

TRAFFIC IMPACT AND ACCESS STUDY

PROPOSED VILLAGE AT BAILEY'S POND Amesbury, Massachusetts

April 15, 2010

Prepared For
Fafard Real Estate and Development Corp.



TEPP LLC

TRANSPORTATION ENGINEERING, PLANNING AND POLICY

93 Stiles Road, Suite 201, Salem, New Hampshire 03079 USA
800 Turnpike Street, Suite 300, North Andover, Massachusetts 01845 USA
Phone (603) 212-9133 and Fax (603) 226-4108
Email tepp@teppllc.com and Web www.teppllc.com

CONTENTS

SUMMARY 1

 Introduction..... 1

 Study Scope 1

 Sight Distances..... 2

 Trip Generation..... 2

 Traffic Volume Changes..... 2

 Capacity Analysis 3

 Conclusion 3

INTRODUCTION 5

 Project Description..... 5

 Study Approach 5

EXISTING CONDITIONS..... 9

 Introduction..... 9

 Physical Conditions 9

 Traffic Volumes 12

 Vehicle Speeds..... 16

 Sight Distances..... 17

 Accidents..... 18

FUTURE CONDITIONS..... 19

 Introduction..... 19

 Planned Road Improvements 19

 Background Traffic Growth..... 19

 No-Build Traffic Volumes 20

 Site Traffic 20

 Build Traffic Volumes 23

 Traffic Volume Changes..... 23

CAPACITY ANALYSIS..... 29

Introduction..... 29

Methods..... 29

Results..... 30

CONCLUSIONS..... 33

APPENDIX

Appendix A: Site Plan

Appendix B: Traffic Counts

Appendix C: Monthly Traffic Variations

Appendix D: Speed Data

Appendix E: Capacity Analysis Worksheets

TABLES

Table 1. Existing weekday traffic volumes. 13

Table 2. Vehicle speeds. 17

Table 3. Sight distances for intersection locations. 18

Table 4. Weekday trip generation. 23

Table 5. Trip distribution/assignment..... 23

Table 6. Traffic-volume changes..... 28

Table 7. Level-of-service criteria for intersections. 29

Table 8. Intersection capacity analysis summary for AM peak hour..... 31

Table 9. Intersection capacity analysis summary for PM peak hour..... 32

FIGURES

Figure 1. Site location..... 6

Figure 2. 2010 existing weekday AM peak-hour volumes..... 14

Figure 3. 2010 existing weekday PM peak-hour volumes..... 15

Figure 4. 2015 no-build weekday AM peak-hour volumes..... 21

Figure 5. 2015 no-build weekday PM peak-hour volumes..... 22

Figure 6. Weekday AM peak-hour site trips..... 24

Figure 7. Weekday PM peak hour site trips..... 25

Figure 8. 2015 build weekday AM peak-hour volumes. 26

Figure 9. 2015 build weekday PM peak-hour volumes..... 27

SUMMARY

INTRODUCTION

TEPP LLC has prepared, for Fafard Real Estate and Development Corp., this traffic impact and access study (TIAS) of the proposed residential development in the Town of Amesbury, Massachusetts. As the site plan in Appendix A shows, the proposed development will:

- be west of Route 150 Extension, south of Summit Avenue and north of Beacon Street
- consist of 148 residential condominium units
- have two driveways along the east side of Route 150 Extension, one driveway along the south side of Summit Avenue and one driveway along the north side of Beacon Street

The existing site includes wooded land surrounding Bailey Pond.

STUDY SCOPE

The TIAS study area consists of the following unsignalized intersections as shown in Figure 1:

- Route 150 Extension/Summit Avenue
- Beacon Street/Route 150 Extension
- Route 150 Extension/proposed north driveway
- Route 150 Extension/proposed south driveway
- Summit Avenue/proposed driveway
- Beacon Street/proposed driveway

This TIAS analyzes traffic operations under the following conditions:

- 2010 existing
- 2015 no-build (*with* background traffic growth and *without* the proposed development)
- 2015 build (*with* background traffic growth and *with* the proposed development)

This TIAS analyses the weekday AM and PM peak hours.

SIGHT DISTANCES

TEPP LLC observed/measured relevant available intersection sight distances on April 4, 2010 at the following intersection locations:

- Route 150 Extension/proposed north driveway
- Route 150 Extension/proposed south driveway
- Summit Avenue/proposed driveway
- Beacon Street/proposed driveway

Findings are:

- except as noted below, sight lines with maintenance of vegetation provide for 85th percentile speeds or are otherwise appropriate
- at the Route 150 Extension/proposed north driveway intersection, clearing to/from the north will provide for 85th percentile speeds
- at the Summit Avenue/proposed driveway intersection, clearing to/from the east will provide for 85th percentile speeds

TRIP GENERATION

The proposed development is calculated to generate the following total vehicle-trips:

- 905 vehicle-trips per weekday (total of in and out)
- 71 vehicle-trips during the weekday AM street peak hour (12 in and 59 out)
- 83 vehicle-trips during the weekday PM street peak hour (56 in and 27 out)

The Institute of Transportation Engineers (ITE) suggests that land developments generating at least 100 peak-hour vehicle trips, in the busier direction, are candidates for consideration of traffic impact analysis. The calculated peak-hour trip generation of the proposed development falls well below this level.

TRAFFIC VOLUME CHANGES

TEPP LLC calculated peak-hour traffic-volume changes due to the development. For:

- Route 150 Extension north of Summit Avenue, the increase is 64 to 75 vehicles per hour
- Route 150 Extension south of Summit Avenue, the increase is 42 to 62 vehicles per hour
- Summit Avenue east of Route 150 Extension, the increase is about 17 vehicles per hour

- Beacon Street east of Route 150 Extension, the increase is about eight vehicles per hour

The above increases are not significant in terms of traffic safety or operations.

CAPACITY ANALYSIS

Capacity analysis was for the weekday AM and PM peak hours under 2010 existing, 2015 no-build and 2015 build conditions. Findings are that:

- Route 150 Extension /Summit Avenue intersection has low calculated delays for all conditions
- Beacon Street/Route 150 Extension intersection has low calculated delays for all conditions
- Route 150 Extension/proposed north driveway intersection has low calculated delays for all conditions
- Route 150 Extension/proposed south driveway intersection has low calculated delays for all conditions
- Summit Avenue/proposed driveway intersection has low calculated delays for all conditions
- Beacon Street/proposed driveway intersection has low calculated delays for all conditions

CONCLUSION

TEPP LLC finds that:

- the site-driveway intersections with off-site streets will provide adequate sight distances
- the proposed development will have no significant impact on overall area traffic safety or operations

INTRODUCTION

PROJECT DESCRIPTION

TEPP LLC has prepared, for Benchmark Engineering Corp., this TIAS of the proposed residential development in the Town of Amesbury, Massachusetts. As Figure 1 and the site plan in Appendix A show, the proposed development will:

- west of Route 150 Extension, south of Summit Avenue and north of Beacon Street
- consist of 148 residential condominium units
- have two driveways along the east side of Route 150 Extension, one driveway along the south side of Summit Avenue and one driveway along the north side of Beacon Street

The existing site includes wooded land surrounding Bailey's Pond.

STUDY APPROACH

A TIAS assesses traffic impacts and access for a proposed land development.

The TIAS study area consists of the following unsignalized intersections as shown in Figure 1:

- Route 150 Extension/Summit Avenue
- Beacon Street/Route 150 Extension
- Route 150 Extension/proposed north driveway
- Route 150 Extension/proposed south driveway
- Summit Avenue/proposed driveway
- Beacon Street/proposed driveway

This TIAS analyzes traffic operations under the following conditions:

- 2010 existing
- 2015 no-build (*with* background traffic growth and *without* the proposed development)
- 2015 build (*with* background traffic growth and *with* the proposed development)

This TIAS analyses the weekday AM and PM peak hours.



Figure 1. Site location.

Differences in traffic operations between the no-build and build conditions approximate traffic impacts of the proposed development.

EXISTING CONDITIONS

INTRODUCTION

Existing conditions include:

- physical conditions of the transportation network, roads and intersections
- traffic volumes
- other relevant information

PHYSICAL CONDITIONS

TRANSPORTATION NETWORK

Figure 1 shows the transportation network, which includes the following existing streets:

- Route 150 Extension
- Summit Avenue
- Beacon Street

The TIAS study area includes the following existing unsignalized intersections:

- Route 150 Extension/Summit Avenue
- Beacon Street/Route 150 Extension

ROUTE 150 EXTENSION

Route 150 Extension:

- is a north-south arterial street
- has connections to the north with the Interstate Route 495 (I-495), a freeway of regional importance, Massachusetts Route 110, an arterial highway, the Amesbury central business district and the State of New Hampshire
- terminates to the south at Beacon Street, a collector street
- has a relatively tangent horizontal alignment and a near-level vertical alignment

- has a paved width of about 32 ft, with one 12-foot travel lane and one paved shoulder per direction
- includes a double-yellow line separating traffic directions and single-white edge lines
- has a posted speed limit of 25 miles per hour (mph) on the southbound approach to its Beacon Street intersection
- has pavement in good condition
- is lined with utility poles on the west side of the road, some with luminaires
- is lined with wooded land, a landfill closure site and some residential development
- is under the jurisdiction of the Commonwealth of Massachusetts

SUMMIT AVENUE

Summit Avenue:

- is an east-west local street
- terminates to the west at Route 150 Extension and continues to the east as Swetts Hill Road
- has a curvilinear horizontal alignment and a vertical alignment with some grades
- has a paved width of about 22 ft
- includes no pavement markings
- has no posted speed limit
- has a posted truck prohibition
- has pavement in overall good condition
- is lined with wooded land to the south and abuts an I-495 ramp to the north
- is under the jurisdiction of the Town

Beacon Street:

- is an east-west collector street
- terminates to the east at Merrimac Street and continues to the west as South Martin Road
- has a curvilinear horizontal alignment and a vertical alignment with some grades
- has a paved width of about 24 ft west of Route 150 Extension and about 26 ft east of Route 150 Extension
- has a paved sidewalk on the north side east of Route 150 Extension

- includes a single-yellow line separating traffic directions and, east of Route 150 Extension, single-white edge lines
- has pavement in good condition
- is lined with utility poles on the north side of the road, some with luminaires
- is lined with some residential development and a commercial use
- is under the jurisdiction of the Town

ROUTE 150 EXTENSION/SUMMIT AVENUE INTERSECTION

The intersection has:

- a T configuration
- Route 150 Extension as the major north-south street and Summit Avenue as the minor east leg
- minor grades on the legs
- one lane on all approaches and departures, with paved shoulder areas on Route 150 Extension
- no channelization
- no STOP sign on the Summit Avenue eastbound approach, where traffic does stop
- has pavement markings on the Route 150 Extension north and south legs that consist of a double-yellow line separating the approach and departure
- has no pavement markings on the Summit Avenue east leg
- a landfill closure site to the west, the I-495/MA 150 interchange to the north and wooded land to the southeast

BEACON STREET/ROUTE 150 EXTENSION INTERSECTION

The intersection has:

- a T configuration
- Beacon Street as the major east-west street and Route 150 Extension as the minor north leg
- minor grades on three legs, with the Beacon Street westbound approach on an upgrade
- one lane on all approaches and departures and a sidewalk on the north side of the Beacon Street east leg

- no channelization
- a yellow flasher for the Beacon Street approaches and a red flasher and STOP-sign control for the Route 150 Extension southbound approach
- has pavement markings on the Route 150 Extension north leg that consist of a double-yellow line separating the approach and departure, white edge lines and a white stop line on the approach
- has pavement markings on the Beacon Street east leg that consist of a single-yellow line separating the approach and departure and white edge lines
- has pavement markings on the Beacon Street west leg that consist of a single-yellow line separating the approach and departure
- residential development, with a commercial use and wooded land nearby

TRAFFIC VOLUMES

TRAFFIC COUNTS

TEPP LLC obtained automatic traffic recorder counts (ATRs) on Tuesday and Wednesday, March 9 and 10, 2010, on:

- Route 150 Extension south of Summit Avenue
- Summit Avenue east of Route 150 Extension
- Beacon Street east of Route 150 Extension

TEPP LLC obtained turning movement counts (TMCs) on Tuesday, March 9, 2010, at the following intersections:

- Route 150 Extension/Summit Avenue
- Beacon Street/Route 150 Extension

The traffic count data are in Appendix B.

MONTHLY ADJUSTMENT

The Massachusetts Department of Transportation (MassDOT) Highway Division reports monthly traffic-volume variations¹ in Appendix C. The March 2010 traffic counts would be multiplied by the following factors to reflect average-month conditions:

¹ MassDOT Highway Division, *2007 Weekday Seasonal Factors*.

- for urban arterials, collectors and rural arterials, 0.97
- for recreational locations in or on the Town of Plymouth, Cape Cod, Martha’s Vineyard and Nantucket, 1.18

Conservatively, TEPP LLC multiplied the March 2010 traffic volumes by 1.18.

EXISTING TRAFFIC VOLUMES

Table 1 and Figures 2 and 3 show 2010 existing weekday peak-hour volumes.

Table 1. Existing weekday traffic volumes.

Location	Daily Vehicles ^a	Peak Hour			
			Vehicles ^a	Percent Direction	Percent of Daily
Route 150 Extension South of Summit Avenue	2,021	AM	193	73 Northbound	10
		PM	201	57 Northbound	10
Summit Avenue East of Route 150 Extension	164	AM	16	69 Westbound	10
		PM	16	75 Eastbound	10
Beacon Street East of Route 150 Extension	2,059	AM	193	72 Westbound	9
		PM	196	58 Westbound	10

^aTotal of both directions.

Table 1 shows that Route 150 Extension:

- carries about 2,000 vehicles per weekday
- carries about 10 percent of the daily volume during each the AM and PM peak hours
- has AM peak hour volumes at 73 percent northbound (to/from I-495)
- has PM peak-hour volumes at 57 percent northbound

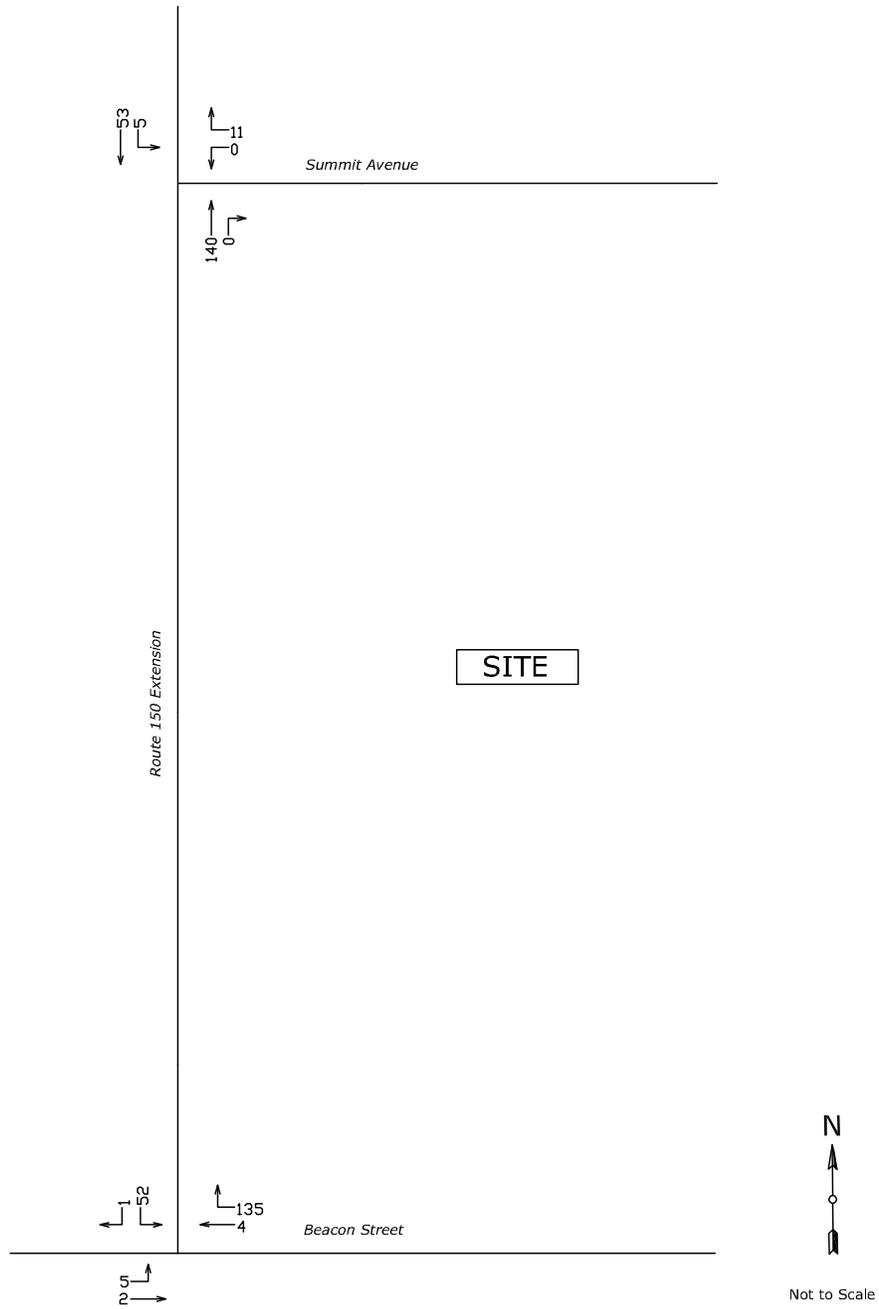


Figure 2. 2010 existing weekday AM peak-hour volumes.

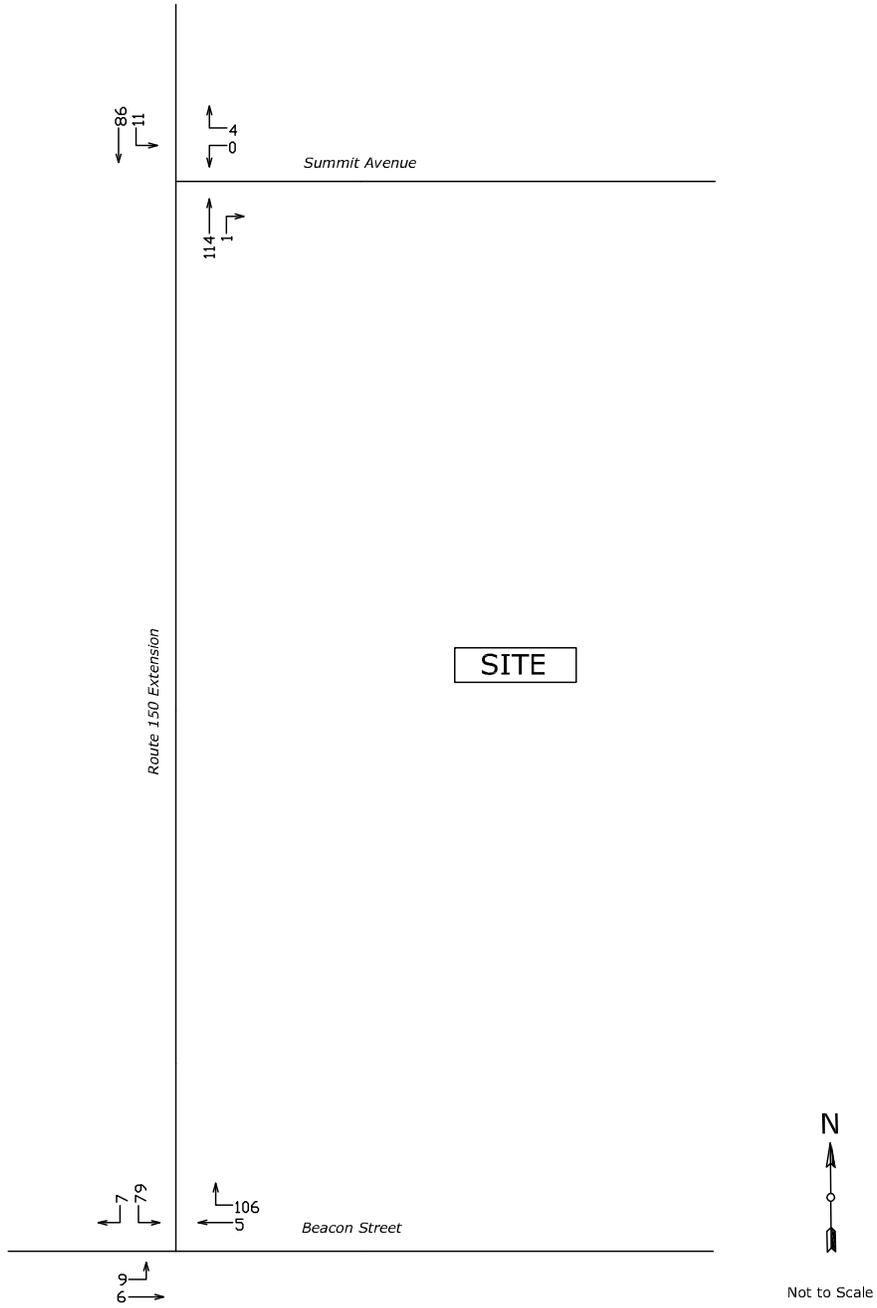


Figure 3. 2010 existing weekday PM peak-hour volumes.

Summit Avenue:

- carries about 160 vehicles per weekday
- carries about 10 percent of the daily volume during each the AM and PM peak hours
- has AM peak hour volumes at 69 percent eastbound
- has PM peak-hour volumes at 75 percent westbound

Beacon Street:

- carries about 2,100 vehicles per weekday
- carries nine to 10 percent of the daily volume during each the AM and PM peak hours
- has AM peak hour volumes at 72 percent westbound (to/from the Route 150 Extension intersection)
- has PM peak-hour volumes at 58 percent westbound

VEHICLE SPEEDS

The ATRs collected vehicle speeds on Tuesday and Wednesday, March 9 and 10, 2010, on:

- Route 150 Extension south of Summit Avenue
- Summit Avenue east of Route 150 Extension
- Beacon Street east of Route 150 Extension

The data are in Appendix D.

Table 2 indicates that for:

- Route 150 Extension, the speed limit is 25 mph (posted) to 40 mph (legal), depending on direction, the mean (or average) speed is 42 to 44 mph and the 85th percentile speed (exceeded by 15 percent of vehicles) is 48 to 51 mph
- Summit Avenue, the speed limit is 40 mph (legal), the mean speed is 34 to 38 mph and the 85th percentile speed is 44 to 45 mph
- Beacon Street, the speed limit is 30 mph (legal), the mean speed is 27 to 29 mph and the 85th percentile speed is 33 to 35 mph

Table 2. Vehicle speeds.

Location and Direction	Speeds (mph) ^a		
	Speed Limit	Mean	85 th Percentile
Route 150 Extension			
Northbound	40 legal	44	51
Southbound	25 posted	42	48
Summit Avenue			
Eastbound	40 legal	34	44
Westbound	40 legal	38	45
Beacon Street			
Eastbound	30 legal	27	33
Westbound	30 legal	29	35

^aFrom ATR survey, March 9 and 10, 2010.

SIGHT DISTANCES

The American Association of State Highway and Transportation Officials (AASHTO) has established the authoritative policy for sight distances at unsignalized intersections. SSD is considered at unsignalized intersections. SSD provides for safety and is fundamental to intersection operation. SSD enables a driver, on the major road, to perceive and react accordingly to a vehicle entering the major road from a minor road. SSD is conservative because it encompasses a wide range of brake-reaction times and deceleration rates.²

TEPP LLC observed/measured relevant available intersection sight distances on April 4, 2010 at the following intersection locations:

- Route 150 Extension/proposed north driveway
- Route 150 Extension/proposed south driveway
- Summit Avenue/proposed driveway
- Beacon Street/proposed driveway

Table 3 shows that:

² AASHTO, *A Policy on Geometric Design of Highways and Streets*, Fifth Edition (Washington, DC, 2004), page 651.

Table 3. Sight distances for intersection locations.

Minor Street	To/From	Available Sight Distance		Major-Street Speeds (mph) ^a		
		Distance (ft)	SSD Provided for (mph)	Speed Limit	Mean	85 th Percentile
Route 150 Extension/ Proposed North Driveway	North	425± ^b	50	25	42	48
	South	615± ^c	51+	40	44	51
Route 150 Extension/ Proposed South Driveway	North	630± ^c	48+	25	42	48
	South	385± ^c	End of Street	40	44	51
Summit Avenue/ Proposed Driveway	West	700+ ^c	44+	40	34	44
	East	400± ^b	45	40 ^c	38	45
Beacon Street/ Proposed Driveway	West	520± ^c	33+	30	27	33
	East	275± ^c	33+	30	29	35

^aAASHTO, pages 110 through 115.

^bWith clearing.

^cWith vegetation maintenance.

- except as noted below, sight lines with maintenance of vegetation provide for 85th percentile speeds or are otherwise appropriate
- at the Route 150 Extension/proposed north driveway intersection, clearing to/from the north will provide for 85th percentile speeds
- at the Summit Avenue/proposed driveway intersection, clearing to/from the east will provide for 85th percentile speeds

ACCIDENTS

The most recent available Massachusetts Department of Transportation (MassDOT) accident data were for the three-year period from 2006 to 2008. The data did not show an accident for the following existing intersections:

- Route 150 Extension/Summit Avenue
- Beacon Street/Route 150 Extension

FUTURE CONDITIONS

INTRODUCTION

Future conditions include:

- planned road improvements independent of the proposed development
- future no-build traffic volumes, with background traffic growth and without the proposed development
- future build traffic volumes, with background traffic growth and with the proposed development

PLANNED ROAD IMPROVEMENTS

No road improvement independent of the proposed development is planned for the study area.

BACKGROUND TRAFFIC GROWTH

Background traffic growth is:

- independent of the proposed development
- related to land development in the immediate area, population and economic development in the region and changes in travel patterns in the region
- generally considers two factors: a general traffic-growth rate and specific planned land developments in the immediate area

TEPP LLC used a one-percent general traffic growth rate. This rate may be conservative (high) given the recent trend to reduced traffic growth.³

TEPP LLC consulted with Town staff regarding specific planned land development in the immediate area. The consultation indicated 80 permitted residential condominium units at Hatters Point on Merrimac Street to the east of the site.

³ The most-recent-available 2006 Mass DOT Traffic Growth Summary shows 0.3 percent annual growth for all Mass DOT Districts and 0.8 percent annual growth for District 4, which includes the Town.

NO-BUILD TRAFFIC VOLUMES

The background traffic growth described above was applied to the 2010 existing traffic volumes. Figures 4 and 5 show the resulting 2015 no-build weekday peak-hour volumes.

SITE TRAFFIC

ITE compiles and publishes trip-generation information for a variety of land uses in *Trip Generation*.⁴ This authoritative guide for estimating site traffic includes residential condominium/townhouse (land use 230) based on dwelling units.⁵

Table 4 presents calculated net changes in trip generation due to the proposed 148-unit development as follows:

- 905 vehicle-trips per weekday (total of in and out)
- 71 vehicle-trips during the weekday AM street peak hour (12 in and 59 out)
- 83 vehicle-trips during the weekday PM street peak hour (56 in and 27 out)

ITE suggests that land developments generating at least 100 peak-hour vehicle trips, in the busier direction, are candidates for consideration of traffic impact analysis.⁶ The calculated peak-hour trip generation of the proposed development falls well below this level.

TRIP DISTRIBUTION AND NETWORK ASSIGNMENT

Trip distribution and network assignment of vehicle trips to and from the site considered such factors as existing travel patterns, population and regional land development.

Table 5 shows estimated trip distribution and network assignment. The percentages consider:

- existing travel patterns
- the proximity of arterial highways such as I-495 and MA 110
- the proximity of Amesbury center

Figures 6 and 7 shows weekday peak-hour site trips.

⁴ ITE, *Trip Generation*, 8th Edition (Washington DC, 2008).

⁵ ITE, *Trip Generation*, 8th Edition, pages 387 through 394.

⁶ ITE, *Manual of Transportation Engineering Studies* (Prentice Hall: Englewood Cliffs, New Jersey, 2000), page 144.

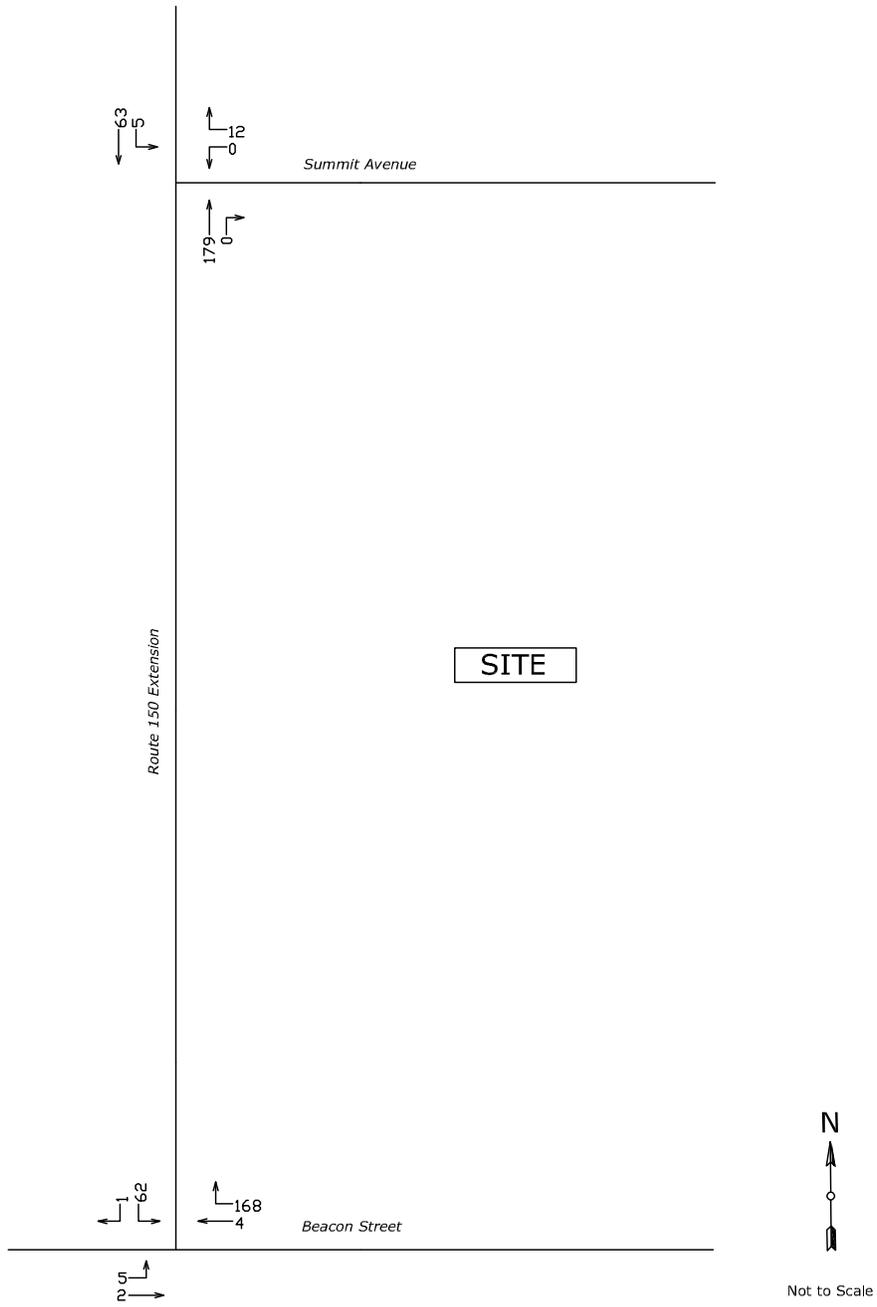


Figure 4. 2015 no-build weekday AM peak-hour volumes.

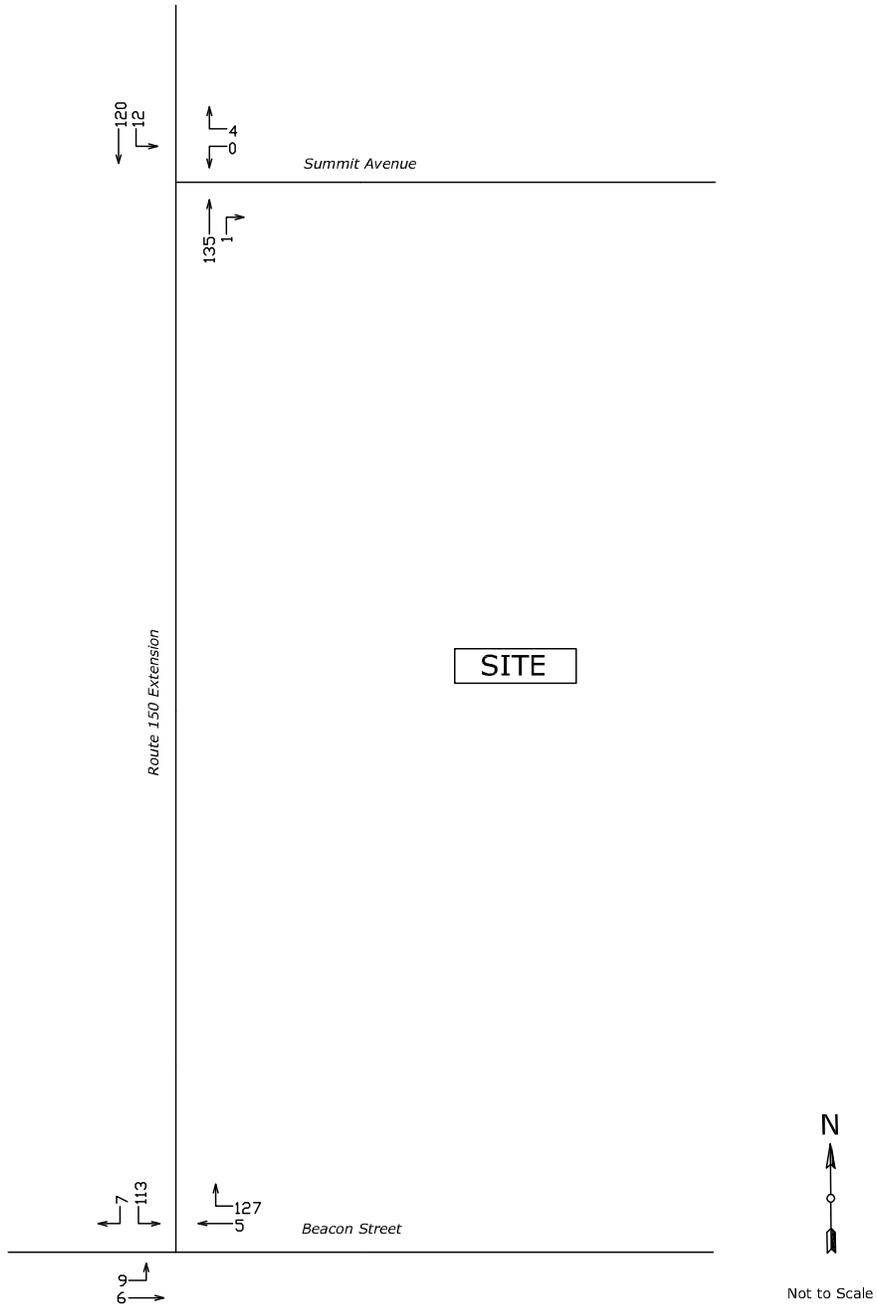


Figure 5. 2015 no-build weekday PM peak-hour volumes.

Table 4. Weekday trip generation.

Period	Calculated Vehicle-Trips ^a
Daily	905
AM Street Peak Hour	
In	12
<u>Out</u>	<u>59</u>
Total	71
PM Street Peak Hour	
Enter	56
<u>Exit</u>	<u>27</u>
Total	83

^aBased on ITE, *Trip Generation*, 8th Edition, land use 230, residential condominium/townhouse, 148 dwelling units.

Table 5. Trip distribution/assignment.

Street and Direction	Percent
Route 150 Extension to/from North	90
Beacon Street to/from East	10

BUILD TRAFFIC VOLUMES

Site traffic volumes were superimposed on the no-build volumes to estimate the build peak-hour volumes. Figures 8 and 9 shows the resulting 2015 build weekday peak-hour volumes.

TRAFFIC VOLUME CHANGES

Table 6 summarizes estimated peak-hour traffic-volume changes due to the development. For:

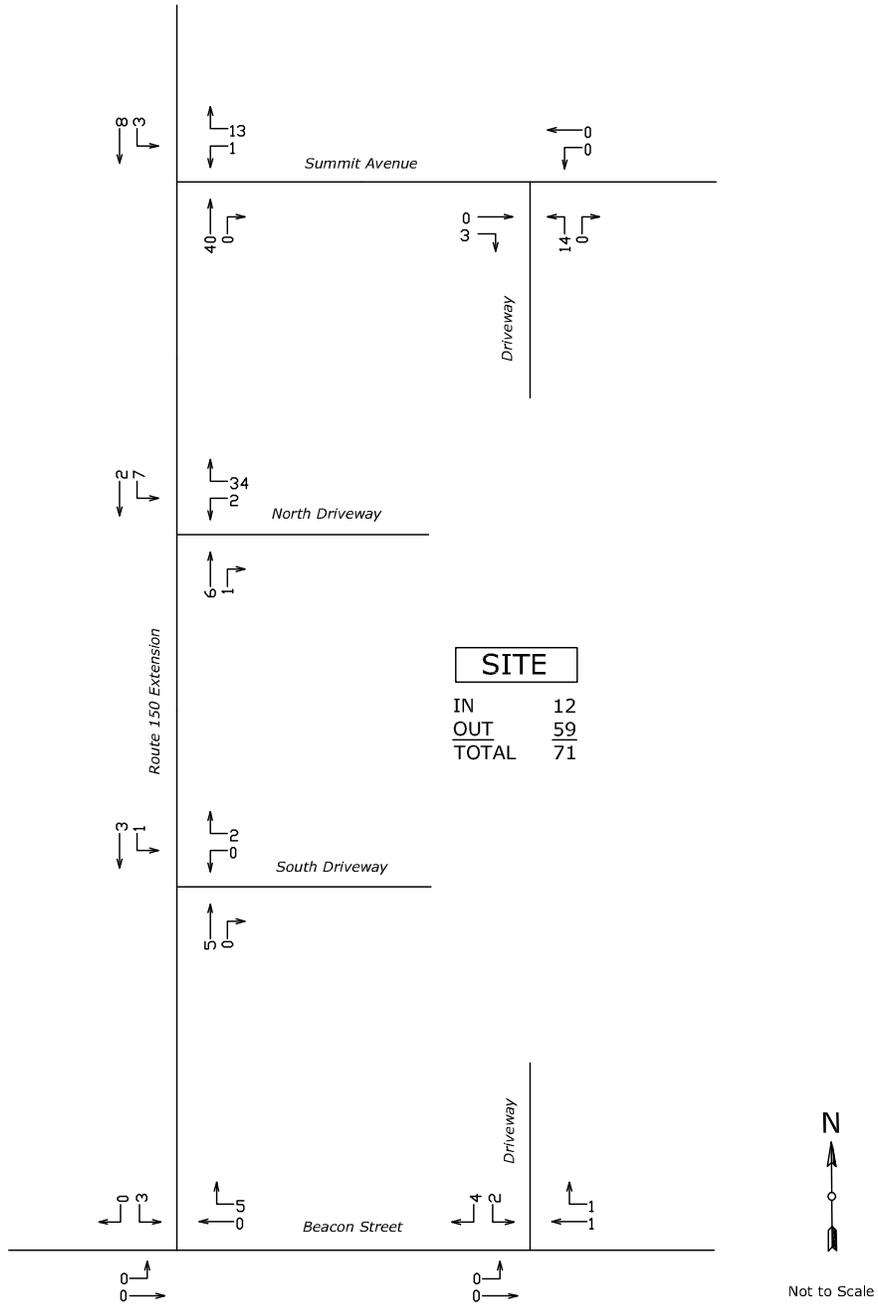


Figure 6. Weekday AM peak-hour site trips.

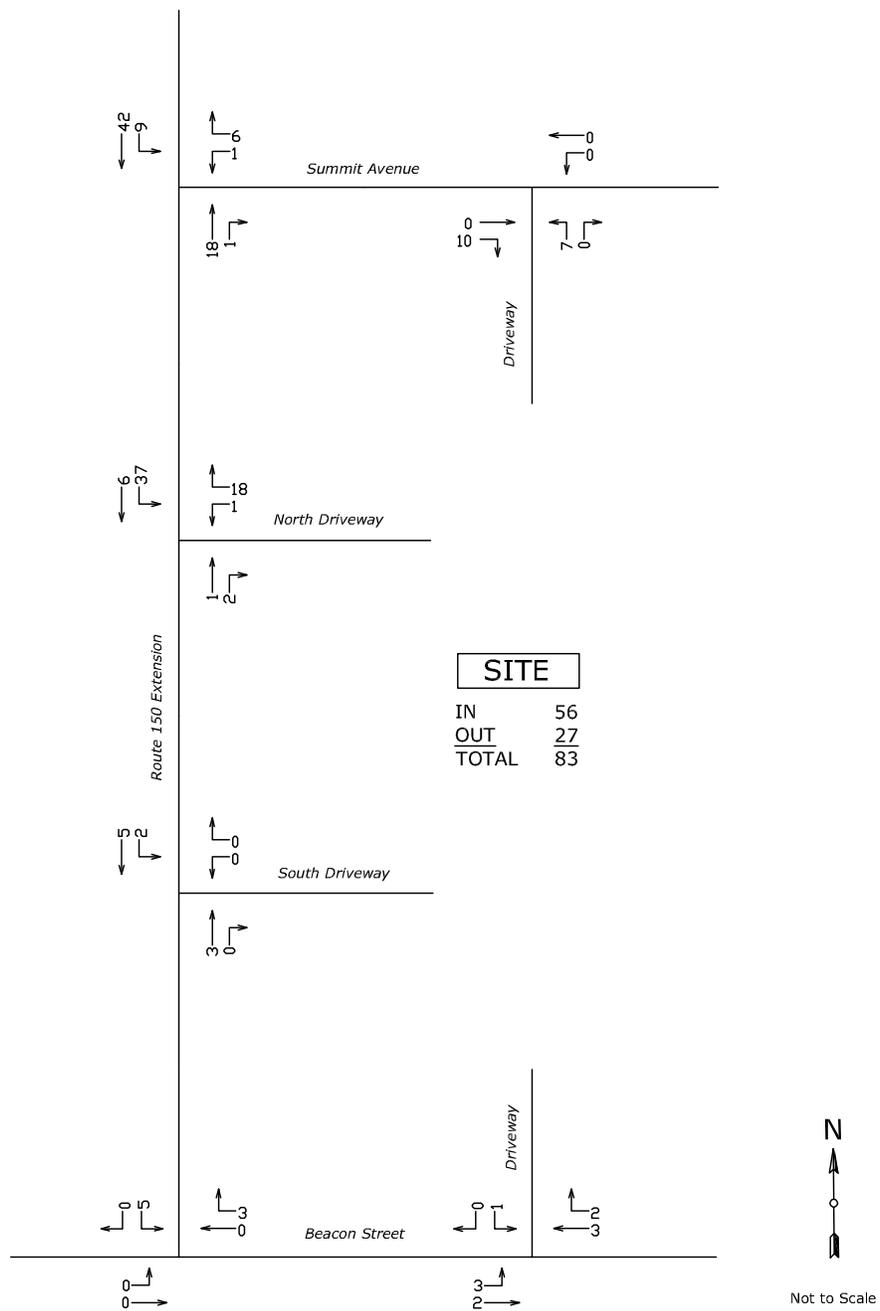


Figure 7. Weekday PM peak hour site trips.

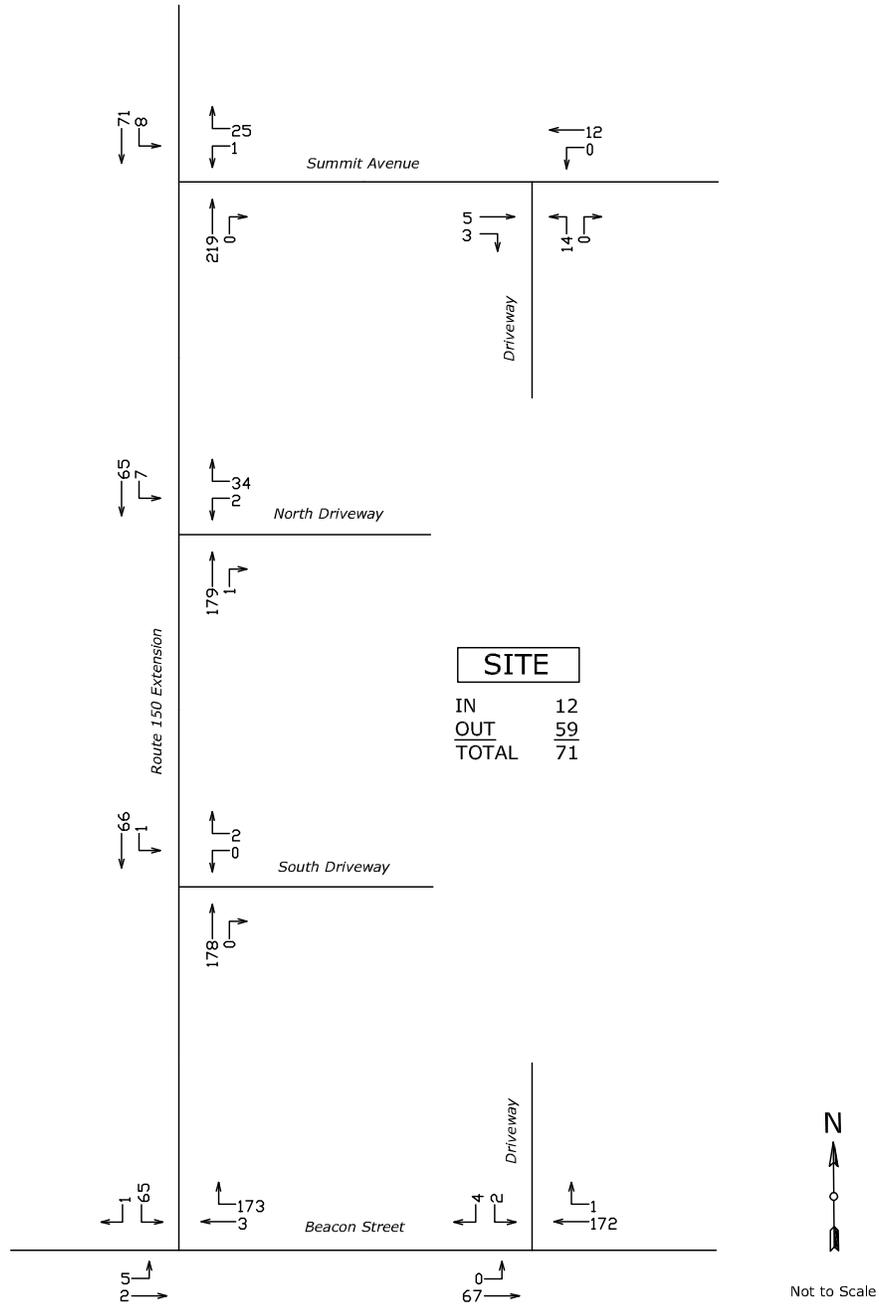


Figure 8. 2015 build weekday AM peak-hour volumes.

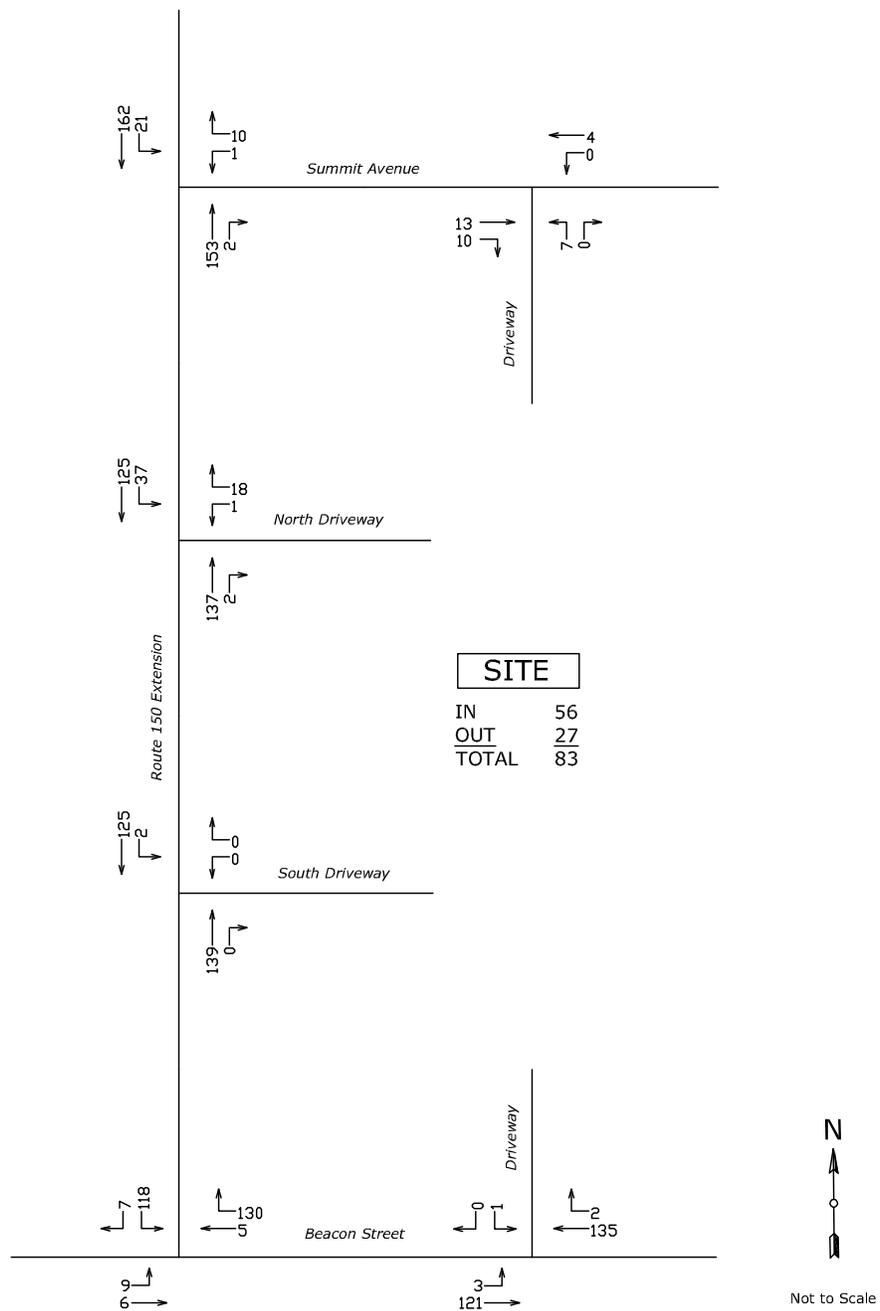


Figure 9. 2015 build weekday PM peak-hour volumes.

Table 6. Traffic-volume changes.

Location and Peak Hour	2015 No-Build ^a	2015 Build	Change
Route 150 Extension North of Summit Avenue			
Weekday AM	259	323	64
Weekday PM	271	346	75
Route 150 Extension South of Summit Avenue			
Weekday AM	242	291	42
Weekday PM	256	318	62
Summit Avenue East of Route 150 Extension			
Weekday AM	17	34	17
Weekday PM	17	34	17
Beacon Street East of Route 150 Extension			
Weekday AM	235	243	8
Weekday PM	251	259	8

^aTwo-way volumes in vehicles per hour.

- Route 150 Extension north of Summit Avenue, the increase is 64 to 75 vehicles per hour
- Route 150 Extension south of Summit Avenue, the increase is 42 to 62 vehicles per hour
- Summit Avenue east of Route 150 Extension, the increase is about 17 vehicles per hour
- Beacon Street east of Route 150 Extension, the increase is about eight vehicles per hour
- locations not tabulated, lesser or no increases

The above increases are not significant in terms of traffic safety or operations.

CAPACITY ANALYSIS

INTRODUCTION

This TIAS has *quantified* existing, future-no-build and future-build traffic volumes. Capacity analysis models the *quality* of traffic operations. Comparing build conditions to the no-build conditions indicates impacts of the development on quality of traffic operations.

METHODS

Capacity analysis estimates levels of service (LOS) for transportation facilities. LOS indicates the quality of traffic operations based on delay and other measures. The six LOS are designated A to F. LOS A represents the best or highest operating conditions. LOS F is the lowest, but does not necessarily connote failure

LOS is a function of traffic volumes. Because these volumes can vary, LOS of a transportation facility can differ by time of day, day of the week, or month. For example, a transportation facility with a low LOS during peak hours may have a high LOS during other hours.

The operational analysis methods of the Transportation Research Board (TRB)⁷ models LOS for intersections based on calculated delay per vehicle, as shown in Table 7. Synchro 7 analysis software is utilized.

Table 7. Level-of-service criteria for intersections.

Level of Service	Average Delay at Signalized Intersections (seconds/vehicle)	Average Delay at Unsignalized Intersections (seconds/vehicle)
A	≤ 10.0	≤ 10.0
B	>10.0 and ≤ 20.0	>10.0 and ≤ 15.0
C	>20.0 and ≤ 35.0	>15.0 and ≤ 25.0
D	>35.0 and ≤ 55.0	>25.0 and ≤ 35.0
E	>55.0 and ≤ 80.0	>35.0 and ≤ 50.0
F	>80	>50

From Transportation Research Board, *Highway Capacity Manual 2000* (Washington, D.C., 2000), pages 16-2 and 17-2.

⁷ TRB, *Highway Capacity Manual 2000* (Washington, D.C., 2000), Chapter 16.

Method inputs include:

- intersection geometry
- traffic control, such as YIELD sign, two-way STOP sign, all-way STOP sign or signal (including phasing, timing and progression)
- traffic volumes
- vehicle composition, such as passenger cars and trucks

The methods are all approximate. In particular, the method for two-way STOP-sign control can be conservative, with observed delays and queuing shorter than those modeled.

RESULTS

Tables 8 and 9 present results for the existing study-area intersections for weekday peak hours under 2010 existing, 2015 no-build and 2015 build conditions. The tables show computed LOS, delays and queues. Capacity analysis worksheets that give background and explanation are in Appendix E.

Findings are that the:

- Route 150 Extension /Summit Avenue intersection has low calculated delays for all conditions
- Beacon Street/Route 150 Extension intersection has low calculated delays for all conditions
- Route 150 Extension/proposed north driveway intersection has low calculated delays for all conditions
- Route 150 Extension/proposed south driveway intersection has low calculated delays for all conditions
- Summit Avenue/proposed driveway intersection has low calculated delays for all conditions
- Beacon Street/proposed driveway intersection has low calculated delays for all conditions

Table 8. Intersection capacity analysis summary for AM peak hour.

Intersection and Movement	LOS ^a /Delay ^b /Queue ^c		
	2010 Existing	2015 No Build	2015 Build
Route 150 Extension/Summit Avenue Unsignalized Intersection			
Route 150 Extension SB L	A/1/0	A/1/1	A/1/1
Summit Avenue WB LR	A/9/2	A/2/2	A/10/5
Beacon Street/Route 150 Extension Unsignalized Intersection			
Beacon Street EB L	A/5/1	A/6/1	A/6/1
Route 150 Extension SB LR	A/9/6	A/10/8	A/10/9
Route 150 Extension/Proposed North Driveway Unsignalized Intersection			
Route 150 Extension SB L	- ^d	-	A/1/1
Proposed North Driveway WB LR	-	-	A/10/4
Route 150 Extension/Proposed South Driveway Unsignalized Intersection			
Route 150 Extension SB L	-	-	A/0/0
Proposed South Driveway WB LR	-	-	A/9/0
Summit Avenue/Proposed Driveway Unsignalized Intersection			
Summit Avenue WB L	-	-	A/0/0
Proposed Driveway NB LR	-	-	A/9/2
Beacon Street/Proposed Driveway Unsignalized Intersection			
Beacon Street EB L	-	-	A/0/0
Proposed Driveway SB LR	-	-	A/10/1

^aLevel of service.

^bAverage delay in seconds per vehicle.

^c95th percentile queue in ft.

^d - = not calculated or not applicable.

EB = eastbound, WB = westbound, SB = southbound, NB = northbound, L = left, T = through, R = right.

Table 9. Intersection capacity analysis summary for PM peak hour.

Intersection and Movement	LOS ^a /Delay ^b /Queue ^c		
	2010 Existing	2015 No Build	2015 Build
Route 150 Extension/Summit Avenue Unsignalized Intersection			
Route 150 Extension SB L	A/1/1	A/1/1	A/1/1
Summit Avenue WB LR	A/9/1	A/9/1	A/10/3
Beacon Street/Route 150 Extension Unsignalized Intersection			
Beacon Street EB L	A/5/1	A/5/1	A/5/1
Route 150 Extension SB LR	A/10/13	B/10/21	B/10/22
Route 150 Extension/Proposed North Driveway Unsignalized Intersection			
Route 150 Extension SB L	- ^d	-	A/2/2
Proposed North Driveway WB LR	-	-	A/9/2
Route 150 Extension/Proposed South Driveway Unsignalized Intersection			
Route 150 Extension SB L	-	-	A/0/0
Proposed South Driveway WB LR	-	-	A/0/0
Summit Avenue/Proposed Driveway Unsignalized Intersection			
Summit Avenue WB L	-	-	A/0/0
Proposed Driveway NB LR	-	-	A/0/1
Beacon Street/Proposed Driveway Unsignalized Intersection			
Beacon Street EB L	-	-	A/0/0
Proposed Driveway SB LR	-	-	B/11/0

^aLevel of service.

^bAverage delay in seconds per vehicle.

^c95th percentile queue in ft.

^d - = not calculated or not applicable.

EB = eastbound, WB = westbound, SB = southbound, NB = northbound, L = left, T = through, R = right.

CONCLUSIONS

TEPP LLC observed/measured relevant available intersection sight distances on April 4, 2010 at the following intersection locations:

- Route 150 Extension/proposed north driveway
- Route 150 Extension/proposed south driveway
- Summit Avenue/proposed driveway
- Beacon Street/proposed driveway

Sight-distance findings are:

- except as noted below, sight lines with maintenance of vegetation provide for 85th percentile speeds or are otherwise appropriate
- at the Route 150 Extension/proposed north driveway intersection, clearing to/from the north will provide for 85th percentile speeds
- at the Summit Avenue/proposed driveway intersection, clearing to/from the east will provide for 85th percentile speeds

ITE suggests that land developments generating at least 100 peak-hour vehicle trips, in the busier direction, are candidates for consideration of traffic impact analysis. The calculated peak-hour trip generation of the proposed development falls well below this level. Traffic-volume increases on Route 150 Extension, Summit Avenue and Beacon Street will not be significant in terms of operations and safety.

Capacity analysis was for the weekday AM and PM peak hours under 2010 existing, 2015 no-build and 2015 build conditions. The six analyzed intersections have low calculated delays for all conditions.

TEPP LLC finds that:

- the site-driveway intersections with off-site streets will provide adequate sight distances
- the proposed development will have no significant impact on overall area traffic safety or operations

APPENDIX

Appendix A: Site Plan

Appendix B: Traffic Counts

Accurate Counts

978-664-2565

Location : Route 150 South of
 Location : Summit Avenue
 City/State: Amesbury, MA
 Counter : 13866

Site Code: 11170001
 111700V1

Start Time	08-Mar-10		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	*	*	1	1	1	7	*	*	*	*	*	*	*	*	1	4
01:00	*	*	1	4	0	0	*	*	*	*	*	*	*	*	0	2
02:00	*	*	0	1	0	0	*	*	*	*	*	*	*	*	0	0
03:00	*	*	0	0	0	0	*	*	*	*	*	*	*	*	0	0
04:00	*	*	1	3	3	6	*	*	*	*	*	*	*	*	2	4
05:00	*	*	15	4	13	5	*	*	*	*	*	*	*	*	14	4
06:00	*	*	61	12	72	24	*	*	*	*	*	*	*	*	66	18
07:00	*	*	110	42	104	43	*	*	*	*	*	*	*	*	107	42
08:00	*	*	92	60	90	44	*	*	*	*	*	*	*	*	91	52
09:00	*	*	56	29	58	23	*	*	*	*	*	*	*	*	57	26
10:00	*	*	48	30	44	33	*	*	*	*	*	*	*	*	46	32
11:00	*	*	37	32	40	40	*	*	*	*	*	*	*	*	38	36
12:00 PM	*	*	50	65	71	50	*	*	*	*	*	*	*	*	60	58
01:00	*	*	52	57	47	45	*	*	*	*	*	*	*	*	50	51
02:00	*	*	56	54	47	62	*	*	*	*	*	*	*	*	52	58
03:00	*	*	67	73	71	74	*	*	*	*	*	*	*	*	69	74
04:00	*	*	77	68	64	67	*	*	*	*	*	*	*	*	70	68
05:00	*	*	73	89	88	84	*	*	*	*	*	*	*	*	80	86
06:00	*	*	59	50	46	67	*	*	*	*	*	*	*	*	52	58
07:00	*	*	35	38	37	33	*	*	*	*	*	*	*	*	36	36
08:00	*	*	17	26	17	27	*	*	*	*	*	*	*	*	17	26
09:00	*	*	18	16	12	30	*	*	*	*	*	*	*	*	15	23
10:00	*	*	8	7	8	17	*	*	*	*	*	*	*	*	8	12
11:00	*	*	4	8	8	4	*	*	*	*	*	*	*	*	6	6
Lane	0	0	938	769	941	785	0	0	0	0	0	0	0	0	937	776
Day	0	0	1707		1726		0	0	0	0	0	0	0	0	1713	
AM Peak			07:00	08:00	07:00	08:00									07:00	08:00
Vol.			110	60	104	44									107	52
PM Peak			16:00	17:00	17:00	17:00									17:00	17:00
Vol.			77	89	88	84									80	86

Comb. Total	0	1707	1726	0	0	0	0	1713
ADT	ADT 1,716	AADT 1,716						

Accurate Counts

978-664-2565

Location : Summit Avenue East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 18141

Site Code: 11170002
 111700V2

Start Time	08-Mar-10		Tue		Wed		Thu		Fri		Sat		Sun		Week Average			
	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB		
12:00 AM	*	*	0	0	0	1	*	*	*	*	*	*	*	*	0	0		
01:00	*	*	0	0	0	0	*	*	*	*	*	*	*	*	0	0		
02:00	*	*	0	0	0	0	*	*	*	*	*	*	*	*	0	0		
03:00	*	*	0	1	0	0	*	*	*	*	*	*	*	*	0	0		
04:00	*	*	1	0	1	0	*	*	*	*	*	*	*	*	1	0		
05:00	*	*	3	2	0	1	*	*	*	*	*	*	*	*	2	2		
06:00	*	*	6	1	10	6	*	*	*	*	*	*	*	8	4			
07:00	*	*	6	4	7	5	*	*	*	*	*	*	*	6	4			
08:00	*	*	7	2	7	4	*	*	*	*	*	*	*	7	3			
09:00	*	*	0	1	1	1	*	*	*	*	*	*	*	0	1			
10:00	*	*	2	4	2	0	*	*	*	*	*	*	*	2	2			
11:00	*	*	4	3	5	6	*	*	*	*	*	*	*	4	4			
12:00 PM	*	*	1	4	1	3	*	*	*	*	*	*	*	1	4			
01:00	*	*	1	4	4	5	*	*	*	*	*	*	*	2	4			
02:00	*	*	2	3	2	7	*	*	*	*	*	*	*	2	5			
03:00	*	*	4	11	10	9	*	*	*	*	*	*	*	7	10			
04:00	*	*	6	4	5	9	*	*	*	*	*	*	*	6	6			
05:00	*	*	4	3	2	6	*	*	*	*	*	*	*	3	4			
06:00	*	*	1	11	4	9	*	*	*	*	*	*	*	2	10			
07:00	*	*	5	6	1	4	*	*	*	*	*	*	*	3	5			
08:00	*	*	0	4	2	3	*	*	*	*	*	*	*	1	4			
09:00	*	*	2	2	2	5	*	*	*	*	*	*	*	2	4			
10:00	*	*	4	1	1	3	*	*	*	*	*	*	*	2	2			
11:00	*	*	0	0	0	1	*	*	*	*	*	*	*	0	0			
Lane	0	0	59	71	67	88	0	0	0	0	0	0	0	0	61	78		
Day	0		130		155		0		0		0		0		139			
AM Peak			08:00	07:00	06:00	06:00											06:00	06:00
Vol.			7	4	10	6											8	4
PM Peak			16:00	15:00	15:00	15:00											15:00	15:00
Vol.			6	11	10	9											7	10

Comb. Total	0	130	155	0	0	0	0	139
ADT	ADT 142		AADT 142					

Accurate Counts 978-664-2565

Location : Beacon Street East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 14014

Site Code: 11170003
 111700V3

Start Time	08-Mar-10		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	1	1	6	1	*	*	*	*	*	*	*	*	4	1
01:00	*	*	3	1	0	0	*	*	*	*	*	*	*	*	2	0
02:00	*	*	0	0	0	0	*	*	*	*	*	*	*	*	0	0
03:00	*	*	0	0	0	0	*	*	*	*	*	*	*	*	0	0
04:00	*	*	4	2	4	4	*	*	*	*	*	*	*	*	4	3
05:00	*	*	5	11	6	11	*	*	*	*	*	*	*	*	6	11
06:00	*	*	17	59	28	70	*	*	*	*	*	*	*	*	22	64
07:00	*	*	37	110	42	105	*	*	*	*	*	*	*	*	40	108
08:00	*	*	66	103	43	92	*	*	*	*	*	*	*	*	54	98
09:00	*	*	30	60	27	59	*	*	*	*	*	*	*	*	28	60
10:00	*	*	25	46	33	48	*	*	*	*	*	*	*	*	29	47
11:00	*	*	28	33	37	43	*	*	*	*	*	*	*	*	32	38
12:00 PM	*	*	59	52	51	72	*	*	*	*	*	*	*	*	55	62
01:00	*	*	59	60	45	53	*	*	*	*	*	*	*	*	52	56
02:00	*	*	53	67	61	59	*	*	*	*	*	*	*	*	57	63
03:00	*	*	73	71	66	75	*	*	*	*	*	*	*	*	70	73
04:00	*	*	65	79	69	70	*	*	*	*	*	*	*	*	67	74
05:00	*	*	83	77	77	88	*	*	*	*	*	*	*	*	80	82
06:00	*	*	46	64	60	52	*	*	*	*	*	*	*	*	53	58
07:00	*	*	34	38	35	44	*	*	*	*	*	*	*	*	34	41
08:00	*	*	26	18	26	19	*	*	*	*	*	*	*	*	26	18
09:00	*	*	15	26	27	9	*	*	*	*	*	*	*	*	21	18
10:00	*	*	7	11	13	8	*	*	*	*	*	*	*	*	10	10
11:00	*	*	7	6	5	9	*	*	*	*	*	*	*	*	6	8
Lane	0	0	743	995	761	991	0	0	0	0	0	0	0	0	752	993
Day	0	0	1738		1752		0	0	0	0	0	0	0	0	1745	
AM Peak			08:00	07:00	08:00	07:00									08:00	07:00
Vol.			66	110	43	105									54	108
PM Peak			17:00	16:00	17:00	17:00									17:00	17:00
Vol.			83	79	77	88									80	82

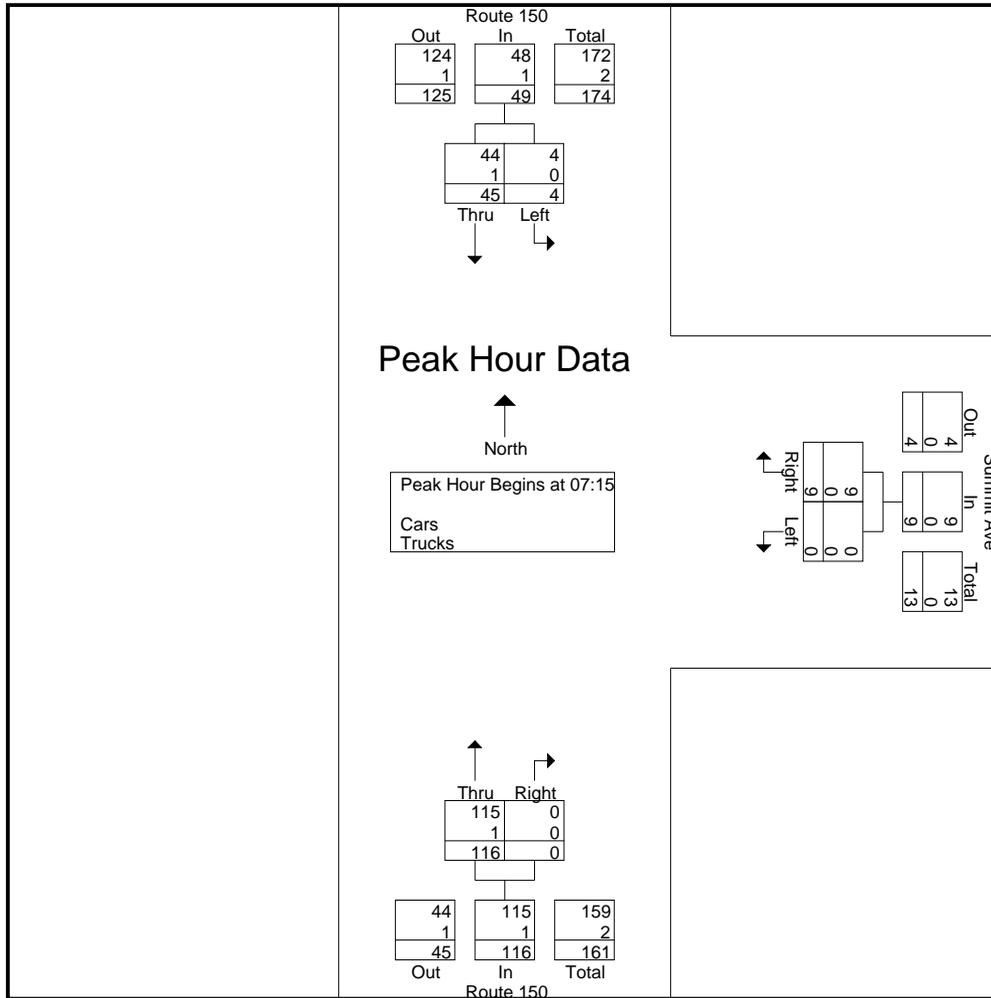
Comb. Total	0	1738	1752	0	0	0	0	1745
ADT	ADT 1,745	AADT 1,745						

N/S Street : Route 150
E/W Street: Summit Avenue
City/State : Amesbury, MA
Weather : Clear

Groups Printed- Cars - Trucks

Start Time	Route 150 From North			Summit Ave From East			Route 150 From South			Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds			
07:00	2	11	0	0	0	0	15	0	0	0	28	28
07:15	0	6	0	0	4	0	34	0	0	0	44	44
07:30	1	15	0	0	1	0	21	0	0	0	38	38
07:45	2	13	1	0	2	0	30	0	0	1	47	48
Total	5	45	1	0	7	0	100	0	0	1	157	158
08:00	1	11	0	0	2	0	31	0	0	0	45	45
08:15	1	8	0	0	1	0	20	0	0	0	30	30
08:30	0	9	0	0	1	0	15	0	0	0	25	25
08:45	0	12	0	0	3	0	25	0	0	0	40	40
Total	2	40	0	0	7	0	91	0	0	0	140	140
Grand Total	7	85	1	0	14	0	191	0	0	1	297	298
Apprch %	7.6	92.4		0	100		100	0				
Total %	2.4	28.6		0	4.7		64.3	0		0.3	99.7	
Cars	7	84		0	14		190	0		0	0	296
% Cars	100	98.8	100	0	100	0	99.5	0	0	0	0	99.3
Trucks	0	1		0	0		1	0		0	0	2
% Trucks	0	1.2	0	0	0	0	0.5	0	0	0	0	0.7

Start Time	Route 150 From North			Summit Ave From East			Route 150 From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15										
07:15	0	6	6	0	4	4	34	0	34	44
07:30	1	15	16	0	1	1	21	0	21	38
07:45	2	13	15	0	2	2	30	0	30	47
08:00	1	11	12	0	2	2	31	0	31	45
Total Volume	4	45	49	0	9	9	116	0	116	174
% App. Total	8.2	91.8		0	100		100	0		
PHF	.500	.750	.766	.000	.563	.563	.853	.000	.853	.926
Cars	4	44	48	0	9	9	115	0	115	172
% Cars	100	97.8	98.0	0	100	100	99.1	0	99.1	98.9
Trucks	0	1	1	0	0	0	1	0	1	2
% Trucks	0	2.2	2.0	0	0	0	0.9	0	0.9	1.1



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

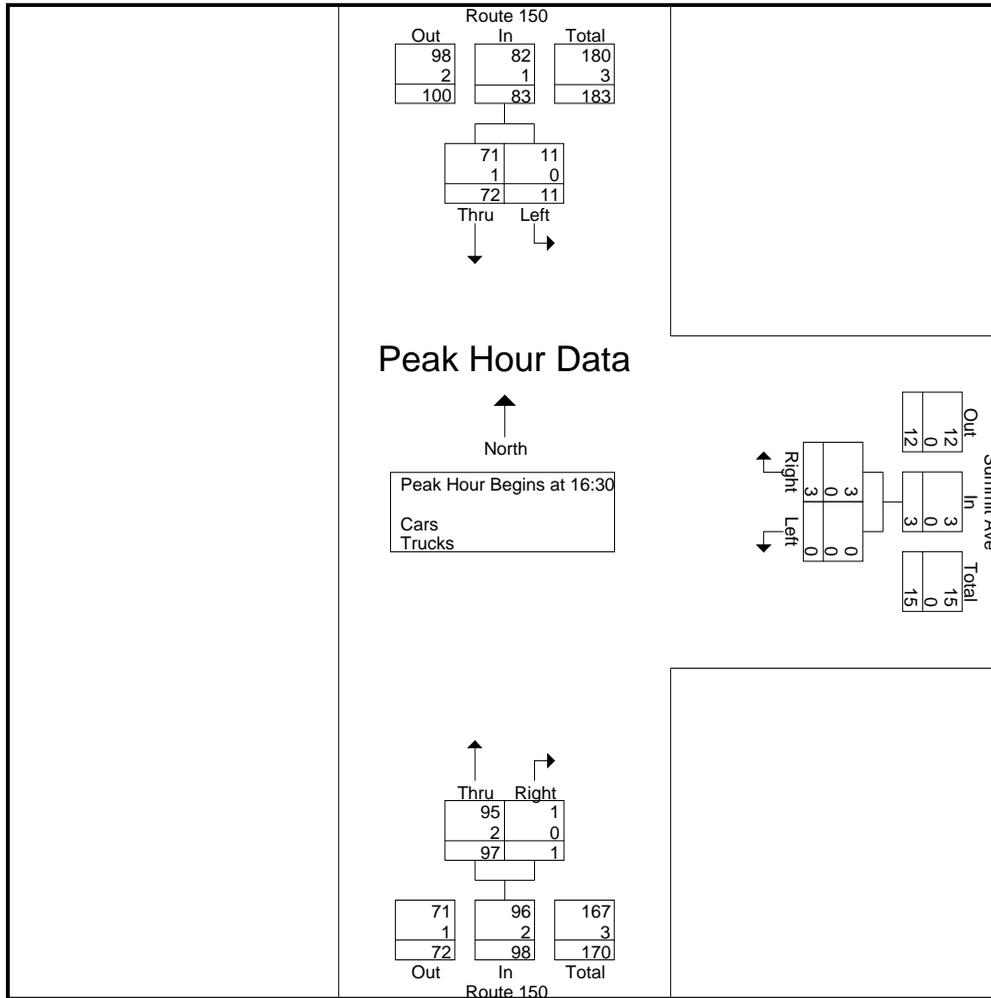
	07:30			07:15			07:15		
+0 mins.	1	15	16	0	4	4	34	0	34
+15 mins.	2	13	15	0	1	1	21	0	21
+30 mins.	1	11	12	0	2	2	30	0	30
+45 mins.	1	8	9	0	2	2	31	0	31
Total Volume	5	47	52	0	9	9	116	0	116
% App. Total	9.6	90.4		0	100		100	0	
PHF	.625	.783	.813	.000	.563	.563	.853	.000	.853
Cars	5	47	52	0	9	9	115	0	115
% Cars	100	100	100	0	100	100	99.1	0	99.1
Trucks	0	0	0	0	0	0	1	0	1
% Trucks	0	0	0	0	0	0	0.9	0	0.9

N/S Street : Route 150
E/W Street: Summit Avenue
City/State : Amesbury, MA
Weather : Clear

Groups Printed- Cars - Trucks

Start Time	Route 150 From North			Summit Ave From East			Route 150 From South			Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Peds	Left	Right	Peds	Thru	Right	Peds			
16:00	0	14	0	0	1	0	15	0	0	0	30	30
16:15	1	24	0	0	1	0	16	0	0	0	42	42
16:30	3	19	0	0	0	0	22	0	0	0	44	44
16:45	3	13	0	0	2	0	19	0	0	0	37	37
Total	7	70	0	0	4	0	72	0	0	0	153	153
17:00	4	17	0	0	1	0	27	0	0	0	49	49
17:15	1	23	0	0	0	0	29	1	0	0	54	54
17:30	0	26	0	0	1	0	15	1	0	0	43	43
17:45	0	19	0	0	1	0	14	0	0	0	34	34
Total	5	85	0	0	3	0	85	2	0	0	180	180
Grand Total	12	155	0	0	7	0	157	2	0	0	333	333
Apprch %	7.2	92.8		0	100		98.7	1.3				
Total %	3.6	46.5		0	2.1		47.1	0.6			100	
Cars	12	153		0	7		155	2		0	0	329
% Cars	100	98.7	0	0	100	0	98.7	100	0	0	0	98.8
Trucks	0	2		0	0		2	0		0	0	4
% Trucks	0	1.3	0	0	0	0	1.3	0	0	0	0	1.2

Start Time	Route 150 From North			Summit Ave From East			Route 150 From South			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:30										
16:30	3	19	22	0	0	0	22	0	22	44
16:45	3	13	16	0	2	2	19	0	19	37
17:00	4	17	21	0	1	1	27	0	27	49
17:15	1	23	24	0	0	0	29	1	30	54
Total Volume	11	72	83	0	3	3	97	1	98	184
% App. Total	13.3	86.7		0	100		99	1		
PHF	.688	.783	.865	.000	.375	.375	.836	.250	.817	.852
Cars	11	71	82	0	3	3	95	1	96	181
% Cars	100	98.6	98.8	0	100	100	97.9	100	98.0	98.4
Trucks	0	1	1	0	0	0	2	0	2	3
% Trucks	0	1.4	1.2	0	0	0	2.1	0	2.0	1.6



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	17:00			16:00			16:30		
+0 mins.	4	17	21	0	1	1	22	0	22
+15 mins.	1	23	24	0	1	1	19	0	19
+30 mins.	0	26	26	0	0	0	27	0	27
+45 mins.	0	19	19	0	2	2	29	1	30
Total Volume	5	85	90	0	4	4	97	1	98
% App. Total	5.6	94.4		0	100		99	1	
PHF	.313	.817	.865	.000	.500	.500	.836	.250	.817
Cars	5	85	90	0	4	4	95	1	96
% Cars	100	100	100	0	100	100	97.9	100	98
Trucks	0	0	0	0	0	0	2	0	2
% Trucks	0	0	0	0	0	0	2.1	0	2

Accurate Counts
978-664-2565

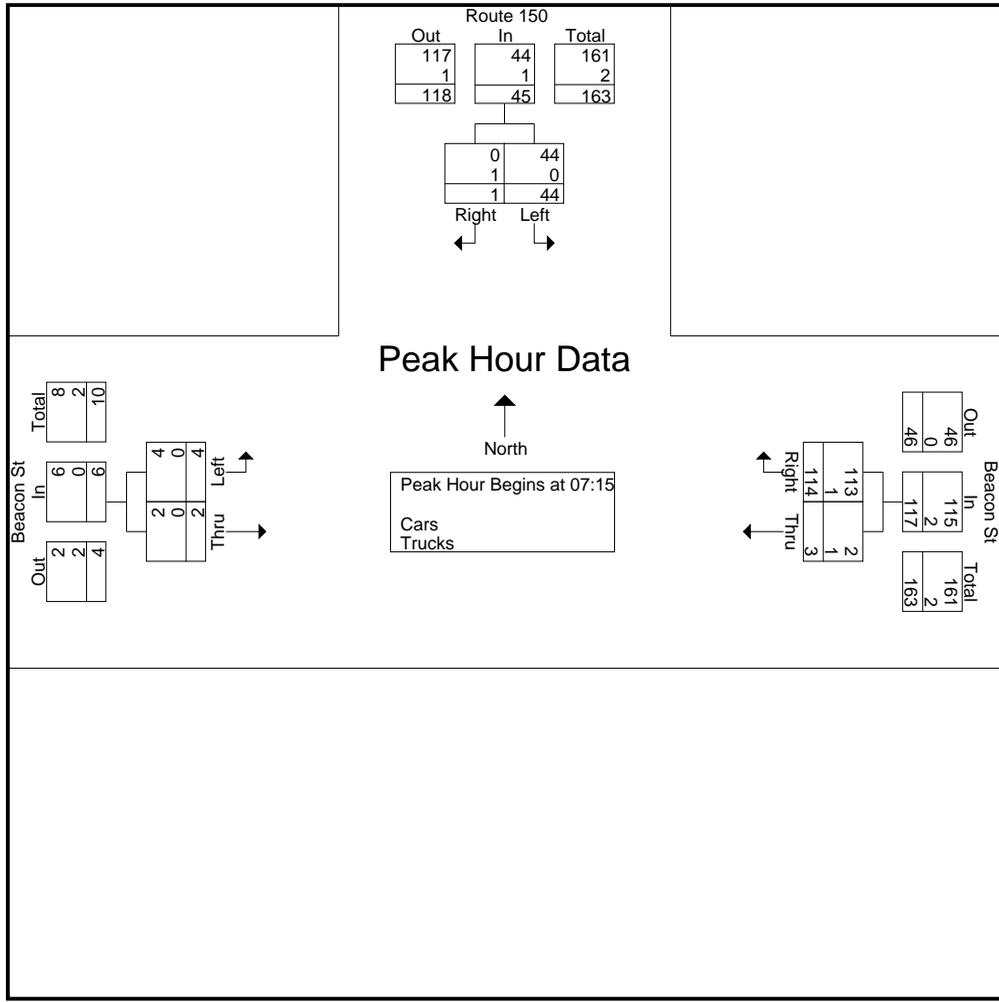
File Name : 11170002
Site Code : 11170002
Start Date : 3/9/2010
Page No : 1

N/S Street : Route 150
E/W Street: Beacon Street
City/State : Amesbury, MA
Weather : Clear

Groups Printed- Cars - Trucks

Start Time	Route 150 From North			Beacon St From East			Beacon St From West			Exclu. Total	Inclu. Total	Int. Total
	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
07:00	9	0	0	0	15	0	0	0	0	0	24	24
07:15	5	1	0	2	34	0	1	1	0	0	44	44
07:30	15	0	0	0	21	0	1	0	0	0	37	37
07:45	13	0	0	0	31	0	0	0	0	0	44	44
Total	42	1	0	2	101	0	2	1	0	0	149	149
08:00	11	0	0	1	28	0	2	1	0	0	43	43
08:15	7	1	0	1	17	0	3	0	0	0	29	29
08:30	10	0	0	0	14	0	0	1	0	0	25	25
08:45	11	1	0	0	25	0	0	1	0	0	38	38
Total	39	2	0	2	84	0	5	3	0	0	135	135
Grand Total	81	3	0	4	185	0	7	4	0	0	284	284
Apprch %	96.4	3.6		2.1	97.9		63.6	36.4				
Total %	28.5	1.1		1.4	65.1		2.5	1.4		0	100	
Cars	81	2		3	184		7	4		0	0	281
% Cars	100	66.7	0	75	99.5	0	100	100	0	0	0	98.9
Trucks	0	1		1	1		0	0		0	0	3
% Trucks	0	33.3	0	25	0.5	0	0	0	0	0	0	1.1

Start Time	Route 150 From North			Beacon St From East			Beacon St From West			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15										
07:15	5	1	6	2	34	36	1	1	2	44
07:30	15	0	15	0	21	21	1	0	1	37
07:45	13	0	13	0	31	31	0	0	0	44
08:00	11	0	11	1	28	29	2	1	3	43
Total Volume	44	1	45	3	114	117	4	2	6	168
% App. Total	97.8	2.2		2.6	97.4		66.7	33.3		
PHF	.733	.250	.750	.375	.838	.813	.500	.500	.500	.955
Cars	44	0	44	2	113	115	4	2	6	165
% Cars	100	0	97.8	66.7	99.1	98.3	100	100	100	98.2
Trucks	0	1	1	1	1	2	0	0	0	3
% Trucks	0	100	2.2	33.3	0.9	1.7	0	0	0	1.8



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

	07:30			07:15			08:00		
+0 mins.	15	0	15	2	34	36	2	1	3
+15 mins.	13	0	13	0	21	21	3	0	3
+30 mins.	11	0	11	0	31	31	0	1	1
+45 mins.	7	1	8	1	28	29	0	1	1
Total Volume	46	1	47	3	114	117	5	3	8
% App. Total	97.9	2.1		2.6	97.4		62.5	37.5	
PHF	.767	.250	.783	.375	.838	.813	.417	.750	.667
Cars	46	1	47	2	113	115	5	3	8
% Cars	100	100	100	66.7	99.1	98.3	100	100	100
Trucks	0	0	0	1	1	2	0	0	0
% Trucks	0	0	0	33.3	0.9	1.7	0	0	0

Accurate Counts
978-664-2565

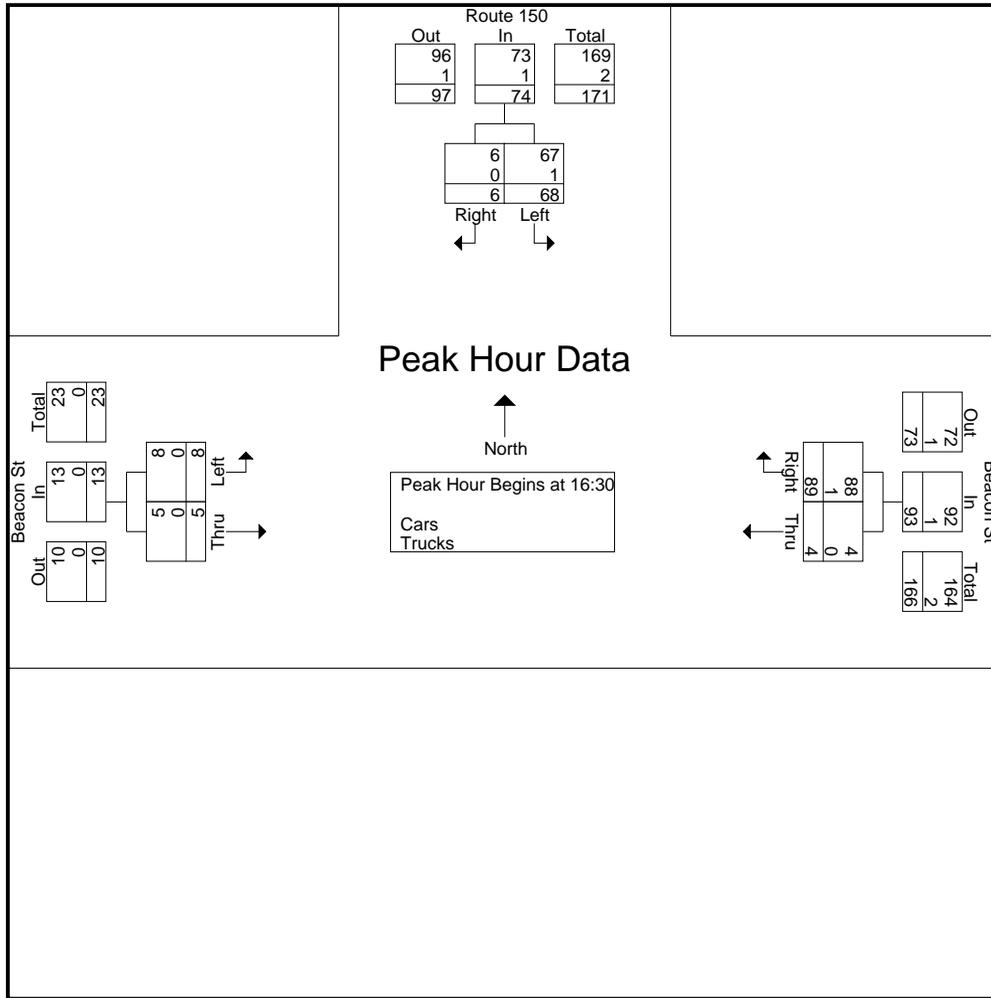
File Name : 11170002
Site Code : 11170002
Start Date : 3/9/2010
Page No : 1

N/S Street : Route 150
E/W Street: Beacon Street
City/State : Amesbury, MA
Weather : Clear

Groups Printed- Cars - Trucks

Start Time	Route 150 From North			Beacon St From East			Beacon St From West			Exclu. Total	Inclu. Total	Int. Total
	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
16:00	14	0	0	2	10	0	2	1	0	0	29	29
16:15	18	1	0	2	16	0	1	1	0	0	39	39
16:30	23	2	0	0	20	0	1	2	0	0	48	48
16:45	7	2	0	1	15	0	2	1	0	0	28	28
Total	62	5	0	5	61	0	6	5	0	0	144	144
17:00	10	1	0	2	22	0	3	2	0	0	40	40
17:15	28	1	0	1	32	0	2	0	0	0	64	64
17:30	24	2	0	1	15	0	1	1	0	0	44	44
17:45	17	2	0	0	11	0	1	0	0	0	31	31
Total	79	6	0	4	80	0	7	3	0	0	179	179
Grand Total	141	11	0	9	141	0	13	8	0	0	323	323
Apprch %	92.8	7.2		6	94		61.9	38.1				
Total %	43.7	3.4		2.8	43.7		4	2.5		0	100	
Cars	139	11		9	140		13	8		0	0	320
% Cars	98.6	100	0	100	99.3	0	100	100	0	0	0	99.1
Trucks	2	0		0	1		0	0		0	0	3
% Trucks	1.4	0	0	0	0.7	0	0	0	0	0	0	0.9

Start Time	Route 150 From North			Beacon St From East			Beacon St From West			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 16:30										
16:30	23	2	25	0	20	20	1	2	3	48
16:45	7	2	9	1	15	16	2	1	3	28
17:00	10	1	11	2	22	24	3	2	5	40
17:15	28	1	29	1	32	33	2	0	2	64
Total Volume	68	6	74	4	89	93	8	5	13	180
% App. Total	91.9	8.1		4.3	95.7		61.5	38.5		
PHF	.607	.750	.638	.500	.695	.705	.667	.625	.650	.703
Cars	67	6	73	4	88	92	8	5	13	178
% Cars	98.5	100	98.6	100	98.9	98.9	100	100	100	98.9
Trucks	1	0	1	0	1	1	0	0	0	2
% Trucks	1.5	0	1.4	0	1.1	1.1	0	0	0	1.1



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	17:00			16:30			16:15		
+0 mins.	10	1	11	0	20	20	1	1	2
+15 mins.	28	1	29	1	15	16	1	2	3
+30 mins.	24	2	26	2	22	24	2	1	3
+45 mins.	17	2	19	1	32	33	3	2	5
Total Volume	79	6	85	4	89	93	7	6	13
% App. Total	92.9	7.1		4.3	95.7		53.8	46.2	
PHF	.705	.750	.733	.500	.695	.705	.583	.750	.650
Cars	79	6	85	4	88	92	7	6	13
% Cars	100	100	100	100	98.9	98.9	100	100	100
Trucks	0	0	0	0	1	1	0	0	0
% Trucks	0	0	0	0	1.1	1.1	0	0	0

Appendix C: Monthly Traffic Variations

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2007 WEEKDAY SEASONAL FACTORS *

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

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP 1 - WEST INTERSTATE	0.95	0.91	0.85	0.85	0.87	0.86	0.91	0.96	0.90	0.88	0.90	0.91
GROUP 2 - RURAL MAJOR COLLECTOR (R-5)	1.11	1.07	1.07	0.98	0.92	0.88	0.88	0.86	0.89	0.93	1.01	1.04
GROUP 3A - RECREATIONAL **(1-4) See below	1.26	1.20	1.18	1.04	0.96	0.86	0.78	0.79	0.93	0.99	1.07	1.12
GROUP 3B - RECREATIONAL *** (5) See below	1.22	1.18	1.20	1.04	0.96	0.88	0.73	0.74	0.99	1.02	1.12	1.17
GROUP 4 - I-495 INTERSTATE	1.05	1.03	1.03	0.95	0.93	0.87	0.86	0.83	0.89	0.93	0.93	0.96
GROUP 5 - EAST INTERSTATE	1.02	0.99	0.97	0.94	0.95	0.91	0.92	0.92	0.94	0.94	0.98	0.99
GROUP 6 - URBAN ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3)	1.03	0.99	0.97	0.92	0.91	0.90	0.92	0.91	0.92	0.93	0.97	0.97
GROUP 7 - I-84 PROXIMITY (STA. 17)	0.84	1.15	1.17	1.08	1.10	1.02	1.01	0.96	1.06	1.06	1.11	1.15
GROUP 8 - I-295 PROXIMITY (STA. 6590)	0.95	1.01	0.96	0.92	0.89	0.88	0.91	0.86	0.91	0.93	0.95	0.92
GROUP 9 - I-195 PROXIMITY (STA. 7)	1.10	1.03	1.00	0.94	0.91	0.87	0.84	0.82	0.88	0.93	1.03	0.99

RECREATIONAL: (ALL YEARS)

****GROUP 3A:**

- 1. CAPE COD (ALL TOWNS)
- 2.PLYMOUTH(SOUTH OF RTE.3A)

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

- 3.MARTHA'S VINEYARD
- 4.NANTUCKET

*****GROUP 3B:**

- 5.PERMANENTS 2 & 189

1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,
1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,
1105,1106,1107,1108,1113,1114,1116,2196,2197,2198

2007 AXLE CORRECTION FACTORS

ROUND OFF

ROAD INVENTORY FUNCTIONAL CLASSIFICATION	AXLE CORRECTION FACTOR
RURAL	
1	0.90
2	0.93
3	0.98
0,5,6	0.98
URBAN	
1	0.96
2,3	0.97
5	0.99
0,6	0.99
I-84	0.83

0 - 999.....10
> 1,000.....100

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

Appendix D: Speed Data

Accurate Counts 978-664-2565

Location : Route 150 South of
 Location : Summit Avenue
 City/State: Amesbury, MA
 Counter : 13866
 Northbound

Site Code: 11170001
 111700S1

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/9/10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	42-51	1
01:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32-41	1
05:00	0	0	0	0	0	2	4	9	0	0	0	0	0	0	0	15	40-49	13
06:00	0	0	1	0	0	11	20	12	13	4	0	0	0	0	0	61	40-49	32
07:00	2	0	0	0	5	12	40	36	9	6	0	0	0	0	0	110	41-50	76
08:00	2	0	0	1	2	12	36	17	17	5	0	0	0	0	0	92	41-50	53
09:00	0	0	0	1	2	9	23	15	4	2	0	0	0	0	0	56	41-50	38
10:00	1	0	0	0	6	8	19	10	3	1	0	0	0	0	0	48	38-47	29
11:00	1	0	0	0	4	7	15	6	3	0	0	0	1	0	0	37	37-46	23
12 PM	0	0	0	2	2	12	22	6	5	1	0	0	0	0	0	50	36-45	34
13:00	1	0	0	0	3	11	16	16	4	0	1	0	0	0	0	52	40-49	32
14:00	0	0	0	0	0	11	19	17	8	1	0	0	0	0	0	56	40-49	36
15:00	0	0	0	0	2	15	20	19	8	2	1	0	0	0	0	67	40-49	39
16:00	1	0	0	0	3	8	27	22	15	1	0	0	0	0	0	77	41-50	49
17:00	1	0	0	1	4	11	24	23	8	1	0	0	0	0	0	73	41-50	47
18:00	0	0	0	0	3	11	23	16	5	1	0	0	0	0	0	59	40-49	39
19:00	0	0	0	0	3	3	13	11	5	0	0	0	0	0	0	35	41-50	24
20:00	0	0	0	0	1	2	7	6	1	0	0	0	0	0	0	17	39-48	13
21:00	0	0	0	0	0	1	7	8	2	0	0	0	0	0	0	18	40-49	15
22:00	0	0	0	0	0	2	4	0	1	1	0	0	0	0	0	8	35-44	6
23:00	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	4	37-46	3
Total	10	0	1	5	40	149	342	250	112	26	2	0	1	0	938			
Percent	1.1%	0.0%	0.1%	0.5%	4.3%	15.9%	36.5%	26.7%	11.9%	2.8%	0.2%	0.0%	0.1%	0.0%				
AM Peak	07:00		06:00	08:00	10:00	07:00	07:00	07:00	08:00	07:00			11:00			07:00		
Vol.	2		1	1	6	12	40	36	17	6			1			110		
PM Peak	13:00			12:00	17:00	15:00	16:00	17:00	16:00	15:00	13:00					16:00		
Vol.	1			2	4	15	27	23	15	2	1					77		

Accurate Counts 978-664-2565

Location : Route 150 South of
 Location : Summit Avenue
 City/State: Amesbury, MA
 Counter : 13866
 Northbound

Site Code: 11170001
 111700S1

Start Time	15	16	21	25	26	30	31	35	36	40	41	45	46	50	51	55	56	60	61	65	66	70	71	75	76	999	Total	Pace Speed	Number in Pace
3/10/10	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	27-36	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	37-46	2	
05:00	0	0	0	0	2	1	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	40-49	10	
06:00	5	0	2	1	1	8	25	20	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	72	41-50	45	
07:00	0	0	0	0	0	10	34	26	27	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104	41-50	60	
08:00	0	0	0	0	4	6	40	25	12	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	41-50	65	
09:00	1	0	1	1	3	11	20	13	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	39-48	34	
10:00	0	0	0	0	1	12	25	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	36-45	37	
11:00	0	0	0	1	1	9	13	13	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	39-48	26	
12 PM	0	1	0	1	4	12	24	22	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	41-50	46	
13:00	1	1	1	0	3	8	14	14	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	40-49	28	
14:00	0	1	0	0	5	7	12	16	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	41-50	28	
15:00	1	0	0	1	4	3	32	17	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	41-50	49	
16:00	0	0	0	0	0	4	25	21	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	41-50	46	
17:00	0	0	0	0	4	13	29	32	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	41-50	61	
18:00	1	0	0	0	2	10	17	8	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	36-45	27	
19:00	1	0	0	1	1	7	11	10	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	39-48	21	
20:00	1	0	0	0	0	5	2	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	43-52	11	
21:00	0	0	0	0	0	5	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	35-44	9	
22:00	0	0	0	0	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	28-37	4	
23:00	0	0	0	0	1	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	38-47	7	
Total	11	3	5	6	38	135	336	261	117	24	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	941			
Percent	1.2%	0.3%	0.5%	0.6%	4.0%	14.3%	35.7%	27.7%	12.4%	2.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%				
AM Peak	06:00		06:00	06:00	08:00	10:00	08:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	07:00	06:00	07:00			
Vol.	5		2	1	4	12	40	26	27	6	1														1	104			
PM Peak	13:00	12:00	13:00	12:00	14:00	17:00	15:00	17:00	16:00	15:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	17:00			
Vol.	1	1	1	1	5	13	32	32	13	3	1															88			
Total	21	3	6	11	78	284	678	511	229	50	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1879			
Percent	1.1%	0.2%	0.3%	0.6%	4.2%	15.1%	36.1%	27.2%	12.2%	2.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%			

15th Percentile : 38 MPH
 50th Percentile : 44 MPH
 85th Percentile : 51 MPH
 95th Percentile : 55 MPH

Stats
 10 MPH Pace Speed : 41-50 MPH
 Number in Pace : 1189
 Percent in Pace : 63.3%
 Number of Vehicles > 40 MPH : 1476
 Percent of Vehicles > 40 MPH : 78.6%
 Mean Speed(Average) : 44 MPH

Accurate Counts 978-664-2565

Location : Route 150 South of
 Location : Summit Avenue
 City/State: Amesbury, MA
 Counter : 13866
 Southbound

Site Code: 11170001
 111700S1

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/9/10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	42-51	1
01:00	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	4	37-46	4
02:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	3	37-46	2
05:00	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	4	32-41	4
06:00	0	0	0	0	2	6	3	1	0	0	0	0	0	0	0	12	34-43	11
07:00	0	1	0	0	4	9	19	7	1	1	0	0	0	0	0	42	37-46	29
08:00	1	0	0	0	5	17	23	13	0	1	0	0	0	0	0	60	36-45	40
09:00	0	0	0	0	1	12	9	6	1	0	0	0	0	0	0	29	35-44	21
10:00	0	0	0	1	2	9	12	4	1	1	0	0	0	0	0	30	36-45	21
11:00	0	1	0	1	1	12	10	6	1	0	0	0	0	0	0	32	36-45	22
12 PM	0	0	0	2	5	17	20	16	5	0	0	0	0	0	0	65	37-46	38
13:00	0	0	0	2	5	17	20	7	4	2	0	0	0	0	0	57	36-45	37
14:00	0	0	0	0	9	11	17	11	6	0	0	0	0	0	0	54	37-46	29
15:00	1	0	0	0	7	19	27	11	8	0	0	0	0	0	0	73	36-45	46
16:00	0	0	0	0	4	18	33	7	4	1	1	0	0	0	0	68	36-45	51
17:00	1	0	0	0	5	29	36	11	5	2	0	0	0	0	0	89	36-45	65
18:00	0	0	0	0	6	20	17	4	3	0	0	0	0	0	0	50	36-45	37
19:00	0	0	0	0	4	17	10	2	5	0	0	0	0	0	0	38	36-45	27
20:00	0	0	0	0	2	8	10	4	2	0	0	0	0	0	0	26	36-45	18
21:00	0	0	0	0	1	7	6	1	1	0	0	0	0	0	0	16	35-44	13
22:00	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0	7	31-40	7
23:00	1	0	0	0	2	1	3	1	0	0	0	0	0	0	0	8	37-46	5
Total	4	2	0	6	69	237	280	114	48	8	1	0	0	0	769			
Percent	0.5%	0.3%	0.0%	0.8%	9.0%	30.8%	36.4%	14.8%	6.2%	1.0%	0.1%	0.0%	0.0%	0.0%				
AM Peak	08:00	07:00		10:00	08:00	08:00	08:00	08:00	00:00	07:00						08:00		
Vol.	1	1		1	5	17	23	13	1	1						60		
PM Peak	15:00			12:00	14:00	17:00	17:00	12:00	15:00	13:00	16:00					17:00		
Vol.	1			2	9	29	36	16	8	2	1					89		

Accurate Counts 978-664-2565

Location : Route 150 South of
 Location : Summit Avenue
 City/State: Amesbury, MA
 Counter : 13866
 Southbound

Site Code: 11170001
 111700S1

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/10/10	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	7	37-46	7
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	1	0	0	1	0	2	1	1	0	0	0	0	0	0	0	6	36-45	3
05:00	0	0	0	0	1	0	1	2	0	1	0	0	0	0	0	5	38-47	3
06:00	5	0	0	0	6	3	7	1	1	1	0	0	0	0	0	24	33-42	10
07:00	0	0	0	0	3	11	19	5	3	2	0	0	0	0	0	43	36-45	30
08:00	1	0	0	1	2	15	15	9	1	0	0	0	0	0	0	44	36-45	30
09:00	1	0	0	0	2	6	8	3	3	0	0	0	0	0	0	23	34-43	14
10:00	0	0	0	0	1	11	12	8	0	1	0	0	0	0	0	33	36-45	23
11:00	0	0	0	2	0	13	15	10	0	0	0	0	0	0	0	40	36-45	28
12 PM	0	0	1	0	3	9	23	13	1	0	0	0	0	0	0	50	39-48	36
13:00	0	0	0	1	4	8	17	11	2	1	1	0	0	0	0	45	38-47	28
14:00	0	0	1	0	5	21	22	11	2	0	0	0	0	0	0	62	36-45	43
15:00	1	0	0	0	9	24	23	12	4	0	0	1	0	0	0	74	36-45	47
16:00	0	0	0	1	7	14	36	6	1	2	0	0	0	0	0	67	36-45	50
17:00	1	0	0	0	4	26	35	15	2	1	0	0	0	0	0	84	36-45	61
18:00	0	0	0	2	6	27	23	7	2	0	0	0	0	0	0	67	36-45	50
19:00	0	0	0	2	2	10	14	3	1	1	0	0	0	0	0	33	36-45	24
20:00	0	0	0	0	4	7	11	4	1	0	0	0	0	0	0	27	36-45	18
21:00	0	0	0	0	8	7	10	3	2	0	0	0	0	0	0	30	36-45	17
22:00	0	0	1	0	3	7	4	1	1	0	0	0	0	0	0	17	33-42	12
23:00	0	0	0	0	1	2	0	1	0	0	0	0	0	0	0	4	28-37	3
Total	10	0	3	10	71	223	302	127	27	10	1	1	0	0	0	785		
Percent	1.3%	0.0%	0.4%	1.3%	9.0%	28.4%	38.5%	16.2%	3.4%	1.3%	0.1%	0.1%	0.0%	0.0%				
AM Peak	06:00			11:00	06:00	08:00	07:00	11:00	07:00	07:00						08:00		
Vol.	5			2	6	15	19	10	3	2						44		
PM Peak	15:00		12:00	18:00	15:00	18:00	16:00	17:00	15:00	16:00	13:00	15:00				17:00		
Vol.	1		1	2	9	27	36	15	4	2	1	1				84		
Total	14	2	3	16	140	460	582	241	75	18	2	1	0	0	0	1554		
Percent	0.9%	0.1%	0.2%	1.0%	9.0%	29.6%	37.5%	15.5%	4.8%	1.2%	0.1%	0.1%	0.0%	0.0%				

15th Percentile : 36 MPH
 50th Percentile : 42 MPH
 85th Percentile : 48 MPH
 95th Percentile : 52 MPH

Stats
 10 MPH Pace Speed : 36-45 MPH
 Number in Pace : 1042
 Percent in Pace : 67.1%
 Number of Vehicles > 40 MPH : 919
 Percent of Vehicles > 40 MPH : 59.1%
 Mean Speed(Average) : 42 MPH

Accurate Counts 978-664-2565

Location : Summit Avenue East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 18141
 Westbound

Site Code: 11170002
 111700S2

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/9/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	22-31	1
05:00	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	3	28-37	2
06:00	0	0	0	0	1	1	3	1	0	0	0	0	0	0	0	6	34-43	5
07:00	0	1	0	1	0	1	3	0	0	0	0	0	0	0	0	6	34-43	4
08:00	0	0	0	0	2	3	1	0	0	0	1	0	0	0	0	7	32-41	6
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
10:00	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	2	22-31	1
11:00	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	4	33-42	3
12 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
13:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32-41	1
14:00	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	32-41	2
15:00	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	4	33-42	2
16:00	0	0	0	1	3	0	1	1	0	0	0	0	0	0	0	6	24-33	4
17:00	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	4	33-42	3
18:00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	12-21	1
19:00	1	0	0	0	1	1	2	0	0	0	0	0	0	0	0	5	33-42	4
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
21:00	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	2	22-31	1
22:00	0	0	0	2	1	0	1	0	0	0	0	0	0	0	0	4	22-31	3
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
Total	1	1	2	5	12	12	20	3	2	0	1	0	0	0	59			
Percent	1.7%	1.7%	3.4%	8.5%	20.3%	20.3%	33.9%	5.1%	3.4%	0.0%	1.7%	0.0%	0.0%	0.0%				
AM Peak		07:00		07:00	08:00	08:00	06:00	06:00	05:00		08:00					08:00		
Vol.		1		1	2	3	3	1	1		1					7		
PM Peak	19:00		17:00	22:00	16:00	12:00	15:00	16:00	15:00							16:00		
Vol.	1		1	2	3	1	2	1	1							6		

Accurate Counts 978-664-2565

Location : Summit Avenue East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 18141
 Westbound

Site Code: 11170002
 111700S2

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/10/10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
06:00	2	0	0	0	0	3	4	1	0	0	0	0	0	0	0	10	37-46	8
07:00	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	7	29-38	7
08:00	0	0	0	1	0	4	1	0	0	1	0	0	0	0	0	7	32-41	5
09:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	37-46	1
10:00	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2	12-21	1
11:00	1	0	0	1	2	0	0	1	0	0	0	0	0	0	0	5	23-32	3
12 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	22-31	1
13:00	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	4	36-45	3
14:00	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	28-37	2
15:00	0	0	0	0	2	3	2	1	2	0	0	0	0	0	0	10	33-42	7
16:00	0	0	0	1	0	3	1	0	0	0	0	0	0	0	0	5	32-41	4
17:00	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	27-36	2
18:00	0	0	0	1	0	2	1	0	0	0	0	0	0	0	0	4	32-41	3
19:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32-41	1
20:00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2	17-26	1
21:00	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	32-41	2
22:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
Total	3	0	1	5	10	27	12	5	3	1	0	0	0	0	0	67		
Percent	4.5%	0.0%	1.5%	7.5%	14.9%	40.3%	17.9%	7.5%	4.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00		10:00	08:00	07:00	08:00	06:00	06:00	10:00	08:00						06:00		
Vol.	2		1	1	4	4	4	1	1	1						10		
PM Peak				16:00	15:00	15:00	15:00	13:00	15:00							15:00		
Vol.				1	2	3	2	1	2							10		
Total	4	1	3	10	22	39	32	8	5	1	1	0	0	0	0	126		
Percent	3.2%	0.8%	2.4%	7.9%	17.5%	31.0%	25.4%	6.3%	4.0%	0.8%	0.8%	0.0%	0.0%	0.0%	0.0%			

15th Percentile : 31 MPH
 50th Percentile : 38 MPH
 85th Percentile : 45 MPH
 95th Percentile : 51 MPH

Stats
 10 MPH Pace Speed : 36-45 MPH
 Number in Pace : 71
 Percent in Pace : 56.3%
 Number of Vehicles > 25 MPH : 118
 Percent of Vehicles > 25 MPH : 93.7%
 Mean Speed(Average) : 38 MPH

Accurate Counts 978-664-2565

Location : Summit Avenue East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 18141
 Eastbound

Site Code: 11170002
 111700S2

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/10/10	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	32-41	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
05:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
06:00	4	0	1	0	0	0	1	0	0	0	0	0	0	0	0	6	*	4
07:00	1	0	0	0	1	2	1	0	0	0	0	0	0	0	0	5	32-41	4
08:00	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	4	33-42	3
09:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	22-31	1
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
11:00	1	0	0	0	2	1	0	2	0	0	0	0	0	0	0	6	27-36	3
12 PM	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3	32-41	3
13:00	1	0	0	1	0	2	1	0	0	0	0	0	0	0	0	5	32-41	3
14:00	1	1	0	2	2	1	0	0	0	0	0	0	0	0	0	7	27-36	5
15:00	0	0	0	0	2	3	2	2	0	0	0	0	0	0	0	9	29-38	5
16:00	1	0	0	3	0	3	0	1	1	0	0	0	0	0	0	9	19-28	3
17:00	1	0	0	1	1	3	0	0	0	0	0	0	0	0	0	6	29-38	5
18:00	1	0	0	1	1	4	2	0	0	0	0	0	0	0	0	9	33-42	7
19:00	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	4	33-42	4
20:00	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	3	*	1
21:00	1	0	0	0	1	0	1	0	2	0	0	0	0	0	0	5	43-52	2
22:00	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	3	23-32	2
23:00	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	27-36	1
Total	13	1	1	9	15	25	15	6	3	0	0	0	0	0	0	88		
Percent	14.8%	1.1%	1.1%	10.2%	17.0%	28.4%	17.0%	6.8%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00		06:00	08:00	11:00	07:00	08:00	11:00								06:00		
Vol.	4		1	1	2	2	2	2								6		
PM Peak	13:00	14:00		16:00	14:00	18:00	15:00	15:00	21:00							15:00		
Vol.	1	1		3	2	4	2	2	2							9		
Total	18	1		3	16	30	48	29	8	6	0	0	0	0	0	159		
Percent	11.3%	0.6%		1.9%	10.1%	18.9%	30.2%	18.2%	5.0%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%			

15th Percentile : 26 MPH
 50th Percentile : 37 MPH
 85th Percentile : 44 MPH
 95th Percentile : 48 MPH

Stats
 10 MPH Pace Speed : 31-40 MPH
 Number in Pace : 78
 Percent in Pace : 49.1%
 Number of Vehicles > 25 MPH : 137
 Percent of Vehicles > 25 MPH : 86.2%
 Mean Speed(Average) : 34 MPH

Accurate Counts 978-664-2565

Location : Beacon Street East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 14014
 Eastbound

Site Code: 11170003
111700S3

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/10/10	0	0	0	3	2	1	0	0	0	0	0	0	0	0	0	6	23-32	5
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	4	22-31	4
05:00	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	6	21-30	5
06:00	4	1	8	9	6	0	0	0	0	0	0	0	0	0	0	28	22-31	18
07:00	1	2	8	20	10	1	0	0	0	0	0	0	0	0	0	42	23-32	30
08:00	1	0	6	22	13	1	0	0	0	0	0	0	0	0	0	43	25-34	35
09:00	3	0	6	10	8	0	0	0	0	0	0	0	0	0	0	27	24-33	19
10:00	2	2	7	9	11	2	0	0	0	0	0	0	0	0	0	33	24-33	20
11:00	0	1	5	19	12	0	0	0	0	0	0	0	0	0	0	37	26-35	31
12 PM	3	0	11	28	9	0	0	0	0	0	0	0	0	0	0	51	21-30	39
13:00	2	1	11	25	3	3	0	0	0	0	0	0	0	0	0	45	21-30	36
14:00	2	0	15	28	15	1	0	0	0	0	0	0	0	0	0	61	21-30	43
15:00	1	0	19	24	20	2	0	0	0	0	0	0	0	0	0	66	22-31	44
16:00	2	1	15	33	17	1	0	0	0	0	0	0	0	0	0	69	23-32	50
17:00	2	0	12	42	16	4	1	0	0	0	0	0	0	0	0	77	24-33	58
18:00	3	2	14	34	7	0	0	0	0	0	0	0	0	0	0	60	21-30	48
19:00	3	0	14	13	4	1	0	0	0	0	0	0	0	0	0	35	21-30	27
20:00	0	0	5	14	7	0	0	0	0	0	0	0	0	0	0	26	23-32	21
21:00	0	0	6	11	9	1	0	0	0	0	0	0	0	0	0	27	25-34	21
22:00	0	0	3	7	3	0	0	0	0	0	0	0	0	0	0	13	23-32	12
23:00	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	5	23-32	5
Total	29	10	167	360	175	19	1	0	761									
Percent	3.8%	1.3%	21.9%	47.3%	23.0%	2.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00	07:00	06:00	08:00	08:00	10:00											08:00	
Vol.	4	2	8	22	13	2											43	
PM Peak	12:00	18:00	15:00	17:00	15:00	17:00	17:00										17:00	
Vol.	3	2	19	42	20	4	1										77	
Total	58	38	314	729	335	29	1	0	1504									
Percent	3.9%	2.5%	20.9%	48.5%	22.3%	1.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

15th Percentile : 23 MPH
 50th Percentile : 28 MPH
 85th Percentile : 33 MPH
 95th Percentile : 35 MPH

Stats
 10 MPH Pace Speed : 26-35 MPH
 Number in Pace : 1064
 Percent in Pace : 70.7%
 Number of Vehicles > 30 MPH : 365
 Percent of Vehicles > 30 MPH : 24.3%
 Mean Speed(Average) : 27 MPH

Accurate Counts 978-664-2565

Location : Beacon Street East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 14014
 Westbound

Site Code: 11170003
 111700S3

Start Time	15	20	25	30	35	40	45	50	55	60	65	70	75	999	Total	Pace Speed	Number in Pace		
3/9/10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	17-26	1		
01:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	17-26	1		
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*		
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*		
04:00	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	18-27	2		
05:00	0	0	0	4	7	0	0	0	0	0	0	0	0	0	11	26-35	11		
06:00	3	0	4	18	26	7	1	0	0	0	0	0	0	0	59	26-35	44		
07:00	4	0	6	28	62	9	1	0	0	0	0	0	0	0	110	26-35	90		
08:00	10	2	2	32	46	10	1	0	0	0	0	0	0	0	103	26-35	78		
09:00	7	0	3	20	25	5	0	0	0	0	0	0	0	0	60	26-35	45		
10:00	3	2	4	14	18	5	0	0	0	0	0	0	0	0	46	26-35	32		
11:00	1	1	1	9	18	3	0	0	0	0	0	0	0	0	33	26-35	27		
12 PM	6	2	5	20	16	3	0	0	0	0	0	0	0	0	52	26-35	36		
13:00	9	4	3	22	18	3	1	0	0	0	0	0	0	0	60	26-35	40		
14:00	8	0	4	21	29	5	0	0	0	0	0	0	0	0	67	26-35	50		
15:00	11	1	2	23	26	8	0	0	0	0	0	0	0	0	71	26-35	49		
16:00	4	0	8	29	32	5	1	0	0	0	0	0	0	0	79	26-35	61		
17:00	2	0	2	27	41	5	0	0	0	0	0	0	0	0	77	26-35	68		
18:00	5	1	11	23	22	2	0	0	0	0	0	0	0	0	64	26-35	45		
19:00	1	0	8	16	10	3	0	0	0	0	0	0	0	0	38	23-32	26		
20:00	2	0	0	7	8	1	0	0	0	0	0	0	0	0	18	26-35	15		
21:00	4	0	1	11	10	0	0	0	0	0	0	0	0	0	26	26-35	21		
22:00	0	0	1	4	4	1	1	0	0	0	0	0	0	0	11	25-34	9		
23:00	1	0	0	2	1	2	0	0	0	0	0	0	0	0	6	26-35	3		
Total	81	13	65	334	419	77	6	0	995										
Percent	8.1%	1.3%	6.5%	33.6%	42.1%	7.7%	0.6%	0.0%											
AM Peak	08:00	08:00	07:00	08:00	07:00	08:00	06:00											07:00	
Vol.	10	2	6	32	62	10	1											110	
PM Peak	15:00	13:00	18:00	16:00	17:00	15:00	13:00											16:00	
Vol.	11	4	11	29	41	8	1											79	

Accurate Counts 978-664-2565

Location : Beacon Street East of
 Location : Route 150
 City/State: Amesbury, MA
 Counter : 14014
 Westbound

Site Code: 11170003
 111700S3

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	999	Total	Pace Speed	Number in Pace
3/10/10	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	17-26	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
04:00	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	4	23-32	4
05:00	0	0	1	4	5	1	0	0	0	0	0	0	0	0	0	11	27-36	10
06:00	9	0	3	18	35	3	2	0	0	0	0	0	0	0	0	70	26-35	53
07:00	5	0	3	26	58	12	1	0	0	0	0	0	0	0	0	105	26-35	84
08:00	8	3	5	26	37	13	0	0	0	0	0	0	0	0	0	92	26-35	63
09:00	2	1	6	17	32	0	1	0	0	0	0	0	0	0	0	59	26-35	49
10:00	8	2	2	22	12	0	2	0	0	0	0	0	0	0	0	48	26-35	34
11:00	2	0	3	15	18	5	0	0	0	0	0	0	0	0	0	43	26-35	33
12 PM	4	1	5	22	31	7	2	0	0	0	0	0	0	0	0	72	26-35	53
13:00	9	0	4	14	21	5	0	0	0	0	0	0	0	0	0	53	26-35	35
14:00	7	1	2	18	23	7	1	0	0	0	0	0	0	0	0	59	26-35	41
15:00	7	0	2	23	35	7	1	0	0	0	0	0	0	0	0	75	26-35	58
16:00	6	0	1	26	33	4	0	0	0	0	0	0	0	0	0	70	26-35	59
17:00	4	1	7	32	37	7	0	0	0	0	0	0	0	0	0	88	26-35	69
18:00	7	2	4	19	17	2	1	0	0	0	0	0	0	0	0	52	26-35	36
19:00	10	1	4	17	8	4	0	0	0	0	0	0	0	0	0	44	24-33	25
20:00	2	0	2	6	9	0	0	0	0	0	0	0	0	0	0	19	25-34	15
21:00	0	0	1	6	2	0	0	0	0	0	0	0	0	0	0	9	23-32	9
22:00	0	1	0	3	2	2	0	0	0	0	0	0	0	0	0	8	26-35	5
23:00	1	0	1	6	1	0	0	0	0	0	0	0	0	0	0	9	22-31	8
Total	91	13	57	322	418	79	11	0	991									
Percent	9.2%	1.3%	5.8%	32.5%	42.2%	8.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	06:00	08:00	09:00	07:00	07:00	08:00	06:00									07:00		
Vol.	9	3	6	26	58	13	2									105		
PM Peak	19:00	18:00	17:00	17:00	17:00	12:00	12:00									17:00		
Vol.	10	2	7	32	37	7	2									88		
Total	172	26	122	656	837	156	17	0	1986									
Percent	8.7%	1.3%	6.1%	33.0%	42.1%	7.9%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

15th Percentile : 25 MPH
 50th Percentile : 31 MPH
 85th Percentile : 35 MPH
 95th Percentile : 38 MPH

Stats
 10 MPH Pace Speed : 26-35 MPH
 Number in Pace : 1493
 Percent in Pace : 75.2%
 Number of Vehicles > 30 MPH : 1010
 Percent of Vehicles > 30 MPH : 50.9%
 Mean Speed(Average) : 29 MPH

Appendix E: Capacity Analysis Worksheets

HCM Unsignalized Intersection Capacity Analysis

2: Beacon Street & Route 150 Extension

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	2	4	135	52	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.50	0.81	0.81	0.75	0.75
Hourly flow rate (vph)	10	4	5	167	69	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	172				112	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	172				112	88
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				92	100
cM capacity (veh/h)	1418				883	975

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	14	172	71
Volume Left	10	0	69
Volume Right	0	167	1
cSH	1418	1700	885
Volume to Capacity	0.01	0.10	0.08
Queue Length 95th (ft)	1	0	6
Control Delay (s)	5.4	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	5.4	0.0	9.4
Approach LOS			A

Intersection Summary			
Average Delay		2.9	
Intersection Capacity Utilization		18.6%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

3: Summit Avenue & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	11	140	0	5	53
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.56	0.56	0.85	0.85	0.77	0.77
Hourly flow rate (vph)	0	20	165	0	6	69
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	247	165			165	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	247	165			165	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	743	885			1426	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	20	165	75
Volume Left	0	0	6
Volume Right	20	0	0
cSH	885	1700	1426
Volume to Capacity	0.02	0.10	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.2	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	0.7
Approach LOS	A		

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		17.4%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

2: Beacon Street & Route 150 Extension

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	2	4	168	62	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.50	0.81	0.81	0.75	0.75
Hourly flow rate (vph)	10	4	5	207	83	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	212				133	109
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	212				133	109
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				90	100
cM capacity (veh/h)	1370				860	951
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	14	212	84			
Volume Left	10	0	83			
Volume Right	0	207	1			
cSH	1370	1700	861			
Volume to Capacity	0.01	0.12	0.10			
Queue Length 95th (ft)	1	0	8			
Control Delay (s)	5.5	0.0	9.6			
Lane LOS	A		A			
Approach Delay (s)	5.5	0.0	9.6			
Approach LOS			A			
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization			20.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: Summit Avenue & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	12	179	0	5	63
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.56	0.56	0.85	0.85	0.77	0.77
Hourly flow rate (vph)	0	21	211	0	6	82
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	305	211			211	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	305	211			211	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	687	835			1372	

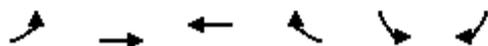
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	21	211	88
Volume Left	0	0	6
Volume Right	21	0	0
cSH	835	1700	1372
Volume to Capacity	0.03	0.12	0.00
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.4	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		19.4%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

2: Beacon Street & Route 150 Extension

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	2	3	173	65	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.50	0.50	0.81	0.81	0.75	0.75
Hourly flow rate (vph)	10	4	4	214	87	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	217				134	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	217				134	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				90	100
cM capacity (veh/h)	1364				858	948

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	14	217	88
Volume Left	10	0	87
Volume Right	0	214	1
cSH	1364	1700	859
Volume to Capacity	0.01	0.13	0.10
Queue Length 95th (ft)	1	0	9
Control Delay (s)	5.5	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	5.5	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay		2.9	
Intersection Capacity Utilization		21.2%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

3: Summit Avenue & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	25	219	0	8	71
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.56	0.56	0.85	0.85	0.77	0.77
Hourly flow rate (vph)	2	45	258	0	10	92
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	371	258			258	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	371	258			258	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			99	
cM capacity (veh/h)	629	786			1319	

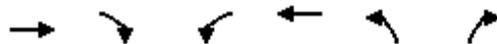
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	46	258	103
Volume Left	2	0	10
Volume Right	45	0	0
cSH	778	1700	1319
Volume to Capacity	0.06	0.15	0.01
Queue Length 95th (ft)	5	0	1
Control Delay (s)	9.9	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay		1.3	
Intersection Capacity Utilization		21.5%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

5: Summit Avenue & Driveway

4/14/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Volume (veh/h)	5	3	0	12	14	0
Sign Control	Free			Free	Stop	
Grade	2%			-6%	0%	
Peak Hour Factor	0.56	0.56	0.56	0.56	0.56	0.56
Hourly flow rate (vph)	9	5	0	21	25	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			14		33	12
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			14		33	12
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		97	100
cM capacity (veh/h)			1617		986	1075

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	14	21	25
Volume Left	0	0	25
Volume Right	5	0	0
cSH	1700	1617	986
Volume to Capacity	0.01	0.00	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.0	8.7
Lane LOS	A		
Approach Delay (s)	0.0	0.0	8.7
Approach LOS	A		

Intersection Summary			
Average Delay			3.6
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)			15

HCM Unsignalized Intersection Capacity Analysis

7: North Driveway & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	2	34	179	1	7	65
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.81	0.81	0.85	0.85	0.77	0.77
Hourly flow rate (vph)	2	42	211	1	9	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	314	211			212	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	314	211			212	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			99	
cM capacity (veh/h)	679	834			1371	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	44	212	94
Volume Left	2	0	9
Volume Right	42	1	0
cSH	824	1700	1371
Volume to Capacity	0.05	0.12	0.01
Queue Length 95th (ft)	4	0	1
Control Delay (s)	9.6	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		19.5%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

9: South Driveway & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	2	178	0	1	66
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.78	0.78	0.81	0.81	0.75	0.75
Hourly flow rate (vph)	0	3	220	0	1	88
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	310	220			220	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	310	220			220	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	686	825			1362	

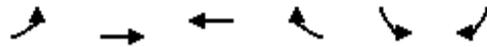
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	3	220	89
Volume Left	0	0	1
Volume Right	3	0	0
cSH	825	1700	1362
Volume to Capacity	0.00	0.13	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	9.4	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		19.4%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

13: Beacon Street & Driveway

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	67	172	1	2	4
Sign Control		Free	Free		Stop	
Grade		0%	8%		0%	
Peak Hour Factor	0.75	0.75	0.81	0.81	0.78	0.78
Hourly flow rate (vph)	0	89	212	1	3	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	214				302	213
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	214				302	213
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1369				694	832

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	89	214	8
Volume Left	0	0	3
Volume Right	0	1	5
cSH	1369	1700	780
Volume to Capacity	0.00	0.13	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	9.7
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		19.1%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

2: Beacon Street & Route 150 Extension

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	6	5	106	79	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.71	0.71	0.64	0.64
Hourly flow rate (vph)	14	9	7	149	123	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	156				119	82
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	156				119	82
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				86	99
cM capacity (veh/h)	1436				871	984

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	23	156	134
Volume Left	14	0	123
Volume Right	0	149	11
cSH	1436	1700	879
Volume to Capacity	0.01	0.09	0.15
Queue Length 95th (ft)	1	0	13
Control Delay (s)	4.5	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	4.5	0.0	9.8
Approach LOS			A

Intersection Summary			
Average Delay		4.5	
Intersection Capacity Utilization		19.0%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

3: Summit Avenue & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	4	114	1	11	86
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.85	0.85	0.87	0.87
Hourly flow rate (vph)	0	11	134	1	13	99
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	259	135			135	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	259	135			135	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	728	920			1461	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	11	135	111
Volume Left	0	0	13
Volume Right	11	1	0
cSH	920	1700	1461
Volume to Capacity	0.01	0.08	0.01
Queue Length 95th (ft)	1	0	1
Control Delay (s)	9.0	0.0	0.9
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	0.9
Approach LOS	A		

Intersection Summary			
Average Delay		0.8	
Intersection Capacity Utilization		21.8%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

2: Beacon Street & Route 150 Extension

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	9	6	5	127	113	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.71	0.71	0.64	0.64
Hourly flow rate (vph)	14	9	7	179	177	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	186				133	96
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186				133	96
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				79	99
cM capacity (veh/h)	1401				854	965

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	23	186	188
Volume Left	14	0	177
Volume Right	0	179	11
cSH	1401	1700	860
Volume to Capacity	0.01	0.11	0.22
Queue Length 95th (ft)	1	0	21
Control Delay (s)	4.6	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	4.6	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay		5.2	
Intersection Capacity Utilization		21.7%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

3: Summit Avenue & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	4	135	1	12	120
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.85	0.85	0.87	0.87
Hourly flow rate (vph)	0	11	159	1	14	138
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	325	159			160	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	325	159			160	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	667	891			1432	

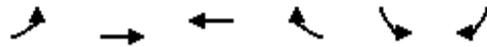
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	11	160	152
Volume Left	0	0	14
Volume Right	11	1	0
cSH	891	1700	1432
Volume to Capacity	0.01	0.09	0.01
Queue Length 95th (ft)	1	0	1
Control Delay (s)	9.1	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		26.3%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

2: Beacon Street & Route 150 Extension

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↘	
Volume (veh/h)	9	6	5	130	118	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.65	0.65	0.71	0.71	0.64	0.64
Hourly flow rate (vph)	14	9	7	183	184	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	190				136	99
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190				136	99
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				78	99
cM capacity (veh/h)	1396				852	963

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	23	190	195
Volume Left	14	0	184
Volume Right	0	183	11
cSH	1396	1700	857
Volume to Capacity	0.01	0.11	0.23
Queue Length 95th (ft)	1	0	22
Control Delay (s)	4.6	0.0	10.4
Lane LOS	A		B
Approach Delay (s)	4.6	0.0	10.4
Approach LOS			B

Intersection Summary			
Average Delay		5.2	
Intersection Capacity Utilization	21.9%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

3: Summit Avenue & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	10	153	2	21	162
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.38	0.38	0.85	0.85	0.87	0.87
Hourly flow rate (vph)	3	26	180	2	24	186
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	416	181			182	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	416	181			182	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			98	
cM capacity (veh/h)	587	867			1405	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	29	182	210
Volume Left	3	0	24
Volume Right	26	2	0
cSH	831	1700	1405
Volume to Capacity	0.03	0.11	0.02
Queue Length 95th (ft)	3	0	1
Control Delay (s)	9.5	0.0	1.0
Lane LOS	A		A
Approach Delay (s)	9.5	0.0	1.0
Approach LOS	A		

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		31.2%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

5: Summit Avenue & Driveway

4/14/2010



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	→
Volume (veh/h)	13	10	0	4	7	0
Sign Control	Free			Free	Stop	
Grade	2%			-6%	0%	
Peak Hour Factor	0.38	0.38	0.38	0.38	0.38	0.38
Hourly flow rate (vph)	34	26	0	11	18	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			61		58	47
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			61		58	47
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	100
cM capacity (veh/h)			1556		954	1027

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	61	11	18
Volume Left	0	0	18
Volume Right	26	0	0
cSH	1700	1556	954
Volume to Capacity	0.04	0.00	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	8.8
Lane LOS	A		
Approach Delay (s)	0.0	0.0	8.8
Approach LOS	A		

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

7: North Driveway & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	1	18	137	2	37	125
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.86	0.86	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	21	161	2	44	147
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	396	162			164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	396	162			164	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			97	
cM capacity (veh/h)	594	888			1427	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	22	164	191
Volume Left	1	0	44
Volume Right	21	2	0
cSH	865	1700	1427
Volume to Capacity	0.03	0.10	0.03
Queue Length 95th (ft)	2	0	2
Control Delay (s)	9.3	0.0	1.9
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	1.9
Approach LOS	A		

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		29.3%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

9: South Driveway & Route 150 Extension

4/14/2010



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	139	0	2	125
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.68	0.68	0.71	0.71	0.64	0.64
Hourly flow rate (vph)	0	0	196	0	3	195
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	397	196			196	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	397	196			196	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	610	851			1383	

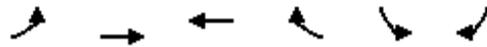
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	196	198
Volume Left	0	0	3
Volume Right	0	0	0
cSH	1700	1700	1383
Volume to Capacity	0.00	0.12	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		11.5%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

13: Beacon Street & Driveway

4/14/2010



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	3	121	135	2	1	0
Sign Control		Free	Free		Stop	
Grade		0%	8%		0%	
Peak Hour Factor	0.64	0.64	0.71	0.71	0.68	0.68
Hourly flow rate (vph)	5	189	190	3	1	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	193				390	192
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	193				390	192
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1392				616	855

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	194	193	1
Volume Left	5	0	1
Volume Right	0	3	0
cSH	1392	1700	616
Volume to Capacity	0.00	0.11	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.2	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	10.9
Approach LOS			B

Intersection Summary			
Average Delay		0.1	
Intersection Capacity Utilization		18.8%	ICU Level of Service
Analysis Period (min)		15	A