University Transportation Research Center - Region 2

Final Report

Relating the 2010 Signalized Intersection Methodology to Alternate Approaches in the Context of NYC Conditions

Performing Organization: Polytechnic Institute of NYU

November 2013

Sponsor:
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16. Abstract

The Highway Capacity Manual (HCM) has had a delay-based level of service methodology for signalized intersections since 1985. The 2010 HCM has revised the method for calculating delay. This happened concurrent with such jurisdictions as NYC reviewing the use of the HCM method in their environmental impact regulations (e.g. CEQR process), and concurrent with a dialog in the profession on when it is appropriate to use simulation models in lieu of HCM methods. This effort focused on providing guidance on how to use the 2010 HCM signalized intersection method in the context of the NYC urban environment.

It was deemed important by NYCDOT to verify whether the delay and saturation flow estimates were consistent with what is found in the field in New York City, and specifically Manhattan.

It was decided to measure and do analyses of the following measures of effectiveness:

a. Saturation flow rate,
b. Delay, and
c. Start-up lost time.

We began the process with meetings with NYCDOT staff to determine what data was available and what level of analysis they thought was needed. The HCM signalized intersection methodology is known to not work well in oversaturated conditions unless a multi-period analysis is done. Since the analysis that NYCDOT does with the HCM always uses a 15-minute period analysis and not a multi-period one, it was decided to only look at intersections that were not oversaturated when measuring and comparing delay results.

The HCM 2010 arterial analysis methodology does consider queues and oversaturated conditions that should better reflect conditions in NYC, given that NYC is made up of arterial streets and not individual isolated intersections. However, the standard method used and required by CEQR is the signalized intersection methodology. This then was another factor in deciding not to use oversaturated intersections.

It was found that the field data of saturation flow and delay were well correlated with the values computed using the 2010 Highway Capacity Manual methodologies, but that the start-up lost times that are defaulted and used in an HCM analysis are very different from the values measured in field data.

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CONTENTS

1. INTRODUCTION and OVERVIEW

The Highway Capacity Manual (HCM) has had a delay-based level of service methodology for signalized intersections since 1985. The 2010 HCM has revised the method for calculating delay. This happened concurrent with such jurisdictions as NYC reviewing the use of the HCM method in their environmental impact regulations (e.g. CEQR process), and concurrent with a dialog in the profession on when it is appropriate to use simulation models in lieu of HCM methods. This effort focused on providing guidance on how to use the 2010 HCM signalized intersection method in the context of the NYC urban environment.

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It was found that the field data of saturation flow and delay were well correlated with the values computed using the 2010 Highway Capacity Manual methodologies, but that the start-up lost times that are defaulted and used in an HCM analysis are very different from the values measured in field data.

2. LITERATURE

The literature study consisted of reviewing the methodology in the 2010 Highway Capacity Manual [1], Chapters 18 and 30 on signalized intersections. The HCM details a methodology to calculate saturation flow rate from data [2], which was used in this project on the video data received from NYCDOT.

Other methods were also reviewed, most being very similar to that documented in the HCM. These included the headway calculation methodology from Refs [3-5].

There is much literature on the estimation methods used and the results of saturation flow rate and lost time studies. A few important studies have concluded that saturation flow rate increases as queues get longer, and that this continues even past the 15th vehicle in queue [6,7].

Field measurements of both saturation flow rate and start-up lost time have been found to vary significantly in much of the literature [8-10]. Reference [9] goes on to state that it is doubtful that base saturation flow rate is even a stable or constant value.

In Ref [5], Rahman et al. came to the conclusion that using the methodology in the HCM would variably underestimate saturation flow at some locations while overestimating it at other locations.

3. DATA COLLECTION

The data collection process in this project turned out to be much more difficult and time consuming than anticipated. The source of data committed to by NYCDOT was video tapes that they were collecting from a simultaneous project underway at NYCDOT. Polytechnic was given access to videos of 20 intersections, from which we would reduce saturation flow, start up lost time, and delay data. The NYU-Poly team spent two to three months going through these videos to find locations that we could use. However, after an analysis of each of the intersections we found that we could not reduce the required data from the video tapes. It was determined that the camera angle did not give access to all information that was needed to collect the usable data. Basically, there were three problems with the video recordings:

1. The video did not include a view of the signal heads, so that we could not see the beginning of green time. Because of this, start up lost time could not be measured.
2. The video did not show the entire link length and thus the back of the queue could not be seen. Without knowing the back of queue, we could not calculate delay.

The team next talked to NYCDOT's Division of Traffic Operations, the Office of Project Analysis/CEQR. They had videos of 5 intersections that they shared with us. Again, after viewing the video recordings, it was determined that neither delay nor headway data could be retrieved.

After discussions with NYCDOT, it was determined that the only way to get the data needed to measure delay, start up lost time, and saturation flow rate was to get new video recordings that would include all the required camera angles. Since the project did not include a budget to go out and collect new data ourselves, we worked with the Traffic Management Center (TMC) of NYCDOT. At the TMC, our team along with TMC employees searched for locations where the camera angle could be adjusted such that the approach could be seen from the front, the stop line was visible, and the signal head was visible. Additionally, we looked for locations where the entire block was visible. A total of nine intersections were selected during the process. Out of these nine, data reduction was done for seven intersections. Not all of the videos were clear enough to get the data we needed, thus those hours of tape were removed.

Additionally, it was discovered that even where the camera could see down the link, it was most often the case, that when the queue was long enough to reach the end of the link, that we could not distinguish the vehicles enough to keep an accurate count of back of queue. Thus for delay studies, we could only use locations that were well undersaturated.

After data reduction, there were 9 hours of of usable data.

Delay Measurement

Three of the videotaped intersections had angles that one could see the entire length of the queue, and thus were able to be reduced to produce delay results. Even at these three intersections, however, there were time periods that were not usable. This was due to queues either backing up from downstream into the study intersection, or queues backing from the study intersection into the upstream intersection. Additionally, there were some time periods that were controlled by a traffic police and thus had to be eliminated, and finally some of the tapes were not clear enough to see the individual vehicles at the upstream end of the link.

Table 1 shows the intersections that produced usable data.

TABLE 1. Intersections Analyzed

Location 1	1st Avenue and 14th Street
Location 2	3rd Avenue and 34th Street
Location 3	West Street and Canal Street

The characteristics and the approach that was video taped at these intersections are summarized in Table 2. At each location, data was reduced in 15-minute intervals.

TABLE 2. Characteristics at Each Intersection Location

	Direction	**Number of Lanes**	**Cycle Length**
Location 1	Northbound	5	90
Location 2	Northbound	5	90
Location 3	Southbound	5	120

Forms were developed to help reduce the data from the video recordings. Table 3 shows the form used to collect delay data, using the method detailed in the Ref [2]. Not all time periods or locations could be used to take delay measurements. Time periods were found that had various levels of delay, but also that were not oversaturated, as this would limit the the accurateness of the calculations. Long queues and oversaturated conditions requires knowing where the end of the queue is in the upstream intersection and continuing the queue counts past the arrival time period. The camera angles could not see past the end of the link, and sometimes could not even see to the end of the link. In either of these cases, such time periods were deleted.

The adjustment factor seen at the end of Table 3 is a factor from the 2010 HCM [1], which accounts for acceleration and deceleration delay. Neither of these are directly measured in the queue-count procedure. The factor depends on the number of vehicles in queue as well as the approach speed of the vehicles [1].

The study methodology recommended in the *Highway Capacity Manual* is based on direct observation of vehicles-in-queue at frequent intervals.

The following should be noted [3]:

1. The method is intended for undersaturated flow conditions.
2. The method does not directly measure acceleration-deceleration delay but uses an adjustment factor to estimate this component.
3. The method also uses an adjustment to correct for errors that are likely to occur in the sampling process (this is the 0.9 factor seen in the form).
4. Actual measurements start at the beginning of the red phase of the subject lane.
5. There should be no overflow queue from the previous green phase when measurements start.

Table 3. Form Used for Delay Studies

Total Control Delay studies												
Intersection		**3 Av & 34 St**					Date & Time				5/17/11; 3:30	
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
Total												0

Step 1	
Interval	
Sum of all Vehicles-in-queue	0
Total Number of vehicles arriving during the study period	
Emprical adjustment factor	0.9
Average Time in queue	
Step 2	
Total Count of Stopping Vehicle	
Number of cycles included in the survey	
Number of lanes in the survey lane group	
Number of Vehicles stopping per lane, per cycle	
Step 3	
Fraction of Vehicles stopping	
Step 4	
Correction Factor (From table below)	
Total Control delay	0

Adjustment Factor for Acceleration/Decceleration Delay			
	Vehicles stopping per lane, per cycle		
Free Flow Speed (mi/h)	7 Vehs	8-19 vehs	20-30 vehs
≤37	5	2	-1
>37-45	7	4	2
>45	9	7	5
Heavy Vehicles			

Saturation Flow and Start-up Lost Time Measurement

Saturation flow rate represents the maximum rate of vehicles on average that can pass through the stop line from a standing queue, after the start-up lost time is passed. It is measured lane-by-lane. Headways are measured as each vehicle's front axle crosses the stop line. These data were reduced from the video tapes. Both start-up lost time and saturation flow rate were calculated from this data, assembling the data in 15-minute intervals. Base saturation flow rate and prevailing saturation flow rate were estimated.

Saturation flow as stated in the HCM, is based on the average headway of vehicles after the first ten to fourteen seconds after beginning of green, which is about four to six vehicles in the queue. Those first four-to-six vehicles are affected by start-up lost time and thus are expected to have higher headways. The HCM recommends using the first four vehicles for determining start-up lost time. Thus, in order to measure saturation flow, we had to use only those time periods that had more than five vehicles in queue at the beginning of green.

In order to properly record headways, the video camera has to capture the signal head (in order to see beginning of green) as well as the stop line. Only two intersections for which we had videos were able to meet these requirements. The two locations are shown in Table 4.

Table 4: Approaches used for Measuring Headways

Location	**Directions**
3rd Avenue at 34th Street	Northbound
Park Avenue at 57th Street	Northbound

The base saturation flow rate is that when there are no heavy vehicles, no turning vehicles, no buses, no bicycles, no pedestrians, level terrain, no parking, non-CBD area type, and 12-foot lanes. It is almost impossible to find locations that have all these conditions. Middle through lanes were used to find this value, since this avoids having to consider the effects of turning vehicles, parking, bicycles and pedestrians. The only factors that could not be avoided are heavy vehicles and area type. To limit the effect of heavy vehicles on headway, any headway of a heavy vehicle or vehicle after the first heavy vehicle were discarded. The prevailing saturation flow rate use all the headways.

Start-up lost time is assumed to be a component of the headways of the first four vehicles, and it is measured relative to the base condition. There were 9 hours of data available for measuring headways. It is true that it would have been preferable to have more locations to get a better calibration of start-up lost time. Our results, however, showed some interesting trends.

3. DATA ANALYSIS

After all the data was collected and reduced, summaries were made and comparisons of results between the field data and the HCM method were performed.

Analysis of Start-up Lost Time

Tables 5, 6, and 7 shows the summary of the start-up lost times and prevailing headway values upon which it was based. This summary is based on the actual data sheets shown in Appendices A and B. Table cc shows the value of start-up lost time by 15-minute intervals. Table 7 shows the average values and standard deviation by location and overall.

Table 5. Start-up Lost Time Values by 15 minutes at Third Avenue and 34th Street.

	3RD AVENUE AT 34TH STREET					
Date	**TIME**	**LOST TIMES**	**Base Headway**	**Prevailing Headway**	**Base Sat Flow**	**Prevailing Sat flow**
28-Sep	8:15	0.98	2.81	4.24	1281	849
28-Sep	8:30	-0.82	2.91	4.46	1237	807
28-Sep	9:45	2.46	2.41	3.05	1494	1180
28-Sep	3:30	4.1	2.02	3.31	1782	1088
28-Sep	3:45	2.77	2.17	2.7	1659	1333
28-Sep	4:00	1.19	3.23	3.67	1115	981
17-May	4:15	2.4	2.1	2.96	1714	1216
28-Sep	4:30	1.36	2.23	2.54	1614	1417
18-May	4:30	0.85	2.94	3.8	1224	947
28-Sep	5:45	0.55	2.78	3.22	1295	1118
28-Sep	6:00	1.21	2.39	3.16	1506	1139
28-Sep	6:15	1.08	2.58	2.85	1395	1263
28-Sep	6:30	2.04	2.96	3.35	1216	1075
18-May	6:30	0.62	2.94	4.5	1224	800
28-Sep	6:45	0.55	2.4	3.28	1500	1098
28-Sep	7:00	-0.34	2.27	2.53	1586	1423

Table 6. Start-up Lost Time Values by 15 minutes at Park Avenue and 57th Street

	Park Avenue					
29-Sep	12:00	1.76	2.54	3.29	1417	1094
28-Sep	12:00	0.20	2.95	3.16	1220	1139
29-Sep	12:30	1.87	2.59	2.59	1390	1390
28-Sep	12:30	-1.33	3.18	3.40	1132	1059
29-Sep	12:45	1.34	2.54	2.99	1417	1204
28-Sep	12:45	-0.34	2.96	3.72	1216	968
29-Sep	1:00	2.43	2.45	2.45	1469	1469
28-Sep	1:00	0.23	3.25	3.72	1108	968
29-Sep	1:15	3.06	2.70	2.70	1333	1333
28-Sep	1:15	1.19	2.64	3.07	1364	1173
29-Sep	1:30	1.57	2.78	3.45	1295	1043
28-Sep	1:30	1.00	2.82	2.99	1277	1204
28-Sep	1:45	0.27	2.81	3.30	1281	1091
28-Sep	2:00	1.77	2.35	3.23	1532	1115
28-Sep	2:15	2.13	2.37	3.94	1519	914
28-Sep	2:30	1.21	2.45	3.09	1469	1165
28-Sep	2:45	2.39	2.29	3.19	1572	1129
29-Sep	4:15	2.51	2.51	3.26	1434	1104
29-Sep	4:30	3.05	2.69	3.46	1338	1040
29-Sep	4:45	3.15	2.46	2.56	1463	1406

Table 7. Statistics for the Start-up Lost Time Data

	Mean	Median	Standard Deviation	No Samples	Lower 95% conf. bound	Upper 95% conf. bound
3rd Ave at 34th St	1.31	1.14	1.22	16	0.72	1.91
3rd Ave at 34th St	1.47	1.67	1.20	20	0.95	2.00
Both Locations	1.40	1.28	1.20	36	1.01	1.79

It can be seen it Table 7 that the means are not very different for the two locations and thus it make sense to consider both locations and all time periods together. The overall mean is 1.4 seconds of start-up lost time. It is interesting that the median is even lower, showing that 50% of the time, the start up lost time is under 1.28 seconds. The 95% confidence bounds on the mean are from 1.01 to 1.79 seconds. The default value that is usually used when running the HCM 2010 procedure is 2.0 seconds of start-up lost time.

The results were not assembled for time periods, that is, AM, PM, and midday values, because there was not enough data in the AM or PM peak to separate it out.

Analysis of Saturation Flow Rates

Using the same headway data found in Appendices B and C, base and prevailing saturation flow rate were calculated. Tables 8 and 9 show summaries of the results.

Table 8. Saturation Flow Rate at Third Avenue and 34th Street.

	3RD AVENUE AT 34TH STREET		
Date	**TIME**	**Base Sat Flow**	**Prevailing Sat flow**
28-Sep	8:15	1281	849
28-Sep	8:30	1237	807
28-Sep	9:45	1494	1180
28-Sep	3:30	1782	1088
28-Sep	3:45	1659	1333
28-Sep	4:00	1115	981
17-May	4:15	1714	1216
28-Sep	4:30	1614	1417
18-May	4:30	1224	947
28-Sep	5:45	1295	1118
28-Sep	6:00	1506	1139
28-Sep	6:15	1395	1263
28-Sep	6:30	1216	1075
18-May	6:30	1224	800
28-Sep	6:45	1500	1098
28-Sep	7:00	1586	1423

Table 9. Saturation Flow Rate at Park Avenue

Date	Time	Base Sat Flow	Prevailing Sat Flow
29-Sep	12:00	1417	1094
28-Sep	12:00	1220	1139
29-Sep	12:30	1390	1390
28-Sep	12:30	1132	1059
29-Sep	12:45	1417	1204
28-Sep	12:45	1216	968
29-Sep	1:00	1469	1469
28-Sep	1:00	1108	968
29-Sep	1:15	1333	1333
28-Sep	1:15	1364	1173
29-Sep	1:30	1295	1043
28-Sep	1:30	1277	1204
28-Sep	1:45	1281	1091
28-Sep	2:00	1532	1115
28-Sep	2:15	1519	914
28-Sep	2:30	1469	1165
28-Sep	2:45	1572	1129
29-Sep	4:15	1434	1104
29-Sep	4:30	1338	1040
29-Sep	4:45	1463	1406

Table 10 shows statistics on the Base saturation flow rate. In the HCM2010, base saturation flow rate is defined as 1900 pcphgpl. Given that we could not avoid the fact that Manhattan is a CBD, we can adjust the 1900 to reflect the area-type factor in the HCM of 0.9. This would give a base saturation flow rate of 1710 pcphgpl. The values found from the data are considerably lower. The mean value for all locations is approximately1400 pcphpl, with the 95% confidence bounds being from 1336 to 1447. Notice that the mean and median are exactly the same, and the standard deviation is only 169 vehicles.

Table 10. Statistics for Base Saturation Flow Rate

	Mean Base Sat Flow	Median	Standard Deviation	No Samples	Lower 95% conf. Bd	Upper 95% conf. Bd
3rd Ave	1428	1445	206	16	1326.64	1529
Park Ave	1362	1377	130	20	1305.39	1419
Both Locations	1392	1393	169	36	1336.28	1447

A t-test was done to see if there was a statistical difference in the means of the two locations. The results, as seen in Table 11, show that there is not a statistically significant difference between the two locations. Thus the overall base saturation flow rate should be used.

Table 11. T-test on means of two locations

Comparing Means [t-test assuming equal variances (homoscedastic)]			
Descriptive Statistics			
VAR	*Sample size*	*Mean*	*Variance*
	16	1,427.75419	42,583.90636
	20	1,362.4148	16,930.53532
Summary			
Degrees Of Freedom	34	*Hypothesized Mean Difference*	0.E+0
Test Statistics	1.15905	*Pooled Variance*	28,248.19902
Two-tailed distribution			
p-level	0.25451	*t Critical Value (5%)*	2.03224
One-tailed distribution			
p-level	0.12726	*t Critical Value (5%)*	1.69092

Table 12 shows the statistics on prevailing saturation flow rate.

Table 12: Statistics for Prevailing Saturation Flow Rate

	Mean Prevailing Sat Flow	Median	Standard Deviation	No Samples	Lower 95% conf. bound	Upper 95% conf. bound
3rd Ave at 34th St	1108.43	1107.79	197.27	16	1011.77	1205.09
3rd Ave at 34th St	1150.42	1121.54	150.42	20	1084.49	1216.34
Both Locations	1131.76	1116.28	171.49	36	1075.74	1187.78

Analysis of Delay

Delay data was measured from the video tapes for the locations shown in Table 1, and delay was calculated using the HCM 2010 methodology. Level of service, as defined in the HCM, is based upon these delay numbers. The breakpoints for level of service at a signalized intersection are given in Table 13.

TABLE 13. LOS Criteria

Control Delay (s/veh)	LOS
≤ 10	A
> 10 – 20	B
> 20 – 35	C
> 35 – 55	D
> 55 – 80	E
> 80	F

Tables 14 - 16 show a sample of the delay results calculated from both the field data and using the 2010 HCM methodology, for each location. Included in the tables are also comparisons of the level of service produced by each methodology. It can be seen that for under saturated conditions, the results align very well. In many cases, a change in level of service is due to the delay number being very close to the break point between the two levels of service. For instance, on 1st Avenue at 14th street, at 4pm, the data calculated a delay of 29.03 seconds per vehicle, which is level of service C. The HCM methodology predicted a delay of 19.07 seconds per vehicle. There is about a 10-second difference per vehicle in the prediction. However, if the HCM2010 value was just 0.93 seconds higher, it would also be in the LOS C range.

TABLE 14. Sample Delay data for 1st Avenue at 14th Street

	1 Ave & 14 Street						
	Time	Data Delay	HCM Delay		Data LOS	HCM LOS	
							Sec Diff
20-Jun	14:00	26.96	23.54		C	C	3.42
	14:15	27.59	23.00		C	C	4.59
	14:30	30.11	22.07		C	C	8.04
	14:45	32.78	23.50		C	C	9.28
	15:00	30.51	26.10		C	C	4.41
	15:15	22.30	21.27		C	C	1.03
	15:30	22.00	21.45		C	C	0.55
	15:45	15.40	19.19		B	B	3.79
	16:00	29.03	19.07		C	B	9.96
	16:15	20.04	18.03		C	B	2.01
	16:30	13.71	17.51		B	B	3.80
	16:45	11.90	21.64		B	C	9.74
	17:00	11.73	19.12		B	B	7.39
	17:15	22.88	18.43		C	B	4.45
	17:30	16.85	18.66		B	B	1.81
	17:45	19.02	20.29		B	C	1.27
21-Jun	14:00	47.42	18.86		D	B	28.56
	14:15	43.12	17.84		D	B	25.28
	14:30	33.18	17.07		C	B	16.11
	14:45	33.56	17.70		C	B	15.86
	15:00	38.97	17.87		D	B	21.10
	15:15	37.21	17.46		D	B	19.75
	15:30	23.33	17.46		C	B	5.87
	15:45	23.61	18.02		C	B	5.59
	16:00	24.27	16.51		C	B	7.76
	16:15	19.46	16.25		B	B	3.21
	16:30	14.33	16.13		B	B	1.80
	18:15	22.61	17.63		C	B	4.98
	18:30	20.52	17.31		C	B	3.21
	18:45	29.07	17.54		C	B	11.53
	19:00	35.44	17.75		D	B	17.69
	19:15	24.37	17.27		C	B	7.10
	19:30	27.28	17.81		C	B	9.47
	19:45	20.44	17.42		C	B	3.02

TABLE 15. Sample Delay data for 3rd Avenue at 34th Street

3rd Avenue at 34th Street							
	Time	Data Delay	HCM Delay		Data LOS	HCM LOS	Sec Diff
5/17/12	7:00	4.5	7.0		A	A	2.5
	7:15	6.0	7.0		A	A	1.0
	7:30	4.8	7.1		A	A	2.3
	7:45	7.3	7.4		A	A	0.1
	8:00	9.8	8.3		A	A	1.5
	8:15	12.1	17.7		B	B	5.6
	8:30	13.5	12.5		B	B	1.0
	8:45	23.6	13.7		C	B	9.9
	9:00	12.1	11.7		B	B	0.4
	9:15	14.1	9.2		B	A	4.9
	10:45	9.3	7.5		A	A	1.8
	11:00	11.9	8.6		B	A	3.3
	11:15	18.4	9.1		B	A	9.3
	11:45	13.6	13.7		B	B	0.1
	12:00	9.0	9.4		A	A	0.4
	12:15	16.0	13.3		B	B	2.7
	12:30	14.3	11.2		B	B	3.1
	12:45	4.6	12.9		A	B	8.3
	13:00	16.9	15.4		B	B	1.5
	13:15	13.6	17.7		B	B	4.1
	13:30	15.0	21.9		B	C	6.9
	13:45	19.0	26.4		B	C	7.4
	14:00	22.5	15.4		C	B	7.1
	14:15	16.8	19.7		B	B	2.9
	14:30	13.3	18.2		B	B	4.9
	14:45	20.0	30.9		C	C	10.9
5/18/12	7:00	3.0	7.6		A	A	4.6
	7:15	3.1	7.9		A	A	4.7
	7:30	3.7	7.8		A	A	4.1
	7:45	9.0	20.5		A	C	11.5
	9:45	11.3	8.5		B	A	2.8
	10:00	11.4	17.4		B	B	6.0
	10:15	10.2	7.9		B	A	2.3
	10:30	14.9	8.4		B	A	6.5
	10:45	13.1	8.4		B	A	4.7
5/20/12	8:45	14.8	21.3		B	C	6.5
	9:00	20.8	32.9		C	C	12.1
	9:15	14.7	33.8		B	C	19.1

TABLE 16. Sample Delay data for West Street at Canal Street

	West Street at Canal						
	Time	Data Delay	HCM Delay		Data LOS	HCM LOS	Sec Diff
Sep-11	10:30 AM	8.2	4.3		A	A	3.9
	10:45 AM	8.1	4.0		A	A	4.1
	11:00 AM	7.9	4.3		A	A	3.6
	11:15 AM	7.1	3.9		A	A	3.1
	11:30 AM	7.6	3.9		A	A	3.8
	11:45 AM	8.8	4.3		A	A	4.5
	4:00 PM	7.5	4.0		A	A	3.5
	4:15 PM	8.0	3.9		A	A	4.1
	4:30 PM	7.4	3.8		A	A	3.5
	4:45 PM	8.6	3.6		A	A	5.0
29-Sep	8:00 AM	9.7	4.3		A	A	5.4
	8:15 AM	8.6	5.2		A	A	3.4
	8:30 AM	8.0	4.6		A	A	3.4
	11:00 AM	9.5	4.0		A	A	5.5
	11:15 AM	7.6	4.5		A	A	3.1
	11:30 AM	9.3	4.3		A	A	5.0
	11:45 AM	8.2	5.0		A	A	3.2
	4:00 PM	8.3	3.8		A	A	4.5
	4:15 PM	10.8	3.4		B	A	7.4
	4:30 PM	11.3	3.5		B	A	7.8
	4:45 PM	9.1	4.2		A	A	4.9
	5:00 PM	8.4	3.6		A	A	4.8
	5:15 PM	8.7	3.8		A	A	4.9
	5:30 PM	9.6	3.9		A	A	5.7
	5:45 PM	8.6	3.5		A	A	5.0
	6:00 PM	8.2	3.3		A	A	4.9
	6:15 PM	9.0	4.1		A	A	4.9
	6:30 PM	9.3	4.4		A	A	5.0
	6:45 PM	9.8	3.5		A	A	6.3
	7:00 PM	9.9	4.1		A	A	5.8
	7:15 PM	10.7	3.6		B	A	7.1
	7:30 PM	8.7	4.1		A	A	4.6
	7:45 PM	10.7	3.3		B	A	7.4

Tables 17 – 19 show the results of doing paired t tests on the mean, hypothesizing that the difference in the means in zero between the field results and HCM results. Only at West and Canal streets can the hypothesis not be rejected. At that location (West and Canal) going Southbound, the through vehicles have an excellent progression and relatively little red time, so the delay numbers are very small in both methodologies.

TABLE 17. Paired t-test for 1st Avenue at 14th Street

Comparing Means [Paired two-sample t-test]			
Descriptive Statistics			
VAR	*Sample size*	*Mean*	*Variance*
	48	22.97104	82.98809
	48	18.8055	4.64903
Summary			
Degrees Of Freedom	47	*Hypothesized Mean Difference*	0.E+0
Test Statistics	3.12213	*Pooled Variance*	43.81856
Two-tailed distribution			
p-level	0.00307	*t Critical Value (5%)*	2.01174
One-tailed distribution			
p-level	0.00153	*t Critical Value (5%)*	1.67793

TABLE 18. Paired t-test for 3rd Avenue at 34th Street

Comparing Means [Paired two-sample t-test]			
Descriptive Statistics			
VAR	*Sample size*	*Mean*	*Variance*
	53	13.10547	28.2052
	53	13.21173	44.30646
Summary			
Degrees Of Freedom	52	*Hypothesized Mean Difference*	0.E+0
Test Statistics	0.12225	*Pooled Variance*	36.25583
Two-tailed distribution			
p-level	0.90317	*t Critical Value (5%)*	2.00665
One-tailed distribution			
p-level	0.45159	*t Critical Value (5%)*	1.67469

TABLE 19. Paired t-test for data at West Street and Canal

Comparing Means [Paired two-sample t-test]			
Descriptive Statistics			
VAR	*Sample size*	*Mean*	*Variance*
	33	8.81515	1.11751
	33	3.99788	0.1987
Summary			
Degrees Of Freedom	32	*Hypothesized Mean Difference*	0.E+0
Test Statistics	21.62943	*Pooled Variance*	0.65811
Two-tailed distribution			
p-level	0.E+0	*t Critical Value (5%)*	2.03693
One-tailed distribution			
p-level	0.E+0	*t Critical Value (5%)*	1.69389

4. SUMMARY OF RESULTS

Field data showed that start-up lost time is regularly less than the 2.0 seconds that is used at a default in the Highway Capacity Manual. It was often the case that the headway of several of the first four vehicles is actually less than the saturation flow rate. Particularly the first vehicle was found to have an extremely low headway, which is probably indicative of the first car often jumping the light.

It has been observed that lanes where there are heavy vehicles, delay values by HCS 2010 are higher than the delay values by data method. While the ones without these components (West St and Canal St) have almost similar delay values by both the methods.

REFERENCES

1. *Highway Capacity Manual,* Transportation Research Board, National Research Council, Washington DC, 2010.

2. *2010 HCM*, Transportation Research Board, Chapter 31, pg

3. Roess, R., Prassas, E., and McShane, W., *Traffic Engineering*, 4th Edition, Prentice Hall, 2010.

4. Li, H, and Prevedouros, P., "Detailed observations of saturation headways and start-up lost times," Transportation Research Record, no. 1802, pp. 44–53, 2002.

5. Murthy, N. and Mohle, H., "Transportation Engineering Basics," ASCE Press. 2001.

6. Rahman, M., Nur-ud-deen, S., Hassan, T., "Comparison of saturation flow rate at signalized intersections in Yokohama and Dhaka," Proceedings of the Eastern Asia Society for Transportation Studies, vol. 5, pp. 959–966, 2005.

7. F. B. Lin and D. R. Thomas, "Headway compression during queue discharge at signalized intersections," Transportation Research Record, no. 1920, pp. 81–85, 2005.

8. Chaudhry, M. and Ranjitkar, P., "Traffic Signal Design with an Increasing Queue Discharge Rate," Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 9, 2013

9. Joseph, J. and Chang, G. "Saturation flow rates and maximum critical lane volumes for planning applications in Maryland," Journal of Transportation Engineering, vol. 131, no. 12, pp. 946–952, 2005

10. Long, G. "Driver behavior model of saturation flow," Transportation Research Record, no. 2027, pp. 65–72, 2007.

11. APPENDIX A

DELAY DATA FOR 1ST AVENUE AND 14TH STREET

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time				06/20/11; 16:00	
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
16:00	1	0	16	18	20	0	0	16	18	18		
16:03	2	0	14	16	16	6	12	15	16	16		
16:06	3	0	14	19	19	0	0	13	14	14		
16:09	4	0	5	6	7	2	1	11	11	11		
16:12	5	0	5	6	6	0	0	8	9	9		
Total		0	54	65	68	8	13	63	68	68	0	407
Step 1												
Interval												20
Sum of all Vehicles-in-queue												407
Total Number of vehicles arriving during the study period												273
Emprical adjustment factor												0.9
Average Time in queue												26.83516484
Step 2												
Total Count of Stopping Vehicle												120
Number of cycles included in the survey												10
Number of lanes in the survey lane group												5
Number of Vehicles stopping per lane, per cycle												2.4
Step 3												
Fraction of Vehicles stopping												0.43956044
Step 4												
Correction Factor (From table below)												5
Total Control delay												29.03296703

Adjustment Factor for Acceleration/Decceleration Delay			
	Vehicles stopping per lane, per cycle		
Free Flow Speed (mi/h)	7 Vehs	8-19 vehs	20-30 vehs
≤37	5	2	-1
>37-45	7	4	2
>45	9	7	5

Heavy Vehicles	16

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 16:15			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
16:15	1	4	1	5	6	0	0	11	12	13		
16:18	2	2	3	3	4	1	0	8	8	9		
16:21	3	0	5	6	7	0	0	13	16	16		
16:24	4	8	11	11	11	0	0	5	7	8		
16:27	5	0	5	8	9	3	2	10	11	12		
Total		14	25	33	37	4	2	47	54	58	0	274

Step 1	
Interval	20
Sum of all Vehicles-in-queue	274
Total Number of vehicles arriving during the study period	269
Emprical adjustment factor	0.9
Average Time in queue	18.33457249
Step 2	
Total Count of Stopping Vehicle	92
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.84
Step 3	
Fraction of Vehicles stopping	0.342007435
Step 4	
Correction Factor (From table below)	5
Total Control delay	20.04460967

Adjustment Factor for Acceleration/Decceleration Delay			
	Vehicles stopping per lane, per cycle		
Free Flow Speed (mi/h)	7 Vehs	8-19 vehs	20-30 vehs
≤37	5	2	-1
>37-45	7	4	2
>45	9	7	5
Heavy Vehicles			18

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time			06/20/11; 16:30		
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
16:30	1	3	2	3	5	12	17	13	17	17		
16:33	2	4	9	9	10	2	0	1	2	5		
16:36	3	0	2	4	5	0	0	1	1	1		
16:39	4	0	1	1	1	0	1	4	5	5		
16:42	5	1	0	2	3	0	0	1	1	2		
Total		8	14	19	24	14	18	20	26	30	0	173

Step 1	
Interval	20
Sum of all Vehicles-in-queue	173
Total Number of vehicles arriving during the study period	248
Emprical adjustment factor	0.9
Average Time in queue	12.55645161
Step 2	
Total Count of Stopping Vehicle	57
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.14
Step 3	
Fraction of Vehicles stopping	0.22983871
Step 4	
Correction Factor (From table below)	5
Total Control delay	13.70564516

Adjustment Factor for Acceleration/Decceleration Delay			
	Vehicles stopping per lane, per cycle		
Free Flow Speed (mi/h)	7 Vehs	8-19 vehs	20-30 vehs
≤37	5	2	-1
>37-45	7	4	2
>45	9	7	5
Heavy Vehicles			14

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 16:45			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
16:45	1	0	4	7	8	0	0	1	1	2		
16:48	2	0	2	6	6	0	0	11	11	13		
16:51	3	2	5	6	7	0	0	9	13	13		
16:54	4	2	4	7	11	0	0	6	6	6		
16:57	5	1	2	3	5	2	2	4	4	6		
Total		5	17	29	37	2	2	31	35	40	0	198

Step 1	
Interval	20
Sum of all Vehicles-in-queue	198
Total Number of vehicles arriving during the study period	333
Emprical adjustment factor	0.9
Average Time in queue	10.7027027
Step 2	
Total Count of Stopping Vehicle	80
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.6

Step 3	
Fraction of Vehicles stopping	0.24024024

Step 4	
Correction Factor (From table below)	5
Total Control delay	11.9039039

Adjustment Factor for Acceleration/Decceleration Delay			
	Vehicles stopping per lane, per cycle		
Free Flow Speed (mi/h)	7 Vehs	8-19 vehs	20-30 vehs
≤37	5	2	-1
>37-45	7	4	2
>45	9	7	5
Heavy Vehicles			24

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 17:00			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
17:00	1	0	3	7	9	3	0	8	8	9		
17:03	2	0	1	4	5	0	0	0	1	2		
17:06	3	0	2	3	4	0	2	4	7	7		
17:09	4	0	6	9	9	2	0	2	4	6		
17:12	5	5	8	9	10	0	0	2	3	4		
Total		5	20	32	37	5	2	16	23	28	0	168

Step 1	
Interval	20
Sum of all Vehicles-in-queue	168
Total Number of vehicles arriving during the study period	288
Emprical adjustment factor	0.9
Average Time in queue	10.5
Step 2	
Total Count of Stopping Vehicle	71
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.42
Step 3	
Fraction of Vehicles stopping	0.246527778
Step 4	
Correction Factor (From table below)	5
Total Control delay	11.73263889

Heavy Vehicles	17

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 17:15			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
17:15	1	3	0	1	3	0	0	2	4	5		
17:18	2	5	3	8	8	0	0	17	18	19		
17:21	3	10	10	12	13	3	3	5	5	8		
17:24	4	4	12	16	16	0	3	12	12	14		
17:27	5	5	17	17	17	0	0	3	4	4		
Total		27	42	54	57	3	6	39	43	50	0	321

Step 1	
Interval	20
Sum of all Vehicles-in-queue	321
Total Number of vehicles arriving during the study period	277
Emprical adjustment factor	0.9
Average Time in queue	20.85920578

Step 2	
Total Count of Stopping Vehicle	112
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	2.24

Step 3	
Fraction of Vehicles stopping	0.40433213

Step 4	
Correction Factor (From table below)	5
Total Control delay	22.88086643
Heavy Vehicles	18

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 17:30			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
17:30	1	1	0	1	2	0	0	14	14	14		
17:33	2	5	6	7	8	1	0	3	3	4		
17:36	3	3	14	16	17	8	3	3	4	4		
17:39	4	0	1	2	3	1	0	8	9	10		
17:42	5	2	11	11	12	0	0	5	6	6		
Total		11	32	37	42	10	3	33	36	38	0	242

Step 1	
Interval	20
Sum of all Vehicles-in-queue	242
Total Number of vehicles arriving during the study period	282
Emprical adjustment factor	0.9
Average Time in queue	15.44680851

Step 2	
Total Count of Stopping Vehicle	79
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.58

Step 3	
Fraction of Vehicles stopping	0.280141844

Step 4	
Correction Factor (From table below)	5
Total Control delay	16.84751773
Heavy Vehicles	21

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time			06/20/11; 17:45		
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
17:45	1	1	7	10	11	3	3	12	14	16		
17:48	2	1	6	8	9	2	0	0	2	2		
17:51	3	2	2	8	11	1	0	15	15	15		
17:54	4	0	15	18	19	4	0	15	17	4		
17:57	5	0	2	2	4	0	0	8	10	10		
Total		4	32	46	54	10	3	50	58	47	0	304

Step 1	
Interval	20
Sum of all Vehicles-in-queue	304
Total Number of vehicles arriving during the study period	320
Emprical adjustment factor	0.9
Average Time in queue	17.1

Step 2	
Total Count of Stopping Vehicle	123
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	2.46

Step 3	
Fraction of Vehicles stopping	0.384375

Step 4	
Correction Factor (From table below)	5
Total Control delay	19.021875
Heavy Vehicles	16

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time			06/20/11; 18:00		
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
18:00	1	0	4	10	11	1	0	1	1	4		
18:03	2	1	3	3	3	0	0	2	3	3		
18:06	3	0	7	7	8	2	0	1	1	1		
18:09	4	1	0	0	2	0	3	8	9	9		
18:12	5	4	4	5	5	1	0	2	2	3		
Total		6	18	25	29	4	3	14	16	20	0	135

Step 1	
Interval	20
Sum of all Vehicles-in-queue	135
Total Number of vehicles arriving during the study period	295
Emprical adjustment factor	0.9
Average Time in queue	8.237288136

Step 2	
Total Count of Stopping Vehicle	54
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.08

Step 3	
Fraction of Vehicles stopping	0.183050847

Step 4	
Correction Factor (From table below)	5
Total Control delay	9.152542373
Heavy Vehicles	14

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time			06/20/11; 18:15		
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
18:15	1	0	1	1	3	0	0	2	3	3		
18:18	2	0	6	10	11	0	0	1	2	3		
18:21	3	3	2	2	1	0	4	10	10	10		
18:24	4	7	6	9	9	5	4	2	2	2		
18:27	5	0	0	0	0	0	0	10	12	14		
Total		10	15	22	24	5	8	25	29	32	0	170

Step 1	
Interval	20
Sum of all Vehicles-in-queue	170
Total Number of vehicles arriving during the study period	300
Emprical adjustment factor	0.9
Average Time in queue	10.2

Step 2	
Total Count of Stopping Vehicle	57
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.14

Step 3	
Fraction of Vehicles stopping	0.19

Step 4	
Correction Factor (From table below)	5
Total Control delay	11.15
Heavy Vehicles	9

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 18:30			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
18:30	1	0	2	2	3	0	0	12	12	14		
18:33	2	5	12	13	14	0	2	5	6	9		
18:36	3	0	6	7	8	0	0	9	10	10		
18:39	4	1	5	5	5	0	0	4	4	4		
18:42	5	0	0	4	4	1	0	3	4	6		
Total		6	25	31	34	1	2	33	36	43	0	211

Step 1	
Interval	20
Sum of all Vehicles-in-queue	211
Total Number of vehicles arriving during the study period	335
Emprical adjustment factor	0.9
Average Time in queue	11.33731343

Step 2	
Total Count of Stopping Vehicle	77
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.54

Step 3	
Fraction of Vehicles stopping	0.229850746

Step 4	
Correction Factor (From table below)	5
Total Control delay	12.48656716
Heavy Vehicles	17

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 18:45			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
18:45	1	0	2	6	6	1	0	12	12	12		
18:48	2	2	6	6	8	0	0	3	3	3		
18:51	3	1	3	8	10	1	0	2	3	3		
18:54	4	0	2	2	2	2	0	0	1	2		
18:57	5	1	3	7	9	2	0	2	2	5		
Total		4	16	29	35	6	0	19	21	25	0	155

Step 1	
Interval	20
Sum of all Vehicles-in-queue	155
Total Number of vehicles arriving during the study period	311
Emprical adjustment factor	0.9
Average Time in queue	8.971061093

Step 2	
Total Count of Stopping Vehicle	69
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.38

Step 3	
Fraction of Vehicles stopping	0.221864952

Step 4	
Correction Factor (From table below)	5
Total Control delay	10.08038585
Heavy Vehicles	18

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 19:00			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
19:00	1	2	1	2	5	2	0	5	6	7		
19:03	2	0	4	5	6	0	4	11	11	11		
19:06	3	4	5	8	9	2	2	1	2	4		
19:09	4	2	2	6	7	4	2	8	8	1		
19:12	5	1	5	8	8	4	2	10	13	14		
Total		9	17	29	35	12	10	35	40	37	0	224

Step 1	
Interval	20
Sum of all Vehicles-in-queue	224
Total Number of vehicles arriving during the study period	311
Emprical adjustment factor	0.9
Average Time in queue	12.96463023

Step 2	
Total Count of Stopping Vehicle	102
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	2.04

Step 3	
Fraction of Vehicles stopping	0.327974277

Step 4	
Correction Factor (From table below)	5
Total Control delay	14.60450161
Heavy Vehicles	16

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time			06/20/11; 19:15		
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
19:15	1	3	11	13	13	2	0	16	16	16		
19:18	2	4	6	11	11	2	2	8	8	8		
19:21	3	0	2	5	5	1	0	3	3	4		
19:24	4	3	4	8	10	1	0	2	2	2		
19:27	5	0	7	7	9	1	0	2	3	4		
Total		10	30	44	48	7	2	31	32	34	0	238

Step 1	
Interval	20
Sum of all Vehicles-in-queue	238
Total Number of vehicles arriving during the study period	322
Emprical adjustment factor	0.9
Average Time in queue	13.30434783

Step 2	
Total Count of Stopping Vehicle	107
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	2.14

Step 3	
Fraction of Vehicles stopping	0.332298137

Step 4	
Correction Factor (From table below)	5
Total Control delay	14.96583851
Heavy Vehicles	12

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time		06/20/11; 19:30			
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
19:15	1	1	3	8	8	3	2	5	5	5		
19:18	2	2	0	4	5	2	0	9	10	10		
19:21	3	0	2	6	6	0	0	9	9	11		
19:24	4	3	2	7	7	2	0	3	4	5		
19:27	5	0	4	4	6	2	2	5	7	7		
Total		6	11	29	32	9	4	31	35	38	0	195

Step 1	
Interval	20
Sum of all Vehicles-in-queue	195
Total Number of vehicles arriving during the study period	321
Emprical adjustment factor	0.9
Average Time in queue	10.93457944

Step 2	
Total Count of Stopping Vehicle	71
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.42

Step 3	
Fraction of Vehicles stopping	0.221183801

Step 4	
Correction Factor (From table below)	5
Total Control delay	12.04049844
Heavy Vehicles	13

Total Control Delay studies												
Intersection		**1 Av & 14 St**					Date & Time			06/20/11; 19:45		
		Number of Vehicles in queue (Count Intervals)										
Clock Time	Cycle Num	1	2	3	4	5	6	7	8	9	10	
19:45	1	0	7	12	12	1	0	4	4	6		
19:48	2	2	2	2	3	1	0	0	0	2		
19:51	3	0	6	10	10	3	0	1	1	1		
19:54	4	3	2	3	4	1	0	4	5	7		
19:57	5	1	1	2	4	2	2	6	6	7		
Total		6	18	29	33	8	2	15	16	23	0	150

Step 1	
Interval	20
Sum of all Vehicles-in-queue	150
Total Number of vehicles arriving during the study period	286
Emprical adjustment factor	0.9
Average Time in queue	9.440559441

Step 2	
Total Count of Stopping Vehicle	60
Number of cycles included in the survey	10
Number of lanes in the survey lane group	5
Number of Vehicles stopping per lane, per cycle	1.2

Step 3	
Fraction of Vehicles stopping	0.20979021

Step 4	
Correction Factor (From table below)	5
Total Control delay	10.48951049
Heavy Vehicles	11

APPENDIX

HEADWAY DATA 3RD AVENUE AND 34TH STREET

Intersection		**3 Av & 34 St**				Date & Time		**5/20/11; 8:15**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
	1	2	3	4	5	6	7	8	9	10	
1	3.85	4.29	5.36	2.29							Right
8:15:04	2.9	2.16	2.4	1.73							
	2.74										
	1.68										
	0										
2	2.24	2.37	4.78	10.48							Right
	2.99	3.71	3.21	11.95							
	2.69	2.87	6.13								
	1.88	4.68									
	0.75	3.33	4.71								
3	2.19	2.43	4.01	2.32	6.81						Right
	2.82	3.05									
	2.76	2.91	2.18								
	0.85	2.27	3.66	2.21							
	0										
4	5.35	8.64	7.94	7.17	5.85	3.9					Right
8:19:34	1.94	2.44									
	2.76	3.35	1.84								
	1.52	3.19									
	0										
5	2.26	3.07	4.64	11.01	2.19						Right
	0										
	0										
	0										
	0										
6	2.98	4.86	3.86	3.24	6.55	3.91	1.04	3.32	2.58	3.4	Right
	0										
	0										
	0										
	0										
7	2.09	4.38	3.72	2.41	12.26	3.01					Right
8:24:04	2.23	3.08	3.35	3.51	4.68	2.3	2.87	1.99	4.83	2.27	
	0										
	0										
	0										
8	2.02	3.86									Right
8:25:34	2.32	2.04	4.5	4.21							
	1.73	3.85	1.66	3.16							
	1.98	3.05	1.76	2.71							

	1.68	2.9	4.05								
9	2.37	3.54									Right
8:27:04 AM	3.4	2.66	2.21	3.24							
	2.23	1.91	1.76	1.68	2.66						
	1.35	4.24	2.43								
	2.79	2.73									
10	3.08	6.83	7.14	2.74	2.59	4.86					Right
	3.46	3.08									
	0										
	4.57										
	0										
11	2.76										Right
8:30:04	2.01	2.32	4.75								
	2.18	3.49									
	3.33										
	0										

		Start up Lost Time				
Ideal Hdwy	Prevailing	1	2	3	4	
		1.19	1.63	2.7	-0.37	
		0.24	-0.5	-0.26	-0.93	
		0.08				
		-0.98				
		-0.42	-0.29	2.12	7.82	
		0.33	1.05	0.55		
		0.03	0.21	3.47	-2.66	
		-0.78	2.02			
		-1.91	0.67			
	6.81	-0.47	-0.23	1.35	-0.34	
		0.16	0.39			
		0.1	0.25	-0.48		
		-1.81	-0.39	1	-0.45	
	4.88					
		-0.72	-0.22			
		0.1		-0.82		
		-1.14				
	2.19					
	2.85					
	7.64					
2.96	3.16	-0.43	0.42			
		-0.34	-0.62			
		-0.93	1.19	-1	0.5	
		-0.68	0.39	-0.9	0.05	

		-0.98	0.24	1.39		
		0.74		-0.45		
2.66	2.66	-0.43	-0.75	-0.9	-0.98	
		-1.31	1.58	-0.23		
		0.13	0.07			
	3.73					
		0.8	0.42			
		1.91				
		-0.65	-0.34	2.09		
		-0.48	0.83			
		0.67				
Base Hdwy	**Prevailing**	-0.27	0.35	0.60	0.29	
2.81	**4.24**				**0.98**	**=Start up lost time**

Intersection	**3 Av & 34 St**				Date & Time	**5/20/11; 8:30**					
	Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
8:31:34	0										
	0										
	0										
	0										
2	0										Right
8:33:04	0										
	0										
	0										
	0										
3	2.43	20.73	5.03	6.17	9.14	2.85					Right
8:34:34	9.06										
	1.28	3.21	2.01	2.18	2.91						
	0										
	0										
4	0										Right
8:36:04	1.96	1.48	2.8	4.46							
	0										
	2.93	3.01	2.62	2.66	3.41						
	4.32										
5	4.24										Right
8:37:34	0										
	2.94	3.47									
	0.7	5.61									
	2.54										
6	2.29	5.42									Right
8:39:04	0										
	0										
	3.07	4.04									
	1.99										
7	3.26										Right
8:40:34	6.41	2.93	3.93								
	0										
	0										
	0										
8	0										Right
8:42:04	0										
	0										
	0										

	0		
9	4.18	5.05	Right
8:43:34	0		
	0		
	2.94	3.01	
	3.32		
10	1.91		Right
8:45:04	1.2	5.25	

		Start up Lost Time		

Ideal Headway	Headway	1	2	3	4
	6				
2.91	2.91	-1.63	0.3		-0.73
		-0.95	-1.43		
		-2.91			
		0.02	0.1	-0.29	-0.25
		1.41			
		0.03	0.56		
		-2.21	2.7		
		-0.37			
		0.16	1.13		
		-0.92			

		3.5	0.02			
		-2.91				
		-2.91				
		0.03	0.1			
		0.41				
		-1.71	2.34			
Base Hdwy 2.91	Prevailing 4.46	-0.69	0.65	-0.29	-0.49	**-0.82**

Intersection	**3 Av & 34 St**				Date & Time	**5/17/11; 9:45**					
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	LANE
1	0										Right
9:44:59	0										
	0										
	0										
	0										
2	5.46	5.85	7.11								Right
9:46:29	0										
	8.93	3.32	1.63								
	6.42	5.88	3.9								
	14.69										
3	0										Right
9:47:59	0										
	0										
	0										
	0										
4	1.48	4.11	3.04	7.89	3.55						Right
9:49:29	2.82	4.14	3.01	3.77	2.1						
	0										
	1.29	4.35									
	0										
5	4.1	4.41	14.04	5.39							Right
9:50:59	4.85	2.94									
	0										
	2.09	3.69									
	0										
6	2.6	5.3	4.38	10.34	5.46	5.83					Right
9:52:29	7.64										
	3.68	6.59									
	5.22	4.18	3.12	1.63							
	1.03	12.29									
7	3.66	5.31	10.95	2.12							Right
9:53:59	1.63	11.29	6.55								
	2.43	3.05									
	1.93	2.91									
	0										
8	2.66										Right
9:55:29	2.41										
	4.05	12.05									
	8.03										

	0								
9	5.61	2.91	2.44	7.92	3.1	2.48	2.63	4.36	Right
9:56:59	13.22	2.38	1.93	5.74	3.05				
	6.58	2.77	2.99	2.21	1.84	2.21	2.32	1.63	
	4.22	6.52	4.91	2.37	2.43	2.85	2.9		
	0								
10	1.73	5.33	3.63	5.17	3.58	3.19	1.7	5.85	Right
9:58:29	2.52	5.17	2.35	6.38	5.05				
	1.2	5.8	1.4	2.6	2.59				
	1.65	4.1	2.98	2.09					
	5.41	7.86							

		Start up Lost Time			
Ideal Headway	Headway	1	2	3	4

0.91 -0.78

3.47 1.49

2.1 0.41

-1.12 1.94

2.44 0.53

-0.32 1.28

5.65

1.27

		2.81	1.77	0.71	-0.78	
		-1.38				
		-0.78				
		0.02				
		-0.48				
		0.00				
		1.64				
	3.14					
	3.05		-0.03	-0.48	3.33	
2	2		0.36	0.58	-0.20	
2.64	2.3	1.81				
	3.58					
		0.11				
2.59	2.59	-1.21				
		-0.76	1.69	0.57	-0.32	
Base Hdwy	**Prevailing**					
2.41	**3.05**	0.28	1.32	0.35	0.51	**2.46**

Intersection		**3 Av & 34 St**				Date & Time		**5/18/11; 17:45**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	LANE
1	5.24	3.77	8.28	3.88	2.96	2.54	2.76	2.9			Right
17:45:04											Thru
	3.51	7.08	3.55	1.99	1.51	2.99	1.82	3.46			Thru
	1.67	6.67	2.27	4.29	1.79	1.4					Thru
	1.46	7.47	3.46	3.83							Thru
2	1.9	2.8	16.14	12.34	4.44	3.55	1.82				Right
17:46:34	5.89	4.05	6.47	2.51	2.12	14.88					
	2.04	4.11	4.94	2.58	3.41						
	1.23	4.8	2.79	2.24	1.95	3.85	1.31	1.63	2.65		
	3.52	2.8	4.08								
3	1.63	3.16	4.05	3.47	2.83	3.65	5.24				Right
17:48:04	2.35	3.1	2.49	2.51	2.77						
	4.46	2.52	2.99	2.3							
	3.8	2.57	5.18								
	0.94	2.44	3.24								
4	8.54	4.18	9.89	4.32	6.02						Right
17:49:34											
	1.77	3.4	2.93								
	0.9	2.79	3.07	2.52	1.95	1.77	2.83				
	1.96	3.04	2.55								
5											Right
17:51:04											
	2.23	2.43	4.19	2.54	2.41						
	0.93	3.22	2.09	1.43	4.19	3.51					
	2.79	2.87	2.49	2.26	2.09	2.93					
6											Right
17:52:34											
7	0.78	11.74	5.55	7.91	4.46	4.13					Right
17:54:04	0.81	20.23	4.83	5.13	1.34	5.13					
	1.29	19.05	3.46	3.05	3.82	4.66					
	1.29	2.21	5.1	13.37	2.55	2.29					
	3.62	3.71	5.02								
8	1.98	3.08	8.19	15.66	3.51						Right
17:55:34											

9	3.94	4.38	4	6.52	5.88	2.3	2.01	3.26	2.55		Right
17:57:04											
10	2.96	7.5	16.09	5.61	3.27	2.66					Right
17:58:34	4.18	3.72	2.15	4.58	2.88	2.59	2.58	2.27	2.59		
11											Right

		Start up Lost Time				
Ideal Headway	Prevailing Headway	1	2	3	4	
	2.79					
2.45	2.45	0.73				
1.60	1.60	-1.11		-0.51	1.51	
		-1.32	4.69	0.68	1.05	
	3.27					
	2.12			3.69	-0.27	
3.41	3.41	-0.74	1.33	2.16	-0.20	
2.28	2.28	-1.55	2.02	0.01	-0.54	
		0.74	0.02	1.30		
	3.91					
	2.77	-0.43	0.32	-0.29	-0.27	
		1.68	-0.26			
		1.02	-0.21	2.40		
		-1.84	-0.34	0.46		
	6.02					
		-1.01	0.62	0.15		
1.86	2.18	-1.88	0.01	0.29	-0.26	
		-0.82	0.26	-0.23		

		-0.55	-0.35			
3.85	3.85	-1.85	0.44	-0.69	-1.35	
2.51	2.51	0.01	0.09	-0.29	-0.52	
	4.46					
	5.13	-1.97		2.05		
4.66	4.24	-1.49		0.68	0.27	
2.42	2.42	-1.49	-0.57			
			0.93			
	3.51					
	3.20					
	2.97					
2.74	2.58	1.40		-0.63		
Base Hdwy	**Prevailing Headway**					**Start up Lost time**
2.78	**3.22**	-0.62	0.57	0.66	-0.06	**0.55**

Intersection		**3 Av & 34 St**				Date & Time		**5/18/11; 18:00**		
Red = Heavy vehicle; Blue = Ped; Green = interference										
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10
1	1.35	3.07	6.66	8.62	3.27	1.91	2.34			
18:00:04	2.87	4.41	4.29	3.94	2.48	2.05	1.65	2.1	2.34	
	0									
	0									
	0									
2	1.95	11.93	7.73	6.95	3.52					
18:01:34	2.73	3.72	2.09	1.71						
	0									
	0									
	0									
3	2.93	8.11	16.55	3.21	3.35	2.69				
18:03:04	1.43	3.86	3.1	2.91	1.84	1.87	2.91	2.43	1.56	
	2.49	4.3	1.88	2.44						
	3.3	3.35	2.02	2.07						
	1.98	3.96	2.53	2.32						
4	5.55	2.16	4.55	4.13	9.42	9.54	4.15	3.32		
18:04:34	1.09	13.33	5.16	3.23	4.88					
	2.54	3.18	3.04	9.31						
	2.8	5.46	2.73	3.55	2.54	4.46				
	0.95	2.48	3.07	4.86						
5	1.98	11.38	8.26	4.18	3.86	3.96	3.08	3.44		
18:06:04	2.4	6.92	13.29	1.63	1.79					
	0									
	0									
6	2.43	3.02	4.08	8.5	7.61	3.13	3.44	4.43		
18:07:34	1.87	3.51	2.79	2.02	2.18	1.82	2.91			
	1.49	2.57	2.84	2.65	2.58					
	1.7	3.47	3.1	1.74	2.04	2.15	1.4			
	4.16									
7	0									
18:09:04	0									
	5	3.6	2.37	1.88	2.59	2.4				
	4.91	2.65	2.27	2.23	2.9	2.07	1.95			
	1.73									
8	1.96	6.25	9.98	2.87	3.83	3.04	6.08	2.91	4.28	
18:10:34	4.94	3.8	2.79	1.65	4.66	2.15	2.77	2.23		
	1.49	3.16	3.88	1.59	2.26					
	1.82	2.48	2.4							

	1.43	2.24	2.99	2.54						
9	5.91	7.36	5.6	4.15	3.01	6.24	4.35	4.21		
18:12:04	1.38	2.76	2.52	4.71	6.45	3.54				
	0.82	2.96	2.12							
	1.79	2.46	2.4							
	2.59									
10	2.57	4.97	18.59	4.35	2.98	4.38				
18:13:34	3.94	2.98	3.99							
	2.15	3.61	2.26	2.04	1.73					
	2.49	2.3	2.4	2.23						
	1.63	3.75	3.96							

		Start up Lost Time				
Ideal headway	Headway	1	2	3	4	
	2.51	-1.04				
	2.12	0.48			1.55	
	3.52	-0.44				
		0.34	1.33	-0.30	-0.68	
	3.02	0.54				
	2.12	-0.96		0.71	0.52	
		0.10		-0.51	0.05	
		0.91	0.96	-0.37	-0.32	
		-0.41	1.57	0.14	-0.07	
	6.61	3.16	-0.23			
		-1.30				
		0.15	0.79	0.65		
3.50	3.50	0.41		0.34	1.16	
		-1.44	0.09	0.68	2.47	
	3.59	-0.41				
	1.79	0.01				
	4.65	0.04				
	2.30	-0.52	1.12	0.40	-0.37	
2.58	2.58	-0.90	0.18	0.45	0.26	
1.86	1.86	-0.69	1.08	0.71	-0.65	
		1.77				
2.50	2.50	2.61	1.21	-0.02	-0.51	
2.31	2.31	2.52	0.26	-0.12	-0.16	
		-0.66				
	3.52	-0.43			0.48	
	2.38	2.55	1.41	0.40	-0.74	
2.26	2.26	-0.90	0.77	1.49	-0.80	
		-0.57	0.09	0.01		
		-0.96	-0.15	0.60	0.15	

	4.45					
	6.45	-1.01	0.37	0.13		
		-1.57	0.57	-0.27		
		-0.60	0.07	0.01		
		0.20				
	3.68	0.18				
		1.55	0.59	1.60		
1.73	1.73	-0.24	1.22	-0.13	-0.35	
		0.10				
		-0.76	1.36	1.57		
Base Hdwy	**Prevailing Headway**					**Start up Lost time**
2.39	3.16	0.05	0.70	0.35	0.11	**1.21**

Intersection		**3 Av & 34 St**				Date & Time		**5/18/11; 18:15**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	1.12	15.97	3.88	2.71	2.3	1.84					Right
18:15:04	4.93	14.21	2.83	2.45	1.93	2.35	1.49	1.76	2.37		
	1.46	2.74									
	1.02	3.77									
	1.57	3.21									
2	2.4	6.58	2.38	4.46	3.33	2.96	12.27				Right
18:16:34	3.43	2.04	3.57	3.05	3.4	2.68	1.91	3.38			
	1.46	1.87	2.62	4.85							
	1.2	2.77	2.43	2.35	2.02	1.82					
	1.85	3.75									
3	4	3.54	4.22	11.71	3.08	7.23					Right
18:18:04	0										
	2.04	2.94	8.87	1.95	1.68	3.01	1.84				
	1.4	2.27	2.07	2.19	3.6						
	1.37	2.02	2.4	3.46	4.3						
4	2.27	4.52	4.08	5.28	6.31	2.54	2.66	2.68			Right
18:19:34	2.79	6.52	2.1	4.6	3.94	1.79	3.12	2.2			
	1.74	4.55	3.32	2.27	2.21	2.99					
	3.21	3.12									
	1.2										
5	4.1	2.48	3.29	3.44							Right
18:21:04	3.02	3.08	2.37	2.07	1.73	2.87	2.49				
	2.91	2.46	2.06	1.96							
	2.01	3.05	3.22								
	2.4										
6	3.88	5.56									Right
18:22:34	2.02	3.19	2.29	4.36							
	1.87	3.99									
	5.47	2.77									
	0										
7	2.26	6.38	8.79	7.94							Right
18:24:04	3.02										
	1.42	3.27									
	0.95	5.42									
	2.43										
8	2.55	11.23	7.89	2.82	3.68	2.73	4.32				Right
18:25:34	2.88	5.94									
	1.82	2.4	3.27	3.91							
	1.76	2.69	1.52	3.33	3.26						

	1.25										
9	2.34	4.27	6.44	8.4	4.43	3.96					Right
18:27:04	1.03	8.19	2.74	3.18	3.54	7.39					
	1.06	5.49	3.27	2.18	1.68	1.65	1.74				
	1.26	3.24	1.63	2.34							
	2.01	1.93	2.34								
10	3.08	4.21	4.19	9.48	3.46	3.32	3.79				Right
18:28:34	1.52	2.6	1.88	4.92	4.82	3.55	5.55	2.63	3.77		
	2.19	3.1	2.4	1.99	1.91	1.74					
	1.62	3.1	2.9	2.44	1.73						
	0.84	2.05	3.04								

		Start up Lost Time				
Ideal headway	Headway	1	2	3	4	
	2.07	-1.46			0.02	
	1.98					
		-1.12	0.16			
		-1.56	1.19			
		-1.01	0.63			
	3.15	-0.18				
	2.84		-0.54	0.99		
		-1.12	-0.71	0.04	2.27	
1.92	1.92	-1.38	0.19	-0.15	-0.23	
		-0.73	1.17			
	3.08					
2.18	2.18	-0.54		6.29	-0.63	
3.60	3.60	-1.18	-0.31	-0.51	-0.39	
4.30	4.30	-1.21	-0.56	-0.18	0.88	
	2.63					
	2.76	0.21		-0.48	2.02	
2.60	2.60	-0.84	1.97	0.74	-0.31	
		0.63	0.54			
		-1.38				
	2.11	0.44	0.50	-0.21	-0.51	
		0.33	-0.12	-0.52	-0.62	
		-0.57	0.47	0.64		
		-0.18				
		-0.56	0.61	-0.29		
		-0.71	1.41			
		2.89	0.19			
			3.80	6.21	5.36	
		0.44				
		-1.16	0.69			
		-1.63	2.84			
		-0.15				
	3.58					
		0.30				
		-0.76	-0.18	0.69		
3.26	3.26	-0.82	0.11	-1.06	0.75	
		-1.33				

	4.20					
	3.54	-1.55	5.61	0.16	0.60	
1.69	1.69	-1.52	2.91	0.69	-0.40	
		-1.32	0.66	-0.95	-0.24	
		-0.57	-0.65	-0.24		
	3.52					
	4.06	-1.06	0.02	-0.70		
1.93	1.83	-0.39	0.52	-0.18	-0.59	
1.73	1.73	-0.96	0.52	0.32	-0.14	
		-1.74	-0.53	0.46		
		-0.67	0.77	0.51	0.46	
Base Hdwy	**Prevailing Headway**					**Start up Lost time**
2.58	**2.85**					**1.08**

Intersection	**3 Av & 34 St**					Date & Time		**5/18/11; 18:30**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	5.89	15.97	2.87	3.27	1.81	2.19					Right
18:30:04	6.5	2.8	3.65	2.51	6.92	5.63					
	2.18	2.38	3.13	2.4	2.01	2.07					
	1.66	3.51	2.71	5.27	4.61	4.36					
	2.26	3.74									
2	7.55	2.73	3.99	3.01	3.01	2.62	4.33	2.69			Right
18:31:34	2.52	2.82	5.22	3.54	1.96	2.32	1.73				
	4.43	4.18	3.24								
	3.47	3.46	2.05								
	1.49	3.74	16.92								
3	1.79	13.93	3.19	6.28							Right
18:33:04	1.09	3.04	4.15	2.83	2.27						
	1.27	2.69	2.02	2.24	2.43						
	1.13	3.58	2.74	1.82	3.93	2.24	1.96				
	0										
4	3.15	3.33	8.12	8.89	3.52						Right
18:34:34	0.7	3.01	2.55	3.66							
	1.8	4.74	3.02	7.81							
	2.02	2.71	6.19								
	9.59	2.9									
5	4.8	4.6	4.83	1.77	3.86						Right
18:36:04	3.04	8.42									
	2.12	3.02									
	2.16	2.43									
	2.79	3.27	3.51	2.85							
6	4	19.6	6.19	3.86	4.64						Right
18:37:34	1.21	3.85	2.69	2.49							
	2.94	3.33									
	1.59	4.88	3.21	4.18	7.14						
	5.69										
7	5.49	3.86									Right
18:39:04	3.71	2.04									
	1.96	4.27	2.52	2.68							
	3.04	4.38	2.62								
	1.59										
8											Right
18:40:34											

9											Right
18:42:04											
10	2.13	5.38	2.6	5.78							Right
18:43:34	4.05	3.79	2.66	2.73	2.1						
	1.43	3.33	3.93								
	1.17	2.77	1.71								
	0.93										

		Start up Lost Time			
Ideal headway	Headway	1	2	3	4
	2.00				
6.28	5.63		0.22	1.07	-0.07
	2.04	-0.40	-0.20	0.55	-0.18
		-0.92	0.93	0.13	2.69
		-0.32	1.16		
	3.16		0.15	1.41	0.43
2.00	2.00	-0.06	0.24		0.96
		1.85	1.60	0.66	
		0.89	0.88	-0.53	
		-1.09	1.16		
2.27	2.27	-1.49	0.46	1.57	0.25
2.43	2.43	-1.31	0.11	-0.56	-0.34
2.71	2.71	-1.45	1.00	0.16	-0.76
	3.52				
		-1.88	0.43	-0.03	1.08
		-0.78	2.16	0.44	5.23
		-0.56	0.13	3.61	
		7.01	0.32		
	3.86			2.25	-0.81
		0.46			
		-0.46	0.44		
		-0.42	-0.15		
		0.21	0.69	0.93	0.27
	4.64	1.42			1.28
		-1.37	1.27	0.11	-0.09
		0.36	0.75		

	7.14	-0.99	2.30	0.63	1.60
		3.11			
		1.13	-0.54		
		-0.62	1.69	-0.06	0.10
		0.46	1.80	0.04	
		-0.99			
2.10	2.10	1.47	1.21	0.08	0.15
		-1.15	0.75	1.35	
		-1.41	0.19	-0.87	
		-1.65			
		-0.03	0.76	0.62	0.69
Base Hdwy	**Prevailing Headway**				**Start up Lost Time**
2.96	**3.35**				**2.04**

Intersection		**3 Av & 34 St**				Date & Time		**5/17/11; 6:45**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	4.36	7.72	6.1								Right
	1.13	2	2.74	1.65							
18:45	3.88	**6.11**	2.48	2.96	1.66	1.63					
	1.66	**8.53**	2.41	2.29							
2	4.68	12.49									Right
	2.65	5.44	1.13								
	1.76	3.18	2.46	2.73							
	1.76	2.79	1.81	2.96							
3	2.65	3.07									Right
	3.02	2.15	3.47								
	1.37	2.26	1.6	2.34							
	1.48	3.88									
4	3.15	11.74									Right
	3.86	2.76									
	2.2										
	1.31	2.68	2.02	2.16							
5	1.34	3.43	3.54								Right
	1.74	3.37	2.77	2.18							
	1.88	2.15									
	4.89										
6	4.33	6.16	9.87								Right
	2.93	2.99	3.69	2.12							
	2.54	2.21	2.65								
7	3.38	3.52	17.58	8.42	3.05						Right
	2.62	1.82	2.37	1.62	2.66						
	1.81	3.96	1.52	2.55							
8	3.86	12.46	17.14								Right
	2.4	2.8	2.12	1.31	1.98	1.34	2.09	2.2	1.18		
	1.7	2.83	3.01	2.15	1.56	2.87					

9	2.54	5.03	13.36	6.3	6.52						Right
	1	2.51	3.1	1.95	1.96						
	1.87	2.88	1.8	3.65	3.18						
10	1.31	3.63	4.5	8.42	3.91	2.97	6.58	6.56	2.13		Right
	1.67	2.43	2.27	2.12	3.94						
	1.57	3.54	4.3	2.96							
11	5.44	4.18	4.86	8.14	4.75						Right
	2.46	2.34	7.44								
	1.09	2.58	1.95								

		Start up Lost Time				
ideal Headway	Headway	1	2	3	4	
		-1.24	-0.37	0.37	-0.72	
1.6	1.6	1.51				
		-0.71		0.04	-0.08	
		0.28	3.07	-1.24		
		-0.61	0.81	0.09	0.36	
		-0.61	0.42	-0.56	0.59	
		0.65	-0.22	1.10		
		-1.00	-0.11	-0.77	-0.03	
		-0.89	1.51			
		1.49	0.39			
		-0.17				
		-1.06	0.31	-0.35	-0.21	
		-1.03	1.06	1.17		
		-0.63	1.00	0.40	-0.19	
		-0.49	-0.22			
		2.52				
		0.56	0.62	1.32	-0.25	
		0.17	-0.16	0.28		
	3.05					
	2.66	0.25	-0.55	0.00	-0.75	
		-0.56	1.59	-0.85	0.18	
1.7	1.76	0.03	0.43	-0.25	-1.06	
2.2	2.22	-0.67	0.46	0.64	-0.22	

	6.52					
	1.96	-1.37	0.14	0.73	-0.42	
	3.18	-0.50	0.51	-0.57	1.28	
	4.43					
3.9	3.94	-0.70	0.06	-0.10	-0.25	
		-0.80	1.17	1.93	0.59	
	4.75					
		0.09	-0.03	5.07		
		-1.28	0.21	-0.42		
Base Hdwy	**Prevailing Headway**					**Start up Lost time**
2.4	**3.28**	-0.24	0.50	0.36	-0.07	**0.55**
1518	1097					

Intersection		**3 Av & 34 St**				Date & Time		**5/17/11; 7:00**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	1.38	4.29	18.92	2.48	2.32	2.34	2.68	2.69			Right
19:00	2.54	3.82	2.37	1.79	2.23	2.02					
	2.27	2.62	2.24	2.49	1.71						
	2.93	2.12									
2	3.61	4.52	20.31	4.14							Right
	2.06	3.54									
	1.52	2.32	2.46	2.46							
	2.91	1.9	2.46	3.21							
3	0										Right
	1.12	7.28	2.8	0.82	1.38	1.96	2.27				
	2.26	3.97	1.66	3.1							
	1.71	3.75									
4	2.21	4.47	3.54	3.21							Right
	1.82	3.83	2.76								
	1.45	2.46									
	1.9	2.69									
5	1.51	5.35	3.18	3.99	4.91						Right
	1.63										
	4.32	2.83	1.43	4.11	4.18	2.62					
	2.49	2.44									
6	2.29	2.87									Right
19:08:40	1.87	3.83	2.62	2.51							
	1.59										
	3.16	1.82									
7	1.46	5.1									Right
	1.99	3.38	2.45								
	1.88	2.73									
	1.34	2.49									
8	4.15	3.58									Right
	4.07	2.99	2.71	2.24							
	0										

	2.23										
9	4.22	5.72	5.3	3.47							Right
	1.87	2.74	3.07	1.76							
	1.9	2.54									
	1.51										
10	4.35	4.47	12.68	4.3	1.59						Right
	3.1	3.24	2.13	2.6	1.81	3.77	1.84	2.48	1.79		
	2.05	1.93	1.95	2.82	1.65	2.99					
	7.06	4.94									

		Start up Lost Time			
Ideal Headway	Headway				
	2.51				
	2.13	0.27	1.55	0.10	-0.48
1.71	1.71	0.00	0.35	-0.03	0.22
		0.66	-0.15		
		-0.21	1.27		
		-0.75	0.05	0.19	0.19
		0.64	-0.37	0.19	0.94
	1.87	-1.15			
		-0.01	1.70	-0.61	0.83
		-0.56	1.48		
		-0.45	1.56	0.49	
		-0.82	0.19		
		-0.37	0.42		
	4.91				
		-0.64			
3.4	3.4	2.05	0.56	-0.84	1.84
		0.22	0.17		
		-0.40	1.56	0.35	0.24
		-0.68			
		0.89	-0.45		
		-0.81	2.83		
		-0.28	1.11	0.18	
		-0.39	0.46		
		-0.93	0.22		
		1.88	1.31		
		1.80	0.72	0.44	-0.03
		-0.04			

		-0.40	0.47	0.80	-0.51
		-0.37	0.27		
		-0.76			
1.59	1.59	2.08	2.20		2.03
2.338	2.34	0.83	0.97	-0.14	0.33
2.32	2.32	-0.22	-0.34	-0.32	0.55
Base Hdwy	**Prevailing Headway**				**Start up Lost time** **-0.34**
2.27	**2.53**				

Intersection		**3 Av & 34 St**				Date & Time		**5/17/11; 4:30**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	1.59	6.58	9.34								Right
16:30	4.27	3.27	1.63								
	1.07	3.43	2.27	4.82	2.87	1.37					
	2.12	3.22	3.19	2.24	3.29	1.96					
	3.35										
2	3.71	4.07	10	4.27	3.18						Right
	1.34	3.08	2.09	4.4	3.99	2.07					
	1.34	4.75	2.02	2.87	1.99	2.26	1.88				
	2.21	2.46	2.37	1.79							
	2.43										
3	2.98	2.97	10.15	4.11	2.46	2.35	3.82	4.54	2.68		Right
	2.4	2.85	2.13	2.82							
	1.74	1.87	1.99	2.09	2.05	4.18	2.59				
	2.1	2.4	2.34	3.99	1.31						
	2.29										
4	1.7	3.86	2.88	3.46	4.91	3.22	2.9	2.07	2.13		Right
	5.72	2.83	2.66								
	2.77	4.43	3.12								
	1.65	3.07	2.96	3.18							
	2.15										
5	0										Right
	1.81	6.39	1.85								
	0										
	0										
	4.68	13.16									
6	2.73	3.1									Right
16:38:29	2.04	3.26	1.48								
	1.68	3.19	1.82								
	2.4	3.58	1.77								
	0										
7	3.04	3.66									Right
	2.15	2.73	1.73	1.73							
	2.77	2.26	1.76	2.58							
	1.31										
	2.35										
8	3.13	4.11	10.82	1.84	2.32	2.88	7.25				Right
	2.4	2.1	1.57	1.91							
	1.4	2.4									
	2.09										

	0										
9	0										Right
	1.62	6.03	3.05	3.3	1.31						
	1.95	3.68	2.26	1.52	1.52						
	2.59	2.71	2.55								
	1.32	3.96									
10	2.63	4.36									Right
	1.34	2.94	1.93								
	0										
	0										
	0										

		Start up Lost Time				
Ideal headway	Headway	1	2	3	4	
		2.04	1.04	-0.60		
2.12	2.12	-1.16	1.20	0.04	2.59	
2.63	2.63	-0.11	0.99	0.96	0.01	
		1.12				
	3.18					
3.03	3.03	-0.89	0.85	-0.14	2.17	
2.04	2.04	-0.89	2.52	-0.21	0.64	
		-0.02	0.23	0.14	-0.44	
		0.20				
	3.17					
		0.17	0.62	-0.10	0.59	
2.94	2.94	-0.49	-0.36	-0.24	-0.14	
1.31	1.31	-0.13	0.17	0.11	1.76	
		0.06				
	3.05					
		3.49	0.60	0.43		
		0.54	2.20	0.89		
		-0.58	0.84	0.73	0.95	
		-0.08				
		-2.23				
		-0.42				
		2.45				
		-0.19	1.03	-0.75		
		-0.55	0.96	-0.41		
		0.17	1.35	-0.46		
		-0.08	0.50	-0.50	-0.50	
		0.54	0.03	-0.47	0.35	
		-0.92				
		0.12				
	4.15	0.90	1.88		-0.39	
		0.17	-0.13	-0.66	-0.32	
		-0.83	0.17			
		-0.14				

	1.31	-0.61				
1.52	1.52	-0.28	1.45	0.03	-0.71	
		0.36	0.48	0.32		
		-0.91	1.73			
		0.40	2.13			
		-0.89	0.71	-0.30		
	Average =	0.01	0.93	-0.05	0.47	
Base Hdwy	**Prevailing Headway**					**Start up Lost time**
2.23	2.54					1.36

Intersection	**3 Av & 34 St**					Date & Time	**5/17/11; 3:30**				
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	1.1	2.6	6.3	3.5	6.3	4.4	2.3				Right
15:30	2.9	3.5	3.1								
	4.4	4.7									
2	1.6	3.9	8.9	3	4.7						Right
	0.6	1.7	3.3	2.9							
	3	2.9	2.9								
	1.5	2.4	3.6	2.7							
3	2	3.9	3.4								Right
	3.2	3.2	1.7	2.4							
	1.8										
	4.3	4.8									
4											Right
5	3.4										Right
	4.4	2.8	1.9	3.4	3.8	1.4	2.5	2.4	2.2		
	2	3.5	2.2	2.2	1.6	1.5	1.4	1.4	2.4	2.3	
	2.2	2.5	1.5	4	1.9						
6	3.5	3.9	7.6	4.2	5.5	2.5	2.9	2.4	3.2	3.5	Right
	2.4	2.7	2.8	1.9	4.1	1.8	3.1				
	3	2.6	3.9	1.9	2.1						
	3.6	3.8	2.8	2.7							
7	4.1	4.8	5.8	6.7	2.7	7					Right
	2.5	3.1	3.7	2.6							
	1.5	5.5	2.6								
	3.3	2.7	7.1								
8	1.8	3.7	2.4								Right
	0.9	2.7	1.9	2.6							
	1.3	2.9	2.7								
	3	3.3	2.4								
9	1.6	4.5	4.3	3	7.8						Right
	3.7	3.6	2.7	1.7	2.2	2.3	2.8	2.6	1.9	2.3	
	3.9	4.7	3	3.2	2.4						

	2.4	3.4	4.9	7						
10	4.4 3.9 3.3 4.8 0	5.8 2.8 4.9 3.8	3.5 4.3	2.7 2.6	2.6	1.9	2.6			Right
11	3.2 3.5 **7.6** 2.9 2.7	4.1 2.7 5.4 3.2 5.4	2.1 2.4 3.6	2.5 3.2	2.9 2	4.2 2.6	5.1	6.1	2	Right

		Start up Lost Time			
Ideal Headway	Headway	1	2	3	4
	4.33				
		0.88	1.48	1.08	
		2.38	2.68		
	4.70				
		-1.42	-0.32	1.28	0.88
		0.98	0.88	0.88	
		-0.52	0.38	1.58	0.68
		1.18	1.18	-0.32	0.38
		-0.22			
		2.28	2.78		
	2.46	2.38	0.78	-0.12	1.38
1.77	1.77	-0.02	1.48	0.18	0.18
1.90	1.90	0.18	0.48	-0.52	
	3.33				
	3.00	0.38	0.68	0.78	-0.12
2.10	2.10	0.98	0.58	1.88	-0.12
		1.58	1.78	0.78	0.68
	4.85				
		0.48	1.08	1.68	0.58
		-0.52	3.48	0.58	
		1.28	0.68	5.08	
		-1.12	0.68	-0.12	0.58
		-0.72	0.88	0.68	
		0.98	1.28	0.38	
	7.80				
	2.35	1.68	1.58	0.68	-0.32
	2.40	1.88	2.68	0.98	1.18

		0.38	1.38	2.88	4.98
	2.37	1.88	0.78		
		1.28	2.88		
		2.78	1.78		
	4.06				
2.30	2.30	1.48	0.68	0.38	1.18
		0.88	1.18		
		0.68	3.38		
	averages	0.84	1.40	0.99	0.87
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.02	3.31				4.10

Intersection		**3 Av & 34 St**				Date & Time		**5/17/11; 3:45**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	1.8	2.3	4.1	4.7							Right
	2.7	3.3	2.8	4.8							
15:45	2.2	3.4	1.6	2.6	2.1						
	2.8	3.7	2	2.1	2.3						
2	1.1	3.3	5.2	2.8	3.6						Right
	2.5	4.8	2.3	3.1							
	1.9	3.6	3.2	2.5	7.9						
	4.3	2.9	4.5	3	1.7						
3	3	5.5	4.8	3.7	3.7	2.6	2.4	2.8			Right
	4.5	2.3	3	2.5	2.9	2.5					
	1.6	6.6	6.2	1.9							
	2.4	3.5	2.5	2.5							
4	3.8	2.9	5.8	5.6	5						Right
	1.1	3.2	4	5.2							
	0										
	0										
5	2.9	5.5	13.6	5	4.5	2.7	2.3				Right
	4.6	2.9	2.2	1.9	1.8	3.3	2.4	1.3			
	5.8	2.3									
	2.2	4.4	2.7								
6	1.9	2.4	5.8	4.4	2.9	4.6					Right
	4.7	5.7	4	3.2	4.2	2.3	2.1				
	3.3	3.2	2.6								
15:53:53	2.5	1.9									
7	5.2	3.6	5.1	6.9							Right
	3.3	4.8	3.8	2.5	3.5						
	1.7	5	2.1	2.3	1.1	2.6	1.6	2.4	2.1		
	4.4										
8	2	5.8	4.4	4.7							Right
	2.2	3.1	3.4	2.6	2.6						
	2.6	7.2	7.4	4.5	2.3	2.3	3.4	1.7	2.9		

	1.6	4.5	7	4.9							
9	1.8	2.9	2.7	2.1	1.6	2.2	1.4	4.1			Right
	4.3	3.1	3	2.2	2.3	2.2	3	2.4	2.4	2.3	
	1.7	2.4	2.7	4.4	4.4	2.4	1.3	1.5	2.2		
	1.7	4.7	1.9	2							
10	1	4	2.5								Right
	1.7	3									
	1.5	3.1	2.4	2.8							
	1.1	3.9	2.7								

		Start up Lost Time			
Ideal Headway	Headway	1	2	3	4
		0.53	1.13	0.63	2.63
2.10	2.10	0.03	1.23	-0.57	0.43
2.30	2.30	0.63	1.53	-0.17	-0.07
	3.60				
		0.33	2.63	0.13	0.93
		-0.27	1.43	1.03	0.33
1.70	1.70	2.13	0.73	2.33	0.83
	2.88				
2.70	2.70	2.33	0.13	0.83	0.33
		-0.57			-0.27
		0.23	1.33	0.33	0.33
	5.00				
		-1.07	1.03		
	3.17				
2.20	2.20	2.43	0.73	0.03	-0.27
		3.63	0.13		
		0.03	2.23	0.53	
	3.75				
	2.20	2.53			

		1.13	1.03	0.43	
		0.33	-0.27		
		1.13	2.63	1.63	0.33
1.96	1.96	-0.47	2.83	-0.07	0.13
		2.23			
	2.60	0.03		1.23	0.43
2.52	2.52	0.43			
		-0.57			
	2.44	-0.37	0.73	0.53	-0.07
	2.43	2.13	0.93	0.83	0.03
1.85	2.36	-0.47	0.23	0.53	2.23
		-0.47	2.53	-0.27	-0.17
		-1.17	1.83	0.33	
		-0.47	0.83		
		-0.67	0.93	0.23	0.63
		-1.07	1.73	0.53	
		0.49	1.26	0.53	0.49
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.17	**2.70**				2.77

Intersection		**3 Av & 34St**				Date & Time		**05/18/11; 16:00-16:15**				
Red = Heavy vehicle; Blue = Ped; Green = interference												Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10		
1	2.87	3.13	3.49	4.91	6.42	3.18	4.69					Right
16:00:43	2.45	5.46	4.41	12.09								
red signal	4.71	3.07	3.72	4.15	4.11							
starts	5.41	3.43	4.74									
	4.9	2.2	**6**	4.2	5.6	2.2						
2	4.33	5.38	6.7	21.73	3.07							Right
16:02:05	1.84	3.97	6.83									
	1.63	3.85	3.94	3.79								
	0.56	4.08	3.13	3.93	4.38							
	1.1	4.5	4.1	6.7	4.3							
3	9.96											Right
16:03:40	6.36	12.44	17.72									
	2.8	4.3	3.41									
	2.57	4.94										
	1.7	7.3	4.6									
4	1.52	12.21	6.55	5.5								Right
	3.36	14.52	11.52									
	1.03	2.13	20.4	3.66	2.55							
	1.2	2.9	2.35									
16:05:12	2.4	6.6										
5	4.55	13.54	13.43	7.09								Right
16:06:42	2.42	17.33	20.93									
	3.52	5.42	9.87									
	4.11	6.52	7.76									
	3	**11.7**	**14.7**									
6	3.61	3.43	2.85	3.21	3.52	2.66	2.27					Right
16:08:13	1.93	4.15	2.27	5.42	2.77	4.47						
	2.35	3.99	3.71	7.17	3.61							
	1.7	3.2	2.8	3.2	2.6	2.4						
	19.7											
7	4.57	8.25	6.86	15.13	4.46	2.73						Right
16:09:42	4.72	7.7	3.58									
	4.75	2.71	3.94	2.69	2.65							
	4.1	3.4	2	2.4	2.4	2.6						
	0											
8	1.6	3.86	3.13	3.15	8.29	5.17	3.76	2.88				Right
16:11:17	3.26	4.13	**7.16**	3.26	**10.1**	2.76						
	2.41	4.68	3.22	2.26	4.74							
	1.8	4.9	6	5.7								

	2.5	5					
9	2.43	13.05	21.51				Right
16:12:42	1.68	5.07	5.52	11.59			
	2.07	4.44	2.54	5.17	3.44		
	1.6	2.1	2.4	2.8	3.3	2.6	
	6.9						
10	1.45	5.14	11.48	5.53	13.15	3.44	Right
16:14:10	1.26	11.76	3.6	1.99			
	0.45	5.03	4.44	9.2			
	3.4	3	2.5	6.2	2.4	3.1	
	1.2	3.2	2.9				

		Start up Lost Time			
Ideal Headway	Headway	Ideal Startup Lost Time			
	4.76				
		-0.78	2.23	1.18	
4.11	4.11	1.48	-0.16	0.49	0.92
		2.18	0.20	1.51	
3.9	3.90	1.67	-1.03		0.97
	3.07				
		-1.39	0.74	3.60	
		-1.60	0.62	0.71	0.56
4.38	4.38	-2.67	0.85	-0.10	0.70
4.3	4.30	-2.13	1.27	0.87	3.47
		6.73			
		-0.43	1.07	0.18	
		-0.66	1.71		
		-1.53			
		0.13			
2.55	2.55	-2.20	-1.10		0.43
		-2.03	-0.33	-0.88	
		-0.83	3.37		
		-0.81			
		0.29	2.19		
		0.88			
		-0.23			
	2.90				
	4.47	-1.30	0.92	-0.96	2.19
	3.61	-0.88	0.76	0.48	
2.5	2.50	-1.53	-0.03	-0.43	-0.03
	3.60				
		1.49		0.35	
2.65	2.65	1.52	-0.52	0.71	-0.54
2.5	2.50	0.87	0.17	-1.23	-0.83
	3.94				
2.76	2.76	0.03	0.90		0.03
		-0.82	1.45	-0.01	-0.97
		-1.43	1.67	2.77	
		-0.73	1.77		

		-1.55	1.84	2.29	
3.44	3.44	-1.16	1.21	-0.69	1.94
2.95	2.95	-1.63	-1.13	-0.83	-0.43
	8.30				
		-1.97		0.37	-1.24
		-2.78	1.80	1.21	
2.75	2.75	0.17	-0.23	-0.73	
		-2.03	-0.03	-0.33	
	Averages=	-0.48	0.76	0.44	0.48

Base Hdwy	**Prevailing Headway**				**Start up Lost time**
3.23	3.67				1.19

Intersection			**3 Av & 34 St**			Date & Time			**5/18/11;16:15-16:30**		
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	1.6	9.9	13.5	5.6							Right
16:15:42	1.2	4.4	2.7	**7.1**	5.1	2.5	1.3				
red signal	2.7	3.4	2.6	1.9	1.6						
starts	0.5	**6**	2.5	2.4							
	0.7										
2	11.2	14.8	3.8	2.7	2.2						Right
16:17:15	5.6	2	**11.2**	14	3	2.1	2.4				
	6.9	**6.7**	4.1	5.4	4.2						
	3.4	**6**	3.5	3.1							
	5.9	3.2	5.2	3							
3	9.3	2.7	3.9	4.6	2.3						Right
16:18:36	13.7	4.2	4.9	5.5							
	2.8	13.8	3.6	2.5	2.8						
	4.6										
	2.4	0									
	11.6	4	3.9	6	4.4						Right
16:20:13	1.1	1.6	3.5	5	5.2						
	1.6	4	1.3	2.5	2.1						
	1.6	2.2	1.5	2.4	1.5	4.7					
	5.7										
5	3.4	2.9									Right
16:21:43	1.8	4	17.1								
	2.1	5.5	3.5	4.8	13.7						
	1.9	3.3	3.4	2.8	4.1	2.5					
	12.7	3.5									
6	30	6.2									Right
16:23:18	21.6	2	1.6	3.3							
	3.8	2.7	2.3	2.3	3.4	3.3					
	2.8	6.5	2.4								
	1.9	5.2	6.2	3.5							
7	1.5	2.7	3.8	9.6	2.7	3.3	4.5				Right
16:24:43	3.5	3.2	5.2	3.7	3.4	3.7					
	3.6	2.7	4.6	4.9							
	0.5	5.2	2.4	3.7							
	0.7	6.7	3.9								
8	2.6	8.2	8.6	6.5							Right
16:26:13	2.3	3.9	2.5								
	2.2	5									
	3.6	4.6	3.3								

	15.4	4.8						
9	4.9	9.5	9.2	7.6				Right
16:27:45	2	2.6	2.6	2.9	9.6			
	1.5	2.6	3.4	5.2	4.7	3	2.8	
	1.5	2.1	2.8	4	**6.1**			
	0.9	2.9	3.6	6	3.8	2.4		
10	0.9	5.6	2.9	12.1	2.4	6.5		Right
16:29:12	1.9	5.2	2.4	**6.8**	3.4	1.9	2.7	
	2	6.8	4.9	3.4	2.1			
	2.1	3.7	2.5	3.1				
	4.1	3.7						

Ideal Headway	Prevailing Headway		Startup Lost Time		
3.8	3.80	-1.741666667	1.458333333	-0.241666667	4.158333333
1.6	1.60	-0.241666667	0.458333333	-0.341666667	-1.041666667
		-2.441666667		-0.441666667	-0.541666667
		-2.241666667			
	2.20				
	2.50	2.658333333	-0.941666667		
4.2	4.20			1.158333333	2.458333333
		0.458333333		0.558333333	0.158333333
		2.958333333	0.258333333	2.258333333	0.058333333
	2.30				
			1.258333333	1.958333333	2.558333333
2.8	2.80	-0.141666667		0.658333333	-0.441666667
		1.658333333			
		-0.541666667	-2.941666667		
	4.40				
	5.20	-1.841666667	-1.341666667	0.558333333	
2.1	2.10	-1.341666667	1.058333333	-1.641666667	-0.441666667
3.1	3.10	-1.341666667	-0.741666667	-1.441666667	-0.541666667
		2.758333333			

		-1.141666667			
	13.70	-0.841666667	2.558333333	0.558333333	1.858333333
3.3	3.30	-1.041666667	0.358333333	0.458333333	-0.141666667
			0.558333333		
			-0.941666667	-1.341666667	0.358333333
3.4	3.40		-0.241666667	-0.641666667	-0.641666667
		-0.141666667		-0.541666667	
		-1.041666667	2.258333333		0.558333333
	3.50				
	3.55	0.558333333	0.258333333	2.258333333	0.758333333
		-0.658333333	-0.241666667	1.658333333	1.958333333
		-2.441666667	2.258333333	-0.541666667	0.758333333
		-2.241666667		0.958333333	
		-0.641666667	0.958333333	-0.441666667	
		-0.741666667	2.058333333		
		0.658333333	1.658333333	0.358333333	
			1.858333333		
		-0.941666667	-0.341666667	-0.341666667	-0.041666667
3.5	3.50	-1.441666667	-0.341666667	0.458333333	2.258333333
	6.10	-1.441666667	-0.841666667	-0.141666667	1.058333333
3.1	3.10	-2.041666667	-0.041666667	0.658333333	
	4.45				
2.3	2.67	-1.041666667		-0.541666667	
2.1	2.10	-0.941666667		1.958333333	0.458333333
		-	0.758333333	-	0.158333333

		0.841666667		0.441666667	
		1.158333333	0.758333333		
		-0.509313725	0.422619048	0.254885057	0.68442029
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.94	3.80				**0.85**

Intersection	**3 Av & 34 St**					Date & Time				**5/18/11; 16:30-16:45**	
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	2.5	5.7	4.4	10.1	3.5	3.4					Right
16:30:43	2.4	4.8	12								
red signal	1.2	2.5	2.8	2.5	2.8						
starts	3.6	3.1	2.3	1.8	2.2						
	10.3	7.3	2.9	2.7							
2	23.2	3.7	3.3								
16:31:58	4.2	**6.9**	4.4	**10.6**							
	2.2	**9.5**	**9.3**	5	**7.9**						
	0.8	4.1	2.6	2.2							
	1.7	4									
3	2.3	21.2									
16:33:42	0										
	10.7	3.8	3.2	2.5	2.8	2.4					
	7	3.1	2.4	**8.9**							
	4.5	2.1	3.7								
4	2.2	4	11.6	2.5	2.8	4.7	6.5				
16:35:12	3.4	2	5.4	4.4	3.2						
	2.4	4.4	2.5	3.6							
	2.1	4.6	1.8	3	2.1						
	3	16.2	3.4								
5	2.7	2.5	4.1	1.4	2.9	13.6	2.6				
16:36:44	3.5	3.5	2	3.4	**14.7**						
	8.5	2.2	2.1	**7**							
	6	9	1.9	3.1	2						
	1.3	4.2									
6	5.2	2.3	4.6	5.3	3.1						
16:38:13	2.3	15.8									
	2.1	6.8	2.4	7.1	4.2						
	1.9	5.5	2.8								
	6.2	4.5									
7											
16:39:43	traffic was controlled by polcimen, all stops										
8	13	2.4									
16:41:18	1.9	5.2	6.6	3.3	5.2	3.2					
	8	3.6	2.1	2.5	4.9	9.1					
	7.9	1.4	2	1.8	5.2	3.9					

		6.1	3.1	1.7	3.2	3.7	4.6	
	9	11.7	11.9	3.9	5.5			
	16:42:45	**6.2**	2.9	3.8	9			
		7.4	3.3	2.4	3.5	2.2	6.7	
		6.4	4.5	2.7	4	1.5		
		0						

Ideal Headway	Headway		Startup Lost Time		
	3.50				
		-0.54	1.86	9.06	
2.8	2.80	-1.74	-0.44	-0.14	-0.44
2.2	2.20	0.66	0.16	-0.64	-1.14
				-0.04	-0.24
		1.26		1.46	
	7.90	-0.74			2.06
		-2.14	1.16	-0.34	-0.74
		-1.24	1.06		
2.6	2.60		0.86	0.26	-0.44
			0.16	-0.54	
		1.56	-0.84	0.76	
	4.65				
3.2	3.20	0.46	-0.94	2.46	1.46
		-0.54	1.46	-0.44	0.66
		-0.84	1.66	-1.14	0.06
		0.06			
	6.37				
	14.70	0.56	0.56	-0.94	0.46
			-0.74	-0.84	
2	2.00			-1.04	0.16
		-1.64	1.26		
	3.10				
		-0.64			
4.2	4.20	-0.84		-0.54	
		-1.04		-0.14	
			1.56		

	4.20	-1.04	2.26		0.36
	4.90		0.66	-0.84	-0.44
4.55	4.55		-1.54	-0.94	-1.14
4.15	4.15		0.16	-1.24	0.26
			-0.04	0.86	6.06
2.2	4.45		0.36	-0.54	0.56
1.5	1.50		1.56	-0.24	1.06
		-2.94			
		-0.60	0.56	0.19	0.48

Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.94	**4.50**				**0.62**

Intersection		**3 Av & 34 St**				Date & Time		**5/17/11; 4:15**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	2.41	5.76	3.79	6.44	3.99	2.32	2.39	5.15	2.82	2.92	Right
	1.07	2.51	2.83	1.42	2.26						
	1.31	2.24	3.8	2.48	3.68	2.74					
	1.9	3.3	2.09	3.83	1.65						
	1.76										
2	3.83	8.65	12	5.16	3.25	2.74	4.91				Right
	1.48	4.44	3.96	1.69	1.83						
	2.73	2.99	2.41	1.42							
	2.35	2.91	2.07	2.37	1.7						
	2.69	3.66									
3	10.18	2.49	2.71	5.84	4.03						Right
16:19:00	8.48	2.54	4.86	2.69	2.6	2.53	2.11	1.43			
	5.63	4.19	2.07	1.7	1.46						
	0										
	0										
4	5.8	7.56	2.45	10.69	2.28	2.28	2.5	3.74			Right
	1.53	4.9	2.46	3.37	2.23	2.01	2.94				
	3.51										
	3.83										
	0										
5	1.88	2.32	2.08	2.89							Right
	1.62	2.91									
	0										
	4.16	3.55	3.3	2.3	1.62	2.13	1.56	2.34	1.31		
	8.98	6.03	8.7	2.79							
6	1.43	5.84	5.96	5.63	3.09	2.7	4.21	3.49	2.13	2.06	Right
16:23:45	0										
	3.52	4.25	4.18	1.51	2.18	1.54	1.52				
	3.83	3.29	3.29	2.18	3.29	1.26					
	4.05	3.79									
7	0										Right
	1.79	3.05	5.33	7.04							
	3.18	2.4	1.8	3.74	2.6						
	1.45	2.35	2.55	2.69	3.82	2.97	1.91	1.54			
	1.52	2.84									
8	2.4	2.85	3.33	2.18	12.34	7.75					Right
	3.04	1.92	2.47	2.91	2.07	2.32					
	2.1	3.38	2.16	2.26	1.88	1.54					
	2.05	3.27	2.63	2.21							

	2.91	3.35	2.48								
9	4.85	3.24	2.92	2.53	2.93	**9.01**					Right
	0										
	1.6	2.58	2.79	1.38							
	1.66	3.08	2.87								
	0										
10	0										Right
	1.7	5.5	1.5	2.7	6	3.6	4.2	2.8	9.5		

Base Headway	Prevailing Headway	1	2	3	4
2.26	2.26	-1.03	0.41	0.73	-0.68
3.21	3.21	-0.79	0.14	1.70	0.38
1.65	1.65	-0.20	1.20	-0.01	1.73
		-0.34			
	3.63	1.73			
1.83	1.83	-0.62	2.34	1.86	-0.41
		0.63	0.89	0.31	-0.68
1.70	1.70	0.25	0.81	-0.03	0.27
		0.59	1.56		
	4.03				
2.17	2.17		0.44	2.76	0.59
1.46	1.46		2.09	-0.03	-0.40
	2.70			0.35	
2.39	2.39	-0.57	2.80	0.36	1.27
		1.41			
		1.73			
		-0.22	0.22	-0.02	0.79
		-0.48	0.81		
1.79	1.79	2.06	1.45	1.20	0.20
					0.69
	2.95	-0.67			
1.75	1.75	1.42	2.15	2.08	-0.59
2.28	2.28	1.73	1.19	1.19	0.08
		1.95	1.69		
		-0.31	0.95		
2.60	2.60	1.08	0.30	-0.30	1.64
2.56	2.56	-0.65	0.25	0.45	0.59

		-0.58	0.74		
	10.05				
2.20	2.20	0.94	-0.18	0.37	0.81
1.71	1.71	0.00	1.28	0.06	0.16
		-0.05	1.17	0.53	0.11
		0.81	1.25	0.38	
	5.97	2.75	1.14		
		-0.50	0.48	0.69	-0.72
		-0.44	0.98	0.77	
	4.15	-0.40			
		0.358535842	1.053685185	0.696277778	0.287777778
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.10	2.96				2.40

APPENDIX
HEADWAY DATA FOR PARK AVENUE

Intersection	**Park Av & 57 St**			Date & Time	**09/29/11; 12:00**					
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1											Right
	5.44										
	4.36										
	4.50										
2											Right
	3.27	3.86									
	3.58	2.20	2.97								
	4.99	2.88	2.02								
3											Right
	4.80										
	4.33										
	4.02										
4											Right
	6.49										
	4.10	3.41	3.12	2.77	2.65						
	2.93	3.02									
5											Right
	2.74	5.28	5.92	9.15	4.83	2.73	2.37				
	1.07	3.51	2.24								
	2.79	2.88	2.27	2.00							
6											Right
	2.35	4.30	2.51								
	1.68										
7											Right
	4.47	3.46									
	1.59	4.08	3.65								
	2.38	**6.95**									
8											Right
	4.96	4.68	3.71	8.37	3.91	5.67					
	4.15										
	3.21										

9							Right
	2.57	5.69					
	3.97	2.15	2.13	2.24	2.65	2.18	
	3.46	3.33	2.37				
10							Right
	1.66	2.23	2.91	4.02			
	2.16	3.83	1.79				
	2.62	3.69	4.27				

Ideal Headway	Headway	Startup Lost Time			
		2.91			
		1.83			
		1.97			
		0.74	1.33		
		1.05	-0.34	0.44	
		2.46	0.35	-0.52	
		2.27			
		1.80			
		1.49			
2.65	2.65	1.57	0.88	0.59	0.24
		0.40	0.49		
	3.31	0.21	2.75	3.39	
		-1.47	0.98	-0.30	
		0.26	0.35	-0.27	-0.54
			-2.54		
		-0.19	1.77	-0.03	
		-0.86			

		1.94	0.93		
		-0.95	1.55	1.12	
		-0.16			
	4.79				
		1.62			
		0.68			
		0.03	3.16		
2.42	2.42	1.44	-0.39	-0.41	-0.30
		0.93	0.80	-0.17	
		-0.88	-0.31	0.38	
		-0.38	1.30	-0.75	
		0.09	1.16	1.74	
	averages =	0.77	0.79	0.40	-0.20

Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.54	3.29				1.76

Intersection	**Park Av & 57 St**				Date & Time	**09/29/11; 12:30**				
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0.00 2.85 2.15 1.85	3.57	3.52	16.64							Right
2	0.00 7.41 4.68 4.00	4.10 3.21	3.88	2.40							Right
3	0.00 4.88 2.77 4.88	4.69 3.35 2.26	2.27 2.60	3.13 2.15							Right
4	0.00 3.04 0.00 2.62	5.22									Right
5	0.00 3.41 1.70 3.22	4.88 3.83 3.13	2.30	3.46	2.63						Right
6 38	0.00 2.93 3.91 1.76	5.55 3.80	2.16	1.98	2.54						Right
7	0.00 2.44 1.76 2.32	3.93 2.85	2.18	2.77							Right
8	0.00 2.18 2.46 2.29	2.46 4.19	2.32	3.22							Right

9	0.00				Right
	3.02	3.79	**15.67**	2.91	
	6.27	2.02	2.05	1.81	
	3.04	3.65	2.60	3.90	
10	0.00				Right
	1.88				
	4.69				
	3.43				

Base Headway	Prevailing Headway	Ideal Startup Lost Time			
		0.27			
		-0.44			
		-0.74			
		4.83	1.52		
		2.10	0.63	1.30	-0.19
		1.42			
		2.30	2.11		
		0.19	0.77	-0.32	0.55
		2.30	-0.33	0.02	-0.44
		0.46	2.64		
		0.04			
		0.83	2.30		
2.63	2.63	-0.89	1.25	-0.29	0.88
		0.64	0.55		
		0.35	2.97		
2.54	2.54	1.33	1.22	-0.43	-0.61
		-0.83			

		-0.15	1.35	-0.41	0.19
		-0.83	0.27		
		-0.27			
		-0.41			
		-0.13	-0.13	-0.27	0.64
		-0.30	1.61		
		0.44	1.21		0.33
		3.69	-0.57	-0.54	-0.78
		0.46	1.07	0.02	1.32
		-0.71			
		2.11			
		0.85			
	averges =	0.65	1.13	-0.10	0.19
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.59	2.59				1.87

Intersection	**Park Av & 57 St**				Date & Time	**09/29/11; 12:45**				
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0.00										Right
	2.66	5.03	2.82								
	1.77	3.05	1.99	1.63							
	2.13										
2	0.00										Right
	3.30	**8.43**									
	2.85	2.65	2.66	3.16							
	2.88	3.77	2.60								
3	0.00										Right
	2.09	3.32									
	4.13	1.96	1.91	3.79	2.16						
	3.40	4.66									
4	0.00										Right
	1.71	3.65									
	2.12	2.24	3.10								
	1.74										
5	0.00										Right
	4.71	3.07									
	3.93	2.63	3.08	1.85	2.44						
	2.65	2.37	2.21	1.27							
6	0.00										Right
53	2.74	4.94	2.91								
	2.83	3.41	1.95	2.66	1.54						
	1.52	2.66									
7	0.00										Right
	0.00										
	3.32	4.82									
	0.00										
8	0.00										Right
	1.87	3.08	1.87	2.82	2.90	6.10					
	3.15	2.52									
	4.79										

9	0.00								Right
	5.17	20.85	2.83	3.02	4.29				
	4.66	2.96	4.68	1.88					
	2.62	2.94	1.66	2.98	1.82				
10	0.00								Right
	4.18	5.10	2.12	2.93					
	2.24	4.14	4.10	2.49	4.16	2.04	2.80	2.20	
	1.63	3.91	3.02	2.07					

Base Headway	Prevailing Headway	Ideal Startup Lost Time			
		0.12	2.49	0.28	
		-0.77	0.51	-0.55	-0.91
		-0.41			
		0.76			
		0.31	0.11	0.12	0.62
		0.34	1.23	0.06	
		-0.45	0.78		
2.16	2.16	1.59	-0.58	-0.63	1.25
		0.86	2.12		
		-0.83	1.11		
		-0.42	-0.30	0.56	

		-0.80			

		2.17	0.53		
2.44	2.22	1.39	0.09	0.54	-0.69
		0.11	-0.17	-0.33	-1.27

		0.20	2.40	0.37	
1.54	1.54	0.29	0.87	-0.59	0.12
		-1.02	0.12		

0.78	2.28		

4.50	6.10	-0.67	0.54	-0.67	0.28
		0.61	-0.02		
		2.25			

	4.29	2.63			
		2.12	0.42	2.14	-0.66
1.82	1.82	0.08	0.40	-0.88	0.44

		1.64	2.56	-0.42	0.39
2.80	2.80	-0.30	1.60	1.56	-0.05
		-0.91	1.37	0.48	-0.47

	averges =	0.41	0.89	0.12	-0.08
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.54	2.99				1.34

Intersection	**Park Av & 57 St**					Date & Time	**09/29/11; 16:00**				
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0.00										Right
	7.67	3.08	2.80								
	9.17	3.04	3.13	1.79	3.10	2.23					
	5.89	1.90	2.41								
2	0.00										Right
	17.48	11.35	9.07	8.05							
	14.16	3.68	5.63	**14.52**	11.99						
	13.35	4.16	4.86	2.58	2.90	5.77	3.29	4.88			
3	6.42	3.05	8.75	3.82							Right
	7.22	5.63	2.24	2.37	2.49	2.97					
	4.55	2.60	2.68	2.60	1.74	2.51	2.29	2.79	2.35		
	2.88	4.78	2.01	2.41	3.50	2.30	2.90				
4	2.27	4.49	11.17								Right
	5.02	1.79	3.21	2.37	2.46	2.20					
	3.97	4.50	3.12	1.66	1.91	3.83	1.68	1.73	2.60		
	4.18	2.69	2.12	2.35	2.29	1.96	2.35	2.46	1.45		
5	0.00										Right
6	0.00										
	2.09	4.39	2.45	2.83	2.04	1.88	4.80				
	1.93	3.01	2.15	2.34	2.74						
6	0.00										Right
	8.43										
	0.00										
	6.81	5.89	2.02	1.65	2.44						
7	2.35	6.31									Right
	1.84										
	3.38	4.05	2.35	2.30	2.48	2.27	2.57				
	6.81	5.89	2.02	1.65	2.44						
8	4.91	15.75									Right
	2.13	9.45	**6.58**	4.89	3.29	10.29	2.73	2.94	2.40		
	2.82	4.33	4.75	4.33	5.50	2.57	2.34	2.80	2.87		
	0.96	2.34	3.29	4.29	2.13	3.35	4.64	3.71	4.38		

9	4.54	2.12	20.92	6.94	3.04	3.29				Right
	1.96	5.49	3.47	10.15	11.12	4.63	1.62			
	0.98	4.29	2.43	2.74	2.68	1.65	1.84	1.85	2.13	
	1.45	3.08	2.91	2.13	2.12	3.69	3.90	3.44		
10	3.21	5.02	11.27	4.82	4.15	2.66	4.46			Right
	2.94	3.62	2.55	2.07						
	2.59	2.85	5.95	2.51						
	1.84	3.86	3.49							

Base Headway	Prevailing Headway	Ideal Startup Lost Time			
			0.30	0.02	
2.67	2.67		0.26	0.35	-0.99
		3.11	-0.88	-0.37	
	11.99		0.90	2.85	
4.21	4.21		1.38	2.08	-0.20
	2.73		2.85	-0.54	-0.41
2.34	2.34	1.77	-0.18	-0.10	-0.18
2.90	2.90	0.10	2.00	-0.77	-0.37
	2.33	2.24	-0.99	0.43	-0.41
2.35	2.35	1.19	1.72	0.34	-1.12
2.10	2.10	1.40	-0.09	-0.66	-0.43
2.90	2.90	-0.69	1.61	-0.33	0.05
2.74	2.74	-0.85	0.23	-0.63	-0.44
2.44	2.44		3.11	-0.76	-1.13

		-0.94			
2.44	2.44	0.60	1.27	-0.43	-0.48
2.44	2.44			-0.76	-1.13

	4.33	-0.65			2.11
3.22	3.22	0.04	1.55	1.97	1.55
3.64	3.64	-1.82	-0.44	0.51	1.51

	3.17				
	5.79	-0.82	2.71	0.69	
2.03	2.03	-1.80	1.51	-0.35	-0.04
3.29	3.29	-1.33	0.30	0.13	-0.65

	3.76	0.43	2.24	8.49	2.04
		0.16	0.84	-0.23	-0.71
		-0.19	0.07	3.17	-0.27
		-0.94	1.08	0.71	
		0.05	0.97	0.63	-0.08

Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.78	3.45				1.57

Intersection	**Park Av & 57 St**					Date & Time	**09/29/11; 16:15**				
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0.00										Right
	10.59	2.87									
	5.71	5.30	2.62	2.49							
	5.58	3.30	3.47								
2	2.21	3.27	27.31	13.79							Right
	0.00										
	3.05	3.04	2.21	2.07							
	3.12	3.33									
3	0.00										Right
	1.45										
	2.26	3.69	5.32	2.30							
	2.09	4.40	3.04	3.41							
4	0.00										Right
	1.77	3.69	**14.55**	3.38	4.21	4.25	2.79	6.91			
	2.57	2.83	3.30	2.30	2.05	2.04	2.18	3.57	1.18		
	2.06	2.38	1.81	1.70	3.44	4.43	3.21				
5	3.49	6.83	7.95	4.19	4.32	5.89	9.53				Right
22	3.68	3.65									
	4.58	4.02	1.79	2.52	3.37	2.21	2.24	2.32	1.51		
	3.19	2.65	3.15								
6	5.69	4.10	9.84	7.30							Right
	2.66										
	3.46	2.65	2.44	1.90	1.59	2.23					
	3.04	2.63	2.16								
7	2.23	4.43	3.82	10.45	7.67	5.24	2.91	1.95			Right
	5.75										
	3.27	2.35	2.25	1.99	2.60						
	3.41	2.96	1.51	2.97							
8	6.61	16.14	21.18								Right
	4.00										
	5.77	21.46	3.51	4.71	2.30	2.69	2.09	1.90	1.96		
	5.58	4.86	14.27	3.88	1.85	2.19	2.48				

9	3.72	13.77	22.76	6.39			Right
	13.99	3.88	2.96	2.87			
	11.45	1.52	6.69	2.94	1.95		
	10.26	1.34	2.19				
10	4.50	17.28	5.77	2.51	6.72		Right
	6.41	17.17	3.12	2.12	2.69		
	17.75	3.49	3.77	3.97	1.84	2.34	
	2.54	15.61	2.96	3.27	2.74	2.77	

Base Headway	Prevailing Headway	Ideal Startup Lost Time			
			0.36		
		3.20	2.79	0.11	-0.02
		3.07	0.79	0.96	

		0.54	0.53	-0.30	-0.44
		0.61	0.82		

		-1.06			
		-0.25	1.18	2.81	-0.21
		-0.42	1.89	0.53	0.90

3.75	4.54	-0.74	1.18		0.87
2.20	2.20	0.06	0.32	0.79	-0.21
3.69	3.69	-0.45	-0.13	-0.70	-0.81

	6.58				
		1.17	1.14		
2.33	2.33	2.07	1.51	-0.72	0.01
		0.68	0.14	0.64	

		0.15			
1.91	1.91	0.95	0.14	-0.07	-0.61
		0.53	0.12	-0.35	

	4.44				
		3.24			
2.60	2.60	0.76	-0.16	-0.26	-0.52
		0.90	0.45	-1.00	0.46

		1.49			
2.19	2.19	3.26		1.00	2.20
2.17	2.17	3.07	2.35		1.37

			1.37	0.45	0.36
1.95	1.95		-0.99	4.18	0.43
			-1.17	-0.32	

	6.72				
	2.69			0.61	-0.39
2.09	2.09		0.98	1.26	1.46
2.76	2.76	0.03		0.45	0.76
		0.99	0.71	0.50	0.31
Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.51	3.26				2.51

Intersection	**Park Av & 57 St**					Date & Time	**09/29/11; 16:45**				
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0.00										Right
	11.42	5.49	4.46	6.75	3.18	2.34	3.68	2.90	2.37	3.19	
	3.27	6.80	4.36	3.36	3.82	3.71	3.07	2.24	2.83	2.15	
	8.50	1.21	2.29	2.65	2.30	2.34	1.88	3.49	3.96		
2	0.00										Right
	4.35	3.04									
	3.51	3.54	3.65	4.83							
	5.91	4.60	3.12								
3	4.72	4.41	21.06	3.58	2.85	3.65					Right
	5.32										
	3.26	3.43	3.41	2.30	1.96	1.87	4.08	2.18			
	3.29	3.02	5.66	2.77	3.75	3.26	1.54	2.38			
4	8.47	4.35	7.05								Right
	3.57	3.90	4.02	3.97							
	1.65	4.19	2.57	1.32	4.10	1.98	1.37	1.35	2.13		
	3.65	4.30	3.05	2.90	2.13						
5	1.76										Right
52	1.65	3.15	4.27								
	1.99	2.26	1.74	2.90							
	0.85										
6	4.05										Right
	3.10	3.69	2.96								
	5.78	2.76	2.13	1.96							
	1.54	4.77									
7	10.17	7.16	7.70								Right
	2.62	3.57	3.26								
	2.91	3.86	2.73	2.27	1.91						
	1.98	2.79	1.46	2.94							
8	0.00										Right
	4.69	3.96	2.83	2.85							
	5.05	2.26	4.39	2.01	1.35						
	3.88	2.58	1.91								

9	0.00				Right
	4.75	3.54	3.08		
	2.79	4.69			
10	0.00				Right
	3.85	3.04	4.02		
	2.60	3.27	2.91	2.18	
	2.15	2.80	2.77		

Base Headway	Prevailing Headway	Ideal Startup Lost Time			
2.94	2.94		3.03	2.00	4.29
2.97	2.97	0.81		1.90	0.90
2.79	2.79		-1.25	-0.17	0.19

		1.89	0.58		
		1.05	1.08	1.19	2.37
		3.45	2.14	0.66	

	3.25				
		2.86			
2.52	2.52	0.80	0.97	0.95	-0.16
2.73	2.73	0.83	0.56	3.20	0.31

1.11	1.44	1.56	1.51
-0.81	1.73	0.11	-1.14
1.19	1.84	0.59	0.44

-0.81	0.69	1.81	
-0.47	-0.20	-0.72	0.44
-1.61			

0.64	1.23	0.50	
3.32	0.30	-0.33	-0.50
-0.92	2.31		

		0.16	1.11	0.80	
1.91	1.91	0.45	1.40	0.27	-0.19
		-0.48	0.33	-1.00	0.48

		2.23	1.50	0.37	0.39
1.35	1.35	2.59	-0.20	1.93	-0.45
		1.42	0.12	-0.55	

		2.29	1.08	0.62	
		0.33	2.23		

		1.39	0.58	1.56	
		0.14	0.81	0.45	-0.28
		-0.31	0.34	0.31	
		0.87	0.99	0.75	0.54

Base Hdwy	**Prevailing Headway**				**Start up Lost time**
2.46	2.56				3.15

Intersection		**Park Av & 57 St**				Date & Time		**09/28/11; 12:00**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	3.4	3.3	2.4	2.9	3.2	5.6	4.6	5	3.8		
	2.1	4	3.6	1.6	3.9	2.7					
	4	4.7	**6.4**	15.1							
2	0										Right
	1.4	3.8	3.6								
	1.3	2.6	2.7	2.3	2.2						
	3.8	4.5	3	2.8	3.1	9.6	7.8	10			
3	0										Right
	4.7	5.3	**8.2**	2.2	2.8	3.9	2				
	3.8	8.7	2.3	2.3	2.8	4.1	3.5	1.5	2.2		
	4.9	6.5	3.2	3.4	4.1	3.7	3.6				
4	0										Right
	5.4	3.3	4.2	8.2	3.8						
	3.1	3.1	2.6	2.7	3.6	3.4	3.8	4.1	2.6		
	2.4	2.9	3.4								
5	0										Right
	3.4	5.3									
	3.6	4.2									
	1.2										
6	0										Right
	9.6	3.1	2.7								
	7	4.4	2.1	2.1	2.3	1.9	3.4	3.2	1.8		
	6.5	5.9	2.5	2.6	2.9	2.1	2.5	2.7	4.4		
7	0										Right
	3.1	9.5	6.6	6.5	4.1						
	6.5	3.3	2.2	4.3	3.2	3.9	3.1	2.8	2.5		
	3.2	2.8	3.9	3.6	4.5	3.3					
8	0										Right
	2.8	2.4	2.9	4.3	2.7						
	2.8	3.2	3.9	2.8	5.5	5.3	4	3.3	2.5		

	5.1	3.6	4.2	3.3	2.1	2.9					
9	0										Right
	19.9	2.6	3	3	3.7						
	1.8	16.3	3.7	4.9	2.6	3.4	3.2	3	2.6		
	1.4										
10	0										Right
	5.3	7.1									
	2.3	4	3.7	3.7	3.5	2.6	2.8	2.4	2.8		

			Start up Lost Time			
ideal headway	headway		Ideal Startup Lost Time			
	4.44		0.45	0.35	-0.55	-0.05
3.30	3.30		-0.85	1.05	0.65	-1.35
			1.05	1.75		
			-1.55	0.85	0.65	
2.20	2.20		-1.65	-0.35	-0.25	-0.65
	3.10		0.85			
	2.90					-0.75
	2.50				-0.65	-0.65
3.80	3.80		1.95		0.25	0.45
	3.80			0.35		
	3.50		0.15	0.15	-0.35	-0.25
			-0.55	-0.05	0.45	
			0.45			
			0.65	1.25		
			-1.75			
				0.15	-0.25	
	2.30				-0.85	-0.85

2.92	2.92				-0.45	-0.35
	4.10		0.15			
	2.90			0.35	-0.75	
3.90	3.90		0.25	-0.15	0.95	0.65
	2.70		-0.15	-0.55	-0.05	
2.90	2.90		-0.15	0.25	0.95	-0.15
2.50	2.50		2.15	0.65	1.25	0.35
	3.70			-0.35	0.05	0.05
2.96	2.96		-1.15			
			-1.55			
2.82	2.82		-0.65	1.05	0.75	0.75
3.03	3.16		-0.10	0.40	0.1	-0.2
Base Hdwy	**Prevailing Headway**				**Start up Lost time**	
2.95	**3.16**				**0.20**	

Intersection		**Park Av & 57 St**				Date & Time		**09/28/11; 12:15**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	2.7	3.6	13	16.2	8.6	2.6					
	2.4	3.5	2.4	2.4	2.1						
	2.8	4.1	3.8								
2	0										Right
	3.2	2.5	12	3.4	3	7.4	3	3.3	2.2		
	1.1	2.9	1.8	2.5	2.6	2.5	2.2	3.6	4.4		
	3	2.7	2.6	2.9	4.6	17.8	2.6	10.4			
3	0										Right
	3.4	2.1	3.5	11.8	3.9	3.1	2.1				
	1.5	3.6	2.6	2	5.1	2.4	3				
	1.2	3.5	3.4	3	2.1	3.3	2.6	3.4	3.5		
4	0										Right
	4	3.5	3.8								
	3.3	2.5	3.1	3.7	3.7	4.5	3.7	3.8	3.7		
	5.2	4.5	3.6	4.1	6.7	16.5	2.6				
5	0										Right
	3.1	3.3	2.1	2.7							
	3.3	2.3	2.2	1.9							
	2.5	3.6	5.3	3.3	3.4	2.8	3.1	2.8	4		
6	0										Right
	3.1										
	3.3	4.5	2.9								
	1.9										
7	0										Right
	3.6										
	4.8	3.4	2.7	3.3	1.7	1.9	1.6				
	6.4	3.4	3								
8	0										Right
	4.2										
	3.6	3.2	2.2	2.7	1.2	1.4					

	2.8	2.4	2								
9	0										Right
	1.4	5.2	2.8								
	2.3	3.4	2.3								
	3.8	3.2	3.3								
10	0										Right
	0										
	3.7	2.6	4.1	4.3	2.7						
	5.1	5.6	2.6								

Base Headway	Prevailing Headway	Start up Lost time			
	2.60	0.16	1.06		
2.10	2.10	-0.14	0.96	-0.14	-0.14
		0.26	1.56	1.26	
	2.88	0.66	-0.04		0.86
2.43	2.43	-1.44	0.36	-0.74	-0.04
	8.85	0.46	0.16	0.06	0.36
	3.03	0.86	-0.44	0.96	
	3.50	-1.04	1.06	0.06	-0.54
2.98	2.98	-1.34	0.96	0.86	0.46
		1.46	0.96	1.26	
3.88	3.88	0.76	-0.04	0.56	1.16
	4.65	2.66	1.96	1.06	1.56
		0.56	0.76	-0.44	0.16
		0.76	-0.24	-0.34	-0.64
3.22	3.22	-0.04	1.06	2.76	0.76
		0.56			
		0.76	1.96	0.36	
		-0.64			

		1.06			
1.73	1.73		0.86	0.16	0.76
			0.86	0.46	
		1.66			
1.30	1.30	1.06	0.66	-0.34	0.16
		0.26	-0.14	-0.54	
		-1.14	2.66	0.26	
		-0.24	0.86	-0.24	
		1.26	0.66	0.76	
2.70	2.70	1.16	0.06	1.56	1.76
		2.56	3.06	0.06	
		0.48	0.86	0.42	0.47
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.54	3.28			2.24	

Intersection		**Park Av & 57 St**				Date & Time		**09/28/11; 12:30**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	2.5	6.4	9.8	7	5.4	3.5	7	3.1			
	1.2										
	2.7	2.8	2.4	2	2.2	1.7	1.9	2.4	2.4		
2	0										Right
	8.4	2.9									
	4.7	2.8	2.3								
	1.8										
3	0										Right
	0										
	1.5	3.1	3.6	2.1	1.5						
	1.8										
4	0										Right
	2.5	3	4.1	4	2.5						
	2	6.9	2.8	3.3	2.8	1.6					
	2.3	4.4	2.3	2.1							
5	0										Right
	15.6	2.1	5	13.1	5.1	4.8					
	17.7	3.6	2.2	4.9	7.2	1.3	2.4	3	2		
	19	2.2	2.5	5.3	3.4	3	3.9				
6	0										Right
	3.2	6.9	22.6	6	4.4						
	1.9	2.6	3.7	4	13.6	6.3	4.7	2.6	3.6		
	2	3.1									
7	0										Right
	6.1	6.9	2.5	1.9	3.3	8	1.6	2.4	5.1		
	6.5	4.8	3.5	2.4	3.4	4.6	4.4	4.1	2.2		
	9.5	2	2.7	2.3	3.7	3.5	6	4.5	3.7		
8	0										Right
	2.2	3.5	3.8	3.3	3.1	3.3					
	1.2	3.3	3.3	4.1	7	2.4	1.6	2	2.3		

	2.3	2.1	4.7	2.4	2.6	2.6	6.2	4.1			
9	0										Right
	2.4	3.6	2.6	3.3	4.1	3.9					
	1.6	4.8	5.1	3.9	2.7	6	5.1	2.6	9		
	3.4	4	3.2	5.1	4.5	2.9	3.4	5.3	5.2		
10	0										Right
	2.7	3.7	3	11.5	8.5	2.7	1.7	3.4	2.6		
	2.6	2.2	2.1	2.3	3.6	6.3	5	2.9	2.2		
	1.6	2.7	2.6	2.7	4	3.4	5.3	3.4	3.5		

Ideal headway	Prevailing headway	Startup Lost Time			
	4.00	-0.73			
		-2.03			
2.12	2.12	-0.53	-0.43	-0.83	-1.23
			-0.33		
			-0.43	-0.93	
		-1.43			
1.50	1.50	-1.73	-0.13	0.37	-1.13
		-1.43			
	2.50	-0.73	-0.23		
2.20	2.20	-1.23	3.67	-0.43	0.07
		-0.93	1.17	-0.93	-1.13
	4.95		-1.13	1.77	
	2.18		0.37	-1.03	
3.43	3.43		-1.03	-0.73	2.07
	4.40				
	6.16	-1.33	-0.63	0.47	0.77

		-1.23	-0.13		
	3.10			-0.73	-1.33
	3.74		1.57	0.27	-0.83
4.28	4.28		-1.23	-0.53	-0.93
	3.20	-1.03	0.27	0.57	0.07
	2.08	-2.03	0.07	0.07	
3.10	3.10	-0.93	-1.13	1.47	-0.83
	4.00	-0.83	0.37	-0.63	0.07
4.10	4.10	-1.63	1.57	1.87	0.67
4.26	4.26	0.17	0.77	-0.03	1.87
	2.60	-0.53	0.47	-0.23	
2.90	2.90	-0.63	-1.03	-1.13	-0.93
3.92	3.92	-1.63	-0.53	-0.63	-0.53
		-1.12	0.083043478	-0.091904762	-0.205
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
3.18	3.40			**-1.33**	

Intersection	**Park Av & 57 St**				Date & Time	**09/28/11; 12:45**				
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	1.8	2.8	2.2	3.5	4.2	2.9	2.1	1.9	2.7		
	2.5	3.8	2.5	17.6	1.9	3.6	3.5	1.9	2.7		
	6.4	2.6	2.2	5.8							
2	0										Right
	3.6	3	2.9	3.5	2.9	7.8	3.3	2.5	3.5		
	1.3	2.5	3.1	3.6	2.6	2.9	2.7	7.1	2		
	1.4	2.4	3.1	3.2	4.4	9.1	2.9	10.6			
3	0										Right
	2	3.7	3.6	2.9	2.4	9.5	1.9	2	3		
	1.5	2.2	2.2	2.6	2.8	10.7	2.3	2.7	2.4		
	1.6	2.2	2.4	5.5	3	6.2	4.1	3.7			
4	0										Right
	1.7	3.8	4.5	4.7	6.3	7.4	5.7	5.3	3.4		
	4.6	3.8	3	2.7	2.7	4.4	3.5	3.3	2.7		
	2.6	3.2	2.9	2.4	2.7	4.6	2.7	2.1	2.7		
5	0										Right
	5.6	4.3	4.1	6.2	2.8	2	2.1	1.5	1.8		
	1.5	3.8	2	3.3	5.3	5.2	3.5	4	2.1		
	2.4	3.2	9.6	5.6							
6	0										Right
	2.6	3.7	3.5	3.8	3.5	3.8	4.7	5.2	3.1		
	2.1	7.3	3.9	3.4	3.4	3.5	4.5	5.8	4.7		
	3.2	4.3	4.4	4.1	3.2	2.4	3.7	3.9	3.5		
7	0										Right
	1.9	4.3	2.7	3.6	6	8.4	3.9	3.1	3		
	1.4	3.5	2.9	10.3	10.2	3.1	3.6	2.6	3.9		
	1.7	3.9	3.8	10.5	3.5	4.5	3.5	2.5	2.6		
8	0										Right
	3.4	5.5	6	5.3	5.7	4.6	3.7				
	10.4	4	3.4	5	4.7	3.6	4.2				

	11.8	2.8	2.9	3.8	2.8	3.4	4.3	2.7	2.7		
9	0										Right
	1.8	4.2	2.6	3.5	7.7	10.7					
	3.2	4.2	8.1	2.8	7.5	1.8	1.7	2.1	2.5		
	1.8	2.8									
10	0										Right
	1.5	6.1	2.5	3.1	8.7	3.9	3.6	3.4	3.6		
	2.6	4.6	3.2	2.4	10.7	4.4	7.1	4.8	4.4		
	3	2.7	3.7	2.4	3.1	**6.1**	4.4	2.9	2.3		

Ideal headway	Prevailing headway	Startup Lost Time			
	2.76	-1.42	-0.42	-1.02	0.28
2.50	2.40	-0.72	0.58	-0.72	
			-0.62	-1.02	2.58
	4.00	0.38	-0.22	-0.32	0.28
2.55	2.55	-1.92	-0.72	-0.12	0.38
	3.65	-1.82	-0.82	-0.12	-0.02
	2.33	-1.22	0.48	0.38	-0.32
2.55	2.55	-1.72	-1.02	-1.02	-0.62
2.70	3.60	-1.62	-1.02	-0.82	2.28
	5.62	-1.52	0.58	1.28	
3.32	3.32		0.58	-0.22	-0.52
2.96	2.96	-0.62	-0.02	-0.32	-0.82
	2.04	2.38	1.08	0.88	
	3.20	-1.72	0.58	-1.22	0.08
		-0.82	-0.02		2.38
	4.06	-0.62	0.48	0.28	0.58
	4.38	-1.12	4.08		0.18
3.34	3.34	-0.02	1.08	1.18	0.88

	4.88	-1.32	1.08	-0.52	0.38
	3.30	-1.82	0.28	-0.32	
3.32	3.32	-1.52	0.68	0.58	
	4.67				
□	4.17		0.78	0.18	1.78
3.18	3.18		-0.42	-0.32	0.58
	9.20	-1.42	0.98	-0.62	0.28
	2.03	-0.02	0.98		-0.42
		-1.42	-0.42		
	4.64	-1.72	2.88	-0.72	-0.12
	4.53	-0.62	1.38	-0.02	-0.82
3.18	3.76	-0.22	-0.52	0.48	-0.82
		-0.968	0.424827586	-0.168	0.366956522
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.96	3.72			-0.34	

Intersection	**Park Av & 57 St**				Date & Time		**09/28/11; 13:00**			
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	6.6	3.3	3.4	6.7	11.2	3.7	3.2	4.8	2.5		
	3.7	2.7	2.3	2.8	2.9	6.6	3.9	2.5	2.9		
	4.6	2.4	1.8	2	2.2	3.3	3.1	4.1	2.9		
2	0										Right
	6.6	2.5	3.8								
	1.9	7.3	2.6	4.3	3.8	4.6	3.5	1.9	2.6		
	4.6	3.6	2.2	4.9	2.9	2.4	3.1	3.3			
3	0										Right
	2.8	4.7	7.7	4.9	5.1	7.6	2.4	2.1	1.8		
	1.6	5.1	4.1	4.6	6.1	2.5	4	3.3	1.7		
	7.5	3.8	4.8	4.6	3.4	3.3	4	3.7	2.2		
4	0										Right
	1.8	7.3	3.7	5.5	3.2	4.4					
	4.6	2.9	2.9	3.3	13.3	3.8	11.5	2.9			
	2.3	2.9	2.8	4.5	5.2	6.8	3.1	2.4	2.1		
5	0										Right
	2.8	4.7	6.9	18.5	4.4						
	3	3.5	6.4	3.8							
	3.9	2.8	3.8	3.1	3.3						
6	0										Right
	4.8	4	13	7.6	3	3.4	3.7	3.3			
	5.4	2.2	2.8	2.9	2.9	6.9	3.4	2.3	3.5		
	3	4.1	2.6	2.2	4.5	2.8	2.7	2.5			
7	0										Right
	6.9	2.6	18.7	4.8	2.9	4.6	4.8				
	3.5	4.1	4.5	3.5	3.9	3.2	2.4	2.9	2.4		
	3.5	2.1	4.2	2.9	2.2	3.2	3.9	3.3	3.3		
8	0										Right
	5.1	5.7	4.1	0.5	2.5	7.3	3.9				
	7.1	3.2	7.4	4.5	6	4.1					

	2.8	2.4	4.1	6	3.7	3.1	3.3	3.1			
9	0										Right
	1.1	3.9	3.1	4.2	9.4						
	1.9	5.1	3.5	6.1	4.1						
	2.4	3.1	2	6	6.3	2.9	3.1	3.3	3.1		
10	0										Right
	3.5	3.7	2.3	6.5	9.6	2.6	1.9				
	2.7	3.6	4.2	2.6	2.9	7.5	3.5				
	2.3	4.1	2.4	2.4	3.1	2.9	6.9	2.9	3.1		

Ideal headway	Prevailing headway	Startup Lost Time			
	5.08		0.05	0.15	
3.05	3.05		-0.55	-0.95	-0.45
3.12	3.12	1.35	-0.85	-1.45	-1.25
			-0.75	0.55	
3.28	3.28	-1.35		-0.65	1.05
2.93	2.93	1.35	0.35	-1.05	
	3.80	-0.45			
2.88	2.88	-1.65	1.85	0.85	1.35
3.32	3.32		0.55	1.55	1.35
	3.80	-1.45		0.45	
	3.35	1.35	-0.35	-0.35	0.05
	3.20	-0.95	-0.35	-0.45	1.25
	4.40	-0.45			
		-0.25	0.25		0.55
3.30	3.30	0.65	-0.45	0.55	-0.15
	3.35		0.75		
3.03	3.03		-1.05	-0.45	-0.35

	3.13	-0.25	0.85	-0.65	-1.05
	4.10		-0.65		
2.96	2.96		0.85	1.25	0.25
3.18	3.18	0.25	-1.15	0.95	-0.35
	4.57	1.85			
4.10	4.10		-0.05		1.25
3.30	3.30	-0.45	-0.85	0.85	
	9.40	-2.15	0.65	-0.15	0.95
4.10	4.10	-1.35	1.85	0.25	2.85
	2.40	-0.85	-0.15	-1.25	
	4.70			-0.95	
3.20	3.20	-0.55	0.35	0.95	-0.65
3.00	3.00	-0.95	0.85	-0.85	-0.85
		-0.266666667	0.036363636	0	0.45625
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
3.25	3.72			0.23	

Intersection	**Park Av & 57 St**				Date & Time		**09/28/11; 13:15**			
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	2	5.1	13.9	4.8	9	3.5	2.6	2.3	2.2		
	1.7	1.9	1.9	2.9	6.8	3.3	2.4	2	2.7		
	1.7	3.7	3.6	10.8							
2	0										Right
	1.6	3.1	15.6	3.6	2.8	3.6	2.5	2.4			
	2.7	2.1	3.2	2.6	3.2	5.1	3	3.5	3.6		
	4.4	2.9	2.7	2.9	2.5	2.4	2.1	3.6	3.8		
3	0										Right
	5.1	3.7	18.1	3.3	2.4	8.3	3.5				
	1.2	4.7	5.5	2.4	1.9	2.2					
	3.5	4.2	4	2.6	3	2.6	2.2	2.2	3.5		
4	0										Right
	2.2	4.5	10.8	2.7	4.6						
	2.6	2.1	2.7	3.4	3.5	3.9	2.1	2.7	1.6		
	4	3	3.9	2.3	2.6						
5	0										Right
	3.4										
	2.4	3.1									
	4.1										
6	0										Right
	4.6	5.3	14.1	3.8	3.4	4.1					
	2.1	2.6	3.1	3.6							
	1.9	3	2.2								
7	0										Right
	3.7	5.6	14.9	6.7	2.9						
	1.9	2.9	2.3	3.9	2.3	2.8	2.2				
	1.8	2.9	1.9	2.6	2.8						
8	0										Right
	5	3.1	2.7	2.3	2.9	3.1					
	3.6	1.9	2.6	2.3	1.9						

	5	2.1	3.4	1.9							
9	0										Right
	6	7.5	3.7								
	6.2	3.6	2.1	2.7							
	8.9	2.1									

Base headway	Prevailing headway	Startup Lost Time			
	3.92	-0.64			
	2.60	-0.94	-0.74	-0.74	0.26
		-0.94	1.06	0.96	
	2.83	-1.04	0.46		0.96
3.68	3.68	0.06	-0.54	0.56	-0.04
2.88	2.88	1.76	0.26	0.06	0.26
	4.73		1.06		0.66
2.05	2.05	-1.44	2.06	2.86	-0.24
2.70	2.70	0.86	1.56	1.36	-0.04
	4.60	-0.44			0.06
2.76	2.76	-0.04	-0.54	0.06	0.76
2.60	2.60	1.36	0.36	1.26	-0.34
		-0.24	0.46		
		1.46			
	3.75				1.16
		-0.54	-0.04	0.46	0.96
		-0.74	0.36	-0.44	
	2.90				
2.43	2.43	-0.74	0.26	-0.34	

2.80	2.80	-0.84	0.26	-0.74	-0.04
	3.00		0.46	0.06	-0.34
1.90	1.90	0.96	-0.74	-0.04	-0.34
		2.36	-0.54	0.76	-0.74
				1.06	
			0.96	-0.54	0.06
		6.26	-0.54		
		0.325	0.295	0.389411765	0.177647059
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.64	3.07			1.187058824	

Intersection	**Park Av & 57 St**				Date & Time	**09/28/11; 13:45**				
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	2.7	1.7	1.6	2.6	2.2	4.5					
	1.4	6	3.3	2.2	3.1	2.2					
	1.8	3.9	2.5	3.3	3.3	4.5	5				
2	0										Right
	2.2	4	3.9	3.1							
	2	4.1	9.3	4.6	3.7	2.9					
	2	3.9	6	5.4	7.5	3.9	3.2	2.7	2.6		
3	0										Right
	0										
	2.9	2.8	5.3	4.5							
	0										
4	0										Right
	1.6										
	2.1	3.3									
	2.6										
5	0										Right
	4.9	5									
	1.5	1.9	4.1	3.2	2.9	2	1.9	1.7	1.6		
	3.9										
6	0										Right
	3.4	4.4	3.8	1.2							
	2	2.5	1.6								
	2.4	3.4									
7	0										Right
	2.9	2.5	2.5	2.7							
	2.4	2.8	5.9	1.5	1.7	2.7	2.4	4.3	2.4		
	1.3	3.8									
8	3.5	17.6	2.4	3.3	5.5	7.5	3.4				Right
	2.6										
	2.2	2.5	2.5	2.7	5.6	4.3					

	1.9	2.7	2	2.9	2.3	2.5	3.1	12.3			
9	0										Right
	1.9	4.1	3	3.2							
	1.6	2.1	2.6	2.8	2.3	2.4	2.2	1.7	1.8		
	1.3	5.7	2	2.2							
10	3.9										Right
	4.8	2.7									
	3.8	1.8	2.4								
	2.1	2.5									

Base headway	Prevailing headway	Startup Lost Time			
	2.20	-0.11	-1.11	-1.21	-0.21
2.65	2.65	-1.41			-0.61
4.27	4.27	-1.01	1.09	-0.31	0.49
		-0.61	1.19	1.09	0.29
3.30	3.30	-0.81	1.29		1.79
	3.98	-0.81	1.09	3.19	2.59
		0.09	-0.01		1.69
		-0.71	0.49		
		-0.21			
2.02	2.02	-1.31	-0.91		
		1.09			
			1.59	0.99	-1.61
		-0.81	-0.31	-1.21	

		-0.41	0.59		
			-0.31	-0.31	-0.11
2.70	2.70	-0.41	-0.01	3.09	-1.31
		-1.51	0.99		
	5.47			-0.41	0.49
		-0.21			
	4.95	-0.61	-0.31	-0.31	-0.11
2.63	2.63	-0.91	-0.11	-0.81	0.09
		-0.91	1.29	0.19	0.39
2.08	2.08	-1.21	-0.71	-0.21	-0.01
		-1.51	2.89	-0.81	-0.61
		1.09			
		1.99	-0.11		
		0.99	-1.01	-0.41	
		-0.71	-0.31		
		-0.438	0.330909091	0.17	0.2025
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.81	3.30			0.27	

Intersection	**Park Av & 57 St**				Date & Time		**09/28/11; 14:15**			
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	1.6	3.5	4.7	2.9							
	3.3	4.1									
	0.9	4.3	3.5								
2	0										Right
	3.4	4.3	2.1								
	1.8	2.3									
	2.3	3.1									
3	0										Right
	6.2	3.9	2.6								
	2.6										
	2.4	2									
4	0										Right
	3.6	6.9	3.8	3.7	4.8						
	2.6	4	2.2	3.1	2.1	0.9	2.2	2	1.4		
	4.6										
5	0										Right
	5.6	3.5	4.1								
	4.9	**6.5**	5.1								
	2.5										
6	0										Right
	4.7	3.4									
	4.3	3.1	4.4	2.7	2.5						
	0										
7	0										Right
	3.4										
	1.8	3.9									
	0										
8	0										Right
	2.6	3.9	2.5								
	2.3	2.6	1.7								

	2.1	3.1	3.5	1.6	2.9						
9	0										Right
	3	6.9	12	10.6	5.7						
	3.5	3.7	1.9	2.4							
	5.3										
10	0										Right
	3.6	5.9	12.8	10.6	6						
	5.4	2.7									
	3.8	2.5									

Base headway	Prevailing headway	Startup Lost Time			
		-0.77	1.13	2.33	0.53
		0.93	1.73		
		-1.47	1.93	1.13	
		1.03	1.93	-0.27	
		-0.57	-0.07		
		-0.07	0.73		
		3.83	1.53	0.23	
		0.23			
		0.03	-0.37		
	4.80			1.43	1.33
1.72	1.72	0.23	1.63	-0.17	0.73
		2.23			
			1.13	1.73	
		2.53			
		0.13			
		2.33	1.03		
2.50	2.50		0.73	2.03	0.33

		-2.37	-2.37	-2.37	-2.37
		1.03			
		-0.57	1.53		
		0.23	1.53	0.13	
		-0.07	0.23	-0.67	
2.90	2.90	-0.27	0.73	1.13	-0.77
	5.70	0.63			
		1.13	1.33	-0.47	0.03
		2.93			
	6.00	1.23	3.53		
		3.03	0.33		
		1.43	0.13		
		0.73	0.953809524	0.476153846	-0.027142857
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.37	3.94			**2.13**	

Intersection		**Park Av & 57 St**				Date & Time		**09/28/11; 14:30**			
Red = Heavy vehicle; Blue = Ped; Green = interference											Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	5.1										Right
	2.4	3.3									
	1.8	1.7	1.4								
	2										
2	0										Right
	2.7										
	2.3										
	2.3	2.6									
3	0										Right
	2.9	2.6	3.5								
	1.9	2.6	2.1	2.1	2.7	2.2					
	3.9	2.4	4.4	2.4	1.8	1.7					
4	0										Right
	7.8	10.9	2.8	4.3	2.8						
	4.9	11.8	2.4	2	2.8	3.3	1.7	1.1	2.3		
	3.7	2.9	4.2								
5	0										Right
	0										
	3										
	1.8	3.4									
6	0										Right
	2.5	4.3	2.5	4.2	2.7						
	1.8	3.6	1.7	2	2						
	1.6	3.4	2.1	1.7	2.1	2.4	2.1	2.8	3.1		
7	3.1										Right
	1.9										
	1.7	5	6.2	2.9	3.7	2	1.7	1.6	1.3		
	0.8										
8	3.5										Right
	4.1	5.3	2.5	2.9							
	4	2.9	2.5	3.2	6.2	2.2	2.9	1.6	1.7		

	4.7	2.3									
9	6.6										Right
	2.9	5.1	3.4								
	2.7	2.8	2.8	3.8	4.7	4.5	3.6	2.9	2.9		
	0.5	1.6	2.9								
10	0										Right
	3.6										
	3.7										
	5										

Base headway	Prevailing headway	Startup Lost Time			
		-0.05	0.85		
		-0.65	-0.75	-1.05	
		-0.45			
		0.25			
		-0.15			
		-0.15	0.15		
			0.15	1.05	
2.45	2.45	-0.55	0.15	-0.35	-0.35
1.75	1.75	1.45	-0.05	1.95	-0.05
	2.80			0.35	
2.24	2.24	2.45		-0.05	-0.45
		1.25	0.45	1.75	
		0.55			
		-0.65	0.95		
	2.70	0.05	1.85	0.05	
2.00	2.00	-0.65	1.15	-0.75	-0.45

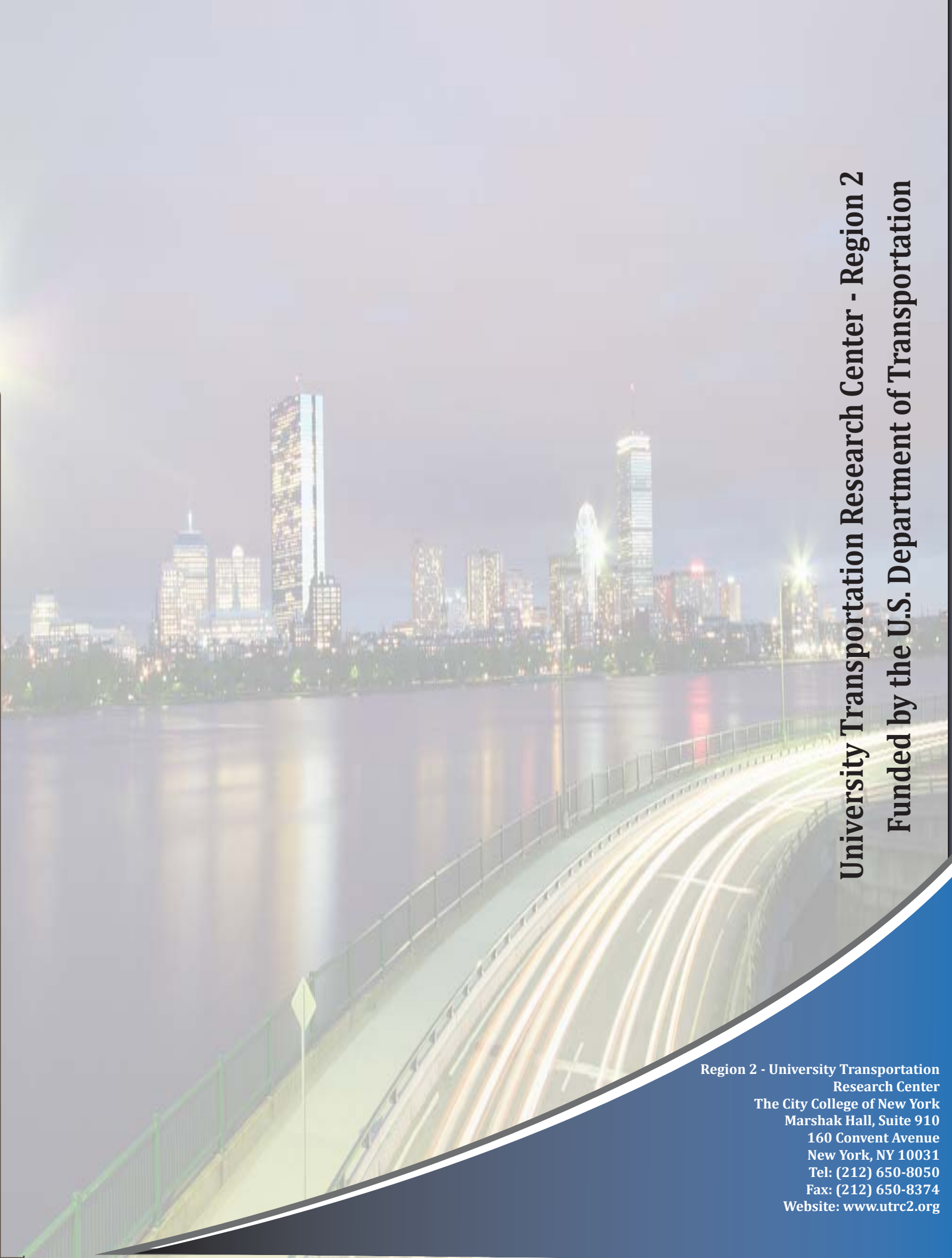
2.50	2.50	-0.85	0.95	-0.35	-0.75
		0.65			
		-0.55			
2.06	2.06	-0.75	2.55		0.45
		-1.65			
		1.05			
				0.05	0.45
	1.83	1.55	0.45	0.05	0.75
		2.25	-0.15		
		0.45	2.65	0.95	
	3.72	0.25	0.35	0.35	1.35
		-1.95	-0.85	0.45	
		1.25			
		0.169230769	0.638235294	0.296666667	0.105555556
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.45	3.09			1.21	

Intersection	**Park Av & 57 St**				Date & Time	**09/28/11; 14:45**				
Red = Heavy vehicle; Blue = Ped; Green = interference										Lane
Vehicle No/ Cycle	1	2	3	4	5	6	7	8	9	10	
1	0										Right
	1.4	6.5									
	4.4	4.6									
	2.3	3.9									
2	0										Right
	3.1	**6.3**									
	1.7	2.4	2.9	4	1.8						
	3.4	3.1	1.9								
3	0										Right
	2.7	3.3	1.9								
	1.5	1.9									
	3.4	2.2	2.4								
4	0										Right
	4.2	3.7	2.8	3							
	4.2	3.2	2.4	3.1	7.8	6.9	3.8	4.4	4.1		
	2.6	2.6	3.7	3.4	5.9	3.6	2.5	2.6			
5	0										Right
	2.9	4.2	10.9	6	2.8	4.3	4	3.7	2.4		
	2.8	3.2									
	1.4	5.4	2.4	2.8	7.5	3.2					
6	0										Right
	3.6	3.3	2.6	2.1	2.3						
	2.1	3.3	3.4	2.3	2.8	2.2	1.7				
	5.1	2.5	3.7	6.5							
7	0										Right
	5.2	3.7	3.3	10	5.7						
	3.6	2.3	1.9	2.1	2.3	1.8					
	3.3	4.7	3.2	2.6	1.6	2.8	1.5	2	2		
8	0										Right
	1.9	2.9	3.6								
	5.6	2.6	2.4	1.8	1.7	5	2.1	1.6	1.7		

	2.9	2.3	2.6	2.3	4	2	2.4	2.6			
9	0										Right
	4.5	3.5	4.5	15.4	7.4	8.1					
	2.5	2.8	1.9								
	1.1	4									
10	0										Right
	4.9	5.8	13.4	5.6	3.4	4.4	3.6				
	3.9	2.7	1.7	2.3	3.6	3	1.8	1.4			
	2.7	3.1	2.6	2.3							

Base headway	Prevailing headway	Startup Lost Time			
		-0.89	4.21		
		2.11	2.31		
		0.01	1.61		
1.80	1.80	-0.59	0.11	0.61	
		1.11	0.81	-0.39	
		0.41	1.01	-0.39	
		-0.79	-0.39		
		1.11	-0.09	0.11	
			1.41	0.51	0.71
	4.10	1.91	0.91	0.11	0.81
	2.90	0.31	0.31	1.41	1.11
3.44	3.44	0.61	1.91		
		0.51	0.91		
	3.20	-0.89	3.11	0.11	0.51
2.30	2.30		1.01	0.31	-0.19
2.23	2.23	-0.11	1.01	1.11	0.01

		2.81	0.21	1.41	
	5.70		1.41	1.01	
2.05	2.05	1.31	0.01	-0.39	-0.19
1.98	1.98	1.01	2.41	0.91	0.31
		-0.39	0.61	1.31	
1.78	1.78	3.31	0.31	0.11	-0.49
2.75	2.75	0.61	0.01	0.31	0.01
	7.75		1.21	2.21	
		0.21	0.51	-0.39	
		-1.19	1.71		
	3.80		3.51		
	2.07		0.41	-0.59	0.01
		0.41	0.81	0.31	0.01
		0.560108696	1.146681034	0.461130952	0.217083333
Base Hdwy	**Prevailing Headway**			**Start up Lost time**	
2.29	3.19			2.39	



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