

UPDATED TRAFFIC IMPACT AND ACCESS STUDY



PROPOSED APARTMENTS LITTLETON, MA

PREPARED FOR:

**15 GREAT ROAD, LLC
CONCORD, MASSACHUSETTS**

JULY 9, 2012

PREPARED BY:



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UPDATED TRAFFIC IMPACT AND ACCESS STUDY

PROPOSED RESIDENTIAL DEVELOPMENT

15 Great Road
LITTLETON, MASSACHUSETTS

Prepared for:

Fifteen Great Road, LLC
c/o Omni Properties

July 9, 2012

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SECTION 1: INTRODUCTION

Bayside Engineering has prepared this updated study to assess the traffic impact and to evaluate the access requirements of the proposed residential development to be located on Great Road in Littleton, Massachusetts. The original Traffic Impact and Access Study (TIAS) was prepared by LandStrategies, dated October 19, 2011.

PROJECT DESCRIPTION

The development is to be located on approximately 23 acres of land on the north side of Great Road, east of Grist Mill Road. Currently, the site is a vacant, wooded parcel of land. As currently proposed, the project will consist of 142 residential townhouse units and 48 residential apartment units. This study has been specifically prepared to address the impacts of the residential apartments. Parking for 411 vehicles will be provided.

Access to the project will be provided by way of a full-movement driveway to Great Road and an emergency access only driveway to Grist Mill Road. Figure 1 shows the site location in relation to the surrounding area.

CHANGES FROM ORIGINAL OCTOBER 2011 TRAFFIC STUDY

Traffic Generation

As a result of project related changes since the date of the original TIAS, the size of the project has changed. The original study consisted of 200 apartment units and the project now consists of 142 residential townhouse units and 48 residential apartment units. This change results in 50 fewer daily vehicle trips generated by the project (1,286 daily vehicle trips vs. 1,336 daily vehicle trips). Correspondingly, the peak hour traffic generation is slightly lower with the current build proposal (95 trips vs. 102 trips) during the weekday morning peak hour and (124 trips vs. 128 trips) during the weekday evening peak hour. When the new trips were assigned to the roadway network and analyzed, the resulting levels of service remain unchanged for the future Build conditions.

Mitigation

It was also previously recommended that Great Road be widened to provide an exclusive left-turn lane into the site. This recommendation remains the same. However, the Massachusetts Department of Transportation (MassDOT) requested the proponent explore options to improve sight distances at the site driveway to/from the east. Based on subsequent review, the proposed profile of Great Road in the vicinity of the site will be improved to further extend the available lines of sight. As part of the proposed widening to provide the exclusive left-turn lane into the site, the grade of Great Road will be raised and the profile designed to meet MassDOT requirements. With this change, the stopping sight distance (SSD) approaching from the east will increase to 428 feet (over the existing 326 feet), which exceeds the American Association of State Highway and Transportation Officials (AASHTO) requirements for 50 mph, the posted speed limit. In excess of 500 feet will continue to be provided for SSD approaching from the west. The intersection sight distance (ISD) will also improve with the change in grade, from 402 feet to in excess of 500 feet.

STUDY METHODOLOGY

This study has been prepared in three stages. The first stage involved an assessment of existing conditions within the study area and included an inventory of roadway geometrics, pedestrian and bicycle facilities and public transportation services. Existing traffic counts were performed at the study area intersections.

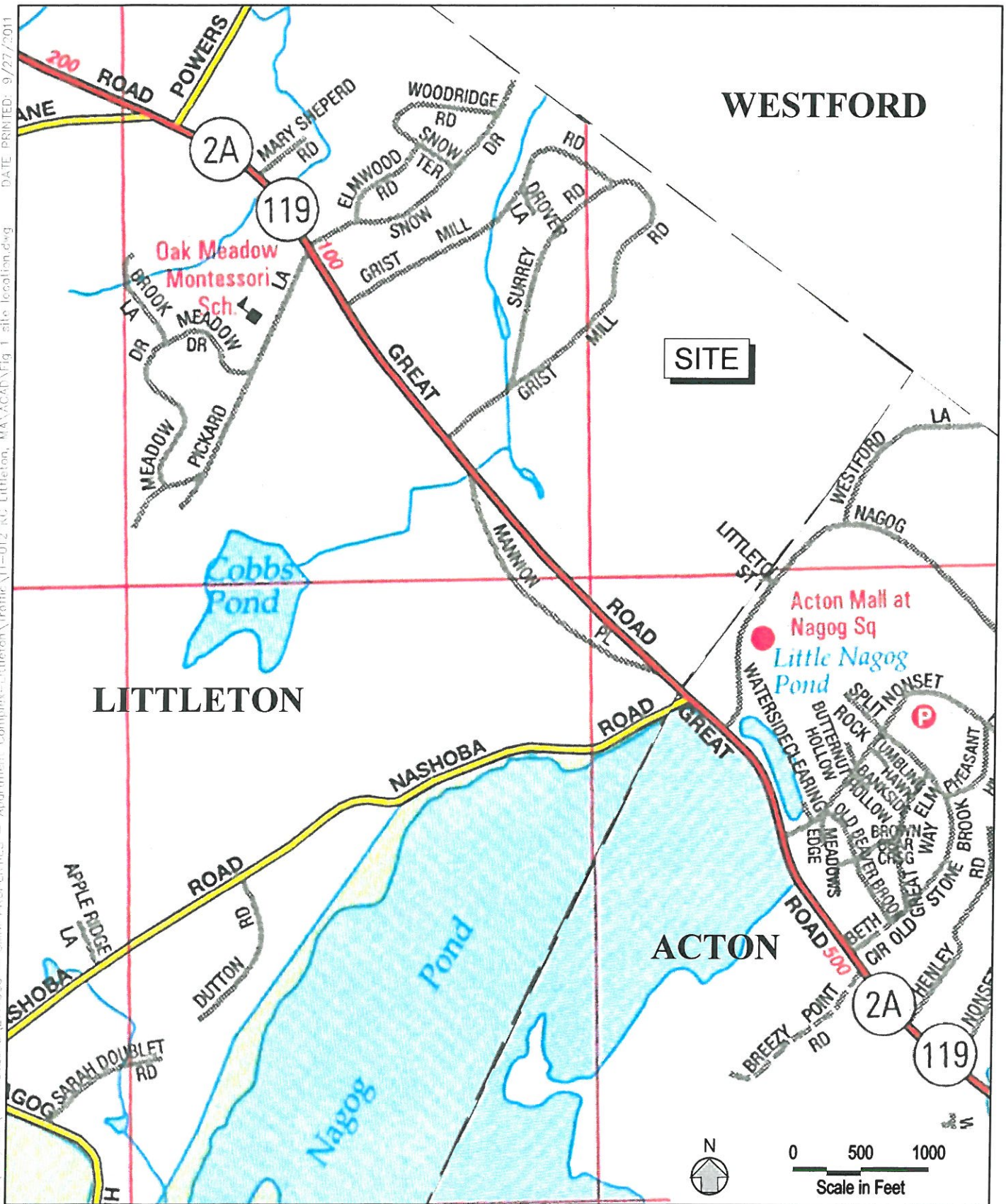
In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the project were assessed along with future traffic demands due to expected traffic growth independent of the proposed project. In accordance with Massachusetts Department of Transportation (MassDOT) and Executive Office of Environmental Affairs (EEA) guidelines, the year 2016 was selected as the basis for modeling future transportation impacts of the proposed development to reflect a five-year planning horizon.

The third stage of the study presents and evaluates measures to address traffic issues, if any, and necessary improvements to accommodate the development.

SUMMARY

Review of the proposed project and access plan shows that in relation to roadway capacity, traffic safety, and traffic impacts upon the surrounding roadway network, the proposed project will have minimal impact on the surrounding roadways and intersections. The existing roadway system has sufficient capacity for the proposed project.

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Figure 1
 Site Location Map

SECTION 2: EXISTING TRAFFIC CONDITIONS

STUDY AREA

Roadway geometry and traffic control information was collected for the following locations:

- Great Road and Nashoba Road
- Great Road and Mannion Place
- Great Road and Grist Mill Road (east)
- Great Road and Grist Mill Road (west)

FIELD SURVEY

A comprehensive field inventory of the proposed site was conducted in May and June 2011. The inventory included collection of existing roadway geometrics, traffic volumes, and safety data for the existing study area intersections and site access driveway locations. Traffic volumes were measured by means of automatic traffic recorder (ATR) counts and substantiated by manual turning movement counts (TMCs) conducted at the study area intersections.

GEOMETRICS

Primary study area roadways are described below.

Roadways

Great Road (Route 2A/119)

Great Road (Route 2A/119) is a two-lane, Urban Principal Arterial under the jurisdiction of the Massachusetts Department of Transportation (MassDOT). Great Road traverses the study area in a general east/west direction. Additional turn lanes are provided at major intersections. Travel lanes are generally separated by a double yellow centerline. Marked shoulders are also provided. The posted speed limit on Great Road in the vicinity of the site is 50 miles per hour (mph). Land

use along Great Road in the study area consists of primarily residential uses.

Intersections

Great Road and Nashoba Road

Nashoba Road intersects Great Road from the south to form this three-legged, unsignalized intersection. The Great Road approaches consist of single lanes permitting left- or right-turn movements. The Nashoba Road approach consists of a single lane which widens at Great Road to provide separate left-and right-turn movements separated by a triangular shaped grassed island. The Nashoba Road approach is under STOP sign control. Land use in the area consists of residential homes, retail uses to the north and Nagog Pond to the east.

Great Road and Mannion Place

Mannion Place intersects Great Road from the south to form this three-legged, unsignalized intersection. The Great Road eastbound and westbound approaches each consist of a single lane permitting left- or right-turns. The Mannion Place approach consists of a wide, single lane approach, permitting left- or right-turn movements. Mannion Place operates under STOP like control. Land use in the area consists of residential homes.

Great Road and Grist Mill Road (East)

Grist Mill Road (east) intersects Great Road from the north to form this three-legged, unsignalized intersection. The Great Road eastbound and westbound approaches each consist of a single lane permitting left- or right-turns. The Grist Mill Road (east) approach consists of a wide lane which was observed to allow vehicles turning right to by-pass vehicles making left-turns. Grist Mill Road (east) is under STOP sign control. Land use in the area consists of residential homes.

Great Road and Grist Mill Road (West)

Grist Mill Road (west) intersects Great Road from the north to form this three-legged, unsignalized intersection. The Great Road eastbound and westbound approaches each consist of a single lane permitting left- or right-turns. The Grist Mill Road (west) approach consists of a single lane which permits both left- and right-turns. Grist Mill Road (west) is under STOP sign control. Land use in the area consists of residential homes and the Oak Meadow Montessori School to the south.

TRAFFIC VOLUMES

Existing Traffic Volumes

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in May 2011. Peak-period turning movement counts were conducted during the weekday morning peak period (7:00 to 9:00 AM) and weekday evening period (4:30 to 6:30 PM). Daily traffic counts were conducted on Great Road and Grist Mill Road for a two day period using automatic traffic recorders (ATR).

Analysis of the peak-period traffic counts indicated that the weekday morning commuter peak hour occurs between 8:00 and 9:00 AM and the weekday evening commuter peak hour occurs between 5:00 and 6:00 PM. It should be noted, however, that the individual intersection peak hours were used in the analysis to present a “worst case” condition. The traffic count worksheets are provided in the Appendix.

Seasonal Adjustment

The traffic-volume data gathered as part of this study was collected during the month of May 2011. Data from the MassDOT was reviewed to determine the monthly variations of the traffic volumes. The traffic data showed May volumes to be slightly higher than average month conditions. Therefore, the May traffic volumes were not adjusted in order to provide for a conservative analysis scenario. The 2011 existing daily and peak-hour traffic volumes for average-month conditions are summarized below in Table 1. The 2011 Existing peak hour traffic flow networks are shown graphically on Figures 2 and 3. The traffic count worksheets are provided in the Appendix.

TABLE 1
EXISTING TRAFFIC-VOLUME SUMMARY^a

Location	Weekday Traffic Volume ^b	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		Traffic Volume ^c	K Factor ^d	Directional Distribution ^e	Traffic Volume	K Factor	Directional Distribution
Great Road, east of Grist Mill Road (East)	16,850	1,396	8.3	62.3% EB	1,550	9.2	61.3% WB
Great Road, between Mannion Place and Nashoba Road	17,100	1,401	8.2	62.5% EB	1,562	9.1	61.1% WB
Grist Mill Road (East) approximately 2,400 ft north of Great Road	115	9	7.8	55.6% SB	10	8.7	50.0% NB

^aTwo-way traffic volume

^bDaily traffic expressed in vehicles per day.

^cExpressed in vehicles per hour.

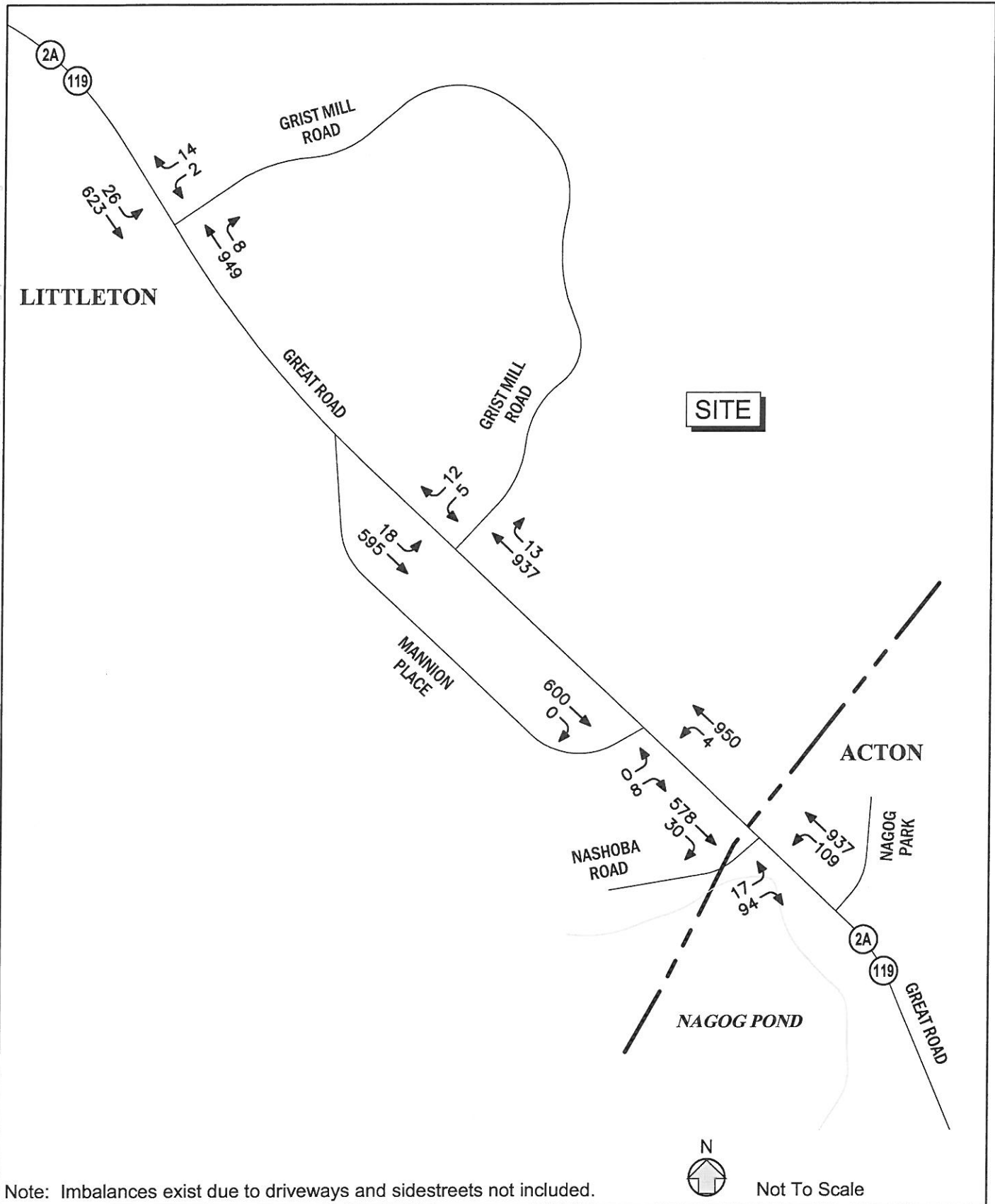
^dPercent of daily traffic volumes which occurs during the peak hour.

^ePercent of peak-hour volume in the predominant direction of travel.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

Great Road was recorded to carry approximately 17,000 vehicles per day (vpd) during average month conditions in front of the site. During the weekday morning peak hour, approximately 1,400 vehicles per hour (vph) were recorded, and during the weekday evening peak hour, approximately 1,560 vph were recorded.

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Figure 3

2011 Existing
 Weekday Evening Peak Hour
 (5:00 - 6:00 P.M.)
 Traffic Volumes

MOTOR VEHICLE CRASH DATA

Motor vehicle crash data for the study area intersections and roadways were obtained from the MassDOT database for 2007 through 2009, the most recent three-year period for which data is available. The motor vehicle crash data was reviewed to determine crash trends in the study area. A summary of the data is provided in Table 2 and the crash data is included in the Appendix.

TABLE 2
MOTOR VEHICLE CRASH DATA SUMMARY^a

Scenario	Location			
	Great Road and Nashoba Road	Great Road Mannion Place	Great Road and Grist Mill Road (East)	Great Road and Grist Mill Road (West)
<i>Year:</i>				
2007	0	1	0	0
2008	1	0	0	0
2009	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	2	1	0	0
Average ^b	0.67	0.33	0.00	0.00
Crash Rate ^c	0.09	0.05	0.00	0.00
Significant ^d	No	No	No	No
<i>Type:</i>				
Angle	0	0	0	0
Rear-End	1	0	0	0
Head-On	0	0	0	0
Sideswipe	0	0	0	0
Run off Road/Hit Fixed Object	0	0	0	0
Single Vehicle Crash	1	0	0	0
<u>Unknown</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total	2	0	0	0
<i>Time of Day:</i>				
Weekday (7:00 to 9:00 AM)	0	0	0	0
Weekday (4:00 to 6:00 PM)	0	0	0	0
<u>Remainder of Day</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total	2	1	0	0
<i>Pavement Conditions:</i>				
Dry	1	0	0	0
Wet	1	0	0	0
Snow	0	0	0	0
Icy	0	1	0	1
Other	0	0	0	0
<u>Unknown</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	0	1	0	0
<i>Day of Week:</i>				
Monday through Friday	0	1	0	0
<u>Saturday and Sunday</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	2	1	0	0
<i>Severity:</i>				
Property Damage Only	2	1	0	0
Personal Injury	0	0	0	0
Fatal Accident	0	0	0	0
Hit and Run	0	0	0	0
<u>Unknown</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	2	1	0	0

^aSource: MassDOT Safety Management/Traffic Operations Unit records, 2007 through 2009.

^bAverage crashes over three-year period.

^cCrash rate per million entering vehicles (mev).

^dSignalized intersections are significant if rate >0.75 crashes per million vehicles, and unsignalized intersections are significant if rate >0.58 crashes per million vehicles.

Vehicle Speeds

Existing speed data for Great Road were also collected using the ATRs. The posted speed limit on Great Road in the site vicinity is 50 mph. The speed data is summarized in Table 3.

TABLE 3
GREAT ROAD VEHICLE SPEEDS

Direction	Posted Speed Limit (mph)	Average Observed Speed ^a (mph)	85 th Percentile Speed (mph)
Great Road Eastbound	50	43	48
Great Road Westbound	50	37	43

^aBased on speed data compiled on May 24-26, 2011.

As shown in Table 3, the average speed of vehicles travelling eastbound or westbound was found to be 43 and 37 mph, respectively. The 85th percentile speed was found to be 48 mph for eastbound vehicles and 43 mph for westbound vehicles. The 85th percentile speed is the speed at which sight distances are typically evaluated.

PLANNED ROADWAY IMPROVEMENTS

Officials for MassDOT and the Town of Littleton were contacted regarding roadway improvements planned for the study area intersections. No improvement projects were identified that would increase capacity at the study area intersections.

SECTION 3:

2016 NO-BUILD AND BUILD TRAFFIC CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2016. Traffic volumes on the roadway network at that time, in the absence of the proposed project, would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others expected to be completed by 2016. Consideration of these factors resulted in the development of 2016 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic flow networks to develop 2016 Build conditions.

2016 NO-BUILD TRAFFIC VOLUMES

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 can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This 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.

Background Traffic Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine traffic growth trends. Based on a review of this data, it was determined that traffic volumes within the study area have generally decreased by one to two percent per year over the past several years. This decline in traffic volume is not expected to continue. Therefore, to provide a conservative case, a 0.5 percent per year compounded annual background traffic growth rate was used to account for potential future traffic growth external to the study area and presently unforeseen development.

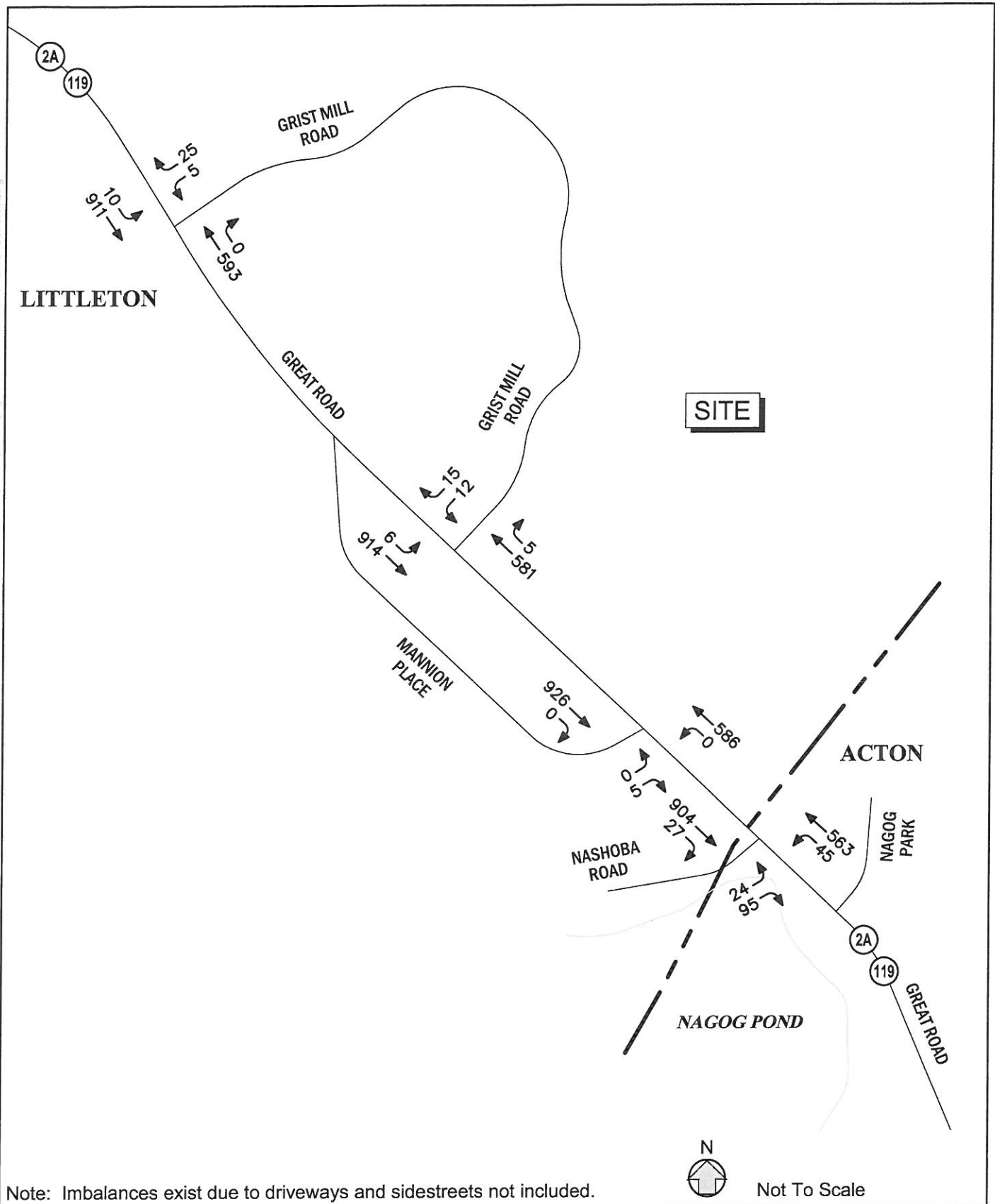
Specific Development by Others

Traffic volumes generated by the specific local developments by others were included in the 2016 No-Build condition. The Towns of Littleton and Acton were contacted to identify specific planned developments. Based on these discussions, there are three potential projects that are currently planned or have been approved in the immediate area that could impact future traffic volumes beyond the general background traffic growth rate. These include an approved 108 unit apartment project, the re-development of the former Cisco site at I-495 (mixed-use retail/commercial), and an approved, but not constructed senior community (153 homes) at the Quail Ridge Country Club in Acton. Site generated traffic volumes were calculated and assigned according to Institute of Transportation Engineers (ITE) recommended procedures.

No-Build Condition Traffic Volumes

The 2016 No-Build weekday morning peak-hour traffic volumes were developed by applying a compounded 0.5 percent annual growth rate to the 2011 Existing peak-hour movement traffic volumes and adding traffic from the identified background projects. Figures 4 and 5 show the projected 2016 No-Build peak hour traffic volumes for the weekday morning and weekday evening peak-hour conditions.

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Note: Imbalances exist due to driveways and sidestreets not included.



Not To Scale



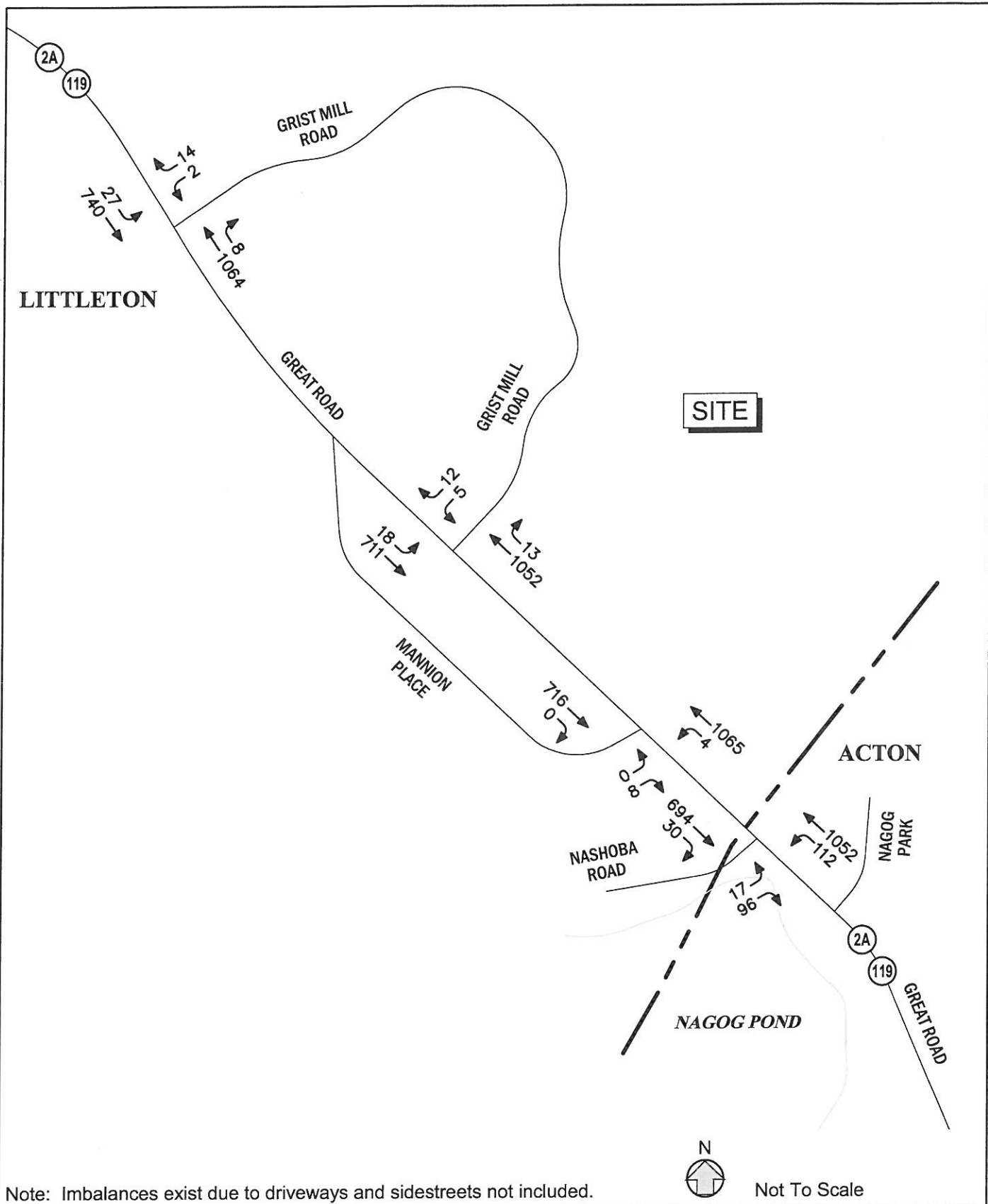
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Figure 4

2016 No-Build
Weekday Morning Peak Hour
(8:00 - 9:00 A.M.)
Traffic Volumes

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Figure 5

2016 No-Build
Weekday Evening Peak Hour
(5:00 - 6:00 P.M.)
Traffic Volumes

FUTURE 2016 BUILD CONDITIONS

Project Description

As currently proposed, the project will consist of 142 residential townhouse units and 48 residential apartment units. This study has been prepared specifically to address the traffic impacts of the residential units. Parking for 411 vehicles will be provided. Access to the project will be provided by way of a full-movement driveway to Great Road and an emergency access only driveway to Grist Mill Road. All site generated traffic was assigned to the Great Road site driveway.

Traffic Generation

Trip-generation data published by the ITE *Trip Generation* manual¹ was reviewed. Trip generation data for Land Use Code (LUC) 220 – Apartments and LUC 230 – Residential Condominium/Townhouse was used to determine the expected trip generation for the proposed project. The expected trip generation for the proposed development is summarized in Table 4 and the trip generation worksheets are included in the Appendix.

TABLE 4
TRIP-GENERATION SUMMARY

	Proposed Apartments Trips ^a	Proposed Townhouse Trips ^b	Total Trips
Average Weekday Daily Traffic	414	872	1,286
<i>Weekday Morning Peak Hour:</i>			
Entering	5	12	17
<u>Exiting</u>	<u>22</u>	<u>56</u>	<u>78</u>
Total	27	68	95
<i>Weekday Evening Peak Hour:</i>			
Entering	29	54	83
<u>Exiting</u>	<u>15</u>	<u>26</u>	<u>41</u>
Total	44	80	124

^aBased on ITE LUC 220, Apartments; 48 dwelling units.

^bBased on ITE LUC 230, Residential Condominium/Townhouse; 142 dwelling units.

On a typical weekday, the proposed development is expected to generate 1,286 vehicle trips (643 vehicles entering and 643 vehicles exiting). During the weekday morning peak hour, 95 vehicle trips (17 vehicles entering and 78 vehicles exiting) are expected. During the weekday evening peak hour, 124 vehicle trips (83 vehicles entering and 41 vehicles exiting) are expected.

¹*Trip Generation*, Eighth Edition; Institute of Transportation Engineers; Washington, DC; 2009.

Trip Distribution

The directional distribution of the vehicular traffic approaching and departing the site is a function of population densities, the location of employment, existing travel patterns, similar uses, and the efficiency of the existing roadway system.

The trip distribution for the project was developed based on a review of Journey to work data for the town of Littleton. Table 6 summarizes the expected trip distribution, which is also shown on Figure 5. The trip distribution worksheets are included in the Appendix.

**TABLE 5
PROPOSED TRIP DISTRIBUTION**

Route	Direction	Percent of Trips
Great Road	East	44
Great Road	West	55
Nashoba Road	South	<u>1</u>
TOTAL		100

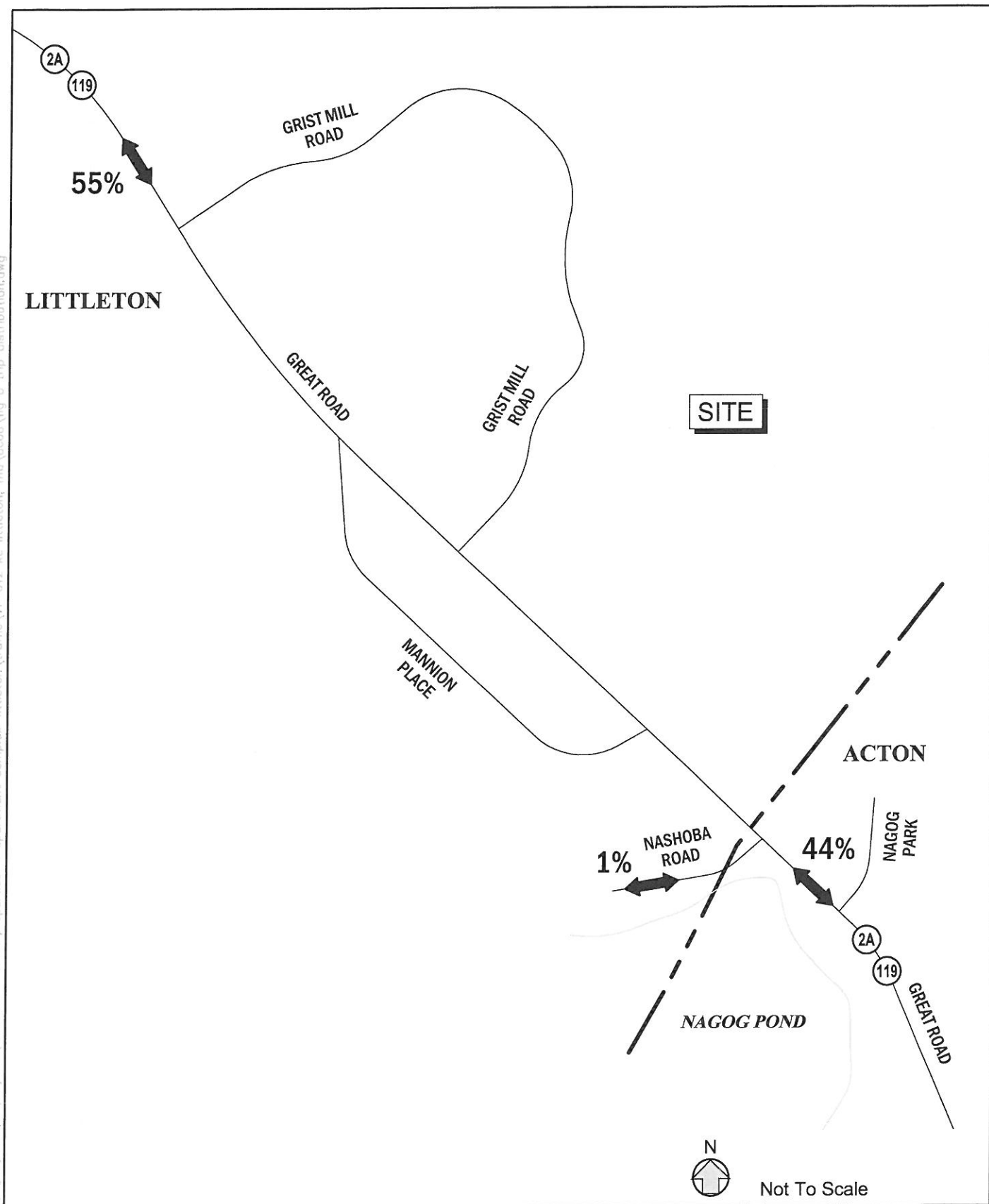
As shown in Table 5, approximately 55 percent of the site traffic is anticipated to arrive and depart the site by way of Great Road to the west and 44 percent by way of Great Road to the east. The remaining one percent is expected to use Nashoba Road.

Future Traffic Volumes - Build Condition

The site-generated traffic presented in Table 4 was distributed within the study area according to the percentages summarized in Table 5. The site generated volumes were superimposed onto the 2016 No-Build traffic volumes to represent the 2016 Build traffic-volume conditions. The anticipated 2016 Build weekday morning and weekday evening traffic volumes are graphically presented in Figures 7 and 8. These volumes were used as the basis for all analysis as well as to identify potential mitigation measures to ameliorate the project's impacts.

A summary of peak-hour projected traffic-volume changes in the site vicinity are shown in Table 6. These volumes are based on the expected increases from the site traffic generation.

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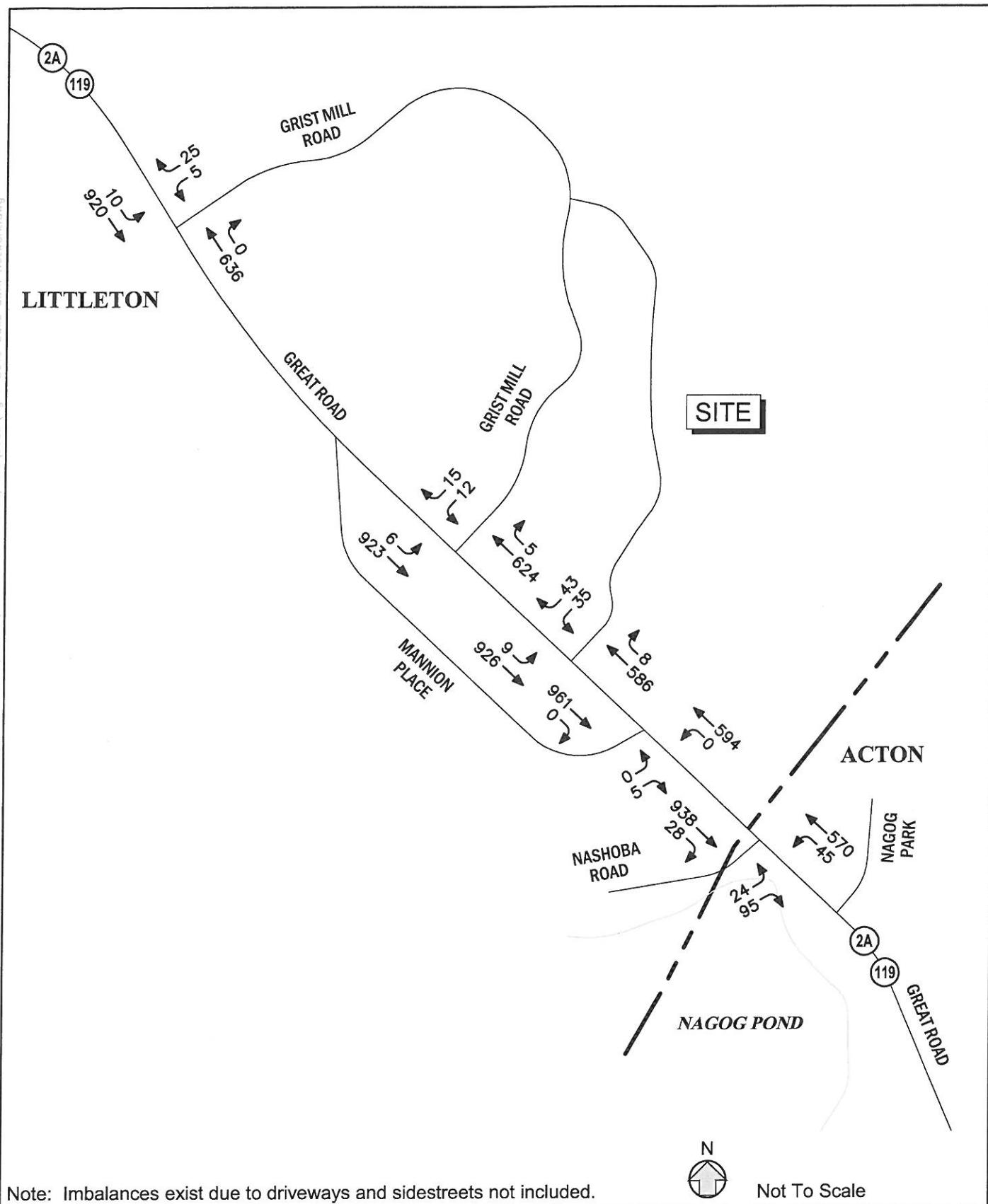
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Figure 6

Trip Distribution Map

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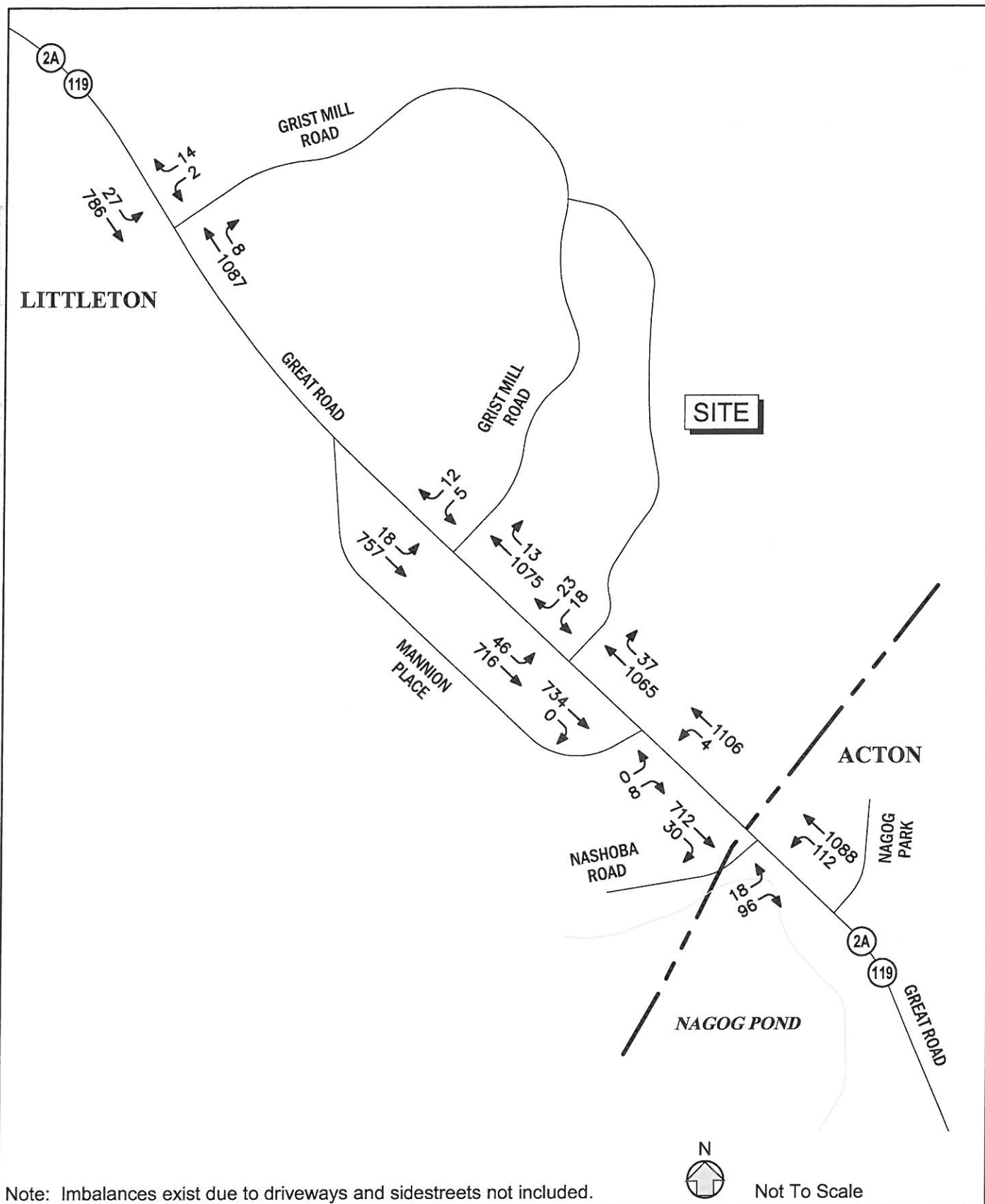
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Figure 7

2016 Build
 Weekday Morning Peak Hour
 (8:00 - 9:00 A.M.)
 Traffic Volumes

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Figure 8

2016 Build
 Weekday Evening Peak Hour
 (5:00 - 6:00 P.M.)
 Traffic Volumes

TABLE 6
TRAFFIC-VOLUME INCREASES^a

Location/Peak Hour	2016 No-Build	2016 Build	Volume Increase over No-Build	Percent Increase over No-Build
<i>Great Road, west of Grist Mill Road (West)</i>				
Weekday Morning	1,539	1,591	52	3.4
Weekday Evening	1,845	1,914	69	3.7
<i>Great Road, east of Nashoba Road</i>				
Weekday Morning	1,607	1,648	41	2.6
Weekday Evening	1,954	2,008	54	2.8

^aAll volumes are vehicles per hour, total of both directions.

As shown in Table 6, project-related increases are in the range of 2.6 to 3.7 percent during the weekday morning peak hour. This is approximately equivalent to one additional vehicle per minute during the respective peak hours.

SECTION 4: CAPACITY ANALYSIS

To assess intersection operations, capacity analyses were conducted for Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the study area intersections serve existing and projected traffic volumes. Vehicle queue analyses provide a secondary measure of the operational characteristics of an intersection or section of roadway under study in terms of lane use and demand.

METHODOLOGY

Levels of Service

Level of service (LOS) is a quantitative measure used to describe the operation of an intersection or roadway segment. The level of service definition is described by the quality of traffic flow and is primarily defined in terms of traffic delays. The primary result of capacity analyses² is the assignment of a level of service to traffic intersections or roadway segments under various traffic-flow conditions. Six levels of service are defined for traffic intersections and roadway segments. Levels of service range from LOS A to LOS F. LOS A represents very good operating conditions and LOS F represents very poor operating conditions.

Unsignalized Intersections

The level of service for an unsignalized intersection is determined by the methodology and procedures described in the 2000 *Highway Capacity Manual*.³ The level of service for unsignalized intersections is measured in terms of average delay for the critical movements (typically side street turning movements or mainline turning movements). The delay for the critical movements is a function of the available capacity for the movement and the degree of saturation of the lane group containing the critical movement. The delay calculation includes the affects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. The definitions for level of service at

²The capacity analysis methodology is based on procedures presented in the *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

³*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

unsignalized intersections are also provided in the 2000 *Highway Capacity Manual*. Table 7 summarizes the relationship between level of service and average control delay for the critical movements at unsignalized intersections.

TABLE 7
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED
INTERSECTIONS^a

Average Delay (seconds per vehicle)	Resulting Level of Service
≤ 10.0	A
10.1 to 15.0	B
15.1 to 25.0	C
25.1 to 35.0	D
35.1 to 50.0	E
>50.0	F

^a*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000; page 17-2.

The analytical methodologies used for the analysis of unsignalized intersections use conservative analysis parameters, such as high critical gaps. The critical gap is defined as the minimum time between successive main line vehicles for a side street vehicle to execute the appropriate turning maneuver. Actual field observations indicate that drivers on minor streets accept smaller gaps in traffic than those used in the analysis procedures and therefore experience less delay than calculated by the HCM methodology. **The analysis results overstate the actual delays experienced in the field.** It should be noted that the unsignalized intersections along heavily trafficked roadways operate at constrained levels and the resulting calculated results of the unsignalized intersection analyses should be considered highly conservative.

Signalized Intersections

Levels of service for signalized intersections are calculated using the methodology and procedures described in the 2000 *Highway Capacity Manual*. The methodology assesses the intersection based on type of signal operation, signal timing and phasing, progression, vehicle mix, and intersection geometrics. Level-of-service designations are based on the delay per vehicle. Table 8 summarizes the relationship between level of service and delay. The calculated delay values result in level-of-service designations which are applied to individual lane groups, to individual intersection approaches, and to the entire intersection.

**TABLE 8
LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED
INTERSECTIONS^a**

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

^a*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000; page 16-2.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2011 Existing, 2016 No-Build, 2016 Build As of Right and 2016 Build conditions for the intersections within the study area. The results of the capacity analyses are summarized in Table 9. Detailed analysis sheets are presented in the Appendix.

Great Road and Grist Mill Road (West)

Under 2011 Existing weekday morning conditions, the critical movements (all movements from Grist Mill Road) at this unsignalized intersection currently operate at level-of-service (LOS) C during the weekday morning peak hour and at LOS D during the weekday evening peak hour. Under future 2016 No-Build conditions, these movements are projected to operate at LOS D during the weekday morning peak hour and at LOS E during the weekday evening peak hour. Under 2016 Build conditions, with the project, the critical movements are modeled to continue to operate at LOS D during the weekday morning peak hour and at LOS E during the weekday evening peak hour.

Great Road and Grist Mill Road (East)

Under 2011 Existing weekday morning conditions, the critical movements (all movements from Grist Mill Road) at this unsignalized intersection currently operate at LOS D during the weekday morning peak hour and at LOS E during the weekday evening peak hour. Under future 2016 No-Build conditions, these movements are projected to operate at LOS D during the weekday morning peak hour and at LOS F during the weekday evening peak hour. Under 2016 Build conditions, with the project, the critical movements are modeled to continue to operate at LOS D during the weekday morning peak hour and at LOS F during the weekday evening peak hour.

TABLE 9
UNSIGNALIZED LEVEL-OF-SERVICE ANALYSIS SUMMARY

Critical Movement/ Peak Hour	2011 Baseline				2016 No-Build				2016 Build			
	Demand ^a	V/C ^b	Delay ^c	LOS ^d	Demand	V/C	Delay	LOS	Demand	V/C	Delay	LOS
Great Road and Grist Mill Road (West):												
<i>All movements from Grist Mill Road:</i>												
Weekday Morning	29	0.21	22.9	C	30	0.24	26.4	D	30	0.26	28.6	D
Weekday Evening	16	0.13	28.2	D	16	0.18	37.3	E	16	0.19	40.5	E
Great Road and Grist Mill Road (East):												
<i>All movements from Grist Mill Road:</i>												
Weekday Morning	27	0.17	25.2	D	27	0.20	29.6	D	27	0.21	32.0	D
Weekday Evening	17	0.24	39.6	E	17	0.33	59.6	F	17	0.36	68.2	F
Great Road and Site Driveway:												
<i>All movements from Site Driveway:</i>												
Weekday Morning	--	--	--	--	--	--	--	--	82	0.46	39.7	E
Weekday Evening	--	--	--	--	--	--	--	--	45	0.46	70.5	F
Great Road and Mannion Place:												
<i>All movements from Mannion Place:</i>												
Weekday Morning	5	0.03	17.6	C	5	0.03	18.7	C	5	0.03	19.5	C
Weekday Evening	8	0.05	14.1	B	8	0.06	16.2	C	8	0.06	16.5	C
Great Road and Nashoba Road:												
<i>Left-turn movements from Nashoba Road:</i>												
Weekday Morning	23	0.23	37.9	E	24	0.28	46.9	F	24	0.30	50.7	F
Weekday Evening	17	0.27	52.9	F	17	0.40	87.9	F	18	0.45	99.8	F
<i>Right-turn movements from Nashoba Road:</i>												
Weekday Morning	93	0.40	22.9	C	95	0.44	25.7	D	95	0.46	27.6	D
Weekday Evening	94	0.22	14.5	B	96	0.27	16.9	C	96	0.27	17.3	C

^aDemand of critical movements in vehicles per hour.

^bVolume-to-capacity ratio.

^cDelay in seconds per vehicle.

^dLevel of service.

Great Road and Site Driveway

Under 2016 Build conditions, the critical movements (left- and right-turn movements from the site driveway) are projected to operate at LOS E during the weekday morning peak hour and at LOS F during the weekday evening peak hour. All other critical movements (i.e. left- and right-turns from Great Road) are projected to operate at LOS A during the peak hours. The 95th percentile queue (the queue that can be expected five percent of the time during the peak hours) is expected to be 2 to 3 vehicles on the site driveway approach. The 95th percentile queue for eastbound left-turns is projected to be one vehicle.

Great Road and Mannion Place

Under 2011 Existing weekday morning conditions, the critical movements (all movements from Mannion Place) at this unsignalized intersection currently operate at LOS C during the weekday morning peak hour and at LOS B during the weekday evening peak hour. Under future 2016

No-Build conditions, these movements are projected to operate at LOS C during the weekday morning peak hour and at LOS C during the weekday evening peak hour. Under 2016 Build conditions, with the project, the critical movements are modeled to continue to C during the weekday morning peak hour and at LOS C during the weekday evening peak hour.

Great Road and Nashoba Road

Under 2011 Existing weekday morning conditions, the critical movements (left-turn movements from Nashoba) at this unsignalized intersection currently operate at LOS E during the weekday morning peak hour and at LOS F during the weekday evening peak hour. Under future 2016 No-Build conditions, these movements are projected to operate at LOS F during the weekday morning peak hour and at LOS F during the weekday evening peak hour. Under 2016 Build conditions, with the project, the critical movements are modeled to operate at LOS F during the weekday morning peak hour and at LOS F during the weekday evening peak hour.

Summary

As shown in Table 10, the project does not cause a significant change in the overall level of service at any of the study area intersections.

SIGHT DISTANCES

Sight distance measurements were performed at the intersection of Great Road at the potential site driveway in accordance with Massachusetts Department of Transportation (MassDOT) standards. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway, to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with MassDOT standards, at a minimum, sufficient SSD must be provided to the intersection.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersections. In accordance with the American Association of State Highway and Transportation Officials (AASHTO) manual, *“If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road.”* Accordingly, the ISD should be at least equal to the SSD, which would allow a driver approaching the minor road to safely stop.

Both the SSD and ISD were measured in the field, as well as determined through a physical survey. The distances were measured in accordance with AASHTO requirements. Table 10 presents the measured SSD and ISD at the intersection of Great Road at the potential site access driveway. The sight distance worksheets are included in the Appendix.

TABLE 10
SIGHT DISTANCE SUMMARY

	Required Minimum (Feet) ^a	Measured (Feet)
<i>Great Road and Proposed Site Driveway</i>		
<i>Stopping Sight Distance:</i>		
Great Road approaching from the east	335	336
Great Road approaching from the west	397	547
<i>Intersection Sight Distance:</i>		
Looking to the east from the proposed site driveway	411 ^b /474 ^c	402
Looking to the west from the proposed site driveway	474 ^b /529 ^c	587

^aRecommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2004, and based on a 43 mph speed westbound and 48 mph eastbound.

^bRecommended minimum value for vehicles turning right exiting a roadway under STOP-sign control.

^cRecommended minimum value for vehicles turning left exiting a roadway under STOP-sign control.

As can be seen in Table 4, the SSD measurements performed at the driveway intersection with Great Road indicate that the SSD currently meet or exceed the recommended minimum requirements based on the recorded 85th percentile speeds on Great Road. Additionally, the measured ISD also meets the SSD requirements. To maintain sight distances, it is recommended that a sight distance triangle be established along the site frontage, in both directions from a point 15 back at the site driveway and extending to each of the corners of the site along Great Road. Within this triangle, any existing vegetation should be cut-back and any plantings be designed to be low growth plantings so as to not impede sight distances. Additional measures are described in the next section, Recommendations and Conclusion.

SECTION 5: RECOMMENDATIONS AND CONCLUSION

The proposed project is expected to generate approximately 95 vehicle trips (17 vehicles entering and 78 vehicles exiting) during the weekday morning peak hour and 124 vehicle trips (83 vehicles entering and 41 vehicles exiting) during the weekday evening peak hour. An analysis of traffic operations at the study area intersections indicates that the proposed project does not result in a significant impact to existing operating conditions.

RECOMMENDATIONS

The final phase of the analysis process is to identify the mitigation measures necessary to minimize the impact of the project on the transportation system. The proponent has made a commitment to implement the mitigation measures listed below.

Great Road and Site Driveway

The capacity analyses performed indicate the critical movements at the site driveway are projected to operate at LOS E and LOS F during the respective weekday morning and evening peak hours. Additional analyses were performed assuming the intersection were to be signalized. These analyses indicate that the intersection would operate at LOS A during both the weekday morning and evening peak hours. This significant improvement in operating conditions indicates that the projected unsignalized analyses will not be as poor as the capacity analysis model indicates. Also, the volume of traffic generated by the proposed project is not large enough to warrant signalization. It is recommended that the site driveway be placed under STOP sign control and designed in accordance with MassDOT requirements.

Further, it is recommended that Great Road be widened to provide an exclusive left-turn lane into the site. Review of NCHRP criteria indicates that the projected left-turn volume into the site during the weekday evening peak hour is large enough to warrant an exclusive lane.

Based on discussions with MassDOT, the proposed profile of Great Road in the vicinity of the site will be improved to further extend the available lines of sight. As part of the proposed widening to provide the exclusive left-turn lane into the site, the grade of Great Road will be raised and the profile designed to meet MassDOT requirements. With this change, the SSD approaching from the east will increase to 428 feet, which exceeds the AASHTO requirements for 50 mph, the posted speed limit. In excess of 500 feet will continue to be provided for SSD

approaching from the west. The intersection sight distance (ISD) will also improve with the change in grade, from 402 feet to in excess of 500 feet.

Lastly, in order to maintain sight distances, it is recommended that a sight distance triangle be established along the site frontage, in both directions from a point 15 back at the site driveway and extending to each of the corners of the site along Great Road. Within this triangle, any existing vegetation should be cut-back and any plantings be designed to be low growth plantings so as to not impede sight distances.

CONCLUSION

Review of the proposed development and access plan shows that in relation to roadway capacity, traffic safety, and traffic impacts upon the surrounding roadway network, the proposed project will meet safety standards and have a minimal impact on existing traffic conditions. With the proposed access, in conjunction with the mitigation measures described above and maintaining sight distances from the driveway (clear sight lines along frontage), safe and efficient access can be provided to the clientele of the proposed development and to the motoring public in the area. Any vehicle queuing expected at the site driveway will occur on the site driveway approach to Great Road.

APPENDIX

Traffic Count Data

Seasonal Adjustment Worksheets

Crash Data Worksheets

Traffic Growth Data

Trip Generation Worksheets

Trip Distribution Gravity Model

Capacity Analysis Worksheets

Sight Distance Worksheets

Traffic Count Data

Great Road (Route 2A/119)
 200' east of Grist Mill Road (East)
 City, State: Littleton, MA
 Client: LandStrategies/ K. Cram



PRECISION
 DATA
 INDUSTRIES, LLC
 P.O. Box 301 Berlin, MA 01503
 Office: 508.481.3999 Fax: 508.545.1234
 Email: datarequests@pdillc.com

112529 A volume
 Site Code: 11-012KC

Start		WB		EB		Combined		24-May-11 Tue	
Time	A.M.		P.M.	A.M.	P.M.	A.M.	P.M.		
12:00	9		114	8	141	17	255		
12:15	13		133	3	112	16	245		
12:30	6		123	1	127	7	250		
12:45	10	38	141	3	123	13	264	53	1014
01:00	5		141	2	122	7	263		
01:15	8		107	1	126	9	233		
01:30	2		148	2	115	4	263		
01:45	3	18	112	2	108	5	220	25	979
02:00	4		143	4	93	8	236		
02:15	2		138	1	131	3	269		
02:30	1		139	0	109	1	248		
02:45	1	8	127	1	119	2	246	14	999
03:00	1		136	2	99	3	235		
03:15	0		177	1	130	1	307		
03:30	2		193	4	126	6	319		
03:45	2	5	186	0	136	2	322	12	1183
04:00	2		177	5	109	7	286		
04:15	3		186	9	116	12	302		
04:30	1		233	10	96	11	329		
04:45	5	11	222	17	149	22	371	52	1288
05:00	5		255	21	119	26	374		
05:15	5		250	31	142	36	392		
05:30	14		232	58	141	72	373		
05:45	19	43	198	73	178	92	376	226	1515
06:00	22		202	117	170	139	372		
06:15	28		154	164	106	192	260		
06:30	55		174	195	116	250	290		
06:45	59	164	174	182	86	241	260	822	1182
07:00	84		142	181	106	265	248		
07:15	58		124	209	75	267	199		
07:30	111		111	198	66	309	177		
07:45	105	358	106	199	77	304	183	1145	807
08:00	137		74	204	73	341	147		
08:15	121		89	185	72	306	161		
08:30	127		78	213	57	340	135		
08:45	128	513	72	230	832	54	256	358	569
09:00	125		55	172	35	297	90		
09:15	115		50	154	41	269	91		
09:30	100		42	138	42	238	84		
09:45	108	448	50	134	598	40	158	242	355
10:00	113		41	116	20	229	61	1046	
10:15	89		33	113	21	202	54		
10:30	119		27	88	17	207	44		
10:45	114	435	27	109	426	13	71	223	199
11:00	99		25	80	11	179	36	861	
11:15	119		13	96	7	215	20		
11:30	109		19	109	4	218	23		
11:45	119	446	17	126	411	1	23	245	97
Total	2487		5910	3971	4277	6458	10187		
Percent	38.5%		58.0%	61.5%	42.0%				
Day Total		8397		8248		16645			
Peak	08:00		04:30	08:00	05:15	08:00	05:00		
Vol.	513		960	832	631	1345	1515		
P.H.F.	0.936		0.941	0.904	0.886	0.939	0.966		

Great Road (Route 2A/119)
 200' east of Grist Mill Road (East)
 City, State: Littleton, MA
 Client: LandStrategies/ K. Cram



112529 A volume
 Site Code: 11-012KC

Start	WB		EB		Combined		25-May-11 Wed
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	7	161	5	134	12	295	
12:15	8	141	4	132	12	273	
12:30	5	152	6	127	11	279	
12:45	6	132	2	129	8	261	1108
01:00	3	132	4	128	7	260	
01:15	2	143	1	123	3	266	
01:30	3	149	3	124	6	273	
01:45	2	136	3	101	5	237	1036
02:00	3	114	1	112	4	226	
02:15	2	119	2	112	4	231	
02:30	0	127	1	118	1	245	
02:45	2	118	1	125	3	243	945
03:00	0	137	1	124	1	261	
03:15	0	186	2	114	2	300	
03:30	2	172	2	123	4	295	
03:45	0	160	3	123	3	283	1139
04:00	3	199	4	125	7	324	
04:15	3	203	5	94	8	297	
04:30	3	199	6	146	9	345	
04:45	4	221	11	125	15	346	1312
05:00	5	258	24	127	29	385	
05:15	8	246	31	130	39	376	
05:30	8	242	51	133	59	375	
05:45	19	220	86	139	105	359	1495
06:00	21	206	115	139	136	345	
06:15	21	173	150	109	171	282	
06:30	61	176	204	116	265	292	
06:45	63	146	203	111	266	257	1176
07:00	84	133	168	79	252	212	
07:15	62	115	220	95	282	210	
07:30	106	113	192	80	298	193	
07:45	102	109	216	70	318	179	794
08:00	122	90	219	72	341	162	
08:15	136	87	211	85	347	172	
08:30	157	58	211	48	368	106	
08:45	136	78	234	57	370	135	575
09:00	130	64	176	56	306	120	
09:15	102	49	174	61	276	110	
09:30	94	45	149	36	243	81	
09:45	119	50	145	33	264	83	394
10:00	95	38	117	21	212	59	
10:15	97	42	96	32	193	74	
10:30	92	34	123	11	215	45	
10:45	112	17	121	19	233	36	214
11:00	115	41	100	16	215	57	
11:15	112	23	107	7	219	30	
11:30	113	22	122	5	235	27	
11:45	129	16	115	444	5	244	135
Total	2479	5992	4147	4331	6626	10323	
Percent	37.4%	58.0%	62.6%	42.0%			
Day Total	8471		8478		16949		
Peak	08:15	04:45	08:00	05:15	08:00	05:00	
Vol.	559	967	875	541	1426	1495	
P.H.F.	0.890	0.937	0.935	0.973	0.964	0.971	

Great Road (Route 2A/119)
 200' east of Grist Mill Road (East)
 City, State: Littleton, MA
 Client: LandStrategies/ K. Cram



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 DATA
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112529 A volume
 Site Code: 11-012KC

Start		WB		EB		Combined		26-May-11 Thu	
Time	A.M.		P.M.	A.M.	P.M.	A.M.	P.M.		
12:00	13		133	3	125	16	258		
12:15	8		128	3	108	11	236		
12:30	11		112	3	111	14	223		
12:45	8	40	146	4	128	12	274	991	
01:00	5		132	1	127	6	259		
01:15	5		122	0	118	5	240		
01:30	3		140	3	117	6	257		
01:45	8	21	124	1	110	9	234	990	
02:00	2		107	3	97	5	204		
02:15	2		141	4	130	6	271		
02:30	2		180	1	111	3	291		
02:45	3	9	155	1	110	4	265	1031	
03:00	0		162	1	132	1	294		
03:15	4		174	3	123	7	297		
03:30	2		211	3	144	5	355		
03:45	4	10	198	4	153	8	351	1297	
04:00	2		206	4	150	6	356		
04:15	2		231	6	130	8	361		
04:30	3		236	9	139	12	375		
04:45	6	13	243	17	127	23	370	1462	
05:00	7		244	11	158	18	402		
05:15	7		277	35	140	42	417		
05:30	9		229	58	145	67	374		
05:45	22	45	230	76	154	98	384	1577	
06:00	25		228	95	143	120	371		
06:15	20		210	149	121	169	331		
06:30	41		172	192	121	233	293		
06:45	59	145	162	197	122	256	284	1279	
07:00	70		153	192	97	262	250		
07:15	85		131	211	88	296	219		
07:30	91		111	186	87	277	198		
07:45	127	373	146	210	799	103	375	916	
08:00	120		108	201	89	321	197		
08:15	118		98	209	104	327	202		
08:30	139		97	226	89	365	186		
08:45	121	498	72	203	839	85	367	742	
09:00	120		64	192	62	312	126		
09:15	107		53	163	68	270	121		
09:30	103		49	151	62	254	111		
09:45	103	433	59	166	672	35	227	452	
10:00	98		48	135	36	233	84		
10:15	91		38	130	34	221	72		
10:30	89		40	120	26	209	66		
10:45	100	378	30	120	505	17	113	269	
11:00	105		39	104	15	209	54		
11:15	122		32	91	14	213	46		
11:30	114		23	112	6	226	29		
11:45	114	455	17	111	423	8	43	154	
Total	2420		6441	4125	4719	6545	11160		
Percent	37.0%		57.7%	63.0%	42.3%				
Day Total		8861		8844		17705			
Peak	07:45		04:30	07:45	05:00	07:45	05:00		
Vol.	504		1000	846	597	1350	1577		
P.H.F.	0.906		0.903	0.936	0.945	0.925	0.945		



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Great Road (Route 2A/119)
200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A CLASS
Site Code: 11-012KC

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/24/11	0	30	8	0	0	0	0	0	0	0	0	0	0	38
01:00	0	12	3	0	2	1	0	0	0	0	0	0	0	18
02:00	0	6	2	0	0	0	0	0	0	0	0	0	0	8
03:00	0	1	0	0	4	0	0	0	0	0	0	0	0	5
04:00	0	7	3	0	0	1	0	0	0	0	0	0	0	11
05:00	1	32	7	0	2	0	0	0	1	0	0	0	0	43
06:00	1	128	24	1	10	0	0	0	0	0	0	0	0	164
07:00	3	288	47	3	10	4	0	2	1	0	0	0	0	358
08:00	4	419	67	1	16	1	0	2	0	0	0	0	0	510
09:00	2	319	94	7	20	4	1	1	1	0	0	0	0	449
10:00	2	310	94	6	15	3	0	2	1	1	0	0	0	434
11:00	7	311	95	2	25	5	0	0	1	0	0	0	0	446
12 PM	4	360	110	4	25	3	0	3	2	0	0	0	0	511
13:00	4	361	110	2	23	3	0	2	3	0	0	0	0	508
14:00	2	386	111	5	36	2	0	5	0	0	0	0	0	547
15:00	2	505	137	1	29	9	0	6	2	0	0	0	0	691
16:00	9	597	161	2	38	4	1	1	1	0	0	0	0	814
17:00	4	744	154	0	28	1	0	1	1	0	0	0	0	933
18:00	4	565	113	0	19	1	0	1	0	0	0	0	0	703
19:00	4	389	75	1	12	1	0	1	0	0	0	0	0	483
20:00	3	260	41	0	8	1	0	0	0	0	0	0	0	313
21:00	6	155	31	0	6	0	0	0	0	0	0	0	0	198
22:00	1	100	24	0	3	0	0	0	0	0	0	0	0	128
23:00	0	55	15	0	2	1	0	0	0	1	0	0	0	74
Total	63	6340	1526	35	333	45	2	27	14	2	0	0	0	8387
Percent	0.8%	75.6%	18.2%	0.4%	4.0%	0.5%	0.0%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	09:00	09:00	09:00	07:00	09:00	07:00	05:00					08:00
Vol.	4	419	94	7	20	4	1	2	1					510
Midday Peak	11:00	14:00	14:00	14:00	14:00	11:00		14:00	13:00					14:00
Vol.	7	386	111	5	36	5		5	3					547
PM Peak	16:00	17:00	16:00	16:00	16:00	15:00	16:00	15:00	15:00	23:00				17:00
Vol.	9	744	161	2	38	9	1	6	2	1				933



PRECISION
D A T A
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Great Road (Route 2A/119)
200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A CLASS
Site Code: 11-012KC

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/25/11	0	23	3	0	0	0	0	0	0	0	0	0	0	26
01:00	0	5	4	0	1	0	0	0	0	0	0	0	0	10
02:00	0	5	1	0	1	0	0	0	0	0	0	0	0	7
03:00	0	1	0	0	1	0	0	0	0	0	0	0	0	2
04:00	0	11	1	0	1	0	0	0	0	0	0	0	0	13
05:00	3	26	10	1	0	0	0	0	0	0	0	0	0	40
06:00	1	126	26	1	12	0	0	0	0	0	0	0	0	166
07:00	2	280	44	3	17	4	1	2	1	0	0	0	0	354
08:00	4	435	81	4	14	4	0	0	3	0	0	0	0	545
09:00	6	302	92	5	25	7	2	4	0	0	0	0	0	443
10:00	4	280	82	3	18	6	2	2	1	0	0	0	0	398
11:00	9	336	96	0	20	3	2	3	0	0	0	0	0	469
12 PM	9	436	98	7	25	4	1	2	3	0	0	0	0	585
13:00	7	409	98	6	31	6	0	1	1	0	0	0	0	559
14:00	6	346	92	4	18	4	1	4	2	0	0	0	0	477
15:00	14	477	127	2	28	6	1	0	0	0	0	0	0	655
16:00	8	616	142	3	35	4	2	7	1	2	0	0	0	820
17:00	14	757	156	2	30	1	0	0	1	0	0	0	0	961
18:00	12	545	113	2	25	1	0	0	1	0	0	0	0	699
19:00	9	379	65	2	13	0	0	1	0	0	0	0	0	469
20:00	4	249	52	2	5	0	0	1	0	0	0	0	0	313
21:00	1	169	30	0	6	0	0	1	0	0	0	0	0	207
22:00	2	103	22	0	3	0	0	0	1	0	0	0	0	131
23:00	5	79	17	0	1	0	0	0	0	0	0	0	0	102
Total	120	6395	1452	47	330	50	12	28	15	2	0	0	0	8451
Percent	1.4%	75.7%	17.2%	0.6%	3.9%	0.6%	0.1%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	08:00	09:00	09:00	09:00	09:00	09:00	09:00	08:00					08:00
Vol.	6	435	92	5	25	7	2	4	3					545
Midday Peak	11:00	12:00	12:00	12:00	13:00	13:00	11:00	14:00	12:00					12:00
Vol.	9	436	98	7	31	6	2	4	3					585
PM Peak	15:00	17:00	17:00	16:00	16:00	15:00	16:00	16:00	16:00	16:00				17:00
Vol.	14	757	156	3	35	6	2	7	1	2				961



PRECISION
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Great Road (Route 2A/119)
200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A CLASS
Site Code: 11-012KC

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/26/11	2	28	9	0	1	0	0	0	0	0	0	0	0	40
01:00	0	16	4	0	1	0	0	0	0	0	0	0	0	21
02:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
03:00	0	5	1	0	3	0	0	0	1	0	0	0	0	10
04:00	1	8	3	0	1	0	0	0	0	0	0	0	0	13
05:00	0	32	9	1	2	1	0	0	0	0	0	0	0	45
06:00	1	101	22	2	15	1	0	0	2	0	0	0	0	144
07:00	5	286	57	4	16	2	0	1	2	0	0	0	0	373
08:00	4	381	83	5	14	3	0	2	2	0	0	0	0	494
09:00	10	325	70	4	18	4	1	1	0	0	0	0	0	433
10:00	3	276	67	2	20	4	2	0	2	1	0	0	0	377
11:00	7	319	98	4	17	3	2	2	2	0	0	0	0	454
12 PM	12	364	107	5	25	2	0	2	2	0	0	0	0	519
13:00	5	383	105	2	16	4	1	0	2	0	0	0	0	518
14:00	8	392	132	4	35	4	1	4	3	0	0	0	0	583
15:00	11	538	138	3	43	2	1	3	5	1	0	0	0	745
16:00	12	694	161	3	34	4	0	2	4	0	0	0	0	914
17:00	16	791	145	2	22	1	0	1	0	0	0	0	0	978
18:00	23	612	111	3	19	1	0	1	0	0	0	0	0	770
19:00	33	412	76	2	15	0	0	3	0	0	0	0	0	541
20:00	18	305	45	0	6	0	0	0	0	0	0	0	0	374
21:00	4	182	31	1	6	0	0	1	0	0	0	0	0	225
22:00	2	126	21	0	4	1	0	1	0	0	0	0	0	155
23:00	1	83	20	0	6	0	0	0	0	1	0	0	0	111
Total	178	6667	1516	47	339	37	8	24	27	3	0	0	0	8846
Percent	2.0%	75.4%	17.1%	0.5%	3.8%	0.4%	0.1%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	08:00	08:00	08:00	09:00	09:00	09:00	08:00	06:00					08:00
Vol.	10	381	83	5	18	4	1	2	2					494
Midday Peak	12:00	14:00	14:00	12:00	14:00	13:00	11:00	14:00	14:00					14:00
Vol.	12	392	132	5	35	4	2	4	3					583
PM Peak	19:00	17:00	16:00	15:00	15:00	16:00	15:00	15:00	15:00	15:00				17:00
Vol.	33	791	161	3	43	4	1	3	5	1				978



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Client: LandStrategies/ K. Cram

112529 A CLASS
Site Code: 11-012KC

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/24/11	0	13	2	0	0	0	0	0	0	0	0	0	0	15
01:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
02:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
03:00	0	4	3	0	0	0	0	0	0	0	0	0	0	7
04:00	0	28	7	0	4	1	0	1	0	0	0	0	0	41
05:00	0	136	32	0	10	0	0	2	3	0	0	0	0	183
06:00	2	491	144	2	14	1	0	1	3	0	0	0	0	658
07:00	0	607	145	2	22	3	2	2	4	0	0	0	0	787
08:00	8	675	120	2	21	2	1	2	2	0	0	0	0	833
09:00	3	483	88	5	14	1	0	2	2	0	0	0	0	598
10:00	2	335	68	1	12	3	1	2	2	0	0	0	0	426
11:00	2	325	62	2	12	4	0	2	1	1	0	0	0	411
12 PM	0	417	64	1	13	6	1	0	1	0	0	0	0	503
13:00	3	368	78	0	16	3	1	1	1	0	0	0	0	471
14:00	1	365	68	1	8	1	0	1	6	0	0	0	0	451
15:00	5	404	69	2	9	1	0	1	0	0	0	0	0	491
16:00	4	404	52	1	8	2	0	0	0	0	0	0	0	471
17:00	2	510	59	1	5	1	0	2	0	0	0	0	0	580
18:00	4	415	51	1	6	0	0	1	0	0	0	0	0	478
19:00	2	289	30	1	2	0	0	0	1	0	0	0	0	325
20:00	4	222	27	0	3	0	0	0	0	0	0	0	0	256
21:00	0	143	14	0	0	1	0	0	0	0	0	0	0	158
22:00	1	62	7	0	1	0	0	0	0	0	0	0	0	71
23:00	0	17	5	0	1	0	0	0	0	0	0	0	0	23
Total	43	6725	1196	22	181	30	6	20	26	1	0	0	0	8250
Percent	0.5%	81.5%	14.5%	0.3%	2.2%	0.4%	0.1%	0.2%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	07:00	09:00	07:00	07:00	07:00	05:00	07:00					08:00
Vol.	8	675	145	5	22	3	2	2	4					833
Midday Peak	13:00	12:00	13:00	11:00	13:00	12:00	12:00	11:00	14:00	11:00				12:00
Vol.	3	417	78	2	16	6	1	2	6	1				503
PM Peak	15:00	17:00	15:00	15:00	15:00	16:00		17:00	19:00					17:00
Vol.	5	510	69	2	9	2		2	1					580



PRECISION
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Great Road (Route 2A/119)
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Client: LandStrategies/ K. Cram

112529 A CLASS
Site Code: 11-012KC

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/25/11	0	16	0	0	1	0	0	0	0	0	0	0	0	17
01:00	0	10	1	0	0	0	0	0	0	0	0	0	0	11
02:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
03:00	0	5	3	0	0	0	0	0	0	0	0	0	0	8
04:00	1	20	3	0	1	0	0	1	0	0	0	0	0	26
05:00	2	138	41	2	5	2	1	1	0	0	0	0	0	192
06:00	7	491	138	4	22	1	1	3	5	0	0	0	0	672
07:00	9	630	126	1	24	3	0	2	2	0	0	0	0	797
08:00	10	704	136	1	13	4	1	3	4	0	0	0	0	876
09:00	5	525	96	2	9	3	0	1	2	0	1	0	0	644
10:00	7	358	70	2	11	4	2	0	4	0	0	0	0	458
11:00	6	352	68	0	13	0	1	3	1	0	0	0	0	444
12 PM	8	424	63	3	12	6	3	2	1	0	0	0	0	522
13:00	4	385	68	2	11	4	1	1	1	0	0	0	0	477
14:00	1	371	72	5	12	1	1	0	4	0	0	0	0	467
15:00	5	396	68	2	7	1	3	0	0	0	0	0	0	482
16:00	3	418	61	0	4	2	0	0	2	0	0	0	0	490
17:00	12	457	54	0	2	1	0	2	1	0	0	0	0	529
18:00	5	412	52	3	2	1	0	1	0	0	0	0	0	476
19:00	10	290	20	1	2	0	0	1	0	0	0	0	0	324
20:00	2	238	18	1	2	0	0	1	0	0	0	0	0	262
21:00	2	164	18	0	2	0	0	0	0	0	0	0	0	186
22:00	0	72	8	0	3	0	0	0	0	0	0	0	0	83
23:00	1	31	1	0	0	0	0	0	0	0	0	0	0	33
Total	100	6911	1186	29	158	33	14	22	27	0	1	0	0	8481
Percent	1.2%	81.5%	14.0%	0.3%	1.9%	0.4%	0.2%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	06:00	06:00	07:00	08:00	05:00	06:00	06:00		09:00			08:00
Vol.	10	704	138	4	24	4	1	3	5		1			876
Midday Peak	12:00	12:00	14:00	14:00	11:00	12:00	12:00	11:00	14:00					12:00
Vol.	8	424	72	5	13	6	3	3	4					522
PM Peak	17:00	17:00	15:00	18:00	15:00	16:00	15:00	17:00	16:00					17:00
Vol.	12	457	68	3	7	2	3	2	2					529



PRECISION
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Client: LandStrategies/ K. Cram

112529 A CLASS
Site Code: 11-012KC

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/26/11	0	10	2	0	0	0	0	0	1	0	0	0	0	13
01:00	0	4	0	0	1	0	0	0	0	0	0	0	0	5
02:00	0	8	0	0	1	0	0	0	0	0	0	0	0	9
03:00	1	7	2	0	0	1	0	0	0	0	0	0	0	11
04:00	1	26	6	0	1	0	0	1	0	1	0	0	0	36
05:00	6	129	36	0	7	1	0	0	1	0	0	0	0	180
06:00	8	454	132	3	29	2	0	2	2	1	0	0	0	633
07:00	14	630	129	2	15	2	0	3	4	0	0	0	0	799
08:00	9	665	135	2	24	3	0	1	1	0	0	0	0	840
09:00	5	550	94	3	13	5	1	0	2	0	0	0	0	673
10:00	5	382	88	1	18	3	0	4	4	0	0	0	0	505
11:00	3	339	60	3	12	2	1	1	2	0	0	0	0	423
12 PM	10	373	66	3	12	5	0	2	1	0	0	0	0	472
13:00	11	366	76	1	10	4	0	0	3	1	0	0	0	472
14:00	6	345	80	4	8	1	0	3	1	0	0	0	0	448
15:00	9	456	79	0	6	0	0	0	2	0	0	0	0	552
16:00	8	443	79	1	11	2	0	1	0	0	0	0	0	545
17:00	14	530	52	0	2	0	0	0	0	0	0	0	0	598
18:00	20	446	36	2	2	2	0	0	0	0	0	0	0	508
19:00	7	319	41	1	5	1	0	0	1	0	0	0	0	375
20:00	11	317	31	1	5	3	0	0	0	0	0	0	0	368
21:00	2	207	18	0	0	0	0	0	0	0	0	0	0	227
22:00	1	104	6	0	1	1	0	0	0	0	0	0	0	113
23:00	1	37	5	0	0	0	0	0	0	0	0	0	0	43
Total	152	7147	1253	27	183	38	2	18	25	3	0	0	0	8848
Percent	1.7%	80.8%	14.2%	0.3%	2.1%	0.4%	0.0%	0.2%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	08:00	06:00	06:00	09:00	09:00	07:00	07:00	04:00				08:00
Vol.	14	665	135	3	29	5	1	3	4	1				840
Midday Peak	13:00	12:00	14:00	14:00	11:00	12:00	11:00	14:00	13:00	13:00				12:00
Vol.	11	373	80	4	12	5	1	3	3	1				472
PM Peak	18:00	17:00	15:00	18:00	16:00	20:00		16:00	15:00					17:00
Vol.	20	530	79	2	11	3		1	2					598



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112529 A SPEED
Site Code: 11-012KC

WB

Start Time	14	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
5/24/11	0	0	0	0	2	3	13	15	4	1	0	0	0	38	49	45
01:00	0	0	0	0	0	0	4	7	6	1	0	0	0	18	52	48
02:00	0	0	0	0	0	0	3	4	0	1	0	0	0	8	48	46
03:00	0	0	0	0	0	1	0	4	0	0	0	0	0	5	47	44
04:00	0	0	0	0	0	0	3	2	6	0	0	0	0	11	52	48
05:00	0	0	0	0	1	2	7	13	18	2	0	0	0	43	53	48
06:00	0	0	1	2	3	11	40	58	40	9	0	0	0	164	52	46
07:00	0	0	0	2	3	31	124	148	44	4	2	0	0	358	49	45
08:00	0	1	1	2	9	37	218	181	53	7	1	0	0	510	49	44
09:00	0	0	1	2	8	72	185	143	37	1	0	0	0	449	48	43
10:00	0	0	1	4	11	54	203	138	18	4	1	0	0	434	48	43
11:00	0	0	0	1	4	49	200	153	32	6	1	0	0	446	49	44
12 PM	0	0	0	2	6	42	208	194	54	5	0	0	0	511	49	45
13:00	0	0	1	1	5	55	232	165	45	2	1	1	0	508	49	44
14:00	0	0	0	2	4	76	207	191	64	3	0	0	0	547	49	44
15:00	1	1	3	5	18	97	302	215	41	6	2	0	0	691	48	43
16:00	0	0	0	2	9	82	369	297	48	7	0	0	0	814	48	44
17:00	0	0	0	5	10	75	426	345	68	4	0	0	0	933	49	44
18:00	0	0	1	3	10	38	299	280	68	3	0	1	0	703	49	45
19:00	0	0	0	3	6	36	195	191	45	6	1	0	0	483	49	45
20:00	0	0	0	2	8	25	135	112	28	3	0	0	0	313	49	44
21:00	0	0	0	0	4	12	58	87	34	3	0	0	0	198	50	46
22:00	0	0	0	1	2	8	38	57	21	0	1	0	0	128	50	45
23:00	0	0	0	0	1	1	16	34	18	3	1	0	0	74	52	47
Total	1	2	9	39	124	807	3485	3034	792	81	11	2	0	8387		
%	0.0%	0.0%	0.1%	0.5%	1.5%	9.6%	41.6%	36.2%	9.4%	1.0%	0.1%	0.0%	0.0%			
AM Peak		08:00	06:00	06:00	08:00	09:00	08:00	08:00	08:00	06:00	07:00			08:00		
Vol.		1	1	2	9	72	218	181	53	9	2			510		
Midday Peak			13:00	12:00	12:00	14:00	13:00	12:00	14:00	11:00	11:00	13:00		14:00		
Vol.			1	2	6	76	232	194	64	6	1	1		547		
PM Peak	15:00	15:00	15:00	15:00	15:00	15:00	17:00	17:00	17:00	16:00	15:00	18:00		17:00		
Vol.	1	1	3	5	18	97	426	345	68	7	2	1		933		
% ile			15th Percentile :			40 MPH										
			50th Percentile :			44 MPH										
			85th Percentile :			49 MPH										
			95th Percentile :			52 MPH										

Stats

10 MPH Pace Speed : 40-49 MPH

Number in Pace : 6519

Percent in Pace : 77.7%

Number of Vehicles > 40 MPH : 6708

Percent of Vehicles > 40 MPH : 80.0%

Mean Speed(Average) : 44 MPH



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Great Road (Route 2A/119)
200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A SPEED
Site Code: 11-012KC

WB

Start Time	14	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
5/25/11	0	0	0	0	0	2	13	6	5	0	0	0	0	26	50	45
01:00	0	0	0	0	0	0	0	4	6	0	0	0	0	10	52	50
02:00	0	0	0	0	1	1	4	0	0	1	0	0	0	7	43	42
03:00	0	0	0	0	0	0	0	1	1	0	0	0	0	2	50	50
04:00	0	0	0	0	0	0	1	4	5	3	0	0	0	13	55	51
05:00	0	0	0	0	0	3	5	7	18	7	0	0	0	40	55	50
06:00	0	0	0	1	1	6	40	72	38	7	0	1	0	166	52	47
07:00	0	0	0	2	1	14	106	157	60	13	1	0	0	354	51	46
08:00	0	0	0	1	10	42	224	200	59	8	0	1	0	545	49	45
09:00	0	0	0	1	2	31	169	181	55	4	0	0	0	443	49	45
10:00	0	0	1	2	1	110	204	68	11	1	0	0	0	398	46	42
11:00	0	0	1	0	5	87	221	126	26	3	0	0	0	469	48	43
12 PM	1	0	1	4	10	115	282	144	27	1	0	0	0	585	47	42
13:00	1	4	1	5	19	115	274	116	21	2	1	0	0	559	47	42
14:00	0	0	0	2	5	59	203	169	35	4	0	0	0	477	48	44
15:00	0	0	0	2	6	63	246	265	66	6	1	0	0	655	49	45
16:00	0	1	0	2	15	94	321	310	68	7	0	1	1	820	49	44
17:00	0	0	0	2	7	75	443	352	76	6	0	0	0	961	49	44
18:00	0	0	0	2	14	73	261	267	76	5	1	0	0	699	49	44
19:00	0	0	2	2	6	14	151	192	85	15	1	1	0	469	51	46
20:00	0	0	0	0	7	19	108	142	32	5	0	0	0	313	49	45
21:00	0	0	0	0	3	13	77	80	29	5	0	0	0	207	50	45
22:00	0	0	1	0	0	6	41	57	19	6	0	0	1	131	51	46
23:00	0	0	0	2	2	7	23	34	28	5	1	0	0	102	53	47
Total	2	5	7	30	115	949	3417	2954	846	114	6	4	2	8451		
%	0.0%	0.1%	0.1%	0.4%	1.4%	11.2%	40.4%	35.0%	10.0%	1.3%	0.1%	0.0%	0.0%			
AM Peak				07:00	08:00	08:00	08:00	08:00	07:00	07:00	07:00	06:00		08:00		
Vol.				2	10	42	224	200	60	13	1	1		545		
Midday Peak	12:00	13:00	11:00	13:00	13:00	12:00	12:00	14:00	14:00	14:00	13:00			12:00		
Vol.	1	4	1	5	19	115	282	169	35	4	1			585		
PM Peak		16:00	19:00	15:00	16:00	16:00	17:00	17:00	19:00	19:00	15:00	16:00	16:00	17:00		
Vol.		1	2	2	15	94	443	352	85	15	1	1	1	961		
% ile			15th Percentile :			40 MPH										
			50th Percentile :			44 MPH										
			85th Percentile :			49 MPH										
			95th Percentile :			53 MPH										
Stats		10 MPH Pace Speed :				40-49 MPH										
		Number in Pace :				6371										
		Percent in Pace :				75.4%										
		Number of Vehicles > 40 MPH :				6659										
		Percent of Vehicles > 40 MPH :				78.8%										
		Mean Speed(Average) :				44 MPH										



PRECISION
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INDUSTRIES, LLC

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Great Road (Route 2A/119)
200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A SPEED
Site Code: 11-012KC

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
5/26/11	0	0	0	0	0	1	6	15	13	2	2	1	0	40	54	49
01:00	0	0	0	0	0	0	3	8	5	5	0	0	0	21	56	50
02:00	0	0	0	0	0	0	1	3	3	2	0	0	0	9	55	50
03:00	0	0	0	0	0	0	3	5	1	1	0	0	0	10	49	47
04:00	0	0	0	0	0	0	3	3	5	2	0	0	0	13	54	50
05:00	0	0	1	0	0	1	6	13	15	9	0	0	0	45	55	49
06:00	0	0	0	1	0	1	29	57	39	16	1	0	0	144	54	48
07:00	0	0	0	2	2	18	115	154	65	16	1	0	0	373	51	46
08:00	0	0	0	1	1	25	163	206	90	7	1	0	0	494	51	46
09:00	0	1	0	1	5	25	168	172	48	12	1	0	0	433	49	45
10:00	0	0	0	0	5	43	133	146	44	4	2	0	0	377	49	45
11:00	0	0	0	0	2	38	211	152	47	4	0	0	0	454	49	44
12 PM	1	0	0	1	11	42	226	183	51	3	1	0	0	519	49	44
13:00	0	0	0	1	2	66	214	176	54	4	1	0	0	518	49	44
14:00	0	0	1	9	9	48	242	231	41	1	1	0	0	583	49	44
15:00	0	1	1	1	3	72	306	285	72	4	0	0	0	745	49	44
16:00	0	0	0	9	30	122	448	247	53	5	0	0	0	914	48	43
17:00	0	0	0	2	10	100	408	389	64	5	0	0	0	978	48	44
18:00	0	0	0	3	14	61	289	323	70	8	2	0	0	770	49	45
19:00	0	1	0	1	2	36	225	220	51	4	1	0	0	541	49	45
20:00	0	0	0	0	7	38	148	133	45	3	0	0	0	374	49	44
21:00	0	0	0	0	4	35	88	76	17	4	1	0	0	225	49	44
22:00	0	0	0	1	2	15	46	59	30	2	0	0	0	155	51	45
23:00	0	0	0	0	0	9	39	39	17	6	1	0	0	111	51	46
Total	1	3	3	33	109	796	3520	3295	940	129	16	1	0	8846		
%	0.0%	0.0%	0.0%	0.4%	1.2%	9.0%	39.8%	37.2%	10.6%	1.5%	0.2%	0.0%	0.0%			
AM Peak		09:00	05:00	07:00	09:00	08:00	09:00	08:00	08:00	06:00	00:00	00:00		08:00		
Vol.		1	1	2	5	25	168	206	90	16	2	1		494		
Midday Peak	12:00		14:00	14:00	12:00	13:00	14:00	14:00	13:00	11:00	12:00			14:00		
Vol.	1		1	9	11	66	242	231	54	4	1			583		
PM Peak		15:00	15:00	16:00	16:00	16:00	16:00	17:00	15:00	18:00	18:00			17:00		
Vol.		1	1	9	30	122	448	389	72	8	2			978		
% ile			15th Percentile :				40 MPH									
			50th Percentile :				44 MPH									
			85th Percentile :				49 MPH									
			95th Percentile :				53 MPH									

Stats

10 MPH Pace Speed : 40-49 MPH

Number in Pace : 6815

Percent in Pace : 77.0%

Number of Vehicles > 40 MPH : 7197

Percent of Vehicles > 40 MPH : 81.4%

Mean Speed(Average) : 45 MPH



PRECISION
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Great Road (Route 2A/119)
200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A SPEED
Site Code: 11-012KC

EB

Start Time	14	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
5/24/11	0	0	0	0	0	3	8	4	0	0	0	0	0	15	46	42
01:00	0	0	0	1	0	0	4	2	0	0	0	0	0	7	45	40
02:00	0	0	0	0	0	3	1	2	0	0	0	0	0	6	45	40
03:00	0	0	0	0	0	0	3	3	1	0	0	0	0	7	47	45
04:00	0	0	0	1	0	6	12	19	3	0	0	0	0	41	48	44
05:00	0	0	0	1	1	5	61	101	12	1	1	0	0	183	49	45
06:00	0	0	0	1	11	36	274	281	53	2	0	0	0	658	49	45
07:00	0	0	0	10	15	81	421	242	18	0	0	0	0	787	47	43
08:00	0	0	0	6	17	176	396	222	14	2	0	0	0	833	47	42
09:00	0	0	0	1	12	62	287	214	18	4	0	0	0	598	48	43
10:00	0	0	0	7	31	63	192	114	18	1	0	0	0	426	47	42
11:00	0	0	0	5	1	26	179	168	29	3	0	0	0	411	49	44
12 PM	0	0	0	3	14	66	231	161	27	1	0	0	0	503	48	43
13:00	0	0	0	0	2	26	233	188	20	2	0	0	0	471	48	44
14:00	1	0	5	14	17	46	189	159	19	1	0	0	0	451	48	43
15:00	6	1	0	4	22	57	242	138	19	2	0	0	0	491	48	42
16:00	0	0	0	2	15	51	222	161	20	0	0	0	0	471	48	43
17:00	0	0	0	9	23	76	265	193	14	0	0	0	0	580	48	43
18:00	0	0	0	10	19	59	219	148	22	1	0	0	0	478	48	43
19:00	0	0	0	1	9	39	137	120	18	1	0	0	0	325	48	44
20:00	0	0	0	5	16	50	112	62	11	0	0	0	0	256	47	42
21:00	0	0	1	1	7	22	82	42	3	0	0	0	0	158	47	42
22:00	0	0	0	0	0	13	25	28	5	0	0	0	0	71	48	44
23:00	0	0	0	0	1	2	9	6	3	2	0	0	0	23	51	45
Total	7	1	6	82	233	968	3804	2778	347	23	1	0	0	8250		
%	0.1%	0.0%	0.1%	1.0%	2.8%	11.7%	46.1%	33.7%	4.2%	0.3%	0.0%	0.0%	0.0%			
AM Peak				07:00	08:00	08:00	07:00	06:00	06:00	09:00	05:00			08:00		
Vol.				10	17	176	421	281	53	4	1			833		
Midday Peak	14:00		14:00	14:00	14:00	12:00	13:00	13:00	11:00	11:00				12:00		
Vol.	1		5	14	17	66	233	188	29	3				503		
PM Peak	15:00	15:00	21:00	18:00	17:00	17:00	17:00	17:00	18:00	15:00				17:00		
Vol.	6	1	1	10	23	76	265	193	22	2				580		
% ile			15th Percentile :			39 MPH										
			50th Percentile :			43 MPH										
			85th Percentile :			48 MPH										
			95th Percentile :			49 MPH										

Stats

10 MPH Pace Speed : 40-49 MPH

Number in Pace : 6582

Percent in Pace : 79.8%

Number of Vehicles > 40 MPH : 6192

Percent of Vehicles > 40 MPH : 75.1%

Mean Speed(Average) : 43 MPH



PRECISION
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200' east of Grist Mill Road (East)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

112529 A SPEED
Site Code: 11-012KC

EB

Start Time	14	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
5/25/11	0	0	0	0	0	2	5	8	2	0	0	0	0	17	48	45
01:00	0	0	0	0	0	3	5	3	0	0	0	0	0	11	45	42
02:00	0	0	0	0	0	0	1	3	1	0	0	0	0	5	47	46
03:00	0	0	0	0	1	0	1	3	2	1	0	0	0	8	51	46
04:00	0	0	0	0	1	2	5	14	4	0	0	0	0	26	49	46
05:00	0	0	0	0	1	6	49	105	29	1	1	0	0	192	50	46
06:00	0	0	5	4	7	41	260	313	40	2	0	0	0	672	49	44
07:00	0	0	1	3	24	85	358	307	19	0	0	0	0	797	48	43
08:00	0	0	0	9	31	170	435	212	17	2	0	0	0	876	47	42
09:00	0	0	0	1	6	79	282	249	25	2	0	0	0	644	48	44
10:00	5	1	2	17	34	115	188	87	8	1	0	0	0	458	46	40
11:00	0	0	0	6	47	128	178	79	6	0	0	0	0	444	46	40
12 PM	3	1	0	18	38	98	234	121	8	1	0	0	0	522	47	41
13:00	2	9	1	11	17	69	207	150	11	0	0	0	0	477	47	42
14:00	0	0	0	3	17	94	213	123	17	0	0	0	0	467	47	42
15:00	0	1	12	4	10	81	224	139	10	0	0	1	0	482	47	42
16:00	0	0	0	2	12	65	236	159	15	1	0	0	0	490	48	43
17:00	0	0	1	6	16	92	235	162	15	2	0	0	0	529	48	42
18:00	0	0	0	3	9	64	230	153	17	0	0	0	0	476	48	43
19:00	0	0	0	1	9	40	143	109	19	3	0	0	0	324	48	43
20:00	0	0	0	1	3	31	126	90	10	1	0	0	0	262	48	43
21:00	0	0	0	0	4	38	80	58	6	0	0	0	0	186	47	43
22:00	0	0	0	1	0	12	31	29	8	2	0	0	0	83	49	44
23:00	0	0	0	0	0	2	13	14	4	0	0	0	0	33	49	45
Total	10	12	22	90	287	1317	3739	2690	293	19	1	1	0	8481		
%	0.1%	0.1%	0.3%	1.1%	3.4%	15.5%	44.1%	31.7%	3.5%	0.2%	0.0%	0.0%	0.0%			
AM Peak			06:00	08:00	08:00	08:00	08:00	06:00	06:00	06:00	05:00			08:00		
Vol.			5	9	31	170	435	313	40	2	1			876		
Midday Peak	12:00	13:00	13:00	12:00	11:00	11:00	12:00	13:00	14:00	12:00				12:00		
Vol.	3	9	1	18	47	128	234	150	17	1				522		
PM Peak		15:00	15:00	17:00	17:00	17:00	16:00	17:00	19:00	19:00		15:00		17:00		
Vol.		1	12	6	16	92	236	162	19	3		1		529		
% ile			15th Percentile :			38 MPH										
			50th Percentile :			43 MPH										
			85th Percentile :			48 MPH										
			95th Percentile :			49 MPH										
Stats		10 MPH Pace Speed :				40-49 MPH										
		Number in Pace :				6429										
		Percent in Pace :				75.8%										
		Number of Vehicles > 40 MPH :				5995										
		Percent of Vehicles > 40 MPH :				70.7%										
		Mean Speed(Average) :				43 MPH										



PRECISION
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Client: LandStrategies/ K. Cram

112529 A SPEED
Site Code: 11-012KC

EB

Start Time	14	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
	14	19	24	29	34	39	44	49	54	59	64	69	9999			
5/26/11	0	0	0	0	0	1	5	3	4	0	0	0	0	13	51	46
01:00	0	0	0	0	0	0	3	1	1	0	0	0	0	5	49	44
02:00	0	0	0	0	1	1	2	4	1	0	0	0	0	9	48	44
03:00	0	0	0	2	0	0	1	4	3	1	0	0	0	11	51	44
04:00	0	0	0	0	0	4	10	18	3	1	0	0	0	36	49	45
05:00	0	0	0	0	1	6	43	107	23	0	0	0	0	180	49	46
06:00	0	0	0	2	10	44	264	281	28	4	0	0	0	633	48	44
07:00	0	0	0	1	19	60	368	327	23	1	0	0	0	799	48	44
08:00	0	0	0	0	15	117	461	221	26	0	0	0	0	840	47	43
09:00	0	0	0	2	11	80	337	219	23	1	0	0	0	673	48	43
10:00	0	0	1	0	8	70	238	167	19	2	0	0	0	505	48	43
11:00	0	0	0	1	10	60	190	141	21	0	0	0	0	423	48	43
12 PM	0	0	0	1	4	61	234	145	27	0	0	0	0	472	48	43
13:00	0	0	1	0	4	75	244	129	18	1	0	0	0	472	47	43
14:00	0	0	0	1	10	50	214	153	20	0	0	0	0	448	48	43
15:00	1	0	0	3	23	62	260	183	18	2	0	0	0	552	48	43
16:00	0	0	0	0	16	73	264	179	13	0	0	0	0	545	48	43
17:00	0	0	0	2	18	77	253	220	26	1	1	0	0	598	48	43
18:00	0	0	0	10	20	58	226	169	20	5	0	0	0	508	48	43
19:00	0	0	0	1	11	36	173	143	11	0	0	0	0	375	48	43
20:00	0	0	0	1	12	61	189	98	6	1	0	0	0	368	47	42
21:00	0	0	0	4	10	63	94	48	7	1	0	0	0	227	47	41
22:00	0	0	0	0	0	13	61	35	4	0	0	0	0	113	48	43
23:00	0	0	0	1	1	4	15	16	3	3	0	0	0	43	49	45
Total	1	0	2	32	204	1076	4149	3011	348	24	1	0	0	8848		
%	0.0%	0.0%	0.0%	0.4%	2.3%	12.2%	46.9%	34.0%	3.9%	0.3%	0.0%	0.0%	0.0%			
AM Peak				03:00	07:00	08:00	08:00	07:00	06:00	06:00				08:00		
Vol.				2	19	117	461	327	28	4				840		
Midday Peak			13:00	11:00	11:00	13:00	13:00	14:00	12:00	13:00				12:00		
Vol.			1	1	10	75	244	153	27	1				472		
PM Peak	15:00			18:00	15:00	17:00	16:00	17:00	17:00	18:00	17:00			17:00		
Vol.	1			10	23	77	264	220	26	5	1			598		
% ile			15th Percentile :			40 MPH										
			50th Percentile :			43 MPH										
			85th Percentile :			48 MPH										
			95th Percentile :			49 MPH										

Stats

10 MPH Pace Speed : 40-49 MPH

Number in Pace : 7160

Percent in Pace : 80.9%

Number of Vehicles > 40 MPH : 6703

Percent of Vehicles > 40 MPH : 75.8%

Mean Speed(Average) : 43 MPH

Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram



PRECISION
DATA
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
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112529 B volume
Site Code: 11-012KC

Start	EB		WB		Combined		24-May-11 Tue
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	8	143	10	119	18	262	
12:15	3	112	12	130	15	242	
12:30	1	120	6	126	7	246	
12:45	3	15	10	38	13	53	1016
01:00	2	122	5	142	7	264	
01:15	1	125	8	97	9	222	
01:30	2	110	3	143	5	253	
01:45	2	7	2	18	4	25	963
02:00	4	96	4	141	8	237	
02:15	1	128	2	134	3	262	
02:30	0	105	1	136	1	241	
02:45	1	6	1	8	2	14	985
03:00	2	97	1	135	3	232	
03:15	2	131	0	181	2	312	
03:30	4	117	2	184	6	301	
03:45	0	8	2	5	2	13	1157
04:00	5	105	2	180	7	285	
04:15	9	118	3	178	12	296	
04:30	10	90	1	235	11	325	
04:45	17	41	5	11	22	52	1275
05:00	21	119	6	257	27	376	
05:15	32	132	5	228	37	360	
05:30	58	131	14	226	72	357	
05:45	69	180	20	45	89	225	1469
06:00	119	165	22	199	141	364	
06:15	162	110	28	153	190	263	
06:30	199	106	53	179	252	285	
06:45	169	649	89	162	228	811	1176
07:00	181	106	77	138	258	244	
07:15	205	78	60	120	265	198	
07:30	201	65	112	108	313	173	
07:45	196	783	96	345	292	1128	797
08:00	206	73	135	80	341	153	
08:15	191	73	120	85	311	158	
08:30	207	53	119	80	326	133	
08:45	224	828	114	488	338	1316	573
09:00	168	35	125	53	293	88	
09:15	151	40	118	50	269	90	
09:30	145	44	98	42	243	86	
09:45	135	599	39	158	248	1053	353
10:00	116	21	109	42	225	63	
10:15	106	21	89	33	195	54	
10:30	97	17	122	27	219	44	
10:45	103	422	109	429	212	851	201
11:00	81	12	99	25	180	37	
11:15	93	7	120	13	213	20	
11:30	107	4	106	19	213	23	
11:45	131	412	117	442	248	854	98
Total	3950	4215	2445	5848	6395	10063	
Percent	61.8%	41.9%	38.2%	58.1%			
Day Total	8165		8293		16458		
Peak	08:00	05:15	08:00	04:30	08:00	05:00	
Vol.	828	607	488	946	1316	1469	
P.H.F.	0.924	0.848	0.904	0.920	0.965	0.977	



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Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B volume
Site Code: 11-012KC

Start		EB		WB		Combined		25-May-11 Wed	
Time	A.M.		P.M.	A.M.	P.M.	A.M.	P.M.		
12:00	5		130	7	149	12	279		
12:15	5		130	9	144	14	274		
12:30	6		110	5	137	11	247		
12:45	2	18	127	5	26	7	253	44	1053
01:00	4		122	3	128	7	250		
01:15	1		116	2	144	3	260		
01:30	3		120	3	147	6	267		
01:45	3	11	95	2	10	5	225	21	1002
02:00	1		115	3	112	4	227		
02:15	2		112	2	113	4	225		
02:30	1		117	0	126	1	243		
02:45	1	5	125	2	7	3	237	12	932
03:00	1		124	0	138	1	262		
03:15	2		116	0	175	2	291		
03:30	2		123	2	172	4	295		
03:45	3	8	121	0	2	3	294	10	1142
04:00	4		125	3	182	7	307		
04:15	5		93	3	210	8	303		
04:30	6		134	4	192	10	326		
04:45	11	26	126	4	14	15	342	40	1278
05:00	24		119	5	241	29	360		
05:15	31		132	7	240	38	372		
05:30	49		127	8	241	57	368		
05:45	88	192	132	19	39	107	344	231	1444
06:00	114		132	20	189	134	321		
06:15	148		111	20	176	168	287		
06:30	206		114	60	177	266	291		
06:45	200	668	108	59	159	259	243	827	1142
07:00	169		77	81	135	250	212		
07:15	216		98	65	119	281	217		
07:30	198		75	104	112	302	187		
07:45	201	784	70	98	348	299	175	1132	791
08:00	208		75	106	91	314	166		
08:15	203		81	120	88	323	169		
08:30	201		51	146	57	347	108		
08:45	218	830	57	130	502	348	136	1332	579
09:00	172		55	125	69	297	124		
09:15	180		63	104	51	284	114		
09:30	147		36	95	46	242	82		
09:45	139	638	33	125	449	264	83	1087	403
10:00	114		21	94	42	208	63		
10:15	91		32	101	40	192	72		
10:30	134		11	96	35	230	46		
10:45	118	457	19	108	399	226	34	856	215
11:00	101		16	110	41	211	57		
11:15	108		8	114	23	222	31		
11:30	119		5	112	22	231	27		
11:45	121	449	5	138	474	259	21	923	136
Total	4086		4244	2429	5873	6515	10117		
Percent	62.7%		41.9%	37.3%	58.1%				
Day Total		8330		8302		16632			
Peak	08:00		05:15	08:15	04:45	08:00	05:00		
Vol.	830		523	521	938	1332	1444		
P.H.F.	0.952		0.991	0.892	0.973	0.957	0.970		

Great Road (Route 2A/119) between
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112529 B volume
Site Code: 11-012KC

Start	EB		WB		Combined		26-May-11 Thu
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	3	127	13	131	16	258	
12:15	3	111	8	128	11	239	
12:30	5	103	13	119	18	222	
12:45	4	124	8	145	12	269	988
01:00	1	126	5	136	6	262	
01:15	0	120	5	117	5	237	
01:30	3	116	3	138	6	254	
01:45	1	108	8	126	9	234	987
02:00	3	102	2	110	5	212	
02:15	4	127	2	136	6	263	
02:30	1	109	2	178	3	287	
02:45	1	110	3	146	4	256	1018
03:00	1	125	0	160	1	285	
03:15	3	127	4	183	7	310	
03:30	3	145	2	211	5	356	
03:45	4	143	4	195	8	338	1289
04:00	5	144	2	206	7	350	
04:15	6	114	3	220	9	334	
04:30	9	141	2	223	11	364	
04:45	17	120	6	237	23	357	1405
05:00	12	144	8	243	20	387	
05:15	35	134	7	262	42	396	
05:30	55	138	10	230	65	368	
05:45	79	149	20	223	99	372	1523
06:00	91	136	23	217	114	353	
06:15	148	130	21	213	169	343	
06:30	197	119	41	176	238	295	
06:45	199	125	58	159	257	284	1275
07:00	189	96	67	156	256	252	
07:15	207	93	86	131	293	224	
07:30	186	87	85	111	271	198	
07:45	202	106	119	144	321	250	924
08:00	202	91	121	103	323	194	
08:15	206	102	113	98	319	200	
08:30	211	87	132	97	343	184	
08:45	203	83	116	70	319	153	731
09:00	185	64	109	63	294	127	
09:15	173	68	100	52	273	120	
09:30	146	63	100	52	246	115	
09:45	161	35	108	60	269	95	457
10:00	137	37	89	48	226	85	
10:15	129	34	86	38	215	72	
10:30	118	23	89	41	207	64	
10:45	116	19	94	32	210	51	272
11:00	107	15	100	38	207	53	
11:15	93	14	122	31	215	45	
11:30	115	6	113	23	228	29	
11:45	114	8	113	17	227	25	152
Total	4093	4648	2345	6373	6438	11021	
Percent	63.6%	42.2%	36.4%	57.8%			
Day Total	8741		8718		17459		
Peak	08:00	05:00	07:45	04:45	07:45	05:00	
Vol.	822	565	485	972	1306	1523	
P.H.F.	0.974	0.948	0.919	0.927	0.952	0.961	



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Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B class
Site Code: 11-012KC

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/24/11	0	12	2	0	1	0	0	0	0	0	0	0	0	15
01:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
02:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
03:00	0	4	4	0	0	0	0	0	0	0	0	0	0	8
04:00	0	26	9	0	4	1	0	1	0	0	0	0	0	41
05:00	0	133	32	0	10	0	0	3	2	0	0	0	0	180
06:00	4	478	141	2	16	3	0	1	4	0	0	0	0	649
07:00	2	590	153	2	20	6	2	3	4	1	0	0	0	783
08:00	7	675	116	2	18	2	1	4	3	0	0	0	0	828
09:00	2	474	99	3	12	5	0	2	2	0	0	0	0	599
10:00	5	327	64	1	14	4	2	3	2	0	0	0	0	422
11:00	4	312	74	1	14	5	0	1	1	0	0	0	0	412
12 PM	2	396	75	1	16	3	1	3	1	0	0	0	0	498
13:00	4	354	86	3	15	3	0	0	1	0	0	0	0	466
14:00	2	365	67	1	8	3	0	2	4	0	0	0	0	452
15:00	4	391	66	1	9	4	0	1	0	0	0	0	0	476
16:00	5	384	54	2	8	3	0	0	0	0	0	0	0	456
17:00	6	483	57	2	4	7	0	2	0	0	0	0	0	561
18:00	10	404	45	1	6	2	0	2	0	0	0	0	0	470
19:00	2	288	30	1	3	0	0	0	1	0	0	0	0	325
20:00	6	219	27	0	4	1	0	0	0	0	0	0	0	257
21:00	0	146	12	0	0	0	0	0	0	0	0	0	0	158
22:00	1	64	6	0	1	0	0	0	0	0	0	0	0	72
23:00	0	17	6	0	1	0	0	0	0	0	0	0	0	24
Total	66	6554	1226	23	184	52	6	28	25	1	0	0	0	8165
Percent	0.8%	80.3%	15.0%	0.3%	2.3%	0.6%	0.1%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	07:00	09:00	07:00	07:00	07:00	08:00	06:00	07:00				08:00
Vol.	7	675	153	3	20	6	2	4	4	1				828
Midday Peak	11:00	12:00	13:00	13:00	12:00	11:00	12:00	12:00	14:00					12:00
Vol.	4	396	86	3	16	5	1	3	4					498
PM Peak	18:00	17:00	15:00	16:00	15:00	17:00		17:00	19:00					17:00
Vol.	10	483	66	2	9	7		2	1					561



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Great Road (Route 2A/119) between
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City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B class
Site Code: 11-012KC

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/25/11	0	17	0	0	1	0	0	0	0	0	0	0	0	18
01:00	0	10	1	0	0	0	0	0	0	0	0	0	0	11
02:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
03:00	0	5	3	0	0	0	0	0	0	0	0	0	0	8
04:00	1	20	3	0	1	0	0	1	0	0	0	0	0	26
05:00	2	136	41	1	7	3	1	1	0	0	0	0	0	192
06:00	9	483	135	3	23	4	2	5	4	0	0	0	0	668
07:00	9	611	128	0	24	6	1	3	1	0	1	0	0	784
08:00	15	657	124	2	18	6	1	3	4	0	0	0	0	830
09:00	7	517	93	2	11	3	1	1	2	1	0	0	0	638
10:00	7	349	75	2	15	3	2	1	2	1	0	0	0	457
11:00	5	350	74	1	11	3	1	3	1	0	0	0	0	449
12 PM	9	397	70	3	10	2	2	3	1	0	0	0	0	497
13:00	5	364	64	1	9	3	2	4	1	0	0	0	0	453
14:00	4	378	64	4	11	2	1	0	5	0	0	0	0	469
15:00	7	394	67	4	7	3	2	0	0	0	0	0	0	484
16:00	7	403	59	1	4	3	0	0	1	0	0	0	0	478
17:00	12	435	56	0	2	2	0	2	1	0	0	0	0	510
18:00	9	400	46	2	2	4	0	2	0	0	0	0	0	465
19:00	11	283	21	1	3	0	0	1	0	0	0	0	0	320
20:00	1	242	15	0	5	0	0	1	0	0	0	0	0	264
21:00	2	169	14	0	2	0	0	0	0	0	0	0	0	187
22:00	0	72	8	0	3	0	0	0	0	0	0	0	0	83
23:00	3	31	0	0	0	0	0	0	0	0	0	0	0	34
Total	125	6727	1162	27	169	47	16	31	23	2	1	0	0	8330
Percent	1.5%	80.8%	13.9%	0.3%	2.0%	0.6%	0.2%	0.4%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	06:00	06:00	07:00	07:00	06:00	06:00	06:00	09:00	07:00			08:00
Vol.	15	657	135	3	24	6	2	5	4	1	1			830
Midday Peak	12:00	12:00	11:00	14:00	11:00	11:00	12:00	13:00	14:00					12:00
Vol.	9	397	74	4	11	3	2	4	5					497
PM Peak	17:00	17:00	15:00	15:00	15:00	18:00	15:00	17:00	16:00					17:00
Vol.	12	435	67	4	7	4	2	2	1					510



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112529 B class
Site Code: 11-012KC

EB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/26/11	0	12	2	0	0	0	0	0	1	0	0	0	0	15
01:00	0	4	0	0	1	0	0	0	0	0	0	0	0	5
02:00	0	7	1	0	1	0	0	0	0	0	0	0	0	9
03:00	1	7	2	0	0	1	0	0	0	0	0	0	0	11
04:00	1	27	6	0	1	0	0	1	0	1	0	0	0	37
05:00	6	130	36	0	7	1	0	1	0	0	0	0	0	181
06:00	11	443	138	3	31	1	1	4	1	2	0	0	0	635
07:00	17	615	123	2	15	3	0	6	3	0	0	0	0	784
08:00	11	659	120	2	23	3	0	2	2	0	0	0	0	822
09:00	8	533	92	3	18	8	1	1	1	0	0	0	0	665
10:00	6	390	72	2	18	5	0	4	3	0	0	0	0	500
11:00	8	343	57	2	12	1	2	3	1	0	0	0	0	429
12 PM	8	373	62	3	12	4	0	2	1	0	0	0	0	465
13:00	8	377	69	0	10	2	1	0	2	1	0	0	0	470
14:00	11	348	70	3	7	3	0	3	3	0	0	0	0	448
15:00	7	454	63	1	9	5	0	0	1	0	0	0	0	540
16:00	8	425	68	2	9	4	0	3	0	0	0	0	0	519
17:00	13	504	44	0	2	2	0	0	0	0	0	0	0	565
18:00	33	429	39	2	3	4	0	0	0	0	0	0	0	510
19:00	9	324	42	1	4	1	0	0	1	0	0	0	0	382
20:00	14	314	29	1	3	2	0	0	0	0	0	0	0	363
21:00	3	207	19	0	0	1	0	0	0	0	0	0	0	230
22:00	1	105	5	0	1	1	0	0	0	0	0	0	0	113
23:00	1	36	6	0	0	0	0	0	0	0	0	0	0	43
Total	185	7066	1165	27	187	52	5	30	20	4	0	0	0	8741
Percent	2.1%	80.8%	13.3%	0.3%	2.1%	0.6%	0.1%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	06:00	06:00	06:00	09:00	06:00	07:00	07:00	06:00				08:00
Vol.	17	659	138	3	31	8	1	6	3	2				822
Midday Peak	14:00	13:00	14:00	12:00	11:00	12:00	11:00	11:00	14:00	13:00				13:00
Vol.	11	377	70	3	12	4	2	3	3	1				470
PM Peak	18:00	17:00	16:00	16:00	15:00	15:00		16:00	15:00					17:00
Vol.	33	504	68	2	9	5		3	1					565



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112529 B class
Site Code: 11-012KC

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/24/11	0	32	6	0	0	0	0	0	0	0	0	0	0	38
01:00	0	12	5	0	0	1	0	0	0	0	0	0	0	18
02:00	0	7	1	0	0	0	0	0	0	0	0	0	0	8
03:00	0	1	1	0	3	0	0	0	0	0	0	0	0	5
04:00	0	7	3	0	0	1	0	0	0	0	0	0	0	11
05:00	1	34	7	0	2	0	0	0	1	0	0	0	0	45
06:00	1	129	19	2	9	2	0	0	0	0	0	0	0	162
07:00	2	280	45	2	9	4	0	2	1	0	0	0	0	345
08:00	1	406	65	2	9	4	0	1	0	0	0	0	0	488
09:00	2	337	88	7	13	4	1	1	1	0	0	0	0	454
10:00	1	313	95	5	7	4	0	1	2	1	0	0	0	429
11:00	8	324	88	1	15	4	0	1	1	0	0	0	0	442
12 PM	3	385	100	4	16	5	0	3	2	0	0	0	0	518
13:00	4	366	97	1	18	1	0	6	4	0	0	0	0	497
14:00	3	392	98	6	23	3	0	7	1	0	0	0	0	533
15:00	2	505	141	1	17	7	0	5	3	0	0	0	0	681
16:00	10	611	164	3	24	2	1	4	0	0	0	0	0	819
17:00	1	742	152	0	10	2	0	0	1	0	0	0	0	908
18:00	3	583	101	0	16	2	0	1	0	0	0	0	0	706
19:00	2	391	68	1	7	1	0	1	1	0	0	0	0	472
20:00	4	267	41	0	3	1	0	0	0	0	0	0	0	316
21:00	1	162	28	0	4	0	0	0	0	0	0	0	0	195
22:00	0	106	21	0	2	0	0	0	0	0	0	0	0	129
23:00	0	56	15	0	1	1	0	0	0	1	0	0	0	74
Total	49	6448	1449	35	208	49	2	33	18	2	0	0	0	8293
Percent	0.6%	77.8%	17.5%	0.4%	2.5%	0.6%	0.0%	0.4%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	09:00	09:00	09:00	07:00	09:00	07:00	05:00					08:00
Vol.	2	406	88	7	13	4	1	2	1					488
Midday Peak	11:00	14:00	12:00	14:00	14:00	12:00		14:00	13:00					14:00
Vol.	8	392	100	6	23	5		7	4					533
PM Peak	16:00	17:00	16:00	16:00	16:00	15:00	16:00	15:00	15:00	23:00				17:00
Vol.	10	742	164	3	24	7	1	5	3	1				908



PRECISION
D A T A
INDUSTRIES, LLC

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Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B class
Site Code: 11-012KC

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/25/11	0	24	2	0	0	0	0	0	0	0	0	0	0	26
01:00	0	6	3	0	1	0	0	0	0	0	0	0	0	10
02:00	0	5	1	0	1	0	0	0	0	0	0	0	0	7
03:00	0	1	0	0	1	0	0	0	0	0	0	0	0	2
04:00	0	12	1	0	1	0	0	0	0	0	0	0	0	14
05:00	3	27	8	0	0	1	0	0	0	0	0	0	0	39
06:00	0	128	24	2	4	0	0	0	1	0	0	0	0	159
07:00	2	284	41	2	11	2	0	2	4	0	0	0	0	348
08:00	8	401	73	4	7	5	0	2	2	0	0	0	0	502
09:00	6	320	91	6	17	4	2	1	2	0	0	0	0	449
10:00	2	299	67	2	18	5	2	2	2	0	0	0	0	399
11:00	7	350	98	0	14	1	3	1	0	0	0	0	0	474
12 PM	8	435	87	5	10	7	0	2	1	0	0	0	1	556
13:00	9	413	94	5	20	4	0	2	2	0	0	0	0	549
14:00	5	356	84	3	9	2	1	1	2	0	0	0	0	463
15:00	12	502	119	2	18	4	1	0	0	0	0	0	0	658
16:00	10	624	130	2	19	3	4	6	1	1	0	0	0	800
17:00	13	757	147	2	10	3	0	1	1	0	0	0	0	934
18:00	10	544	110	1	10	0	0	1	1	0	0	0	0	677
19:00	7	396	59	2	6	0	0	1	0	0	0	0	0	471
20:00	4	257	46	2	3	2	0	1	0	0	0	0	0	315
21:00	2	181	27	0	4	1	0	1	0	0	0	0	0	216
22:00	2	104	24	0	1	0	0	0	1	0	0	0	0	132
23:00	4	81	16	0	1	0	0	0	0	0	0	0	0	102
Total	114	6507	1352	40	186	44	13	24	20	1	0	0	1	8302
Percent	1.4%	78.4%	16.3%	0.5%	2.2%	0.5%	0.2%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00	09:00	09:00	09:00	08:00	09:00	07:00	07:00					08:00
Vol.	8	401	91	6	17	5	2	2	4					502
Midday Peak	13:00	12:00	11:00	12:00	13:00	12:00	11:00	12:00	13:00				12:00	12:00
Vol.	9	435	98	5	20	7	3	2	2				1	556
PM Peak	17:00	17:00	17:00	15:00	16:00	15:00	16:00	16:00	16:00	16:00				17:00
Vol.	13	757	147	2	19	4	4	6	1	1				934



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112529 B class
Site Code: 11-012KC

WB

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
5/26/11	2	34	6	0	0	0	0	0	0	0	0	0	0	42
01:00	0	17	3	0	1	0	0	0	0	0	0	0	0	21
02:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
03:00	0	5	2	0	2	0	0	0	1	0	0	0	0	10
04:00	1	9	2	0	1	0	0	0	0	0	0	0	0	13
05:00	0	33	9	0	1	2	0	0	0	0	0	0	0	45
06:00	0	111	22	1	7	0	0	0	2	0	0	0	0	143
07:00	4	279	54	4	10	0	1	1	4	0	0	0	0	357
08:00	4	385	75	5	9	2	0	2	0	0	0	0	0	482
09:00	4	333	59	3	13	2	2	1	0	0	0	0	0	417
10:00	4	271	56	2	17	6	1	0	1	0	0	0	0	358
11:00	4	328	89	6	10	4	1	3	3	0	0	0	0	448
12 PM	13	385	98	4	17	2	0	2	2	0	0	0	0	523
13:00	5	389	98	2	13	6	1	2	1	0	0	0	0	517
14:00	7	410	120	5	18	3	1	3	3	0	0	0	0	570
15:00	8	572	127	3	29	1	0	4	4	1	0	0	0	749
16:00	8	697	149	4	18	4	0	3	2	0	0	1	0	886
17:00	12	791	132	2	15	2	0	3	0	1	0	0	0	958
18:00	26	613	107	3	10	4	0	2	0	0	0	0	0	765
19:00	29	423	76	1	8	1	0	4	0	0	0	0	0	542
20:00	16	306	40	0	5	1	0	0	0	0	0	0	0	368
21:00	5	191	27	1	3	0	0	0	0	0	0	0	0	227
22:00	3	135	21	0	0	0	0	0	0	0	0	0	0	159
23:00	1	82	23	0	2	0	0	0	0	1	0	0	0	109
Total	156	6807	1396	46	209	40	7	30	23	3	0	1	0	8718
Percent	1.8%	78.1%	16.0%	0.5%	2.4%	0.5%	0.1%	0.3%	0.3%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	08:00	08:00	09:00	05:00	09:00	08:00	07:00					08:00
Vol.	4	385	75	5	13	2	2	2	4					482
Midday Peak	12:00	14:00	14:00	11:00	14:00	13:00	11:00	11:00	11:00					14:00
Vol.	13	410	120	6	18	6	1	3	3					570
PM Peak	19:00	17:00	16:00	16:00	15:00	16:00		15:00	15:00	15:00		16:00		17:00
Vol.	29	791	149	4	29	4		4	4	1		1		958



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112529 B speed
Site Code: 11-012KC

EB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
5/24/11	0	1	1	0	0	4	7	2	0	0	0	0	0	15	44	38
01:00	1	1	0	0	0	1	2	2	0	0	0	0	0	7	45	35
02:00	0	0	0	0	2	0	2	2	0	0	0	0	0	6	45	40
03:00	0	0	1	0	1	0	1	4	1	0	0	0	0	8	48	41
04:00	0	0	0	1	1	7	16	13	3	0	0	0	0	41	48	43
05:00	0	1	4	11	12	21	69	53	8	1	0	0	0	180	48	41
06:00	3	13	39	50	79	157	189	107	12	0	0	0	0	649	45	38
07:00	5	12	28	45	165	309	200	16	3	0	0	0	0	783	42	36
08:00	12	11	56	77	188	305	162	17	0	0	0	0	0	828	41	34
09:00	2	8	19	49	129	233	150	8	1	0	0	0	0	599	42	36
10:00	0	3	17	24	77	183	94	24	0	0	0	0	0	422	42	36
11:00	0	5	10	24	88	171	99	13	2	0	0	0	0	412	42	36
12 PM	1	15	23	34	107	186	104	27	1	0	0	0	0	498	42	36
13:00	1	3	22	27	94	181	117	20	1	0	0	0	0	466	42	36
14:00	2	7	20	34	83	168	111	26	1	0	0	0	0	452	43	36
15:00	1	16	30	38	95	170	97	28	1	0	0	0	0	476	42	35
16:00	1	13	30	30	87	163	106	24	2	0	0	0	0	456	42	36
17:00	0	7	47	59	154	190	89	14	1	0	0	0	0	561	41	34
18:00	0	4	22	20	124	194	95	10	1	0	0	0	0	470	41	36
19:00	2	6	12	19	60	132	79	14	0	1	0	0	0	325	42	36
20:00	0	9	12	11	47	91	71	14	2	0	0	0	0	257	43	36
21:00	0	3	6	9	13	48	67	12	0	0	0	0	0	158	44	38
22:00	0	1	4	2	7	23	18	14	3	0	0	0	0	72	46	39
23:00	0	0	1	1	1	7	4	7	2	1	0	0	0	24	48	41
Total	31	139	404	565	1614	2944	1949	471	45	3	0	0	0	8165		
%	0.4%	1.7%	4.9%	6.9%	19.8%	36.1%	23.9%	5.8%	0.6%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	06:00	08:00	08:00	08:00	07:00	07:00	06:00	06:00	05:00				08:00		
Vol.	12	13	56	77	188	309	200	107	12	1				828		
Midday Peak	14:00	12:00	12:00	12:00	12:00	12:00	13:00	12:00	11:00					12:00		
Vol.	2	15	23	34	107	186	117	27	2					498		
PM Peak	19:00	15:00	17:00	17:00	17:00	18:00	16:00	15:00	22:00	19:00				17:00		
Vol.	2	16	47	59	154	194	106	28	3	1				561		
% ile			15th Percentile :			30 MPH										
			50th Percentile :			37 MPH										
			85th Percentile :			43 MPH										
			95th Percentile :			46 MPH										

Stats

10 MPH Pace Speed : 35-44 MPH

Number in Pace : 4893

Percent in Pace : 59.9%

Number of Vehicles > 40 MPH : 2078

Percent of Vehicles > 40 MPH : 25.5%

Mean Speed(Average) : 36 MPH



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112529 B speed
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EB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
5/25/11	0	0	1	0	0	9	6	1	1	0	0	0	0	18	43	39
01:00	0	1	1	0	0	3	4	2	0	0	0	0	0	11	43	37
02:00	0	0	0	0	0	1	1	2	1	0	0	0	0	5	46	45
03:00	0	0	0	0	1	0	3	2	1	1	0	0	0	8	54	44
04:00	0	0	1	0	0	4	5	13	3	0	0	0	0	26	49	44
05:00	0	0	1	2	2	20	66	85	14	1	1	0	0	192	49	44
06:00	5	1	15	28	49	135	256	159	18	2	0	0	0	668	47	40
07:00	15	12	48	58	140	272	198	38	3	0	0	0	0	784	43	35
08:00	4	25	77	77	169	317	148	13	0	0	0	0	0	830	41	34
09:00	1	5	28	30	154	234	158	27	1	0	0	0	0	638	42	36
10:00	1	6	29	63	151	166	33	8	0	0	0	0	0	457	39	33
11:00	1	7	25	68	147	162	35	4	0	0	0	0	0	449	39	33
12 PM	7	12	34	81	180	146	35	2	0	0	0	0	0	497	38	32
13:00	5	34	42	101	168	91	11	1	0	0	0	0	0	453	36	30
14:00	0	6	35	43	109	177	85	12	2	0	0	0	0	469	41	35
15:00	2	10	27	35	125	200	79	6	0	0	0	0	0	484	40	35
16:00	1	8	22	31	118	194	86	17	1	0	0	0	0	478	41	35
17:00	6	5	28	39	129	206	80	16	1	0	0	0	0	510	41	35
18:00	2	12	31	27	126	159	94	13	1	0	0	0	0	465	41	35
19:00	0	1	7	4	50	138	98	21	1	0	0	0	0	320	43	38
20:00	0	3	6	6	44	127	58	20	0	0	0	0	0	264	43	37
21:00	0	1	10	11	32	65	57	11	0	0	0	0	0	187	43	37
22:00	0	3	2	0	6	21	35	11	5	0	0	0	0	83	46	40
23:00	0	1	1	0	2	6	14	9	1	0	0	0	0	34	47	41
Total	50	153	471	704	1902	2853	1645	493	54	4	1	0	0	8330		
%	0.6%	1.8%	5.7%	8.5%	22.8%	34.2%	19.7%	5.9%	0.6%	0.0%	0.0%	0.0%	0.0%			
AM Peak	07:00	08:00	08:00	08:00	08:00	08:00	06:00	06:00	06:00	06:00	05:00			08:00		
Vol.	15	25	77	77	169	317	256	159	18	2	1			830		
Midday Peak	12:00	13:00	13:00	13:00	12:00	14:00	14:00	14:00	14:00					12:00		
Vol.	7	34	42	101	180	177	85	12	2					497		
PM Peak	17:00	18:00	18:00	17:00	17:00	17:00	19:00	19:00	22:00					17:00		
Vol.	6	12	31	39	129	206	98	21	5					510		
% ile			15th Percentile :			29 MPH										
			50th Percentile :			36 MPH										
			85th Percentile :			42 MPH										
			95th Percentile :			46 MPH										

Stats

10 MPH Pace Speed :	30-39 MPH
Number in Pace :	4755
Percent in Pace :	57.1%
Number of Vehicles > 40 MPH :	1868
Percent of Vehicles > 40 MPH :	22.4%
Mean Speed(Average) :	35 MPH



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EB

Start Time	14	15	20	25	30	35	40	45	50	55	60	65	70	Total	85th % ile	Ave Speed
5/26/11	2	0	1	0	0	2	7	2	1	0	0	0	0	15	45	35
01:00	0	0	0	0	0	1	3	0	1	0	0	0	0	5	42	42
02:00	0	0	0	0	1	1	2	3	2	0	0	0	0	9	50	44
03:00	0	0	2	0	0	1	1	3	3	1	0	0	0	11	51	43
04:00	0	0	1	0	0	4	13	13	6	0	0	0	0	37	49	44
05:00	0	2	3	3	4	17	62	71	17	2	0	0	0	181	49	44
06:00	4	5	24	35	60	142	233	118	12	2	0	0	0	635	46	39
07:00	4	12	42	61	116	265	213	67	3	1	0	0	0	784	43	37
08:00	3	14	45	65	199	328	145	22	1	0	0	0	0	822	41	35
09:00	2	7	30	58	140	255	149	24	0	0	0	0	0	665	42	36
10:00	3	9	21	45	97	170	122	29	4	0	0	0	0	500	43	36
11:00	0	0	19	32	78	167	109	23	1	0	0	0	0	429	43	37
12 PM	0	1	17	17	89	197	127	11	5	1	0	0	0	465	42	37
13:00	0	7	23	26	86	189	117	21	1	0	0	0	0	470	42	36
14:00	1	5	22	33	74	162	129	22	0	0	0	0	0	448	43	36
15:00	0	5	27	35	104	223	132	14	0	0	0	0	0	540	42	36
16:00	2	8	38	42	113	199	102	14	1	0	0	0	0	519	41	35
17:00	0	8	28	34	141	234	103	15	2	0	0	0	0	565	41	35
18:00	4	6	19	39	114	209	104	15	0	0	0	0	0	510	41	35
19:00	1	4	14	19	71	155	98	17	3	0	0	0	0	382	43	37
20:00	0	4	9	20	66	151	91	20	2	0	0	0	0	363	43	37
21:00	1	3	7	18	52	76	56	13	3	1	0	0	0	230	43	36
22:00	0	2	1	4	11	40	41	11	3	0	0	0	0	113	44	39
23:00	0	0	1	1	3	8	18	10	2	0	0	0	0	43	47	41
Total	27	102	394	587	1619	3196	2177	558	73	8	0	0	0	8741		
%	0.3%	1.2%	4.5%	6.7%	18.5%	36.6%	24.9%	6.4%	0.8%	0.1%	0.0%	0.0%	0.0%			
AM Peak	06:00	08:00	08:00	08:00	08:00	08:00	06:00	06:00	05:00	05:00				08:00		
Vol.	4	14	45	65	199	328	233	118	17	2				822		
Midday Peak	14:00	13:00	13:00	14:00	12:00	12:00	14:00	11:00	12:00	12:00				13:00		
Vol.	1	7	23	33	89	197	129	23	5	1				470		
PM Peak	18:00	16:00	16:00	16:00	17:00	17:00	15:00	20:00	19:00	21:00				17:00		
Vol.	4	8	38	42	141	234	132	20	3	1				565		
% ile			15th Percentile :			30 MPH										
			50th Percentile :			37 MPH										
			85th Percentile :			43 MPH										
			95th Percentile :			46 MPH										

Stats

10 MPH Pace Speed :	35-44 MPH
Number in Pace :	5373
Percent in Pace :	61.5%
Number of Vehicles > 40 MPH :	2380
Percent of Vehicles > 40 MPH :	27.2%
Mean Speed(Average) :	36 MPH



PRECISION
D A T A
INDUSTRIES, LLC

P.O.Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B speed
Site Code: 11-012KC

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
5/24/11	0	0	0	2	3	5	21	6	1	0	0	0	0	38	45	41
01:00	0	0	0	0	0	6	7	5	0	0	0	0	0	18	46	42
02:00	0	0	0	0	1	2	2	3	0	0	0	0	0	8	46	42
03:00	0	0	0	1	0	1	2	1	0	0	0	0	0	5	41	38
04:00	0	0	1	0	1	1	2	4	2	0	0	0	0	11	48	42
05:00	0	5	0	0	3	7	16	11	2	1	0	0	0	45	47	40
06:00	0	3	5	7	26	45	42	27	7	0	0	0	0	162	46	39
07:00	0	1	8	17	67	143	78	31	0	0	0	0	0	345	43	37
08:00	0	3	21	28	120	178	104	32	1	0	1	0	0	488	43	36
09:00	0	9	24	29	116	145	108	22	1	0	0	0	0	454	42	36
10:00	2	7	23	25	85	159	106	19	2	0	1	0	0	429	42	36
11:00	0	8	12	31	114	181	76	18	1	1	0	0	0	442	41	36
12 PM	0	5	13	24	126	230	96	21	3	0	0	0	0	518	42	36
13:00	0	8	10	41	127	210	81	19	0	0	1	0	0	497	41	36
14:00	0	4	18	42	145	202	88	32	2	0	0	0	0	533	42	36
15:00	1	7	18	29	192	281	120	32	1	0	0	0	0	681	42	36
16:00	0	9	18	57	285	339	98	13	0	0	0	0	0	819	39	35
17:00	5	11	16	89	316	359	103	9	0	0	0	0	0	908	39	34
18:00	0	2	14	38	217	277	132	24	2	0	0	0	0	706	41	36
19:00	0	2	15	25	136	188	84	21	1	0	0	0	0	472	42	36
20:00	1	2	3	15	56	129	84	25	1	0	0	0	0	316	43	37
21:00	0	2	1	3	20	66	71	29	3	0	0	0	0	195	45	40
22:00	0	1	1	3	10	43	56	13	1	0	1	0	0	129	44	40
23:00	0	0	2	0	8	10	24	26	3	1	0	0	0	74	48	42
Total	9	89	223	506	2174	3207	1601	443	34	3	4	0	0	8293		
%	0.1%	1.1%	2.7%	6.1%	26.2%	38.7%	19.3%	5.3%	0.4%	0.0%	0.0%	0.0%	0.0%			
AM Peak		09:00	09:00	09:00	08:00	08:00	09:00	08:00	06:00	05:00	08:00			08:00		
Vol.		9	24	29	120	178	108	32	7	1	1			488		
Midday Peak		11:00	14:00	14:00	14:00	12:00	12:00	14:00	12:00	11:00	13:00			14:00		
Vol.		8	18	42	145	230	96	32	3	1	1			533		
PM Peak	17:00	17:00	15:00	17:00	17:00	17:00	18:00	15:00	21:00	23:00	22:00			17:00		
Vol.	5	11	18	89	316	359	132	32	3	1	1			908		
% ile				15th Percentile :		30 MPH										
				50th Percentile :		36 MPH										
				85th Percentile :		42 MPH										
				95th Percentile :		45 MPH										

Stats

10 MPH Pace Speed : 30-39 MPH

Number in Pace : 5381

Percent in Pace : 64.9%

Number of Vehicles > 40 MPH : 1764

Percent of Vehicles > 40 MPH : 21.3%

Mean Speed(Average) : 36 MPH



PRECISION
D A T A
INDUSTRIES, LLC

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Email: datarequests@pdillc.com

Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B speed
Site Code: 11-012KC

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
5/25/11	0	0	1	0	2	7	10	6	0	0	0	0	0	26	45	40
01:00	0	0	2	0	0	0	4	4	0	0	0	0	0	10	46	40
02:00	0	0	1	0	2	1	2	1	0	0	0	0	0	7	41	35
03:00	0	0	0	0	0	0	1	1	0	0	0	0	0	2	45	44
04:00	0	1	0	0	2	1	3	4	3	0	0	0	0	14	50	42
05:00	0	1	1	1	1	9	7	8	10	1	0	0	0	39	52	43
06:00	0	1	6	0	12	30	64	35	9	1	1	0	0	159	48	41
07:00	0	2	13	16	64	105	91	50	7	0	0	0	0	348	45	38
08:00	0	7	38	42	121	171	98	23	1	1	0	0	0	502	42	35
09:00	0	5	14	38	119	159	91	20	3	0	0	0	0	449	42	36
10:00	3	7	31	73	118	106	50	11	0	0	0	0	0	399	40	33
11:00	0	5	22	33	162	165	78	8	1	0	0	0	0	474	40	35
12 PM	4	15	31	86	192	160	51	17	0	0	0	0	0	556	39	33
13:00	4	7	51	159	230	86	12	0	0	0	0	0	0	549	35	30
14:00	0	4	15	13	124	190	93	21	3	0	0	0	0	463	42	36
15:00	4	7	15	52	162	256	138	22	1	1	0	0	0	658	42	36
16:00	1	5	17	67	240	311	132	24	2	1	0	0	0	800	41	35
17:00	3	7	27	44	295	440	107	10	1	0	0	0	0	934	39	35
18:00	0	0	14	25	201	271	136	29	1	0	0	0	0	677	42	36
19:00	0	1	5	9	87	205	110	43	9	1	1	0	0	471	44	38
20:00	0	1	7	7	67	111	88	30	4	0	0	0	0	315	44	38
21:00	0	2	2	6	45	78	62	18	3	0	0	0	0	216	44	38
22:00	0	0	0	2	15	31	52	29	2	1	0	0	0	132	46	41
23:00	0	1	0	3	14	22	31	25	4	2	0	0	0	102	48	41
Total	19	79	313	676	2275	2915	1511	439	64	9	2	0	0	8302		
%	0.2%	1.0%	3.8%	8.1%	27.4%	35.1%	18.2%	5.3%	0.8%	0.1%	0.0%	0.0%	0.0%			
AM Peak Vol.		08:00	08:00	08:00	08:00	08:00	08:00	07:00	05:00	05:00	06:00			08:00		
		7	38	42	121	171	98	50	10	1	1			502		
Midday Peak Vol.	12:00	12:00	13:00	13:00	13:00	14:00	14:00	14:00	14:00					12:00		
	4	15	51	159	230	190	93	21	3					556		
PM Peak Vol.	15:00	15:00	17:00	16:00	17:00	17:00	15:00	19:00	19:00	23:00	19:00			17:00		
	4	7	27	67	295	440	138	43	9	2	1			934		
% ile			15th Percentile :			30 MPH										
			50th Percentile :			36 MPH										
			85th Percentile :			42 MPH										
			95th Percentile :			46 MPH										

Stats

10 MPH Pace Speed : 30-39 MPH

Number in Pace : 5190

Percent in Pace : 62.5%

Number of Vehicles > 40 MPH : 1722

Percent of Vehicles > 40 MPH : 20.7%

Mean Speed(Average) : 36 MPH



PRECISION
D A T A
INDUSTRIES, LLC

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Office: 508.481.3999 Fax: 508.545.1234
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Great Road (Route 2A/119) between
Nashoba Road and Mannion Place
City, State: Acton, MA
Client: LandStrategies/ K. Cram

112529 B speed
Site Code: 11-012KC

WB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
5/26/11	1	1	0	0	8	2	10	14	3	1	1	1	0	42	49	42
01:00	0	0	0	1	0	2	9	7	2	0	0	0	0	21	48	43
02:00	0	0	0	0	0	2	3	1	3	0	0	0	0	9	51	45
03:00	0	0	0	1	1	0	4	2	1	1	0	0	0	10	46	42
04:00	0	0	0	0	2	1	4	4	2	0	0	0	0	13	48	43
05:00	0	1	2	0	3	4	15	11	9	0	0	0	0	45	50	43
06:00	0	0	4	2	14	30	50	28	11	4	0	0	0	143	48	41
07:00	0	3	13	28	72	103	97	36	5	0	0	0	0	357	44	37
08:00	0	2	23	41	97	161	117	40	1	0	0	0	0	482	43	36
09:00	0	2	6	27	91	163	94	32	2	0	0	0	0	417	43	37
10:00	0	3	19	13	71	143	77	28	4	0	0	0	0	358	43	37
11:00	0	1	16	9	97	185	110	26	4	0	0	0	0	448	43	37
12 PM	0	4	9	14	124	214	124	29	4	1	0	0	0	523	43	37
13:00	1	1	17	35	135	194	101	29	4	0	0	0	0	517	42	36
14:00	0	7	5	24	121	248	140	24	1	0	0	0	0	570	42	37
15:00	0	2	20	44	195	307	145	34	2	0	0	0	0	749	42	36
16:00	3	18	51	80	294	329	92	17	2	0	0	0	0	886	39	34
17:00	1	3	9	35	326	470	102	12	0	0	0	0	0	958	39	35
18:00	0	4	16	18	203	364	123	31	6	0	0	0	0	765	41	36
19:00	0	2	3	17	121	233	125	36	4	0	1	0	0	542	43	37
20:00	1	0	4	6	59	153	113	28	4	0	0	0	0	368	43	38
21:00	0	3	4	15	44	73	68	18	1	1	0	0	0	227	43	37
22:00	0	2	1	4	18	51	58	24	1	0	0	0	0	159	45	39
23:00	0	0	0	0	15	29	40	24	1	0	0	0	0	109	46	40
Total	7	59	222	414	2111	3461	1821	535	77	8	2	1	0	8718		
%	0.1%	0.7%	2.5%	4.7%	24.2%	39.7%	20.9%	6.1%	0.9%	0.1%	0.0%	0.0%	0.0%			
AM Peak	00:00	07:00	08:00	08:00	08:00	09:00	08:00	08:00	06:00	06:00	00:00	00:00		08:00		
Vol.	1	3	23	41	97	163	117	40	11	4	1	1		482		
Midday Peak	13:00	14:00	13:00	13:00	13:00	14:00	14:00	12:00	11:00	12:00				14:00		
Vol.	1	7	17	35	135	248	140	29	4	1				570		
PM Peak	16:00	16:00	16:00	16:00	17:00	17:00	15:00	19:00	18:00	21:00	19:00			17:00		
Vol.	3	18	51	80	326	470	145	36	6	1	1			958		
% ile			15th Percentile :		31 MPH											
			50th Percentile :		37 MPH											
			85th Percentile :		43 MPH											
			95th Percentile :		46 MPH											

Stats

10 MPH Pace Speed : 30-39 MPH

Number in Pace : 5572

Percent in Pace : 63.9%

Number of Vehicles > 40 MPH : 2079

Percent of Vehicles > 40 MPH : 23.8%

Mean Speed(Average) : 37 MPH



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Grist Mill Road approx. 2400'
north of Great Road (East)
City, State: Littleton, MA
Client: LandStratgies/ K. Cram

112529 C volume
Site Code: 11-012KC

Start	NB		SB		Combined		24-May-11 Tue
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	0	0	0	1	0	1	
12:15	0	1	0	2	0	3	
12:30	0	3	0	1	0	4	
12:45	1	1	0	0	1	1	9
01:00	0	0	0	0	0	0	
01:15	0	1	0	0	0	1	
01:30	0	1	0	1	0	2	
01:45	0	1	0	0	0	1	4
02:00	0	2	0	0	0	2	
02:15	0	4	0	1	0	5	
02:30	0	0	0	1	0	1	
02:45	0	2	0	0	0	2	10
03:00	0	2	0	3	0	5	
03:15	0	1	0	0	0	1	
03:30	0	2	0	2	0	4	
03:45	0	1	0	0	0	1	11
04:00	0	2	0	0	0	2	
04:15	0	0	0	3	0	3	
04:30	0	2	0	4	0	6	
04:45	1	1	0	0	1	1	12
05:00	0	1	0	1	0	2	
05:15	0	2	1	2	1	4	
05:30	0	2	0	2	0	4	
05:45	0	1	0	3	0	4	14
06:00	0	2	0	1	0	3	
06:15	1	0	0	1	1	1	
06:30	1	2	2	1	3	3	
06:45	1	1	0	0	1	1	8
07:00	1	2	1	2	2	4	
07:15	1	0	3	0	4	0	
07:30	1	2	2	1	3	3	
07:45	2	1	0	1	2	2	9
08:00	0	0	1	0	1	0	
08:15	4	3	2	1	6	4	
08:30	2	0	1	0	3	0	
08:45	1	0	0	0	1	0	4
09:00	1	0	1	0	2	0	
09:15	2	0	1	0	3	0	
09:30	0	0	1	0	1	0	
09:45	2	0	1	0	3	0	0
10:00	0	0	0	0	0	0	
10:15	1	0	0	0	1	0	
10:30	2	0	0	0	2	0	
10:45	1	0	1	0	2	0	0
11:00	0	1	1	0	1	1	
11:15	2	0	0	0	2	0	
11:30	0	0	0	0	0	0	
11:45	0	0	1	0	1	0	1
Total	28	47	20	35	48	82	
Percent	58.3%	57.3%	41.7%	42.7%			
Day Total	75		55		130		
Peak	07:45	01:30	06:30	04:15	07:30	05:15	
Vol.	8	8	6	8	12	15	
P.H.F.	0.500	0.500	0.500	0.500	0.500	0.938	

Grist Mill Road approx. 2400'
north of Great Road (East)
City, State: Littleton, MA
Client: LandStratgies/ K. Cram



PRECISION
D A T A
INDUSTRIES, LLC

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Office: 508.481.3999 Fax: 508.545.1234
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112529 C volume
Site Code: 11-012KC

Start	NB			SB			Combined			25-May-11 Wed
Time	A.M.	P.M.		A.M.	P.M.		A.M.	P.M.		
12:00	0	1		0	2		0	3		
12:15	0	0		0	1		0	1		
12:30	0	0		0	2		0	2		
12:45	0	1	2	0	1	6	0	2	8	
01:00	1	0		0	2		1	2		
01:15	0	1		0	0		0	1		
01:30	0	0		0	2		0	2		
01:45	0	1	1	0	1	5	0	1	6	
02:00	0	2		0	1		0	3		
02:15	0	1		0	3		0	4		
02:30	0	0		0	1		0	1		
02:45	0	4	7	0	4	9	0	8	16	
03:00	0	0		0	1		0	1		
03:15	0	3		0	0		0	3		
03:30	0	1		0	0		0	1		
03:45	0	0	4	1	0	1	1	0	5	
04:00	0	0		0	3		0	3		
04:15	0	2		0	0		0	2		
04:30	0	1		0	2		0	3		
04:45	0	0	3	0	1	6	0	1	9	
05:00	0	3		0	0		0	3		
05:15	0	3		0	1		0	4		
05:30	0	0		0	1		0	1		
05:45	0	1	7	0	1	3	0	2	10	
06:00	0	3		0	1		0	4		
06:15	1	1		0	1		1	2		
06:30	0	1		2	0		2	1		
06:45	0	1	6	2	1	3	2	2	9	
07:00	1	1		3	0		4	1		
07:15	1	3		2	1		3	4		
07:30	2	2		0	0		2	2		
07:45	1	2	8	0	1	2	1	3	10	
08:00	0	0		2	1		2	1		
08:15	1	0		0	0		1	0		
08:30	0	0		2	0		2	0		
08:45	0	1	0	0	1	2	0	1	2	
09:00	1	0		0	0		1	0		
09:15	0	0		0	0		0	0		
09:30	2	0		1	0		3	0		
09:45	1	0	0	0	0	0	1	0	0	
10:00	0	0		0	0		0	0		
10:15	0	0		2	0		2	0		
10:30	0	0		2	0		2	0		
10:45	0	0	0	0	0	0	0	0	0	
11:00	0	1		0	0		0	1		
11:15	0	0		0	0		0	0		
11:30	0	0		0	0		0	0		
11:45	0	0	1	1	0	0	1	0	1	
Total	12	39		20	37		32	76		
Percent	37.5%	51.3%		62.5%	48.7%					
Day Total	51			57			108			
Peak	07:00	02:45		06:30	02:00		06:30	02:00		
Vol.	5	8		9	9		11	16		
P.H.F.	0.625	0.500		0.750	0.563		0.688	0.500		

Grist Mill Road approx. 2400'
north of Great Road (East)
City, State: Littleton, MA
Client: LandStratgies/ K. Cram



PRECISION
D A T A
INDUSTRIES, LLC

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Office: 508.481.3999 Fax: 508.545.1234
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112529 C volume
Site Code: 11-012KC

Start	NB			SB			Combined			26-May-11 Thu
Time	A.M.	P.M.		A.M.	P.M.		A.M.	P.M.		
12:00	0	1		0	1		0	2		
12:15	0	0		0	1		0	1		
12:30	0	0		0	0		0	0		
12:45	0	0	2	0	0	2	0	0	4	
01:00	0	1		0	0		0	1		
01:15	1	0		0	1		1	1		
01:30	0	1		0	0		0	1		
01:45	0	0	2	0	0	1	0	0	3	
02:00	0	2		0	3		0	5		
02:15	0	1		0	0		0	1		
02:30	0	1		0	0		0	1		
02:45	0	0	4	0	1	4	0	1	8	
03:00	0	2		0	2		0	4		
03:15	0	0		0	0		0	0		
03:30	0	2		0	0		0	2		
03:45	0	1	5	0	0	2	0	1	7	
04:00	0	0		0	2		0	2		
04:15	0	2		1	2		1	4		
04:30	0	0		0	0		0	0		
04:45	0	2	4	0	2	6	0	4	10	
05:00	0	1		0	1		0	2		
05:15	0	0		0	1		0	1		
05:30	0	0		0	1		0	1		
05:45	0	1	2	0	1	4	0	2	6	
06:00	0	1		0	1		0	2		
06:15	1	0		1	0		2	0		
06:30	0	2		1	0		1	2		
06:45	0	2	5	0	2	3	0	4	8	
07:00	0	0		0	2		0	2		
07:15	1	0		2	0		3	0		
07:30	1	0		1	1		2	1		
07:45	1	0	0	1	1	4	2	1	4	
08:00	1	1		0	2		1	3		
08:15	2	1		2	1		4	2		
08:30	1	0		0	2		1	2		
08:45	2	2	4	1	2	7	3	4	11	
09:00	3	0		1	1		4	1		
09:15	1	1		1	1		2	2		
09:30	0	0		0	0		0	0		
09:45	0	0	1	0	0	2	0	0	3	
10:00	1	0		1	1		2	1		
10:15	0	0		0	0		0	0		
10:30	1	1		0	1		1	2		
10:45	0	1	2	1	0	2	1	1	4	
11:00	0	0		0	0		0	0		
11:15	0	0		3	0		3	0		
11:30	1	1		0	0		1	1		
11:45	0	0	1	1	1	1	1	1	2	
Total	18	32		18	38		36	70		
Percent	50.0%	45.7%		50.0%	54.3%					
Day Total	50			56			106			
Peak	08:15	03:00		07:00	08:00		08:15	08:00		
Vol.	8	5		4	7		12	11		
P.H.F.	0.667	0.625		0.500	0.875		0.750	0.688		



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S: Nashoba Road
E/W: Great Road (Route 2A/119)
City, State: Acton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 B
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Great Road (Route 2A/119) From East		Nashoba Road From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
07:00 AM	73	9	9	3	2	182	278
07:15 AM	66	1	17	3	2	213	302
07:30 AM	102	8	23	2	4	206	345
07:45 AM	112	9	16	2	5	193	337
Total	353	27	65	10	13	794	1262
08:00 AM	130	7	24	6	4	210	381
08:15 AM	117	8	11	8	8	189	341
08:30 AM	124	13	25	3	8	206	379
08:45 AM	126	16	33	6	6	223	410
Total	497	44	93	23	26	828	1511
Grand Total	850	71	158	33	39	1622	2773
Apprch %	92.3	7.7	82.7	17.3	2.3	97.7	
Total %	30.7	2.6	5.7	1.2	1.4	58.5	
Cars	807	66	154	32	35	1547	2641
% Cars	94.9	93	97.5	97	89.7	95.4	95.2
Heavy Vehicles	43	5	4	1	4	75	132
% Heavy Vehicles	5.1	7	2.5	3	10.3	4.6	4.8

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	130	7	137	24	6	30	4	210	214	381
08:15 AM	117	8	125	11	8	19	8	189	197	341
08:30 AM	124	13	137	25	3	28	8	206	214	379
08:45 AM	126	16	142	33	6	39	6	223	229	410
Total Volume	497	44	541	93	23	116	26	828	854	1511
% App. Total	91.9	8.1		80.2	19.8		3	97		
PHF	.956	.688	.952	.705	.719	.744	.813	.928	.932	.921
Cars	473	39	512	90	22	112	24	790	814	1438
% Cars	95.2	88.6	94.6	96.8	95.7	96.6	92.3	95.4	95.3	95.2
Heavy Vehicles	24	5	29	3	1	4	2	38	40	73
% Heavy Vehicles	4.8	11.4	5.4	3.2	4.3	3.4	7.7	4.6	4.7	4.8



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S: Nashoba Road
E/W: Great Road (Route 2A/119)
City, State: Acton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 B
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

	Great Road (Route 2A/119) From East		Nashoba Road From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
07:00 AM	68	9	9	3	2	169	260
07:15 AM	60	1	16	3	1	203	284
07:30 AM	98	8	23	2	3	200	334
07:45 AM	108	9	16	2	5	185	325
Total	334	27	64	10	11	757	1203
08:00 AM	124	7	24	5	4	203	367
08:15 AM	113	7	10	8	8	181	327
08:30 AM	116	12	23	3	6	193	353
08:45 AM	120	13	33	6	6	213	391
Total	473	39	90	22	24	790	1438
Grand Total	807	66	154	32	35	1547	2641
Apprch %	92.4	7.6	82.8	17.2	2.2	97.8	
Total %	30.6	2.5	5.8	1.2	1.3	58.6	

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	124	7	131	24	5	29	4	203	207	367
08:15 AM	113	7	120	10	8	18	8	181	189	327
08:30 AM	116	12	128	23	3	26	6	193	199	353
08:45 AM	120	13	133	33	6	39	6	213	219	391
Total Volume	473	39	512	90	22	112	24	790	814	1438
% App. Total	92.4	7.6		80.4	19.6		2.9	97.1		
PHF	.954	.750	.962	.682	.688	.718	.750	.927	.929	.919



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File Name : 112529 B
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Great Road (Route 2A/119) From East		Nashoba Road From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
07:00 AM	5	0	0	0	0	13	18
07:15 AM	6	0	1	0	1	10	18
07:30 AM	4	0	0	0	1	6	11
07:45 AM	4	0	0	0	0	8	12
Total	19	0	1	0	2	37	59
08:00 AM	6	0	0	1	0	7	14
08:15 AM	4	1	1	0	0	8	14
08:30 AM	8	1	2	0	2	13	26
08:45 AM	6	3	0	0	0	10	19
Total	24	5	3	1	2	38	73
Grand Total	43	5	4	1	4	75	132
Apprch %	89.6	10.4	80	20	5.1	94.9	
Total %	32.6	3.8	3	0.8	3	56.8	

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	6	0	6	0	1	1	0	7	7	14
08:15 AM	4	1	5	1	0	1	0	8	8	14
08:30 AM	8	1	9	2	0	2	2	13	15	26
08:45 AM	6	3	9	0	0	0	0	10	10	19
Total Volume	24	5	29	3	1	4	2	38	40	73
% App. Total	82.8	17.2		75	25		5	95		
PHF	.750	.417	.806	.375	.250	.500	.250	.731	.667	.702



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Client: LandStrategies/ K. Cram

File Name : 112529 B
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Peds and Bicycles

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	1	0	0	2	0	0	0	3
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	1	0	0	0	0	0	0	0	0	1
Total	1	0	1	0	0	2	0	0	0	4
08:00 AM	0	0	0	0	0	0	0	1	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	0	1
Grand Total	1	0	1	0	0	2	0	1	0	5
Apprch %	50	0	50	0	0	100	0	100	0	
Total %	20	0	20	0	0	40	0	20	0	

	Great Road (Route 2A/119) From East				Nashoba Road From South				Great Road (Route 2A/119) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	1	1	0	0	2	2	0	0	0	0	3
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	1	0	0	1	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	1	0	1	2	0	0	2	2	0	1	0	1	5
% App. Total	50	0	50		0	0	100		0	100	0		
PHF	.250	.000	.250	.500	.000	.000	.250	.250	.000	.250	.000	.250	.417



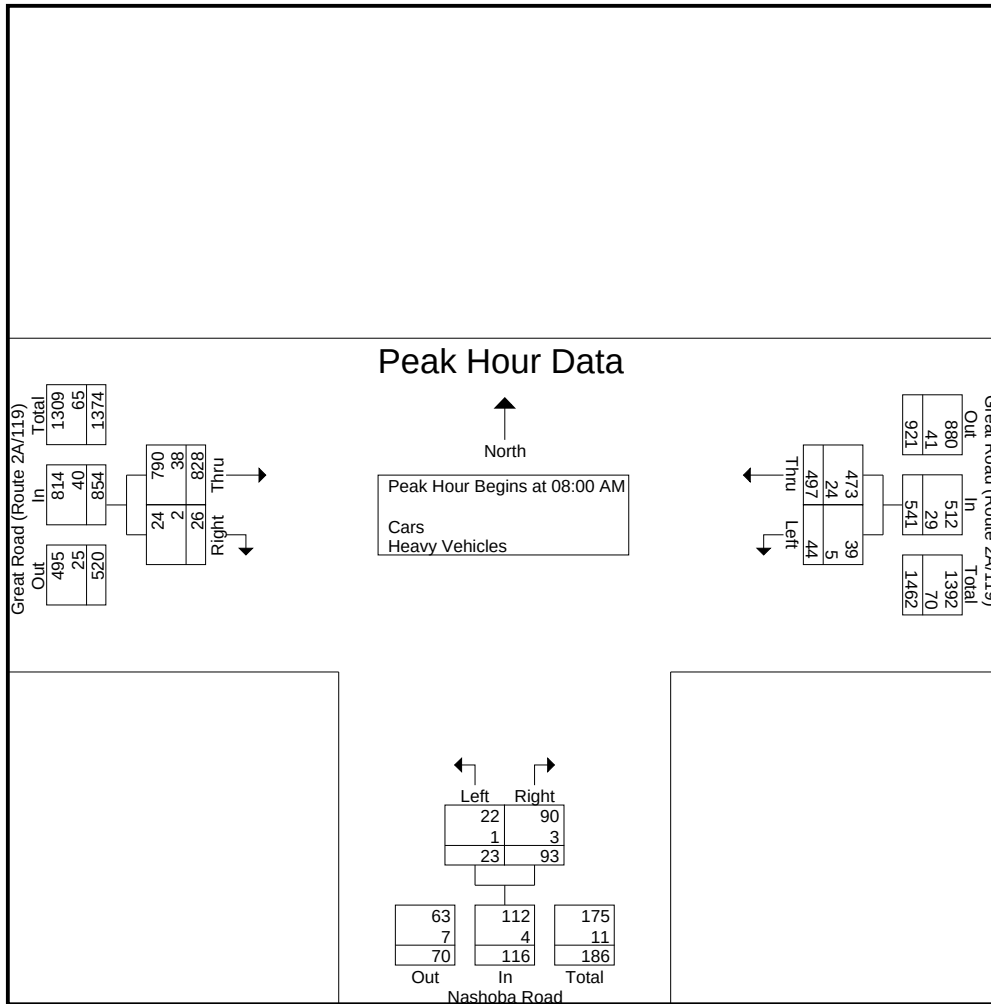
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S: Nashoba Road
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File Name : 112529 B
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	130	7	137	24	6	30	4	210	214	381
08:15 AM	117	8	125	11	8	19	8	189	197	341
08:30 AM	124	13	137	25	3	28	8	206	214	379
08:45 AM	126	16	142	33	6	39	6	223	229	410
Total Volume	497	44	541	93	23	116	26	828	854	1511
% App. Total	91.9	8.1		80.2	19.8		3	97		
PHF	.956	.688	.952	.705	.719	.744	.813	.928	.932	.921
Cars	473	39	512	90	22	112	24	790	814	1438
% Cars	95.2	88.6	94.6	96.8	95.7	96.6	92.3	95.4	95.3	95.2
Heavy Vehicles	24	5	29	3	1	4	2	38	40	73
% Heavy Vehicles	4.8	11.4	5.4	3.2	4.3	3.4	7.7	4.6	4.7	4.8





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Client: LandStrategies/ K. Cram

File Name : 112529 BB
Site Code : 11-014KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Great Road (Route 2A/119) From East		Nashoba Road From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
04:30 PM	244	25	11	3	3	97	383
04:45 PM	214	25	21	7	6	148	421
Total	458	50	32	10	9	245	804
05:00 PM	268	36	22	4	6	117	453
05:15 PM	229	22	24	5	10	144	434
05:30 PM	238	26	27	1	8	133	433
05:45 PM	185	14	20	2	12	175	408
Total	920	98	93	12	36	569	1728
06:00 PM	206	16	24	5	3	154	408
06:15 PM	144	25	24	9	8	106	316
Grand Total	1728	189	173	36	56	1074	3256
Apprch %	90.1	9.9	82.8	17.2	5	95	
Total %	53.1	5.8	5.3	1.1	1.7	33	
Cars	1700	188	172	34	56	1058	3208
% Cars	98.4	99.5	99.4	94.4	100	98.5	98.5
Heavy Vehicles	28	1	1	2	0	16	48
% Heavy Vehicles	1.6	0.5	0.6	5.6	0	1.5	1.5

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	214	25	239	21	7	28	6	148	154	421
05:00 PM	268	36	304	22	4	26	6	117	123	453
05:15 PM	229	22	251	24	5	29	10	144	154	434
05:30 PM	238	26	264	27	1	28	8	133	141	433
Total Volume	949	109	1058	94	17	111	30	542	572	1741
% App. Total	89.7	10.3		84.7	15.3		5.2	94.8		
PHF	.885	.757	.870	.870	.607	.957	.750	.916	.929	.961
Cars	936	108	1044	94	17	111	30	536	566	1721
% Cars	98.6	99.1	98.7	100	100	100	100	98.9	99.0	98.9
Heavy Vehicles	13	1	14	0	0	0	0	6	6	20
% Heavy Vehicles	1.4	0.9	1.3	0	0	0	0	1.1	1.0	1.1



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S: Nashoba Road
E/W: Great Road (Route 2A/119)
City, State: Acton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 BB
Site Code : 11-014KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

	Great Road (Route 2A/119) From East		Nashoba Road From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
04:30 PM	235	25	11	2	3	93	369
04:45 PM	208	25	21	7	6	147	414
Total	443	50	32	9	9	240	783
05:00 PM	265	35	22	4	6	114	446
05:15 PM	228	22	24	5	10	144	433
05:30 PM	235	26	27	1	8	131	428
05:45 PM	183	14	20	2	12	173	404
Total	911	97	93	12	36	562	1711
06:00 PM	204	16	24	5	3	153	405
06:15 PM	142	25	23	8	8	103	309
Grand Total	1700	188	172	34	56	1058	3208
Apprch %	90	10	83.5	16.5	5	95	
Total %	53	5.9	5.4	1.1	1.7	33	

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	208	25	233	21	7	28	6	147	153	414
05:00 PM	265	35	300	22	4	26	6	114	120	446
05:15 PM	228	22	250	24	5	29	10	144	154	433
05:30 PM	235	26	261	27	1	28	8	131	139	428
Total Volume	936	108	1044	94	17	111	30	536	566	1721
% App. Total	89.7	10.3		84.7	15.3		5.3	94.7		
PHF	.883	.771	.870	.870	.607	.957	.750	.912	.919	.965



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File Name : 112529 BB
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Start Date : 5/24/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Great Road (Route 2A/119) From East		Nashoba Road From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
04:30 PM	9	0	0	1	0	4	14
04:45 PM	6	0	0	0	0	1	7
Total	15	0	0	1	0	5	21
05:00 PM	3	1	0	0	0	3	7
05:15 PM	1	0	0	0	0	0	1
05:30 PM	3	0	0	0	0	2	5
05:45 PM	2	0	0	0	0	2	4
Total	9	1	0	0	0	7	17
06:00 PM	2	0	0	0	0	1	3
06:15 PM	2	0	1	1	0	3	7
Grand Total	28	1	1	2	0	16	48
Apprch %	96.6	3.4	33.3	66.7	0	100	
Total %	58.3	2.1	2.1	4.2	0	33.3	

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	9	0	9	0	1	1	0	4	4	14
04:45 PM	6	0	6	0	0	0	0	1	1	7
05:00 PM	3	1	4	0	0	0	0	3	3	7
05:15 PM	1	0	1	0	0	0	0	0	0	1
Total Volume	19	1	20	0	1	1	0	8	8	29
% App. Total	95	5		0	100		0	100		
PHF	.528	.250	.556	.000	.250	.250	.000	.500	.500	.518



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File Name : 112529 BB
Site Code : 11-014KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	1	0	0	0	0	0	0	1
Total	0	0	1	0	0	0	0	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	1	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	0	1	1	2
06:00 PM	0	0	0	0	0	0	0	0	0	0
06:15 PM	1	0	0	0	0	0	0	0	0	1
Grand Total	1	0	1	0	0	0	0	1	1	4
Apprch %	50	0	50	0	0	0	0	50	50	
Total %	25	0	25	0	0	0	0	25	25	

	Great Road (Route 2A/119)				Nashoba Road				Great Road (Route 2A/119)				
	From East					From South				From West			
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	1	1	0	0	0	0	0	0	0	0	1
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	1	1
Total Volume	0	0	1	1	0	0	0	0	0	1	0	1	2
% App. Total	0	0	100		0	0	0		0	100	0		
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.000	.250	.000	.250	.500



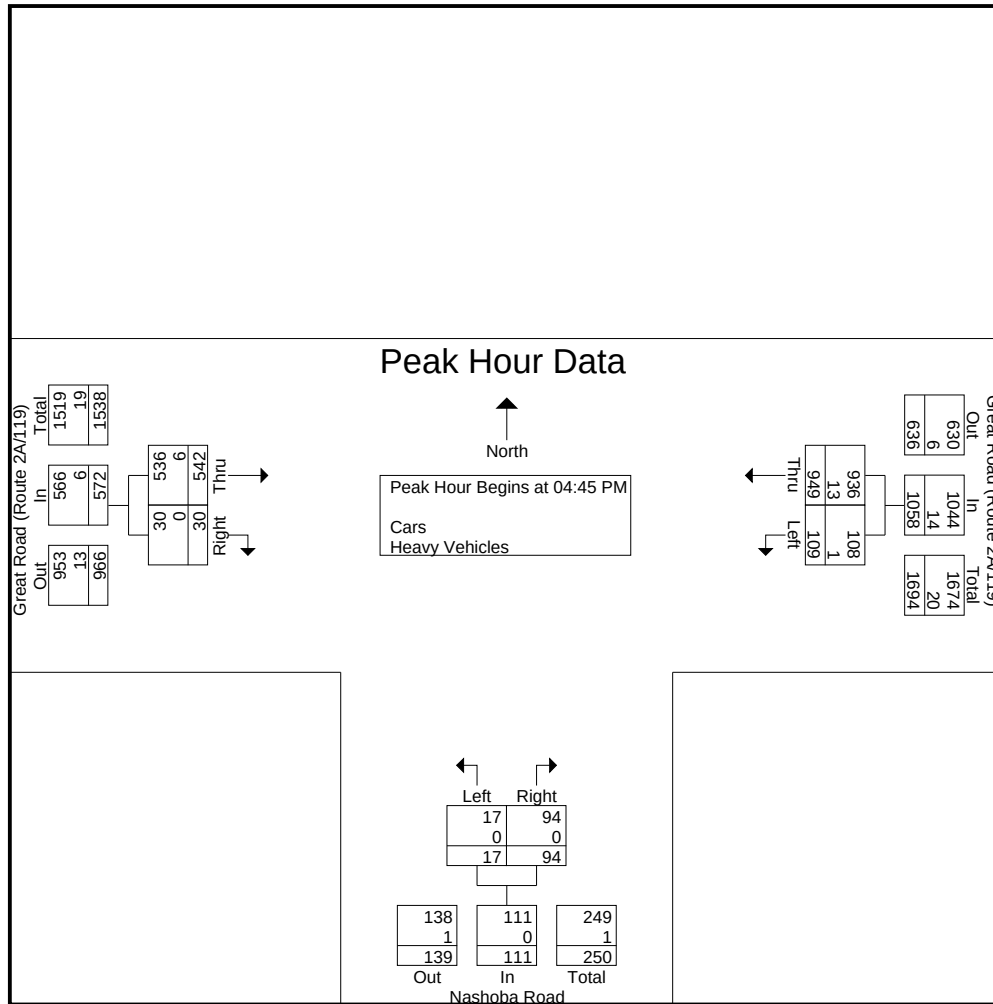
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P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
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S: Nashoba Road
E/W: Great Road (Route 2A/119)
City, State: Acton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 BB
Site Code : 11-014KC
Start Date : 5/24/2011
Page No : 1

	Great Road (Route 2A/119) From East			Nashoba Road From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	214	25	239	21	7	28	6	148	154	421
05:00 PM	268	36	304	22	4	26	6	117	123	453
05:15 PM	229	22	251	24	5	29	10	144	154	434
05:30 PM	238	26	264	27	1	28	8	133	141	433
Total Volume	949	109	1058	94	17	111	30	542	572	1741
% App. Total	89.7	10.3		84.7	15.3		5.2	94.8		
PHF	.885	.757	.870	.870	.607	.957	.750	.916	.929	.961
Cars	936	108	1044	94	17	111	30	536	566	1721
% Cars	98.6	99.1	98.7	100	100	100	100	98.9	99.0	98.9
Heavy Vehicles	13	1	14	0	0	0	0	6	6	20
% Heavy Vehicles	1.4	0.9	1.3	0	0	0	0	1.1	1.0	1.1





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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 C
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Great Road (Route 2A/119) From East		Mannion Place From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
07:00 AM	78	0	2	1	0	180	261
07:15 AM	64	0	1	0	0	215	280
07:30 AM	108	0	2	0	0	205	315
07:45 AM	114	0	0	2	0	199	315
Total	364	0	5	3	0	799	1171
08:00 AM	133	0	2	0	0	211	346
08:15 AM	127	0	0	0	0	198	325
08:30 AM	127	0	1	0	0	213	341
08:45 AM	126	0	2	0	0	233	361
Total	513	0	5	0	0	855	1373
Grand Total	877	0	10	3	0	1654	2544
Apprch %	100	0	76.9	23.1	0	100	
Total %	34.5	0	0.4	0.1	0	65	
Cars	839	0	8	3	0	1588	2438
% Cars	95.7	0	80	100	0	96	95.8
Heavy Vehicles	38	0	2	0	0	66	106
% Heavy Vehicles	4.3	0	20	0	0	4	4.2

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	133	0	133	2	0	2	0	211	211	346
08:15 AM	127	0	127	0	0	0	0	198	198	325
08:30 AM	127	0	127	1	0	1	0	213	213	341
08:45 AM	126	0	126	2	0	2	0	233	233	361
Total Volume	513	0	513	5	0	5	0	855	855	1373
% App. Total	100	0		100	0		0	100		
PHF	.964	.000	.964	.625	.000	.625	.000	.917	.917	.951
Cars	492	0	492	4	0	4	0	821	821	1317
% Cars	95.9	0	95.9	80.0	0	80.0	0	96.0	96.0	95.9
Heavy Vehicles	21	0	21	1	0	1	0	34	34	56
% Heavy Vehicles	4.1	0	4.1	20.0	0	20.0	0	4.0	4.0	4.1



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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 C
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

	Great Road (Route 2A/119) From East		Mannion Place From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
07:00 AM	73	0	2	1	0	169	245
07:15 AM	59	0	1	0	0	205	265
07:30 AM	105	0	1	0	0	201	307
07:45 AM	110	0	0	2	0	192	304
Total	347	0	4	3	0	767	1121
08:00 AM	128	0	2	0	0	205	335
08:15 AM	124	0	0	0	0	191	315
08:30 AM	119	0	0	0	0	201	320
08:45 AM	121	0	2	0	0	224	347
Total	492	0	4	0	0	821	1317
Grand Total	839	0	8	3	0	1588	2438
Apprch %	100	0	72.7	27.3	0	100	
Total %	34.4	0	0.3	0.1	0	65.1	

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	128	0	128	2	0	2	0	205	205	335
08:15 AM	124	0	124	0	0	0	0	191	191	315
08:30 AM	119	0	119	0	0	0	0	201	201	320
08:45 AM	121	0	121	2	0	2	0	224	224	347
Total Volume	492	0	492	4	0	4	0	821	821	1317
% App. Total	100	0		100	0		0	100		
PHF	.961	.000	.961	.500	.000	.500	.000	.916	.916	.949



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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 C
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Great Road (Route 2A/119) From East		Mannion Place From South		Great Road (Route 2A/119) From West		Int. Total
	Thru	Left	Right	Left	Right	Thru	
07:00 AM	5	0	0	0	0	11	16
07:15 AM	5	0	0	0	0	10	15
07:30 AM	3	0	1	0	0	4	8
07:45 AM	4	0	0	0	0	7	11
Total	17	0	1	0	0	32	50
08:00 AM	5	0	0	0	0	6	11
08:15 AM	3	0	0	0	0	7	10
08:30 AM	8	0	1	0	0	12	21
08:45 AM	5	0	0	0	0	9	14
Total	21	0	1	0	0	34	56
Grand Total	38	0	2	0	0	66	106
Apprch %	100	0	100	0	0	100	
Total %	35.8	0	1.9	0	0	62.3	

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	5	0	5	0	0	0	0	6	6	11
08:15 AM	3	0	3	0	0	0	0	7	7	10
08:30 AM	8	0	8	1	0	1	0	12	12	21
08:45 AM	5	0	5	0	0	0	0	9	9	14
Total Volume	21	0	21	1	0	1	0	34	34	56
% App. Total	100	0		100	0		0	100		
PHF	.656	.000	.656	.250	.000	.250	.000	.708	.708	.667



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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 C
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	1	1
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	1	0	0	0	0	0	0	0	0	1
Total	1	0	0	0	0	0	0	0	1	2
08:00 AM	0	0	0	0	0	0	0	1	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	0	1
Grand Total	1	0	0	0	0	0	0	1	1	3
Apprch %	100	0	0	0	0	0	0	50	50	
Total %	33.3	0	0	0	0	0	0	33.3	33.3	

	Great Road (Route 2A/119)				Mannion Place				Great Road (Route 2A/119)				
	From East					From South				From West			
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	0	0	0	0	0	0	0	0	1	1	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	1	0	0	1	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	1	0	0	1	0	0	0	0	0	1	1	2	3
% App. Total	100	0	0		0	0	0		0	50	50		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.250	.250	.500	.750



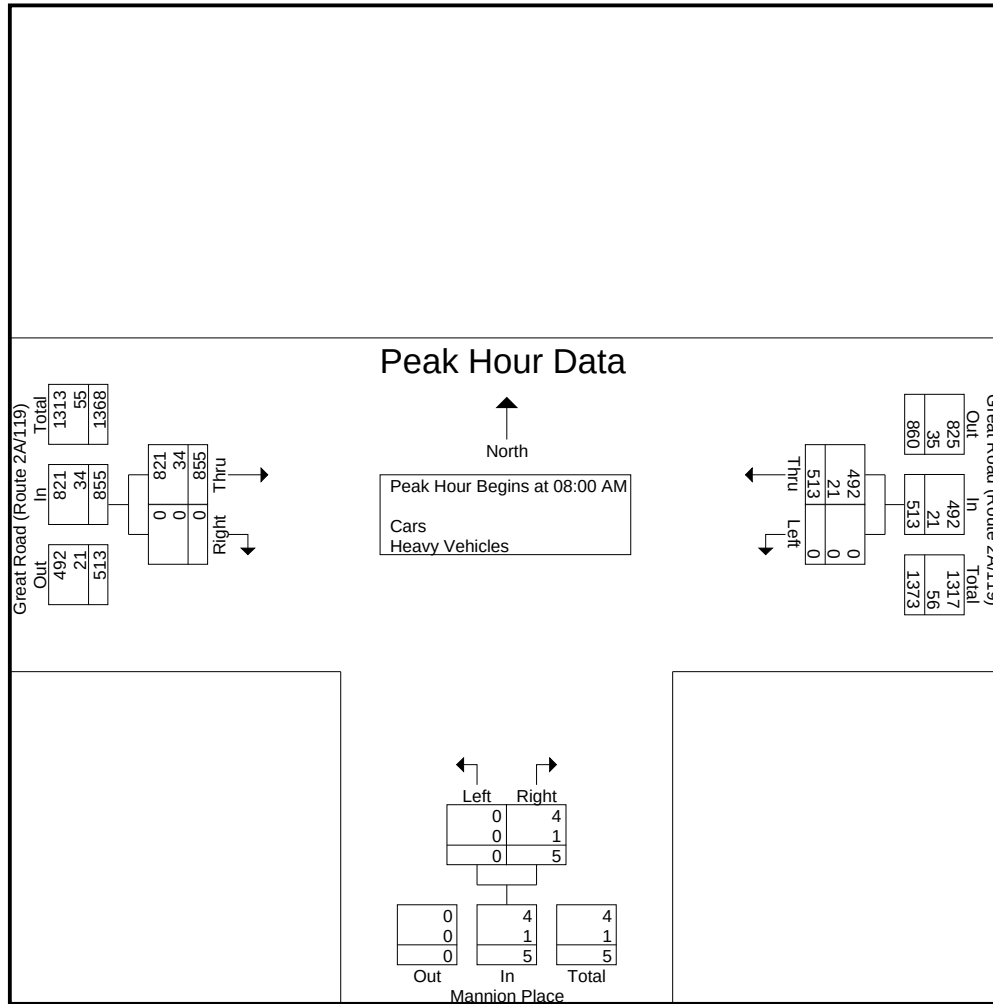
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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 C
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. 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	133	0	133	2	0	2	0	211	211	346
08:15 AM	127	0	127	0	0	0	0	198	198	325
08:30 AM	127	0	127	1	0	1	0	213	213	341
08:45 AM	126	0	126	2	0	2	0	233	233	361
Total Volume	513	0	513	5	0	5	0	855	855	1373
% App. Total	100	0		100	0		0	100		
PHF	.964	.000	.964	.625	.000	.625	.000	.917	.917	.951
Cars	492	0	492	4	0	4	0	821	821	1317
% Cars	95.9	0	95.9	80.0	0	80.0	0	96.0	96.0	95.9
Heavy Vehicles	21	0	21	1	0	1	0	34	34	56
% Heavy Vehicles	4.1	0	4.1	20.0	0	20.0	0	4.0	4.0	4.1





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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 CC
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Great Road (Route 2A/119) From East		Mannion Place From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
04:30 PM	248	0	0	1	0	102	351
04:45 PM	223	1	1	0	0	152	377
Total	471	1	1	1	0	254	728
05:00 PM	277	1	2	0	0	123	403
05:15 PM	238	0	5	0	0	149	392
05:30 PM	239	1	0	0	0	142	382
05:45 PM	191	2	1	0	0	189	383
Total	945	4	8	0	0	603	1560
06:00 PM	209	2	0	0	0	155	366
06:15 PM	152	2	0	0	0	110	264
Grand Total	1777	9	9	1	0	1122	2918
Apprch %	99.5	0.5	90	10	0	100	
Total %	60.9	0.3	0.3	0	0	38.5	
Cars	1750	8	9	1	0	1107	2875
% Cars	98.5	88.9	100	100	0	98.7	98.5
Heavy Vehicles	27	1	0	0	0	15	43
% Heavy Vehicles	1.5	11.1	0	0	0	1.3	1.5

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	277	1	278	2	0	2	0	123	123	403
05:15 PM	238	0	238	5	0	5	0	149	149	392
05:30 PM	239	1	240	0	0	0	0	142	142	382
05:45 PM	191	2	193	1	0	1	0	189	189	383
Total Volume	945	4	949	8	0	8	0	603	603	1560
% App. Total	99.6	0.4		100	0		0	100		
PHF	.853	.500	.853	.400	.000	.400	.000	.798	.798	.968
Cars	937	4	941	8	0	8	0	596	596	1545
% Cars	99.2	100	99.2	100	0	100	0	98.8	98.8	99.0
Heavy Vehicles	8	0	8	0	0	0	0	7	7	15
% Heavy Vehicles	0.8	0	0.8	0	0	0	0	1.2	1.2	1.0



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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 CC
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

	Great Road (Route 2A/119) From East		Mannion Place From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
04:30 PM	240	0	0	1	0	98	339
04:45 PM	216	1	1	0	0	151	369
Total	456	1	1	1	0	249	708
05:00 PM	275	1	2	0	0	120	398
05:15 PM	237	0	5	0	0	149	391
05:30 PM	236	1	0	0	0	140	377
05:45 PM	189	2	1	0	0	187	379
Total	937	4	8	0	0	596	1545
06:00 PM	207	2	0	0	0	154	363
06:15 PM	150	1	0	0	0	108	259
Grand Total	1750	8	9	1	0	1107	2875
Apprch %	99.5	0.5	90	10	0	100	
Total %	60.9	0.3	0.3	0	0	38.5	

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	275	1	276	2	0	2	0	120	120	398
05:15 PM	237	0	237	5	0	5	0	149	149	391
05:30 PM	236	1	237	0	0	0	0	140	140	377
05:45 PM	189	2	191	1	0	1	0	187	187	379
Total Volume	937	4	941	8	0	8	0	596	596	1545
% App. Total	99.6	0.4		100	0		0	100		
PHF	.852	.500	.852	.400	.000	.400	.000	.797	.797	.970



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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 CC
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Great Road (Route 2A/119) From East		Mannion Place From South		Great Road (Route 2A/119) From West		
Start Time	Thru	Left	Right	Left	Right	Thru	Int. Total
04:30 PM	8	0	0	0	0	4	12
04:45 PM	7	0	0	0	0	1	8
Total	15	0	0	0	0	5	20
05:00 PM	2	0	0	0	0	3	5
05:15 PM	1	0	0	0	0	0	1
05:30 PM	3	0	0	0	0	2	5
05:45 PM	2	0	0	0	0	2	4
Total	8	0	0	0	0	7	15
06:00 PM	2	0	0	0	0	1	3
06:15 PM	2	1	0	0	0	2	5
Grand Total	27	1	0	0	0	15	43
Apprch %	96.4	3.6	0	0	0	100	
Total %	62.8	2.3	0	0	0	34.9	

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	8	0	8	0	0	0	0	4	4	12
04:45 PM	7	0	7	0	0	0	0	1	1	8
05:00 PM	2	0	2	0	0	0	0	3	3	5
05:15 PM	1	0	1	0	0	0	0	0	0	1
Total Volume	18	0	18	0	0	0	0	8	8	26
% App. Total	100	0		0	0		0	100		
PHF	.563	.000	.563	.000	.000	.000	.000	.500	.500	.542



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S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 CC
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			Int. Total
	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	1	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	0	1
06:00 PM	0	0	0	0	0	0	0	0	0	0
06:15 PM	1	0	0	0	0	0	0	0	1	2
Grand Total	1	0	0	0	0	0	0	1	1	3
Apprch %	100	0	0	0	0	0	0	50	50	
Total %	33.3	0	0	0	0	0	0	33.3	33.3	

	Great Road (Route 2A/119) From East				Mannion Place From South				Great Road (Route 2A/119) From West				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:30 PM													
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
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	1	0	0	1	0	0	0	0	0	0	1	1	2
Total Volume	1	0	0	1	0	0	0	0	0	0	1	1	2
% App. Total	100	0	0		0	0	0		0	0	100		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.250	.250	.250



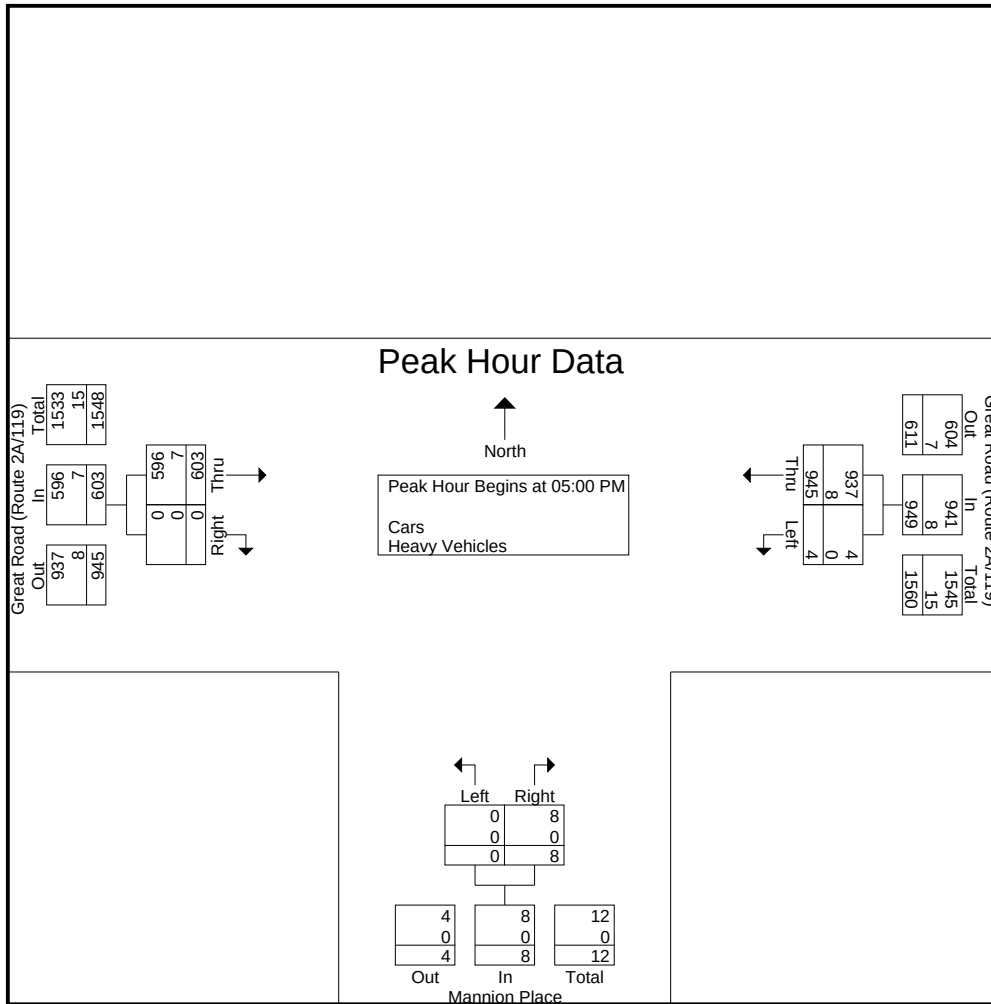
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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

S: Mannion Place
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 CC
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

	Great Road (Route 2A/119) From East			Mannion Place From South			Great Road (Route 2A/119) From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	277	1	278	2	0	2	0	123	123	403
05:15 PM	238	0	238	5	0	5	0	149	149	392
05:30 PM	239	1	240	0	0	0	0	142	142	382
05:45 PM	191	2	193	1	0	1	0	189	189	383
Total Volume	945	4	949	8	0	8	0	603	603	1560
% App. Total	99.6	0.4		100	0		0	100		
PHF	.853	.500	.853	.400	.000	.400	.000	.798	.798	.968
Cars	937	4	941	8	0	8	0	596	596	1545
% Cars	99.2	100	99.2	100	0	100	0	98.8	98.8	99.0
Heavy Vehicles	8	0	8	0	0	0	0	7	7	15
% Heavy Vehicles	0.8	0	0.8	0	0	0	0	1.2	1.2	1.0





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N: Grist Mill Road (West)
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 D
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Grist Mill Road (West) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
07:00 AM	6	1	0	89	172	0	268
07:15 AM	5	0	1	65	221	3	295
07:30 AM	4	1	1	110	208	1	325
07:45 AM	6	0	0	107	191	0	304
Total	21	2	2	371	792	4	1192
08:00 AM	4	0	0	144	215	1	364
08:15 AM	9	1	0	128	203	4	345
08:30 AM	7	4	0	126	212	3	352
08:45 AM	4	0	0	135	225	2	366
Total	24	5	0	533	855	10	1427
Grand Total	45	7	2	904	1647	14	2619
Apprch %	86.5	13.5	0.2	99.8	99.2	0.8	
Total %	1.7	0.3	0.1	34.5	62.9	0.5	
Cars	43	5	2	870	1590	13	2523
% Cars	95.6	71.4	100	96.2	96.5	92.9	96.3
Heavy Vehicles	2	2	0	34	57	1	96
% Heavy Vehicles	4.4	28.6	0	3.8	3.5	7.1	3.7

	Grist Mill Road (West) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	4	0	4	0	144	144	215	1	216	364
08:15 AM	9	1	10	0	128	128	203	4	207	345
08:30 AM	7	4	11	0	126	126	212	3	215	352
08:45 AM	4	0	4	0	135	135	225	2	227	366
Total Volume	24	5	29	0	533	533	855	10	865	1427
% App. Total	82.8	17.2		0	100		98.8	1.2		
PHF	.667	.313	.659	.000	.925	.925	.950	.625	.953	.975
Cars	22	4	26	0	515	515	827	9	836	1377
% Cars	91.7	80.0	89.7	0	96.6	96.6	96.7	90.0	96.6	96.5
Heavy Vehicles	2	1	3	0	18	18	28	1	29	50
% Heavy Vehicles	8.3	20.0	10.3	0	3.4	3.4	3.3	10.0	3.4	3.5



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N: Grist Mill Road (West)
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 D
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

Start Time	Grist Mill Road (West) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		Int. Total
	Right	Left	Right	Thru	Thru	Left	
07:00 AM	6	1	0	84	164	0	255
07:15 AM	5	0	1	62	214	3	285
07:30 AM	4	0	1	105	201	1	312
07:45 AM	6	0	0	104	184	0	294
Total	21	1	2	355	763	4	1146
08:00 AM	3	0	0	142	208	1	354
08:15 AM	8	1	0	126	196	3	334
08:30 AM	7	3	0	118	204	3	335
08:45 AM	4	0	0	129	219	2	354
Total	22	4	0	515	827	9	1377
Grand Total	43	5	2	870	1590	13	2523
Apprch %	89.6	10.4	0.2	99.8	99.2	0.8	
Total %	1.7	0.2	0.1	34.5	63	0.5	

	Grist Mill Road (West)			Great Road (Route 2A/119)			Great Road (Route 2A/119)			
	From North			From East			From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	3	0	3	0	142	142	208	1	209	354
08:15 AM	8	1	9	0	126	126	196	3	199	334
08:30 AM	7	3	10	0	118	118	204	3	207	335
08:45 AM	4	0	4	0	129	129	219	2	221	354
Total Volume	22	4	26	0	515	515	827	9	836	1377
% App. Total	84.6	15.4		0	100		98.9	1.1		
PHF	.688	.333	.650	.000	.907	.907	.944	.750	.946	.972



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City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 D
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Grist Mill Road (West) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		Int. Total
	Right	Left	Right	Thru	Thru	Left	
07:00 AM	0	0	0	5	8	0	13
07:15 AM	0	0	0	3	7	0	10
07:30 AM	0	1	0	5	7	0	13
07:45 AM	0	0	0	3	7	0	10
Total	0	1	0	16	29	0	46
08:00 AM	1	0	0	2	7	0	10
08:15 AM	1	0	0	2	7	1	11
08:30 AM	0	1	0	8	8	0	17
08:45 AM	0	0	0	6	6	0	12
Total	2	1	0	18	28	1	50
Grand Total	2	2	0	34	57	1	96
Apprch %	50	50	0	100	98.3	1.7	
Total %	2.1	2.1	0	35.4	59.4	1	

	Grist Mill Road (West)			Great Road (Route 2A/119)			Great Road (Route 2A/119)			
	From North			From East			From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	1	0	1	0	2	2	7	0	7	10
08:15 AM	1	0	1	0	2	2	7	1	8	11
08:30 AM	0	1	1	0	8	8	8	0	8	17
08:45 AM	0	0	0	0	6	6	6	0	6	12
Total Volume	2	1	3	0	18	18	28	1	29	50
% App. Total	66.7	33.3		0	100		96.6	3.4		
PHF	.500	.250	.750	.000	.563	.563	.875	.250	.906	.735



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File Name : 112529 D
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Start Date : 5/24/2011
Page No : 1

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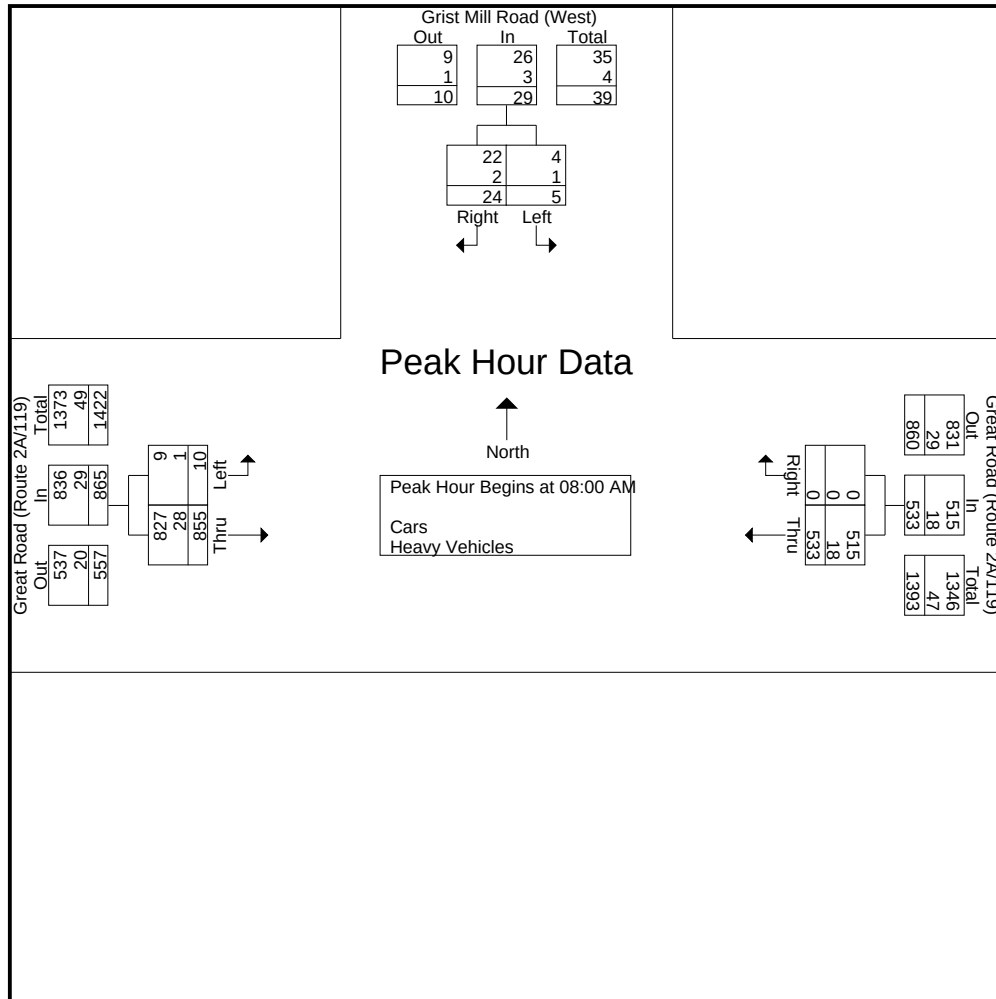
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City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 D
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

	Grist Mill Road (West) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	4	0	4	0	144	144	215	1	216	364
08:15 AM	9	1	10	0	128	128	203	4	207	345
08:30 AM	7	4	11	0	126	126	212	3	215	352
08:45 AM	4	0	4	0	135	135	225	2	227	366
Total Volume	24	5	29	0	533	533	855	10	865	1427
% App. Total	82.8	17.2		0	100		98.8	1.2		
PHF	.667	.313	.659	.000	.925	.925	.950	.625	.953	.975
Cars	22	4	26	0	515	515	827	9	836	1377
% Cars	91.7	80.0	89.7	0	96.6	96.6	96.7	90.0	96.6	96.5
Heavy Vehicles	2	1	3	0	18	18	28	1	29	50
% Heavy Vehicles	8.3	20.0	10.3	0	3.4	3.4	3.3	10.0	3.4	3.5





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E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 DD
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Grist Mill Road (West) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:30 PM	3	0	0	237	106	2	348
04:45 PM	5	1	2	230	154	5	397
Total	8	1	2	467	260	7	745
05:00 PM	1	0	2	268	127	6	404
05:15 PM	4	1	1	244	156	5	411
05:30 PM	4	0	1	240	148	5	398
05:45 PM	5	1	4	197	192	10	409
Total	14	2	8	949	623	26	1622
06:00 PM	6	0	2	201	150	3	362
06:15 PM	1	0	0	152	118	3	274
Grand Total	29	3	12	1769	1151	39	3003
Apprch %	90.6	9.4	0.7	99.3	96.7	3.3	
Total %	1	0.1	0.4	58.9	38.3	1.3	
Cars	28	3	11	1747	1141	39	2969
% Cars	96.6	100	91.7	98.8	99.1	100	98.9
Heavy Vehicles	1	0	1	22	10	0	34
% Heavy Vehicles	3.4	0	8.3	1.2	0.9	0	1.1

	Grist Mill Road (West) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	1	0	1	2	268	270	127	6	133	404
05:15 PM	4	1	5	1	244	245	156	5	161	411
05:30 PM	4	0	4	1	240	241	148	5	153	398
05:45 PM	5	1	6	4	197	201	192	10	202	409
Total Volume	14	2	16	8	949	957	623	26	649	1622
% App. Total	87.5	12.5		0.8	99.2		96	4		
PHF	.700	.500	.667	.500	.885	.886	.811	.650	.803	.987
Cars	13	2	15	7	940	947	618	26	644	1606
% Cars	92.9	100	93.8	87.5	99.1	99.0	99.2	100	99.2	99.0
Heavy Vehicles	1	0	1	1	9	10	5	0	5	16
% Heavy Vehicles	7.1	0	6.3	12.5	0.9	1.0	0.8	0	0.8	1.0



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E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 DD
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

	Grist Mill Road (West) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:30 PM	3	0	0	230	105	2	340
04:45 PM	5	1	2	225	152	5	390
Total	8	1	2	455	257	7	730
05:00 PM	1	0	1	265	126	6	399
05:15 PM	4	1	1	242	156	5	409
05:30 PM	4	0	1	238	146	5	394
05:45 PM	4	1	4	195	190	10	404
Total	13	2	7	940	618	26	1606
06:00 PM	6	0	2	201	149	3	361
06:15 PM	1	0	0	151	117	3	272
Grand Total	28	3	11	1747	1141	39	2969
Apprch %	90.3	9.7	0.6	99.4	96.7	3.3	
Total %	0.9	0.1	0.4	58.8	38.4	1.3	

	Grist Mill Road (West) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	1	0	1	1	265	266	126	6	132	399
05:15 PM	4	1	5	1	242	243	156	5	161	409
05:30 PM	4	0	4	1	238	239	146	5	151	394
05:45 PM	4	1	5	4	195	199	190	10	200	404
Total Volume	13	2	15	7	940	947	618	26	644	1606
% App. Total	86.7	13.3		0.7	99.3		96	4		
PHF	.813	.500	.750	.438	.887	.890	.813	.650	.805	.982



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E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 DD
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Heavy Vehicles

	Grist Mill Road (West) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:30 PM	0	0	0	7	1	0	8
04:45 PM	0	0	0	5	2	0	7
Total	0	0	0	12	3	0	15
05:00 PM	0	0	1	3	1	0	5
05:15 PM	0	0	0	2	0	0	2
05:30 PM	0	0	0	2	2	0	4
05:45 PM	1	0	0	2	2	0	5
Total	1	0	1	9	5	0	16
06:00 PM	0	0	0	0	1	0	1
06:15 PM	0	0	0	1	1	0	2
Grand Total	1	0	1	22	10	0	34
Apprch %	100	0	4.3	95.7	100	0	
Total %	2.9	0	2.9	64.7	29.4	0	

	Grist Mill Road (West) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	0	0	0	0	7	7	1	0	1	8
04:45 PM	0	0	0	0	5	5	2	0	2	7
05:00 PM	0	0	0	1	3	4	1	0	1	5
05:15 PM	0	0	0	0	2	2	0	0	0	2
Total Volume	0	0	0	1	17	18	4	0	4	22
% App. Total	0	0		5.6	94.4		100	0		
PHF	.000	.000	.000	.250	.607	.643	.500	.000	.500	.688



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Client: LandStrategies/ K. Cram

File Name : 112529 DD
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

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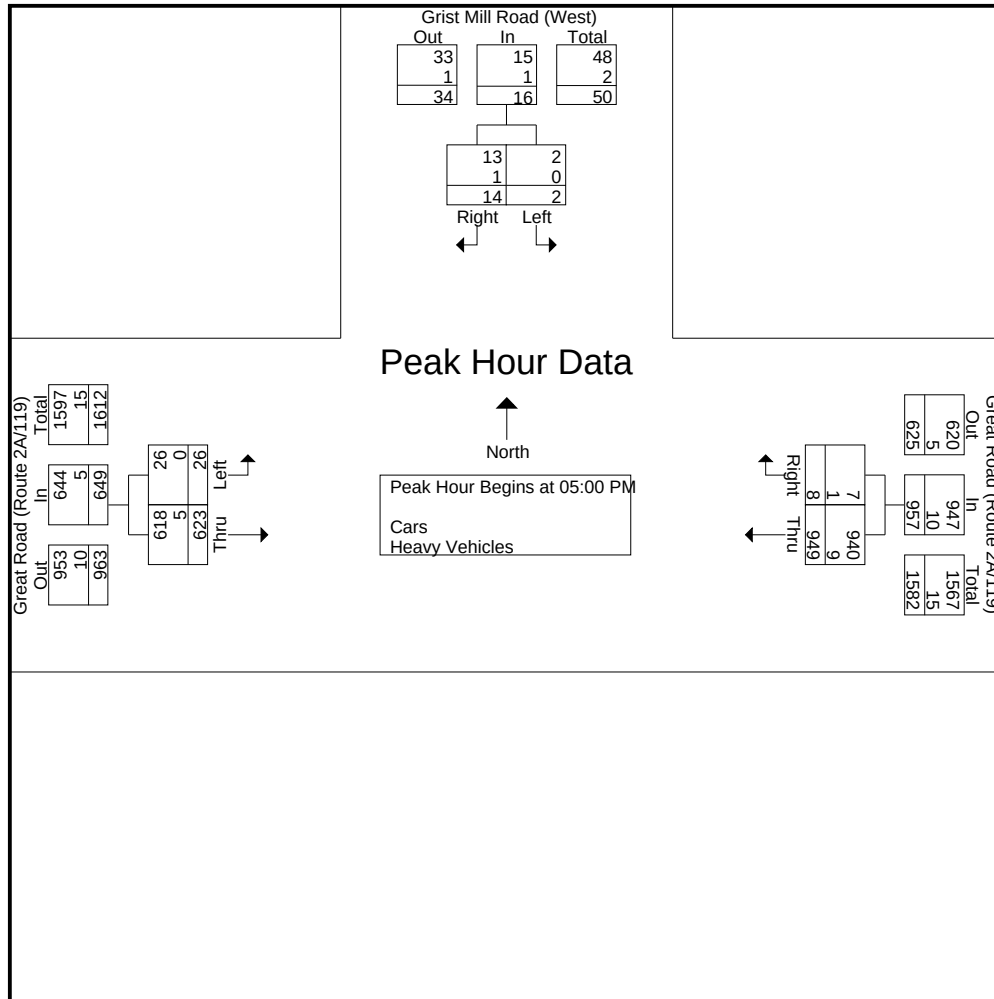
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E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 DD
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

	Grist Mill Road (West) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	1	0	1	2	268	270	127	6	133	404
05:15 PM	4	1	5	1	244	245	156	5	161	411
05:30 PM	4	0	4	1	240	241	148	5	153	398
05:45 PM	5	1	6	4	197	201	192	10	202	409
Total Volume	14	2	16	8	949	957	623	26	649	1622
% App. Total	87.5	12.5		0.8	99.2		96	4		
PHF	.700	.500	.667	.500	.885	.886	.811	.650	.803	.987
Cars	13	2	15	7	940	947	618	26	644	1606
% Cars	92.9	100	93.8	87.5	99.1	99.0	99.2	100	99.2	99.0
Heavy Vehicles	1	0	1	1	9	10	5	0	5	16
% Heavy Vehicles	7.1	0	6.3	12.5	0.9	1.0	0.8	0	0.8	1.0





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N: Grist Mill Road (East)
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 E
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Grist Mill Road (East) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
07:00 AM	6	6	1	80	171	0	264
07:15 AM	4	4	3	61	212	2	286
07:30 AM	2	5	0	108	202	2	319
07:45 AM	0	2	0	113	195	1	311
Total	12	17	4	362	780	5	1180
08:00 AM	3	3	2	132	210	1	351
08:15 AM	5	4	2	125	195	2	333
08:30 AM	3	3	0	125	211	1	343
08:45 AM	4	2	1	139	242	2	390
Total	15	12	5	521	858	6	1417
Grand Total	27	29	9	883	1638	11	2597
Apprch %	48.2	51.8	1	99	99.3	0.7	
Total %	1	1.1	0.3	34	63.1	0.4	
Cars	27	27	9	843	1572	9	2487
% Cars	100	93.1	100	95.5	96	81.8	95.8
Heavy Vehicles	0	2	0	40	66	2	110
% Heavy Vehicles	0	6.9	0	4.5	4	18.2	4.2

	Grist Mill Road (East) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	3	3	6	2	132	134	210	1	211	351
08:15 AM	5	4	9	2	125	127	195	2	197	333
08:30 AM	3	3	6	0	125	125	211	1	212	343
08:45 AM	4	2	6	1	139	140	242	2	244	390
Total Volume	15	12	27	5	521	526	858	6	864	1417
% App. Total	55.6	44.4		1	99		99.3	0.7		
PHF	.750	.750	.750	.625	.937	.939	.886	.750	.885	.908
Cars	15	11	26	5	499	504	824	5	829	1359
% Cars	100	91.7	96.3	100	95.8	95.8	96.0	83.3	95.9	95.9
Heavy Vehicles	0	1	1	0	22	22	34	1	35	58
% Heavy Vehicles	0	8.3	3.7	0	4.2	4.2	4.0	16.7	4.1	4.1



PRECISION
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INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
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N: Grist Mill Road (East)
E/W: Great Road (Route 2A/119)
City, State: Littleton, MA
Client: LandStrategies/ K. Cram

File Name : 112529 E
Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars

Start Time	Grist Mill Road (East) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		Int. Total
	Right	Left	Right	Thru	Thru	Left	
07:00 AM	6	6	1	75	161	0	249
07:15 AM	4	4	3	55	201	2	269
07:30 AM	2	4	0	105	198	1	310
07:45 AM	0	2	0	109	188	1	300
Total	12	16	4	344	748	4	1128
08:00 AM	3	3	2	127	204	1	340
08:15 AM	5	4	2	122	188	1	322
08:30 AM	3	2	0	117	199	1	322
08:45 AM	4	2	1	133	233	2	375
Total	15	11	5	499	824	5	1359
Grand Total	27	27	9	843	1572	9	2487
Apprch %	50	50	1.1	98.9	99.4	0.6	
Total %	1.1	1.1	0.4	33.9	63.2	0.4	

	Grist Mill Road (East)			Great Road (Route 2A/119)			Great Road (Route 2A/119)			
	From North			From East			From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	3	3	6	2	127	129	204	1	205	340
08:15 AM	5	4	9	2	122	124	188	1	189	322
08:30 AM	3	2	5	0	117	117	199	1	200	322
08:45 AM	4	2	6	1	133	134	233	2	235	375
Total Volume	15	11	26	5	499	504	824	5	829	1359
% App. Total	57.7	42.3		1	99		99.4	0.6		
PHF	.750	.688	.722	.625	.938	.940	.884	.625	.882	.906



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Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Grist Mill Road (East) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		Int. Total
	Right	Left	Right	Thru	Thru	Left	
07:00 AM	0	0	0	5	10	0	15
07:15 AM	0	0	0	6	11	0	17
07:30 AM	0	1	0	3	4	1	9
07:45 AM	0	0	0	4	7	0	11
Total	0	1	0	18	32	1	52
08:00 AM	0	0	0	5	6	0	11
08:15 AM	0	0	0	3	7	1	11
08:30 AM	0	1	0	8	12	0	21
08:45 AM	0	0	0	6	9	0	15
Total	0	1	0	22	34	1	58
Grand Total	0	2	0	40	66	2	110
Apprch %	0	100	0	100	97.1	2.9	
Total %	0	1.8	0	36.4	60	1.8	

	Grist Mill Road (East)			Great Road (Route 2A/119)			Great Road (Route 2A/119)			
	From North			From East			From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. 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	0	0	0	0	5	5	6	0	6	11
08:15 AM	0	0	0	0	3	3	7	1	8	11
08:30 AM	0	1	1	0	8	8	12	0	12	21
08:45 AM	0	0	0	0	6	6	9	0	9	15
Total Volume	0	1	1	0	22	22	34	1	35	58
% App. Total	0	100		0	100		97.1	2.9		
PHF	.000	.250	.250	.000	.688	.688	.708	.250	.729	.690



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Page No : 1

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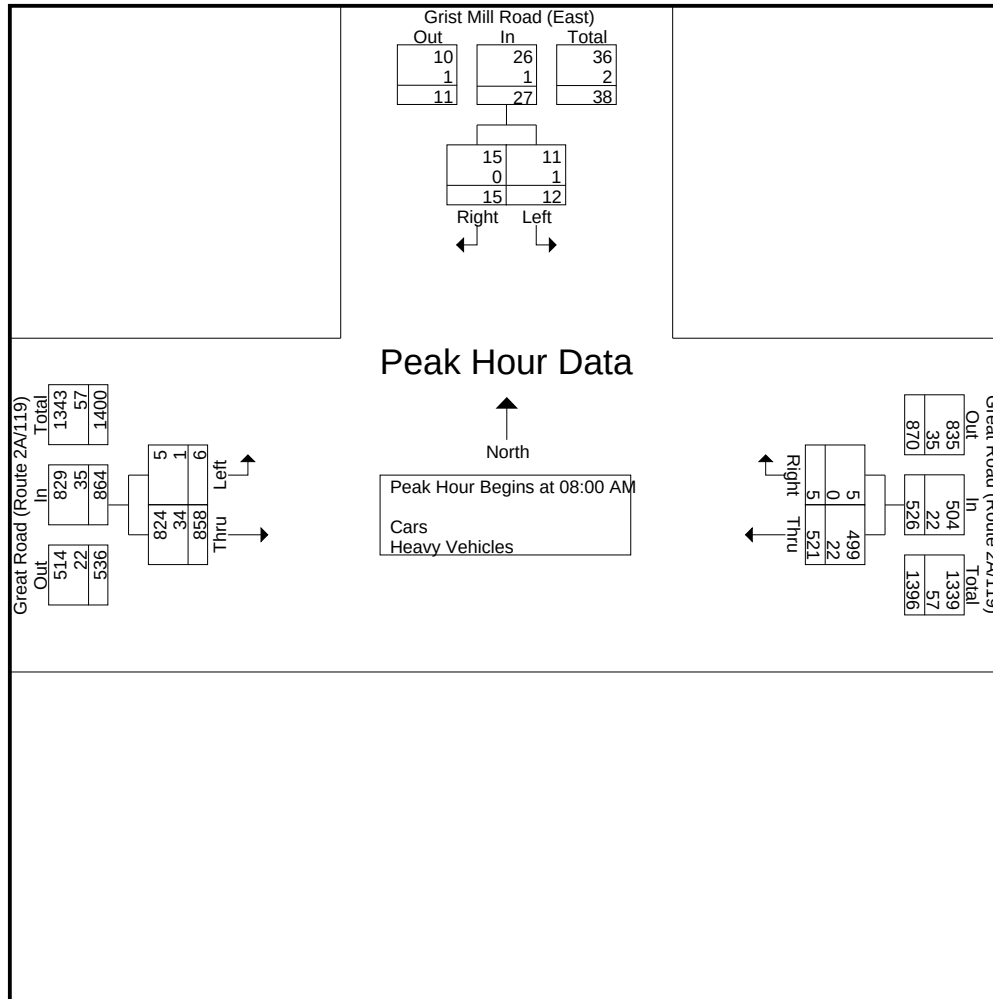
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	Grist Mill Road (East) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	3	3	6	2	132	134	210	1	211	351
08:15 AM	5	4	9	2	125	127	195	2	197	333
08:30 AM	3	3	6	0	125	125	211	1	212	343
08:45 AM	4	2	6	1	139	140	242	2	244	390
Total Volume	15	12	27	5	521	526	858	6	864	1417
% App. Total	55.6	44.4		1	99		99.3	0.7		
PHF	.750	.750	.750	.625	.937	.939	.886	.750	.885	.908
Cars	15	11	26	5	499	504	824	5	829	1359
% Cars	100	91.7	96.3	100	95.8	95.8	96.0	83.3	95.9	95.9
Heavy Vehicles	0	1	1	0	22	22	34	1	35	58
% Heavy Vehicles	0	8.3	3.7	0	4.2	4.2	4.0	16.7	4.1	4.1





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Site Code : 11-012KC
Start Date : 5/24/2011
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Grist Mill Road (East) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:30 PM	1	2	5	246	102	2	358
04:45 PM	4	2	4	216	150	5	381
Total	5	4	9	462	252	7	739
05:00 PM	5	0	3	274	125	3	410
05:15 PM	3	1	5	236	145	5	395
05:30 PM	0	1	4	231	139	6	381
05:45 PM	4	3	1	196	186	4	394
Total	12	5	13	937	595	18	1580
06:00 PM	2	3	2	198	150	1	356
06:15 PM	3	0	5	149	115	5	277
Grand Total	22	12	29	1746	1112	31	2952
Apprch %	64.7	35.3	1.6	98.4	97.3	2.7	
Total %	0.7	0.4	1	59.1	37.7	1.1	
Cars	22	12	28	1725	1098	30	2915
% Cars	100	100	96.6	98.8	98.7	96.8	98.7
Heavy Vehicles	0	0	1	21	14	1	37
% Heavy Vehicles	0	0	3.4	1.2	1.3	3.2	1.3

	Grist Mill Road (East) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	5	0	5	3	274	277	125	3	128	410
05:15 PM	3	1	4	5	236	241	145	5	150	395
05:30 PM	0	1	1	4	231	235	139	6	145	381
05:45 PM	4	3	7	1	196	197	186	4	190	394
Total Volume	12	5	17	13	937	950	595	18	613	1580
% App. Total	70.6	29.4		1.4	98.6		97.1	2.9		
PHF	.600	.417	.607	.650	.855	.857	.800	.750	.807	.963
Cars	12	5	17	13	929	942	588	18	606	1565
% Cars	100	100	100	100	99.1	99.2	98.8	100	98.9	99.1
Heavy Vehicles	0	0	0	0	8	8	7	0	7	15
% Heavy Vehicles	0	0	0	0	0.9	0.8	1.2	0	1.1	0.9



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File Name : 112529 EE
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Page No : 1

Groups Printed- Cars

	Grist Mill Road (East) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:30 PM	1	2	5	238	98	2	346
04:45 PM	4	2	3	212	149	5	375
Total	5	4	8	450	247	7	721
05:00 PM	5	0	3	272	122	3	405
05:15 PM	3	1	5	235	145	5	394
05:30 PM	0	1	4	228	137	6	376
05:45 PM	4	3	1	194	184	4	390
Total	12	5	13	929	588	18	1565
06:00 PM	2	3	2	197	150	1	355
06:15 PM	3	0	5	149	113	4	274
Grand Total	22	12	28	1725	1098	30	2915
Apprch %	64.7	35.3	1.6	98.4	97.3	2.7	
Total %	0.8	0.4	1	59.2	37.7	1	

	Grist Mill Road (East) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	5	0	5	3	272	275	122	3	125	405
05:15 PM	3	1	4	5	235	240	145	5	150	394
05:30 PM	0	1	1	4	228	232	137	6	143	376
05:45 PM	4	3	7	1	194	195	184	4	188	390
Total Volume	12	5	17	13	929	942	588	18	606	1565
% App. Total	70.6	29.4		1.4	98.6		97	3		
PHF	.600	.417	.607	.650	.854	.856	.799	.750	.806	.966



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Page No : 1

Groups Printed- Heavy Vehicles

	Grist Mill Road (East) From North		Great Road (Route 2A/119) From East		Great Road (Route 2A/119) From West		
Start Time	Right	Left	Right	Thru	Thru	Left	Int. Total
04:30 PM	0	0	0	8	4	0	12
04:45 PM	0	0	1	4	1	0	6
Total	0	0	1	12	5	0	18
05:00 PM	0	0	0	2	3	0	5
05:15 PM	0	0	0	1	0	0	1
05:30 PM	0	0	0	3	2	0	5
05:45 PM	0	0	0	2	2	0	4
Total	0	0	0	8	7	0	15
06:00 PM	0	0	0	1	0	0	1
06:15 PM	0	0	0	0	2	1	3
Grand Total	0	0	1	21	14	1	37
Apprch %	0	0	4.5	95.5	93.3	6.7	
Total %	0	0	2.7	56.8	37.8	2.7	

	Grist Mill Road (East) From North			Great Road (Route 2A/119) From East			Great Road (Route 2A/119) From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	0	0	0	0	8	8	4	0	4	12
04:45 PM	0	0	0	1	4	5	1	0	1	6
05:00 PM	0	0	0	0	2	2	3	0	3	5
05:15 PM	0	0	0	0	1	1	0	0	0	1
Total Volume	0	0	0	1	15	16	8	0	8	24
% App. Total	0	0		6.2	93.8		100	0		
PHF	.000	.000	.000	.250	.469	.500	.500	.000	.500	.500



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Start Time	Right	Left	Peds	Right	Thru	Peds	Thru	Left	Peds	Int. Total
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	1	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	0	0	1
06:00 PM	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	1	0	0	0	0	0	1
Grand Total	0	1	0	1	0	0	0	0	0	2
Apprch %	0	100	0	100	0	0	0	0	0	
Total %	0	50	0	50	0	0	0	0	0	

[illegible]



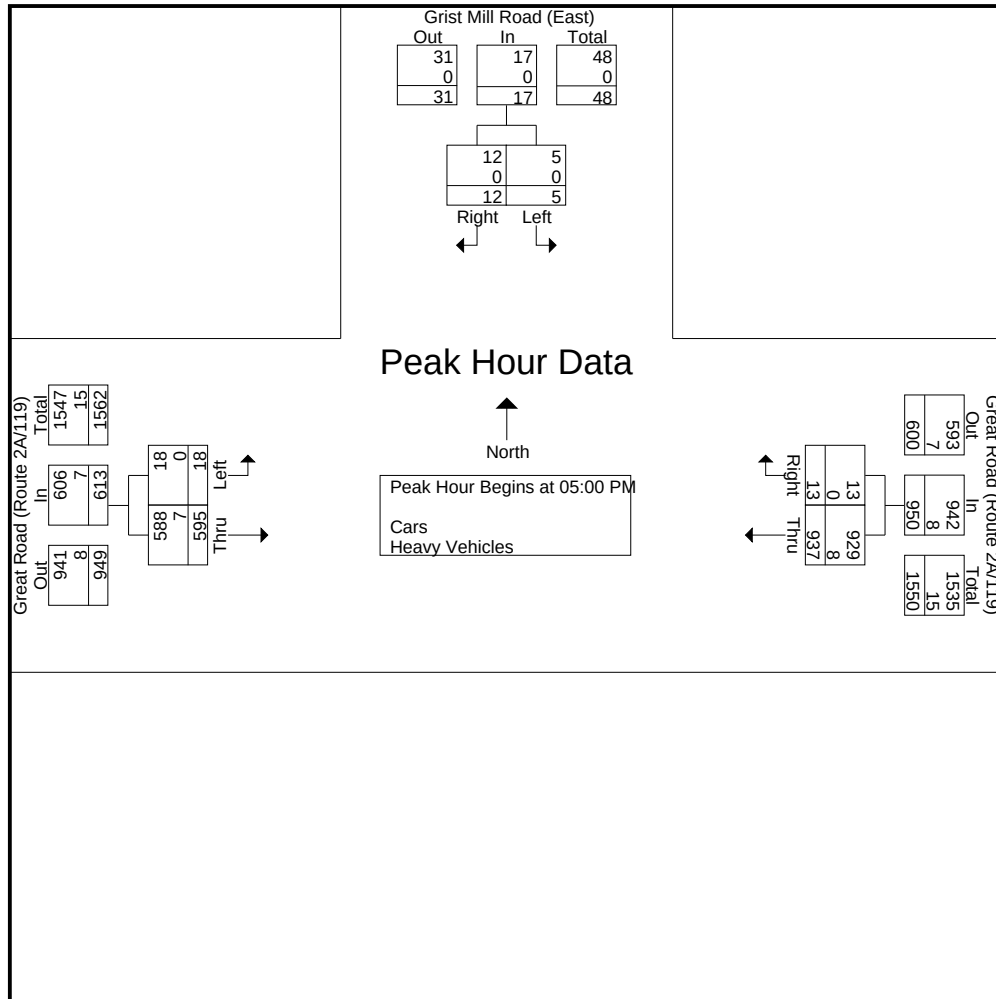
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Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	5	0	5	3	274	277	125	3	128	410
05:15 PM	3	1	4	5	236	241	145	5	150	395
05:30 PM	0	1	1	4	231	235	139	6	145	381
05:45 PM	4	3	7	1	196	197	186	4	190	394
Total Volume	12	5	17	13	937	950	595	18	613	1580
% App. Total	70.6	29.4		1.4	98.6		97.1	2.9		
PHF	.600	.417	.607	.650	.855	.857	.800	.750	.807	.963
Cars	12	5	17	13	929	942	588	18	606	1565
% Cars	100	100	100	100	99.1	99.2	98.8	100	98.9	99.1
Heavy Vehicles	0	0	0	0	8	8	7	0	7	15
% Heavy Vehicles	0	0	0	0	0.9	0.8	1.2	0	1.1	0.9



Seasonal Adjustment Worksheets

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2010 WEEKDAY SEASONAL FACTORS *

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

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

RECREATIONAL: (ALL YEARS)

**GROUP 3A:

1. CAPE COD (ALL TOWNS)

2. PLYMOUTH (SOUTH OF RTE. 3A)

7014, 7079, 7080, 7090, 7091, 7092, 7093, 7094, 7095, 7096, 7097, 7108, 7178

3. MARTHA'S VINEYARD

4. NANTUCKET

***GROUP 3B:

5. PERMANENTS 2 & 189

1086, 1087, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092,

1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104,

1105, 1106, 1107, 1108, 1113, 1114, 1116, 2196, 2197, 2198

2010 AXLE CORRECTION FACTORS

ROAD INVENTORY

FUNCTIONAL CLASSIFICATION

FACTOR

RURAL

1 0.93

2 0.97

3 0.98

0,5,6 0.98

URBAN

1 0.96

2,3 0.97

5 0.98

0,6 0.98

I-84 0.78

ROUND OFF

0 - 999.....10

> 1,000.....100

Apply I-84 factor to stations:

3290, 3921, 3929

Crash Data Worksheets

MASS HIGHWAYMassDOT Crash Report for LITTLETON for the year 2008

MASS HIGHWAY MassDOT Highway Crash Report for ACTON in the year 2007

Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection

MassDOT MassDOT Crash Report for ACTON for the year 2008

Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection
2383864	ACTON	28-Sep-2008	3:12 AM	Property damage only (none injured)	1	0	0	Single vehicle crash	V1: Travelling straight ahead	V1: Westbound	V1: Collision with motor vehicle in traffic	V1: Light truck (van, mini-van, panel pickup, sport utility) with other motor vehicle	Wet	Dark - lighted roadway	Rain/Fog, smog, smoke	GREAT ROAD Rte 2A / NASHOBA ROAD

MassDOT MassDOT Crash Report for ACTON for the year 2009

Crash Number	City/Town Name	Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior to Crash	Vehicle Travel Directions	Most Harmful Events	Vehicle Configuration	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection
2430393	ACTON	04-Jan-2009	3:44 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: Westbound / V2: Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	V1: Passenger car / V2: Passenger car	Dry	Daylight	Clear/Clear	NAGOG PARK DRIVE / GREAT ROAD Rte 2A W / NASHOBA ROAD

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Littleton COUNT DATE : May 2011

DISTRICT : 3 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Great Road

ST #

MINOR STREET(S) : Mannion Place

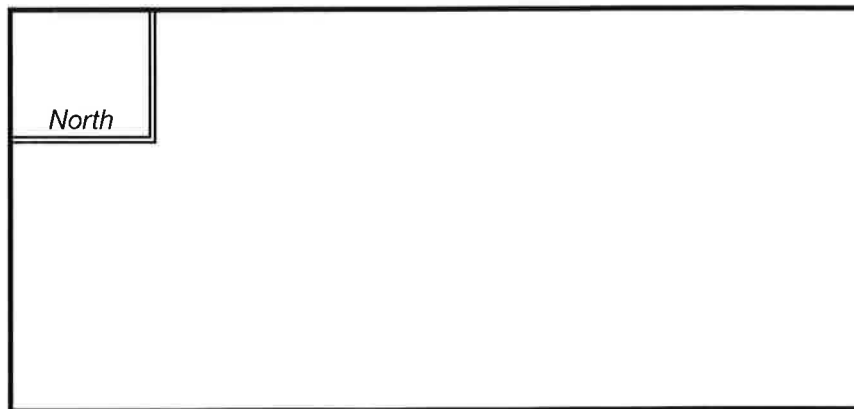
ST #

ST #

ST #

ST #

**INTERSECTION
DIAGRAM**
(Label Approaches)



INTERSECTION
REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	600	954	8			1,562

" 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 : _____

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Littleton COUNT DATE : May 2011

DISTRICT : 3 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Great Road

ST #

MINOR STREET(S) : Nashoba Road

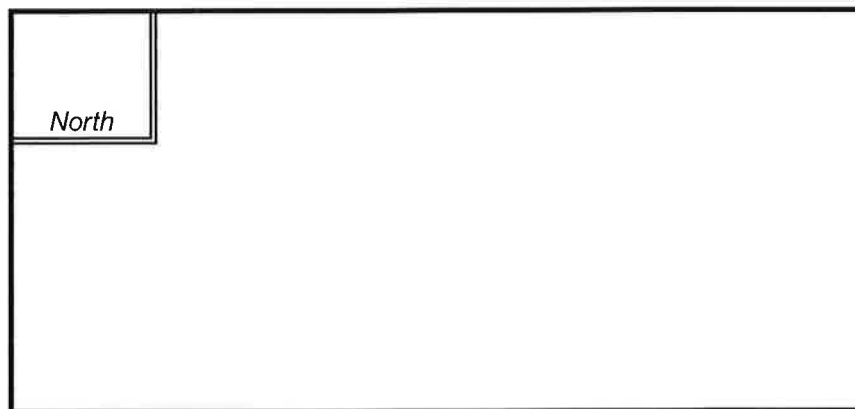
ST #

ST #

ST #

ST #

**INTERSECTION
DIAGRAM**
(Label Approaches)



INTERSECTION
REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	EB	WB	NB	SB		
VOLUMES (PM) :	608	1,046	111			1,765

" 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 : _____

Traffic Growth Data

SECTION I - CONTINUOUS COUNTING STATION MONTHLY AVERAGE DAILY TRAFFIC

STATION 4094 - TEWKSBURY - RTE.1-495 - SOUTH OF RTE. 133

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
07	102,351	102,627	106,577	110,198	118,938	121,809	127,805	133,457	119,013	118,605	115,154	106,941	115,290
	-1%	-2%	4%	2%	-4%	-1%	-3%	-6%	-4%	-2%	-8%	2%	-2%
08	101,374	101,031	111,000	112,165	114,506	120,016	123,483	125,679	114,656	116,648	105,753	108,715	112,919
	-5%	3%	-6%	2%	0%	2%	3%	2%	3%	-2%	1%	-7%	0%
09	96,811	103,712	104,446	114,001	115,035	122,117	127,687	128,491	118,421	113,868	106,337	100,903	112,652

STATION 4170 - CHELMSFORD - RTE.1-495 - NORTH OF RTE. 4

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
06	100,000	102,000	102,000	104,000	103,243	108,638	117,000	117,356	105,105	102,950	98,868	92,481	104,470
	-8%	-7%	-8%	-8%	1%	1%	-3%	2%	1%	2%	-3%	-5%	-3%
07	91,950	94,873	94,099	95,258	103,802	109,192	113,808	120,103	106,428	105,467	95,598	88,019	101,550
	-10%	-6%	1%	1%	-4%	-4%	-5%	-7%	-3%	-3%	-3%	-2%	-4%
08	82,908	89,494	95,000	96,549	99,670	104,487	107,612	111,258	103,346	101,899	92,885	86,352	97,622
	4%	0%	-7%	1%	-1%	1%	3%	1%	0%	-1%	1%	4%	1%
09	86,006	89,523	88,806	97,307	98,894	105,468	111,003	112,512	103,316	100,554	94,083	90,186	98,138

ITALICS = ESTIMATED DATA
MADT

Trip Generation Worksheets

Proposed Townhouses, Littleton, MA

Land Use Code (LUC) 230 - Residential Condominium/Townhouse

Source: Institute of Transportation Engineers (ITE) - 8th Edition

Average Vehicle Trips Ends vs.: Dwelling Units

Independent Variable (X): 142 DU

AVERAGE WEEKDAY DAILY

$$\ln T = 0.87 * \ln (X) + 2.46 \quad R^2 = 0.80$$

$$\ln T = 0.87 * \ln (142) + 2.46$$

$$\ln T = 6.77$$

$$T = 872.68$$

$$T = 872 \quad \text{vehicle trips}$$

with 50% (436 vpd) entering and 50% (436 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$\ln T = 0.80 * \ln (X) + 0.26 \quad R^2 = 0.76$$

$$\ln T = 0.80 * \ln (142) + 0.26$$

$$\ln T = 4.22$$

$$T = 68.35$$

$$T = 68 \quad \text{vehicle trips}$$

with 17% (12 vph) entering and 83% (56 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$\ln T = 0.82 * \ln (X) + 0.32 \quad R^2 = 0.80$$

$$\ln T = 0.82 * \ln (142) + 0.32$$

$$\ln T = 4.38$$

$$T = 80.14$$

$$T = 80 \quad \text{vehicle trips}$$

with 67% (54 vph) entering and 33% (26 vph) exiting.

SATURDAY DAILY

$$T = 3.62 * (X) + 427.93 \quad R^2 = 0.84$$

$$T = 3.62 * (142) + 427.93$$

$$T = 941.97$$

$$T = 942 \quad \text{vehicle trips}$$

with 50% (471 vpd) entering and 50% (471 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$$T = 0.29 * (X) + 42.63 \quad R^2 = 0.84$$

$$T = 0.29 * (142) + 42.63$$

$$T = 83.81$$

$$T = 84 \quad \text{vehicle trips}$$

with 54% (45 vph) entering and 46% (39 vph) exiting.

Proposed Townhouses, Littleton, MA

Land Use Code (LUC) 230 - Residential Condominium/Townhouse

Source: Institute of Transportation Engineers (ITE) - 8th Edition

Average Vehicle Trips Ends vs.: Dwelling Units

Independent Variable (X): 142 DU

SUNDAY

$$T = 3.13 * (X) + 357.26 \quad R^2 = 0.88$$

$$T = 3.13 * (142) + 357.26$$

$$T = 801.72$$

T = 670 vehicle trips
with 50% (335 vpd) entering and 50% (335 vpd) exiting.

SUNDAY PEAK HOUR OF GENERATOR

$$T = 0.23 * (X) + 50.01 \quad R^2 = 0.78$$

$$T = 0.23 * (142) + 50.01$$

$$T = 82.67$$

T = 83 vehicle trips
with 49% (41 vph) entering and 51% (42 vph) exiting.

Proposed Apartments, Littleton, MA

Land Use Code (LUC) 220 - Apartments

Source: Institute of Transportation Engineers (ITE) - 8th Edition

Average Vehicle Trips Ends vs: Dwelling units
Independent Variable (X): 48

AVERAGE WEEKDAY DAILY

$$T = 6.06 * (X) + 123.56 \quad R^2 = 0.87$$

$$T = 6.06 * 48 + 123.56$$

$$T = 414.44$$

$$T = 414 \text{ vehicle trips} \quad 8.625$$

with 50% (207 vpd) entering and 50% (207 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.49 * (X) + 3.73 \quad R^2 = 0.83$$

$$T = 0.49 * 48 + 3.73$$

$$T = 27.25$$

$$T = 27 \text{ vehicle trips}$$

with 20% (5 vph) entering and 80% (22 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.55 * (X) + 17.65 \quad R^2 = 0.77$$

$$T = 0.55 * 48 + 17.65$$

$$T = 44.05$$

$$T = 44 \text{ vehicle trips}$$

with 65% (29 vph) entering and 35% (15 vph) exiting.

SATURDAY DAILY

$$T = 7.85 * (X) - 256.19 \quad R^2 = 0.85$$

$$T = 7.85 * 48 - 256.19$$

$$T = 120.61$$

$$T = 120 \text{ vehicle trips}$$

with 50% (60 vpd) entering and 50% (60 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$$T = 0.41 * (X) + 19.23 \quad R^2 = 0.56$$

$$T = 0.41 * 48 + 19.23$$

$$T = 38.91$$

$$T = 39 \text{ vehicle trips}$$

with 53% (21 vph) entering and 47% (18 vph) exiting.

(same distribution split as ITE LUC 210 during the Saturday peak hour of generator)

Proposed Apartments, Littleton, MA

Land Use Code (LUC) 220 - Apartments

Source: Institute of Transportation Engineers (ITE) - 8th Edition

Average Vehicle Trips Ends vs: Dwelling units

Independent Variable (X): 48

SUNDAY DAILY

$$T = 6.42 * (X) - 101.12 \quad R^2 = 0.82$$

$$T = 6.42 * 48 - 101.12$$

$$T = 207.04$$

T = 208 vehicle trips

with 50% (104 vpd) entering and 50% (104 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$$T = 0.51 * (X) \quad \text{No Formula. Average Rate}$$

$$T = 0.51 * 48$$

$$T = 24.48$$

T = 24 vehicle trips

with 53% (13 vph) entering and 47% (11 vph) exiting.

(same distribution split as ITE LUC 210 during the Sunday peak hour of generator)

Trip Distribution Gravity Model

Residence MCD/County to Workplace MCD/County Flows for Massachusetts: 2000
Sorted by Residence State-County, or State-County-County Subdivision (in 12 states)

Res State	Res County	Res MCD	Res (CJMSA)	Res PMSA	Residence State-County-MCD Name	Work State	Work County	Work MCD	Work (CJMSA)	Work PMSA	Workplace State-County-MCD Name	Count
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	005	16425	1122	5400		Dartmouth town Bristol Co. MA	8
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	01465	1122	4160		Andover town Essex Co. MA	37
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	05595	1122	1120		Beverly city Essex Co. MA	9
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	29405	1122	4160		Haverhill city Essex Co. MA	27
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	34550	1122	4160		Lawrence city Essex Co. MA	8
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	37560	1122	1120		Lynnfield town Essex Co. MA	8
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	40710	1122	4160		Methuen city Essex Co. MA	8
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	46365	1122	4160		North Andover town Essex Co.	27
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	52490	1122	1120		Peabody city Essex Co. MA	14
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	59105	1122	1120		Salem city Essex Co. MA	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	009	60015	1122	1120		Saugus town Essex Co. MA	9
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	011	61135	9999	9999		Shelburne town Franklin Co. M#	10
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	013	52105	8000	9999		Palmer town Hampden Co. MA	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	00380	1122	1120		Acton town Middlesex Co. MA	295
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	01605	1122	1120		Arlington town Middlesex Co. M	24
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	03005	1122	1120		Ayer town Middlesex Co. MA	41
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	04615	1122	1120		Bedford town Middlesex Co. M#	41
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	05070	1122	1120		Belmont town Middlesex Co. M#	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	05805	1122	4560		Billerica town Middlesex Co. M#	43
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	07350	1122	1120		Boxbor. town Middlesex Co. M#	21
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	09840	1122	1120		Burlington town Middlesex Co. I	30
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	11000	1122	1120		Cambridge city Middlesex Co. I	103
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	11525	1122	1120		Carlisle town Middlesex Co. MA	27
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	13135	1122	4560		Chelmsford town Middlesex Co.	112
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	15060	1122	1120		Concord town Middlesex Co. M.	294
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	21990	1122	1120		Everett city Middlesex Co. MA	36
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	24925	1122	1120		Framingham town Middlesex Co.	65
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	27480	1122	4560		Groton town Middlesex Co. MA	62
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	30700	1122	1120		Holliston town Middlesex Co. M.	8
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	31085	1122	1120		Hopkinton town Middlesex Co. I	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	31540	1122	1120		Hudson town Middlesex Co. M#	33
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	35215	1122	1120		Lexington town Middlesex Co. I	119
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	35425	1122	1120		Lincoln town Middlesex Co. MA	31
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	35950	1122	1120		Littleton town Middlesex Co. M#	801
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	37000	1122	4560		Lowell city Middlesex Co. MA	139
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	38715	1122	1120		Marlbor. city Middlesex Co. MA	94
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	39625	1122	1120		Maynard town Middlesex Co. M	90
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	39835	1122	1120		Medford city Middlesex Co. MA	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	43895	1122	1120		Natick town Middlesex Co. MA	20
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	45560	1122	1120		Newton city Middlesex Co. MA	27
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	48955	1122	1120		North Reading town Middlesex	34
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	52805	1122	4560		Pepperell town Middlesex Co. I	15
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	56130	1122	1120		Reading town Middlesex Co. M#	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	61590	1122	1120		Shirley town Middlesex Co. MA	23
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	62535	1122	1120		Somerville city Middlesex Co. I	21
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	68050	1122	1120		Stow town Middlesex Co. MA	30
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	68260	1122	1120		Sudbury town Middlesex Co. M#	40
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	69415	1122	4560		Tewksbury town Middlesex Co.	31
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	70360	1122	1120		Townsend town Middlesex Co. I	34
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	71025	1122	4560		Tyngsbor. town Middlesex Co. I	13
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	72215	1122	1120		Wakefield town Middlesex Co. I	9
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	72600	1122	1120		Waltham city Middlesex Co. M#	97
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	73440	1122	1120		Watertown city Middlesex Co. I	21
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	73790	1122	1120		Wayland town Middlesex Co. M	7
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	76135	1122	4560		Westford town Middlesex Co. I	251
25	017	35950	1122	1120	Littleton town Middlesex Co. M# 025	017	77255	1122	1120		Weston town Middlesex Co. M#	13

Route 119 E (east of Nashob Road)

Nashoba Road

Route 119 W (west of I-495)

I-495 NB

I-495 SB

I-495 NB via Powers Road

8

37

27

8

8

27

14

7

9

10

7

295

24

41

41

7

21

103

27

294

36

65

119

31

90

7

20

27

15

7

23

34

21

30

40

31

13

9

34

21

97

21

7

251

13

Route 119 E
(east of Nashoba
Road)

Nashoba
Road

Route 119 W
(west of I-495)

I-495 NB

I-495 NB via
Powers Road

I-495 SB

Residence MCD/County to Workplace MCD/County Flows for Massachusetts: 2000
Sorted by Residence State-County, or State-County Subdivision (in 12 states)

[illegible]

Capacity Analysis Worksheets

5: Great Road & Nashoba Rd (R)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	849	0	44	503	0	93
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.92	0.69	0.95	0.92	0.71
Hourly flow rate (vph)	913	0	64	529	0	131
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				268		
pX, platoon unblocked						
vC, conflicting volume			913		1570	913
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			913		1570	913
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			91		100	60
cM capacity (veh/h)			711		112	330
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	913	593	131			
Volume Left	0	64	0			
Volume Right	0	0	131			
cSH	1700	711	330			
Volume to Capacity	0.54	0.09	0.40			
Queue Length 95th (ft)	0	7	46			
Control Delay (s)	0.0	2.4	22.9			
Lane LOS		A	C			
Approach Delay (s)	0.0	2.4	22.9			
Approach LOS			C			
Intersection Summary						
Average Delay		2.7				
Intersection Capacity Utilization		66.2%	ICU Level of Service		C	
Analysis Period (min)		15				

7: Great Road & Nashoba Road (L)
HCM Unsignalized Intersection Capacity Analysis

2011 Existing AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	849	26	0	503	23	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.81	0.92	0.95	0.72	0.92
Hourly flow rate (vph)	913	32	0	529	32	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				351		
pX, platoon unblocked						
vC, conflicting volume			945		1458	929
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			945		1458	929
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		77	100
cM capacity (veh/h)			734		141	327
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	945	529	32			
Volume Left	0	0	32			
Volume Right	32	0	0			
cSH	1700	1700	141			
Volume to Capacity	0.56	0.31	0.23			
Queue Length 95th (ft)	0	0	21			
Control Delay (s)	0.0	0.0	37.9			
Lane LOS			E			
Approach Delay (s)	0.0	0.0	37.9			
Approach LOS			E			
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			56.3%	ICU Level of Service	B	
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

9: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2011 Existing AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	870	0	0	526	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.63
Hourly flow rate (vph)	946	0	0	548	0	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				664		
pX, platoon unblocked						
vC, conflicting volume			946		1494	946
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			946		1494	946
tC, single (s)			4.1		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			100		100	97
cM capacity (veh/h)			734		137	294
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	946	548	8			
Volume Left	0	0	0			
Volume Right	0	0	8			
cSH	1700	734	294			
Volume to Capacity	0.56	0.00	0.03			
Queue Length 95th (ft)	0	0	2			
Control Delay (s)	0.0	0.0	17.6			
Lane LOS			C			
Approach Delay (s)	0.0	0.0	17.6			
Approach LOS			C			
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			55.8%	ICU Level of Service		B
Analysis Period (min)			15			

13: Great Road & Grist Mill Road (E)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	858	521	5	12	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.89	0.94	0.63	0.75	0.75
Hourly flow rate (vph)	8	964	554	8	16	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	562				1538	558
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	562				1538	558
tC, single (s)	4.3				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.6	3.3
p0 queue free %	99				87	96
cM capacity (veh/h)	939				122	533
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	972	562	36			
Volume Left	8	0	16			
Volume Right	0	8	20			
cSH	939	1700	214			
Volume to Capacity	0.01	0.33	0.17			
Queue Length 95th (ft)	1	0	15			
Control Delay (s)	0.2	0.0	25.2			
Lane LOS	A		D			
Approach Delay (s)	0.2	0.0	25.2			
Approach LOS			D			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization		59.9%		ICU Level of Service		B
Analysis Period (min)		15				

15: Great Road & Mannion Place
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			0.0%	ICU Level of Service	A	
Analysis Period (min)			15			

17: Great Road & Grist Mill Road (W)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	855	533	0	5	24
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.63	0.95	0.93	0.92	0.31	0.67
Hourly flow rate (vph)	16	900	573	0	16	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	573				1505	573
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	573				1505	573
tC, single (s)	4.2				6.6	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
p0 queue free %	98				86	93
cM capacity (veh/h)	961				119	508
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	916	573	52			
Volume Left	16	0	16			
Volume Right	0	0	36			
cSH	961	1700	253			
Volume to Capacity	0.02	0.34	0.21			
Queue Length 95th (ft)	1	0	19			
Control Delay (s)	0.5	0.0	22.9			
Lane LOS	A		C			
Approach Delay (s)	0.5	0.0	22.9			
Approach LOS			C			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization		63.0%		ICU Level of Service		B
Analysis Period (min)		15				

5: Great Road & Nashoba Rd (R)
 HCM Unsignalized Intersection Capacity Analysis

2016 No-Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	904	0	45	563	0	95
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.92	0.69	0.95	0.92	0.71
Hourly flow rate (vph)	972	0	65	593	0	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				268		
pX, platoon unblocked						
vC, conflicting volume			972		1695	972
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			972		1695	972
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			90		100	56
cM capacity (veh/h)			674		93	305
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	972	658	134			
Volume Left	0	65	0			
Volume Right	0	0	134			
cSH	1700	674	305			
Volume to Capacity	0.57	0.10	0.44			
Queue Length 95th (ft)	0	8	53			
Control Delay (s)	0.0	2.5	25.7			
Lane LOS		A	D			
Approach Delay (s)	0.0	2.5	25.7			
Approach LOS			D			
Intersection Summary						
Average Delay		2.9				
Intersection Capacity Utilization		70.1%	ICU Level of Service	C		
Analysis Period (min)		15				

7: Great Road & Nashoba Road (L)
HCM Unsignalized Intersection Capacity Analysis

2016 No-Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	904	27	0	563	24	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.81	0.92	0.95	0.72	0.92
Hourly flow rate (vph)	972	33	0	593	33	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				351		
pX, platoon unblocked						
vC, conflicting volume			1005		1581	989
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1005		1581	989
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		72	100
cM capacity (veh/h)			697		118	302
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	1005	593	33			
Volume Left	0	0	33			
Volume Right	33	0	0			
cSH	1700	1700	118			
Volume to Capacity	0.59	0.35	0.28			
Queue Length 95th (ft)	0	0	27			
Control Delay (s)	0.0	0.0	46.9			
Lane LOS			E			
Approach Delay (s)	0.0	0.0	46.9			
Approach LOS			E			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			59.2%	ICU Level of Service		B
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

9: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2016 No-Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	926	0	0	586	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.63
Hourly flow rate (vph)	1007	0	0	610	0	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				664		
pX, platoon unblocked						
vC, conflicting volume			1007		1617	1007
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1007		1617	1007
tC, single (s)			4.1		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			100		100	97
cM capacity (veh/h)			696		115	270
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	1007	610	8			
Volume Left	0	0	0			
Volume Right	0	0	8			
cSH	1700	696	270			
Volume to Capacity	0.59	0.00	0.03			
Queue Length 95th (ft)	0	0	2			
Control Delay (s)	0.0	0.0	18.7			
Lane LOS			C			
Approach Delay (s)	0.0	0.0	18.7			
Approach LOS			C			
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			58.7%	ICU Level of Service		B
Analysis Period (min)			15			

13: Great Road & Grist Mill Road (E)
 HCM Unsignalized Intersection Capacity Analysis

2016 No-Build AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	914	581	5	12	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.89	0.94	0.63	0.75	0.75
Hourly flow rate (vph)	8	1027	618	8	16	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	626				1665	622
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	626				1665	622
tC, single (s)	4.3				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.6	3.3
p0 queue free %	99				84	96
cM capacity (veh/h)	887				102	490
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	1035	626	36			
Volume Left	8	0	16			
Volume Right	0	8	20			
cSH	887	1700	182			
Volume to Capacity	0.01	0.37	0.20			
Queue Length 95th (ft)	1	0	18			
Control Delay (s)	0.3	0.0	29.6			
Lane LOS	A		D			
Approach Delay (s)	0.3	0.0	29.6			
Approach LOS			D			
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		62.9%		ICU Level of Service		B
Analysis Period (min)		15				

15: Great Road & Mannion Place
 HCM Unsignalized Intersection Capacity Analysis

2016 No-Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			0.0%	ICU Level of Service	A	
Analysis Period (min)			15			

17: Great Road & Grist Mill Road (W)
 HCM Unsignalized Intersection Capacity Analysis

2016 No-Build AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	911	593	0	5	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.63	0.95	0.93	0.92	0.31	0.67
Hourly flow rate (vph)	16	959	638	0	16	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	638				1628	638
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	638				1628	638
tC, single (s)	4.2				6.6	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
p0 queue free %	98				84	92
cM capacity (veh/h)	909				100	466
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	975	638	53			
Volume Left	16	0	16			
Volume Right	0	0	37			
cSH	909	1700	221			
Volume to Capacity	0.02	0.38	0.24			
Queue Length 95th (ft)	1	0	23			
Control Delay (s)	0.5	0.0	26.4			
Lane LOS	A		D			
Approach Delay (s)	0.5	0.0	26.4			
Approach LOS			D			
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		65.9%		ICU Level of Service		C
Analysis Period (min)		15				

5: Great Road & Nashoba Rd (R)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	938	0	45	570	0	95
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.92	0.69	0.95	0.92	0.71
Hourly flow rate (vph)	1009	0	65	600	0	134
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				268		
pX, platoon unblocked						
vC, conflicting volume			1009		1739	1009
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1009		1739	1009
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			90		100	54
cM capacity (veh/h)			653		87	290
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	1009	665	134			
Volume Left	0	65	0			
Volume Right	0	0	134			
cSH	1700	653	290			
Volume to Capacity	0.59	0.10	0.46			
Queue Length 95th (ft)	0	8	57			
Control Delay (s)	0.0	2.6	27.6			
Lane LOS		A	D			
Approach Delay (s)	0.0	2.6	27.6			
Approach LOS			D			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			70.5%	ICU Level of Service	C	
Analysis Period (min)			15			

7: Great Road & Nashoba Road (L)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	938	28	0	570	24	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.81	0.92	0.95	0.72	0.92
Hourly flow rate (vph)	1009	35	0	600	33	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				351		
pX, platoon unblocked						
vC, conflicting volume			1043		1626	1026
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1043		1626	1026
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		70	100
cM capacity (veh/h)			675		111	288
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	1043	600	33			
Volume Left	0	0	33			
Volume Right	35	0	0			
cSH	1700	1700	111			
Volume to Capacity	0.61	0.35	0.30			
Queue Length 95th (ft)	0	0	29			
Control Delay (s)	0.0	0.0	50.7			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	50.7			
Approach LOS			F			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			61.1%	ICU Level of Service		B
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

9: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	961	0	0	594	0	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.96	0.92	0.63
Hourly flow rate (vph)	1045	0	0	619	0	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				664		
pX, platoon unblocked						
vC, conflicting volume			1045		1663	1045
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1045		1663	1045
tC, single (s)			4.1		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			100		100	97
cM capacity (veh/h)			674		108	257
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	1045	619	8			
Volume Left	0	0	0			
Volume Right	0	0	8			
cSH	1700	674	257			
Volume to Capacity	0.61	0.00	0.03			
Queue Length 95th (ft)	0	0	2			
Control Delay (s)	0.0	0.0	19.5			
Lane LOS			C			
Approach Delay (s)	0.0	0.0	19.5			
Approach LOS			C			
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			60.6%	ICU Level of Service		B
Analysis Period (min)			15			

11: Great Road & Site Driveway HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	926	586	8	35	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	1007	637	9	38	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)			846			
pX, platoon unblocked						
vC, conflicting volume	646				1667	641
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	646				1667	641
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				64	90
cM capacity (veh/h)	949				106	478
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	1016	646	85			
Volume Left	10	0	38			
Volume Right	0	9	47			
cSH	949	1700	186			
Volume to Capacity	0.01	0.38	0.46			
Queue Length 95th (ft)	1	0	54			
Control Delay (s)	0.3	0.0	39.7			
Lane LOS	A		E			
Approach Delay (s)	0.3	0.0	39.7			
Approach LOS			E			
Intersection Summary						
Average Delay			2.1			
Intersection Capacity Utilization			67.2%	ICU Level of Service		C
Analysis Period (min)			15			

13: Great Road & Grist Mill Road (E)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	923	624	5	12	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.89	0.94	0.63	0.75	0.75
Hourly flow rate (vph)	8	1037	664	8	16	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	672				1721	668
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	672				1721	668
tC, single (s)	4.3				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.6	3.3
p0 queue free %	99				83	96
cM capacity (veh/h)	852				94	462
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	1045	672	36			
Volume Left	8	0	16			
Volume Right	0	8	20			
cSH	852	1700	169			
Volume to Capacity	0.01	0.40	0.21			
Queue Length 95th (ft)	1	0	19			
Control Delay (s)	0.3	0.0	32.0			
Lane LOS	A		D			
Approach Delay (s)	0.3	0.0	32.0			
Approach LOS			D			
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization		63.4%		ICU Level of Service		B
Analysis Period (min)		15				

15: Great Road & Mannion Place
 HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			0.0%	ICU Level of Service		A
Analysis Period (min)			15			

17: Great Road & Grist Mill Road (W)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	920	636	0	5	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.63	0.95	0.93	0.92	0.31	0.67
Hourly flow rate (vph)	16	968	684	0	16	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	684				1684	684
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	684				1684	684
tC, single (s)	4.2				6.6	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.7	3.4
p0 queue free %	98				82	91
cM capacity (veh/h)	873				92	439
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	984	684	53			
Volume Left	16	0	16			
Volume Right	0	0	37			
cSH	873	1700	205			
Volume to Capacity	0.02	0.40	0.26			
Queue Length 95th (ft)	1	0	25			
Control Delay (s)	0.5	0.0	28.6			
Lane LOS	A		D			
Approach Delay (s)	0.5	0.0	28.6			
Approach LOS			D			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			66.4%	ICU Level of Service		C
Analysis Period (min)			15			

	→	←	↘
Lane Group	EBT	WBT	SBL
Lane Group Flow (vph)	1017	646	85
v/c Ratio	0.66	0.42	0.31
Control Delay	7.4	3.7	16.7
Queue Delay	0.0	0.0	0.0
Total Delay	7.4	3.7	16.7
Queue Length 50th (ft)	144	62	14
Queue Length 95th (ft)	#369	137	45
Internal Link Dist (ft)	515	102	131
Turn Bay Length (ft)			
Base Capacity (vph)	1522	1527	573
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.67	0.42	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

11: Great Road & Site Driveway HCM Signalized Intersection Capacity Analysis

2016 Build AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	9	926	586	8	35	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	1.00		0.93	
Flt Protected		1.00	1.00		0.98	
Satd. Flow (prot)		1827	1824		1720	
Flt Permitted		0.99	1.00		0.98	
Satd. Flow (perm)		1818	1824		1720	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	1007	637	9	38	47
RTOR Reduction (vph)	0	0	0	0	43	0
Lane Group Flow (vph)	0	1017	646	0	42	0
Heavy Vehicles (%)	0%	4%	4%	0%	0%	0%
Turn Type	Perm					
Protected Phases		2	6		4	
Permitted Phases	2					
Actuated Green, G (s)		43.2	43.2		4.3	
Effective Green, g (s)		43.2	43.2		4.3	
Actuated g/C Ratio		0.78	0.78		0.08	
Clearance Time (s)		4.0	4.0		4.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		1415	1420		133	
v/s Ratio Prot			0.35		c0.02	
v/s Ratio Perm		c0.56				
v/c Ratio		0.72	0.45		0.31	
Uniform Delay, d1		3.1	2.1		24.2	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		1.8	0.2		1.4	
Delay (s)		4.9	2.3		25.6	
Level of Service		A	A		C	
Approach Delay (s)		4.9	2.3		25.6	
Approach LOS		A	A		C	
Intersection Summary						
HCM Average Control Delay			4.9	HCM Level of Service		A
HCM Volume to Capacity ratio			0.68			
Actuated Cycle Length (s)			55.5	Sum of lost time (s)		8.0
Intersection Capacity Utilization			67.2%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

11: Great Road & Site Driveway
Timing Report, Sorted By Phase

2016 Build AM Peak Hour



Phase Number	2	4	6
Movement	EBTL	SBL	WBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Min	None	Min
Maximum Split (s)	40	20	40
Maximum Split (%)	66.7%	33.3%	66.7%
Minimum Split (s)	20	20	20
Yellow Time (s)	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	11	11	11
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	40	0
End Time (s)	40	0	40
Yield/Force Off (s)	36	56	36
Yield/Force Off 170(s)	36	45	36
Local Start Time (s)	0	40	0
Local Yield (s)	36	56	36
Local Yield 170(s)	36	45	36

Intersection Summary

Cycle Length	60
Control Type	Actuated-Uncoordinated
Natural Cycle	60

Splits and Phases: 11: Great Road & Site Driveway

 02	 04
40 s	20 s
 06	
40 s	

5: Great Road & Nashoba Rd (R)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	578	0	109	937	0	94
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.76	0.89	0.92	0.87
Hourly flow rate (vph)	628	0	143	1053	0	108
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				268		
pX, platoon unblocked						
vC, conflicting volume			628		1968	628
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			628		1968	628
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		100	78
cM capacity (veh/h)			959		59	486
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	628	1196	108			
Volume Left	0	143	0			
Volume Right	0	0	108			
cSH	1700	959	486			
Volume to Capacity	0.37	0.15	0.22			
Queue Length 95th (ft)	0	13	21			
Control Delay (s)	0.0	4.4	14.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	4.4	14.5			
Approach LOS			B			
Intersection Summary						
Average Delay		3.5				
Intersection Capacity Utilization		92.4%		ICU Level of Service		F
Analysis Period (min)		15				

7: Great Road & Nashoba Road (L)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	578	30	0	937	17	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.75	0.92	0.89	0.61	0.92
Hourly flow rate (vph)	628	40	0	1053	28	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				351		
pX, platoon unblocked						
vC, conflicting volume			668		1701	648
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			668		1701	648
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		73	100
cM capacity (veh/h)			931		102	474
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	668	1053	28			
Volume Left	0	0	28			
Volume Right	40	0	0			
cSH	1700	1700	102			
Volume to Capacity	0.39	0.62	0.27			
Queue Length 95th (ft)	0	0	25			
Control Delay (s)	0.0	0.0	52.9			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	52.9			
Approach LOS			F			
Intersection Summary						
Average Delay		0.8				
Intersection Capacity Utilization		59.3%	ICU Level of Service	B		
Analysis Period (min)		15				

Intersection Sign configuration not allowed in HCM analysis.

9: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2011 Existing PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	600	0	4	950	0	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.92	0.50	0.85	0.92	0.40
Hourly flow rate (vph)	750	0	8	1118	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				664		
pX, platoon unblocked						
vC, conflicting volume			750		1884	750
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			750		1884	750
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	95
cM capacity (veh/h)			868		78	415
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	750	1126	20			
Volume Left	0	8	0			
Volume Right	0	0	20			
cSH	1700	868	415			
Volume to Capacity	0.44	0.01	0.05			
Queue Length 95th (ft)	0	1	4			
Control Delay (s)	0.0	0.3	14.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	14.1			
Approach LOS			B			
Intersection Summary						
Average Delay		0.3				
Intersection Capacity Utilization		56.5%	ICU Level of Service	B		
Analysis Period (min)		15				

13: Great Road & Grist Mill Road (E)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	595	937	13	5	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.80	0.86	0.65	0.42	0.60
Hourly flow rate (vph)	24	744	1090	20	12	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1110				1891	1100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1110				1891	1100
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				84	92
cM capacity (veh/h)	637				75	261
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	768	1110	32			
Volume Left	24	0	12			
Volume Right	0	20	20			
cSH	637	1700	135			
Volume to Capacity	0.04	0.65	0.24			
Queue Length 95th (ft)	3	0	22			
Control Delay (s)	1.0	0.0	39.6			
Lane LOS	A		E			
Approach Delay (s)	1.0	0.0	39.6			
Approach LOS			E			
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization		60.1%		ICU Level of Service		B
Analysis Period (min)		15				

15: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2011 Existing PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		0.0%		ICU Level of Service		A
Analysis Period (min)		15				

17: Great Road & Grist Mill Road (W)
 HCM Unsignalized Intersection Capacity Analysis

2011 Existing PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	26	623	949	8	2	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.81	0.89	0.50	0.50	0.70
Hourly flow rate (vph)	40	769	1066	16	4	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1082				1923	1074
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1082				1923	1074
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	94				94	92
cM capacity (veh/h)	652				70	261
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	809	1082	24			
Volume Left	40	0	4			
Volume Right	0	16	20			
cSH	652	1700	179			
Volume to Capacity	0.06	0.64	0.13			
Queue Length 95th (ft)	5	0	11			
Control Delay (s)	1.7	0.0	28.2			
Lane LOS	A		D			
Approach Delay (s)	1.7	0.0	28.2			
Approach LOS			D			
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			63.9%	ICU Level of Service		B
Analysis Period (min)			15			

5: Great Road & Nashoba Rd (R)
HCM Unsignalized Intersection Capacity Analysis

2016 No-Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	694	0	112	1052	0	96
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.76	0.89	0.92	0.87
Hourly flow rate (vph)	754	0	147	1182	0	110
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				268		
pX, platoon unblocked						
vC, conflicting volume			754		2231	754
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			754		2231	754
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		100	73
cM capacity (veh/h)			860		40	412
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	754	1329	110			
Volume Left	0	147	0			
Volume Right	0	0	110			
cSH	1700	860	412			
Volume to Capacity	0.44	0.17	0.27			
Queue Length 95th (ft)	0	15	27			
Control Delay (s)	0.0	6.1	16.9			
Lane LOS		A	C			
Approach Delay (s)	0.0	6.1	16.9			
Approach LOS			C			
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization		104.8%		ICU Level of Service		G
Analysis Period (min)		15				

7: Great Road & Nashoba Road (L)
HCM Unsignalized Intersection Capacity Analysis

2016 No-Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	694	30	0	1065	17	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.75	0.92	0.89	0.61	0.92
Hourly flow rate (vph)	754	40	0	1197	28	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				351		
pX, platoon unblocked						
vC, conflicting volume			794		1971	774
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			794		1971	774
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		60	100
cM capacity (veh/h)			836		70	401
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	794	1197	28			
Volume Left	0	0	28			
Volume Right	40	0	0			
cSH	1700	1700	70			
Volume to Capacity	0.47	0.70	0.40			
Queue Length 95th (ft)	0	0	39			
Control Delay (s)	0.0	0.0	87.9			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	87.9			
Approach LOS			F			
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		66.1%		ICU Level of Service		C
Analysis Period (min)		15				

Intersection Sign configuration not allowed in HCM analysis.

9: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2016 No-Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	716	0	4	1065	0	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.92	0.50	0.85	0.92	0.40
Hourly flow rate (vph)	895	0	8	1253	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				664		
pX, platoon unblocked						
vC, conflicting volume			895		2164	895
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			895		2164	895
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	94
cM capacity (veh/h)			767		52	342
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	895	1261	20			
Volume Left	0	8	0			
Volume Right	0	0	20			
cSH	1700	767	342			
Volume to Capacity	0.53	0.01	0.06			
Queue Length 95th (ft)	0	1	5			
Control Delay (s)	0.0	0.4	16.2			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.4	16.2			
Approach LOS			C			
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			62.6%	ICU Level of Service		B
Analysis Period (min)			15			

13: Great Road & Grist Mill Road (E)
 HCM Unsignalized Intersection Capacity Analysis

2016 No-Build PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	711	1052	13	5	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.80	0.86	0.65	0.42	0.60
Hourly flow rate (vph)	24	889	1223	20	12	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1243				2170	1233
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1243				2170	1233
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				76	91
cM capacity (veh/h)	567				50	218
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	913	1243	32			
Volume Left	24	0	12			
Volume Right	0	20	20			
cSH	567	1700	97			
Volume to Capacity	0.04	0.73	0.33			
Queue Length 95th (ft)	3	0	32			
Control Delay (s)	1.3	0.0	59.6			
Lane LOS	A		F			
Approach Delay (s)	1.3	0.0	59.6			
Approach LOS			F			
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization		66.2%		ICU Level of Service		C
Analysis Period (min)		15				

15: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2016 No-Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			0.0%	ICU Level of Service		A
Analysis Period (min)			15			

17: Great Road & Grist Mill Road (W)
 HCM Unsignalized Intersection Capacity Analysis

2016 No-Build PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	27	740	1064	8	2	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.81	0.89	0.50	0.50	0.70
Hourly flow rate (vph)	42	914	1196	16	4	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1212				2200	1204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1212				2200	1204
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	93				91	91
cM capacity (veh/h)	583				46	219
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	955	1212	24			
Volume Left	42	0	4			
Volume Right	0	16	20			
cSH	583	1700	135			
Volume to Capacity	0.07	0.71	0.18			
Queue Length 95th (ft)	6	0	16			
Control Delay (s)	2.2	0.0	37.3			
Lane LOS	A		E			
Approach Delay (s)	2.2	0.0	37.3			
Approach LOS			E			
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		70.8%		ICU Level of Service		C
Analysis Period (min)		15				

5: Great Road & Nashoba Rd (R)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	712	0	112	1088	0	96
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.76	0.89	0.92	0.87
Hourly flow rate (vph)	774	0	147	1222	0	110
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				268		
pX, platoon unblocked						
vC, conflicting volume			774		2291	774
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			774		2291	774
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		100	73
cM capacity (veh/h)			846		36	402
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	774	1370	110			
Volume Left	0	147	0			
Volume Right	0	0	110			
cSH	1700	846	402			
Volume to Capacity	0.46	0.17	0.27			
Queue Length 95th (ft)	0	16	28			
Control Delay (s)	0.0	6.7	17.3			
Lane LOS		A	C			
Approach Delay (s)	0.0	6.7	17.3			
Approach LOS			C			
Intersection Summary						
Average Delay			4.9			
Intersection Capacity Utilization			107.6%	ICU Level of Service	G	
Analysis Period (min)			15			

7: Great Road & Nashoba Road (L)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	712	30	0	1088	18	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.75	0.92	0.89	0.61	0.92
Hourly flow rate (vph)	774	40	0	1222	30	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)				351		
pX, platoon unblocked						
vC, conflicting volume			814		2016	794
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			814		2016	794
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		55	100
cM capacity (veh/h)			822		65	391
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	814	1222	30			
Volume Left	0	0	30			
Volume Right	40	0	0			
cSH	1700	1700	65			
Volume to Capacity	0.48	0.72	0.45			
Queue Length 95th (ft)	0	0	44			
Control Delay (s)	0.0	0.0	99.8			
Lane LOS			F			
Approach Delay (s)	0.0	0.0	99.8			
Approach LOS			F			
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		67.3%		ICU Level of Service		C
Analysis Period (min)		15				

Intersection Sign configuration not allowed in HCM analysis.

9: Great Road & Mannion Place
HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Volume (veh/h)	734	0	4	1106	0	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.80	0.92	0.50	0.85	0.92	0.40
Hourly flow rate (vph)	918	0	8	1301	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)				664		
pX, platoon unblocked						
vC, conflicting volume			918		2235	918
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			918		2235	918
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	94
cM capacity (veh/h)			752		47	332
Direction, Lane #	EB 1	WB 1	NE 1			
Volume Total	918	1309	20			
Volume Left	0	8	0			
Volume Right	0	0	20			
cSH	1700	752	332			
Volume to Capacity	0.54	0.01	0.06			
Queue Length 95th (ft)	0	1	5			
Control Delay (s)	0.0	0.5	16.5			
Lane LOS		A	C			
Approach Delay (s)	0.0	0.5	16.5			
Approach LOS			C			
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		64.7%		ICU Level of Service		C
Analysis Period (min)		15				

11: Great Road & Site Driveway
HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	46	716	1065	37	18	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	778	1158	40	20	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)			846			
pX, platoon unblocked						
vC, conflicting volume	1198				2056	1178
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1198				2056	1178
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				65	89
cM capacity (veh/h)	583				55	232
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	828	1198	45			
Volume Left	50	0	20			
Volume Right	0	40	25			
cSH	583	1700	97			
Volume to Capacity	0.09	0.70	0.46			
Queue Length 95th (ft)	7	0	49			
Control Delay (s)	2.5	0.0	70.5			
Lane LOS	A		F			
Approach Delay (s)	2.5	0.0	70.5			
Approach LOS			F			
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization		85.4%		ICU Level of Service	E	
Analysis Period (min)		15				

13: Great Road & Grist Mill Road (E)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	757	1075	13	5	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.80	0.86	0.65	0.42	0.60
Hourly flow rate (vph)	24	946	1250	20	12	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1270				2254	1260
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1270				2254	1260
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				73	90
cM capacity (veh/h)	554				44	210
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	970	1270	32			
Volume Left	24	0	12			
Volume Right	0	20	20			
cSH	554	1700	87			
Volume to Capacity	0.04	0.75	0.36			
Queue Length 95th (ft)	3	0	36			
Control Delay (s)	1.4	0.0	68.2			
Lane LOS	A		F			
Approach Delay (s)	1.4	0.0	68.2			
Approach LOS			F			
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			67.4%	ICU Level of Service		C
Analysis Period (min)			15			

15: Great Road & Mannion Place
 HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085
Direction, Lane #	EB 1	WB 1	NW 1			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS			A			
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		0.0%	ICU Level of Service	A		
Analysis Period (min)		15				

17: Great Road & Grist Mill Road (W)
 HCM Unsignalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	27	786	1087	8	2	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.81	0.89	0.50	0.50	0.70
Hourly flow rate (vph)	42	970	1221	16	4	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1237				2283	1229
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1237				2283	1229
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	93				90	91
cM capacity (veh/h)	570				41	212
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	1012	1237	24			
Volume Left	42	0	4			
Volume Right	0	16	20			
cSH	570	1700	125			
Volume to Capacity	0.07	0.73	0.19			
Queue Length 95th (ft)	6	0	17			
Control Delay (s)	2.4	0.0	40.5			
Lane LOS	A		E			
Approach Delay (s)	2.4	0.0	40.5			
Approach LOS			E			
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			73.2%	ICU Level of Service		D
Analysis Period (min)			15			

	→	←	↘
Lane Group	EBT	WBT	SBL
Lane Group Flow (vph)	828	1198	45
v/c Ratio	0.56	0.72	0.30
Control Delay	3.8	6.1	29.3
Queue Delay	0.0	0.4	0.0
Total Delay	3.8	6.5	29.3
Queue Length 50th (ft)	101	202	12
Queue Length 95th (ft)	211	449	46
Internal Link Dist (ft)	515	102	131
Turn Bay Length (ft)			
Base Capacity (vph)	1477	1670	314
Starvation Cap Reductn	0	133	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.56	0.78	0.14
Intersection Summary			

11: Great Road & Site Driveway HCM Signalized Intersection Capacity Analysis

2016 Build PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	46	716	1065	37	18	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	
Lane Util. Factor		1.00	1.00		1.00	
Frt		1.00	1.00		0.93	
Flt Protected		1.00	1.00		0.98	
Satd. Flow (prot)		1857	1854		1686	
Flt Permitted		0.88	1.00		0.98	
Satd. Flow (perm)		1639	1854		1686	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	778	1158	40	20	25
RTOR Reduction (vph)	0	0	1	0	24	0
Lane Group Flow (vph)	0	828	1197	0	21	0
Turn Type	Perm					
Protected Phases		2	6		4	
Permitted Phases	2					
Actuated Green, G (s)		81.3	81.3		4.6	
Effective Green, g (s)		81.3	81.3		4.6	
Actuated g/C Ratio		0.87	0.87		0.05	
Clearance Time (s)		4.0	4.0		4.0	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		1419	1605		83	
v/s Ratio Prot			c0.65		c0.01	
v/s Ratio Perm		0.51				
v/c Ratio		0.58	0.75		0.26	
Uniform Delay, d1		1.7	2.4		43.0	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		0.6	1.9		1.6	
Delay (s)		2.3	4.3		44.6	
Level of Service		A	A		D	
Approach Delay (s)		2.3	4.3		44.6	
Approach LOS		A	A		D	
Intersection Summary						
HCM Average Control Delay			4.4		HCM Level of Service	A
HCM Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			93.9		Sum of lost time (s)	8.0
Intersection Capacity Utilization			85.4%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

11: Great Road & Site Driveway Timing Report, Sorted By Phase

2016 Build PM Peak Hour



Phase Number	2	4	6
Movement	EBTL	SBL	WBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	Min	None	Min
Maximum Split (s)	70	20	70
Maximum Split (%)	77.8%	22.2%	77.8%
Minimum Split (s)	20	20	20
Yellow Time (s)	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5
Minimum Initial (s)	4	4	4
Vehicle Extension (s)	3	3	3
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	5	5	5
Flash Dont Walk (s)	11	11	11
Dual Entry	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes
Start Time (s)	0	70	0
End Time (s)	70	0	70
Yield/Force Off (s)	66	86	66
Yield/Force Off 170(s)	66	75	66
Local Start Time (s)	0	70	0
Local Yield (s)	66	86	66
Local Yield 170(s)	66	75	66

Intersection Summary

Cycle Length	90
Control Type	Actuated-Uncoordinated
Natural Cycle	90

Splits and Phases: 11: Great Road & Site Driveway

→ ø2	↘ ø4
70 s	20 s
← ø6	
70 s	

Sight Distance Worksheets

Sight Distance Calculations

Proposed Residential, Littleton, MA

Inputs

Posted Speed Limit = 50 mph

Direction 1 =	Great Road Eastbound	85% Speed =	48	mph	Grade =	0	t =	2.5 s	a =	11.2 ft/s ²
Direction 2 =	Great Road Westbound	85% Speed =	43	mph	Grade =	0	t =	2.5 s	a =	11.2 ft/s ²
							Left: t _g =	7.5 s		
							Right: t _g =	6.5 s		

SSD = Reaction Distance + Braking Distance

Reaction Distance = 1.47 x V x t

Braking Distance = $V^2 / (30 \times ((a/32.2) + G))$

ISD = 1.47 x V x t_g

Where t = reaction time (sec)
 t_g = time gap for minor road vehicle to enter the major road
 V = travel speed (mph)
 G = roadway grade
 a = deceleration rate (ft/s²)

Calculations

	Reaction Distance (ft)	Brake Distance (ft)	SSD (ft)
Great Road Eastbound	176.4	220.8	397
Great Road Westbound	158.0	177.2	335

For 48 mph:

Left Turn ISD =	529	ft
Right Turn ISD =	459	ft

For 43 mph:

Left Turn ISD =	474	ft
Right Turn ISD =	411	ft

Sight Distance Calculations

Proposed Residential, Littleton, MA

Inputs

Posted Speed Limit = 50 mph

Direction 1 =	Great Road Eastbound	85% Speed =	50	mph	Grade =	0	t =	2.5 s	a =	11.2 ft/s ²
Direction 2 =	Great Road Westbound	85% Speed =	50	mph	Grade =	0	t =	2.5 s	a =	11.2 ft/s ²
							Left: t _g =	7.5 s		
							Right: t _g =	6.5 s		

SSD = Reaction Distance + Braking Distance

Reaction Distance = 1.47 x V x t

Braking Distance = V² / (30 x ((a/32.2) + G))

ISD = 1.47 x V x t_g

Where t = reaction time (sec)
 t_g = time gap for minor road vehicle to enter the major road
 V = travel speed (mph)
 G = roadway grade
 a = deceleration rate (ft/s²)

Calculations

	Reaction Distance (ft)	Brake Distance (ft)	SSD (ft)
Great Road Eastbound	183.8	239.6	423
Great Road Westbound	183.8	239.6	423

For 50 mph:

Left Turn ISD =	551	ft
Right Turn ISD =	478	ft

For 50 mph:

Left Turn ISD =	551	ft
Right Turn ISD =	478	ft