APRIL 2010

CITY OF CUMBERLAND

TRAFFIC CIRCULATION & SIGNING STUDY

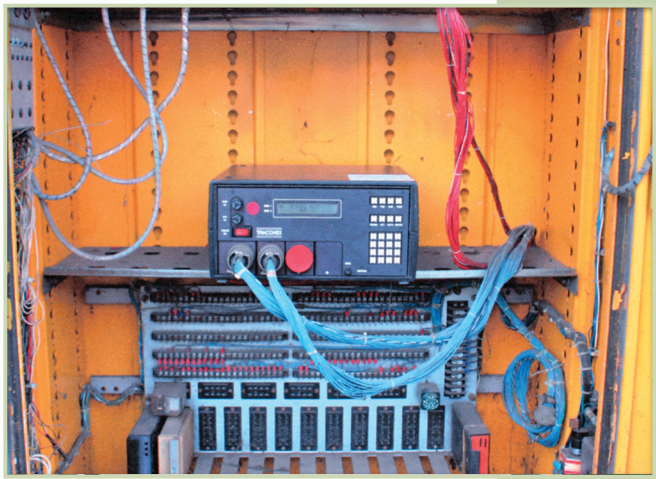

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

The *Cumberland Traffic Circulation and Signing Study* summarizes a review of existing truck, vehicular, and pedestrian traffic in the City of Cumberland in Allegany County, Maryland. The study examines particular areas in the City where operational, safety, and signing deficiencies were identified, and provides improvement strategies to address these deficiencies. To accomplish the primary study goals, truck-related movements, concerns, constraints, and opportunities were analyzed from a system-wide perspective.

Background Data and Analysis

Project data includes a compilation and analysis of current truck and passenger vehicle traffic volume and accident data available from the City and State Highway Administration. An inventory and assessment of existing signage and street and intersection design and geometrics (including vehicle weight constraints) for all collector and arterial streets was conducted to identify signage and structural deficiencies. Vehicular and pedestrian traffic counts were conducted at specific areas of concern.

Issues of Concern

In response to the issues and concerns that were identified, potential improvement options were developed and refined based on stakeholder discussions and a review of the specific conditions within the City of Cumberland. Improvement options were investigated as follows:

- Signing and Marking Improvements
- Signalization Improvements
- Geometric Improvements

Project Action Plan

Improvement options were developed based on a variety of analysis tools. The most effective and feasible options were selected and summarized in the Project Action Plan below.

Issue #	Location	Description
Signing and Marking Improvements		
B	Citywide	Begin phased program of modernizing street name signs; begin discussion with SHA about developing a coordinated tourism signing program;
C.2	Mechanic Street at Queen City Drive (north side)	Install signs along Mechanic Street restricting all trucks over ¾ ton, except local deliveries, beyond Queen City Drive; repaint the southbound Mechanic Street approach to remove the separate left-turn lane; relocate the westbound lane of Queen City Drive to the north.
D.2	Baltimore Street at Canal Street	Consult with local business owners about restricting westbound left turns and requiring drivers to access Canal Street from the south, which would require installation of signs showing the left turn restriction.
C.3/D.3	Baltimore Street/Washington Street at Cumberland Street/Greene Street	As a short term solution, install skipped double yellow striping at the intersection between the Baltimore Street and Greene Street approaches and install a STOP sign along the Greene Street approach with a sign stating "EXCEPT RIGHT TURN". To discourage trucks from driving on Washington Street, add the regulatory message "NO TRUCKS" below the guide message on westbound Baltimore Street and install a standard I-68 sign assembly on the same approach.
D.7	McMullen Bridge	Install signing along Henderson Avenue, Polk Street, Columbia Avenue, and Independence Avenue to direct traffic onto the bridge.
Signalization Improvements		
A	Citywide	Conduct detailed study of the cost of modernizing and retiming traffic signals Citywide. Acquire funding for phased implementation of the modernization plan.

Issue #	Location	Description
D.1	Baltimore Street at Mechanic Street	Remove the pedestrian phase and allow pedestrians to cross the roadway during vehicular phases; investigate coordination of this signal with the nearby signals at the intersections of Mechanic Street at Bedford Street and Mechanic Street at Harrison Street.
D.4	MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps	As a short term solution, implement the proposed signal timing revisions.
Geometric Improvements		
D.3	Baltimore Street/Washington Street at Cumberland Street/Greene Street	As a long term solution, examine the feasibility of a roundabout.
D.4	MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps	As a long term solution, implement Alternative 2, which includes changes to the northbound lane configurations, as well as signalization of the Eastbound I-68 off-ramp. Install new overhead signs to direct traffic into the correct lane.
D.5	MD 51 at Lamont Street	Restrict thrus and left turns from Lamont Street, and restrict left turns from southbound MD 51. Install signing directing southbound vehicles to make a u-turn at 2nd Street and then turn right onto Lamont Street.
D.6	MD 51 at Virginia Avenue	Install either of the Michigan Left proposals.
Improvements from Related Issues		
D.2	Baltimore Street at Canal Street	The signal timing improvements at the nearby intersection of Baltimore Street at Mechanic Street will improve operations at this intersection.
E.1	MD 51 NB at Canal Parkway NB Weave	Implementation of the solutions at the intersection of MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps will improve operations in this area.

Issue #	Location	Description
Geometric Improvements		
5	Baltimore Street/Washington Street at Cumberland Street/Greene Street	As a long term solution, examine the feasibility of a roundabout.
6	MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps	As a long term solution, implement Alternative 2, which includes changes to the northbound lane configurations, as well as signalization of the Eastbound I-68 off-ramp. Install new overhead signs to direct traffic into the correct lane.
8	MD 51 at Lamont Street	Restrict thrus and left turns from Lamont Street, and restrict left turns from southbound MD 51. Install signing directing southbound vehicles to make a u-turn at 2nd Street and then turn right onto Lamont Street.
9	MD 51 at Virginia Avenue	Install either of the Michigan Left proposals.
Improvements from Related Issues		
4	Baltimore Street at Canal Street	The signal timing improvements at the nearby intersection of Baltimore Street at Mechanic Street will improve operations at this intersection.
7	MD 51 NB at Canal Parkway NB Weave	Implementation of the solutions at the intersection of MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps will improve operations in this area.

I. INTRODUCTION

A. Project Description and Purpose

The last Traffic Safety Study for the City of Cumberland was completed in October 1979 by Henningson, Durham, and Richardson. The report evaluated traffic flows, accident patterns, and traffic controls to determine how traffic patterns should be managed and directed. Recommended implementation strategies included a long list of signage and traffic control device improvements, street surface and intersection design improvements, and a number of non-engineering recommendations. Many of the study's recommendations were implemented, but several—including a truck routing system—were not addressed. Two efforts to improve directional signage for vehicular traffic were undertaken. The first was in the 1980's to provide directional signage to tourism destinations (brown signs with a train logo) and the second was a thematic signage program in downtown Cumberland to improve traffic circulation as recommended by the City's 1998 Downtown Design and Development Plan.

Since the 1979 study and the implementation of the signage programs, Cumberland has changed significantly. Traffic volumes and travel patterns have changed in response to business closures and redevelopment projects. Consequently, the City sought funding assistance for a new Traffic Circulation and Signage Study to help address these issues and provide additional guidance and scheduling justification for street improvements by the City's Pavement Management System. At the City's request, the Allegany County Department of Planning Services funded this engineering study with the following objectives in mind:

- To address complaints regarding heavy truck traffic in the downtown area and trucks getting lost on city streets not designed to handle heavy loads
- To address the need for better directional signage to help regional and non-local traffic negotiate the City's street network. The City also desires a more unified signage scheme, preferably patterned in accordance with the 1998 Downtown Design and Development Plan.

To further the objectives of this study, the City assembled a group of local stakeholders comprised of the City Engineer and City Planner, representatives of City/State Police, City Fire Department, Tourism Director, and several community and business representatives with the intent of tapping into this base of local knowledge to gain a broader understanding of traffic operations and safety issues in the City. The list of stakeholders who participated is contained in Appendix A.

The City contracted with Whitman, Requardt and Associates, LLP (WR&A) to perform the study. WR&A had worked with the City in the past on related projects, such as Ridgely, WV Truck Restriction Signing Project. WR&A has also worked on many projects with the Traffic staff of the Maryland State Highway Administration's District 6 office, the staff within SHA responsible for traffic engineering in Allegany County.

B. Location And Study Area

The study area includes the entire City of Cumberland. The streets/intersections that were studied based on guidance from the Project Manager and the steering committee are shown in Figure 1.

II. DATA COLLECTION AND ANALYSIS

A. Background Data

WR&A staff obtained the following data:

- Topographic mapping of the entire City
- Documentation of current tourist destination signing and thematic signing
- Information on high crash locations for SHA maintained roadways in the City, both for road segments and intersections (from SHA's Traffic Safety Analysis Division and City records)
- Road segment traffic volumes from City records
- Sight distance study at one intersection of concern to the stakeholder committee (MD 51 at Lamont Street)
- License plate study of trucks traveling through downtown along Mechanic Street (conducted on March 23, 2010).

B. Intersection Counts

Traffic/pedestrian counts were performed at the following seven intersections:

- Mechanic Street at Queen City Drive
- Baltimore Street at Mechanic Street
- Baltimore Street at Canal Street
- Baltimore Street/Washington Street at Cumberland Street/Greene Street
- MD 51 at Queen City Drive/Mechanic Street/Centre Street/Winston Street/I-68 Ramps
- MD 51 at Lamont Street
- MD 51 at Virginia Avenue

At six of these intersections, counts were performed during the AM peak period of 7:00 to 9:00 AM, and during the PM peak period of 3:00 to 5:00 PM. A thirteen-hour count was performed at the intersection of Mechanic Street at Queen City Drive between the hours of 6:00 AM and 7:00 PM for the purpose of a signal warrant study. Traffic count data can be found in Appendix B.

FIGURE 1 – STUDY AREA

C. Field Inventory and Traffic Observations

Field inventory and traffic observations of the major streets and intersection problem areas identified in the Stakeholder meeting were conducted during the one-week period of October 19 – 22, 2009. Specific data obtained included:

- Inventory of current guide signing
- Geometric features and constraints along the major routes
- Traffic operations and potential trouble spots
- Truck turning movements and opportunities for alternative routing, (included travel time/delay run on several routes)
- Pedestrian/bicyclist patterns
- Traffic control devices, such as traffic signals, that are either not operating properly or are in need of modernization or upgrading (WR&A's assigned traffic engineer was accompanied by Mr. Einer Johnson, a member of the stakeholder committee, to seven of the City's signalized intersections to view control equipment)

III. ISSUES OF CONCERN

Issues of concern were identified based on direct field observations as well as discussions and comments from stakeholder meeting. Figure 2 shows a map of the City of Cumberland with the locations of these issues. These issues are described in Table 1 with brief descriptions of the potential concerns. In addition to the ten issues shown in Figure 2, there are three citywide issues.

FIGURE 2 –ISSUES OF CONCERN

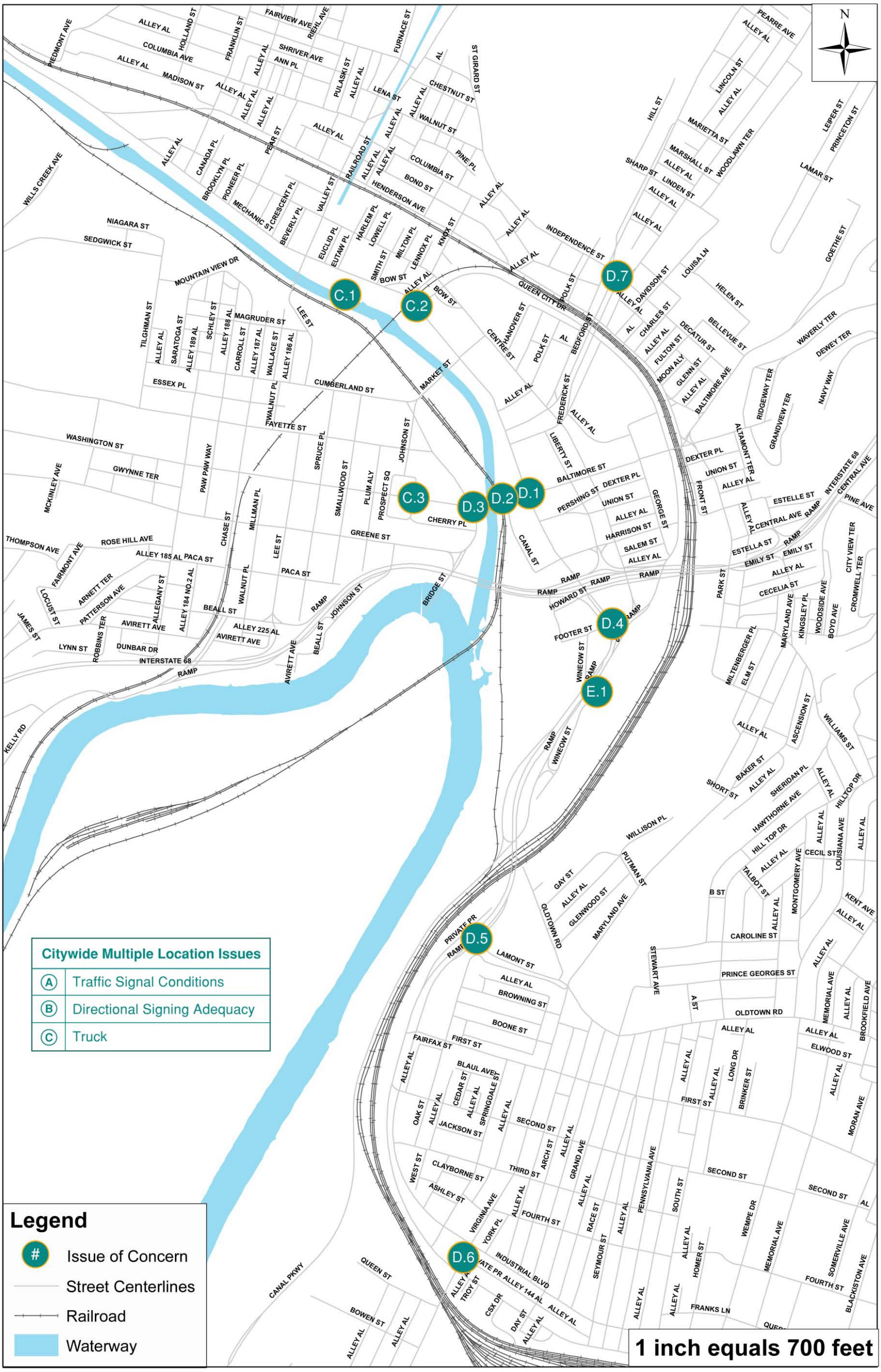


Table 1. Issues of Concern

Issue	Location	Description
A	**Citywide**	**Traffic Signal Conditions**
B	**Citywide**	**Directional Signing Adequacy**
C	**Various**	**Truck Travel Issues**
C.1	Mechanic Street in downtown Cumberland	Businesses are concerned about noise and vibration from trucks traveling through downtown Cumberland
C.2	Mechanic Street at Queen City Drive (north side)	Better accommodate trucks that travel under the nearby low-clearance bridge; examine feasibility of installation of a traffic signal
C.3	Baltimore Street/Washington Street at Cumberland Street/Greene Street	Trucks travel on a truck-restricted section of Washington Street
C.4	Multiple Locations	Questionable truck turning geometrics
D	**Various**	**Intersection Operation Issues**
D.1	Baltimore Street at Mechanic Street	Determine signal phasing/timing to best serve pedestrian and vehicular traffic
D.2	Baltimore Street at Canal Street	Examine pedestrian accommodations and turning traffic
D.3	Baltimore Street/Washington Street at Cumberland Street/Greene Street	Confusing intersection; vehicle right-of-way conflicts
D.4	MD 51 at Queen City Drive/ Mechanic Street/ Centre Street/ Winston Street/I-68 Ramps	Signal timing and queuing issues
D.5	MD 51 at Lamont Street	Restricted sight distance for traffic turning left from Lamont
D.6	MD 51 at Virginia Avenue	Delays and queuing problems
D.7	McMullen Bridge	Develop signing to direct more traffic to the westbound lanes of the bridge
E.1	MD 51 NB at Canal Parkway	Vehicle weaving conflicts

The following is a detailed description of each issue, along with an assessment of potential solutions. Issues A, B, and C involve assessments of current conditions. Issues 1 and 10 involve signing and marking improvements only. Issue 5 consists of a solution that involves signing only, and alternative solutions that involve signalization and/or geometric improvements. All other issues involve operational improvements.

A. Traffic Signal Condition

WR&A's assigned traffic engineer was accompanied by Mr. Einer Johnson, a city resident who is a member of the stakeholder committee, to six of the City's signalized intersections to view control equipment. Mr. Johnson volunteers his services and helps the City to troubleshoot signal timing, phasing and electrical problems. He formerly worked for the City of Baltimore's traffic signal electronics shop as a maintenance technician. He has also been able to assist the City in procuring used traffic controllers, cabinets and conflict monitors from Baltimore that became expendable when they modernized their traffic control system. That equipment is currently in use at three intersections.

Following is an assessment of the signal equipment at the seven intersections visited. Figures 3A, 3B, and 3C show examples of the equipment.

- Queen City Drive at Centre Street (Figure 3A)
  - The control cabinet is not sealed and, to prevent water intrusion, it has been covered with a garbage bag.
  - Loop detection is not working along southbound Queen City Drive and that movement has been placed on recall (i.e. signal changes to serve QCD whether or not vehicle is present).
  - The northbound loops are working with no problems.
- Centre Street at Valley Street
  - The northbound Valley Street thru lane needs a new loop.
  - The signal is operating on recall for the Valley Street approaches, and provides a 20-second phase length.
- Mechanic Street at Valley Street – the pedestrian signals have been removed.
- Mechanic Street at Henderson Avenue – the westbound Mechanic Street loop has been removed.
- Henderson Avenue at Pear Street (Figure 3B) – the northbound Pear Street signal heads are covered to prevent vandalism.
- Henderson Avenue at Knox Street (Figure 3C)
  - The controller has telephone communication, but the communication has not worked in over three years.
  - The signal provides 34 seconds to Knox Street every time a vehicle is detected, which causes excessive delay along Henderson Avenue.

FIGURE 3A
QUEEN CITY DRIVE AT CENTRE STREET
CONTROLLER

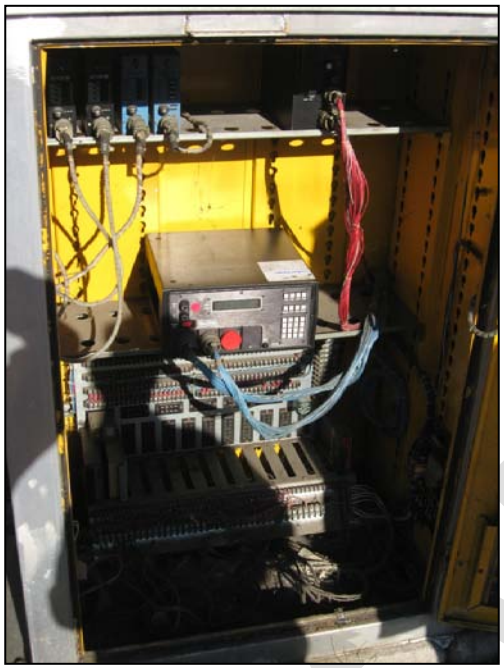
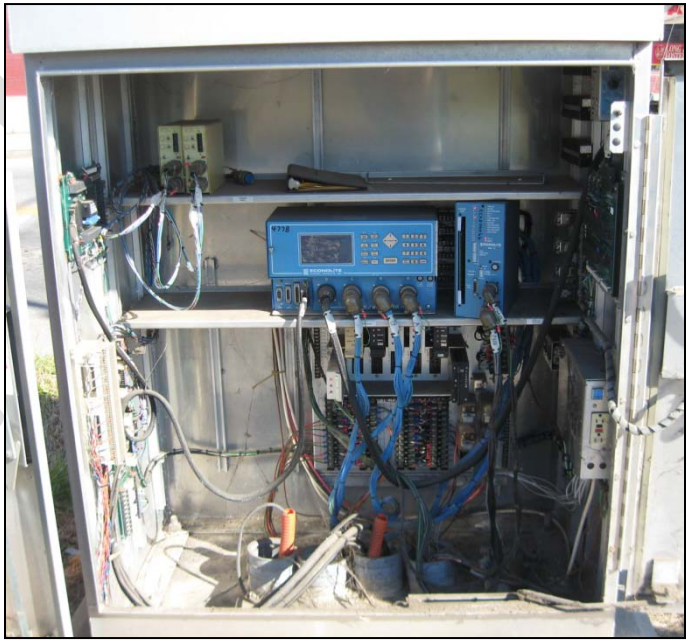


FIGURE 3B
HENDERSON AVENUE AT PEAR STREET
COVERED SIGNAL HEAD

FIGURE 3C
HENDERSON AVENUE AT KNOX STREET
CONTROLLER



Additional problems with traffic signal equipment were raised at the steering committee meeting and in discussions with Mr. Johnson:

- The intersections in downtown, many of which are closely spaced, are not interconnected, and therefore operate as a series of isolated intersections, which leads to inefficient operations and unnecessary delays.
- Four different brands of controllers and a mix of control cabinet brands/generations are used at the twenty two signalized intersections in the City. When a signal goes out of service due to a knockdown, part failure or for some other reason, it can remain out of service for an extended period of time, depending on the availability of a compatible

controller. This was the case recently at the intersection of Queen City Drive at Baltimore Street, which has a railroad pre-emption circuit. Mr. Johnson was able to fashion a temporary fix to get the signal operating in flashing mode, but it wasn't until the controller manufacturer could send out a representative from Florida that the permanent repair could be installed.

The deteriorating condition of the signal equipment is the most serious of the traffic-related problems that was observed during the study. The City should consider a staged modernization of all signal equipment, starting with the equipment in Downtown, which has the heaviest concentration of traffic and pedestrians, most complex intersections and inter-related signal operations, and the greatest need for a well-functioning, modern signal system. A more detailed study of the signalized intersections is needed to identify the cost of such a modernization program; however, as a rough estimate, the City of Winchester, Virginia is very near completion of a traffic signal modernization program that was implemented at a cost of approximately $150,000 per intersection for equipment modernization (complete rebuilds) and an additional $5,000 per intersection for retiming (4 timing plans per intersection).

B. Directional Signing Adequacy

As has been noted through various discussions with City staff and the stakeholder group there is a perception that Cumberland's street system is confusing, making navigation difficult for unfamiliar drivers. Some of this confusion could be a result of the discontinuity in the street system. Barriers, both natural (Potomac River and Willis Creek) and man-made (I-68 Viaduct, Railroad, Baltimore Street Pedestrian Mall) have resulted in street rerouting and closures. In addition, certain streets are one-way for portions only, further complicating drivers' understanding of the street network. Although outside the scope of this study, a comprehensive review of the street network, including review of one-way patterns could provide options for simplifying Cumberland's street network.

Although Cumberland's street system can be confusing, there are several guide signing systems in place to guide unfamiliar drivers to select sites through the City. These existing guide signs were inventoried by WR&A (see Appendix F). Most are in good to poor condition. The majority of the signs provide messages that are adequate and relevant to motorists. Most of the signing issues noted below are more global in nature and do not specifically relate to a particular sign or routing issue.

- **Street Name Sign Letter Type and Size.** The current edition of the MUTCD (2009) requires that all street name signs be composed of an initial upper case letter followed by lower case letters. Typically the street name signs within the City contain all uppercase letters. In addition, the MUTCD requires that overhead street name signs contain a 12" initial upper case letter followed by a 9" lower case letters. The larger text size will increase the size of the sign substantially. This combination of mixed case text and larger text has been found to provide better recognition by motorists. The deadline for updating signs to conform

with the 2009 MUTCD is January 9, 2012 for 6" initial upper case letter followed by lower case letters on post mounted signs; and December 22, 2018 for overhead street name signs containing a 12" initial upper case letter followed by a 9" lower case letters.

- **Message Inconsistency.** Most guide signs in downtown are of a decorative type with curved tops and consist of three types – Destination, Parking, and Marquee signs. In addition, there are brown "Historic Cumberland" signs that contain similar messages. All of these signs are intended to guide tourists and unfamiliar drivers once they are on the city streets, and most of these drivers use I-68 to reach Cumberland. Ideally, to avoid motorist confusion, the messages displayed on I-68 would be consistent with the City's directional sign messages. In at least two cases, this is not so, and in many cases, destinations that are signed on the City's signs are not mentioned on the highway. These cases are described in Table 2.

Table 2. Comparison of Highway and Local Street Sign Messages

SHA I-68 Destination Messages	City Directional Sign Messages
Inconsistent Messages	
Tourist Info	Visitor Center
Western MD Station Center	Canal Place/Bike Trail
Consistent Message	
Scenic RR	Scenic Railroad
Destinations Not Signed on I-68	
Not Signed	Shops and Dining
	Historic Downtown
	Transit Stations (Amtrak, Bus)
	Parking (Public, Permit, Hourly)
	City Hall
	Washington Street Historic District

It is neither expected nor practical to sign all tourist destinations in the City on I-68. SHA has developed the Tourism Area and Corridor Signing Program to address such situations. The program consultants typically begin the process by conducting a geographical analysis of attractions and then develop a preliminary breakdown of the region into tourism areas and corridors. Tourists are first guided to areas, then corridors, then individual attractions. The City should work with Allegany County to coordinate with SHA to consider Cumberland for the TAC Program.

- **Sign Layout.** The majority of the City's directional signs are sized to fit within the constraints of an urban environment; however, the size of the text used is smaller than minimum allowed (6" upper case/4" lower case) and/or the spacing has been compressed

to make messages fit. In addition, some signs contain route marker shields to guide motorists, which are very helpful to guide the motorist; however, the size of these shields is approximately 9", almost a third of the minimum shield size of 24". The small size of these legend elements may not allow all drivers to read and react to these signs, rendering them useless. Another consideration is the color of the signs, which should meet Federal contrast requirements. Use of standard guide sign colors (white on green/blue/brown) will ensure signs meet these requirements. Also, the signs are typically painted, with no retro-reflective qualities. Using retro-reflective sheeting would enhance the night time visibility of these signs. Figures 4A – 4H show examples of the different types of signs throughout the City.

FIGURE 4A
GROUND MOUNTED
STREET NAME SIGN

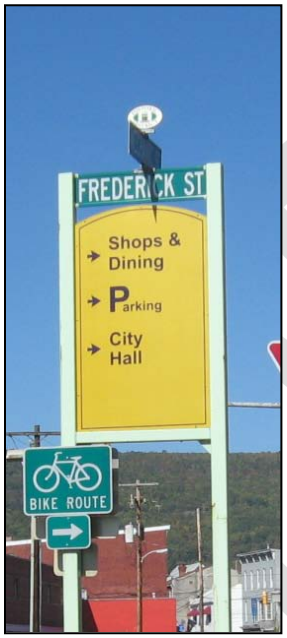


FIGURE 4B
OVERHEAD MOUNTED
STREET NAME SIGN

FIGURE 4C
DESTINATION SIGN

FIGURE 4D
PARKING SIGN

FIGURE 4E
MARQUEE SIGN

FIGURE 4F
I-68 SUPPLEMENTAL SIGN

FIGURE 4G
CITY DIRECTIONAL SIGN AT
END OF OFF-RAMP

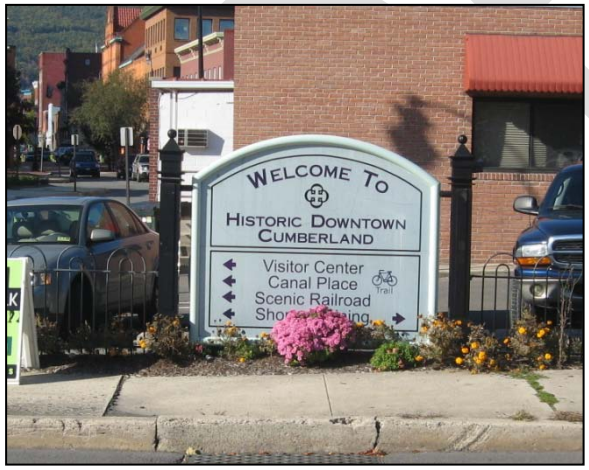


FIGURE 4H
CITY DIRECTIONAL SIGN AT
END OF OFF-RAMP

C. Truck-Related Issues

During the field inventories and associated studies of City mapping, potential constraints, conflicts, and controlling factors were indentified that could affect truck travel or the selection of future improvement alternatives throughout the City. Identified issues include the following:

1. Truck Travel along Mechanic Street through Downtown

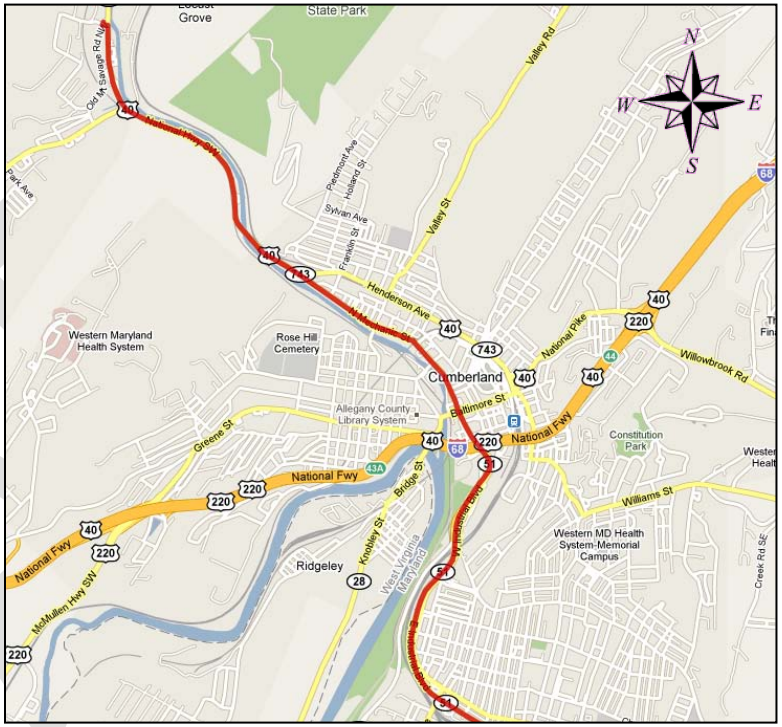
a. Problem

Many residents and businesses have complained about truck traffic on Mechanic Street in downtown Cumberland. Of particular concern to the City are coal trucks that travel from coal mines in southern Pennsylvania to the Warrior Run power plant south of the city on Mexico Farms Road. Additionally, many large trucks travel through downtown to access I-68 and US 220. A survey of truck traffic taken on Tuesday, March 23, 2010, showed that out of 111 trucks that traveled southbound through Mechanic Street north of the city and/or downtown at Harrison Street, only 21 passed through both points, one of which turned right onto Howard Street. The vast majority of trucks that travel along Mechanic Street have destinations within the City. Of the 20 vehicles that can be classified as through traffic, 14 continued southbound along MD 51, and 6 took the on-ramp to Eastbound I-68. No coal trucks were observed on the day the truck study was conducted.

The route that trucks take along Mechanic Street from north of the city to the power plant is displayed in Figure 5, along with details of this route. Details of travel time runs can be found in Appendix D. The 7.8-mile route takes approximately 15 minutes. After passing through the city, trucks continue southbound along MD 51 to reach the power plant.

FIGURE 5 – TRUCK ROUTE ALONG MECHANIC STREET
7.8 MILES – 15 MINUTES

- Travel SB along MD 36
- Turn left onto US 40 Alt. (becomes Mechanic Street, then becomes SB MD 51)
- Turn right at Mexico Farm Road
- End at Warrior Run Power Plant



b. Potential Solutions

There are three alternate routes that through trucks could follow that would reduce truck traffic through downtown Cumberland while maintaining a reasonable travel time and travel distance for these trucks. Signing improvements would help to divert truck travel along Mechanic Street by directing trucks to alternate routes. The three detour routes begin just north of the MD 36 at US 40 Alt. intersection north of the city. Travel time runs were conducted along the Mechanic Street route as well as the proposed detour routes. The proposed detour routes are displayed in Figures 6A, 6B, and 6C, along with their respective travel distances, travel times, and route details. Details of travel time runs can be found in Appendix D. After passing through the city, all routes continue southbound along MD 51 to reach the power plant.

FIGURE 6A – DETOUR ROUTE A
12.8 MILES – 20 MINUTES

- Travel SB along MD 36
- Turn right onto US 40 Alt.
- Turn left onto Campground Road (becomes Vocke Road)
- Turn left onto the I-68 EB On-Ramp
- Exit onto SB MD 51
- Turn right at Mexico Farm Road
- End at Warrior Run Power Plant

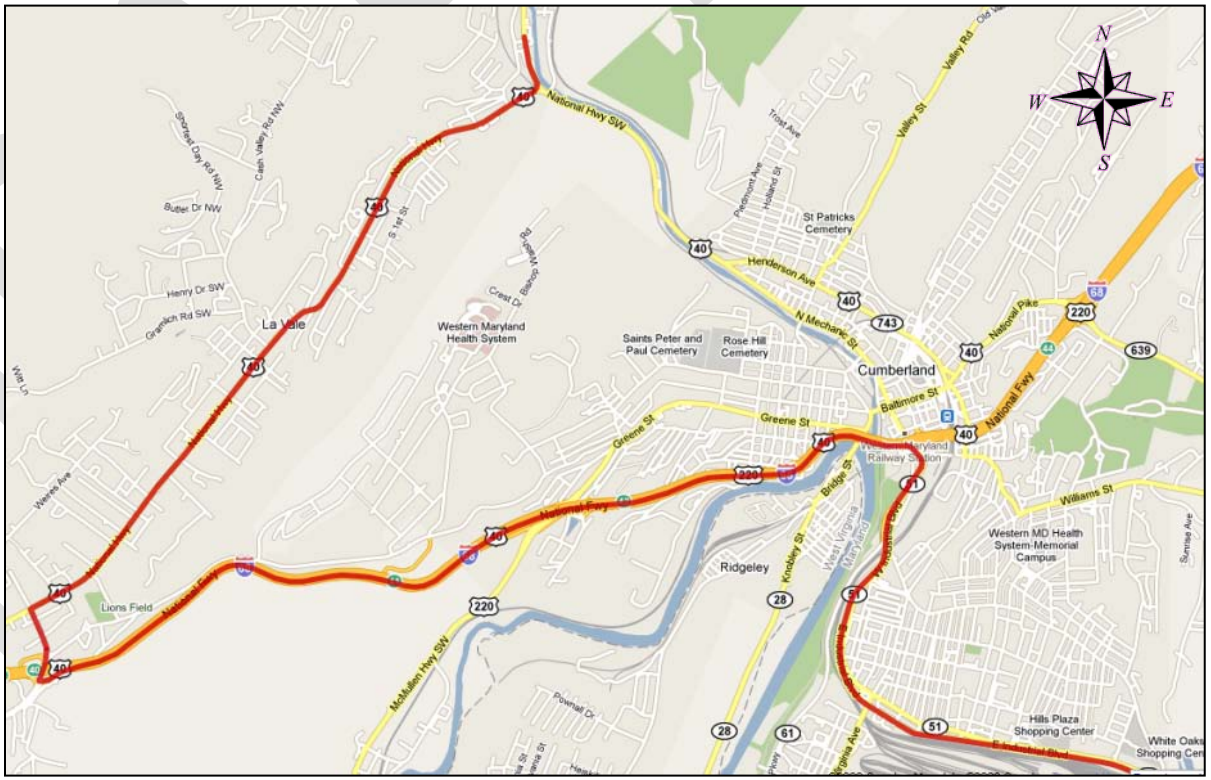


FIGURE 6B – DETOUR ROUTE B
8.1 MILES – 15 MINUTES

- Travel SB along MD 36
- Turn left onto US 40 Alt. (becomes Mechanic Street)
- Turn left onto Queen City Drive
- Turn left onto SB MD 51
- Turn right at Mexico Farm Road
- End at Warrior Run Power Plant

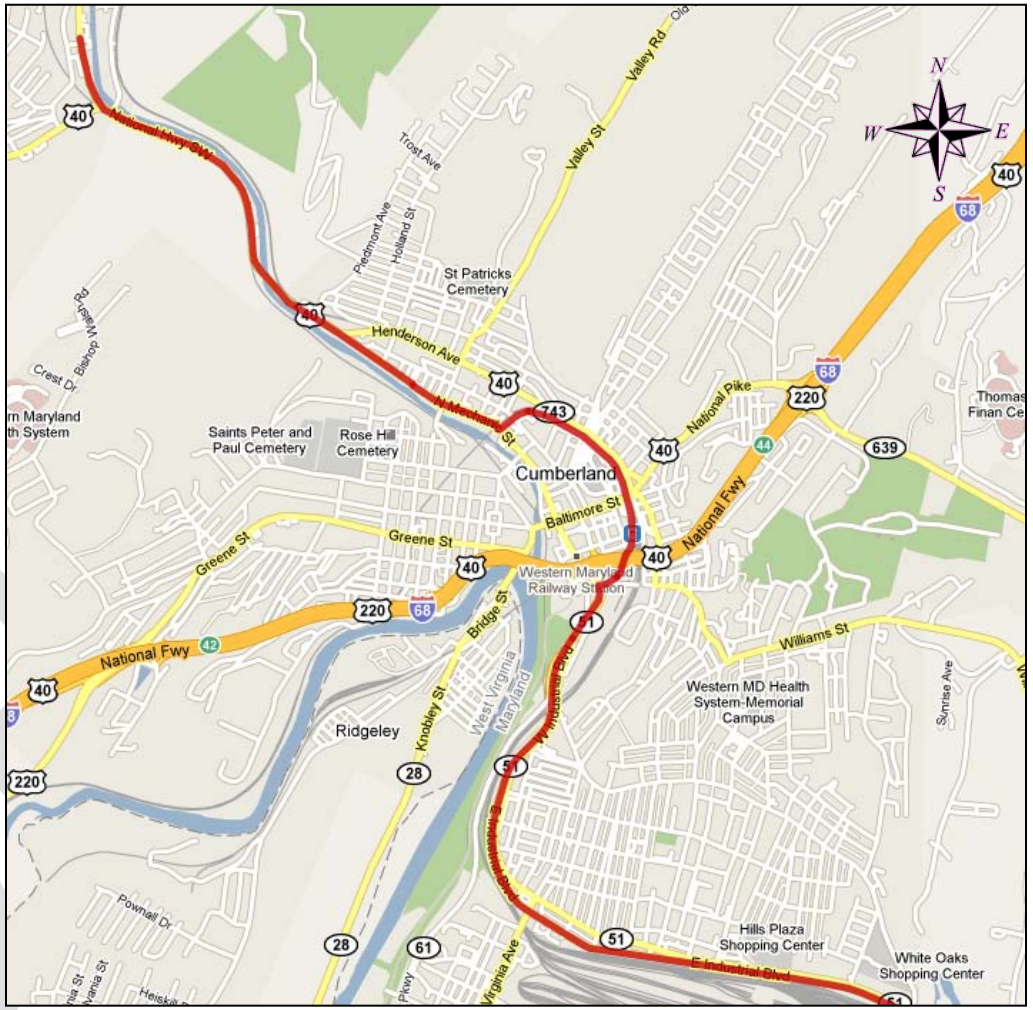
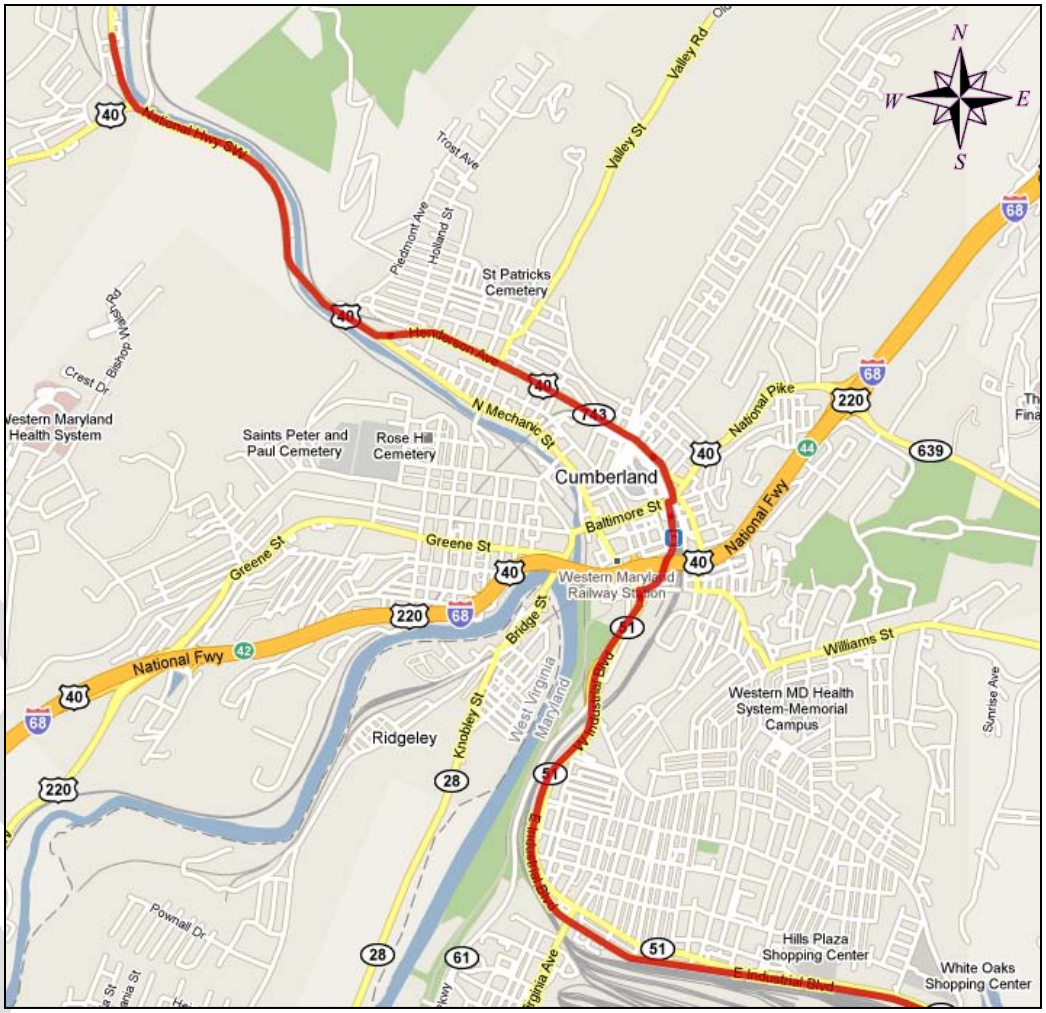


FIGURE 6C – DETOUR ROUTE C
8.1 MILES – 16 MINUTES

- Travel SB along MD 36
- Turn left onto US 40 Alt.
- Turn left onto Henderson Avenue (becomes Front Street)
- Turn right onto Baltimore Street
- Turn left onto Queen City Drive
- Turn left onto SB MD 51
- Turn right at Mexico Farm Road
- End at Warrior Run Power Plant



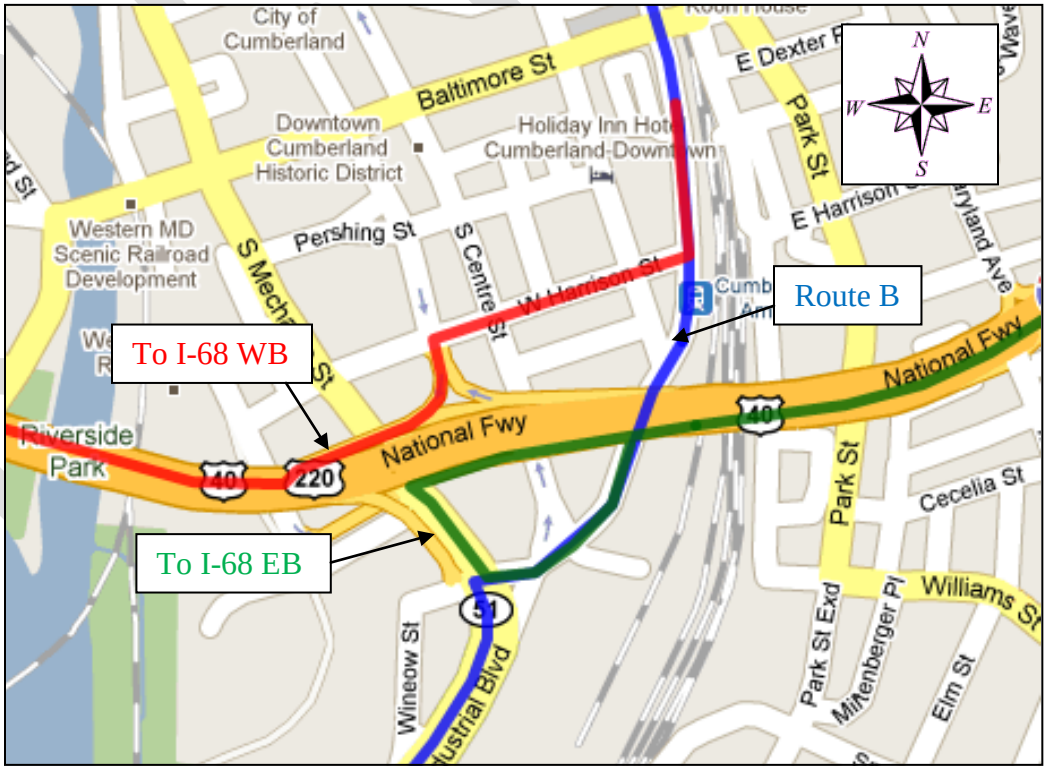
As shown, Route B has the shortest average travel time, which is approximately identical to that of the route along Mechanic Street through downtown. Routes B and C have approximately the same travel distance, which is significantly shorter than that of Route A, and about 0.3 miles longer than the route along Mechanic Street. While Route C's travel time is only about one minute longer than that of Route B and the route along Mechanic Street, trucks may have difficulty traveling between the two closely-spaced intersections of Front Street at Baltimore Street and Baltimore Street at Queen City Drive. Trucks traveling along this route would travel SB along Henderson Avenue, turn right onto Baltimore Street, and then immediately turn left onto Queen City Drive. This maneuver may make Route C a less-than-desirable route. Route A would minimize travel time through the City of Cumberland and would take trucks off of Mechanic Street everywhere south of Henderson Avenue; however, travel time and travel distance along this route is greater than along either of the other two routes.

c. Recommendation

In order to direct traffic along Route B, install signs along Mechanic Street north of its intersection with Queen City Drive restricting trucks along Mechanic Street beyond Queen City Drive, with an exception of local deliveries.

In addition to coal trucks traveling to the power plant, trucks wishing to reach I-68 should also follow Route B. As shown in Figure 7, when trucks are driving along Queen City Drive, they may turn right onto Harrison Street to access I-68 Westbound or turn right onto Mechanic Street to access I-68 Eastbound. Alternatively, if trucks have difficulty making the turn onto Centre Street, they may turn right onto Mechanic Street, then right onto Harrison Street to turn right onto the ramp to I-68 Eastbound.

FIGURE 7 –ROUTES TO I-68 FROM ROUTE B



2. Mechanic Street at Queen City Drive (North Side)

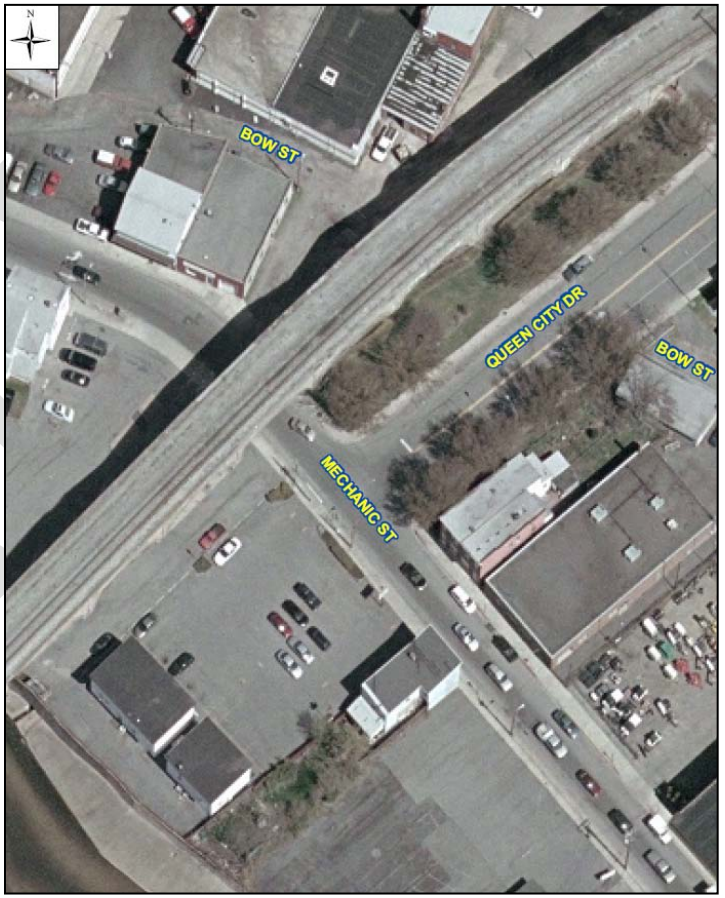
a. Problem

This intersection (see Figure 8), which is located in the northern section of Cumberland, is a stop-controlled intersection. It is located at the north end of the truck detour proposed under Issue C.1.

Queen City Drive terminates at Mechanic Street, and there is a parking lot on the opposite side of the intersection from Queen City Drive, which serves as the eastbound leg of the intersection. Mechanic Street is one-way southbound, with a thru lane and a left-turn lane upstream of the intersection. There is one travel lane downstream of the intersection, along with a parking lane on the left side of the roadway. Queen City Drive is a two-lane roadway with parking along both sides. Stop-sign control is present along the westbound Queen City Drive approach and the eastbound parking lot approach.

Approximately 40 feet north of the intersection, there is a bridge over Mechanic Street with a vertical clearance of 14'-0" in the center of the roadway, 11'-6" along the left side of the roadway, and 12'-0" along the right side of the roadway, as shown in Figure 9 below. Several trucks were observed traveling through the center of the roadway, straddling the southbound thru lane and the southbound left-turn lane, to clear the bridge. Additionally, there are concerns about whether eastbound and westbound vehicles receive enough gaps in southbound traffic to clear the intersection with minimal delay.

FIGURE 8 – MECHANIC STREET AT QUEEN CITY DRIVE



b. Potential Solutions

Installation of a traffic signal at this intersection had been considered to provide eastbound and westbound traffic with a phase independent from southbound traffic so that vehicles along these approaches would not have to wait for gaps in southbound traffic to clear the intersection. A thirteen-hour count was performed at this intersection on Wednesday, December 16, 2009 from 6 AM to 7 PM for the purpose of a signal warrant study. Table 3 provides a summary of the signal warrant analysis. Detailed signal warrant analysis can be found in Appendix E. As shown in Table 3, the warrant is not met. Warrants 1 and 2, which require minimum vehicular volumes to be met during at least 8 hours and 4 hours respectively, are not met during any hour.

FIGURE 9 –VERTICAL CLEARANCE ALONG SOUTHBOUND MECHANIC STREET

TABLE 3 – SIGNAL WARRANT ANALYSIS SUMMARY
MECHANIC STREET AT QUEEN CITY DRIVE (NORTH SIDE)

Md-MUTCD Warrant		Criteria			No. of Hours or Criteria Observed	Warrant Satisfied
		Major Street Volume (VPH)	Minor-street Volume (VPH)	No. of Hours Required		
1A –	Minimum Vehicular Volume	500	150	8	0	NO
1B –	Interruption of Continuous Traffic	750	75	8	0	
1C –	Combination Warrant	400	120	8	0	
	80% of Warrants 1A & 1B (56% of Warrants #1A & 1B)	600	75			
2 –	Four-Hour Warrant	(See Appendix for charts)		4	0	NO
3A –	Peak-Hour Delay Warrant	Total Delay > 4 Veh-hours		1	0	NO
		Approach Volume ≥ 100 VPH			38	
		Total Entering Volume ≥ 800 VPH			656	
3B –	Peak-Hour Volume Warrant	(See Figure 4C-1 and 4C-2 in Appendix E)		1	0	
4 –	Pedestrian Volume	100 or more pedestrians for any 4 hours OR 190 or more pedestrians during any 1 hour AND Fewer than 60 gaps/hr of adequate length for peds to cross during same period observed above.			N/A	N/A
5 –	School Crossing	Intersection is not used as crossing for school children.			N/A	N/A
6 –	Coordinated Signal System	In order to maintain proper grouping of vehicles within a signal system.			N/A	N/A
7 –	Crash Experience	Five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred in a 12-month period. Also, 80% of either Warrant #1 or Warrant #2 is satisfied.			80% of either Warrant #1 or Warrant #2 not satisfied	NO
8 –	Roadway Network	Intersection of two major roadways.			NO	NO

Analysis was performed using SimTraffic simulation software during the AM peak hour of 11:00 AM to Noon and the PM peak hour of 3:00 to 4:00 PM. Table 4 summarizes the results of SimTraffic analysis. Detailed SimTraffic output is included in Appendix E. As shown, the intersection currently operates at LOS A during both peak hours. Vehicles along the minor approaches have low average delay times. During peak hour observations, frequent gaps in southbound traffic were observed, and delay times for vehicles along the minor approaches were low.

TABLE 4 – SIMTRAFFIC ANALYSIS SUMMARY
MECHANIC STREET AT QUEEN CITY DRIVE (NORTH SIDE) – EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
SB Mechanic Street	0.6	A	4	0.6	A	7
EB Parking Lot	5.3	A	27	4.7	A	23
WB Queen City Drive	7.8	A	50	8.3	A	48
Intersection Summary	1.3	A	--	1.1	A	--

In order to address the issue of southbound truck drivers traveling though the southbound thru lane and the southbound left-turn lane simultaneously and to improve the turning geometrics for trucks following the diversion route proposed under Issue C.1 (see discussion under C.4), the southbound left-turn lane can be removed, requiring all southbound traffic to use a single lane, which would be placed in the center of the roadway where the clearance is the greatest. As shown in Table 5 below, removal of the southbound left-turn lane would have a minimal impact on operations. Average delay would increase by 0.5 seconds during each peak hour, and LOS would remain unchanged. Detailed SimTraffic output can be found in Appendix E.

To better accommodate southbound left-turning truck traffic, the westbound lane of Queen City Drive should be relocated to the right, to provide more room for southbound turns to safely make their turning movement. Parking along this approach would have to be removed to accommodate the relocation of the travel lane. If parking is in high demand in this area, more parking could be provided along Mechanic Street north of the intersection if the left-turn lane here is removed, in the areas where there are not adjacent driveways.

TABLE 5 – SIMTRAFFIC ANALYSIS SUMMARY
MECHANIC STREET AT QUEEN CITY DRIVE (NORTH SIDE) – PROPOSED CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
SB Mechanic Street	1.1	A	4	1.1	A	8
EB Parking Lot	4.9	A	27	4.0	A	23
WB Queen City Drive	8.9	A	53	9.6	A	48
Intersection Summary	1.8	A	--	1.6	A	--

A traffic signal warrant analysis was performed under the proposed geometry. Table 6 provides a summary of this analysis. Detailed signal warrant analysis can be found in Appendix E. As shown, no warrants are met under this geometry.

c. Recommendation

Signing and marking improvements are recommended at this intersection, which include removal of the southbound left-turn lane of Mechanic Street as well as the relocation of the westbound lane of Queen City Drive. A signal is not recommended for this location.

TABLE 6 – SIGNAL WARRANT ANALYSIS SUMMARY
MECHANIC STREET AT QUEEN CITY DRIVE (NORTH SIDE) – PROPOSED GEOMETRY

Md-MUTCD Warrant		Criteria			No. of Hours or Criteria Observed	Warrant Satisfied
		Major Street Volume (VPH)	Minor-street Volume (VPH)	No. of Hours Required		
1A –	Minimum Vehicular Volume	500	150	8	0	NO
1B –	Interruption of Continuous Traffic	750	75	8	0	
1C –	Combination Warrant	400	120	8	0	
	80% of Warrants 1A & 1B (56% of Warrants #1A & 1B)	600	75			
2 –	Four-Hour Warrant	(See Appendix for charts)		4	0	NO
3A –	Peak-Hour Delay Warrant	Total Delay > 4 Veh-hours		1	0	NO
		Approach Volume ≥ 100 VPH			38	
		Total Entering Volume ≥ 800 VPH			656	
3B –	Peak-Hour Volume Warrant	(See Figure 4C-1 and 4C-2 in Appendix E)		1	0	
4 –	Pedestrian Volume	100 or more pedestrians for any 4 hours OR 190 or more pedestrians during any 1 hour AND Fewer than 60 gaps/hr of adequate length for peds to cross during same period observed above.			N/A	N/A
5 –	School Crossing	Intersection is not used as crossing for school children.			N/A	N/A
6 –	Coordinated Signal System	In order to maintain proper grouping of vehicles within a signal system.			N/A	N/A
7 –	Crash Experience	Five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred in a 12-month period. Also, 80% of either Warrant #1 or Warrant #2 is satisfied.			80% of either Warrant #1 or Warrant #2 not satisfied	NO
8 –	Roadway Network	Intersection of two major roadways.			NO	NO

d. Trucks on Washington Street

Trucks traveling westbound along Baltimore Street through the intersection of Washington Street/Cumberland Street/Greene Street that are destined for Ridgely, WV or westbound Interstate 68 will sometimes inadvertently continue westbound along Washington Street. Washington Street is an inadequate route for trucks for three reasons. First, Washington Street is a residential street. It is narrow in several areas, which is particularly problematic for trucks and many residents have complained about these stray trucks. Second, Washington Street becomes one-way eastbound at Kiefer Avenue. At this point, trucks must turn right onto Kiefer Avenue and then make a hard left onto Fayette Street to reach Braddock Road and Greene Street. Finally, there is a weight-restricted bridge over the railroad, east of Chase Street (Single Unit 15,000 lbs GVW, Combination Unit 22,000 lbs GCW).

The intended route for trucks traveling westbound along Baltimore Street at the Washington Street/Cumberland Street/Greene Street is along Greene Street, which can accommodate large trucks and provides the most direct access to points west of the City. Some of the directional signs around the Baltimore Street/Washington Street/Cumberland Street/Greene Street intersection contain the message "Washington Street Historic District".

Recommendations: The City should add the regulatory message "NO TRUCKS" below the guide message to help alert trucks to the existing truck restriction along Washington Street. In addition, the approach to this intersection is one that contains the undersized I-68 route shield on the historic sign panel, as previously discussed. Using a standard shield would provide much better direction for trucks destined for the interstate.

e. Inadequate Truck Turning Radii

Locations: Based on field-observations, a review of existing and proposed truck routes, and stakeholder comments, the following turning movements throughout the City may be difficult for trucks to execute due to existing intersection geometrics such as tight corner radii, narrow lanes, skewed approach angles, etc.

- Southbound left turns from Mechanic Street onto Queen City Drive (north side of City)
- Westbound left turns from Harrison Street onto I-68 Westbound On-ramp at Liberty Street
- Southbound right turns from Queen City Drive onto Harrison Street
- Westbound right turns from Queen City Drive onto Centre Street (north side of City)
- Westbound left turns from Queen City Drive/Winston Street onto southbound MD 51
- Westbound right turns from Winston Street onto Mechanic Street
- Westbound left turns from Harrison Street onto Mechanic Street

Analyses: To quantify any problematic maneuvers, AutoTURN software was used to assess locations where tractor-trailer trucks have difficulty making turning maneuvers. AutoTURN is a CAD-based software tool that specifically evaluates vehicle paths and clearances through intersections for various vehicle types. For this project, vehicle centerline paths were drawn to scale on aerial

photographs, and truck turning envelopes were simulated for standard WB-50 tractor-trailer trucks. The turning envelopes indicated the paths of the front and rear overhangs of the truck being evaluated. The analyses are summarized in Table 7. Graphics displaying the results of AutoTURN analyses can be found in Appendix C.

Table 7. Intersection Geometric Concerns

Intersection	Movement of Concern	Assessment
Mechanic Street at Queen City Drive (North Side of City)	SBL	With parking and striping changes proposed under C.2, trucks can execute this turn.
Harrison Street at I-68 Westbound On-ramp/Liberty Street	WBL	Geometrics are just barely inadequate for trucks to execute the turn. Minor encroachment on the mountable island at the ramp entrance required for trucks to execute the turn. If C.1 diversion plan is implemented, modifications to the island should be made.
Queen City Drive at Harrison Street	SBR	Trucks can only execute this turn by swinging wide into the left lane of Queen City Drive, which is not an unusual maneuver in an urban setting.
Centre Street at Queen City Drive (North Side of City)	WBR	Trucks can only execute this turn by swinging wide into the left lane of Queen City Drive, which is not an unusual maneuver in an urban setting.
MD 51/Mechanic Street at Winston Street	WBL	Geometrics are just barely inadequate for trucks to execute the turn. By cutting back the nose of the median on the south side of the intersection, trucks can execute the turn. If C.1 diversion plan is implemented, modifications to the median should be made.
	WBR	Trucks can only execute this turn by swinging wide into the left lane of Winston Street, which is not an unusual maneuver in an urban setting
Harrison Street at Mechanic Street	WBL	Trucks are barely able to execute this turn with current striping. Setting back the northbound stop line would provide additional margin for error.

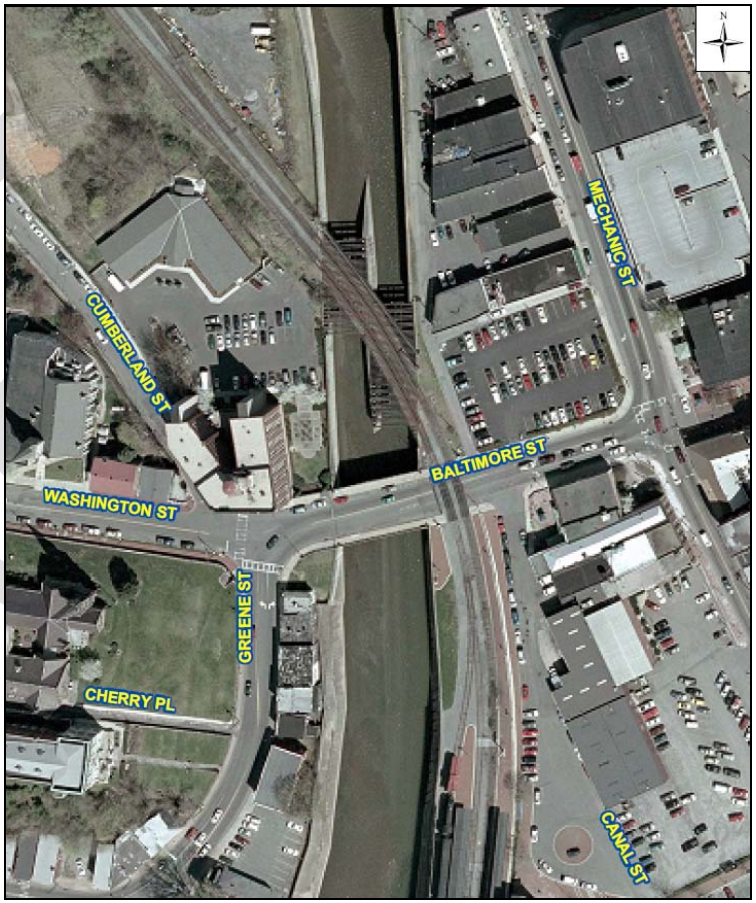
D. Intersection Operation Issues

1. Baltimore Street at Mechanic Street

a. Problem

The intersection of Baltimore Street at Mechanic Street is a T-intersection with Baltimore Street terminating at Mechanic Street. Northbound Mechanic Street consists of a shared left-turn/thru lane, southbound Mechanic Street consists of a thru lane and a right-turn lane, and eastbound Mechanic Street consists of a left-turn lane and a right-turn lane. Baltimore Street is a pedestrian plaza east of the intersection. This intersection has significant pedestrian traffic, including 33 pedestrians crossing the intersection during the AM peak hour, and 32 pedestrians crossing during the PM peak hour, as measured during counts conducted on Wednesday, December 16, 2009. The intersection is controlled by a traffic signal, with exclusive/permissive left turn phasing along the northbound Mechanic Street approach, permissive/overlap right-turn phasing along the southbound Mechanic Street approach, and a push-button actuated exclusive pedestrian phase. Right turns on red are permitted along the eastbound Baltimore Street approach. The layout of this intersection as well as the nearby intersections of Baltimore Street at Canal Street and Baltimore Street/Washington Street at Cumberland Street/Greene Street is shown in Figure 10. The intersections of Baltimore Street at Canal Street and Baltimore Street/Washington Street at Cumberland Street/Greene Street are analyzed in their respective sections of this report.

FIGURE 10 – BALTIMORE STREET AT MECHANIC STREET AND NEARBY INTERSECTIONS



A lunchtime survey of pedestrian activity was conducted from 11:55 AM to 12:15 PM on Tuesday, October 20, 2009, as lunchtime is a period of heavy pedestrian traffic. During this 20-minute period, a total of 37 pedestrians crossed at the intersection, 6 pedestrians crossed near the intersection, and 5 walked across the pedestrian plaza along the east side of the intersection. Of the 37 pedestrians that crossed at the intersection, 20 did so during the exclusive pedestrian phase. 17 pedestrians did not wait for the pedestrian phase and instead crossed when they saw an adequate gap in vehicular traffic.

This intersection experiences significant queuing along northbound Baltimore Street due to heavy left-turning traffic along this approach, including 137 turns during the AM peak hour and 222 turns during the PM peak hour. Vehicles that do not clear during the exclusive left-turn phase receive few gaps in southbound traffic during the permissive phase, and typically have to wait until the end of the permissive phase to clear the intersection. As a result, several vehicles must wait through the red phase and then clear the intersection during the following left-turn phase. As the northbound approach is a single-lane approach with a narrow shoulder, northbound thru vehicles are unable to bypass left-turning vehicles. As there are buildings along both sides of the roadway, widening the roadway would be a less-than-desirable option.

Eastbound Mechanic Street left-turn queues are significant during the PM peak hour, and frequently extend beyond the railroad tracks west of Canal Street, as shown in Figure 11. During a survey of queuing at this intersection from 4:00 to 5:00 PM on Wednesday, October 21, 2009, there were 14 instances in which queues developed in the left lane that extended beyond the railroad tracks. During this period, there were 8 instances of cars stopped on the railroad tracks, creating a potential safety issue. 4 of the 14 queues extended to the intersection of Baltimore Street/Washington Street at Cumberland Street/Greene Street, blocking traffic at this intersection. Additionally, there was one queue of right-turning vehicles that extended beyond the railroad tracks, which included a vehicle that stopped on the tracks. No trains traveled across Baltimore Street during this observation period.

FIGURE 11 – HEAVY WESTBOUND QUEUES DURING THE PM PEAK HOUR

Table 8 provides a summary of existing peak hour conditions at the Baltimore Street at Mechanic Street intersection. Detailed SimTraffic output can be found in Appendix E. This intersection, the Baltimore Street at Canal Street intersection, and the Baltimore Street/Washington Street at Cumberland Street/Greene Street intersection are all closely spaced. The operations of these three intersections are related to each other due to their proximity, and were therefore analyzed as a single network in SimTraffic. Analyses of the other two intersections in this network can be found in their respective sections of this report.

TABLE 8 – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET AT MECHANIC STREET – EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Baltimore Street	17.0	B	150	25.9	C	218
NB Mechanic Street	42.0	D	215	53.0	D	351
SB Mechanic Street	15.6	B	228	13.5	B	261
Intersection Summary	21.7	C	--	26.8	C	--

b. Potential Solution

The intersection was analyzed with the proposed condition of removal of the pedestrian phase. Under this scenario, pedestrians would cross the intersection during the same phases as vehicular traffic. The overlap phase for southbound Mechanic Street right turns would be removed to allow pedestrians to cross Mechanic Street during the Baltimore Street phase. A summary of proposed conditions at this intersection can be found in Table 9, and detailed SimTraffic output can be found in Appendix E.

TABLE 9 – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET AT MECHANIC STREET – REMOVAL OF EXCLUSIVE PEDESTRIAN PHASE

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Baltimore Street	7.5	A	95	10.4	B	136
NB Mechanic Street	19.0	B	119	37.0	D	265
SB Mechanic Street	10.9	B	161	10.6	B	196
Intersection Summary	11.3	B	--	16.4	B	--

c. Recommendation

Remove the pedestrian phase and allow pedestrians to cross the roadway during vehicular phases. Investigate coordination of this signal with the nearby signals at the intersections of Mechanic Street at Bedford Street and Mechanic Street at Harrison Street.

2. Baltimore Street at Canal Street

a. Problem

The intersection of Baltimore Street at Canal Street is located approximately 150 feet west of the intersection of Baltimore Street at Mechanic Street, and approximately 250 feet east of the intersection of Baltimore Street/Washington Street at Cumberland Street/Greene Street. Stop control is present along the Canal Street approaches. Additionally, there is a pedestrian-actuated flashing signal for the Great Allegheny Passage Trail at this intersection that directs vehicles to stop as pedestrians cross Baltimore Street. Drivers obey this signal and stop for crossing pedestrians when the signal is flashing. All approaches consist of a single lane; however, eastbound Baltimore Street consists of two lanes just east of this intersection, and the eastbound approach, while striped for one lane, is wide enough to accommodate two lanes of vehicles. These two lanes serve as the left-turn lane and right-turn lane at the Baltimore Street at Mechanic Street intersection. This intersection is adjacent to railroad tracks. Vehicles typically slow down approaching these tracks due to the steep grade along both sides of these railroad tracks. The layout of this intersection is shown in Figure 10 above.

During AM peak hour observations on Wednesday, October 21, 2009, delay for all vehicles was minimal due to low traffic volumes. Turning volumes are particularly low. During the traffic count performed on Thursday, December 17, 2009, only one vehicle arrived at the intersection along the parking lot north of the intersection, and six vehicles arrived at the intersection along NB Canal Street.

Traffic is heavier during the PM peak hour. During the traffic count performed on Thursday, December 17, 2009, 19 vehicles arrived at the intersection along southbound Canal Street, and 12 vehicles arrived at the intersection along northbound Canal Street. The intersection is frequently blocked due to queuing along the Baltimore Street approach at the intersection of Baltimore Street at Mechanic Street.

While turning volumes are low (13 AM/1 PM westbound lefts and 12 AM/2 PM eastbound lefts), these vehicles sometimes have to wait a while for adequate gaps to turn, blocking traffic. Westbound left turns are of particular concern, as the queues that develop behind the turning vehicles can extend beyond the intersection of Baltimore Street at Mechanic Street, blocking vehicles along Mechanic Street from turning onto Baltimore Street.

Table 10 provides a summary of existing peak hour conditions at the Baltimore Street at Canal Street intersection. Detailed SimTraffic output can be found in Appendix E.

TABLE 10 – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET AT CANAL STREET – EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Baltimore Street	1.2	A	20	2.2	A	56
WB Baltimore Street	0.8	A	24	1.1	A	43
NB Canal Street	5.1	A	27	10.0	B	34
SB Canal Street	0.0	A	6	5.5	A	39
Intersection Summary	1.1	A	--	1.9	A	--

b. Potential Solutions

With the proposed revisions to signal timing at the nearby intersection of Baltimore Street at Mechanic Street, the queues along Baltimore Street will not extend to the Baltimore Street at Canal Street intersection. A summary of operations at the Baltimore Street at Canal Street intersection can be found in Table 11, and detailed SimTraffic output can be found in Appendix E.

Restricting westbound left turns would eliminate the instances of westbound queues extending to the intersection of Baltimore Street at Mechanic Street; however, this would block vehicles from the east from using the only publicly-owned entrance to Canal Street. Vehicles could enter Canal Street from the south, but would have to travel through a private parking lot, via Harrison Street, to do so.

c. Recommendation

The signal timing improvements at the nearby intersection of Baltimore Street at Mechanic Street will result in improvements at this intersection. Consult with local business owners about possibly restricting westbound left turns and requiring drivers to access Canal Street from the south, which would require installation of signs showing the left turn restriction.

TABLE 11 – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET AT CANAL STREET – PROPOSED CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Baltimore Street	1.3	A	21	1.5	A	21
WB Baltimore Street	0.8	A	19	0.9	A	29
NB Canal Street	5.8	A	21	8.3	A	31
SB Canal Street	0.0	A	6	4.9	A	39
Intersection Summary	1.1	A	--	1.4	A	--

3. Baltimore Street/Washington Street at Cumberland Street/Greene Street

a. Problem

The intersection of Baltimore Street/Washington Street at Cumberland Street/Greene Street is a stop-controlled intersection with stop control along the eastbound Washington Street and southbound Cumberland Street approaches. This is in conflict with the Manual on Uniform Traffic Control Devices (MUTCD), which states, "STOP signs and YIELD signs shall not be installed on different approaches to the same unsignalized intersection if those approaches conflict with or oppose each other." The westbound Baltimore Street and northbound Greene Street approaches are free movements. The heaviest movements are northbound right turns (310 AM/407 PM) and westbound left turns (164 AM/317 PM). All other vehicular movements experience peak hour volumes of 61 vehicles per hour or less. Three of the four approaches are single-lane approaches, with the exception of the northbound Greene Street approach, which has a separate right-turn lane. The layout of this intersection is shown in Figure 10 above. Trucks sometimes travel westbound along Baltimore Street through the intersection of Baltimore Street/Washington Street at Cumberland Street/Greene Street and continue westbound along Washington Street (in violation of a signed truck restriction), when the preferred route is to turn left onto Greene Street. Table 12 provides a summary of existing peak hour conditions at the Baltimore Street/Washington Street at Cumberland Street/Greene Street intersection. Detailed SimTraffic output is located in Appendix E.

TABLE 12 – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET/WASHINGTON STREET AT CUMBERLAND STREET/
GREENE STREET – EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Washington Street	9.1	A	19	17.4	C	50
WB Baltimore Street	0.6	A	7	0.7	A	9
NB Greene Street	2.5	A	26	3.6	A	40
SB Cumberland Street	7.4	A	38	13.6	B	54
Intersection Summary	2.5	A	--	4.2	A	--

b. Potential Solutions

To prevent trucks from traveling west through this intersection from Baltimore Street to Washington Street, the intersection should be altered to make it clear that the primary westbound movement is to turn onto Greene Street. Currently, there are no markings at the intersection that indicate that this movement is the major movement. Installing skipped double yellow striping at the intersection between the Baltimore Street and Greene Street approaches would direct travelers in this direction and reduce confusion at this intersection. In addition, the Greene Street approach would have a STOP sign with an accompanying sign stating "EXCEPT RIGHT TURN" to prevent confusion over right-of-way between Greene Street traffic and Baltimore Street traffic.

It should be noted that no trucks made the westbound thru movement from Baltimore Street to Washington Street during the traffic count conducted on Thursday, December 17, 2009 from 7:00 – 9:00 AM and 4:00 – 6:00 PM. Trucks accounted for 0.4% of all westbound left turns onto Greene Street. While this may indicate that trucks already follow the recommended route through Greene Street during the peak hours, there may be trucks that take the route through Washington Street during off-peak hours.

In addition to the proposed signing and marking improvements, four solutions were analyzed:

A. All-way stop control
B. Two-way stop control along Cumberland Street and Greene Street
C. Roundabout
D. Traffic signal

The first two options are low-cost improvements that would bring the intersection to meet MUTCD standards and may improve expectancy for drivers unfamiliar with the intersection. Option C, a roundabout, would be a one-lane roundabout with single-lane approaches. Option D, a traffic signal, is unlikely to meet the signal warrants but serves as an example of how signalization would alter intersection operations. The proposed signal would be semi-actuated with permissive phasing along the Baltimore Street and Washington Street approaches and split phasing along the Cumberland Street and Greene Street approaches. Options A, B, and D were analyzed using SimTraffic software, and Option C was analyzed using SIDRA roundabout analysis software. Tables 13A through 12D show the peak hour conditions under the proposed solutions. Detailed SimTraffic and SIDRA output is located in Appendix E.

TABLE 13A – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET/WASHINGTON STREET AT CUMBERLAND STREET/
GREENE STREET – ALL-WAY STOP CONTROL

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Washington Street	4.7	A	14	5.2	A	25
WB Baltimore Street	5.9	A	74	8.2	A	126
NB Greene Street	5.7	A	73	7.7	A	95
SB Cumberland Street	3.5	A	38	4.4	A	45
Intersection Summary	5.6	A	--	7.5	A	--

TABLE 13B – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET/WASHINGTON STREET AT CUMBERLAND STREET/GREENE STREET
TWO-WAY STOP CONTROL ALONG CUMBERLAND STREET AND GREENE STREET

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Washington Street	0.4	A	1	0.7	A	2
WB Baltimore Street	1.8	A	36	2.5	A	63
NB Greene Street	5.9	A	72	8.6	A	101
SB Cumberland Street	4.8	A	40	8.9	A	50
Intersection Summary	3.9	A	--	5.4	A	--

TABLE 13C – SIDRA ROUNDABOUT SUMMARY
BALTIMORE STREET/WASHINGTON STREET AT CUMBERLAND STREET/
GREENE STREET – INSTALLATION OF ROUNDABOUT

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Washington Street	3.3	A	10	5.2	A	21
WB Baltimore Street	5.2	A	39	6.1	A	79
NB Greene Street	3.1	A	63	3.4	A	102
SB Cumberland Street	4.8	A	7	6.0	A	13
Intersection Summary	4.0	A	--	4.8	A	--

TABLE 13D – SIMTRAFFIC ANALYSIS SUMMARY
BALTIMORE STREET/WASHINGTON STREET AT CUMBERLAND STREET/
GREENE STREET – SIGNALIZED INTERSECTION

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Washington Street	4.7	A	12	8.5	A	43
WB Baltimore Street	8.2	A	123	17.1	B	225
NB Greene Street	6.0	A	71	8.0	A	81
SB Cumberland Street	18.6	B	45	15.9	B	59
Intersection Summary	7.4	A	--	12.1	B	--

c. Recommendation

As a short term solution, install skipped double yellow striping at the intersection between the Baltimore Street and Greene Street approaches and install a STOP sign along the Greene Street approach with a sign stating "EXCEPT RIGHT TURN" to prevent confusion over right-of-way between Greene Street traffic and Baltimore Street traffic. Additional discussion is required for how to sign the northbound left turn. There is no standard sign in the MUTCD to cover this movement, which requires northbound left turning drivers to yield to westbound left turning drivers. As a long term solution, examine the feasibility of a roundabout.

4. MD 51 at Queen City Drive/Mechanic Street/Centre Street/Winston Street/I-68 Ramps

a. Problem

This network of intersections consists of two signalized intersections and one stop-controlled intersection, all in close proximity to each other. A diagram of this intersection is shown in Figure 12. This network consists of the three inter-related intersections, listed from west to east:

- I-68 Eastbound Off-Ramp at Winston Street – stop control along I-68 Eastbound Off-Ramp
- Mechanic Street/MD 51 at Winston Street – signalized
- Centre Street/MD 51 at Winston Street/Queen City Drive – signalized

There are three lanes of northbound MD 51, which split into five lanes approximately 350' south of the intersection. Two lanes continue north onto Mechanic Street (with an option to turn left onto Winston Street from the left-most of these lanes), one lane continues north onto Centre Street (with an option to turn left onto Winston Street), and two lanes continue north onto eastbound Queen City Drive via channelized right-turn lanes. This right-turn movement is a free movement. The lane of NB MD 51 that continues onto Centre Street leads to an on-ramp onto I-68 Westbound just north of the intersection. The right lane of Mechanic Street leads to an on-ramp I-68 Eastbound just north of the intersection.

FIGURE 12 – MD 51 AT QUEEN CITY DRIVE/ MECHANIC STREET/CENTRE STREET/ WINSTON STREET/I-68 RAMPS

Southbound Mechanic Street consists of two lanes north of Winston Street. At its intersection with Winston Street, Mechanic Street consists of a thru lane and a shared thru/right-turn lane. The thru lanes continue onto southbound MD 51. The I-68 Eastbound Off-Ramp consists of a single-lane southbound approach at Winston Street with a channelized right-turn lane. The thru lane is stop-controlled and continues onto southbound MD 51. The right-turn lane is yield-controlled. Westbound Queen City Drive consists of two lanes. There is a free right-turn movement onto Centre Street, which serves as an added lane on Centre Street. West of Centre Street, Queen City Drive becomes Winston Street, which consists of a left-turn lane onto southbound MD 51 and a thru lane.

The intersection network operates on two-phase signal operations consisting of a northbound/ southbound phase and a westbound phase. There are no eastbound approaches at this intersection, as the eastbound lanes of Queen City Drive are formed from the channelized right-turn lanes of northbound MD 51. Both signalized intersections operate under the same controller.

Between January 2006 and December 2008, there were 21 reported crashes at this intersection, including 10 rear end crashes. 4 of these rear end crashes occurred on the I-68 Eastbound Off-Ramp. Table 14 provides a summary of crash data at this intersection.

TABLE 14 – CRASH DATA SUMMARY
MD 51 AT QUEEN CITY DRIVE/MECHANIC STREET/ CENTRE STREET/WINSTON STREET/I-68 RAMPS

Crashes	2006	2007	2008	2006-2008	
				Total	Percent
Severity					
Fatal	0	0	0	0	0%
Injury	0	1	2	3	14%
Property Damage	5	7	6	18	86%
Total	**5**	**8**	**8**	**21**	**100%**
Type					
Sideswipe	1	2	1	4	19%
Rear End	2	3	5	10	48%
Single Vehicle	2	3	2	7	33%
Case					
Darkness	1	3	2	6	29%
Wet Surface	1	0	0	1	5%
Alcohol Related	0	1	0	1	5%

Currently, vehicles traveling northbound wishing to enter Mechanic Street or Centre Street must travel in the left-most lane. Vehicles wishing to turn left onto Winston Street must do the same. Vehicles wishing to turn right onto Queen City Drive may do so from either the center lane or the right lane. As traffic heading to Centre Street is the heaviest movement, this places a large majority of traffic into a single lane (prior to where northbound MD 51 splits into five lanes), causing long queues in this lane. These queues make it difficult for vehicles merging upstream from Canal Parkway to enter this lane, causing weaving issues there.

North of the intersection, Centre Street currently consists of two lanes. The right lane is an added lane from westbound Queen City Drive right turns, which is currently an unrestricted movement. Vehicles making this right-turn movement that wish to enter the left lane of Centre Street must wait for gaps in traffic in the left lane to clear before changing lanes. There is a Wendy's restaurant along the west side of Centre Street that is accessible from Centre Street as well as from Winston Street. The Winston Street entrance is between the two signals. Although patrons traveling westbound along Queen City Drive/Winston Street can access the restaurant by traveling through the first signalized intersection and making an immediate right turn into the parking lot, several drivers choose instead to bypass the signal by turning right onto Centre Street, waiting for traffic to clear in the left lane of Centre Street, then crossing into the left lane of Centre Street to turn left into the Wendy's parking lot. A similar issue arises when vehicles make a right turn from westbound Queen City Drive onto Centre Street to access the I-68 Westbound On-Ramp, although in this case the drivers have a greater distance where they can change lanes.

Existing peak hour conditions were analyzed using SimTraffic software. A summary of peak hour conditions can be found in Table 15. Detailed SimTraffic output is located in Appendix E. As shown, the overall network operates at LOS A during the AM peak hour and LOS B during the PM peak hour.

TABLE 15 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT QUEEN CITY DRIVE/MECHANIC STREET/CENTRE STREET/WINSTON STREET/I-68 RAMPS
EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
I-68 Eastbound Off-Ramp at Winston Street						
WB Winston Street	1.0	A	9	0.5	A	11
SB I-68 Eastbound Off-Ramp	7.8	A	95	9.5	A	119
Intersection Summary	7.4	A	--	9.3	A	--
Mechanic Street/MD 51 at Winston Street						
WB Winston Street	18.0	B	93	17.5	B	114
NB MD 51	2.3	A	62	11.9	B	105
SB Mechanic Street	2.4	A	76	13.5	B	150
Intersection Summary	4.6	A	--	14.1	B	--
Centre Street/MD 51 at Winston Street/Queen City Drive						
WB Queen City Drive	13.9	B	66	28.8	C	178
NB MD 51	5.5	A	215	4.3	A	320
Intersection Summary	6.5	A	--	9.2	A	--
Network Summary	8.5	A	--	14.5	B	--

b. Proposed Solutions

Signal timing adjustments can reduce the long northbound queue lengths. The minimum times for westbound vehicles approaching Centre Street can be decreased to allow more time for northbound vehicles. In the PM peak hour, the cycle length can be reduced from 80 seconds to 60 seconds. Table 16 shows the effects of the optimized timings (see Appendix E for SimTraffic analysis). As shown, overall delay decreases during both peak hours. 95th percentile queue lengths along the lane of northbound MD 51 that leads to Centre Street decrease from 215 feet to 141 feet during the AM peak hour and from 320 feet to 246 feet during the PM peak hour.

TABLE 16 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT QUEEN CITY DRIVE/MECHANIC STREET/CENTRE STREET/WINSTON STREET/I-68 RAMPS
OPTIMIZED SIGNAL TIMINGS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
I-68 Eastbound Off-Ramp at Winston Street						
WB Winston Street	0.7	A	4	0.6	A	15
SB I-68 Eastbound Off-Ramp	7.8	A	95	9.5	A	117
Intersection Summary	7.4	A	--	9.3	A	--
Mechanic Street/MD 51 at Winston Street						
WB Winston Street	24.8	C	89	7.6	A	71
NB MD 51	2.0	A	61	7.4	A	80
SB Mechanic Street	2.2	A	76	8.1	A	113
Intersection Summary	5.4	A	--	7.8	A	--
Centre Street/MD 51 at Winston Street/Queen City Drive						
WB Queen City Drive	22.2	C	77	20.8	C	145
NB MD 51	2.4	A	141	4.1	A	246
Intersection Summary	4.9	A	--	7.5	A	--
Network Summary	7.8	A	--	11.0	B	--

During the peak hour observation periods, the I-68 Eastbound Off-Ramp experienced maximum queues of 6 vehicles during the AM peak hour and 8 vehicles during the PM peak hour. Additionally, there may be confusion and a potential safety issue here as these vehicles must stop for northbound lefts and southbound rights at the Mechanic Street/MD 51 at Winston Street intersection. The Manual on Uniform Traffic Control Devices (MUTCD), Section 2B.05, states, "Because the potential for conflicting commands could create driver confusion, STOP signs shall not be installed at intersections where traffic control signals are installed and operating." Installation of a signal at this intersection in place of the existing stop sign would address this issue. The signal would be coordinated with the existing signals at this intersection. By installing a signal here, vehicles would be able to travel through the intersection without stopping during the green phase, and there would be less confusion over right-of-way. The southbound right-turn movement along Mechanic Street, which currently serves 2 vehicles during the AM peak hour and 5 vehicles during the PM peak hour, would be restricted. These drivers could instead access Winston Street by turning left onto Harrison Street north of the intersection, and then turn right onto Queen City Drive and continue through the intersection to Winston Street. This scenario was modeled in SimTraffic, and results are shown in Table 17 below. Detailed SimTraffic output can be found in Appendix E. Overall network delay decreases slightly. Average delay along the I-68 Eastbound Off-Ramp decreases, although 95th percentile queue lengths along this approach increase. These queue lengths (138 feet during the AM peak hour and 180 feet during the PM peak hour) are much shorter than the length of the ramp (approximately 500 feet).

If it is desired to continue to allow vehicles from the I-68 Eastbound Off-Ramp to clear the intersection during the red phase, a green/flashing red signal could be installed for this approach. The signal here would be green when northbound MD 51 and southbound Mechanic Street have the green phase, and would be flashing red when westbound Winston Street and westbound Queen City Drive have the green phase. Such a signal would allow vehicles along this approach to travel through the intersection without stopping during the green phase, and would also allow vehicles to cross the intersection on the red phase after stopping to look for conflicting traffic.

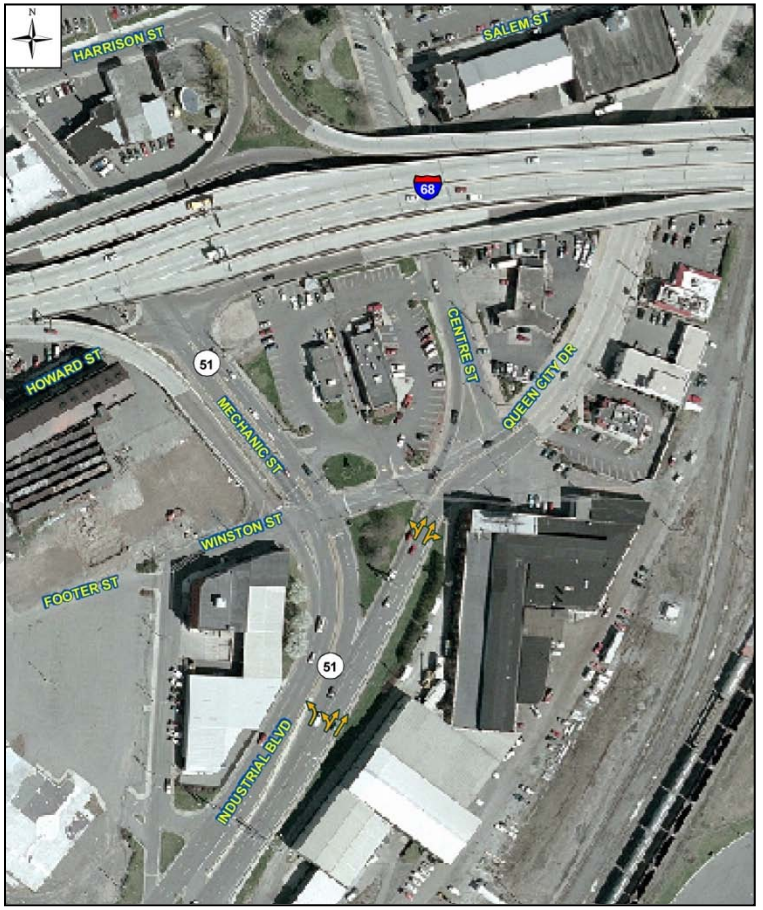
TABLE 17 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT QUEEN CITY DRIVE/MECHANIC STREET/CENTRE STREET/WINSTON STREET/I-68 RAMPS
SIGNALIZATION OF EB I-68 OFF-RAMP

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
I-68 Eastbound Off-Ramp at Winston Street						
WB Winston Street	1.4	A	12	2.9	A	10
SB I-68 Eastbound Off-Ramp	2.4	A	102	6.7	A	180
Intersection Summary	2.4	A	--	6.6	A	--
Mechanic Street/MD 51 at Winston Street						
WB Winston Street	27.3	C	50	27.7	C	138
NB MD 51	1.8	A	59	4.6	A	74
SB Mechanic Street	1.9	A	70	4.7	A	94
Intersection Summary	5.5	A	--	10.2	B	--
Centre Street/MD 51 at Winston Street/Queen City Drive						
WB Queen City Drive	22.7	C	76	25.9	C	165
NB MD 51	2.4	A	138	3.5	A	227
Intersection Summary	5.0	A	--	8.0	A	--
Network Summary	6.5	A	--	11.5	B	--

Cutting off westbound traffic at the intersection of I-68 Eastbound Off-Ramp at Winston Street and making the I-68 Eastbound Off-Ramp a free movement was also examined. Under this scenario, westbound thru vehicles wishing to access Winston Street west of the intersection would be required to turn left onto southbound MD 51 and then make an immediate right, accessing Winston Street via the access point to the south of this intersection. These vehicles would have to enter an approximately 350 foot long weave section with traffic from the I-68 Eastbound Off-Ramp. As this ramp experiences a PM peak hour volume of 537 vehicles, which would allow for few gaps, this is an unadvisable scenario.

While signal retiming helps reduce the queue lengths in the northbound lanes, further geometric improvements would improve intersection operations. Two alternatives were developed in which the northbound MD 51 lane configuration is altered. Under Alternative 1, shown in Figure 13, the left-most lane leads to Mechanic Street, the center lane leads to both Mechanic Street and Centre Street, and the right-most lane leads to both Centre Street and Queen City Drive. This would separate the traffic heading to Mechanic Street and Eastbound I-68 from traffic heading to Centre Street and Westbound I-68. Additionally, both lanes of Centre Street north of Queen City Drive would serve traffic from northbound MD 51, and right-turning vehicles from westbound Queen City Drive would be required to stop before turning onto Centre Street, thus allowing these vehicles to immediately enter their desired lane upon turning.

FIGURE 13 – ALTERNATIVE 1 LANE CONFIGURATION CHANGES



This scenario was modeled in SimTraffic. Results can be found in Table 18, and detailed SimTraffic output can be found in Appendix E. As shown, results do not differ significantly from those detailed in Table 17. During the PM peak hour, the northbound MD 51 95th percentile queue length at the Centre Street/MD 51 at Winston Street/Queen City Drive intersection decreases from 320 feet under existing conditions to 249 feet. This queue develops in the right lane as opposed to the left lane. This layout would make it easier for vehicles to safely enter northbound MD 51 from Canal Parkway, which is addressed in the next section of the report.

TABLE 18 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT QUEEN CITY DRIVE/MECHANIC STREET/CENTRE STREET/WINSTON STREET/I-68 RAMPS
SIGNALIZATION OF EB I-68 OFF-RAMP AND ALTERNATIVE 1 NB MD 51 LANE CONFIGURATION

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
I-68 Eastbound Off-Ramp at Winston Street						
WB Winston Street	1.5	A	14	1.1	A	0
SB I-68 Eastbound Off-Ramp	2.6	A	108	6.5	A	198
Intersection Summary	2.6	A	--	6.5	A	--
Mechanic Street/MD 51 at Winston Street						
WB Winston Street	26.8	C	94	22.8	C	131
NB MD 51	2.0	A	56	4.3	A	73
SB Mechanic Street	2.1	A	75	4.8	A	104
Intersection Summary	5.6	A	--	9.1	A	--
Centre Street/MD 51 at Winston Street/Queen City Drive						
WB Queen City Drive	18.2	B	76	27.3	C	167
NB MD 51	4.3	A	137	7.0	A	249
Intersection Summary	6.0	A	--	11.0	B	--
Network Summary	6.7	A	--	12.2	B	--

A second alternative involves changing the northbound lane configurations so that the left lane leads to Mechanic Street and I-68 Eastbound, the center lane would lead to Centre Street and I-68 Westbound, and the right lane would lead to Queen City Drive, as shown in Figure 14. This scenario was modeled in SimTraffic. Results can be found in Table 19 and detailed SimTraffic output can be found in Appendix E. As shown, this configuration provides slightly improved operations compared to the first alternative configuration.

FIGURE 14 – ALTERNATIVE 2
LANE CONFIGURATION CHANGES

TABLE 19 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT QUEEN CITY DRIVE/MECHANIC STREET/CENTRE STREET/WINSTON STREET/I-68 RAMPS
SIGNALIZATION OF EB I-68 OFF-RAMP AND ALTERNATIVE 2 NB MD 51 LANE CONFIGURATION

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
I-68 Eastbound Off-Ramp at Winston Street						
WB Winston Street	1.5	A	14	1.3	A	4
SB I-68 Eastbound Off-Ramp	2.6	A	109	7.0	A	197
Intersection Summary	2.6	A	--	6.9	A	--
Mechanic Street/MD 51 at Winston Street						
WB Winston Street	26.3	C	93	19.0	B	128
NB MD 51	2.0	A	48	4.8	A	66
SB Mechanic Street	2.0	A	50	5.1	A	104
Intersection Summary	5.5	A	--	8.4	A	--
Centre Street/MD 51 at Winston Street/Queen City Drive						
WB Queen City Drive	18.2	B	66	33.6	C	180
NB MD 51	3.8	A	179	4.3	A	246
Intersection Summary	5.6	A	--	10.2	B	--
Network Summary	6.6	A	--	11.7	B	--

c. Recommendation

As a short term solution, implement the proposed signal timing revisions. As a long term solution, implement Alternative 2, which includes changes to the northbound lane configurations, as well as signalization of the Eastbound I-68 off-ramp. Install new overhead signs to direct traffic into the correct lane. Similar lane configuration alternatives have been explored by SHA. These improvements should be coordinated with any planned SHA projects.

5. MD 51 at Lamont Street

a. Problem

The intersection of MD 51 at Lamont Street is an unsignalized intersection with stop control along the Lamont Street approach and the parking lot/Thomas Street approach. Thomas Street is a lightly-travelled roadway adjacent to a parking lot that intersects with MD 51 across from Lamont Street. Northbound MD 51 consists of a left turn lane, two thru lanes, and a channelized right-turn lane with a deceleration lane. Southbound MD 51 consists of a left turn lane, a thru lane, and a shared thru/right-turn lane. Westbound Lamont Street has a shared left-turn/thru lane and a channelized free right-turn lane with a 500-foot acceleration lane. Eastbound Thomas Street consists of a single-lane approach. The layout of the intersection is shown in Figure 15.

FIGURE 15 – MD 51 AT LAMONT STREET

As expressed at the stakeholder meeting, safety is a concern for vehicles turning from Lamont Street and Thomas Street onto MD 51 due to the high vehicle speeds along MD 51 and lack of adequate sight distance. Sight distance for drivers making a left turn from Lamont Street is 370 feet. Figure 16 shows the restricted sight distance here. Sight distance for drivers making a left turn from Thomas Street is 5.55 feet. According to Exhibit 9-55 of the AASHTO Green Book, the minimum required sight distance for vehicles making a left turn from a stop-controlled approach with a design street of 50 mph along the intersecting roadway is 425 feet. The Lamont Street approach does not meet this requirement. According to the Green Book, if a divided-highway median is wide enough to store the design vehicle with a clearance to the through lanes of approximately 3 feet at both ends of the vehicle, no separate analysis for the departure sight triangle for left turns is needed on the minor-road approach for the near roadway to the left. Vehicles looking to make a thru movement or left turn from the Lamont Street and Thomas Street approaches have to wait for sufficient gaps in traffic along both directions of MD 51 in order to enter the intersection because the median is narrow, and vehicles are therefore unable to cross one direction of MD 51 and then dwell in the median while waiting for an acceptable gap in traffic in the other direction of MD 51. MD 51 has 11-foot-wide left-turn lanes along both directions, with a 7-foot-wide median. This 18-foot-wide area is too narrow an area for vehicles turning from Lamont Street or Thomas Street to safely dwell while waiting for an adequate gap in traffic.

FIGURE 16 – SIGHT DISTANCE RESTRICTION FROM LAMONT STREET

Between January 2006 and December 2008, there were 40 reported crashes at this intersection, including 14 T-type collisions and 14 rear end collisions. Table 20 below provides a summary of crash data at this intersection.

TABLE 20 – CRASH DATA SUMMARY
MD 51 AT LAMONT STREET

Crashes	2006	2007	2008	2006-2008	
				Total	Percent
Severity					
Fatal	0	0	0	0	0%
Injury	3	3	3	9	22%
Property Damage	9	13	9	31	78%
Total	**12**	**16**	**12**	**40**	**100%**
Type					
Sideswipe	3	0	2	5	12%
T-Type	5	4	5	14	35%
Rear End	3	8	3	14	35%
Single Vehicle	1	4	2	7	18%
Case					
Darkness	1	5	2	8	20%
Wet Surface	3	2	1	6	15%
Alcohol Related	0	1	1	2	5%

A radar speed study was conducted along both directions of MD 51 near Lamont Street during off-peak hours on Wednesday, October 21, 2009, in order to assess "free-flow" travel speeds, that is, the speed at which motorists are most comfortable traveling when not impacted by congestion. Results are summarized in Table 21, and detailed speed data can be found in Appendix E. As indicated, during "free-flow" off-peak traffic hours, motorists are traveling at 85th percentile speeds of 51 mph northbound and 46 mph southbound, both above the posted speed limit of 45 mph.

TABLE 21 – SPEED DATA SUMMARY
MD 51 AT LAMONT STREET

Criteria	MD 51	
	NB	SB
Posted Speed Limit	45 mph	45 mph
85th Percentile Speed	**51 mph**	**46 mph**
% Exceeding Speed Limit	56%	19%
10 mph Pace	42 – 51 mph	37 – 46 mph
Mean Speed	46.3 mph	42.5 mph

SimTraffic analyses were performed during the AM peak hour of 7:15 to 8:15 AM and the PM peak hour of 3:30 to 4:30 PM. Table 22 summarizes the results of SimTraffic analysis. Detailed SimTraffic output can be found in Appendix E. As shown, the intersection currently operates at LOS A during both peak hours.

TABLE 22 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT LAMONT STREET – EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Thomas Street*	0.0	A	0	20.2	C	33
WB Lamont Street	1.6	A	28	2.6	A	38
NB MD 51	0.9	A	6	1.4	A	9
SB MD 51	1.4	A	65	2.9	A	111
Intersection Summary	1.3	A	--	2.4	A	--

*Zero vehicles traveled along the EB Thomas Street approach during the AM peak hour.

b. Proposed Solutions

Widening the median would allow left-turning vehicles along Lamont Street and Thomas Street to safely dwell in the median while waiting for acceptable gaps in traffic. The 12-foot-wide deceleration lane from northbound MD 51 to eastbound Lamont Street and the 12-foot-wide acceleration lane from westbound Lamont Street to northbound MD 51 would be removed, and the two northbound MD 51 lanes would be shifted 12 feet to the east to provide for a 30-foot-wide median. The northbound right-turn lane would be removed, and one of the northbound thru lanes would be converted to a shared thru/right-turn lane. Northbound right-turn channelization would remain. There are currently 42 northbound right turns during the AM peak hour and 23 northbound right turns during the PM peak hour. The westbound channelized right-turn lane would remain, but would be yield-controlled due to the removal of the acceleration lane. SimTraffic analysis was performed under these conditions, and is summarized in Table 23. Detailed SimTraffic output can be found in Appendix E. As shown, the proposed geometry will offer similar peak hour conditions to the existing geometry.

TABLE 23 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT LAMONT STREET – PROPOSED CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
EB Thomas Street	0.0	A	0	15.0	B	28
WB Lamont Street	2.0	A	32	2.9	A	33
NB MD 51	0.6	A	6	0.8	A	7
SB MD 51	1.6	A	69	2.7	A	103
Intersection Summary	1.3	A	--	2.2	A	--

Unfortunately, this layout would likely result in additional sight distance issues, and is therefore not recommended. Alternative proposals restricting access are preferred. These proposals include the restriction of left turns and thrus from westbound Lamont Street onto southbound MD 51 and the restriction of left turns from southbound MD 51 to Lamont Street. Vehicles from Lamont Street wishing to access MD 51 to the south may do so by following the local roadway network to Virginia Avenue, which reaches MD 51 via a signalized intersection. Vehicles traveling southbound along MD 51 wishing to access Lamont Street may do so by traveling past Lamont Street and making a u-turn approximately 1,400 feet to the south at the intersection of MD 51 at 2nd Street, then turning right onto Lamont Street. 6 AM/7 PM vehicles make a westbound left turn, and 0 AM/2 PM vehicles make a westbound thru movement. 219 AM/325 PM vehicles make a westbound left turn.

c. Recommendation

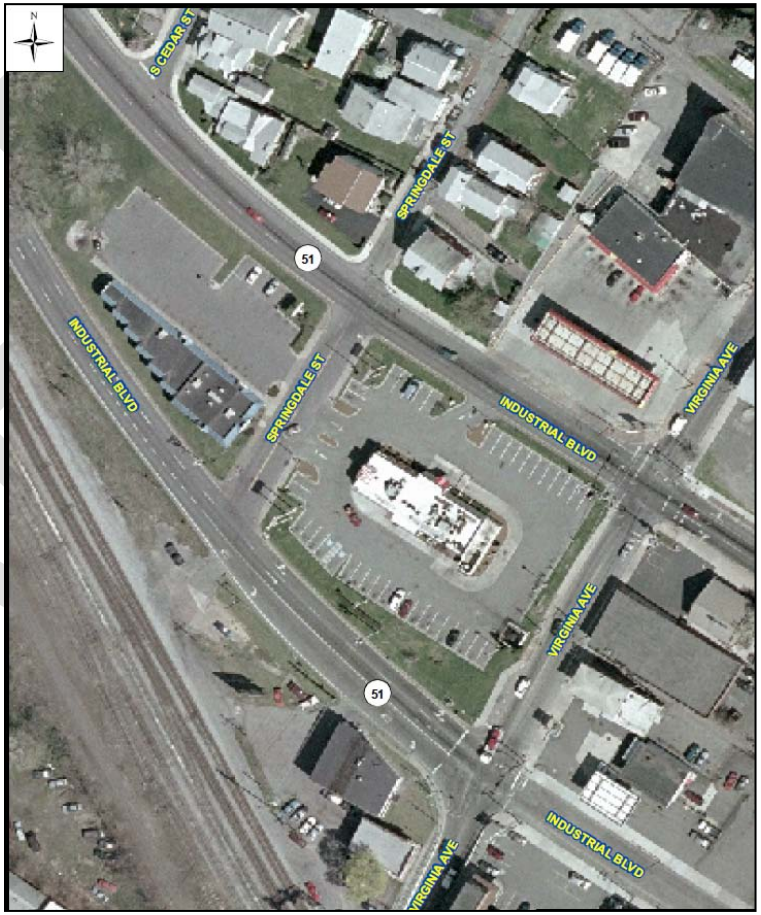
Restrict thrus and left turns from Lamont Street, and restrict left turns from southbound MD 51. Install signing directing southbound vehicles to make a u-turn at 2nd Street and then turn right onto Lamont Street. In addition, signing could be installed directing drivers to use 1st Street to access southbound MD 51. Since this section of MD 51 is owned by SHA, improvement options should be coordinated with SHA.

6. MD 51 at Virginia Avenue

a. Problem

MD 51 is a one-way pair in the vicinity of Virginia Avenue. The eastbound and westbound lanes of MD 51 are set approximately 200 feet apart, with houses and businesses between the two sets of lanes. Westbound MD 51 consists of a shared left-turn/thru lane, a thru lane, and an approximately 250-foot-long shared thru/right-turn lane. The center lane and right-most lane of westbound MD 51 merge approximately 1,150 feet downstream of the intersection. Eastbound MD 51 consists of a shared left-turn/thru lane, a thru lane, and a right-turn lane. Northbound Virginia Avenue consists of a single-lane approach at eastbound MD 51, and has a separate 85-foot-long left-turn bay at its approach to westbound MD 51. Southbound Virginia Avenue consists of a single-lane approach at westbound MD 51 and has a separate 50-foot-long left-turn bay at its approach to eastbound MD 51. The layout of MD 51 at Virginia Avenue is shown in Figure 17.

FIGURE 17 – MD 51 AT VIRGINIA AVENUE



Between January 2006 and December 2008, there were 17 reported crashes at this intersection, all of which resulted in property damage only. Table 24 below provides a summary of crash data at this intersection.

TABLE 24 – CRASH DATA SUMMARY
MD 51 AT VIRGINIA AVENUE

Crashes	2006	2007	2008	2006-2008	
				Total	Percent
Severity					
Fatal	0	0	0	0	0%
Injury	0	0	0	0	0%
Property Damage	8	8	1	17	100%
Total	**8**	**8**	**1**	**17**	**100%**
Type					
Sideswipe	2	2	0	4	24%
T-Type	4	1	0	5	29%
Rear End	2	3	0	5	29%
Single Vehicle	0	1	0	1	6%
Angle	0	1	0	1	6%
Bicycle	0	0	1	1	6%
Case					
Darkness	2	2	0	4	24%
Wet Surface	1	0	0	1	6%
Alcohol Related	1	0	0	1	6%

MD 51 at Virginia Avenue consists of two signalized intersections that operate as one signal system. Eastbound and westbound thru traffic run concurrently with a leading westbound left-turn/thru phase. Northbound and southbound traffic run on split phasing, with the southbound phase preceding the northbound phase. There is an eight-second clearance phase for southbound Virginia Avenue at eastbound MD 51 that occurs after the eastbound/westbound MD 51 phase and before the eastbound Virginia Avenue phase. The signal is semi-actuated with camera-actuation along the Virginia Avenue approaches. This network experiences long delay times and heavy queues. The network was analyzed using SimTraffic software. A summary of existing operations is shown in Table 25, and detailed SimTraffic output can be found in Appendix E. As shown, the signal system operates at LOS C during the AM peak hour and LOS D during the PM peak hour. The approach with the greatest delay is the southbound Virginia Avenue approach to westbound MD 51, which operates under LOS D during the AM peak hour and LOS E during the PM peak hour.

Queuing was measured along the northbound Virginia Avenue approach to eastbound MD 51 during the PM peak hour on Tuesday, March 2, 2010. The longest observed queue consisted of 28 vehicles. The second-longest queue consisted of 22 vehicles, which is approximately the same as the 95th percentile queue determined in SimTraffic. Most queues were between 11 and 17 vehicles. Each vehicle cleared the intersection on green during 19 of the 20 queues that occurred during this peak hour. The one queue that did not clear contained 22 vehicles, 2 of which did not clear the intersection on green. One of these vehicles was able to turn right on red.

Additionally, there is a tight turning radius for vehicles turning right from eastbound MD 51 onto Virginia Avenue. While the northbound Virginia Avenue stop bar is set back from the intersection in order to provide space for eastbound trucks to turn right, conflicts occur when a northbound right-turning vehicle stops beyond the stop bar. These vehicles do so to look for an adequate gap in eastbound traffic before turning right on red. When a northbound vehicle stops beyond the stop bar, the eastbound right-turning truck must wait for the northbound vehicle to turn while the northbound vehicle waits for an acceptable gap in eastbound thru traffic.

TABLE 25 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT VIRGINIA AVENUE – EXISTING CONDITIONS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
WB MD 51 at Virginia Avenue						
WB MD 51	23.0	C	138	34.1	C	268
NB Virginia Avenue	16.7	B	50	16.0	B	69
SB Virginia Avenue	54.0	D	109	66.3	E	145
Intersection Summary	24.0	C	--	32.3	C	--
EB MD 51 at Virginia Avenue						
EB MD 51	30.7	C	192	38.5	D	281
NB Virginia Avenue	41.7	D	397	49.5	D	524
SB Virginia Avenue	14.6	B	110	20.0	C	194
Intersection Summary	32.6	C	--	38.6	D	--
Network Summary	36.7	D	--	47.6	D	--

b. Proposed Solutions

One proposal to improve the intersection involves altering the lane configuration along westbound MD 51 to provide for a separate left-turn lane. Under this configuration, the left-most lane of westbound MD 51 would be converted to a dedicated left-turn lane, and the other two lanes would serve as thru lanes. Under the existing geometry, several thru vehicles travel in the left-most lane along with left-turning vehicles. When the left-turning vehicles queue back from the eastbound MD 51 at Virginia Avenue signal, as shown in Figure 18, the thru vehicles get trapped in this lane, and are often unable to change lanes due to the lack of adequate gaps in traffic in the center lane. By converting the left-most lane to a dedicated left-turn lane, thru vehicles would only travel in dedicated thru lanes and would avoid getting trapped behind left-turning vehicles. Currently, the three westbound lanes merge to two lanes approximately 1,150 feet downstream. If the left-most lane is converted to a dedicated left-turn lane, then westbound MD 51 would consist of two lanes west of Virginia Avenue, and there would be no downstream merge.

FIGURE 18 – QUEUES ALONG VIRGINIA AVENUE BLOCK WESTBOUND MD 51 LEFT TURNS

Table 26 provides a summary of peak hour operations with the conversion of the left-most lane of westbound MD 51 to a dedicated left-turn lane. Detailed SimTraffic output can be found in Appendix E. As shown, the intersections would operate at slightly improved conditions during the PM peak hour compared to existing conditions. The 95th percentile queue for westbound traffic during the PM peak hour would decrease from 268 feet to 242 feet.

TABLE 26 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT VIRGINIA AVENUE – CONVERSION OF LEFT LANE OF WESTBOUND MD 51 TO LEFT TURNS ONLY

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
WB MD 51 at Virginia Avenue						
WB MD 51	23.3	C	165	31.9	C	242
NB Virginia Avenue	17.1	B	49	16.8	B	71
SB Virginia Avenue	54.5	D	106	65.7	E	145
Intersection Summary	24.2	C	--	31.0	C	--
EB MD 51 at Virginia Avenue						
EB MD 51	29.7	C	188	38.7	D	287
NB Virginia Avenue	43.1	D	401	48.7	D	522
SB Virginia Avenue	12.1	B	95	15.3	B	163
Intersection Summary	32.3	C	--	37.5	D	--
Signal Network Summary	36.6	D	--	46.1	D	--

Two other issues were also examined. Restricting northbound right turns on red would eliminate the possibility of northbound right-turning vehicles blocking eastbound trucks from turning right, although this would increase average delay and queues along the northbound approach. Currently, 208 vehicles make a northbound right turn during the AM peak hour. 201 vehicles make this movement during the PM peak hour.

The other issue involves signal phasing. Currently, there is an eight-second clearance phase for southbound Virginia Avenue at eastbound MD 51, which occurs after the eastbound/westbound MD 51 phase and before the southbound Virginia Avenue phase. This phase allows vehicles that have made a westbound left turn onto Virginia Avenue to clear eastbound MD 51 before the vehicles along southbound Virginia Avenue start. Overall, this results in the southbound phases having unused green time at the expense of green time for other phases. As there are only 42 AM/65 PM southbound thru vehicles, it is advisable to combine the clearance phase with the southbound Virginia Avenue phase, which would provide a higher percentage of green time for the phases with greater traffic volumes. The cycle length would be reduced from 180 seconds to 160 seconds during both peak hours. Table 27 summarizes

operations with all improvements implemented. Detailed SimTraffic output can be found in Appendix E. As shown, during both peak hours, implementing these improvements will decrease delay at the intersection over the scenario of conversion of the left-most lane of westbound MD 51 to a dedicated left-turn lane.

TABLE 27 – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT VIRGINIA AVENUE – WITH ALL PROPOSED IMPROVEMENTS

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
WB MD 51 at Virginia Avenue						
WB MD 51	20.3	C	155	27.5	C	223
NB Virginia Avenue	15.0	B	50	15.1	B	65
SB Virginia Avenue	51.4	D	105	61.7	E	128
Intersection Summary	21.4	C	--	27.3	C	--
EB MD 51 at Virginia Avenue						
EB MD 51	26.2	C	168	33.7	C	256
NB Virginia Avenue	40.6	D	355	48.0	D	470
SB Virginia Avenue	13.5	B	96	16.8	B	152
Intersection Summary	29.9	C	--	35.2	D	--
Signal Network Summary	33.5	C	--	42.3	D	--

Finally, the installation of a "Michigan left" was investigated. In a Michigan left, some or all left-turn movements are prohibited, and vehicles wishing to make this movement must instead turn around at a distance away from the intersection. Under this proposal, the westbound lane of Virginia Avenue would be closed between the eastbound and westbound lanes of MD 51. Westbound left turns would continue west along MD 51, make a u-turn at a turnaround lane onto eastbound MD 51, and finally turn right onto Virginia Avenue. Southbound thrus and left turns from Virginia Avenue would have to turn right onto westbound Virginia Avenue, use the turnaround lane to reach eastbound MD 51, and finally travel through the intersection of Eastbound MD 51 at Virginia Avenue. Under this layout, the westbound left-turn phase would be eliminated, and northbound and southbound traffic could operate concurrently, allowing the signal to operate on two-phase operations, and reducing the cycle length from 180 seconds to 60 seconds.

There are two proposed locations for the turnaround lane. Option A involves using the existing Springdale Street as a turnaround lane. Under this option, construction of a traffic signal at the intersection of Eastbound MD 51 at Springdale Street would be required as sight distance here may not be adequate for trucks wishing to turn from Springdale Street onto MD 51. Option B involves constructing a new turnaround lane further west. Figures 19A and 19B display the proposed layouts of the two options. Tables 28A and 28B summarize operations under this layout, and detailed SimTraffic output can be found in Appendix E.

FIGURE 19A – MD 51 AT VIRGINIA AVENUE
MICHIGAN LEFT OPTION A

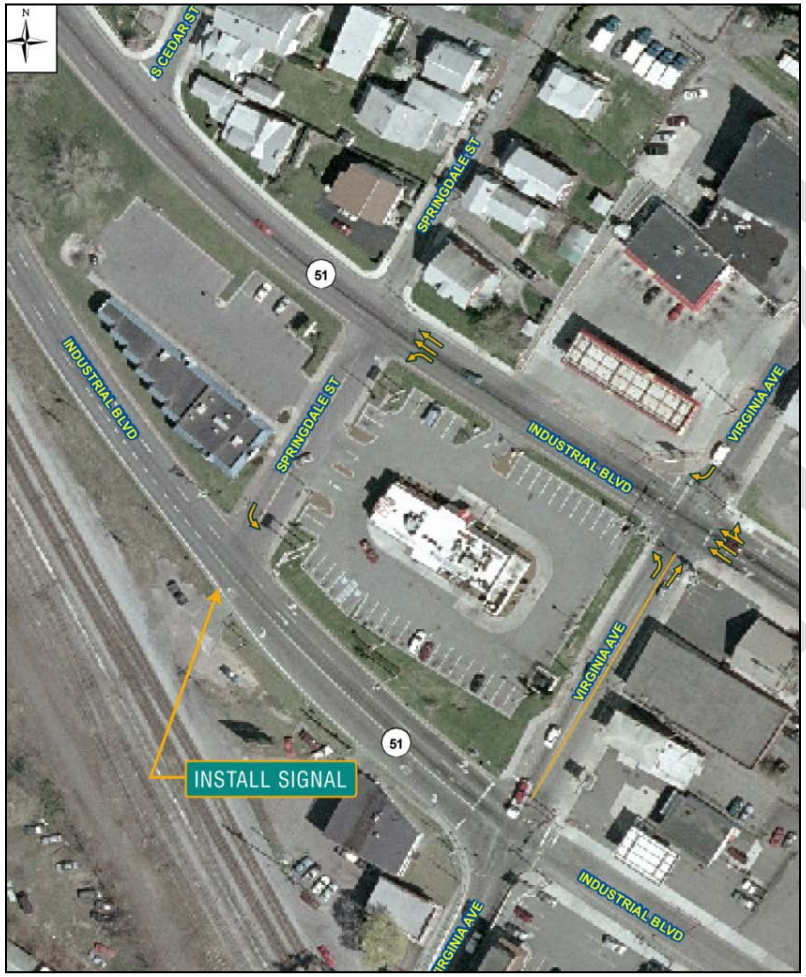


FIGURE 19B – MD 51 AT VIRGINIA AVENUE
MICHIGAN LEFT OPTION B

TABLE 28A – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT VIRGINIA AVENUE –MICHIGAN LEFT OPTION A

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
WB MD 51 at Virginia Avenue						
WB MD 51	13.1	B	114	14.6	B	139
NB Virginia Avenue	4.9	A	60	5.7	A	59
SB Virginia Avenue	2.1	A	42	3.4	A	52
Intersection Summary	10.5	B	--	11.6	B	--
EB MD 51 at Virginia Avenue						
EB MD 51	7.1	A	98	7.6	A	116
NB Virginia Avenue	13.2	B	199	14.0	B	201
Intersection Summary	9.4	A	--	9.7	A	--
EB MD 51 at Springdale Street						
EB MD 51	2.9	A	73	4.6	A	89
SB Springdale Street	21.5	C	144	16.6	B	176
Intersection Summary	7.3	A	--	8.1	A	--
Network Summary	16.8	B	--	19.0	B	--

TABLE 28B – SIMTRAFFIC ANALYSIS SUMMARY
MD 51 AT VIRGINIA AVENUE –MICHIGAN LEFT OPTION B

Approach	AM Peak Hour			PM Peak Hour		
	Delay (s)	LOS	95th % Queue (ft)	Delay (s)	LOS	95th % Queue (ft)
WB MD 51 at Virginia Avenue						
WB MD 51	13.0	B	106	15.1	B	138
NB Virginia Avenue	4.6	A	55	5.1	A	58
SB Virginia Avenue	2.0	A	40	3.0	A	51
Intersection Summary	10.3	B	--	11.8	B	--
EB MD 51 at Virginia Avenue						
EB MD 51	8.1	A	108	8.1	A	118
NB Virginia Avenue	10.4	B	170	12.6	B	205
Intersection Summary	9.0	A	--	9.6	A	--
EB MD 51 at Turnaround Lane						
EB MD 51	0.2	A	4	0.2	A	0
SB Turnaround Lane	6.0	A	89	9.6	A	129
Intersection Summary	1.6	A	--	3.2	A	--
Network Summary	14.0	B	--	16.8	B	--

As shown, under both options, delay and queue lengths decrease substantially during both peak hours compared to existing conditions. LOS improves from C to B during the AM peak hour and from D to B during the PM peak hour.

c. Recommendation

Install either of the Michigan Left proposals.

7. McMullen Bridge

a. Problem

The McMullen Bridge is located just north of downtown Cumberland and serves traffic along eastbound Frederick Street and westbound Bedford Street. It crosses over Henderson Avenue, Queen City Drive, and the railroad tracks. A map of the access points to/from the east side of the bridge is shown in Figure 20. The westbound lanes of the bridge are not heavily traveled, due in part to the fact that the bridge is accessed by one-way streets including Bedford Street, Independence Street, and Polk Street. Drivers traveling along Henderson Avenue wishing to access the westbound lanes of the bridge may do so by turning onto eastbound Polk Street, turning left onto Columbia Avenue and then turning right immediately onto eastbound Polk Street, then turning right onto southbound Independence Street, which terminates at the McMullen Bridge.

FIGURE 20 –MCMULLEN BRIDGE AND NEARBY ROADWAYS

b. Proposed Solution/Recommendation

There is no signing in this area directing drivers to make these movements. Install signing along Henderson Avenue, Polk Street, Columbia Avenue, and Independence Avenue to direct traffic onto this bridge. This could send more vehicles to this bridge as opposed to other access points to downtown, including the intersections of Front Street at Baltimore Street and Baltimore Street at Queen City Drive.

E. Vehicle Weaving Conflict

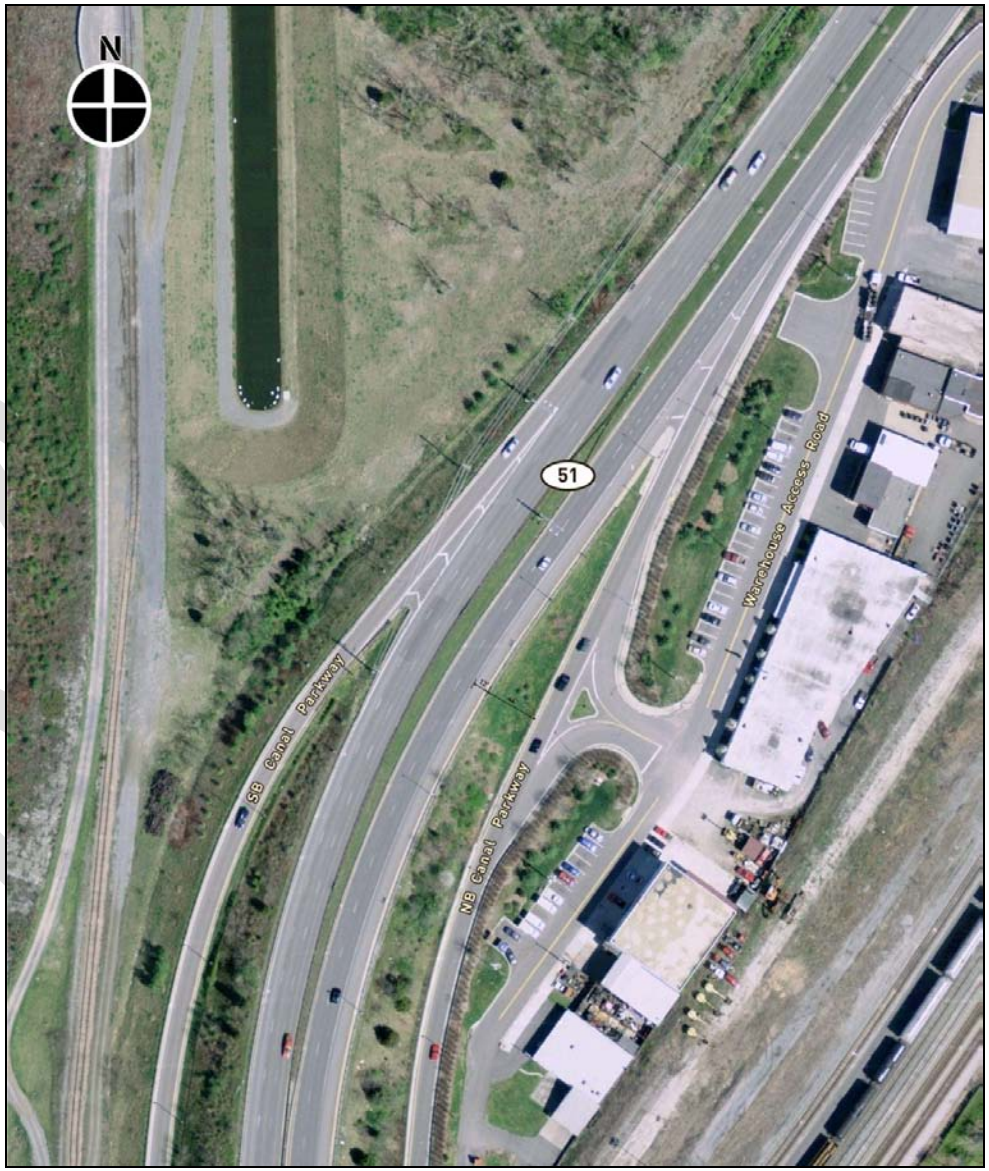
1. MD 51 Northbound at Canal Parkway Northbound Weave

a. Problem

The section of northbound MD 51 (Industrial Boulevard) between the ramp from northbound Canal Parkway and the signalized intersection of MD 51 with Queen City Drive, Mechanic Street, Centre Street, Winston Street, and the I-68 Ramps currently operates as a weave section. The weave area of northbound MD 51 and the ramp from northbound Canal Parkway is shown in Figure 21. Northbound MD 51 consists of three lanes in this area. At the south end of this section, there are two lanes along MD 51, and the third lane is added on the right from northbound Canal Parkway. At the north end of this section, the left lane leads to northbound Centre Street, northbound Mechanic Street, and the I-68 Ramps, with an option to turn left onto Winston Street. The center and right lanes lead to eastbound Queen City Drive.

Vehicles traveling from northbound Canal Parkway must perform two lane changes in an approximately 650-foot-long segment to enter the lane of northbound MD 51 that leads to Centre Street, Mechanic Street, and the I-68 Ramps. Due to the relatively low traffic volumes, conflicts here are infrequent. AM and PM peak hour observations were conducted on October 22, 2009. During the AM peak hour, there were three instances in which vehicles from Canal Parkway wishing to merge into the left-most lane of MD 51 had to slow down in order to merge into that lane. During the PM peak hour,

FIGURE 21 – NORTHBOUND MD 51 WEAVE SECTION



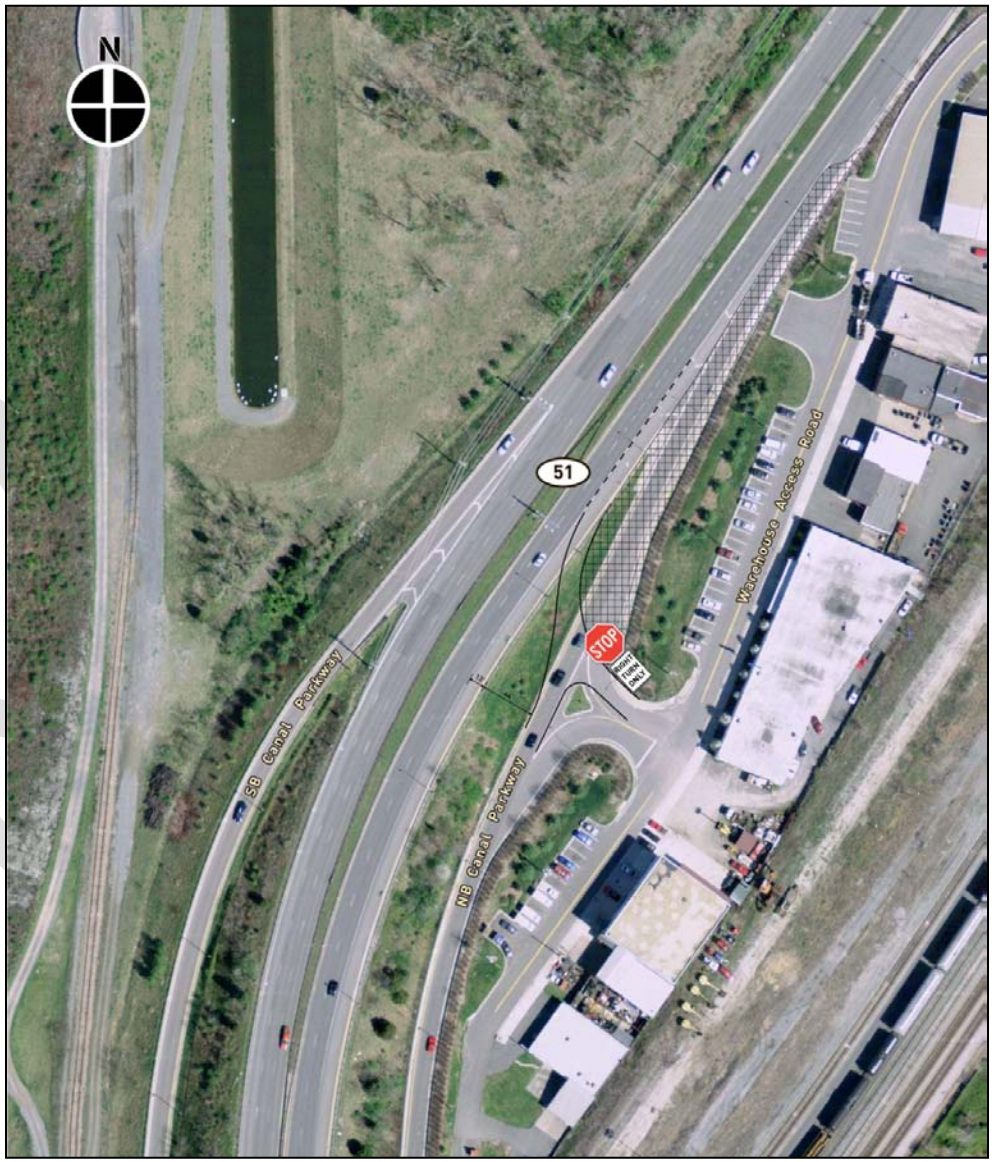
there was one instance of a conflict caused by a long queue in the left lane at the intersection of MD 51 at Queen City Drive, Mechanic Street, Centre Street, Winston Street, and the I-68 Ramps. In this instance, a vehicle entering MD 51 from Canal Parkway waited in the Canal Parkway ramp while waiting for the queue in the left lane to clear, causing a queue to form in the Canal Parkway ramp.

b. Potential Solutions

To minimize weaving, it is proposed that Canal Parkway merge with MD 51 prior to the beginning of the third lane, as shown in Figure 22. Canal Parkway would merge with MD 51, and the third lane would open downstream. This would allow Canal Parkway traffic to merge with MD 51 traffic prior to when MD 51 traffic would attempt to enter the right-most lane. The right-out access would be replaced with a stop-controlled access point for vehicles along the warehouse access road wishing to access MD 51 in this area. This scenario may not be feasible due to the grade separation between MD 51 and Canal Parkway.

Another way to address the weaving issue is to change the lane configurations of MD 51 downstream at the intersection of MD 51 at Queen City Drive/Mechanic Street/Centre Street/Winston Street/I-68 Ramps, as described in the previous section of this report. Under both Alternative 1 and Alternative 2, most drivers would be required to make fewer lane changes, and the queue lengths will be shorter, allowing a greater distance in which drivers may enter their desired lane.

FIGURE 22 – PROPOSED IMPROVEMENTS TO NORTHBOUND MD 51 WEAVE SECTION



c. Recommendation

Make no changes to the existing geometry at this location. The improvements at the intersection of MD 51 at Queen City Drive/Mechanic Street/Centre Street/Winston Street/I-68 Ramps will result in less weaving as well as a longer area in which vehicles can change lanes.

IV. Project Action Plan

A summary of the recommended improvements is provided in the Project Action Plan in Table 29 below.

Table 29. Project Action Plan

Issue #	Location	Description
Signing and Marking Improvements		
B	Citywide	Begin phased program of modernizing street name signs; begin discussion with SHA about developing a coordinated tourism signing program;
C.2	Mechanic Street at Queen City Drive (north side)	Install signs along Mechanic Street restricting all trucks over ¾ ton, except local deliveries, beyond Queen City Drive; repaint the southbound Mechanic Street approach to remove the separate left-turn lane; relocate the westbound lane of Queen City Drive to the north.
D.2	Baltimore Street at Canal Street	Consult with local business owners about restricting westbound left turns and requiring drivers to access Canal Street from the south, which would require installation of signs showing the left turn restriction.
C.3/D.3	Baltimore Street/Washington Street at Cumberland Street/Greene Street	As a short term solution, install skipped double yellow striping at the intersection between the Baltimore Street and Greene Street approaches and install a STOP sign along the Greene Street approach with a sign stating "EXCEPT RIGHT TURN". To discourage trucks from driving on Washington Street, add the regulatory message "NO TRUCKS" below the guide message on westbound Baltimore Street and install a standard I-68 sign assembly on the same approach.
D.7	McMullen Bridge	Install signing along Henderson Avenue, Polk Street, Columbia Avenue, and Independence Avenue to direct traffic onto the bridge.
Signalization Improvements		
A	Citywide	Conduct detailed study of the cost of modernizing and retiming traffic signals Citywide. Acquire funding for phased implementation of the modernization plan.

Issue #	Location	Description
D.1	Baltimore Street at Mechanic Street	Remove the pedestrian phase and allow pedestrians to cross the roadway during vehicular phases; investigate coordination of this signal with the nearby signals at the intersections of Mechanic Street at Bedford Street and Mechanic Street at Harrison Street.
D.4	MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps	As a short term solution, implement the proposed signal timing revisions.
Geometric Improvements		
D.3	Baltimore Street/Washington Street at Cumberland Street/Greene Street	As a long term solution, examine the feasibility of a roundabout.
D.4	MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps	As a long term solution, implement Alternative 2, which includes changes to the northbound lane configurations, as well as signalization of the Eastbound I-68 off-ramp. Install new overhead signs to direct traffic into the correct lane.
D.5	MD 51 at Lamont Street	Restrict thrus and left turns from Lamont Street, and restrict left turns from southbound MD 51. Install signing directing southbound vehicles to make a u-turn at 2nd Street and then turn right onto Lamont Street.
D.6	MD 51 at Virginia Avenue	Install either of the Michigan Left proposals.
Improvements from Related Issues		
D.2	Baltimore Street at Canal Street	The signal timing improvements at the nearby intersection of Baltimore Street at Mechanic Street will improve operations at this intersection.
E.1	MD 51 NB at Canal Parkway NB Weave	Implementation of the solutions at the intersection of MD 51 at Queen City Drive/ Mechanic Street/Centre Street/ Winston Street/I-68 Ramps will improve operations in this area.

Appendices

Appendix A:
Meeting Minutes

WHITMAN, REQUARDT AND ASSOCIATES, LLP
801 South Caroline Street
Baltimore, Maryland 21231

Engineers, Architects and Planners
Phone: (410) 235-3450
Fax: (410) 243-5716

MEMORANDUM OF MEETING

Date: October 16, 2009
Revised November 16, 2009 (revisions shown in blue italics)

Date of Meeting: September 8, 2009

Time: 2:00 PM

Location: Public Safety Building
20 Bedford Street
Room 336

Project: Cumberland Traffic Circulation and Signing Study Stakeholders Group Meeting
WR&A WO #31722-001

Attendees:

Terri Bennett	City of Cumberland	terribennett@allconet.org
John Chapman	City of Cumberland	jchapman@allconet.org
John DiFonzo	City of Cumberland	jdifonzo@allconet.org
Bill Gray	UPS	dingo_11600@verizon.net
William Herbaugh	City of Cumberland	wherbaugh@allconet.org
Harold Hipsley	City of Cumberland	hhipsley@allconet.org
Einer Johnson	Citizen	N/A
Albert Kenner	Citizen	x5e2general@albertkeener.com
Greg Leake	Cumberland Police	gmleake@allconet.org
Kathy McKenney	City of Cumberland	kmckenney@allconet.org
Ed Miller	MDOT	emiller2@mdot.state.md.us
Stephen Bucy	SHA (for George Small)	SBucy@sha.state.md.us
Keith Skidmore	Citizen	kws32268@verizon.net
Jim Stafford	Allegany County Transit	jstafford@allconet.org
Kim Twigg	City of Cumberland	kimtwigg@allconet.org
Dave Umling	City of Cumberland	dumling@allconet.org
Jay Walbert	Allegany County	jay.walbert@acps.k12.md.us
Siera Wigfield	Allegany County	Siera.Wigfield@allconet.org
Tom Hannan	WR&A	thannan@wrallp.com
Jeremy Mocny	WR&A	jmocny@wrallp.com

Invitees Not in Attendance:

Brooke Cassell	City of Cumberland	bcassell@allconet.org
Roy Cool	Allegany County	rcool@allconet.org
Charles Hinnant	City of Cumberland	chinnant@allconet.org
Mike Nixon	MDOT	mnixon@mdot.state.md.us
Jeff Repp	City of Cumberland	jrepp@allconet.org
Jeff Rhodes	City of Cumberland	jrhodes@allconet.org
Boyce Rogers	City of Cumberland	brogers@allconet.org
Brenda Smith	City of Cumberland	brendasmith@allconet.org

Prepared by: Tom Hannan, WR&A

WHITMAN, REQUARDT AND ASSOCIATES, LLP
801 South Caroline Street
Baltimore, Maryland 21231

Engineers, Architects and Planners
Phone: (410) 235-3450
Fax: (410) 243-5716

MEMORANDUM OF MEETING

- Tom Hannan gave an introduction of the project to the Stakeholders. John DiFonzo approached WR&A to do a transportation study using County funds. In summary, WR&A had previously worked with John DiFonzo on the Ridgely, WV truck signing project. WR&A was brought on board due to the success of that project coupled with the need to address other issues in the City. John DiFonzo thanked the group for their participation.

- The role of stakeholders is to help the project team (City and WR&A) identify problems in the City and to help prioritize solutions. The stakeholders can provide local knowledge and advise the project team on potential improvement alternatives. Stakeholder input during the process will also give study recommendations more weight when funding decisions are being considered.

    - There are several components to the study, outlined below. John emphasized that some projects may have expensive solutions; however, the goal would be to focus on low cost solutions.

        - Truck Routing/Signing – major component. City is broken up by water, rail, roads; not well defined as a grid network; out of towners/tourists need guide signing.

        - Geometric Features Inventory/Assessment – roadway geometry, curb radii, etc.

        - Traffic Operations Assessment

            - Device inventory (signals, signs, markings)

            - Crash data review – no major problems in City compared to statewide averages; stakeholders may be aware of unreported property damage crashes, which do not show up in SHA's records.

    - Data collection efforts will include conducting one week field study, outlined below. The project was scoped as a moderately budgeted project, which did not allow for a more exhaustive and expensive origin and destination study. WR&A will make use of City conducted traffic counts wherever possible.

        - Signing inventory

        - Tourist survey

        - Train station license plate survey – where are people coming from/to

        - Trucking industry survey of trucking industry reps – has been done in other areas; good information provided about problems/uses along their routes.

- Jeremy Mocny began the brainstorming discussion by reviewing several issues that John emailed to WR&A at the beginning of the study. The issues are listed below generally in the order of the discussion. ***See attached for original list of issues.***

    - Lt. Leake – Truck drivers continue to get lost along the truck detour route on west side of town***, which is in place due to a restricted vertical clearance railroad overpass on Greene Strett. The Allegany***

Street leg along the truck detour route is a problem. In addition, there have been complaints of trucks getting lost and stuck on Washington Street. Based on field observations prior to the meeting, signs are missing along the Greene Street truck detour. Need: "← Truck Route" on northbound Allegany Street followed by "End Detour" sign on westbound Greene Street. Harold Hipsley agreed to follow-up on this. ***WR&A will investigate the truck detour route as part of the study.***

- Baltimore and Mechanic – people push button and then cross on "Don't Walk" phase; signal changes and no pedestrians present, causing unnecessary delay; "Barnes Dance" operation. WR&A recommend adding standard pedestrian instructional sign.

- Allegany and Greene – "Barnes Dance" with Police Officer near elementary school

- Harold Hipsley – Coal trucks – 6 to 12 round trips per day; 1-15 trucks per day; origin is Berlin.

- Einer Johnson – Trucks could use Queen City Drive, but intersection of Queen City Drive and Mechanic can not be negotiated. Buses can negotiate the turn. Dave Umling mentioned that bike study looked at geometry.

- Lt. Leake – ***At times during the lunch hour trucks may occupy an entire block in the downtown area.***

- Terri Bennett – Truck noise a problem for downtown businesses

- Harold Hipsley – Both Queen City Drive/Mechanic and Queen City Drive/Centre turns to MD 51 South have geometry problems for tractor trailers.

- Problem intersection of Queen City Drive and I-68 EB exit (Exit No. 43C). There are sight distance restrictions at the intersection ***due to the location of a bridge pier***, as well as at the Citgo and Roy Rogers. ***I-68 was constructed first, and that when Queen City Drive was constructed the geometry of the roadway had to work with the existing bridge pier locations, resulting in the sight restrictions observed today.*** Queen City Drive is City-owned; MD 51 is state-owned. ~~***Stephen Bucy (SHA District 6 Traffic Representative for George Small) mentioned that SHA has done studies of this intersection.***~~

- Another problem intersection is MD 51 (Industrial Boulevard) and Virginia Avenue. Southbound right turns from MD 51 have difficulty making turns when northbound Virginia Avenue vehicles pull beyond the stop line; potentially prohibiting right-turns on red. SHA-maintained signal with long cycle length is a problem today. ***Stephen Bucy (SHA District 6 Traffic Representative for George Small) mentioned that SHA has done studies of this intersection,*** and implemented improvements over the years.

- Lt. Leake mentioned that Virginia Avenue is the only access point from Canal Parkway, which can lead to westbound left turn problems due to short spacing between signals.

- Field work should be accelerated to avoid temporary one-way pattern from September 2009 to 2010; resurfacing/curb/sidewalk; Lamont Street to Boulevard. ~~***Steve Bucy mentioned that patterns could change with the new hospital, Steve will provide TIS.***~~ The one-way operation is being evaluated by the City as a permanent change.

- ***Stephen Bucy mentioned that travel patterns on the East Side of town could change with the opening of the new hospital; Stephen will provide TIS.***

- Harrison/Mechanic Street: westbound Harrison to southbound Mechanic, trucks can not make left turn.

- Einer Johnson – All signals operate isolated; he recommends linking Bedford, Baltimore, Harrison, Mechanic together and adding fire house pre-emption; no Opticom today. Interconnect cable is present in the handboxes, but there is not enough slack to connect the intersections; all intersections currently operate on fixed time operation, other problems: power outage creates problems; no detectors.

- Several issues were raised regarding the Canal Street and Baltimore Street intersection:

  - The first issue was a traffic operations issue related to stacking across this intersection from the west leg of the Baltimore/Mechanic Street intersection. One recommendation was to prohibit westbound Baltimore Street left turns onto southbound Canal Street. Another complaint voiced is that news trucks take up a lot of space in this block. ~~*In addition to the current operational issues, future traffic problems could be added by a new Fairfield Inn planned for this area, with up to two restaurants proposed.*~~

  - The second issue dealt with the Great Allegheny Passage Trail crossing of Baltimore Street, which is located just west of the intersection with Canal Street. Einer Johnson mentioned that bikers don't understand the crossing operation and the intent of the warning lights. Terri Bennett mentioned that trail organization is working on signing that will instruct peds/bicyclists to use the flashing lights. John DiFonzo mentioned that a bike detector there may not be working; it was put in by Allegany County. Lt. Leake mentioned planned educational sessions to include distributing pamphlets about crossings. For now, the trail crossing will not be studied further as part of this study.

- ~~*On southbound Mechanic Street, left turns are prohibited at Pershing and Harrison. Potential solution: convert Mechanic Street to one-way northbound.*~~

- *Comment was made about the difficulty of trucks making left turns at the Mechanic Street at Pershing Street and Harrison Street intersections. One solution proposed for this section was to convert it to one-way southbound.*

- Lt. Leake – Lamont Street at MD 51 (Industrial Boulevard) intersection has high velocity crash problems due to poor sight distance. Left turns from westbound Lamont to southbound MD 51 have to cross three lanes of northbound traffic to enter median opening.

- Question: Will the study address pedestrians/bicyclists issues? John DiFonzo will have WR&A coordinate with on-going bike trail and downtown studies and will coordinate traffic signing efforts. This study will primarily focus on truck/general routing, not tourism/ped/bike.

- Question: How will planning for US 220 upgrade to connect to Corridor H be integrated into this study? Dave Umling responded that alignments have not been set. John DiFonzo reiterated that consideration of Corridor H will not be part of this study.

- Harold Hipsley – Handicap parking permit holders have overwhelmed the use of on-street parking spaces.

- Albert Keener – It is easier to *make right turns from side street/entrances to go* south on Queen City Drive than *it is to make left turns from side street/entrances to go* north. This may be related to signal timing preferences. WR&A will investigate this issue further to determine the issues and possible options to recommend for improvement.

- Trucking related issues and comments included:

- Ed Miller – Cumberland would be the fourth town to study truck routing. Baltimore recently completed a study; New York has a very detailed truck routing map on their website. Use of the "jake brake" can not be prohibited; however, signs stating "Modified Exhaust Systems Prohibited" is an option.
- John DiFonzo – Deliveries to many businesses are now made by large trucks due to the 'on-time delivery' approach to shipping.
- Bill Gray – Local trucking companies to contact: Pitt-Ohio, UPS Freight. Two companies have truck-specific GPS units: Cobra, Hendricks; providing them with truck route mapping would be a good way of reducing truck traffic on local streets.
- William Herbaugh and Kim Twigg – Northbound Canal Parkway "on-ramp" at MD 51 (Industrial Boulevard) – have weaving problems. ***In addition to the current operational issues, future traffic problems could be added by a new Fairfield Inn planned for this area, with up to two restaurants proposed.***

o Teri Bennett – Maryland/Virginia/Oldtown intersection has an issue with trucks turning onto Virginia; vehicles can't make left turn onto Maryland from Virginia per Albert Keener.

- Next meeting: December ~~***8th***~~ ***9th***, which is the same day as the Allegany County Transportation Adv. Committee (Police, Maintenance, and Emergency personnel). ***Invitations will be sent out prior to the meeting with time and location.***

Any participant wishing to amend the minutes is requested to notify the writer within seven (7) days.

Enclosures

John DiFonzo's Issues List:

From: John DiFonzo [JDiFonzo@allconet.org]
Sent: Monday, August 10, 2009 12:47 PM
To: Hannan, Thomas
Cc: Mocny, Jeremy; Hershman, Evan; Umling, David
Subject: RE: Cumberland
Attachments: Controllers maintained by the City modified.doc; Historic Sign 7-86-T.tif; PBQ&D 2002 Mech Balt.tif; RBA draft1987.tif; RBA techMemo.tif

Tom,
This reminded me that I have not sent you some information I came across. It is not as big as I though, so I am just attaching it to this email.
In addition to that I wanted to mention a few others areas that I would like to see addressed in the study. They are as follows:

1. There are CSX Bridges with restricted weight limits on Cumberland Street, Fayette Street and Washington Street.
2. That same track goes over Greene Street and it has a clearance of only 12' 10". Trucks are detoured onto a "Truck Route" which goes over the tracks (Allegany Street, Beall Street, and S. Lee Street) and the signing (or lack of good signing) may contribute to trucks getting onto streets they don't belong on.
3. Washington Street is a residential street in the historic area of town, and we have received complaints about trucks that appear to be lost traveling on Washington Street. It may be possible that No. 2 contributes to this problem, but I am not sure.
4. I have received a complaint about the need for a pedestrian light at S. Mechanic Street and Harrison Street, because of the number of cars that park near the train station or under I 68 and then walk to their jobs in the morning and afternoon. (I understand this one may be out of the scope, but I thought I would mention it anyway.)
5. We have received a request for a sign indicating that trucks are not allowed on Decatur Street, because they turn from Baltimore Avenue then can make the turn onto Fredrick Street at Decatur Street. The only problem I see with this request is that the intersection of Decatur Street and Frederick Street is like just about every intersection in Cumberland.
6. Signs on the McMullen Bridge facing Fredrick Street at Centre Street direct travelers to Route 220 North, but Rte. 40 and Rte. 220 were directed to and made part of I 68 years ago.
7. We have some screwy lane markings on Greene Street east of Allegany Street in an attempt to allow a left turn lane onto Allegany Street from Greene Street. The same kind of left hand turn lane exists on Park Street at the Post Office. I think we know the answer, but it would be good to have a recommendation. I think we will need to eliminate a few parking spaces in both cases, and trying to keep this is what appears to be causing the problems.
8. One of the primary complaints that we received and may have been the start of the need for this study is the coal truck traffic that sometimes uses Mechanic Street to connect to Route 51. AES, a power plant in Mexico Farms gets most of its coal from I-68 to Industrial Blvd. (Rt. 51) however we understand that some of the trucks come from Rte. 36. The shortest route from Rt. 36 to Rt. 51 S is Mechanic Street.
9. A lot of truck traffic uses Virginia Avenue and that means they have to go under the CSX tracks near the CSX Yard. The road was lowered so that trucks no longer get stuck in the "sub-way" but the turns are a little hard to make for trucks. Don't think this one can be solved, but …..
10. Our Historic Signs are old and faded and need to be replaced.
11. The Downtown area does have some new informational signs, but even they need to be painted.

I am sure there are other places but wanted to make sure these received at least a good look during this study.
Thanks,
John

WHITMAN, REQUARDT AND ASSOCIATES, LLP
801 South Caroline Street
Baltimore, Maryland 21231

Engineers, Architects and Planners
Phone: (410) 235-3450
Fax: (410) 243-5716

MEMORANDUM OF MEETING

Date: March 15, 2010

Date of Meeting: March 8, 2010

Time: 10:00 AM

Location: Cumberland, MD

Project: Cumberland Traffic Study
WR&A W.O.: 31722-001

Attendees:

John DiFonzo	City of Cumberland	jdifonzo@allconet.org
John Chapman	City of Cumberland	jchapman@allconet.org
David Umling	City of Cumberland	dumling@allconet.org
Kim Root	City of Cumberland	kimtwigg@allconet.org
Harold Hipsley	City of Cumberland	hhipsley@allconet.org
Greg Leake	Cumberland Police	gmleake@allconet.org
Einer Johnson	Citizen	N/A
Stephen Bucy	SHA	SBucy@sha.state.md.us
Siera Wigfield	Allegany County	Siera.Wigfield@allconet.org
Tom Hannan	WR&A	thannan@wrallp.com
Jeremy Mocny	WR&A	jmocny@wrallp.com
Evan Hershman	WR&A	ehershman@wrallp.com

The purpose of this meeting was to discuss WR&A's preliminary findings and recommendations. The following issues were discussed:

- Issue #1: Trucks on Mechanic Street in Downtown
  - Options for detouring trucks around downtown were presented, Option B – the Queen City Drive route is the recommended option. Existing travel times through downtown need to be shown for comparison.
  - Left turn for trucks from WB Winston Street to SB Industrial Boulevard is problematic and may render the Mechanic Street to Industrial Boulevard truck detour impractical.
  - Trucks destined for I-68 need to be considered. WR&A will conduct a license plate study along Mechanic Street to determine what percent of trucks are destined for I-68 (left turns at Harrison Street) versus Industrial Boulevard.
  - The Downtown Development Committee has been one of the driving forces for getting trucks off Mechanic Street. Their primary concerns are that trucks block intersections and rut the street. This should be sufficient rationale for diverting trucks onto the alternative route. Once the license plate study is complete a meeting will be scheduled

with the MD Motor Trucking Association and coal trucking companies in Pennsylvania to discuss the detour option(s).

- Einer is working on a solution for the flashing operation at the Baltimore/Queen City intersection; when the track preemption circuit is triggered, it will place the signal in flashing operation. WR&A will assess the effect of train preemption on the Mechanic Street to Queen City Drive truck diversion route

- Issue #2:
  - An option was presented that restriped the southbound Mechanic Street approach to the intersection to provided only one shared left-thru lane to allow all vehicles to pass under the center of the restricted vertical clearance railroad arch, and removed parking on the westbound Queen City Drive approach to shift the travel lane north. The restriping on Mechanic Street may provide parking opportunities to offset the parking lost on Queen City Drive.
  - Continuous parking on east side of Mechanic Street approaching Queen City Drive is not feasible due to the presence of private driveways along this side of the roadway. WR&A will assess how many spaces can be created and whether the number of spaces lost on Queen City Drive by shifting the travel lane can be offset by adding parking on Mechanic Street.
- Issue #3: Baltimore Street at Mechanic Street
  - The Baltimore Street detector is out of service
  - Einer provided the timing data; no timing sheet exists.
  - The signals along Mechanic Street are not coordinated and the interconnect system is incomplete or non-existent; time-based coordination suing GPS units is a possibility that WR&A will explore. WR&A will also assess the potential coordination patterns with and without the exclusive ped phase.
  - WR&A will develop several conceptual signal improvement options, with estimated costs for each. Since the City would use bond funds to fund the improvements, accessible pedestrian signals (APS) will not be required. The City wants the cost of making the complete set of improvements, not partial improvements.
  - Trucks often do not extend green interval when they move too slowly from the stop line, creating more congestion for all traffic.
  - A previous study showed level of service can be improved with a roundabout, but not with a signal.
- Issue #4: Baltimore Street at Canal Street
  - Einer suggested making Canal Street one-way northbound to address the problem of westbound backups that disrupt the intersection of Baltimore/Mechanic. Vehicles destined for the Times-News could use Harrison Street to get there, but would have to travel on private property for part of the trip. In lieu of creating a one-way street, Jeremy suggested prohibiting left turns from Baltimore Street. John Chapman thought that this turn prohibition may be difficult to sign and enforce.
  - The parking lot with entry gate on the north side of Baltimore Street could also be a source of backups.
  - In the study of Baltimore/Mechanic signal improvement options, WR&A will assess the feasibility of adding near side indications at the railroad tracks and/or queue detection in

the block east of the tracks to reduce blockages of the Canal Street intersection that contribute to the westbound queuing problems.

- Issue #5: Baltimore Street at Washington Street/Cumberland Street/Greene Street
  - Check MUTCD for 3-way stop-controlled intersections; develop plan with options.
  - City has a contract or is on board to repave street.
  - IfCumberland Street were to operate one-way northbound (one option proposed), trucks may not be able to negotiate turns at Algonquin, and ambulances may not be able to make turns.
- Issue #6: MD 51 at Queen City Drive/Mechanic Street/Centre Street/Winston Street/I-68 Ramps
  - Most accidents may be ice-related.
  - Install "STOP ahead" sign on ramp?
  - SHA is forcing restaurant to do traffic study.
  - No detection for MD 51 and Mechanic Street approaches; operation as fully-actuated signal would reduce queuing.
  - Increasing green time from 34 seconds would reduce queuing.
  - Centre Street at Queen City Drive is currently operating under 4-way stop control.
- There may be latent demand to use Mechanic Street – need to account for growth by a percentage.
- Issue #7: SHA has signing ideas that coupled with improvements at MD 51 at Queen City Drive/Mechanic Street/Centre Street/Winston Street/I-68 Ramps may alleviate this issue.
- Issue #8: MD 51 at Lamont Street
  - Accidents are severe due to high speed along MD 51.
  - Consider relocating southbound left turn to a u-turn.
  - This issue will be left for SHA to resolve since MD 51 is SHA owned.
- Issue #9: MD 51 at Virginia Avenue
  - Improvement options were studied for this intersection, including implementing "Michigan Lefts". The resulting re-directed left turns include: truck turns are problematic on Springdale Street – short storage, possible sight distance problem, on-street parking.
  - Quebec Avenue at Industrial Boulevard has a Michigan Left.
  - Is 2nd Street/Cedar Street possible alternatives to Springdale Street?
- Issue #10: McMullen Bridge – signed as "TO US 220"; re-sign as Bedford Street. The truck turning issue reported at Frederick and Decatur Streets will be added to this issue.
- Results to be posted on the internet.

The above is a memorandum of understanding between the parties regarding the topics discussed and the decisions reached. Any participants desiring to add to, or otherwise amend the minutes, are requested to put their comments in writing to the writer within seven (7) days; otherwise, the minutes will stand as written.

Click to enter SENDER'S NAME

Enclosures

cc: Click to enter CC

Appendix B:
Traffic Count Data

Whitman, Requardt & Associates, LLP

Location: Cumberland, Maryalnd
Intersection: Mechanic St/Queen City Dr
Date: Wednesday, December 16, 2009
Counter: BB

File Name : 04 Mechanic Street at Queen City Drive
Site Code : 04
Start Date : 12/16/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Mechanic St From North					Queen City Dr From East					Mechanic St From South					Parking Lot 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	Exclu. Total	Inclu. Total	Int. Total
06:00 AM	0	22	2	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	24	25
06:15 AM	0	51	6	0	57	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	58	58
06:30 AM	0	65	7	0	72	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	72	73
06:45 AM	0	56	15	0	71	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	72	72
Total	0	194	30	0	224	0	0	2	0	2	0	0	0	0	0	0	0	0	2	0	2	226	228
07:00 AM	0	54	15	0	69	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	71	71
07:15 AM	0	76	24	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	100	101
07:30 AM	0	91	23	0	114	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	115	115
07:45 AM	1	102	37	0	140	0	2	4	0	6	0	0	0	0	0	0	0	0	0	0	0	146	146
Total	1	323	99	0	423	0	2	7	0	9	0	0	0	0	0	0	0	0	1	0	1	432	433
08:00 AM	1	83	23	0	107	0	2	4	0	6	0	0	0	0	0	1	0	0	0	1	0	114	114
08:15 AM	0	121	28	0	149	0	1	6	0	7	0	0	0	0	0	0	1	0	0	1	0	157	157
08:30 AM	3	89	35	0	127	0	0	7	1	7	0	0	0	0	0	2	0	0	0	2	1	136	137
08:45 AM	0	96	20	0	116	0	2	10	0	12	0	0	0	0	0	0	0	0	0	0	0	128	128
Total	4	389	106	0	499	0	5	27	1	32	0	0	0	0	0	3	1	0	0	4	1	535	536
09:00 AM	0	86	28	0	114	0	2	6	0	8	0	0	0	0	0	0	1	0	1	1	1	123	124
09:15 AM	4	49	19	0	72	0	0	9	0	9	0	0	0	0	0	0	1	0	0	1	0	82	82
09:30 AM	1	80	20	0	101	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	105	105
09:45 AM	1	79	23	0	103	0	3	13	0	16	0	0	0	0	0	0	1	0	0	1	0	120	120
Total	6	294	90	0	390	0	5	32	0	37	0	0	0	0	0	0	3	0	1	3	1	430	431
10:00 AM	0	71	29	0	100	0	1	10	0	11	0	0	0	0	0	1	0	0	0	1	0	112	112
10:15 AM	2	90	30	0	122	0	2	14	0	16	0	0	0	0	0	2	1	0	0	3	0	141	141
10:30 AM	1	83	19	0	103	0	0	6	0	6	0	0	0	0	0	1	1	0	1	2	1	111	112
10:45 AM	2	103	15	0	120	0	2	15	2	17	0	0	0	0	0	1	0	0	0	1	2	138	140
Total	5	347	93	0	445	0	5	45	2	50	0	0	0	0	0	5	2	0	1	7	3	502	505
11:00 AM	0	106	27	0	133	0	2	10	0	12	0	0	0	0	0	1	1	0	0	2	0	147	147
11:15 AM	0	111	23	0	134	0	1	12	2	13	0	0	0	0	0	2	1	0	1	3	3	150	153
11:30 AM	0	114	38	0	152	0	1	11	1	12	0	0	0	0	0	0	3	0	0	3	1	167	168
11:45 AM	0	112	35	0	147	0	2	15	0	17	0	0	0	0	0	1	1	0	0	2	0	166	166
Total	0	443	123	0	566	0	6	48	3	54	0	0	0	0	0	4	6	0	1	10	4	630	634
12:00 PM	0	85	27	0	112	0	2	13	0	15	0	0	0	0	0	1	0	0	0	1	0	128	128
12:15 PM	3	103	24	0	130	0	0	13	0	13	0	0	0	0	0	2	1	0	0	3	0	146	146
12:30 PM	3	94	31	0	128	0	0	6	0	6	0	0	0	0	0	0	1	0	0	1	0	135	135
12:45 PM	0	119	26	0	145	0	2	8	0	10	0	0	0	0	0	3	0	0	0	3	0	158	158
Total	6	401	108	0	515	0	4	40	0	44	0	0	0	0	0	6	2	0	0	8	0	567	567

Whitman, Requardt & Associates, LLP

Location: Cumberland, Maryalnd
Intersection: Mechanic St/Queen City Dr
Date: Wednesday, December 16, 2009
Counter: BB

File Name : 04 Mechanic Street at Queen City Drive
Site Code : 04
Start Date : 12/16/2009
Page No : 2

Groups Printed- Cars - Heavy Vehicles

	Mechanic St From North					Queen City Dr From East					Mechanic St From South					Parking Lot 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	Exclu. Total	Inclu. Total	Int. Total
01:00 PM	0	109	32	1	141	0	0	16	3	16	0	0	0	0	0	0	1	0	0	1	4	158	162
01:15 PM	1	106	32	0	139	0	2	9	0	11	0	0	0	0	0	0	1	0	0	1	0	151	151
01:30 PM	2	128	30	1	160	0	1	11	0	12	0	0	0	0	0	0	0	0	0	0	1	172	173
01:45 PM	5	121	30	0	156	0	0	17	0	17	1	0	0	0	1	0	0	0	0	0	0	174	174
Total	8	464	124	2	596	0	3	53	3	56	1	0	0	0	1	0	2	0	0	2	5	655	660
02:00 PM	0	101	19	0	120	0	0	10	0	10	0	0	0	0	0	1	0	0	1	1	1	131	132
02:15 PM	1	97	28	0	126	0	1	12	0	13	0	0	0	0	0	0	1	0	0	1	0	140	140
02:30 PM	0	116	35	1	151	0	0	16	1	16	0	0	0	0	0	1	1	0	3	2	5	169	174
02:45 PM	0	105	33	0	138	0	1	14	0	15	0	0	0	0	0	0	0	0	0	0	0	153	153
Total	1	419	115	1	535	0	2	52	1	54	0	0	0	0	0	2	2	0	4	4	6	593	599
03:00 PM	1	126	32	0	159	0	1	9	2	10	0	0	0	0	0	2	0	0	1	2	3	171	174
03:15 PM	2	118	24	0	144	0	0	11	1	11	0	0	0	0	0	2	0	0	0	2	1	157	158
03:30 PM	1	127	28	0	156	0	0	10	3	10	0	0	0	0	0	0	1	0	0	1	3	167	170
03:45 PM	1	114	36	0	151	0	1	6	2	7	0	0	0	0	0	1	2	0	0	3	2	161	163
Total	5	485	120	0	610	0	2	36	8	38	0	0	0	0	0	5	3	0	1	8	9	656	665
04:00 PM	0	104	36	0	140	0	1	19	1	20	0	0	0	0	0	0	3	0	2	3	3	163	166
04:15 PM	0	95	22	0	117	0	0	13	0	13	0	0	0	0	0	0	0	0	0	0	0	130	130
04:30 PM	0	103	26	0	129	0	2	11	1	13	0	0	0	0	0	2	0	0	0	2	1	144	145
04:45 PM	0	105	25	0	130	0	1	9	0	10	0	0	0	0	0	0	1	0	0	1	0	141	141
Total	0	407	109	0	516	0	4	52	2	56	0	0	0	0	0	2	4	0	2	6	4	578	582
05:00 PM	0	130	29	0	159	1	2	11	1	14	0	0	0	0	0	3	2	0	0	5	1	178	179
05:15 PM	0	118	19	1	137	0	0	9	0	9	0	0	0	0	0	1	0	0	1	1	2	147	149
05:30 PM	0	79	13	0	92	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	97	97
05:45 PM	1	91	15	0	107	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	112	112
Total	1	418	76	1	495	1	2	30	1	33	0	0	0	0	0	4	2	0	1	6	3	534	537
06:00 PM	0	83	17	0	100	0	0	9	0	9	0	0	0	0	0	0	0	0	1	0	1	109	110
06:15 PM	0	80	18	0	98	0	0	7	0	7	0	0	0	0	0	0	0	0	3	0	3	105	108
06:30 PM	0	54	19	0	73	0	0	8	0	8	0	0	0	0	0	0	1	0	2	1	2	82	84
06:45 PM	0	66	11	0	77	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	0	81	81
Total	0	283	65	0	348	0	1	27	0	28	0	0	0	0	0	0	1	0	6	1	6	377	383
Grand Total	37	4867	1258	4	6162	1	41	451	21	493	1	0	0	0	1	31	28	0	20	59	45	6715	6760
Apprch %	0.6	79	20.4			0.2	8.3	91.5			100	0	0			52.5	47.5	0					
Total %	0.6	72.5	18.7		91.8	0	0.6	6.7		7.3	0	0	0		0	0.5	0.4	0		0.9	0.7	99.3	
Cars	37	4775	1248		6064	1	41	447		510	1	0	0		1	31	28	0		79	0	0	6654
% Cars	100	98.1	99.2	100	98.3	100	100	99.1	100	99.2	100	0	0	0	100	100	100	0	100	100	0	0	98.4
Heavy Vehicles	0	92	10		102	0	0	4		4	0	0	0		0	0	0	0		0	0	0	106
% Heavy Vehicles	0	1.9	0.8	0	1.7	0	0	0.9	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	1.6

Whitman, Requardt & Associates, LLP

Location: Cumberland, Maryalnd
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File Name : 04 Mechanic Street at Queen City Drive
Site Code : 04
Start Date : 12/16/2009
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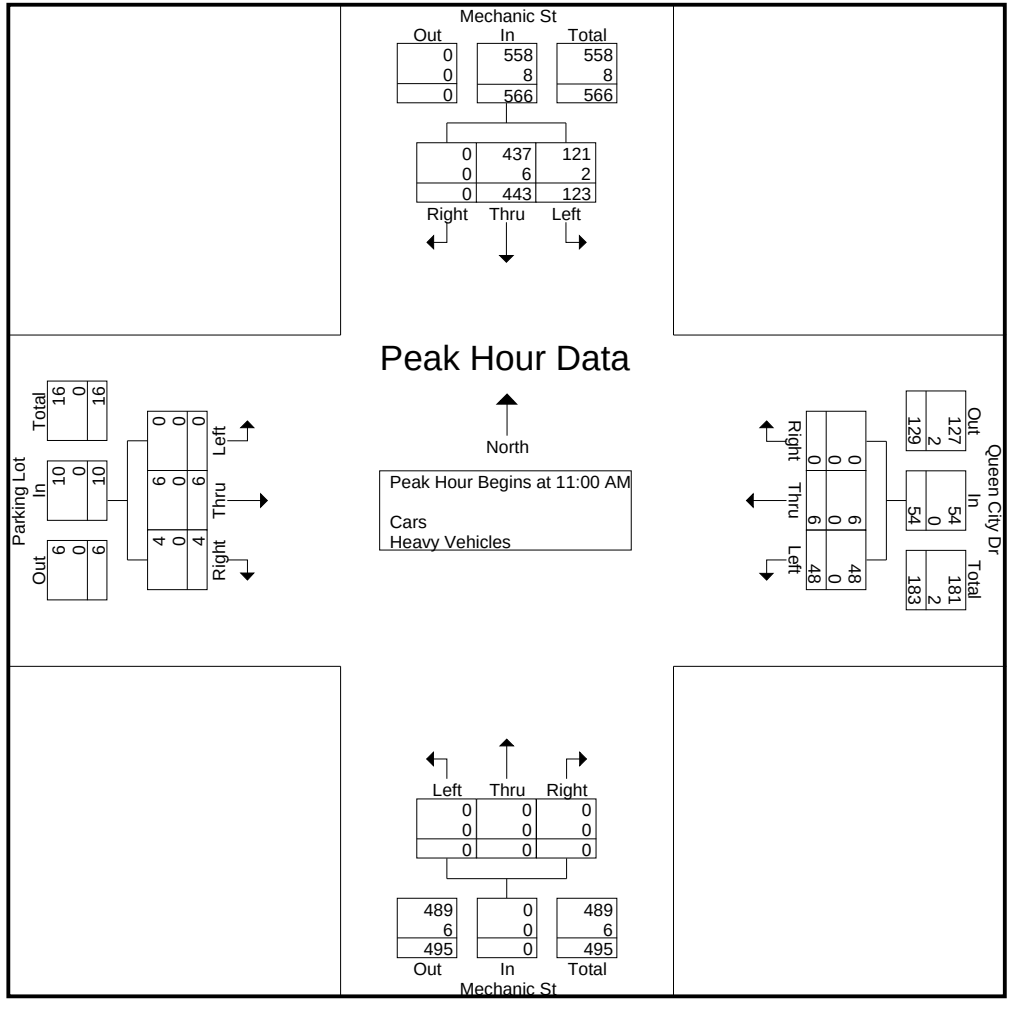
	Mechanic St From North				Queen City Dr From East				Mechanic St From South				Parking Lot From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	106	27	133	0	**2**	10	12	0	0	0	0	1	1	0	2	147
11:15 AM	0	111	23	134	0	1	12	13	0	0	0	0	**2**	1	0	**3**	150
11:30 AM	0	**114**	**38**	**152**	0	1	11	12	0	0	0	0	0	**3**	0	3	**167**
11:45 AM	0	112	35	147	0	2	**15**	**17**	0	0	0	0	1	1	0	2	166
Total Volume	0	443	123	566	0	6	48	54	0	0	0	0	4	6	0	10	630
% App. Total	0	78.3	21.7		0	11.1	88.9		0	0	0		40	60	0		
PHF	.000	.971	.809	.931	.000	.750	.800	.794	.000	.000	.000	.000	.500	.500	.000	.833	.943
Cars	0	437	121	558	0	6	48	54	0	0	0	0	4	6	0	10	622
% Cars	0	98.6	98.4	98.6	0	100	100	100	0	0	0	0	100	100	0	100	98.7
Heavy Vehicles	0	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	8
% Heavy Vehicles	0	1.4	1.6	1.4	0	0	0	0	0	0	0	0	0	0	0	0	1.3

Whitman, Requardt & Associates, LLP

Location: Cumberland, Maryalnd
Intersection: Mechanic St/Queen City Dr
Date: Wednesday, December 16, 2009
Counter: BB

File Name : 04 Mechanic Street at Queen City Drive
Site Code : 04
Start Date : 12/16/2009
Page No : 4



Whitman, Requardt & Associates, LLP

Location: Cumberland, Maryalnd
Intersection: Mechanic St/Queen City Dr
Date: Wednesday, December 16, 2009
Counter: BB

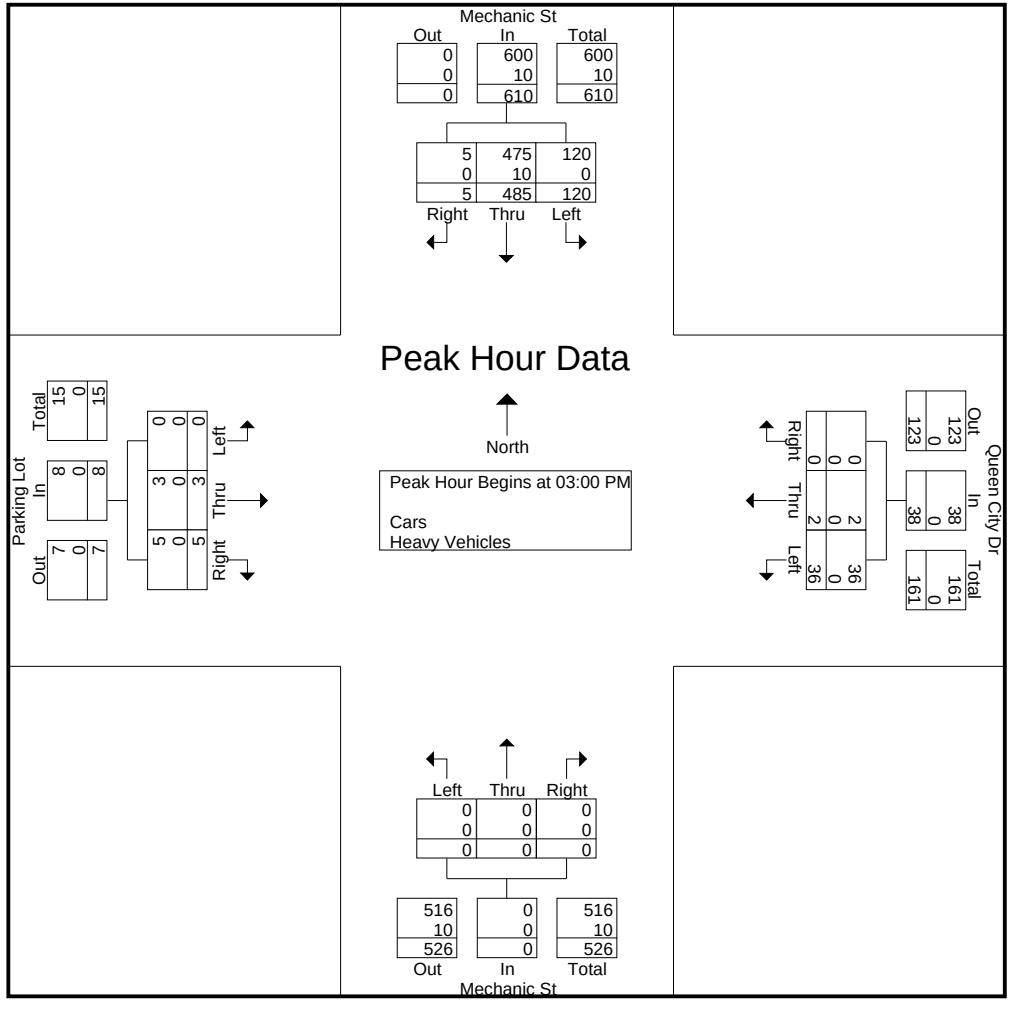
File Name : 04 Mechanic Street at Queen City Drive
Site Code : 04
Start Date : 12/16/2009
Page No : 5

	Mechanic St From North				Queen City Dr From East				Mechanic St From South				Parking Lot From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	1	126	32	**159**	0	**1**	9	10	0	0	0	0	**2**	0	0	2	**171**
03:15 PM	**2**	118	24	144	0	0	**11**	**11**	0	0	0	0	2	0	0	2	157
03:30 PM	1	**127**	28	156	0	0	10	10	0	0	0	0	0	1	0	1	167
03:45 PM	1	114	**36**	151	0	1	6	7	0	0	0	0	1	**2**	0	**3**	161
Total Volume	5	485	120	610	0	2	36	38	0	0	0	0	5	3	0	8	656
% App. Total	0.8	79.5	19.7		0	5.3	94.7		0	0	0		62.5	37.5	0		
PHF	.625	.955	.833	.959	.000	.500	.818	.864	.000	.000	.000	.000	.625	.375	.000	.667	.959
Cars	5	475	120	600	0	2	36	38	0	0	0	0	5	3	0	8	646
% Cars	100	97.9	100	98.4	0	100	100	100	0	0	0	0	100	100	0	100	98.5
Heavy Vehicles	0	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10
% Heavy Vehicles	0	2.1	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0	1.5

Whitman, Requardt & Associates, LLP

Location: Cumberland, Maryalnd
Intersection: Mechanic St/Queen City Dr
Date: Wednesday, December 16, 2009
Counter: BB

File Name : 04 Mechanic Street at Queen City Drive
Site Code : 04
Start Date : 12/16/2009
Page No : 6



Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore St / Mechanic St
Date: Wendesday, December 16th, 2009
Counter: JI

File Name : 02 Baltimore St at Mechanic St
Site Code : 00000000
Start Date : 12/16/2009
Page No : 1

Groups Printed- Cars - Heavy Trucks - Peds Against Light

	Mechanic St From North					Baltimore St. From East					Mechanic St From South					Baltimore St. 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	9	40	0	1	49	0	0	0	0	0	0	4	11	0	15	12	0	14	0	26	1	90	91
07:15 AM	18	55	0	0	73	0	0	0	1	0	2	11	29	1	42	31	0	24	0	55	2	170	172
07:30 AM	20	91	1	2	112	0	0	0	1	0	0	10	28	2	38	41	1	39	0	81	5	231	236
07:45 AM	32	93	0	1	125	1	0	1	1	2	1	16	32	5	49	36	0	44	0	80	7	256	263
Total	79	279	1	4	359	1	0	1	3	2	3	41	100	8	144	120	1	121	0	242	15	747	762
08:00 AM	31	60	0	2	91	0	0	0	0	0	0	12	34	3	46	50	0	48	0	98	5	235	240
08:15 AM	29	84	0	13	113	0	0	0	1	0	0	8	33	3	41	39	0	37	0	76	17	230	247
08:30 AM	37	79	0	1	116	0	0	1	1	1	0	18	38	2	56	35	0	39	0	74	4	247	251
08:45 AM	34	65	0	2	99	0	1	0	0	1	1	11	33	3	45	47	2	35	1	84	6	229	235
Total	131	288	0	18	419	0	1	1	2	2	1	49	138	11	188	171	2	159	1	332	32	941	973
03:00 PM	37	90	1	3	128	0	0	0	0	0	0	18	53	8	71	74	0	64	0	138	11	337	348
03:15 PM	42	98	0	1	140	0	1	0	0	1	1	13	39	5	53	64	0	65	0	129	6	323	329
03:30 PM	35	82	1	9	118	1	0	0	0	1	1	18	69	2	88	42	1	55	0	98	11	305	316
03:45 PM	38	115	0	3	153	0	0	0	0	0	1	18	48	5	67	66	0	61	1	127	9	347	356
Total	152	385	2	16	539	1	1	0	0	2	3	67	209	20	279	246	1	245	1	492	37	1312	1349
04:00 PM	53	88	0	6	141	0	0	1	0	1	0	12	63	1	75	74	0	44	0	118	7	335	342
04:15 PM	33	90	0	0	123	0	0	0	0	0	0	19	68	7	87	79	0	59	0	138	7	348	355
04:30 PM	42	94	0	3	136	0	0	0	0	0	0	29	43	6	72	53	0	50	0	103	9	311	320
04:45 PM	36	85	0	2	121	0	0	0	0	0	0	16	52	7	68	59	0	71	1	130	10	319	329
Total	164	357	0	11	521	0	0	1	0	1	0	76	226	21	302	265	0	224	1	489	33	1313	1346
Grand Total	526	1309	3	49	1838	2	2	3	5	7	7	233	673	60	913	802	4	749	3	1555	117	4313	4430
Apprch %	28.6	71.2	0.2			28.6	28.6	42.9			0.8	25.5	73.7			51.6	0.3	48.2					
Total %	12.2	30.4	0.1		42.6	0	0	0.1		0.2	0.2	5.4	15.6		21.2	18.6	0.1	17.4		36.1	2.6	97.4	
Cars	524	1284	3		1841	2	2	3		9	7	233	673		925	800	4	748		1554	0	0	4329
% Cars	99.6	98.1	100	61.2	97.6	100	100	100	40	75	100	100	100	20	95.1	99.8	100	99.9	66.7	99.7	0	0	97.7
Heavy Trucks	2	25	0		27	0	0	0		0	0	0	0		0	2	0	1		3	0	0	30
% Heavy Trucks	0.4	1.9	0	0	1.4	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0.2	0	0	0.7
Peds Against Light	0	0	0		19	0	0	0		3	0	0	0		48	0	0	0		1	0	0	71
% Peds Against Light	0	0	0	38.8	1	0	0	0	60	25	0	0	0	80	4.9	0	0	0	33.3	0.1	0	0	1.6

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore St / Mechanic St
Date: Wendesday, December 16th, 2009
Counter: JI

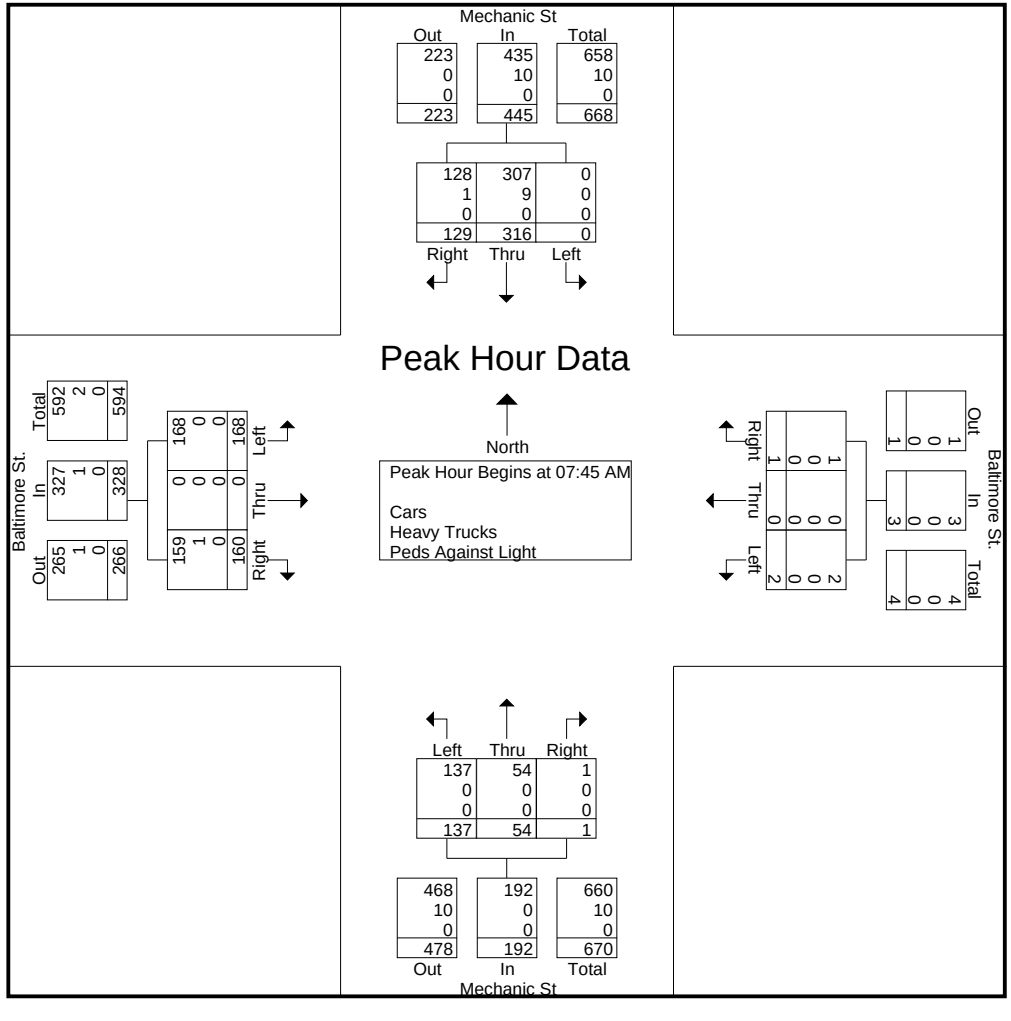
File Name : 02 Baltimore St at Mechanic St
Site Code : 00000000
Start Date : 12/16/2009

	Mechanic St From North				Baltimore St. From East				Mechanic St From South				Baltimore St. From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	32	**93**	0	**125**	**1**	0	**1**	**2**	**1**	16	32	49	36	0	44	80	**256**
08:00 AM	31	60	0	91	0	0	0	0	0	12	34	46	**50**	0	**48**	**98**	235
08:15 AM	29	84	0	113	0	0	0	0	0	8	33	41	39	0	37	76	230
08:30 AM	**37**	79	0	116	0	0	1	1	0	**18**	**38**	**56**	35	0	39	74	247
Total Volume	129	316	0	445	1	0	2	3	1	54	137	192	160	0	168	328	968
% App. Total	29	71	0		33.3	0	66.7		0.5	28.1	71.4		48.8	0	51.2		
PHF	.872	.849	.000	.890	.250	.000	.500	.375	.250	.750	.901	.857	.800	.000	.875	.837	.945
Cars	128	307	0	435	1	0	2	3	1	54	137	192	159	0	168	327	957
% Cars	99.2	97.2	0	97.8	100	0	100	100	100	100	100	100	99.4	0	100	99.7	98.9
Heavy Trucks	1	9	0	10	0	0	0	0	0	0	0	0	1	0	0	1	11
% Heavy Trucks	0.8	2.8	0	2.2	0	0	0	0	0	0	0	0	0.6	0	0	0.3	1.1
Peds Against Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds Against Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore St / Mechanic St
Date: Wendesday, December 16th, 2009
Counter: JI

File Name : 02 Baltimore St at Mechanic St
Site Code : 00000000
Start Date : 12/16/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore St / Mechanic St
Date: Wendesday, December 16th, 2009
Counter: JI

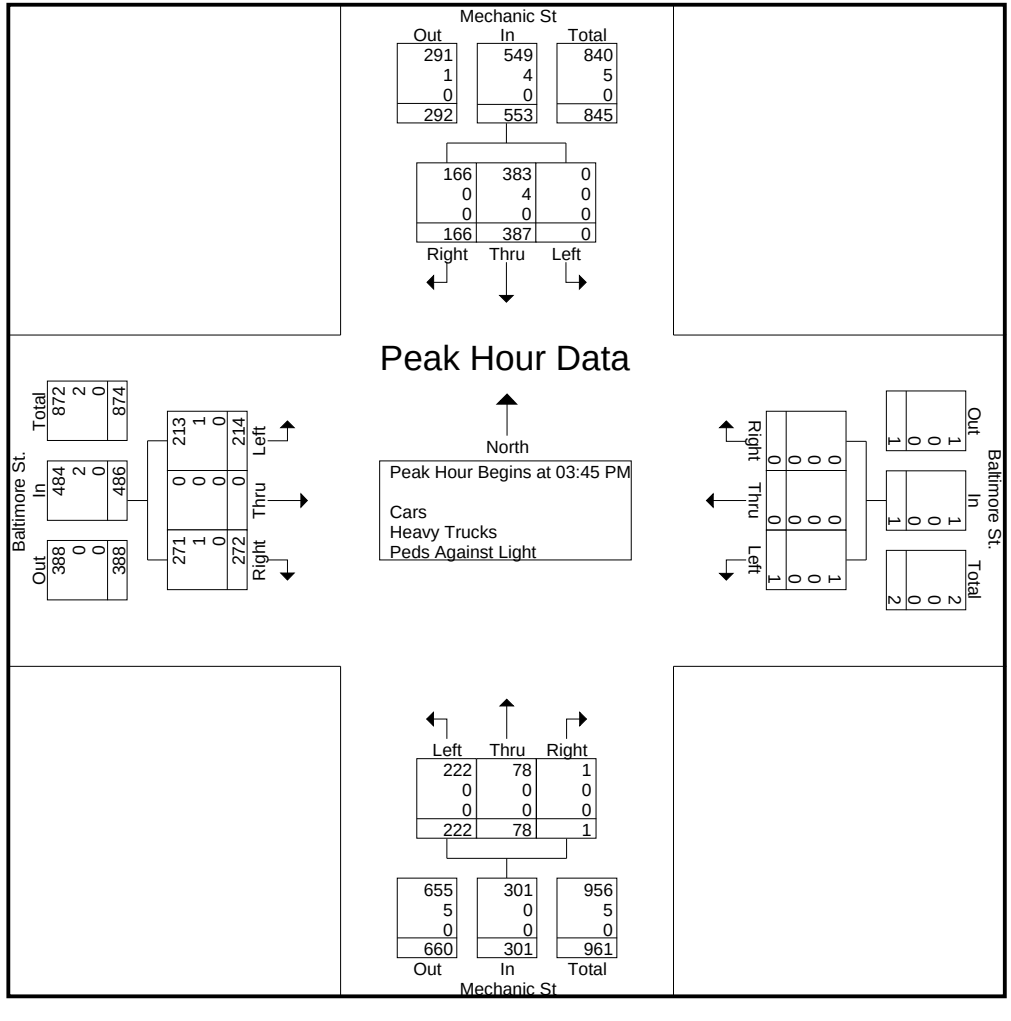
File Name : 02 Baltimore St at Mechanic St
Site Code : 00000000
Start Date : 12/16/2009

	Mechanic St From North				Baltimore St. From East				Mechanic St From South				Baltimore St. From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 08:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	38	**115**	0	**153**	0	0	0	0	**1**	18	48	67	66	0	**61**	127	347
04:00 PM	**53**	88	0	141	0	0	**1**	**1**	0	12	63	75	74	0	44	118	335
04:15 PM	33	90	0	123	0	0	0	0	0	19	**68**	**87**	**79**	0	59	**138**	**348**
04:30 PM	42	94	0	136	0	0	0	0	0	**29**	43	72	53	0	50	103	311
Total Volume	166	387	0	553	0	0	1	1	1	78	222	301	272	0	214	486	1341
% App. Total	30	70	0		0	0	100		0.3	25.9	73.8		56	0	44		
PHF	.783	.841	.000	.904	.000	.000	.250	.250	.250	.672	.816	.865	.861	.000	.877	.880	.963
Cars	166	383	0	549	0	0	1	1	1	78	222	301	271	0	213	484	1335
% Cars	100	99.0	0	99.3	0	0	100	100	100	100	100	100	99.6	0	99.5	99.6	99.6
Heavy Trucks	0	4	0	4	0	0	0	0	0	0	0	0	1	0	1	2	6
% Heavy Trucks	0	1.0	0	0.7	0	0	0	0	0	0	0	0	0.4	0	0.5	0.4	0.4
Peds Against Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds Against Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore St / Mechanic St
Date: Wendesday, December 16th, 2009
Counter: JI

File Name : 02 Baltimore St at Mechanic St
Site Code : 00000000
Start Date : 12/16/2009
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore / Canal
Date: Thursday: December 17, 2009
Counter JI

File Name : 05 Baltimore St at Canal Street
Site Code : 00000000
Start Date : 12/17/2009
Page No : 1

Groups Printed- Cars - Heavy Trucks - CBIZ Parking Lot

	Canal St. From North					Baltimore St. From East					Canal St. From South					Baltimore St. 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	1	0	2	1	3	5	3	8
07:15 AM	0	0	0	8	0	1	0	0	3	1	0	0	0	4	0	2	0	1	3	3	18	4	22
07:30 AM	0	0	0	4	0	1	0	2	1	3	0	0	0	6	0	3	0	3	3	6	14	9	23
07:45 AM	0	0	1	2	1	1	0	6	0	7	0	0	0	4	0	9	0	2	0	11	6	19	25
Total	0	0	1	16	1	3	0	8	4	11	0	0	0	16	0	15	0	8	7	23	43	35	78
08:00 AM	0	0	0	2	0	4	0	4	0	8	1	0	2	6	3	5	0	2	2	7	10	18	28
08:15 AM	0	0	0	7	0	5	0	0	2	5	1	0	0	3	1	6	0	6	0	12	12	18	30
08:30 AM	0	0	0	1	0	2	0	2	0	4	2	0	0	3	2	6	0	3	0	9	4	15	19
08:45 AM	0	0	0	2	0	2	0	1	1	3	1	0	0	2	1	1	0	3	1	4	6	8	14
Total	0	0	0	12	0	13	0	7	3	20	5	0	2	14	7	18	0	14	3	32	32	59	91
03:00 PM	0	0	1	4	1	0	0	0	2	0	1	0	0	7	1	4	0	0	2	4	15	6	21
03:15 PM	1	0	0	5	1	0	0	2	2	2	4	0	1	6	5	2	0	0	0	2	13	10	23
03:30 PM	0	0	1	5	1	0	0	0	2	0	1	0	1	5	2	4	0	0	0	4	12	7	19
03:45 PM	1	0	1	11	2	0	0	0	3	0	3	0	2	3	5	1	0	0	0	1	17	8	25
Total	2	0	3	25	5	0	0	2	9	2	9	0	4	21	13	11	0	0	2	11	57	31	88
04:00 PM	3	0	2	6	5	0	0	0	5	0	1	0	0	2	1	3	0	1	1	4	14	10	24
04:15 PM	1	0	0	2	1	0	0	1	8	1	2	0	2	9	4	0	0	0	0	0	19	6	25
04:30 PM	10	1	0	7	11	0	0	1	3	1	1	0	1	0	2	2	0	0	0	2	10	16	26
04:45 PM	2	0	1	3	3	0	0	0	2	0	1	0	0	2	1	0	0	0	1	0	8	4	12
Total	16	1	3	18	20	0	0	2	18	2	5	0	3	13	8	5	0	1	2	6	51	36	87
Grand Total	18	1	7	71	26	16	0	19	34	35	19	0	9	64	28	49	0	23	14	72	183	161	344
Apprch %	69.2	3.8	26.9			45.7	0	54.3			67.9	0	32.1			68.1	0	31.9					
Total %	11.2	0.6	4.3		16.1	9.9	0	11.8		21.7	11.8	0	5.6		17.4	30.4	0	14.3		44.7	53.2	46.8	
Cars	0	0	1		71	0	0	19		53	18	0	9		91	49	0	0		63	0	0	278
% Cars	0	0	14.3	98.6	73.2	0	0	100	100	76.8	94.7	0	100	100	98.9	100	0	0	100	73.3	0	0	80.8
Heavy Trucks	0	0	0		0	0	0	0		0	1	0	0		1	0	0	0		0	0	0	1
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	5.3	0	0	0	1.1	0	0	0	0	0	0	0	0.3
CBIZ Parking Lot	18	1	6		26	16	0	0		16	0	0	0		0	0	0	23		23	0	0	65
% CBIZ Parking Lot	100	100	85.7	1.4	26.8	100	0	0	0	23.2	0	0	0	0	0	0	0	100	0	26.7	0	0	18.9

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore / Canal
Date: Thursday: December 17, 2009
Counter JI

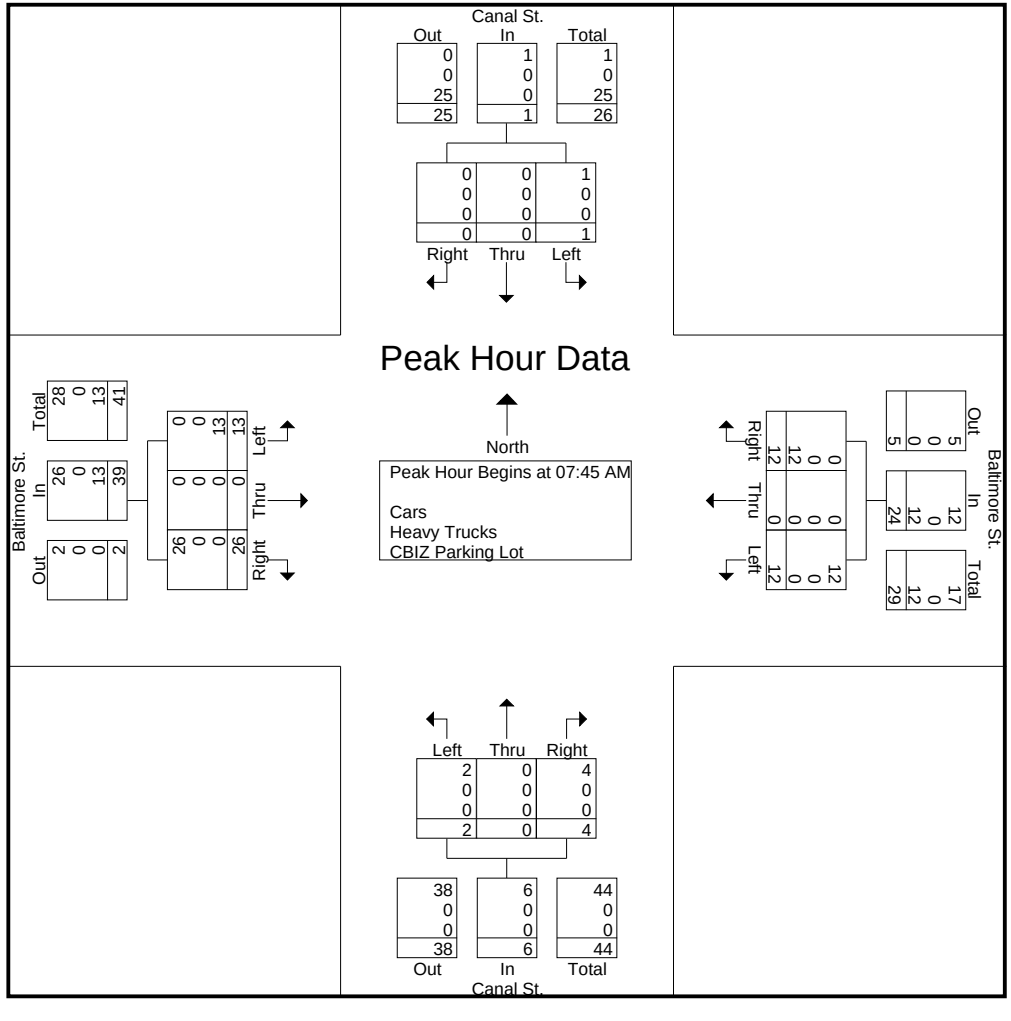
File Name : 05 Baltimore St at Canal Street
Site Code : 00000000
Start Date : 12/17/2009

	Canal St. From North				Baltimore St. From East				Canal St. From South				Baltimore St. From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	0	**1**	**1**	1	0	**6**	7	0	0	0	0	**9**	0	2	11	**19**
08:00 AM	0	0	0	0	4	0	4	**8**	1	0	**2**	**3**	5	0	2	7	18
08:15 AM	0	0	0	0	**5**	0	0	5	1	0	0	1	6	0	**6**	**12**	18
08:30 AM	0	0	0	0	2	0	2	4	**2**	0	0	2	6	0	3	9	15
Total Volume	0	0	1	1	12	0	12	24	4	0	2	6	26	0	13	39	70
% App. Total	0	0	100		50	0	50		66.7	0	33.3		66.7	0	33.3		
PHF	.000	.000	.250	.250	.600	.000	.500	.750	.500	.000	.250	.500	.722	.000	.542	.813	.921
Cars	0	0	1	1	0	0	12	12	4	0	2	6	26	0	0	26	45
% Cars	0	0	100	100	0	0	100	50.0	100	0	100	100	100	0	0	66.7	64.3
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CBIZ Parking Lot	0	0	0	0	12	0	0	12	0	0	0	0	0	0	13	13	25
% CBIZ Parking Lot	0	0	0	0	100	0	0	50.0	0	0	0	0	0	0	100	33.3	35.7

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore / Canal
Date: Thursday: December 17, 2009
Counter JI

File Name : 05 Baltimore St at Canal Street
Site Code : 00000000
Start Date : 12/17/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore / Canal
Date: Thursday: December 17, 2009
Counter JI

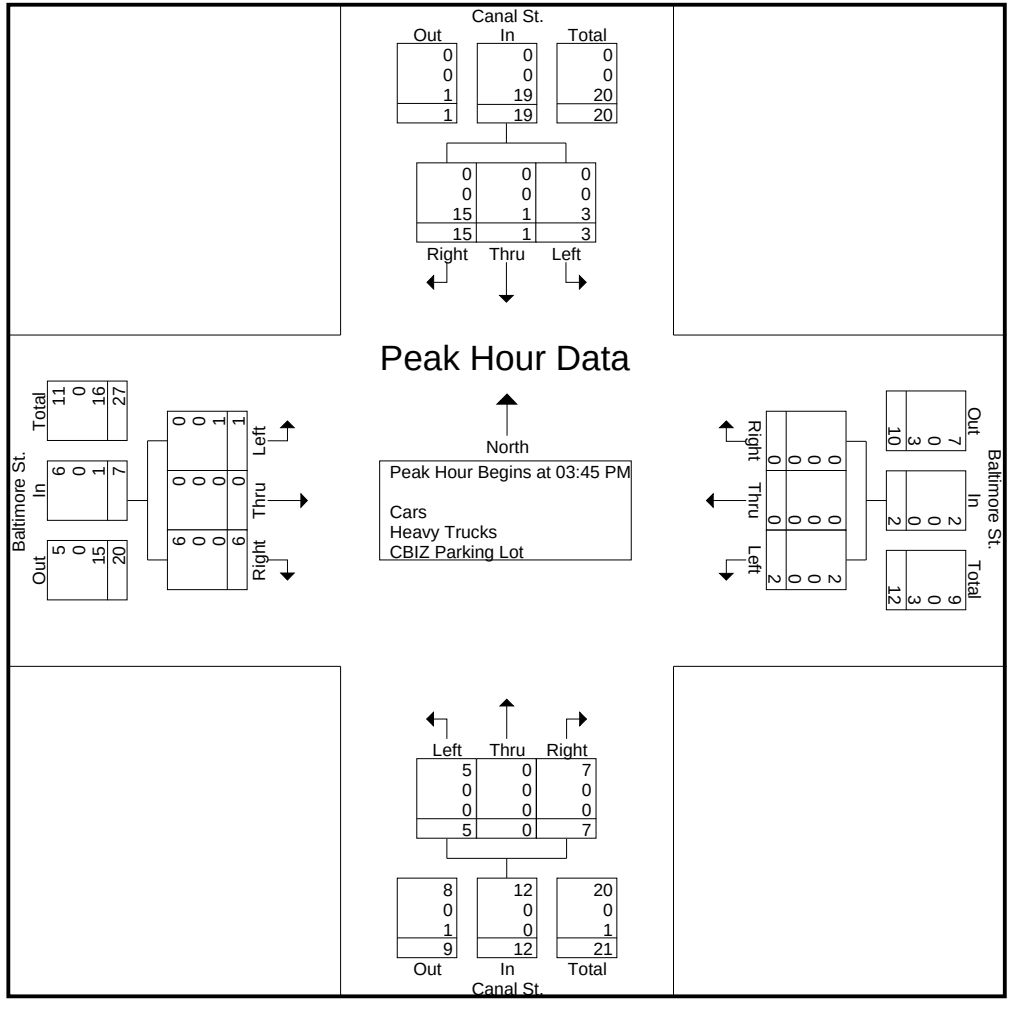
File Name : 05 Baltimore St at Canal Street
Site Code : 00000000
Start Date : 12/17/2009

	Canal St. From North				Baltimore St. From East				Canal St. From South				Baltimore St. From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	1	0	1	2	0	0	0	0	**3**	0	**2**	**5**	1	0	0	1	8
04:00 PM	3	0	**2**	5	0	0	0	0	1	0	0	1	**3**	0	**1**	**4**	10
04:15 PM	1	0	0	1	0	0	**1**	**1**	2	0	2	4	0	0	0	0	6
04:30 PM	**10**	**1**	0	**11**	0	0	1	1	1	0	1	2	2	0	0	2	**16**
Total Volume	15	1	3	19	0	0	2	2	7	0	5	12	6	0	1	7	40
% App. Total	78.9	5.3	15.8		0	0	100		58.3	0	41.7		85.7	0	14.3		
PHF	.375	.250	.375	.432	.000	.000	.500	.500	.583	.000	.625	.600	.500	.000	.250	.438	.625
Cars	0	0	0	0	0	0	2	2	7	0	5	12	6	0	0	6	20
% Cars	0	0	0	0	0	0	100	100	100	0	100	100	100	0	0	85.7	50.0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CBIZ Parking Lot	15	1	3	19	0	0	0	0	0	0	0	0	0	0	1	1	20
% CBIZ Parking Lot	100	100	100	100	0	0	0	0	0	0	0	0	0	0	100	14.3	50.0

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Baltimore / Canal
Date: Thursday: December 17, 2009
Counter JI

File Name : 05 Baltimore St at Canal Street
Site Code : 00000000
Start Date : 12/17/2009
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Cumberland St/Greene St
Date: Thursday, December 17, 2009
Counter: BB

File Name : 06 Baltimore St at Green St Cumberland St
Site Code : 06
Start Date : 12/17/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Cumberland St From North					Baltimore St From East					Greene St From South					Washington St 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	5	2	0	7	4	5	15	0	24	45	9	2	2	56	0	7	1	2	8	4	95	99
07:15 AM	0	9	3	1	12	6	15	29	0	50	47	10	3	0	60	1	6	0	0	7	1	129	130
07:30 AM	0	3	5	0	8	9	16	29	2	54	69	15	2	1	86	0	10	1	0	11	3	159	162
07:45 AM	0	4	6	1	10	2	11	31	0	44	89	17	1	0	107	0	9	0	0	9	1	170	171
Total	0	21	16	2	37	21	47	104	2	172	250	51	8	3	309	1	32	2	2	35	9	553	562
08:00 AM	3	3	4	0	10	7	8	34	0	49	76	6	1	4	83	2	16	0	0	18	4	160	164
08:15 AM	0	2	2	0	4	3	11	36	0	50	106	9	0	2	115	1	10	2	0	13	2	182	184
08:30 AM	0	9	1	1	10	3	18	37	1	58	76	9	6	2	91	1	11	0	0	12	4	171	175
08:45 AM	2	7	4	0	13	7	23	55	1	85	65	5	4	0	74	5	4	0	0	9	1	181	182
Total	5	21	11	1	37	20	60	162	2	242	323	29	11	8	363	9	41	2	0	52	11	694	705
*** BREAK ***																							
03:00 PM	3	10	4	1	17	5	21	102	0	128	114	12	3	2	129	9	10	3	1	22	4	296	300
03:15 PM	0	10	2	1	12	6	9	71	0	86	98	13	1	0	112	2	22	2	0	26	1	236	237
03:30 PM	3	5	5	0	13	6	15	81	0	102	121	8	6	0	135	7	13	2	0	22	0	272	272
03:45 PM	2	5	4	5	11	11	16	66	0	93	89	14	2	2	105	4	16	2	0	22	7	231	238
Total	8	30	15	7	53	28	61	320	0	409	422	47	12	4	481	22	61	9	1	92	12	1035	1047
04:00 PM	4	14	3	0	21	7	18	80	1	105	105	7	1	1	113	5	21	1	0	27	2	266	268
04:15 PM	1	8	4	0	13	2	11	79	0	92	89	4	7	0	100	6	9	1	1	16	1	221	222
04:30 PM	1	4	1	0	6	7	22	80	0	109	84	5	7	0	96	5	11	0	0	16	0	227	227
04:45 PM	0	7	2	0	9	7	11	77	0	95	90	10	5	0	105	5	13	1	0	19	0	228	228
Total	6	33	10	0	49	23	62	316	1	401	368	26	20	1	414	21	54	3	1	78	3	942	945
Grand Total	19	105	52	10	176	92	230	902	5	1224	1363	153	51	16	1567	53	188	16	4	257	35	3224	3259
Apprch %	10.8	59.7	29.5			7.5	18.8	73.7			87	9.8	3.3			20.6	73.2	6.2					
Total %	0.6	3.3	1.6		5.5	2.9	7.1	28		38	42.3	4.7	1.6		48.6	1.6	5.8	0.5		8	1.1	98.9	
Cars	19	103	50		182	92	230	898		1225	1362	153	51		1582	53	188	16		261	0	0	3250
% Cars	100	98.1	96.2	100	97.8	100	100	99.6	100	99.7	99.9	100	100	100	99.9	100	100	100	100	100	0	0	99.7
Heavy Vehicles	0	2	2		4	0	0	4		4	1	0	0		1	0	0	0		0	0	0	9
% Heavy Vehicles	0	1.9	3.8	0	2.2	0	0	0.4	0	0.3	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0.3

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Cumberland St/Greene St
Date: Thursday, December 17, 2009
Counter: BB

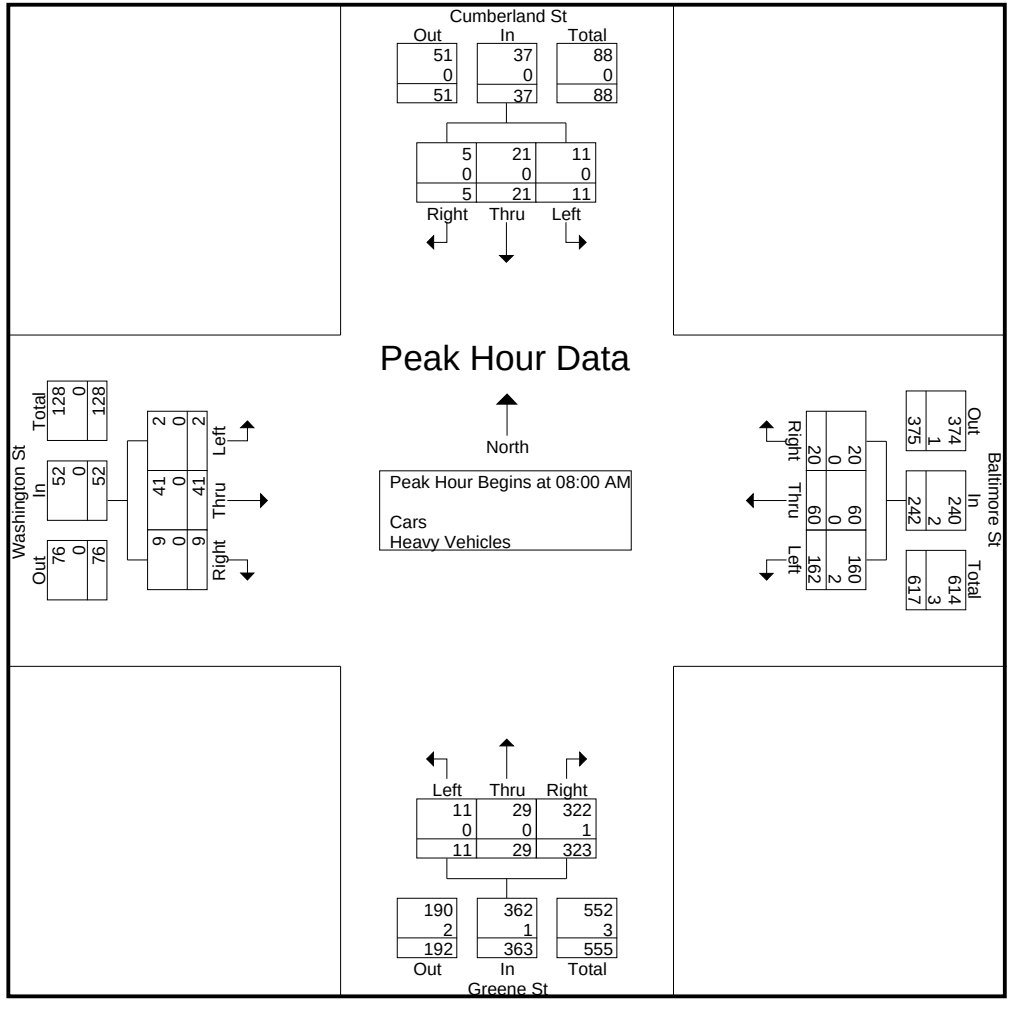
File Name : 06 Baltimore St at Green St Cumberland St
Site Code : 06
Start Date : 12/17/2009

	Cumberland St From North				Baltimore St From East				Greene St From South				Washington St From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	**3**	3	**4**	10	**7**	8	34	49	76	6	1	83	2	**16**	0	**18**	160
08:15 AM	0	2	2	4	3	11	36	50	**106**	**9**	0	**115**	1	10	**2**	13	**182**
08:30 AM	0	**9**	1	10	3	18	37	58	76	9	**6**	91	1	11	0	12	171
08:45 AM	2	7	4	**13**	7	**23**	**55**	**85**	65	5	4	74	**5**	4	0	9	181
Total Volume	5	21	11	37	20	60	162	242	323	29	11	363	9	41	2	52	694
% App. Total	13.5	56.8	29.7		8.3	24.8	66.9		89	8	3		17.3	78.8	3.8		
PHF	.417	.583	.688	.712	.714	.652	.736	.712	.762	.806	.458	.789	.450	.641	.250	.722	.953
Cars	5	21	11	37	20	60	160	240	322	29	11	362	9	41	2	52	691
% Cars	100	100	100	100	100	100	98.8	99.2	99.7	100	100	99.7	100	100	100	100	99.6
Heavy Vehicles	0	0	0	0	0	0	2	2	1	0	0	1	0	0	0	0	3
% Heavy Vehicles	0	0	0	0	0	0	1.2	0.8	0.3	0	0	0.3	0	0	0	0	0.4

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Cumberland St/Greene St
Date: Thursday, December 17, 2009
Counter: BB

File Name : 06 Baltimore St at Green St Cumberland St
Site Code : 06
Start Date : 12/17/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Cumberland St/Greene St
Date: Thursday, December 17, 2009
Counter: BB

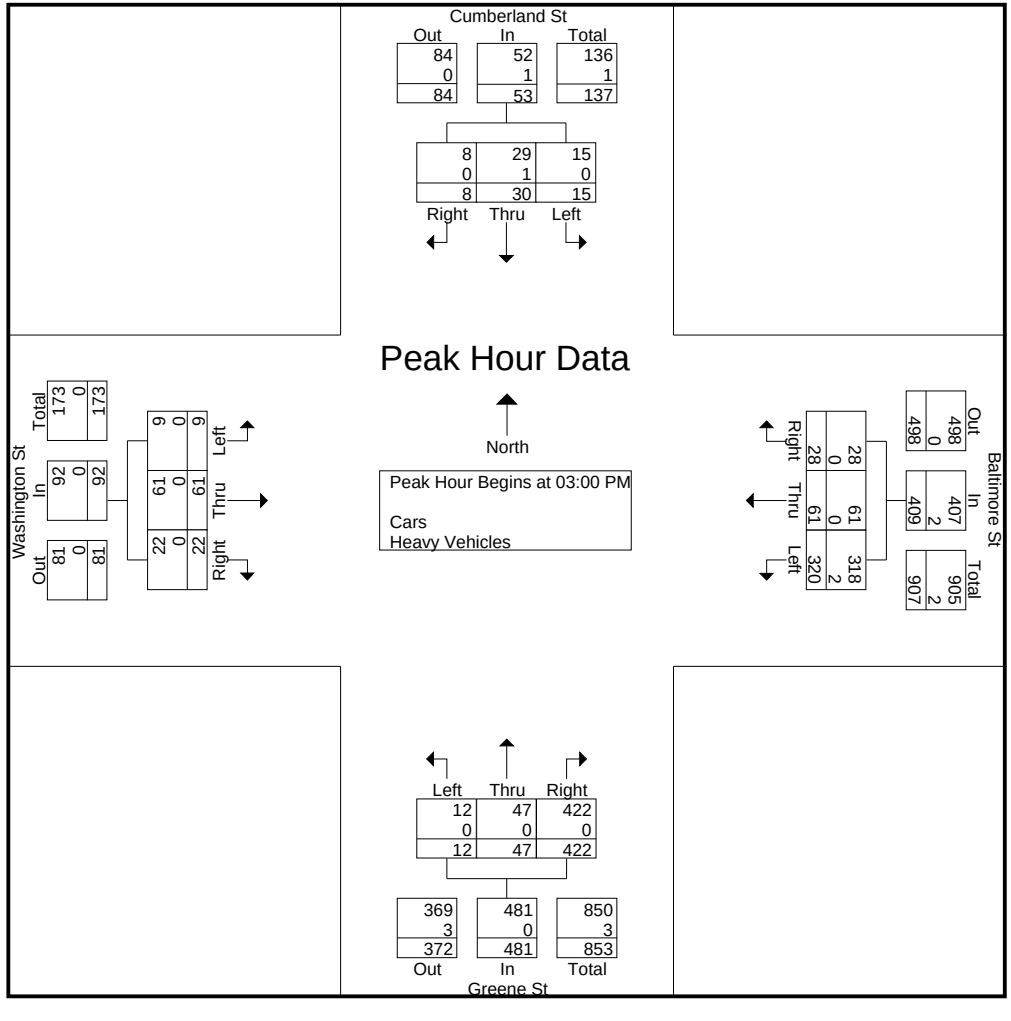
File Name : 06 Baltimore St at Green St Cumberland St
Site Code : 06
Start Date : 12/17/2009
Page No : 4

	Cumberland St From North				Baltimore St From East				Greene St From South				Washington St From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	**3**	**10**	4	**17**	5	**21**	**102**	**128**	114	12	3	129	**9**	10	**3**	22	**296**
03:15 PM	0	10	2	12	6	9	71	86	98	13	1	112	2	**22**	2	**26**	236
03:30 PM	3	5	**5**	13	6	15	81	102	**121**	8	**6**	**135**	7	13	2	22	272
03:45 PM	2	5	4	11	**11**	16	66	93	89	**14**	2	105	4	16	2	22	231
Total Volume	8	30	15	53	28	61	320	409	422	47	12	481	22	61	9	92	1035
% App. Total	15.1	56.6	28.3		6.8	14.9	78.2		87.7	9.8	2.5		23.9	66.3	9.8		
PHF	.667	.750	.750	.779	.636	.726	.784	.799	.872	.839	.500	.891	.611	.693	.750	.885	.874
Cars	8	29	15	52	28	61	318	407	422	47	12	481	22	61	9	92	1032
% Cars	100	96.7	100	98.1	100	100	99.4	99.5	100	100	100	100	100	100	100	100	99.7
Heavy Vehicles	0	1	0	1	0	0	2	2	0	0	0	0	0	0	0	0	3
% Heavy Vehicles	0	3.3	0	1.9	0	0	0.6	0.5	0	0	0	0	0	0	0	0	0.3

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Cumberland St/Greene St
Date: Thursday, December 17, 2009
Counter: BB

File Name : 06 Baltimore St at Green St Cumberland St
Site Code : 06
Start Date : 12/17/2009
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: MD 51 / Queen City Dr.
Date: Thursday, December 17, 2009
Counter: ET / JT

File Name : 03 Maryland 51 at Queen City Drive
Site Code : 03
Start Date : 12/17/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles - Right Turn On Red

	(As Assigned) From North					Queen City Drive From East					MD 51 From South					Winston St. 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	83	70	0	0	153	3	0	11	0	14	0	35	1	0	36	0	0	0	0	0	0	203	203
07:15 AM	92	77	0	1	169	2	1	19	0	22	0	77	1	0	78	0	0	0	0	0	1	269	270
07:30 AM	125	114	0	3	239	5	1	13	0	19	0	66	3	0	69	0	0	0	0	0	3	327	330
07:45 AM	111	103	2	3	216	5	3	24	0	32	0	76	2	0	78	0	0	0	0	0	3	326	329
Total	411	364	2	7	777	15	5	67	0	87	0	254	7	0	261	0	0	0	0	0	7	1125	1132
08:00 AM	77	91	2	1	170	13	0	14	0	27	0	71	2	0	73	0	0	0	0	0	1	270	271
08:15 AM	92	95	1	0	188	4	2	18	0	24	0	64	1	0	65	0	0	0	0	0	0	277	277
08:30 AM	84	91	1	0	176	4	0	30	0	34	0	67	0	0	67	0	0	0	0	0	0	277	277
08:45 AM	76	86	1	0	163	8	0	28	0	36	0	78	1	0	79	0	0	0	0	0	0	278	278
Total	329	363	5	1	697	29	2	90	0	121	0	280	4	0	284	0	0	0	0	0	1	1102	1103
*** BREAK ***																							
03:00 PM	153	151	1	3	305	10	0	65	0	75	0	70	2	0	72	0	0	0	0	0	3	452	455
03:15 PM	131	143	0	1	274	10	1	47	0	58	0	58	0	0	58	0	0	0	0	0	1	390	391
03:30 PM	131	135	1	1	267	12	1	48	0	61	1	75	1	0	77	0	0	0	0	0	1	405	406
03:45 PM	116	160	0	1	276	10	1	38	0	49	0	62	1	0	63	0	0	0	0	0	1	388	389
Total	531	589	2	6	1122	42	3	198	0	243	1	265	4	0	270	0	0	0	0	0	6	1635	1641
04:00 PM	152	162	1	0	315	16	1	78	0	95	0	70	1	0	71	0	0	0	0	0	0	481	481
04:15 PM	138	131	0	0	269	7	0	57	0	64	0	63	0	0	63	0	0	0	0	0	0	396	396
04:30 PM	113	166	0	2	279	9	0	62	0	71	0	73	4	0	77	0	0	0	0	0	2	427	429
04:45 PM	119	141	0	2	260	5	0	58	0	63	0	57	0	0	57	0	0	0	0	0	2	380	382
Total	522	600	1	4	1123	37	1	255	0	293	0	263	5	0	268	0	0	0	0	0	4	1684	1688
Grand Total	1793	1916	10	18	3719	123	11	610	0	744	1	1062	20	0	1083	0	0	0	0	0	18	5546	5564
Apprch %	48.2	51.5	0.3			16.5	1.5	82			0.1	98.1	1.8			0	0	0					
Total %	32.3	34.5	0.2		67.1	2.2	0.2	11		13.4	0	19.1	0.4		19.5	0	0	0		0	0.3	99.7	
Cars	1719	1863	10		3610	119	11	605		735	1	1034	20		1055	0	0	0		0	0	0	5400
% Cars	95.9	97.2	100	100	96.6	96.7	100	99.2	0	98.8	100	97.4	100	0	97.4	0	0	0	0	0	0	0	97.1
Heavy Vehicles	74	53	0		127	0	0	5		5	0	28	0		28	0	0	0		0	0	0	160
% Heavy Vehicles	4.1	2.8	0	0	3.4	0	0	0.8	0	0.7	0	2.6	0	0	2.6	0	0	0	0	0	0	0	2.9
Right Turn On Red	0	0	0		0	4	0	0		4	0	0	0		0	0	0	0		0	0	0	4
% Right Turn On Red	0	0	0	0	0	3.3	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.1

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: MD 51 / Queen City Dr.
Date: Thursday, December 17, 2009
Counter: ET / JT

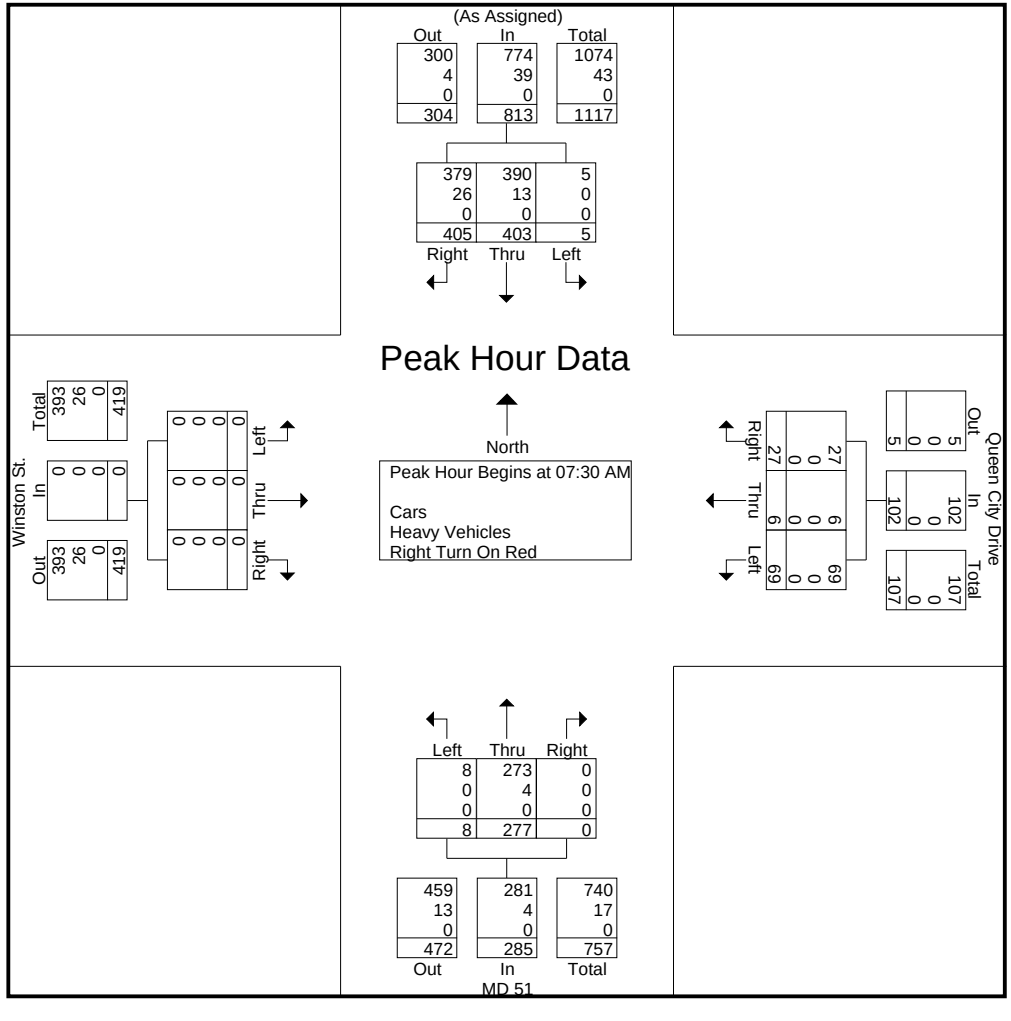
File Name : 03 Maryland 51 at Queen City Drive
Site Code : 03
Start Date : 12/17/2009

	(As Assigned) From North				Queen City Drive From East				MD 51 From South				Winston St. From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**125**	**114**	0	**239**	5	1	13	19	0	66	**3**	69	0	0	0	0	**327**
07:45 AM	111	103	**2**	216	5	**3**	**24**	**32**	0	**76**	2	**78**	0	0	0	0	326
08:00 AM	77	91	2	170	**13**	0	14	27	0	71	2	73	0	0	0	0	270
08:15 AM	92	95	1	188	4	2	18	24	0	64	1	65	0	0	0	0	277
Total Volume	405	403	5	813	27	6	69	102	0	277	8	285	0	0	0	0	1200
% App. Total	49.8	49.6	0.6		26.5	5.9	67.6		0	97.2	2.8		0	0	0		
PHF	.810	.884	.625	.850	.519	.500	.719	.797	.000	.911	.667	.913	.000	.000	.000	.000	.917
Cars	379	390	5	774	27	6	69	102	0	273	8	281	0	0	0	0	1157
% Cars	93.6	96.8	100	95.2	100	100	100	100	0	98.6	100	98.6	0	0	0	0	96.4
Heavy Vehicles	26	13	0	39	0	0	0	0	0	4	0	4	0	0	0	0	43
% Heavy Vehicles	6.4	3.2	0	4.8	0	0	0	0	0	1.4	0	1.4	0	0	0	0	3.6
Right Turn On Red	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Right Turn On Red	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: MD 51 / Queen City Dr.
Date: Thursday, December 17, 2009
Counter: ET / JT

File Name : 03 Maryland 51 at Queen City Drive
Site Code : 03
Start Date : 12/17/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: MD 51 / Queen City Dr.
Date: Thursday, December 17, 2009
Counter: ET / JT

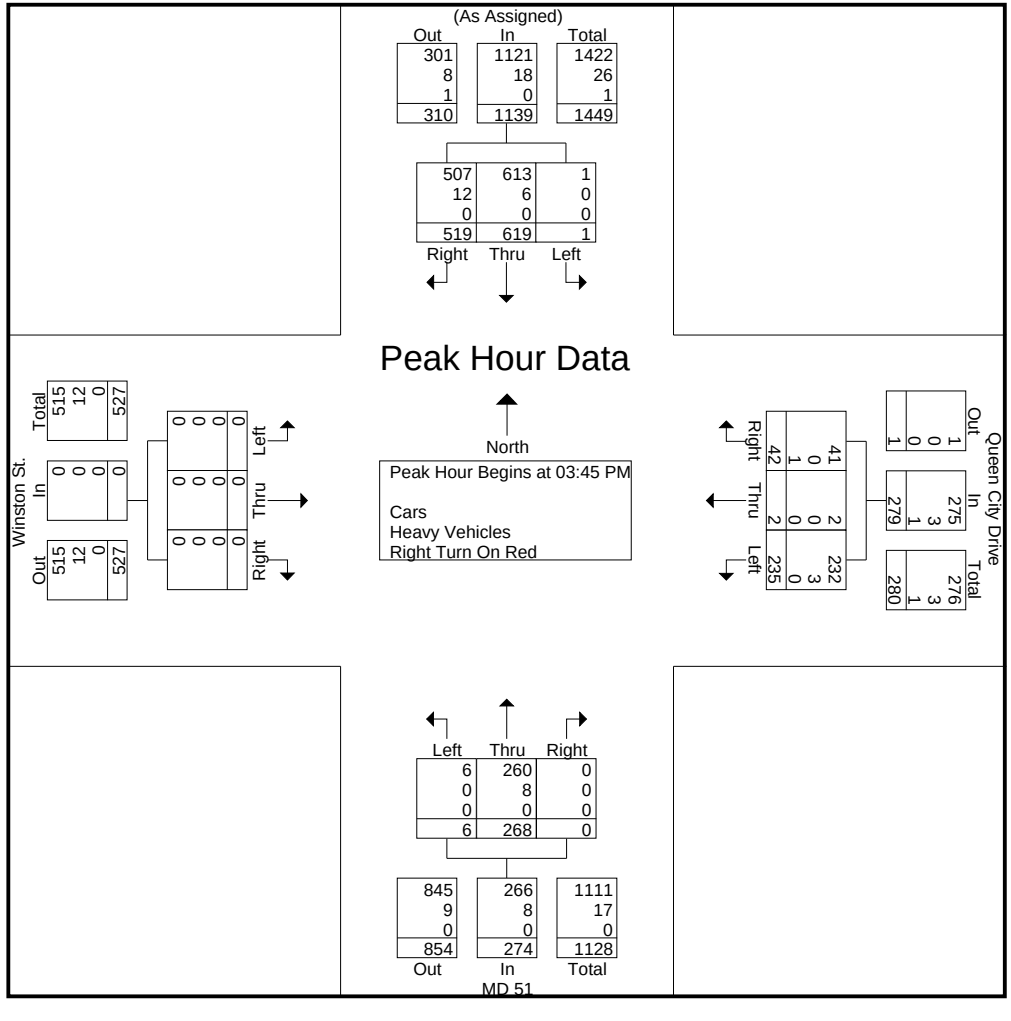
File Name : 03 Maryland 51 at Queen City Drive
Site Code : 03
Start Date : 12/17/2009
Page No : 4

	(As Assigned) From North				Queen City Drive From East				MD 51 From South				Winston St. From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	116	160	0	276	10	**1**	38	49	0	62	1	63	0	0	0	0	388
04:00 PM	**152**	162	**1**	**315**	**16**	1	**78**	**95**	0	70	1	71	0	0	0	0	**481**
04:15 PM	138	131	0	269	7	0	57	64	0	63	0	63	0	0	0	0	396
04:30 PM	113	**166**	0	279	9	0	62	71	0	**73**	**4**	**77**	0	0	0	0	427
Total Volume	519	619	1	1139	42	2	235	279	0	268	6	274	0	0	0	0	1692
% App. Total	45.6	54.3	0.1		15.1	0.7	84.2		0	97.8	2.2		0	0	0		
PHF	.854	.932	.250	.904	.656	.500	.753	.734	.000	.918	.375	.890	.000	.000	.000	.000	.879
Cars	507	613	1	1121	41	2	232	275	0	260	6	266	0	0	0	0	1662
% Cars	97.7	99.0	100	98.4	97.6	100	98.7	98.6	0	97.0	100	97.1	0	0	0	0	98.2
Heavy Vehicles	12	6	0	18	0	0	3	3	0	8	0	8	0	0	0	0	29
% Heavy Vehicles	2.3	1.0	0	1.6	0	0	1.3	1.1	0	3.0	0	2.9	0	0	0	0	1.7
Right Turn On Red	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
% Right Turn On Red	0	0	0	0	2.4	0	0	0.4	0	0	0	0	0	0	0	0	0.1

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: MD 51 / Queen City Dr.
Date: Thursday, December 17, 2009
Counter: ET / JT

File Name : 03 Maryland 51 at Queen City Drive
Site Code : 03
Start Date : 12/17/2009
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Queen City Dr/Centre St
Date: Thursday, January 14th, 2010
Counter: BB

File Name : Centre St @ Queen City Drive
Site Code : 00000000
Start Date : 1/14/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Centre St From North					Queen City Drive From East					Centre St From South					Winston St 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	17	0	0	17	42	92	1	0	135	0	0	0	0	0	0	152	152
07:15 AM	0	0	0	0	0	2	23	0	0	25	54	92	0	0	146	0	0	0	0	0	0	171	171
07:30 AM	0	0	0	0	0	0	27	0	0	27	82	126	0	0	208	0	0	0	0	0	0	235	235
07:45 AM	0	0	0	0	0	3	27	0	0	30	67	164	2	0	233	0	0	0	0	0	0	263	263
Total	0	0	0	0	0	5	94	0	0	99	245	474	3	0	722	0	0	0	0	0	0	821	821
08:00 AM	0	0	0	0	0	6	27	0	0	33	83	125	1	0	209	0	0	0	0	0	0	242	242
08:15 AM	0	0	0	0	0	2	24	0	0	26	71	130	1	0	202	0	0	0	0	0	0	228	228
08:30 AM	0	0	0	0	0	2	30	0	1	32	90	133	1	0	224	0	0	0	0	0	1	256	257
08:45 AM	0	0	0	0	0	2	27	0	1	29	84	110	1	0	195	0	0	0	0	0	1	224	225
Total	0	0	0	0	0	12	108	0	2	120	328	498	4	0	830	0	0	0	0	0	2	950	952
*** BREAK ***																							
03:00 PM	0	0	0	0	0	4	72	0	0	76	100	150	1	0	251	0	0	0	0	0	0	327	327
03:15 PM	0	0	0	0	0	8	56	0	0	64	84	155	0	0	239	0	0	0	0	0	0	303	303
03:30 PM	0	0	0	0	0	14	64	0	1	78	133	176	0	0	309	0	0	0	0	0	1	387	388
03:45 PM	0	0	0	0	0	4	53	0	0	57	115	185	3	0	303	0	0	0	0	0	0	360	360
Total	0	0	0	0	0	30	245	0	1	275	432	666	4	0	1102	0	0	0	0	0	1	1377	1378
04:00 PM	0	0	0	0	0	10	60	0	0	70	115	152	2	0	269	0	0	0	0	0	0	339	339
04:15 PM	0	0	0	0	0	4	31	0	0	35	104	179	1	2	284	0	0	0	0	0	2	319	321
04:30 PM	0	0	0	0	0	11	70	0	2	81	103	154	0	0	257	0	0	0	0	0	2	338	340
04:45 PM	0	0	0	0	0	15	73	0	0	88	98	148	1	0	247	0	0	0	0	0	0	335	335
Total	0	0	0	0	0	40	234	0	2	274	420	633	4	2	1057	0	0	0	0	0	4	1331	1335
Grand Total	0	0	0	0	0	87	681	0	5	768	1425	2271	15	2	3711	0	0	0	0	0	7	4479	4486
Apprch %	0	0	0			11.3	88.7	0			38.4	61.2	0.4			0	0	0					
Total %	0	0	0		0	1.9	15.2	0		17.1	31.8	50.7	0.3		82.9	0	0	0		0	0.2	99.8	
Cars	0	0	0		0	87	679	0		771	1410	2199	15		3626	0	0	0		0	0	0	4397
% Cars	0	0	0	0	0	100	99.7	0	100	99.7	98.9	96.8	100	100	97.7	0	0	0	0	0	0	0	98
Heavy Vehicles	0	0	0		0	0	2	0		2	15	72	0		87	0	0	0		0	0	0	89
% Heavy Vehicles	0	0	0	0	0	0	0.3	0	0	0.3	1.1	3.2	0	0	2.3	0	0	0	0	0	0	0	2

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Queen City Dr/Centre St
Date: Thursday, January 14th, 2010
Counter: BB

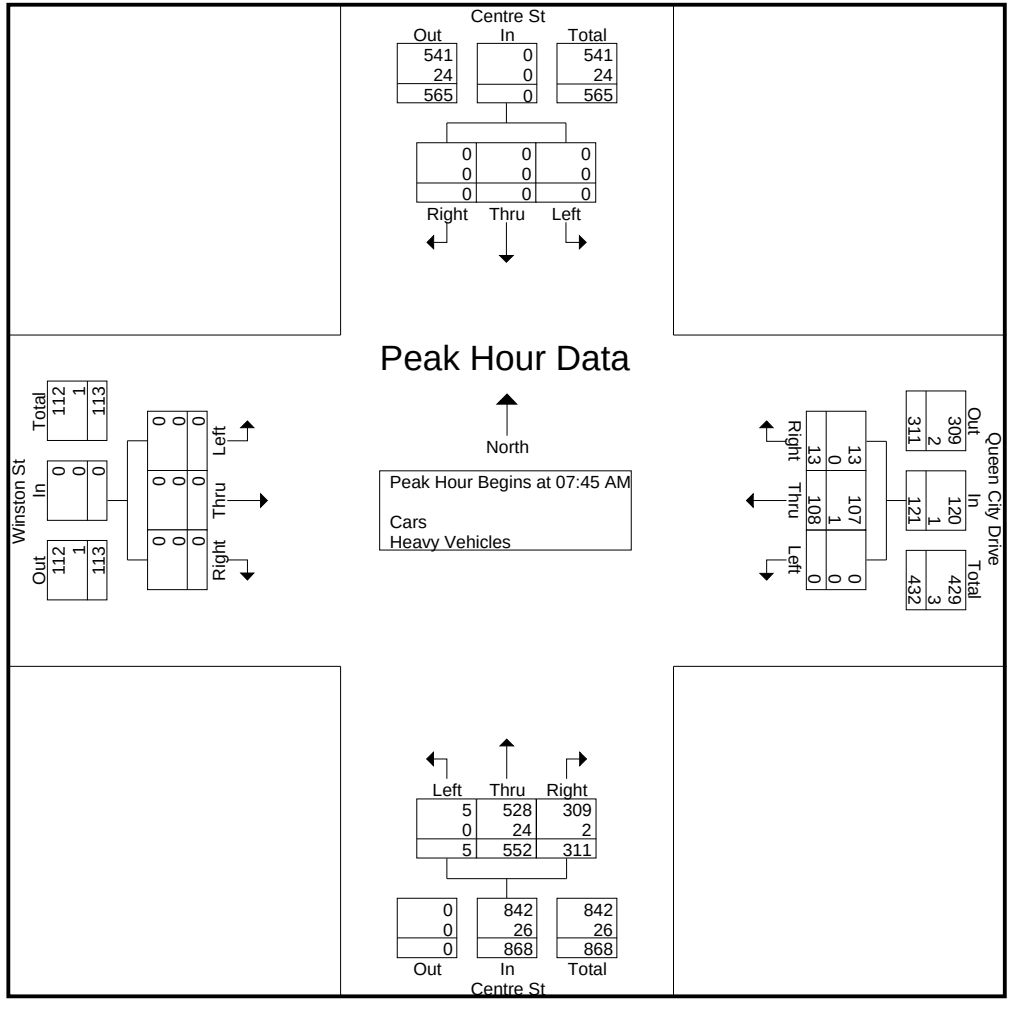
File Name : Centre St @ Queen City Drive
Site Code : 00000000
Start Date : 1/14/2010
Page No : 2

	Centre St From North				Queen City Drive From East				Centre St From South				Winston St From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	0	0	0	3	27	0	30	67	**164**	**2**	**233**	0	0	0	0	**263**
08:00 AM	0	0	0	0	**6**	27	0	**33**	83	125	1	209	0	0	0	0	242
08:15 AM	0	0	0	0	2	24	0	26	71	130	1	202	0	0	0	0	228
08:30 AM	0	0	0	0	2	**30**	0	32	**90**	133	1	224	0	0	0	0	256
Total Volume	0	0	0	0	13	108	0	121	311	552	5	868	0	0	0	0	989
% App. Total	0	0	0		10.7	89.3	0		35.8	63.6	0.6		0	0	0		
PHF	.000	.000	.000	.000	.542	.900	.000	.917	.864	.841	.625	.931	.000	.000	.000	.000	.940
Cars	0	0	0	0	13	107	0	120	309	528	5	842	0	0	0	0	962
% Cars	0	0	0	0	100	99.1	0	99.2	99.4	95.7	100	97.0	0	0	0	0	97.3
Heavy Vehicles	0	0	0	0	0	1	0	1	2	24	0	26	0	0	0	0	27
% Heavy Vehicles	0	0	0	0	0	0.9	0	0.8	0.6	4.3	0	3.0	0	0	0	0	2.7

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Queen City Dr/Centre St
Date: Thursday, January 14th, 2010
Counter: BB

File Name : Centre St @ Queen City Drive
Site Code : 00000000
Start Date : 1/14/2010
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Queen City Dr/Centre St
Date: Thursday, January 14th, 2010
Counter: BB

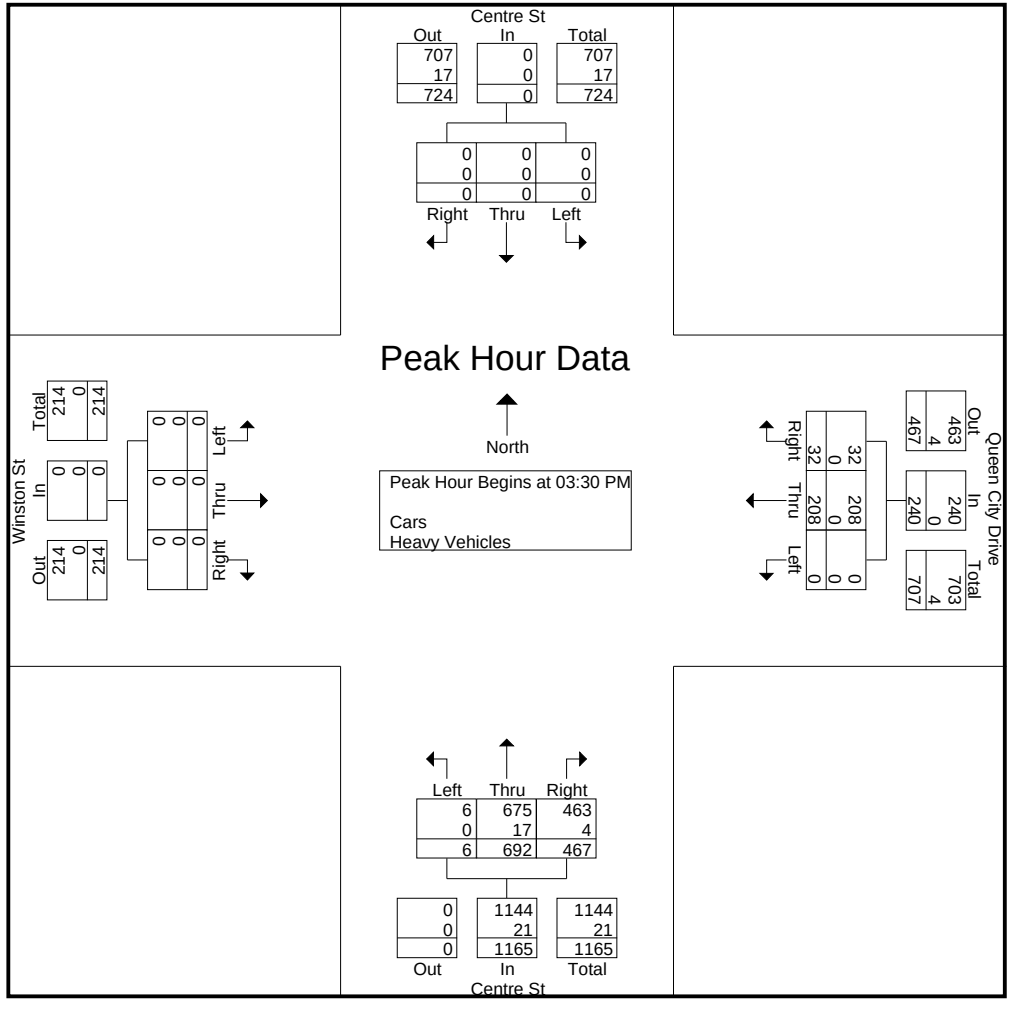
File Name : Centre St @ Queen City Drive
Site Code : 00000000
Start Date : 1/14/2010

	Centre St From North				Queen City Drive From East				Centre St From South				Winston St From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	0	0	0	0	**14**	**64**	0	**78**	**133**	176	0	**309**	0	0	0	0	**387**
03:45 PM	0	0	0	0	4	53	0	57	115	**185**	**3**	303	0	0	0	0	360
04:00 PM	0	0	0	0	10	60	0	70	115	152	2	269	0	0	0	0	339
04:15 PM	0	0	0	0	4	31	0	35	104	179	1	284	0	0	0	0	319
Total Volume	0	0	0	0	32	208	0	240	467	692	6	1165	0	0	0	0	1405
% App. Total	0	0	0		13.3	86.7	0		40.1	59.4	0.5		0	0	0		
PHF	.000	.000	.000	.000	.571	.813	.000	.769	.878	.935	.500	.943	.000	.000	.000	.000	.908
Cars	0	0	0	0	32	208	0	240	463	675	6	1144	0	0	0	0	1384
% Cars	0	0	0	0	100	100	0	100	99.1	97.5	100	98.2	0	0	0	0	98.5
Heavy Vehicles	0	0	0	0	0	0	0	0	4	17	0	21	0	0	0	0	21
% Heavy Vehicles	0	0	0	0	0	0	0	0	0.9	2.5	0	1.8	0	0	0	0	1.5

Whitman, Requardt & Associates, LLP

Location: Cumberland, MD
Intersection: Queen City Dr/Centre St
Date: Thursday, January 14th, 2010
Counter: BB

File Name : Centre St @ Queen City Drive
Site Code : 00000000
Start Date : 1/14/2010
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Rte 51 @ Lamont St
Date: Wednesday, December 16th, 2009
Counter: RZ

File Name : 07 Maryland 51 at Lamont Street
Site Code : 00000000
Start Date : 12/16/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Route 51 From North					Lamont Street From East					Route 51 From South					Parking Lot for Bar 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	91	28	0	119	27	0	2	0	29	2	93	0	0	95	0	0	1	0	1	0	244	244
07:15 AM	2	118	49	0	169	36	0	2	0	38	6	116	1	0	123	0	0	0	0	0	0	330	330
07:30 AM	2	115	49	0	166	88	0	0	0	88	7	106	0	0	113	0	0	0	0	0	0	367	367
07:45 AM	2	106	66	0	174	86	0	2	0	88	9	132	0	0	141	0	0	0	0	0	0	403	403
Total	6	430	192	0	628	237	0	6	0	243	24	447	1	0	472	0	0	1	0	1	0	1344	1344
08:00 AM	0	93	55	0	148	45	0	2	2	47	1	141	1	0	143	0	0	0	0	0	2	338	340
08:15 AM	0	79	50	0	129	53	0	5	0	58	10	103	0	0	113	0	0	0	0	0	0	300	300
08:30 AM	0	98	48	0	146	72	0	3	0	75	7	106	0	0	113	0	0	0	0	0	0	334	334
08:45 AM	0	84	51	0	135	44	0	1	0	45	7	110	0	0	117	0	0	1	0	1	0	298	298
Total	0	354	204	0	558	214	0	11	2	225	25	460	1	0	486	0	0	1	0	1	2	1270	1272
*** BREAK ***																							
03:00 PM	3	117	89	0	209	79	1	4	1	84	11	151	1	1	163	0	0	1	0	1	2	457	459
03:15 PM	2	118	76	0	196	75	0	4	0	79	6	142	2	0	150	2	0	0	0	2	0	427	427
03:30 PM	4	117	78	0	199	88	1	4	0	93	10	155	0	0	165	1	0	2	0	3	0	460	460
03:45 PM	2	126	71	0	199	90	1	0	1	91	9	150	1	0	160	3	0	1	0	4	1	454	455
Total	11	478	314	0	803	332	3	12	2	347	36	598	4	1	638	6	0	4	0	10	3	1798	1801
04:00 PM	3	123	77	0	203	89	0	2	0	91	10	157	1	0	168	2	0	0	0	2	0	464	464
04:15 PM	6	128	99	0	233	71	0	1	0	72	13	139	2	0	154	3	0	2	0	5	0	464	464
04:30 PM	0	136	91	0	227	64	0	2	0	66	8	149	0	0	157	3	0	1	0	4	0	454	454
04:45 PM	5	127	83	0	215	73	0	3	2	76	10	155	0	0	165	1	0	0	0	1	2	457	459
Total	14	514	350	0	878	297	0	8	2	305	41	600	3	0	644	9	0	3	0	12	2	1839	1841
Grand Total	31	1776	1060	0	2867	1080	3	37	6	1120	126	2105	9	1	2240	15	0	9	0	24	7	6251	6258
Apprch %	1.1	61.9	37			96.4	0.3	3.3			5.6	94	0.4			62.5	0	37.5					
Total %	0.5	28.4	17		45.9	17.3	0	0.6		17.9	2	33.7	0.1		35.8	0.2	0	0.1		0.4	0.1	99.9	
Cars	30	1658	1051		2739	1064	3	35		1108	117	2006	9		2133	15	0	9		24	0	0	6004
% Cars	96.8	93.4	99.2	0	95.5	98.5	100	94.6	100	98.4	92.9	95.3	100	100	95.2	100	0	100	0	100	0	0	95.9
Heavy Vehicles	1	118	9		128	16	0	2		18	9	99	0		108	0	0	0		0	0	0	254
% Heavy Vehicles	3.2	6.6	0.8	0	4.5	1.5	0	5.4	0	1.6	7.1	4.7	0	0	4.8	0	0	0	0	0	0	0	4.1

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Rte 51 @ Lamont St
Date: Wednesday, December 16th, 2009
Counter: RZ

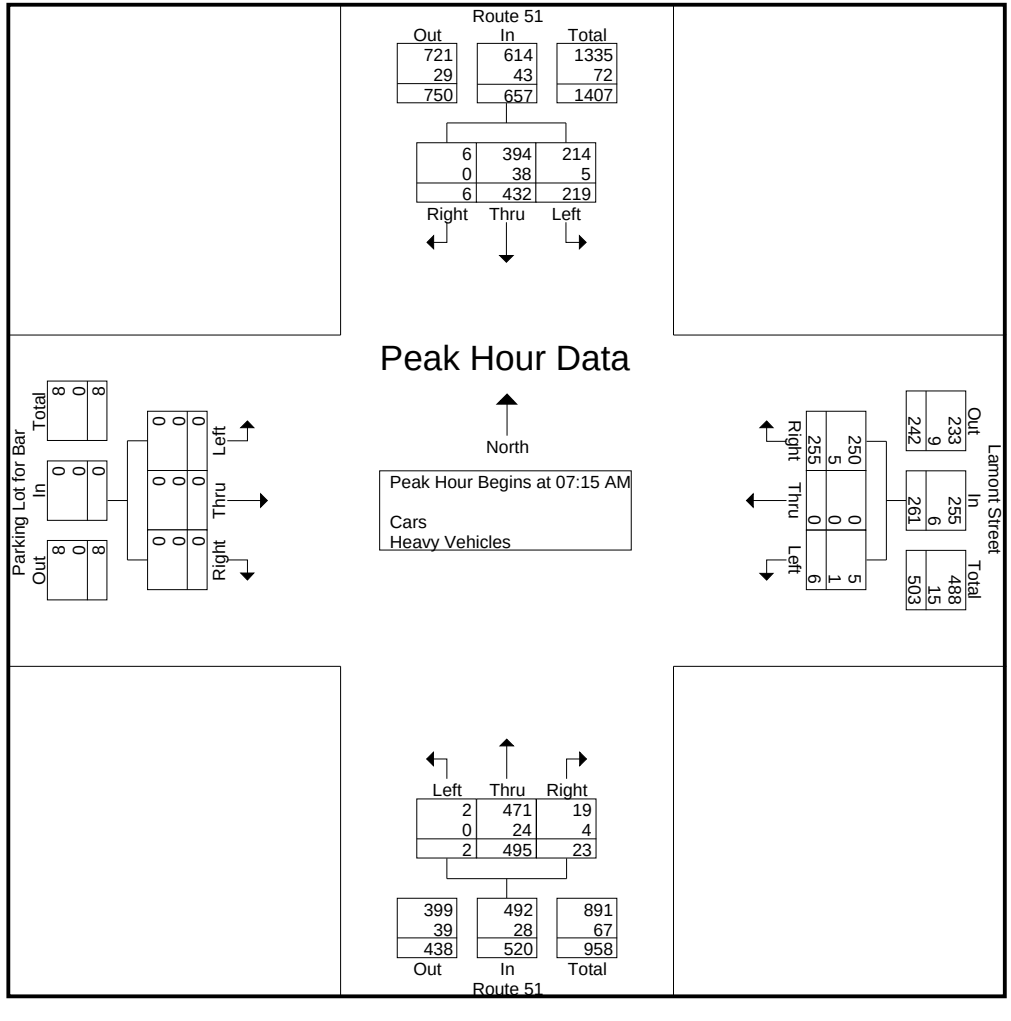
File Name : 07 Maryland 51 at Lamont Street
Site Code : 00000000
Start Date : 12/16/2009

	Route 51 From North				Lamont Street From East				Route 51 From South				Parking Lot for Bar From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	**2**	**118**	49	169	36	0	**2**	38	6	116	**1**	123	0	0	0	0	330
07:30 AM	2	115	49	166	**88**	0	0	**88**	7	106	0	113	0	0	0	0	367
07:45 AM	2	106	**66**	**174**	86	0	2	88	**9**	132	0	141	0	0	0	0	**403**
08:00 AM	0	93	55	148	45	0	2	47	1	**141**	1	**143**	0	0	0	0	338
Total Volume	6	432	219	657	255	0	6	261	23	495	2	520	0	0	0	0	1438
% App. Total	0.9	65.8	33.3		97.7	0	2.3		4.4	95.2	0.4		0	0	0		
PHF	.750	.915	.830	.944	.724	.000	.750	.741	.639	.878	.500	.909	.000	.000	.000	.000	.892
Cars	6	394	214	614	250	0	5	255	19	471	2	492	0	0	0	0	1361
% Cars	100	91.2	97.7	93.5	98.0	0	83.3	97.7	82.6	95.2	100	94.6	0	0	0	0	94.6
Heavy Vehicles	0	38	5	43	5	0	1	6	4	24	0	28	0	0	0	0	77
% Heavy Vehicles	0	8.8	2.3	6.5	2.0	0	16.7	2.3	17.4	4.8	0	5.4	0	0	0	0	5.4

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Rte 51 @ Lamont St
Date: Wednesday, December 16th, 2009
Counter: RZ

File Name : 07 Maryland 51 at Lamont Street
Site Code : 00000000
Start Date : 12/16/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Rte 51 @ Lamont St
Date: Wednesday, December 16th, 2009
Counter: RZ

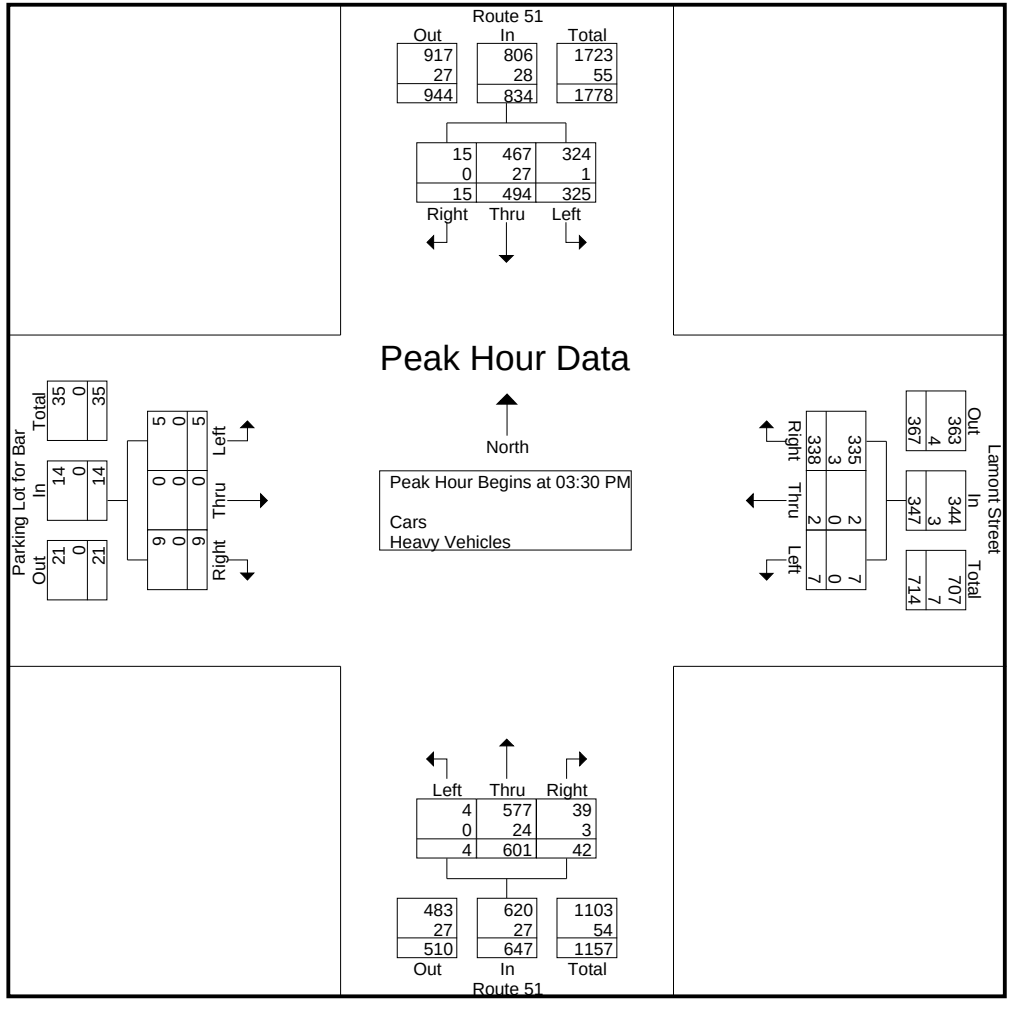
File Name : 07 Maryland 51 at Lamont Street
Site Code : 00000000
Start Date : 12/16/2009

	Route 51 From North				Lamont Street From East				Route 51 From South				Parking Lot for Bar From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	4	117	78	199	88	**1**	**4**	**93**	10	155	0	165	1	0	**2**	3	460
03:45 PM	2	126	71	199	**90**	1	0	91	9	150	1	160	**3**	0	1	4	454
04:00 PM	3	123	77	203	89	0	2	91	10	**157**	1	**168**	2	0	0	2	**464**
04:15 PM	**6**	**128**	**99**	**233**	71	0	1	72	**13**	139	**2**	154	3	0	2	**5**	464
Total Volume	15	494	325	834	338	2	7	347	42	601	4	647	9	0	5	14	1842
% App. Total	1.8	59.2	39		97.4	0.6	2		6.5	92.9	0.6		64.3	0	35.7		
PHF	.625	.965	.821	.895	.939	.500	.438	.933	.808	.957	.500	.963	.750	.000	.625	.700	.992
Cars	15	467	324	806	335	2	7	344	39	577	4	620	9	0	5	14	1784
% Cars	100	94.5	99.7	96.6	99.1	100	100	99.1	92.9	96.0	100	95.8	100	0	100	100	96.9
Heavy Vehicles	0	27	1	28	3	0	0	3	3	24	0	27	0	0	0	0	58
% Heavy Vehicles	0	5.5	0.3	3.4	0.9	0	0	0.9	7.1	4.0	0	4.2	0	0	0	0	3.1

Whitman, Requardt & Associates, LLP

Location: Cumberland, Md
Intersection: Rte 51 @ Lamont St
Date: Wednesday, December 16th, 2009
Counter: RZ

File Name : 07 Maryland 51 at Lamont Street
Site Code : 00000000
Start Date : 12/16/2009
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 NB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: JT

File Name : 01B Md 51 Nb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles - Right Turn On Red

	Virginia Avenue From North					MD 51 NB From East					Virginia Avenue From South					MD 51 NB 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	9	0	0	9	12	48	20	0	80	0	10	47	0	57	0	0	0	0	0	0	146	146
07:15 AM	3	13	0	0	16	16	67	16	1	99	0	11	34	1	45	0	0	0	0	0	2	160	162
07:30 AM	2	5	0	0	7	8	78	19	0	105	0	19	29	0	48	0	0	0	0	0	0	160	160
07:45 AM	1	14	0	0	15	12	86	30	0	128	0	15	16	0	31	0	0	0	0	0	0	174	174
Total	6	41	0	0	47	48	279	85	1	412	0	55	126	1	181	0	0	0	0	0	2	640	642
08:00 AM	1	10	0	0	11	9	88	30	0	127	0	11	17	0	28	0	0	0	1	0	1	166	167
08:15 AM	3	13	0	0	16	15	71	26	0	112	0	11	32	0	43	0	0	0	0	0	0	171	171
08:30 AM	6	21	0	0	27	14	65	38	0	117	0	15	17	0	32	0	0	0	0	0	0	176	176
08:45 AM	0	8	0	0	8	14	76	29	0	119	0	15	31	0	46	0	0	0	0	0	0	173	173
Total	10	52	0	0	62	52	300	123	0	475	0	52	97	0	149	0	0	0	1	0	1	686	687
*** BREAK ***																							
03:00 PM	4	10	0	0	14	15	108	49	0	172	0	19	33	0	52	0	0	0	0	0	0	238	238
03:15 PM	3	21	0	0	24	18	111	46	0	175	0	24	36	0	60	0	0	0	1	0	1	259	260
03:30 PM	5	10	0	0	15	14	110	47	0	171	0	28	36	0	64	0	0	0	0	0	0	250	250
03:45 PM	3	15	0	0	18	13	84	35	1	132	0	31	27	0	58	0	0	0	0	0	1	208	209
Total	15	56	0	0	71	60	413	177	1	650	0	102	132	0	234	0	0	0	1	0	2	955	957
04:00 PM	8	19	0	0	27	15	123	60	1	198	0	27	17	0	44	0	0	0	0	0	1	269	270
04:15 PM	5	19	0	0	24	21	110	47	0	178	0	20	26	0	46	0	0	0	0	0	0	248	248
04:30 PM	3	14	0	0	17	14	98	47	0	159	0	17	15	0	32	0	0	0	0	0	0	208	208
04:45 PM	6	29	0	1	35	15	109	44	0	168	0	24	19	0	43	0	0	0	0	0	1	246	247
Total	22	81	0	1	103	65	440	198	1	703	0	88	77	0	165	0	0	0	0	0	2	971	973
Grand Total	53	230	0	1	283	225	1432	583	3	2240	0	297	432	1	729	0	0	0	2	0	7	3252	3259
Apprch %	18.7	81.3	0			10	63.9	26			0	40.7	59.3			0	0	0					
Total %	1.6	7.1	0		8.7	6.9	44	17.9		68.9	0	9.1	13.3		22.4	0	0	0		0	0.2	99.8	
Cars	38	223	0		262	93	1361	570		2027	0	294	411		706	0	0	0		2	0	0	2997
% Cars	71.7	97	0	100	92.3	41.3	95	97.8	100	90.4	0	99	95.1	100	96.7	0	0	0	100	100	0	0	92
Heavy Vehicles	0	7	0		7	1	71	13		85	0	3	21		24	0	0	0		0	0	0	116
% Heavy Vehicles	0	3	0	0	2.5	0.4	5	2.2	0	3.8	0	1	4.9	0	3.3	0	0	0	0	0	0	0	3.6
Right Turn On Red	15	0	0		15	131	0	0		131	0	0	0		0	0	0	0		0	0	0	146
% Right Turn On Red	28.3	0	0	0	5.3	58.2	0	0	0	5.8	0	0	0	0	0	0	0	0	0	0	0	0	4.5

Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 NB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: JT

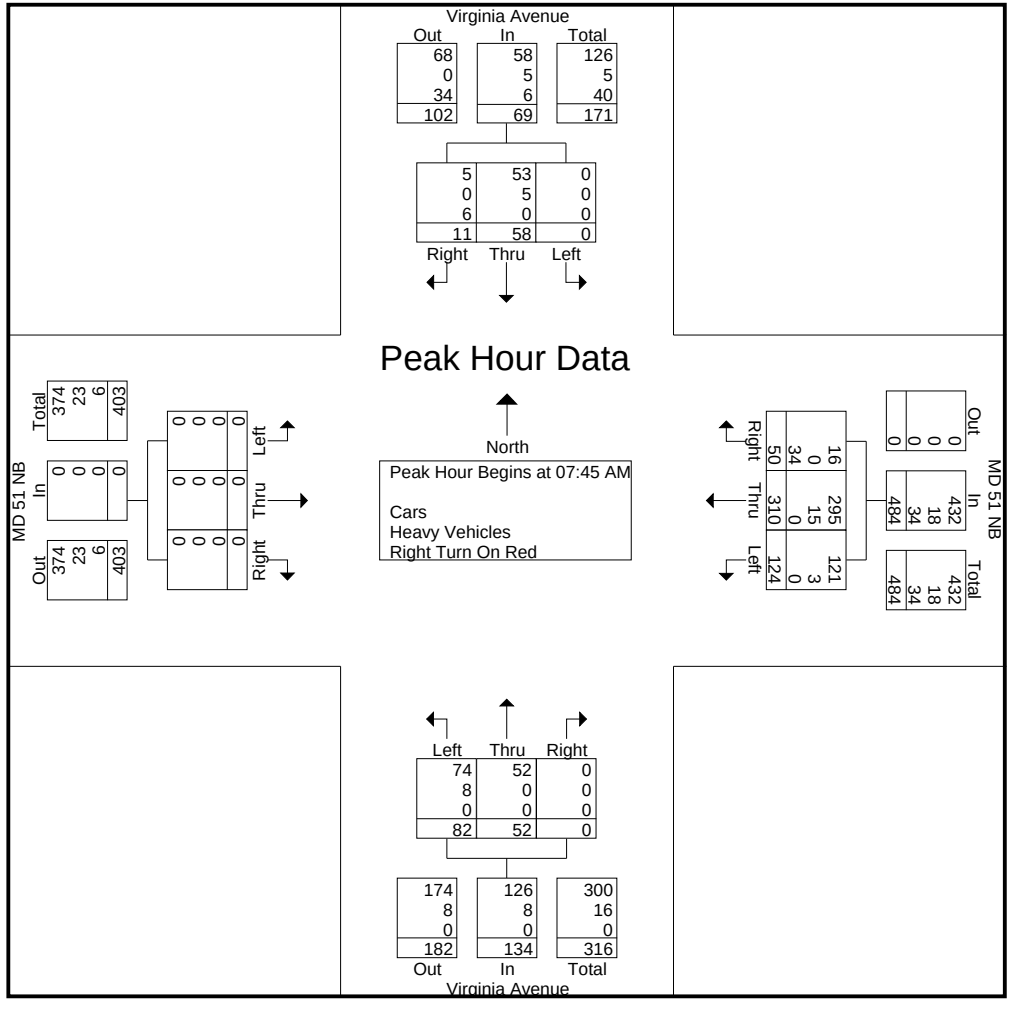
File Name : 01B Md 51 Nb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009

	Virginia Avenue From North				MD 51 NB From East				Virginia Avenue From South				MD 51 NB From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	1	14	0	15	12	86	30	**128**	0	**15**	16	31	0	0	0	0	174
08:00 AM	1	10	0	11	9	**88**	30	127	0	11	17	28	0	0	0	0	166
08:15 AM	3	13	0	16	**15**	71	26	112	0	11	**32**	**43**	0	0	0	0	171
08:30 AM	**6**	**21**	0	**27**	14	65	**38**	117	0	15	17	32	0	0	0	0	**176**
Total Volume	11	58	0	69	50	310	124	484	0	52	82	134	0	0	0	0	687
% App. Total	15.9	84.1	0		10.3	64	25.6		0	38.8	61.2		0	0	0		
PHF	.458	.690	.000	.639	.833	.881	.816	.945	.000	.867	.641	.779	.000	.000	.000	.000	.976
Cars	5	53	0	58	16	295	121	432	0	52	74	126	0	0	0	0	616
% Cars	45.5	91.4	0	84.1	32.0	95.2	97.6	89.3	0	100	90.2	94.0	0	0	0	0	89.7
Heavy Vehicles	0	5	0	5	0	15	3	18	0	0	8	8	0	0	0	0	31
% Heavy Vehicles	0	8.6	0	7.2	0	4.8	2.4	3.7	0	0	9.8	6.0	0	0	0	0	4.5
Right Turn On Red	6	0	0	6	34	0	0	34	0	0	0	0	0	0	0	0	40
% Right Turn On Red	54.5	0	0	8.7	68.0	0	0	7.0	0	0	0	0	0	0	0	0	5.8

Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 NB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: JT

File Name : 01B Md 51 Nb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 NB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: JT

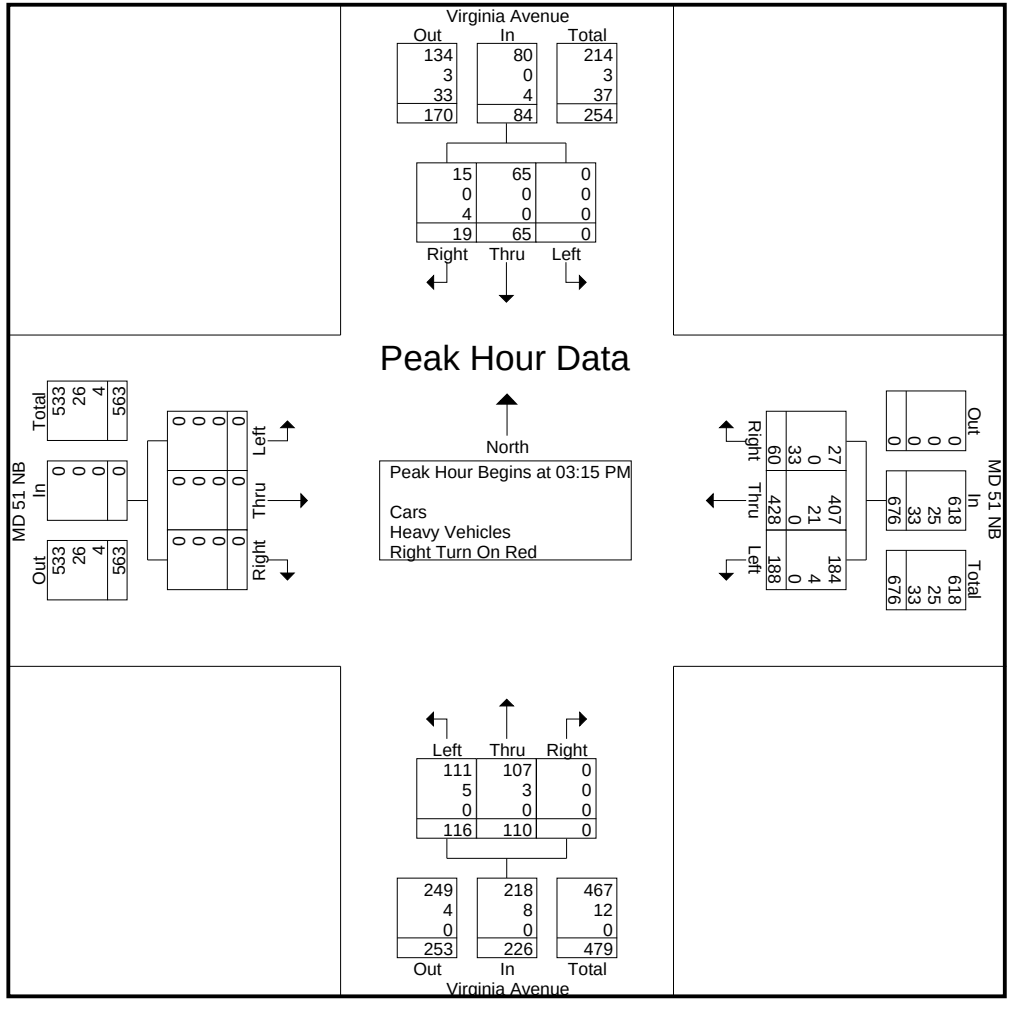
File Name : 01B Md 51 Nb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 4

	Virginia Avenue From North				MD 51 NB From East				Virginia Avenue From South				MD 51 NB From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	3	**21**	0	24	**18**	111	46	175	0	24	**36**	60	0	0	0	0	259
03:30 PM	5	10	0	15	14	110	47	171	0	28	36	**64**	0	0	0	0	250
03:45 PM	3	15	0	18	13	84	35	132	0	**31**	27	58	0	0	0	0	208
04:00 PM	**8**	19	0	**27**	15	**123**	**60**	**198**	0	27	17	44	0	0	0	0	**269**
Total Volume	19	65	0	84	60	428	188	676	0	110	116	226	0	0	0	0	986
% App. Total	22.6	77.4	0		8.9	63.3	27.8		0	48.7	51.3		0	0	0		
PHF	.594	.774	.000	.778	.833	.870	.783	.854	.000	.887	.806	.883	.000	.000	.000	.000	.916
Cars	15	65	0	80	27	407	184	618	0	107	111	218	0	0	0	0	916
% Cars	78.9	100	0	95.2	45.0	95.1	97.9	91.4	0	97.3	95.7	96.5	0	0	0	0	92.9
Heavy Vehicles	0	0	0	0	0	21	4	25	0	3	5	8	0	0	0	0	33
% Heavy Vehicles	0	0	0	0	0	4.9	2.1	3.7	0	2.7	4.3	3.5	0	0	0	0	3.3
Right Turn On Red	4	0	0	4	33	0	0	33	0	0	0	0	0	0	0	0	37
% Right Turn On Red	21.1	0	0	4.8	55.0	0	0	4.9	0	0	0	0	0	0	0	0	3.8

Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 NB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: JT

File Name : 01B Md 51 Nb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 5



Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 SB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: ET

File Name : 01A Md 51 Sb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 1

Groups Printed- Cars - Heavy Vehicles - Right Turn On Red

	Virginia Avenue From North					MD 51 SB From East					Virginia Avenue From South					MD 51 SB 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	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	24	6	0	30	0	0	0	0	0	36	55	0	0	91	34	79	0	0	113	0	234	234
07:15 AM	0	24	6	0	30	0	0	0	0	0	53	44	1	0	98	23	93	7	0	123	0	251	251
07:30 AM	0	23	2	0	25	0	0	0	0	0	68	43	0	0	111	28	87	3	0	118	0	254	254
07:45 AM	0	38	5	0	43	0	0	0	0	0	43	29	0	0	72	30	72	1	0	103	0	218	218
Total	0	109	19	0	128	0	0	0	0	0	200	171	1	0	372	115	331	11	0	457	0	957	957
08:00 AM	0	36	4	0	40	0	0	0	0	0	44	26	0	0	70	35	55	2	0	92	0	202	202
08:15 AM	0	32	7	0	39	0	0	0	0	0	36	37	0	0	73	27	59	6	0	92	0	204	204
08:30 AM	0	53	6	0	59	0	0	0	0	0	34	31	0	0	65	42	61	2	0	105	0	229	229
08:45 AM	0	30	8	0	38	0	0	0	0	0	31	46	0	0	77	28	71	0	0	99	0	214	214
Total	0	151	25	0	176	0	0	0	0	0	145	140	0	0	285	132	246	10	0	388	0	849	849
*** BREAK ***																							
03:00 PM	0	52	6	0	58	0	0	0	0	0	40	56	0	0	96	46	83	4	0	133	0	287	287
03:15 PM	0	66	4	0	70	0	0	0	0	0	63	60	0	0	123	41	108	7	0	156	0	349	349
03:30 PM	0	52	5	0	57	0	0	0	0	0	51	61	0	0	112	45	91	2	0	138	0	307	307
03:45 PM	0	50	3	0	53	0	0	0	0	0	55	55	0	0	110	35	87	3	0	125	0	288	288
Total	0	220	18	0	238	0	0	0	0	0	209	232	0	0	441	167	369	16	0	552	0	1231	1231
04:00 PM	0	64	2	0	66	0	0	0	0	0	32	48	0	0	80	38	110	4	0	152	0	298	298
04:15 PM	0	67	5	0	72	0	0	0	0	0	35	40	0	0	75	37	87	4	4	128	4	275	279
04:30 PM	0	48	6	0	54	0	0	0	0	0	34	30	0	0	64	30	102	3	0	135	0	253	253
04:45 PM	0	71	6	0	77	0	0	0	0	0	37	38	0	0	75	35	98	4	0	137	0	289	289
Total	0	250	19	0	269	0	0	0	0	0	138	156	0	0	294	140	397	15	4	552	4	1115	1119
Grand Total	0	730	81	0	811	0	0	0	0	0	692	699	1	0	1392	554	1343	52	4	1949	4	4152	4156
Apprch %	0	90	10			0	0	0			49.7	50.2	0.1			28.4	68.9	2.7					
Total %	0	17.6	2		19.5	0	0	0		0	16.7	16.8	0		33.5	13.3	32.3	1.3		46.9	0.1	99.9	
Cars	0	710	78		788	0	0	0		0	644	673	1		1318	162	1241	51		1454	0	0	3560
% Cars	0	97.3	96.3	0	97.2	0	0	0	0	0	93.1	96.3	100	0	94.7	29.2	92.4	98.1	0	74.4	0	0	85.7
Heavy Vehicles	0	20	3		23	0	0	0		0	8	24	0		32	17	102	1		120	0	0	175
% Heavy Vehicles	0	2.7	3.7	0	2.8	0	0	0	0	0	1.2	3.4	0	0	2.3	3.1	7.6	1.9	0	6.1	0	0	4.2
Right Turn On Red	0	0	0		0	0	0	0		0	40	2	0		42	375	0	0		379	0	0	421
% Right Turn On Red	0	0	0	0	0	0	0	0	0	0	5.8	0.3	0	0	3	67.7	0	0	100	19.4	0	0	10.1

Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 SB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: ET

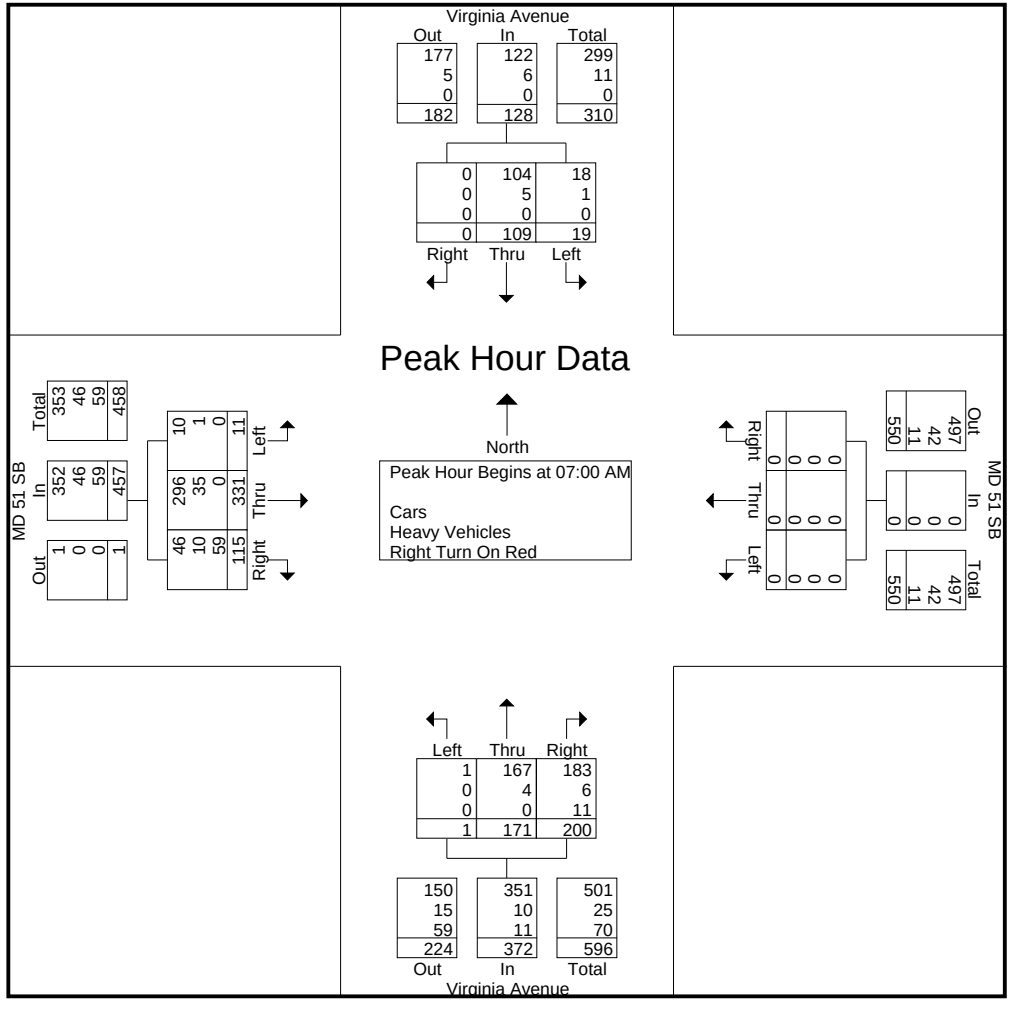
File Name : 01A Md 51 Sb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 2

	Virginia Avenue From North				MD 51 SB From East				Virginia Avenue From South				MD 51 SB From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	24	**6**	30	0	0	0	0	36	**55**	0	91	**34**	79	0	113	234
07:15 AM	0	24	6	30	0	0	0	0	53	44	**1**	98	23	**93**	**7**	**123**	251
07:30 AM	0	23	2	25	0	0	0	0	**68**	43	0	**111**	28	87	3	118	**254**
07:45 AM	0	**38**	5	**43**	0	0	0	0	43	29	0	72	30	72	1	103	218
Total Volume	0	109	19	128	0	0	0	0	200	171	1	372	115	331	11	457	957
% App. Total	0	85.2	14.8		0	0	0		53.8	46	0.3		25.2	72.4	2.4		
PHF	.000	.717	.792	.744	.000	.000	.000	.000	.735	.777	.250	.838	.846	.890	.393	.929	.942
Cars	0	104	18	122	0	0	0	0	183	167	1	351	46	296	10	352	825
% Cars	0	95.4	94.7	95.3	0	0	0	0	91.5	97.7	100	94.4	40.0	89.4	90.9	77.0	86.2
Heavy Vehicles	0	5	1	6	0	0	0	0	6	4	0	10	10	35	1	46	62
% Heavy Vehicles	0	4.6	5.3	4.7	0	0	0	0	3.0	2.3	0	2.7	8.7	10.6	9.1	10.1	6.5
Right Turn On Red	0	0	0	0	0	0	0	0	11	0	0	11	59	0	0	59	70
% Right Turn On Red	0	0	0	0	0	0	0	0	5.5	0	0	3.0	51.3	0	0	12.9	7.3

Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 SB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: ET

File Name : 01A Md 51 Sb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 3



Whitman, Requardt & Associates, LLP

Location: Allegany County, MD
Intersection: MD 51 SB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: ET

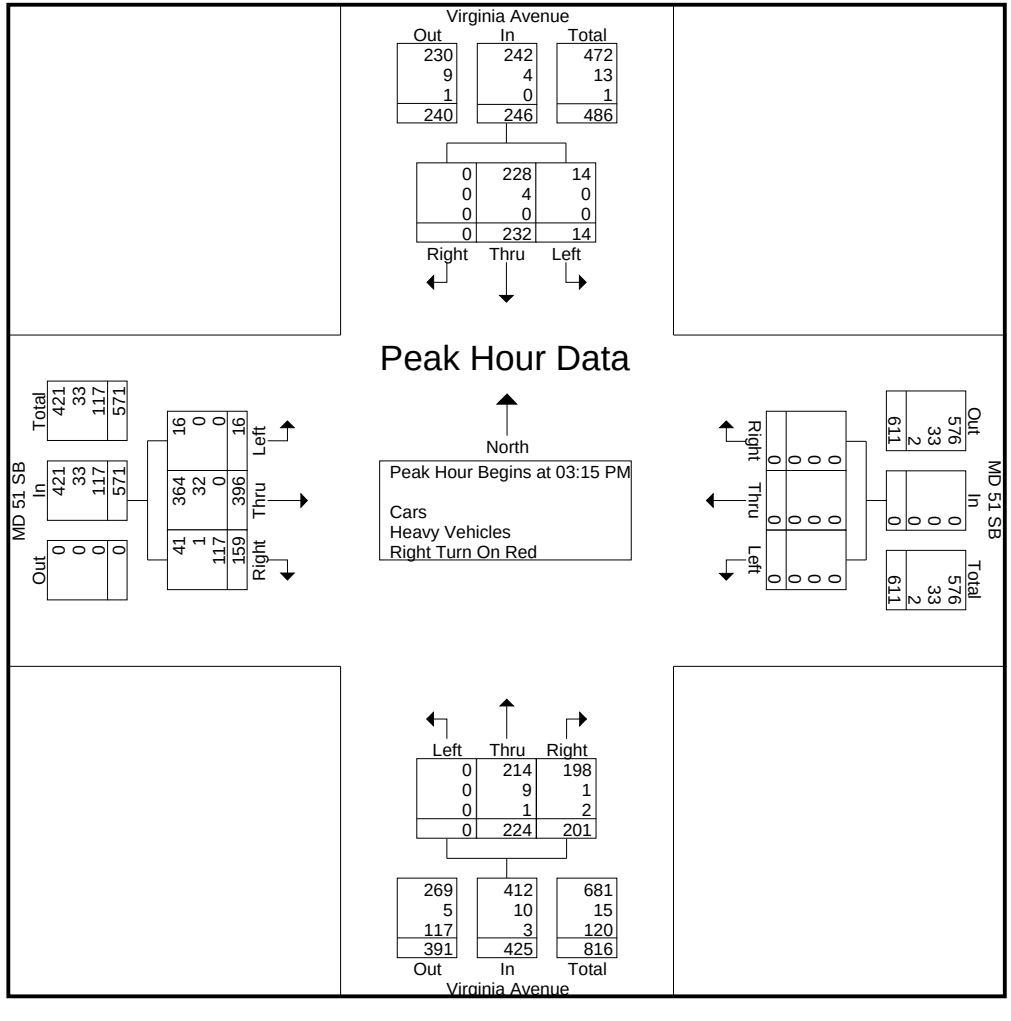
File Name : 01A Md 51 Sb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 4

	Virginia Avenue From North				MD 51 SB From East				Virginia Avenue From South				MD 51 SB From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 04:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	0	**66**	4	**70**	0	0	0	0	**63**	60	0	**123**	41	108	**7**	**156**	**349**
03:30 PM	0	52	**5**	57	0	0	0	0	51	**61**	0	112	**45**	91	2	138	307
03:45 PM	0	50	3	53	0	0	0	0	55	55	0	110	35	87	3	125	288
04:00 PM	0	64	2	66	0	0	0	0	32	48	0	80	38	**110**	4	152	298
Total Volume	0	232	14	246	0	0	0	0	201	224	0	425	159	396	16	571	1242
% App. Total	0	94.3	5.7		0	0	0		47.3	52.7	0		27.8	69.4	2.8		
PHF	.000	.879	.700	.879	.000	.000	.000	.000	.798	.918	.000	.864	.883	.900	.571	.915	.890
Cars	0	228	14	242	0	0	0	0	198	214	0	412	41	364	16	421	1075
% Cars	0	98.3	100	98.4	0	0	0	0	98.5	95.5	0	96.9	25.8	91.9	100	73.7	86.6
Heavy Vehicles	0	4	0	4	0	0	0	0	1	9	0	10	1	32	0	33	47
% Heavy Vehicles	0	1.7	0	1.6	0	0	0	0	0.5	4.0	0	2.4	0.6	8.1	0	5.8	3.8
Right Turn On Red	0	0	0	0	0	0	0	0	2	1	0	3	117	0	0	117	120
% Right Turn On Red	0	0	0	0	0	0	0	0	1.0	0.4	0	0.7	73.6	0	0	20.5	9.7

Whitman, Requardt & Associates, LLP

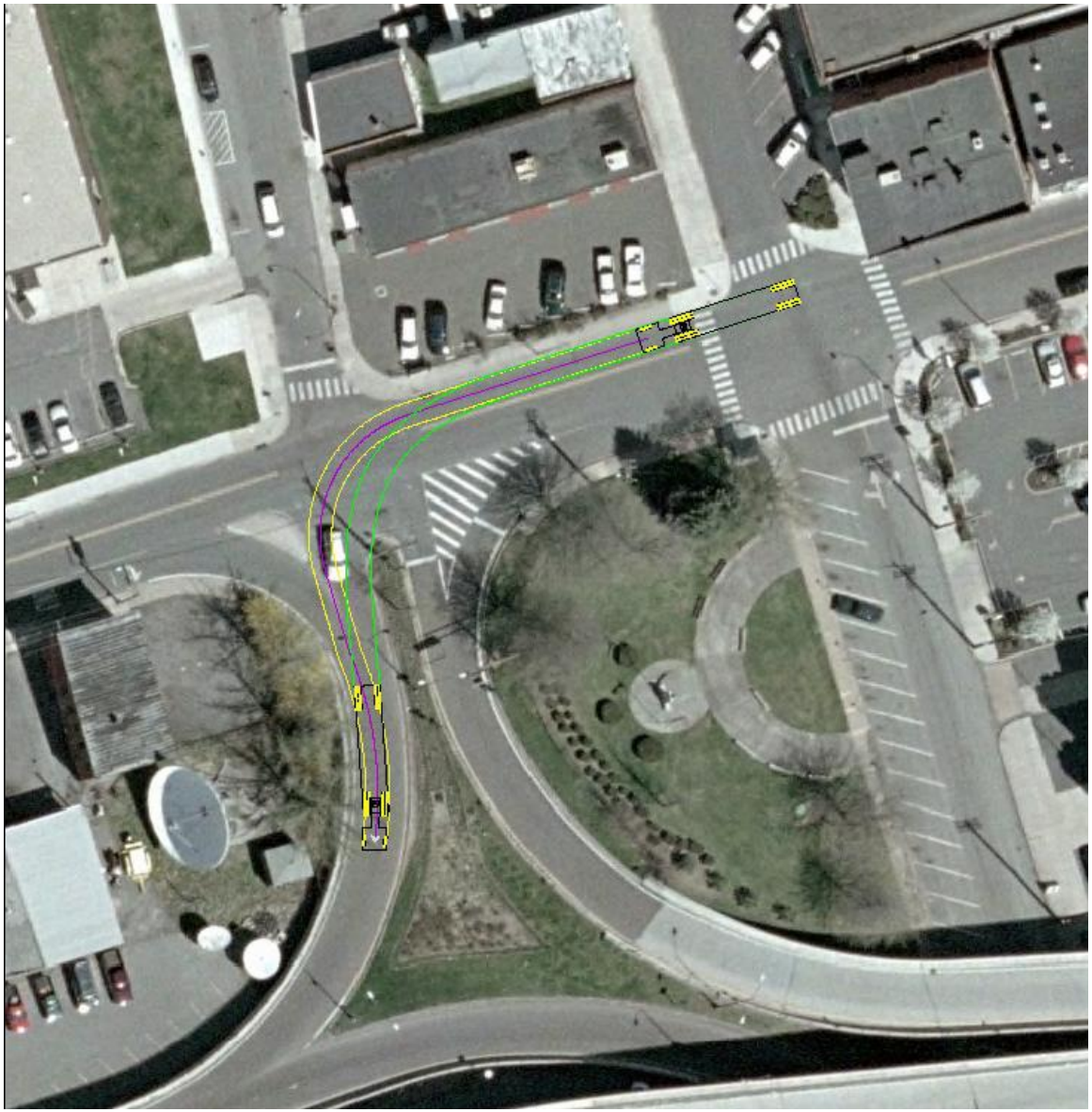
Location: Allegany County, MD
Intersection: MD 51 SB / Virginia Ave.
Date: Wednesday, December 16, 2009
Counter: ET

File Name : 01A Md 51 Sb at Virginia Ave
Site Code : 00000000
Start Date : 12/16/2009
Page No : 5



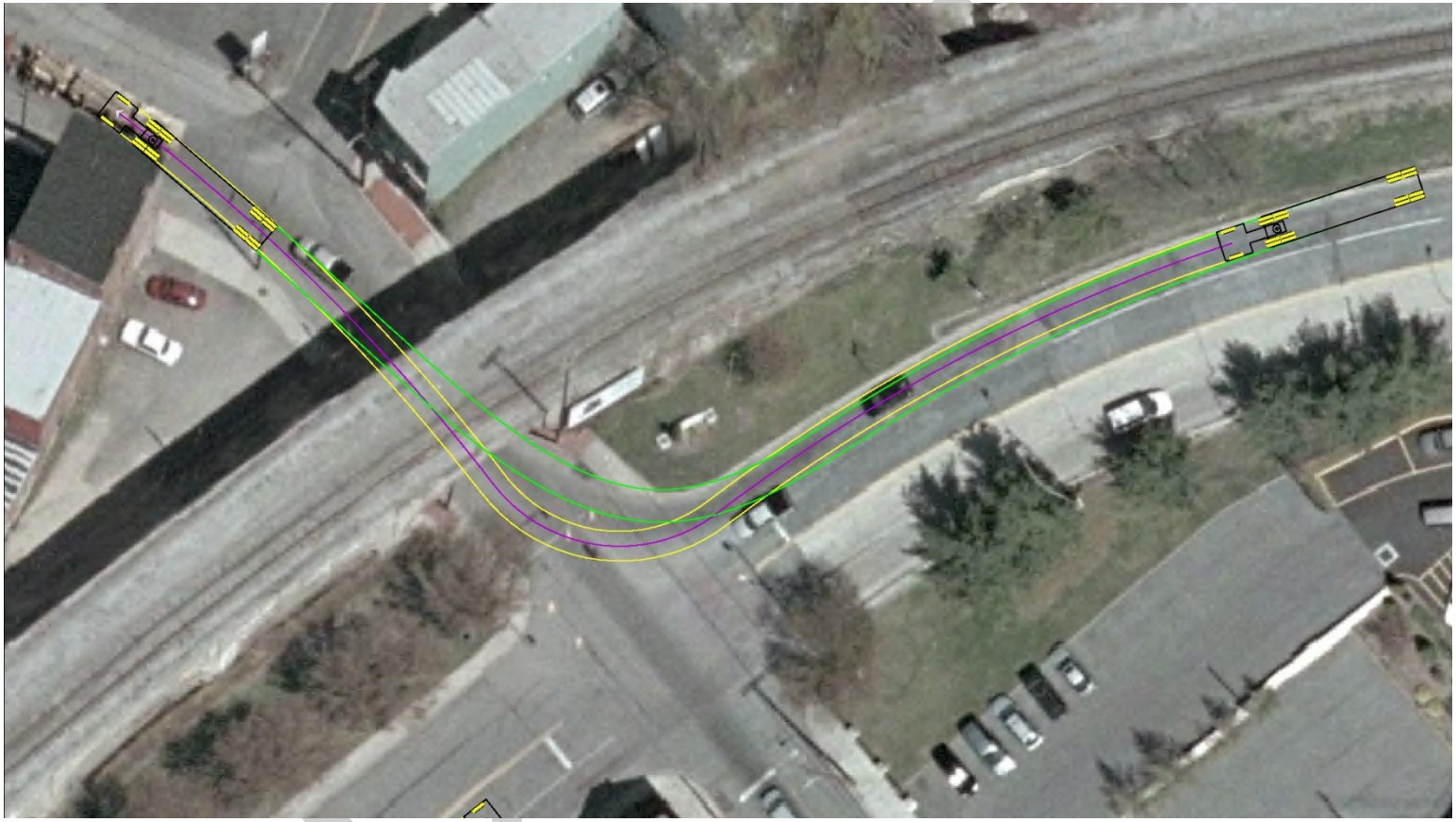
Appendix C:
AutoTURN Graphics

Mechanic Street at Queen City Drive (North Side of City) – Southbound left turn

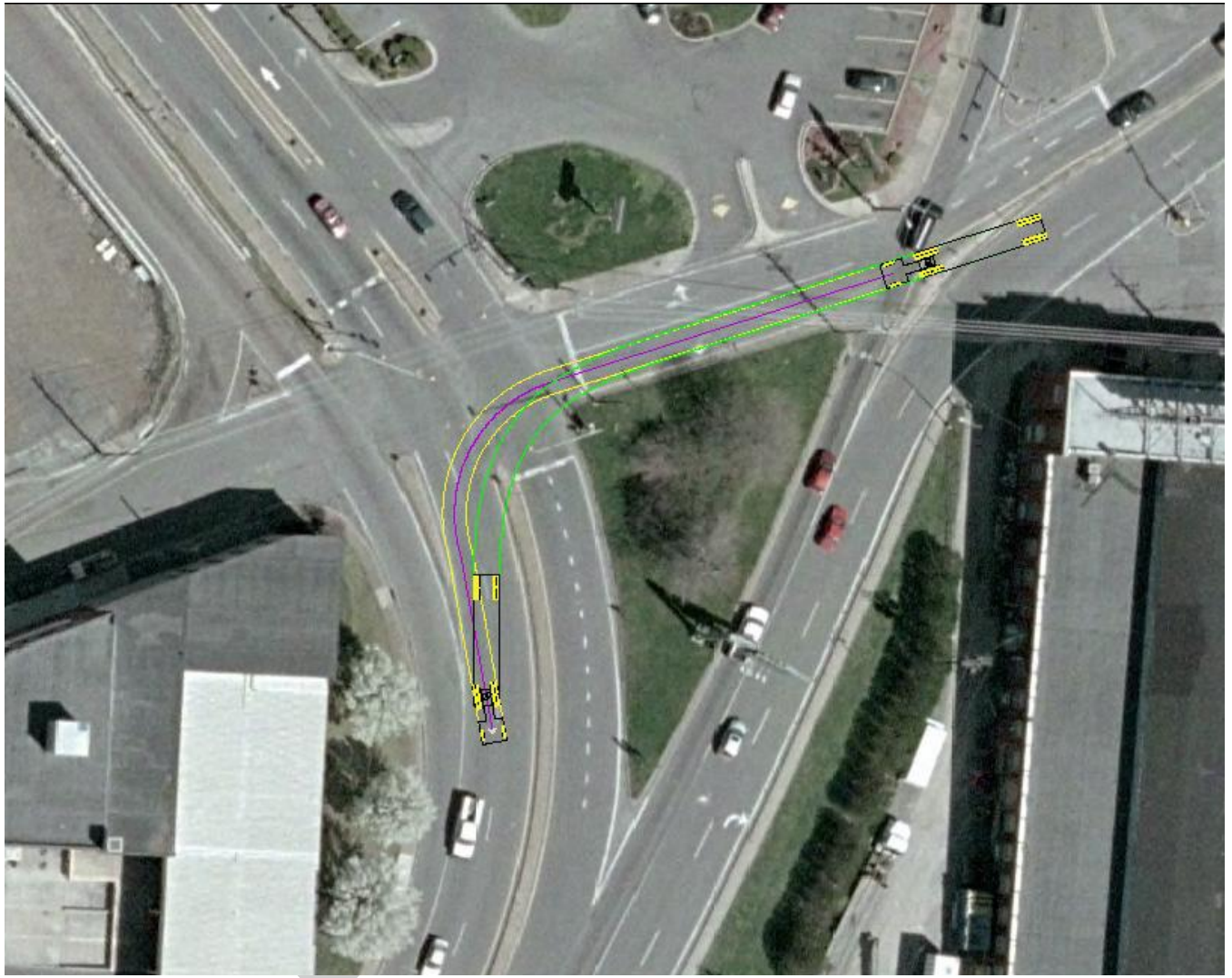


Harrison Street at I-68 Westbound On-ramp/Liberty Street – Westbound left turn

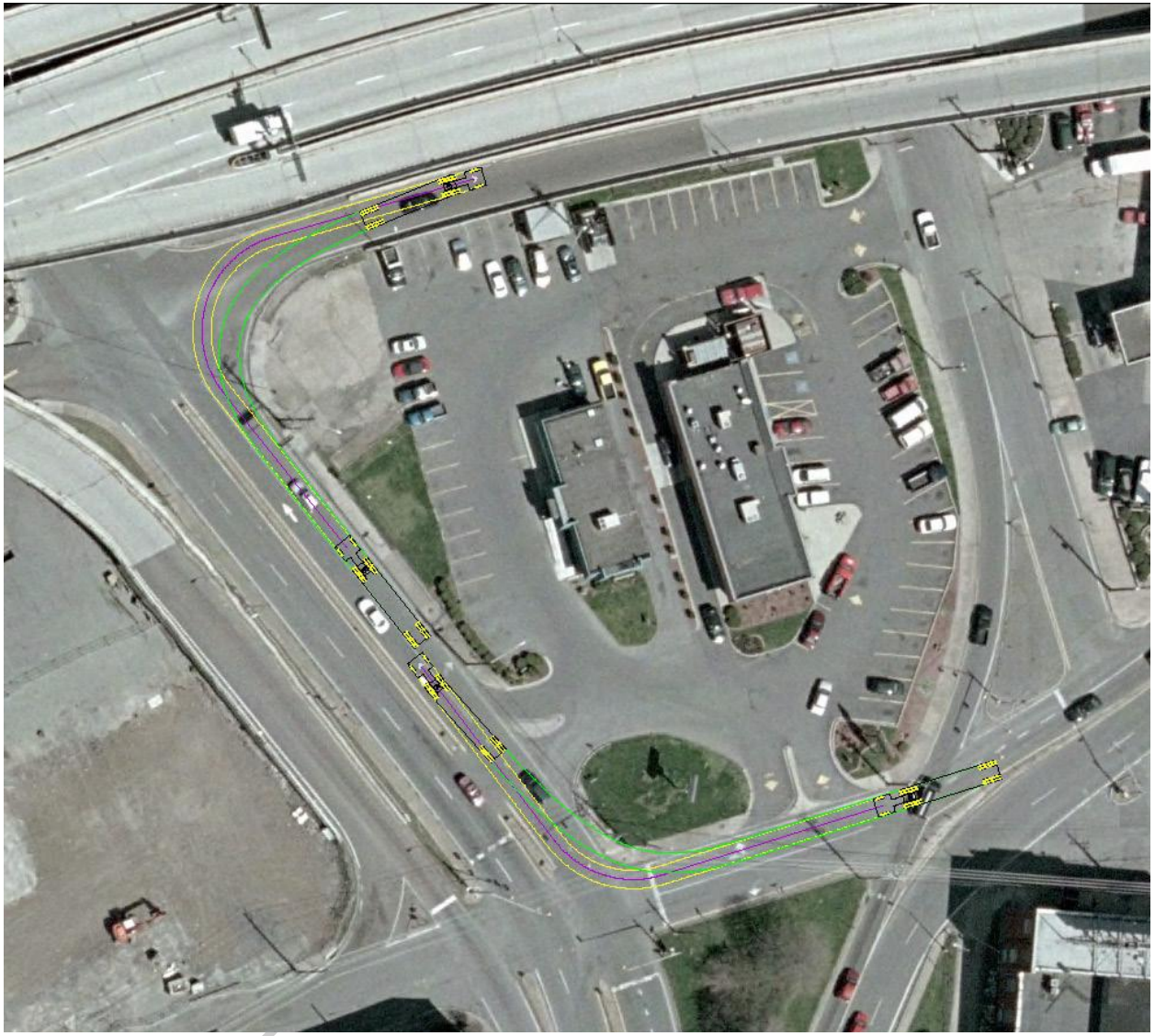
Queen City Drive at Harrison Street – Southbound right turn



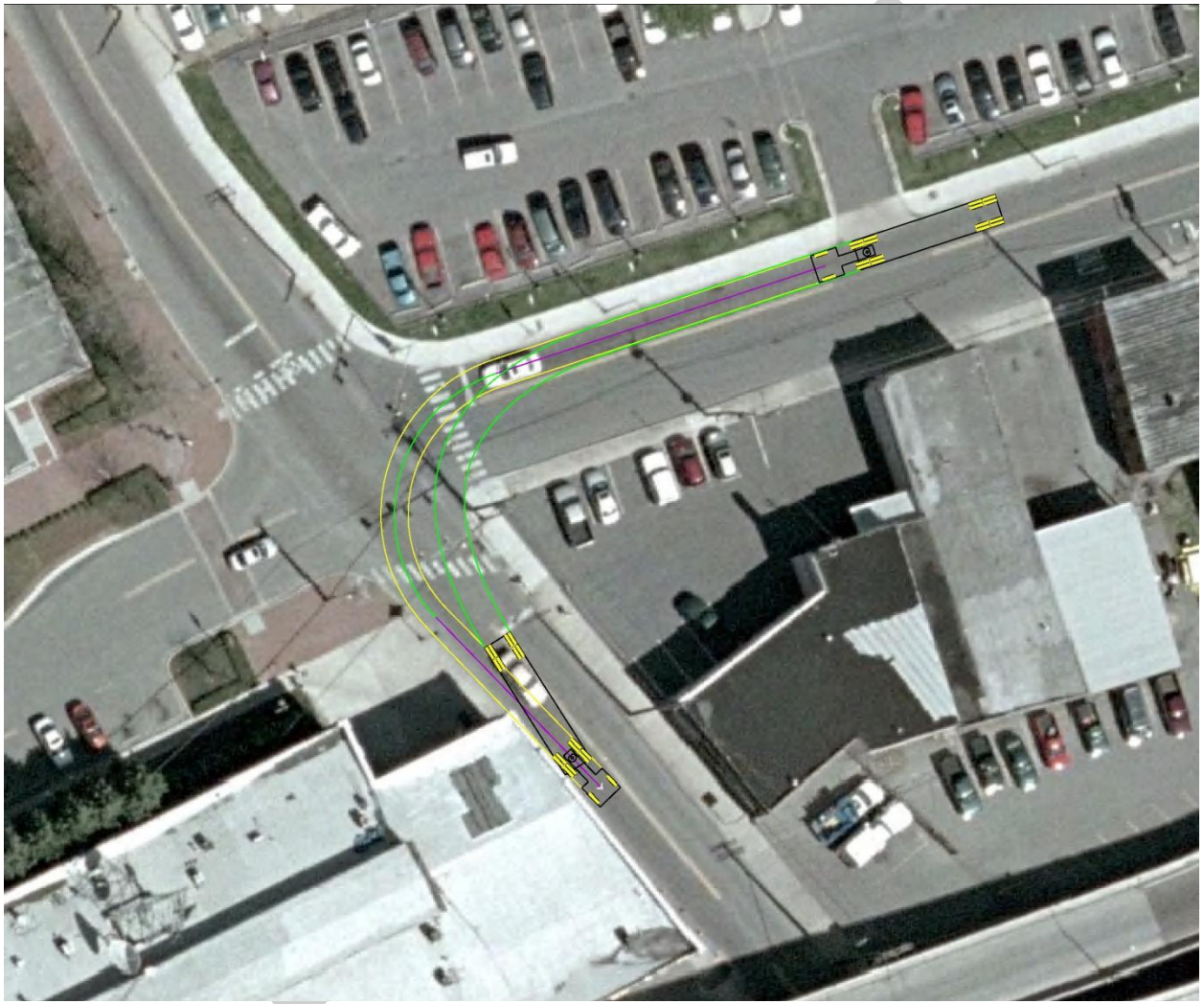
Centre Street at Queen City Drive (North Side of City) – Westbound right turn



MD 51/Mechanic Street at Winston Street – Westbound left turn



MD 51/Mechanic Street at Winston Street – Westbound right turn



Harrison Street at Mechanic Street – Westbound left turn

Appendix D:
Truck Travel Times

Cumberland Traffic Study
Travel Time Data

Travel Time Segments - Mechanic Street Route (7.8 miles)

Benchmark	Description		Travel Times				Average
			9:55 AM	10:04 AM	2:14 PM	2:24 PM	
			Start	*Start*	*Start*	*Start*	
Start			0	0	0	0	
			↓	↓	↓	↓	
1	MD 36 at US 40 Alt.*		0:37	0:51	1:24	0:49	0:55
6	Mechanic Street at Queen City Drive (North Side)*		4:36	4:18	5:25	4:19	4:39
7	Queen City Drive at MD 51		6:43	6:05	8:00	7:25	7:03
5	MD 51 at Mexico Farm Road*		14:33	12:32	15:43	14:12	14:15
Finish	Warrior Run Power Plant*		15:10	13:10	16:19	14:49	14:52

*Route B travel times were used for these legs of the runs

Cumberland Traffic Study
Travel Time Data

Travel Time Segments - Route A (12.8 miles)

Benchmark	Description		Travel Times				Average
			9:21 AM	10:22 AM	1:30 PM	2:20 PM	
			Start	*Start*	*Start*	*Start*	
Start			0	0	0	0	
			↓	↓	↓	↓	
1	MD 36 at US 40 Alt.		0:29	0:28	0:24	0:29	0:27
2	US 40 Alt. at Campground Road		5:37	6:41	6:30*	6:39	6:21
3	Vocke Road at I-68 EB On Ramp		6:25	7:57	7:29	7:33	7:21
4	I-68 EB Off Ramp to MD 51		11:27	13:11	12:53	13:08	12:39
5	MD 51 at Mexico Farm Road		18:09	20:06	20:05	20:01	19:35
Finish	Warrior Run Power Plant		18:47	20:44	20:51	20:37	20:14

*There was flagging operation along a segment of US 40 between benchmarks 1 and 2. We did not stop passing through this segment, but we did have to slow down.

Cumberland Traffic Study
Travel Time Data

Travel Time Segments - Route B (8.0 miles)

Benchmark	Description		Travel Times				Average
			10:00 AM	10:59 AM	2:10 PM	3:04 PM	
			Start	*Start*	*Start*	*Start*	
Start			0	0	0	0	
			↓	↓	↓	↓	
1	MD 36 at US 40 Alt.		0:37	0:51	1:24	0:49	0:55
6	Mechanic Street at Queen City Drive (North Side)		4:36	4:18	5:25	4:19	4:39
7	Queen City Drive at MD 51		7:28	7:16	7:23	6:42	7:12
5	MD 51 at Mexico Farm Road		15:18	13:43	15:06	13:29	14:24
Finish	Warrior Run Power Plant		15:55	14:21	15:42	14:06	15:01

Cumberland Traffic Study
Travel Time Data

Travel Time Segments - Route C (8.0 miles)

Benchmark	Description		Travel Times				Average
			9:25 AM	10:36 AM	12:43 PM	3:43 PM	
			Start	*Start*	*Start*	*Start*	
Start			0	0	0	0	
			↓	↓	↓	↓	
1	MD 36 at US 40 Alt.		0:23	1:31*	1:04	1:45	1:10
8	US 40 Alt. at Henderson Avenue		3:27	3:31	3:37	3:50	3:36
9	Henderson Avenue at Baltimore Street		6:20	6:29	6:38	6:49	6:34
10	Baltimore Street at Queen City Drive		6:36	6:40	6:49	7:04	6:47
7	Queen City Drive at MD 51		7:57	8:05	8:21	8:11	8:08
5	MD 51 at Mexico Farm Road		15:48	14:30	15:17	16:50	15:36
Finish	Warrior Run Power Plant		16:29	15:06	15:54	17:36	16:16

*Long queue did not clear on green. We had to wait through one extra cycle to clear the MD 36 at US 40 Alt. intersection.

Appendix E:
Intersection Analyses

City of Cumberland
Wednesday TMC

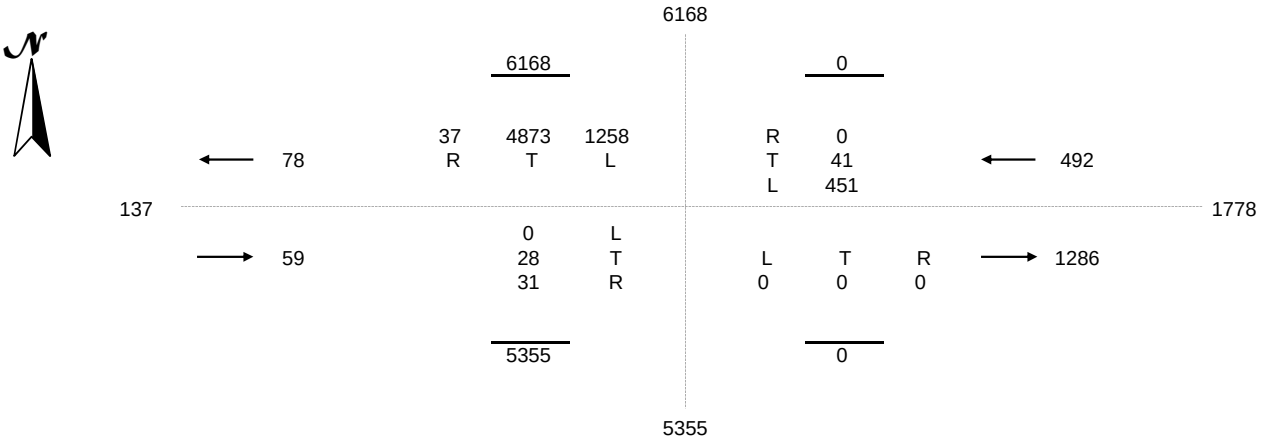
Location:	Mechanic Street at Queen City Drive	**County:**	Allegany
Date:	12/16/2009	**CITY**	Cumberland
Recorder:	BB	**Weather:**	

Street Name / Hour Ending	Mechanic Street From North				Mechanic Street From South				Queen City Drive From East				Parking Lot From West				TOTAL
	L	T	R	TOTAL	L	T	R	TOTAL	L	T	R	TOTAL	L	T	R	TOTAL	
07:00	30	194	0	224	0	0	0	0	2	0	0	2	0	0	0	0	226
08:00	99	323	1	423	0	0	0	0	7	2	0	9	0	0	0	0	432
09:00	106	389	4	499	0	0	0	0	27	5	0	32	0	1	3	4	535
10:00	90	294	6	390	0	0	0	0	32	5	0	37	0	3	0	3	430
11:00	93	347	5	445	0	0	0	0	45	5	0	50	0	2	5	7	502
12:00	123	443	0	566	0	0	0	0	48	6	0	54	0	6	4	10	630
13:00	108	401	6	515	0	0	0	0	40	4	0	44	0	2	6	8	567
14:00	124	464	8	596	0	0	0	0	53	3	0	56	0	2	0	2	654
15:00	115	419	1	535	0	0	0	0	52	2	0	54	0	2	2	4	593
16:00	120	485	5	610	0	0	0	0	36	2	0	38	0	3	5	8	656
17:00	109	407	0	516	0	0	0	0	52	4	0	56	0	4	2	6	578
18:00	76	424	1	501	0	0	0	0	30	2	0	32	0	2	4	6	539
19:00	65	283	0	348	0	0	0	0	27	1	0	28	0	1	0	1	377
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1258	4873	37	6168	0	0	0	0	451	41	0	492	0	28	31	59	6719

PEDESTRIAN SCHOOL CHILDREN & U-TURN BREAKDOWN

HOUR	NORTH LEG PED.	NORTH LEG U.T.	SOUTH LEG PED.	SOUTH LEG U.T.	EAST LEG PED.	EAST LEG U.T.	WEST LEG PED.	WEST LEG U.T.
6:00 - 7:00	0	0	0	0	0	0	0	0
7:00 - 8:00	0	0	0	0	0	0	0	0
8:00 - 9:00	0	0	0	0	0	0	0	0
9:00 - 10:00	0	0	0	0	0	0	0	0
10:00 - 11:00	0	0	0	0	0	0	0	0
11:00 - 12:00	0	0	0	0	0	0	0	0
12:00 - 1:00	0	0	0	0	0	0	0	0
1:00 - 2:00	0	0	0	0	0	0	0	0
2:00 - 3:00	0	0	0	0	0	0	0	0
3:00 - 4:00	0	0	0	0	0	0	0	0
4:00 - 5:00	0	0	0	0	0	0	0	0
5:00 - 6:00	0	0	0	0	0	0	0	0
6:00 - 7:00	0	0	0	0	0	0	0	0
7:00 - 8:00	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0

12 HOUR SUMMARY



TRAFFIC SIGNAL WARRANT No. 1 (CONDITION A) - ANALYSIS WORKSHEET

MAJOR ROAD : Mechanic Street
MINOR ROAD : Queen City Drive

ROAD NUMBER:
DAYS Thursday
COUNT DATES: 12/16/09

TIME	VOLUMES COUNTED														WARRANT No. 1		
	MAJOR ROAD - 1 LANE Mechanic Street							MINOR ROAD - 2 LANE Queen City Drive							CONDITION A (100%)		
	Northbound			Southbound			TOTAL BOTH APPROACHES	Eastbound			Westbound			MAXIMUM VOLUME - ONE APPROACH	Major	Minor	Major & Minor
	☐ LT	☐ TH	☐ RT	☐ LT	☑ TH	☑ RT		☑ LT	☑ TH	☑ RT	☑ LT	☑ TH	☑ RT		500	150	
6:00 - 7:00 AM	0	0	0	30	194	0	194	0	0	0	2	0	0	2			
7:00 - 8:00 AM	0	0	0	99	323	1	324	0	0	0	7	2	0	9			
8:00 - 9:00 AM	0	0	0	106	389	4	393	0	1	3	27	5	0	32			
9:00 - 10:00 AM	0	0	0	90	294	6	300	0	3	0	32	5	0	37			
10:00 - 11:00 AM	0	0	0	93	347	5	352	0	2	5	45	5	0	50			
11:00 AM- 12:00 PM	0	0	0	123	443	0	443	0	6	4	48	6	0	54			
12:00 - 1:00 PM	0	0	0	108	401	6	407	0	2	6	40	4	0	44			
1:00 - 2:00 PM	0	0	0	124	464	8	472	0	2	0	53	3	0	56			
2:00 - 3:00 PM	0	0	0	115	419	1	420	0	2	2	52	2	0	54			
3:00 - 4:00 PM	0	0	0	120	485	5	490	0	3	5	36	2	0	38			
4:00 - 5:00 PM	0	0	0	109	407	0	407	0	4	2	52	4	0	56			
5:00 - 6:00 PM	0	0	0	76	424	1	425	0	2	4	30	2	0	32			
6:00 - 7:00 PM	0	0	0	65	283	0	283	0	1	0	27	1	0	28			
7:00 - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
NUMBER OF HOURS SATISFIED															0	0	0
SIGNAL WARRANTED (8 HRS OR MORE MAJOR & MINOR SATISFIED)															NO		

TRAFFIC SIGNAL WARRANT No. 1 (CONDITION B) - ANALYSIS WORKSHEET

MAJOR ROAD : Mechanic Street
MINOR ROAD : Queen City Drive

ROAD NUMBER:
DAY: Thursday COUNT DATE: 12/16/09

TIME	VOLUMES COUNTED														WARRANT No. 1		
	MAJOR ROAD - 1 LANE Mechanic Street							MINOR ROAD - 2 LANE Queen City Drive							CONDITION B (100%)		
	Northbound			Southbound			TOTAL BOTH APPROACHES	Eastbound			Westbound			MAXIMUM VOLUME - ONE APPROACH	Major	Minor	Major & Minor
	☐ LT	☐ TH	☐ RT	☐ LT	☑ TH	☐ RT		☑ LT	☑ TH	☑ RT	☑ LT	☑ TH	☑ RT		750	75	
6:00 - 7:00 AM	0	0	0	30	194	0	194	0	0	0	2	0	0	2			
7:00 - 8:00 AM	0	0	0	99	323	1	323	0	0	0	7	2	0	9			
8:00 - 9:00 AM	0	0	0	106	389	4	389	0	1	3	27	5	0	32			
9:00 - 10:00 AM	0	0	0	90	294	6	294	0	3	0	32	5	0	37			
10:00 - 11:00 AM	0	0	0	93	347	5	347	0	2	5	45	5	0	50			
11:00 AM- 12:00 PM	0	0	0	123	443	0	443	0	6	4	48	6	0	54			
12:00 - 1:00 PM	0	0	0	108	401	6	401	0	2	6	40	4	0	44			
1:00 - 2:00 PM	0	0	0	124	464	8	464	0	2	0	53	3	0	56			
2:00 - 3:00 PM	0	0	0	115	419	1	419	0	2	2	52	2	0	54			
3:00 - 4:00 PM	0	0	0	120	485	5	485	0	3	5	36	2	0	38			
4:00 - 5:00 PM	0	0	0	109	407	0	407	0	4	2	52	4	0	56			
5:00 - 6:00 PM	0	0	0	76	424	1	424	0	2	4	30	2	0	32			
6:00 - 7:00 PM	0	0	0	65	283	0	283	0	1	0	27	1	0	28			
7:00 - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
NUMBER OF HOURS SATISFIED															0	0	0
SIGNAL WARRANTED (8 HRS OR MORE MAJOR & MINOR SATISFIED)															NO		

TRAFFIC SIGNAL WARRANT No. 1 (COMBINATION OF CONDITIONS A and B) - ANALYSIS WORKSHEET

MAJOR ROAD : Mechanic Street ROAD NUMBER:
MINOR ROAD : Queen City Drive DAY: Thursday COUNT DATE: 12/16/09

TIME	VOLUMES COUNTED														WARRANT No. 1 (80% VOLUMES)				
	MAJOR ROAD - 1 LANE Mechanic Street							MINOR ROAD - 2 LANE Queen City Drive							CONDITION A		CONDITION B		
	Northbound			Southbound			TOTAL BOTH APPROACHES	Eastbound			Westbound			MAXIMUM VOLUME - ONE APPROACH	Major	Minor	Major	Minor	Combination A & B
	☐ LT	☐ TH	☐ RT	☐ LT	☑ TH	☑ RT		☑ LT	☑ TH	☑ RT	☑ LT	☑ TH	☑ RT		400	120	600	60	
6:00 - 7:00 AM	0	0	0	30	194	0	194	0	0	0	2	0	0	2					
7:00 - 8:00 AM	0	0	0	99	323	1	324	0	0	0	7	2	0	9					
8:00 - 9:00 AM	0	0	0	106	389	4	393	0	1	3	27	5	0	32					
9:00 - 10:00 AM	0	0	0	90	294	6	300	0	3	0	32	5	0	37					
10:00 - 11:00 AM	0	0	0	93	347	5	352	0	2	5	45	5	0	50					
11:00 AM- 12:00 PM	0	0	0	123	443	0	443	0	6	4	48	6	0	54					
12:00 - 1:00 PM	0	0	0	108	401	6	407	0	2	6	40	4	0	44					
1:00 - 2:00 PM	0	0	0	124	464	8	472	0	2	0	53	3	0	56					
2:00 - 3:00 PM	0	0	0	115	419	1	420	0	2	2	52	2	0	54					
3:00 - 4:00 PM	0	0	0	120	485	5	490	0	3	5	36	2	0	38					
4:00 - 5:00 PM	0	0	0	109	407	0	407	0	4	2	52	4	0	56					
5:00 - 6:00 PM	0	0	0	76	424	1	425	0	2	4	30	2	0	32					
6:00 - 7:00 PM	0	0	0	65	283	0	283	0	1	0	27	1	0	28					
7:00 - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
NUMBER OF HOURS SATISFIED															7	0	0	0	0
SIGNAL WARRANTED (8 HRS OR MORE MAJOR & MINOR SATISFIED)															NO				

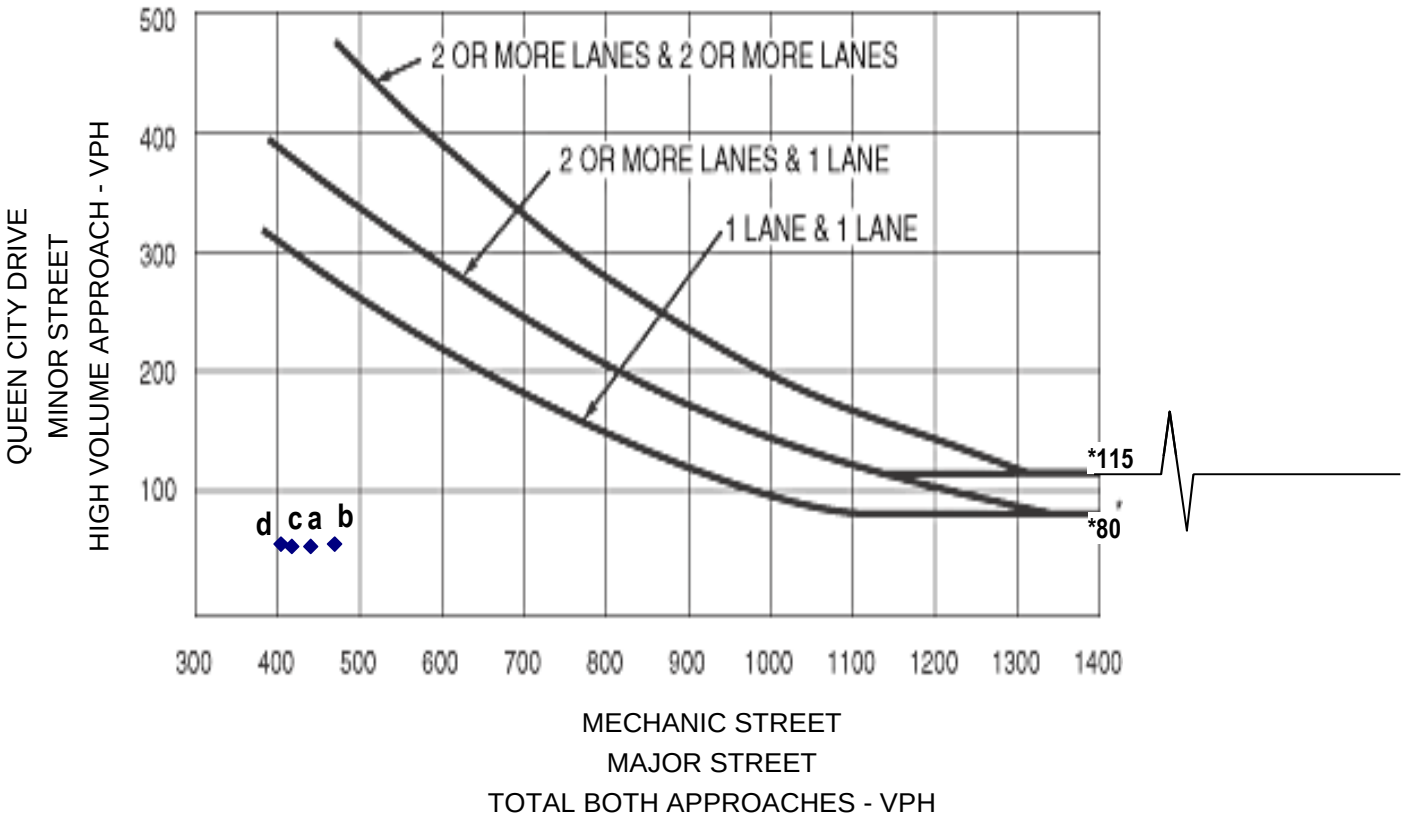
FOUR HOUR VOLUME WARRANT

a:(407,56)

b:(472,56)

c:(443,54)

d:(420,54)



WARRANT MET: NO

NOTE: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for minor street approach with one lane

WARRANT 2 - FOUR HOUR VEHICULAR VOLUME

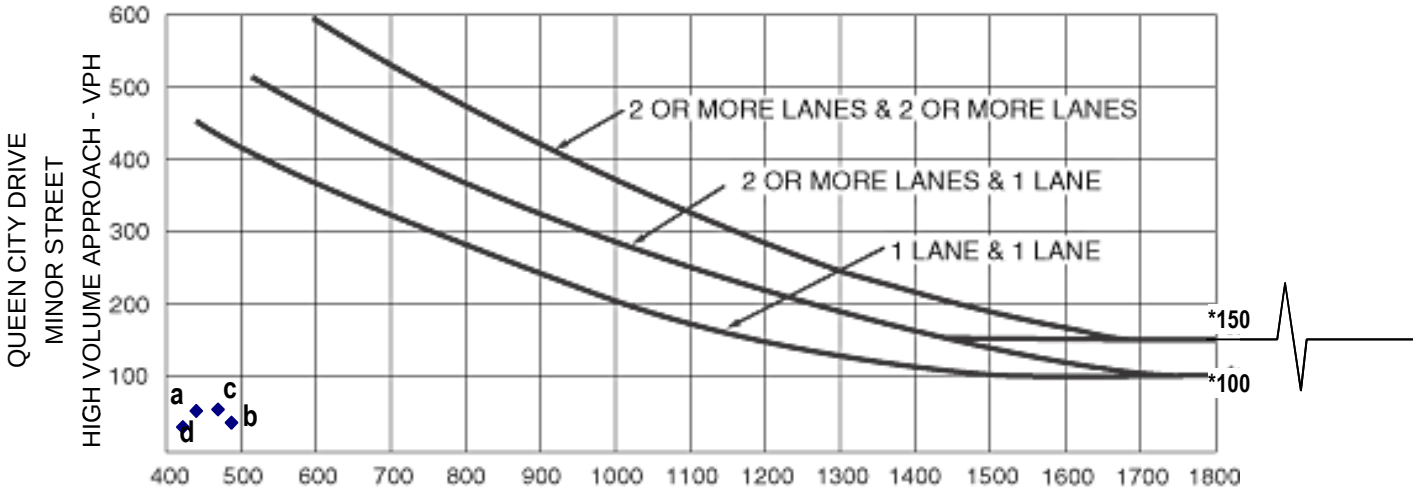
PEAK HOUR VOLUME WARRANT

a:(443,54)

b:(490,38)

c:(425,32)

d:(472,56)



WARRANT MET: NO

NOTE: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for minor street approach with one lane

WARRANT 3 - PEAK HOUR

SIGNAL WARRANT ANALYSIS SUMMARY

WARRANT	CRITERIA			NO. OF HOURS OR CRITERIA OBSERVED	WARRANT SATISFIED
	Major Street Volume (VPH)	Minor-street Volume (VPH)	Number of Hours Required		
1A – Minimum Vehicular Volume	500	150	8	0 hours	NO
1B – Interruption of Continuous Traffic	750	75	8	0 hours	
1C – Combination Warrant	400	120	8	0 hours	
80% of Warrants 1A & 1B (56% of Warrants #1A & 1B)	600	60			
2 – Four-Hour Warrant	(See Appendix for charts)		4	0 hours	NO
3A – Peak-Hour Delay Warrant	Total Delay > 4 Veh-hours Approach Volume ≥ 100 VPH Total Entering Volume ≥ 800 VPH		1	N/A N/A	NO
3B – Peak-Hour Volume Warrant	(See Figure 4C-1 and 4C-2)		1	443 vph (AM) 425 vph (PM) 54 vph (AM) 32 vph (PM)	
4 – Pedestrian Volume	100 or more pedestrians for any 4 hours OR 190 or more pedestrians during any 1 hour AND Fewer than 60 gaps/hour of adequate length for pedestrians to cross during same period observed above.			N/A	N/A
5 – School Crossing	Intersection is not used as crossing for school children.			N/A	N/A
6 – Coordinated Signal System	In order to maintain proper grouping of vehicles Within a signal system.			N/A	N/A
7 – Crash Experience	Five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred in a 12-month period. Also, 80% of either Warrant #1 or Warrant #2 is satisfied.			80% of either warrant #1 or warrant #2 not satisfied	NO
8 – Roadway Network	Intersection of two major roadways.			NO	NO

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	2:50	2:50	2:50	2:50	2:50	2:50
End Time	4:00	4:00	4:00	4:00	4:00	4:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	634	622	659	613	662	638
Vehs Exited	631	623	658	615	656	636
Starting Vehs	1	9	8	8	2	5
Ending Vehs	4	8	9	6	8	6
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	183	179	187	177	190	183
Travel Time (hr)	6.8	6.7	7.0	6.6	7.1	6.8
Total Delay (hr)	0.5	0.5	0.5	0.4	0.5	0.5
Total Stops	56	62	83	67	62	65
Fuel Used (gal)	5.8	5.8	6.0	5.6	5.9	5.8

Interval #0 Information Seeding

Start Time	2:50
End Time	3:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:00
End Time	4:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	634	622	659	613	662	638
Vehs Exited	631	623	658	615	656	636
Starting Vehs	1	9	8	8	2	5
Ending Vehs	4	8	9	6	8	6
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	183	179	187	177	190	183
Travel Time (hr)	6.8	6.7	7.0	6.6	7.1	6.8
Total Delay (hr)	0.5	0.5	0.5	0.4	0.5	0.5
Total Stops	56	62	83	67	62	65
Fuel Used (gal)	5.8	5.8	6.0	5.6	5.9	5.8

1: Mechanic Street & Queen City Drive Performance by approach

Approach	SE	NE	SW	All
Total Delay (hr)	0.1	0.0	0.1	0.2
Delay / Veh (s)	0.6	5.3	7.8	1.3
Total Stops	0	9	56	65
Travel Dist (mi)	27.7	0.2	5.5	33.4
Travel Time (hr)	1.1	0.0	0.3	1.4
Avg Speed (mph)	26	9	17	23
Fuel Used (gal)	0.8	0.0	0.2	1.0
HC Emissions (g)	6	0	1	7
CO Emissions (g)	174	1	30	205
NOx Emissions (g)	21	0	2	23
Vehicles Entered	571	9	57	637
Vehicles Exited	570	9	56	635
Hourly Exit Rate	570	9	56	635
Input Volume	566	10	54	630
% of Volume	101	90	104	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	0.5
Delay / Veh (s)	2.7
Total Stops	65
Travel Dist (mi)	183.0
Travel Time (hr)	6.8
Avg Speed (mph)	27
Fuel Used (gal)	5.8
HC Emissions (g)	44
CO Emissions (g)	1362
NOx Emissions (g)	136
Vehicles Entered	638
Vehicles Exited	636
Hourly Exit Rate	636
Input Volume	1826
% of Volume	35
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Mechanic Street & Queen City Drive

Movement	SE	NE	SW
Directions Served	L	TR	LT
Maximum Queue (ft)	5	31	60
Average Queue (ft)	0	7	28
95th Queue (ft)	4	27	50
Link Distance (ft)		128	511
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	175		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	2:50	2:50	2:50	2:50	2:50	2:50
End Time	4:00	4:00	4:00	4:00	4:00	4:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	673	672	622	623	622	642
Vehs Exited	672	668	623	621	621	641
Starting Vehs	7	5	8	5	7	6
Ending Vehs	8	9	7	7	8	7
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	195	193	181	182	180	186
Travel Time (hr)	7.2	7.3	6.7	6.7	6.7	6.9
Total Delay (hr)	0.5	0.5	0.4	0.5	0.4	0.5
Total Stops	44	49	45	38	41	44
Fuel Used (gal)	6.2	6.3	5.7	5.7	5.5	5.9

Interval #0 Information Seeding

Start Time	2:50
End Time	3:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:00
End Time	4:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	673	672	622	623	622	642
Vehs Exited	672	668	623	621	621	641
Starting Vehs	7	5	8	5	7	6
Ending Vehs	8	9	7	7	8	7
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	195	193	181	182	180	186
Travel Time (hr)	7.2	7.3	6.7	6.7	6.7	6.9
Total Delay (hr)	0.5	0.5	0.4	0.5	0.4	0.5
Total Stops	44	49	45	38	41	44
Fuel Used (gal)	6.2	6.3	5.7	5.7	5.5	5.9

1: Mechanic Street & Queen City Drive Performance by approach

Approach	SE	NE	SW	All
Total Delay (hr)	0.1	0.0	0.1	0.2
Delay / Veh (s)	0.6	4.7	8.3	1.1
Total Stops	1	7	36	44
Travel Dist (mi)	29.0	0.2	3.5	32.6
Travel Time (hr)	1.1	0.0	0.2	1.4
Avg Speed (mph)	26	9	16	24
Fuel Used (gal)	0.9	0.0	0.1	1.0
HC Emissions (g)	8	0	0	8
CO Emissions (g)	201	0	16	217
NOx Emissions (g)	25	0	1	26
Vehicles Entered	598	7	36	641
Vehicles Exited	598	7	36	641
Hourly Exit Rate	598	7	36	641
Input Volume	610	8	38	656
% of Volume	98	88	95	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	0.5
Delay / Veh (s)	2.7
Total Stops	44
Travel Dist (mi)	186.2
Travel Time (hr)	6.9
Avg Speed (mph)	27
Fuel Used (gal)	5.9
HC Emissions (g)	51
CO Emissions (g)	1445
NOx Emissions (g)	153
Vehicles Entered	642
Vehicles Exited	641
Hourly Exit Rate	641
Input Volume	1922
% of Volume	33
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Mechanic Street & Queen City Drive

Movement	SE	NE	SW
Directions Served	L	TR	LT
Maximum Queue (ft)	15	31	52
Average Queue (ft)	1	5	22
95th Queue (ft)	7	23	48
Link Distance (ft)		128	511
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	175		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	2:50	2:50	2:50	2:50	2:50	2:50
End Time	4:00	4:00	4:00	4:00	4:00	4:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	634	622	659	613	655	637
Vehs Exited	632	623	658	616	650	637
Starting Vehs	2	9	8	9	2	6
Ending Vehs	4	8	9	6	7	6
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	183	179	188	177	188	183
Travel Time (hr)	7.0	6.8	7.1	6.7	7.1	6.9
Total Delay (hr)	0.6	0.6	0.7	0.6	0.6	0.6
Total Stops	56	61	83	68	59	66
Fuel Used (gal)	5.9	5.9	6.1	5.7	6.0	5.9

Interval #0 Information Seeding

Start Time	2:50
End Time	3:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:00
End Time	4:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	634	622	659	613	655	637
Vehs Exited	632	623	658	616	650	637
Starting Vehs	2	9	8	9	2	6
Ending Vehs	4	8	9	6	7	6
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	183	179	188	177	188	183
Travel Time (hr)	7.0	6.8	7.1	6.7	7.1	6.9
Total Delay (hr)	0.6	0.6	0.7	0.6	0.6	0.6
Total Stops	56	61	83	68	59	66
Fuel Used (gal)	5.9	5.9	6.1	5.7	6.0	5.9

1: Mechanic Street & Queen City Drive Performance by approach

Approach	SE	NE	SW	All
Total Delay (hr)	0.2	0.0	0.1	0.3
Delay / Veh (s)	1.1	4.9	8.9	1.8
Total Stops	0	9	57	66
Travel Dist (mi)	27.0	0.2	5.5	32.8
Travel Time (hr)	1.1	0.0	0.4	1.5
Avg Speed (mph)	24	9	16	22
Fuel Used (gal)	0.8	0.0	0.2	1.0
HC Emissions (g)	5	0	1	6
CO Emissions (g)	140	0	32	173
NOx Emissions (g)	20	0	3	22
Vehicles Entered	570	9	57	636
Vehicles Exited	570	9	57	636
Hourly Exit Rate	570	9	57	636
Input Volume	566	10	54	630
% of Volume	101	90	106	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	0.6
Delay / Veh (s)	3.4
Total Stops	66
Travel Dist (mi)	182.9
Travel Time (hr)	6.9
Avg Speed (mph)	27
Fuel Used (gal)	5.9
HC Emissions (g)	46
CO Emissions (g)	1468
NOx Emissions (g)	145
Vehicles Entered	637
Vehicles Exited	637
Hourly Exit Rate	637
Input Volume	1826
% of Volume	35
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Mechanic Street & Queen City Drive

Movement	SE	NE	SW
Directions Served	LTR	TR	LT
Maximum Queue (ft)	6	31	64
Average Queue (ft)	0	7	29
95th Queue (ft)	4	27	53
Link Distance (ft)	190	135	516
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	2:50	2:50	2:50	2:50	2:50	2:50
End Time	4:00	4:00	4:00	4:00	4:00	4:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	673	668	624	623	616	641
Vehs Exited	672	664	625	623	618	640
Starting Vehs	7	5	8	7	8	7
Ending Vehs	8	9	7	7	6	7
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	196	192	181	182	179	186
Travel Time (hr)	7.4	7.3	6.8	6.9	6.8	7.0
Total Delay (hr)	0.6	0.6	0.6	0.6	0.6	0.6
Total Stops	44	45	44	38	40	43
Fuel Used (gal)	6.3	6.3	5.8	5.8	5.6	6.0

Interval #0 Information Seeding

Start Time	2:50
End Time	3:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:00
End Time	4:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	673	668	624	623	616	641
Vehs Exited	672	664	625	623	618	640
Starting Vehs	7	5	8	7	8	7
Ending Vehs	8	9	7	7	6	7
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	196	192	181	182	179	186
Travel Time (hr)	7.4	7.3	6.8	6.9	6.8	7.0
Total Delay (hr)	0.6	0.6	0.6	0.6	0.6	0.6
Total Stops	44	45	44	38	40	43
Fuel Used (gal)	6.3	6.3	5.8	5.8	5.6	6.0

1: Mechanic Street & Queen City Drive Performance by approach

Approach	SE	NE	SW	All
Total Delay (hr)	0.2	0.0	0.1	0.3
Delay / Veh (s)	1.1	4.0	9.6	1.6
Total Stops	1	7	35	43
Travel Dist (mi)	28.4	0.2	3.4	32.0
Travel Time (hr)	1.2	0.0	0.2	1.4
Avg Speed (mph)	24	10	15	22
Fuel Used (gal)	0.8	0.0	0.1	0.9
HC Emissions (g)	7	0	0	7
CO Emissions (g)	158	0	15	174
NOx Emissions (g)	23	0	1	24
Vehicles Entered	598	7	35	640
Vehicles Exited	599	7	35	641
Hourly Exit Rate	599	7	35	641
Input Volume	610	8	38	656
% of Volume	98	88	92	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	0.6
Delay / Veh (s)	3.4
Total Stops	43
Travel Dist (mi)	186.1
Travel Time (hr)	7.0
Avg Speed (mph)	27
Fuel Used (gal)	6.0
HC Emissions (g)	52
CO Emissions (g)	1531
NOx Emissions (g)	160
Vehicles Entered	641
Vehicles Exited	640
Hourly Exit Rate	640
Input Volume	1922
% of Volume	33
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Mechanic Street & Queen City Drive

Movement	SE	NE	SW
Directions Served	LTR	TR	LT
Maximum Queue (ft)	22	31	56
Average Queue (ft)	1	5	22
95th Queue (ft)	8	23	48
Link Distance (ft)	190	135	516
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

City of Cumberland
Wednesday TMC

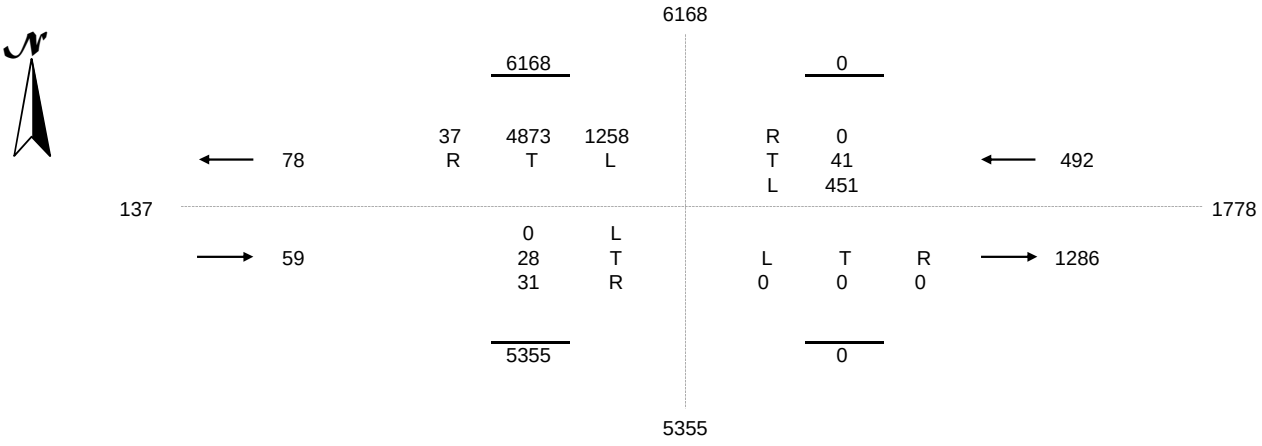
Location:	Mechanic Street at Queen City Drive (Proposed Geometry)	**County:**	Allegany
Date:	12/16/2009	**CITY**	Cumberland
Recorder:	BB	**Weather:**	

Street Name / Hour Ending	Mechanic Street From North				Mechanic Street From South				Queen City Drive From East				Parking Lot From West				TOTAL
	L	T	R	TOTAL	L	T	R	TOTAL	L	T	R	TOTAL	L	T	R	TOTAL	
07:00	30	194	0	224	0	0	0	0	2	0	0	2	0	0	0	0	226
08:00	99	323	1	423	0	0	0	0	7	2	0	9	0	0	0	0	432
09:00	106	389	4	499	0	0	0	0	27	5	0	32	0	1	3	4	535
10:00	90	294	6	390	0	0	0	0	32	5	0	37	0	3	0	3	430
11:00	93	347	5	445	0	0	0	0	45	5	0	50	0	2	5	7	502
12:00	123	443	0	566	0	0	0	0	48	6	0	54	0	6	4	10	630
13:00	108	401	6	515	0	0	0	0	40	4	0	44	0	2	6	8	567
14:00	124	464	8	596	0	0	0	0	53	3	0	56	0	2	0	2	654
15:00	115	419	1	535	0	0	0	0	52	2	0	54	0	2	2	4	593
16:00	120	485	5	610	0	0	0	0	36	2	0	38	0	3	5	8	656
17:00	109	407	0	516	0	0	0	0	52	4	0	56	0	4	2	6	578
18:00	76	424	1	501	0	0	0	0	30	2	0	32	0	2	4	6	539
19:00	65	283	0	348	0	0	0	0	27	1	0	28	0	1	0	1	377
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1258	4873	37	6168	0	0	0	0	451	41	0	492	0	28	31	59	6719

PEDESTRIAN SCHOOL CHILDREN & U-TURN BREAKDOWN

HOUR	NORTH LEG PED.	NORTH LEG U.T.	SOUTH LEG PED.	SOUTH LEG U.T.	EAST LEG PED.	EAST LEG U.T.	WEST LEG PED.	WEST LEG U.T.
6:00 - 7:00	0	0	0	0	0	0	0	0
7:00 - 8:00	0	0	0	0	0	0	0	0
8:00 - 9:00	0	0	0	0	0	0	0	0
9:00 - 10:00	0	0	0	0	0	0	0	0
10:00 - 11:00	0	0	0	0	0	0	0	0
11:00 - 12:00	0	0	0	0	0	0	0	0
12:00 - 1:00	0	0	0	0	0	0	0	0
1:00 - 2:00	0	0	0	0	0	0	0	0
2:00 - 3:00	0	0	0	0	0	0	0	0
3:00 - 4:00	0	0	0	0	0	0	0	0
4:00 - 5:00	0	0	0	0	0	0	0	0
5:00 - 6:00	0	0	0	0	0	0	0	0
6:00 - 7:00	0	0	0	0	0	0	0	0
7:00 - 8:00	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0

12 HOUR SUMMARY



TRAFFIC SIGNAL WARRANT No. 1 (CONDITION A) - ANALYSIS WORKSHEET

MAJOR ROAD : Mechanic Street
MINOR ROAD : Queen City Drive

ROAD NUMBER:
DAYS Thursday
COUNT DATES: 12/16/09

TIME	VOLUMES COUNTED														WARRANT No. 1		
	MAJOR ROAD - 1 LANE Mechanic Street							MINOR ROAD - 2 LANE Queen City Drive							CONDITION A (100%)		
	Northbound			Southbound			TOTAL BOTH APPROACHES	Eastbound			Westbound			MAXIMUM VOLUME - ONE APPROACH	Major	Minor	Major & Minor
	☐ LT	☐ TH	☐ RT	☑ LT	☑ TH	☑ RT		☑ LT	☑ TH	☑ RT	☑ LT	☑ TH	☑ RT		500	150	
6:00 - 7:00 AM	0	0	0	30	194	0	224	0	0	0	2	0	0	2			
7:00 - 8:00 AM	0	0	0	99	323	1	423	0	0	0	7	2	0	9			
8:00 - 9:00 AM	0	0	0	106	389	4	499	0	1	3	27	5	0	32			
9:00 - 10:00 AM	0	0	0	90	294	6	390	0	3	0	32	5	0	37			
10:00 - 11:00 AM	0	0	0	93	347	5	445	0	2	5	45	5	0	50			
11:00 AM- 12:00 PM	0	0	0	123	443	0	566	0	6	4	48	6	0	54			
12:00 - 1:00 PM	0	0	0	108	401	6	515	0	2	6	40	4	0	44			
1:00 - 2:00 PM	0	0	0	124	464	8	596	0	2	0	53	3	0	56			
2:00 - 3:00 PM	0	0	0	115	419	1	535	0	2	2	52	2	0	54			
3:00 - 4:00 PM	0	0	0	120	485	5	610	0	3	5	36	2	0	38			
4:00 - 5:00 PM	0	0	0	109	407	0	516	0	4	2	52	4	0	56			
5:00 - 6:00 PM	0	0	0	76	424	1	501	0	2	4	30	2	0	32			
6:00 - 7:00 PM	0	0	0	65	283	0	348	0	1	0	27	1	0	28			
7:00 - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
NUMBER OF HOURS SATISFIED															7	0	0
SIGNAL WARRANTED (8 HRS OR MORE MAJOR & MINOR SATISFIED)															NO		

TRAFFIC SIGNAL WARRANT No. 1 (CONDITION B) - ANALYSIS WORKSHEET

MAJOR ROAD : Mechanic Street
MINOR ROAD : Queen City Drive

ROAD NUMBER:
DAY: Thursday COUNT DATE: 12/16/09

TIME	VOLUMES COUNTED														WARRANT No. 1		
	MAJOR ROAD - 1 LANE Mechanic Street							MINOR ROAD - 2 LANE Queen City Drive							CONDITION B (100%)		
	Northbound			Southbound			TOTAL BOTH APPROACHES	Eastbound			Westbound			MAXIMUM VOLUME - ONE APPROACH	Major	Minor	Major & Minor
	☐ LT	☐ TH	☐ RT	☑ LT	☑ TH	☐ RT		☑ LT	☑ TH	☑ RT	☑ LT	☑ TH	☑ RT		750	75	
6:00 - 7:00 AM	0	0	0	30	194	0	224	0	0	0	2	0	0	2			
7:00 - 8:00 AM	0	0	0	99	323	1	422	0	0	0	7	2	0	9			
8:00 - 9:00 AM	0	0	0	106	389	4	495	0	1	3	27	5	0	32			
9:00 - 10:00 AM	0	0	0	90	294	6	384	0	3	0	32	5	0	37			
10:00 - 11:00 AM	0	0	0	93	347	5	440	0	2	5	45	5	0	50			
11:00 AM- 12:00 PM	0	0	0	123	443	0	566	0	6	4	48	6	0	54			
12:00 - 1:00 PM	0	0	0	108	401	6	509	0	2	6	40	4	0	44			
1:00 - 2:00 PM	0	0	0	124	464	8	588	0	2	0	53	3	0	56			
2:00 - 3:00 PM	0	0	0	115	419	1	534	0	2	2	52	2	0	54			
3:00 - 4:00 PM	0	0	0	120	485	5	605	0	3	5	36	2	0	38			
4:00 - 5:00 PM	0	0	0	109	407	0	516	0	4	2	52	4	0	56			
5:00 - 6:00 PM	0	0	0	76	424	1	500	0	2	4	30	2	0	32			
6:00 - 7:00 PM	0	0	0	65	283	0	348	0	1	0	27	1	0	28			
7:00 - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
NUMBER OF HOURS SATISFIED															0	0	0
SIGNAL WARRANTED (8 HRS OR MORE MAJOR & MINOR SATISFIED)															NO		

TRAFFIC SIGNAL WARRANT No. 1 (COMBINATION OF CONDITIONS A and B) - ANALYSIS WORKSHEET

MAJOR ROAD : Mechanic Street
MINOR ROAD : Queen City Drive

ROAD NUMBER:
DAY: Thursday

COUNT DATE: 12/16/09

TIME	VOLUMES COUNTED														WARRANT No. 1 (80% VOLUMES)				
	MAJOR ROAD - 1 LANE Mechanic Street							MINOR ROAD - 2 LANE Queen City Drive							CONDITION A		CONDITION B		
	Northbound			Southbound			TOTAL BOTH APPROACHES	Eastbound			Westbound			MAXIMUM VOLUME - ONE APPROACH	Major	Minor	Major	Minor	Combination A & B
	☐ LT	☐ TH	☐ RT	☑ LT	☑ TH	☑ RT		☑ LT	☑ TH	☑ RT	☑ LT	☑ TH	☑ RT		400	120	600	60	
6:00 - 7:00 AM	0	0	0	30	194	0	224	0	0	0	2	0	0	2					
7:00 - 8:00 AM	0	0	0	99	323	1	423	0	0	0	7	2	0	9					
8:00 - 9:00 AM	0	0	0	106	389	4	499	0	1	3	27	5	0	32					
9:00 - 10:00 AM	0	0	0	90	294	6	390	0	3	0	32	5	0	37					
10:00 - 11:00 AM	0	0	0	93	347	5	445	0	2	5	45	5	0	50					
11:00 AM- 12:00 PM	0	0	0	123	443	0	566	0	6	4	48	6	0	54					
12:00 - 1:00 PM	0	0	0	108	401	6	515	0	2	6	40	4	0	44					
1:00 - 2:00 PM	0	0	0	124	464	8	596	0	2	0	53	3	0	56					
2:00 - 3:00 PM	0	0	0	115	419	1	535	0	2	2	52	2	0	54					
3:00 - 4:00 PM	0	0	0	120	485	5	610	0	3	5	36	2	0	38					
4:00 - 5:00 PM	0	0	0	109	407	0	516	0	4	2	52	4	0	56					
5:00 - 6:00 PM	0	0	0	76	424	1	501	0	2	4	30	2	0	32					
6:00 - 7:00 PM	0	0	0	65	283	0	348	0	1	0	27	1	0	28					
7:00 - 8:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
NUMBER OF HOURS SATISFIED															10	0	1	0	0
SIGNAL WARRANTED (8 HRS OR MORE MAJOR & MINOR SATISFIED)															NO				

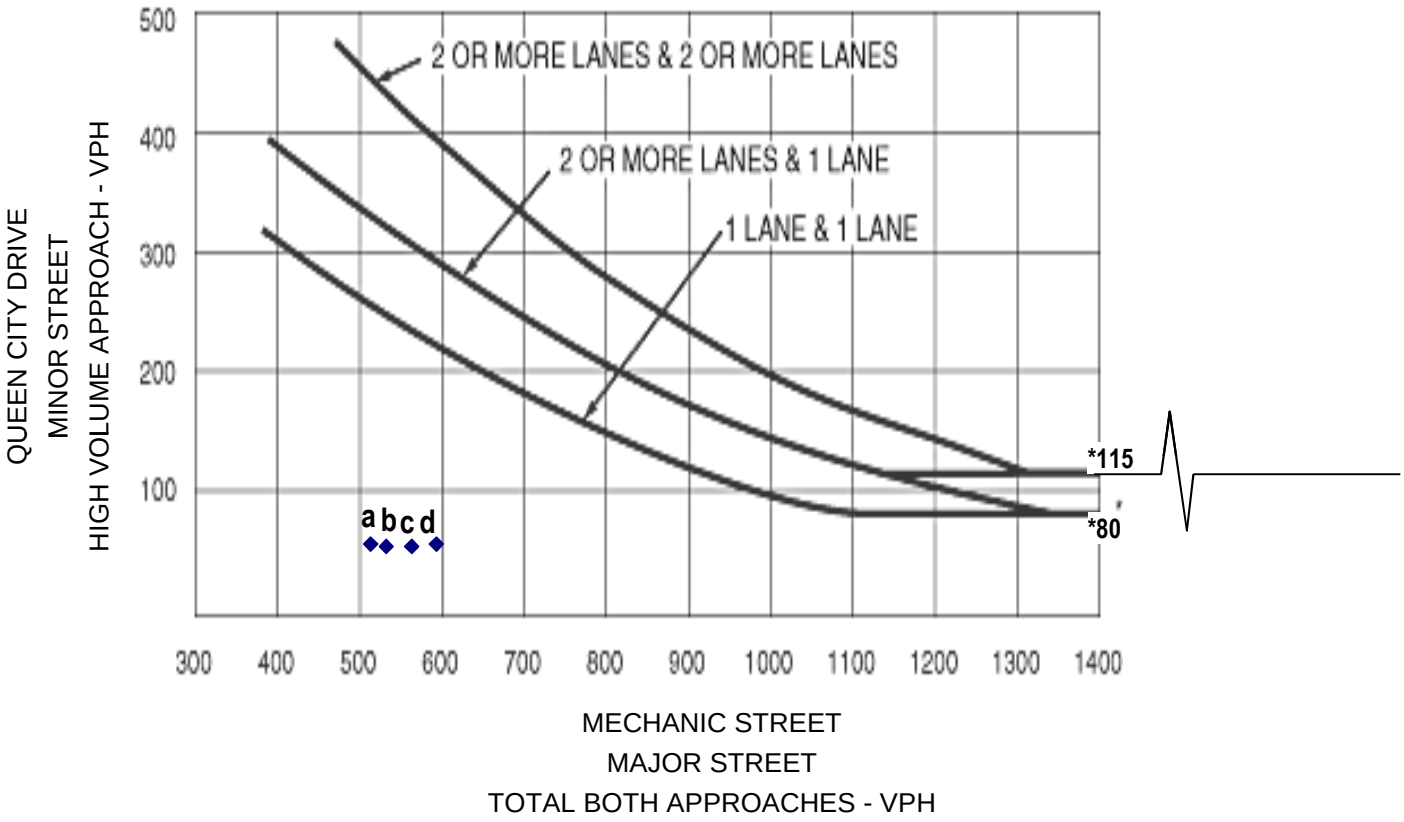
FOUR HOUR VOLUME WARRANT

a:(516,56)

b:(596,56)

c:(566,54)

d:(535,54)



WARRANT MET: NO

NOTE: 115 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 80 vph applies as the lower threshold volume for minor street approach with one lane

WARRANT 2 - FOUR HOUR VEHICULAR VOLUME

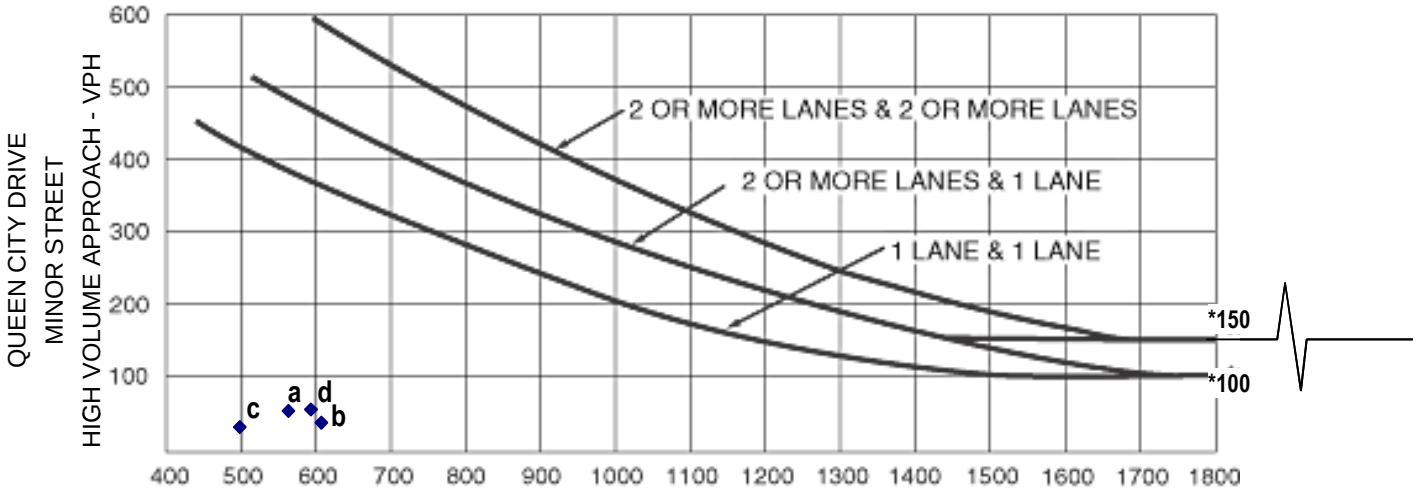
PEAK HOUR VOLUME WARRANT

a:(566,54)

b:(610,38)

c:(501,32)

d:(596,56)



MECHANIC STREET
MAJOR STREET
TOTAL BOTH APPROACHES - VPH

WARRANT MET: NO

NOTE: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for minor street approach with one lane

WARRANT 3 - PEAK HOUR

SIGNAL WARRANT ANALYSIS SUMMARY

WARRANT	CRITERIA			NO. OF HOURS OR CRITERIA OBSERVED	WARRANT SATISFIED
	Major Street Volume (VPH)	Minor-street Volume (VPH)	Number of Hours Required		
1A – Minimum Vehicular Volume	500	150	8	0 hours	NO
1B – Interruption of Continuous Traffic	750	75	8	0 hours	
1C – Combination Warrant	400	120	8	0 hours	
80% of Warrants 1A & 1B (56% of Warrants #1A & 1B)	600	60			
2 – Four-Hour Warrant	(See Appendix for charts)		4	0 hours	NO
3A – Peak-Hour Delay Warrant	Total Delay > 4 Veh-hours Approach Volume ≥ 100 VPH Total Entering Volume ≥ 800 VPH		1	N/A N/A	NO
3B – Peak-Hour Volume Warrant	(See Figure 4C-1 and 4C-2)		1	566 vph (AM) 501 vph (PM) 54 vph (AM) 32 vph (PM)	
4 – Pedestrian Volume	100 or more pedestrians for any 4 hours OR 190 or more pedestrians during any 1 hour AND Fewer than 60 gaps/hour of adequate length for pedestrians to cross during same period observed above.			N/A	N/A
5 – School Crossing	Intersection is not used as crossing for school children.			N/A	N/A
6 – Coordinated Signal System	In order to maintain proper grouping of vehicles Within a signal system.			N/A	N/A
7 – Crash Experience	Five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred in a 12-month period. Also, 80% of either Warrant #1 or Warrant #2 is satisfied.			80% of either warrant #1 or warrant #2 not satisfied	NO
8 – Roadway Network	Intersection of two major roadways.			NO	NO

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:35	7:35	7:35	7:35	7:35	7:35
End Time	8:45	8:45	8:45	8:45	8:45	8:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1077	1074	1087	1043	1051	1065
Vehs Exited	1090	1070	1082	1047	1043	1066
Starting Vehs	31	26	20	37	20	28
Ending Vehs	18	30	25	33	28	25
Denied Entry Before	0	0	1	0	1	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	412	404	403	392	394	401
Travel Time (hr)	24.2	24.3	24.9	23.1	22.7	23.8
Total Delay (hr)	6.7	7.0	7.7	6.4	5.9	6.7
Total Stops	808	829	859	792	789	813
Fuel Used (gal)	16.0	16.0	16.0	15.4	15.3	15.7

Interval #0 Information Seeding

Start Time	7:35
End Time	7:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1077	1074	1087	1043	1051	1065
Vehs Exited	1090	1070	1082	1047	1043	1066
Starting Vehs	31	26	20	37	20	28
Ending Vehs	18	30	25	33	28	25
Denied Entry Before	0	0	1	0	1	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	412	404	403	392	394	401
Travel Time (hr)	24.2	24.3	24.9	23.1	22.7	23.8
Total Delay (hr)	6.7	7.0	7.7	6.4	5.9	6.7
Total Stops	808	829	859	792	789	813
Fuel Used (gal)	16.0	16.0	16.0	15.4	15.3	15.7

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.1	0.0	0.2	0.1	0.5
Delay / Veh (s)	9.1	0.6	2.5	7.4	2.5
Total Stops	48	0	16	35	99
Travel Dist (mi)	9.0	11.2	65.3	3.8	89.4
Travel Time (hr)	0.5	0.5	2.7	0.2	4.0
Avg Speed (mph)	18	21	25	16	23
Fuel Used (gal)	0.3	0.3	1.8	0.1	2.4
HC Emissions (g)	1	2	12	0	15
CO Emissions (g)	29	56	360	11	456
NOx Emissions (g)	4	7	35	1	47
Vehicles Entered	48	242	336	35	661
Vehicles Exited	48	242	338	35	663
Hourly Exit Rate	48	242	338	35	663
Input Volume	52	244	350	37	683
% of Volume	92	99	97	95	97
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.1	0.1	0.0	0.0	0.2
Delay / Veh (s)	1.2	0.8	5.1		1.1
Total Stops	7	7	7	0	21
Travel Dist (mi)	14.7	10.0	0.3	0.0	25.0
Travel Time (hr)	0.9	0.6	0.0	0.0	1.6
Avg Speed (mph)	16	16	11	2	16
Fuel Used (gal)	1.1	0.7	0.0	0.0	1.8
HC Emissions (g)	10	8	0	0	17
CO Emissions (g)	436	304	0	0	741
NOx Emissions (g)	46	34	0	0	80
Vehicles Entered	349	269	7	0	625
Vehicles Exited	349	269	7	0	625
Hourly Exit Rate	349	269	7	0	625
Input Volume	362	267	6	1	636
% of Volume	96	101	117	0	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	1.5	2.4	1.9	5.7
Delay / Veh (s)	17.0	42.0	15.6	21.7
Total Stops	240	204	249	693
Travel Dist (mi)	11.9	31.0	68.4	111.2
Travel Time (hr)	2.1	3.7	4.7	10.5
Avg Speed (mph)	6	9	15	11
Fuel Used (gal)	0.7	1.5	2.5	4.7
HC Emissions (g)	2	3	19	25
CO Emissions (g)	107	193	504	804
NOx Emissions (g)	10	19	65	94
Vehicles Entered	314	201	436	951
Vehicles Exited	313	202	435	950
Hourly Exit Rate	313	202	435	950
Input Volume	329	191	445	965
% of Volume	95	106	98	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	6.7
Delay / Veh (s)	22.8
Total Stops	813
Travel Dist (mi)	401.1
Travel Time (hr)	23.8
Avg Speed (mph)	17
Fuel Used (gal)	15.7
HC Emissions (g)	105
CO Emissions (g)	3733
NOx Emissions (g)	422
Vehicles Entered	1065
Vehicles Exited	1066
Hourly Exit Rate	1066
Input Volume	3366
% of Volume	32
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	30	12	38	35	43
Average Queue (ft)	7	0	7	4	18
95th Queue (ft)	19	7	26	19	38
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LR
Maximum Queue (ft)	33	46	48	30	11
Average Queue (ft)	3	2	4	7	0
95th Queue (ft)	18	20	24	27	6
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	165	87	243	279	88
Average Queue (ft)	83	30	126	139	33
95th Queue (ft)	150	60	215	228	73
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	3				
Queuing Penalty (veh)	4				
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 4

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1415	1491	1487	1447	1458	1460
Vehs Exited	1433	1488	1488	1442	1433	1456
Starting Vehs	49	38	35	33	22	34
Ending Vehs	31	41	34	38	47	38
Denied Entry Before	0	1	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	548	574	576	558	557	563
Travel Time (hr)	34.1	36.0	37.9	35.6	35.4	35.8
Total Delay (hr)	10.7	11.6	13.3	11.8	11.6	11.8
Total Stops	1159	1227	1313	1253	1208	1233
Fuel Used (gal)	21.8	23.0	23.2	22.4	22.0	22.5

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1415	1491	1487	1447	1458	1460
Vehs Exited	1433	1488	1488	1442	1433	1456
Starting Vehs	49	38	35	33	22	34
Ending Vehs	31	41	34	38	47	38
Denied Entry Before	0	1	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	548	574	576	558	557	563
Travel Time (hr)	34.1	36.0	37.9	35.6	35.4	35.8
Total Delay (hr)	10.7	11.6	13.3	11.8	11.6	11.8
Total Stops	1159	1227	1313	1253	1208	1233
Fuel Used (gal)	21.8	23.0	23.2	22.4	22.0	22.5

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.4	0.1	0.4	0.2	1.1
Delay / Veh (s)	17.4	0.7	3.6	13.6	4.2
Total Stops	88	2	36	52	178
Travel Dist (mi)	16.2	18.4	85.5	5.6	125.7
Travel Time (hr)	1.1	0.9	3.7	0.5	6.2
Avg Speed (mph)	15	20	24	12	21
Fuel Used (gal)	0.6	0.5	2.3	0.2	3.5
HC Emissions (g)	1	1	10	2	15
CO Emissions (g)	65	67	365	53	549
NOx Emissions (g)	7	7	32	7	54
Vehicles Entered	88	399	440	52	979
Vehicles Exited	88	400	440	52	980
Hourly Exit Rate	88	400	440	52	980
Input Volume	92	409	466	53	1020
% of Volume	96	98	94	98	96
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.3	0.1	0.0	0.0	0.4
Delay / Veh (s)	2.2	1.1	10.0	5.5	1.9
Total Stops	26	13	13	18	70
Travel Dist (mi)	19.1	14.3	0.5	0.4	34.3
Travel Time (hr)	1.3	0.9	0.1	0.1	2.3
Avg Speed (mph)	15	16	7	7	15
Fuel Used (gal)	1.4	1.1	0.0	0.0	2.5
HC Emissions (g)	9	7	0	0	16
CO Emissions (g)	475	367	2	1	845
NOx Emissions (g)	52	39	0	0	91
Vehicles Entered	451	379	13	18	861
Vehicles Exited	451	379	13	17	860
Hourly Exit Rate	451	379	13	17	860
Input Volume	483	388	12	19	902
% of Volume	93	98	108	89	95
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.3	4.3	2.1	9.7
Delay / Veh (s)	25.9	53.0	13.5	26.8
Total Stops	383	346	256	985
Travel Dist (mi)	17.3	45.8	86.3	149.4
Travel Time (hr)	4.2	6.3	5.6	16.1
Avg Speed (mph)	4	7	15	9
Fuel Used (gal)	1.3	2.4	3.1	6.8
HC Emissions (g)	2	5	12	19
CO Emissions (g)	134	291	439	864
NOx Emissions (g)	13	29	53	95
Vehicles Entered	455	296	552	1303
Vehicles Exited	455	295	550	1300
Hourly Exit Rate	455	295	550	1300
Input Volume	486	300	553	1339
% of Volume	94	98	99	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	11.8
Delay / Veh (s)	29.2
Total Stops	1233
Travel Dist (mi)	562.5
Travel Time (hr)	35.8
Avg Speed (mph)	16
Fuel Used (gal)	22.5
HC Emissions (g)	97
CO Emissions (g)	4373
NOx Emissions (g)	473
Vehicles Entered	1460
Vehicles Exited	1456
Hourly Exit Rate	1456
Input Volume	4756
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	68	20	43	35	74
Average Queue (ft)	19	1	16	5	28
95th Queue (ft)	50	9	40	22	54
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LTR
Maximum Queue (ft)	101	53	78	38	35
Average Queue (ft)	9	7	8	10	15
95th Queue (ft)	56	35	43	34	39
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)	0		0		
Queuing Penalty (veh)	1		1		
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	1	0			
Queuing Penalty (veh)	3	1			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	211	147	414	309	88
Average Queue (ft)	133	60	203	154	34
95th Queue (ft)	218	118	351	261	75
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	15	1			
Queuing Penalty (veh)	38	2			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 45

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:35	7:35	7:35	7:35	7:35	7:35
End Time	8:45	8:45	8:45	8:45	8:45	8:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1042	1057	1035	1079	1116	1065
Vehs Exited	1029	1059	1046	1081	1117	1067
Starting Vehs	16	25	23	22	19	19
Ending Vehs	29	23	12	20	18	19
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	392	396	393	408	422	402
Travel Time (hr)	20.1	20.7	20.2	21.2	21.8	20.8
Total Delay (hr)	3.4	3.7	3.4	3.8	3.8	3.6
Total Stops	637	670	641	643	687	655
Fuel Used (gal)	14.5	14.7	14.5	15.2	15.5	14.9

Interval #0 Information Seeding

Start Time	7:35
End Time	7:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1042	1057	1035	1079	1116	1065
Vehs Exited	1029	1059	1046	1081	1117	1067
Starting Vehs	16	25	23	22	19	19
Ending Vehs	29	23	12	20	18	19
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	392	396	393	408	422	402
Travel Time (hr)	20.1	20.7	20.2	21.2	21.8	20.8
Total Delay (hr)	3.4	3.7	3.4	3.8	3.8	3.6
Total Stops	637	670	641	643	687	655
Fuel Used (gal)	14.5	14.7	14.5	15.2	15.5	14.9

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.1	0.0	0.2	0.1	0.5
Delay / Veh (s)	9.8	0.4	2.5	6.9	2.5
Total Stops	51	1	14	33	99
Travel Dist (mi)	9.7	11.1	66.0	3.7	90.4
Travel Time (hr)	0.5	0.5	2.7	0.2	4.0
Avg Speed (mph)	18	21	25	16	23
Fuel Used (gal)	0.3	0.3	1.7	0.1	2.4
HC Emissions (g)	1	1	9	0	11
CO Emissions (g)	29	48	299	9	386
NOx Emissions (g)	4	5	28	1	38
Vehicles Entered	53	239	338	34	664
Vehicles Exited	51	239	341	34	665
Hourly Exit Rate	51	239	341	34	665
Input Volume	52	244	350	37	683
% of Volume	98	98	97	92	97
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.1	0.1	0.0	0.0	0.2
Delay / Veh (s)	1.3	0.8	4.7		1.1
Total Stops	7	8	5	0	20
Travel Dist (mi)	14.8	9.7	0.2	0.0	24.8
Travel Time (hr)	0.9	0.6	0.0	0.0	1.6
Avg Speed (mph)	16	16	11	4	16
Fuel Used (gal)	1.1	0.7	0.0	0.0	1.8
HC Emissions (g)	8	7	0	0	15
CO Emissions (g)	422	297	0	0	720
NOx Emissions (g)	43	30	0	0	73
Vehicles Entered	351	263	5	0	619
Vehicles Exited	352	263	5	0	620
Hourly Exit Rate	352	263	5	0	620
Input Volume	362	267	6	1	636
% of Volume	97	99	83	0	97
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	0.6	1.0	1.0	2.7
Delay / Veh (s)	7.2	19.8	8.3	10.1
Total Stops	177	159	200	536
Travel Dist (mi)	11.9	28.0	71.1	111.0
Travel Time (hr)	1.2	2.2	4.0	7.4
Avg Speed (mph)	10	13	18	15
Fuel Used (gal)	0.5	1.1	2.4	3.9
HC Emissions (g)	1	3	18	22
CO Emissions (g)	84	151	460	694
NOx Emissions (g)	8	16	60	84
Vehicles Entered	314	182	453	949
Vehicles Exited	314	181	453	948
Hourly Exit Rate	314	181	453	948
Input Volume	329	191	445	965
% of Volume	95	95	102	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	3.6
Delay / Veh (s)	12.2
Total Stops	655
Travel Dist (mi)	402.3
Travel Time (hr)	20.8
Avg Speed (mph)	19
Fuel Used (gal)	14.9
HC Emissions (g)	95
CO Emissions (g)	3505
NOx Emissions (g)	389
Vehicles Entered	1065
Vehicles Exited	1067
Hourly Exit Rate	1067
Input Volume	3366
% of Volume	32
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	33	16	29	33	56
Average Queue (ft)	8	1	5	3	19
95th Queue (ft)	23	8	21	17	43
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LR
Maximum Queue (ft)	17	36	41	30	12
Average Queue (ft)	2	2	4	4	0
95th Queue (ft)	15	19	21	21	6
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	114	71	165	188	53
Average Queue (ft)	49	28	77	97	13
95th Queue (ft)	94	56	131	162	40
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1541	1512	1471	1422	1427	1475
Vehs Exited	1544	1529	1462	1438	1410	1476
Starting Vehs	33	37	33	41	18	30
Ending Vehs	30	20	42	25	35	29
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	597	586	571	557	548	572
Travel Time (hr)	33.8	34.6	32.0	31.4	31.0	32.5
Total Delay (hr)	8.3	9.6	7.7	7.5	7.6	8.1
Total Stops	1101	1147	1088	1078	1010	1085
Fuel Used (gal)	22.7	23.0	21.5	21.3	20.9	21.9

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1541	1512	1471	1422	1427	1475
Vehs Exited	1544	1529	1462	1438	1410	1476
Starting Vehs	33	37	33	41	18	30
Ending Vehs	30	20	42	25	35	29
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	597	586	571	557	548	572
Travel Time (hr)	33.8	34.6	32.0	31.4	31.0	32.5
Total Delay (hr)	8.3	9.6	7.7	7.5	7.6	8.1
Total Stops	1101	1147	1088	1078	1010	1085
Fuel Used (gal)	22.7	23.0	21.5	21.3	20.9	21.9

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.5	0.1	0.5	0.2	1.3
Delay / Veh (s)	21.1	0.7	3.7	16.0	4.7
Total Stops	89	3	39	53	184
Travel Dist (mi)	16.5	18.8	89.0	5.8	130.0
Travel Time (hr)	1.2	0.9	3.8	0.5	6.5
Avg Speed (mph)	14	20	24	12	20
Fuel Used (gal)	0.6	0.5	2.4	0.2	3.6
HC Emissions (g)	1	2	11	1	15
CO Emissions (g)	70	79	369	33	551
NOx Emissions (g)	8	9	33	4	53
Vehicles Entered	89	407	457	53	1006
Vehicles Exited	89	408	458	53	1008
Hourly Exit Rate	89	408	458	53	1008
Input Volume	92	409	466	53	1020
% of Volume	97	100	98	100	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.2	0.1	0.0	0.0	0.3
Delay / Veh (s)	1.6	0.8	10.7	4.5	1.4
Total Stops	12	9	11	19	51
Travel Dist (mi)	20.0	14.5	0.4	0.4	35.3
Travel Time (hr)	1.3	0.9	0.1	0.0	2.3
Avg Speed (mph)	16	16	7	8	16
Fuel Used (gal)	1.5	1.1	0.0	0.0	2.6
HC Emissions (g)	10	7	0	0	18
CO Emissions (g)	538	389	1	1	930
NOx Emissions (g)	57	40	0	0	97
Vehicles Entered	473	387	11	19	890
Vehicles Exited	472	386	11	19	888
Hourly Exit Rate	472	386	11	19	888
Input Volume	483	388	12	19	902
% of Volume	98	99	92	100	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	1.3	3.3	1.3	6.0
Delay / Veh (s)	10.1	41.4	8.7	16.4
Total Stops	310	306	234	850
Travel Dist (mi)	17.9	44.6	87.0	149.6
Travel Time (hr)	2.3	5.2	5.0	12.4
Avg Speed (mph)	8	9	18	12
Fuel Used (gal)	0.8	2.1	2.9	5.8
HC Emissions (g)	2	4	13	19
CO Emissions (g)	116	264	445	825
NOx Emissions (g)	11	27	54	92
Vehicles Entered	473	288	555	1316
Vehicles Exited	472	290	555	1317
Hourly Exit Rate	472	290	555	1317
Input Volume	486	300	553	1339
% of Volume	97	97	100	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	8.1
Delay / Veh (s)	19.8
Total Stops	1085
Travel Dist (mi)	571.6
Travel Time (hr)	32.5
Avg Speed (mph)	18
Fuel Used (gal)	21.9
HC Emissions (g)	102
CO Emissions (g)	4553
NOx Emissions (g)	486
Vehicles Entered	1475
Vehicles Exited	1476
Hourly Exit Rate	1476
Input Volume	4756
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	88	18	51	42	79
Average Queue (ft)	24	1	15	6	30
95th Queue (ft)	60	11	40	24	59
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LTR
Maximum Queue (ft)	26	42	58	35	49
Average Queue (ft)	2	5	5	9	15
95th Queue (ft)	12	23	27	32	41
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	176	138	339	217	59
Average Queue (ft)	74	48	159	118	17
95th Queue (ft)	135	94	286	198	47
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	1	0			
Queuing Penalty (veh)	3	1			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 4

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:35	7:35	7:35	7:35	7:35	7:35
End Time	8:45	8:45	8:45	8:45	8:45	8:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1077	1097	1090	1039	1068	1072
Vehs Exited	1084	1094	1090	1048	1062	1076
Starting Vehs	32	25	30	29	24	29
Ending Vehs	25	28	30	20	30	24
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	409	412	410	392	402	405
Travel Time (hr)	25.6	24.7	25.0	24.1	24.5	24.8
Total Delay (hr)	8.2	7.1	7.5	7.4	7.3	7.5
Total Stops	1431	1370	1404	1374	1409	1399
Fuel Used (gal)	16.4	16.3	16.3	15.8	16.0	16.2

Interval #0 Information Seeding

Start Time	7:35
End Time	7:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1077	1097	1090	1039	1068	1072
Vehs Exited	1084	1094	1090	1048	1062	1076
Starting Vehs	32	25	30	29	24	29
Ending Vehs	25	28	30	20	30	24
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	409	412	410	392	402	405
Travel Time (hr)	25.6	24.7	25.0	24.1	24.5	24.8
Total Delay (hr)	8.2	7.1	7.5	7.4	7.3	7.5
Total Stops	1431	1370	1404	1374	1409	1399
Fuel Used (gal)	16.4	16.3	16.3	15.8	16.0	16.2

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.1	0.4	0.6	0.0	1.0
Delay / Veh (s)	4.7	5.9	5.7	3.5	5.6
Total Stops	49	242	349	37	677
Travel Dist (mi)	8.9	11.2	67.4	4.0	91.6
Travel Time (hr)	0.4	0.9	3.1	0.2	4.7
Avg Speed (mph)	21	12	22	19	20
Fuel Used (gal)	0.3	0.3	1.9	0.1	2.5
HC Emissions (g)	1	1	12	0	14
CO Emissions (g)	24	44	369	11	449
NOx Emissions (g)	3	5	36	1	46
Vehicles Entered	48	241	346	37	672
Vehicles Exited	49	241	349	37	676
Hourly Exit Rate	49	241	349	37	676
Input Volume	52	244	350	37	683
% of Volume	94	99	100	100	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.2	0.1	0.0	0.0	0.2
Delay / Veh (s)	1.6	0.9	4.1	12.8	1.3
Total Stops	8	7	7	1	23
Travel Dist (mi)	15.1	10.0	0.3	0.0	25.4
Travel Time (hr)	1.0	0.6	0.0	0.0	1.7
Avg Speed (mph)	15	16	12	5	15
Fuel Used (gal)	1.1	0.7	0.0	0.0	1.9
HC Emissions (g)	10	7	0	0	17
CO Emissions (g)	442	273	0	0	715
NOx Emissions (g)	50	30	0	0	80
Vehicles Entered	357	269	7	1	634
Vehicles Exited	357	269	7	1	634
Hourly Exit Rate	357	269	7	1	634
Input Volume	362	267	6	1	636
% of Volume	99	101	117	100	100
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	1.4	2.5	2.0	5.8
Delay / Veh (s)	15.2	44.7	16.4	21.9
Total Stops	242	202	255	699
Travel Dist (mi)	12.2	30.6	67.9	110.8
Travel Time (hr)	2.0	3.7	4.8	10.6
Avg Speed (mph)	6	8	14	11
Fuel Used (gal)	0.7	1.5	2.5	4.7
HC Emissions (g)	3	3	18	24
CO Emissions (g)	114	195	477	785
NOx Emissions (g)	11	20	61	92
Vehicles Entered	325	198	433	956
Vehicles Exited	324	198	433	955
Hourly Exit Rate	324	198	433	955
Input Volume	329	191	445	965
% of Volume	98	104	97	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	7.5
Delay / Veh (s)	25.1
Total Stops	1399
Travel Dist (mi)	405.0
Travel Time (hr)	24.8
Avg Speed (mph)	16
Fuel Used (gal)	16.2
HC Emissions (g)	106
CO Emissions (g)	3807
NOx Emissions (g)	434
Vehicles Entered	1072
Vehicles Exited	1076
Hourly Exit Rate	1076
Input Volume	3366
% of Volume	32
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	25	85	43	88	31
Average Queue (ft)	6	44	18	45	17
95th Queue (ft)	14	74	39	73	38
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LR
Maximum Queue (ft)	42	42	56	30	23
Average Queue (ft)	3	2	4	7	1
95th Queue (ft)	20	20	27	27	11
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	152	93	272	282	84
Average Queue (ft)	78	32	125	139	33
95th Queue (ft)	133	65	215	228	69
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	1	0			
Queuing Penalty (veh)	2	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 2

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1424	1558	1474	1398	1451	1460
Vehs Exited	1449	1556	1472	1397	1449	1466
Starting Vehs	49	43	33	35	31	37
Ending Vehs	24	45	35	36	33	36
Denied Entry Before	0	1	0	0	0	0
Denied Entry After	0	0	1	1	0	0
Travel Distance (mi)	553	600	568	540	562	564
Travel Time (hr)	35.2	39.2	36.6	33.9	36.9	36.3
Total Delay (hr)	11.6	13.5	12.3	10.8	12.8	12.2
Total Stops	1942	2145	2051	1903	2053	2018
Fuel Used (gal)	22.3	24.5	22.9	21.6	22.6	22.8

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1424	1558	1474	1398	1451	1460
Vehs Exited	1449	1556	1472	1397	1449	1466
Starting Vehs	49	43	33	35	31	37
Ending Vehs	24	45	35	36	33	36
Denied Entry Before	0	1	0	0	0	0
Denied Entry After	0	0	1	1	0	0
Travel Distance (mi)	553	600	568	540	562	564
Travel Time (hr)	35.2	39.2	36.6	33.9	36.9	36.3
Total Delay (hr)	11.6	13.5	12.3	10.8	12.8	12.2
Total Stops	1942	2145	2051	1903	2053	2018
Fuel Used (gal)	22.3	24.5	22.9	21.6	22.6	22.8

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.1	0.9	1.0	0.1	2.1
Delay / Veh (s)	5.2	8.2	7.7	4.4	7.5
Total Stops	88	390	454	55	987
Travel Dist (mi)	16.2	18.1	88.4	6.0	128.6
Travel Time (hr)	0.8	1.7	4.3	0.3	7.2
Avg Speed (mph)	20	10	21	18	18
Fuel Used (gal)	0.5	0.6	2.5	0.2	3.7
HC Emissions (g)	1	1	11	1	14
CO Emissions (g)	52	58	385	35	530
NOx Emissions (g)	6	6	34	5	51
Vehicles Entered	88	393	456	54	991
Vehicles Exited	88	395	453	55	991
Hourly Exit Rate	88	395	453	55	991
Input Volume	92	409	466	53	1020
% of Volume	96	97	97	104	97
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.3	0.1	0.1	0.0	0.6
Delay / Veh (s)	2.7	1.3	20.4	8.3	2.5
Total Stops	25	10	13	18	66
Travel Dist (mi)	19.6	13.9	0.5	0.4	34.4
Travel Time (hr)	1.4	0.9	0.1	0.1	2.5
Avg Speed (mph)	14	15	5	6	14
Fuel Used (gal)	1.5	1.0	0.0	0.0	2.5
HC Emissions (g)	10	6	0	0	16
CO Emissions (g)	482	306	2	1	792
NOx Emissions (g)	56	34	0	0	91
Vehicles Entered	463	370	13	18	864
Vehicles Exited	463	372	13	18	866
Hourly Exit Rate	463	372	13	18	866
Input Volume	483	388	12	19	902
% of Volume	96	96	108	95	96
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.2	3.6	2.2	8.9
Delay / Veh (s)	24.4	45.0	14.3	24.8
Total Stops	387	312	266	965
Travel Dist (mi)	17.6	44.9	84.7	147.3
Travel Time (hr)	4.1	5.5	5.7	15.3
Avg Speed (mph)	4	8	15	10
Fuel Used (gal)	1.3	2.2	3.0	6.5
HC Emissions (g)	2	5	11	18
CO Emissions (g)	140	274	428	842
NOx Emissions (g)	13	27	51	92
Vehicles Entered	466	290	540	1296
Vehicles Exited	465	291	540	1296
Hourly Exit Rate	465	291	540	1296
Input Volume	486	300	553	1339
% of Volume	96	97	98	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	12.2
Delay / Veh (s)	30.0
Total Stops	2018
Travel Dist (mi)	564.4
Travel Time (hr)	36.3
Avg Speed (mph)	16
Fuel Used (gal)	22.8
HC Emissions (g)	97
CO Emissions (g)	4405
NOx Emissions (g)	482
Vehicles Entered	1460
Vehicles Exited	1466
Hourly Exit Rate	1466
Input Volume	4756
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	32	153	57	120	55
Average Queue (ft)	10	72	24	59	25
95th Queue (ft)	25	126	44	95	45
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)		0			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)			100		
Storage Blk Time (%)				1	
Queuing Penalty (veh)				0	

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LTR
Maximum Queue (ft)	113	63	78	51	57
Average Queue (ft)	8	6	7	12	14
95th Queue (ft)	53	32	41	40	42
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)	0		1		
Queuing Penalty (veh)	1		2		
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	1	0			
Queuing Penalty (veh)	3	1			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	211	151	332	328	83
Average Queue (ft)	126	57	182	159	35
95th Queue (ft)	212	114	299	266	71
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	15	1			
Queuing Penalty (veh)	35	2			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 45

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:35	7:35	7:35	7:35	7:35	7:35
End Time	8:45	8:45	8:45	8:45	8:45	8:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1047	1101	1098	1044	1015	1061
Vehs Exited	1049	1099	1096	1048	1023	1062
Starting Vehs	31	33	30	30	25	30
Ending Vehs	29	35	32	26	17	28
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	396	414	414	394	386	401
Travel Time (hr)	24.3	24.8	24.8	23.9	22.6	24.1
Total Delay (hr)	7.4	7.1	7.2	7.0	6.1	6.9
Total Stops	1114	1128	1141	1097	1039	1104
Fuel Used (gal)	15.6	16.4	16.3	15.6	15.1	15.8

Interval #0 Information Seeding

Start Time	7:35
End Time	7:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1047	1101	1098	1044	1015	1061
Vehs Exited	1049	1099	1096	1048	1023	1062
Starting Vehs	31	33	30	30	25	30
Ending Vehs	29	35	32	26	17	28
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	396	414	414	394	386	401
Travel Time (hr)	24.3	24.8	24.8	23.9	22.6	24.1
Total Delay (hr)	7.4	7.1	7.2	7.0	6.1	6.9
Total Stops	1114	1128	1141	1097	1039	1104
Fuel Used (gal)	15.6	16.4	16.3	15.6	15.1	15.8

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.0	0.1	0.6	0.1	0.7
Delay / Veh (s)	0.4	1.8	5.9	4.8	3.9
Total Stops	0	19	337	41	397
Travel Dist (mi)	8.8	11.3	65.3	4.4	89.8
Travel Time (hr)	0.4	0.6	3.0	0.3	4.3
Avg Speed (mph)	24	18	22	17	21
Fuel Used (gal)	0.3	0.4	1.8	0.1	2.5
HC Emissions (g)	1	3	12	0	16
CO Emissions (g)	23	89	358	13	483
NOx Emissions (g)	3	12	36	2	53
Vehicles Entered	47	244	336	40	667
Vehicles Exited	48	245	337	41	671
Hourly Exit Rate	48	245	337	41	671
Input Volume	52	244	350	37	683
% of Volume	92	100	96	111	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.1	0.1	0.0	0.0	0.2
Delay / Veh (s)	1.4	0.9	3.4	2.0	1.2
Total Stops	7	7	3	1	18
Travel Dist (mi)	14.9	10.1	0.1	0.0	25.1
Travel Time (hr)	1.0	0.6	0.0	0.0	1.6
Avg Speed (mph)	16	16	13	10	16
Fuel Used (gal)	1.1	0.7	0.0	0.0	1.8
HC Emissions (g)	10	8	0	0	17
CO Emissions (g)	400	301	0	0	701
NOx Emissions (g)	46	34	0	0	80
Vehicles Entered	354	272	3	1	630
Vehicles Exited	354	273	3	1	631
Hourly Exit Rate	354	273	3	1	631
Input Volume	362	267	6	1	636
% of Volume	98	102	50	100	99
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	1.4	2.3	1.9	5.6
Delay / Veh (s)	15.8	43.5	15.7	21.4
Total Stops	235	201	253	689
Travel Dist (mi)	12.0	29.9	68.6	110.5
Travel Time (hr)	2.0	3.6	4.8	10.4
Avg Speed (mph)	6	8	15	11
Fuel Used (gal)	0.7	1.5	2.5	4.6
HC Emissions (g)	2	3	21	26
CO Emissions (g)	110	187	516	813
NOx Emissions (g)	11	19	67	97
Vehicles Entered	316	194	438	948
Vehicles Exited	315	194	436	945
Hourly Exit Rate	315	194	436	945
Input Volume	329	191	445	965
% of Volume	96	102	98	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	6.9
Delay / Veh (s)	23.5
Total Stops	1104
Travel Dist (mi)	400.9
Travel Time (hr)	24.1
Avg Speed (mph)	17
Fuel Used (gal)	15.8
HC Emissions (g)	111
CO Emissions (g)	3784
NOx Emissions (g)	439
Vehicles Entered	1061
Vehicles Exited	1062
Hourly Exit Rate	1062
Input Volume	3366
% of Volume	32
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	1	48	47	92	39
Average Queue (ft)	0	11	18	44	20
95th Queue (ft)	1	36	39	72	40
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LR
Maximum Queue (ft)	38	45	70	30	17
Average Queue (ft)	4	2	5	3	1
95th Queue (ft)	21	18	30	18	7
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	154	88	259	280	96
Average Queue (ft)	79	31	123	137	34
95th Queue (ft)	139	62	209	232	72
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	2	0			
Queuing Penalty (veh)	3	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 3

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1417	1521	1488	1494	1475	1479
Vehs Exited	1429	1514	1485	1494	1461	1476
Starting Vehs	40	38	39	33	27	35
Ending Vehs	28	45	42	33	41	37
Denied Entry Before	0	0	0	1	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	548	586	578	576	572	572
Travel Time (hr)	34.6	38.0	36.9	37.2	36.5	36.6
Total Delay (hr)	11.2	13.0	12.2	12.6	12.0	12.2
Total Stops	1510	1679	1687	1592	1630	1617
Fuel Used (gal)	22.0	23.9	23.1	23.4	22.8	23.0

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1417	1521	1488	1494	1475	1479
Vehs Exited	1429	1514	1485	1494	1461	1476
Starting Vehs	40	38	39	33	27	35
Ending Vehs	28	45	42	33	41	37
Denied Entry Before	0	0	0	1	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	548	586	578	576	572	572
Travel Time (hr)	34.6	38.0	36.9	37.2	36.5	36.6
Total Delay (hr)	11.2	13.0	12.2	12.6	12.0	12.2
Total Stops	1510	1679	1687	1592	1630	1617
Fuel Used (gal)	22.0	23.9	23.1	23.4	22.8	23.0

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.0	0.3	1.1	0.1	1.5
Delay / Veh (s)	0.7	2.5	8.6	8.9	5.4
Total Stops	1	54	446	56	557
Travel Dist (mi)	16.8	18.9	86.9	6.0	128.6
Travel Time (hr)	0.7	1.2	4.4	0.4	6.7
Avg Speed (mph)	24	16	21	15	20
Fuel Used (gal)	0.5	0.6	2.5	0.2	3.8
HC Emissions (g)	1	2	11	2	16
CO Emissions (g)	54	97	391	44	586
NOx Emissions (g)	7	14	35	6	60
Vehicles Entered	90	411	448	56	1005
Vehicles Exited	90	410	446	56	1002
Hourly Exit Rate	90	410	446	56	1002
Input Volume	92	409	466	53	1020
% of Volume	98	100	96	106	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.3	0.1	0.0	0.0	0.5
Delay / Veh (s)	2.2	1.0	12.9	5.9	1.9
Total Stops	27	13	12	17	69
Travel Dist (mi)	19.7	14.7	0.4	0.4	35.2
Travel Time (hr)	1.3	0.9	0.1	0.1	2.4
Avg Speed (mph)	15	16	6	7	15
Fuel Used (gal)	1.4	1.1	0.0	0.0	2.5
HC Emissions (g)	9	6	0	0	15
CO Emissions (g)	434	337	1	1	774
NOx Emissions (g)	51	38	0	0	89
Vehicles Entered	464	390	12	17	883
Vehicles Exited	465	390	12	17	884
Hourly Exit Rate	465	390	12	17	884
Input Volume	483	388	12	19	902
% of Volume	96	101	100	89	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.3	4.3	2.0	9.7
Delay / Veh (s)	25.8	51.6	13.3	26.4
Total Stops	389	340	262	991
Travel Dist (mi)	17.7	46.3	86.9	150.9
Travel Time (hr)	4.3	6.2	5.7	16.2
Avg Speed (mph)	4	7	16	9
Fuel Used (gal)	1.3	2.4	3.1	6.8
HC Emissions (g)	2	5	12	19
CO Emissions (g)	143	291	443	876
NOx Emissions (g)	13	29	54	96
Vehicles Entered	467	299	555	1321
Vehicles Exited	467	299	556	1322
Hourly Exit Rate	467	299	556	1322
Input Volume	486	300	553	1339
% of Volume	96	100	101	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	12.2
Delay / Veh (s)	29.8
Total Stops	1617
Travel Dist (mi)	571.9
Travel Time (hr)	36.6
Avg Speed (mph)	16
Fuel Used (gal)	23.0
HC Emissions (g)	99
CO Emissions (g)	4404
NOx Emissions (g)	487
Vehicles Entered	1479
Vehicles Exited	1476
Hourly Exit Rate	1476
Input Volume	4756
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	4	78	71	139	62
Average Queue (ft)	0	26	27	58	27
95th Queue (ft)	2	63	54	101	50
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)				1	
Queuing Penalty (veh)				1	

Intersection: 2: Baltimore Street & Canal Street

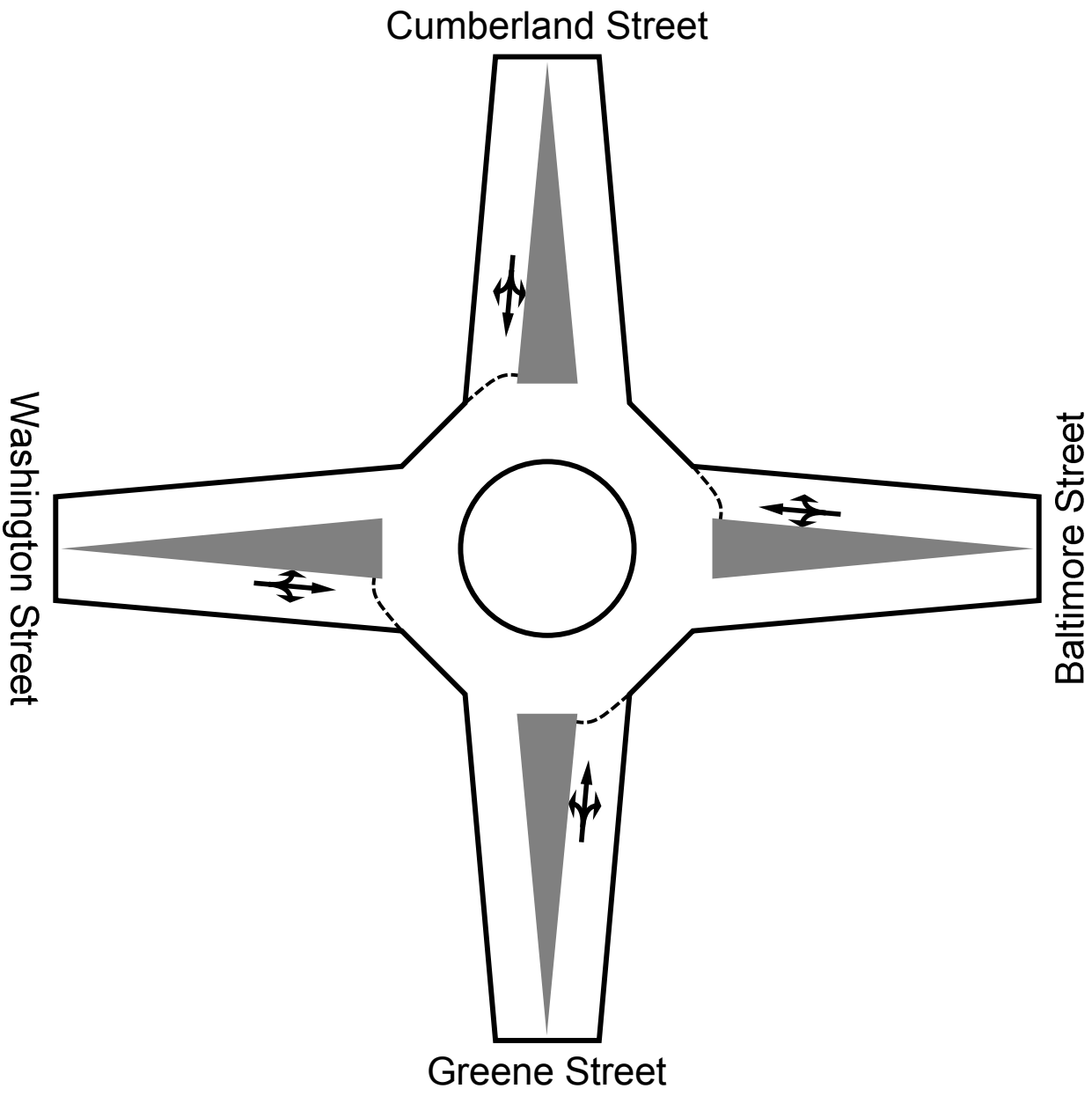
Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LTR
Maximum Queue (ft)	91	59	68	38	49
Average Queue (ft)	8	7	7	11	15
95th Queue (ft)	51	33	38	35	42
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)	0		0		
Queuing Penalty (veh)	0		1		
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	1	0			
Queuing Penalty (veh)	3	1			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	211	154	413	308	95
Average Queue (ft)	133	56	199	156	37
95th Queue (ft)	213	114	347	253	77
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	17	1			
Queuing Penalty (veh)	41	2			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 48


Cumberland Street
Washington Street
Baltimore Street
Greene Street

SIDRA INTERSECTION

Movement Summary

Baltimore Street/Washington Street at Cumberland Street/Greene Street

AM Peak Hour

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
Greene Street										
3L	L	12	0.0	0.308	6.9	LOS A	63	0.25	0.56	21.8
8T	T	32	0.0	0.311	2.0	LOS A	63	0.25	0.27	23.5
8R	R	337	0.9	0.310	3.0	LOS A	63	0.25	0.35	23.1
Approach		**381**	**0.8**	**0.310**	**3.1**	**LOS A**	**63**	**0.25**	**0.35**	**23.1**
Baltimore Street										
1L	L	178	1.1	0.214	6.8	LOS A	39	0.19	0.56	21.9
6T	T	65	0.0	0.215	1.9	LOS A	39	0.19	0.25	23.7
6R	R	22	0.0	0.214	2.9	LOS A	39	0.19	0.34	23.3
Approach		**265**	**0.8**	**0.215**	**5.2**	**LOS A**	**39**	**0.19**	**0.46**	**22.4**
Cumberland Street										
7L	L	12	0.0	0.045	8.1	LOS A	7	0.43	0.61	21.5
4T	T	23	0.0	0.045	3.2	LOS A	7	0.43	0.39	23.1
4R	R	5	0.0	0.045	4.3	LOS A	7	0.43	0.44	22.7
Approach		**40**	**0.0**	**0.045**	**4.8**	**LOS A**	**7**	**0.43**	**0.46**	**22.5**
Washington Street										
5L	L	2	0.0	0.062	7.9	LOS A	10	0.39	0.60	21.6
2T	T	45	0.0	0.062	3.0	LOS A	10	0.39	0.37	23.1
2R	R	10	0.0	0.062	4.0	LOS A	10	0.39	0.42	22.8
Approach		**57**	**0.0**	**0.062**	**3.3**	**LOS A**	**10**	**0.39**	**0.39**	**23.0**
All Vehicles		**743**	**0.7**	**0.311**	**4.0**	**LOS A**	**63**	**0.25**	**0.40**	**22.8**

SIDRA INTERSECTION

Movement Summary

Baltimore Street/Washington Street at Cumberland Street/Greene Street

PM Peak Hour

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
Greene Street										
3L	L	13	0.0	0.433	7.3	LOS A	102	0.38	0.57	21.6
8T	T	51	0.0	0.436	2.4	LOS A	102	0.38	0.32	23.2
8R	R	442	0.0	0.434	3.4	LOS A	102	0.38	0.40	22.8
Approach		**506**	**0.0**	**0.434**	**3.4**	**LOS A**	**102**	**0.38**	**0.39**	**22.8**
Baltimore Street										
1L	L	345	0.9	0.367	7.1	LOS A	79	0.30	0.56	21.7
6T	T	66	0.0	0.367	2.2	LOS A	79	0.30	0.29	23.4
6R	R	30	0.0	0.366	3.2	LOS A	79	0.30	0.37	23.0
Approach		**440**	**0.7**	**0.367**	**6.1**	**LOS A**	**79**	**0.30**	**0.51**	**22.0**
Cumberland Street										
7L	L	16	0.0	0.078	9.4	LOS A	13	0.56	0.68	21.1
4T	T	33	3.0	0.078	4.5	LOS A	13	0.56	0.51	22.7
4R	R	9	0.0	0.078	5.5	LOS A	13	0.56	0.53	22.4
Approach		**58**	**1.7**	**0.078**	**6.0**	**LOS A**	**13**	**0.56**	**0.56**	**22.2**
Washington Street										
5L	L	10	0.0	0.130	9.3	LOS A	21	0.55	0.70	21.1
2T	T	66	0.0	0.130	4.4	LOS A	21	0.55	0.52	22.7
2R	R	24	0.0	0.130	5.5	LOS A	21	0.55	0.54	22.4
Approach		**100**	**0.0**	**0.130**	**5.2**	**LOS A**	**21**	**0.55**	**0.55**	**22.5**
All Vehicles		**1104**	**0.4**	**0.436**	**4.8**	**LOS A**	**102**	**0.37**	**0.46**	**22.4**

SIDRA SOLUTIONS

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:35	7:35	7:35	7:35	7:35	7:35
End Time	8:45	8:45	8:45	8:45	8:45	8:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1059	1062	1066	1077	1037	1060
Vehs Exited	1070	1060	1059	1085	1034	1062
Starting Vehs	33	28	23	27	27	26
Ending Vehs	22	30	30	19	30	27
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	404	399	400	408	389	400
Travel Time (hr)	24.5	24.7	24.3	24.7	23.9	24.4
Total Delay (hr)	7.3	7.8	7.2	7.2	7.3	7.4
Total Stops	1175	1116	1148	1192	1122	1150
Fuel Used (gal)	16.1	16.0	15.9	16.2	15.5	15.9

Interval #0 Information Seeding

Start Time	7:35
End Time	7:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:45
End Time	8:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1059	1062	1066	1077	1037	1060
Vehs Exited	1070	1060	1059	1085	1034	1062
Starting Vehs	33	28	23	27	27	26
Ending Vehs	22	30	30	19	30	27
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	404	399	400	408	389	400
Travel Time (hr)	24.5	24.7	24.3	24.7	23.9	24.4
Total Delay (hr)	7.3	7.8	7.2	7.2	7.3	7.4
Total Stops	1175	1116	1148	1192	1122	1150
Fuel Used (gal)	16.1	16.0	15.9	16.2	15.5	15.9

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.1	0.5	0.6	0.2	1.4
Delay / Veh (s)	4.7	8.2	6.0	18.6	7.4
Total Stops	19	123	278	34	454
Travel Dist (mi)	8.9	11.1	65.5	4.0	89.5
Travel Time (hr)	0.4	1.0	3.1	0.4	4.9
Avg Speed (mph)	21	11	22	11	19
Fuel Used (gal)	0.3	0.4	1.8	0.2	2.7
HC Emissions (g)	1	3	12	0	15
CO Emissions (g)	28	80	354	18	481
NOx Emissions (g)	4	11	35	2	51
Vehicles Entered	48	239	336	38	661
Vehicles Exited	49	239	338	37	663
Hourly Exit Rate	49	239	338	37	663
Input Volume	52	244	350	37	683
% of Volume	94	98	97	100	97
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.1	0.1	0.0	0.0	0.2
Delay / Veh (s)	1.4	0.9	3.8	3.2	1.2
Total Stops	6	8	5	1	20
Travel Dist (mi)	14.8	9.9	0.2	0.0	24.9
Travel Time (hr)	1.0	0.6	0.0	0.0	1.6
Avg Speed (mph)	16	16	12	8	16
Fuel Used (gal)	1.1	0.7	0.0	0.0	1.8
HC Emissions (g)	10	7	0	0	17
CO Emissions (g)	407	287	0	0	695
NOx Emissions (g)	46	33	0	0	78
Vehicles Entered	352	268	5	1	626
Vehicles Exited	352	268	5	1	626
Hourly Exit Rate	352	268	5	1	626
Input Volume	362	267	6	1	636
% of Volume	97	100	83	100	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	1.3	2.1	1.9	5.4
Delay / Veh (s)	15.3	39.9	15.8	20.5
Total Stops	232	190	254	676
Travel Dist (mi)	12.0	29.5	69.0	110.5
Travel Time (hr)	2.0	3.4	4.8	10.1
Avg Speed (mph)	6	9	15	11
Fuel Used (gal)	0.7	1.4	2.5	4.6
HC Emissions (g)	2	3	20	26
CO Emissions (g)	109	181	519	810
NOx Emissions (g)	11	18	67	96
Vehicles Entered	317	191	439	947
Vehicles Exited	317	192	438	947
Hourly Exit Rate	317	192	438	947
Input Volume	329	191	445	965
% of Volume	96	101	98	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	7.4
Delay / Veh (s)	25.0
Total Stops	1150
Travel Dist (mi)	400.1
Travel Time (hr)	24.4
Avg Speed (mph)	16
Fuel Used (gal)	15.9
HC Emissions (g)	109
CO Emissions (g)	3781
NOx Emissions (g)	435
Vehicles Entered	1060
Vehicles Exited	1062
Hourly Exit Rate	1062
Input Volume	3366
% of Volume	32
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	19	154	52	95	51
Average Queue (ft)	3	62	19	41	20
95th Queue (ft)	12	123	42	71	45
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)		0			
Queuing Penalty (veh)		0			
Storage Bay Dist (ft)			100		
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LR
Maximum Queue (ft)	43	27	51	30	6
Average Queue (ft)	3	1	5	5	1
95th Queue (ft)	20	14	25	23	7
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	0	0			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	170	92	234	240	108
Average Queue (ft)	80	31	119	132	36
95th Queue (ft)	141	65	199	215	79
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	2	0			
Queuing Penalty (veh)	3	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 3

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1451	1491	1434	1466	1448	1459
Vehs Exited	1472	1483	1445	1484	1428	1463
Starting Vehs	46	42	44	50	27	41
Ending Vehs	25	50	33	32	47	36
Denied Entry Before	0	0	0	1	0	0
Denied Entry After	0	0	0	1	0	0
Travel Distance (mi)	562	573	557	572	560	565
Travel Time (hr)	36.9	37.3	37.3	39.3	36.6	37.5
Total Delay (hr)	12.9	12.9	13.5	14.9	12.6	13.4
Total Stops	1686	1744	1784	1847	1780	1770
Fuel Used (gal)	22.7	23.4	22.8	23.8	22.5	23.1

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1451	1491	1434	1466	1448	1459
Vehs Exited	1472	1483	1445	1484	1428	1463
Starting Vehs	46	42	44	50	27	41
Ending Vehs	25	50	33	32	47	36
Denied Entry Before	0	0	0	1	0	0
Denied Entry After	0	0	0	1	0	0
Travel Distance (mi)	562	573	557	572	560	565
Travel Time (hr)	36.9	37.3	37.3	39.3	36.6	37.5
Total Delay (hr)	12.9	12.9	13.5	14.9	12.6	13.4
Total Stops	1686	1744	1784	1847	1780	1770
Fuel Used (gal)	22.7	23.4	22.8	23.8	22.5	23.1

1: Washington Street & Cumberland Street Performance by approach

Approach	EB	WB	NB	SE	All
Total Delay (hr)	0.2	1.9	1.0	0.2	3.3
Delay / Veh (s)	8.5	17.1	8.0	15.9	12.1
Total Stops	54	312	327	45	738
Travel Dist (mi)	17.0	18.1	87.7	5.9	128.7
Travel Time (hr)	0.9	2.7	4.3	0.5	8.5
Avg Speed (mph)	18	7	21	12	15
Fuel Used (gal)	0.5	1.0	2.5	0.2	4.2
HC Emissions (g)	1	2	11	2	16
CO Emissions (g)	64	96	389	54	602
NOx Emissions (g)	7	13	34	7	61
Vehicles Entered	93	393	451	54	991
Vehicles Exited	91	393	451	54	989
Hourly Exit Rate	91	393	451	54	989
Input Volume	92	409	466	53	1020
% of Volume	99	96	97	102	97
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

2: Baltimore Street & Canal Street Performance by approach

Approach	EB	WB	NB	SB	All
Total Delay (hr)	0.3	0.1	0.0	0.1	0.6
Delay / Veh (s)	2.6	1.3	12.3	10.5	2.3
Total Stops	30	16	13	20	79
Travel Dist (mi)	19.6	14.0	0.5	0.4	34.5
Travel Time (hr)	1.4	0.9	0.1	0.1	2.4
Avg Speed (mph)	14	15	7	5	14
Fuel Used (gal)	1.4	1.0	0.0	0.0	2.4
HC Emissions (g)	9	6	0	0	15
CO Emissions (g)	453	293	2	1	749
NOx Emissions (g)	52	33	0	0	86
Vehicles Entered	461	373	13	20	867
Vehicles Exited	461	373	13	20	867
Hourly Exit Rate	461	373	13	20	867
Input Volume	483	388	12	19	902
% of Volume	95	96	108	105	96
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

3: Baltimore Street & Mechanic Street Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.3	3.6	1.9	8.8
Delay / Veh (s)	25.5	44.2	13.0	24.5
Total Stops	389	318	246	953
Travel Dist (mi)	17.7	45.3	84.1	147.1
Travel Time (hr)	4.2	5.5	5.4	15.2
Avg Speed (mph)	4	8	16	10
Fuel Used (gal)	1.3	2.2	3.0	6.5
HC Emissions (g)	2	5	10	16
CO Emissions (g)	140	274	398	812
NOx Emissions (g)	13	28	47	88
Vehicles Entered	466	292	536	1294
Vehicles Exited	467	295	537	1299
Hourly Exit Rate	467	295	537	1299
Input Volume	486	300	553	1339
% of Volume	96	98	97	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	13.4
Delay / Veh (s)	32.9
Total Stops	1770
Travel Dist (mi)	564.8
Travel Time (hr)	37.5
Avg Speed (mph)	15
Fuel Used (gal)	23.1
HC Emissions (g)	93
CO Emissions (g)	4297
NOx Emissions (g)	474
Vehicles Entered	1459
Vehicles Exited	1463
Hourly Exit Rate	1463
Input Volume	4756
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Washington Street & Cumberland Street

Movement	EB	WB	NB	NB	SE
Directions Served	LTR	LTR	<L	R	LR>
Maximum Queue (ft)	67	247	83	99	82
Average Queue (ft)	15	139	28	50	27
95th Queue (ft)	43	225	63	81	59
Link Distance (ft)	950	170		1016	565
Upstream Blk Time (%)		3			
Queuing Penalty (veh)		14			
Storage Bay Dist (ft)			100		
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			1	0	

Intersection: 2: Baltimore Street & Canal Street

Movement	EB	EB	WB	NB	SB
Directions Served	LT	TR	LTR	LR	LTR
Maximum Queue (ft)	123	63	65	42	53
Average Queue (ft)	11	8	9	11	15
95th Queue (ft)	59	38	41	36	42
Link Distance (ft)	170		126	190	109
Upstream Blk Time (%)	0		0		
Queuing Penalty (veh)	1		0		
Storage Bay Dist (ft)		50			
Storage Blk Time (%)	1	1			
Queuing Penalty (veh)	2	2			

Intersection: 3: Baltimore Street & Mechanic Street

Movement	EB	EB	NB	SB	SB
Directions Served	L	R	LT	T	R
Maximum Queue (ft)	211	176	375	296	86
Average Queue (ft)	135	60	182	142	35
95th Queue (ft)	214	125	313	243	72
Link Distance (ft)	126	126	815	827	827
Upstream Blk Time (%)	16	2			
Queuing Penalty (veh)	38	4			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 62

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:20	7:20	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2070	2044	1996	2035	1962	2022
Vehs Exited	2077	2037	1989	2026	1954	2017
Starting Vehs	26	22	16	18	19	20
Ending Vehs	19	29	23	27	27	25
Denied Entry Before	0	1	1	0	0	0
Denied Entry After	0	1	1	0	0	0
Travel Distance (mi)	591	584	568	580	561	577
Travel Time (hr)	25.4	25.1	24.2	25.1	24.1	24.8
Total Delay (hr)	4.9	4.8	4.5	4.9	4.6	4.8
Total Stops	908	921	901	899	896	903
Fuel Used (gal)	21.6	21.5	20.9	21.1	20.4	21.1

Interval #0 Information Seeding

Start Time	7:20
End Time	7:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2070	2044	1996	2035	1962	2022
Vehs Exited	2077	2037	1989	2026	1954	2017
Starting Vehs	26	22	16	18	19	20
Ending Vehs	19	29	23	27	27	25
Denied Entry Before	0	1	1	0	0	0
Denied Entry After	0	1	1	0	0	0
Travel Distance (mi)	591	584	568	580	561	577
Travel Time (hr)	25.4	25.1	24.2	25.1	24.1	24.8
Total Delay (hr)	4.9	4.8	4.5	4.9	4.6	4.8
Total Stops	908	921	901	899	896	903
Fuel Used (gal)	21.6	21.5	20.9	21.1	20.4	21.1

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	0.8	0.8
Delay / Veh (s)	1.0	7.8	7.4
Total Stops	0	371	371
Travel Dist (mi)	0.2	39.9	40.1
Travel Time (hr)	0.0	2.2	2.2
Avg Speed (mph)	12	18	18
Fuel Used (gal)	0.0	1.3	1.3
HC Emissions (g)	0	26	27
CO Emissions (g)	8	696	704
NOx Emissions (g)	1	70	71
Vehicles Entered	20	379	399
Vehicles Exited	20	378	398
Hourly Exit Rate	20	378	398
Input Volume	19	386	405
% of Volume	105	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	0.6	0.2	0.3	1.0
Delay / Veh (s)	18.0	2.3	2.4	4.6
Total Stops	112	48	70	230
Travel Dist (mi)	3.6	11.0	40.1	54.7
Travel Time (hr)	0.7	0.6	1.6	3.0
Avg Speed (mph)	5	19	25	19
Fuel Used (gal)	0.3	0.6	1.2	2.1
HC Emissions (g)	2	6	17	24
CO Emissions (g)	58	297	394	748
NOx Emissions (g)	7	20	49	77
Vehicles Entered	114	283	393	790
Vehicles Exited	114	283	392	789
Hourly Exit Rate	114	283	392	789
Input Volume	110	281	395	786
% of Volume	104	101	99	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	0.5	1.3	1.7
Delay / Veh (s)	13.9	5.5	6.5
Total Stops	70	230	300
Travel Dist (mi)	14.0	41.9	55.9
Travel Time (hr)	1.0	2.7	3.7
Avg Speed (mph)	15	15	15
Fuel Used (gal)	0.5	1.4	1.9
HC Emissions (g)	3	17	20
CO Emissions (g)	107	349	456
NOx Emissions (g)	10	49	59
Vehicles Entered	122	837	959
Vehicles Exited	123	838	961
Hourly Exit Rate	123	838	961
Input Volume	116	861	977
% of Volume	106	97	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.1	0.1	0.2
Delay / Veh (s)	0.6	0.3	0.4
Total Stops	0	1	1
Travel Dist (mi)	18.0	22.9	40.9
Travel Time (hr)	0.8	0.9	1.6
Avg Speed (mph)	24	26	25
Fuel Used (gal)	0.8	0.6	1.4
HC Emissions (g)	10	7	17
CO Emissions (g)	375	189	564
NOx Emissions (g)	37	20	58
Vehicles Entered	466	1113	1579
Vehicles Exited	466	1113	1579
Hourly Exit Rate	466	1113	1579
Input Volume	468	1136	1604
% of Volume	100	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.2	0.4	0.0	0.7
Delay / Veh (s)	2.3	1.3	0.0	1.2
Total Stops	0	0	0	0
Travel Dist (mi)	14.8	122.4	2.8	140.1
Travel Time (hr)	0.7	4.6	0.1	5.4
Avg Speed (mph)	20	28	25	27
Fuel Used (gal)	1.3	3.6	0.1	5.0
HC Emissions (g)	38	42	1	81
CO Emissions (g)	1146	863	33	2042
NOx Emissions (g)	119	114	4	237
Vehicles Entered	371	1112	465	1948
Vehicles Exited	370	1111	464	1945
Hourly Exit Rate	370	1111	464	1945
Input Volume	379	1133	466	1978
% of Volume	98	98	100	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	4.8
Delay / Veh (s)	8.5
Total Stops	903
Travel Dist (mi)	576.9
Travel Time (hr)	24.8
Avg Speed (mph)	24
Fuel Used (gal)	21.1
HC Emissions (g)	316
CO Emissions (g)	8862
NOx Emissions (g)	950
Vehicles Entered	2022
Vehicles Exited	2017
Hourly Exit Rate	2017
Input Volume	7780
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	14	110
Average Queue (ft)	1	64
95th Queue (ft)	9	95
Link Distance (ft)	0	557
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	TR
Maximum Queue (ft)	110	60	41	65	69	94
Average Queue (ft)	51	23	10	28	17	34
95th Queue (ft)	93	52	32	62	51	76
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB
Directions Served	T	TR	LT
Maximum Queue (ft)	84	56	256
Average Queue (ft)	30	21	114
95th Queue (ft)	66	49	209
Link Distance (ft)	601	601	177
Upstream Blk Time (%)			1
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: MD 51 & NB MD 51

Movement	NE	NE
Directions Served	LT	T
Maximum Queue (ft)	15	6
Average Queue (ft)	0	0
95th Queue (ft)	6	4
Link Distance (ft)	1	1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 4

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2837	2852	2766	2885	2760	2819
Vehs Exited	2846	2871	2768	2899	2761	2829
Starting Vehs	41	49	35	46	38	43
Ending Vehs	32	30	33	32	37	33
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	818	823	796	833	796	813
Travel Time (hr)	40.0	41.2	38.5	40.2	39.0	39.8
Total Delay (hr)	11.4	12.3	10.8	11.1	11.2	11.4
Total Stops	1546	1589	1479	1486	1476	1514
Fuel Used (gal)	32.1	32.4	30.9	32.4	31.0	31.8

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2837	2852	2766	2885	2760	2819
Vehs Exited	2846	2871	2768	2899	2761	2829
Starting Vehs	41	49	35	46	38	43
Ending Vehs	32	30	33	32	37	33
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	818	823	796	833	796	813
Travel Time (hr)	40.0	41.2	38.5	40.2	39.0	39.8
Total Delay (hr)	11.4	12.3	10.8	11.1	11.2	11.4
Total Stops	1546	1589	1479	1486	1476	1514
Fuel Used (gal)	32.1	32.4	30.9	32.4	31.0	31.8

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	1.4	1.4
Delay / Veh (s)	0.5	9.5	9.3
Total Stops	0	526	526
Travel Dist (mi)	0.1	55.8	55.9
Travel Time (hr)	0.0	3.3	3.4
Avg Speed (mph)	15	17	17
Fuel Used (gal)	0.0	1.7	1.7
HC Emissions (g)	0	16	16
CO Emissions (g)	3	606	609
NOx Emissions (g)	0	50	50
Vehicles Entered	9	528	537
Vehicles Exited	9	529	538
Hourly Exit Rate	9	529	538
Input Volume	8	539	547
% of Volume	112	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	1.3	0.9	2.1	4.3
Delay / Veh (s)	17.5	11.9	13.5	14.1
Total Stops	98	133	285	516
Travel Dist (mi)	8.2	10.3	57.6	76.1
Travel Time (hr)	1.7	1.3	4.1	7.1
Avg Speed (mph)	5	8	14	11
Fuel Used (gal)	0.7	0.6	2.4	3.7
HC Emissions (g)	3	5	19	27
CO Emissions (g)	114	220	732	1066
NOx Emissions (g)	15	19	67	100
Vehicles Entered	264	266	564	1094
Vehicles Exited	265	266	563	1094
Hourly Exit Rate	265	266	563	1094
Input Volume	271	273	590	1134
% of Volume	98	97	95	96
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	2.3	1.4	3.7
Delay / Veh (s)	28.8	4.3	9.2
Total Stops	219	237	456
Travel Dist (mi)	33.3	58.6	91.9
Travel Time (hr)	3.5	3.5	7.0
Avg Speed (mph)	10	17	13
Fuel Used (gal)	1.6	1.9	3.5
HC Emissions (g)	7	15	22
CO Emissions (g)	398	355	752
NOx Emissions (g)	30	49	78
Vehicles Entered	291	1158	1449
Vehicles Exited	290	1159	1449
Hourly Exit Rate	290	1159	1449
Input Volume	295	1169	1464
% of Volume	98	99	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.2	0.2	0.4
Delay / Veh (s)	1.0	0.4	0.6
Total Stops	0	11	11
Travel Dist (mi)	30.0	29.2	59.2
Travel Time (hr)	1.4	1.2	2.6
Avg Speed (mph)	22	25	23
Fuel Used (gal)	1.8	0.8	2.6
HC Emissions (g)	18	10	28
CO Emissions (g)	784	243	1027
NOx Emissions (g)	81	29	110
Vehicles Entered	774	1431	2205
Vehicles Exited	774	1431	2205
Hourly Exit Rate	774	1431	2205
Input Volume	809	1450	2259
% of Volume	96	99	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.3	0.6	0.0	1.0
Delay / Veh (s)	2.4	1.6	0.0	1.3
Total Stops	0	4	0	4
Travel Dist (mi)	21.1	156.3	4.8	182.2
Travel Time (hr)	1.1	5.9	0.2	7.2
Avg Speed (mph)	20	28	25	26
Fuel Used (gal)	1.9	4.5	0.2	6.6
HC Emissions (g)	26	55	1	83
CO Emissions (g)	1137	1143	40	2320
NOx Emissions (g)	101	152	5	259
Vehicles Entered	527	1417	774	2718
Vehicles Exited	527	1419	774	2720
Hourly Exit Rate	527	1419	774	2720
Input Volume	537	1438	809	2784
% of Volume	98	99	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	11.4
Delay / Veh (s)	14.5
Total Stops	1514
Travel Dist (mi)	813.3
Travel Time (hr)	39.8
Avg Speed (mph)	21
Fuel Used (gal)	31.8
HC Emissions (g)	320
CO Emissions (g)	11053
NOx Emissions (g)	1081
Vehicles Entered	2819
Vehicles Exited	2829
Hourly Exit Rate	2829
Input Volume	11050
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	25	150
Average Queue (ft)	1	76
95th Queue (ft)	11	119
Link Distance (ft)	0	557
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	TR
Maximum Queue (ft)	116	32	100	140	152	162
Average Queue (ft)	71	6	36	60	82	100
95th Queue (ft)	114	24	78	105	134	150
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	2		0	0		
Queuing Penalty (veh)	3		0	0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB
Directions Served	T	TR	LT
Maximum Queue (ft)	222	97	260
Average Queue (ft)	100	29	140
95th Queue (ft)	178	69	240
Link Distance (ft)	601	601	177
Upstream Blk Time (%)			2
Queuing Penalty (veh)			9
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: MD 51 & NB MD 51

Movement	NE
Directions Served	LT
Maximum Queue (ft)	96
Average Queue (ft)	7
95th Queue (ft)	47
Link Distance (ft)	1
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB I-68 Off-ramp &

Movement	NE
Directions Served	T
Maximum Queue (ft)	66
Average Queue (ft)	2
95th Queue (ft)	33
Link Distance (ft)	576
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 12

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:20	7:20	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2070	2044	1996	2035	1962	2022
Vehs Exited	2075	2039	1989	2025	1958	2017
Starting Vehs	24	24	16	18	19	19
Ending Vehs	19	29	23	28	23	24
Denied Entry Before	0	1	1	0	0	0
Denied Entry After	0	1	1	0	0	0
Travel Distance (mi)	591	584	568	580	561	577
Travel Time (hr)	25.0	24.6	23.8	24.7	23.9	24.4
Total Delay (hr)	4.5	4.4	4.2	4.5	4.4	4.4
Total Stops	770	765	732	750	724	748
Fuel Used (gal)	21.3	21.2	20.6	20.8	20.1	20.8

Interval #0 Information Seeding

Start Time	7:20
End Time	7:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2070	2044	1996	2035	1962	2022
Vehs Exited	2075	2039	1989	2025	1958	2017
Starting Vehs	24	24	16	18	19	19
Ending Vehs	19	29	23	28	23	24
Denied Entry Before	0	1	1	0	0	0
Denied Entry After	0	1	1	0	0	0
Travel Distance (mi)	591	584	568	580	561	577
Travel Time (hr)	25.0	24.6	23.8	24.7	23.9	24.4
Total Delay (hr)	4.5	4.4	4.2	4.5	4.4	4.4
Total Stops	770	765	732	750	724	748
Fuel Used (gal)	21.3	21.2	20.6	20.8	20.1	20.8

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	0.8	0.8
Delay / Veh (s)	0.7	7.8	7.4
Total Stops	0	371	371
Travel Dist (mi)	0.2	39.9	40.1
Travel Time (hr)	0.0	2.2	2.2
Avg Speed (mph)	13	18	18
Fuel Used (gal)	0.0	1.3	1.3
HC Emissions (g)	0	26	27
CO Emissions (g)	6	696	702
NOx Emissions (g)	1	70	71
Vehicles Entered	20	379	399
Vehicles Exited	20	378	398
Hourly Exit Rate	20	378	398
Input Volume	19	386	405
% of Volume	105	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	0.8	0.2	0.2	1.2
Delay / Veh (s)	24.8	2.0	2.2	5.4
Total Stops	66	39	53	158
Travel Dist (mi)	3.6	11.0	40.1	54.7
Travel Time (hr)	1.0	0.6	1.6	3.1
Avg Speed (mph)	4	20	25	18
Fuel Used (gal)	0.4	0.6	1.2	2.2
HC Emissions (g)	2	6	17	25
CO Emissions (g)	70	302	368	740
NOx Emissions (g)	9	21	47	77
Vehicles Entered	114	283	393	790
Vehicles Exited	115	283	392	790
Hourly Exit Rate	115	283	392	790
Input Volume	110	281	395	786
% of Volume	105	101	99	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	0.8	0.6	1.3
Delay / Veh (s)	22.2	2.4	4.9
Total Stops	90	127	217
Travel Dist (mi)	14.0	41.9	55.9
Travel Time (hr)	1.2	2.0	3.3
Avg Speed (mph)	11	21	17
Fuel Used (gal)	0.6	1.2	1.8
HC Emissions (g)	3	17	20
CO Emissions (g)	130	364	493
NOx Emissions (g)	11	49	60
Vehicles Entered	122	837	959
Vehicles Exited	122	838	960
Hourly Exit Rate	122	838	960
Input Volume	116	861	977
% of Volume	105	97	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.1	0.1	0.1
Delay / Veh (s)	0.5	0.2	0.3
Total Stops	0	1	1
Travel Dist (mi)	18.0	22.9	40.9
Travel Time (hr)	0.7	0.8	1.6
Avg Speed (mph)	25	27	26
Fuel Used (gal)	0.7	0.6	1.4
HC Emissions (g)	9	7	17
CO Emissions (g)	336	200	536
NOx Emissions (g)	34	21	55
Vehicles Entered	466	1113	1579
Vehicles Exited	466	1113	1579
Hourly Exit Rate	466	1113	1579
Input Volume	468	1136	1604
% of Volume	100	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.2	0.4	0.0	0.6
Delay / Veh (s)	2.3	1.3	0.0	1.2
Total Stops	0	0	0	0
Travel Dist (mi)	14.8	122.4	2.9	140.1
Travel Time (hr)	0.7	4.5	0.1	5.4
Avg Speed (mph)	20	28	25	27
Fuel Used (gal)	1.3	3.6	0.1	5.0
HC Emissions (g)	38	42	1	82
CO Emissions (g)	1146	866	33	2046
NOx Emissions (g)	119	116	4	239
Vehicles Entered	371	1112	465	1948
Vehicles Exited	370	1111	465	1946
Hourly Exit Rate	370	1111	465	1946
Input Volume	379	1133	466	1978
% of Volume	98	98	100	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	4.4
Delay / Veh (s)	7.8
Total Stops	748
Travel Dist (mi)	577.1
Travel Time (hr)	24.4
Avg Speed (mph)	24
Fuel Used (gal)	20.8
HC Emissions (g)	310
CO Emissions (g)	8626
NOx Emissions (g)	923
Vehicles Entered	2022
Vehicles Exited	2017
Hourly Exit Rate	2017
Input Volume	7780
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	8	110
Average Queue (ft)	0	63
95th Queue (ft)	4	95
Link Distance (ft)	0	557
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	TR
Maximum Queue (ft)	103	60	46	73	74	99
Average Queue (ft)	43	17	10	25	17	30
95th Queue (ft)	89	49	36	61	54	76
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB
Directions Served	T	TR	LT
Maximum Queue (ft)	96	60	173
Average Queue (ft)	37	24	67
95th Queue (ft)	77	55	137
Link Distance (ft)	601	601	177
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: MD 51 & NB MD 51

Movement	NE
Directions Served	T
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2837	2852	2766	2885	2760	2819
Vehs Exited	2845	2867	2766	2900	2757	2828
Starting Vehs	39	43	33	45	33	40
Ending Vehs	31	28	33	30	36	32
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	818	823	796	833	795	813
Travel Time (hr)	37.3	37.8	36.1	37.8	36.3	37.0
Total Delay (hr)	8.7	9.0	8.4	8.8	8.4	8.6
Total Stops	1389	1409	1349	1411	1331	1374
Fuel Used (gal)	31.3	31.4	30.2	31.7	30.1	30.9

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2837	2852	2766	2885	2760	2819
Vehs Exited	2845	2867	2766	2900	2757	2828
Starting Vehs	39	43	33	45	33	40
Ending Vehs	31	28	33	30	36	32
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	818	823	796	833	795	813
Travel Time (hr)	37.3	37.8	36.1	37.8	36.3	37.0
Total Delay (hr)	8.7	9.0	8.4	8.8	8.4	8.6
Total Stops	1389	1409	1349	1411	1331	1374
Fuel Used (gal)	31.3	31.4	30.2	31.7	30.1	30.9

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	1.4	1.4
Delay / Veh (s)	0.6	9.5	9.3
Total Stops	0	526	526
Travel Dist (mi)	0.1	55.8	55.9
Travel Time (hr)	0.0	3.3	3.4
Avg Speed (mph)	15	17	17
Fuel Used (gal)	0.0	1.7	1.7
HC Emissions (g)	0	16	16
CO Emissions (g)	3	605	608
NOx Emissions (g)	0	50	50
Vehicles Entered	9	528	537
Vehicles Exited	9	529	538
Hourly Exit Rate	9	529	538
Input Volume	8	539	547
% of Volume	112	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	0.6	0.5	1.3	2.4
Delay / Veh (s)	7.6	7.4	8.1	7.8
Total Stops	37	110	235	382
Travel Dist (mi)	8.2	10.3	57.6	76.1
Travel Time (hr)	0.9	0.9	3.3	5.1
Avg Speed (mph)	9	11	18	15
Fuel Used (gal)	0.5	0.5	2.1	3.2
HC Emissions (g)	3	5	16	25
CO Emissions (g)	113	235	614	961
NOx Emissions (g)	16	19	57	91
Vehicles Entered	264	266	564	1094
Vehicles Exited	264	266	563	1093
Hourly Exit Rate	264	266	563	1093
Input Volume	271	273	590	1134
% of Volume	97	97	95	96
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	1.7	1.3	3.0
Delay / Veh (s)	20.8	4.1	7.5
Total Stops	203	257	460
Travel Dist (mi)	33.3	58.6	91.8
Travel Time (hr)	2.8	3.4	6.2
Avg Speed (mph)	12	17	15
Fuel Used (gal)	1.4	1.8	3.2
HC Emissions (g)	7	14	21
CO Emissions (g)	370	344	714
NOx Emissions (g)	28	47	74
Vehicles Entered	291	1158	1449
Vehicles Exited	290	1159	1449
Hourly Exit Rate	290	1159	1449
Input Volume	295	1169	1464
% of Volume	98	99	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.2	0.1	0.3
Delay / Veh (s)	0.9	0.4	0.6
Total Stops	0	4	4
Travel Dist (mi)	30.0	29.2	59.2
Travel Time (hr)	1.4	1.1	2.5
Avg Speed (mph)	22	26	24
Fuel Used (gal)	1.7	0.8	2.5
HC Emissions (g)	18	10	27
CO Emissions (g)	784	246	1030
NOx Emissions (g)	77	29	105
Vehicles Entered	773	1429	2202
Vehicles Exited	773	1431	2204
Hourly Exit Rate	773	1431	2204
Input Volume	809	1450	2259
% of Volume	96	99	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.3	0.6	0.0	1.0
Delay / Veh (s)	2.4	1.5	0.0	1.3
Total Stops	0	1	0	1
Travel Dist (mi)	21.1	156.3	4.8	182.1
Travel Time (hr)	1.1	5.9	0.2	7.2
Avg Speed (mph)	20	28	25	27
Fuel Used (gal)	1.9	4.5	0.2	6.6
HC Emissions (g)	26	56	1	83
CO Emissions (g)	1137	1145	43	2325
NOx Emissions (g)	101	153	5	259
Vehicles Entered	527	1417	773	2717
Vehicles Exited	527	1418	773	2718
Hourly Exit Rate	527	1418	773	2718
Input Volume	537	1438	809	2784
% of Volume	98	99	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	8.6
Delay / Veh (s)	11.0
Total Stops	1374
Travel Dist (mi)	813.0
Travel Time (hr)	37.0
Avg Speed (mph)	22
Fuel Used (gal)	30.9
HC Emissions (g)	316
CO Emissions (g)	10930
NOx Emissions (g)	1060
Vehicles Entered	2819
Vehicles Exited	2828
Hourly Exit Rate	2828
Input Volume	11050
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	27	147
Average Queue (ft)	1	75
95th Queue (ft)	15	117
Link Distance (ft)	0	557
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	TR
Maximum Queue (ft)	86	25	94	95	109	134
Average Queue (ft)	30	1	25	48	53	73
95th Queue (ft)	71	12	64	80	96	113
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	0		0	0		
Queuing Penalty (veh)	0		0	0		
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB
Directions Served	T	TR	LT
Maximum Queue (ft)	189	79	254
Average Queue (ft)	85	29	122
95th Queue (ft)	145	61	220
Link Distance (ft)	601	601	177
Upstream Blk Time (%)			2
Queuing Penalty (veh)			6
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: MD 51 & NB MD 51

Movement	NE
Directions Served	LT
Maximum Queue (ft)	46
Average Queue (ft)	2
95th Queue (ft)	21
Link Distance (ft)	1
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB I-68 Off-ramp &

Movement	NE
Directions Served	T
Maximum Queue (ft)	8
Average Queue (ft)	0
95th Queue (ft)	5
Link Distance (ft)	576
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 6

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:20	7:20	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2080	2046	2003	2033	1958	2024
Vehs Exited	2081	2042	1996	2022	1954	2020
Starting Vehs	20	23	16	16	19	19
Ending Vehs	19	27	23	27	23	25
Denied Entry Before	0	1	1	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	596	585	571	581	560	579
Travel Time (hr)	24.4	24.1	23.2	23.8	23.1	23.7
Total Delay (hr)	3.8	3.8	3.5	3.7	3.6	3.7
Total Stops	444	451	401	405	415	425
Fuel Used (gal)	20.5	20.4	19.7	19.9	19.2	19.9

Interval #0 Information Seeding

Start Time	7:20
End Time	7:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2080	2046	2003	2033	1958	2024
Vehs Exited	2081	2042	1996	2022	1954	2020
Starting Vehs	20	23	16	16	19	19
Ending Vehs	19	27	23	27	23	25
Denied Entry Before	0	1	1	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	596	585	571	581	560	579
Travel Time (hr)	24.4	24.1	23.2	23.8	23.1	23.7
Total Delay (hr)	3.8	3.8	3.5	3.7	3.6	3.7
Total Stops	444	451	401	405	415	425
Fuel Used (gal)	20.5	20.4	19.7	19.9	19.2	19.9

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	0.3	0.3
Delay / Veh (s)	1.4	2.4	2.4
Total Stops	2	46	48
Travel Dist (mi)	0.2	40.0	40.2
Travel Time (hr)	0.0	1.6	1.6
Avg Speed (mph)	13	25	25
Fuel Used (gal)	0.0	1.3	1.3
HC Emissions (g)	0	26	26
CO Emissions (g)	8	533	540
NOx Emissions (g)	1	71	72
Vehicles Entered	14	378	392
Vehicles Exited	14	377	391
Hourly Exit Rate	14	377	391
Input Volume	14	386	400
% of Volume	100	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	0.9	0.1	0.2	1.2
Delay / Veh (s)	27.3	1.8	1.9	5.5
Total Stops	74	37	46	157
Travel Dist (mi)	3.5	11.1	40.1	54.6
Travel Time (hr)	1.0	0.5	1.6	3.1
Avg Speed (mph)	3	20	26	18
Fuel Used (gal)	0.4	0.6	1.2	2.2
HC Emissions (g)	2	6	17	24
CO Emissions (g)	62	303	358	723
NOx Emissions (g)	8	20	48	76
Vehicles Entered	112	286	392	790
Vehicles Exited	113	286	391	790
Hourly Exit Rate	113	286	391	790
Input Volume	110	281	395	786
% of Volume	103	102	99	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	0.8	0.6	1.3
Delay / Veh (s)	22.7	2.4	5.0
Total Stops	91	127	218
Travel Dist (mi)	13.8	42.1	55.8
Travel Time (hr)	1.2	2.0	3.3
Avg Speed (mph)	11	21	17
Fuel Used (gal)	0.6	1.2	1.8
HC Emissions (g)	3	17	20
CO Emissions (g)	124	357	482
NOx Emissions (g)	10	48	59
Vehicles Entered	120	840	960
Vehicles Exited	120	841	961
Hourly Exit Rate	120	841	961
Input Volume	116	861	977
% of Volume	103	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.1	0.1	0.1
Delay / Veh (s)	0.4	0.2	0.3
Total Stops	0	1	1
Travel Dist (mi)	18.2	23.0	41.2
Travel Time (hr)	0.7	0.8	1.6
Avg Speed (mph)	25	27	26
Fuel Used (gal)	0.7	0.6	1.4
HC Emissions (g)	9	7	17
CO Emissions (g)	329	201	531
NOx Emissions (g)	33	21	55
Vehicles Entered	471	1117	1588
Vehicles Exited	471	1117	1588
Hourly Exit Rate	471	1117	1588
Input Volume	473	1136	1609
% of Volume	100	98	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.1	0.4	0.0	0.5
Delay / Veh (s)	0.5	1.3	0.0	0.8
Total Stops	0	0	0	0
Travel Dist (mi)	14.8	122.9	2.9	140.5
Travel Time (hr)	0.6	4.6	0.1	5.2
Avg Speed (mph)	26	28	25	28
Fuel Used (gal)	0.4	3.6	0.1	4.1
HC Emissions (g)	9	42	1	53
CO Emissions (g)	209	863	33	1105
NOx Emissions (g)	27	115	4	146
Vehicles Entered	371	1116	469	1956
Vehicles Exited	371	1115	469	1955
Hourly Exit Rate	371	1115	469	1955
Input Volume	379	1133	471	1983
% of Volume	98	98	100	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	3.7
Delay / Veh (s)	6.5
Total Stops	425
Travel Dist (mi)	578.6
Travel Time (hr)	23.7
Avg Speed (mph)	25
Fuel Used (gal)	19.9
HC Emissions (g)	279
CO Emissions (g)	7412
NOx Emissions (g)	825
Vehicles Entered	2024
Vehicles Exited	2020
Hourly Exit Rate	2020
Input Volume	7785
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	24	129
Average Queue (ft)	2	41
95th Queue (ft)	12	102
Link Distance (ft)	0	557
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	T
Maximum Queue (ft)	118	60	37	72	67	87
Average Queue (ft)	50	18	9	24	13	28
95th Queue (ft)	105	49	31	59	46	70
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	1					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB
Directions Served	T	TR	LT
Maximum Queue (ft)	98	60	174
Average Queue (ft)	37	23	67
95th Queue (ft)	76	54	134
Link Distance (ft)	601	601	177
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: MD 51 & NB MD 51

Movement	NE
Directions Served	T
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2837	2852	2755	2884	2761	2818
Vehs Exited	2844	2865	2756	2895	2757	2823
Starting Vehs	40	49	37	45	37	40
Ending Vehs	33	36	36	34	41	37
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	819	822	793	833	796	813
Travel Time (hr)	37.8	38.4	36.2	37.9	36.7	37.4
Total Delay (hr)	9.2	9.7	8.7	8.9	8.9	9.0
Total Stops	1152	1192	1124	1148	1116	1146
Fuel Used (gal)	30.6	30.7	29.4	30.9	29.4	30.2

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2837	2852	2755	2884	2761	2818
Vehs Exited	2844	2865	2756	2895	2757	2823
Starting Vehs	40	49	37	45	37	40
Ending Vehs	33	36	36	34	41	37
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	819	822	793	833	796	813
Travel Time (hr)	37.8	38.4	36.2	37.9	36.7	37.4
Total Delay (hr)	9.2	9.7	8.7	8.9	8.9	9.0
Total Stops	1152	1192	1124	1148	1116	1146
Fuel Used (gal)	30.6	30.7	29.4	30.9	29.4	30.2

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	1.0	1.0
Delay / Veh (s)	2.9	6.7	6.6
Total Stops	1	174	175
Travel Dist (mi)	0.1	55.7	55.8
Travel Time (hr)	0.0	2.9	2.9
Avg Speed (mph)	10	20	20
Fuel Used (gal)	0.0	1.9	1.9
HC Emissions (g)	0	17	17
CO Emissions (g)	5	521	526
NOx Emissions (g)	0	56	57
Vehicles Entered	7	527	534
Vehicles Exited	7	528	535
Hourly Exit Rate	7	528	535
Input Volume	6	539	545
% of Volume	117	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	2.0	0.3	0.7	3.1
Delay / Veh (s)	27.7	4.6	4.7	10.2
Total Stops	261	83	164	508
Travel Dist (mi)	8.2	10.2	57.6	76.1
Travel Time (hr)	2.4	0.7	2.7	5.9
Avg Speed (mph)	3	14	21	13
Fuel Used (gal)	0.8	0.5	2.0	3.3
HC Emissions (g)	3	6	16	25
CO Emissions (g)	117	265	549	931
NOx Emissions (g)	15	21	54	91
Vehicles Entered	265	265	565	1095
Vehicles Exited	265	265	564	1094
Hourly Exit Rate	265	265	564	1094
Input Volume	271	273	590	1134
% of Volume	98	97	96	96
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	2.1	1.1	3.2
Delay / Veh (s)	25.9	3.5	8.0
Total Stops	234	222	456
Travel Dist (mi)	33.4	58.5	91.9
Travel Time (hr)	3.3	3.2	6.5
Avg Speed (mph)	10	18	14
Fuel Used (gal)	1.6	1.8	3.3
HC Emissions (g)	7	14	21
CO Emissions (g)	398	350	748
NOx Emissions (g)	30	46	75
Vehicles Entered	292	1156	1448
Vehicles Exited	293	1157	1450
Hourly Exit Rate	293	1157	1450
Input Volume	295	1169	1464
% of Volume	99	99	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.2	0.1	0.3
Delay / Veh (s)	0.8	0.3	0.5
Total Stops	0	5	5
Travel Dist (mi)	30.1	29.1	59.3
Travel Time (hr)	1.3	1.1	2.5
Avg Speed (mph)	22	26	24
Fuel Used (gal)	1.6	0.8	2.4
HC Emissions (g)	16	9	26
CO Emissions (g)	712	241	953
NOx Emissions (g)	70	28	97
Vehicles Entered	777	1426	2203
Vehicles Exited	777	1428	2205
Hourly Exit Rate	777	1428	2205
Input Volume	811	1450	2261
% of Volume	96	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.2	0.6	0.0	0.8
Delay / Veh (s)	1.2	1.5	0.0	1.0
Total Stops	0	1	0	1
Travel Dist (mi)	20.9	156.0	4.8	181.7
Travel Time (hr)	0.9	5.9	0.2	7.0
Avg Speed (mph)	23	28	25	27
Fuel Used (gal)	0.9	4.5	0.2	5.6
HC Emissions (g)	9	56	1	66
CO Emissions (g)	282	1142	39	1462
NOx Emissions (g)	38	153	5	196
Vehicles Entered	526	1415	777	2718
Vehicles Exited	526	1415	777	2718
Hourly Exit Rate	526	1415	777	2718
Input Volume	537	1438	811	2786
% of Volume	98	98	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	9.0
Delay / Veh (s)	11.5
Total Stops	1146
Travel Dist (mi)	812.5
Travel Time (hr)	37.4
Avg Speed (mph)	22
Fuel Used (gal)	30.2
HC Emissions (g)	297
CO Emissions (g)	9757
NOx Emissions (g)	991
Vehicles Entered	2818
Vehicles Exited	2823
Hourly Exit Rate	2823
Input Volume	11052
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	16	214
Average Queue (ft)	1	105
95th Queue (ft)	10	180
Link Distance (ft)	0	557
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	T
Maximum Queue (ft)	123	70	45	80	77	107
Average Queue (ft)	101	30	15	44	40	60
95th Queue (ft)	138	61	42	74	75	94
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	18	0				
Queuing Penalty (veh)	24	0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB
Directions Served	T	TR	LT
Maximum Queue (ft)	211	83	254
Average Queue (ft)	95	30	106
95th Queue (ft)	165	64	200
Link Distance (ft)	601	601	177
Upstream Blk Time (%)			1
Queuing Penalty (veh)			4
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: MD 51 & NB MD 51

Movement	NE
Directions Served	LT
Maximum Queue (ft)	40
Average Queue (ft)	2
95th Queue (ft)	21
Link Distance (ft)	1
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB I-68 Off-ramp &

Movement	NE
Directions Served	T
Maximum Queue (ft)	9
Average Queue (ft)	0
95th Queue (ft)	6
Link Distance (ft)	576
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 28

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:20	7:20	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2080	2045	2002	2033	1958	2024
Vehs Exited	2081	2041	1995	2022	1954	2019
Starting Vehs	20	24	16	16	19	22
Ending Vehs	19	28	23	27	23	24
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	596	586	571	581	561	579
Travel Time (hr)	24.5	24.0	23.4	23.9	23.3	23.8
Total Delay (hr)	3.9	3.8	3.7	3.7	3.8	3.8
Total Stops	578	541	542	525	543	547
Fuel Used (gal)	20.8	20.6	20.0	20.2	19.5	20.2

Interval #0 Information Seeding

Start Time	7:20
End Time	7:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2080	2045	2002	2033	1958	2024
Vehs Exited	2081	2041	1995	2022	1954	2019
Starting Vehs	20	24	16	16	19	22
Ending Vehs	19	28	23	27	23	24
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	596	586	571	581	561	579
Travel Time (hr)	24.5	24.0	23.4	23.9	23.3	23.8
Total Delay (hr)	3.9	3.8	3.7	3.7	3.8	3.8
Total Stops	578	541	542	525	543	547
Fuel Used (gal)	20.8	20.6	20.0	20.2	19.5	20.2

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	0.3	0.3
Delay / Veh (s)	1.5	2.6	2.6
Total Stops	2	49	51
Travel Dist (mi)	0.2	40.0	40.2
Travel Time (hr)	0.0	1.6	1.7
Avg Speed (mph)	13	25	25
Fuel Used (gal)	0.0	1.3	1.3
HC Emissions (g)	0	27	27
CO Emissions (g)	5	553	558
NOx Emissions (g)	1	73	74
Vehicles Entered	14	378	392
Vehicles Exited	14	377	391
Hourly Exit Rate	14	377	391
Input Volume	14	386	400
% of Volume	100	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	0.8	0.2	0.2	1.2
Delay / Veh (s)	26.8	2.0	2.1	5.6
Total Stops	70	42	49	161
Travel Dist (mi)	4.0	10.9	40.1	54.9
Travel Time (hr)	1.0	0.6	1.6	3.2
Avg Speed (mph)	4	19	26	17
Fuel Used (gal)	0.4	0.6	1.2	2.2
HC Emissions (g)	2	6	17	24
CO Emissions (g)	74	331	361	766
NOx Emissions (g)	9	20	47	76
Vehicles Entered	112	286	392	790
Vehicles Exited	113	286	391	790
Hourly Exit Rate	113	286	391	790
Input Volume	110	281	395	786
% of Volume	103	102	99	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	0.6	1.0	1.6
Delay / Veh (s)	18.2	4.3	6.0
Total Stops	89	245	334
Travel Dist (mi)	13.5	43.1	56.5
Travel Time (hr)	1.1	2.5	3.6
Avg Speed (mph)	12	17	16
Fuel Used (gal)	0.5	1.4	1.9
HC Emissions (g)	3	17	20
CO Emissions (g)	113	439	551
NOx Emissions (g)	10	55	65
Vehicles Entered	120	840	960
Vehicles Exited	120	839	959
Hourly Exit Rate	120	839	959
Input Volume	116	861	977
% of Volume	103	97	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.1	0.0	0.1
Delay / Veh (s)	0.4	0.1	0.2
Total Stops	0	0	0
Travel Dist (mi)	18.2	22.8	41.0
Travel Time (hr)	0.7	0.8	1.6
Avg Speed (mph)	25	28	26
Fuel Used (gal)	0.8	0.5	1.3
HC Emissions (g)	10	6	16
CO Emissions (g)	352	132	484
NOx Emissions (g)	35	16	51
Vehicles Entered	471	1116	1587
Vehicles Exited	471	1117	1588
Hourly Exit Rate	471	1117	1588
Input Volume	473	1136	1609
% of Volume	100	98	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.1	0.1	0.0	0.2
Delay / Veh (s)	0.6	0.4	0.0	0.4
Total Stops	0	1	0	1
Travel Dist (mi)	14.8	123.1	2.9	140.7
Travel Time (hr)	0.6	4.3	0.1	5.0
Avg Speed (mph)	26	29	25	29
Fuel Used (gal)	0.4	3.7	0.1	4.3
HC Emissions (g)	10	45	1	57
CO Emissions (g)	216	1010	35	1260
NOx Emissions (g)	29	129	4	162
Vehicles Entered	371	1116	469	1956
Vehicles Exited	371	1114	469	1954
Hourly Exit Rate	371	1114	469	1954
Input Volume	379	1133	471	1983
% of Volume	98	98	100	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	3.8
Delay / Veh (s)	6.7
Total Stops	547
Travel Dist (mi)	578.8
Travel Time (hr)	23.8
Avg Speed (mph)	24
Fuel Used (gal)	20.2
HC Emissions (g)	284
CO Emissions (g)	7707
NOx Emissions (g)	854
Vehicles Entered	2024
Vehicles Exited	2019
Hourly Exit Rate	2019
Input Volume	7785
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	24	141
Average Queue (ft)	2	43
95th Queue (ft)	14	108
Link Distance (ft)	0	557
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	T
Maximum Queue (ft)	112	59	62	75	67	90
Average Queue (ft)	47	16	15	22	15	29
95th Queue (ft)	94	46	45	56	49	75
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	1					
Queuing Penalty (veh)	1					
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB	NB
Directions Served	T	TR	LT	TR
Maximum Queue (ft)	98	67	136	177
Average Queue (ft)	38	26	52	79
95th Queue (ft)	76	55	103	137
Link Distance (ft)	585	585	198	198
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: MD 51 & NB MD 51

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2835	2850	2749	2896	2764	2819
Vehs Exited	2840	2864	2760	2903	2768	2827
Starting Vehs	40	47	44	43	42	43
Ending Vehs	35	33	33	36	38	31
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	818	823	795	836	799	814
Travel Time (hr)	38.7	38.5	36.7	39.2	37.0	38.0
Total Delay (hr)	10.1	9.7	9.1	10.0	9.1	9.6
Total Stops	1248	1250	1206	1248	1175	1223
Fuel Used (gal)	31.1	31.0	29.8	31.5	29.8	30.6

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2835	2850	2749	2896	2764	2819
Vehs Exited	2840	2864	2760	2903	2768	2827
Starting Vehs	40	47	44	43	42	43
Ending Vehs	35	33	33	36	38	31
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	818	823	795	836	799	814
Travel Time (hr)	38.7	38.5	36.7	39.2	37.0	38.0
Total Delay (hr)	10.1	9.7	9.1	10.0	9.1	9.6
Total Stops	1248	1250	1206	1248	1175	1223
Fuel Used (gal)	31.1	31.0	29.8	31.5	29.8	30.6

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	1.0	1.0
Delay / Veh (s)	1.1	6.5	6.5
Total Stops	0	153	153
Travel Dist (mi)	0.1	55.6	55.7
Travel Time (hr)	0.0	2.9	2.9
Avg Speed (mph)	19	20	20
Fuel Used (gal)	0.0	1.9	1.9
HC Emissions (g)	0	17	17
CO Emissions (g)	4	486	490
NOx Emissions (g)	0	53	53
Vehicles Entered	8	525	533
Vehicles Exited	8	528	536
Hourly Exit Rate	8	528	536
Input Volume	6	539	545
% of Volume	133	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	1.7	0.3	0.8	2.8
Delay / Veh (s)	22.8	4.3	4.8	9.1
Total Stops	127	72	148	347
Travel Dist (mi)	9.4	10.0	57.7	77.2
Travel Time (hr)	2.1	0.7	2.7	5.5
Avg Speed (mph)	4	15	21	14
Fuel Used (gal)	0.8	0.5	1.9	3.3
HC Emissions (g)	4	7	15	26
CO Emissions (g)	141	299	498	937
NOx Emissions (g)	17	21	51	89
Vehicles Entered	268	263	565	1096
Vehicles Exited	267	264	565	1096
Hourly Exit Rate	267	264	565	1096
Input Volume	274	270	590	1134
% of Volume	97	98	96	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	2.2	2.2	4.5
Delay / Veh (s)	27.3	7.0	11.0
Total Stops	254	459	713
Travel Dist (mi)	32.7	60.0	92.7
Travel Time (hr)	3.4	4.4	7.8
Avg Speed (mph)	10	14	12
Fuel Used (gal)	1.6	2.3	3.9
HC Emissions (g)	7	17	24
CO Emissions (g)	399	512	911
NOx Emissions (g)	30	65	95
Vehicles Entered	292	1161	1453
Vehicles Exited	292	1165	1457
Hourly Exit Rate	292	1165	1457
Input Volume	295	1172	1467
% of Volume	99	99	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.1	0.2	0.3
Delay / Veh (s)	0.7	0.4	0.5
Total Stops	0	9	9
Travel Dist (mi)	30.2	29.0	59.2
Travel Time (hr)	1.3	1.1	2.5
Avg Speed (mph)	23	26	24
Fuel Used (gal)	1.5	0.6	2.2
HC Emissions (g)	15	8	23
CO Emissions (g)	664	180	844
NOx Emissions (g)	64	22	86
Vehicles Entered	777	1430	2207
Vehicles Exited	777	1431	2208
Hourly Exit Rate	777	1431	2208
Input Volume	811	1450	2261
% of Volume	96	99	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.1	0.3	0.0	0.4
Delay / Veh (s)	1.0	0.8	0.0	0.6
Total Stops	0	1	0	1
Travel Dist (mi)	20.9	156.5	4.9	182.3
Travel Time (hr)	0.9	5.6	0.2	6.7
Avg Speed (mph)	24	28	25	28
Fuel Used (gal)	0.8	4.7	0.2	5.6
HC Emissions (g)	8	59	1	68
CO Emissions (g)	234	1328	34	1596
NOx Emissions (g)	32	168	4	204
Vehicles Entered	526	1418	777	2721
Vehicles Exited	525	1418	777	2720
Hourly Exit Rate	525	1418	777	2720
Input Volume	537	1438	811	2786
% of Volume	98	99	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	9.6
Delay / Veh (s)	12.2
Total Stops	1223
Travel Dist (mi)	814.2
Travel Time (hr)	38.0
Avg Speed (mph)	22
Fuel Used (gal)	30.6
HC Emissions (g)	302
CO Emissions (g)	9935
NOx Emissions (g)	1015
Vehicles Entered	2819
Vehicles Exited	2827
Hourly Exit Rate	2827
Input Volume	11055
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	SB
Directions Served	TR
Maximum Queue (ft)	234
Average Queue (ft)	112
95th Queue (ft)	198
Link Distance (ft)	557
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	T	T	T	T
Maximum Queue (ft)	120	74	67	98	99	113
Average Queue (ft)	82	17	27	36	46	63
95th Queue (ft)	131	51	60	73	86	104
Link Distance (ft)	105	105	133	133	536	536
Upstream Blk Time (%)	10	0				
Queuing Penalty (veh)	13	0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB	NB
Directions Served	T	TR	LT	TR
Maximum Queue (ft)	205	107	211	271
Average Queue (ft)	94	38	103	150
95th Queue (ft)	167	79	188	238
Link Distance (ft)	585	585	199	199
Upstream Blk Time (%)			0	1
Queuing Penalty (veh)			1	7
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: MD 51 & NB MD 51

Movement	NE	NE
Directions Served	LT	T
Maximum Queue (ft)	18	28
Average Queue (ft)	1	1
95th Queue (ft)	9	11
Link Distance (ft)	1	1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 21

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:20	7:20	7:20	7:20	7:20	7:20
End Time	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2080	2045	2002	2033	1958	2024
Vehs Exited	2081	2042	1997	2022	1954	2020
Starting Vehs	20	24	17	16	19	22
Ending Vehs	19	27	22	27	23	25
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	595	585	570	580	560	578
Travel Time (hr)	24.4	23.9	23.2	23.8	23.1	23.7
Total Delay (hr)	3.9	3.7	3.6	3.7	3.7	3.7
Total Stops	488	474	461	438	461	463
Fuel Used (gal)	20.6	20.4	19.8	20.0	19.3	20.0

Interval #0 Information Seeding

Start Time	7:20
End Time	7:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:30
End Time	8:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2080	2045	2002	2033	1958	2024
Vehs Exited	2081	2042	1997	2022	1954	2020
Starting Vehs	20	24	17	16	19	22
Ending Vehs	19	27	22	27	23	25
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	595	585	570	580	560	578
Travel Time (hr)	24.4	23.9	23.2	23.8	23.1	23.7
Total Delay (hr)	3.9	3.7	3.6	3.7	3.7	3.7
Total Stops	488	474	461	438	461	463
Fuel Used (gal)	20.6	20.4	19.8	20.0	19.3	20.0

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	0.3	0.3
Delay / Veh (s)	1.5	2.6	2.6
Total Stops	2	50	52
Travel Dist (mi)	0.2	40.0	40.2
Travel Time (hr)	0.0	1.6	1.7
Avg Speed (mph)	13	25	25
Fuel Used (gal)	0.0	1.3	1.3
HC Emissions (g)	0	27	27
CO Emissions (g)	5	555	560
NOx Emissions (g)	1	73	74
Vehicles Entered	14	378	392
Vehicles Exited	14	377	391
Hourly Exit Rate	14	377	391
Input Volume	14	386	400
% of Volume	100	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	0.8	0.2	0.2	1.2
Delay / Veh (s)	26.3	2.0	2.0	5.5
Total Stops	69	40	49	158
Travel Dist (mi)	3.4	10.7	40.1	54.2
Travel Time (hr)	1.0	0.6	1.6	3.1
Avg Speed (mph)	3	19	26	17
Fuel Used (gal)	0.4	0.6	1.2	2.2
HC Emissions (g)	2	7	17	25
CO Emissions (g)	61	396	360	818
NOx Emissions (g)	8	23	47	78
Vehicles Entered	112	286	392	790
Vehicles Exited	113	286	391	790
Hourly Exit Rate	113	286	391	790
Input Volume	110	281	395	786
% of Volume	103	102	99	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	0.6	0.9	1.5
Delay / Veh (s)	18.2	3.8	5.6
Total Stops	81	171	252
Travel Dist (mi)	13.8	42.1	55.8
Travel Time (hr)	1.1	2.4	3.4
Avg Speed (mph)	13	18	16
Fuel Used (gal)	0.5	1.3	1.8
HC Emissions (g)	3	15	18
CO Emissions (g)	112	306	418
NOx Emissions (g)	10	45	55
Vehicles Entered	120	841	961
Vehicles Exited	120	840	960
Hourly Exit Rate	120	840	960
Input Volume	116	861	977
% of Volume	103	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.1	0.1	0.1
Delay / Veh (s)	0.4	0.2	0.3
Total Stops	0	1	1
Travel Dist (mi)	18.2	22.9	41.1
Travel Time (hr)	0.7	0.8	1.6
Avg Speed (mph)	25	27	26
Fuel Used (gal)	0.8	0.5	1.3
HC Emissions (g)	10	6	16
CO Emissions (g)	350	93	443
NOx Emissions (g)	35	14	50
Vehicles Entered	471	1116	1587
Vehicles Exited	471	1117	1588
Hourly Exit Rate	471	1117	1588
Input Volume	473	1136	1609
% of Volume	100	98	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.1	0.2	0.0	0.3
Delay / Veh (s)	0.6	0.7	0.0	0.5
Total Stops	0	0	0	0
Travel Dist (mi)	14.8	123.0	2.9	140.6
Travel Time (hr)	0.6	4.4	0.1	5.1
Avg Speed (mph)	26	29	25	28
Fuel Used (gal)	0.4	3.6	0.1	4.2
HC Emissions (g)	10	43	1	54
CO Emissions (g)	216	908	35	1159
NOx Emissions (g)	29	118	4	151
Vehicles Entered	371	1116	469	1956
Vehicles Exited	371	1114	469	1954
Hourly Exit Rate	371	1114	469	1954
Input Volume	379	1133	471	1983
% of Volume	98	98	100	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	3.7
Delay / Veh (s)	6.6
Total Stops	463
Travel Dist (mi)	578.0
Travel Time (hr)	23.7
Avg Speed (mph)	25
Fuel Used (gal)	20.0
HC Emissions (g)	281
CO Emissions (g)	7515
NOx Emissions (g)	836
Vehicles Entered	2024
Vehicles Exited	2020
Hourly Exit Rate	2020
Input Volume	7785
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	24	141
Average Queue (ft)	2	44
95th Queue (ft)	14	109
Link Distance (ft)	0	557
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	LT	T	T	T
Maximum Queue (ft)	114	55	56	58	72	86
Average Queue (ft)	47	16	16	19	15	29
95th Queue (ft)	93	45	47	48	50	74
Link Distance (ft)	105	105	132	132	536	536
Upstream Blk Time (%)	1					
Queuing Penalty (veh)	1					
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB	NB
Directions Served	T	TR	LT	R
Maximum Queue (ft)	90	59	212	36
Average Queue (ft)	30	21	98	1
95th Queue (ft)	66	50	179	25
Link Distance (ft)	598	598	196	196
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			1	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: MD 51 & NB MD 51

Movement	NE
Directions Served	T
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 2

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:35	3:35	3:35	3:35	3:35	3:35
End Time	4:45	4:45	4:45	4:45	4:45	4:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	2835	2850	2749	2896	2764	2819
Vehs Exited	2838	2863	2761	2906	2762	2826
Starting Vehs	39	48	44	46	42	44
Ending Vehs	36	35	32	36	44	35
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	817	821	793	835	796	813
Travel Time (hr)	38.5	37.7	36.2	39.1	36.0	37.5
Total Delay (hr)	10.0	9.0	8.7	10.0	8.2	9.2
Total Stops	1058	1003	994	1083	931	1012
Fuel Used (gal)	30.7	30.4	29.3	31.2	29.2	30.2

Interval #0 Information Seeding

Start Time	3:35
End Time	3:45
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:45
End Time	4:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2835	2850	2749	2896	2764	2819
Vehs Exited	2838	2863	2761	2906	2762	2826
Starting Vehs	39	48	44	46	42	44
Ending Vehs	36	35	32	36	44	35
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	1	0
Travel Distance (mi)	817	821	793	835	796	813
Travel Time (hr)	38.5	37.7	36.2	39.1	36.0	37.5
Total Delay (hr)	10.0	9.0	8.7	10.0	8.2	9.2
Total Stops	1058	1003	994	1083	931	1012
Fuel Used (gal)	30.7	30.4	29.3	31.2	29.2	30.2

1: Winston Street & I-68 EB Off-Ramp Performance by approach

Approach	WB	SB	All
Total Delay (hr)	0.0	1.0	1.0
Delay / Veh (s)	1.3	7.0	6.9
Total Stops	0	162	162
Travel Dist (mi)	0.1	55.6	55.7
Travel Time (hr)	0.0	2.9	2.9
Avg Speed (mph)	18	19	19
Fuel Used (gal)	0.0	1.9	1.9
HC Emissions (g)	0	17	17
CO Emissions (g)	5	510	515
NOx Emissions (g)	0	55	55
Vehicles Entered	8	525	533
Vehicles Exited	8	526	534
Hourly Exit Rate	8	526	534
Input Volume	6	539	545
% of Volume	133	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

2: Winston Street & Mechanic Street Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	1.4	0.4	0.8	2.6
Delay / Veh (s)	19.0	4.8	5.1	8.4
Total Stops	104	76	159	339
Travel Dist (mi)	8.1	9.8	57.7	75.6
Travel Time (hr)	1.8	0.7	2.8	5.3
Avg Speed (mph)	4	14	21	14
Fuel Used (gal)	0.7	0.5	2.0	3.2
HC Emissions (g)	3	7	15	25
CO Emissions (g)	121	330	505	957
NOx Emissions (g)	16	22	51	88
Vehicles Entered	268	263	565	1096
Vehicles Exited	267	263	565	1095
Hourly Exit Rate	267	263	565	1095
Input Volume	274	270	590	1134
% of Volume	97	97	96	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

3: Winston Street & Centre Street Performance by approach

Approach	WB	NB	All
Total Delay (hr)	2.7	1.4	4.1
Delay / Veh (s)	33.6	4.3	10.2
Total Stops	261	241	502
Travel Dist (mi)	33.4	58.6	92.0
Travel Time (hr)	3.9	3.4	7.3
Avg Speed (mph)	9	17	13
Fuel Used (gal)	1.7	1.8	3.6
HC Emissions (g)	7	14	22
CO Emissions (g)	428	346	774
NOx Emissions (g)	31	48	80
Vehicles Entered	292	1161	1453
Vehicles Exited	292	1164	1456
Hourly Exit Rate	292	1164	1456
Input Volume	295	1172	1467
% of Volume	99	99	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

4: MD 51 & NB MD 51 Performance by approach

Approach	SB	NE	All
Total Delay (hr)	0.2	0.1	0.3
Delay / Veh (s)	0.7	0.3	0.5
Total Stops	0	7	7
Travel Dist (mi)	30.2	29.1	59.3
Travel Time (hr)	1.3	1.1	2.4
Avg Speed (mph)	23	26	24
Fuel Used (gal)	1.6	0.6	2.2
HC Emissions (g)	16	8	24
CO Emissions (g)	682	140	823
NOx Emissions (g)	65	21	87
Vehicles Entered	777	1430	2207
Vehicles Exited	778	1431	2209
Hourly Exit Rate	778	1431	2209
Input Volume	811	1450	2261
% of Volume	96	99	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

5: EB I-68 Off-ramp & Performance by approach

Approach	SB	NE	SW	All
Total Delay (hr)	0.2	0.4	0.0	0.5
Delay / Veh (s)	1.1	1.0	0.0	0.7
Total Stops	0	0	0	0
Travel Dist (mi)	20.9	156.4	4.9	182.1
Travel Time (hr)	0.9	5.7	0.2	6.8
Avg Speed (mph)	24	29	25	28
Fuel Used (gal)	0.8	4.5	0.2	5.5
HC Emissions (g)	8	57	1	66
CO Emissions (g)	230	1211	35	1476
NOx Emissions (g)	33	155	5	192
Vehicles Entered	524	1418	778	2720
Vehicles Exited	524	1418	778	2720
Hourly Exit Rate	524	1418	778	2720
Input Volume	537	1438	811	2786
% of Volume	98	99	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	9.2
Delay / Veh (s)	11.7
Total Stops	1012
Travel Dist (mi)	812.5
Travel Time (hr)	37.5
Avg Speed (mph)	22
Fuel Used (gal)	30.2
HC Emissions (g)	295
CO Emissions (g)	9655
NOx Emissions (g)	981
Vehicles Entered	2819
Vehicles Exited	2826
Hourly Exit Rate	2826
Input Volume	11055
% of Volume	26
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Winston Street & I-68 EB Off-Ramp

Movement	WB	SB
Directions Served	T	TR
Maximum Queue (ft)	5	236
Average Queue (ft)	0	112
95th Queue (ft)	4	197
Link Distance (ft)	0	557
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Winston Street & Mechanic Street

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	T	T	T	T
Maximum Queue (ft)	122	74	80	83	85	110
Average Queue (ft)	73	16	33	32	47	67
95th Queue (ft)	128	50	66	63	85	104
Link Distance (ft)	105	105	133	133	536	536
Upstream Blk Time (%)	9	0				
Queuing Penalty (veh)	12	0				
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Winston Street & Centre Street

Movement	WB	WB	NB	NB
Directions Served	T	TR	LT	R
Maximum Queue (ft)	205	100	268	110
Average Queue (ft)	97	28	141	6
95th Queue (ft)	180	70	234	61
Link Distance (ft)	598	598	198	198
Upstream Blk Time (%)			1	0
Queuing Penalty (veh)			8	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: MD 51 & NB MD 51

Movement	NE	NE
Directions Served	T	T
Maximum Queue (ft)	17	16
Average Queue (ft)	1	1
95th Queue (ft)	12	11
Link Distance (ft)	1	1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: EB I-68 Off-ramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 19

Whitman, Requardt and Associates, LLP

Radar Speed Study
Quantitative Summary

Description:

Route: MD 51

Direction: NB

Location: South of Lamont St

County: Allegany

Posted Speed Limit: 45

Date: 21-Oct-09

Time: 1:00 - 1:45 PM

Weather: Sunny

WRA W.O.#: 31722-001

Recorder(s): EFH/LEM

Results:

85th %-ile Speed = **51** **mph**

Modal Speed = 43 mph

Mean Speed = 46.3 mph

10 mph Pace = 42 - 51 mph

% in pace= 73%

% Over Speed Limit = 56%

Vehicle Classification:

Passenger Cars: 84%

Trucks: 14%

Buses: 2%

Speed (mph)	Number Vehicles	Cumul. Vehicles	% of Total	% Accum.
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36	1	1	1%	1%
37	1	2	1%	2%
38	5	7	4%	5%
39	5	12	4%	9%
40	5	17	4%	13%
41	3	20	2%	16%
42	5	25	4%	19%
43	**14**	39	11%	30%
44	9	48	7%	37%
45	9	57	7%	44%
46	8	65	6%	50%
47	11	76	9%	59%
48	13	89	10%	69%
49	8	97	6%	75%
50	8	105	6%	81%
51	9	114	7%	88%
52	3	117	2%	91%
53	4	121	3%	94%
54	1	122	1%	95%
55	3	125	2%	97%
56	2	127	2%	98%
57	1	128	1%	99%
58	0	128	0%	99%
59	1	129	1%	100%
60				
61				
62				
63				
64				
65				
66				
67				
68				

Whitman, Requardt and Associates, LLP

Radar Speed Study
Quantitative Summary

Description:

Route: MD 51

Direction: SB

Location: South of Lamont St

County: Allegany

Posted Speed Limit: 45

Date: 21-Oct-09

Time: 1:00 - 1:45 PM

Weather: Sunny

WRA W.O.#: 31722-001

Recorder(s): EFH/LEM

Results:

85th %-ile Speed = **46** **mph**

Modal Speed = 39 mph

Mean Speed = 42.5 mph

10 mph Pace = 37 - 46 mph

% in pace= 80%

% Over Speed Limit = 19%

Vehicle Classification:

Passenger Cars: 87%

Trucks: 13%

Buses: 0%

Speed (mph)	Number Vehicles	Cumul. Vehicles	% of Total	% Accum.
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35	3	3	3%	3%
36	4	7	4%	6%
37	3	10	3%	9%
38	9	19	8%	17%
39	**14**	33	13%	30%
40	6	39	5%	35%
41	10	49	9%	44%
42	9	58	8%	52%
43	12	70	11%	63%
44	9	79	8%	71%
45	11	90	10%	81%
46	6	96	5%	86%
47	2	98	2%	88%
48	3	101	3%	91%
49	2	103	2%	93%
50	1	104	1%	94%
51	1	105	1%	95%
52	1	106	1%	95%
53	1	107	1%	96%
54	2	109	2%	98%
55	1	110	1%	99%
56	1	111	1%	100%
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1397	1493	1488	1431	1409	1444
Vehs Exited	1397	1494	1490	1432	1414	1446
Starting Vehs	11	15	14	12	18	14
Ending Vehs	11	14	12	11	13	12
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	460	492	491	473	465	476
Travel Time (hr)	12.2	13.2	13.3	12.7	12.5	12.8
Total Delay (hr)	0.9	1.0	1.1	1.0	1.0	1.0
Total Stops	98	114	119	116	109	110
Fuel Used (gal)	17.4	18.8	18.8	18.0	17.7	18.1

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1397	1493	1488	1431	1409	1444
Vehs Exited	1397	1494	1490	1432	1414	1446
Starting Vehs	11	15	14	12	18	14
Ending Vehs	11	14	12	11	13	12
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	460	492	491	473	465	476
Travel Time (hr)	12.2	13.2	13.3	12.7	12.5	12.8
Total Delay (hr)	0.9	1.0	1.1	1.0	1.0	1.0
Total Stops	98	114	119	116	109	110
Fuel Used (gal)	17.4	18.8	18.8	18.0	17.7	18.1

1: Thomas Street & MD 51 Performance by approach

Approach	NW	NE	SW	All
Total Delay (hr)	0.1	0.1	0.3	0.5
Delay / Veh (s)	1.6	0.9	1.4	1.3
Total Stops	5	1	102	108
Travel Dist (mi)	36.0	78.2	69.7	183.8
Travel Time (hr)	1.3	1.8	2.1	5.2
Avg Speed (mph)	27	46	34	36
Fuel Used (gal)	0.9	2.6	1.9	5.4
HC Emissions (g)	11	71	60	142
CO Emissions (g)	255	2476	1535	4266
NOx Emissions (g)	30	218	182	430
Vehicles Entered	263	522	658	1443
Vehicles Exited	262	522	658	1442
Hourly Exit Rate	262	522	658	1442
Input Volume	261	520	657	1438
% of Volume	100	100	100	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	1.0
Delay / Veh (s)	2.5
Total Stops	110
Travel Dist (mi)	476.1
Travel Time (hr)	12.8
Avg Speed (mph)	38
Fuel Used (gal)	18.1
HC Emissions (g)	456
CO Emissions (g)	16066
NOx Emissions (g)	1414
Vehicles Entered	1444
Vehicles Exited	1446
Hourly Exit Rate	1446
Input Volume	4283
% of Volume	34
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Thomas Street & MD 51

Movement	NW	NE	SW	SW
Directions Served	LR	L	L	T
Maximum Queue (ft)	47	11	75	10
Average Queue (ft)	6	1	37	0
95th Queue (ft)	28	6	65	7
Link Distance (ft)	825			500
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		225	150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:20	3:20	3:20	3:20	3:20	3:20
End Time	4:30	4:30	4:30	4:30	4:30	4:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1784	1949	1877	1840	1819	1854
Vehs Exited	1777	1951	1877	1844	1822	1854
Starting Vehs	13	20	20	17	19	18
Ending Vehs	20	18	20	13	16	18
Denied Entry Before	0	0	0	1	0	0
Denied Entry After	0	0	0	3	0	0
Travel Distance (mi)	584	639	616	604	598	608
Travel Time (hr)	16.7	18.6	17.6	17.3	17.2	17.5
Total Delay (hr)	1.9	2.4	1.9	2.0	2.1	2.1
Total Stops	205	284	217	226	214	228
Fuel Used (gal)	22.7	25.2	24.3	23.9	23.2	23.9

Interval #0 Information Seeding

Start Time	3:20
End Time	3:30
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	3:30
End Time	4:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1784	1949	1877	1840	1819	1854
Vehs Exited	1777	1951	1877	1844	1822	1854
Starting Vehs	13	20	20	17	19	18
Ending Vehs	20	18	20	13	16	18
Denied Entry Before	0	0	0	1	0	0
Denied Entry After	0	0	0	3	0	0
Travel Distance (mi)	584	639	616	604	598	608
Travel Time (hr)	16.7	18.6	17.6	17.3	17.2	17.5
Total Delay (hr)	1.9	2.4	1.9	2.0	2.1	2.1
Total Stops	205	284	217	226	214	228
Fuel Used (gal)	22.7	25.2	24.3	23.9	23.2	23.9

1: Thomas Street & MD 51 Performance by approach

Approach	SE	NW	NE	SW	All
Total Delay (hr)	0.1	0.3	0.2	0.7	1.3
Delay / Veh (s)	20.2	2.6	1.4	2.9	2.4
Total Stops	15	9	2	195	221
Travel Dist (mi)	0.4	48.0	98.9	87.5	234.8
Travel Time (hr)	0.1	1.9	2.4	3.0	7.4
Avg Speed (mph)	3	26	44	29	33
Fuel Used (gal)	0.0	1.3	3.3	2.4	7.0
HC Emissions (g)	0	10	79	54	143
CO Emissions (g)	2	286	3164	1580	5032
NOx Emissions (g)	0	28	241	173	441
Vehicles Entered	15	351	662	827	1855
Vehicles Exited	15	349	661	828	1853
Hourly Exit Rate	15	349	661	828	1853
Input Volume	14	347	647	834	1842
% of Volume	107	101	102	99	101
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

Total Network Performance

Total Delay (hr)	2.1
Delay / Veh (s)	4.0
Total Stops	228
Travel Dist (mi)	608.2
Travel Time (hr)	17.5
Avg Speed (mph)	35
Fuel Used (gal)	23.9
HC Emissions (g)	463
CO Emissions (g)	19203
NOx Emissions (g)	1496
Vehicles Entered	1854
Vehicles Exited	1854
Hourly Exit Rate	1854
Input Volume	5462
% of Volume	34
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Thomas Street & MD 51

Movement	SE	NW	NE	SW	SW
Directions Served	LR	LTR	L	L	R
Maximum Queue (ft)	36	47	20	136	4
Average Queue (ft)	10	12	1	60	0
95th Queue (ft)	33	38	9	111	3
Link Distance (ft)	118	825			500
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			225	150	
Storage Blk Time (%)				0	
Queuing Penalty (veh)				0	

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1397	1497	1488	1436	1414	1446
Vehs Exited	1397	1497	1489	1436	1420	1448
Starting Vehs	11	14	14	12	19	14
Ending Vehs	11	14	13	12	13	13
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	461	494	491	475	468	478
Travel Time (hr)	12.4	13.4	13.5	13.0	12.8	13.0
Total Delay (hr)	1.0	1.2	1.3	1.2	1.2	1.2
Total Stops	176	204	212	209	209	201
Fuel Used (gal)	17.5	19.0	18.9	18.1	17.8	18.3

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1397	1497	1488	1436	1414	1446
Vehs Exited	1397	1497	1489	1436	1420	1448
Starting Vehs	11	14	14	12	19	14
Ending Vehs	11	14	13	12	13	13
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	461	494	491	475	468	478
Travel Time (hr)	12.4	13.4	13.5	13.0	12.8	13.0
Total Delay (hr)	1.0	1.2	1.3	1.2	1.2	1.2
Total Stops	176	204	212	209	209	201
Fuel Used (gal)	17.5	19.0	18.9	18.1	17.8	18.3

1: Thomas Street & MD 51 Performance by approach

Approach	NW	NE	SW	All
Total Delay (hr)	0.1	0.1	0.3	0.5
Delay / Veh (s)	2.0	0.6	1.6	1.3
Total Stops	5	1	111	117
Travel Dist (mi)	37.1	78.4	69.9	185.4
Travel Time (hr)	1.4	1.7	2.1	5.2
Avg Speed (mph)	27	46	33	36
Fuel Used (gal)	1.0	2.7	1.9	5.6
HC Emissions (g)	11	72	61	145
CO Emissions (g)	277	2608	1555	4440
NOx Emissions (g)	31	225	185	440
Vehicles Entered	263	523	661	1447
Vehicles Exited	263	523	660	1446
Hourly Exit Rate	263	523	660	1446
Input Volume	261	520	657	1438
% of Volume	101	101	100	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	1.2
Delay / Veh (s)	3.0
Total Stops	201
Travel Dist (mi)	477.8
Travel Time (hr)	13.0
Avg Speed (mph)	37
Fuel Used (gal)	18.3
HC Emissions (g)	459
CO Emissions (g)	16105
NOx Emissions (g)	1429
Vehicles Entered	1446
Vehicles Exited	1448
Hourly Exit Rate	1448
Input Volume	4283
% of Volume	34
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Thomas Street & MD 51

Movement	NW	NE	SW
Directions Served	LR	L	L
Maximum Queue (ft)	57	11	76
Average Queue (ft)	6	1	39
95th Queue (ft)	32	6	69
Link Distance (ft)	819		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		225	150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:20	3:20	3:20	3:20	3:20	3:20
End Time	4:30	4:30	4:30	4:30	4:30	4:30
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1823	1887	1765	1829	1755	1812
Vehs Exited	1818	1888	1767	1827	1755	1811
Starting Vehs	15	16	12	14	16	15
Ending Vehs	20	15	10	16	16	13
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	598	621	579	600	577	595
Travel Time (hr)	17.0	18.0	16.4	17.4	16.6	17.1
Total Delay (hr)	2.0	2.3	1.8	2.2	1.9	2.1
Total Stops	329	359	288	370	312	332
Fuel Used (gal)	23.3	24.5	22.6	23.6	22.4	23.3

Interval #0 Information Seeding

Start Time	3:20
End Time	3:30
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:30
End Time	4:30
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1823	1887	1765	1829	1755	1812
Vehs Exited	1818	1888	1767	1827	1755	1811
Starting Vehs	15	16	12	14	16	15
Ending Vehs	20	15	10	16	16	13
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	598	621	579	600	577	595
Travel Time (hr)	17.0	18.0	16.4	17.4	16.6	17.1
Total Delay (hr)	2.0	2.3	1.8	2.2	1.9	2.1
Total Stops	329	359	288	370	312	332
Fuel Used (gal)	23.3	24.5	22.6	23.6	22.4	23.3

1: Thomas Street & MD 51 Performance by approach

Approach	SE	NW	NE	SW	All
Total Delay (hr)	0.1	0.3	0.1	0.6	1.1
Delay / Veh (s)	15.0	2.9	0.8	2.7	2.2
Total Stops	14	8	1	190	213
Travel Dist (mi)	0.3	46.4	96.9	86.9	230.5
Travel Time (hr)	0.1	1.9	2.2	2.9	7.1
Avg Speed (mph)	4	25	44	30	33
Fuel Used (gal)	0.0	1.2	3.4	2.4	7.0
HC Emissions (g)	0	8	87	57	152
CO Emissions (g)	1	259	3418	1626	5304
NOx Emissions (g)	0	24	265	179	468
Vehicles Entered	14	329	647	821	1811
Vehicles Exited	13	329	648	820	1810
Hourly Exit Rate	13	329	648	820	1810
Input Volume	14	347	647	834	1842
% of Volume	93	95	100	98	98
Denied Entry Before	0	0	0	0	0
Denied Entry After	0	0	0	0	0

Total Network Performance

Total Delay (hr)	2.1
Delay / Veh (s)	4.1
Total Stops	332
Travel Dist (mi)	595.2
Travel Time (hr)	17.1
Avg Speed (mph)	35
Fuel Used (gal)	23.3
HC Emissions (g)	474
CO Emissions (g)	18946
NOx Emissions (g)	1523
Vehicles Entered	1812
Vehicles Exited	1811
Hourly Exit Rate	1811
Input Volume	5462
% of Volume	33
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: Thomas Street & MD 51

Movement	SE	NW	NE	SW
Directions Served	LR	LTR	L	L
Maximum Queue (ft)	24	47	15	130
Average Queue (ft)	10	9	1	55
95th Queue (ft)	28	33	7	103
Link Distance (ft)	112	819		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			225	150
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1257	1291	1290	1324	1255	1282
Vehs Exited	1255	1285	1274	1330	1273	1284
Starting Vehs	31	28	26	33	44	31
Ending Vehs	33	34	42	27	26	32
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	490	502	499	517	491	500
Travel Time (hr)	31.2	33.0	30.2	33.8	31.8	32.0
Total Delay (hr)	12.7	13.9	11.3	14.2	13.3	13.1
Total Stops	997	1056	983	1048	996	1013
Fuel Used (gal)	19.9	20.9	19.6	21.2	19.8	20.3

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1257	1291	1290	1324	1255	1282
Vehs Exited	1255	1285	1274	1330	1273	1284
Starting Vehs	31	28	26	33	44	31
Ending Vehs	33	34	42	27	26	32
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	490	502	499	517	491	500
Travel Time (hr)	31.2	33.0	30.2	33.8	31.8	32.0
Total Delay (hr)	12.7	13.9	11.3	14.2	13.3	13.1
Total Stops	997	1056	983	1048	996	1013
Fuel Used (gal)	19.9	20.9	19.6	21.2	19.8	20.3

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	2.9	0.7	0.8	4.4
Delay / Veh (s)	23.0	16.7	54.0	24.0
Total Stops	236	28	44	308
Travel Dist (mi)	87.4	8.5	6.2	102.1
Travel Time (hr)	6.0	1.1	1.0	8.2
Avg Speed (mph)	15	8	6	13
Fuel Used (gal)	3.3	0.6	0.4	4.3
HC Emissions (g)	47	6	8	61
CO Emissions (g)	1106	203	151	1460
NOx Emissions (g)	129	23	19	171
Vehicles Entered	460	158	50	668
Vehicles Exited	456	157	52	665
Hourly Exit Rate	456	157	52	665
Input Volume	459	156	49	664
% of Volume	99	101	106	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.5	4.1	0.6	8.2
Delay / Veh (s)	30.7	41.7	14.6	32.6
Total Stops	307	345	51	703
Travel Dist (mi)	79.0	65.8	7.1	151.9
Travel Time (hr)	6.3	6.9	0.9	14.2
Avg Speed (mph)	12	10	8	11
Fuel Used (gal)	3.2	2.8	0.5	6.5
HC Emissions (g)	77	21	13	111
CO Emissions (g)	1513	524	292	2329
NOx Emissions (g)	196	62	37	294
Vehicles Entered	415	353	136	904
Vehicles Exited	411	355	137	903
Hourly Exit Rate	411	355	137	903
Input Volume	436	350	141	927
% of Volume	94	101	97	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	13.1
Delay / Veh (s)	36.7
Total Stops	1013
Travel Dist (mi)	499.8
Travel Time (hr)	32.0
Avg Speed (mph)	16
Fuel Used (gal)	20.3
HC Emissions (g)	378
CO Emissions (g)	8524
NOx Emissions (g)	1078
Vehicles Entered	1282
Vehicles Exited	1284
Hourly Exit Rate	1284
Input Volume	2885
% of Volume	45
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	LT	T	TR	L	T	TR
Maximum Queue (ft)	162	150	158	61	56	160
Average Queue (ft)	79	66	85	19	15	50
95th Queue (ft)	138	127	139	50	44	109
Link Distance (ft)	1003	1003			224	640
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255	85		
Storage Blk Time (%)				0	0	
Queuing Penalty (veh)				0	0	

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB	SB	SB
Directions Served	LT	T	R	TR	L	T
Maximum Queue (ft)	193	207	63	443	44	140
Average Queue (ft)	108	119	32	232	5	49
95th Queue (ft)	179	192	58	397	26	110
Link Distance (ft)	1003	1003	1003	974		224
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					50	
Storage Blk Time (%)					1	15
Queuing Penalty (veh)					1	2

Network Summary

Network wide Queuing Penalty: 4

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:05	3:05	3:05	3:05	3:05	3:05
End Time	4:15	4:15	4:15	4:15	4:15	4:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1723	1825	1745	1726	1743	1751
Vehs Exited	1729	1832	1733	1721	1738	1751
Starting Vehs	54	48	40	49	44	47
Ending Vehs	48	41	52	54	49	50
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	677	717	685	678	681	687
Travel Time (hr)	47.0	52.3	47.7	51.1	47.9	49.2
Total Delay (hr)	21.3	25.2	21.9	25.4	22.0	23.2
Total Stops	1493	1634	1533	1599	1531	1557
Fuel Used (gal)	28.4	30.7	28.8	29.6	28.5	29.2

Interval #0 Information Seeding

Start Time	3:05
End Time	3:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:15
End Time	4:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1723	1825	1745	1726	1743	1751
Vehs Exited	1729	1832	1733	1721	1738	1751
Starting Vehs	54	48	40	49	44	47
Ending Vehs	48	41	52	54	49	50
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	677	717	685	678	681	687
Travel Time (hr)	47.0	52.3	47.7	51.1	47.9	49.2
Total Delay (hr)	21.3	25.2	21.9	25.4	22.0	23.2
Total Stops	1493	1634	1533	1599	1531	1557
Fuel Used (gal)	28.4	30.7	28.8	29.6	28.5	29.2

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	6.2	1.1	1.5	8.8
Delay / Veh (s)	34.1	16.0	66.3	32.3
Total Stops	407	40	75	522
Travel Dist (mi)	124.4	13.1	9.9	147.4
Travel Time (hr)	10.6	1.7	1.9	14.2
Avg Speed (mph)	12	8	5	11
Fuel Used (gal)	5.1	0.9	0.7	6.8
HC Emissions (g)	59	13	1	74
CO Emissions (g)	1458	372	90	1920
NOx Emissions (g)	164	47	8	219
Vehicles Entered	652	243	81	976
Vehicles Exited	657	243	81	981
Hourly Exit Rate	657	243	81	981
Input Volume	676	240	84	1000
% of Volume	97	101	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	6.3	5.9	1.4	13.6
Delay / Veh (s)	38.5	49.5	20.0	38.6
Total Stops	466	451	112	1029
Travel Dist (mi)	111.9	79.8	13.3	205.0
Travel Time (hr)	10.3	9.3	2.1	21.7
Avg Speed (mph)	11	9	6	9
Fuel Used (gal)	4.8	3.6	1.0	9.5
HC Emissions (g)	102	30	7	139
CO Emissions (g)	2075	705	248	3028
NOx Emissions (g)	257	83	32	371
Vehicles Entered	586	430	251	1267
Vehicles Exited	586	427	250	1263
Hourly Exit Rate	586	427	250	1263
Input Volume	571	425	254	1250
% of Volume	103	100	98	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	23.2
Delay / Veh (s)	47.6
Total Stops	1557
Travel Dist (mi)	687.4
Travel Time (hr)	49.2
Avg Speed (mph)	14
Fuel Used (gal)	29.2
HC Emissions (g)	441
CO Emissions (g)	10516
NOx Emissions (g)	1308
Vehicles Entered	1751
Vehicles Exited	1751
Hourly Exit Rate	1751
Input Volume	4006
% of Volume	44
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	LT	T	TR	L	T	TR
Maximum Queue (ft)	315	268	245	82	65	160
Average Queue (ft)	164	125	129	27	24	78
95th Queue (ft)	268	223	208	69	59	145
Link Distance (ft)	1003	1003			224	640
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255	85		
Storage Blk Time (%)		0	0	1	0	
Queuing Penalty (veh)		0	0	1	0	

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB	SB	SB
Directions Served	LT	T	R	TR	L	T
Maximum Queue (ft)	299	300	85	596	65	219
Average Queue (ft)	171	185	40	332	6	99
95th Queue (ft)	266	281	69	524	34	194
Link Distance (ft)	1003	1003	1003	974		224
Upstream Blk Time (%)						1
Queuing Penalty (veh)						3
Storage Bay Dist (ft)					50	
Storage Blk Time (%)					1	28
Queuing Penalty (veh)					2	4

Network Summary

Network wide Queuing Penalty: 11

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1262	1301	1290	1327	1255	1287
Vehs Exited	1261	1307	1272	1324	1273	1287
Starting Vehs	31	28	24	33	44	30
Ending Vehs	32	22	42	36	26	30
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	492	508	499	516	491	501
Travel Time (hr)	31.0	33.3	30.1	33.9	31.9	32.0
Total Delay (hr)	12.3	14.0	11.2	14.5	13.4	13.1
Total Stops	989	1068	979	1058	998	1017
Fuel Used (gal)	19.9	21.0	19.5	21.1	19.8	20.3

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1262	1301	1290	1327	1255	1287
Vehs Exited	1261	1307	1272	1324	1273	1287
Starting Vehs	31	28	24	33	44	30
Ending Vehs	32	22	42	36	26	30
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	492	508	499	516	491	501
Travel Time (hr)	31.0	33.3	30.1	33.9	31.9	32.0
Total Delay (hr)	12.3	14.0	11.2	14.5	13.4	13.1
Total Stops	989	1068	979	1058	998	1017
Fuel Used (gal)	19.9	21.0	19.5	21.1	19.8	20.3

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	3.0	0.7	0.8	4.5
Delay / Veh (s)	23.3	17.1	54.5	24.2
Total Stops	239	30	44	313
Travel Dist (mi)	87.5	8.3	6.2	102.1
Travel Time (hr)	6.0	1.1	1.0	8.2
Avg Speed (mph)	15	7	6	13
Fuel Used (gal)	3.2	0.6	0.4	4.2
HC Emissions (g)	44	6	7	57
CO Emissions (g)	986	201	133	1319
NOx Emissions (g)	119	23	16	157
Vehicles Entered	461	157	50	668
Vehicles Exited	458	157	51	666
Hourly Exit Rate	458	157	51	666
Input Volume	459	156	49	664
% of Volume	100	101	104	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.4	4.2	0.4	8.1
Delay / Veh (s)	29.7	43.1	12.1	32.3
Total Stops	304	356	42	702
Travel Dist (mi)	79.4	66.1	6.9	152.4
Travel Time (hr)	6.3	7.1	0.8	14.2
Avg Speed (mph)	13	9	9	11
Fuel Used (gal)	3.2	2.9	0.5	6.5
HC Emissions (g)	79	20	12	111
CO Emissions (g)	1551	514	271	2336
NOx Emissions (g)	201	60	34	295
Vehicles Entered	417	355	134	906
Vehicles Exited	414	354	134	902
Hourly Exit Rate	414	354	134	902
Input Volume	436	350	141	927
% of Volume	95	101	95	97
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	13.1
Delay / Veh (s)	36.6
Total Stops	1017
Travel Dist (mi)	501.1
Travel Time (hr)	32.0
Avg Speed (mph)	16
Fuel Used (gal)	20.3
HC Emissions (g)	372
CO Emissions (g)	8344
NOx Emissions (g)	1063
Vehicles Entered	1287
Vehicles Exited	1287
Hourly Exit Rate	1287
Input Volume	2885
% of Volume	45
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR
Maximum Queue (ft)	142	196	198	66	60	139
Average Queue (ft)	48	82	99	19	16	51
95th Queue (ft)	104	160	165	49	44	106
Link Distance (ft)	1004	1004			219	646
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255	85		
Storage Blk Time (%)		0		0	0	
Queuing Penalty (veh)		0		0	0	

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB	SB	SB
Directions Served	LT	T	R	TR	L	T
Maximum Queue (ft)	193	208	59	437	48	126
Average Queue (ft)	105	117	32	235	4	40
95th Queue (ft)	175	188	55	401	22	95
Link Distance (ft)	1003	1003	1003	974		219
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					50	
Storage Blk Time (%)					0	11
Queuing Penalty (veh)					0	2

Network Summary

Network wide Queuing Penalty: 3

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:05	3:05	3:05	3:05	3:05	3:05
End Time	4:15	4:15	4:15	4:15	4:15	4:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1721	1825	1745	1729	1743	1753
Vehs Exited	1735	1833	1730	1734	1738	1754
Starting Vehs	54	47	40	49	44	46
Ending Vehs	40	39	55	44	49	43
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	679	718	684	682	681	689
Travel Time (hr)	47.0	51.6	48.0	48.3	47.9	48.6
Total Delay (hr)	21.3	24.5	22.1	22.4	22.0	22.5
Total Stops	1483	1596	1527	1520	1519	1529
Fuel Used (gal)	28.4	30.4	28.8	28.9	28.4	29.0

Interval #0 Information Seeding

Start Time	3:05
End Time	3:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:15
End Time	4:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1721	1825	1745	1729	1743	1753
Vehs Exited	1735	1833	1730	1734	1738	1754
Starting Vehs	54	47	40	49	44	46
Ending Vehs	40	39	55	44	49	43
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	679	718	684	682	681	689
Travel Time (hr)	47.0	51.6	48.0	48.3	47.9	48.6
Total Delay (hr)	21.3	24.5	22.1	22.4	22.0	22.5
Total Stops	1483	1596	1527	1520	1519	1529
Fuel Used (gal)	28.4	30.4	28.8	28.9	28.4	29.0

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	5.8	1.1	1.5	8.4
Delay / Veh (s)	31.9	16.8	65.7	31.0
Total Stops	395	43	76	514
Travel Dist (mi)	124.4	13.0	10.1	147.4
Travel Time (hr)	10.2	1.7	1.9	13.8
Avg Speed (mph)	12	8	5	11
Fuel Used (gal)	5.0	0.9	0.7	6.6
HC Emissions (g)	57	13	1	71
CO Emissions (g)	1350	362	90	1802
NOx Emissions (g)	157	45	8	210
Vehicles Entered	651	242	83	976
Vehicles Exited	660	242	82	984
Hourly Exit Rate	660	242	82	984
Input Volume	676	240	84	1000
% of Volume	98	101	98	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	6.3	5.8	1.1	13.2
Delay / Veh (s)	38.7	48.7	15.3	37.5
Total Stops	469	449	93	1011
Travel Dist (mi)	112.3	79.5	13.1	205.0
Travel Time (hr)	10.4	9.2	1.7	21.3
Avg Speed (mph)	11	9	8	10
Fuel Used (gal)	4.8	3.6	1.0	9.4
HC Emissions (g)	102	29	7	138
CO Emissions (g)	2067	686	251	3003
NOx Emissions (g)	258	80	32	370
Vehicles Entered	589	428	251	1268
Vehicles Exited	590	426	250	1266
Hourly Exit Rate	590	426	250	1266
Input Volume	571	425	254	1250
% of Volume	103	100	98	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	22.5
Delay / Veh (s)	46.1
Total Stops	1529
Travel Dist (mi)	688.9
Travel Time (hr)	48.6
Avg Speed (mph)	14
Fuel Used (gal)	29.0
HC Emissions (g)	435
CO Emissions (g)	10281
NOx Emissions (g)	1295
Vehicles Entered	1753
Vehicles Exited	1754
Hourly Exit Rate	1754
Input Volume	4006
% of Volume	44
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR
Maximum Queue (ft)	253	296	266	89	64	156
Average Queue (ft)	117	133	144	27	24	78
95th Queue (ft)	213	242	237	71	59	145
Link Distance (ft)	1004	1004			219	646
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255	85		
Storage Blk Time (%)		0	1	2	0	
Queuing Penalty (veh)		1	1	2	0	

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB	SB	SB
Directions Served	LT	T	R	TR	L	T
Maximum Queue (ft)	306	316	99	590	43	213
Average Queue (ft)	174	189	41	328	4	82
95th Queue (ft)	269	287	73	522	24	163
Link Distance (ft)	1003	1003	1003	974		219
Upstream Blk Time (%)						0
Queuing Penalty (veh)						1
Storage Bay Dist (ft)					50	
Storage Blk Time (%)					1	23
Queuing Penalty (veh)					1	3

Network Summary

Network wide Queuing Penalty: 10

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1264	1289	1284	1322	1259	1283
Vehs Exited	1268	1299	1270	1318	1271	1286
Starting Vehs	39	32	26	32	40	33
Ending Vehs	35	22	40	36	28	33
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	3	0	0	0
Travel Distance (mi)	493	503	498	515	494	501
Travel Time (hr)	30.3	31.7	29.9	32.1	30.6	30.9
Total Delay (hr)	11.6	12.6	11.1	12.6	12.0	12.0
Total Stops	968	1003	977	995	992	987
Fuel Used (gal)	19.8	20.4	19.4	20.7	19.6	20.0

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1264	1289	1284	1322	1259	1283
Vehs Exited	1268	1299	1270	1318	1271	1286
Starting Vehs	39	32	26	32	40	33
Ending Vehs	35	22	40	36	28	33
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	3	0	0	0
Travel Distance (mi)	493	503	498	515	494	501
Travel Time (hr)	30.3	31.7	29.9	32.1	30.6	30.9
Total Delay (hr)	11.6	12.6	11.1	12.6	12.0	12.0
Total Stops	968	1003	977	995	992	987
Fuel Used (gal)	19.8	20.4	19.4	20.7	19.6	20.0

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	2.6	0.7	0.7	3.9
Delay / Veh (s)	20.3	15.0	51.4	21.4
Total Stops	230	30	44	304
Travel Dist (mi)	87.1	8.4	6.1	101.6
Travel Time (hr)	5.6	1.0	1.0	7.6
Avg Speed (mph)	16	8	6	14
Fuel Used (gal)	3.1	0.6	0.4	4.1
HC Emissions (g)	46	6	8	60
CO Emissions (g)	1004	204	146	1354
NOx Emissions (g)	125	24	18	167
Vehicles Entered	457	156	50	663
Vehicles Exited	459	158	50	667
Hourly Exit Rate	459	158	50	667
Input Volume	459	156	49	664
% of Volume	100	101	102	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	3.0	4.0	0.5	7.5
Delay / Veh (s)	26.2	40.6	13.5	29.9
Total Stops	298	333	50	681
Travel Dist (mi)	79.3	66.2	6.9	152.4
Travel Time (hr)	5.9	6.9	0.9	13.6
Avg Speed (mph)	14	10	8	11
Fuel Used (gal)	3.1	2.8	0.5	6.4
HC Emissions (g)	73	21	12	106
CO Emissions (g)	1434	521	267	2222
NOx Emissions (g)	188	61	33	282
Vehicles Entered	417	355	136	908
Vehicles Exited	415	355	136	906
Hourly Exit Rate	415	355	136	906
Input Volume	436	350	141	927
% of Volume	95	101	96	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	12.0
Delay / Veh (s)	33.5
Total Stops	987
Travel Dist (mi)	500.7
Travel Time (hr)	30.9
Avg Speed (mph)	16
Fuel Used (gal)	20.0
HC Emissions (g)	375
CO Emissions (g)	8363
NOx Emissions (g)	1070
Vehicles Entered	1283
Vehicles Exited	1286
Hourly Exit Rate	1286
Input Volume	2885
% of Volume	45
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR
Maximum Queue (ft)	133	170	186	65	51	142
Average Queue (ft)	45	71	89	18	13	48
95th Queue (ft)	103	138	155	50	41	105
Link Distance (ft)	1004	1004			219	646
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255	85		
Storage Blk Time (%)			0	0	0	
Queuing Penalty (veh)			0	0	0	

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB	SB	SB
Directions Served	LT	T	R	TR	L	T
Maximum Queue (ft)	176	194	60	408	48	113
Average Queue (ft)	95	104	32	227	6	45
95th Queue (ft)	157	168	53	355	28	96
Link Distance (ft)	1003	1003	1003	974		219
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					50	
Storage Blk Time (%)					1	13
Queuing Penalty (veh)					1	2

Network Summary

Network wide Queuing Penalty: 3

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:05	3:05	3:05	3:05	3:05	3:05
End Time	4:15	4:15	4:15	4:15	4:15	4:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1727	1817	1745	1737	1746	1755
Vehs Exited	1743	1829	1734	1741	1727	1755
Starting Vehs	56	49	43	53	42	48
Ending Vehs	40	37	54	49	61	49
Denied Entry Before	0	0	0	2	0	0
Denied Entry After	1	0	0	0	0	0
Travel Distance (mi)	682	715	681	684	679	688
Travel Time (hr)	46.1	49.0	45.9	47.1	45.3	46.7
Total Delay (hr)	20.3	22.0	20.3	21.1	19.5	20.6
Total Stops	1445	1560	1457	1529	1481	1495
Fuel Used (gal)	28.3	29.7	28.2	28.7	27.7	28.5

Interval #0 Information Seeding

Start Time	3:05
End Time	3:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:15
End Time	4:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1727	1817	1745	1737	1746	1755
Vehs Exited	1743	1829	1734	1741	1727	1755
Starting Vehs	56	49	43	53	42	48
Ending Vehs	40	37	54	49	61	49
Denied Entry Before	0	0	0	2	0	0
Denied Entry After	1	0	0	0	0	0
Travel Distance (mi)	682	715	681	684	679	688
Travel Time (hr)	46.1	49.0	45.9	47.1	45.3	46.7
Total Delay (hr)	20.3	22.0	20.3	21.1	19.5	20.6
Total Stops	1445	1560	1457	1529	1481	1495
Fuel Used (gal)	28.3	29.7	28.2	28.7	27.7	28.5

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	5.0	1.0	1.4	7.4
Delay / Veh (s)	27.5	15.1	61.7	27.3
Total Stops	384	45	75	504
Travel Dist (mi)	124.4	13.1	10.0	147.4
Travel Time (hr)	9.4	1.6	1.8	12.8
Avg Speed (mph)	14	8	5	12
Fuel Used (gal)	4.8	0.9	0.7	6.4
HC Emissions (g)	55	12	1	68
CO Emissions (g)	1314	345	87	1745
NOx Emissions (g)	154	44	8	206
Vehicles Entered	652	244	82	978
Vehicles Exited	654	245	82	981
Hourly Exit Rate	654	245	82	981
Input Volume	676	240	84	1000
% of Volume	97	102	98	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	SB	All
Total Delay (hr)	5.5	5.7	1.2	12.4
Delay / Veh (s)	33.7	48.0	16.8	35.2
Total Stops	460	424	102	986
Travel Dist (mi)	112.0	80.1	13.0	205.2
Travel Time (hr)	9.5	9.1	1.8	20.5
Avg Speed (mph)	12	9	7	10
Fuel Used (gal)	4.6	3.6	1.0	9.2
HC Emissions (g)	97	28	7	131
CO Emissions (g)	1971	676	246	2893
NOx Emissions (g)	248	80	31	359
Vehicles Entered	587	432	248	1267
Vehicles Exited	587	427	247	1261
Hourly Exit Rate	587	427	247	1261
Input Volume	571	425	254	1250
% of Volume	103	100	97	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

Total Network Performance

Total Delay (hr)	20.6
Delay / Veh (s)	42.3
Total Stops	1495
Travel Dist (mi)	688.1
Travel Time (hr)	46.7
Avg Speed (mph)	15
Fuel Used (gal)	28.5
HC Emissions (g)	424
CO Emissions (g)	10114
NOx Emissions (g)	1273
Vehicles Entered	1755
Vehicles Exited	1755
Hourly Exit Rate	1755
Input Volume	4006
% of Volume	44
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR
Maximum Queue (ft)	220	305	261	83	76	156
Average Queue (ft)	103	121	131	27	24	69
95th Queue (ft)	193	223	218	65	61	128
Link Distance (ft)	1004	1004			219	646
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255	85		
Storage Blk Time (%)		0	0	1	0	
Queuing Penalty (veh)		1	1	1	0	

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB	SB	SB
Directions Served	LT	T	R	TR	L	T
Maximum Queue (ft)	247	269	85	532	56	184
Average Queue (ft)	158	169	40	303	6	74
95th Queue (ft)	241	256	71	470	32	152
Link Distance (ft)	1003	1003	1003	974		219
Upstream Blk Time (%)						0
Queuing Penalty (veh)						0
Storage Bay Dist (ft)					50	
Storage Blk Time (%)					1	27
Queuing Penalty (veh)					1	4

Network Summary

Network wide Queuing Penalty: 8

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1331	1365	1255	1365	1318	1326
Vehs Exited	1333	1363	1255	1377	1315	1328
Starting Vehs	28	19	27	34	27	27
Ending Vehs	26	21	27	22	30	26
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	525	539	491	542	520	523
Travel Time (hr)	26.3	27.5	24.4	27.1	26.2	26.3
Total Delay (hr)	6.1	6.9	5.5	6.3	6.2	6.2
Total Stops	1146	1268	1057	1183	1153	1161
Fuel Used (gal)	19.7	20.3	18.4	20.5	19.4	19.7

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1331	1365	1255	1365	1318	1326
Vehs Exited	1333	1363	1255	1377	1315	1328
Starting Vehs	28	19	27	34	27	27
Ending Vehs	26	21	27	22	30	26
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Travel Distance (mi)	525	539	491	542	520	523
Travel Time (hr)	26.3	27.5	24.4	27.1	26.2	26.3
Total Delay (hr)	6.1	6.9	5.5	6.3	6.2	6.2
Total Stops	1146	1268	1057	1183	1153	1161
Fuel Used (gal)	19.7	20.3	18.4	20.5	19.4	19.7

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	1.7	0.2	0.0	2.0
Delay / Veh (s)	13.1	4.9	2.1	10.5
Total Stops	274	43	21	338
Travel Dist (mi)	91.7	8.5	5.6	105.8
Travel Time (hr)	4.9	0.6	0.3	5.8
Avg Speed (mph)	19	14	20	19
Fuel Used (gal)	3.1	0.5	0.2	3.7
HC Emissions (g)	54	7	0	61
CO Emissions (g)	1177	218	15	1409
NOx Emissions (g)	150	25	2	177
Vehicles Entered	479	155	46	680
Vehicles Exited	479	155	46	680
Hourly Exit Rate	479	155	46	680
Input Volume	472	156	49	677
% of Volume	101	99	94	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	All
Total Delay (hr)	1.2	1.3	2.5
Delay / Veh (s)	7.1	13.2	9.4
Total Stops	345	242	587
Travel Dist (mi)	31.4	65.6	97.0
Travel Time (hr)	2.6	4.1	6.7
Avg Speed (mph)	12	16	15
Fuel Used (gal)	1.3	2.1	3.5
HC Emissions (g)	35	24	60
CO Emissions (g)	769	526	1295
NOx Emissions (g)	98	69	167
Vehicles Entered	585	353	938
Vehicles Exited	586	353	939
Hourly Exit Rate	586	353	939
Input Volume	573	350	923
% of Volume	102	101	102
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

11: WB MD 51 & Springdale Street Performance by approach

Approach	WB	All
Total Delay (hr)	0.3	0.3
Delay / Veh (s)	1.7	1.7
Total Stops	0	0
Travel Dist (mi)	29.8	29.8
Travel Time (hr)	1.4	1.4
Avg Speed (mph)	21	21
Fuel Used (gal)	1.9	1.9
HC Emissions (g)	41	41
CO Emissions (g)	1247	1247
NOx Emissions (g)	134	134
Vehicles Entered	570	570
Vehicles Exited	569	569
Hourly Exit Rate	569	569
Input Volume	567	567
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

12: EB MD 51 & Springdale Street Performance by approach

Approach	EB	SB	All
Total Delay (hr)	0.4	0.8	1.2
Delay / Veh (s)	2.9	21.5	7.3
Total Stops	91	134	225
Travel Dist (mi)	58.2	5.5	63.7
Travel Time (hr)	2.3	1.1	3.5
Avg Speed (mph)	25	5	18
Fuel Used (gal)	1.7	0.4	2.2
HC Emissions (g)	54	7	61
CO Emissions (g)	985	150	1135
NOx Emissions (g)	144	19	163
Vehicles Entered	444	140	584
Vehicles Exited	445	140	585
Hourly Exit Rate	445	140	585
Input Volume	436	137	573
% of Volume	102	102	102
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Total Delay (hr)	6.2
Delay / Veh (s)	16.8
Total Stops	1161
Travel Dist (mi)	523.2
Travel Time (hr)	26.3
Avg Speed (mph)	20
Fuel Used (gal)	19.7
HC Emissions (g)	437
CO Emissions (g)	9650
NOx Emissions (g)	1256
Vehicles Entered	1326
Vehicles Exited	1328
Hourly Exit Rate	1328
Input Volume	4047
% of Volume	33
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	T	T	TR	L	T	R
Maximum Queue (ft)	108	107	124	69	43	36
Average Queue (ft)	43	55	70	27	10	17
95th Queue (ft)	88	96	114	60	34	42
Link Distance (ft)	1009	1009		220	220	638
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB
Directions Served	LT	T	R	TR
Maximum Queue (ft)	119	112	72	246
Average Queue (ft)	53	53	33	111
95th Queue (ft)	98	97	60	199
Link Distance (ft)	231	231	231	973
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: WB MD 51 & Springdale Street

Movement	WB
Directions Served	L
Maximum Queue (ft)	14
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	224
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12: EB MD 51 & Springdale Street

Movement	EB	EB	EB	SB
Directions Served	T	T	T	L
Maximum Queue (ft)	60	88	88	174
Average Queue (ft)	15	35	27	84
95th Queue (ft)	46	73	71	144
Link Distance (ft)	688	688	688	169
Upstream Blk Time (%)				0
Queuing Penalty (veh)				1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 1

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:05	3:05	3:05	3:05	3:05	3:05
End Time	4:15	4:15	4:15	4:15	4:15	4:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1719	1769	1710	1764	1803	1753
Vehs Exited	1722	1779	1709	1752	1806	1754
Starting Vehs	47	39	39	33	45	42
Ending Vehs	44	29	40	45	42	40
Denied Entry Before	0	0	0	0	1	0
Denied Entry After	1	0	0	0	2	1
Travel Distance (mi)	683	706	674	695	716	695
Travel Time (hr)	35.7	36.7	34.7	36.2	37.3	36.1
Total Delay (hr)	9.1	9.5	8.8	9.2	9.6	9.2
Total Stops	1711	1741	1617	1748	1768	1718
Fuel Used (gal)	26.3	27.0	25.5	26.8	27.3	26.6

Interval #0 Information Seeding

Start Time	3:05
End Time	3:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:15
End Time	4:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1719	1769	1710	1764	1803	1753
Vehs Exited	1722	1779	1709	1752	1806	1754
Starting Vehs	47	39	39	33	45	42
Ending Vehs	44	29	40	45	42	40
Denied Entry Before	0	0	0	0	1	0
Denied Entry After	1	0	0	0	2	1
Travel Distance (mi)	683	706	674	695	716	695
Travel Time (hr)	35.7	36.7	34.7	36.2	37.3	36.1
Total Delay (hr)	9.1	9.5	8.8	9.2	9.6	9.2
Total Stops	1711	1741	1617	1748	1768	1718
Fuel Used (gal)	26.3	27.0	25.5	26.8	27.3	26.6

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	2.7	0.4	0.1	3.2
Delay / Veh (s)	14.6	5.7	3.4	11.6
Total Stops	405	62	41	508
Travel Dist (mi)	128.7	12.2	9.8	150.7
Travel Time (hr)	7.2	0.9	0.5	8.6
Avg Speed (mph)	18	14	19	18
Fuel Used (gal)	4.4	0.7	0.3	5.4
HC Emissions (g)	63	4	1	68
CO Emissions (g)	1481	202	33	1716
NOx Emissions (g)	178	21	4	202
Vehicles Entered	671	223	80	974
Vehicles Exited	675	223	81	979
Hourly Exit Rate	675	223	81	979
Input Volume	692	240	84	1016
% of Volume	98	93	96	96
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	All
Total Delay (hr)	1.7	1.6	3.3
Delay / Veh (s)	7.6	14.0	9.7
Total Stops	528	282	810
Travel Dist (mi)	44.2	76.3	120.5
Travel Time (hr)	3.8	4.9	8.6
Avg Speed (mph)	12	16	14
Fuel Used (gal)	2.0	2.5	4.5
HC Emissions (g)	35	8	43
CO Emissions (g)	841	322	1162
NOx Emissions (g)	109	37	146
Vehicles Entered	830	411	1241
Vehicles Exited	831	411	1242
Hourly Exit Rate	831	411	1242
Input Volume	833	425	1258
% of Volume	100	97	99
Denied Entry Before	0	0	0
Denied Entry After	0	1	1

11: WB MD 51 & Springdale Street Performance by approach

Approach	WB	All
Total Delay (hr)	0.4	0.4
Delay / Veh (s)	1.9	1.9
Total Stops	1	1
Travel Dist (mi)	42.0	42.0
Travel Time (hr)	2.1	2.1
Avg Speed (mph)	20	20
Fuel Used (gal)	2.6	2.6
HC Emissions (g)	49	49
CO Emissions (g)	1575	1575
NOx Emissions (g)	170	170
Vehicles Entered	801	801
Vehicles Exited	799	799
Hourly Exit Rate	799	799
Input Volume	827	827
% of Volume	97	97
Denied Entry Before	0	0
Denied Entry After	0	0

12: EB MD 51 & Springdale Street Performance by approach

Approach	EB	SB	All
Total Delay (hr)	0.7	1.1	1.9
Delay / Veh (s)	4.6	16.6	8.1
Total Stops	162	220	382
Travel Dist (mi)	75.4	9.5	85.0
Travel Time (hr)	3.3	1.6	4.9
Avg Speed (mph)	23	6	17
Fuel Used (gal)	2.4	0.7	3.0
HC Emissions (g)	68	2	70
CO Emissions (g)	1330	100	1430
NOx Emissions (g)	185	13	197
Vehicles Entered	578	244	822
Vehicles Exited	577	244	821
Hourly Exit Rate	577	244	821
Input Volume	571	253	824
% of Volume	101	96	100
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Total Delay (hr)	9.2
Delay / Veh (s)	19.0
Total Stops	1718
Travel Dist (mi)	694.7
Travel Time (hr)	36.1
Avg Speed (mph)	19
Fuel Used (gal)	26.6
HC Emissions (g)	407
CO Emissions (g)	10219
NOx Emissions (g)	1265
Vehicles Entered	1753
Vehicles Exited	1754
Hourly Exit Rate	1754
Input Volume	5697
% of Volume	31
Denied Entry Before	0
Denied Entry After	1

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	T	T	TR	L	T	R
Maximum Queue (ft)	150	151	152	70	61	57
Average Queue (ft)	64	74	89	29	20	27
95th Queue (ft)	119	122	139	59	54	52
Link Distance (ft)	1009	1009		220	220	638
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB
Directions Served	LT	T	R	TR
Maximum Queue (ft)	147	144	88	254
Average Queue (ft)	66	69	44	119
95th Queue (ft)	114	116	73	201
Link Distance (ft)	231	231	231	973
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: WB MD 51 & Springdale Street

Movement	WB
Directions Served	L
Maximum Queue (ft)	22
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	224
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12: EB MD 51 & Springdale Street

Movement	EB	EB	EB	SB
Directions Served	T	T	T	L
Maximum Queue (ft)	72	104	92	184
Average Queue (ft)	28	50	42	113
95th Queue (ft)	66	89	82	176
Link Distance (ft)	688	688	688	169
Upstream Blk Time (%)				1
Queuing Penalty (veh)				3
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 3

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	7:05	7:05	7:05	7:05	7:05	7:05
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1337	1357	1255	1372	1319	1327
Vehs Exited	1339	1356	1256	1391	1313	1331
Starting Vehs	29	21	27	39	28	27
Ending Vehs	27	22	26	20	34	26
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	1	0	0
Travel Distance (mi)	539	548	501	558	533	536
Travel Time (hr)	25.8	26.4	23.9	26.9	25.4	25.7
Total Delay (hr)	5.1	5.4	4.7	5.6	5.0	5.2
Total Stops	1093	1136	1011	1175	1098	1104
Fuel Used (gal)	19.9	20.3	18.5	20.8	19.5	19.8

Interval #0 Information Seeding

Start Time	7:05
End Time	7:15
Total Time (min)	10

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:15
End Time	8:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1337	1357	1255	1372	1319	1327
Vehs Exited	1339	1356	1256	1391	1313	1331
Starting Vehs	29	21	27	39	28	27
Ending Vehs	27	22	26	20	34	26
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	1	0	0
Travel Distance (mi)	539	548	501	558	533	536
Travel Time (hr)	25.8	26.4	23.9	26.9	25.4	25.7
Total Delay (hr)	5.1	5.4	4.7	5.6	5.0	5.2
Total Stops	1093	1136	1011	1175	1098	1104
Fuel Used (gal)	19.9	20.3	18.5	20.8	19.5	19.8

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	1.7	0.2	0.0	1.9
Delay / Veh (s)	13.0	4.6	2.0	10.3
Total Stops	277	41	21	339
Travel Dist (mi)	91.4	8.5	5.4	105.4
Travel Time (hr)	4.9	0.6	0.3	5.7
Avg Speed (mph)	19	15	20	19
Fuel Used (gal)	3.1	0.5	0.1	3.7
HC Emissions (g)	55	7	0	63
CO Emissions (g)	1217	217	14	1447
NOx Emissions (g)	154	25	2	181
Vehicles Entered	478	156	45	679
Vehicles Exited	479	156	45	680
Hourly Exit Rate	479	156	45	680
Input Volume	472	156	49	677
% of Volume	101	100	92	100
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	All
Total Delay (hr)	1.3	1.0	2.4
Delay / Veh (s)	8.1	10.4	9.0
Total Stops	389	225	614
Travel Dist (mi)	59.1	65.7	124.9
Travel Time (hr)	3.7	3.8	7.5
Avg Speed (mph)	16	17	17
Fuel Used (gal)	2.0	2.1	4.1
HC Emissions (g)	53	23	76
CO Emissions (g)	1123	510	1634
NOx Emissions (g)	141	68	208
Vehicles Entered	587	353	940
Vehicles Exited	588	354	942
Hourly Exit Rate	588	354	942
Input Volume	573	350	923
% of Volume	103	101	102
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

11: WB MD 51 & Turnaround Lane Performance by approach

Approach	WB	All
Total Delay (hr)	0.3	0.3
Delay / Veh (s)	1.9	1.9
Total Stops	1	1
Travel Dist (mi)	55.3	55.3
Travel Time (hr)	2.3	2.3
Avg Speed (mph)	24	24
Fuel Used (gal)	2.7	2.7
HC Emissions (g)	60	60
CO Emissions (g)	1648	1648
NOx Emissions (g)	186	186
Vehicles Entered	569	569
Vehicles Exited	569	569
Hourly Exit Rate	569	569
Input Volume	567	567
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

12: EB MD 51 & Turnaround Lane Performance by approach

Approach	EB	SE	All
Total Delay (hr)	0.0	0.2	0.3
Delay / Veh (s)	0.2	6.0	1.6
Total Stops	1	140	141
Travel Dist (mi)	37.9	4.5	42.4
Travel Time (hr)	1.3	0.5	1.8
Avg Speed (mph)	29	9	24
Fuel Used (gal)	1.1	0.2	1.3
HC Emissions (g)	35	4	39
CO Emissions (g)	602	77	679
NOx Emissions (g)	95	10	105
Vehicles Entered	447	140	587
Vehicles Exited	448	139	587
Hourly Exit Rate	448	139	587
Input Volume	436	137	573
% of Volume	103	101	102
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Total Delay (hr)	5.2
Delay / Veh (s)	14.0
Total Stops	1104
Travel Dist (mi)	535.7
Travel Time (hr)	25.7
Avg Speed (mph)	21
Fuel Used (gal)	19.8
HC Emissions (g)	444
CO Emissions (g)	9878
NOx Emissions (g)	1275
Vehicles Entered	1327
Vehicles Exited	1331
Hourly Exit Rate	1331
Input Volume	4047
% of Volume	33
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	T	T	TR	L	T	R
Maximum Queue (ft)	114	111	130	65	44	34
Average Queue (ft)	46	54	66	23	10	15
95th Queue (ft)	92	96	106	55	34	40
Link Distance (ft)	1009	1009		218	218	636
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB
Directions Served	LT	T	R	TR
Maximum Queue (ft)	112	137	60	210
Average Queue (ft)	58	64	29	94
95th Queue (ft)	101	108	53	170
Link Distance (ft)	467	467	467	973
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: WB MD 51 & Turnaround Lane

Movement	WB
Directions Served	L
Maximum Queue (ft)	27
Average Queue (ft)	1
95th Queue (ft)	16
Link Distance (ft)	460
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12: EB MD 51 & Turnaround Lane

Movement	EB	SE
Directions Served	T	L
Maximum Queue (ft)	8	118
Average Queue (ft)	0	47
95th Queue (ft)	4	89
Link Distance (ft)	445	125
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:05	3:05	3:05	3:05	3:05	3:05
End Time	4:15	4:15	4:15	4:15	4:15	4:15
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intvls	1	1	1	1	1	1
Vehs Entered	1788	1844	1767	1801	1768	1793
Vehs Exited	1794	1832	1768	1787	1785	1793
Starting Vehs	39	35	35	35	59	41
Ending Vehs	33	47	34	49	42	41
Denied Entry Before	0	0	0	0	1	0
Denied Entry After	0	0	0	1	0	0
Travel Distance (mi)	719	738	705	720	708	718
Travel Time (hr)	36.5	37.2	35.1	36.2	35.3	36.1
Total Delay (hr)	8.5	8.8	8.0	8.4	8.1	8.3
Total Stops	1678	1689	1580	1671	1596	1644
Fuel Used (gal)	27.3	28.0	26.6	27.3	26.5	27.1

Interval #0 Information Seeding

Start Time	3:05
End Time	3:15
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:15
End Time	4:15
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1788	1844	1767	1801	1768	1793
Vehs Exited	1794	1832	1768	1787	1785	1793
Starting Vehs	39	35	35	35	59	41
Ending Vehs	33	47	34	49	42	41
Denied Entry Before	0	0	0	0	1	0
Denied Entry After	0	0	0	1	0	0
Travel Distance (mi)	719	738	705	720	708	718
Travel Time (hr)	36.5	37.2	35.1	36.2	35.3	36.1
Total Delay (hr)	8.5	8.8	8.0	8.4	8.1	8.3
Total Stops	1678	1689	1580	1671	1596	1644
Fuel Used (gal)	27.3	28.0	26.6	27.3	26.5	27.1

1: WB MD 51 & Virginia Avenue Performance by approach

Approach	WB	NB	SB	All
Total Delay (hr)	2.9	0.3	0.1	3.3
Delay / Veh (s)	15.1	5.1	3.0	11.8
Total Stops	428	56	34	518
Travel Dist (mi)	131.3	12.7	9.8	153.7
Travel Time (hr)	7.4	0.9	0.5	8.8
Avg Speed (mph)	18	14	19	18
Fuel Used (gal)	4.5	0.7	0.3	5.5
HC Emissions (g)	75	4	1	80
CO Emissions (g)	1710	212	37	1959
NOx Emissions (g)	209	22	4	235
Vehicles Entered	686	231	80	997
Vehicles Exited	687	231	82	1000
Hourly Exit Rate	687	231	82	1000
Input Volume	692	240	84	1016
% of Volume	99	96	98	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0

2: EB MD 51 & Virginia Avenue Performance by approach

Approach	EB	NB	All
Total Delay (hr)	1.9	1.5	3.4
Delay / Veh (s)	8.1	12.6	9.6
Total Stops	566	290	856
Travel Dist (mi)	81.6	77.8	159.4
Travel Time (hr)	5.3	4.8	10.0
Avg Speed (mph)	16	16	16
Fuel Used (gal)	3.0	2.5	5.5
HC Emissions (g)	72	8	80
CO Emissions (g)	1662	313	1976
NOx Emissions (g)	206	36	242
Vehicles Entered	849	418	1267
Vehicles Exited	849	419	1268
Hourly Exit Rate	849	419	1268
Input Volume	859	425	1284
% of Volume	99	99	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

11: WB MD 51 & Turnaround Lane Performance by approach

Approach	WB	All
Total Delay (hr)	0.5	0.5
Delay / Veh (s)	2.4	2.4
Total Stops	6	6
Travel Dist (mi)	79.9	79.9
Travel Time (hr)	3.5	3.5
Avg Speed (mph)	23	23
Fuel Used (gal)	3.9	3.9
HC Emissions (g)	78	78
CO Emissions (g)	2214	2214
NOx Emissions (g)	253	253
Vehicles Entered	830	830
Vehicles Exited	830	830
Hourly Exit Rate	830	830
Input Volume	838	838
% of Volume	99	99
Denied Entry Before	0	0
Denied Entry After	0	0

12: EB MD 51 & Turnaround Lane Performance by approach

Approach	EB	SE	All
Total Delay (hr)	0.0	0.7	0.7
Delay / Veh (s)	0.2	9.6	3.2
Total Stops	0	255	255
Travel Dist (mi)	46.9	8.2	55.2
Travel Time (hr)	1.6	1.1	2.8
Avg Speed (mph)	29	7	20
Fuel Used (gal)	1.4	0.4	1.8
HC Emissions (g)	44	7	50
CO Emissions (g)	784	136	920
NOx Emissions (g)	122	17	139
Vehicles Entered	555	255	810
Vehicles Exited	555	254	809
Hourly Exit Rate	555	254	809
Input Volume	571	253	824
% of Volume	97	100	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Total Delay (hr)	8.3
Delay / Veh (s)	16.8
Total Stops	1644
Travel Dist (mi)	718.2
Travel Time (hr)	36.1
Avg Speed (mph)	20
Fuel Used (gal)	27.1
HC Emissions (g)	446
CO Emissions (g)	11093
NOx Emissions (g)	1369
Vehicles Entered	1793
Vehicles Exited	1793
Hourly Exit Rate	1793
Input Volume	5734
% of Volume	31
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: WB MD 51 & Virginia Avenue

Movement	WB	WB	WB	NB	NB	SB
Directions Served	T	T	TR	L	T	R
Maximum Queue (ft)	167	150	150	71	66	56
Average Queue (ft)	78	75	87	26	17	23
95th Queue (ft)	138	125	134	58	47	51
Link Distance (ft)	1009	1009		218	218	636
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			255			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: EB MD 51 & Virginia Avenue

Movement	EB	EB	EB	NB
Directions Served	LT	T	R	TR
Maximum Queue (ft)	133	135	89	259
Average Queue (ft)	68	75	36	118
95th Queue (ft)	114	118	67	205
Link Distance (ft)	467	467	467	973
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: WB MD 51 & Turnaround Lane

Movement	WB
Directions Served	L
Maximum Queue (ft)	67
Average Queue (ft)	5
95th Queue (ft)	35
Link Distance (ft)	460
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 12: EB MD 51 & Turnaround Lane

Movement	SE
Directions Served	L
Maximum Queue (ft)	134
Average Queue (ft)	78
95th Queue (ft)	129
Link Distance (ft)	125
Upstream Blk Time (%)	1
Queuing Penalty (veh)	3
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 3

Appendix F:
Signing Inventory

Sign No.	Location			Facing
	On	**At**	**Corner**	
D1	Mechanic Street	Baltimore Street	SE	NB
D10	Union Street	Alley	NW	NB
D11	George Street	Harrison Street	NE	SB
D12	Queen City Drive	Bedford Street	NW	SB
D12	Queen City Drive	Bedford Street	NW	NB
D13	Harrison Street	Centre Street	NE?	EB
D13	Harrison Street	Centre Street	NE?	WB
D14	Baltimore Street	Queen City Drive	SW	EB
D15	Queen City Drive	Harrison Street	NW	SB
D16	Queen City Drive	Winston Street	NW	SB
D18	Baltimore Street	Greene Street	NE	WB
D19	Greene Street	Bridge Street	NE	EB
D2	Howard Street	Industrial Blvd	NE	EB
D20	Greene Street	Baltimore Street	SE	NB
D21	Washington Street	Greene Street	SW	EB
D22	Centre Street	Harrison Street	SE	NB
D23	Henderson Avenue	Glenn Street	SW	NB
D24	Centre Street	Frederick Street	SE	NB
D25	Frederick Street	Liberty Street	SW	EB
D26	Harrison Street	Mechanic Street	SW	EB
D27	Centre Street	Union Street	SE	NB
D28	George Street	Union Street	NE	EB
D29	Park Street	Dexter Place	SE	NB
D3	Baltimore Avenue	Park Street	MIddle	EB
D30	Henderson Street	Baltimore Avenue	NW	SB
D31	Baltimore Avenue	Henderson Avenue	Middle	SB
D31	Baltimore Avenue	Henderson Avenue	Middle	NB
D32	Queen City Drive	Harrison Street	SE	NB
D33	Baltimore Street	Mechanic Street	SW	EB
D35	Mechanic Street	Harrison Street	SE	NB
D36	Harrison Street	Centre Street	NE	EB
D36	Harrison Street	Centre Street	NE	WB
D37	Greene Street	Bridge Street	SW	EB
D4	Centre Street	Bedford Street	SE	NB
D5	Mechanic Street	Baltimore Street	NW	SB
D6	Harrison Street	Mechanic Street	NE	WB
D7	Frederick Street Connector	Queen City Drive	SW	EB
D8	Queen City Drive	Baltimore Street	NW	SB

H1	Bedford Street	Centre Street	NE	WB
H2	Bedford Street	Centre Street	NE	WB
H3	Queen City Drive	Mechanic Street	NW	WB
H4	Mechanic Street	Queen City Drive	NW	SB
H5	Lee Street	Greene Street	SE	NB
H6	Queen City Drive	Centre Street	NE	WB
H7	Johnson Street	I-68 Ramps	S	SB
H8	Mechanic Street	Harrison Street	SE	NB
M1	Queen City Drive	I-68 EB Off-ramp	NE	EB
M2	Queen City Drive	Baltimore Street	NW	WB
M4	Harrison Street	I-68 WB Off-ramp	NE	NB
M5	Mechanic Street	Frederick Street	Middle	NB
M5	Mechanic Street	Frederick Street	Middle	SB
M6	Baltimore Street	Queen City Drive	NW	NB
M7	Greene Street	Johnson Street	N	NB
P1	Industrial Blvd	Harrison Street	SE	NB
P1	Industrial Blvd	Harrison Street	SE	SB
P10	Howard Street	I-68 WB Off-ramp	NE	WB
P11	George Street	Union Street	SW	NB
P11	George Street	Union Street	SW	SB
P12	Harrison Street	George Street	NE	EB
P12	Harrison Street	George Street	NE	WB
P13	Industrial Blvd	Howard Street	NW	SB
P14	Mechanic Street	Howard Street	SW	SB
P15	Mechanic Street	Howard Street	NW	NB
P2	Union Street	Alley	SE	EB
P2	Union Street	Alley	SE	WB
P3	Frederick Street	Alley	SW	EB
P4	Mechanic Street	Pershing Street	SE	NB
P4	Mechanic Street	Pershing Street	SE	SB
P5	Pershing Street	Mechanic Street	NE	EB
P5	Pershing Street	Mechanic Street	NE	WB
P6	Liberty Street	Alley	SW	SB
P7	Baltimore Street	Georgre Street	NE	WB
P9	Greene Street	Parking Lot	SW	EB
P9	Greene Street	Parking Lot	SW	WB

Sign D1 – NB Mechanic Street at Baltimore Street

Sign D2 – EB Howard Street at Industrial Boulevard

Sign D3 – EB Baltimore Street at Park Avenue

Sign D4 (Sign Panel Missing) – NB Centre Street at Bedford Street

Sign D5 – SB Mechanic Street at Baltimore Street

Sign D6 – WB Harrison Street at Mechanic Street

Sign D7 – EB Frederick Street Connector at Queen City Drive

Sign D8 – SB Queen City Drive at Baltimore Street

Sign D10 – Union Street at Alley (parking garage exit)

Sign D11 – SB George Street at Harrison Street

Sign D12 – SB Queen City Drive at Bedford Street

Sign D12 – NB Queen City Drive at Bedford Street

Sign D13 – EB Harrison Street at Centre Street

Sign D13 – WB Harrison Street at Centre Street

Sign D14 – EB Baltimore Street at Queen City Drive

Sign D15 – SB Queen City Drive at Harrison Street

Sign D16 – EB Baltimore Street at Queen City Drive

Sign D18 – WB Baltimore Street at Greene Street

Sign D19 – WB Greene Street at Bridge Street

Sign D20 – NB Greene Street at Baltimore Street

Sign D21 – EB Washington Street at Greene Street

Sign D22 – NB Centre Street at Harrison Street

Sign D23 – SB Henderson Avenue at Glenn Street

Sign D24 – NB Centre Street at Frederick Street

Sign D25 – EB Frederick Street at Liberty Street

Sign D26 – EB Harrison Street at Mechanic Street

Sign D27 – NB Centre Street at Union Street

Sign D28 – EB George Street at Union Street

Sign D29 – NB Park Street at Dexter Place

Sign D30 – SB Henderson Avenue at Baltimore Street

Sign D31 – SB Baltimore Avenue at Henderson Avenue

Sign D31 – NB Baltimore Avenue at Henderson Avenue

Sign D32 – NB Queen City Drive at Harrison Street

Sign D33 – EB Baltimore Street at Mechanic Street

Sign D35 – NB Mechanic Street at Harrison Street

Sign D36 – EB Harrison Street at Centre Street

Sign D36 – WB Harrison Street at Centre Street

Sign D37 – EB Greene Street at Bridge Street

Sign H1 – WB Bedford Street at Centre Street

Sign H2 – WB Bedford Street at Centre Street

Sign H3 – WB Queen City Drive at Mechanic Street

Sign H4 – SB Mechanic Street at Queen City Drive

Sign H5 – NB Lee Street at Greene Street

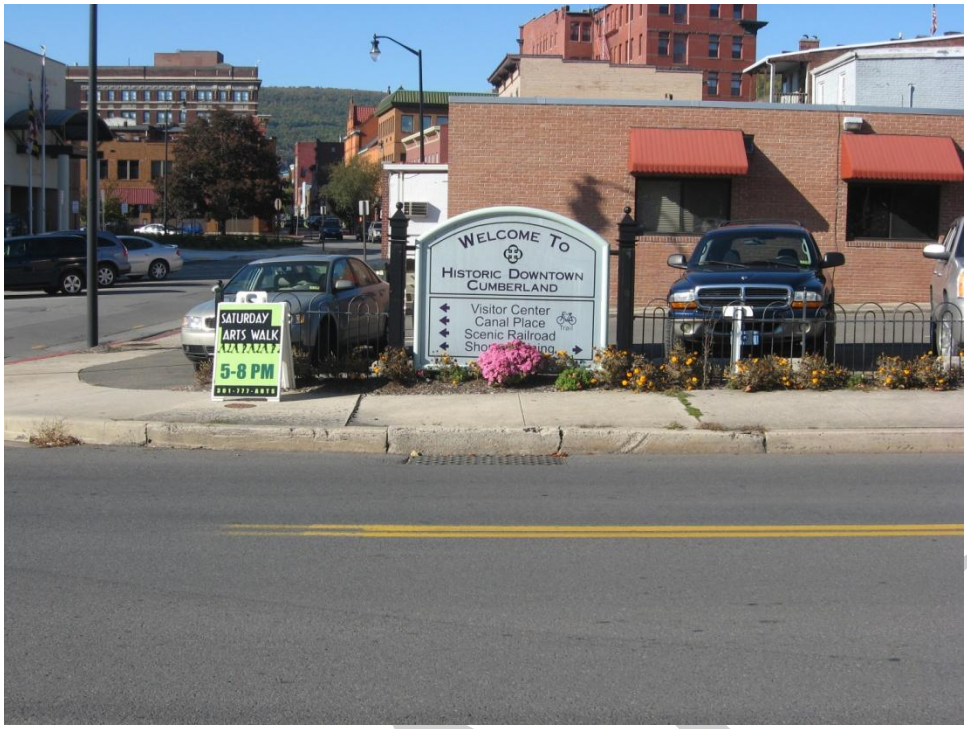
Sign H6 – WB Queen City Drive at Centre Street

Sign H7 – EB I-68 Off-ramp at Johnson Street

Sign H8 – NB Mechanic Street at Harrison Street

Sign M1 – EB I-68 Off-ramp at Queen City Drive

Sign H6 – WB Baltimore Street at Queen City Drive



Sign M4 – WB I-68 Off-ramp at Harrison Street

Sign M5 – NB Mechanic Street at Frederick Street

Sign M5 – SB Mechanic Street at Frederick Street

Sign M6 – NB Queen City Drive at Baltimore Street

Sign M7 – NB Johnson Street at Greene Street

Sign P1 – NB Industrial Boulevard at Harrison Street

Sign P1 – SB Industrial Boulevard at Harrison Street

Sign P2 – EB Union Street at Alley (parking garage exit)

Sign P2 – WB Union Street at Alley (parking garage exit)

Sign P3 – EB Frederick Street at Alley (parking garage exit)

Sign P4 – NB Mechanic Street at Pershing Street

Sign P4 – SB Mechanic Street at Pershing Street

Sign P5 – EB Pershing Street at Parking Garage

Sign P5 – WB Pershing Street at Parking Garage

Sign P6 – SB Liberty Street at Parking Entrance

Sign P7 – WB Baltimore Street at George Street

Sign P9 – EB Greene at Parking Lot

Sign P9 – WB Greene Street at Parking Lot

Sign P10 – WB Howard Street at I-68 Off-ramp

Sign P11 – NB George Street at Union Street

Sign P11 – SB George Street at Union Street

Sign P12 – EB Harrison Street at George Street

Sign P12 – WB Harrison Street at George Street

Sign P13 – SB Industrial Boulevard at Howard Street

Sign P14 – SB Mechanic Street at Howard Street

Sign P15 – NB Mechanic Street at Howard Street

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