

# TRAFFIC SIGNAL COORDINATION FOR WELLINGTON STREET WEST, TORONTO, ONTARIO

by

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B.Eng., Ryerson University, 2014

A Project

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Engineering

in the Program of

Civil Engineering

Toronto, Ontario, Canada, 2017

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TRAFFIC SIGNAL COORDINATION FOR WELLINGTON STREET WEST,  
TORONTO, ONTARIO

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**Abstract**

The increasing volume of traffic in cities has a significant effect on road traffic congestion and the travel time it takes for road users to reach their destinations. Coordinating traffic signals, which is a system of light that cascade in sequence where a platoon of vehicles can travel through a continuous series of green light without stopping, can improve the driver's experience significantly. This report covers the development of a coordinated traffic signal system along Wellington Street West from Church Street to Blue Jays Way Street as part of a City of Toronto signal coordination project. The objective of this study is to improve coordination through modification of signal timing plans while maintaining reasonably minimal impacts to the side street levels of service and delays. The overall goal is to reduced travel times, delays, number of stops and fuel consumption, resulting in public benefit.

## **Acknowledgments**

I would like to thank the team at the City of Toronto, especially Rajanath Bissessar, Hao Le, and Darryl Spencer, for providing me with the support, training, data and topic for the project undertaken for this report. I would also like to thank Dr. Bhagwant Persaud for being my graduate student advisor over the last two years and Rachel Peluso for the administrative help throughout my time at Ryerson. Lastly, I would like to thank Dr. Sognlian Li, Dr. Arnold Yuan and Dr. Bhagwant Persaud for evaluating this report.

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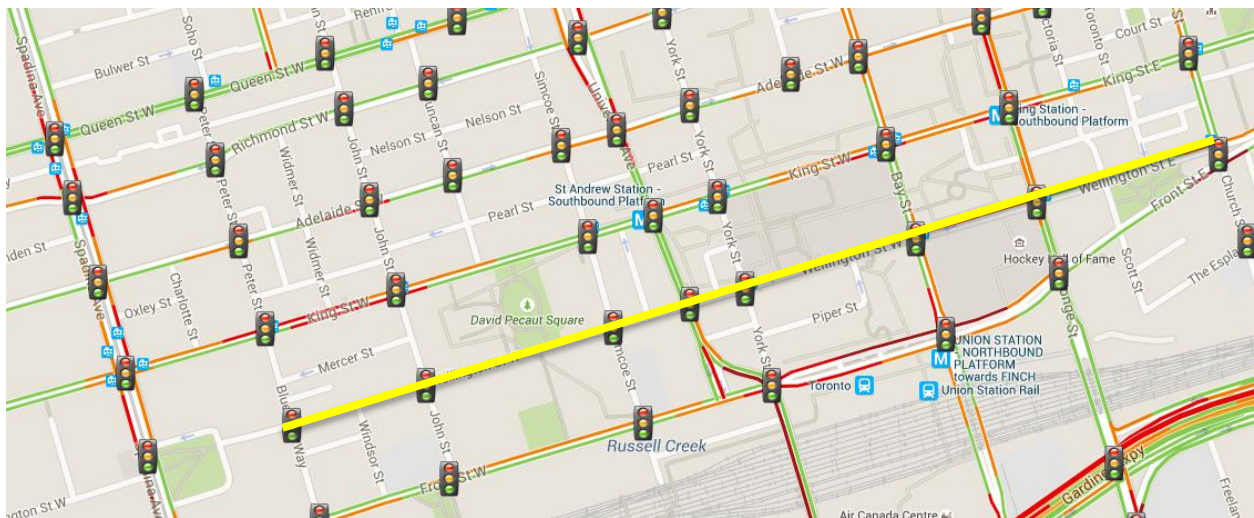
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## 1. Introduction

Traffic signal progression or coordination aims to provide a wave of “green lights” on corridors. Under the direction of the City of Toronto, this study was completed to improve the coordination of traffic signals along Wellington Street West from Church Street to Blue Jays Way Street.

The objective of this report is to analyze the existing conditions in terms of traffic flow and traffic operation. It further identifies deficiencies and provides solutions to improve the measure of effectiveness. This goal would be accomplished by conducting a comprehensive study of the existing conditions as well as developing alternative analysis along with recommendations on new signal timings for the study corridor. The study corridor includes 8 signalized intersections as illustrated in **Figure 1**.



*Figure 1: Study Area*

All the intersections in this study are operating under TransSuite control system. TransSuite traffic control system is a family of transportation management software products. It relies on a second-by-second communication system that also displays real-time graphical information. It depends on site equipment where it can maintain coordination up to one day in its memory in case of communication loss. TransSuite does not control the traffic movements by itself; however, it sends commands to the controller to follow the timing plans [1].

City of Toronto uses six mode of control to operate traffic signal that includes: fully-actuated (FA), fixed-time (FXT), semi-actuated (SA), semi-actuated pedestrian (SAP), semi-actuated vehicle (SAV), and pedestrian-actuated (PED). The mode of control (MOC) for intersections is all of fixed (FXT) type. Mode of control of an intersection refers to the type signal operation. The mode of control at City of Toronto is determined based on the off-peak vehicle and pedestrian volume. The fixed mode of operation refers to an automatic change of signal direction from the main street to side street and vice versa [2]. Detailed intersection information is shown in **Table 1**.

PX#	Intersection Name	Distance (Approx.) M	Speed Limit km/hr	MOC	Existing CONTROL SYSTEM	Controller TYPE
15	CHURCH ST	294	50	FXT	TransSuite	Econolite ASC/3-2100
30	YONGE ST	200	50	FXT	TransSuite	PEEK ATC-1000
60	BAY ST	280	50	FXT	TransSuite	Econolite ASC/3-2100
71	YORK ST	85	50	FXT	TransSuite	Econolite ASC/3-2100
76	UNIVERSITY AVE	120	50	FXT	TransSuite	PEEK ATC-1000
264	SIMCOE ST	309	50	FXT	TransSuite	Econolite ASC/3-2100
1489	JOHN ST	210	50	FXT	TransSuite	Econolite ASC/3-2100
1682	BLUE JAYS WAY	START	50	FXT	TransSuite	Econolite ASC/3-2100

*Table 1: Wellington Street -Control area spreadsheet*

To successfully achieve the project goal, the work was divided into 7 major tasks that are listed below:

Task 1 – Project Planning and Preparation;

Task 2 – Data Collection;

Task 3 - Speed and Delay Run Surveys;

Task 4 – Base Model Development and Calibration

Task 5 – Optimization, Alternative Analysis, and Recommendations

Task 6 – Review and Quality Assurance

Task 7 – Final Report

The focus of this report is on detail summary of task 2 to task 5 findings.

## **2. Data Collection Review and Site Observation**

### **2.1 Data Collection Review**

#### **2.1.1 Turning Movement Counts**

The Turning Movement Counts (TMCs) were provided by the Traffic Safety Unit (TSU) at the City of Toronto. Refer to **Appendix A** for the summarized TMCs and Peak Hour Factors (PHF). The traffic movement counts data for many of intersections were older than two years, so comprehensive volume balancing was conducted to account for imbalanced volumes. Details on volume balancing can be found in section 3.1.

#### **2.1.2 Traffic Signal Timing Plans**

Signal timing plans were collected from the in-house Pedestrian Crossing (PX) folders. The PX folders contain a comprehensive history of each of the signalized intersection. Every PX number corresponds to a unique intersection with information including signal timing plans, public request for review of the timing plan and other events that have contributed to the current state of the intersection and signal timing plans.

These signal timing plans were used in the development of the base Synchro model. Signal timings for the study intersections are provided in **Appendix B**.

#### **2.1.3 Intersection Drawings**

The intersection drawings were collected from available PX folders in the ITS department cabinets, since no electronic version of these drawing were available. Google Earth and Mirasan tools were used to verify the critical distances, lane configuration, and storage lengths. Field measurements were done at the locations where inconsistency was observed.

#### **2.1.4 Posted Speed Limit**

The posted speed limit along Wellington Street West from Church Street to Blue Jays Ways Street is 50 km/h.

### **2.1.5 Adjacent Land Uses**

Wellington Street passes through the Financial and Entertainment districts. These consist of commercial, institutional and open space land uses.

### **2.1.6 On-Street Parking**

Generally, on-street parking is prohibited during rush hour for most of the intersections, however, taxi stands are provided between Bay Street and York Street during rush hour.

### **2.1.7 Pedestrian and Cyclist Activities**

The presences of pedestrian and cyclist are notable in the following intersections which can be found in TMC tables in **Appendix A**:

- Bay Street at Wellington
- York Street at Wellington

### **2.1.8 Construction Area – Temporary Construction Timings**

Temporary construction of condominium building was taking near the north side of the Yonge and Wellington intersection. The westbound right turn lane was fully occupied with construction and site materials, resulting in reduced number of lanes for westbound movements. This observations were taken into account for a more accurate model calibration.

## **2.2 Field Observations**

The focus of the observation during AM, OFF and PM peaks was to identify locations with queue spillback, queue blockages, significant long queues, stop-and-go conditions, high pedestrian activity, pedestrian impedance, long delays generated by transit vehicles, and approaches and movements where vehicles required more than one cycle to pass through the intersection.

Consideration for the implementation of advance left-turn phases will be made, based on observations, and later confirmed within the Synchro model. Field observations were completed by the author of this report in April 2015. Details of field observation can be found in **Appendix C**.

## **2.3 “Before” Travel Run Study**

In order to create a baseline for the existing traffic condition, travel run and delay survey were conducted in the west directions of the Wellington Street. A minimum of 5 runs per direction, per period, per day, was required. This resulted in a total of 15 runs per direction, per period. The ‘before’ runs were conducted on the following two weekdays:

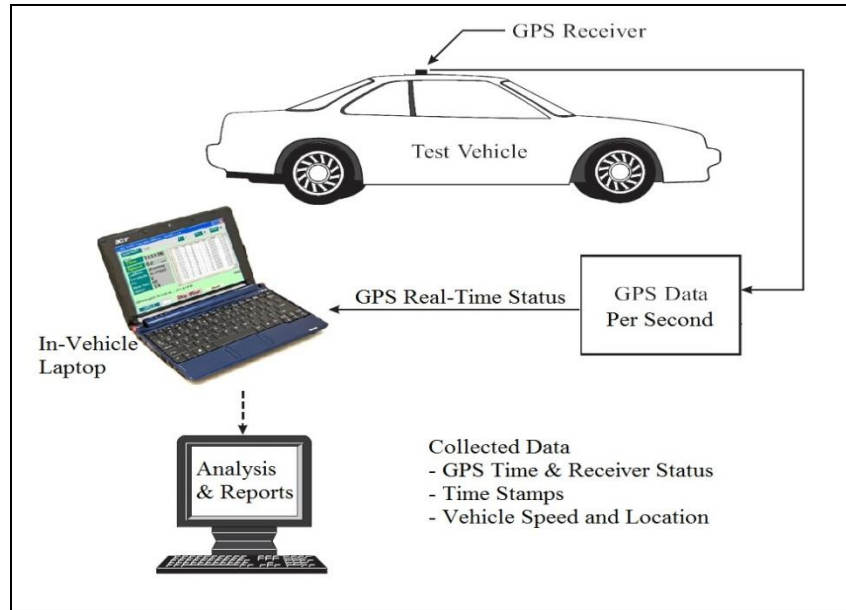
- Tuesday, April 21/2015
- Wednesday, April 22/2015

By reviewing the available intersection turning movement count data the ‘before’ runs and delay survey were conducted during the following time periods on each day:

- AM Peak: 7:00 – 9:30
- Off Peak: 10:30 – 14:30
- PM Peak: 15:30 – 6:30

### **2.3.1 Travel Time and Delay Study Analysis**

This section focuses on the study of corridor travel time and delay using Global Positioning System (GPS) and Test Vehicle Techniques. The travel time study provides information and data on the amount of time it takes to travel a segment of a road. In conducting the travel time study the "floating car method" was applied using GPS equipment and software illustrated in **Figure 2**. With the "floating car method", drivers attempt to travel with the flow of traffic by changing lanes to pass as many cars as they are passed by [3].



**Figure 2: Equipment Setup for GPS Test Vehicle Technique**

As five to six runs per direction per peak period per day was the requested minimum sample size for the busiest two hours, some runs with partial lane blockage were still included in the delay analysis. To ensure that the travel time variances caused by partial lane blockages were acceptable in the delay analysis, the confidence level of each survey study per direction per peak period (i.e., 15 runs) was reviewed. In this study, PC-Travel software was used for travel time and delay analysis with the source of GPS data collection [4]. Based on the confidence level calculations in PC-Travel software, the ‘before’ surveys obtained a sufficient sample size (i.e., 15 runs) that realized 95% confidence (permitted error of approximately 2.0 km/h to 5.0 km/h). [3]

**Appendix D** provides the reports generated by the PC-Travel software. These reports record the following four traffic performance (MOEs) from the ‘before’ survey:

- Travel time – time required to travel between upstream and downstream intersection measured from stop bars;
- Average speed – average speed recorded between upstream and downstream intersection;
- Stops – average number of times that the vehicle speed dropped below 8 km/h; and
- Total delay – total time recorded when the vehicle speed dropped below the normal travel speed of 50 km/h.

The average field measurements of the MOEs are summarized in

*Table 2: PC Travel output data of Field Study*

Peak Period	Movement	Node	Travel Time	Number of Stops	AVG Speed	Total Delay
AM	WB	Church	52.5	0.7	13.2	40.5
		Yonge	85.7	1.7	12.1	68.5
		Bay	64.3	0.8	11.3	52.3
		York	47.3	1	21.7	30.3
		University	17.8	0.3	8.1	15.3
		Simcoe	28.3	0.5	12.4	22.2
		John	50.8	0.8	20.1	33.3
		Blue Jays Way	30.3	0.3	25.8	17.2
		Total	377	6.1	124.7	279.6
OFF		Church	50.2	1	9.5	42.2
		Yonge	49.6	0.8	21.4	31.6
		Bay	48.4	0.8	15.5	35.4
		York	62.4	2.4	14.1	47.4
		University	22.8	0.4	14.2	17.2
		Simcoe	33.2	0.6	13.3	25.4
		John	54.2	0.8	19.8	36
		Blue Jays Way	42.6	0.63	17.4	30
		Total	363.4	7.43	125.2	265.2
PM		Church	76	1.3	8.1	65.5
		Yonge	59	1	18.5	40.8
		Bay	45.3	1	15.3	33.3
		York	88.8	2.3	10.3	73.3
		University	32.8	0.5	8.4	27.8
		Simcoe	16.8	0.3	23.3	9.8
		John	42.5	0.5	17.4	25.5
		Blue Jays Way	43.5	1	28.2	31.5
		Total	404.7	7.9	129.5	307.5



### 3. **Base Synchro Model Development and Adjustments**

To analyze the current traffic signal operations a base model was constructed in Synchro 7 and Simtraffic. Synchro is a macroscopic traffic analysis tool based on the methodology outlined in the Highway Capacity Manual (2000) [5]. It is used for signalized intersections and has the capability to optimize the signal timing and offsets. Simtraffic is a traffic simulation software which performs microsimulation of the expected traffic flows [6].

In this study, the base models were developed for peak periods of AM, OFF Peak and PM during the weekdays only and imported to Synchro software. The purpose was to examine existing operations using current traffic signal phasing and timings, intersection turning movement, traffic count data and other associated road network information. The following shows a summary of steps taken for creating the base Synchro model:

1. All signalized intersection nodes have been added and the intersection spacing has been confirmed using Google Maps.
2. Nodes have been numbered per the PX numbers. Lane configurations at the intersections and pedestrian crossing have been coded based on intersection drawings.
3. The signal timing plans have been coded using the existing TransSuite timing cards available in PX folders.
4. Vehicle volumes have been balanced as explained in Section 3.1
5. Volume parameters have been coded based on traffic counts including pedestrian volumes, cyclists, heavy vehicle percentage and peak hour factor.
6. To reflect the real traffic better, the City's Peak Hour Factor (PHF) reports were inserted for each movement for AM and PM period. However, for the OFF Peak period the PHF number was manually calculated according to the following formula from Highway Capacity Manual (HCM) 2010 [7]:

$$PHF = \frac{V_h}{4 * V_{15min}}$$

Where  $V_h$  the hourly volume and  $V_{15min}$  is the highest 15-minute count.

7. Permit Right Turn on Red (RTOR) based on the field regulations
8. The “Referenced to:” field in the Synchro model was adjusted to “Begin of Green:” for all MTSS Controllers, as well as TransSuite Controllers operating Econolite and PEEK 3000. The “Referenced to:” field in the Synchro model was adjusted to “TS2 – 1st Green” for all TransSuite Controllers operating EPAC and PEEK ATC-1000.

### **3.1 Volume Balancing**

As part of the Base Synchro Model development, volume balancing between adjacent intersections is required by the City for this project. This step was done using the following methodology as provided by the City:

1. Identify locations that have a volume imbalance greater than 10%
2. Determine land uses and presence of access within the areas where imbalances are greater than 10%
3. Based on the land use, accesses and local knowledge, determine if the imbalance is justified
4. If the imbalance is not justified, then volumes will be balanced using the major/major intersection as a reference for balancing the smaller intersection within 10%, using the following assumptions:
5. If Major/Major volume is greater than adjacent Major/Minor intersection volume, then increase the Major/Minor through volume
6. If Major/Major volume is less than consecutive adjacent Major/Minor intersection volumes, then increase the Major/Major volume
7. If Major/Minor is imbalanced with consecutive adjacent Major/Minors, increase or decrease accordingly
8. In general, Major/Major volumes should not be lowered to accommodate volume balancing

**Figure 3** illustrates an example of volume balancing for the off-peak period from the intersection of Church/Wellington to Yonge/Wellington.

			YONGE		px 30					CHURCH		px 15	
Date:										Date:			
May-14										Apr-09			
			↑	48						↑	143		
186	257	0	←	908	1,042		1,128	175	161	91	←	937	
↔	↓	↔	↑	86				↔	↓	↔	↑	19	
	0	↑	↔	↑	↔				205	↑	↔	↑	↔
	0	→	305	393	0	-86	imbalance		440	→	16	296	32
	0	↓				8.3%			26	↓			
Comments: No major parking lots													

**Figure 3: Volume Balancing Example**

The imbalance volume of vehicles exiting Church/Wellington and entering Yonge/Wellington is larger than 10% and, since there is no major access point or justification, volume balancing is conducted by reducing the volume of westbound through movement vehicles by 200 (from 1137 to 937 vehicles) at Church/Wellington. This results in an imbalance of 8.3% as seen in **Figure 3**.

It should be noted that volume balancing is only conducted for through movements. Please refer to **Appendix E** for all other intersections.

#### 4. **Calibration Methodology and Validation of the Synchro Model**

For the development of the calibrated model, guidelines from City of Toronto [8] and Highway Capacity Manual [7] were used and followed; however, any exception to the procedure and the guidelines are specified in the next section.

##### 4.1 **Calibration**

The base existing Synchro model needs to be calibrated to reflect the observed site conditions. Therefore, intersections with over capacity conditions ( $V/C < 1$ ) and poor LOS will be identified for the calibration.

The assumption parameters for the uncalibrated model for all three periods is presented in following tables. Parameters that had influence on V/C ratio include the lane utilization factor, lost time adjustment and movement counts. The next section explains additional adjustments applied to the model.

**Table 3: Calibration Assumption for AM peak**

Segment	Adjustments							
	Ideal Sat. Flow	PHF	Lost Time	Lane Width	Adjacent Parking	Bus Blockage	Other	Notes
Church-Yonge	1700 for WBR	WBL=0.91,WBT=0.93,WBR=0.53						Construction on The Right Lane
Yonge-Bay	1800	WBL=0.79 WBT=0.97 WBR=0.75				4		
Bay-York	1700	WBT=0.88,WBR=0.85		3m for all lanes	20	4		
York-University	Increased to 2005 for WBT and WBR and to 2000 for WBL	Intersection AVG=0.93	Decreased to -2			4		
University-Simcoe	1800	Intersection AVG=0.95					Drop Lane	Location of DropLane:58 m from Left & 62 m from Right
Simcoe-John	1800	WBL=0.71 WBT=0.84 WBR=0.87			15			
John-Blue Jays Way	1900	WBL=0.73 WBT=0.73 WBR=0.67			15		*Drop Lane	103m from Left & 107m from Right

Segment	Adjustments							
	Ideal Sat. Flow	PHF	Lost Time	Lane Width	Adjacent Parking	Bus Blockage	Other	Notes
Church-Yonge	1750	WBL=0.82,W BT=0.87 ,WBR=0.82				50		
Yonge-Bay	1700	WBL=0.77,W BT=0.90,WBR =0.62				30	4	
Bay-York	1800	WBT=0.95, WBR=0.91			3m for all lanes	30	4	
York-University	Increased to 2005 for WBT , WBR and WBL	WBL=0.91,W BT= 0.90, WBL=0.90		Decreased to -3			4	
University-Simcoe	1800	WBT=0.93,W BR=0.91,						drop lane
Simcoe-John	1800	WBL=0.71,W BT=0.83, WBR=0.91				10		
John-Blue Jays Way	1800	WBL=0.96,W BT=0.69, WBR=0.74				10		added drop lane using bend node and created offset of -2 to account for left side drop lane instead of right

*Table 4: Calibration Assumption for PM peak*

Segment	Adjustments							
	Ideal Sat. Flow	PHF	Lost Time	Lane Width	Adjacent Parking	Bus Blockage	Other	Notes
Church-Yonge	1800	WBT=0.88 WBR=0.79 WBL=0.84				50		
Yonge-Bay	1800	WBT=0.79 WBR=0.69 WBL=0.76				40		
Bay-York	1800	WBT=0.8 WBR=0.89 WBL=0			3m for all lanes	40		
York-University	1900	WBT=0.76 WBR=0.73 WBL=0.71						
University-Simcoe	1800	WBT=0.87 WBR=0 WBL=0.93						drop lane
Simcoe-John	1800	WBT=0.83 WBR=0.58 WBL=0.81				30		
John-Blue Jays Way	1800	WBT=0.61 WBR=0.72 WBL=0.79				10		added drop lane using bend node and created offset of -2 to account for left side drop lane instead of right

*Table 5: Calibration Assumption for OFF peak*

#### 4.1.1 Intersections with On-Street Parking

During the site visit, on-street parking on the north and south of the corridor was recorded. It should be noted that on-street parking can adversely affect the flow of the traffic in the following ways:

- Capacity loss of the intersection
- Reduction of lane utilization factor
- Increase of delay that can be continued to the other links.

To consider the effect of the above problems in the Synchro model, a checkmark to the box for that approach was applied in the “*Adjacent Parking Lane*” category from the “*Volume Settings*”. Also, the numbers of parking maneuvers were inserted by estimating the number of cars going in and out of parking stall per hour based on site visits. **Figure 4** was utilized as an aid for Synchro parking maneuver coding.

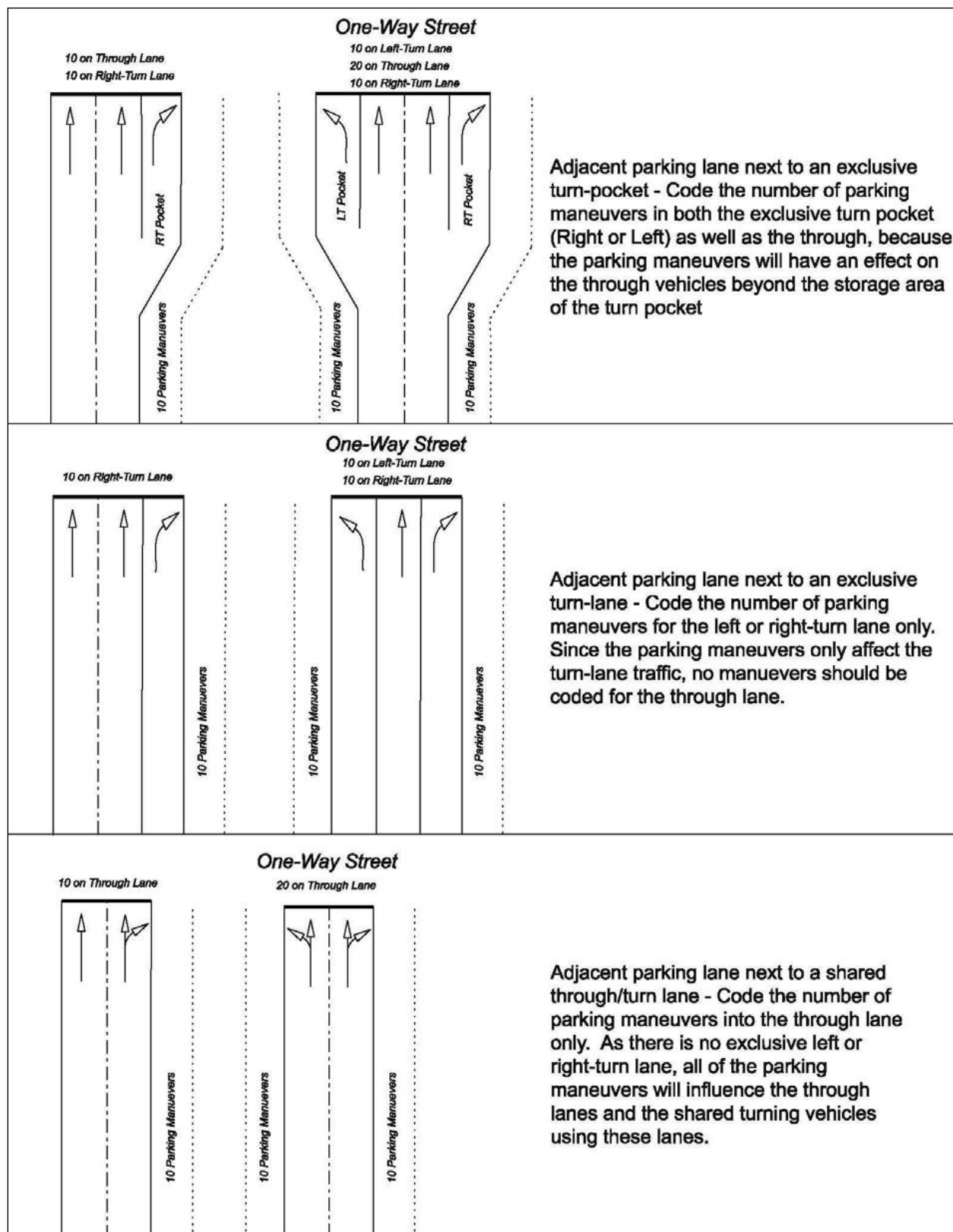


Figure 4-Parking Manoeuvres coding [9]



## **4.2 Validation of the Calibrated Model**

The travel time and delay data from the Travel Run Study were used to validate the calibrated Synchro models. It should be noted that the purpose of calibration is to reflect a known capacity condition, while the purpose of the validation is to verify that models would have similar travel times and delays along the corridor.

The corridor travel time has two components for each segment: travel time (a function of the intersection spacing and the travel speed), and signal delay (the delay experienced due to a red light or queuing).

From Synchro, the arterial level of service report can provide outputs for each segment along the corridor, separated into these two components: segment travel time, and signal delay. These will be compared with the observed data from surveys to determine the validity of the calibrated model. The calibrated Synchro output is compared with Travel Run Study result and summarized in **Table 6**.

AM					
Segment		Observed Travel Time (s)	Synchro Calibrated Travel Time (s)	Difference	Difference (%)
From	To				
Church	Yonge	85.7	59.3	-26.4	-30.8%
Yonge	Bay	64.3	61.6	-2.7	-4.2%
Bay	York	47.3	35.3	-12.0	-25.4%
York	University	17.8	34.4	+16.6	+93.3%
University	Simcoe	28.3	23.3	-5.0	-17.7%
Simcoe	John	50.8	41.2	-9.6	-18.9%
John	Blue Jays Way	30.3	48.4	+18.1	+59.7%
<b>Total:</b>		<b>324.5</b>	<b>303.5</b>	<b>-21.0</b>	<b>-6.5%</b>
PM					
Segment		Observed Travel Time (s)	Synchro Calibrated Travel Time (s)	Difference	Difference (%)
From	To				
Church	Yonge	58.5	51.5	-7.0	-12.0%
Yonge	Bay	60.7	35.3	-25.4	-41.8%
Bay	York	54.0	41.4	-12.6	-23.3%
York	University	25.8	32.1	+6.3	+24.4%
University	Simcoe	35.5	30.3	-5.2	-14.6%
Simcoe	John	47.3	47.1	-0.2	-0.4%
John	Blue Jays Way	25.8	31	+5.2	+20.2%
<b>Total:</b>		<b>307.6</b>	<b>268.7</b>	<b>-38.9</b>	<b>-12.6%</b>
OFF PEAK*					
Segment		Observed Travel Time (s)	Synchro Calibrated Travel Time (s)	Difference	Difference (%)
From	To				
Church	Yonge	49.6	46.3	-3.3	-6.7%
Yonge	Bay	48.4	34.5	-13.9	-28.7%
Bay	York	62.4	32.3	-30.1	-48.2%
York	University	22.8	33.7	+10.9	+47.8%
University	Simcoe	33.2	27.9	-5.3	-16.0%
Simcoe	John	54.2	33.5	-20.7	-38.2%
John	Blue Jays Way	42.6	31.0	-11.6	-27.2%
<b>Total:</b>		<b>313.2</b>	<b>239.2</b>	<b>-74</b>	<b>-23.6%</b>

**Table 6: Travel Time Comparison**

The overall corridor travel times are comparable to the observed corridor travel times and the values are within 6% to 23% of target.

## 5. Development of Alternative Timing Plans

### 5.1 Methodologies for Signal Optimization

Signal timing optimization is a process in which delay, the number of stops and travel time will be reduced to improve the traffic flow performances. The following steps were taken for optimization in this study:

**Define New Control Areas:** The study area was divided into fewer control areas by determining the desirability of coordinating the intersections based on existing traffic operations for each peak period, current cycle length, minimum cycle length, through volumes on Wellington Street, road classification, intersection space distance, intersection control type and coordinatability provide by Synchro. The control areas for Yonge and University Streets were locked since they are part of the north-south coordination. The proposed control areas are shown in **Table 7**.

PX#	INTERSECTION NAME	Min. Cycle Length	Min CL			Current			Proposed		
			AM	OFF	PM	AM	OFF	PM	AM	OFF	PM
15	Church St	50	88	88	88	88	90	90	90	90	90
30	Yonge St	50	64	64	64	64	80	75	80	80	75
60	Bay St	50	64	64	53	53	70	60	70	80	75
71	York St	50	56	67	67	67	70	60	70	80	75
76	University Ave	50	75	75	64	64	110	100	110	110	100
264	Simcoe St	50	53	53	53	53	70	70	70	80	80
1489	John St	50	54	54	54	54	70	70	70	80	80
1682	Blue Jays Way	50	70	70	70	70	70	70	70	80	80

*Table 7-Proposed Control Area*

#### 5.1.1 Optimization of Splits

For the split optimization, each control area was optimized separately according to its new proposed cycle length. In this optimization process, the objective function is to minimize the splits. Splits are optimized by percentile, with Synchro attempting to provide enough green time

to serve 90% of the flow from a lane group. All phases are assigned to a split greater or equal to their Minimum Split. If the minimum split is greater than the cycle length, then the optimization repeats the process and attempts 70<sup>th</sup> percentile and then 50<sup>th</sup> percentile. Parameters required for this optimization are volume, lanes, left turn type, fixed timing and cycle length.

The constrains function is the cycle length, since Toronto District believes that not more than 80 second cycle length should be considered for downtown area.

Within a control area, different split phasing may have been assigned for each of the intersections during the AM Peak, daytime OFF Peak and PM Peak.

The following manual adjustments on splits were applied on the optimized model:

- Ensured that the new timing of each advanced left turn phase would not be greater than 20 seconds; and
- Ensured that the new timing of each critical movement would not have an enormous change, especially for major-major intersections.

### 5.1.2 Optimization of Offsets

With the new cycle lengths and splits, each control area was optimized as a separate system in offset optimization, and per City's guidelines [8].

The objective in offset optimization is to minimize delay for each zone so it works well with its adjacent signals. Parameters required for offset optimization are distance between intersections, speed limit, volume, lanes, fixed timing and cycle length. City of Toronto limits the offset to be referenced to “beginning of green” and NEMA phases “2+6”.

## 5.2 Review Left / Right Turn Movements

After the optimization of cycle lengths, splits, and offsets, the new MOEs were reviewed in Synchro. Among the three optimized models, the following left turn phases were proposed to be changed from permissive to protected / permissive operation in **Table 8**.

*Table 8-Proposed Left-Turn Phase*

Intersections	New Advanced Left/Right-Turn	Timing Plan	Status
Simcoe at Wellington	Northbound Left-Turn	AM & PM Peak	Implementation in 2015
Simcoe at Wellington	Eastbound Right -Turn	AM & PM Peak	Implementation in 2015

Note that the NBLA/EBRA will only come up if the NB demand exceeds 2 cars. Additional hardware (e.g., left-turn signal heads and detector setback loops, etc.) and budget are required for implementation. The proposed Timing plans are provided in **Appendix G**.

## 6. Evaluation of Proposed Signal Timings

### 6.1 Intersection and Movement Traffic Operations

The main measures of effectiveness (“MOE”) are the travel time comparison between the calibrated existing conditions and the alternative conditions for AM, OFF and PM peak periods. Other MOE such as delay, the number of stops, capacity utilization (V/C ratio), average speed, fuel consumption, and emissions are also considered for the evaluation of the proposed alternatives.

#### 6.1.1 Evaluation of AM Peak Period

Synchro optimized travel times are summarized in **Table 9**.

*Table 9-AM Optimized Travel Time*

Segment		Synchro Calibrated Travel Time	Synchro Optimized Travel Time	difference (Opt. - Cal.)	Difference (%)
From	To				
church	Yonge	59.3	58.5	-0.8	-1.3%
Yonge	Bay	61.6	33.9	-27.7	-45.0%
Bay	York	35.3	30.4	-4.9	-13.9%
York	University	34.4	34.3	-0.1	-0.3%
University	Simcoe	23.3	28.7	+5.4	+23.2%
Simcoe	John	41.2	35.1	-6.1	-14.8%
John	Blue Jays Way	48.4	19.1	-29.3	-60.5%
		303.5	240.0	-63.5	
			<b>Effective Difference:</b>	<b>-68.0</b>	

Overall, the proposed coordination plan reduces westbound travel times along the entire corridor by 68.0 (-26.4%) second. One corridor control area—between Yonge Street and York Street—experienced a significant decrease in travel time. It should be noted that these intersections are closely spaced, and the decrease in travel time and coordinatability is very important. Also, another significant decrease in travel time could be observed on the stretch between Simcoe Street to Blue Jays Way Street, where the travel time in this control area has been improved by approximately 35 seconds.

### 6.1.2 Evaluation of PM Peak Period Alternatives

The impacts to westbound travel times corresponding with the revised timing plans for the PM peak periods are presented in **Table 10**.

*Table 10-PM Optimized Travel Time*

Segment		Synchro Calibrated Travel Time	Synchro Optimized Travel Time	Difference (Opt. - Cal.)	Difference (%)
From	To				
church	Yonge	51.5	51.6	+0.1	+0.2%
Yonge	Bay	35.3	33.2	-2.1	-5.9%
Bay	York	41.4	36.9	-4.5	-10.9%
York	University	32.1	32.6	+0.5	+1.6%
University	Simcoe	30.3	30.5	+0.2	+0.7%
Simcoe	John	47.1	41.4	-5.7	-12.1%
John	Blue Jays Way	31	24.5	-6.5	-21.0%
		268.7	250.7	-18.0	
			<b>Effective Difference:</b>	<b>-18.8</b>	

Overall the proposed coordination plan reduces westbound travel times across the entire corridor by 18.8 (-7.2%). The most notable decreased travel time is between Simcoe Street and Blue Jays Way Street. A similar improvement is observed for another segment of the corridor between Yonge Street to York Street, where the cycle length in this control area has been increased by 10 second.

### 6.1.3 Evaluation of OFF Peak Period Alternatives

The impacts to westbound travel times corresponding with the revised timing plans for the OFF peak period are presented in **Table 11**.

*Table 11-OFF Peak Optimized Travel Time*

Segment		Synchro Calibrated Travel Time	Synchro Optimized Travel Time	Difference (Opt. - Cal.)	Difference (%)
From	To				
church	Yonge	46.3	46.3	0.0	0.0%
Yonge	Bay	34.5	33.1	-1.4	-4.1%
Bay	York	32.3	31.2	-1.1	-3.4%
York	University	33.7	34.2	+0.5	+1.5%
University	Simcoe	27.9	27.9	0.0	0.0%
Simcoe	John	33.5	36.5	+3.0	+9.0%
John	Blue Jays Way	31.0	21.1	-9.9	-31.9%
From	To	46.3	252.3	-5.1	
			<b>Effective Difference:</b>	<b>-9.4</b>	

Overall the proposed coordination plan reduces northbound and southbound travel times across the entire corridor by 9.4 (-3.8%). Some corridor segments experienced increases in travel time, the most notable of which is the westbound travel time between Simcoe Street and John Street. Otherwise, travel times for most control areas have been improved.

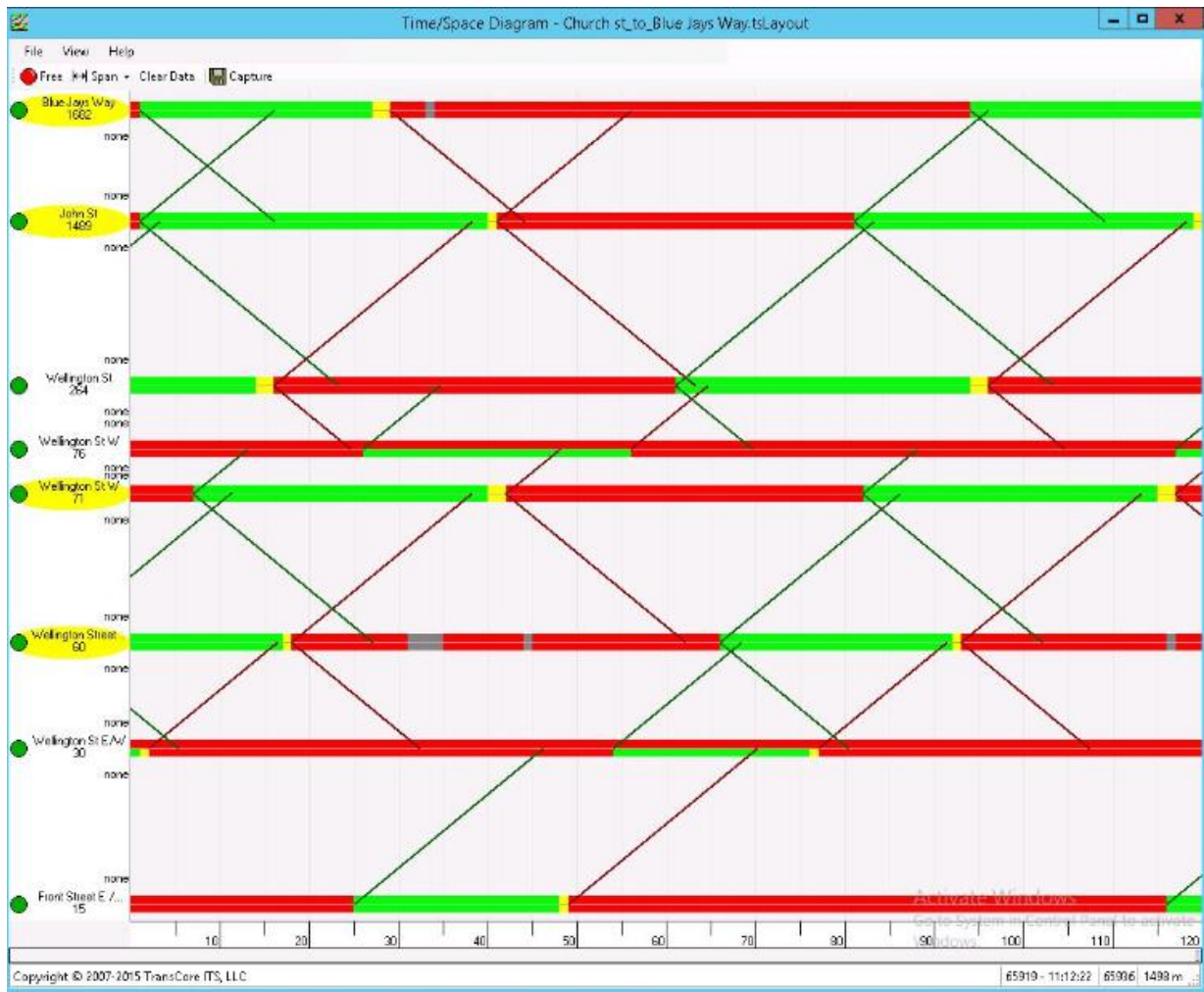
## 6.2 Time-Space Diagram

After implementation of the new timing plans, the offset developed from Synchro model should be verified with City's TransSuite TSD software. This software allows the user to create time-space diagrams for user-defined group signals. To generate a TSD using this software the signal spacing and posted speed limited should be inserted as an input. After creating the TSD it allows the user to monitor the start and end of the main street green times and green bands that would have been provided for all coordinated signals in a control area. Screenshots of the TSD are provided in **Figure 5**, **Figure 6** and **Figure 7**.

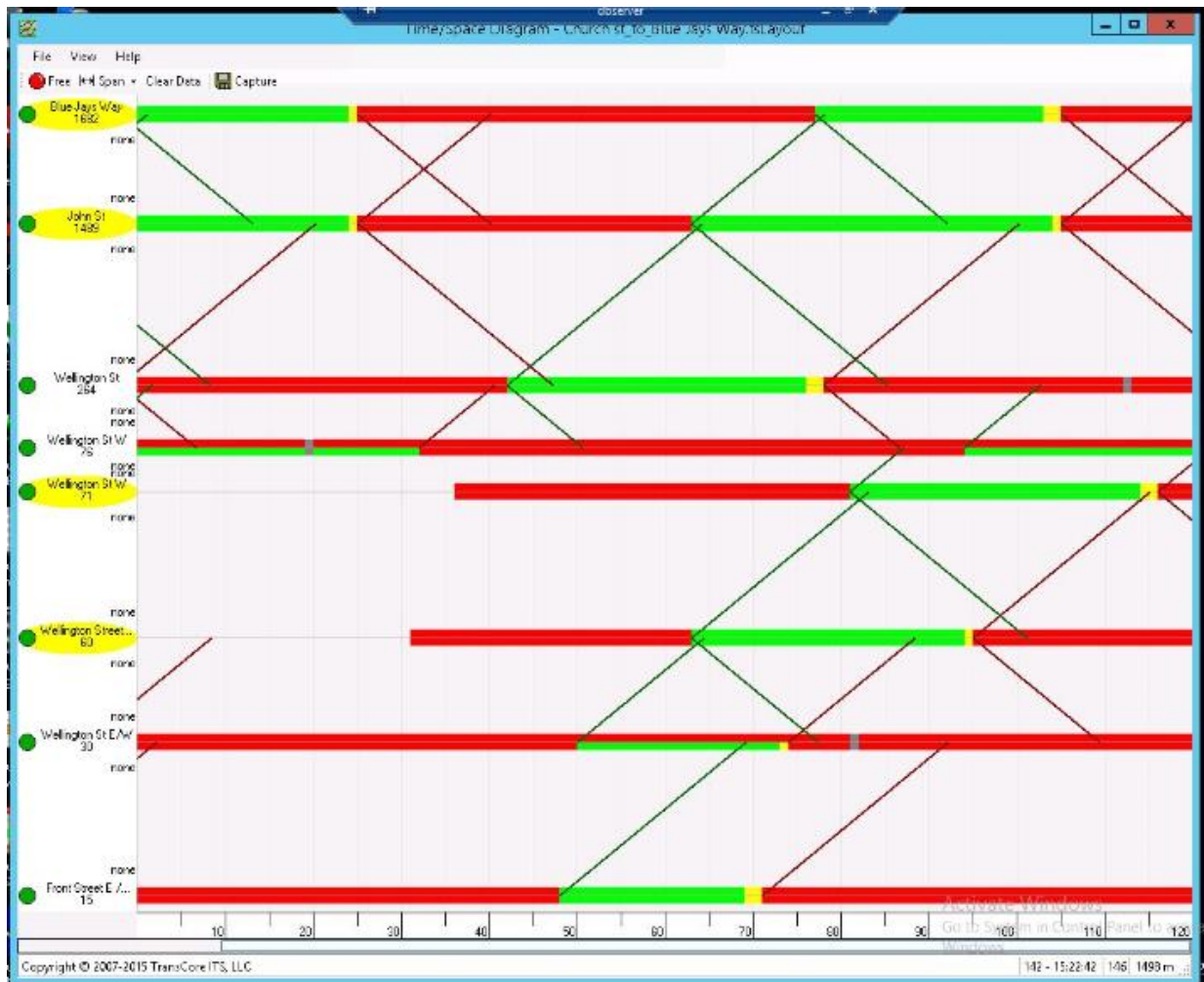




Figure 5: TransSuite TSD AM Peak



**Figure 6: TransSuite TSD OFF Peak**



**Figure 7: TransSuite TSD PM**

### 6.3 MOE and Operation Summary

All intersections and movements are evaluated using Synchro. The detailed MOEs per movement are recorded in **Appendix F** for the daytime OFF Peak, AM Peak, and PM Peak, respectively and the overall intersection MOE is summarized below.

#### Level of Service (LOS)

Table 12 summarizes the changes to the intersection LOS after optimization (with those intersections that improved LOS highlighted in green).

Overall, the signalized intersections maintain the LOS for all peak periods, except for Simcoe Street where the overall LOS after optimization has declined to C. For Simcoe Street, it should be noted that before signal optimization the signal plan was with respect to the northbound through movements only and no left turn signal existed. However, after installation of a new northbound left turn phase and removing the northbound through movement on Simcoe Street, the southbound movements, experienced a longer delay. It should be noted that the goal of coordination is to favour westbound movements over all other movements. **Table 12** summarizes the overall intersection LOS.

PX#	Intersection Name	Before			After		
		AM	PM	OFF	AM	PM	OFF
15	Church & Wellington St	E	F	C	E	F	C
30	Yonge & Wellington St	C	C	B	C	C	B
60	Bay & Wellington St	C	B	B	C	B	B
71	York & Wellington St	B	B	B	B	B	B
76	University Ave & Wellington St	C	C	B	C	C	B
264	Simcoe & Wellington St	E	F	B	E	F	C
1489	John & Wellington St	B	C	B	B	C	B
1682	Blue Jays Way & Wellington St	C	C	C	C	C	C

*Table 12-Intersection LOS*

An example of detailed movement performance is illustrated in **Table 13**. For all other intersections refer to **Appendix F**.

Movement of Interest	Am-Peak Baseline			Am-Peak Optimized1			Difference	
	v/c Ratio	Total Delay	(LOS)	v/c Ratio	Total Delay	(LOS)	v/c Ratio	Total Delay
WBT	0.4	16.8	B	0.48	10.7	B	0.08	-6.1
NBT	0.97	42	D	0.83	20.2	C	-0.14	-21.8
SBT	0.82	35.8	D	0.58	20.2	C	-0.24	-15.6

*Table 13: Individual Movement Performance*

### Maximum V/C Ratio

**Table 14** summarizes the ‘before’ and ‘after’ overall v/c ratios for each of the intersections for all three peak periods. Note that in the “Difference” column, a negative value indicates a better v/c ratio. [10]

*Table 14: Summary of Maximum V/C Ratios*

PX#	INTERSECTION NAME	Maximum V/C Ratio								
		Before			After			Difference		
		OFF	AM	PM	OFF	AM	PM	OFF	AM	PM
15	Church & Wellington St	0.64	0.93	1.28	<b>0.64</b>	<b>0.93</b>	<b>1.28</b>	0.00	0.00	0.00
30	Yonge & Wellington St	0.55	0.76	0.55	<b>0.55</b>	<b>0.76</b>	<b>0.55</b>	0.00	0	0.00
60	Bay & Wellington St	0.61	0.83	0.66	<b>0.58</b>	<b>0.83</b>	<b>0.64</b>	-0.03	0	-0.02
71	York & Wellington St	0.50	0.69	0.66	<b>0.48</b>	<b>0.69</b>	<b>0.64</b>	-0.02	0	-0.02
76	University Ave. & Wellington St	0.54	0.63	0.65	<b>0.54</b>	<b>0.63</b>	<b>0.65</b>	0.00	0	0.00
264	Simcoe & Wellington St	0.45	0.65	0.90	<b>0.53</b>	<b>0.65</b>	<b>1.02</b>	0.08	0	0.12
1489	John & Wellington St	0.42	0.65	0.73	<b>0.41</b>	<b>0.65</b>	<b>0.72</b>	-0.01	0	-0.01
1682	Blue Jays Way & Wellington St	0.63	0.68	0.85	<b>0.63</b>	<b>0.68</b>	<b>0.84</b>	0.00	0	-0.01

## 7. Economic and Environmental Benefits

The economic and environmental impacts of the project are discussed in this section. The environmental and economic impacts of the signal timing improvements have also been measured to produce a summary of tangible improvements gained from this study. To analyze the economic impacts for the corridor, a cost-benefit analysis was undertaken [11]. The project costs and benefits were based on the following information:

- Model Output
- Delay

- Fuel Consumption
- Project Cost

The project environmental impacts were based on the following model outputs:

- Carbon Monoxide produced
- Nitrogen Oxides produced

## **7.1 Economic Benefits**

To determine whether traffic signal coordination was successful in terms of cost-effectiveness, a benefit and cost analysis was performed. The benefits of the project were measured in terms of savings of the consumption of gas, the value of stops, and the economic value of delay. The assumptions and references for the benefit-cost ratio are summarized below:

- The daily benefit should be based on 2hrs of AM/PM and 4hrs of OFF peak
- The annual benefits should be based on 250 weeks per year [4].
- The savings in \$ for travel time should be based on travel time value at US \$15.86 per hour [4].
- The savings in \$ for number of stops should be based on the value of US at \$0.014 per stop [4].
- The savings in \$ for fuel consumption should be based on Toronto's average fuel cost throughout the year at CAN per liter for 2015 [12].
- The estimated City's cost to conduct signal coordination \$2450 since the was conducted internally and includes costs such as Project information collection, Site investigations, traffic data counts, Synchro model reviews and uploading the new timing plans into the controller
- The savings in \$ for Carbon Monoxide should be based on the value of US at \$7.011 per Kilogram [4].
- The savings in \$ for Nitrogen Oxide should be based on the value of US at \$14.192 per Kilogram [4].

- The currency conversion rate should be based on \$1.27 from CAN\$ to US\$
- Number of signals within the signal coordination study

Benefits for this study are estimated for a period of one year and converted to present value [10] for a life cycle of 3 years [11] and discount rate of 4% [13]. The benefit and cost ratio is perfumed using the following equation:

R = Benefit-Cost Ratio, B = Total Value of the Benefits, C = Total Value of the Costs

$$R = \frac{B}{C}$$

The benefit, cost, and benefit-cost ratio are summarized in **Table 15**.

Measure of Effectiveness	Delays (hrs)	Stops	Speed (Km/hr)	Travel Time (hr)	Fuel Consumed (l)	CO Emissions (kg)	NOx Emissions (kg)
Before	271,500	20,038,000	15	378,000	1,704,500	31,550	6,095
After	270,500	19,028,000	16.25	374,000	1,666,500	30,995	5,985
Improvement	\$1000	\$1,010000	\$-1.25	\$4,000	\$38,000	\$555	\$110
% Improvement	0%	5%	-8%	1%	2%	2%	2%
Annual Benefit	\$22,559	\$20,113	-	-	\$41,420	\$5,535	\$2,221
Present Value of Discounted Future Benefit	\$62,604	\$55,815			\$114,944	\$15,359	\$6,162
Total Benefits	\$254,884						
Cost	\$19,600						
Benefit-Cost Ratio	13:1						

*Table 15: Benefit-Cost Analysis*

The signal coordination benefit-cost ratio is 13:1, meaning that benefit of the investment including travel time savings, stops and fuel emissions exceeds the life cycle cost by a factor of thirteen meaning the project is worthwhile.

## 8. **Conclusions and Recommendations**

This study was completed to improve the coordination of traffic signals along Wellington Street West from Church Street to Blue Jays Way Street. The analysis methodologies, findings, and recommendations from the study are documented in this report. In summary, the project included 8 signalized intersections. The study included a review of the signal timings and coordination for AM, OFF and PM peak periods. The purpose of this project was to optimize signals through modification of signal timing plans while maintaining reasonably minimal impacts to the side street levels of service and delays. Inherently, the improvement of coordination yields reduced travel times, delays, a number of stops, and fuel consumption – producing a better driving experience for all motorists.

The required field data for the analyses were collected at the beginning of the study, including turning movement counts (TMC), existing and historical timing plan, intersection drawings, and peak hour factor. The field visit was conducted to confirm the intersection and lane configuration or to observe any signal deficiencies. Travel run and delay study was conducted using GPS equipment and later transferred into the computer using PC-Travel software. The purpose of before period travel run and delay study was to assist with the calibration of the Synchro model before optimization. The model calibration process was educational and enforced the fundamental concepts and principle of traffic engineering. Therefore, the baseline Synchro models were developed and then calibrated for the AM, PM, and OFF peak periods for use in future analysis. The models were calibrated to the observed travel times throughout the corridor, and calibration was achieved by adjusting the Synchro parameters based on field observations. For each of the three time periods, calibration was achieved such that the modeled travel times were within 6% to 20% of the observed travel times over the entire corridor. The associated microsimulation software, Simtraffic and TransSuite also demonstrated the effectiveness when developing and visualizing offset and split solutions and the corresponding progression through ‘green band’.



The following factors had a negative impact on signal coordination and the smooth flow of traffic:

- On Street Construction,
- Illegal On-Street Parking,
- Reduces lanes -available to through traffic from three to two lanes in some areas.
- Parking Regulations
- Volume exceeding the capacity

This project proved that with a good understanding of signal timing concept, the user could leverage the strength of signal timing model and engineering judgment.

Finally, the benefits derived from this project proved that signal timing should not be compromised in the field and an effort like this to perform city-wide signal timing optimization is well worth the money. The benefits outweighed the cost of the entire project.

## **Recommendation**

Trafficware's Synchro model is a well used and accepted traffic optimization and modeling in North America, which has also the ability of calculation emission as seen in this report. Although Synchro is a traffic model but it only provides relatively crude traffic emission estimates.

In recognition of the need for more detailed emissions analyses for project evaluation and other micro-scale applications, the EPA is currently in the testing stage of the second implementation of a comprehensive mobile emissions model, MOVES-HVI (Motor Vehicle Emissions Simulator). The EPA reports that MOVES will incorporate second-by-second speed traces and vehicle specific power (which accounts for acceleration, speed, grade and road load) to allow project level dis-aggregate analysis of emissions. Both Synchro (the traffic model) and MOVES (the emissions model) are designed and function better with real assessments than detailed line assessments [14].

Assessing the emissions benefits of traffic signal coordination would be much better served by using MOVES C and MicroFac or similar model. With a MicroFac model one can address the specifics of the system, the fleet mix and the specifics of the arterial corridors being considered, to obtain reliable estimates of the probable fuel savings and emission reductions and be best assured that they are valid and reasonable [15].

While the Synchro model gives an indication of the energy and environmental benefits, MOVES would allow for a more detailed assessment, and the MicroFac model would allow for an even higher confidence in result and conclusion validity.

## **APPENDIX A**

TMC and PHF Data

## Peak Hour Factor Calculations Report

Survey Date: Apr-23-2009 (Thursday)  
Survey Type: Routine Hours

### CHURCH ST AT FRONT ST & WELLINGTON ST (PX 15)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.783	0.554	0.625	0.835	0.893	0.669	0.658	0.655	0.880	0.820	0.675	0.679
PM	0.896	0.825	0.667	0.764	0.673	0.851	0.800	0.750	0.875	0.828	0.857	0.500

#### Peak Hour Factors

	NB	EB	SB	WB
AM	0.780	0.781	0.878	0.802
PM	0.885	0.774	0.924	0.848

#### Intersection Peak Hour Factors

AM	0.946
PM	0.853

## Peak Hour Factor Calculations Report

Survey Date: May-06-2014 (Tuesday)  
Survey Type: Routine Hours

### WELLINGTON ST AT YONGE ST (PX 30)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.885		0.921				0.983	0.872		0.933	0.538	0.913
PM	0.915		0.926				0.938	0.875		0.874	0.870	0.818

#### Peak Hour Factors

	NB	EB	SB	WB
AM	0.900		0.934	0.926
PM	0.931		0.920	0.886

#### Intersection Peak Hour Factors

AM	0.953
PM	0.923

## Peak Hour Factor Calculations Report

**Survey Date:** Aug-12-2009 (Wednesday)  
**Survey Type:** Routine Hours

### BAY ST AT WELLINGTON ST (PX 60)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.959		0.891				0.901	0.980		0.970	0.750	0.786
PM	0.976		0.569				0.943	0.903		0.909	0.617	0.777

#### Peak Hour Factors

	NB	EB	SB	WB
AM	0.952		0.922	0.972
PM	0.953		0.939	0.916

#### Intersection Peak Hour Factors

AM	0.981
PM	0.988

## Peak Hour Factor Calculations Report

Survey Date: Aug-07-2012 (Tuesday)  
 Survey Type: Routine Hours

### WELLINGTON ST AT YORK ST (PX 71)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.883		0.824							0.880	0.855	
PM	0.832		0.750							0.953	0.910	

#### Peak Hour Factors

	NB	EB	SB	WB
AM	0.937			0.926
PM	0.848			0.962

#### Intersection Peak Hour Factors

AM	0.974
PM	0.960

## Peak Hour Factor Calculations Report

Survey Date: May-05-2011 (Thursday)  
Survey Type: Routine Hours

### UNIVERSITY AVE AT WELLINGTON ST (PX 76)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.904		0.871				0.859	0.781		0.892	0.860	0.900
PM	0.936		0.483				0.723	0.800		0.802	0.802	0.914

#### Peak Hour Factors

	NB	EB	SB	WB
AM	0.900		0.877	0.925
PM	0.912		0.731	0.841

#### Intersection Peak Hour Factors

AM	0.929
PM	0.899



## Peak Hour Factor Calculations Report

Survey Date: Nov-26-2009 (Thursday)  
Survey Type: Routine Hours

### SIMCOE ST AT WELLINGTON ST (PX 264)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM					0.617		0.810	0.840		0.853		0.886
PM					0.915		0.916	0.717		0.914		0.925

#### Peak Hour Factors

	NB	EB	SB	WB
AM		0.617	0.931	0.898
PM		0.915	0.883	0.926

#### Intersection Peak Hour Factors

AM	0.946
PM	0.950

Peak Hour Factor Calculations Report

Survey Date: Apr-23-2009 (Thursday)  
Survey Type: Routine Hours

**JOHN ST AT WELLINGTON ST (PX 1489)**Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.899	0.767	0.625				0.884	0.900	0.793	0.841	0.869	0.708
PM	0.833	0.600	0.750				0.929	0.889	0.958	0.830	0.913	0.710

Peak Hour Factors

	NB	EB	SB	WB
AM	0.833		0.973	0.931
PM	0.841		0.926	0.857

Intersection Peak Hour Factors

AM	0.913
PM	0.889

## Peak Hour Factor Calculations Report

Survey Date: Jul-27-2011 (Wednesday)  
Survey Type: Routine Hours

### BLUE JAYS WAY AT WELLINGTON ST (PX 1682)

#### Movement Peak Hour Factors

	NB_Thru	NB_Right	NB_Left	EB_Thru	EB_Right	EB_Left	SB_Thru	SB_Right	SB_Left	WB_Thru	WB_Right	WB_Left
AM	0.942		0.650		0.800	0.545	0.954	0.656		0.726	0.672	0.735
PM	0.724		0.639		0.611	0.625	0.693	0.771		0.696	0.738	0.967

#### Peak Hour Factors

	NB	EB	SB	WB
AM	0.945	0.667	0.960	0.842
PM	0.717	0.783	0.713	0.875

#### Intersection Peak Hour Factors

AM	0.943
PM	0.887

## Turning Movement Count Summary Report

CHURCH ST AT FRONT ST & WELLINGTON ST (PX 15)

Survey Date: 2009-Apr-23 (Thursday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
08:30-09:30	CAR	629	15	288	31	334	543	198	424	25	647	202	88	158	165	411	1,285	19	1,105	143	1,267	N	390	0	0
	TRK	18	0	6	0	6	13	6	11	0	17	3	2	3	8	13	33	0	25	6	31	S	344	0	0
AM PEAK	BUS	4	1	2	1	4	7	1	5	1	7	1	1	0	2	3	10	0	7	1	8	E	196	0	0
																					W	316	0	0	
TOTAL:		651	16	296	32	344	563	205	440	26	671	206	91	161	175	427	1,328	19	1,137	150	1,306				
17:00-18:00	CAR	465	8	233	99	340	1,319	160	1,115	35	1,310	381	105	304	264	673	1,030	42	758	72	872	N	577	0	0
	TRK	3	0	1	0	1	4	1	3	2	6	3	1	1	20	22	31	0	11	1	12	S	920	0	0
PM PEAK	BUS	1	0	1	0	1	5	0	5	0	5	1	0	1	3	4	9	0	6	0	6	E	204	0	0
																					W	465	0	0	
TOTAL:		469	8	235	99	342	1,328	161	1,123	37	1,321	385	106	306	287	699	1,070	42	775	73	890				
OFF HR AVG	CAR	343	15	114	38	167	502	158	389	39	586	183	75	119	139	333	571	25	417	71	513	N	199	0	0
	TRK	16	1	3	2	6	30	7	24	2	33	6	4	3	11	18	24	1	12	6	19	S	386	0	0
	BUS	3	2	1	1	4	6	1	5	2	8	3	0	0	1	1	6	1	3	1	5	E	159	0	0
TOTAL:		362	18	118	41	177	538	166	418	43	627	192	79	122	151	352	601	27	432	78	537				
07:30-09:30	CAR	1,079	36	489	52	577	873	337	669	48	1,054	408	152	301	282	735	2,301	59	1,983	253	2,295	N	486	0	0
	TRK	31	1	9	0	10	24	16	21	0	37	5	3	5	10	18	47	0	36	6	42	S	489	0	0
2 HR AM	BUS	7	3	4	1	8	9	2	6	3	11	4	2	1	2	5	13	0	8	1	9	E	242	0	0
																					W	432	0	0	
TOTAL:		1,117	40	502	53	595	906	355	696	51	1,102	417	157	307	294	758	2,361	59	2,027	260	2,346				
16:00-18:00	CAR	792	46	362	141	549	2,037	295	1,702	84	2,081	616	194	459	360	1,013	1,545	73	1,139	135	1,347	N	697	0	0
	TRK	8	0	3	0	3	21	3	18	3	24	7	3	3	28	34	50	1	22	2	25	S	1,078	0	0
2 HR PM	BUS	2	0	1	1	2	12	1	10	9	20	12	1	2	3	6	12	1	9	0	10	E	244	0	0
																					W	640	0	0	
TOTAL:		802	46	366	142	554	2,070	299	1,730	96	2,125	635	198	464	391	1,053	1,607	75	1,170	137	1,382				
07:30-18:00	CAR	3,241	141	1,306	346	1,793	4,916	1,264	3,926	287	5,477	1,754	644	1,237	1,196	3,077	6,128	230	4,791	671	5,692	N	1,978	0	0
	TRK	102	6	25	8	39	164	46	136	9	191	33	20	19	82	121	193	5	105	31	141	S	3,109	0	0
8 HR SUM	BUS	18	9	9	5	23	44	5	35	19	59	27	4	4	9	17	46	4	28	4	36	E	1,122	0	0
																					W	1,844	0	0	
TOTAL:		3,361	156	1,340	359	1,855	5,124	1,315	4,097	315	5,727	1,814	668	1,260	1,287	3,215	6,367	239	4,924	706	5,869				

Total 8 Hour Vehicle Volume: 16,666

Total 8 Hour Bicycle Volume: 0

Total 8 Hour Intersection Volume: 16,666

Comment: THIRD PHASE RAMP RE-OPEN BAY ST CLOSURE TO FGG EB

## Turning Movement Count Summary Report

WELLINGTON ST AT YONGE ST (PX 30)

Survey Date: 2014-May-06 (Tuesday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
07:30-08:30	CAR	411	291	368	0	659	0	0	0	0	0	316	0	232	164	396	1,328	84	873	43	1,000	N	737	27	0
	TRK	27	13	22	0	35	0	0	0	0	0	20	0	18	5	23	50	2	32	5	39	S	602	15	0
AM PEAK	BUS	3	1	3	0	4	0	0	0	0	0	7	0	7	17	24	21	0	3	0	3	E	884	32	0
																					W	1,054	0	0	
TOTAL:		441	305	393	0	698	0	0	0	0	0	343	0	257	186	443	1,399	86	908	48	1,042				
17:00-18:00	CAR	468	137	388	0	525	0	0	0	0	0	421	0	300	105	405	672	121	430	80	631	N	824	38	0
	TRK	11	8	7	0	15	0	0	0	0	0	10	0	6	3	9	21	4	10	4	18	S	1,039	28	0
PM PEAK	BUS	2	1	2	0	3	0	0	0	0	0	6	0	5	19	24	23	1	3	0	4	E	1,783	28	0
																					W	1,890	0	0	
TOTAL:		481	146	397	0	543	0	0	0	0	0	437	0	311	127	438	716	126	443	84	653				
OFF HR AVG	CAR	381	173	341	0	514	0	0	0	0	0	386	0	282	126	408	692	104	393	40	537	N	420	18	0
	TRK	15	10	12	0	22	0	0	0	0	0	31	0	23	8	31	38	8	20	3	31	S	470	12	0
	BUS	1	1	1	0	2	0	0	0	0	0	4	0	3	11	14	15	1	3	0	4	E	605	16	0
																					W	705	0	0	
TOTAL:		397	184	354	0	538	0	0	0	0	0	421	0	308	145	453	745	113	416	43	572				
07:30-09:30	CAR	842	543	771	0	1,314	0	0	0	0	0	664	0	492	307	799	2,438	172	1,588	71	1,831	N	1,711	51	0
	TRK	48	17	39	0	56	0	0	0	0	0	47	0	42	11	53	92	5	64	9	78	S	1,514	41	0
2 HR AM	BUS	5	2	5	0	7	0	0	0	0	0	12	0	11	37	48	47	1	8	0	9	E	2,199	105	0
																					W	2,551	0	0	
TOTAL:		895	562	815	0	1,377	0	0	0	0	0	723	0	545	355	900	2,577	178	1,660	80	1,918				
16:00-18:00	CAR	810	335	693	0	1,028	0	0	0	0	0	831	0	592	205	797	1,393	239	853	117	1,209	N	1,530	63	0
	TRK	19	15	14	0	29	0	0	0	0	0	24	0	15	6	21	44	9	23	5	37	S	1,712	48	0
2 HR PM	BUS	5	2	5	0	7	0	0	0	0	0	10	0	9	37	46	47	1	8	0	9	E	2,921	48	0
																					W	3,719	0	0	
TOTAL:		834	352	712	0	1,064	0	0	0	0	0	865	0	616	248	864	1,484	249	884	122	1,255				
07:30-18:00	CAR	3,176	1,568	2,827	0	4,395	0	0	0	0	0	3,039	0	2,213	1,015	3,228	6,596	826	4,013	349	5,188	N	4,919	186	0
	TRK	129	70	102	0	172	0	0	0	0	0	193	0	147	48	195	283	46	165	27	238	S	5,106	137	0
8 HR SUM	BUS	16	8	15	0	23	0	0	0	0	0	35	0	31	116	147	153	4	29	1	34	E	7,540	216	0
																					W	9,091	0	0	
TOTAL:		3,321	1,646	2,944	0	4,590	0	0	0	0	0	3,267	0	2,391	1,179	3,570	7,032	876	4,207	377	5,460				

Total 8 Hour Vehicle Volume: 13,620

Total 8 Hour Bicycle Volume: 539

Total 8 Hour Intersection Volume: 14,159

Comment:

## Turning Movement Count Summary Report

BAY ST AT WELLINGTON ST (PX 60)

Survey Date: 2009-Aug-12 (Wednesday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
07:30-08:30	CAR	736	139	706	0	845	0	0	0	0	0	459	0	393	149	542	1,382	66	1,094	30	1,190	N	416	0	0
	TRK	33	3	29	0	32	0	0	0	0	0	21	0	17	5	22	23	4	15	4	23	S	1,217	0	0
AM PEAK	BUS	9	0	9	0	9	0	0	0	0	0	13	0	8	0	8	10	5	10	0	15	E	2,461	0	0
																					W	2,596	0	0	
TOTAL:		778	142	744	0	886	0	0	0	0	0	493	0	418	154	572	1,415	75	1,119	34	1,228				
17:00-18:00	CAR	404	41	367	0	408	0	0	0	0	0	903	0	788	65	853	753	115	647	37	799	N	559	0	0
	TRK	4	0	4	0	4	0	0	0	0	0	7	0	6	3	9	5	1	2	0	3	S	830	0	0
PM PEAK	BUS	13	0	12	0	12	0	0	0	0	0	19	0	11	0	11	7	8	7	1	16	E	1,943	0	0
																					W	3,087	0	0	
TOTAL:		421	41	383	0	424	0	0	0	0	0	929	0	805	68	873	765	124	656	38	818				
OFF HR AVG	CAR	504	52	457	0	509	0	0	0	0	0	534	0	464	109	573	619	70	458	47	575	N	299	0	0
	TRK	29	12	23	0	35	0	0	0	0	0	33	0	28	6	34	35	5	17	6	28	S	509	0	0
	BUS	12	1	12	0	13	0	0	0	0	0	15	0	12	0	12	4	3	3	0	6	E	500	0	0
TOTAL:		545	65	492	0	557	0	0	0	0	0	582	0	504	115	619	658	78	478	53	609				
07:30-09:30	CAR	1,425	245	1,351	0	1,596	0	0	0	0	0	899	0	760	284	1,044	2,493	139	1,964	74	2,177	N	649	0	0
	TRK	59	7	55	0	62	0	0	0	0	0	44	0	38	9	47	55	6	39	4	49	S	1,931	0	0
2 HR AM	BUS	22	1	21	0	22	0	0	0	0	0	35	0	26	0	26	24	9	23	1	33	E	3,773	0	0
																					W	4,215	0	0	
TOTAL:		1,506	253	1,427	0	1,680	0	0	0	0	0	978	0	824	293	1,117	2,572	154	2,026	79	2,259				
16:00-18:00	CAR	852	91	744	0	835	0	0	0	0	0	1,522	0	1,310	142	1,452	1,482	212	1,249	108	1,569	N	997	0	0
	TRK	11	1	11	0	12	0	0	0	0	0	32	0	25	4	29	16	7	11	0	18	S	1,397	0	0
2 HR PM	BUS	34	1	30	0	31	0	0	0	0	0	36	0	22	0	22	23	14	22	4	40	E	4,098	0	0
																					W	6,758	0	0	
TOTAL:		897	93	785	0	878	0	0	0	0	0	1,590	0	1,357	146	1,503	1,521	233	1,282	112	1,627				
07:30-18:00	CAR	4,290	544	3,922	0	4,466	0	0	0	0	0	4,554	0	3,925	861	4,786	6,450	629	5,045	368	6,042	N	2,843	0	0
	TRK	185	56	158	0	214	0	0	0	0	0	206	0	173	36	209	210	33	118	27	178	S	5,365	0	0
8 HR SUM	BUS	103	6	97	0	103	0	0	0	0	0	128	0	94	0	94	62	34	56	6	96	E	9,870	0	0
																					W	4,241	0	0	
TOTAL:		4,578	606	4,177	0	4,783	0	0	0	0	0	4,888	0	4,192	897	5,089	6,722	696	5,219	401	6,316				

Total 8 Hour Vehicle Volume: 16,188

Total 8 Hour Bicycle Volume: 0

Total 8 Hour Intersection Volume: 16,188

Comment:

## Turning Movement Count Summary Report

WELLINGTON ST AT YORK ST (PX 71)

Survey Date: 2012-Aug-07 (Tuesday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other			
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total
08:30-09:30	CAR	799	112	611	0	723	0	0	0	0	0	0	0	0	0	876	0	764	188	952	N	410	0	0
	TRK	50	3	28	0	31	0	0	0	0	0	0	0	0	0	29	0	26	22	48	S	729	43	0
AM PEAK	BUS	7	9	7	0	16	0	0	0	0	0	0	0	0	0	14	0	5	0	5	E	1,872	92	0
																				W	565	0	0	
TOTAL:		856	124	646	0	770	0	0	0	0	0	0	0	0	0	919	0	795	210	1,005				
17:00-18:00	CAR	580	54	336	0	390	0	0	0	0	0	0	0	0	0	1,045	0	991	244	1,235	N	491	0	0
	TRK	10	4	3	0	7	0	0	0	0	0	0	0	0	0	12	0	8	7	15	S	658	40	0
PM PEAK	BUS	6	12	4	0	16	0	0	0	0	0	0	0	0	0	17	0	5	2	7	E	2,020	120	0
																				W	783	0	0	
TOTAL:		596	70	343	0	413	0	0	0	0	0	0	0	0	0	1,074	0	1,004	253	1,257				
OFF HR AVG	CAR	517	52	344	0	396	0	0	0	0	0	0	0	0	0	535	0	483	173	656	N	304	0	0
	TRK	37	4	19	0	23	0	0	0	0	0	0	0	0	0	25	0	21	18	39	S	436	24	0
	BUS	7	9	6	0	15	0	0	0	0	0	0	0	0	0	14	0	5	1	6	E	716	39	0
																				W	249	0	0	
TOTAL:		561	65	369	0	434	0	0	0	0	0	0	0	0	0	574	0	509	192	701				
07:30-09:30	CAR	1,472	221	1,106	0	1,327	0	0	0	0	0	0	0	0	0	1,602	0	1,381	366	1,747	N	660	0	0
	TRK	97	4	55	0	59	0	0	0	0	0	0	0	0	0	52	0	48	42	90	S	1,187	76	0
2 HR AM	BUS	14	19	14	0	33	0	0	0	0	0	0	0	0	0	28	0	9	0	9	E	4,016	151	0
																				W	1,036	0	0	
TOTAL:		1,583	244	1,175	0	1,419	0	0	0	0	0	0	0	0	0	1,682	0	1,438	408	1,846				
16:00-18:00	CAR	1,078	121	626	0	747	0	0	0	0	0	0	0	0	0	1,908	0	1,787	452	2,239	N	823	0	0
	TRK	23	4	10	0	14	0	0	0	0	0	0	0	0	0	24	0	20	13	33	S	1,216	85	0
2 HR PM	BUS	10	26	8	0	34	0	0	0	0	0	0	0	0	0	37	0	11	2	13	E	4,274	200	0
																				W	1,643	0	0	
TOTAL:		1,111	151	644	0	795	0	0	0	0	0	0	0	0	0	1,969	0	1,818	467	2,285				
07:30-18:00	CAR	4,617	550	3,107	0	3,657	0	0	0	0	0	0	0	0	0	5,648	0	5,098	1,510	6,608	N	2,699	0	0
	TRK	264	22	139	0	161	0	0	0	0	0	0	0	0	0	174	0	152	125	277	S	4,147	257	0
8 HR SUM	BUS	50	82	46	0	128	0	0	0	0	0	0	0	0	0	121	0	39	4	43	E	11,155	507	0
																				W	3,675	0	0	
TOTAL:		4,931	654	3,292	0	3,946	0	0	0	0	0	0	0	0	0	5,943	0	5,289	1,639	6,928				

Total 8 Hour Vehicle Volume: 10,874

Total 8 Hour Bicycle Volume: 764

Total 8 Hour Intersection Volume: 11,638

Comment:

## Turning Movement Count Summary Report

UNIVERSITY AVE AT WELLINGTON ST (PX 76)

Survey Date: 2011-May-05 (Thursday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
08:00-09:00 AM PEAK	CAR	979	101	893	0	994	0	0	0	0	0	1,192	0	1,120	125	1,245	797	72	571	86	729	N	1,300	16	0
	TRK	18	4	16	0	20	0	0	0	0	0	24	0	17	1	18	20	7	15	2	24	S	920	16	0
	BUS	11	0	8	0	8	0	0	0	0	0	17	0	15	2	17	13	2	11	3	16	E	894	11	0
																					W	1,229	21	0	
TOTAL:		1,008	105	917	0	1,022	0	0	0	0	0	1,233	0	1,152	128	1,280	830	81	597	91	769				
16:45-17:45 PM PEAK	CAR	929	29	730	0	759	0	0	0	0	0	1,032	0	926	112	1,038	879	106	738	199	1,043	N	920	12	0
	TRK	11	1	11	0	12	0	0	0	0	0	15	0	14	1	15	13	1	11	0	12	S	847	13	0
	BUS	5	0	3	0	3	0	0	0	0	0	5	0	5	7	12	17	0	10	2	12	E	654	3	0
																					W	942	29	0	
TOTAL:		945	30	744	0	774	0	0	0	0	0	1,052	0	945	120	1,065	909	107	759	201	1,067				
OFF HR AVG	CAR	760	47	661	0	708	0	0	0	0	0	1,075	0	981	76	1,057	454	94	331	99	524	N	862	10	0
	TRK	24	3	20	0	23	0	0	0	0	0	34	0	28	4	32	23	6	16	4	26	S	685	15	0
	BUS	11	0	9	0	9	0	0	0	0	0	25	0	23	2	25	11	2	9	2	13	E	286	4	0
																					W	226	19	0	
TOTAL:		795	50	690	0	740	0	0	0	0	0	1,134	0	1,032	82	1,114	488	102	356	105	563				
07:30-09:30 2 HR AM	CAR	1,907	186	1,743	0	1,929	0	0	0	0	0	2,090	0	1,963	251	2,214	1,437	127	1,000	164	1,291	N	2,096	32	0
	TRK	41	12	32	0	44	0	0	0	0	0	42	0	31	2	33	52	11	38	9	58	S	1,466	30	0
	BUS	22	0	14	0	14	0	0	0	0	0	28	0	23	7	30	28	5	21	8	34	E	1,392	18	0
																					W	1,871	41	0	
TOTAL:		1,970	198	1,789	0	1,987	0	0	0	0	0	2,160	0	2,017	260	2,277	1,517	143	1,059	181	1,383				
16:00-18:00 2 HR PM	CAR	1,671	73	1,293	0	1,366	0	0	0	0	0	2,051	0	1,826	201	2,027	1,524	225	1,250	378	1,853	N	1,787	19	0
	TRK	19	2	17	0	19	0	0	0	0	0	27	0	25	3	28	23	2	18	2	22	S	1,678	18	0
	BUS	15	0	12	0	12	0	0	0	0	0	8	0	8	17	25	39	0	22	3	25	E	1,161	5	0
																					W	1,902	44	0	
TOTAL:		1,705	75	1,322	0	1,397	0	0	0	0	0	2,086	0	1,859	221	2,080	1,586	227	1,290	383	1,900				
07:30-18:00 8 HR SUM	CAR	6,616	447	5,678	0	6,125	0	0	0	0	0	8,440	0	7,713	756	8,469	4,778	727	3,575	938	5,240	N	7,329	90	0
	TRK	154	27	127	0	154	0	0	0	0	0	204	0	167	19	186	167	37	121	27	185	S	5,882	106	0
	BUS	79	0	62	0	62	0	0	0	0	0	134	0	123	32	155	112	11	80	17	108	E	3,697	40	0
																					W	4,677	159	0	
TOTAL:		6,849	474	5,867	0	6,341	0	0	0	0	0	8,778	0	8,003	807	8,810	5,057	775	3,776	982	5,533				

Total 8 Hour Vehicle Volume: 20,684

Total 8 Hour Bicycle Volume: 395

Total 8 Hour Intersection Volume: 21,079

Comment:



## Turning Movement Count Summary Report

SIMCOE ST AT WELLINGTON ST (PX 264)

Survey Date: 2009-Nov-26 (Thursday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
08:30-09:30	CAR	0	0	0	0	0	0	0	0	37	37	381	0	188	121	309	694	156	573	0	729	N	395	0	0
	TRK	0	0	0	0	0	0	0	0	6	6	25	0	8	6	14	22	11	16	0	27	S	570	0	0
AM PEAK	BUS	0	0	0	0	0	0	0	0	0	0	6	0	1	0	1	2	5	2	0	7	E	164	0	0
																					W	723	0	0	
TOTAL:		0	0	0	0	0	0	0	0	43	43	412	0	197	127	324	718	172	591	0	763				
17:00-18:00	CAR	0	0	0	0	0	0	0	0	205	205	973	0	546	86	632	649	222	563	0	785	N	351	0	0
	TRK	0	0	0	0	0	0	0	0	2	2	17	0	11	0	11	6	4	6	0	10	S	709	0	0
PM PEAK	BUS	0	0	0	0	0	0	0	0	0	0	24	0	9	0	9	5	15	5	0	20	E	305	0	0
																					W	421	0	0	
TOTAL:		0	0	0	0	0	0	0	0	207	207	1,014	0	566	86	652	660	241	574	0	815				
OFF HR AVG	CAR	0	0	0	0	0	0	0	0	58	58	321	0	174	87	261	403	89	316	0	405	N	315	0	0
	TRK	0	0	0	0	0	0	0	0	5	5	28	0	14	4	18	20	9	16	0	25	S	373	0	0
	BUS	0	0	0	0	0	0	0	0	0	0	8	0	2	0	2	1	6	1	0	7	E	95	0	0
TOTAL:		0	0	0	0	0	0	0	0	63	63	357	0	190	91	281	424	104	333	0	437				
07:30-09:30	CAR	0	0	0	0	0	0	0	0	63	63	661	0	331	242	573	1,308	267	1,066	0	1,333	N	723	0	0
	TRK	0	0	0	0	0	0	0	0	9	9	38	0	15	7	22	44	14	37	0	51	S	1,063	0	0
2 HR AM	BUS	0	0	0	0	0	0	0	0	0	0	14	0	3	0	3	6	11	6	0	17	E	351	0	0
																					W	1,383	0	0	
TOTAL:		0	0	0	0	0	0	0	0	72	72	713	0	349	249	598	1,358	292	1,109	0	1,401				
16:00-18:00	CAR	0	0	0	0	0	0	0	0	448	448	1,902	0	1,045	175	1,220	1,159	409	984	0	1,393	N	704	0	0
	TRK	0	0	0	0	0	0	0	0	6	6	52	0	32	1	33	20	14	19	0	33	S	1,312	0	0
2 HR PM	BUS	0	0	0	0	0	0	0	0	0	0	49	0	17	0	17	5	32	5	0	37	E	642	0	0
																					W	912	0	0	
TOTAL:		0	0	0	0	0	0	0	0	454	454	2,003	0	1,094	176	1,270	1,184	455	1,008	0	1,463				
07:30-18:00	CAR	0	0	0	0	0	0	0	0	743	743	3,848	0	2,072	763	2,835	4,078	1,033	3,315	0	4,348	N	2,685	0	0
	TRK	0	0	0	0	0	0	0	0	33	33	200	0	103	25	128	144	64	119	0	183	S	3,865	0	0
8 HR SUM	BUS	0	0	0	0	0	0	0	0	0	0	96	0	28	0	28	15	68	15	0	83	E	1,372	0	0
																					W	3,506	0	0	
TOTAL:		0	0	0	0	0	0	0	0	776	776	4,144	0	2,203	788	2,991	4,237	1,165	3,449	0	4,614				

Total 8 Hour Vehicle Volume: 8,381

Total 8 Hour Bicycle Volume: 0

Total 8 Hour Intersection Volume: 8,381

Comment:

## Turning Movement Count Summary Report

JOHN ST AT WELLINGTON ST (PX 1489)

Survey Date: 2009-Apr-23 (Thursday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Total	Peds	Bike	Other			
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left					Thru	Right	Total
08:15-09:15 AM PEAK	CAR	513	15	374	264	653	356	0	0	0	0	285	92	251	54	397	365	34	296	139	469	N	779	1	0
	TRK	16	0	6	11	17	11	0	0	0	0	7	0	5	1	6	9	2	8	10	20	S	606	1	0
	BUS	2	0	1	2	3	2	0	0	0	0	2	0	2	0	2	7	0	7	1	8	E	978	0	0
																					W	704	9	0	
TOTAL:		531	15	381	277	673	369	0	0	0	0	294	92	258	55	405	381	36	311	150	497				
17:00-18:00 PM PEAK	CAR	735	27	450	24	501	47	0	0	0	0	514	23	338	128	489	952	176	797	285	1,258	N	451	0	0
	TRK	5	2	3	0	5	1	0	0	0	0	4	1	2	2	5	8	2	4	2	8	S	317	0	0
	BUS	4	0	4	0	4	0	0	0	0	0	0	0	0	0	0	5	0	5	0	5	E	832	0	0
																					W	332	0	0	
TOTAL:		744	29	457	24	510	48	0	0	0	0	518	24	340	130	494	965	178	806	287	1,271				
OFF HR AVG	CAR	348	14	236	48	298	66	0	0	0	0	283	18	233	34	285	308	50	260	112	422	N	286	1	0
	TRK	16	0	7	3	10	4	0	0	0	0	8	1	6	2	9	15	2	13	9	24	S	176	0	0
	BUS	2	0	1	1	2	1	0	0	0	0	1	0	1	0	1	4	0	4	1	5	E	421	0	0
																					W	342	0	0	
TOTAL:		366	14	244	52	310	71	0	0	0	0	292	19	240	36	295	327	52	277	122	451				
07:30-09:30 2 HR AM	CAR	833	24	587	386	997	525	0	0	0	0	464	139	380	93	612	629	84	512	246	842	N	1,135	4	0
	TRK	26	0	8	14	22	15	0	0	0	0	13	1	9	3	13	25	4	22	18	44	S	809	1	0
	BUS	2	0	1	3	4	3	0	0	0	0	2	0	2	0	2	11	0	11	1	12	E	1,494	0	0
																					W	1,089	11	0	
TOTAL:		861	24	596	403	1,023	543	0	0	0	0	479	140	391	96	627	665	88	545	265	898				
16:00-18:00 2 HR PM	CAR	1,225	73	709	53	835	92	0	0	0	0	953	39	664	224	927	1,627	289	1,330	516	2,135	N	891	0	0
	TRK	12	2	9	0	11	1	0	0	0	0	13	1	7	4	12	18	6	12	3	21	S	509	0	0
	BUS	5	0	4	1	5	1	0	0	0	0	2	0	2	0	2	10	0	10	1	11	E	1,464	0	0
																					W	653	0	0	
TOTAL:		1,242	75	722	54	851	94	0	0	0	0	968	40	673	228	941	1,655	295	1,352	520	2,167				
07:30-18:00 8 HR SUM	CAR	3,447	151	2,238	629	3,018	878	0	0	0	0	2,546	249	1,974	452	2,675	3,483	572	2,880	1,209	4,661	N	3,171	6	0
	TRK	99	3	43	27	73	34	0	0	0	0	56	7	38	15	60	102	18	84	56	158	S	2,022	1	0
	BUS	15	0	9	9	18	9	0	0	0	0	6	0	6	0	6	37	0	37	6	43	E	4,642	1	0
																					W	3,109	12	0	
TOTAL:		3,561	154	2,290	665	3,109	921	0	0	0	0	2,608	256	2,018	467	2,741	3,622	590	3,001	1,271	4,862				

Total 8 Hour Vehicle Volume: 10,712

Total 8 Hour Bicycle Volume: 20

Total 8 Hour Intersection Volume: 10,732

Comment: THIRD PHASE RAMP RE-OPEN BAY ST CLOSURE TO FGG EB

## Turning Movement Count Summary Report

BLUE JAYS WAY AT WELLINGTON ST (PX 1682)

Survey Date: 2011-Jul-27 (Wednesday)

Survey Type: Routine Hours

Time Period	Vehicle Type	Exits	NORTHBOUND				EASTBOUND				SOUTHBOUND				WESTBOUND				Peds	Bike	Other				
			Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left	Thru	Right	Total	Exits	Left				Thru	Right	Total	
08:30-09:30 AM PEAK	CAR	705	13	603	0	616	0	24	0	32	56	445	0	313	21	334	95	100	61	78	239	N	483	0	0
	TRK	24	1	20	0	21	0	0	0	1	1	19	0	10	1	11	2	8	0	4	12	S	975	0	0
	BUS	2	0	2	0	2	0	0	0	0	0	6	0	5	0	5	0	1	0	0	1	E W	334 382	0	0
TOTAL:		731	14	625	0	639	0	24	0	33	57	470	0	328	22	350	97	109	61	82	252				
17:00-18:00 PM PEAK	CAR	456	23	307	0	330	0	25	0	22	47	800	0	488	37	525	255	290	195	124	609	N	694	0	0
	TRK	5	0	5	0	5	0	0	0	0	0	7	0	4	0	4	2	3	2	0	5	S	856	0	0
	BUS	4	0	0	0	0	0	0	0	0	0	3	0	3	0	3	0	0	0	4	4	E W	670 457	0	0
TOTAL:		465	23	312	0	335	0	25	0	22	47	810	0	495	37	532	257	293	197	128	618				
OFF HR AVG	CAR	350	12	236	0	248	0	23	0	27	50	478	0	283	22	305	130	168	96	91	355	N	268	0	0
	TRK	16	0	11	0	11	0	0	0	1	1	21	0	11	1	12	3	9	2	5	16	S	275	0	0
	BUS	3	0	2	0	2	0	0	0	0	0	5	0	5	0	5	0	0	0	1	1	E W	387 236	0	0
TOTAL:		369	12	249	0	261	0	23	0	28	51	504	0	299	23	322	133	177	98	97	372				
07:30-09:30 2 HR AM	CAR	1,100	20	919	0	939	0	41	0	66	107	772	0	507	41	548	158	199	97	140	436	N	722	0	0
	TRK	32	2	25	0	27	0	0	0	2	2	35	0	19	2	21	4	14	0	7	21	S	1,280	0	0
	BUS	6	0	5	0	5	0	0	0	0	0	11	0	10	0	10	0	1	0	1	2	E W	572 544	0	0
TOTAL:		1,138	22	949	0	971	0	41	0	68	109	818	0	536	43	579	162	214	97	148	459				
16:00-18:00 2 HR PM	CAR	961	55	593	0	648	0	44	0	34	78	1,235	0	802	91	893	683	399	537	324	1,260	N	1,089	0	0
	TRK	7	0	6	0	6	0	0	0	0	0	12	0	7	1	8	5	5	4	1	10	S	1,305	0	0
	BUS	7	0	2	0	2	0	0	0	0	0	6	0	5	0	5	0	1	0	5	6	E W	1,145 757	0	0
TOTAL:		975	55	601	0	656	0	44	0	34	78	1,253	0	814	92	906	688	405	541	330	1,276				
07:30-18:00 8 HR SUM	CAR	3,460	122	2,454	0	2,576	0	178	0	209	387	3,920	0	2,441	220	2,661	1,358	1,270	1,016	828	3,114	N	2,883	0	0
	TRK	103	2	74	0	76	0	1	0	4	5	128	0	71	6	77	20	53	12	28	93	S	3,685	0	0
	BUS	24	0	14	0	14	0	0	0	0	0	36	0	33	0	33	0	3	0	10	13	E W	3,264 2,246	0	0
TOTAL:		3,587	124	2,542	0	2,666	0	179	0	213	392	4,084	0	2,545	226	2,771	1,378	1,326	1,028	866	3,220				

Total 8 Hour Vehicle Volume: 9,049

Total 8 Hour Bicycle Volume: 0

Total 8 Hour Intersection Volume: 9,049

Comment:

## **APPENDIX B**

### Signal Timing Plans

LOCATION: Church St & Front St/Wellington St		DISTRICT: Toronto & East York			<div>N</div>
PX: 15		COMPUTER SYSTEM: TransSuite			
MODE / COMMENT: FXT		CONTROLLER / CABINET TYPE: Econolite ASC/3-2100 / TS2 T1			
PREPARED / CHECKED BY: TS / LL		CONFLICT FLASH: Red & Red			
PREPARATION DATE: July 6, 2011		DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing @ 1.2 m/s)			
IMPLEMENTATION DATE: November 10, 2011		CHANNEL / DROP: 4018 / 1			

NEMA Phase		OFF	AM	PM	Phase Mode (Fixed/Demanded/ Callable)	Remarks
		All Other Times	06:45-09:30 M-F	15:30-18:15 M-F		
		Local Plan	Pattern 1	Pattern 2		
	System Plan	1	2	3		
1 Front St EB 	WLK 7 FDW 14 MIN 21 MAX1 22 AMB 4 ALR 3 SPLIT				Fixed	<div>Pedestrian Minimums:</div> <div>Crosswalk 1 &amp; 4 - EWWK = 7 sec, EWFD = 14 sec Crosswalk 2,3,5 &amp; 6 - NSWK = 7 sec, NSFD = 14 sec Phasing Sequence:</div> <div></div> <div>Crosswalk 3 &amp; 5 overlaps Ph2 &amp; Ph4/8 (starts in Ph2 but terminates at the end of Ph4/8) Ped displays for Crosswalks 6 and 2 terminate in Ph4/8 and start again in Ph1</div> <div>Two stage crossing for NS pedestrians</div>
2 Front St WB 	WLK 7 FDW 14 MIN 21 MAX1 24 AMB 4 ALR 3 SPLIT				Fixed	
3 	WLK FDW MIN MAX1 AMB ALR SPLIT					
4 Church St 	WLK 7 FDW 14 MIN 21 MAX1 22 AMB 4 ALR 4 SPLIT				Fixed	
5 	WLK 7 FDW 14 MIN 21 MAX1 22 AMB 4 ALR 3 SPLIT					
6 	WLK 7 FDW 14 MIN 21 MAX1 24 AMB 4 ALR 3 SPLIT					
7 	WLK FDW MIN MAX1 AMB ALR SPLIT					
8 Church St 	WLK 7 FDW 14 MIN 21 MAX1 22 AMB 4 ALR 4 SPLIT				Fixed	
	CL OF	90 1	90 1	90 1		

Notes: Pick up under TransSuite on March 5, 2013.

LOCATION: Yonge St. & Wellington St. E./ Wellington St. W.		DISTRICT: Toronto & East York		<div>N ↑</div>				
MODE/COMMENT: FXT		COMPUTER SYSTEM: TransSuite						
PX: 30		CONTROLLER/CABINET TYPE: PEEK ATC 1000 / TS2 T1						
PREPARED/CHECKED BY: TY/ LC/PV		CONFLICT FLASH: Red & Red						
PREPARATION DATE: October 9, 2014		DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing @1.2 m/s)						
IMPLEMENTATION DATE: October 10, 2014		CHANNEL/DROP: 4009/20						
NEMA Phase		OFF All Other Times	AM 06:30-09:30 M-F	PM 15:00-19:00 M-F	NIGHT 23:00-06:30 Daily	Special Event Times to be determined	Phase Mode  (Fixed/Demanded or Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 16		
	Split Table	Split 1	Split 2	Split 3	Split 4	Split 16		
1	<div>NOT USED</div>	WLK FDW MIN MAX1 AMB ALR SPLIT						<div>Pedestrian Minimums: NSWK = 7 sec., NSFD = 12 sec. EWWK = 7 sec., EWFD = 13 sec. Fixed NBLA - shared left/thru lane.</div>
2	<div>Yonge St. </div>	WLK 7 FDW 12 MIN 19 MAX1 40 AMB 4 ALR 2 SPLIT					Fixed	
3	<div>NOT USED</div>	WLK FDW MIN MAX1 AMB ALR SPLIT						
4	<div>NOT USED</div>	WLK 7 FDW 13 MIN 20 MAX1 23 AMB 4 ALR 2 SPLIT						
5	<div></div>	WLK FDW MIN 6 MAX1 6 AMB 3 ALR 1 SPLIT					Fixed.	
6	<div>Yonge St. </div>	WLK 7 FDW 12 MIN 19 MAX1 29 AMB 4 ALR 2 SPLIT					Fixed.	
7	<div>NOT USED</div>	WLK FDW MIN MAX1 AMB ALR SPLIT						
8	<div>Wellington St. </div>	WLK 7 FDW 13 MIN 20 MAX1 23 AMB 4 ALR 2 SPLIT					Fixed.	
		CL OF	75 44	80 28	80 44	75 44	85 44	

NOTES: Wellington Street is one-way westbound.  
 Picked up system control on January 28, 2014

LOCATION: Bay St & Wellington St

PX: 60

MODE / COMMENT: FXT with 2-wire Polara APS

PREPARED / CHECKED BY: TS

PREPARATION DATE: February 15, 2012

IMPLEMENTATION DATE: February 15, 2012

DISTRICT: Toronto & East York

COMPUTER SYSTEM: TransSuite

CONTROLLER/CABINET TYPE: Econolite ASC/3-2100 / TS2 T1

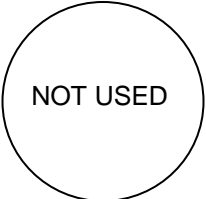
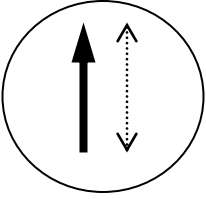
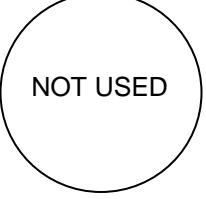
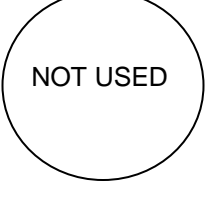
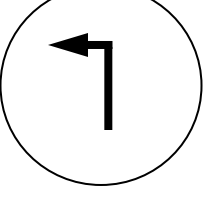
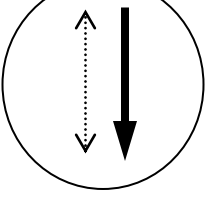
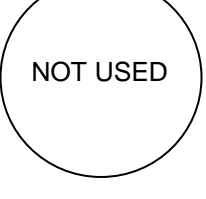
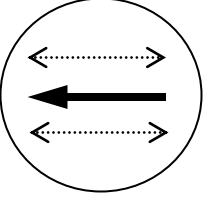
CONFLICT FLASH: Red & Red

DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing @ 1.2 m/s)

CHANNEL/DROP: 4016 / 2

N

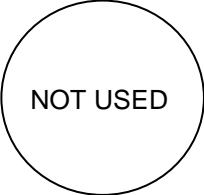
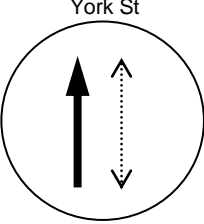
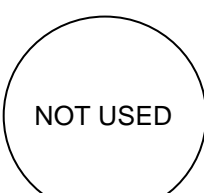
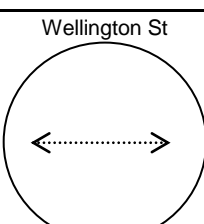
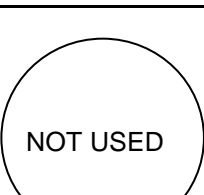
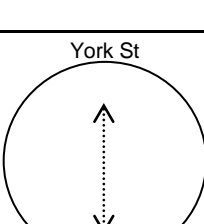
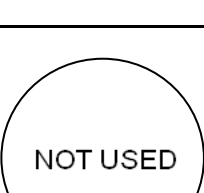
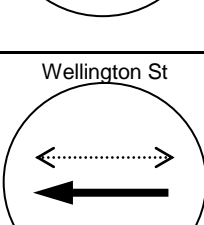
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NEMA Phase		OFF	AM	PM	PAM	Gardiner	Phase Mode (Fixed/Demanded/Callable)	Remarks
		All Other Times	07:00-09:30 M-F	15:30-18:15 M-F	06:45-7:00 M-F	Times to be determined		
		Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 61		
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 61		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 4	Plan 61		
1 	WLK FDW MIN MAX1 AMB ALR SPLIT							Pedestrian Minimums: NSWK = 7 sec., NSFD = 12 sec. EWWK = 7 sec., EWFD = 12 sec. APS on during NSWK and EWWK when activated. APS not on during NBLA. Extended Push Activation = 3 sec. NS pushbutton monitored on local detector 2 & EW pushbutton monitored on local detector 6.
2 Bay St 	WLK 7 FDW 12 MIN 19 MAX1 19 AMB 4 ALR 3 SPLIT						Fixed	
3 	WLK FDW MIN MAX1 AMB ALR SPLIT							
4 	WLK 7 FDW 12 MIN 19 MAX1 19 AMB 4 ALR 2 SPLIT							
5 	WLK FDW MIN 6 MAX1 6 AMB 3 ALR 1 SPLIT						Fixed NBLA 7:00-9:30 M-F (in shared left/thru lane)	
6 Bay St 	WLK 7 FDW 12 MIN 19 MAX1 19 AMB 4 ALR 3 SPLIT						Fixed	
7 	WLK FDW MIN MAX1 AMB ALR SPLIT							
8 Wellington St 	WLK 7 FDW 12 MIN 19 MAX1 19 AMB 4 ALR 2 SPLIT						Fixed	
	CL OF	60 35	70 47	70 15	70 37	70 1		

NOTES: Wellington St one-way WB.  
Pick up on TransSuite system on Mar 5,2013.

<b>LOCATION:</b>	<b>York St &amp; Wellington St</b>	<b>DISTRICT:</b>	<b>Toronto &amp; East York</b>
<b>MODE/COMMENT:</b>	<b>FXT</b>	<b>COMPUTER SYSTEM:</b>	<b>TransSuite</b>
<b>PX:</b>	<b>71</b>	<b>CONTROLLER/CABINET TYPE:</b>	<b>Econolite ASC/3-2100 / TS2T1</b>
<b>PREPARED/CHECKED BY:</b>	<b>TY/HL</b>	<b>CONFLICT FLASH:</b>	<b>Red &amp; Red</b>
<b>PREPARATION DATE:</b>	<b>September 17, 2014</b>	<b>DESIGN WALK SPEED:</b>	<b>1.0m/s (FDW based on full crossing @ 1.2</b>
<b>IMPLEMENTATION DATE:</b>	<b>September 18, 2014</b>	<b>CHANNEL/DROP:</b>	



NEMA Phase		OFF	AM	PM	P+PAM	Gardiner Closure	Phase Mode (Fixed/Demanded or Callable)	Remarks
		All Other Times	07:00-09:30 M-F	15:15-18:30 M-F	06:30-07:00 09:30-10:00 M-F			
		Pattern 1	Pattern 2	Pattern 3	Pattern 4			
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 61		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 4	Plan 61		
1		WLK FDW MIN MAX1 AMB ALR SPLIT						Pedestrian Minimums: NSWK = 7 sec, NSFD = 14 sec EWWK = 7 sec, EWFD = 14 sec
2		WLK 7 FDW 14 MIN 21 MAX1 21 AMB 4 ALR 2 SPLIT					Fixed	
3		WLK FDW MIN MAX1 AMB ALR SPLIT						
4		WLK 7 FDW 14 MIN 21 MAX1 27 AMB 4 ALR 2 SPLIT					Fixed	
5		WLK FDW MIN MAX1 AMB ALR SPLIT						
6		WLK 7 FDW 14 MIN 21 MAX1 21 AMB 4 ALR 2 SPLIT					Fixed	
7		WLK FDW MIN MAX1 AMB ALR SPLIT						
8		WLK 7 FDW 14 MIN 21 MAX1 27 AMB 4 ALR 2 SPLIT					Fixed	
	CL OF	60 2	70 65	70 38	70 57	70 1		

NOTES: York St is one-way northbound. Wellington St is one-way westbound.



LOCATION:		University Avenue & Wellington Street West				DISTRICT:		Toronto & East York		<div>N ↑</div>
MODE/COMMENT:		FXT				COMPUTER SYSTEM:		TransSuite		
PX:		76 - Construction Timing for University Ave Work				CONTROLLER/CABINET TYPE:		PEEK ATC-1000 / TS2T1		
PREPARED/CHECKED BY:		TY / LL				CONFLICT FLASH:		Red & Red		
PREPARATION DATE:		February 20, 2015				DESIGN WALK SPEED:		1.0m/s (FDW based on full crossing @ 1.2m)		
IMPLEMENTATION DATE:		February 20, 2015				CHANNEL/DROP:		4003/3		
NEMA Phase		OFF	AM	PM	NIGHT	Phase Mode (Fixed/Demanded or Callable)	Remarks			
		All Other Times	06:30-10:00 M-F	15:15-19:00 M-F	19:00-06:30 Daily					
	Local Plan Split Table	Pattern 1 Split 1	Pattern 2 Split 2	Pattern 3 Split 3	Pattern 4 Split 4					
1	<div>NOT USED</div>	WLK FDW MIN MAX1 AMB ALR SPLIT					Pedestrian Minimums: NSWK = 7 sec, NSFD = 14 sec EWWK = 7 sec, EWFD = 21 sec			
2	<div>University Avenue</div> <div><div>↑</div><div>↑↓</div></div>	WLK 7 FDW 14 MIN 21 MAX1 59 AMB 4 ALR 2 SPLIT				Fixed				
3	<div>NOT USED</div>	WLK FDW MIN MAX1 AMB ALR SPLIT								
4	<div>Wellington Avenue West</div> <div>NOT USED</div>	WLK 7 FDW 21 MIN 28 MAX1 28 AMB 4 ALR 3 SPLIT				Fixed.				
5	<div><div>↶</div></div>	WLK FDW MIN 6 MAX1 6 AMB 3 ALR 1 SPLIT				Fixed during AM peak only				
6	<div>University Avenue</div> <div><div>↑↓</div><div>↓</div></div>	WLK 7 FDW 14 MIN 21 MAX1 59 AMB 4 ALR 2 SPLIT				Fixed.				
7	<div>NOT USED</div>	WLK FDW MIN MAX1 AMB ALR SPLIT								
8	<div>Wellington Avenue West</div> <div><div>↔</div><div>↔</div><div>↔</div></div>	WLK 7 FDW 21 MIN 28 MAX1 28 AMB 4 ALR 3 SPLIT				Fixed.				
		CL 100 OF 91	110 82	110 93	90 21					

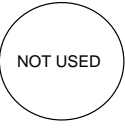
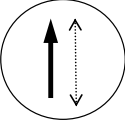
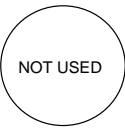
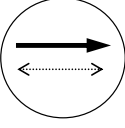
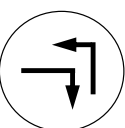
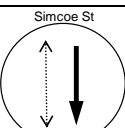
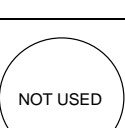
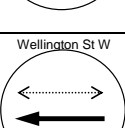
NOTES: Wellington Street West is one-way westbound.

Picked up on TransSuite Jan 14, 2013 at 12:25pm

PX0076

5/4/2016

<b>LOCATION:</b>	<b>Simcoe St &amp; Wellington St</b>	<b>DISTRICT:</b>	<b>Toronto &amp; East York</b>
<b>MODE/COMMENT:</b>	<b>FXT</b>	<b>COMPUTER SYSTEM:</b>	<b>TransSuite</b>
<b>PX:</b>	<b>264</b>	<b>CONTROLLER/CABINET TYPE:</b>	<b>Econolite ASC/3-2100 / TS2T1</b>
<b>PREPARED/CHECKED BY:</b>	<b>AD/SH/DS</b>	<b>CONFLICT FLASH:</b>	<b>Red &amp; Red</b>
<b>PREPARATION DATE:</b>	<b>May 06, 2015</b>	<b>DESIGN WALK SPEED:</b>	<b>1.0m/s (FDW based on full crossing @ 1.2m/s)</b>
<b>IMPLEMENTATION DATE:</b>		<b>CHANNEL/DROP:</b>	<b>4042/1</b>

NEMA Phase			OFF	AM	PM	AMI	PMI	EVE	Phase Mode (Fixed/Demanded or Callable)	Remarks
			All Other Times	07:00- 09:30 M-F	16:00- 18:00 M-F	06:30-07:00 & 09:30- 10:00 M-F	15:15-16:00 & 18:00- 18:30 M-F	00:01-06:30 & 19:00- 23:59 M-F		
			Pattern 1 Plan 1	Pattern 2 Plan 2	Pattern 3 Plan 3	Pattern 4 Plan 4	Pattern 5 Plan 5	Pattern 6 Plan 6		
1		WLK FDW MIN MAX1 AMB ALR SPLIT								Pedestrian Minimums: NSWK = 7 sec, NSFD = 14 sec EWWK = 7 sec, EWFD = 11 sec Left Turn Passage = 2 sec
2	Simcoe St 	WLK 7 FDW 14 MIN 21 MAX1 35 AMB 4 ALR 2 SPLIT							Fixed	
			41	39	39	39	39	39	Northbound motorists permitted to make left turn only. (Bicycles excepted).	
3		WLK FDW MIN MAX1 AMB ALR SPLIT								
4	Wellington St W 	WLK 7 FDW 11 MIN 18 MAX1 33 AMB 4 ALR 2 SPLIT							Fixed	
			39	41	41	41	41	41	Eastbound motorists permitted to make right turn only.	
5		WLK FDW MIN 6 MAX1 7 AMB 3 ALR 1 SPLIT							NBLA Callable / Extendable by 9m setback loop 24 hours, daily	
			11	11	11	11	11	11		
6	Simcoe St 	WLK 7 FDW 14 MIN 21 MAX1 24 AMB 4 ALR 2 SPLIT							Fixed	
			30	28	28	28	28	28		
7		WLK FDW MIN MAX1 AMB ALR SPLIT								
8	Wellington St W 	WLK 7 FDW 11 MIN 18 MAX1 33 AMB 4 ALR 2 SPLIT							Fixed	
			39	41	41	41	41	41		
		CL	80	80	80	80	80	80		
		OF	28	27	58	62	61	40		

NOTES: North leg: One-way Southbound only (except contra-flow bicycle lane)  
 East leg: One-way Westbound only  
 Picked up on TransSuite on April 15, 2013

LOCATION:		Blue Jays Way & Wellington St W			DISTRICT:		Toronto & East York	
MODE/COMMENT:		FXT with Callable EB Phase			COMPUTER SYSTEM:		TransSuite	
PX:		1682			CONTROLLER/CABINET TYPE:		Econolite ASC/3-2100 / TS2T1	
PREPARED/CHECKED BY:		ML			CONFLICT FLASH:		Red & Red	
PREPARATION DATE:		August 20, 2013			DESIGN WALK SPEED:		1.0m/s (FDW based on full crossing @ 1.2m/s)	
IMPLEMENTATION DATE:		August 20, 2013			CHANNEL/DROP:		4047/2	

NEMA Phase		OFF	AM	PM	Phase Mode (Fixed/Demanded or Callable)	Remarks
		All Other Times	06:30-10:00 M-F	15:15-18:30 M-F		
		Local Plan	Pattern 1	Pattern 2		
	System Plan	Plan 1	Plan 2	Plan 3		
1		WLK FDW MIN MAX1 AMB ALR SPLIT				Pedestrian Minimums: NSWK = 7 sec, NSFD = 14 sec EWWK = 7 sec, EWFD = 14 sec Three phase operation sequence: NSG/NSWK, EBLA/EBRA,/EWDW, WBG/EWWK. EB phase callable by stopbar loop. Unused time given to NS phase.
2	Blue Jays Way 	WLK 7 FDW 14 MIN 21 MAX1 21 AMB 4 ALR 2 SPLIT			Fixed	
3	Wellington St W 	WLK FDW MIN 7 MAX1 7 AMB 4 ALR 2 SPLIT			Callable and Extendable by Stopbar Loop	
4	Wellington St W 	WLK 7 FDW 14 MIN 21 MAX1 21 AMB 4 ALR 2 SPLIT				
5		WLK FDW MIN MAX1 AMB ALR SPLIT				
6	Blue Jays Way 	WLK 7 FDW 14 MIN 21 MAX1 21 AMB 4 ALR 2 SPLIT			Fixed	
7		WLK FDW MIN MAX1 AMB ALR SPLIT				
8	Wellington St W 	WLK 7 FDW 14 MIN 21 MAX1 21 AMB 4 ALR 2 SPLIT			Fixed	
		CL OF VP	70 44 14	70 62 14	70 49 14	

NOTES: Wellington St W at East of Blue Jays Way - one way westbound.  
 Picked up TransSuite System on April 26, 2013 at 13:35

## **APPENDIX C**

### Field Observation

# Field Observations (Before Study) – WELLINGTON WEST

## Church Street

### AM Peak

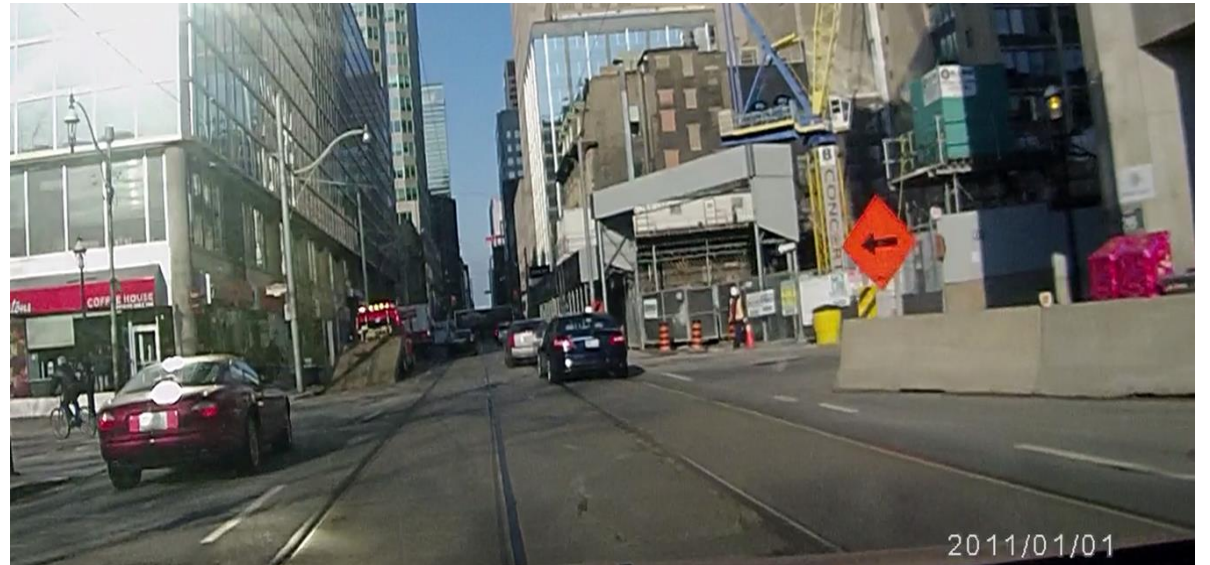
- Free flow between Church and Yonge
- Lane reduction due to on street parking on north side



## Yonge Street

### AM Peak

- Lane reduction due to construction
- Free Flow



### Yonge Street

#### PM Peak

- On-street parking on both sides resulting in reduced number of lane



### Bay Street

#### PM Peak

- Light traffic congestion





### York Street

#### AM Peak

- Free flow between Bay and York, However street parking for Taxies reduces the lanes number to two



### York Street

#### PM Peak

- Moderate congestion on through movement with heavier left turn lane.



### University Street

#### AM Peak

- Long left turn queue requires two cycle to clear



### York Street

#### PM Peak

- Moderate congestion





## Blue Jays Way Street

### PM Peak

- Not Coordinated, stop at red every travel run



## **APPENDIX D**

Before Speed and Travel Run Studies

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington street AM**  
Study Date : **04/24/2015**  
Page No. : **1**

**Overall Output Statistics**

Node #	Length	Node	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 10 KPH	Time <= 50 KPH	Time <= 70 KPH
1	0								
2	193	CHURCH	52.5	0.7	13.2	40.5	26.5	52.5	52.5
3	289	YONGE	85.7	1.7	12.1	68.5	47.5	85.7	85.7
4	202	BAY	64.3	0.8	11.3	52.3	36.7	64.3	64.3
5	285	YORK	47.3	1.0	21.7	30.3	11.3	47.3	47.3
6	40	UNIVERSITY	17.8	0.3	8.1	15.3	12.0	17.8	17.8
7	97	SIMCOE	28.3	0.5	12.4	22.2	16.7	27.5	28.3
8	288	JOHN	50.8	0.8	20.4	33.3	19.7	50.7	50.8
9	217	BLUE JAYS WAY	30.3	0.3	25.8	17.2	11.0	29.2	30.2
10	62		4.8	0.0	46.3	1.5	0.0	4.0	4.7
<b>Total</b>	<b>1,673</b>		<b>382.0</b>	<b>6.2</b>	<b>15.8</b>	<b>281.2</b>	<b>181.3</b>	<b>379.0</b>	<b>381.7</b>

Stats based on 6 BEFORE runs.

Stops based on a Stop Speed of 8 KPH.

Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington street AM**  
Study Date : **04/24/2015**  
Page No. : **2**

**Detailed Statistics By Run**

**Travel Time (sec) by Section**

01Wellington AM03-WB-003t  
01Wellington AM04-WB-004  
01Wellington AM05-WB-005  
01Wellington AM06-WB-006  
01wellington AM1-WB-001  
01Wellington AM2-WB-002

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	193	CHURCH	27	52	78	64	73	21
3	289	YONGE	106	65	97	91	32	123
4	202	BAY	84	20	76	41	105	60
5	285	YORK	57	27	78	36	29	57
6	40	UNIVERSITY	68	15	6	7	6	5
7	97	SIMCOE	10	36	26	54	36	8
8	288	JOHN	22	77	29	49	67	61
9	217	BLUE JAYS WAY	59	50	17	18	19	19
10	62		9	5	5	6	4	0
<b>Totals</b>	<b>1673</b>		<b>442</b>	<b>347</b>	<b>412</b>	<b>366</b>	<b>371</b>	<b>354</b>

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington street AM**  
Study Date : **04/24/2015**  
Page No. : **3**

**Detailed Statistics By Run**

**Number of Stops by Section**

01Wellington AM03-WB-003t  
01Wellington AM04-WB-004  
01Wellington AM05-WB-005  
01Wellington AM06-WB-006  
01wellington AM1-WB-001  
01Wellington AM2-WB-002

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	193	CHURCH	0	1	1	1	1	0
3	289	YONGE	2	1	1	2	1	3
4	202	BAY	1	0	1	1	1	1
5	285	YORK	1	0	1	1	0	3
6	40	UNIVERSITY	1	1	0	0	0	0
7	97	SIMCOE	0	0	1	1	1	0
8	288	JOHN	0	2	0	1	1	1
9	217	BLUE JAYS WAY	1	1	0	0	0	0
10	62		0	0	0	0	0	0
<b>Totals</b>	<b>1673</b>		<b>6</b>	<b>6</b>	<b>5</b>	<b>7</b>	<b>5</b>	<b>8</b>

Stops based on a Stop Speed of 8 KPH.

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington street AM**  
Study Date : **04/24/2015**  
Page No. : **4**

**Detailed Statistics By Run**

**Average Speed (KPH) by Section**

01Wellington AM03-WB-003t  
01Wellington AM04-WB-004  
01Wellington AM05-WB-005  
01Wellington AM06-WB-006  
01wellington AM1-WB-001  
01Wellington AM2-WB-002

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	193	CHURCH	25.6	13.6	9.2	11.2	9.9	34.0
3	289	YONGE	9.8	15.8	10.7	11.2	31.5	8.4
4	202	BAY	8.7	36.5	9.6	17.9	7.0	12.1
5	285	YORK	17.8	38.3	13.1	28.6	34.9	18.0
6	40	UNIVERSITY	2.2	8.7	25.2	19.5	24.9	33.1
7	97	SIMCOE	39.6	9.8	13.6	6.9	9.6	40.6
8	288	JOHN	47.0	13.8	35.1	20.7	15.5	17.3
9	217	BLUE JAYS WAY	13.0	15.7	46.4	45.1	41.7	37.0
10	62		24.9	42.5	45.1	35.9	63.6	0.0
<b>Totals</b>	<b>1673</b>		<b>13.7</b>	<b>17.4</b>	<b>14.7</b>	<b>16.5</b>	<b>16.3</b>	<b>16.2</b>

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington street AM**  
Study Date : **04/24/2015**  
Page No. : **5**

**Detailed Statistics By Run**

**Total Delay (sec) by Section**

01Wellington AM03-WB-003t  
01Wellington AM04-WB-004  
01Wellington AM05-WB-005  
01Wellington AM06-WB-006  
01wellington AM1-WB-001  
01Wellington AM2-WB-002

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	193	CHURCH	15	40	66	52	61	9
3	289	YONGE	89	48	79	74	15	106
4	202	BAY	72	8	64	29	93	48
5	285	YORK	40	10	61	19	12	40
6	40	UNIVERSITY	66	13	3	4	4	2
7	97	SIMCOE	3	30	20	48	30	2
8	288	JOHN	4	59	12	32	50	43
9	217	BLUE JAYS WAY	46	36	4	4	6	7
10	62		5	1	1	2	0	0
<b>Totals</b>	<b>1673</b>		<b>340</b>	<b>245</b>	<b>310</b>	<b>264</b>	<b>271</b>	<b>257</b>

Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington pm**  
Study Date : **04/27/2015**  
Page No. : **1**

**Overall Output Statistics**

Node #	Length	Node	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 10 KPH	Time <= 50 KPH	Time <= 70 KPH
1	0								
2	171	church	76.0	1.3	8.1	65.5	54.8	76.0	76.0
3	303	Yonge	59.0	1.0	18.5	40.8	27.8	59.0	59.0
4	193	Bay	45.3	1.0	15.3	33.3	20.5	45.3	45.3
5	254	York	88.8	2.3	10.3	73.3	51.8	88.8	88.8
6	77	university	32.8	0.5	8.4	27.8	22.5	32.8	32.8
7	108	Simcoe	16.8	0.3	23.3	9.8	4.8	16.5	16.8
8	277	John	42.5	0.5	23.4	25.5	13.3	42.3	42.5
9	210	Blue Jays way	43.5	1.0	17.4	31.5	22.3	42.5	43.3
10	45		5.8	0.0	28.2	3.5	0.0	5.5	5.5
<b>Total</b>	<b>1,638</b>		<b>410.3</b>	<b>7.8</b>	<b>14.4</b>	<b>310.8</b>	<b>217.5</b>	<b>408.5</b>	<b>409.8</b>

Stats based on 4 BEFORE runs.  
Stops based on a Stop Speed of 8 KPH.  
Total Delay based on a Normal Speed of 60 KPH.



**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington pm**  
Study Date : **04/27/2015**  
Page No. : **2**

**Detailed Statistics By Run**

**Travel Time (sec) by Section**

01wellington pm 1-wb-001t  
01wellington pm 2-wb-002t  
01wellington pm 3-wB-003t  
01wellington pm 4-wB-004t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4
1	0					
2	171	church	97	74	66	67
3	303	Yonge	25	49	76	86
4	193	Bay	51	56	41	33
5	254	York	29	41	90	195
6	77	university	11	8	66	46
7	108	Simcoe	14	9	34	10
8	277	John	31	47	67	25
9	210	Blue Jays way	51	58	41	24
10	45		6	8	9	0
Totals	1638		315	350	490	486

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington pm**  
Study Date : **04/27/2015**  
Page No. : **3**

**Detailed Statistics By Run**

**Number of Stops by Section**

01wellington pm 1-wb-001t  
01wellington pm 2-wb-002t  
01wellington pm 3-wB-003t  
01wellington pm 4-wB-004t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4
1	0					
2	171	church	2	1	1	1
3	303	Yonge	0	1	2	1
4	193	Bay	1	1	1	1
5	254	York	0	1	4	4
6	77	university	0	0	1	1
7	108	Simcoe	0	0	1	0
8	277	John	0	1	1	0
9	210	Blue Jays way	1	1	1	1
10	45		0	0	0	0
Totals	1638		4	6	12	9

Stops based on a Stop Speed of 8 KPH.

**City of Toronto**  
Heading Second Line  
Heading Third Line

Study Name : **wellington pm**  
Study Date : **04/27/2015**  
Page No. : **4**

**Detailed Statistics By Run**

**Average Speed (KPH) by Section**

01wellington pm 1-wb-001t  
01wellington pm 2-wb-002t  
01wellington pm 3-wB-003t  
01wellington pm 4-wB-004t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4
1	0					
2	171	church	6.5	8.7	9.8	9.4
3	303	Yonge	44.3	22.1	14.0	12.5
4	193	Bay	13.3	12.4	16.9	21.5
5	254	York	31.7	22.3	10.5	4.6
6	77	university	24.4	35.0	4.1	6.1
7	108	Simcoe	29.2	44.9	11.7	38.8
8	277	John	32.2	20.4	14.4	40.2
9	210	Blue Jays way	14.6	13.3	18.5	21.1
10	45		26.8	20.9	18.2	0.0
Totals	1638		18.8	16.9	12.1	11.3

**City of Toronto**  
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Study Name : **wellington pm**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Total Delay (sec) by Section**

01wellington pm 1-wb-001t  
01wellington pm 2-wb-002t  
01wellington pm 3-wB-003t  
01wellington pm 4-wB-004t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4
1	0					
2	171	church	87	63	55	57
3	303	Yonge	6	31	58	68
4	193	Bay	39	44	29	21
5	254	York	14	25	74	180
6	77	university	6	3	61	41
7	108	Simcoe	7	2	27	3
8	277	John	14	30	50	8
9	210	Blue Jays way	38	45	28	15
10	45		3	5	6	0
Totals	1638		214	248	388	393

Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
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Study Name : **Wellington off peak**  
Study Date : **04/27/2015**  
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**Overall Output Statistics**

Node #	Length	Node	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 10 KPH	Time <= 50 KPH	Time <= 70 KPH
1	0								
2	133	church	50.2	1.0	9.5	42.2	32.4	50.2	50.2
3	295	Yonge	49.6	0.8	21.4	31.6	18.0	49.6	49.6
4	209	Bay	48.4	0.8	15.5	35.4	20.4	48.4	48.4
5	244	York	62.4	2.4	14.1	47.4	27.0	62.4	62.4
6	90	University	22.8	0.4	14.2	17.2	11.4	22.8	22.8
7	123	Simcoe	33.2	0.6	13.3	25.4	18.6	33.0	33.2
8	298	John	54.2	0.8	19.8	36.0	23.2	54.2	54.2
9	206	Blue Jays Way	42.6	0.6	17.4	30.8	22.8	42.2	42.2
10	0								
<b>Total</b>	<b>1,598</b>		<b>364.0</b>	<b>7.4</b>	<b>15.8</b>	<b>266.2</b>	<b>173.8</b>	<b>363.2</b>	<b>363.4</b>

Stats based on 5 BEFORE runs.  
Stops based on a Stop Speed of 8 KPH.  
Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
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Study Name : **Wellington off peak**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Travel Time (sec) by Section**

01Wellington off 1-wb-001t  
01Wellington off 2-wb-002t  
01Wellington off 3-wb-003t  
01wellington off 7-wb-007t  
01wellington off-wb-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5
1	0						
2	133	church	63	42	49	59	38
3	295	Yonge	74	51	38	59	26
4	209	Bay	38	56	70	55	23
5	244	York	32	66	80	106	28
6	90	University	9	35	48	14	8
7	123	Simcoe	10	24	65	17	50
8	298	John	60	29	57	58	67
9	206	Blue Jays Way	60	50	20	65	18
10	0		0	1	1	0	1
<b>Totals</b>	<b>1598</b>		<b>346</b>	<b>354</b>	<b>428</b>	<b>433</b>	<b>259</b>

**City of Toronto**  
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Study Name : **Wellington off peak**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Number of Stops by Section**

01Wellington off 1-wb-001t  
01Wellington off 2-wb-002t  
01Wellington off 3-wb-003t  
01wellington off 7-wb-007t  
01wellington off-wb-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5
1	0						
2	133	church	1	1	1	1	1
3	295	Yonge	1	1	1	1	0
4	209	Bay	1	1	1	1	0
5	244	York	1	3	2	6	0
6	90	University	0	1	1	0	0
7	123	Simcoe	0	1	1	0	1
8	298	John	1	0	1	1	1
9	206	Blue Jays Way	1	1	0	1	0
10	0		0	0	0	0	0
<b>Totals</b>	<b>1598</b>		<b>6</b>	<b>9</b>	<b>8</b>	<b>11</b>	<b>3</b>

Stops based on a Stop Speed of 8 KPH.

**City of Toronto**  
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Study Name : **Wellington off peak**  
Study Date : **04/27/2015**  
Page No. : **4**

**Detailed Statistics By Run**

**Average Speed (KPH) by Section**

01Wellington off 1-wb-001t  
01Wellington off 2-wb-002t  
01Wellington off 3-wb-003t  
01wellington off 7-wb-007t  
01wellington off-wb-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5
1	0						
2	133	church	7.6	11.4	9.8	8.3	12.8
3	295	Yonge	14.4	21.3	28.0	18.0	40.7
4	209	Bay	19.9	13.4	10.7	13.6	32.8
5	244	York	27.7	12.9	11.1	8.4	32.6
6	90	University	39.3	10.2	6.9	22.5	35.4
7	123	Simcoe	40.9	18.3	6.8	26.3	9.3
8	298	John	17.9	37.4	19.1	18.6	15.9
9	206	Blue Jays Way	9.9	14.0	37.0	10.3	42.5
10	0		0.0	0.0	35.4	0.0	46.7
<b>Totals</b>	<b>1598</b>		<b>16.3</b>	<b>16.3</b>	<b>13.6</b>	<b>13.2</b>	<b>22.5</b>



**City of Toronto**  
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Study Name : **Wellington off peak**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Total Delay (sec) by Section**

01Wellington off 1-wb-001t  
01Wellington off 2-wb-002t  
01Wellington off 3-wb-003t  
01wellington off 7-wb-007t  
01wellington off-wb-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5
1	0						
2	133	church	55	34	41	51	30
3	295	Yonge	56	33	20	41	8
4	209	Bay	25	43	57	42	10
5	244	York	17	51	65	91	13
6	90	University	3	29	42	9	3
7	123	Simcoe	2	16	57	10	42
8	298	John	42	10	39	40	49
9	206	Blue Jays Way	50	38	7	54	5
10	0		0	1	0	0	0
<b>Totals</b>	<b>1598</b>		<b>250</b>	<b>255</b>	<b>328</b>	<b>338</b>	<b>160</b>

Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
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Study Name : **Wellington Day 2 AM**  
Study Date : **04/27/2015**  
Page No. : **1**

**Overall Output Statistics**

Node #	Length	Node	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 10 KPH	Time <= 50 KPH	Time <= 70 KPH
1	0								
2	140	church	69.1	1.0	7.3	60.6	50.9	69.1	69.1
3	293	yonge	67.3	1.0	15.7	49.3	36.3	66.9	67.3
4	197	Bay	42.9	0.9	16.5	30.9	19.6	42.9	42.9
5	271	York	67.3	1.6	14.5	50.9	32.1	66.0	67.3
6	84	university	35.4	0.9	8.5	30.4	23.6	35.4	35.4
7	129	Simcoe	14.6	0.0	31.8	6.6	0.0	14.6	14.6
8	317	John	40.3	0.4	28.3	21.1	8.4	39.1	40.3
9	211	Blue Jays Way	38.9	0.4	19.5	28.0	20.9	37.3	38.1
10	61		1.3	0.0	170.7	0.4	0.0	1.1	1.1
<b>Total</b>	<b>1,703</b>		<b>377.0</b>	<b>6.1</b>	<b>16.3</b>	<b>278.1</b>	<b>191.7</b>	<b>372.4</b>	<b>376.1</b>

Stats based on 7 BEFORE runs.  
Stops based on a Stop Speed of 8 KPH.  
Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
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Study Name : **Wellington Day 2 AM**  
Study Date : **04/27/2015**  
Page No. : **2**

**Detailed Statistics By Run**

**Travel Time (sec) by Section**

02Wellington AM 1-WB-001t  
02Wellington AM 2-WB-002t  
02Wellington AM 3-WB-003t  
02Wellington AM 4-WB-004t  
02Wellington AM 5-WB-005t  
02Wellington AM 6-WB-006t  
02Wellington AM 7-WB-007t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7
1	0								
2	140	church	50	78	65	77	57	72	85
3	293	yonge	25	68	62	27	56	141	92
4	197	Bay	16	35	60	68	16	56	49
5	271	York	46	23	57	145	89	32	79
6	84	university	37	14	56	30	8	73	30
7	129	Simcoe	15	13	17	16	12	14	15
8	317	John	36	31	24	25	26	75	65
9	211	Blue Jays Way	17	55	66	13	82	21	18
10	61		2	0	0	0	0	7	0
<b>Totals</b>	<b>1703</b>		<b>244</b>	<b>317</b>	<b>407</b>	<b>401</b>	<b>346</b>	<b>491</b>	<b>433</b>

# City of Toronto

## Heading Second Line

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Study Name : **Wellington Day 2 AM**  
 Study Date : **04/27/2015**  
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## Detailed Statistics By Run

### Number of Stops by Section

02Wellington AM 1-WB-001t  
 02Wellington AM 2-WB-002t  
 02Wellington AM 3-WB-003t  
 02Wellington AM 4-WB-004t  
 02Wellington AM 5-WB-005t  
 02Wellington AM 6-WB-006t  
 02Wellington AM 7-WB-007t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7
1	0								
2	140	church	2	1	1	1	0	1	1
3	293	yonge	0	1	1	0	1	3	1
4	197	Bay	0	1	1	1	0	2	1
5	271	York	2	0	1	4	2	0	2
6	84	university	1	1	0	2	0	1	1
7	129	Simcoe	0	0	0	0	0	0	0
8	317	John	1	0	0	0	0	1	1
9	211	Blue Jays Way	0	1	1	0	1	0	0
10	61		0	0	0	0	0	0	0
<b>Totals</b>	<b>1703</b>		<b>6</b>	<b>5</b>	<b>5</b>	<b>8</b>	<b>4</b>	<b>8</b>	<b>7</b>

Stops based on a Stop Speed of 8 KPH.

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Study Name : **Wellington Day 2 AM**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Average Speed (KPH) by Section**

02Wellington AM 1-WB-001t  
02Wellington AM 2-WB-002t  
02Wellington AM 3-WB-003t  
02Wellington AM 4-WB-004t  
02Wellington AM 5-WB-005t  
02Wellington AM 6-WB-006t  
02Wellington AM 7-WB-007t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7
1	0								
2	140	church	10.2	6.9	8.1	6.6	9.3	6.9	6.3
3	293	yonge	42.5	15.4	17.1	40.0	18.6	7.4	11.2
4	197	Bay	44.2	20.0	11.7	10.3	43.3	13.1	14.5
5	271	York	21.3	42.4	16.6	6.6	11.3	30.1	12.5
6	84	university	8.5	21.0	5.8	10.0	35.4	3.9	9.4
7	129	Simcoe	30.6	38.1	28.0	30.4	41.8	33.1	30.7
8	317	John	31.6	36.7	47.8	46.1	42.5	15.3	17.7
9	211	Blue Jays Way	45.8	6.8	9.2	38.1	7.8	36.1	40.6
10	61		35.4	0.0	0.0	0.0	0.0	31.0	0.0
<b>Totals</b>	<b>1703</b>		<b>24.6</b>	<b>17.6</b>	<b>14.3</b>	<b>14.1</b>	<b>16.8</b>	<b>12.5</b>	<b>13.5</b>

**City of Toronto**  
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Study Name : **Wellington Day 2 AM**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Total Delay (sec) by Section**

02Wellington AM 1-WB-001t  
02Wellington AM 2-WB-002t  
02Wellington AM 3-WB-003t  
02Wellington AM 4-WB-004t  
02Wellington AM 5-WB-005t  
02Wellington AM 6-WB-006t  
02Wellington AM 7-WB-007t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7
1	0								
2	140	church	42	69	56	69	48	64	76
3	293	yonge	7	50	44	9	38	123	74
4	197	Bay	4	23	48	56	4	44	37
5	271	York	30	7	41	129	72	15	62
6	84	university	32	9	51	25	3	68	25
7	129	Simcoe	7	5	9	8	4	6	7
8	317	John	17	12	5	5	7	56	46
9	211	Blue Jays Way	4	48	55	4	71	8	6
10	61		0	0	0	0	0	3	0
<b>Totals</b>	<b>1703</b>		<b>143</b>	<b>223</b>	<b>309</b>	<b>305</b>	<b>247</b>	<b>387</b>	<b>333</b>

Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
Heading Second Line  
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Study Name : **Wellington Day 2 PM**  
Study Date : **04/27/2015**  
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**Overall Output Statistics**

Node #	Length	Node	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 10 KPH	Time <= 50 KPH	Time <= 70 KPH
1	0								
2	212	church	55.7	0.8	13.7	42.7	28.2	55.7	55.7
3	285	Yonge	58.5	0.8	17.5	41.5	27.7	58.5	58.5
4	211	Bay	60.7	1.8	12.5	47.7	33.2	60.7	60.7
5	226	York	54.0	1.2	15.1	40.0	22.7	53.8	54.0
6	54	University	25.8	0.3	7.5	22.8	17.8	25.8	25.8
7	112	Simcoe	35.5	0.5	11.4	28.5	19.5	35.5	35.5
8	315	John	47.3	0.5	23.9	28.3	14.2	47.3	47.3
9	214	Blue Jays Way	25.8	0.2	29.8	12.8	3.0	25.8	25.8
10	58		14.5	0.5	14.5	11.3	7.5	13.8	13.8
<b>Total</b>	<b>1,687</b>		<b>377.8</b>	<b>6.7</b>	<b>16.1</b>	<b>275.7</b>	<b>173.7</b>	<b>377.0</b>	<b>377.2</b>

Stats based on 6 BEFORE runs.  
Stops based on a Stop Speed of 8 KPH.  
Total Delay based on a Normal Speed of 60 KPH.

**City of Toronto**  
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Study Name : **Wellington Day 2 PM**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Travel Time (sec) by Section**

02Wellington PM 1-WB-001t  
02Wellington PM 2-WB-002t  
02Wellington PM 3-WB-003  
02Wellington PM 4-WB-004  
02Wellington PM 5-WB-005  
02Wellington PM 6-WB-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	212	church	59	99	50	28	26	72
3	285	Yonge	64	23	63	86	60	55
4	211	Bay	50	40	61	50	67	96
5	226	York	32	41	26	46	36	143
6	54	University	24	39	11	48	24	9
7	112	Simcoe	47	33	19	47	53	14
8	315	John	32	30	69	55	31	67
9	214	Blue Jays Way	23	20	26	19	24	43
10	58		7	12	26	35	4	3
<b>Totals</b>	<b>1687</b>		<b>338</b>	<b>337</b>	<b>351</b>	<b>414</b>	<b>325</b>	<b>502</b>



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Study Name : **Wellington Day 2 PM**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Number of Stops by Section**

02Wellington PM 1-WB-001t  
02Wellington PM 2-WB-002t  
02Wellington PM 3-WB-003  
02Wellington PM 4-WB-004  
02Wellington PM 5-WB-005  
02Wellington PM 6-WB-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	212	church	1	1	1	1	0	1
3	285	Yonge	1	0	1	1	1	1
4	211	Bay	1	1	1	1	1	6
5	226	York	0	1	0	2	1	3
6	54	University	1	1	0	0	0	0
7	112	Simcoe	0	1	0	1	1	0
8	315	John	0	0	1	1	0	1
9	214	Blue Jays Way	0	0	0	0	0	1
10	58		0	1	1	1	0	0
<b>Totals</b>	<b>1687</b>		<b>4</b>	<b>6</b>	<b>5</b>	<b>8</b>	<b>4</b>	<b>13</b>

Stops based on a Stop Speed of 8 KPH.

**City of Toronto**  
Heading Second Line  
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Study Name : **Wellington Day 2 PM**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Average Speed (KPH) by Section**

02Wellington PM 1-WB-001t  
02Wellington PM 2-WB-002t  
02Wellington PM 3-WB-003  
02Wellington PM 4-WB-004  
02Wellington PM 5-WB-005  
02Wellington PM 6-WB-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	212	church	13.0	8.0	15.7	27.7	29.4	10.7
3	285	Yonge	16.4	43.3	16.1	11.9	17.4	18.9
4	211	Bay	14.8	19.0	12.3	15.0	11.2	7.8
5	226	York	25.6	20.2	31.5	17.6	22.4	5.7
6	54	University	7.6	4.6	17.8	4.2	8.3	21.6
7	112	Simcoe	9.0	12.1	21.7	8.6	7.6	30.3
8	315	John	35.4	37.8	16.5	20.7	37.3	16.7
9	214	Blue Jays Way	33.5	38.8	29.7	40.8	31.9	17.8
10	58		29.2	19.0	8.3	6.0	19.3	16.9
<b>Totals</b>	<b>1687</b>		<b>18.0</b>	<b>18.1</b>	<b>17.4</b>	<b>14.7</b>	<b>18.3</b>	<b>11.8</b>

**City of Toronto**  
Heading Second Line  
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Study Name : **Wellington Day 2 PM**  
Study Date : **04/27/2015**  
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**Detailed Statistics By Run**

**Total Delay (sec) by Section**

02Wellington PM 1-WB-001t  
02Wellington PM 2-WB-002t  
02Wellington PM 3-WB-003  
02Wellington PM 4-WB-004  
02Wellington PM 5-WB-005  
02Wellington PM 6-WB-006t

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
1	0							
2	212	church	46	86	37	15	13	59
3	285	Yonge	47	6	46	69	43	38
4	211	Bay	37	27	48	37	54	83
5	226	York	18	27	12	32	22	129
6	54	University	21	36	8	45	21	6
7	112	Simcoe	40	26	12	40	46	7
8	315	John	13	11	50	36	12	48
9	214	Blue Jays Way	10	7	13	6	11	30
10	58		3	8	22	31	2	2
<b>Totals</b>	<b>1687</b>		<b>235</b>	<b>234</b>	<b>248</b>	<b>311</b>	<b>224</b>	<b>402</b>

Total Delay based on a Normal Speed of 60 KPH.

## **APPENDIX E**

### Volume Balancing

Date:										YONGE		px 30		Historical data				Date:				CHURCH		px 15		Historical data							
May-14														2009				Apr-09								2005							
										<		48		<				32				<		143		<							
1,399										186		257		0		!				990				!		854		!					
8										\$		9		>		86		1,042				1,128				175		161		91		>	
										0		=		:		#		;		-86				205		=		:		#		;	
										0		"		305		393		0		8.3%				440		"		16		296		32	
										0		?												26		?							
Comments: No major parking lots																																	

YORK										BAY									
Date:				YORK		px 71		Date:				BAY		px 60					
Aug-12								Aug-09											
1,074	0	0	0	<	253							<	38						
	8	\$	9	!	1004	1,257	765	68	805	0		!	656	818					
				>	0			8	\$	9		>	124						
<hr/>																			
		0	=	:	#	;			0	=	:	#	;						
		0	"	70	343	0			0	"	41	383	0						
		0	?						0	?									
<hr/>																			
							+492 imbalance						+102 imbalance						
							39.1%						12.5%						
<hr/>																			
Comments: At least 3 major parking lots																			
Comments: At least 2 major parking lots																			

YORK												BAY											
Date:				px 71				Date:				px 60											
Aug-12								Aug-09															
574	0	0	0	<	192			658	115	504	0	<	53										
	8	\$	9	!	509	701			8	\$	9	!	478	609									
				>	0							>	78										
		0	=	:	#	;				0	=	:	#	;									
		0	"	65	369	0	+43	imbalance		0	"	65	492	0	-136								
		0	?				6.1%			0	?				22.3%								
Comments: At least 3 major parking lots												Comments: At least 2 major parking lots											

<div>Date: Nov-09</div>				SIMCOE		px 264		<div>Historical data</div> <table><tr><td></td><td>2007</td><td>2003</td></tr><tr><td>&lt;</td><td>0</td><td>0</td></tr><tr><td>!</td><td>464</td><td>650</td></tr><tr><td>&gt;</td><td>94</td><td>102</td></tr></table>					2007	2003	<	0	0	!	464	650	>	94	102	<div>Date: May-11</div>				UNIVERSITY		px 76		<div>Historical data</div> <table><tr><td></td><td>2009</td><td>2006</td><td>2002</td></tr><tr><td>&lt;</td><td>143</td><td>177</td><td>127</td></tr><tr><td>!</td><td>574</td><td>7134</td><td>462</td></tr><tr><td>&gt;</td><td>109</td><td>137</td><td>137</td></tr></table>					2009	2006	2002	<	143	177	127	!	574	7134	462	>	109	137	137
	2007	2003																																																	
<	0	0																																																	
!	464	650																																																	
>	94	102																																																	
	2009	2006	2002																																																
<	143	177	127																																																
!	574	7134	462																																																
>	109	137	137																																																
815	127	197	0	<	0	763						830	128	1,152	0	<	91																																		
	8	\$	9	!	591							8		\$	9	!	597	769																																	
				>	172											>	81																																		
		0	=	:	#	:								0	=	:	#	:																																	
		0	"		97	0	0	-67	imbalance					0	"		105	917	0																																
		43	?					8.8%						0	?																																				
Comments: Several major parking lots												Comments: A couple smaller parking lots																																							

Date: Nov-09				SIMCOE		px 264						Date: May-11				UNIVERSITY		px 76											
				<	0										<	201													
754	86	566	0	!	574	815				909	120	945	0	!	759	1,067													
	8	\$	9	>	241						8	\$	9	>	107														
				:	#	:					0	=		:	#	:													
	0	=		94	0	0						0	"		30	744	0												
	0	"										0	"																
	63	?										0	?																
								-94 11.5%				imbalance																	
Comments: Several major parking lots													Comments: A couple smaller parking lots																

Date: Nov-09				SIMCOE		px 264						Date: May-11				UNIVERSITY		px 76							
				<		0										<		105							
				!		333		437						488		82		1,032		0					
424				91		190		0												!		356		563	
8						\$		9						8				\$		9					
				0		=										0		=							
				0		"										0		"							
				47		?										0		0							

AM

BLUE JAYS WAY										px 1489			JOHN			px 1489																																		
Date:						Historical data			Date:			Historical data																																						
Jul-11						<table><tr><th></th><th>2008</th><th>2003</th></tr><tr><td>&lt;</td><td>61</td><td>56</td></tr><tr><td>!</td><td>71</td><td>10</td></tr><tr><td>&gt;</td><td>82</td><td>98</td></tr></table>				2008	2003	<	61	56	!	71	10	>	82	98	<table><tr><th></th><th>Apr-09</th></tr><tr><td>&lt;</td><td>150</td></tr><tr><td>!</td><td>311</td></tr><tr><td>&gt;</td><td>36</td></tr></table>				Apr-09	<	150	!	311	>	36	<table><tr><th></th><th>2008</th><th>2005</th><th>2000</th></tr><tr><td>&lt;</td><td>125</td><td>141</td><td>111</td></tr><tr><td>!</td><td>227</td><td>201</td><td>309</td></tr><tr><td>&gt;</td><td>68</td><td>83</td><td>104</td></tr></table>				2008	2005	2000	<	125	141	111	!	227	201	309	>	68	83	104
	2008	2003																																																
<	61	56																																																
!	71	10																																																
>	82	98																																																
	Apr-09																																																	
<	150																																																	
!	311																																																	
>	36																																																	
	2008	2005	2000																																															
<	125	141	111																																															
!	227	201	309																																															
>	68	83	104																																															
97	22	328	0	<	82	252	381	55	258	92	<	150	497																																					
	8	\$	9		61			8	\$	9		311																																						
				>	109						>	36																																						
		24	=	:	#	:			0	=	:	#	:																																					
		0	"	14	625	0			0	"	15	381	277																																					
		33	?						0	?																																								
						<div>-129</div> imbalance								<div>-318</div> imbalance - WB																																				
						<div>51.2%</div>								<div>64.0%</div>																																				
														<div>-326</div> imbalance - EB																																				
														<div>117.7%</div>																																				
Comments: No major parking lots; but motorists observed using SB laneway to Front St, west of John St.																																																		

[illegible]

## Off Peak

BLUE JAYS WAY							JOHN					
Date:							Date:					
JUL-11							Apr-09					
133	23	299	0	<	97			36	240	19	<	122
	<b>8</b>	\$	<b>9</b>		98	372		<b>8</b>	\$	<b>9</b>		277
				>	177						>	52
		23	=	:	#	:			0	=	:	#
		0	"	12	249	0			0	"	14	244
		28	?						0	?		52
					+45	imbalance			0			+27
					12.1%				0			6.0%
									-24	imbalance - EB		
									46.2%			

Comments: No major parking lots; but motorists observed using SB laneway to Front St, west of John St.



## **APPENDIX F**

Detailed MOE

## 15: Church & Wellington St

[illegible]

**30: Yonge & Wellington St**

[illegible]

[illegible]

[illegible][illegible]

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264: Simcoe & Wellington St								
Lane Group	AM - Baseline			AM - Optimized 1			Difference	
	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay
EBL								
EBT								
EBR	1.12	98.6	F	0.77	21.1	C	-0.35	-77.5
WBL								
WBT	0.44	11.6	B	0.52	17.9	B	0.08	6.3
WBR								
NBL	0.61	39.1	D	0.37	17.8	C	0.37	-21.3
NBT								
NBR								
SBL								
SBT	0.8	37.3	D	0.89	52.7	D	0.09	15.4
SBR								

1489: John & Wellington St								
Lane Group	AM - Baseline			AM - Optimized 1			Difference	
	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay
EBL								
EBT								
EBR								
WBL								
WBT	0.4	16.8	B	0.48	10.7	B	0.08	-6.1
WBR								
NBL								
NBT	0.97	42	D	0.83	20.2	C	-0.14	-21.8
NBR								
SBL								
SBT	0.82	35.9	D	0.59	20.2	C	-0.23	-15.7
SBR								



[illegible][illegible]

[illegible]



[illegible][illegible]

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264: Simcoe & Wellington St								
Lane Group	OFF - Baseline			OFF - Optimized 1			Difference	
	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay
EBL								
EBT								
EBR	0.18	1.2	A	0.1	0.8	A	-0.08	-0.4
WBL							0	
WBT	0.3	12	B	0.35	17	B	0.05	5
WBR							0	
NBL	0.53	29.1	C	0.37	16.4	B	-0.16	-12.7
NBT								
NBR								
SBL								
SBT	0.66	24.5	C	0.79	39.5	D	0.13	15
SBR								

1489: John & Wellington St								
Lane Group	OFF - Baseline			OFF - Optimized 1			Difference	
	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay
EBL								
EBT								
EBR								
WBL								
WBT	0.42	9.1	A	0.43	12.2	B	0.01	3.1
WBR								
NBL								
NBT	0.42	17.6	B	0.41	18.9	B	-0.01	1.3
NBR								
SBL								
SBT	0.39	18.9	B	0.37	20	B	-0.02	1.1
SBR								


[illegible]

## 15: Church & Wellington St

[illegible]

**30: Yonge & Wellington St**

[illegible]

[illegible][illegible]

[illegible][illegible]

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264: Simcoe & Wellington St								
Lane Group	PM - Baseline			PM - Optimized 1			Difference	
	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay
EBL								
EBT								
EBR	0.32	17.6	B	0.25	2.8	A	-0.07	-14.8
WBL								
WBT	0.55	14.2	B	0.61	19.6	B	0.06	5.4
WBR								
NBL	1.09	151.2	F	0.45	20.6	C	-0.64	-130.6
NBT								
NBR								
SBL								
SBT	1.39	209.7	F	1.73	362.9	F	0.34	153.2
SBR								

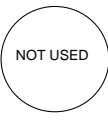
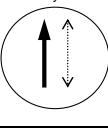
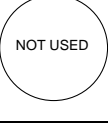
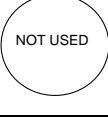
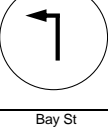
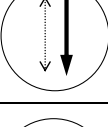

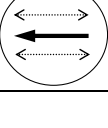
1489: John & Wellington St								
Lane Group	PM - Baseline			PM - Optimized 1			Difference	
	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay	Level of Service (LOS)	v/c Ratio	Total Delay
EBL								
EBT								
EBR								
WBL								
WBT	0.79	22.7	C	0.77	16	B	-0.02	-6.7
WBR								
NBL								
NBT	0.66	23.4	C	0.65	25.5	C	-0.01	2.1
NBR								
SBL								
SBT	0.62	22.5	C	0.61	24.5	C	-0.01	2
SBR								





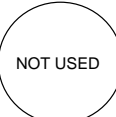
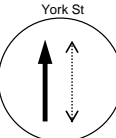
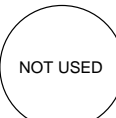
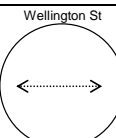
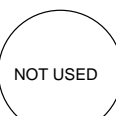
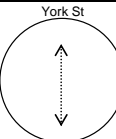
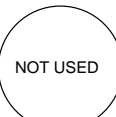

## **APPENDIX G**

### Proposed Signal Timing Plans

LOCATION: Bay St & Wellington St		DISTRICT: Toronto & East York						
PX: 60		COMPUTER SYSTEM: TransSuite						
MODE / COMMENT: FXT with 2-wire Polara APS		CONTROLLER/CABINET TYPE: Econolite ASC/3-2100 / TS2 T1						
PREPARED / CHECKED BY: SS/DS		CONFLICT FLASH: Red & Red						
PREPARATION DATE: Nov 03,2015		DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing @ 1.2 m/s)						
IMPLEMENTATION DATE:		CHANNEL/DROP: 4016 / 2						
		CONTROLLER FRIMWARE: 2.47.10						
NEMA Phase		OFF	AM	PM	PAM	Gardiner	Phase Mode (Fixed/Demanded/Callable)	Remarks
		All Other Times	07:00-10:00 M-F	15:00-19:00 M-F	All Other Times	Times to be determined		
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 61		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 4	Plan 61		
1		WLK FDW MIN MAX1 AMB ALR SPLIT						Pedestrian Minimums: NSWK = 7 sec., NSFD = 12 sec. EWWK = 7 sec., EWFD = 12 sec. APS on during NSWK and EWWK when activated. APS not on during NBLA. Extended Push Activation = 3 sec. NS pushbutton monitored on local detector 2 & EW pushbutton monitored on local detector 6.
2		WLK 7 FDW 12 MIN 19 MAX1 38 AMB 4 ALR 3 SPLIT					Fixed	
3		WLK FDW MIN MAX1 AMB ALR SPLIT						
4		WLK 7 FDW 12 MIN 19 MAX1 20 AMB 4 ALR 2 SPLIT						
5		WLK FDW MIN 6 MAX1 6 AMB 3 ALR 1 SPLIT					Fixed NBLA 7:00-9:30 M-F (in shared left/thru lane)	
6		WLK 7 FDW 12 MIN 19 MAX1 38 AMB 4 ALR 3 SPLIT					Fixed	
7		WLK FDW MIN MAX1 AMB ALR SPLIT						
8		WLK 7 FDW 12 MIN 19 MAX1 20 AMB 4 ALR 2 SPLIT					Fixed	
		CL						
		OF						

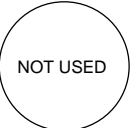
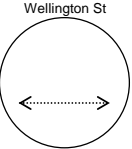
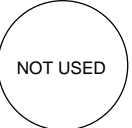
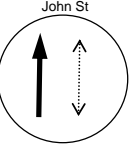
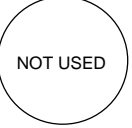
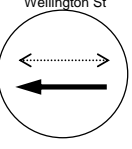
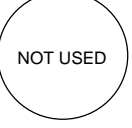
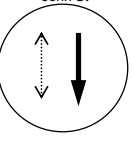
NOTES: Wellington St one-way WB.  
Pick up on TransSuite system on Mar 5,2013.

<b>LOCATION:</b>	York St & Wellington St	<b>DISTRICT:</b>	Toronto & East York
<b>MODE/COMMENT:</b>	FXT	<b>COMPUTER SYSTEM:</b>	TransSuite
<b>PX:</b>	71	<b>CONTROLLER/CABINET TYPE:</b>	Econolite ASC/3-2100 / TS2T1
<b>PREPARED/CHECKED BY:</b>	SS/DS	<b>CONFLICT FLASH:</b>	Red & Red
<b>PREPARATION DATE:</b>	Nov 03,2015	<b>DESIGN WALK SPEED:</b>	1.0m/s (FDW based on full crossing @ 1.2m/s)
<b>IMPLEMENTATION DATE:</b>		<b>CHANNEL/DROP:</b>	4016/9
		<b>CONTROLLER FRIMWARE:</b>	2.47.10

NEMA Phase		OFF	AM	PM	PAM	Gardiner Closure	Phase Mode (Fixed/Demanded or Callable)	Remarks
		All Other Times	07:00-9:30 M-F	15:00-19:00 M-F	All Other Times			
		Pattern 1	Pattern 2	Pattern 3	Pattern 4			
	Local Plan	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 61		
	System Plan	Plan 1	Plan 2	Plan 3	Plan 4	Plan 61		
1		WLK FDW MIN MAX1 AMB ALR SPLIT						Pedestrian Minimums: NSWK = 7 sec, NSFD = 14 sec EWWK = 7 sec, EWFD = 14 sec
2		WLK 7 FDW 14 MIN 21 MAX1 29 AMB 4 ALR 2 SPLIT					Fixed	
3		WLK FDW MIN MAX1 AMB ALR SPLIT						
4		WLK 7 FDW 14 MIN 21 MAX1 35 AMB 4 ALR 2 SPLIT					Fixed	
5		WLK FDW MIN MAX1 AMB ALR SPLIT						
6		WLK 7 FDW 14 MIN 21 MAX1 29 AMB 4 ALR 2 SPLIT					Fixed	
7		WLK FDW MIN MAX1 AMB ALR SPLIT						
8		WLK 7 FDW 14 MIN 21 MAX1 35 AMB 4 ALR 2 SPLIT					Fixed	
	CL OF	75 10	80 65	80 6	75 10	80 65		

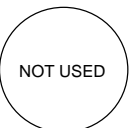
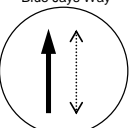
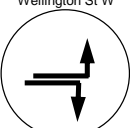

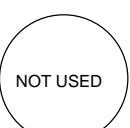
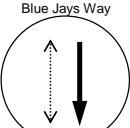
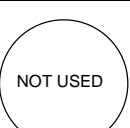
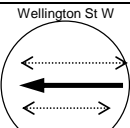
NOTES: York St is one-way northbound. Wellington St is one-way westbound.  
Picked up under TransSuite on March 23, 2015 at 15:02.

<b>LOCATION:</b>	<b>Wellington St &amp; John St</b>	<b>DISTRICT:</b>	<b>Toronto &amp; East York</b>
<b>PX:</b>	<b>1489</b>	<b>COMPUTER SYSTEM:</b>	<b>TransSuite</b>
<b>MODE/COMMENT:</b>	<b>FXT with 2-Wire Polara APS</b>	<b>CONTROLLER/CABINET TYPE:</b>	<b>Econolite ASC/3-2100 / TS2T1</b>
<b>PREPARED/CHECKED BY:</b>	<b>SS/DS</b>	<b>CONFLICT FLASH:</b>	<b>Red &amp; Red</b>
<b>PREPARATION DATE:</b>	<b>November 3, 2015</b>	<b>DESIGN WALK SPEED:</b>	<b>1.0 m/s (FDW based on full crossing at 1.2 m/s)</b>
<b>IMPLEMENTATION DATE:</b>		<b>CHANNEL/DROP:</b>	<b>4047/1</b>
		<b>CONTROLLER FRIMWARE:</b>	<b>2.47.10</b>

NEMA Phase	System Plan Local Plan	OFF All Other Times	AM 7:00-10:00 M F	PM 15:00-19:00 M-F	Phase Mode (Fixed/Demanded /Callable)	Remarks
		Plan 1	Plan 2	Plan 3		
		Pattern 1	Pattern 2	Pattern 3		
1 	WLK FDW MIN MAX AMB ALR SPLIT					Pedestrian Minimums: EWWK = 7 sec, EWFD = 13 sec NSWK = 7 sec, NSFD = 13 sec Extended APS Push Button = 3 sec APS on during NSWK & EWWK when activated by push button.
2 	WLK 7 FDW 13 MIN 20 MAX1 39 AMB 4 ALR 2 SPLIT	45	38	46	Fixed	
3 	WLK FDW MIN MAX AMB ALR SPLIT					
4 	WLK 7 FDW 13 MIN 20 MAX1 29 AMB 4 ALR 2 SPLIT	35	42	34	Fixed	
5 	WLK FDW MIN MAX AMB ALR SPLIT					
6 	WLK 7 FDW 13 MIN 20 MAX1 39 AMB 4 ALR 2 SPLIT	45	38	46	Fixed	
7 	WLK FDW MIN MAX AMB ALR SPLIT					
8 	WLK 7 FDW 13 MIN 20 MAX1 29 AMB 4 ALR 2 SPLIT	35	42	34	Fixed	
	CL	80	80	80		
	OFF	78	77	27		

Note: Wellington St one-way westbound (west leg only)  
Picked up TransSuite System on April 26, 2013 at 13:03

<b>LOCATION:</b>	<b>Blue Jays Way &amp; Wellington St W</b>	<b>DISTRICT:</b>	<b>Toronto &amp; East York</b>
<b>MODE/COMMENT:</b>	<b>FXT with Callable EB Phase</b>	<b>COMPUTER SYSTEM:</b>	<b>TransSuite</b>
<b>PX:</b>	<b>1682</b>	<b>CONTROLLER/CABINET TYPE:</b>	<b>Econolite ASC/3-2100 / TS2T1</b>
<b>PREPARED/CHECKED BY:</b>	<b>SS/DS</b>	<b>CONFLICT FLASH:</b>	<b>Red &amp; Red</b>
<b>PREPARATION DATE:</b>	<b>Nov 03,2015</b>	<b>DESIGN WALK SPEED:</b>	<b>1.0m/s (FDW based on full crossing @ 1.2m/s)</b>
<b>IMPLEMENTATION DATE:</b>		<b>CHANNEL/DROP:</b>	<b>4047/2</b>
		<b>CONTROLLER FRIMWARE:</b>	<b>2.47.10</b>

NEMA Phase		OFF	AM	PM	Phase Mode (Fixed/Demanded or Callable)	Remarks
		All Other Times	7:00-10:00 M-F	15:00-19:00 M-F		
		Pattern 1	Pattern 2	Pattern 3		
	Local Plan	Pattern 1	Pattern 2	Pattern 3		
	System Plan	Plan 1	Plan 2	Plan 3		
1	 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT				Pedestrian Minimums: NSWK = 7 sec, NSFD = 14 sec EWWK = 7 sec, EWFD = 14 sec Three phase operation sequence: NSG/NSWK, EBLA/EBRA/EWDW, WBG/EWWK. EB phase callable by stopbar loop. Unused time given to NS phase.
2	Blue Jays Way 	WLK 7 FDW 14 MIN 21 MAX1 26 AMB 4 ALR 2 SPLIT	32	32	32	Fixed
3	Wellington St W 	WLK FDW MIN 7 MAX1 7 AMB 4 ALR 2 SPLIT	16	20	16	Callable and Extendable by Stopbar Loop
4	Wellington St W  NOT USED	WLK 7 FDW 14 MIN 21 MAX1 26 AMB 4 ALR 2 SPLIT	32	28	32	
5	 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT				
6	Blue Jays Way 	WLK 7 FDW 14 MIN 21 MAX1 26 AMB 4 ALR 2 SPLIT	32	32	32	Fixed
7	 NOT USED	WLK FDW MIN MAX1 AMB ALR SPLIT				
8	Wellington St W 	WLK 7 FDW 14 MIN 21 MAX1 26 AMB 4 ALR 2 SPLIT	32	28	32	Fixed
		CL OF VP	80 46 14	80 44 14	80 76 14	

NOTES: Wellington St W at East of Blue Jays Way - one way westbound.  
Picked up TransSuite System on April 26, 2013 at 13:35

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