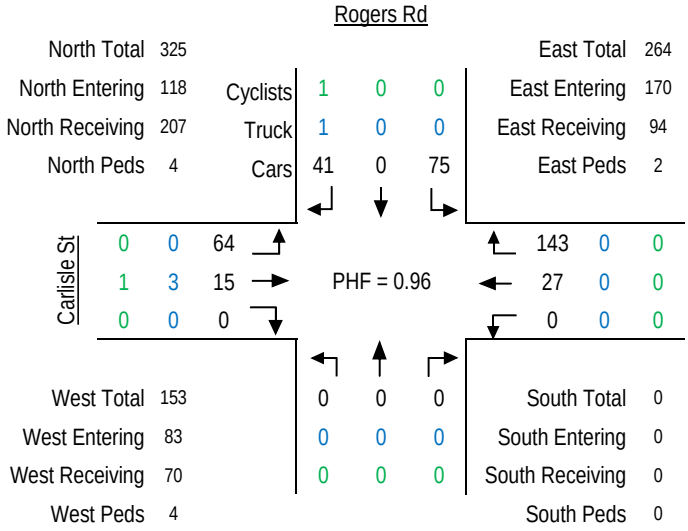
Intersection: Carlisle St & Rogers Rd

Intersection ID:

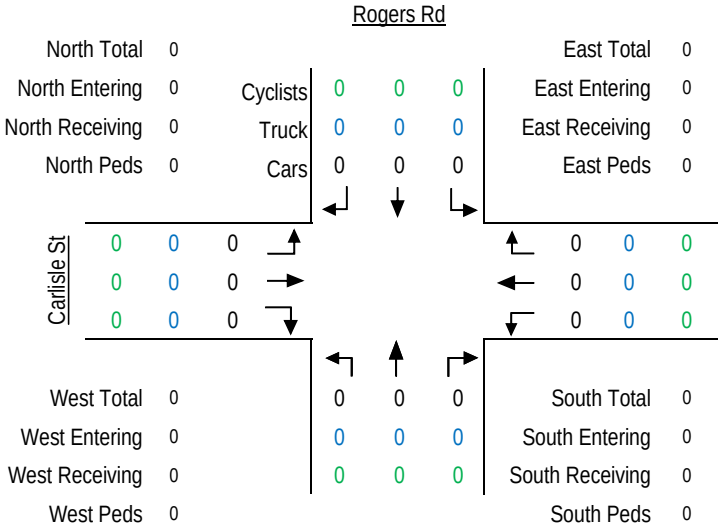
Municipality: Cobourg, Ontario

Date: Wednesday September 16, 2020

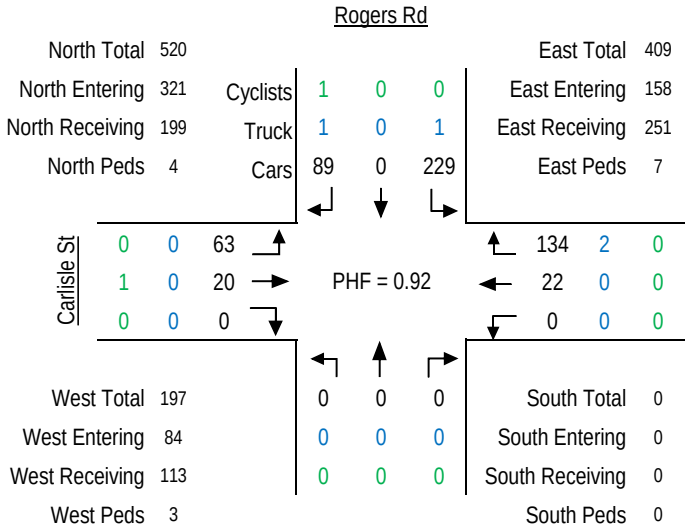
AM Peak Hour: 8:00 to 9:00



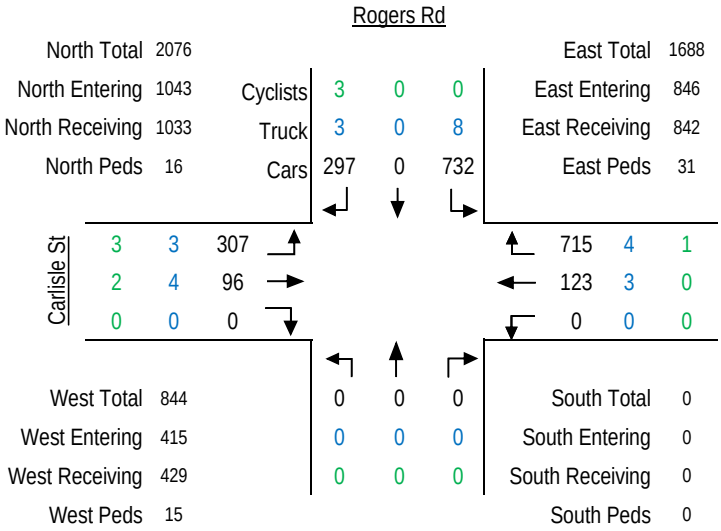
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 5-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

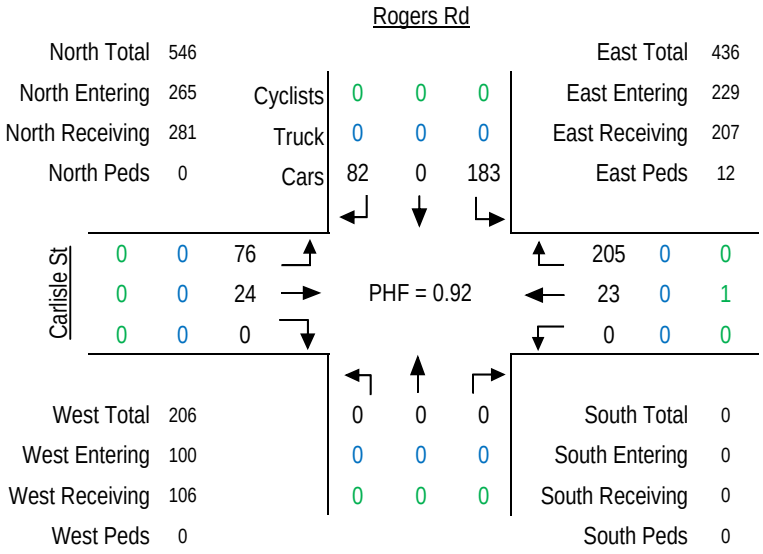
Intersection: Carlisle St & Rogers Rd

Municipality: Cobourg, Ontario

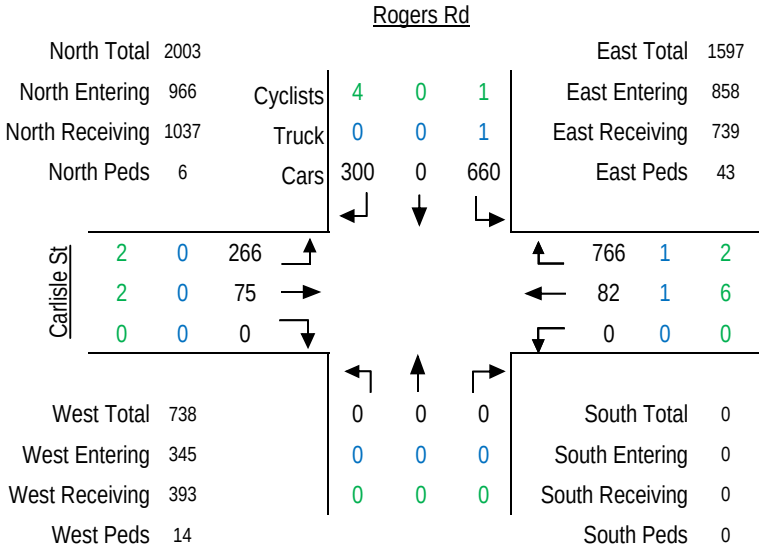
Count Time: 11:00pm - 3:00pm

Date: Saturday September 19, 2020

SAT Peak Hour: 12:30 to 13:30



Total 4-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

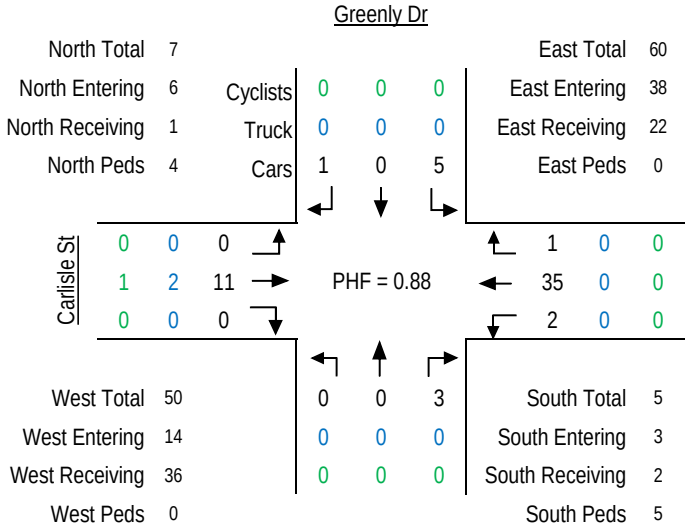
Intersection: Carlisle St & Greenly Dr

Intersection ID:

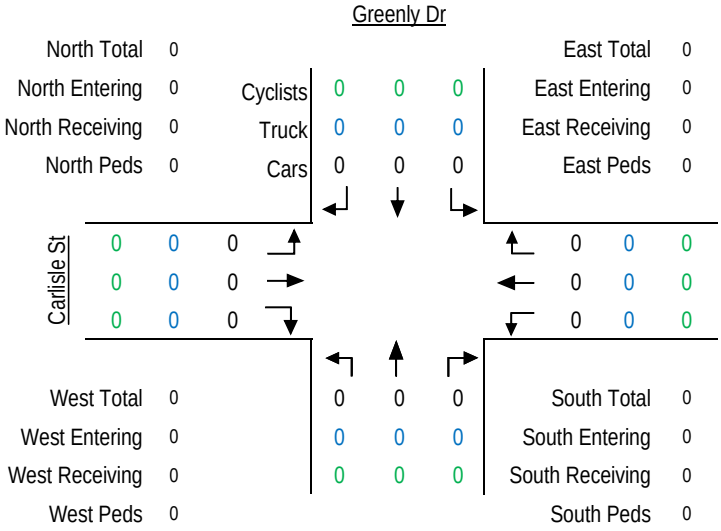
Municipality: Cobourg, Ontario

Date: Wednesday September 16, 2020

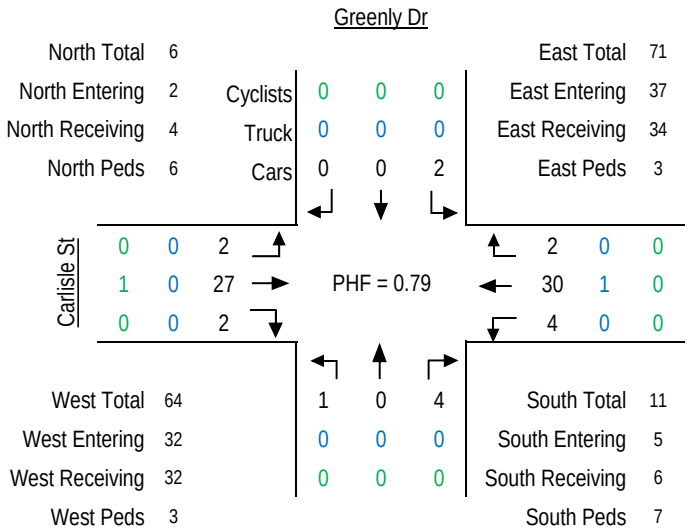
AM Peak Hour: 8:00 to 9:00



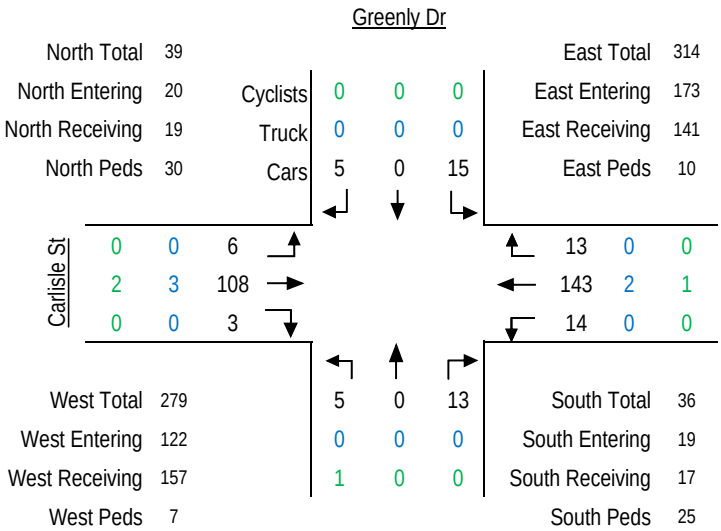
MD Peak Hour: - to -



PM Peak Hour: 16:00 to 17:00



Total 5-Hour Count



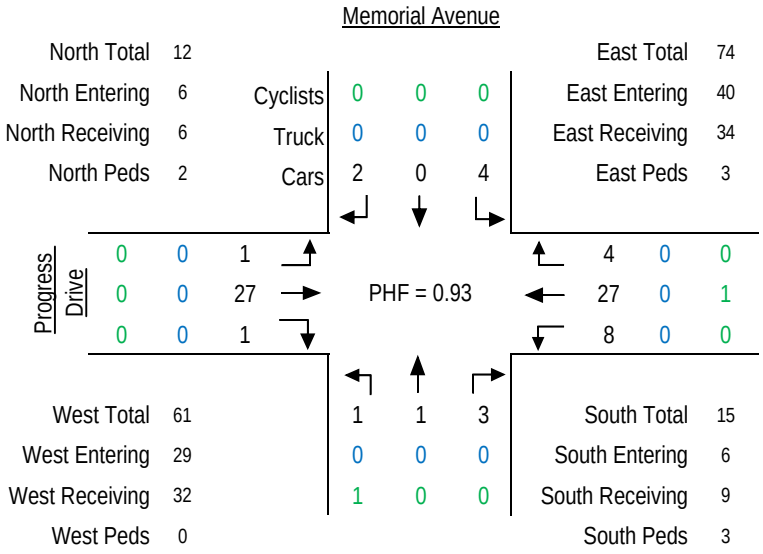
TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

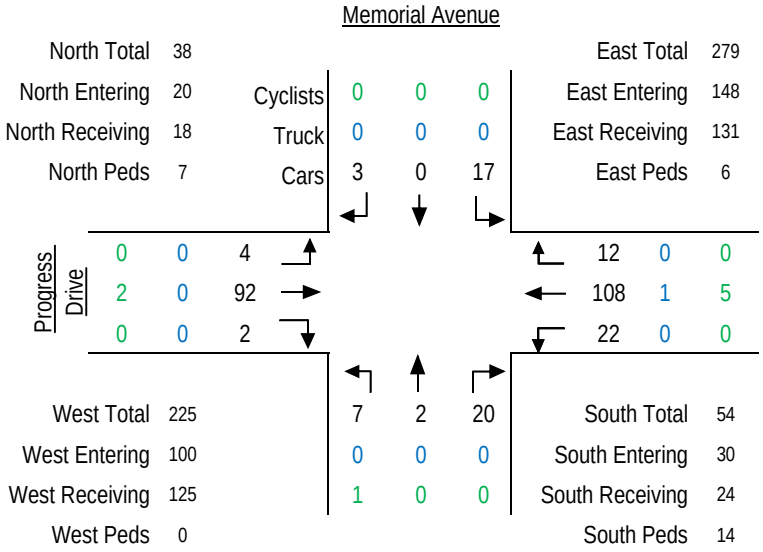
Intersection: Carlisle St & Greenly Dr
Municipality: Cobourg, Ontario

Count Time: 11:00pm - 3:00pm
Date: Saturday September 19, 2020

SAT Peak Hour: 12:45 to 13:45



Total 4-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

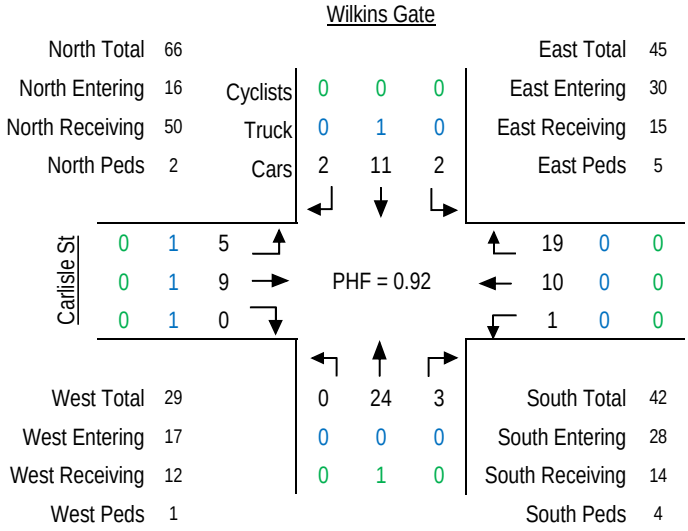
Intersection: Carlisle St & Wilkins Gate

Intersection ID:

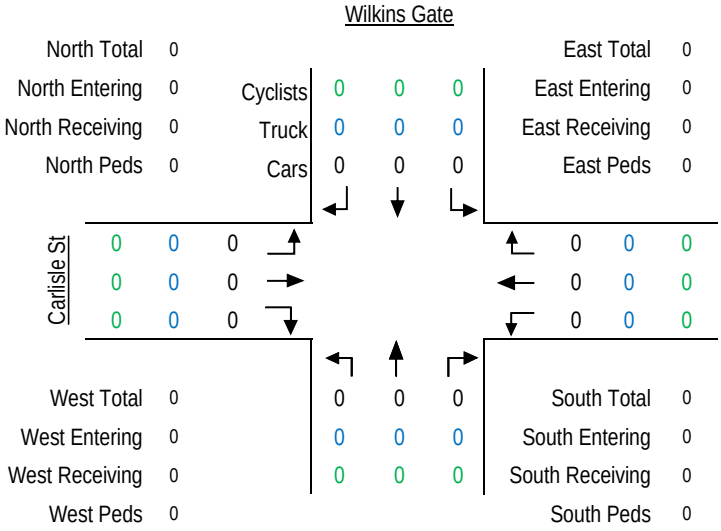
Municipality: Cobourg, Ontario

Date: Wednesday September 16, 2020

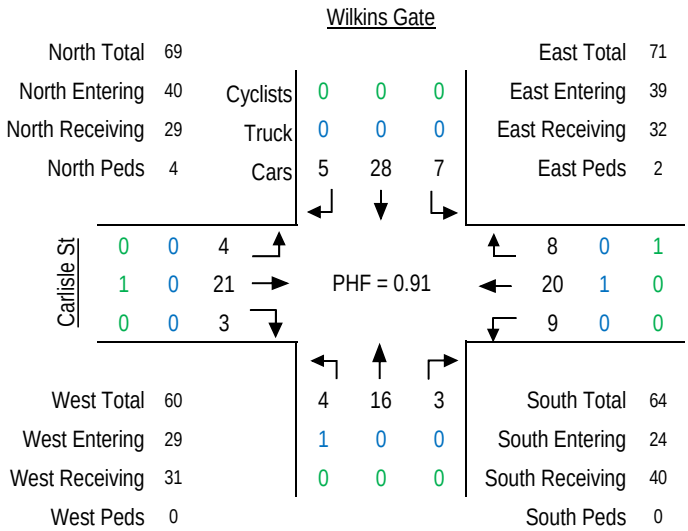
AM Peak Hour: 7:30 to 8:30



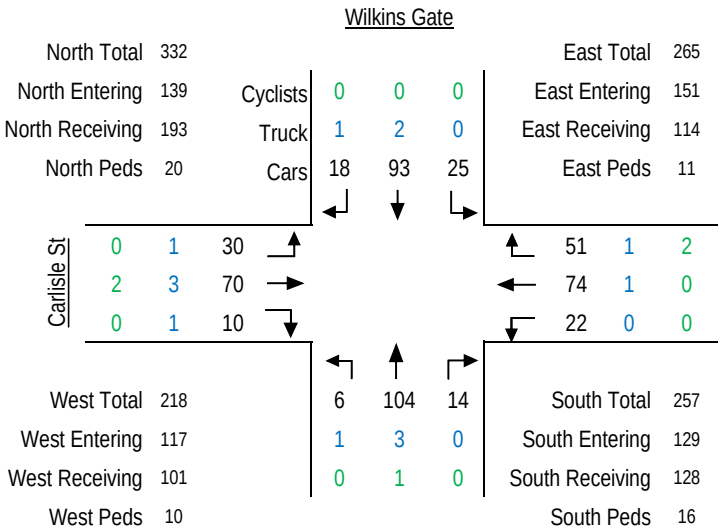
MD Peak Hour: - to -



PM Peak Hour: 15:30 to 16:30



Total 5-Hour Count



TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

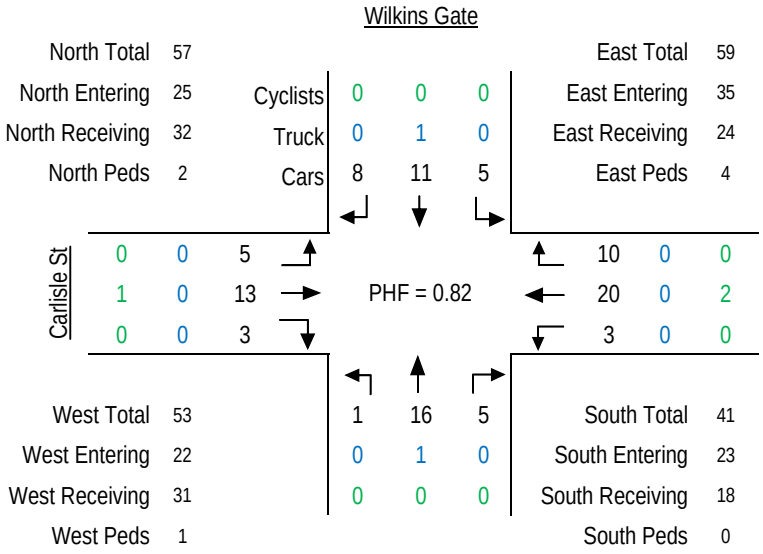
Intersection: Carlisle St & Wilkins Gate

Municipality: Cobourg, Ontario

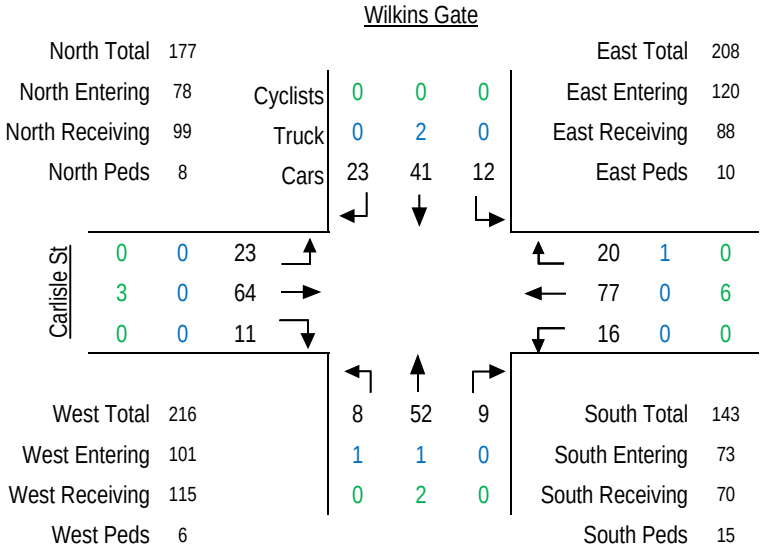
Count Time: 11:00pm - 3:00pm

Date: Saturday September 19, 2020

SAT Peak Hour: 11:15 to 12:15



Total 4-Hour Count



Programmed EPAC Data

5/30/200
10:13:40P

Intersection Name: Elgin and Northumberland Mall **Intersection Alias: 100**

Access Code: 9999 Channel: 5 Address: 0 Revision: 3.30d

Access Data

Port 2 Comm :1200 Baud
Port 3 Comm :1200 Baud

Phase Data

Vehical Basic Timings

Phase	Min_Grn	Passage	Max1	Max2	Yellow	All Red
2	20	5.0	45	45	4.1	2.1
4	8	5.0	15	15	4.1	2.4
6	20	5.0	45	45	4.1	2.1

Vehical Density Timings

Added Initial	Max_Initial	Time B4 Reduction	Cars Before Reduction	Time To Reduce	Min_Gap
0.0	0	0	0	0	0.0
0.0	0	0	0	0	0.0
0.0	0	0	0	0	0.0

Pedestrian Timing

Phase	Walk	Ped Clear	Flashing Walk	Extended Ped Clear	Actuated Rest in Walk
2	10	15	No	0	Yes
4	0	0	No	0	No
6	10	15	No	0	Yes

General Control

Initialize	Non-Act Response	Veh Recall	Ped Recall	Recall Delay
Yellow	NonActI	Max	Non	0
Inactive	None	None	None	0
Yellow	NonActI	Max	Non	0

Miscellaneous

Non Lock	Dual Entry	Last Car Passage	Conditional Service	No Simultaneous Gap Out
Yes	Yes	No	No	No
Yes	Yes	No	No	No
No	Yes	No	No	No

Special Sequence
Default Data

Vehical Detector Phase Assignment

Assigned Phase	Mode	Switched Phase	Extend	Delay

Default Data

Pedestrian Detector
Default Data

Special Detector Phase Assignment

Assign Phase	Mode	Switched Phase	Extend	Delay

Default Data

Unit Data

General Control

Startup Time: 5sec Startup State: Flash Red Revert: 4sec
Auto Ped Clear: Yes Stop Time Reset: No Alternate Sequence: 0
ABC connector Input Modes: 0
ABC connector Output Modes: 0
D connector Input Modes: 0
D connector Output Modes: 0

Ring	Input Respons	Output Selection
1	Ring 1	Ring 1
2	Ring 2	Ring 2
3	None	None
4	None	None

Remote Flash
Test A = Flash

Phase	Flash Entry Phase	Flash Exit Phase

Default Data - No Flash

Channel	Flash Color	Flash Alternat

Default Data - No Flash

Overlaps

Overlaps

Phase(s)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Trail Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trail Yellow	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Trail Red	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Plus Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minus Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ring

Phase	Ring	Next Phase
2	1	3
4	1	1
6	2	7

Concurrent Phases

Phase(s)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1	2	3	4	1	1	3	3	9	1	1	1	1	1	1	1
	5	5	7	7	2	2	4	4								
	6	6	8	8	5	6	7	8								

APPENDIX B

County Road 2 Class EA, Excerpts

lane per direction. The annual growth rate used is 1.8% to reflect average growth based on the observed traffic patterns.

2.1.3 Future Conditions

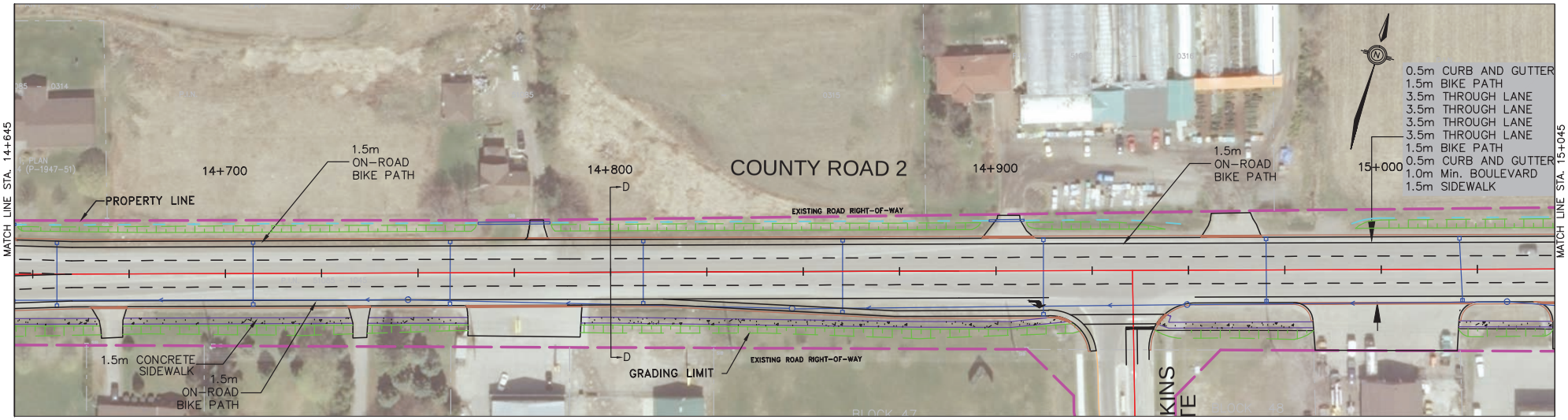
The future traffic conditions were forecast for 2021 and 2031. Using the same methodology for existing conditions and applying a growth rate of 1.8% per annum, future traffic volumes were forecast and analyzed. The 1.8% per annum growth rate was modelled based on existing travel demand on County Road 2, which is considered a more representative estimate for the study corridor than using aggregated population forecasts for the entire County.

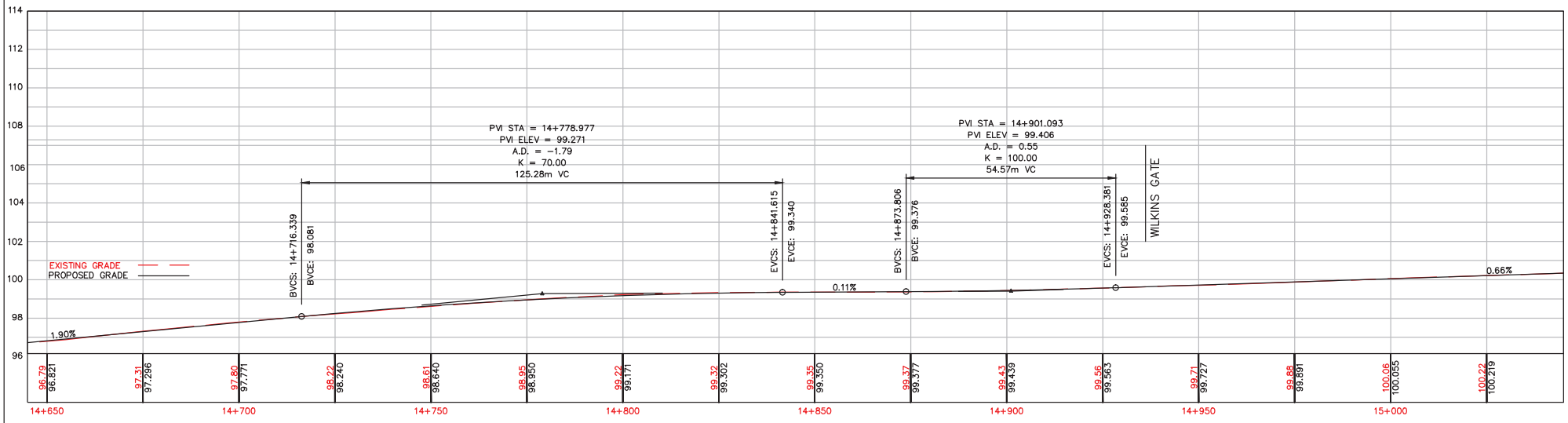
2.1.3.1 2031 AADT Forecasts

With 1.8% growth rate maintained over the next 20 years, the AADT traffic will increase by 175% and County Road 2 will approach the 0.85 volume to capacity threshold in the PM peak period from 2:00PM to 4:00PM. This is shown in **Table 2-2**.

2.1.3.2 2031 SADT Forecasts

The assessment of the SADT traffic reveals a similar pattern. A 1.8% growth rate was applied to the SADT conditions for the 2031 traffic forecast as presented in **Table 2-3**. The 2031 summer traffic forecast shows deterioration in traffic performance. County Road 2 will be congested in the afternoon peak period from 12:00 to 4:00 PM with the volume to capacity ratios reaching 0.88, which just exceeds the 0.85 threshold at the end of the 20 year horizon.





LEGEND

- Ditch
- Grassed Swales
- New Culvert
- Existing Storm Sewer
- Rip Rap
- Proposed Storm Sewer & Manhole
- Catchbasin
- Property Requirement
- Impacted Utility
- Dropped Curb
- Paved Shoulder
- Multi-Use Trail
- Curb and Gutter

No.	DATE	REVISIONS	BY

SCALES
5m 0 10m Horizontal
1m 0 2m Vertical

Northumberland county

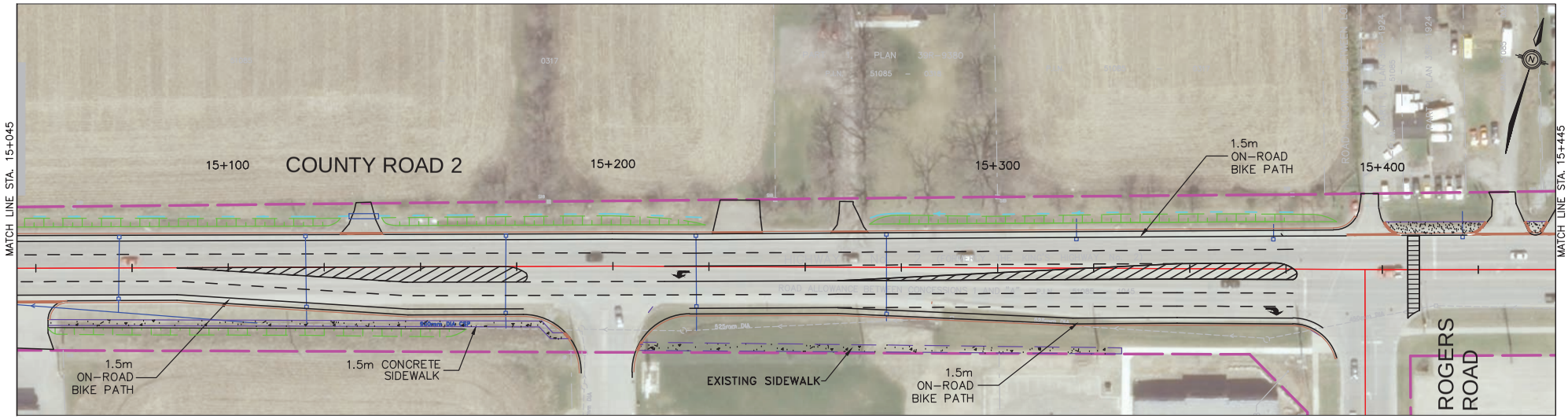
HDR

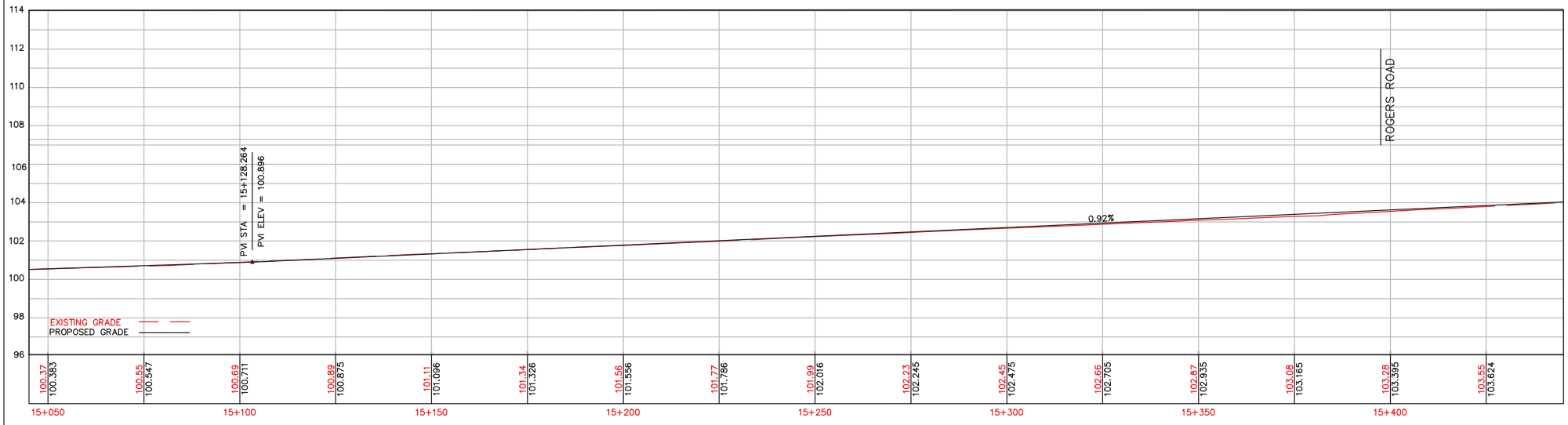
DESIGN	Y.P
DRAWN	Y.C
CHECKED	A.R

CONCEPTUAL DESIGN

County Road 2 Class EA
Hamilton Rd to William St

PLATE NO. 13





LEGEND

- Ditch
- Grassed Swales
- New Culvert
- Existing Storm Sewer
- Rip Rap
- Proposed Storm Sewer & Manhole
- Catchbasin
- Property Requirement
- Impacted Utility
- Dropped Curb
- Paved Shoulder
- Multi-Use Trail
- Curb and Gutter

No.	DATE	REVISIONS	BY

SCALES
5m 0 10m Horizontal
1m 0 2m Vertical

Northumberland county

HDR

DESIGN	P.Y
DRAWN	Y.C
CHECKED	A.R

CONCEPTUAL DESIGN

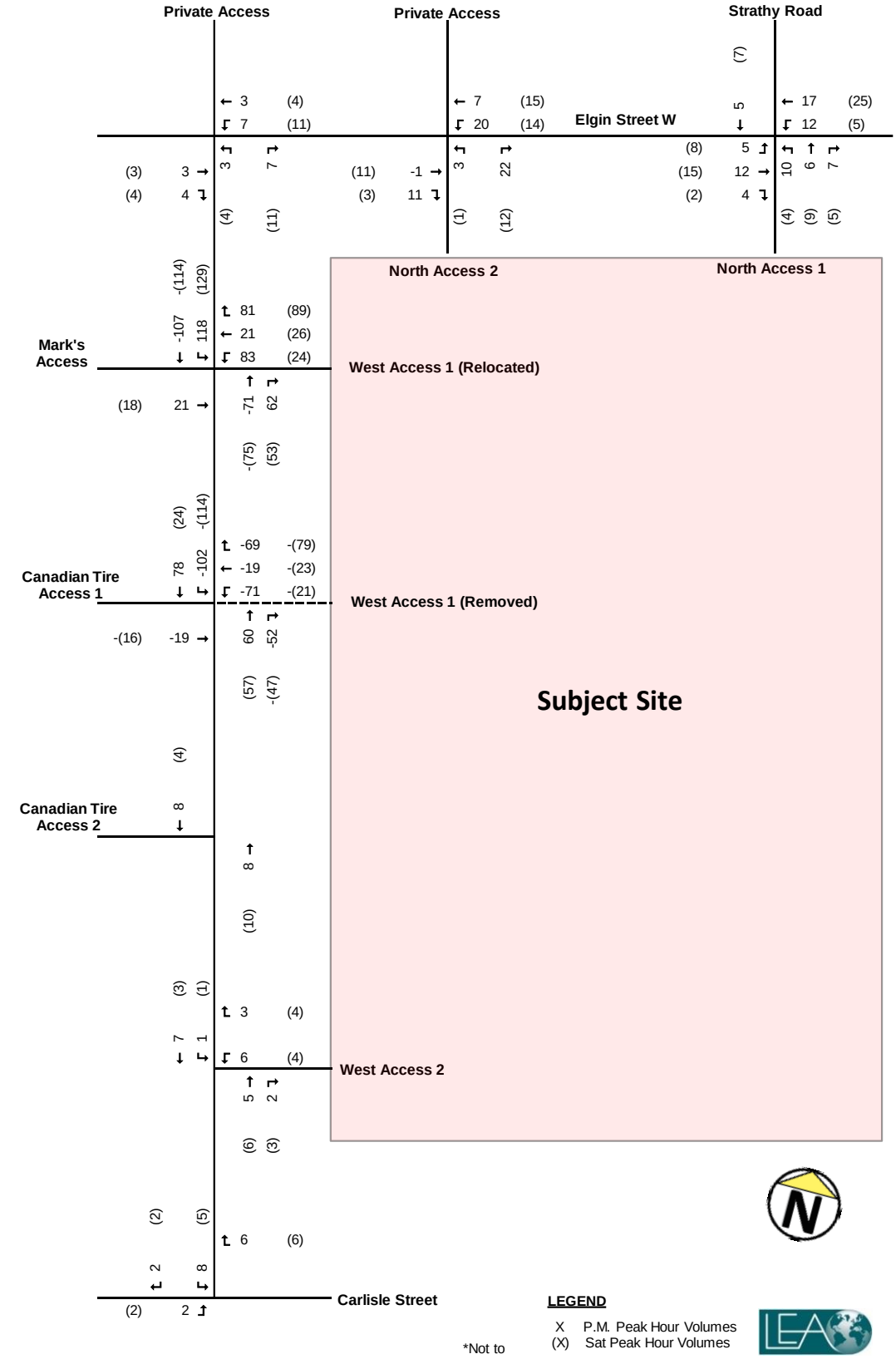
County Road 2 Class EA
Hamilton Rd to William St

PLATE NO. 14

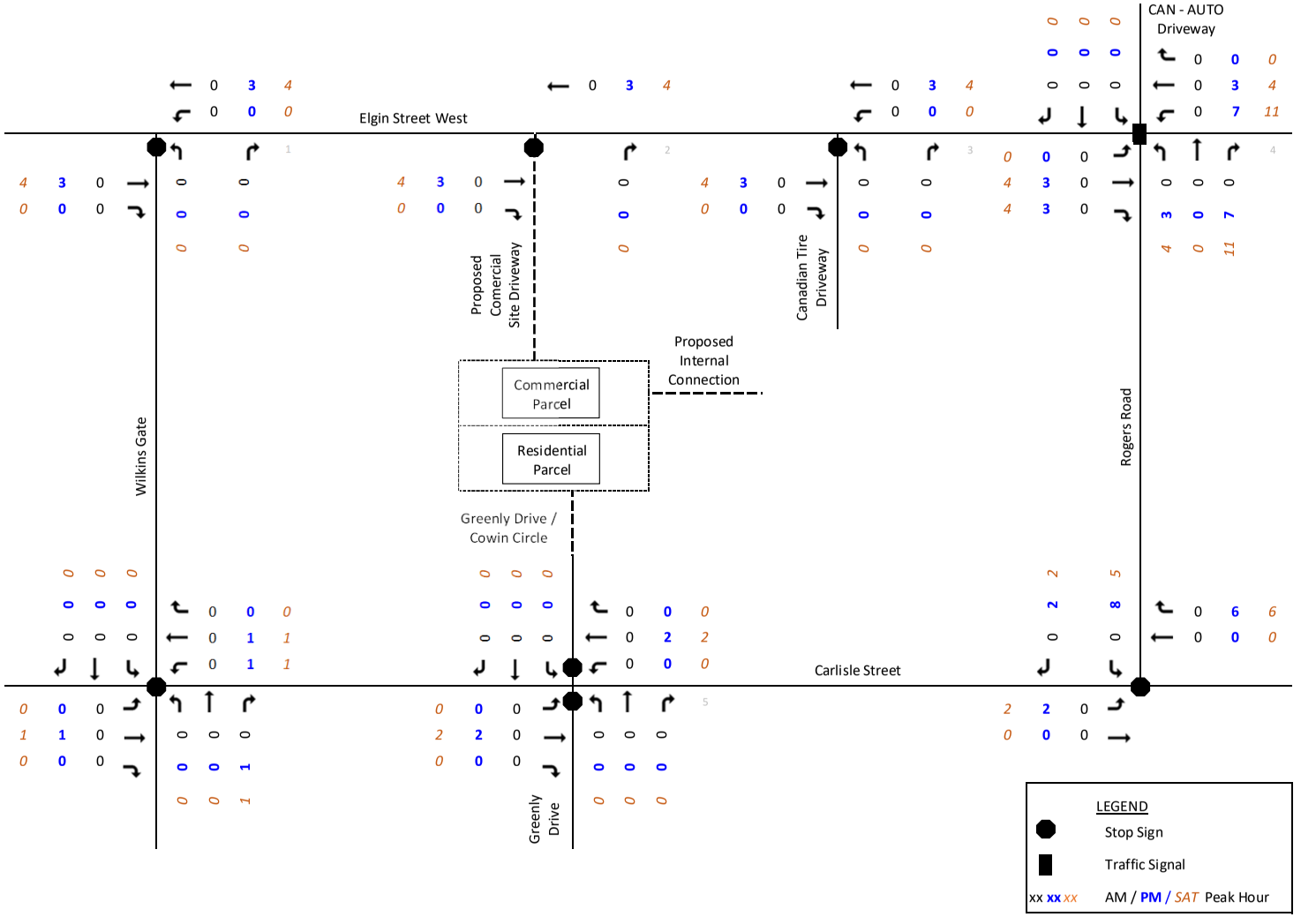
APPENDIX C

Background Development Information

Figure 4.2: Net Site Traffic



DEV 1 – Proposed Driveway Relocation and Commercial Addition, Northumberland Mall, Town of Cobourg



Source: Figure 4.2 of Transportation Impact Study, Proposed Driveway Relocation and Commercial Addition, Northumberland Mall, Town of Cobourg, dated July 17th, 2019; prepared by LEA Consulting Ltd.

Note: The weekday AM peak hour volumes were unavailable from the study prepared by LEA Consulting Ltd., thus the development was assumed to have negligible traffic impacts during the weekday AM peak hour

APPENDIX D

Capacity Analysis Sheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	423	8	24	432	25	33
Future Volume (Veh/h)	423	8	24	432	25	33
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)	460	9	26	470	27	36
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			469		752	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			469		752	234
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	95
cM capacity (veh/h)			1103		342	761

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	307	162	183	313	27	36
Volume Left	0	0	26	0	27	0
Volume Right	0	9	0	0	0	36
cSH	1700	1700	1103	1700	342	761
Volume to Capacity	0.18	0.10	0.02	0.18	0.08	0.05
Queue Length 95th (m)	0.0	0.0	0.6	0.0	2.0	1.2
Control Delay (s)	0.0	0.0	1.4	0.0	16.4	10.0
Lane LOS			A		C	A
Approach Delay (s)	0.0		0.5		12.7	
Approach LOS					B	

Intersection Summary					
Average Delay	1.0				
Intersection Capacity Utilization	37.9%	ICU Level of Service	A		
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	437	0	0	445	0	0
Future Volume (Veh/h)	437	0	0	445	0	0
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)	475	0	0	484	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			475		717	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			475		717	238
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1098		369	770

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	238	238	0	242	242	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.14	0.14	0.00	0.14	0.14	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		0.0
Approach LOS						A

Intersection Summary					
Average Delay	0.0				
Intersection Capacity Utilization	15.6%	ICU Level of Service	A		
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	388	49	29	404	41	19
Future Volume (Veh/h)	388	49	29	404	41	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	408	52	31	425	43	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked						
vC, conflicting volume			460		708	230
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			460		708	230
tC, single (s)			4.1		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		88	97
cM capacity (veh/h)			1112		352	763

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	272	188	31	212	212	43	20
Volume Left	0	0	31	0	0	43	0
Volume Right	0	52	0	0	0	0	20
cSH	1700	1700	1112	1700	1700	352	763
Volume to Capacity	0.16	0.11	0.03	0.13	0.13	0.12	0.03
Queue Length 95th (m)	0.0	0.0	0.7	0.0	0.0	3.3	0.6
Control Delay (s)	0.0	0.0	8.3	0.0	0.0	16.6	9.8
Lane LOS			A			C	A
Approach Delay (s)	0.0		0.6			14.5	
Approach LOS						B	

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	29.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	388	57	282	364	63	297
Future Volume (vph)	388	57	282	364	63	297
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.19	0.06	0.53	0.18	0.30	0.67
Control Delay	4.5	1.4	9.7	4.4	26.9	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	1.4	9.7	4.4	26.9	10.8
LOS	A	A	A	A	C	B
Approach Delay	4.1			6.7	13.6	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 7.6		Intersection LOS: A	
Intersection Capacity Utilization 55.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	388	57	282	364	63	297
Future Volume (vph)	388	57	282	364	63	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3433	1521	1750	3433	1750	1566
Flt Permitted	1.00	1.00	0.50	1.00	0.95	1.00
Satd. Flow (perm)	3433	1521	919	3433	1750	1566
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	436	64	317	409	71	334
RTOR Reduction (vph)	0	22	0	0	0	288
Lane Group Flow (vph)	436	42	317	409	71	46
Heavy Vehicles (%)	4%	5%	2%	4%	2%	2%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.1	39.1	39.1	39.1	8.2	8.2
Effective Green, g (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2237	991	598	2237	239	214
v/s Ratio Prot	0.13			0.12	c0.04	
v/s Ratio Perm		0.03	c0.35			0.03
v/c Ratio	0.19	0.04	0.53	0.18	0.30	0.21
Uniform Delay, d1	4.2	3.7	5.6	4.1	23.3	23.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	3.3	0.2	0.7	0.5
Delay (s)	4.4	3.8	8.9	4.3	24.0	23.5
Level of Service	A	A	A	A	C	C
Approach Delay (s)	4.3			6.3	23.6	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	55.8%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	89	25	38	199	104	58
Future Volume (vph)	89	25	38	199	104	58
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	93	26	40	207	108	60

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	119	247	168
Volume Left (vph)	93	0	108
Volume Right (vph)	0	207	60
Hadj (s)	0.22	-0.50	-0.07
Departure Headway (s)	4.8	4.0	4.6
Degree Utilization, x	0.16	0.27	0.22
Capacity (veh/h)	708	864	728
Control Delay (s)	8.7	8.4	8.9
Approach Delay (s)	8.7	8.4	8.9
Approach LOS	A	A	A

Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	39.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	18	0	3	49	1	0	0	4	7	0	1
Future Volume (Veh/h)	0	18	0	3	49	1	0	0	4	7	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	20	0	3	56	1	0	0	5	8	0	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)												
pX, platoon unblocked												
vC, conflicting volume	57			20			84	83	20	88	82	56
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			20			84	83	20	88	82	56
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1560			1609			906	810	1064	897	810	1016

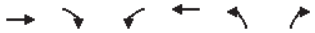
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	60	5	9
Volume Left	0	3	0	8
Volume Right	0	1	5	1
cSH	1560	1609	1064	909
Volume to Capacity	0.00	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.1	0.2
Control Delay (s)	0.0	0.4	8.4	9.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.4	8.4	9.0
Approach LOS			A	A

Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			17.9%		ICU Level of Service				A			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	14	1	1	14	26	0	33	4	3	17	3
Future Volume (vph)	8	14	1	1	14	26	0	33	4	3	17	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	15	1	1	15	28	0	36	4	3	18	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	25	44	40	24
Volume Left (vph)	9	1	0	3
Volume Right (vph)	1	28	4	3
Hadj (s)	0.32	-0.38	-0.06	0.05
Departure Headway (s)	4.4	3.7	4.0	4.1
Degree Utilization, x	0.03	0.05	0.04	0.03
Capacity (veh/h)	800	954	871	850
Control Delay (s)	7.5	6.9	7.2	7.3
Approach Delay (s)	7.5	6.9	7.2	7.3
Approach LOS	A	A	A	A

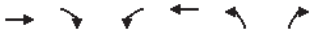
Intersection Summary												
Delay			7.2									
Level of Service			A									
Intersection Capacity Utilization			15.8%		ICU Level of Service				A			
Analysis Period (min)			15									



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	565	16	27	599	15	36
Future Volume (Veh/h)	565	16	27	599	15	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	577	16	28	611	15	37
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			593		946	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			593		946	296
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		94	95
cM capacity (veh/h)			993		256	706

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	385	208	232	407	15	37
Volume Left	0	0	28	0	15	0
Volume Right	0	16	0	0	0	37
cSH	1700	1700	993	1700	256	706
Volume to Capacity	0.23	0.12	0.03	0.24	0.06	0.05
Queue Length 95th (m)	0.0	0.0	0.7	0.0	1.5	1.3
Control Delay (s)	0.0	0.0	1.3	0.0	19.9	10.4
Lane LOS			A		C	B
Approach Delay (s)	0.0		0.5		13.1	
Approach LOS					B	

Intersection Summary					
Average Delay		0.8			
Intersection Capacity Utilization		46.4%	ICU Level of Service		A
Analysis Period (min)		15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	612	0	0	605	0	0
Future Volume (Veh/h)	612	0	0	605	0	0
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)	665	0	0	658	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			665		994	332
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			665		994	332
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			934		245	669

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	332	332	0	329	329	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.20	0.20	0.00	0.19	0.19	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		0.0
Approach LOS						A

Intersection Summary					
Average Delay		0.0			
Intersection Capacity Utilization		20.3%	ICU Level of Service		A
Analysis Period (min)		15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	559	53	45	555	50	35
Future Volume (Veh/h)	559	53	45	555	50	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	621	59	50	617	56	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked					1.00	
vC, conflicting volume			680		1059	340
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			680		1051	340
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		74	94
cM capacity (veh/h)			908		212	662

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	414	266	50	308	308	56	39
Volume Left	0	0	50	0	0	56	0
Volume Right	0	59	0	0	0	0	39
cSH	1700	1700	908	1700	1700	212	662
Volume to Capacity	0.24	0.16	0.06	0.18	0.18	0.26	0.06
Queue Length 95th (m)	0.0	0.0	1.4	0.0	0.0	8.2	1.5
Control Delay (s)	0.0	0.0	9.2	0.0	0.0	27.9	10.8
Lane LOS			A			D	B
Approach Delay (s)	0.0		0.7			20.9	
Approach LOS						C	

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	467	115	310	555	81	245
Future Volume (vph)	467	115	310	555	81	245
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.23	0.12	0.60	0.27	0.37	0.60
Control Delay	4.6	1.2	11.8	4.8	28.4	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	1.2	11.8	4.8	28.4	9.9
LOS	A	A	B	A	C	A
Approach Delay	4.0			7.3	14.5	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 7.5		Intersection LOS: A	
Intersection Capacity Utilization 56.3%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	467	115	310	555	81	245
Future Volume (vph)	467	115	310	555	81	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1597	1785	3500	1733	1597
Flt Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	3500	1597	869	3500	1733	1597
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	513	126	341	610	89	269
RTOR Reduction (vph)	0	44	0	0	0	232
Lane Group Flow (vph)	513	82	341	610	89	37
Heavy Vehicles (%)	2%	0%	0%	2%	3%	0%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.0	39.0	39.0	39.0	8.3	8.3
Effective Green, g (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2275	1038	564	2275	239	220
v/s Ratio Prot	0.15			0.17	c0.05	
v/s Ratio Perm		0.05	c0.39			0.02
v/c Ratio	0.23	0.08	0.60	0.27	0.37	0.17
Uniform Delay, d1	4.3	3.9	6.1	4.5	23.5	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	4.8	0.3	1.0	0.4
Delay (s)	4.5	4.0	10.8	4.7	24.5	23.2
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.4			6.9	23.5	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	56.3%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	81	26	28	174	294	115
Future Volume (vph)	81	26	28	174	294	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	88	28	30	189	320	125

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	116	219	445
Volume Left (vph)	88	0	320
Volume Right (vph)	0	189	125
Hadj (s)	0.15	-0.50	-0.02
Departure Headway (s)	5.5	4.7	4.7
Degree Utilization, x	0.18	0.29	0.58
Capacity (veh/h)	596	702	727
Control Delay (s)	9.7	9.6	14.1
Approach Delay (s)	9.7	9.6	14.1
Approach LOS	A	A	B

Intersection Summary				
Delay	12.2			
Level of Service	B			
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	3	35	3	5	40	3	1	0	5	3	0	0
Future Volume (Veh/h)	3	35	3	5	40	3	1	0	5	3	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	4	44	4	6	51	4	1	0	6	4	0	0
Pedestrians								2			2	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	57			50			121	125	48	127	125	55
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			50			121	125	48	127	125	55
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1558			1567			851	762	1025	839	762	1016

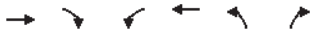
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	52	61	7	4
Volume Left	4	6	1	4
Volume Right	4	4	6	0
cSH	1558	1567	996	839
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.1	0.2	0.1
Control Delay (s)	0.6	0.7	8.6	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	0.6	0.7	8.6	9.3
Approach LOS			A	A

Intersection Summary					
Average Delay	1.4				
Intersection Capacity Utilization	14.3%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	27	4	12	27	10	6	20	4	9	36	6
Future Volume (vph)	5	27	4	12	27	10	6	20	4	9	36	6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	5	30	4	13	30	11	7	22	4	10	40	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	39	54	33	57
Volume Left (vph)	5	13	7	10
Volume Right (vph)	4	11	4	7
Hadj (s)	-0.04	-0.03	0.04	-0.04
Departure Headway (s)	4.1	4.1	4.2	4.1
Degree Utilization, x	0.04	0.06	0.04	0.06
Capacity (veh/h)	849	852	826	855
Control Delay (s)	7.3	7.4	7.4	7.4
Approach Delay (s)	7.3	7.4	7.4	7.4
Approach LOS	A	A	A	A

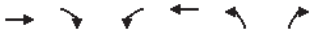
Intersection Summary					
Delay	7.4				
Level of Service	A				
Intersection Capacity Utilization	14.7%	ICU Level of Service		A	
Analysis Period (min)	15				



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	537	6	20	584	3	29
Future Volume (Veh/h)	537	6	20	584	3	29
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	610	7	23	664	3	33
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			617		992	308
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			617		992	308
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	95
cM capacity (veh/h)			973		241	693

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	407	210	244	443	3	33
Volume Left	0	0	23	0	3	0
Volume Right	0	7	0	0	0	33
cSH	1700	1700	973	1700	241	693
Volume to Capacity	0.24	0.12	0.02	0.26	0.01	0.05
Queue Length 95th (m)	0.0	0.0	0.6	0.0	0.3	1.2
Control Delay (s)	0.0	0.0	1.0	0.0	20.2	10.5
Lane LOS			A		C	B
Approach Delay (s)	0.0		0.4		11.3	
Approach LOS					B	

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	40.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	605	0	0	538	0	0
Future Volume (Veh/h)	605	0	0	538	0	0
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)	658	0	0	585	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			658		950	329
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			658		950	329
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			939		262	673

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	329	329	0	292	292	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.19	0.19	0.00	0.17	0.17	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		0.0
Approach LOS						A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	20.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	532	73	53	483	55	47
Future Volume (Veh/h)	532	73	53	483	55	47
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	537	74	54	488	56	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked						
vC, conflicting volume			611		926	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			611		926	306
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		78	93
cM capacity (veh/h)			978		256	696

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	358	253	54	244	244	56	47
Volume Left	0	0	54	0	0	56	0
Volume Right	0	74	0	0	0	0	47
cSH	1700	1700	978	1700	1700	256	696
Volume to Capacity	0.21	0.15	0.06	0.14	0.14	0.22	0.07
Queue Length 95th (m)	0.0	0.0	1.4	0.0	0.0	6.5	1.7
Control Delay (s)	0.0	0.0	8.9	0.0	0.0	22.9	10.5
Lane LOS			A			C	B
Approach Delay (s)	0.0		0.9			17.3	
Approach LOS						C	

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	33.7%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	458	112	348	489	85	309
Future Volume (vph)	458	112	348	489	85	309
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.20	0.11	0.60	0.21	0.36	0.64
Control Delay	4.5	1.2	11.4	4.6	28.0	10.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	1.2	11.4	4.6	28.0	10.3
LOS	A	A	B	A	C	B
Approach Delay	3.9			7.4	14.1	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 7.8		Intersection LOS: A	
Intersection Capacity Utilization 58.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	458	112	348	489	85	309
Future Volume (vph)	458	112	348	489	85	309
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3535	1597	1785	3570	1785	1597
Flt Permitted	1.00	1.00	0.48	1.00	0.95	1.00
Satd. Flow (perm)	3535	1597	909	3570	1785	1597
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	467	114	355	499	87	315
RTOR Reduction (vph)	0	40	0	0	0	272
Lane Group Flow (vph)	467	74	355	499	87	43
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.1	39.1	39.1	39.1	8.2	8.2
Effective Green, g (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2303	1040	592	2326	243	218
v/s Ratio Prot	0.13			0.14	c0.05	
v/s Ratio Perm		0.05	c0.39			0.03
v/c Ratio	0.20	0.07	0.60	0.21	0.36	0.20
Uniform Delay, d1	4.2	3.8	6.0	4.2	23.5	23.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	4.4	0.2	0.9	0.4
Delay (s)	4.4	4.0	10.4	4.4	24.4	23.4
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.3			6.9	23.6	
Approach LOS	A			A	C	

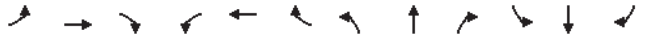
Intersection Summary				
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.56			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	58.4%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	76	24	23	205	183	82
Future Volume (vph)	76	24	23	205	183	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	26	25	223	199	89

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	109	248	288
Volume Left (vph)	83	0	199
Volume Right (vph)	0	223	89
Hadj (s)	0.15	-0.54	-0.05
Departure Headway (s)	5.1	4.2	4.7
Degree Utilization, x	0.15	0.29	0.37
Capacity (veh/h)	658	795	730
Control Delay (s)	9.0	9.0	10.4
Approach Delay (s)	9.0	9.0	10.4
Approach LOS	A	A	B

Intersection Summary				
Delay	9.6			
Level of Service	A			
Intersection Capacity Utilization	44.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	1	27	1	8	27	4	1	1	3	4	0	2
Future Volume (Veh/h)	1	27	1	8	27	4	1	1	3	4	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1	29	1	9	29	4	1	1	3	4	0	2
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	33			30			82	82	30	84	81	31
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	33			30			82	82	30	84	81	31
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	100	100	100
cM capacity (veh/h)	1592			1596			904	806	1051	900	808	1049

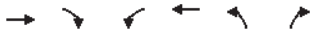
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	42	5	6
Volume Left	1	9	1	4
Volume Right	1	4	3	2
cSH	1592	1596	961	945
Volume to Capacity	0.00	0.01	0.01	0.01
Queue Length 95th (m)	0.0	0.1	0.1	0.2
Control Delay (s)	0.2	1.6	8.8	8.8
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	1.6	8.8	8.8
Approach LOS			A	A

Intersection Summary						
Average Delay	2.0					
Intersection Capacity Utilization	15.4%	ICU Level of Service		A		
Analysis Period (min)	15					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	13	3	3	20	10	1	17	5	5	12	8
Future Volume (vph)	5	13	3	3	20	10	1	17	5	5	12	8
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	16	4	4	24	12	1	21	6	6	15	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	26	40	28	31
Volume Left (vph)	6	4	1	6
Volume Right (vph)	4	12	6	10
Hadj (s)	-0.05	-0.16	-0.04	-0.09
Departure Headway (s)	4.0	3.9	4.0	4.0
Degree Utilization, x	0.03	0.04	0.03	0.03
Capacity (veh/h)	876	906	868	885
Control Delay (s)	7.1	7.1	7.2	7.1
Approach Delay (s)	7.1	7.1	7.2	7.1
Approach LOS	A	A	A	A

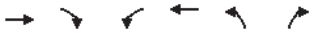
Intersection Summary						
Delay	7.1					
Level of Service	A					
Intersection Capacity Utilization	13.3%	ICU Level of Service		A		
Analysis Period (min)	15					



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	462	8	24	472	25	33
Future Volume (Veh/h)	462	8	24	472	25	33
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)	502	9	26	513	27	36
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			511		810	251
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			511		810	251
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		91	95
cM capacity (veh/h)			1065		314	743

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total	251	251	9	197	342	27	36
Volume Left	0	0	0	26	0	27	0
Volume Right	0	0	9	0	0	0	36
cSH	1700	1700	1700	1065	1700	314	743
Volume to Capacity	0.15	0.15	0.01	0.02	0.20	0.09	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.6	0.0	2.2	1.2
Control Delay (s)	0.0	0.0	0.0	1.3	0.0	17.6	10.1
Lane LOS				A		C	B
Approach Delay (s)	0.0			0.5		13.3	
Approach LOS						B	

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	39.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	478	0	0	487	0	0
Future Volume (Veh/h)	478	0	0	487	0	0
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)	520	0	0	529	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			520		784	260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			520		784	260
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1056		334	745

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	260	260	0	264	264	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.15	0.15	0.00	0.16	0.16	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		0.0
Approach LOS						A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	16.8%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	424	49	29	442	41	19
Future Volume (Veh/h)	424	49	29	442	41	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	446	52	31	465	43	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked						
vC, conflicting volume			498		740	223
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			498		740	223
tC, single (s)			4.1		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		87	97
cM capacity (veh/h)			1076		336	771

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	223	223	52	31	232	232	43	20
Volume Left	0	0	0	31	0	0	43	0
Volume Right	0	0	52	0	0	0	0	20
cSH	1700	1700	1700	1076	1700	1700	336	771
Volume to Capacity	0.13	0.13	0.03	0.03	0.14	0.14	0.13	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.7	0.0	0.0	3.5	0.6
Control Delay (s)	0.0	0.0	0.0	8.4	0.0	0.0	17.3	9.8
Lane LOS				A			C	A
Approach Delay (s)	0.0			0.5			14.9	
Approach LOS							B	

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	28.4%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	424	57	282	398	63	297
Future Volume (vph)	424	57	282	398	63	297
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.21	0.06	0.55	0.20	0.30	0.67
Control Delay	4.5	1.4	10.3	4.5	26.9	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.5	1.4	10.3	4.5	26.9	10.8
LOS	A	A	B	A	C	B
Approach Delay	4.2			6.9	13.6	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 7.6		Intersection LOS: A	
Intersection Capacity Utilization 55.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	424	57	282	398	63	297
Future Volume (vph)	424	57	282	398	63	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3433	1521	1750	3433	1750	1566
Flt Permitted	1.00	1.00	0.48	1.00	0.95	1.00
Satd. Flow (perm)	3433	1521	884	3433	1750	1566
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	476	64	317	447	71	334
RTOR Reduction (vph)	0	22	0	0	0	288
Lane Group Flow (vph)	476	42	317	447	71	46
Heavy Vehicles (%)	4%	5%	2%	4%	2%	2%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.1	39.1	39.1	39.1	8.2	8.2
Effective Green, g (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2237	991	576	2237	239	214
v/s Ratio Prot	0.14			0.13	c0.04	
v/s Ratio Perm		0.03	c0.36			0.03
v/c Ratio	0.21	0.04	0.55	0.20	0.30	0.21
Uniform Delay, d1	4.2	3.7	5.7	4.2	23.3	23.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	3.8	0.2	0.7	0.5
Delay (s)	4.4	3.8	9.4	4.4	24.0	23.5
Level of Service	A	A	A	A	C	C
Approach Delay (s)	4.4			6.5	23.6	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	89	25	38	199	104	58
Future Volume (vph)	89	25	38	199	104	58
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	93	26	40	207	108	60

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	119	247	168
Volume Left (vph)	93	0	108
Volume Right (vph)	0	207	60
Hadj (s)	0.22	-0.50	-0.07
Departure Headway (s)	4.8	4.0	4.6
Degree Utilization, x	0.16	0.27	0.22
Capacity (veh/h)	708	864	728
Control Delay (s)	8.7	8.4	8.9
Approach Delay (s)	8.7	8.4	8.9
Approach LOS	A	A	A

Intersection Summary			
Delay	8.6		
Level of Service	A		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	18	0	3	49	1	0	0	4	7	0	1
Future Volume (Veh/h)	0	18	0	3	49	1	0	0	4	7	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	20	0	3	56	1	0	0	5	8	0	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)												
pX, platoon unblocked												
vC, conflicting volume	57			20			84	83	20	88	82	56
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			20			84	83	20	88	82	56
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1560			1609			906	810	1064	897	810	1016

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	60	5	9
Volume Left	0	3	0	8
Volume Right	0	1	5	1
cSH	1560	1609	1064	909
Volume to Capacity	0.00	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.1	0.2
Control Delay (s)	0.0	0.4	8.4	9.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.4	8.4	9.0
Approach LOS			A	A

Intersection Summary						
Average Delay	1.5					
Intersection Capacity Utilization	17.9%	ICU Level of Service		A		
Analysis Period (min)	15					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	14	1	1	14	26	0	33	4	3	17	3
Future Volume (vph)	8	14	1	1	14	26	0	33	4	3	17	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	15	1	1	15	28	0	36	4	3	18	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	25	44	40	24
Volume Left (vph)	9	1	0	3
Volume Right (vph)	1	28	4	3
Hadj (s)	0.32	-0.38	-0.06	0.05
Departure Headway (s)	4.4	3.7	4.0	4.1
Degree Utilization, x	0.03	0.05	0.04	0.03
Capacity (veh/h)	800	954	871	850
Control Delay (s)	7.5	6.9	7.2	7.3
Approach Delay (s)	7.5	6.9	7.2	7.3
Approach LOS	A	A	A	A

Intersection Summary						
Delay	7.2					
Level of Service	A					
Intersection Capacity Utilization	15.8%	ICU Level of Service		A		
Analysis Period (min)	15					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	621	16	27	658	15	36
Future Volume (Veh/h)	621	16	27	658	15	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	634	16	28	671	15	37
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			650		1026	317
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			650		1026	317
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		93	95
cM capacity (veh/h)			946		227	685

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total	317	317	16	252	447	15	37
Volume Left	0	0	0	28	0	15	0
Volume Right	0	0	16	0	0	0	37
cSH	1700	1700	1700	946	1700	227	685
Volume to Capacity	0.19	0.19	0.01	0.03	0.26	0.07	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.7	0.0	1.7	1.4
Control Delay (s)	0.0	0.0	0.0	1.3	0.0	22.0	10.6
Lane LOS				A		C	B
Approach Delay (s)	0.0			0.5		13.8	
Approach LOS						B	

Intersection Summary					
Average Delay	0.7				
Intersection Capacity Utilization	48.0%	ICU Level of Service	A		
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	672	0	0	664	0	0
Future Volume (Veh/h)	672	0	0	664	0	0
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)	730	0	0	722	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			730		1091	365
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			730		1091	365
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			883		213	638

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	365	365	0	361	361	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.21	0.21	0.00	0.21	0.21	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		0.0
Approach LOS						A

Intersection Summary					
Average Delay	0.0				
Intersection Capacity Utilization	21.9%	ICU Level of Service	A		
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	614	53	45	610	50	35
Future Volume (Veh/h)	614	53	45	610	50	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	682	59	50	678	56	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked					0.98	
vC, conflicting volume			741		1121	341
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			741		1081	341
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		72	94
cM capacity (veh/h)			862		199	661

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	341	341	59	50	339	339	56	39
Volume Left	0	0	0	50	0	0	56	0
Volume Right	0	0	59	0	0	0	0	39
cSH	1700	1700	1700	862	1700	1700	199	661
Volume to Capacity	0.20	0.20	0.03	0.06	0.20	0.20	0.28	0.06
Queue Length 95th (m)	0.0	0.0	0.0	1.5	0.0	0.0	8.9	1.5
Control Delay (s)	0.0	0.0	0.0	9.4	0.0	0.0	30.0	10.8
Lane LOS				A			D	B
Approach Delay (s)	0.0			0.6			22.1	
Approach LOS							C	

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	514	118	317	610	84	252
Future Volume (vph)	514	118	317	610	84	252
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.25	0.12	0.65	0.29	0.38	0.60
Control Delay	4.7	1.2	13.6	5.0	28.7	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	1.2	13.6	5.0	28.7	9.9
LOS	A	A	B	A	C	A
Approach Delay	4.1			7.9	14.6	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 7.8		Intersection LOS: A	
Intersection Capacity Utilization 56.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	514	118	317	610	84	252
Future Volume (vph)	514	118	317	610	84	252
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1597	1785	3500	1733	1597
Flt Permitted	1.00	1.00	0.44	1.00	0.95	1.00
Satd. Flow (perm)	3500	1597	827	3500	1733	1597
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	565	130	348	670	92	277
RTOR Reduction (vph)	0	46	0	0	0	239
Lane Group Flow (vph)	565	85	348	670	92	38
Heavy Vehicles (%)	2%	0%	0%	2%	3%	0%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.0	39.0	39.0	39.0	8.3	8.3
Effective Green, g (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2275	1038	537	2275	239	220
v/s Ratio Prot	0.16			0.19	c0.05	
v/s Ratio Perm		0.05	c0.42			0.02
v/c Ratio	0.25	0.08	0.65	0.29	0.38	0.17
Uniform Delay, d1	4.4	3.9	6.3	4.5	23.5	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	5.9	0.3	1.0	0.4
Delay (s)	4.6	4.0	12.3	4.9	24.6	23.2
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.5			7.4	23.5	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	56.6%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	83	26	28	180	302	117
Future Volume (vph)	83	26	28	180	302	117
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	28	30	196	328	127

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	118	226	455
Volume Left (vph)	90	0	328
Volume Right (vph)	0	196	127
Hadj (s)	0.15	-0.51	-0.02
Departure Headway (s)	5.5	4.7	4.8
Degree Utilization, x	0.18	0.30	0.60
Capacity (veh/h)	591	695	723
Control Delay (s)	9.8	9.7	14.7
Approach Delay (s)	9.8	9.7	14.7
Approach LOS	A	A	B

Intersection Summary				
Delay	12.5			
Level of Service	B			
Intersection Capacity Utilization	52.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	37	3	5	42	3	1	0	5	3	0	0
Future Volume (Veh/h)	3	37	3	5	42	3	1	0	5	3	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	4	47	4	6	53	4	1	0	6	4	0	0
Pedestrians								2			2	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	59			53			126	130	51	132	130	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	59			53			126	130	51	132	130	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1555			1563			845	757	1021	832	757	1013

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	55	63	7	4
Volume Left	4	6	1	4
Volume Right	4	4	6	0
cSH	1555	1563	992	832
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (m)	0.1	0.1	0.2	0.1
Control Delay (s)	0.6	0.7	8.7	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	0.6	0.7	8.7	9.3
Approach LOS			A	A

Intersection Summary					
Average Delay	1.3				
Intersection Capacity Utilization	14.5%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	28	4	13	28	10	6	20	5	9	36	6
Future Volume (vph)	5	28	4	13	28	10	6	20	5	9	36	6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	5	31	4	14	31	11	7	22	5	10	40	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	40	56	34	57
Volume Left (vph)	5	14	7	10
Volume Right (vph)	4	11	5	7
Hadj (s)	-0.03	-0.02	0.02	-0.04
Departure Headway (s)	4.1	4.1	4.2	4.1
Degree Utilization, x	0.05	0.06	0.04	0.06
Capacity (veh/h)	848	850	828	852
Control Delay (s)	7.3	7.4	7.4	7.4
Approach Delay (s)	7.3	7.4	7.4	7.4
Approach LOS	A	A	A	A

Intersection Summary					
Delay	7.4				
Level of Service	A				
Intersection Capacity Utilization	15.1%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	591	6	20	642	3	29
Future Volume (Veh/h)	591	6	20	642	3	29
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	672	7	23	730	3	33
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			679		1083	336
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			679		1083	336
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	95
cM capacity (veh/h)			923		210	666

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total	336	336	7	266	487	3	33
Volume Left	0	0	0	23	0	3	0
Volume Right	0	0	7	0	0	0	33
cSH	1700	1700	1700	923	1700	210	666
Volume to Capacity	0.20	0.20	0.00	0.02	0.29	0.01	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.6	0.0	0.3	1.2
Control Delay (s)	0.0	0.0	0.0	1.0	0.0	22.4	10.7
Lane LOS				A		C	B
Approach Delay (s)	0.0			0.4		11.7	
Approach LOS						B	

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	42.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	665	0	0	592	0	0
Future Volume (Veh/h)	665	0	0	592	0	0
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)	723	0	0	643	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			723		1044	362
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			723		1044	362
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			889		228	641

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	362	362	0	322	322	0
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.21	0.21	0.00	0.19	0.19	0.00
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		0.0
Approach LOS						A

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	21.7%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	586	73	53	532	55	47
Future Volume (Veh/h)	586	73	53	532	55	47
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	592	74	54	537	56	47
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked						
vC, conflicting volume			666		968	296
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			666		968	296
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		77	93
cM capacity (veh/h)			933		240	706

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	296	296	74	54	268	268	56	47
Volume Left	0	0	0	54	0	0	56	0
Volume Right	0	0	74	0	0	0	0	47
cSH	1700	1700	1700	933	1700	1700	240	706
Volume to Capacity	0.17	0.17	0.04	0.06	0.16	0.16	0.23	0.07
Queue Length 95th (m)	0.0	0.0	0.0	1.5	0.0	0.0	7.0	1.7
Control Delay (s)	0.0	0.0	0.0	9.1	0.0	0.0	24.5	10.5
Lane LOS				A			C	B
Approach Delay (s)	0.0			0.8			18.1	
Approach LOS							C	

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	32.9%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	505	116	359	539	89	320
Future Volume (vph)	505	116	359	539	89	320
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.22	0.11	0.65	0.24	0.37	0.65
Control Delay	4.6	1.2	13.3	4.7	28.2	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	1.2	13.3	4.7	28.2	10.4
LOS	A	A	B	A	C	B
Approach Delay	4.0			8.1	14.3	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 8.1		Intersection LOS: A	
Intersection Capacity Utilization 59.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	505	116	359	539	89	320
Future Volume (vph)	505	116	359	539	89	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3535	1597	1785	3570	1785	1597
Flt Permitted	1.00	1.00	0.46	1.00	0.95	1.00
Satd. Flow (perm)	3535	1597	868	3570	1785	1597
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	515	118	366	550	91	327
RTOR Reduction (vph)	0	41	0	0	0	282
Lane Group Flow (vph)	515	77	366	550	91	45
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.0	39.0	39.0	39.0	8.3	8.3
Effective Green, g (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2297	1038	564	2320	246	220
v/s Ratio Prot	0.15			0.15	c0.05	
v/s Ratio Perm		0.05	c0.42			0.03
v/c Ratio	0.22	0.07	0.65	0.24	0.37	0.21
Uniform Delay, d1	4.3	3.9	6.4	4.3	23.5	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	5.7	0.2	0.9	0.5
Delay (s)	4.5	4.0	12.1	4.6	24.4	23.4
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.4			7.6	23.6	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.60			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	59.0%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	78	24	23	211	188	84
Future Volume (vph)	78	24	23	211	188	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	26	25	229	204	91

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	111	254	295
Volume Left (vph)	85	0	204
Volume Right (vph)	0	229	91
Hadj (s)	0.15	-0.54	-0.05
Departure Headway (s)	5.1	4.3	4.7
Degree Utilization, x	0.16	0.30	0.38
Capacity (veh/h)	653	791	727
Control Delay (s)	9.0	9.1	10.6
Approach Delay (s)	9.0	9.1	10.6
Approach LOS	A	A	B

Intersection Summary			
Delay	9.8		
Level of Service	A		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	29	1	8	29	4	1	1	3	4	0	2
Future Volume (Veh/h)	1	29	1	8	29	4	1	1	3	4	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1	31	1	9	31	4	1	1	3	4	0	2
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	35			32			86	86	32	88	85	33
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	35			32			86	86	32	88	85	33
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	100	100	100
cM capacity (veh/h)	1589			1593			898	802	1048	894	804	1046

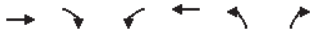
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	44	5	6
Volume Left	1	9	1	4
Volume Right	1	4	3	2
cSH	1589	1593	958	940
Volume to Capacity	0.00	0.01	0.01	0.01
Queue Length 95th (m)	0.0	0.1	0.1	0.2
Control Delay (s)	0.2	1.5	8.8	8.9
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	1.5	8.8	8.9
Approach LOS			A	A

Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			15.6%		ICU Level of Service				A			
Analysis Period (min)			15									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	14	3	4	21	10	1	17	6	5	12	8
Future Volume (vph)	5	14	3	4	21	10	1	17	6	5	12	8
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	6	17	4	5	26	12	1	21	7	6	15	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	27	43	29	31
Volume Left (vph)	6	5	1	6
Volume Right (vph)	4	12	7	10
Hadj (s)	-0.04	-0.14	-0.06	-0.09
Departure Headway (s)	4.0	3.9	4.0	4.0
Degree Utilization, x	0.03	0.05	0.03	0.03
Capacity (veh/h)	874	902	869	882
Control Delay (s)	7.1	7.1	7.1	7.1
Approach Delay (s)	7.1	7.1	7.1	7.1
Approach LOS	A	A	A	A

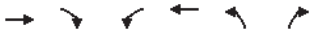
Intersection Summary												
Delay			7.1									
Level of Service			A									
Intersection Capacity Utilization			13.3%		ICU Level of Service				A			
Analysis Period (min)			15									



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	491	9	24	502	26	37
Future Volume (Veh/h)	491	9	24	502	26	37
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)	534	10	26	546	28	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			544		859	267
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			544		859	267
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		90	94
cM capacity (veh/h)			1035		292	725

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total	267	267	10	208	364	28	40
Volume Left	0	0	0	26	0	28	0
Volume Right	0	0	10	0	0	0	40
cSH	1700	1700	1700	1035	1700	292	725
Volume to Capacity	0.16	0.16	0.01	0.03	0.21	0.10	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.6	0.0	2.5	1.4
Control Delay (s)	0.0	0.0	0.0	1.3	0.0	18.6	10.3
Lane LOS				A		C	B
Approach Delay (s)	0.0			0.5		13.7	
Approach LOS						B	

Intersection Summary					
Average Delay			1.0		
Intersection Capacity Utilization			41.5%	ICU Level of Service	A
Analysis Period (min)			15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	467	44	0	517	0	37
Future Volume (Veh/h)	467	44	0	517	0	37
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)	508	48	0	562	0	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			556		789	254
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			556		789	254
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	95
cM capacity (veh/h)			1025		332	752

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	254	254	48	281	281	40
Volume Left	0	0	0	0	0	0
Volume Right	0	0	48	0	0	40
cSH	1700	1700	1700	1700	1700	752
Volume to Capacity	0.15	0.15	0.03	0.17	0.17	0.05
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.3
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	10.1
Lane LOS						B
Approach Delay (s)	0.0			0.0		10.1
Approach LOS						B

Intersection Summary					
Average Delay			0.3		
Intersection Capacity Utilization			22.9%	ICU Level of Service	A
Analysis Period (min)			15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	447	52	75	434	79	22
Future Volume (Veh/h)	447	52	75	434	79	22
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	471	55	79	457	83	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked						
vC, conflicting volume			526		858	236
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			526		858	236
tC, single (s)			4.1		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		69	97
cM capacity (veh/h)			1051		269	757

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	236	236	55	79	228	228	83	23
Volume Left	0	0	0	79	0	0	83	0
Volume Right	0	0	55	0	0	0	0	23
cSH	1700	1700	1700	1051	1700	1700	269	757
Volume to Capacity	0.14	0.14	0.03	0.08	0.13	0.13	0.31	0.03
Queue Length 95th (m)	0.0	0.0	0.0	1.9	0.0	0.0	10.2	0.8
Control Delay (s)	0.0	0.0	0.0	8.7	0.0	0.0	24.3	9.9
Lane LOS				A			C	A
Approach Delay (s)	0.0			1.3			21.2	
Approach LOS							C	

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	30.9%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	450	57	286	427	72	311
Future Volume (vph)	450	57	286	427	72	311
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.23	0.06	0.58	0.21	0.34	0.68
Control Delay	4.6	1.4	11.1	4.6	27.7	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	1.4	11.1	4.6	27.7	11.0
LOS	A	A	B	A	C	B
Approach Delay	4.3			7.2	14.2	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 7.9		Intersection LOS: A	
Intersection Capacity Utilization 55.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	450	57	286	427	72	311
Future Volume (vph)	450	57	286	427	72	311
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3433	1521	1750	3433	1750	1566
Flt Permitted	1.00	1.00	0.47	1.00	0.95	1.00
Satd. Flow (perm)	3433	1521	858	3433	1750	1566
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	506	64	321	480	81	349
RTOR Reduction (vph)	0	22	0	0	0	301
Lane Group Flow (vph)	506	42	321	480	81	48
Heavy Vehicles (%)	4%	5%	2%	4%	2%	2%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.1	39.1	39.1	39.1	8.2	8.2
Effective Green, g (s)	39.1	39.1	39.1	39.1	8.2	8.2
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2237	991	559	2237	239	214
v/s Ratio Prot	0.15			0.14	c0.05	
v/s Ratio Perm		0.03	c0.37			0.03
v/c Ratio	0.23	0.04	0.57	0.21	0.34	0.22
Uniform Delay, d1	4.3	3.7	5.8	4.2	23.4	23.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	4.2	0.2	0.8	0.5
Delay (s)	4.5	3.8	10.1	4.5	24.3	23.6
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.4			6.7	23.7	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.53			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	55.8%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	106	30	40	202	106	62
Future Volume (vph)	106	30	40	202	106	62
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	110	31	42	210	110	65

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	141	252	175
Volume Left (vph)	110	0	110
Volume Right (vph)	0	210	65
Hadj (s)	0.22	-0.50	-0.08
Departure Headway (s)	4.8	4.0	4.7
Degree Utilization, x	0.19	0.28	0.23
Capacity (veh/h)	703	851	717
Control Delay (s)	8.9	8.6	9.1
Approach Delay (s)	8.9	8.6	9.1
Approach LOS	A	A	A

Intersection Summary				
Delay	8.8			
Level of Service	A			
Intersection Capacity Utilization	41.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	18	0	3	49	7	0	0	4	29	0	6
Future Volume (Veh/h)	2	18	0	3	49	7	0	0	4	29	0	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	2	20	0	3	56	8	0	0	5	33	0	7
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	64			20			97	94	20	95	90	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	64			20			97	94	20	95	90	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	96	100	99
cM capacity (veh/h)	1551			1609			882	797	1064	886	801	1011

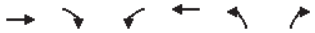
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	67	5	40
Volume Left	2	3	0	33
Volume Right	0	8	5	7
cSH	1551	1609	1064	906
Volume to Capacity	0.00	0.00	0.00	0.04
Queue Length 95th (m)	0.0	0.0	0.1	1.1
Control Delay (s)	0.7	0.3	8.4	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	0.7	0.3	8.4	9.2
Approach LOS			A	A

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	19.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	15	1	1	16	29	0	34	4	4	17	3
Future Volume (vph)	9	15	1	1	16	29	0	34	4	4	17	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	16	1	1	17	32	0	37	4	4	18	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	27	50	41	25
Volume Left (vph)	10	1	0	4
Volume Right (vph)	1	32	4	3
Hadj (s)	0.32	-0.38	-0.06	0.06
Departure Headway (s)	4.4	3.7	4.0	4.2
Degree Utilization, x	0.03	0.05	0.05	0.03
Capacity (veh/h)	797	953	866	844
Control Delay (s)	7.6	6.9	7.2	7.3
Approach Delay (s)	7.6	6.9	7.2	7.3
Approach LOS	A	A	A	A

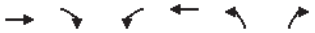
Intersection Summary				
Delay	7.2			
Level of Service	A			
Intersection Capacity Utilization	17.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	647	23	27	686	15	38
Future Volume (Veh/h)	647	23	27	686	15	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	660	23	28	700	15	39
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			683		1066	330
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			683		1066	330
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		93	94
cM capacity (veh/h)			919		214	672

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total	330	330	23	261	467	15	39
Volume Left	0	0	0	28	0	15	0
Volume Right	0	0	23	0	0	0	39
cSH	1700	1700	1700	919	1700	214	672
Volume to Capacity	0.19	0.19	0.01	0.03	0.27	0.07	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.8	0.0	1.8	1.5
Control Delay (s)	0.0	0.0	0.0	1.3	0.0	23.1	10.7
Lane LOS				A		C	B
Approach Delay (s)	0.0			0.4		14.1	
Approach LOS						B	

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	48.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	661	39	0	692	0	36
Future Volume (Veh/h)	661	39	0	692	0	36
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)	718	42	0	752	0	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			760		1094	359
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			760		1094	359
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	94
cM capacity (veh/h)			861		212	643

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	359	359	42	376	376	39
Volume Left	0	0	0	0	0	0
Volume Right	0	0	42	0	0	39
cSH	1700	1700	1700	1700	1700	643
Volume to Capacity	0.21	0.21	0.02	0.22	0.22	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.5
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	11.0
Lane LOS						B
Approach Delay (s)	0.0			0.0		11.0
Approach LOS						B

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	28.3%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	636	56	83	603	85	38
Future Volume (Veh/h)	636	56	83	603	85	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	707	62	92	670	94	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)				194		
pX, platoon unblocked					0.99	
vC, conflicting volume			769		1226	354
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			769		1200	354
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		41	94
cM capacity (veh/h)			841		159	649

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	354	354	62	92	335	335	94	42
Volume Left	0	0	0	92	0	0	94	0
Volume Right	0	0	62	0	0	0	0	42
cSH	1700	1700	1700	841	1700	1700	159	649
Volume to Capacity	0.21	0.21	0.04	0.11	0.20	0.20	0.59	0.06
Queue Length 95th (m)	0.0	0.0	0.0	2.9	0.0	0.0	25.1	1.7
Control Delay (s)	0.0	0.0	0.0	9.8	0.0	0.0	56.3	10.9
Lane LOS				A			F	B
Approach Delay (s)	0.0			1.2			42.3	
Approach LOS							E	

Intersection Summary			
Average Delay		4.0	
Intersection Capacity Utilization		36.9%	ICU Level of Service A
Analysis Period (min)		15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	539	118	331	634	91	260
Future Volume (vph)	539	118	331	634	91	260
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.26	0.12	0.70	0.31	0.42	0.61
Control Delay	4.8	1.2	16.4	5.1	29.5	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	1.2	16.4	5.1	29.5	10.0
LOS	A	A	B	A	C	B
Approach Delay	4.2			8.9	15.1	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 8.4		Intersection LOS: A	
Intersection Capacity Utilization 57.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	539	118	331	634	91	260
Future Volume (vph)	539	118	331	634	91	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3500	1597	1785	3500	1733	1597
Flt Permitted	1.00	1.00	0.43	1.00	0.95	1.00
Satd. Flow (perm)	3500	1597	805	3500	1733	1597
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	592	130	364	697	100	286
RTOR Reduction (vph)	0	46	0	0	0	246
Lane Group Flow (vph)	592	85	364	697	100	40
Heavy Vehicles (%)	2%	0%	0%	2%	3%	0%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.0	39.0	39.0	39.0	8.3	8.3
Effective Green, g (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2275	1038	523	2275	239	220
v/s Ratio Prot	0.17			0.20	c0.06	
v/s Ratio Perm		0.05	c0.45			0.02
v/c Ratio	0.26	0.08	0.70	0.31	0.42	0.18
Uniform Delay, d1	4.4	3.9	6.7	4.6	23.6	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	7.5	0.3	1.2	0.4
Delay (s)	4.7	4.0	14.2	4.9	24.8	23.2
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.6			8.1	23.6	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	57.4%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	93	29	31	183	304	131
Future Volume (vph)	93	29	31	183	304	131
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	32	34	199	330	142

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	133	233	472
Volume Left (vph)	101	0	330
Volume Right (vph)	0	199	142
Hadj (s)	0.15	-0.50	-0.04
Departure Headway (s)	5.6	4.9	4.8
Degree Utilization, x	0.21	0.31	0.63
Capacity (veh/h)	583	681	717
Control Delay (s)	10.1	10.1	15.7
Approach Delay (s)	10.1	10.1	15.7
Approach LOS	B	B	C

Intersection Summary				
Delay	13.3			
Level of Service	B			
Intersection Capacity Utilization	54.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	37	3	5	42	20	1	0	5	16	0	3
Future Volume (Veh/h)	14	37	3	5	42	20	1	0	5	16	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	18	47	4	6	53	25	1	0	6	20	0	4
Pedestrians								2			2	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.2			1.2	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	80			53			168	179	51	170	168	68
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	80			53			168	179	51	170	168	68
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	99	97	100	100
cM capacity (veh/h)	1528			1563			784	705	1021	780	714	1000

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	69	84	7	24
Volume Left	18	6	1	20
Volume Right	4	25	6	4
cSH	1528	1563	979	810
Volume to Capacity	0.01	0.00	0.01	0.03
Queue Length 95th (m)	0.3	0.1	0.2	0.7
Control Delay (s)	2.0	0.5	8.7	9.6
Lane LOS	A	A	A	A
Approach Delay (s)	2.0	0.5	8.7	9.6
Approach LOS			A	A

Intersection Summary					
Average Delay	2.6				
Intersection Capacity Utilization	17.7%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	32	4	13	30	11	6	21	5	16	36	6
Future Volume (vph)	5	32	4	13	30	11	6	21	5	16	36	6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	5	35	4	14	33	12	7	23	5	18	40	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	44	59	35	65
Volume Left (vph)	5	14	7	18
Volume Right (vph)	4	12	5	7
Hadj (s)	-0.03	-0.03	0.02	-0.01
Departure Headway (s)	4.1	4.1	4.2	4.2
Degree Utilization, x	0.05	0.07	0.04	0.07
Capacity (veh/h)	841	845	822	842
Control Delay (s)	7.4	7.4	7.4	7.5
Approach Delay (s)	7.4	7.4	7.4	7.5
Approach LOS	A	A	A	A

Intersection Summary					
Delay	7.4				
Level of Service	A				
Intersection Capacity Utilization	16.8%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	623	8	20	672	3	34
Future Volume (Veh/h)	623	8	20	672	3	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	708	9	23	764	3	39
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			717		1136	354
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			717		1136	354
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	94
cM capacity (veh/h)			893		194	648

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total	354	354	9	278	509	3	39
Volume Left	0	0	0	23	0	3	0
Volume Right	0	0	9	0	0	0	39
cSH	1700	1700	1700	893	1700	194	648
Volume to Capacity	0.21	0.21	0.01	0.03	0.30	0.02	0.06
Queue Length 95th (m)	0.0	0.0	0.0	0.6	0.0	0.4	1.5
Control Delay (s)	0.0	0.0	0.0	1.0	0.0	23.9	10.9
Lane LOS				A		C	B
Approach Delay (s)	0.0			0.4		11.8	
Approach LOS						B	

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	43.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	650	52	0	622	0	46
Future Volume (Veh/h)	650	52	0	622	0	46
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)	707	57	0	676	0	50
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				288		
pX, platoon unblocked						
vC, conflicting volume			764		1045	354
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			764		1045	354
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			858		228	649

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	354	354	57	338	338	50
Volume Left	0	0	0	0	0	0
Volume Right	0	0	57	0	0	50
cSH	1700	1700	1700	1700	1700	649
Volume to Capacity	0.21	0.21	0.03	0.20	0.20	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	11.0
Lane LOS						B
Approach Delay (s)	0.0			0.0		11.0
Approach LOS						B

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	28.0%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	614	76	100	521	96	50
Future Volume (Veh/h)	614	76	100	521	96	50
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	620	77	101	526	97	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				194		
pX, platoon unblocked						
vC, conflicting volume			697		1085	310
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			697		1085	310
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		49	93
cM capacity (veh/h)			909		191	692

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	310	310	77	101	263	263	97	51
Volume Left	0	0	0	101	0	0	97	0
Volume Right	0	0	77	0	0	0	0	51
cSH	1700	1700	1700	909	1700	1700	191	692
Volume to Capacity	0.18	0.18	0.05	0.11	0.15	0.15	0.51	0.07
Queue Length 95th (m)	0.0	0.0	0.0	3.0	0.0	0.0	20.4	1.9
Control Delay (s)	0.0	0.0	0.0	9.5	0.0	0.0	42.0	10.6
Lane LOS				A			E	B
Approach Delay (s)	0.0			1.5			31.2	
Approach LOS							D	

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	37.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	536	116	373	567	97	329
Future Volume (vph)	536	116	373	567	97	329
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	20.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	31.2	31.2	31.2	31.2	14.5	14.5
Total Split (s)	45.0	45.0	45.0	45.0	15.0	15.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.1	2.1	2.1	2.1	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Act Effct Green (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
v/c Ratio	0.24	0.11	0.70	0.25	0.40	0.66
Control Delay	4.7	1.2	15.9	4.7	28.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.7	1.2	15.9	4.7	28.9	10.5
LOS	A	A	B	A	C	B
Approach Delay	4.1			9.2	14.7	
Approach LOS	A			A	B	

Intersection Summary			
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 8.7		Intersection LOS: A	
Intersection Capacity Utilization 59.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 4: Rogers Road & Elgin Street West

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	536	116	373	567	97	329
Future Volume (vph)	536	116	373	567	97	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3535	1597	1785	3570	1785	1597
Flt Permitted	1.00	1.00	0.45	1.00	0.95	1.00
Satd. Flow (perm)	3535	1597	841	3570	1785	1597
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	547	118	381	579	99	336
RTOR Reduction (vph)	0	41	0	0	0	290
Lane Group Flow (vph)	547	77	381	579	99	46
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	39.0	39.0	39.0	39.0	8.3	8.3
Effective Green, g (s)	39.0	39.0	39.0	39.0	8.3	8.3
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.14	0.14
Clearance Time (s)	6.2	6.2	6.2	6.2	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2297	1038	546	2320	246	220
v/s Ratio Prot	0.15			0.16	c0.06	
v/s Ratio Perm		0.05	c0.45			0.03
v/c Ratio	0.24	0.07	0.70	0.25	0.40	0.21
Uniform Delay, d1	4.3	3.9	6.7	4.4	23.6	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1	7.2	0.3	1.1	0.5
Delay (s)	4.6	4.0	14.0	4.6	24.7	23.4
Level of Service	A	A	B	A	C	C
Approach Delay (s)	4.5			8.3	23.7	
Approach LOS	A			A	C	

Intersection Summary				
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.7	
Intersection Capacity Utilization	59.7%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	89	28	27	214	191	98
Future Volume (vph)	89	28	27	214	191	98
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	30	29	233	208	107
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total (vph)	127	262	315			
Volume Left (vph)	97	0	208			
Volume Right (vph)	0	233	107			
Hadj (s)	0.15	-0.53	-0.07			
Departure Headway (s)	5.2	4.3	4.7			
Degree Utilization, x	0.18	0.32	0.41			
Capacity (veh/h)	643	773	720			
Control Delay (s)	9.3	9.4	11.1			
Approach Delay (s)	9.3	9.4	11.1			
Approach LOS	A	A	B			

Intersection Summary				
Delay	10.1			
Level of Service	B			
Intersection Capacity Utilization	47.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	5	29	1	8	29	22	1	1	3	19	0	10
Future Volume (Veh/h)	5	29	1	8	29	22	1	1	3	19	0	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	31	1	9	31	24	1	1	3	20	0	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	55			32			114	114	32	106	103	43
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	55			32			114	114	32	106	103	43
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	100	98	100	99
cM capacity (veh/h)	1563			1593			853	773	1048	869	784	1033

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	37	64	5	31
Volume Left	5	9	1	20
Volume Right	1	24	3	11
cSH	1563	1593	938	921
Volume to Capacity	0.00	0.01	0.01	0.03
Queue Length 95th (m)	0.1	0.1	0.1	0.8
Control Delay (s)	1.0	1.1	8.9	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	1.0	1.1	8.9	9.0
Approach LOS			A	A

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	15.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	16	3	4	26	13	1	18	6	7	12	8
Future Volume (vph)	6	16	3	4	26	13	1	18	6	7	12	8
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	20	4	5	32	16	1	22	7	9	15	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	31	53	30	34
Volume Left (vph)	7	5	1	9
Volume Right (vph)	4	16	7	10
Hadj (s)	-0.03	-0.16	-0.06	-0.06
Departure Headway (s)	4.1	3.9	4.1	4.0
Degree Utilization, x	0.03	0.06	0.03	0.04
Capacity (veh/h)	866	902	859	867
Control Delay (s)	7.2	7.1	7.2	7.2
Approach Delay (s)	7.2	7.1	7.2	7.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.2			
Level of Service	A			
Intersection Capacity Utilization	14.4%	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.