

Existing Conditions Report

November 2015

Broadway Traffic Signalization Study Kingston, New York

Prepared for:
City of Kingston

420 Broadway Kingston, New York 12401







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1.0 Introduction

The Broadway Traffic Signalization Study and Design project was initiated by the City of Kingston utilizing a New York State Energy Research Development Authority (NYSERDA) grant. The goal of this project is to improve traffic flow and reduce delays within the Broadway corridor, which in turn will improve operations for all modes of travel (vehicular, transit, pedestrian and bicycle), while reducing fossil fuel consumption and greenhouse gas emissions. All of which will improve the quality of life along Broadway.

This project, which focuses on the seven signalized intersections along Broadway between St. James Street and East Chester Street, is being progressed simultaneously and implemented in conjunction with the Broadway Connectivity Design project, whose goal is to create a more livable, vibrant community through a combination of complete streets strategies and improved multi-modal connectivity. The Broadway Connectivity project is currently in preliminary design and is proposed to go to construction in the fall of 2016.

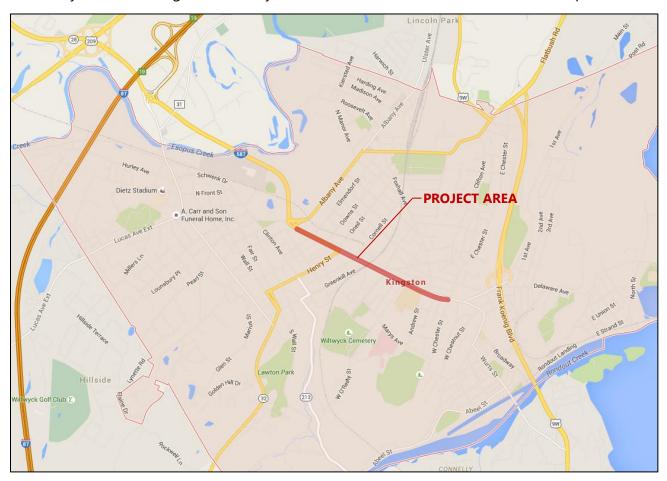
The Broadway Traffic Signalization Study and Design project is to be completed in three Phases:

- ➤ **Traffic Signalization Study** This study will be completed in two parts, the first being this Existing Conditions Report. Once the proposed concept for the Broadway Connectivity project is finalized, the "Build" condition analysis will be conducted and a Traffic Signal Coordination Study Report outlining findings and recommendations will be issued.
- ➤ **Signal Improvement Design** Once recommendations from the Signalization Study have been reviewed and approved by the City of Kingston, design plans will be developed for the implementation of signal improvements. This design effort will include both preliminary and final design for these improvements, which will be completed using New York State Department of Transportation (NYSDOT) and City standards, and in accordance with the Manual on Uniform Traffic Control Devices. It is anticipated that these design plans will be incorporated into the plans being developed for the Broadway Connectivity project.
- ➤ Equipment Installation and Final Reporting Implementation of the signal improvements through a separate construction contract. During the equipment installation, construction inspection support will be provided, and after construction a field review of traffic conditions will be performed. A Final Project Summary Report discussing the improvements made and their effect on various Measures of Effectiveness (MOE's) will be issued.

The document that follows is the first of these reports and contains information concerning the existing traffic operations within the Broadway corridor. It outlines the data collection effort conducted and the methodology used for analysis. It also summarizes the existing condition MOE's that will be used determine the benefit of any corridor improvements.

2.0 Project Area

This project area extends from St. James Street to East Chester Street along Broadway in downtown Kingston. This nearly one mile section of roadway includes seven (7) signalized intersections, which are described later in this report. The Broadway corridor consists of a four lane cross section within the western half of the corridor and a two lane section within the eastern half of the corridor. Turn lanes are present at only a few locations and on-street parking is prevalent throughout the entire corridor. The posted speed limit is 30 mph along Broadway, as it is throughout the City. The corridor location is shown on the Map Below.



PROJECT LOCATION MAP

The seven signalized intersection to be reviewed as part of this study include:

- 1. Elmendorf Street/Liberty Street and Broadway
- 2. O'Neil Street/Henry Street and Broadway
- 3. Cornell Street/Cedar Street and Broadway
- 4. Grand Street/Pine Grove Avenue and Broadway
- 5. East/West O'Reilly Street and Broadway
- 6. Foxhall Road and Broadway
- 7. East/West Chester Street and Broadway

3.0 Existing Conditions

Existing conditions were identified through a compilation of available data from previous studies and designs, field observations and data collection conducted by Greenman-Pedersen, Inc. (GPI) specifically for this project. The available data included:

- "Building a Better Broadway" Corridor Study Existing Condition Report, 2015
 - Limited peak hour traffic volumes at select intersections
 - Automatic Traffic Recorder (ATR) data detailing 24-hour traffic variations along Broadway.
- Broadway Signalization Project Design Plans, April 2001

This data, along with the data collected by GPI, is discussed subsequently.

3.1 Intersection Descriptions

A field review of the existing intersections was conducted in the fall of 2015. As part of this review, existing intersection geometry was noted, traffic operations were observed and the existing signal equipment was inventoried. A summary of the inventoried elements is listed in the table below. A more detailed description of each location follows.

Intersection Inventory Summary

					<i></i>		
			Inte	rsection Numl	ber*		
Element	1	2	3	4	5	6	7
Roadway Cross Section On Broadway	2-Lane W. 4-Lane E.	4-Lane	4-Lane	2-Lane	2-Lane	2-Lane	2-Lane
Turn Lanes on Broadway	WB LT (Lane drop)	No	No	EB LT,RT WB LT	No	No	EB LT WB RT
Signal Information							
Controller Brand	Econolite	Peek	Econolite	Peek	Econolite	Econolite	Econolite
Detection	Semi-	Semi-	Semi-	Semi-	Semi-	Semi-	Semi-
Detection	Actuated	Actuated	Actuated	Actuated	Actuated	Actuated	Actuated
Detector Type	Microwave	Microwave	Microwave	Microwave	Microwave	Microwave	Microwave
Detectors Functional	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Signal Phases	2	2	2	3	2	2	2
Side Street Recall Mode	Min	Max	Ped	Max	Min	Max	None
Turn Arrows	No	No	No	EB LT	No	No	No
Signal Interconnect	No	No	No	No	No	No	No
Pedestrian Signals	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countdown Timers	No	No	No	No	No	No	No
Signal Head Size	8 inch	8 inch	8 inch	8" except 12" arrows	8 inch	8 inch	8 inch
Pole Type	Mast Arm	Mast Arm	Mast Arm	Mast Arm	Mast Arm	Mast Arm	Mast Arm
Install Date	2002	2002	2002	2002	2002	2002	2002
Crosswalks	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ADA Ramps	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: EB=eastbound, WB=westbound, LT= left turn, RT=right turn



^{*} Intersection numbers listed in Section 2.0.

3.1.1 Elmendorf Street/Liberty Street and Broadway

This is a four legged intersection with single lane approach eastbound and southbound and a two lane approach (left turn lane, through-right lane) westbound. The Liberty Street leg of the intersection is one-way leading away from the intersection. Although a left turn lane does not exist along the eastbound Broadway approach, there is sufficient width for a left turn vehicle to queue while allowing through vehicles to pass, thus it operates as if an unmarked minimal length de facto left turn lane was present.

Traffic at this intersection is controlled by a semi-actuated traffic signal, meaning vehicle detection (microwave detectors) is present on



the side streets only and not on Broadway. This allows the green time for the side streets to be shortened based on demand, while the mainline traffic along Broadway gets a set amount of green time every signal cycle.

There are crosswalks and pedestrian signals with pushbutton actuation on each of the approaches, but no countdown timers. The signal operates with just two phases, with no protected turn arrows. Signal heads are 8" diameter mounted on existing mast arms.

Present at this intersection is an "Econolite" brand controller, but no interconnect to adjacent signals currently exists. Record plans show an existing conduit that runs between this location and the O'Neil Street/Henry Street signal controller, but discussions with the City Electrician revealed that the interconnect wires were never connected, and the age and operability of this interconnect wire and conduit in unknown.

3.1.2 O'Neil Street/Henry Street and Broadway

This four legged intersection has two lanes (a through-left lane and a through-right lane) both eastbound and westbound on Broadway. Northbound and southbound approaches have a separate left turn lane, and additionally there is a right turn slip ramp on the northbound approach. This pulls all northbound right turn vehicles away from the signal and directs them to a stop controlled approach along Broadway located 40 feet to the east of the signalized intersection.



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The traffic signal at this location is semi-actuated, same as all the signals within the corridor. Vehicular detection on the side streets is accomplished through microwave detectors mounted to the signal mast arms. However, the controller is set to max recall for all signal phases, so the detectors, though operational, are not utilized.

There are crosswalks and pedestrian signals with pushbutton actuation on each of the approaches, but no countdown timers.

The signal operates with just two phases (Broadway approaches go green together, then the Henry & O'Neil approaches go green simultaneously). There are no existing protected turn arrows. All signal heads are 8" diameter mounted on existing mast arms.

Present at this intersection is a "Peek" brand controller, but no interconnect to adjacent signals currently exists. Record plans show an existing conduit that runs between this location and the signal both east and west of here, but similar to the Liberty Street/ Elmendorf Street intersection, the wires were never connected and the current operability of those wires is unknown.

3.1.3 Cornell Street/Cedar Street and Broadway

This four legged intersection has two lanes (a through-left lane and a through-right lane) both eastbound and westbound on Broadway. There are just single lane approaches on the side streets northbound and southbound.

The traffic signal at this location is semiactuated with microwave detectors for the side street traffic. There are crosswalks and pedestrian signals with pushbutton actuation on each of the approaches, but no countdown timers. However, the controller is programmed for pedestrian recall on each approach, so the pedestrian walk and clearance is activated every signal cycle regardless of whether or not a



pushbutton is actuated. The signal operates with just two phases, with no existing protected turn arrows. Signal heads are all 8" diameter mounted on mast arms.

Present at this intersection is an "Econolite" brand controller, but no interconnect to adjacent signals currently exists. Record plans show an existing conduit that runs between this location and the signal both east and west of here, but similar to the other intersections, the wires were never connected and the current operability of those wires is unknown.

3.1.4 Grand Street/Pine Grove Avenue and Broadway

This four legged intersection has an the northbound and southbound side street approaches offset 50 foot from each other, which results in potential conflicts and additional delay for left turn vehicles on those approaches. On both of these approaches, the lane geometry includes a right turn lane and a through-left lane. The westbound approach has a left turn only lane and a through-right lane, and the eastbound approach widens to allow for three lanes at the intersection (left, through, right).

The traffic signal at this location is semi-actuated with microwave detectors for the side street traffic and for the eastbound left turn



movement. However, the controller is programmed for max recall for all phases, so these detectors, though operational, are not being utilized. There are crosswalks and pedestrian signals with pushbutton actuation on each of the approaches, but no countdown timers.

The signal operates with three phase operations with an eastbound left turn arrow phase preceding the Broadway through movement green phase. This is the only signal within the corridor that includes a protected turn movement. When the eastbound left turn arrow is active, a corresponding right turn arrow for the southbound approach is activated. Turn arrows at this location are 12" diameter bi-modal heads (both yellow and green arrows are displayed in the same head). All other signal heads are 8" diameter. All are mounted on mast arms.

Present at this intersection is a "Peek" brand controller, but no interconnect to adjacent

signals currently exists. Record plans show an existing conduit that runs between this location and the signal both east and west of here, but similar to the other intersections, the wires were never connected and the current operability of those wires is unknown.

3.1.5 East/West O'Reilly Street and Broadway

This four legged intersection has single lane approach for each direction.

The traffic signal at this location is semi-actuated with microwave detectors for side street traffic.

There are crosswalks and pedestrian signals with



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pushbutton actuation on each of the approaches, but no countdown timers. The signal operates with just two phases, with no existing protected turn arrows.

Present at this intersection is an "Econolite" brand controller, but no interconnect to adjacent signals currently exists. Record plans show an existing conduit that runs between this location and the signal both east and west of here, but similar to the other intersections, the wires were never connected and the current operability of those wires is unknown.

3.1.6 Foxhall Road and Broadway

This three legged intersection has single lane approach for each direction. However, the eastbound Broadway approach does have sufficient width to queue a left turn vehicle while allowing through vehicles to pass, thus operating as if the approach had an unmarked minimal length de facto left turn lane.

The traffic signal at this location is semi-actuated with microwave detectors for the Foxhall Road approach. However, the signal is set for max recall for all approaches, so the detector is not utilized.



There are crosswalks and pedestrian signals with pushbutton actuation on each of the approaches, but no countdown timers. The signal operates with just two phases, with no existing protected turn arrows. All signal heads are 8" diameter mounted on mast arms.

Present at this intersection is an "Econolite" brand controller, but no interconnect to adjacent signals currently exists. Record plans show an existing conduit that runs between

this location and the signal both east and west of here, but similar to the other intersections, the wires were never connected and the current operability of those wires is unknown.

3.1.7 East/West Chester Street and Broadway

This four legged intersection has single lane approaches on the northbound and southbound Chester Street approaches. The eastbound Broadway approach widens to add a 100' long left turn lane, and the westbound Broadway approach widens to add a 150' long right turn lane.



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The traffic signal at this location is semi-actuated with microwave detectors for the Chester Road approaches only. There are crosswalks and pedestrian signals with pushbutton actuation on each of the approaches, but no countdown timers. The signal operates with just two phases, with no existing protected turn arrows. All signal heads are 8" diameter mounted on mast arms.

Present at this intersection is an "Econolite" brand controller, but no interconnect to adjacent signals currently exists. Record plans show an existing conduit that runs between this location and the signal both east and west of here, but similar to the other intersections, the wires were never connected and the current operability of those wires is unknown.

3.2 Signal Equipment Compatibility and Interconnect Potential

As stated in the intersection descriptions above, signal controllers within the corridor are a mix between Econolite and Peek. If incorporated into an interconnected system, these controllers would not be able to "talk" to each other, so any signal interconnect would require some controller replacement. To ensure compatibility, it would be best to replace all controllers with the latest model available. Controllers along Washington Avenue and at the Flatbush/East Chester intersection were recently replaced with the *Econolite Cobalt* controller. This model controller would also work well for an interconnected signal system along Broadway as it could be plugged into the existing cabinets without any cabinet modifications, and is capable of a variety of signal coordination options. It also provides consistency with other controllers already installed within the City, which will help simplify maintenance issues.

Interconnect options within the corridor include both hardwire and radio. As stated above, a conduit and interconnect cable appears to have been run previously between these intersections, but was never connected. It is also unclear whether that conduit is still intact or if the wires are still serviceable. These issues would need to be explored in more depth to determine the feasibility of this method. If the conduit and cable are functioning, this could be a reasonably priced option for interconnect. Otherwise, running a new underground cable would cost more than \$225,000, which may make this interconnect method cost prohibitive.

Radio interconnect was an option proposed in the April 2001 design plans for each of these signals. However, the radios and antennae necessary to implement the interconnect were never installed. Cost was likely the issue at that time, but the reason is not clear. There appears to be good line-of-sight between intersections, so this option would be a good mid-cost alternative for interconnect, at a total price of \$35,000-\$40,000 for the radios and equipment necessary at the seven locations.

Overall, it appears that an interconnected signal system may be possible with minimal existing equipment replacement (outside of the controller units). The benefit and potential

need for such a system will be discussed in the <u>Traffic Signal Coordination Study Report</u>, which will be prepared after the build condition preferred geometric alternative is identified and analyzed. The feasibility of utilizing the existing interconnect conduit or installing a radio interconnect will be examined at that time.

3.3 Data Collection

After reviewing the available data, several gaps were identified that required further field investigation. These gaps included peak hour corridor travel time information, queue data for key approaches, and peak hour traffic count data at various location. This data was collected during weekday peak periods (7:30-9:00 AM and 4:00-5:30 PM) on September 17, 2015 through September 29, 2015. Some traffic count data was available through previous studies, so the traffic counts conducted at that time only included the following intersections and time periods.

- Elmendorf Street/Liberty Street and Broadway AM & PM Periods
- O'Neil Street/Henry Street and Broadway AM Period Only
- Grand Street/Pine Grove Avenue and Broadway AM Period Only
- East/West O'Reilly Street and Broadway AM & PM Periods
- Foxhall Road and Broadway AM & PM Periods
- East/West Chester Street and Broadway AM & PM Periods

These counts included observations of all traffic modes to include passenger car, truck, pedestrian and bicycle. Count data sheets for each intersection are included in Appendix A of this report.

Vehicular queues were also observed during each traffic count to determine reasonable estimations for the typical maximum queue during peak periods at various locations. This information was used in the simulation model calibration process. A chart showing the observed queues is included in Appendix A of this report.

In addition, during each peak period, travel time runs were performed to identify the average length of time to travel the corridor, the amount of time delayed at the traffic signals and the average travel speed through the corridor. Detailed information concerning these travel time runs is included in Appendix A of this report. To summarize this information, the table below lists the average travel times and speeds for the overall corridor.

Travel Time Summary

	114101 111110 04111111411										
	Α	M Peak Hou	ır	F	PM Peak hou	r					
Direction	Travel Time	Signal Delay	Average Speed	Travel Time	Signal Delay	Average Speed					
Eastbound	3:55	1:46	14.4 mph	4:30	2:19	12.5 mph					
Westbound	4:17	1:53	13.2 mph	4:25	2:06	12.8 mph					

3.4 Traffic Volumes

Using the traffic counts collected in September 2015, along with 2011 AM & PM peak hour data at the Broadway/Cedar/Chester intersection, and 2014 PM peak hour data at the Broadway/Henry/O'Neil and Broadway Pine Grove/Grand intersections, existing condition traffic volumes were developed for the corridor. This was done by comparing traffic flows and adjusting traffic volumes to balance between intersections. This was done for both the AM and PM peak hours to derive traffic volumes for analysis. These Existing Condition Traffic Volumes are depicted in Figures 1 & 2 included in Appendix B of this report.

4.0 Existing Traffic Operation

In order to compare alternatives and assess the benefits of proposed improvements, an existing condition baseline for traffic operations must be determined. For this study, the measures of effectiveness (MOE's) will be calculated using traffic simulation modeling. The MOE's to be compared between various alternatives include:

- Delay and Level of Service at each intersection.
- Corridor Travel Time and Average Speed
- Overall Vehicle Hours of Delay (VHD) and Number of Vehicular Stops
- Fuel Consumption and Emissions

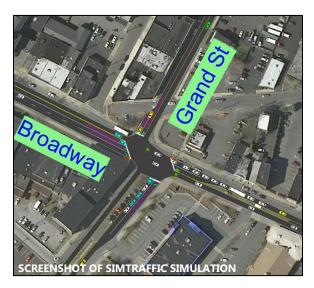
4.1 Analysis Methodology

Traffic simulation modeling was performed utilizing the Synchro/Simtraffic Software Package developed by Trafficware LLC. The software uses car movement and traffic control logic similar to real world driver conditions. Parameters such as gap acceptance, speeds, driver aggressiveness and vehicle type are stochastically applied (randomly distributed based on a probability curve) to the model, and vehicle statistics are recorded on a second by second basis. Because of the stochastic nature of these models, different random seeds can generate different output values, similar to how traffic varies slightly from day to day on a roadway. As a result, multiple model runs should be conducted and averaged to determine the result values for alternative comparison.

Traditionally, the methodologies found in the Highway Capacity Manual (HCM 2010), published by the Transportation Research Board (TRB) are the standard for signalized intersection analysis. However, these methodologies do not accurately reflect operations when traffic signals are closely spaced and vehicular queues can impact adjacent intersections; where heavy pedestrian traffic impedes turning vehicles; or for corridors with coordinated traffic signals, which are all conditions found in the Broadway Corridor. As such, a traffic simulation model, calibrated to existing driver behavior and traffic conditions, is the best analysis methodology, for the Broadway Traffic Signalization Study.

4.2 Model Calibration

As touched upon above, a simulation model requires car movement parameters to define how traffic will flow. The simulation model incorporates very reasonable default parameters for use, but they may not be accurate for driving conditions in all areas. Rural drivers tend to be less aggressive than urban drivers; geometric conditions sometimes result in longer start-up losses at certain traffic signals; and various other reasons result in different driver behavior that changes from location to location. Because of this, model outputs for an existing condition



model needs to be compared to field observed conditions and parameters adjusted until the modeled conditions are reasonably representative of the field conditions.

For the Broadway corridor, travel times and signal delay were the comparative statistics used for calibration. Queues were also reviewed, but as queuing is a much more volatile statistics, queues were compared for general trends rather that exact values.

The table below shows the calibration statistics for both the AM peak hour and PM peak hour models developed for this study.

Calibration Summary

	Т	ravel Time Dat	ta	ignal Delay Da	ata				
Direction	Model Output	Field Observation	Percent Difference	Model Output	Field Observation	Percent Difference			
	AM Peak Hour								
Eastbound	243.6 sec.	235 sec.	+3.7%	111.3 sec.	106 sec.	+5.0%			
Westbound	254.7 sec.	257 sec.	-0.9%	122.2 sec	113 sec.	+8.1%			
	PM Peak Hour								
Eastbound	269.7 sec.	270 sec.	-0.1%	135.3 sec.	139 sec.	-2.7%			
Westbound	274.4 sec.	265 sec.	+3.5%	141.0 sec.	126 sec.	11.9%			

As can be seen, the modeled travel times are all within 4% of the field measured values. Typically anything less than 10% is considered statistically equivalent for modeling purposes, and values between 10% and 15% can be considered reasonable for calibration. As such, the modeled travel time values should be considered extremely representative of the existing conditions.

Signal delay stop time varies slightly more between the model and field measurements, with the worst case statistical condition in the model (westbound delay in the PM peak hour) being almost 12% different than field conditions, but given the difficulty in accurately

determining stop time while in a rolling queue in the field, a higher percent difference would be expected for that statistic. Overall though, the percent differences are still within an acceptable range to be considered calibrated.

Based on the modeling effort, the existing condition models developed for this study are considered calibrated and an accurate representation of AM and PM peak hour traffic conditions within the corridor. The traffic parameters from these models will be carried forward to the build condition models to ensure an accurate comparison of alternatives in future analyses.

4.3 Results of Analysis

In addition to the MOE's outputted by the simulation models, traffic operational conditions can also be described in terms of level of service (LOS). Level of service is a letter grade representation of traffic delay and congestion at a particular location. LOS ranges from "A" to "F" with LOS A representing the best operating condition with unrestricted flow and little or no delay per vehicle, and LOS F representing the worst conditions, with high congestion, long delays and poor traffic operations. LOS C or better is generally desirable, but LOS D is generally acceptable during peak periods

The level of service criteria for an intersection is based on the individual delay experienced by each vehicle at that intersection, while the overall level of service for an urban corridor is based on the average travel speed within the corridor as it relates to the base free-flow speed, which for Broadway is assumed to be the speed limit of 30 mph. The level of service criteria for both signalized intersections and urban corridors are shown in the table below.

l evel	of Co	rvico	Crita	ria
I evei	OT SE	rvice	(rite	rıa

LOS	Signalized Intersection Delay Per Vehicle (sec.)	Urban Corridor as a Percentage of Base Free-Flow Speed	Urban Corridor with 30 mph Base Free-Flow Speed
Α	<u><</u> 10.0	> 85%	> 25.5 mph
В	> 10.0 and <u><</u> 20.0	> 67% and <u><</u> 85%	> 20.1 mph and < 25.5 mph
С	> 20.0 and <u><</u> 35.0	> 50% and <u><</u> 67%	> 15.0 mph and < 20.1 mph
D	> 35.0 and <u><</u> 55.0	> 40% and <u><</u> 50%	> 12.0 mph and < 15.0 mph
E	> 55.0 and <u><</u> 80.0	> 30% and <u><</u> 40%	> 9.0 mph and <u><</u> 12.0 mph
F	> 80.0	<u><</u> 30%	<u><</u> 9.0 mph

For both the AM peak hour and the PM peak hour, Simtraffic traffic simulation models were developed. Each model was then run 10 times using different random seeds and the outputs averaged to obtain the existing condition results. Simulation model output sheets for both the existing AM peak hour and PM peak hour models are included in Appendix C of this report.

The averaged measures of effectiveness outputted from the traffic simulation models are summarized in the table below along with the equivalent levels of service based on the criteria listed above.

Simulation Model MOE Summary

Simulation Model MOE Summary									
		AM Peak Hour	PM Peak Hour						
Intersection Performance		LOS (delay per veh.)	LOS (delay per veh.)						
Broadway at	Eastbound	B (19.5)	B (14.6)						
Elmendorf Street/	Westbound	C (21.7)	C (20.2)						
Liberty Street	Southbound	B (17.0)	C (20.4)						
	Overall	C (20.4)	B (17.5)						
Broadway at	Eastbound	C (20.1)	B (19.5)						
O'Neil Street/	Westbound	B (18.1)	B (18.7)						
Henry Street	Northbound	B (17.2)	B (15.4)						
	Southbound	B (19.0)	C (21.3)						
	Overall	B (19.0)	B (19.0)						
Broadway at	Eastbound	C (22.5)	C (33.9)						
Cornell Street/	Westbound	B (16.6)	C (26.1)						
Cedar Street	Northbound	B (14.7)	B (16.6)						
	Southbound	B (18.2)	C (20.5)						
	Overall	B (18.8)	C (27.1)						
Broadway at	Eastbound	B (14.3)	B (18.0)						
Grand Street/	Westbound	C (29.3)	D (35.3)						
Pine Grove Avenue	Northbound	D (38.9)	D (45.3)						
	Southbound	B (15.3)	B (14.3)						
	Overall	C (20.3)	C (24.3)						
Broadway at	Eastbound	B (17.9)	B (12.1)						
East O'Reilly Street/	Westbound	B (17.3)	B (17.5)						
West O'Reilly Street	Northbound	C (22.0)	B (18.7)						
	Southbound	B (19.6)	B (17.4)						
	Overall	B (18.3)	B (15.1)						
Broadway at	Eastbound	C (25.8)	D (35.9)						
Foxhall Road	Westbound	C (20.8)	C (20.2)						
	Southbound	B (10.7)	B (15.4)						
	Overall	C (22.3)	C (27.4)						
Broadway at	Eastbound	B (12.9)	B (14.2)						
East Chester Street/	Westbound	B (10.4)	B (13.3)						
West Chester Street	Northbound	B (18.9)	B (19.3)						
	Southbound	C (31.1)	C (30.6)						
	Overall	B (16.7)	B (17.3)						
Network Performance		AM Peak Hour	PM Peak Hour						
Average Travel Time (second	s) Eastbound Westbound	243.6 sec. 254.7 sec.	269.7 sec. 274.4 sec.						
Average Travel Speed/	Eastbound	13.9 mph / LOS D	12.6 mph / LOS D						
Corridor Level of Service	Westbound	13.3 mph / LOS D	12.3 mph / LOS D						
Total Number of Stops		5,708	6,793						
Overall Vehicle Hours of Dela	ay (VHD)	51.2 VHD	66.3 VHD						
Fuel Consumed (gallons)		72.5 gal.	85.5 gal.						
HO Emissions (g)		1,334 g	761 g						
CO Emissions (g)		28,047 g	20,728 g						
NOx Emissions (g)		3,924 g	2,729 g						
Total Emissions (kg)		33.3 kg	24.2 kg						

5.0 Conclusion & Summary

This Existing Condition Report is just the first part of the overall Traffic Signalization Study being conducted for the Broadway corridor between St James Street and East/West Chester Street in downtown Kingston New York. For this report, Greenman-Pedersen, Inc (GPI) compiled available data, performed field obsevations and data collection, developed and calibrated existing condition AM and PM peak hour traffic simulation models for the corridor, and calculated several measures of effectiveness (MOE's) that will be used to compare the existing conditions to build alternatives. Key points to make about this report include the following:

- ➤ The existing traffic traffic volumes used in the analysis are a compilation of count data from 2011, 2014 and 2015. Traffic flows were balanced between intersection with a bais toward the 2015 data to create an accurate representation of 2015 traffic volumes at all intersections.
- Additional field data collected included travel time measurements, queue observations, and a review of equipment and signal timing parameters in the existing controller cabinets.
- The analysis was performed using the Simtraffic Traffic Simulation Model as opposed to the methodologies detailed in the <u>Highway Capacity Manual</u>. This is because the <u>Highway Capacity Manual</u> does not accurately represent operations where queues from closely spaced traffic signals interact; where heavy pedestrian traffic conflicts with vehicular traffic; or where coordinated systems are used.
- > The traffic simulation models were calibrated to real world field conditions and were run 10 times with different random seeds to develop averaged results for reporting.
- ➤ Overall the model results showed that all intersections operate within acceptable levels, with no approach operating worse than LOS D. The Corridor level of service is also LOS D during both the AM and PM peak hours.
- A noteworthy MOE to report is emissions, where the AM Peak hour model shows higher emission totals than the PM peak hour, even though the overall delay is much less. The reason for this is because the truck traffic percentage is significantly higher in the AM peak hour and trucks produce significantly more emissions than cars.

Once a preferred build alternative is designated in the Broadway Connectivity Design project, build condition models will be developed and the Traffic Signal Coordination Study Report will be progressed. The second report of the Traffic Signalization Study will compare the existing condition results to the build condition results and determine the benefit of signal timing improvements and signal coordination within the corridor. This information will be used for grant justification and to measure the success of the overall design project.

APPENDIX A Traffic Counts/Data Collection



BROADWAY TRAFFIC SIGNALIZATION STUDY | City of Kingston, New York

APPENDIX A-1 ATR Data



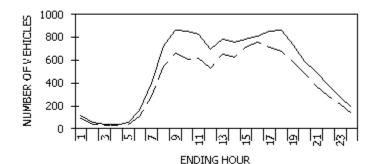
2014 Traffic Count Station Locations Destentier St Progress St Wood St Appay St Similaries Tenefroediave Unite of Ed THINTS Broymare Hembek Ave Ext Stenleyes Hemlock Ave **Elmendoutes** Theoden St. The state of the s **ाजा** क Artislay of Fill Soundings Forter Highland Ave **जन्म**नुस Si Silvedore 3 Chester St Park St Remodello Momeson HasbrouckAve 8210 Bulling मिलावन Borning Jansen Ave 1102 **Broadway** Sold light of the second secon Welles lin E Gunda Marko (OFFICE OF THE PROPERTY OF THE Susens अहाविक्र Leven & Constitution OrchardSt Rollmansz Proper d 32 elegifilizes Olitoli Aco Tentenco St. Andrewed Wong Grand Wording PAR BORREY OF POST Wednestruted Jervis Ave Etholy Salara El Sa Wago Aro omosi REPOR NWIDUTAY9 213 CEITANCE OF Welley. O Little Op Montrepose Ave

County of Ulster Classification Count Average Weekday Data Report

ROAD #: COUNTY NAME: REGION CODE: YEAR: 2014 MONTH: April 0280 ROAD NAME: BROADWAY STATION: 868210 Ulster DIRECTION East West TOTAL W OREILLY ST FROM: NUMBER OF VEHICLES NUMBER OF AXLES % HEAVY VEHICLES (F4-F13) % TRUCKS AND BUSES (F3-F13) AXLE CORRECTION FACTOR 22164 45089 4.04% TO: REF-MARKER: END MILEPOINT: 12343 9821 **HENRY ST** 24912 2.68% 10.71% 20177 5.75% 0110150 NO. OF LANES: FUNC-CLASS: STATION NO: 14 8210 HPMS NO: LION#: 9.63% 10.23% 0.99 0.97 0.98 COUNT TAKEN BY: PROCESSED BY: ORG CODE: TST INITIALS: KAJ ORG CODE: ULS INITIALS: DS

TAKEN BY: SSED BY:	ORG CODE: 1			BA	TCH ID: UL	S-Process	sed								
VEHIC	CLE CLASS	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
NO	. OF AXLES	2	2	2	2.5	2	3	4	3.5	5	6	5	6	8.75	
ENDING HOUI	2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00	0 0 1 0 0 0 0 0 0	102 51 33 32 50 146 355 664 784 773 732	9 5 6 2 3 9 29 41 54 66 72	0 0 0 0 0 0 0 1 1 1	2 1 0 0 0 4 6 4 10 9	2 2 0 0 0 2 5 8 9 6 8	0 0 0 0 0 0 1 1 1 1 2 2	0 0 0 0 0 0 0 0	0 0 0 0 0 0 1 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	115 59 40 34 53 161 397 720 862 858 858
Eas		2 0 1 2 2 3 3 2 2 0 1 1 0 0	621 682 644 685 696 746 770 664 544 454 351 253 168	72 56 70 83 77 76 79 74 47 40 30 27 19	1 1 1 4 3 5 3 1 1 1 0 0	10 11 17 12 12 14 11 5 6 2 2 3 1	5 5 9 9 4 9 8 8 8 6 5 3 3 4	2 2 1 2 3 1 3 1 0 0 0	1 1 1 1 0 2 3 0 0 0 0 0 0	0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 1 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	629 697 784 757 785 809 854 863 729 593 493 385 276 190
	VEHICLES	21 42	11000 22000	991 1982	24 60	143 286	123 369	22 88	10 35	4 20	5 30	0 0	0 0	0 0	12343 24912
ENDING HOU	3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00	1 0 0 0 0 0 1 3 4 1 3 2	84 37 32 35 41 104 268 528 627 568 547	3 2 0 1 0 0 5 9 7 8 13	0 0 0 0 0 0 0 0	1 0 1 0 0 1 0 1 2 3 4 2	2 1 0 1 1 1 6 10 25 30 48 39	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	91 40 33 37 42 106 280 551 665 611 617 533
Wes		1 1 0 1 1 2 1 3 2 2 0	566 536 624 656 613 605 520 446 346 264 197	12 43 48 53 47 26 24 13 14 7	1 0 2 2 2 0 0 1 0 0 0 0	9 9 6 6 6 6 1 2 0 1	34 34 35 40 41 40 32 17 14 9	0 1 0 1 2 0 0 0 0 0 0	0 1 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 1 1 2 1 0 1 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	535 656 624 717 761 710 680 579 482 376 283 210
		30 60 51 102	8845 17690 19845 39690	381 762 1372 2744	6 15 30 75	62 124 205 410	481 1443 604 1812	4 16 26 104 VE F	2 7 12 42 HICLE CLA	0 0 4 20 ASSIFICAT	10 60 15 90 TON CODE	0 0 0 0	0 0 0 0	0 0 0	9821 20177 22164 45089

TRAFFIC FLOW BY DIRECTION



East	West							
PEAK HOUR DATA								
DIRECTION East	HOUR 18	COUNT 863	2-WAY A.M.	HOUR 9	COUNT 1527			
West	16	761	P.M.	16	1570			

-1.	M	oto	orcy	cl	es

F2. Autos*
F3. 2 Axle, 4-Tire Pickups, Vans, Motorhomes*
F4. Buses
F5. 2 Axle, 6-Tire Single Unit Trucks
F6. 3 Axle Single Unit Trucks
F7. 4 or More Axle Single Unit Trucks
F8. 4 or Less Axle Vehicles, One Unit is a Truck
F9. 5 Axle Double Unit Vehicles, One Unit is a Truck
F10. 6 or More Double Unit Vehicles, One Unit is a Truck
F11. 5 or Less Axle Multi-Unit Trucks
F12. 6 Axle Multi-Unit Trucks

F12. 6 Axle Multi-Unit Trucks F13. 7 or More Axle Multi-Unit Trucks

* INCLUDING THOSE HAULING TRAILERS

FUNCTIONAL CLASS CODES:

RURAL URBAN

01	11 PRINCIPAL ARTERIAL-INTERSTATE
02	12 PRINCIPAL ARTERIAL-EXPRESSWAY
02	14 PRINCIPAL ARTERIAL-OTHER

SYSTEM

16 MINOR ARTERIAL 17 MAJOR COLLECTOR 17 MINOR COLLECTOR 06

07 08 19 LOCAL SYSTEM

County of Ulster Classification Count Average Weekday Data Report

ROAD #: COUNTY NAME: REGION CODE: FROM TO: REF-END

0280 Ulster

ROAD NAME: BROADWAY

YEAR: 2014 MONTH: April

STATION: 861102

TOTAL

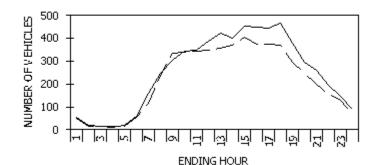
11200 22620 3.29% 12.76%

0.99

DECION CODE							
REGION CODE: FROM:	8 FOXHALL AVE			DIRECTION	East	West	
TO:	W OREILLY ST			NUMBER OF VEHICLES	5973	5227	
REF-MARKER:				NUMBER OF AXLES	12131	10489	
END MILEPOINT:	0110102	NO. OF LANES:	2	% HEAVY VEHICLES (F4-F13)	4.29%	2.14%	
FUNC-CLASS:	14	HPMS NO:		% TRUCKS AND BUSES (F3-F13)	13.11%	12.36%	
STATION NO:	1102	LION#:		AXLE CORRECTION FACTOR	0.98	1.00	
COUNT TAKEN BY: PROCESSED BY:	ORG CODE: TST ORG CODE: ULS		TCH ID: ULS-Pro	ocessed			

VEHICLE	CLASS	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
NO. O	F AXLES	2	2	2	2.5	2	3	4	3.5	5	6	5	6	8.75	
DIRECTION East	1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 24:00	0 0 0 0 0 1 4 3 3 4 4 6 6 5 2 2 3 1 1 0 0 0 0	48 18 12 10 18 48 48 208 250 279 287 324 353 342 388 391 407 340 268 236 178 136 136 83	4 2 4 1 0 7 16 26 33 42 38 46 35 39 37 33 40 25 20 15 12 8 8 6	0 0 0 0 0 0 1 2 2 1 2 2 1 3 3 4 1 1 0 0 0 0 0	1 0 0 0 0 2 3 4 7 7 7 9 9 7 7 6 5 3 4 1 1 0 0 1 0	1 0 0 0 0 2 4 5 11 10 9 11 11 12 7 8 11 8 7 7 6 2 2 2	0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 1 1 0 0 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		54 20 117 11 18 57 77 159 248 303 342 349 425 403 452 449 443 465 381 297 260 196
TOTAL VEHICLES TOTAL AXLES		46 92	5144 10288	527 1054	23 58	84 168	135 405	2 8	4 14	4 20	4 24	0 0	0 0	0 0	5973 12131
DIRECTION West	1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 24:00	0 0 0 0 0 0 0 0 1 1 1 1 1 1 2 0 0 0 0 0	43 15 12 12 13 47 94 200 289 289 297 300 299 322 355 329 330 333 266 220 186 115 62	5 2 2 1 2 7 19 32 34 39 33 38 49 38 39 34 31 22 14 11 12 4	0 0 0 0 0 0 2 2 4 4 0 2 0 1 1 2 3 0 0 0 0 0	0 0 0 0 1 1 1 3 7 7 8 9 8 8 6 6 5 5 3 2 3 0 0 0 0	0 0 0 0 1 1 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0 0 0 0 0	0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		48 177 15 14 16 56 117 239 335 338 342 350 359 369 405 373 375 368 297 246 200 155 127 66
TOTAL VE TOTAI GRAND TOTAL VE GRAND TOTAI	L AXLES EHICLES	9 18 55 110	4572 9144 9716 19432	534 1068 1061 2122	17 42 40 100	77 154 161 322	10 30 145 435	1 4 3 12 VEH	4 14 8 28 HICLE CLA	3 15 7 35 ASSIFICAT	0 0 4 24 TION CODE	0 0 0 0	0 0 0 0	0 0 0	5227 10489 11200 22620

TRAFFIC FLOW BY DIRECTION



East		Wes	t		
		PEAK	HOUR DATA		
DIRECTION East	HOUR 18	COUNT 465	2-WAY A.M.	HOUR 12	COUNT 736
West	15	405	P.M.	15	857

-1.	M	oto	orcy	cl	es

FUNCTIONAL CLASS CODES:

RURAL URBAN

01	11 PRINCIPAL ARTERIAL-INTERSTATE
02	12 PRINCIPAL ARTERIAL-EXPRESSWAY
02	14 PRINCIPAL ARTERIAL-OTHER
06	16 MINOR ARTERIAL
07	17 MAJOR COLLECTOR
08	17 MINOR COLLECTOR
09	19 LOCAL SYSTEM

SYSTEM

F1. Motorcycles
F2. Autos*
F3. 2 Axle, 4-Tire Pickups, Vans, Motorhomes*
F4. Buses
F5. 2 Axle, 6-Tire Single Unit Trucks
F6. 3 Axle Single Unit Trucks
F7. 4 or More Axle Single Unit Trucks
F8. 4 or Less Axle Vehicles, One Unit is a Truck
F9. 5 Axle Double Unit Vehicles, One Unit is a Truck
F10. 6 or More Double Unit Vehicles, One Unit is a Truck
F11. 5 or Less Axle Multi-Unit Trucks
F12 6 Axle Multi-Unit Trucks

F12. 6 Axle Multi-Unit Trucks F13. 7 or More Axle Multi-Unit Trucks

^{*} INCLUDING THOSE HAULING TRAILERS

Page 1 of 2 Date: 05/28/2014

Station: 868210

East

Road #: Road name: BROADWAY

From: W OREILLY ST To: HENRY ST Direction: East

Tue 04/15/2014 12:00 Start date: End date: Fri 04/18/2014 11:45

County: Ulster Town: KINGSTON

LION#:

85th% Speed

37.9

Speed limit: 30

72 hours Count duration: Functional class: 14 30 Factor group: Batch ID:

ULS-Processed Org: TST Init: KAJ Org: ULS Init: DS Count taken by: Processed by:

Speeds, mph

	0.0-	20.1-	25.1-	30.1-	35.1-	40.1-	45.1-	50.1-	55.1-	60.1-	65.1-	70.1-	75.1-	% Exc	% Exc	% Exc	% Exc	% Exc				
Hour	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	95.0	45.0	50.0	55.0	60.0	65.0	Avg	50th%	85th%	Total
4.00					40									0.7					0.4.5			440
1:00	0	0	9	53	40	8	2	1	0	0	0	0	0	2.7	0.9	0.0	0.0	0.0	34.5	34.5	39.3	113
2:00	0	0	5	19	23	8	2	1	1	0	0	1	0	8.3	5.0	3.3	1.7	1.7	36.1	36.4	42.6	60
3:00	0	1	5	11	18	3	0	1	0	0	0	0	0	2.6	2.6	0.0	0.0	0.0	34.4	35.7	39.5	39
4:00	0	0	1	16	17	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	34.8	35.2	38.8	35
5:00	0	0	6	16	27	3	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	34.6	35.8	39.2	52
6:00	0	2	19	78	53	5	2	0	0	0	0	0	0	1.3	0.0	0.0	0.0	0.0	33.5	33.8	38.5	159
7:00	1	1	27	168	170	23	4	0	0	0	0	0	0	1.0	0.0	0.0	0.0	0.0	34.5	35.0	39.1	394
8:00	2	13	93	348	220	33	5	1	0	0	0	0	0	0.8	0.1	0.0	0.0	0.0	33.1	33.6	38.5	715
9:00	5	19	100	437	258	33	4	3	1	0	0	1	0	1.0	0.6	0.2	0.1	0.1	32.9	33.6	38.4	861
10:00	1	17	123	461	213	31	4	1	0	0	0	0	0	0.6	0.1	0.0	0.0	0.0	32.7	33.1	37.9	851
11:00	4	22	186	423	165	18	2	0	0	0	0	0	0	0.2	0.0	0.0	0.0	0.0	31.6	32.4	36.9	820
12:00	3	20	140	363	149	16	3	0	0	0	0	0	0	0.4	0.0	0.0	0.0	0.0	31.9	32.6	37.2	694
13:00	4	20	184	385	153	26	3	1	0	0	0	1	0	0.6	0.3	0.1	0.1	0.1	31.7	32.4	37.3	777
14:00	5	49	179	358	137	21	1	0	0	0	0	0	0	0.1	0.0	0.0	0.0	0.0	30.9	32.0	36.7	750
15:00	5	26	192	379	144	21	4	1	0	0	0	0	0	0.6	0.1	0.0	0.0	0.0	31.4	32.2	36.9	772
16:00	7	31	170	375	180	29	4	0	0	0	0	0	0	0.5	0.0	0.0	0.0	0.0	31.6	32.6	37.6	796
17:00	4	16	147	402	223	37	8	2	0	0	0	0	0	1.2	0.2	0.0	0.0	0.0	32.6	33.2	38.3	839
18:00	2	20	157	422	208	34	6 3	0	0	0	0	0	0	0.7	0.0	0.0	0.0	0.0	32.4	33.0	38.0	849 715
19:00	1	18	121	368	177	24	3	2	0	0	1	0	0	0.8	0.4	0.1	0.1	0.1	32.5	33.0	37.9	
20:00	0	10	91	306	157	21	1	0	0	0	1	0	0	0.3	0.2	0.2	0.2	0.2	32.8	33.2	38.0	587
21:00	0	9 4	91	289 224	79 05	16	2 2	0	0	0	0	0	0	0.4	0.0	0.0	0.0	0.0	32.1	32.5	36.6	486
22:00	0	-	53		85	12	4	0		0		0	0	0.5	0.0	0.0	0.0	0.0	32.8	33.0	37.5	380
23:00	0	2 2	18 23	148	85 58	17 12	1	1	0	0	0	0	0	0.7 1.6	0.4	0.0	0.0	0.0	34.0	34.0	38.8	272
24:00	U	2	23	87	56	12	'	'	U	U	'	U	U	1.0	1.1	0.5	0.5	0.5	33.7	33.9	39.0	185
Avg. Daily Total	44	302	2140	6136	3039	452	64	16	2	0	3	3	0	0.7	0.2	0.1	0.0	0.0	32.4	33.0	37.9	12201
Percent		2.5%	17.5%	50.3%	24.9%	3.7%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7	0.2	0.1	0.0	0.0	32.4	33.0	31.5	12201
Cum. Percent		2.8%	20.4%	70.7%	95.6%	99.3%	99.8%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%									
Average hour	0.476	13	89	256	127	19	39.076	33.376	0	0	0	0	0									508
Average nour	2	13	69	230	127	19	3		U	U	U	U	U									300

TRAFFIC FLOW BY DIRECTION

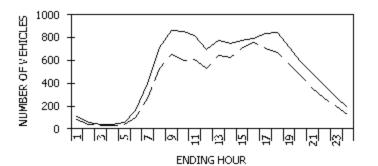
West		30.9	33.0		38.0
		Peak H	our Data		
Direction	Hour	Count	2-way	Hour	Count
East	9	861	A.M.	9	1510
West	16	754	P.M.	16	1550

50th% Speed

33.0

Avg. Speed

32.4



--- East - - West

Page 2 of 2 Date: 05/28/2014

Station: 868210

Road #: Road name: BROADWAY

From: W OREILLY ST To: **HENRY ST** Direction: West

Tue 04/15/2014 12:00 Start date: End date: Fri 04/18/2014 11:45

County: Ulster Town: KINGSTON

LION#:

85th% Speed

37.9

Speed limit: 30

72 hours Count duration: Functional class: 14 30 Factor group:

Batch ID:

ULS-Processed Org: TST Init: KAJ Org: ULS Init: DS Count taken by: Processed by:

Speeds, mph

								,														
	0.0-	20.1-	25.1-	30.1-	35.1-	40.1-	45.1-	50.1-	55.1-	60.1-	65.1-	70.1-	75.1-	% Exc								
Hour	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	95.0	45.0	50.0	55.0	60.0	65.0	Avg	50th%	85th%	Total
1:00	0	0	2	31	33	13	2	2	0	0	0	0	0	4.8	2.4	0.0	0.0	0.0	36.2	36.3	41.8	83
2:00	0	0	0	7	12	15	2	0	0	0	0	0	0	5.6	0.0	0.0	0.0	0.0	38.7	39.6	43.9	36
3:00	0	0	0	5	14	9	3	0	0	0	0	0	0	9.7	0.0	0.0	0.0	0.0	38.6	38.8	44.1	31
4:00	0	0	0	3	15	14	1	0	0	0	0	0	0	3.0	0.0	0.0	0.0	0.0	39.2	39.6	43.6	33
5:00	0	0	0	21	15	2	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	34.8	34.6	38.8	38
6:00	0	1	12	25	49	14	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	35.0	36.3	39.9	101
7:00	0	0	5	43	162	55	4	0	0	0	0	0	0	1.5	0.0	0.0	0.0	0.0	37.3	37.7	41.7	269
8:00	34	19	61	234	151	25	2	0	0	0	0	0	0	0.4	0.0	0.0	0.0	0.0	30.1	33.2	38.3	526
9:00	14	7	72	316	224	13	2	0	1	0	0	0	0	0.5	0.2	0.2	0.0	0.0	32.4	33.7	38.2	649
10:00	7	10	61	299	205	14	0	1	0	0	0	0	0	0.2	0.2	0.0	0.0	0.0	32.8	33.7	38.2	597
11:00	22	22	84	339	133	8	0	1	0	0	0	0	0	0.2	0.2	0.0	0.0	0.0	30.7	32.7	37.0	609
12:00	18	15	71	295	118	11	2	0	0	0	0	0	0	0.4	0.0	0.0	0.0	0.0	31.0	32.8	37.2	530
13:00	19	27	135	332	120	11	1	0	0	0	0	1	0	0.3	0.2	0.2	0.2	0.2	30.4	32.2	36.6	646
14:00	20	31	120	332	107	10	2	0	0	0	0	0	0	0.3	0.0	0.0	0.0	0.0	30.2	32.2	36.3	622
15:00	122	50	131	314	78	9	1	0	0	0	0	0	0	0.1	0.0	0.0	0.0	0.0	25.1	30.8	34.8	705
16:00	97	65	139	311	129	11	2	0	0	0	0	0	0	0.3	0.0	0.0	0.0	0.0	26.4	31.3	36.2	754
17:00	16	25	93	409	142	17	4	2	0	0	0	0	0	8.0	0.3	0.0	0.0	0.0	31.3	32.7	37.1	708
18:00	2	15	91	350	187	21	2	0	0	0	0	0	0	0.3	0.0	0.0	0.0	0.0	32.7	33.3	38.0	668
19:00	8	12	41	282	201	23	1	0	0	0	0	0	0	0.2	0.0	0.0	0.0	0.0	33.0	34.0	38.5	568
20:00	11	8	96	239	96	10	5	0	0	0	0	0	0	1.1	0.0	0.0	0.0	0.0	31.2	32.5	37.2	465
21:00	1	2	69	184	90	5	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	32.3	32.9	37.4	351
22:00	0	0	25	149	76	12	2	0	0	0	0	0	0	0.8	0.0	0.0	0.0	0.0	33.7	33.6	38.4	264
23:00	0	0	5	86	88	19	1	1	0	0	0	0	0	1.0	0.5	0.0	0.0	0.0	35.3	35.6	39.5	200
24:00	0	0	2	35	70	14	2	0	1	1	0	0	0	3.2	1.6	1.6	8.0	0.0	36.5	36.9	40.0	125
	204		4045	4044	0545			_						0.5								0.570
Avg. Daily Total		309	1315	4641	2515	355	41	7	2	1	0	1	0	0.5	0.1	0.0	0.0	0.0	30.9	33.0	38.0	9578
Percent		3.2%	13.7%	48.5%	26.3%	3.7%	0.4% 99.9%	0.1% 100.0%	0.0% 100.0%	0.0%	0.0% 100.0%	0.0% 100.0%	0.0%									
Cum. Percent		7.3%	21.0%	69.5%	95.8%	99.5%				100.0%			100.0%									200
Average hour	16	13	55	193	105	15	2	0	0	0	0	0	0									399

TRAFFIC FLOW BY DIRECTION

West		30.9	33.0		38.0
		Peak Ho	our Data		
Direction	Hour	Count	2-way	Hour	Count
East	9	861	A.M.	9	1510
West	16	754	P.M.	16	1550

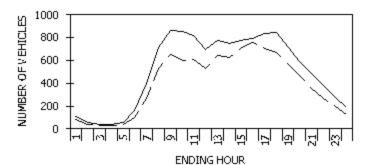
50th% Speed

33.0

Avg. Speed

32.4

East



--- East - - West

Page 1 of 2 Date: 05/28/2014

Station: 861102

Road #: Road name: BROADWAY

From: FOXHALL AVE To: W OREILLY ST

Direction: East

East

Tue 04/15/2014 11:00 Start date: Fri 04/18/2014 11:45

End date: County: Ulster

Town: KINGSTON Speed limit: 30

LION#:

85th% Speed

30.0

73 hours Count duration: Functional class: 14 30

Factor group: Batch ID: **ULS-Processed** Org: TST Init: KAJ Org: ULS Init: DS Count taken by: Processed by:

Speeds, mph

	0.0-	20.1-	25.1-	30.1-	35.1-	40.1-	45.1-	50.1-	55.1-	60.1-	65.1-	70.1-	75.1-	% Exc								
Hour	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	95.0	45.0	50.0	55.0	60.0	65.0	Avg	50th%	85th%	Total
					_						_		_									
1:00	0	4	21	15	3	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	29.2	29.3	34.2	44
2:00	0	1	9	6	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	29.2	29.2	33.8	17
3:00	0	2	6	5	1	1	0	0	1	0	0	0	0	6.3	6.3	6.3	0.0	0.0	30.3	30.0	38.0	16
4:00	0	1	4	2	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	27.8	28.2	32.4	7
5:00	0	0	7	6	2	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	31.0	30.9	36.6	16
6:00 7:00	0 2	4	27 71	16	3 6	0	0	0	0	0	0	0	0	0.0	0.0	0.0 0.0	0.0	0.0	28.9	28.9 28.6	33.6 33.3	50 138
		16		43	3	0		-		0	-	0		0.0	0.0		0.0	0.0	28.0		33.3 31.4	
8:00 9:00	23 17	45 84	91 123	37 46	3	0	0 0	0	0	0	0	0	0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	24.1 24.9	26.8 26.5	30.9	199 273
10:00	9	110	153	34	3	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	25.2	26.3	29.8	310
11:00	19	112	150	30	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	24.4	25.9	29.5	312
12:00	49	135	132	20	3	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	22.3	24.5	29.0	339
13:00	43	148	170	25	5	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	23.2	25.2	29.2	391
14:00	49	152	120	28	2	2	0	0	0	0	1	0	0	0.3	0.3	0.3	0.3	0.3	22.4	24.3	29.2	354
15:00	159	103	105	19	2	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	18.5	21.8	28.3	389
16:00	66	142	154	33	3	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	22.2	24.7	29.3	398
17:00	27	118	195	47	4	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	24.6	26.3	29.9	391
18:00	35	153	173	38	2	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	23.7	25.4	29.5	402
19:00	25	86	175	43	4	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	24.7	26.6	30.0	334
20:00	4	78	133	46	6	0	1	0	0	0	0	0	0	0.4	0.0	0.0	0.0	0.0	26.3	27.0	31.4	268
21:00	0	66	130	34	3	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	26.6	27.0	30.5	234
22:00	1	30	108	29	3	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	27.1	27.6	31.1	171
23:00	2	21	70	36	4	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	27.5	28.2	32.8	133
24:00	0	11	46	17	6	1	0	1	1	0	0	0	0	2.4	2.4	1.2	0.0	0.0	28.6	28.4	34.0	83
Avg. Daily Total	530	1622	2373	655	74	10	1	1	2	0	1	0	0	0.1	0.1	0.1	0.0	0.0	23.9	26.1	30.0	5269
Percent 1	10.1%	30.8%	45.0%	12.4%	1.4%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%									
Cum. Percent 1	10.1%	40.8%	85.9%	98.3%	99.7%	99.9%	99.9%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%									
Average hour	22	68	99	27	3	0	0	0	0	0	0	0	0									220

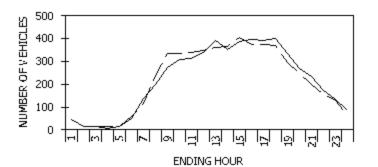
TRAFFIC FLOW BY DIRECTION

West		21.9	24.1		29.0
		Peak H	our Data		
Direction	Hour	Count	2-way	Hour	Count
East	18	402	A.M.	12	687
West	15	404	PM	15	793

50th% Speed

26.1

Avg. Speed 23.9



--- East

- - West

Page 2 of 2 Date: 05/28/2014

Station: 861102

Road #: Road name: BROADWAY

From: FOXHALL AVE To: W OREILLY ST

Direction: West

Tue 04/15/2014 11:00 Start date: End date: Fri 04/18/2014 11:45

County: Ulster Town: KINGSTON

Speed limit: 30

LION#:

Count duration: 73 hours Functional class: 14 30 Factor group:

Batch ID: **ULS-Processed** Org: TST Init: KAJ Org: ULS Init: DS Count taken by: Processed by:

Speeds, mph

								- 1	,														
		0.0-	20.1-	25.1-	30.1-	35.1-	40.1-	45.1-	50.1-	55.1-	60.1-	65.1-	70.1-	75.1-	% Exc								
	Hour	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	95.0	45.0	50.0	55.0	60.0	65.0	Avg	50th%	85th%	Total
	1:00	1	7	24	12	3	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	27.5	28.3	33.4	47
	2:00	0	3	9	2	2	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	27.8	27.8	34.0	16
	3:00	0	3	5	5	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	27.7	28.6	33.1	13
	4:00	1	2	6	5	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	26.7	28.8	33.8	15
	5:00	0	2	8	4	2	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	28.8	28.8	34.6	16
	6:00	2	12	26	13	4	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	26.7	27.8	33.3	57
	7:00	4	34	55	20	3	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	25.7	26.9	31.4	116
	8:00	25	95	93	21	2	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	23.2	25.0	29.4	237
	9:00	55	151	111	19	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	21.7	23.8	28.6	336
	10:00	68	150	106	12	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	21.0	23.4	28.2	336
	11:00	49	172	107	11	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	21.8	23.6	28.2	340
	12:00	85	175	80	8	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	20.1	22.6	27.3	348
	13:00	63	179	100	16	1	0	0	0	1	0	0	0	0	0.3	0.3	0.3	0.0	0.0	21.4	23.3	28.2	360
	14:00	80	182	89	16	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	20.6	22.9	27.9	367
	15:00	152	166	73	11	1	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	18.5	21.6	26.8	404
	16:00	85	157	110	20	1	0	1	0	0	0	0	0	0	0.3	0.0	0.0	0.0	0.0	20.8	23.3	28.5	374
	17:00	58	146	145	23	2	1	0	0	1	0	0	0	0	0.3	0.3	0.3	0.0	0.0	22.2	24.5	29.0	376
	18:00	61	155	136	16	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	21.8	24.0	28.6	369
	19:00	35	115	120	24	2	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	23.0	25.0	29.3	297
	20:00	22	89	110	23	2	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	23.7	25.6	29.5	246
	21:00	9	71	101	19	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	24.8	26.1	29.5	201
	22:00	8	43	82	21	1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	25.1	26.7	30.0	155
	23:00	3	31	70	22	2	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	26.2	27.2	31.1	128
	24:00	0	11	32	17	2	1	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	28.0	28.3	33.2	63
Δνα	. Daily Total	866	2151	1798	360	34	5	1	0	2	0	0	0	0	0.1	0.0	0.0	0.0	0.0	21.9	24.1	29.0	5217
Avg.	Percent 1		41.2%	34.5%	6.9%	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1	0.0	0.0	0.0	0.0	21.5	24.1	23.0	3217
Cı	ım. Percent 1		57.8%	92.3%	99.2%	99.8%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%									
	verage hour	36	90	75	15	33.070	0	0	0	0	0	0	0	0									217
	vorage nour	50	30	7.5	10		U	U	U	U	U	U	U	U									217

TRAFFIC FLOW BY DIRECTION

East West	Avg	g. Speed 23.9 21.9	50th% Speed 26.1 24.1	85th%	% Speed 30.0 29.0
		Peak I	Hour Data		
Direction	Hour	Count	2-way	Hour	Count
East	18	402	A.M.	12	687
West	15	404	P.M.	15	793



--- East

- - West

BROADWAY TRAFFIC SIGNALIZATION STUDY | City of Kingston, New York

APPENDIX A-2 Turn Movement Count Data



Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300 Albany, NY, 12205

Albany, NY, 1220 (518)-453-9431

Elmendorf St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Elmendorf St & Broadway AM

Site Code : 09241541 Start Date : 9/24/2015

Page No : 1

Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

						GI.	oupsiin	icu- mi	OS - DIII	gie Omit 11t	icks/ Dusc	5 - IIacu	, II and	1.0							
		Elı	mendorf	St			E	Broadwa	y				Liberty]	Broadwa	y		
		F	rom Nor	th			F	rom Eas	st			Fr	om Sout	h			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	11	2	10	3	26	24	145	9	3	181	2	0	0	0	2	3	132	3	4	142	351
07:45 AM	4	2	4	2	12	17	136	3	4	160	0	0	0	0	0	4	155	7	1	167	339
Total	15	4	14	5	38	41	281	12	7	341	2	0	0	0	2	7	287	10	5	309	690
08:00 AM	8	1	1	3	13	3	104	19	2	128	0	0	0	0	0	23	111	4	2	140	281
08:15 AM	12	2	6	4	24	11	128	9	3	151	0	0	0	2	2	4	126	6	3	139	316
08:30 AM	5	0	4	0	9	6	147	12	3	168	0	0	0	1	1	2	77	2	2	83	261
08:45 AM	3	4	4	0	11	13	114	14	3	144	0	0	0	0	0	3	84	9	2	98	253
Total	28	7	15	7	57	33	493	54	11	591	0	0	0	3	3	32	398	21	9	460	1111
Grand Total	43	11	29	12	95	74	774	66	18	932	2	0	0	3	5	39	685	31	14	769	1801
Apprch %	45.3	11.6	30.5	12.6		7.9	83	7.1	1.9		40	0	0	60		5.1	89.1	4	1.8		
Total %	2.4	0.6	1.6	0.7	5.3	4.1	43	3.7	1	51.7	0.1	0	0	0.2	0.3	2.2	38	1.7	0.8	42.7	
Autos	41	11	28	11	91	72	712	63	11	858	2	0	0	3	5	37	639	28	9	713	1667
% Autos	95.3	100	96.6	91.7	95.8	97.3	92	95.5	61.1	92.1	100	0	0	100	100	94.9	93.3	90.3	64.3	92.7	92.6
Single Unit Trucks/Buses	2	0	1	1	4	2	54	3	7	66	0	0	0	0	0	2	41	3	5	51	121
% Single Unit Trucks/Buses	4.7	0	3.4	8.3	4.2	2.7	7	4.5	38.9	7.1	0	0	0	0	0	5.1	6	9.7	35.7	6.6	6.7
Tractor Trailers	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	5	0	0	5	13
% Tractor Trailers	0	0	0	0	0	0	1	0	0	0.9	0	0	0	0	0	0	0.7	0	0	0.7	0.7

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Elmendorf St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Elmendorf St & Broadway AM

Site Code : 09241541 Start Date : 9/24/2015

Page No : 2

			mendorf 'rom Nor					Broadwa From Eas				F	Liberty rom Sou					Broadwa From We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis	From 07	:30 AM to	08:45 A	M - Peak	1 of 1			,			'					,				•	•
Peak Hour for Entire	e Intersec	tion Begin	ns at 07:3	0 AM																	
07:30 AM	11	2	10	3	26	24	145	9	3	181	2	0	0	0	2	3	132	3	4	142	351
07:45 AM	4	2	4	2	12	17	136	3	4	160	0	0	0	0	0	4	155	7	1	167	339
08:00 AM	8	1	1	3	13	3	104	19	2	128	0	0	0	0	0	23	111	4	2	140	281
08:15 AM	12	2	6	4	24	11	128	9	3	151	0	0	0	2	2	4	126	6	3	139	316
Total Volume	35	7	21	12	75	55	513	40	12	620	2	0	0	2	4	34	524	20	10	588	1287
% App. Total	46.7	9.3	28	16		8.9	82.7	6.5	1.9		50	0	0	50		5.8	89.1	3.4	1.7		
PHF	.729	.875	.525	.750	.721	.573	.884	.526	.750	.856	.250	.000	.000	.250	.500	.370	.845	.714	.625	.880	.917

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Elmendorf St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Elmendorf St & Broadway PM

Site Code : 09241542 Start Date : 9/24/2015

Page No : 1

Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

							_			sic Omi III	icis, Dube						_				1
			mendorf				ŀ	Broadwa	y				Liberty S	it				Broadwa	•		
		F	rom Nor	th			F	From Eas	st			F	rom Sou	th			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	5	9	6	0	20	4	145	13	2	164	2	0	0	2	4	1	156	10	2	169	357
04:15 PM	9	5	8	1	23	17	121	6	5	149	0	0	0	2	2	5	140	11	3	159	333
04:30 PM	7	5	4	4	20	10	126	5	6	147	0	0	0	3	3	6	166	14	8	194	364
04:45 PM	5	3	5	0	13	6	139	15	4	164	0	0	0	0	0	7	138	14	4	163	340
Total	26	22	23	5	76	37	531	39	17	624	2	0	0	7	9	19	600	49	17	685	1394
05:00 PM	9	7	6	5	27	26	123	15	6	170	0	0	0	2	2	4	147	12	11	174	373
05:15 PM	8	4	5	1	18	13	128	12	5	158	0	0	0	2	2	7	134	17	4	162	340
Grand Total	43	33	34	11	121	76	782	66	28	952	2	0	0	11	13	30	881	78	32	1021	2107
Apprch %	35.5	27.3	28.1	9.1		8	82.1	6.9	2.9		15.4	0	0	84.6		2.9	86.3	7.6	3.1		
Total %	2	1.6	1.6	0.5	5.7	3.6	37.1	3.1	1.3	45.2	0.1	0	0	0.5	0.6	1.4	41.8	3.7	1.5	48.5	
Autos	43	33	34	8	118	75	758	66	20	919	2	0	0	11	13	30	863	77	25	995	2045
% Autos	100	100	100	72.7	97.5	98.7	96.9	100	71.4	96.5	100	0	0	100	100	100	98	98.7	78.1	97.5	97.1
Single Unit Trucks/Buses	0	0	0	3	3	1	19	0	8	28	0	0	0	0	0	0	16	1	7	24	55
% Single Unit Trucks/Buses	0	0	0	27.3	2.5	1.3	2.4	0	28.6	2.9	0	0	0	0	0	0	1.8	1.3	21.9	2.4	2.6
Tractor Trailers	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
% Tractor Trailers	0	0	0	0	0	0	0.6	0	0	0.5	0	0	0	0	0	0	0.2	0	0	0.2	0.3

			mendorf 'rom Nor					Broadway From Eas	,				Liberty S rom Sou					Broadwa From We			
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis	s From 04	:00 PM to	05:15 PN	1 - Peak	1 of 1																
Peak Hour for Entir	re Intersec	tion Begin	ns at 04:30) PM																	
04:30 PM	7	5	4	4	20	10	126	5	6	147	0	0	0	3	3	6	166	14	8	194	364
04:45 PM	5	3	5	0	13	6	139	15	4	164	0	0	0	0	0	7	138	14	4	163	340
05:00 PM	9	7	6	5	27	26	123	15	6	170	0	0	0	2	2	4	147	12	11	174	373
05:15 PM	8	4	5	1	18	13	128	12	5	158	0	0	0	2	2	7	134	17	4	162	340
Total Volume	29	19	20	10	78	55	516	47	21	639	0	0	0	7	7	24	585	57	27	693	1417
% App. Total	37.2	24.4	25.6	12.8		8.6	80.8	7.4	3.3		0	0	0	100		3.5	84.4	8.2	3.9		
PHF	.806	.679	.833	.500	.722	.529	.928	.783	.875	.940	.000	.000	.000	.583	.583	.857	.881	.838	.614	.893	.950

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

O'Neil St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: O'Neil St & Broadway AM

Site Code : 09291561 Start Date : 9/29/2015

Page No : 1

Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

			OIN - : 1 O							ingic oilit				11411015							
			O'Neil S					Broadwa	•				Henry S					Broadwa	•		
		F	<u>rom Nor</u>	th			F	rom Ea	st			<u>Fr</u>	rom Sou	<u>ıth</u>			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	7	11	5	3	26	9	145	4	8	166	9	2	9	1	21	11	170	7	7	195	408
07:45 AM	5	9	4	2	20	5	151	7	3	166	9	8	14	0	31	10	174	9	3	196	413
Total	12	20	9	5	46	14	296	11	11	332	18	10	23	1	52	21	344	16	10	391	821
08:00 AM	8	7	4	3	22	7	109	4	3	123	5	9	9	0	23	13	149	5	4	171	339
08:15 AM	8	9	1	0	18	11	107	5	0	123	12	8	10	1	31	20	102	13	7	142	314
08:30 AM	4	20	3	1	28	5	115	7	3	130	14	9	14	2	39	8	127	6	4	145	342
08:45 AM	4	12	3	3	22	4	156	5	3	168	12	11	11	0	34	24	137	6	11	178	402
Total	24	48	11	7	90	27	487	21	9	544	43	37	44	3	127	65	515	30	26	636	1397
Grand Total	36	68	20	12	136	41	783	32	20	876	61	47	67	4	179	86	859	46	36	1027	2218
Apprch %	26.5	50	14.7	8.8		4.7	89.4	3.7	2.3		34.1	26.3	37.4	2.2		8.4	83.6	4.5	3.5		
Total %	1.6	3.1	0.9	0.5	6.1	1.8	35.3	1.4	0.9	39.5	2.8	2.1	3	0.2	8.1	3.9	38.7	2.1	1.6	46.3	
Autos	32	63	18	11	124	37	735	28	18	818	57	44	59	3	163	77	815	40	32	964	2069
% Autos	88.9	92.6	90	91.7	91.2	90.2	93.9	87.5	90	93.4	93.4	93.6	88.1	75	91.1	89.5	94.9	87	88.9	93.9	93.3
Single Unit Trucks/Buses	4	5	2	1	12	4	44	3	2	53	4	3	6	1	14	7	42	6	4	59	138
% Single Unit Trucks/Buses	11.1	7.4	10	8.3	8.8	9.8	5.6	9.4	10	6.1	6.6	6.4	9	25	7.8	8.1	4.9	13	11.1	5.7	6.2
Tractor Trailers	0	0	0	0	0	0	4	1	0	5	0	0	2	0	2	2	2	0	0	4	11
% Tractor Trailers	0	0	0	0	0	0	0.5	3.1	0	0.6	0	0	3	0	1.1	2.3	0.2	0	0	0.4	0.5

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

O'Neil St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: O'Neil St & Broadway AM

Site Code : 09291561 Start Date : 9/29/2015

Page No : 2

			O'Neil S					Broadwa From Ea	•				Henry S					Broadwa rom We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	is From	07:30 AN	/I to 08:4	5 AM - P	eak 1 of 1		,	· ·			,										
Peak Hour for Enti	ire Inters	ection B	egins at (07:30 AN	Л																
07:30 AM	7	11	5	3	26	9	145	4	8	166	9	2	9	1	21	11	170	7	7	195	408
07:45 AM	5	9	4	2	20	5	151	7	3	166	9	8	14	0	31	10	174	9	3	196	413
08:00 AM	8	7	4	3	22	7	109	4	3	123	5	9	9	0	23	13	149	5	4	171	339
08:15 AM	8	9	1	0	18	11	107	5	0	123	12	8	10	1	31	20	102	13	7	142	314
Total Volume	28	36	14	8	86	32	512	20	14	578	35	27	42	2	106	54	595	34	21	704	1474
% App. Total	32.6	41.9	16.3	9.3		5.5	88.6	3.5	2.4		33	25.5	39.6	1.9		7.7	84.5	4.8	3		
PHF	.875	.818	.700	.667	.827	.727	.848	.714	.438	.870	.729	.750	.750	.500	.855	.675	.855	.654	.750	.898	.892

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Pine Grove Rd & Broadway Kingston, New York, 12401 Project No 2014045.00 File Name: Pine Grove Rd & Broadway AM

Site Code : 20150455 Start Date : 9/29/2015

Page No : 1

Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

			Grand S					roadwa		ingic onit			e Grove	Dd				Broadwa	11/		
									•										•		
		<u> </u>	rom Nor	rtn				rom Ea	St			<u> Fr</u>	om Sou	itn				rom We	est		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	53	15	10	13	91	6	115	2	0	123	4	1	28	67	100	62	127	41	4	234	548
07:45 AM	71	13	1	7	92	6	104	5	0	115	3	9	30	24	66	57	96	52	1	206	479
Total	124	28	11	20	183	12	219	7	0	238	7	10	58	91	166	119	223	93	5	440	1027
08:00 AM	58	6	7	1	72	4	77	1	1	83	1	8	21	1	31	37	106	46	0	189	375
08:15 AM	55	16	2	1	74	7	94	3	1	105	5	9	20	3	37	28	78	41	0	147	363
08:30 AM	58	8	2	2	70	4	97	3	0	104	4	14	27	4	49	41	104	48	0	193	416
08:45 AM	65	13	2	4	84	5	110	3	1	119	4	12	29	5	50	33	100	47	0	180	433
Total	236	43	13	8	300	20	378	10	3	411	14	43	97	13	167	139	388	182	0	709	1587
,																					
Grand Total	360	71	24	28	483	32	597	17	3	649	21	53	155	104	333	258	611	275	5	1149	2614
Apprch %	74.5	14.7	5	5.8		4.9	92	2.6	0.5		6.3	15.9	46.5	31.2		22.5	53.2	23.9	0.4		
Total %	13.8	2.7	0.9	1.1	18.5	1.2	22.8	0.7	0.1	24.8	0.8	2	5.9	4	12.7	9.9	23.4	10.5	0.2	44	
Autos	339	68	22	28	457	30	570	17	3	620	19	53	145	104	321	251	577	248	5	1081	2479
% Autos	94.2	95.8	91.7	100	94.6	93.8	95.5	100	100	95.5	90.5	100	93.5	100	96.4	97.3	94.4	90.2	100	94.1	94.8
Single Unit Trucks/Buses	20	2	2	0	24	2	25	0	0	27	1	0	10	0	11	7	33	27	0	67	129
% Single Unit Trucks/Buses	5.6	2.8	8.3	0	5	6.2	4.2	0	0	4.2	4.8	0	6.5	0	3.3	2.7	5.4	9.8	0	5.8	4.9
Tractor Trailers	1	1	0	0	2	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	6
% Tractor Trailers	0.3	1.4	0	0	0.4	0	0.3	0	0	0.3	4.8	0	0	0	0.3	0	0.2	0	0	0.1	0.2

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Pine Grove Rd & Broadway Kingston, New York, 12401 Project No 2014045.00 File Name: Pine Grove Rd & Broadway AM

Site Code : 20150455 Start Date : 9/29/2015

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			Grand S rom Noi					Broadwa From Ea	•				ne Grove rom Sou					Broadwa From We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	sis From (07:30 AN	1 to 08:4	5 AM - P	eak 1 of 1	,	,				'			'			,			·	
Peak Hour for En	tire Inters	ection B	egins at (07:30 AN	Λ .																
07:30 AM	53	15	10	13	91	6	115	2	0	123	4	1	28	67	100	62	127	41	4	234	548
07:45 AM	71	13	1	7	92	6	104	5	0	115	3	9	30	24	66	57	96	52	1	206	479
08:00 AM	58	6	7	1	72	4	77	1	1	83	1	8	21	1	31	37	106	46	0	189	375
08:15 AM	55	16	2	1	74	7	94	3	1	105	5	9	20	3	37	28	78	41	0	147	363
Total Volume	237	50	20	22	329	23	390	11	2	426	13	27	99	95	234	184	407	180	5	776	1765
% App. Total	72	15.2	6.1	6.7		5.4	91.5	2.6	0.5		5.6	11.5	42.3	40.6		23.7	52.4	23.2	0.6		
PHF	.835	.781	.500	.423	.894	.821	.848	.550	.500	.866	.650	.750	.825	.354	.585	.742	.801	.865	.313	.829	.805

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

O'Reilly St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: O'Reilly St & Broadway AM

Site Code : 20150451 Start Date : 9/17/2015

Page No : 1

Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

						GIC	oups Fil	iileu- Ai	utos - 3	ingle Unit	ITUCKS/E	ouses -	Tactor	i i allei 5							
		E	. O'Reil	ly			В	roadwa	ıy			W	I. O'Reil	lly				Broadwa	ıy		
		Fi	om Nor	th			F	rom Ea	st			Fr	om Sou	ıth			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	8	12	8	13	41	10	89	3	19	121	12	29	6	20	67	7	94	2	2	105	334
07:45 AM	1	10	1	2	14	2	75	1	1	79	3	9	7	10	29	9	99	2	0	110	232
Total	9	22	9	15	55	12	164	4	20	200	15	38	13	30	96	16	193	4	2	215	566
08:00 AM	11	17	4	2	34	3	79	3	1	86	7	12	10	7	36	4	71	6	0	81	237
08:15 AM	3	5	0	2	10	3	92	2	2	99	7	14	4	9	34	6	94	4	2	106	249
08:30 AM	7	10	3	3	23	2	83	4	0	89	2	14	7	8	31	2	87	4	0	93	236
08:45 AM	6	8	4	1_	19	3	71	5	0	79	9	15	6	3	33	6	92	2	0	100	231
Total	27	40	11	8	86	11	325	14	3	353	25	55	27	27	134	18	344	16	2	380	953
ı					0					1											
Grand Total	36	62	20	23	141	23	489	18	23	553	40	93	40	57	230	34	537	20	4	595	1519
Apprch %	25.5	44	14.2	16.3		4.2	88.4	3.3	4.2		17.4	40.4	17.4	24.8		5.7	90.3	3.4	0.7		
Total %	2.4	4.1	1.3	1.5	9.3	1.5	32.2	1.2	1.5	36.4	2.6	6.1	2.6	3.8	15.1	2.2	35.4	1.3	0.3	39.2	
Autos	36	60	19	23	138	21	465	17	23	526	39	91	37	57	224	30	509	20	4	563	1451
% Autos	100	96.8	95	100	97.9	91.3	95.1	94.4	100	95.1	97.5	97.8	92.5	100	97.4	88.2	94.8	100	100	94.6	95.5
Single Unit Trucks/Buses	0	2	1	0	3	2	23	1	0	26	1	2	3	0	6	4	28	0	0	32	67
% Single Unit Trucks/Buses	0	3.2	5	0	2.1	8.7	4.7	5.6	0_	4.7	2.5	2.2	7.5	0	2.6	11.8	5.2	0	0	5.4	4.4
Tractor Trailers	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Tractor Trailers	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.1

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

O'Reilly St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: O'Reilly St & Broadway AM Site Code: 20150451

Site Code : 20150451 Start Date : 9/17/2015

Page No : 2

			E. O'Reil rom Noi	•				Broadwa From Eas	•				V. O'Rei rom So	•				Broadwa From We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	sis From	07:30 AN	/I to 08:4	5 AM - P	eak 1 of 1			<u> </u>								,		,			
Peak Hour for En	tire Inters	ection B	egins at (07:30 AM	1																
07:30 AM	8	12	8	13	41	10	89	3	19	121	12	29	6	20	67	7	94	2	2	105	334
07:45 AM	1	10	1	2	14	2	75	1	1	79	3	9	7	10	29	9	99	2	0	110	232
08:00 AM	11	17	4	2	34	3	79	3	1	86	7	12	10	7	36	4	71	6	0	81	237
08:15 AM	3	5	0	2	10	3	92	2	2	99	7	14	4	9	34	6	94	4	2	106	249
Total Volume	23	44	13	19	99	18	335	9	23	385	29	64	27	46	166	26	358	14	4	402	1052
% App. Total	23.2	44.4	13.1	19.2		4.7	87	2.3	6		17.5	38.6	16.3	27.7		6.5	89.1	3.5	1		
PHF	.523	.647	.406	.365	.604	.450	.910	.750	.303	.795	.604	.552	.675	.575	.619	.722	.904	.583	.500	.914	.787

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

O'Reilly St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: O'Reilly St & Broadway PM

Site Code : 20150452 Start Date : 9/17/2015

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Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

				<u> </u>		<u> </u>				ingle offic			- actor								
		E.	O'Reilly	/ St			E	Broadwa	ıy			W.	O'Reilly	/ St			E	Broadwa	ıy		
		Fi	om Nor	rth			F	rom Ea	st			Fr	om Sou	ıth			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	8	12	6	7	33	2	85	3	1	91	13	16	11	10	50	6	100	5	0	111	285
04:15 PM	9	14	5	2	30	1	80	3	0	84	8	16	6	13	43	7	109	3	0	119	276
04:30 PM	12	12	3	8	35	4	87	7	0	98	4	14	8	6	32	5	117	0	1	123	288
04:45 PM	6	17	4	10	37	1	76	7	0	84	9	9	9	10	37	4	105	1	1	111	269
Total	35	55	18	27	135	8	328	20	1	357	34	55	34	39	162	22	431	9	2	464	1118
05:00 PM	14	9	4	6	33	1	87	6	2	96	6	12	8	4	30	3	98	6	1	108	267
05:15 PM	14	11	7	9	41	5	85	3	0	93	7	14	7	3	31	11	119	5	0	135	300
Grand Total	63	75	29	42	209	14	500	29	3	546	47	81	49	46	223	36	648	20	3	707	1685
Apprch %	30.1	35.9	13.9	20.1		2.6	91.6	5.3	0.5		21.1	36.3	22	20.6		5.1	91.7	2.8	0.4		
Total %	3.7	4.5	1.7	2.5	12.4	0.8	29.7	1.7	0.2	32.4	2.8	4.8	2.9	2.7	13.2	2.1	38.5	1.2	0.2	42	
Autos	61	74	29	42	206	13	485	28	3	529	46	80	48	46	220	35	638	20	3	696	1651
% Autos	96.8	98.7	100	100	98.6	92.9	97	96.6	100	96.9	97.9	98.8	98	100	98.7	97.2	98.5	100	100	98.4	98_
Single Unit Trucks/Buses	2	1	0	0	3	1	15	1	0	17	1	1	1	0	3	1	8	0	0	9	32
% Single Unit Trucks/Buses	3.2	1.3	0	0	1.4	7.1	3	3.4	0	3.1	2.1	1.2	2	0	1.3	2.8	1.2	0	0	1.3	1.9
Tractor Trailers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
% Tractor Trailers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.3	0.1

	E. O'Reilly St From North					Broadway From East					W. O'Reilly St From South					Broadway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	eak Hour Analysis From 04:00 PM to 05:15 PM - Peak 1 of 1																				
Peak Hour for En	eak Hour for Entire Intersection Begins at 04:30 PM																				
04:30 PM	12	12	3	8	35	4	87	7	0	98	4	14	8	6	32	5	117	0	1	123	288
04:45 PM	6	17	4	10	37	1	76	7	0	84	9	9	9	10	37	4	105	1	1	111	269
05:00 PM	14	9	4	6	33	1	87	6	2	96	6	12	8	4	30	3	98	6	1	108	267
05:15 PM	14	11	7	9	41	5	85	3	0	93	7	14	7	3	31	11	119	5	0	135	300
Total Volume	46	49	18	33	146	11	335	23	2	371	26	49	32	23	130	23	439	12	3	477	1124
% App. Total	31.5	33.6	12.3	22.6		3	90.3	6.2	0.5		20	37.7	24.6	17.7		4.8	92	2.5	0.6		
PHF	.821	.721	.643	.825	.890	.550	.963	.821	.250	.946	.722	.875	.889	.575	.878	.523	.922	.500	.750	.883	.937

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Foxhall Rd & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Foxhall Rd & Broadway AM

Site Code : 09171521 Start Date : 9/17/2015

Page No : 1

Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

			الممايدة	١		<u> </u>				ingic onit	TT GOTTO,						-)			
			oxhall F					roadwa	•				cal Driv	•				Broadwa	•		
		Fı	om Nor	rth			F	rom Ea	<u>st</u>			<u> </u>	om Sou	ıth			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	16	5	8	0	29	11	68	1	0	80	0	0	0	3	3	4	90	15	0	109	221
07:45 AM	14	2	12	0	28	1	84	2	0	87	0	0	1	0	1	3	86	2	12	103	219
Total	30	7	20	0	57	12	152	3	0	167	0	0	1	3	4	7	176	17	12	212	440
08:00 AM	10	2	6	0	18	3	76	0	0	79	2	0	2	0	4	2	61	8	0	71	172
08:15 AM	6	1	1	0	8	10	109	0	0	119	2	0	2	0	4	6	84	9	4	103	234
08:30 AM	12	0	2	2	16	4	76	1	0	81	1	0	0	2	3	0	73	15	1	89	189
08:45 AM	10	2	1_	0	13	3	70	2	2	77	2	0	0	1	3	2	81	5	4	92	185
Total	38	5	10	2	55	20	331	3	2	356	7	0	4	3	14	10	299	37	9	355	780
Grand Total	68	12	30	2	112	32	483	6	2	523	7	0	5	6	18	17	475	54	21	567	1220
Apprch %	60.7	10.7	26.8	1.8		6.1	92.4	1.1	0.4		38.9	0	27.8	33.3		3	83.8	9.5	3.7		
Total %	5.6	1_	2.5	0.2	9.2	2.6	39.6	0.5	0.2	42.9	0.6	0	0.4	0.5	1.5	1.4	38.9	4.4	1.7	46.5	
Autos	65	12	28	2	107	31	459	6	2	498	7	0	5	6	18	17	441	54	20	532	1155
% Autos	95.6	100	93.3	100	95.5	96.9	95	100	100	95.2	100	0	100	100	100	100	92.8	100	95.2	93.8	94.7
Single Unit Trucks/Buses	2	0	2	0	4	1	23	0	0	24	0	0	0	0	0	0	34	0	1	35	63
% Single Unit Trucks/Buses	2.9	0	6.7	0	3.6	3.1	4.8	0	0	4.6	0	0	0	0	0	0	7.2	0	4.8	6.2	5.2
Tractor Trailers	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Tractor Trailers	1.5	0	0	0	0.9	0	0.2	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.2

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Foxhall Rd & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Foxhall Rd & Broadway AM

Site Code : 09171521 Start Date : 9/17/2015

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		-	oxhall I					Broadwa From Ea	•				ical Driv	•				Broadwa From We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	is From	07:30 AN	1 to 08:4	5 AM - P	eak 1 of 1			· ·			,										
Peak Hour for Ent	ire Inters	ection B	egins at (07:30 AN	Л																
07:30 AM	16	5	8	0	29	11	68	1	0	80	0	0	0	3	3	4	90	15	0	109	221
07:45 AM	14	2	12	0	28	1	84	2	0	87	0	0	1	0	1	3	86	2	12	103	219
08:00 AM	10	2	6	0	18	3	76	0	0	79	2	0	2	0	4	2	61	8	0	71	172
08:15 AM	6	1	1	0	8	10	109	0	0	119	2	0	2	0	4	6	84	9	4	103	234
Total Volume	46	10	27	0	83	25	337	3	0	365	4	0	5	3	12	15	321	34	16	386	846
% App. Total	55.4	12	32.5	0		6.8	92.3	0.8	0		33.3	0	41.7	25		3.9	83.2	8.8	4.1		
PHF	.719	.500	.563	.000	.716	.568	.773	.375	.000	.767	.500	.000	.625	.250	.750	.625	.892	.567	.333	.885	.904

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300

Albany, NY, 12205 (518)-453-9431

Foxhall Rd & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Foxhall Rd & Broadway PM

Site Code : 09171522 Start Date : 9/17/2015

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Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

		F	oxhall F) d		011		Broadwa		ingle offic	11 4010/1		ical Driv				F	Broadwa	nv		
			om Nor					rom Ea	•				rom Sou					rom We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left		App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	7	0	21	0	28	16	70	0	1	87	2	0	0	0	2	1	102	19	0	122	239
04:15 PM	18	0	19	2	39	9	70	2	5	86	4	0	0	0	4	1	111	5	2	119	248
04:30 PM	12	0	16	0	28	9	83	0	2	94	2	0	2	2	6	0	107	10	0	117	245
04:45 PM	6	1	24	0	31	11	81	0	0	92	0	0	0	0	0	0	88	18	0	106	229
Total	43	1	80	2	126	45	304	2	8	359	8	0	2	2	12	2	408	52	2	464	961
05:00 PM	10	0	23	0	33	6	89	1	11	107	1	2	1	0	4	1	102	7	0	110	254
05:15 PM	10	0	30	0	40	8	84	0	0	92	1	0	0	0	1	1	128	7	0	136	269
Grand Total	63	1	133	2	199	59	477	3	19	558	10	2	3	2	17	4	638	66	2	710	1484
Apprch %	31.7	0.5	66.8	1		10.6	85.5	0.5	3.4		58.8	11.8	17.6	11.8		0.6	89.9	9.3	0.3		
Total %	4.2	0.1	9	0.1	13.4	4	32.1	0.2	1.3	37.6	0.7	0.1	0.2	0.1	1.1	0.3	43	4.4	0.1	47.8	
Autos	63	1	130	2	196	58	459	3	18	538	10	2	3	1	16	4	630	66	0	700	1450
% Autos	100	100	97.7	100	98.5	98.3	96.2	100	94.7	96.4	100	100	100	50	94.1	100	98.7	100	0	98.6	97.7
Single Unit Trucks/Buses	0	0	3	0	3	1	18	0	1	20	0	0	0	1	1	0	8	0	2	10	34
% Single Unit Trucks/Buses	0	0	2.3	0	1.5	1.7	3.8	0	5.3	3.6	0	0	0	50	5.9	0	1.3	0	100	1.4	2.3
Tractor Trailers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		_	oxhall F					Broadwa From Ea	•				lical Driv	•				Broadwa From We	,		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	sis From (04:00 PN	1 to 05:15	5 PM - P	eak 1 of 1						'										
Peak Hour for En	tire Inters	ection B	egins at (04:30 PM	Λ																
04:30 PM	12	0	16	0	28	9	83	0	2	94	2	0	2	2	6	0	107	10	0	117	245
04:45 PM	6	1	24	0	31	11	81	0	0	92	0	0	0	0	0	0	88	18	0	106	229
05:00 PM	10	0	23	0	33	6	89	1	11	107	1	2	1	0	4	1	102	7	0	110	254
05:15 PM	10	0	30	0	40	8	84	0	0	92	1	0	0	0	1	1	128	7	0	136	269
Total Volume	38	1	93	0	132	34	337	1	13	385	4	2	3	2	11	2	425	42	0	469	997
% App. Total	28.8	0.8	70.5	0		8.8	87.5	0.3	3.4		36.4	18.2	27.3	18.2		0.4	90.6	9	0		
PHF	.792	.250	.775	.000	.825	.773	.947	.250	.295	.900	.500	.250	.375	.250	.458	.500	.830	.583	.000	.862	.927

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Chester St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Chester St & Broadway AM

Site Code : 20150453 Start Date : 9/24/2015

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Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

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			Chester					roadwa	•				Cheste					Broadwa	•		
		<u>Fı</u>	om Nor	rth			F	<u>rom Ea</u>	st			<u>Fr</u>	om Sou	ıth			F	rom We	st		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	21	28	18	19	86	13	88	3	0	104	10	17	2	14	43	5	75	16	3	99	332
07:45 AM	18	38	12	6	74	17	55	5	0	77	16	13	6	5	40	2	105	16	4	127	318
Total	39	66	30	25	160	30	143	8	0	181	26	30	8	19	83	7	180	32	7	226	650
08:00 AM	13	30	21	0	64	25	73	3	0	101	7	13	4	1	25	5	84	8	0	97	287
08:15 AM	17	26	19	5	67	34	82	2	0	118	14	20	4	1	39	2	82	11	0	95	319
08:30 AM	12	29	18	7	66	27	77	3	0	107	6	11	0	3	20	2	71	10	1	84	277
08:45 AM	12	18	17	3	50	19	88	3	0	110	9	9	11	0	19	4	65	11	0	80	259
Total	54	103	75	15	247	105	320	11	0	436	36	53	9	5	103	13	302	40	1	356	1142
Grand Total	93	169	105	40	407	135	463	19	0	617	62	83	17	24	186	20	482	72	8	582	1792
Apprch %	22.9	41.5	25.8	9.8		21.9	75	3.1	0		33.3	44.6	9.1	12.9		3.4	82.8	12.4	1.4		
Total %	5.2	9.4	5.9	2.2	22.7	7.5	25.8	1.1	0	34.4	3.5	4.6	0.9	1.3	10.4	1.1	26.9	4	0.4	32.5	
Autos	81	162	97	40	380	124	450	16	0	590	55	81	15	24	175	17	441	67	8	533	1678
% Autos	87.1	95.9	92.4	100	93.4	91.9	97.2	84.2	0	95.6	88.7	97.6	88.2	100	94.1	85	91.5	93.1	100	91.6	93.6
Single Unit Trucks/Buses	12	7	8	0	27	11	11	3	0	25	7	2	2	0	11	3	38	5	0	46	109
% Single Unit Trucks/Buses	12.9	4.1	7.6	0	6.6	8.1	2.4	15.8	0	4.1	11.3	2.4	11.8	0	5.9	15	7.9	6.9	0	7.9	6.1
Tractor Trailers	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	5
% Tractor Trailers	0	0	0	0	0	0	0.4	0	0	0.3	0	0	0	0	0	0	0.6	0	0	0.5	0.3

Greenman-Pedersen, Inc.

80 Wolf Road, Suite 300 Albany, NY, 12205 (518)-453-9431

Chester St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Chester St & Broadway AM

Site Code : 20150453 Start Date : 9/24/2015

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			Chester					Broadwa From Ea	•				Cheste					Broadwa From We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	is From (07:30 AN	1 to 08:45	5 AM - P	eak 1 of 1			-			,	,					,				
Peak Hour for Ent	ire Inters	ection Be	egins at 0	7:30 AN	Л																
07:30 AM	21	28	18	19	86	13	88	3	0	104	10	17	2	14	43	5	75	16	3	99	332
07:45 AM	18	38	12	6	74	17	55	5	0	77	16	13	6	5	40	2	105	16	4	127	318
08:00 AM	13	30	21	0	64	25	73	3	0	101	7	13	4	1	25	5	84	8	0	97	287
08:15 AM	17	26	19	5	67	34	82	2	0	118	14	20	4	1	39	2	82	11	0	95	319
Total Volume	69	122	70	30	291	89	298	13	0	400	47	63	16	21	147	14	346	51	7	418	1256
% App. Total	23.7	41.9	24.1	10.3		22.2	74.5	3.2	0		32	42.9	10.9	14.3		3.3	82.8	12.2	1.7		
PHF	.821	.803	.833	.395	.846	.654	.847	.650	.000	.847	.734	.788	.667	.375	.855	.700	.824	.797	.438	.823	.946

Greenman-Pedersen, Inc. 80 Wolf Road, Suite 300

80 Wolf Road, Suite 30 Albany, NY, 12205 *(518)-453-9431*

Chester St & Broadway Kingston, New York, 12401 Project No 2015045.00 File Name: Chester St & Broadway PM

Site Code : 20150454 Start Date : 9/24/2015

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Groups Printed- Autos - Single Unit Trucks/Buses - Tractor Trailers

		F.	Chester	r St		<u> </u>		Broadwa		ingle Unit	11 4010/1		Cheste				F	Broadwa	av		
			om Nor					rom Ea	•				rom Sou					rom We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	17	14	17	6	54	29	72	0	0	101	12	18	3	3	36	5	114	11	3	133	324
04:15 PM	22	20	24	3	69	23	60	3	2	88	9	19	2	6	36	4	133	17	0	154	347
04:30 PM	15	20	25	6	66	27	71	0	3	101	14	14	3	2	33	8	137	9	1	155	355
04:45 PM	15	17	22	5	59	21	75	1	1	98	5	18	1	4	28	3	124	13	2	142	327
Total	69	71	88	20	248	100	278	4	6	388	40	69	9	15	133	20	508	50	6	584	1353
05:00 PM	17	23	23	2	65	15	62	5	2	84	7	17	6	1	31	8	117	20	0	145	325
05:15 PM	12	22	28	6	68	34	78	1	0	113	14	19	2	4	39	1	123	18	0	142	362
Grand Total	98	116	139	28	381	149	418	10	8	585	61	105	17	20	203	29	748	88	6	871	2040
Apprch %	25.7	30.4	36.5	7.3		25.5	71.5	1.7	1.4		30	51.7	8.4	9.9		3.3	85.9	10.1	0.7		
Total %	4.8	5.7	6.8	1.4	18.7	7.3	20.5	0.5	0.4	28.7	3	5.1	0.8	1_	10	1.4	36.7	4.3	0.3	42.7	
Autos	97	115	136	28	376	145	411	10	8	574	61	101	17	20	199	28	741	88	6	863	2012
% Autos	99	99.1	97.8	100	98.7	97.3	98.3	100	100	98.1	100	96.2	100	100	98	96.6	99.1	100	100	99.1	98.6
Single Unit Trucks/Buses	1	1	3	0	5	4	7	0	0	11	0	4	0	0	4	1	7	0	0	8	28
% Single Unit Trucks/Buses	1_	0.9	2.2	0	1.3	2.7	1.7	0	0	1.9	0	3.8	0	0	2	3.4	0.9	0	0	0.9	1.4
Tractor Trailers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Tractor Trailers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

			Cheste					Broadwa From Ea	•				. Cheste					Broadwa From We	•		
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analys	sis From (04:00 PN	1 to 05:15	5 PM - P	eak 1 of 1																
Peak Hour for En	tire Inters	ection B	egins at (04:30 PM	1																
04:30 PM	15	20	25	6	66	27	71	0	3	101	14	14	3	2	33	8	137	9	1	155	355
04:45 PM	15	17	22	5	59	21	75	1	1	98	5	18	1	4	28	3	124	13	2	142	327
05:00 PM	17	23	23	2	65	15	62	5	2	84	7	17	6	1	31	8	117	20	0	145	325
05:15 PM	12	22	28	6	68	34	78	1	0	113	14	19	2	4	39	1	123	18	0	142	362
Total Volume	59	82	98	19	258	97	286	7	6	396	40	68	12	11	131	20	501	60	3	584	1369
% App. Total	22.9	31.8	38	7.4		24.5	72.2	1.8	1.5		30.5	51.9	9.2	8.4		3.4	85.8	10.3	0.5		
PHF	.868	.891	.875	.792	.949	.713	.917	.350	.500	.876	.714	.895	.500	.688	.840	.625	.914	.750	.375	.942	.945

Pass. Vehicles

		O'Ne Southl				Broad Westb	•			Henr Northb	•			Broad Eastb	•		
Start Time	Left	Thru	Right	U-Turn	Total												
3:00 PM	6	16	12	0	8	144	8	5	10	6	12	0	4	149	12	0	392
3:15 PM	4	14	15	0	9	138	4	6	12	15	12	0	5	148	7	0	389
3:30 PM	4	14	14	0	7	162	2	1	7	18	15	0	12	132	14	0	402
3:45 PM	10	15	16	0	5	136	4	1	4	17	12	0	8	153	9	0	390
4:00 PM	3	17	8	0	5	158	7	0	11	14	7	0	9	155	10	0	404
4:15 PM	10	20	10	0	8	158	9	0	6	7	15	0	6	145	12	0	406
4:30 PM	7	18	9	0	6	159	13	0	8	15	18	0	5	151	14	0	423
4:45 PM	14	10	13	0	9	144	6	0	14	12	18	0	11	162	14	1	428
5:00 PM	14	16	13	0	7	133	10	0	11	16	13	0	3	176	20	0	432
5:15 PM	5	16	16	0	4	141	4	0	14	13	6	0	9	160	16	0	404
5:30 PM	6	13	12	0	4	119	5	0	19	16	11	0	12	165	13	0	395
5:45 PM	2	13	12	0	3	114	4	0	8	14	7	0	14	156	11	0	358
4:15-5:15 pm	45	64	45	0	30	594	38	0	39	50	64	0	25	634	60	1	

Buses

			eil St bound			Broad Westb	•			Heni Northb					dway oound		Buses
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total
3:00 PM	0	1	0	0	1	3	0	0	1	1	0	0	1	4	2	0	14
3:15 PM	3	1	1	0	1	1	0	0	0	2	1	0	0	4	0	0	14
3:30 PM	0	0	0	0	0	3	3	1	1	1	2	0	0	6	0	0	17
3:45 PM	1	0	0	0	0	2	1	0	0	2	0	0	0	3	0	0	9
4:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	3
4:30 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4:15-5:15 pm	0	0	2	0	0	1	1	0	0	0	2	0	0	1	0	0	7

Trucks

			eil St bound			Broad Westb	•			Heni Northi				Broa Eastb	dway oound		
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total
3:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	1	3	1	0	7
3:15 PM	0	0	0	0	0	4	0	0	0	2	0	0	0	3	1	0	10
3:30 PM	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
4:00 PM	0	0	0	0	1	3	0	0	1	1	0	0	0	2	1	0	9
4:15 PM	0	0	0	0	0	2	0	0	1	0	0	0	0	2	0	0	5
4:30 PM	0	0	1	0	0	3	0	0	0	0	0	0	1	1	0	0	6
4:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
5:15 PM	0	1	0	0	0	3	0	0	1	0	0	0	0	4	0	0	9
5:30 PM	0	0	0	0	0	1	0	0	1	1	0	0	1	2	0	0	6
5:45 PM	0	0	0	0	0	3	0	0	0	0	0	0	1	2	0	0	6
4:15-5:15 pm	0	0	1	0	0	6	0	0	1	0	0	0	2	5	1	0	16

TOTAL Vehicles

		O'Ne Southb				Broad Westb	,			Hen North	ry St bound			Broad Eastb	,			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total	Hourly
3:00 PM	6	17	12	0	9	148	8	5	11	8	12	0	6	156	15	0	413	
3:15 PM	7	15	16	0	10	143	4	6	12	19	13	0	5	155	8	0	413	
3:30 PM	4	14	14	0	7	169	5	2	8	19	17	0	12	138	14	0	423	
3:45 PM	11	15	16	0	5	138	5	1	4	19	12	0	8	160	9	0	403	1652
4:00 PM	3	17	8	0	6	162	8	0	12	15	7	0	9	157	11	0	415	1654
4:15 PM	10	20	10	0	8	161	9	0	7	7	16	0	6	148	12	0	414	1655
4:30 PM	7	18	12	0	6	162	13	0	8	15	18	0	6	152	14	0	431	1663
4:45 PM	14	10	13	0	9	145	7	0	14	12	19	0	11	163	15	1	433	1693
5:00 PM	14	16	13	0	7	133	10	0	11	16	13	0	4	177	20	0	434	1712
5:15 PM	5	17	16	0	4	144	4	0	15	13	6	0	9	165	16	0	414	1712
5:30 PM	6	13	12	0	4	120	5	0	20	17	11	0	13	167	13	0	401	1682
5:45 PM	2	13	12	0	3	117	5	0	8	14	7	0	15	158	11	0	365	1614
4:15-5:15 pm	45	64	48	0	30	601	39	0	40	50	66	0	27	640	61	1	1712	

Bicycles

	O'Nei Southbo		Broad Westb	•	Her Northb	•	Broad Eastb	•	
Start Time	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW	Total
3:00 PM	0	0	0	0	0	0	0	1	1
3:15 PM	0	0	0	0	0	2	0	1	3
3:30 PM	0	0	0	0	0	3	0	0	3
3:45 PM	0	0	0	0	0	0	1	0	1
4:00 PM	1	1	0	0	0	1	0	1	4
4:15 PM	0	0	0	0	0	0	1	0	1
4:30 PM	0	2	0	0	0	0	0	1	3
4:45 PM	3	1	0	0	2	0	0	0	6
5:00 PM	1	0	0	0	0	1	0	0	2
5:15 PM	0	0	0	0	0	2	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0
5:45 PM	1	0	0	0	1	0	0	0	2
4:15-5:15 pm	4	3	0	0	2	1	1	1	

Pedestrians

	O'N Southb		Broad Westh	dway oound	Henr Northb	4	Broad Eastb	•	
Start Time	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW	Total
3:00 PM	8	4	5	1	1	6	2	1	28
3:15 PM	7	0	1	2	7	6	1	2	26
3:30 PM	1	2	3	4	0	4	2	2	18
3:45 PM	4	4	0	4	7	12	1	1	33
4:00 PM	14	8	3	1	4	3	2	0	35
4:15 PM	1	2	1	1	3	2	4	1	15
4:30 PM	2	3	1	4	2	1	0	1	14
4:45 PM	2	7	0	2	4	5	0	2	22
5:00 PM	4	1	2	1	1	2	2	1	14
5:15 PM	7	4	5	4	1	1	1	0	23
5:30 PM	2	2	5	2	4	3	0	2	20
5:45 PM	1	4	4	6	0	0	0	0	15
4:15-5:15 pm	9	13	4	8	10	10	6	5	

Pass. Vehicles

		Grar South				Broad Westb	,			Pine Gro Northb				Broad Eastb	•		ı
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total
3:00 PM	1	10	52	0	4	100	5	0	31	16	9	0	65	106	32	0	431
3:15 PM	2	15	50	0	2	109	7	0	30	11	5	0	56	98	19	0	404
3:30 PM	5	10	51	0	5	102	8	0	16	15	3	0	54	112	18	0	399
3:45 PM	8	16	49	0	5	93	3	0	20	8	7	0	43	114	29	0	395
4:00 PM	2	10	55	0	6	100	7	0	30	13	7	0	46	115	23	0	414
4:15 PM	4	14	64	0	7	108	2	0	26	11	10	0	62	110	34	0	452
4:30 PM	5	10	64	0	5	103	4	0	31	18	11	0	40	120	22	0	433
4:45 PM	4	9	73	0	8	82	11	0	23	12	5	0	79	151	33	0	490
5:00 PM	6	15	90	0	6	93	9	0	26	8	5	0	81	116	40	0	495
5:15 PM	2	8	39	0	2	92	4	0	23	13	4	0	53	128	32	0	400
5:30 PM	4	10	40	0	5	88	5	0	22	7	4	0	35	124	31	0	375
5:45 PM	4	6	46	0	6	89	7	0	19	10	7	0	39	138	11	0	382
4:15-5:15 pm	19	48	291	0	26	386	26	0	106	49	31	0	262	497	129	0	

Buses

		Grar South				Broa Westk					ove Ave bound			Broad Eastb			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total
3:00 PM	0	0	3	0	0	1	0	0	0	0	1	0	3	2	0	0	10
3:15 PM	0	1	1	0	1	2	1	0	1	1	1	0	3	5	3	0	20
3:30 PM	0	2	0	0	0	2	0	0	4	0	2	0	1	5	3	0	19
3:45 PM	0	0	1	0	0	3	0	0	0	0	0	0	3	4	0	0	11
4:00 PM	0	0	2	0	0	1	0	0	0	0	0	0	1	1	1	0	6
4:15 PM	0	0	2	0	0	0	0	0	0	1	0	0	2	1	0	0	6
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
5:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15-5:15 pm	0	1	2	0	0	2	0	0	0	1	0	0	3	2	0	0	

Trucks

			nd St bound			Broa Westl					ove Ave bound				dway oound		
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total
3:00 PM	0	1	1	0	4	3	0	0	0	1	1	0	1	1	1	0	14
3:15 PM	0	1	1	0	0	1	0	0	0	2	4	0	0	1	0	0	10
3:30 PM	1	2	3	0	1	2	0	0	0	1	C	0	0	0	0	0	10
3:45 PM	1	1	0	0	0	1	0	0	0	1	3	0	0	3	0	0	10
4:00 PM	0	1	1	0	1	0	0	0	0	0	C	0	3	1	1	0	8
4:15 PM	1	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	4
4:30 PM	1	1	0	0	0	2	0	0	0	0	1	0	0	0	0	0	5
4:45 PM	0	0	0	0	5	1	1	0	0	2	1	0	1	1	0	0	12
5:00 PM	0	0	0	0	2	0	0	0	0	0	4	0	1	1	0	0	8
5:15 PM	0	2	0	0	1	1	0	0	0	2	C	0	1	2	0	0	9
5:30 PM	0	1	2	0	0	1	0	0	0	1	C	0	1	0	0	0	6
5:45 PM	0	2	2	0	0	5	0	0	0	1	C	0	1	0	0	0	11
4:15-5:15 pm	2	1	0	0	7	3	1	0	0	2	8	0	2	3	0	0	

TOTAL Vehicles

			d St bound			Broad Westb	,			Pine Gro Northb				Broad Eastb	,		
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Total
3:00 PM	1	11	56	0	8	104	5	0	31	17	11	0	69	109	33	0	455
3:15 PM	2	17	52	0	3	112	8	0	31	14	10	0	59	104	22	0	434
3:30 PM	6	14	54	0	6	106	8	0	20	16	5	0	55	117	21	0	428
3:45 PM	9	17	50	0	5	97	3	0	20	9	10	0	46	121	29	0	416
4:00 PM	2	11	58	0	7	101	7	0	30	13	7	0	50	117	25	0	428
4:15 PM	5	14	66	0	7	108	2	0	26	12	12	0	64	112	34	0	462
4:30 PM	6	12	64	0	5	106	4	0	31	18	12	0	40	120	22	0	440
4:45 PM	4	9	73	0	13	84	12	0	23	14	6	0	80	153	33	0	504
5:00 PM	6	15	90	0	8	93	9	0	26	8	9	0	83	117	40	0	504
5:15 PM	2	10	40	0	3	93	4	0	23	15	4	0	54	131	32	0	411
5:30 PM	4	11	42	0	5	89	5	0	22	8	4	0	36	124	31	0	381
5:45 PM	4	8	48	0	6	95	7	0	19	11	7	0	40	138	11	0	394
4:15-5:15 pm	21	50	293	0	33	391	27	0	106	52	39	0	267	502	129	0	1910
						451				158							

Bicycles

	Grar South	nd St bound		dway oound		ove St.	Broad Eastb	-
Start Time	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW
3:00 PM	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	1	0	2	0	0
3:45 PM	0	1	0	2	0	0	0	0
4:00 PM	3	0	1	0	0	1	0	0
4:15 PM	0	1	0	0	0	0	0	0
4:30 PM	0	1	0	0	0	0	0	0
4:45 PM	0	1	0	0	3	0	0	0
5:00 PM	2	0	0	1	0	1	0	0
5:15 PM	1	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	1	0	0	0
5:45 PM	0	0	0	1	0	0	1	0
4:15-5:15 pm	2	3	0	1	3	1	0	0

Pedestrians

	Grar Southl		Broad Westk	•	Pine Gr Northl		Broad Eastb	
Start Time	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW	Peds CCW	Peds CW
3:00 PM	1	2	1	5	2	23	1	6
3:15 PM	4	2	3	2	7	8	1	0
3:30 PM	6	0	1	1	1	3	2	0
3:45 PM	3	0	2	1	2	2	4	0
4:00 PM	7	1	1	0	3	1	1	1
4:15 PM	1	7	0	0	2	1	0	1
4:30 PM	1	0	1	1	2	2	2	0
4:45 PM	2	1	0	0	1	1	0	0
5:00 PM	2	0	1	0	6	6	0	0
5:15 PM	0	2	0	0	4	2	1	0
5:30 PM	1	1	0	0	0	2	1	0
5:45 PM	1	0	0	0	1	2	0	0
4:15-5:15 pm	6	8	2	1	11	10	2	1

Start Date: 06/01/2011 Start Time: 7:00 AM Vehicle Type: ALL

		Saccome Southbo				Broads Westbo	,			Cedar S Northb				Broad Eastbo	•	
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
7:00 AM	7	8	9		4	75	0		15	6	2		5	101	6	
7:15 AM	8	8	19		5	101	3		20	10	3		3	151	15	
7:30 AM	9	10	8		7	118	3		30	17	5		5	197	7	
7:45 AM	12	15	27		5	152	3		45	18	5		8	173	5	
8:00 AM	9	12	6		4	125	7		24	14	2		11	121	9	
8:15 AM	10	11	7		4	130	9		37	14	12		6	157	11	
8:30 AM	14	18	15		3	151	12		25	19	6		7	126	10	
8:45 AM	18	25	14		4	146	11		23	27	6		8	111	14	
4:00 PM	23	27	18		10	136	14		38	24	6		14	173	11	
4:15 PM	20	27	15		6	134	15		34	20	11		21	138	6	
4:30 PM	16	26	5		6	138	8		39	15	5		17	156	12	
4:45 PM	21	20	16		4	149	11		37	17	5		12	146	7	
5:00 PM	19	24	12		4	135	10		30	17	12		12	175	9	
5:15 PM	14	22	11		4	139	13		30	13	2		18	155	10	
5:30 PM	10	24	18		4	130	20		37	24	15		10	157	10	
5:45 PM	12	22	12		4	143	11		21	18	7		19	121	15	
6:00 PM	0	0	0		0	0	0		1	0	0		1	1	0	
AM Peak Hour	40	48	48		20	525	22		136	63	24		30	648	32	
PHF	0.83	0.80	0.44		0.71	0.86	0.61		0.76	0.88	0.50		0.68	0.82	0.73	
% HV	12.5	8.3	6.3		10.0	6.3	13.6		9.6	3.2	4.2		13.3	5.6	9.4	
PM Peak Hour	80	100	54		26	557	48		148	76	27		64	613	36	
PHF	0.9	0.9	0.8		0.7	0.9	0.8		0.9	0.8	0.6		0.8	0.9	0.8	
% HV	6.3	5.0	3.7		0.0	1.8	2.1		1.4	3.9	3.7		3.1	3.1	5.6	

Start Date: 06/01/2011 Start Time: 7:00 AM

Vehicle Type: Passenger Cars

		Southbou Southl				Westbou Westb				Northbou Northl	nd Street bound			Eastbour Eastb		
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
7:00 AM	6	7	9	0	4	72	0	0	14	6	1	0	5	96	5	0
7:15 AM	4	8	16	0	4	101	1	0	19	9	3	0	2	140	13	0
7:30 AM	8	9	8	0	6	108	2	0	27	15	5	0	5	185	7	0
7:45 AM	10	13	24	0	5	148	3	0	42	18	4	0	6	164	5	0
8:00 AM	7	11	6	0	3	115	6	0	21	13	2	0	9	111	8	0
8:15 AM	9	11	7	0	4	121	8	0	33	14	12	0	6	152	9	0
8:30 AM	12	17	15	0	3	141	12	0	25	18	4	0	6	118	6	0
8:45 AM	16	22	12	0	4	139	11	0	23	25	5	0	7	104	14	0
4:00 PM	21	25	18	0	10	133	14	1	36	24	6	0	13	162	11	0
4:15 PM	19	26	15	0	6	134	14	0	32	19	11	0	21	132	4	0
4:30 PM	15	26	5	0	6	136	8	0	39	14	5	0	17	151	12	0
4:45 PM	20	19	15	0	4	146	11	0	36	17	5	0	12	142	7	0
5:00 PM	19	23	12	0	3	131	10	0	30	17	11	0	11	171	9	0
5:15 PM	12	21	11	0	4	138	13	0	30	13	2	0	17	150	10	0
5:30 PM	9	23	18	0	4	128	20	0	37	24	15	1	10	154	10	0
5:45 PM	12	20	12	0	4	137	11	0	19	17	7	0	17	119	13	0
6:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0

Start Date: 06/01/2011 Start Time: 7:00 AM Vehicle Type: Trucks

		Southbou Southb					nd Street bound			Northbou Northb				Eastbour Eastb		
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
7:00 AM	1	1	0	0	0	0	0	0	1	0	1	0	0	1	1	0
7:15 AM	3	0	1	0	1	0	0	0	1	1	0	0	1	2	1	0
7:30 AM	1	0	0	0	0	1	1	0	1	1	0	0	0	5	0	0
7:45 AM	1	1	1	0	0	3	0	0	2	0	1	0	0	3	0	0
8:00 AM	1	0	0	0	0	3	0	0	0	1	0	0	0	1	1	0
8:15 AM	0	0	0	0	0	4	1	0	0	0	0	0	0	2	2	0
8:30 AM	2	0	0	0	0	3	0	0	0	0	2	0	1	7	4	0
8:45 AM	2	1	2	0	0	3	0	0	0	2	0	0	1	4	0	0
4:00 PM	1	1	0	0	0	2	0	0	0	0	0	0	1	4	0	0
4:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0
4:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
4:45 PM	1	1	1	0	0	1	0	0	0	0	0	0	0	4	0	0
5:00 PM	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
5:30 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0
5:45 PM	0	1	0	0	0	4	0	0	1	0	0	0	0	0	2	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Date: 06/01/2011 Start Time: 7:00 AM Vehicle Type: Bus

		Southbou Southl					ind Street bound			Northbou Northl				Eastbour Eastb	nd Street bound	
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
7:00 AM	0	0	0	0	0	3	0	0	0	0	0	0	0	4	0	0
7:15 AM	1	0	2	0	0	0	2	0	0	0	0	0	0	9	1	0
7:30 AM	0	1	0	0	1	9	0	0	2	0	0	0	0	7	0	0
7:45 AM	0	1	2	0	0	1	0	0	1	0	0	0	2	6	0	0
8:00 AM	1	1	0	0	1	7	1	0	3	0	0	0	2	9	0	0
8:15 AM	1	0	0	0	0	5	0	0	4	0	0	0	0	3	0	0
8:30 AM	0	1	0	0	0	7	0	0	0	1	0	0	0	1	0	0
8:45 AM	0	2	0	0	0	4	0	0	0	0	1	0	0	3	0	0
4:00 PM	1	0	0	0	0	1	0	0	1	0	0	0	0	3	0	0
4:15 PM	0	1	0	0	0	0	1	0	1	1	0	0	0	2	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	0	2	0	0	0	0	0	0	0	2	0	0
5:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
5:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Date: 06/01/2011 Start Time: 7:00 AM Vehicle Type: Bicycle

		Southbou Southb				Westbou				Northbou Northl				Eastbour Eastb		
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	1	0	0	0	0	0	0	1	0	0	0	0	4	0	0
4:15 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
4:30 PM	0	0	0	0	0	2	0	0	0	1	0	0	0	2	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	1	1	0	0	0	0	0	0	1	2	0	0
5:15 PM	1	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
5:45 PM	0	1	0	0	0	1	0	0	1	0	0	0	2	1	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Start Date: 06/01/2011 Start Time: 7:00 AM Vehicle Type: Pedestrian

	Southbound Street Southbound	Westbound Street Westbound	Northbound Street Northbound	Eastbound Street Eastbound
Start Time	Peds	Peds	Peds	Peds
7:00 AM	5	1	8	0
7:15 AM	11	5	14	2
7:30 AM	12	1	9	1
7:45 AM	8	1	2	0
8:00 AM	6	0	3	0
8:15 AM	13	1	0	1
8:30 AM	5	2	3	1
8:45 AM	10	0	4	2
4:00 PM	6	6	4	4
4:15 PM	5	0	6	4
4:30 PM	8	2	4	2
4:45 PM	5	0	7	2
5:00 PM	8	0	3	0
5:15 PM	0	0	4	1
5:30 PM	1	0	8	1
5:45 PM	2	0	4	4
6:00 PM	0	0	0	0

BROADWAY TRAFFIC SIGNALIZATION STUDY | City of Kingston, New York

APPENDIX A-3 Queue Observations



Broadway Traffic Signalization Study Kingston, New York

Queueing of Observe	ed Broadway Intersecti	ions
Intersection	Queue (No	o. of Cars)
intersection	AM	PM
Liberty St/Elmendorf St & Broadway		
Liberty St (SB)	3	4
Broadway (EB)	17	19
Broadway (WB)	28	13
O'Neil St/Henry St & Broadway		
O'Neil St (SB)	9(Thru/RT) 6(LT)	n/a
Henry St (NB)	2(Thru/LT) 2(RT)	n/a
Broadway (EB)	12	n/a
Broadway (WB)	19	n/a
Pine Grove Ave/Grand St & Broadway		
Grand St (SB)	10 to 13	n/a
Pine Grove Ave (NB)	6(Thru/LT) 4(RT)	n/a
Broadway (EB)	12 to 15	n/a
Broadway (WB)	15 to 18	n/a
O'Reilly St & Broaday		
E. O'Reilly St (SB)	6	4
W. O'Reilly St (NB)	8 to 10	5
Broadway (EB)	8 to 10	8 to 10
Broadway (WB)	12 to 15	12 to 15
Foxhall Ave & Broadway		
Foxhall Ave (SB)	3	5
Broadway (EB)	12	10
Broadway (WB)	17	8
Chester St & Broadway		
E. Chester St (SB)	3 to 5	3 to 5
W. Chester St (NB)	3 to 5	3 to 5
Broadway (EB)	9 to 11	9 to 11
Broadway (WB)	10 to 13	10 to 13

n/a = No observed queue was noted during field investigation.

Observations conducted in September 2015

BROADWAY TRAFFIC SIGNALIZATION STUDY | City of Kingston, New York

APPENDIX A-4 Travel Time Data



AM PEAK HOUR TRAVEL TIME RUNS

	Roadway Segm	ents (Eastbound)	Segment	Segi	ment Tr	avel Tir	nes (se	c.) ⁽¹⁾		Queue	Delay (sec.) ⁽²⁾		Average Travel
Seg #	Start	Finish	Length (Ft)	#1	#2	#3	#4	Avg.	#1	#2	#3	#4	Avg.	Speed (mph) ⁽⁴⁾
E1	Elmendorf/Liberty	O'Neill/Henry	920'	59	57	56	28	50	30	32	26	0	22	12.5
E2	O'Neill/Henry	Cedar/Cornell	635'	42	33	17	31	31	26	15	0	17	15	14.0
E3	Cedar/Cornell	Grand/Pine Grove	1,100'	28	61	54	35	45	0	36	27	22	21	16.7
E4	Grand/Pine Grove	O'Reilly	705'	18	40	34	37	32	0	24	15	21	15	15.0
E5	O'Reilly	Foxhall	955'	59	21	37	45	41	34	0	14	26	19	15.9
E6	Foxhall	Chester	650'	31	57	33	23	36	13	35	6	0	14	12.3
	OVERALL EASTBOUND)	4,965'		3	: 55		235		1	: 46		106	14.4

	Roadway Segm	ents (Westbound)	Segment	Segi	ment Tr	avel Tir	nes (se	c.) ⁽¹⁾		Queue	Delay (sec.) ⁽²⁾		Average Travel
Seg #	Start	Finish	Length (Ft)	#1	#2	#3	#4	Avg.	#1	#2	#3	#4	Avg.	Speed (mph) ⁽⁴⁾
W1	Chester	Foxhall	650'	53	63	48	67	58	33	43	30	48	39	7.6
W2	Foxhall	O'Reilly	955'	29	38	35	42	36	0	0	8	16	6	18.1
W3	O'Reilly	Grand/Pine Grove	705'	14	67	48	18	37	0	43	25	0	17	13.0
W4	Grand/Pine Grove	Cedar/Cornell	1,100'	39	54	77	24	49	0	21	46	0	17	15.3
W5	Cedar/Cornell	O'Neill/Henry	635'	55	56	16	33	40	40	33	0	16	22	10.8
W6	O'Neill/Henry	Elmendorf/Liberty	920'	51	53	21	22	37	24	23	0	0	12	17.0
	OVERALL WESTBOUN	D	4,965'		4	: 17		257		1	: 53		113	13.2

⁽¹⁾ Travel Time Runs conducted in the field on September 29, 2015.

PM PEAK HOUR TRAVEL TIME RUNS

	Roadway Segn	nents (Eastbound)	Segment	Segi	ment Tr	avel Tir	nes (se	c.) ⁽¹⁾		Queue	Delay	(sec.) ⁽²⁾		Average Travel
Seg#	Start	Finish	Length (Ft)	#1	#2	#3	#4	Avg.	#1	#2	#3	#4	Avg.	Speed (mph) ⁽⁴⁾
E1	Elmendorf/Liberty	O'Neill/Henry	920'	67	26	23	-	39	47	0	0	-	16	16.1
E2	O'Neill/Henry	Cedar/Cornell	635'	50	51	43	-	48	30	31	33	-	31	9.0
E3	Cedar/Cornell	Grand/Pine Grove	1,100'	30	61	24	-	38	17	33	0	-	17	19.7
E4	Grand/Pine Grove	O'Reilly	705'	45	25	26	-	32	32	0	0	-	11	15.0
E5	O'Reilly	Foxhall	955'	80	63	82	-	75	65	33	50	-	49	8.7
E6	Foxhall	Chester	650'	21	34	58	-	38	0	10	35	-	15	11.7
	OVERALL EASTBOUN	D	4,965'		4	: 30		270		2	: 19		139	12.5

	Roadway Segm	ents (Westbound)	Segment	Segi	ment Tr	avel Tir	nes (se	c.) ⁽¹⁾		Queue	Delay (sec.) ⁽²⁾		Average Travel
Seg #	Start	Finish	Length (Ft)	#1	#2	#3	#4	Avg.	#1	#2	#3	#4	Avg.	Speed (mph) ⁽⁴⁾
W1	Chester	Foxhall	650'	46	24	80	-	50	22	0	54	•	25	8.9
W2	Foxhall	O'Reilly	955'	29	48	35	-	37	0	15	0	1	5	17.6
W3	O'Reilly	Grand/Pine Grove	705'	47	55	63	-	55	30	40	47	1	39	8.7
W4	Grand/Pine Grove	Cedar/Cornell	1,100'	45	74	30	-	50	17	44	0	-	20	15.0
W5	Cedar/Cornell	O'Neill/Henry	635'	18	32	41	-	30	0	15	25	-	13	14.4
W6	O'Neill/Henry	Elmendorf/Liberty	920'	34	48	48	-	43	17	26	28	-	24	14.6
	OVERALL WESTBOUN	ID	4,965'		4	: 25		265		2	: 06		126	12.8

 $^{^{(1)}}$ Travel Time Runs conducted in the field on September 17, 2015.

 $^{^{(2)}}$ Queue delay time is included as part of the segment travel time reported.

⁽³⁾ Running Speed = Segment Length / Time in Motion. It represents the free flow speed.

⁽⁴⁾ Travel Speed = Segment Length / Travel Time (including stop delay)

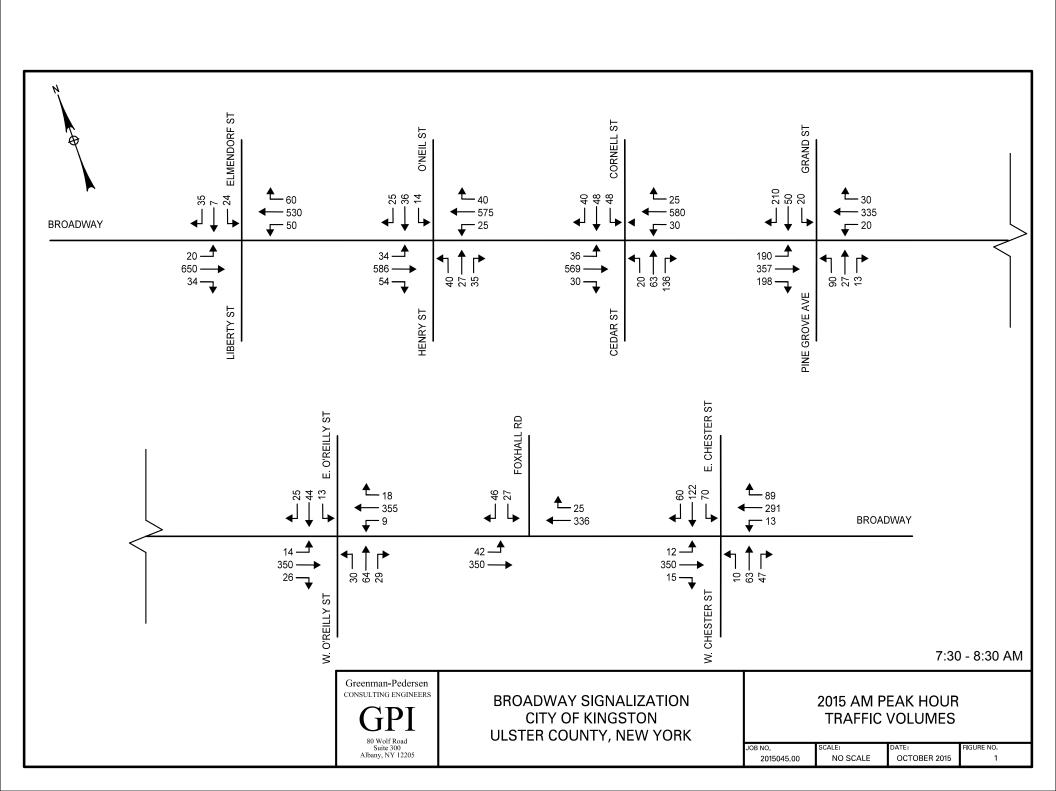
 $^{^{(2)}}$ Queue delay time is included as part of the segment travel time reported.

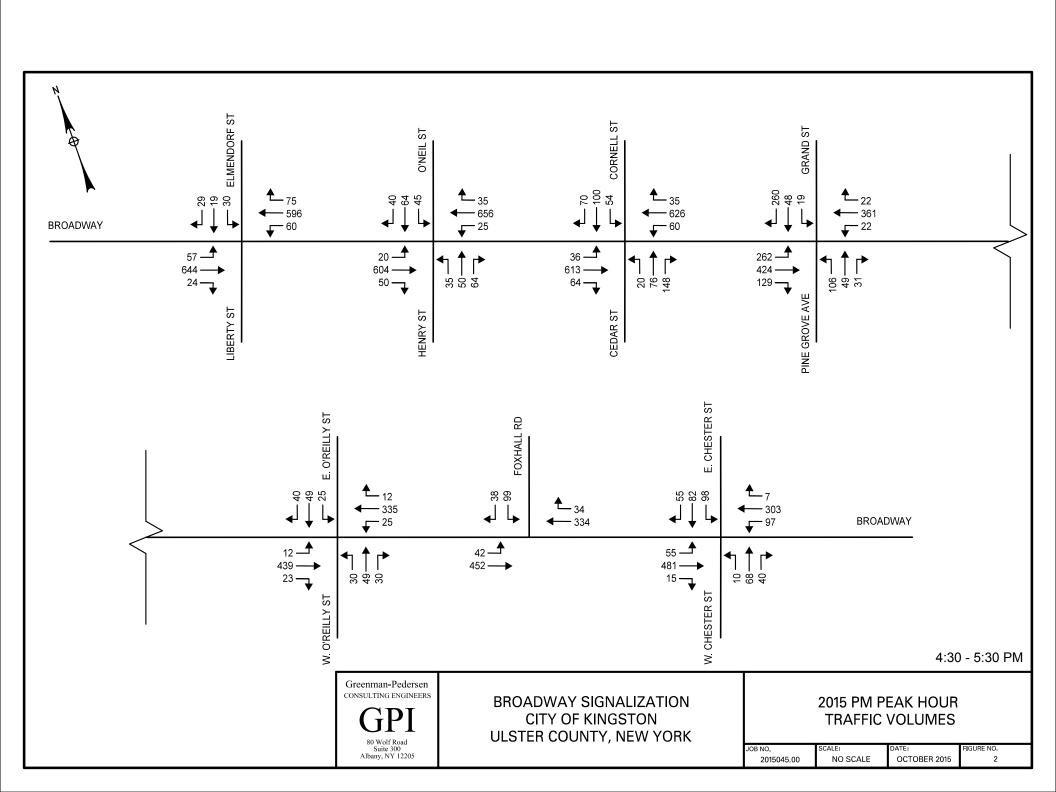
 $^{^{(3)}}$ Running Speed = Segment Length / Time in Motion. It represents the free flow speed.

⁽⁴⁾ Travel Speed = Segment Length / Travel Time (including stop delay)

APPENDIX B Traffic Volumes Diagrams







APPENDIX C Simulation Model Output Sheets



1: Liberty St/Elmendorf St & Broadway Performance by approach

Approach	EB	WB	SB	All
Denied Delay (hr)	0.3	0.0	0.0	0.3
Denied Del/Veh (s)	1.4	0.0	0.1	0.7
Total Delay (hr)	3.9	3.9	0.3	8.1
Total Del/Veh (s)	19.5	21.7	17.0	20.4
Stop Delay (hr)	2.4	2.4	0.3	5.1
Stop Del/Veh (s)	11.9	13.3	15.9	12.7
Total Stops	451	376	48	875
Stop/Veh	0.62	0.58	0.76	0.61
Travel Dist (mi)	132.6	110.4	8.4	251.4
Travel Time (hr)	9.6	8.4	0.7	18.7
Avg Speed (mph)	14	13	13	14
Fuel Used (gal)	4.8	4.7	0.3	9.8
Fuel Eff. (mpg)	27.8	23.6	27.2	25.8
HC Emissions (g)	100	102	3	205
CO Emissions (g)	1792	1913	78	3783
NOx Emissions (g)	255	287	10	552
Density (ft/veh)	207	214	1056	241

2: Henry St/O'Neil St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	
Denied Del/Veh (s)	0.0	0.0	1.6	0.9	0.2	
Total Delay (hr)	4.0	3.3	0.5	0.4	8.2	
Total Del/Veh (s)	20.1	18.1	17.2	19.0	19.0	
Stop Delay (hr)	3.2	2.4	0.4	0.4	6.4	
Stop Del/Veh (s)	15.8	12.9	15.4	17.4	14.7	
Total Stops	403	346	43	51	843	
Stop/Veh	0.56	0.52	0.43	0.64	0.54	
Travel Dist (mi)	121.8	77.9	4.1	12.7	216.5	
Travel Time (hr)	9.0	6.6	0.7	1.0	17.2	
Avg Speed (mph)	14	12	6	13	13	
Fuel Used (gal)	5.1	3.6	0.2	0.5	9.5	
Fuel Eff. (mpg)	23.7	21.4	19.2	27.3	22.9	
HC Emissions (g)	101	73	4	11	188	
CO Emissions (g)	2090	1515	69	198	3872	
NOx Emissions (g)	295	213	8	28	543	
Density (ft/veh)	206	195	1140	1751	324	

3: Cedar St /Cornell St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.1
Total Delay (hr)	4.1	3.1	0.9	0.7	8.8
Total Del/Veh (s)	22.5	16.6	14.7	18.2	18.8
Stop Delay (hr)	3.1	2.0	8.0	0.6	6.5
Stop Del/Veh (s)	17.0	11.0	12.9	16.1	14.0
Total Stops	472	369	156	98	1095
Stop/Veh	0.72	0.56	0.71	0.73	0.65
Travel Dist (mi)	78.8	130.2	54.7	17.9	281.7
Travel Time (hr)	7.4	8.5	3.2	1.4	20.6
Avg Speed (mph)	11	15	17	12	14
Fuel Used (gal)	3.8	5.3	1.8	0.7	11.6
Fuel Eff. (mpg)	20.6	24.4	31.1	26.0	24.2
HC Emissions (g)	64	88	21	8	180
CO Emissions (g)	1348	1873	429	186	3836
NOx Emissions (g)	192	273	60	23	548
Density (ft/veh)	176	244	407	482	262

4: Pine Grove Ave./Grand St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.0	0.2	0.3	
Denied Del/Veh (s)	0.1	0.0	0.6	3.1	0.6	
Total Delay (hr)	3.2	3.5	1.4	1.2	9.2	
Total Del/Veh (s)	14.3	29.3	38.9	15.3	20.3	
Stop Delay (hr)	2.2	2.7	1.3	1.1	7.3	
Stop Del/Veh (s)	10.0	23.3	36.5	13.2	16.0	
Total Stops	462	296	110	221	1089	
Stop/Veh	0.58	0.70	0.87	0.76	0.66	
Travel Dist (mi)	156.9	54.5	11.0	19.0	241.4	
Travel Time (hr)	9.8	5.7	1.9	2.4	19.8	
Avg Speed (mph)	16	10	6	9	12	
Fuel Used (gal)	6.2	2.6	0.7	1.0	10.5	
Fuel Eff. (mpg)	25.3	20.8	15.9	19.5	23.0	
HC Emissions (g)	101	39	8	14	161	
CO Emissions (g)	2140	816	201	346	3504	
NOx Emissions (g)	311	115	21	40	486	
Density (ft/veh)	320	227	495	323	310	

5: W. O'Reilly St/E. O'Reilly St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.1	0.2	0.2	0.1
Total Delay (hr)	2.0	1.9	0.8	0.5	5.2
Total Del/Veh (s)	17.9	17.3	22.0	19.6	18.3
Stop Delay (hr)	1.4	1.2	0.7	0.4	3.7
Stop Del/Veh (s)	12.4	11.1	19.8	17.6	13.2
Total Stops	224	202	92	65	583
Stop/Veh	0.55	0.51	0.74	0.73	0.58
Travel Dist (mi)	54.6	69.4	12.0	8.2	144.1
Travel Time (hr)	4.3	4.8	1.3	8.0	11.1
Avg Speed (mph)	13	15	9	10	13
Fuel Used (gal)	2.2	2.8	0.6	0.4	5.9
Fuel Eff. (mpg)	24.6	24.8	21.5	22.9	24.3
HC Emissions (g)	35	47	5	2	90
CO Emissions (g)	686	920	149	76	1831
NOx Emissions (g)	102	142	17	8	268
Density (ft/veh)	168	199	396	590	239

6: Broadway & Foxhall Ave Performance by approach

Approach	EB	WB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.2	0.0
Total Delay (hr)	3.0	2.1	0.2	5.3
Total Del/Veh (s)	25.8	20.8	10.7	22.3
Stop Delay (hr)	2.2	1.7	0.2	4.1
Stop Del/Veh (s)	19.1	16.1	9.8	17.0
Total Stops	260	223	43	526
Stop/Veh	0.62	0.60	0.57	0.61
Travel Dist (mi)	72.1	43.9	7.0	123.0
Travel Time (hr)	5.9	4.0	0.5	10.5
Avg Speed (mph)	12	11	13	12
Fuel Used (gal)	3.1	2.0	0.2	5.4
Fuel Eff. (mpg)	23.1	21.7	28.6	22.8
HC Emissions (g)	49	34	3	86
CO Emissions (g)	972	729	68	1770
NOx Emissions (g)	145	99	8	252
Density (ft/veh)	310	161	906	284

7: W. Chester St/E. Chester St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.4	0.2	0.3	0.2
Total Delay (hr)	1.4	1.1	0.7	2.2	5.4
Total Del/Veh (s)	12.9	10.4	18.9	31.1	16.7
Stop Delay (hr)	1.0	8.0	0.6	2.0	4.4
Stop Del/Veh (s)	9.0	7.6	16.7	27.8	13.5
Total Stops	191	187	96	223	697
Stop/Veh	0.48	0.48	0.76	0.87	0.60
Travel Dist (mi)	48.1	34.2	10.3	23.5	116.2
Travel Time (hr)	3.4	2.6	1.1	3.2	10.3
Avg Speed (mph)	14	13	9	7	11
Fuel Used (gal)	2.0	1.3	0.5	1.3	5.1
Fuel Eff. (mpg)	23.6	26.1	22.0	18.3	22.8
HC Emissions (g)	42	19	10	19	89
CO Emissions (g)	846	451	207	440	1944
NOx Emissions (g)	124	55	25	50	254
Density (ft/veh)	368	362	393	152	302

Total Network Performance

Denied Delay (hr)	0.8
Denied Del/Veh (s)	1.0
Total Delay (hr)	51.2
Total Del/Veh (s)	61.4
Stop Delay (hr)	37.6
Stop Del/Veh (s)	45.1
Total Stops	5708
Stop/Veh	1.90
Travel Dist (mi)	1728.6
Travel Time (hr)	124.3
Avg Speed (mph)	14
Fuel Used (gal)	72.5
Fuel Eff. (mpg)	23.8
HC Emissions (g)	1334
CO Emissions (g)	28047
NOx Emissions (g)	3924
Density (ft/veh)	244

Arterial Level of Service: EB Broadway

		Delay	Travel	Dist	Arterial	
Cross Street	Node	(s/veh)	time (s)	(mi)	Speed	
Henry St	2	19.9	44.5	0.2	14	
Cedar St	3	21.5	38.9	0.1	11	
Pine Grove Ave.	4	13.7	41.8	0.2	18	
W. O'Reilly St	5	18.4	38.1	0.1	13	
Foxhall Ave	6	24.8	49.8	0.2	13	
W. Chester St	7	13.0	30.6	0.1	14	
Total		111.3	243.6	0.9	14	

Arterial Level of Service: WB Broadway

		Delay	Travel	Dist	Arterial	
Cross Street	Node	(s/veh)	time (s)	(mi)	Speed	
Foxhall Ave	6	21.5	38.9	0.1	11	
E. O'Reilly St	5	17.3	43.0	0.2	15	
Grand St	4	28.9	47.6	0.1	10	
Cornell St	3	16.5	45.2	0.2	16	
O'Neil St	2	18.2	35.4	0.1	13	
Elmendorf St	1	19.7	44.6	0.2	14	
Total		122.2	254.7	0.9	13	

Intersection: 1: Liberty St/Elmendorf St & Broadway

Movement	EB	EB	WB	WB	SB	
Directions Served	L	TR	L	TR	LTR	
Maximum Queue (ft)	131	549	170	482	94	
Average Queue (ft)	18	248	44	212	32	
95th Queue (ft)	78	456	114	414	68	
Link Distance (ft)		965	841	841	700	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	75					
Storage Blk Time (%)	0	27				
Queuing Penalty (veh)	0	6				

Intersection: 2: Henry St/O'Neil St & Broadway

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	Т	L	TR
Maximum Queue (ft)	308	293	257	302	68	84	44	96
Average Queue (ft)	153	137	103	160	27	19	10	32
95th Queue (ft)	262	250	201	270	63	61	33	74
Link Distance (ft)	841	841	562	562		248		837
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					50		75	
Storage Blk Time (%)					8	3	0	1
Queuing Penalty (veh)					2	1	0	0

Intersection: 3: Cedar St / Cornell St & Broadway

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	346	296	160	300	159	147
Average Queue (ft)	166	135	101	130	72	60
95th Queue (ft)	301	257	177	228	134	114
Link Distance (ft)	562	562		1001	1304	694
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			60			
Storage Blk Time (%)			14	26		
Queuing Penalty (veh)			45	84		

Intersection: 4: Pine Grove Ave./Grand St & Broadway

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	
Directions Served	L	Т	R	L	TR	LT	R	LT	R	
Maximum Queue (ft)	221	275	114	99	416	175	49	222	73	
Average Queue (ft)	90	110	53	15	156	68	7	77	59	
95th Queue (ft)	173	221	96	59	332	138	31	173	84	
Link Distance (ft)		1001	1001		622	454		344		
Upstream Blk Time (%)					0					
Queuing Penalty (veh)					0					
Storage Bay Dist (ft)	340			50			150		45	
Storage Blk Time (%)	0			0	35	2		14	14	
Queuing Penalty (veh)	0			2	7	0		30	11	

Intersection: 5: W. O'Reilly St/E. O'Reilly St & Broadway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	419	347	156	124
Average Queue (ft)	150	134	58	46
95th Queue (ft)	312	288	113	92
Link Distance (ft)	622	894	502	490
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Broadway & Foxhall Ave

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	LR
Maximum Queue (ft)	53	407	307	88
Average Queue (ft)	22	173	154	31
95th Queue (ft)	53	329	266	71
Link Distance (ft)		894	592	487
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	20			
Storage Blk Time (%)	17	40		
Queuing Penalty (veh)	61	17		

Intersection: 7: W. Chester St/E. Chester St & Broadway

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (ft)	64	319	44	238	137	255
Average Queue (ft)	9	131	7	107	63	135
95th Queue (ft)	43	271	30	193	117	226
Link Distance (ft)		592	463	463	436	488
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	210					
Storage Blk Time (%)		3				
Queuing Penalty (veh)		0				

Network Summary

Network wide Queuing Penalty: 266

1: Liberty St/Elmendorf St & Broadway Performance by approach

Approach	EB	WB	SB	All
Denied Delay (hr)	0.3	0.0	0.0	0.3
Denied Del/Veh (s)	1.5	0.0	0.1	0.7
Total Delay (hr)	3.1	4.2	0.5	7.7
Total Del/Veh (s)	14.6	20.2	20.4	17.5
Stop Delay (hr)	1.9	2.3	0.4	4.6
Stop Del/Veh (s)	8.9	11.2	18.8	10.5
Total Stops	349	394	65	808
Stop/Veh	0.46	0.53	0.80	0.51
Travel Dist (mi)	138.1	128.0	10.6	276.7
Travel Time (hr)	9.0	9.5	0.9	19.4
Avg Speed (mph)	16	13	12	15
Fuel Used (gal)	4.8	5.3	0.4	10.5
Fuel Eff. (mpg)	29.0	23.9	25.3	26.3
HC Emissions (g)	42	57	5	104
CO Emissions (g)	976	1303	114	2393
NOx Emissions (g)	133	192	14	340
Density (ft/veh)	222	191	766	233

2: Henry St/O'Neil St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.0	0.1	0.1	
Denied Del/Veh (s)	0.0	0.0	1.1	1.4	0.2	
Total Delay (hr)	3.9	3.8	0.6	0.9	9.2	
Total Del/Veh (s)	19.5	18.7	15.4	21.3	19.0	
Stop Delay (hr)	3.1	2.7	0.6	8.0	7.2	
Stop Del/Veh (s)	15.5	13.2	13.5	19.5	14.7	
Total Stops	400	387	60	98	945	
Stop/Veh	0.56	0.53	0.40	0.65	0.54	
Travel Dist (mi)	123.4	87.8	6.0	23.6	240.8	
Travel Time (hr)	8.9	7.5	0.9	1.9	19.3	
Avg Speed (mph)	14	12	7	13	13	
Fuel Used (gal)	5.0	4.2	0.3	0.9	10.4	
Fuel Eff. (mpg)	24.7	21.0	19.4	25.8	23.1	
HC Emissions (g)	43	46	2	6	98	
CO Emissions (g)	1183	1184	56	170	2593	
NOx Emissions (g)	156	162	6	20	344	
Density (ft/veh)	208	172	826	888	290	

3: Cedar St /Cornell St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	
Denied Del/Veh (s)	0.1	0.0	0.3	0.3	0.1	
Total Delay (hr)	7.1	5.5	1.2	1.3	15.1	
Total Del/Veh (s)	33.9	26.1	16.6	20.5	27.1	
Stop Delay (hr)	5.7	4.0	1.0	1.2	11.9	
Stop Del/Veh (s)	27.4	18.9	14.4	17.9	21.4	
Total Stops	656	542	187	174	1559	
Stop/Veh	0.87	0.72	0.71	0.74	0.78	
Travel Dist (mi)	89.6	149.2	64.4	30.7	333.9	
Travel Time (hr)	10.9	11.8	3.9	2.6	29.2	
Avg Speed (mph)	8	13	16	12	11	
Fuel Used (gal)	4.9	6.5	2.1	1.2	14.7	
Fuel Eff. (mpg)	18.3	23.1	30.3	24.9	22.7	
HC Emissions (g)	33	60	14	8	116	
CO Emissions (g)	996	1534	358	254	3142	
NOx Emissions (g)	126	213	47	29	415	
Density (ft/veh)	120	177	333	265	185	

4: Pine Grove Ave./Grand St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.1	0.3	0.4	
Denied Del/Veh (s)	0.0	0.0	1.0	3.2	0.7	
Total Delay (hr)	4.3	4.1	2.5	1.3	12.1	
Total Del/Veh (s)	18.0	35.3	45.3	14.3	24.3	
Stop Delay (hr)	2.9	3.3	2.3	1.1	9.6	
Stop Del/Veh (s)	12.1	28.6	42.8	12.2	19.3	
Total Stops	522	332	173	236	1263	
Stop/Veh	0.61	0.80	0.89	0.72	0.70	
Travel Dist (mi)	172.3	54.8	17.0	21.4	265.5	
Travel Time (hr)	11.6	6.4	3.2	2.6	23.8	
Avg Speed (mph)	15	9	5	9	11	
Fuel Used (gal)	7.1	2.8	1.2	1.1	12.2	
Fuel Eff. (mpg)	24.2	19.7	14.6	19.7	21.8	
HC Emissions (g)	55	27	8	8	98	
CO Emissions (g)	1561	649	271	269	2750	
NOx Emissions (g)	213	87	27	29	356	
Density (ft/veh)	273	204	285	298	258	

5: W. O'Reilly St/E. O'Reilly St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.0	
Total Delay (hr)	2.6	2.5	0.6	0.6	6.3	
Total Del/Veh (s)	18.0	23.2	20.7	19.4	20.2	
Stop Delay (hr)	1.7	1.9	0.6	0.6	4.7	
Stop Del/Veh (s)	12.1	17.5	18.7	17.4	15.1	
Total Stops	278	229	80	83	670	
Stop/Veh	0.54	0.59	0.74	0.73	0.60	
Travel Dist (mi)	68.9	69.4	10.3	10.6	159.1	
Travel Time (hr)	5.4	5.4	1.1	1.1	12.9	
Avg Speed (mph)	13	13	10	10	12	
Fuel Used (gal)	2.8	2.9	0.5	0.5	6.6	
Fuel Eff. (mpg)	24.4	24.1	22.2	22.5	24.0	
HC Emissions (g)	19	27	5	5	55	
CO Emissions (g)	508	637	132	124	1401	
NOx Emissions (g)	73	94	15	14	196	
Density (ft/veh)	132	177	474	459	206	

6: Broadway & Foxhall Ave Performance by approach

Approach	EB	WB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.2	0.0
Total Delay (hr)	5.3	2.2	0.6	8.1
Total Del/Veh (s)	35.9	20.2	15.4	27.4
Stop Delay (hr)	4.0	1.7	0.6	6.2
Stop Del/Veh (s)	26.9	15.6	13.8	21.0
Total Stops	418	227	83	728
Stop/Veh	0.78	0.59	0.56	0.68
Travel Dist (mi)	94.8	45.9	13.5	154.3
Travel Time (hr)	9.2	4.1	1.2	14.5
Avg Speed (mph)	10	11	11	11
Fuel Used (gal)	4.4	2.1	0.6	7.0
Fuel Eff. (mpg)	21.7	22.4	24.5	22.1
HC Emissions (g)	29	17	5	52
CO Emissions (g)	764	454	145	1364
NOx Emissions (g)	109	61	16	186
Density (ft/veh)	200	157	399	204

7: W. Chester St/E. Chester St & Broadway Performance by approach

Approach	EB	WB	NB	SB	All	
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	
Denied Del/Veh (s)	0.0	0.3	0.2	0.3	0.2	
Total Delay (hr)	2.3	1.5	0.7	2.1	6.6	
Total Del/Veh (s)	14.2	13.3	19.3	30.6	17.3	
Stop Delay (hr)	1.6	1.3	0.6	1.9	5.3	
Stop Del/Veh (s)	9.6	11.0	17.1	27.5	13.9	
Total Stops	302	217	94	207	820	
Stop/Veh	0.51	0.52	0.76	0.85	0.60	
Travel Dist (mi)	72.6	36.6	10.2	22.3	141.7	
Travel Time (hr)	5.3	3.1	1.1	3.0	12.6	
Avg Speed (mph)	14	12	9	7	11	
Fuel Used (gal)	3.2	1.5	0.5	1.2	6.4	
Fuel Eff. (mpg)	22.8	24.0	21.6	18.3	22.1	
HC Emissions (g)	22	11	3	8	45	
CO Emissions (g)	671	355	109	290	1424	
NOx Emissions (g)	98	40	11	30	179	
Density (ft/veh)	234	304	399	162	248	

Total Network Performance

Denied Delay (hr)	0.9
Denied Del/Veh (s)	1.0
Total Delay (hr)	66.3
Total Del/Veh (s)	69.3
Stop Delay (hr)	49.7
Stop Del/Veh (s)	52.0
Total Stops	6793
Stop/Veh	1.97
Travel Dist (mi)	2005.6
Travel Time (hr)	151.1
Avg Speed (mph)	13
Fuel Used (gal)	85.5
Fuel Eff. (mpg)	23.4
HC Emissions (g)	761
CO Emissions (g)	20728
NOx Emissions (g)	2729
Density (ft/veh)	201

Arterial Level of Service: EB Broadway

		Delay	Travel	Dist	Arterial	
Cross Street	Node	(s/veh)	time (s)	(mi)	Speed	
Henry St	2	19.3	44.4	0.2	14	
Cedar St	3	33.6	51.0	0.1	9	
Pine Grove Ave.	4	15.3	44.4	0.2	17	
W. O'Reilly St	5	18.2	37.7	0.1	13	
Foxhall Ave	6	35.0	60.6	0.2	11	
W. Chester St	7	14.0	31.7	0.1	14	
Total		135.3	269.7	0.9	13	

Arterial Level of Service: WB Broadway

		Delay	Travel	Dist	Arterial	
Cross Street	Node	(s/veh)	time (s)	(mi)	Speed	
Foxhall Ave	6	21.0	38.2	0.1	12	
E. O'Reilly St	5	23.0	49.0	0.2	13	
Grand St	4	35.2	54.3	0.1	9	
Cornell St	3	23.4	52.2	0.2	14	
O'Neil St	2	18.8	36.2	0.1	12	
Elmendorf St	1	19.6	44.5	0.2	14	
Total		141.0	274.4	0.9	12	

Intersection: 1: Liberty St/Elmendorf St & Broadway

Movement	EB	EB	WB	WB	SB
Directions Served	L	TR	L	TR	LTR
Maximum Queue (ft)	149	424	136	592	99
Average Queue (ft)	45	187	39	221	40
95th Queue (ft)	125	357	93	473	80
Link Distance (ft)		965	841	841	700
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	75				
Storage Blk Time (%)	1	20			
Queuing Penalty (veh)	8	11			

Intersection: 2: Henry St/O'Neil St & Broadway

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	TR	LT	TR	L	Т	L	TR
Maximum Queue (ft)	281	259	274	328	72	94	92	138
Average Queue (ft)	150	128	120	176	25	33	27	45
95th Queue (ft)	250	228	230	296	61	76	67	97
Link Distance (ft)	841	841	562	562		248		837
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)					50		75	
Storage Blk Time (%)					5	6	1	3
Queuing Penalty (veh)					3	2	1	1

Intersection: 3: Cedar St / Cornell St & Broadway

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	448	416	160	484	208	197
Average Queue (ft)	223	181	127	202	88	96
95th Queue (ft)	387	354	191	394	165	167
Link Distance (ft)	562	562		1001	1304	694
Upstream Blk Time (%)	0	0				
Queuing Penalty (veh)	0	0				
Storage Bay Dist (ft)			60			
Storage Blk Time (%)			35	34		
Queuing Penalty (veh)			124	131		

Intersection: 4: Pine Grove Ave./Grand St & Broadway

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	
Directions Served	L	Т	R	L	TR	LT	R	LT	R	
Maximum Queue (ft)	248	355	96	99	423	261	152	193	72	
Average Queue (ft)	118	136	36	18	183	106	21	71	62	
95th Queue (ft)	214	279	73	69	362	216	93	155	81	
Link Distance (ft)		1001	1001		622	454		344		
Upstream Blk Time (%)		0						0		
Queuing Penalty (veh)		0						0		
Storage Bay Dist (ft)	340			50			150		45	
Storage Blk Time (%)		0		0	41	8		11	19	
Queuing Penalty (veh)		0		1	9	2		28	13	

Intersection: 5: W. O'Reilly St/E. O'Reilly St & Broadway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	403	387	113	142
Average Queue (ft)	172	152	51	54
95th Queue (ft)	349	321	95	106
Link Distance (ft)	622	894	502	490
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Broadway & Foxhall Ave

Movement	EB	EB	WB	SB
Directions Served	L	Т	TR	LR
Maximum Queue (ft)	45	555	286	157
Average Queue (ft)	24	255	155	58
95th Queue (ft)	53	473	262	116
Link Distance (ft)		894	591	487
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	20			
Storage Blk Time (%)	16	46		
Queuing Penalty (veh)	72	20		

Intersection: 7: W. Chester St/E. Chester St & Broadway

Movement	EB	EB	WB	WB	NB	SB
Directions Served	L	TR	L	TR	LTR	LTR
Maximum Queue (ft)	239	336	115	193	138	244
Average Queue (ft)	43	159	55	84	59	120
95th Queue (ft)	131	300	97	154	108	208
Link Distance (ft)		591	463	463	436	488
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	210					
Storage Blk Time (%)		4				
Queuing Penalty (veh)		2				

Network Summary

Network wide Queuing Penalty: 429



Engineering and Construction Services

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