MEMORANDUM

TO: Mr. Dante Angelucci
Senior Vice President - Development
Alexandria Real Estate Equities, Inc.
400 Technology Square, Suite 101
Cambridge MA, 02139

FROM: Mr. Jeffrey S. Dirk, P.E., PTOE, FITE
Managing Partner
Vanasse & Associates, Inc.
35 New England Business Center Drive
Suite 140
Andover, MA 01810-1066
(978) 269-6830
jdirk@rdva.com
Professional Engineer in CT, MA, ME, NH, RI and VA

DATE: June 10, 2022

RE: 9141

SUBJECT: Transportation Impact Assessment
3000 Minuteman Road – Initial Campus Redevelopment
Andover, Massachusetts

Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the renovation and expansion of the former Philips Healthcare campus located at 3000 Minuteman Road in Andover, Massachusetts, to accommodate laboratory/current Good Manufacturing Practice (cGMP) uses (hereafter referred to as the "Project"). This assessment evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing traffic conditions and future traffic conditions, both with and without the Project, along River Road, 1776 Drive and Minuteman Road, and at the intersections of River Road at Minuteman Road and Shattuck Road and River Road at 1776 Drive. Expanded development within the campus beyond this initial phase will be the subject of a separate TIA.

Based on this assessment, we have concluded the following with respect to the initial phase of the Project:

1. Using trip-generation statistics published by the Institute of Transportation Engineers (ITE)[1] for similar functional areas to those that will be associated with the campus redevelopment (research and development (R&D) and manufacturing space for trip-generation purposes), the initial phase of the Project is expected to generate approximately 5,914 vehicle trips on an average weekday (two-way volume over the operational day of the Project), with approximately 628 vehicle trips expected during the weekday morning peak-hour and 671 vehicle trips expected during the weekday evening peak-hour;

2. In comparison to the former Philips Health Care campus at full occupancy, the initial phase of the Project is expected to generate approximately 314 *additional* vehicle trips on an average weekday (an approximate 6 percent increase), with 117 *fewer* vehicle trips expected during the weekday morning peak-hour (an approximate 13 percent decrease) and 87 *fewer* vehicle trips during the weekday evening peak-hour (an approximate 10 percent decrease);

[1] *Trip Generation,* 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.

3. The reduction in peak-hour traffic associated with the initial phase of the Project was shown to result in a corresponding *decrease* in motorist delays and vehicle queuing over No-Build conditions with the reoccupancy of the Philips Health Care campus, acknowledging that one or more movements at the study area intersections were shown to operate over capacity (i.e., level-of-service (LOS) "F") independent of the initial phase of the Project;

4. No apparent safety deficiencies were noted with respect to the motor vehicle crash history at the study intersections; and

5. Lines of sight to and from the River Road/1776 Drive and River Road/Minuteman Road/ Shattuck Road intersections (the primary intersections through which access to the Project site will be provided) were found to exceed the recommended minimum distances for the intersections to operate in a safe and efficient manner based on the appropriate approach speed.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the recommendations defined herein.

The following details our assessment of the Project.

PROJECT DESCRIPTION

The Project will entail the renovation and expansion of the former Philips Healthcare campus located at 3000 Minuteman Road in Andover, Massachusetts, to accommodate laboratory/cGMP uses. The campus currently contains four (4) buildings that encompass approximately 726,000± square foot (sf) of office/manufacturing space. The redevelopment plan will transform the former office/manufacturing campus into a life sciences campus consisting of a mix of laboratory, research and development, office, cGMP manufacturing and warehouse space, and will include an expansion of one (1) of the existing building (Building 1) and the addition of two (2) new future buildings. When complete, the campus will contain approximately 1.126± million sf of space. The Project site is bounded by areas of open and wooded space and the Merrimack River to the north and west, and commercial properties to the south and east. Figure 1 depicts the Project site in relation to the existing roadway network.

The initial phase of the Project, which is the subject of this TIA, will involve the four (4) existing buildings within the campus and will consist of the following elements:

- ***Building 1:*** renovation of the existing 86,000± sf office building to accommodate lab/office (R&D) space and the construction of a 100,000± sf addition that will include cGMP and warehouse space.
- ***Building 2:*** renovation of the existing 164,100± sf building that was formerly used as office (41,025± sf) and associated electronics manufacturing space (123,075± sf) to accommodate a similar amount of laboratory/office (41,025± sf) and associated cGMP space (123,075± sf).
- ***Building 3:*** renovation of the existing 171,200± sf building that was formerly used as office (42,800± sf) and associated electronics manufacturing space (128,400± sf) to accommodate a similar amount of laboratory/office (42,800± sf) and associated cGMP space (128,400± sf).
- ***Building 4:*** renovation of the existing 256,700± sf building that was formerly used as office space to accommodate a similar amount (256,700± sf) of laboratory/office space.

The existing Link & Amenities Building (48,200± sf) will continue to provide accessory and supporting amenities for the campus, with no change to the existing function of the building.

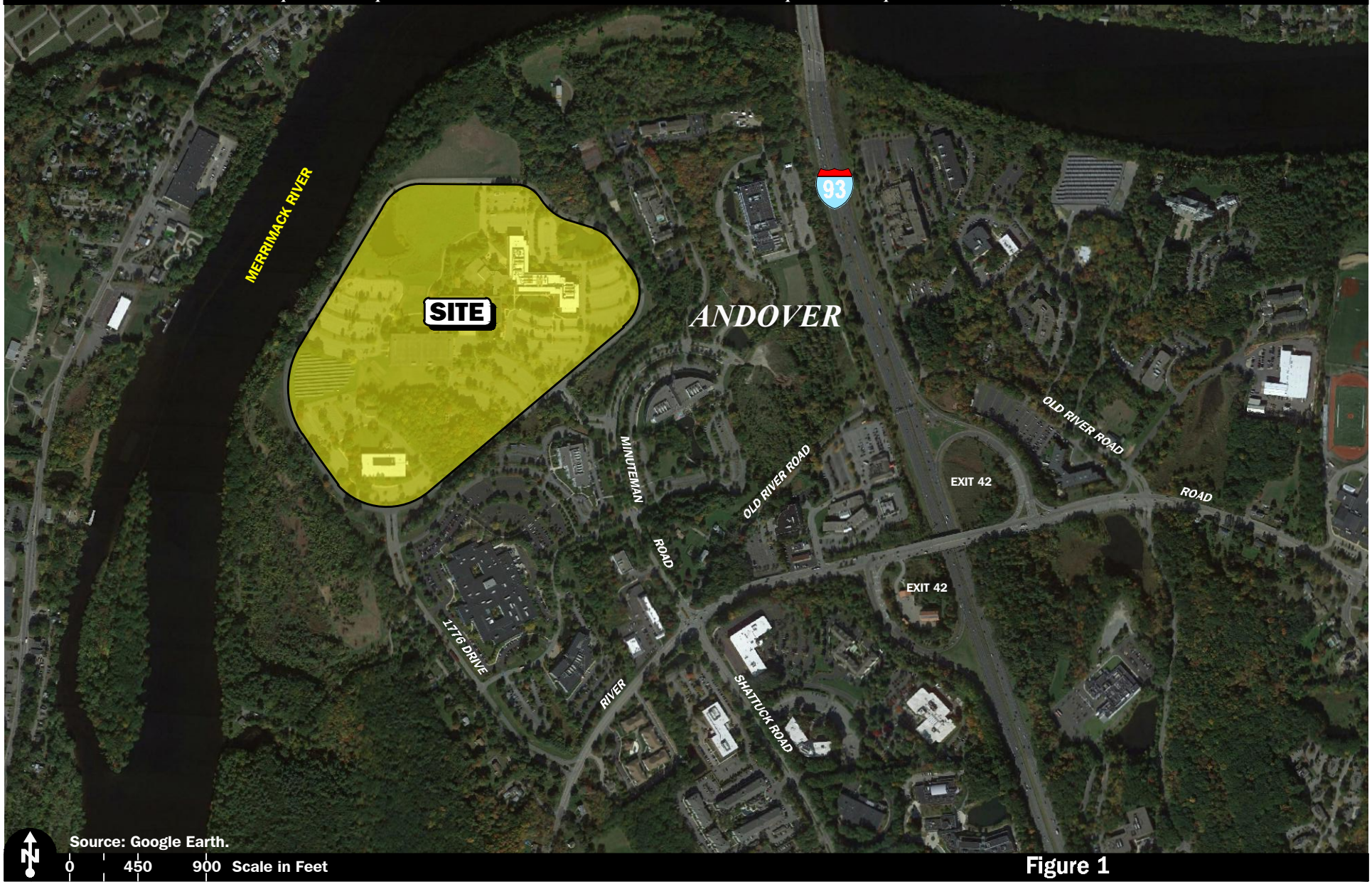


Figure 1

Site Location Map

Vanasse & Associates inc

R:\9141\9141SLM.dwg, 6/9/2022 12:22:34 PM

Access to the Project site will continue to be provided by way of the existing driveways that serve the campus and are connected to 1776 Drive and Minuteman Road, both of which provide access to River Road. ***There are no changes proposed to the existing campus roadway network as it relates to 1776 Drive or Minuteman Road that would result in a change in travel patterns or the increased use of 1776 Drive.*** In fact, the subsequent addition of buildings to the campus as a part of a later phase of the Project will occur in a portion of the campus that is more proximate to the Minuteman Road access.

STUDY METHODOLOGY

This study was prepared in consultation with MassDOT and the Town of Andover; was performed in accordance with MassDOT's *Transportation Impact Assessment (TIA) Guidelines* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian and bicycle facilities; on-street parking; public transportation services; observations of traffic flow; and collection of pedestrian, bicycle, and vehicle counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for analyses consistent with MassDOT guidelines. The analysis conducted in stage two identifies existing or projected future capacity, safety, and access issues, as these areas relate to the transportation infrastructure.

The third stage of the study presents and evaluates measures to address deficiencies in the transportation infrastructure, if any, identified in stage two of the study.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in May and June 2022. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; public transportation services; traffic volumes; and operating characteristics; as well as posted speed limits and land use information within the study area. The study area that was assessed for the Project was defined in consultation with the Town of Andover Planning & Economic Development Division, and consisted of River Road, 1776 Drive and Minuteman Road, and the following specific intersections: River Road at 1776 Drive and River Road at Minuteman Road and Shattuck Road.

The following describes the study area roadways and intersections.

Roadways

River Road

- Two to four-lane urban minor arterial roadway under Town jurisdiction, with the exception of the segment of roadway between the I-93 north and southbound ramps, which is under MassDOT jurisdiction
- Traverses the study area in a general east-west direction

- Provides four 11 to 12-foot-wide travel lanes separated by a raised median with variable width marked shoulders provided between Shattuck Road and North Street; west of Shattuck Road, River Road provides two 11 to 12-foot wide travel lanes separated by a double-yellow centerline with variable width marked shoulders provided
- Sidewalks are generally provided along one or both sides of the roadway within the study area
- Illumination is provided by way of street lights mounted on wood poles
- Posted speed limit along River Road within the study area is 35 miles per hour (mph) west of the I-93 northbound ramps and 30 mph to the east
- Bicycle lanes are provided along both sides of the roadway between 1776 Drive and Minuteman Road
- Land use within the study area consists of the Project site, commercial properties and areas of open and wooded space

1776 Drive

- Four-lane private roadway
- Traverses a general north-south direction between River Road and the Project site (approximately 2,200 linear feet (lf))
- Provides two 12-foot wide travel lanes per direction separated by a raised median with 1-foot wide marked shoulders provided
- Sidewalks are not provided
- Land use within the study area consists of the Project site, commercial properties, and areas of open and wooded space

Minuteman Road

- Four-lane private road
- Traverses a general north-south direction between River Road and the Project site (approximately 2,500 lf)
- Provides two 12-foot wide travel lanes per direction separated by a raised median with 1 to 2-foot wide marked shoulders provided
- Posted speed limit is 25 mph
- A sidewalk is provided along the east side of the roadway
- Land use within the study area consists of the Project site, commercial properties, and areas of open and wooded space

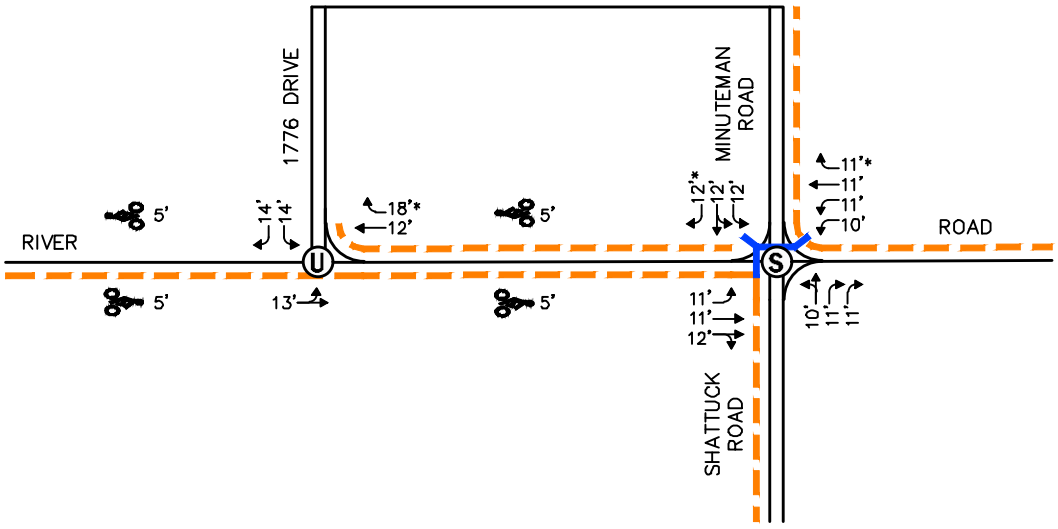
Intersections

Table 1 and Figure 2 summarize existing lane use, traffic control, and pedestrian and bicycle accommodations at the study area intersections as observed in June 2022.

Legend:

- Unsignalized Intersection
- Signalized Intersection
- Sidewalk
- Crosswalk
- XX' Lane Use and Travel Lane Width
- *XX' Channelized Right-Turn Lane
- XX' Bike Lane and Width

SITE



Not To Scale

Figure 2

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

Vanasse & Associates inc

Table 1
STUDY AREA INTERSECTION DESCRIPTION

Intersection	Traffic Control Type[a]	No. of Travel Lanes Provided	Shoulder Provided? (Yes/No/Width)	Pedestrian Accommodations? (Yes/No/Description)	Bicycle Accommodations? (Yes/No/Description)
River Rd./ Minuteman Rd./ Shattuck Rd.	TS	2 left-turn lanes and 1 through lane on River Rd. westbound approach with right-turns exiting prior to the intersection by way of a channelized right-turn lane; 1 left-turn lane and 2 general purpose lanes provided on River Rd. eastbound approach; 1 left-turn/through lane and 2 right-turn lanes on Shattuck Rd. approach; 1 left-turn lane and 1 left-turn/ through lane on Minuteman Rd. approach with right-turns exiting prior the intersection by way of a channelized right-turn lane	Yes; 1 to 4-feet on all legs	Yes; sidewalks provided along both sides of River Rd. west of the intersection, the north side of River Rd. east of the intersection, the east side of Minuteman Rd. and along the west side of Shattuck Rd.; crosswalks provided for crossing Minuteman Rd. and the River Rd. west leg; pedestrian traffic signal equipment and phasing provided as a part of the traffic signal system (exclusive)	Yes; 5-foot bike lanes provided along River Rd. west of the intersection; bicycle detection is provided as a part of the traffic signal system; Shared-traveled-way along the remaining portions of River Rd., Shattuck Rd., and Minuteman Rd.[b]
River Rd./ 1776 Dr.	S	1 general-purpose travel lane on River Rd. approaches with eastbound right-turns exiting prior to the intersection by way of a channelized right-turn lane; 1 left-turn lane and 1 right-turn lane on 1776 Dr. approach	Yes; 1 to 5-feet on all legs	Yes; sidewalks provided along both sides of River Rd. east of the intersection and along the south side to the west	Yes; 5-foot bike lanes provided along River Rd.; Shared-traveled-way along 1776 Dr.

[a]TS = traffic signal control; S = STOP-sign control.
[b]Combined shoulder and travel lane wide equal to or exceeding 14 feet.

Existing Traffic Volumes

In order to determine existing traffic-volume demands and flow patterns within the study area, automatic traffic recorder (ATR) counts, turning movement counts (TMCs), and vehicle classification counts were completed in May 2022. The ATR counts were conducted on River Road, east of Shattuck Road, on May 11th and 12th, 2022 (Wednesday through Thursday, inclusive) in order to record weekday traffic conditions over an extended period, with weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak-period TMCs performed at the study intersections on May 11th, 2022 (Wednesday). These time periods were selected for analysis purposes as they are representative of the peak traffic-volume hours for both the Project and the adjacent roadway network.

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, traffic-volume data from MassDOT Continuous Count Station No. 5124 located on Interstate I-93 in Andover were reviewed. Based on a review of this data, it was determined that traffic volumes for the month of May are approximately 1.5 percent *above* average-month conditions. As such, no adjustment was made to the May traffic volumes as they are representative of average-month conditions.

In order to account for the impact on traffic volumes and trip patterns resulting from the COVID-19 pandemic, traffic volume data collected at MassDOT Continuous Count Station No. 5124 in May 2016 were compared to May 2022 traffic volumes that were collected at the same location. The 2016 traffic volumes were expanded to 2019 by applying the traffic growth procedure detailed in the April 2020 "Guidance on Traffic Counting Data" published by MassDOT[2] in order to allow for a comparison of the data. Based on this pre- and post-COVID-19 traffic-volume comparison, the traffic-volume data that was collected as part of this assessment was found to be within the range of normal daily and seasonal traffic volume conditions that existed prior to the COVID-19 pandemic. As such, adjustments to the traffic-volume data was not required.

The 2022 Existing traffic volumes are summarized in Table 2, with the weekday morning and evening peak-hour traffic volumes graphically depicted on Figure 3. Note that the peak-hour traffic volumes presented in Table 2 were obtained from the TMCs and are reflected on the aforementioned figures.

Table 2
2022 EXISTING TRAFFIC VOLUMES

Location/Peak-Hour	AWT[a]	VPH[b]	K Factor[c]	Directional Distribution[d]
River Road, east of Shattuck Road:	14,760	--	--	--
Weekday Morning (7:30 – 8:30 AM)	--	1,499	10.2	70.3% WB
Weekday Evening (4:30 – 5:30 PM)	--	1,346	9.1	67.6% EB

[a]Average weekday traffic in vehicles per day.
[b]Vehicles per hour.
[c]Percent of daily traffic occurring during the peak-hour.
[d]Percent traveling in peak direction.
EB = eastbound; WB = westbound.

As can be seen in Table 2, River Road, east of Shattuck Road, was found to accommodate approximately 14,760 vehicles on an average weekday (two-way, 24-hour volume), with approximately 1,499 vehicles per hour (vph) during the weekday morning peak-hour and 1,346 vph during the weekday evening peak-hour.

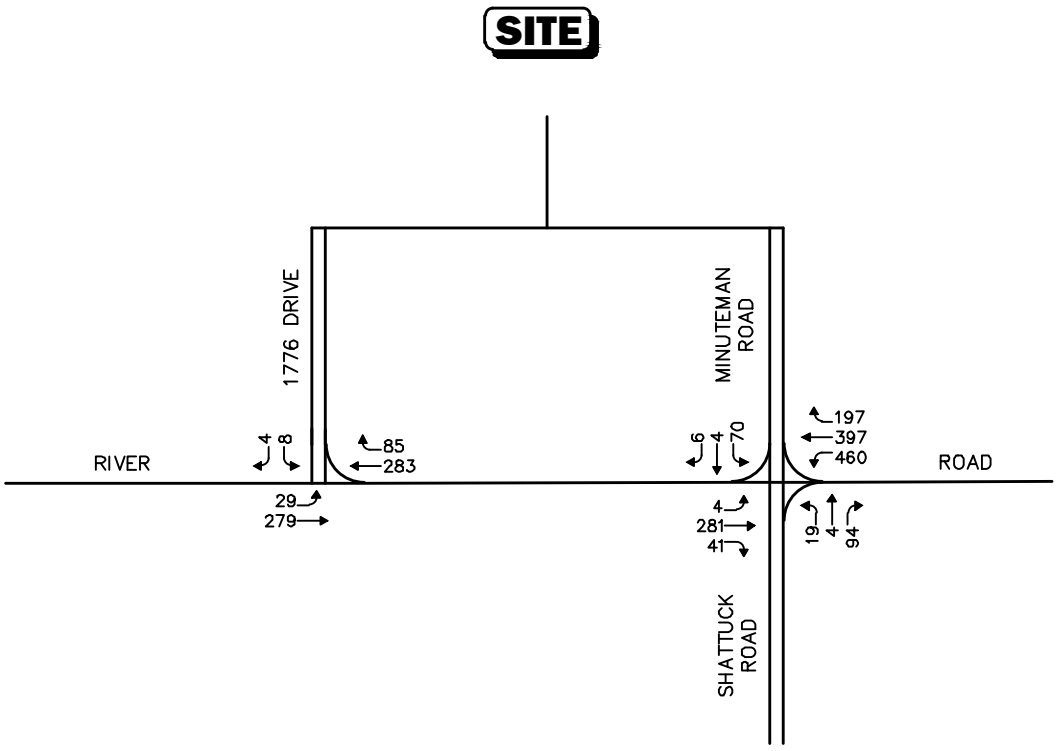
Pedestrian and Bicycle Facilities

Sidewalks are provided within the study area as follows: *River Road* - along the south side between 1776 Drive and Brundrett Avenue, along both sides between 1776 Drive and Minuteman Road/ Shattuck Road, along the north side between Minuteman Road and the I-93 southbound ramps, and along the south side east of the I-93 southbound ramps; *Minuteman Road* – along the east side; *Shattuck Road* – along the west side. Marked crosswalks are provided for crossing Minuteman Road and the River Road west leg of the River Road/Minuteman Road/Shattuck Road intersection and the River Road east leg of the River Road/I-93 southbound ramps intersection, with pedestrian traffic signal equipment and phasing provided for the River Road crossings at these intersections. Bicycle lanes are provided along both sides of River Road between Brundrett Avenue and Minuteman Road, with the remaining portions of River Road and both Minuteman Road and Shattuck Road providing sufficient width (combined travel lane and shoulder)[3] to support bicycle travel in a shared travelled-way configuration.

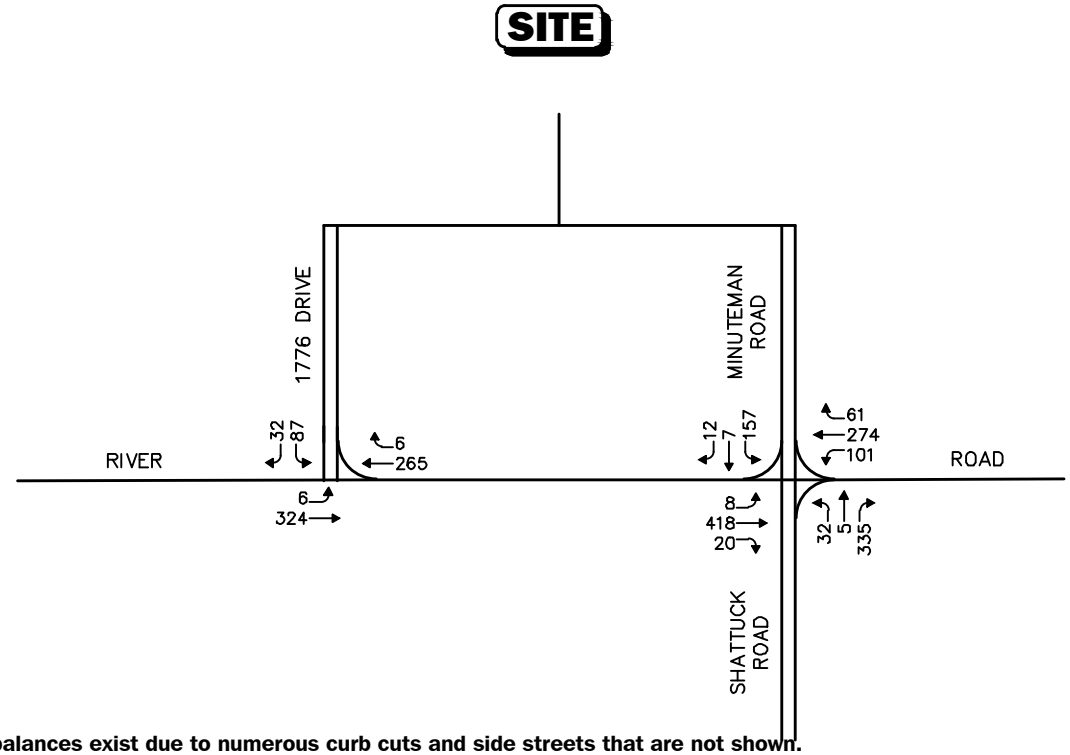
[3]*Guidance on Traffic Count Data*; MassDOT; revised April 2020.

[4]A minimum combined travel lane and paved shoulder width of 14-feet is required to support bicycle travel in a shared traveled-way condition.

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 3

2022 Existing
Peak-Hour Traffic Volumes

Vanasse & Associates inc

Public Transportation Services

The Project site is served by public transportation services that are provided by the Merrimack Valley Regional Transit Authority (MVRTA). The MVRTA operates bus Route 37, *Beacon Street*, which travels along River Road to Minuteman Road, with a stop located at Springhill Suites by Marriot (north of the Project site), and thereafter to the Buckley Transportation Center in Lawrence where connections can be made to other bus lines. From the Buckley Transportation Center, bus service is provided to Lawrence Station on the Haverhill Line of the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail system with service to North Station in Boston. MVRTA buses operate in a passenger demand service mode and will stop anywhere along the service route where it is safe to pick-up or discharge a passenger.

The public transportation schedules and fare information are attached.

Spot Speed Measurements

Vehicle travel speed measurements were performed on River Road, east of Shattuck Road, in conjunction with the ATR counts. Table 3 summarizes the vehicle travel speed measurements.

Table 3
VEHICLE TRAVEL SPEED MEASUREMENTS

	River Road	
	Eastbound	Westbound
Mean Travel Speed (mph)	34	36
85th Percentile Speed (mph)	38	41
Posted Speed Limit (mph)	35	35

mph = miles per hour.

As can be seen in Table 3, the mean vehicle travel speed along River Road in the vicinity of the Project site was found to be 34 mph in the eastbound direction and 36 mph westbound. The measured 85th percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be 38 mph in the eastbound direction and 41 mph westbound, which is 3 to 6 mph above the posted speed limit (35 mph). The 85th percentile speed is used as the basis of engineering design and in the evaluation of sight distances and is often used in establishing posted speed limits

Motor Vehicle Crash Data

Motor vehicle crash information for the study area intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent five-year period available (2015 through 2019, inclusive) to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, severity, roadway and weather conditions, and day of occurrence, and is presented in Table 4.

Table 4
MOTOR VEHICLE CRASH DATA SUMMARY[a]

	River Road/ Minuteman Road/ Shattuck Road	River Road/ 1776 Drive
Traffic Control Type[b]	TS	U
Year:		
2015	0	1
2016	3	0
2017	1	2
2018	0	2
2019	0	3
Total	4	8
Average	0.80	1.6
Crash Rate[c]	0.14	0.55
MassDOT Crash Rate:[d]	0.73/0.78	0.57/0.57
Significant?[e]	No	No
Type:		
Angle	0	1
Head-On	0	0
Rear-End	4	4
Rear-to-Rear	0	0
Sideswipe	0	2
Fixed Object	0	1
Pedestrian/Bicycle	0	0
Unknown/Other	0	0
Total	4	8
Conditions:		
Clear	3	3
Cloudy	0	2
Rain	0	1
Snow/Ice	1	2
Not Reported/Other	0	0
Total	4	8
Lighting:		
Daylight	3	6
Dawn/Dusk	0	0
Dark (Road Lit)	1	2
Dark (Road Unlit)	0	0
Total	4	8
Day of Week:		
Monday-Friday	3	7
Saturday	1	1
Sunday	0	0
Total	4	8
Severity:		
Property Damage Only	4	7
Non-fatal Injury	0	1
Not Reported	0	0
Total	4	8

[a]Source: MassDOT Safety Management/Traffic Operations Unit records, 2015 through 2019.
[b]Traffic Control Type: TS = traffic signal; U = unsignalized.
[c]Crash rate per million vehicles entering the intersection.
[d]Statewide/District crash rate.
[e]The intersection crash rate is significant if it is found to exceed the MassDOT crash rate for the MassDOT Highway Division District in which the Project is located (District 4).

As can be seen in Table 4, the study area intersections were found to have experienced an average of 1.6 or fewer reported motor vehicle crashes per year over the five-year review period and were identified to have motor vehicle crash rates that are *below* both the MassDOT Statewide and district average crash rates for similar intersections for the MassDOT Highway Division District in which the intersections are located (District 4). The crash data indicated that the majority of the reported crashes occurred on a weekday, during daylight, under clear weather conditions and involved rear-end type collisions that resulted in property damage only.

A review of the MassDOT statewide High Crash Location List indicated that there are no locations within the study area that are included on MassDOT's Highway Safety Improvement Program (HSIP) listing as a high crash location.

The detailed MassDOT Crash Rate Worksheets are attached.

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2029, which reflects a seven-year planning horizon consistent with MassDOT guidelines. Independent of the Project, traffic volumes on the roadway network in the year 2029 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon the 2029 No-Build traffic volumes reflect 2029 Build traffic-volume conditions with the Project.

Future Traffic Growth

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

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

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

Specific Development by Others

The Town of Andover Planning Department was consulted in order to determine if there were any projects that would have an impact on future traffic volumes at the study intersections. Based on this consultation, the following project was identified for inclusion in this assessment:

- ***Proposed cGMP Facility, 300 Minuteman Road, Andover, Massachusetts.*** This project entails the construction of a 224,500± sf cGMP facility to be located at 300 Minuteman Road, southeast of the Project site. Traffic volumes associated with this project within the study area were obtained from the traffic study prepared for the project and were incorporated into future conditions traffic volumes.[4]

- ***Proposed Research and Development Facility, One Corporate Drive, Andover, Massachusetts.*** This project entails the repurposing and expansion to the existing general office building located at One Corporate Drive, south of the Project site. Traffic volumes associated with this project within the study area were obtained from the traffic study prepared for the project and were incorporated into future conditions traffic volumes.[5]

In addition to the aforementioned projects, traffic volumes associated with the reoccupancy of the Philips Health Care campus were estimated using trip-generation statistics published by the ITE[6] for similar land uses and were added to the future condition traffic volumes. No other developments were identified

[4] *Transportation Impact Assessment*, Proposed Medical/Pharmaceutical Manufacturing Facility, Andover, Massachusetts; VAI; 2021.

[5] *Transportation Impact Assessment*, Proposed Research and Development Facility, Andover, Massachusetts; VAI; 2022.

[6] Ibid 1.

at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

General Background Traffic Growth

Traffic-volume data compiled by MassDOT from permanent count stations located in Andover, Methuen, Tewksbury, and Lawrence were reviewed in order to determine general traffic growth trends in the area. This data indicates that traffic volumes have fluctuated over the past several years, with the average growth rate found to be approximately 1.2 percent per year. In order to provide a prudent planning condition for the Project, a slightly higher 1.5 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and presently unforeseen development within the study area.

Roadway Improvement Projects

The Town of Andover and MassDOT were contacted in order to determine if there were any planned future roadway improvement projects expected to be complete by 2029 within the study area. Based on these discussions, the following roadway improvement project was identified within the study area:

- ***River Road/Minuteman Road/Shattuck Road Intersection Improvements*** – In conjunction with the construction of the cGMP facility to be located at 300 Minuteman Road, the following improvements will be completed at the River Road/Minuteman Road/Shattuck Road intersection:

  - Replace the existing inductive loop vehicle detection system with video detection (four (4) video cameras required)
  - Replace the existing pedestrian signal indications (two (2)) with countdown-type indications
  - Replace the existing pedestrian pushbuttons with ADA compliant audible devices

No other roadway improvement projects, aside from routine maintenance activities, were identified to be planned within the study area at this time.

No-Build Traffic Volumes

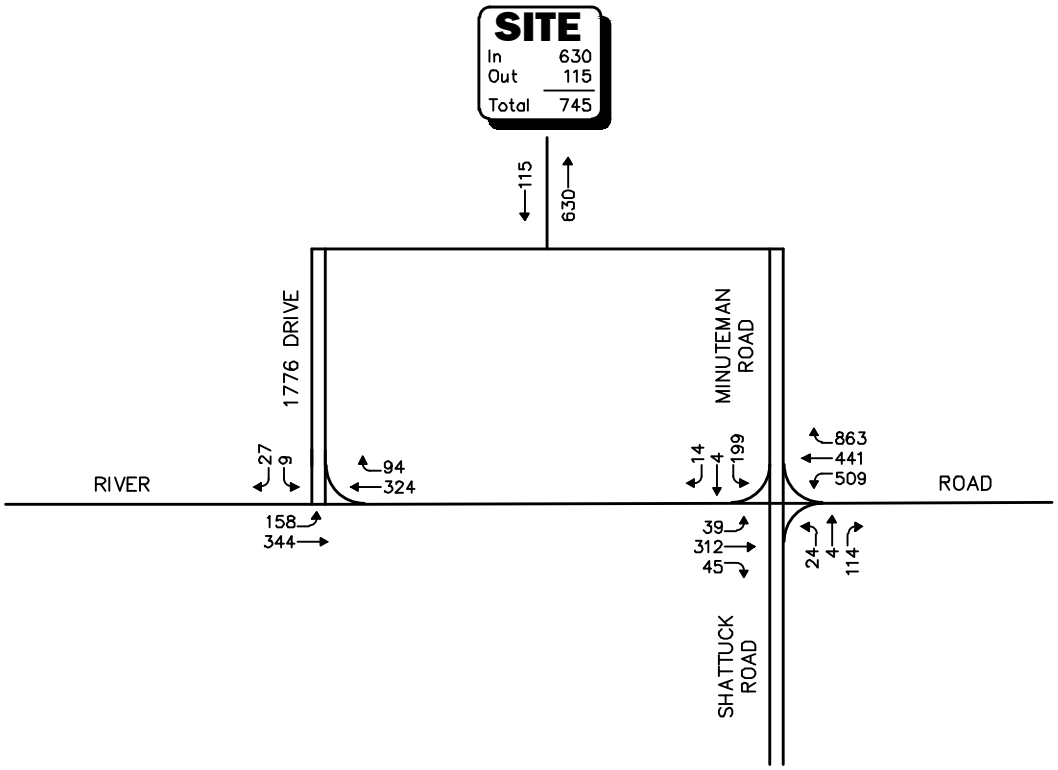
The 2029 No-Build condition peak-hour traffic volumes were developed by: i) applying the 1.5 percent per year compounded annual background traffic growth rate to the 2022 Existing peak-hour traffic volumes; and ii) adding the peak-hour traffic volumes associated with the identified specific development projects by others (300 Minuteman Road and One Corporate Drive) and the trips associated with the reoccupancy of the existing buildings that are associated with the Philips Health Care campus. The resulting 2029 No-Build weekday morning and evening peak-hour traffic volumes are shown on Figure 4.

Project-Generated Traffic

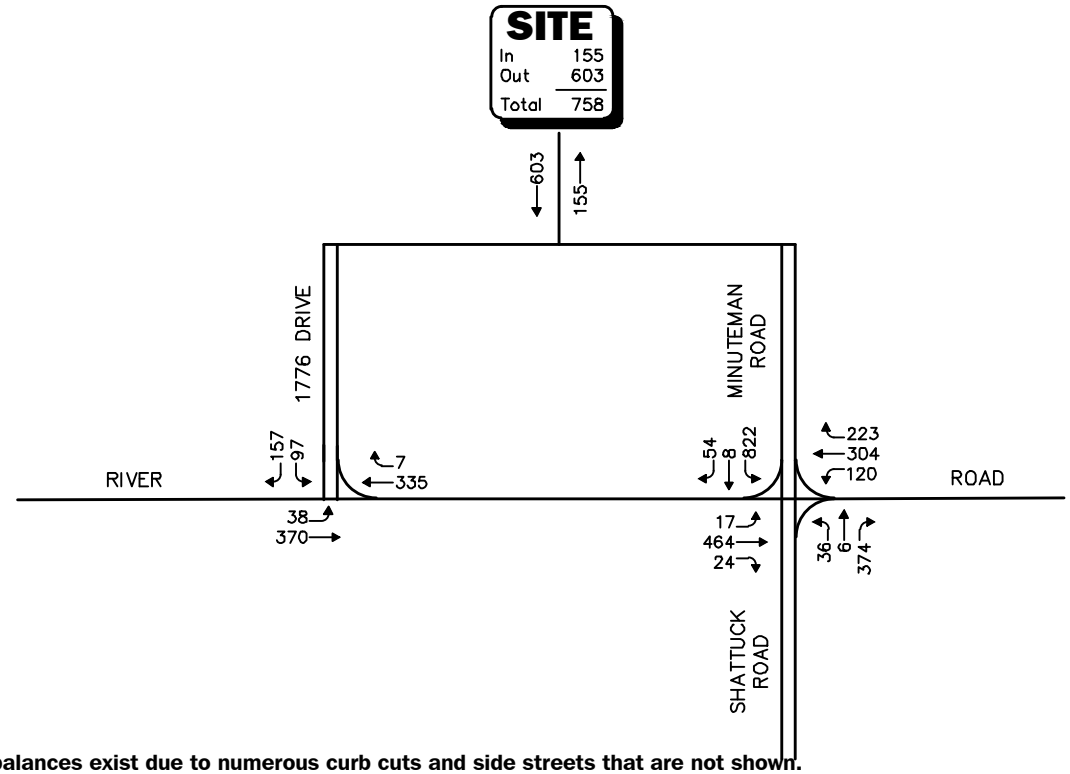
In order to determine the traffic characteristics of the initial phase of the Project, trip-generation methodologies established by the ITE[7] were used. The ITE provides trip-generation information for various types of land uses developed as a result of scientific studies that have been conducted over the past 50 plus years, the most recent update of which was published in 2021. This data includes trip estimates for similar functional areas to those that will be associated with the campus redevelopment (functionally classified as R&D and manufacturing for trip-generation purposes). ITE Land Use Codes (LUCs) 140, *Manufacturing,*

[7] Ibid 1.

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 4

2029 No-Build
Peak-Hour Traffic Volumes

Vanasse & Associates inc

and 760, *Research and Development Center*, were used to establish the traffic characteristics of the Project, the results of which are summarized in Table 5.

Table 5
TRIP GENERATION SUMMARY

Time Period/Direction	Vehicle Trips (A) Lab/Office/R&D Space (426,525 sf)[a]	(B) Manufacturing/ Warehouse Space (cGMP) (351,475 sf)[b]	(A + B) Total trips
Average Weekday Daily:			
Entering	2,193	764	2,957
Exiting	2,193	764	2,957
Total	4,386	1,528	5,914
Weekday Morning Peak Hour:			
Entering	331	170	501
Exiting	73	54	127
Total	404	224	628
Weekday Evening Peak Hour:			
Entering	61	89	150
Exiting	322	199	521
Total	383	288	671

[a]Based on ITE LUC 760, *Research and Development Center*.
[b]Based on ITE LUC 140, *Manufacturing.*

Project-Generated Traffic Volume Summary

As can be seen in Table 5, the initial phase of the Project is expected to generate approximately 5,914 vehicle trips on an average weekday (two-way volume over the operational day of the Project, or 2,957 vehicles entering and 2,957 exiting), with approximately 628 vehicle trips (501 vehicles entering and 127 exiting) expected during the weekday morning peak-hour and 671 vehicle trips (150 vehicles entering and 521 exiting) expected during the weekday evening peak-hour.

Table 2 compares the traffic characteristics of the initial phase of the Project to those of the former Philips Health Care campus at full occupancy (approximately 3,000 employees). As discussed previously, the existing Link & Amenities Building (48,200± sf) will continue to provide accessory and supporting amenities for the campus, with no change to the existing function of the building. As such, trips associated with this building will be the same for both the initial phase of the Project and for the former Philips Health Care campus.

Table 6
TRIP GENERATION SUMMARY COMPARISON

Time Period/Direction	Vehicle Trips[a] (A) Initial Campus Renovation and Expansion (826,200 sf)	(B) Former Philips Healthcare Campus (726,200 sf)[b]	(A - B) Difference
Average Weekday Daily:	5,914	5,600	+314
Weekday Morning Peak Hour:	628	745	-117
Weekday Evening Peak Hour:	671	758	-87

[a]Includes trips associated with the Link & Amenities Building (48,200 sf).
[b]Based on ITE LUC 140, *Manufacturing*; 251,475 sf; LUC 710, *General Office Building*; 342,700 sf; and LUC 760, *Research and Development Center*; 83,825 sf.

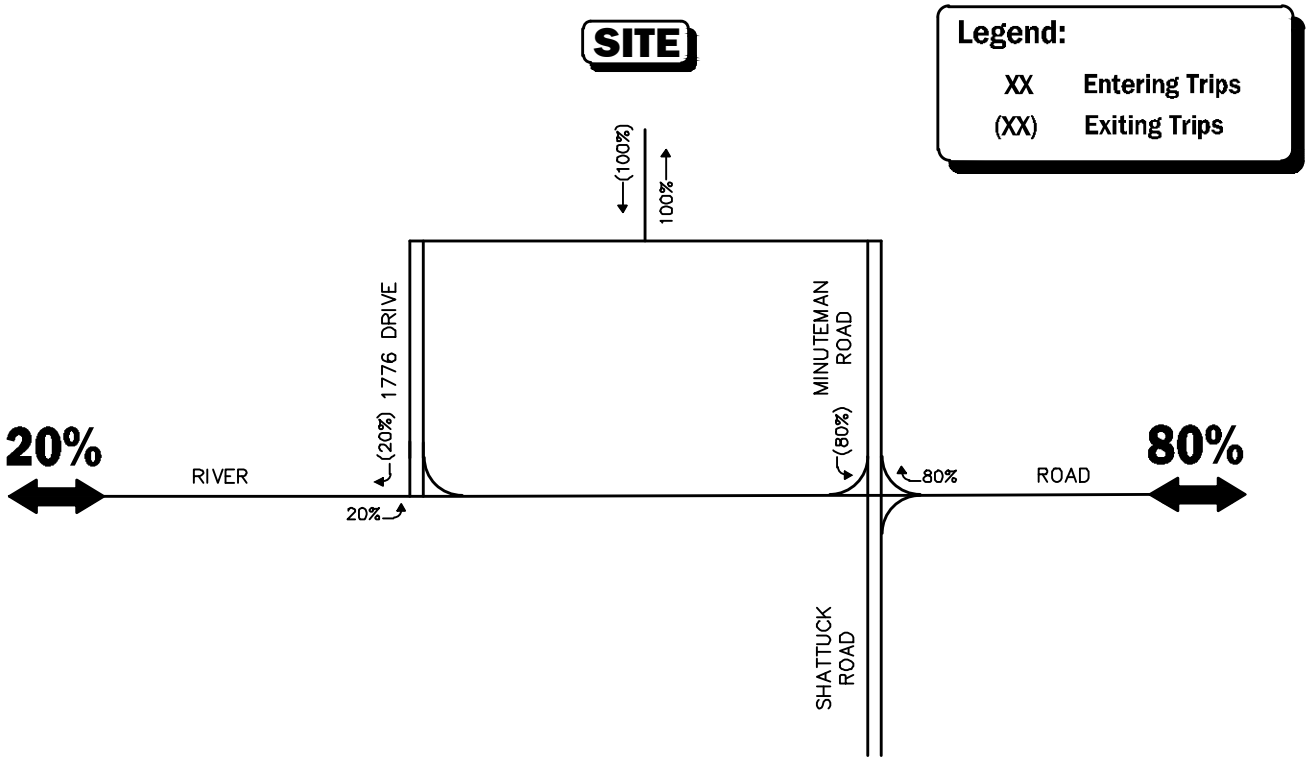
As can be seen in Table 6, the initial phase of the Project is expected to generate 314 additional vehicle trips on an average weekday (an approximate 6 percent increase) when compared to the former Philips Health Care campus at full occupancy, with 117 fewer vehicle trips expected during the weekday morning peak-hour (an approximate 13 percent decrease) and 87 fewer vehicle trips during the weekday evening peak-hour (an approximate 10 percent decrease).

Trip Distribution and Assignment

The directional distribution of generated trips to and from the Project site was determined based on a review of U.S. Census Journey-to-Work data for the Town of Andover and then refined based on a review of existing traffic patterns within the study area. The general trip distribution for the Project is graphically depicted on Figure 5, with the additional traffic that is expected to be generated by the Project assigned on the study area roadway network as shown on Figure 6.

Build Traffic Volumes

The 2029 Build condition traffic volumes consist of the 2029 No-Build traffic volumes with the removal of the trips associated with the reoccupancy of the Philips Healthcare Campus and the addition of trips associated with the initial phase of the Project. The 2029 Build weekday morning and evening peak-hour traffic volumes are graphically depicted on Figure 7.



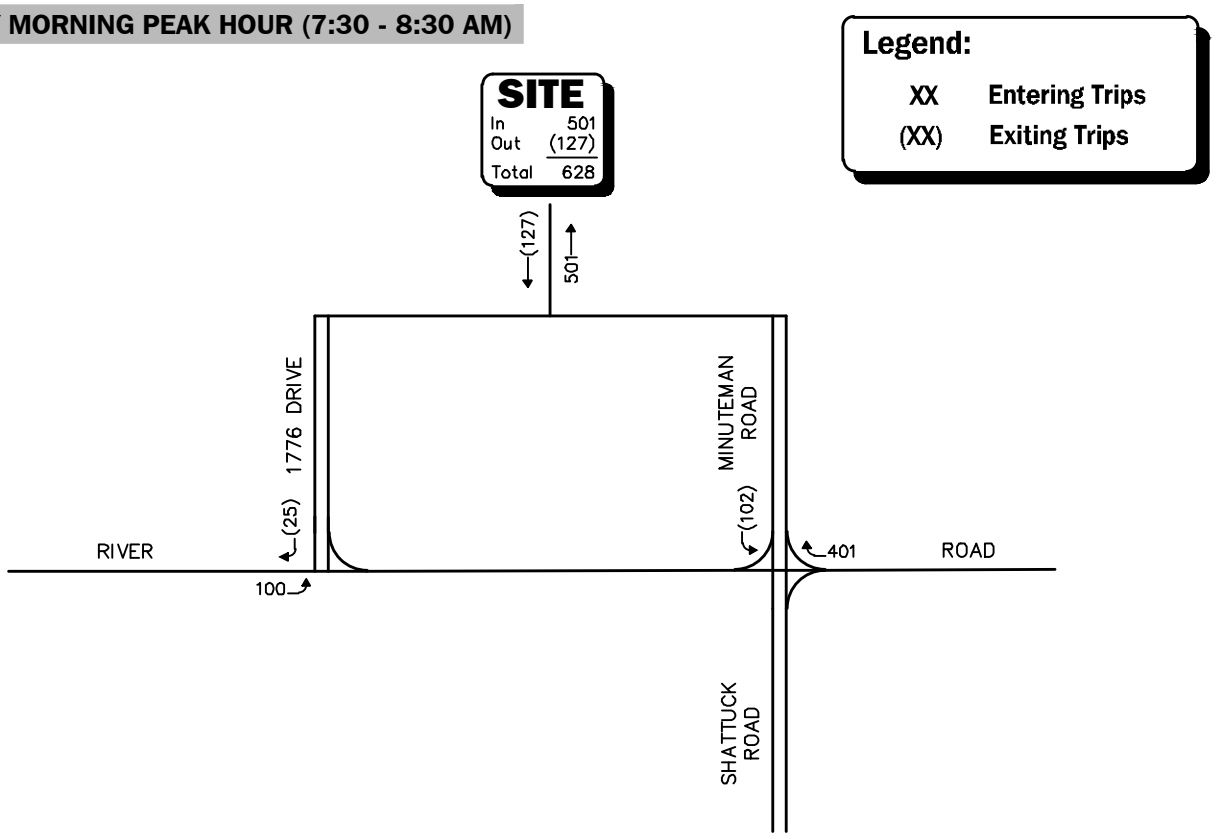
Not To Scale

Figure 5

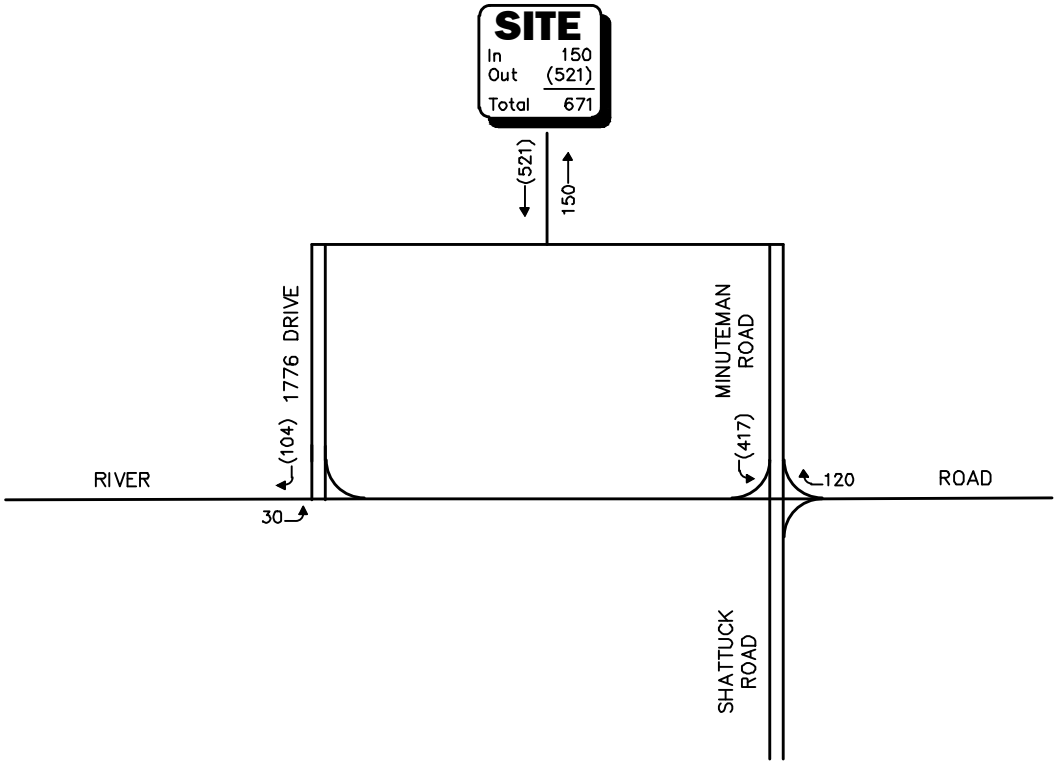
Trip Distribution Map

Vanasse & Associates inc

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



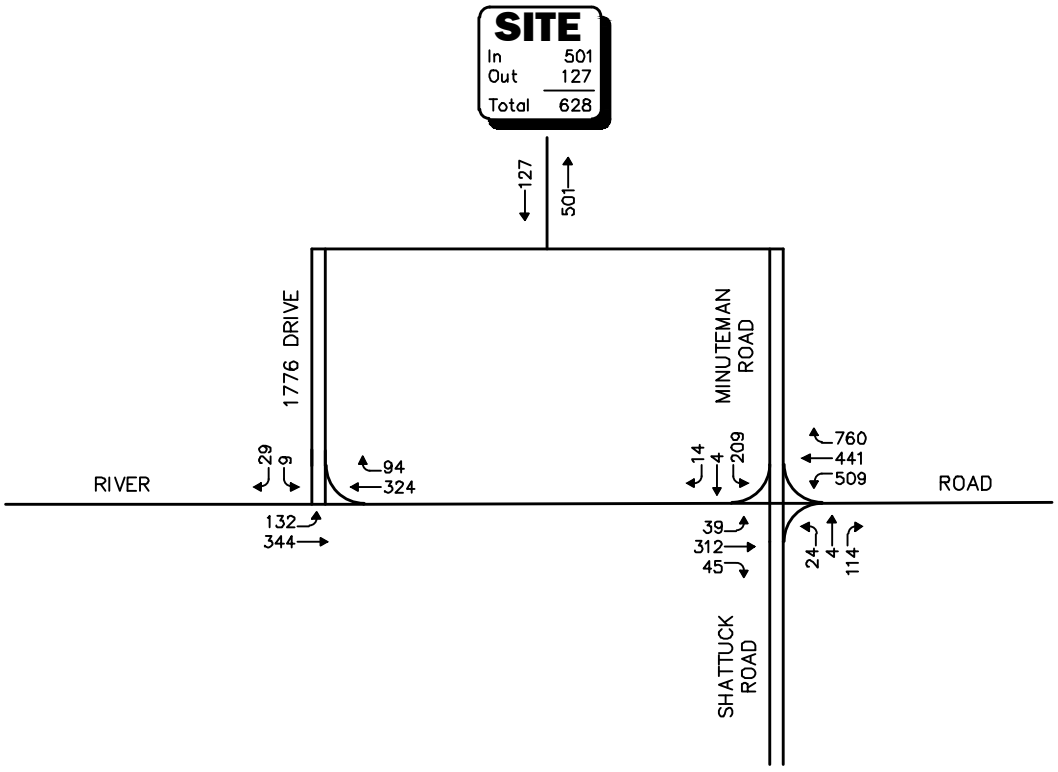
Not To Scale

Figure 6

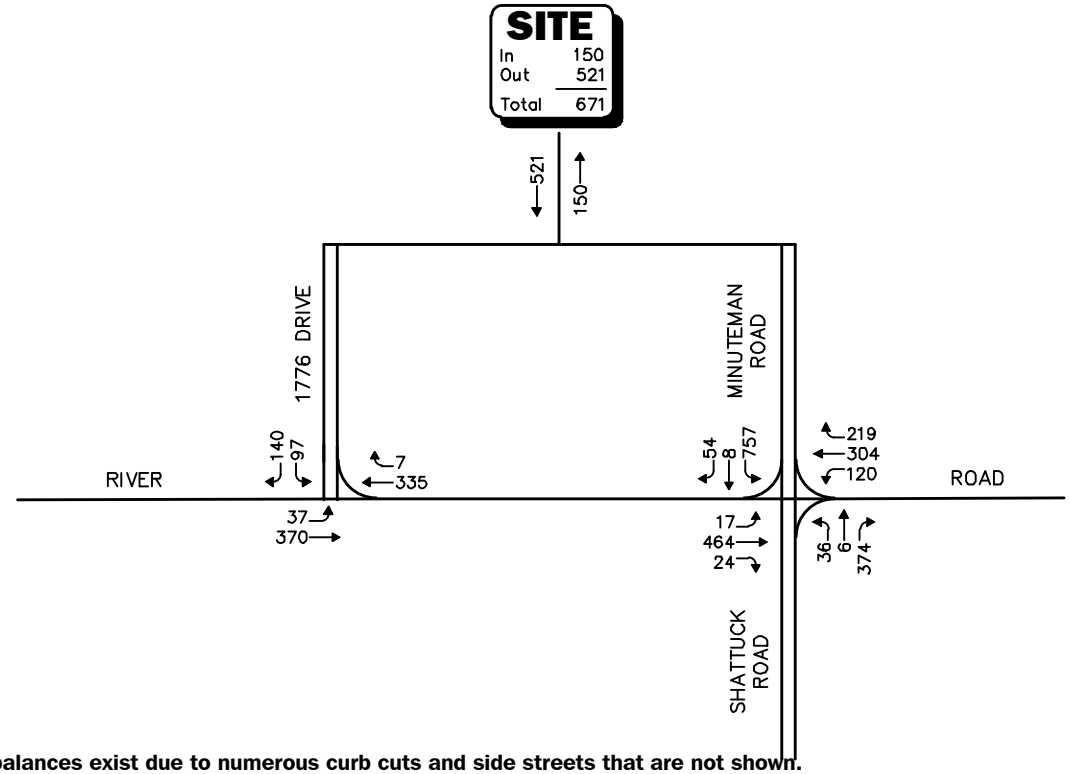
Project-Generated Peak-Hour Traffic Volumes

Vanasse & Associates inc

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 7

2029 Build
Peak-Hour Traffic Volumes

Vanasse & Associates inc

TRAFFIC OPERATIONS ANALYSIS

In order to assess the potential impact of the Project on the roadway network, a detailed traffic operations analysis (motorist delays, vehicle queuing, and level-of-service) was performed for the study intersections. Capacity analyses provide an indication of how well transportation facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

In brief, six levels of service are defined for each type of facility. They are given letter designations ranging from A to F, with LOS "A" representing the best operating conditions and LOS "F" representing congested or constrained operations. An LOS of "E" is representative of a transportation facility that is operating at its design capacity with an LOS of "D" generally defined as the limit of "acceptable" traffic operations. Since the level-of-service of a traffic facility is a function of the flows placed upon it, such a facility may operate at a wide range of levels of service depending on the time of day, day of week, or period of the year. The Synchro® intersection capacity analysis software, which is based on the analysis methodologies and procedures presented in the 2010 *Highway Capacity Manual* (HCM)[8] for unsignalized intersections and in the 2000 *Highway Capacity Manual*[9] for signalized intersections was used to complete the level-of-service and vehicle queue analyses.

Analysis Results

Level-of-service and vehicle queue analysis were conducted for 2022 Existing, 2029 No-Build, and 2029 Build conditions for the intersections within the study area. The results of the intersection capacity and vehicle queue analyses are summarized in Table 7, with the detailed analysis results attached.

The following is a summary of the level-of-service and vehicle queue analyses for intersections within the study area. For context, we note that an LOS of "D" or better is generally defined as "acceptable" operating conditions.

River Road at Shattuck Road and Minuteman Road

No change in overall level-of-service was shown to occur for any movement as a result of the construction of the initial phase of the Project. Operating conditions for through/right-turn movements from the River Road eastbound approach were shown to experience an increase in average motorist delay of less than 1.0 seconds that resulted in a minor degradation in level-of-service from LOS B to LOS C. Independent of the Project, one or more movements at the intersection were shown to operate over capacity (i.e., LOS F) during the peak-hours under 2029 No-Build conditions. Vehicle queues at the intersection were shown to *decrease* by up to five (5) vehicles when compared to 2029 No-Build conditions with the fully occupied Philips Health Care campus.

River Road at 1776 Drive

No change in level-of-service or vehicle queuing is predicted to occurs as a result of the construction of the initial phase of the Project, with Project-related impacts defined as a general *decrease* in motorist delay when compared to 2029 No-Build conditions with the fully occupied Philips Health Care campus.

[8] *Highway Capacity Manual*, Transportation Research Board; Washington, DC; 2010.
[9] *Highway Capacity manual*, Transportation Research Board; Washington, DC; 2000.

Table 7
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

	2022 Existing				2029 No-Build				2029 Build			
Signalized Intersection/Peak Hour/Movement	V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	V/C	Delay	LOS	Queue 50th/95th	V/C	Delay	LOS	Queue 50th/95th
River Road at Minuteman Road and Shattuck Road												
Weekday Morning:												
River Road EB LT	0.02	16.0	B	0/1	0.17	18.6	B	1/2	0.18	19.0	B	1/2
River Road EB TH/RT	0.39	17.9	B	2/5	0.40	19.9	B	3/6	0.42	20.3	C	3/6
River Road WB LT	0.81	30.3	C	3/14	1.13	>80.0	F	5/17	1.13	>80.0	F	5/17
River Road WB TH	0.48	9.4	A	4/13	0.57	13.0	B	5/14	0.58	13.4	B	5/14
River Road WB RT	0.14	7.3	A	0/2	0.61	14.3	B	0/3	0.54	12.9	B	0/3
Shattuck Road NB LT/TH	0.15	23.6	C	1/2	0.19	27.8	C	1/2	0.19	27.4	C	1/2
Shattuck Road NB RT	0.14	15.5	B	1/2	0.21	20.4	C	1/2	0.21	20.1	C	1/2
Minuteman Road SB LT	0.28	26.1	C	1/2	0.42	26.8	C	2/7	0.43	26.2	C	2/7
Minuteman Road SB TH	0.28	26.0	C	1/3	0.42	26.8	C	2/7	0.43	26.2	C	2/7
Minuteman Road SB RT	0.00	24.4	C	1/2	0.01	24.1	C	0/0	0.01	23.4	C	0/0
Overall	--	**18.4**	**B**	--	--	**35.2**	**D**	--	--	**35.7**	**D**	--
Weekday Evening:												
River Road EB LT	0.03	19.5	B	0/1	0.07	21.6	C	0/1	0.07	21.6	C	0/1
River Road EB TH/RT	0.55	23.0	C	3/7	0.61	26.1	C	4/8	0.61	26.1	C	4/8
River Road WB LT	0.25	26.1	C	1/3	0.33	29.8	C	1/3	0.33	29.8	C	1/3
River Road WB TH	0.40	13.0	B	3/8	0.46	15.5	B	3/9	0.46	15.5	B	3/9
River Road WB RT	0.05	10.7	B	0/1	0.16	13.1	B	0/2	0.16	13.1	B	0/2
Shattuck Road NB LT/TH	0.21	25.3	C	1/2	0.25	28.8	C	1/3	0.25	28.9	C	1/3
Shattuck Road NB RT	0.66	23.5	C	3/4	0.80	32.3	C	4/6	0.80	32.3	C	4/6
Minuteman Road SB LT	0.45	27.6	C	2/4	1.99	>80.0	F	11/30	1.76	>80.0	F	10/26
Minuteman Road SB TH	0.44	27.6	C	2/4	2.02	>80.0	F	12/30	1.72	>80.0	F	9/25
Minuteman Road SB RT	0.01	24.7	C	0/0	0.04	27.5	C	0/0	0.04	27.5	C	0/0
Overall	--	**21.7**	**C**	--	--	**>80.0**	**F**	--	--	**>80.0**	**F**	--

[a]Volume-to-capacity ratio.
[b]Control (signal) delay per vehicle in seconds.
[c]Level-of-Service.
[d]Queue length in vehicles based on 25-feet per vehicle.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound.
LT = left-turning movements; TH = through movements; RT = right-turning movements.

Table 8
UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

	2022 Existing				2029 No-Build				2029 Build			
Unsignalized Intersection/Peak-Hour/Movement	Demand[a]	Delay[b]	LOS[c]	Queue[d] 95th	Demand	Delay	LOS	Queue 95th	Demand	Delay	LOS	Queue 95th
River Road at 1776 Drive												
Weekday Morning:												
River Road EB LT/TH	308	0.7	A	0	502	2.7	A	1	476	2.3	A	1
River Road WB TH/RT	368	0.0	A	0	418	0.0	A	0	418	0.0	A	0
1776 Drive SB LT	8	14.7	B	0	9	24.3	C	0	9	22.1	C	0
1776 Drive SB RT	4	10.0	B	0	27	10.6	B	0	29	10.6	B	0
Weekday Evening:												
River Road EB LT/TH	330	0.1	A	0	408	0.8	A	0	407	0.8	A	0
River Road WB TH/RT	271	0.0	A	0	342	0.0	A	0	342	0.0	A	0
1776 Drive SB LT	87	17.0	C	1	97	22.7	C	2	97	22.6	C	2
1776 Drive SB RT	32	10.3	B	0	157	12.5	B	1	140	12.2	B	1

[a]Demand in vehicles per hour.
[b]Average control delay per vehicle (in seconds).
[c]Level of service.
[d]Queue length in vehicles.
EB = eastbound; SB = southbound; WB = westbound.
LT = left-turning movements; TH = through movements; RT = right-turning movements.

SIGHT DISTANCE ASSESSMENT

Sight distance measurements were performed at the River Road/Shattuck Road/Minuteman Road and River Road/1776 Drive intersections in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)[10] requirements. 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 oncoming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 9 presents the measured SSD and ISD at the subject intersections.

Table 9
SIGHT DISTANCE MEASUREMENTS[a]

	Feet		
Intersection/Sight Distance Measurement	Required Minimum (SSD)	Desirable (ISD)[b]	Measured
River Road at Shattuck Road and Minuteman Road			
Stopping Sight Distance:			
River Road approaching from the east	360	--	500+
River Road approaching from the west	360	--	500+
Intersection Sight Distance:			
Looking to the east from Minuteman Road	360	430	500+
Looking to the west from Minuteman Road	360	500	500+
River Road at 1776 Drive			
Stopping Sight Distance:			
River Road approaching from the east	360	--	500+
River Road approaching from the west	360	--	500+
Intersection Sight Distance:			
Looking to the east from 1776 Drive	360	430	500+
Looking to the west from 1776 Drive	360	500	500+

[a]Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets,* 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018; and based on a 45 mph approach speed on River Road.

[b]Values shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.

As can be seen in Table 7 the available lines of sight at the River Road/Shattuck Road/Minuteman Road and the River Road/1776 Drive intersections were found exceed the recommended minimum sight distance to function in a safe (SSD) and efficient (ISD) manner based on a 45 mph approach speed along River Road, which is above both the measured 85th percentile vehicle travel speed (38/41 mph) and the posted speed limit in the vicinity of the Project site (35 mph).

[10] *A Policy on Geometric Design of Highway and Streets,* 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.

SUMMARY

VAI has completed an assessment of the potential impacts on the transportation infrastructure associated with the initial phase of the renovation and expansion of the former Philips Health Care campus located at 3000 Minuteman Road in Andover, Massachusetts, to accommodate laboratory/cGMP uses. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the initial phase of the Project. Expanded development within the campus beyond that associated with this initial phase of the Project will be the subject of a separate TIA. Based on this assessment, we have concluded the following with respect to the initial phase of the Project:

1. Using trip-generation statistics published by the ITE[11] for similar functional areas to those that will be associated with the campus redevelopment (research and development (R&D) and manufacturing space for trip-generation purposes), the initial phase of the Project is expected to generate approximately 5,914 vehicle trips on an average weekday (two-way volume over the operational day of the Project), with approximately 628 vehicle trips expected during the weekday morning peak-hour and 671 vehicle trips expected during the weekday evening peak-hour;

2. In comparison to the former Philips Health Care campus at full occupancy, the initial phase of the Project is expected to generate approximately 314 *additional* vehicle trips on an average weekday (an approximate 6 percent increase), with 117 *fewer* vehicle trips expected during the weekday morning peak-hour (an approximate 13 percent decrease) and 87 *fewer* vehicle trips during the weekday evening peak-hour (an approximate 10 percent decrease);

3. The reduction in peak-hour traffic associated with the initial phase of the Project was shown to result in a corresponding *decrease* in motorist delays and vehicle queuing over No-Build conditions with the reoccupancy of the Philips Health Care campus, acknowledging that one or more movements at the study area intersections were shown to operate over capacity (i.e., LOS "F") independent of the initial phase of the Project;

4. No apparent safety deficiencies were noted with respect to the motor vehicle crash history at the study intersections; and

5. Lines of sight to and from the River Road/1776 Drive and River Road/Minuteman Road/ Shattuck Road intersections (the primary intersections through which access to the Project site will be provided) were found to exceed the recommended minimum distances for the intersections to operate in a safe and efficient manner based on the appropriate approach speed.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with the implementation of the recommendations that follow.

[11] Ibid 1.

RECOMMENDATIONS

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified as a part of this assessment. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

Project Access

Access to the Project site will continue to be provided by way of the existing driveways that serve the campus and are connected to 1776 Drive and Minuteman Road, both of which provide access to River Road. ***There are no changes proposed to the existing campus roadway network as it relates to 1776 Drive or Minuteman Road that would result in a change in travel patterns or the increased use of 1776 Drive.*** In fact, the subsequent addition of buildings to the campus as a part of a later phase of the Project will occur in a portion of the campus that is more proximate to the Minuteman Road access. The following recommendations are offered with respect to the design and operation of the Project site access and internal circulation:

- The Project site driveways will continue be a minimum of 24-feet in width or as required to accommodate the turning and maneuvering requirements of delivery trucks and the largest anticipated responding emergency vehicle as defined by the Andover Fire Department.

- Within the Project site, drive aisles will continue to be a minimum of 23-feet where perpendicular parking is proposed in order to facilitate parking maneuvers, and should accommodate the turning and maneuvering requirements of delivery vehicles where appropriate.

- All signs and pavement markings to be installed within the Project site shall conform to the applicable standards of the *Manual on Uniform Traffic Control Devices* (MUTCD).[12]

- Sidewalks and pedestrian paths are provided within the Project site that extend or provide access to the existing sidewalk along Minuteman Road.

- American with Disabilities Act (ADA) compliant wheelchair ramps will be provided at all pedestrian crossings where a sidewalk is provided.

- Signs and landscaping to be installed as a part of the Project within intersection sight triangle areas will be designed and maintained so as not to restrict lines of sight.

- Snow accumulations (windrows) within sight triangle areas will be promptly removed where such accumulations would impede sight lines.

- Consideration will be given to providing electric vehicle (EV) charging stations within the Project site.

[12] *Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.

Off-Site

River Road at Shattuck Road and Minuteman Road

Independent of the Project, motorist delays for left-turn movements from the River Road westbound approach and left-turn/through movements from Minuteman Road were shown to operate over their design capacity (i.e., LOS "F") with or without the addition of traffic associated with the initial phase of the Project. In an effort to reduce motorist delays and vehicle queuing at the intersection, the Project proponent will design and implement an optimal traffic signal timing plan. As can be seen in Table 10, with the implementation of an optimal traffic signal timing plan, intersection operations were shown to improve to the extent that no movement at the intersection would operate below LOS D during the peak hours, an improvements over No-Build conditions. These improvements will be completed prior to the issuance of a Certificate of Occupancy for the Project, subject to receipt of all necessary rights, permits and approvals.

Transportation Demand Management

The Project site is ideally situated to take advantage of available public transportation opportunities in the area (MVRTA bus Route 37). In an effort to encourage the use of alternative modes of transportation to single-occupancy vehicles (SOVs) and to promote healthy transportation options to employees of the Project, the following Transportation Demand Management (TDM) measures will be implemented or will be encouraged to be implemented as a part of the Project:

- A transportation coordinator will be assigned for the Project to coordinate the TDM program;
- Information regarding public transportation services, maps, schedules and fare information will be posted in a central location and/or otherwise made available to employees;
- The transportation coordinator will facilitate a rideshare matching program for employees to encourage carpooling;
- A "welcome packet" will be provided to employees detailing available commuter options and will include the contact information for the transportation coordinator and information to enroll in the employee rideshare program;
- Specific amenities will be provided to discourage off-site trips, including providing a break-room equipped with a microwave and refrigerator; offering direct deposit of paychecks; coordinating with a dry-cleaning service for on-site pick-up and delivery; allowing telecommuting or flexible work schedules; and other such measures to reduce overall traffic volumes and travel during peak traffic volume periods; and
- Secure bicycle parking should be provided within the Project site and should include an exterior bicycle rack and weather protected bicycle parking within the building.

With implementation of the above recommendations, safe and efficient access can be provided to the Project site and the Project can be accommodated within the confines of the existing transportation infrastructure.

cc: File

Table 10
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/Peak-hour/Movement	2029 No-Build				2029 Build				2029 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] 50th/95th	V/C	Delay	LOS	Queue 50th/95th	V/C	Delay	LOS	Queue 50th/95th
River Road at Minuteman Road and Shattuck Road												
Weekday Morning:												
River Road EB LT	0.17	18.6	B	1/2	0.18	19.0	B	1/2	0.21	22.7	C	1/2
River Road EB TH/RT	0.40	19.9	B	3/6	0.42	20.3	C	3/6	0.49	24.3	C	3/6
River Road WB LT	1.13	>80.0	F	5/17	1.13	>80.0	F	5/17	0.81	33.8	C	4/15
River Road WB TH	0.57	13.0	B	5/14	0.58	13.4	B	5/14	0.57	13.5	B	5/14
River Road WB RT	0.61	14.3	B	0/3	0.54	12.9	B	0/3	0.54	13.2	B	0/3
Shattuck Road NB LT/TH	0.19	27.8	C	1/2	0.19	27.4	C	1/2	0.16	28.1	C	1/1
Shattuck Road NB RT	0.21	20.4	C	1/2	0.21	20.1	C	1/2	0.16	17.3	B	1/2
Minuteman Road SB LT	0.42	26.8	C	2/7	0.43	26.2	C	2/7	0.48	29.4	C	2/7
Minuteman Road SB TH	0.42	26.8	C	2/7	0.43	26.2	C	2/7	0.48	29.3	C	2/7
Minuteman Road SB RT	0.01	24.1	C	0/0	0.01	23.4	C	0/0	0.01	26.0	C	0/0
Overall	--	**35.2**	**D**	--	--	**35.7**	**D**	--	--	**21.1**	**C**	--
Weekday Evening:												
River Road EB LT	0.07	21.6	C	0/1	0.07	21.6	C	0/1	0.09	31.1	C	1/2
River Road EB TH/RT	0.61	26.1	C	4/8	0.61	26.1	C	4/8	0.78	41.4	D	6/12
River Road WB LT	0.33	29.8	C	1/3	0.33	29.8	C	1/3	0.32	37.1	D	2/3
River Road WB TH	0.46	15.5	B	3/9	0.46	15.5	B	3/9	0.53	24.0	C	5/12
River Road WB RT	0.16	13.1	B	0/2	0.16	13.1	B	0/2	0.16	19.9	B	0/2
Shattuck Road NB LT/TH	0.25	28.8	C	1/3	0.25	28.9	C	1/3	0.33	39.9	D	1/2
Shattuck Road NB RT	0.80	32.3	C	4/6	0.80	32.3	C	4/6	0.89	49.8	D	6/6
Minuteman Road SB LT	1.99	>80.0	F	11/30	1.76	>80.0	F	10/26	0.88	48.3	D	8/26
Minuteman Road SB TH	2.02	>80.0	F	12/30	1.72	>80.0	F	9/25	0.86	45.6	D	8/21
Minuteman Road SB RT	0.04	27.5	C	0/0	0.04	27.5	C	0/0	0.04	24.1	C	0/0
Overall	--	**>80.0**	**F**	--	--	**>80.0**	**F**	--	--	**40.0**	**D**	--

[a]Volume-to-capacity ratio.
[b]Control (signal) delay per vehicle in seconds.
[c]Level-of-Service.
[d]Queue length in vehicles.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements

ATTACHMENTS

PROJECT SITE PLAN
AUTOMATIC TRAFFIC RECORDER COUNT DATA
TURNING MOVEMENT COUNT DATA
SEASONAL ADJUSTMENT DATA
COVID ADJUSTMENT
VEHICLE TRAVEL SPEED DATA
PUBLIC TRANSPORTATION SCHEDULE
MASSDOT CRASH RATE WORKSHEETS AND HIGH CRASH LOCATION MAPPING
GENERAL BACKGROUND TRAFFIC GROWTH
TRIP-GENERATION CALCULATIONS
JOURNEY TO WORK TRIP DISTRIBUTION
CAPACITY ANALYSIS WORKSHEETS

PROJECT SITE PLAN

Existing Program Summary

Building 1
86,000 SF
Office

Building 2
164,100 SF
Electronics Manufacturing/ Office

Building 3
171,200 SF
Electronics Manufacturing/ Office

Building 4
256,700 SF
Office

Link & Amenities Buildings
48,200 SF
Lobby, Cafeteria, Office

TOTAL: 726,000 SF

Existing Plan

Proposed Program Summary

Building 1
86,000 SF
Research Lab/Support Lab/Office

Building 1 Addition
100,000 SF
GMP Manufacturing/GMP Warehouse

Building 2
164,100 SF
GMP Manufacturing/GMP Warehouse/ Research Lab/Support Lab/Office

Building 3
171,200 SF
GMP Manufacturing/GMP Warehouse/ Research Lab/Support Lab/Office

Building 4
256,700 SF
Research Lab/Support Lab/Office

Building 5
150,000 SF
GMP Manufacturing/GMP Warehouse

Building 6
150,000 SF
GMP Manufacturing/GMP Warehouse/Research Lab/Support Lab

Central Utility Plan (CUP)
15,000 SF

Link & Amenities Buildings
48,200 SF
Lobby, Cafeteria, Fitness

TOTAL: 1,126,000 SF

Conceptual Master Plan

3000 Minuteman Road, Andover, Massachusetts 11/03/2021

ALEXANDRIA. SASAKI SMMA

AUTOMATIC TRAFFIC RECORDER COUNT DATA

Location : River Road WB 91410WB1
Location : East of Shattuck Road
City/State: Andover, MA

	5/11/2022	WB,		Hour Totals	
Time	Wednesday	Morning	Afternoon	Morning	Afternon
12:00		18	92		
12:15		9	74		
12:30		5	119		
12:45		3	94	35	379
1:00		4	96		
1:15		5	83		
1:30		5	85		
1:45		4	86	18	350
2:00		4	84		
2:15		8	102		
2:30		2	137		
2:45		4	129	18	452
3:00		12	130		
3:15		5	119		
3:30		3	114		
3:45		5	92	25	455
4:00		8	80		
4:15		9	97		
4:30		17	99		
4:45		41	89	75	365
5:00		19	124		
5:15		34	124		
5:30		42	84		
5:45		83	105	178	437
6:00		48	94		
6:15		80	79		
6:30		94	86		
6:45		155	88	377	347
7:00		132	72		
7:15		159	68		
7:30		226	76		
7:45		270	60	787	276
8:00		256	69		
8:15		242	53		
8:30		201	61		
8:45		217	56	916	239
9:00		172	51		
9:15		123	32		
9:30		99	32		
9:45		92	33	486	148
10:00		90	28		
10:15		73	29		
10:30		68	24		
10:45		60	18	291	99
11:00		64	24		
11:15		72	11		
11:30		73	29		
11:45		104	32	313	96
Total		3519	3643		
Percent		49.1%	50.9%		

Location : River Road WB 91410WB1
Location : East of Shattuck Road
City/State: Andover, MA

	5/12/2022	WB,		Hour Totals	
Time	Thursday	Morning	Afternoon	Morning	Afternon
12:00		16	96		
12:15		12	102		
12:30		9	91		
12:45		9	108	46	397
1:00		1	79		
1:15		3	82		
1:30		10	74		
1:45		5	103	19	338
2:00		6	88		
2:15		13	107		
2:30		1	123		
2:45		4	146	24	464
3:00		14	109		
3:15		5	130		
3:30		5	108		
3:45		9	90	33	437
4:00		10	103		
4:15		8	102		
4:30		18	123		
4:45		41	155	77	483
5:00		23	130		
5:15		38	116		
5:30		42	103		
5:45		79	99	182	448
6:00		49	75		
6:15		61	77		
6:30		87	69		
6:45		153	89	350	310
7:00		113	73		
7:15		161	77		
7:30		205	65		
7:45		248	63	727	278
8:00		247	80		
8:15		231	63		
8:30		178	53		
8:45		244	58	900	254
9:00		177	52		
9:15		121	42		
9:30		101	34		
9:45		75	26	474	154
10:00		83	27		
10:15		69	23		
10:30		65	27		
10:45		62	27	279	104
11:00		61	24		
11:15		80	18		
11:30		69	32		
11:45		96	36	306	110
Total		3417	3777		
Percent		47.5%	52.5%		
Grand Total		6936	7420		
Percent		48.3%	51.7%		
ADT		ADT: 7,178		AADT: 7,178	

Location : River Road WB 91410WB1
Location : East of Shattuck Road
City/State: Andover, MA

5/9/2022	5/9/22	5/10/22	5/11/2022	5/12/2022	5/13/2022	5/14/2022	5/15/2022	Average	
Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon - Fri	Mon - Sun
12:00 AM	*	*	35	46	*	*	*	40	40
1:00	*	*	18	19	*	*	*	18	18
2:00	*	*	18	24	*	*	*	21	21
3:00	*	*	25	33	*	*	*	29	29
4:00	*	*	75	77	*	*	*	76	76
5:00	*	*	178	182	*	*	*	180	180
6:00	*	*	377	350	*	*	*	364	364
7:00	*	*	787	727	*	*	*	757	757
8:00	*	*	916	900	*	*	*	908	908
9:00	*	*	486	474	*	*	*	480	480
10:00	*	*	291	279	*	*	*	285	285
11:00	*	*	313	306	*	*	*	310	310
12:00 PM	*	*	379	397	*	*	*	388	388
1:00	*	*	350	338	*	*	*	344	344
2:00	*	*	452	464	*	*	*	458	458
3:00	*	*	455	437	*	*	*	446	446
4:00	*	*	365	483	*	*	*	424	424
5:00	*	*	437	448	*	*	*	442	442
6:00	*	*	347	310	*	*	*	328	328
7:00	*	*	276	278	*	*	*	277	277
8:00	*	*	239	254	*	*	*	246	246
9:00	*	*	148	154	*	*	*	151	151
10:00	*	*	99	104	*	*	*	102	102
11:00	*	*	96	110	*	*	*	103	103
Total	0	0	7162	7194	0	0	0	7177	7177
Percent	0.0%	0.0%	49.9%	50.1%	0.0%	0.0%	0.0%		
AM Peak			8:00	8:00				8:00	8:00
Volume			916	900				908	908
PM Peak			3:00	4:00				2:00	2:00
Volume			455	483				458	458

TURNING MOVEMENT COUNT DATA

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 1

Groups Printed- Cars - Trucks

	1776 Dr From North		River Rd From East		River Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	1	1	61	10	1	47	121
07:15 AM	1	0	49	17	4	59	130
07:30 AM	3	1	84	21	7	77	193
07:45 AM	1	0	57	27	8	64	157
Total	6	2	251	75	20	247	601
08:00 AM	3	1	68	14	4	70	160
08:15 AM	1	2	74	23	10	68	178
08:30 AM	0	0	55	10	2	73	140
08:45 AM	4	0	58	20	9	93	184
Total	8	3	255	67	25	304	662
Grand Total	14	5	506	142	45	551	1263
Apprch %	73.7	26.3	78.1	21.9	7.6	92.4	
Total %	1.1	0.4	40.1	11.2	3.6	43.6	
Cars	13	5	484	141	45	528	1216
% Cars	92.9	100	95.7	99.3	100	95.8	96.3
Trucks	1	0	22	1	0	23	47
% Trucks	7.1	0	4.3	0.7	0	4.2	3.7

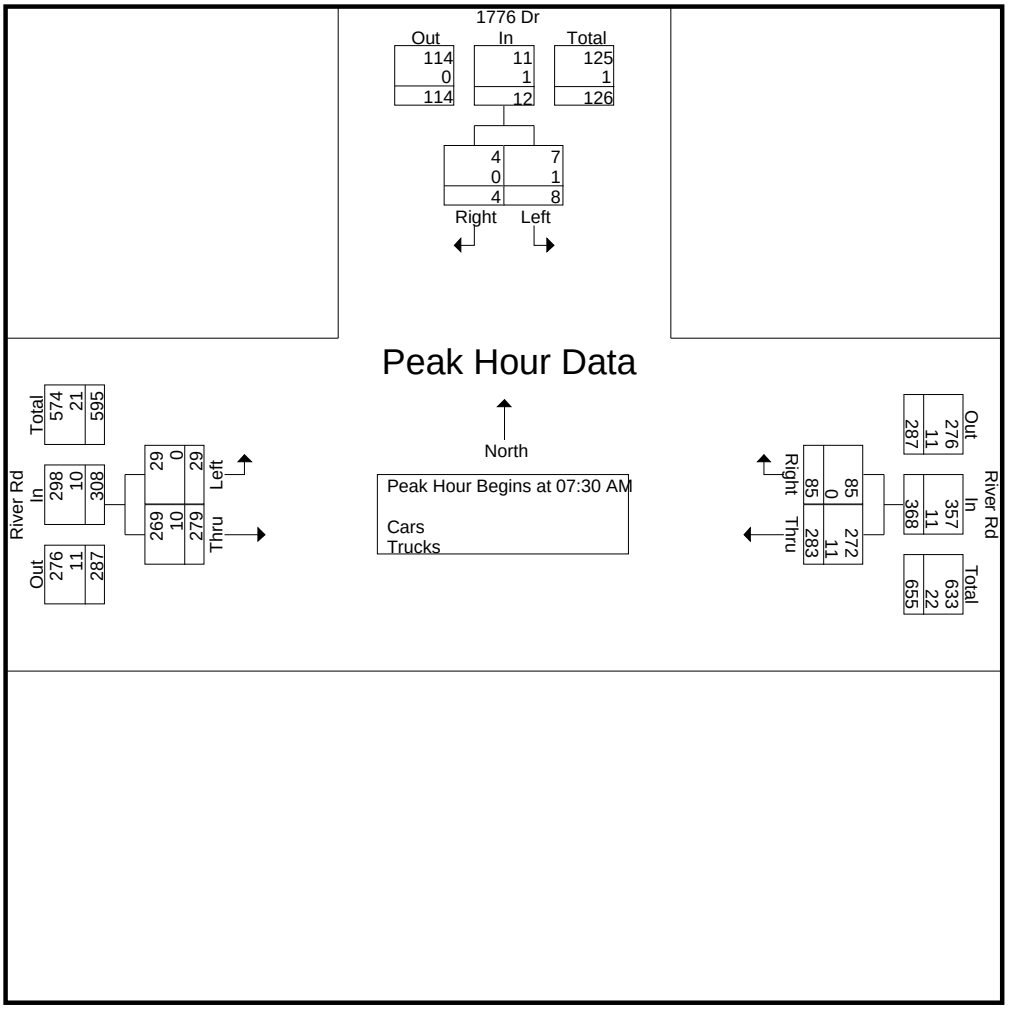
	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	**3**	1	**4**	**84**	21	**105**	7	**77**	**84**	**193**
07:45 AM	1	0	1	57	**27**	84	8	64	72	157
08:00 AM	3	1	4	68	14	82	4	70	74	160
08:15 AM	1	**2**	3	74	23	97	**10**	68	78	178
Total Volume	8	4	12	283	85	368	29	279	308	688
% App. Total	66.7	33.3		76.9	23.1		9.4	90.6		
PHF	.667	.500	.750	.842	.787	.876	.725	.906	.917	.891
Cars	7	4	11	272	85	357	29	269	298	666
% Cars	87.5	100	91.7	96.1	100	97.0	100	96.4	96.8	96.8
Trucks	1	0	1	11	0	11	0	10	10	22
% Trucks	12.5	0	8.3	3.9	0	3.0	0	3.6	3.2	3.2

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 2



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

Peak Hour for Each Approach Begins at:

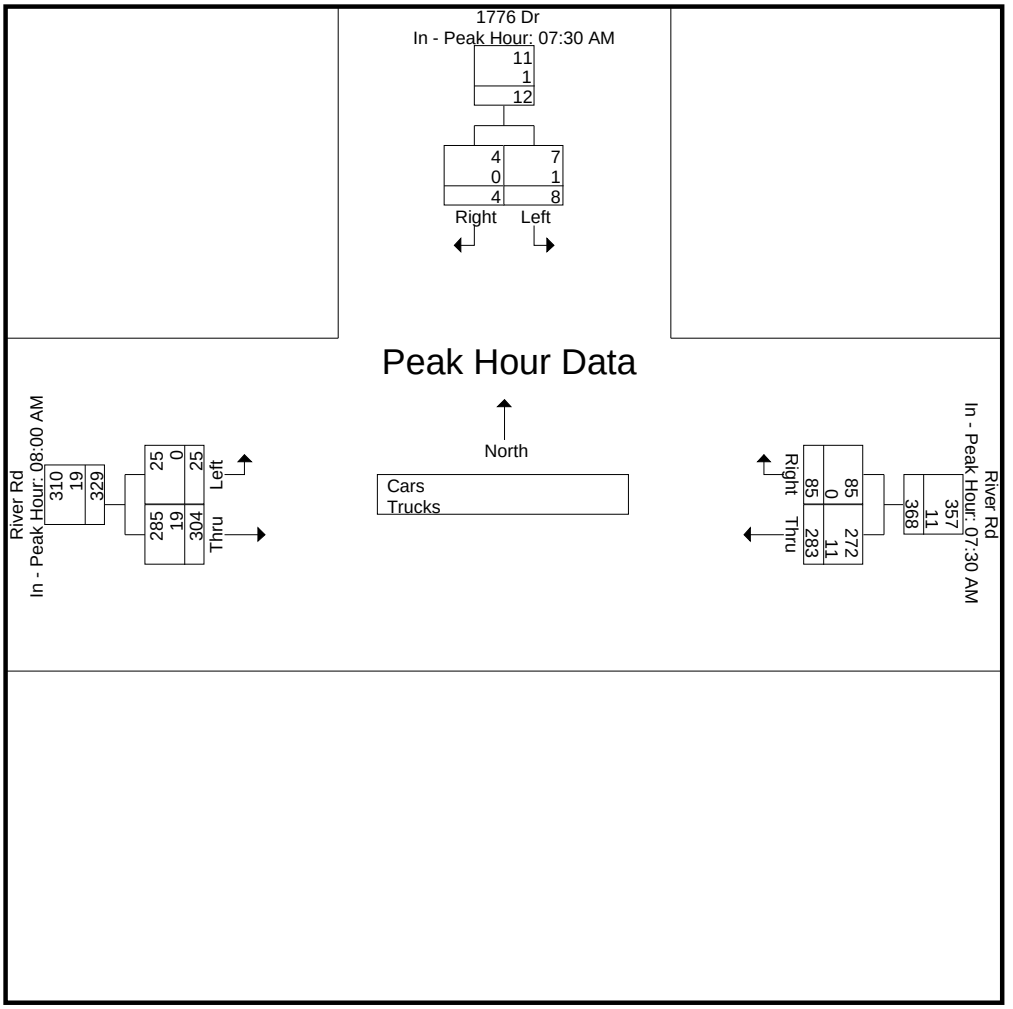
	07:30 AM			07:30 AM			08:00 AM		
+0 mins.	**3**	1	**4**	**84**	21	**105**	4	70	74
+15 mins.	1	0	1	57	**27**	84	**10**	68	78
+30 mins.	3	1	4	68	14	82	2	73	75
+45 mins.	1	**2**	3	74	23	97	9	**93**	**102**
Total Volume	8	4	12	283	85	368	25	304	329
% App. Total	66.7	33.3		76.9	23.1		7.6	92.4	
PHF	.667	.500	.750	.842	.787	.876	.625	.817	.806
Cars	7	4	11	272	85	357	25	285	310
% Cars	87.5	100	91.7	96.1	100	97	100	93.8	94.2
Trucks	1	0	1	11	0	11	0	19	19
% Trucks	12.5	0	8.3	3.9	0	3	0	6.2	5.8

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 3



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022

Groups Printed- Cars

	1776 Dr From North		River Rd From East		River Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	1	1	60	10	1	47	120
07:15 AM	1	0	45	16	4	57	123
07:30 AM	3	1	79	21	7	75	186
07:45 AM	1	0	55	27	8	64	155
Total	6	2	239	74	20	243	584
08:00 AM	2	1	67	14	4	68	156
08:15 AM	1	2	71	23	10	62	169
08:30 AM	0	0	50	10	2	70	132
08:45 AM	4	0	57	20	9	85	175
Total	7	3	245	67	25	285	632
Grand Total	13	5	484	141	45	528	1216
Apprch %	72.2	27.8	77.4	22.6	7.9	92.1	
Total %	1.1	0.4	39.8	11.6	3.7	43.4	

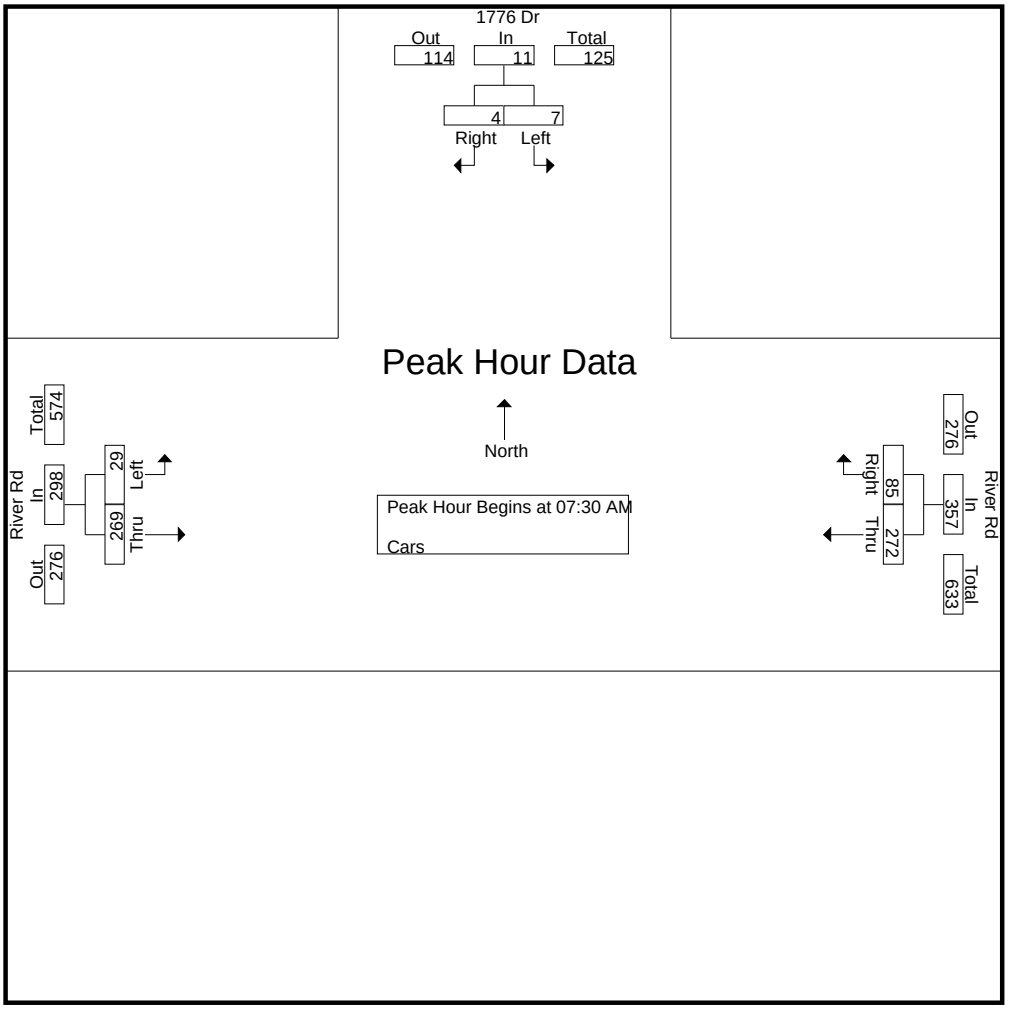
	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	**3**	1	**4**	**79**	21	**100**	7	**75**	**82**	**186**
07:45 AM	1	0	1	55	**27**	82	8	64	72	155
08:00 AM	2	1	3	67	14	81	4	68	72	156
08:15 AM	1	**2**	3	71	23	94	**10**	62	72	169
Total Volume	7	4	11	272	85	357	29	269	298	666
% App. Total	63.6	36.4		76.2	23.8		9.7	90.3		
PHF	.583	.500	.688	.861	.787	.893	.725	.897	.909	.895

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 5



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

Peak Hour for Each Approach Begins at:

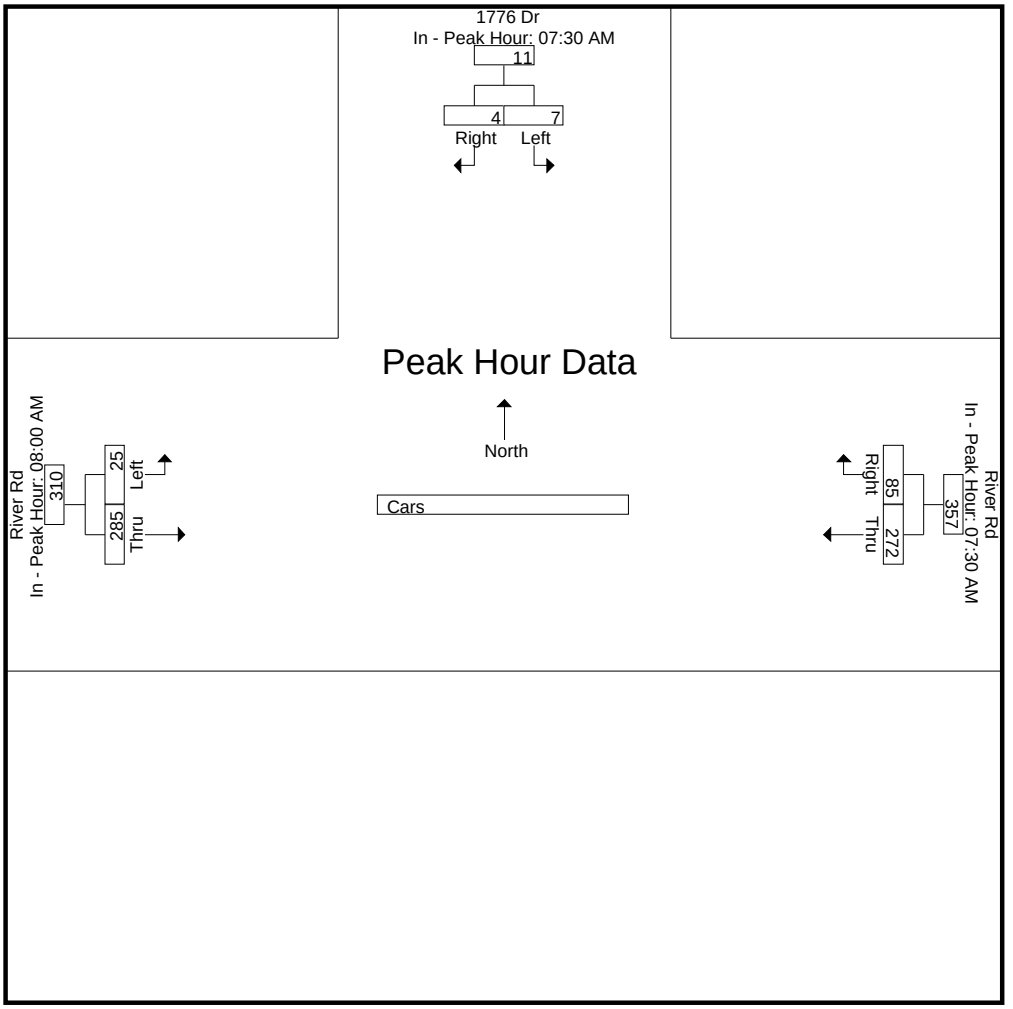
	07:30 AM			07:30 AM			08:00 AM		
+0 mins.	**3**	1	**4**	**79**	21	**100**	4	68	72
+15 mins.	1	0	1	55	**27**	82	**10**	62	72
+30 mins.	2	1	3	67	14	81	2	70	72
+45 mins.	1	**2**	3	71	23	94	9	**85**	**94**
Total Volume	7	4	11	272	85	357	25	285	310
% App. Total	63.6	36.4		76.2	23.8		8.1	91.9	
PHF	.583	.500	.688	.861	.787	.893	.625	.838	.824

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 6



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 7

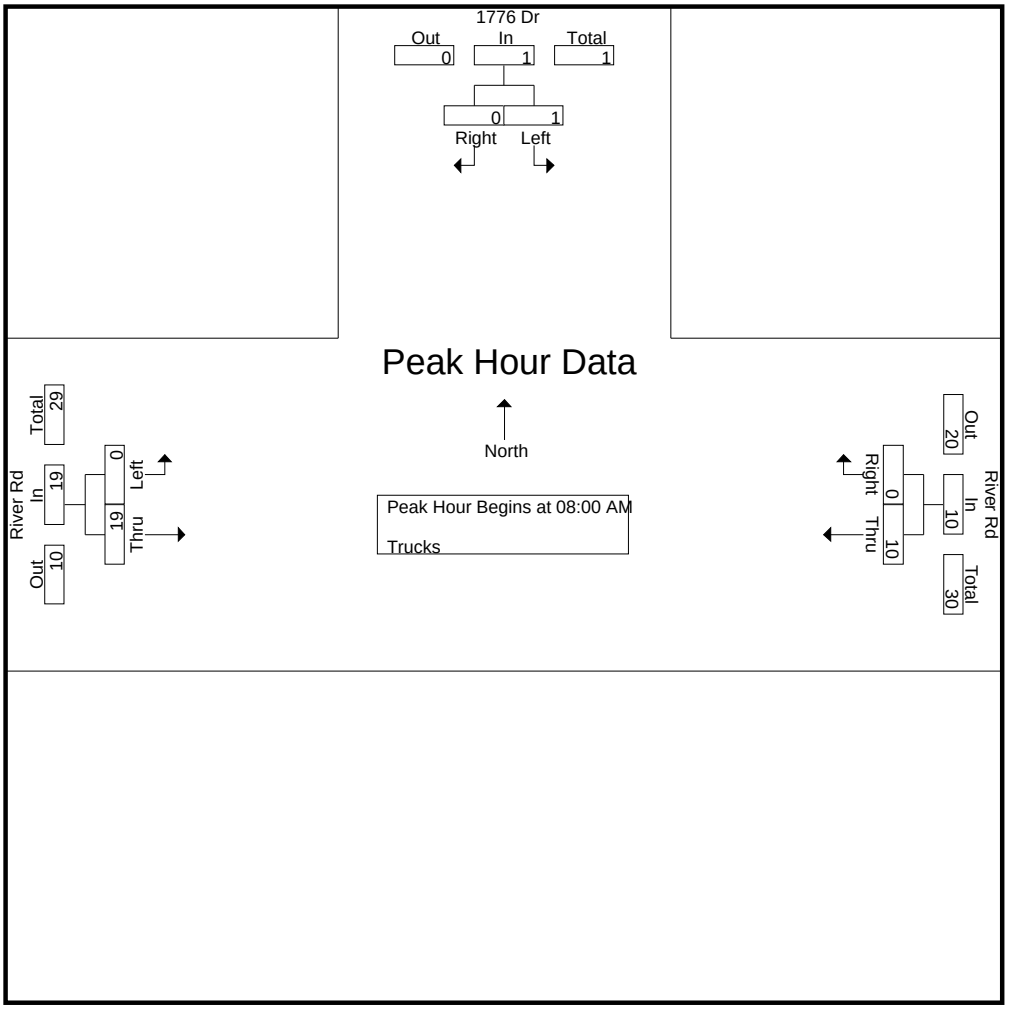
Groups Printed- Trucks

	1776 Dr From North		River Rd From East		River Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	0	0	1	0	0	0	1
07:15 AM	0	0	4	1	0	2	7
07:30 AM	0	0	5	0	0	2	7
07:45 AM	0	0	2	0	0	0	2
Total	0	0	12	1	0	4	17
08:00 AM	1	0	1	0	0	2	4
08:15 AM	0	0	3	0	0	6	9
08:30 AM	0	0	5	0	0	3	8
08:45 AM	0	0	1	0	0	8	9
Total	1	0	10	0	0	19	30
Grand Total	1	0	22	1	0	23	47
Apprch %	100	0	95.7	4.3	0	100	
Total %	2.1	0	46.8	2.1	0	48.9	

	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	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	**1**	0	**1**	1	0	1	0	2	2	4
08:15 AM	0	0	0	3	0	3	0	6	6	**9**
08:30 AM	0	0	0	**5**	0	**5**	0	3	3	8
08:45 AM	0	0	0	1	0	1	0	**8**	**8**	9
Total Volume	1	0	1	10	0	10	0	19	19	30
% App. Total	100	0		100	0		0	100		
PHF	.250	.000	.250	.500	.000	.500	.000	.594	.594	.833

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 8



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

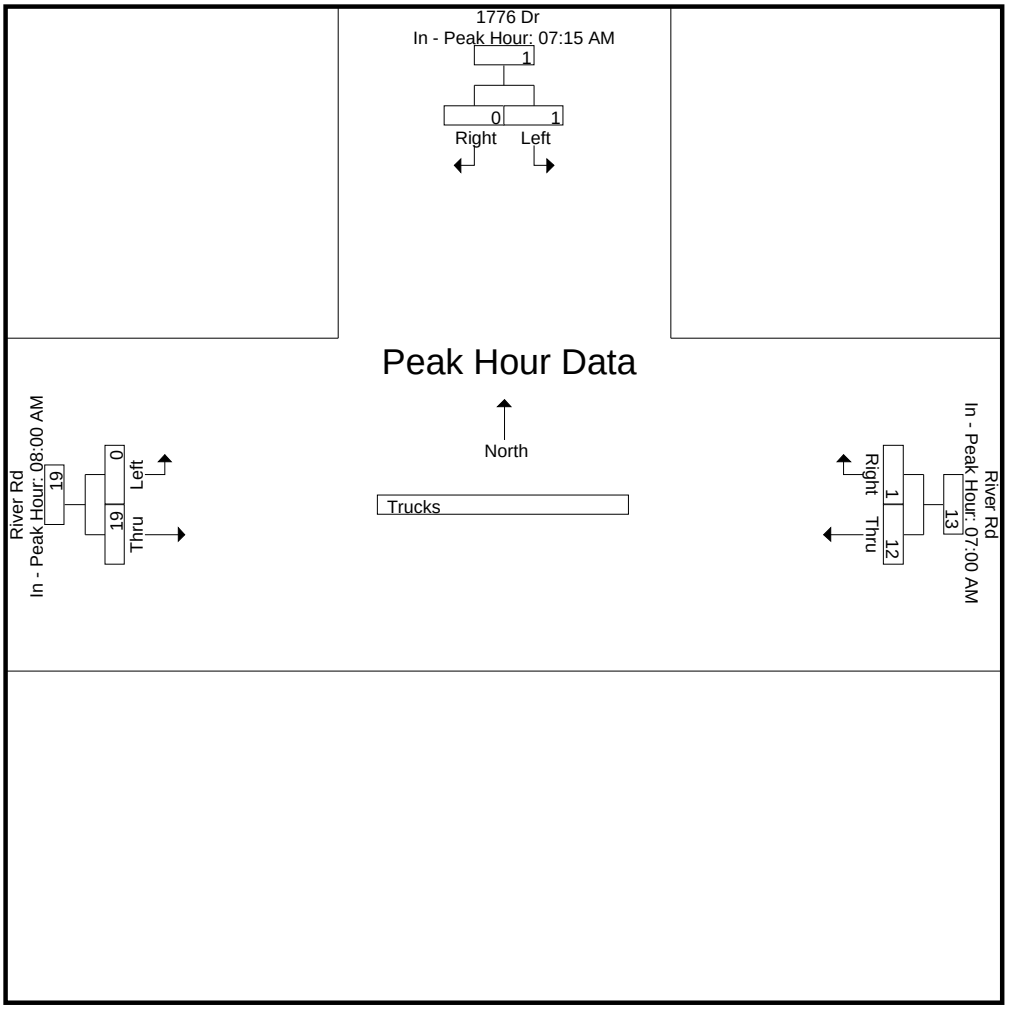
	07:15 AM			07:00 AM			08:00 AM		
+0 mins.	0	0	0	1	0	1	0	2	2
+15 mins.	0	0	0	4	**1**	**5**	0	6	6
+30 mins.	0	0	0	**5**	0	5	0	3	3
+45 mins.	**1**	0	**1**	2	0	2	0	**8**	**8**
Total Volume	1	0	1	12	1	13	0	19	19
% App. Total	100	0		92.3	7.7		0	100	
PHF	.250	.000	.250	.600	.250	.650	.000	.594	.594

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 9



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022

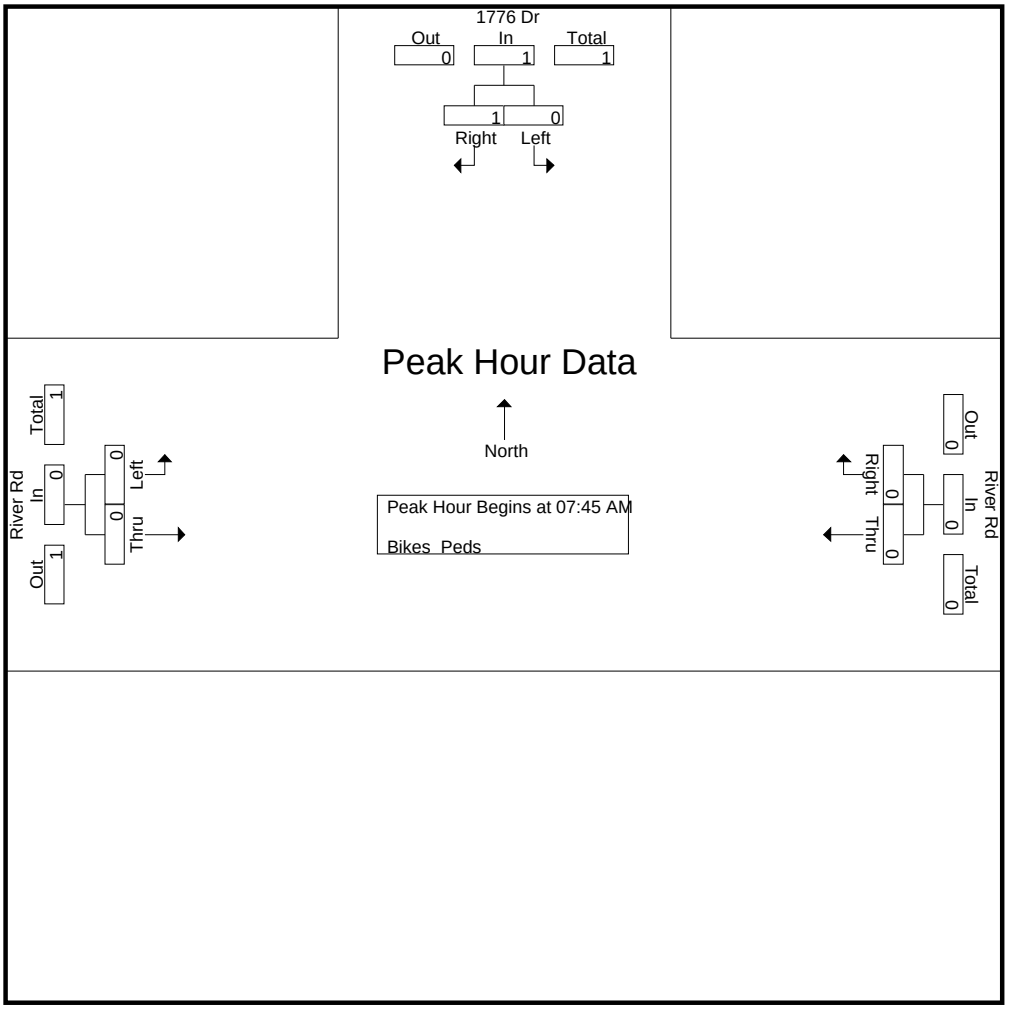
Groups Printed- Bikes Peds

	1776 Dr From North			River Rd From East			River Rd From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	1	0	0	0	0	0	0	0	0	1	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	0	0	0	1	1
Grand Total	0	1	0	0	0	0	0	0	0	0	1	1
Apprch %	0	100		0	0		0	0				
Total %	0	100		0	0		0	0		0	100	

	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	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 07:45 AM										
07:45 AM	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	**1**	**1**	0	0	0	0	0	0	**1**
Total Volume	0	1	1	0	0	0	0	0	0	1
% App. Total	0	100		0	0		0	0		
PHF	.000	.250	.250	.000	.000	.000	.000	.000	.000	.250

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 11

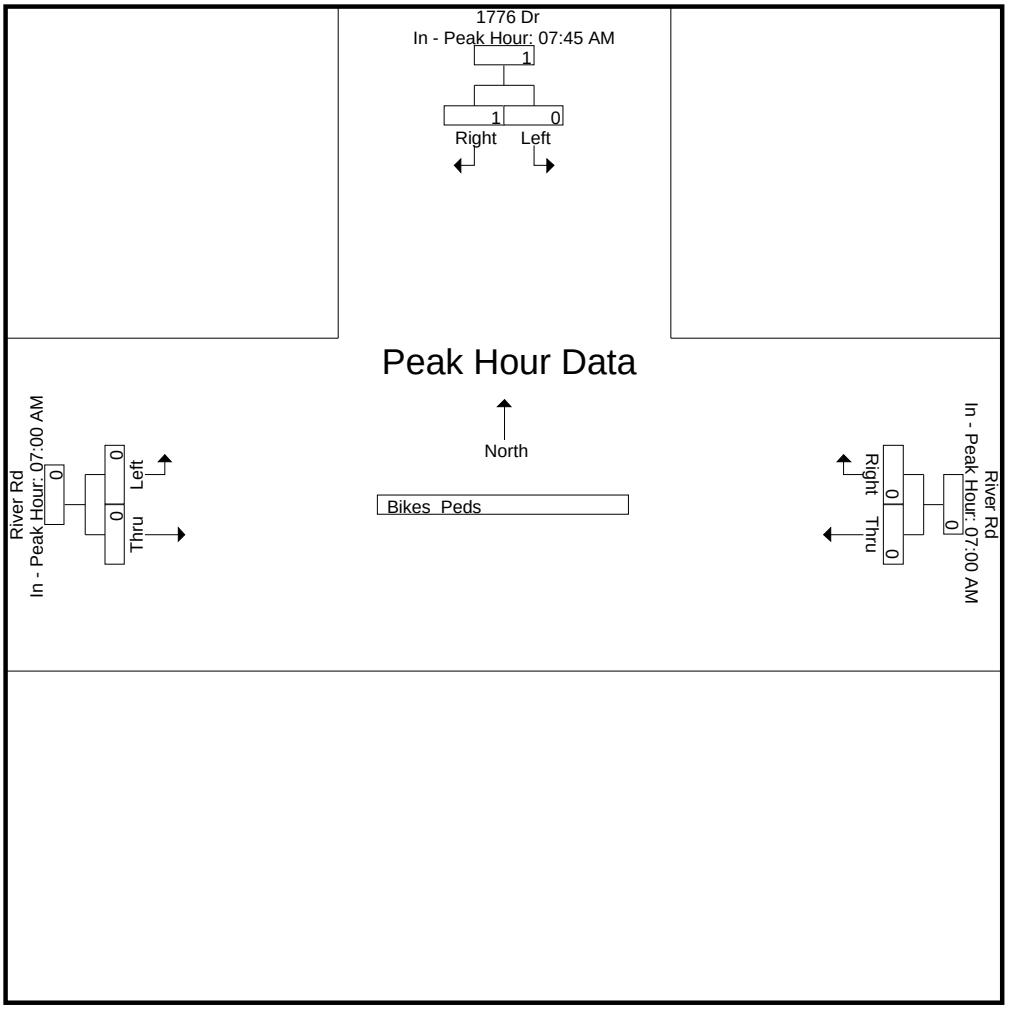


Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

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

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 12



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 1

Groups Printed- Cars - Trucks

	1776 Dr From North		River Rd From East		River Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	19	9	53	2	0	99	182
04:15 PM	12	5	72	2	2	76	169
04:30 PM	27	9	56	3	1	85	181
04:45 PM	15	9	57	0	3	76	160
Total	73	32	238	7	6	336	692
05:00 PM	33	9	80	1	0	87	210
05:15 PM	9	1	84	1	0	74	169
05:30 PM	13	3	59	1	0	72	148
05:45 PM	8	5	55	4	2	79	153
Total	63	18	278	7	2	312	680
Grand Total	136	50	516	14	8	648	1372
Apprch %	73.1	26.9	97.4	2.6	1.2	98.8	
Total %	9.9	3.6	37.6	1	0.6	47.2	
Cars	134	50	515	12	8	639	1358
% Cars	98.5	100	99.8	85.7	100	98.6	99
Trucks	2	0	1	2	0	9	14
% Trucks	1.5	0	0.2	14.3	0	1.4	1

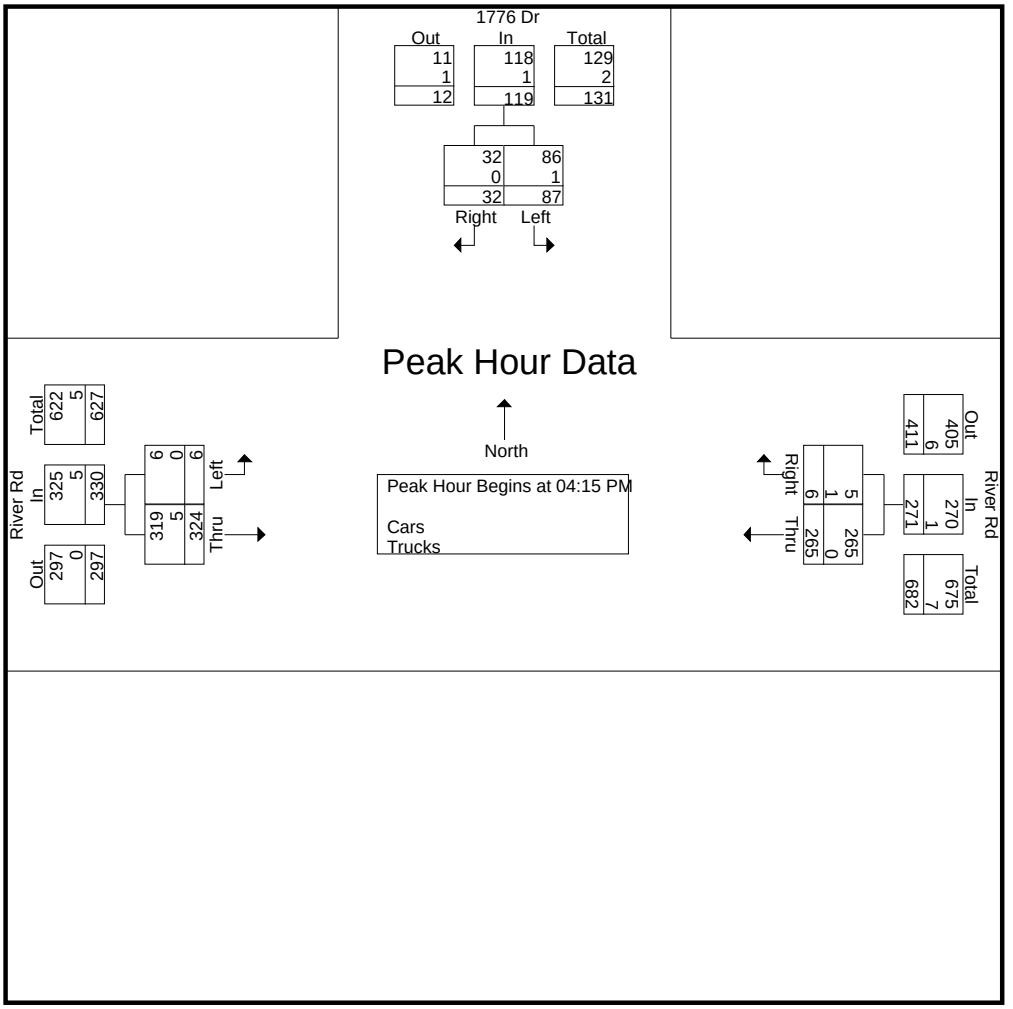
	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:15 PM										
04:15 PM	12	5	17	72	2	74	2	76	78	169
04:30 PM	27	**9**	36	56	**3**	59	1	85	86	181
04:45 PM	15	9	24	57	0	57	**3**	76	79	160
05:00 PM	**33**	9	**42**	**80**	1	**81**	0	**87**	**87**	**210**
Total Volume	87	32	119	265	6	271	6	324	330	720
% App. Total	73.1	26.9		97.8	2.2		1.8	98.2		
PHF	.659	.889	.708	.828	.500	.836	.500	.931	.948	.857
Cars	86	32	118	265	5	270	6	319	325	713
% Cars	98.9	100	99.2	100	83.3	99.6	100	98.5	98.5	99.0
Trucks	1	0	1	0	1	1	0	5	5	7
% Trucks	1.1	0	0.8	0	16.7	0.4	0	1.5	1.5	1.0

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 2



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

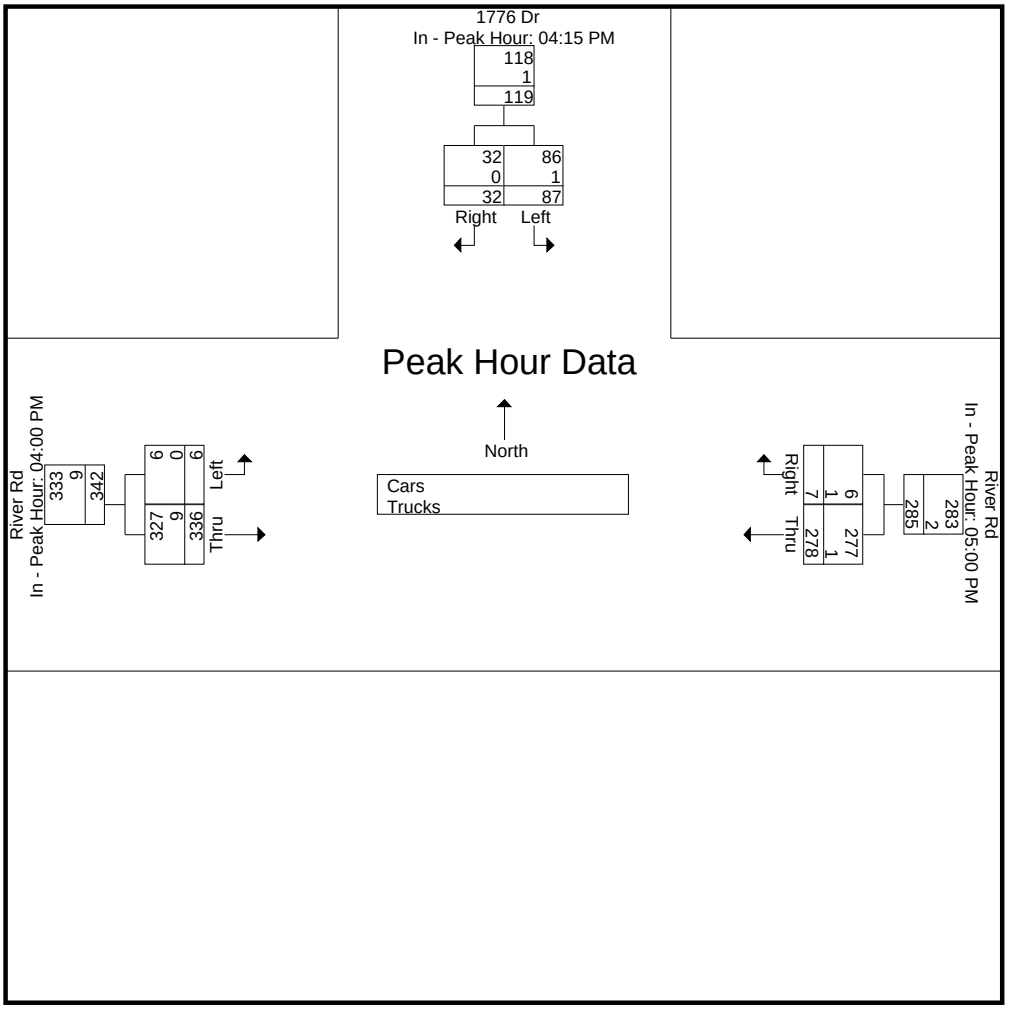
Peak Hour for Each Approach Begins at:

	04:15 PM			05:00 PM			04:00 PM		
+0 mins.	12	5	17	80	1	81	0	**99**	**99**
+15 mins.	27	**9**	36	**84**	1	**85**	2	76	78
+30 mins.	15	9	24	59	1	60	1	85	86
+45 mins.	**33**	9	**42**	55	**4**	59	**3**	76	79
Total Volume	87	32	119	278	7	285	6	336	342
% App. Total	73.1	26.9		97.5	2.5		1.8	98.2	
PHF	.659	.889	.708	.827	.438	.838	.500	.848	.864
Cars	86	32	118	277	6	283	6	327	333
% Cars	98.9	100	99.2	99.6	85.7	99.3	100	97.3	97.4
Trucks	1	0	1	1	1	2	0	9	9
% Trucks	1.1	0	0.8	0.4	14.3	0.7	0	2.7	2.6

Accurate Counts
978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 3



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022

Groups Printed- Cars

	1776 Dr From North		River Rd From East		River Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	18	9	53	1	0	95	176
04:15 PM	12	5	72	2	2	72	165
04:30 PM	27	9	56	3	1	85	181
04:45 PM	15	9	57	0	3	75	159
Total	72	32	238	6	6	327	681
05:00 PM	32	9	80	0	0	87	208
05:15 PM	9	1	84	1	0	74	169
05:30 PM	13	3	59	1	0	72	148
05:45 PM	8	5	54	4	2	79	152
Total	62	18	277	6	2	312	677
Grand Total	134	50	515	12	8	639	1358
Apprch %	72.8	27.2	97.7	2.3	1.2	98.8	
Total %	9.9	3.7	37.9	0.9	0.6	47.1	

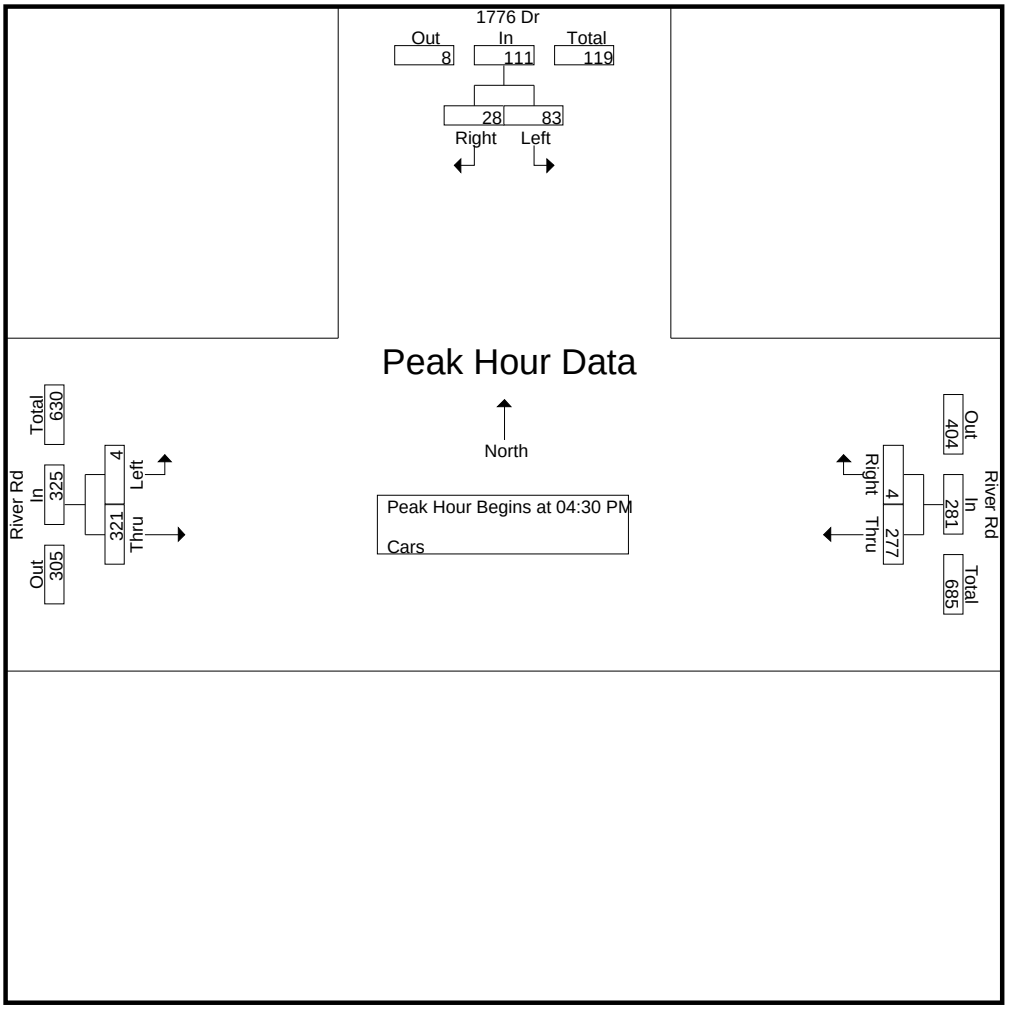
	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	27	**9**	36	56	**3**	59	1	85	86	181
04:45 PM	15	9	24	57	0	57	**3**	75	78	159
05:00 PM	**32**	9	**41**	80	0	80	0	**87**	**87**	**208**
05:15 PM	9	1	10	**84**	1	**85**	0	74	74	169
Total Volume	83	28	111	277	4	281	4	321	325	717
% App. Total	74.8	25.2		98.6	1.4		1.2	98.8		
PHF	.648	.778	.677	.824	.333	.826	.333	.922	.934	.862

Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 5



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

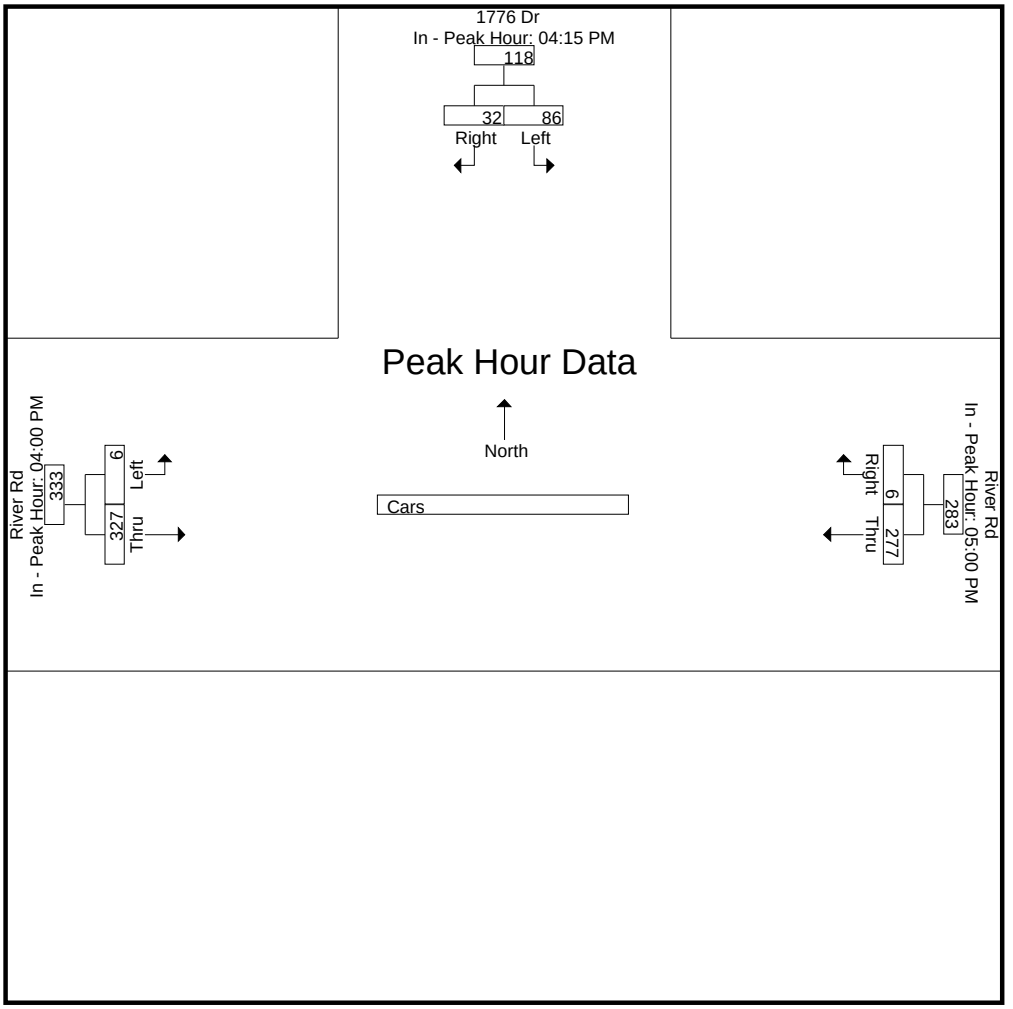
Peak Hour for Each Approach Begins at:

	04:15 PM			05:00 PM			04:00 PM		
+0 mins.	12	5	17	80	0	80	0	**95**	**95**
+15 mins.	27	**9**	36	**84**	1	**85**	2	72	74
+30 mins.	15	9	24	59	1	60	1	85	86
+45 mins.	**32**	9	**41**	54	**4**	58	**3**	75	78
Total Volume	86	32	118	277	6	283	6	327	333
% App. Total	72.9	27.1		97.9	2.1		1.8	98.2	
PHF	.672	.889	.720	.824	.375	.832	.500	.861	.876

Accurate Counts
978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 6



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 7

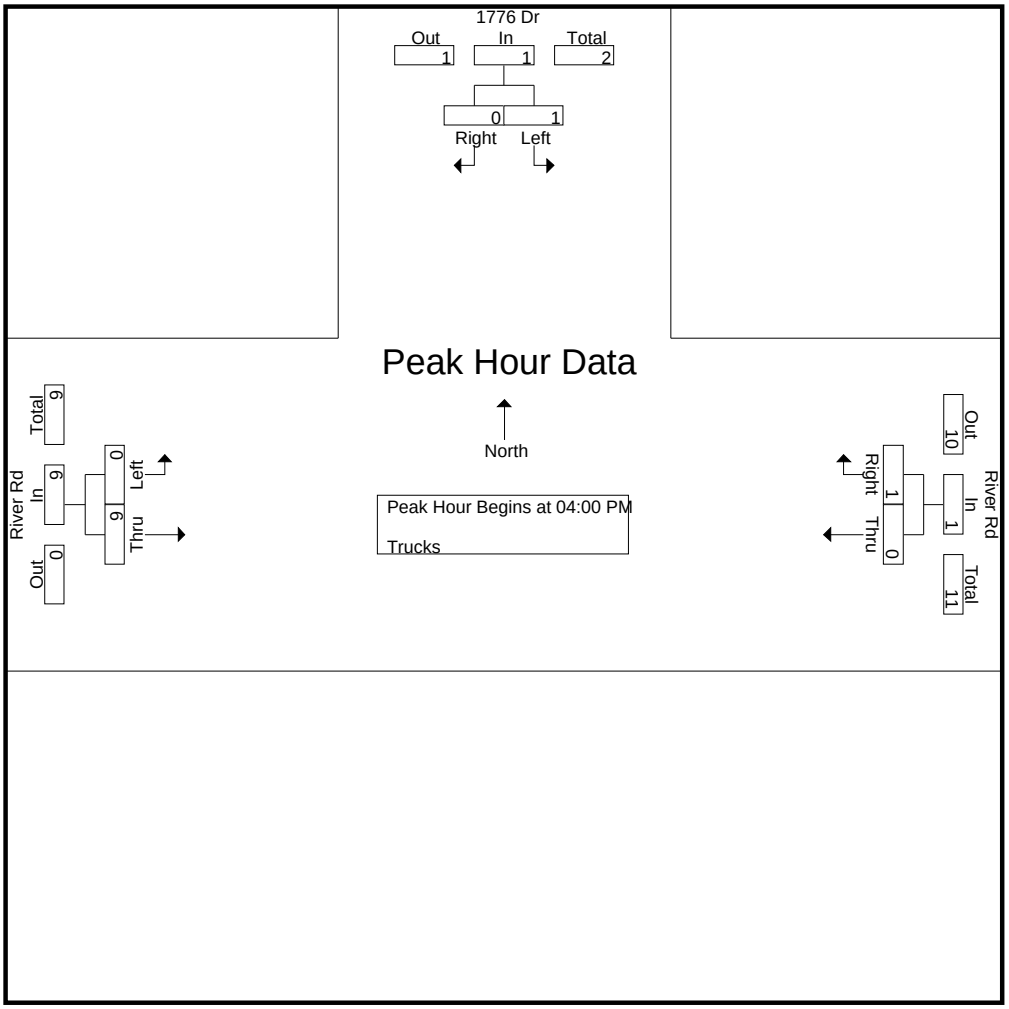
Groups Printed- Trucks

	1776 Dr From North		River Rd From East		River Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	1	0	0	1	0	4	6
04:15 PM	0	0	0	0	0	4	4
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	1	1
Total	1	0	0	1	0	9	11
05:00 PM	1	0	0	1	0	0	2
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0
05:45 PM	0	0	1	0	0	0	1
Total	1	0	1	1	0	0	3
Grand Total	2	0	1	2	0	9	14
Apprch %	100	0	33.3	66.7	0	100	
Total %	14.3	0	7.1	14.3	0	64.3	

	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	**1**	0	**1**	0	**1**	**1**	0	**4**	**4**	**6**
04:15 PM	0	0	0	0	0	0	0	4	4	4
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	1	1	1
Total Volume	1	0	1	0	1	1	0	9	9	11
% App. Total	100	0		0	100		0	100		
PHF	.250	.000	.250	.000	.250	.250	.000	.563	.563	.458

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 8



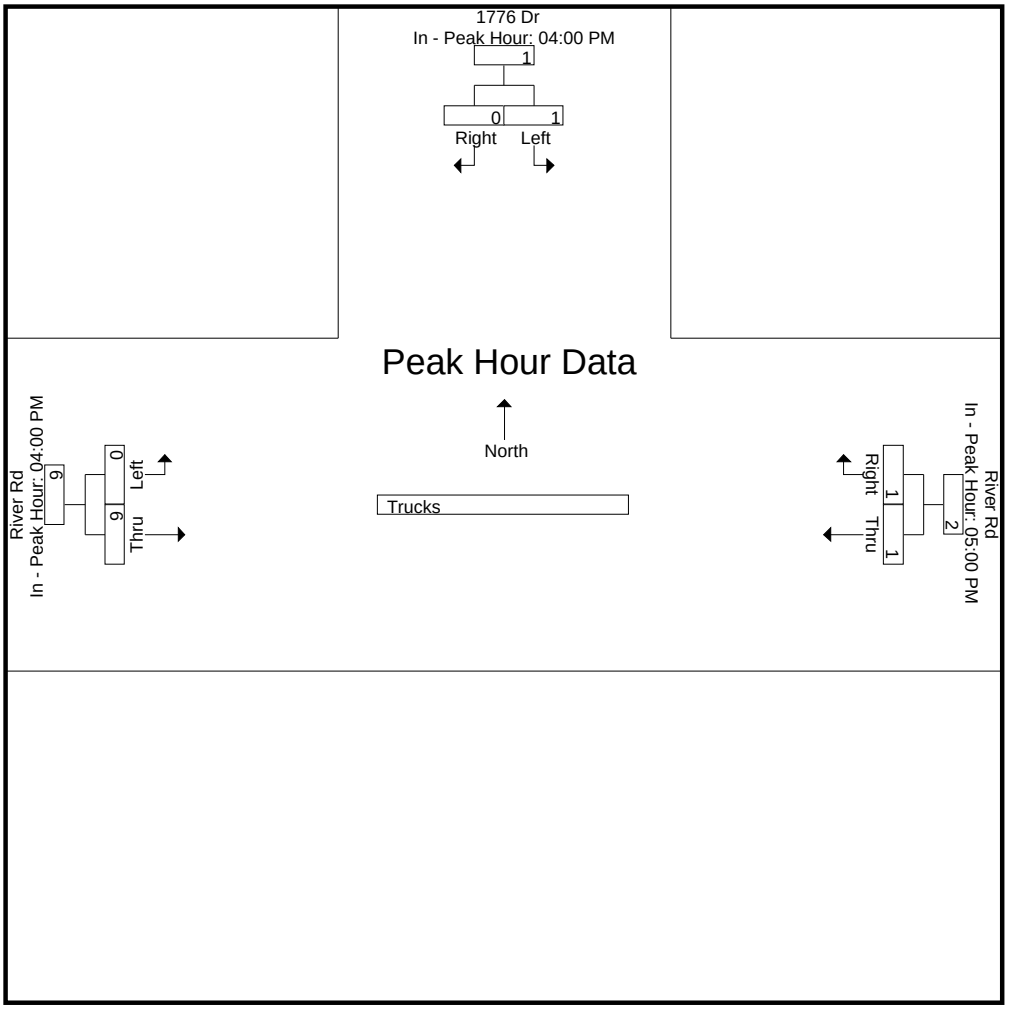
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM			05:00 PM			04:00 PM		
+0 mins.	**1**	0	**1**	0	**1**	**1**	0	**4**	**4**
+15 mins.	0	0	0	0	0	0	0	4	4
+30 mins.	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	**1**	0	1	0	1	1
Total Volume	1	0	1	1	1	2	0	9	9
% App. Total	100	0		50	50		0	100	
PHF	.250	.000	.250	.250	.250	.500	.000	.563	.563

Accurate Counts
978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 9



Accurate Counts

978-664-2565

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022

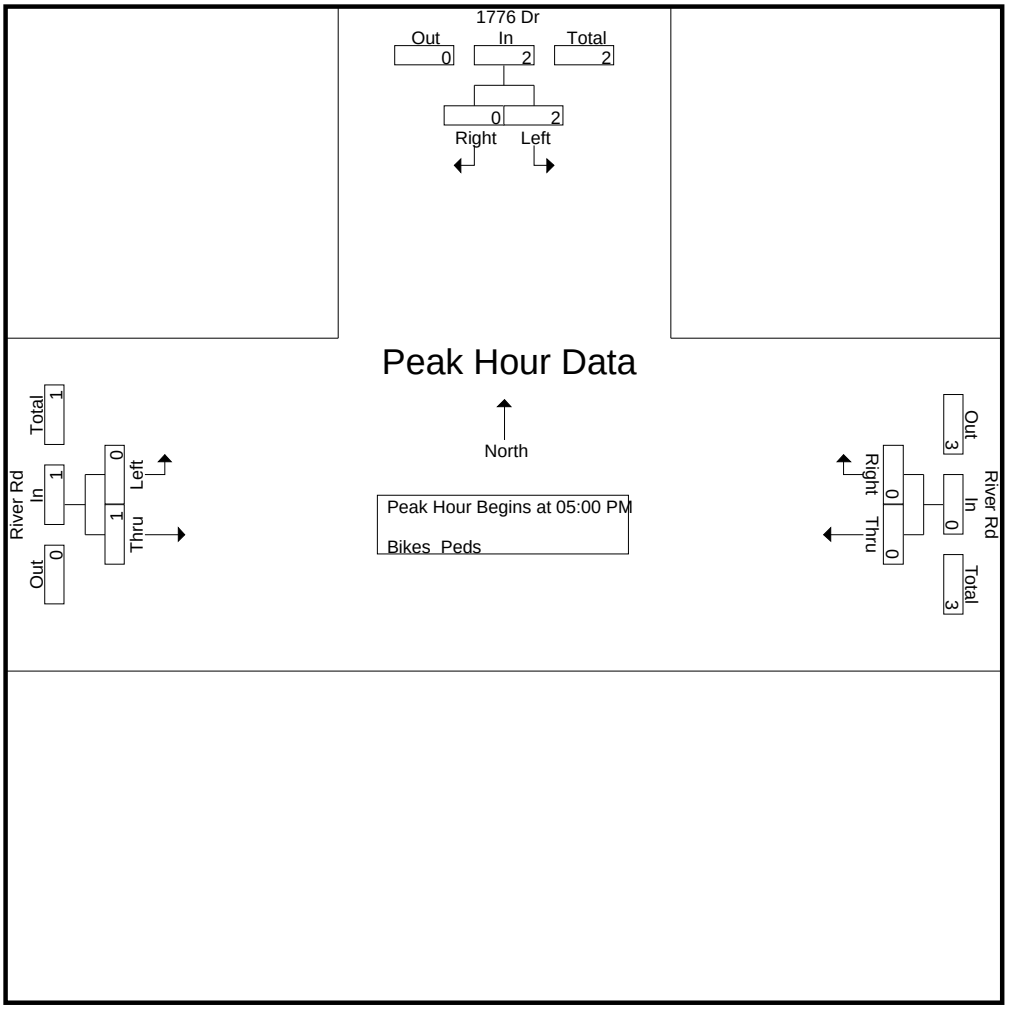
Groups Printed- Bikes Peds

	1776 Dr From North			River Rd From East			River Rd From West					
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	1	0	0	0	0	0	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	0	0	1	1
05:00 PM	0	0	1	0	0	0	0	0	0	1	0	1
05:15 PM	0	0	0	0	0	0	0	0	1	1	0	1
05:30 PM	1	0	0	0	0	0	0	0	0	0	1	1
05:45 PM	1	0	2	0	0	1	0	1	0	3	2	5
Total	2	0	3	0	0	1	0	1	1	5	3	8
Grand Total	2	0	3	1	0	1	0	1	1	5	4	9
Apprch %	100	0		100	0		0	100				
Total %	50	0		25	0		0	25		55.6	44.4	

	1776 Dr From North			River Rd From East			River Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	**1**	0	**1**	0	0	0	0	0	0	1
05:45 PM	1	0	1	0	0	0	0	**1**	**1**	**2**
Total Volume	2	0	2	0	0	0	0	1	1	3
% App. Total	100	0		0	0		0	100		
PHF	.500	.000	.500	.000	.000	.000	.000	.250	.250	.375

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 11

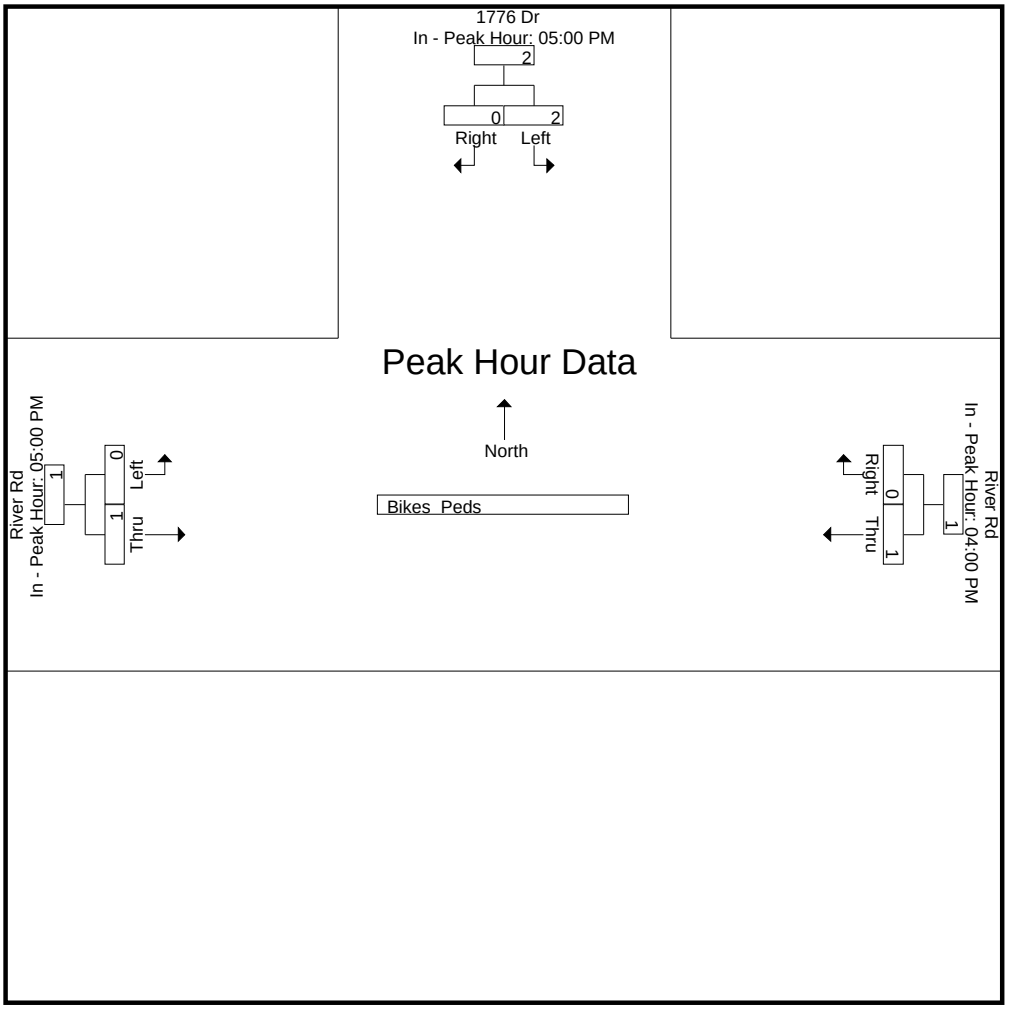


Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM			04:00 PM			05:00 PM		
+0 mins.	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0
+30 mins.	**1**	0	**1**	**1**	0	**1**	0	0	0
+45 mins.	1	0	1	0	0	0	0	**1**	**1**
Total Volume	2	0	2	1	0	1	0	1	1
% App. Total	100	0		100	0		0	100	
PHF	.500	.000	.500	.250	.000	.250	.000	.250	.250

N/S Street : 1776 Drive
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410001
Site Code : 91410001
Start Date : 5/11/2022
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 1

Groups Printed- Cars - Trucks

	Minuteman Rd From North			River Rd From East			Shattuck Rd From South			River Rd From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	21	0	0	73	54	14	22	0	69	0	49	2	304
07:15 AM	10	1	1	59	68	32	2	0	17	1	67	7	265
07:30 AM	18	2	1	84	113	30	4	0	19	1	74	12	358
07:45 AM	19	2	0	143	97	57	4	2	27	1	61	12	425
Total	68	5	2	359	332	133	32	2	132	3	251	33	1352
08:00 AM	17	0	4	136	90	44	5	1	28	0	68	7	400
08:15 AM	16	0	1	97	97	66	6	1	20	2	78	10	394
08:30 AM	12	2	1	100	69	44	3	0	31	0	71	9	342
08:45 AM	13	0	3	113	72	48	9	0	37	1	94	7	397
Total	58	2	9	446	328	202	23	2	116	3	311	33	1533
Grand Total	126	7	11	805	660	335	55	4	248	6	562	66	2885
Apprch %	87.5	4.9	7.6	44.7	36.7	18.6	17.9	1.3	80.8	0.9	88.6	10.4	
Total %	4.4	0.2	0.4	27.9	22.9	11.6	1.9	0.1	8.6	0.2	19.5	2.3	
Cars	122	7	11	796	639	330	54	4	240	6	539	66	2814
% Cars	96.8	100	100	98.9	96.8	98.5	98.2	100	96.8	100	95.9	100	97.5
Trucks	4	0	0	9	21	5	1	0	8	0	23	0	71
% Trucks	3.2	0	0	1.1	3.2	1.5	1.8	0	3.2	0	4.1	0	2.5

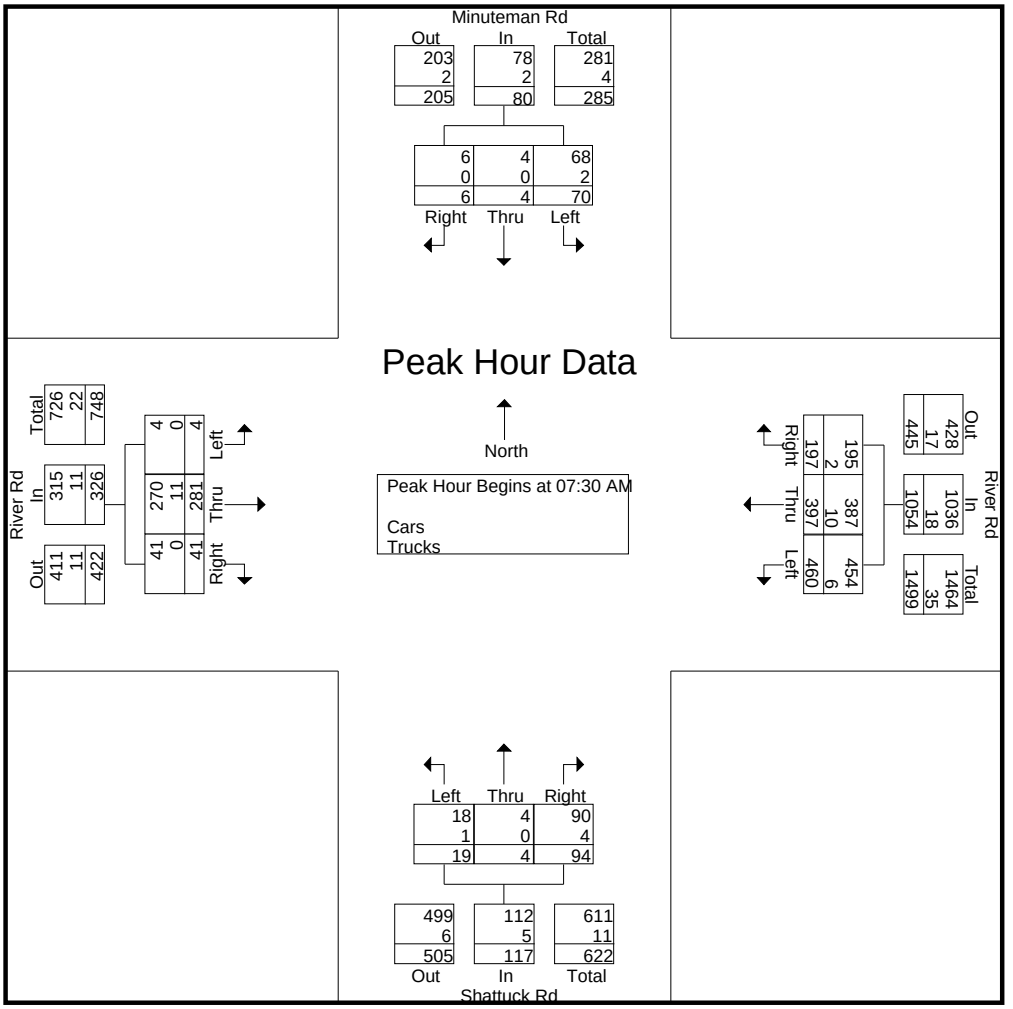
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	18	**2**	1	**21**	84	**113**	30	227	4	0	19	23	1	74	**12**	87	358
07:45 AM	**19**	2	0	21	**143**	97	57	**297**	4	**2**	27	33	1	61	12	74	**425**
08:00 AM	17	0	**4**	21	136	90	44	270	5	1	**28**	**34**	0	68	7	75	400
08:15 AM	16	0	1	17	97	97	**66**	260	**6**	1	20	27	**2**	**78**	10	**90**	394
Total Volume	70	4	6	80	460	397	197	1054	19	4	94	117	4	281	41	326	1577
% App. Total	87.5	5	7.5		43.6	37.7	18.7		16.2	3.4	80.3		1.2	86.2	12.6		
PHF	.921	.500	.375	.952	.804	.878	.746	.887	.792	.500	.839	.860	.500	.901	.854	.906	.928
Cars	68	4	6	78	454	387	195	1036	18	4	90	112	4	270	41	315	1541
% Cars	97.1	100	100	97.5	98.7	97.5	99.0	98.3	94.7	100	95.7	95.7	100	96.1	100	96.6	97.7
Trucks	2	0	0	2	6	10	2	18	1	0	4	5	0	11	0	11	36
% Trucks	2.9	0	0	2.5	1.3	2.5	1.0	1.7	5.3	0	4.3	4.3	0	3.9	0	3.4	2.3

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 2



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

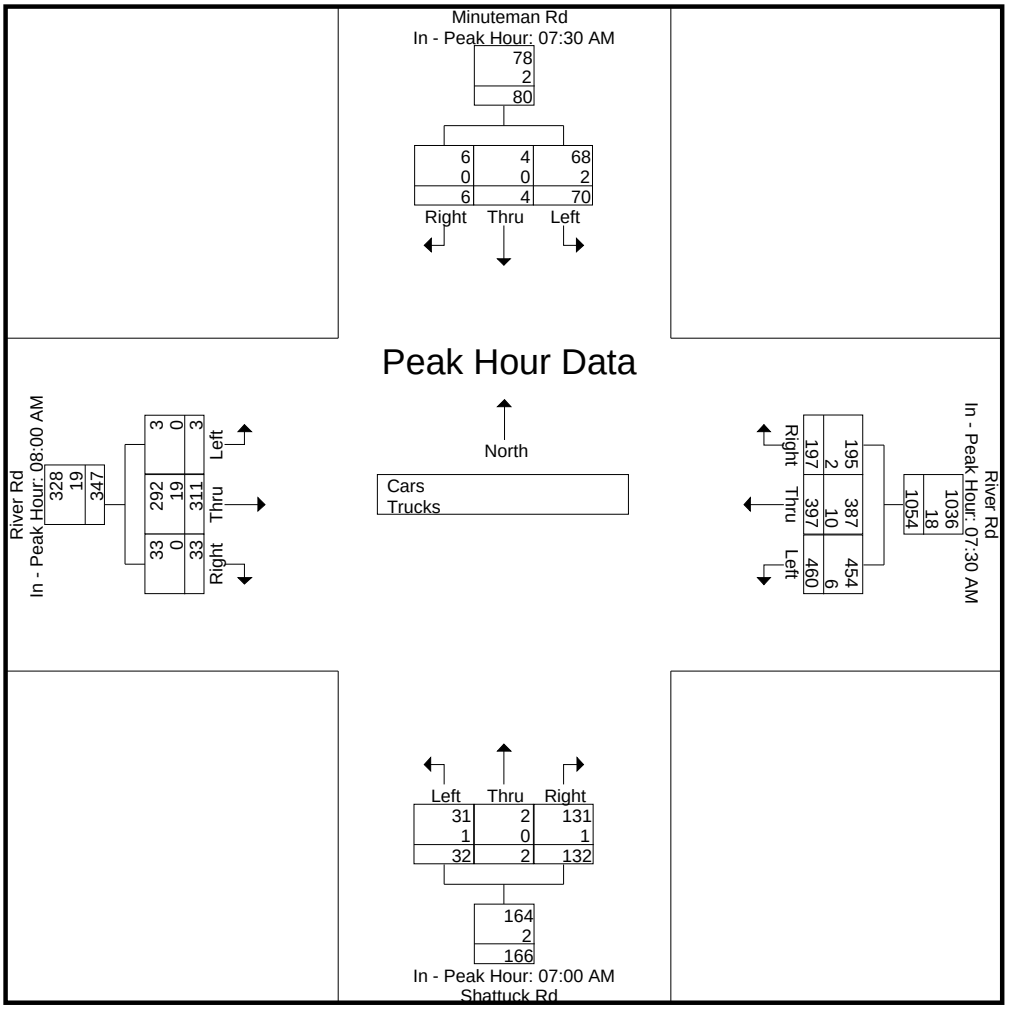
	07:30 AM				07:30 AM				07:00 AM				08:00 AM			
+0 mins.	18	**2**	1	**21**	84	**113**	30	227	**22**	0	**69**	**91**	0	68	7	75
+15 mins.	**19**	2	0	21	**143**	97	57	**297**	2	0	17	19	**2**	78	**10**	90
+30 mins.	17	0	**4**	21	136	90	44	270	4	0	19	23	0	71	9	80
+45 mins.	16	0	1	17	97	97	**66**	260	4	**2**	27	33	1	**94**	7	**102**
Total Volume	70	4	6	80	460	397	197	1054	32	2	132	166	3	311	33	347
% App. Total	87.5	5	7.5		43.6	37.7	18.7		19.3	1.2	79.5		0.9	89.6	9.5	
PHF	.921	.500	.375	.952	.804	.878	.746	.887	.364	.250	.478	.456	.375	.827	.825	.850
Cars	68	4	6	78	454	387	195	1036	31	2	131	164	3	292	33	328
% Cars	97.1	100	100	97.5	98.7	97.5	99	98.3	96.9	100	99.2	98.8	100	93.9	100	94.5
Trucks	2	0	0	2	6	10	2	18	1	0	1	2	0	19	0	19
% Trucks	2.9	0	0	2.5	1.3	2.5	1	1.7	3.1	0	0.8	1.2	0	6.1	0	5.5

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022

Groups Printed- Cars

	Minuteman Rd From North			River Rd From East			Shattuck Rd From South			River Rd From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	21	0	0	73	53	14	22	0	69	0	49	2	303
07:15 AM	9	1	1	58	64	31	2	0	16	1	65	7	255
07:30 AM	18	2	1	82	108	30	4	0	19	1	72	12	349
07:45 AM	18	2	0	142	96	56	3	2	27	1	61	12	420
Total	66	5	2	355	321	131	31	2	131	3	247	33	1327
08:00 AM	17	0	4	133	89	44	5	1	24	0	65	7	389
08:15 AM	15	0	1	97	94	65	6	1	20	2	72	10	383
08:30 AM	12	2	1	99	65	43	3	0	31	0	70	9	335
08:45 AM	12	0	3	112	70	47	9	0	34	1	85	7	380
Total	56	2	9	441	318	199	23	2	109	3	292	33	1487
Grand Total	122	7	11	796	639	330	54	4	240	6	539	66	2814
Apprch %	87.1	5	7.9	45.1	36.2	18.7	18.1	1.3	80.5	1	88.2	10.8	
Total %	4.3	0.2	0.4	28.3	22.7	11.7	1.9	0.1	8.5	0.2	19.2	2.3	

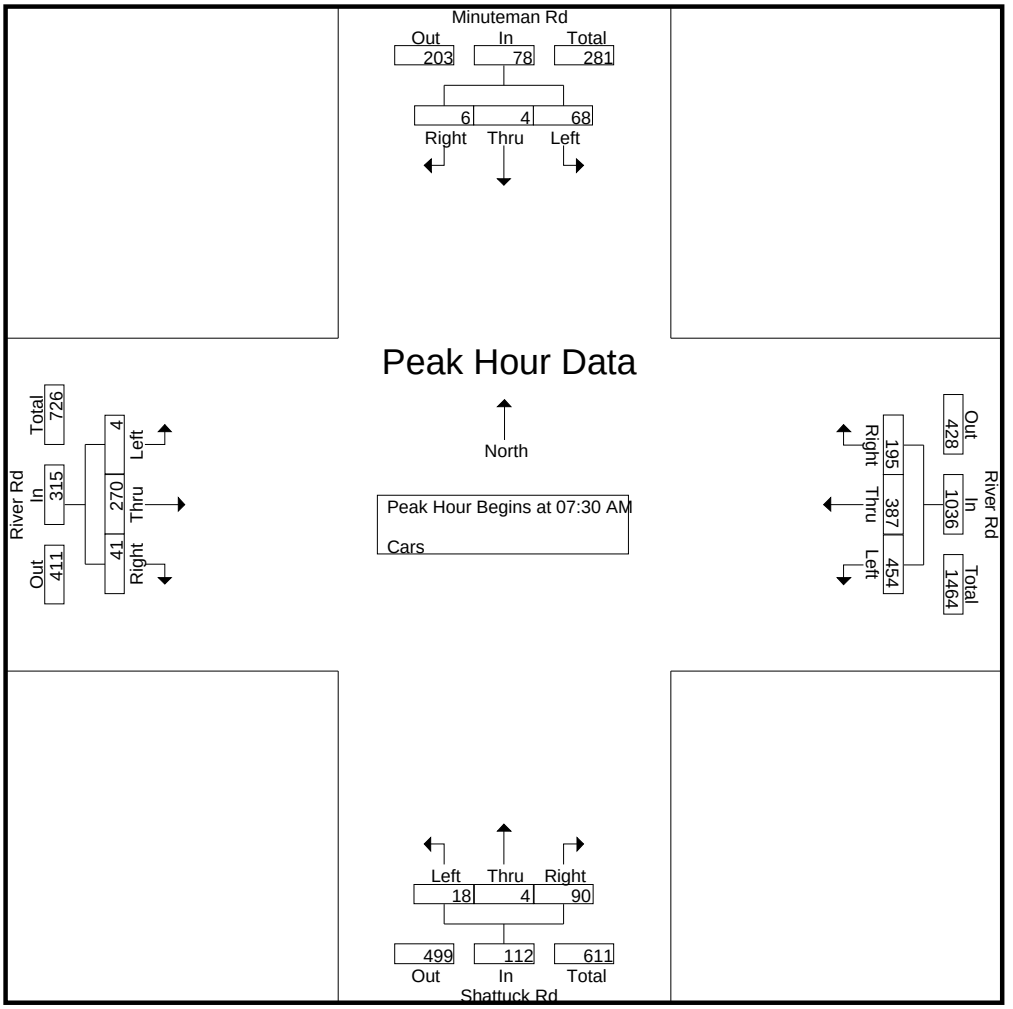
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**18**	**2**	1	**21**	82	**108**	30	220	4	0	19	23	1	**72**	**12**	**85**	349
07:45 AM	18	2	0	20	**142**	96	56	**294**	3	**2**	**27**	**32**	1	61	12	74	**420**
08:00 AM	17	0	**4**	21	133	89	44	266	5	1	24	30	0	65	7	72	389
08:15 AM	15	0	1	16	97	94	**65**	256	**6**	1	20	27	**2**	72	10	84	383
Total Volume	68	4	6	78	454	387	195	1036	18	4	90	112	4	270	41	315	1541
% App. Total	87.2	5.1	7.7		43.8	37.4	18.8		16.1	3.6	80.4		1.3	85.7	13		
PHF	.944	.500	.375	.929	.799	.896	.750	.881	.750	.500	.833	.875	.500	.938	.854	.926	.917

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 5



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

Peak Hour for Each Approach Begins at:

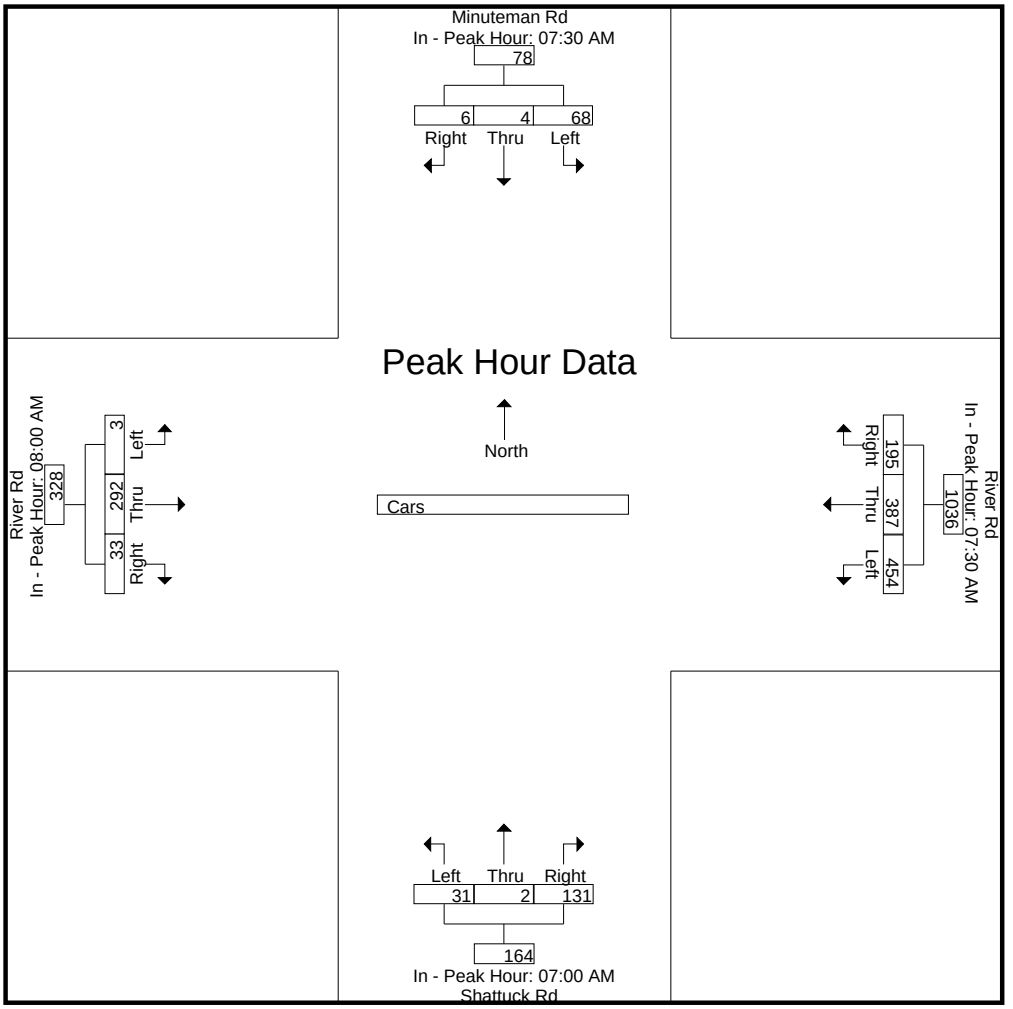
	07:30 AM				07:30 AM				07:00 AM				08:00 AM			
+0 mins.	**18**	**2**	1	**21**	82	**108**	30	220	**22**	0	**69**	**91**	0	65	7	72
+15 mins.	18	2	0	20	**142**	96	56	**294**	2	0	16	18	**2**	72	**10**	84
+30 mins.	17	0	**4**	21	133	89	44	266	4	0	19	23	0	70	9	79
+45 mins.	15	0	1	16	97	94	**65**	256	3	**2**	27	32	1	**85**	7	**93**
Total Volume	68	4	6	78	454	387	195	1036	31	2	131	164	3	292	33	328
% App. Total	87.2	5.1	7.7		43.8	37.4	18.8		18.9	1.2	79.9		0.9	89	10.1	
PHF	.944	.500	.375	.929	.799	.896	.750	.881	.352	.250	.475	.451	.375	.859	.825	.882

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022

Groups Printed- Trucks

	Minuteman Rd From North			River Rd From East			Shattuck Rd From South			River Rd From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	1
07:15 AM	1	0	0	1	4	1	0	0	1	0	2	0	10
07:30 AM	0	0	0	2	5	0	0	0	0	0	2	0	9
07:45 AM	1	0	0	1	1	1	1	0	0	0	0	0	5
Total	2	0	0	4	11	2	1	0	1	0	4	0	25
08:00 AM	0	0	0	3	1	0	0	0	4	0	3	0	11
08:15 AM	1	0	0	0	3	1	0	0	0	0	6	0	11
08:30 AM	0	0	0	1	4	1	0	0	0	0	1	0	7
08:45 AM	1	0	0	1	2	1	0	0	3	0	9	0	17
Total	2	0	0	5	10	3	0	0	7	0	19	0	46
Grand Total	4	0	0	9	21	5	1	0	8	0	23	0	71
Apprch %	100	0	0	25.7	60	14.3	11.1	0	88.9	0	100	0	
Total %	5.6	0	0	12.7	29.6	7	1.4	0	11.3	0	32.4	0	

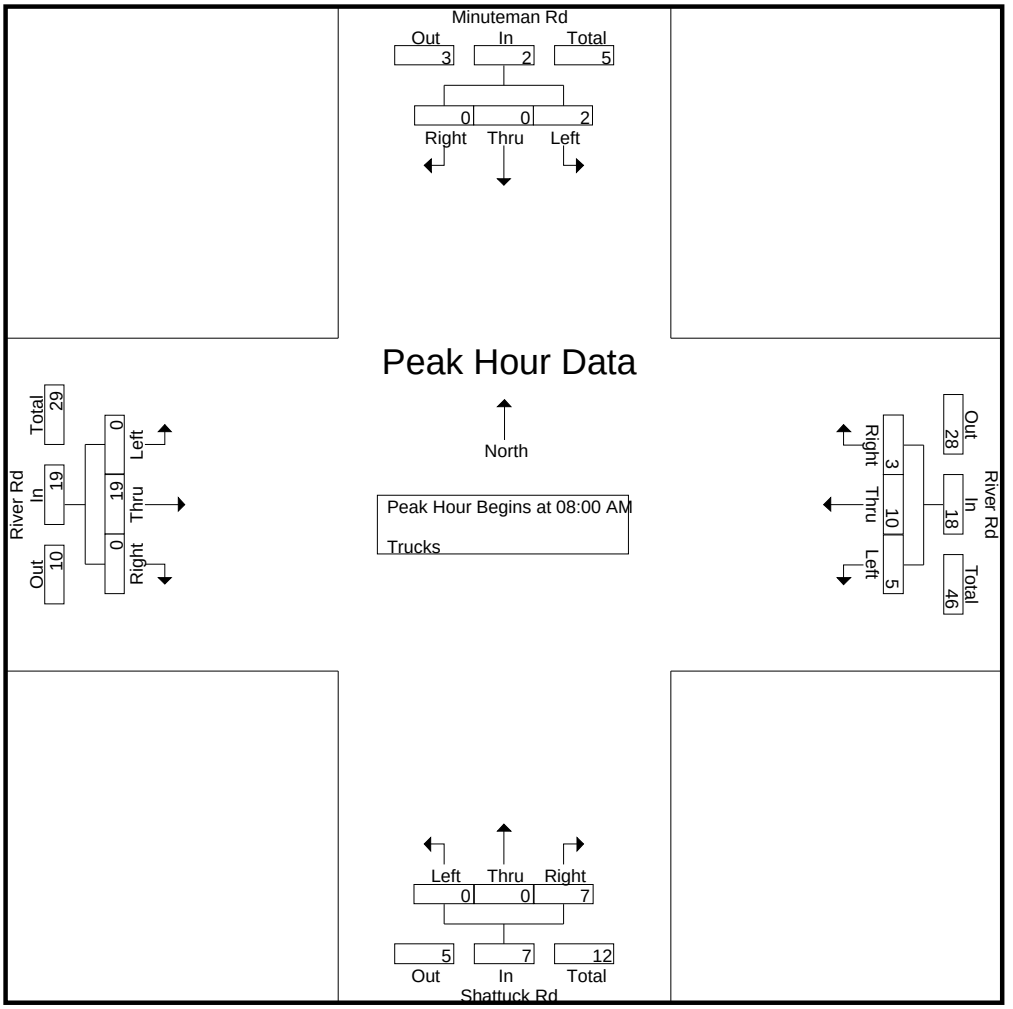
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	**3**	1	0	4	0	0	**4**	**4**	0	3	0	3	11
08:15 AM	**1**	0	0	**1**	0	3	**1**	4	0	0	0	0	0	6	0	6	11
08:30 AM	0	0	0	0	1	**4**	1	**6**	0	0	0	0	0	1	0	1	7
08:45 AM	1	0	0	1	1	2	1	4	0	0	3	3	0	**9**	0	**9**	**17**
Total Volume	2	0	0	2	5	10	3	18	0	0	7	7	0	19	0	19	46
% App. Total	100	0	0		27.8	55.6	16.7		0	0	100		0	100	0		
PHF	.500	.000	.000	.500	.417	.625	.750	.750	.000	.000	.438	.438	.000	.528	.000	.528	.676

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 8



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

Peak Hour for Each Approach Begins at:

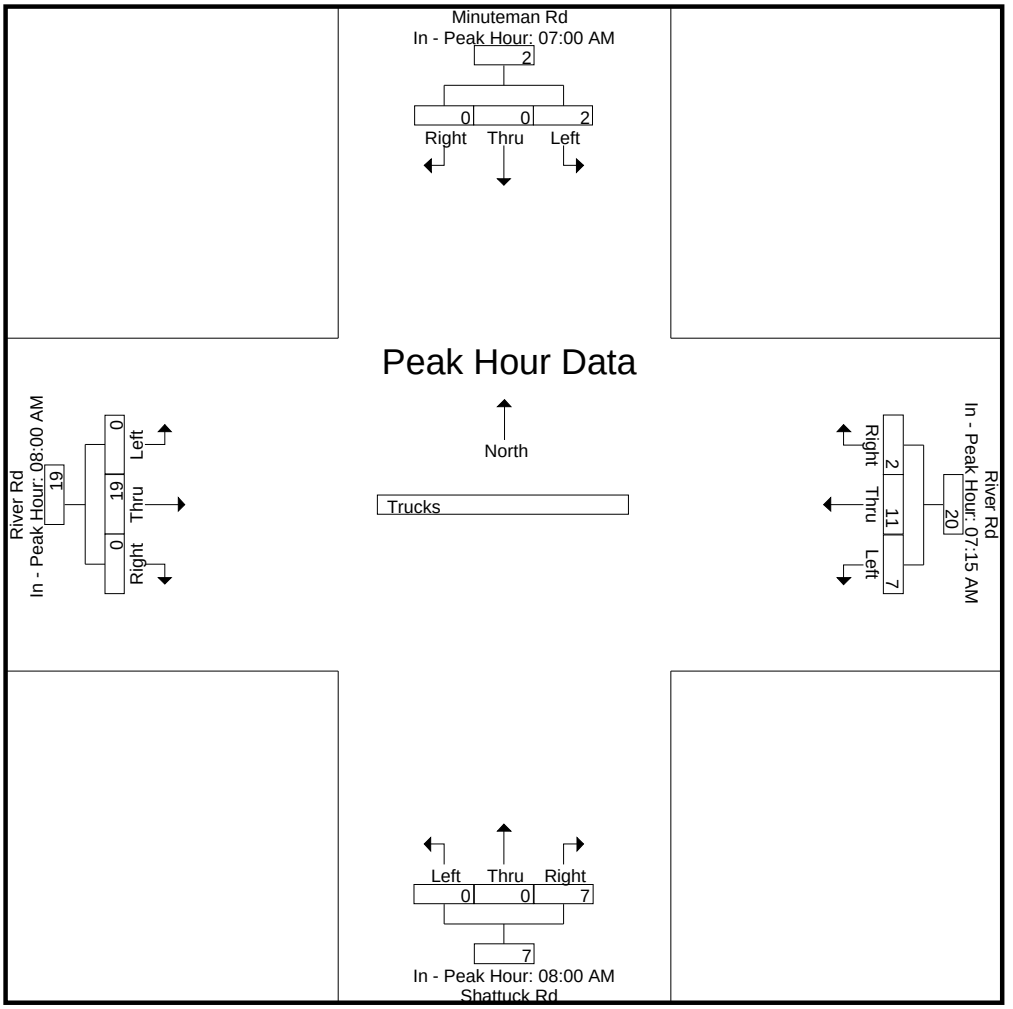
	07:00 AM				07:15 AM				08:00 AM				08:00 AM			
+0 mins.	0	0	0	0	1	4	**1**	6	0	0	**4**	**4**	0	3	0	3
+15 mins.	**1**	0	0	**1**	2	**5**	0	**7**	0	0	0	0	0	6	0	6
+30 mins.	0	0	0	0	1	1	1	3	0	0	0	0	0	1	0	1
+45 mins.	1	0	0	1	**3**	1	0	4	0	0	3	3	0	**9**	0	**9**
Total Volume	2	0	0	2	7	11	2	20	0	0	7	7	0	19	0	19
% App. Total	100	0	0		35	55	10		0	0	100		0	100	0	
PHF	.500	.000	.000	.500	.583	.550	.500	.714	.000	.000	.438	.438	.000	.528	.000	.528

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022

Groups Printed- Bikes Peds

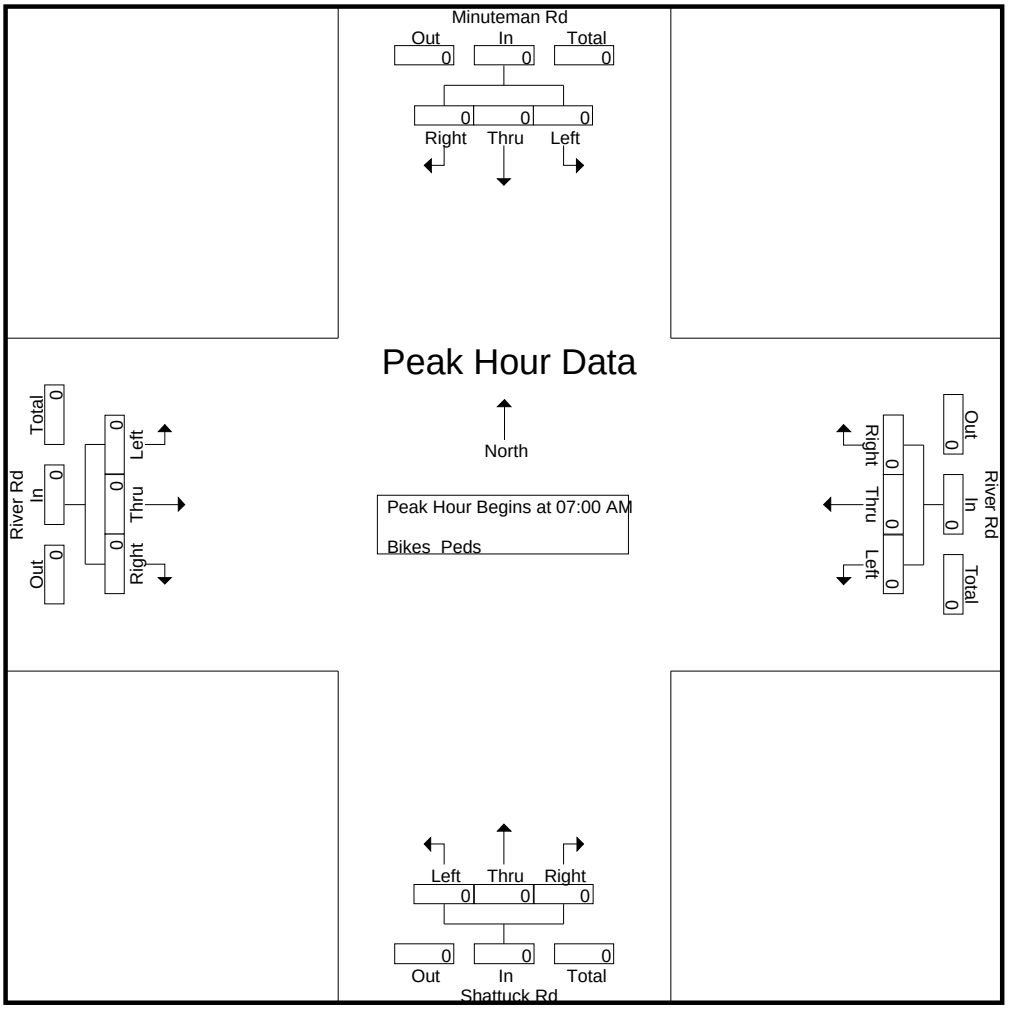
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	3	0	3
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	4	0	4
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	2	5	0	5
Grand Total	0	0	0	2	0	0	0	2	0	0	0	1	0	0	0	3	8	0	8
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	

	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022



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

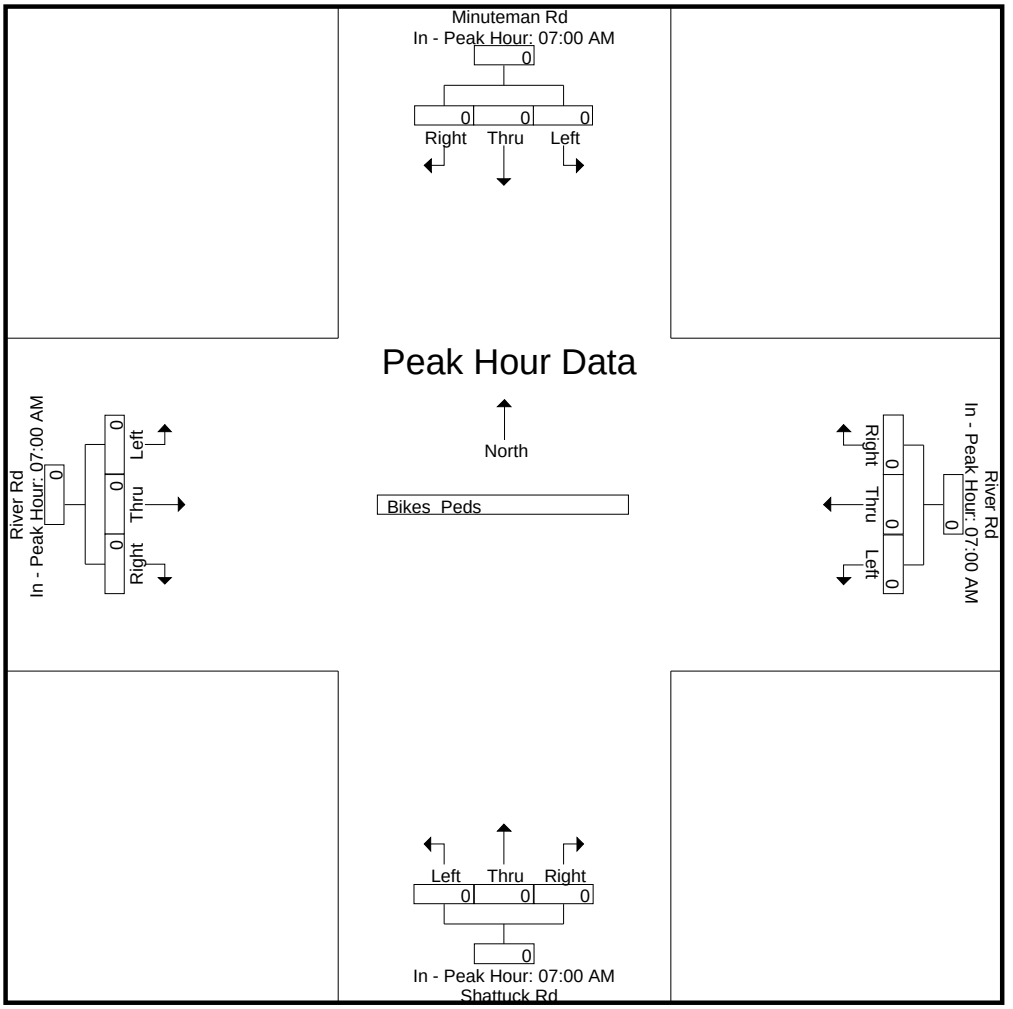
	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	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

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 12



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 1

Groups Printed- Cars - Trucks

	Minuteman Rd From North			River Rd From East			Shattuck Rd From South			River Rd From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	36	1	0	19	57	5	8	0	73	0	134	7	340
04:15 PM	22	0	1	16	73	10	6	0	43	0	104	2	277
04:30 PM	36	2	3	29	50	15	6	2	72	0	118	3	336
04:45 PM	35	1	5	20	53	15	6	0	62	1	93	4	295
Total	129	4	9	84	233	45	26	2	250	1	449	16	1248
05:00 PM	56	1	2	26	82	17	10	2	127	3	111	8	445
05:15 PM	30	3	2	26	89	14	10	1	74	4	96	5	354
05:30 PM	41	0	3	21	51	15	4	0	44	3	104	2	288
05:45 PM	31	1	6	20	65	24	5	0	40	1	99	4	296
Total	158	5	13	93	287	70	29	3	285	11	410	19	1383
Grand Total	287	9	22	177	520	115	55	5	535	12	859	35	2631
Apprch %	90.3	2.8	6.9	21.8	64	14.2	9.2	0.8	89.9	1.3	94.8	3.9	
Total %	10.9	0.3	0.8	6.7	19.8	4.4	2.1	0.2	20.3	0.5	32.6	1.3	
Cars	281	9	22	175	518	111	55	5	532	12	848	35	2603
% Cars	97.9	100	100	98.9	99.6	96.5	100	100	99.4	100	98.7	100	98.9
Trucks	6	0	0	2	2	4	0	0	3	0	11	0	28
% Trucks	2.1	0	0	1.1	0.4	3.5	0	0	0.6	0	1.3	0	1.1

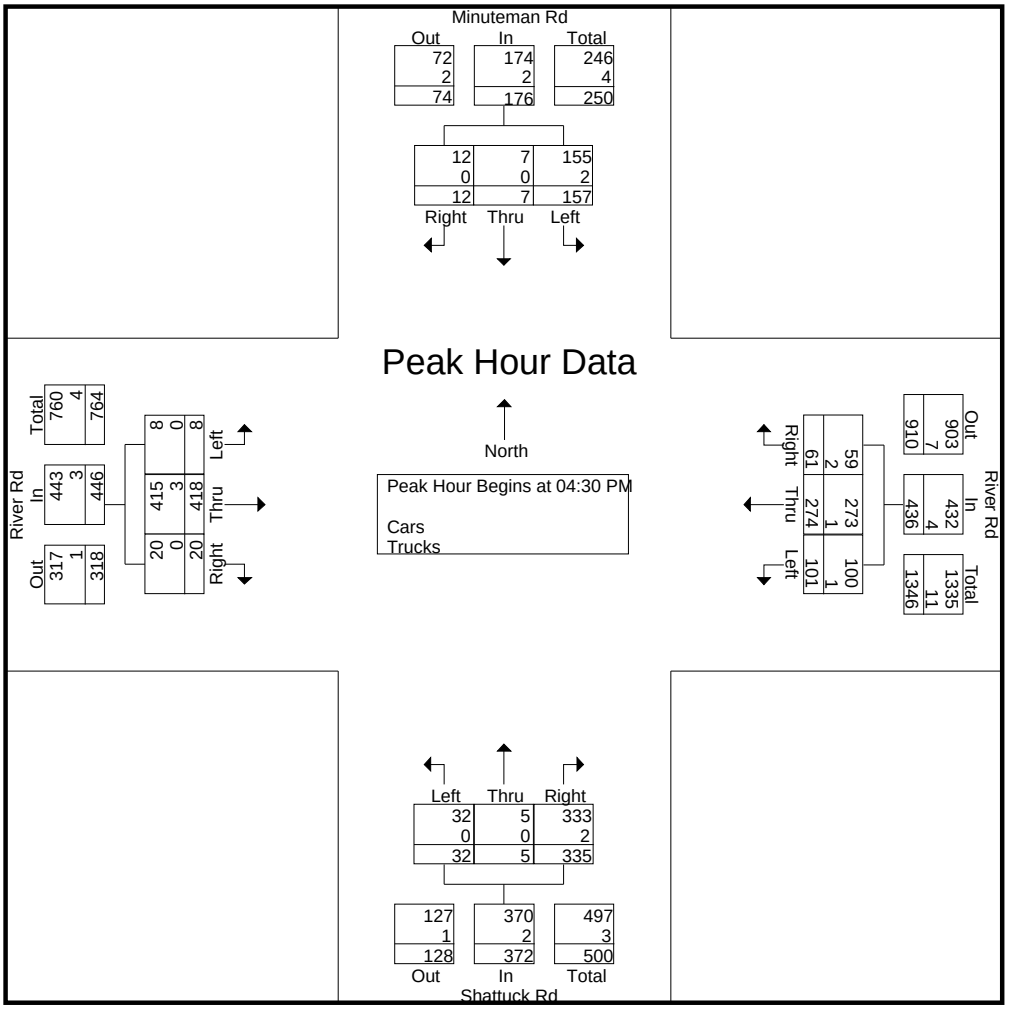
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	36	2	3	41	**29**	50	15	94	6	**2**	72	80	0	**118**	3	121	336
04:45 PM	35	1	**5**	41	20	53	15	88	6	0	62	68	1	93	4	98	295
05:00 PM	**56**	1	2	**59**	26	82	**17**	125	**10**	2	**127**	**139**	3	111	**8**	**122**	**445**
05:15 PM	30	**3**	2	35	26	**89**	14	**129**	10	1	74	85	**4**	96	5	105	354
Total Volume	157	7	12	176	101	274	61	436	32	5	335	372	8	418	20	446	1430
% App. Total	89.2	4	6.8		23.2	62.8	14		8.6	1.3	90.1		1.8	93.7	4.5		
PHF	.701	.583	.600	.746	.871	.770	.897	.845	.800	.625	.659	.669	.500	.886	.625	.914	.803
Cars	155	7	12	174	100	273	59	432	32	5	333	370	8	415	20	443	1419
% Cars	98.7	100	100	98.9	99.0	99.6	96.7	99.1	100	100	99.4	99.5	100	99.3	100	99.3	99.2
Trucks	2	0	0	2	1	1	2	4	0	0	2	2	0	3	0	3	11
% Trucks	1.3	0	0	1.1	1.0	0.4	3.3	0.9	0	0	0.6	0.5	0	0.7	0	0.7	0.8

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 2



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

Peak Hour for Each Approach Begins at:

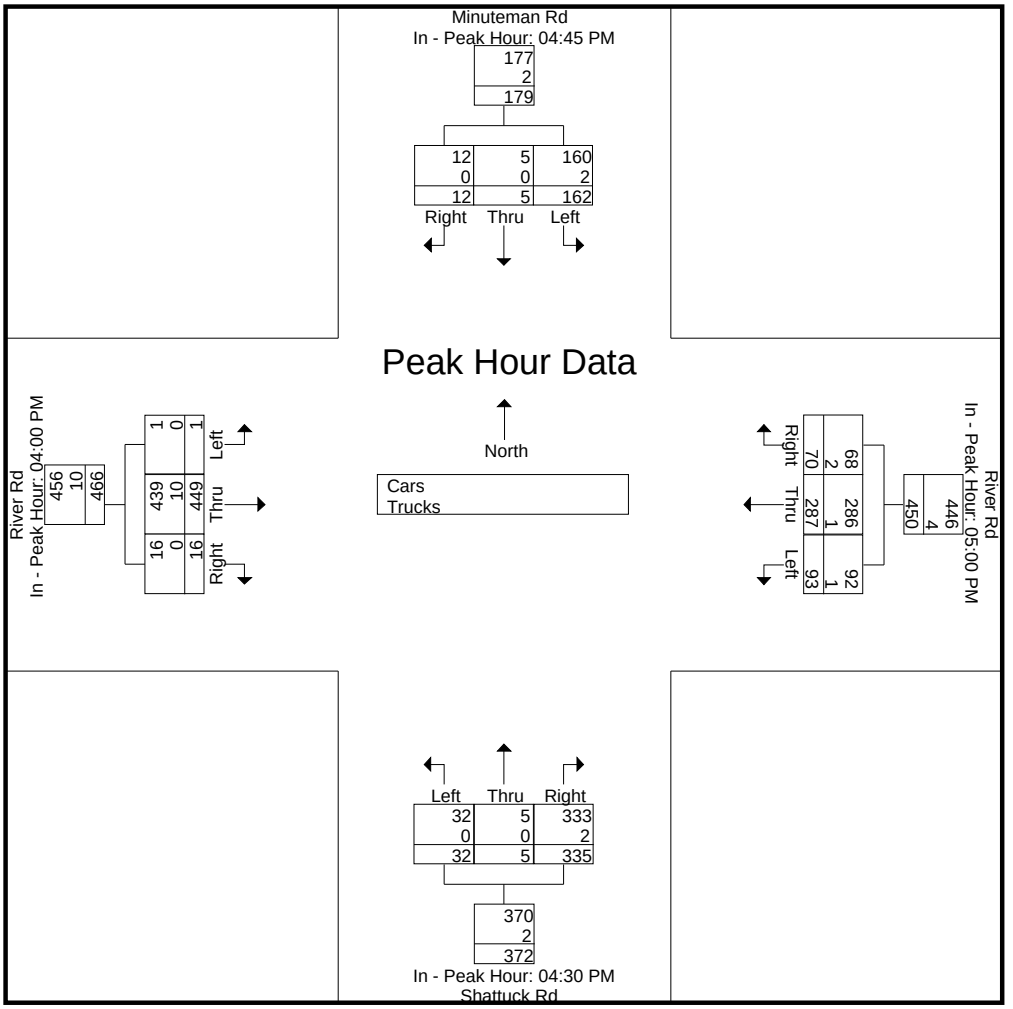
	04:45 PM				05:00 PM				04:30 PM				04:00 PM			
+0 mins.	35	1	**5**	41	**26**	82	17	125	6	**2**	72	80	0	**134**	**7**	**141**
+15 mins.	**56**	1	2	**59**	26	**89**	14	**129**	6	0	62	68	0	104	2	106
+30 mins.	30	**3**	2	35	21	51	15	87	**10**	2	**127**	**139**	0	118	3	121
+45 mins.	41	0	3	44	20	65	**24**	109	10	1	74	85	**1**	93	4	98
Total Volume	162	5	12	179	93	287	70	450	32	5	335	372	1	449	16	466
% App. Total	90.5	2.8	6.7		20.7	63.8	15.6		8.6	1.3	90.1		0.2	96.4	3.4	
PHF	.723	.417	.600	.758	.894	.806	.729	.872	.800	.625	.659	.669	.250	.838	.571	.826
Cars	160	5	12	177	92	286	68	446	32	5	333	370	1	439	16	456
% Cars	98.8	100	100	98.9	98.9	99.7	97.1	99.1	100	100	99.4	99.5	100	97.8	100	97.9
Trucks	2	0	0	2	1	1	2	4	0	0	2	2	0	10	0	10
% Trucks	1.2	0	0	1.1	1.1	0.3	2.9	0.9	0	0	0.6	0.5	0	2.2	0	2.1

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 4

Groups Printed- Cars

	Minuteman Rd From North			River Rd From East			Shattuck Rd From South			River Rd From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	34	1	0	19	56	5	8	0	73	0	130	7	333
04:15 PM	21	0	1	16	73	9	6	0	43	0	100	2	271
04:30 PM	36	2	3	28	50	15	6	2	71	0	117	3	333
04:45 PM	34	1	5	20	53	14	6	0	61	1	92	4	291
Total	125	4	9	83	232	43	26	2	248	1	439	16	1228
05:00 PM	56	1	2	26	81	17	10	2	127	3	110	8	443
05:15 PM	29	3	2	26	89	13	10	1	74	4	96	5	352
05:30 PM	41	0	3	20	51	15	4	0	44	3	104	2	287
05:45 PM	30	1	6	20	65	23	5	0	39	1	99	4	293
Total	156	5	13	92	286	68	29	3	284	11	409	19	1375
Grand Total	281	9	22	175	518	111	55	5	532	12	848	35	2603
Apprch %	90.1	2.9	7.1	21.8	64.4	13.8	9.3	0.8	89.9	1.3	94.7	3.9	
Total %	10.8	0.3	0.8	6.7	19.9	4.3	2.1	0.2	20.4	0.5	32.6	1.3	

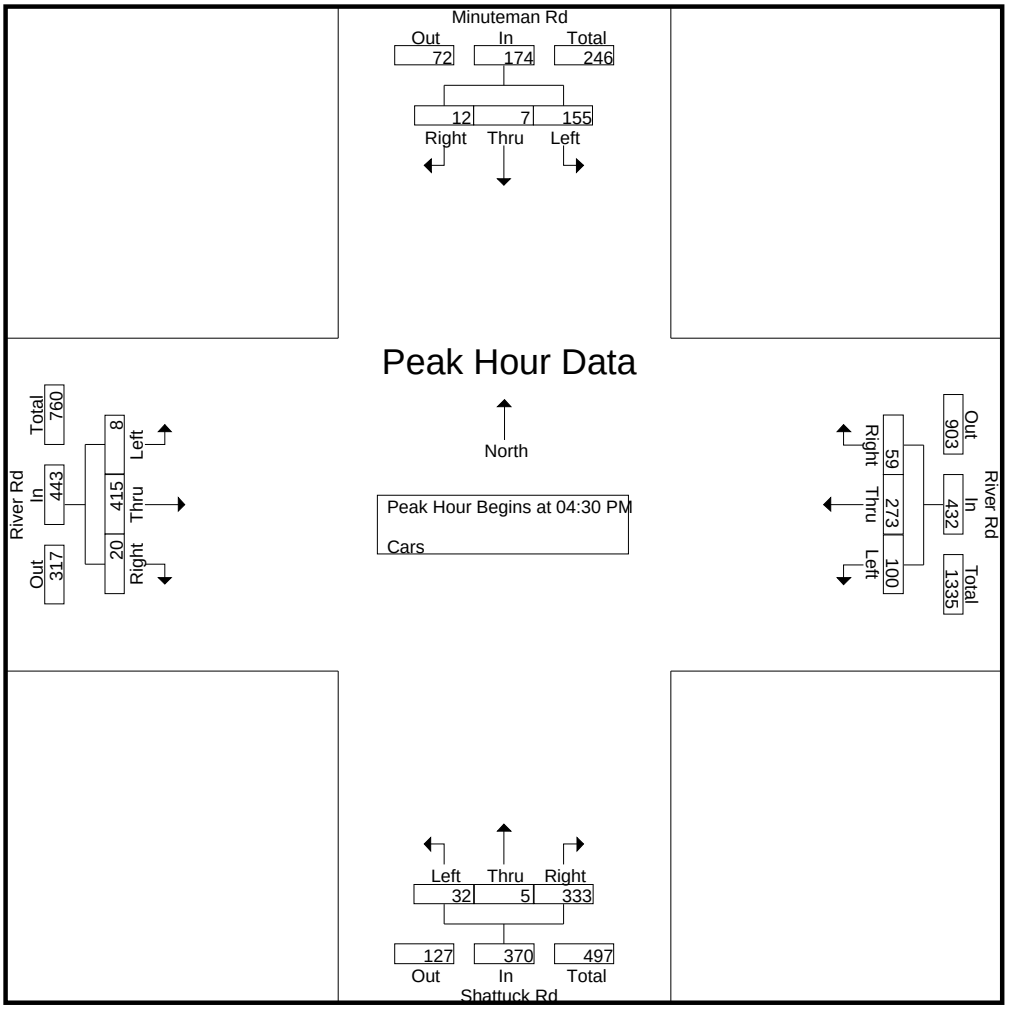
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	36	2	3	41	**28**	50	15	93	6	**2**	71	79	0	**117**	3	120	333
04:45 PM	34	1	**5**	40	20	53	14	87	6	0	61	67	1	92	4	97	291
05:00 PM	**56**	1	2	**59**	26	81	**17**	124	**10**	2	**127**	**139**	3	110	**8**	**121**	**443**
05:15 PM	29	**3**	2	34	26	**89**	13	**128**	10	1	74	85	**4**	96	5	105	352
Total Volume	155	7	12	174	100	273	59	432	32	5	333	370	8	415	20	443	1419
% App. Total	89.1	4	6.9		23.1	63.2	13.7		8.6	1.4	90		1.8	93.7	4.5		
PHF	.692	.583	.600	.737	.893	.767	.868	.844	.800	.625	.656	.665	.500	.887	.625	.915	.801

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 5



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

Peak Hour for Each Approach Begins at:

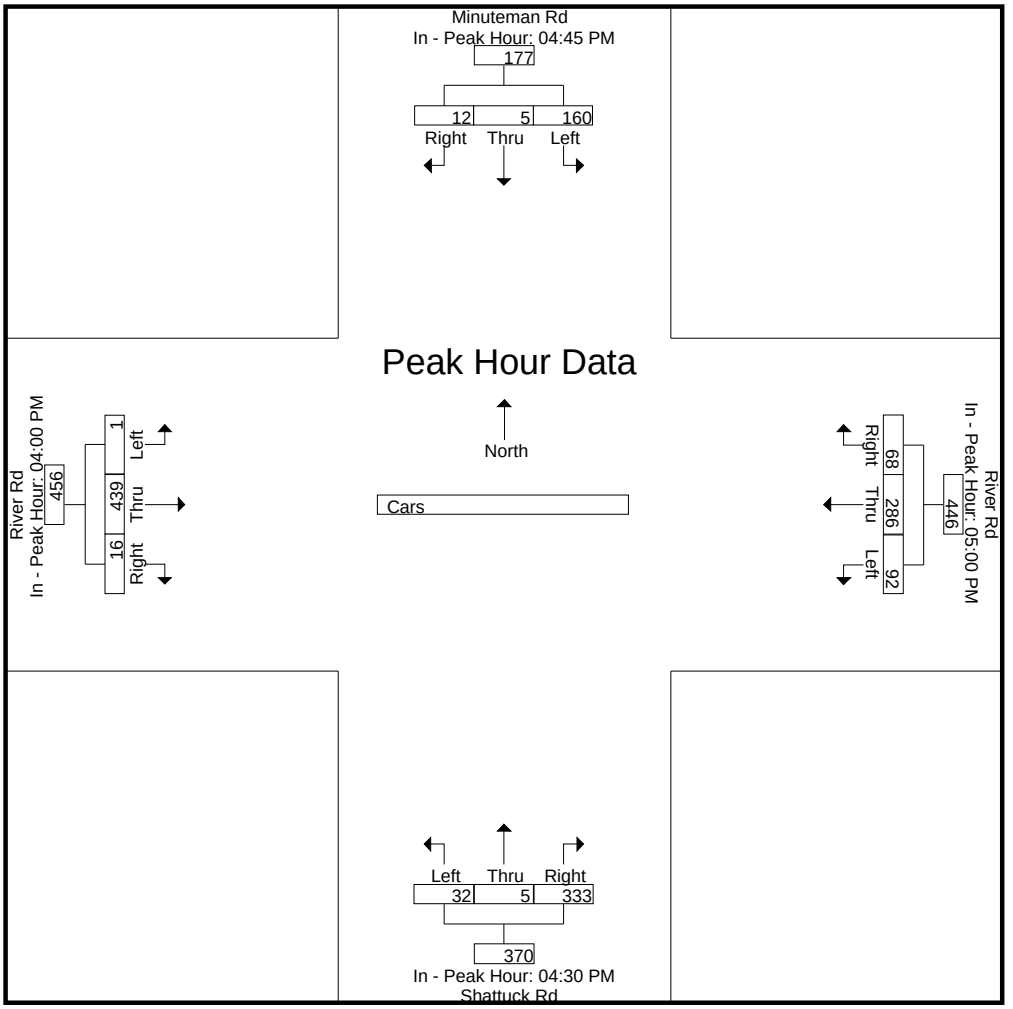
	04:45 PM				05:00 PM				04:30 PM				04:00 PM			
+0 mins.	34	1	**5**	40	**26**	81	17	124	6	**2**	71	79	0	**130**	**7**	**137**
+15 mins.	**56**	1	2	**59**	26	**89**	13	**128**	6	0	61	67	0	100	2	102
+30 mins.	29	**3**	2	34	20	51	15	86	**10**	2	**127**	**139**	0	117	3	120
+45 mins.	41	0	3	44	20	65	**23**	108	10	1	74	85	**1**	92	4	97
Total Volume	160	5	12	177	92	286	68	446	32	5	333	370	1	439	16	456
% App. Total	90.4	2.8	6.8		20.6	64.1	15.2		8.6	1.4	90		0.2	96.3	3.5	
PHF	.714	.417	.600	.750	.885	.803	.739	.871	.800	.625	.656	.665	.250	.844	.571	.832

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 6



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 7

Groups Printed- Trucks

	Minuteman Rd From North			River Rd From East			Shattuck Rd From South			River Rd From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	2	0	0	0	1	0	0	0	0	0	4	0	7
04:15 PM	1	0	0	0	0	1	0	0	0	0	4	0	6
04:30 PM	0	0	0	1	0	0	0	0	1	0	1	0	3
04:45 PM	1	0	0	0	0	1	0	0	1	0	1	0	4
Total	4	0	0	1	1	2	0	0	2	0	10	0	20
05:00 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
05:15 PM	1	0	0	0	0	1	0	0	0	0	0	0	2
05:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	1
05:45 PM	1	0	0	0	0	1	0	0	1	0	0	0	3
Total	2	0	0	1	1	2	0	0	1	0	1	0	8
Grand Total	6	0	0	2	2	4	0	0	3	0	11	0	28
Apprch %	100	0	0	25	25	50	0	0	100	0	100	0	
Total %	21.4	0	0	7.1	7.1	14.3	0	0	10.7	0	39.3	0	

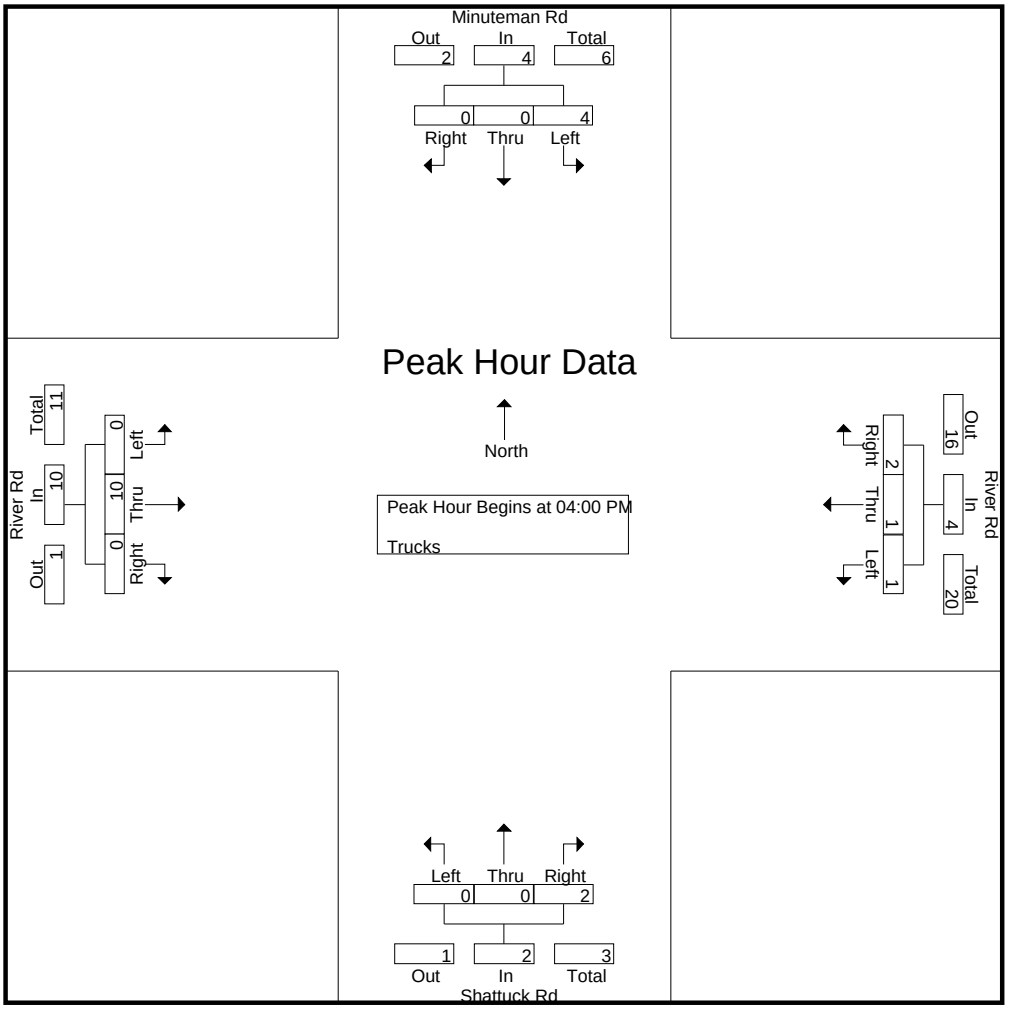
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	**2**	0	0	**2**	0	**1**	0	**1**	0	0	0	0	0	**4**	0	**4**	**7**
04:15 PM	1	0	0	1	0	0	**1**	1	0	0	0	0	0	4	0	4	6
04:30 PM	0	0	0	0	**1**	0	0	1	0	0	**1**	**1**	0	1	0	1	3
04:45 PM	1	0	0	1	0	0	1	1	0	0	1	1	0	1	0	1	4
Total Volume	4	0	0	4	1	1	2	4	0	0	2	2	0	10	0	10	20
% App. Total	100	0	0		25	25	50		0	0	100		0	100	0		
PHF	.500	.000	.000	.500	.250	.250	.500	1.00	.000	.000	.500	.500	.000	.625	.000	.625	.714

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 8



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

Peak Hour for Each Approach Begins at:

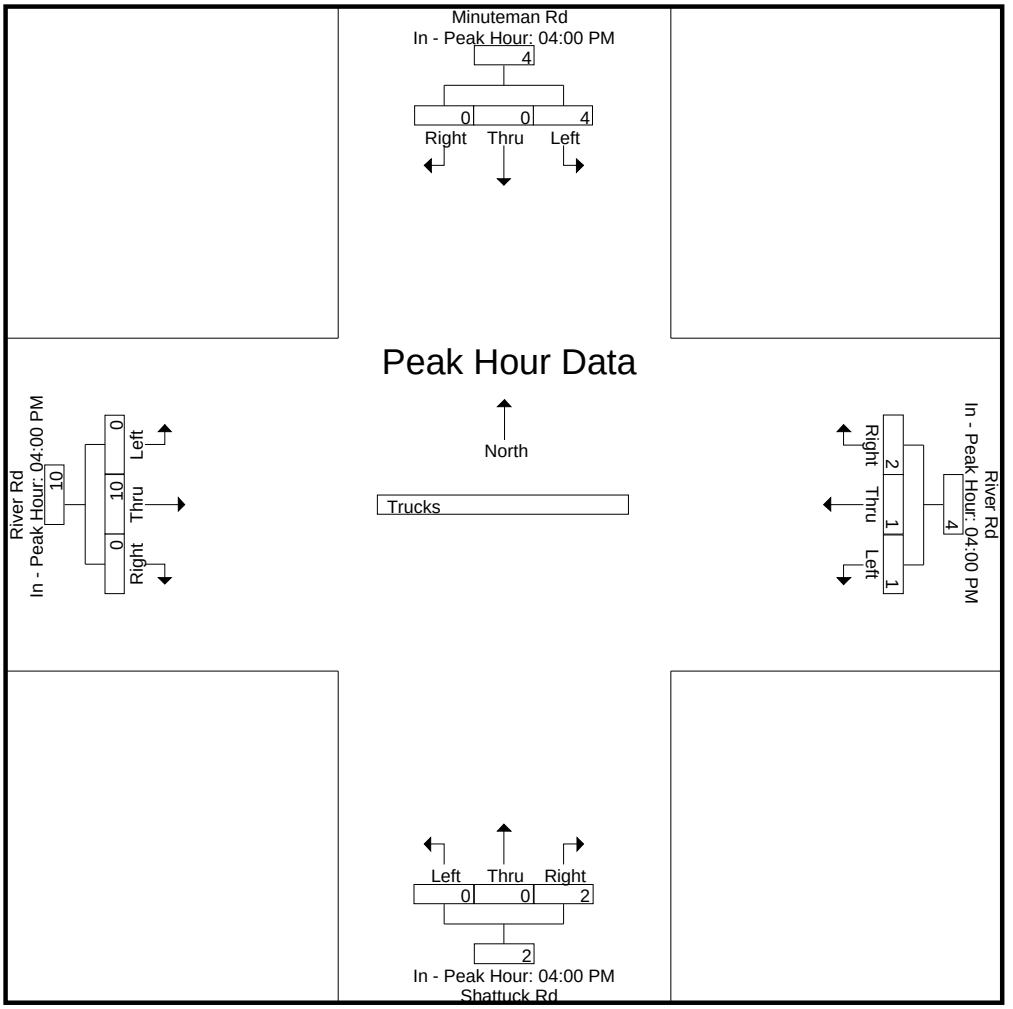
	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	**2**	0	0	**2**	0	**1**	0	**1**	0	0	0	0	0	**4**	0	**4**
+15 mins.	1	0	0	1	0	0	**1**	1	0	0	0	0	0	4	0	4
+30 mins.	0	0	0	0	**1**	0	0	1	0	0	**1**	**1**	0	1	0	1
+45 mins.	1	0	0	1	0	0	1	1	0	0	1	1	0	1	0	1
Total Volume	4	0	0	4	1	1	2	4	0	0	2	2	0	10	0	10
% App. Total	100	0	0		25	25	50		0	0	100		0	100	0	
PHF	.500	.000	.000	.500	.250	.250	.500	1.000	.000	.000	.500	.500	.000	.625	.000	.625

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 9



Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 10

Groups Printed- Bikes Peds

	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	3
04:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1
04:45 PM	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	4	8	0	8
Total	0	0	0	4	0	1	0	1	0	0	0	0	0	0	0	7	12	1	13
05:00 PM	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	4	6	1	7
05:15 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
05:45 PM	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	3	1	4
Total	0	0	0	5	0	0	0	0	0	0	1	0	0	2	0	6	11	3	14
Grand Total	0	0	0	9	0	1	0	1	0	0	1	0	0	2	0	13	23	4	27
Apprch %	0	0	0		0	100	0		0	0	100		0	100	0				
Total %	0	0	0		0	25	0		0	0	25		0	50	0		85.2	14.8	

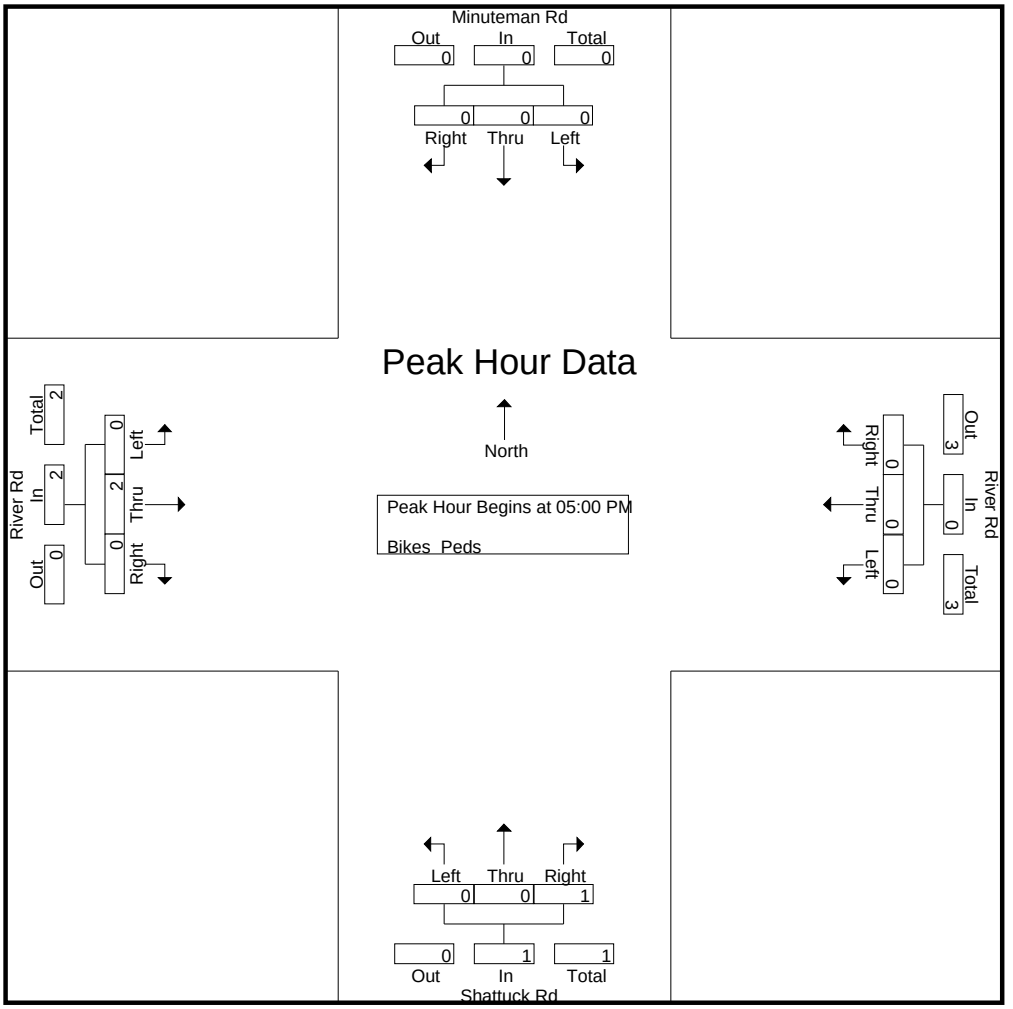
	Minuteman Rd From North				River Rd From East				Shattuck Rd From South				River Rd From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	0	0	0	0	0	**1**	**1**	0	0	0	0	**1**
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	2	3
% App. Total	0	0	0		0	0	0		0	0	100		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.500	.000	.500	.750

Accurate Counts

978-664-2565

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 11

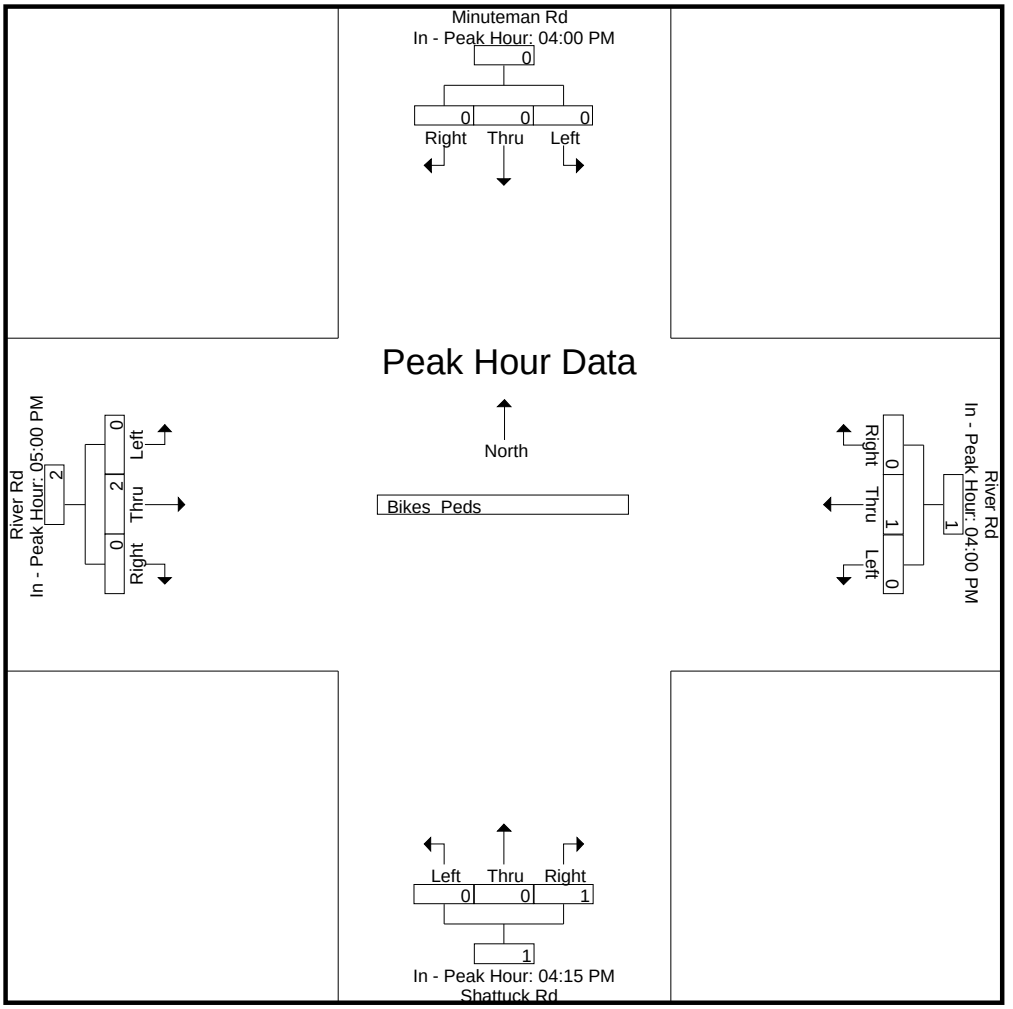


Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:15 PM				05:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	**1**	0	**1**
+45 mins.	0	0	0	0	0	0	0	0	0	0	**1**	**1**	0	1	0	1
Total Volume	0	0	0	0	0	1	0	1	0	0	1	1	0	2	0	2
% App. Total	0	0	0		0	100	0		0	0	100		0	100	0	
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.250	.250	.000	.500	.000	.500

N/S Street : Minuteman Rd / Shattuck Rd
E/W Street : River Road
City/State : Andover, MA
Weather : Clear

File Name : 91410002
Site Code : 91410002
Start Date : 5/11/2022
Page No : 12



SEASONAL ADJUSTMENT DATA

Massachusetts Highway Department
5124: Monthly Hourly Volume for May 2016

Location ID: 5124
County: Essex
Functional Class 1
Location: INTERSTATE 93

Seasonal Factor Group: U1-Essex
Daily Factor Group:
Axle Factor Group: U1-Essex
Growth Factor Group:

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	1547	1011	660	501	468	910	1656	2627	3635	4800	6300	7408	8134	8159	7776	7920	7597	7026	6096	4817	3569	2642	1766	1264	98289	Accepted
2	948	488	494	667	1917	6299	8107	9986	8861	6589	5797	5851	6156	6654	8193	9173	9579	9594	7650	4856	3449	2719	2008	1530	127565	Accepted
3	815	577	570	696	1866	6473	8260	9697	9169	6806	5976	5996	6367	6761	8956	10000	10225	9973	8021	5376	4055	3247	2243	1659	133784	Accepted
4	856	627	557	705	1882	6604	8535	10086	9342	6630	5963	5946	6850	6991	9145	9859	9412	9852	8272	5663	4089	3055	2181	1711	134813	Accepted
5																										
6	1087	771	636	801	1825	6180	8065	9915	8617	6840	6591	7186	7790	8342	10144	10314	10137	9923	8742	6545	4728	4108	3199	2572	145058	Accepted
7	1376	843	689	539	758	1915	2900	4262	5644	6686	7655	8441	8936	8852	9165	8869	8713	8153	6904	5934	4669	3940	3175	2327	121345	Accepted
8	1400	838	587	462	379	787	1415	2225	3529	5109	7033	8350	9135	8857	8396	8563	8114	7748	7224	5926	4677	3153	2139	1286	107332	Accepted
9	739	455	467	717	1964	6702	8570	9933	9089	6639	5895	6070	6518	6750	8478	9616	9931	9639	7887	5466	4202	3116	2263	1796	132902	Accepted
10	924	589	541	740	2009	6825	8575	9887	9495	7045	5947	6196	6714	7045	8884	9795	10233	9831	8804	5707	4340	3414	2498	2158	138196	Accepted
11	1049	618	542	682	1871	6747	8694	10300	9250	7044	5887	6607	6982	6802	9086	9825	10292	9837	7679	6159	4588	3488	2592	2212	138833	Accepted
12	1043	651	586	734	2024	6730	8616	10554	9458	7256	6378	6657	7163	7353	8907	10081	9881	10057	8354	6516	4834	3819	2830	2183	142665	Accepted
13	1103	742	653	754	1880	6351	8028	9857	8552	6909	6700	7249	8278	8004	9693	10359	10385	9528	8565	6406	4761	3881	3299	2482	144419	Accepted
14	1502	816	632	599	822	2147	3306	4744	6343	7278	8056	8972	8924	8611	8580	8382	8520	8084	7461	5862	4744	4123	3435	2429	124372	Accepted
15	1459	936	594	432	452	950	1878	2634	3880	5375	6932	7958	8495	8436	8111	8033	8086	7488	6726	5318	3835	2895	1889	1265	104057	Accepted
16	713	477	454	671	1959	6728	8552	10318	8881	6880	5889	6095	6559	6930	8939	9911	10156	9595	7912	5214	3877	2996	2098	1668	133472	Accepted
17	832	558	547	704	2035	6874	8709	10549	9166	6841	6138	5936	6474	6488	8885	9738	9776	9979	8705	5681	4130	3325	2256	1744	136070	Accepted
18	916	621	499	693	1921	6817	8644	9493	9894	8274	6361	6634	6766	7074	9082	9684	10173	9474	8809	5991	4654	3629	2448	1845	140396	Accepted
19	950	655	584	735	2010	6764	8711	10518	9276	7129	6308	6250	6930	7455	9374	10201	10014	9657	8776	6270	4491	3664	2560	1997	141279	Accepted
20	1067	752	603	750	1901	6282	7983	10375	8662	7074	6909	7440	7989	8673	9871	10561	10650	10219	8265	6445	5099	4193	3302	2948	148013	Accepted
21	1536	952	630	621	887	2106	3194	4787	6230	7236	8178	8922	9283	8723	8988	8526	8389	8260	7217	5769	5193	4306	3580	2642	126155	Accepted
22	1437	890	577	477	508	916	1698	2622	3808	5132	6999	8170	8382	8217	8248	8263	7592	6520	6515	5704	4622	3012	2081	1395	103785	Accepted
23	755	514	491	695	2022	6817	8699	10330	8995	7086	5817	6866	6726	7026	8810	9750	10176	9531	8492	5546	3995	3103	2082	1687	136011	Accepted
24	858	616	559	702	1995	6674	8388	9461	8643	7212	5737	6361	6428	6964	8699	9939	10085	9714	8429	5446	4083	3367	2448	1971	134779	Accepted
25	978	604	574	739	1993	6943	8528	10429	9208	7117	6209	6294	7126	7172	9080	10270	10121	9761	8959	5761	4529	3658	2544	2162	140759	Accepted
26	1019	663	645	757	2056	6922	8557	10241	9247	7368	6523	6907	7318	7913	9714	10512	10380	9783	8237	6710	4959	4057	2838	2383	145709	Accepted
27	1252	850	635	796	1909	5940	7536	9581	8276	7225	7198	8251	9146	9265	10085	9907	9335	8765	7493	6475	5541	4178	3171	2489	145299	Accepted
28	1320	834	665	579	802	1709	2997	4499	6133	7423	8632	8759	8640	8274	7573	7359	6933	6602	6053	5357	4522	4050	3377	2354	115446	Accepted
29	1431	833	556	405	464	921	1502	2286	3333	4656	6484	7581	7822	7846	7322	7040	7113	6649	6391	5388	4487	3577	2720	1833	98640	Accepted
30	1076	686	455	346	478	929	1413	1795	2506	3628	5188	6817	7217	7440	7455	7404	6942	6424	5947	5408	4402	3449	2188	1366	90959	Accepted
31	731	455	450	664	1983	6950	8491	10151	9448	7526	5979	6732	6934	7362	9067	9595	9815	9774	8323	5804	4251	3327	2277	1745	137834	Accepted

ADT **128941**

Month	Year	ADT	Adjustment Needed
January	2016	106779	-9.78
February	2016	109961	-7.09
March	2016	115652	-2.28
April	2016	117697	-0.56
May	2016	120071	**1.45**
June	2016	127300	7.56
July	2016	124359	5.07
August	2016	128663	8.71
September	2016	121329	2.51
October	2016	119695	1.13
November	2016	116403	-1.65
December	2016	112345	-5.08
Average		118354.5	

COVID ADJUSTMENT

Massachusetts Highway Department
5124: Monthly Hourly Volume for May 2022

Location ID: 5124
County: Essex
Functional Class 1
Location: INTERSTATE 93

Seasonal Factor Group: U1-Essex
Daily Factor Group:
Axle Factor Group: U1-Essex
Growth Factor Group:

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	1607	1035	662	508	626	1133	1896	3019	4324	5829	7637	8998	9408	8897	8524	8475	8304	8100	7174	6047	4501	3326	2088	1428	113546	Accepted
2	805	696	553	744	2205	6131	8441	9979	8175	6817	6152	6369	6874	7611	9958	10575	10270	8775	7435	4774	3567	2632	1924	1662	133124	Accepted
3	834	660	586	773	2275	6275	8383	9993	8499	6846	6245	6466	6877	7720	10109	10987	10798	10898	7376	5162	3972	3025	2566	1893	139218	Accepted
4	984	761	570	765	2258	6098	8244	9903	8234	6767	6123	6545	6855	7626	9576	10888	9940	10244	7384	5046	3962	3117	2178	1904	135972	Accepted
5	936	766	637	820	2274	6317	8676	10570	8616	7120	6678	7011	7514	8073	10092	11111	11078	10778	8403	5936	4942	3736	2735	2181	147000	Accepted
6																										
7	1471	979	790	685	1034	2063	3182	4751	5974	7195	8457	9558	9466	9488	9489	9142	8534	8046	7053	6036	5130	4130	3284	2421	128358	Accepted
8	1399	1012	597	480	515	877	1556	2665	3876	5877	8166	9116	9988	9292	9010	9018	9436	8488	7359	6145	4746	3275	2039	1363	116295	Accepted
9	748	613	534	772	2336	6159	8314	9806	8014	6812	6380	6563	7125	7514	9294	10962	10636	10057	6834	5165	3915	2824	2026	1746	135149	Accepted
10	963	686	607	781	2331	6385	8595	8989	8923	7046	6357	6644	6857	7675	9669	10949	11100	10408	7709	5463	4139	3095	2208	1948	139527	Accepted
11	1043	617	572	780	2257	6257	8630	10110	8457	6989	6581	6785	7511	8081	9737	11255	11012	10584	7607	5524	4387	3333	2726	1985	142820	Accepted
12	1040	719	642	796	2227	6303	8390	10043	8586	7272	6717	7219	7476	8294	10032	10988	11350	10499	8280	5775	4885	3564	2954	2059	146110	Accepted
13	1154	813	642	859	2210	5841	7756	9204	8152	7379	7342	7666	8540	9110	10577	11321	11002	10733	8289	6354	5155	4208	3401	2458	150166	Accepted
14	1587	1029	771	730	1042	2170	3375	4736	6276	7523	8578	9279	9740	9203	9106	8798	8320	7928	6831	5806	4920	4234	3327	2525	127834	Accepted
15	1439	896	613	523	617	1097	1774	2828	3946	5884	7469	8725	9257	9186	8982	8698	7721	7058	6551	5881	4384	3079	2058	1399	110065	Accepted
16	837	631	593	733	2218	6072	8387	9695	7865	6794	6376	6816	7142	7777	9687	9707	9913	10150	6835	5110	3751	2772	1974	1655	133490	Accepted
17	910	585	628	771	2268	6331	8249	8359	8581	6975	6726	6794	7153	7583	9793	10908	10843	10347	7742	5601	4473	3131	2315	1868	138934	Accepted
18	1020	687	573	799	2340	6308	8518	9571	8289	7170	6644	6818	7349	8234	10252	11411	11238	10763	7777	5788	4735	3734	2613	1994	144625	Accepted
19	1107	671	605	835	2293	6252	8327	9829	8408	6949	6696	6976	7424	8082	9772	10598	11076	10436	7872	5892	4436	3338	2459	2130	142463	Accepted
20	1150	837	630	841	2251	5997	7822	9176	8002	7298	7314	7993	8816	9416	10769	11618	11185	10972	8865	6595	5398	4242	3333	2685	153205	Accepted
21	1641	902	734	746	1083	2049	3283	4645	6209	7443	8252	9072	9505	9283	9256	8841	8312	7741	6688	5700	5340	4346	3423	2648	127142	Accepted
22	2060	1261	731	563	597	1206	2021	2945	4275	5852	7670	8535	9173	9128	8667	8239	8093	7701	6834	5879	4773	3413	2250	1592	113458	Accepted
23	869	665	552	830	2240	6261	8547	9766	7824	6738	6729	6790	7319	7880	9894	11198	10827	10042	7405	5313	4201	2995	2091	1842	138818	Accepted
24	1077	656	600	781	2377	6371	8784	10117	8759	7369	6855	6745	7101	7969	9732	10821	11158	10234	7931	5826	4508	3183	2243	1854	143051	Accepted
25	934	649	614	755	2247	6408	8556	9944	8576	7230	6859	7170	7522	8382	10083	10650	10689	10722	8021	6006	4673	3408	2426	1801	144325	Accepted
26	1044	677	645	824	2261	6358	8577	9855	8804	7475	6967	7368	7709	8542	10270	11270	10748	10997	8422	6296	5231	3954	2867	2105	149266	Accepted
27	1191	843	592	802	2103	5593	7539	8786	8002	7469	7977	8818	9536	9875	10825	11137	10489	10261	8320	6697	5270	4077	3029	2530	151761	Accepted
28	1915	993	784	673	871	1607	2840	4021	5459	7013	8497	9040	9355	8984	8872	8232	7709	6787	5794	4944	4244	3880	3061	2201	117776	Accepted
29	1376	896	615	524	574	1093	1982	2877	4142	6034	8048	8630	9107	8560	8178	7695	7606	7478	7286	6629	5303	3929	2836	2129	113527	Accepted
30	1485	759	578	475	641	1248	1942	2616	3512	5094	6621	8215	8303	8203	7916	7578	7407	7227	7154	6882	5109	3700	2440	1498	106603	Accepted
31	820	556	520	715	2267	6333	8596	10082	8951	7306	6609	7117	7561	7555	9887	10793	10733	10802	7701	5502	4328	3203	2312	1740	141989	Accepted

ADT **134187**

May 2016 ADT	128,941
Growth Rate	101.50%
May 2016 ADT (Adjusted to 2019)	134,831
May 2022 ADT	134,187
COVID Adjustment	0.48%

VEHICLE TRAVEL SPEED DATA

Location : River Road EB 91410001
Location : East of Shattuck Road
City/State: Andover, MA
Direction: EB,

5/11/2022 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	3	22	37	11	1	1	0	0	0	0	0	75
1:00	0	0	5	5	11	2	2	0	0	0	0	0	0	25
2:00	0	0	0	4	5	0	0	0	0	0	0	0	0	9
3:00	0	0	1	3	7	6	0	0	0	0	0	0	0	17
4:00	0	0	2	6	22	14	8	0	0	0	0	0	0	52
5:00	0	0	3	22	37	22	22	5	1	0	0	0	0	112
6:00	0	0	6	43	120	79	22	3	1	0	0	0	0	274
7:00	0	0	2	52	232	109	27	3	0	0	0	0	0	425
8:00	0	0	14	101	222	116	19	1	0	0	0	0	0	473
9:00	1	0	15	103	162	87	21	3	0	0	0	0	0	392
10:00	0	0	7	66	143	97	16	0	0	0	0	0	0	329
11:00	0	0	15	90	178	83	25	1	1	0	0	0	0	393
12:00 PM	0	0	5	77	214	94	18	2	1	0	0	0	0	411
1:00	0	1	6	63	191	110	29	5	0	0	0	0	0	405
2:00	0	0	0	88	311	146	33	2	1	0	0	0	0	581
3:00	0	0	5	165	466	196	41	4	1	0	0	0	0	878
4:00	0	0	3	97	386	239	52	10	2	0	0	0	0	789
5:00	0	2	7	126	409	182	66	5	0	0	0	0	0	797
6:00	0	1	5	68	154	136	35	5	0	0	0	0	0	404
7:00	0	2	1	47	113	72	18	4	0	0	0	0	0	257
8:00	0	0	6	42	76	57	16	2	0	0	0	0	0	199
9:00	0	0	1	17	44	37	15	4	0	0	0	0	0	118
10:00	0	0	2	18	29	18	5	1	0	0	0	0	0	73
11:00	0	0	1	10	22	20	6	0	1	0	0	0	0	60
Total	1	6	115	1335	3591	1933	497	61	9	0	0	0	0	7548
			Percentile	15th	50th	85th	95th							
			Speed	29	33	38	41							

Mean Speed (Average)	33.6
10 MPH Pace Speed	30-39
Number in Pace	5512
Percent in Pace	73.0%
Number > 35 MPH	2500
Percent > 35 MPH	33.1%

Location : River Road EB 91410001
Location : East of Shattuck Road
City/State: Andover, MA
Direction: EB,

5/12/2022 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	0	20	45	9	5	0	1	0	0	0	0	80
1:00	0	0	2	2	6	6	2	0	0	0	0	0	0	18
2:00	0	0	1	3	2	6	1	0	0	0	0	0	0	13
3:00	0	0	0	4	4	4	0	2	1	0	0	0	0	15
4:00	0	0	3	14	16	7	10	1	0	0	0	0	0	51
5:00	0	0	1	11	44	44	14	2	1	0	0	0	0	117
6:00	0	1	3	34	108	71	18	4	1	0	0	0	0	240
7:00	0	0	1	64	221	104	28	1	0	0	0	0	0	419
8:00	0	1	3	77	244	102	17	5	1	0	0	0	0	450
9:00	0	1	14	100	189	82	21	3	0	0	0	0	0	410
10:00	0	0	4	63	136	90	20	5	1	0	0	0	0	319
11:00	0	0	4	57	167	111	30	4	1	0	0	0	0	374
12:00 PM	0	0	1	75	168	127	36	1	1	0	0	0	0	409
1:00	0	0	4	59	171	153	38	3	2	0	0	0	0	430
2:00	0	1	0	83	249	194	48	4	1	0	0	0	0	580
3:00	0	0	3	161	467	197	35	0	1	1	0	0	0	865
4:00	0	0	3	98	383	217	58	10	3	0	0	0	0	772
5:00	0	1	2	131	402	225	50	4	2	0	0	0	0	817
6:00	0	0	4	66	211	140	41	9	0	0	0	0	0	471
7:00	0	1	2	52	127	74	18	3	0	0	0	0	0	277
8:00	0	0	2	47	82	58	23	0	0	0	0	0	0	212
9:00	0	0	3	25	46	35	16	1	0	0	0	0	0	126
10:00	0	0	1	23	33	19	6	1	0	0	0	0	0	83
11:00	0	0	1	14	22	16	3	1	2	0	0	0	0	59
Total	0	6	62	1283	3543	2091	538	64	19	1	0	0	0	7607
			Percentile	15th	50th	85th	95th							
			Speed	30	33	38	41							
			Mean Speed (Average)	33.9										
			10 MPH Pace Speed	30-39										
			Number in Pace	5618										
			Percent in Pace	73.9%										
			Number > 35 MPH	2713										
			Percent > 35 MPH	35.7%										
Grand Total	1	12	177	2618	7134	4024	1035	125	28	1	0	0	0	15155
Stats			Percentile	15th	50th	85th	95th							
			Speed	29	33	38	41							
			Mean Speed (Average)	33.7										
			10 MPH Pace Speed	30-39										
			Number in Pace	11130										
			Percent in Pace	73.4%										
			Number > 35 MPH	5213										
			Percent > 35 MPH	34.4%										

Location : River Road EB 91410001
Location : East of Shattuck Road
City/State: Andover, MA

	5/11/2022	EB,		Hour Totals	
Time	Wednesday	Morning	Afternoon	Morning	Afternon
12:00		65	128		
12:15		5	95		
12:30		1	99		
12:45		4	89	75	411
1:00		14	98		
1:15		2	84		
1:30		5	115		
1:45		4	108	25	405
2:00		2	139		
2:15		2	114		
2:30		2	170		
2:45		3	158	9	581
3:00		8	197		
3:15		2	211		
3:30		3	302		
3:45		4	168	17	878
4:00		18	229		
4:15		8	169		
4:30		14	205		
4:45		12	186	52	789
5:00		15	284		
5:15		20	176		
5:30		31	182		
5:45		46	155	112	797
6:00		37	126		
6:15		58	90		
6:30		71	99		
6:45		108	89	274	404
7:00		138	86		
7:15		86	65		
7:30		98	54		
7:45		103	52	425	257
8:00		119	53		
8:15		108	59		
8:30		102	51		
8:45		144	36	473	199
9:00		148	34		
9:15		111	31		
9:30		71	27		
9:45		62	26	392	118
10:00		97	24		
10:15		61	15		
10:30		89	18		
10:45		82	16	329	73
11:00		79	29		
11:15		95	13		
11:30		109	13		
11:45		110	5	393	60
Total		2576	4972		
Percent		34.1%	65.9%		

Location : River Road EB 91410001
Location : East of Shattuck Road
City/State: Andover, MA

	5/12/2022	EB,		Hour Totals	
Time	Thursday	Morning	Afternoon	Morning	Afternon
12:00		59	119		
12:15		8	103		
12:30		9	99		
12:45		4	88	80	409
1:00		12	98		
1:15		2	106		
1:30		2	114		
1:45		2	112	18	430
2:00		3	164		
2:15		6	113		
2:30		1	153		
2:45		3	150	13	580
3:00		5	193		
3:15		2	208		
3:30		3	279		
3:45		5	185	15	865
4:00		10	227		
4:15		9	169		
4:30		19	195		
4:45		13	181	51	772
5:00		14	230		
5:15		14	214		
5:30		34	194		
5:45		55	179	117	817
6:00		30	155		
6:15		47	116		
6:30		72	100		
6:45		91	100	240	471
7:00		135	90		
7:15		102	58		
7:30		84	62		
7:45		98	67	419	277
8:00		112	65		
8:15		102	47		
8:30		106	51		
8:45		130	49	450	212
9:00		136	48		
9:15		90	29		
9:30		104	23		
9:45		80	26	410	126
10:00		102	21		
10:15		75	21		
10:30		75	26		
10:45		67	15	319	83
11:00		84	13		
11:15		86	17		
11:30		90	16		
11:45		114	13	374	59
Total		2506	5101		
Percent		32.9%	67.1%		
Grand Total		5082	10073		
Percent		33.5%	66.5%		
ADT		ADT: 7,578		AADT: 7,578	

Location : River Road EB 91410001
Location : East of Shattuck Road
City/State: Andover, MA

5/9/2022	5/9/22	5/10/22	5/11/2022	5/12/2022	5/13/2022	5/14/2022	5/15/2022	Average	
Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon - Fri	Mon - Sun
12:00 AM	*	*	75	80	*	*	*	78	78
1:00	*	*	25	18	*	*	*	22	22
2:00	*	*	9	13	*	*	*	11	11
3:00	*	*	17	15	*	*	*	16	16
4:00	*	*	52	51	*	*	*	52	52
5:00	*	*	112	117	*	*	*	114	114
6:00	*	*	274	240	*	*	*	257	257
7:00	*	*	425	419	*	*	*	422	422
8:00	*	*	473	450	*	*	*	462	462
9:00	*	*	392	410	*	*	*	401	401
10:00	*	*	329	319	*	*	*	324	324
11:00	*	*	393	374	*	*	*	384	384
12:00 PM	*	*	411	409	*	*	*	410	410
1:00	*	*	405	430	*	*	*	418	418
2:00	*	*	581	580	*	*	*	580	580
3:00	*	*	878	865	*	*	*	872	872
4:00	*	*	789	772	*	*	*	780	780
5:00	*	*	797	817	*	*	*	807	807
6:00	*	*	404	471	*	*	*	438	438
7:00	*	*	257	277	*	*	*	267	267
8:00	*	*	199	212	*	*	*	206	206
9:00	*	*	118	126	*	*	*	122	122
10:00	*	*	73	83	*	*	*	78	78
11:00	*	*	60	59	*	*	*	60	60
Total	0	0	7548	7607	0	0	0	7581	7581
Percent	0.0%	0.0%	49.8%	50.2%	0.0%	0.0%	0.0%		
AM Peak			8:00	8:00				8:00	8:00
Volume			473	450				462	462
PM Peak			3:00	3:00				3:00	3:00
Volume			878	865				872	872

Location : River Road WB 91410WB1
Location : East of Shattuck Road
City/State: Andover, MA
Direction: WB,

5/11/2022 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	0	1	3	3	18	6	3	1	0	0	0	0	35
1:00	1	1	1	4	3	4	3	1	0	0	0	0	0	18
2:00	0	0	0	10	5	2	1	0	0	0	0	0	0	18
3:00	0	0	0	10	12	3	0	0	0	0	0	0	0	25
4:00	0	2	0	8	20	27	11	6	1	0	0	0	0	75
5:00	1	4	7	7	44	61	36	11	6	1	0	0	0	178
6:00	2	8	14	13	94	158	67	19	2	0	0	0	0	377
7:00	2	19	34	25	212	361	116	12	5	1	0	0	0	787
8:00	0	22	41	42	237	383	153	29	8	1	0	0	0	916
9:00	0	13	25	20	116	206	73	27	3	3	0	0	0	486
10:00	0	10	8	12	51	127	65	16	2	0	0	0	0	291
11:00	1	10	14	18	68	125	59	15	2	1	0	0	0	313
12:00 PM	1	18	27	20	74	148	64	21	4	2	0	0	0	379
1:00	0	11	11	14	72	150	71	16	4	1	0	0	0	350
2:00	0	14	20	35	115	182	62	20	4	0	0	0	0	452
3:00	2	15	13	26	112	184	82	18	3	0	0	0	0	455
4:00	0	10	18	20	86	143	65	15	6	2	0	0	0	365
5:00	1	19	18	23	94	177	83	19	2	1	0	0	0	437
6:00	1	3	6	20	69	140	80	23	3	2	0	0	0	347
7:00	1	9	10	19	50	105	69	9	4	0	0	0	0	276
8:00	0	3	9	16	74	97	32	8	0	0	0	0	0	239
9:00	1	6	6	12	48	51	20	4	0	0	0	0	0	148
10:00	0	4	1	15	33	33	11	1	1	0	0	0	0	99
11:00	1	3	4	8	42	26	10	2	0	0	0	0	0	96
Total	15	204	288	400	1734	2911	1239	295	61	15	0	0	0	7162

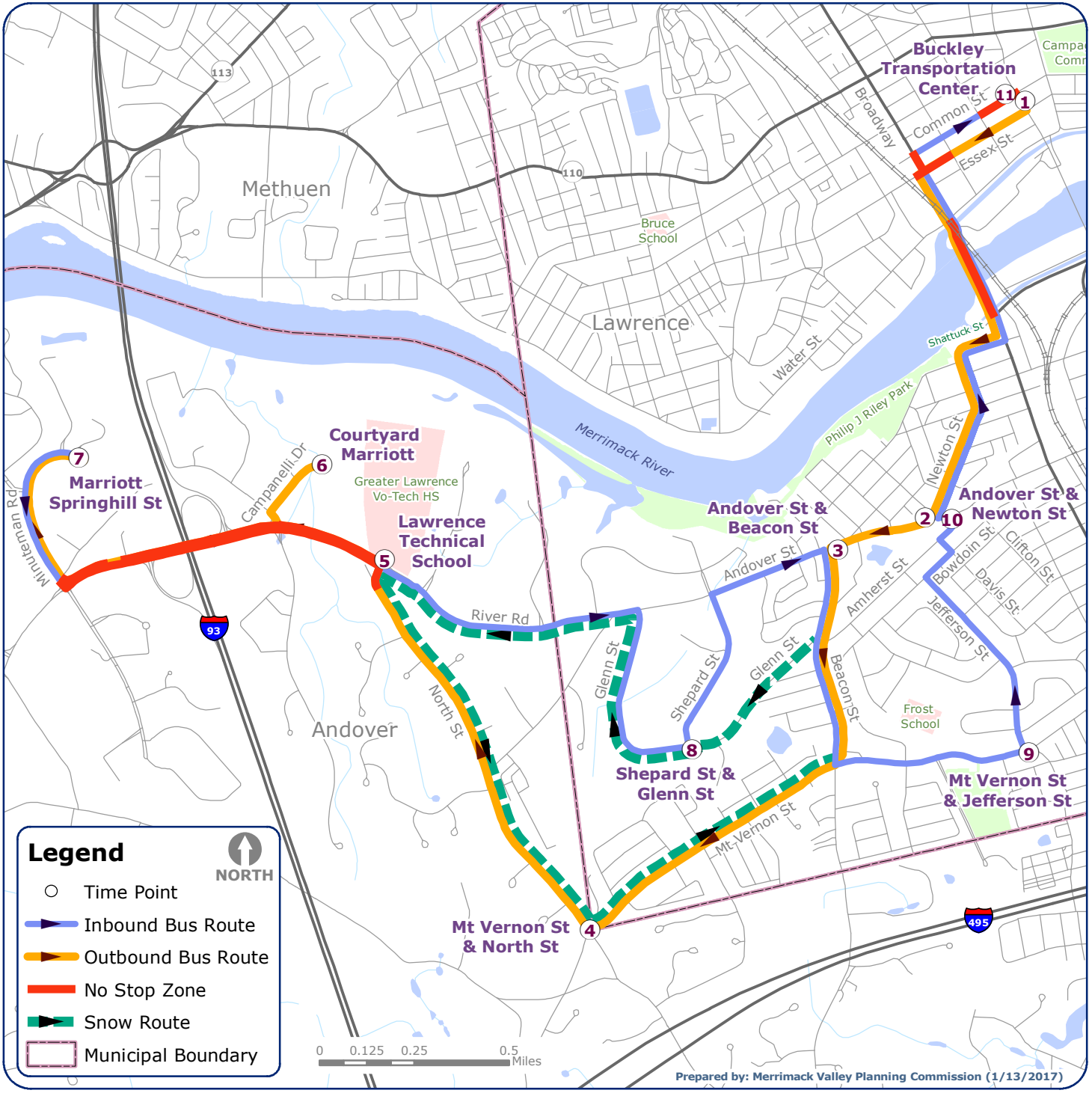
Percentile	15th	50th	85th	95th
Speed	31	36	41	45

Mean Speed (Average)	36.0
10 MPH Pace Speed	30-39
Number in Pace	4595
Percent in Pace	64.2%
Number > 35 MPH	4521
Percent > 35 MPH	63.1%

Location : River Road WB 91410WB1
Location : East of Shattuck Road
City/State: Andover, MA
Direction: WB,

5/12/2022 Time	0 - 15 MPH	> 15 - 20 MPH	> 20 - 25 MPH	> 25 - 30 MPH	> 30 - 35 MPH	> 35 - 40 MPH	> 40 - 45 MPH	> 45 - 50 MPH	> 50 - 55 MPH	> 55 - 60 MPH	> 60 - 65 MPH	> 65 - 70 MPH	> 70 MPH	Total
12:00 AM	0	1	0	2	13	21	9	0	0	0	0	0	0	46
1:00	0	0	2	1	9	4	2	1	0	0	0	0	0	19
2:00	0	0	1	1	5	14	3	0	0	0	0	0	0	24
3:00	0	0	0	4	13	14	2	0	0	0	0	0	0	33
4:00	0	3	1	7	21	26	16	3	0	0	0	0	0	77
5:00	1	3	4	6	46	67	43	8	3	0	0	1	0	182
6:00	0	9	13	14	95	139	61	16	3	0	0	0	0	350
7:00	0	27	36	39	237	283	86	18	1	0	0	0	0	727
8:00	0	18	27	51	294	373	113	17	6	1	0	0	0	900
9:00	1	19	23	30	121	178	75	20	6	1	0	0	0	474
10:00	1	9	14	8	58	114	56	18	0	1	0	0	0	279
11:00	1	12	14	6	65	128	61	15	4	0	0	0	0	306
12:00 PM	1	18	16	18	77	182	70	12	2	1	0	0	0	397
1:00	1	11	7	24	72	129	79	11	4	0	0	0	0	338
2:00	2	20	32	29	121	182	65	11	2	0	0	0	0	464
3:00	3	13	17	30	140	159	57	15	2	1	0	0	0	437
4:00	0	7	23	31	120	196	90	15	1	0	0	0	0	483
5:00	2	18	19	9	132	181	70	14	2	1	0	0	0	448
6:00	0	8	12	18	67	135	53	15	2	0	0	0	0	310
7:00	2	8	9	15	64	119	50	11	0	0	0	0	0	278
8:00	0	9	8	25	80	88	37	6	1	0	0	0	0	254
9:00	0	5	2	24	58	45	17	3	0	0	0	0	0	154
10:00	0	3	4	10	33	37	13	2	2	0	0	0	0	104
11:00	0	3	2	12	45	35	9	3	1	0	0	0	0	110
Total	15	224	286	414	1986	2849	1137	234	42	6	0	1	0	7194
			Percentile	15th	50th	85th	95th							
			Speed	31	36	41	44							
		Mean Speed (Average)		35.5										
		10 MPH Pace Speed		30-39										
		Number in Pace		4786										
		Percent in Pace		66.5%										
		Number > 35 MPH		4269										
		Percent > 35 MPH		59.3%										
Grand Total	30	428	574	814	3720	5760	2376	529	103	21	0	1	0	14356
Stats			Percentile	15th	50th	85th	95th							
			Speed	31	36	41	45							
		Mean Speed (Average)		35.8										
		10 MPH Pace Speed		30-39										
		Number in Pace		9381										
		Percent in Pace		65.3%										
		Number > 35 MPH		8790										
		Percent > 35 MPH		61.2%										

PUBLIC TRANSPORTATION SCHEDULE


Buckley Transportation Center
Common St
Essex St
Broadway
Methuen
Lawrence
Bruce School
Water St
Shattuck St
Philip J Riley Park
Merrimack River
Newton St
Andover St & Newton St
Andover St & Beacon St
Courtyard Marriott
Greater Lawrence Vo-Tech HS
Lawrence Technical School
Marriott Springhill St
Campanelli Dr
Minuteman Rd
River Rd
Andover St
Amherst St
Bowdoin St
Clifton St
Davis St
Jefferson St
Glenn St
Shepard St
Beacon St
Frost School
Shepard St & Glenn St
Mt Vernon St & Jefferson St
Mt Vernon St
North St
Mt Vernon St & North St
Andover
113
110
93
495
1
2
3
4
5
6
7
8
9
10
11
Legend
NORTH
Time Point
Inbound Bus Route
Outbound Bus Route
No Stop Zone
Snow Route
Municipal Boundary
0 0.125 0.25 0.5 Miles
Prepared by: Merrimack Valley Planning Commission (1/13/2017)

Fares

Fares
Statewide Access Pass
How to Ride
More

All fares are one-way. All-Day and 31-Day Passes are available.

The MBTA Charlie Card is also accepted at these fares. Learn more about the CharlieCard here.

Click here to learn how to use the MVRTA Charlie Card.

Si necesita esta información en español, contacte a la Coordinadora del Título VI de la MVRTA al 978- 469- 6878 x134 o por correo electrónico a: mchester@mvrta.com.

Nếu quý vị cần thông tin này bằng tiếng Việt, vui lòng liên hệ với Điều phối viên Luật VI của MVRTA theo số 978- 469- 6878 x134 hoặc địa chỉ email: mchester@mvrta.com.

如果需要简体中文信息，请联系MVRTA Title VI协调员，电话：978- 469- 6878 x134，电子邮件：mchester@mvrta.com。

Fixed Route Fares

FIXED ROUTE FARE	CASH	CHARLIE CARD
Full Fare	$1.25	$1.00
Reduced Fare*	$.60	$.50
Children 5 & under (with adult)	Free	Free
Transfers	Free	Free

*Reduced fare available to:
- Senior Citizens (60+)
- Passengers with disabilities
- Passengers with valid Medicare Card
- Students (13-17)
- Children (6-12)
- Passengers with Statewide Access Pass

Any state-issued ID with your date of birth may be used as proof of age for reduced fare

Beach Bus Fares

BEACH BUS FARE	CASH / CHARLIE CARD	REDUCED FARE
To/From Salisbury Beach	$2.00	$1.00
To/From Hampton Beach	$3.00	$1.50

- No transfers
- Day passes not accepted
- Monthly passes can only be used up to Salisbury Beach

Passes

TYPE	PRICE

TYPE	PRICE
31-Day Pass Full Fare	$30.00
31-Day Pass, Reduced Fare*	$15.00
All-Day Pass Full Fare	$3.00
All-Day Pass, Reduced Fare*	$1.50

*Reduced fare available to:
- Senior Citizens (60+)
- Passengers with disabilities
- Passengers with valid Medicare Card
- Students (13-17)
- Children (6-12)
- Passengers with Statewide Access Pass

Any state-issued ID with your date of birth may be used as proof of age for reduced fare

All Day Passes allow one passenger unlimited rides for an entire day. When boarding the MVRTA bus, simply advise the bus operator that you would like to purchase an All-Day Pass. The All-Day Pass will then be issued directly from the farebox once you deposit the appropriate fare. To use the pass, simply swipe it through the farebox each time you board the bus.

Haga clic aquí para tarifas.

点击这里查看票价。

Bấm vào đây để giá vé.

Pass Purchase Locations:

Washington Square Transit Station
12 Washington Sq.
Haverhill, Ma. 01830
(978) 372-3900

Buckley Transportation Center
295 Common St.
Lawrence, Ma. 01840
(978) 688-8903

Lost & Damaged Tickets

Tickets are not refundable and lost, stolen, or damaged tickets cannot be replaced.

Lost & Damaged Charlie Cards

Lost, stolen, and damaged Charlie Cards should be reported immediately to preserve as much value as possible. Riders are responsible for fares while lost, stolen, or damaged Charlie Cards issues are resolved.

Contact Us

MVRTA Administrative Offices

Monday - Friday
8:00AM - 5:00PM

85 Railroad Avenue
Haverhill, MA 01835

(978) 469-6878

(978) 521-5956

marketing@mvrta.com

Administration

Advisory Board Meeting
Careers
Contact Us

Follow Us

Like us on Facebook

Follow @MVRTA_ on Twitter

About MVRTA

The MVRTA serves the northeast corner of Massachusetts with over 1 million miles of scheduled bus routes, and elderly and disabled transportation.

MASSDOT CRASH RATE WORKSHEETS AND HIGH CRASH LOCATION MAPPING

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Andover COUNT DATE : 5/11/2022

DISTRICT : 4 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : River Road

MINOR STREET(S) : 1776 Drive

INTERSECTION DIAGRAM (Label Approaches)

↑ *North*

PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	0	119	330	271		**720**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **8,000**

TOTAL # OF CRASHES : 8 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **1.60**

CRASH RATE CALCULATION : **0.55** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : Below MassDOT Statewide and District Average Crash Rates

Project Title & Date: Proposed Residential Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Andover COUNT DATE : 5/11/2022

DISTRICT : 4 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

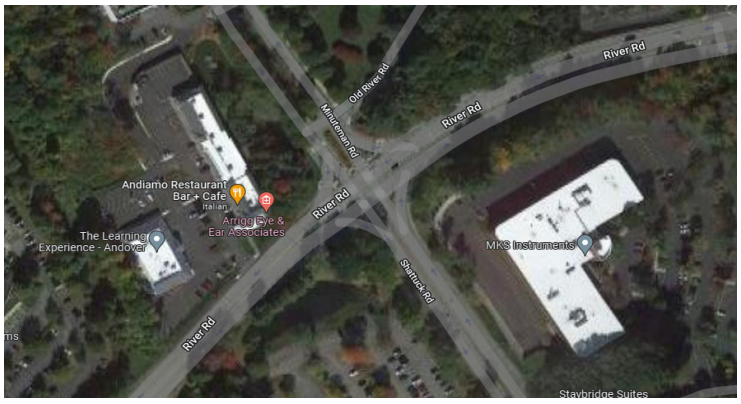
MAJOR STREET : River Road

MINOR STREET(S) : Shattuck Road

Minuteman Road

INTERSECTION DIAGRAM (Label Approaches)

↑ *North*



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	373	176	446	436		**1,431**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **15,900**

TOTAL # OF CRASHES : 4 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **0.80**

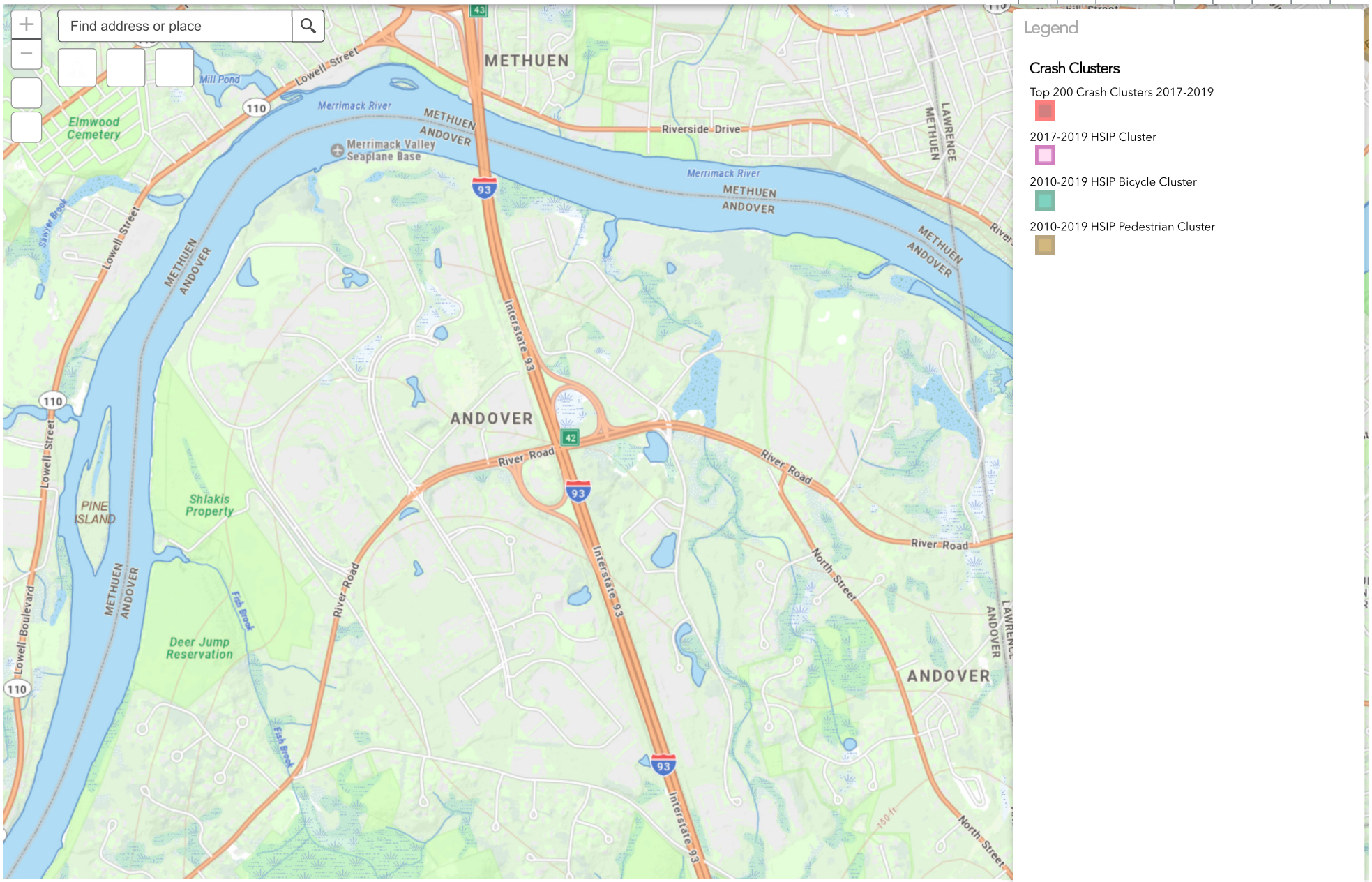
CRASH RATE CALCULATION : **0.14** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : Below MassDOT Statewide and District Average Crash Rates

Project Title & Date: Proposed Residential Development

Top Crash Locations

Accessible Version



Legend

Crash Clusters

Top 200 Crash Clusters 2017-2019

2017-2019 HSIP Cluster

2010-2019 HSIP Bicycle Cluster

2010-2019 HSIP Pedestrian Cluster

App State

Click to restore the map extent and layers visibility where you left off.

GENERAL BACKGROUND TRAFFIC GROWTH

General Background Traffic Growth - Daily Traffic Volumes

CITY/TOWN	ROUTE/STREET	LOCATION	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average Annual
Andover	I-93	South of Methuen	123,633	124,488		123,295	121,630	123,614	126,235	129,908	130,817	132,947	134,409	**1.18%**
Methuen	I-93	North of Rtes. 110/113	119,732	114,628	117,713	115,082	111,501	111,072	116,586	118,710	116,829	115,369	116,638	**-0.23%**
Methuen	I-93	North of Pelham St.		108,000	108,743	106,471	105,841	107,534	111,835			119,203	120,514	**0.78%**
Andover	I-495	South of I-93	114,291	108,190			113,110	114,378	129,383	120,002	120,842	122,810	124,161	**1.20%**
Andover	I-495	North of I-93	108,363	101,236	104,915	106,340	105,045	101,386	115,962	113,807	114,604	116,470	117,751	**0.97%**
Andover	I-93	North of Rte. 133	130,287	126,391			131,816	133,482	119,415	137,886	142,206	135,114	139,986	**0.71%**
Andover	I-495	North of Rte. 28	94,700	94,578	94,751	101,346	98,812	100,116	104,535	107,148	107,898	109,409	110,613	**1.59%**
Tewksbury	I-495	South of Rte. 133	112,718	113,253	110,031	115,174	116,441	118,168	121,224	121,171	120,192	121,634	122,004	**0.81%**
Lawrence	River Road	West of Shattuck Road							6,752	7,171	7,293	7,315	7,286	**1.95%**
Tewksbury	River Road	Andover Town Line					3,235	3,335	3,412	3,624	3,686	3,697	3,682	**2.20%**
Andover	Ramp-River Rd to Rt 93 NB	River Road On-Ramp						9,919	10,157			10,826	10,783	**1.00%**
Andover	Ramp-Rt 93 SB to River Rd	Exit 45 River Road S Lawrence						8,411	8,604	9,137	9,292	9,320	9,283	**2.02%**
														1.18%

TRIP-GENERATION CALCULATIONS

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
140

LAND USE GROUP:
(100-199) Industrial

LAND USE :
140 - Manufacturing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

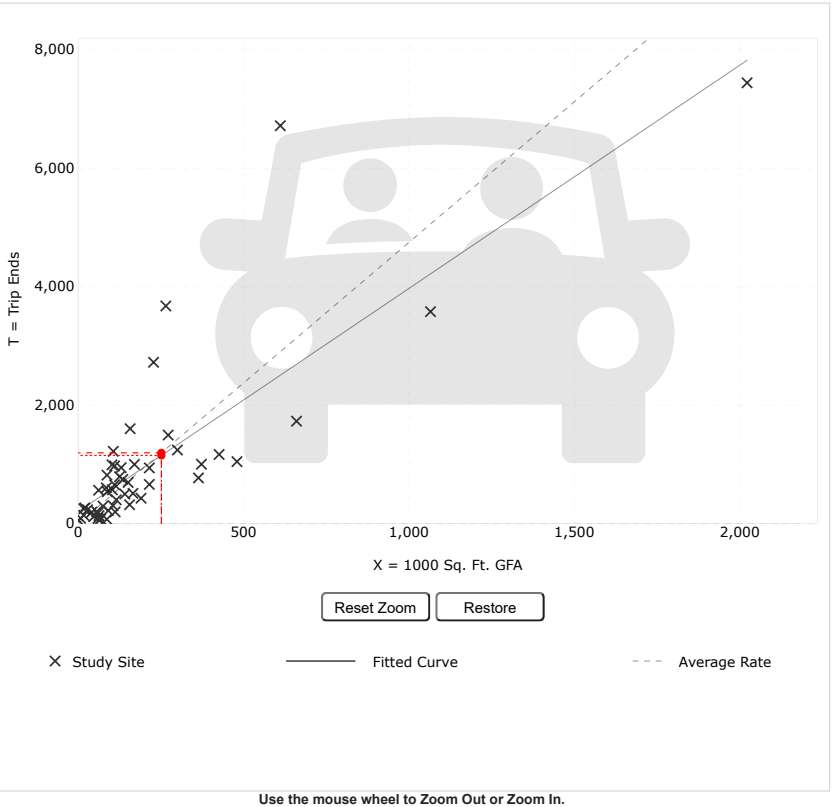
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
251.48 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Manufacturing (140) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
53

Avg. 1000 Sq. Ft. GFA:
208

Average Rate:
4.75

Range of Rates:
0.83 - 49.50

Standard Deviation:
3.20

Fitted Curve Equation:
T = 3.77(X) + 201.98

R^2:
0.68

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 1195 (Total), 597 (Entry), 598 (Exit)
Fitted Curve: 1150 (Total), 575 (Entry), 575 (Exit)

Graph Look Up

ITETripGen Web-based App

Graph Look Up

How to Use *ITETripGen*

TGM Desk Reference

TGM Appendices

Support Documents

Add Users

Comments

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
140

LAND USE GROUP:
(100-199) Industrial

LAND USE :
140 - Manufacturing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

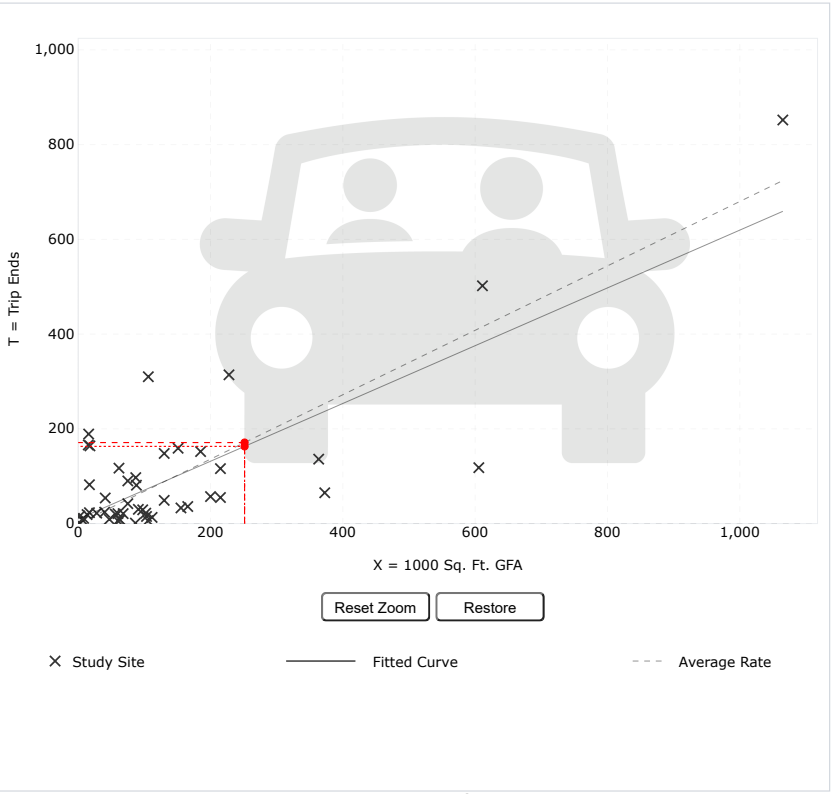
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
251.48 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Manufacturing (140) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
48

Avg. 1000 Sq. Ft. GFA:
138

Average Rate:
0.68

Range of Rates:
0.01 - 11.93

Standard Deviation:
1.03

Fitted Curve Equation:
T = 0.61(X) + 9.54

R^2:
0.62

Directional Distribution:
76% entering, 24% exiting

Calculated Trip Ends:
Average Rate: 171 (Total), 130 (Entry), 41 (Exit)
Fitted Curve: 163 (Total), 124 (Entry), 39 (Exit)

Add-ons to do more

Try OTISS Pro

Graph Look Up

ITETripGen Web-based App

Graph Look Up

How to Use *ITETripGen*

TGM Desk Reference

TGM Appendices

Support Documents

Add Users

Comments

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
140

LAND USE GROUP:
(100-199) Industrial

LAND USE :
140 - Manufacturing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

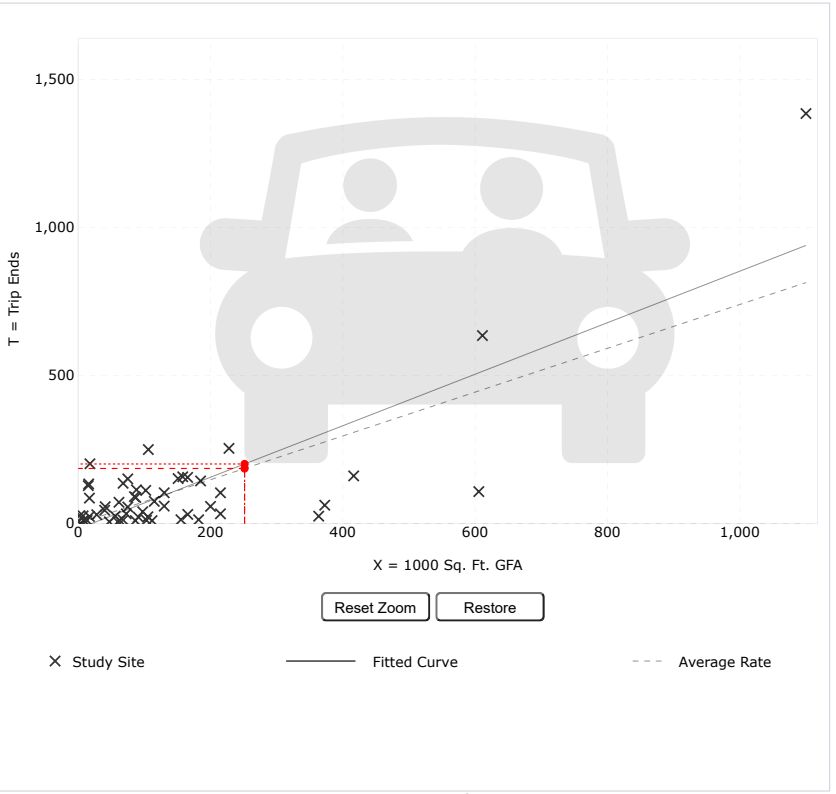
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
251.48 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Manufacturing (140) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
55

Avg. 1000 Sq. Ft. GFA:
142

Average Rate:
0.74

Range of Rates:
0.07 - 11.37

Standard Deviation:
0.93

Fitted Curve Equation:
T = 0.87(X) - 17.50

R^2:
0.64

Directional Distribution:
31% entering, 69% exiting

Calculated Trip Ends:
Average Rate: 186 (Total), 58 (Entry), 128 (Exit)
Fitted Curve: 201 (Total), 62 (Entry), 139 (Exit)

Add-ons to do more

Try OTISS Pro

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
710

LAND USE GROUP:
(700-799) Office

LAND USE :
710 - General Office Building

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

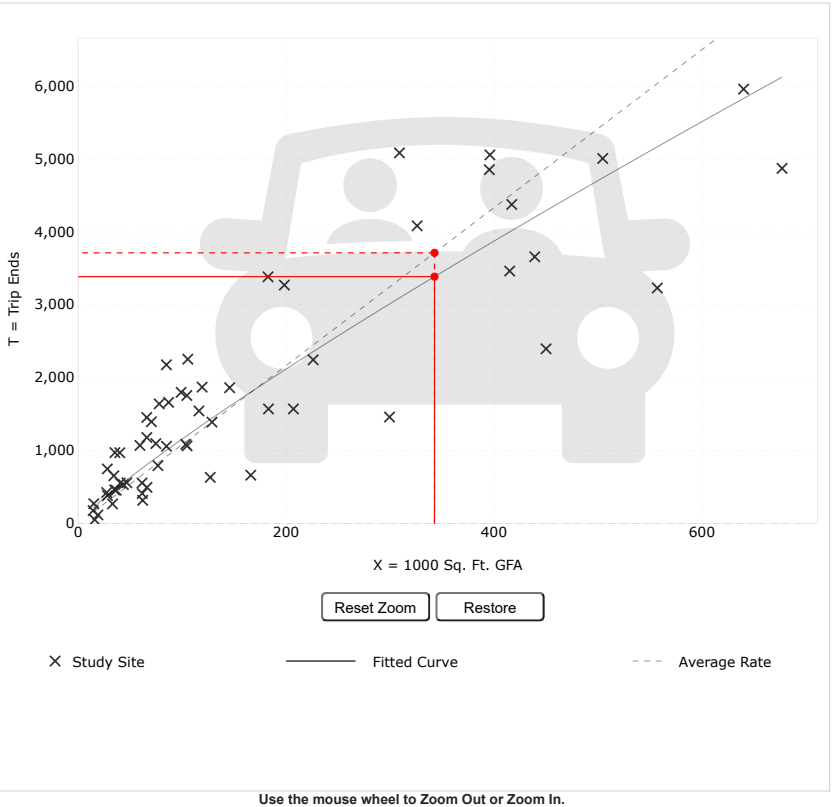
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
342.7 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
59

Avg. 1000 Sq. Ft. GFA:
163

Average Rate:
10.84

Range of Rates:
3.27 - 27.56

Standard Deviation:
4.76

Fitted Curve Equation:
Ln(T) = 0.87 Ln(X) + 3.05

R^2:
0.78

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 3715 (Total), 1857 (Entry), 1858 (Exit)
Fitted Curve: 3388 (Total), 1694 (Entry), 1694 (Exit)

Graph Look Up

ITETripGen Web-based App

Graph Look Up

How to Use *ITETripGen*

TGM Desk Reference

TGM Appendices

Support Documents

Add Users

Comments

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
710

LAND USE GROUP:
(700-799) Office

LAND USE :
710 - General Office Building

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

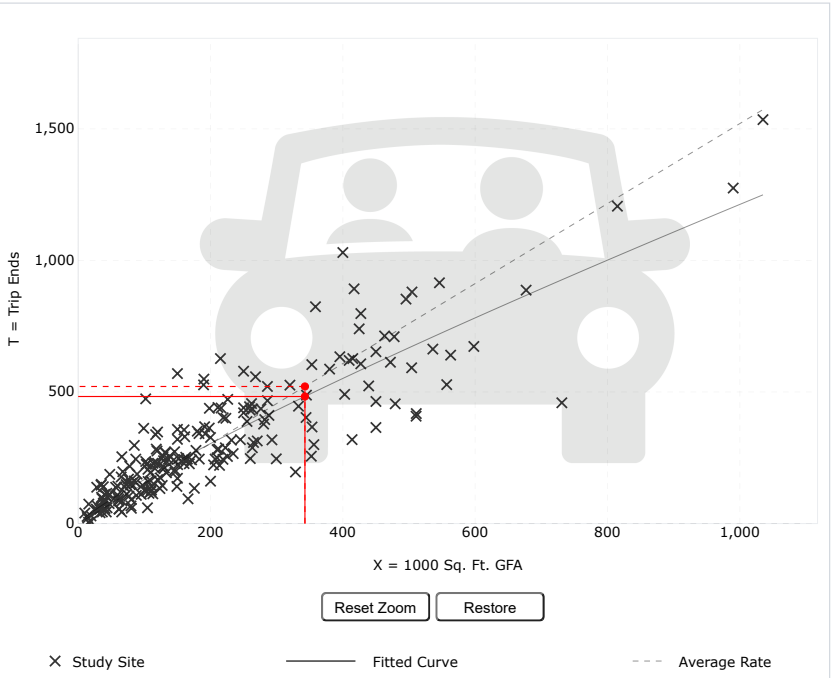
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
342.7 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
221

Avg. 1000 Sq. Ft. GFA:
201

Average Rate:
1.52

Range of Rates:
0.32 - 4.93

Standard Deviation:
0.58

Fitted Curve Equation:
Ln(T) = 0.86 Ln(X) + 1.16

R^2:
0.78

Directional Distribution:
88% entering, 12% exiting

Calculated Trip Ends:
Average Rate: 521 (Total), 458 (Entry), 63 (Exit)
Fitted Curve: 483 (Total), 425 (Entry), 58 (Exit)

Add-ons to do more

Try OTISS Pro

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
710

LAND USE GROUP:
(700-799) Office

LAND USE :
710 - General Office Building

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

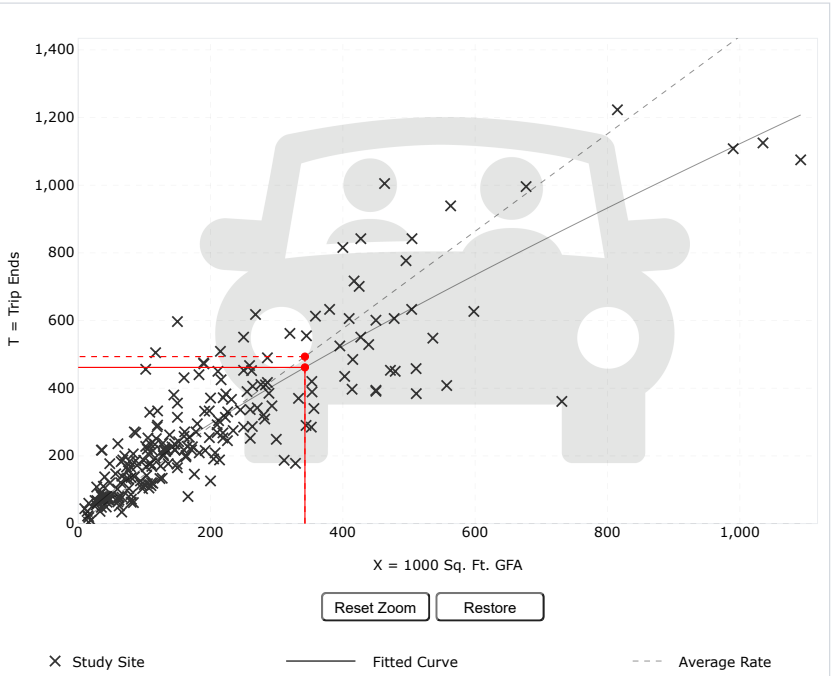
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
342.7 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
General Office Building (710) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
232

Avg. 1000 Sq. Ft. GFA:
199

Average Rate:
1.44

Range of Rates:
0.26 - 6.20

Standard Deviation:
0.60

Fitted Curve Equation:
Ln(T) = 0.83 Ln(X) + 1.29

R^2:
0.77

Directional Distribution:
17% entering, 83% exiting

Calculated Trip Ends:
Average Rate: 493 (Total), 83 (Entry), 410 (Exit)
Fitted Curve: 462 (Total), 78 (Entry), 384 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
760

LAND USE GROUP:
(700-799) Office

LAND USE :
760 - Research and Development Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

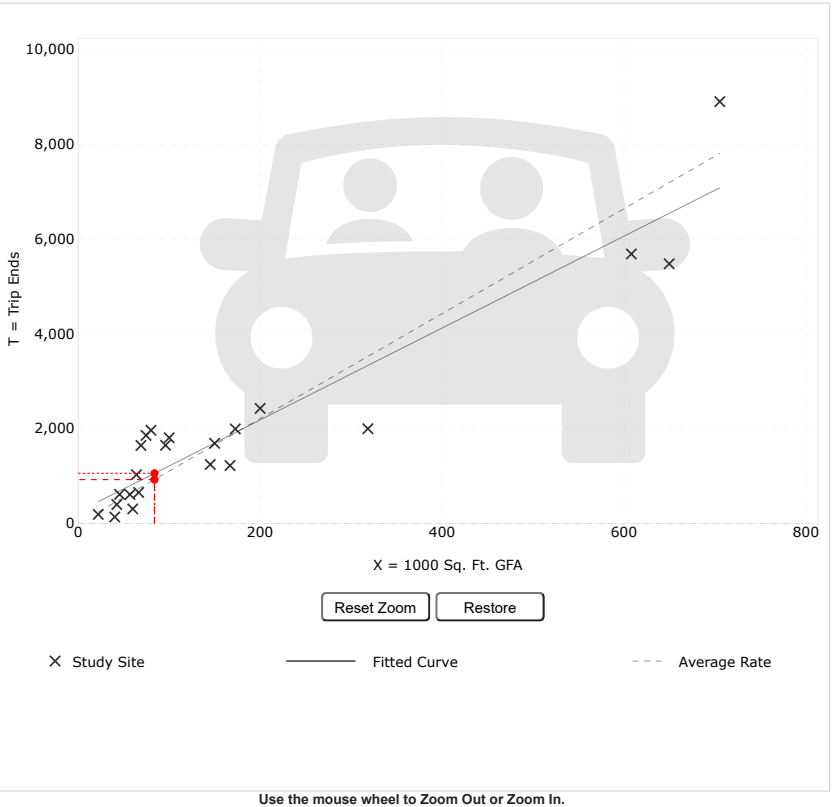
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
83.83 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Research and Development Center (760) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. 1000 Sq. Ft. GFA:
179

Average Rate:
11.08

Range of Rates:
3.48 - 24.95

Standard Deviation:
4.45

Fitted Curve Equation:
T = 9.70(X) + 247.71

R^2:
0.89

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 929 (Total), 464 (Entry), 465 (Exit)
Fitted Curve: 1061 (Total), 530 (Entry), 531 (Exit)

Graph Look Up

ITETripGen Web-based App

Graph Look Up

How to Use *ITETripGen*

TGM Desk Reference

TGM Appendices

Support Documents

Add Users

Comments

Query | Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
760

LAND USE GROUP:
(700-799) Office

LAND USE :
760 - Research and Development Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

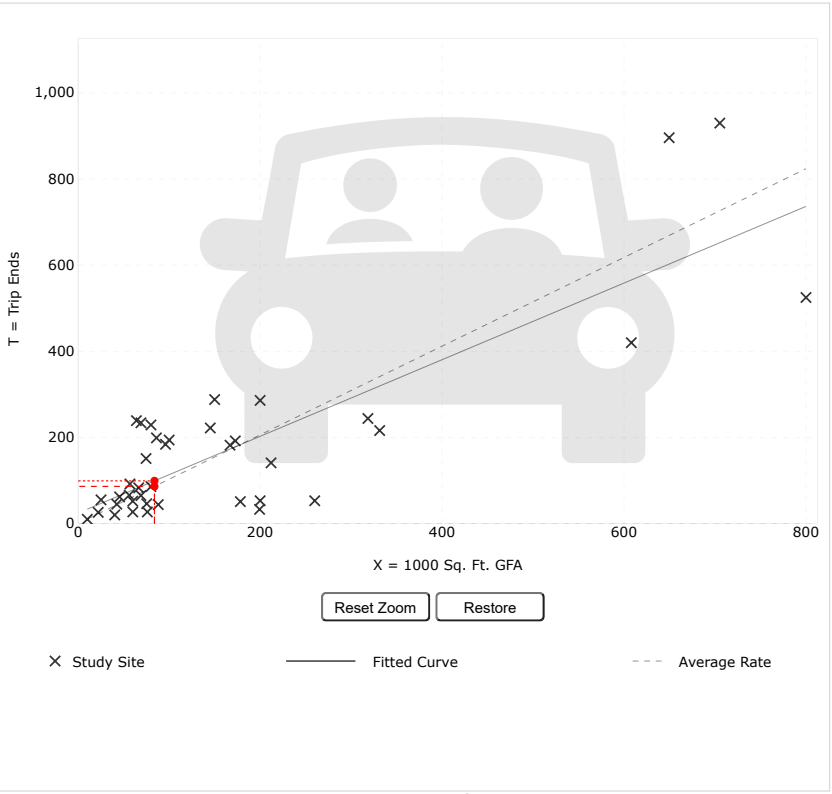
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
83.83 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Research and Development Center (760) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
39

Avg. 1000 Sq. Ft. GFA:
173

Average Rate:
1.03

Range of Rates:
0.17 - 3.73

Standard Deviation:
0.65

Fitted Curve Equation:
T = 0.89(X) + 24.54

R^2:
0.70

Directional Distribution:
82% entering, 18% exiting

Calculated Trip Ends:
Average Rate: 86 (Total), 70 (Entry), 16 (Exit)
Fitted Curve: 99 (Total), 81 (Entry), 18 (Exit)

Add-ons to do more

Try OTISS Pro

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
760

LAND USE GROUP:
(700-799) Office

LAND USE :
760 - Research and Development Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

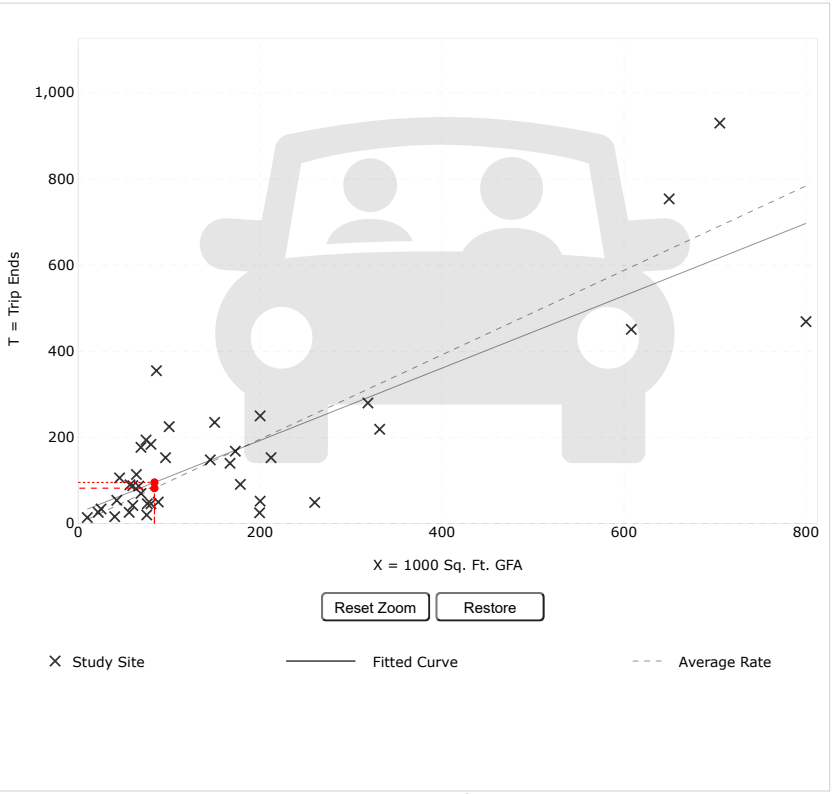
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
83.83 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Research and Development Center (760) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
39

Avg. 1000 Sq. Ft. GFA:
173

Average Rate:
0.98

Range of Rates:
0.13 - 4.13

Standard Deviation:
0.64

Fitted Curve Equation:
T = 0.84(X) + 25.08

R^2:
0.70

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 82 (Total), 13 (Entry), 69 (Exit)
Fitted Curve: 95 (Total), 15 (Entry), 80 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
140

LAND USE GROUP:
(100-199) Industrial

LAND USE :
140 - Manufacturing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

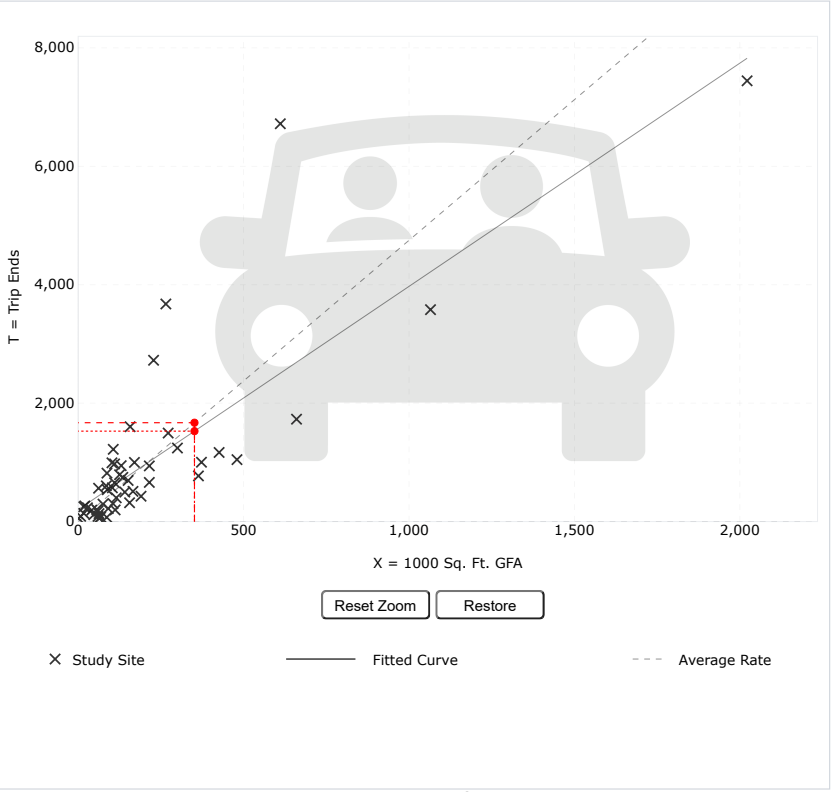
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
351.48 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Manufacturing (140) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
53

Avg. 1000 Sq. Ft. GFA:
208

Average Rate:
4.75

Range of Rates:
0.83 - 49.50

Standard Deviation:
3.20

Fitted Curve Equation:
T = 3.77(X) + 201.98

R^2:
0.68

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 1670 (Total), 835 (Entry), 835 (Exit)
Fitted Curve: 1527 (Total), 763 (Entry), 764 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
140

LAND USE GROUP:
(100-199) Industrial

LAND USE :
140 - Manufacturing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

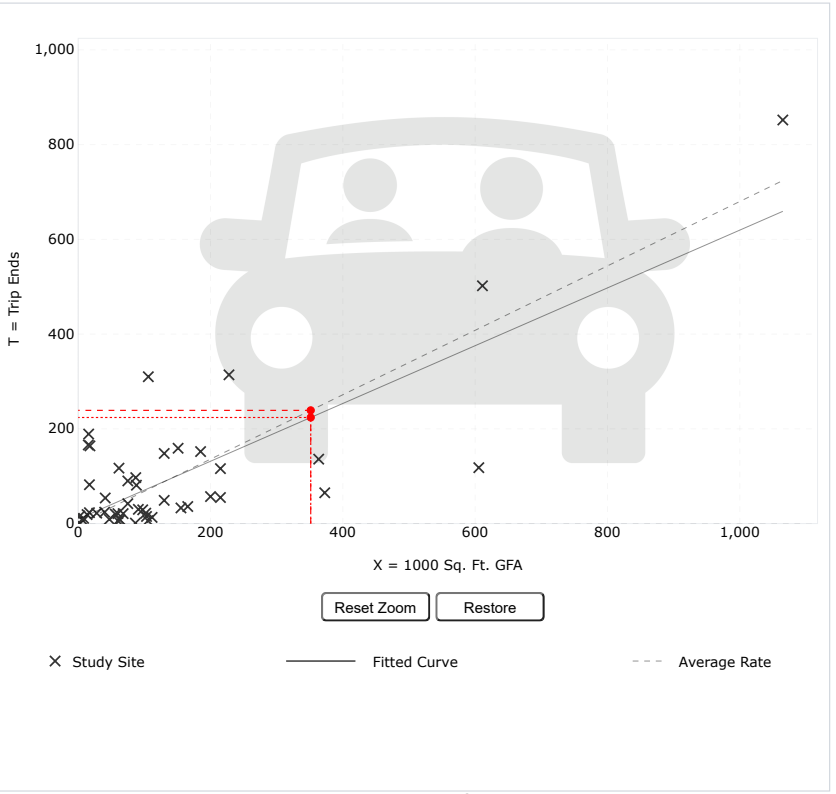
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
351.48 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Manufacturing (140) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
48

Avg. 1000 Sq. Ft. GFA:
138

Average Rate:
0.68

Range of Rates:
0.01 - 11.93

Standard Deviation:
1.03

Fitted Curve Equation:
T = 0.61(X) + 9.54

R^2:
0.62

Directional Distribution:
76% entering, 24% exiting

Calculated Trip Ends:
Average Rate: 239 (Total), 182 (Entry), 57 (Exit)
Fitted Curve: 224 (Total), 170 (Entry), 54 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
140

LAND USE GROUP:
(100-199) Industrial

LAND USE :
140 - Manufacturing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

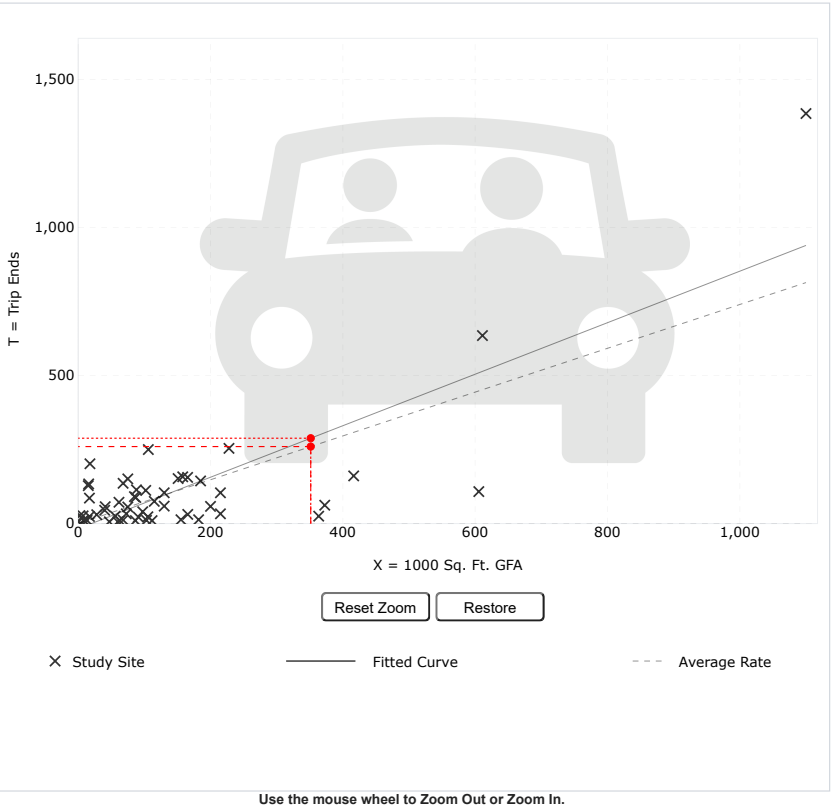
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
351.48 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Manufacturing (140) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
55

Avg. 1000 Sq. Ft. GFA:
142

Average Rate:
0.74

Range of Rates:
0.07 - 11.37

Standard Deviation:
0.93

Fitted Curve Equation:
T = 0.87(X) - 17.50

R^2:
0.64

Directional Distribution:
31% entering, 69% exiting

Calculated Trip Ends:
Average Rate: 260 (Total), 81 (Entry), 179 (Exit)
Fitted Curve: 288 (Total), 89 (Entry), 199 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
760

LAND USE GROUP:
(700-799) Office

LAND USE :
760 - Research and Development Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

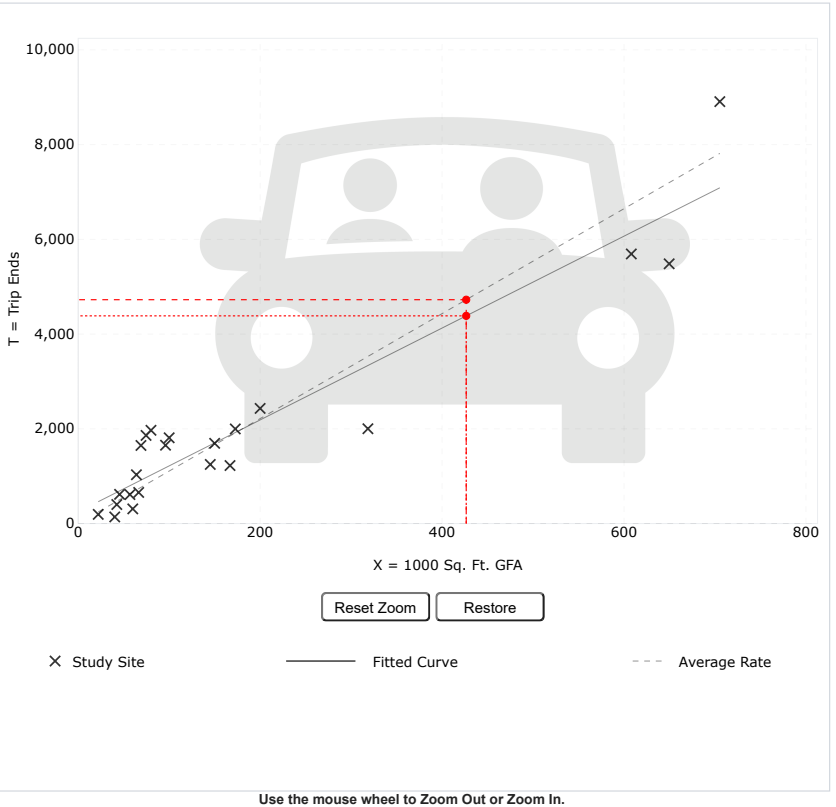
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
426.53 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Research and Development Center (760) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. 1000 Sq. Ft. GFA:
179

Average Rate:
11.08

Range of Rates:
3.48 - 24.95

Standard Deviation:
4.45

Fitted Curve Equation:
T = 9.70(X) + 247.71

R^2:
0.89

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 4726 (Total), 2363 (Entry), 2363 (Exit)
Fitted Curve: 4385 (Total), 2192 (Entry), 2193 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
760

LAND USE GROUP:
(700-799) Office

LAND USE :
760 - Research and Development Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

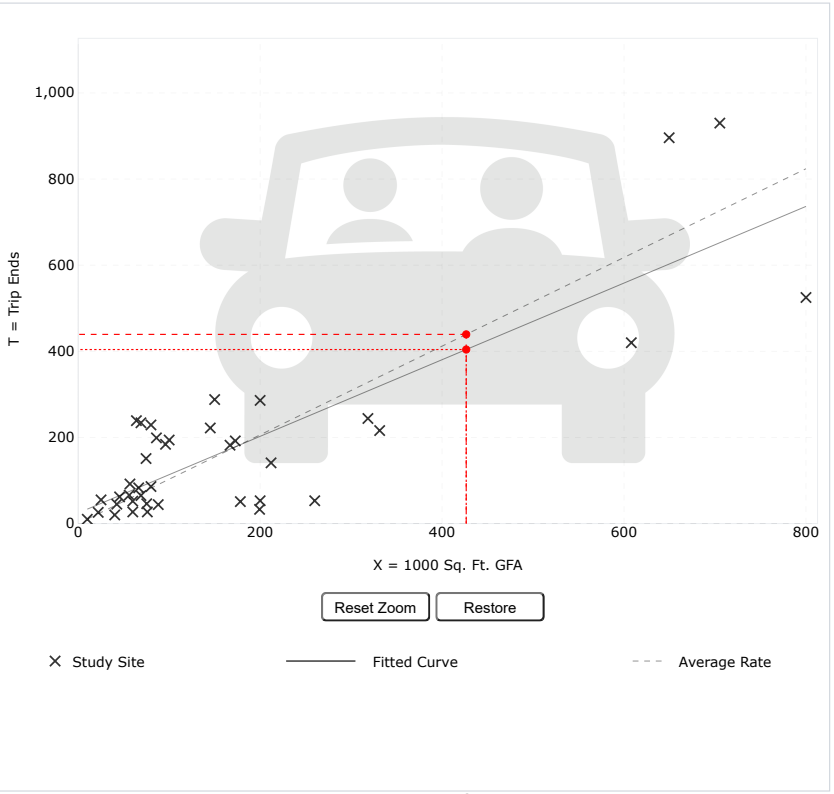
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
426.53 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Research and Development Center (760) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
39

Avg. 1000 Sq. Ft. GFA:
173

Average Rate:
1.03

Range of Rates:
0.17 - 3.73

Standard Deviation:
0.65

Fitted Curve Equation:
T = 0.89(X) + 24.54

R^2:
0.70

Directional Distribution:
82% entering, 18% exiting

Calculated Trip Ends:
Average Rate: 439 (Total), 360 (Entry), 79 (Exit)
Fitted Curve: 404 (Total), 331 (Entry), 73 (Exit)

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
760

LAND USE GROUP:
(700-799) Office

LAND USE :
760 - Research and Development Center

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

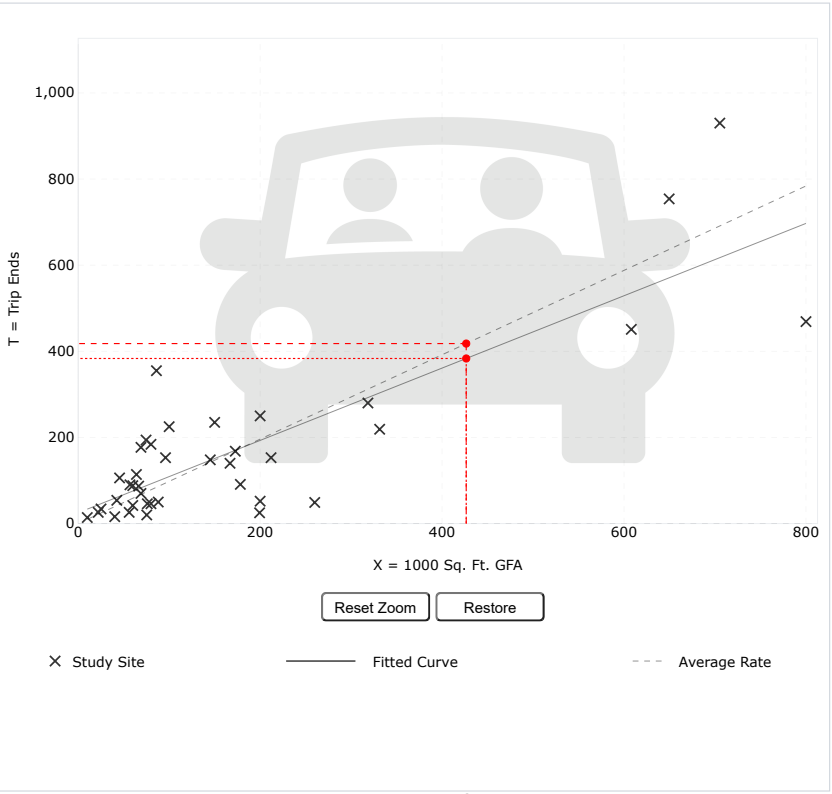
INDEPENDENT VARIABLE (IV):
1000 Sq. Ft. GFA

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
426.53 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Research and Development Center (760) Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GFA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
39

Avg. 1000 Sq. Ft. GFA:
173

Average Rate:
0.98

Range of Rates:
0.13 - 4.13

Standard Deviation:
0.64

Fitted Curve Equation:
T = 0.84(X) + 25.08

R^2:
0.70

Directional Distribution:
16% entering, 84% exiting

Calculated Trip Ends:
Average Rate: 418 (Total), 67 (Entry), 351 (Exit)
Fitted Curve: 383 (Total), 61 (Entry), 322 (Exit)

JOURNEY TO WORK TRIP DISTRIBUTION

3000 Minuteman Road Intial Redevelopment
Andover, Massachusetts

Residence	Workplace	Number	River Road (East)		River Road (West)								
Andover town	Andover town	5,075	50%	2538	50%	2538		0		0		0		0
Lawrence city	Andover town	2,671	100%	2671		0		0		0		0		0
Methuen Town city	Andover town	2,017	100%	2017		0		0		0		0		0
Haverhill city	Andover town	1,770	100%	1770		0		0		0		0		0
Lowell city	Andover town	1,376		0	100%	1376		0		0		0		0
North Andover town	Andover town	1,155	100%	1155		0		0		0		0		0
Salem town	Andover town	1,012	100%	1012		0		0		0		0		0
Boston city	Andover town	827	100%	827		0		0		0		0		0
Dracut town	Andover town	763		0	100%	763		0		0		0		0
Tewksbury town	Andover town	595	50%	298	50%	298		0		0		0		0
Derry town	Andover town	539	100%	539		0		0		0		0		0
Billerica town	Andover town	514	75%	386	25%	129		0		0		0		0
Peabody city	Andover town	511	100%	511		0		0		0		0		0
Londonderry town	Andover town	489	100%	489		0		0		0		0		0
Chelmsford town	Andover town	397	50%	199	50%	199		0		0		0		0
Nashua city	Andover town	363	100%	363		0		0		0		0		0
Windham town	Andover town	314	100%	314		0		0		0		0		0
Newburyport city	Andover town	299	100%	299		0		0		0		0		0
Gloucester city	Andover town	295	100%	295		0		0		0		0		0
Westford town	Andover town	271	75%	203	25%	68		0		0		0		0
Danvers town	Andover town	268	100%	268		0		0		0		0		0
Amesbury Town city	Andover town	260	100%	260		0		0		0		0		0
Manchester city	Andover town	247	100%	247		0		0		0		0		0
Woburn city	Andover town	246	100%	246		0		0		0		0		0
Cambridge city	Andover town	241	100%	241		0		0		0		0		0
North Reading town	Andover town	233	100%	233		0		0		0		0		0
Reading town	Andover town	223	100%	223		0		0		0		0		0
Framingham town	Andover town	221	100%	221		0		0		0		0		0
Somerville city	Andover town	221	100%	221		0		0		0		0		0
Wakefield town	Andover town	217	100%	217		0		0		0		0		0
Wilmington town	Andover town	215	100%	215		0		0		0		0		0
Burlington town	Andover town	212	100%	212		0		0		0		0		0
Beverly city	Andover town	209	100%	209		0		0		0		0		0
Plaistow town	Andover town	209	100%	209		0		0		0		0		0
Pelham town	Andover town	206	100%	206		0		0		0		0		0
Medford city	Andover town	202	100%	202		0		0		0		0		0
Hudson town	Andover town	200	100%	200		0		0		0		0		0
Lynn city	Andover town	197	100%	197		0		0		0		0		0
Tyngsborough town	Andover town	187	100%	187		0		0		0		0		0
Waltham city	Andover town	174	100%	174		0		0		0		0		0
Salem city	Andover town	165	100%	165		0		0		0		0		0
		25,467		20,098		5,369		0		0		0		0
				78.9%		21.1%		0.0%		0.0%		0.0%		0.0%
		SAY		**80%**		**20%**								

CAPACITY ANALYSIS WORKSHEETS

River Road at 1776 Drive
River Road at Shattuck Road and Minuteman Road

River Road at 1776 Drive

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	29	279	283	85	8	4
Future Vol, veh/h	29	279	283	85	8	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	88	88	75	75
Heavy Vehicles, %	0	4	4	0	13	0
Mvmt Flow	32	303	322	97	11	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	322	0	-	0	689	322
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	367	-
Critical Hdwy	4.1	-	-	-	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.2	-	-	-	3.617	3.3
Pot Cap-1 Maneuver	1249	-	-	0	395	724
Stage 1	-	-	-	0	710	-
Stage 2	-	-	-	0	677	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1249	-	-	-	383	724
Mov Cap-2 Maneuver	-	-	-	-	383	-
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	677	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1249	-	-	383	724
HCM Lane V/C Ratio	0.025	-	-	0.028	0.007
HCM Control Delay (s)	8	0	-	14.7	10
HCM Lane LOS	A	A	-	B	B
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	324	265	6	87	32
Future Vol, veh/h	6	324	265	6	87	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	84	84	71	71
Heavy Vehicles, %	0	2	0	17	1	0
Mvmt Flow	6	341	315	7	123	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	315	0	-	0	668	315
Stage 1	-	-	-	-	315	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	4.1	-	-	-	6.41	6.2
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.2	-	-	-	3.509	3.3
Pot Cap-1 Maneuver	1257	-	-	0	425	730
Stage 1	-	-	-	0	742	-
Stage 2	-	-	-	0	713	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1257	-	-	-	422	730
Mov Cap-2 Maneuver	-	-	-	-	422	-
Stage 1	-	-	-	-	738	-
Stage 2	-	-	-	-	713	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	15.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1257	-	-	422	730
HCM Lane V/C Ratio	0.005	-	-	0.29	0.062
HCM Control Delay (s)	7.9	0	-	17	10.3
HCM Lane LOS	A	A	-	C	B
HCM 95th %tile Q(veh)	0	-	-	1.2	0.2

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	158	344	324	94	9	27
Future Vol, veh/h	158	344	324	94	9	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	88	92	92	92
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	172	374	368	102	10	29

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	368	0	-	0	1086	368
Stage 1	-	-	-	-	368	-
Stage 2	-	-	-	-	718	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1191	-	-	0	239	677
Stage 1	-	-	-	0	700	-
Stage 2	-	-	-	0	483	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1191	-	-	-	196	677
Mov Cap-2 Maneuver	-	-	-	-	196	-
Stage 1	-	-	-	-	573	-
Stage 2	-	-	-	-	483	-

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1191	-	-	196	677
HCM Lane V/C Ratio	0.144	-	-	0.05	0.043
HCM Control Delay (s)	8.5	0	-	24.3	10.6
HCM Lane LOS	A	A	-	C	B
HCM 95th %tile Q(veh)	0.5	-	-	0.2	0.1

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	38	370	335	7	97	157
Future Vol, veh/h	38	370	335	7	97	157
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	95	84	92	92	92
Heavy Vehicles, %	2	2	0	2	2	2
Mvmt Flow	41	389	399	8	105	171

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	399	0	-	0	870	399
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	471	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1160	-	-	0	322	651
Stage 1	-	-	-	0	678	-
Stage 2	-	-	-	0	628	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1160	-	-	-	308	651
Mov Cap-2 Maneuver	-	-	-	-	308	-
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	628	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	16.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1160	-	-		308	651
HCM Lane V/C Ratio	0.036	-	-		0.342	0.262
HCM Control Delay (s)	8.2	0	-		22.7	12.5
HCM Lane LOS	A	A	-		C	B
HCM 95th %tile Q(veh)	0.1	-	-		1.5	1

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	132	344	324	94	9	29
Future Vol, veh/h	132	344	324	94	9	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	88	92	92	92
Heavy Vehicles, %	2	4	4	2	2	2
Mvmt Flow	143	374	368	102	10	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	368	0	-	0	1028	368
Stage 1	-	-	-	-	368	-
Stage 2	-	-	-	-	660	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1191	-	-	0	259	677
Stage 1	-	-	-	0	700	-
Stage 2	-	-	-	0	514	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1191	-	-	-	220	677
Mov Cap-2 Maneuver	-	-	-	-	220	-
Stage 1	-	-	-	-	594	-
Stage 2	-	-	-	-	514	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1191	-	-	220	677
HCM Lane V/C Ratio	0.12	-	-	0.044	0.047
HCM Control Delay (s)	8.4	0	-	22.1	10.6
HCM Lane LOS	A	A	-	C	B
HCM 95th %tile Q(veh)	0.4	-	-	0.1	0.1

Intersection	
Int Delay, s/veh	4.2

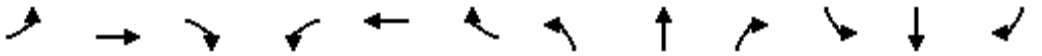
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	37	370	335	7	97	140
Future Vol, veh/h	37	370	335	7	97	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	95	84	92	92	92
Heavy Vehicles, %	2	2	0	2	2	2
Mvmt Flow	40	389	399	8	105	152

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	399	0	-	0	868	399
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	469	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1160	-	-	0	323	651
Stage 1	-	-	-	0	678	-
Stage 2	-	-	-	0	630	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	1160	-	-	-	309	651
Mov Cap-2 Maneuver	-	-	-	-	309	-
Stage 1	-	-	-	-	648	-
Stage 2	-	-	-	-	630	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	16.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	1160	-	-	309	651
HCM Lane V/C Ratio	0.035	-	-	0.341	0.234
HCM Control Delay (s)	8.2	0	-	22.6	12.2
HCM Lane LOS	A	A	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	1.5	0.9

River Road at Shattuck Road and Minuteman Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	281	41	460	397	197	19	4	94	70	4	6
Future Volume (vph)	4	281	41	460	397	197	19	4	94	70	4	6
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.961		0.950	0.957	
Satd. Flow (prot)	1805	3422	0	3351	1783	1546	0	1637	2642	1665	1682	1615
Flt Permitted	0.505			0.950				0.961		0.950	0.957	
Satd. Flow (perm)	960	3422	0	3351	1783	1546	0	1637	2642	1665	1682	1615
Satd. Flow (RTOR)		16				221						131
Adj. Flow (vph)	4	309	45	517	446	221	22	5	109	74	4	6
Lane Group Flow (vph)	4	354	0	517	446	221	0	27	109	39	39	6
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	41.0	41.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	41.0	41.0		13.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	38.0%	38.0%		12.0%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	36.0	36.0		9.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.02	0.38		0.76	0.42	0.22		0.10	0.12	0.14	0.14	0.02
Control Delay	21.5	19.9		36.4	14.0	3.1		30.6	13.7	30.3	30.3	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	21.5	19.9		36.4	14.0	3.1		30.6	13.7	30.3	30.3	0.0
Queue Length 50th (ft)	1	47		80	89	0		7	11	11	11	0
Queue Length 95th (ft)	10	130		#345	314	42		41	34	57	57	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	715	2555		682	1563	1382		370	849	376	380	466
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.01	0.14		0.76	0.29	0.16		0.07	0.13	0.10	0.10	0.01

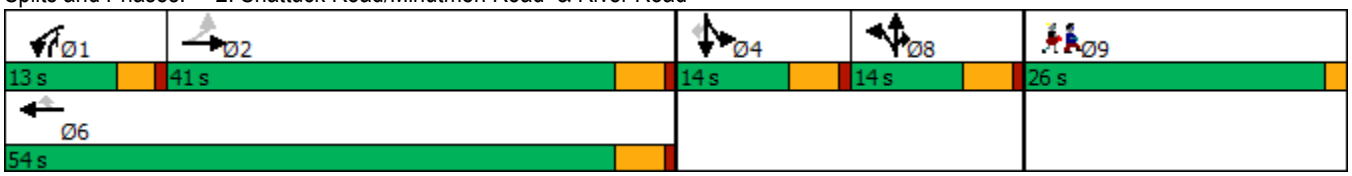
Intersection Summary
Cycle Length: 108

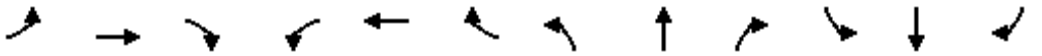
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	5
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 53.8
Natural Cycle: 115
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road

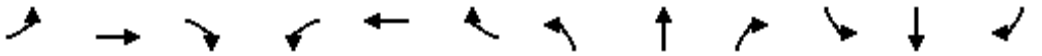




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	281	41	460	397	197	19	4	94	70	4	6
Future Volume (vph)	4	281	41	460	397	197	19	4	94	70	4	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1805	3422		3351	1783	1546		1637	2642	1665	1682	1615
Flt Permitted	0.50	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.96	1.00
Satd. Flow (perm)	959	3422		3351	1783	1546		1637	2642	1665	1682	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.89	0.89	0.89	0.86	0.86	0.86	0.95	0.95	0.95
Adj. Flow (vph)	4	309	45	517	446	221	22	5	109	74	4	6
RTOR Reduction (vph)	0	12	0	0	0	106	0	0	0	0	0	6
Lane Group Flow (vph)	4	342	0	517	446	115	0	27	109	39	39	0
Heavy Vehicles (%)	0%	4%	0%	1%	3%	1%	5%	0%	4%	3%	0%	0%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	14.0	14.0		11.0	29.0	29.0		5.5	16.5	3.8	3.8	3.8
Effective Green, g (s)	15.0	15.0		11.0	30.0	30.0		6.5	16.5	4.8	4.8	4.8
Actuated g/C Ratio	0.26	0.26		0.19	0.52	0.52		0.11	0.28	0.08	0.08	0.08
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	248	886		636	923	801		183	752	138	139	133
v/s Ratio Prot		0.10		c0.15	c0.25			c0.02	0.04	c0.02	0.02	
v/s Ratio Perm	0.00					0.07						0.00
v/c Ratio	0.02	0.39		0.81	0.48	0.14		0.15	0.14	0.28	0.28	0.00
Uniform Delay, d1	16.0	17.7		22.5	9.0	7.3		23.2	15.4	24.9	24.9	24.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.3		7.8	0.4	0.1		0.4	0.1	1.1	1.1	0.0
Delay (s)	16.0	17.9		30.3	9.4	7.3		23.6	15.5	26.1	26.0	24.4
Level of Service	B	B		C	A	A		C	B	C	C	C
Approach Delay (s)		17.9			18.1			17.1			25.9	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	418	20	101	274	61	32	5	335	157	7	12
Future Volume (vph)	8	418	20	101	274	61	32	5	335	157	7	12
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.956	
Satd. Flow (prot)	1805	3551	0	3351	1837	1516	0	1699	2720	1698	1710	1615
Flt Permitted	0.566			0.950				0.958		0.950	0.956	
Satd. Flow (perm)	1075	3551	0	3351	1837	1516	0	1699	2720	1698	1710	1615
Satd. Flow (RTOR)		5				91						131
Adj. Flow (vph)	9	459	22	119	322	72	48	7	500	209	9	16
Lane Group Flow (vph)	9	481	0	119	322	72	0	55	500	109	109	16
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	41.0	41.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	41.0	41.0		13.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	38.0%	38.0%		12.0%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	36.0	36.0		9.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.03	0.55		0.25	0.39	0.10		0.21	0.55	0.44	0.43	0.05
Control Delay	22.2	24.9		31.2	15.4	3.1		31.9	22.2	36.3	36.2	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	24.9		31.2	15.4	3.1		31.9	22.2	36.3	36.2	0.2
Queue Length 50th (ft)	2	78		19	71	0		17	75	36	36	0
Queue Length 95th (ft)	16	181		59	202	16		50	95	102	102	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	625	2068		474	1471	1232		267	912	267	268	364
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.01	0.23		0.25	0.22	0.06		0.21	0.55	0.41	0.41	0.04

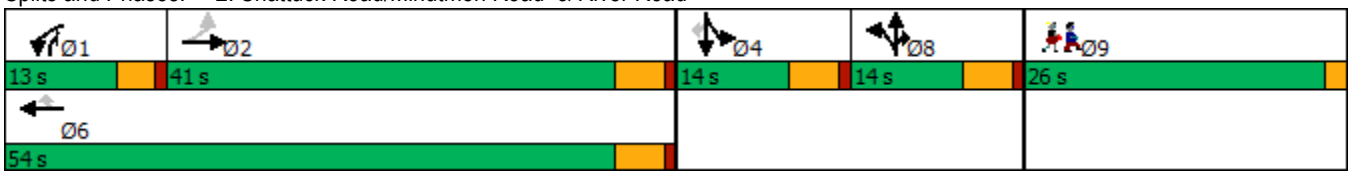
Intersection Summary
Cycle Length: 108

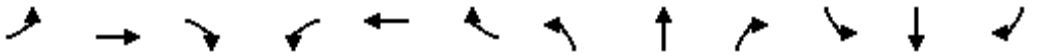
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	16
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 66.2
Natural Cycle: 105
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road

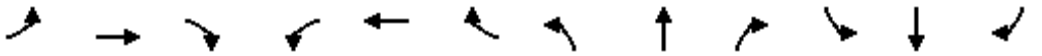




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	418	20	101	274	61	32	5	335	157	7	12
Future Volume (vph)	8	418	20	101	274	61	32	5	335	157	7	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.96	1.00
Satd. Flow (prot)	1805	3551		3351	1837	1516		1699	2720	1698	1710	1615
Flt Permitted	0.57	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.96	1.00
Satd. Flow (perm)	1075	3551		3351	1837	1516		1699	2720	1698	1710	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.85	0.85	0.85	0.67	0.67	0.67	0.75	0.75	0.75
Adj. Flow (vph)	9	459	22	119	322	72	48	7	500	209	9	16
RTOR Reduction (vph)	0	4	0	0	0	40	0	0	0	0	0	14
Lane Group Flow (vph)	9	477	0	119	322	32	0	55	500	109	109	2
Heavy Vehicles (%)	0%	1%	0%	1%	0%	3%	0%	0%	1%	1%	0%	0%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	15.4	15.4		9.4	28.8	28.8		9.4	18.8	8.7	8.7	8.7
Effective Green, g (s)	16.4	16.4		9.4	29.8	29.8		10.4	18.8	9.7	9.7	9.7
Actuated g/C Ratio	0.24	0.24		0.14	0.44	0.44		0.15	0.28	0.14	0.14	0.14
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	261	865		468	813	671		262	759	244	246	232
v/s Ratio Prot		c0.13		0.04	0.18			0.03	c0.18	c0.06	0.06	
v/s Ratio Perm	0.01					0.02						0.00
v/c Ratio	0.03	0.55		0.25	0.40	0.05		0.21	0.66	0.45	0.44	0.01
Uniform Delay, d1	19.4	22.2		25.8	12.7	10.7		24.9	21.4	26.3	26.3	24.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.8		0.3	0.3	0.0		0.4	2.1	1.3	1.3	0.0
Delay (s)	19.5	23.0		26.1	13.0	10.7		25.3	23.5	27.6	27.6	24.7
Level of Service	B	C		C	B	B		C	C	C	C	C
Approach Delay (s)		22.9			15.7			23.7			27.4	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	67.3	Sum of lost time (s)	19.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	312	45	509	441	863	24	4	114	199	4	14
Future Volume (vph)	39	312	45	509	441	863	24	4	114	199	4	14
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.954	
Satd. Flow (prot)	1770	3422	0	3351	1783	1531	0	1624	2642	1681	1688	1583
Flt Permitted	0.482			0.950				0.958		0.950	0.954	
Satd. Flow (perm)	898	3422	0	3351	1783	1531	0	1624	2642	1681	1688	1583
Satd. Flow (RTOR)		16				938						131
Adj. Flow (vph)	42	343	49	572	496	938	28	4	133	216	4	15
Lane Group Flow (vph)	42	392	0	572	496	938	0	32	133	110	110	15
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	41.0	41.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	41.0	41.0		13.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	38.0%	38.0%		12.0%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	36.0	36.0		9.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.17	0.41		1.10	0.56	0.76		0.14	0.18	0.41	0.41	0.04
Control Delay	21.9	20.6		103.4	16.6	5.9		34.9	17.7	37.8	37.7	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	21.9	20.6		103.4	16.6	5.9		34.9	17.7	37.8	37.7	0.2
Queue Length 50th (ft)	11	57		~125	117	0		10	18	36	36	0
Queue Length 95th (ft)	47	141		#425	352	80		52	48	#169	#168	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	571	2182		518	1427	1413		279	662	289	290	380
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.07	0.18		1.10	0.35	0.66		0.11	0.20	0.38	0.38	0.04

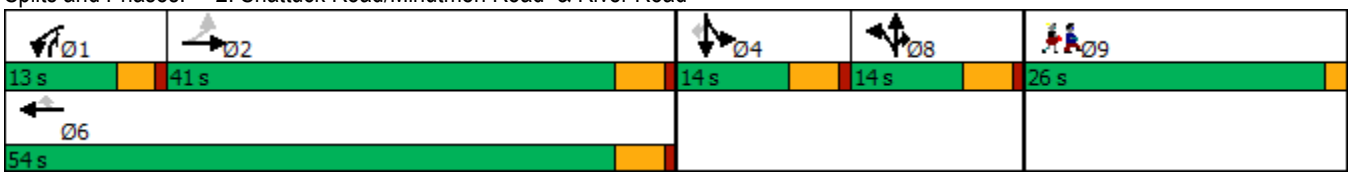
Intersection Summary
Cycle Length: 108

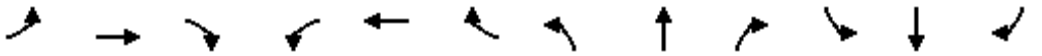
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	5
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 65
Natural Cycle: 115
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road

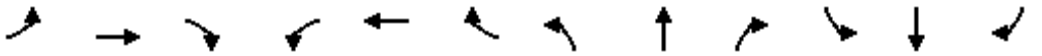




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	312	45	509	441	863	24	4	114	199	4	14
Future Volume (vph)	39	312	45	509	441	863	24	4	114	199	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	3423		3351	1783	1531		1624	2642	1681	1688	1583
Flt Permitted	0.48	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	898	3423		3351	1783	1531		1624	2642	1681	1688	1583
Peak-hour factor, PHF	0.92	0.91	0.91	0.89	0.89	0.92	0.86	0.92	0.86	0.92	0.92	0.92
Adj. Flow (vph)	42	343	49	572	496	938	28	4	133	216	4	15
RTOR Reduction (vph)	0	12	0	0	0	481	0	0	0	0	0	13
Lane Group Flow (vph)	42	380	0	572	496	457	0	32	133	110	110	2
Heavy Vehicles (%)	2%	4%	0%	1%	3%	2%	5%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	17.4	17.4		10.1	31.5	31.5		6.0	16.1	9.3	9.3	9.3
Effective Green, g (s)	18.4	18.4		10.1	32.5	32.5		7.0	16.1	10.3	10.3	10.3
Actuated g/C Ratio	0.28	0.28		0.15	0.49	0.49		0.10	0.24	0.15	0.15	0.15
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	247	944		507	868	745		170	637	259	260	244
v/s Ratio Prot		0.11		c0.17	0.28			c0.02	0.05	c0.07	0.07	
v/s Ratio Perm	0.05					c0.30						0.00
v/c Ratio	0.17	0.40		1.13	0.57	0.61		0.19	0.21	0.42	0.42	0.01
Uniform Delay, d1	18.3	19.7		28.3	12.2	12.5		27.3	20.2	25.5	25.5	23.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3		80.2	0.9	1.5		0.5	0.2	1.1	1.1	0.0
Delay (s)	18.7	20.0		108.5	13.1	14.0		27.8	20.4	26.6	26.6	23.9
Level of Service	B	B		F	B	B		C	C	C	C	C
Approach Delay (s)		19.8			40.7			21.8			26.5	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	19.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	464	24	120	304	223	36	5	374	872	8	54
Future Volume (vph)	17	464	24	120	304	223	36	5	374	872	8	54
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.956		0.950	0.953	
Satd. Flow (prot)	1770	3551	0	3351	1837	1531	0	1692	2720	1681	1686	1583
Flt Permitted	0.547			0.950				0.956		0.950	0.953	
Satd. Flow (perm)	1019	3551	0	3351	1837	1531	0	1692	2720	1681	1686	1583
Satd. Flow (RTOR)		5				242						131
Adj. Flow (vph)	18	510	26	141	358	242	54	5	558	948	9	59
Lane Group Flow (vph)	18	536	0	141	358	242	0	59	558	474	483	59
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	41.0	41.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	41.0	41.0		13.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	38.0%	38.0%		12.0%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	36.0	36.0		9.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.07	0.62		0.33	0.45	0.30		0.24	0.69	1.97	2.00	0.17
Control Delay	26.0	29.1		36.6	19.2	3.8		37.7	29.2	471.8	485.1	1.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	29.1		36.6	19.2	3.8		37.7	29.2	471.8	485.1	1.1
Queue Length 50th (ft)	5	88		24	80	0		19	91	~280	~287	0
Queue Length 95th (ft)	26	202		70	225	45		75	#132	#735	#748	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	542	1891		433	1320	1168		243	803	241	242	339
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.03	0.28		0.33	0.27	0.21		0.24	0.69	1.97	2.00	0.17

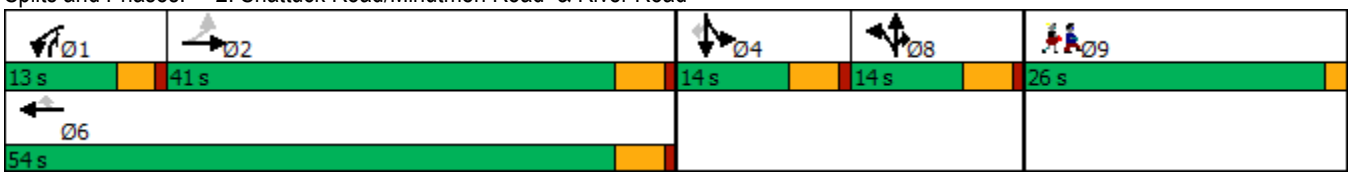
Intersection Summary
Cycle Length: 108

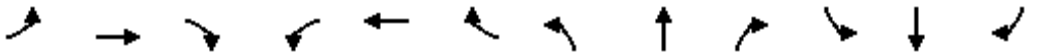
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	16
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 73.6
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road

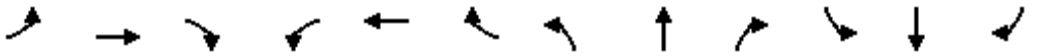




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	464	24	120	304	223	36	5	374	872	8	54
Future Volume (vph)	17	464	24	120	304	223	36	5	374	872	8	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	3550		3351	1837	1531		1693	2720	1681	1687	1583
Flt Permitted	0.55	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1019	3550		3351	1837	1531		1693	2720	1681	1687	1583
Peak-hour factor, PHF	0.92	0.91	0.91	0.85	0.85	0.92	0.67	0.92	0.67	0.92	0.92	0.92
Adj. Flow (vph)	18	510	26	141	358	242	54	5	558	948	9	59
RTOR Reduction (vph)	0	4	0	0	0	138	0	0	0	0	0	51
Lane Group Flow (vph)	18	532	0	141	358	104	0	59	558	474	483	8
Heavy Vehicles (%)	2%	1%	0%	1%	0%	2%	0%	2%	1%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	17.2	17.2		9.5	30.7	30.7		9.5	19.0	9.5	9.5	9.5
Effective Green, g (s)	18.2	18.2		9.5	31.7	31.7		10.5	19.0	10.5	10.5	10.5
Actuated g/C Ratio	0.25	0.25		0.13	0.43	0.43		0.14	0.26	0.14	0.14	0.14
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	250	871		429	785	654		239	697	238	239	224
v/s Ratio Prot		c0.15		0.04	0.19			0.03	c0.21	0.28	c0.29	
v/s Ratio Perm	0.02					0.07						0.01
v/c Ratio	0.07	0.61		0.33	0.46	0.16		0.25	0.80	1.99	2.02	0.04
Uniform Delay, d1	21.5	24.8		29.4	15.1	13.0		28.3	25.8	31.8	31.8	27.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	1.3		0.5	0.4	0.1		0.5	6.6	460.9	473.9	0.1
Delay (s)	21.6	26.1		29.8	15.5	13.1		28.8	32.3	492.7	505.7	27.5
Level of Service	C	C		C	B	B		C	C	F	F	C
Approach Delay (s)		25.9			17.5			32.0			471.9	
Approach LOS		C			B			C			F	

Intersection Summary			
HCM 2000 Control Delay	179.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	19.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Future Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.954	
Satd. Flow (prot)	1770	3422	0	3351	1783	1531	0	1624	2642	1681	1688	1583
Flt Permitted	0.482			0.950				0.958		0.950	0.954	
Satd. Flow (perm)	898	3422	0	3351	1783	1531	0	1624	2642	1681	1688	1583
Satd. Flow (RTOR)		16				826						131
Adj. Flow (vph)	42	343	49	572	496	826	28	4	133	227	4	15
Lane Group Flow (vph)	42	392	0	572	496	826	0	32	133	116	115	15
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	41.0	41.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	41.0	41.0		13.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	38.0%	38.0%		12.0%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	36.0	36.0		9.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.17	0.42		1.09	0.56	0.70		0.14	0.18	0.42	0.41	0.04
Control Delay	22.4	21.0		99.2	16.9	5.0		34.4	17.2	37.3	37.2	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	21.0		99.2	16.9	5.0		34.4	17.2	37.3	37.2	0.2
Queue Length 50th (ft)	11	57		~117	117	0		10	17	37	36	0
Queue Length 95th (ft)	47	141		#425	352	70		52	48	#180	#177	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	576	2202		523	1472	1408		281	670	291	292	382
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.07	0.18		1.09	0.34	0.59		0.11	0.20	0.40	0.39	0.04

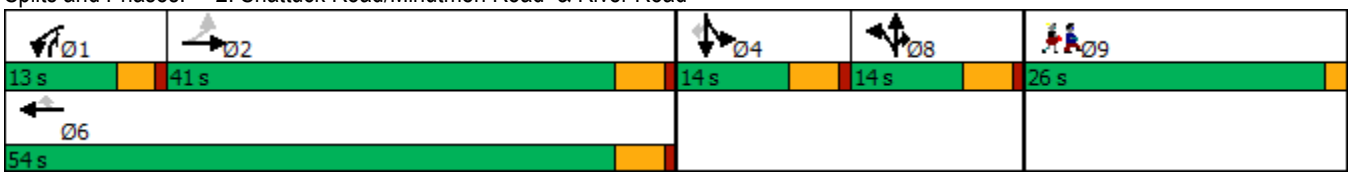
Intersection Summary
Cycle Length: 108

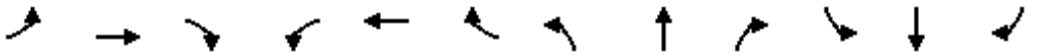
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	5
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 64.3
Natural Cycle: 115
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road

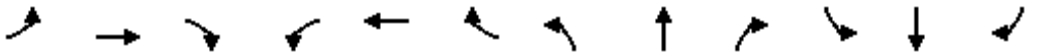




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Future Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	3423		3351	1783	1531		1624	2642	1681	1688	1583
Flt Permitted	0.48	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	898	3423		3351	1783	1531		1624	2642	1681	1688	1583
Peak-hour factor, PHF	0.92	0.91	0.91	0.89	0.89	0.92	0.86	0.92	0.86	0.92	0.92	0.92
Adj. Flow (vph)	42	343	49	572	496	826	28	4	133	227	4	15
RTOR Reduction (vph)	0	12	0	0	0	431	0	0	0	0	0	13
Lane Group Flow (vph)	42	380	0	572	496	395	0	32	133	116	115	2
Heavy Vehicles (%)	2%	4%	0%	1%	3%	2%	5%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	16.6	16.6		10.0	30.6	30.6		6.0	16.0	9.5	9.5	9.5
Effective Green, g (s)	17.6	17.6		10.0	31.6	31.6		7.0	16.0	10.5	10.5	10.5
Actuated g/C Ratio	0.27	0.27		0.15	0.48	0.48		0.11	0.24	0.16	0.16	0.16
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	239	912		507	853	733		172	640	267	268	251
v/s Ratio Prot		0.11		c0.17	c0.28			c0.02	0.05	c0.07	0.07	
v/s Ratio Perm	0.05					0.26						0.00
v/c Ratio	0.18	0.42		1.13	0.58	0.54		0.19	0.21	0.43	0.43	0.01
Uniform Delay, d1	18.6	20.0		28.0	12.4	12.1		26.9	19.9	25.1	25.0	23.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.3		80.2	1.0	0.8		0.5	0.2	1.1	1.1	0.0
Delay (s)	19.0	20.3		108.2	13.4	12.9		27.4	20.1	26.2	26.2	23.4
Level of Service	B	C		F	B	B		C	C	C	C	C
Approach Delay (s)		20.2			41.8			21.5			26.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Future Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (prot)	1770	3551	0	3351	1837	1531	0	1695	2720	1681	1686	1583
Flt Permitted	0.547			0.950				0.958		0.950	0.953	
Satd. Flow (perm)	1019	3551	0	3351	1837	1531	0	1695	2720	1681	1686	1583
Satd. Flow (RTOR)		5				238						131
Adj. Flow (vph)	18	510	26	141	358	238	54	7	558	823	9	59
Lane Group Flow (vph)	18	536	0	141	358	238	0	61	558	420	412	59
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	41.0	41.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	41.0	41.0		13.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	38.0%	38.0%		12.0%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	36.0	36.0		9.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.07	0.62		0.33	0.45	0.30		0.25	0.69	1.74	1.70	0.17
Control Delay	26.0	29.1		36.6	19.2	3.8		37.7	29.2	375.2	358.6	1.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	29.1		36.6	19.2	3.8		37.7	29.2	375.2	358.6	1.1
Queue Length 50th (ft)	5	88		24	80	0		20	91	~235	~228	0
Queue Length 95th (ft)	26	202		70	225	45		77	#132	#654	#642	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	542	1891		433	1320	1167		243	803	241	242	339
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.03	0.28		0.33	0.27	0.20		0.25	0.69	1.74	1.70	0.17

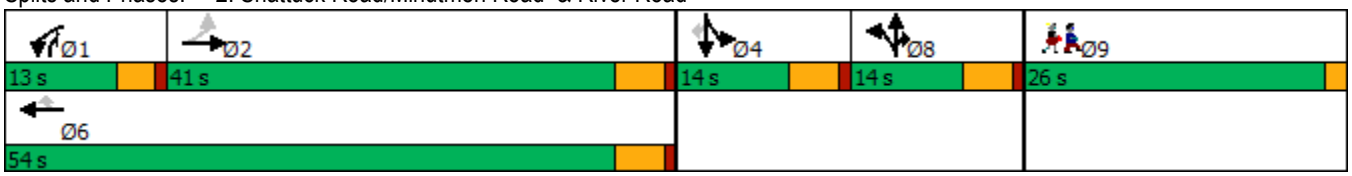
Intersection Summary
Cycle Length: 108

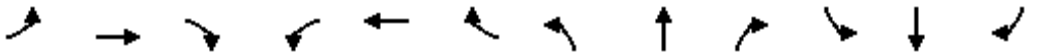
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	16
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 73.6
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Future Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	3550		3351	1837	1531		1694	2720	1681	1687	1583
Flt Permitted	0.55	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1019	3550		3351	1837	1531		1694	2720	1681	1687	1583
Peak-hour factor, PHF	0.92	0.91	0.91	0.85	0.85	0.92	0.67	0.92	0.67	0.92	0.92	0.92
Adj. Flow (vph)	18	510	26	141	358	238	54	7	558	823	9	59
RTOR Reduction (vph)	0	4	0	0	0	136	0	0	0	0	0	51
Lane Group Flow (vph)	18	532	0	141	358	102	0	61	558	420	412	8
Heavy Vehicles (%)	2%	1%	0%	1%	0%	2%	0%	2%	1%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	17.2	17.2		9.5	30.7	30.7		9.5	19.0	9.5	9.5	9.5
Effective Green, g (s)	18.2	18.2		9.5	31.7	31.7		10.5	19.0	10.5	10.5	10.5
Actuated g/C Ratio	0.25	0.25		0.13	0.43	0.43		0.14	0.26	0.14	0.14	0.14
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	250	871		429	785	654		240	697	238	239	224
v/s Ratio Prot		c0.15		0.04	0.19			0.04	c0.21	c0.25	0.24	
v/s Ratio Perm	0.02					0.07						0.01
v/c Ratio	0.07	0.61		0.33	0.46	0.16		0.25	0.80	1.76	1.72	0.04
Uniform Delay, d1	21.5	24.8		29.4	15.1	13.0		28.3	25.8	31.8	31.8	27.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	1.3		0.5	0.4	0.1		0.6	6.6	360.8	342.8	0.1
Delay (s)	21.6	26.1		29.8	15.5	13.1		28.9	32.3	392.6	374.6	27.5
Level of Service	C	C		C	B	B		C	C	F	F	C
Approach Delay (s)		25.9			17.5			32.0			360.1	
Approach LOS		C			B			C			F	

Intersection Summary			
HCM 2000 Control Delay	131.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	19.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Future Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.954	
Satd. Flow (prot)	1770	3422	0	3351	1783	1531	0	1624	2642	1681	1688	1583
Flt Permitted	0.482			0.950				0.958		0.950	0.954	
Satd. Flow (perm)	898	3422	0	3351	1783	1531	0	1624	2642	1681	1688	1583
Satd. Flow (RTOR)		15				826						131
Adj. Flow (vph)	42	343	49	572	496	826	28	4	133	227	4	15
Lane Group Flow (vph)	42	392	0	572	496	826	0	32	133	116	115	15
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	10.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	36.0	36.0		18.0	54.0	54.0	14.0	14.0		14.0	14.0	14.0
Total Split (%)	33.3%	33.3%		16.7%	50.0%	50.0%	13.0%	13.0%		13.0%	13.0%	13.0%
Maximum Green (s)	31.0	31.0		14.0	49.0	49.0	9.0	9.0		9.0	9.0	9.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.21	0.50		0.80	0.56	0.70		0.16	0.13	0.47	0.47	0.04
Control Delay	26.4	25.5		39.3	16.7	4.9		35.5	14.7	40.0	39.8	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	26.4	25.5		39.3	16.7	4.9		35.5	14.7	40.0	39.8	0.2
Queue Length 50th (ft)	13	65		102	117	0		11	16	41	41	0
Queue Length 95th (ft)	51	152		#368	352	70		52	43	#180	#177	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	436	1670		712	1353	1361		246	882	255	256	351
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.10	0.23		0.80	0.37	0.61		0.13	0.15	0.45	0.45	0.04

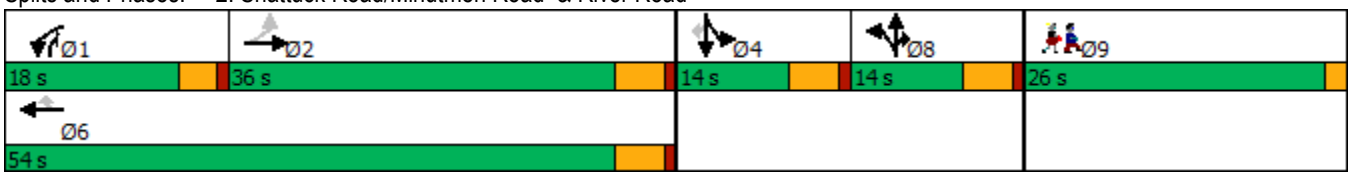
Intersection Summary
Cycle Length: 108

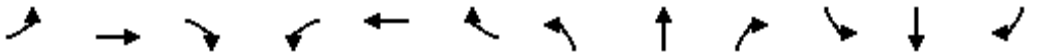
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	5
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 69.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road

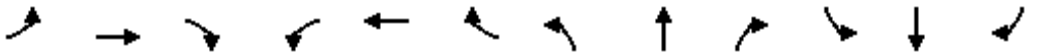




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Future Volume (vph)	39	312	45	509	441	760	24	4	114	209	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	3423		3351	1783	1531		1624	2642	1681	1688	1583
Flt Permitted	0.48	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	898	3423		3351	1783	1531		1624	2642	1681	1688	1583
Peak-hour factor, PHF	0.92	0.91	0.91	0.89	0.89	0.92	0.86	0.92	0.86	0.92	0.92	0.92
Adj. Flow (vph)	42	343	49	572	496	826	28	4	133	227	4	15
RTOR Reduction (vph)	0	12	0	0	0	420	0	0	0	0	0	13
Lane Group Flow (vph)	42	380	0	572	496	406	0	32	133	116	115	2
Heavy Vehicles (%)	2%	4%	0%	1%	3%	2%	5%	2%	4%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	14.9	14.9		14.8	33.7	33.7		7.7	22.5	9.1	9.1	9.1
Effective Green, g (s)	15.9	15.9		14.8	34.7	34.7		8.7	22.5	10.1	10.1	10.1
Actuated g/C Ratio	0.23	0.23		0.21	0.49	0.49		0.12	0.32	0.14	0.14	0.14
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	202	770		702	876	752		200	841	240	241	226
v/s Ratio Prot		0.11		c0.17	c0.28			c0.02	0.05	c0.07	0.07	
v/s Ratio Perm	0.05					0.27						0.00
v/c Ratio	0.21	0.49		0.81	0.57	0.54		0.16	0.16	0.48	0.48	0.01
Uniform Delay, d1	22.2	23.8		26.6	12.6	12.4		27.7	17.3	27.8	27.8	26.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.5		7.2	0.8	0.7		0.4	0.1	1.5	1.5	0.0
Delay (s)	22.7	24.3		33.8	13.5	13.2		28.1	17.3	29.4	29.3	26.0
Level of Service	C	C		C	B	B		C	B	C	C	C
Approach Delay (s)		24.2			19.5			19.4			29.1	
Approach LOS		C			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	70.6	Sum of lost time (s)	19.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Future Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (prot)	1770	3551	0	3351	1837	1531	0	1695	2720	1681	1686	1583
Flt Permitted	0.547			0.950				0.958		0.950	0.953	
Satd. Flow (perm)	1019	3551	0	3351	1837	1531	0	1695	2720	1681	1686	1583
Satd. Flow (RTOR)		4				238						131
Adj. Flow (vph)	18	510	26	141	358	238	54	7	558	823	9	59
Lane Group Flow (vph)	18	536	0	141	358	238	0	61	558	420	412	59
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Detector Phase	2	2		1	6	6	8	8	8 1	4	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	10.0		9.5	22.5	22.5	14.0	14.0		14.0	14.0	14.0
Total Split (s)	22.0	22.0		16.0	38.0	38.0	14.0	14.0		30.0	30.0	30.0
Total Split (%)	20.4%	20.4%		14.8%	35.2%	35.2%	13.0%	13.0%		27.8%	27.8%	27.8%
Maximum Green (s)	17.0	17.0		12.0	33.0	33.0	9.0	9.0		25.0	25.0	25.0
Yellow Time (s)	4.0	4.0		3.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-1.0	-1.0		0.0	-1.0	-1.0		-1.0		-1.0	-1.0	-1.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None		None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.09	0.78		0.32	0.53	0.33		0.33	0.79	0.87	0.85	0.11
Control Delay	37.2	45.7		41.3	28.6	5.0		47.2	39.7	53.4	51.3	0.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	45.7		41.3	28.6	5.0		47.2	39.7	53.4	51.3	0.4
Queue Length 50th (ft)	7	132		33	130	0		29	141	204	200	0
Queue Length 95th (ft)	32	#291		74	287	55		84	#140	#534	#520	0
Internal Link Dist (ft)		766			370			242			260	
Turn Bay Length (ft)	80			350					190	125		100
Base Capacity (vph)	203	712		446	693	726		187	704	485	486	549
Starvation Cap Reductn	0	0		0	0	0		0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0		0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0		0	0	0	0	0
Reduced v/c Ratio	0.09	0.75		0.32	0.52	0.33		0.33	0.79	0.87	0.85	0.11

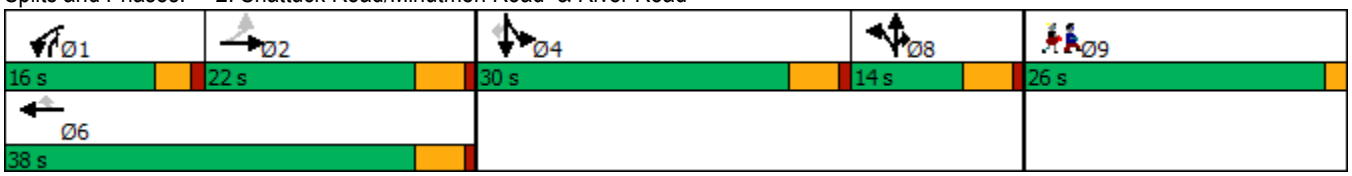
Intersection Summary
Cycle Length: 108

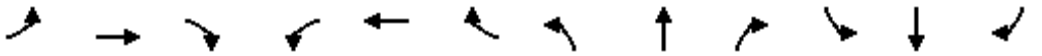
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	24%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	18.0
Pedestrian Calls (#/hr)	16
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Actuated Cycle Length: 91.9
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Shattuck Road/Minutmen Road & River Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Future Volume (vph)	17	464	24	120	304	219	36	6	374	757	8	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	5.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1770	3550		3351	1837	1531		1694	2720	1681	1687	1583
Flt Permitted	0.55	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1019	3550		3351	1837	1531		1694	2720	1681	1687	1583
Peak-hour factor, PHF	0.92	0.91	0.91	0.85	0.85	0.92	0.67	0.92	0.67	0.92	0.92	0.92
Adj. Flow (vph)	18	510	26	141	358	238	54	7	558	823	9	59
RTOR Reduction (vph)	0	3	0	0	0	151	0	0	0	0	0	42
Lane Group Flow (vph)	18	533	0	141	358	87	0	61	558	420	412	17
Heavy Vehicles (%)	2%	1%	0%	1%	0%	2%	0%	2%	1%	2%	2%	2%
Turn Type	Perm	NA		Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases		2		1	6		8	8	8 1	4	4	
Permitted Phases	2					6						4
Actuated Green, G (s)	16.9	16.9		12.2	33.1	33.1		9.2	21.4	25.5	25.5	25.5
Effective Green, g (s)	17.9	17.9		12.2	34.1	34.1		10.2	21.4	26.5	26.5	26.5
Actuated g/C Ratio	0.19	0.19		0.13	0.37	0.37		0.11	0.23	0.28	0.28	0.28
Clearance Time (s)	5.0	5.0		4.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	196	683		439	673	561		185	625	478	480	451
v/s Ratio Prot		c0.15		0.04	0.19			0.04	c0.21	c0.25	0.24	
v/s Ratio Perm	0.02					0.06						0.01
v/c Ratio	0.09	0.78		0.32	0.53	0.16		0.33	0.89	0.88	0.86	0.04
Uniform Delay, d1	30.9	35.7		36.6	23.2	19.8		38.2	34.7	31.7	31.5	24.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	5.8		0.4	0.8	0.1		1.0	15.1	16.6	14.1	0.0
Delay (s)	31.1	41.4		37.1	24.0	19.9		39.3	49.8	48.3	45.6	24.1
Level of Service	C	D		D	C	B		D	D	D	D	C
Approach Delay (s)		41.1			25.2			48.7			45.4	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	40.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	93.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group