



Employee-owned.
Client-centric.
Solution-focused.



5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684

www.ptsl.com

2023-03-28
Project: 220661

Chris Pidgeon MCIP, RPP
Principal Planner
GSP Group
72 Victoria Street South
Suite 201
Kitchener ON N2G 4Y9

Dear Mr. Pidgeon:

**RE: COMMENT RESPONSE AND LETTER OF OPINION REGARDING NEW
DEVELOPMENT PLAN, PROPOSED MIXED USE DEVELOPMENT, 562-565
CONESTOGO ROAD, WATERLOO ON**

In June 2021, a Transportation Impact Assessment and Transportation Demand Management Plan (the study) was prepared and submitted in support of the development applications for the above-noted project. The proposed development included eight development blocks with approximately 432 residential units in mid-rise buildings, 2,102 residential units in hi-rise buildings, approximately 21,400 ft² Gross Floor Area (GFA) commercial area, and 196,100 ft² GFA of office space. Two-thousand, six-hundred and forty-eight vehicular parking spaces were proposed on a mixture of underground and podium parking spaces. Bicycle parking (1797 spaces) was proposed in both Type A (760) and Type B (1037) facilities.

The study concluded that under full development and occupancy of the site under 2032 conditions:

- ▶ all study area intersections were forecast to have acceptable operational values except for the following critical movements:
 - The eastbound left-turn movement on **Northfield Drive West at Conestogo Road/Colby Drive** which was forecast to operate at LOS E during the PM peak hour;
 - The westbound left-turn movement on **Northfield Drive West at Conestogo Road/Colby Drive** which was forecast to operate at LOS F and experience a v/c greater than 1.0 during the PM peak hour;
 - The northbound shared movement on **Conestogo Road/Colby Drive at Northfield Drive West** which was forecast to operate at LOS E/F and experience v/c values of 0.85/>1.0 during the AM/PM peak hours;

- The westbound left-turn movement on **Conestogo Road at King Street North** was forecast to operate at a LOS F with a v/c greater than 1.0 during the PM peak hour; and
- The southbound left-turn movement on **King Street North at Conestogo Road** was forecast to operate at a LOS E during the PM peak hour.
- ▶ no additional signalized traffic control was justified to 2035;
- ▶ a 15-metre northbound auxiliary left-turn lane on Conestoga Road at Street 'C'; and
- ▶ the proposed number of parking spaces was sufficient to meet the forecast site need.

The study recommended that:

- ▶ a northbound left-turn lane with 15 m of storage length be constructed on **Conestogo Road at Street C**;
- ▶ a northbound and southbound left-turn lane with protected/permissive signal phasing be constructed on **Conestogo Road and Northfield Drive**; and
- ▶ The eastbound approach of **Conestogo Road and King Street North** be reconfigured to:
 - a dedicated right-turn lane; and
 - a shared left-through lane.

Agency Comments

The City of Waterloo and Region of Waterloo reviewed the report and provided comments to the applicant. The comments and requested action/information are summarized below.

City of Waterloo

- ▶ **Transportation Impact Study:** The City issued comments on 21 April 2022, and made no reference to the Study, or staff's review.
 - **Comment CoW1:** Subsequent to issuing the above-noted consolidated comments, the City requested a 23-metre Right-of-Way (ROW) to accommodate the left-turn lane on Conestogo Road. This request exceeded the existing ROW, including at the signalized intersection of Conestogo Road and King Street, where a left-turn lane currently exists.

- **Response:** *WalterFedy prepared and submitted a prepared functional design that illustrated with implementation of the left-turn lane at Street 'C' no additional ROW was required. To date the City has not responded. This matter remains unresolved.*



Region of Waterloo

- ▶ **Transportation Impact Study:** The Regional comments were contained in the 21 April 2022 consolidated comments and note that:

- **Comment RMOW1:** “That the consultant provide a brief memo in response to the relevant comments below and as provided in more detail to the traffic consultant in a letter dated November 23, 2021. The main concern is to gain a better understanding of the impacts of the proposed intersection improvements on the alternative transportation modes, particularly since this development has significant opportunity to leverage existing infrastructure for increasing the use of alternative modes (transit, walking, cycling) for the residents and shoppers regularly accessing the site.”

- **Response:** *WalterFedy prepared and submitted a prepared functional design that illustrated with implementation of the left-turn lane at Street ‘C’ no additional ROW was required. To date the City and Region have not responded. This matter remains unresolved.*

- **Comment RMOW2:** That the recommendations for the northbound and southbound left-turn lanes and associated left-turn phases at Northfield Drive and Conestoga Road / Colby Drive be deferred until the above requested memo is submitted and approved.

- **Response:** *WalterFedy prepared and submitted a prepared functional design that illustrated with implementation of the left-turn lane at Street ‘C’ no additional ROW was required. To date the City and Region have not responded. This matter remains unresolved.*

- **Comment RMOW3:** That the decision for the proposed northbound left-turn lane on Conestoga Road at proposed Street C, and the proposed reconfiguration of the eastbound approach at King Street North and Conestoga Road be deferred to staff at the City of Waterloo.

- **Response:** *WalterFedy prepared and submitted a prepared functional design that illustrated with implementation of the left-turn lane at Street ‘C’ no additional ROW was required. To date the City and Region have not responded. This matter remains unresolved.*

- Should the TIS recommend any additional road improvements on Northfield Drive West, a functional design, cost estimate, letter of credit/certified cheque along with a signed agreement for the road works may be required.

- **Response:** *The TIA does not recommend and road improvements to Northfield Drive West.*



Ministry of Transportation

- ▶ **Transportation Impact Study:** The Regional comments were contained in the 21 April 2022 consolidated comments and note that:

- **Comment MTO1:** The study did not include microsimulation modelling as requested in February 2020 and again in September 2020. For guidance on the ministry standards for microsimulation models the consultant should contact Jeanne-Marie Deletsu - Head, Traffic Modelling & Analysis Section at Jeanne-Marie.Deletsu@ontario.ca or (437) 288-4452

- **Response:** *The majority of the demand (~95%) generated by proposed development cannot be accessed by the Northfield Drive interchange as it serves (W-S, S-W, N-E and E-N) movements only. The ramp system is free-flow, with no traffic control and therefore cannot be assessed by traditional TIA operational methods. More specifically, the TIA assigns 5% of the demand to/from the north via Highway 85 (23 AM Peak Hour trips and 21 PM peak hour trips). This level of additional traffic on a free-flow ramp with a capacity of 1,800 vph and a will have imperceptible impacts on the Northfield Drive interchange.*

At the King Street Interchange, traffic generated by proposed development uses the free-flow S-N and N-S movements only which are not subject to any traffic control. and therefore cannot be assessed by traditional TIA operational methods. More specifically, the TIA assigns 150-240 peak hour trips to these ramps to increase the total ramp volumes to a high of about 850 vehicles per hour during the peak hours. This level of traffic on a free-flow ramp with a capacity of 1,800 vph is not typically a concern.

A microsimulation model is typically used where traditional analysis tools identify problematic movements or other operational concerns for free-flow conditions. The operational assessments contained in the TIA, show that the signalized ramp termini operate at excellent LOS throughout the planning horizons to 2037.

Accordingly, there is insufficient empirical support or need to develop such a micro-simulation model.

- **Comment MTO2:** In addition to the use of microsimulation, queue and storage lengths for left turn and through movements at the signalized ramp terminal intersections will be calculated using the arrival rate method explained on MTO's Signal Timing Policy. For queues/storage lengths for right turn movements we will use Chapter 9 of TAC's Geometric Design Guide for Canadian Roads. 2.1. Queue assessment shall include a review to determine if the queues impede access the free flow ramps/channelizations, auxiliary lanes, if they reach the adjacent intersection or the freeway. Volume distribution for queue/storage length assessment: 60/40 for dual left turn lanes, 50/50 for through volumes distributed in a 2-lane cross section.



- **Response:** The Northfield Drive traffic signals are operated by the Region of Waterloo. Accordingly, the Region of Waterloo operational analysis parameters govern. The analysis of the signals at Northfield Drive and Parkside Drive and Northfield Drive and Conestoga Road shows that the 95th percentile queues along Northfield Drive are no closer than 200 m from the free flow ramp gore. The implication of this information is that there is no impact on the operation of the free-flow ramps.

At the King Street ramps, the subject site does not contribute any significant traffic flow to the to the signalized ramp terminals (40-70 vehicles during the peak hour, or about one vehicle per cycle). Nonetheless, the forecast 95th percentile queues along King Street are no closer than 100 m from the free flow ramp gore. The implication of this information is that there is no impact on the operation of the free-flow ramps.

Based on this, there is no support for the notion that the queues (upon which the site has little impact) pose any potential operational impact on the access/egress to/from the free flow ramps.

- **Comment MTO3:** The ministry disagrees with the study area: The study did not include the Highway 85 – Northfield Drive interchange. Our communication in February 2020, requested that the interchange of Highway 85 – Northfield Drive be included. 3.2. Include the intersection of Northfield Drive – Kumpf Drive

- **Response:** Most of the demand (~95%) generated by proposed development cannot be accessed by the Northfield Drive interchange as it serves (W-S, S-W, N-E and E-N) movements only. The ramp system is free flow, with no traffic control and therefore cannot be assessed by traditional TIA operational methods. More specifically, the TIA assigns 5% of the demand to/from the north via Highway 85 (23 AM Peak Hour trips and 21 PM peak hour trips). This level of additional traffic on a free-flow ramp with a capacity of 1,800 vph and a will have imperceptible impacts on the Northfield Drive interchange.

The intersection of Kumpf Drive and Northfield Drive operates under the jurisdiction of the City of Waterloo and the Region of Waterloo. As Kumpf Drive operates as a RIRO intersection with stop control on the side street, neither agency expressed a desire to have the intersection analyzed. Further standard operational assessment techniques will not yield any probative information for Ministry. No site traffic has been assigned to Kumpf Drive.



- **Comment MTO4:** Trip distribution, Synchro and microsimulation model need to be adjusted to account for the updated study area. Simulation models shall match existing conditions including channelizations, free flow ramps, pedestrian/bike phases and LRT phases.

- **Response:** *It is our opinion that the Northfield Drive interchange will not be materially impacted by the site traffic as it serves only the W-S, S-W, N-E and E-N movements. Further the intersection of Kumpf Drive and Northfield Drive operates under the jurisdiction of the City of Waterloo and the Region of Waterloo. As Kumpf Drive operates as a RIRO intersection with stop control on the side street, neither agency expressed a desire to have the intersection analyzed. Further standard operational assessment techniques will not yield any probative information for Ministry. No site traffic has been assigned to Kumpf Drive.*

Beyond this, the LRT signal does not impact the free-flow operation of the ramps system. The signal permits S-E movements across the eastbound lanes of Northfield Drive, west of the ramp structure. Therefore, modelling the signal will provide the Ministry with no information regarding the operation of the free-flow ramps.

- **Comment MTO5:** The ministry has concerns with the data used in the study. MTO will contact the RMW to confirm next steps with regards to the data. Additional comments will be forthcoming.
 - Data was collected on different years and was not projected to the same initial year (i.e.: 2020 volumes).
 - There are lane balancing issues between the ramp terminals at Highway 85 – King Street and at Northfield Drive.
 - Highway 85 – King Street North Ramp Terminal:
 - Data was collected in November 11, 2020 (Remembrance Day); and it is not consistent and much lower than the 2013 counts provided in the appendices and the 2019 data collected by MTO.
 - WB right turn and SB left turn volumes were transposed in the Synchro files and figures. 7.3.3. WB right turn volumes were not collected.
 - Highway 85 – King Street South Ramp Terminal:
 - 2018 data is not recent enough to be used on a TIS.
 - There are some inconsistencies with the data collected by MTO in 2019.

- **Response:** *The Ministry refused to accept any data collected in 2020, or 2021, owing to the impacts of the COVID-19 Global Pandemic. Therefore, we were required to rely on available data, including those counted as far back as 2018. The Ministry did not provide its data for use in the study, despite requests.*



- **Comment MTO6:** The ministry does not have data for the ramps at Highway 85 – Northfield Drive Interchange..

• **Response:** *It is our opinion that the Northfield Drive interchange will not be materially impacted by the site traffic as it serves only the W-S, S-W, N-E and E-N movements.*

- **Comment MTO7:** Use the following for MTO facilities:

- 9.1. Synchro PHF:0.92 for all scenarios and peak periods.
- 9.2. Growth rate: 1%

• **Response:** *The subject lands do not add traffic to any Ministry-controlled signalized intersections. The Ministry parameters conflict with the Region of Waterloo parameters leading to potentially two different assessments for the same intersections. This was discussed at the pre-study consultation, and it was agreed the RMOW parameters would be used, including the forecast growth rates.*

- **Comment MTO7:** Submit 2 copies of the report in PDF format: one locked and sealed; and the other unlocked and without the seal.

• **Response:** *It is Paradigm's practice to provide two digital copies with each submission:*

Courtesy Copy – *This version is printable. It also allows PDF comments and posting on agency web sites. It is not signed or sealed.*

Submission Copy – *This is a signed, sealed version (required by review agencies) that in accordance with guidance from the Professional Engineers of Ontario is locked from printing and editing, protecting our practitioner's seal.*

The guidance from Professional Engineers of Ontario (Use of the Professional Engineer's Seal) details the obligations of the practitioner and the firm. Sections 7.2 and 7.3 clearly layout these obligations. If a document contains a professional engineers seal, we are obliged to take all reasonable precautions to ensure that the document cannot be modified without our knowledge and have a mechanism in place to ensure our practitioner's seal is protected. We have discussed our approach with the Professional Engineers of Ontario, and they support our practice.

- **Comment MTO8:** Please note that there is another development at 475-485 King St N (Waterloo Inn) who's study area and timeline overlaps with this one. MTO's suggestion is to do one comprehensive study to include both developments as they both have to do the same kind of study.



- **Response:** *The development applications for the 475-485 King St N (Waterloo Inn) project were filed after the candidate site's documents were prepared and submitted. It is neither fair, nor reasonable to delay this application on that basis.*

Further, the 475-485 King St N (Waterloo Inn) application have since been filed, giving due consideration to the 525-565 Conestoga Road development. Therefore, the Ministry has already been provided with this information. The Ministry's review of this application did not identify any additional operational concerns at the Highway 85 and King Street ramp termini.

Response Summary and Action

The summary responses include:

- ▶ **Functional Design of Conestoga Road:** WalterFedy has prepared and submitted a functional design for Conestoga Road across the site frontage. It shows that should the City of Waterloo elect to require left-turn lanes at the site driveways and the Region require one, northbound at Northfield Drive, that they could be constructed within the existing ROW.
- ▶ **Data:** The Ministry has objected to the use of data collected prior to the COVID-19 Global pandemic and at the same time, objected to the use of any data collected during the pandemic. These conflicting demands are confounding.

Subsequent applications (475-485 King St N (Waterloo Inn)) filed in 2021 (and accepted by the Ministry), that contained updated information showed that traffic volumes decreased over the 2019 data.

- ▶ **Micro-Simulation Model:** In general, the need and justification for a micro-simulation model requested by the Ministry is questionable. A microsimulation model is typically used where traditional analysis tools identify problematic movements or other operational concerns for free-flow conditions. The operational assessments contained in the TIA (attached here), show that the signalized ramp termini operate at excellent LOS throughout the planning horizons to 2037. Beyond this, the site movements make little use of the Highway 85/Northfield Drive interchange as it primarily serves S-W and W-S demand with free-flow right-turn ramps. In addition, the impacts at the King Street interchange are limited to additional traffic on free-flow S-N and N-S ramps.

Subsequent applications (475-485 King Street North) were not held to the same standard, despite adding more traffic than the proposed development to the critical movements at the signalized termini at Highway 85 and King Street North.

Accordingly, there is insufficient empirical support or need to develop such a micro-simulation model.



New Development Plan

Following the completion of the Study and submission of the planning applications, site ownership was transferred and the development plan was revised. The current applicant has created revised plans with additional residential units, reduced commercial (retail) space, and no office space.

Figure 1 illustrates the revised development concept. Note that development south of the Hydro One corridor has been eliminated.

Table 1 compares the development statistics between the two plans.

TABLE 1: REVISED DEVELOPMENT STATISTICS

Original Plan	Revised Plan	Difference
432 mid-rise residential units	432 mid-rise residential units	No change
2102 high-rise residential units	3548 high-rise residential units	1446 more high-rise residential units
196,100 ft ² of office space	0 ft ² of office space	196,100 ft ² less office space
21,400 ft ² of commercial space	17,575 ft ² of commercial space	3,825 ft ² less commercial space

Base Year (2020) Traffic Volumes

Observed traffic volumes were adjusted by the accepted growth rates to normalize all counts to a consistent base year (2020). **Figure 2** and **Figure 3** illustrate the revised base year (2020) traffic volumes during the AM peak hour and PM peak hour, respectively

2037 Traffic Forecasts

Background Traffic Forecasts

Given the information for 475-485 King St N (Waterloo Inn) is now known, and the planning applications have been filed, the background traffic forecasts have been updated to include the proposed development's contribution.

Figure 4 and **Figure 5** illustrate the updated 2037 background traffic assignment for the AM peak hour and 237 PM peak conditions, respectively.



Site Trip Generation

Applying the trip generation methodology of section 3.2 (“Trip Generation”) of the TIS report results in 959 trips in AM peak hour and 1092 trips in the PM peak hour. This allows for internal capture (site residents using the site commercial facilities). The net change of the revise development is 172 AM peak hour trips and 235 additional PM peak hour trips.

Table 2 summarizes the revised site trip generation under the new development plan.

Figure 6 and **Figure 7** illustrate the revised forecast traffic assignment under the new development plan during the 2037 AM peak hour and 2037 PM peak hour respectively.

Total Traffic Forecasts

Figure 8 and **Figure 9** illustrate the 2037 total traffic assignment under the new development plan and updated background forecasts for the AM peak hour and PM peak hour, respectively.

Traffic Operations

Table 3 and **Table 4** summarize the updated study area intersection forecast operations under the new development plan and updated background traffic forecasts at the 2037 horizon during the AM peak hour and PM peak hour, respectively. The assessment indicates:

- ▶ The Highway 85 and King Street ramp termini are forecast to operate at excellent Levels of Service (LOS ‘A-B’) during both the AM and PM peak hours at the 2037 total development horizon;
- ▶ The only local intersection with problematic movements remains Northfield Drive and Conestogo Road where the previously recommended northbound left-turn lane will assist in reducing overall delays.
- ▶ The balance of the signalized intersections are forecast to operate at LOS ‘D’ to 2037 or better with no individual problem movements.

Conclusions

Based on the revised development submission and the responses to the requests it is concluded that:

- ▶ **Micro-Simulation Model:** A microsimulation model is typically used where traditional analysis tools identify problematic movements or other operational concerns for free-flow conditions. The operational assessments show that the signalized ramp termini operate at excellent LOS throughout the planning horizons to 2037. Accordingly, there is insufficient empirical support or need to develop such a micro-simulation model.
- ▶ **Non-MTO Intersection Operations:** The only local intersection with problematic movements remains Northfield Drive and Conestogo Road where the previously recommended northbound left-turn lane will assist in reducing overall delays. The



balance of the signalized intersections are forecast to operate at LOS 'D' to 2037 or better with no individual problem movements.

- ▶ **Functional Design of Conestoga Road:** A functional design to provide the required left-turn lane at the site entrance has prepared and submitted a functional design for Conestoga Road across the site frontage. It shows that should the City of Waterloo elect to require left-turn lanes at the site driveways and the Region require one, northbound at Northfield Drive, that they could be constructed within the existing ROW.

Recommendation

Based on the analyses contained herein it is recommended that the review agencies apply the following conditions to the development approvals for the subject lands:

- ▶ A northbound left-turn lane with 15 m of storage length be constructed on **Conestogo Road at each site access**;
- ▶ A northbound and southbound left-turn lane with protected/permissive signal phasing be constructed on **Conestogo Road and Northfield Drive**; and
- ▶ The eastbound approach of **Conestogo Road and King Street North** be reconfigured to:
 - a dedicated right-turn lane; and
 - a shared left-through lane.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED



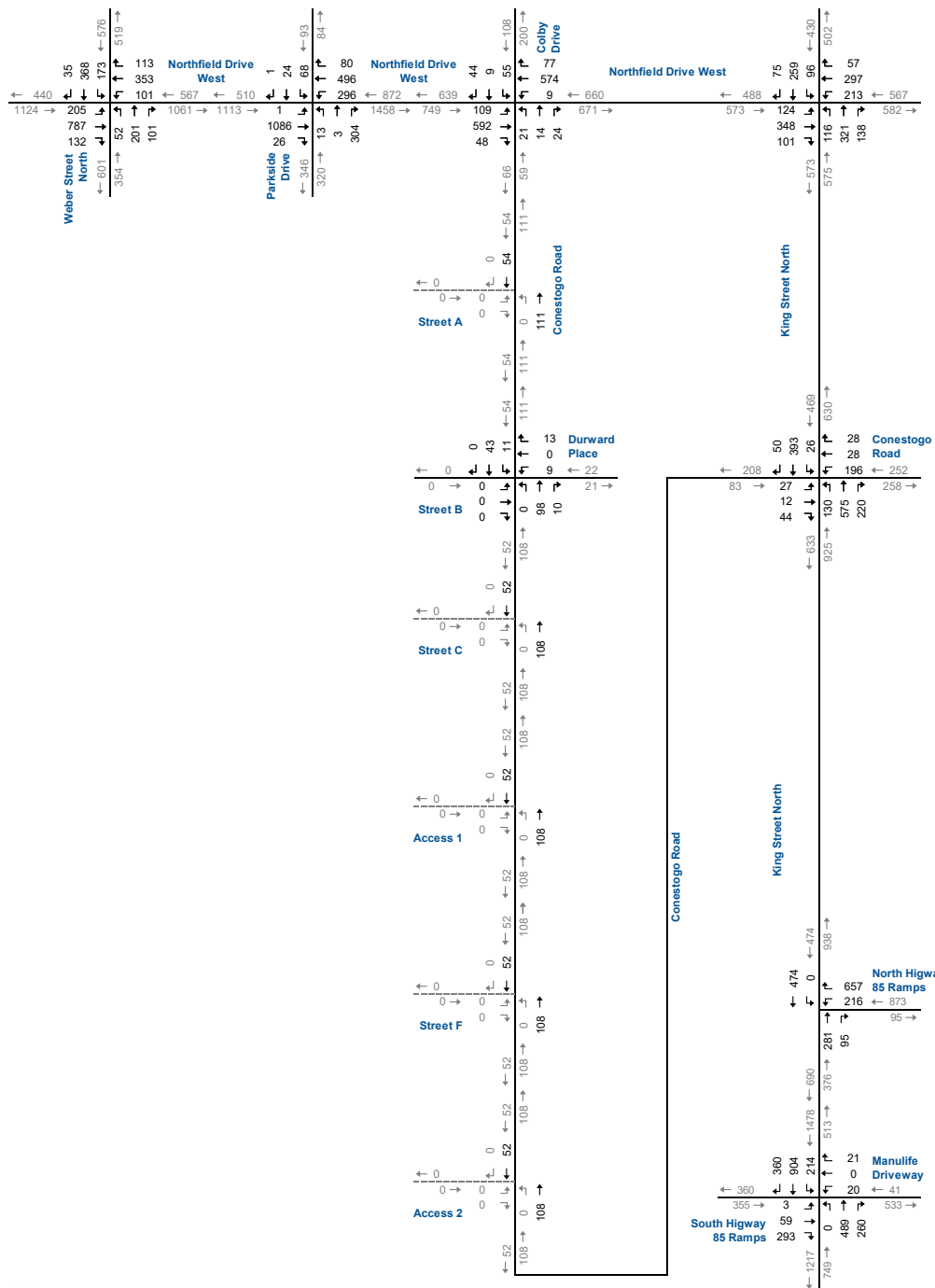
Jim Mallett

M.A.Sc., P.Eng., PTOE

President and Chief Executive Officer, Principal





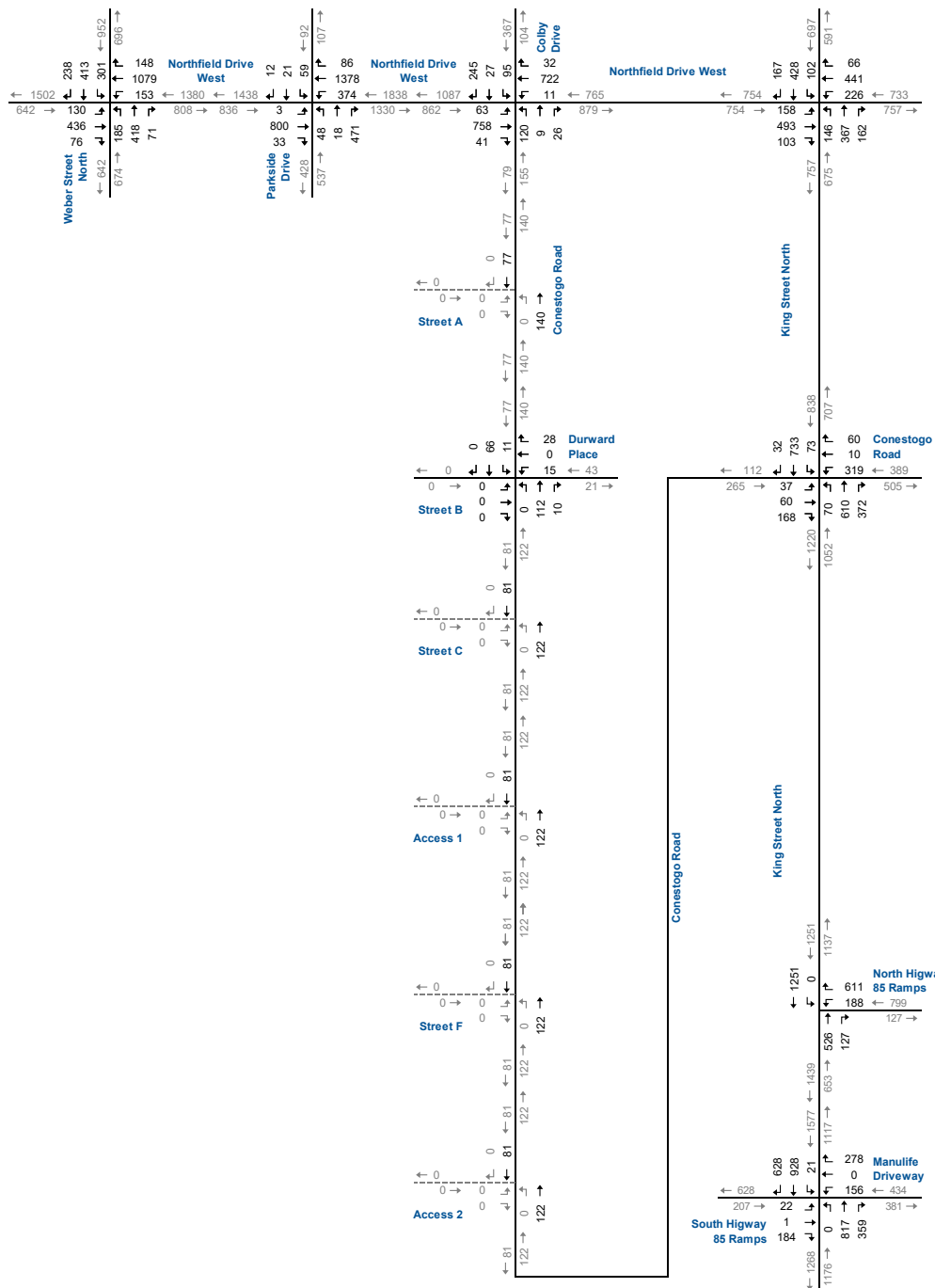


2020 Adjusted Base Year AM Peak Hour Traffic Volumes

562-565 Conestogo Road
220661

Figure 2



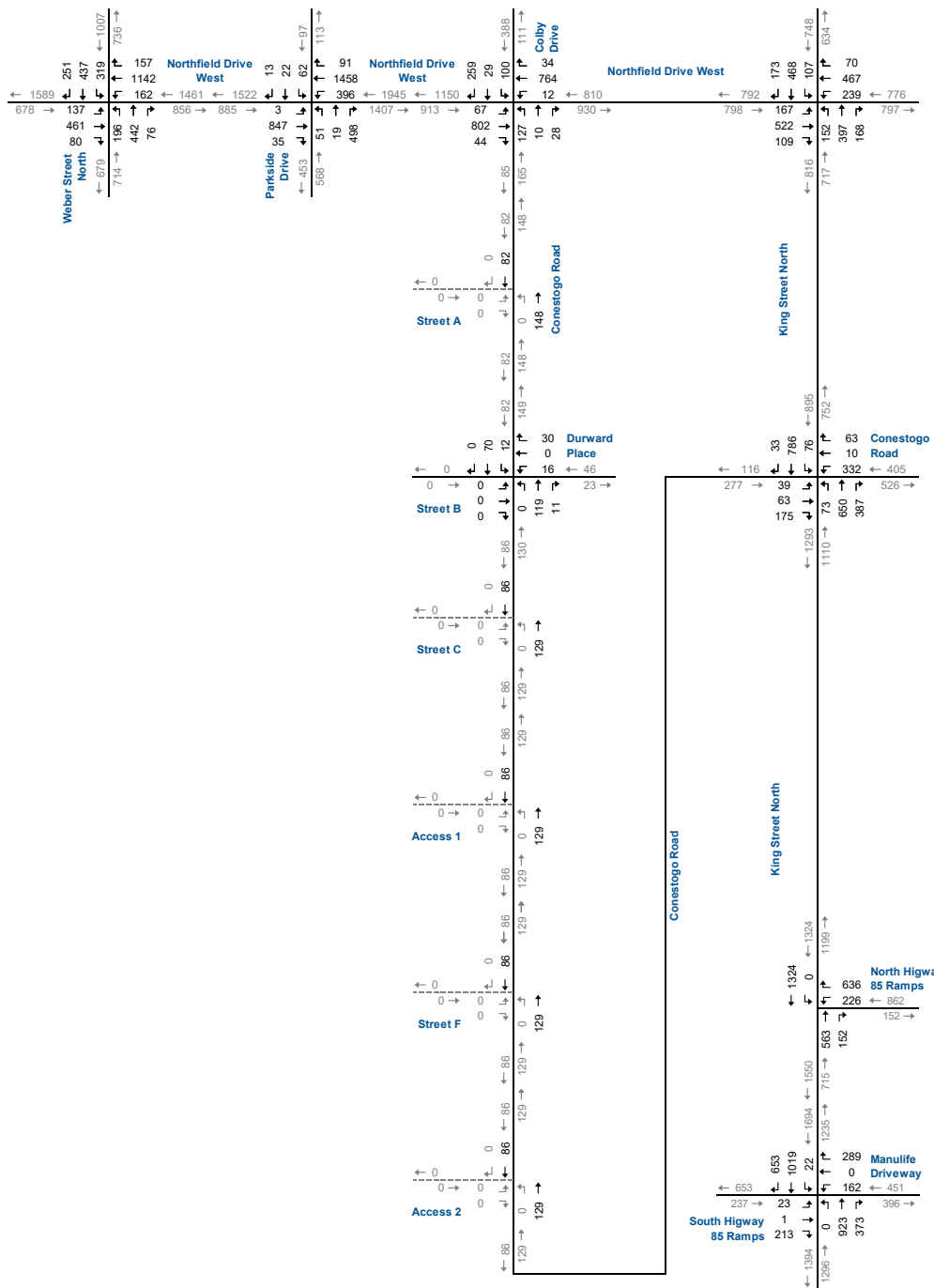


2020 Adjust Base Year PM Peak Hour Traffic Volumes

562-565 Conestogo Road
220661

Figure 3



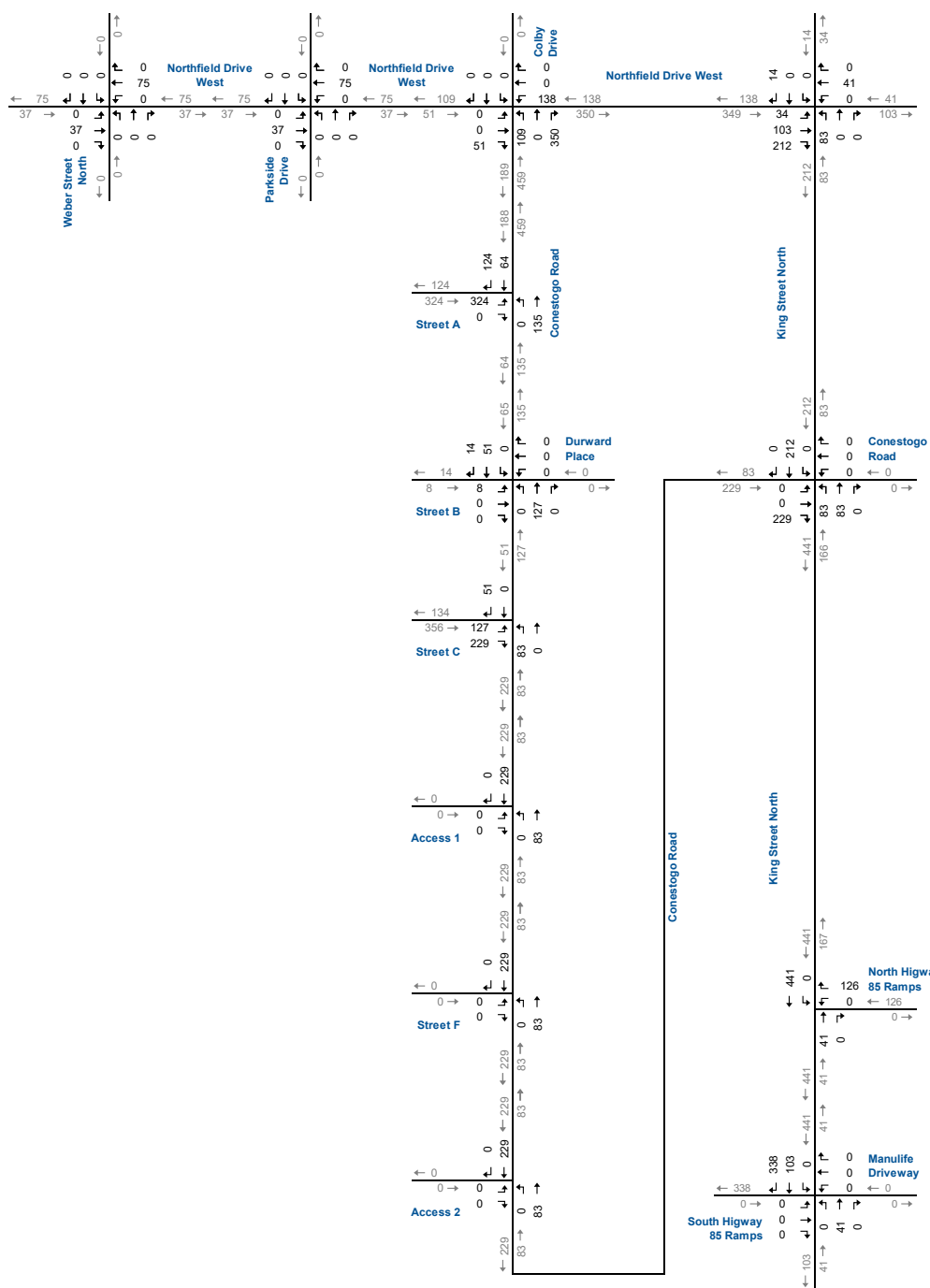


Revised 2037 Background PM Peak Hour Traffic Volumes

562-565 Conestogo Road
220661

Figure 5





Revised Site-Generated AM Peak Hour Traffic Volumes

562-565 Conestogo Road
220661

Figure 6



TABLE 2: REVISED SITE TRIP GENERATION

Full Build-Out (2027)									
221: Multifamily Housing (Mid-Rise)	432 Units	(1)	37	107	144	(2)	110	70	180
222: Multifamily Housing (High-Rise)	3548 Units	(3)	241	765	1006	(4)	741	474	1215
820: Shopping Center	17.6 1000 Sq. ft	(5)	100	61	161	(6)	72	78	150
Total Trips			378	933	1311		923	622	1545
<i>Internal Capture</i>		-	16	16	32	-	24	24	48
<i>Mode Split</i>		25%	91	229	320	25%	225	150	375
<i>Passby: 820</i>		n/a	0	0	0	34%	15	15	30
Total Net Trips			271	688	959		659	433	1092

(1) $Ln(Trip) = 0.98Ln(x) - 0.98$

(2) $Ln(Trip) = 0.96Ln(x) - 0.63$

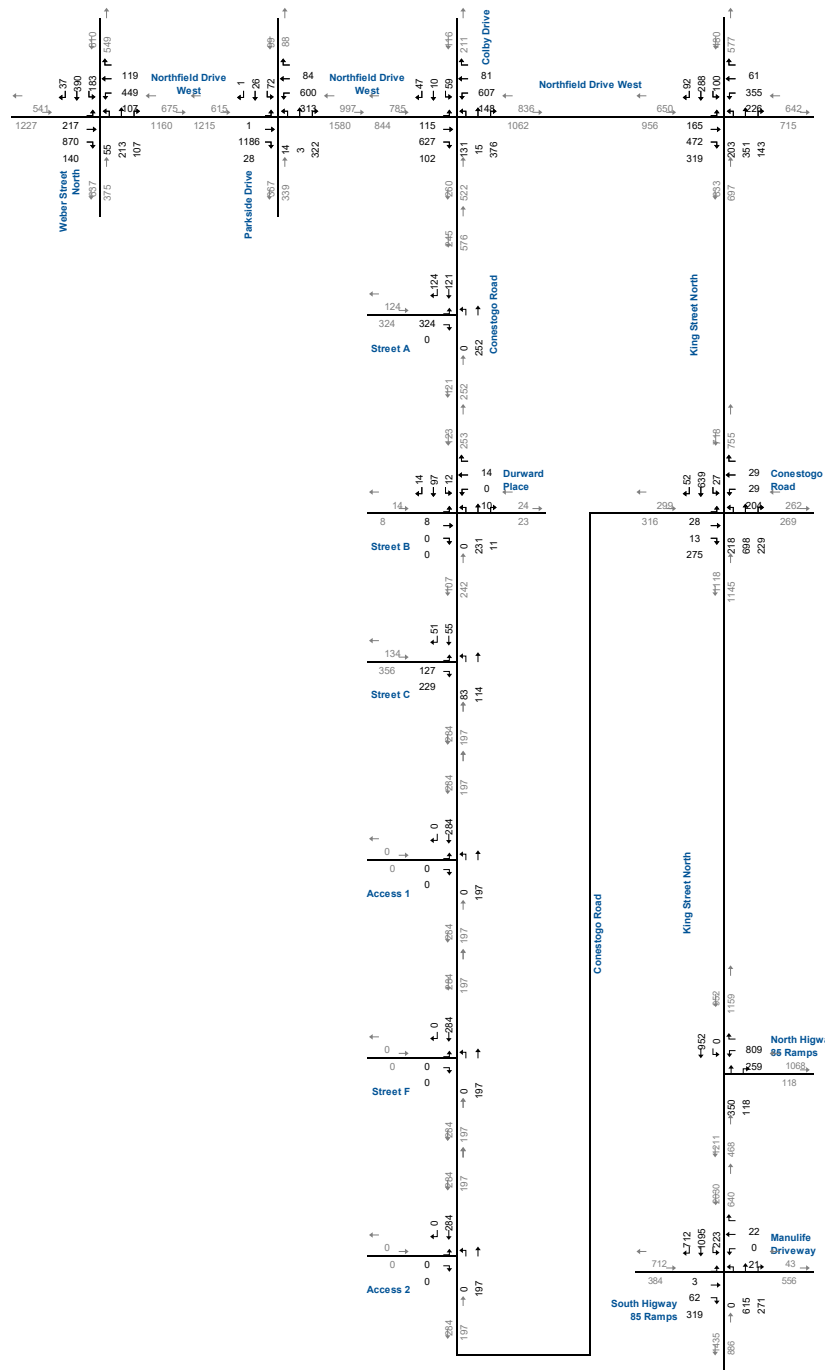
(3) $Trip = 0.28x + 12.86$

(4) $Trip = 0.34x + 8.56$

(5) $Trip = 0.50x + 151.78$

(6) $Ln(Trip) = 0.74Ln(x) + 2.89$



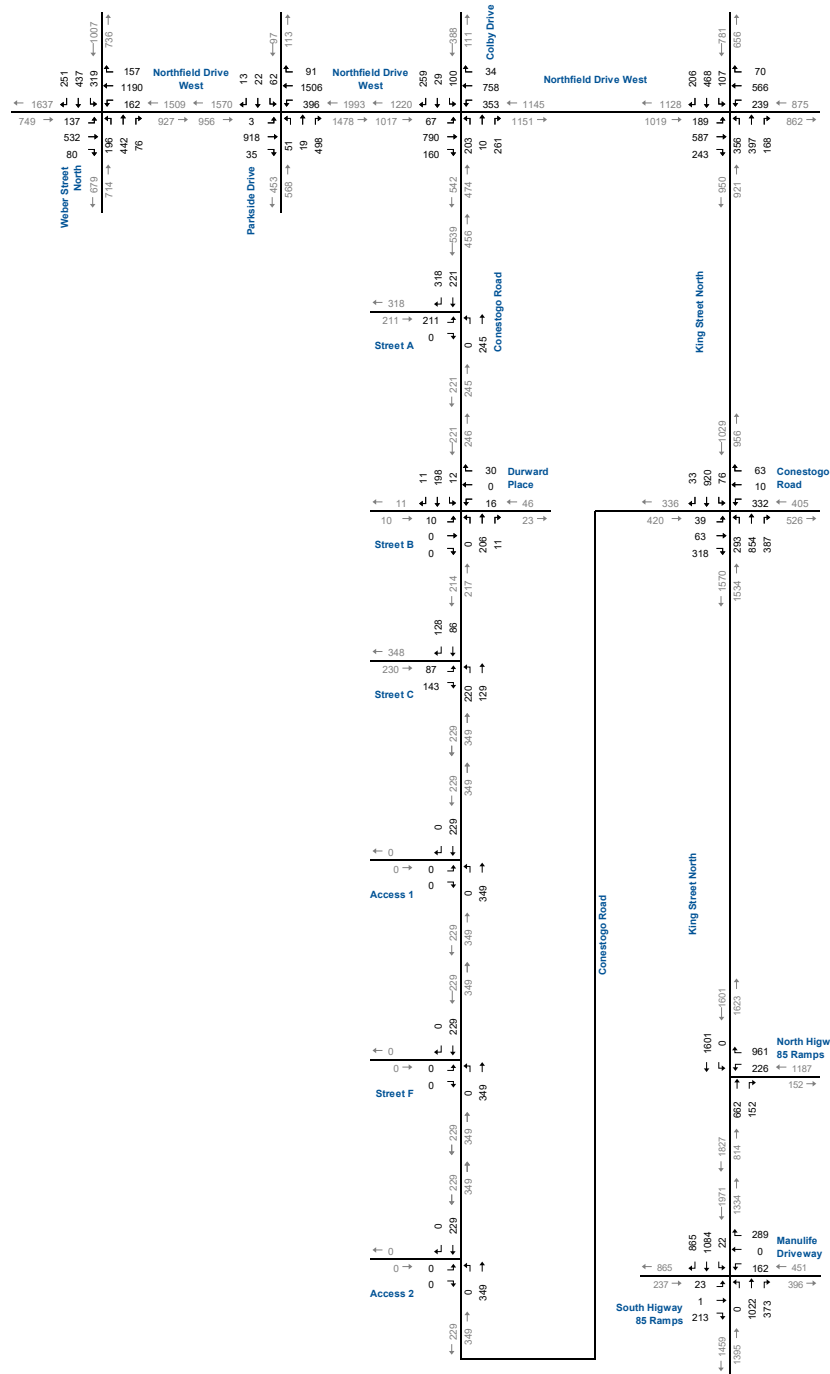


Revised 2037 Total AM Peak Hour Traffic Volumes

562-565 Conestogo Road
220661

Figure 8





Revised 2037 Background PM Peak Hour Traffic Volumes

562-565 Conestogo Road
220661

Figure 9



**TABLE 3: UPDATED 2037 AM PEAK HOUR
FORECAST INTERSECTION OPERATIONS**

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Weber Street North & Northfield Drive West	TCS	LOS Delay V/C Q	C 24 0.53 49	D 38 0.80 144	> > >	D 36	C 33 0.59 26	C 31 0.38 60	A 1 0.20 1	C 26	C 21 0.16 16	C 28 0.35 40	> > >	C 26	C 24 0.42 44	C 27 0.35 54	> > >	C 26	C 30
	Parkside Drive & Northfield Drive West	TCS	LOS Delay V/C Q	B 18 0.00 1	C 28 0.73 172	> > >	C 28	C 33 0.76 72	A 6 0.29 32	> > >	B 14	< 40 0.06 10	A 10 0.61 27	> > >	B 11	D 45 0.31 30	D 39 0.08 14	> > >	D 44	C 21
	Conestogo Road/Colby Drive & Northfield Drive West	TCS	LOS Delay V/C Q	D 50 0.53 40	C 22 0.53 80	> > >	C 26	D 49 0.61 48	B 19 0.47 68	> > >	C 25	< 189 1.33 196	F > > >	F 189	< 31 0.50 35	C > > >	C 31	E 62		
	King Street North & Northfield Drive West	TCS	LOS Delay V/C Q	B 20 0.40 35	D 36 0.78 107	> > >	C 34	D 52 0.54 42	C 28 0.38 53	> > >	D 37	C 28 0.50 58	C 33 0.50 75	> > >	C 32	C 24 0.30 30	D 35 0.29 47	A 1 0.18 1	C 26	C 32
	Conestogo Road & Access 2/Durward Place	TWSC	LOS Delay V/C Q	< 11 0.01 0	B > > >	B 11	< 10 0.04 1	B > > >	B 10	A 0 0.00 0	A 0 0.00 0	A 0 0.00 0	A 0 0.00 0	A 0	A 8 0.01 0	A 0 0.00 0	A 0 0.00 0	A 1		
	King Street North & Conestogo Road	TCS	LOS Delay V/C Q	D 38 0.16 13	B 14 0.66 28	> > >	B 16	D 45 0.51 34	B 14 0.13 13	> > >	D 38	B 16 0.55 38	B 16 0.37 76	A 8 0.24 38	B 14	D 48 0.25 14	C 21 0.48 75	> > >	C 22	B 19
	King Street North & Highway 85 Ramps (North)	TCS	LOS Delay V/C Q					D 35 0.50 34		A 1 0.55 0	A 10		A 3 0.21 16	> > >	A 3	A 0 0.00 0	A 5 0.39 41		A 5	A 6
	King Street North & Highway 85 Ramps (South)/Manulife	TCS	LOS Delay V/C Q	C 35 0.01 3	D 39 0.24 24	A 0 0.22 0	A 7	D 37 0.13 11		A 1 0.09 0	B 19		A 6 0.28 35	A 1 0.26 8	A 5	A 4 0.39 16	A 4 0.42 44	A 2 0.55 0	A 3	A 4

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



**TABLE 4: UPDATED 2037 PM PEAK HOUR
FORECAST INTERSECTION OPERATIONS**

Analysis Period	Intersection	Control Type	MOE	Direction/Movement/Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
PM Peak Hour	Weber Street North & Northfield Drive West	TCS	LOS Delay V/C Q	E 57 0.81 53	C 29 0.50 77	> > >	C 34	C 22 0.48 36	D 40 0.84 169	A 9 0.25 21	C 35	D 38 0.71 50	D 40 0.58 76	> > >	D 39	D 53 0.89 94	D 36 0.69 91	> > >	D 41	D 37
	Parkside Drive & Northfield Drive West	TCS	LOS Delay V/C Q	B 19 0.03 2	C 26 0.62 115	> > >	C 26	E 65 0.99 128	B 16 0.74 165	> > >	C 26	< 34 0.19 25	C 23 0.79 87	> > >	C 24	C 34 0.20 23	C 23 0.08 12	> > >	C 30	C 26
	Conestogo Road/Colby Drive & Northfield Drive West	TCS	LOS Delay V/C Q	E 70 0.55 32	D 41 0.84 136	> > >	D 43	F 526 2.06 194	C 29 0.58 100	> > >	F 182	< 119 1.14 192	> > >	F 119	< 30 0.75 102	C 30	> > >	C 30	F 106	
	King Street North & Northfield Drive West	TCS	LOS Delay V/C Q	C 24 0.55 40	D 41 0.80 124	> > >	D 38	D 54 0.55 44	C 32 0.56 85	> > >	D 38	F 81 1.01 136	D 35 0.55 87	> > >	D 53	C 26 0.36 31	D 39 0.48 74	A 7 0.37 20	C 29	D 40
	Conestogo Road & Access 2/Durward Place	TWSC	LOS Delay V/C Q	< 12 0.02 1	B 12	> > >	B 12	< 11 0.07 2	> > >	B 11	A 0 0.00 0	A 0 0.00 0	A 0 0.00 0	> > >	A 0	A 0 0.01 0	A 0 0.00 0	A 0 0.00 0	A 0	
	King Street North & Conestogo Road	TCS	LOS Delay V/C Q	C 35 0.15 16	C 32 0.82 76	> > >	C 33	F 112 1.05 80	A 8 0.14 11	> > >	F 94	D 48 0.87 104	C 24 0.52 110	B 17 0.47 89	C 27	E 61 0.50 35	C 32 0.72 136	> > >	C 34	D 38
	King Street North & Highway 85 Ramps (North)	TCS	LOS Delay V/C Q					D 38 0.48 33		A 2 0.66 0	A 9		A 4 0.34 32	> > >	A 4	A 0 0.00 0	A 6 0.63 90		A 6	A 7
King Street North & Highway 85 Ramps (South)/Manulife	TCS	LOS Delay V/C Q	C 24 0.05 9	C 22 0.00 1	C 27 0.56 50	C 27	C 32 0.50 46		C 32 0.70 68	C 32		A 9 0.48 81	A 2 0.35 12	A 7	A 8 0.09 6	A 10 0.51 88	A 4 0.72 16	A 7	B 11	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

V/C - Volume to Capacity Ratio

Q - 95th Percentile Queue Length (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

< / > - Shared with through movement



2037 Peak Hour Traffic Operations Assessments



Lanes, Volumes, Timings

(200039) 525-565 Conestogo Road

1: Weber Street North & Northfield Drive West

Total 2037 AM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖	↖	↖		↖	↖	
Traffic Volume (vph)	217	870	140	107	449	119	55	213	107	183	390	37
Future Volume (vph)	217	870	140	107	449	119	55	213	107	183	390	37
Ideal Flow (vphpl)	1775	1775	1775	1775	1900	1750	1775	1775	1775	1775	1775	1775
Storage Length (m)	100.0		0.0	50.0		65.0	95.0		0.0	85.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	100.0			85.0			40.0			40.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00			0.98	0.99		1.00	1.00	
Frt		0.979				0.850		0.950			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1670	3255	0	1670	3438	1430	1653	3036	0	1561	3172	0
Flt Permitted	0.356			0.119			0.503			0.431		
Satd. Flow (perm)	623	3255	0	209	3438	1403	864	3036	0	707	3172	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17				191		72			9	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		195.7			296.1			157.0			246.4	
Travel Time (s)		11.7			17.8			11.3			17.7	
Confl. Peds. (#/hr)	8		11	11		8	20		3	3		20
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	2%	1%	5%	4%	2%	6%	3%	8%	4%	11%
Adj. Flow (vph)	217	870	140	107	449	119	55	213	107	183	390	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	217	1010	0	107	449	119	55	320	0	183	427	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	38.4		5.0	38.4	38.4	5.0	30.0		7.0	30.0	
Minimum Split (s)	9.0	44.4		9.0	44.4	44.4	9.0	36.0		13.0	36.0	
Total Split (s)	16.8	49.2		12.0	44.4	44.4	10.8	36.0		22.8	48.0	
Total Split (%)	14.0%	41.0%		10.0%	37.0%	37.0%	9.0%	30.0%		19.0%	40.0%	
Maximum Green (s)	12.8	43.2		8.0	38.4	38.4	6.8	30.0		16.8	42.0	
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0	-2.0	0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max	Max	None	Max		None	Max	
Walk Time (s)		14.4			14.4	14.4		11.0			11.0	
Flash Dont Walk (s)		24.0			24.0	24.0		19.0			19.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effect Green (s)	56.7	45.2		48.5	40.8	40.8	40.1	33.6		53.2	44.7	
Actuated g/C Ratio	0.48	0.38		0.41	0.35	0.35	0.34	0.28		0.45	0.38	
v/c Ratio	0.53	0.80		0.59	0.38	0.20	0.16	0.35		0.42	0.35	

Lanes, Volumes, Timings

(200039) 525-565 Conestogo Road

1: Weber Street North & Northfield Drive West

Total 2037 AM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	24.0	38.3		32.9	30.8	0.9	20.6	27.5		23.5	27.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	24.0	38.3		32.9	30.8	0.9	20.6	27.5		23.5	27.4	
LOS	C	D		C	C	A	C	C		C	C	
Approach Delay		35.8			25.9			26.5			26.3	
Approach LOS		D			C			C			C	
Queue Length 50th (m)	31.5	115.6		14.4	44.4	0.0	7.5	25.1		27.3	39.4	
Queue Length 95th (m)	49.0	143.9		26.4	59.5	0.7	15.5	39.8		43.9	53.7	
Internal Link Dist (m)		171.7			272.1			133.0			222.4	
Turn Bay Length (m)	100.0			50.0		65.0	95.0			85.0		
Base Capacity (vph)	413	1256		185	1187	610	340	914		454	1205	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.53	0.80		0.58	0.38	0.20	0.16	0.35		0.40	0.35	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 118.2

Natural Cycle: 105

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 30.2

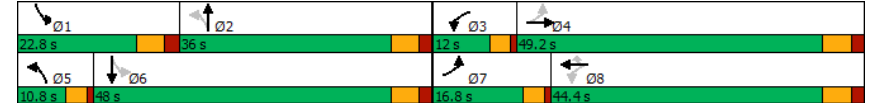
Intersection LOS: C

Intersection Capacity Utilization 94.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: Weber Street North & Northfield Drive West



Lanes, Volumes, Timings

(200039) 525-565 Conestogo Road

2: Parkside Drive & Northfield Drive West

Total 2037 AM Peak Hour

	↖	→	↘	↙	←	↖	↙	↗	↘	↖	↙	↗	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖		↖	↖			↖	↖	↖	↖		
Traffic Volume (vph)	1	1186	28	313	600	84	14	3	322	72	26	1	
Future Volume (vph)	1	1186	28	313	600	84	14	3	322	72	26	1	
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1650	1650	1750	1650	1650	1750	
Storage Length (m)	35.0		0.0	25.0		0.0	0.0		25.0	7.5		0.0	
Storage Lanes	1		0	1		0	0		1	1		0	
Taper Length (m)	60.0			55.0			0.0			60.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		1.00		1.00	0.96	0.97	1.00		
Frt		0.997			0.982				0.850		0.994		
Flt Protected	0.950			0.950				0.960		0.950			
Satd. Flow (prot)	1686	3265	0	1621	3214	0	0	1584	1430	1507	1639	0	
Flt Permitted	0.392			0.113				0.840		0.746			
Satd. Flow (perm)	695	3265	0	193	3214	0	0	1383	1376	1153	1639	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		2			34				322		1		
Link Speed (k/h)		60			60			50			50		
Link Distance (m)		296.1			760.4			102.9			159.0		
Travel Time (s)		17.8			45.6			7.4			11.4		
Confl. Peds. (#/hr)	3		2	2		3	2		22	22		2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Heavy Vehicles (%)	0%	3%	0%	4%	3%	1%	0%	0%	4%	4%	0%	0%	
Adj. Flow (vph)	1	1186	28	313	600	84	14	3	322	72	26	1	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	1	1214	0	313	684	0	0	17	322	72	27	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA		
Protected Phases		4		3	8			2			6		
Permitted Phases	4			8			2		2	6			
Detector Phase	4	4		3	8		2	2	2	6	6		
Switch Phase													
Minimum Initial (s)	48.0	48.0		5.0	48.0		30.0	30.0	30.0	30.0	30.0		
Minimum Split (s)	54.0	54.0		9.0	63.0		36.0	36.0	36.0	36.0	36.0		
Total Split (s)	56.0	56.0		36.0	92.0		28.0	28.0	28.0	28.0	28.0		
Total Split (%)	46.7%	46.7%		30.0%	76.7%		23.3%	23.3%	23.3%	23.3%	23.3%		
Maximum Green (s)	50.0	50.0		32.0	86.0		22.0	22.0	22.0	22.0	22.0		
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0		0.0	-2.0		-2.0	-2.0	-2.0	-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0		
Lead/Lag	Lag	Lag		Lead									
Lead-Lag Optimize?	Yes	Yes		Yes									
Vehicle Extension (s)	3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0		
Recall Mode	Max	Max		None	Max		None	None	None	None	None		
Walk Time (s)	40.0	40.0			40.0		10.0	10.0	10.0	10.0	10.0		
Flash Dont Walk (s)	8.0	8.0			8.0		20.0	20.0	20.0	20.0	20.0		
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0		
Act Effct Green (s)	61.2	61.2		88.0	88.0			24.0	24.0	24.0	24.0		
Actuated g/C Ratio	0.51	0.51		0.73	0.73			0.20	0.20	0.20	0.20		
v/c Ratio	0.00	0.73		0.76	0.29			0.06	0.61	0.31	0.08		

Lanes, Volumes, Timings

(200039) 525-565 Conestogo Road

2: Parkside Drive & Northfield Drive West

Total 2037 AM Peak Hour

	↖	→	↘	↙	←	↖	↙	↗	↘	↖	↙	↗	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	18.0	27.5		32.6	5.5			39.8	9.8	45.4	38.9		
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay	18.0	27.5		32.6	5.5			39.8	9.8	45.4	38.9		
LOS	B	C		C	A			D	A	D	D		
Approach Delay		27.5			14.0			11.3			43.6		
Approach LOS		C			B			B			D		
Queue Length 50th (m)	0.1	119.6		43.9	24.8			3.4	0.0	15.4	5.3		
Queue Length 95th (m)	1.3	172.0		72.5	32.2			10.2	27.1	30.1	13.8		
Internal Link Dist (m)		272.1			736.4			78.9			135.0		
Turn Bay Length (m)	35.0			25.0					25.0	7.5			
Base Capacity (vph)	354	1665		522	2366			276	532	230	328		
Starvation Cap Reductn	0	0		0	0			0	0	0	0		
Spillback Cap Reductn	0	0		0	0			0	0	0	0		
Storage Cap Reductn	0	0		0	0			0	0	0	0		
Reduced v/c Ratio	0.00	0.73		0.60	0.29			0.06	0.61	0.31	0.08		

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 20.9

Intersection LOS: C

Intersection Capacity Utilization 115.0%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 2: Parkside Drive & Northfield Drive West



Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
3: Conestogo Road/Colby Drive & Northfield Drive West Total 2037 AM Peak Hour

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↔	↔		↔	↔			↔			↔		
Traffic Volume (vph)	115	627	102	148	607	81	131	15	376	59	10	47	
Future Volume (vph)	115	627	102	148	607	81	131	15	376	59	10	47	
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1550	1550	1550	1550	1550	1550	
Storage Length (m)	30.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	0		0	0		0	
Taper Length (m)	55.0			85.0			0.0			0.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		1.00		0.99				0.99	
Frt		0.979			0.982			0.903				0.945	
Flt Protected	0.950			0.950				0.988				0.975	
Satd. Flow (prot)	1653	3182	0	1519	3136	0	0	1205	0	0	1308	0	
Flt Permitted	0.950			0.950				0.878				0.542	
Satd. Flow (perm)	1652	3182	0	1518	3136	0	0	1070	0	0	727	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		20			18			125			33		
Link Speed (k/h)		60			60			50			50		
Link Distance (m)		760.4			386.4			111.9			225.9		
Travel Time (s)		45.6			23.2			8.1			16.3		
Confl. Peds. (#/hr)	1		2	2		1	1		1	1		1	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Heavy Vehicles (%)	2%	3%	6%	11%	5%	8%	5%	7%	17%	11%	11%	5%	
Adj. Flow (vph)	115	627	102	148	607	81	131	15	376	59	10	47	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	115	729	0	148	688	0	0	522	0	0	116	0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA		
Protected Phases	7	4		3	8			2			6		
Permitted Phases							2			6			
Detector Phase	7	4		3	8		2	2		6	6		
Switch Phase													
Minimum Initial (s)	5.0	40.0		5.0	40.0		8.0	8.0		8.0	8.0		
Minimum Split (s)	10.0	46.0		10.0	46.0		14.0	14.0		14.0	14.0		
Total Split (s)	21.0	41.0		29.0	49.0		32.0	32.0		32.0	32.0		
Total Split (%)	20.6%	40.2%		28.4%	48.0%		31.4%	31.4%		31.4%	31.4%		
Maximum Green (s)	16.0	35.0		24.0	43.0		26.0	26.0		26.0	26.0		
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-1.0	-2.0		-1.0	-2.0			-2.0			-2.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0			4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	Yes	Yes		Yes	Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Recall Mode	None	Max		None	Max		None	None		None	None		
Walk Time (s)		29.0			29.0			10.0			10.0		
Flash Dont Walk (s)		11.0			11.0		19.0	19.0		19.0	19.0		
Pedestrian Calls (#/hr)		0			0		0	0		0	0		
Act Effct Green (s)	12.8	42.6		15.8	45.6			28.0			28.0		
Actuated g/C Ratio	0.13	0.43		0.16	0.46			0.28			0.28		
v/c Ratio	0.53	0.53		0.61	0.47			1.33			0.50		

Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
3: Conestogo Road/Colby Drive & Northfield Drive West Total 2037 AM Peak Hour

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	49.5	22.3		49.1	19.3					188.8		30.9	
Queue Delay	0.0	0.0		0.0	0.0					0.0		0.0	
Total Delay	49.5	22.3		49.1	19.3					188.8		30.9	
LOS	D	C		D	B					F		C	
Approach Delay		26.0			24.6					188.8		30.9	
Approach LOS		C			C					F		C	
Queue Length 50th (m)	21.7	53.4		27.8	47.1					~117.5		13.6	
Queue Length 95th (m)	40.3	79.8		47.9	67.5					#195.6		35.0	
Internal Link Dist (m)		736.4			362.4					87.9		201.9	
Turn Bay Length (m)	30.0			40.0									
Base Capacity (vph)	285	1388		386	1461					393		230	
Starvation Cap Reductn	0	0		0	0					0		0	
Spillback Cap Reductn	0	0		0	0					0		0	
Storage Cap Reductn	0	0		0	0					0		0	
Reduced v/c Ratio	0.40	0.53		0.38	0.47					1.33		0.50	

Intersection Summary

Area Type: Other

Cycle Length: 102

Actuated Cycle Length: 98.5

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.33

Intersection Signal Delay: 62.4

Intersection LOS: E

Intersection Capacity Utilization 92.7%

ICU Level of Service F

Analysis Period (min) 15

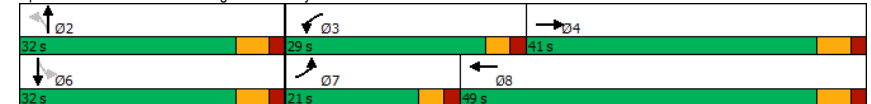
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Conestogo Road/Colby Drive & Northfield Drive West



Lanes, Volumes, Timings

4: King Street North & Northfield Drive West

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	165	472	319	226	355	61	203	351	143	100	288	92
Future Volume (vph)	165	472	319	226	355	61	203	351	143	100	288	92
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1900	1750
Storage Length (m)	15.0		0.0	45.0		0.0	175.0		0.0	50.0		50.0
Storage Lanes	1		0	2		0	1		0	1		1
Taper Length (m)	75.0			75.0			100.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	1.00	0.99		1.00		1.00		0.99		1.00		
Frt		0.940			0.978			0.957			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1606	2954	0	2974	3106	0	1506	2977	0	1653	3406	1390
Flt Permitted	0.470			0.950			0.454			0.386		
Satd. Flow (perm)	794	2954	0	2967	3106	0	720	2977	0	669	3406	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		130			18			43				154
Link Speed (k/h)		60			60			60				60
Link Distance (m)		386.4			199.4			358.2				200.8
Travel Time (s)		23.2			12.0			21.5				12.0
Confl. Peds. (#/hr)	1		4	4		1		7	7			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	5%	9%	10%	7%	0%	12%	4%	17%	2%	6%	7%
Adj. Flow (vph)	165	472	319	226	355	61	203	351	143	100	288	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	165	791	0	226	416	0	203	494	0	100	288	92
Turn Type	pm+pt	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4						2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	20.0		8.0	20.0		5.0	20.0		5.0	20.0	20.0
Minimum Split (s)	9.0	48.0		14.0	48.0		9.0	37.0		9.0	37.0	37.0
Total Split (s)	19.0	48.0		31.0	60.0		19.0	37.0		19.0	37.0	37.0
Total Split (%)	14.1%	35.6%		23.0%	44.4%		14.1%	27.4%		14.1%	27.4%	27.4%
Maximum Green (s)	15.0	40.0		25.0	52.0		15.0	30.0		15.0	30.0	30.0
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	4.0		2.0	4.0		1.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	-4.0		-2.0	-4.0		0.0	-3.0		0.0	-3.0	-3.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		10.0			10.0			10.0			10.0	10.0
Flash Dont Walk (s)		30.0			30.0			20.0			20.0	20.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	48.2	36.0		16.3	40.0		50.3	37.1		43.3	33.4	33.4
Actuated g/C Ratio	0.42	0.31		0.14	0.35		0.44	0.32		0.37	0.29	0.29
v/c Ratio	0.40	0.78		0.54	0.38		0.50	0.50		0.30	0.29	0.18

Lanes, Volumes, Timings

4: King Street North & Northfield Drive West

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	19.9	36.3		52.4	28.2		27.9	33.1		24.3	35.1	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	19.9	36.3		52.4	28.2		27.9	33.1		24.3	35.1	1.0
LOS	B	D		D	C		C	C		C	D	A
Approach Delay		33.5			36.7			31.5			26.3	
Approach LOS		C			D			C			C	
Queue Length 50th (m)	22.1	77.3		26.6	37.8		31.1	46.0		14.1	28.9	0.0
Queue Length 95th (m)	35.2	107.4		41.9	53.1		57.9	75.4		29.6	46.7	0.8
Internal Link Dist (m)		362.4			175.4			334.2			176.8	
Turn Bay Length (m)	15.0			45.0		175.0				50.0		50.0
Base Capacity (vph)	458	1217		702	1531		417	985		408	983	510
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.36	0.65		0.32	0.27		0.49	0.50		0.25	0.29	0.18

Intersection Summary

Area Type: Other

Cycle Length: 135

Actuated Cycle Length: 115.5

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 32.5

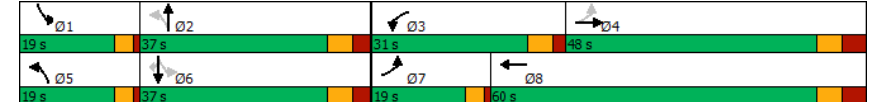
Intersection LOS: C

Intersection Capacity Utilization 77.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: King Street North & Northfield Drive West



Lanes, Volumes, Timings

5: Conestogo Road & Access 2/Durward Place

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	8	0	0	10	0	14	0	231	11	12	97	14
Future Volume (vph)	8	0	0	10	0	14	0	231	11	12	97	14
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.921			0.994			0.985	
Flt Protected		0.950			0.980						0.995	
Satd. Flow (prot)	0	1472	0	0	1337	0	0	1471	0	0	1428	0
Flt Permitted		0.950			0.980						0.995	
Satd. Flow (perm)	0	1472	0	0	1337	0	0	1471	0	0	1428	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.8			75.2			52.3			68.1	
Travel Time (s)		3.9			5.4			3.8			4.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	0%	5%	0%	9%	7%	0%
Adj. Flow (vph)	8	0	0	10	0	14	0	231	11	12	97	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	24	0	0	242	0	0	123	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 29.8%

ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC

5: Conestogo Road & Access 2/Durward Place

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	8	0	0	10	0	14	0	231	11	12	97	14
Future Vol, veh/h	8	0	0	10	0	14	0	231	11	12	97	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	8	0	5	0	9	7	0
Mvmt Flow	8	0	0	10	0	14	0	231	11	12	97	14

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	372	370	104	365	372	237	111	0	0	242	0	0
Stage 1	128	128	-	237	237	-	-	-	-	-	-	-
Stage 2	244	242	-	128	135	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.28	4.1	-	-	4.19	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.372	2.2	-	-	2.281	-	-
Pot Cap-1 Maneuver	589	563	956	595	561	787	1492	-	-	1284	-	-
Stage 1	881	794	-	771	713	-	-	-	-	-	-	-
Stage 2	764	709	-	881	789	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	574	557	956	590	555	787	1492	-	-	1284	-	-
Mov Cap-2 Maneuver	574	557	-	590	555	-	-	-	-	-	-	-
Stage 1	881	786	-	771	713	-	-	-	-	-	-	-
Stage 2	750	709	-	872	781	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	11.4		10.4		0		0.8	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1492	-	-	574	691	1284	-	-
HCM Lane V/C Ratio	-	-	-	0.014	0.035	0.009	-	-
HCM Control Delay (s)	0	-	-	11.4	10.4	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lanes, Volumes, Timings

6: King Street North & Conestogo Road

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	↖	→	↗	↘	↙	↘	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	28	13	275	204	29	29	218	698	229	27	639	52
Future Volume (vph)	28	13	275	204	29	29	218	698	229	27	639	52
Ideal Flow (vphpl)	1775	1650	1650	1775	1650	1650	1775	1900	1750	1775	1775	1775
Storage Length (m)	25.0		0.0	35.0		0.0	35.0		0.0	45.0		0.0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (m)	30.0			40.0			80.0			60.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.98		0.99			1.00		0.97	0.99		1.00
Frt		0.857			0.925			0.850			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1519	1322	0	3057	1347	0	1653	3471	1444	1249	3149	0
Flt Permitted	0.719			0.950			0.279			0.950		
Satd. Flow (perm)	1148	1322	0	3025	1347	0	485	3471	1403	1241	3149	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		275			29						9	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		155.4			105.1			302.0			358.2	
Travel Time (s)		11.2			7.6			18.1			21.5	
Confl. Peds. (#/hr)	1		5	5		1	2		9	9		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	11%	0%	5%	7%	0%	25%	2%	4%	3%	35%	6%	2%
Adj. Flow (vph)	28	13	275	204	29	29	218	698	229	27	639	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	288	0	204	58	0	218	698	229	27	691	0
Turn Type	Perm	NA		Prot	NA		pm+pt	NA	pm+ov	Prot	NA	
Protected Phases		4		3	8		5	2	3	1	6	
Permitted Phases	4						2		2			
Detector Phase	4	4		3	8		5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		5.0	20.0	5.0	5.0	20.0	
Minimum Split (s)	17.0	17.0		11.0	17.0		9.0	27.0	11.0	10.0	27.0	
Total Split (s)	32.0	32.0		18.0	50.0		14.0	47.0	18.0	15.0	48.0	
Total Split (%)	28.6%	28.6%		16.1%	44.6%		12.5%	42.0%	16.1%	13.4%	42.9%	
Maximum Green (s)	25.0	25.0		12.0	43.0		10.0	40.0	12.0	10.0	41.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	3.0	3.0		2.0	3.0		1.0	3.0	2.0	2.0	3.0	
Lost Time Adjust (s)	-3.0	-3.0		-2.0	-3.0		0.0	-3.0	-2.0	-1.0	-3.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		None	Max	None	None	Max	
Walk Time (s)	7.0	7.0			7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0			0			0			0	
Act Effect Green (s)	14.9	14.9		12.9	31.8		56.3	52.4	65.3	8.5	44.1	
Actuated g/C Ratio	0.15	0.15		0.13	0.33		0.58	0.54	0.67	0.09	0.45	
v/c Ratio	0.16	0.66		0.51	0.13		0.55	0.37	0.24	0.25	0.48	

Lanes, Volumes, Timings

6: King Street North & Conestogo Road

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	↖	→	↗	↘	↙	↘	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	38.3	13.7		44.8	14.0		16.3	15.9	7.7	48.3	20.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	38.3	13.7		44.8	14.0		16.3	15.9	7.7	48.3	20.6	
LOS	D	B		D	B		B	B	A	D	C	
Approach Delay		15.8			38.0			14.4			21.7	
Approach LOS		B			D			B			C	
Queue Length 50th (m)	5.0	2.3		19.2	4.0		18.2	33.4	9.1	5.0	47.6	
Queue Length 95th (m)	13.1	27.6		33.5	12.7		37.5	75.5	37.9	14.4	75.0	
Internal Link Dist (m)		131.4			81.1			278.0			334.2	
Turn Bay Length (m)	25.0			35.0			35.0				45.0	
Base Capacity (vph)	329	575		438	650		399	1862	960	140	1425	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.09	0.50		0.47	0.09		0.55	0.37	0.24	0.19	0.48	

Intersection Summary

Area Type: Other

Cycle Length: 112

Actuated Cycle Length: 97.7

Natural Cycle: 65

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 19.2

Intersection LOS: B

Intersection Capacity Utilization 74.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 6: King Street North & Conestogo Road



Lanes, Volumes, Timings

7: King Street North & Highway 85 Ramps (North)

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↔↔	↔↔	↔↔	↔↔	↔↔
Traffic Volume (vph)	259	809	350	118	0	952
Future Volume (vph)	259	809	350	118	0	952
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	80.0		0.0	20.0	
Storage Lanes	2	1		0	1	
Taper Length (m)	7.5				55.0	
Lane Util. Factor	0.97	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor		0.99	0.99			
Frt		0.850	0.962			
Flt Protected	0.950					
Satd. Flow (prot)	3502	1615	3279	0	1881	3539
Flt Permitted	0.950					
Satd. Flow (perm)	3502	1595	3279	0	1881	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		718	56			
Link Speed (k/h)	50		60			60
Link Distance (m)	426.0		348.2			230.2
Travel Time (s)	30.7		20.9			13.8
Confl. Peds. (#/hr)		1		3	3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	15%	1%	2%
Adj. Flow (vph)	282	879	380	128	0	1035
Shared Lane Traffic (%)						
Lane Group Flow (vph)	282	879	508	0	0	1035
Turn Type	Prot	Free	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		Free			6	
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		49.0		5.0	49.0
Minimum Split (s)	15.4		55.0		9.0	55.0
Total Split (s)	44.0		55.0		11.0	66.0
Total Split (%)	40.0%		50.0%		10.0%	60.0%
Maximum Green (s)	38.6		49.0		7.0	60.0
Yellow Time (s)	3.3		3.7		3.0	3.7
All-Red Time (s)	2.1		2.3		1.0	2.3
Lost Time Adjust (s)	-1.4		-2.0		0.0	-2.0
Total Lost Time (s)	4.0		4.0		4.0	4.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		None	Max
Walk Time (s)	10.0		37.0			37.0
Flash Dont Walk (s)	28.6		12.0			12.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	13.6	83.6			62.0	
Actuated g/C Ratio	0.16	1.00	0.74			0.74
v/c Ratio	0.50	0.55	0.21			0.39

Lanes, Volumes, Timings

7: King Street North & Highway 85 Ramps (North)

(200039) 525-565 Conestogo Road

Total 2037 AM Peak Hour

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Control Delay	35.1	1.4	3.3			4.6
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	35.1	1.4	3.3			4.6
LOS	D	A	A			A
Approach Delay	9.6		3.3			4.6
Approach LOS	A		A			A
Queue Length 50th (m)	22.5	0.0	9.3			26.3
Queue Length 95th (m)	34.4	0.0	16.4			41.2
Internal Link Dist (m)	402.0		324.2			206.2
Turn Bay Length (m)		80.0				
Base Capacity (vph)	1676	1595	2447			2626
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.17	0.55	0.21			0.39

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 83.6

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 6.5

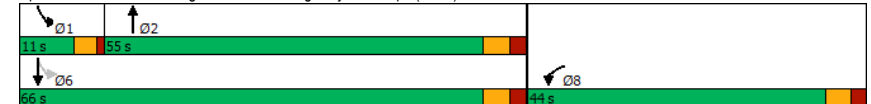
Intersection LOS: A

Intersection Capacity Utilization 56.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 7: King Street North & Highway 85 Ramps (North)



Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
8: King Street North & Highway 85 Ramps (South)/Manulife Total 2037 AM Peak Hour

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↘	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙
Traffic Volume (vph)	3	62	319	21	0	22	0	615	271	223	1095	712	
Future Volume (vph)	3	62	319	21	0	22	0	615	271	223	1095	712	
Ideal Flow (vphpl)	1900	1900	1900	1900	0	1900	0	1900	1900	1900	1900	1900	
Storage Length (m)	0.0		80.0	0.0		0.0	0.0		90.0	25.0		150.0	
Storage Lanes	1		1	1		1	0		1	1		1	
Taper Length (m)	7.5			7.5			7.5			75.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Ped Bike Factor	0.99		0.99	0.99		0.98			0.97	1.00		0.97	
Frt			0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950						0.950			
Satd. Flow (prot)	1805	1900	1568	1719	0	1417	0	3438	1568	1805	3471	1442	
Flt Permitted	0.950			0.713						0.354			
Satd. Flow (perm)	1785	1900	1545	1275	0	1384	0	3438	1521	670	3471	1405	
Right Turn on Red			Yes			Yes			Yes		Yes		
Satd. Flow (RTOR)			344			68			295			774	
Link Speed (k/h)		50			50			60				60	
Link Distance (m)		157.5			131.0			183.5				348.2	
Travel Time (s)		11.3			9.4			11.0				20.9	
Confl. Peds. (#/hr)	9		10	10		9	11		11	11		11	
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	
Heavy Vehicles (%)	0%	0%	3%	5%	0%	14%	0%	5%	3%	0%	4%	12%	
Adj. Flow (vph)	3	67	347	23	0	24	0	668	295	242	1190	774	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	3	67	347	23	0	24	0	668	295	242	1190	774	
Turn Type	Perm	NA	Free	Perm		Perm		NA	Perm	pm+pt	NA	Free	
Protected Phases		4						2		1	6		
Permitted Phases	4		Free	8		8			2	6		Free	
Detector Phase	4	4		8		8		2	2	1	6		
Switch Phase													
Minimum Initial (s)	10.0	10.0		10.0		10.0		60.1	60.1	5.0	60.1		
Minimum Split (s)	33.0	33.0		33.0		33.0		66.0	66.0	11.0	66.0		
Total Split (s)	33.0	33.0		33.0		33.0		66.0	66.0	11.0	77.0		
Total Split (%)	30.0%	30.0%		30.0%		30.0%		60.0%	60.0%	10.0%	70.0%		
Maximum Green (s)	26.3	26.3		26.3		26.3		60.1	60.1	7.0	71.1		
Yellow Time (s)	3.3	3.3		3.3		3.3		3.7	3.7	3.0	3.7		
All-Red Time (s)	3.4	3.4		3.4		3.4		2.2	2.2	1.0	2.2		
Lost Time Adjust (s)	-2.7	-2.7		-2.7		-2.7		-1.9	-1.9	0.0	-1.9		
Total Lost Time (s)	4.0	4.0		4.0		4.0		4.0	4.0	4.0	4.0		
Lead/Lag								Lag	Lag	Lead			
Lead-Lag Optimize?								Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0	3.0	3.0	3.0		
Recall Mode	None	None		None		None		Max	Max	None	Max		
Walk Time (s)	10.0	10.0		10.0		10.0		50.1	50.1		50.1		
Flash Dont Walk (s)	16.3	16.3		16.3		16.3		10.0	10.0		10.0		
Pedestrian Calls (#/hr)	0	0		0		0		0	0		0		
Act Effct Green (s)	13.1	13.1	90.7	13.1		13.1		62.8	62.8	73.5	74.4	90.7	
Actuated g/C Ratio	0.14	0.14	1.00	0.14		0.14		0.69	0.69	0.81	0.82	1.00	
v/c Ratio	0.01	0.24	0.22	0.13		0.09		0.28	0.26	0.39	0.42	0.55	

Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
8: King Street North & Highway 85 Ramps (South)/Manulife Total 2037 AM Peak Hour

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	35.0	38.7	0.3	37.4		0.7		6.5	1.4	4.4	3.7	1.6	
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	35.0	38.7	0.3	37.4		0.7		6.5	1.4	4.4	3.7	1.6	
LOS	C	D	A	D		A		A	A	A	A	A	
Approach Delay		6.8			18.7			5.0			3.0		
Approach LOS		A			B			A			A		
Queue Length 50th (m)	0.5	11.6	0.0	3.9		0.0		24.9	0.0	9.2	31.1	0.0	
Queue Length 95th (m)	3.2	24.2	0.0	11.2		0.0		35.2	8.4	16.2	44.1	0.0	
Internal Link Dist (m)		133.5			107.0			159.5			324.2		
Turn Bay Length (m)			80.0						90.0	25.0		150.0	
Base Capacity (vph)	574	611	1545	410		491		2379	1143	630	2848	1405	
Starvation Cap Reductn	0	0	0	0		0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0		0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0		0		0	0	0	0	0	
Reduced v/c Ratio	0.01	0.11	0.22	0.06		0.05		0.28	0.26	0.38	0.42	0.55	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 90.7

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 4.2

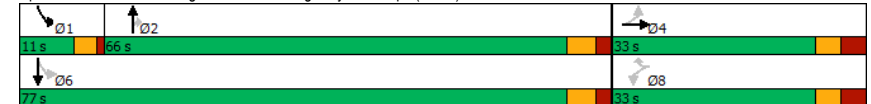
Intersection LOS: A

Intersection Capacity Utilization 84.6%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 8: King Street North & Highway 85 Ramps (South)/Manulife



Lanes, Volumes, Timings
9: Conestogo Road & Access 1

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖			↗	↘	↙
Traffic Volume (vph)	324	0	0	252	121	124
Future Volume (vph)	324	0	0	252	121	124
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.932		
Flt Protected	0.950					
Satd. Flow (prot)	1444	0	0	1520	1416	0
Flt Permitted	0.950					
Satd. Flow (perm)	1444	0	0	1520	1416	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	43.7			68.1	111.9	
Travel Time (s)	3.1			4.9	8.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	352	0	0	274	132	135
Shared Lane Traffic (%)						
Lane Group Flow (vph)	352	0	0	274	267	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	45.8%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
9: Conestogo Road & Access 1

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

Intersection						
Int Delay, s/veh	8.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖			↗	↘	↙
Traffic Vol, veh/h	324	0	0	252	121	124
Future Vol, veh/h	324	0	0	252	121	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	352	0	0	274	132	135

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	474	200	267
Stage 1	200	-	-
Stage 2	274	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	549	841	1297
Stage 1	834	-	-
Stage 2	772	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	549	841	1297
Mov Cap-2 Maneuver	549	-	-
Stage 1	834	-	-
Stage 2	772	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1297	-	549	-
HCM Lane V/C Ratio	-	-	0.641	-
HCM Control Delay (s)	0	-	22.5	-
HCM Lane LOS	A	-	C	-
HCM 95th %tile Q(veh)	0	-	4.5	-

Lanes, Volumes, Timings
10: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	127	229	83	114	55	51
Future Volume (vph)	127	229	83	114	55	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.913				0.935	
Flt Protected	0.982			0.979		
Satd. Flow (prot)	1670	0	0	1824	1742	0
Flt Permitted	0.982			0.979		
Satd. Flow (perm)	1670	0	0	1824	1742	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	55.5			51.0	52.3	
Travel Time (s)	4.0			3.7	3.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	249	90	124	60	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	387	0	0	214	115	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 45.0%
Analysis Period (min) 15

HCM 6th TWSC
10: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

Intersection						
Int Delay, s/veh	8.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	127	229	83	114	55	51
Future Vol, veh/h	127	229	83	114	55	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	138	249	90	124	60	55

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	392	88	115	0	-	0
Stage 1	88	-	-	-	-	-
Stage 2	304	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	612	970	1474	-	-	-
Stage 1	935	-	-	-	-	-
Stage 2	748	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	572	970	1474	-	-	-
Mov Cap-2 Maneuver	572	-	-	-	-	-
Stage 1	873	-	-	-	-	-
Stage 2	748	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.1	3.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1474	- 777	-	-
HCM Lane V/C Ratio	0.061	- 0.498	-	-
HCM Control Delay (s)	7.6	0 14.1	-	-
HCM Lane LOS	A	A B	-	-
HCM 95th %tile Q(veh)	0.2	- 2.8	-	-

Lanes, Volumes, Timings
11: Conestogo Road & Access 3

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	197	284	0
Future Volume (vph)	0	0	0	197	284	0
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1520	0	0	1520	1520	0
Flt Permitted						
Satd. Flow (perm)	1520	0	0	1520	1520	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	58.0			36.4	51.0	
Travel Time (s)	4.2			2.6	3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	214	309	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	214	309	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 21.7% ICU Level of Service A
Analysis Period (min) 15

HCM 6th TWSC
11: Conestogo Road & Access 3

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	197	284	0
Future Vol, veh/h	0	0	0	197	284	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	214	309	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	523	309	309
Stage 1	309	-	-
Stage 2	214	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	514	731	1252
Stage 1	745	-	-
Stage 2	822	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	514	731	1252
Mov Cap-2 Maneuver	514	-	-
Stage 1	745	-	-
Stage 2	822	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1252	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings
12: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	197	284	0
Future Volume (vph)	0	0	0	197	284	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	59.4			44.1	36.4	
Travel Time (s)	4.3			3.2	2.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	214	309	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	214	309	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 18.3% ICU Level of Service A
Analysis Period (min) 15

HCM 6th TWSC
12: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	197	284	0
Future Vol, veh/h	0	0	0	197	284	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	214	309	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	523	309	309	0	-	0
Stage 1	309	-	-	-	-	-
Stage 2	214	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	514	731	1252	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	822	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	514	731	1252	-	-	-
Mov Cap-2 Maneuver	514	-	-	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	822	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1252	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	0	-
HCM Lane LOS	A	-	A	-
HCM 95th %tile Q(veh)	0	-	-	-

Lanes, Volumes, Timings
13: Conestogo Road & Access 4

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Volume (vph)	0	0	0	197	284	0
Future Volume (vph)	0	0	0	197	284	0
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1520	0	0	1520	1520	0
Flt Permitted						
Satd. Flow (perm)	1520	0	0	1520	1520	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	57.5			146.8	44.1	
Travel Time (s)	4.1			10.6	3.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	214	309	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	214	309	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 21.7%
Analysis Period (min) 15

HCM 6th TWSC
13: Conestogo Road & Access 4

(200039) 525-565 Conestogo Road
Total 2037 AM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	0	0	0	197	284	0
Future Vol, veh/h	0	0	0	197	284	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	214	309	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	523	309	309	0	-	0
Stage 1	309	-	-	-	-	-
Stage 2	214	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	514	731	1252	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	822	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	514	731	1252	-	-	-
Mov Cap-2 Maneuver	514	-	-	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	822	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1252	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings

1: Weber Street North & Northfield Drive West

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖	↖	↖		↖	↖	
Traffic Volume (vph)	137	532	80	162	1190	157	196	442	76	319	437	251
Future Volume (vph)	137	532	80	162	1190	157	196	442	76	319	437	251
Ideal Flow (vphpl)	1775	1775	1775	1775	1900	1750	1775	1775	1775	1775	1775	1775
Storage Length (m)	100.0		0.0	50.0		65.0	95.0		0.0	85.0		0.0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (m)	100.0			85.0			40.0			40.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		0.99		0.97	0.98	0.99		0.99	0.98	
Frt		0.980				0.850		0.978			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1653	3196	0	1670	3574	1458	1670	3238	0	1653	3092	0
Flt Permitted	0.091			0.293			0.220			0.266		
Satd. Flow (perm)	158	3196	0	511	3574	1421	381	3238	0	458	3092	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	16					113			16			96
Link Speed (k/h)	60			60			50		50			50
Link Distance (m)	195.7			296.1			157.0		246.4			
Travel Time (s)	11.7			17.8			11.3		17.7			
Confl. Peds. (#/hr)	15		21	21		15	45		23	23		45
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	3%	3%	1%	1%	2%	1%	1%	3%	2%	1%	0%
Adj. Flow (vph)	137	532	80	162	1190	157	196	442	76	319	437	251
Shared Lane Traffic (%)												
Lane Group Flow (vph)	137	612	0	162	1190	157	196	518	0	319	688	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	38.4		5.0	38.4	38.4	5.0	30.0		7.0	30.0	
Minimum Split (s)	9.0	44.4		9.0	44.4	44.4	9.0	36.0		13.0	36.0	
Total Split (s)	12.0	49.4		14.0	51.4	51.4	17.0	36.6		20.0	39.6	
Total Split (%)	10.0%	41.2%		11.7%	42.8%	42.8%	14.2%	30.5%		16.7%	33.0%	
Maximum Green (s)	8.0	43.4		10.0	45.4	45.4	13.0	30.6		14.0	33.6	
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0	-2.0	0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	Max		None	Max	Max	None	Max		None	Max	
Walk Time (s)		14.4			14.4	14.4		11.0			11.0	
Flash Dont Walk (s)		24.0			24.0	24.0		19.0			19.0	
Pedestrian Calls (#/hr)		0			0	0		0			0	
Act Effect Green (s)	53.8	45.8		57.0	47.4	47.4	44.9	32.6		51.9	36.3	
Actuated g/C Ratio	0.45	0.38		0.48	0.40	0.40	0.37	0.27		0.43	0.30	
v/c Ratio	0.81	0.50		0.48	0.84	0.25	0.71	0.58		0.89	0.69	

Lanes, Volumes, Timings

1: Weber Street North & Northfield Drive West

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	56.7	29.4		22.2	39.7	8.9	37.6	39.7		53.4	35.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	56.7	29.4		22.2	39.7	8.9	37.6	39.7		53.4	35.8	
LOS	E	C		C	D	A	D	D		D	D	
Approach Delay		34.4			34.6			39.1			41.4	
Approach LOS		C			C			D			D	
Queue Length 50th (m)	18.1	59.0		21.8	138.9	6.7	30.3	56.7		54.0	68.9	
Queue Length 95th (m)	#53.1	77.1		35.6	169.3	21.4	#49.5	75.5		#94.5	91.3	
Internal Link Dist (m)		171.7			272.1			133.0			222.4	
Turn Bay Length (m)	100.0			50.0		65.0	95.0			85.0		
Base Capacity (vph)	170	1228		341	1411	629	284	891		357	1001	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.81	0.50		0.48	0.84	0.25	0.69	0.58		0.89	0.69	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Natural Cycle: 105

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 37.1

Intersection LOS: D

Intersection Capacity Utilization 98.9%

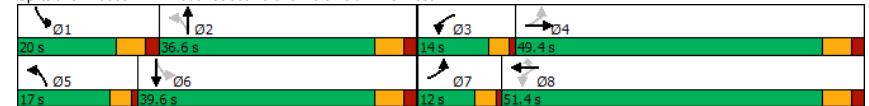
ICU Level of Service F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Weber Street North & Northfield Drive West



Lanes, Volumes, Timings

(200039) 525-565 Conestogo Road

2: Parkside Drive & Northfield Drive West

Total 2037 PM Peak Hour

	↖	→	↘	↙	←	↖	↙	↘	↗	↖	↙	↘	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖		↖	↖			↖	↖	↖	↖	↖	
Traffic Volume (vph)	3	918	35	396	1506	91	51	19	498	62	22	13	
Future Volume (vph)	3	918	35	396	1506	91	51	19	498	62	22	13	
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1650	1650	1750	1650	1650	1750	
Storage Length (m)	35.0		0.0	25.0		0.0	0.0		25.0	7.5		0.0	
Storage Lanes	1		0	1		0	0		1	1		0	
Taper Length (m)	60.0			55.0			0.0			60.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		1.00		0.98	0.97	0.98		0.98	
Frt		0.994			0.991				0.850		0.944		
Flt Protected	0.950			0.950				0.965		0.950			
Satd. Flow (prot)	1686	3282	0	1653	3301	0	0	1592	1458	1537	1532	0	
Flt Permitted	0.128			0.173				0.802		0.711			
Satd. Flow (perm)	227	3282	0	301	3301	0	0	1292	1417	1133	1532	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		4			10				327		13		
Link Speed (k/h)		60			60			50			50		
Link Distance (m)		296.1			760.4			102.9			159.0		
Travel Time (s)		17.8			45.6			7.4			11.4		
Confl. Peds. (#/hr)	10		6	6		10	28		14	14		28	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Heavy Vehicles (%)	0%	2%	3%	2%	1%	2%	0%	0%	2%	2%	0%	0%	
Adj. Flow (vph)	3	918	35	396	1506	91	51	19	498	62	22	13	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	3	953	0	396	1597	0	0	70	498	62	35	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA		
Protected Phases		4		3	8			2			6		
Permitted Phases	4			8			2		2	6			
Detector Phase	4	4		3	8		2	2	2	6	6		
Switch Phase													
Minimum Initial (s)	48.0	48.0		5.0	48.0		30.0	30.0	30.0	30.0	30.0		
Minimum Split (s)	54.0	54.0		9.0	63.0		36.0	36.0	36.0	36.0	36.0		
Total Split (s)	58.8	58.8		21.6	80.4		39.6	39.6	39.6	39.6	39.6		
Total Split (%)	49.0%	49.0%		18.0%	67.0%		33.0%	33.0%	33.0%	33.0%	33.0%		
Maximum Green (s)	52.8	52.8		17.6	74.4		33.6	33.6	33.6	33.6	33.6		
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0	2.0		
Lost Time Adjust (s)	-2.0	-2.0		0.0	-2.0			-2.0	-2.0	-2.0	-2.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0		
Lead/Lag	Lag	Lag		Lead									
Lead-Lag Optimize?	Yes	Yes		Yes									
Vehicle Extension (s)	3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0	3.0		
Recall Mode	Max	Max		None	Max		None	None	None	None	None		
Walk Time (s)	40.0	40.0			40.0		10.0	10.0	10.0	10.0	10.0		
Flash Dont Walk (s)	8.0	8.0			8.0		20.0	20.0	20.0	20.0	20.0		
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0		
Act Effct Green (s)	54.8	54.8		76.4	76.4			32.7	32.7	32.7	32.7		
Actuated g/C Ratio	0.47	0.47		0.65	0.65			0.28	0.28	0.28	0.28		
v/c Ratio	0.03	0.62		0.99	0.74			0.19	0.79	0.20	0.08		

Lanes, Volumes, Timings

(200039) 525-565 Conestogo Road

2: Parkside Drive & Northfield Drive West

Total 2037 PM Peak Hour

	↖	→	↘	↙	←	↖	↙	↘	↗	↖	↙	↘	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	18.7	25.6		64.7	16.5			33.8	23.1	34.1	22.6		
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay	18.7	25.6		64.7	16.5			33.8	23.1	34.1	22.6		
LOS	B	C		E	B			C	C	C	C		
Approach Delay		25.6			26.0			24.4			29.9		
Approach LOS		C			C			C			C		
Queue Length 50th (m)	0.4	87.0		55.7	122.1			12.9	39.3	11.4	3.9		
Queue Length 95th (m)	2.4	115.4		#128.4	165.0			25.4	86.9	23.4	12.0		
Internal Link Dist (m)		272.1			736.4			78.9			135.0		
Turn Bay Length (m)	35.0			25.0					25.0	7.5			
Base Capacity (vph)	105	1537		399	2157			392	658	344	474		
Starvation Cap Reductn	0	0		0	0			0	0	0	0		
Spillback Cap Reductn	0	0		0	0			0	0	0	0		
Storage Cap Reductn	0	0		0	0			0	0	0	0		
Reduced v/c Ratio	0.03	0.62		0.99	0.74			0.18	0.76	0.18	0.07		

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 117.1

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 25.8

Intersection LOS: C

Intersection Capacity Utilization 122.7%

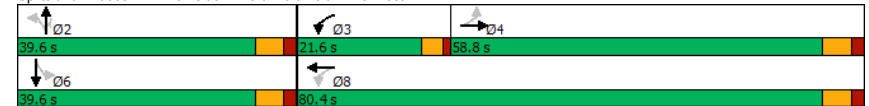
ICU Level of Service H

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Parkside Drive & Northfield Drive West



Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
3: Conestogo Road/Colby Drive & Northfield Drive West Total 2037 PM Peak Hour

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↙	↕	↘	↙	↕	↘	↙	↕	↘	↙	↕	↘	
Traffic Volume (vph)	67	790	160	353	758	34	203	10	261	100	29	259	
Future Volume (vph)	67	790	160	353	758	34	203	10	261	100	29	259	
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1550	1550	1550	1550	1550	1550	
Storage Length (m)	30.0		0.0	40.0		0.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	0		0	0		0	
Taper Length (m)	55.0			85.0			0.0			0.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor	1.00	1.00		1.00		1.00		0.99			0.99		
Frt		0.975			0.994			0.926			0.910		
Flt Protected	0.950			0.950				0.979			0.987		
Satd. Flow (prot)	1653	3119	0	1547	3285	0	0	1378	0	0	1366	0	
Flt Permitted	0.950			0.950				0.627			0.774		
Satd. Flow (perm)	1648	3119	0	1546	3285	0	0	882	0	0	1071	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		23			5			66			108		
Link Speed (k/h)		60			60			50			50		
Link Distance (m)		760.4			386.4			124.3			225.9		
Travel Time (s)		45.6			23.2			8.9			16.3		
Confl. Peds. (#/hr)	6		2	2		6	2		7	7		2	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Heavy Vehicles (%)	2%	3%	15%	9%	2%	0%	2%	0%	0%	1%	0%	1%	
Adj. Flow (vph)	67	790	160	353	758	34	203	10	261	100	29	259	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	67	950	0	353	792	0	0	474	0	0	388	0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA		
Protected Phases	7	4		3	8			2			6		
Permitted Phases							2				6		
Detector Phase	7	4		3	8		2	2			6	6	
Switch Phase													
Minimum Initial (s)	5.0	40.0		5.0	40.0		8.0	8.0		8.0	8.0		
Minimum Split (s)	10.0	46.0		10.0	46.0		14.0	14.0		14.0	14.0		
Total Split (s)	13.0	46.0		17.0	50.0		54.0	54.0		54.0	54.0		
Total Split (%)	11.1%	39.3%		14.5%	42.7%		46.2%	46.2%		46.2%	46.2%		
Maximum Green (s)	8.0	40.0		12.0	44.0		48.0	48.0		48.0	48.0		
Yellow Time (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0		
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		
Lost Time Adjust (s)	-1.0	-2.0		-1.0	-2.0			-2.0			-2.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0			4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	Yes	Yes		Yes	Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Recall Mode	None	Max		None	Max		None	None		None	None		
Walk Time (s)		29.0			29.0			10.0			10.0		
Flash Dont Walk (s)		11.0			11.0		19.0	19.0		19.0	19.0		
Pedestrian Calls (#/hr)		0			0		0	0		0	0		
Act Effct Green (s)	8.6	42.0		13.0	48.6			50.0			50.0		
Actuated g/C Ratio	0.07	0.36		0.11	0.42			0.43			0.43		
v/c Ratio	0.55	0.84		2.06	0.58			1.14			0.75		

Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
3: Conestogo Road/Colby Drive & Northfield Drive West Total 2037 PM Peak Hour

	←	→	↙	↘	←	↙	↘	→	↙	↘	→	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Control Delay	69.6	41.4		525.7	29.0			118.6			30.4		
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0		
Total Delay	69.6	41.4		525.7	29.0			118.6			30.4		
LOS	E	D		F	C			F			C		
Approach Delay		43.3			182.1			118.6			30.4		
Approach LOS		D			F			F			C		
Queue Length 50th (m)	15.8	107.3		~134.2	78.8			~124.7			57.3		
Queue Length 95th (m)	#31.7	135.5		#194.0	100.1			#192.2			101.9		
Internal Link Dist (m)		736.4			362.4			100.3			201.9		
Turn Bay Length (m)	30.0			40.0									
Base Capacity (vph)	127	1134		171	1367			414			519		
Starvation Cap Reductn	0	0		0	0			0			0		
Spillback Cap Reductn	0	0		0	0			0			0		
Storage Cap Reductn	0	0		0	0			0			0		
Reduced v/c Ratio	0.53	0.84		2.06	0.58			1.14			0.75		

Intersection Summary

Area Type: Other

Cycle Length: 117

Actuated Cycle Length: 117

Natural Cycle: 130

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 2.06

Intersection Signal Delay: 106.0

Intersection LOS: F

Intersection Capacity Utilization 121.8%

ICU Level of Service H

Analysis Period (min) 15

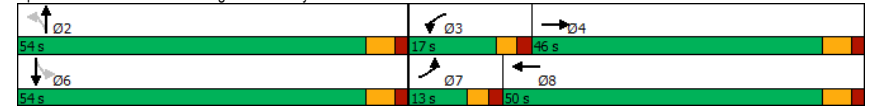
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Conestogo Road/Colby Drive & Northfield Drive West



Lanes, Volumes, Timings

4: King Street North & Northfield Drive West

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖		↖	↖	↖
Traffic Volume (vph)	189	587	243	239	566	70	356	397	168	107	468	206
Future Volume (vph)	189	587	243	239	566	70	356	397	168	107	468	206
Ideal Flow (vphpl)	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1900	1750
Storage Length (m)	15.0		0.0	45.0		0.0	175.0		0.0	50.0		50.0
Storage Lanes	1		0	2		0	1		0	1		1
Taper Length (m)	75.0			75.0			100.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor	0.99	0.99		0.99		1.00		0.99		0.99		
Frt		0.956			0.983			0.955				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1670	3103	0	3176	3226	0	1606	3131	0	1637	3539	1473
Flt Permitted	0.291			0.950			0.291			0.332		
Satd. Flow (perm)	508	3103	0	3139	3226	0	492	3131	0	567	3539	1473
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50			12			46				206
Link Speed (k/h)		60			60			60				60
Link Distance (m)		386.4			199.4			358.2				200.8
Travel Time (s)		23.2			12.0			21.5				12.0
Confl. Peds. (#/hr)	16		22	22		16		20	20			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	2%	5%	3%	2%	6%	5%	2%	1%	3%	2%	1%
Adj. Flow (vph)	189	587	243	239	566	70	356	397	168	107	468	206
Shared Lane Traffic (%)												
Lane Group Flow (vph)	189	830	0	239	636	0	356	565	0	107	468	206
Turn Type	pm+pt	NA		Prot	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4						2			6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	20.0		8.0	20.0		5.0	20.0		5.0	20.0	20.0
Minimum Split (s)	9.0	48.0		14.0	48.0		9.0	37.0		9.0	37.0	37.0
Total Split (s)	19.0	48.0		31.0	60.0		19.0	37.0		19.0	37.0	37.0
Total Split (%)	14.1%	35.6%		23.0%	44.4%		14.1%	27.4%		14.1%	27.4%	27.4%
Maximum Green (s)	15.0	40.0		25.0	52.0		15.0	30.0		15.0	30.0	30.0
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	4.0		2.0	4.0		1.0	3.0		1.0	3.0	3.0
Lost Time Adjust (s)	0.0	-4.0		-2.0	-4.0		0.0	-3.0		0.0	-3.0	-3.0
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		10.0			10.0			10.0			10.0	10.0
Flash Dont Walk (s)		30.0			30.0			20.0			20.0	20.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	51.3	38.5		16.4	42.0		51.4	37.8		43.6	33.2	33.2
Actuated g/C Ratio	0.43	0.32		0.14	0.35		0.43	0.32		0.37	0.28	0.28
v/c Ratio	0.55	0.80		0.55	0.56		1.01	0.55		0.36	0.48	0.37

Lanes, Volumes, Timings

4: King Street North & Northfield Drive West

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	←	→	↖	↗	←	→	↖	↗	←	→	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	23.6	41.4		53.6	32.4		80.9	35.2		26.1	39.0	7.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	23.6	41.4		53.6	32.4		80.9	35.2		26.1	39.0	7.0
LOS	C	D		D	C		F	D		C	D	A
Approach Delay		38.1			38.2			52.9			28.8	
Approach LOS		D			D			D			C	
Queue Length 50th (m)	25.6	92.4		29.0	64.9		~66.0	56.9		16.0	51.6	0.0
Queue Length 95th (m)	39.9	123.5		43.9	84.8		#135.9	87.0		31.3	74.5	19.7
Internal Link Dist (m)		362.4			175.4			334.2			176.8	
Turn Bay Length (m)	15.0			45.0			175.0			50.0		50.0
Base Capacity (vph)	375	1182		723	1529		352	1024		364	984	558
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.50	0.70		0.33	0.42		1.01	0.55		0.29	0.48	0.37

Intersection Summary

Area Type: Other

Cycle Length: 135

Actuated Cycle Length: 119.2

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 39.9

Intersection LOS: D

Intersection Capacity Utilization 88.4%

ICU Level of Service E

Analysis Period (min) 15

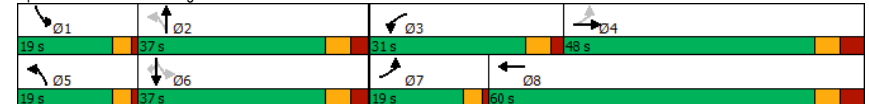
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 4: King Street North & Northfield Drive West



Lanes, Volumes, Timings
5: Conestogo Road & Access 2/Durward Place

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	10	0	0	16	0	30	0	206	11	12	198	11
Future Volume (vph)	10	0	0	16	0	30	0	206	11	12	198	11
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.912			0.993			0.993	
Flt Protected		0.950			0.983						0.997	
Satd. Flow (prot)	0	1472	0	0	1297	0	0	1468	0	0	1462	0
Flt Permitted		0.950			0.983						0.997	
Satd. Flow (perm)	0	1472	0	0	1297	0	0	1468	0	0	1462	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		54.8			75.2			46.9			55.7	
Travel Time (s)		3.9			5.4			3.4			4.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	0%	0%	11%	0%	4%	20%	9%	5%	0%
Adj. Flow (vph)	10	0	0	16	0	30	0	206	11	12	198	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	46	0	0	217	0	0	221	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 35.7% ICU Level of Service A

Analysis Period (min) 15

HCM 6th TWSC
5: Conestogo Road & Access 2/Durward Place

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Intersection												
Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	10	0	0	16	0	30	0	206	11	12	198	11
Future Vol, veh/h	10	0	0	16	0	30	0	206	11	12	198	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	11	0	4	20	9	5	0
Mvmt Flow	10	0	0	16	0	30	0	206	11	12	198	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	455	445	204	440	445	212	209	0	0	217	0	0
Stage 1	228	228	-	212	212	-	-	-	-	-	-	-
Stage 2	227	217	-	228	233	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.31	4.1	-	-	4.19	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.399	2.2	-	-	2.281	-	-
Pot Cap-1 Maneuver	519	511	842	531	511	806	1374	-	-	1312	-	-
Stage 1	779	719	-	795	731	-	-	-	-	-	-	-
Stage 2	780	727	-	779	716	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	496	506	842	527	506	806	1374	-	-	1312	-	-
Mov Cap-2 Maneuver	496	506	-	527	506	-	-	-	-	-	-	-
Stage 1	779	712	-	795	731	-	-	-	-	-	-	-
Stage 2	751	727	-	771	709	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	12.4		10.7		0		0.4	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1374	-	-	496	681	1312	-	-
HCM Lane V/C Ratio	-	-	-	0.02	0.068	0.009	-	-
HCM Control Delay (s)	0	-	-	12.4	10.7	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-

Lanes, Volumes, Timings

6: King Street North & Conestogo Road

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	39	63	318	332	10	63	293	854	387	76	920	33
Future Volume (vph)	39	63	318	332	10	63	293	854	387	76	920	33
Ideal Flow (vphpl)	1775	1650	1650	1775	1650	1650	1775	1900	1750	1775	1775	1775
Storage Length (m)	25.0		0.0	35.0		0.0	35.0		0.0	45.0		0.0
Storage Lanes	1		0	2		0	1		1	1		0
Taper Length (m)	30.0			40.0			80.0			60.0		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor	1.00	0.98		0.99		0.99			0.97	0.99		1.00
Frt		0.875			0.871				0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1686	1410	0	3146	1339	0	1686	3539	1488	1606	3289	0
Flt Permitted	0.709			0.950			0.136			0.950		
Satd. Flow (perm)	1256	1410	0	3115	1339	0	241	3539	1443	1597	3289	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		211			63						3	
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		155.4			105.1			302.0			358.2	
Travel Time (s)		11.2			7.6			18.1			21.5	
Confl. Peds. (#/hr)	1		5	5		1	2		9	9		2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	3%	0%	4%	0%	7%	0%	2%	0%	5%	2%	0%
Adj. Flow (vph)	39	63	318	332	10	63	293	854	387	76	920	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	381	0	332	73	0	293	854	387	76	953	0
Turn Type	Perm	NA		Prot	NA		pm+pt	NA	pm+ov	Prot	NA	
Protected Phases		4		3	8		5	2	3	1	6	
Permitted Phases	4						2		2			
Detector Phase	4	4		3	8		5	2	3	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0		5.0	20.0	5.0	5.0	20.0	
Minimum Split (s)	17.0	17.0		11.0	17.0		9.0	27.0	11.0	10.0	27.0	
Total Split (s)	38.0	38.0		15.0	53.0		19.0	51.0	15.0	16.0	48.0	
Total Split (%)	31.7%	31.7%		12.5%	44.2%		15.8%	42.5%	12.5%	13.3%	40.0%	
Maximum Green (s)	31.0	31.0		9.0	46.0		15.0	44.0	9.0	11.0	41.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	3.0	3.0		2.0	3.0		1.0	3.0	2.0	2.0	3.0	
Lost Time Adjust (s)	-3.0	-3.0		-2.0	-3.0		0.0	-3.0	-2.0	-1.0	-3.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag		Lead			Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		None	Max	None	None	Max	
Walk Time (s)	7.0	7.0			7.0			7.0			7.0	
Flash Dont Walk (s)	11.0	11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)	0	0			0			0			0	
Act Effct Green (s)	23.3	23.3		11.1	38.3		62.8	51.4	62.4	10.4	44.2	
Actuated g/C Ratio	0.21	0.21		0.10	0.35		0.57	0.47	0.57	0.09	0.40	
v/c Ratio	0.15	0.82		1.05	0.14		0.87	0.52	0.47	0.50	0.72	

Lanes, Volumes, Timings

6: King Street North & Conestogo Road

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	34.9	32.5		112.5	7.8		47.5	24.3	17.0	60.6	32.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.9	32.5		112.5	7.8		47.5	24.3	17.0	60.6	32.4	
LOS	C	C		F	A		D	C	B	E	C	
Approach Delay		32.8			93.7			26.9			34.5	
Approach LOS		C			F			C			C	
Queue Length 50th (m)	7.2	37.6		~42.1	1.5		39.1	73.8	47.8	16.3	93.2	
Queue Length 95th (m)	16.4	75.6		#80.2	11.0		#104.3	110.1	89.1	34.8	136.5	
Internal Link Dist (m)		131.4			81.1			278.0			334.2	
Turn Bay Length (m)	25.0			35.0			35.0			45.0		
Base Capacity (vph)	391	584		317	635		336	1657	825	176	1327	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.10	0.65		1.05	0.11		0.87	0.52	0.47	0.43	0.72	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 109.7

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 37.9

Intersection LOS: D

Intersection Capacity Utilization 96.0%

ICU Level of Service F

Analysis Period (min) 15

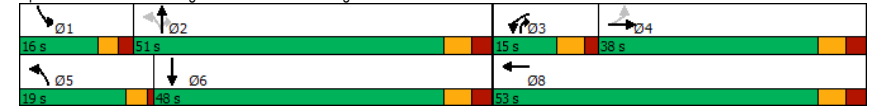
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: King Street North & Conestogo Road



Lanes, Volumes, Timings

7: King Street North & Highway 85 Ramps (North)

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↔	↔↔		↔	↔↔
Traffic Volume (vph)	226	961	662	152	0	1601
Future Volume (vph)	226	961	662	152	0	1601
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	80.0		0.0	20.0	
Storage Lanes	2	1		0	1	
Taper Length (m)	7.5				55.0	
Lane Util. Factor	0.97	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor		0.99	0.99			
Frt		0.850	0.972			
Flt Protected	0.950					
Satd. Flow (prot)	3467	1615	3446	0	1900	3610
Flt Permitted	0.950					
Satd. Flow (perm)	3467	1594	3446	0	1900	3610
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		543	37			
Link Speed (k/h)	50		60			60
Link Distance (m)	426.0		348.2			230.2
Travel Time (s)	30.7		20.9			13.8
Confl. Peds. (#/hr)		3		38	38	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	4%	0%	0%
Adj. Flow (vph)	246	1045	720	165	0	1740
Shared Lane Traffic (%)						
Lane Group Flow (vph)	246	1045	885	0	0	1740
Turn Type	Prot	Free	NA	pm+pt	NA	
Protected Phases	8		2		1	6
Permitted Phases		Free			6	
Detector Phase	8		2		1	6
Switch Phase						
Minimum Initial (s)	10.0		54.5		5.0	54.5
Minimum Split (s)	15.4		60.5		9.0	60.5
Total Split (s)	38.5		60.5		11.0	71.5
Total Split (%)	35.0%		55.0%		10.0%	65.0%
Maximum Green (s)	33.1		54.5		7.0	65.5
Yellow Time (s)	3.3		3.7		3.0	3.7
All-Red Time (s)	2.1		2.3		1.0	2.3
Lost Time Adjust (s)	-1.4		-2.0		0.0	-2.0
Total Lost Time (s)	4.0		4.0		4.0	4.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Recall Mode	None		Max		None	Max
Walk Time (s)	10.0		42.5			42.5
Flash Dont Walk (s)	23.1		12.0			12.0
Pedestrian Calls (#/hr)	0		0			0
Act Effct Green (s)	13.2	88.8	67.6			67.6
Actuated g/C Ratio	0.15	1.00	0.76			0.76
v/c Ratio	0.48	0.66	0.34			0.63

Lanes, Volumes, Timings

7: King Street North & Highway 85 Ramps (North)

(200039) 525-565 Conestogo Road

Total 2037 PM Peak Hour

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔↔	↔	↔↔		↔	↔↔
Control Delay	37.8	2.1	3.8			6.4
Queue Delay	0.0	0.0	0.0			0.0
Total Delay	37.8	2.1	3.8			6.4
LOS	D	A	A			A
Approach Delay	8.9		3.8			6.4
Approach LOS	A		A			A
Queue Length 50th (m)	21.0	0.0	19.6			58.7
Queue Length 95th (m)	32.6	0.0	31.5			90.3
Internal Link Dist (m)	402.0		324.2			206.2
Turn Bay Length (m)		80.0				
Base Capacity (vph)	1348	1594	2630			2746
Starvation Cap Reductn	0	0	0			0
Spillback Cap Reductn	0	0	0			0
Storage Cap Reductn	0	0	0			0
Reduced v/c Ratio	0.18	0.66	0.34			0.63

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 88.8

Natural Cycle: 85

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 6.6

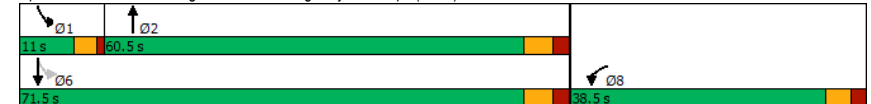
Intersection LOS: A

Intersection Capacity Utilization 62.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 7: King Street North & Highway 85 Ramps (North)



Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
8: King Street North & Highway 85 Ramps (South)/Manulife Total 2037 PM Peak Hour

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↙		↖	↗	↘	↙	↖	↗	↘
Traffic Volume (vph)	23	1	213	162	0	289	0	1022	373	22	1084	865
Future Volume (vph)	23	1	213	162	0	289	0	1022	373	22	1084	865
Ideal Flow (vphpl)	1900	1900	1900	1900	0	1900	0	1900	1900	1900	1900	1900
Storage Length (m)	0.0		80.0	0.0		0.0	0.0		90.0	25.0		150.0
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (m)	7.5			7.5			7.5			75.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00		0.96	0.97		0.99			0.97	1.00		0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1805	1900	1553	1787	0	1615	0	3539	1583	1805	3539	1553
Flt Permitted	0.950			0.757						0.209		
Satd. Flow (perm)	1800	1900	1485	1378	0	1591	0	3539	1542	397	3539	1502
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47			58			405			940
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		157.5			131.0			183.5			348.2	
Travel Time (s)		11.3			9.4			11.0			20.9	
Confl. Peds. (#/hr)	3		32	32		3	13		6	6		13
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
Heavy Vehicles (%)	0%	0%	4%	1%	0%	0%	0%	2%	2%	0%	2%	4%
Adj. Flow (vph)	25	1	232	176	0	314	0	1111	405	24	1178	940
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	1	232	176	0	314	0	1111	405	24	1178	940
Turn Type	Perm	NA	Perm	Perm		Perm		NA	Perm	Perm	NA	Perm
Protected Phases		4						2			6	
Permitted Phases	4		4	8		8		2	2	6		6
Detector Phase	4	4	4	8		8		2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0		10.0		54.6	54.6	54.6	54.6	54.6
Minimum Split (s)	16.7	16.7	16.7	16.7		16.7		60.5	60.5	60.5	60.5	60.5
Total Split (s)	49.5	49.5	49.5	49.5		49.5		60.5	60.5	60.5	60.5	60.5
Total Split (%)	45.0%	45.0%	45.0%	45.0%		45.0%		55.0%	55.0%	55.0%	55.0%	55.0%
Maximum Green (s)	42.8	42.8	42.8	42.8		42.8		54.6	54.6	54.6	54.6	54.6
Yellow Time (s)	3.3	3.3	3.3	3.3		3.3		3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	3.4	3.4	3.4	3.4		3.4		2.2	2.2	2.2	2.2	2.2
Lost Time Adjust (s)	-2.7	-2.7	-2.7	-2.7		-2.7		-1.9	-1.9	-1.9	-1.9	-1.9
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None		None		Max	Max	Max	Max	Max
Walk Time (s)	10.0	10.0	10.0	10.0		10.0		44.6	44.6	44.6	44.6	44.6
Flash Dont Walk (s)	22.8	22.8	22.8	22.8		22.8		10.0	10.0	10.0	10.0	10.0
Pedestrian Calls (#/hr)	0	0	0	0		0		0	0	0	0	0
Act Effect Green (s)	22.2	22.2	22.2	22.2		22.2		56.7	56.7	56.7	56.7	56.7
Actuated g/C Ratio	0.26	0.26	0.26	0.26		0.26		0.65	0.65	0.65	0.65	0.65
v/c Ratio	0.05	0.00	0.56	0.50		0.70		0.48	0.35	0.09	0.51	0.72

Lanes, Volumes, Timings (200039) 525-565 Conestogo Road
8: King Street North & Highway 85 Ramps (South)/Manulife Total 2037 PM Peak Hour

	←	→	↙	↘	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	23.5	22.0	27.3	32.4		32.2		9.4	1.8	8.5	9.7	4.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	23.5	22.0	27.3	32.4		32.2		9.4	1.8	8.5	9.7	4.3
LOS	C	C	C	C		C		A	A	A	A	A
Approach Delay		26.9			32.3			7.4			7.4	
Approach LOS		C			C			A			A	
Queue Length 50th (m)	3.3	0.1	27.8	26.2		40.6		45.6	0.0	1.4	49.7	0.0
Queue Length 95th (m)	9.2	1.3	50.2	45.5		68.3		81.1	11.7	5.9	88.2	15.7
Internal Link Dist (m)		133.5			107.0			159.5			324.2	
Turn Bay Length (m)			80.0					90.0		25.0		150.0
Base Capacity (vph)	945	997	802	723		863		2308	1146	259	2308	1306
Starvation Cap Reductn	0	0	0	0		0		0	0	0	0	0
Spillback Cap Reductn	0	0	0	0		0		0	0	0	0	0
Storage Cap Reductn	0	0	0	0		0		0	0	0	0	0
Reduced v/c Ratio	0.03	0.00	0.29	0.24		0.36		0.48	0.35	0.09	0.51	0.72

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 87

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 11.3

Intersection LOS: B

Intersection Capacity Utilization 121.8%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 8: King Street North & Highway 85 Ramps (South)/Manulife



Lanes, Volumes, Timings
9: Conestogo Road & Access 1

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖			↗	↘	↙
Traffic Volume (vph)	211	0	0	245	221	318
Future Volume (vph)	211	0	0	245	221	318
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.920		
Flt Protected	0.950					
Satd. Flow (prot)	1444	0	0	1520	1398	0
Flt Permitted	0.950					
Satd. Flow (perm)	1444	0	0	1520	1398	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	47.0			55.7	124.3	
Travel Time (s)	3.4			4.0	8.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	229	0	0	266	240	346
Shared Lane Traffic (%)						
Lane Group Flow (vph)	229	0	0	266	586	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min)	15

HCM 6th TWSC
9: Conestogo Road & Access 1

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Intersection						
Int Delay, s/veh	5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖			↗	↘	↙
Traffic Vol, veh/h	211	0	0	245	221	318
Future Vol, veh/h	211	0	0	245	221	318
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	229	0	0	266	240	346

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	679	413	586
Stage 1	413	-	-
Stage 2	266	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	417	639	989
Stage 1	668	-	-
Stage 2	779	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	417	639	989
Mov Cap-2 Maneuver	417	-	-
Stage 1	668	-	-
Stage 2	779	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	989	-	417	-
HCM Lane V/C Ratio	-	-	0.55	-
HCM Control Delay (s)	0	-	23.7	-
HCM Lane LOS	A	-	C	-
HCM 95th %tile Q(veh)	0	-	3.2	-

Lanes, Volumes, Timings
10: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	87	143	220	129	86	128
Future Volume (vph)	87	143	220	129	86	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.916				0.919	
Flt Protected	0.981			0.969		
Satd. Flow (prot)	1674	0	0	1805	1712	0
Flt Permitted	0.981			0.969		
Satd. Flow (perm)	1674	0	0	1805	1712	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	52.7			47.0	46.9	
Travel Time (s)	3.8			3.4	3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	155	239	140	93	139
Shared Lane Traffic (%)						
Lane Group Flow (vph)	250	0	0	379	232	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 54.9%
Analysis Period (min) 15

HCM 6th TWSC
10: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Intersection						
Int Delay, s/veh	7.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	87	143	220	129	86	128
Future Vol, veh/h	87	143	220	129	86	128
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	95	155	239	140	93	139

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	781	163	232	0	-	0
Stage 1	163	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	363	882	1336	-	-	-
Stage 1	866	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	293	882	1336	-	-	-
Mov Cap-2 Maneuver	293	-	-	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	538	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.1	5.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1336	-	501	-
HCM Lane V/C Ratio	0.179	-	0.499	-
HCM Control Delay (s)	8.3	0	19.1	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.7	-	2.7	-

Lanes, Volumes, Timings
11: Conestogo Road & Access 3

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	349	229	0
Future Volume (vph)	0	0	0	349	229	0
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1520	0	0	1520	1520	0
Flt Permitted						
Satd. Flow (perm)	1520	0	0	1520	1520	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	41.2			47.9	47.0	
Travel Time (s)	3.0			3.4	3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	379	249	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	379	249	0
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 25.8%
Analysis Period (min) 15

HCM 6th TWSC
11: Conestogo Road & Access 3

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	349	229	0
Future Vol, veh/h	0	0	0	349	229	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	379	249	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	628	249	249
Stage 1	249	-	-
Stage 2	379	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	447	790	1317
Stage 1	792	-	-
Stage 2	692	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	447	790	1317
Mov Cap-2 Maneuver	447	-	-
Stage 1	792	-	-
Stage 2	692	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1317	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings
12: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Volume (vph)	0	0	0	349	229	0
Future Volume (vph)	0	0	0	349	229	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1863	1863	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1863	1863	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	54.7			43.4	47.9	
Travel Time (s)	3.9			3.1	3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	379	249	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	379	249	0
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.7%
Analysis Period (min)	15
	ICU Level of Service A

HCM 6th TWSC
12: Conestogo Road

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	0	0	0	349	229	0
Future Vol, veh/h	0	0	0	349	229	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	379	249	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	628	249	249
Stage 1	249	-	-
Stage 2	379	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	447	790	1317
Stage 1	792	-	-
Stage 2	692	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	447	790	1317
Mov Cap-2 Maneuver	447	-	-
Stage 1	792	-	-
Stage 2	692	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1317	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-

Lanes, Volumes, Timings
13: Conestogo Road & Access 4

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	349	229	0
Future Volume (vph)	0	0	0	349	229	0
Ideal Flow (vphpl)	1550	1550	1550	1550	1550	1550
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1520	0	0	1520	1520	0
Flt Permitted						
Satd. Flow (perm)	1520	0	0	1520	1520	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	38.7			145.4	43.4	
Travel Time (s)	2.8			10.5	3.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	379	249	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	379	249	0
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization 25.8%	ICU Level of Service A					
Analysis Period (min) 15						

HCM 6th TWSC
13: Conestogo Road & Access 4

(200039) 525-565 Conestogo Road
Total 2037 PM Peak Hour

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	349	229	0
Future Vol, veh/h	0	0	0	349	229	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	379	249	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	628	249	249	0	-	0
Stage 1	249	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	447	790	1317	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	447	790	1317	-	-	-
Mov Cap-2 Maneuver	447	-	-	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	692	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR
Capacity (veh/h)	1317	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	0	-
HCM Lane LOS	A	-	A	-
HCM 95th %tile Q(veh)	0	-	-	-