

# MEMORANDUM



**TO:** Mr. Joseph Lynch  
MB Development  
7 Bristol Lane  
Foxborough, MA 02035

**FROM:** Mr. Jeffrey S. Dirk, P.E., PTOE, FITE *and*  
Ms. Lori A. Shattuck, EIT  
Vanasse & Associates, Inc.  
10 New England Business Center Drive  
Suite 314  
Andover, MA 01810-1066  
(978) 474-8800  
[www.rdva.com](http://www.rdva.com)

**DATE:** December 2, 2014

**RE:** 6708

**SUBJECT:** Preliminary Transportation Assessment  
Proposed Residential Development - 144 Main Street (Route 140)  
Foxborough, Massachusetts

---

Vanasse & Associates, Inc. (VAI) has conducted a preliminary evaluation of the anticipated traffic characteristics and proposed access configuration associated with the proposed construction of a residential development to be located at 144 Main Street (Route 140) in Foxborough, Massachusetts (hereafter referred to as the "Project"). This assessment evaluates the following specific areas as they relate to the Project: i) existing traffic volumes and vehicle travel speeds along Main Street proximate to the Project site; ii) projected traffic characteristics of the Project; and iii) access and safety considerations with respect to the design and operation of the Project site driveway and its intersection with Main Street.

The Project will require the issuance of a State Highway Access Permit from the Massachusetts Department of Transportation (MassDOT) for access to Main Street (Route 140), a minor arterial roadway under MassDOT jurisdiction.

Based on this analysis and as more fully described herein, it has been concluded that Project-related traffic-volume increases are considered nominal when dispersed over the day or during the peak-hours and would not result in a material impact (increase) on motorist delays or vehicle queuing over existing or anticipated future conditions without the Project. Further, given the relatively low volume of traffic that is expected to be generated by the Project and that adequate lines of sight are afforded to and from the Project site driveway, access to the Project site can be afforded in a safe manner.

The following details our assessment of the Project.

## **PROJECT DESCRIPTION**

The Project will entail the construction of eight (8) single-family homes to be located at 144 Main Street in Foxborough, Massachusetts. The Project site consists of approximately 1.2± acre of land that is bounded by Main Street to the north and residential properties to the south, east and west. Access to the Project site will be provided by a new driveway that will intersect the south side of Main Street approximately 175 feet east of the Stop & Shop Supermarket driveway and approximately 230 feet west of Weston Avenue. Figure 1 depicts the Project site location in relation to the existing roadway network.





Figure 1

Site Location Map

**EXISTING CONDITIONS CONTEXT**

Main Street is a four-lane, urban minor arterial roadway that is under MassDOT jurisdiction in the vicinity of the Project and traverses the Project locus in a general northwest-southeast direction. In the vicinity of the Project site, Main Street provides four 11-foot wide travel lanes separated by a double-yellow centerline with 2-foot wide marked shoulders provided. A 5-foot wide sidewalk is provided along the north side of Main Street in the vicinity of the Project site and along both sides of the roadway to the south, with marked crosswalks, pedestrian pushbuttons and signal indications, and phasing provided at the Main Street/Stop & Shop Supermarket driveway and Main Street/Weston Avenue/Chestnut Street intersections, both of which are under traffic signal control. Land use in the vicinity of the Project site consists of residential and commercial properties, and areas of open and wooded space.

Traffic volumes and vehicle travel speeds were measured along Main Street in the vicinity of the Project site over a continuous 48-hour period (two consecutive weekdays) in March 2014 while public schools were in regular session by means of an Automatic Traffic Recorder (ATR). Tables 1 and 2 summarize the traffic volume and vehicle travel speed data, respectively. Note that traffic volumes for the month of March are representative of above average-month conditions.<sup>1</sup>

**Table 1  
2014 EXISTING TRAFFIC VOLUMES**

Location	AWT <sup>a</sup>	Weekday Morning Peak-Hour (8:00 – 9:00 AM)			Weekday Evening Peak-Hour (5:00 – 6:00 PM)		
		VPH <sup>b</sup>	K Factor <sup>c</sup>	Directional Distribution	VPH	K Factor	Directional Distribution
Main Street, west of Weston Avenue	13,515	868	6.4	54.6% EB	1,200	8.9	52.8% WB

<sup>a</sup>Average weekday traffic in vehicles per day.  
<sup>b</sup>Vehicles per hour.  
<sup>c</sup>Percent of daily traffic occurring during the peak-hour.  
 EB = eastbound; WB = westbound.

As can be seen in Table 1, Main Street in the vicinity of the Project site was found to accommodate approximately 13,515 vehicles on an average weekday (two-way, 24-hour volume), with approximately 868 vehicles per hour (vph) during the weekday morning peak-hour (8:00 to 9:00 AM) and 1,200 vph during the weekday evening peak-hour (5:00 to 6:00 PM).

<sup>1</sup>MassDOT Traffic Volumes for the Commonwealth of Massachusetts; 2011 Weekday Seasonal Factors, Group 6 – Urban Arterials, Collectors and Rural Arterials.



**Table 2**  
**VEHICLE TRAVEL SPEED MEASUREMENTS**

	Main Street	
	Eastbound	Westbound
Mean Travel Speed (mph)	29	33
85 <sup>th</sup> Percentile Speed (mph)	37	39
Posted Speed Limit (mph)	45	40

mph = miles per hour.

As can be seen in Table 2, the mean (average) vehicle travel speed along Main Street in the vicinity of the Project site was found to be approximately 31 mph. The average measured 85<sup>th</sup> percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be approximately 38 mph, which is below the posted speed limit in the area of the Project site (40 to 45 mph). The 85<sup>th</sup> percentile speed is used as the basis of engineering design and in the evaluation of sight distances, and is often used in establishing posted speed limits.

### **TRAFFIC VOLUME PROJECTIONS**

In order to develop the traffic characteristics of the Project, trip-generation statistics published by the Institute of Transportation Engineers (ITE)<sup>2</sup> were used. The ITE provides trip-generation information for various types of land uses developed as a result of scientific studies that have been conducted over the past 50 plus years, the most recent update of which was published in 2012. Based on a review of the ITE database and the known elements of the Project, ITE Land Use Code (LUC) 210, *Single-Family Detached Housing*, was used to develop the traffic characteristics of the Project. Given the small number of homes proposed (8 units), the average trip rate was used vs. the regression equation. Table 3 summarizes the anticipated traffic characteristics of the Project using the above methodology.

<sup>2</sup>*Trip Generation*, 9<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2012.



**Table 3**  
**TRIP GENERATION SUMMARY**

Time Period/Direction	Single-Family Detached Housing (8 Units) <sup>a</sup>
<i>Average Weekday Daily:</i>	
Entering	38
<u>Exiting</u>	<u>38</u>
Total	76
<i>Weekday Morning Peak-Hour:</i>	
Entering	2
<u>Exiting</u>	<u>4</u>
Total	6
<i>Weekday Evening Peak-Hour:</i>	
Entering	5
<u>Exiting</u>	<u>3</u>
Total	8

<sup>a</sup>Based on ITE LUC 210, *Single-Family Detached Housing*.

As can be seen in Table 3, the Project is expected to generate approximately 76 vehicle trips on an average weekday (two-way, 24-hour volume, or 38 vehicles entering and 38 exiting), with 6 vehicle trips expected during the weekday morning peak-hour (2 vehicles entering and 4 exiting) and 8 vehicle trips expected during the weekday evening peak-hour (5 vehicles entering and 3 exiting).

*Such traffic volume increases are considered nominal when dispersed over the day or during the peak-hours and would not result in a material impact (increase) on motorist delays or vehicle queuing over existing or anticipated future conditions without the Project.*

### **PROJECT ACCESS EVALUATION**

An evaluation of the proposed access to the Project site was completed with respect to both traffic operations and safety. With respect to traffic operations, as indicated in Table 3, the Project is expected to generate 6 to 8 vehicle trips during the peak traffic volume hours, or approximately one (1) vehicle every 8 to 10 minutes during the peak-hour. Such increases would not be readily apparent on the roadway network over existing conditions and would not result in a material impact (increase) on motorist delays or vehicle queuing.

With respect to safety, two specific elements were considered: 1) the location of the proposed driveway in relation to the signalized intersections of Main Street at the Stop & Shop Supermarket driveway and Main Street at Weston Avenue and Chestnut Street; and 2) lines of sight to and from the Project site driveway along Main Street.

As proposed, the Project site driveway will intersect the south side of Main Street approximately 175 feet east of the Stop & Shop Supermarket driveway and approximately 230 feet west of Weston Avenue. This



location places the driveway within the influence area of the traffic signal at both intersections.<sup>3</sup> Accordingly, motorists entering or exiting the Project site driveway will experience delays when vehicle queues are present that may block the driveway; however, given the relatively low volume of traffic expected to be generated by the Project (one (1) vehicle every 15 minutes during the peak-hour), the associated impacts are expected to be minimal and would not impact operating conditions at the adjacent intersections.

Sight distance measurements were performed at the intersection of Main Street at the Project site driveway in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)<sup>4</sup> requirements. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 4 presents the measured SSD and ISD at the subject intersection.

**Table 4**  
**SIGHT DISTANCE MEASUREMENTS<sup>a</sup>**

Intersection/Sight Distance Measurement	Feet		
	Required Minimum	ISD <sup>b</sup>	Measured
<i>Main Street at the Project Site Driveway</i>			
<i>Stopping Sight Distance:</i>			
Main Street approaching from the east	425	--	510
Main Street approaching from the west	425	--	650+
<i>Intersection Sight Distance:</i>			
Looking to the east from the Project Site Driveway	425	590/515	460
Looking to the west from the Project Site Driveway	425	590/515	650+

<sup>a</sup>Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 6<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); 2011; and based on a 50 mph approach speed on Main Street.

<sup>b</sup>Values shown are the intersection sight distance for a vehicle turning right/left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed; adjusted for a four-lane roadway.

As can be seen in Table 4, the available lines of sight at the subject intersection were found to exceed the recommended minimum sight distance requirements to function in a safe manner based on a 50 mph approach speed along Main Street, which is 5 to 10 mph above the posted speed limit (40 to 45 mph) and exceeds the measured 85<sup>th</sup> percentile vehicle travel speed (38 mph) along this roadway in the vicinity of the Project site.

<sup>3</sup>The influence area is defined as the area where the controlling features of the intersection result in vehicle queuing or similar residual affects that impact the operation of proximate roadways, driveways or intersections.

<sup>4</sup>*A Policy on Geometric Design of Highways and Streets*, 6<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); 2011.



Accordingly, with respect to both traffic operations and safety, it has been concluded that the Project site driveway can function in a safe manner without materially impacting operating conditions at the adjacent signalized intersections along Main Street.

## **SUMMARY**

VAI has completed a preliminary evaluation of the proposed eight (8) lot, single-family residential subdivision to be located at 144 Main Street in Foxborough, Massachusetts. This assessment has evaluated the following specific areas as they relate to the Project: i) existing traffic volumes and vehicle travel speeds along Main Street proximate to the Project site; ii) projected traffic characteristics of the Project; and iii) access and safety considerations with respect to the design and operation of the Project site driveway and its intersection with Main Street.

Based on this analysis and as more fully described herein, it has been concluded that Project-related traffic-volume increases are considered nominal when dispersed over the day or during the peak-hours and would not result in a material impact (increase) on motorist delays or vehicle queuing over existing or anticipated future conditions without the Project. Further, given the relatively low volume of traffic that is expected to be generated by the Project and that adequate lines of sight are afforded to and from the Project site driveway, access to the Project site can be afforded in a safe manner with implementation of the recommendations that follow.

## **RECOMMENDATIONS**

- The Project site driveway should be a minimum of 22 feet in width and accommodate two-way travel with vehicles exiting the Project site placed under STOP-sign control with a marked STOP-line provided.
- All signs and pavement markings to be installed within the Project site shall conform to the applicable standards of the *Manual on Uniform Traffic Control Devices (MUTCD)*.<sup>5</sup>
- Signs or landscaping along the Project driveway and at its intersections with Main Street should be designed and maintained so as not to restrict lines of sight.
- Consideration should be given to extending the sidewalk along the south side of Main Street between Weston Avenue and the segment of sidewalk located opposite the Stop & Shop Supermarket driveway.

---

<sup>5</sup>*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.

## **ATTACHMENTS**

---

AUTOMATIC TRAFFIC RECORDER COUNTS  
VEHICLE TRAVEL SPEED MEASUREMENTS  
TRIP GENERATION CALCULATIONS  
SIGHT DISTANCE ADJUSTMENT CALCULATIONS

**AUTOMATIC TRAFFIC RECORDER COUNTS**

---

Location : Main Street EB  
Location : West of Weston Avenue  
City/State: Foxborough, MA

Site Code: 6708WB01  
6708VOLEB

Start Time	Wed 19-Mar-14		Thu 20-Mar-14		Fri 21-Mar-14		Daily Average		
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	7	101	8	110	*	*	8	106	
12:15	5	99	7	107	*	*	6	103	
12:30	2	114	3	98	*	*	2	106	
12:45	4	108	2	108	*	*	3	108	
01:00	0	102	1	98	*	*	0	100	
01:15	1	115	5	89	*	*	3	102	
01:30	0	99	1	103	*	*	0	101	
01:45	1	111	1	121	*	*	1	116	
02:00	2	87	4	105	*	*	3	96	
02:15	3	95	2	104	*	*	2	100	
02:30	2	119	0	113	*	*	1	116	
02:45	1	136	0	120	*	*	0	128	
03:00	2	150	4	146	*	*	3	148	
03:15	6	139	3	147	*	*	4	143	
03:30	2	148	1	147	*	*	2	148	
03:45	2	143	3	130	*	*	2	136	
04:00	2	134	3	137	*	*	2	136	
04:15	5	120	2	134	*	*	4	127	
04:30	4	139	11	124	*	*	8	132	
04:45	7	122	10	132	*	*	8	127	
05:00	14	134	11	149	*	*	12	142	
05:15	17	129	17	132	*	*	17	130	
05:30	24	164	27	153	*	*	26	158	
05:45	18	146	17	129	*	*	18	138	
06:00	38	111	33	136	*	*	36	124	
06:15	50	127	43	113	*	*	46	120	
06:30	56	74	63	118	*	*	60	96	
06:45	76	123	80	98	*	*	78	110	
07:00	101	90	97	102	*	*	99	96	
07:15	99	83	108	94	*	*	104	88	
07:30	100	89	100	78	*	*	100	84	
07:45	94	87	109	70	*	*	102	78	
08:00	120	76	123	75	*	*	122	76	
08:15	125	67	120	66	*	*	122	66	
08:30	110	57	103	72	*	*	106	64	
08:45	128	69	115	70	*	*	122	70	
09:00	104	73	92	61	*	*	98	67	
09:15	80	37	81	40	*	*	80	38	
09:30	68	30	72	34	*	*	70	32	
09:45	78	28	81	36	*	*	80	32	
10:00	80	21	77	26	*	*	78	24	
10:15	83	25	87	20	*	*	85	22	
10:30	100	18	71	16	*	*	86	17	
10:45	103	22	87	16	*	*	95	19	
11:00	88	28	69	23	*	*	78	26	
11:15	83	14	85	21	*	*	84	18	
11:30	100	7	97	11	*	*	98	9	
11:45	78	8	109	9	*	*	94	8	
Total	2273	4318	2245	4341	0	0	2258	4331	
Combined Total	6591		6586		0		6589		
Peak Vol.	08:00 483	03:00 580	-	08:00 461	03:00 570	-	-	08:00 472	03:00 575
P.H.F.	0.943	0.967	-	0.937	0.969	-	-	0.967	0.971
ADT	ADT 6,588		AADT 6,588						

Accurate Counts  
978-664-2565

Location : Main Street EB  
Location : West of Weston Avenue  
City/State: Foxborough, MA

Site Code: 6708WB01  
6708VLEB

Start Time	Mon 17-Mar-14	Tue 18-Mar-14	Wed 19-Mar-14	Thu 20-Mar-14	Fri 21-Mar-14	Average Day	Sat 22-Mar-14	Sun 23-Mar-14	Week Average
12:00 AM	*	*	18	20	*	19	*	*	19
01:00	*	*	2	8	*	5	*	*	5
02:00	*	*	8	6	*	7	*	*	7
03:00	*	*	12	11	*	12	*	*	12
04:00	*	*	18	26	*	22	*	*	22
05:00	*	*	73	72	*	72	*	*	72
06:00	*	*	220	219	*	220	*	*	220
07:00	*	*	394	414	*	404	*	*	404
08:00	*	*	483	461	*	472	*	*	472
09:00	*	*	330	326	*	328	*	*	328
10:00	*	*	366	322	*	344	*	*	344
11:00	*	*	349	360	*	354	*	*	354
12:00 PM	*	*	422	423	*	422	*	*	422
01:00	*	*	427	411	*	419	*	*	419
02:00	*	*	437	442	*	440	*	*	440
03:00	*	*	580	570	*	575	*	*	575
04:00	*	*	515	527	*	521	*	*	521
05:00	*	*	573	563	*	568	*	*	568
06:00	*	*	435	465	*	450	*	*	450
07:00	*	*	349	344	*	346	*	*	346
08:00	*	*	269	283	*	276	*	*	276
09:00	*	*	168	171	*	170	*	*	170
10:00	*	*	86	78	*	82	*	*	82
11:00	*	*	57	64	*	60	*	*	60
Day Total	0	0	6591	6586	0	6588	0	0	6588
% Avg. WKDay	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%
% Avg. Week	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	0.0%	0.0%
AM Peak Vol.	-	-	08:00 483	08:00 461	-	08:00 472	-	-	08:00 472
PM Peak Vol.	-	-	15:00 580	15:00 570	-	15:00 575	-	-	15:00 575
Grand Total	0	0	6591	6586	0	6588	0	0	6588
ADT			ADT 6,588	AADT 6,588					

Location : Main Street WB  
Location : West of Weston Avenue  
City/State: Foxborough, MA

Site Code: 6708WB01  
6708VOLWB

Start Time	19-Mar-14		20-Mar-14		21-Mar-14		Daily Average			
	Wed A.M.	P.M.	Thu A.M.	P.M.	Fri A.M.	P.M.	A.M.	P.M.		
12:00	10	106	11	111	*	*	10	108		
12:15	6	107	3	100	*	*	4	104		
12:30	2	111	3	102	*	*	2	106		
12:45	6	109	4	122	*	*	5	116		
01:00	6	105	3	102	*	*	4	104		
01:15	1	102	1	116	*	*	1	109		
01:30	2	97	4	86	*	*	3	92		
01:45	3	120	2	101	*	*	2	110		
02:00	3	149	2	109	*	*	2	129		
02:15	0	127	3	132	*	*	2	130		
02:30	0	134	0	139	*	*	0	136		
02:45	1	129	1	131	*	*	1	130		
03:00	3	131	1	157	*	*	2	144		
03:15	0	148	0	141	*	*	0	144		
03:30	3	165	2	172	*	*	2	168		
03:45	1	160	3	148	*	*	2	154		
04:00	2	154	2	151	*	*	2	152		
04:15	2	155	3	164	*	*	2	160		
04:30	8	146	7	174	*	*	8	160		
04:45	8	133	6	142	*	*	7	138		
05:00	7	171	7	144	*	*	7	158		
05:15	10	154	8	156	*	*	9	155		
05:30	18	169	15	174	*	*	16	172		
05:45	27	157	32	138	*	*	30	148		
06:00	38	160	36	147	*	*	37	154		
06:15	53	119	54	122	*	*	54	120		
06:30	82	138	82	156	*	*	82	147		
06:45	64	114	75	105	*	*	70	110		
07:00	86	99	72	99	*	*	79	99		
07:15	93	77	75	98	*	*	84	88		
07:30	94	84	81	98	*	*	88	91		
07:45	87	80	94	82	*	*	90	81		
08:00	99	81	87	77	*	*	93	79		
08:15	125	70	101	81	*	*	113	76		
08:30	95	64	77	79	*	*	86	72		
08:45	104	48	104	48	*	*	104	48		
09:00	94	65	88	66	*	*	91	66		
09:15	79	58	83	66	*	*	81	62		
09:30	95	45	84	31	*	*	90	38		
09:45	85	34	88	32	*	*	86	33		
10:00	81	27	70	31	*	*	76	29		
10:15	82	20	72	26	*	*	77	23		
10:30	107	28	95	20	*	*	101	24		
10:45	92	16	96	23	*	*	94	20		
11:00	95	7	99	23	*	*	97	15		
11:15	92	9	85	12	*	*	88	10		
11:30	92	7	98	13	*	*	95	10		
11:45	125	7	118	7	*	*	122	7		
Total	2268	4696	2137	4754	0	0	2201	4729		
Combined Total	6964		6891		0		6930			
Peak	08:00	05:00	-	11:00	03:45	-	-	-	11:00	03:30
Vol.	423	651	-	400	637	-	-	-	402	634
P.H.F.	0.846	0.952	-	0.847	0.915	-	-	-	0.824	0.943
ADT	ADT 6,928		AADT 6,928							

Accurate Counts  
978-664-2565

Location : Main Street WB  
Location : West of Weston Avenue  
City/State: Foxborough, MA

Site Code: 6708WB01  
6708VOLWB

Start Time	Mon 17-Mar-14	Tue 18-Mar-14	Wed 19-Mar-14	Thu 20-Mar-14	Fri 21-Mar-14	Average Day	Sat 22-Mar-14	Sun 23-Mar-14	Week Average
12:00 AM	*	*	24	21	*	22	*	*	22
01:00	*	*	12	10	*	11	*	*	11
02:00	*	*	4	6	*	5	*	*	5
03:00	*	*	7	6	*	6	*	*	6
04:00	*	*	20	18	*	19	*	*	19
05:00	*	*	62	62	*	62	*	*	62
06:00	*	*	237	247	*	242	*	*	242
07:00	*	*	360	322	*	341	*	*	341
08:00	*	*	423	369	*	396	*	*	396
09:00	*	*	353	343	*	348	*	*	348
10:00	*	*	362	333	*	348	*	*	348
11:00	*	*	404	400	*	402	*	*	402
12:00 PM	*	*	433	435	*	434	*	*	434
01:00	*	*	424	405	*	414	*	*	414
02:00	*	*	539	511	*	525	*	*	525
03:00	*	*	604	618	*	611	*	*	611
04:00	*	*	588	631	*	610	*	*	610
05:00	*	*	651	612	*	632	*	*	632
06:00	*	*	531	530	*	530	*	*	530
07:00	*	*	340	377	*	358	*	*	358
08:00	*	*	263	285	*	274	*	*	274
09:00	*	*	202	195	*	198	*	*	198
10:00	*	*	91	100	*	96	*	*	96
11:00	*	*	30	55	*	42	*	*	42
Day Total	0	0	6964	6891	0	6926	0	0	6926
% Avg. WKDay	0.0%	0.0%	100.5%	99.5%	0.0%	100.0%	0.0%	0.0%	0.0%
% Avg. Week	0.0%	0.0%	100.5%	99.5%	0.0%	100.0%	0.0%	0.0%	0.0%
AM Peak Vol.	-	-	08:00 423	11:00 400	-	11:00 402	-	-	11:00 402
PM Peak Vol.	-	-	17:00 651	16:00 631	-	17:00 632	-	-	17:00 632
Grand Total	0	0	6964	6891	0	6926	0	0	6926
ADT			ADT 6,928	ADT 6,928		ADT 6,928			ADT 6,928

**VEHICLE TRAVEL SPEED MEASUREMENTS**

---



Accurate Counts  
978-664-2565

Location : Main Street EB  
 Location : West of Weston Avenue  
 City/State: Foxborough, MA

Site Code: 6708WB01  
 6708SPDEB

Start Time	1	16	21	26	31	36	41	46	51	56	61	66	71	76	81	85th Percent	95th Percent
	15	20	25	30	35	40	45	50	55	60	65	70	75	79	Total	Percent	Percent
03/20/14	0	0	0	0	6	5	6	3	0	0	0	0	0	0	20	45	48
01:00	0	0	0	0	0	6	2	0	0	0	0	0	0	0	8	42	44
02:00	0	0	0	0	0	6	0	0	0	0	0	0	0	0	6	39	40
03:00	0	0	0	1	2	5	2	1	0	0	0	0	0	0	11	43	47
04:00	0	1	0	0	7	13	4	1	0	0	0	0	0	0	26	41	45
05:00	0	0	1	4	14	33	19	1	0	0	0	0	0	0	72	42	44
06:00	0	2	6	35	54	79	39	3	1	1	0	0	0	0	219	41	44
07:00	4	9	57	98	104	92	40	10	0	0	0	0	0	0	414	39	43
08:00	11	37	64	114	127	79	26	3	0	0	0	0	0	0	461	37	41
09:00	8	24	49	100	93	41	10	1	0	0	0	0	0	0	326	35	39
10:00	8	13	71	101	74	48	7	0	0	0	0	0	0	0	322	35	39
11:00	9	20	73	123	65	47	16	6	1	0	0	0	0	0	360	36	41
12 PM	15	39	88	120	104	41	14	2	0	0	0	0	0	0	423	34	39
13:00	9	44	91	122	75	47	18	5	0	0	0	0	0	0	411	35	40
14:00	17	45	91	135	94	40	17	3	0	0	0	0	0	0	442	34	39
15:00	60	103	149	136	77	32	12	1	0	0	0	0	0	0	570	31	36
16:00	43	68	148	136	79	40	9	4	0	0	0	0	0	0	527	32	37
17:00	22	69	124	177	107	47	16	1	0	0	0	0	0	0	563	33	38
18:00	27	47	132	99	106	42	11	1	0	0	0	0	0	0	465	34	38
19:00	4	13	55	105	95	52	19	1	0	0	0	0	0	0	344	36	40
20:00	7	13	42	72	80	63	15	1	0	0	0	0	0	0	283	37	40
21:00	0	5	21	49	53	33	8	2	0	0	0	0	0	0	171	37	41
22:00	0	0	6	9	30	20	9	4	0	0	0	0	0	0	78	40	45
23:00	0	0	2	0	21	33	6	2	0	0	0	0	0	0	64	40	44
Total	244	552	1270	1736	1467	934	325	56	1	1	0	0	0	0	6586		
Percent AM	3.7%	8.4%	19.3%	26.4%	22.3%	14.2%	4.9%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Peak Vol.	11	37	73	123	127	92	40	10	1	1					461		
PM Peak Vol.	60	103	149	177	107	53	19	5							570		
Grand Total	471	971	2286	3209	3071	2113	897	148	9	2	0	0	0	0	13177		
Percent	3.6%	7.4%	17.3%	24.4%	23.3%	16.0%	6.8%	1.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			

Statistic	10 MPH Pace Speed	26-35 MPH
Number in Pace	5682	
Percent in Pace	43.1%	
Number of Vehicles > 30 MPH	6240	
Percent of Vehicles > 30 MPH	47.4%	
Mean Speed(Average)	29 MPH	



Accurate Counts  
978-664-2565

Location : Main Street WB  
 Location : West of Weston Avenue  
 City/State: Foxborough, MA

Site Code: 6708WB01  
 6708SPDWB

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	76	81	86	91	95th Percent	
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	Percent		
03/20/14	0	0	1	1	8	5	4	2	0	0	0	0	0	0	0	0	0	21	43
01:00	0	0	1	3	0	5	4	1	0	0	0	0	0	0	0	0	0	10	40
02:00	0	0	0	1	0	4	1	0	0	0	0	0	0	0	0	0	0	6	41
03:00	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0	0	0	6	40
04:00	0	0	3	1	2	7	5	0	0	0	0	0	0	0	0	0	0	18	42
05:00	0	0	3	4	19	26	9	1	0	0	0	0	0	0	0	0	0	62	40
06:00	0	0	12	45	61	77	43	9	0	0	0	0	0	0	0	0	0	247	41
07:00	0	1	19	71	94	95	41	1	0	0	0	0	0	0	0	0	0	322	40
08:00	0	2	25	85	118	96	40	3	0	0	0	0	0	0	0	0	0	369	39
09:00	0	4	22	77	128	84	25	3	0	0	0	0	0	0	0	0	0	343	38
10:00	0	3	25	97	103	79	24	2	0	0	0	0	0	0	0	0	0	333	38
11:00	4	6	41	133	114	80	22	0	0	0	0	0	0	0	0	0	0	400	37
12 PM	0	1	32	109	139	109	43	2	0	0	0	0	0	0	0	0	0	435	39
13:00	5	2	40	104	143	83	23	5	0	0	0	0	0	0	0	0	0	405	37
14:00	3	14	64	137	140	116	32	5	0	0	0	0	0	0	0	0	0	511	38
15:00	3	27	91	180	183	112	21	1	0	0	0	0	0	0	0	0	0	618	36
16:00	12	27	104	199	158	102	25	4	0	0	0	0	0	0	0	0	0	631	36
17:00	9	20	62	200	159	122	36	4	0	0	0	0	0	0	0	0	0	612	37
18:00	2	11	69	154	163	98	31	2	0	0	0	0	0	0	0	0	0	530	37
19:00	0	3	31	97	131	85	24	5	1	0	0	0	0	0	0	0	0	377	38
20:00	0	2	19	74	71	87	26	5	1	0	0	0	0	0	0	0	0	285	39
21:00	1	0	8	32	43	60	36	14	1	0	0	0	0	0	0	0	0	195	43
22:00	0	1	1	8	13	24	37	13	3	0	0	0	0	0	0	0	0	100	45
23:00	0	0	1	7	7	15	17	6	2	0	0	0	0	0	0	0	0	55	45
Total	39	124	674	1822	1998	1572	566	88	8	0	0	0	0	0	0	0	0	6891	
Percent AM	0.6%	1.8%	9.8%	26.4%	29.0%	22.8%	8.2%	1.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
Peak Vol.	4	6	41	133	128	96	43	9										400	
PM Peak Vol.	12	27	104	200	183	122	43	14	3									631	
Grand Total	82	234	1197	3454	3962	3266	1403	241	13	3	0	0	0	0	0	0	0	13855	
Percent	0.6%	1.7%	8.6%	24.9%	28.6%	23.6%	10.1%	1.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		

15th Percentile : 25 MPH  
 50th Percentile : 32 MPH  
 85th Percentile : 39 MPH  
 95th Percentile : 43 MPH

Statistic s  
 10 MPH Pace Speed : 28-37 MPH  
 Number in Pace : 7245  
 Percent in Pace : 52.3%  
 Number of Vehicles > 30 MPH : 8888  
 Percent of Vehicles > 30 MPH : 64.2%  
 Mean Speed(Average) : 33 MPH

**TRIP GENERATION CALCULATIONS**

---

**Institute of Transportation Engineers (ITE)**  
**Trip Generation, 9th Edition**  
**Land Use Code (LUC) 210 - Single-Family Detached Housing**

Average Vehicle Trips Ends vs: Dwelling Units  
Independent Variable (X): 8

**AVERAGE WEEKDAY DAILY**

$T = 9.52 * (X)$   
 $T = 9.52 * 8$   
 $T = 76.16$   
 $T = 76.00$   
 $T = 76$  vehicle trips  
with 50% ( 38 vpd) entering and 50% ( 38 vpd) exiting.

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

$T = 0.75 * (X)$   
 $T = 0.75 * 8$   
 $T = 6.00$   
 $T = 6$  vehicle trips  
with 25% ( 2 vph) entering and 75% ( 4 vph) exiting.

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

$T = 1.00 * (X)$   
 $T = 1.00 * 8$   
 $T = 8.00$   
 $T = 8.00$   
 $T = 8$  vehicle trips  
with 63% ( 5 vph) entering and 37% ( 3 vph) exiting.

**SIGHT DISTANCE ADJUSTMENT CALCULATIONS**

---

Proposed Residential Development  
144 Main Street  
Foxborough, MA

**Sight Distance Adjustments**

**Main Street (Route 140), Foxborough, MA**

**4-lane Highway**

***Left-Turn from Minor Road***

***Adjustment for multilane highways***

$$\text{ISD} = 1.47 * V_{\text{major}} * t_g$$

Where:

ISD = Intersection Sight Distance

$V_{\text{major}}$  = design speed of major road (mph)

$t_g$  = time gap for minor road vehicle to enter the major road

$$\text{ISD} = 1.47 * 50 * 8$$

$$\text{ISD} = 588$$

***Right-Turn from Minor Road***

***Adjustment for multilane highways***

$$\text{ISD} = 1.47 * V_{\text{major}} * t_g$$

Where:

ISD = Intersection Sight Distance

$V_{\text{major}}$  = design speed of major road (mph)

$t_g$  = time gap for minor road vehicle to enter the major road

$$\text{ISD} = 1.47 * 50 * 7$$

$$\text{ISD} = 514.5$$