Vanasse & Associates, Inc.
Transportation Engineers & Planners

10 New England Business Center Drive
Suite 314
Andover, MA 01810-1066
Office 978-474-8800
Fax 978-688-6508

Ref: 5556

February 5, 2010

Mr. William B. Clark
Planning Director, Town of Milton
Town Office Building
525 Canton Avenue
Milton, MA 02186

Re: Proposed Commercial Development
Blue Hill Avenue/Temple Shalom of Milton
Milton, Massachusetts

Dear Mr. Clark:

Vanasse & Associates, Inc. (VAI) is providing detailed responses to the comments raised in the January 29, 2010 memorandum prepared by Howard/Stein-Hudson Associates, Inc. (HSH) on behalf of the Town with respect to their review of the December 17, 2009 Traffic Impact Assessment (the "December 2009 TIA") prepared by VAI in support of the proposed neighborhood retail plaza to be located off Blue Hill Avenue (Route 138) and on the site of the Temple Shalom of Milton in Milton, Massachusetts (the "Project"). Listed below are each of the comments raised in HSH's subject memorandum followed by our detailed response.

Study Area

Comment: *"A study area boundary generally extends to the point where the trip dispersion from a project has become so low that it imposes no significant impact on general traffic. This is generally true for the study area for the project. Intersections at the periphery of the study area receive, on average, less than 10% additional traffic for the weekend peak and less than 5% additional traffic on the weekday peak. HSH finds that the selection of study area intersections was appropriate and includes the intersections within the adjacent transportation network that will be affected by the project."*

Response: No response required; VAI and HSH are in agreement that the study area assessed in the December 2009 TIA is appropriate to assess the potential impact of the Project.

Traffic Data Collection

Comment: *"HSH finds that the data collection was performed in a satisfactory manner and that the selection of the peak hour and use of the seasonal adjustment are acceptable."*

Response: No response required; VAI and HSH are in agreement that the data collection, seasonal adjustment and peak hour establishment were completed in accordance with state standards and those of Traffic Engineering and Transportation Planning professions.

Safety

Crash Rate Analysis

Comment: *"The proponent should more fully examine the potential causes of the high crash rate at the Decker Street/Crown Street and Blue Hills Parkway/Blue Hill Terrace Street intersections to determine if additional traffic from the project could exacerbate the crash rate."*

Response: The detailed motor vehicle crash records for the subject intersections have been requested from the Town of Milton Police Department and will be summarized under separate cover as soon as the information is received. With respect to the Decker Street/Crown Street intersection, two (2) motor vehicle crashes were reported at the intersection over the three-year review period, both of which involved property damage only. At present, the Project site has two driveways that access Crown Street, both of which will be closed in conjunction with the Project. As such, at the completion of the Project, overall traffic volumes at the Decker Street/Crown Street intersection are expected to be reduced over current conditions. Additionally, the Project proponent has committed to the implementation of defined safety improvements at both the Decker Street/Crown Street and Blue Hills Parkway/Blue Hill Terrace Street intersections that will focus on addressing any identified safety deficiencies at these locations.

Sight Distance Analysis

Comment: *"The TIA demonstrates that adequate sight distance exists at the intersection of Blue Hill Avenue and the proposed site driveway."*

Response: No response required; VAI and HSH are in agreement that the Project driveway is properly located to afford the required lines of sight to operate in a safe and efficient manner.

Comment: *"The proponent should review the remaining study area intersections to identify other locations where sight distance may be a concern.*

Response: Sight distance measurements were completed at all of the study intersections as requested by HSH. Copies of the requisite field notes are included in the appendix attached hereto. Based on a review of these measurements, all of the study intersections were found to meet or exceed the required sight distances for the posted, statutory and/or measured travel speed along the intersecting roadway with the following notation:

> When present, vehicles parked on-street and proximate to an intersection (within 25 feet) were found to limit sight lines from the minor street approach. It is suggested that on-street parking, where permitted, be prohibited within 25-feet of an intersection in order to provide and maintain the required sight lines.

Comment: *"The Proponent should confirm that sufficient sight distance to the signal exists on the Concord Avenue approach of the proposed intersection of Blue Hill Avenue/ Concord Avenue/Site Driveway. If adequate sight distance does not exist, a W3-3 (Signal Ahead) sign should be considered for placement on Concord Avenue."*

Response: A W3-3 sign will be installed on Concord Avenue in advance of the proposed traffic signal in order to provide advance warning to motorists of the signal ahead and the potential for stopped vehicles.

Comment: *"The proponent should examine the sight distance available to vehicles exiting the Amor Road approach of the intersection of Blue Hill Avenue/Hudson Street/Amor Road. The photo below shows the available sight distance for vehicles on the Amor Road eastbound approach looking north."*

Response: Sight lines to and from Amor Road were found to meet or exceed the required values for both the posted and measured travel speeds along Blue Hill Avenue (35 miles per hour (mph) posted, 41 mph average measured 85th percentile travel speed).

Background Growth and Specific Development

Comment: *"HSH finds the assessment and application of background traffic growth and specific development acceptable."*

Response: No response required; VAI and HSH are in agreement that the future No-Build condition was developed using appropriate methodologies.

Trip Generation

Comment: *"The proponent should provide detailed trip generation calculations in the appendix for LUC 850 (Supermarket)."*

Response: The requested trip-generation worksheet is included in the appendix attached hereto.

Comment: *"The trip generation methodology for the Supermarket (LUC 850) appears incorrect for the weekday evening peak hour. The ITE Trip Generation handbook recommends the use of the regression equation when 20 or more data points are available; 40 data points are available for LUC 850 during the weekday evening peak hour. The TIA should include discussion regarding the selection of the average rate over the regression equation."*

Response: The average rate method was used to establish the traffic characteristics of the grocery store component of the Project during the weekday evening peak hour in accordance with the ITE trip-generation methodology since the correlation coefficient (R^2) for the regression equation is below 0.75 during this time period.

Site Traffic Distribution and Assignment

Comment: *"The proponent should provide more detail regarding how the trip distribution percentages were determined."*

Response: A figure depicting the trip distribution calculations for the Project is included in the appendix attached hereto.

Traffic Operations Analysis

Comment: *"The TIA includes a summary of intersection capacity and queue analysis in Tables 7 and 11. The results reported in these tables differ from the results reported in the analysis. The proponent should reconcile these discrepancies."*

Response: A review of the technical appendix included as a part of the December 2009 TIA in relation to Tables 7 and 11 does not indicate any apparent discrepancies between the reported data and the analysis worksheets. VAI did provide electronic files of the analysis model to HSH to assist in their review of the Project at their request. The discrepancies between the viewed electronic files and the information in Tables 7 and 11 of the December 2009 TIA is due to the Synchro© Intersection Capacity Utilization (ICU) methodology vs. the Highway Capacity Manual (HCM) methodology. The December 2009 TIA presents the HCM methodology results as required by MassDOT; the ICU methodology is not accepted by MassDOT.

Comment: *"In the analysis for the Build Mitigated Conditions for the Saturday peak hour, the Blue Hill Avenue northbound through volume at the intersection of Blue Hill Avenue and Decker Street appears to be coded in correctly. The analysis was performed using a volume of 294 while the build traffic volume figure indicates a volume of 394. The proponent should recode this volume and reanalyze this intersection."*

Response: The intersection of Blue Hill Avenue at Decker Street was not included as a part of the Build with Mitigation analysis condition as no improvements are proposed at this intersection that would require such an analysis and no such analysis was included in the December 2009 TIA. That said, the electronic files provided to HSH to aid in their review did include the entire study area roadway network inclusive of the subject intersection; however, again, no analysis was completed at this location under the Build with Mitigation condition and, as such, the noted traffic volume differential is not material to the analysis results for the Mitigated condition.

Comment: *"The exclusive pedestrian phases appear to be coded incorrectly in all analyses. The pedestrian phase setting is set to 'no,' which does not allow the exclusive pedestrian phase to be called. The proponent should recode the exclusive pedestrian phases in each Synchro model and reanalyze the affected intersections."*

Response: The pedestrian recall setting in the Synchro© analysis is and continues to be set to "none" since the pedestrian phase at the signalized intersection of Blue Hill Avenue/

Cheever Street/Blue Hill Terrace Street is not set to recall (i.e., the pedestrian phase is actuated by pushbutton and is active only when a pedestrian is present). However, in order to simulate pedestrian actuation of the traffic signal system, a 25 percent pedestrian actuation was coded into the Synchro© analysis. This actuation rate approximates the number of anticipated pedestrian calls during the peak periods based on observed pedestrian volumes at the intersection. Tables 7R and 11R summarizes the analysis results. As shown therein, overall operating conditions at the subject intersection are expected to be maintained at a level-of-service (LOS) of "D" or better during the peak periods with the addition of Project-related traffic and no mitigation, and at a LOS "C" during both peak periods with the planned improvements to be implemented in conjunction with the Project (no change over No-Build conditions).

Comment: *"The Turn on Red condition appears to be coded incorrectly at the intersection of Blue Hill Avenue/Blue Hill Terrace/Cheever Street. This intersection is modeled with right turns on red permitted for each approach. However, existing signage at this location indicates that turns on red are not permitted for either Cheever Street eastbound or the Blue Hill Terrace westbound approach. The proponent should correct the Synchro models and reanalyze this intersection."*

Response: Tables 7R and 11R reflect the revised analysis conditions for the subject intersection incorporating both the 25 percent pedestrian actuation and the right-turn-on-red prohibition. As shown therein, overall operating conditions at the subject intersection are expected to be maintained at a LOS of "D" or better during the peak periods with the addition of Project-related traffic and no mitigation, and at a LOS "C" during both peak periods with the planned improvements to be implemented in conjunction with the Project (no change over No-Build conditions).

Site Plan Review

Parking Demand

Comment: *"The TIA indicates that a modal adjustment factor of 90% was used in the shared parking analysis for the retail components, while the detailed shared parking analysis contained in the appendix uses a modal adjustment of 95%. The proponent should reconcile this difference."*

Response: The modal adjustment factor that was used for the pharmacy and grocery store components of the Project (retail) is 95 percent and was incorrectly stated as 90 percent on page 26 of the December 2009 TIA. That said, the resulting parking demand calculations presented in the appendix of the December 2009 TIA and cited in the associated narrative are correct as stated therein.

Comment: *"The TIA indicates that 141 parking spaces will be provided while the site plan indicates 144 parking spaces as shown on the site plan. The proponent should reconcile this difference."*

Response: The site plan was undergoing refinements as the traffic study was being prepared in order to address comments received from the Planning Board and neighbors. As a result of these refinements, the parking supply was increased under the current site plan to 144 parking spaces.

Comment: *"Due to the long headway of bus service within the project area, the proponent should evaluate the feasibility of the project without the 10 percent non-auto mode split."*

Response: As stated above, the non-auto mode split for the project is 5 percent and reflects the service schedule for the bus as well as pedestrian and bicycle trips from the proximate neighborhood areas.

Comment: *"The proponent should indicate graphically on the site plan how the peak parking demand for the overall site will be accommodated."*

Response: Given the predicted surplus of parking (peak demand of 121 spaces vs. a supply of 144 spaces) it is expected that patrons of the Project will park proximate to the entrances of the respective components of the Project and then outward thereafter as spaces are occupied, with employees directed to park in more remote locations.

Comment: *"Given the small number of parking spaces adjacent to the temple, the proponent should indicate graphically on the site plan how the peak parking demand will be accommodated."*

Response: The peak periods of activity at the relocated Temple tend to be non-coincidental with the peak parking demands of the remaining elements of the Project. As such, sufficient parking should be available within the site to accommodate the proposed uses in a shared parking fashion (i.e., no dedicated parking).

Comment: *"The TIA should provide information regarding the observance of religious holidays at the temple, which may result in increased parking demand and may coincide with the Saturday peak parking demand period."*

Response: The parking demand calculations for the Temple are based on Town of Milton Zoning requirements which are reflective of religious observances. As such, the analysis provided in the December 2009 TIA would be representative of an appropriate design condition for the respective components of the Project. Under specific instances where the Temple may participate in an event or holiday where attendance is expected to exceed typical levels, a parking management plan will be developed in consultation with the town.

Comment: *"Of the perpendicular parking spaces, 31 feature a depth of 16 feet. Review of the Town of Milton's Zoning Bylaws indicates that these spaces are likely intended for use by compact cars only. The site plan should indicate which parking spaces are designated for compact car spaces and should be appropriately designated."*

Response: The site plan will be revised as necessary to address this comment prior to filing with the town.

Comment: *"The site plan should include all typical dimensions for parking stalls and circulation aisles."*

Response: The site plan will be revised as necessary to address this comment prior to filing with the town.

Site Circulation

Comment: *"The proponent should indicate if a handicapped-accessible route exists between the grocery store and the pharmacy, and vice versa."*

Response: The site plan will be revised as necessary to address this comment prior to filing with the town.

Comment: *"Review of the MassDOT design standards indicates that the typical curve radius for the site driveways is 30 feet. The proponent should demonstrate the need for a 50-foot curve radius at the entrance of the site. Larger radius curves increase the crosswalk distance and allow vehicles to enter and exit at high speeds."*

Response: The site plan will be revised as necessary to address this comment prior to filing with the town.

Comment: *"It is unclear if the preschool component of the Temple will require pick-up/drop-off operations. The proponent should indicate where the pick-up/drop-off operations will occur."*

Response: The program of operations for the Temple have not yet been defined. As the program is developed, the required elements will be incorporated into the site plan prior to filing with the town.

Comment: *"The proposed circulation plan is unclear at the intersection of the 3 internal circulation roadways in the eastern portion of the site. The proponent should clarify the proposed circulation plan at this location."*

Response: On-site circulation for the Project continues to evolve as the plan is refined. These elements of the site plan will be reconciled prior to filing with the town.

Service and Loading

Comments: HSH raised specific comments with respect to loading and delivery vehicle circulation; loading area locations; delivery schedules and truck sizes; snow storage; and emergency vehicle access and circulation.

Response: At present, the site plan is conceptual in nature and will undergo refinement as the plans advance toward filing with the town and, at that time, these comments will be addressed.

Pavement Markings and Signage

Comments: HSH offered specific comments with respect to the design and installation of signs and pavement markings within the Project and coordination with MassDOT concerning off-site improvements.

Response: These comments will be addressed as the site plan is refined for filing with the town.

Construction –period Issues

Comment: *"A construction Management Plan (CMP) should be provided that describes the overall schedule, truck traffic to and from the site, traffic impacts, and other information important to the community."*

Response: A detailed Construction Management Plan (CMP) will be developed for the project in conjunction with the site plan filing with the town.

Mitigation

Comment: *"The proponent should indicate if the sidewalks along the site's Blue Hill Avenue frontage will be rebuilt as part of the project."*

Response: The sidewalk along the Project frontage will be reconstructed as necessary to accommodate the Project access, the closure of the existing driveways serving the Project site, and as required to meet accessibility (ADA) requirements.

Comment: *"The proponent should indicate the limits of bicycle-related improvements, and coordinate any bicycle-related pavement markings or signage with existing pavement markings and signage."*

Response: The planned improvements to be completed in conjunction with the Project will incorporate bicycle accommodations by way of bicycle detection at traffic signals to be constructed or modified in conjunction with the Project. In addition, the Project will incorporate bicycle racks and associated directional signs to these facilities. These amenities and improvements will be integrated into the existing sign and pavement markings that are present proximate to the improvement areas.

Comment: *"The stop sign on the Hudson Street approach of the Blue Hill Avenue/Hudson Street/ Amor Road intersection is partially hidden by an existing tree and utility pole. The stop sign should be relocated where it will be more visible to motorists."*

Response: The subject STOP-sign will be relocated as necessary to improve visibility.

Comment: *"The proponent should provide more detail on the traffic calming measures proposed as part of the mitigation for the project."*

Response: A preliminary traffic calming plan is under development for the neighborhood areas proximate to the Project (both sides of Blue Hills Parkway) that will incorporate the traffic calming measures detailed in Table 12 of the December 2009 TIA as appropriate to the specific roadway environment. This plan will be presented to the town and HSH for discussion and refinement within the next week.

We trust that this information is responsive to the comments raised in HSH's January 29, 2010 memorandum. If you should have any questions regarding our responses or would like to discuss this information in more detail, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.

Jeffrey S. Dirk, P.E., PTOE
Vice President

JSD/jsd

cc: K. Pyke, P.E., PTOE
M. Coffman – Coffman Realty, Inc.
N. Corcoran, Esquire – Corcoran & Associates, P.C.
BG, LAS, File

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

Signalized Intersection/Peak Hour/Movement	2009 Existing				2014 No-Build				2014 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Blue Hill Avenue at Cheever Street and Blue Hill Terrace Street												
Weekday Evening:												
Cheever Street EB LT/TH/RT	0.43	38.0	D	1/2	0.42	37.8	D	1/2	0.45	38.4	D	1/2
Blue Hill Terrace Street WB LT/TH/RT	0.66	44.8	D	1/4	0.66	43.9	D	2/5	0.79	57.1	E	2/6
Blue Hill Avenue NB LT/TH/RT	0.81	27.9	C	4/25	0.85	29.7	C	9/28	0.89	34.0	C	10/30
Blue Hill Avenue SB LT/TH/RT	0.74	24.4	C	4/22	0.80	25.9	C	8/26	0.92	38.2	D	9/29
Overall	**0.75**	**28.1**	**C**	--	**0.78**	**29.3**	**C**	--	**0.85**	**37.9**	**D**	--
Saturday Midday:												
Cheever Street EB LT/TH/RT	0.55	40.3	D	1/2	0.60	46.2	D	1/2	0.61	49.8	D	1/2
Blue Hill Terrace Street WB LT/TH/RT	0.60	36.8	D	1/3	0.64	41.5	D	1/3	0.56	33.9	C	1/4
Blue Hill Avenue NB LT/TH/RT	0.54	16.8	B	2/12	0.57	16.8	B	3/13	0.60	18.8	B	3/15
Blue Hill Avenue SB LT/TH/RT	0.66	19.2	B	3/16	0.68	19.4	B	3/19	0.77	24.1	C	4/21
Overall	**0.64**	**20.3**	**C**	--	**0.67**	**20.9**	**C**	--	**0.72**	**23.7**	**C**	--

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

Table 11R
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

Signalized Intersection/Peak Hour/Movement	2014 No-Build				2014 Build				2014 Build with Mitigation			
	V/C[a]	Delay[b]	LOS[c]	Queue[d] Avg/95th	V/C	Delay	LOS	Queue Avg./95th	V/C	Delay	LOS	Queue Avg./95th
Blue Hill Avenue at Cheever Street and Blue Hill Terrace Street												
Weekday Evening:												
Cheever Street EB LT/TH/RT	0.42	37.8	D	1/2	0.45	38.4	D	1/2	0.51	47.0	D	1/2
Blue Hill Terrace Street WB LT/TH/RT	0.66	43.9	D	2/5	0.79	57.1	E	2/6	0.73	53.7	D	3/6
Blue Hill Avenue NB LT/TH/RT	0.85	29.7	C	9/28	0.89	34.0	C	10/30	0.75	24.4	C	9/23
Blue Hill Avenue SB LT/TH/RT	0.80	25.9	C	8/26	0.92	38.2	D	9/29	0.76	17.8	B	10/22
Overall	**0.78**	**29.3**	**C**	--	**0.85**	**37.9**	**D**	--	**0.74**	**24.7**	**C**	--
Saturday Midday:												
Cheever Street EB LT/TH/RT	0.60	46.2	D	1/2	0.61	49.8	D	1/2	0.35	38.1	D	1/2
Blue Hill Terrace Street WB LT/TH/RT	0.64	41.5	D	1/3	0.56	33.9	C	1/4	0.57	39.0	D	2/3
Blue Hill Avenue NB LT/TH/RT	0.57	16.8	B	3/13	0.60	18.8	B	3/15	0.53	19.3	B	5/13
Blue Hill Avenue SB LT/TH/RT	0.68	19.4	B	3/19	0.77	24.1	C	4/21	0.67	23.3	C	4/17
Overall	**0.67**	**20.9**	**C**	--	**0.72**	**23.7**	**C**	--	**0.62**	**23.6**	**C**	--
Blue Hill Avenue at Concord Avenue and the Project Driveway												
Weekday Evening:												
Concord Avenue EB LT/TH/RT									0.43	54.2	D	1/1
Project Driveway WB LT/TH/RT									0.66	50.4	D	2/6
Blue Hill Avenue NB LT/TH/RT									0.70	9.3	A	2/7
Blue Hill Avenue SB LT	See Table 6				See Table 6				0.28	10.6	B	1/3
Blue Hill Avenue SB TH/RT	(Unsignalized Intersection Analysis)				(Unsignalized Intersection Analysis)				0.52	12.4	B	3/15
Overall									**0.70**	**14.9**	**B**	--
Saturday Midday:												
Concord Avenue EB LT/TH/RT									0.27	44.6	D	0/1
Project Driveway WB LT/TH/RT									0.46	37.4	D	1/3
Blue Hill Avenue NB LT/TH/RT									0.56	11.0	B	1/16
Blue Hill Avenue SB LT									0.14	9.6	A	1/2
Blue Hill Avenue SB TH/RT									0.48	12.0	B	3/12
Overall									**0.55**	**14.3**	**B**	--

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

APPENDIX

SIGHT DISTANCE FIELD MEASUREMENTS
TRIP-GENERATION CALCULATIONS
TRIP-DISTRIBUTION WORKSHEETS
REVISED CAPACITY ANALYSIS WORKSHEETS

SIGHT DISTANCE FIELD MEASUREMENTS

Vanasse & Associates, Inc.
Transportation Engineers & Planners

10 New England Business Center Drive
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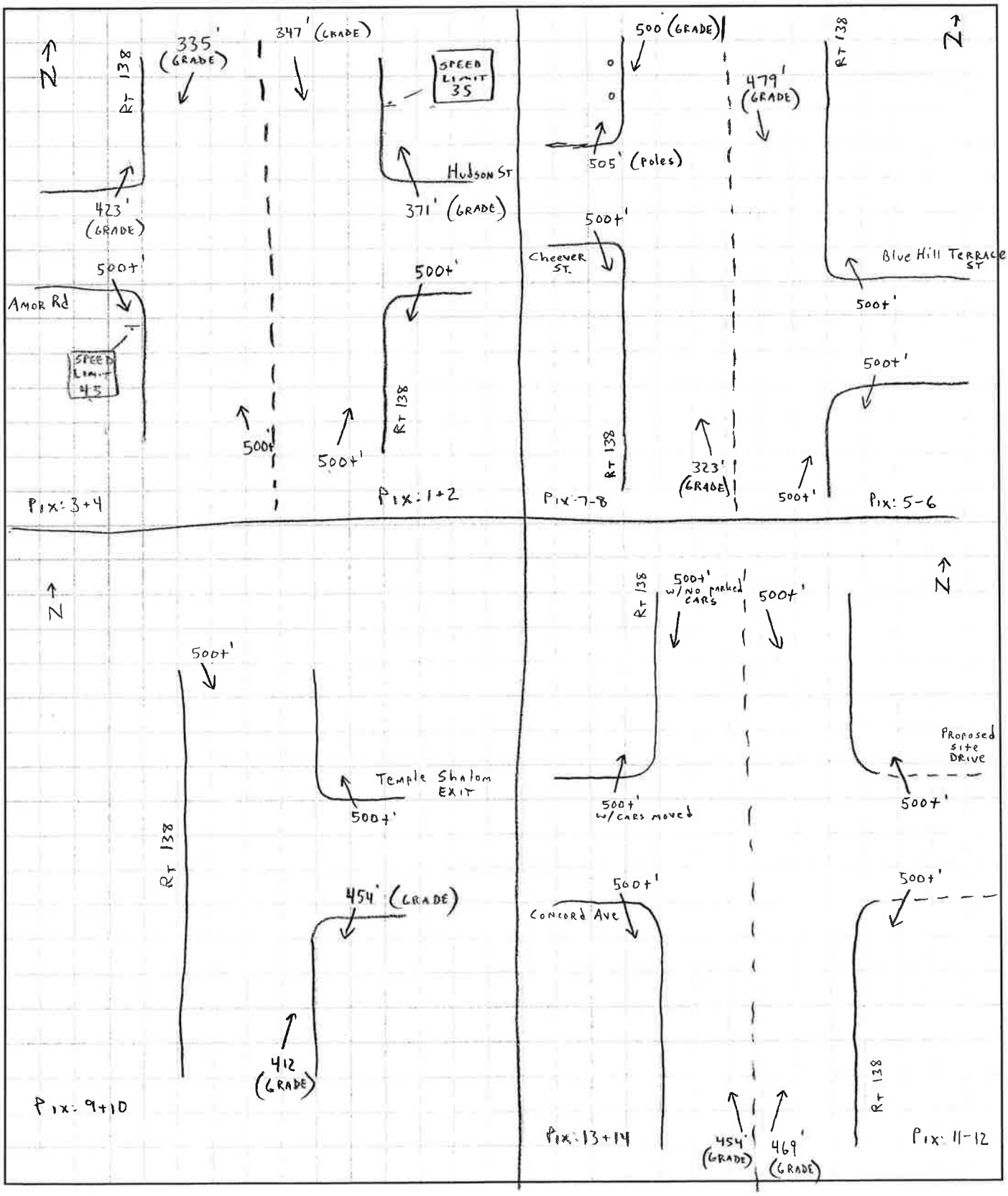
Calculations

Job: Milton
Location: Multiple Locations
Title: Sight Distances
Calculated by: SRF

Job Number: 5556
Date: 2/1/10
Sheet 1 of 3
Checked by:



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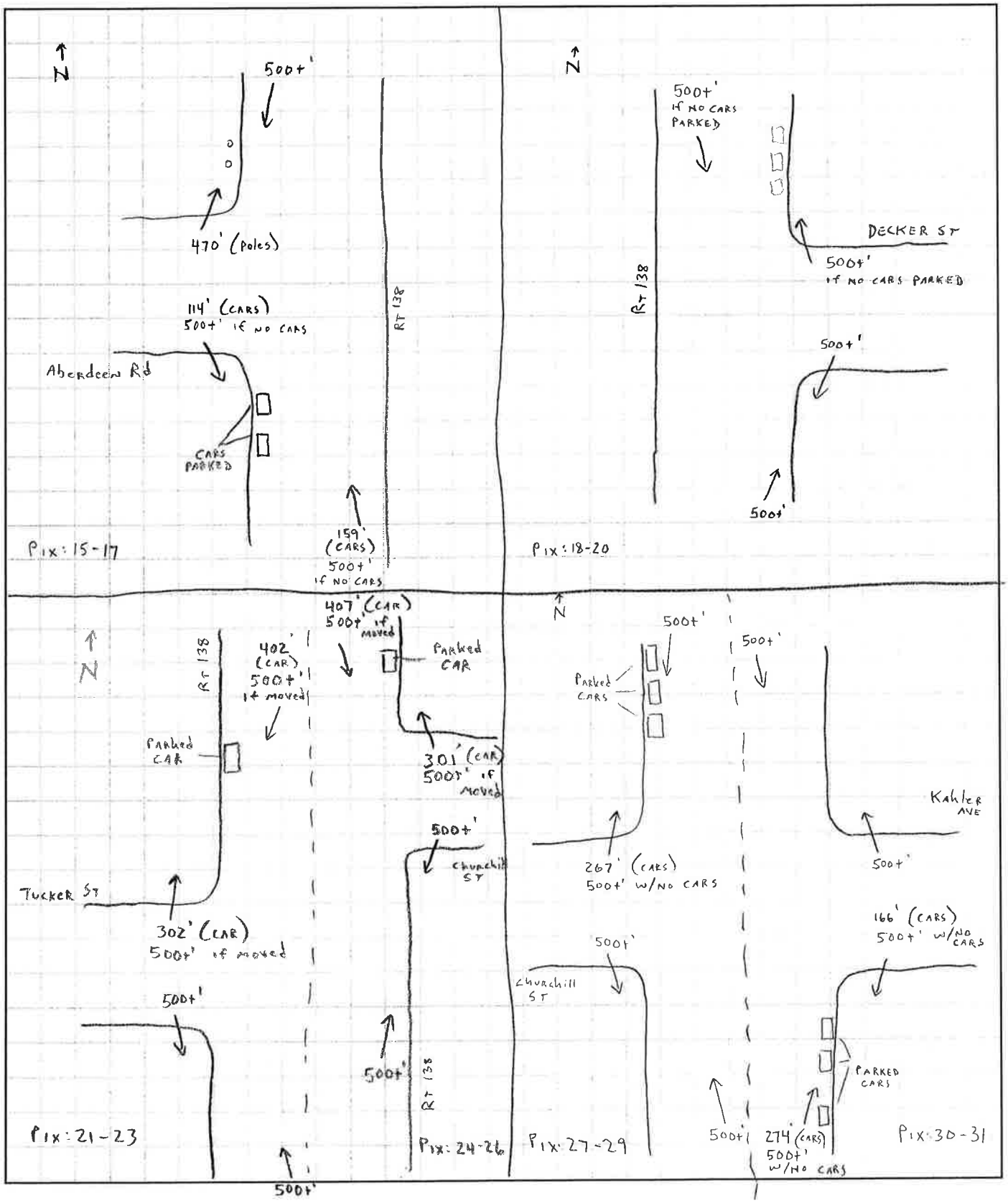
Calculations

Job: Milton
Location: Multiple Locations
Title: Sight Distances
Calculated by: SRF

Job Number: 5556
Date: 2/1/10
Sheet 2 of 3
Checked by:



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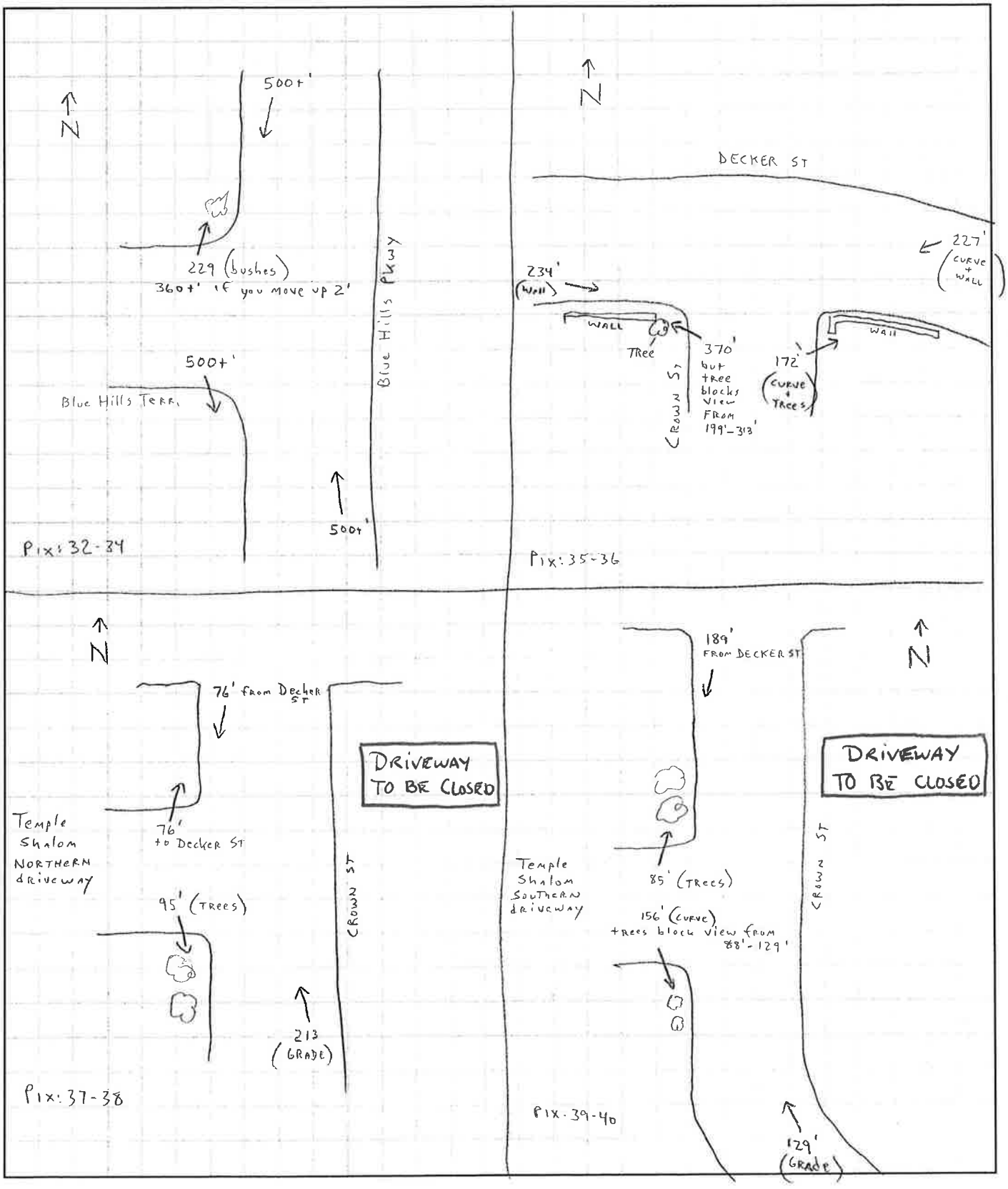
Calculations

Job: Milton
Location: Multiple Locations
Title: Sight Distances
Calculated by: SRF

Job Number: 5556
Date: 2/2/10
Sheet 3 of 3
Checked by:



TRIP-GENERATION CALCULATIONS

Institute of Transportation Engineers (ITE)
*Trip Generation, 8*th Edition
Land Use Code (LUC) 850 - Supermarket

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area
Independent Variable (X): 10

AVERAGE WEEKDAY DAILY

T = 102.24 (X)
T = 102.24 * 10
T = 1022.40
T = 1,022 vehicle trips
with 50% (511 vpd) entering and 50% (511 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 3.59 (X)
T = 3.59 * 10
T = 35.90
T = 36
T = 36 vehicle trips
with 61% (22 vph) entering and 39% (14 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 10.50 (X)
T = 10.50 * 10
T = 105.00
T = 105
T = 105 vehicle trips
with 51% (54 vph) entering and 49% (51 vph) exiting.

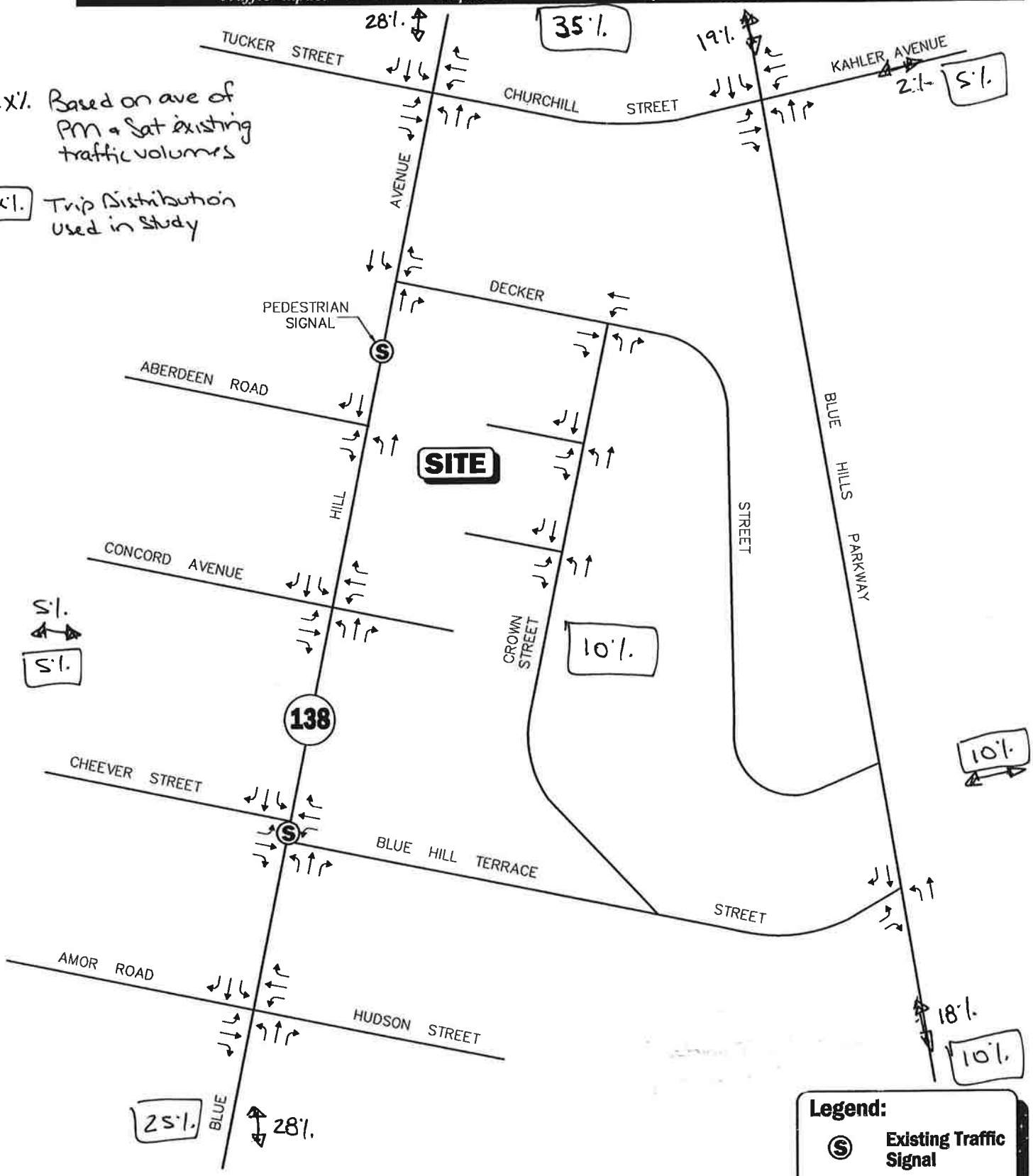
SATURDAY DAILY

T = 177.59 * (X)
T = 177.59 * 10
T = 1775.90
T = 1,776 vehicle trips
with 50% (888 vpd) entering and 50% (888 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 10.85 * (X)
T = 10.85 * 10
T = 108.50
T = 108
T = 108 vehicle trips
with 51% (55 vph) entering and 49% (53 vph) exiting.

TRIP-DISTRIBUTION WORKSHEETS



XX'. Based on ave of PM & Sat existing traffic volumes

XX'. Trip Distribution used in study

Legend:

Ⓢ **Existing Traffic Signal**

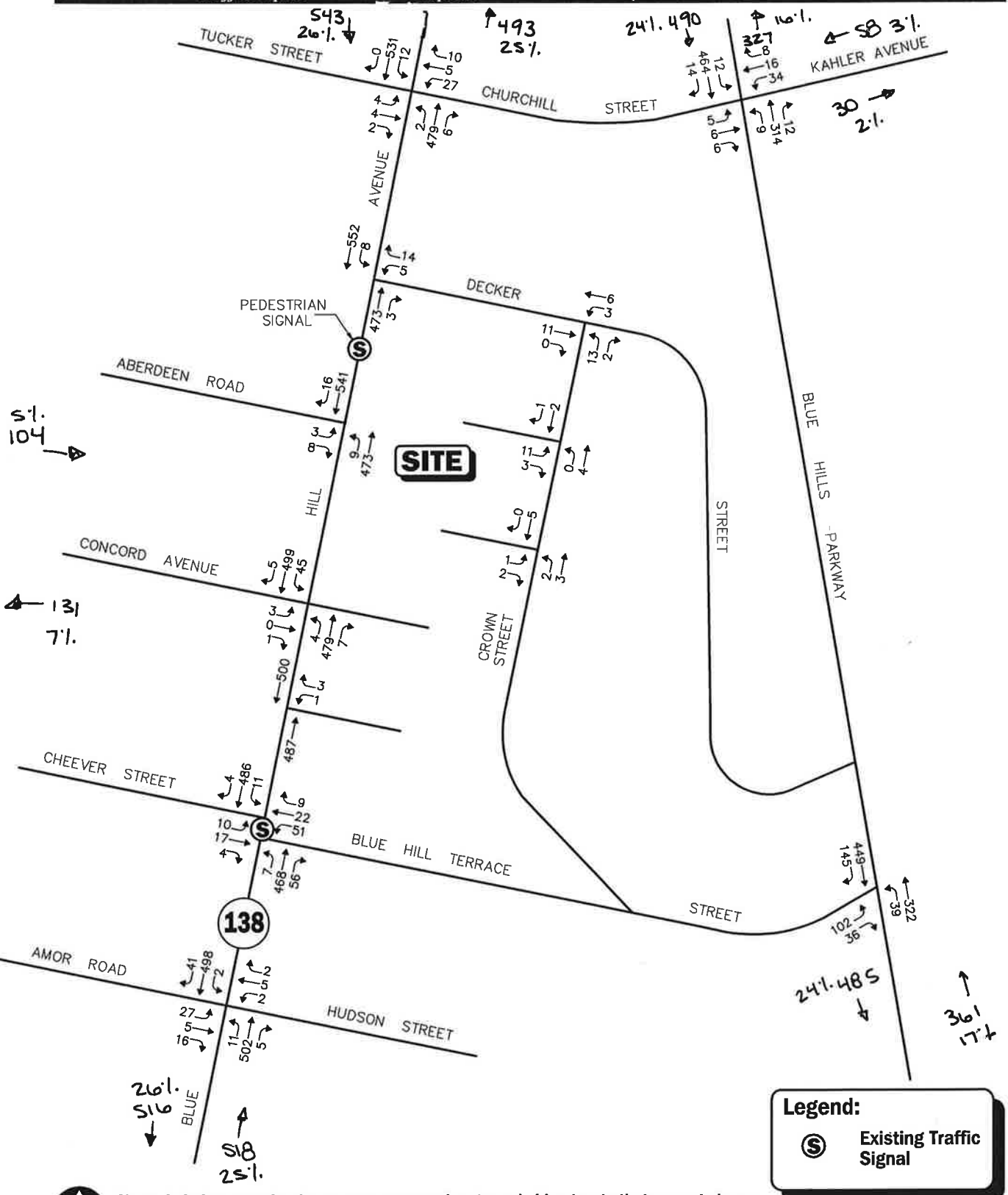
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure -

- TID worksheet
-
-

Vanasse & Associates, Inc.
Transportation Engineers & Planners



Legend:

Ⓢ Existing Traffic Signal

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

Not To Scale

Figure 2

2009 Existing Weekday Evening Peak Hour Traffic Volumes

Vanasse & Associates, Inc.
Transportation Engineers & Planners

TIS Worksheet

R:\5556\5556NT5.dwg 11/23/2009 3:06:32 PM EST

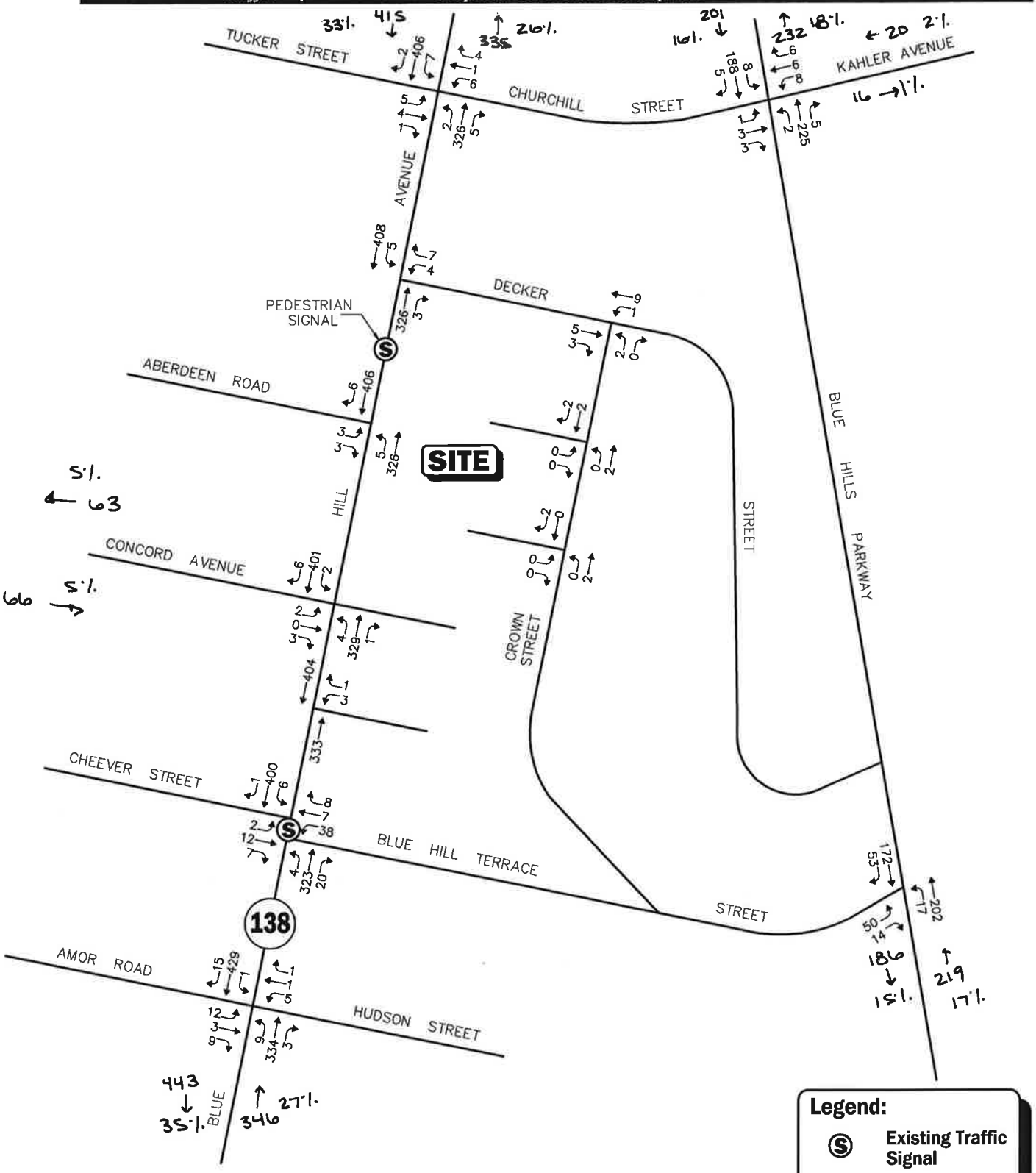


Figure 3

2009 Existing
Saturday Midday
Peak Hour Traffic Volumes

Vanasse & Associates, Inc.
Transportation Engineers & Planners

TIS Worksheet

REVISED CAPACITY ANALYSIS WORKSHEETS

Blue Hill Avenue (Route 138) at Concord Avenue and the Project driveway
Blue Hill Avenue (Route 138) at Cheever Street and Blue Hill Terrace Street

Blue Hill Avenue (Route 138) at Concord Avenue and the Project driveway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↰	↑	
Volume (vph)	3	1	1	60	1	66	4	516	64	100	549	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)		5.0			5.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.93			0.99		1.00	1.00	
Flt Protected		0.97			0.98			1.00		0.95	1.00	
Satd. Flow (prot)		1795			1692			1839		1745	1843	
Flt Permitted		0.97			0.98			1.00		0.30	1.00	
Satd. Flow (perm)		1795			1692			1834		543	1843	
Peak-hour factor, PHF	0.33	0.33	0.33	0.92	0.92	0.92	0.91	0.91	0.91	0.96	0.96	0.96
Adj. Flow (vph)	9	3	3	65	1	72	4	567	70	104	572	5
RTOR Reduction (vph)	0	3	0	0	44	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	12	0	0	94	0	0	637	0	104	577	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	2%	0%	0%	3%	0%
Turn Type	Split			Split			Perm			pm+pt		
Protected Phases	4	4		3	3			2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		1.4			7.6			44.8		53.8	53.8	
Effective Green, g (s)		1.4			7.6			44.8		53.8	53.8	
Actuated g/C Ratio		0.02			0.08			0.50		0.60	0.60	
Clearance Time (s)		5.0			5.0			5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		28			143			913		378	1102	
v/s Ratio Prot		c0.01			c0.06					0.01	c0.31	
v/s Ratio Perm								c0.35		0.15		
v/c Ratio		0.43			0.66			0.70		0.28	0.52	
Uniform Delay, d1		43.9			39.9			17.4		10.2	10.6	
Progression Factor		1.00			1.00			0.33		1.00	1.00	
Incremental Delay, d2		10.3			10.4			3.6		0.4	1.8	
Delay (s)		54.2			50.4			9.3		10.6	12.4	
Level of Service		D			D			A		B	B	
Approach Delay (s)		54.2			50.4			9.3			12.1	
Approach LOS		D			D			A			B	

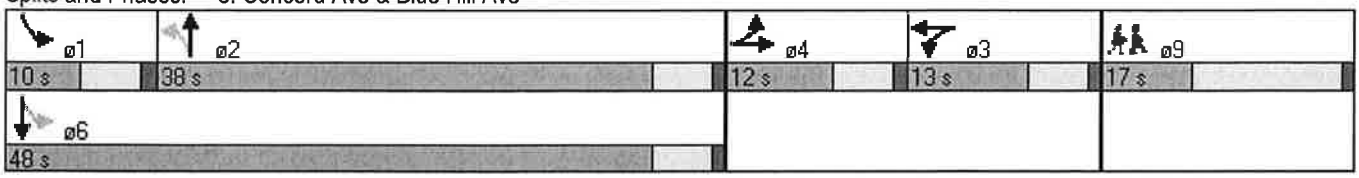
Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	32.2
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø9
Lane Configurations							
Volume (vph)	1	1	4	516	100	549	
Lane Group Flow (vph)	15	138	0	641	104	577	
Turn Type			Perm		pm+pt		
Protected Phases	4	3		2	1	6	9
Permitted Phases			2		6		
Detector Phase	4	3	2	2	1	6	
Switch Phase							
Minimum Initial (s)	5.0	5.0	6.0	6.0	4.0	6.0	6.0
Minimum Split (s)	11.0	11.0	11.0	11.0	9.0	11.0	17.0
Total Split (s)	12.0	13.0	38.0	38.0	10.0	48.0	17.0
Total Split (%)	13.3%	14.4%	42.2%	42.2%	11.1%	53.3%	19%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	10.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	None	C-Max	None
v/c Ratio	0.12	0.74		0.54	0.22	0.42	
Control Delay	36.4	50.4		7.9	7.3	8.4	
Queue Delay	0.0	0.9		0.2	0.0	0.2	
Total Delay	36.4	51.4		8.1	7.3	8.6	
Queue Length 50th (ft)	7	50		33	9	70	
Queue Length 95th (ft)	8	#137		#165	60	355	
Internal Link Dist (ft)	237	180		215		220	
Turn Bay Length (ft)					100		
Base Capacity (vph)	142	194		1196	469	1364	
Starvation Cap Reductn	0	0		90	0	0	
Spillback Cap Reductn	0	6		0	0	234	
Storage Cap Reductn	0	0		0	0	0	
Reduced v/c Ratio	0.11	0.73		0.58	0.22	0.51	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Concord Ave & Blue Hill Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↕	
Volume (vph)	2	1	3	51	1	45	4	354	48	53	428	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	11	12	12
Total Lost time (s)		5.0			5.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.93			0.94			0.98		1.00	1.00	
Flt Protected		0.98			0.97			1.00		0.95	1.00	
Satd. Flow (prot)		1741			1701			1806		1711	1841	
Flt Permitted		0.98			0.97			1.00		0.36	1.00	
Satd. Flow (perm)		1741			1701			1800		656	1841	
Peak-hour factor, PHF	0.42	0.42	0.42	0.92	0.92	0.92	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	5	2	7	55	1	49	4	398	54	60	486	7
RTOR Reduction (vph)	0	7	0	0	40	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	7	0	0	65	0	0	452	0	60	493	0
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	4%	0%	2%	3%	0%
Turn Type	Split			Split			Perm			pm+pt		
Protected Phases	4	4		3	3			2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		1.2			6.6			36.1		45.0	45.0	
Effective Green, g (s)		1.2			6.6			36.1		45.0	45.0	
Actuated g/C Ratio		0.02			0.08			0.45		0.56	0.56	
Clearance Time (s)		5.0			5.0			5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		26			140			812		420	1036	
v/s Ratio Prot		c0.00			c0.04					0.01	c0.27	
v/s Ratio Perm								c0.25		0.07		
v/c Ratio		0.27			0.46			0.56		0.14	0.48	
Uniform Delay, d1		39.0			35.0			16.1		9.5	10.5	
Progression Factor		1.00			1.00			0.52		1.00	1.00	
Incremental Delay, d2		5.6			2.4			2.6		0.2	1.6	
Delay (s)		44.6			37.4			11.0		9.6	12.0	
Level of Service		D			D			B		A	B	
Approach Delay (s)		44.6			37.4			11.0			11.8	
Approach LOS		D			D			B			B	

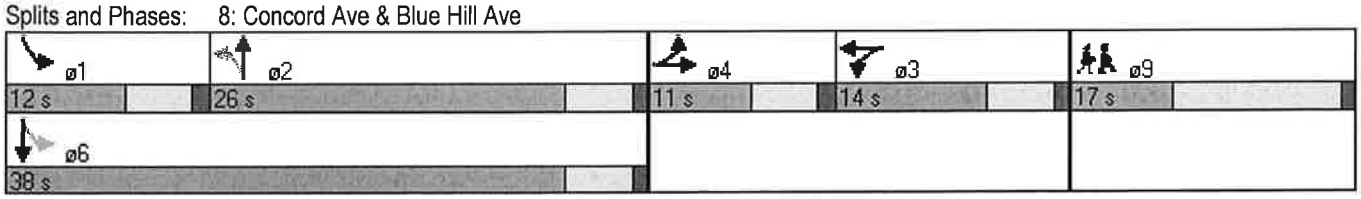
Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	32.2
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø9
Lane Configurations							
Volume (vph)	1	1	4	354	53	428	
Lane Group Flow (vph)	14	105	0	456	60	493	
Turn Type			Perm		pm+pt		
Protected Phases	4	3		2	1	6	9
Permitted Phases			2		6		
Detector Phase	4	3	2	2	1	6	
Switch Phase							
Minimum Initial (s)	5.0	5.0	6.0	6.0	4.0	6.0	6.0
Minimum Split (s)	11.0	11.0	11.0	11.0	9.0	11.0	17.0
Total Split (s)	11.0	14.0	26.0	26.0	12.0	38.0	17.0
Total Split (%)	13.8%	17.5%	32.5%	32.5%	15.0%	47.5%	21%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	10.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	C-Max	C-Max	None	C-Max	None
v/c Ratio	0.11	0.52		0.38	0.11	0.36	
Control Delay	27.7	30.6		10.2	7.8	8.5	
Queue Delay	0.7	4.5		0.2	0.0	0.0	
Total Delay	28.3	35.2		10.4	7.8	8.5	
Queue Length 50th (ft)	3	29		7	5	57	
Queue Length 95th (ft)	8	75		#404	39	285	
Internal Link Dist (ft)	237	180		215		220	
Turn Bay Length (ft)					100		
Base Capacity (vph)	137	230		1194	574	1378	
Starvation Cap Reductn	0	0		240	0	0	
Spillback Cap Reductn	45	72		0	0	72	
Storage Cap Reductn	0	0		0	0	0	
Reduced v/c Ratio	0.15	0.66		0.48	0.10	0.38	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Concord Ave & Blue Hill Ave



Blue Hill Avenue (Route 138) at Cheever Street and Blue Hill Terrace Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	10	18	4	51	22	9	7	468	56	11	486	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.98			0.99			1.00	
Flt Protected		0.98			0.97			1.00			1.00	
Satd. Flow (prot)		1840			1754			1839			1842	
Flt Permitted		0.98			0.97			0.99			0.98	
Satd. Flow (perm)		1840			1754			1824			1812	
Peak-hour factor, PHF	0.77	0.77	0.77	0.84	0.84	0.84	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	13	23	5	61	26	11	8	514	62	12	512	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	41	0	0	98	0	0	580	0	0	528	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			2	
Permitted Phases							2			2		
Actuated Green, G (s)		4.0			6.5			30.2			30.2	
Effective Green, g (s)		4.0			6.5			30.2			30.2	
Actuated g/C Ratio		0.05			0.08			0.39			0.39	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		95			148			714			710	
v/s Ratio Prot		c0.02			c0.06							
v/s Ratio Perm								c0.32			0.29	
v/c Ratio		0.43			0.66			0.81			0.74	
Uniform Delay, d1		35.4			34.2			20.9			20.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.1			10.6			7.0			4.2	
Delay (s)		38.6			44.8			27.9			24.4	
Level of Service		D			D			C			C	
Approach Delay (s)		38.6			44.8			27.9			24.4	
Approach LOS		D			D			C			C	

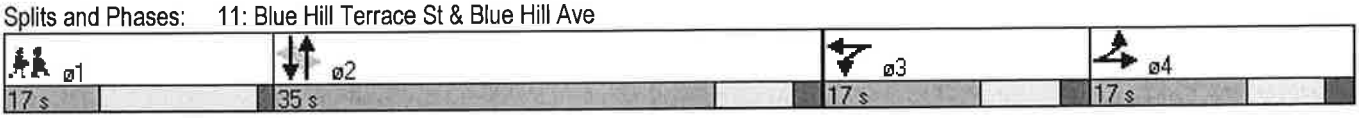
Intersection Summary			
HCM Average Control Delay	28.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	36.4
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø1
Lane Configurations							
Volume (vph)	17	22	7	468	11	486	
Lane Group Flow (vph)	40	98	0	584	0	528	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		2	1
Permitted Phases			2		2		
Detector Phase	4	3	2	2	2	2	
Switch Phase							
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	17.0	17.0	35.0	35.0	35.0	35.0	17.0
Total Split (%)	19.8%	19.8%	40.7%	40.7%	40.7%	40.7%	20%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None
v/c Ratio	0.16	0.37		0.59		0.54	
Control Delay	36.5	38.0		25.7		24.8	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	36.5	38.0		25.7		24.8	
Queue Length 50th (ft)	11	26		99		87	
Queue Length 95th (ft)	46	102		#610		#536	
Internal Link Dist (ft)	265	1205		276		90	
Turn Bay Length (ft)							
Base Capacity (vph)	371	354		998		987	
Starvation Cap Reductn	0	0		0		0	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.11	0.28		0.59		0.53	

Intersection Summary

Cycle Length: 86
Actuated Cycle Length: 62.9
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	2	12	7	38	7	8	4	323	20	6	400	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.95			0.98			0.99			1.00	
Flt Protected		1.00			0.97			1.00			1.00	
Satd. Flow (prot)		1723			1701			1862			1861	
Flt Permitted		1.00			0.97			0.99			0.99	
Satd. Flow (perm)		1723			1701			1852			1850	
Peak-hour factor, PHF	0.66	0.66	0.66	0.78	0.78	0.78	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	3	18	11	49	9	10	4	336	21	6	430	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	32	0	0	68	0	0	358	0	0	437	0
Heavy Vehicles (%)	50%	0%	0%	3%	0%	0%	25%	1%	0%	0%	2%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			2	
Permitted Phases							2			2		
Actuated Green, G (s)		2.1			4.1			22.1			22.1	
Effective Green, g (s)		2.1			4.1			22.1			22.1	
Actuated g/C Ratio		0.03			0.07			0.36			0.36	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		58			113			661			661	
v/s Ratio Prot		c0.02			c0.04							
v/s Ratio Perm								0.19			c0.24	
v/c Ratio		0.55			0.60			0.54			0.66	
Uniform Delay, d1		29.4			28.1			15.9			16.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		10.9			8.7			0.9			2.5	
Delay (s)		40.3			36.8			16.8			19.2	
Level of Service		D			D			B			B	
Approach Delay (s)		40.3			36.8			16.8			19.2	
Approach LOS		D			D			B			B	

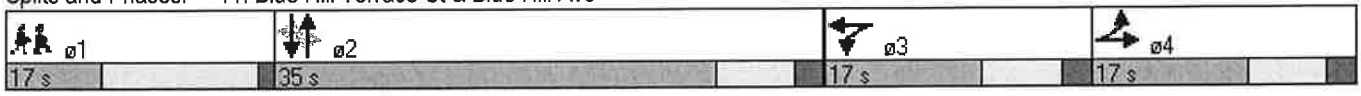
Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	33.6
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø1
Lane Configurations							
Volume (vph)	12	7	4	323	6	400	
Lane Group Flow (vph)	32	68	0	361	0	437	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		2	1
Permitted Phases			2		2		
Detector Phase	4	3	2	2	2	2	
Switch Phase							
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	17.0	17.0	35.0	35.0	35.0	35.0	17.0
Total Split (%)	19.8%	19.8%	40.7%	40.7%	40.7%	40.7%	20%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None
v/c Ratio	0.09	0.18		0.31		0.37	
Control Delay	30.2	28.7		15.6		16.9	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	30.2	28.7		15.6		16.9	
Queue Length 50th (ft)	7	14		49		63	
Queue Length 95th (ft)	34	70		290		#398	
Internal Link Dist (ft)	265	1205		276		63	
Turn Bay Length (ft)							
Base Capacity (vph)	582	574		1260		1258	
Starvation Cap Reductn	0	0		0		0	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.05	0.12		0.29		0.35	

Intersection Summary

Cycle Length: 86
Actuated Cycle Length: 47.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	11	18	4	54	23	9	7	520	59	12	549	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.99			1.00	
Flt Protected		0.98			0.97			1.00			1.00	
Satd. Flow (prot)		1839			1755			1840			1843	
Flt Permitted		0.98			0.97			0.99			0.98	
Satd. Flow (perm)		1839			1755			1825			1810	
Peak-hour factor, PHF	0.77	0.77	0.77	0.84	0.84	0.84	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	14	23	5	64	27	11	8	571	65	13	578	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	42	0	0	102	0	0	640	0	0	595	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			2	
Permitted Phases							2			2		
Actuated Green, G (s)		4.1			6.7			31.3			31.3	
Effective Green, g (s)		4.1			6.7			31.3			31.3	
Actuated g/C Ratio		0.05			0.09			0.41			0.41	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		99			154			750			743	
v/s Ratio Prot		c0.02			c0.06							
v/s Ratio Perm								c0.35			0.33	
v/c Ratio		0.42			0.66			0.85			0.80	
Uniform Delay, d1		34.9			33.7			20.4			19.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.9			10.2			9.3			6.2	
Delay (s)		37.8			43.9			29.7			25.9	
Level of Service		D			D			C			C	
Approach Delay (s)		37.8			43.9			29.7			25.9	
Approach LOS		D			D			C			C	

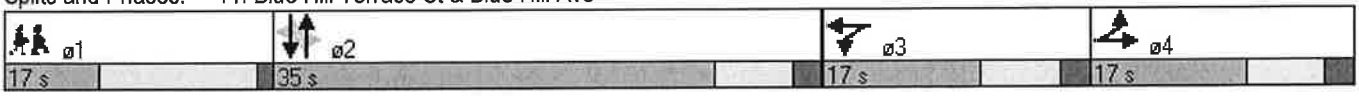
Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	76.2	Sum of lost time (s)	34.1
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø1
Lane Configurations							
Volume (vph)	18	23	7	520	12	549	
Lane Group Flow (vph)	42	102	0	644	0	595	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		2	1
Permitted Phases			2		2		
Detector Phase	4	3	2	2	2	2	
Switch Phase							
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	17.0	17.0	35.0	35.0	35.0	35.0	17.0
Total Split (%)	19.8%	19.8%	40.7%	40.7%	40.7%	40.7%	20%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None
v/c Ratio	0.19	0.41		0.65		0.61	
Control Delay	34.2	36.4		23.9		23.2	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	34.2	36.4		23.9		23.2	
Queue Length 50th (ft)	16	38		212		191	
Queue Length 95th (ft)	48	105		#697		#631	
Internal Link Dist (ft)	265	1205		276		90	
Turn Bay Length (ft)							
Base Capacity (vph)	330	315		992		981	
Starvation Cap Reductn	0	0		0		0	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.13	0.32		0.65		0.61	

Intersection Summary

Cycle Length: 86
Actuated Cycle Length: 62.4
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	2	13	7	40	7	8	4	360	21	6	440	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.99			1.00	
Flt Protected		1.00			0.96			1.00			1.00	
Satd. Flow (prot)		1733			1701			1863			1862	
Flt Permitted		1.00			0.96			0.99			0.99	
Satd. Flow (perm)		1733			1701			1854			1851	
Peak-hour factor, PHF	0.66	0.66	0.66	0.78	0.78	0.78	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	3	20	11	51	9	10	4	375	22	6	473	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	34	0	0	70	0	0	399	0	0	480	0
Heavy Vehicles (%)	50%	0%	0%	3%	0%	0%	25%	1%	0%	0%	2%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			2	
Permitted Phases							2			2		
Actuated Green, G (s)		2.1			4.1			24.3			24.3	
Effective Green, g (s)		2.1			4.1			24.3			24.3	
Actuated g/C Ratio		0.03			0.06			0.38			0.38	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		57			109			703			702	
v/s Ratio Prot		c0.02			c0.04							
v/s Ratio Perm								0.21			c0.26	
v/c Ratio		0.60			0.64			0.57			0.68	
Uniform Delay, d1		30.6			29.3			15.7			16.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		15.6			12.2			1.1			2.8	
Delay (s)		46.2			41.5			16.8			19.4	
Level of Service		D			D			B			B	
Approach Delay (s)		46.2			41.5			16.8			19.4	
Approach LOS		D			D			B			B	

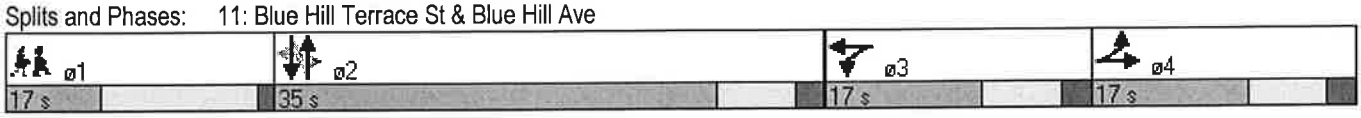
Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	33.6
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

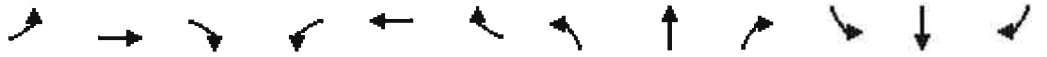
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø1
Lane Configurations							
Volume (vph)	13	7	4	360	6	440	
Lane Group Flow (vph)	34	70	0	401	0	480	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		2	1
Permitted Phases			2		2		
Detector Phase	4	3	2	2	2	2	
Switch Phase							
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	17.0	17.0	35.0	35.0	35.0	35.0	17.0
Total Split (%)	19.8%	19.8%	40.7%	40.7%	40.7%	40.7%	20%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None
v/c Ratio	0.10	0.19		0.33		0.40	
Control Delay	31.0	29.7		15.9		17.3	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	31.0	29.7		15.9		17.3	
Queue Length 50th (ft)	8	16		56		72	
Queue Length 95th (ft)	35	72		327		#460	
Internal Link Dist (ft)	265	1205		276		63	
Turn Bay Length (ft)							
Base Capacity (vph)	536	527		1241		1237	
Starvation Cap Reductn	0	0		0		0	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.06	0.13		0.32		0.39	

Intersection Summary

Cycle Length: 86
Actuated Cycle Length: 48.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	12	18	4	54	23	30	7	542	59	35	570	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.96			0.99			1.00	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1837			1723			1841			1841	
Flt Permitted		0.98			0.98			0.99			0.93	
Satd. Flow (perm)		1837			1723			1826			1714	
Peak-hour factor, PHF	0.77	0.77	0.77	0.84	0.84	0.84	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	16	23	5	64	27	36	8	596	65	37	600	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	44	0	0	127	0	0	665	0	0	642	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			2	
Permitted Phases							2			2		
Actuated Green, G (s)		4.1			7.1			31.3			31.3	
Effective Green, g (s)		4.1			7.1			31.3			31.3	
Actuated g/C Ratio		0.05			0.09			0.41			0.41	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		98			160			746			700	
v/s Ratio Prot		c0.02			c0.07							
v/s Ratio Perm								0.36			c0.37	
v/c Ratio		0.45			0.79			0.89			0.92	
Uniform Delay, d1		35.2			34.0			21.1			21.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.2			23.1			12.9			16.8	
Delay (s)		38.4			57.1			34.0			38.2	
Level of Service		D			E			C			D	
Approach Delay (s)		38.4			57.1			34.0			38.2	
Approach LOS		D			E			C			D	

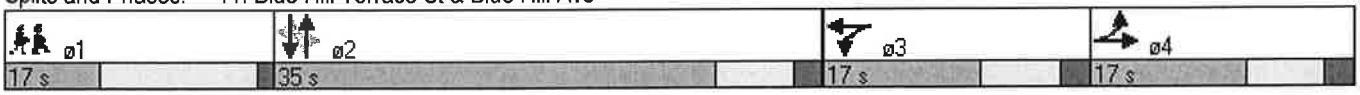
Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	76.6	Sum of lost time (s)	34.1
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø1
Lane Configurations							
Volume (vph)	18	23	7	542	35	570	
Lane Group Flow (vph)	44	127	0	669	0	642	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		2	1
Permitted Phases			2		2		
Detector Phase	4	3	2	2	2	2	
Switch Phase							
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	17.0	17.0	35.0	35.0	35.0	35.0	17.0
Total Split (%)	19.8%	19.8%	40.7%	40.7%	40.7%	40.7%	20%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None
v/c Ratio	0.20	0.49		0.68		0.70	
Control Delay	34.4	38.8		24.9		26.2	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	34.4	38.8		24.9		26.2	
Queue Length 50th (ft)	17	48		232		228	
Queue Length 95th (ft)	50	#144		#731		#712	
Internal Link Dist (ft)	265	1205		276		215	
Turn Bay Length (ft)							
Base Capacity (vph)	327	307		987		923	
Starvation Cap Reductn	0	0		0		0	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.13	0.41		0.68		0.70	

Intersection Summary

Cycle Length: 86
Actuated Cycle Length: 62.8
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	3	13	7	40	7	24	4	379	21	22	458	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.95			0.99			1.00	
Flt Protected		0.99			0.97			1.00			1.00	
Satd. Flow (prot)		1692			1676			1864			1859	
Flt Permitted		0.99			0.97			0.99			0.97	
Satd. Flow (perm)		1692			1676			1855			1801	
Peak-hour factor, PHF	0.66	0.66	0.66	0.78	0.78	0.78	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	5	20	11	51	9	31	4	395	22	24	492	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	36	0	0	91	0	0	419	0	0	518	0
Heavy Vehicles (%)	50%	0%	0%	3%	0%	0%	25%	1%	0%	0%	2%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			2	
Permitted Phases							2			2		
Actuated Green, G (s)		2.4			6.6			25.6			25.6	
Effective Green, g (s)		2.4			6.6			25.6			25.6	
Actuated g/C Ratio		0.04			0.10			0.37			0.37	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		59			162			694			674	
v/s Ratio Prot		c0.02			c0.05							
v/s Ratio Perm								0.23			c0.29	
v/c Ratio		0.61			0.56			0.60			0.77	
Uniform Delay, d1		32.5			29.5			17.3			18.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		17.2			4.4			1.5			5.3	
Delay (s)		49.8			33.9			18.8			24.1	
Level of Service		D			C			B			C	
Approach Delay (s)		49.8			33.9			18.8			24.1	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	68.4	Sum of lost time (s)	33.8
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø1
Lane Configurations							
Volume (vph)	13	7	4	379	22	458	
Lane Group Flow (vph)	36	91	0	421	0	518	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		2	1
Permitted Phases			2		2		
Detector Phase	4	3	2	2	2	2	
Switch Phase							
Minimum Initial (s)	4.0	4.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	17.0	17.0	35.0	35.0	35.0	35.0	17.0
Total Split (%)	19.8%	19.8%	40.7%	40.7%	40.7%	40.7%	20%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes					
Recall Mode	None	None	None	None	None	None	None
v/c Ratio	0.13	0.30		0.41		0.53	
Control Delay	32.2	32.1		17.9		20.2	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	32.2	32.1		17.9		20.2	
Queue Length 50th (ft)	10	24		63		85	
Queue Length 95th (ft)	36	89		#374		#524	
Internal Link Dist (ft)	265	1205		276		215	
Turn Bay Length (ft)							
Base Capacity (vph)	422	418		1099		1064	
Starvation Cap Reductn	0	0		0		0	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.09	0.22		0.38		0.49	

Intersection Summary

Cycle Length: 86
Actuated Cycle Length: 54.4
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	12	18	4	54	23	30	7	542	59	35	570	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.99			1.00	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1838			1777			1841			1841	
Flt Permitted		0.98			0.98			0.99			0.94	
Satd. Flow (perm)		1838			1777			1827			1734	
Peak-hour factor, PHF	0.77	0.77	0.77	0.84	0.84	0.84	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	16	23	5	64	27	36	8	596	65	37	600	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	1	0
Lane Group Flow (vph)	0	44	0	0	127	0	0	665	0	0	641	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		4.2			8.8			43.8			43.8	
Effective Green, g (s)		4.2			8.8			43.8			43.8	
Actuated g/C Ratio		0.05			0.10			0.49			0.49	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		86			174			889			844	
v/s Ratio Prot		c0.02			c0.07							
v/s Ratio Perm								0.36			c0.37	
v/c Ratio		0.51			0.73			0.75			0.76	
Uniform Delay, d1		41.9			39.4			18.7			18.8	
Progression Factor		1.00			1.00			1.00			0.64	
Incremental Delay, d2		5.1			14.2			5.7			5.8	
Delay (s)		47.0			53.7			24.4			17.8	
Level of Service		D			D			C			B	
Approach Delay (s)		47.0			53.7			24.4			17.8	
Approach LOS		D			D			C			B	

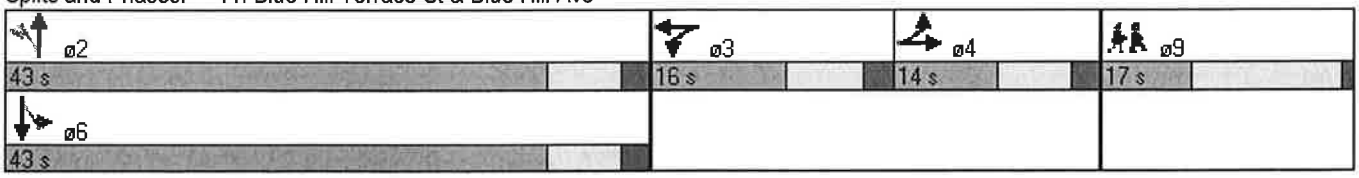
Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	33.2
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø9
Lane Configurations							
Volume (vph)	18	23	7	542	35	570	
Lane Group Flow (vph)	44	127	0	669	0	642	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		6	9
Permitted Phases			2		6		
Detector Phase	4	3	2	2	6	6	
Switch Phase							
Minimum Initial (s)	7.0	8.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	14.0	15.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	14.0	16.0	43.0	43.0	43.0	43.0	17.0
Total Split (%)	15.6%	17.8%	47.8%	47.8%	47.8%	47.8%	19%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead					
Lead-Lag Optimize?							
Recall Mode	None	None	C-Max	C-Max	Max	Max	None
v/c Ratio	0.31	0.73		0.59		0.60	
Control Delay	45.3	64.4		17.2		13.1	
Queue Delay	0.0	0.0		0.0		0.2	
Total Delay	45.3	64.4		17.2		13.3	
Queue Length 50th (ft)	24	71		225		237	
Queue Length 95th (ft)	49	#139		#570		#549	
Internal Link Dist (ft)	265	1205		276		215	
Turn Bay Length (ft)							
Base Capacity (vph)	143	178		1128		1068	
Starvation Cap Reductn	0	0		0		74	
Spillback Cap Reductn	0	0		0		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.31	0.71		0.59		0.65	

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (98%), Referenced to phase 2:NBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	3	13	7	40	7	24	4	379	21	22	458	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		7.0			7.0			7.0			7.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			0.95			0.99			1.00	
Flt Protected		0.99			0.97			1.00			1.00	
Satd. Flow (prot)		1730			1676			1864			1859	
Flt Permitted		0.99			0.97			1.00			0.97	
Satd. Flow (perm)		1730			1677			1856			1804	
Peak-hour factor, PHF	0.66	0.66	0.66	0.78	0.78	0.78	0.96	0.96	0.96	0.93	0.93	0.93
Adj. Flow (vph)	5	20	11	51	9	31	4	395	22	24	492	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	36	0	0	91	0	0	419	0	0	518	0
Heavy Vehicles (%)	33%	0%	0%	3%	0%	0%	25%	1%	0%	0%	2%	0%
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		3	3			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		4.8			7.7			34.3			34.3	
Effective Green, g (s)		4.8			7.7			34.3			34.3	
Actuated g/C Ratio		0.06			0.10			0.43			0.43	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		104			161			796			773	
v/s Ratio Prot		c0.02			c0.05							
v/s Ratio Perm								0.23			c0.29	
v/c Ratio		0.35			0.57			0.53			0.67	
Uniform Delay, d1		36.1			34.6			16.9			18.3	
Progression Factor		1.00			1.00			1.00			1.04	
Incremental Delay, d2		2.0			4.5			2.5			4.4	
Delay (s)		38.1			39.0			19.3			23.3	
Level of Service		D			D			B			C	
Approach Delay (s)		38.1			39.0			19.3			23.3	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	33.2
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	ø9
Lane Configurations							
Volume (vph)	13	7	4	379	22	458	
Lane Group Flow (vph)	36	91	0	421	0	518	
Turn Type			Perm		Perm		
Protected Phases	4	3		2		6	9
Permitted Phases			2		6		
Detector Phase	4	3	2	2	6	6	
Switch Phase							
Minimum Initial (s)	8.0	9.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	16.0	13.0	13.0	13.0	13.0	17.0
Total Split (s)	15.0	17.0	31.0	31.0	31.0	31.0	17.0
Total Split (%)	18.8%	21.3%	38.8%	38.8%	38.8%	38.8%	21%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	10.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	
Lead/Lag	Lag	Lead					
Lead-Lag Optimize?							
Recall Mode	None	None	C-Max	C-Max	C-Max	C-Max	None
v/c Ratio	0.21	0.46		0.37		0.47	
Control Delay	36.3	40.6		15.4		18.3	
Queue Delay	0.0	0.2		0.1		0.2	
Total Delay	36.3	40.8		15.5		18.5	
Queue Length 50th (ft)	17	43		122		99	
Queue Length 95th (ft)	32	75		#318		#422	
Internal Link Dist (ft)	265	1205		276		215	
Turn Bay Length (ft)							
Base Capacity (vph)	173	210		1130		1097	
Starvation Cap Reductn	0	0		0		126	
Spillback Cap Reductn	0	7		78		0	
Storage Cap Reductn	0	0		0		0	
Reduced v/c Ratio	0.21	0.45		0.40		0.53	

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Offset: 62 (78%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Blue Hill Terrace St & Blue Hill Ave