Report to the Arlington Redevelopment Board

Recommended Traffic Mitigation
Symmes Redevelopment

Submitted by

Arlington Transportation Advisory Committee

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TAC
Symmes Transportation Subcommittee

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A.3 Adopt a phased treatment of the Summer/Grove and Summer/Oak Hill intersections. Phase 1) Traffic calming measures to include refuge islands and crosswalks at Grove and Oak Hill; Phase 2) If needed, signal at Grove Street coordinated with the signal at Summer/Hospital/Brattle.[1]

A.4 Prepare for the possible future installation of a right-turn pocket for westbound traffic turning right from Summer Street to Hospital Road if future studies indicate that it's implementation is of significant benefit.[1]

Task B: Woodside Lane Access

B.1 Permit one-way access into the Symmes site from Woodside Lane.

Task C: Off-Site Roadway Mitigation

C.1 Narrow the entrance to Oak Hill Drive from Summer Street.

C.2 Install curb extensions at Oak Hill Drive and Woodside Lane.

C.3 Install traffic calming device(s) on Oak Hill Drive north of Woodside Lane contingent upon abutter consensus.

C.4 Install stop sign on Woodside Lane at Oak Hill Drive.

C.5 Install curb extensions at Woodside Lane, Vista Circle, Hazel Terrace contingent upon abutter approval.

Task D: Pedestrians and Bicycles

D.1 Install sidewalk on entire length of Hospital Road.

D.2 Install sidewalk on the north side of Summer Street from Hospital Road to Oak Hill Drive.

D.3 Add a crosswalk on Hospital Road at the approach to Summer Street.

D.4 At the Summer/Brattle/Hemlock intersection, add a crosswalk to the Mass Highway plan from the northwest corner of Hemlock to the southeast corner of Brattle.

D.5 Add a sidewalk on the hospital side of Woodside Lane between Hospital Road and

Oak Hill Drive, contingent on abutter consensus.

D.6 Explore improving access to Bikeway via Brattle Place.

D.7 Install a curb cut on the south side of Summer Street behind High School to access Bikeway.

D.8 Install and/or improve sidewalks on west side of upper Hemlock Street between Yerxa and Epping for Stratton Elementary School access.

Task E: Public Transportation

E.1 Encourage a shuttle bus operating from site to Alewife Station and town.

E.2 Encourage working with MBTA to increase Route 67 service to site and area.

E.3 Provide bus stops with rain cover at site and medical office building.

E.4 Encourage tenants of medical office building to employ transportation demand management.

E.5 Encourage unbundling the cost of parking in all leases and purchases.

[1]We are recommending that Phase 1 include Recommendations A.1, A.2, Phase 1 of A.3, C.1, C.2, C.3, and C.4. Following the implementation of Phase 1 by about 12 to 18 months, an evaluation for Phase 2 should be made. Mitigation measures to be evaluated for Phase 2 would include a signal at Grove and Summer, a westbound right turn pocket into Hospital Road, and moving the crosswalk on Summer Street at Hospital Road to the east of Hospital Road. In preparation for the eventuality of Phase 2 mitigations, a conduit should be placed between the signal controller at Hospital Road and the location of the potential signal controller at Grove Street, no structures should be put in place that would preclude the installation of a right turn pocket, and the signal at Hospital Road should be made capable of implementing a pedestrian actuated crossing of Summer Street to the east of Hospital Road.

2. Introduction

At the request of the Arlington Redevelopment Board (ARB), the Board of Selectmen tasked the Transportation Advisory Committee (TAC) in August of 2004 to support the ARB in the consideration of transportation issues with respect to the Symmes Redevelopment project. At the TAC meeting on 24 August, the TAC formed a subcommittee of five members to concentrate on this effort, the Symmes Transportation Subcommittee (STS).

The ARB requested that the TAC manage the peer review of the report prepared by the developer's consultant [ref. 1], Howard Stein-Hudson (HSH), in preparation for the Special Town Meeting to be held on 20 September 2004. This Special Town Meeting was called to consider zoning revisions to accommodate the Symmes development. Gary Hebert of Fay, Spofford & Thorndike (FST) was selected to conduct the peer review, and his report [appendix A] was submitted on 15 September. The STS presented a preliminary transportation evaluation at the Special Town Meeting, based upon the HSH report, the peer review, and its own analyses.

Following the affirmative vote of the Special Town Meeting, the next step in the ARB process is for the developer to apply for a Special Permit as required for the Symmes project. The ARB then performs a thorough evaluation of many things including transportation. To support this evaluation, the STS developed a task plan for conducting this review as described in Section 4. The STS conducted twenty meetings between August 2004 and March 2005. In addition, individual work was required between meetings. There has been neighborhood and developer representation at the majority of our meetings. This report and recommendations are the completion of this effort.

We of the STS would like to thank Symmes Redevelopment Associates for their support, and Jane Howard and Jim Danila of HSH and Gary Hebert of FST for their assistance in the analyses.

Fig 1 illustrates the location of the site and the roadways in the area. Summer Street is currently under reconstruction between the Lexington line and Brattle Street by Mass Highway. Fig 2 illustrates the projected development on the site as of September 2004.

The TAC's approach to the evaluation has been to understand the transportation issues impacting this area of Arlington for the future. This obviously requires understanding the contribution of a major development such as Symmes. Our focus, however, has been the integrated whole, not just the Symmes Redevelopment Project.

3. Impact of the Development

The HSH report [ref. 1] released in September 2004 analyzed the traffic conditions looking forward to 2009 based upon projected general increases in traffic volume and the traffic contribution from the 265 residential units and medical facilities on the Symmes site. Most of the analyses used the Synchro computer analysis, a standard traffic engineering tool.

In Figs 3 and 4, we summarize some of the computer analyses from the HSH report, all projecting to 2009. Fig 3 focuses on the Summer/Brattle/Hemlock intersection, and Fig 4 on the Hospital/

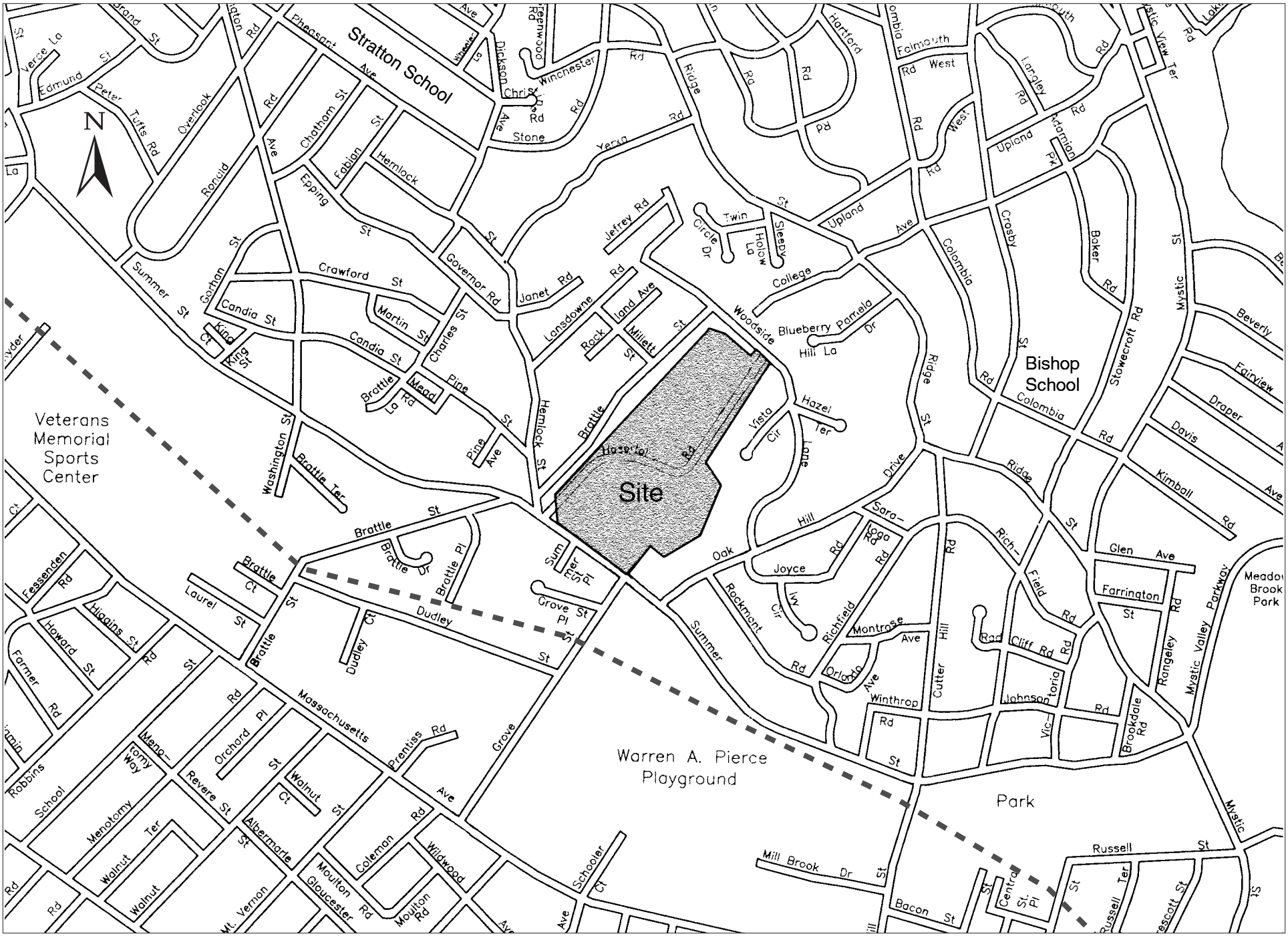

Fig 1 Symmes Area Map

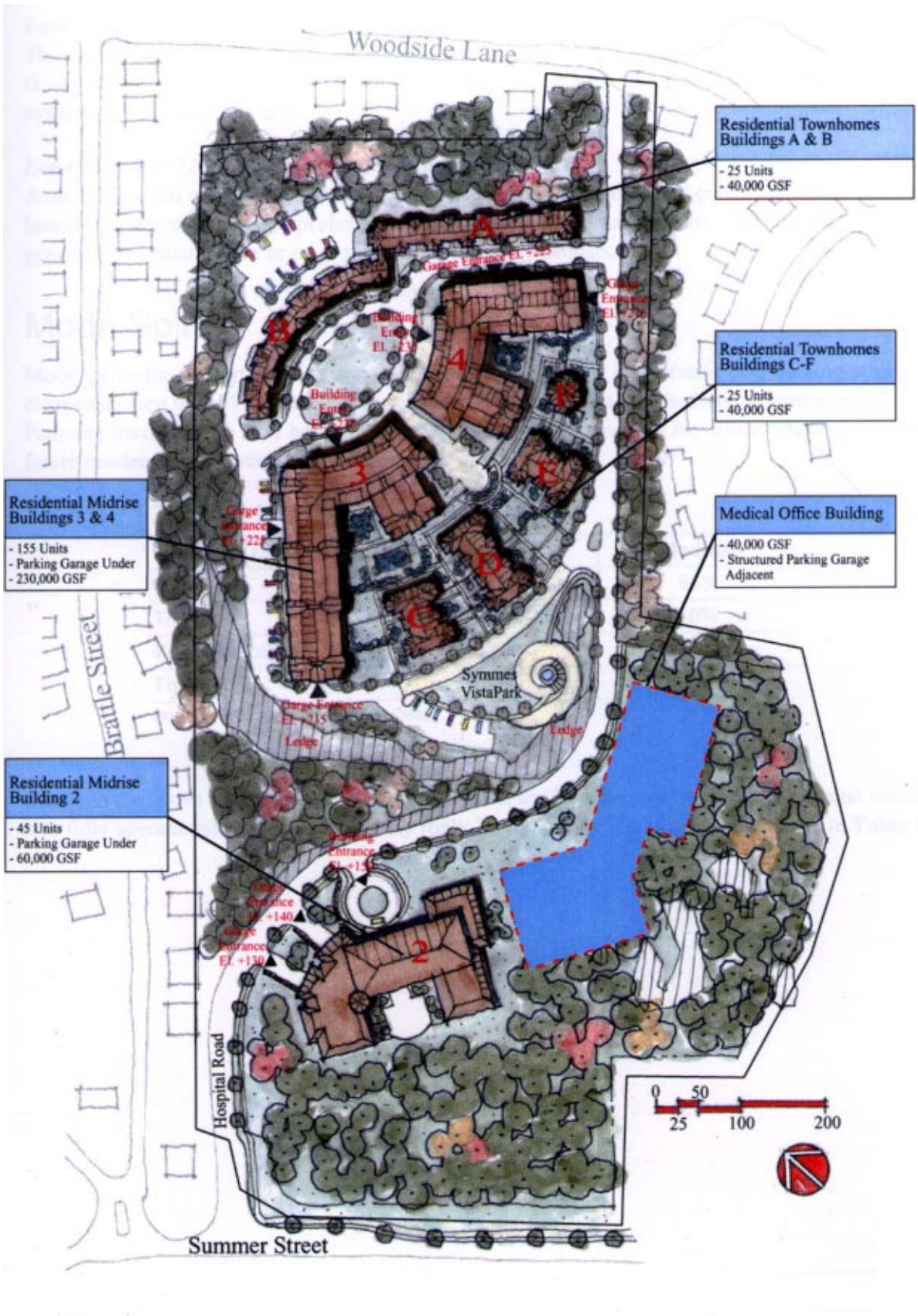

Fig 2 Projected Symmes Development (September 2004)

Summer intersection. Fig 3 shows the projections for 2009 for no development on the site, for the development being completed, and for the development completed with a new signal at Hospital Road and Summer Street.

First we examine the Hospital Road and Summer Street intersection. We observe from Fig 3.1 that with no development on the site, the flow of traffic on Summer Street continues to perform satisfactorily. In fig 3.2, the project is built, but a signal is not installed at the Hospital Road and Summer Street intersection. The flow of traffic on Summer Street continues to work well, but the exit from the developed site via Hospital Road is difficult. Delays for southbound left (SBL) are over 10 minutes in the peak AM hour and over 3 minutes in the peak PM hour. This length of delay would hamper the ability of the developer to sell the properties and would encourage site residents to exit via Woodside Lane. To be successful, the project requires a signal at Hospital Road and Summer Street.

	EBL	EBT	WBT	WBR	SBL	SBR	Total
AM Peak - Volumes		816	769		2	10	1597
Level of Service		**A**			**D**		
delay in sec		0	0		26.3		
queues in ft - 50%		1			5		
-95%							
PM Peak - Volumes	2	662	712	8	11	12	1407
Level of Service		**A**			**E**		
delay in sec		0.1			42.6		
queues in ft - 50%							
-95%							

EBL = eastbound left, EBT = eastbound through, WBT = westbound through, WBR = westbound right, SBL = southbound left, SBR = southbound right

Fig 3.1 Hospital/Summer Intersection (No Build, 2009, no signal at Hospital Road, 3.1% volume increase, Woodside open)

	EBL	EBT	WBT	WBR	SBL	SBR	Total
AM Peak - Volumes	20	761	609	44	56	27	1517
Level of Service		**A**			**F**	**C**	
delay in sec		0.7			754.8	16.6	
queues in ft - 50%		2	0		254	11	
-95%							
PM Peak - Volumes	26	662	712	67	60	34	1561
Level of Service		**A**			**F**	**C**	
delay in sec		0.9	0		208.7	16.3	
queues in ft - 50%		3	0		203	14	
-95%							

Fig 3.2 Hospital/Summer Intersection (Project Built, 2009, no signal at Hospital Rd, 3.1% volume increase, Woodside Open)

HSH has worked with Mass Highway and designed a signal at Hospital Road that is coordinated with the Brattle/Summer Street intersection. The performance of the combined signal is shown in Fig 3.3 with Woodside Lane open and Fig 3.4 with Woodside closed. In both cases the delay exiting Hospital Road SB left is less than 1 minute, and SB right about a minute. We agree with HSH's recommendation of this signal.

Recommendation A.1 Redesign Summer/Brattle/Hospital intersection to include signal at Hospital Road.

	EBL	EBT	WBT	WBR	SBL	SBR	Total
AM Peak - Volumes	20	761	609	44	56	27	1517
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		3.7	36.1		35.2	56.4	
queues in ft - 50%		0	377		52	24	
-95%							
PM Peak - Volumes	26	662	712	67	60	34	1561
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		2	35.4		40.3	63.1	
queues in ft - 50%		0	440		63	35	
-95%		m102	#966		69	58	

m = metered by other intersection,
# = number is approximate, acceptable for the design of storage bays, and valid for comparisons

Fig 3.3 Hospital/Summer Intersection (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized, 3.1% volume increase, Woodside open)

	EBL	EBT	WBT	WBR	SBL	SBR	Total
AM Peak - Volumes	21	761	609	70	86	27	1574
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		3.5	49.2		35.7	57	
queues in ft - 50%		0	442		83	24	
-95%							
PM Peak - Volumes	27	662	712	100	103	35	1639
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		2.3	47.6		40.3	61.7	
queues in ft - 50%		0	**528**		113	36	
-95%		m81	#1030		109	59	

Fig 3.4 Hospital/Summer Intersection (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized, 3.1% volume increase, Woodside closed)

The necessary signal at Hospital Road has further impacts. From Fig 4.1, for the Brattle/Summer/ Hemlock intersection without a signal at Hospital Road, we see that eastbound through (EBT) traffic on Summer Street operates at Level of Service (LOS) B in the AM and PM peak hours. With the signal at Hospital Road (Fig 4.2), the LOS for eastbound through traffic on Summer Street in the PM drops from LOS B to LOS D. This is a significant change since the delay increases from 14.6 to 35.5 seconds. Concurrently, westbound through (WBT) traffic improves from LOS C in the AM to LOS B. Other travel directions of the intersection have the same LOS as before.

The Grove and Oak Hill intersections with Summer Street are also impacted by the Hospital Road signal in the following ways: a) the left turn from Grove onto Summer Street (already difficult and the source of 3 crashes per year) would become more difficult, b) pedestrian crossing of Summer Street between Hospital Road and Mill Street would continue to be dangerous, and c) queues from westbound traffic at PM peak hours are projected to occasionally block the Grove Street intersection.

Of course, the development will have other transportation impacts than the Summer Street Corridor. These will include Woodside Lane, Oak Hill Drive, and other local streets. These will be addressed in the following sections.

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
AM Peak Volumes LOS delay in sec queues in ft - 50% -95%	12	669 **B** 18.4 222 #684	25	83	619 **C** 23.9 177 #683	58	30	27 **D** 42.8 64 146	59	167 **D** 43.6 84 #210	61 **C** 27.4 36 99	36	1846
PM Peak Volumes LOS delay in sec queues in ft - 50% -95%	25	656 **B** 14.6 240 497	35	68	720 **B** 17 247 #472	105	57	31 **D** 51.4 75 #190	53	60 **C** 30.8 27 68	9 **B** 17.4 4 28	19	1838

Fig. 4.1 Summer/Brattle/Hemlock Intersection (No Build, 2009, no signal at Hospital Road, 3.1% volume increase over Feb 04 measurement, Woodside open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
AM Peak Volumes LOS delay in sec queues in ft - 50% -95%	12	674 **C** 30.1 314 #736	25	100	628 **B** 12.9 36 #124	58	30	27 **D** 47.8 67 #175	69	167 **D** 41.9 77 #214	61 **C** 24.3 32 90	36	1887
PM Peak Volumes LOS delay in sec queues in ft - 50% -95%	25	665 **D** 35.5 373 #833	35	85	728 **B** 18.6 44 #855	105	57	31 **D** 53.1 94 #227	70	60 **C** 33.1 29 77	9 **B** 18.6 4 31	19	1889

Fig. 4.2 Summer/Brattle/Hemlock Intersection (Project Built, 2009, signal at Hospital Road coordinated with Hemlock, 3.1% volume increase over Feb 04 measurement, Woodside open)

4. Organization of Work

Summer Street is an important major east/west arterial for Arlington and those who commute through Arlington using it. A key to the success of the Symmes project and for the future of Arlington is the operation of the Summer Street Corridor from Brattle Street to Mill Street. If this corridor is operating properly, there will be less congestion, less cut-through traffic into neighborhoods, and increased safety in the area. If the corridor is congested, the development will have less value to prospective owners, and will cause degradation of the quality of life for those using Summer Street and for the neighborhoods around Symmes. For these reasons, the Summer Street Corridor was the first focus of our work (Task A). This was followed by a consideration of the vehicular access to and from the site via Woodside Lane (Task B), and mitigation measures for potentially impacted roadways (Task C).

The availability of transportation alternatives to the automobile is important to the site, and to Arlington. Ensuring that the area is friendly to pedestrian and bicycle use (Task D) and the availability of public transportation (Task E) are also examined and recommendations made.

5. Discussion and Recommendations

In our examination of the Symmes area, we have considered the list of requirements and preferences put forth by the Symmes Advisory Committee in their formal report [ref. 2]. These are cited where applicable.

5.1 TASK A: SUMMER STREET CORRIDOR

5.1.1 Expected Traffic Volumes

The September HSH report [ref. 1] used the traditional measurement and extrapolation technique widely applied by Traffic Engineers to predict future volumes: make a set of measurements and extrapolate the volumes based upon the average increases per year that Mass Highway collects on major throughways in Massachusetts (such as Route 2). Currently this growth is 0.5% per year, or 3.1% total over five years. HSH, FST, and others in the field use this method.

HSH measured an average volume of 15,836 vehicles per day on March 2 and 3 of 2004. To make a projection to 2009 using the standard technique, the measured volume was increased by 3.1% for the five years. The projected volume for 2009 is then 16,327 vehicles per day.

Several measurements have been made on Summer Street over the years, as shown in Table 1. These measurements were all taken between Hospital Road and Grove Street on Summer Street.

Measurement Date and Source	Daily Volume
August 1989 / Marchionda & Associates Thursday 8/17	13,919
October 1998 / FST Wednesday 10/28	18,045
March 2004 / HSH Tuesday 3/2 and Wed 3/3	15,836

Table 1 Measurements on Summer Street between Hospital Road and Grove Street

From Table 1, we note that the increase in volume on Summer Street from 1989 to 2004 is 0.9% per year averaged over 15 years. We also note that the increase in volume from 1989 to 1998 was 2.6% per year. Applying the 0.9% per year increase would yield 4.6% over five years; applying the 2.6% per year would yield a 13.7% increase. These numbers illustrate the dependency of projections on which years are being compared. Projecting traffic volumes 5 years into the future has significant uncertainties that are compounded when broad area averages are used rather than local conditions.

The volume measured in 1998 by FST was higher (18,045) than that projected by HSH for 2009 (16,327). In 1998 the Massachusetts economy was booming and the work on Reeds Brook Park (now McClennen Park) on Summer Street had not yet begun. In 2004, the economy was down, the unemployment rate had not yet recovered, and western Summer Street was impacted by the development of McClennen Park and the Mass Highway project to reconstruct Summer Street from the Lexington line to Brattle Street. There are rational reasons why a measurement in early 2004 might be lower than in 1998. It would not be out of the question for traffic volumes on Summer Street to return to the 1998 level sometime in the next decade.

5.1.2 Robustness to Increased Traffic Volumes

As a roadway approaches its capacity, delays increase exponentially. We wish to ensure that the operation of the Summer Street Corridor does not approach this point. To this end, we requested analyses to be performed at both the 3.1% increase over 5 years and a 10% increase. The 10% increase would bring the level to 17,420 vehicles per day. If these higher volumes illustrated reasonable operation, the corridor could be considered robust in the face of changing conditions.

Fig 5 illustrates the results of this sensitivity analysis. Figs 5.1 and 5.2 compare the analyzed performance at the Brattle/Hemlock/Summer intersection in 2009. We note that for the 10% increase, the westbound through (WBT) and eastbound through (EBT) delays increase only slightly. The level of service is consistent except for the PM peak hour where the WBT drops from a LOS B to a LOS C for both WBT and SBT. This change represents an increased delay from 18.6 sec to 22.5 sec and is a minor increase. This intersection appears to operate well with the 10% increase of traffic.

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
AM Peak Volumes Level of Service delay in sec queues in ft - 50% -95%	12	674 **C** 30.1 314 #736	25	100	628 **B** 12.9 36 #124	58	30	27 **D** 47.8 67 #175	69	167 **D** 41.9 77 #214	61 **C** 24.3 32 90	36	1887
PM Peak Volumes Level of Service delay in sec queues in ft - 50% -95%	25	665 **D** 35.5 373 #833	35	85	728 **B** 18.6 44 #855	105	57	31 **D** 53.1 94 #227	70	60 **C** 33.1 29 77	9 **B** 18.6 4 31	19	1889

Fig 5.1 Brattle/Hemlock/Summer Intersection (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized, 3.1% volume increase, Woodside open)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
AM Peak Volumes Level of Service delay in sec queues in ft - 50% -95%	12	720 **C** 34.6 349 #808	25	100	672 **B** 14.4 40 m#177	58	30	27 **D** 47.7 66 #172	68	167 **D** 41.7 77 #213	61 **C** 24.3 32 90	36	1976
PM Peak Volumes Level of Service delay in sec queues in ft - 50% -95%	25	712 **D** 42.2 417 #910	35	85	779 **C** 22.5 62 #935	105	57	31 **D** 53.1 94 #227	70	60 33.1 29 77	9 **C** 18.6 4 31	19	1987

Fig 5.2 Brattle/Hemlock/Summer Intersection (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized, 10% volume increase, Woodside open)

Fig 5.3 and 5.4 compare the operation of the Hospital Road and Summer Street intersection. Here again, with a 10% increase the delays increase only slightly, and the level of service is the same.

From this analysis we reach the very important conclusion that the Summer Street Corridor should continue to operate at an acceptable level of service for reasonable future volume increases.

	EBL	EBT	WBT	WBR	SBL	SBR	Total
AM Peak Volumes	20	761	609	44	56	27	1517
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		3.7	36.1		35.2	56.4	
queues in ft - 50%		0	377		52	24	
-95%		#595	#731		61	45	
PM Peak Volumes	26	662	712	67	60	34	1561
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		2	35.4		40.3	63.1	
queues in ft - 50%		0	440		63	35	
-95%		m102	#966		69	58	

Fig 5.3 Hospital/Summer Intersection (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized, 3.1% volume increase, Woodside open)

	EBL	EBT	WBT	WBR	SBL	SBR	Total
AM Peak Volumes	21	866	804	54	97	47	1889
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		5.1	44.1		35.1	56.4	
queues in ft - 50%		0	422		52	24	
-95%		m#799	#805		61	m45	
PM Peak Volumes	26	723	828	73	103	59	1812
Level of Service		**A**	**D**		**D**	**E**	
delay in sec		2.7	42.9		40.3	62.6	
queues in ft - 50%		0	**492**		63	35	
-95%		m123	#1058		69	58	

Fig 5.4 Hospital/Summer Intersection (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized, 10% volume increase, Woodside open)

5.1.3 Examination of Corridor Improvements

Several additional configurations were examined for the Summer Street Corridor at AM and PM peak hours, each at 3.1% increase and 10% increase of volumes. Each were analyzed with Woodside Lane open one-way inbound and with Woodside closed. The configurations included: a) additional signals at Summer's intersection with Grove Street and Oak Hill Drive, coordinated with Hospital Road/Brattle Street signal. b) coordination of all signals between Mill Street/Cutter Hill/Summer intersection and Brattle/Summer intersection. c) a signal at Grove Street but not Oak Hill, and d) traffic calming methods at the Grove and Oak Hill intersections with Summer Street.

a. Corridor operation with signals at Grove Street and at Oak Hill

The analyses of the corridor are summarized in Fig 6. Fig 6.1 is eastbound at the AM peak hour and Fig 6.2 is westbound at the PM peak hour.

In these diagrams each intersection is represented by a rectangle. Within the rectangle the traffic volumes for the peak hour in each direction entering the intersection are represented with the LOS if it was given in the analysis. Above the rectangle are the volumes entering and exiting from the street to the north – for example, Hemlock. Below the rectangle are the volumes entering and exiting from the street to the south, for example Brattle. The queues, delays and LOS for the through movement are indicated below the rectangles.

These analyses indicate that the corridor operates satisfactorily at 10% volume, with signals at Grove and Oak Hill, and Mill/Summer optimized but not coordinated. The intersections in this string operate at LOS C-A-A-A-E from east to west in 6.1, and LOS A-A-C-C from west to east in 6.2 (Mill was not analyzed). The LOS E eastbound for the Mill/Summer/Cutter Hill intersection is the same as the current operation in the morning. The only apparent difficulty is the queue westbound in the PM at Hospital Road backing up to and blocking Grove Street. There is 440 ft between the east edge of Hospital Road and the west edge of Grove Street. The 50% probable westbound queue is 530 ft. This will be discussed in a later section when a right turn pocket westbound into Hospital Road is discussed.

b. Coordinating Mill/Summer/Cutter Hill with the other signals

Fig 7 illustrates a sample of the results from analyses of coordination of all signals in the corridor. Fig 7.1 is AM peak hour eastbound without the Mill/Summer intersection added to the coordination, and Fig 7.2 is with it added to the coordination.

Coordinating the Mill/Summer intersection with the other signals makes a little difference to the rest of the corridor, but degrades the performance at Mill/Summer. This coordination does not help and is not recommended.

Fig 6. Operation of the Summer Street Corridor at the AM and PM peak hours (Project Built, 2009, signal at Hospital Rd coordinated with Hemlock, Mill optimized but not coordinated, 10% volume increase, signal at Grove and at Oak Hill, Woodside open one-way)

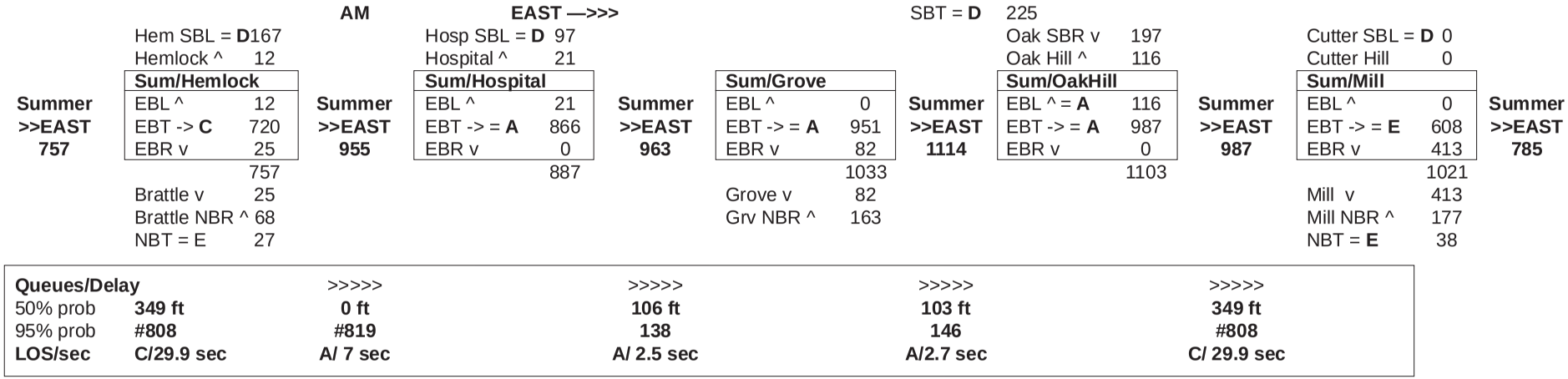

Fig 6.1 Eastbound Corridor at peak AM hour

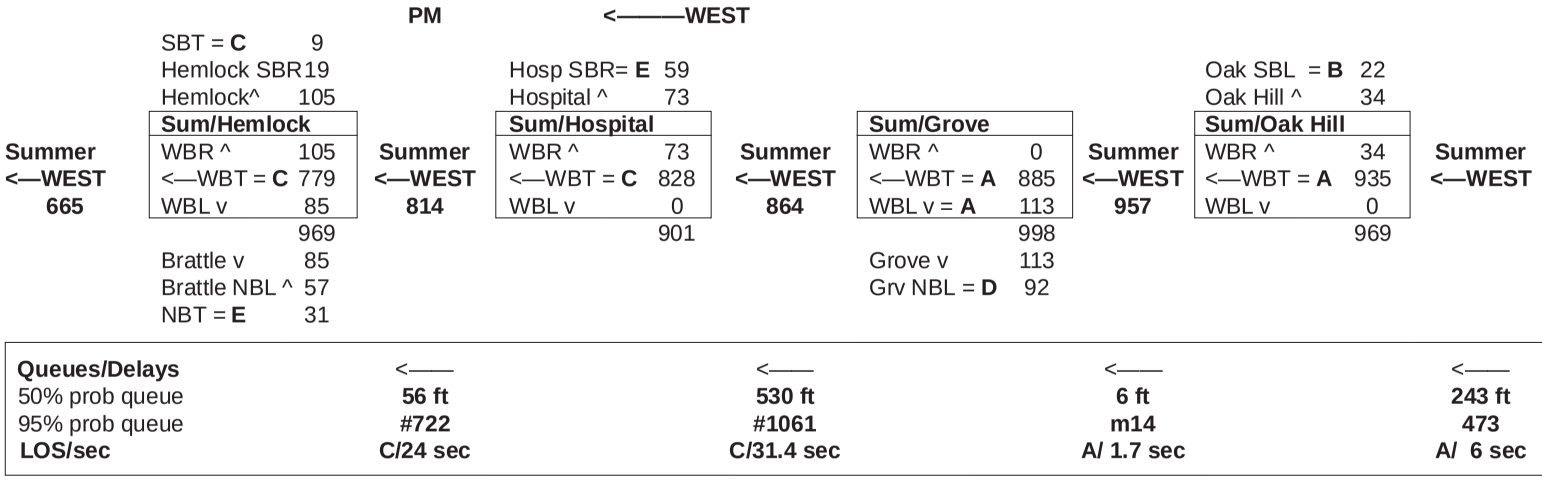

Fig 6.2 Westbound Corridor at peak PM hour

Fig 7 Operation of the Summer Street Corridor Eastbound at the AM peak hour (Project Built, 2009, signals on Summer Street at Mill St, Oak Hill Dr, Grove St, Hospital and Brattle St, Woodside open one-way)

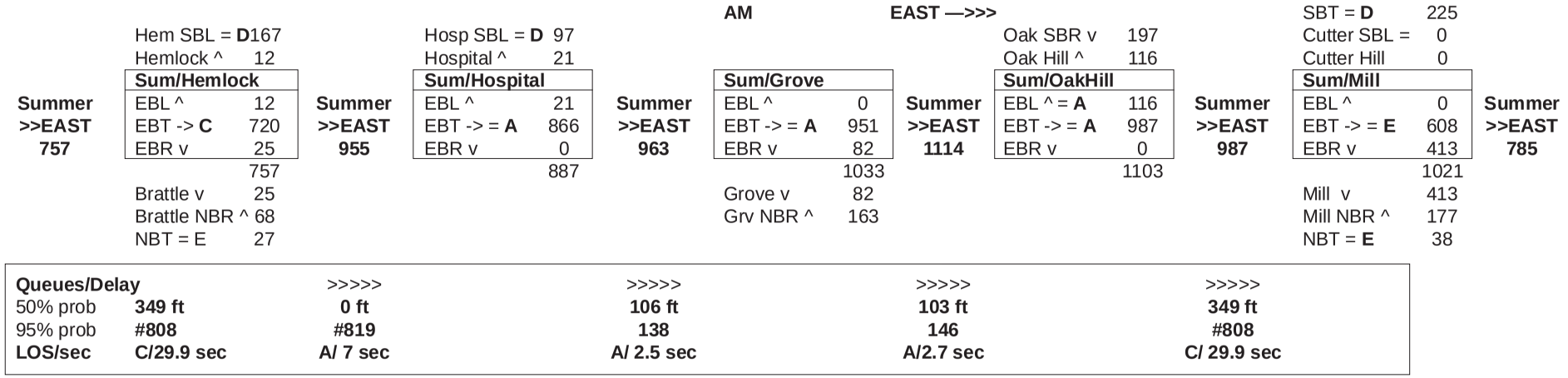

Fig 7.1 Eastbound Corridor at peak AM hour - all signals coordinated EXCEPT Mill/Summer

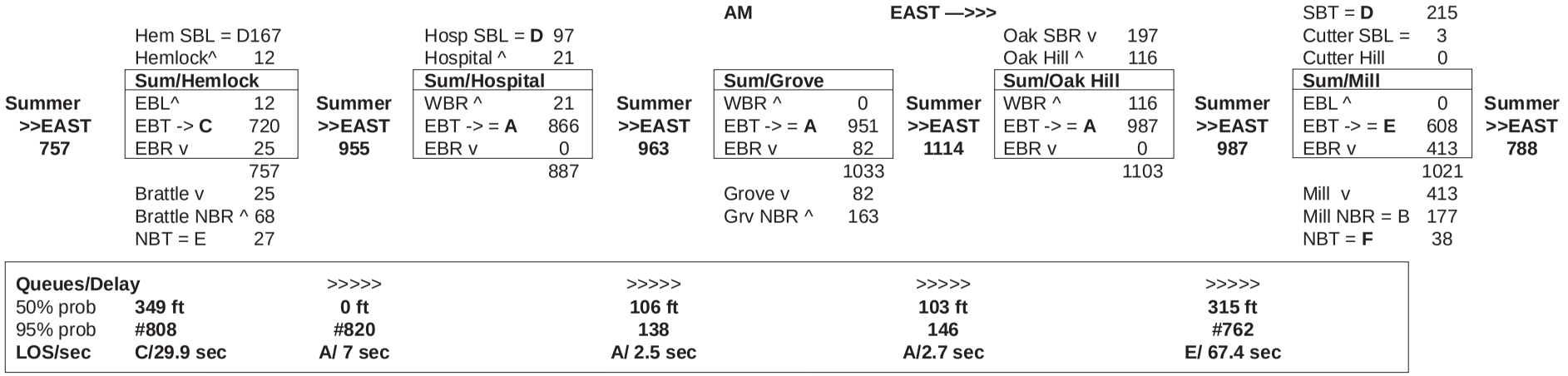

Fig 7.2 Eastbound Corridor at peak AM hour - all signals coordinated INCLUDING Mill/Summer

5.1.4 Consideration of Recommendations

a. Optimization of signal timing at Mill/Cutter Hill Summer Street intersection

HSH proposed optimization of the signal timing of this intersection to improve the operation of Summer Street. All of the analyses conducted have assumed this optimization.

Recommendation A.2 Optimize the signal timing at the Mill/Cutter Hill Summer Street intersection.
We recommend that this optimization be done in the same time frame as the installation of the Hospital Road/Summer Street signal. TAC requests to set the design goals of the optimization.

b. Signal at Grove Street

The intersection at Grove and Summer Streets meets four warrants for the placement of a signal, and has been seriously considered. The difficulties of the intersection without a signal include: a) safety for vehicles turning left from Grove onto Summer, b) the safety of pedestrians, and c) the potential of blockage from the queue at Hospital Road at the PM peak hour.

The difficulties associated with installing a signal here are: a) the road width on Summer Street will not support two left turn lanes (one eastbound at Oak Hill and one westbound at Grove, which are quite heavily used), b) its presence might lead to an increase of cut-through traffic on Oak Hill Drive, and c) the signal may merely push the queues from Grove Street back to the Oak Hill Drive intersection.

A pedestrian signal was discussed, but it must be on a section of roadway rather than an intersection, and such a signal does not meet traffic warrants due to the current low pedestrian volume on this road segment. However, we expect pedestrian volume to increase substantially in the future.

As noted before, a signal was also considered at the Oak Hill Drive intersection that would work in conjunction with Grove, but the 150 ft spacing between the two intersections leads to complex queuing, and again there is insufficient width for two left turn lanes. This configuration was rejected by both FST and HSH, and we agree.

Another option suggested by FST is a set of traffic calming and pedestrian assistance measures to improve safety without a signal. A modification of this suggestion would be traffic islands placed on the eastbound approach to Grove and the westbound approach to Oak Hill. Crosswalks would be installed at the intersection side of each of the islands. In the 150 ft between the intersections, a middle lane would be marked-off that could be used for left turns from either direction. Fig. 8 from FST illustrates this concept.

Recommendation A.3 Adopt a phased approach for the Summer/Grove and Summer/Oak Hill intersections. Phase 1) Traffic calming measures to include refuge islands and crosswalks at Grove and Oak Hill; Phase 2) If needed, signal at Grove Street coordinated with the signals at Summer/Hospital/Brattle.
The signals at Brattle/Hemlock/Summer and Hospital/Summer will likely be installed in the summer of 2006. As Phase 1 for the complex Grove Street and Oak Hill Drive intersections with Summer Street, we recommend implementation of a traffic calming and pedestrian safety design concept as described above, followed by an extensive period of observation of the corridor

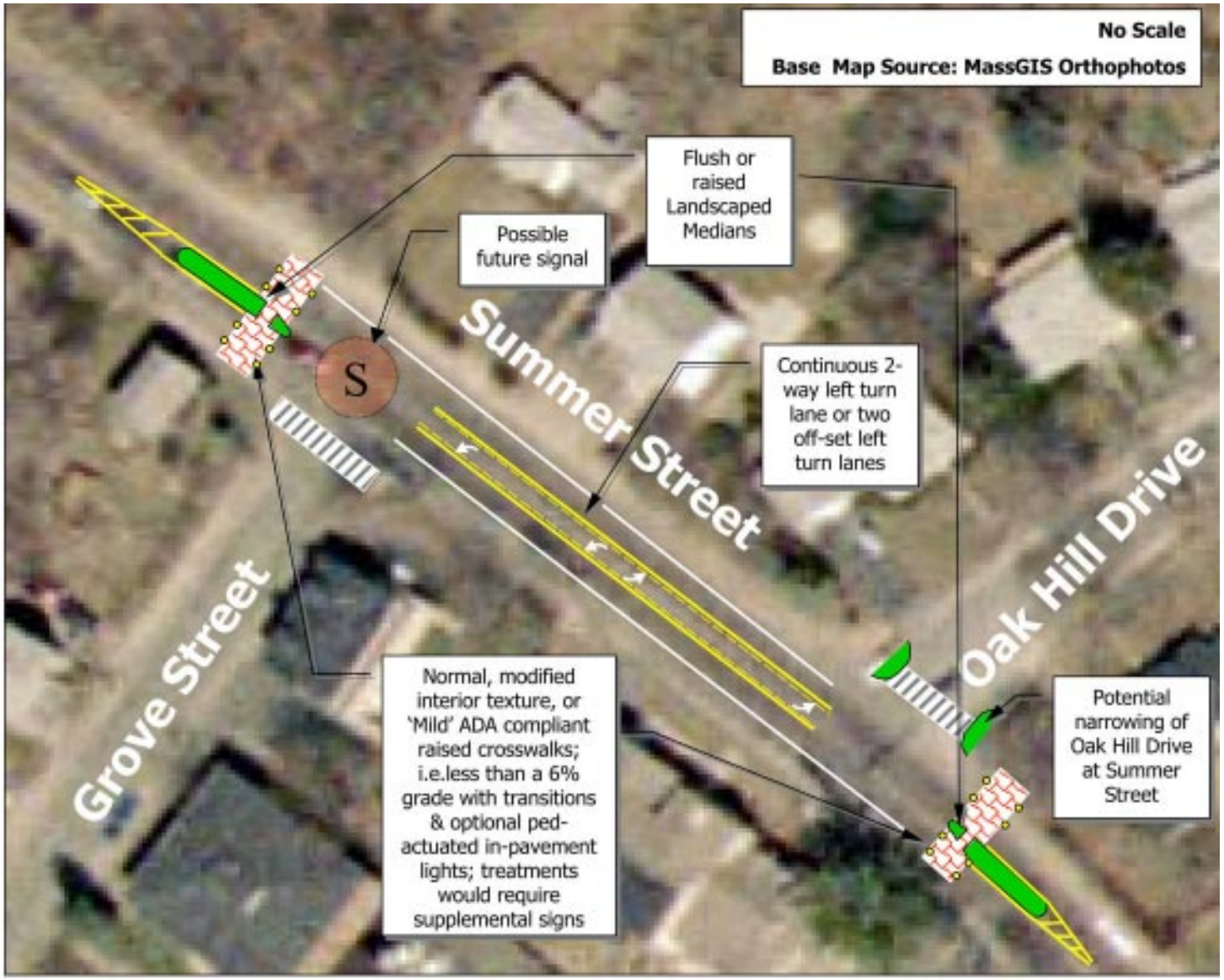

Fig 8. FST Potential Pedestrian Crossing/Calming Concept at Summer Street at Grove Street and Oak Hill Drive

operation after the Hospital Road signal is functional. For Phase 2 we recommend revisiting the Grove Street signal after this observation period, and recommend installing a signal then if it is needed. The capability for coordination between the Hospital Road controller and the potential controller at Grove Street should be provided during sidewalk installation.

b. Right Turn Pocket For Westbound Turn into Hospital Road

Earlier we mentioned that one of the impacts of the signal at Hospital Road was the queues that could block the Grove Street intersection for some of the PM peak hour. A right turn pocket westbound into Hospital Road was examined to see if queue lengths would be significantly reduced. The distance between Hospital Road and Grove Street is 440 ft.

From Fig 5.3 and 5.4, and from additional Synchro data, we construct the table below.

Condition	PM 50%	PM 95%
Fig 5.3; 3.1% volume growth and Woodside open inbound only	440 ft	#966 ft
Fig 5.4; 10% volume growth and Woodside open inbound only	**492 ft**	#1058 ft
10% volume growth and Woodside CLOSED	**630 ft**	#934 ft
10% volume growth, Woodside open inbound only and RT Pocket	356 ft	#934 ft
10% volume growth, Woodside CLOSED and RT Pocket	362 ft	#920 ft

= number is approximate, acceptable for the design of storage bays, and valid for comparisons

Table 2. Impact on Queues of Right Turn Pocket Westbound into Hospital Road

From this data, the right turn pocket does reduce the 50% queue (or the average queue length during the peak hour) to under the 440 feet whether Woodside Lane is open one-way or closed to traffic. Each of the 95% queues (which would be exceeded only 5% of the time during the peak hour) exceed the 440 feet, but these occur for only very short periods.

The presence of this pocket for a distance of 150 to 200 ft would take another 12 foot or so strip from the wooded area and add more asphalt to the Hospital Road intersection. There is also an MBTA Route 67 bus stop in the area of the pocket, causing some additional complications.

Recommendation A.4 Prepare for the possible future installation of a right-turn pocket for westbound traffic turning right from Summer Street to Hospital Road if future studies indicate that it's implementation is of significant benefit.
We recommend that the need for the right turn pocket be reviewed after the Brattle/Hemlock and Hospital Road signals are installed and operating for at least a year, and that this be done in conjunction with the Grove Street signal review. We recommend that the layout of the pocket be designed now, and that the development of the local area where the pocket would be installed be done in a manner that would allow its future installation if needed.

5.2 TASK B: WOODSIDE LANE ACCESS

5.2.1 Background

The current site layout allows vehicular access via two routes: Hospital Road leading to Summer Street, and Hospital Road leading to Woodside Lane. The primary entrance to the site is via Summer Street.

a. Access via Woodside Lane when the Hospital was Fully Operational

A 12-hour traffic count taken when the Hospital was in operation [ref. 3] indicated that most traffic accessed the site via Summer Street. During this 12 hours, approximately 12% of the vehicles used the Woodside lane access.

	12 hour		AM Peak (7:30-8:30)		PM Peak (4:00–5:00)	
	Summer	Woodside	Summer	Woodside	Summer	Woodside
Entering	915	105	169	24	70	6
Exiting	785	134	46	6	159	22
Total	1700	239	215	30	229	28

Table 3 May 11, 1982 Traffic Counts

The actual 24-hour volume with the hospital in full operation should be considerably higher than the 1982 count, for two reasons:

- The 1982 counts were taken before the North wing was added. This wing increased the total floor space by 32%.
- A 24-hour count will have higher volumes than a 12-hour count, especially for a 24/7 operation, such as a hospital.

To extrapolate the 1982 count to a total 24-hour count for the Woodside Lane access, we apply the daily trip generation for the fully operational hospital to the 1982 counts. According to VHB daily trip generation for the fully operational hospital was 4,540 vehicle trips [ref. 4].

239*(4540/(1700+239)) = 560 trips / day via the Woodside lane access[1]

b. Woodside Neighbors Concerns

The Woodside Lane neighbors are concerned that even though the total traffic generated by the site is expected to be less than what was generated when the hospital was in full operation, the changes in land use may mean that a higher fraction of site residents and visitors will use the Woodside access, leading to excessive traffic on Woodside Lane. Reasons that usage of the Woodside access might increase include the following:

- With the change from hospital to mixed residential/medical use, more motorists will be regular users, thus likely to become familiar with the local streets near the site.
- The signal at Hospital and Summer may create significant delay, thus leading motorists to seek alternate routes.

[1]Since this figure is based on a single traffic count and an estimate of total traffic volume when the hospital was in full operation, it should be viewed as approximate.

c. Emergency Services Requirements

The requirements for emergency services (Police and Fire) were discussed at a meeting on February 7, 2005 [appendix F]. These requirements include:

- Two entrances are required to the Symmes site for emergency access.
- The minimum requirement is a one-way access into the site with adequate width for a ladder fire truck.
- The accesses are to have no speed humps or other items that would delay access. (A locked gate will not meet this requirement.)

The Arlington emergency services would also like to have Hospital Road as a public way so that safety regulations could be enforced, but the minimum requirement is that fire lanes be designated and maintained.

d. Symmes Advisory Committee Recommendations

Two recommendations of the Symmes Advisory Committee [ref. 2] are particularly relevant to this discussion:

> *REQUIREMENT: Primary access to the site shall be from Summer Street.*
>
> *REQUIREMENT: Woodside Lane shall remain a low-volume local roadway. No proposal should suggest that more than 10 percent of non-residential peak-hour site traffic would utilize Woodside Lane. Proposals suggesting programs to minimize use of Woodside Lane, including the installation of a traffic monitoring program, are encouraged.*

What does "low-volume local roadway" mean? In those few cases where other jurisdictions have published daily traffic volume guidelines for local roads, they have ranged from a maximum of 1000 vehicles / day (San Antonio, TX) [ref. 5] to 3,000 vehicles / day (Halifax, NS) [ref. 6]. Here in Arlington, although most local roads carry fewer than 1,000 vehicles / day, a substantial number carry between 1,000 and 2,000 vehicles / day, with a few carrying over 2,000 vehicles / day.

5.2.2 Traffic Generation on Woodside Lane

Site-generated Traffic on Woodside Lane Under Various Options

Both HSH [ref. 1] and TAC [appendix G] estimated site-generated traffic on Woodside Lane under several options, as summarized in the table below.

Estimate	Daily Vehicles[1]	Fraction of non-residential peak-hour site traffic using Woodside Lane
HSH Two way access (page 35)	310[2]	5.3% (total, not peak hour)
HSH Two way access worst case (Fig 14)	800	33.2% (total, not peak hour)
HSH Emergency access only	0	0%
TAC Two way access	720	11%
TAC One way access inbound	350	4%

[1] All numbers are rounded to the nearest 10
[2] Calculated as 0.164*1494+0.053*1244 (pages 32 and 35 of HSH report)

Background Traffic on Woodside Lane

Woodside Lane currently serves approximately 70 households. Based on ITE Trip Generation (approximately 9 trips/household/day), we would expect approximately 630 trips / day to be generated by these residents. Not all of these trips will pass a single point on Woodside Lane (for example, someone at the bottom of the hill might use Oak Hill drive, while someone at the top of the hill might travel via Brattle Street, and neither would be included in a count taken at Hospital Road). Therefore, the trips at a particular point on Woodside lane would be somewhat less than the 630 total trips.

5.2.3 Options Considered

Three options were considered:

- Close the Woodside Lane access, except for emergency vehicles, pedestrians and bicycles
- Permit one-way access into the site from Woodside Lane
- Permit two-way access to and from the site via Woodside Lane (the current arrangement)

First, we discuss the advantages and disadvantage of each option. This is followed by a discussion of the impacts of the various options on Oak Hill Drive.

a. Close the Woodside Lane Access

This option has the following advantages:

- Clearly meets the objective of minimizing site generated traffic on Woodside Lane
- Will also reduce possible cut-through traffic from Woodside Lane through the site

However, it has several significant disadvantages:

- It is unclear how unimpeded emergency vehicle access can be maintained (for example, a locked gate requires that all emergency responders have a means of access and may create a delay in the emergency response)
- It is less likely to be properly cleared in winter, thus impeding pedestrian access to the site and its associated bus stop.
- It forces those Woodside Lane residents who wish a safe left turn onto Summer via a signalized intersection onto circuitous routes (either via Millett/Lansdowne/Hemlock or via Cutter Hill).
- It forces site residents and visitors traveling to/from the north onto more circuitous routes
- By forcing all site residents through the Summer/Brattle/Hospital intersection, it will add to the congestion at this intersection.

b. Permit One-way Access into the Site from Woodside Lane

This option has the following advantages:

- It is more consistent than the previous option with unimpeded emergency vehicle access, as a traffic-actuated gate (similar to those in parking lots) can be used if needed for one-way control
- It provides Woodside Lane residents with a reasonably direct, traffic-signal-protected left turn onto Summer Street.
- The 350 site-generated trips on Woodside Lane is considerably less than the 500+ trips via Woodside Lane when the hospital was in full operation
- It is consistent with the SAC requirement to maintain Woodside Lane as a low volume

local roadway (630 background trips plus 350 site trips is fewer than 1000 vehicles/ day)
- It is consistent with the SAC requirement that less than 10% of the non-residential peak hour site traffic use the Woodside Lane access.
- It removes traffic from the westbound approach of Summer Street to the Hospital Road intersection during the evening peak hour.
- It shares some of the impact of the site with residents living on other streets such as Summer.

It has the following disadvantages:
- Enforcement may be a challenge unless a gate is used, although roadway design may help by providing a narrow access. HSH developed a concept to illustrate this [appendix D].
- It can be expected to lead to an increase in traffic on the lower part of Woodside Lane during the evening peak hour.

c. Permit Two-way Access to and from the Site from Woodside Lane

This option has the following advantages:
- It provides unimpeded emergency vehicle access
- It provides Woodside Lane residents with a reasonably direct, traffic signal protected left turn onto Summer Street.
- It provides excellent mobility for residents and visitors to the site who wish to travel to the east or north.
- It reduces peak hour traffic at the Summer Street/Brattle Street/Hospital Road intersections.

It has the following disadvantages:
- Under some estimates, it may not be consistent with the SAC requirement that less than 10% of the non-residential peak hour site traffic use the Woodside Lane access.
- The estimated 700+ site-generated trips on Woodside Lane is greater than the 500+ trips via Woodside Lane when the hospital was in full operation.
- It would likely push daily traffic on Woodside Lane to approximately 1,400 vehicles per day. Although a number of local streets in Arlington do carry daily volumes in excess of 1,400 vehicles (examples include Brooks Street, Cleveland Street, Marathon Street, upper Jason Street, Oak Hill Drive, Orvis Road, and Quincy Street), it is more normal for a local street to carry fewer than 1,000 vehicles per day. It should also be noted that Woodside Lane has steep hills, sharp curves and no sidewalks.

5.2.4 Impacts on Oak Hill Drive

Oak Hill Drive is a local road that carries approximately 1,900 vehicles per day [ref. 1]. Speeding and traffic volumes on this road have been a long-standing concern of residents. Under ***all*** the Woodside Lane access options, it can be expected that some site traffic will use Oak Hill Drive. With respect to additional site-generated traffic, there are four cases to consider:

1. Traffic going from the site to the north

If the Woodside lane access is either closed or one-way inbound, this traffic will likely travel via Hospital Road, Summer Street and Oak Hill Drive, connecting to Route 3 via Ridge Street.

If the Woodside lane access is open in both directions, the traffic will likely travel via Woodside Lane and Oak Hill Drive.

2. Traffic going from the site to the east

If the Woodside lane access is either closed or one-way inbound, most of this traffic will likely use Hospital Road to Summer Street to Mill Street, thus avoiding Oak Hill Drive altogether. However, some motorists may travel via Hospital Road, Summer Street and Oak Hill Drive, connecting to Route 3 via Ridge Street.

If the Woodside lane access is open in both directions, more motorists may find the Woodside Lane/Oak Hill Drive route attractive.

3. Traffic going to the site from the north

If the Woodside lane access is closed, this traffic will likely travel via Oak Hill Drive, Summer Street and Hospital Road.

If the Woodside lane access is open (either two-way or one-way), the traffic will likely travel via Oak Hill Drive and Woodside Lane.

4. Traffic going to the site from the east

If the Woodside lane access is closed this traffic will either use Mill Street/Summer Street/ Hospital Road (avoiding Oak Hill Drive) or will enter the area via Mystic Street/Ridge Street/Oak Hill Drive.

If the Woodside Lane access is open (either two-way or one-way), the Mystic Street/Ridge Street/ Oak Hill Drive/Woodside Lane route may become somewhat more attractive.

Oak Hill Drive Summary

If the Woodside Lane access is closed, more motorists (particularly those traveling to/from the east) will use Summer Street, thus avoiding Oak Hill Drive altogether. However, some motorists (particularly those traveling to/from the north) will use Oak Hill Drive between Ridge Street and Summer Street.

If the Woodside Lane access is open, there will be more turning movements at Woodside Lane and Oak Hill Drive. This may help to reduce speeding on Oak Hill Drive. However, keeping this access open may make the lower part of Oak Hill Drive/Woodside Lane a more attractive alternative to those motorists traveling from the east who would otherwise use Summer Street.

5.2.5 Impacts on Summer Street

Summer Street is an arterial with a mix of residential and commercial land use. Residents there are concerned about

- increased traffic (safety, noise, quality of life)
- character change of the neighborhood (resulting from additional traffic signals and possible roadway width expansion)
- balancing of traffic between the Summer Street and Woodside Lane accesses
- pedestrian safety (walking along the north side of Summer Street, and crossing Summer Street).

Closure of the Woodside Lane access will result in longer queues and more delay at the Summer/ Brattle/Hospital Road intersection (recall Table 2 on page 18). Keeping the access open will reduce delay at this intersection, because some motorists will be able to avoid it.

The impact of one-way access from Woodside is intermediate between that of keeping the access fully open and having it closed. During periods when most traffic is exiting the site (AM peak) its impact will be similar to that of having the access closed. During periods when most traffic is entering the site, its impact will be similar to that of keeping the access fully open.

5.2.6 Recommendation

The committee recommends the following measure:

Recommendation B.1 Permit one-way access into the Symmes site from Woodside Lane.

5.3 TASK C: OFF-SITE ROADWAY MITIGATION

5.3.1 Background

This section summarizes the issues and recommendations associated with off-site roadway mitigation measures for the following locations:

- Oak Hill Drive/Summer Street
- Oak Hill Drive/Woodside Lane
- Oak Hill Drive north of Woodside Lane
- Woodside Lane/Vista Circle/Hazel Terrace

Traffic mitigation issues associated with Summer Street are covered in Section 5.2.

Existing year 2004 peak hour traffic volumes [ref. 1] on the off-site roadways in the study area are as follows:

Oak Hill Drive south of Woodside – 264 vehicles AM/192 vehicles PM
Oak Hill Drive north of Woodside – 236 vehicles AM/163 vehicles PM
Woodside Lane west of Oak Hill – 55 vehicles AM/53 vehicles PM

The intersections of Oak Hill Drive/Summer Street, Oak Hill Drive/Woodside Lane and Woodside Land/Vista Circle/Hazel Terrace are all characterized as wide intersections that have wide corner radii. These characteristics result in long crosswalk distances for pedestrians, high vehicle speeds while turning, and restrict sight distance for some movements. Oak Hill Drive is a relatively straight roadway with a southbound slope linking Summer Street on the south with Ridge Street/Cutter Hill Road on the north. The straight alignment of the roadway is conducive to high vehicle speeds.

Under the one-way and two-way Woodside Lane site access options, the proposed Symmes project would increase traffic volumes on both Woodside Lane and Oak Hill Drive.

5.3.2 Concerns

Residents of both Woodside Lane and Oak Hill Drive areas have expressed concerns regarding safety and speeding vehicles on these roadways. There is a concern that additional traffic generated by the Symmes project will exacerbate conditions on these roadways and intersections.

The Symmes Advisory Committee Recommendations [ref. 2] stated, "REQUIREMENT: Traffic mitigation measures should take into consideration the intersections of Summer Street with Oak Hill Drive, Grove Street…"

5.3.3 Options Considered

The following options were evaluated:

- Narrow the entrance to Oak Hill Drive from Summer Street with curb extensions
- Median separator on Oak Hill Drive approach to Summer Street
- Curb extensions at Oak Hill Drive and Woodside Lane
- Traffic calming device(s) on Oak Hill Drive north of Woodside Lane
- Four-way Stop control at Oak Hill Drive, Woodside Lane and Joyce Road (if Woodside Lane provides two-way access to site)
- Stop sign on Woodside Lane at Oak Hill Drive
- Curb extensions at Woodside lane, Vista Circle and Hazel Terrace

The advantages and disadvantages for each of these options are discussed separately below.

Narrow entrance to Oak Hill Drive at Summer Street

This measure consists of extending the curbs on the Oak Hill Drive corners at Summer Street. The advantages include: reduces pedestrian crossing distance, slows vehicle speeds while turning, improves sight distance, and reduces impermeable pavement area. There are no significant disadvantages, aside from ensuring that drainage and emergency vehicle/truck turning radius issues are addressed during the design process.

Median separator on Oak Hill Drive approach to Summer Street

This measure is an alternative to the curb extension option presented above. This measure has the same advantages as the curb extensions. While the crossing distance for both options would be about the same, this option would provide a median refuge for pedestrians. The main disadvantage of this option is that center median separators at intersections are fixed objects in the roadway and are often struck by vehicles.

Curb extensions at Oak Hill Drive and Woodside Lane

This measure consists of extending the curbs on the Woodside Lane corners at Oak Hill Drive. This measure would have the same advantages and disadvantages as Oak Hill Drove/Summer Street curb extensions listed above.

Traffic calming device(s) on Oak Hill Drive north of Woodside Lane

This measure would consist of installing a traffic calming device(s) on Oak Hill Drive north of Woodside Lane to reduce vehicle speeds. The exact device (vertical or horizontal) would have to

be determined during the design process. The advantages are that a physical traffic calming device would slow vehicles 24 hours every day and improve safety for pedestrians. The disadvantages are that some devices (particularly vertical) may have noise impacts on adjacent residents. Residents would need to be involved during the design process, and there should be a consensus among the affected abutters (over 1/2 approving) for the device(s).

Four-way Stop control at Oak Hill Drive, Woodside Lane and Joyce Road (if Woodside Lane provides two-way access to site)

This measure would provide all-way stop control at each of the four approaches at the Oak Hill Drive/Woodside Lane/Joyce Road intersection. This measure was suggested as a method to reduce vehicle speeds and improve safety. It is an alternative to the traffic calming device discussed above. The disadvantage with this measure is that under existing traffic volumes and one-way Woodside Lane access to the site, traffic volumes would be unbalanced at the intersection. Over time motorists on the Oak Hill Drive approaches would tend to ignore the Stop signs, since there would most often be no competing traffic, and no reason to stop. Because the Woodside Lane access has been recommended for one-way inbound access to the site, this measure provides little advantage for improving safety and reducing vehicle speeds.

Stop sign on Woodside Lane approach to Oak Hill Drive

This measure consists of formalizing the right-of-way for side street motorists by installing a stop sign at the Woodside Lane approach to Oak Hill Drive. This measure would enforce that eastbound motorists on Woodside Lane must stop before proceeding onto Oak Hill Drive or Joyce Road. The existing wide corner radius on the southwest corner of Woodside Lane does not encourage motorists to stop. This measure could be done in coordination with the curb extension measure discussed above.

Curb extensions at Woodside Lane, Vista Circle and Hazel Terrace

This measure consists of extending the curbs on the Vista Circle and Hazel Terrace corners at Woodside Lane. This measure would have the same advantages and disadvantages as the Oak Hill Drive/Summer Street curb extensions listed above. Because both of the side streets are private ways, abutter approval would be needed. This measure could be implemented in coordination with the proposed sidewalk on the west side of Woodside Lane that is discussed in section 5.4.

5.3.4 Recommendations

The committee recommends the following measures:

Recommendation C.1 Narrow the entrance to Oak Hill Drive from Summer Street.

Recommendation C.2 Install curb extensions at Oak Hill Drive and Woodside Lane.

Recommendation C.3 Install traffic calming device(s) on Oak Hill Drive north of Woodside Lane contingent upon abutter consensus.

Recommendation C.4 Install stop sign on Woodside Lane at Oak Hill Drive.

Recommendation C.5 Install curb extensions at Woodside Lane, Vista Circle, Hazel Terrace contingent upon abutter approval.

5.4 TASK D: PEDESTRIANS AND BICYCLES

5.4.1 Background and Process

The Symmes neighborhood presents a complex set of challenges and opportunities for pedestrians and cyclists. Early in the STS's process an inventory was conducted in order to better understand the specifics of the area's conditions. Within a half-mile radius from the main hospital building there are three public schools, four accesses to the Bikeway, four public parks or fields and three distinct bus routes. Destinations and routes were mapped and areas of concern were highlighted. Fig 9 documents this inventory.

Later in the STS's process, the Bicycle and Pedestrian Working Group was formed to discuss problems and potential solutions for the area. The Working Group members were Sandi Bourgeois (pedestrian, Woodside Lane resident), Elisabeth Carr-Jones (Walking in Arlington, TAC member), Deborah Dill (cyclist, Millett Street resident), Jack Johnson (Arlington Bicycle Advisory Committee Chair), Jeff Maxtutis (TAC member) and Stephan Miller (ABAC member, Woodside Lane resident).

The Working Group met to explore bicycle and pedestrian ideas for the Symmes project and surrounding area. After the meeting, the ideas were organized by street and submitted to the Working Group members for prioritization. Four of the Working Group members participated by rating each of the ideas as high, medium or low priority. The result was a prioritized list where the ideas are grouped into three categories under each street:

> Supported by Group = rated high priority by those in the neighborhood,
> Mixed Support by Group = lack of consensus by those in the neighborhood,
> Not Supported by Group = rated low priority by those in the neighborhood.

Within these three categories the ideas were ordered using the priority rankings from those outside the neighborhood. The results of this exercise are recorded in the Pedestrian Working Group Priorities [appendix H].

5.4.2 Site Considerations

Hospital Road and Summer Street

Currently, the Symmes site makes no accommodation for pedestrians. There are no sidewalks on Hospital Road or on the site's Summer Street frontage. Hospital Road also presents difficulties for cyclists due to its steep grades, curves, abutting ledge and embankments.

In 2003, VHB [ref. 4] recommended that all alternatives should consider providing sidewalks on Hospital Road and that bicycle accommodations should be provided within the site. The Symmes Advisory Committee [ref. 2] made the following recommendation:

> *REQUIREMENT: An on-site pedestrian network is required, with connections to public points of access. Sidewalks along the Summer Street frontage are required.*

FST [appendix B] recommended that a sidewalk be provided at minimum on one side of Hospital Road along its entire length, and that a sidewalk be provided on the north side of Summer Street

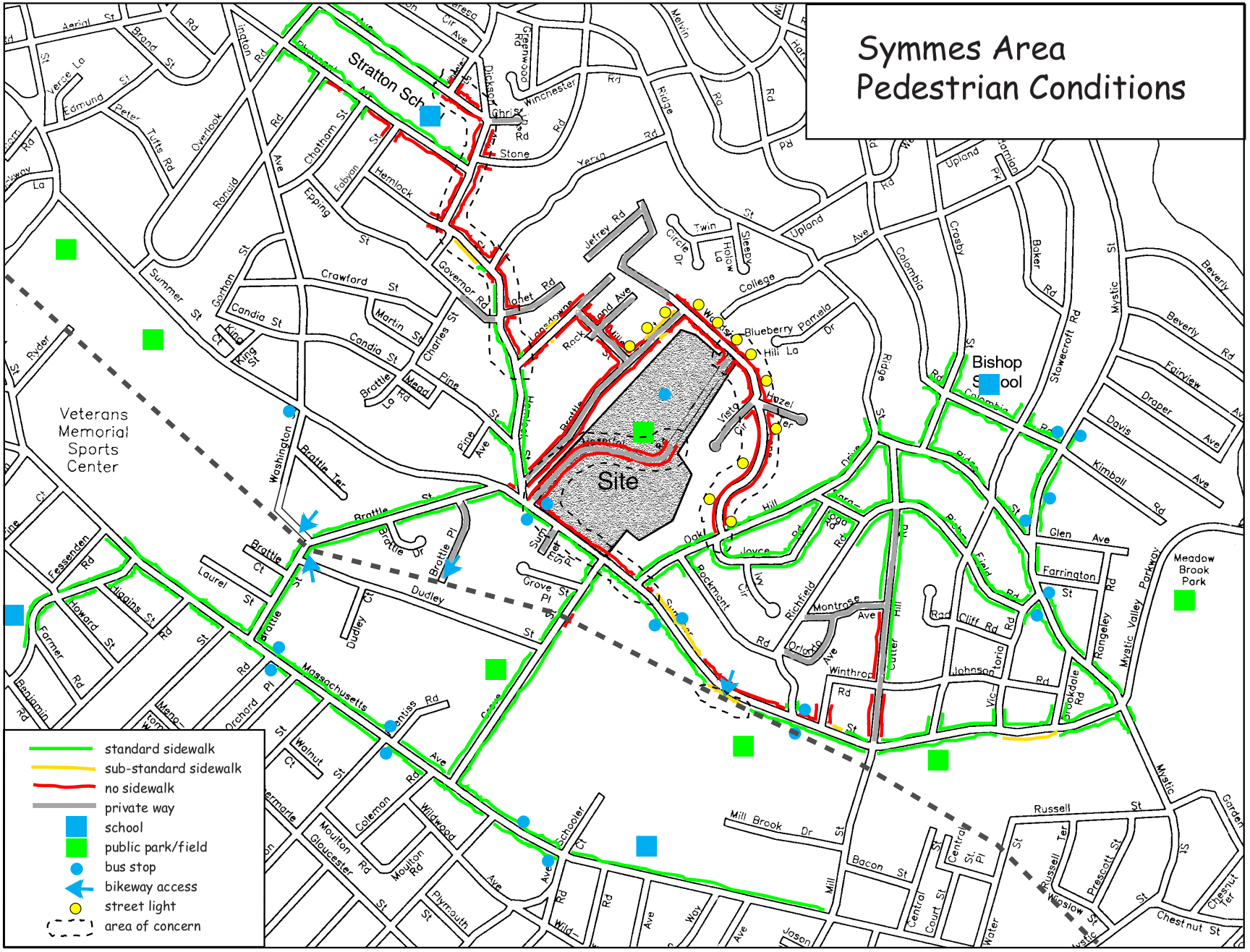

Fig 9 Symmes Area Inventory of Pedestrian and Bicycle Conditions

between the site and the Bikeway crossing of Summer Street. The Bicycle and Pedestrian Working Group ranked the installation of a sidewalk on Hospital Road as a high priority and supported the sidewalk on Summer Street between Hospital Road and Oak Hill Drive. The TAC previously recommended the installation of a sidewalk on Summer Street between Hospital Road and Oak Hill Drive in 2001 [ref. 7] as part of a report on Oak Hill Drive.

Since space for a sidewalk along Hospital Road is restricted by ledge and steep drop offs, a sidewalk on only one side is an acceptable solution. It is understood that the steep grade of portions of the roadway will make the sidewalk ADA non-compliant and that some sections of the sidewalk may be sufficiently steep to require the installation of railings. The Bicycle and Pedestrian Working Group also supported providing a slightly wider sidewalk (6'-7') along the southern portion of Hospital Road in order to accommodate cyclists walking their bikes up the hill.

The section of Summer Street on the north side of Summer Street between Hospital Road and Oak Hill Drive is one of relatively few sections of Arlington's arterial roadways that does not have sidewalks on both sides. It hosts a stop for the MBTA Route 67 bus and a portion of it abuts the Summer Street Woods. Although the installation of the sidewalk and buffer strip would necessitate the loss of some trees in the abutting Summer Street Woods, it could be accomplished sensitively in order to minimize the loss of mature trees. New trees could also be planted within the buffer strip to mitigate this loss.

Sidewalks on Hospital Road and Summer Street necessitate a crosswalk on Hospital Road at the approach to Summer Street to connect the pedestrian network. The combined intersection plan developed by HSH and approved by Mass Highway [appendix E] does not include this crosswalk. Installing the crosswalk was suggested by FST [appendix A] and supported by Bicycle and Pedestrian Working Group.

It is important to note that with the signal phasing presented by HSH to Mass Highway, a Hospital Road crosswalk will be the only crosswalk in the combined intersection that will not have an exclusive pedestrian phase. HSH's proposal for signalling this crosswalk is to have a concurrent pedestrian phase for it during the Summer Street through traffic phase.

The intersection plan submitted by HSH to Mass Highway includes a crosswalk on Summer Street to the west of Hospital Road. Moving the crosswalk to the east of Hospital Road would better service the bus stops on Summer Street and make more sense with the retained crosswalk between Hemlock and Brattle Streets. HSH reports that moving the crosswalk cannot be accomplished using the current signal phasing without a significant decrease in the level of service for eastbound traffic turning left onto Summer from Hospital Road.

Walking Trail

The Symmes Advisory Committee [ref. 2] made the following recommendation.

> *REQUIREMENT: The open spaces of the site are to be established as an interconnected system, maximizing reuse of natural and existing woods and vegetation in a manner that is restored or improved as appropriate to maintain sanctuary for birds and other wildlife. Walking trails shall connect all significant open spaces.*

Although not formally voted, the TAC would like to record its support for the establishment of a walking/hiking trail between the medical office building portion of the site and Summer Street

near the intersection with Grove Street along the old hospital right-of-way. Such a trail would provide a seasonal alternative pedestrian access to the top of the hill as well as a more direct route to and from Massachusetts Avenue via Grove Street.

Site Recommendations

The TAC recommends the following measures:

Recommendation D.1 Install sidewalk on entire length of Hospital Road.
The TAC recommends that the Hospital Road sidewalk provide continuous pedestrian access to the major site destinations, but that decisions on where and if the sidewalk crosses the roadway be made with respect to the site plan in accordance with AASHTO guidelines.

Recommendation D.2 Install sidewalk on the north side of Summer Street from Hospital Road to Oak Hill Drive.
The TAC recommends that the sidewalk and buffer strip be installed in order to minimize the loss of mature trees in the abutting Summer Street Woods, and that new trees be planted where appropriate within the buffer strip.

Recommendation D.3 Add a crosswalk on Hospital Road at the approach to Summer Street.

5.4.3 Off-Site Considerations

The Symmes Advisory Committee [ref. 2] made the following recommendations:

> *REQUIREMENT: Traffic mitigation measures should take into consideration the intersections of Summer Street with Oak Hill Drive, Grove Street, Hospital Road and Brattle Street/Hemlock Street.*
>
> *PREFERENCE: Off-site improvements that provide pedestrian connections to schools and the Minuteman Bikeway are encouraged.*

Summer, Brattle and Hemlock Intersection

There is currently a crosswalk on Summer Street that connects the northwest corner of Hemlock Street and the southeast corner of Brattle Street. Although a new crosswalk is provided across Summer Street west of Hemlock connecting to the turning island for Brattle Street, the intersection plan developed by HSH and approved by Mass Highway [appendix E] does not include this crosswalk. The current crosswalk location is convenient and familiar for area pedestrians and it connects to sidewalks that are cleared of snow in winter. HSH has indicated that retaining this crosswalk will not affect the proposed signal phasing. Retaining the crosswalk in its current location was suggested by FST and supported by Bicycle and Pedestrian Working Group.

The current intersection of Brattle and Hemlock Streets is a hostile environment for pedestrians. Despite the redesign of the intersection, the Bicycle and Pedestrian Working Group was concerned enough about the safety of pedestrians crossing Hemlock Street to recommend that a crosswalk be added at the northwest (uphill) corner of Brattle Street. The Subcommittee considered the crosswalk, but determined that it would be too close to the other crosswalks at the intersection of Hemlock and Summer Streets and that it would add further complication to the intersection.

Woodside Lane

Woodside Lane does not currently have sidewalks. Additional traffic on Woodside Lane would decrease pedestrian safety along this roadway. In association with other recommendations, a sidewalk on the Hospital side of Woodside Lane between Hospital Road and Oak Hill Drive would complete a pedestrian block encompassing Summer Street, Hospital Road, Woodside Lane and Oak Hill Drive. It would also serve pedestrians from the top of the hill using the MBTA Route 350 bus route along Mystic Street. The Bicycle and Pedestrian Working Group ranked this sidewalk a high priority.

However, several obstacles at the periphery of the roadway as well as steep grades in some portions make sidewalk installation challenging for this section of Woodside Lane. If the Woodside access to the site is not closed to traffic, a plan for the sidewalk should be developed for the consideration of the abutters. If there is consensus among the abutters (over 1/2 approving) on the sidewalk plan, then a sidewalk is recommended for this section of Woodside Lane. Additional street lighting on this section of Woodside Lane should also be investigated.

Paper Street at Millett

Preliminary investigation by the Planning Department indicates that the Town is in possession of the paper street lot between the Symmes site and Brattle Street near Millett Street. An informal pedestrian path through the paper street would improve pedestrian circulation between the Symmes site and the neighborhood to the north and west of the site, including the Stratton School.

However, nearby neighbors have expressed concerns regarding any use of the paper street. A title search is required to determine exactly what the Town's legal rights are with respect to this lot. For these reasons, we recommend that decisions regarding the paper street be deferred until the Town's rights to the lot, and an acceptable concept for the informal path, can be determined.

Bikeway Access

Because the Bikeway crosses many of the roadways above grade, there are currently few easy, neighborhood access points to the Bikeway between Arlington Center and Arlington Heights. And there is no north-south access to the Bikeway between Brattle Street and Mill Street. The TAC supports improved access to the Bikeway in this area.

The desirability of an access at Grove Street is evidenced by embankment erosion caused by people scrambling between the Bikeway and the sidewalk at this location. An access stair to the Bikeway at Grove Street would enhance the Town's pedestrian/bicycle network and provide more direct access to the proposed Symmes site pedestrian trail network. The Bicycle and Pedestrian Working Group supported this access stair. Unfortunately, installing an access stair at this location would require significant engineering expense.

The at-grade connector to the Bikeway at Brattle Place has the potential to provide a closer access point to the Symmes site, although the state of the Brattle Place road surface currently discourages cyclists from using it. Roadway repaving to improve cyclist access is a possibility, but it would require the approval of the abutters since Brattle Place is a Private Way. This idea received mixed support by the Bicycle and Pedestrian Working Group.

Currently, the connector to the Bikeway on Summer Street behind the High School is an important access for cyclists in the Symmes neighborhood. However, this connector does not have a curb cut (or ramp) on Summer Street to allow cyclists to ride directly between Summer Street and the Bikeway. The installation of a curb cut at this Bikeway access was suggested and supported by the Bicycle and Pedestrian Working Group.

Stratton School Access

The Director of Planning and Community Development has informed the TAC that the Arlington Schools redistricting plan will place the entire Symmes site within the Stratton School district. Unfortunately, there are currently very few sidewalks between the Stratton School and the Symmes site. The Arlington Transportation Assessment Study [ref. 8] reports that the Stratton School has the highest percentage of roadways within a quarter-mile radius without sidewalks.

Although it is desirable to eventually complete the sidewalk network surrounding the Stratton School, improving the block of Hemlock Street between Yerxa Road and Epping Street on the south/west side of Hemlock Street with a standard sidewalk and buffer strip would be of immediate benefit to Stratton students walking from the site and surrounding neighborhood. It is understood that the steep grade of much of this block will make the sidewalk ADA non-compliant and that some sections of the sidewalk may be sufficiently steep to require the installation of railings.

Off-Site Recommendations

The TAC recommends the following measures:

Recommendation D.4 At the Summer/Brattle/Hemlock intersection, add a crosswalk to the Mass Highway plan from the northwest corner of Hemlock to the southeast corner of Brattle.

Recommendation D.5 Add a sidewalk on the hospital side of Woodside Lane between Hospital Road and Oak Hill Drive, contingent on abutter consensus.

Recommendation D.6 Explore improving access to Bikeway via Brattle Place.

Recommendation D.7 Install a curb cut on the south side of Summer Street behind High School to access Bikeway.

Recommendation D.8 Install and/or improve sidewalks on west side of upper Hemlock Street between Yerxa and Epping for Stratton Elementary School access.

5.5 TASK E: PUBLIC TRANSPORTATION

5.5.1 Background

The closest MBTA bus route to the site is the Route 67, which runs between Alewife Station and Turkey Hill. It currently has an outbound stop at the hospital, while the closest inbound stop is at Summer Street and Hospital Road. It operates between 6:20 AM and 8:30 PM on weekdays only, with a peak hour headway of 25 minutes.

Two other routes within walking distance are the Route 77/Route 79 along Massachusetts Avenue and the Route 350 along Mystic Street. All three routes connect to the Red Line and the Route 350 provides a public transit option for those working near Mall Road or Cambridge Street in Burlington. The closest stops for Routes 77 and 79 are approximately 0.6 miles from the site, while the closest stop for the Route 350 is approximately 0.7 miles from the site. The Route 77 offers service 7 days per week and late in the evening with peak hour headways of less than 10 minutes. The Route 79 offers additional weekday service along Massachusetts Avenue. The Route 350 offers weekday and weekend service with a peak hour headway of 20 minutes.

5.5.2 Options Considered

Options fall into three areas. All are aimed at encouraging transit use.

- Ensure that there is adequate transit service at the site
- Ensure that site residents, site visitors and area residents have attractive walking access to public transit service
- Employ transportation demand management measures to encourage public transit use by site residents and visitors.

Adequate transit service to the site includes, at a minimum, connections between the site and a nearby stop (such as Alewife Station) on the Red Line. This can be provided either through enhanced service on the existing MBTA Route 67 (with both inbound and outbound stops at the site) or via a shuttle between the site and Alewife Station.

Attractive access to transit includes the following elements:

- Transit stops that are near the major trip generators (medical office building and residential areas)
- A sheltered place for passengers to wait
- Safe and direct walking routes between trip generators (both in and near the site) and transit stops, both in the site and in the surrounding area.

Transportation Demand Management (TDM) measures are aimed at reducing single occupant vehicle use and encouraging public transit use. They include:

- Restrictions on parking
- Provision of transit passes as an employee benefit (or, at a minimum, allowing employees to purchase transit passes with pre-tax income)
- Provision of car sharing services
- Carpool and vanpool incentives.

5.5.3 Recommendations

The first two recommendations are aimed at encouraging adequate transit service:

Recommendation E.1 Encourage a shuttle bus operating from site to Alewife Station and town.

Recommendation E.2 Encourage working with MBTA to increase Route 67 service to site and area.
If service on the MBTA Route 67 can be increased, a shuttle bus may not be necessary. However, we recognize that the ability of the MBTA to increase service may be constrained by factors outside of the Town's or the developer's control. Therefore, should it prove impossible for the MBTA to provide adequate service, a shuttle bus should be provided.

The last three recommendations target transit access and transportation demand management.

Recommendation E.3 Provide bus stops with rain cover at site and medical office building.
Major trip generators at the site include the medical office building and the main residential complex. Stops (with shelter) should be provided at both locations.

Recommendation E.4 Encourage tenants of medical office building to employ transportation demand management.
TDM measures, as mentioned earlier, may include pre-tax purchase of transit passes (either as a payroll deduction or as a fringe benefit), publicity to encourage car pooling, preferential parking for car pools, provision of bicycle parking and charging for single occupant vehicle employee parking.

Recommendation E.5 Encourage unbundling the cost of parking in all leases and purchases.
This recommendation applies to both the residential area and the medical office building. To discourage residents from bringing an excessive number of vehicles onto the site, the cost of parking should be unbundled from leases and sales. This means, for example, that a sale of an apartment might include a single parking space, with a discount offered to the buyer who is willing to forgo that space, and a per-space surcharge imposed on the buyer who needs two or more spaces.

References

1. *Symmes Hospital Redevelopment Transportation Overview*, Howard/Stein-Hudson, September 13, 2004.

2. *Recommendations to Special Town Meeting*, Town of Arlington Symmes Advisory Committee, May 5, 2003.

3. *Traffic Study*, Choate-Symmes Health Services Inc, Arthur Leslie, VP for General Services to President Paul Downey, May 12, 1982.

4. *Symmes Hospital Reuse Alternatives Draft Transportation Alternatives*, Vanasse Hangen Brustlin, January 8, 2003.

5. *Rule Interpretation Decision: Clarification of Street Classification by Traffic Counts*, San Antonio, Texas (www.sanantonio.gov/dsd/pdf/RID_014.pdf).

6. *Shortcut Policy*, Halifax Regional Municipality web site (http://www.halifax.ca/traffic/calming/Shortcut_Policy).

7. *Consideration of Oak Hill Drive Referral*, Town of Arlington Transportation Advisory Committee, November 14, 2001.

8. *Transportation Assessment Study*, Town of Arlington, Massachusetts, The Louis Berger Group, May 2002.