APPENDIX A

TRANSPORTATION REVIEW

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FROM: Ian Borsuk
DATE: February 18, 2010
OUR FILE: 7499 West Transitway Extension (Bayshore to Moodie)
SUBJECT: West Transitway Existing Transit and Transportation Review

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1.0 Introduction

The purpose of this report is to document the existing transit and transportation conditions within the study area. The reliability of transit service is to be reviewed and alternative corridors are to be assessed to determine the potential benefits of providing an exclusive, fully grade separated transit facility. It is recognized that the ultimate grade-separation of Moodie Drive is not included in the current TMP and is therefore not currently anticipated within the planning horizon (to 2031).

2.0 Existing Infrastructure and Operations

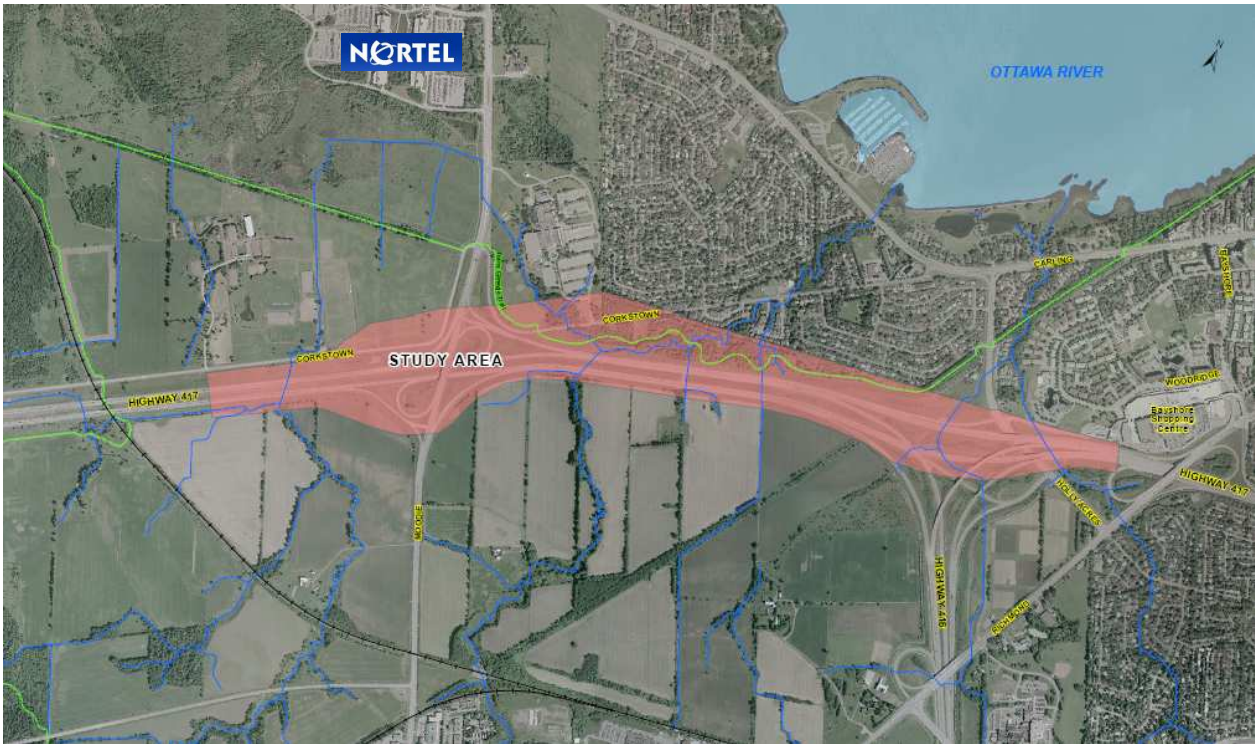
This section documents the existing transit and traffic conditions for the Study Area (as defined in Figure 1 for the West Transitway extension from Bayshore Station to Moodie Drive)

2.1 Study Area

The study area is depicted in Figure 1, below. It includes Highway 417 (Eagleson Road to Holly Acres Road), the Highways 416/417 interchange, Holly Acres Road, and Moodie Drive. The study area is located within the Greenbelt and consequently limits the potential for future development immediately adjacent to the proposed Transitway facility. Any increase in traffic travelling through the study area is therefore due to development growth occurring on either side of the Greenbelt.

It is noted that employment levels at the former Nortel Campus have fallen significantly in recent years. Consequently the basis for previously developed traffic projections have been altered and may no longer be relevant. These growth assumptions have therefore been reviewed and updated based on the most recent information available.

Figure 1 - Study Area

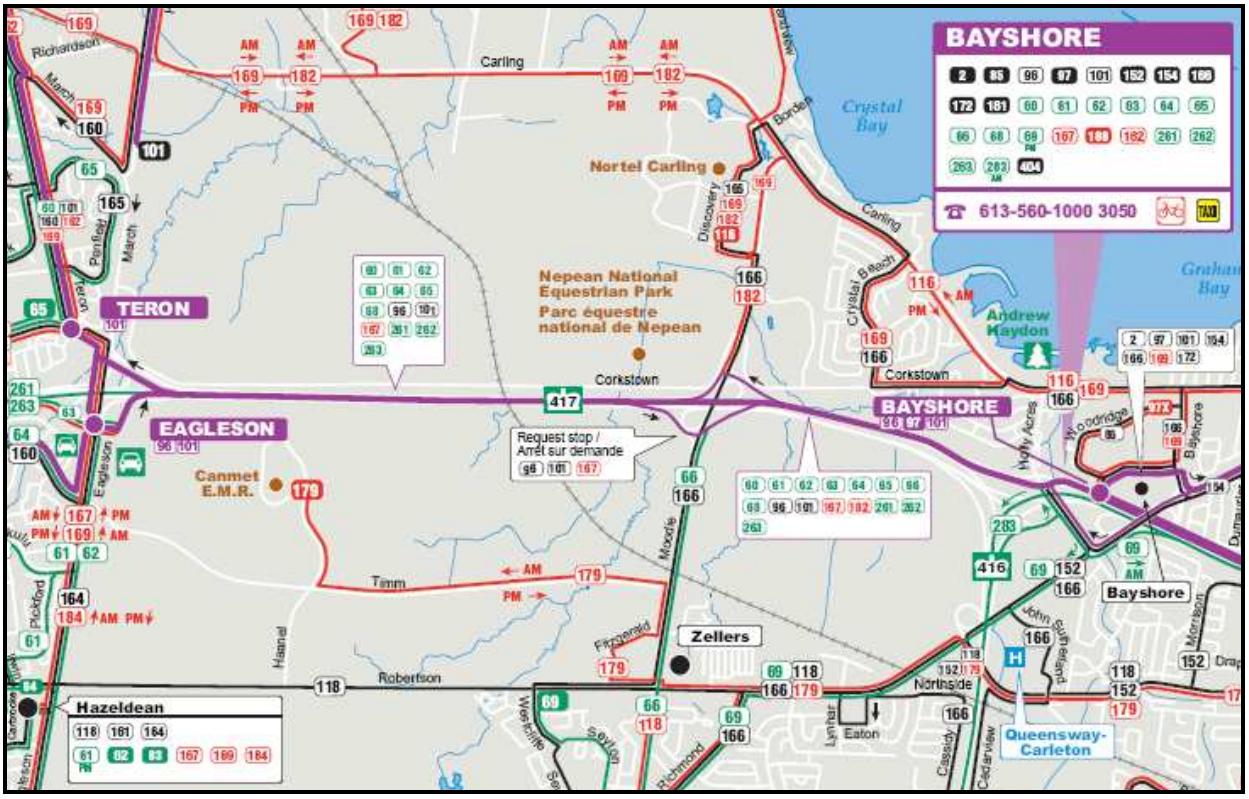


2.2 Transit Operations & Infrastructure

Several bus routes operate in the Queensway corridor between Moodie Drive and Bayshore Station including Transitway Routes 96 and 101, which operate frequently, and express and rural services such as Routes 60, 61, 62, 63, 64, 65, 66, 68, and 261, 262, 263 that circulate through communities west of the study area and provide direct connections to downtown. Peak transit services are offered by Routes 167 and 182, which operate eastbound in the a.m. and westbound in the p.m. respectively, and currently use Highway 417 within the Study Area. West of Moodie Drive, Transitway services operates on Highway 417 within bus-only shoulder lanes.

West of Moodie Drive, Routes 66 and 182 operate on Richmond Road and Carling Avenue respectively to travel to/from Kanata.

Figure 2 - OCTranspo System Map (2009)



As part of the construction of the West Transitway extension project (Pinecrest to Bayshore), Bayshore Transitway Station (located north of Highway 417) has recently been modified to include separate platforms for Transitway and local services. Accordingly, all bus routes that travel to/from Kanata have realigned their routes to this newly constructed section of Transitway. Consequently, all eastbound buses now exit Highway 417 at Holly Acres Road, turn left to travel north on Holly Acres Road and then turn right to access Bayshore Station. Westbound buses exit at Bayshore Station crossing Holly Acres Road to the existing highway access ramp onto Highway 417.

There is an eastbound bus stop at the Highway 417/Moodie Drive interchange that utilizes a Demand for Service Indicator Signal (DSIS). This service allows the eastbound buses on Highway 417 to exit the highway when a sign is illuminated indicating there are waiting

passengers at the bus stop. Currently, eastbound Routes 96, 101 and the a.m. peak Route 167 exit the highway to service this stop. If the signal is not activated, buses will remain on the Highway bypassing the stop.

Route 166 is an all-day local bus route that travels north-south along Moodie Drive and services the former Nortel Campus and the Crystal Beach community north of Highway 417; Bells Corners and the Queensway Carleton Hospital south of Highway 417; and ultimately connects to the Bayshore Transitway Station.

Table 1 presents the volume of buses in the Highway 417 corridor throughout the day and operating in both the eastbound and westbound directions. (Source: OCTranspo Winter 2009 Schedule)

Table 1 - Volume of Buses within the Highway 417 Corridor (OC Transpo: Winter 2009 Schedule)

Rte	Eastbound		Westbound	
	Time Period	# of Buses	Time Period	# of Buses
60 E	a.m. Peak Period	14	p.m. Peak Period	14
61 E	a.m. Peak Period	10	p.m. Peak Period	18
62 E	a.m. Peak Period	8	p.m. Peak Period	11
63 E	a.m. Peak Period	9	p.m. Peak Period	10
64 E	a.m. Peak Period	10	p.m. Peak Period	9
65 E	a.m. Peak Period	8	p.m. Peak Period	8
66 E	a.m. Peak Period	12	p.m. Peak Period	12
68 E	a.m. Peak Period	12	p.m. Peak Period	9
96 A	All Day	115	All Day	118
101 A	All Day	31	All Day	29
167 P	p.m. Peak Period	2	a.m. Peak Period	2
182 P	p.m. Peak Period	16	a.m. Peak Period	15
261 E	a.m. Peak Period	4	p.m. Peak Period	4
262 E	a.m. Peak Period	6	p.m. Peak Period	8
263 E	a.m. Peak Period	4	p.m. Peak Period	4
TOTAL		**261**		**271**

E = Express Routes ## P = Peak Only Routes ## A = All Day Routes

OC Transpo's 2009 service schedule indicates that 60 eastbound buses are in service between Moodie Drive and Holly Acres Road during the a.m. peak hour and 15 during the p.m. peak hour. An estimate of the number of passengers carried by OC Transpo during the a.m. and p.m. peak hours was obtained from the 2005 Origin-Destination survey and shows that there are approximately 3000 eastbound passengers during the a.m. peak hour and 900 eastbound passengers during the p.m. peak hour. The westbound direction shows 16 buses in service during the a.m. peak hour and 63 buses during the p.m. peak hour, accommodating 625 and 2700 passengers per hour respectively.

2.3 Traffic Operations & Infrastructure

The primary road network in the study area is comprised of the following roadways:

- Highway 417 functions as a major freeway within the study area providing 3 primary westbound lanes plus a westbound auxiliary (1) traffic lane plus 2 additional lanes carrying traffic from 416; Eastbound traffic has 4 freeway lanes plus a eastbound auxiliary (1) traffic lane.
- Moodie Drive (4 lanes)
- Holly Acres Road (4 lanes)
- Highway 416/417 Interchange
- Corkstown Road (2 lanes)

2.3.1 Highway Traffic

The 2006 Average Annual Daily Traffic (AADT) volume on Highway 417 (as reported by MTO) between Bayshore and Moodie is approximately 104,400 vehicles. Table 2 presents the AADT volumes for this roadway segment, as well as for the highway segments immediately east and west of this section. Historical AADT volumes for this section of Highway 417 are included in Appendix A.

Table 2 – Average Annual Daily Traffic on Highway 417 (2006 MTO)

Highway	Between	AADT
417	Eagleson - Moodie	94,600
417	Moodie - Bayshore	104,400
417	Bayshore - Pinecrest	125,200

2.3.2 Local Traffic

Traffic counts and signal-timing information was assembled for the major intersections within the study area based on information provided by the City of Ottawa. This information is important in understanding the existing traffic conditions as well as identifying areas where congestion may result in unacceptable traffic delays and traffic queues at intersections.

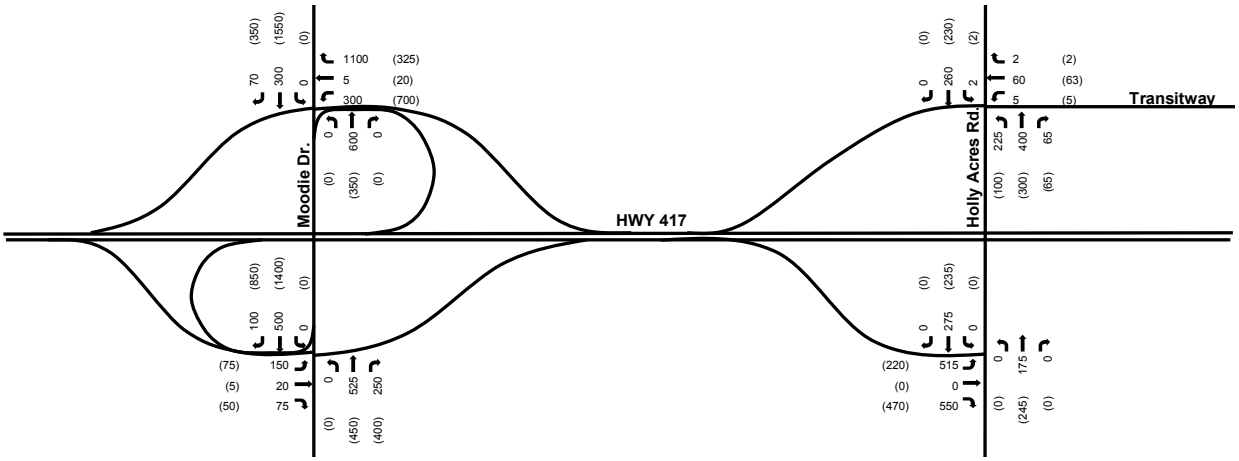
Historical traffic counts, obtained from the City of Ottawa's Annual Traffic Count Program, were reviewed and analyzed for the past 5 years to identify the annual rate of traffic growth. These rates of growth were also reviewed in light of changing levels of employment in the area (e.g. Nortel).

The traffic analysis also considered the construction of a westbound barrier wall on Highway 417 in 2008 which impacted on the traffic weaving movements (i.e. traffic from northbound 416 exiting to Moodie Drive). This new westbound barrier wall ensures northbound vehicles on Highway 416 now exit the Highway at Holly Acres Road, turn left and use Holly Acres Road to cross under Highway 417, and then use the westbound ramp to enter Highway 417 on the north side to connect to Moodie Drive. MRC conducted additional traffic counts on Holly Acres Road in April 2009. The traffic counts indicate that approximately 225 northbound vehicles per hour turn left from Holly Acres onto the Highway on-ramp during the a.m. peak period (100 vehicles per hour during the p.m. peak period). This traffic volume reflects the current (lower) employment levels at the former Nortel campus and compared against the 2001 MTO estimate of

360 veh/hr that would have been diverted onto Holly Acres Road when Nortel was fully developed.

Figure 3 identifies the existing traffic volumes used in the analysis. These volumes include the traffic diverted onto Holly Acres Road from Hwy 416 as well as a reduction in employment levels at the former Nortel facility.

Figure 3 - Existing a.m. (p.m.) Peak Hour Traffic Volumes



Synchro 7, a traffic operational planning software package designed to assist in the identification of intersection level of service (LOS) was used and is based on the Highway Capacity Manual (HCM). The LOS at the major intersections within the study area was analyzed using detailed traffic volume data, traffic signal timings and lane geometry. Table 3 presents the results of the Synchro Analysis. The detailed Synchro model output is included in Appendix B.

Table 3 - Existing LOS and V/C at Major Intersections

Intersection / Turning Movement	a.m. Peak Hour			p.m. Peak Hour		
	Volume	LOS (SYNCHRO)	V/C (SYNCHRO)	Volume	LOS (SYNCHRO)	V/C (SYNCHRO)
Moodie Drive & Highway 417 S						
SBTR	500/100	A	0.26	1400/850	A	0.59
NBT	525	A	0.26	450	A	0.19
NBR	250	A	0.26	400	A	0.34
EBL	150	C	0.53	75	C	0.34
EB-TWAY	**20**	**C**	**0.07**	**5**	**C**	**0.02**
EBR	75	A	0.24	50	B	0.21
Moodie Drive & Highway 417N						
NBTR	600/75	A	0.30	350/175	A	0.17
SBT	300	A	0.15	1550	B	0.76
SBR	70	A	0.08	350	A	0.33
WBL	300	D	0.67	700	D	0.86
WB - TWAY	**5**	**C**	**0.03**	**20**	**C**	**0.07**
WBR	1100	A	0.86	325	A	0.22
Holly Acres Road & Highway 417S						
NBT	175	A	0.11	245	A	0.14
SBT	275	A	0.18	235	A	0.13
EBL	**515**	**F**	**1.06**	**220**	**C**	**0.67**
EBR	550	A	0.46	470	A	0.47

Intersection / Turning Movement	a.m. Peak Hour			p.m. Peak Hour		
	Volume	LOS (SYNCHRO)	V/C (SYNCHRO)	Volume	LOS (SYNCHRO)	V/C (SYNCHRO)
Holly Acres Road & Highway 417N / Transitway						
NBL	225	D	0.77	100	D	0.46
NBTR	400/65	A	0.42	300/65	A	0.20
SBT	260	B	0.16	230	B	0.13
WB-TWAY	**60**	**D**	**0.50**	**63**	**D**	**0.48**

The analysis of existing operations demonstrates the relatively high level of service provided to roadway users within the study area during the morning and afternoon peak hours. Traffic turn movements operating at a level of service D or E are in general, based on actuated signal plans with minor-street service and these approaches could have additional capacity available should higher volumes of vehicles demand signal timing changes. The intersection approaches used by Transitway Buses at Moodie Drive operate well within acceptable levels of service for the existing traffic conditions analysed, with the exception of the eastbound highway off-ramp at Holly Acres Road which fails during the a.m. peak. However it is noted that the existing signal timings can be modified to better optimize green times and balance the delays between the eastbound highway off-ramp and the traffic on Holly Acres Road. This will be an important planned intervention now that all eastbound buses are exiting the highway for access into Bayshore Station.

3.0 Existing Transit Service Reliability

This section documents the existing reliability of transit services between Moodie Drive and Bayshore Transitway Station. It has been recognized that there are existing traffic and transit issues during the a.m. peak periods for eastbound transit services (inbound to Ottawa).

3.1 Transit Data Provided

Data collected through OC Transpo's Automated Passenger Counting (APC) system was provided. The data reports the actual travel times between stations for example and compares these results with the scheduled travel time. The two transit stations that were used in this analysis were the existing station at the Eagleson Park and Ride facility and Bayshore Transitway Station. Eagleson was selected instead of Moodie since not all buses service the DSIS at Moodie Drive, as the DSIS allows buses to skip the stop and stay on the Highway 417. To facilitate our analysis, Transitway Route 96 was used to represent transit services in the corridor since it provides service to both the Eagleson Park and Ride and Bayshore Station. At the time when the data collection was undertaken, many routes from the west end did not service Bayshore station; rather they remained on Highway 417 until Queensway Station where they then gained access to the Southwest Transitway.

The data provided by OC Transpo includes APC data for the Fall and Winter 2008 Bookings, and is included in Appendix C.

3.2 Scheduled Travel Times

The scheduled travel time for eastbound buses in the a.m. peak periods (6:00-9:00) between the existing station at the Eagleson Park and Ride facility and Bayshore Station for Route 96 is 9 minutes. During the off-peak the scheduled travel time is 7 minutes. This suggests that the schedule has already been adjusted to account for 2 minutes of delay during the a.m. peak period.

3.3 Actual Travel Time

Actual travel times between the Eagleson Park and Ride and Bayshore Station have been documented and range from 6 to 11 minutes during the a.m. peak period in the eastbound direction.

The variability of travel times can be represented by the standard deviation (SD) from the mean travel time for all bus trips. A lower SD indicates that the travel time data tend to be very close to the same value (low variability = high service reliability), while a higher SD indicates that the data is spread out over a large range of values (high variability = low reliability). For the section between the existing station at the Eagleson Park and Ride facility and Bayshore Station, the current SD is generally 1 or more during the peak periods. This can be compared to other existing exclusive Transitway sections which generally have a standard deviation of less than 0.8. This comparison demonstrates that the transit service operating between Eagleson and Bayshore are less reliable than the remaining Transitway sections.

During the fall 2008 booking, 61 per cent of all a.m. Peak Period buses took longer than the theoretical 7 minutes that could be achieved in an uncongested environment. Nine per cent of all the buses take longer than the scheduled 9 minute travel time. Since this data was collected, additional lanes have been in operation on Highway 417. OCTranspo has confirmed that although there has been some improvement in the service resulting from the widening of the highway, reliability of service remains an issue. The morning eastbound queues begin upstream and sometimes extend westerly through the 416/417 interchange.

3.4 Summary of Results

The current transit services and operations are not ideal within the study area and the analysis demonstrated that they can be significantly improved with an exclusive Transitway corridor which would eliminate the congestion delay and delays at the highway off ramps (where transit vehicles are shared with general traffic lanes). Also, it is noted that further increases in traffic and transit volumes will cause both the existing delays and levels of traffic congestion to worsen. The proposed separate Transitway facility would improve the service reliability.

4.0 Travel Time Savings for the Ultimate Grade Separated Facility

The existing Transitway and Express buses travelling between Kanata and Bayshore Station can also benefit from the proposed West Transitway extension because of the reduction in travel times and the increased reliability associated with operation in an exclusive facility. Travel time savings come from two primary areas; changes in the physical design of the facility, and the reduction in both signal and congestion delays. Both of these elements are discussed in the sections below. Note that this analysis assumes that station dwell times are constant in all alternatives and are therefore not included in the assessment.

4.1 Travel Time Savings due to Revised Physical Design

The new Transitway alignment would be shorter in overall distance than the existing route, and buses would also be able to achieve a higher average operating speed within the corridor compared with current conditions. All of the alternative alignments being considered result in a travel time savings of approximately 1 minute for eastbound buses. Table 4 presents the theoretical travel time of the existing and alternative alignments being considered. The analysis is based on the preliminary designs used for comparison of corridors and do not represent the

detail design that would subsequently be developed for the recommended corridor. The basis of the travel time assessments is detailed further in Appendix D.

Table 4 - Travel Time Analysis Summary (west of Moodie Drive to Bayshore Station)

Route/Corridor	Travel Distance	Travel Time		Average Speed
	Meters	Sec.	Min.	km/h
Existing	4015	226	3.77	64.0
FORMER RAILWAY	3312	167	2.78	71.6
QUEENSWAY NORTH	3292	166	2.76	71.5
QUEENSWAY MEDIAN	3228	168	2.80	69.2
QUEENSWAY SOUTH	3351	178	2.96	67.9

Assumptions:

1. Acceleration and deceleration rates assumed to be constant (a = 1 m/s^2, d=1.2 m/s^2)
2. Effects due to profile grades not considered
3. Does not consider station dwell times, signal delay, or congestion delay

There are no significant differences in the overall length of the proposed route(s) for westbound buses; therefore travel time savings due to the physical design of the facility for westbound buses are not anticipated.

4.2 Travel Time Savings due to Elimination of Congestion and Signal Delay

As noted in Section 3, two minutes is currently added to the scheduled travel times during the a.m. peak period because of the delays that have been experienced in this corridor. This two minute delay accounts for the congestion on the highway where buses operate in mixed traffic, as well as the potential for the buses to be further delayed at the Moodie Drive and Holy Acres Road signalized intersections. As the ultimate configuration of all four route alternatives comprises an exclusive grade-separated corridor, each of the routes considered will benefit equally from the elimination of both congestion and signal delay.

4.3 Total Travel Time Savings for all Route Alternatives

The physical design of the facility results in a 1 minute travel time saving for eastbound buses during all time periods. However based on current physical designs for the westbound travel direction, no significant travel time savings are noted..

The two (2) minute travel time savings, that results from the elimination of both congestion and signal delay, would be achieved during both peak periods and for the peak travel direction only. The following table summarize the travel time savings for eastbound buses during each time period.

Eastbound			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr
revised physical design	1 min	1 min	1 min
elimination of congestion & signal delay	2 min	0 min	0 min
Total	**3 min**	**1 min**	**1 min**

Combining the travel time savings due to changes in physical design as well as elimination of congestion and signal delay would result in a total of 3 minute savings in the eastbound direction during the a.m. peak period. During the rest of the day eastbound buses would benefit from the

1 minute time savings due to the changes in physical design alone. The following table summarizes the travel time savings for westbound buses.

Westbound			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr
revised physical design	0 min	0 min	0 min
elimination of congestion & signal delay	0 min	0 min	2 min
Total	**0 min**	**0 min**	**2 min**

For westbound buses, the time savings would only be achieved during the p.m. peak period due to the elimination of both congestion and signal delay. When considering the round trip travel time savings, 3 minutes can be saved during the peak periods while an approximate 1 minute travel time saving can be achieved during the midday/evening service periods.

Total Round Trip			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr
Eastbound Time Savings / trip	3 min	1 min	1 min
Westbound Time Savings / trip	0 min	0 min	2 min
Round Trip Time Savings / trip	**3 min**	**1 min**	**3 min**

From a travel time savings perspective, all four route alternatives will benefit equally (3 minutes in peak hours, 1 minute in off peak hours) from the implementation of an exclusive, grade-separated transit facility.

5.0 Potential Cost Savings due to Reduced Travel Time

The operation of an exclusive, fully grade separated Transitway that removes buses from mixed traffic operations on Highway 417 will result in cost savings to both the City and the users, transit passengers. There are capital cost savings due to fewer buses required in operation, operational cost savings due to fewer transit service hours required to accommodate the transit demand, and passenger cost savings due to the reduction of travel time passengers spend in transit vehicles. As the grade separation of Moodie Drive is not included in the current Transportation Master Plan, these savings are not anticipated to be realized until at least 2031 (the horizon year). The following discussion is therefore only intended to illustrate the potential operational, capital and passenger cost savings associated with implementing the Moodie Drive grade separation in 2031. It is possible that, through future TMP updates (conducted at five year intervals), the implementation of the Moodie Drive grade separation could be advanced or further deferred. For the purpose of this discussion, an opening day of 2031 has been assumed. This assessment is further detailed in Appendix E.

5.1 Total Transit Capital Cost Savings

With the buses requiring less time to complete a round-trip than the existing routing, fewer buses would be required in-service to provide the equivalent transit capacity. Assuming that half of the passengers are accommodated on articulated buses and the remainder on standard buses, the 3 minute round trip travel time savings in both the a.m. and p.m. peaks results in 8 fewer buses being required to accommodate the transit demand in 2031.

Year	Total time savings (min)	Passengers / peak hr / peak dir	Service Frequency		# of Buses saved
			veh / hr	headway (min)	
2031	3	8,000 WB passengers p.m. peak	146	0.4	8

Assuming vehicle costs of $630,000 and $900,000 for standard and articulated hybrid-electric buses respectively, the introduction of this new exclusive Transitway would allow the city to save $6.12 million in capital costs (opening day = 2031) due to fewer buses required in service to accommodate the transit demand.

5.2 Total Annual Transit Operational Cost Savings

Annual cost savings accrued to the City have been based on the projected number of passengers on this specific section of the west Transitway and the number of buses required to accommodate these passengers. The following assumptions were applied in the analysis

- a.m. & p.m. peak hour ridership from 2031 TRANS Model
- Daily ridership = (a.m. peak hour + p.m. peak hour) x 5
- Annual ridership = 250 x Daily ridership
- Transit fleet mix
  - ½ passengers on articulated (70 passengers/bus);
  - ½ passengers on standard buses (45 passengers/bus)

Each bus within the corridor will also benefit from the travel time savings resulting in fewer total operational hours of in-service transit vehicles.

In 2031, the 6,100 a.m. peak hour eastbound passengers can be accommodated on 117 buses. Assuming that the duration of the peak period lasts for 3 hours in the a.m. and that each bus also benefits from a 3 minute time savings, then there will be 18 hrs of transit time savings resulting from enhanced a.m. peak eastbound transit service in 2031. (117 buses/hr x 3 hrs x 3 min/bus = 18 hrs)

Direction	**Eastbound**			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr	Daily Total
Ridership (2031)	6,400	17,000	2,100	42,500
# of buses required (2031)*	117	310	38	
2031 Transit time savings (Hours)	18	5	2	**25**

* Fewer buses would be required if more articulated buses are used.

The total estimated annual cost savings have been based on 250 service days, and an average transit operational cost of 120$/hr (2008 OC Transpo Average Hourly Operational Cost)
Annual Eastbound Time Savings (2031) = 25 x 250 = **6,250 hrs**
Annual Eastbound Cost savings (2031) = 6,250 hrs x $120/hr = **$750,000**

Direction	**Westbound**			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr	Daily Total
Ridership (2031)	2,800	21,600	8,000	54,000
# of buses required (2031)*	51	394	146	
2031 Transit time savings (Hours)	0	0	15	**15**

* Fewer buses would be required if more articulated buses are used.

Annual Westbound Time Savings (2031) = 15 x 250 = **3,750 hrs**
Annual Westbound Cost savings (2031) = 3,750 hrs x $120/hr = **$450,000**

The following table summarizes the total annual transit time savings in 2031:

Total Transit Time Savings (Both Directions)	2031
Eastbound	$ 750,000
Westbound	$ 450,000
	$ 1,200,000

5.3 Total Annual Passenger Cost Savings

The annual passenger travel time savings have been based on considering the number of transit riders on both the eastbound and westbound transit services operating throughout the day.

The estimate of the total annual (2031) eastbound and westbound passenger time savings is also based on 250 service days, and an average income of $10.49/hr. (Derived from the 2006 Census average income and converted to hourly using a standard work week)

In 2031, the 6,400 eastbound transit passengers per hour in the a.m. peak would all benefit from a 3 minute time savings. During a 3 hour a.m. peak period, there would be approximately 960 hours saved of passenger time due to enhancements to eastbound services.

Direction	Eastbound			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr	Daily Total
Ridership (2031)	6,400	17,000	2,100	42,500
Total Passenger time savings - 2031 (Hours)	960	283	105	1,348

Annual Eastbound Passenger Time savings (2031) = 1,348 hrs x 250days = **337,000 hrs**
Annual Eastbound Passenger Cost savings (2031) = 240,000 hrs x $10.49/hr = **$3.53 million**

Direction	Westbound			
Time Period	a.m. peak hr	midday / evening	p.m. peak hr	Daily Total
Ridership (2031)	2,800	21,600	8,000	54,000
Total time savings - 2031 (Hours)	0	0	800	800

Annual Westbound Passenger Time savings (2031) = 800 hrs x 250days = **200,000 hrs**
Annual Westbound Passenger Cost savings (2031) = 200,000 hrs x $10.49/hr = **$2.1 million**

Total Passenger Time Savings (Both Directions)	2031
Eastbound	$ 3,530,000
Westbound	$ 2,100,000
	$ 5,630,000

The travel time savings results in an annual total of $5.63 million in 2031.

6.0 Conclusion

The above analysis shows that existing transit conditions result in travel time variability. By implementing an exclusive grade-separated facility the City can reduce travel times and improve reliability which will benefit users and save the City capital and operating costs.

Memo To: R. Hunton
Date: February 18, 2010

Appendix A – Highway Traffic Volumes

Ministry of Transportation Ontario (MTO): Historical Average Annual Daily Traffic Volume

Highway	Location Description	Dist	Year	Patt Type	AADT	SADT	SAWDT	WADT	AR
			2006	UC	134,900	142,700	157,600	127,000	0.4
417	PINECREST RD IC 129-OTTA/KANATA LTS	1.3	1988	UC	73,050	76,700	82,500	68,600	1.4
			1989	UC	74,550	78,200	84,200	70,800	1.1
			1990	UC	77,600	83,000	90,000	73,700	1.2
			1991	UC	79,200	83,900	91,000	76,800	1.6
			1992	UC	79,000	83,700	90,800	75,800	1.2
			1993	UC	79,000	82,100	89,200	73,400	0.7
			1994	UC	86,000	91,200	99,800	78,300	0.4
			1995	UC	88,800	92,400	101,200	82,600	0.4
			1996	UC	91,600	97,500	107,200	87,000	0.5
			1997	UC	94,400	99,100	110,400	88,700	0.5
			1998	UC	97,200	103,400	113,700	92,300	0.4
			1999	UC	96,500	102,700	112,900	91,700	0.5
			2000	UC	102,000	108,500	120,200	95,900	0.4
			2001	UC	107,500	115,000	126,900	101,100	0.4
			2002	UC	113,100	120,500	133,100	105,900	0.4
			2003	SC	118,600	124,500	138,800	104,400	0.5
			2004	SC	118,400	125,000	138,100	104,800	0.6
			2005	SC	121,800	129,000	142,200	107,200	0.5
			2006	SC	125,200	132,500	146,400	110,400	0.3
417	RICHMOND RD IC 130 -BAYSHORE DR	2.9	1988	UC	63,750	66,900	72,000	59,900	0.2
			1989	UC	65,750	69,000	74,200	62,400	0.1
			1990	UC	68,650	73,400	79,600	65,200	0.2
			1991	UC	70,300	74,500	80,800	68,100	0.5
			1992	UC	66,850	70,800	76,800	64,100	0.7
			1993	UC	66,850	69,500	75,500	62,100	1.1
			1994	UC	74,800	79,300	86,800	68,100	0.5
			1995	UC	77,200	80,300	88,000	71,800	0.4
			1996	UC	79,700	84,800	93,200	75,700	0.4
			1997	SC	82,100	87,300	96,200	73,100	0.4
			1998	SC	84,700	90,000	99,300	75,400	0.3
			1999	SC	87,100	92,600	102,100	77,500	0.7
			2000	SC	89,600	95,200	105,000	79,100	0.6
			2001	SC	92,100	98,500	107,800	81,000	0.5
			2002	SC	94,500	100,300	110,600	83,300	0.5
			2003	SC	97,000	101,900	113,500	85,400	0.5
			2004	SC	99,500	105,100	116,100	88,000	0.6
			2005	SC	102,000	108,000	119,100	89,800	0.6
			2006	SC	104,400	110,500	122,000	92,100	0.6
417	MOODIE DR IC 134	4.0	1988	C	52,250	57,900	57,900	47,000	0.5
			1989	C	53,950	59,800	60,400	48,500	0.5
			1990	C	57,550	63,800	63,800	51,700	0.6
			1991	C	59,000	64,900	65,400	53,600	0.9
			1992	C	57,500	62,100	63,800	52,900	1.0
			1993	C	58,000	62,600	64,300	53,900	0.7
			1994	C	64,600	70,400	72,400	58,100	0.4
			1995	UC	67,100	69,800	76,500	62,400	0.4
			1996	UC	69,600	74,100	81,400	66,100	0.4
			1997	UC	72,100	75,700	84,400	67,800	0.3
			1998	UC	74,600	79,400	87,300	70,900	0.3
			1999	UC	77,100	82,000	90,200	73,200	0.4
			2000	UC	79,600	84,700	93,800	74,800	0.4
			2001	UC	82,100	87,800	96,900	77,200	0.4
			2002	UC	84,600	90,100	99,500	79,200	0.3
			2003	UC	87,100	92,300	102,800	81,900	0.4
			2004	UC	89,600	94,700	105,000	84,600	0.5
			2005	UC	92,100	97,500	107,700	86,400	0.5
			2006	UC	94,600	100,000	110,500	89,000	0.4

Memo To: R. Hunton
Date: February 18, 2010

Appendix B – Intersection Traffic Analysis

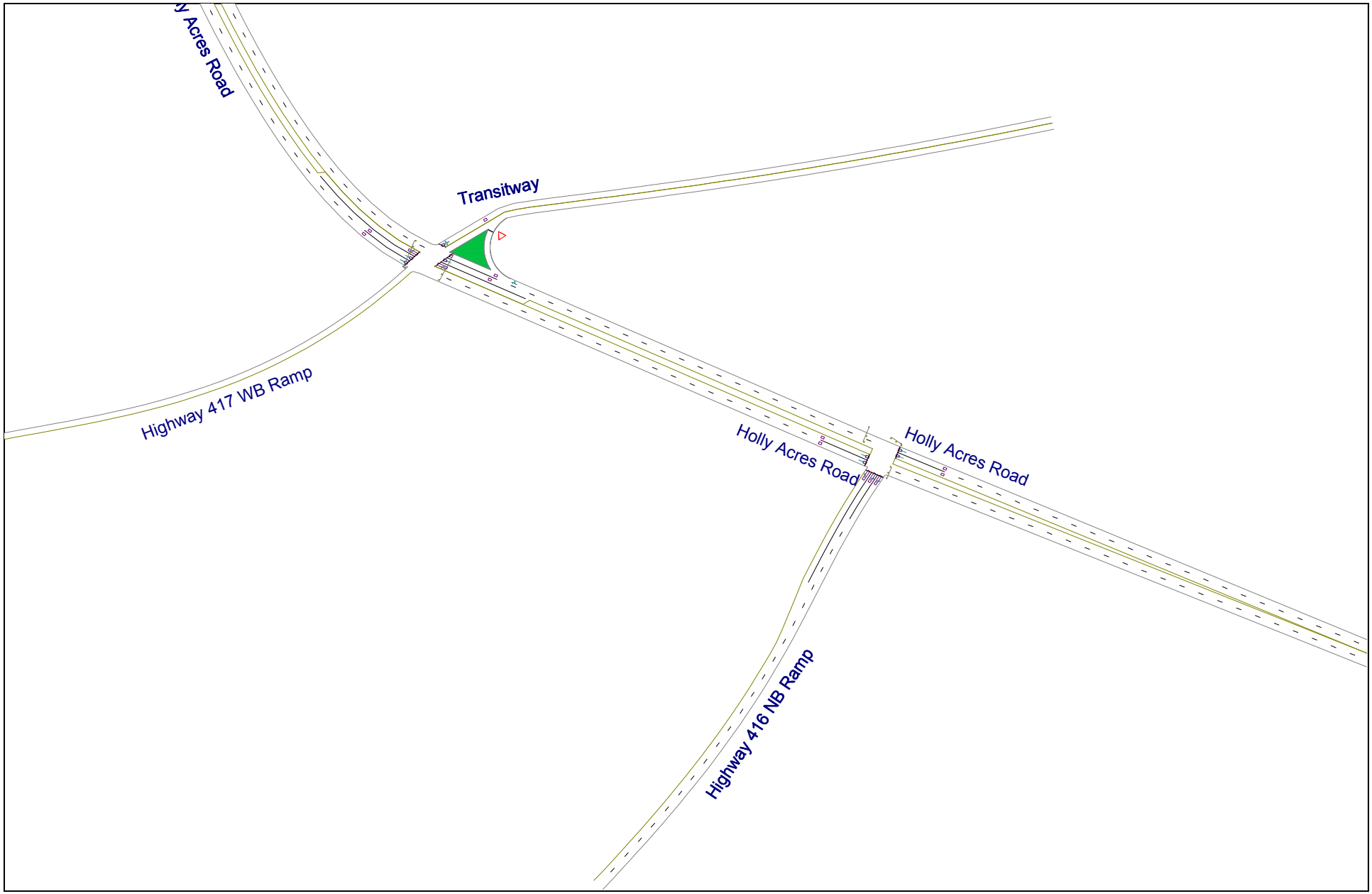
SYNCHRO (HCM)

- Existing Holly Acres Road Configuration
- Holly Acres a.m.
  - Westbound 417 On Ramp / Transitway
  - Eastbound 417 Off Ramp
- Holly Acres p.m.
  - Westbound 417 On Ramp / Transitway
  - Eastbound 417 Off Ramp

- Existing Moodie Drive Configuration
- Moodie a.m.
  - Eastbound 417 ramp
  - Westbound 417 ramp
- Moodie p.m.
  - Eastbound 417 ramp
  - Westbound 417 ramp

Holly Acres Road @ Highway 417

Existing Configuration
2/19/2010



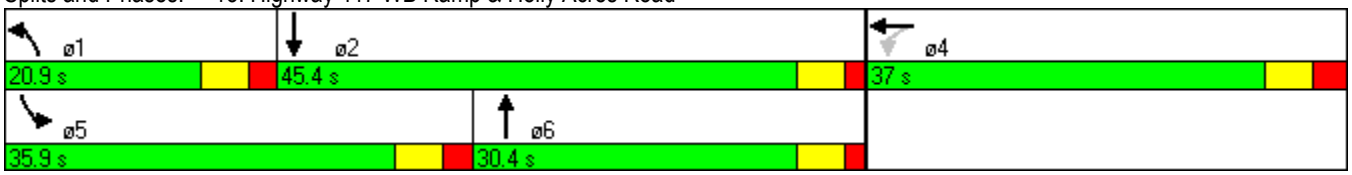
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	5	60	2	225	400	65	2	260	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	70.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5		2.5	2.5		2.5	2.5		2.5	2.5		2.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt					0.996			0.979				
Flt Protected					0.996		0.950			0.950		
Satd. Flow (prot)	0	0	0	0	903	0	1695	1551	0	864	3390	0
Flt Permitted					0.996		0.950			0.950		
Satd. Flow (perm)	0	0	0	0	903	0	1695	1551	0	864	3390	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					1			7				
Link Speed (k/h)		100			48			48			48	
Link Distance (m)		385.7			377.7			290.9			336.3	
Travel Time (s)		13.9			28.3			21.8			25.2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	100%	100%	100%	2%	1%	100%	100%	2%	0%
Adj. Flow (vph)	0	0	0	5	62	2	234	417	68	2	271	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	69	0	234	485	0	2	271	0
Turn Type				Perm			Prot			Prot		
Protected Phases					4		1	6		5	2	
Permitted Phases				4								
Detector Phase				4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)				22.4	22.4		10.9	21.4		10.9	21.4	
Total Split (s)	0.0	0.0	0.0	37.0	37.0	0.0	20.9	30.4	0.0	35.9	45.4	0.0
Total Split (%)	0.0%	0.0%	0.0%	35.8%	35.8%	0.0%	20.2%	29.4%	0.0%	34.8%	43.9%	0.0%
Yellow Time (s)				3.7	3.7		3.7	3.7		3.7	3.7	
All-Red Time (s)				2.7	2.7		2.2	1.7		2.2	1.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	6.4	6.4	4.0	5.9	5.4	4.0	5.9	5.4	4.0
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode				None	None		None	Max		None	Max	
Act Effct Green (s)					12.7		15.0	61.8		5.9	42.0	
Actuated g/C Ratio					0.15		0.18	0.74		0.07	0.50	
v/c Ratio					0.50		0.77	0.42		0.03	0.16	
Control Delay					46.0		52.9	8.9		40.0	13.4	
Queue Delay					0.0		0.0	0.0		0.0	0.0	
Total Delay					46.0		52.9	8.9		40.0	13.4	
LOS					D		D	A		D	B	
Approach Delay					46.0			23.2			13.6	
Approach LOS					D			C			B	
Queue Length 50th (m)					10.4		36.3	25.4		0.3	12.5	
Queue Length 95th (m)					23.2		#78.3	83.9		2.5	22.4	

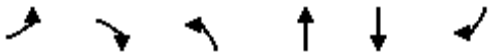
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		361.7			353.7			266.9			312.3	
Turn Bay Length (m)										70.0		
Base Capacity (vph)					333		305	1146		311	1701	
Starvation Cap Reductn					0		0	0		0	0	
Spillback Cap Reductn					0		0	0		0	0	
Storage Cap Reductn					0		0	0		0	0	
Reduced v/c Ratio					0.21		0.77	0.42		0.01	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 103.3			
Actuated Cycle Length: 83.7			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 22.2		Intersection LOS: C	
Intersection Capacity Utilization 53.6%		ICU Level of Service A	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 13: Highway 417 WB Ramp & Holly Acres Road





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	515	550	0	175	275	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0	0.0	0.0			0.0
Storage Lanes	1	2	0			0
Taper Length (m)	40.0	2.5	2.5			2.5
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95	1.00
Frt		0.850				
Flt Protected	0.950					
Satd. Flow (prot)	1544	2669	0	3325	3390	0
Flt Permitted	0.950					
Satd. Flow (perm)	1544	2669	0	3325	3390	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		598				
Link Speed (k/h)	100			48	48	
Link Distance (m)	303.5			156.2	290.9	
Travel Time (s)	10.9			11.7	21.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	12%	2%	2%	4%	2%	2%
Adj. Flow (vph)	560	598	0	190	299	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	560	598	0	190	299	0
Turn Type		Perm				
Protected Phases	8			6	2	
Permitted Phases		8				
Detector Phase	8	8		6	2	
Switch Phase						
Minimum Initial (s)	10.0	10.0		10.0	10.0	
Minimum Split (s)	29.5	29.5		26.5	26.5	
Total Split (s)	29.5	29.5	0.0	40.5	40.5	0.0
Total Split (%)	42.1%	42.1%	0.0%	57.9%	57.9%	0.0%
Yellow Time (s)	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None		Max	Max	
Act Effct Green (s)	24.0	24.0		35.0	35.0	
Actuated g/C Ratio	0.34	0.34		0.50	0.50	
v/c Ratio	1.06	0.46		0.11	0.18	
Control Delay	81.6	2.9		9.5	9.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	81.6	2.9		9.5	9.9	
LOS	F	A		A	A	
Approach Delay	41.0			9.5	9.9	
Approach LOS	D			A	A	
Queue Length 50th (m)	~82.4	0.0		6.4	10.5	
Queue Length 95th (m)	#136.7	10.3		11.3	16.8	

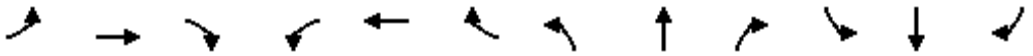
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Internal Link Dist (m)	279.5			132.2	266.9	
Turn Bay Length (m)	75.0					
Base Capacity (vph)	529	1308		1663	1695	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	1.06	0.46		0.11	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 31.7		Intersection LOS: C	
Intersection Capacity Utilization 47.6%		ICU Level of Service A	
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: 14: Highway 416 NB Ramp & Holly Acres Road

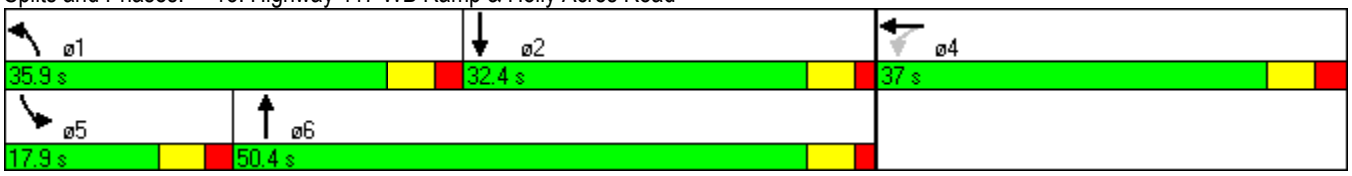


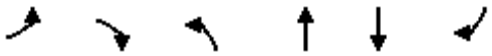
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	5	63	2	100	300	65	2	230	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	0.0		0.0	50.0		0.0	70.0		0.0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (m)	2.5		2.5	2.5		2.5	2.5		2.5	2.5		2.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt					0.996			0.973				
Flt Protected					0.997		0.950			0.950		
Satd. Flow (prot)	0	0	0	0	904	0	1695	2815	0	1695	3424	0
Flt Permitted					0.997		0.950			0.950		
Satd. Flow (perm)	0	0	0	0	904	0	1695	2815	0	1695	3424	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					1			31				
Link Speed (k/h)		100			48			48			48	
Link Distance (m)		385.7			377.7			290.9			592.4	
Travel Time (s)		13.9			28.3			21.8			44.4	
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%	0%	100%	100%	100%	2%	2%	100%	2%	1%	0%
Adj. Flow (vph)	0	0	0	5	68	2	109	326	71	2	250	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	75	0	109	397	0	2	250	0
Turn Type				Perm			Prot			Prot		
Protected Phases					4		1	6		5	2	
Permitted Phases				4								
Detector Phase				4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)				10.0	10.0		5.0	10.0		5.0	10.0	
Minimum Split (s)				22.4	22.4		10.9	21.4		10.9	21.4	
Total Split (s)	0.0	0.0	0.0	37.0	37.0	0.0	35.9	50.4	0.0	17.9	32.4	0.0
Total Split (%)	0.0%	0.0%	0.0%	35.1%	35.1%	0.0%	34.1%	47.9%	0.0%	17.0%	30.8%	0.0%
Yellow Time (s)				3.7	3.7		3.7	3.7		3.7	3.7	
All-Red Time (s)				2.7	2.7		2.2	1.7		2.2	1.7	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	6.4	6.4	4.0	5.9	5.4	4.0	5.9	5.4	4.0
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode				None	None		None	Max		None	Max	
Act Effct Green (s)					12.2		10.0	50.3		5.7	39.1	
Actuated g/C Ratio					0.17		0.14	0.70		0.08	0.55	
v/c Ratio					0.48		0.46	0.20		0.01	0.13	
Control Delay					38.7		36.0	6.2		35.0	12.7	
Queue Delay					0.0		0.0	0.0		0.0	0.0	
Total Delay					38.7		36.0	6.2		35.0	12.7	
LOS					D		D	A		C	B	
Approach Delay					38.7			12.6			12.8	
Approach LOS					D			B			B	
Queue Length 50th (m)					8.7		12.8	7.7		0.3	9.5	
Queue Length 95th (m)					23.7		31.3	25.5		2.4	21.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		361.7			353.7			266.9			568.4	
Turn Bay Length (m)							50.0			70.0		
Base Capacity (vph)					390		716	1986		286	1869	
Starvation Cap Reductn					0		0	0		0	0	
Spillback Cap Reductn					0		0	0		0	0	
Storage Cap Reductn					0		0	0		0	0	
Reduced v/c Ratio					0.19		0.15	0.20		0.01	0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 105.3			
Actuated Cycle Length: 71.7			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 15.0		Intersection LOS: B	
Intersection Capacity Utilization 38.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 13: Highway 417 WB Ramp & Holly Acres Road



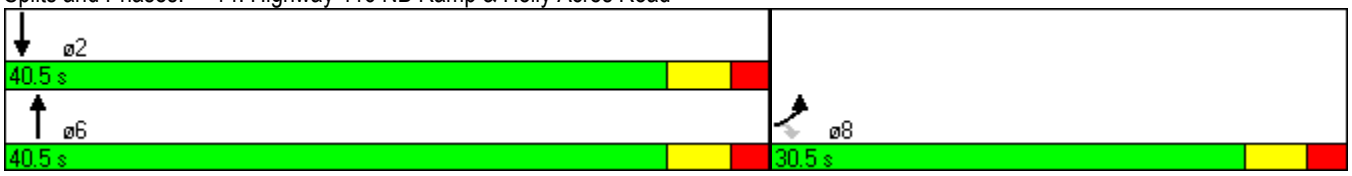


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	220	470	0	245	235	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	75.0	0.0	0.0			0.0
Storage Lanes	1	2	0			0
Taper Length (m)	40.0	2.5	2.5			2.5
Lane Util. Factor	1.00	0.88	1.00	0.95	0.95	1.00
Frt		0.850				
Flt Protected	0.950					
Satd. Flow (prot)	1361	2669	0	3390	3390	0
Flt Permitted	0.950					
Satd. Flow (perm)	1361	2669	0	3390	3390	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		511				
Link Speed (k/h)	100			48	48	
Link Distance (m)	303.5			312.5	290.9	
Travel Time (s)	10.9			23.4	21.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	27%	2%	2%	2%	2%	2%
Adj. Flow (vph)	239	511	0	266	255	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	239	511	0	266	255	0
Turn Type		Perm				
Protected Phases	8			6	2	
Permitted Phases		8				
Detector Phase	8	8		6	2	
Switch Phase						
Minimum Initial (s)	10.0	10.0		10.0	10.0	
Minimum Split (s)	30.5	30.5		26.5	26.5	
Total Split (s)	30.5	30.5	0.0	40.5	40.5	0.0
Total Split (%)	43.0%	43.0%	0.0%	57.0%	57.0%	0.0%
Yellow Time (s)	3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None		Max	Max	
Act Effct Green (s)	16.4	16.4		35.2	35.2	
Actuated g/C Ratio	0.26	0.26		0.56	0.56	
v/c Ratio	0.67	0.47		0.14	0.13	
Control Delay	30.3	3.4		7.8	7.8	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	30.3	3.4		7.8	7.8	
LOS	C	A		A	A	
Approach Delay	12.0			7.8	7.8	
Approach LOS	B			A	A	
Queue Length 50th (m)	24.5	0.0		6.6	6.3	
Queue Length 95th (m)	44.2	9.6		15.5	15.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Internal Link Dist (m)	279.5			288.5	266.9	
Turn Bay Length (m)	75.0					
Base Capacity (vph)	546	1377		1904	1904	
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	0.44	0.37		0.14	0.13	

Intersection Summary			
Area Type:	Other		
Cycle Length: 71			
Actuated Cycle Length: 62.7			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 10.3		Intersection LOS: B	
Intersection Capacity Utilization 34.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 14: Highway 416 NB Ramp & Holly Acres Road



Moodie Drive @ Highway 417

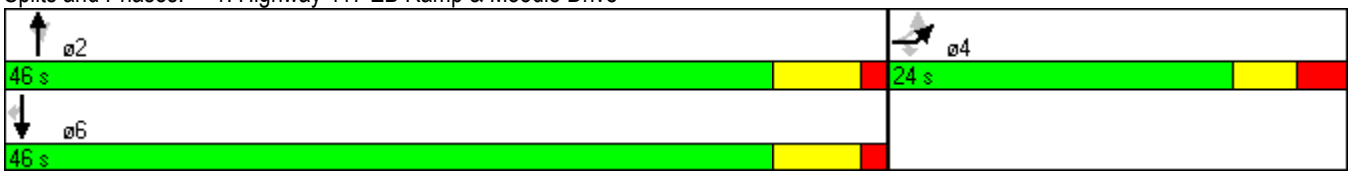
Existing Configuration
2/19/2010

Lane Group	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Lane Configurations											
Volume (vph)	150	20	75	0	525	250	0	500	100	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		0.0	85.0	0.0		100.0	0.0		300.0	0.0	0.0
Storage Lanes		2	2	0		1	0		1	0	0
Taper Length (m)		2.5	30.0	2.5		30.0	2.5		2.5	2.5	2.5
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Frt			0.850			0.850			0.850		
Flt Protected	0.950	0.950									
Satd. Flow (prot)	1695	1729	1532	0	3390	1502	0	3293	1473	0	0
Flt Permitted	0.950	0.950									
Satd. Flow (perm)	1695	1729	1532	0	3390	1502	0	3293	1473	0	0
Right Turn on Red			Yes			Yes			Yes		
Satd. Flow (RTOR)			82			272			109		
Link Speed (k/h)		48			48			48		48	
Link Distance (m)		493.1			293.3			459.8		294.3	
Travel Time (s)		37.0			22.0			34.5		22.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.99	0.99
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	5%	5%	0%	0%
Adj. Flow (vph)	163	22	82	0	571	272	0	543	109	0	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	163	22	82	0	571	272	0	543	109	0	0
Turn Type	Perm		Perm			Perm			Perm		
Protected Phases		4			2			6			
Permitted Phases	4		4			2			6		
Detector Phase	4	4	4		2	2		6	6		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0		10.0	10.0		10.0	10.0		
Minimum Split (s)	24.0	24.0	24.0		24.0	24.0		24.0	24.0		
Total Split (s)	24.0	24.0	24.0	0.0	46.0	46.0	0.0	46.0	46.0	0.0	0.0
Total Split (%)	34.3%	34.3%	34.3%	0.0%	65.7%	65.7%	0.0%	65.7%	65.7%	0.0%	0.0%
Yellow Time (s)	3.3	3.3	3.3		4.6	4.6		4.6	4.6		
All-Red Time (s)	2.7	2.7	2.7		1.4	1.4		1.4	1.4		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None		C-Max	C-Max		C-Max	C-Max		
Act Effct Green (s)	12.8	12.8	12.8		45.2	45.2		45.2	45.2		
Actuated g/C Ratio	0.18	0.18	0.18		0.65	0.65		0.65	0.65		
v/c Ratio	0.53	0.07	0.24		0.26	0.26		0.26	0.11		
Control Delay	31.5	22.2	7.6		6.1	1.6		6.1	1.8		
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	31.5	22.2	7.6		6.1	1.6		6.1	1.8		
LOS	C	C	A		A	A		A	A		
Approach Delay		23.4			4.7			5.4			
Approach LOS		C			A			A			
Queue Length 50th (m)	19.8	2.5	0.0		13.7	0.0		13.0	0.0		
Queue Length 95th (m)	33.0	7.0	9.1		26.5	8.3		25.3	5.4		

Lane Group	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Internal Link Dist (m)		469.1			269.3			435.8		270.3	
Turn Bay Length (m)			85.0			100.0			300.0		
Base Capacity (vph)	436	445	455		2190	1066		2127	990		
Starvation Cap Reductn	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.37	0.05	0.18		0.26	0.26		0.26	0.11		

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 35 (50%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.53			
Intersection Signal Delay: 7.8		Intersection LOS: A	
Intersection Capacity Utilization 34.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Highway 417 EB Ramp & Moodie Drive

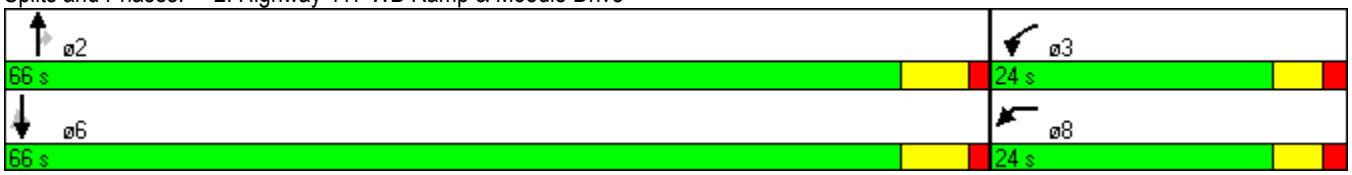


Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations											
Volume (vph)	300	5	1100	0	600	75	0	300	70	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		150.0	80.0	0.0		300.0	0.0		100.0	0.0	0.0
Storage Lanes		1	1	0		1	0		1	0	0
Taper Length (m)		2.5	50.0	2.5		2.5	2.5		25.0	2.5	2.5
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Frt			0.850			0.850			0.850		
Flt Protected	0.950	0.950									
Satd. Flow (prot)	3195	1153	1517	0	3390	1432	0	3357	1394	0	0
Flt Permitted	0.950	0.950									
Satd. Flow (perm)	3195	1153	1517	0	3390	1432	0	3357	1394	0	0
Right Turn on Red			Yes			Yes			Yes		
Satd. Flow (RTOR)			467			89			83		
Link Speed (k/h)		100			48			48		48	
Link Distance (m)		711.5			459.8			276.1		116.5	
Travel Time (s)		25.6			34.5			20.7		8.7	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.92	0.92
Heavy Vehicles (%)	5%	50%	2%	0%	2%	8%	0%	3%	11%	0%	0%
Adj. Flow (vph)	357	6	1310	0	714	89	0	357	83	0	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	357	6	1310	0	714	89	0	357	83	0	0
Turn Type	Prot		Free			Perm			Perm		
Protected Phases	3	8			2			6			
Permitted Phases			Free			2			6		
Detector Phase	3	8			2	2		6	6		
Switch Phase											
Minimum Initial (s)	10.0	10.0			10.0	10.0		10.0	10.0		
Minimum Split (s)	15.1	23.1			26.0	26.0		26.0	26.0		
Total Split (s)	24.0	24.0	0.0	0.0	66.0	66.0	0.0	66.0	66.0	0.0	0.0
Total Split (%)	26.7%	26.7%	0.0%	0.0%	73.3%	73.3%	0.0%	73.3%	73.3%	0.0%	0.0%
Yellow Time (s)	3.3	3.3			4.6	4.6		4.6	4.6		
All-Red Time (s)	1.8	1.8			1.4	1.4		1.4	1.4		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	4.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None			C-Max	C-Max		C-Max	C-Max		
Act Effct Green (s)	15.1	15.1	90.0		63.8	63.8		63.8	63.8		
Actuated g/C Ratio	0.17	0.17	1.00		0.71	0.71		0.71	0.71		
v/c Ratio	0.67	0.03	0.86		0.30	0.09		0.15	0.08		
Control Delay	41.1	29.8	7.6		5.5	1.4		3.7	0.6		
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	41.1	29.8	7.6		5.5	1.4		3.7	0.6		
LOS	D	C	A		A	A		A	A		
Approach Delay		14.8			5.1			3.1			
Approach LOS		B			A			A			
Queue Length 50th (m)	30.1	0.9	0.0		20.4	0.0		6.4	0.2		
Queue Length 95th (m)	38.6	3.7	0.0		29.4	3.6		9.1	1.2		

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Internal Link Dist (m)		687.5			435.8			252.1		92.5	
Turn Bay Length (m)	150.0	150.0	80.0			300.0			100.0		
Base Capacity (vph)	671	242	1517		2403	1041		2380	1012		
Starvation Cap Reductn	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.53	0.02	0.86		0.30	0.09		0.15	0.08		

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 20 (22%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 10.4		Intersection LOS: B	
Intersection Capacity Utilization 35.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 2: Highway 417 WB Ramp & Moodie Drive

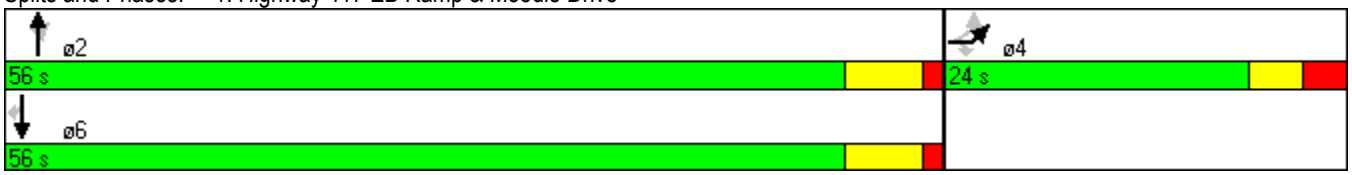


Lane Group	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Lane Configurations											
Volume (vph)	75	5	50	0	450	400	0	1400	850	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		0.0	85.0	0.0		100.0	0.0		300.0	0.0	0.0
Storage Lanes		2	2	0		1	0		1	0	0
Taper Length (m)		2.5	30.0	2.5		30.0	2.5		2.5	2.5	2.5
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Frt			0.850			0.850			0.850		
Flt Protected	0.950	0.950									
Satd. Flow (prot)	1647	1729	1502	0	3424	1532	0	3424	1517	0	0
Flt Permitted	0.950	0.950									
Satd. Flow (perm)	1647	1729	1502	0	3424	1532	0	3424	1517	0	0
Right Turn on Red			Yes			Yes			Yes		
Satd. Flow (RTOR)			41			435			924		
Link Speed (k/h)		48			48			48		48	
Link Distance (m)		493.1			293.3			459.8		294.3	
Travel Time (s)		37.0			22.0			34.5		22.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.99	0.99
Heavy Vehicles (%)	5%	0%	3%	0%	1%	1%	0%	1%	2%	0%	0%
Adj. Flow (vph)	82	5	54	0	489	435	0	1522	924	0	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	82	5	54	0	489	435	0	1522	924	0	0
Turn Type	Perm		Perm			Perm			Perm		
Protected Phases		4			2			6			
Permitted Phases	4		4			2			6		
Detector Phase	4	4	4		2	2		6	6		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0		10.0	10.0		10.0	10.0		
Minimum Split (s)	24.0	24.0	24.0		24.0	24.0		24.0	24.0		
Total Split (s)	24.0	24.0	24.0	0.0	56.0	56.0	0.0	56.0	56.0	0.0	0.0
Total Split (%)	30.0%	30.0%	30.0%	0.0%	70.0%	70.0%	0.0%	70.0%	70.0%	0.0%	0.0%
Yellow Time (s)	3.3	3.3	3.3		4.6	4.6		4.6	4.6		
All-Red Time (s)	2.7	2.7	2.7		1.4	1.4		1.4	1.4		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None	None		C-Max	C-Max		C-Max	C-Max		
Act Effct Green (s)	11.8	11.8	11.8		60.6	60.6		60.6	60.6		
Actuated g/C Ratio	0.15	0.15	0.15		0.76	0.76		0.76	0.76		
v/c Ratio	0.34	0.02	0.21		0.19	0.34		0.59	0.67		
Control Delay	33.7	27.0	14.5		4.3	1.4		7.4	3.3		
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	33.7	27.0	14.5		4.3	1.4		7.4	3.3		
LOS	C	C	B		A	A		A	A		
Approach Delay		26.1			2.9			5.8			
Approach LOS		C			A			A			
Queue Length 50th (m)	11.7	0.7	1.8		10.1	0.0		48.9	0.0		
Queue Length 95th (m)	21.5	3.2	10.1		21.8	9.3		96.5	12.3		

Lane Group	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR
Internal Link Dist (m)		469.1			269.3			435.8		270.3	
Turn Bay Length (m)			85.0			100.0			300.0		
Base Capacity (vph)	371	389	370		2595	1266		2595	1374		
Starvation Cap Reductn	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.22	0.01	0.15		0.19	0.34		0.59	0.67		

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 6 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 5.9		Intersection LOS: A	
Intersection Capacity Utilization 60.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Highway 417 EB Ramp & Moodie Drive

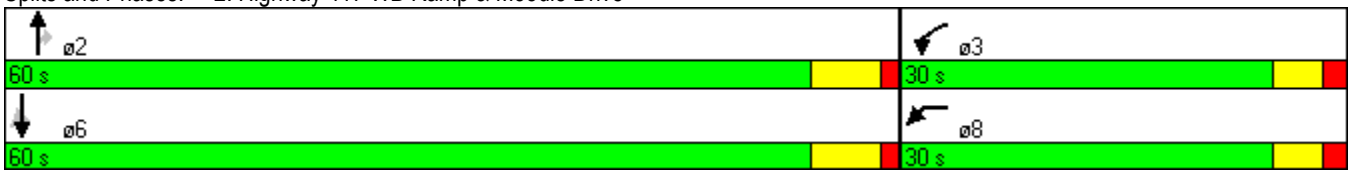


Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Lane Configurations											
Volume (vph)	700	20	325	0	350	175	0	1550	350	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)		150.0	80.0	0.0		300.0	0.0		100.0	0.0	0.0
Storage Lanes		1	1	0		1	0		1	0	0
Taper Length (m)		2.5	50.0	2.5		2.5	2.5		25.0	2.5	2.5
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Frt			0.850			0.850			0.850		
Flt Protected	0.950	0.950									
Satd. Flow (prot)	3195	1235	1502	0	3390	1473	0	3424	1532	0	0
Flt Permitted	0.950	0.950									
Satd. Flow (perm)	3195	1235	1502	0	3390	1473	0	3424	1532	0	0
Right Turn on Red			Yes			Yes			Yes		
Satd. Flow (RTOR)			335			180			361		
Link Speed (k/h)		100			48			48		48	
Link Distance (m)		711.5			459.8			276.1		116.5	
Travel Time (s)		25.6			34.5			20.7		8.7	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.92	0.92
Heavy Vehicles (%)	5%	40%	3%	0%	2%	5%	0%	1%	1%	0%	0%
Adj. Flow (vph)	722	21	335	0	361	180	0	1598	361	0	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	722	21	335	0	361	180	0	1598	361	0	0
Turn Type	Prot		Free			Perm			Perm		
Protected Phases	3	8			2			6			
Permitted Phases			Free			2			6		
Detector Phase	3	8			2	2		6	6		
Switch Phase											
Minimum Initial (s)	10.0	10.0			10.0	10.0		10.0	10.0		
Minimum Split (s)	15.1	23.1			26.0	26.0		26.0	26.0		
Total Split (s)	30.0	30.0	0.0	0.0	60.0	60.0	0.0	60.0	60.0	0.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	0.0%	66.7%	66.7%	0.0%	66.7%	66.7%	0.0%	0.0%
Yellow Time (s)	3.3	3.3			4.6	4.6		4.6	4.6		
All-Red Time (s)	1.8	1.8			1.4	1.4		1.4	1.4		
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.1	5.1	4.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	4.0
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode	None	None			C-Max	C-Max		C-Max	C-Max		
Act Effct Green (s)	23.5	23.5	90.0		55.4	55.4		55.4	55.4		
Actuated g/C Ratio	0.26	0.26	1.00		0.62	0.62		0.62	0.62		
v/c Ratio	0.86	0.07	0.22		0.17	0.18		0.76	0.33		
Control Delay	43.5	24.8	0.3		8.0	1.7		10.2	1.0		
Queue Delay	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay	43.5	24.8	0.3		8.0	1.7		10.2	1.0		
LOS	D	C	A		A	A		B	A		
Approach Delay		29.7			5.9			8.5			
Approach LOS		C			A			A			
Queue Length 50th (m)	60.0	2.7	0.0		13.4	0.0		111.8	2.7		
Queue Length 95th (m)	#83.1	8.2	0.0		19.6	7.4		52.4	m0.0		

Lane Group	WBL2	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NER
Internal Link Dist (m)		687.5			435.8			252.1		92.5	
Turn Bay Length (m)	150.0	150.0	80.0			300.0			100.0		
Base Capacity (vph)	884	342	1502		2085	975		2106	1082		
Starvation Cap Reductn	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.82	0.06	0.22		0.17	0.18		0.76	0.33		

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 18 (20%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 75.6%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

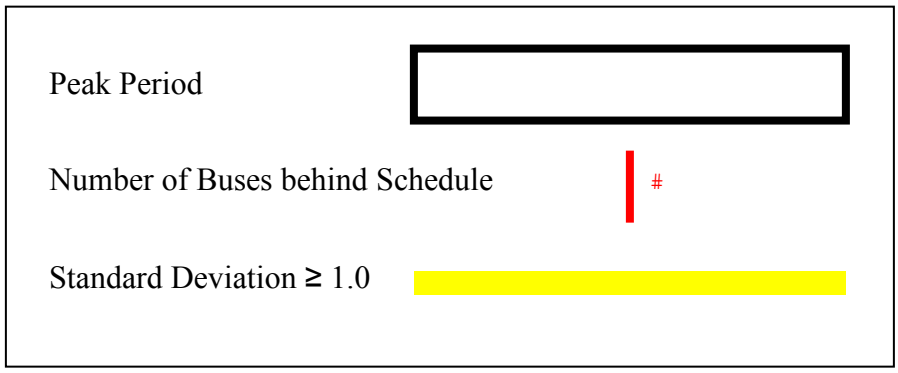
Splits and Phases: 2: Highway 417 WB Ramp & Moodie Drive



Memo To: R. Hunton
Date: February 18, 2010

Appendix C – Automated Passenger Count (APC) Data for Transit Reliability

Route 96 EB:	Eagelson to Bayshore	(Winter 2008, Fall 2008)
Route 95 WB:	Montreal to Blair	(Summer 2008, Fall 2008)
Route 95 WB:	St. Laurent to Hurdman	(Winter 2008, Fall 2008)
Route 95 EB:	Dominion to Lebreton	(Winter 2008, Fall 2008)
Route 97 EB:	Hurdman to Greenboro	(Winter 2008, Fall 2008)



PROCESSED: 2009-07-14 09:30:09

AUTOMATIC PASSENGER COUNTING SYSTEM
DISTRIBUTION OF RUNNING TIMES BY SECTION
WEEKDAY SERVICE

BOOKING: JAN08 PERIOD: 2008-01-06 TO 2008-04-19

ROUTE: 96
DIRECTION: 0 EBND
TERMINALS: WI920 EAGLESON 2B TO WD960 BAYSHORE 4B

RUNNING TIME (MINUTES)

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
06:01-07:00	8.0	7.8	7.8	0.9	58.0	16			7	5	3	1													
07:01-08:00	8.9	7.0	6.6	1.0	65.2	21		8	8	3	1	1													
08:01-09:00	9.0	6.9	6.8	0.7	65.7	15		4	9	2															
09:01-10:00	7.1	6.5	6.5	0.5	69.3	16		9	7																
10:01-11:00	7.0	6.8	6.4	1.0	67.4	11	1	6	2	1	1														
11:01-12:00	7.0	6.5	6.3	0.6	69.4	15		9	4	2															
12:01-13:00	7.0	6.4	6.3	0.4	70.3	13		8	5																
13:01-14:00	7.0	6.4	6.4	0.6	70.7	14	1	7	5	1															
14:01-15:00	7.0	6.8	6.7	0.5	66.1	15		3	10	2															
15:01-16:00	7.0	6.8	6.6	0.4	66.3	9		3	6																
16:01-17:00	7.0	6.6	6.5	0.4	67.7	13		5	8																
17:01-18:00	7.5	7.3	7.1	1.0	62.0	17		2	10	4			1												
18:01-19:00	7.0	6.9	6.9	0.6	65.2	17		4	10	3															
19:01-20:00	7.0	6.8	6.7	0.3	66.2	11			11																
20:01-21:00	7.0	7.2	7.1	0.7	62.7	16		1	11	3	1														
21:01-22:00	7.0	6.8	6.6	0.6	66.6	17		4	10	3															
22:01-23:00	7.0	7.1	7.3	0.8	63.9	16		5	6	4	1														
23:01-24:00	7.0	7.7	7.4	1.1	59.3	19		3	7	4	4	1													

PROCESSED: 2009-07-13 15:10:23

BOOKING: SEP08 PERIOD: 2008-08-31 TO 2008-12-19

RUNNING TIME (MINUTES)

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
06:01-07:00	8.0	7.7	7.7	0.8	58.5	23		1	6	12	3	1													
07:01-08:00	8.8	7.8	7.7	1.1	58.1	25		2	9	6	6	1	1												
08:01-09:00	9.0	7.8	7.6	1.4	58.5	19		1	7	7	1	2	1												
09:01-10:00	7.2	6.8	6.7	0.8	66.8	22		11	6	4	1														
10:01-11:00	7.0	7.2	7.2	0.6	62.8	18		3	10	4	1														
11:01-12:00	7.0	6.7	6.8	0.5	66.9	19		4	13	2															
12:01-13:00	7.0	6.7	6.6	0.3	67.3	19		7	12																
13:01-14:00	7.0	6.7	6.6	0.6	67.3	22		8	11	3															
14:01-15:00	7.0	7.1	7.0	0.6	63.2	17		1	13	2	1														
15:01-16:00	7.0	7.2	7.2	0.8	63.2	21		6	9	6															
16:01-17:00	7.0	7.3	7.5	0.9	62.5	11		3	3	5															
17:01-18:00	7.6	8.1	8.1	1.0	56.0	16		1	5	3	6	1													
18:01-19:00	7.0	7.4	6.9	1.2	61.7	19		4	7	5	1	2													
19:01-20:00	7.0	7.0	7.0	0.6	64.3	9		2	5	2															
20:01-21:00	7.0	7.2	7.0	1.0	63.1	28		7	11	7	3														
21:01-22:00	7.0	7.2	7.4	0.9	63.2	10		3	3	3	1														
22:01-23:00	7.0	7.1	7.0	0.8	63.6	31		8	13	9	1														
23:01-24:00	7.0	7.4	7.1	1.0	61.9	10		3	3	2	2														

PROCESSED: 2009-07-14 14:30:59

AUTOMATIC PASSENGER COUNTING SYSTEM
DISTRIBUTION OF RUNNING TIMES BY SECTION
WEEKDAY SERVICE

BOOKING: SEP08 PERIOD: 2008-08-31 TO 2008-12-19

ROUTE: 95
DIRECTION: 1 WBND
TERMINALS: EK564 REGIONAL ROAD 174 / RAMP - BRETE TO EE915 BLAIR 2B

RUNNING TIME (MINUTES)

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
06:01-07:00	8.0	6.2	6.2	0.4	65.4	43		38	4	1															
07:01-08:00	8.0	6.3	6.2	0.6	64.7	67		54	10	2	1														
08:01-09:00	8.0	6.4	6.3	0.6	64.2	46	1	34	8	3															
09:01-10:00	8.0	6.3	6.2	0.7	65.0	33	1	25	5	1	1														
10:01-11:00	8.0	6.4	6.2	0.8	64.5	35		26	7		2														
11:01-12:00	8.0	6.1	6.0	0.3	66.9	37		32	5																
12:01-13:00	8.0	6.4	6.3	0.7	63.9	39		29	8	1	1														
13:01-14:00	8.0	6.1	6.0	0.4	67.1	36	1	29	6																
14:01-15:00	8.0	6.2	6.1	0.5	65.9	40	1	28	10	1															
15:01-16:00	8.0	6.4	6.2	0.8	64.6	55	2	39	6	7	1														
16:01-17:00	8.0	6.3	6.1	0.6	65.5	64	2	48	10	3	1														
17:01-18:00	8.0	6.2	6.2	0.5	65.6	62	1	49	10	2															
18:01-19:00	8.0	6.2	6.1	0.4	66.2	51	1	42	8																
19:01-20:00	8.0	6.2	6.0	0.5	66.5	32	1	25	5	1															
20:01-21:00	8.0	6.3	6.2	0.6	65.4	38		31	5	1	1														
21:01-22:00	8.0	6.1	6.0	0.4	66.9	48	1	40	7																
22:01-23:00	8.0	6.3	6.2	0.6	64.9	23		16	5	2															
23:01-24:00	8.0	6.0	5.9	0.4	68.1	22	1	18	3																

PROCESSED: 2009-07-14 14:31:32

BOOKING: JUN08 PERIOD: 2008-06-22 TO 2008-08-30

RUNNING TIME (MINUTES)

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
06:01-07:00	8.0	6.2	6.1	0.4	66.2	38			32	5	1														
07:01-08:00	8.0	6.5	6.3	0.7	63.2	51			35	12	3	1													
08:01-09:00	8.0	6.3	6.2	0.5	64.6	40			32	6	2														
09:01-10:00	8.0	6.2	6.1	0.6	66.2	39		1	34	2	2														
10:01-11:00	8.0	6.3	6.1	0.6	65.3	30			24	4	1	1													
11:01-12:00	8.0	6.1	6.0	0.3	67.4	36			32	4															
12:01-13:00	8.0	6.2	6.1	0.4	66.0	29			24	5															
13:01-14:00	8.0	6.2	6.2	0.4	65.6	36			31	4	1														
14:01-15:00	8.0	6.3	6.4	0.5	64.5	35		1	24	8	2														
15:01-16:00	8.0	6.3	6.2	0.6	64.7	46		1	34	7	4														
16:01-17:00	8.0	6.4	6.2	0.5	64.4	41			31	8	1	1													
17:01-18:00	8.0	6.4	6.2	0.6	64.5	46		1	30	13	2														
18:01-19:00	8.0	6.3	6.2	0.4	65.3	36			30	4	2														
19:01-20:00	8.0	6.1	6.1	0.3	67.0	24			22	2															
20:01-21:00	8.0	6.3	6.1	0.8	65.3	27		1	20	4	1		1												
21:01-22:00	8.0	6.3	6.1	0.6	65.5	23			19	3		1													
22:01-23:00	8.0	6.3	6.1	0.5	65.4	27			20	6	1														
23:01-24:00	8.0	6.8	6.3	1.1	60.9	14			8	4	1		1												

PROCESSED: 2009-07-17 09:02:48

AUTOMATIC PASSENGER COUNTING SYSTEM
DISTRIBUTION OF RUNNING TIMES BY SECTION
WEEKDAY SERVICE

BOOKING: SEP08 PERIOD: 2008-08-31 TO 2008-12-19

ROUTE: 95
DIRECTION: 1 WBND
TERMINALS: EB905 ST LAURENT 2B TO AF950 HURDMAN 2B

							RUNNING TIME (MINUTES)																	
TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
06:01-07:00	4.0	3.4	3.5	0.3	46.0	30		16	14																
07:01-08:00	4.0	4.1	3.9	0.8	40.0	65		17	33	10	5														
08:01-09:00	4.0	4.3	4.0	1.0	38.2	51		8	26	9	5	3													
09:01-10:00	4.0	3.3	3.3	0.3	48.4	34		31	3																
10:01-11:00	4.0	3.3	3.3	0.3	47.8	32		25	7																
11:01-12:00	4.0	3.4	3.3	0.3	46.6	40		28	12																
12:01-13:00	4.0	3.5	3.5	0.3	45.1	33		19	14																
13:01-14:00	4.0	3.4	3.4	0.3	46.9	41		29	12																
14:01-15:00	4.0	3.6	3.4	0.5	44.5	38		20	15	3															
15:01-16:00	4.0	4.0	3.8	0.7	40.4	54		12	29	11	2														
16:01-17:00	4.0	4.1	4.0	0.7	39.1	59		10	32	15	2														
17:01-18:00	4.0	3.6	3.6	0.4	43.5	68		27	38	3															
18:01-19:00	4.0	3.4	3.3	0.4	47.0	42		28	14																
19:01-20:00	4.0	3.4	3.4	0.3	47.1	42		25	17																
20:01-21:00	4.0	3.3	3.2	0.3	48.5	36		29	7																
21:01-22:00	4.0	3.2	3.1	0.4	50.0	46		38	8																
22:01-23:00	4.0	3.2	3.2	0.3	49.2	28		22	6																
23:01-24:00	4.0	3.1	3.0	0.2	51.3	20		20																	

PROCESSED: 2009-07-17 09:05:43

BOOKING: JAN08 PERIOD: 2008-01-06 TO 2008-04-19

							RUNNING TIME (MINUTES)																	
TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19
06:01-07:00	4.0	3.4	3.4	0.3	46.3	32			20	12															
07:01-08:00	4.0	3.6	3.4	0.4	44.4	53			31	20	2														
08:01-09:00	4.0	3.9	3.7	0.7	41.8	53			19	24	9	1													
09:01-10:00	4.0	3.3	3.3	0.3	47.8	48			36	11	1														
10:01-11:00	4.0	3.2	3.2	0.3	48.9	47			39	8															
11:01-12:00	4.0	3.3	3.3	0.3	48.3	53			41	12															
12:01-13:00	4.0	3.4	3.4	0.4	47.1	64		1	37	26															
13:01-14:00	4.0	3.3	3.3	0.3	48.0	46			34	12															
14:01-15:00	4.0	3.4	3.4	0.3	46.7	62			40	22															
15:01-16:00	4.0	3.6	3.5	0.4	44.3	88			40	46	2														
16:01-17:00	4.0	3.8	3.6	0.6	42.2	74			23	42	9														
17:01-18:00	4.0	3.6	3.5	0.3	44.3	63			25	37	1														
18:01-19:00	4.0	3.3	3.3	0.4	48.4	59		1	46	12															
19:01-20:00	4.0	3.3	3.3	0.4	48.7	40			31	8	1														
20:01-21:00	4.0	3.3	3.3	0.4	47.9	39			27	11	1														
21:01-22:00	4.0	3.1	3.1	0.3	50.5	50		1	44	5															
22:01-23:00	4.0	3.2	3.1	0.4	50.3	37			31	6															
23:01-24:00	4.0	3.1	3.1	0.2	50.6	31			30	1															

PROCESSED: 2009-07-17 09:03:02

AUTOMATIC PASSENGER COUNTING SYSTEM
DISTRIBUTION OF RUNNING TIMES BY SECTION
WEEKDAY SERVICE

BOOKING: SEP08 PERIOD: 2008-08-31 TO 2008-12-19

ROUTE: 95
DIRECTION: 0 EBND
TERMINALS: NH920 DOMINION 2A TO CJ930 LEBRETON 2A

RUNNING TIME (MINUTES)

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
06:01-07:00	6.0	6.1	6.0	0.5	45.3	25		3	18	4															
07:01-08:00	6.0	6.5	6.4	0.6	42.1	49			26	21	2														
08:01-09:00	6.0	6.8	6.8	0.8	40.7	66		2	23	31	8	2													
09:01-10:00	6.0	6.2	6.1	0.6	44.3	37		3	22	12															
10:01-11:00	6.0	6.1	6.2	0.6	45.1	34		5	21	8															
11:01-12:00	6.0	6.1	6.1	0.5	44.8	39		3	24	12															
12:01-13:00	6.0	6.1	6.3	0.7	45.0	38		7	22	9															
13:01-14:00	6.0	6.1	6.1	0.5	45.0	39		5	26	8															
14:01-15:00	6.0	6.2	6.3	0.5	44.0	43		2	29	12															
15:01-16:00	6.9	6.5	6.5	0.5	42.0	58			29	27	2														
16:01-17:00	7.0	6.8	6.7	0.8	40.6	71		2	24	34	10		1												
17:01-18:00	7.0	6.5	6.3	0.9	42.5	54		2	28	17	6	1													
18:01-19:00	6.7	6.0	5.9	0.5	45.3	54		5	39	9	1														
19:01-20:00	6.0	5.8	5.8	0.6	47.5	41	1	11	26	3															
20:01-21:00	6.0	5.7	5.6	0.5	48.5	47		15	30	2															
21:01-22:00	6.0	5.9	5.8	0.6	46.7	29		9	15	5															
22:01-23:00	6.0	5.6	5.6	0.4	49.2	38		17	21																
23:01-24:00	6.0	5.9	6.0	0.5	46.2	13		2	10	1															

PROCESSED: 2009-07-17 09:06:03

BOOKING: JAN08 PERIOD: 2008-01-06 TO 2008-04-19

RUNNING TIME (MINUTES)

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
06:01-07:00	6.0	6.0	5.9	0.5	46.1	29			4	21	4														
07:01-08:00	6.0	6.5	6.5	0.6	42.1	50			2	23	22	3													
08:01-09:00	6.0	6.8	6.8	0.8	40.7	70			3	26	30	9		2											
09:01-10:00	6.0	6.2	6.3	0.7	44.4	51			8	28	14	1													
10:01-11:00	6.0	6.0	6.0	0.6	45.6	47			10	27	10														
11:01-12:00	6.0	6.0	6.0	0.6	45.6	66			11	44	9	2													
12:01-13:00	6.0	6.2	6.3	0.5	44.5	41			3	28	10														
13:01-14:00	6.0	6.1	6.3	0.5	44.8	57			5	39	13														
14:01-15:00	6.0	6.2	6.3	0.5	44.2	68			6	40	22														
15:01-16:00	6.9	6.8	6.8	0.9	40.9	64			2	24	26	9	2	1											
16:01-17:00	7.0	6.9	6.8	0.6	40.0	81				23	47	9	2												
17:01-18:00	7.0	6.6	6.5	0.7	41.7	78			2	35	35	5	1												
18:01-19:00	6.6	6.1	6.0	0.6	45.1	60			5	42	12	1													
19:01-20:00	6.0	5.9	5.9	0.4	46.6	37			5	31	1														
20:01-21:00	6.0	5.9	5.8	0.8	47.2	52		1	11	33	5	1	1												
21:01-22:00	6.0	5.6	5.6	0.4	49.3	41			19	22															
22:01-23:00	6.0	5.8	5.7	0.6	47.8	39		1	9	24	5														
23:01-24:00	6.0	6.0	5.9	0.6	46.0	11			3	5	3														

PROCESSED: 2009-07-17 09:03:17

AUTOMATIC PASSENGER COUNTING SYSTEM
DISTRIBUTION OF RUNNING TIMES BY SECTION
WEEKDAY SERVICE

BOOKING: SEP08 PERIOD: 2008-08-31 TO 2008-12-19

ROUTE: 97
DIRECTION: 0 EBND
TERMINALS: AF930 HURDMAN 1D TO RF900 GREENBORO 1A

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	RUNNING TIME (MINUTES) 06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
06:01-07:00	11.0	9.1	9.0	0.4	46.7	10			1	8	1														
07:01-08:00	11.0	9.5	9.6	0.8	44.6	16			1	4	10	1													
08:01-09:00	11.0	10.0	9.8	0.9	42.6	19				5	11	2		1											
09:01-10:00	11.0	9.4	9.5	0.5	45.0	18				8	10														
10:01-11:00	11.0	9.5	9.3	0.7	44.6	21				11	7	3													
11:01-12:00	11.0	9.5	9.5	0.9	44.6	25			1	10	10	3	1												
12:01-13:00	11.0	9.5	9.7	0.8	44.7	23			2	8	11	2													
13:01-14:00	11.0	10.0	9.8	0.7	42.2	23				6	11	5	1												
14:01-15:00	11.5	10.4	10.2	0.9	40.9	24			1	2	11	7	3												
15:01-16:00	12.9	10.9	10.9	1.0	39.0	20					8	6	5	1											
16:01-17:00	13.0	10.3	10.2	0.9	41.4	43				11	15	12	4	1											
17:01-18:00	12.5	10.3	10.2	0.8	41.3	47				7	22	15	3												
18:01-19:00	11.0	9.5	9.4	0.8	44.9	40			5	17	13	5													
19:01-20:00	11.0	9.7	9.7	0.8	43.8	32				15	12	5													
20:01-21:00	11.0	10.1	10.2	0.9	42.3	21			1	4	9	7													
21:01-22:00	10.0	9.5	9.3	0.9	44.8	23			3	10	5	5													
22:01-23:00	10.0	9.6	9.9	0.8	44.2	20			1	8	9	2													
23:01-24:00	10.0	9.2	9.2	0.6	46.1	15			1	11	2	1													

PROCESSED: 2009-07-17 09:05:14

BOOKING: JAN08 PERIOD: 2008-01-06 TO 2008-04-19

TIME PERIOD	SCHED TIME	MEAN	MED.	STDDEV	AVG SPEED	NO. OBS	RUNNING TIME (MINUTES) 07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
06:01-07:00	11.0	9.0	8.8	0.6	47.1	17		4	11	2															
07:01-08:00	11.0	9.5	9.3	0.8	44.6	18		1	9	5	2	1													
08:01-09:00	11.0	9.7	9.6	0.7	43.7	23			10	12		1													
09:01-10:00	11.0	9.2	9.2	0.6	46.3	21		2	14	5															
10:01-11:00	11.0	9.3	9.1	1.0	46.0	36		7	16	10	2		1												
11:01-12:00	11.0	9.2	9.2	0.8	46.0	31		5	17	7	2														
12:01-13:00	11.0	9.7	9.6	0.8	43.8	47			19	20	8														
13:01-14:00	11.0	9.6	9.7	0.8	44.3	38		3	13	18	4														
14:01-15:00	11.4	10.1	10.1	0.7	42.0	36			6	19	10	1													
15:01-16:00	13.0	10.4	10.3	0.8	40.8	42			5	21	12	3	1												
16:01-17:00	13.0	10.4	10.4	0.7	40.9	45		1	3	24	14	3													
17:01-18:00	12.5	10.1	10.2	0.8	41.8	37			8	20	6	3													
18:01-19:00	11.1	9.9	9.9	0.7	42.8	50		2	11	26	10	1													
19:01-20:00	11.0	9.5	9.6	0.8	44.7	38		4	14	16	4														
20:01-21:00	11.0	9.4	9.5	0.8	45.4	40		6	14	19	1														
21:01-22:00	10.0	9.4	9.4	0.9	45.2	38		3	19	14	1		1												
22:01-23:00	10.0	9.2	9.1	0.6	46.2	23		3	14	5	1														
23:01-24:00	10.0	9.2	9.2	0.6	46.3	25		5	12	8															

Memo To: R. Hunton
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Appendix D – Travel Time Calculations for Grade-Separated Facility

From west of Moodie Drive to Bayshore Station

Route	Travel Distance	Rank	Travel Time		Rank	Average Speed	Rank
	Meters		Sec.	Min.		km/h	
Existing	4015		225.9	3.77		64.0	
FORMER RAILWAY (Yellow)	3312	3	166.6	2.78	2	71.6	1
QUEENSWAY NORTH (Red)	3292	2	165.7	2.76	1	71.5	2
QUEENSWAY MEDIAN (Blue)	3228	1	168.0	2.80	3	69.2	3
QUEENSWAY SOUTH (Magenta)	3351	4	177.7	2.96	4	67.9	4

Assumptions:

1. Acceleration and decelaration rates assumed to be constant (a = 1 m/s^2, d=1.2 m/s^2)
2. Effects due to profile grades not factored in the calculations
3. Does not consider station dwell times, signal delay, or congestion delay

Acceleration / Deceleration Distance (m) = $x_a = \frac{u_1^2 - u_2^2}{254 \left(\frac{a}{9.81} \right)}$, where

u_1 = Start speed (km/h)
u_2 = End speed (km/h)
a = accel. rate (m/s^2) = 1
= decel. rate (m/s^2) = 1.2

Acceleration / Deceleration Time (sec.) = $t_a = \frac{x_a}{\frac{u_1 + u_2}{2}}$

80 uncongested travel speed

EXISTING

	Link Distance (m)	Remarks	u_1 (km/h)	u_2 (km/h)	x_a (m)	t_a (sec)	Const. Distance (m)	Const. Time (sec.)	Total Time (sec.)
travel at 80	255.000			80			255.000	11.475	11.5
decelerate for Moodie Station	260.000	Decel.	80	50	125.39	6.944	134.614	6.058	13.0
travel through Moodie Station	200.000	Decel.	50	50	0.00	0.000	200.000	14.400	14.4
accelerate after Moodie Station	555.000	Accel.	50	80	150.46	8.333	404.537	18.204	26.5
travel on Highway	1300.000		80	80			1300.000	58.500	58.5
decelerate for Holly Acres	745.000	Decel.	80	20	192.90	13.889	552.099	24.844	38.7
accelerate after Holly Acres	150.000	Accel.	20	50	81.02	8.333	68.981	4.967	13.3
decelerate for turn into Bayshore	120.000	Decel.	50	20	67.52	6.944	52.485	3.779	10.7
accelerate into Station	230.000	Accel.	20	50	81.02	8.333	148.981	10.727	19.1
decelerate for Bayshore Station	200.000	Decel.	50	0	80.38	11.574	119.624	8.613	20.2
		Bayshore Stn							

4015.000

Total Travel Distance (m) = 4015.00
Total Travel Time (sec.) = 225.9
(min.) = 3.77

Average speed (km/h) = 63.98

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RAILWAY

Station Start	Station End	Link Distance (m)	Remarks	u_1 (km/h)	u_2 (km/h)	x_a (m)	t_a (sec)	Const. Distance (m)	Const. Time (sec.)	Total Time (sec.)
10+000.000	10+544.448	544.448		80	80	0.00	0.000	544.448	24.500	24.5
10+544.448	10+932.659	388.211	Decel.	80	50	125.39	6.944	262.825	11.827	18.8
10+932.659	11+132.659	200.000	Moodie Stn	50	50	0.00	0.000	200.000	14.400	14.4
11+132.659	13+000.000	1867.341	Accel.	50	80	150.46	8.333	1716.878	77.260	85.6
13+000.000	13+311.920	311.920	Decel.	80	0	205.76	18.519	106.159	4.777	23.3
			Bayshore Stn							
		3311.920						Total Travel Distance (m) =		3311.92
								Total Travel Time (sec.) =		166.6
								(min.) =		2.78
								Average speed (km/h) =		71.58

QUEENSWAY NORTH

Station Start	Station End	Link Distance (m)	Remarks	u_1 (km/h)	u_2 (km/h)	x_a (m)	t_a (sec)	Const. Distance (m)	Const. Time (sec.)	Total Time (sec.)
10+000.000	10+544.448	544.448			80			544.448	24.500	24.5
10+544.448	10+933.049	388.601	Decel.	80	50	125.39	6.944	263.215	11.845	18.8
10+933.049	11+133.049	200.000	Moodie Stn	50	50			200.000	14.400	14.4
11+133.049	12+879.902	1746.853	Accel.	50	80	150.46	8.333	1596.390	71.838	80.2
12+879.902	13+291.763	411.861	Decel.	80	0	205.76	18.519	206.100	9.274	27.8
			Bayshore Stn							
		3291.763						Total Travel Distance (m) =		3291.76
								Total Travel Time (sec.) =		165.7
								(min.) =		2.76
								Average speed (km/h) =		71.54

QUEENSWAY MEDIAN

Station Start	Station End	Link Distance (m)	Remarks	u_1 (km/h)	u_2 (km/h)	x_a (m)	t_a (sec)	Const. Distance (m)	Const. Time (sec.)	Total Time (sec.)
10+000.000	10+109.963	109.963	Decel.	80	60	90.02	4.630	19.942	0.897	5.5
10+109.963	10+300.000	190.037	Decel.	60	50	35.37	2.315	154.672	9.280	11.6
10+300.000	10+500.000	200.000	Moodie Stn	50	50	0.00		200.000	14.400	14.4
10+500.000	12+015.244	1515.244	Accel.	50	80	150.46	8.333	1364.781	61.415	69.7
12+015.244	12+381.172	365.928	Decel.	80	50	125.39	6.944	240.542	10.824	17.8
12+381.172	12+945.148	563.976	Accel.	50	80	150.46	8.333	413.513	18.608	26.9
12+945.148	13+228.164	283.016	Decel.	80	0	205.76	18.519	77.255	3.476	22.0
			Bayshore Stn							
		3228.164						Total Travel Distance (m) =		3228.16
								Total Travel Time (sec.) =		168.0
								(min.) =		2.80
								Average speed (km/h) =		69.18

QUEENSWAY SOUTH

Station Start	Station End	Link Distance (m)	Remarks	u_1 (km/h)	u_2 (km/h)	x_a (m)	t_a (sec)	Const. Distance (m)	Const. Time (sec.)	Total Time (sec.)
10+000.000	10+115.571	115.571	Decel.	80	60	90.02	4.630	25.550	1.150	5.8
10+115.571	10+300.000	184.429	Decel.	60	50	35.37	2.315	149.064	8.944	11.3
10+300.000	10+500.000	200.000	Moodie Stn	50	50	0.00		200.000	14.400	14.4
10+500.000	10+765.934	265.934		50	50	0.00		265.934	19.147	19.1
10+765.934	13+067.918	2301.984	Accel.	50	80	150.46	8.333	2151.521	96.818	105.2
13+067.918	13+350.688	282.770	Decel.	80	0	205.76	18.519	77.009	3.465	22.0
			Bayshore Stn							
		3350.688						Total Travel Distance (m) =		3350.69
								Total Travel Time (sec.) =		177.7
								(min.) =		2.96
								Average speed (km/h) =		67.87

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Appendix E – Capital / Operational / User Cost Savings

Transit Capital Cost Savings due to reduction in Transit Route Trip Time

Total number of buses required is determined for peak hour operations. The maximum peak hour volume is in the PM in the westbound direction with 8000 passengers per hour. During the peak period, the round trip transit travel time will be improved by 3 minutes due to the exclusive grade separated facility.

Year	2031	
savings	3	minutes per bus
PPH tot	8000	passengers
PPH artic	4000	passengers
PPH stand	4000	passengers
VPH artic	57	buses per hour
VPH stand	89	buses per hour
VPH tot	146	buses per hour
savings	438	total minutes saved per hr
savings	8	buses saved

PPH = Passengers per hour past a point on the route
VPH = Vehicles per hour on the route (PPH / VC)
VC = Vehicle Capacity (Articulated = 70; Standard = 45)

4 x $ 630,000.00 + 4 x $ 900,000.00 = $ 6,120,000.00

Transit Operating Cost Savings & Passenger Cost Savings

Direction	Eastbound						
Time Period	AM Peak hr*	Midday / evening	PM Peak hr*	Daily Total	Annual Total	Value of Time (per hr)**	Time Savings, $, Annual
Ridership (2031)	6400	17000	2100	42500			
Time Savings / trip (minutes)	3	1	1				
hrs per period	3	18	3	24			
Passenger time savings - 2031 (Hrs)	960	283	105	1348	337083	$ 10.49	$3,534,319
# of buses required (2005)	55	142	16				
# of buses required (2031)	117	310	38				
Time Savings / trip (minutes)	3	1	1				
hrs per period	3	18	3	24			
Total Transit time savings - 2031 (Hrs)	18	5	2	25	6250	$ 120.00	$ 750,000

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Direction	Westbound						
Time Period	AM Peak hr*	Midday / evening	PM peak hr*	Daily Total	Annual Total	Value of Time (per hr)**	Time Savings, $, Annual
Ridership (2031)	2800	21600	8000	54000			
Time Savings / trip	0	0	2				
hrs per period	3	18	3	24			
Passenger time savings - 2031 (Hrs)	0	0	800	800	200000	$ 10.49	$2,097,000
# of buses required (2031)	51	394	146				
Time Savings / trip (minutes)	0	0	2				
hrs per period	3	18	3	24			
Total Transit time savings - 2031 (Hrs)	0	0	15	15	3750	$ 120.00	$ 450,000

Total Passenger Time Savings (Both Directions)	2031
Eastbound	$ 3,534,319
Westbound	$ 2,097,000
	$ 5,631,319

Total Transit Time Savings (Both Directions)	2031
Eastbound	$ 750,000
Westbound	$ 450,000
	$ 1,200,000

Assumptions:

Daily ridership = (AM peak hour+ PM peak hour) x 5

Annual ridership = 250 x Daily

½ passengers on articulated (70 passengers/bus); ½ passengers on standard buses (45 passengers/bus)

* AM & PM Peak Hour from 2005 & 2031 TRANS Model, assume linear growth

**Census 2006, average income, converted to hourly using standard work week ($10.49/hr)

**OC Transpo 2008, Average Hourly Operational Cost ($120/hr)