

## UPDATED TRAFFIC IMPACT AND ACCESS STUDY

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### PROPOSED CVS PHARMACY WINCHESTER, MASSACHUSETTS

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May 2013

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## **EXECUTIVE SUMMARY**

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Vanasse & Associates, Inc. (VAI) has updated the January 2013 Traffic Impact and Access Study (TIAS) to determine the potential traffic impacts associated with the revised development program for the proposed CVS Pharmacy to be located at 278 Washington Street in Winchester, Massachusetts. In addition, based on comments received on the original TIAS (September 2012), new turning movement counts (TMCs) were conducted during the weekday morning, weekday evening and Saturday midday peak periods in November and December 2012 in order to present a non-summer month analysis condition. (The original TIAS is based on July 2012 traffic volumes and did not analyze the weekday morning peak hour). This study identifies and analyzes existing traffic conditions and future traffic conditions both with and without the project, and reviews access requirements, potential off-site improvements, and safety considerations.

The project entails the construction of an 11,955 square foot (sf) CVS Pharmacy with a 2,405 sf mezzanine to be located at 278 Washington Street in Winchester, Massachusetts. The existing uses on-site will be demolished as part of the project, which consist of a 5,389 sf building located at 278-292 Washington Street that contains retail uses and services, a 4,000± sf building (with a ±4,000 sf basement) located at 16-20 Swanton Street that contains the Rodeo Restaurant and Fashion Cleaners, and a 1,800 sf automotive repair garage located at 12 Swanton Street that contains Bossi's Automotive. The project site is situated on the southwest corner of the intersection of Washington Street and Swanton Street and is bounded by Swanton Street to the north, Washington Street to the east, residential properties to the south, and a commercial parking lot and residential home to the west. Access to the existing site is provided via one full-access driveway located off of Washington Street and three full-access driveways located off of Swanton Street. Access to the proposed project will be provided via one full-access driveway located off of Washington Street and one full-access driveway located off of Swanton Street, eliminating two driveways on Swanton Street. Parking will be provided on-site for 63 vehicles.

This study was prepared in consultation with the Town of Winchester, and was performed in general accordance with the state guidelines for Traffic Impact Assessments (TIAs).

### **EXISTING CONDITIONS**

A comprehensive field inventory of existing conditions within the study area was conducted in July and updated in November and December 2012. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; traffic volumes; and

operating characteristics; as well as posted speed limits and land use information within the study area. The study area for the project was selected to contain the major roadways providing access to the project, Washington Street and Swanton Street, as well as the intersections of Washington Street at Swanton Street and Park Avenue, Washington Street at the site driveway and Park Road, Swanton Street at the retail service driveway, Swanton Street at Bossi's Automotive driveway, and Swanton Street at Rodeo Grill/Fashion Cleaners driveway.

### **Existing Traffic Volumes**

In order to determine existing traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) and vehicle classification counts were completed in November and December 2012. The manual TMCs were conducted during the weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM) and Saturday midday (11:00 AM to 2:00 PM) peak-periods at the study intersections. Based on a review of the Massachusetts Department of Transportation (MassDOT) 2010 Weekday Seasonal Factors for Group 6 Roadways (urban arterials, collectors and rural arterials), November and December traffic volumes were found to be representative of average-month conditions, and no adjustments were made in accordance with MassDOT standards.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 7:45 and 8:45 AM, with the weekday evening peak hour generally occurring between 5:00 and 6:00 PM and the Saturday midday peak hour generally occurring between 12:00 and 1:00 PM.

### **Pedestrian and Bicycle Facilities**

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in July and November 2012. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of existing and planned future bicycle facilities. In general, sidewalks are provided along the study area roadways with crosswalk and pedestrian traffic signal equipment and phasing provided at the signalized intersection.

There are no formal existing bicycle facilities that were identified within the immediate study area; however, bicycle detection and associated pavement markings are provided at the intersection of Washington Street at Swanton Street and Park Avenue.

### **Motor Vehicle Crash Data**

Motor vehicle crash information for the study area intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent three-year period available (2008 through 2010) in order to examine motor vehicle crash trends occurring within the study area. Two (2) motor vehicle crashes were reported to have occurred at the study area intersections over the three-year review period. Both crashes involved property damage only and were classified as angle-type collisions. The study area intersections were found to have a motor vehicle crash rate below the MassDOT average for a signalized or unsignalized intersection, as appropriate, for the MassDOT Highway Division District in which the project is located (District 4). No fatal motor vehicle crashes were reported at the study area intersections over the three-year review period. It should be noted that VAI contacted the Town's Safety Officer, Sergeant Tom Groux, to discuss safety conditions in the area. Based upon our discussion, there are no safety deficiencies in the area. It is important to note that sidewalks exist

along both sides of Washington Street and Swanton Street and crosswalks exist on all four legs of the intersection. When the pedestrian signal phase is actuated by the pushbutton, traffic is stopped on all approaches providing the safest pedestrian condition.

### **FUTURE CONDITIONS**

Traffic volumes in the study area were projected to the year 2017, which reflects a five-year planning horizon consistent with State traffic study guidelines. Independent of the project, traffic volumes on the roadway network in the year 2017 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated project-generated traffic volumes superimposed upon the 2017 No-Build traffic network reflect the 2017 Build conditions with the project.

### **Specific Development by Others**

The Planning Department of the Town of Winchester was contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. One project was identified:

- ***Winchester Community Park*** - This proposed project consists of the construction of a community park facility containing four multi-purpose turf fields, including three outdoor fields and one indoor full-size field to be located at 120-134 Cross Street in Winchester.

In addition to the community park, at the time the traffic counts were conducted in November and December 2012, approximately 2,289 sf of space was vacant (of which 1,689 sf was previously occupied by a bank and 600 sf was occupied by a beauty salon) in the 5,389 sf retail building located on the project site. The 2,000± sf Rodeo Restaurant (with a 2,000± sf basement) closed in September 2012; however, the traffic associated with the restaurant is included in the weekday evening and Saturday midday peak hour driveway counts (conducted in July 2012). The restaurant was not open during the weekday morning peak hour. By the end of April 2013, all uses on-site are closed with the exception of the laundromat. In order to account for the occupancy of the 2,289 sf of space that was vacant at the time the traffic counts were completed, traffic volumes expected to be generated by the 2,289 sf of vacant space were included in the future traffic-volume projections.

It should also be noted that the Winchester Hospital has plans to expand. A traffic study was conducted in February 2007 for an outpatient care facility at 620 Washington Street that would include a radiation oncology facility, an ambulatory-care center, medical office space, a health/wellness center and ancillary retail space.<sup>1</sup> A portion of this facility was opened in 2011. Traffic associated with this space is included in the existing traffic volumes. There are no definitive plans to permit the remaining space at this time; therefore, traffic volumes expected to be generated by the remaining space are not included in the future traffic volume projections. However, a review of the traffic study prepared for the hospital expansion indicates approximately 23 to 34 peak hour trips will travel on Washington Street through the study area. These additional trips do not change overall operations, levels-of-service, or the recommendations outlined in this report.

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<sup>1</sup>*Traffic Impact and Access Study, Proposed Outpatient Care Facility at 620 Washington Street, Winchester, MA;* VHB; February 2007.

No other developments were identified that are expected to result in an increase in traffic within the study area beyond the background traffic growth rate.

### **General Background Traffic Growth**

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on a review of this data, a 1.0 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and presently unforeseen development within the study area.

### **Roadway Improvement Projects**

The Town of Winchester was contacted in order to determine if there were any planned roadway improvement projects expected to be completed within the study area. At this time, there are no roadway improvement projects planned for the study area.

### **No-Build Traffic Volumes**

The 2017 No-Build peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2012 existing peak-hour traffic volumes and then superimposing the peak-hour traffic volumes expected to be generated by the identified specific development project by others and the full-occupancy of the project site.

### **Project-Generated Traffic**

The project consists of the construction of an 11,955 sf CVS Pharmacy with a 2,405 sf mezzanine. Trip-generation statistics published by the Institute of Transportation Engineers (ITE)<sup>2</sup> for LUC 880, Pharmacy/Drugstore without Drive-Through Window, were used to develop the traffic characteristics of the project.

### **Pass-By Trips**

Not all the trips expected to be generated by the project will consist of new trips on the roadway network. A portion of the trips will consist of pass-by trips, or vehicles already traveling along Washington Street and Swanton Street for other purposes that will patronize the project in conjunction with their trip and then continue on to their original destination. Statistics published by the ITE<sup>3</sup> indicate that, on average, 53 percent of the trips generated by a pharmacy/drugstore without a drive-through window consist of pass-by trips. In accordance with state standards for the preparation of TIAs, a 25 percent pass-by trip rate was applied to the trip-generation calculations for the project.

The project is expected to generate approximately 970 new vehicle trips on an average weekday (485 entering and 485 exiting), with approximately 52 new vehicle trips (32 entering and 20 exiting) during the weekday morning peak hour, approximately 91 new vehicle trips (46 entering and 45 exiting) during the weekday evening peak hour and 115 new vehicle trips (56 entering and 59 exiting) during the Saturday midday peak hour.

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<sup>2</sup>*Trip Generation*, Eighth Edition; Institute of Transportation Engineers; Washington, DC; 2008.

<sup>3</sup>*Trip Generation Handbook, an ITE Recommended Practice*; Institute of Transportation Engineers; Washington DC; June 2004.

### **Trip Distribution and Assignment**

The directional distribution of generated trips to and from the project was determined based on a review of existing travel patterns at the study intersections. In general, 35 percent of the project-related traffic was assigned to/from the north on Washington Street, with 35 percent assigned to/from the south on Washington Street, 25 percent to/from the west on Swanton Street and 5 percent to/from the east on Park Avenue.

### **Build Condition Traffic-Volume Networks**

The 2017 Build condition networks consist of the 2017 No-Build traffic volumes with the existing site traffic removed and the anticipated site-generated traffic added to them. The project was shown to result in traffic-volume increases outside of the immediate study area ranging from 0.2 to 2.0 percent during the peak periods.

### **TRAFFIC OPERATIONS ANALYSIS**

In order to assess the impact of the project on the roadway network, traffic operations and vehicle queue analyses were performed at the study intersections under 2012 Existing, 2017 No-Build and 2017 Build conditions. The analysis indicates that the addition of project-related traffic will not have a significant impact on motorist delays over No-Build conditions. The study area intersections were shown to continue to operate at LOS “D” or better with the redevelopment of the project site.

### **RECOMMENDATIONS**

A transportation improvement program has been developed that is designed to provide safe and efficient access to the project and address any deficiencies identified at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and have been incorporated into the revised site plans.

#### **Site Access**

Access to the project will be provided by way of two driveways: one that will intersect the west side of Washington Street, approximately 150 feet south of Swanton Street and one that will intersect the south side of Swanton Street, approximately 200 feet west of Washington Street. It is recommended that the driveways be designed to provide one 12-foot wide (minimum) exiting travel lane and a single 12-foot wide (minimum) entering lane. Vehicles exiting the driveways should be placed under STOP-sign control. Street illumination should be provided at the driveway intersections with Washington Street and Swanton Street. Signs and landscaping adjacent to the site driveway intersections with Washington Street and Swanton Street, and within the project site, should be designed and maintained so as not to restrict lines of sight. As proposed, the building location is set back and will not restrict lines of sight for vehicles exiting the site driveways. It is recommended that both driveways provide full-access to and from the site to distribute site traffic on both Washington Street and Swanton Street. A “Do Not Block Driveway” sign and associated striping will be provided at the Swanton Street driveway to restrict eastbound traffic from blocking the driveway and to allow for left-turning traffic to enter and exit the site.

It should be noted that a delay study was conducted during the weekday evening peak hour for left-turns exiting the existing site driveway onto Washington Street. The average delay was found to be approximately 14 seconds. As such, this driveway was found to operate efficiently and will operate safely with the development of the proposed project.

With the implementation of the above recommendations, safe and efficient access will be provided to the planned development and the proposed project can be constructed with minimal impact to the area as designed.

## **INTRODUCTION**

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Vanasse & Associates, Inc. (VAI) has updated the January 2013 Traffic Impact and Access Study (TIAS) to determine the potential traffic impacts associated with the revised development program for the proposed CVS Pharmacy to be located at 278 Washington Street in Winchester, Massachusetts. In addition, based on comments received on the original TIAS (September 2012), new turning movement counts (TMCs) were conducted during the weekday morning, weekday evening and Saturday midday peak periods in November and December 2012 in order to present a non-summer month analysis condition. (The original TIAS is based on July 2012 traffic volumes and did not analyze the weekday morning peak hour). This study identifies and analyzes existing traffic conditions and future traffic conditions both with and without the project, and reviews access requirements, potential off-site improvements, and safety considerations.

## **PROJECT DESCRIPTION**

The project entails the construction of an 11,955 square foot (sf) CVS Pharmacy with a 2,405 sf mezzanine to be located at 278 Washington Street in Winchester, Massachusetts. The existing uses on-site will be demolished as part of the project and consist of a 5,389 sf building located at 278-292 Washington Street that contains retail uses and services, a 4,000± sf building (with a ±4,000 sf basement) located at 16-20 Swanton Street that contains the Rodeo Restaurant and Fashion Cleaners, and a 1,800 sf automotive repair garage located at 12 Swanton Street that contains Bossi's Automotive. The project site is situated on the southwest corner of the intersection of Washington Street and Swanton Street and is bounded by Swanton Street to the north, Washington Street to the east, residential properties to the south, and a commercial parking lot and residential home to the west. Access to the existing site is provided via one full-access driveway located off of Washington Street and three full-access driveways located off of Swanton Street. Access to the proposed project will be provided via one full-access driveway located off of Washington Street and one full-access driveway located off of Swanton Street, eliminating two driveways on Swanton Street. Parking will be provided on-site for 63 vehicles. Figure 1 depicts the project location in relation to the existing roadway network.

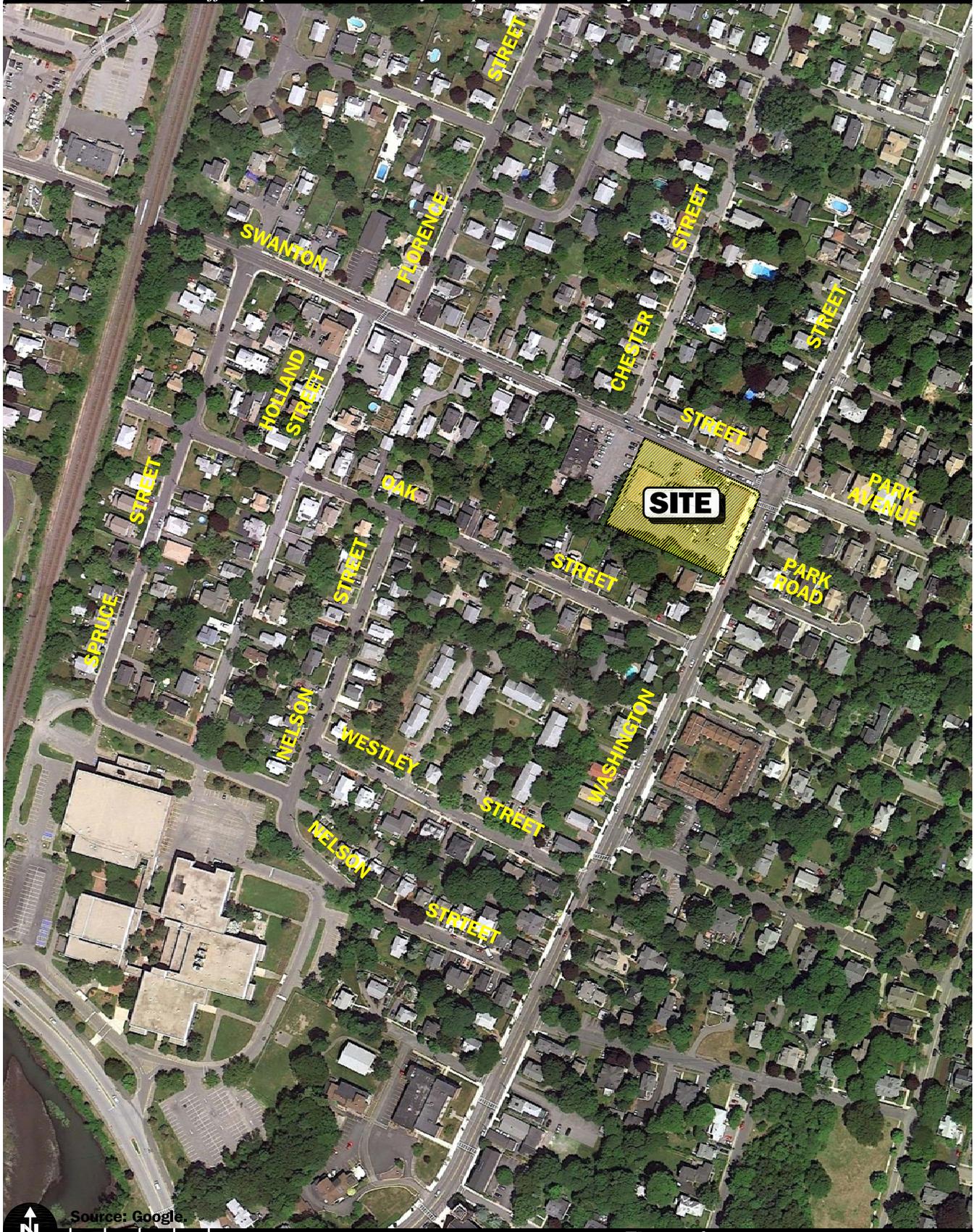


Figure 1

Site Location Map



## **STUDY METHODOLOGY**

This study was prepared in consultation with the Town of Winchester; was performed in general accordance with the state guidelines for Traffic Impact Assessments (TIAs); and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian and bicycle facilities; observations of traffic flow; and collection of peak period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the project were assessed along with future traffic demands due to expected traffic growth independent of the project. A five-year time horizon was selected for analyses consistent with state guidelines for the preparation of TIAs. The traffic analysis conducted in stage two identifies existing or projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any, identified in stage two of the study.

## **EXISTING CONDITIONS**

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A comprehensive field inventory of existing conditions within the study area was conducted in July 2012 and updated in November and December 2012. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; traffic volumes; and operating characteristics; as well as posted speed limits and land use information within the study area. The study area for the project was selected to contain the major roadways providing access to the project, Washington Street and Swanton Street, as well as the intersections of Washington Street at Swanton Street and Park Avenue, Washington Street at the site driveway and Park Road, Swanton Street at the retail service driveway, Swanton Street at Bossi's Automotive driveway, and Swanton Street at Rodeo Grill/Fashion Cleaners driveway.

The following describes the study area roadways and intersections.

### **Roadways**

#### **Washington Street**

Washington Street is a two-lane roadway under local jurisdiction that traverses the study area in a general north-south direction. Within the study area, Washington Street provides one 12-foot wide travel lane per direction separated by a double-yellow centerline with 1 to 2-foot wide shoulders provided along the east side of the roadway and on-street parking permitted along the west side of the roadway. The posted speed limit on Washington Street is 30 miles per hour (mph). A sidewalk exists along both sides of Washington Street. Land use along Washington Street, within the study area, consists of the project site and residential uses.

#### **Swanton Street**

Swanton Street is a two-lane roadway under local jurisdiction that traverses the study area in a general east-west direction. Within the study area, Swanton Street provides one 12 to 13-foot wide travel lane per direction separated by a double-yellow centerline with 2 to 3-foot wide shoulders. A sidewalk exists along both sides of Swanton Street. Land use along Swanton Street, within the study area, consists of the project site and both commercial and residential uses.

## **Intersections**

### **Washington Street at Swanton Street and Park Avenue**

Park Avenue and Swanton Street intersects Washington Street from the east and west, respectively, to form this four-legged intersection under traffic signal control. The Washington Street northbound approach consists of a 12-foot wide left-turn lane and an 11-foot wide through/right-turn lane with a 1-foot wide marked shoulder. The Washington Street southbound approach consists of a 12-foot wide general-purpose travel lane with a 6-foot wide marked shoulder. The directions of travel along Washington Street are separated by a double-yellow centerline. The Swanton Street eastbound approach consists of a 13-foot wide general-purpose travel lane with a 2-foot wide marked shoulder. The directions of travel along Swanton Street are separated by a double-yellow centerline. The Park Avenue westbound approach consists of an 11-foot wide general-purpose travel lane with a 2-foot wide marked shoulder. The directions of travel along Park Avenue are separated by a double-yellow centerline. Sidewalks exist along all sides of the intersection, with crosswalks provided across all legs of the intersection. Illumination is provided by way of street lights mounted on wood poles. Land use in the vicinity of the intersection consists of the project site and residential homes. The traffic signal operates in a three-phase, fully-actuated mode, providing a protected northbound left-turn phase, with an exclusive pedestrian phase provided when activated.

## **EXISTING TRAFFIC VOLUMES**

In order to determine existing traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) and vehicle classification counts were completed in November and December 2012. The manual TMCs were conducted during the weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM) and Saturday midday (11:00 AM to 2:00 PM) peak-periods at the study intersections.

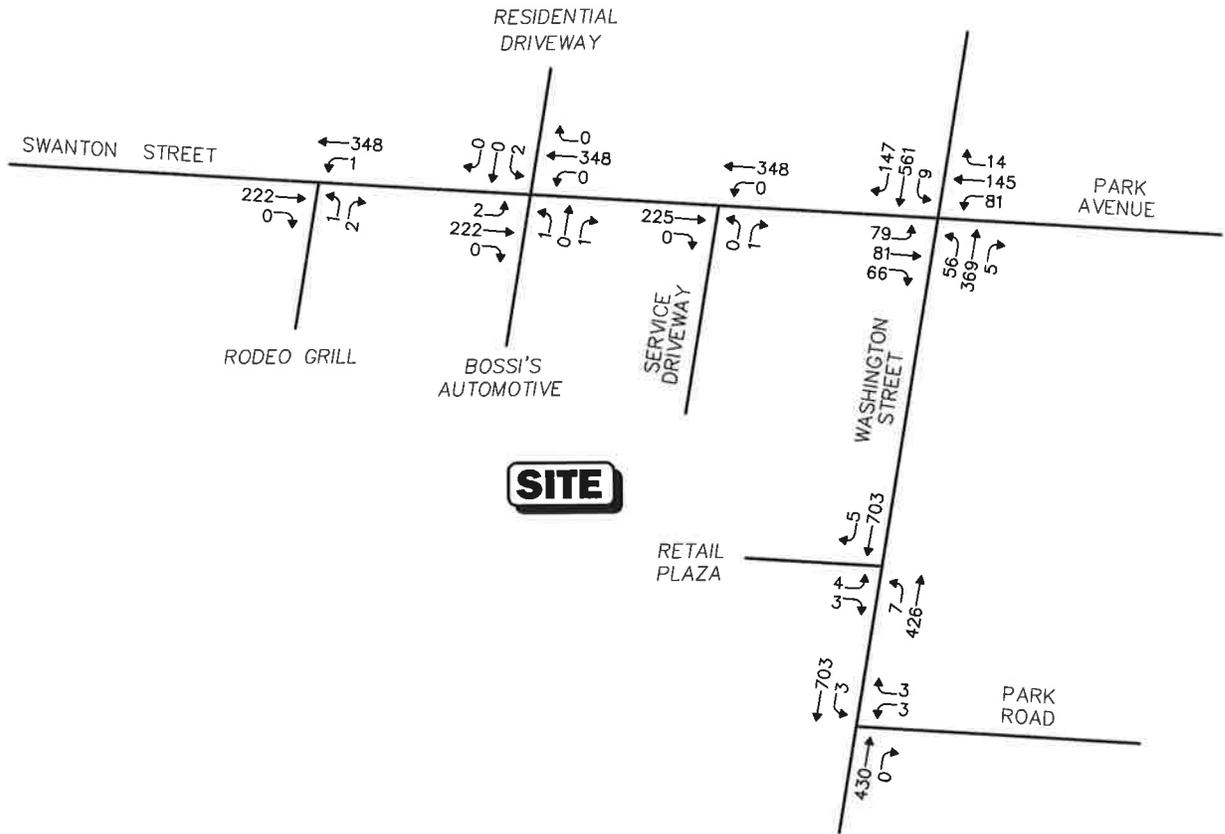
### **Traffic Volume Adjustments**

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, the MassDOT 2010 Weekday Seasonal Factors for Group 6 Roadways (urban arterials, collectors and rural arterials) were reviewed. Based on a review of this data, it was determined that traffic volumes for the month of November and December are representative of average-month conditions; therefore, no adjustments were necessary. The 2012 existing weekday morning peak hour traffic volumes are graphically depicted on Figure 2, with the 2012 existing weekday evening and Saturday midday peak hour traffic volumes graphically depicted on Figure 3.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 7:45 and 8:45 AM, with the weekday evening peak hour generally occurring between 5:00 and 6:00 PM and the Saturday midday peak hour generally occurring between 12:00 and 1:00 PM.

## **PEDESTRIAN AND BICYCLE FACILITIES**

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in July and November 2012. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of existing and planned future bicycle facilities. In general,



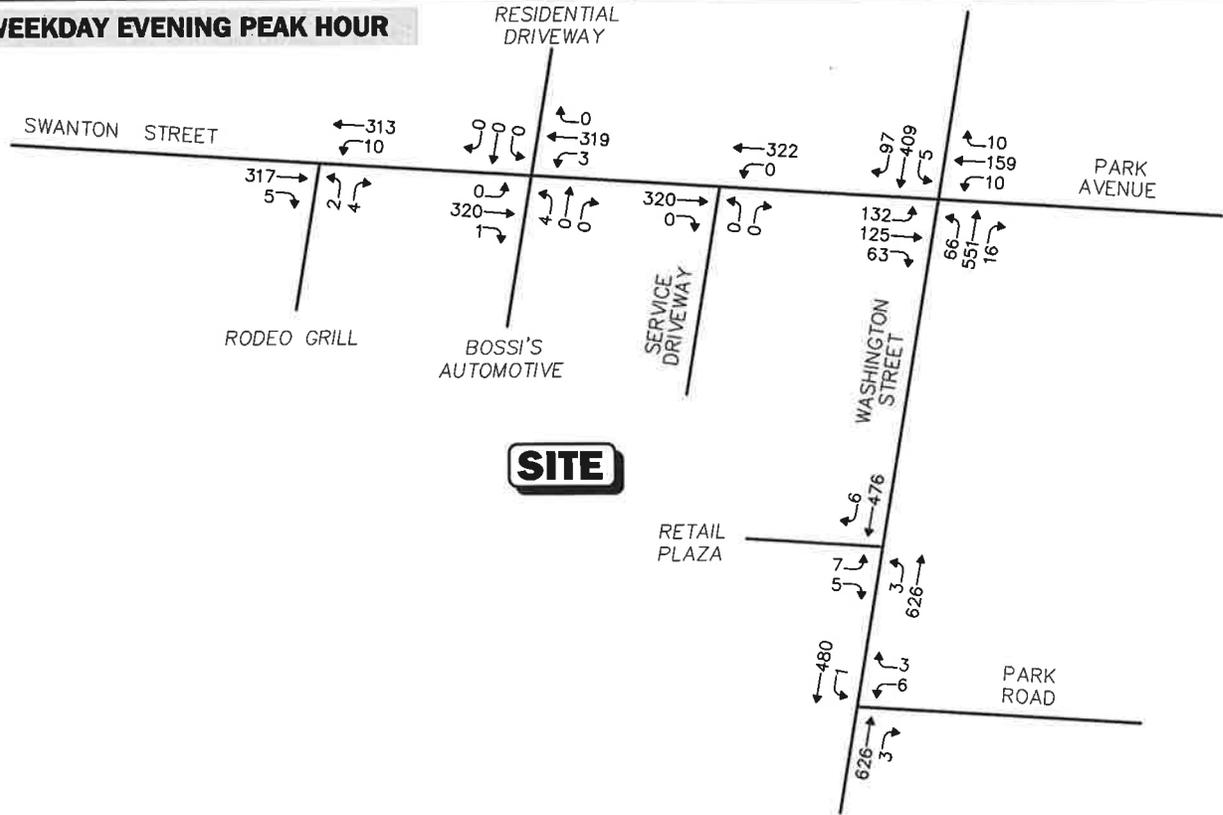
Not To Scale

Figure 2

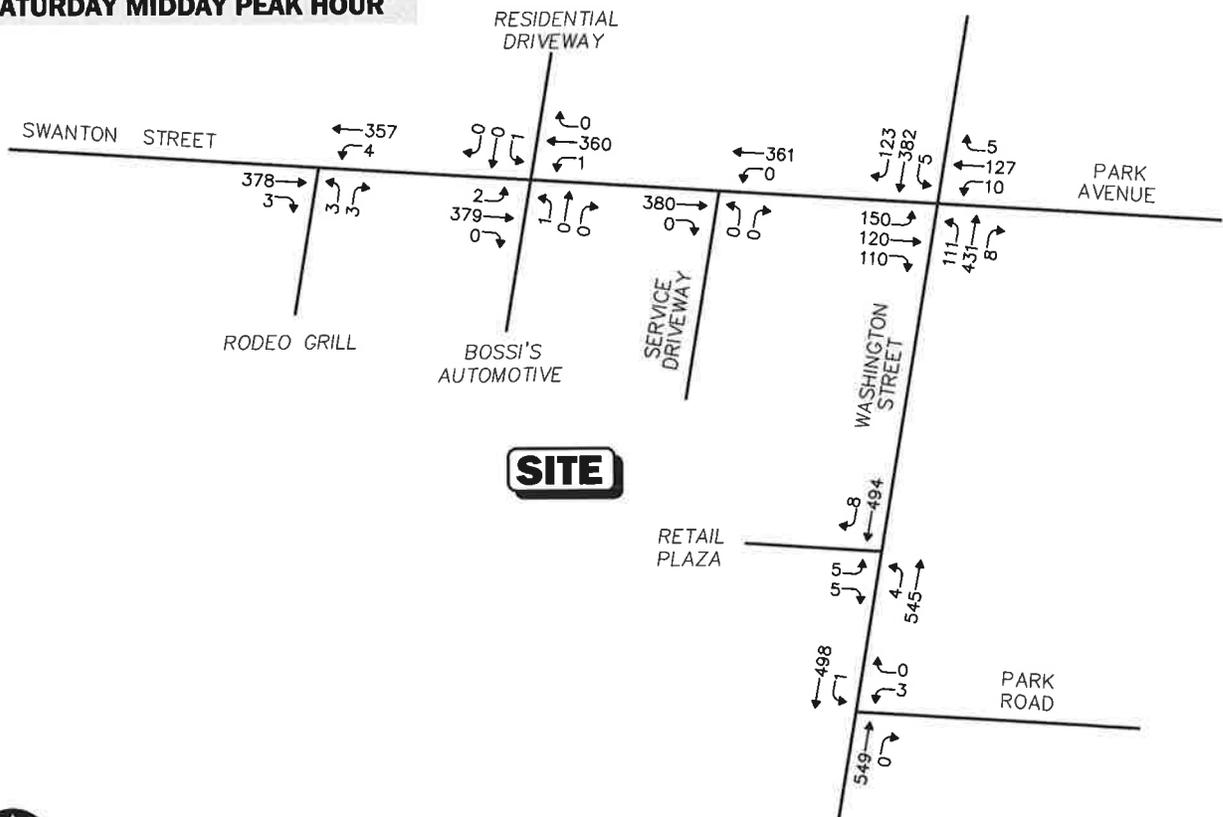


2012 Existing  
Weekday Morning  
Peak Hour Traffic Volumes  
Non-Summer Conditions

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



Not To Scale



**Figure 3**

**2012 Existing  
Weekday Evening and  
Saturday Midday  
Peak Hour Traffic Volumes  
Non-Summer Conditions**

sidewalks are provided along the study area roadways with crosswalk and pedestrian traffic signal equipment and phasing provided at the signalized intersections.

There are no formal existing bicycle facilities that were identified within the immediate study area; however, bicycle detection and associated pavement markings are provided at the intersection of Washington Street at Swanton Street and Park Avenue.

### **MOTOR VEHICLE CRASH DATA**

Motor vehicle crash information for the study area intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent three-year period available (2008 through 2010) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, severity, and day of occurrence, and presented in Table 1.

As can be seen in Table 1, two (2) motor vehicle crashes were reported to have occurred at the study area intersections over the three-year review period. Both crashes involved property damage only and were classified as angle-type collisions. The study area intersections were found to have a motor vehicle crash rate below the MassDOT average for a signalized or unsignalized intersection, as appropriate, for the MassDOT Highway Division District in which the project is located (District 4). No fatal motor vehicle crashes were reported at the study area intersections over the three-year review period.

It should be noted that VAI contacted the Town's Safety Officer, Sergeant Tom Groux, to discuss safety conditions in the area. Based upon our discussion, there are no safety deficiencies in the area. It is important to note that sidewalks exist along both sides of Washington Street and Swanton Street and crosswalks exist on all four legs of the intersection. When the pedestrian signal phase is actuated by the pushbutton, traffic is stopped on all approaches providing the safest pedestrian condition.

**Table 1**  
**MOTOR VEHICLE CRASH DATA SUMMARY<sup>a</sup>**

	Washington Street/ Swanton Street/ Park Avenue	Washington Street/ Site Driveway	Swanton Street/ Site Driveways
<i>Year:</i>			
2008	0	1	0
2009	1	0	0
<u>2010</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	1	1	0
Average	0.33	0.33	0.00
Rate <sup>b</sup>	0.05	0.07	0.00
Significant? <sup>c</sup>	No	No	No
<i>Type:</i>			
Angle	1	1	0
Rear-End	0	0	0
Head-On	0	0	0
Sideswipe	0	0	0
Fixed Object	0	0	0
Pedestrian	0	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	1	1	0
<i>Day of Week:</i>			
Monday through Friday	0	1	0
Saturday	1	0	0
<u>Sunday</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	1	1	0
<i>Severity:</i>			
Property Damage Only	1	1	0
Personal Injury	0	0	0
<u>Fatality</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	1	1	0

<sup>a</sup>Source: MassDOT Safety Management/Traffic Operations Unit records, 2008 through 2010.

<sup>b</sup>Crash rate per million vehicles entering the intersection.

<sup>c</sup>The intersection crash rate is significant if it is found to exceed 0.59 crashes per million vehicles entering an intersection for an unsignalized intersection and 0.78 crashes per million vehicles entering an intersection for a signalized intersection as defined by MassDOT for District 4.

## **FUTURE CONDITIONS**

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Traffic volumes in the study area were projected to the year 2017, which reflects a five-year planning horizon consistent with State traffic study guidelines. Independent of the project, traffic volumes on the roadway network in the year 2017 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated project-generated traffic volumes superimposed upon this 2017 No-Build traffic network reflect the 2017 Build conditions with the project.

### **FUTURE TRAFFIC GROWTH**

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

### **Specific Development by Others**

The Planning Department of the Town of Winchester was contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. One project was identified:

- **Winchester Community Park** - This proposed project consists of the construction of a community park facility containing four multi-purpose turf fields, including three outdoor fields and one indoor full-size field to be located at 120-134 Cross Street in Winchester. Traffic volumes expected to be generated by this project were obtained from the traffic study<sup>4</sup> prepared for the project and were assigned onto the study area roadway network based on the distribution pattern presented therein.

In addition to the community park, at the time the traffic counts were conducted in November and December 2012, approximately 2,289 sf of space was vacant (of which 1,689 sf was previously occupied by a bank and 600 sf was occupied by a beauty salon) in the 5,389 sf retail building located on the project site. The 2,000± sf Rodeo Restaurant (with a 2,000± sf basement) closed in September 2012; however, the traffic associated with the restaurant is included in the weekday evening and Saturday midday peak hour driveway counts (conducted in July 2012). The restaurant was not open during the weekday morning peak hour. By the end of April 2013, all uses on-site are closed with the exception of the laundromat. In order to account for the occupancy of the 2,289 sf of space that was vacant at the time the traffic counts were completed, traffic volumes expected to be generated by the 2,289 sf of vacant space were included in the future traffic-volume projections.

It should also be noted that the Winchester Hospital has plans to expand. A traffic study was conducted in February 2007 for an outpatient care facility at 620 Washington Street that would include a radiation oncology facility, an ambulatory-care center, medical office space, a health/wellness center and ancillary retail space.<sup>5</sup> A portion of this facility was opened in 2011. Traffic associated with this space is included in the existing traffic volumes. There are no definitive plans to permit the remaining space at this time; therefore, traffic volumes expected to be generated by the remaining space are not included in the future traffic volume projections. However, a review of the traffic study prepared for the hospital expansion indicates approximately 23 to 34 peak hour trips will travel on Washington Street through the study area. These additional trips do not change overall operations, levels-of-service, or the recommendations outlined in this report.

No other developments were identified that are expected to result in an increase in traffic within the study area beyond the background traffic growth rate.

### **General Background Traffic Growth**

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on a review of this data, a 1.0 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and presently unforeseen development within the study area.

### **Roadway Improvement Projects**

The Town of Winchester was contacted in order to determine if there were any planned roadway improvement projects expected to be completed within the study area. At this time, there are no roadway improvement projects planned for the study area.

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<sup>4</sup>*Traffic Impact Assessment – Winchester Community Park, 120-134 Cross Street, Winchester, MA; MDM Transportation Consultants, Inc.; June 22, 2012.*

<sup>5</sup>*Traffic Impact and Access Study, Proposed Outpatient Care Facility at 620 Washington Street, Winchester, MA; VHB; February 2007.*

### **No-Build Traffic Volumes**

The 2017 No-Build peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2012 existing peak-hour traffic volumes and then superimposing the peak-hour traffic volumes expected to be generated by the identified specific development project by others and the full-occupancy of the project site. The resulting 2017 No-Build weekday morning peak hour traffic volumes are graphically depicted on Figure 4, with the 2017 No-Build weekday evening and Saturday midday peak hour traffic volumes graphically depicted on Figure 5.

### **PROJECT-GENERATED TRAFFIC**

Design year (2017 Build) traffic volumes for the study area roadways were determined by estimating project-generated traffic volumes and assigning those volumes on the study roadways.

The project consists of the construction of an 11,955 sf CVS Pharmacy with a 2,405 sf mezzanine. Trip-generation statistics published by the ITE<sup>6</sup> for LUC 880, Pharmacy/Drugstore without Drive-Through Window, were used to develop the traffic characteristics of the project.

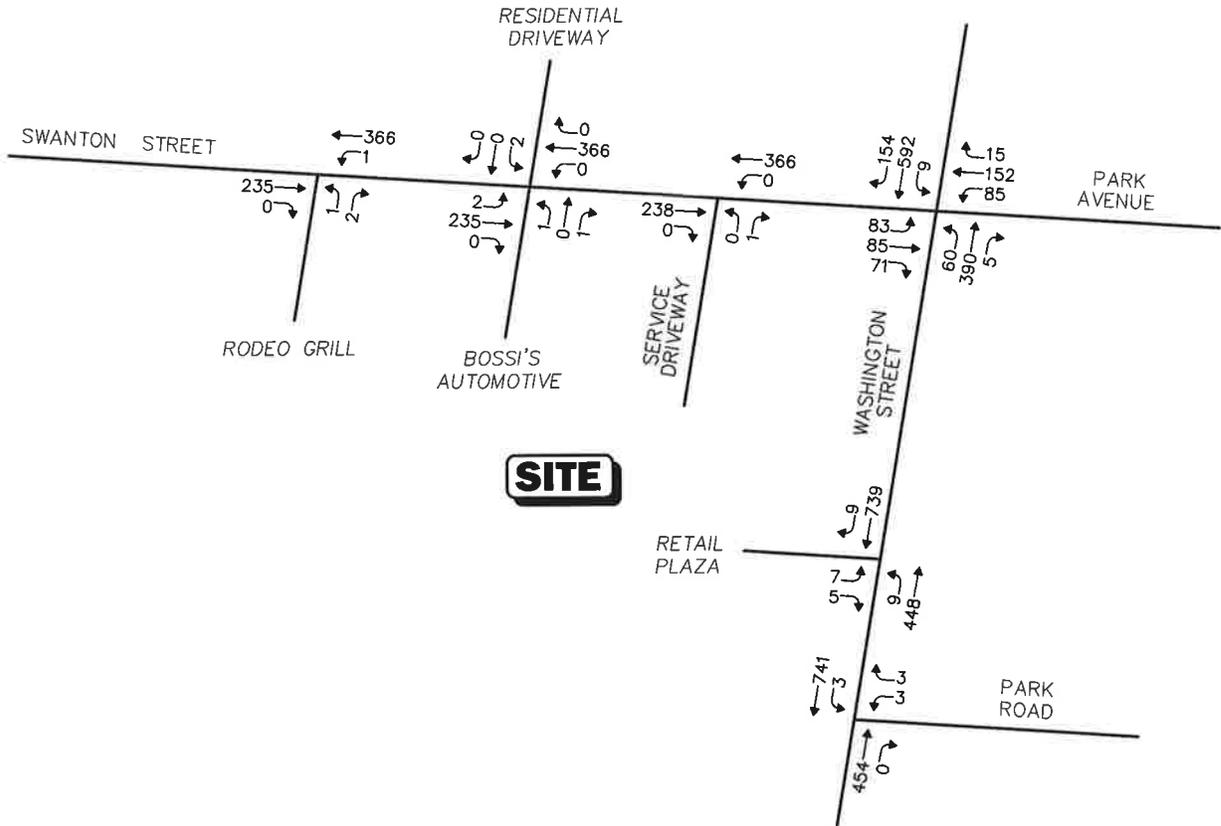
### **Pass-By Trips**

Not all the trips expected to be generated by the project will consist of new trips on the roadway network. A portion of the trips will consist of pass-by trips, or vehicles already traveling along Washington Street and Swanton Street for other purposes that will patronize the project in conjunction with their trip and then continue on to their original destination. Statistics published by the ITE<sup>7</sup> indicate that, on average, 53 percent of the trips generated by a pharmacy/drugstore without a drive-through window consist of pass-by trips. In accordance with state standards for the preparation of TIAs, a 25 percent pass-by trip rate was applied to the trip-generation calculations for the project. Table 2 summarizes the anticipated traffic characteristics of the project.

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<sup>6</sup>Ibid 2.

<sup>7</sup>Ibid 3.



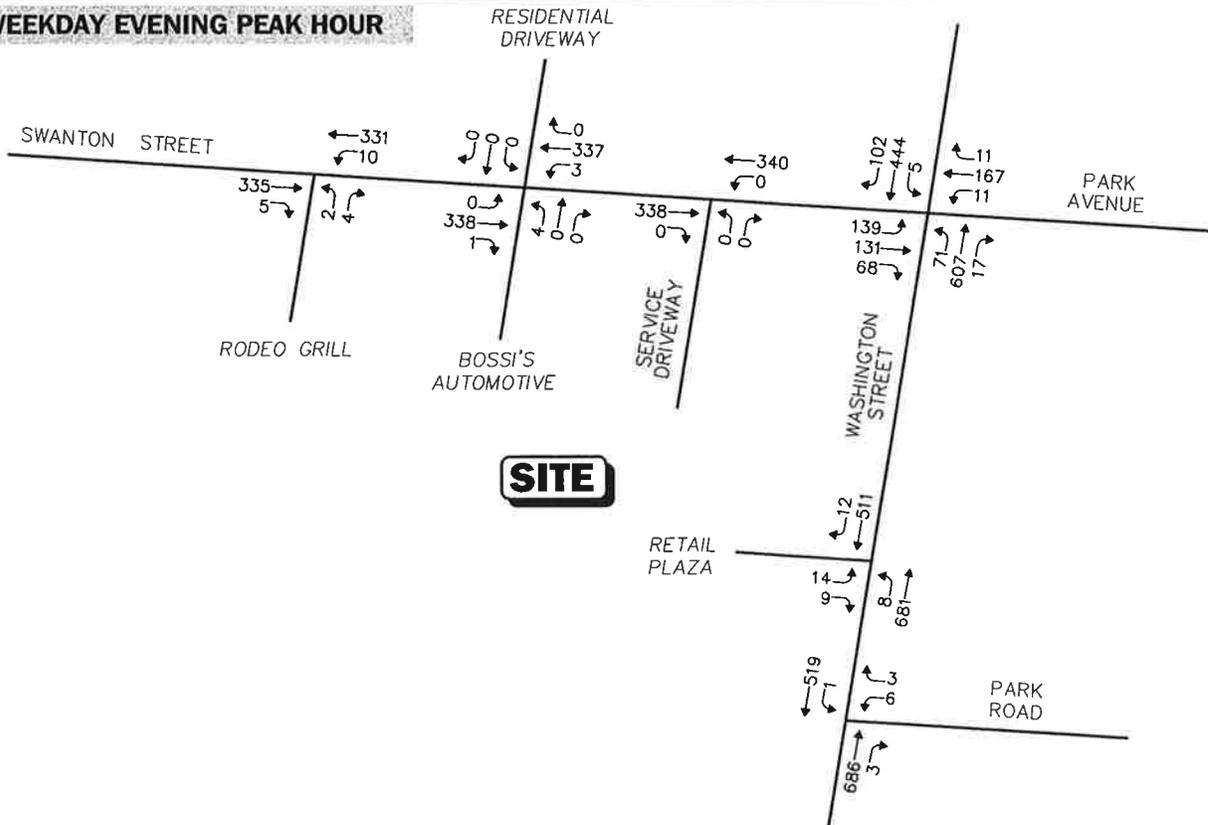
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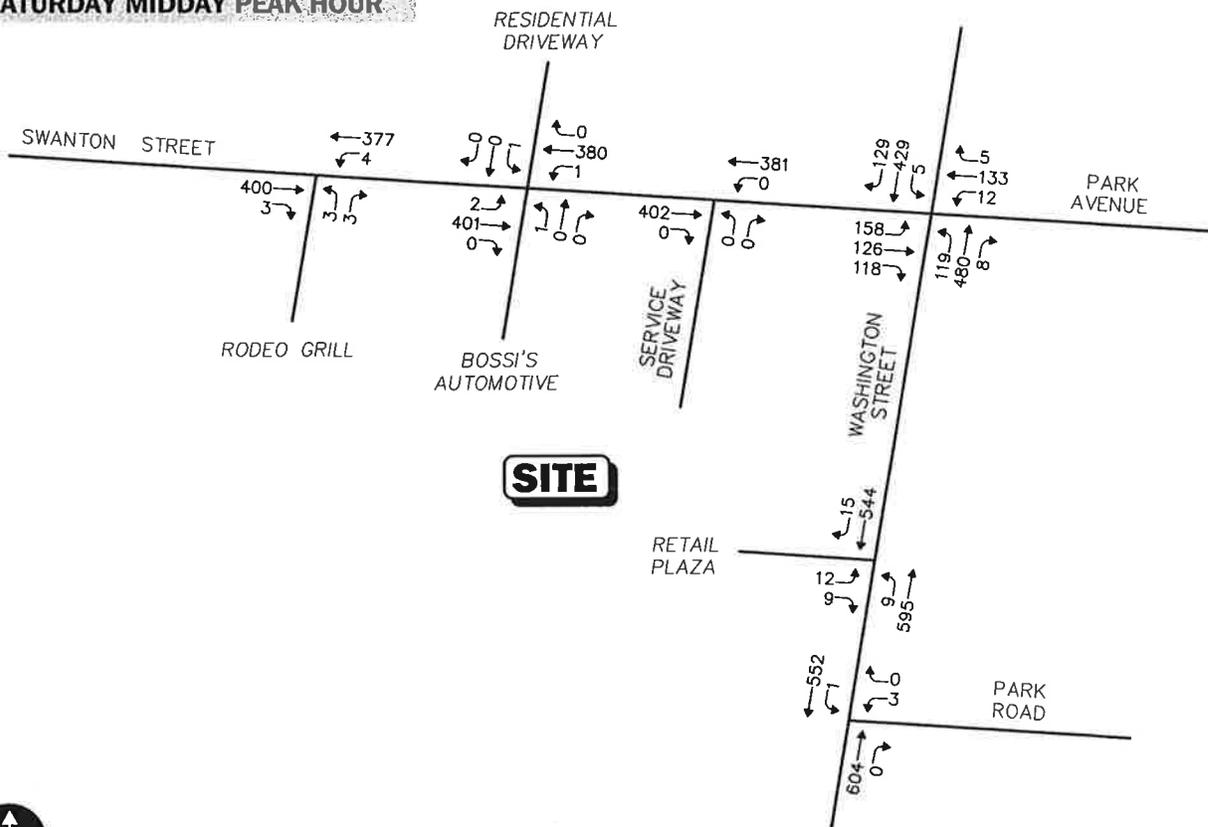
Figure 4

**2017 No-Build  
Weekday Morning  
Peak Hour Traffic Volumes  
Non-Summer Conditions**

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



Not To Scale



**Figure 5**

**2017 No-Build  
Weekday Evening and  
Saturday Midday  
Peak Hour Traffic Volumes  
Non-Summer Conditions**

**Table 2**  
**TRIP-GENERATION SUMMARY**

Time Period/Direction	(A) Pharmacy Trips	(B = 0.25 x A) Pass-By Trips	(A - B) Total New Trips
Average Weekday Daily	1,294	324	970
<i>Weekday Morning Peak Hour:</i>			
Entering	41	9	32
Exiting	29	9	20
Total	70	18	52
<i>Weekday Evening Peak Hour:</i>			
Entering	61	15	46
Exiting	60	15	45
Total	121	30	91
<i>Saturday Midday Peak Hour:</i>			
Entering	75	19	56
Exiting	78	19	59
Total	153	38	115

<sup>a</sup>Based on ITE LUC 880, Pharmacy/Drugstore without Drive-Through Window; 11,955 sf Pharmacy plus 2,405 sf mezzanine.

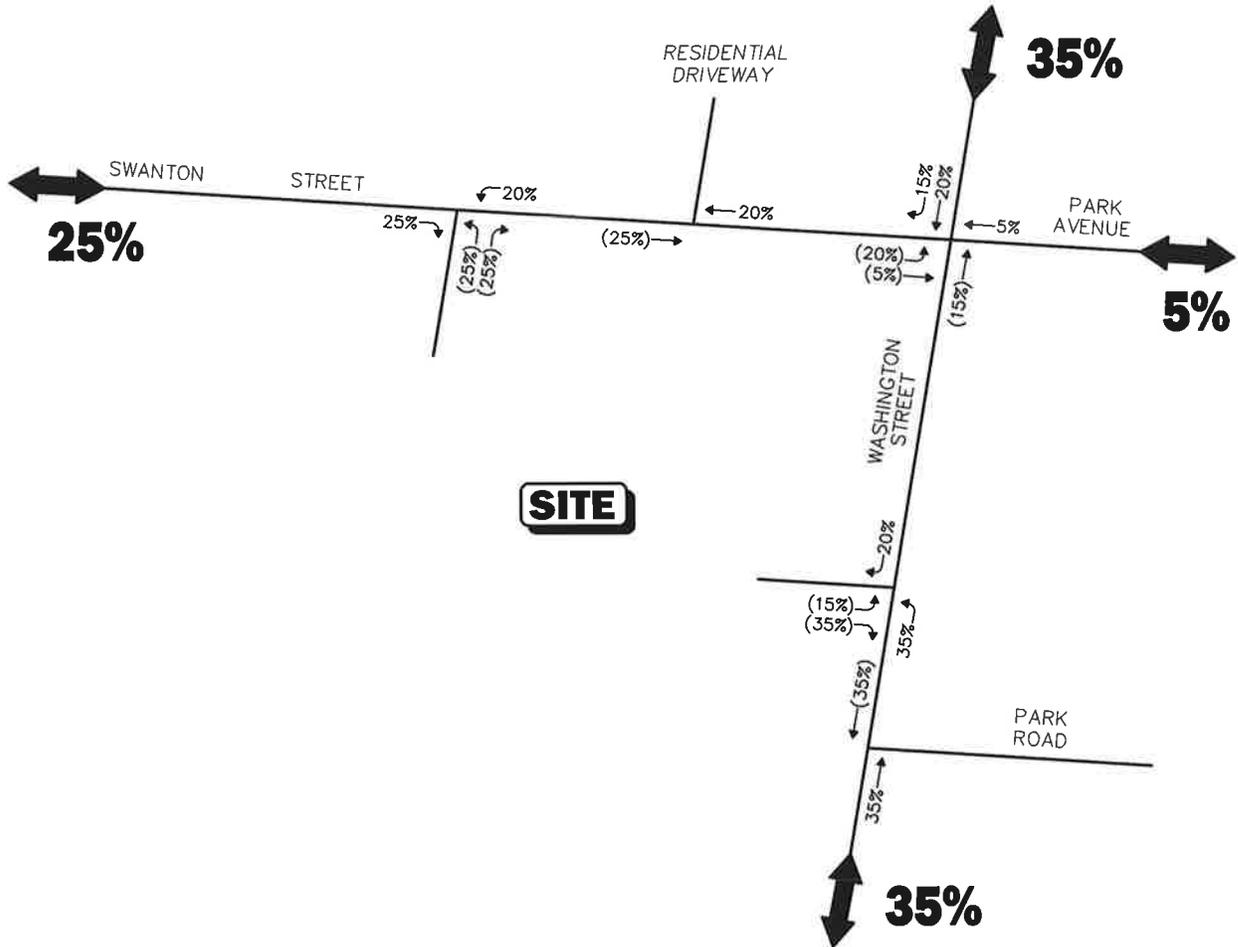
As can be seen in Table 2, the project is expected to generate approximately 970 new vehicle trips on an average weekday (485 entering and 485 exiting), with approximately 52 new vehicle trips (32 entering and 20 exiting) during the weekday morning peak hour, approximately 91 new vehicle trips (46 entering and 45 exiting) during the weekday evening peak hour and 115 new vehicle trips (56 entering and 59 exiting) during the Saturday midday peak hour.

### **Trip Distribution and Assignment**

The directional distribution of generated trips to and from the project was determined based on a review of existing travel patterns at the study intersections. The general trip distribution for the project is summarized in Table 3 and graphically depicted on Figure 6. The weekday morning peak-hour traffic volumes expected to be generated by the project were assigned on the study area roadway network as shown on Figure 7. The weekday evening and Saturday midday peak-hour traffic volumes expected to be generated by the project were assigned on the study area roadway network as shown on Figure 8.

**Legend:**

**XX** Entering Trips  
**(XX)** Exiting Trips

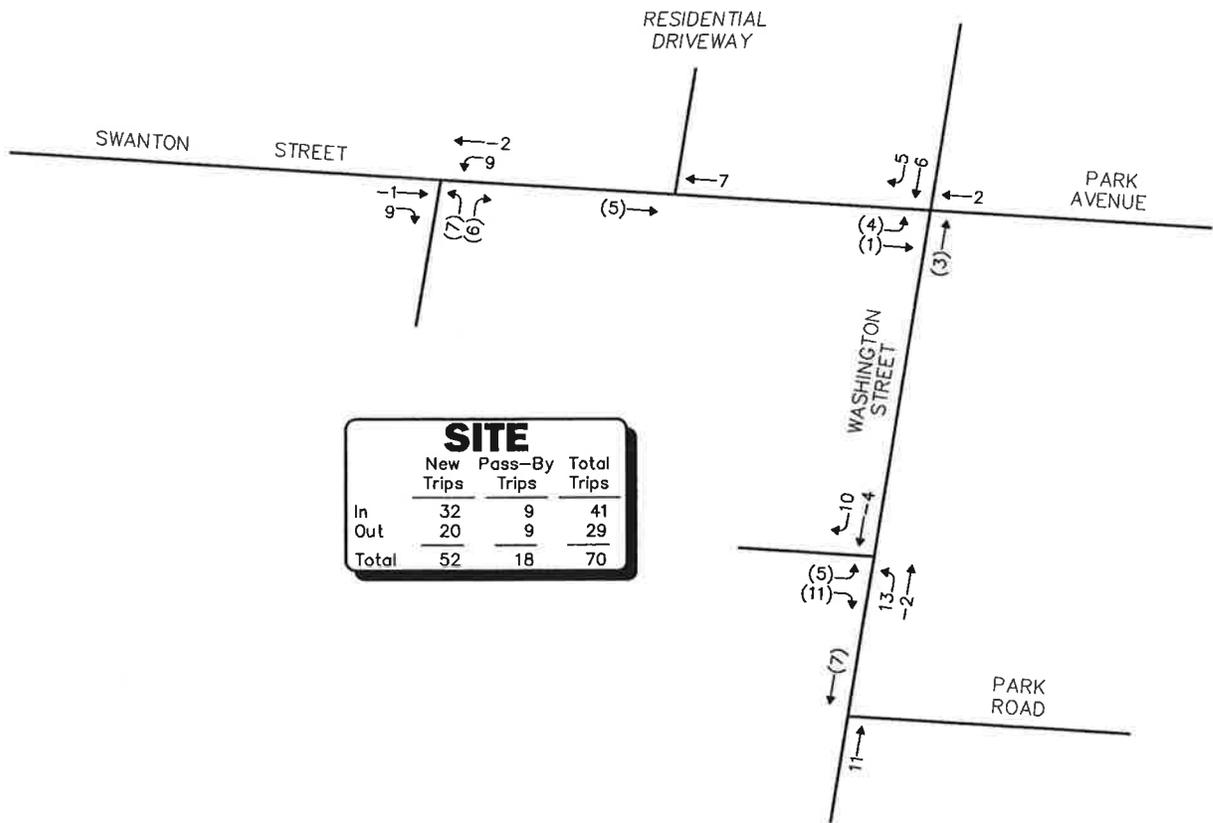


Not To Scale

**Figure 6**



**Trip Distribution Map**



SITE			
	New Trips	Pass-By Trips	Total Trips
In	32	9	41
Out	20	9	29
Total	52	18	70

**Legend:**  
 XX Entering Trips  
 (XX) Exiting Trips

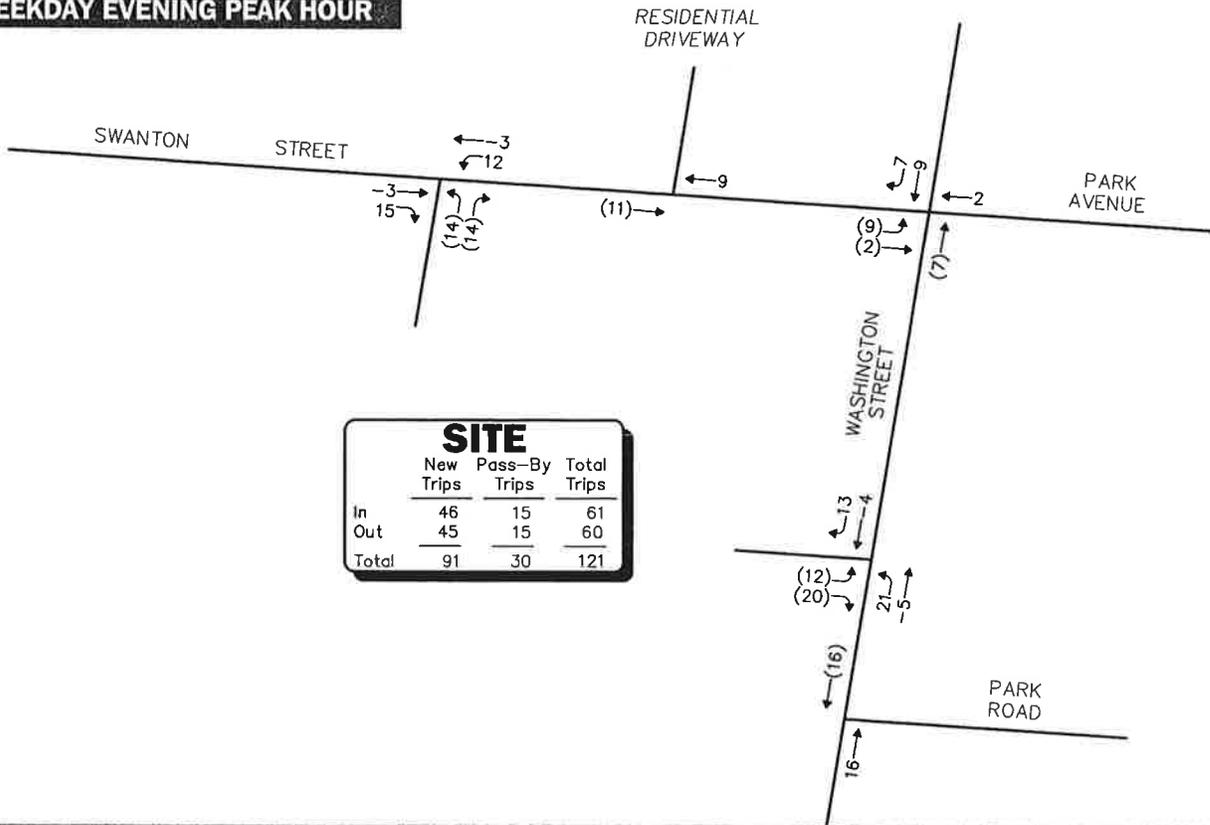
Not To Scale

Figure 7

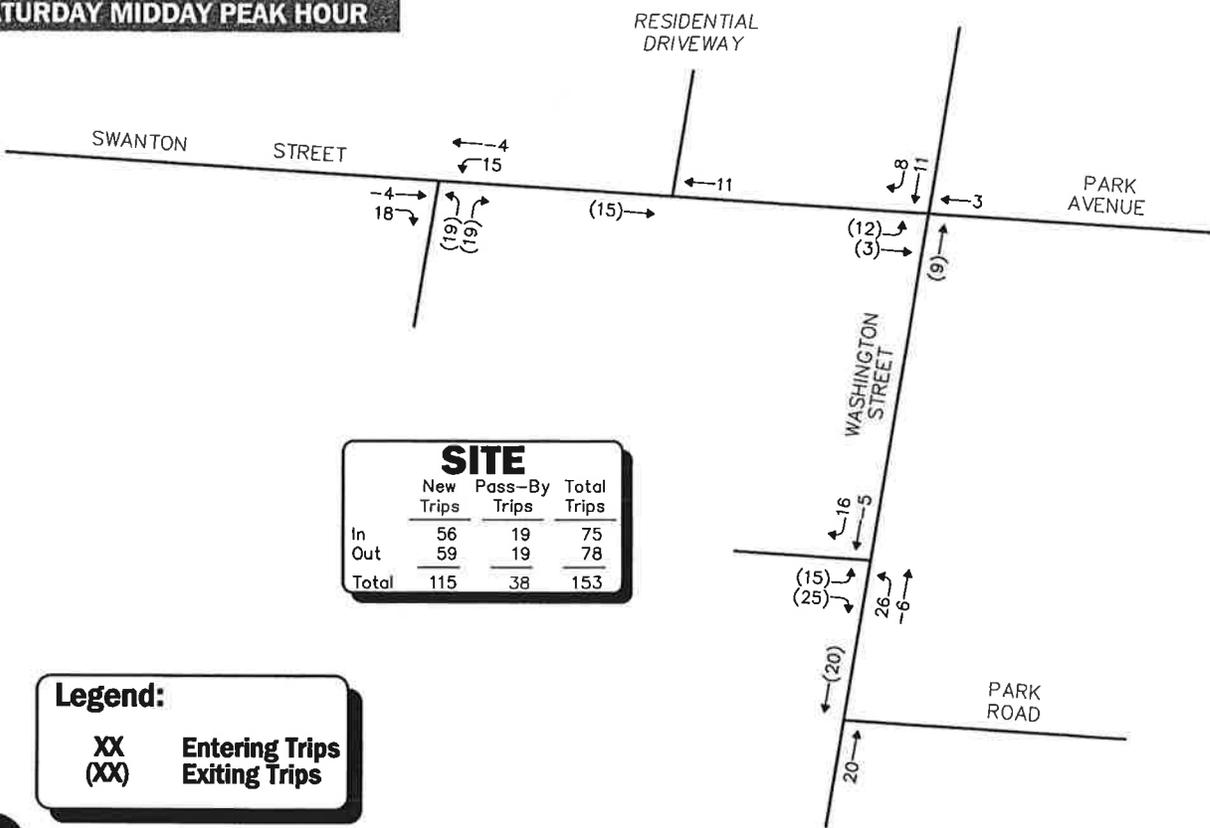


Project-Generated Weekday Morning Peak Hour Traffic Volumes

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



**Legend:**  
**XX** Entering Trips  
**(XX)** Exiting Trips

Not To Scale

**Figure 8**



**Project-Generated  
 Weekday Evening and  
 Saturday Midday  
 Peak Hour Traffic Volumes**

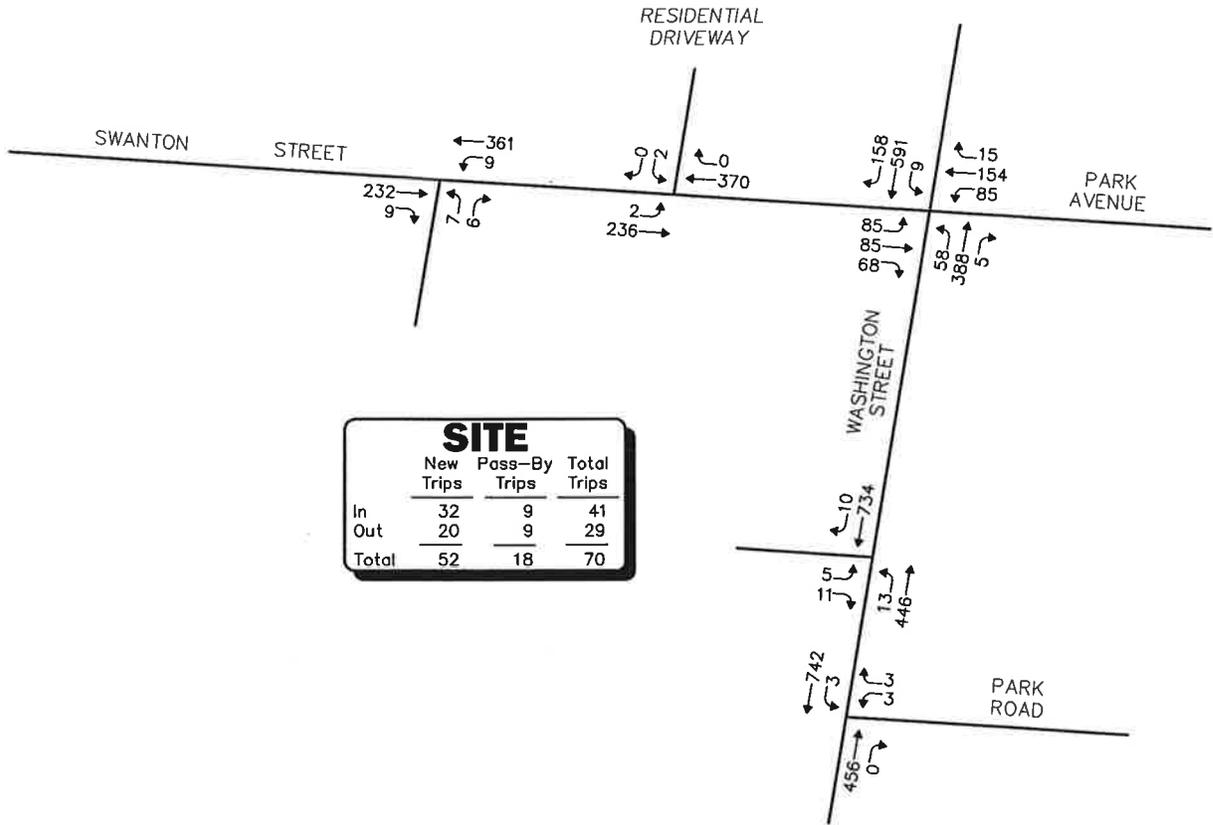
**Table 3**  
**TRIP-DISTRIBUTION SUMMARY**

Roadway	Direction (To/From)	Percent
Washington Street	North	35
Washington Street	South	35
Swanton Street	West	25
Park Avenue	East	<u>5</u>
TOTAL		100

**FUTURE TRAFFIC VOLUMES - BUILD CONDITION**

The 2017 Build condition networks consist of the 2017 No-Build traffic volumes with the existing site traffic removed and the anticipated site-generated traffic added to them. The 2017 Build weekday morning peak hour traffic volumes are graphically depicted on Figure 9, with the 2017 Build weekday evening and Saturday midday peak hour traffic volumes graphically depicted on Figure 10.

A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 4. These volumes are based on the expected increases from the project.



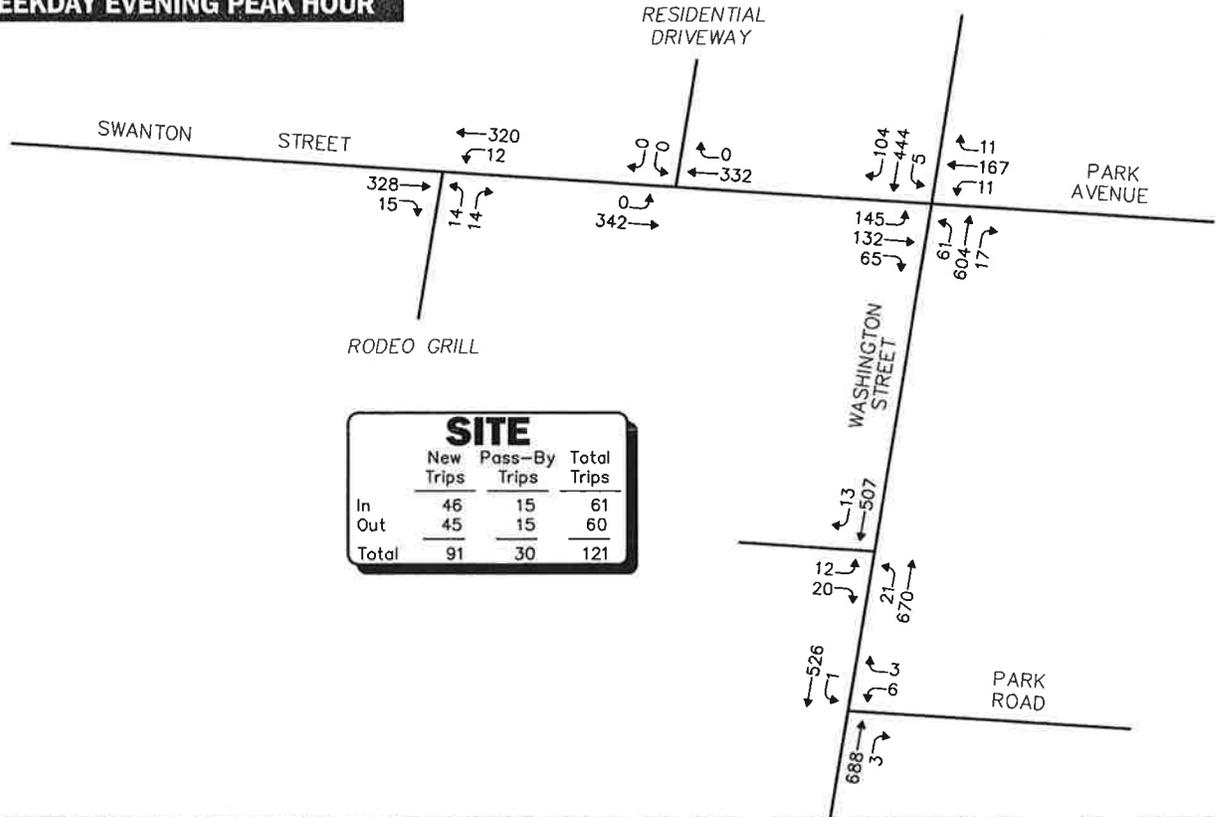
North arrow icon  
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Figure 9

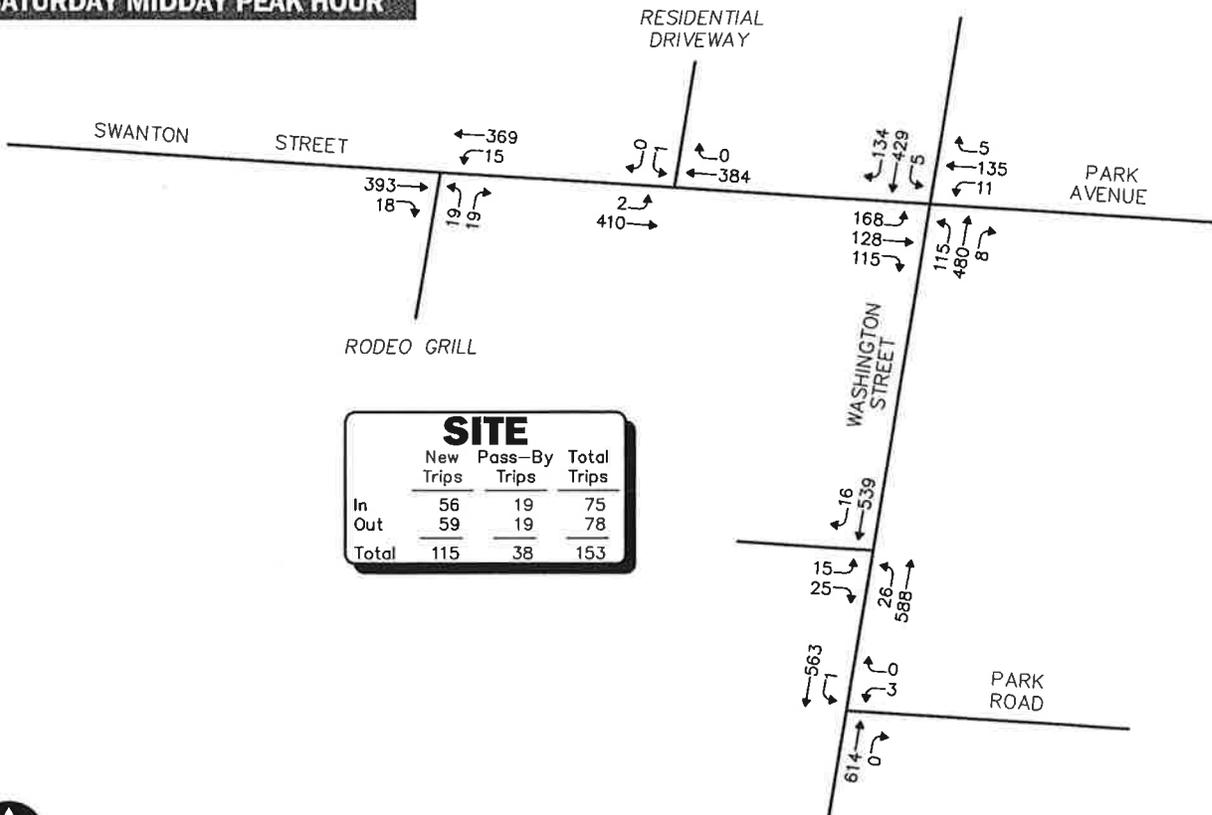


**2017 Build  
Weekday Morning  
Peak Hour Traffic Volumes  
Non-Summer Conditions**

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



Not To Scale

**Figure 10**



**2017 Build  
Weekday Evening and  
Saturday Midday  
Peak Hour Traffic Volumes  
Non-Summer Conditions**

**Table 4**  
**PEAK-HOUR TRAFFIC-VOLUME INCREASES**

Location/Peak Hour	2017 No-Build	2017 Build	Traffic Volume Increase Over No-Build	Percent Increase Over No-Build
<i>Washington Street, north of Swanton Street:</i>				
Weekday Morning	1,243	1,246	3	0.2
Weekday Evening	1,308	1,313	5	0.4
Saturday MIDDAY	1,206	1,221	15	1.2
<i>Washington Street, south of the site:</i>				
Weekday Morning	1,198	1,201	3	0.2
Weekday Evening	1,214	1,223	9	0.7
Saturday MIDDAY	1,159	1,180	21	1.8
<i>Swanton Street, west of the site:</i>				
Weekday Morning	602	609	7	1.2
Weekday Evening	673	677	4	0.6
Saturday MIDDAY	783	799	16	2.0
<i>Park Avenue, east of Washington Street:</i>				
Weekday Morning	351	353	2	0.6
Weekday Evening	342	343	1	0.3
Saturday MIDDAY	289	292	3	1.0

As shown in Table 4, project-related traffic-volume increases external to the study area relative to 2017 No-Build conditions are anticipated to range from 0.2 to 2.0 percent during the peak periods.

# **TRAFFIC OPERATIONS ANALYSIS**

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Measuring existing and future traffic volumes quantifies traffic flow within the study area, to assess quality of flow, roadway capacity analyses were conducted under Existing, No-Build and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them.

## **METHODOLOGY**

### **Levels of Service**

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.<sup>8</sup> The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

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<sup>8</sup>The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual*, Transportation Research Board, Washington, DC; 2000.

## Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the 2000 *Highway Capacity Manual*.<sup>9</sup> Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the affects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the 2000 *Highway Capacity Manual*. Table 5 summarizes the relationship between level of service and average control delay.

**Table 5**  
**LEVEL-OF-SERVICE CRITERIA FOR**  
**UNSIGNALIZED INTERSECTIONS<sup>a</sup>**

Level of Service	Average Control Delay (Seconds Per Vehicle)
A	≤ 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	>50.0

<sup>a</sup>Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000; page 17-2.

<sup>9</sup>*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

## **Signalized Intersections**

The six levels of service for signalized intersections may be described as follows:

- *LOS A* describes operations with very low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than *LOS A*.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the 2000 *Highway Capacity Manual*. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. Level-of-service designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 6 summarizes the relationship between level of service and control delay. The tabulated control delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

**Table 6**  
**LEVEL-OF-SERVICE CRITERIA**  
**FOR SIGNALIZED INTERSECTIONS<sup>a</sup>**

Level of Service	Control (Signal) Delay Per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

<sup>a</sup>Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000; page 16-2.

## **ANALYSIS RESULTS**

Level-of-service analyses were conducted for 2012 Existing, 2017 No-Build and 2017 Build conditions for the intersections within the study area. The results of the intersection capacity analyses are summarized for unsignalized and signalized intersections in Tables 7 and 8, respectively.

The following is a summary of the level-of-service analyses for the intersections within the study area.

### **Unsignalized Intersections**

#### **Washington Street at the Retail/Site Driveway**

Under 2012 Existing conditions, the critical movements at this unsignalized intersection (left and right-turns from the site driveway) were shown to operate at LOS C during the weekday morning, weekday evening and Saturday midday peak hours. Under 2017 No-Build conditions, the critical movements were shown to operate at LOS D during the weekday morning and evening peak hours and at LOS C during the Saturday midday peak hour. Under 2017 Build conditions, the critical movements were shown to operate at LOS C during the weekday morning, weekday evening and Saturday midday peak hours. The delay improves from No-Build to Build conditions due to the increase in proportion of right-turns exiting the site driveway (Synchro averages the delay for left and right-turns in a shared lane). It should be noted that a delay study was conducted during the weekday evening peak hour for left-turns exiting the existing site driveway onto Washington Street. The average delay was found to be approximately 14 seconds. As such, this driveway was found to operate efficiently and will operate safely with the development of the proposed project.

#### **Washington Street at Park Road**

Under 2012 Existing conditions, the critical movements at this unsignalized intersection (left and right-turns from Park Road) were shown to operate at LOS C during the weekday morning, weekday evening and Saturday midday peak hours. Under 2017 No-Build and Build conditions, the critical movements were shown to operate at LOS C during the weekday morning peak hour and at LOS D during the weekday evening and Saturday midday peak hours.

#### **Swanson Street at Bossi's Automotive Driveway**

Under 2012 Existing and 2017 No-Build conditions, the critical movements at this unsignalized intersection (all movements from Bossi's Automotive driveway) were shown to operate at LOS B during the weekday morning and evening peak hours and at LOS C during the Saturday midday peak hour. This driveway will be closed under 2017 Build conditions.

**Table 7**  
**UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY**

Unsignalized Intersection/Critical Movement/ Peak Hour	2012 Existing			2017 No-Build			2017 Build		
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Demand	Delay	LOS	Demand	Delay	LOS
<b>Washington Street at the Site Driveway<sup>d</sup></b>									
Left and right-turns from the site driveway									
Weekday Morning	7	21.7	C	12	25.4	D	16	20.0	C
Weekday Evening	12	21.4	C	23	29.8	D	32	24.3	C
Saturday MIDDAY	10	17.3	C	21	23.8	C	40	22.0	C
<b>Washington Street at Park Road</b>									
Left and right-turns from Park Road									
Weekday Morning	6	19.1	C	6	21.1	C	6	21.2	C
Weekday Evening	9	22.6	C	9	26.9	D	9	27.5	D
Saturday MIDDAY	3	23.4	C	3	29.0	D	3	30.0	D
<b>Swanton Street at Bossi's Automotive</b>									
All movements from Bossi's Automotive									
Weekday Morning	2	11.1	B	2	11.4	B	--	--	--
Weekday Evening	4	13.7	B	4	14.1	B	--	--	--
Saturday MIDDAY	1	15.5	C	1	16.3	C			
<b>Swanton Street at the Site Driveway</b>									
Left and right-turns from the site driveway									
Weekday Morning	3	10.4	B	3	10.7	B	13	11.8	B
Weekday Evening	6	11.0	B	6	11.2	B	28	12.1	B
Saturday MIDDAY	6	13.0	B	6	13.4	B	38	14.6	B

<sup>a</sup>Demand in vehicles per hour.

<sup>b</sup>Average control delay per vehicle (in seconds).

<sup>c</sup>Level-of-Service.

<sup>d</sup>The delay improves from No-Build to Build conditions due to increase in proportion of right-turns under the Build condition. (Synchro averages the delay for left and right-turns in a shared lane).

**Table 8**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY**

Signalized Intersection/Peak Hour	2012 Existing			2017 No-Build			2017 Build		
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	V/C	Delay	LOS	V/C	Delay	LOS
<b>Washington Street at Swanton Street and Park Avenue</b>									
Weekday Morning	0.89	36.9	D	0.94	45.1	D	0.95	46.3	D
Weekday Evening	0.89	32.6	C	0.96	42.5	D	0.94	42.5	D
Saturday MIDDAY	0.88	31.6	C	0.96	42.1	D	0.99	46.2	D

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level-of-Service.

### **Swanson Street at the Rodeo Restaurant/Site Driveway**

Under 2012 Existing, 2017 No-Build and 2017 Build conditions, the critical movements at this unsignalized intersection (left and right-turns from the site driveway) were shown to operate at LOS B during the weekday morning, weekday evening and Saturday midday peak hours.

### **Signalized Intersection**

#### **Washington Street at Swanton Street and Park Avenue**

Under 2012 Existing conditions, this signalized intersection was shown to operate at an overall LOS D during the weekday morning peak hour and at LOS C during the weekday evening and Saturday midday peak hours. Under 2017 No-Build and Build conditions, this signalized intersection was shown to operate at an overall LOS D during the weekday morning, weekday evening and Saturday midday peak hours.

## **RECOMMENDATIONS AND CONCLUSIONS**

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### **RECOMMENDATIONS**

A transportation improvement program has been developed that is designed to provide safe and efficient access to the project and address any deficiencies identified at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and have been incorporated into the revised site plans.

#### **Site Access**

Access to the project will be provided by way of two driveways: one that will intersect the west side of Washington Street, approximately 150 feet south of Swanton Street and one that will intersect the south side of Swanton Street, approximately 200 feet west of Washington Street. It is recommended that the driveways be designed to provide one 12-foot wide (minimum) exiting travel lane and a single 12-foot wide (minimum) entering lane. Vehicles exiting the driveways should be placed under STOP-sign control. Street illumination should be provided at the driveway intersections with Washington Street and Swanton Street. Signs and landscaping adjacent to the site driveway intersections with Washington Street and Swanton Street, and within the project site, should be designed and maintained so as not to restrict lines of sight. As proposed, the building location is set back and will not restrict lines of sight for vehicles exiting the site driveways. It is recommended that both driveways provide full-access to and from the site to distribute site traffic on both Washington Street and Swanton Street. A "Do Not Block Driveway" sign and associated striping will be provided at the Swanton Street driveway to restrict eastbound traffic from blocking the driveway and to allow for left-turning traffic to enter and exit the site.

It should be noted that a delay study was conducted during the weekday evening peak hour for left-turns exiting the existing site driveway onto Washington Street. The average delay was found to be approximately 14 seconds. As such, this driveway was found to operate efficiently and will operate safely with the development of the proposed project.

## **CONCLUSIONS**

Based on this assessment, the project will not have a significant impact on motorist delays over No-Build conditions. The study area intersections were shown to continue to operate at LOS "D" or better with the redevelopment of the project site. With the implementation of the above recommendations, safe and efficient access will be provided to the planned development and the proposed project can be constructed with minimal impact to the area as designed.

## APPENDIX

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MANUAL TURNING MOVEMENT COUNT DATA  
PEDESTRIAN COUNT DATA  
SEASONAL ADJUSTMENT DATA  
MASSDOT CRASH RATE WORKSHEETS  
BACKGROUND DEVELOPMENT NETWORKS  
TRIP-GENERATION CALCULATIONS  
REMOVAL OF EXISTING SITE TRAFFIC NETWORKS  
CAPACITY ANALYSIS WORKSHEETS

MANUAL TURNING MOVEMENT COUNT DATA

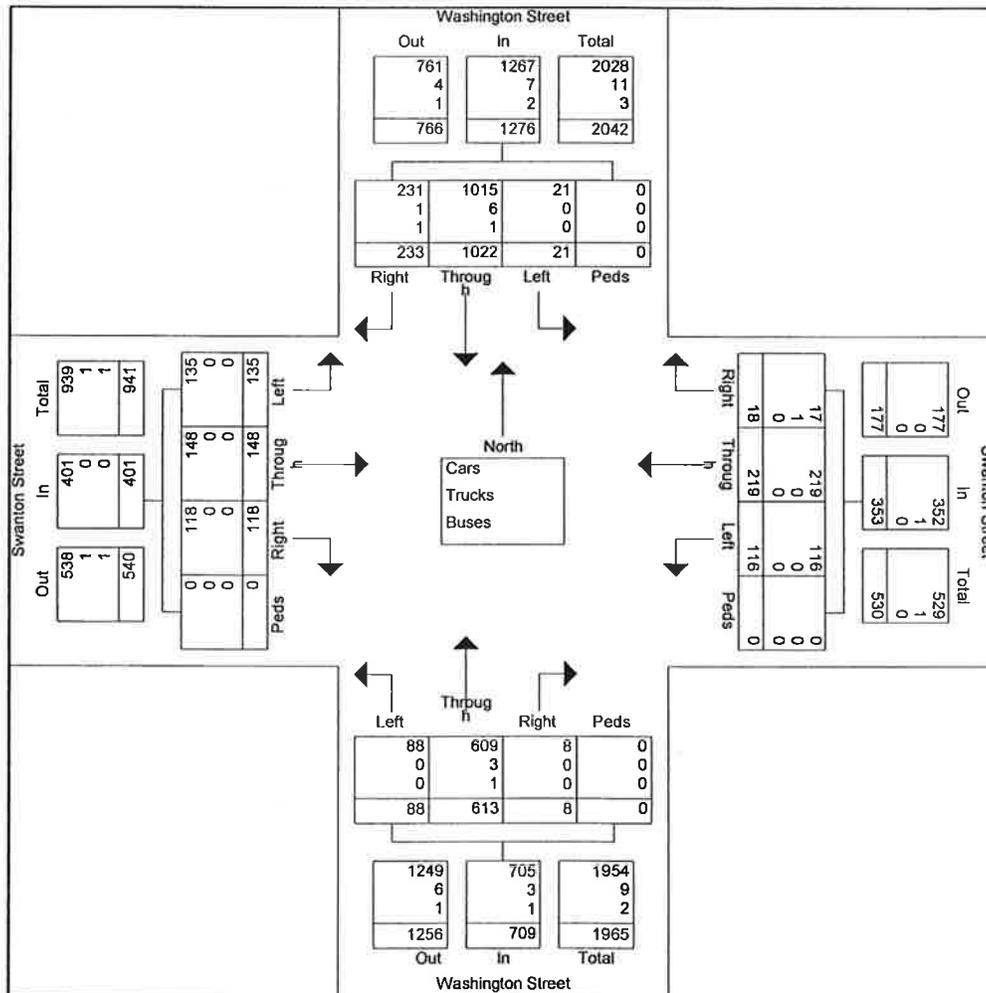
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Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001am  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 1

Groups Printed: Cars - Trucks - Buses

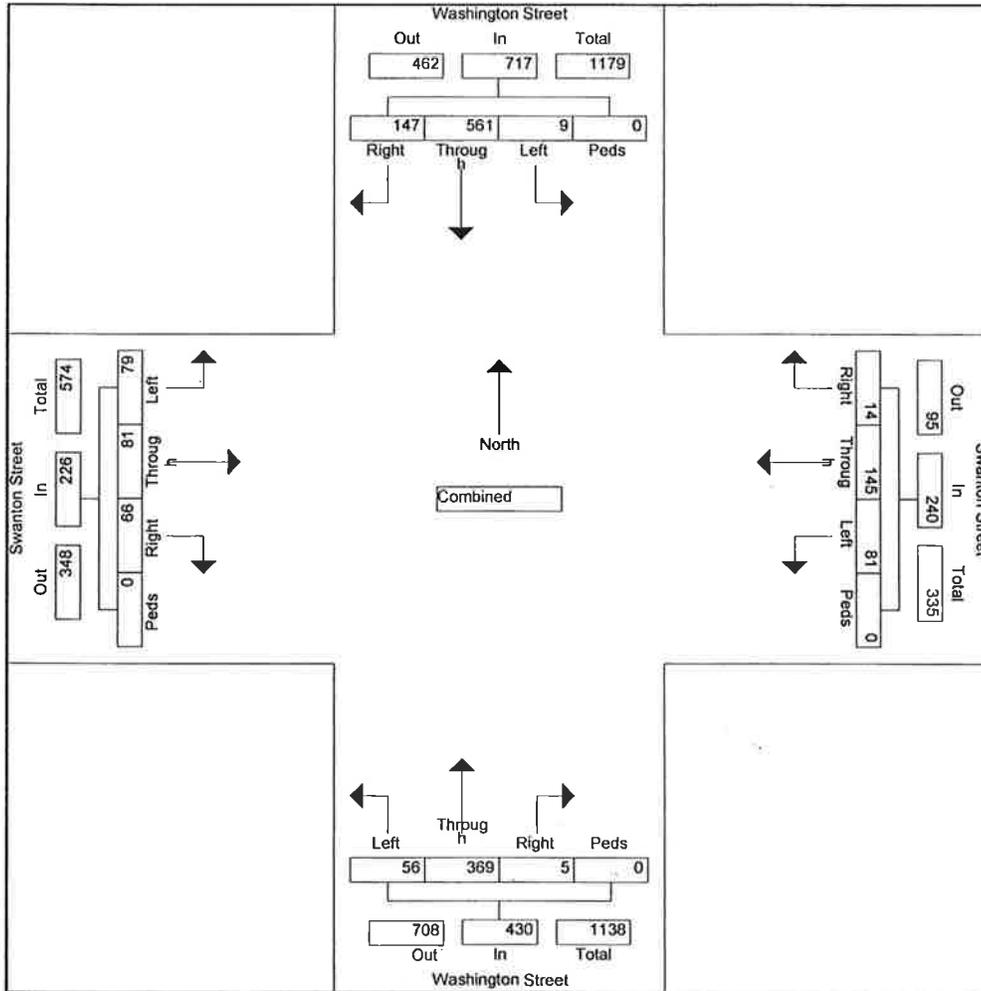
End Time	Washington Street From North				Swanton Street From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
07:30 AM	30	160	6	0	1	18	10	0	1	79	9	0	19	28	28	0	389
07:45 AM	37	144	3	0	3	36	8	0	1	105	12	0	12	23	21	0	405
08:00 AM	27	145	1	0	2	45	26	0	0	87	10	0	19	14	21	0	397
Total	94	449	10	0	6	99	44	0	2	271	31	0	50	65	70	0	1191
08:15 AM	26	139	0	0	7	30	29	0	2	81	13	0	22	23	18	0	390
08:30 AM	57	133	5	0	2	34	18	0	2	96	21	0	13	21	19	0	421
08:45 AM	30	156	4	0	1	27	15	0	1	72	13	0	17	19	16	0	371
09:00 AM	26	145	2	0	2	29	10	0	1	93	10	0	16	20	12	0	366
Total	139	573	11	0	12	120	72	0	6	342	57	0	68	83	65	0	1548
Grand Total	233	1022	21	0	18	219	116	0	8	613	88	0	118	148	135	0	2739
Apprch %	18.3	80.1	1.6	0.0	5.1	62.0	32.9	0.0	1.1	86.5	12.4	0.0	29.4	36.9	33.7	0.0	
Total %	8.5	37.3	0.8	0.0	0.7	8.0	4.2	0.0	0.3	22.4	3.2	0.0	4.3	5.4	4.9	0.0	



Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001am  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 2

End Time	Washington Street From North					Swanton Street From East					Washington Street From South					Swanton Street From West					Int. Total		
	Right	Thro u g h	Left	Peds	App. Total	Right	Thro u g h	Left	Peds	App. Total	Right	Thro u g h	Left	Peds	App. Total	Right	Thro u g h	Left	Peds	App. Total			
Peak Hour From 07:30 AM to 09:00 AM - Peak 1 of 1 Intersection 07:45 AM	Volume	147	561	9	0	717	14	145	81	0	240	5	369	56	0	430	66	81	79	0	226	1613	
	Percent	20.5	78.2	1.3	0.0		5.8	60.4	33.8	0.0		1.2	85.8	13.0	0.0		29.2	35.8	35.0	0.0			
High Int. 08:30 AM	Volume	57	145	5	0	195	7	45	29	0	73	2	105	21	0	119	22	23	21	0	63	421	
Peak Factor						0.919					0.822					0.903						0.897	0.958

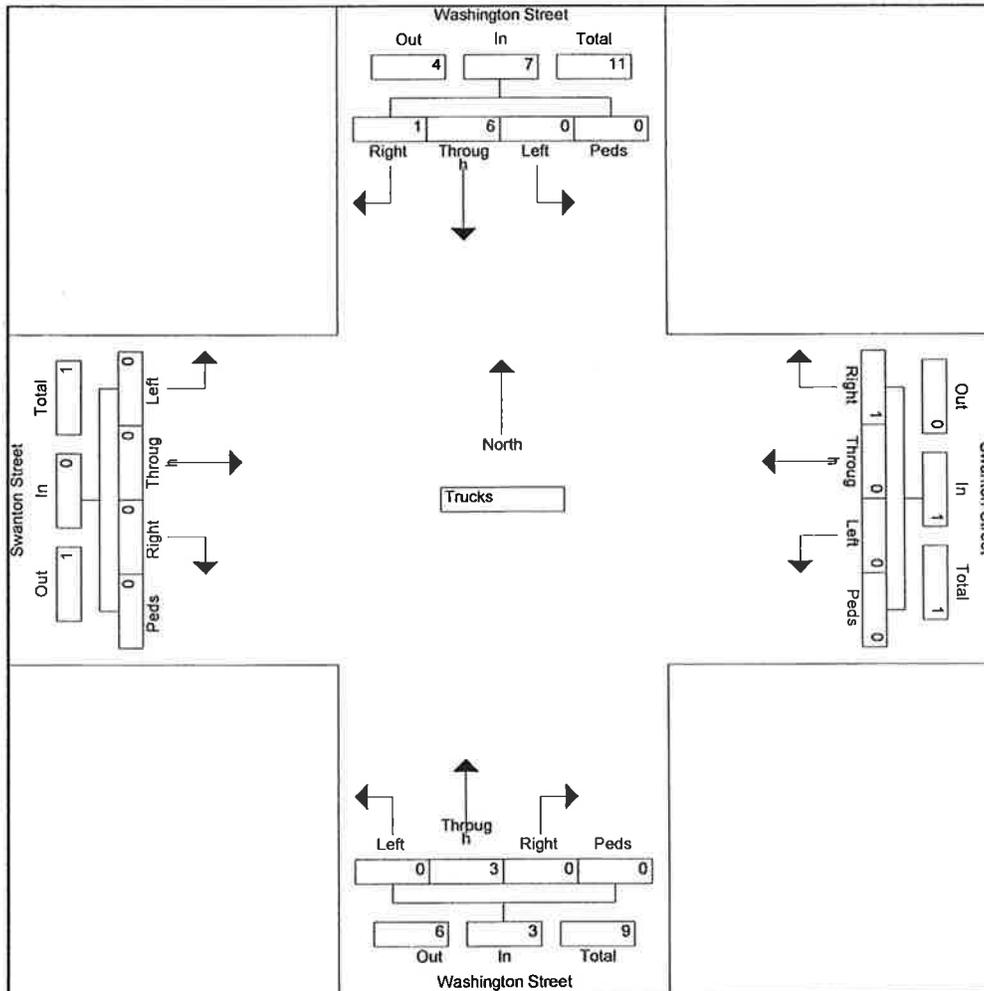


Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001am  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 1

Groups Printed: Trucks

End Time	Washington Street From North				Swanton Street From East				Washington Street From South				Swanton Street From West				Int. Total	
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds		
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
07:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
07:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6
08:15 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
09:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Total	1	1	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	5
Grand Total	1	6	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	11
Apprch %	14.3	85.7	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	9.1	54.5	0.0	0.0	9.1	0.0	0.0	0.0	0.0	27.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

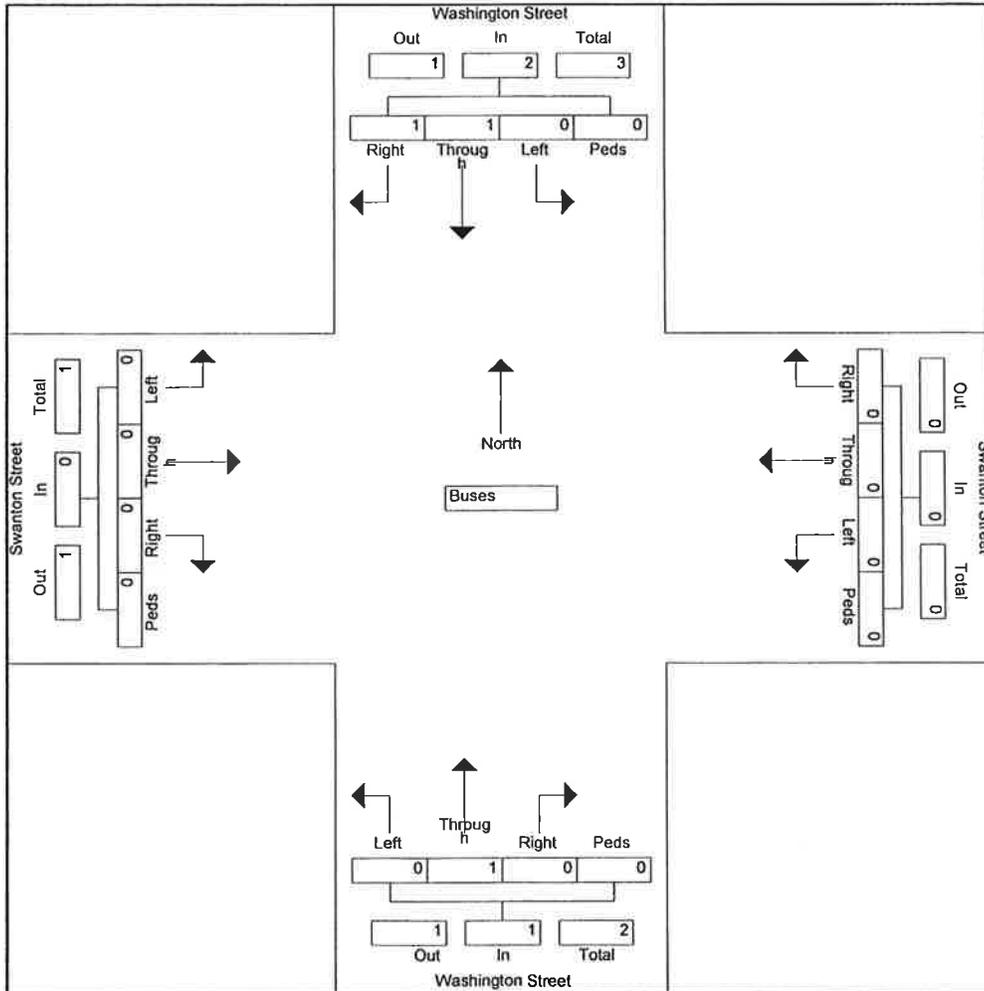


Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001am  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 1

Groups Printed: Buses

End Time	Washington Street From North				Swanton Street From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Grand Total	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Approch %	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	33.3	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	

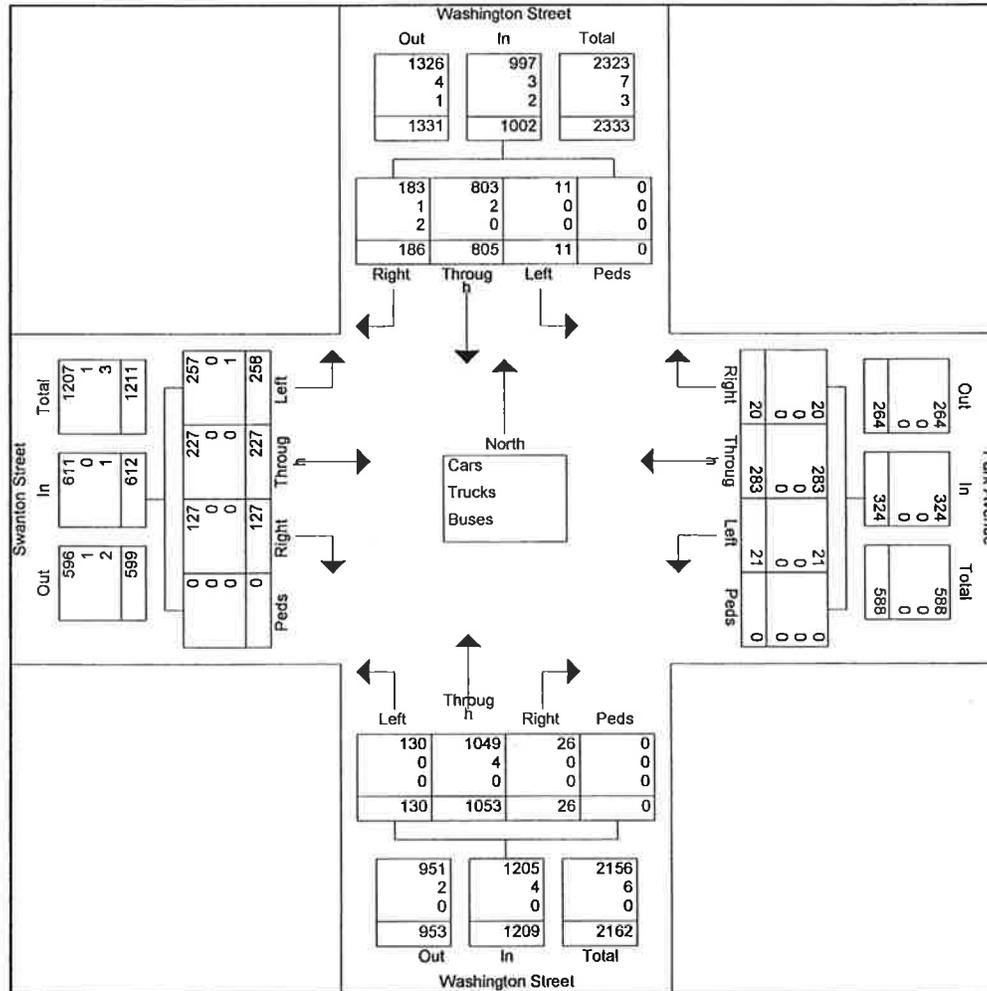


Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001pm  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 1

Groups Printed: Cars - Trucks - Buses

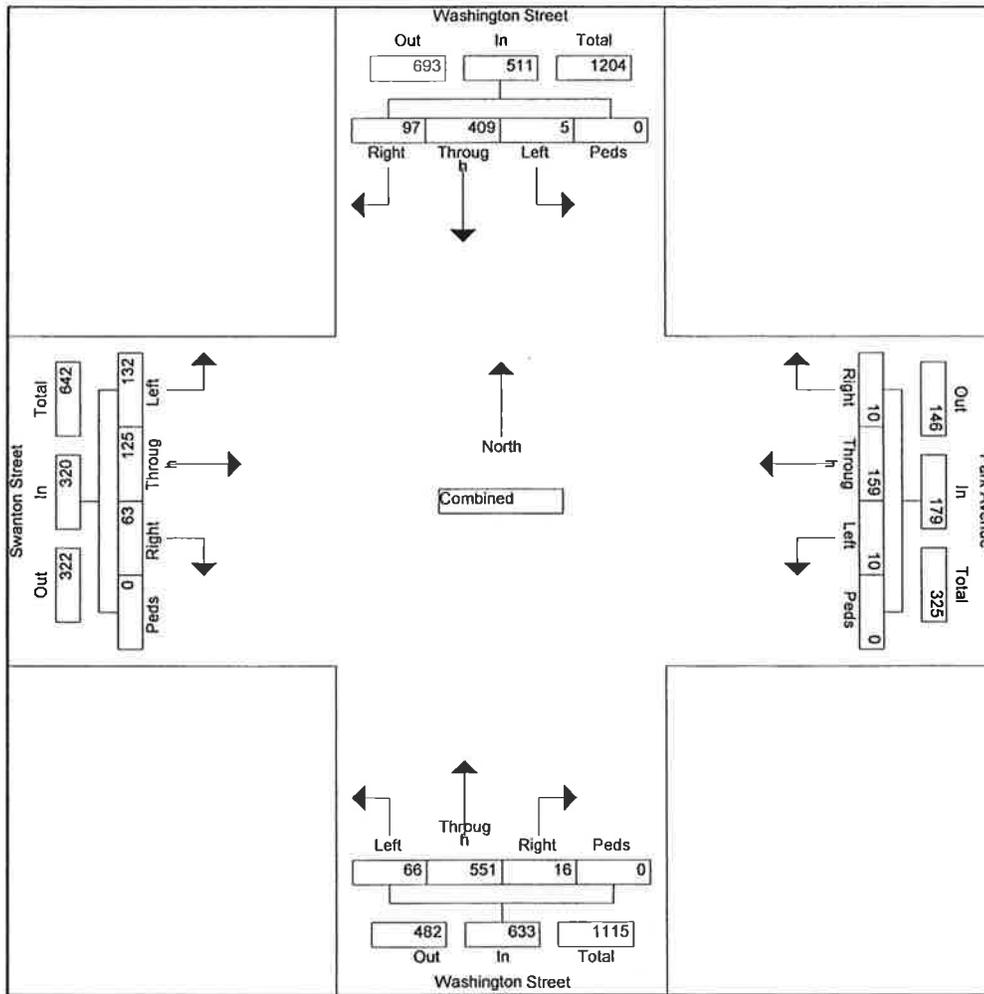
End Time	Washington Street From North				Park Avenue From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:15 PM	16	82	3	0	4	33	2	0	3	108	18	0	10	28	33	0	340
04:30 PM	17	95	0	0	3	19	2	0	2	112	13	0	21	33	34	0	351
04:45 PM	27	118	1	0	0	36	3	0	1	141	17	0	18	25	34	0	421
05:00 PM	20	91	2	0	5	37	5	0	7	143	19	0	20	30	36	0	415
Total	80	386	6	0	12	125	12	0	13	504	67	0	69	116	137	0	1527
05:15 PM	21	103	1	0	1	35	3	0	4	143	11	0	13	35	40	0	410
05:30 PM	20	103	1	0	1	39	2	0	2	132	17	0	16	29	24	0	386
05:45 PM	36	112	1	0	3	48	0	0	3	133	19	0	14	31	32	0	432
06:00 PM	29	101	2	0	3	36	4	0	4	141	16	0	15	16	25	0	392
Total	106	419	5	0	8	158	9	0	13	549	63	0	58	111	121	0	1620
Grand Total	186	805	11	0	20	283	21	0	26	1053	130	0	127	227	258	0	3147
Apprch %	18.6	80.3	1.1	0.0	6.2	87.3	6.5	0.0	2.2	87.1	10.8	0.0	20.8	37.1	42.2	0.0	
Total %	5.9	25.6	0.3	0.0	0.6	9.0	0.7	0.0	0.8	33.5	4.1	0.0	4.0	7.2	8.2	0.0	



Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001pm  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 2

End Time	Washington Street From North					Park Avenue From East					Washington Street From South					Swanton Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour From 04:15 PM to 06:00 PM - Peak 1 of 1 Intersection 05:00 PM	97	409	5	0	511	10	159	10	0	179	16	551	66	0	633	63	125	132	0	320	1643
Volume	97	409	5	0	511	10	159	10	0	179	16	551	66	0	633	63	125	132	0	320	1643
Percent	19.0	80.0	1.0	0.0		5.6	88.8	5.6	0.0		2.5	87.0	10.4	0.0		19.7	39.1	41.3	0.0		
High Int. 05:45 PM	36	112	2	0	149	5	48	5	0	51	7	143	19	0	169	20	35	40	0	88	432
Volume	36	112	2	0	149	5	48	5	0	51	7	143	19	0	169	20	35	40	0	88	432
Peak Factor					0.857					0.877					0.936					0.909	0.951

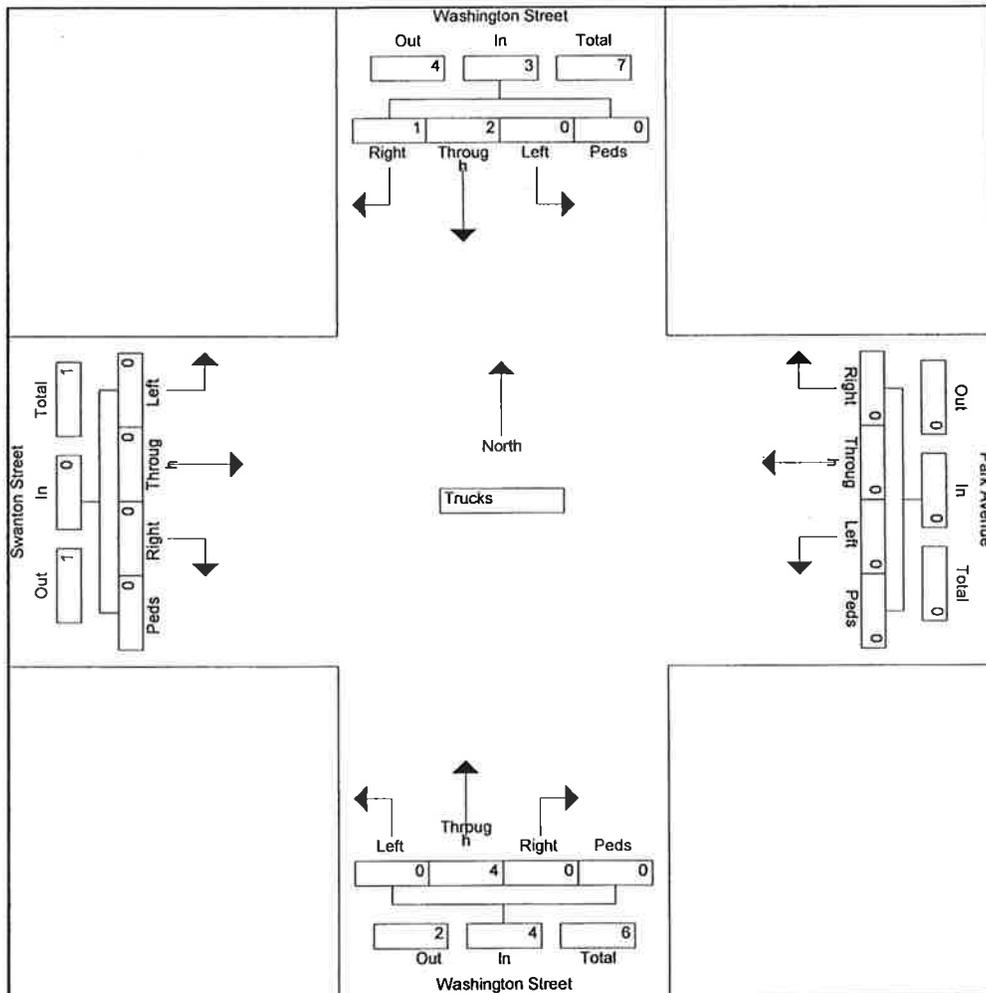


Vanasse & Associates  
 Washington Street at Swanton Street  
 Winchester, MA  
 Weather: Clear

File Name : 627001pm  
 Site Code : 00627001  
 Start Date : 11/01/2012  
 Page : 1

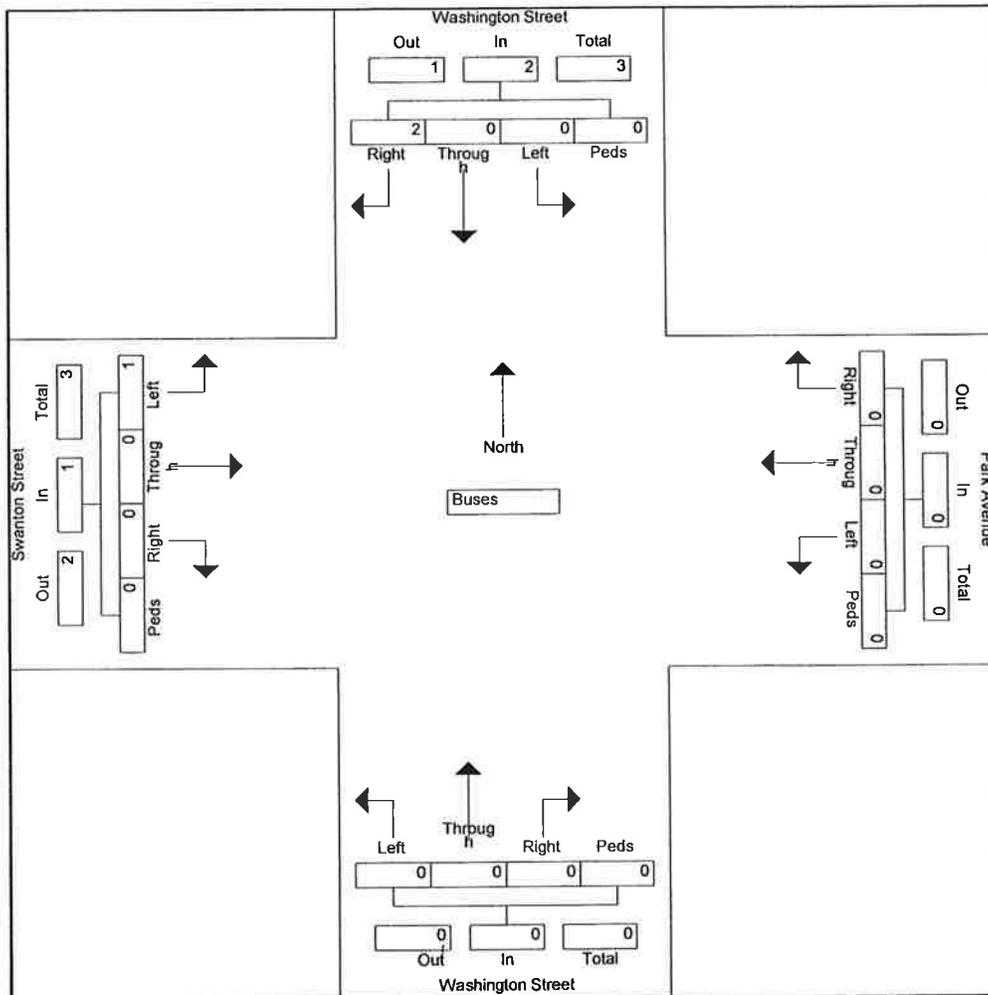
Groups Printed: Trucks

End Time	Washington Street From North				Park Avenue From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throu gh	Left	Peds	Right	Throu gh	Left	Peds	Right	Throu gh	Left	Peds	Right	Throu gh	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:15 PM	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
05:15 PM	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
Grand Total	1	2	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7
Apprch %	33.3	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	14.3	28.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.1	0.0	0.0	0.0	0.0	0.0	0.0	



Groups Printed: Buses

End Time	Washington Street From North				Park Avenue From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throu gh	Left	Peds	Right	Throu gh	Left	Peds	Right	Throu gh	Left	Peds	Right	Throu gh	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
06:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
Grand Total	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
Apprch %	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	
Total %	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	

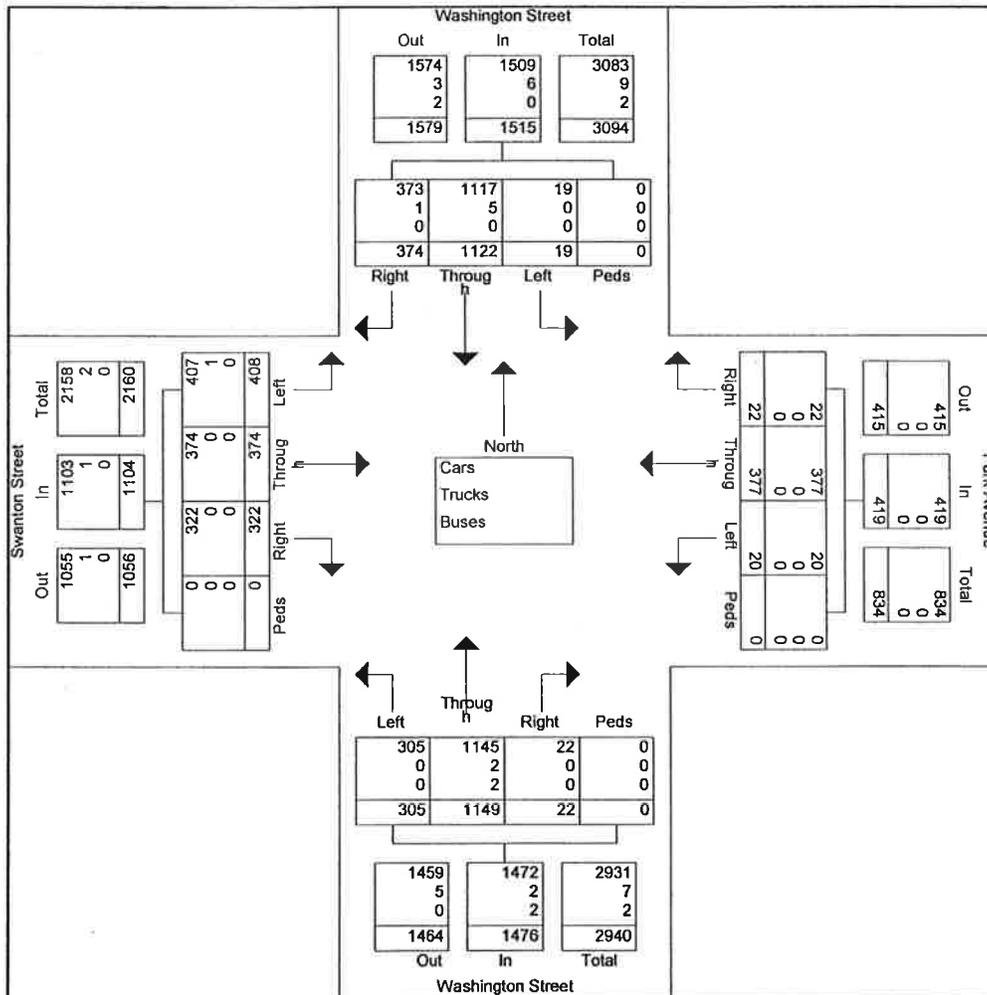


Vanasse & Associates  
 Washington St at Swanton St  
 Winchester, MA  
 Weather: Clear

File Name : 627001sa  
 Site Code : 00627001  
 Start Date : 11/17/2012  
 Page : 1

Groups Printed: Cars - Trucks - Buses

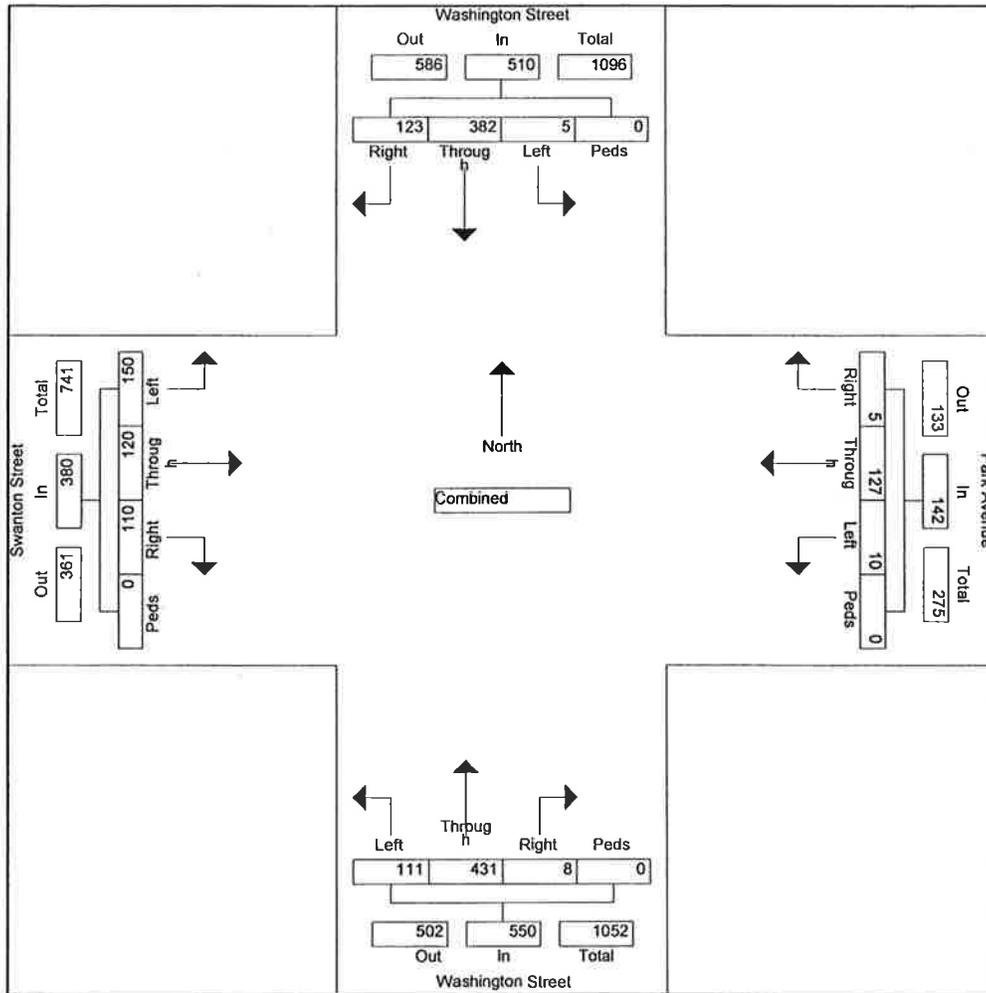
End Time	Washington Street From North				Park Avenue From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11:15 AM	27	130	1	0	3	26	2	0	2	93	26	0	25	23	29	0	387
11:30 AM	35	95	0	0	0	30	3	0	0	86	27	0	35	33	21	0	365
11:45 AM	40	81	1	0	1	42	0	0	0	85	28	0	27	26	29	0	360
12:00 PM	32	87	0	0	1	26	3	0	4	105	23	0	24	24	48	0	377
Total	134	393	2	0	5	124	8	0	6	369	104	0	111	106	127	0	1489
12:15 PM	33	111	1	0	3	33	3	0	3	126	21	0	31	32	34	0	431
12:30 PM	26	81	2	0	1	34	1	0	1	113	37	0	33	34	35	0	398
12:45 PM	32	103	2	0	0	34	3	0	0	87	30	0	22	30	33	0	376
01:00 PM	23	89	1	0	1	35	2	0	2	85	21	0	18	31	44	0	352
Total	114	384	6	0	5	136	9	0	6	411	109	0	104	127	146	0	1557
01:15 PM	28	97	5	0	5	26	1	0	1	86	27	0	26	51	32	0	385
01:30 PM	31	78	1	0	5	36	1	0	2	93	15	0	31	28	33	0	354
01:45 PM	38	76	4	0	0	25	0	0	5	104	24	0	24	32	35	0	367
02:00 PM	29	94	1	0	2	30	1	0	2	86	26	0	26	30	35	0	362
Total	126	345	11	0	12	117	3	0	10	369	92	0	107	141	135	0	1468
Grand Total	374	1122	19	0	22	377	20	0	22	1149	305	0	322	374	408	0	4514
Apprch %	24.7	74.1	1.3	0.0	5.3	90.0	4.8	0.0	1.5	77.8	20.7	0.0	29.2	33.9	37.0	0.0	
Total %	8.3	24.9	0.4	0.0	0.5	8.4	0.4	0.0	0.5	25.5	6.8	0.0	7.1	8.3	9.0	0.0	



Vanasse & Associates  
 Washington St at Swanton St  
 Winchester, MA  
 Weather: Clear

File Name : 627001sa  
 Site Code : 00627001  
 Start Date : 11/17/2012  
 Page : 2

End Time	Washington Street From North					Park Avenue From East					Washington Street From South					Swanton Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour From 11:15 AM to 02:00 PM - Peak 1 of 1																					
Intersection 12:00 PM	123	382	5	0	510	5	127	10	0	142	8	431	111	0	550	110	120	150	0	380	1582
Volume	24.1	74.9	1.0	0.0		3.5	89.4	7.0	0.0		1.5	78.4	20.2	0.0		28.9	31.6	39.5	0.0		
Percent																					
High Int. 12:15 PM	33	111	2	0	145	3	34	3	0	39	4	126	37	0	151	33	34	48	0	102	431
Volume																					
Peak Factor	0.879					0.910					0.911					0.931					0.918

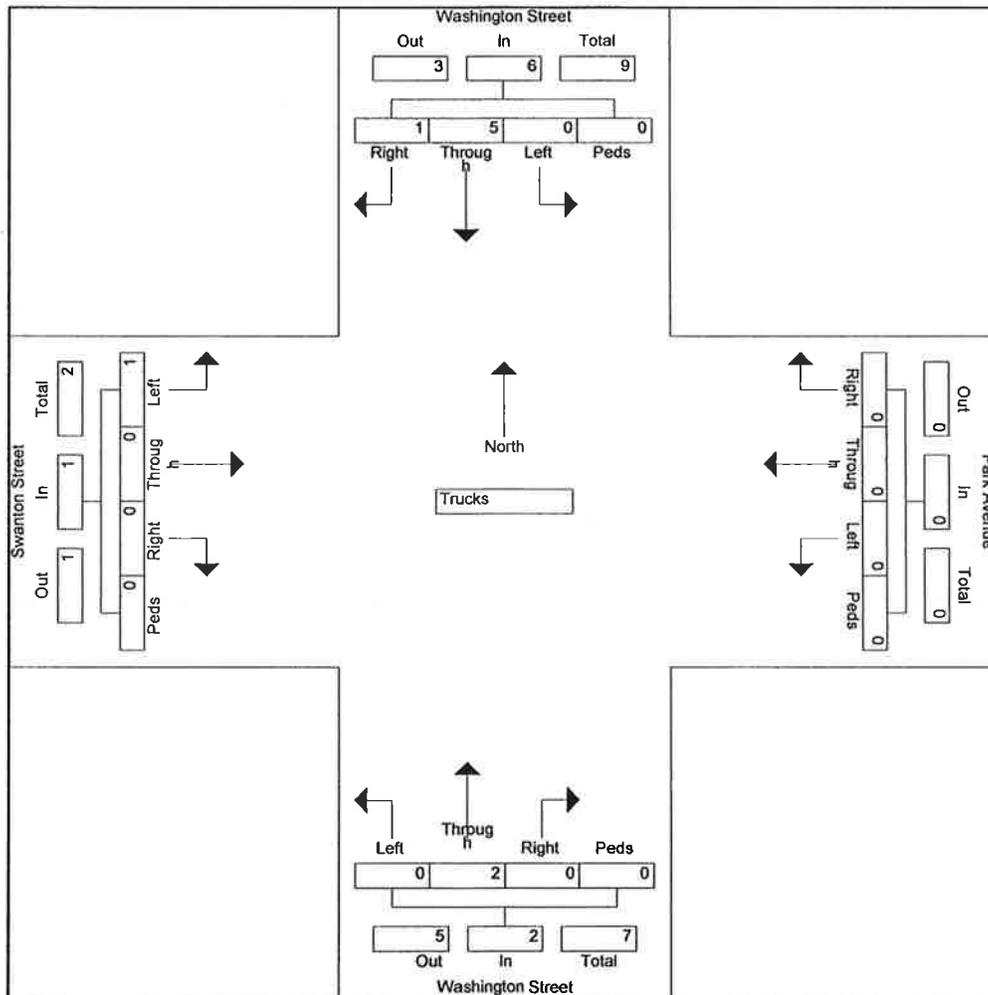


Vanasse & Associates  
 Washington St at Swanton St  
 Winchester, MA  
 Weather: Clear

File Name : 627001sa  
 Site Code : 00627001  
 Start Date : 11/17/2012  
 Page : 1

Groups Printed: Trucks

End Time	Washington Street From North				Park Avenue From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
11:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
01:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
01:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
01:30 PM	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Grand Total	1	5	0	0	0	0	0	0	0	2	0	0	0	0	1	0	
Apprch %	16.7	83.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0	
Total %	11.1	55.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	0.0	0.0	11.1	0.0	

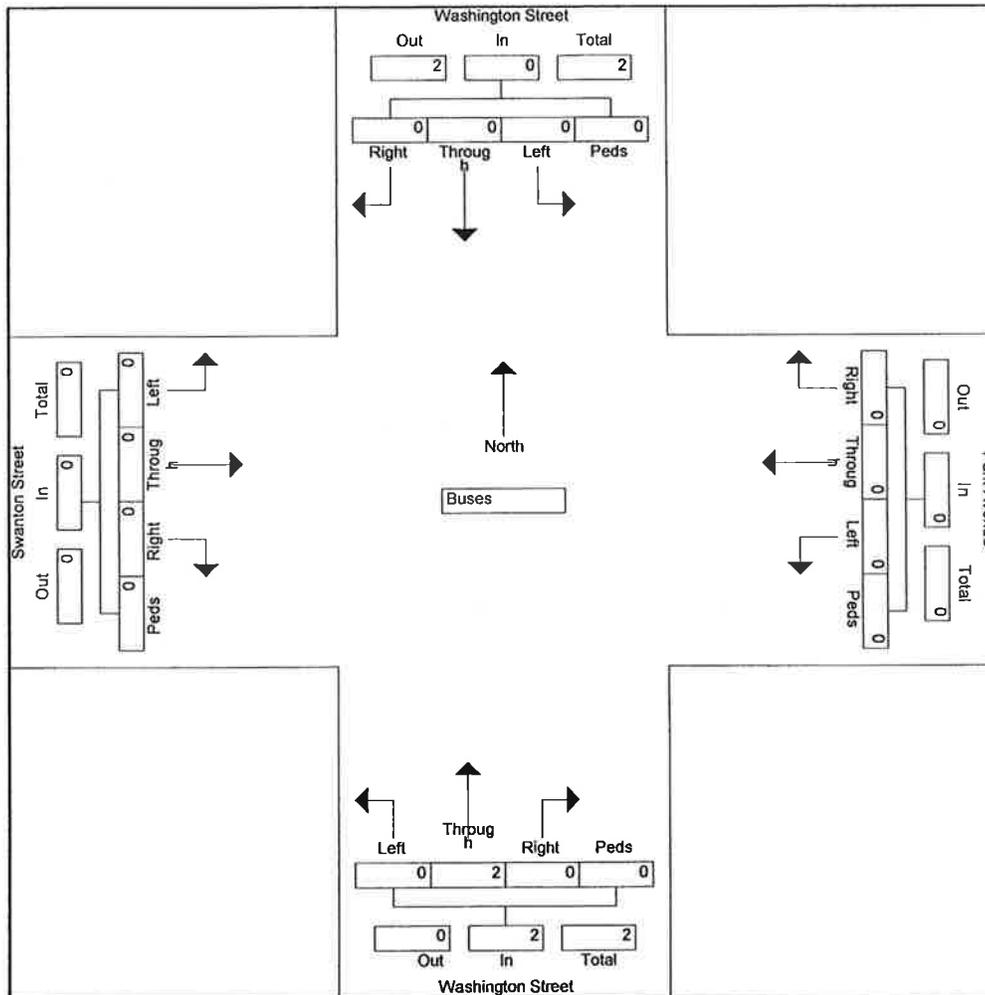


Vanasse & Associates  
 Washington St at Swanton St  
 Winchester, MA  
 Weather: Clear

File Name : 627001sa  
 Site Code : 00627001  
 Start Date : 11/17/2012  
 Page : 1

Groups Printed: Buses

End Time	Washington Street From North				Park Avenue From East				Washington Street From South				Swanton Street From West				Int. Total
	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	Right	Throug h	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
Apprch %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	



**Accurate Counts**  
978-664-2565

N/S Street : Washington Street  
E/W Street: Park Road / Site Driveway  
City/State : Winchester, MA  
Weather : Overcast

File Name : 627000R4  
Site Code : 62700004  
Start Date : 12/13/2012  
Page No : 1

**Groups Printed- Cars**

Start Time	Washington St From North			Park Rd From East			Washington St From South			Site Dr From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	0	1	2	0	1	4	0	0	1	0	0	9
07:15 AM	1	0	0	0	0	0	0	0	0	1	0	2	4
07:30 AM	1	0	1	1	0	1	2	0	0	1	0	0	7
07:45 AM	1	0	3	0	0	1	1	0	0	1	0	1	8
Total	3	0	5	3	0	3	7	0	0	4	0	3	28
08:00 AM	0	0	1	1	0	0	0	0	0	1	0	0	3
08:15 AM	0	0	1	1	1	1	0	0	0	1	0	1	6
08:30 AM	0	0	0	0	0	0	2	0	0	0	0	0	2
08:45 AM	0	0	1	0	0	0	2	0	0	1	0	0	4
Total	0	0	3	2	1	1	4	0	0	3	0	1	15
Grand Total	3	0	8	5	1	4	11	0	0	7	0	4	43
Apprch %	27.3	0	72.7	50	10	40	100	0	0	63.6	0	36.4	
Total %	7	0	18.6	11.6	2.3	9.3	25.6	0	0	16.3	0	9.3	

Start Time	Washington St From North				Park Rd From East				Washington St From South				Site Dr From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:00 AM	0	0	1	1	2	0	1	3	4	0	0	4	1	0	0	1	9
07:15 AM	1	0	0	1	0	0	0	0	0	0	0	0	1	0	2	3	4
07:30 AM	1	0	1	2	1	0	1	2	2	0	0	2	1	0	0	1	7
07:45 AM	1	0	3	4	0	0	1	1	1	0	0	1	1	0	1	2	8
Total Volume	3	0	5	8	3	0	3	6	7	0	0	7	4	0	3	7	28
% App. Total	37.5	0	62.5		50	0	50		100	0	0		57.1	0	42.9		
PHF	.750	.000	.417	.500	.375	.000	.750	.500	.438	.000	.000	.438	1.00	.000	.375	.583	.778

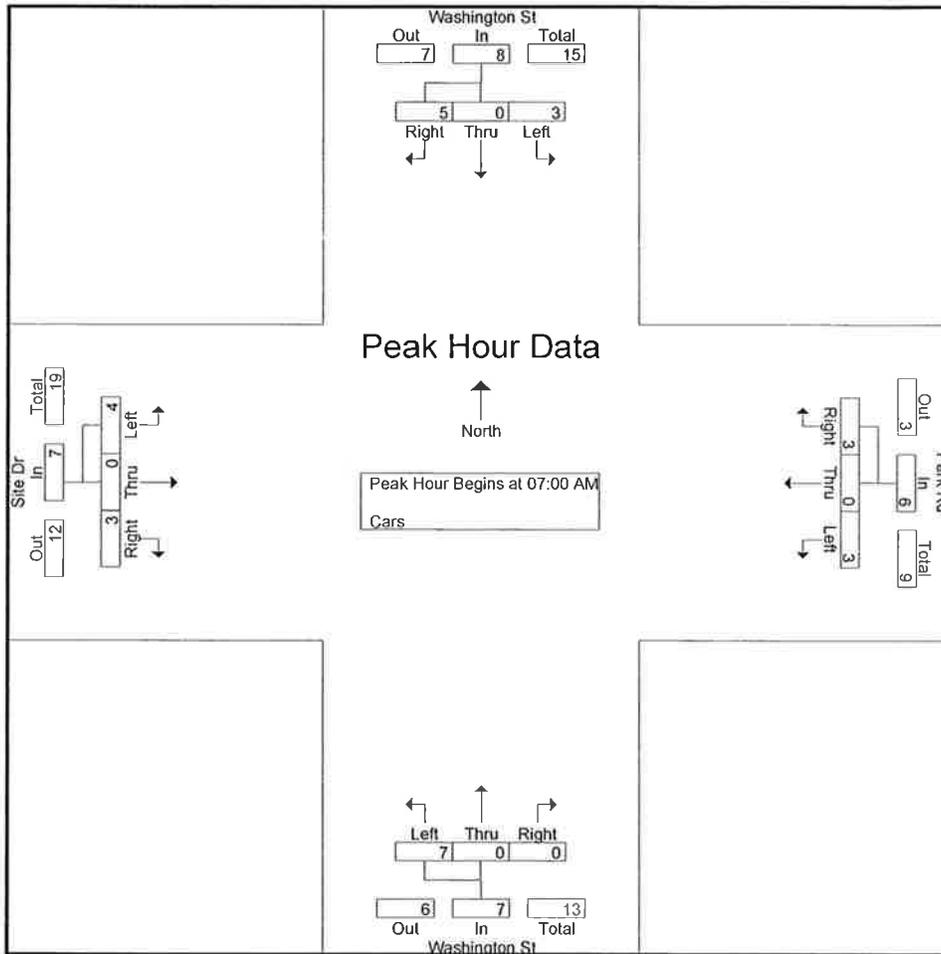
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM

**Accurate Counts**  
978-664-2565

N/S Street : Washington Street  
E/W Street: Park Road / Site Driveway  
City/State : Winchester, MA  
Weather : Overcast

File Name : 627000R4  
Site Code : 62700004  
Start Date : 12/13/2012  
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

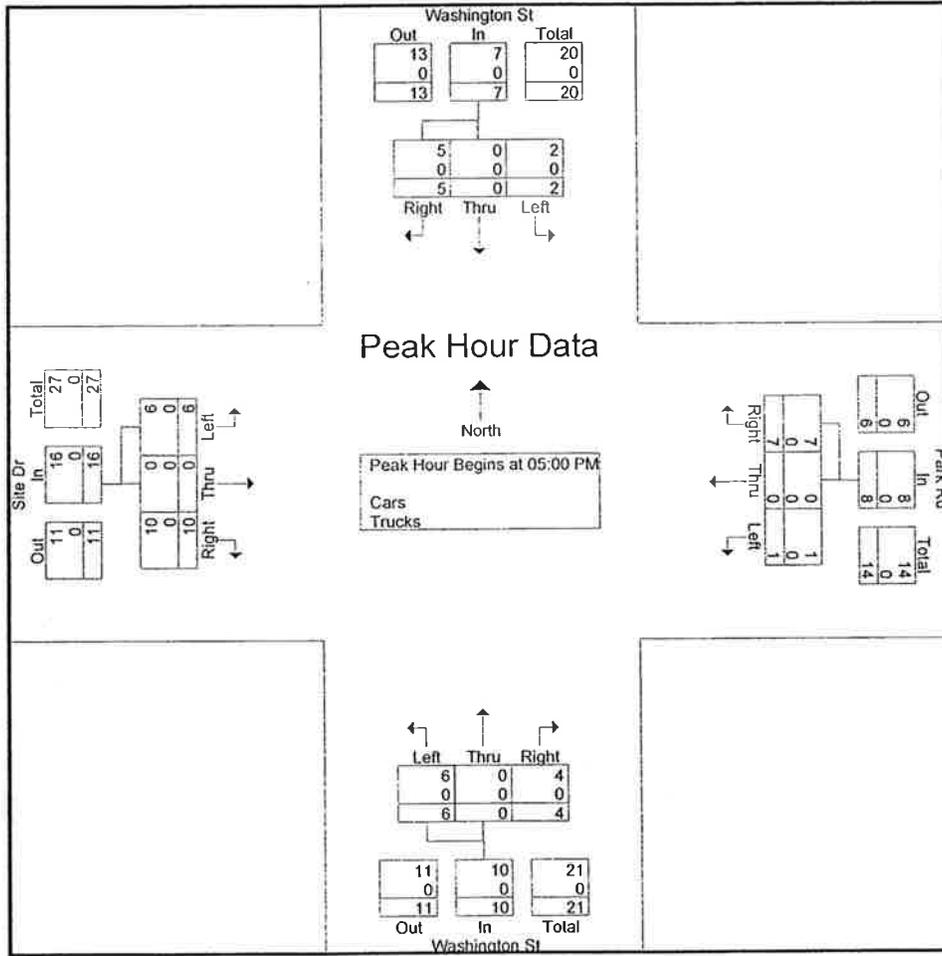
	07:00 AM				07:30 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	1	1	1	0	1	2	4	0	0	4	1	0	0	1
+15 mins.	1	0	0	1	0	0	1	1	0	0	0	0	1	0	2	3
+30 mins.	1	0	1	2	1	0	0	1	2	0	0	2	1	0	0	1
+45 mins.	1	0	3	4	1	1	1	3	1	0	0	1	1	0	1	2
Total Volume	3	0	5	8	3	1	3	7	7	0	0	7	4	0	3	7
% App. Total	37.5	0	62.5		42.9	14.3	42.9		100	0	0		57.1	0	42.9	
PHF	.750	.000	.417	.500	.750	.250	.750	.583	.438	.000	.000	.438	1.000	.000	.375	.583



**Accurate Counts**  
978-664-2565

N/S Street : Washington Street  
E/W Street : Park Road / Site Driveway  
City/State : Winchester, MA  
Weather : Clear

File Name : 62700004  
Site Code : 62700004  
Start Date : 7/12/2012  
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	04:00 PM				04:30 PM				05:00 PM				05:00 PM			
+0 mins.	0	0	4	4	1	0	0	1	1	0	1	2	4	0	0	4
+15 mins.	1	0	0	1	3	0	0	3	1	0	1	2	0	0	3	3
+30 mins.	1	0	0	1	0	0	2	2	1	0	0	1	2	0	2	4
+45 mins.	0	0	2	2	0	0	3	3	3	0	2	5	0	0	5	5
Total Volume	2	0	6	8	4	0	5	9	6	0	4	10	6	0	10	16
% App. Total	25	0	75		44.4	0	55.6		60	0	40		37.5	0	62.5	
PHF	.500	.000	.375	.500	.333	.000	.417	.750	.500	.000	.500	.500	.375	.000	.500	.800
Cars	2	0	5	7	3	0	5	8	6	0	4	10	6	0	10	16
% Cars	100	0	83.3	87.5	75	0	100	88.9	100	0	100	100	100	0	100	100
Trucks	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0
% Trucks	0	0	16.7	12.5	25	0	0	11.1	0	0	0	0	0	0	0	0

**Accurate Counts**  
978-664-2565

N/S Street : Washington Street  
E/W Street : Park Road / Site Driveway  
City/State : Winchester, MA  
Weather : Clear

File Name : 627000S4  
Site Code : 62700004  
Start Date : 7/14/2012  
Page No : 1

**Groups Printed- Cars**

Start Time	Washington St From North			Park Rd From East			Washington St From South			Site Dr From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	0	4	2	0	0	1	0	0	0	0	4	11
11:15 AM	0	0	1	0	0	0	0	0	0	2	0	0	3
11:30 AM	0	0	1	0	0	0	2	0	0	2	0	0	5
11:45 AM	1	0	2	1	0	0	1	0	0	1	0	1	7
<b>Total</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>26</b>
12:00 PM	1	0	1	2	0	0	0	0	0	1	0	1	6
12:15 PM	0	0	4	1	0	2	2	0	0	4	0	0	13
12:30 PM	0	0	3	0	0	1	1	0	0	3	0	0	8
12:45 PM	1	0	0	1	0	0	3	0	0	0	0	2	7
<b>Total</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>3</b>	<b>34</b>
01:00 PM	1	0	2	3	0	0	1	0	1	3	0	1	12
01:15 PM	1	0	1	0	0	0	1	0	0	0	0	0	3
01:30 PM	1	0	2	1	0	0	0	0	0	3	0	0	7
01:45 PM	2	0	2	1	0	0	0	0	0	0	0	3	8
<b>Total</b>	<b>5</b>	<b>0</b>	<b>7</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>6</b>	<b>0</b>	<b>4</b>	<b>30</b>
<b>Grand Total</b>	<b>8</b>	<b>0</b>	<b>23</b>	<b>12</b>	<b>0</b>	<b>3</b>	<b>12</b>	<b>0</b>	<b>1</b>	<b>19</b>	<b>0</b>	<b>12</b>	<b>90</b>
Apprch %	25.8	0	74.2	80	0	20	92.3	0	7.7	61.3	0	38.7	
Total %	8.9	0	25.6	13.3	0	3.3	13.3	0	1.1	21.1	0	13.3	

Start Time	Washington St From North				Park Rd From East				Washington St From South				Site Dr From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:15 PM																	
12:15 PM	0	0	4	4	1	0	2	3	2	0	0	2	4	0	0	4	13
12:30 PM	0	0	3	3	0	0	1	1	1	0	0	1	3	0	0	3	8
12:45 PM	1	0	0	1	1	0	0	1	3	0	0	3	0	0	2	2	7
01:00 PM	1	0	2	3	3	0	0	3	1	0	1	2	3	0	1	4	12
<b>Total Volume</b>	<b>2</b>	<b>0</b>	<b>9</b>	<b>11</b>	<b>5</b>	<b>0</b>	<b>3</b>	<b>8</b>	<b>7</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>10</b>	<b>0</b>	<b>3</b>	<b>13</b>	<b>40</b>
% App. Total	18.2	0	81.8		62.5	0	37.5		87.5	0	12.5		76.9	0	23.1		
PHF	.500	.000	.563	.688	.417	.000	.375	.667	.583	.000	.250	.667	.625	.000	.375	.813	.769

**Accurate Counts**  
978-664-2565

N/S Street : Automotive Garage  
E/W Street: Swanton Street  
City/State : Winchester, MA  
Weather : Overcast

File Name : 627000R2  
Site Code : 62700002  
Start Date : 12/13/2012  
Page No : 1

**Groups Printed- Cars**

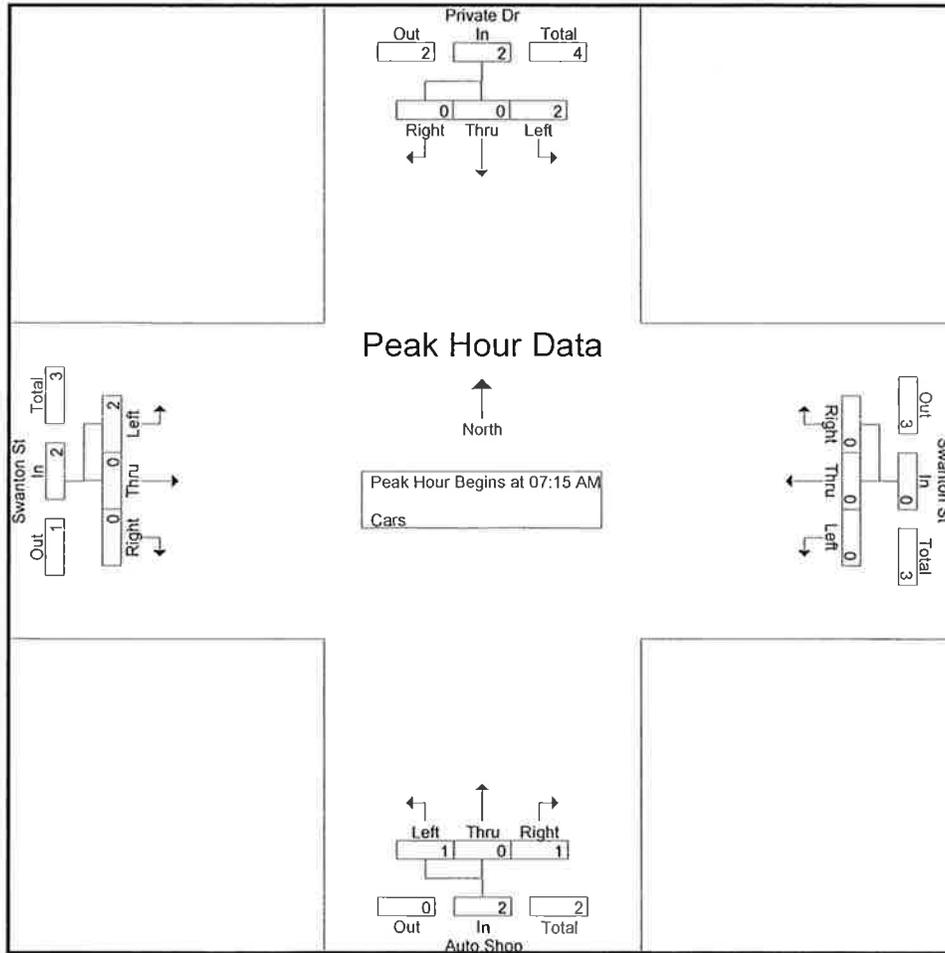
Start Time	Private Dr From North			Swanton St From East			Auto Shop From South			Swanton St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	2	0	0	2
07:30 AM	1	0	0	0	0	0	0	0	1	0	0	0	2
07:45 AM	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	1	0	0	0	0	0	1	0	1	2	0	0	5
08:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	2	0	0	0	0	0	1	0	1	2	0	0	6
Apprch %	100	0	0	0	0	0	50	0	50	100	0	0	
Total %	33.3	0	0	0	0	0	16.7	0	16.7	33.3	0	0	

Start Time	Private Dr From North				Swanton St From East				Auto Shop From South				Swanton St From West				Int. Total
	Left	Thru	Right	App Total	Left	Thru	Right	App Total	Left	Thru	Right	App Total	Left	Thru	Right	App Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
07:30 AM	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	2
07:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
08:00 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	2	0	0	2	0	0	0	0	1	0	1	2	2	0	0	2	6
% App. Total	100	0	0		0	0	0		50	0	50		100	0	0		
PHF	.500	.000	.000	.500	.000	.000	.000	.000	.250	.000	.250	.500	.250	.000	.000	.250	.750

**Accurate Counts**  
978-664-2565

N/S Street : Automotive Garage  
E/W Street: Swanton Street  
City/State : Winchester, MA  
Weather : Overcast

File Name : 627000R2  
Site Code : 62700002  
Start Date : 12/13/2012  
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	07:15 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2
+30 mins.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
+45 mins.	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
Total Volume	2	0	0	2	0	0	0	0	1	0	1	2	2	0	0	2
% App. Total	100	0	0	100	0	0	0	0	50	0	50	100	100	0	0	100
PHF	.500	.000	.000	.500	.000	.000	.000	.000	.250	.000	.250	.500	.250	.000	.000	.250

**Accurate Counts**  
978-664-2565

N/S Street : Automotive Garage  
E/W Street: Swanton Street  
City/State : Winchester, MA  
Weather : Clear

File Name : 62700002  
Site Code : 62700002  
Start Date : 7/12/2012  
Page No : 1

**Groups Printed- Cars - Trucks**

Start Time	Private Dr From North			Swanton St From East			Auto Shop From South			Swanton St From West			Int. Total	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:15 PM	0	0	0	1	0	0	1	0	0	1	0	0	1	
04:30 PM	0	0	0	1	0	0	1	0	0	0	0	0	1	
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	2	0	0	2	0	0	1	0	0	2	
05:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	
05:15 PM	0	0	0	1	0	0	0	0	0	0	0	0	1	
05:30 PM	0	0	0	2	0	0	3	0	0	0	0	0	0	
05:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	
Total	0	0	0	3	0	0	5	0	0	0	0	0	1	
Grand Total	0	0	0	5	0	0	7	0	0	1	0	0	3	16
Apprch %	0	0	0	100	0	0	100	0	0	25	0	0	75	
Total %	0	0	0	31.2	0	0	43.8	0	0	6.2	0	0	18.8	
Cars	0	0	0	4	0	0	6	0	0	1	0	0	3	14
% Cars	0	0	0	80	0	0	85.7	0	0	100	0	0	100	87.5
Trucks	0	0	0	1	0	0	1	0	0	0	0	0	0	2
% Trucks	0	0	0	20	0	0	14.3	0	0	0	0	0	0	12.5

Start Time	Private Dr From North				Swanton St From East				Auto Shop From South				Swanton St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
05:15 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	2
05:30 PM	0	0	0	0	2	0	0	2	3	0	0	3	0	0	0	0	5
05:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
Total Volume	0	0	0	0	3	0	0	3	5	0	0	5	0	0	1	1	9
% App. Total	0	0	0	0	100	0	0	100	100	0	0	100	0	0	100	0	
PHF	.000	.000	.000	.000	.375	.000	.000	.375	.417	.000	.000	.417	.000	.000	.250	.250	.450
Cars	0	0	0	0	2	0	0	2	4	0	0	4	0	0	1	1	7
% Cars	0	0	0	0	66.7	0	0	66.7	80.0	0	0	80.0	0	0	100	100	77.8
Trucks	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	2
% Trucks	0	0	0	0	33.3	0	0	33.3	20.0	0	0	20.0	0	0	0	0	22.2

# Accurate Counts

978-664-2565

N/S Street : Automotive Garage  
 E/W Street: Swanton Street  
 City/State : Winchester, MA  
 Weather : Clear

File Name : 62700002  
 Site Code : 62700002  
 Start Date : 7/12/2012  
 Page No : 1

### Groups Printed- Trucks

Start Time	Private Dr From North			Swanton St From East			Auto Shop From South			Swanton St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	1	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	0	0	0	1	0	0	1	0	0	0	0	0	2
<b>Grand Total</b>	0	0	0	1	0	0	1	0	0	0	0	0	2
Apprch %	0	0	0	100	0	0	100	0	0	0	0	0	
Total %	0	0	0	50	0	0	50	0	0	0	0	0	

Start Time	Private Dr From North				Swanton St From East				Auto Shop From South				Swanton St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
<b>Total Volume</b>	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	2
<b>% App. Total</b>	0	0	0		100	0	0		100	0	0		0	0	0		
<b>PHF</b>	.000	.000	.000	.000	.250	.000	.000	.250	.250	.000	.000	.250	.000	.000	.000	.000	.500

**Accurate Counts**  
978-664-2565

N/S Street : Automotive Garage  
E/W Street: Swanton Street  
City/State : Winchester, MA  
Weather : Clear

File Name : 627000S2  
Site Code : 62700002  
Start Date : 7/14/2012  
Page No : 1

**Groups Printed- Cars**

Start Time	Private Dr From North			Swanton St From East			Auto Shop From South			Swanton St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	2	0	0	2
11:30 AM	0	0	0	1	0	0	1	0	0	0	0	0	2
11:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	1
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>5</b>
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	2
12:45 PM	0	0	0	0	0	0	1	0	0	0	0	1	2
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	2	0	0	1	0	1	0	0	0	4
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>Grand Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>13</b>
<b>Apprch %</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>0</b>	<b>40</b>	<b>50</b>	<b>0</b>	<b>50</b>	
<b>Total %</b>	<b>7.7</b>	<b>0</b>	<b>0</b>	<b>23.1</b>	<b>0</b>	<b>0</b>	<b>23.1</b>	<b>0</b>	<b>15.4</b>	<b>15.4</b>	<b>0</b>	<b>15.4</b>	

Start Time	Private Dr From North				Swanton St From East				Auto Shop From South				Swanton St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:00 AM																	
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
11:30 AM	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	2
11:45 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
<b>Total Volume</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>% App. Total</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>100</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>100</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>100</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>250</b>	<b>625</b>
<b>PHF</b>	<b>.250</b>	<b>.000</b>	<b>.000</b>	<b>.250</b>	<b>.250</b>	<b>.000</b>	<b>.000</b>	<b>.250</b>	<b>.250</b>	<b>.000</b>	<b>.000</b>	<b>.250</b>	<b>.250</b>	<b>.000</b>	<b>.000</b>	<b>.250</b>	<b>.625</b>

# Accurate Counts

978-664-2565

N/S Street : Rodeo Grill Driveway  
 E/W Street: Swanton Street  
 City/State : Winchester, MA  
 Weather : Overcast

File Name : 627000R3  
 Site Code : 62700003  
 Start Date : 12/13/2012  
 Page No : 1

### Groups Printed- Cars

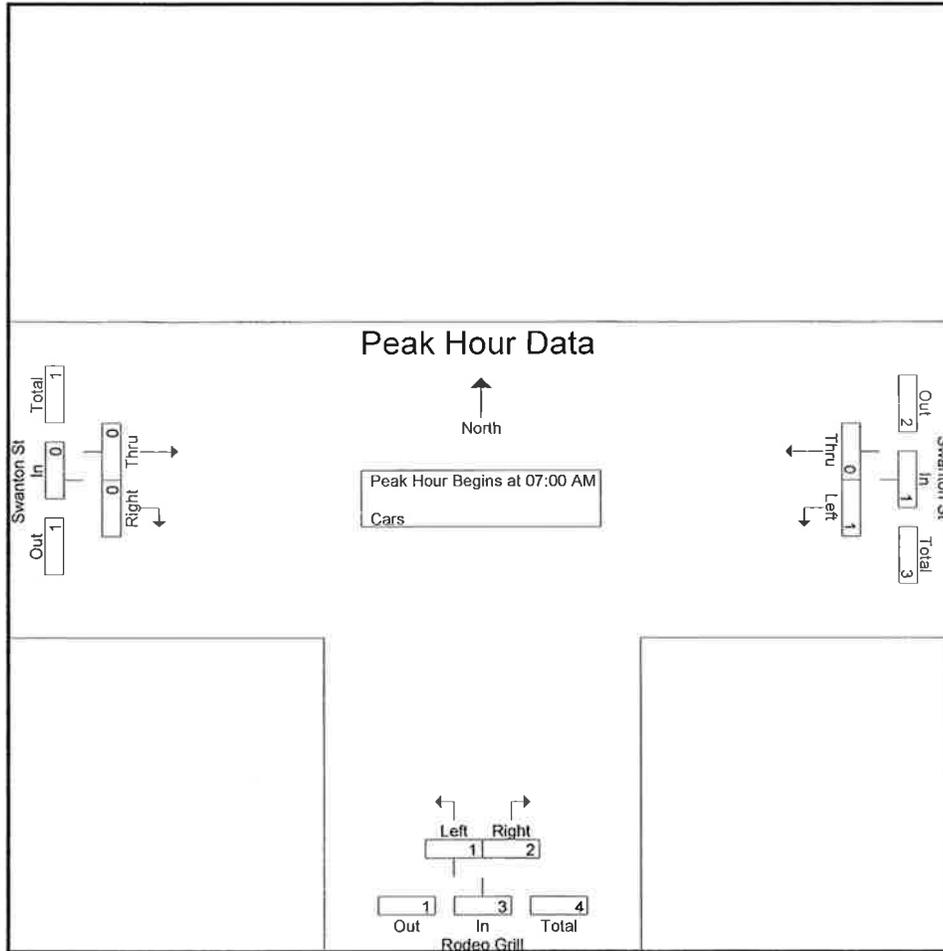
Start Time	Swanton St From East		Rodeo Grill From South		Swanton St From West		Int. Total
	Left	Thru	Left	Right	Thru	Right	
07:00 AM	1	0	0	1	0	0	2
07:15 AM	0	0	1	0	0	0	1
07:30 AM	0	0	0	1	0	0	1
07:45 AM	0	0	0	0	0	0	0
<b>Total</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>4</b>
08:00 AM	0	0	0	2	0	0	2
08:15 AM	0	0	1	0	0	0	1
08:30 AM	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Grand Total</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>7</b>
Apprch %	100	0	33.3	66.7	0	0	
Total %	14.3	0	28.6	57.1	0	0	

Start Time	Swanton St From East			Rodeo Grill From South			Swanton St From West			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	1	0	1	0	1	1	0	0	0	2
07:15 AM	0	0	0	1	0	1	0	0	0	1
07:30 AM	0	0	0	0	1	1	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0
<b>Total Volume</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>% App. Total</b>	<b>100</b>	<b>0</b>	<b></b>	<b>33.3</b>	<b>66.7</b>	<b></b>	<b>0</b>	<b>0</b>	<b></b>	<b></b>
PHF	.250	.000	.250	.250	.500	.750	.000	.000	.000	.500

**Accurate Counts**  
978-664-2565

N/S Street : Rodeo Grill Driveway  
E/W Street: Swanton Street  
City/State : Winchester, MA  
Weather : Overcast

File Name : 627000R3  
Site Code : 62700003  
Start Date : 12/13/2012  
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	07:00 AM			07:15 AM			07:00 AM		
+0 mins.	1	0	1	1	0	1	0	0	0
+15 mins.	0	0	0	0	1	1	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	2	2	0	0	0
Total Volume	1	0	1	1	3	4	0	0	0
% App. Total	100	0		25	75		0	0	
PHF	.250	.000	.250	.250	.375	.500	.000	.000	.000

**Accurate Counts**  
978-664-2565

N/S Street : Rodeo Grill Driveway  
E/W Street : Swanton Street  
City/State : Winchester, MA  
Weather : Clear

File Name : 62700003  
Site Code : 62700003  
Start Date : 7/12/2012  
Page No : 1

**Groups Printed- Cars**

Start Time	Swanton St From East		Rodeo Grill From South		Swanton St From West		Int. Total
	Left	Thru	Left	Right	Thru	Right	
04:00 PM	0	0	0	1	0	0	1
04:15 PM	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	1	0	0	1	2
Total	0	0	1	1	0	1	3
05:00 PM	0	0	1	0	0	2	3
05:15 PM	3	0	0	1	0	1	5
05:30 PM	7	0	0	3	0	1	11
05:45 PM	0	0	1	1	0	1	3
Total	10	0	2	5	0	5	22
Grand Total	10	0	3	6	0	6	25
Apprch %	100	0	33.3	66.7	0	100	
Total %	40	0	12	24	0	24	

Start Time	Swanton St From East			Rodeo Grill From South			Swanton St From West			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
05:00 PM	0	0	0	1	0	1	0	2	2	3
05:15 PM	3	0	3	0	1	1	0	1	1	5
05:30 PM	7	0	7	0	3	3	0	1	1	11
05:45 PM	0	0	0	1	1	2	0	1	1	3
Total Volume	10	0	10	2	5	7	0	5	5	22
% App. Total	100	0		28.6	71.4		0	100		
PHF	.357	.000	.357	.500	.417	.583	.000	.625	.625	.500

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 05:00 PM

# Accurate Counts

978-664-2565

N/S Street : Rodeo Grill Driveway  
 E/W Street: Swanton Street  
 City/State : Winchester, MA  
 Weather : Clear

File Name : 627000S3  
 Site Code : 62700003  
 Start Date : 7/14/2012  
 Page No : 1

### Groups Printed- Cars

Start Time	Swanton St From East		Rodeo Grill From South		Swanton St From West		Int. Total
	Left	Thru	Left	Right	Thru	Right	
11:00 AM	2	0	2	0	0	2	6
11:15 AM	1	0	1	1	0	1	4
11:30 AM	1	0	0	1	0	0	2
11:45 AM	0	0	0	1	0	0	1
<b>Total</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>13</b>
12:00 PM	0	0	1	0	0	1	2
12:15 PM	1	0	1	1	0	1	4
12:30 PM	1	0	1	2	0	3	7
12:45 PM	1	0	0	1	0	0	2
<b>Total</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>15</b>
01:00 PM	1	0	0	0	0	0	1
01:15 PM	1	0	0	0	0	1	2
01:30 PM	1	0	0	1	0	1	3
01:45 PM	0	0	1	0	0	1	2
<b>Total</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>8</b>
<b>Grand Total</b>	<b>10</b>	<b>0</b>	<b>7</b>	<b>8</b>	<b>0</b>	<b>11</b>	<b>36</b>
Apprch %	100	0	46.7	53.3	0	100	
Total %	27.8	0	19.4	22.2	0	30.6	

Start Time	Swanton St From East			Rodeo Grill From South			Swanton St From West			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
12:00 PM	0	0	0	1	0	1	0	1	1	2
12:15 PM	1	0	1	1	1	2	0	1	1	4
12:30 PM	1	0	1	1	2	3	0	3	3	7
12:45 PM	1	0	1	0	1	1	0	0	0	2
<b>Total Volume</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>15</b>
<b>% App. Total</b>	<b>100</b>	<b>0</b>	<b>750</b>	<b>42.9</b>	<b>57.1</b>	<b>583</b>	<b>0.000</b>	<b>100</b>	<b>417</b>	<b>536</b>
<b>PHF</b>	<b>.750</b>	<b>.000</b>	<b>.750</b>	<b>.750</b>	<b>.500</b>	<b>.583</b>	<b>.000</b>	<b>.417</b>	<b>.417</b>	<b>.536</b>

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 12:00 PM

**Accurate Counts**  
978-664-2565

N/S Street : 1st Driveway  
E/W Street: Swanton Street  
City/State : Winchester, MA  
Weather : Overcast

File Name : 627000R5  
Site Code : 62700005  
Start Date : 12/13/2012  
Page No : 1

**Groups Printed- Cars**

Start Time	Swanton St From East		1st Dr From South		Swanton St From West		Int. Total
	Left	Thru	Left	Right	Thru	Right	
07:00 AM	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0
07:30 AM	0	0	0	1	0	0	1
07:45 AM	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	1
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	0	0	0	1	0	0	1
Apprch %	0	0	0	100	0	0	
Total %	0	0	0	100	0	0	

Start Time	Swanton St From East			1st Dr From South			Swanton St From West			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	1	1	0	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	1	1	0	0	0	1
% App. Total	0	0		0	100		0	0		
PHF	.000	.000	.000	.000	.250	.250	.000	.000	.000	.250

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

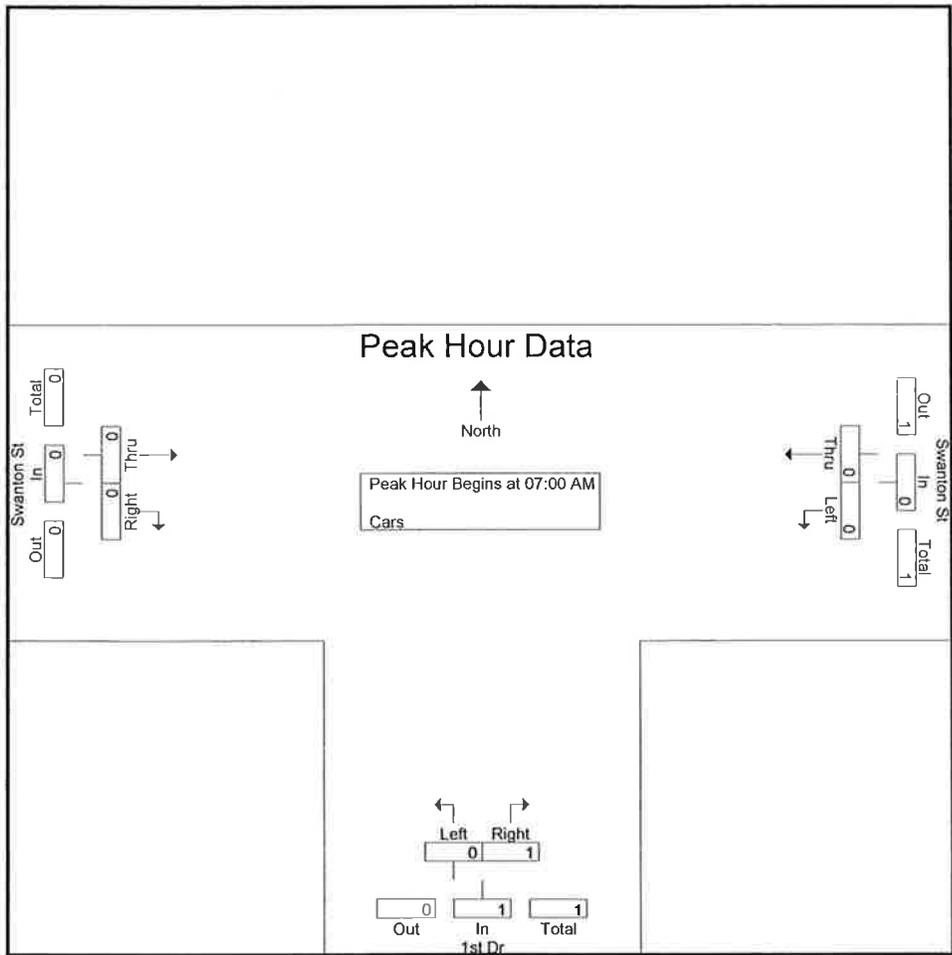
Peak Hour for Entire Intersection Begins at 07:00 AM

# Accurate Counts

978-664-2565

N/S Street : 1st Driveway  
 E/W Street: Swanton Street  
 City/State : Winchester, MA  
 Weather : Overcast

File Name : 627000R5  
 Site Code : 62700005  
 Start Date : 12/13/2012  
 Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:00 AM			07:00 AM			07:00 AM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	1	1	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	1	1	0	0	0
% App. Total	0	0	0	0	100	250	0	0	0
PHF	.000	.000	.000	.000	.250	.250	.000	.000	.000



## On-Street Parking Turnover

4PM-3

4:15- 2

4:30- 3

4:45- 1

5PM-1

5:15- 3

5:30- 2

5:45- 1

6PM-2

11AM - 1

11:15 - 1

11:30 - 2

11:45 - 1

12PM - 1

12:15 - 1

12:30 - 1

12:45 - 3

1 PM - 2

1:15 - 3

1:30 - 1

1:45 - 1

2 PM - 2

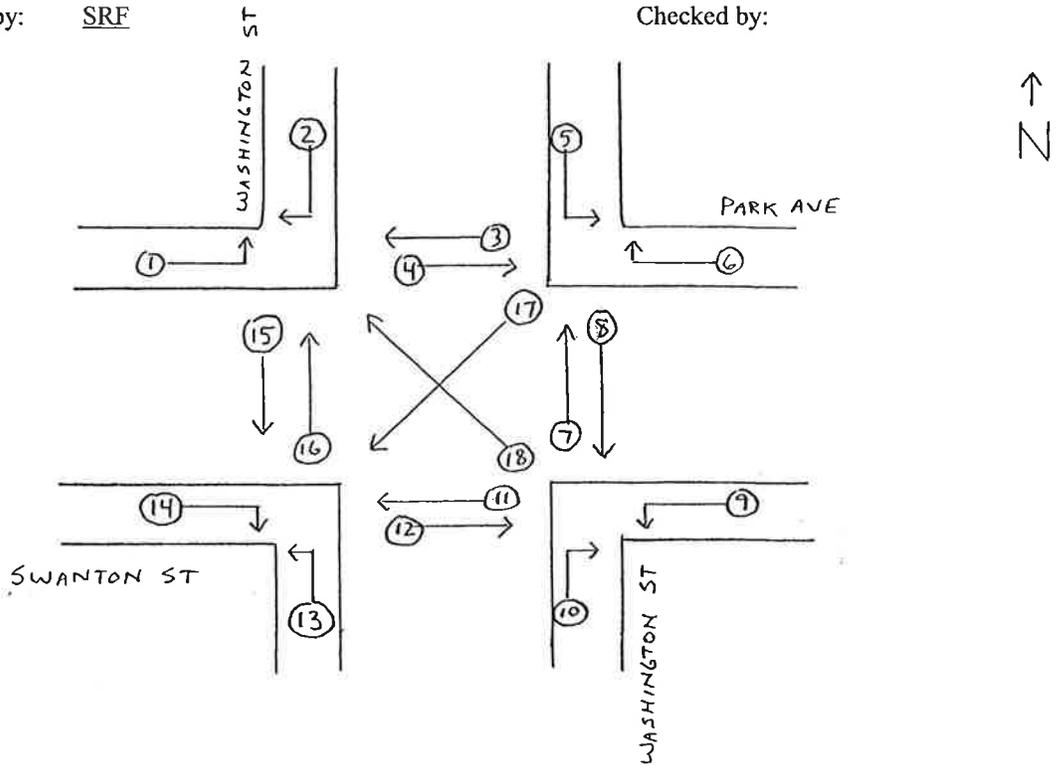
PEDESTRIAN COUNT DATA

---

# VAI Calculations

Job: Winchester, MA  
 Location: Washington St at Swanton St  
 Title: Pedestrian Count  
 Calculated by: SRF

Job Number: 6270  
 Date: 11/2/12  
 Sheet: 1 of 1  
 Checked by:



Time Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total	Hourly Total
7:15AM	1	0	0	0	0	0	1	9	1	1	1	0	0	0	1	0	0	0	15	
7:30	0	1	0	1	0	0	1	9	2	3	1	0	0	0	4	0	0	0	22	
7:45	0	1	0	0	0	0	0	2	0	0	0	0	0	0	2	0	2	0	7	
8:00	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	1	0	0	4	48
8:15	0	0	0	0	0	1	1	2	1	0	0	0	0	1	1	1	0	2	10	43
8:30	1	0	0	0	0	3	1	1	0	0	0	0	0	0	1	0	0	0	7	28
8:45	0	0	0	0	2	1	1	0	1	1	0	0	2	2	0	1	0	0	11	32
9:00	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	3	31
<b>Total</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>6</b>	<b>23</b>	<b>5</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>79</b>	
<b>Pk Hr Total</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>20</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>48</b>	

# VAI Calculations

Job: Wimchester, MA

Job Number: 6270

Location: Washington St at Swanton St

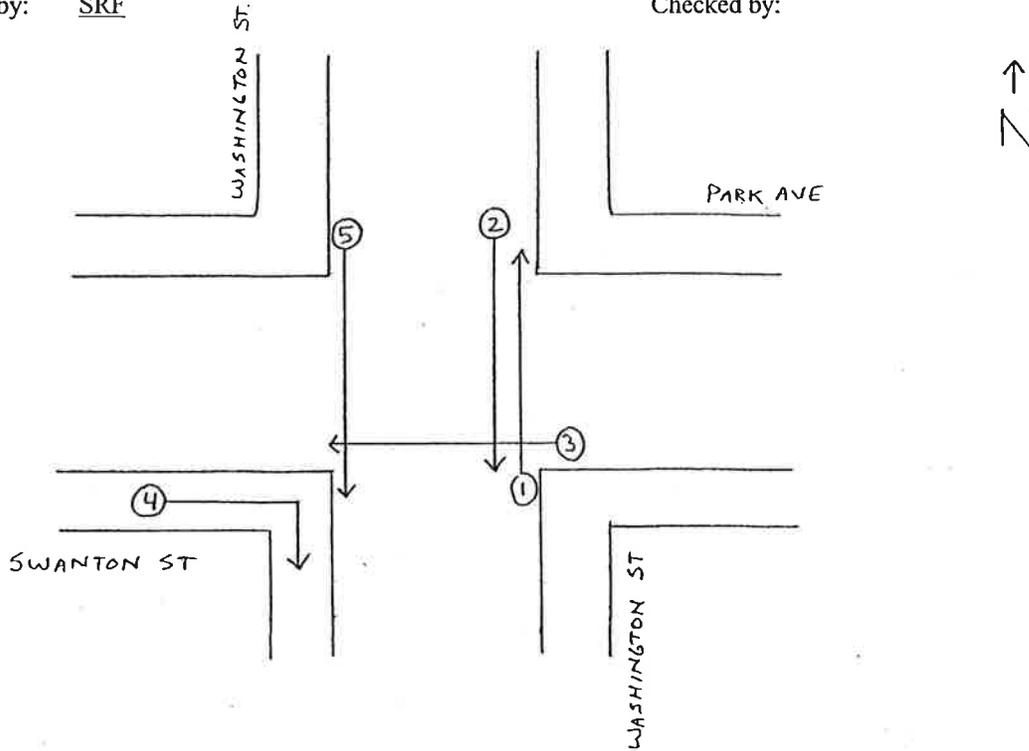
Date: 11/2/12

Title: Bicycle Count

Sheet: 1 of 1

Calculated by: SRF

Checked by:



Time Ending	1	2	3	4	5	Total	Hourly Total
7:15AM	1	0	1	1	1	4	
7:30	0	2	0	0	2	4	
7:45	0	1	0	1	0	2	
8:00	1	0	0	0	0	1	11
8:15	0	0	0	0	0	0	7
8:30	0	0	0	0	2	2	5
8:45	2	0	0	0	0	2	5
9:00	1	0	0	0	1	2	6
<b>Total</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>17</b>	
<b>Pk Hr Total</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>11</b>	

Name: John [unclear]

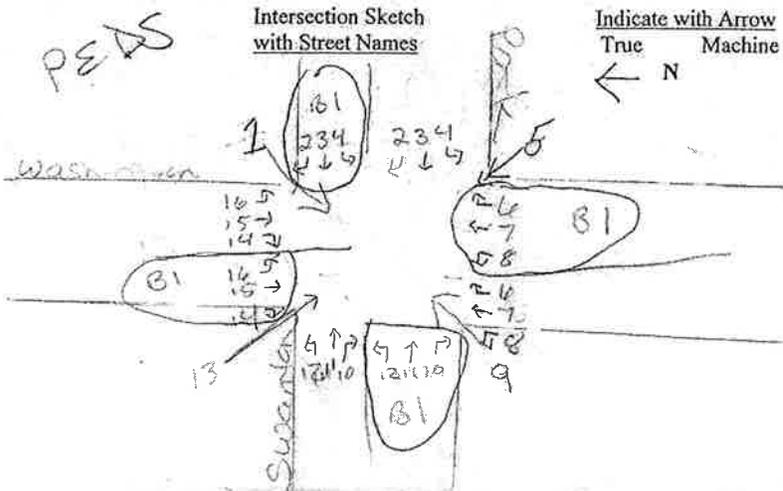
Date: 11-1

Intersection: Wash Park + S. [unclear]

Time: 4:40

City/Town: Winchester

Counter#: 1339



**Accurate Counts**  
978-664-2565

N/S Street : Washington Street  
E/W Street: Swanton St / Park Ave  
City/State : Winchester, MA  
Weather : Cloudy

File Name : 62700006  
Site Code : 62700006  
Start Date : 11/1/2012  
Page No : 1

**Groups Printed- Peds - Peds B1**

Start Time	Washington St From North				Park Ave From East				Washington St From South				Swanton St From West				Int. Total	
	16	15	14	13	4	3	2	1	8	7	6	5	12	11	10	9		
04:00 PM	0	4	0	0	1	0	0	0	0	3	1	0	0	0	0	0	0	9
04:15 PM	0	0	2	0	0	1	0	0	0	2	0	0	0	0	0	0	0	5
04:30 PM	0	3	0	0	0	0	0	0	0	4	3	0	0	0	1	3	1	15
04:45 PM	0	1	0	0	0	0	0	0	0	1	3	2	0	0	0	0	0	7
Total	0	8	2	0	1	1	0	0	0	5	11	3	0	0	1	3	1	36
05:00 PM	0	0	1	0	2	0	0	0	0	1	1	0	0	1	1	0	0	7
05:15 PM	0	4	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	7
05:30 PM	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	7
05:45 PM	0	0	0	0	0	1	0	0	0	0	2	0	0	2	0	0	0	5
Total	0	6	1	0	3	1	0	0	0	0	6	2	0	3	1	3	0	26
Grand Total	0	14	3	0	4	2	0	0	0	5	17	5	0	3	2	6	1	62
Apprch %	0	82.4	17.6	0	66.7	33.3	0	0	0	18.5	63	18.5	0	25	16.7	50	8.3	
Total %	0	22.6	4.8	0	6.5	3.2	0	0	0	8.1	27.4	8.1	0	4.8	3.2	9.7	1.6	
Peds	0	7	0	0	4	1	0	0	0	5	6	1	0	3	2	1	1	31
% Peds	0	50	0	0	100	50	0	0	0	100	35.3	20	0	100	100	16.7	100	50
Peds B1	0	7	3	0	0	1	0	0	0	0	11	4	0	0	0	5	0	31
% Peds B1	0	50	100	0	0	50	0	0	0	0	64.7	80	0	0	0	83.3	0	50

Start Time	Washington St From North					Park Ave From East					Washington St From South					Swanton St From West					Int. Total
	16	15	14	13	App. Total	4	3	2	1	App. Total	8	7	6	5	App. Total	12	11	10	9	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	4	0	0	4	1	0	0	0	1	0	3	1	0	4	0	0	0	0	0	9
04:15 PM	0	0	2	0	2	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	5
04:30 PM	0	3	0	0	3	0	0	0	0	0	4	3	0	0	7	0	1	3	1	5	15
04:45 PM	0	1	0	0	1	0	0	0	0	0	1	3	2	0	6	0	0	0	0	0	7
Total Volume	0	8	2	0	10	1	1	0	0	2	5	11	3	0	19	0	1	3	1	5	36
% App. Total	0	80	20	0		50	50	0	0		26.3	57.9	15.8	0		0	20	60	20		
PHF	.000	.500	.250	.000	.625	.250	.250	.000	.000	.500	.313	.917	.375	.000	.679	.000	.250	.250	.250	.250	.600
Peds	0	5	0	0	5	1	0	0	0	1	5	5	1	0	11	0	1	1	1	3	20
% Peds	0	62.5	0	0	50.0	100	0	0	0	50.0	100	45.5	33.3	0	57.9	0	100	33.3	100	60.0	55.6
Peds B1	0	3	2	0	5	0	1	0	0	1	0	6	2	0	8	0	0	2	0	2	16
% Peds B1	0	37.5	100	0	50.0	0	100	0	0	50.0	0	54.5	66.7	0	42.1	0	0	66.7	0	40.0	44.4

# Accurate Counts

978-664-2565

N/S Street : Washington Street  
 E/W Street : Swanton St / Park Ave  
 City/State : Winchester, MA  
 Weather : Cloudy

File Name : 62700006  
 Site Code : 62700006  
 Start Date : 11/1/2012  
 Page No : 1

### Groups Printed- Peds

	Washington St From North				Park Ave From East				Washington St From South				Swanton St From West				Int. Total
	16	15	14	13	4	3	2	1	8	7	6	5	12	11	10	9	
Start Time	16	15	14	13	4	3	2	1	8	7	6	5	12	11	10	9	
04:00 PM	0	4	0	0	1	0	0	0	0	3	1	0	0	0	0	0	9
04:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	4	0	0	0	0	1	1	1	7
04:45 PM	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	3
Total	0	5	0	0	1	0	0	0	5	5	1	0	0	1	1	1	20
05:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	1	1	0	0	4
05:15 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	2	0	0	0	4
Total	0	2	0	0	3	1	0	0	0	1	0	0	3	1	0	0	11
Grand Total	0	7	0	0	4	1	0	0	5	6	1	0	3	2	1	1	31
Apprch %	0	100	0	0	80	20	0	0	41.7	50	8.3	0	42.9	28.6	14.3	14.3	
Total %	0	22.6	0	0	12.9	3.2	0	0	16.1	19.4	3.2	0	9.7	6.5	3.2	3.2	

	Washington St From North					Park Ave From East					Washington St From South					Swanton St From West					Int. Total
	16	15	14	13	App. Total	4	3	2	1	App. Total	8	7	6	5	App. Total	12	11	10	9	App. Total	
Start Time	16	15	14	13	App. Total	4	3	2	1	App. Total	8	7	6	5	App. Total	12	11	10	9	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	4	0	0	4	1	0	0	0	1	0	3	1	0	4	0	0	0	0	0	9
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	1	1	1	3	7
04:45 PM	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	3
Total Volume	0	5	0	0	5	1	0	0	0	1	5	5	1	0	11	0	1	1	1	3	20
% App. Total	0	100	0	0		100	0	0	0		45.5	45.5	9.1	0		0	33.3	33.3	33.3		
PHF	.000	.313	.000	.000	.313	.250	.000	.000	.000	.250	.313	.417	.250	.000	.688	.000	.250	.250	.250	.250	.556

**Accurate Counts**  
978-664-2565

N/S Street : Washington Street  
E/W Street: Swanton St / Park Ave  
City/State : Winchester, MA  
Weather : Cloudy

File Name : 62700006  
Site Code : 62700006  
Start Date : 11/1/2012  
Page No : 1

**Groups Printed- Peds BI**

Start Time	Washington St From North				Park Ave From East				Washington St From South				Swanton St From West				Int. Total
	16	15	14	13	4	3	2	1	8	7	6	5	12	11	10	9	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	4
04:30 PM	0	3	0	0	0	0	0	0	0	3	0	0	0	0	2	0	8
04:45 PM	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	4
<b>Total</b>	0	3	2	0	0	1	0	0	0	6	2	0	0	0	2	0	16
05:00 PM	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	3
05:15 PM	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	4
05:30 PM	0	2	0	0	0	0	0	0	0	3	0	0	0	0	2	0	7
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
<b>Total</b>	0	4	1	0	0	0	0	0	0	5	2	0	0	0	3	0	15
<b>Grand Total</b>	0	7	3	0	0	1	0	0	0	11	4	0	0	0	5	0	31
Apprch %	0	70	30	0	0	100	0	0	0	73.3	26.7	0	0	0	100	0	
Total %	0	22.6	9.7	0	0	3.2	0	0	0	35.5	12.9	0	0	0	16.1	0	

Start Time	Washington St From North					Park Ave From East					Washington St From South					Swanton St From West					Int. Total
	16	15	14	13	App. Total	4	3	2	1	App. Total	8	7	6	5	App. Total	12	11	10	9	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	0	2	0	2	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	4
04:30 PM	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	0	0	2	0	2	8
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	4
05:00 PM	0	0	1	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3
<b>Total Volume</b>	0	3	3	0	6	0	1	0	0	1	0	7	3	0	10	0	0	2	0	2	19
<b>% App. Total</b>	0	50	50	0		0	100	0	0		0	70	30	0		0	0	100	0		
<b>PHF</b>	.000	.250	.375	.000	.500	.000	.250	.000	.000	.250	.000	.583	.375	.000	.625	.000	.000	.250	.000	.250	.594

# Accurate Counts

978-664-2565

N/S Street : Washington Street  
 E/W Street: Swanton St / Park Ave  
 City/State : Winchester, MA  
 Weather : Cloudy

File Name : 62700006  
 Site Code : 62700006  
 Start Date : 11/1/2012  
 Page No : 1

### Groups Printed- Bikes

Start Time	Washington St From North			Park Ave From East			Washington St From South			Swanton St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	2	0	0	0	0	0	1	0	0	0	1	4
<b>Total</b>	0	3	0	0	0	0	0	2	0	0	0	1	6
05:00 PM	0	0	0	0	0	0	0	3	0	0	0	0	3
05:15 PM	0	2	0	0	0	0	0	1	1	0	0	0	4
05:30 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
05:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
<b>Total</b>	0	4	0	0	0	0	0	5	1	0	0	0	10
<b>Grand Total</b>	0	7	0	0	0	0	0	7	1	0	0	1	16
<b>Apprch %</b>	0	100	0	0	0	0	0	87.5	12.5	0	0	100	
<b>Total %</b>	0	43.8	0	0	0	0	0	43.8	6.2	0	0	6.2	

Start Time	Washington St From North				Park Ave From East				Washington St From South				Swanton St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	1	1	4
05:00 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	3
05:15 PM	0	2	0	2	0	0	0	0	0	1	1	2	0	0	0	0	4
05:30 PM	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
<b>Total Volume</b>	0	5	0	5	0	0	0	0	0	6	1	7	0	0	1	1	13
<b>% App. Total</b>	0	100	0		0	0	0		0	85.7	14.3		0	0	100		
<b>PHF</b>	.000	.625	.000	.625	.000	.000	.000	.000	.000	.500	.250	.583	.000	.000	.250	.250	.813

# VAI Calculations

Job: CVS  
 Location: 833 Mass Ave, Arlington  
 Title: Pedestrian Count  
 Calculated by: SRF

Job Number: 6270  
 Date: 10/6/12  
 Sheet: 1 of 1  
 Checked by:

Time Ending	Pedestrians In	Pedestrians Out	Total	Hourly Total
7:15AM	2	3	5	
7:30	0	1	1	
7:45	3	2	5	
8:00	4	3	7	18
8:15	1	3	4	17
8:30	1	2	3	19
8:45	4	0	4	18
9:00	3	3	6	17
Total	18	17	35	
Pk Hr Total	9	10	19	

# VAI Calculations

Job: CVS  
 Location: 833 Mass Ave, Arlington, MA  
 Title: Pedestrian Count  
 Calculated by: SRF

Job Number: 6270  
 Date: 10/6/12  
 Sheet: 1 of 1  
 Checked by:

Time Ending	Peds In	Peds Out	Total	Hourly Total
3:15	4	2	6	
3:30	6	4	10	
3:45	6	5	11	
4:00	4	5	9	36
4:15	4	1	5	35
4:30	3	10	13	38
4:45	2	2	4	31
5:00	2	2	4	26
5:15	2	4	6	27
5:30	8	5	13	27
5:45	0	3	3	26
6:00	0	0	0	22
<b>Total</b>	41	43	84	
<b>Pk Hr Total</b>	17	21	38	

SEASONAL ADJUSTMENT DATA

---

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2010 WEEKDAY SEASONAL FACTORS

\*Note: These are weekday factors. The average of the factors for the year will not equal 1, as weekend data are not considered.

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP 1 - WEST INTERSTATE	0.97	0.93	0.89	0.88	0.89	0.87	0.91	0.89	0.89	0.90	0.93	0.95
GROUP 2 - RURAL MAJOR COLLECTOR (R-5) <i>Use group 2 for R5, R6, &amp; R0</i>	1.11	1.10	1.07	1.00	0.91	0.89	0.87	0.86	0.90	0.92	1.02	1.06
GROUP 3A - RECREATIONAL <b>**</b> (1-4) See below	1.26	1.25	1.19	1.08	0.95	0.88	0.77	0.76	0.93	1.00	1.08	1.15
GROUP 3B - RECREATIONAL <b>***</b> (5) See below	1.25	1.23	1.16	1.10	0.96	0.90	0.75	0.73	0.93	0.99	1.13	1.16
GROUP 4 - I-495 INTERSTATE	1.02	0.99	0.98	0.95	0.92	0.88	0.86	0.84	0.93	0.95	0.99	1.03
GROUP 5 - EAST INTERSTATE	1.04	1.00	0.97	0.93	0.92	0.91	0.92	0.89	0.92	0.93	0.97	1.01
GROUP 6: URBAN/ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3) <i>Use group 6 for U2, U3, U5, U6, U0, R2, &amp; R3</i>	1.01	1.00	0.96	0.93	0.91	0.90	0.91	0.90	0.92	0.93	0.97	0.99
GROUP 7 - I-84 PROXIMITY (STA. 17, 3921)	1.21	1.20	1.11	1.06	1.00	1.01	0.95	0.90	1.06	1.06	1.06	1.14
GROUP 8 - I-295 PROXIMITY (STA. 6590)	1.00	0.99	0.95	0.92	0.88	0.87	0.92	0.88	0.91	0.91	0.92	0.94
GROUP 9 - I-195 PROXIMITY (STA. 7)	1.10	1.05	1.03	0.96	0.90	0.86	0.85	0.79	0.88	0.93	0.99	1.04

ROAD INVENTORY  
 AXLE CORRECTION FACTOR  
 0 - 999 ..... 10  
 > 1,000 ..... 100

2010 AXLE CORRECTION FACTORS

ROAD INVENTORY	AXLE CORRECTION FACTOR
<b>RURAL</b>	
1	0.93
2	0.97
3	0.98
0,5,6	0.98
<b>URBAN</b>	
1	0.96
2,3	0.97
5	0.98
0,6	0.98
1,5	0.78

RECREATIONAL: (ALL YEARS)  
**\*\***GROUP 3A:  
 1. CAPE COD (ALL TOWNS)  
 2. PLYMOUTH (SOUTH OF RTE. 3A)  
 7014, 7079, 7080, 7090, 7091, 7092, 7093, 7094, 7095, 7096, 7097, 7108, 7178  
 J. MARTHA'S VINEYARD  
 4. NANTUCKET  
**\*\*\***GROUP 3B:  
 5. PERMANENTS 2 & 189  
 1088, 1067, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092,  
 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104,  
 1105, 1106, 1107, 1108, 1113, 1114, 1116, 2196, 2197, 2198

Apply I-84 factor to stations:  
 3290, 3921, 3929

MASSDOT CRASH RATE WORKSHEETS

---

# MassDOT

## CRASH RATE WORKSHEET

CITY/TOWN : Winchester COUNT DATE : 2012

DISTRICT : 4 UNSIGNALIZED :  SIGNALIZED :

**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

ST #

MINOR STREET(S) : Swanton Street

ST #

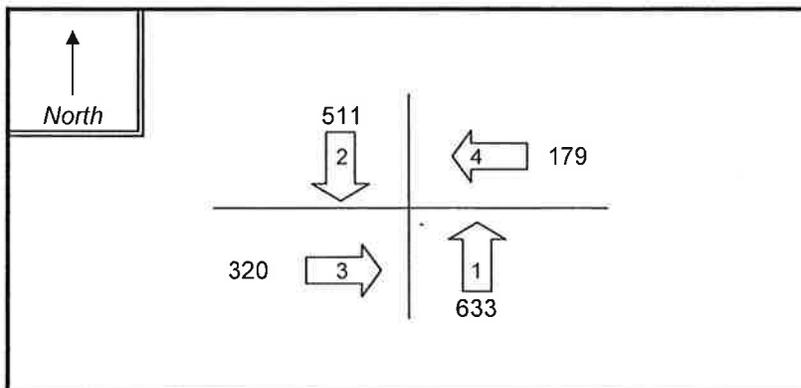
Park Avenue

ST #

ST #

ST #

**INTERSECTION  
DIAGRAM  
(Label Approaches)**



INTERSECTION  
REF #

**Peak Hour Volumes**

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	633	511	320	179		1,643

" K " FACTOR :  APPROACH ADT :  ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :  # OF YEARS :  AVERAGE # OF ACCIDENTS ( A ) :

CRASH RATE CALCULATION :  RATE =  $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : \_\_\_\_\_  
\_\_\_\_\_



# CRASH RATE WORKSHEET

CITY/TOWN : Winchester COUNT DATE : 2012

DISTRICT : 4 UNSIGNALIZED :  Yes SIGNALIZED :

**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

ST #

MINOR STREET(S) : Site Driveway

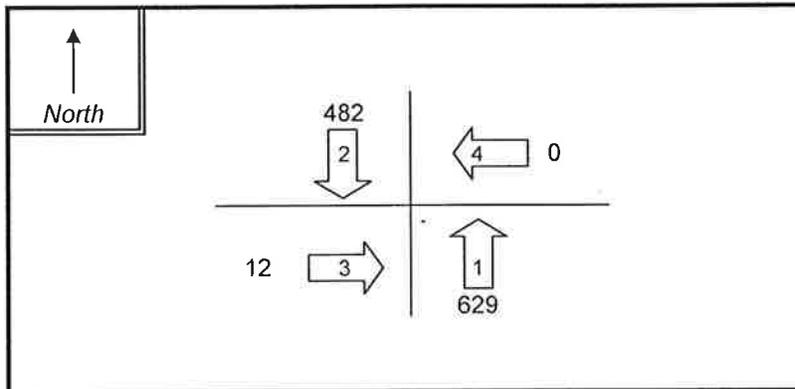
ST #

ST #

ST #

ST #

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



INTERSECTION  
REF #

### Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	629	482	12	0		1,123

"K" FACTOR :  APPROACH ADT :  ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :  # OF YEARS :  AVERAGE # OF ACCIDENTS ( A ) :

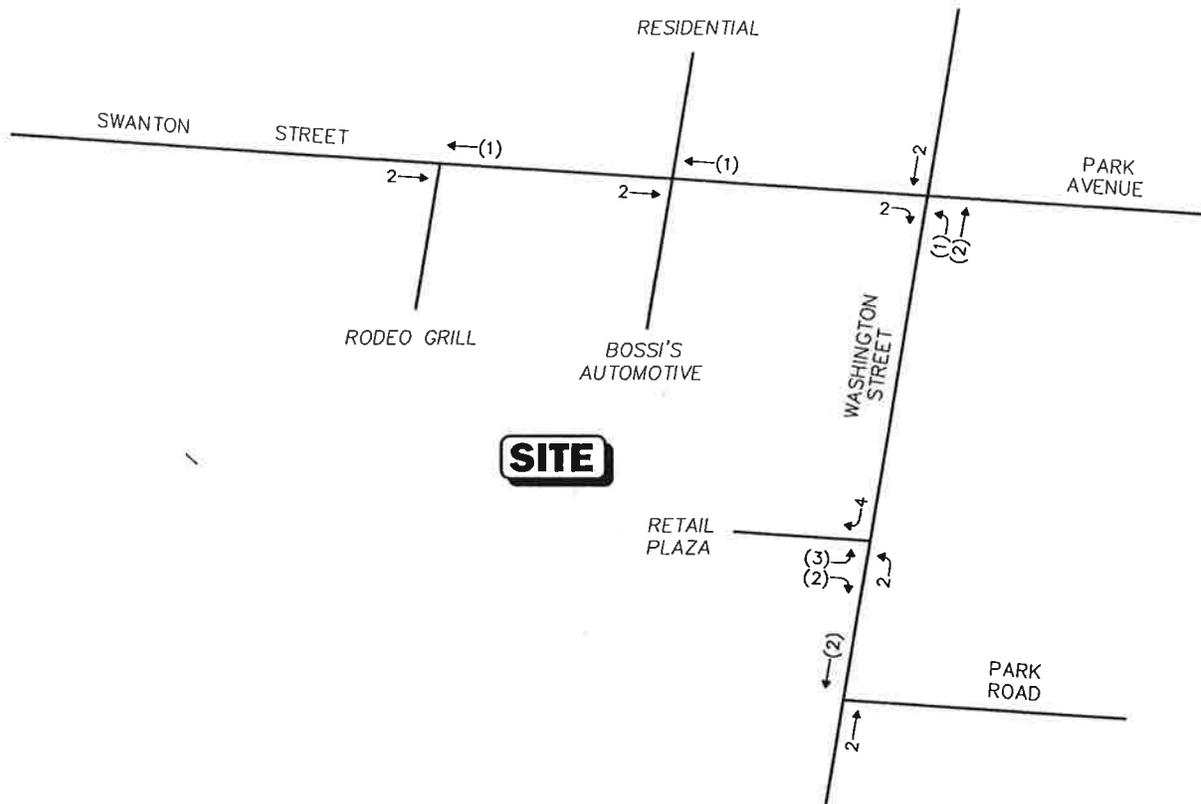
CRASH RATE CALCULATION :  RATE =  $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : \_\_\_\_\_

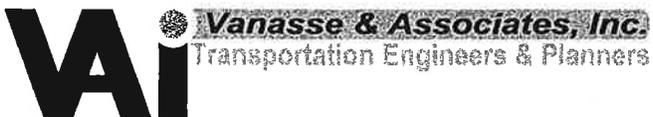
## BACKGROUND DEVELOPMENT NETWORKS

---

**WEEKDAY MORNING PEAK HOUR**



 Not To Scale



**Figure A-1**

**Background Development  
Full Occupancy of Site  
Peak Hour Traffic Volumes**

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



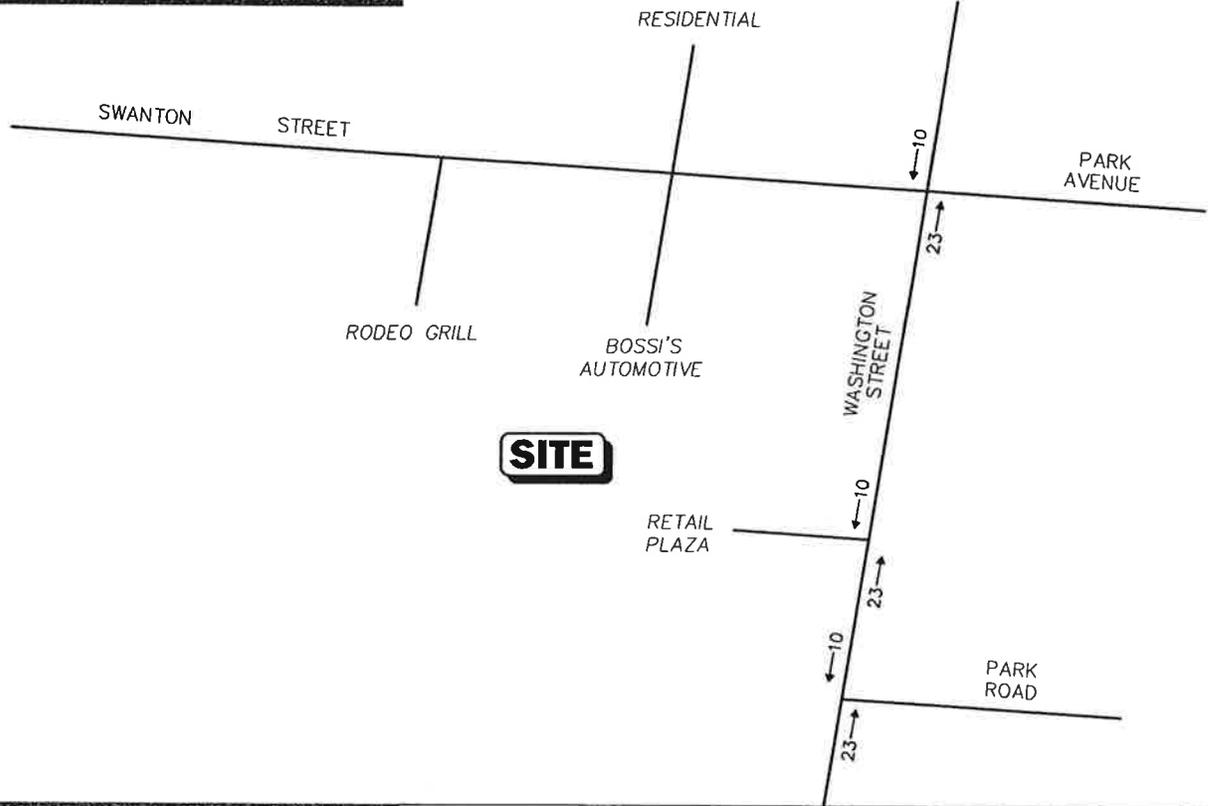
Not To Scale

**Figure A-2**



**Background Development  
Full Occupancy of Site  
Peak Hour Traffic Volumes**

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



**Figure A-3**



**Background Development  
Winchester Community Park  
Peak Hour Traffic Volumes**

## TRIP-GENERATION CALCULATIONS

---

**Institute of Transportation Engineers (ITE) - 8th Edition**  
**Land Use Code (LUC) 880 - Pharmacy/Drugstore without Drive Through Window**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Floor Area  
Independent Variable (X): 14.360

**AVERAGE WEEKDAY DAILY**

$$T = 90.06 * (X)$$

$$T = 90.06 * 14.360$$

$$T = 1293.26$$

$$T = 1,294 \text{ vehicle trips}$$

with 50% ( 647 vpd) entering and 50% ( 647 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 9.5 * (X) - 66.58$$

$$T = 9.5 * 14.360 - 66.580$$

$$T = 69.84$$

$$T = 70 \text{ vehicle trips}$$

with 59% ( 41 vph) entering and 41% ( 29 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$$T = 8.42 * (X)$$

$$T = 8.42 * 14.360$$

$$T = 120.91$$

$$T = 121 \text{ vehicle trips}$$

with 50% ( 61 vph) entering and 50% ( 60 vph) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$$T = 10.68 * (X)$$

$$T = 10.68 * 14.360$$

$$T = 153.36$$

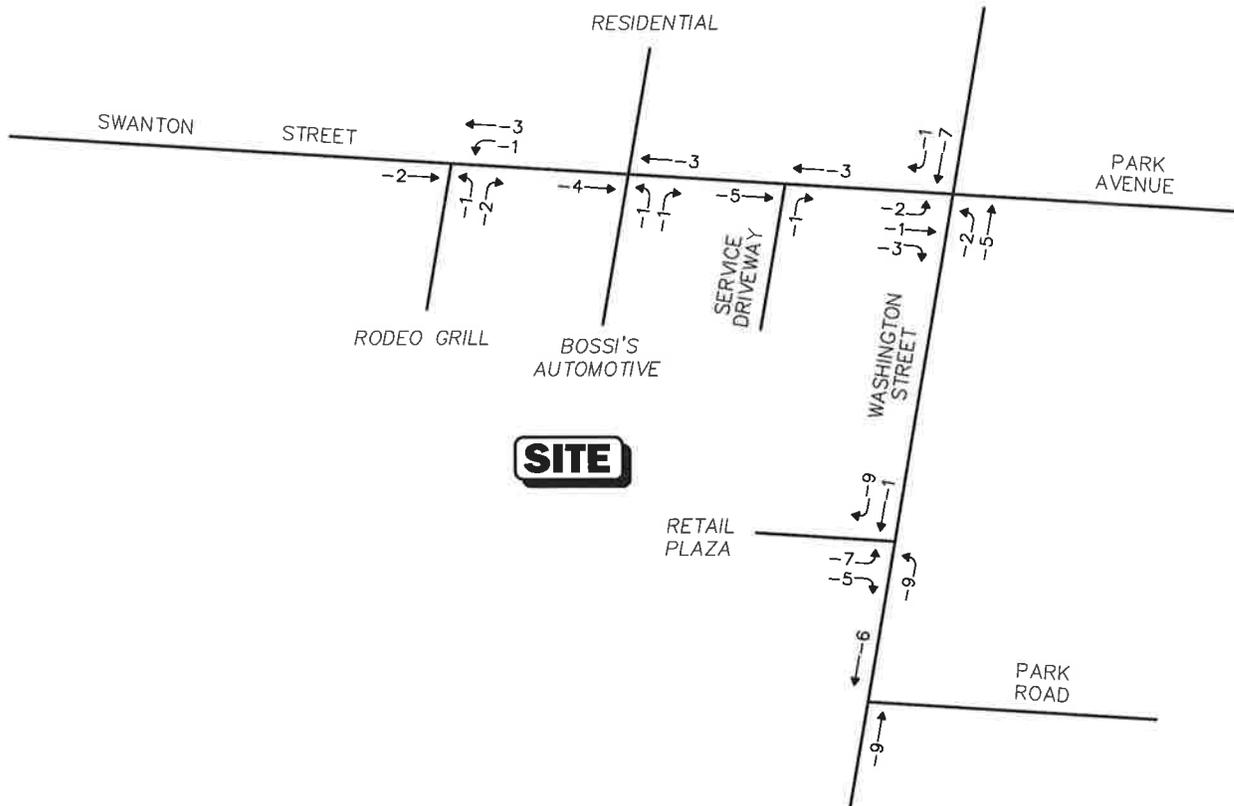
$$T = 153 \text{ vehicle trips}$$

with 49% ( 75 vph) entering and 51% ( 78 vph) exiting.

REMOVAL OF EXISTING SITE TRAFFIC NETWORKS

---

**WEEKDAY MORNING PEAK HOUR**



 Not To Scale

**Figure A-4**

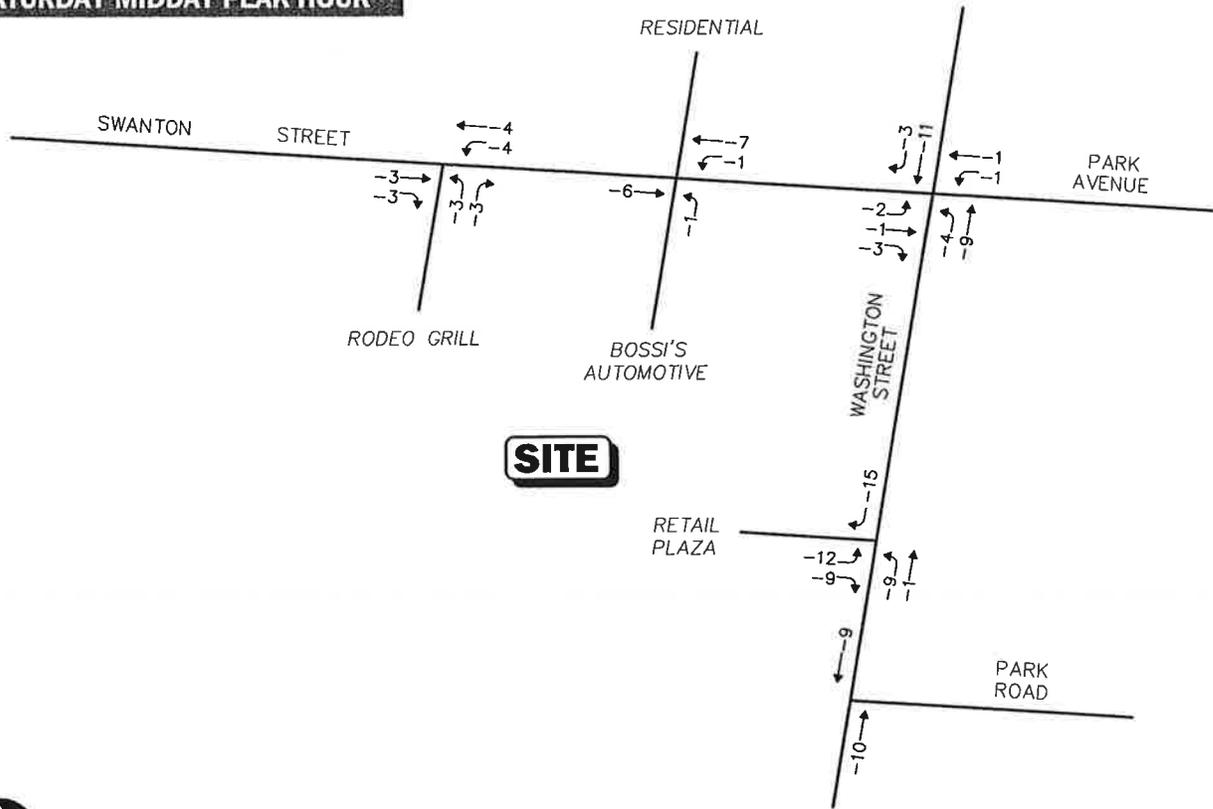


**Removal of Existing Site Trips  
Peak Hour Traffic Volumes**

**WEEKDAY EVENING PEAK HOUR**



**SATURDAY MIDDAY PEAK HOUR**



Not To Scale

**Figure A-5**



**Removal of Existing Site Trips  
Peak Hour Traffic Volumes**

CAPACITY ANALYSIS WORKSHEETS

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Washington Street at Swanton Street and Park Avenue

Washington Street at the Site Driveway

Washington Street at Park Road

Swanton Street at Bossi's Automotive Driveway

Swanton Street at the Site Driveway/Rodeo Restaurant Driveway

Washington Street at Swanton Street and Park Avenue

---

2012 Existing Weekday Morning Peak Hour  
3: Swanton Street & Washington St

Queues  
4/25/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↗	↖		↕	
Volume (vph)	79	81	81	145	56	369	9	561	
Lane Group Flow (vph)	0	251	0	293	62	416	0	780	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	22.0	22.0	22.0	22.0	12.0	42.0	30.0	30.0	16.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	15.0%	52.5%	37.5%	37.5%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.65		0.76	0.16	0.40		0.92	
Control Delay		33.0		38.9	9.7	11.3		41.0	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		33.0		38.9	9.7	11.3		41.0	
Queue Length 50th (ft)		83		101	9	75		~343	
Queue Length 95th (ft)		#248		#260	40	232		#769	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		394		394	382	1031		844	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.64		0.74	0.16	0.40		0.92	

**Intersection Summary**

Cycle Length: 80

Actuated Cycle Length: 67.7

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

2012 Existing Weekday Morning Peak Hour  
3: Swanton Street & Washington St

Queues  
4/25/2013

Splits and Phases: 3: Swanton Street & Washington St

 ø2	 ø3	 ø4
42 s	16 s	22 s
 ø5	 ø6	
12 s	30 s	

2012 Existing Weekday Morning Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/25/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	81	66	81	145	14	56	369	5	9	561	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.96			0.99		1.00	1.00			0.97	
Flt Protected		0.98			0.98		0.95	1.00			1.00	
Satd. Flow (prot)		1854			1792		1805	1815			1828	
Flt Permitted		0.73			0.76		0.20	1.00			0.99	
Satd. Flow (perm)		1386			1387		371	1815			1818	
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	88	90	73	99	177	17	62	410	6	10	610	160
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	251	0	0	293	0	62	416	0	0	780	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		16.9			16.9		38.9	38.9			29.4	
Effective Green, g (s)		18.9			18.9		40.9	40.9			31.4	
Actuated g/C Ratio		0.26			0.26		0.56	0.56			0.43	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		357			357		314	1011			778	
v/s Ratio Prot							0.01	c0.23				
v/s Ratio Perm		0.18			c0.21		0.10				c0.43	
v/c Ratio		0.70			0.82		0.20	0.41			1.00	
Uniform Delay, d1		24.7			25.7		11.1	9.3			21.0	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		6.2			14.0		0.3	1.2			32.9	
Delay (s)		30.9			39.7		11.4	10.6			53.9	
Level of Service		C			D		B	B			D	
Approach Delay (s)		30.9			39.7			10.7			53.9	
Approach LOS		C			D			B			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			36.9			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			73.4			Sum of lost time (s)		17.6				
Intersection Capacity Utilization			69.4%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

2012 Existing Weekday Evening Peak Hour  
3: Swanton Street & Washington St

Queues  
4/25/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↗	↖		↕	
Volume (vph)	132	125	10	159	66	551	5	409	
Lane Group Flow (vph)	0	337	0	195	76	651	0	587	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	26.0	26.0	26.0	26.0	12.0	38.0	26.0	26.0	16.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	15.0%	47.5%	32.5%	32.5%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.79		0.36	0.22	0.73		0.90	
Control Delay		40.0		23.4	14.7	23.9		46.1	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		40.0		23.4	14.7	23.9		46.1	
Queue Length 50th (ft)		108		53	13	170		217	
Queue Length 95th (ft)		#325		144	49	#488		#556	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		463		589	349	894		655	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.73		0.33	0.22	0.73		0.90	

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 70.6  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Swanton Street & Washington St

↑ ø2 38 s	↖ ø3 16 s	↔ ø4 26 s
↙ ø5 12 s	↓ ø6 26 s	

2012 Existing Weekday Evening Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/25/2013

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	132	125	63	10	159	10	66	551	16	5	409	97	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12	
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0		
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00		
Frt		0.97			0.99		1.00	1.00			0.97		
Flt Protected		0.98			1.00		0.95	1.00			1.00		
Satd. Flow (prot)		1873			1800		1805	1811			1829		
Flt Permitted		0.72			0.98		0.19	1.00			0.99		
Satd. Flow (perm)		1385			1766		370	1811			1817		
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	139	132	66	11	173	11	76	633	18	6	470	111	
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0	
Lane Group Flow (vph)	0	337	0	0	195	0	76	651	0	0	587	0	
Heavy Vehicles (%)	0%	0%	0%	17%	0%	0%	0%	1%	0%	0%	1%	2%	
Turn Type	Perm			Perm			pm+pt			Perm			
Protected Phases		4			4		5	2				6	
Permitted Phases	4			4			2			6			
Actuated Green, G (s)		19.8			19.8		34.1	34.1				23.4	
Effective Green, g (s)		21.8			21.8		36.1	36.1				25.4	
Actuated g/C Ratio		0.29			0.29		0.49	0.49				0.34	
Clearance Time (s)		5.0			5.0		6.0	6.0				6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0				3.0	
Lane Grp Cap (vph)		406			518		309	880				621	
v/s Ratio Prot							0.02	c0.36					
v/s Ratio Perm		c0.24			0.11		0.10					c0.32	
v/c Ratio		0.83			0.38		0.25	0.74				0.95	
Uniform Delay, d1		24.5			20.9		13.5	15.3				23.8	
Progression Factor		1.00			1.00		1.00	1.00				1.00	
Incremental Delay, d2		13.4			0.5		0.4	5.6				24.9	
Delay (s)		37.9			21.3		13.9	20.9				48.7	
Level of Service		D			C		B	C				D	
Approach Delay (s)		37.9			21.3			20.1				48.7	
Approach LOS		D			C			C				D	

Intersection Summary

HCM Average Control Delay	32.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	20.4
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

2012 Existing Saturday Midday Peak Hour  
3: Swanton Street & Washington St

Queues  
4/25/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↙	↘		↕	
Volume (vph)	150	120	10	127	111	431	5	382	
Lane Group Flow (vph)	0	408	0	156	122	483	0	594	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	25.0	25.0	25.0	25.0	12.0	39.0	27.0	27.0	16.0
Total Split (%)	31.3%	31.3%	31.3%	31.3%	15.0%	48.8%	33.8%	33.8%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.85		0.27	0.33	0.51		0.87	
Control Delay		41.9		20.2	12.7	14.7		38.5	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		41.9		20.2	12.7	14.7		38.5	
Queue Length 50th (ft)		141		43	21	106		215	
Queue Length 95th (ft)		#412		120	74	301		#562	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		481		582	373	944		686	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.85		0.27	0.33	0.51		0.87	

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 68  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Swanton Street & Washington St

↑ ø2 39 s	↙ ø3 16 s	↔ ø4 25 s
↖ ø5 12 s	↓ ø6 27 s	

2012 Existing Saturday Midday Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/25/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	120	110	10	127	5	111	431	8	5	382	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.96			1.00		1.00	1.00			0.96	
Flt Protected		0.98			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1850			1822		1805	1814			1815	
Flt Permitted		0.78			0.97		0.21	1.00			0.99	
Satd. Flow (perm)		1469			1777		395	1814			1806	
Peak-hour factor, PHF	0.93	0.93	0.93	0.91	0.91	0.91	0.91	0.91	0.91	0.88	0.88	0.80
Adj. Flow (vph)	161	129	118	11	140	5	122	474	9	6	434	154
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	408	0	0	156	0	122	483	0	0	594	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		20.2			20.2		34.6	34.6			23.8	
Effective Green, g (s)		22.2			22.2		36.6	36.6			25.8	
Actuated g/C Ratio		0.31			0.31		0.51	0.51			0.36	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		450			545		332	917			644	
v/s Ratio Prot							0.03	c0.27				
v/s Ratio Perm		c0.28			0.09		0.15				c0.33	
v/c Ratio		0.91			0.29		0.37	0.53			0.92	
Uniform Delay, d1		24.1			19.1		12.7	12.1			22.3	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		21.6			0.3		0.7	2.2			20.8	
Delay (s)		45.7			19.4		13.4	14.2			43.1	
Level of Service		D			B		B	B			D	
Approach Delay (s)		45.7			19.4			14.1			43.1	
Approach LOS		D			B			B			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			31.6				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			72.4				Sum of lost time (s)		17.6			
Intersection Capacity Utilization			93.2%				ICU Level of Service		F			
Analysis Period (min)			15									
c	Critical Lane Group											

2017 No-Build Weekday Morning Peak Hour  
3: Swanton Street & Washington St

Queues  
4/25/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↗	↖		↕	
Volume (vph)	83	85	85	152	60	390	9	592	
Lane Group Flow (vph)	0	265	0	307	67	439	0	820	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	22.0	22.0	22.0	22.0	12.0	42.0	30.0	30.0	16.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	15.0%	52.5%	37.5%	37.5%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.68		0.80	0.18	0.43		0.98	
Control Delay		34.9		42.2	9.9	11.6		50.5	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		34.9		42.2	9.9	11.6		50.5	
Queue Length 50th (ft)		89		107	10	80		~376	
Queue Length 95th (ft)		#268		#281	42	249		#815	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		388		386	368	1027		841	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.68		0.80	0.18	0.43		0.98	

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 68  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

2017 No-Build Weekday Morning Peak Hour  
 3: Swanton Street & Washington St

Queues  
 4/25/2013

Splits and Phases: 3: Swanton Street & Washington St

 ø2 42 s		 ø3 16 s		 ø4 22 s	
 ø5 12 s	 ø6 30 s				

2017 No-Build Weekday Morning Peak Hour HCM Signalized Intersection Capacity Analysis  
 3: Swanton Street & Washington St 4/25/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	85	71	85	152	15	60	390	5	9	592	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.96			0.99		1.00	1.00			0.97	
Flt Protected		0.98			0.98		0.95	1.00			1.00	
Satd. Flow (prot)		1852			1792		1805	1815			1829	
Flt Permitted		0.73			0.75		0.18	1.00			0.99	
Satd. Flow (perm)		1369			1364		342	1815			1818	
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	92	94	79	104	185	18	67	433	6	10	643	167
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	265	0	0	307	0	67	439	0	0	820	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		17.2			17.2		38.9	38.9			29.4	
Effective Green, g (s)		19.2			19.2		40.9	40.9			31.4	
Actuated g/C Ratio		0.26			0.26		0.55	0.55			0.43	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		357			355		299	1007			775	
v/s Ratio Prot							0.02	c0.24				
v/s Ratio Perm		0.19			c0.23		0.11				c0.45	
v/c Ratio		0.74			0.86		0.22	0.44			1.06	
Uniform Delay, d1		25.0			26.0		11.6	9.6			21.2	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		8.1			19.1		0.4	1.4			48.8	
Delay (s)		33.1			45.2		12.0	11.0			69.9	
Level of Service		C			D		B	B			E	
Approach Delay (s)		33.1			45.2			11.1			69.9	
Approach LOS		C			D			B			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			45.1			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.94									
Actuated Cycle Length (s)			73.7			Sum of lost time (s)		17.6				
Intersection Capacity Utilization			72.4%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

2017 No-Build Weekday Evening Peak Hour  
3: Swanton Street & Washington St

Queues  
4/24/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↗	↖		↕	
Volume (vph)	139	131	11	167	71	607	5	444	
Lane Group Flow (vph)	0	356	0	206	82	718	0	633	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	26.0	26.0	26.0	26.0	12.0	38.0	26.0	26.0	16.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	15.0%	47.5%	32.5%	32.5%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.81		0.36	0.26	0.82		0.99	
Control Delay		42.3		23.3	15.2	28.9		63.2	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		42.3		23.3	15.2	28.9		63.2	
Queue Length 50th (ft)		117		57	14	198		~248	
Queue Length 95th (ft)		#351		152	53	#566		#609	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		447		576	319	877		639	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.80		0.36	0.26	0.82		0.99	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 71.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

2017 No-Build Weekday Evening Peak Hour  
 3: Swanton Street & Washington St

Queues  
 4/24/2013

Splits and Phases: 3: Swanton Street & Washington St

 ø2 38 s		 ø3 16 s		 ø4 26 s	
 ø5 12 s	 ø6 26 s				

2017 No-Build Weekday Evening Peak Hour HCM Signalized Intersection Capacity Analysis  
 3: Swanton Street & Washington St 4/24/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗			↕	
Volume (vph)	139	131	68	11	167	11	71	607	17	5	444	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.97			0.99		1.00	1.00			0.98	
Flt Protected		0.98			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1871			1799		1805	1811			1830	
Flt Permitted		0.72			0.98		0.16	1.00			0.99	
Satd. Flow (perm)		1366			1762		308	1811			1818	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	146	138	72	12	182	12	82	698	20	6	510	117
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	356	0	0	206	0	82	718	0	0	633	0
Heavy Vehicles (%)	0%	0%	0%	17%	0%	0%	0%	1%	0%	0%	1%	2%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		21.0			21.0		33.9	33.9			23.2	
Effective Green, g (s)		23.0			23.0		35.9	35.9			25.2	
Actuated g/C Ratio		0.31			0.31		0.48	0.48			0.33	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		417			537		280	862			608	
v/s Ratio Prot							0.03	c0.40				
v/s Ratio Perm		c0.26			0.12		0.11				c0.35	
v/c Ratio		0.85			0.38		0.29	0.83			1.04	
Uniform Delay, d1		24.6			20.6		14.6	17.1			25.1	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		15.5			0.5		0.6	9.3			47.6	
Delay (s)		40.1			21.1		15.1	26.4			72.7	
Level of Service		D			C		B	C			E	
Approach Delay (s)		40.1			21.1			25.3			72.7	
Approach LOS		D			C			C			E	

Intersection Summary			
HCM Average Control Delay	42.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	75.4	Sum of lost time (s)	20.5
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

2017 No-Build Saturday Midday Peak Hour  
3: Swanton Street & Washington St

Queues  
4/24/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↙	↘		↕	
Volume (vph)	158	126	12	133	119	480	5	429	
Lane Group Flow (vph)	0	432	0	164	131	536	0	655	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	25.0	25.0	25.0	25.0	12.0	39.0	27.0	27.0	16.0
Total Split (%)	31.3%	31.3%	31.3%	31.3%	15.0%	48.8%	33.8%	33.8%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.92		0.28	0.37	0.57		0.95	
Control Delay		51.2		20.4	13.4	15.7		50.7	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		51.2		20.4	13.4	15.7		50.7	
Queue Length 50th (ft)		155		45	23	122		~253	
Queue Length 95th (ft)		#446		125	78	346		#635	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		471		578	351	944		687	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.92		0.28	0.37	0.57		0.95	

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 68  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Swanton Street & Washington St

 ø2	 ø3	 ø4
39 s	16 s	25 s
 ø5	 ø6	
12 s	27 s	

2017 No-Build Saturday Midday Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/24/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖			↕	
Volume (vph)	158	126	118	12	133	5	119	480	8	5	429	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Fr <sub>t</sub>		0.96			1.00		1.00	1.00			0.97	
Fl <sub>t</sub> Protected		0.98			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1849			1822		1805	1814			1818	
Fl <sub>t</sub> Permitted		0.76			0.97		0.18	1.00			0.99	
Satd. Flow (perm)		1440			1765		338	1814			1809	
Peak-hour factor, PHF	0.93	0.93	0.93	0.91	0.91	0.91	0.91	0.91	0.91	0.88	0.88	0.80
Adj. Flow (vph)	170	135	127	13	146	5	131	527	9	6	488	161
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	432	0	0	164	0	131	536	0	0	655	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		20.2			20.2		34.6	34.6			23.8	
Effective Green, g (s)		22.2			22.2		36.6	36.6			25.8	
Actuated g/C Ratio		0.31			0.31		0.51	0.51			0.36	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		442			541		309	917			645	
v/s Ratio Prot							0.04	c0.30				
v/s Ratio Perm		c0.30			0.09		0.17				c0.36	
v/c Ratio		0.98			0.30		0.42	0.58			1.02	
Uniform Delay, d <sub>1</sub>		24.9			19.2		13.3	12.6			23.3	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d <sub>2</sub>		36.5			0.3		0.9	2.7			39.4	
Delay (s)		61.4			19.5		14.2	15.3			62.7	
Level of Service		E			B		B	B			E	
Approach Delay (s)		61.4			19.5			15.1			62.7	
Approach LOS		E			B			B			E	

Intersection Summary			
HCM Average Control Delay	42.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	17.6
Intersection Capacity Utilization	100.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2017 Build Weekday Morning Peak Hour  
3: Swanton Street & Washington St

Queues  
4/24/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↖	↗		↕	
Volume (vph)	85	85	85	154	58	388	9	591	
Lane Group Flow (vph)	0	264	0	310	64	437	0	824	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	22.0	22.0	22.0	22.0	12.0	42.0	30.0	30.0	16.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	15.0%	52.5%	37.5%	37.5%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.69		0.80	0.17	0.43		0.98	
Control Delay		35.3		42.4	9.8	11.6		51.7	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		35.3		42.4	9.8	11.6		51.7	
Queue Length 50th (ft)		89		109	9	80		~379	
Queue Length 95th (ft)		#269		#283	41	246		#821	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		383		388	367	1027		840	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.69		0.80	0.17	0.43		0.98	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 68

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Swanton Street & Washington St

 ø2 42 s		 ø3 16 s		 ø4 22 s	
 ø5 12 s	 ø6 30 s				

2017 Build Weekday Morning Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/24/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	85	68	85	154	15	58	388	5	9	591	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.96			0.99		1.00	1.00			0.97	
Flt Protected		0.98			0.98		0.95	1.00			1.00	
Satd. Flow (prot)		1854			1792		1805	1815			1827	
Flt Permitted		0.72			0.75		0.18	1.00			0.99	
Satd. Flow (perm)		1353			1373		339	1815			1817	
Peak-hour factor, PHF	0.90	0.90	0.90	0.82	0.82	0.82	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	94	94	76	104	188	18	64	431	6	10	642	172
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	264	0	0	310	0	64	437	0	0	824	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		17.2			17.2		38.9	38.9			29.4	
Effective Green, g (s)		19.2			19.2		40.9	40.9			31.4	
Actuated g/C Ratio		0.26			0.26		0.55	0.55			0.43	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		352			358		298	1007			774	
v/s Ratio Prot							0.02	c0.24				
v/s Ratio Perm		0.20			c0.23		0.10				c0.45	
v/c Ratio		0.75			0.87		0.21	0.43			1.06	
Uniform Delay, d1		25.0			26.0		11.6	9.6			21.2	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		8.7			19.1		0.4	1.4			50.9	
Delay (s)		33.7			45.2		12.0	11.0			72.1	
Level of Service		C			D		B	B			E	
Approach Delay (s)		33.7			45.2			11.1			72.1	
Approach LOS		C			D			B			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			46.3				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			73.7				Sum of lost time (s)			17.6		
Intersection Capacity Utilization			72.7%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

2017 Build Weekday Evening Peak Hour  
3: Swanton Street & Washington St

Queues  
4/24/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↙	↘		↕	
Volume (vph)	145	132	11	167	61	604	5	444	
Lane Group Flow (vph)	0	360	0	206	70	714	0	636	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	26.0	26.0	26.0	26.0	12.0	38.0	26.0	26.0	16.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	15.0%	47.5%	32.5%	32.5%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.83		0.36	0.21	0.82		0.91	
Control Delay		44.2		23.2	14.7	29.0		46.0	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		44.2		23.2	14.7	29.0		46.0	
Queue Length 50th (ft)		120		57	12	197		~251	
Queue Length 95th (ft)		#362		152	46	#562		#614	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		434		574	337	871		702	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.83		0.36	0.21	0.82		0.91	

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 72

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Swanton Street & Washington St

 ø2 38 s	 ø3 16 s	 ø4 26 s
 ø5 12 s	 ø6 26 s	

2017 Build Weekday Evening Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/24/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	132	65	11	167	11	61	604	17	5	444	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.97			0.99		1.00	1.00			0.97	
Flt Protected		0.98			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1873			1799		1805	1811			1829	
Flt Permitted		0.70			0.98		0.19	1.00			0.99	
Satd. Flow (perm)		1335			1762		361	1811			1817	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	153	139	68	12	182	12	70	694	20	6	510	120
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	360	0	0	206	0	70	714	0	0	636	0
Heavy Vehicles (%)	0%	0%	0%	17%	0%	0%	0%	1%	0%	0%	1%	2%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		21.4			21.4		35.2	35.2			25.8	
Effective Green, g (s)		23.4			23.4		37.2	37.2			27.8	
Actuated g/C Ratio		0.30			0.30		0.48	0.48			0.36	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		405			535		275	874			655	
v/s Ratio Prot							0.02	c0.39				
v/s Ratio Perm		c0.27			0.12		0.10				c0.35	
v/c Ratio		0.89			0.39		0.25	0.82			0.97	
Uniform Delay, d1		25.6			21.2		14.2	17.0			24.3	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		20.4			0.5		0.5	8.3			28.7	
Delay (s)		46.0			21.6		14.7	25.4			53.0	
Level of Service		D			C		B	C			D	
Approach Delay (s)		46.0			21.6			24.4			53.0	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	20.5
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

2017 Build Saturday Midday Peak Hour  
 3: Swanton Street & Washington St

Queues  
 4/24/2013



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	ø3
Lane Configurations		↕		↕	↙	↘		↕	
Volume (vph)	168	128	11	135	115	480	5	429	
Lane Group Flow (vph)	0	443	0	165	126	536	0	662	
Turn Type	Perm		Perm		pm+pt		Perm		
Protected Phases		4		4	5	2		6	3
Permitted Phases	4		4		2		6		
Detector Phase	4	4	4	4	5	2	6	6	
Switch Phase									
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	15.0	15.0	15.0	4.0
Minimum Split (s)	11.0	11.0	11.0	11.0	12.0	21.0	21.0	21.0	16.0
Total Split (s)	25.0	25.0	25.0	25.0	12.0	39.0	27.0	27.0	16.0
Total Split (%)	31.3%	31.3%	31.3%	31.3%	15.0%	48.8%	33.8%	33.8%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	3.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5
Lost Time Adjust (s)	0.0	-2.0	0.0	-2.0	-2.0	-2.0	0.0	-2.0	
Total Lost Time (s)	5.0	3.0	5.0	3.0	4.0	4.0	6.0	4.0	
Lead/Lag	Lag	Lag	Lag	Lag	Lead		Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes					Yes
Recall Mode	None	None	None	None	None	Max	Max	Max	None
v/c Ratio		0.95		0.28	0.36	0.57		0.96	
Control Delay		58.7		20.4	13.3	15.7		52.9	
Queue Delay		0.0		0.0	0.0	0.0		0.0	
Total Delay		58.7		20.4	13.3	15.7		52.9	
Queue Length 50th (ft)		161		46	22	122		~262	
Queue Length 95th (ft)		#464		125	76	346		#643	
Internal Link Dist (ft)		84		252		78		149	
Turn Bay Length (ft)					150				
Base Capacity (vph)		464		580	349	944		687	
Starvation Cap Reductn		0		0	0	0		0	
Spillback Cap Reductn		0		0	0	0		0	
Storage Cap Reductn		0		0	0	0		0	
Reduced v/c Ratio		0.95		0.28	0.36	0.57		0.96	

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 68  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Swanton Street & Washington St

 ø2 39 s		 ø3 16 s		 ø4 25 s	
 ø5 12 s	 ø6 27 s				

2017 Build Saturday Midday Peak Hour  
3: Swanton Street & Washington St

HCM Signalized Intersection Capacity Analysis  
4/24/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖			↕	
Volume (vph)	168	128	115	11	135	5	115	480	8	5	429	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	11	11	11	12	11	11	12	12	12
Total Lost time (s)		3.0			3.0		4.0	4.0			4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.96			1.00		1.00	1.00			0.97	
Flt Protected		0.98			1.00		0.95	1.00			1.00	
Satd. Flow (prot)		1851			1823		1805	1814			1816	
Flt Permitted		0.75			0.97		0.17	1.00			0.99	
Satd. Flow (perm)		1418			1771		332	1814			1807	
Peak-hour factor, PHF	0.93	0.93	0.93	0.91	0.91	0.91	0.91	0.91	0.91	0.88	0.88	0.80
Adj. Flow (vph)	181	138	124	12	148	5	126	527	9	6	488	168
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	443		0	165		0	536		0	662	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)		20.2			20.2		34.6	34.6			23.8	
Effective Green, g (s)		22.2			22.2		36.6	36.6			25.8	
Actuated g/C Ratio		0.31			0.31		0.51	0.51			0.36	
Clearance Time (s)		5.0			5.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		435			543		306	917			644	
v/s Ratio Prot							0.04	c0.30				
v/s Ratio Perm		c0.31			0.09		0.17				c0.37	
v/c Ratio		1.02			0.30		0.41	0.58			1.03	
Uniform Delay, d1		25.1			19.2		13.3	12.6			23.3	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		47.9			0.3		0.9	2.7			42.8	
Delay (s)		73.0			19.5		14.2	15.3			66.1	
Level of Service		E			B		B	B			E	
Approach Delay (s)		73.0			19.5			15.1			66.1	
Approach LOS		E			B			B			E	

Intersection Summary			
HCM Average Control Delay	46.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	17.6
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Washington Street at the Site Driveway

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2012 Existing Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 11: Retail Driveway & Washington St

4/25/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	
Volume (veh/h)	4	3	7	426	703	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	5	4	8	473	764	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.59	0.59	0.59			
vC, conflicting volume	1256	767	770			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1089	266	271			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	160	486	775			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	9	481	770
Volume Left	5	8	0
Volume Right	4	0	5
cSH	224	775	1700
Volume to Capacity	0.04	0.01	0.45
Queue Length 95th (ft)	3	1	0
Control Delay (s)	21.7	0.3	0.0
Lane LOS	C	A	
Approach Delay (s)	21.7	0.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		47.3%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2012 Existing Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 11: Retail Dwy & Washington St 4/25/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	5	3	626	476	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	14	10	3	720	547	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.70	0.70	0.70			
vC, conflicting volume	1277	551	554			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1182	145	150			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	98	100			
cM capacity (veh/h)	169	654	1012			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	24	723	554
Volume Left	14	3	0
Volume Right	10	0	7
cSH	244	1012	1700
Volume to Capacity	0.10	0.00	0.33
Queue Length 95th (ft)	8	0	0
Control Delay (s)	21.4	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	21.4	0.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		45.3%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2012 Existing Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 11: Retail Driveway & Washington St 4/25/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	4	545	494	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.84	0.84	0.94	0.94
Hourly flow rate (vph)	8	8	5	649	526	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (ft)					158	
pX, platoon unblocked	0.72	0.72	0.72			
vC, conflicting volume	1188	530	534			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1064	144	150			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	100			
cM capacity (veh/h)	200	669	1033			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	16	654	534
Volume Left	8	5	0
Volume Right	8	0	9
cSH	307	1033	1700
Volume to Capacity	0.05	0.00	0.31
Queue Length 95th (ft)	4	0	0
Control Delay (s)	17.3	0.1	0.0
Lane LOS	C	A	
Approach Delay (s)	17.3	0.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		41.9%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 11: Retail Driveway & Washington St 4/25/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	5	9	448	739	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	9	7	10	498	803	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.59	0.59	0.59			
vC, conflicting volume	1326	808	813			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1205	329	337			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	99	99			
cM capacity (veh/h)	137	452	729			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	16	508	813
Volume Left	9	10	0
Volume Right	7	0	10
cSH	192	729	1700
Volume to Capacity	0.08	0.01	0.48
Queue Length 95th (ft)	7	1	0
Control Delay (s)	25.4	0.4	0.0
Lane LOS	D	A	
Approach Delay (s)	25.4	0.4	0.0
Approach LOS	D		

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		49.4%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 11: Retail Dwy & Washington St

4/24/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↑	
Volume (veh/h)	14	9	8	681	511	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	28	18	9	783	587	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.68	0.68	0.68			
vC, conflicting volume	1395	594	601			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1346	169	179			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	97	99			
cM capacity (veh/h)	132	619	959			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	46	792	601
Volume Left	28	9	0
Volume Right	18	0	14
cSH	191	959	1700
Volume to Capacity	0.24	0.01	0.35
Queue Length 95th (ft)	23	1	0
Control Delay (s)	29.8	0.3	0.0
Lane LOS	D	A	
Approach Delay (s)	29.8	0.3	0.0
Approach LOS	D		

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization		52.2%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 11: Retail Driveway & Washington St 4/24/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↓	
Volume (veh/h)	12	9	9	595	544	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.84	0.84	0.94	0.94
Hourly flow rate (vph)	19	14	11	708	579	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.67	0.67	0.67			
vC, conflicting volume	1316	587	595			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1227	142	154			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	98	99			
cM capacity (veh/h)	152	630	968			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	33	719	595
Volume Left	19	11	0
Volume Right	14	0	16
cSH	225	968	1700
Volume to Capacity	0.15	0.01	0.35
Queue Length 95th (ft)	13	1	0
Control Delay (s)	23.8	0.3	0.0
Lane LOS	C	A	
Approach Delay (s)	23.8	0.3	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		48.5%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Weekday Morning Peak Hour  
11: Site Driveway & Washington St

HCM Unsignalized Intersection Capacity Analysis  
4/24/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘ ↙			↕	↕	
Volume (veh/h)	5	11	13	446	734	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	7	15	14	496	798	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.59	0.59	0.59			
vC, conflicting volume	1328	803	809			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1208	321	330			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	97	98			
cM capacity (veh/h)	135	456	733			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	21	510	809
Volume Left	7	14	0
Volume Right	15	0	11
cSH	262	733	1700
Volume to Capacity	0.08	0.02	0.48
Queue Length 95th (ft)	7	2	0
Control Delay (s)	20.0	0.6	0.0
Lane LOS	C	A	
Approach Delay (s)	20.0	0.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		49.2%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Weekday Evening Peak Hour  
11: Site Driveway & Washington St

HCM Unsignalized Intersection Capacity Analysis  
4/24/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	12	20	21	670	507	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.50	0.50	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	24	40	24	770	583	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.67	0.67	0.67			
vC, conflicting volume	1409	590	598			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1364	143	154			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	94	97			
cM capacity (veh/h)	125	627	964			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	64	794	598
Volume Left	24	24	0
Volume Right	40	0	15
cSH	250	964	1700
Volume to Capacity	0.26	0.03	0.35
Queue Length 95th (ft)	25	2	0
Control Delay (s)	24.3	0.7	0.0
Lane LOS	C	A	
Approach Delay (s)	24.3	0.7	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		62.2%	ICU Level of Service B
Analysis Period (min)		15	

\* User Entered Value

2017 Build Saturday Midday Peak Hour  
11: Site Driveway & Washington St

HCM Unsignalized Intersection Capacity Analysis  
4/24/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑	↓	
Volume (veh/h)	15	25	26	588	539	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.84	0.84	0.94	0.94
Hourly flow rate (vph)	24	40	31	700	573	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					158	
pX, platoon unblocked	0.67	0.67	0.67			
vC, conflicting volume	1344	582	590			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1268	135	148			
tC, single (s)	*6.0	*5.5	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	94	97			
cM capacity (veh/h)	141	635	973			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	63	731	590
Volume Left	24	31	0
Volume Right	40	0	17
cSH	274	973	1700
Volume to Capacity	0.23	0.03	0.35
Queue Length 95th (ft)	22	2	0
Control Delay (s)	22.0	0.8	0.0
Lane LOS	C	A	
Approach Delay (s)	22.0	0.8	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		62.1%	ICU Level of Service B
Analysis Period (min)		15	

\* User Entered Value

Washington Street at Park Road

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2012 Existing Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 13: Park Rd & Washington St

4/25/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	3	3	430	0	3	703
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	4	4	478	0	3	764
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.60					
vC, conflicting volume	1248	478			478	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1083	478			478	
tC, single (s)	*6.0	*5.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	165	649			1095	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	478	767
Volume Left	4	0	3
Volume Right	4	0	0
cSH	263	1700	1095
Volume to Capacity	0.03	0.28	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	19.1	0.0	0.1
Lane LOS	C		A
Approach Delay (s)	19.1	0.0	0.1
Approach LOS	C		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		49.4%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2012 Existing Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 13: Park Rd & Washington St 4/25/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↑	↘	↙	↓
Volume (veh/h)	6	3	626	3	1	480
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.67	0.67	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	9	4	720	3	1	552
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.71					
vC, conflicting volume	1275	721			723	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1183	721			723	
tC, single (s)	*6.0	*5.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	99			100	
cM capacity (veh/h)	171	495			889	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	13	723	553
Volume Left	9	0	1
Volume Right	4	3	0
cSH	218	1700	889
Volume to Capacity	0.06	0.43	0.00
Queue Length 95th (ft)	5	0	0
Control Delay (s)	22.6	0.0	0.0
Lane LOS	C		A
Approach Delay (s)	22.6	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		43.1%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2012 Existing Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 13: Park Rd & Washington St 4/25/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↕			↘
Volume (veh/h)	3	0	549	0	1	498
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.84	0.84	0.94	0.94
Hourly flow rate (vph)	8	0	654	0	1	530
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.73					
vC, conflicting volume	1185	654			654	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1070	654			654	
tC, single (s)	*6.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			100	
cM capacity (veh/h)	203	471			943	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	654	531
Volume Left	8	0	1
Volume Right	0	0	0
cSH	203	1700	943
Volume to Capacity	0.04	0.38	0.00
Queue Length 95th (ft)	3	0	0
Control Delay (s)	23.4	0.0	0.0
Lane LOS	C		A
Approach Delay (s)	23.4	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		38.9%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 13: Park Rd & Washington St

4/25/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↑		↘	↓
Volume (veh/h)	3	3	454	0	3	741
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	4	4	504	0	3	805
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.60					
vC, conflicting volume	1316	504			504	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1194	504			504	
tC, single (s)	*6.0	*5.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			100	
cM capacity (veh/h)	142	630			1071	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	504	809
Volume Left	4	0	3
Volume Right	4	0	0
cSH	232	1700	1071
Volume to Capacity	0.03	0.30	0.00
Queue Length 95th (ft)	3	0	0
Control Delay (s)	21.1	0.0	0.1
Lane LOS	C		A
Approach Delay (s)	21.1	0.0	0.1
Approach LOS	C		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		51.4%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 13: Park Rd & Washington St

4/24/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↑			↘
Volume (veh/h)	6	3	686	3	1	519
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.67	0.67	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	9	4	789	3	1	597
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.69					
vC, conflicting volume	1389	790			792	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1339	790			792	
tC, single (s)	*6.0	*5.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	99			100	
cM capacity (veh/h)	136	458			838	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	13	792	598
Volume Left	9	0	1
Volume Right	4	3	0
cSH	178	1700	838
Volume to Capacity	0.08	0.47	0.00
Queue Length 95th (ft)	6	0	0
Control Delay (s)	26.9	0.0	0.0
Lane LOS	D		A
Approach Delay (s)	26.9	0.0	0.0
Approach LOS	D		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		46.3%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 13: Park Rd & Washington St

4/24/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↗			↕
Volume (veh/h)	3	0	604	0	1	552
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.84	0.84	0.94	0.94
Hourly flow rate (vph)	8	0	719	0	1	587
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.69					
vC, conflicting volume	1308	719			719	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1222	719			719	
tC, single (s)	*6.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	158	432			892	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	719	588
Volume Left	8	0	1
Volume Right	0	0	0
cSH	158	1700	892
Volume to Capacity	0.05	0.42	0.00
Queue Length 95th (ft)	4	0	0
Control Delay (s)	29.0	0.0	0.0
Lane LOS	D		A
Approach Delay (s)	29.0	0.0	0.0
Approach LOS	D		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		41.8%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Weekday Morning Peak Hour  
13: Park Rd & Washington St

HCM Unsignalized Intersection Capacity Analysis  
4/24/2013



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↕		↘	↕
Volume (veh/h)	3	3	456	0	3	742
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.75	0.75	0.90	0.90	0.92	0.92
Hourly flow rate (vph)	4	4	507	0	3	807
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.60					
vC, conflicting volume	1320	507			507	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1199	507			507	
tC, single (s)	*6.0	*5.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			100	
cM capacity (veh/h)	141	629			1069	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	507	810
Volume Left	4	0	3
Volume Right	4	0	0
cSH	230	1700	1069
Volume to Capacity	0.03	0.30	0.00
Queue Length 95th (ft)	3	0	0
Control Delay (s)	21.2	0.0	0.1
Lane LOS	C		A
Approach Delay (s)	21.2	0.0	0.1
Approach LOS	C		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		51.4%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Weekday Evening Peak Hour  
13: Park Rd & Washington St

HCM Unsignalized Intersection Capacity Analysis

4/24/2013

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	6	3	688	3	1	526
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.67	0.67	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	9	4	791	3	1	605
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.68					
vC, conflicting volume	1399	793			794	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1352	793			794	
tC, single (s)	*6.0	*5.5			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	99			100	
cM capacity (veh/h)	132	457			836	
<b>Direction, Lane #</b>						
	WB 1	NB 1	SB 1			
Volume Total	13	794	606			
Volume Left	9	0	1			
Volume Right	4	3	0			
cSH	173	1700	836			
Volume to Capacity	0.08	0.47	0.00			
Queue Length 95th (ft)	6	0	0			
Control Delay (s)	27.5	0.0	0.0			
Lane LOS	D		A			
Approach Delay (s)	27.5	0.0	0.0			
Approach LOS	D					
<b>Intersection Summary</b>						
Average Delay			0.3			
Intersection Capacity Utilization			46.4%		ICU Level of Service	A
Analysis Period (min)			15			

\* User Entered Value



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙		↑		↘	↓
Volume (veh/h)	3	0	614	0	1	563
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.84	0.84	0.94	0.94
Hourly flow rate (vph)	8	0	731	0	1	599
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						242
pX, platoon unblocked	0.69					
vC, conflicting volume	1332	731			731	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1257	731			731	
tC, single (s)	*6.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	152	425			883	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	731	600
Volume Left	8	0	1
Volume Right	0	0	0
cSH	152	1700	883
Volume to Capacity	0.05	0.43	0.00
Queue Length 95th (ft)	4	0	0
Control Delay (s)	30.0	0.0	0.0
Lane LOS	D		A
Approach Delay (s)	30.0	0.0	0.0
Approach LOS	D		

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		42.3%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

Swanton Street at Bossi's Automotive Driveway

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2012 Existing Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 6: Swanton Street & Bossi's Automotive 4/25/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	222	0	0	348	0	1	0	1	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.82	0.82	0.82	0.50	0.50	0.50	0.50	0.50	0.50
Hourly flow rate (vph)	2	247	0	0	424	0	2	0	2	4	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					164							
pX, platoon unblocked	0.91						0.91	0.91		0.91	0.91	0.91
vC, conflicting volume	424			247			676	676	247	678	676	424
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	324			247			599	599	247	601	599	324
tC, single (s)	4.1			4.1			*6.0	6.5	*5.5	*6.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	100	100
cM capacity (veh/h)	1141			1331			457	382	836	455	382	660
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	249	424	4	4								
Volume Left	2	0	2	4								
Volume Right	0	0	2	0								
cSH	1141	1331	591	455								
Volume to Capacity	0.00	0.00	0.01	0.01								
Queue Length 95th (ft)	0	0	1	1								
Control Delay (s)	0.1	0.0	11.1	13.0								
Lane LOS	A		B	B								
Approach Delay (s)	0.1	0.0	11.1	13.0								
Approach LOS			B	B								
<b>Intersection Summary</b>												
Average Delay			0.2									
Intersection Capacity Utilization			28.3%		ICU Level of Service				A			
Analysis Period (min)			15									

\* User Entered Value

2012 Existing Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 6: Swanton Street & Bossi's Automotive 4/25/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	320	1	3	319	0	4	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.33	0.33	0.33	0.92	0.92	0.92
Hourly flow rate (vph)	0	337	1	3	347	0	12	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					164							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	347			338			691	691	337	691	691	347
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	250			338			623	623	337	623	624	250
tC, single (s)	4.1			4.4			*6.0	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.7	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	100	100	100	100
cM capacity (veh/h)	1225			1067			427	373	709	370	372	732
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	338	350	12	0								
Volume Left	0	3	12	0								
Volume Right	1	0	0	0								
cSH	1225	1067	427	1700								
Volume to Capacity	0.00	0.00	0.03	0.00								
Queue Length 95th (ft)	0	0	2	0								
Control Delay (s)	0.0	0.1	13.7	0.0								
Lane LOS		A	B	A								
Approach Delay (s)	0.0	0.1	13.7	0.0								
Approach LOS			B	A								
<b>Intersection Summary</b>												
Average Delay			0.3									
Intersection Capacity Utilization			29.2%		ICU Level of Service					A		
Analysis Period (min)			15									

\* User Entered Value

2012 Existing Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 6: Swanton Street & Bossi's Automotive 4/25/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	379	0	1	360	0	1	0	0	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.82	0.82	0.82	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	2	436	0	1	439	0	4	0	0	4	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					164							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	439			436			882	882	436	882	882	439
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	349			436			829	829	436	829	829	349
tC, single (s)	4.1			4.1			*6.0	6.5	6.2	*6.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	99	100	100
cM capacity (veh/h)	1126			1135			346	283	625	346	283	644
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	438	440	4	4								
Volume Left	2	1	4	4								
Volume Right	0	0	0	0								
cSH	1126	1135	346	346								
Volume to Capacity	0.00	0.00	0.01	0.01								
Queue Length 95th (ft)	0	0	1	1								
Control Delay (s)	0.1	0.0	15.5	15.5								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.1	0.0	15.5	15.5								
Approach LOS			C	C								
<b>Intersection Summary</b>												
Average Delay			0.2									
Intersection Capacity Utilization			31.4%		ICU Level of Service				A			
Analysis Period (min)			15									

\* User Entered Value

2017 No-Build Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 6: Swanton Street & Bossi's Automotive 4/25/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	235	0	0	366	0	1	0	1	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.82	0.82	0.82	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	2	261	0	0	446	0	4	0	4	8	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					164							
pX, platoon unblocked	0.91						0.91	0.91		0.91	0.91	0.91
vC, conflicting volume	446			261			712	712	261	716	712	446
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	339			261			631	631	261	636	631	339
tC, single (s)	4.1			4.1			*6.0	6.5	*5.5	*6.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	98	100	100
cM capacity (veh/h)	1118			1315			435	363	823	431	363	642
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	263	446	8	8								
Volume Left	2	0	4	8								
Volume Right	0	0	4	0								
cSH	1118	1315	569	431								
Volume to Capacity	0.00	0.00	0.01	0.02								
Queue Length 95th (ft)	0	0	1	1								
Control Delay (s)	0.1	0.0	11.4	13.5								
Lane LOS	A		B	B								
Approach Delay (s)	0.1	0.0	11.4	13.5								
Approach LOS			B	B								
<b>Intersection Summary</b>												
Average Delay			0.3									
Intersection Capacity Utilization			29.3%		ICU Level of Service					A		
Analysis Period (min)			15									

\* User Entered Value

2017 No-Build Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 6: Swanton Street & Bossi's Automotive 4/24/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	338	1	3	337	0	4	0	0	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.33	0.33	0.33	0.92	0.92	0.92
Hourly flow rate (vph)	0	356	1	3	366	0	12	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					164							
pX, platoon unblocked	0.91						0.91	0.91		0.91	0.91	0.91
vC, conflicting volume	366			357			729	729	356	729	730	366
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	261			357			658	658	356	658	658	261
tC, single (s)	4.1			4.4			*6.0	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.7	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	100	100	100	100
cM capacity (veh/h)	1203			1049			406	353	692	347	353	716
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	357	370	12	0								
Volume Left	0	3	12	0								
Volume Right	1	0	0	0								
cSH	1203	1049	406	1700								
Volume to Capacity	0.00	0.00	0.03	0.00								
Queue Length 95th (ft)	0	0	2	0								
Control Delay (s)	0.0	0.1	14.1	0.0								
Lane LOS		A	B	A								
Approach Delay (s)	0.0	0.1	14.1	0.0								
Approach LOS			B	A								
<b>Intersection Summary</b>												
Average Delay			0.3									
Intersection Capacity Utilization			30.1%		ICU Level of Service				A			
Analysis Period (min)			15									

\* User Entered Value

2017 No-Build Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 6: Swanton Street & Bossi's Automotive 4/24/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	401	0	1	380	0	1	0	0	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.82	0.82	0.82	0.25	0.25	0.25	0.25	0.25	0.25
Hourly flow rate (vph)	2	461	0	1	463	0	4	0	0	4	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					164							
pX, platoon unblocked	0.91						0.91	0.91		0.91	0.91	0.91
vC, conflicting volume	463			461			931	931	461	931	931	463
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	366			461			878	878	461	878	878	366
tC, single (s)	4.1			4.1			*6.0	6.5	6.2	*6.0	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	99	100	100
cM capacity (veh/h)	1100			1111			323	263	605	323	263	625
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	463	465	4	4								
Volume Left	2	1	4	4								
Volume Right	0	0	0	0								
cSH	1100	1111	323	323								
Volume to Capacity	0.00	0.00	0.01	0.01								
Queue Length 95th (ft)	0	0	1	1								
Control Delay (s)	0.1	0.0	16.3	16.3								
Lane LOS	A	A	C	C								
Approach Delay (s)	0.1	0.0	16.3	16.3								
Approach LOS			C	C								
<b>Intersection Summary</b>												
Average Delay			0.2									
Intersection Capacity Utilization			32.6%		ICU Level of Service					A		
Analysis Period (min)			15									

\* User Entered Value

Swanton Street at the Site Driveway/Rodeo Restaurant Driveway

2012 Existing Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 8: Swanton Street & Rodeo Grill Dwy 4/25/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Volume (veh/h)	222	0	1	348	1	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	247	0	1	387	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked						
vC, conflicting volume			247		636	247
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			247		636	247
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1331		478	836

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	247	388	4
Volume Left	0	1	1
Volume Right	0	0	3
cSH	1700	1331	669
Volume to Capacity	0.15	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	10.4
Lane LOS		A	B
Approach Delay (s)	0.0	0.0	10.4
Approach LOS			B

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		29.1%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2012 Existing Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 8: Swanton Street & Rodeo Grill Dwy 4/25/2013

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	↗
Volume (veh/h)	317	5	10	313	2	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.92	0.92	0.50	0.50
Hourly flow rate (vph)	334	5	11	340	4	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked					0.94	
vC, conflicting volume			339		698	336
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			339		646	336
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1232		439	758

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	339	351	12
Volume Left	0	11	4
Volume Right	5	0	8
cSH	1700	1232	610
Volume to Capacity	0.20	0.01	0.02
Queue Length 95th (ft)	0	1	2
Control Delay (s)	0.0	0.3	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.0
Approach LOS			B

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		34.5%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2012 Existing Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 8: Swanton Street & Rodeo Grill Dwy 4/25/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗			↖	↘	
Volume (veh/h)	378	3	4	357	3	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.82	0.82	0.75	0.75
Hourly flow rate (vph)	434	3	5	435	4	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)	257					
pX, platoon unblocked	0.94					
vC, conflicting volume			438		881	436
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			438		844	436
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1133		347	680

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	438	440	8
Volume Left	0	5	4
Volume Right	3	0	4
cSH	1700	1133	459
Volume to Capacity	0.26	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.1	13.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	13.0
Approach LOS			B

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		32.0%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Weekday Morning Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 8: Swanton Street & Rodeo Grill Dwy

4/25/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Volume (veh/h)	235	0	1	366	1	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.82	0.82	0.75	0.75
Hourly flow rate (vph)	261	0	1	446	1	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)	257					
pX, platoon unblocked	0.94					
vC, conflicting volume	261			710 261		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	261			657 261		
tC, single (s)	4.1			*6.0 *5.5		
tC, 2 stage (s)						
tF (s)	2.2			3.5 3.3		
p0 queue free %	100			100 100		
cM capacity (veh/h)	1315			436 823		

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	261	448	4
Volume Left	0	1	1
Volume Right	0	0	3
cSH	1700	1315	635
Volume to Capacity	0.15	0.00	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	0.0	0.0	10.7
Approach LOS	B		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

\* User Entered Value

2017 No-Build Weekday Evening Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 8: Swanton Street & Rodeo Grill Dwy 4/24/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Volume (veh/h)	335	5	10	331	2	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.92	0.92	0.50	0.50
Hourly flow rate (vph)	353	5	11	360	4	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked					0.93	
vC, conflicting volume			358		737	355
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			358		683	355
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1212		417	743

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	358	371	12
Volume Left	0	11	4
Volume Right	5	0	8
cSH	1700	1212	590
Volume to Capacity	0.21	0.01	0.02
Queue Length 95th (ft)	0	1	2
Control Delay (s)	0.0	0.3	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.2
Approach LOS			B

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization		35.5%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 No-Build Saturday Midday Peak Hour HCM Unsignalized Intersection Capacity Analysis  
 8: Swanton Street & Rodeo Grill Dwy 4/24/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↷			↶	↷	↶
Volume (veh/h)	400	3	4	377	3	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.82	0.82	0.75	0.75
Hourly flow rate (vph)	460	3	5	460	4	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked					0.93	
vC, conflicting volume			463		931	461
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			463		891	461
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1109		324	661

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	463	465	8
Volume Left	0	5	4
Volume Right	3	0	4
cSH	1700	1109	435
Volume to Capacity	0.27	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.1	13.4
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	13.4
Approach LOS			B

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		33.0%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Weekday Morning Peak Hour  
8: Swanton Street & Site Driveway

HCM Unsignalized Intersection Capacity Analysis

4/24/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Volume (veh/h)	232	9	9	361	7	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.82	0.82	0.75	0.75
Hourly flow rate (vph)	258	10	11	440	9	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked					0.93	
vC, conflicting volume			268		725	263
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			268		666	263
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1308		424	822

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	268	451	17
Volume Left	0	11	9
Volume Right	10	0	8
cSH	1700	1308	546
Volume to Capacity	0.16	0.01	0.03
Queue Length 95th (ft)	0	1	2
Control Delay (s)	0.0	0.3	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	11.8
Approach LOS			B

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization		36.2%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Weekday Evening Peak Hour  
8: Swanton Street & Site Driveway

HCM Unsignalized Intersection Capacity Analysis

4/24/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↩			↩	↩	
Volume (veh/h)	328	15	12	320	14	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.92	0.92	0.90	0.90
Hourly flow rate (vph)	345	16	13	348	16	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked					0.93	
vC, conflicting volume			361		727	353
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			361		669	353
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	98
cM capacity (veh/h)			1209		422	745

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	361	361	31
Volume Left	0	13	16
Volume Right	16	0	16
cSH	1700	1209	539
Volume to Capacity	0.21	0.01	0.06
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.4	12.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	12.1
Approach LOS			B

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		36.6%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value

2017 Build Saturday Midday Peak Hour  
8: Swanton Street & Site Driveway

HCM Unsignalized Intersection Capacity Analysis  
4/24/2013

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	393	18	15	369	19	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.82	0.82	0.75	0.75
Hourly flow rate (vph)	452	21	18	450	25	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				257		
pX, platoon unblocked					0.93	
vC, conflicting volume			472		949	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			472		910	462
tC, single (s)			4.1		*6.0	*5.5
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	96
cM capacity (veh/h)			1100		313	661

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	472	468	51
Volume Left	0	18	25
Volume Right	21	0	25
cSH	1700	1100	424
Volume to Capacity	0.28	0.02	0.12
Queue Length 95th (ft)	0	1	10
Control Delay (s)	0.0	0.5	14.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	14.6
Approach LOS			B

Intersection Summary			
Average Delay		1.0	
Intersection Capacity Utilization		41.6%	ICU Level of Service A
Analysis Period (min)		15	

\* User Entered Value