

Transportation Impact Assessment

Proposed Fire Station Acton, Massachusetts

Prepared for:

Kaestle Boos Associates, Inc.
Foxborough, Massachusetts

TRANSPORTATION IMPACT ASSESSMENT

PROPOSED FIRE STATION ACTON, MASSACHUSETTS

Prepared for:

Kaestle Boos Associates, Inc.
Foxborough, Massachusetts

October 2019

Prepared by:

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EXECUTIVE SUMMARY

Vanasse and Associates, Inc. (VAI) has completed a detailed assessment of the potential impacts on the transportation infrastructure associated with the proposed 12,300 square foot (sf) fire station that accommodates 3 apparatus bays to be located at 66 Harris Street in Acton, Massachusetts. The station will be staffed initially with 3 employees with potential for growth up to 6 employees. This assessment has been completed in accordance with State and Town standards and those of the Traffic Engineering and Transportation Planning professions for the preparation of such reports. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project. Based on this assessment, we have concluded the following with respect to the Project:

- The Project is expected to generate 8 vehicle trips (2 vehicles entering and 6 exiting) during the weekday morning peak-hour. During the weekday evening peak hour the Project is expected to generate 10 vehicle trips (5 vehicle entering and 5 exiting).
- Traffic increases on area roadways will be less than 5 vehicles and will not noticeably change delays or vehicle queues.
- The project can be safely accommodated with minimal impact to the area.

In summary, a safe environment and manageable traffic conditions can be maintained with the following recommendations.

RECOMMENDATIONS

A Transportation Improvement Program has been designed to provide safe and efficient access to the site. The following components have been recommended as part of this evaluation.

Project Access

Project access is provided by way of three new full access driveways onto Harris Street. The following recommendations are offered with respect to the design and operation of the Project site driveways:

- The existing vegetation on the western property line should be trimmed in order to ensure adequate sight distance is maintained.
- The site driveways be placed under STOP-sign (Manual of Uniform Traffic Control Designation R1-1) control, with painted STOP-bars on the driveways at the STOP-sign locations.
- All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current Manual on Uniform Traffic Devices (MUTCD).¹
- Any landscaping or building features near the driveway intersections with Harris Street should not exceed 24 inches in height or should be placed out of the lines of sight for motorists exiting the site and those approaching the driveways on Harris Street.
- The Emergency Vehicle (W11-8) traffic warning sign from the MUTCD should be placed on Harris Street in both directions in advance of the site.

CONCLUSION

As documented in this study, project-related traffic increases will not result in significant increases to overall traffic volumes or traffic delays within the study area. The project-related traffic can be adequately accommodated within the existing infrastructure with minimal impact to area traffic operations with the above recommendations implemented.

¹*Manual on Uniform Traffic Control Devices*, 2009 Edition; Federal Highway Administration; 2009

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) to assess the traffic impacts and evaluate the access and egress requirements of a proposed 12,300 sf fire station that accommodates 3 apparatus bays to be located at 66 Harris Street in Acton, Massachusetts. The station will be staffed initially with 3 employees with potential for growth up to 6 employees. This report was prepared in accordance with MassDOT guidelines for preparation of a TIA and the Town of Acton's zoning bylaw. This report identifies existing traffic parameters within the study area, identifies the impact of traffic generated by the proposed development, and evaluates project-related impacts with regard to capacity and roadway requirements. The following provides a brief summary of the study findings.

PROPOSED PROJECT

The proposed project involves constructing a 12,300 sf fire station that accommodates three apparatus bays to be located at 66 Harris Street in Acton, Massachusetts. The station will be staffed initially with 3 employees with potential for growth up to 6 employees. Access to the site will be provided via three driveways. The western driveway provides access to an 18 space parking lot, the middle driveway connects to the 3 apparatus bays, and the eastern driveway provides access to the 3 space visitor parking lot.

STUDY METHODOLOGY

This transportation impact and access evaluation is conducted in several stages. The first phase documents existing conditions in the transportation study area including an inventory of roadway geometry, observed traffic volumes, and historic accident characteristics. Next, future year traffic conditions are forecast that account for other planned area development projects, planned transportation improvement projects, normal area growth, and project-related traffic increases. The third phase quantifies operating characteristics of study intersections to identify existing and future year deficiencies for which improvements are warranted. Specific attention is given to the incremental impacts of the proposed project. Finally, recommendations are made to ensure the proposed access design allows for safe and efficient traffic flow to and from the site.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in September 2019. The field investigation consisted of an inventory of existing roadway geometrics, traffic volumes, and operating characteristics including vehicle speeds, along with posted speed limits, sight distances and land use information within the study area. The study area for the project contains the major roadways which provide access to the project, as well as the intersections which are expected to accommodate the majority of project-related traffic. The study area is listed below and graphically depicted in Figure 1.

- Main Street at Harris Street
- Great Road at Harris Street/Acorn Park Drive

The following describes the study area roadways and intersections.

GEOMETRY

Roadways

Harris Street

Harris Street is classified as a local roadway under the jurisdiction of the Town of Acton. Harris Street runs in an east–west alignment and connects Great Road to Main Street. The direction of travel on Harris Street is separated by a double yellow center line. The land uses along Harris Street consist of residential uses and wooded areas.

Intersections

Figure 2 summarizes existing lane use, travel lane widths, and sidewalk and crosswalks locations at the study area intersections as observed in September 2019.

EXISTING TRAFFIC VOLUMES

In order to establish base traffic-volume conditions within the study area, manual turning movement counts (TMCs) and automatic traffic recorder counts (ATRs) were completed in September 2019. The ATR was

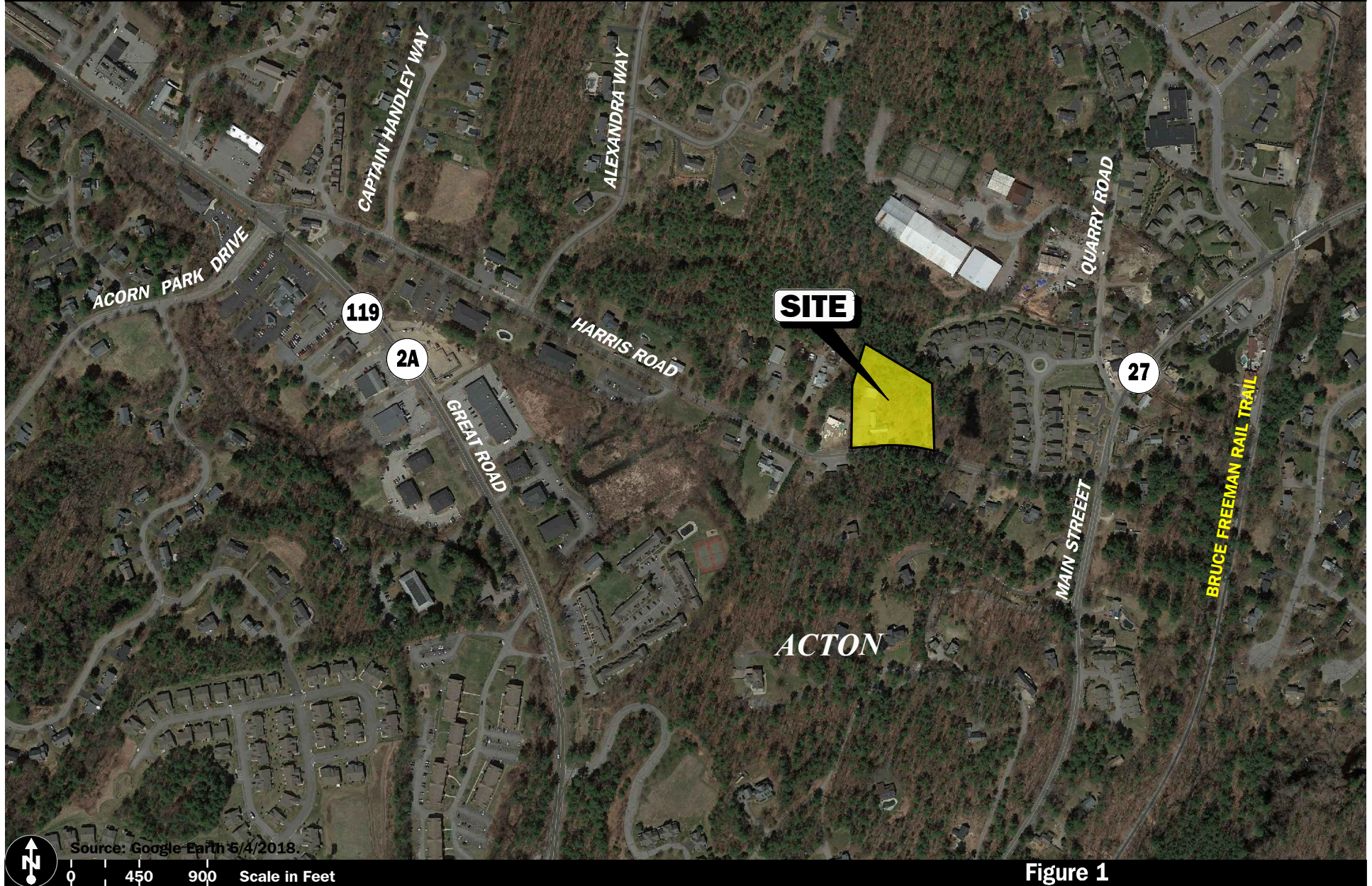
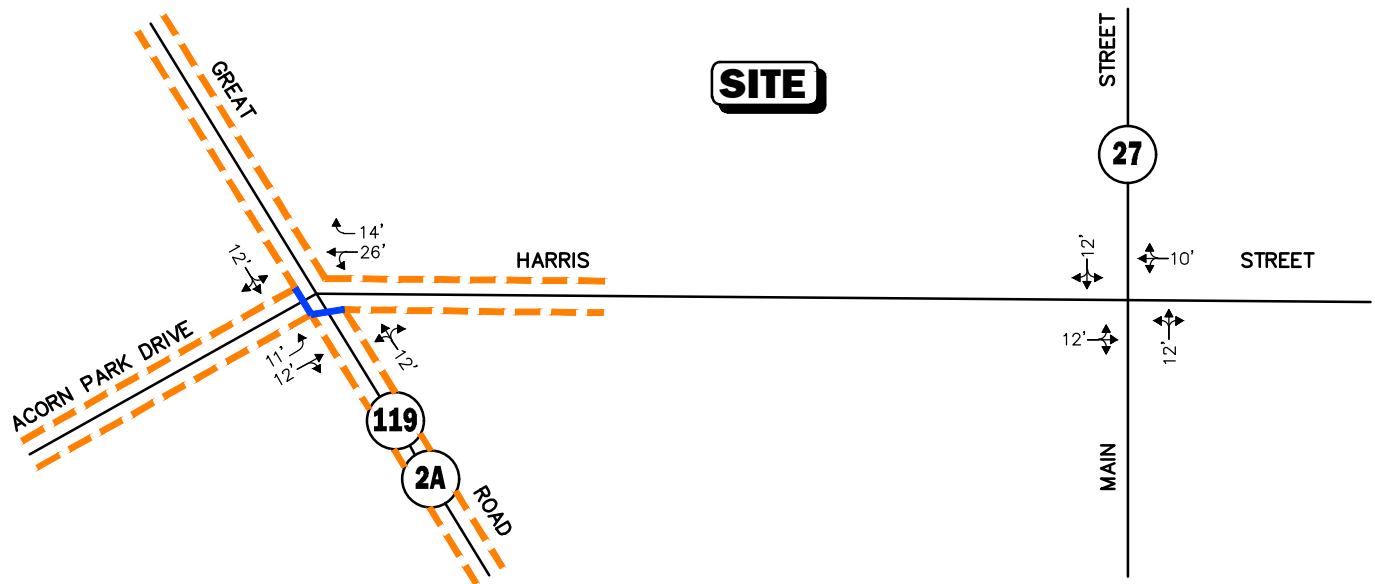


Figure 1

Site Location Map

Legend:

- Sidewalk
- Crosswalk
- xx'  Lane Use and Travel Lane Width



Not To Scale



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Transportation Engineers & Planners

Figure 2

**Existing Intersection Lane Use,
Travel Lane Width and Pedestrian
Facilities**

placed on Harris Street near the proposed site driveway for 24 hours. The TMCs were conducted during the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:00 PM) peak periods.

Traffic Volume Adjustments

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, traffic count data from the Massachusetts Department of Transportation (MassDOT) were reviewed. Based on this data, September-month volumes are approximately equal to average-month volumes. Therefore, the observed volumes were not adjusted. Existing traffic volumes on Harris Street are summarized in Table 1.

Table 1
EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY

Location	Weekday	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Daily Volume (vpd) ^a	Volume (vph) ^b	Percent of Daily Traffic ^c	Predominant Flow	Volume (vph)	Percent of Daily Traffic	Predominant Flow
Harris Street, near 66 Harris Street Driveway	2,400	226	9.4	58% EB	275	11.5	61% WB

Source: ATR and TMC counts conducted by VAI in September 2019.

^aTwo-way daily traffic expressed in vehicles per day

^bTwo-way peak-hour volume expressed in vehicles per hour.

^cThe percent of daily traffic that occurs during the peak hour.

EB = eastbound; WB = westbound.

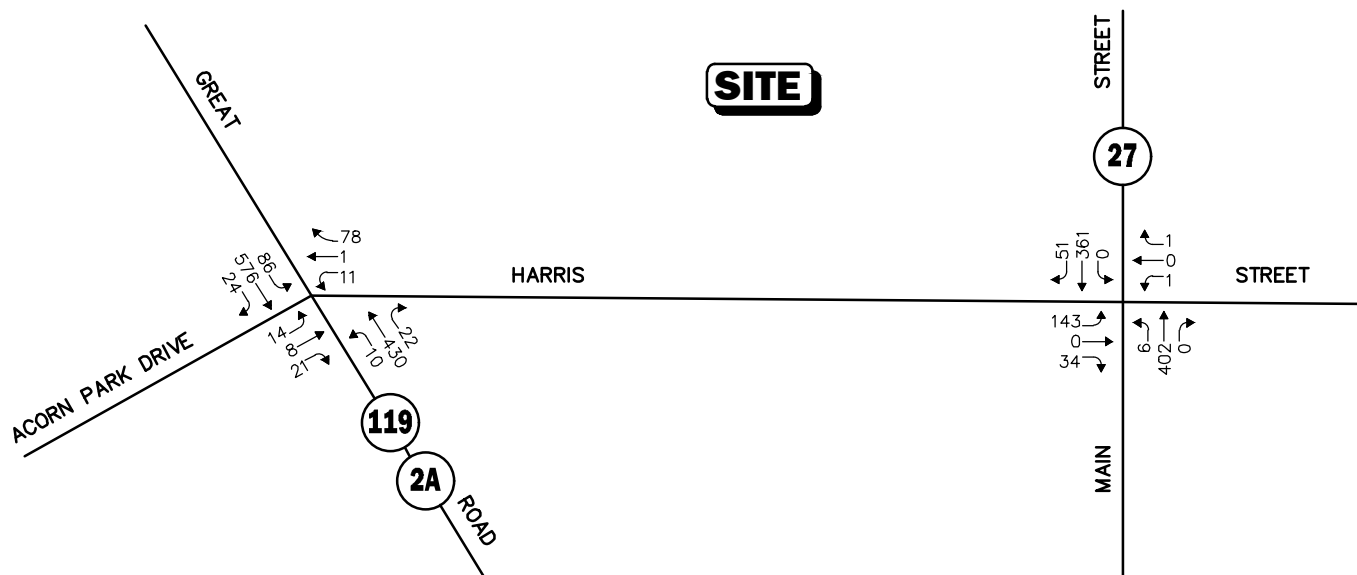
As can be seen in Table 1, Harris Street was found to accommodate approximately 2,400 vehicles per day (vpd) with 226 vehicles per hour (vph) during the weekday morning peak hour and 275 vph during the weekday evening peak hour. During the weekday morning peak hour, 58 percent of the traffic is traveling eastbound and during the weekday evening peak hour 61 percent of the traffic is traveling westbound. The 2019 Existing weekday morning and weekday evening peak hour traffic volumes are graphically depicted in Figure 3.

Analyses of the peak-period traffic counts indicate that the weekday morning peak hour generally occurs between 8:00 and 9:00 AM and the weekday evening peak hour between 5:00 and 6:00 PM. In all instances, individual intersection peak hours were utilized for analysis purposes.

PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in September 2019. 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 bicycle facilities. Sidewalks are provided along both sides of Great Road and Acorn Park Drive. Harris Street has sidewalks provided on the northern side of the roadway from Great Road to Alexandra Way and on the southern side of the roadway from Great Road to Samantha Way. Crosswalks are provided across the western and southern legs of the intersection of Great Road at Harris Street/Acorn Park Drive. No Bicycle facilities are provided within the study area.

WEEKDAY EVENING PEAK HOUR (4:00 - 5:00PM)



SATURDAY MIDDAY PEAK HOUR (12:00 - 1:00PM)

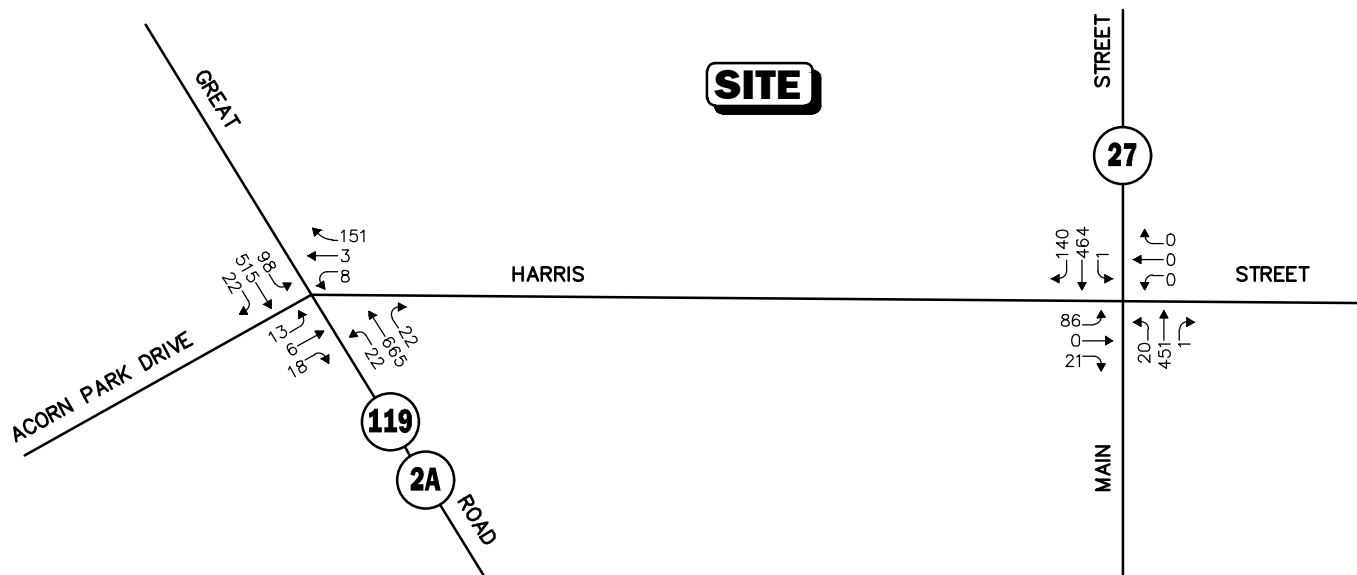


Figure 3

2019 Existing
Peak Hour Traffic Volumes

PUBLIC TRANSPORTATION

Public transportation services are provided within the study area by Ride the CAT (Cross-Acton Transit) for fixed-route bus service. The CAT bus stops at Sachem Way in Acton, approximately 0.5 miles northwest of the Project site and delivers people to and from the South Acton Commuter Rail Station. The CAT bus operates Monday through Friday beginning at 8:00 AM and continuing until 6:00 PM with 60 minute headways. The South Acton Commuter Rail Station is part of the Massachusetts Bay Transit Authority (MBTA) Fitchburg Line which operates on weekdays from 4:50 AM to 1:44 AM with headways ranging from 10 to 115 minutes. On Saturday and Sunday, the Fitchburg Line operates from 6:30 AM to 1:06 AM with headways ranging from 125-215 minutes. The Town of Acton also provides the MinuteVan which is a door to door transit service that services Acton and adjacent towns. This services is in operation Monday through Friday from 8:30 AM to 4:00 PM. Schedule and fare information for the CAT fixed-route bus service and the MBTA commuter rail service are provided in the Appendix.

MOTOR VEHICLE CRASH SUMMARY

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2013 through 2017) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, weather condition, lighting condition, pavement condition, and severity.

As can be seen in Table 2, the intersection of Great Road at Harris Street/Acorn Park Drive experienced a total of 11 accidents over the five-year review period, averaging 2.2 accidents per year. The majority of the accidents were angle collisions (6 out of 11), occurred on dry pavement (7 out of 11), during the daylight (7 out of 11), in clear weather (7 out of 11), and caused property damage only (9 out of 11). The intersection of Main Street at Harris Street experienced a total of 6 accidents over the five-year review period, averaging 1.2 accidents per year. The majority of the accidents were angle collisions (3 out of 6), occurred on dry pavement (4 out of 6), during the daylight or on a dark lighted roadway (both 3 out of 6), in clear weather (5 out of 6), and caused property damage only (5 out of 6).

No fatalities were reported over the five-year period reviewed. The crash rate for the intersections were observed to be lower than the MassDOT District 3 crash rates and the intersections do not appear on the high crash location database and are not included on MassDOT's Highway Safety Improvement Program (HSIP) listing as a high crash location. Designation as a HSIP location allows for MassDOT to prioritize funding for safety-related improvements in a specific region of the state.

Table 2
MOTOR VEHICLE CRASH DATA SUMMARY

Scenario	Great Road at Harris Street/Acorn Park Drive	Main Street at Harris Street
<i>Year:</i>		
2013	2	2
2014	2	3
2015	6	0
2016	0	0
<u>2017</u>	<u>1</u>	<u>1</u>
Total	11	6
Average ^a	2.2	1.2
Crash Rate ^b	0.45	0.32
Significant ^c	No	No
<i>Type:</i>		
Angle	6	3
Rear-End	2	2
Head-On	0	0
Sideswipe	1	0
Fixed Object	1	0
Pedestrian	0	0
Bicyclist	0	0
<u>Unknown/Other</u>	<u>1</u>	<u>1</u>
Total	11	6
<i>Weather Conditions:</i>		
Clear	7	5
Cloudy/Rain	4	1
Snow/Ice	0	0
Fog	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>
Total	11	6
<i>Lighting Conditions:</i>		
Daylight	7	3
Dawn/Dusk	0	0
Dark (lit)	4	3
Dark (unlit)	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>
Total	11	6
<i>Pavement Conditions:</i>		
Dry	7	4
Wet	2	0
Snow/Ice	2	2
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>
Total	11	6
<i>Severity:</i>		
Property Damage Only	9	5
Personal Injury	2	1
Fatality	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>
Total	11	6

^aAverage number of crashes over five-year period.

^bCrash rate per million entering vehicles (mev).

^cSignificant if crash rate > 0.89 for signalized intersections or > 0.61 for unsignalized intersections (MassDOT District 3 rates).

Source: MassDOT Crash Data, 2013 through 2017.

VEHICLE SPEEDS

Existing vehicle speeds along Harris Street near the proposed site driveway were recorded to determine the average and 85th percentile vehicle speeds. The speed limit on Harris Street is not posted, however, the prima facie² speed limit for Harris Street would be assumed to be 30 mph. The results of the speed measurements are shown in Table 3.

Table 3
OBSERVED VEHICLE SPEEDS – (In Miles Per Hour)

Direction	Prima Facie Speed	Average Speed	85 th Percentile Speed ^a
<i>Harris Street, near proposed site driveway</i>			
Eastbound	30	31	34
Westbound	30	32	35

^aThe 85th percentile speed is the speed at which 85 percent of the traffic is traveling at or below. It is commonly used for setting speed limits on roadways.

As can be seen from Table 3, the average speed recorded eastbound on Harris Street was 31 mph and the 85th percentile speed recorded was 34 mph. The average speed recorded westbound was 32 mph and the 85th percentile speed was 35 mph.

SIGHT DISTANCE EVALUATION

Sight distances were reviewed at the locations of the proposed driveways where they intersect with Harris Street in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)³ standards.

Stopping sight distance (SSD) is the minimum distance required for an approaching driver at a height of 3.5 feet to perceive and react accordingly to a stationary object 2 feet tall in its path. The values are based on a perception and reaction time of 2.5 seconds and braking distance required under wet, level pavements. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. The results of the analysis are shown in Table 4.

As can be seen from Table 4, adequate SSD is provided at all three site driveways. It is recommended that the existing vegetation on the western property line be trimmed to ensure adequate sight distance is maintained.

² “Prima facie” speed limits refer to statutory speed limits identified in Chapter 90, Section 17 of the MGL. In this case, on roads with thickly settled or business districts, the reasonable and proper rate of speed is 30 mph.

³ *A Policy on Geometric Design of Highway and Streets*, 6th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2011.

Table 4
SIGHT DISTANCE MEASUREMENTS

Location/Sight Distance	Distances Based on 85 th Percentile Speed	Measured Distances
West Site Driveway at Harris Street		
<i>Stopping Sight Distance:</i>		
Looking east to/from the driveway	247 ^a	500+
Looking west to/from the driveway	236 ^b	245
Middle Site Driveway at Harris Street		
<i>Stopping Sight Distance:</i>		
Looking east to/from the driveway	247 ^a	500+
Looking west to/from the driveway	236 ^b	296
East Site Driveway at Harris Street		
<i>Stopping Sight Distance:</i>		
Looking east to/from the driveway	247 ^a	306
Looking west to/from the driveway	236 ^b	452

^aBased on 85th percentile WB travel speed of 35 mph.

^bBased on 85th percentile EB travel speed of 34 mph.

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2026, which reflects a seven-year planning horizon consistent with state traffic study guidelines. Independent of the project, traffic volumes on the roadway network in the year 2026 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated project-generated traffic volumes superimposed upon this 2026 No-Build traffic network reflect the 2026 Build conditions with the project.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development in the immediate area, as well as the surrounding region. Several methods are 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 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.

General Background 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 and other area traffic studies, it was determined that the traffic volumes are generally stagnant in the area. To be conservative, a 1.0 percent per year compounded annual background traffic growth rate was used to account for future traffic growth including presently unforeseen development within the study area.

Specific Area Developments

The Town of Acton was contacted in order to determine if there are any planned or approved development projects that are expected to influence future traffic volumes within the study area. Based on these discussions, there were no projects identified that would affect the study area.

Planned Roadway Improvements

The Town of Acton was contacted to determine if there are any planned roadway improvements in the area that would have an impact on future traffic operations. Based on these discussions the following project was identified.

Main Street Reconstruction – Main Street will be widened to accommodate bike lanes on both sides of the roadway from Great Road to Ledge Rock Way. In addition, sidewalks will be constructed on each side of the roadway from Great Road to Ledge Rock Way.

No-Build Traffic Volumes

The 2026 No-Build weekday morning and weekday evening peak-hour traffic-volume networks were developed by applying a compounded 1.0 percent annual growth rate to the 2019 Existing peak hour traffic volumes over the seven-year planning horizon. The resulting 2026 No-Build weekday morning and weekday evening peak-hour traffic-volume networks are displayed on Figure 4.

SITE-GENERATED TRAFFIC

The proposed development involves constructing a 12,300 sf fire station that accommodates three apparatus bays to be located at 66 Harris Street in Acton, Massachusetts. The station will be staffed with up to 6 employees. The fire station at 7 Concord Road in Acton, Massachusetts, which is staffed by 4 employees, was observed in order to estimate the traffic to be generated by the new fire station. The number of entering and exiting vehicles from the fire station at 7 Concord Road were recoded from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM on a typical weekday. The weekday morning and weekday evening peak hour volumes are summarized in Table 5.

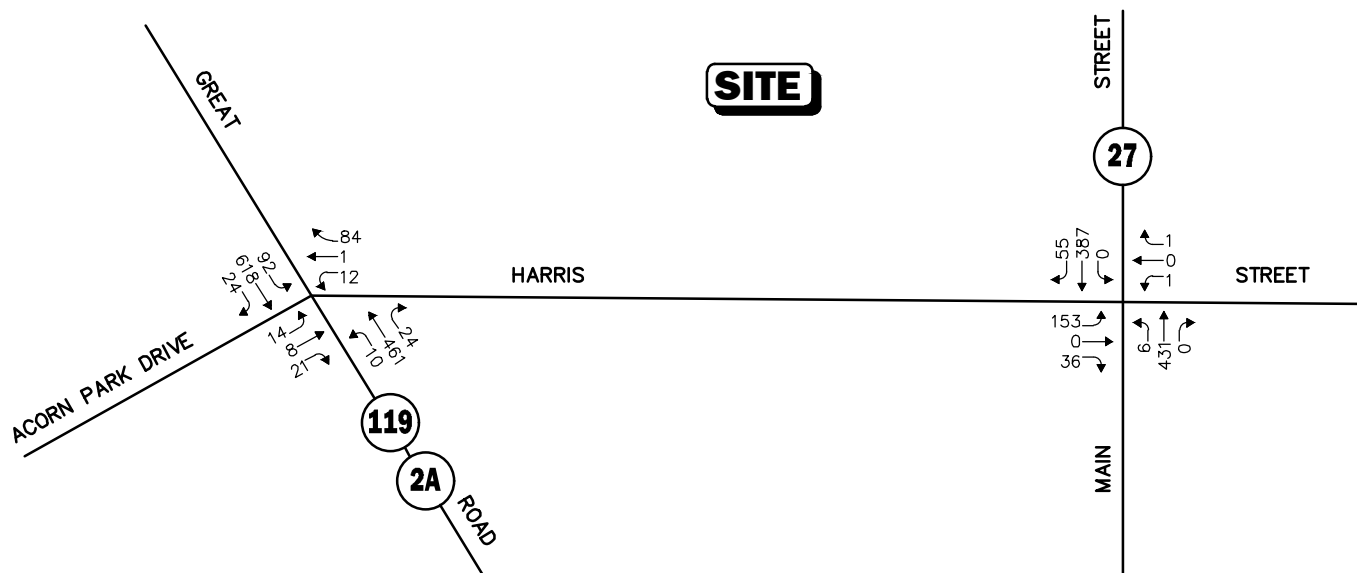
Table 5
7 CONCORD ROAD
TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	7 Concord Road Fire Station 4 Employees
<i>Weekday Morning Peak Hour:</i>	
Entering	1
<u>Exiting</u>	<u>4</u>
Total	5
<i>Weekday Evening Peak Hour:</i>	
Entering	3
<u>Exiting</u>	<u>3</u>
Total	6

Source: Counts conducted by VAI in September 2019.

As can be seen in Table 5, the 7 Concord Road facility generates a total of 5 vehicle trips (1 entering and 4 exiting) during the weekday morning peak hours. During the weekday evening peak hour the 7 Concord Road facility generates a total of 6 vehicle trips (3 entering and 3 exiting).

WEEKDAY EVENING PEAK HOUR (4:00 - 5:00PM)



SATURDAY MIDDAY PEAK HOUR (12:00 - 1:00PM)

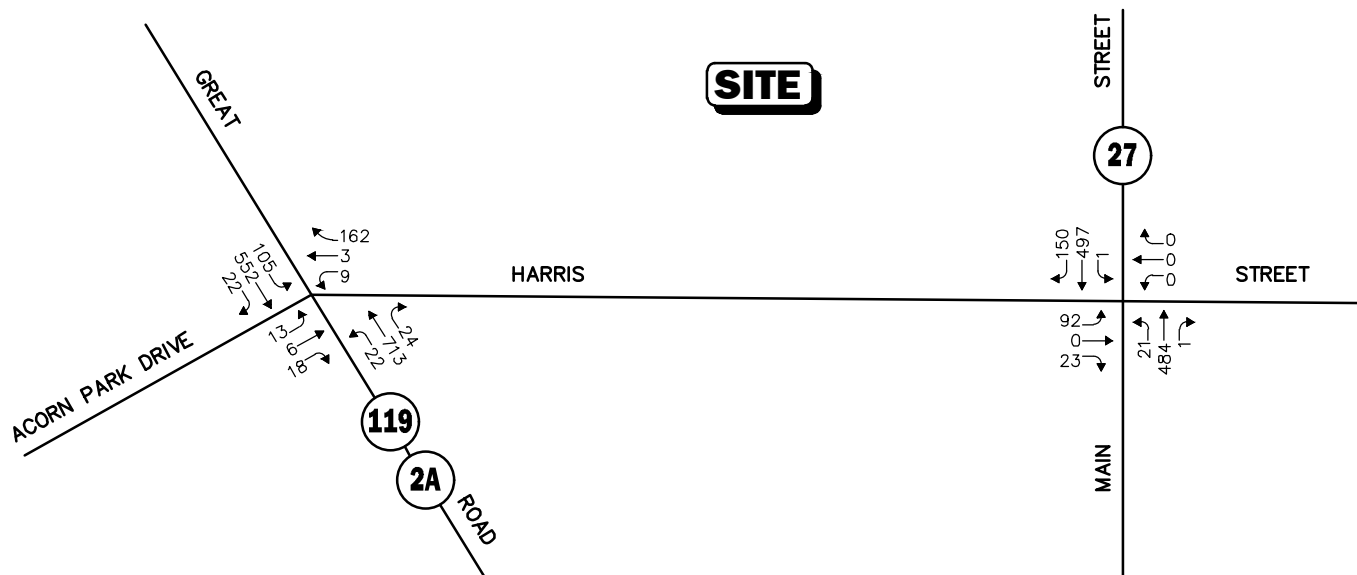


Figure 4

2026 No-Build
Peak Hour Traffic Volumes

In order to determine the trips to be generated by the proposed fire station, trip rates based on number on employees were developed based on the counts conducted at 7 Concord Road. A total of 4 employees work at the 7 Concord Road station. The proposed fire station may have up to 6 employees. Table 6 summarizes the trip rates at 7 Concord Road and applies those rates to the proposed facility.

Table 6
TRIP RATES AND PROPOSED TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	7 Concord Road Fire Station 4 Employees ^a	Trip Rate ^b	Proposed Fire Station 6 Employees ^c
<i>Weekday Morning Peak Hour:</i>			
Entering	1	0.25	2
<u>Exiting</u>	<u>4</u>	<u>1.00</u>	<u>6</u>
Total	5	1.25	8
<i>Weekday Evening Peak Hour:</i>			
Entering	3	0.75	5
<u>Exiting</u>	<u>3</u>	<u>0.75</u>	<u>5</u>
Total	6	1.50	10

^aFrom Table 5.

^bTrip rate based on number of trips divided by 4 employees.

^cBased on trip rate multiplied by 6 employees.

As can be seen in Table 6, the site is expected to generate 8 vehicle trips (2 entering and 6 exiting) during the weekday morning peak hour. During the weekday evening peak hour, the site is expected to generate 10 vehicle trips (5 entering and 5 exiting).

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated trips to and from the proposed development is typically a function of population densities, areas of employment, existing traffic patterns at area intersections, and prevailing traffic conditions on area roadways. For this development, the expected trip distribution is based on the incident analysis from 2016 that was presented at the September 18, 2019 public forum presentation in Acton, Massachusetts. The analysis indicates that the majority of the emergency calls from north Acton occur along Great Road. A significant number of emergency calls also come from Main Street. The proposed distribution is summarized in Table 7 and graphically depicted on Figure 5. The additional traffic expected to be generated by the project was assigned on the study area roadway networks as shown on Figure 6.

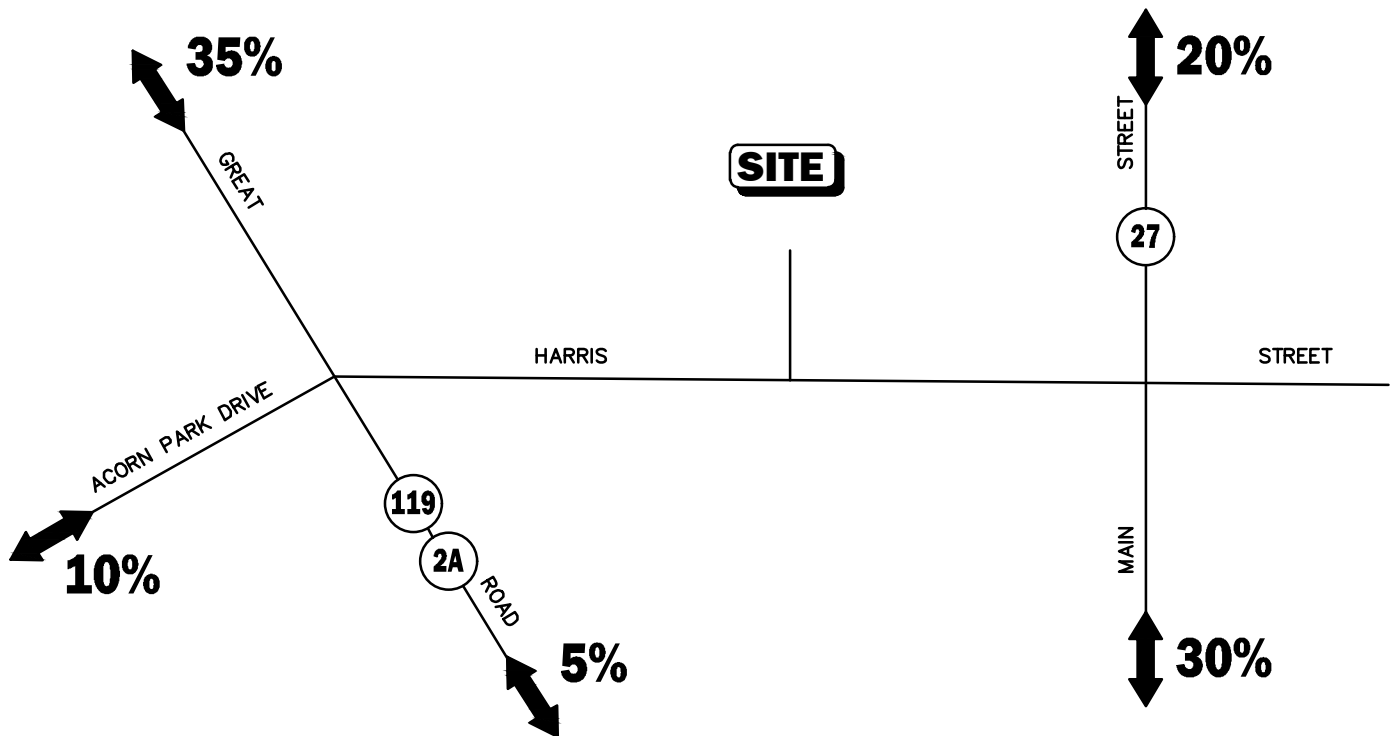
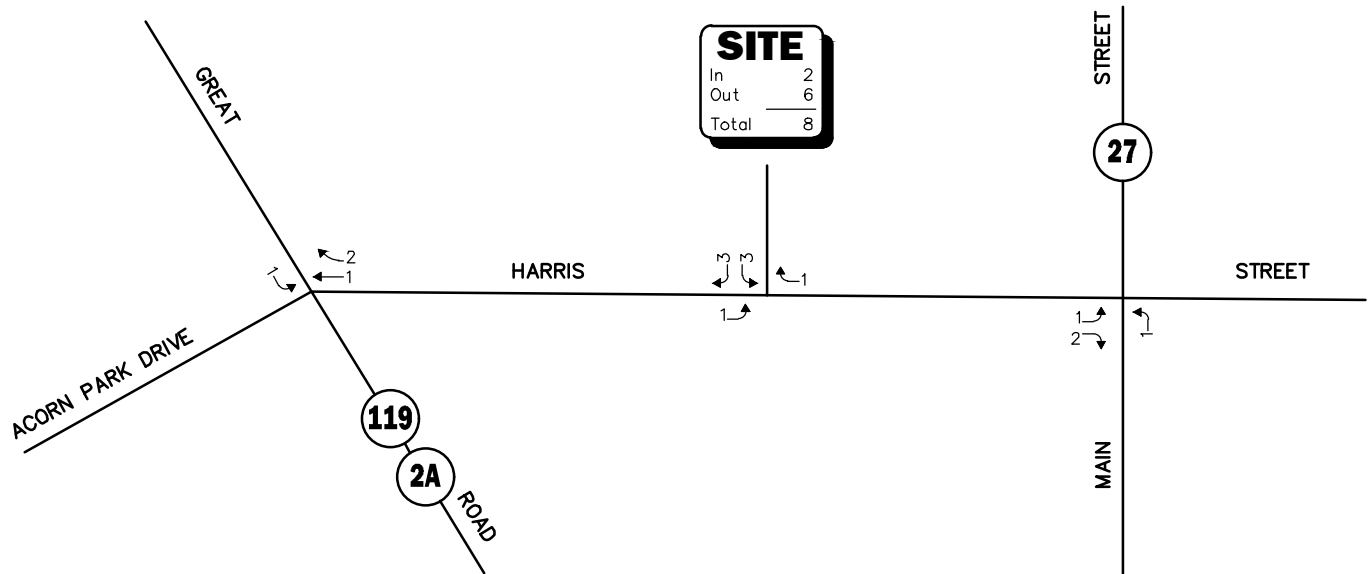


Figure 5

Trip Distribution Map

WEEKDAY EVENING PEAK HOUR (4:00 - 5:00PM)



SATURDAY MIDDAY PEAK HOUR (12:00 - 1:00PM)

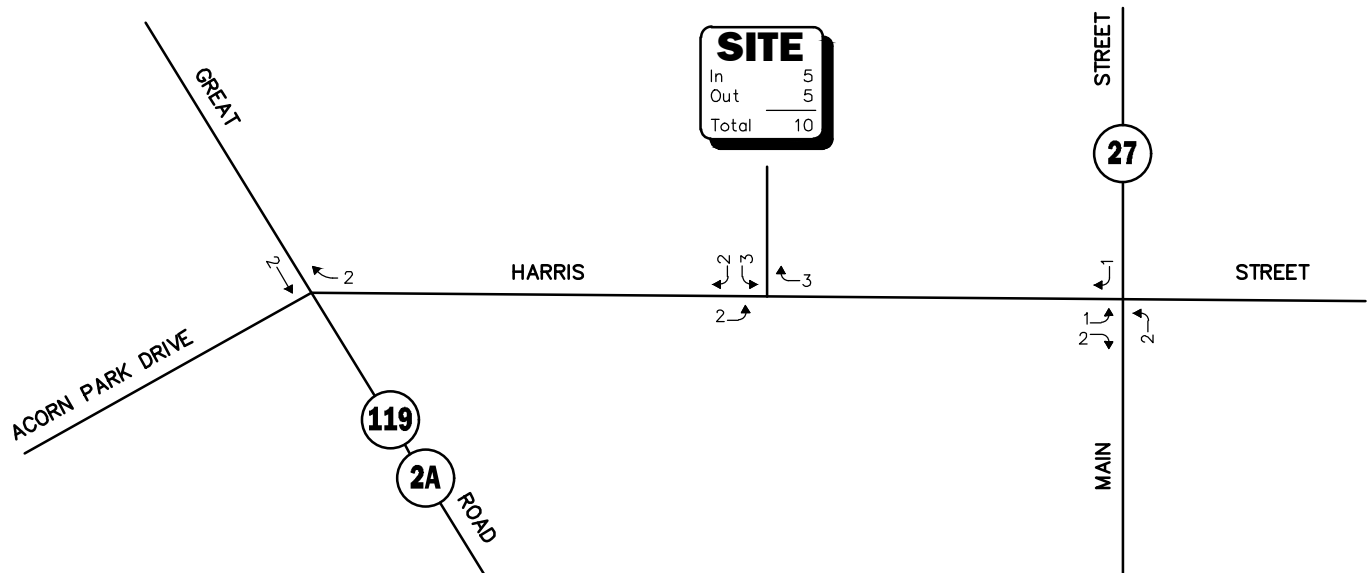


Figure 6

Site Generated
Peak Hour Traffic Volumes

Table 7
TRIP-DISTRIBUTION SUMMARY

Roadway	Direction (To/From)	Percent (To/From)
Main Street	North	20
Main Street	South	30
Great Road	North	35
Great Road	South	5
Acorn Park Drive	West	<u>10</u>
TOTAL		100

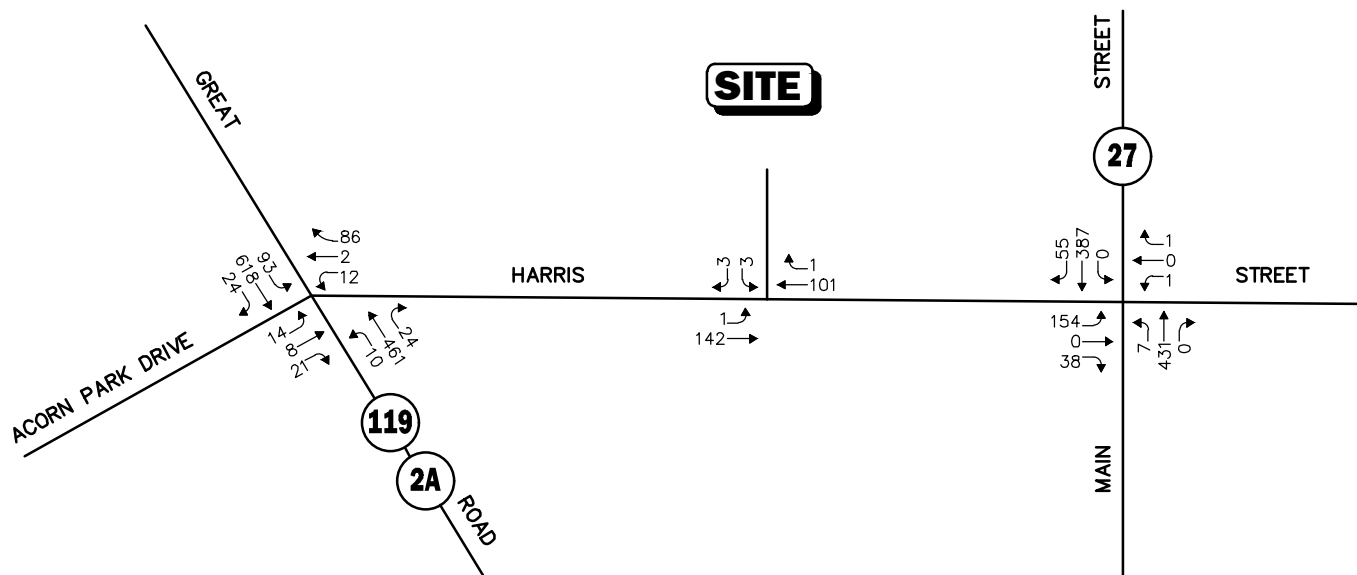
FUTURE TRAFFIC VOLUMES – BUILD CONDITION

The 2026 Build condition networks consist of the 2026 No-Build traffic volumes with the proposed site-generated traffic added to them. The 2026 Build weekday morning and weekday evening peak hour traffic-volume networks are graphically depicted on Figure 7.

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 8. These volumes are based on the expected increases from the project.

As shown in Table 8, project-related traffic-volume increases external to the study area relative to 2026 No-Build conditions are anticipated to range from 0.0 to 1.3 percent during the peak periods.

WEEKDAY EVENING PEAK HOUR (4:00 - 5:00PM)



SATURDAY MIDDAY PEAK HOUR (12:00 - 1:00PM)

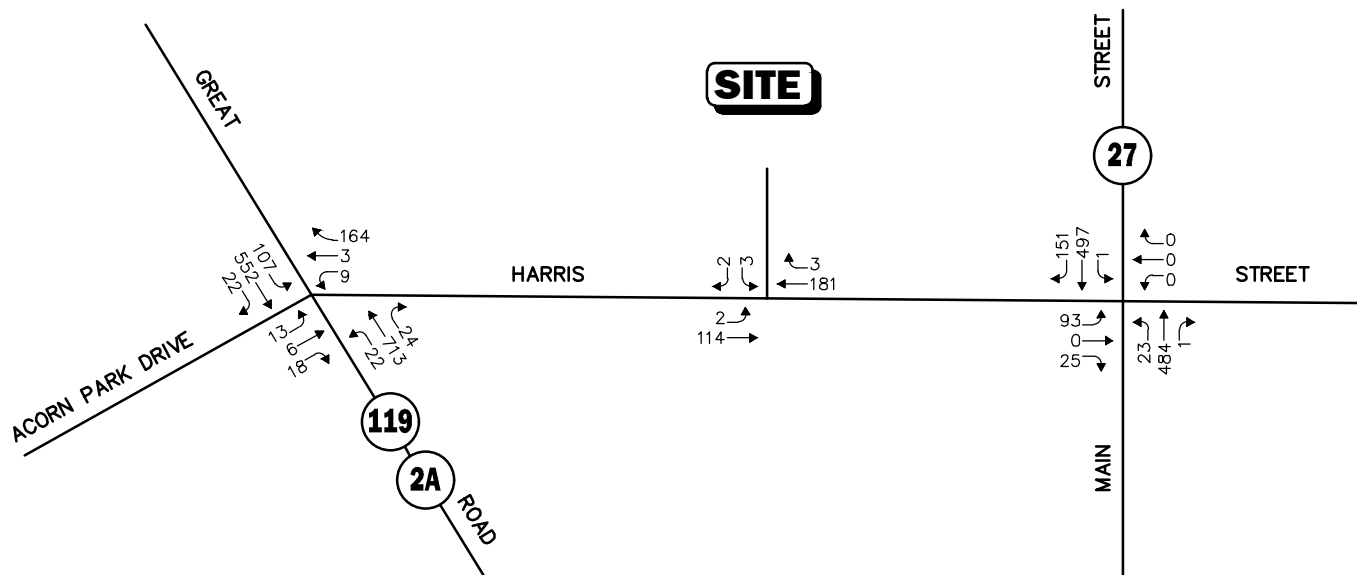


Figure 7

2026 Build
Peak Hour Traffic Volumes

Table 8
PEAK-HOUR TRAFFIC-VOLUME INCREASES^a

Location/Peak Hour	2026 No-Build	2026 Build	Traffic Volume Increase Over No-Build	Percent Increase Over No-Build
<i>Great Road, north of Harris Street:</i>				
Weekday Morning	1,293	1,296	3	0.2
Weekday Evening	1,567	1,571	4	0.3
<i>Great Road, south of Harris Street:</i>				
Weekday Morning	1,146	1,146	0	0.0
Weekday Evening	1,338	1,338	0	0.0
<i>Main Street, north of Harris Street:</i>				
Weekday Morning	1,027	1,029	2	0.2
Weekday Evening	1,224	1,226	2	0.2
<i>Main Street, south of Harris Street:</i>				
Weekday Morning	861	864	3	0.3
Weekday Evening	1,026	1,030	4	0.4
<i>Acorn Park Drive, west of Great Road</i>				
Weekday Morning	78	79	1	1.3
Weekday Evening	84	84	0	0.0

^aTwo-way traffic total.

TRAFFIC OPERATIONS ANALYSIS

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.⁴ 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.

⁴The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016.

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 *Highway Capacity Manual 6th Edition*.⁵ 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 effects 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 *Highway Capacity Manual 6th Edition*. Table 9 summarizes the relationship between level of service and average control delay for two-way stop controlled and all-way stop controlled intersections.

Table 9
LEVEL-OF-SERVICE CRITERIA FOR
UNSIGNALIZED INTERSECTIONS^a

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
$v/c \leq 1.0$	$v/c > 1.0$	
A	F	≤ 10.0
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	> 50.0

^aSource: *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016; page 20-6.

⁵*Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2019 Existing, 2026 No-Build, and 2026 Build conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with tabular summaries provided in Table 10.

Unsignalized Intersection Results

Great Road at Harris Street/Acorn Park Drive

Under 2019 Existing conditions the Acorn Park Drive and Harris Street left-turn movements operate at LOS F while the right-turn movements operate at LOS C or better. Under 2026 No-Build conditions the Acorn Park Drive and Harris Street left-turn movements continue to operate at LOS F while the right-turn movements operate at LOS D or better. No changes to LOS occur as a result of the addition of Project volumes under 2026 Build conditions.

Main Street at Harris Street

Under 2019 Existing conditions the eastbound movement operates at LOS F during the weekday morning peak hour and LOS E during the weekday evening peak hour. The westbound movement operates at LOS C during the weekday morning peak hour and LOS B during the weekday evening peak hour. Under 2026 No-Build conditions the eastbound movement operates at LOS F during the weekday morning and weekday evening peak hours. The westbound movement operates at LOS C during the weekday morning peak hour and LOS B during the weekday evening peak hour. No changes to LOS occur as a result of the addition of project volumes under 2026 Build conditions.

Harris Street at Site Driveway

Under 2026 Build conditions the critical movement operates at LOS A during the weekday morning peak hour and LOS B during the weekday evening peak hour.

Table 10
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Location	2019 Existing				2026 No-Build				2026 Build			
	Demand ^a	Delay ^b	LOS ^c	Queue ^d 95 th	Demand	Delay	LOS	Queue 95 th	Demand	Delay	LOS	Queue 95 th
Great Road at Harris Street/Acorn Park Drive												
<i>Weekday Morning:</i>												
Acorn Park Drive EB LT	14	>50	F	15	14	>50	F	20	14	>50	F	20
Acorn Park Drive EB TH/RT	29	21	C	13	29	24	C	13	29	24	C	13
Harris Street WB LT/TH	12	>50	F	13	13	>50	F	18	14	>50	F	18
Harris Street WB RT	78	13	B	15	84	14	B	18	86	14	B	18
<i>Weekday Evening:</i>												
Acorn Park Drive EB LT	13	>50	F	35	13	>50	F	48	13	>50	F	48
Acorn Park Drive EB TH/RT	24	24	C	13	24	28	D	15	24	28	D	15
Harris Street WB LT/TH	11	>50	F	15	12	>50	F	23	12	>50	F	23
Harris Street WB RT	151	19	C	48	162	22	C	60	164	22	C	63
Main Street at Harris Street												
<i>Weekday Morning:</i>												
Harris Street EB LT/TH/RT	177	>50	F	168	189	>50	F	230	192	>50	F	238
Harris Street WB LT/TH/RT	2	16	C	0	2	17	C	0	2	17	C	0
<i>Weekday Evening:</i>												
Harris Street EB LT/TH/RT	107	40	E	73	115	>50	F	98	118	>50	F	100
Harris Street WB LT/TH/RT	1 ^e	11	B	0	1 ^e	12	B	0	1 ^e	12	B	0
Harris Street at Site Driveway												
<i>Weekday Morning:</i>												
Site Driveway SB LT/RT	--	--	--	--	--	--	--	--	6	9	A	0
<i>Weekday Evening:</i>												
Site Driveway SB LT/RT	--	--	--	--	--	--	--	--	5	10	B	0

^aVehicle volume.

^bAverage stopped delay per vehicle (in seconds).

^cLevel-of-service.

^d95th percentile queue length in feet.

^eAssumed 1 vehicle exiting Harris Street from the east in order to produce a level of service for the movement.

RECOMMENDATIONS AND CONCLUSIONS

Vanasse and Associates, Inc. (VAI) has completed a detailed assessment of the potential impacts on the transportation infrastructure associated with the proposed 12,300 sf fire station that accommodates 3 apparatus bays to be located at 66 Harris Street in Acton, Massachusetts. The station will be staffed initially with 3 employees with potential for growth up to 6 employees. This assessment has been completed in accordance with State and Town standards and those of the Traffic Engineering and Transportation Planning professions for the preparation of such reports. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project. Based on this assessment, we have concluded the following with respect to the Project:

- The Project is expected to generate 8 vehicle trips (2 vehicles entering and 6 exiting) during the weekday morning peak-hour. During the weekday evening peak hour the Project is expected to generate 10 vehicle trips (5 vehicle entering and 5 exiting).
- Traffic increases on area roadways will be less than 5 vehicles and will not noticeably change delays or vehicle queues.
- The project can be safely accommodated with minimal impact to the area.

In summary, a safe environment and manageable traffic conditions can be maintained with the following recommendations.

RECOMMENDATIONS

A Transportation Improvement Program has been designed to provide safe and efficient access to the site. The following components have been recommended as part of this evaluation.

Project Access

Project access is provided by way of three new full access driveways onto Harris Street. The following recommendations are offered with respect to the design and operation of the Project site driveways:

- The existing vegetation on the western property line should be trimmed in order to ensure adequate sight distance is maintained.
- The site driveways be placed under STOP-sign (Manual of Uniform Traffic Control Designation R1-1) control, with painted STOP-bars on the driveways at the STOP-sign locations.
- All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current Manual on Uniform Traffic Devices (MUTCD).⁶
- Any landscaping or building features near the driveway intersections with Harris Street should not exceed 24 inches in height or should be placed out of the lines of sight for motorists exiting the site and those approaching the driveways on Harris Street.
- The Emergency Vehicle (W11-8) traffic warning sign from the MUTCD should be placed on Harris Street in both directions in advance of the site.

CONCLUSION

As documented in this study, project-related traffic increases will not result in significant increases to overall traffic volumes or traffic delays within the study area. The project-related traffic can be adequately accommodated within the existing infrastructure with minimal impact to area traffic operations with the above recommendations implemented.

⁶Ibid 1

APPENDIX

TRAFFIC COUNT DATA
SEASONAL ADJUSTMENT DATA
PUBLIC TRANSPORTATION SCHEDULES
MOTOR VEHICLE CRASH DATA
SPEED STUDY DATA
BACKGROUND GROWTH RATE DATA
CAPACITY ANALYSIS

TRAFFIC COUNT DATA

Accurate Counts
978-664-2565

Page 1

Location : Harris Street
Location : at 66 Harris Street
City/State: Acton, MA

8346VOL1

Start Time	9/25/2019 Wed	WB		Hour Totals		EB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	12			2	10				
12:15		0	13			2	10				
12:30		0	16			0	15				
12:45		0	14	0	55	1	21	5	56	5	111
01:00		0	13			1	9				
01:15		0	11			0	14				
01:30		0	12			0	18				
01:45		0	9	0	45	1	17	2	58	2	103
02:00		0	14			0	19				
02:15		0	13			0	16				
02:30		0	19			0	16				
02:45		0	17	0	63	0	15	0	66	0	129
03:00		0	13			0	17				
03:15		0	17			0	22				
03:30		0	28			0	34				
03:45		0	21	0	79	0	27	0	100	0	179
04:00		0	25			0	28				
04:15		0	25			1	41				
04:30		2	27			0	26				
04:45		0	25	2	102	1	40	2	135	4	237
05:00		4	26			1	47				
05:15		5	24			0	41				
05:30		7	31			6	41				
05:45		4	23	20	104	2	35	9	164	29	268
06:00		16	21			5	47				
06:15		18	27			3	42				
06:30		32	21			4	43				
06:45		29	12	95	81	10	26	22	158	117	239
07:00		26	10			8	24				
07:15		37	10			12	20				
07:30		51	6			14	12				
07:45		34	12	148	38	15	12	49	68	197	106
08:00		38	7			15	6				
08:15		29	4			24	11				
08:30		38	8			28	9				
08:45		27	11	132	30	27	5	94	31	226	61
09:00		33	3			15	10				
09:15		13	3			20	3				
09:30		12	5			12	9				
09:45		11	2	69	13	11	4	58	26	127	39
10:00		14	3			11	4				
10:15		15	0			9	1				
10:30		12	1			12	1				
10:45		14	1	55	5	20	4	52	10	107	15
11:00		10	1			9	0				
11:15		22	2			9	1				
11:30		12	0			9	1				
11:45		8	0	52	3	8	0	35	2	87	5
Total		573	618			328	874			901	1492
Percent		48.1%	51.9%			27.3%	72.7%			37.7%	62.3%
Grand Total		573	618			328	874			901	1492
Percent		48.1%	51.9%			27.3%	72.7%			37.7%	62.3%

ADT

ADT 2,393

AADT 2,393

Location : Harris Street
Location : at 66 Harris Street
City/State: Acton, MA

8346VOL1

Start Time	9/25/2019 Wed	WB	EB	Total
12:00 AM		0	5	5
01:00		0	2	2
02:00		0	0	0
03:00		0	0	0
04:00		2	2	4
05:00		20	9	29
06:00		95	22	117
07:00		148	49	197
08:00		132	94	226
09:00		69	58	127
10:00		55	52	107
11:00		52	35	87
12:00 PM		55	56	111
01:00		45	58	103
02:00		63	66	129
03:00		79	100	179
04:00		102	135	237
05:00		104	164	268
06:00		81	158	239
07:00		38	68	106
08:00		30	31	61
09:00		13	26	39
10:00		5	10	15
11:00		3	2	5
Total		1191	1202	2393
Percent		49.8%	50.2%	
AM Peak	-	07:00	08:00	08:00
Vol.	-	148	94	226
PM Peak	-	17:00	17:00	17:00
Vol.	-	104	164	268
Grand Total		1191	1202	2393
Percent		49.8%	50.2%	
ADT		ADT 2,393	AADT 2,393	

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 1

Groups Printed- Cars - Trucks													
Start Time	Main St From North			Harris St From East			Main St From South			Harris St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	60	7	0	0	0	0	95	0	33	1	9	205
07:15 AM	0	75	9	0	0	1	1	82	0	13	0	7	188
07:30 AM	0	100	9	0	0	0	1	85	0	45	0	14	254
07:45 AM	0	99	9	1	0	0	1	100	0	28	0	9	247
Total	0	334	34	1	0	1	3	362	0	119	1	39	894
08:00 AM	0	82	15	0	0	0	2	95	0	38	0	3	235
08:15 AM	0	80	18	0	0	1	2	122	0	32	0	8	263
08:30 AM	0	78	12	0	0	0	2	104	0	22	0	5	223
08:45 AM	0	100	18	1	0	0	1	95	0	26	0	7	248
Total	0	340	63	1	0	1	7	416	0	118	0	23	969
Grand Total	0	674	97	2	0	2	10	778	0	237	1	62	1863
Approch %	0	87.4	12.6	50	0	50	1.3	98.7	0	79	0.3	20.7	
Total %	0	36.2	5.2	0.1	0	0.1	0.5	41.8	0	12.7	0.1	3.3	
Cars	0	656	92	2	0	2	9	754	0	237	1	62	1815
% Cars	0	97.3	94.8	100	0	100	90	96.9	0	100	100	100	97.4
Trucks	0	18	5	0	0	0	1	24	0	0	0	0	48
% Trucks	0	2.7	5.2	0	0	0	10	3.1	0	0	0	0	2.6

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear

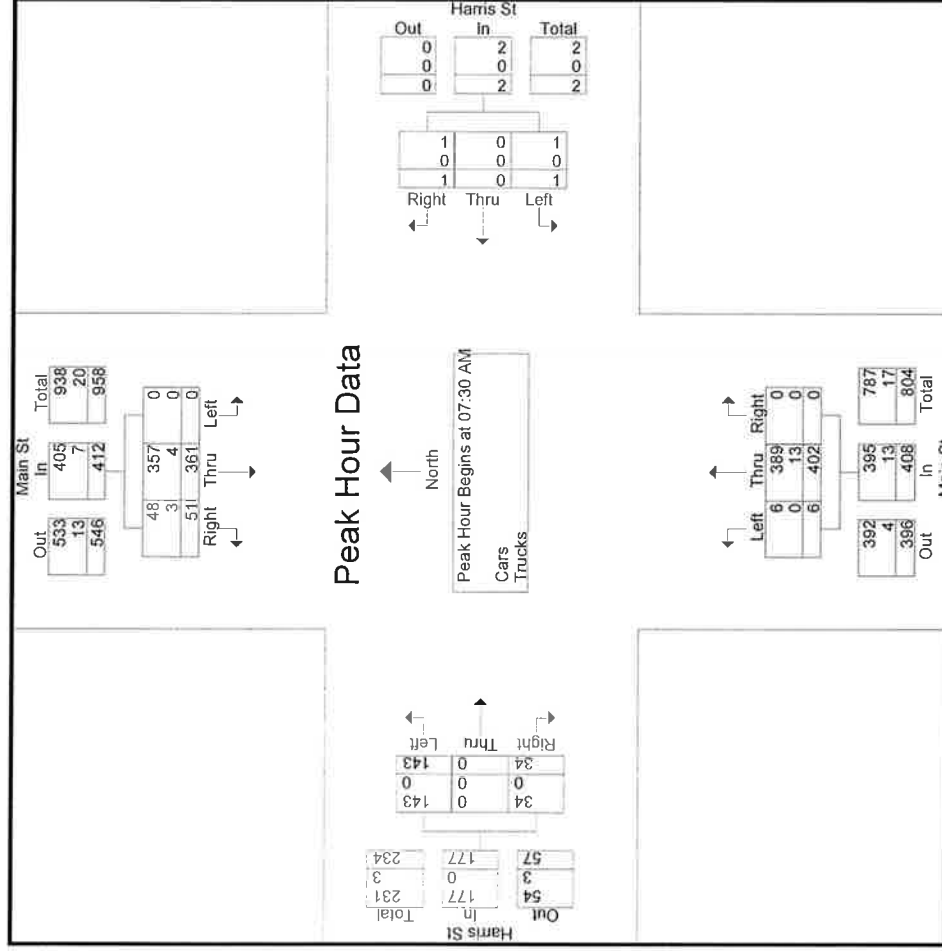
File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 2

Start Time	Main St From North				Harris St From East				Main St From South				Harris 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 07:30 AM																	
07:30 AM	0	100	9	109	0	0	0	0	1	85	0	86	45	0	14	59	254
07:45 AM	0	99	9	108	1	0	0	1	1	100	0	101	28	0	9	37	247
08:00 AM	0	82	15	97	0	0	0	0	2	95	0	97	38	0	3	41	235
08:15 AM	0	80	18	98	0	0	1	1	2	122	0	124	32	0	8	40	263
Total Volume	0	361	51	412	1	0	1	2	6	402	0	408	143	0	34	177	999
% App. Total	0	87.6	12.4		50	0	50		1.5	98.5	0		80.8	0	19.2		
PHF	.000	.903	.708	.945	.250	.000	.250	.500	.750	.824	.000	.823	.794	.000	.607	.750	.950
Cars	0	357	48	405	1	0	1	2	6	389	0	395	143	0	34	177	979
% Cars	0	98.9	94.1	98.3	100	0	100	100	100	96.8	0	96.8	100	0	100	100	98.0
Trucks	0	4	3	7	0	0	0	0	0	13	0	13	0	0	0	0	20
% Trucks	0	1.1	5.9	1.7	0	0	0	0	0	3.2	0	3.2	0	0	0	0	2.0

Accurate Counts 978-664-2565

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 3

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear



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

Peak Hour for Each Approach Begins at:

	07:30 AM	07:00 AM	07:45 AM	07:30 AM	07:00 AM	07:45 AM
+0 mins.	0	100	9	0	0	0
+15 mins.	0	99	9	0	1	2
+30 mins.	0	82	15	0	0	2
+45 mins.	0	80	18	0	0	2
Total Volume	0	361	51	1	1	7
% App. Total	0	87.6	12.4	50	50	1.6
				421	421	98.4
				0	0	0
				143	143	80.8
				0	0	0
				34	34	19.2
				0	0	0
				59	59	177
				37	37	41
				40	40	40

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 9

Groups Printed- Trucks												
Start Time	Main St From North			Harris St From East			Main St From South			Harris St From West		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
07:00 AM	0	8	1	0	0	0	0	4	0	0	0	0
07:15 AM	0	5	1	0	0	0	1	4	0	0	0	0
07:30 AM	0	1	0	0	0	0	0	2	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	2	0	0	0	0
Total	0	14	2	0	0	0	1	12	0	0	0	0
08:00 AM	0	1	3	0	0	0	0	5	0	0	0	0
08:15 AM	0	2	0	0	0	0	0	4	0	0	0	0
08:30 AM	0	1	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	3	0	0	0	0
Total	0	4	3	0	0	0	0	12	0	0	0	0
Grand Total	0	18	5	0	0	0	1	24	0	0	0	0
Apprch %	0	78.3	21.7	0	0	0	4	96	0	0	0	0
Total %	0	37.5	10.4	0	0	0	2.1	50	0	0	0	0

13

11

3

2

29

9

6

1

3

19

48

N/S Street : Main Street
EW Street : Harris Street
City/State : Acton, MA
Weather : Clear

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 13

[illegible]

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 1

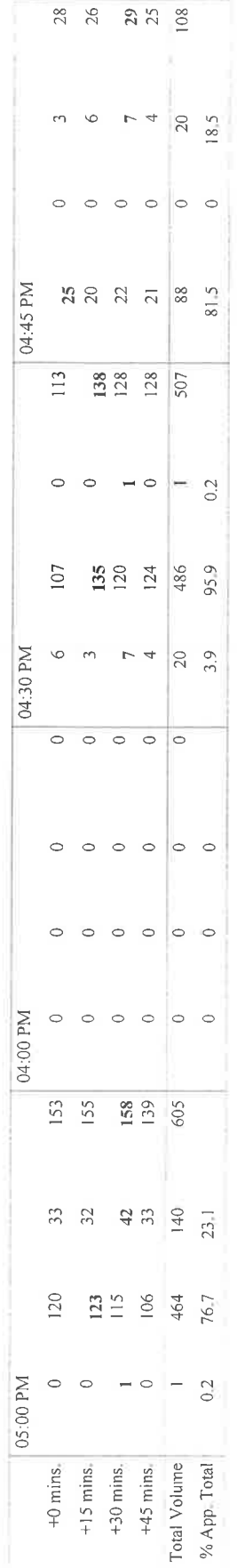
Groups Printed- Cars - Trucks

Start Time	Main St From North			Harris St From East			Main St From South			Harris St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	103	22	0	0	0	4	115	0	18	0	1	263
04:15 PM	0	109	21	0	0	0	6	115	0	20	0	3	274
04:30 PM	0	107	23	0	0	0	6	107	0	18	0	2	263
04:45 PM	0	93	27	0	0	0	3	135	0	25	0	3	286
Total	0	412	93	0	0	0	19	472	0	81	0	9	1086
05:00 PM	0	120	33	0	0	0	7	120	1	20	0	6	307
05:15 PM	0	123	32	0	0	0	4	124	0	22	0	7	312
05:30 PM	1	115	42	0	0	0	7	88	0	21	0	4	278
05:45 PM	0	106	33	0	0	0	2	119	0	23	0	4	287
Total	1	464	140	0	0	0	20	451	1	86	0	21	1184
Grand Total	1	876	233	0	0	0	39	923	1	167	0	30	2270
Apprch %	0.1	78.9	21	0	0	0	4	95.8	0.1	84.8	0	15.2	
Total %	0	38.6	10.3	0	0	0	1.7	40.7	0	7.4	0	1.3	
Cars	1	874	232	0	0	0	39	921	1	166	0	30	2264
% Cars	100	99.8	99.6	0	0	0	100	99.8	100	99.4	0	100	99.7
Trucks	0	2	1	0	0	0	0	2	0	1	0	0	6
% Trucks	0	0.2	0.4	0	0	0	0	0.2	0	0.6	0	0	0.3

978-664-2565

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 2

Main St From North				Harris St From East				Main St From South				Harris St From West						
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. 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	120	33	153	0	0	0	0	0	7	120	1	128	20	0	6	26	307
05:15 PM	0	123	32	155	0	0	0	0	0	4	124	0	128	22	0	7	29	312
05:30 PM	1	115	42	158	0	0	0	0	0	7	88	0	95	21	0	4	25	278
05:45 PM	0	106	33	139	0	0	0	0	0	2	119	0	121	23	0	4	27	287
Total Volume	1	464	140	605	0	0	0	0	0	20	451	1	472	86	0	21	107	1184
% App. Total	0.2	76.7	23.1		0	0	0	0	0	4.2	95.6	0.2		80.4	0	19.6		
PHF	.250	.943	.833	.957	.000	.000	.000	.000	.000	.714	.909	.250	.922	.935	.000	.750	.922	.949
Cars	1	464	140	605	0	0	0	0	0	20	451	1	472	85	0	21	106	1183
% Cars	100	100	100	100	0	0	0	0	0	100	100	100	100	98.8	0	100	99.1	99.9
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	0	0	0.9	0.1



Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 9

Groups Printed- Trucks													
Start Time	Main St From North			Harris St From East			Main St From South			Harris St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	1	1	0	0	0	0	1	0	0	0	0	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	1	0	0	0	0	2	0	0	0	0	5
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	1
05:30 PM	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
Total	0	0	0	0	0	0	0	0	0	1	0	0	1
Grand Total	0	2	1	0	0	0	0	2	0	1	0	0	6
Apprch %	0	66.7	33.3	0	0	0	0	100	0	100	0	0	
Total %	0	33.3	16.7	0	0	0	0	33.3	0	16.7	0	0	

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Harris Street
City/State : Acton, MA
Weather : Clear

File Name : 83460002
Site Code : 83460002
Start Date : 9/19/2019
Page No : 13

Groups Printed- Bikes Peds																			
Start Time	Main St From North				Harris St From East				Main St From South				Harris St From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru		Right	Peds	Left	Thru		Right	Peds	Left	Thru		Right	Peds				
04:00 PM	0	0	0	0	0	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	0	0	0	0	0	
04:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	
Total	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2	2	
05:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	
05:15 PM	0	0	0	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	0	0	0	0	
05:45 PM	0	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	0	0	0	0	0	1	1	1	2	
Grand Total	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	1	3	4	
Approch %	0	50	50		0	0	0	0		100	0	0	0	0					
Total %	0	33.3	33.3		0	0	0	0		33.3	0	0	0	0		25	75		

Accurate Counts

978-664-2565

N/S Street : Great Road
 E/W Street : Harris St / Acorn Park Dr
 City/State : Acorn, MA
 Weather : Clear

File Name : 83460001
 Site Code : 83460001
 Start Date : 9/19/2019
 Page No : 1

Groups Printed- Cars - Trucks

Start Time	Great Rd From North			Harris St From East			Great Rd From South			Acorn Park Dr From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	23	161	1	1	0	6	0	49	6	1	1	5	254
07:15 AM	15	157	3	1	0	14	2	86	1	1	0	3	283
07:30 AM	35	191	0	5	0	11	6	69	3	5	3	13	341
07:45 AM	28	157	2	3	0	12	2	77	1	3	2	7	294
Total	101	666	6	10	0	43	10	281	11	10	6	28	1172
08:00 AM	29	142	6	3	0	16	3	63	7	2	3	2	276
08:15 AM	20	153	13	2	1	20	4	113	7	4	2	7	346
08:30 AM	18	151	4	5	0	18	1	122	2	4	1	5	331
08:45 AM	19	130	1	1	0	24	2	132	6	4	2	7	328
Total	86	576	24	11	1	78	10	430	22	14	8	21	1281
Grand Total	187	1242	30	21	1	121	20	711	33	24	14	49	2453
Approch %	12.8	85.1	2.1	14.7	0.7	84.6	2.6	93.1	4.3	27.6	16.1	56.3	
Total %	7.6	50.6	1.2	0.9	0	4.9	0.8	29	1.3	1	0.6	2	
Cars	187	1218	26	19	1	117	18	698	33	24	14	46	2401
% Cars	100	98.1	86.7	90.5	100	96.7	90	98.2	100	100	100	93.9	97.9
Trucks	0	24	4	2	0	4	2	13	0	0	0	3	52
% Trucks	0	1.9	13.3	9.5	0	3.3	10	1.8	0	0	0	6.1	2.1

Accurate Counts

978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 2

Start Time	Great Rd From North				Harris St From East				Great Rd From South				Acorn Park 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 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	29	142	6	177	3	0	16	19	3	63	7	73	2	3	2	7	276
08:15 AM	20	153	13	186	2	1	20	23	4	113	7	124	4	2	7	13	346
08:30 AM	18	151	4	173	5	0	18	23	1	122	2	125	4	1	5	10	331
08:45 AM	19	130	1	150	1	0	24	25	2	132	6	140	4	2	7	13	328
Total Volume	86	576	24	686	11	1	78	90	10	430	22	462	14	8	21	43	1281
% App. Total	12.5	84	3.5		12.2	1.1	86.7		2.2	93.1	4.8		32.6	18.6	48.8		
PHF	.741	.941	.462	.922	.550	.250	.813	.900	.625	.814	.786	.825	.875	.667	.750	.827	.926
Cars	86	567	22	675	10	1	76	87	10	421	22	453	14	8	19	41	1256
% Cars	100	98.4	91.7	98.4	90.9	100	97.4	96.7	100	97.9	100	98.1	100	100	90.5	95.3	98.0
Trucks	0	9	2	11	1	0	2	3	0	9	0	9	0	0	2	2	25
% Trucks	0	1.6	8.3	1.6	9.1	0	2.6	3.3	0	2.1	0	1.9	0	0	9.5	4.7	2.0

Accurate Counts

978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 9

Groups Printed- Trucks

Start Time	Great Rd From North			Harris St From East			Great Rd From South			Acorn Park Dr From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	6	1	0	0	0	0	0	0	0	0	0	7
07:15 AM	0	5	1	1	0	2	2	4	0	0	0	1	16
07:30 AM	0	2	0	0	0	0	0	0	0	0	0	0	2
07:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	0	15	2	1	0	2	2	4	0	0	0	1	27
08:00 AM	0	2	0	0	0	2	0	5	0	0	0	0	9
08:15 AM	0	4	2	1	0	0	0	0	0	0	0	2	9
08:30 AM	0	1	0	0	0	0	0	3	0	0	0	0	4
08:45 AM	0	2	0	0	0	0	0	1	0	0	0	0	3
Total	0	9	2	1	0	2	0	9	0	0	0	2	25
Grand Total	0	24	4	2	0	4	2	13	0	0	0	3	52
Approch %	0	85.7	14.3	33.3	0	66.7	13.3	86.7	0	0	0	100	
Total %	0	46.2	7.7	3.8	0	7.7	3.8	25	0	0	0	5.8	

978-664-2565

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 13

[illegible]

Accurate Counts

978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 1

Groups Printed- Cars - Trucks													
Start Time	Great Rd From North			Harris St From East			Great Rd From South			Acorn Park Dr From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	17	122	4	2	1	21	3	148	5	4	0	6	333
04:15 PM	21	150	5	2	0	21	4	156	4	1	1	7	372
04:30 PM	18	121	2	1	0	22	4	177	3	2	2	1	353
04:45 PM	19	136	3	1	1	28	2	175	6	1	1	3	376
Total	75	529	14	6	2	92	13	656	18	8	4	17	1434
05:00 PM	28	115	5	3	1	43	3	169	6	3	4	5	385
05:15 PM	21	131	4	3	2	33	7	155	7	6	0	7	376
05:30 PM	22	123	6	1	0	38	4	163	6	3	0	2	368
05:45 PM	27	146	7	1	0	37	8	178	3	1	2	4	414
Total	98	515	22	8	3	151	22	665	22	13	6	18	1543
Grand Total	173	1044	36	14	5	243	35	1321	40	21	10	35	2977
Approch %	13.8	83.3	2.9	5.3	1.9	92.7	2.5	94.6	2.9	31.8	15.2	53	
Total %	5.8	35.1	1.2	0.5	0.2	8.2	1.2	44.4	1.3	0.7	0.3	1.2	
Cars	172	1042	35	14	5	242	35	1316	40	21	10	33	2965
% Cars	99.4	99.8	97.2	100	100	99.6	100	99.6	100	100	100	94.3	99.6
Trucks	1	2	1	0	0	1	0	5	0	0	0	2	12
% Trucks	0.6	0.2	2.8	0	0	0.4	0	0.4	0	0	0	5.7	0.4

Accurate Counts
978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 2

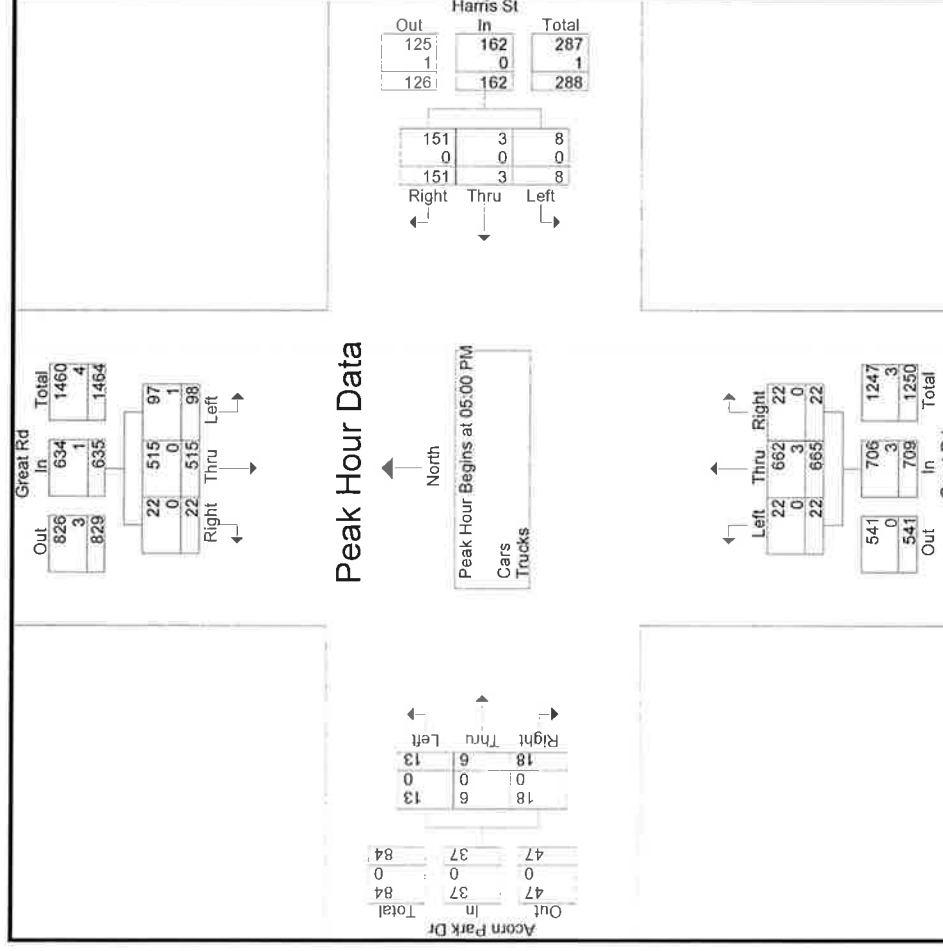
Great Rd From North				Harris St From East				Great Rd From South				Acorn Park Dr From West					
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	28	115	5	148	3	1	43	47	3	169	6	178	3	4	5	12	385
05:15 PM	21	131	4	156	3	2	33	38	7	155	7	169	6	0	7	13	376
05:30 PM	22	123	6	151	1	0	38	39	4	163	6	173	3	0	2	5	368
05:45 PM	27	146	7	180	1	0	37	38	8	178	3	189	1	2	4	7	414
Total Volume	98	515	22	635	8	3	151	162	22	665	22	709	13	6	18	37	1543
% App. Total	15.4	81.1	3.5		4.9	1.9	93.2		3.1	93.8	3.1		35.1	16.2	48.6		
PHF	.875	.882	.786	.882	.667	.375	.878	.862	.688	.934	.786	.938	.542	.375	.643	.712	.932
Cars	97	515	22	634	8	3	151	162	22	662	22	706	13	6	18	37	1539
% Cars	99.0	100	100	99.8	100	100	100	100	100	99.5	100	99.6	100	100	100	100	99.7
Trucks	1	0	0	1	0	0	0	0	0	3	0	3	0	0	0	0	4
% Trucks	1.0	0	0	0.2	0	0	0	0	0	0.5	0	0.4	0	0	0	0	0.3

Accurate Counts

978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 3



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM		05:00 PM		04:30 PM		05:00 PM	
+0 mins.	28	115	5	148	4	177	3	4
+15 mins.	21	131	4	156	2	175	6	0
+30 mins.	22	123	6	151	3	169	6	0
+45 mins.	27	146	7	180	7	155	7	2
Total Volume	98	515	22	635	16	676	22	18
% App. Total	15.4	81.1	3.5	4.9	2.2	94.7	3.1	48.6

Accurate Counts

978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 9

Groups Printed- Trucks													
Start Time	Great Rd From North			Harris St From East			Great Rd From South			Acorn Park Dr From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	1	1	0	0	0	0	1	0	0	0	2	5
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	1	0	0	0	1	0	1	0	0	0	0	3
Total	0	2	1	0	0	1	0	2	0	0	0	2	8
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	1	0	0	0	0	0	0	2	0	0	0	0	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	1	0	0	0	0	0	0	3	0	0	0	0	4
Grand Total	1	2	1	0	0	1	0	5	0	0	0	2	12
Approch %	25	50	25	0	0	100	0	100	0	0	0	100	
Total %	8.3	16.7	8.3	0	0	8.3	0	41.7	0	0	0	16.7	

Accurate Counts

978-664-2565

N/S Street : Great Road
E/W Street : Harris St / Acorn Park Dr
City/State : Acton, MA
Weather : Clear

File Name : 83460001
Site Code : 83460001
Start Date : 9/19/2019
Page No : 13

Groups Printed- Bikes Peds																
Start Time	Great Rd			Harris St			Great Rd			Acorn Park Dr			Exclu. Total	Inclu. Total	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	0	0	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	2	0	0	2
04:45 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	2	0	0	2
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	2	1	0	3
05:30 PM	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
Total	0	0	0	0	0	0	0	1	0	0	0	0	2	1	0	3
Grand Total	0	0	0	0	0	0	0	1	0	0	0	0	4	1	0	5
Approch %	0	0	0	0	0	0	0	100	0	0	0	0				
Total %	0	0	0	0	0	0	0	100	0	0	0	0	80	20		

Accurate Counts

978-664-2565

N/S Street : Acton Fire Department
 E/W Street : Concord Road
 City/State : Acton, MA
 Weather : Clear

File Name : 83460003
 Site Code : 83460003
 Start Date : 9/19/2019
 Page No : 1

Groups Printed- Cars - Trucks				Int. Total
Start Time	In From North	Out From South	Thru	
07:00 AM	0	0	3	3
07:15 AM	0	0	1	1
07:30 AM	1	0	0	1
07:45 AM	0	0	0	0
Total	1	0	4	5
08:00 AM	0	0	0	0
08:15 AM	0	0	1	1
08:30 AM	0	0	0	0
08:45 AM	1	0	0	1
Total	1	0	1	2
Grand Total	2	0	5	7
Apprch %	100	0	100	
Total %	28.6	0	71.4	
Cars	1	0	4	5
% Cars	50	0	80	71.4
Trucks	1	0	1	2
% Trucks	50	0	20	28.6

Accurate Counts

978-664-2565

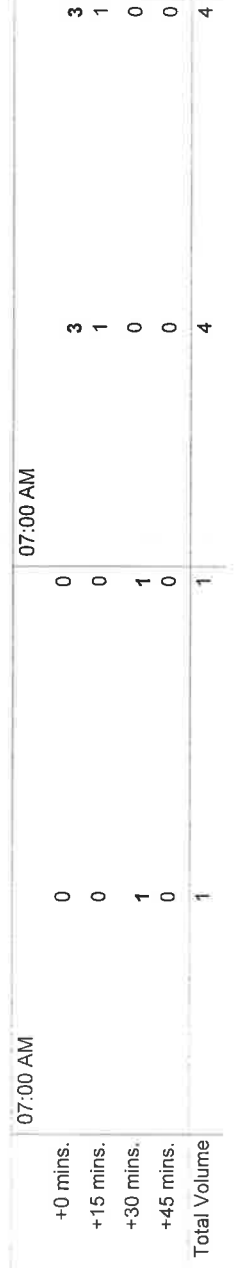
N/S Street : Acton Fire Department
E/W Street : Concord Road
City/State : Acton, MA
Weather : Clear

File Name : 83460003
Site Code : 83460003
Start Date : 9/19/2019
Page No : 2

Start Time	In		Out		Int. Total
	From North	From South	Thru	Thru	
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	0	0	0	3	3
07:15 AM	0	0	0	1	1
07:30 AM	1	1	0	0	1
07:45 AM	0	0	0	0	0
Total Volume	1	1	4	4	5
% App. Total	100	100	100	100	100
PHF	.250	.250	.333	.333	.417
Cars	1	1	4	4	5
% Cars	100	100	100	100	100
Trucks	0	0	0	0	0
% Trucks	0	0	0	0	0

978-664-2565

File Name : 83460003
Site Code : 83460003
Start Date : 9/19/2019
Page No : 3



Peak Hour for Each Approach Begins at:

978-664-2565

File Name : 83460003
Site Code : 83460003
Start Date : 9/19/2019
Page No : 1

Groups Printed- Trucks					
Start Time	In From North		Out From South		Int. Total
	Thru	Thru	Thru	Thru	
07:00 AM	0	0	0	0	0
07:15 AM	0	0	0	0	0
07:30 AM	0	0	0	0	0
07:45 AM	0	0	0	0	0
Total	0	0	0	0	0
08:00 AM	0	0	0	0	0
08:15 AM	0	0	1	1	1
08:30 AM	0	0	0	0	0
08:45 AM	1	1	0	0	1
Total	1	1	1	1	2
Grand Total	1	1	1	1	2
Apprch %	100	100	100	100	
Total %	50	50	50	50	

Accurate Counts

978-664-2565

N/S Street : Acton Fire Department
 E/W Street : Concord Road
 City/State : Acton, MA
 Weather : Clear

File Name : 83460003
 Site Code : 83460003
 Start Date : 9/19/2019
 Page No : 1

Groups Printed- Cars - Trucks				
Start Time	In From North	Thru	Out From South	Thru
04:00 PM	1	1		1
04:15 PM		1		1
04:30 PM		0		0
04:45 PM	1	1		1
Total	3	3		3
05:00 PM	0	0		2
05:15 PM	0	0		0
05:30 PM	0	0		0
05:45 PM	0	0		0
Total	0	0		2
Grand Total	3	3		5
Approch %	100	100		100
Total %	37.5	37.5		62.5
Cars	3	3		5
% Cars	100	100		100
Trucks	0	0		0
% Trucks	0	0		0
				8
				100
				0
				0
				2
				8
				100
				0
				0
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Accurate Counts

978-864-2565

N/S Street : Acton Fire Department
E/W Street : Concord Road
City/State : Acton, MA
Weather : Clear

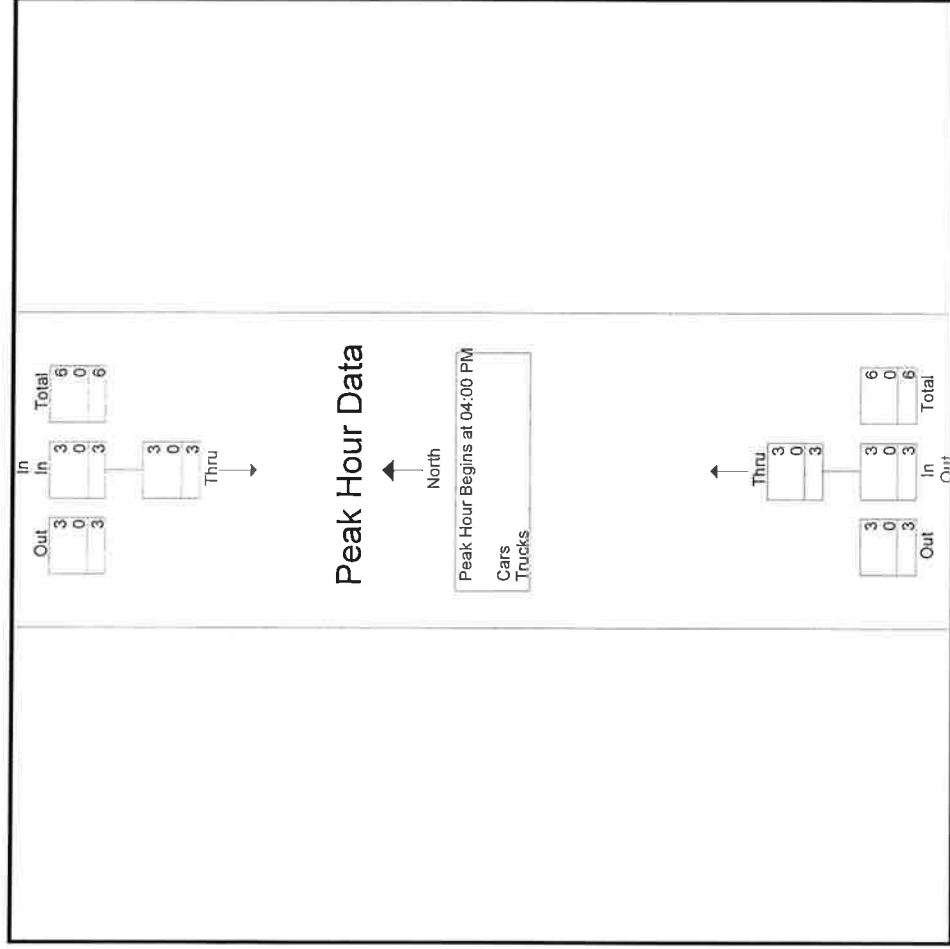
File Name : 83460003
Site Code : 83460003
Start Date : 9/19/2019
Page No : 2

Start Time	In From North		Out From South		Int. Total
	Thru	App. Total	Thru	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	1	1	1	1	2
04:15 PM	1	1	1	1	2
04:30 PM	0	0	0	0	0
04:45 PM	1	1	1	1	2
Total Volume	3	3	3	3	6
% App. Total	100		100		
PHF	.750	.750	.750	.750	.750
Cars	3	3	3	3	6
% Cars	100	100	100	100	100
Trucks	0	0	0	0	0
% Trucks	0	0	0	0	0

Accurate Counts 978-664-2565

N/S Street : Acton Fire Department
 E/W Street : Concord Road
 City/State : Acton, MA
 Weather : Clear

File Name : 83460003
 Site Code : 83460003
 Start Date : 9/19/2019
 Page No : 3



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	04:15 PM	
+0 mins.	1	1	1
+15 mins.	1	1	0
+30 mins.	0	0	1
+45 mins.	1	1	2
Total Volume	3	3	4

Accurate Counts

978-664-2565

N/S Street : Acton Fire Department
 E/W Street : Concord Road
 City/State : Acton, MA
 Weather : Clear

File Name : 83460003
 Site Code : 83460003
 Start Date : 9/19/2019
 Page No : 1

Groups Printed- Trucks					Int. Total
Start Time	In From North	Thru	Out From South	Thru	
04:00 PM		0		0	0
04:15 PM		0		0	0
04:30 PM		0		0	0
04:45 PM		0		0	0
Total		0		0	0
05:00 PM		0		0	0
05:15 PM		0		0	0
05:30 PM		0		0	0
05:45 PM		0		0	0
Total		0		0	0
Grand Total		0		0	0
Apprch %		0		0	
Total %					

SEASONAL ADJUSTMENT DATA

Massachusetts Highway Department

4172: Monthly Hourly Volume for 2018-2019

Location ID:	4172	Seasonal Factor Group:	U2
County:	Middlesex	Daily Factor Group:	
Functional Class	2	Axle Factor Group:	U2
Location:	Route 2	Growth Factor Group:	U2
	West of Route 27		

	Monthly Volume	Variation from Avg Month
2019 January	42578	0.95
2019 February	42546	0.95
2019 March	43587	0.98
2019 April	46015	1.03
2019 May	47576	1.07
2019 June	46717	1.05
2019 July	43922	0.98
2018 August	44767	1.00
2018 September	44652	1.00
2018 October	47064	1.05
2018 November	44082	0.99
2018 December	41865	0.94
Average	44614	1.00

PUBLIC TRANSPORTATION SCHEDULES



MOBILE SHUTTLE TRACKER

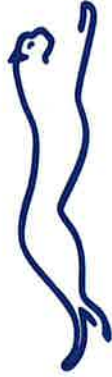
Download the App



Ride Systems
Ride Systems

- > Download the free mobile app, available in Google Play or the App Store.
- > Select 'Cross Acton Transit'.
- > See the route and your nearest stop.
- > Access the schedule on your phone.

Track the Shuttle Online
CrossActonTransit.com



Ride the CAT
Cross-Acton Transit

Track the Shuttle Online
CrossActonTransit.com



Town of Acton
Acton-Ma.gov

Resident Transportation Services
MinuteVan.net

CrossTownConnect



Learn more about your commuting options
CrossTownConnect.org



EFFECTIVE AUG 2017



ALL FARES \$1.00 (exact change required)

WITH SERVICE TO

Sachem Way	Acton Plaza 1 & 2
Nagog Woods	Acton Pharmacy/West Acton
Nagog Mall*	Windsor Avenue
Avalon Drive	S. Acton MBTA (mid-day*)
Great Roads Condominiums	Kmart Parking Lot
Gould's Plaza	Town Hall/Library*

FOR MORE INFORMATION

CrossTown Connect Dispatch
(978) 844-6809

Ride the CAT
Cross-Acton Transit

A Service of Town of Acton
Managed by CrossTown Connect TMA
Operated by TransAction Corporate Shuttles



Effective August 2017

Sachem Way	Nagow Woods (postal kiosk)	Nagow Mall* (by request only)	Avalon Drive (sales office)	Great Road Condos (front entrance mailboxes)	Gould's Plaza (Donelan's entrance)	Town Hall/Library* (by request only)	Action Plaza 1 & 2 (Roche Brothers entrance)	Action Pharmacy (563 Massachusetts Ave)	Windsor Green (68 Windsor Ave)	S. Action MBTA Station (by request only, during mid-day hours*)	Kmart Parking Lot/ Kmart Entrance (0.3miles to A/B schools)	Town Hall/Library* (by request only)
8:00	8:04	8:07*	8:10	8:14			NO STOPS			8:33	8:40	8:46*
9:00	9:04	9:07*	9:10	9:14	9:19	9:24*	9:30	9:35	9:38	9:43	9:48	9:54*
10:00	10:04	10:07*	10:10	10:14	10:19	10:24*	10:30	10:35	10:38	10:43*	10:48	10:54*
11:00	11:04	11:07*	11:10	11:14	11:19	11:24*	11:30	11:35	11:38	11:43*	11:48	11:54*
12:00	12:04	12:07*	12:10	12:14	12:19	12:24*	12:30	12:35	12:38	12:43*	12:48	12:54*
1:00*	1:04*	1:07*	1:10*				NO STOPS					
2:00	2:04	2:07*	2:10	2:14	2:19	2:24*	2:30	2:35	2:38	2:43*	2:48	2:54*
3:00	3:04	3:07*	3:10	3:14	3:19	3:24*	3:30	3:35	3:38	3:43*	3:48	3:54*
4:00	4:04	4:07*	4:10	4:14	4:19	4:24*	4:30	4:35	4:38	4:43	4:48	4:54*
5:00	5:04	5:07*	5:10	5:14	5:19	5:24*	5:30	5:35	5:38	5:43	5:48	5:54*
6:00*	6:04*	6:07*	6:10*	6:14*			NO STOPS					

am times shown in light type | pm times shown in bold type

PLEASE NOTE All times are approximate due to traffic and weather conditions in the area.



Crosstown Connect Dispatch

(978) 844-6809

Monday thru Friday

8:30am—4:00pm

***Bus Only Travels To These Stops Upon Request**

- Onboard riders can ask the driver to stop
- Or call Dispatch in advanced to request a stop

No shuttle services on weekends

and the following Holidays:

New Year's Day, President's Day, Patriots Day, Memorial Day, 4th of July, Labor Day, Thanksgiving (and the day after), and Christmas Day.

Don't see your stop?

- Call Dispatch 24-hours in advanced to see if we can accomodate your request

This shuttle is operated by
tcs shuttles.com | 781.895.1100



TransAction
Corporate Shuttles

FITCHBURG LINE

Effective May 20, 2019

Monday to Friday

Inbound to Boston

ZONE	STATION	TRAIN #	400	402	404	406	408	492	410	412	414	416	418	420	422	424	426	428	430	432
8	Wachusett	6	4:50	5:45	6:20	6:40	7:10	-	8:10	9:37	10:50	12:05	1:30	2:50	4:05	5:43	7:03	8:25	9:30	10:35
8	Fitchburg	6	4:58	5:53	6:28	6:48	7:18	-	8:18	9:45	10:58	12:13	1:38	2:58	4:13	5:51	7:11	8:33	9:38	10:43
8	North Leominster	6	5:05	6:00	6:35	6:55	7:25	-	8:25	9:52	11:05	12:20	1:45	3:05	4:20	5:58	7:18	8:40	9:45	10:50
8	Shirley	6	5:13	6:08	6:43	7:03	7:33	-	8:33	10:00	11:13	12:28	1:53	3:13	4:28	6:06	7:26	8:48	9:53	10:58
8	Ayer	6	5:18	6:13	6:48	7:08	7:38	-	8:38	10:05	11:18	12:33	1:58	3:18	4:33	6:11	7:31	8:53	9:58	11:03
7	Littleton/Rte 495	6	5:26	6:21	6:56	7:16	7:46	7:55	8:46	10:13	11:26	12:41	2:06	3:26	4:41	6:19	7:39	9:01	10:06	11:11
6	South Acton	6	5:33	6:28	7:03	7:23	7:53	8:02	8:53	10:19	11:32	12:47	2:12	3:32	4:47	6:25	7:45	9:07	10:12	11:17
5	West Concord	6	5:37	6:32	-	7:28	-	8:06	8:57	10:23	11:36	12:51	2:16	3:36	4:53	6:29	7:49	9:11	10:16	11:21
5	Concord	6	5:42	6:37	-	7:33	-	8:11	9:02	10:27	11:40	12:55	2:20	3:40	4:57	6:33	7:53	9:15	10:20	11:25
4	Lincoln	6	5:49	6:44	-	7:40	-	8:18	9:09	10:33	11:46	1:01	2:26	3:46	5:03	6:39	7:59	9:21	10:26	11:31
3	Silver Hill	6	-	6:47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Hastings	6	5:54	6:50	-	-	-	8:24	-	10:37	11:50	-	-	-	-	-	-	-	-	-
3	Kendal Green	6	5:57	6:53	-	7:47	-	8:27	9:15	10:39	11:52	1:07	2:32	3:52	5:09	6:45	8:05	9:27	10:32	11:37
2	Brandels/Roberts	6	6:01	6:57	-	7:51	-	8:31	9:18	10:42	11:55	1:10	2:35	3:55	5:13	6:48	8:08	9:30	10:35	11:40
2	Waltham	6	6:05	7:01	-	7:55	8:13	8:35	9:22	10:46	11:59	1:13	2:41	3:59	5:17	6:52	8:12	9:34	10:39	11:44
1	Waverley	6	6:10	7:06	-	8:00	-	8:40	9:27	10:51	12:04	-	-	-	5:22	6:53	-	9:39	-	-
1	Belmont	6	6:13	7:09	-	8:03	-	8:43	9:30	10:53	12:06	1:20	2:47	4:07	5:24	6:58	8:18	9:41	10:45	11:50
1A	Porter Square	6	6:18	7:14	7:31	8:08	8:22	8:48	9:35	10:58	12:11	1:25	2:52	4:12	5:29	7:03	8:23	9:46	10:50	11:55
1A	North Station	6	6:29	7:25	7:42	8:19	8:33	8:59	9:46	11:08	12:21	1:35	3:02	4:22	5:40	7:13	8:33	9:56	11:00	12:05

Trains in purple box indicate peak period trains.

Monday to Friday

Outbound from Boston

ZONE	STATION	TRAIN #	401	491	403	405	407	409	411	413	415	417	419	421	423	425	427	429	431	433
1A	North Station	6	6:35	6:45	7:43	8:45	10:00	11:15	12:45	1:55	3:30	3:59	4:30	5:05	5:35	6:25	7:15	8:45	10:40	12:10
1A	Porter Square	6	6:45	6:55	7:53	8:55	10:10	11:25	12:55	2:05	3:40	4:09	4:41	5:15	5:46	6:35	7:25	8:55	10:50	12:20
1	Belmont	6	-	6:50	7:58	9:00	10:15	11:30	1:00	2:10	3:45	4:14	-	5:20	-	6:10	6:40	7:30	9:00	10:55
1	Waverley	6	-	7:02	8:00	9:02	10:17	-	1:12	2:12	3:48	4:17	-	5:23	-	6:13	6:43	7:32	9:02	10:57
2	Waltham	6	-	7:07	8:05	9:07	10:22	11:36	1:06	2:17	3:53	4:22	-	5:28	5:56	6:48	7:37	9:07	11:02	12:32
2	Brandels/Roberts	6	-	7:10	8:09	9:10	10:25	11:39	1:09	2:20	3:57	4:26	-	5:32	-	6:22	6:52	7:40	9:10	11:05
3	Kendal Green	6	-	7:14	8:13	9:14	10:29	11:43	1:13	2:24	4:01	4:30	-	5:36	-	6:26	6:56	7:44	9:14	11:09
3	Hastings	6	-	-	-	-	-	-	-	-	-	4:33	-	5:39	-	6:29	6:59	7:47	-	-
3	Silver Hill	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Lincoln	6	-	7:19	8:18	9:19	10:34	11:48	1:18	2:29	4:07	4:38	-	5:45	6:06	6:36	7:06	7:53	9:19	11:14
5	Concord	6	-	7:24	8:23	9:24	10:39	11:53	1:23	2:34	4:12	4:43	-	5:50	6:11	6:41	7:11	7:58	9:24	11:19
5	West Concord	6	-	7:28	8:28	9:28	10:43	11:57	1:27	2:38	4:17	4:48	-	5:55	6:16	6:46	7:16	8:02	9:28	11:23
6	South Acton	6	7:09	7:33	8:33	9:33	10:48	12:02	1:32	2:43	4:21	4:52	5:08	6:00	6:21	6:50	7:20	8:07	9:33	11:28
7	Littleton/Rte 495	6	7:16	7:40	8:41	9:40	10:55	12:09	1:39	2:50	4:28	5:00	5:15	6:07	6:28	6:57	7:27	8:14	9:40	11:35
8	Ayer	6	7:24	-	8:49	9:48	11:03	12:17	1:47	2:58	4:36	-	5:23	6:15	6:36	7:05	7:35	8:22	9:48	11:43
8	Shirley	6	7:29	-	8:54	9:53	11:08	12:23	1:53	3:03	4:42	-	5:28	6:21	6:42	7:11	7:41	8:27	9:53	11:48
8	North Leominster	6	7:38	-	9:04	10:02	11:17	12:32	2:02	3:12	4:51	-	5:37	6:30	6:51	7:20	7:50	8:36	10:02	11:57
8	Fitchburg	6	7:48	-	9:14	10:10	11:24	12:41	2:09	3:21	4:58	-	5:44	6:37	7:00	7:27	7:59	8:43	10:09	12:04
8	Wachusett	6	7:58	-	9:21	10:19	11:34	12:51	2:19	3:31	5:08	-	5:55	6:48	7:10	7:37	8:09	8:53	10:19	12:14

Trains in purple box indicate peak period trains.

Keep in Mind:

This schedule will be effective from May 20, 2019 and will replace the schedule of October 29, 2018.

Presidents' Day and 4th of July operate on a Saturday service schedule.

New Year's Day, Memorial Day, Labor Day, Thanksgiving Day, and Christmas Day operate on a Sunday service schedule.

For all other holiday schedules, please check MBTA.com or call 617-222-3200.



Times in purple with "f" indicate a flag stop: Passengers must tell the conductor that they wish to leave. Passengers waiting to board must be visible on the platform for the train to stop.



Times in blue indicate an early departure (L stop): The train may leave ahead of schedule at these stops.



Bikes: Bicycles are allowed on trains with the bicycle symbol shown below the train number.



High level platform and bridge plate available.
Visit mbta.com/accessibility for more information.



KEOLIS



617-222-3200



Download the
Commuter Rail App



Follow
@MBTA_CR

MOTOR VEHICLE CRASH DATA

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Acton COUNT DATE : 2019
 DISTRICT : 3 UNSIGNALIZED : ☒ SIGNALIZED : ☐

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Great Road
 MINOR STREET(S) : Harris Street
Acron Park Drive

ST #

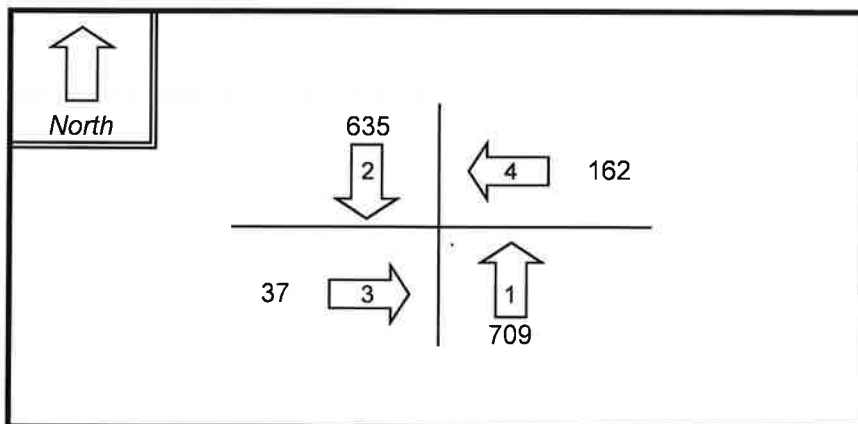
ST #

ST #

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**INTERSECTION
DIAGRAM**
(Label Approaches)



**INTERSECTION
REF #**

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	709	635	37	162		1,543

" 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 : Accident Rate for District 3 signalized intersections = 0.89
Accident Rate for District 3 unsignalized intersections = 0.61

MassDOT Crash Report for Great Road at Harris Street and Acorn Park Drive in Acton MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
08/14/2013	Property damage only (none injured)	5:49 PM	3	D1: (Inattention) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Entering traffic lane / V2: Travelling straight ahead / V3: Slowing or stopped in traffic	V1: W / V2: E / V3: E	Clear		GREAT ROAD Rte 119 E / HARRIS STREET
10/24/2013	Property damage only (none injured)	8:45 AM	2	D1: (Glare)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: N	Clear/Clear		GREAT ROAD / HARRIS STREET
02/14/2014	Property damage only (none injured)	7:59 PM	2	D1: (No improper driving) / D2: (Driving too fast for conditions) / (Driving too fast for conditions)	Dark - lighted roadway	Sideswipe, opposite direction	Ice	V1: Travelling straight ahead / V2: Entering traffic lane	V1: W / V2: W	Cloudy/Cloudy		GREAT ROAD / HARRIS STREET / Rte 2A
12/15/2014	Non-fatal injury	7:46 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way) / (Inattention)	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: S	Clear		ACORN PARK DRIVE / GREAT ROAD
01/28/2015	Property damage only (none injured)	12:43 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Angle	Snow	V1: Travelling straight ahead / V2: Entering traffic lane	V1: W / V2: N	Clear		ACORN PARK DRIVE / GREAT ROAD
02/07/2015	Property damage only (none injured)	8:48 AM	3		Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead / V3: Travelling straight ahead	V1: W / V2: W / V3: W	Clear		GREAT ROAD / HARRIS STREET
02/12/2015	Property damage only (none injured)	8:06 AM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Entering traffic lane	V1: E / V2: N	Cloudy		GREAT ROAD Rte 2A E / ACORN PARK DRIVE / HARRIS STREET
05/31/2015	Non-fatal injury	2:30 PM	2	D1: (No improper driving) / D2: (Visibility obstructed)	Daylight	Angle	Wet	V1: Travelling straight ahead / V2: Turning left	V1: E / V2: W	Rain/Cloudy		GREAT ROAD / ACORN PARK DRIVE
11/20/2015	Property damage only (none injured)	11:02 PM	1	D1: (Fatigued/asleep)	Dark - lighted roadway	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: W	Clear/Clear		GREAT ROAD / GREAT ROAD / ACORN PARK DRIVE
11/23/2015	Property damage only (none injured)	6:25 PM	2	D1: (No improper driving) / D2: (Inattention)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Clear		GREAT ROAD Rte 119 E / HARRIS STREET / ACORN PARK DRIVE
02/15/2017	Property damage only (none injured)	12:04 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way) / (No improper driving)	Daylight	Single vehicle crash	Wet	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: E	Cloudy/Cloudy		HARRIS STREET / GREAT ROAD Rte 2A E / HARRIS STREET

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Acton COUNT DATE : 2019
 DISTRICT : 3 UNSIGNALIZED : ☒ SIGNALIZED : ☐

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Main Street

ST #

MINOR STREET(S) : Harris Street

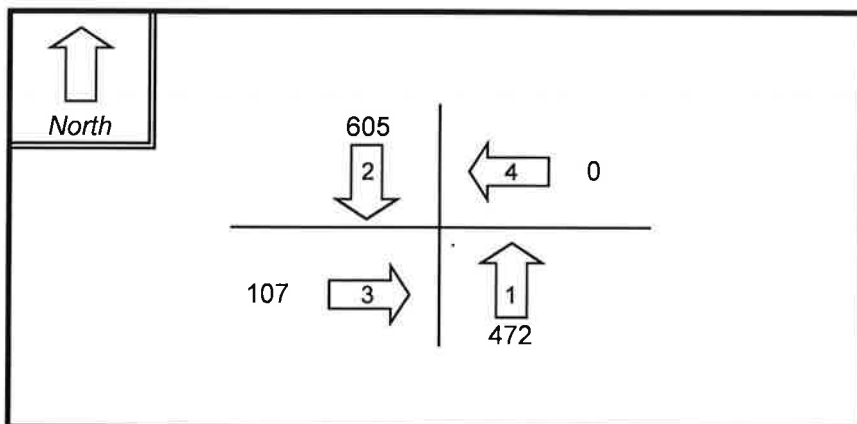
ST #

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 (PM) :	472	605	107	0		1,184

" 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 : Accident Rate for District 3 signalized intersections = 0.89

Accident Rate for District 3 unsignalized intersections = 0.61

MassDOT Crash Report for Main Street at Harris Street in Acton MA 2013-2017

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Street Number	Roadway
06/12/2013	Property damage only (none injured)	9:35 PM	2	D1: (No improper driving) / D2: (Other improper action)	Dark - lighted roadway	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: N / V2: Not Reported	Clear	749	MAIN STREET
09/18/2013	Property damage only (none injured)	11:44 AM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: S / V2: N	Clear/Clear		MAIN STREET / HARRIS STREET
01/04/2014	Property damage only (none injured)	6:26 PM	2	D1: (No improper driving) / D2: (Driving too fast for conditions),(Disregarded traffic signs, signals, road markings)	Dark - lighted roadway	Angle	Snow	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: S / V2: E	Clear		MAIN STREET / HARRIS STREET
04/10/2014	Property damage only (none injured)	7:48 AM	2	D1: (No improper driving) / D2: (Failed to yield right of way)	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Entering traffic lane	V1: S / V2: E	Clear		HARRIS STREET / MAIN STREET
02/18/2014	Property damage only (none injured)	10:09 PM	2	D1: (Other Improper action) / D2: (No improper driving),(No improper driving) / D2: (Followed too closely),(Followed too closely)	Dark - lighted roadway	Rear-to-rear	Snow	V1: Backing / V2: Parked	V1: E / V2: Not Reported	Cloudy/Cloudy		MAIN STREET / HARRIS STREET
06/28/2017	Non-fatal injury	4:17 PM	2		Daylight	Rear-end	Dry	V1: Turning left / V2: Travelling straight ahead	V1: N / V2: N	Clear/Clear		MAIN STREET / HARRIS STREET

SPEED STUDY DATA

Accurate Counts
978-664-2565

Location : Harris Street
Location : at 66 Harris Street
City/State: Acton, MA

8346SPD1

EB

Start Time	1	4	7	10	13	16	19	22	25	28	31	34	37	40	Total
09/25/19	3	6	9	12	15	18	21	24	27	30	33	36	39	40	999
01:00	0	0	0	0	0	0	0	0	0	1	3	0	1	0	5
02:00	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
06:00	0	0	0	0	0	0	0	1	0	0	2	4	1	1	9
07:00	1	0	0	0	0	0	0	1	5	3	6	4	3	0	22
08:00	2	0	0	0	0	0	0	2	3	16	11	10	4	1	49
09:00	1	0	0	0	0	0	0	1	3	20	34	27	5	0	94
10:00	0	0	0	0	0	0	0	0	6	10	17	14	5	4	58
11:00	0	0	0	0	0	0	0	0	9	17	15	10	1	0	52
12 PM	0	0	0	0	0	0	0	1	4	6	11	6	4	3	35
13:00	0	0	0	1	2	0	0	1	2	18	22	6	7	0	56
14:00	1	0	0	0	1	0	0	3	2	17	16	15	1	1	58
15:00	0	0	0	0	0	0	0	1	8	16	23	12	3	1	66
16:00	2	0	0	0	0	0	0	5	13	18	41	19	4	0	100
17:00	1	0	0	0	1	1	3	1	16	32	43	24	10	3	135
18:00	0	0	0	1	0	0	0	2	16	45	64	23	10	2	164
19:00	0	0	0	0	0	0	2	0	13	35	66	36	5	0	158
20:00	0	0	0	0	0	0	1	0	5	24	28	7	2	1	68
21:00	0	0	0	0	0	0	1	1	1	11	11	5	0	3	31
22:00	0	0	0	0	0	0	0	0	5	7	9	1	3	0	26
23:00	0	0	0	0	0	0	0	0	3	1	2	1	1	2	10
Total	8	0	0	2	4	1	8	23	117	298	425	226	70	20	1202

15th Percentile : 27 MPH
50th Percentile : 30 MPH
85th Percentile : 34 MPH
95th Percentile : 36 MPH

Mean Speed(Average) : 31 MPH
10 MPH Pace Speed : 27-36 MPH
Number in Pace : 988
Percent in Pace : 82.2%
Number of Vehicles > 30 MPH : 741
Percent of Vehicles > 30 MPH : 61.6%

Grand Total : 8 0 0 2 4 1 8 23 117 298 425 226 70 20 1202

Overall

15th Percentile : 27 MPH
50th Percentile : 30 MPH
85th Percentile : 34 MPH
95th Percentile : 36 MPH

Mean Speed(Average) : 31 MPH
10 MPH Pace Speed : 27-36 MPH
Number in Pace : 988
Percent in Pace : 82.2%
Number of Vehicles > 30 MPH : 741
Percent of Vehicles > 30 MPH : 61.6%

Accurate Counts
978-684-2565

Location : Harris Street
Location : at 66 Harris Street
City/State: Acton, MA

WB

8346SPD1

Start Time	1	4	7	10	13	16	19	22	25	28	31	34	37	40	Total
09/25/19	3	6	9	12	15	18	21	24	27	30	33	36	39	999	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	12	0	0	1	0	0	4	20	67	210	367	331	134	45	1191

Daily

15th Percentile : 27 MPH
50th Percentile : 32 MPH
85th Percentile : 35 MPH
95th Percentile : 37 MPH

Mean Speed(Average) : 32 MPH
10 MPH Pace Speed : 28-37 MPH
Number in Pace : 953
Percent in Pace : 80.0%
Number of Vehicles > 30 MPH : 877
Percent of Vehicles > 30 MPH : 73.6%

Grand Total

12 0 0 0 1 0 0 4 20 67 210 367 331 134 45 1191

Overall

15th Percentile : 27 MPH
50th Percentile : 32 MPH
85th Percentile : 35 MPH
95th Percentile : 37 MPH

Mean Speed(Average) : 32 MPH
10 MPH Pace Speed : 28-37 MPH
Number in Pace : 953
Percent in Pace : 80.0%
Number of Vehicles > 30 MPH : 877
Percent of Vehicles > 30 MPH : 73.6%

BACKGROUND GROWTH RATE DATA

Massachusetts Highway Department

4002: Annual Growth Rate 2006-2016

Location ID:	4002	Seasonal Factor Group:	U3
County:	Middlesex County	Daily Factor Group:	
Functional Class	3 - Other Principal Arterial	Axle Factor Group:	U3
Location:	Great Road at Littleton Town Line	Growth Factor Group:	U3

Year	AADT
2016	14966
2006	15461

A = 2016/2006	0.9680
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B = $A^{(1/10)}$	0.9968
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Average Annual Growth Rate	-0.32
Use	1 Percent

Massachusetts Highway Department

4001: Annual Growth Rate 2006-2016

Location ID:	4001	Seasonal Factor Group:	U3
County:	Middlesex County	Daily Factor Group:	
Functional Class	3 - Other Principal Arterial	Axle Factor Group:	U3
Location:	Main Street	Growth Factor Group:	U3
	North of Route 2A		

Year	AADT
2016	10445
2006	10374

A = 2016/2006	1.0068
B = A^(1/10)	1.0007

Average Annual Growth Rate	0.07
Use	1 Percent

Massachusetts Highway Department

241132: Annual Growth Rate 2005-2015

Location ID:	241132	Seasonal Factor Group:	U3
County:	Middlesex County	Daily Factor Group:	
Functional Class	3 - Other Principal Arterial	Axle Factor Group:	U3
Location:	Acton Road	Growth Factor Group:	U3
	South of Route 225		

Year	AADT
2015	7543
2005	7500

A = 2015/2005	1.0057
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B = $A^{(1/10)}$	1.0006
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Average Annual Growth Rate	0.06
Use	1 Percent

CAPACITY ANALYSIS

Great Road at Harris Street and Acorn Park Drive

Mains Street at Harris Street

Harris Street at Site Driveway

Great Road at Harris Street and Acorn Park Drive

Intersection												
Int Delay, s/veh	3											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↖	↗			↕	↗
Traffic Vol, veh/h	86	576	24	10	430	22	14	8	21	11	1	78
Future Vol, veh/h	86	576	24	10	430	22	14	8	21	11	1	78
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	100	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	83	83	83	83	83	83	90	90	90
Heavy Vehicles, %	0	2	8	0	2	0	0	0	10	9	0	3
Mvmt Flow	93	626	26	12	518	27	17	10	25	12	1	87

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	545	0	0	652	0	0	1381	1394	639	1399	1394	532
Stage 1	-	-	-	-	-	-	825	825	-	556	556	-
Stage 2	-	-	-	-	-	-	556	569	-	843	838	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.3	7.19	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.19	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.19	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.39	3.581	4	3.327
Pot Cap-1 Maneuver	1034	-	-	944	-	-	123	143	462	114	143	546
Stage 1	-	-	-	-	-	-	370	390	-	503	516	-
Stage 2	-	-	-	-	-	-	519	509	-	349	384	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1034	-	-	944	-	-	90	121	462	89	121	546
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	121	-	89	121	-
Stage 1	-	-	-	-	-	-	317	335	-	432	507	-
Stage 2	-	-	-	-	-	-	428	500	-	275	329	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.1	0.2	31.7	17.9
HCM LOS			D	C

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SERSWLn1	SWLn2
Capacity (veh/h)	90	260	944	-	-	1034	-	-	91 546
HCM Lane V/C Ratio	0.187	0.134	0.013	-	-	0.09	-	-	0.147 0.159
HCM Control Delay (s)	54	21	8.9	0	-	8.8	0	-	51.2 12.8
HCM Lane LOS	F	C	A	A	-	A	A	-	F B
HCM 95th %tile Q(veh)	0.6	0.5	0	-	-	0.3	-	-	0.5 0.6

Intersection												
Int Delay, s/veh	5.1											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘			↕	↗
Traffic Vol, veh/h	98	515	22	22	665	22	13	6	18	8	3	151
Future Vol, veh/h	98	515	22	22	665	22	13	6	18	8	3	151
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	100	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	94	94	94	75	75	75	86	86	86
Heavy Vehicles, %	1	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	111	585	25	23	707	23	17	8	24	9	3	176

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	730	0	0	610	0	0	1586	1596	598	1601	1597	719
Stage 1	-	-	-	-	-	-	820	820	-	765	765	-
Stage 2	-	-	-	-	-	-	766	776	-	836	832	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	879	-	-	979	-	-	88	108	506	86	108	432
Stage 1	-	-	-	-	-	-	372	392	-	399	415	-
Stage 2	-	-	-	-	-	-	398	410	-	364	387	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	879	-	-	979	-	-	42	84	506	63	84	432
Mov Cap-2 Maneuver	-	-	-	-	-	-	42	84	-	63	84	-
Stage 1	-	-	-	-	-	-	301	317	-	322	398	-
Stage 2	-	-	-	-	-	-	225	394	-	273	313	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.5	0.3	65	22.4
HCM LOS			F	C

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SERSWLn1	SWLn2
Capacity (veh/h)	42	224	979	-	-	879	-	-	68 432
HCM Lane V/C Ratio	0.413	0.143	0.024	-	-	0.127	-	-	0.188 0.406
HCM Control Delay (s)	141.3	23.7	8.8	0	-	9.7	0	-	69.8 18.9
HCM Lane LOS	F	C	A	A	-	A	A	-	F C
HCM 95th %tile Q(veh)	1.4	0.5	0.1	-	-	0.4	-	-	0.6 1.9

Intersection

Int Delay, s/veh 3.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘			↕	↗
Traffic Vol, veh/h	92	618	24	10	461	24	14	8	21	12	1	84
Future Vol, veh/h	92	618	24	10	461	24	14	8	21	12	1	84
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	100	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	83	83	83	83	83	83	90	90	90
Heavy Vehicles, %	0	2	8	0	2	0	0	0	10	9	0	3
Mvmt Flow	100	672	26	12	555	29	17	10	25	13	1	93

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	584	0	0	698	0	0	1479	1493	685	1497	1492	570
Stage 1	-	-	-	-	-	-	885	885	-	594	594	-
Stage 2	-	-	-	-	-	-	594	608	-	903	898	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.3	7.19	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.19	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.19	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.39	3.581	4	3.327
Pot Cap-1 Maneuver	1001	-	-	908	-	-	105	124	435	97	125	519
Stage 1	-	-	-	-	-	-	342	366	-	479	496	-
Stage 2	-	-	-	-	-	-	495	489	-	323	361	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1001	-	-	908	-	-	74	102	435	73	102	519
Mov Cap-2 Maneuver	-	-	-	-	-	-	74	102	-	73	102	-
Stage 1	-	-	-	-	-	-	286	306	-	400	486	-
Stage 2	-	-	-	-	-	-	397	479	-	246	302	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.1	0.2	37.8	20.3
HCM LOS			E	C

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	74	229	908	-	-	1001	-	-	75	519
HCM Lane V/C Ratio	0.228	0.153	0.013	-	-	0.1	-	-	0.193	0.18
HCM Control Delay (s)	67.5	23.5	9	0	-	9	0	-	64.1	13.5
HCM Lane LOS	F	C	A	A	-	A	A	-	F	B
HCM 95th %tile Q(veh)	0.8	0.5	0	-	-	0.3	-	-	0.7	0.7

Intersection												
Int Delay, s/veh	6.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕			↕	↕
Traffic Vol, veh/h	105	552	22	22	713	24	13	6	18	9	3	162
Future Vol, veh/h	105	552	22	22	713	24	13	6	18	9	3	162
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	100	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	94	94	94	75	75	75	86	86	86
Heavy Vehicles, %	1	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	119	627	25	23	759	26	17	8	24	10	3	188

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	785	0	0	652	0	0	1698	1709	640	1712	1708	772
Stage 1	-	-	-	-	-	-	878	878	-	818	818	-
Stage 2	-	-	-	-	-	-	820	831	-	894	890	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	838	-	-	944	-	-	74	92	479	72	92	403
Stage 1	-	-	-	-	-	-	345	368	-	373	393	-
Stage 2	-	-	-	-	-	-	372	387	-	338	364	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	838	-	-	944	-	-	30	68	479	50	68	403
Mov Cap-2 Maneuver	-	-	-	-	-	-	30	68	-	50	68	-
Stage 1	-	-	-	-	-	-	268	286	-	289	376	-
Stage 2	-	-	-	-	-	-	188	370	-	242	282	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.5	0.3	98.9	26.5
HCM LOS			F	D

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	30	191	944	-	-	838	-	-	54	403
HCM Lane V/C Ratio	0.578	0.168	0.025	-	-	0.142	-	-	0.258	0.467
HCM Control Delay (s)	230.6	27.6	8.9	0	-	10	0	-	93.5	21.5
HCM Lane LOS	F	D	A	A	-	B	A	-	F	C
HCM 95th %tile Q(veh)	1.9	0.6	0.1	-	-	0.5	-	-	0.9	2.4

Intersection												
Int Delay, s/veh	3.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘			↕	↗
Traffic Vol, veh/h	93	618	24	10	461	24	14	8	21	12	2	86
Future Vol, veh/h	93	618	24	10	461	24	14	8	21	12	2	86
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	100	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	83	83	83	83	83	83	90	90	90
Heavy Vehicles, %	0	2	8	0	2	0	0	0	10	9	0	3
Mvmt Flow	101	672	26	12	555	29	17	10	25	13	2	96

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	584	0	0	698	0	0	1482	1495	685	1499	1494	570
Stage 1	-	-	-	-	-	-	887	887	-	594	594	-
Stage 2	-	-	-	-	-	-	595	608	-	905	900	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.3	7.19	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.19	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.19	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.39	3.581	4	3.327
Pot Cap-1 Maneuver	1001	-	-	908	-	-	104	124	435	97	124	519
Stage 1	-	-	-	-	-	-	341	365	-	479	496	-
Stage 2	-	-	-	-	-	-	494	489	-	322	360	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1001	-	-	908	-	-	72	101	435	73	101	519
Mov Cap-2 Maneuver	-	-	-	-	-	-	72	101	-	73	101	-
Stage 1	-	-	-	-	-	-	284	304	-	399	486	-
Stage 2	-	-	-	-	-	-	393	479	-	245	300	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.1	0.2	38.7	20.6
HCM LOS			E	C

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1	SWLn2
Capacity (veh/h)	72	227	908	-	-	1001	-	-	76	519
HCM Lane V/C Ratio	0.234	0.154	0.013	-	-	0.101	-	-	0.205	0.184
HCM Control Delay (s)	69.7	23.7	9	0	-	9	0	-	64.2	13.5
HCM Lane LOS	F	C	A	A	-	A	A	-	F	B
HCM 95th %tile Q(veh)	0.8	0.5	0	-	-	0.3	-	-	0.7	0.7

Intersection												
Int Delay, s/veh	6.6											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔		↔	↔			↔	↔
Traffic Vol, veh/h	107	552	22	22	713	24	13	6	18	9	3	164
Future Vol, veh/h	107	552	22	22	713	24	13	6	18	9	3	164
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	100	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	94	94	94	75	75	75	86	86	86
Heavy Vehicles, %	1	0	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	122	627	25	23	759	26	17	8	24	10	3	191

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	785	0	0	652	0	0	1704	1715	640	1718	1714	772
Stage 1	-	-	-	-	-	-	884	884	-	818	818	-
Stage 2	-	-	-	-	-	-	820	831	-	900	896	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	838	-	-	944	-	-	73	91	479	71	91	403
Stage 1	-	-	-	-	-	-	343	366	-	373	393	-
Stage 2	-	-	-	-	-	-	372	387	-	336	362	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	838	-	-	944	-	-	29	67	479	49	67	403
Mov Cap-2 Maneuver	-	-	-	-	-	-	29	67	-	49	67	-
Stage 1	-	-	-	-	-	-	264	282	-	288	376	-
Stage 2	-	-	-	-	-	-	186	370	-	239	279	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.6	0.3	103.3	26.7
HCM LOS			F	D

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SERSWLn1	SWLn2
Capacity (veh/h)	29	189	944	-	-	838	-	-	53 403
HCM Lane V/C Ratio	0.598	0.169	0.025	-	-	0.145	-	-	0.263 0.473
HCM Control Delay (s)	242.5	27.9	8.9	0	-	10	0	-	95.6 21.7
HCM Lane LOS	F	D	A	A	-	B	A	-	F C
HCM 95th %tile Q(veh)	1.9	0.6	0.1	-	-	0.5	-	-	0.9 2.5

Main Street at Harris Street

Intersection

Int Delay, s/veh 11.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	143	0	34	1	0	1	6	402	0	0	361	51
Future Vol, veh/h	143	0	34	1	0	1	6	402	0	0	361	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	82	82	82	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	1	6
Mvmt Flow	191	0	45	1	0	1	7	490	0	0	380	54

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	912	911	407	934	938	490	434	0	0	490	0	0
Stage 1	407	407	-	504	504	-	-	-	-	-	-	-
Stage 2	505	504	-	430	434	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	257	276	648	248	266	582	1136	-	-	1084	-	-
Stage 1	625	601	-	554	544	-	-	-	-	-	-	-
Stage 2	553	544	-	607	585	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	255	274	648	229	264	582	1136	-	-	1084	-	-
Mov Cap-2 Maneuver	255	274	-	229	264	-	-	-	-	-	-	-
Stage 1	620	601	-	550	540	-	-	-	-	-	-	-
Stage 2	547	540	-	565	585	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	55.4		16		0.1		0	
HCM LOS	F		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1136	-	-	289	329	1084	-	-
HCM Lane V/C Ratio	0.006	-	-	0.817	0.008	-	-	-
HCM Control Delay (s)	8.2	0	-	55.4	16	0	-	-
HCM Lane LOS	A	A	-	F	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	6.7	0	0	-	-

Intersection												
Int Delay, s/veh	3.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	86	0	21	0	0	1	20	451	1	1	464	140
Future Vol, veh/h	86	0	21	0	0	1	20	451	1	1	464	140
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	75	75	75	92	92	92	96	96	96
Heavy Vehicles, %	1	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	93	0	23	0	0	1	22	490	1	1	483	146

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	1093	1093	556	1105	1166	491	629	0
Stage 1	558	558	-	535	535	-	-	-
Stage 2	535	535	-	570	631	-	-	-
Critical Hdwy	7.11	6.5	6.2	7.1	6.5	6.2	4.1	-
Critical Hdwy Stg 1	6.11	5.5	-	6.1	5.5	-	-	-
Critical Hdwy Stg 2	6.11	5.5	-	6.1	5.5	-	-	-
Follow-up Hdwy	3.509	4	3.3	3.5	4	3.3	2.2	-
Pot Cap-1 Maneuver	193	216	534	190	196	582	963	-
Stage 1	516	515	-	533	527	-	-	-
Stage 2	531	527	-	510	477	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	188	209	534	177	190	582	963	-
Mov Cap-2 Maneuver	188	209	-	177	190	-	-	-
Stage 1	500	514	-	516	511	-	-	-
Stage 2	513	511	-	488	477	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	39.9	11.2	0.4	0
HCM LOS	E	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	963	-	-	215	582	1083	-	-
HCM Lane V/C Ratio	0.023	-	-	0.541	0.002	0.001	-	-
HCM Control Delay (s)	8.8	0	-	39.9	11.2	8.3	0	-
HCM Lane LOS	A	A	-	E	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	2.9	0	0	-	-

Intersection												
Int Delay, s/veh	17.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	153	0	36	1	0	1	6	431	0	0	387	55
Future Vol, veh/h	153	0	36	1	0	1	6	431	0	0	387	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	82	82	82	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	1	6
Mvmt Flow	204	0	48	1	0	1	7	526	0	0	407	58
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	977	976	436	1000	1005	526	465	0	0	526	0	0
Stage 1	436	436	-	540	540	-	-	-	-	-	-	-
Stage 2	541	540	-	460	465	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	232	253	625	224	243	556	1107	-	-	1051	-	-
Stage 1	603	583	-	530	524	-	-	-	-	-	-	-
Stage 2	529	524	-	585	566	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	230	251	625	205	241	556	1107	-	-	1051	-	-
Mov Cap-2 Maneuver	230	251	-	205	241	-	-	-	-	-	-	-
Stage 1	598	583	-	525	519	-	-	-	-	-	-	-
Stage 2	523	519	-	540	566	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	88.8		17.1		0.1		0					
HCM LOS	F		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1107	-	-	261	300	1051	-	-				
HCM Lane V/C Ratio	0.007	-	-	0.966	0.009	-	-	-				
HCM Control Delay (s)	8.3	0	-	88.8	17.1	0	-	-				
HCM Lane LOS	A	A	-	F	C	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	9.2	0	0	-	-				

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	92	0	23	0	0	1	21	484	1	1	497	150
Future Vol, veh/h	92	0	23	0	0	1	21	484	1	1	497	150
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	75	75	75	92	92	92	96	96	96
Heavy Vehicles, %	1	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	100	0	25	0	0	1	23	526	1	1	518	156

Major/Minor	Minor2		Minor1		Major1		Major2		Major2		Major2	
Conflicting Flow All	1171	1171	596	1184	1249	527	674	0	0	527	0	0
Stage 1	598	598	-	573	573	-	-	-	-	-	-	-
Stage 2	573	573	-	611	676	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	170	194	507	168	175	555	927	-	-	1050	-	-
Stage 1	491	494	-	508	507	-	-	-	-	-	-	-
Stage 2	506	507	-	484	456	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	165	187	507	155	169	555	927	-	-	1050	-	-
Mov Cap-2 Maneuver	165	187	-	155	169	-	-	-	-	-	-	-
Stage 1	474	493	-	490	489	-	-	-	-	-	-	-
Stage 2	487	489	-	459	455	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	53.8		11.5		0.4		0	
HCM LOS	F		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	927	-	-	191 555	1050	-	-
HCM Lane V/C Ratio	0.025	-	-	0.654 0.002	0.001	-	-
HCM Control Delay (s)	9	0	-	53.8 11.5	8.4	0	-
HCM Lane LOS	A	A	-	F B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	3.9 0	0	-	-

Intersection												
Int Delay, s/veh	18.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	154	0	38	1	0	1	7	431	0	0	387	55
Future Vol, veh/h	154	0	38	1	0	1	7	431	0	0	387	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	82	82	82	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	0	1	6
Mvmt Flow	205	0	51	1	0	1	9	526	0	0	407	58

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	981	980	436	1006	1009	526	465	0	0	526	0	0
Stage 1	436	436	-	544	544	-	-	-	-	-	-	-
Stage 2	545	544	-	462	465	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	231	252	625	222	242	556	1107	-	-	1051	-	-
Stage 1	603	583	-	527	522	-	-	-	-	-	-	-
Stage 2	526	522	-	584	566	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	228	249	625	202	239	556	1107	-	-	1051	-	-
Mov Cap-2 Maneuver	228	249	-	202	239	-	-	-	-	-	-	-
Stage 1	596	583	-	521	516	-	-	-	-	-	-	-
Stage 2	519	516	-	537	566	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	92.6		17.3		0.1		0	
HCM LOS	F		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1107	-	-	261	296	1051	-	-
HCM Lane V/C Ratio	0.008	-	-	0.981	0.009	-	-	-
HCM Control Delay (s)	8.3	0	-	92.6	17.3	0	-	-
HCM Lane LOS	A	A	-	F	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	9.5	0	0	-	-

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	93	0	25	0	0	1	23	484	1	1	497	151
Future Vol, veh/h	93	0	25	0	0	1	23	484	1	1	497	151
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	75	75	75	92	92	92	96	96	96
Heavy Vehicles, %	1	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	101	0	27	0	0	1	25	526	1	1	518	157
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1176	1176	597	1189	1254	527	675	0	0	527	0	0
Stage 1	599	599	-	577	577	-	-	-	-	-	-	-
Stage 2	577	577	-	612	677	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	169	193	507	166	173	555	926	-	-	1050	-	-
Stage 1	490	494	-	506	505	-	-	-	-	-	-	-
Stage 2	504	505	-	484	455	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	163	185	507	152	166	555	926	-	-	1050	-	-
Mov Cap-2 Maneuver	163	185	-	152	166	-	-	-	-	-	-	-
Stage 1	471	493	-	487	486	-	-	-	-	-	-	-
Stage 2	484	486	-	457	454	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	56.2		11.5		0.4		0					
HCM LOS	F		B									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	926	-	-	190	555	1050	-	-				
HCM Lane V/C Ratio	0.027	-	-	0.675	0.002	0.001	-	-				
HCM Control Delay (s)	9	0	-	56.2	11.5	8.4	0	-				
HCM Lane LOS	A	A	-	F	B	A	A	-				
HCM 95th %tile Q(veh)	0.1	-	-	4.1	0	0	-	-				

Harris Street at Site Driveway

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Traffic Vol, veh/h	1	142	101	1	3	3
Future Vol, veh/h	1	142	101	1	3	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	3	0	0	0
Mvmt Flow	1	154	110	1	3	3

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	111	0	-	0	267
Stage 1	-	-	-	-	111
Stage 2	-	-	-	-	156
Critical Hdwy	4.1	-	-	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	2.2	-	-	-	3.5
Pot Cap-1 Maneuver	1492	-	-	-	727
Stage 1	-	-	-	-	919
Stage 2	-	-	-	-	877
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1492	-	-	-	726
Mov Cap-2 Maneuver	-	-	-	-	726
Stage 1	-	-	-	-	918
Stage 2	-	-	-	-	877

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1492	-	-	-	822
HCM Lane V/C Ratio	0.001	-	-	-	0.008
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	↔
Traffic Vol, veh/h	2	114	181	3	3	2
Future Vol, veh/h	2	114	181	3	3	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	1	0	0	0	0
Mvmt Flow	2	124	197	3	3	2

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	200	0	0	327	199
Stage 1	-	-	-	199	-
Stage 2	-	-	-	128	-
Critical Hdwy	4.1	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	3.5	3.3
Pot Cap-1 Maneuver	1384	-	-	671	847
Stage 1	-	-	-	839	-
Stage 2	-	-	-	903	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1384	-	-	670	847
Mov Cap-2 Maneuver	-	-	-	670	-
Stage 1	-	-	-	837	-
Stage 2	-	-	-	903	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1384	-	-	-	731
HCM Lane V/C Ratio	0.002	-	-	-	0.007
HCM Control Delay (s)	7.6	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0