

Ref: 6529

November 4, 2013

Town of Framingham  
Planning Board  
Memorial Building  
150 Concord Street  
Framingham, MA 01702

Attn: Ms. Amanda L. Loomis  
Planning Board Administrator

Re: Response to Traffic Review Comments  
Proposed CVS/Pharmacy® - Concord Street (Route 126)/Hartford Street  
Framingham, Massachusetts

Dear Ms. Loomis:

Vanasse & Associates, Inc. (VAI) is providing supplemental information and analyses in response to the comments raised in the October 2, 2013 letter received from Mr. Kien Ho, P.E., PTOE of BETA Group, Inc., (BETA) concerning his review of the July 22, 2013 *Traffic Impact and Access Study* (the “July 2013 TIAS”) and the associated Site Plans prepared in support of the proposed CVS/pharmacy® to be located on the northwest corner of the intersection of Concord Street (Route 126) at Hartford Street in Framingham, Massachusetts (hereafter referred to as the “Project”). Listed below are the comments raised in Mr. Ho’s October 2, 2013 review letter followed by our detailed response, with the associated supporting data, calculations, plans, and analysis worksheets attached.

## **TRAFFIC IMPACT AND ACCESS STUDY**

### **Study Area Intersections**

**Comment:** *The study area included within this review encompasses the following intersections:*

*SIGNALIZED INTERSECTIONS*

*Concord Street at Anzio Road/Gorman Road*

*Concord Street at Hartford Street (Pepperoncini Driveway unsignalized)*

*UNSIGNALIZED INTERSECTIONS*

*Concord Street at Normandy Road/Thelma Road*

*Concord Street at North Project Site Driveway/Gulf Station Driveway*

*Concord Street at Prindiville Avenue/Burdette Avenue*

*We recommend that the fire station signal system be included in the study.*

**Response:** The traffic signal at the fire station operates in flashing mode until activated by an emergency response from the fire station. The traffic control signal at the intersection of Concord Street at Hartford Street and the Project site driveway will be upgraded in its entirety as a part of the Project and will be interconnected and coordinated with the existing traffic signals to the north and south of the intersection along Concord Street, including the traffic signal at the fire station, and will include an emergency vehicle pre-emption system.

### Traffic Volumes

**Comment:** *The proponent conducted turning movement counts (TMC) during the weekday evening (4-6PM) and Saturday mid-day peak period (11AM-2PM) at all of the study area intersections. The counts were conducted on Thursday, May 30<sup>th</sup> and Saturday June 1<sup>st</sup>, 2013. The overall peak hours for the weekday evening and Saturday mid-day peaks were determined to be 5:00-6:00 PM and 12:45-1:45 PM, respectively. BETA finds this acceptable.*

**Response:** No response necessary.

**Comment:** *The proponent compared the May and June volumes collected with 2007 MassDOT seasonal adjustment factor data, which showed May and June data to be higher than the average month. To be conservative, the proponent did not adjust the volumes downward to reflect average month conditions and BETA finds this acceptable.*

**Response:** No response necessary.

### Pedestrian and Bicycle Facilities

**Comment:** *A field inventory by the proponent was performed of the pedestrian and bicycle facilities in the study area. This inventory failed to mention the antiquated pedestrian traffic signals, faded crosswalks, non ADA compliant wheelchair ramps (see Figure 1) and lack of Accessible Pedestrian signal equipment at the Concord Street and Hartford Street/Site driveway intersection. Wheelchair ramps are not provided at the majority of pedestrian crossings at the intersection. The proponent should include a pedestrian accommodation upgrade and bicycle accommodations as part of the intersection mitigation.*

**Response:** Pedestrian crosswalks, pushbuttons and phasing at the intersection of Concord Street at Hartford Street and the Project site driveway will be upgraded to meet current Americans with Disabilities Act (ADA), Manual on Uniform Traffic Control Device (MUTCD)<sup>1</sup> and MassDOT standards, and will include the installation of bicycle detection and associated signs and pavement markings.

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<sup>1</sup>Manual on Uniform Traffic Control Devices (MUTCD); Federal Highway Administration; Washington, D.C.; 2009.



## Motor Vehicle Crash Data

**Comment:** *The proponent performed accident analyses for the years of 2008-2010 based on the most recent data available from MassDOT at the time of the study. MassDOT has recently released the 2011 crash data. We recommend that the proponent review and include the 2011 crash data into this report.*

**Response:** Motor vehicle crash information for the study area intersections was updated to include the year 2011. The data is summarized by intersection, type, severity, and day of occurrence, and presented in Table 3A. A review of this data continues to indicate that, with the exception of the Concord Street/Anzio Road/Gorman Road intersection, the study area intersections have a motor vehicle crash rate below the MassDOT average for a signalized or unsignalized intersection, as appropriate, for the MassDOT Highway Division District in which the intersections are located (District 3).

**Comment:** *Crash rates were computed for all intersections and compared to the most recent MassDOT District 3 average. The calculated crash rates are lower than the District 3 average for all but one of the intersections. **The crash rate calculated for the intersection of Concord Street at Anzio Road/Gorman Road is 1.38 crashes per million entering vehicles (MEV) which is significantly higher than the District 3 average of 0.89 MEV and Statewide average of 0.80 MEV.** The majority of these crashes were rear-end or angle crashes. Upon review of the intersection, it is apparent that the signal layout does not meet current MUTCD standards. For instance, the existing signal lenses are 8-inches while the current standard is a 12-inch lens; currently no overhead signals are provided at the intersection but the current standard is to mount a minimum of one traffic signal overhead. Improving these features would improve the overall safety at the Concord Street at Anzio Road/Gorman Road intersection and reduce the higher than average crash rate. We recommend the proponent consider these upgrades as part of their off-site mitigation.*

**Response:** As part of the Project, existing signs and pavement markings at the Concord Street/Anzio Road/Gorman Road intersection will be reviewed, upgraded and/or replaced as necessary; the traffic signal indications will be relamped to include 12-inch LED-type indications and adjusted as may be required in order to improve the visibility of the signal indications; pedestrian push-buttons and signal heads will be replaced as may be necessary to meet current design standards; the existing traffic signal timing will be reviewed and adjusted as may be necessary with a particular emphasis on the yellow and all-read clearance intervals; and the vehicle detection system will be evaluated and repaired/replaced or adjusted as necessary. The existing traffic signal controller and cabinet will be reviewed in the context of the planned improvements and will be upgraded or replaced as may be necessary to accommodate the proposed modifications to the traffic signal system.

The above measures have been purposely designed to reduce the frequency of occurrence of motor vehicle crashes at the intersection and off-set the projected impact of the Project, and can be completed within the public right-of-way subject to receipt of all necessary rights, permits and approvals. The suggested additional improvements would appear to require private property acquisition in order to accommodate the additional traffic signal poles and foundations, and allow for the passage of pedestrians.



**Table 3A**  
**MOTOR VEHICLE CRASH DATA SUMMARY<sup>a</sup>**

	Concord Street/ Anzio Road/ Gorman Road	Concord Street/ Normandy Road/ Thelma Road	Concord Street/ North Site Drive/ Gulf Station Drive	Concord Street/ Hartford Street/ South Site Drive	Concord Street/ Prindiville Avenue/ Burdette Avenue
Traffic Control Type: <sup>b</sup>	TS	U	U	TS	U
<i>Year:</i>					
2008	12	2	3	5	7
2009	13	5	0	7	1
2010	11	3	1	5	2
<u>2011</u>	<u>8</u>	<u>3</u>	<u>4</u>	<u>2</u>	<u>1</u>
Total	44	13	8	19	11
Average	11.00	3.25	2.00	4.75	2.75
Calculated Crash Rate <sup>c</sup>	1.26	0.40	0.26	0.55	0.38
Significant? <sup>d</sup>	Yes	No	No	No	No
<i>Type:</i>					
Angle	16	0	3	7	4
Rear-End	26	11	5	6	6
Head-On	0	0	0	0	1
Sideswipe	0	0	0	4	0
Fixed Object	1	1	0	1	0
Pedestrian/Bicycle	1	1	0	1	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	44	13	8	19	11
<i>Day of Week:</i>					
Monday through Friday	33	7	6	14	9
Saturday	6	5	2	3	2
<u>Sunday</u>	<u>5</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>0</u>
Total	44	13	8	19	11
<i>Severity:</i>					
Property Damage Only	27	6	8	14	8
Personal Injury	17	7	0	5	3
<u>Fatality</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	44	13	8	19	11

<sup>a</sup>Source: MassDOT Safety Management/Traffic Operations Unit records, 2008 through 2011.

<sup>b</sup>Traffic Control Type: U = unsignalized; TS = traffic signal; R = rotary/roundabout.

<sup>c</sup>Crash rate per million vehicles entering the intersection.

<sup>d</sup>The intersection crash rate is significant if it is found to exceed 0.66 crashes per million vehicles entering an intersection for an unsignalized intersection and 0.89 crashes per million vehicles entering an intersection for a signalized intersection as defined by MassDOT for the MassDOT District in which the Project is located (District 3).



## Future Traffic Growth

**Comment:** *Traffic volumes were projected to 2018 to reflect a future 5-year planning horizon. No-Build conditions were calculated by increasing existing traffic volumes by an annual growth rate of 1% per year (over a 5-yr period). We find this growth rate to be high. A growth rate of 0.5% has historically been used for projects in Town. We recommend that the proponent adjust the future volumes accordingly to incorporate a growth rate of 0.5% per year over 5 years.*

**Response:** The 2018 No-Build and Build condition peak-hour traffic-volume networks and analyses were revised to incorporate a 0.5 percent per year compounded annual background traffic growth rate. The revised 2018 No-Build weekday evening and Saturday midday peak-hour traffic-volumes are depicted on Figures 4A and 5A, respectively, with the 2018 Build weekday evening and Saturday midday peak-hour traffic-volumes depicted on Figures 9A and 10A, respectively. The results of the revised intersection capacity and vehicle queue analyses are summarized in Tables 9A and 10A. Please note that the revised 2018 Build condition peak-hour traffic volumes and analyses also reflect revised traffic volume projections and a revised trip distribution pattern for the Project (discussion follows).

**Comment:** *Discussions with the Town Planning Department confirmed that no additional planned development traffic is expected and therefore we find it acceptable that the proponent added no additional future development traffic to the volumes.*

**Response:** No response necessary.

## Trip Generation (Site-Generated Traffic)

**Comment:** *The proposed trip generation data was calculated using the latest Institute of Transportation Engineers (ITE) data Land Use Code 881 -Pharmacy/Drugstore with Drive-Through Window. As a result of this project, the expected new trips are 113 and 93 during the weekday evening and Saturday mid-day peak periods, respectively. We request that the proponent verify the daily Saturday number of vehicle trips were determined since the ITE Trip Generation manual has insufficient information to determine these trips. We also request that the proponent collect empirical trip generation data from two or three similar dual drive-thru sites to support the ITE trip generation data.*

**Response:** Traffic counts were completed during the weekday evening (4:00 to 6:00 PM) and Saturday midday (11:00 AM to 2:00 PM) peak periods in October 2013 at two existing CVS/pharmacies® with drive-through prescription facilities similar to that proposed. A comparison of the average observed trip rates to the ITE trip rates used in the July 2013 TIAS is provided in Table A, with the detailed traffic counts for each observation site attached hereto.



**Table A**  
**COMPARISON OF ITE AND EMPIRICAL CVS/PHARMACY®**  
**TRIP RATES**

Time Period/Direction	Trips per 1,000 sf	
	ITE LUC 881 Trip Rate <sup>a</sup>	CVS/Pharmacy® Observed Trip Rate <sup>b</sup>
<i>Weekday Evening Peak Hour:</i>		
Entering	4.95	5.75
<u>Exiting</u>	<u>4.96</u>	<u>5.93</u>
Total	9.91	11.68
<i>Saturday Midday Peak Hour:</i>		
Entering	4.02	6.88
<u>Exiting</u>	<u>4.18</u>	<u>7.35</u>
Total	8.20	14.23

<sup>a</sup>Based on ITE LUC 881, *Pharmacy/Drugstore with Drive-Through Window*.

<sup>b</sup>Based on average of empirical data collected at two existing CVS/pharmacy® locations.

As can be seen in Table A, the empirical trip rates were found to be higher than the ITE trip rates and, therefore, the empirical data was used to develop the traffic characteristics of the Project. Table 4A summarizes the anticipated traffic characteristics of the Project using the empirical trip rates, with the revised Project-generated peak-hour traffic-volume networks shown on Figures 7A and 8A, and the associated revised 2018 Build condition peak-hour traffic volumes shown on Figures 9A and 10A. Please note that these figures also reflect a revised trip distribution pattern for the Project (discussion follows). Revised average weekday and Saturday daily trip-generation projections were developed for the Project using the empirical peak-hour trip rates.



**Table 4A**  
**TRIP GENERATION SUMMARY**

Time Period/Direction	Vehicle Trips		
	(A) Proposed Pharmacy (15,195 sf) <sup>a</sup>	(B = A x 0.25) 25% Pass-By Trips	(C = A - B) New Trips
<i>Average Weekday Daily:</i>			
Entering	865	217	648
<u>Exiting</u>	<u>865</u>	<u>217</u>	<u>648</u>
Total	1,730	434	1,296
<i>Weekday Evening Peak Hour:</i>			
Entering	87	22	65
<u>Exiting</u>	<u>90</u>	<u>22</u>	<u>68</u>
Total	177	44	133
<i>Saturday Daily:</i>			
Entering	1,058	265	793
<u>Exiting</u>	<u>1,058</u>	<u>265</u>	<u>793</u>
Total	2,116	530	1,586
<i>Saturday Midday Peak Hour:</i>			
Entering	104	27	77
<u>Exiting</u>	<u>112</u>	<u>27</u>	<u>85</u>
Total	216	54	162

<sup>a</sup>Based on empirical data collected at two CVS/pharmacy® locations with a drive-through facility.

As can be seen in Table 4A, based on empirical data, the Project is expected to generate approximately 1,296 new vehicle trips on an average weekday (two-way volume over the operational day of the pharmacy), with approximately 133 new vehicle trips expected during the weekday evening peak-hour. On a Saturday, the Project is expected to generate approximately 1,586 new vehicle trips (again, two-way volume over the operational day), with approximately 162 new vehicle trips expected during the Saturday midday peak-hour.

**Comment:** *The percentage of pass-by trips was also calculated using ITE data. A pass-by deduction of 25% was taken from the proposed traffic volumes and not added to the No-Build roadway network volumes during each of the peak periods. BETA finds this standard practice acceptable.*

**Response:** No response necessary.



**Trip Distribution/Assignment**

**Comment:** *Site generated trips were distributed onto the study area network based on the review of existing traffic patterns. The weekday evening and Saturday mid-day volumes are similar. We question this trip distribution. The 50% trip distribution from north of the site seems high as there are several types of drug stores on Route 9. We ask the proponent verify the trip distribution.*

**Response:** As requested by BETA, a review of the location of existing pharmacies in the area was completed. Based on this review, it was determined that there are existing pharmacies located both north and south of the Project site. While it is expected that the directional distribution of generated trips to and from the Project site will generally follow existing traffic patterns within the study area, the trip distribution pattern for the Project was modified slightly to reflect increased use of Hartford Street (20 percent vs. 10 percent) and Concord Street south of the Project site (50 percent vs. 40 percent), with a corresponding reduction in traffic to/from the north on Concord Street (30 percent vs. 50 percent). The modified trip distribution pattern is shown in Table 5A and graphically depicted on Figure 6A, with Figures 7A and 8A depicting the revised Project-generated traffic assignment, and Figures 9A and 10A depicting the associated revised 2018 Build condition peak-hour traffic volumes.

**Table 5A  
 TRIP-DISTRIBUTION SUMMARY**

Roadway	Direction (To/From)	Percent
Concord Street	North	30
Concord Street	South	50
Hartford Street	East	<u>20</u>
TOTAL		100

**Capacity & Queue Analysis**

**Comment:** CONCORD STREET AT ANZIO ROAD/GORMAN ROAD  
*Capacity and queue analysis results were not provided for the 2018 Build with mitigation condition at the intersection of Concord Street at Anzio Road/Gorman Road. The capacity analysis results should be provided for our review.*

**Response:** The revised 2018 Build with Mitigation capacity analysis results are summarized in Table 12A.

**Comment:** *A review of the 2013 Existing and 2018 Build condition revealed that the Concord Street northbound approach would degrade from a LOS C to LOS D and the southbound approach would degrade from a LOS B to LOS C. While the LOS may be acceptable,*



*queuing is a problem along the Concord Street corridor. The northbound queue length currently extends more than 900 feet which is past the Normandy Road/Thelma Road intersection. Queue lengths along Concord Street approaching the intersection would increase by approximately 100 feet in both directions during both peak periods.*

**Response:** An optimal traffic signal timing and phasing plan will be implemented at the Concord Street/Anzio Road/Gorman Road intersection prior to the issuance of a Certificate of Occupancy for the Project and subject to receipt of all necessary rights, permits and approvals. Under 2018 Build with Mitigation conditions, the north and southbound vehicle queues on Concord Street are estimated to increase by between 0 to 2 vehicles during the peak periods when compared to No-Build conditions.

**Comment:** CONCORD STREET AT HARTFORD STREET/SOUTH DRIVEWAY  
*Overall, the analysis reflects minor degradations in overall LOS and/or delay from the 2013 Existing to 2018 Build with mitigation conditions at the Concord Street and Hartford Street/Site driveway intersection. The most significant movement improvement would be the Hartford Street westbound approach to the intersection. This movement would improve from a LOS F to a LOS E during the PM peak period. All other movements would continue to operate at a LOS D or better.*

**Response:** No response necessary; a similar level of improvement is noted under the revised traffic volume conditions (see Table 12A).

**Comment:** *The overall intersection would degrade from a LOS B to LOS C with an increase in delay from 19.6 seconds to 22.1 seconds from the 2013 Existing to 2018 Build with mitigation condition during the evening peak and remain a LOS B with a 13.0 to 14.4 increase in delay during the Saturday mid-day peak period.*

**Response:** The revised capacity analysis indicates that the Concord Street/Hartford Street/Project site driveway intersection will operate at an overall LOS C during the weekday evening peak-hour and at LOS B during the Saturday midday peak-hour under 2018 No-Build, 2018 Build and 2018 Build with Mitigation conditions (no change in overall LOS reported over No-Build conditions).

**Comment:** *The queue length along Concord Street northbound approaching the intersection would increase by approximately 100 feet during the PM peak period extending past the Prindiville Avenue/Burdette Avenue intersection.*

**Response:** Under 2018 Build with Mitigation conditions, the projected average north and southbound vehicle queues on Concord Street are estimated to increase by between 1 to 2 vehicles during the peak periods, with the 95<sup>th</sup> percentile queue (exceeded only 5 percent of the time during the peak-hour) estimated to increase by between 5 to 6 vehicles during the peak periods. However, overall delays at the improved intersection are projected to increase by only 2 seconds during the weekday evening peak-hour and by 2.9 seconds during the Saturday midday peak-hour when compared to No-Build conditions.



**Comment:** CONCORD STREET AT PRINDIVILLE/BURDETTE AND CONCORD STREET AT NORMANDY ROAD/THELMA ROAD

*Without mitigation proposed at these two unsignalized intersections within the study area, a few approaches will remain a LOS F during the 2018 Build with mitigation conditions. These approaches are listed below:*

*Concord Street at Prindiville Avenue/Burdette Avenue*

- *PM - Prindiville Avenue & Burdette Avenue*
- *Saturday - Prindiville Avenue*

*Concord Street at Normandy Road/Thelma Road*

- *PM - Thelma Road*

*Due to the long queuing and traffic congestion issue, a traffic signal warrant analysis should be included for these two intersections to improve overall traffic progression.*

**Response:** An analysis of operating conditions at the unsignalized intersections of Concord Street at Normandy Road and Thelma Road and Concord Street at Prindiville Avenue and Burdette Avenue indicates that motorists exiting Thelma Road, Prindiville Avenue and Burdette Avenue experience excessive delay during one or both peak periods under 2013 Existing conditions independent of the Project due to the relatively large volume of conflicting traffic on Concord Street. The addition of Project-related traffic to these intersections resulted in a minimal increase in vehicle queuing over No-Build conditions (0 to 1 vehicle).

Given the reported poor operating conditions at these intersections again, independent of the Project, a Traffic Signal Warrant Analysis (TSWA) was conducted at both locations in accordance with the methodology and procedures outlined in the Manual on Uniform Traffic Control Devices (MUTCD).<sup>2</sup> In order to complete this analysis, 12-hour manual turning movement and vehicle classification counts were conducted at the subject intersections on Wednesday, October 9, 2013.

In brief, The MUTCD establishes nine warrants or criteria to evaluate a location for the installation (or retention) of a traffic signal. At least one of the nine warrants must be satisfied in order to justify the installation or retention of a traffic signal; however, satisfaction of a warrant in and of itself does not necessarily indicate that the installation of a traffic signal is the best traffic control solution. An engineering evaluation of the location in question should indicate that the establishment of traffic signal control will improve the overall safety and/or operation of the intersection. Table B lists the nine warrants used to evaluate an intersection for traffic signal control as presented in the MUTCD.

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<sup>2</sup>Ibid.

**Table B**  
**TRAFFIC SIGNAL WARRANTS**

Warrant No.	Description
1	Eight-Hour Vehicular Volume
2	Four-Hour Vehicular Volume
3	Peak-Hour
4	Pedestrian Volume
5	School Crossing
6	Coordinated Signal System
7	Crash Experience
8	Roadway Network
9	Intersection Near a Grade Crossing

Each of the nine traffic signal warrants listed in Table B were evaluated for the intersections of Concord Street at Normandy Road and Thelma Road and Concord Street at Prindiville Avenue and Burdette Avenue based on the current intersection geometry and under 2013 Existing, 2018 No-Build and 2018 Build traffic volume conditions. Based on this evaluation, the installation of a traffic control signal was not found to be warranted at either intersection. Further, the installation of a traffic control signal at either intersection absent intervening measures would have the distinct potential to induce cut-through traffic on the intersecting residential roadways. The detailed TSWA worksheets and supporting materials are attached.

### Off-Site Mitigation

**Comment:** *BETA has reviewed the proposed measures of mitigation by the proponent, assessed the adequacy of the measures and recommended additional mitigation measures to be considered of this development.*

#### CONCORD STREET AT ANZIO ROAD/GORMAN ROAD

*The proponent proposes to upgrade and/or replace the existing signs and pavement markings as needed, relamp and adjust existing signal indications, adjust the signal timing and repair vehicle detection at the intersection.*

- *In addition, BETA recommends the signal equipment be upgraded. For example, the 8-inch signal lenses be replaced with the current standard 12-inch lenses, the pedestrian signals be upgraded, and a minimum of one traffic signal per direction be mounted overhead to improve the overall safety at the intersection and help reduce the higher than average crash rate. Also, the signal cabinet be replaced and controller be upgraded.*



**Response:** As part of the Project, existing signs and pavement markings at the Concord Street/Anzio Road/Gorman Road intersection will be reviewed, upgraded and/or replaced as necessary; the traffic signal indications will be relamped to include 12-inch LED-type indications and adjusted as may be required in order to improve the visibility of the signal indications; pedestrian push-buttons and signal heads will be replaced as may be necessary to meet current design standards; the existing traffic signal timing will be reviewed and adjusted as may be necessary with a particular emphasis on the yellow and all-read clearance intervals; and the vehicle detection system will be evaluated and repaired/replaced or adjusted as necessary. The existing traffic signal controller and cabinet will be reviewed in the context of the planned improvements and will be upgraded or replaced as may be necessary to accommodate the proposed modifications to the traffic signal system.

The above measures have been purposely designed to reduce the frequency of occurrence of motor vehicle crashes at the intersection and off-set the potential impacts of the Project, and can be completed within the public right-of-way subject to receipt of all necessary rights, permits and approvals. The suggested addition of traffic signal poles and mast arms would appear to require private property acquisition in order to accommodate the poles and foundations, and allow for the passage of pedestrians.

**Comment:** *The analysis shows the same pedestrian phase timing at this intersection for the 2013 Existing analysis and the 2018 Build with mitigation analysis. Please verify that the pedestrian phase timing is in conformance with the latest 2009 MUTCD standards.*

**Response:** The revised traffic operations analysis summarized in Table 12A has been refined to reflect the modified pedestrian phase timing at this intersection.

**Comment:** CONCORD STREET AT HARTFORD STREET/SOUTH DRIVEWAY  
*The proponent is proposing to integrate the southern driveway into the existing signal system at the intersection. The driveway signalization will provide a safer and more efficient traffic operation. It is unclear as to whether or not the proponent is planning to reconstruct the entire intersection and upgrade all of the signal equipment.*

**Response:** The traffic signal system at the intersection of Concord Street at Hartford Street and the Project site driveway will be reconstructed, upgraded and replaced in its entirety. A Conceptual Improvement Plan depicting the planned intersection and traffic control improvements at the intersection is enclosed.

**Comment:** *In order to improve the visibility of the traffic signals a minimum of one signal head per approach should be mounted overhead, several of the signal heads should be replaced, the pedestrian signals should be replaced and upgraded with APS equipment, and the intersection should be ADA must compliant. In addition, fire station traffic signal system pre-emption should be integrated as part of the signal upgrade. We request that the proponent verify that these improvements will be included as part of the proposed mitigation.*

**Response:** As stated previously, the traffic signal system at the intersection of Concord Street at Hartford Street and the Project site driveway will be reconstructed, upgraded and replaced in its entirety, and will include APS equipment and ADA compliant wheelchair



ramps and pedestrian traffic signal equipment. The reconstructed traffic signal system will include an emergency vehicle pre-emption system and will be coordinated with the flashing emergency signal at the fire station. A Conceptual Improvement Plan depicting the planned intersection and traffic control improvements at the Concord Street/Hartford Street/Project site driveway intersection is enclosed.

**Comment:** *The analysis shows identical pedestrian phase timing at this intersection for the 2013 Existing analysis and the 2018 Build with mitigation analysis. An average of 25 pedestrians per hour cross at the intersection during the weekday peak period. Please verify that the pedestrian phase timing is in conformance with the proper pedestrian clearance according to the latest 2009 MUTCD standards.*

**Response:** The revised traffic operations analysis summarized in Table 12A has been refined to reflect the modified pedestrian phase timing at this intersection.

### **Neighborhood Roadway Traffic Impact**

**Comment:** *The study did not evaluate potential cut-through traffic through the immediate surrounding neighborhoods.*

**Response:** The access configuration for the Project and the planned off-site roadway, intersection and traffic control improvements have been specifically designed to reduce the potential inducement of cut-through traffic through the immediate surrounding residential neighborhoods for residents not destined to the Project site. The access configuration for the Project has been purposely designed to focus traffic toward Concord Street and Hartford Street, with no access afforded from or proximate to the immediate residential streets. Further, the planned improvements to the Concord Street/Hartford Street and Concord Street/Anzio Road/Gorman Road intersections, including the interconnection and coordination of traffic signals along the Concord Street corridor (inclusive of the flashing emergency signal at the fire station) will facilitate the safe and efficient movement of vehicles, pedestrians and bicycles in the area such that the introduction of Project-related traffic will not in and of itself induce cut-through traffic on neighborhood streets.

### **SITE PLAN**

**Comment:** *BETA has reviewed the site plan specifically for geometric, access and traffic circulation concerns and offers the following comments:*

*An estimation of the anticipated average and maximum queue length for the dual drive-thru was not included in the TIAS for the proposed facility. Based on the site plan, there is approximately 140' of queue storage (approximately 6 vehicles) for the inner drive-thru lane and approximately 65' (approximately 3 vehicles) before conflict would occur between queued vehicles and vehicles entering/exiting the north entrance or vehicles circulating the parking lot. We request that the proponent provide an empirical queue analysis by collecting queue length data at two similar dual drive-thru CVS/pharmacy locations to verify that the queues would not extend back enough to create conflict.*



**Response:** Vehicle queue observations were completed at the drive-through prescription facilities in conjunction with the traffic counts performed at the two (2) CVS/pharmacy® locations that were selected to establish the empirical trip rates for the Project. Based on these observations, the average vehicle queue was found to be approximately one (1) vehicle and the maximum observed vehicle queue was found to be three (3) vehicles. As such, and as indicated in BETA's review of the drive-through prescription facility, the drive-through area is appropriately designed to accommodate the observed maximum vehicle queue without impeding access to the Project site or on-site circulation. The drive-through prescription facility vehicle queue observations are attached hereto.

It should be noted that the Site Plan for the Project has been revised to eliminate the outer drive-through lane. This modification would not impact the conclusion stated above with respect to the adequacy of the drive-through facility to accommodate the projected vehicle queue given that the queue observations cited above represent the observed queue on a per lane basis and that simultaneous occupancy of both lanes by a vehicle was infrequent and limited in duration.

**Comment:** *We request that the proponent identify the primary route for emergency, delivery (WB-50) and service vehicles to the site and graphically shown circulating the site using AutoTurn to ensure that vehicle turning radii are adequate. It is unclear how a WB-50 truck will be able to perform delivery at the loading dock.*

**Response:** An AutoTurn® analysis for the requested vehicles has been prepared by Civil Design Group and is attached hereto.

**Comment:** *The 12'x25' loading area as shown behind the proposed CVS appears to allow an approximately 10' wide lane for drive-thru vehicles to travel through. Circulation would be more challenging if loading vehicles parked slightly outside their allotted area. It appears that the delivery truck will be in conflict with the drive-thru operation.*

**Response:** The designated loading area shown behind the proposed building is sufficiently wide to accommodate small delivery vehicles such as FedEx, UPS, Coke, Pepsi and similar vendors, while affording sufficient room for vehicles to maneuver around such vehicles in a safe and efficient manner, even in the event that said vehicles may be parked slightly outside of the designated area.

With respect to the loading area for the tractor-semitrailer combination (WB-50), deliveries by such vehicles will occur approximately one (1) to two (2) times per week and are scheduled during off-peak customer hours. When these deliveries occur, the drive-through lane adjacent to the pharmacy building is closed and traffic cones are placed to direct vehicles around the truck.

**Comment:** *The site plan shows 13 less parking spaces provided than required. Additional parking needs to be provided.*

**Response:** The Project will provide 71 parking spaces to meet the needs of customers and employees, or a parking ratio of approximately 4.67 spaces per 1,000 sf. This parking ratio exceeds the observed peak parking demand values published by the Institute of



Transportation Engineers (ITE)<sup>3</sup> for a pharmacy with drive-through window, which documented average and 85<sup>th</sup> percentile peak parking demands of 2.39 and 2.92 spaces per 1,000 sf, respectively, on a weekday, and 2.18 and 2.94 spaces per 1,000 sf, respectively, on a Saturday. As such, the proposed parking supply is sufficient to meet the anticipated parking demands of the Project while preserving (or increasing) open space and reducing impervious area.

## **CONCORD STREET AT NORTH DRIVEWAY**

**Comment:** *The proponent is proposing to create a right-turn in access and right-turn out only egress at the north driveway and offers the following recommendations:*

*BETA recommends the installation of “No Left Turn” signage at the north site driveway to deter prohibited left turn movements from Concord Street northbound into the driveway.*

**Response:** The enclosed Conceptual Improvement Plan reflects the installation of the requested signs.

**Comment:** *BETA recommends the installation of “Do Not Enter” signage at the north site driveway to deter left turn movements from Concord Street northbound into the driveway egress lane.*

**Response:** The enclosed Conceptual Improvement Plan reflects the installation of the requested signs.

**Comment:** *BETA recommends the consideration of a raised median at the north site driveway in order to physically deter and prohibit left-turn movements into or out of the driveway.*

**Response:** In order to accommodate the turning and maneuvering requirements for delivery trucks, the island to be installed within the north Project site driveway will be a flush, serrated concrete island. The proposed island in combination with: i) the redesign of the driveway to improve the channelization of vehicles exiting the Project site; and ii) the installation of the recommended turn restriction signs noted above and depicted on the enclosed Conceptual Improvement Plan; will serve to deter motorists from turning left to enter or exit the Project site at the north Project site driveway.

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<sup>3</sup>*Parking Generation*, 4<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, D.C.; 2010.



Town of Framingham  
November 4, 2013  
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We trust that this information is responsive to the comments that were raised in the October 2, 2013 *Peer Review of Traffic Impact and Access Study* letter prepared by BETA concerning their review of the July 2013 TIAS and the associated Site Plans prepared in support of the Project. If you should have any questions regarding our responses or would like to discuss the information in more detail, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read "Jeffrey S. Dirk", is written over a faint, oval-shaped background.

Jeffrey S. Dirk, P.E., PTOE, FITE  
Principal

JSD/LAS

Attachments

cc: K. Ho, P.E., PTOE – BETA Group, Inc. (via email)  
E. Youssef (via email)  
P. Galvani, Esquire (via email)  
P. Henry, P.E. - Civil Design Group, LLC (via email)  
C. Moretti – T.M. Crowley (via email)  
LAS, File

**Table 9A**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak Hour/Movement	2013 Existing				2018 No-Build				2018 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b>Concord Street at Anzio Road and Gorman Road</b>												
<i>Weekday Evening:</i>												
Anzio Road EB LT	0.69	52.4	D	6/7	0.70	52.8	D	6/7	0.70	52.8	D	6/7
Anzio Road EB TH/RT	0.12	21.9	C	1/1	0.12	21.8	C	1/1	0.12	21.8	C	1/1
Concord Street NB TH/RT	0.86	28.4	C	20/34	0.89	31.6	C	21/36	0.91	32.7	C	22/37
Concord Street SB LT	0.49	12.8	B	1/3	0.52	18.4	B	1/4	0.55	21.9	C	2/5
Concord Street SB TH	0.69	10.7	B	12/20	0.71	11.3	B	13/21	0.72	11.5	B	13/22
<b>Overall</b>	--	<b>22.0</b>	<b>C</b>	--	--	<b>23.9</b>	<b>C</b>	--	--	<b>24.8</b>	<b>C</b>	--
<i>Saturday Midday:</i>												
Anzio Road EB LT	0.71	53.1	D	6/9	0.72	53.5	D	6/9	0.72	53.5	D	6/9
Anzio Road EB TH/RT	0.09	22.4	C	1/2	0.09	22.4	C	1/2	0.09	22.4	C	1/2
Concord Street NB TH/RT	0.82	24.6	C	20/34	0.84	26.4	C	21/36	0.86	28.0	C	23/37
Concord Street SB LT	0.25	5.8	A	1/1	0.27	6.2	A	1/1	0.28	6.4	A	1/1
Concord Street SB TH	0.60	8.8	A	9/15	0.62	9.3	A	10/16	0.63	9.5	A	11/16
<b>Overall</b>	--	<b>20.6</b>	<b>C</b>	--	--	<b>21.6</b>	<b>C</b>	--	--	<b>22.4</b>	<b>C</b>	--

See notes at end of table.



**Table 9A (Continued)**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak Hour/Movement	2013 Existing				2018 No-Build				2018 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b>Concord Street at Hartford Street and South Project Site Driveway</b>												
<i>Weekday Evening:</i>												
South Project Site Driveway EB LT/TH/RT	0.03	20.2	C	0/1	0.03	20.2	C	0/1	--	--	--	--
South Project Site Driveway EB LT	--	--	--	--	--	--	--	--	0.33	37.6	D	1/2
South Project Site Driveway EB TH/RT	--	--	--	--	--	--	--	--	0.17	14.4	B	1/2
Hartford Street WB LT/TH	1.01	>80.0	F	5/9	1.04	>80.0	F	5/9	1.20	>80.0	F	6/10
Hartford Street WB RT	0.64	9.4	A	0/2	0.64	9.5	A	0/2	0.64	9.5	A	0/2
Concord Street NB LT/TH	0.71	17.2	B	10/16	0.73	18.0	B	11/17	0.82	22.8	C	12/22
Concord Street NB RT	0.10	1.0	A	0/1	0.10	1.1	A	0/1	0.10	1.0	A	0/1
Concord Street SB LT	0.28	5.0	A	1/1	0.30	5.2	A	1/1	0.31	5.4	A	1/1
Concord Street SB TH/RT	0.62	7.8	A	6/10	0.63	8.1	A	7/10	0.63	8.1	A	7/10
<b>Overall</b>	--	<b>19.6</b>	<b>B</b>	--	--	<b>20.6</b>	<b>C</b>	--	--	<b>28.5</b>	<b>C</b>	--
<i>Saturday Midday:</i>												
South Project Site Driveway EB LT/TH/RT	0.07	16.6	B	0/0	0.07	16.6	B	0/0	--	--	--	--
South Project Site Driveway EB LT	--	--	--	--	--	--	--	--	0.24	30.9	C	1/2
South Project Site Driveway EB TH/RT	--	--	--	--	--	--	--	--	0.22	14.3	B	1/2
Hartford Street WB LT/TH	0.53	43.5	D	3/5	0.63	44.2	D	3/5	0.71	49.4	D	3/6
Hartford Street WB RT	0.54	9.3	A	0/2	0.55	9.2	A	0/2	0.54	9.0	A	0/2
Concord Street NB LT/TH	0.71	16.9	B	10/16	0.73	17.8	B	11/17	0.85	25.7	C	13/23
Concord Street NB RT	0.08	0.8	A	0/1	0.09	0.8	A	0/1	0.08	0.8	A	0/1
Concord Street SB LT	0.23	4.4	A	1/1	0.24	4.6	A	1/1	0.26	4.9	A	1/1
Concord Street SB TH/RT	0.62	7.7	A	6/10	0.64	8.0	A	7/11	0.64	8.3	A	7/11
<b>Overall</b>	--	<b>13.0</b>	<b>B</b>	--	--	<b>13.4</b>	<b>B</b>	--	--	<b>17.3</b>	<b>B</b>	--

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Percentile delay per vehicle in seconds.

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.



**Table 10A**  
**UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/Peak Hour/Movement	2013 Existing				2018 No-Build				2018 Build			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>
<b>Concord Street at Normandy Road and Thelma Road</b>												
<i>Weekday Evening:</i>												
Normandy Road EB LT/TH/RT	65	28.7	D	2	67	30.8	D	2	67	31.7	D	2
Thelma Road WB LT/TH/RT	7	>50.0	F	1	7	>50.0	F	1	7	>50.0	F	1
Concord Street NB LT	87	10.8	B	1	89	11.0	B	1	89	11.1	B	1
Concord Street NB TH/RT	902	0.0	A	0	925	0.0	A	0	943	0.0	A	0
Concord Street SB LT	4	9.9	A	0	4	9.9	A	0	4	10.1	B	0
Concord Street SB TH/RT	919	0.0	A	0	942	0.0	A	0	952	0.0	A	0
<i>Saturday Midday:</i>												
Normandy Road EB LT/TH/RT	53	23.2	C	1	54	24.3	C	1	54	25.3	D	1
Thelma Road WB LT/TH/RT	2	16.7	C	0	2	17.1	C	0	2	17.5	C	0
Concord Street NB LT	64	10.3	B	1	66	10.4	B	1	66	10.5	B	1
Concord Street NB TH/RT	859	0.0	A	0	881	0.0	A	0	904	0.0	A	0
Concord Street SB LT	2	9.9	A	0	2	10.1	B	0	2	10.2	B	0
Concord Street SB TH/RT	838	0.0	A	0	859	0.0	A	0	876	0.0	A	0
<b>Concord Street at the Project Site North Driveway and the Gulf Gas Station Driveway</b>												
<i>Weekday Evening:</i>												
Project Site North Driveway EB LT/TH/RT	2	>50.0	F	1	2	>50.0	F	1	--	--	--	--
Project Site North Driveway EB RT	--	--	--	--	--	--	--	--	8	16.7	C	0
Gulf Gas Station Driveway WB LT/TH/RT	33	23.3	C	1	33	24.3	C	1	33	25.1	D	1
Concord Street NB LT/TH/RT	975	0.0	A	0	1,000	0.0	A	0	1,019	0.0	A	0
Concord Street SB LT/TH/RT	889	0.1	A	0	911	0.1	A	0	921	0.1	A	0
<i>Saturday Midday:</i>												
Project Site North Driveway EB LT/TH/RT	3	>50.0	F	1	3	>50.0	F	1	--	--	--	--
Project Site North Driveway EB RT	--	--	--	--	--	--	--	--	9	16.8	C	0
Gulf Gas Station Driveway WB LT/TH/RT	25	19.5	C	1	25	20.1	C	1	25	20.8	C	1
Concord Street NB LT/TH/RT	901	0.0	A	0	924	0.0	A	0	949	0.0	A	0
Concord Street SB LT/TH/RT	852	0.2	A	0	873	0.2	A	0	890	0.2	A	0

See notes at end of table.



**Table 10A (Continued)**  
**UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/Peak Hour/Movement	2013 Existing				2018 No-Build				2018 Build			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>
<b>Concord Street at Prindiville Avenue and Burdette Avenue</b>												
<i>Weekday Evening:</i>												
Prindiville Avenue EB LT/TH/RT	45	>50.0	F	4	46	>50.0	F	4	46	>50.0	F	5
Burdette Avenue WB LT/TH/RT	21	>50.0	F	1	21	>50.0	F	2	21	>50.0	F	2
Concord Street NB LT/TH/RT	769	0.4	A	0	788	0.4	A	0	816	0.4	A	0
Concord Street SB LT/TH/RT	964	0.1	A	0	988	0.1	A	0	1,018	0.1	A	0
<i>Saturday Midday:</i>												
Prindiville Avenue EB LT/TH/RT	49	>50.0	F	4	50	>50.0	F	4	50	>50.0	F	4
Burdette Avenue WB LT/TH/RT	8	48.8	E	1	8	>50.0	F	1	8	>50.0	F	1
Concord Street NB LT/TH/RT	768	0.3	A	0	787	0.2	A	0	824	0.2	A	0
Concord Street SB LT/TH/RT	875	0.0	A	0	897	0.0	A	0	934	0.0	A	0

<sup>a</sup>Demand in vehicles per hour.

<sup>b</sup>Average control delay per vehicle (in seconds).

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.



**Table 12A**  
**MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak Hour/Movement	2018 No-Build				2018 Build				2018 Build with Mitigation			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b>Concord Street at Anzio Road and Gorman Road</b>												
<i>Weekday Evening:</i>												
Anzio Road EB LT	0.70	52.8	D	6/7	0.70	52.8	D	6/7	0.73	54.7	D	6/7
Anzio Road EB TH/RT	0.12	21.8	C	1/1	0.12	21.8	C	1/1	0.12	22.0	C	1/1
Concord Street NB TH/RT	0.89	31.6	C	21/36	0.91	32.7	C	22/37	0.91	31.8	C	22/37
Concord Street SB LT	0.52	18.4	B	1/4	0.55	21.9	C	2/5	0.54	20.5	C	2/4
Concord Street SB TH	0.71	11.3	B	13/21	0.72	11.5	B	13/22	0.72	10.6	B	13/19
<b>Overall</b>	--	<b>23.9</b>	<b>C</b>	--	--	<b>24.8</b>	<b>C</b>	--	--	<b>24.1</b>	<b>C</b>	--
<i>Saturday Midday:</i>												
Anzio Road EB LT	0.72	53.5	D	6/9	0.72	53.5	D	6/9	0.72	51.6	D	6/9
Anzio Road EB TH/RT	0.09	22.4	C	1/2	0.09	22.4	C	1/2	0.09	21.8	C	1/2
Concord Street NB TH/RT	0.84	26.4	C	21/36	0.86	28.0	C	23/37	0.88	28.8	C	23/35
Concord Street SB LT	0.27	6.2	A	1/1	0.28	6.4	A	1/1	0.28	6.3	A	1/1
Concord Street SB TH	0.62	9.3	A	10/16	0.63	9.5	A	11/16	0.64	9.3	A	10/15
<b>Overall</b>	--	<b>21.6</b>	<b>C</b>	--	--	<b>22.4</b>	<b>C</b>	--	--	<b>22.4</b>	<b>C</b>	--

See notes at end of table.



**Table 12A (Continued)**  
**MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak Hour/Movement	2018 No-Build				2018 Build				2018 Build with Mitigation			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b>Concord Street at Hartford Street and South Project Site Driveway</b>												
<i>Weekday Evening:</i>												
South Project Site Driveway EB LT/TH/RT	0.03	20.2	C	0/1	--	--	--	--	--	--	--	--
South Project Site Driveway EB LT	--	--	--	--	0.33	37.6	D	1/2	0.17	24.8	C	1/2
South Project Site Driveway EB TH/RT	--	--	--	--	0.17	14.4	B	1/2	0.13	11.6	B	1/2
Hartford Street WB LT/TH	1.04	>80.0	F	5/9	1.20	>80.0	F	6/10	0.85	54.5	D	5/9
Hartford Street WB RT	0.64	9.5	A	0/2	0.64	9.5	A	0/2	0.56	6.8	A	0/2
Concord Street NB LT/TH	0.73	18.0	B	11/17	0.82	22.8	C	12/22	0.92	34.7	C	13/23
Concord Street NB RT	0.10	1.1	A	0/1	0.10	1.0	A	0/1	0.11	1.2	A	0/1
Concord Street SB LT	0.30	5.2	A	1/1	0.31	5.4	A	1/1	0.43	10.6	B	1/2
Concord Street SB TH/RT	0.63	8.1	A	7/10	0.63	8.1	A	7/10	0.71	12.4	B	8/13
<b>Overall</b>	--	<b>20.6</b>	<b>C</b>	--	--	<b>28.5</b>	<b>C</b>	--	--	<b>22.6</b>	<b>C</b>	--
<i>Saturday Midday:</i>												
South Project Site Driveway EB LT/TH/RT	0.07	16.6	B	0/0	--	--	--	--	--	--	--	--
South Project Site Driveway EB LT	--	--	--	--	0.24	30.9	C	1/2	0.22	29.6	C	1/2
South Project Site Driveway EB TH/RT	--	--	--	--	0.22	14.3	B	1/2	0.21	14.0	B	1/2
Hartford Street WB LT/TH	0.63	44.2	D	3/5	0.71	49.4	D	3/6	0.70	48.3	D	3/6
Hartford Street WB RT	0.55	9.2	A	0/2	0.54	9.0	A	0/2	0.53	8.9	A	0/2
Concord Street NB LT/TH	0.73	17.8	B	11/17	0.85	25.7	C	13/23	0.84	23.2	C	12/22
Concord Street NB RT	0.09	0.8	A	0/1	0.08	0.8	A	0/1	0.08	0.7	A	0/1
Concord Street SB LT	0.24	4.6	A	1/1	0.26	4.9	A	1/1	0.28	5.1	A	1/1
Concord Street SB TH/RT	0.64	8.0	A	7/11	0.64	8.3	A	7/11	0.65	8.3	A	6/10
<b>Overall</b>	--	<b>13.4</b>	<b>B</b>	--	--	<b>17.3</b>	<b>B</b>	--	--	<b>16.3</b>	<b>B</b>	--

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Percentile delay per vehicle in seconds.

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in vehicles.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.



## ATTACHMENTS

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OCTOBER 2, 2013 BETA REVIEW LETTER  
CONCEPTUAL IMPROVEMENT PLAN  
REVISED PEAK-HOUR TRAFFIC-VOLUME NETWORKS  
MASSDOT CRASH RATE WORKSHEETS  
EMPIRICAL TRIP-GENERATION DATA  
PEDESTRIAN SIGNAL TIMING CALCULATIONS  
CAPACITY ANALYSIS WORKSHEETS  
TRAFFIC SIGNAL WARRANTS ANALYSIS  
DRIVE-THROUGH WINDOW VEHICLE QUEUE OBSERVATIONS  
AUTOTURN EXHIBITS

OCTOBER 2, 2013 BETA REVIEW LETTER

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October 2, 2013

Town of Framingham  
Planning Board  
Memorial Building  
150 Concord Street  
Framingham, Massachusetts 01702

Attn.: Ms. Amanda L. Loomis  
Planning Board Administrator

Re: **Framingham, Massachusetts**  
Proposed CVS/pharmacy – Concord Street (Route 126) & Hartford Street

Dear Ms. Loomis:

BETA Group, Inc. (BETA) has completed our review of the *Traffic Impact and Access Study (TIAS)* prepared for the proposed CVS/Pharmacy project located in the Town of Framingham. This review focused primarily on the traffic impacts on the surrounding roadway network system within the project study area adjacent to the proposed site with a focus on the off-site mitigation measures proposed by the proponent and traffic related site plan review.

The following materials prepared by the applicant have been received and are incorporated into our review:

- *Traffic Impact and Access Study CVS/Pharmacy*, Framingham, Massachusetts; Vanasse & Associates, Inc., July 22, 2013
- *Site Plan for CVS/pharmacy at Store #1034*; 480-498 Concord Street, Framingham, MA 01702, Issued to the Town of Framingham Planning Board, Dated August 7<sup>th</sup>, 2013, Civil Design Group, LLC.

Our findings based on the provided information are as follows:

## **TRAFFIC IMPACT AND ACCESS STUDY**

### ***PROJECT DESCRIPTION***

The project site is located along the west side of the Concord Street (Route 126) and Hartford Street intersection. The existing site consists of Pepperoncini's Pizzeria, a residential home with repair shop and a commercial building. Although the intersection of Concord Street (Route 126)

and Hartford Street is signalized, but includes the unsignalized driveway to Pepperoncini's which makes up the fourth leg of the intersection.

**STUDY AREA INTERSECTIONS**

The study area included within this review encompasses the following intersections:

SIGNALIZED INTERSECTIONS

Concord Street at Anzio Road/Gorman Road

Concord Street at Hartford Street (Pepperoncini Driveway unsignalized)

UNSIGNALIZED INTERSECTIONS

Concord Street at Normandy Road/Thelma Road

Concord Street at North Project Site Driveway/Gulf Station Driveway

Concord Street at Prindiville Avenue/Burdette Avenue

*We recommend that the fire station signal system be included in the study.*

**TRAFFIC VOLUMES**

The proponent conducted turning movement counts (TMC) during the weekday evening (4-6PM) and Saturday mid-day peak period (11AM-2PM) at all of the study area intersections. The counts were conducted on Thursday, May 30<sup>th</sup> and Saturday June 1<sup>st</sup>, 2013. The overall peak hours for the weekday evening and Saturday mid-day peaks were determined to be 5:00-6:00 PM and 12:45-1:45 PM, respectively. BETA finds this acceptable.

The proponent compared the May and June volumes collected with 2007 MassDOT seasonal adjustment factor data, which showed May and June data to be higher than the average month. To be conservative, the proponent did not adjust the volumes downward to reflect average month conditions and BETA finds this acceptable.

**PEDESTRIAN AND BICYCLE FACILITIES**

A field inventory by the proponent was performed of the pedestrian and bicycle facilities in the study area. This inventory failed to mention the antiquated pedestrian traffic signals, faded crosswalks, non ADA compliant wheelchair ramps (see Figure 1) and lack of Accessible Pedestrian signal equipment at the Concord Street and Hartford Street/Site driveway intersection. Wheelchair ramps are not provided at the majority of pedestrian crossings at the intersection. *The proponent should include a pedestrian accommodation upgrade and bicycle accommodations as part of the intersection mitigation.*



Figure 1 Looking eastbound across Concord Street north of Hartford Street.

**MOTOR VEHICLE CRASH DATA**

The proponent performed accident analyses for the years of 2008-2010 based on the most recent data available from MassDOT at the time of the study. MassDOT has recently released the 2011

crash data. *We recommend that the proponent review and include the 2011 crash data into this report.*

Crash rates were computed for all intersections and compared to the most recent MassDOT District 3 average. The calculated crash rates are lower than the District 3 average for all but one of the intersections. **The crash rate calculated for the intersection of Concord Street at Anzio Road/Gorman Road is 1.38 crashes per million entering vehicles (MEV) which is significantly higher than the District 3 average of 0.89 MEV and Statewide average of 0.80 MEV.** The majority of these crashes were rear-end or angle crashes. Upon review of the intersection, it is apparent that the signal layout does not meet current MUTCD standards. For instance, the existing signal lenses are 8-inches while the current standard is a 12-inch lense; currently no overhead signals are provided at the intersection but the current standard is to mount a minimum of one traffic signal overhead. Improving these features would improve the overall safety at the Concord Street at Anzio Road/Gorman Road intersection and reduce the higher than average crash rate. *We recommend the proponent consider these upgrades as part of their off-site mitigation.*

#### ***FUTURE TRAFFIC GROWTH***

Traffic volumes were projected to 2018 to reflect a future 5-year planning horizon. No-Build conditions were calculated by increasing existing traffic volumes by an annual growth rate of 1% per year (over a 5-yr period). We find this growth rate to be high. A growth rate of 0.5% has historically been used for projects in Town. *We recommend that the proponent adjust the future volumes accordingly to incorporate a growth rate of 0.5% per year over 5 years.*

Discussions with the Town Planning Department confirmed that no additional planned development traffic is expected and therefore we find it acceptable that the proponent added no additional future development traffic to the volumes.

#### ***TRIP GENERATION (SITE-GENERATED TRAFFIC)***

The proposed trip generation data was calculated using the latest Institute of Transportation Engineers (ITE) data Land Use Code 881 -Pharmacy/Drugstore with Drive-Through Window. As a result of this project, the expected new trips are 113 and 93 during the weekday evening and Saturday mid-day peak periods, respectively. *We request that the proponent verify the daily Saturday number of vehicle trips were determined since the ITE Trip Generation manual has insufficient information to determine these trips. We also request that the proponent collect empirical trip generation data from two or three similar dual drive-thru sites to support the ITE trip generation data.*

The percentage of pass-by trips was also calculated using ITE data. A pass-by deduction of 25% was taken from the proposed traffic volumes and not added to the No-Build roadway network volumes during each of the peak periods. BETA finds this standard practice acceptable.

**TRIP DISTRIBUTION/ASSIGNMENT**

Site generated trips were distributed onto the study area network based on the review of existing traffic patterns. The weekday evening and Saturday mid-day volumes are similar. We question this trip distribution. The 50% trip distribution from north of the site seems high as there are several types of drug stores on Route 9. *We ask the proponent verify the trip distribution.*

**CAPACITY & QUEUE ANALYSIS**

CONCORD STREET AT ANZIO ROAD/GORMAN ROAD

Capacity and queue analysis results were not provided for the 2018 Build with mitigation condition at the intersection of Concord Street at Anzio Road/Gorman Road. *The capacity analysis results should be provided for our review.*

A review of the 2013 Existing and 2018 Build condition revealed that the Concord Street northbound approach would degrade from a LOS C to LOS D and the southbound approach would degrade from a LOS B to LOS C. While the LOS may be acceptable, queuing is a problem along the Concord Street corridor. The northbound queue length currently extends more than 900 feet which is past the Normandy Road/Thelma Road intersection. Queue lengths along Concord Street approaching the intersection would increase by approximately 100 feet in both directions during both peak periods.

CONCORD STREET AT HARTFORD STREET/SOUTH DRIVEWAY

Overall, the analysis reflects minor degradations in overall LOS and/or delay from the 2013 Existing to 2018 Build with mitigation conditions at the Concord Street and Hartford Street/Site driveway intersection. The most significant movement improvement would be the Hartford Street westbound approach to the intersection. This movement would improve from a LOS F to a LOS E during the PM peak period. All other movements would continue to operate at a LOS D or better.

The overall intersection would degrade from a LOS B to LOS C with an increase in delay from 19.6 seconds to 22.1 seconds from the 2013 Existing to 2018 Build with mitigation condition during the evening peak and remain a LOS B with a 13.0 to 14.4 increase in delay during the Saturday mid-day peak period.

The queue length along Concord Street northbound approaching the intersection would increase by approximately 100 feet during the PM peak period extending past the Prindiville Avenue/Burdette Avenue intersection.

CONCORD STREET AT PRINDIVILLE/BURDETTE AND CONCORD STREET AT NORMANDY ROAD/THELMA ROAD

Without mitigation proposed at these two unsignalized intersections within the study area, a few approaches will remain a LOS F during the 2018 Build with mitigation conditions. These approaches are listed below:

Concord Street at Prindiville Avenue/Burdette Avenue

- PM - Prindiville Avenue & Burdette Avenue
- Saturday - Prindiville Avenue



Concord Street at Normandy Road/Thelma Road

- PM - Thelma Road

*Due to the long queuing and traffic congestion issue, a traffic signal warrant analysis should be included for these two intersections to improve overall traffic progression.*

**OFF-MITIGATION**

BETA has reviewed the proposed measures of mitigation by the proponent, assessed the adequacy of the measures and recommended additional mitigation measures to be considered of this development.

CONCORD STREET AT ANZIO ROAD/GORMAN ROAD

The proponent proposes to upgrade and/or replace the existing signs and pavement markings as needed, relamp and adjust existing signal indications, adjust the signal timing and repair vehicle detection at the intersection.

- *In addition, BETA recommends the signal equipment be upgraded.* For example, the 8-inch signal lenses be replaced with the current standard 12-inch lenses, the pedestrian signals be upgraded, and a minimum of one traffic signal per direction be mounted overhead to improve the overall safety at the intersection and help reduce the higher than average crash rate. Also, the signal cabinet be replaced and controller be upgraded.
- The analysis shows the same pedestrian phase timing at this intersection for the 2013 Existing analysis and the 2018 Build with mitigation analysis. *Please verify that the pedestrian phase timing is in conformance with the latest 2009 MUTCD standards.*

CONCORD STREET AT HARTFORD STREET/SOUTH DRIVEWAY

The proponent is proposing to integrate the southern driveway into the existing signal system at the intersection. The driveway signalization will provide a safer and more efficient traffic operation. It is unclear as to whether or not the proponent is planning to reconstruct the entire intersection and upgrade all of the signal equipment.

- In order to improve the visibility of the traffic signals a minimum of one signal head per approach should be mounted overhead, several of the signal heads should be replaced, the pedestrian signals should be replaced and upgraded with APS equipment, and the intersection should be ADA must compliant. In addition, fire station traffic signal system pre-emption should be integrated as part of the signal upgrade. *We request that the proponent verify that these improvements will be included as part of the proposed mitigation.*
- The analysis shows identical pedestrian phase timing at this intersection for the 2013 Existing analysis and the 2018 Build with mitigation analysis. An average of 25 pedestrians

per hour cross at the intersection during the weekday peak period. *Please verify that the pedestrian phase timing is in conformance with the proper pedestrian clearance according to the latest 2009 MUTCD standards.*

**NEIGHBORHOOD ROADWAY TRAFFIC IMPACT**

- The study did not evaluate potential cut-through traffic through the immediate surrounding neighborhoods.

**SITE PLAN**

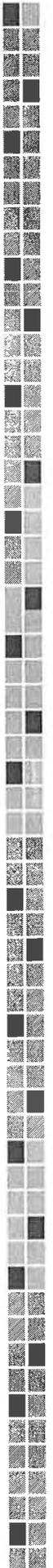
BETA has reviewed the site plan specifically for geometric, access and traffic circulation concerns and offers the following comments:

- An estimation of the anticipated average and maximum queue length for the dual drive-thru was not included in the TIAS for the proposed facility. Based on the site plan, there is approximately 140' of queue storage (approximately 6 vehicles) for the inner drive-thru lane and approximately 65' (approximately 3 vehicles) before conflict would occur between queued vehicles and vehicles entering/exiting the north entrance or vehicles circulating the parking lot. *We request that the proponent provide an empirical queue analysis by collecting queue length data at two similar dual drive-thru CVS/pharmacy locations to verify that the queues would not extend back enough to create conflict.*
- *We request that the proponent identify the primary route for emergency, delivery (WB-50) and service vehicles to the site and graphically shown circulating the site using AutoTurn to ensure that vehicle turning radii are adequate.* It is unclear how a WB-50 truck will be able to perform delivery at the loading dock.
- The 12'x25' loading area as shown behind the proposed CVS appears to allow an approximately 10' wide lane for drive-thru vehicles to travel through. Circulation would be more challenging if loading vehicles parked slightly outside their allotted area. It appears that the delivery truck will be in conflict with the drive-thru operation.
- The site plan shows 13 less parking spaces provided than required. *Additional parking needs to be provided.*

CONCORD STREET AT NORTH DRIVEWAY

The proponent is proposing to create a right-turn in access and right-turn out only egress at the north driveway and offers the following recommendations:

- BETA recommends the installation of "No Left Turn" signage at the north site driveway to deter prohibited left turn movements from Concord Street northbound into the driveway.
- BETA recommends the installation of "Do Not Enter" signage at the north site driveway to deter left turn movements from Concord Street northbound into the driveway egress lane.



- BETA recommends the consideration of a raised median at the north site driveway in order to physically deter and prohibit left-turn movements into or out of the driveway.

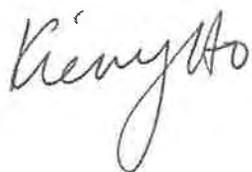
## CONCLUSION

In addition to the off-site mitigation and site plan comments outlined above, the following traffic analysis and additional data collection comments should be addressed:

- We recommend that the fire station signal system be included in the study.
- We recommend that the proponent review and include the 2011 crash data into this report.
- We recommend that the proponent adjust the future volumes accordingly to incorporate a growth rate of 0.5% per year over 5 years.
- We request that the proponent verify the daily Saturday number of vehicle trips were determined since the ITE Trip Generation manual has insufficient information to determine these trips.
- We request that the proponent collect empirical trip generation data from two or three similar dual drive-thru sites to support the ITE trip generation data.
- The 2018 Build with mitigation condition capacity analysis results at the intersection of Concord Street at Anzio Road/Gorman Road should be provided for our review.
- We ask the proponent verify the trip distribution.
- A traffic signal warrant analysis should be included for the intersections of Concord Street at Prindiville/Burdette and Concord Street at Normandy Road/Thelma Road to improve overall traffic progression.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,  
BETA Group, Inc.



Kien Ho, P.E., PTOE  
Vice President

cc: Thomas J. Begin - Finance Analyst / Administrative Assistant  
Jaklyn Centracchio, BETA Group, Inc.

\\Betama1\projects\4600s\4617 - Framingham - CVS Peer Review\Engineering\Reports\Text\4617 - CVS Peer Review.docx

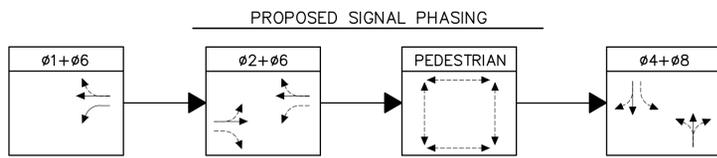
CONCEPTUAL IMPROVEMENT PLAN

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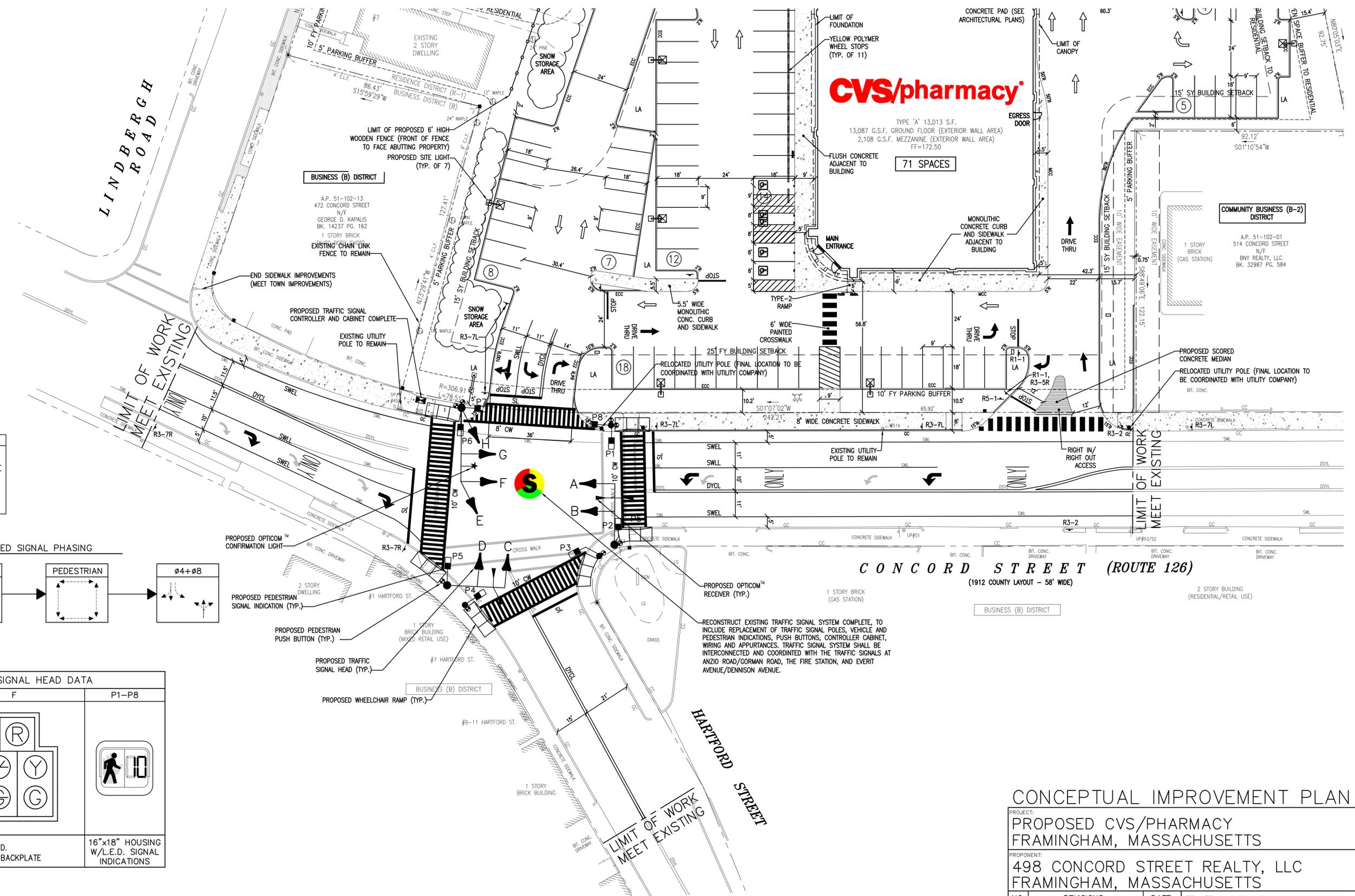


SIGN LEGEND	
R1-1	
R3-2	
R3-5R	
R3-7L	
R3-7R	
R5-1	

STRIPING LEGEND	
BWLL	BROKEN WHITE LANE LINE
DYCL	DOUBLE YELLOW CENTER LINE
SWEL	SOLID WHITE EDGE LINE
SWLL	SOLID WHITE LANE LINE
SL	STOP LINE
CW	CROSSWALK



PROPOSED SIGNAL HEAD DATA		
A,B,C,D,E,G,H	F	P1-P8
12" L.E.D. W/5" LOUVERED BACKPLATE		16"x18" HOUSING W/L.E.D. SIGNAL INDICATIONS



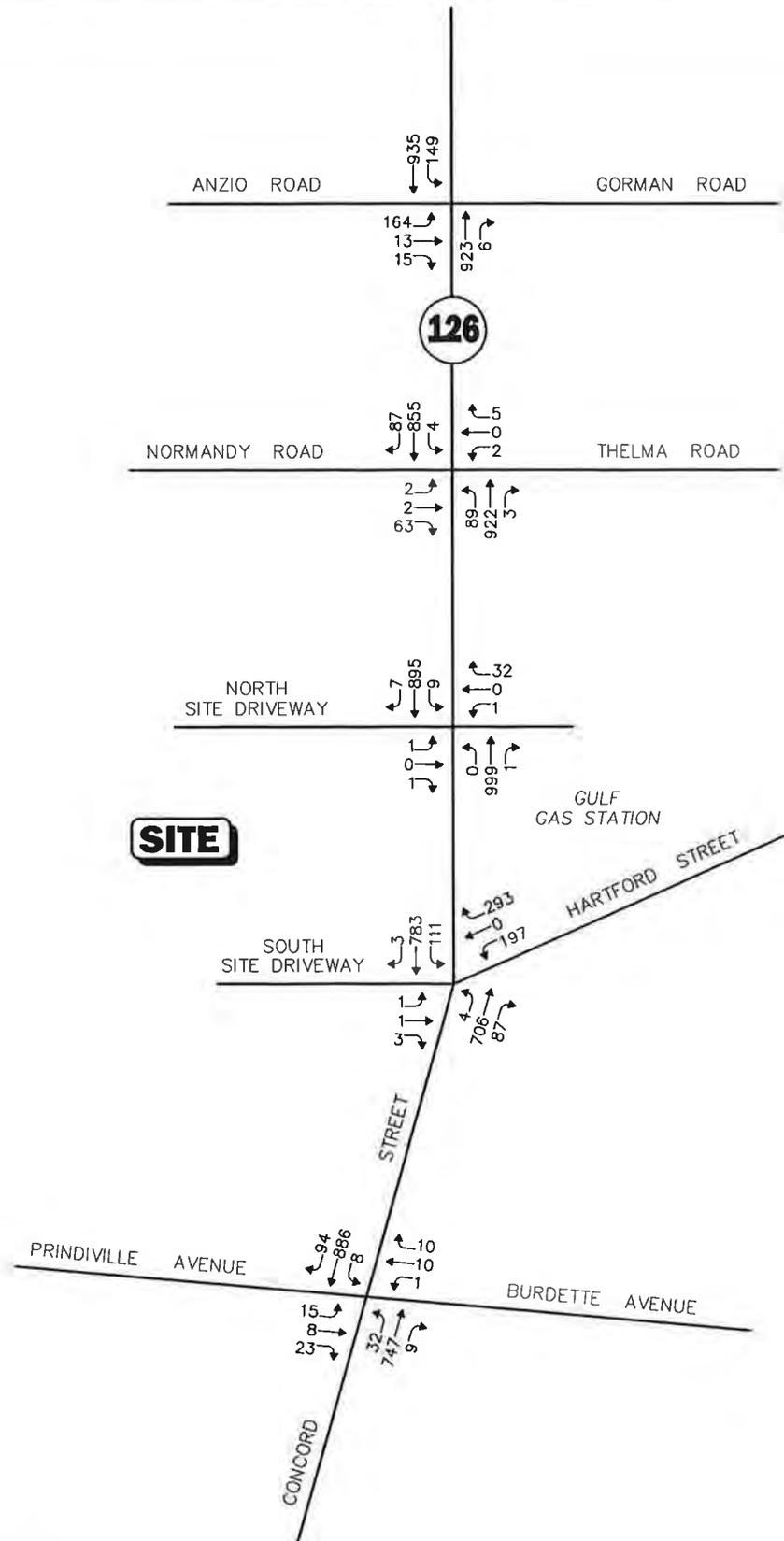
NOTES: 1. THIS PLAN IS FOR REVIEW PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION.  
 2. BASE PLAN INFORMATION OBTAINED FROM CIVIL DESIGN GROUP, LLC.

CONCEPTUAL IMPROVEMENT PLAN

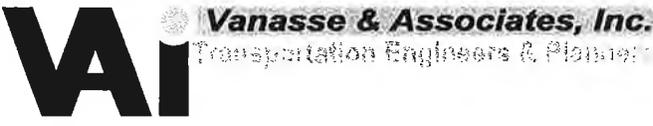
PROJECT: PROPOSED CVS/PHARMACY FRAMINGHAM, MASSACHUSETTS		
PROPOSITOR: 498 CONCORD STREET REALTY, LLC FRAMINGHAM, MASSACHUSETTS		
NO.	REVISIONS	DATE
DESIGNED BY:	JSD	DATE: 10/24/13
DRAWN BY:	JTG	SCALE: 1" = 20'
CHECKED BY:	JSD	SHEET 1 OF 1



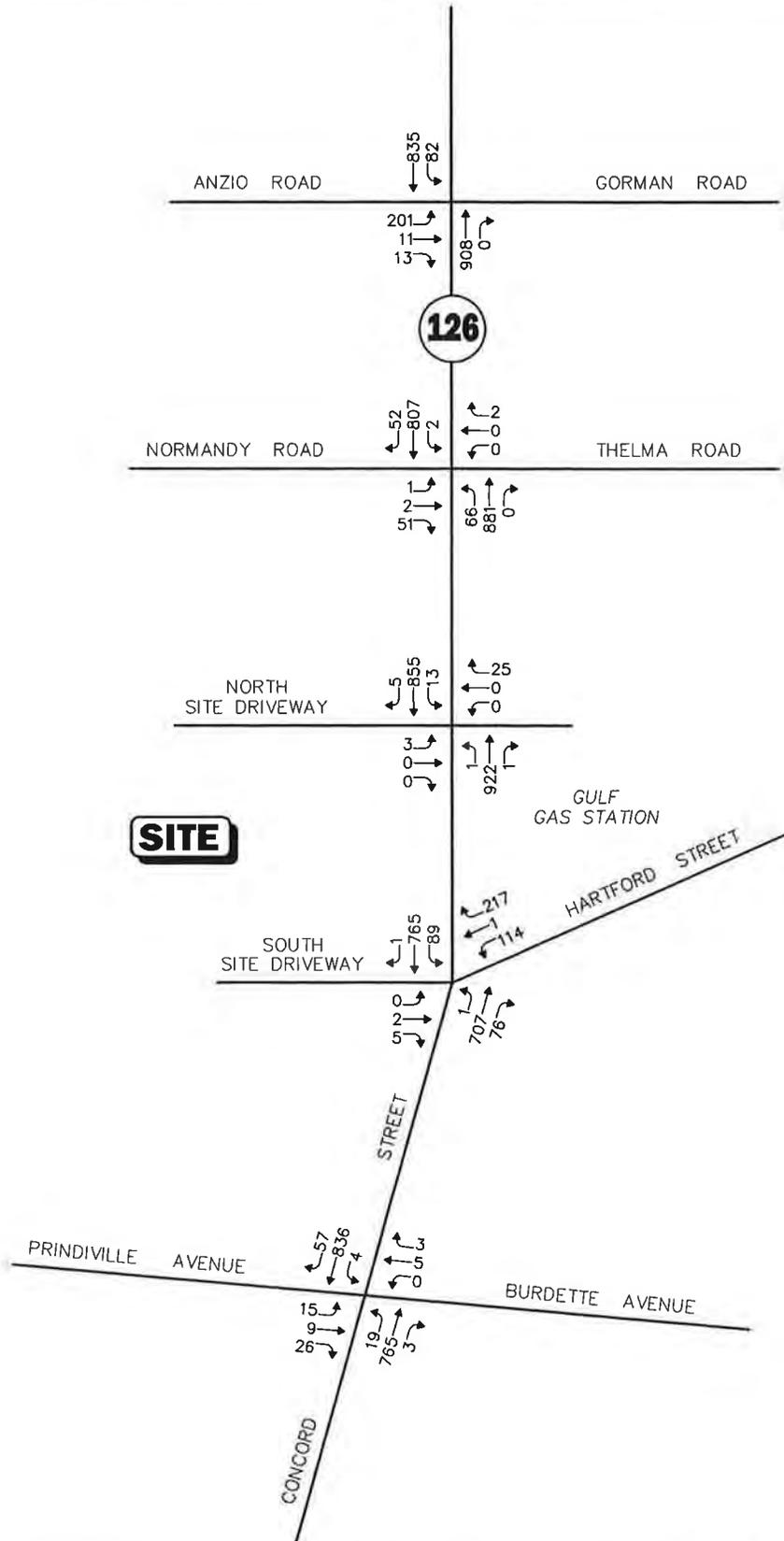
REVISED PEAK-HOUR TRAFFIC-VOLUME NETWORKS



Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
 Not To Scale **Figure 4A**



**2018 No-Build  
 Weekday Evening  
 Peak Hour Traffic Volumes**



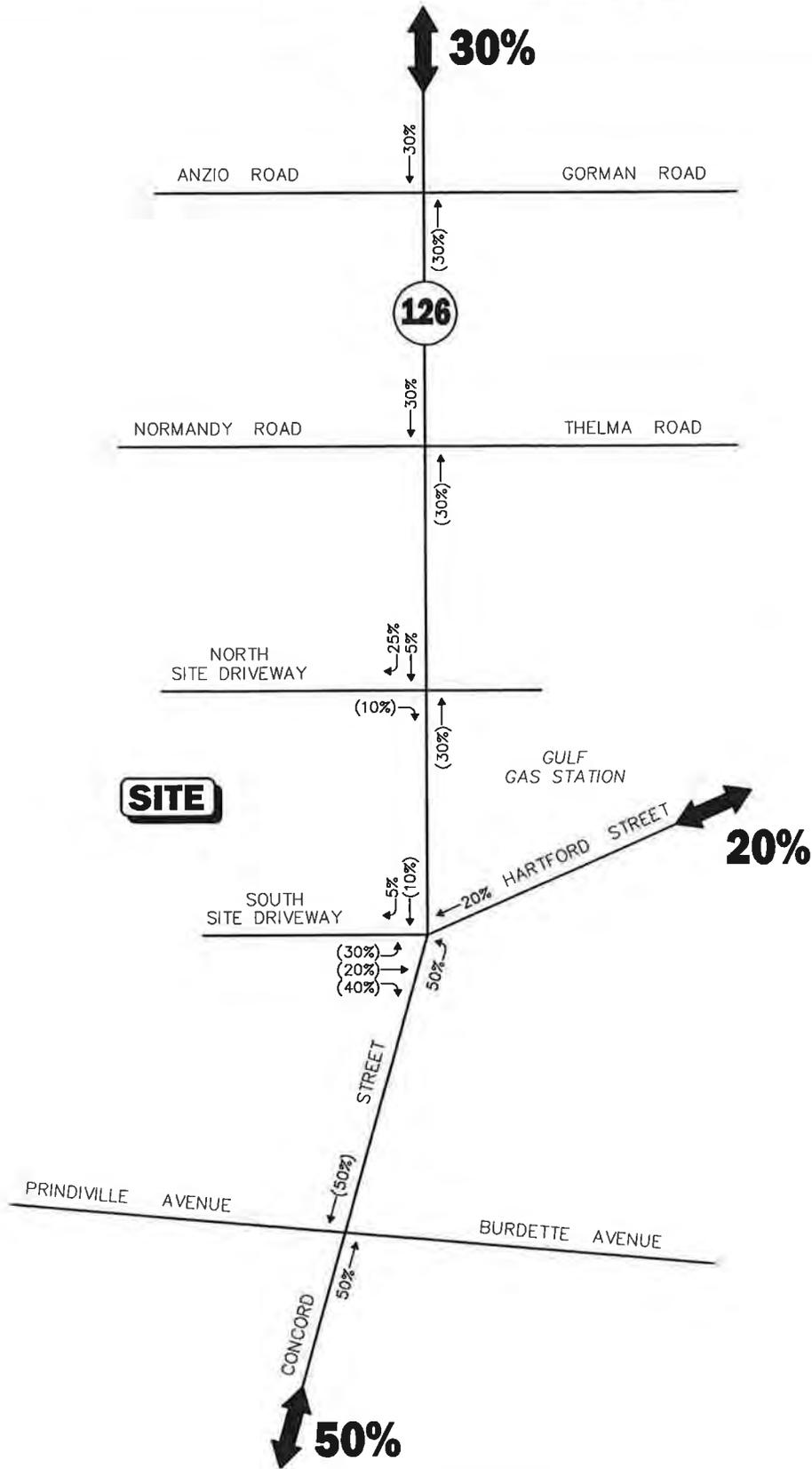
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 5A



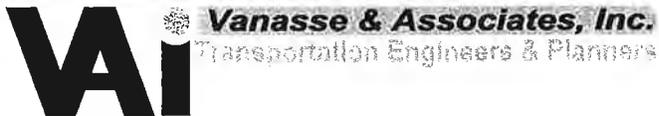
2018 No-Build  
Saturday Midday  
Peak Hour Traffic Volumes



North Arrow  
Not To Scale

Figure 6A

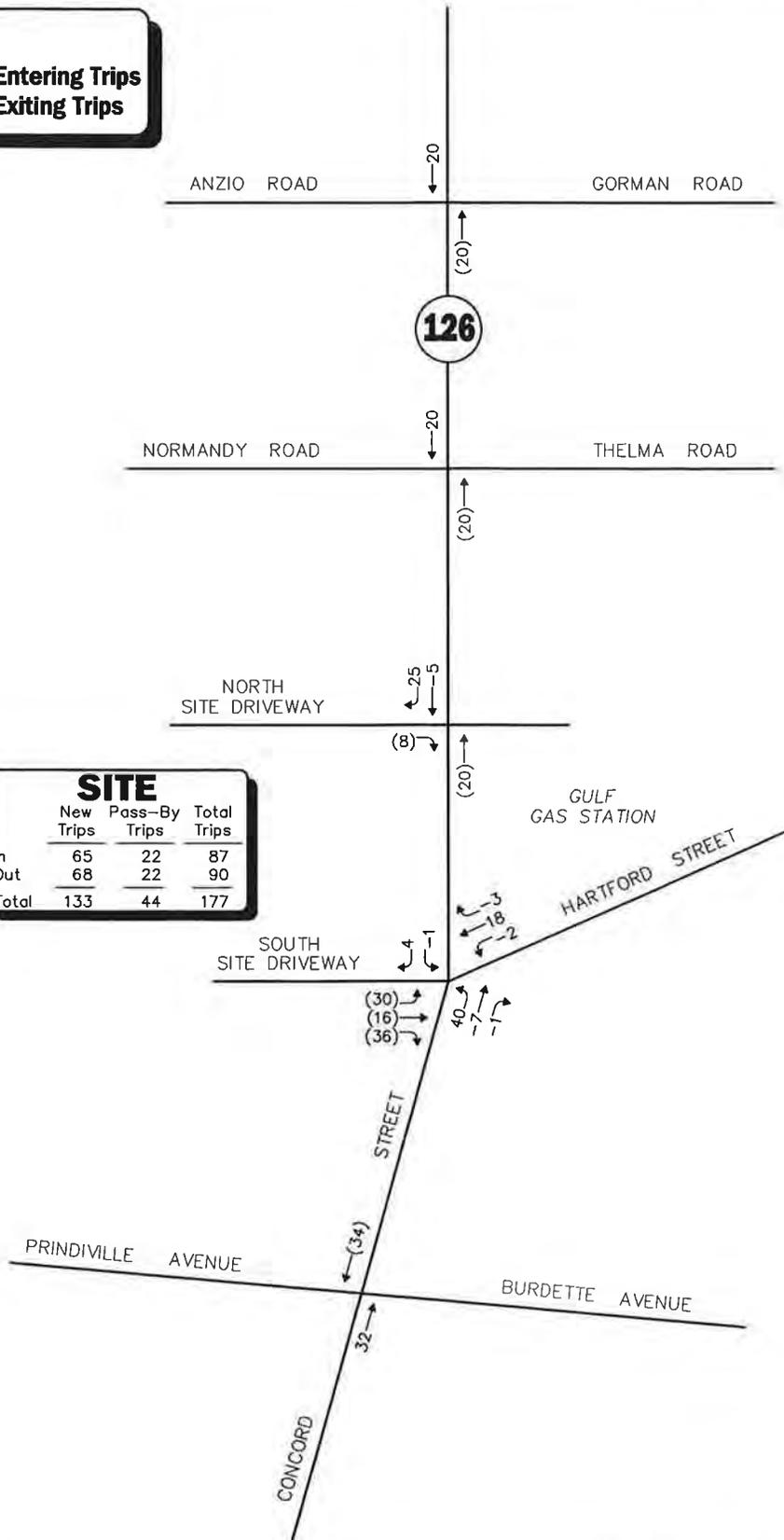
Trip Distribution Map



**Legend:**

**XX** Entering Trips  
**(XX)** Exiting Trips

SITE			
	New Trips	Pass-By Trips	Total Trips
In	65	22	87
Out	68	22	90
Total	133	44	177



 Not To Scale

**Figure 7A**



**Project-Generated  
 Weekday Evening  
 Peak Hour Traffic Volumes**

**Legend:**

**XX** Entering Trips  
**(XX)** Exiting Trips

SITE			
	New Trips	Pass-By Trips	Total Trips
In	77	27	104
Out	85	27	112
Total	162	54	216

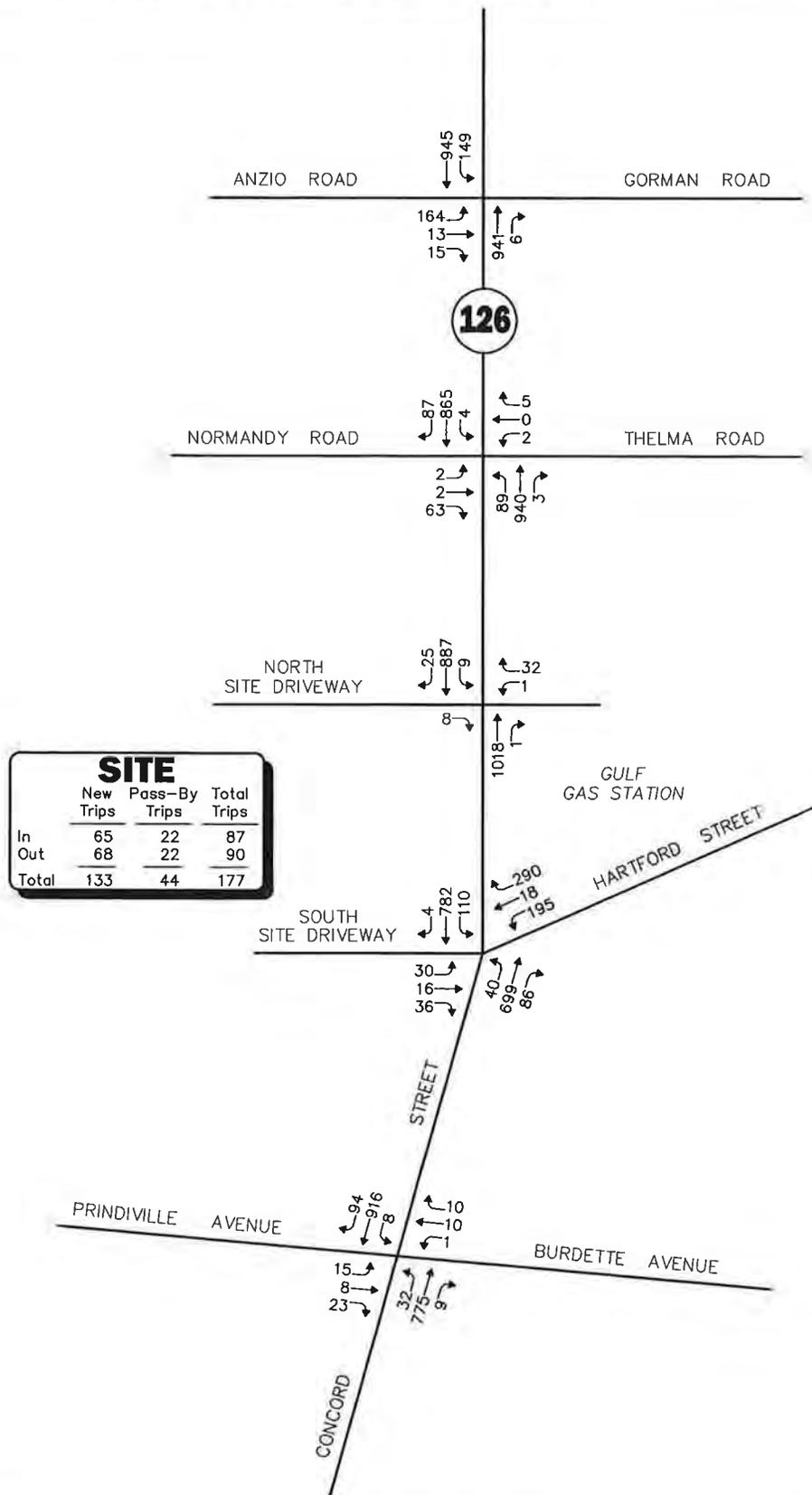


Not To Scale

**Figure 8A**



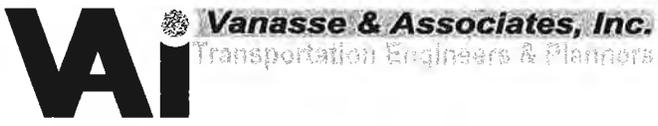
**Project-Generated Saturday Midday Peak Hour Traffic Volumes**



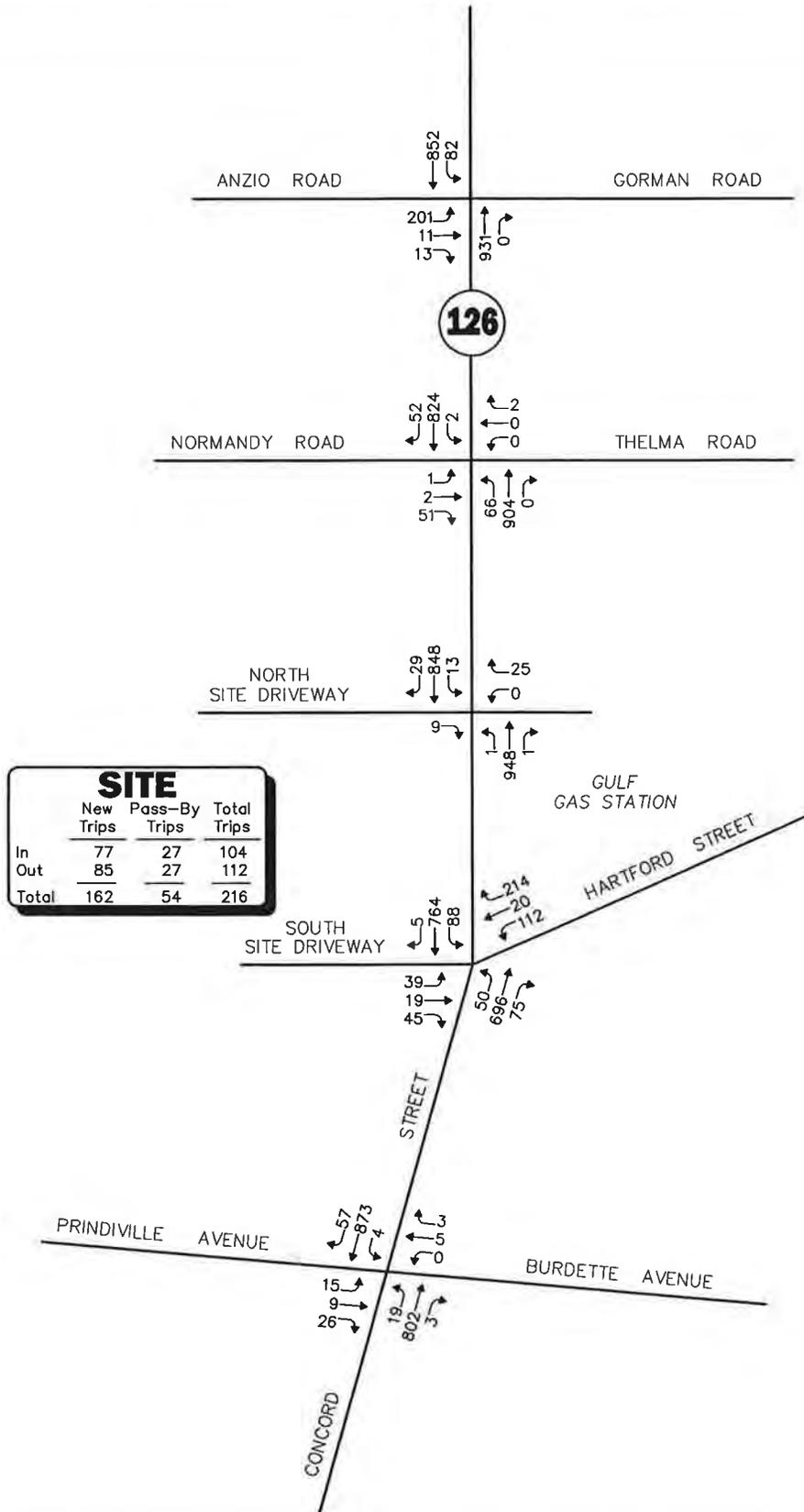
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 9A



2018 Build  
Weekday Evening  
Peak Hour Traffic Volumes



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

Not To Scale

Figure 10A



2018 Build  
Saturday Midday  
Peak Hour Traffic Volumes

MASSDOT CRASH RATE WORKSHEETS

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# CRASH RATE WORKSHEET

CITY/TOWN : Framingham COUNT DATE : 2013  
 DISTRICT : 3 UNSIGNALIZED :  SIGNALIZED :  Yes

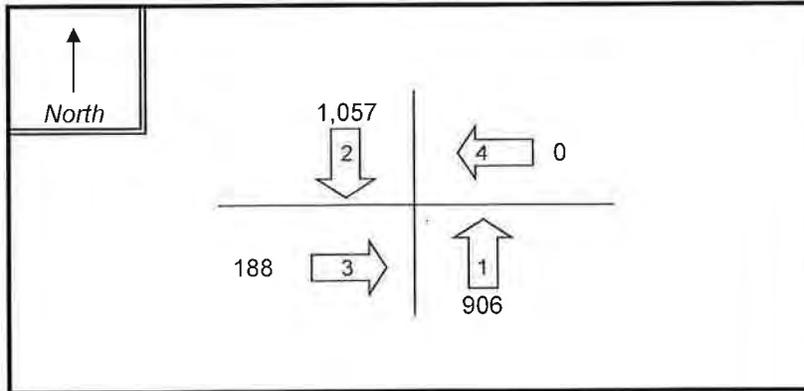
**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Concord Street (Route 126) ST #   
 MINOR STREET(S) : Anzio Road ST #   
Gorman Road ST #   
 ST #   
 ST #

**INTERSECTION DIAGRAM**  
(Label Approaches)



INTERSECTION REF #

**Peak Hour Volumes**

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	906	1,057	188	0		2,151

" K " FACTOR :  0.090 APPROACH ADT :  23,900 ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :  44 # OF YEARS :  4 AVERAGE # OF ACCIDENTS ( A ) :  11.00

CRASH RATE CALCULATION :  1.26 RATE =  $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Crash rate is significant if > 0.66 crashes per mev for an unsignalized intersection and > 0.89 crashes per mev for a signalized intersection for MassDOT District 3.



# CRASH RATE WORKSHEET

CITY/TOWN : Framingham COUNT DATE : 2013

DISTRICT : 3 UNSIGNALIZED :  Yes SIGNALIZED :

**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Concord Street (Route 126)

ST #

MINOR STREET(S) : Normandy Road

ST #

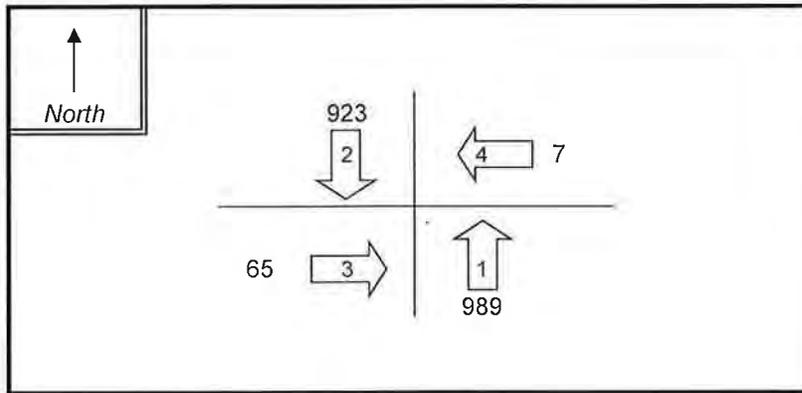
Thelma Road

ST #

ST #

ST #

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



INTERSECTION  
REF #

**Peak Hour Volumes**

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	989	923	65	7		1,984

" K " FACTOR :  APPROACH ADT :  ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :	<input type="text" value="13"/>	# OF YEARS :	<input type="text" value="4"/>	AVERAGE # OF ACCIDENTS ( A ) :	<input type="text" value="3.25"/>
------------------------	---------------------------------	--------------	--------------------------------	--------------------------------	-----------------------------------

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

Comments : Crash rate is significant if > 0.66 crashes per mev for an unsignalized intersection and >0.89 crashes per mev for a signalized intersection for MassDOT District 3.

# MassDOT

## CRASH RATE WORKSHEET

CITY/TOWN : Framingham COUNT DATE : 2013  
 DISTRICT : 3 UNSIGNALIZED :  Yes SIGNALIZED :

**MHD USE ONLY**

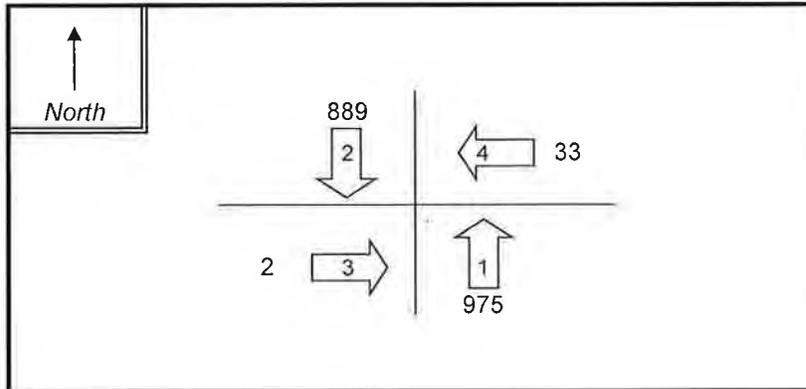
Source #

~ INTERSECTION DATA ~

MAJOR STREET : Concord Street (Route 126)  
 MINOR STREET(S) : North Project-Site Driveway  
Gulf Gas Station Driveway

ST #   
 ST #   
 ST #   
 ST #   
 ST #

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



INTERSECTION  
 REF #

**Peak Hour Volumes**

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	975	889	2	33		1,899

" K " FACTOR :  APPROACH ADT :  ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :  # OF YEARS :  AVERAGE # OF ACCIDENTS ( A ) :

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

Comments : Crash rate is significant if > 0.66 crashes per mev for an unsignalized intersection and > 0.89 crashes per mev for a signalized intersection for MassDOT District 3.

# MassDOT

## CRASH RATE WORKSHEET

CITY/TOWN : Framingham COUNT DATE : 2013  
 DISTRICT : 3 UNSIGNALIZED :  SIGNALIZED :

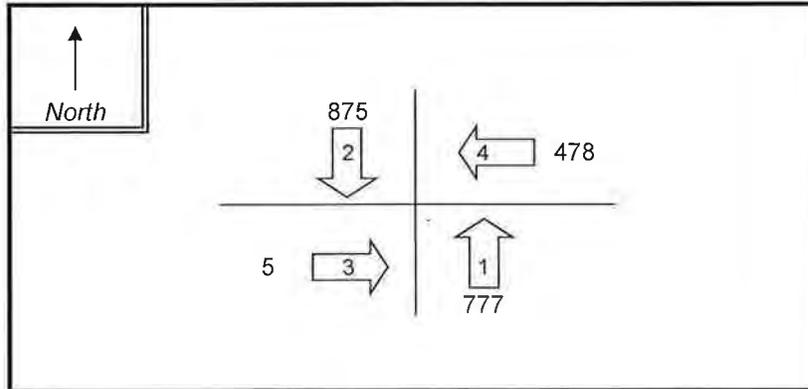
**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Concord Street (Route 126) ST #   
 MINOR STREET(S) : Hartford Street ST #   
South Project-Site Driveway ST #   
 ST #   
 ST #

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



INTERSECTION  
 REF #

**Peak Hour Volumes**

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	777	875	5	478		2,135

" K " FACTOR :  APPROACH ADT :  ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :  # OF YEARS :  AVERAGE # OF ACCIDENTS ( A ) :

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

Comments : Crash rate is significant if > 0.66 crashes per mev for an unsignalized intersection and >0.89 crashes per mev for a signalized intersection for MassDOT District 3.

# MassDOT

## CRASH RATE WORKSHEET

CITY/TOWN : Framingham COUNT DATE : 2013  
 DISTRICT : 3 UNSIGNALIZED :  Yes SIGNALIZED :

**MHD USE ONLY**

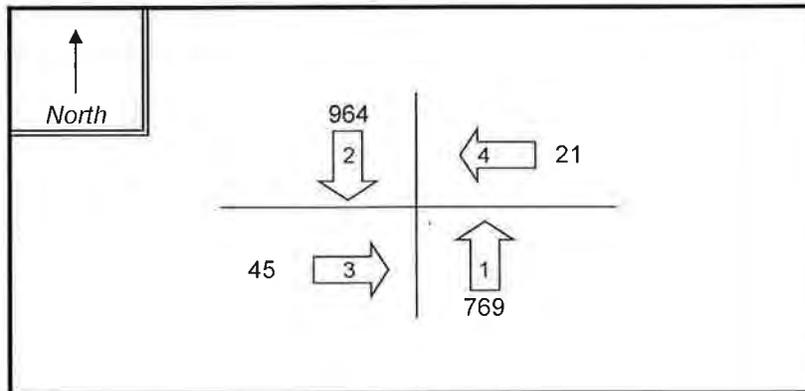
Source #

~ INTERSECTION DATA ~

MAJOR STREET : Concord Street (Route 126)  
 MINOR STREET(S) : Prindiville Avenue  
Burdette Avenue

ST #   
 ST #   
 ST #   
 ST #   
 ST #

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



INTERSECTION  
 REF #

**Peak Hour Volumes**

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/PM) :	769	964	45	21		1,799

" K " FACTOR :  APPROACH ADT :  ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS :  # OF YEARS :  AVERAGE # OF ACCIDENTS ( A ) :

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

Comments : Crash rate is significant if > 0.66 crashes per mev for an unsignalized intersection and > 0.89 crashes per mev for a signalized intersection for MassDOT District 3.

EMPIRICAL TRIP-GENERATION DATA

---

**CVS/Pharmacy Empirical Trip Generation Data**

	Framingham <u>14,255 sf</u>	Sudbury <u>12,803 sf</u>
Weekday Evening		
In	86	70
Out	<u>91</u>	<u>70</u>
Total	177	140

Saturday Midday		
In	116	72
Out	<u>116</u>	<u>84</u>
Total	232	156

Trip Rates	Framingham <u>14,255 sf</u>	Sudbury <u>12,803 sf</u>	Average	Proposed Framingham <u>15,195 sf</u>
Weekday Evening				
In	6.033	5.467	5.75	87.37
Out	6.384	5.467	5.93	90.04
Total	12.417	10.935	11.68	177.41
Saturday Midday				
In	8.137	5.624	6.88	104.55
Out	8.137	6.561	7.35	111.67
Total	16.275	12.185	14.23	216.22

$$\text{Daily Trip Rate} = \frac{\text{Weekday PM Emp. Trip Rate}}{\text{Weekday PM ITE Trip Rate}} \times \text{ITE Daily Trip Rate}$$

$$= \frac{11.68}{9.91} \times 96.91$$

$$= 113.87$$

$$\text{Daily Trips} = 113.87 \times 15.195 = \underline{1730}$$

$$\text{Saturday Trip Rate} = \frac{14.23}{8.20} \times 80.19$$

$$= 139.16$$

$$\text{Saturday Daily Trips} = 139.16 \times 15.195$$

$$= \underline{2,116}$$

**Accurate Counts**  
978-664-2565

N/S Street : CVS Entramce  
E/W Street: Worcester Road  
City/State : Framingham, MA  
Weather : Clear

File Name : FRAM0001  
Site Code : FRAM0001  
Start Date : 10/15/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	CVS Dwy From North		CVS Dwy From South		Int. Total
	IN				
04:00 PM	7		0		7
04:15 PM	9		0		9
04:30 PM	10		0		10
04:45 PM	4		0		4
Total	30		0		30
05:00 PM	10		0		10
05:15 PM	5		0		5
05:30 PM	5		0		5
05:45 PM	11		0		11
Total	31		0		31
Grand Total	61		0		61
Apprch %	100		0		
Total %	100		0		

Start Time	CVS Dwy From North		CVS Dwy From South		Int. Total
	IN	App. Total		App. Total	
4:15:00 PM	9	9	0	0	9
4:30:00 PM	10	10	0	0	10
4:45:00 PM	4	4	0	0	4
5:00:00 PM	10	10	0	0	10
Total Volume	33	33	0	0	33
% App. Total	100		0		
PHF	.825	.825	.000	.000	.825

Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 4:15:00 PM

**Accurate Counts**  
978-664-2565

N/S Street : Temple Street  
E/W Street: CVS Driveway  
City/State : Framingham, MA  
Weather : Clear

File Name : FRAM0002  
Site Code : FRAM0002  
Start Date : 10/15/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	CVS Dwy From East		CVS Dwy From West		Int. Total
	IN		OUT		
04:00 PM	17		25		42
04:15 PM	12		20		32
04:30 PM	13		30		43
04:45 PM	16		21		37
Total	58		96		154
05:00 PM	18		24		42
05:15 PM	17		23		40
05:30 PM	12		25		37
05:45 PM	16		22		38
Total	63		94		157
Grand Total	121		190		311
Apprch %	100		100		
Total %	38.9		61.1		

Start Time	CVS Dwy From East		CVS Dwy From West		Int. Total
	IN	App. Total	OUT	App. Total	
4:30:00 PM	13	13	30	30	43
4:45:00 PM	16	16	21	21	37
5:00:00 PM	18	18	24	24	42
5:15:00 PM	17	17	23	23	40
Total Volume	64	64	98	98	162
% App. Total	100		100		
PHF	.889	.889	.817	.817	.942

Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 4:30:00 PM

**Accurate Counts**  
978-664-2565

N/S Street : CVS Dwy / Office Building  
E/W Street:  
City/State : Framingham, MA  
Weather : Clear

File Name : FRAM0003  
Site Code : FRAM0003  
Start Date : 10/15/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	CVS Dwy From North		Office Bldg From South		Int. Total
	OUT		Thru		
04:00 PM	4		1		5
04:15 PM	2		0		2
04:30 PM	2		0		2
04:45 PM	2		4		6
Total	10		5		15
05:00 PM	2		1		3
05:15 PM	1		2		3
05:30 PM	1		1		2
05:45 PM	3		4		7
Total	7		8		15
Grand Total	17		13		30
Apprch %	100		100		
Total %	56.7		43.3		

Start Time	CVS Dwy From North		Office Bldg From South		Int. Total
	OUT	App. Total	Thru	App. Total	
4:00:00 PM	4	4	1	1	5
4:15:00 PM	2	2	0	0	2
4:30:00 PM	2	2	0	0	2
4:45:00 PM	2	2	4	4	6
Total Volume	10	10	5	5	15
% App. Total	100		100		
PHF	.625	.625	.313	.313	.625

Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 4:00:00 PM

**Accurate Counts**  
978-664-2565

N/S Street : CVS Entramce  
E/W Street: Worcester Road  
City/State : Framingham, MA  
Weather : Clear

File Name : FRAM00S1  
Site Code : FRAM0001  
Start Date : 10/19/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	CVS Dwy From North		CVS Dwy From South		Int. Total
	IN				
11:00 AM	8		0		8
11:15 AM	5		0		5
11:30 AM	7		0		7
11:45 AM	13		0		13
Total	33		0		33
12:00 PM	8		0		8
12:15 PM	7		0		7
12:30 PM	3		0		3
12:45 PM	3		0		3
Total	21		0		21
01:00 PM	6		0		6
01:15 PM	6		0		6
01:30 PM	8		0		8
01:45 PM	6		0		6
Total	26		0		26
Grand Total	80		0		80
Apprch %	100		0		
Total %	100		0		

Start Time	CVS Dwy From North		CVS Dwy From South		Int. Total
	IN	App. Total		App. Total	
Peak Hour Analysis From 11:00:00 AM to 1:45:00 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 11:30:00 AM					
11:30:00 AM	7	7	0	0	7
11:45:00 AM	13	13	0	0	13
12:00:00 PM	8	8	0	0	8
12:15:00 PM	7	7	0	0	7
Total Volume	35	35	0	0	35
% App. Total	100		0		
PHF	.673	.673	.000	.000	.673

**Accurate Counts**  
978-664-2565

N/S Street : Temple Street  
E/W Street: CVS Driveway  
City/State : Framingham, MA  
Weather : Clear

File Name : FRAM00S2  
Site Code : FRAM0002  
Start Date : 10/19/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	CVS Dwy From East		CVS Dwy From West		Int. Total
	IN		OUT		
11:00 AM	17		20		37
11:15 AM	15		22		37
11:30 AM	17		22		39
11:45 AM	16		30		46
Total	65		94		159
12:00 PM	29		27		56
12:15 PM	26		34		60
12:30 PM	20		33		53
12:45 PM	21		20		41
Total	96		114		210
01:00 PM	12		33		45
01:15 PM	13		10		23
01:30 PM	12		23		35
01:45 PM	19		23		42
Total	56		89		145
Grand Total	217		297		514
Apprch %	100		100		
Total %	42.2		57.8		

Start Time	CVS Dwy From East		CVS Dwy From West		Int. Total
	IN	App. Total	OUT	App. Total	
Peak Hour Analysis From 11:00:00 AM to 1:45:00 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 11:45:00 AM					
11:45:00 AM	16	16	30	30	46
12:00:00 PM	29	29	27	27	56
12:15:00 PM	26	26	34	34	60
12:30:00 PM	20	20	33	33	53
Total Volume	91	91	124	124	215
% App. Total	100		100		
PHF	.784	.784	.912	.912	.896

**Accurate Counts**  
978-664-2565

N/S Street : CVS Dwy / Office Building  
E/W Street:  
City/State : Framingham, MA  
Weather : Clear

File Name : FRAM00S3  
Site Code : FRAM0003  
Start Date : 10/19/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	CVS Dwy From North		Office Bldg From South		Int. Total
	OUT		Thru		
11:00 AM	4		1		5
11:15 AM	2		0		2
11:30 AM	2		0		2
11:45 AM	2		4		6
Total	10		5		15
12:00 PM	2		1		3
12:15 PM	1		2		3
12:30 PM	1		1		2
12:45 PM	3		4		7
Total	7		8		15
01:00 PM	0		0		0
01:15 PM	0		0		0
01:30 PM	0		0		0
01:45 PM	0		0		0
Total	0		0		0
Grand Total	17		13		30
Apprch %	100		100		
Total %	56.7		43.3		

Start Time	CVS Dwy From North		Office Bldg From South		Int. Total
	OUT	App. Total	Thru	App. Total	
Peak Hour Analysis From 11:00:00 AM to 1:45:00 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 11:00:00 AM					
11:00:00 AM	4	4	1	1	5
11:15:00 AM	2	2	0	0	2
11:30:00 AM	2	2	0	0	2
11:45:00 AM	2	2	4	4	6
Total Volume	10	10	5	5	15
% App. Total	100		100		
PHF	.625	.625	.313	.313	.625

**Accurate Counts**  
978-664-2565

N/S Street : CVS West Driveway  
E/W Street: Route 20  
City/State : Wayland, MA  
Weather : Cloudy

File Name : WAY00001  
Site Code : WAY00001  
Start Date : 10/10/2013  
Page No : 1

**Groups Printed- Cars**

	IN		OUT		Int. Total
	From North		From South		
Start Time	IN		OUT		
04:00 PM	18		14		32
04:15 PM	18		17		35
04:30 PM	18		10		28
<b>04:45 PM</b>	<b>16</b>		<b>15</b>		<b>31</b>
Total	70		56		126
05:00 PM	15		12		27
05:15 PM	14		12		26
05:30 PM	9		11		20
<b>05:45 PM</b>	<b>10</b>		<b>5</b>		<b>15</b>
Total	48		40		88
Grand Total	118		96		214
Apprch %	100		100		
Total %	55.1		44.9		

Start Time	IN		OUT		Int. Total
	IN	App. Total	OUT	App. Total	
04:00 PM	18	18	14	14	32
04:15 PM	18	18	17	17	35
04:30 PM	18	18	10	10	28
04:45 PM	16	16	15	15	31
Total Volume	70	70	56	56	126
% App. Total	100		100		
PHF	.972	.972	.824	.824	.900

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

**Accurate Counts**  
978-664-2565

N/S Street : CVS East Driveway  
E/W Street: Route 20  
City/State : Wayland, MA  
Weather : Cloudy

File Name : WAY00002  
Site Code : WAY00002  
Start Date : 10/10/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	From North		EXIT ONLY From South		Int. Total
	Thru		OUT		
04:00 PM	0		2		2
04:15 PM	0		4		4
04:30 PM	0		5		5
04:45 PM	0		3		3
Total	0		14		14
05:00 PM	0		1		1
05:15 PM	0		3		3
05:30 PM	0		2		2
05:45 PM	0		2		2
Total	0		8		8
Grand Total	0		22		22
Apprch %	0		100		
Total %	0		100		

Start Time	From North		EXIT ONLY From South		Int. Total
	Thru	App. Total	OUT	App. Total	
Peak Hour Analysis From 4:00:00 PM to 5:45:00 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 4:00:00 PM					
4:00:00 PM	0	0	2	2	2
4:15:00 PM	0	0	4	4	4
4:30:00 PM	0	0	5	5	5
4:45:00 PM	0	0	3	3	3
Total Volume	0	0	14	14	14
% App. Total	0		100		
PHF	.000	.000	.700	.700	.700

**Accurate Counts**  
978-664-2565

N/S Street : CVS West Driveway  
E/W Street: Route 20  
City/State : Wayland, MA  
Weather : Clear

File Name : WAY000S1  
Site Code : WAY00001  
Start Date : 10/19/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	IN		OUT		Int. Total
	From North	IN	From South	OUT	
11:00 AM		16		19	35
11:15 AM		25		23	48
11:30 AM		19		16	35
11:45 AM		12		13	25
Total		72		71	143
12:00 PM		17		14	31
12:15 PM		18		17	35
12:30 PM		14		15	29
12:45 PM		19		8	27
Total		68		54	122
01:00 PM		17		21	38
01:15 PM		17		17	34
01:30 PM		12		12	24
01:45 PM		18		15	33
Total		64		65	129
Grand Total		204		190	394
Apprch %		100		100	
Total %		51.8		48.2	

Start Time	IN		OUT		Int. Total
	From North	App. Total	From South	App. Total	
11:00 AM	16	16	19	19	35
11:15 AM	25	25	23	23	48
11:30 AM	19	19	16	16	35
11:45 AM	12	12	13	13	25
Total Volume	72	72	71	71	143
% App. Total	100		100		
PHF	.720	.720	.772	.772	.745

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 11:00 AM

**Accurate Counts**  
978-664-2565

N/S Street : CVS East Driveway  
E/W Street: Route 20  
City/State : Wayland, MA  
Weather : Clear

File Name : WAY000S2  
Site Code : WAY00002  
Start Date : 10/19/2013  
Page No : 1

**Groups Printed- Cars**

Start Time	From North		EXIT ONLY From South		Int. Total
	Thru		OUT		
11:00 AM	0		2		2
11:15 AM	0		6		6
11:30 AM	0		3		3
11:45 AM	0		2		2
Total	0		13		13
12:00 PM	0		2		2
12:15 PM	0		4		4
12:30 PM	0		1		1
12:45 PM	0		2		2
Total	0		9		9
01:00 PM	0		1		1
01:15 PM	0		2		2
01:30 PM	0		1		1
01:45 PM	0		2		2
Total	0		6		6
Grand Total	0		28		28
Apprch %	0		100		
Total %	0		100		

Start Time	From North		EXIT ONLY From South		Int. Total
	Thru	App. Total	OUT	App. Total	
Peak Hour Analysis From 11:00:00 AM to 1:45:00 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 11:00:00 AM					
11:00:00 AM	0	0	2	2	2
11:15:00 AM	0	0	6	6	6
11:30:00 AM	0	0	3	3	3
11:45:00 AM	0	0	2	2	2
Total Volume	0	0	13	13	13
% App. Total	0		100		
PHF	.000	.000	.542	.542	.542

## PEDESTRIAN SIGNAL TIMING CALCULATIONS

---

Job: Cvs Pharmacy  
Location: Frammingham, MA  
Title: Pedestrian Signal Timing  
Calculated by: Lon S.

Job Number: 6529  
Date: 10/24/13  
Sheet 1 of       
Checked by:     

Concord Street at Anzio Rd = Gorman Rd  
Crossing @

$$\text{- Concord St } (3 \times 12') + \left(\frac{4'+4'}{2}\right) = 40 \text{ ft}$$

$$40 \text{ ft} / 3.5 \text{ ft/sec} = 11.4 \text{ sec.}$$

$$\text{FDW} + \text{Buffer} = 11 \text{ sec.}$$

Concord Street at Hartford Street  
Crossing @

$$\text{- Concord St } (12' + 11' + 11') + \left(\frac{4'+5'}{2}\right) = 38.5' \approx 39 \text{ ft}$$

$$39 \text{ ft} / 3.5 \text{ ft/sec} = 11.1 \text{ sec}$$

$$\text{FDW} + \text{Buffer} = 11 \text{ sec.}$$

## CAPACITY ANALYSIS WORKSHEETS

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Concord Street at Anzio Road and Gorman Road

Concord Street at Normandy Road and Thelma Road

Concord Street at the North Project Site Driveway and the Gulf Gas Station Driveway

Concord Street at Hartford Street and the South Project Site Driveway

Concord Street at Prindiville Avenue and Burdette Avenue

Concord Street at Anzio Road and Gorman Road

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2018 No-Build Weekday Evening Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/24/2013

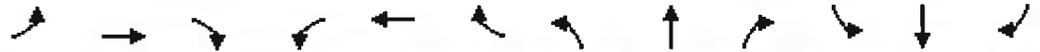
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	164	13	15	0	0	0	0	923	6	149	935	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	60		0
Storage Lanes	1		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	1746	0	0	0	0	0	1817	0	1805	1881	0
Flt Permitted	0.950									0.081		
Satd. Flow (perm)	1805	1746	0	0	0	0	0	1817	0	154	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		355			370			645			238	
Travel Time (s)		8.1			8.4			14.7			5.4	
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.96	0.96	0.96	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	219	37	0	0	0	0	0	967	0	160	1005	0
Turn Type	Perm	NA						NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4									6		
Detector Phase	4	4						2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0						4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0						22.0		10.0	22.0	
Total Split (s)	26.0	26.0						66.0		16.0	82.0	
Total Split (%)	21.1%	21.1%						53.7%		13.0%	66.7%	
Yellow Time (s)	3.0	3.0						3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0						3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0						-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0						4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None						Max		Max	Max	
Act Effct Green (s)	18.1	18.1						62.0		78.1	78.1	
Actuated g/C Ratio	0.17	0.17						0.60		0.75	0.75	
v/c Ratio	0.70	0.12						0.89		0.52	0.71	
Control Delay	52.8	21.8						31.6		18.4	11.3	
Queue Delay	0.0	0.0						0.0		0.0	0.0	
Total Delay	52.8	21.8						31.6		18.4	11.3	
LOS	D	C						C		B	B	
Approach Delay		48.3						31.6			12.3	
Approach LOS		D						C			B	
Queue Length 50th (ft)	139	10						529		28	312	
Queue Length 95th (ft)	176	29						#888		101	523	
Internal Link Dist (ft)		275			290			565			158	
Turn Bay Length (ft)										60		
Base Capacity (vph)	381	384						1081		305	1409	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	15.0
Total Split (s)	15.0
Total Split (%)	12%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 No-Build Weekday Evening Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/24/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0						0		0	0	
Spillback Cap Reductn	0	0						0		0	0	
Storage Cap Reductn	0	0						0		0	0	
Reduced v/c Ratio	0.57	0.10						0.89		0.52	0.71	

Intersection Summary

Area Type: Other  
 Cycle Length: 123  
 Actuated Cycle Length: 104.2  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 23.9  
 Intersection Capacity Utilization 76.3%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 1: Concord St (Rte 126) & Anzio Road/Gorman Road

φ1	φ2	φ4	φ9
16 s	66 s	26 s	15 s
φ6			
82 s			

2018 No-Build Saturday Midday Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/24/2013

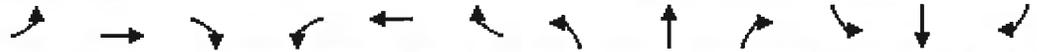
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	201	11	13	0	0	0	0	908	0	82	835	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	60		0
Storage Lanes	1		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	1748	0	0	0	0	0	1818	0	1805	1881	0
Fit Permitted	0.950									0.105		
Satd. Flow (perm)	1805	1748	0	0	0	0	0	1818	0	200	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		355			370			645			238	
Travel Time (s)		8.1			8.4			14.7			5.4	
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	231	28	0	0	0	0	0	966	0	85	870	0
Turn Type	Perm	NA						NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4									6		
Detector Phase	4	4						2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0						10.0		9.0	10.0	
Minimum Split (s)	13.0	13.0						16.0		16.0	16.0	
Total Split (s)	26.0	26.0						66.0		16.0	82.0	
Total Split (%)	21.1%	21.1%						53.7%		13.0%	66.7%	
Yellow Time (s)	3.0	3.0						3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0						3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0						-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0						4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None						Max		None	Max	
Act Effct Green (s)	18.8	18.8						66.1		78.1	78.1	
Actuated g/C Ratio	0.18	0.18						0.63		0.74	0.74	
v/c Ratio	0.72	0.09						0.84		0.27	0.62	
Control Delay	53.5	22.4						26.4		6.2	9.3	
Queue Delay	0.0	0.0						0.0		0.0	0.0	
Total Delay	53.5	22.4						26.4		6.2	9.3	
LOS	D	C						C		A	A	
Approach Delay		50.1						26.4			9.0	
Approach LOS		D						C			A	
Queue Length 50th (ft)	147	7						529		14	247	
Queue Length 95th (ft)	221	30						#881		28	384	
Internal Link Dist (ft)		275			290			565			158	
Turn Bay Length (ft)										60		
Base Capacity (vph)	378	379						1145		332	1400	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	15.0
Total Split (s)	15.0
Total Split (%)	12%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 No-Build Saturday Midday Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/24/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0						0		0	0	
Spillback Cap Reductn	0	0						0		0	0	
Storage Cap Reductn	0	0						0		0	0	
Reduced v/c Ratio	0.61	0.07						0.84		0.26	0.62	

Intersection Summary

Area Type: Other  
 Cycle Length: 123  
 Actuated Cycle Length: 104.9  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 21.6  
 Intersection Capacity Utilization 76.4%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 1: Concord St (Rte 126) & Anzio Road/Gorman Road

ø1	ø2	ø4	ø9
16 s	66 s	26 s	15 s
ø6			
82 s			

2018 Build Weekday Evening Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	164	13	15	0	0	0	0	941	6	149	945	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	60		0
Storage Lanes	1		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	1746	0	0	0	0	0	1817	0	1805	1881	0
Flt Permitted	0.950									0.073		
Satd. Flow (perm)	1805	1746	0	0	0	0	0	1817	0	139	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20										
Link Speed (mph)		30			30			30				30
Link Distance (ft)		355			370			645				238
Travel Time (s)		8.1			8.4			14.7				5.4
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.96	0.96	0.96	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	219	37	0	0	0	0	0	986	0	160	1016	0
Turn Type	Perm	NA						NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4									6		
Detector Phase	4	4						2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0						10.0		9.0	10.0	
Minimum Split (s)	13.0	13.0						16.0		16.0	16.0	
Total Split (s)	26.0	26.0						66.0		16.0	82.0	
Total Split (%)	21.1%	21.1%						53.7%		13.0%	66.7%	
Yellow Time (s)	3.0	3.0						3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0						3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0						-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0						4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None						Max		None	Max	
Act Effct Green (s)	18.1	18.1						62.5		78.1	78.1	
Actuated g/C Ratio	0.17	0.17						0.60		0.75	0.75	
v/c Ratio	0.70	0.12						0.91		0.55	0.72	
Control Delay	52.8	21.8						32.7		21.9	11.5	
Queue Delay	0.0	0.0						0.0		0.0	0.0	
Total Delay	52.8	21.8						32.7		21.9	11.5	
LOS	D	C						C		C	B	
Approach Delay		48.3						32.7			12.9	
Approach LOS		D						C			B	
Queue Length 50th (ft)	139	10						552		36	319	
Queue Length 95th (ft)	176	29						#917		109	537	
Internal Link Dist (ft)		275			290			565			158	
Turn Bay Length (ft)										60		
Base Capacity (vph)	381	384						1089		296	1409	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	15.0
Total Split (s)	15.0
Total Split (%)	12%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Weekday Evening Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0						0		0	0	
Spillback Cap Reductn	0	0						0		0	0	
Storage Cap Reductn	0	0						0		0	0	
Reduced v/c Ratio	0.57	0.10						0.91		0.54	0.72	

Intersection Summary

Area Type: Other  
 Cycle Length: 123  
 Actuated Cycle Length: 104.2  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 24.8  
 Intersection Capacity Utilization 77.2%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 1: Concord St (Rte 126) & Anzio Road/Gorman Road

ø1	ø2	ø4	ø9
16 s	66 s	26 s	15 s
ø6			
82 s			

2018 Build Saturday Midday Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	201	11	13	0	0	0	0	931	0	82	852	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	12	12	12	12	11	12	12	12	12	
Storage Length (ft)	0		0	0		0	0		0	60		0	
Storage Lanes	1		0	0		0	0		0	1		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	1805	1748	0	0	0	0	0	1818	0	1805	1881	0	
Flt Permitted	0.950									0.092			
Satd. Flow (perm)	1805	1748	0	0	0	0	0	1818	0	175	1881	0	
Right Turn on Red			Yes				Yes		Yes			Yes	
Satd. Flow (RTOR)		15											
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		355			370			645			238		
Travel Time (s)		8.1			8.4			14.7			5.4		
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96	
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	231	28	0	0	0	0	0	990	0	85	888	0	
Turn Type	Perm	NA						NA		pm+pt	NA		
Protected Phases		4						2		1	6		
Permitted Phases	4									6			
Detector Phase	4	4						2		1	6		
Switch Phase													
Minimum Initial (s)	8.0	8.0						10.0		9.0	10.0		
Minimum Split (s)	13.0	13.0						16.0		16.0	16.0		
Total Split (s)	26.0	26.0						66.0		16.0	82.0		
Total Split (%)	21.1%	21.1%						53.7%		13.0%	66.7%		
Yellow Time (s)	3.0	3.0						3.0		3.0	3.0		
All-Red Time (s)	2.0	2.0						3.0		3.0	3.0		
Lost Time Adjust (s)	-1.0	-1.0						-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0	4.0						4.0		4.0	4.0		
Lead/Lag								Lag		Lead			
Lead-Lag Optimize?								Yes		Yes			
Recall Mode	None	None						Max		None	Max		
Act Effct Green (s)	18.8	18.8						66.1		78.1	78.1		
Actuated g/C Ratio	0.18	0.18						0.63		0.74	0.74		
v/c Ratio	0.72	0.09						0.86		0.28	0.63		
Control Delay	53.5	22.4						28.0		6.4	9.5		
Queue Delay	0.0	0.0						0.0		0.0	0.0		
Total Delay	53.5	22.4						28.0		6.4	9.5		
LOS	D	C						C		A	A		
Approach Delay		50.1						28.0			9.3		
Approach LOS		D						C			A		
Queue Length 50th (ft)	147	7						557		14	256		
Queue Length 95th (ft)	221	30						#917		28	401		
Internal Link Dist (ft)		275			290			565			158		
Turn Bay Length (ft)										60			
Base Capacity (vph)	378	379						1145		317	1400		

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	15.0
Total Split (s)	15.0
Total Split (%)	12%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Saturday Midday Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0						0		0	0	
Spillback Cap Reductn	0	0						0		0	0	
Storage Cap Reductn	0	0						0		0	0	
Reduced v/c Ratio	0.61	0.07						0.86		0.27	0.63	

Intersection Summary

Area Type: Other  
 Cycle Length: 123  
 Actuated Cycle Length: 104.9  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 22.4  
 Intersection Capacity Utilization 77.6%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 1: Concord St (Rte 126) & Anzio Road/Gorman Road

φ1	φ2	φ4	φ9
16 s	66 s	26 s	15 s
φ6			
82 s			

2018 Build Mitigated Weekday Evening Peak Hour  
1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
10/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	164	13	15	0	0	0	0	941	6	149	945	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	60		0
Storage Lanes	1		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	1746	0	0	0	0	0	1817	0	1805	1881	0
Flt Permitted	0.950									0.073		
Satd. Flow (perm)	1805	1746	0	0	0	0	0	1817	0	139	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		355			370			645			238	
Travel Time (s)		8.1			8.4			14.7			5.4	
Peak Hour Factor	0.75	0.75	0.75	0.92	0.92	0.92	0.96	0.96	0.96	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	219	37	0	0	0	0	0	986	0	160	1016	0
Turn Type	Perm	NA						NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4									6		
Detector Phase	4	4						2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0						10.0		9.0	10.0	
Minimum Split (s)	13.0	13.0						16.0		16.0	16.0	
Total Split (s)	22.0	22.0						64.0		16.0	80.0	
Total Split (%)	18.3%	18.3%						53.3%		13.3%	66.7%	
Yellow Time (s)	3.0	3.0						3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0						3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0						-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0						4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None						Max		None	Max	
Act Effct Green (s)	16.9	16.9						60.5		76.0	76.0	
Actuated g/C Ratio	0.17	0.17						0.60		0.75	0.75	
v/c Ratio	0.73	0.12						0.91		0.54	0.72	
Control Delay	54.7	22.0						31.8		20.5	10.6	
Queue Delay	0.0	0.0						0.0		0.0	0.0	
Total Delay	54.7	22.0						31.8		20.5	10.6	
LOS	D	C						C		C	B	
Approach Delay		50.0						31.8			11.9	
Approach LOS		D						C			B	
Queue Length 50th (ft)	135	9						537		35	307	
Queue Length 95th (ft)	174	29						#857		102	456	
Internal Link Dist (ft)		275			290			565			158	
Turn Bay Length (ft)										60		
Base Capacity (vph)	322	327						1088		302	1417	

0.5% per Year  
LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	15%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Mitigated Weekday Evening Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0						0		0	0	
Spillback Cap Reductn	0	0						0		0	0	
Storage Cap Reductn	0	0						0		0	0	
Reduced v/c Ratio	0.68	0.11						0.91		0.53	0.72	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 100.9  
 Natural Cycle: 120  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 24.1  
 Intersection Capacity Utilization 77.2%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 1: Concord St (Rte 126) & Anzio Road/Gorman Road

ø1	ø2	ø4	ø9
16 s	64 s	22 s	18 s
ø6			
80 s			

2018 Build Mitigated Saturday Midday Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	201	11	13	0	0	0	0	931	0	82	852	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	60		0
Storage Lanes	1		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	1748	0	0	0	0	0	1818	0	1805	1881	0
Flt Permitted	0.950									0.085		
Satd. Flow (perm)	1805	1748	0	0	0	0	0	1818	0	162	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15										
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		355			370			645			238	
Travel Time (s)		8.1			8.4			14.7			5.4	
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.94	0.94	0.94	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	231	28	0	0	0	0	0	990	0	85	888	0
Turn Type	Perm	NA						NA		pm+pt	NA	
Protected Phases		4						2		1	6	
Permitted Phases	4									6		
Detector Phase	4	4						2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0						10.0		9.0	10.0	
Minimum Split (s)	13.0	13.0						16.0		16.0	16.0	
Total Split (s)	24.0	24.0						62.0		16.0	78.0	
Total Split (%)	20.0%	20.0%						51.7%		13.3%	65.0%	
Yellow Time (s)	3.0	3.0						3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0						3.0		3.0	3.0	
Lost Time Adjust (s)	-1.0	-1.0						-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0						4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Recall Mode	None	None						Max		None	Max	
Act Effct Green (s)	18.0	18.0						62.2		74.0	74.0	
Actuated g/C Ratio	0.18	0.18						0.62		0.74	0.74	
v/c Ratio	0.72	0.09						0.88		0.28	0.64	
Control Delay	51.6	21.8						28.8		6.3	9.3	
Queue Delay	0.0	0.0						0.0		0.0	0.0	
Total Delay	51.6	21.8						28.8		6.3	9.3	
LOS	D	C						C		A	A	
Approach Delay		48.4						28.8			9.1	
Approach LOS		D						C			A	
Queue Length 50th (ft)	140	7						555		13	254	
Queue Length 95th (ft)	214	30						#873		27	372	
Internal Link Dist (ft)		275			290			565			158	
Turn Bay Length (ft)										60		
Base Capacity (vph)	360	361						1130		317	1392	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	15%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Mitigated Saturday Midday Peak Hour  
 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Lanes, Volumes, Timings  
 10/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0						0		0	0	
Spillback Cap Reductn	0	0						0		0	0	
Storage Cap Reductn	0	0						0		0	0	
Reduced v/c Ratio	0.64	0.08						0.88		0.27	0.64	

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 100  
 Natural Cycle: 120  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 22.4  
 Intersection LOS: C  
 Intersection Capacity Utilization 77.6%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Concord St (Rte 126) & Anzio Road/Gorman Road

Ø1	Ø2	Ø4	Ø9
16 s	62 s	24 s	18 s
Ø6			
78 s			

Concord Street at Normandy Road and Thelma Road

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2018 No-Build Weekday Evening Peak Hour  
 2: Concord St (Rte 126) & Normandy Rd/Thelma Rd

Lanes, Volumes, Timings  
 10/24/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	2	63	2	0	5	89	922	3	4	855	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	11	11	11
Storage Length (ft)	0		0	0		0	95		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1655	0	0	1694	0	1685	1819	0	1745	1795	0
Flt Permitted		0.999			0.985		0.950			0.950		
Satd. Flow (perm)	0	1655	0	0	1694	0	1685	1819	0	1745	1795	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		358			370			605			645	
Travel Time (s)		8.1			8.4			13.8			14.7	
Peak Hour Factor	0.86	0.86	0.86	0.35	0.35	0.35	0.97	0.97	0.97	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	77	0	0	20	0	92	954	0	4	1013	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 69.4% ICU Level of Service C  
 Analysis Period (min) 15

2018 No-Build Weekday Evening Peak Hour  
 2: Concord St (Rte 126) & Normandy Rd/Thelma Rd

HCM 2010 TWSC  
 10/24/2013

Intersection												
Intersection Delay, s/veh	2.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	2	63	2	0	5	89	922	3	4	855	87
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	95	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	35	35	35	97	97	97	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	2	73	6	0	14	92	951	3	4	919	94

Major/Minor	Minor2		Minor1			Major1		Major2				
Conflicting Flow All	2118	2112	966	2149	2158	952	1013	0	0	954	0	0
Stage 1	975	975	-	1136	1136	-	-	-	-	-	-	-
Stage 2	1143	1137	-	1013	1022	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	37	52	311	35	48	317	692	-	-	729	-	-
Stage 1	305	332	-	248	279	-	-	-	-	-	-	-
Stage 2	246	279	-	291	316	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	32	45	311	23	41	317	692	-	-	729	-	-
Mov Capacity-2 Maneuver	32	45	-	23	41	-	-	-	-	-	-	-
Stage 1	264	330	-	215	242	-	-	-	-	-	-	-
Stage 2	204	242	-	220	314	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.8	78.7	1	0
HCM LOS	D	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	692	-	-	216	68	729	-	-
HCM Lane V/C Ratio	0.133	-	-	0.361	0.294	0.006	-	-
HCM Control Delay (s)	10.996	-	-	30.8	78.7	9.968	-	-
HCM Lane LOS	B			D	F	A		
HCM 95th %tile Q(veh)	0.456	-	-	1.553	1.062	0.018	-	-

Notes  
 - : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 No-Build Saturday Midday Peak Hour  
 2: Concord St (Rte 126) & Normandy Rd/Thelma Rd

Lanes, Volumes, Timings  
 10/24/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	2	51	0	0	2	66	881	0	2	807	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	11	11	11
Storage Length (ft)	0		0	0		0	95		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1655	0	0	1644	0	1685	1818	0	1745	1803	0
Flt Permitted		0.999					0.950			0.950		
Satd. Flow (perm)	0	1655	0	0	1644	0	1685	1818	0	1745	1803	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		358			370			605			645	
Travel Time (s)		8.1			8.4			13.8			14.7	
Peak Hour Factor	0.88	0.88	0.88	0.25	0.25	0.25	0.90	0.90	0.90	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	61	0	0	8	0	73	979	0	2	944	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 63.9%      ICU Level of Service B  
 Analysis Period (min) 15

Intersection												
Intersection Delay, s/veh	1.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	2	51	0	0	2	66	881	0	2	807	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	95	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	25	25	25	90	90	90	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	1	2	58	0	0	8	73	979	0	2	887	57

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	2050	2046	915	2076	2074	979	944	0	0	979	0	0
Stage 1	920	920	-	1126	1126	-	-	-	-	-	-	-
Stage 2	1130	1126	-	950	948	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	42	57	333	40	54	306	735	-	-	713	-	-
Stage 1	327	352	-	251	282	-	-	-	-	-	-	-
Stage 2	250	282	-	315	342	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	38	51	333	29	49	306	735	-	-	713	-	-
Mov Capacity-2 Maneuver	38	51	-	29	49	-	-	-	-	-	-	-
Stage 1	295	351	-	226	254	-	-	-	-	-	-	-
Stage 2	219	254	-	258	341	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.3	17.1	0.7	0
HCM LOS	C	C		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	735	-	-	247	306	713	-	-
HCM Lane V/C Ratio	0.1	-	-	0.248	0.026	0.003	-	-
HCM Control Delay (s)	10.44	-	-	24.3	17.1	10.065	-	-
HCM Lane LOS	B	-	-	C	C	B	-	-
HCM 95th %tile Q(veh)	0.331	-	-	0.953	0.08	0.009	-	-

Notes  
 ~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 Build Weekday Evening Peak Hour  
 2: Concord St (Rte 126) & Normandy Rd/Thelma Rd

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	2	63	2	0	5	89	940	3	4	865	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	11	11	11
Storage Length (ft)	0		0	0		0	95		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1655	0	0	1694	0	1685	1819	0	1745	1795	0
Flt Permitted		0.999			0.985		0.950			0.950		
Satd. Flow (perm)	0	1655	0	0	1694	0	1685	1819	0	1745	1795	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		358			370			605			645	
Travel Time (s)		8.1			8.4			13.8			14.7	
Peak Hour Factor	0.86	0.86	0.86	0.35	0.35	0.35	0.97	0.97	0.97	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	77	0	0	20	0	92	972	0	4	1024	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 69.9% ICU Level of Service C  
 Analysis Period (min) 15

2018 Build Weekday Evening Peak Hour  
 2: Concord St (Rte 126) & Normandy Rd/Thelma Rd

HCM 2010 TWSC  
 10/28/2013

Intersection												
Intersection Delay, s/veh	2.4											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	2	63	2	0	5	89	940	3	4	865	87
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	95	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	35	35	35	97	97	97	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	2	2	73	6	0	14	92	969	3	4	930	94

Major/Minor	Minor2		Minor1			Major1		Major2				
Conflicting Flow All	2146	2141	977	2177	2186	971	1024	0	0	972	0	0
Stage 1	985	985	-	1154	1154	-	-	-	-	-	-	-
Stage 2	1161	1156	-	1023	1032	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	36	49	307	34	46	309	686	-	-	717	-	-
Stage 1	301	329	-	242	274	-	-	-	-	-	-	-
Stage 2	240	273	-	287	313	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	31	42	307	22	40	309	686	-	-	717	-	-
Mov Capacity-2 Maneuver	31	42	-	22	40	-	-	-	-	-	-	-
Stage 1	261	327	-	210	237	-	-	-	-	-	-	-
Stage 2	198	236	-	216	311	-	-	-	-	-	-	-

Approach	EB		WB			NB		SB		
HCM Control Delay, s	31.7		83.3			1		0		
HCM LOS	D		F							

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	686	-	-	211	65	717	-	-
HCM Lane V/C Ratio	0.134	-	-	0.369	0.308	0.006	-	-
HCM Control Delay (s)	11.056	-	-	31.7	83.3	10.051	-	-
HCM Lane LOS	B	-	-	D	F	B	-	-
HCM 95th %tile Q(veh)	0.46	-	-	1.602	1.113	0.018	-	-

Notes  
 ~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 Build Saturday Midday Peak Hour  
 2: Concord St (Rte 126) & Normandy Rd/Thelma Rd

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	2	51	0	0	2	66	904	0	2	824	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	11	11	11
Storage Length (ft)	0		0	0		0	95		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1655	0	0	1644	0	1685	1818	0	1745	1803	0
Flt Permitted		0.999					0.950			0.950		
Satd. Flow (perm)	0	1655	0	0	1644	0	1685	1818	0	1745	1803	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		358			370			605			645	
Travel Time (s)		8.1			8.4			13.8			14.7	
Peak Hour Factor	0.88	0.88	0.88	0.25	0.25	0.25	0.90	0.90	0.90	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	61	0	0	8	0	73	1004	0	2	962	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 65.1% ICU Level of Service C  
 Analysis Period (min) 15

**Intersection**

Intersection Delay, s/veh 1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	2	51	0	0	2	66	904	0	2	824	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	95	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	25	25	25	90	90	90	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	1	2	58	0	0	8	73	1004	0	2	905	57

Major/Minor	Minor2		Minor1			Major1		Major2				
Conflicting Flow All	2093	2089	934	2120	2118	1004	963	0	0	1004	0	0
Stage 1	938	938	-	1151	1151	-	-	-	-	-	-	-
Stage 2	1155	1151	-	969	967	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	39	53	325	37	51	296	723	-	-	698	-	-
Stage 1	320	346	-	243	275	-	-	-	-	-	-	-
Stage 2	242	275	-	307	335	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	35	48	325	27	46	296	723	-	-	698	-	-
Mov Capacity-2 Maneuver	35	48	-	27	46	-	-	-	-	-	-	-
Stage 1	288	345	-	218	247	-	-	-	-	-	-	-
Stage 2	212	247	-	250	334	-	-	-	-	-	-	-

Approach	EB		WB			NB		SB		
HCM Control Delay, s	25.3		17.5			0.7		0		
HCM LOS	D		C							

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	723	-	-	238	296	698	-	-
HCM Lane V/C Ratio	0.101	-	-	0.258	0.027	0.003	-	-
HCM Control Delay (s)	10.541	-	-	25.3	17.5	10.174	-	-
HCM Lane LOS	B	-	-	D	C	B	-	-
HCM 95th %tile Q(veh)	0.337	-	-	0.997	0.083	0.009	-	-

**Notes**

~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

Concord Street at the North Project Site Driveway and the Gulf Gas Station Driveway

2018 No-Build Weekday Evening Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

Lanes, Volumes, Timings  
 10/24/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	1	1	0	32	0	999	1	9	895	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	13	13	13	11	11	11	16	16	16
Satd. Flow (prot)	0	1959	0	0	1702	0	0	1818	0	0	2130	0
Flt Permitted		0.976			0.999							
Satd. Flow (perm)	0	1959	0	0	1702	0	0	1818	0	0	2130	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		205			284			235			605	
Travel Time (s)		4.7			6.5			5.3			13.8	
Peak Hour Factor	0.25	0.25	0.25	0.75	0.75	0.75	0.93	0.93	0.93	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	44	0	0	1075	0	0	958	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 64.7%      ICU Level of Service C  
 Analysis Period (min) 15

2018 No-Build Weekday Evening Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

HCM 2010 TWSC  
 10/24/2013

Intersection												
Intersection Delay, s/veh	0.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	0	1	1	0	32	0	999	1	9	895	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	25	75	75	75	93	93	93	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	4	0	4	1	0	43	0	1074	1	9	942	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2061	2040	946	2042	2043	1075	949	0	0	1075	0	0
Stage 1	965	965	-	1075	1075	-	-	-	-	-	-	-
Stage 2	1096	1075	-	967	968	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	41	57	320	42	57	269	732	-	-	656	-	-
Stage 1	309	336	-	268	298	-	-	-	-	-	-	-
Stage 2	261	298	-	308	335	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	34	55	320	41	55	269	732	-	-	656	-	-
Mov Capacity-2 Maneuver	34	55	-	41	55	-	-	-	-	-	-	-
Stage 1	309	326	-	268	298	-	-	-	-	-	-	-
Stage 2	220	298	-	295	325	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	72.7			24.3			0			0.1		
HCM LOS	F			C								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	732	-	-	61	230	656	-	-
HCM Lane V/C Ratio	-	-	-	0.131	0.191	0.014	-	-
HCM Control Delay (s)	0	-	-	72.7	24.3	10.568	0	-
HCM Lane LOS	A	-	-	F	C	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.426	0.689	0.044	-	-

Notes

- : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 No-Build Saturday Midday Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

Lanes, Volumes, Timings  
 10/24/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	0	0	0	0	25	1	922	1	13	855	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	13	13	13	11	11	11	16	16	16
Satd. Flow (prot)	0	2046	0	0	1698	0	0	1819	0	0	2128	0
Flt Permitted		0.950									0.999	
Satd. Flow (perm)	0	2046	0	0	1698	0	0	1819	0	0	2128	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		205			284			235			605	
Travel Time (s)		4.7			6.5			5.3			13.8	
Peak Hour Factor	0.38	0.38	0.38	0.69	0.69	0.69	0.87	0.87	0.87	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	36	0	0	1062	0	0	959	0
Sign Control		Stop			Stop			Free			Free	

**Intersection Summary**

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 65.4%      ICU Level of Service C  
 Analysis Period (min) 15

2018 No-Build Saturday Midday Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

HCM 2010 TWSC  
 10/24/2013

Intersection												
Intersection Delay, s/veh	1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	3	0	0	0	0	25	1	922	1	13	855	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	38	38	38	69	69	69	87	87	87	91	91	91
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	8	0	0	0	0	36	1	1060	1	14	940	5

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	2052	2034	942	2034	2037	1060	945	0	0	1061	0	0
Stage 1	971	971	-	1063	1063	-	-	-	-	-	-	-
Stage 2	1081	1063	-	971	974	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	42	58	322	43	57	275	734	-	-	664	-	-
Stage 1	307	334	-	272	302	-	-	-	-	-	-	-
Stage 2	266	302	-	307	333	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	35	55	322	41	54	275	734	-	-	664	-	-
Mov Capacity-2 Maneuver	35	55	-	41	54	-	-	-	-	-	-	-
Stage 1	306	319	-	271	301	-	-	-	-	-	-	-
Stage 2	230	301	-	293	318	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	135.6	20.1	0	0.2
HCM LOS	F	C		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	734	-	-	35	275	664	-	-
HCM Lane V/C Ratio	0.002	-	-	0.226	0.132	0.022	-	-
HCM Control Delay (s)	9.912	0	-	135.6	20.1	10.541	0	-
HCM Lane LOS	A	A	-	F	C	B	A	-
HCM 95th %tile Q(veh)	0.005	-	-	0.721	0.448	0.066	-	-

Notes  
 ~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 Build Weekday Evening Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	8	1	0	32	0	1018	1	9	887	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	13	13	13	11	11	11	16	16	16
Satd. Flow (prot)	0	0	1826	0	1702	0	0	1818	0	0	2124	0
Flt Permitted					0.999							
Satd. Flow (perm)	0	0	1826	0	1702	0	0	1818	0	0	2124	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		205			284			235			605	
Travel Time (s)		4.7			6.5			5.3			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.93	0.93	0.93	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	9	0	44	0	0	1096	0	0	969	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 65.4% ICU Level of Service C  
 Analysis Period (min) 15

2018 Build Weekday Evening Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

HCM 2010 TWSC  
 10/28/2013

Intersection												
Intersection Delay, s/veh	0.6											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	8	1	0	32	0	1018	1	9	887	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	75	75	75	93	93	93	95	95	95
Heavy Vehicles, %	0	0	2	0	0	0	0	1	0	0	1	0
Mvmt Flow	0	0	9	1	0	43	0	1095	1	9	934	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2082	2062	947	2061	2074	1095	960	0	0	1096	0	0
Stage 1	966	966	-	1095	1095	-	-	-	-	-	-	-
Stage 2	1116	1096	-	966	979	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.318	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	40	55	317	41	54	262	725	-	-	644	-	-
Stage 1	309	336	-	261	292	-	-	-	-	-	-	-
Stage 2	254	292	-	309	331	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	33	53	317	39	52	262	725	-	-	644	-	-
Mov Capacity-2 Maneuver	33	53	-	39	52	-	-	-	-	-	-	-
Stage 1	309	326	-	261	292	-	-	-	-	-	-	-
Stage 2	213	292	-	292	321	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.7			25.1			0			0.1		
HCM LOS	C			D								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	725	-	-	317	223	644	-	-
HCM Lane V/C Ratio	-	-	-	0.027	0.197	0.015	-	-
HCM Control Delay (s)	0	-	-	16.7	25.1	10.674	0	-
HCM Lane LOS	A	-	-	C	D	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.084	0.715	0.045	-	-

Notes  
 ~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 Build Saturday Midday Peak Hour  
 3: Concord St (Rte 126) & North Site Driveway/Gulf Driveway

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	9	0	0	25	0	948	1	13	848	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	13	13	13	11	11	11	16	16	16
Satd. Flow (prot)	0	0	1826	0	1698	0	0	1818	0	0	2121	0
Flt Permitted											0.999	
Satd. Flow (perm)	0	0	1826	0	1698	0	0	1818	0	0	2121	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		205			284			235			605	
Travel Time (s)		4.7			6.5			5.3			13.8	
Peak Hour Factor	0.92	0.92	0.92	0.69	0.69	0.69	0.87	0.87	0.87	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	10	0	36	0	0	1091	0	0	978	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 66.8% ICU Level of Service C  
 Analysis Period (min) 15

Intersection												
Intersection Delay, s/veh	0.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	9	0	0	25	0	948	1	13	848	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	69	69	69	87	87	87	91	91	91
Heavy Vehicles, %	0	0	2	0	0	0	0	1	0	0	1	2
Mvmt Flow	0	0	10	0	0	36	0	1090	1	14	932	32

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2084	2067	948	2066	2082	1090	964	0	0	1091	0	0
Stage 1	976	976	-	1090	1090	-	-	-	-	-	-	-
Stage 2	1108	1091	-	976	992	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.318	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	39	55	316	41	54	264	722	-	-	647	-	-
Stage 1	305	332	-	263	294	-	-	-	-	-	-	-
Stage 2	257	293	-	305	326	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	32	52	316	38	51	264	722	-	-	647	-	-
Mov Capacity-2 Maneuver	32	52	-	38	51	-	-	-	-	-	-	-
Stage 1	305	316	-	263	294	-	-	-	-	-	-	-
Stage 2	222	293	-	282	311	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.8			20.8			0			0.2		
HCM LOS	C			C								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	722	-	-	316	264	647	-	-
HCM Lane V/C Ratio	-	-	-	0.031	0.137	0.022	-	-
HCM Control Delay (s)	0	-	-	16.8	20.8	10.69	0	-
HCM Lane LOS	A	-	-	C	C	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.096	0.469	0.068	-	-

Notes

~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

Concord Street at Hartford Street and the South Project Site Driveway

2018 No-Build Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/24/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1	3	197	0	293	4	706	87	111	783	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	10	11	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		90	130		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1738	0	0	1685	1507	0	1819	1561	1668	1817	0
Flt Permitted		0.929			0.752			0.997		0.183		
Satd. Flow (perm)	0	1633	0	0	1334	1507	0	1813	1561	321	1817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				357			130			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			407			490			235	
Travel Time (s)		5.0			9.3			11.1			5.3	
Peak Hour Factor	0.63	0.63	0.63	0.82	0.82	0.82	0.92	0.92	0.92	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	9	0	0	240	357	0	771	95	117	827	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		8	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	21.0	21.0	21.0	8.0	21.0	
Minimum Split (s)	10.0	10.0		10.0	10.0	10.0	26.0	26.0	26.0	13.0	45.0	
Total Split (s)	17.0	17.0		17.0	17.0	17.0	45.0	45.0	45.0	13.0	58.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%	18.5%	48.9%	48.9%	48.9%	14.1%	63.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		4.0			4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	Max	Max	Max	None	Max	
Act Effct Green (s)		13.0			13.0	13.0		43.6	43.6	54.0	54.0	
Actuated g/C Ratio		0.17			0.17	0.17		0.58	0.58	0.72	0.72	
v/c Ratio		0.03			1.04	0.64		0.73	0.10	0.30	0.63	
Control Delay		20.2			104.3	9.5		18.0	1.1	5.2	8.1	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		20.2			104.3	9.5		18.0	1.1	5.2	8.1	
LOS		C			F	A		B	A	A	A	
Approach Delay		20.2			47.6			16.1			7.8	
Approach LOS		C			D			B			A	
Queue Length 50th (ft)		2			~123	0		261	0	13	159	
Queue Length 95th (ft)		9			#223	47		414	11	26	254	
Internal Link Dist (ft)		138			327			410			155	
Turn Bay Length (ft)									90	130		
Base Capacity (vph)		287			231	556		1054	962	392	1308	

0.5% per Year  
 LAS

2018 No-Build Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

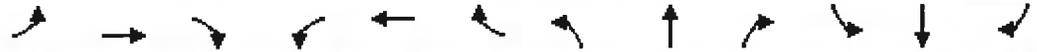
Lanes, Volumes, Timings  
 10/24/2013

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	18%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

0.5% per Year  
 LAS

2018 No-Build Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/24/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0			0	0		0	0	0	0	
Spillback Cap Reductn		0			0	0		0	0	0	0	
Storage Cap Reductn		0			0	0		0	0	0	0	
Reduced v/c Ratio		0.03			1.04	0.64		0.73	0.10	0.30	0.63	

Intersection Summary

Area Type: Other  
 Cycle Length: 92  
 Actuated Cycle Length: 75  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.04  
 Intersection Signal Delay: 20.6  
 Intersection Capacity Utilization 106.4%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 4: Concord St (Rte 126) & South Site Driveway/Hartford St

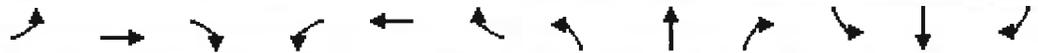
ϕ1 13 s	ϕ2 45 s	ϕ4 17 s	ϕ9 17 s
ϕ6 58 s		ϕ8 17 s	

2018 No-Build Saturday Midday Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/24/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2	5	114	1	217	1	707	76	89	765	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	10	11	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		90	130		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1720	0	0	1690	1492	0	1819	1561	1685	1819	0
Flt Permitted					0.713			0.999		0.184		
Satd. Flow (perm)	0	1720	0	0	1264	1492	0	1817	1561	326	1819	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14				249			130			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			407			490			235	
Travel Time (s)		5.0			9.3			11.1			5.3	
Peak Hour Factor	0.35	0.35	0.35	0.87	0.87	0.87	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	132	249	0	778	84	98	842	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		8	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	21.0	21.0	21.0	8.0	21.0	
Minimum Split (s)	10.0	10.0		10.0	10.0	10.0	26.0	26.0	26.0	13.0	45.0	
Total Split (s)	17.0	17.0		17.0	17.0	17.0	45.0	45.0	45.0	13.0	58.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%	18.5%	48.9%	48.9%	48.9%	14.1%	63.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		-1.0			-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)		4.0			4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	Max	Max	Max	None	Max	
Act Effct Green (s)		12.2			12.2	12.2		43.7	43.7	54.0	54.0	
Actuated g/C Ratio		0.16			0.16	0.16		0.59	0.59	0.73	0.73	
v/c Ratio		0.07			0.63	0.55		0.73	0.09	0.24	0.64	
Control Delay		16.6			44.2	9.2		17.8	0.8	4.6	8.0	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		16.6			44.2	9.2		17.8	0.8	4.6	8.0	
LOS		B			D	A		B	A	A	A	
Approach Delay		16.6			21.3			16.1			7.7	
Approach LOS		B			C			B			A	
Queue Length 50th (ft)		2			57	0		264	0	11	163	
Queue Length 95th (ft)		4			#118	53		420	8	22	263	
Internal Link Dist (ft)		138			327			410			155	
Turn Bay Length (ft)									90	130		
Base Capacity (vph)		312			221	466		1070	972	401	1323	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	18%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0			0	0		0	0	0	0	
Spillback Cap Reductn		0			0	0		0	0	0	0	
Storage Cap Reductn		0			0	0		0	0	0	0	
Reduced v/c Ratio		0.06			0.60	0.53		0.73	0.09	0.24	0.64	

Intersection Summary

Area Type: Other  
 Cycle Length: 92  
 Actuated Cycle Length: 74.2  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 13.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 93.7%  
 ICU Level of Service F  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 4: Concord St (Rte 126) & South Site Driveway/Hartford St

ρ1	ρ2	ρ4	ρ9
13 s	45 s	17 s	17 s
ρ5		ρ8	
58 s		17 s	

2018 Build Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	16	36	195	18	290	40	699	86	110	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	10	11	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		90	130		0
Storage Lanes	1		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	1669	0	0	1695	1507	0	1812	1561	1668	1817	0
Flt Permitted	0.308				0.704			0.932		0.164		
Satd. Flow (perm)	574	1669	0	0	1248	1507	0	1694	1561	288	1817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39				354			130			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			407			490			235	
Travel Time (s)		5.0			9.3			11.1			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.82	0.82	0.82	0.92	0.92	0.92	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	1%	0%	1%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	56	0	0	260	354	0	803	93	116	827	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		8	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	21.0	21.0	21.0	8.0	21.0	
Minimum Split (s)	10.0	10.0		10.0	10.0	10.0	26.0	26.0	26.0	13.0	45.0	
Total Split (s)	17.0	17.0		17.0	17.0	17.0	45.0	45.0	45.0	13.0	58.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%	18.5%	48.9%	48.9%	48.9%	14.1%	63.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0			-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	Max	Max	Max	None	Max	
Act Effct Green (s)	13.0	13.0			13.0	13.0		43.6	43.6	54.0	54.0	
Actuated g/C Ratio	0.17	0.17			0.17	0.17		0.58	0.58	0.72	0.72	
v/c Ratio	0.33	0.17			1.20	0.64		0.82	0.10	0.31	0.63	
Control Delay	37.6	14.4			158.8	9.5		22.8	1.0	5.4	8.1	
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	37.6	14.4			158.8	9.5		22.8	1.0	5.4	8.1	
LOS	D	B			F	A		C	A	A	A	
Approach Delay		23.0			72.7			20.6			7.8	
Approach LOS		C			E			C			A	
Queue Length 50th (ft)	14	7			~150	0		298	0	13	159	
Queue Length 95th (ft)	40	36			#252	47		#543	11	26	254	
Internal Link Dist (ft)		138			327			410			155	
Turn Bay Length (ft)									90	130		
Base Capacity (vph)	99	321			216	553		985	962	372	1308	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	18%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0			0	0		0	0	0	0	
Spillback Cap Reductn	0	0			0	0		0	0	0	0	
Storage Cap Reductn	0	0			0	0		0	0	0	0	
Reduced v/c Ratio	0.33	0.17			1.20	0.64		0.82	0.10	0.31	0.63	

Intersection Summary

Area Type: Other  
 Cycle Length: 92  
 Actuated Cycle Length: 75  
 Natural Cycle: 150  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.20  
 Intersection Signal Delay: 28.5  
 Intersection Capacity Utilization 108.8%  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 4: Concord St (Rte 126) & South Site Driveway/Hartford St

 $\phi_1$	 $\phi_2$	 $\phi_4$	 $\phi_9$
13 s	45 s	17 s	17 s
 $\phi_6$		 $\phi_8$	
58 s		17 s	

2018 Build Saturday Midday Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	19	45	112	20	214	50	696	75	88	764	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	11	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		90	130		0
Storage Lanes	1		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1711	1612	0	0	1701	1492	0	1812	1561	1685	1817	0
Flt Permitted	0.567				0.710			0.908		0.155		
Satd. Flow (perm)	1021	1612	0	0	1259	1492	0	1650	1561	275	1817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49				246			130			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		218			407			490				235
Travel Time (s)		5.0			9.3			11.1				5.3
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	1%	2%	1%	0%	0%	1%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	70	0	0	152	246	0	820	82	97	845	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		8	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	21.0	21.0	21.0	8.0	21.0	
Minimum Split (s)	10.0	10.0		10.0	10.0	10.0	26.0	26.0	26.0	13.0	45.0	
Total Split (s)	17.0	17.0		17.0	17.0	17.0	45.0	45.0	45.0	13.0	58.0	
Total Split (%)	18.5%	18.5%		18.5%	18.5%	18.5%	48.9%	48.9%	48.9%	14.1%	63.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0			-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	Max	Max	Max	None	Max	
Act Effct Green (s)	12.8	12.8			12.8	12.8		43.7	43.7	54.0	54.0	
Actuated g/C Ratio	0.17	0.17			0.17	0.17		0.58	0.58	0.72	0.72	
v/c Ratio	0.24	0.22			0.71	0.54		0.85	0.08	0.26	0.64	
Control Delay	30.9	14.3			49.4	9.0		25.7	0.8	4.9	8.3	
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	30.9	14.3			49.4	9.0		25.7	0.8	4.9	8.3	
LOS	C	B			D	A		C	A	A	A	
Approach Delay		20.5			24.4			23.4			7.9	
Approach LOS		C			C			C			A	
Queue Length 50th (ft)	17	8			67	0		318	0	11	164	
Queue Length 95th (ft)	45	41			#144	53		#572	7	22	264	
Internal Link Dist (ft)		138			327			410			155	
Turn Bay Length (ft)									90	130		
Base Capacity (vph)	177	320			219	462		963	965	368	1312	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	17.0
Total Split (s)	17.0
Total Split (%)	18%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Saturday Midday Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0			0	0		0	0	0	0	
Spillback Cap Reductn	0	0			0	0		0	0	0	0	
Storage Cap Reductn	0	0			0	0		0	0	0	0	
Reduced v/c Ratio	0.24	0.22			0.69	0.53		0.85	0.08	0.26	0.64	

Intersection Summary

Area Type: Other  
 Cycle Length: 92  
 Actuated Cycle Length: 74.8  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.85  
 Intersection Signal Delay: 17.3  
 Intersection Capacity Utilization 98.3%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: B  
 ICU Level of Service F

Splits and Phases: 4: Concord St (Rte 126) & South Site Driveway/Hartford St

p1	p2	p4	p9
13 s	45 s	17 s	17 s
p6		p8	
58 s		17 s	

2018 Build Mitigated Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	16	36	195	18	290	40	699	86	110	782	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	10	11	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		90	130		0
Storage Lanes	1		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	1669	0	0	1695	1507	0	1812	1561	1668	1817	0
Flt Permitted	0.420				0.704			0.931		0.110		
Satd. Flow (perm)	782	1669	0	0	1248	1507	0	1692	1561	193	1817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39				354			133			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			407			490			235	
Travel Time (s)		5.0			9.3			11.1			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.82	0.82	0.82	0.92	0.92	0.92	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	1%	0%	1%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	56	0	0	260	354	0	803	93	116	827	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		8	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	21.0	21.0	21.0	6.0	21.0	
Minimum Split (s)	10.0	10.0		10.0	10.0	10.0	26.0	26.0	26.0	11.0	45.0	
Total Split (s)	21.0	21.0		21.0	21.0	21.0	40.0	40.0	40.0	11.0	51.0	
Total Split (%)	23.3%	23.3%		23.3%	23.3%	23.3%	44.4%	44.4%	44.4%	12.2%	56.7%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0			-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	
Act Effct Green (s)	17.1	17.1			17.1	17.1		36.2	36.2	44.7	44.7	
Actuated g/C Ratio	0.24	0.24			0.24	0.24		0.52	0.52	0.64	0.64	
v/c Ratio	0.17	0.13			0.85	0.56		0.92	0.11	0.43	0.71	
Control Delay	24.8	11.6			54.5	6.8		34.7	1.2	10.6	12.4	
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	24.8	11.6			54.5	6.8		34.7	1.2	10.6	12.4	
LOS	C	B			D	A		C	A	B	B	
Approach Delay		16.5			27.0			31.2			12.2	
Approach LOS		B			C			C			B	
Queue Length 50th (ft)	12	6			112	0		319	0	17	201	
Queue Length 95th (ft)	35	32			#208	43		#564	11	41	327	
Internal Link Dist (ft)		138			327			410			155	
Turn Bay Length (ft)									90	130		
Base Capacity (vph)	191	437			305	636		876	873	272	1229	

0.5% per Year  
 LAS

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	20%
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Mitigated Weekday Evening Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0			0	0		0	0	0	0	
Spillback Cap Reductn	0	0			0	0		0	0	0	0	
Storage Cap Reductn	0	0			0	0		0	0	0	0	
Reduced v/c Ratio	0.17	0.13			0.85	0.56		0.92	0.11	0.43	0.67	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 69.8  
 Natural Cycle: 150  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 22.6  
 Intersection Capacity Utilization 108.8%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: C  
 ICU Level of Service G

Splits and Phases: 4: Concord St (Rte 126) & South Site Driveway/Hartford St

φ1	φ2	φ4	φ9
11 s	40 s	21 s	18 s
φ6		φ8	
51 s		21 s	

2018 Build Mitigated Saturday Midday Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	19	45	112	20	214	50	696	75	88	764	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	10	11	11	11	10	11	11
Storage Length (ft)	0		0	0		0	0		90	130		0
Storage Lanes	1		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	1667	0	0	1701	1492	0	1812	1561	1685	1817	0
Flt Permitted	0.582				0.710			0.909		0.161		
Satd. Flow (perm)	1084	1667	0	0	1259	1492	0	1652	1561	286	1817	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49				246			133			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			407			490			235	
Travel Time (s)		5.0			9.3			11.1			5.3	
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	0%	0%	1%	2%	1%	0%	0%	1%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	70	0	0	152	246	0	820	82	97	845	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		8	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	21.0	21.0	21.0	6.0	21.0	
Minimum Split (s)	10.0	10.0		10.0	10.0	10.0	26.0	26.0	26.0	11.0	45.0	
Total Split (s)	16.0	16.0		16.0	16.0	16.0	45.0	45.0	45.0	11.0	56.0	
Total Split (%)	17.8%	17.8%		17.8%	17.8%	17.8%	50.0%	50.0%	50.0%	12.2%	62.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0			-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	
Act Effct Green (s)	12.1	12.1			12.1	12.1		41.2	41.2	49.7	49.7	
Actuated g/C Ratio	0.17	0.17			0.17	0.17		0.59	0.59	0.71	0.71	
v/c Ratio	0.22	0.21			0.70	0.53		0.84	0.08	0.28	0.65	
Control Delay	29.6	14.0			48.3	8.9		23.2	0.7	5.1	8.3	
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	29.6	14.0			48.3	8.9		23.2	0.7	5.1	8.3	
LOS	C	B			D	A		C	A	A	A	
Approach Delay		19.8			24.0			21.1			7.9	
Approach LOS		B			C			C			A	
Queue Length 50th (ft)	16	8			65	0		283	0	10	153	
Queue Length 95th (ft)	44	40			#144	52		#537	6	21	250	
Internal Link Dist (ft)		138			327			410			155	
Turn Bay Length (ft)									90	130		
Base Capacity (vph)	187	328			217	461		974	975	344	1359	

0.5% per Year  
 LAS

Synchro 8 Report  
 S:\Jobs\6529\Synchro\RTC\m2018bsr.syn

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	10.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	20%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	

2018 Build Mitigated Saturday Midday Peak Hour  
 4: Concord St (Rte 126) & South Site Driveway/Hartford St

Lanes, Volumes, Timings  
 10/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0			0	0		0	0	0	0	
Spillback Cap Reductn	0	0			0	0		0	0	0	0	
Storage Cap Reductn	0	0			0	0		0	0	0	0	
Reduced v/c Ratio	0.22	0.21			0.70	0.53		0.84	0.08	0.28	0.62	

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 69.8  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 16.3  
 Intersection Capacity Utilization 98.3%  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Intersection LOS: B  
 ICU Level of Service F

Splits and Phases: 4: Concord St (Rte 126) & South Site Driveway/Hartford St

ρ1	ρ2	ρ4	ρ9
11 s	45 s	16 s	18 s
ρ6		ρ8	
56 s		16 s	

Concord Street at Prindiville Avenue and Burdette Avenue

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2018 No-Build Weekday Evening Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

Lanes, Volumes, Timings  
 10/24/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	8	23	1	10	10	32	747	9	8	886	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	12	12	12	12	12	12	12	12	12
Satd. Flow (prot)	0	1859	0	0	1775	0	0	1877	0	0	1859	0
Flt Permitted		0.984			0.997			0.998				
Satd. Flow (perm)	0	1859	0	0	1775	0	0	1877	0	0	1859	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			395			388			490	
Travel Time (s)		9.4			9.0			8.8			11.1	
Peak Hour Factor	0.75	0.75	0.75	0.66	0.66	0.66	0.95	0.95	0.95	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	0	0	32	0	0	829	0	0	1063	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 76.3% ICU Level of Service D  
 Analysis Period (min) 15

2018 No-Build Weekday Evening Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

HCM 2010 TWSC

10/24/2013

Intersection

Intersection Delay, s/veh 5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	8	23	1	10	10	32	747	9	8	886	94
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	66	66	66	95	95	95	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	20	11	31	2	15	15	34	786	9	9	953	101

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1894	1883	1003	1899	1929	791	1054	0	0	796	0	0
Stage 1	1020	1020	-	858	858	-	-	-	-	-	-	-
Stage 2	874	863	-	1041	1071	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	54	72	297	53	67	393	668	-	-	835	-	-
Stage 1	288	317	-	354	376	-	-	-	-	-	-	-
Stage 2	347	374	-	280	300	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	38	64	297	38	59	393	668	-	-	835	-	-
Mov Capacity-2 Maneuver	38	64	-	38	59	-	-	-	-	-	-	-
Stage 1	262	308	-	322	342	-	-	-	-	-	-	-
Stage 2	290	340	-	236	292	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	143.3	60.9	0.4	0.1
HCM LOS	F	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	668	-	-	77	95	835	-	-
HCM Lane V/C Ratio	0.05	-	-	0.797	0.335	0.01	-	-
HCM Control Delay (s)	10.675	0	-	143.3	60.9	9.356	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.159	-	-	3.916	1.298	0.031	-	-

Notes

~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 No-Build Saturday Midday Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

Lanes, Volumes, Timings  
 10/24/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	9	26	0	5	3	19	765	3	4	836	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	12	12	12	12	12	12	12	12	12
Satd. Flow (prot)	0	1856	0	0	1803	0	0	1880	0	0	1865	0
Flt Permitted		0.986						0.999				
Satd. Flow (perm)	0	1856	0	0	1803	0	0	1880	0	0	1865	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			395			388			490	
Travel Time (s)		9.4			9.0			8.8			11.1	
Peak Hour Factor	0.77	0.77	0.77	0.50	0.50	0.50	0.88	0.88	0.88	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	65	0	0	16	0	0	894	0	0	996	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 70.2%      ICU Level of Service C  
 Analysis Period (min) 15

2018 No-Build Saturday Midday Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

HCM 2010 TWSC  
 10/24/2013

Intersection

Intersection Delay, s/veh 4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	9	26	0	5	3	19	765	3	4	836	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	50	50	50	88	88	88	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	19	12	34	0	10	6	22	869	3	4	929	63

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1891	1885	961	1906	1915	871	992	0	0	873	0	0
Stage 1	969	969	-	914	914	-	-	-	-	-	-	-
Stage 2	922	916	-	992	1001	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	54	71	314	53	68	353	705	-	-	781	-	-
Stage 1	307	334	-	330	355	-	-	-	-	-	-	-
Stage 2	327	354	-	299	323	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	44	66	314	39	63	353	705	-	-	781	-	-
Mov Capacity-2 Maneuver	44	66	-	39	63	-	-	-	-	-	-	-
Stage 1	288	330	-	310	333	-	-	-	-	-	-	-
Stage 2	293	332	-	254	319	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	114.9	52.8	0.2	0
HCM LOS	F	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	705	-	-	89	91	781	-	-
HCM Lane V/C Ratio	0.031	-	-	0.73	0.176	0.006	-	-
HCM Control Delay (s)	10.268	0	-	114.9	52.8	9.636	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.095	-	-	3.655	0.601	0.017	-	-

Notes

- : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 Build Weekday Evening Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	8	23	1	10	10	32	775	9	8	916	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	12	12	12	12	12	12	12	12	12
Satd. Flow (prot)	0	1859	0	0	1775	0	0	1876	0	0	1860	0
Flt Permitted		0.984			0.997			0.998				
Satd. Flow (perm)	0	1859	0	0	1775	0	0	1876	0	0	1860	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			395			388			490	
Travel Time (s)		9.4			9.0			8.8			11.1	
Peak Hour Factor	0.75	0.75	0.75	0.66	0.66	0.66	0.95	0.95	0.95	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	0	0	32	0	0	859	0	0	1095	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other  
 Control Type: Unsignalized  
 Intersection Capacity Utilization 77.9%      ICU Level of Service D  
 Analysis Period (min) 15

2018 Build Weekday Evening Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

HCM 2010 TWSC  
 10/28/2013

Intersection												
Intersection Delay, s/veh	6.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	8	23	1	10	10	32	775	9	8	916	94
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	66	66	66	95	95	95	93	93	93
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	20	11	31	2	15	15	34	816	9	9	985	101

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1956	1946	1035	1961	1991	821	1086	0	0	825	0	0
Stage 1	1053	1053	-	888	888	-	-	-	-	-	-	-
Stage 2	903	893	-	1073	1103	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	49	66	284	48	61	378	650	-	-	814	-	-
Stage 1	276	306	-	341	365	-	-	-	-	-	-	-
Stage 2	335	363	-	269	290	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	33	58	284	33	53	378	650	-	-	814	-	-
Mov Capacity-2 Maneuver	33	58	-	33	53	-	-	-	-	-	-	-
Stage 1	249	297	-	308	330	-	-	-	-	-	-	-
Stage 2	277	328	-	225	282	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	184.1			69.6			0.4			0.1		
HCM LOS	F			F								

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	650	-	-	68	86	814	-	-
HCM Lane V/C Ratio	0.052	-	-	0.902	0.37	0.011	-	-
HCM Control Delay (s)	10.841	0	-	184.1	69.6	9.47	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.164	-	-	4.397	1.451	0.032	-	-

Notes  
 ~ : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

2018 Build Saturday Midday Peak Hour  
 5: Concord St (Rte 126) & Prindiville Ave/Burdette Ave

Lanes, Volumes, Timings  
 10/28/2013

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	15	9	26	0	5	3	19	802	3	4	873	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	14	12	12	12	12	12	12	12	12	12
Satd. Flow (prot)	0	1856	0	0	1803	0	0	1880	0	0	1867	0
Flt Permitted		0.986						0.999				
Satd. Flow (perm)	0	1856	0	0	1803	0	0	1880	0	0	1867	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			395			388			490	
Travel Time (s)		9.4			9.0			8.8			11.1	
Peak Hour Factor	0.77	0.77	0.77	0.50	0.50	0.50	0.88	0.88	0.88	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	65	0	0	16	0	0	936	0	0	1037	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	72.2%
Analysis Period (min)	15
	ICU Level of Service C

Intersection

Intersection Delay, s/veh 5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	9	26	0	5	3	19	802	3	4	873	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	50	50	50	88	88	88	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	19	12	34	0	10	6	22	911	3	4	970	63

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1975	1969	1002	1989	1998	913	1033	0	0	915	0	0
Stage 1	1011	1011	-	956	956	-	-	-	-	-	-	-
Stage 2	964	958	-	1033	1042	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Capacity-1 Maneuver	47	63	297	46	61	334	681	-	-	754	-	-
Stage 1	291	320	-	313	339	-	-	-	-	-	-	-
Stage 2	309	338	-	283	309	-	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Capacity-1 Maneuver	38	58	297	32	56	334	681	-	-	754	-	-
Mov Capacity-2 Maneuver	38	58	-	32	56	-	-	-	-	-	-	-
Stage 1	272	316	-	292	317	-	-	-	-	-	-	-
Stage 2	274	316	-	238	305	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	150.3	60.1	0.2	0
HCM LOS	F	F		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	681	-	-	78	81	754	-	-
HCM Lane V/C Ratio	0.032	-	-	0.833	0.198	0.006	-	-
HCM Control Delay (s)	10.459	0	-	150.3	60.1	9.803	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0.098	-	-	4.185	0.681	0.018	-	-

Notes

- : Volume Exceeds Capacity; \$ : Delay Exceeds 300 Seconds; Error : Computation Not Defined

TRAFFIC SIGNAL WARRANTS ANALYSIS

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**Concord Street at Normandy Road and Thelma Road  
Traffic Signal Warrant Analysis Summary**

**2013 Existing Traffic Volumes**

Start Time	Concord Street Volume (Major Street) <sup>a</sup>	Thelma Road Volume (Minor Street) <sup>b</sup>	Warrant 1 Condition A <sup>c</sup>	Warrant 1 Condition B <sup>d</sup>	Warrant 2 <sup>e</sup>	Warrant 3 <sup>f</sup>
7:00	1534	7	No	No	No	No
8:00	1580	6	No	No	No	No
9:00	1430	2	No	No	No	No
10:00	1297	6	No	No	No	No
11:00	1458	1	No	No	No	No
12:00	1540	2	No	No	No	No
1:00	1572	1	No	No	No	No
2:00	1588	6	No	No	No	No
3:00	1640	3	No	No	No	No
4:00	1753	2	No	No	No	No
5:00	1815	5	No	No	No	No
6:00	1772	3	No	No	No	No
<b>Warrant Satisfied?</b>			<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**2018 No-Build Volumes (0.5% Growth/Year)**

Start Time	Concord Street Volume (Major Street) <sup>a</sup>	Thelma Road Volume (Minor Street) <sup>b</sup>	Warrant 1 Condition A <sup>c</sup>	Warrant 1 Condition B <sup>d</sup>	Warrant 2 <sup>e</sup>	Warrant 3 <sup>f</sup>
7:00	1573	7	No	No	No	No
8:00	1620	6	No	No	No	No
9:00	1466	2	No	No	No	No
10:00	1330	6	No	No	No	No
11:00	1495	1	No	No	No	No
12:00	1579	2	No	No	No	No
1:00	1612	1	No	No	No	No
2:00	1628	6	No	No	No	No
3:00	1681	3	No	No	No	No
4:00	1797	2	No	No	No	No
5:00	1861	5	No	No	No	No
6:00	1817	3	No	No	No	No
<b>Warrant Satisfied?</b>			<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**2018 Build Volumes (No-Build plus Project-Generated)**

Start Time	Concord Street Volume (Major Street) <sup>a</sup>	Thelma Road Volume (Minor Street) <sup>b</sup>	Warrant 1 Condition A <sup>c</sup>	Warrant 1 Condition B <sup>d</sup>	Warrant 2 <sup>e</sup>	Warrant 3 <sup>f</sup>
7:00	1578	7	No	No	No	No
8:00	1634	6	No	No	No	No
9:00	1480	2	No	No	No	No
10:00	1351	6	No	No	No	No
11:00	1522	1	No	No	No	No
12:00	1612	2	No	No	No	No
1:00	1643	1	No	No	No	No
2:00	1659	6	No	No	No	No
3:00	1713	3	No	No	No	No
4:00	1829	2	No	No	No	No
5:00	1901	5	No	No	No	No
6:00	1846	3	No	No	No	No
<b>Warrant Satisfied?</b>			<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

<sup>a</sup>Based on TMC count conducted on Concord Street in October 2013. Volume includes total of both approaches.

<sup>b</sup>Based on TMC count conducted on Normandy/Thelma Road in October 2013. Volume includes eastbound approach.

<sup>c</sup>Warrant 1 Condition A - Eight Hour Vehicular Volume, Minimum Vehicular Volume - satisfied when major street volume > 500 and minor street volume > 150.

<sup>d</sup>Warrant 1 Condition B - Eight Hour Vehicular Volume, Interruption of Continuous Traffic - satisfied when major street volume > 750 and minor street volume > 75.

<sup>e</sup>Warrant 2, Four Hour Vehicular Volume - see Table 4C-1. (Lower threshold volume for minor street is 60 vph).

<sup>f</sup>Warrant 3, Peak Hour - see Table 4C-3. (Lower threshold volume for minor street is 100 vph).

**Note: Minor street volumes were based on Thelma Road since left-turns are restricted from Normandy Road.**

**Concord Street at Prindiville Avenue and Burdette Avenue  
Traffic Signal Warrant Analysis Summary**

**2013 Existing Traffic Volumes**

Start Time	Concord Street Volume (Major Street) <sup>a</sup>	Prindiville Avenue Volume (Minor Street) <sup>b</sup>	Warrant 1 Condition A <sup>c</sup>	Warrant 1 Condition B <sup>d</sup>	Warrant 2 <sup>e</sup>	Warrant 3 <sup>f</sup>
7:00	1243	40	No	No	No	No
8:00	1343	42	No	No	No	No
9:00	1209	37	No	No	No	No
10:00	1207	20	No	No	No	No
11:00	1255	36	No	No	No	No
12:00	1303	24	No	No	No	No
1:00	1396	44	No	No	No	No
2:00	1499	40	No	No	No	No
3:00	1487	51	No	No	No	No
4:00	1600	65	No	No	Yes	No
5:00	1628	49	No	No	No	No
6:00	1559	57	No	No	No	No
<b>Warrant Satisfied?</b>			<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**2018 No-Build Volumes (0.5% Growth/Year)**

Start Time	Concord Street Volume (Major Street) <sup>a</sup>	Prindiville Avenue Volume (Minor Street) <sup>b</sup>	Warrant 1 Condition A <sup>c</sup>	Warrant 1 Condition B <sup>d</sup>	Warrant 2 <sup>e</sup>	Warrant 3 <sup>f</sup>
7:00	1274	41	No	No	No	No
8:00	1377	43	No	No	No	No
9:00	1240	38	No	No	No	No
10:00	1237	21	No	No	No	No
11:00	1287	37	No	No	No	No
12:00	1336	25	No	No	No	No
1:00	1431	45	No	No	No	No
2:00	1537	41	No	No	No	No
3:00	1525	52	No	No	No	No
4:00	1640	67	No	No	Yes	No
5:00	1669	50	No	No	No	No
6:00	1598	58	No	No	No	No
<b>Warrant Satisfied?</b>			<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

**2018 Build Volumes (No-Build plus Project-Generated)**

Start Time	Concord Street Volume (Major Street) <sup>a</sup>	Prindiville Avenue Volume (Minor Street) <sup>b</sup>	Warrant 1 Condition A <sup>c</sup>	Warrant 1 Condition B <sup>d</sup>	Warrant 2 <sup>e</sup>	Warrant 3 <sup>f</sup>
7:00	1284	41	No	No	No	No
8:00	1400	43	No	No	No	No
9:00	1263	38	No	No	No	No
10:00	1273	21	No	No	No	No
11:00	1333	37	No	No	No	No
12:00	1391	25	No	No	No	No
1:00	1484	45	No	No	No	No
2:00	1589	41	No	No	No	No
3:00	1577	52	No	No	No	No
4:00	1693	67	No	No	Yes	No
5:00	1736	50	No	No	No	No
6:00	1647	58	No	No	No	No
<b>Warrant Satisfied?</b>			<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

<sup>a</sup>Based on TMC count conducted on Concord Street in October 2013. Volume includes total of both approaches.

<sup>b</sup>Based on TMC count conducted on Prindiville/Burdette Avenue and in October 2013. Volume includes eastbound approach.

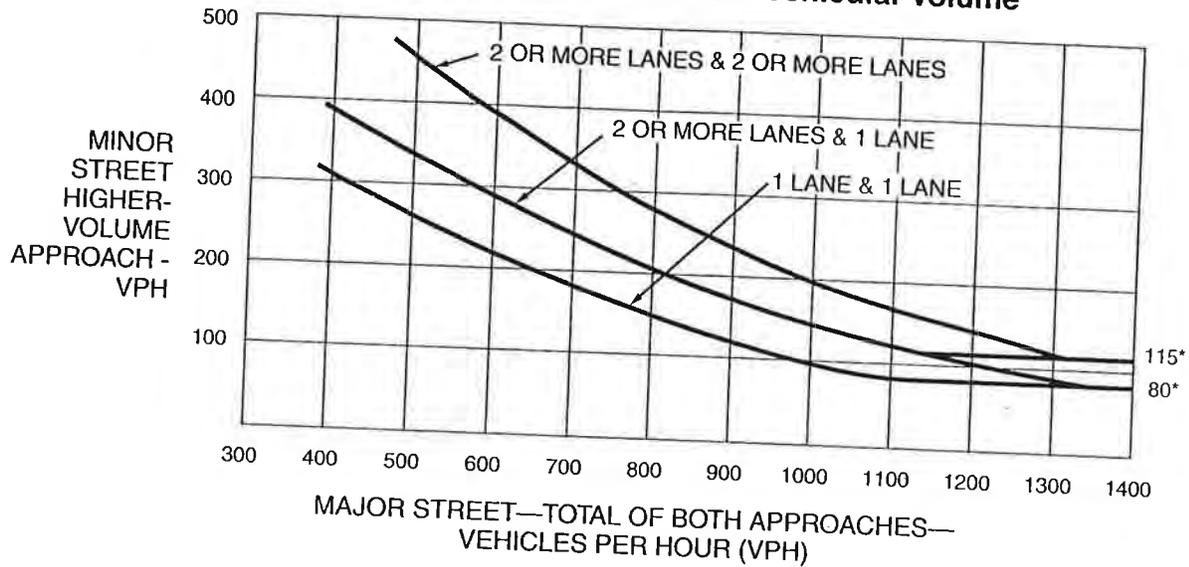
<sup>c</sup>Warrant 1 Condition A - Eight Hour Vehicular Volume, Minimum Vehicular Volume - satisfied when major street volume > 500 and minor street volume > 150.

<sup>d</sup>Warrant 1 Condition B - Eight Hour Vehicular Volume, Interruption of Continuous Traffic - satisfied when major street volume > 750 and minor street volume > 75.

<sup>e</sup>Warrant 2, Four Hour Vehicular Volume - see Table 4C-1. (Lower threshold volume for minor street is 60 vph).

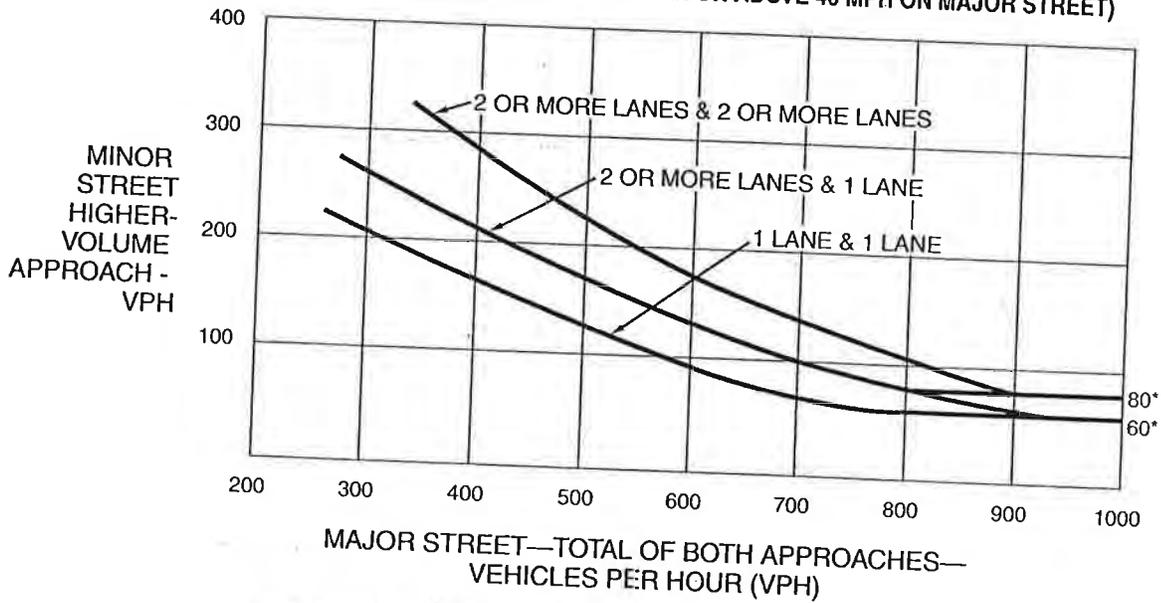
<sup>f</sup>Warrant 3, Peak Hour - see Table 4C-3. (Lower threshold volume for minor street is 100 vph).

**Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume**



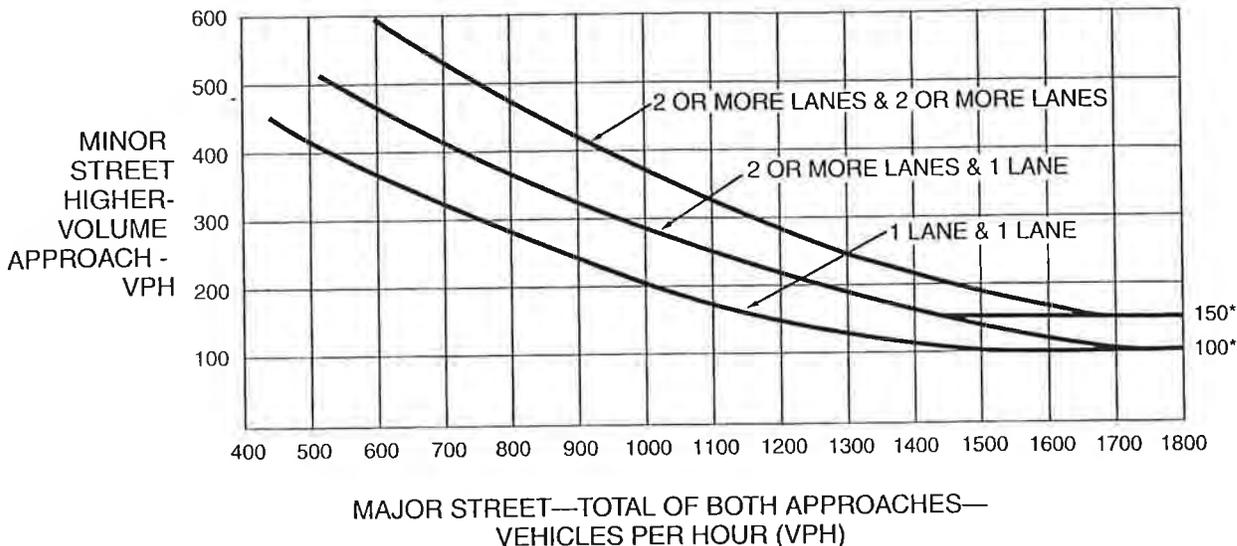
\*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

**Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)**  
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



\*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

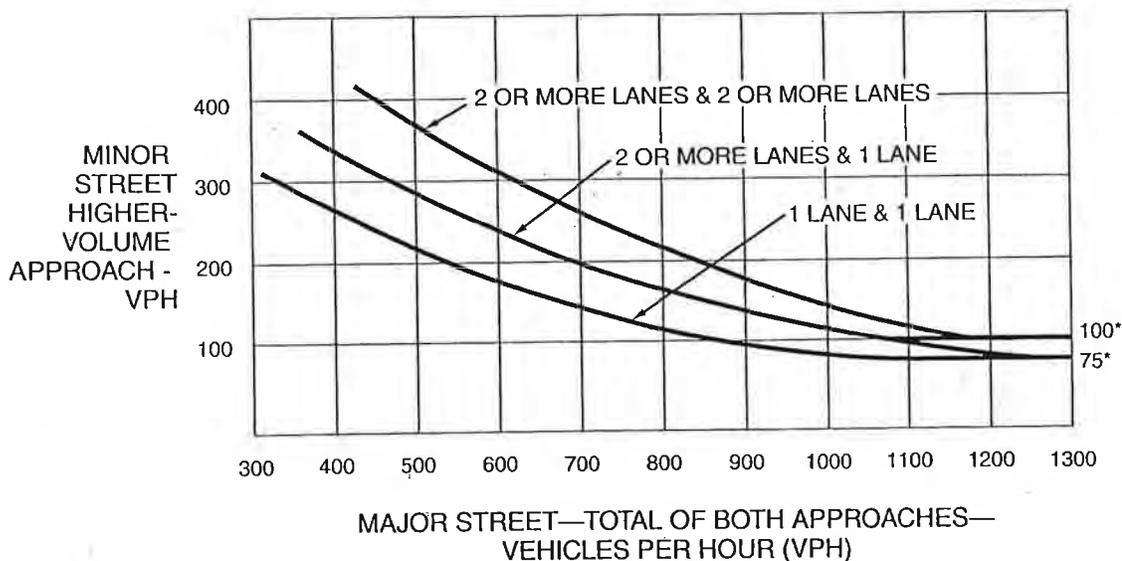
**Figure 4C-3. Warrant 3, Peak Hour**



\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



\*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

# Accurate Counts

978-664-2565

N/S Street : Concord Street  
 E/W Street: Prindiville Av / Burdette Av  
 City/State : Framingham, MA  
 Weather : Clear

File Name : 65290001  
 Site Code : 65290001  
 Start Date : 10/9/2013  
 Page No : 1

## Groups Printed - Cars - Trucks

Start Time	Concord St From North			Burdette Ave From East			Concord St From South			Prindiville Ave From West			Int Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	2	124	8	0	5	0	3	181	1	7	0	2	333
07:15 AM	0	130	11	0	2	0	0	175	0	6	1	2	330
07:30 AM	2	147	5	0	2	5	6	157	0	5	3	4	336
07:45 AM	0	133	22	0	4	2	15	117	1	3	1	6	304
Total	4	534	46	0	13	7	27	630	2	21	5	14	1303
08:00 AM	1	181	7	0	7	3	11	158	2	7	6	8	391
08:15 AM	2	167	8	0	3	0	3	132	1	3	1	4	324
08:30 AM	0	162	9	1	2	3	2	172	1	5	1	2	360
08:45 AM	1	146	14	0	0	1	5	158	0	2	1	2	330
Total	4	656	38	1	12	7	21	620	4	17	9	16	1405
09:00 AM	0	142	12	0	0	1	3	166	1	5	1	3	334
09:15 AM	0	133	3	1	3	0	5	149	2	4	2	4	306
09:30 AM	0	137	7	1	1	3	5	134	1	4	2	4	299
09:45 AM	1	146	3	0	4	0	2	157	0	3	3	2	321
Total	1	558	25	2	8	4	15	606	4	16	8	13	1260
10:00 AM	1	136	10	0	2	0	4	164	2	0	1	3	323
10:15 AM	1	130	10	0	1	0	2	163	0	2	1	1	311
10:30 AM	1	130	7	0	0	0	3	142	1	3	1	1	289
10:45 AM	0	155	8	0	1	0	5	131	1	2	1	4	308
Total	3	551	35	0	4	0	14	600	4	7	4	9	1231
11:00 AM	0	158	5	0	1	1	3	150	0	5	2	1	326
11:15 AM	1	140	7	0	0	0	2	151	0	6	2	2	311
11:30 AM	1	137	13	0	1	0	4	155	0	2	1	1	315
11:45 AM	2	148	10	0	1	2	3	164	1	9	1	4	345
Total	4	583	35	0	3	3	12	620	1	22	6	8	1297
12:00 PM	0	157	3	0	0	1	2	163	0	1	0	4	331
12:15 PM	1	133	8	2	3	2	6	169	1	3	0	1	329
12:30 PM	1	169	7	0	2	1	3	139	0	1	1	4	328
12:45 PM	3	167	14	0	0	0	6	151	0	4	3	2	350
Total	5	626	32	2	5	4	17	622	1	9	4	11	1338
01:00 PM	1	182	5	0	1	0	9	154	0	5	1	8	366
01:15 PM	1	178	5	0	0	0	5	158	0	3	4	2	356
01:30 PM	1	180	9	0	1	2	12	171	0	4	3	3	386
01:45 PM	2	147	8	0	0	0	10	157	1	9	0	2	336
Total	5	687	27	0	2	2	36	640	1	21	8	15	1444

# Accurate Counts

978-664-2565

File Name : 65290001  
 Site Code : 65290001  
 Start Date : 10/9/2013  
 Page No : 2

N/S Street : Concord Street  
 E/W Street : Prindiville Av / Burdette Av  
 City/State : Framingham, MA  
 Weather : Clear

## Groups Printed- Cars - Trucks

Start Time	Concord St			Burdette Ave			Concord St			Prindiville Ave			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
02:00 PM	2	186	11	0	1	0	18	160	3	2	6	3	392
02:15 PM	6	179	6	0	2	1	14	165	1	0	1	6	381
02:30 PM	2	182	14	1	1	1	13	151	1	5	1	5	377
02:45 PM	3	206	15	0	0	2	8	153	0	5	2	4	398
Total	13	753	46	1	4	4	53	629	5	12	10	18	1548
03:00 PM	0	199	13	0	0	2	14	158	1	7	2	11	407
03:15 PM	5	194	14	0	1	1	5	153	1	1	2	6	383
03:30 PM	4	174	9	3	1	2	3	159	2	1	5	2	365
03:45 PM	6	185	17	0	1	5	7	164	0	4	3	7	399
Total	15	752	53	3	3	10	29	634	4	13	12	26	1554
04:00 PM	5	178	20	0	1	4	20	163	16	8	4	6	425
04:15 PM	4	209	28	1	0	0	4	172	1	5	5	7	436
04:30 PM	2	197	16	0	0	0	10	156	2	5	5	6	399
04:45 PM	2	187	17	0	1	0	3	184	4	7	3	4	412
Total	13	771	81	1	2	4	37	675	23	25	17	23	1672
05:00 PM	0	187	26	1	1	1	4	175	5	5	0	1	406
05:15 PM	3	193	31	0	0	1	9	177	6	3	2	7	432
05:30 PM	3	192	22	0	1	2	9	158	2	6	4	8	407
05:45 PM	0	209	20	1	1	1	8	188	1	3	4	6	442
Total	6	781	99	2	3	5	30	698	14	17	10	22	1687
06:00 PM	5	197	39	0	0	1	5	152	0	11	6	6	422
06:15 PM	5	210	23	0	0	0	6	167	0	7	1	8	427
06:30 PM	2	193	15	1	4	3	5	156	0	1	2	5	387
06:45 PM	2	211	12	2	1	1	3	151	0	6	1	3	393
Total	14	811	89	3	5	5	19	626	0	25	10	22	1629
Grand Total	87	8063	606	15	64	55	310	7600	63	205	103	197	17368
Approach %	1	92.1	6.9	11.2	47.8	41	3.9	95.3	0.8	40.6	20.4	3.9	
Total %	0.5	46.4	3.5	0.1	0.4	0.3	1.8	43.8	0.4	1.2	0.6	1.1	
Cars	85	7929	600	15	61	54	304	7397	63	204	101	192	17005
% Cars	97.7	98.3	99	100	95.3	98.2	98.1	97.3	100	99.5	98.1	97.5	97.9
Trucks	2	134	6	0	3	1	6	203	0	1	2	5	363
% Trucks	2.3	1.7	1	0	4.7	1.8	1.9	2.7	0	0.5	1.9	2.5	2.1



# Accurate Counts

## 978-664-2565

N/S Street : Concord Street  
 E/W Street: Prindiville Av / Burdette Av  
 City/State : Framingham, MA  
 Weather : Clear

File Name : 65290001  
 Site Code : 65290001  
 Start Date : 10/9/2013  
 Page No : 2

Start Time	Groups Printed- Bikes Peds																		
	Concord St From North				Burdette Ave From East				Concord St From South				Prindiville Ave From West						
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
02:15 PM	0	3	0	1	0	0	0	2	0	2	0	7	0	0	0	0	10	5	15
02:30 PM	0	2	0	0	0	0	0	3	0	0	0	0	0	0	0	1	4	3	7
02:45 PM	0	1	0	2	0	0	0	1	0	1	0	0	0	0	0	3	6	2	8
Total	0	9	0	4	0	0	0	12	0	5	0	9	0	0	0	6	31	14	45
03:00 PM	0	2	0	6	0	0	0	9	0	2	0	0	0	0	0	1	16	4	20
03:15 PM	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	1	4	1	5
03:30 PM	0	0	0	0	0	0	0	7	0	1	0	0	0	0	0	0	7	1	8
03:45 PM	0	0	0	1	0	0	0	3	0	1	0	0	0	0	0	0	4	1	5
Total	0	2	0	7	0	0	0	22	0	5	0	0	0	0	0	2	31	7	38
04:00 PM	0	3	0	3	0	0	0	4	0	1	0	3	0	0	0	2	12	4	16
04:15 PM	0	3	0	0	0	0	0	3	0	3	0	0	0	0	0	6	9	6	15
04:30 PM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	2	3
04:45 PM	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	2	5	2	7
Total	0	7	0	3	0	0	0	11	0	7	0	3	0	0	0	10	27	14	41
05:00 PM	0	0	0	0	0	0	0	7	0	1	0	0	0	0	0	0	7	1	8
05:15 PM	0	2	0	0	0	0	0	3	0	1	0	0	0	0	0	1	4	3	7
05:30 PM	0	1	0	0	0	0	0	2	0	5	0	1	0	0	0	4	6	6	10
05:45 PM	0	1	0	0	0	0	0	5	0	1	0	0	0	0	0	1	6	2	8
Total	0	4	0	0	0	0	0	17	0	8	0	1	0	0	0	3	21	12	33
06:00 PM	0	2	0	0	0	0	0	4	0	0	0	0	0	0	0	4	8	2	10
06:15 PM	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	5	5	3	8
06:30 PM	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	1	5	1	6
06:45 PM	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	5	5
Total	0	5	0	0	0	0	0	6	1	5	0	2	0	0	0	10	18	11	29
Grand Total	0	49	1	26	0	0	1	149	2	65	0	23	0	1	1	69	267	120	387
Approch %	0	98	2		0	0	100		3	97	0		0	50	50				
Total %	0	40.8	0.8		0	0	0.8		1.7	54.2	0		0	0.8	0.8		69	31	

Start Time	Concord St From North												Burdette Ave From East				Concord St From South				Prindiville Ave From West					
	Left	Thru	Right	App.	Total	Left	Thru	Right	App.	Total	Left	Thru	Right	App.	Total	Left	Thru	Right	App.	Total	Left	Thru	Right	App.	Total	Int. Total
	08:45 AM	0	2	0	0	2	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	3
09:15 AM	0	2	0	0	2	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	7
09:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	6	0	0	6	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	0	0	0	0	19
% App. Total	0	100	0	0	100	0	0	0	0	0	0	100	0	0	100	0	0	0	0	0	0	0	0	0	0	679
PHF	0.000	0.750	0.000		0.750	0.000	0.000	0.000		0.000	0.000	0.650	0.000		0.650	0.000	0.000	0.000		0.000	0.000	0.000	0.000		0.000	

Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1  
 Peak Hour for Entire Intersection Begins at 08:45 AM

# Accurate Counts

## 978-664-2565

N/S Street : Concord Street  
 E/W Street : Normandy Rd / Thelma Rd  
 City/State : Framingham, MA  
 Weather : Clear

File Name : 65290002  
 Site Code : 65290002  
 Start Date : 10/9/2013  
 Page No : 1

### Groups Printed - Cars - Trucks

Start Time	Concord St From North			Thelma Rd From East			Concord St From South			Normandy Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	1	134	18	0	0	4	8	214	0	0	0	9	388
07:15 AM	0	137	31	0	0	0	11	210	3	0	0	12	404
07:30 AM	0	131	24	0	0	2	13	197	0	1	1	14	383
07:45 AM	1	145	35	0	1	0	19	200	2	0	0	15	418
<b>Total</b>	<b>2</b>	<b>547</b>	<b>108</b>	<b>0</b>	<b>1</b>	<b>6</b>	<b>51</b>	<b>821</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>50</b>	<b>1593</b>
08:00 AM	0	166	21	0	1	2	25	195	0	0	1	39	450
08:15 AM	0	163	24	1	0	0	18	197	0	0	0	14	417
08:30 AM	0	145	26	1	0	0	18	209	1	1	0	14	415
08:45 AM	1	143	24	1	0	0	11	193	0	1	0	17	391
<b>Total</b>	<b>1</b>	<b>617</b>	<b>95</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>72</b>	<b>794</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>84</b>	<b>1673</b>
09:00 AM	0	115	20	0	0	0	14	194	0	1	1	12	357
09:15 AM	1	164	12	0	0	0	16	184	1	1	0	16	395
09:30 AM	0	143	17	0	0	0	33	171	1	1	0	14	380
09:45 AM	0	141	19	1	0	1	12	171	1	1	2	15	364
<b>Total</b>	<b>1</b>	<b>563</b>	<b>68</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>75</b>	<b>720</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>57</b>	<b>1496</b>
10:00 AM	1	130	15	0	0	1	20	183	1	0	0	9	360
10:15 AM	0	148	16	0	0	2	12	147	1	0	0	10	336
10:30 AM	0	118	11	0	1	1	7	145	0	2	0	15	300
10:45 AM	0	145	22	0	0	1	11	163	1	0	0	18	361
<b>Total</b>	<b>1</b>	<b>541</b>	<b>64</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>50</b>	<b>638</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>52</b>	<b>1357</b>
11:00 AM	0	141	19	0	0	0	11	200	0	1	1	15	388
11:15 AM	0	143	22	0	0	0	15	176	0	1	0	12	369
11:30 AM	0	161	17	0	0	0	15	162	1	2	0	8	366
11:45 AM	0	148	24	0	0	1	22	181	0	1	0	23	400
<b>Total</b>	<b>0</b>	<b>593</b>	<b>82</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>63</b>	<b>719</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>58</b>	<b>1523</b>
12:00 PM	1	133	23	0	0	1	15	206	0	3	0	17	399
12:15 PM	2	159	21	0	0	1	24	172	0	2	0	28	409
12:30 PM	1	175	19	0	0	0	18	178	0	1	1	19	412
12:45 PM	0	149	22	0	0	0	22	200	0	1	0	23	417
<b>Total</b>	<b>4</b>	<b>616</b>	<b>85</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>79</b>	<b>756</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>87</b>	<b>1637</b>
01:00 PM	0	186	25	0	0	1	14	188	0	0	0	25	439
01:15 PM	0	186	25	0	0	0	12	181	0	0	0	15	419
01:30 PM	0	168	10	0	0	0	15	175	0	0	0	16	384
01:45 PM	1	166	17	0	0	0	16	186	1	2	0	24	413
<b>Total</b>	<b>1</b>	<b>706</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>57</b>	<b>730</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>80</b>	<b>1655</b>

# Accurate Counts

## 978-664-2565

N/S Street : Concord Street  
 E/W Street : Normandy Rd / Thelma Rd  
 City/State : Framingham, MA  
 Weather : Clear

File Name : 65290002  
 Site Code : 65290002  
 Start Date : 10/9/2013  
 Page No : 2

### Groups Printed- Cars - Trucks

Start Time	Concord St From North			Thelma Rd From East			Concord St From South			Normandy Rd From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
02:00 PM	0	166	23	0	1	0	17	163	1	3	1	13	388
02:15 PM	0	177	15	1	1	1	23	173	0	1	1	26	419
02:30 PM	1	196	12	0	0	0	14	207	1	0	0	18	449
02:45 PM	0	178	19	1	0	1	20	176	6	1	0	22	424
Total	1	717	69	2	2	2	74	719	8	5	2	79	1680
03:00 PM	2	196	15	0	0	0	18	183	0	2	1	23	440
03:15 PM	0	178	17	0	0	0	8	170	0	1	0	20	394
03:30 PM	1	184	24	0	0	1	20	191	2	0	0	18	441
03:45 PM	0	181	23	0	0	2	20	207	0	0	0	11	444
Total	3	739	79	0	0	3	66	751	2	3	1	72	1719
04:00 PM	1	183	18	0	0	0	24	204	0	2	0	17	449
04:15 PM	1	207	15	0	0	1	21	197	0	1	0	15	458
04:30 PM	1	203	24	0	0	0	16	197	0	0	0	18	459
04:45 PM	0	192	20	0	0	1	18	211	0	1	0	18	461
Total	3	785	77	0	0	2	79	809	0	4	0	68	1827
05:00 PM	0	193	15	0	0	2	21	210	0	1	1	17	460
05:15 PM	1	213	16	0	0	2	16	209	0	1	0	19	477
05:30 PM	2	206	9	1	0	0	21	211	0	0	0	23	473
05:45 PM	0	205	22	0	0	0	22	221	2	0	1	13	486
Total	3	817	62	1	0	4	80	851	2	2	2	72	1896
06:00 PM	0	203	21	0	0	1	15	195	0	1	0	14	450
06:15 PM	0	218	12	0	0	1	19	200	1	0	1	21	473
06:30 PM	1	194	23	0	0	1	14	193	0	0	0	23	449
06:45 PM	1	226	19	0	0	0	21	196	0	2	0	16	481
Total	2	841	75	0	0	3	69	784	1	3	1	74	1853
Grand Total	22	8082	941	7	5	32	815	9092	27	40	13	833	19909
Approach %	0.2	89.4	10.4	15.9	11.4	72.7	8.2	91.5	0.3	4.5	1.5	94	
Total %	0.1	40.6	4.7	0	0	0.2	4.1	45.7	0.1	0.2	0.1	4.2	
Cars	22	7867	920	7	5	32	804	8874	26	38	13	821	19429
% Cars	100	97.3	97.8	100	100	100	98.7	97.6	96.3	95	100	98.6	97.6
Trucks	0	215	21	0	0	0	11	218	1	2	0	12	480
% Trucks	0	2.7	2.2	0	0	0	1.3	2.4	3.7	5	0	1.4	2.4



# Accurate Counts

## 978-664-2565

N/S Street : Concord Street  
 E/W Street: Normandy Rd / Thelma Rd  
 City/State : Framingham, MA  
 Weather : Clear

File Name : 65290002  
 Site Code : 65290002  
 Start Date : 10/9/2013  
 Page No : 2

Start Time	Concord St From North						Thelma Rd From East						Concord St From South						Normandy Rd From West							
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Left		Thru		Right			
02:15 PM	0	5	0	0	0	7	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	2	19	5	24
02:30 PM	0	0	0	0	0	7	0	0	0	0	3	0	4	0	0	0	0	0	0	0	0	0	11	4	4	15
02:45 PM	0	4	0	0	0	1	0	0	0	0	2	0	6	0	0	0	0	0	0	0	0	0	3	10	10	13
Total	0	10	0	0	0	15	0	0	0	0	18	0	10	0	0	0	0	0	0	0	0	8	43	20	63	
03:00 PM	0	1	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	1	2	3	5	
03:15 PM	0	0	0	0	0	2	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	5	1	6	
03:30 PM	0	1	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2	2	3	5	
03:45 PM	0	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4	5	4	9	
Total	0	5	0	0	0	2	0	0	0	0	2	0	6	0	0	0	0	0	0	0	0	7	14	11	25	
04:00 PM	0	4	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	3	7	5	12	
04:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	3	4	9	
04:30 PM	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	6	1	7	
04:45 PM	0	0	0	0	0	2	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	3	6	1	7	
Total	0	6	0	0	0	5	0	0	0	0	3	0	5	0	0	0	0	0	0	0	0	13	23	12	35	
05:00 PM	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	2	5	3	8	
05:15 PM	0	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	2	2	6	
05:30 PM	0	1	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	2	4	4	7	
05:45 PM	0	2	0	0	0	3	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	2	8	3	11	
Total	0	6	0	0	0	3	0	0	0	0	6	0	7	0	0	0	0	0	0	0	0	6	18	14	32	
06:00 PM	0	2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	2	3	5	
06:15 PM	0	2	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	1	1	5	6	
06:30 PM	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	5	1	6	
06:45 PM	0	2	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4	4	
Total	0	7	0	0	0	0	0	0	0	0	2	0	6	0	0	0	0	0	0	0	0	5	8	13	21	
Grand Total	0	57	1	0	0	48	0	0	0	0	66	9	72	0	0	0	0	0	0	0	0	8	228	147	375	
Approch %	0	98.3	1.7	0	0	0	0	0	0	0	0	11.1	88.9	0	0	0	0	0	0	0	0	100				
Total %	0	38.8	0.7	0	0	0	0	0	0	0	0	6.1	49	0	0	0	0	0	0	0	0	5.4	60.8	39.2		

Start Time	Concord St From North						Thelma Rd From East						Concord St From South						Normandy Rd From West						
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		
07:45 AM	0	2	0	0	0	2	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	5	0	7
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	2	4
08:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3
08:30 AM	0	1	0	0	0	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	1	3	1	5
Total Volume	0	4	0	0	0	4	0	0	0	0	4	4	8	0	0	0	0	0	0	0	0	3	12	3	19
% App. Total	0	100	0	0	0	0	0	0	0	0	0	33.3	66.7	0	0	0	0	0	0	0	0	100	37.5	37.5	67.9
PHF	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	1.000	0.000	0.000	0.600	0.000	0.000	0.000	0.000	0.000	0.375	0.375	0.375	0.679

Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1  
 Peak Hour for Entire Intersection Begins at 07:45 AM

DRIVE-THROUGH WINDOW VEHICLE QUEUE OBSERVATIONS

CVS/Pharmacy Framingham  
 Drive-Through Queues  
 Tuesday, October 15, 2013  
 4:00 to 6:00 PM

Start Time	Queues
04:00 PM	1
04:01 PM	2
04:02 PM	2
04:03 PM	1
04:04 PM	0
04:05 PM	1
04:06 PM	2
04:07 PM	1
04:08 PM	2
04:09 PM	2
04:10 PM	2
04:11 PM	2
04:12 PM	1
04:13 PM	1
04:14 PM	0
04:15 PM	0
04:16 PM	0
04:17 PM	0
04:18 PM	0
04:19 PM	0
04:20 PM	1
04:21 PM	1
04:22 PM	1
04:23 PM	0
04:24 PM	0
04:25 PM	1
04:26 PM	1
04:27 PM	0
04:28 PM	0
04:29 PM	0
04:30 PM	0
04:31 PM	1
04:32 PM	1
04:33 PM	1
04:34 PM	1
04:35 PM	1
04:36 PM	2
04:37 PM	2
04:38 PM	1
04:39 PM	1
04:40 PM	0

Start Time	Queues
04:41 PM	0
04:42 PM	0
04:43 PM	0
04:44 PM	0
04:45 PM	0
04:46 PM	0
04:47 PM	0
04:48 PM	2
04:49 PM	1
04:50 PM	2
04:51 PM	1
04:52 PM	1
04:53 PM	0
04:54 PM	0
04:55 PM	0
04:56 PM	0
04:57 PM	0
04:58 PM	0
04:59 PM	0
05:00 PM	0
05:01 PM	1
05:02 PM	2
05:03 PM	0
05:04 PM	0
05:05 PM	0
05:06 PM	0
05:07 PM	1
05:08 PM	1
05:09 PM	1
05:10 PM	0
05:11 PM	0
05:12 PM	0
05:13 PM	0
05:14 PM	1
05:15 PM	1
05:16 PM	1
05:17 PM	1
05:18 PM	0
05:19 PM	0
05:20 PM	0
05:21 PM	0

Start Time	Queues
05:22 PM	0
05:23 PM	1
05:24 PM	1
05:25 PM	0
05:26 PM	0
05:27 PM	0
05:28 PM	0
05:29 PM	0
05:30 PM	0
05:31 PM	1
05:32 PM	1
05:33 PM	1
05:34 PM	2
05:35 PM	2
05:36 PM	2
05:37 PM	2
05:38 PM	1
05:39 PM	0
05:40 PM	2
05:41 PM	1
05:42 PM	1
05:43 PM	1
05:44 PM	2
05:45 PM	1
05:46 PM	2
05:47 PM	2
05:48 PM	1
05:49 PM	1
05:50 PM	1
05:51 PM	1
05:52 PM	1
05:53 PM	1
05:54 PM	0
05:55 PM	0
05:56 PM	0
05:57 PM	1
05:58 PM	0
05:59 PM	0

average 0.72  
 max 2

CVS/Pharmacy Framingham  
 Drive-Through Queues  
 Saturday, October 19, 2013  
 11:00 AM to 2:00 PM

Start Time	Queues						
11:00 AM	0	11:49 AM	1	12:38 PM	0	01:27 PM	0
11:01 AM	0	11:50 AM	0	12:39 PM	1	01:28 PM	0
11:02 AM	0	11:51 AM	0	12:40 PM	1	01:29 PM	1
11:03 AM	0	11:52 AM	0	12:41 PM	0	01:30 PM	1
11:04 AM	0	11:53 AM	0	12:42 PM	0	01:31 PM	1
11:05 AM	0	11:54 AM	0	12:43 PM	0	01:32 PM	1
11:06 AM	0	11:55 AM	0	12:44 PM	0	01:33 PM	1
11:07 AM	0	11:56 AM	0	12:45 PM	0	01:34 PM	1
11:08 AM	0	11:57 AM	1	12:46 PM	0	01:35 PM	1
11:09 AM	0	11:58 AM	1	12:47 PM	0	01:36 PM	0
11:10 AM	0	11:59 AM	1	12:48 PM	0	01:37 PM	0
11:11 AM	1	12:00 PM	1	12:49 PM	0	01:38 PM	0
11:12 AM	1	12:01 PM	1	12:50 PM	0	01:39 PM	1
11:13 AM	0	12:02 PM	1	12:51 PM	0	01:40 PM	1
11:14 AM	0	12:03 PM	0	12:52 PM	1	01:41 PM	1
11:15 AM	1	12:04 PM	0	12:53 PM	1	01:42 PM	1
11:16 AM	1	12:05 PM	0	12:54 PM	1	01:43 PM	1
11:17 AM	2	12:06 PM	1	12:55 PM	1	01:44 PM	1
11:18 AM	3	12:07 PM	1	12:56 PM	0	01:45 PM	0
11:19 AM	3	12:08 PM	0	12:57 PM	0	01:46 PM	0
11:20 AM	3	12:09 PM	0	12:58 PM	1	01:47 PM	0
11:21 AM	3	12:10 PM	0	12:59 PM	1	01:48 PM	1
11:22 AM	3	12:11 PM	0	01:00 PM	1	01:49 PM	1
11:23 AM	2	12:12 PM	0	01:01 PM	1	01:50 PM	0
11:24 AM	2	12:13 PM	0	01:02 PM	1	01:51 PM	0
11:25 AM	2	12:14 PM	0	01:03 PM	0	01:52 PM	1
11:26 AM	2	12:15 PM	0	01:04 PM	0	01:53 PM	1
11:27 AM	1	12:16 PM	1	01:05 PM	0	01:54 PM	1
11:28 AM	0	12:17 PM	1	01:06 PM	0	01:55 PM	1
11:29 AM	0	12:18 PM	1	01:07 PM	1	01:56 PM	0
11:30 AM	0	12:19 PM	0	01:08 PM	1	01:57 PM	0
11:31 AM	0	12:20 PM	0	01:09 PM	3	01:58 PM	0
11:32 AM	0	12:21 PM	0	01:10 PM	2	01:59 PM	0
11:33 AM	0	12:22 PM	0	01:11 PM	2		
11:34 AM	0	12:23 PM	0	01:12 PM	1		
11:35 AM	1	12:24 PM	0	01:13 PM	0		
11:36 AM	1	12:25 PM	0	01:14 PM	0		
11:37 AM	1	12:26 PM	3	01:15 PM	1		
11:38 AM	0	12:27 PM	0	01:16 PM	1		
11:39 AM	0	12:28 PM	2	01:17 PM	1		
11:40 AM	0	12:29 PM	2	01:18 PM	0		
11:41 AM	0	12:30 PM	1	01:19 PM	0		
11:42 AM	1	12:31 PM	0	01:20 PM	1		
11:43 AM	1	12:32 PM	2	01:21 PM	1		
11:44 AM	1	12:33 PM	2	01:22 PM	1		
11:45 AM	1	12:34 PM	2	01:23 PM	1		
11:46 AM	1	12:35 PM	2	01:24 PM	1		
11:47 AM	1	12:36 PM	2	01:25 PM	0		
11:48 AM	1	12:37 PM	2	01:26 PM	0		

Average 0.666667  
 Max 3

CVS/Pharmacy Wayland  
 Drive-Through Queues  
 Thursday, October 10, 2013  
 4:00 to 6:00 PM

Start Time	Queues
04:00 PM	0
04:01 PM	0
04:02 PM	0
04:03 PM	0
04:04 PM	0
04:05 PM	0
04:06 PM	0
04:07 PM	0
04:08 PM	0
04:09 PM	0
04:10 PM	0
04:11 PM	0
04:12 PM	0
04:13 PM	0
04:14 PM	0
04:15 PM	0
04:16 PM	0
04:17 PM	0
04:18 PM	0
04:19 PM	0
04:20 PM	2
04:21 PM	2
04:22 PM	2
04:23 PM	2
04:24 PM	2
04:25 PM	2
04:26 PM	2
04:27 PM	2
04:28 PM	1
04:29 PM	1
04:30 PM	1
04:31 PM	1
04:32 PM	0
04:33 PM	0
04:34 PM	0
04:35 PM	0
04:36 PM	0
04:37 PM	0
04:38 PM	0
04:39 PM	0
04:40 PM	0
04:41 PM	0
04:42 PM	1
04:43 PM	1
04:44 PM	1
04:45 PM	0
04:46 PM	0
04:47 PM	0

Start Time	Queues
04:48 PM	0
04:49 PM	0
04:50 PM	0
04:51 PM	0
04:52 PM	0
04:53 PM	1
04:54 PM	1
04:55 PM	2
04:56 PM	2
04:57 PM	2
04:58 PM	1
04:59 PM	1
05:00 PM	0
05:01 PM	0
05:02 PM	0
05:03 PM	0
05:04 PM	0
05:05 PM	0
05:06 PM	0
05:07 PM	0
05:08 PM	0
05:09 PM	0
05:10 PM	0
05:11 PM	0
05:12 PM	0
05:13 PM	0
05:14 PM	0
05:15 PM	0
05:16 PM	0
05:17 PM	0
05:18 PM	0
05:19 PM	0
05:20 PM	0
05:21 PM	0
05:22 PM	0
05:23 PM	0
05:24 PM	0
05:25 PM	0
05:26 PM	0
05:27 PM	0
05:28 PM	0
05:29 PM	1
05:30 PM	1
05:31 PM	1
05:32 PM	1
05:33 PM	1
05:34 PM	1
05:35 PM	1

Start Time	Queues
05:36 PM	1
05:37 PM	0
05:38 PM	0
05:39 PM	0
05:40 PM	0
05:41 PM	0
05:42 PM	1
05:43 PM	1
05:44 PM	0
05:45 PM	0
05:46 PM	0
05:47 PM	0
05:48 PM	0
05:49 PM	0
05:50 PM	0
05:51 PM	0
05:52 PM	0
05:53 PM	1
05:54 PM	1
05:55 PM	0
05:56 PM	0
05:57 PM	0
05:58 PM	0
05:59 PM	0

average 0.38  
 max 2

CVS/Pharmacy Wayland  
 Drive-Through Queues  
 Saturday, October 19, 2013  
 11:00 AM to 2:00 PM

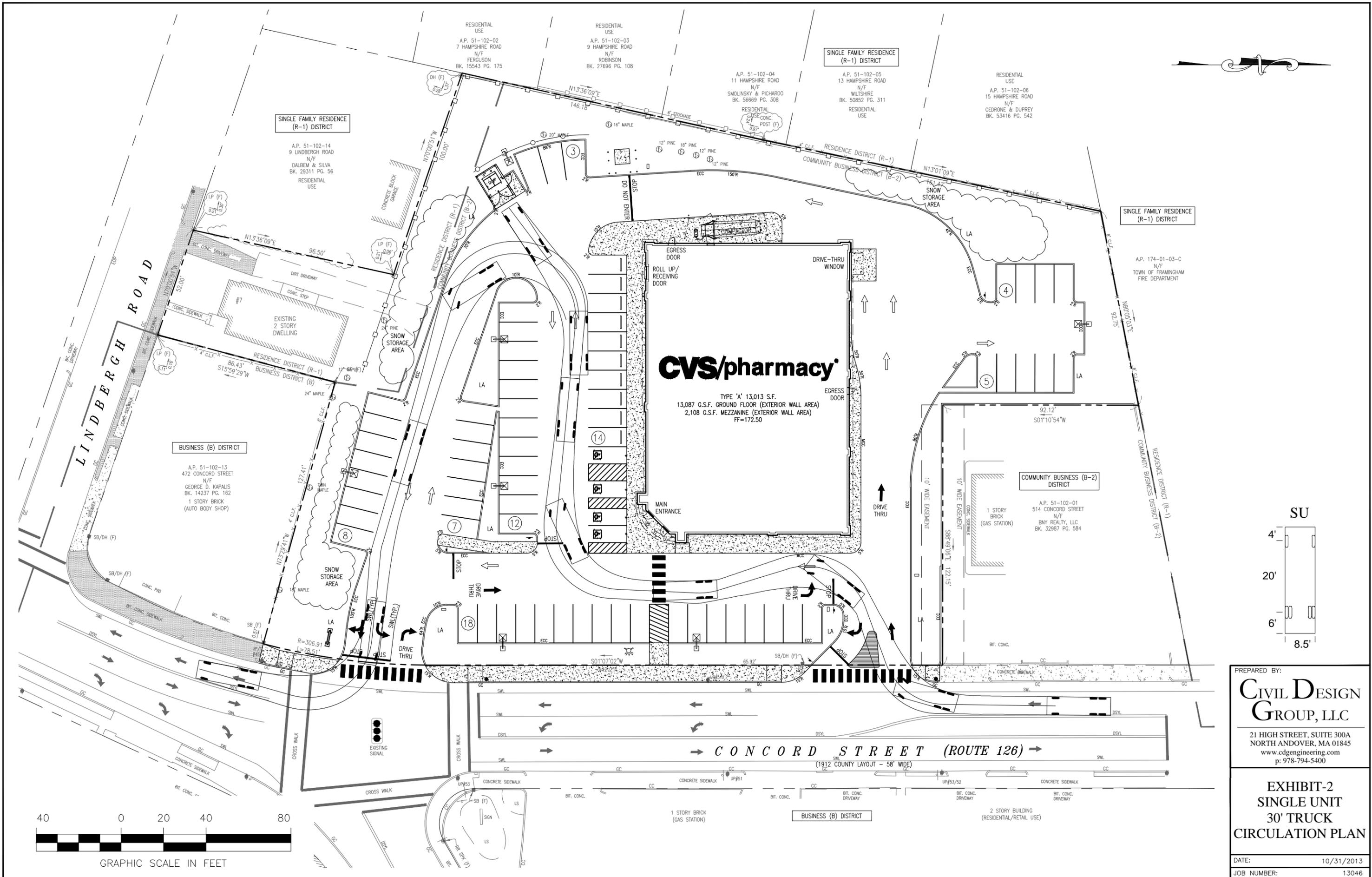
Start Time	Queues						
11:00 AM	0	11:50 AM	1	12:40 PM	0	01:30 PM	0
11:01 AM	0	11:51 AM	1	12:41 PM	0	01:31 PM	0
11:02 AM	0	11:52 AM	0	12:42 PM	0	01:32 PM	0
11:03 AM	1	11:53 AM	0	12:43 PM	0	01:33 PM	0
11:04 AM	1	11:54 AM	0	12:44 PM	0	01:34 PM	0
11:05 AM	1	11:55 AM	0	12:45 PM	0	01:35 PM	0
11:06 AM	1	11:56 AM	0	12:46 PM	0	01:36 PM	0
11:07 AM	1	11:57 AM	0	12:47 PM	0	01:37 PM	0
11:08 AM	1	11:58 AM	0	12:48 PM	0	01:38 PM	0
11:09 AM	1	11:59 AM	1	12:49 PM	0	01:39 PM	0
11:10 AM	1	12:00 PM	1	12:50 PM	0	01:40 PM	0
11:11 AM	1	12:01 PM	1	12:51 PM	0	01:41 PM	0
11:12 AM	0	12:02 PM	1	12:52 PM	0	01:42 PM	0
11:13 AM	0	12:03 PM	1	12:53 PM	0	01:43 PM	0
11:14 AM	0	12:04 PM	0	12:54 PM	0	01:44 PM	0
11:15 AM	0	12:05 PM	0	12:55 PM	0	01:45 PM	0
11:16 AM	0	12:06 PM	0	12:56 PM	0	01:46 PM	0
11:17 AM	0	12:07 PM	0	12:57 PM	1	01:47 PM	0
11:18 AM	1	12:08 PM	0	12:58 PM	1	01:48 PM	1
11:19 AM	1	12:09 PM	0	12:59 PM	1	01:49 PM	0
11:20 AM	1	12:10 PM	0	01:00 PM	0	01:50 PM	0
11:21 AM	0	12:11 PM	0	01:01 PM	0	01:51 PM	0
11:22 AM	0	12:12 PM	0	01:02 PM	0	01:52 PM	1
11:23 AM	0	12:13 PM	0	01:03 PM	0	01:53 PM	0
11:24 AM	0	12:14 PM	0	01:04 PM	1	01:54 PM	0
11:25 AM	1	12:15 PM	0	01:05 PM	2	01:55 PM	0
11:26 AM	1	12:16 PM	1	01:06 PM	1	01:56 PM	0
11:27 AM	1	12:17 PM	1	01:07 PM	0	01:57 PM	0
11:28 AM	1	12:18 PM	2	01:08 PM	0	01:58 PM	0
11:29 AM	1	12:19 PM	1	01:09 PM	0	01:59 PM	0
11:30 AM	0	12:20 PM	1	01:10 PM	0		
11:31 AM	0	12:21 PM	1	01:11 PM	0		
11:32 AM	0	12:22 PM	0	01:12 PM	0		
11:33 AM	0	12:23 PM	0	01:13 PM	0		
11:34 AM	0	12:24 PM	0	01:14 PM	0		
11:35 AM	0	12:25 PM	0	01:15 PM	0		
11:36 AM	0	12:26 PM	0	01:16 PM	0		
11:37 AM	0	12:27 PM	0	01:17 PM	0		
11:38 AM	0	12:28 PM	0	01:18 PM	0		
11:39 AM	0	12:29 PM	0	01:19 PM	0		
11:40 AM	0	12:30 PM	0	01:20 PM	0		
11:41 AM	0	12:31 PM	0	01:21 PM	0		
11:42 AM	0	12:32 PM	0	01:22 PM	0		
11:43 AM	0	12:33 PM	0	01:23 PM	0		
11:44 AM	0	12:34 PM	0	01:24 PM	0		
11:45 AM	0	12:35 PM	0	01:25 PM	0		
11:46 AM	1	12:36 PM	0	01:26 PM	0		
11:47 AM	1	12:37 PM	0	01:27 PM	0		
11:48 AM	1	12:38 PM	1	01:28 PM	0		
11:49 AM	1	12:39 PM	0	01:29 PM	0		

average 0.25  
 max 2

AUTOTURN EXHIBITS

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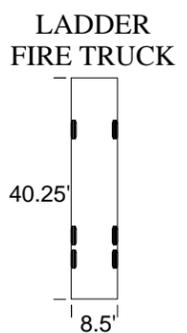
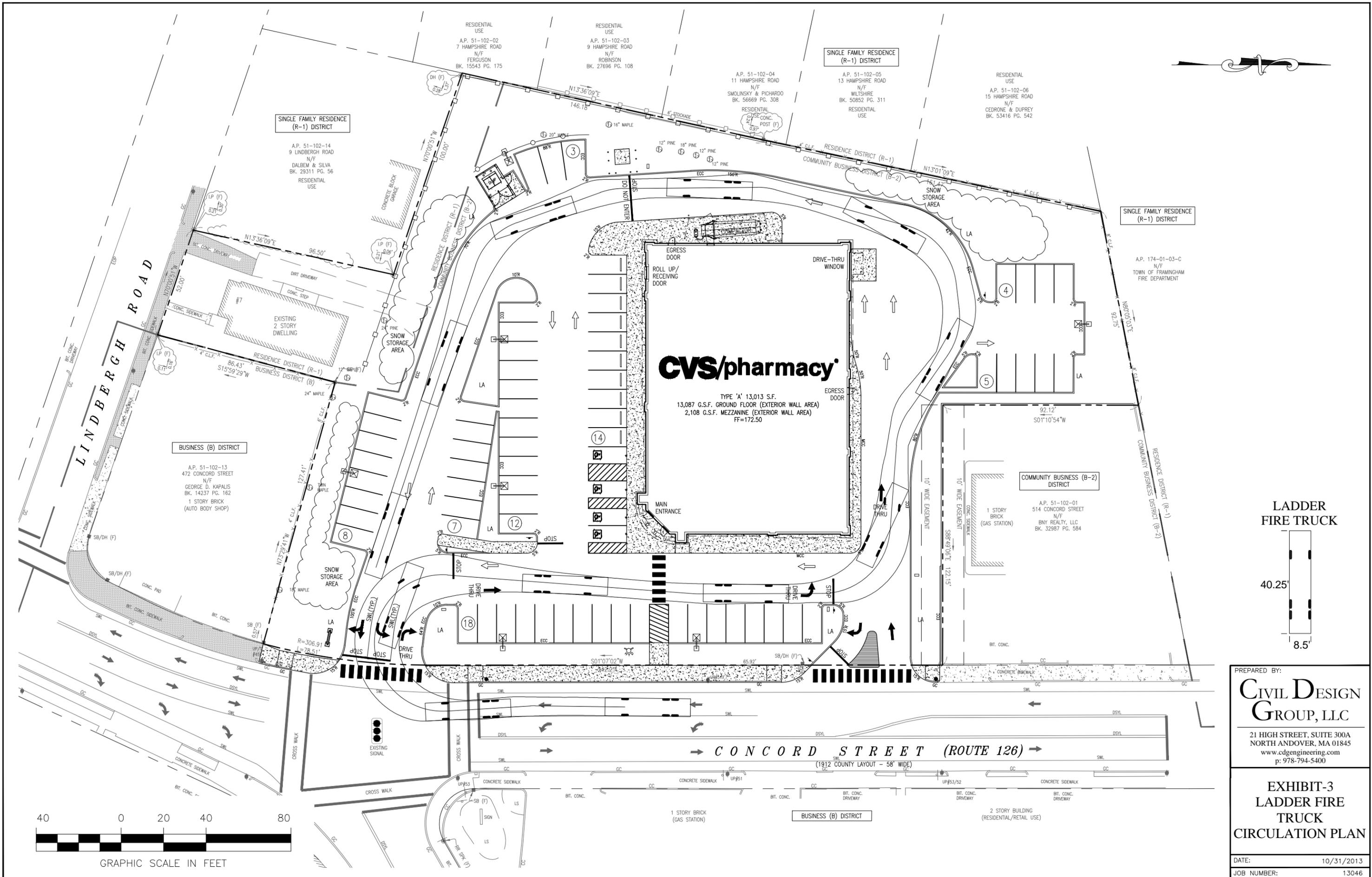




PREPARED BY:  
**CIVIL DESIGN GROUP, LLC**  
 21 HIGH STREET, SUITE 300A  
 NORTH ANDOVER, MA 01845  
 www.cdengineering.com  
 p: 978-794-5400

**EXHIBIT-2**  
**SINGLE UNIT**  
**30' TRUCK**  
**CIRCULATION PLAN**

DATE: 10/31/2013  
 JOB NUMBER: 13046



PREPARED BY:  
**CIVIL DESIGN GROUP, LLC**  
21 HIGH STREET, SUITE 300A  
NORTH ANDOVER, MA 01845  
www.cdengineering.com  
p: 978-794-5400

**EXHIBIT-3  
LADDER FIRE TRUCK  
CIRCULATION PLAN**

DATE: 10/31/2013  
JOB NUMBER: 13046

