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Chapter One: Introduction

Background

The Town of Arlington Planning Department selected The Louis Berger Group, Inc. (Berger) to conduct the initial phase of a comprehensive transportation assessment. This report documents the study including public meetings and work sessions, data collection, and analysis. Recommendations are provided in response to some of the major transportation issues in the town. This study should be considered as an initial phase which lays the groundwork for a more comprehensive transportation study and design projects within the town.

Study Objectives

The primary goal of the Transportation Assessment Study was to evaluate the transportation system within the Town of Arlington and propose necessary improvements in response to identified user needs. Figure 1 is a street map of Arlington.

The objectives of the study were to:

- identify transportation issues in the community and develop preliminary recommendations;
- solicit input from residents of Arlington;
- work closely with town officials and obtain their input and suggestions; and
- apply a balanced multi-modal approach in evaluating user needs in the transportation system and in developing recommendations.

The next section of this report provides a detailed description of the comments provided by the residents of Arlington during the neighborhood meetings. Subsequently, a detailed discussion of the existing conditions is provided for the various modes of transportation. The final section of this report provides general conclusions and recommendations.

Community Participation

One of the critical components of this study was an extensive community participation program which included two work sessions with town officials as well as three neighborhood meetings. The work sessions were held with the Community Safety Department and with the Planning and Public Works Departments. Berger also attended additional meetings with the Transportation Advisory Committee, which was formed after the study was initiated.

The three neighborhood meetings, held at Town Hall on July 17, September 13, and October 24, provided an opportunity for

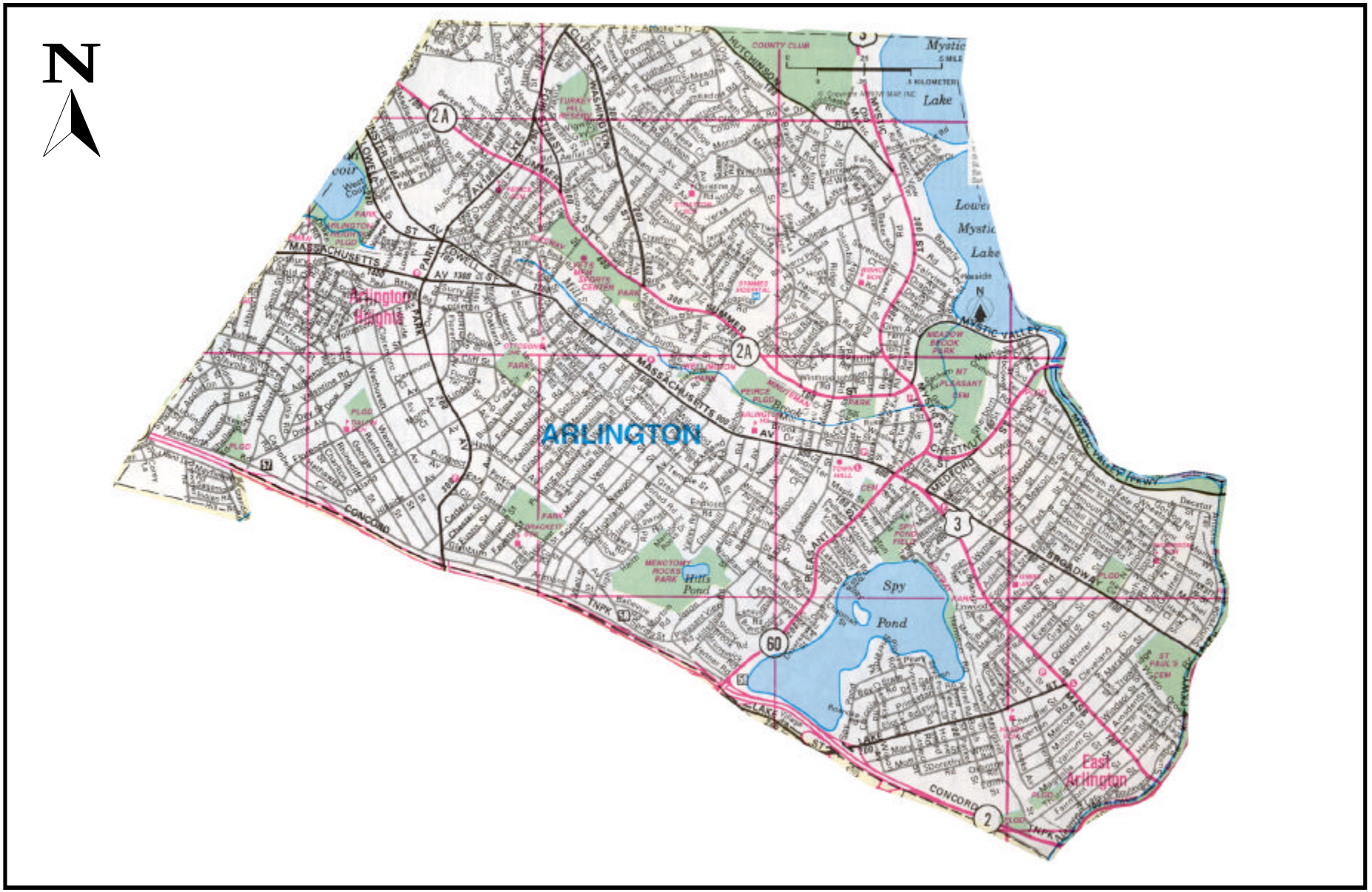


Figure # 1
Town of Arlington Street Map

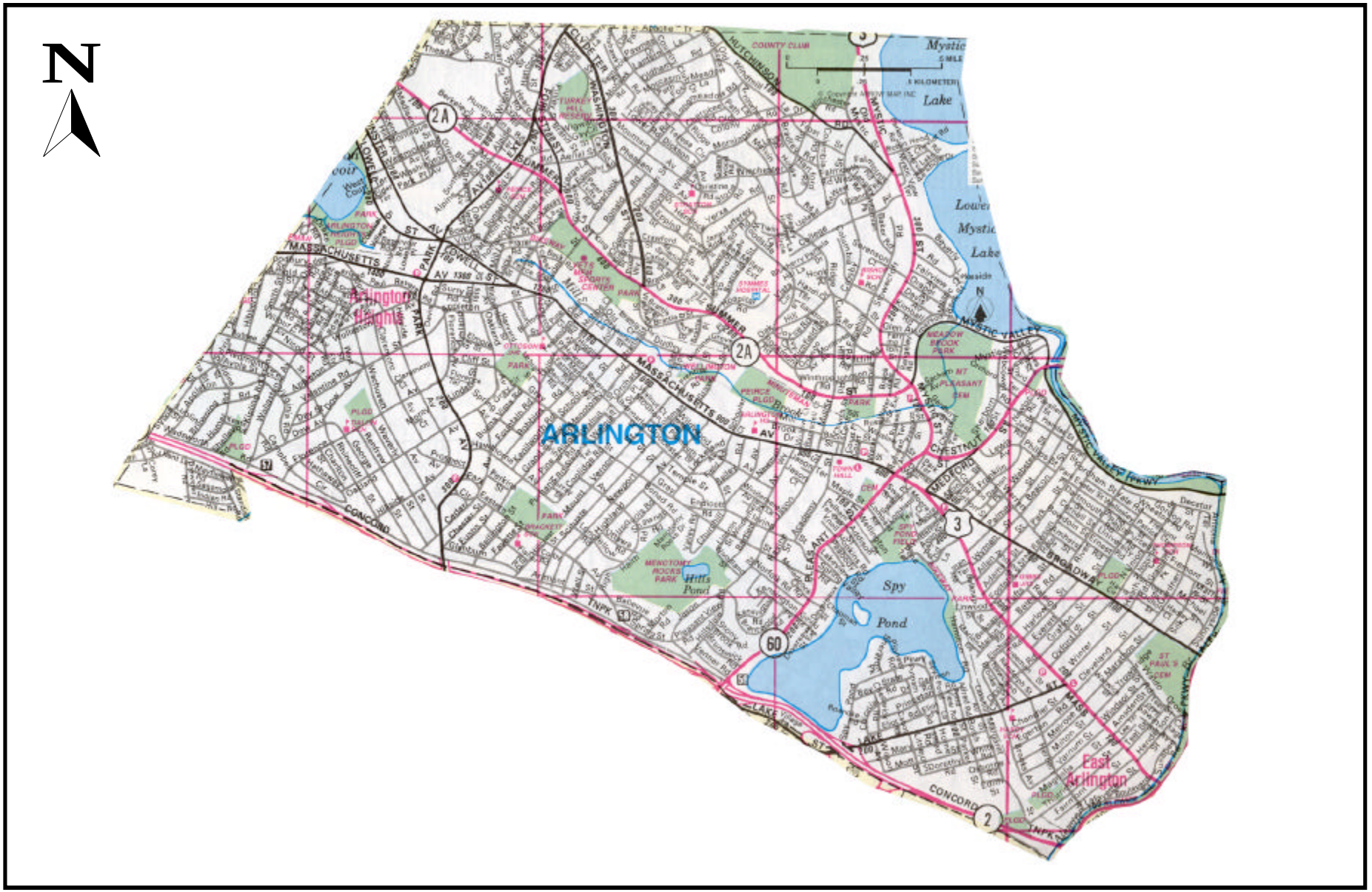


Figure # 1
Town of Arlington Street Map

Arlington residents to voice their concerns on issues related to transportation. Each of the three meetings was well publicized and was well attended. The attendees were provided with feedback forms to provide additional opportunity for them to provide comments. The meeting attendees, as well as the town residents, were informed of the study and provided the opportunity to submit their comments either in writing or via email over the Internet.

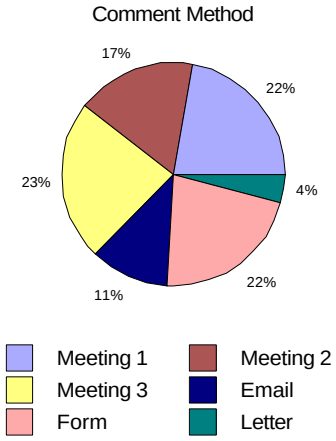
Residents cited comments covering a wide range of transportation issues. A summary of the comments is provided in the following section.

Chapter Two: Community Input

Following is an assessment of the neighborhood meetings and the types of comments provided by the residents. A complete listing of comments is documented in a Technical Memorandum titled *Summary of Comments from Residents* submitted to the Planning Department and the Transportation Advisory Committee on December 21, 2001.

The following is a summary of key statistics related to the residents' comments. Figure 2 illustrates a breakdown of the method used to provide the comments.

Figure 2: Comment Method



Most of the comments received were at the three meetings. Residents also used the feedback forms to offer their comments. A total of 25 residents provided comments at Meeting 1, 17 at Meeting 2, and 34 residents at Meeting 3. Sixteen residents used forms, while 17 used the email system. Each respondor provided more than one comment.

Figure 3 illustrates the distribution of the comments into various categories. A detailed discussion of comments within each category is provided subsequently. The appendix includes a summary table of the the comments.

An important point to note is that the highest percentage of comments related to pedestrians, followed by bicycles and enforcement. This appears to be consistent with the Vision 2020 survey results conducted by the Transportation Advisory Committee. A summary of the survey results is included in the Appendix.

Figure 3: Comment Category

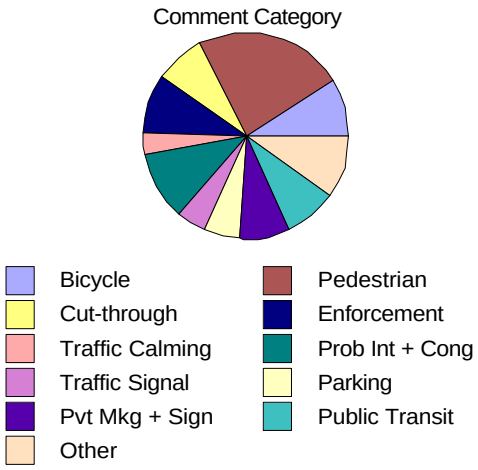


Table 1 presents the various categories of comments and the number of comments received in each category.

Table 1: Number of Comments Per Comment Category

Category of Comment	Number of Comments
General	10
Regional Problems	3
Congestion	9
Problem Intersections	22
Traffic Signals	16
Cut-through	26
Traffic Calming	12
Parking	19
Public Transit	27
Bicycle	32
Pedestrian	69
Schools	11
Signage	16
Pavement Markings	12
Enforcement	32
Roadway Geometry	5
Maintenance	5
New Development	3
Institutional	5

General

Residents recognized that many of the problems within the town

are a result of regional problems. They suggested regional solutions that will benefit problems localized within the town. There was also a request for infrastructure improvements that would encourage walk, bike, and bus usage and provide commuters with alternatives to the automobile.

Regional Problems

Residents in the town understand that much of the cut-through traffic results from the poor operating conditions at the Route 2 and Route 16 (Alewife Brook Parkway) intersection. Even the current traffic congestion on I-95/Route 128 causes increases in cut-through traffic.

Congestion

The following streets were highlighted as having traffic congestion problems:

- Pleasant Street
- Lake Street
- Highland Avenue
- Park Avenue
- Mill Street

Some residents of Highland Avenue requested that the town take a holistic approach in dealing with cut-through traffic. Traffic from one street should not be diverted to another street. Highland Avenue was thought to be directly impacted by any restrictions imposed on Jason Street.

Problem Intersections

The following intersections were cited as having problems in descending order of the number times each intersection was mentioned. The three intersections that were mentioned by many were: Massachusetts Avenue and Pleasant Street, Route 16 and Massachusetts Avenue, and Massachusetts Avenue at Lake Street.

- Route 16 at Massachusetts Avenue
- Massachusetts Avenue at Pleasant Street
- Massachusetts Avenue at Lake Street
- Park Avenue at Lowell Street/Westminster Street/Bow Street
- Joyce Road/Oak Hill Drive/Woodside Lane
- Summer Street and Oak Hill Drive
- Summer Street at Grove Street
- Summer Street at Mystic Street
- Rhinecliff Street at Dow Avenue

Traffic Signals

The comments received from the residents indicate a need to upgrade and/or re-time many of the traffic signals in the town. Some residents asked that traffic signals along Massachusetts Avenue be coordinated, preferably allowing for progression in the peak direction of traffic flow. Intersections that were specifically

mentioned to be in need of review include:

- Massachusetts Avenue at Pleasant Street
- Massachusetts Avenue at Lake Street
- Lake Street at Brook Street
- Jason Street at Gray Street
- Broadway at Friendly's Restaurant
- Park Avenue at Access Road
- Massachusetts Avenue at Park Avenue
- Route 16 at Broadway
- Massachusetts Avenue at Appleton Street
- Massachusetts Avenue at Park Circle

Neighborhood Cut-through

Many residents were concerned regarding the level of cut-through traffic on many of the town's neighborhood streets. The most mentioned was Jason Street. Following is the list of streets mentioned by the residents as being used by commuters to cut-through.

- Jason Street
- Hillsdale Road
- Pleasant View Road
- Oak Hill Drive
- Aberdeen Road
- Bow Street
- Russell Street
- Water Street
- Herbert Road
- Victoria Road
- Brooksdale Road
- Rawson Road
- Mary Street
- Gary Street
- Washington Street
- Orvis Road
- Brooks Avenue

Traffic Calming

In conjunction with the residents' concerns regarding cut-through traffic, many resident believe that traffic calming strategies might help. Many mentioned the potential use of either speed bumps, humps, or tables. One resident thought that additional STOP signs might help in controlling speeds.

Parking

Concerns shared by residents in this category include:

- Illegal parking by parents/guardians during school drop-off/pick-up.
- Some residents requested the town re-visit the overnight parking ban, possibly allowing for limited on-street parking in residential areas. Residents also spoke in support of the

parking ban.
- Some residents and business owners indicated a parking supply deficiency in the Arlington Town Center.
- Proximity of on-street parking too close to intersections. This creates sight distance restrictions.
- Existing on-street parking on Highland Avenue was raised as a concern as it restricts the width available for vehicles to travel. One suggestion was to allow parking on one-side only.
- Other specific parking concerns included parking supply deficiency at the Trader Joe's parking lot and at the Post Office.

Public Transit

Residents asked for the town to work with the MBTA to impose better bus service during the weekday off-peak hours and during the weekends. Some requested that the town look into a cross-town bus service similar to Lexington. A few residents inquired about a possible extension of the Red Line from Alewife into Arlington. Other comments included having a signal system that gives priority to buses. Some residents thought that the town should provide better information relating to the existing public transportation alternatives, including bus routes, stops and schedules.

Pedestrians

This category drew the most comments from residents. Many residents feel that the level of pedestrian infrastructure in the Town needs to be improved. There were repeated calls for additional sidewalks and crosswalks. Given the increase in traffic on Arlington's streets as well as the speeding of cut-through traffic on neighborhood streets, many residents feel unsafe crossing streets. They believe the town should provide well-delineated crosswalks with adequate advance warning signs to inform motorists. The other major comment voiced by residents is the need to keep the sidewalks plowed in winter.

Other comments relating to pedestrian safety include:
- Crosswalks at all bus stops
- Crosswalks should be provided with wheelchair ramps
- Crosswalks should be clearly delineated using thermoplastic tape
- Crosswalks should be provided with advance warning signs

There were many comments in this category relating to pedestrian signals. Residents complained about the existing pedestrian phasing at the Massachusetts Avenue and Lake Street intersection. Length of the "WALK" pedestrian interval was cited as inadequate at many intersections. Some indicated concerns with the pedestrian signals at Massachusetts Avenue and Pleasant Street as well as Massachusetts Avenue and Medford Street intersections.

Other areas that were mentioned with inadequate pedestrian infrastructure include: Russell Street, Summer Street and Oak Hill Drive intersection; Warren Street and Rawson Road intersec-

tion; Jason Street and Irving Street intersection; Massachusetts Avenue at Foster Street/Linwood Street intersection.

Bicycle

Residents asked that the bike path be plowed during winter. They also called for more bike lanes, especially on wide streets. In particular, they asked that the existing provision for bikes on Massachusetts Avenue in Arlington Heights be extended through its entire length. One resident requested more bike racks in Arlington. The chip sealing method of repairing roadways was thought to be hazardous to bikers because of the rough surface and presence of loose stones. Some asked that the Town provide more incentives for bike usage, especially through better infrastructure.

School

Most comments in this category related to school crossings. Several roads were highlighted as either difficult or dangerous to cross by school children. They include Massachusetts Avenue, Pleasant Street, and Park Avenue. Residents stressed the need for the town to have good quality crosswalks in school zones and assign them as a top priority.

Signage

Residents asked for an upgrade of the existing signage in the Town. More street signs were called for and a review of the NO TURN ON RED signs was requested. Additional STOP signs in the Town were suggested as means to improve safety as well as manage traffic speeds in residential areas.

Pavement Markings

Residents asked that wide streets be clearly delineated with lane markings. Massachusetts Avenue in East Arlington was cited by many as in need of lane delineation. Some residents noted that solid yellow center lines are needed on many streets to clearly indicate the opposing lanes of travel. One resident suggested that Pleasant Street could be delineated such that two lanes could be provided in the peak direction of traffic.

Enforcement

Residents asked for a greater level of enforcement, especially for controlling speeds in residential areas. The need to enforce parking restrictions was also cited.

Roadway Geometry

There were few comments in this category. The need for having longer exclusive left turn bays at intersections was mentioned as well as consistent use of the Manual of Uniform Traffic Control Devices within the Town.

Maintenance

The few comments in this category were varied and are included in the appendix of this technical memorandum.

New Development

There were three comments in this category, two of which requested that the town be hesitant before approving developments, while another commentor suggested that the town encourage new businesses to come into Arlington.

Institutional

A few residents welcomed the formation of the Transportation Advisory Committee (TAC) and asked that its structure be formalized and function as an umbrella organization among the various agencies in the town dealing with transportation elements. Two residents asked that the town hire either a Traffic Engineer or a Transportation Coordinator.

Chapter Three: Traffic Analysis

Regional Issues

Many of Arlington's traffic congestion problems stem from additional traffic resulting on Arlington streets by commuters looking to avoid regional congestion problem locations. The primary source of this congestion if the traffic delays at the Route 2 and Alewife Brook Parkway intersection. Traffic destined to Cambridge and Boston tends to avoid this congested intersection and seeks alternate routes through Arlington, Medford, Somerville, and Belmont. Given the incessant traffic congestion on I-95/Route 128, many commuters traveling between suburban communities also tend to avoid using the Interstate and look for local highways and streets.

The Massachusetts Highway Department (MassHighway) has been trying to address these regional congestion problem locations. However, many times their ability to implement improvements is hindered by either physical constraints, sensitive environmental resources, or opposition from local communities. Compounding this are the ever-present financial constraints constantly imposed on public agencies, which in recent years has been further exacerbated by the funding-hungry Central Artery/Tunnel project .

The Boston Metropolitan Planning Organization (Boston MPO) is the planning organization that evaluates the regional problems and initiates improvement strategies for the later implementation by MassHighway and other state agencies. The Boston MPO consists of seven agencies, seven municipalities, and a public advisory committee that collectively carry out the federally mandated "continuing, comprehensive, and cooperative" (3C) transportation planning process for the region. The Boston MPO has established a Joint Regional Transportation Committee (JRTC) to assure citizen participation in regional transportation planning. The Metropolitan Area Planning Council (MAPC), which is one of the Boston MPO member agencies, is responsible for regional comprehensive planning for the 101 cities/towns located within the Boston MPO. The MAPC holds elections every two years to determine municipal representation in the Boston MPO. The city of Boston has permanent status, while six other municipalities are included to serve as representatives for the 101 cities/towns. Currently the cities of Everett, Newton, and Peabody, and the towns of Bedford, Hopkinton, and Framingham are the municipal representatives for the Boston MPO. The Central Transportation Planning staff carry out the Boston MPO work program.

The town of Arlington should work with the municipal representatives or the MAPC, JRTC, or the CTPS to address solutions to regional congestion problems and related vehicular problems within the town.

Neighborhood Cut-Through Traffic

Residents have voiced concerns about an increase in cut-through traffic on many of the residential streets in Arlington. While some of this cut-through traffic is caused by regional congestion problems discussed above, a significant amount of cut-through traffic is a result of existing vehicular delays within the Town Center and particularly at the intersection of Massachusetts Avenue and Pleasant Street/Mystic Street.

Typically, cut-through occurs when commuters who wish to divert from regional highways and major thoroughfares use residential and neighborhood streets in an attempt to avoid congestion hot-spots. Sometimes the term cut-through traffic is applied incorrectly. Some of the residential and neighborhood streets may function as a "collector" street. A collector street, as the name implies, functions to collect traffic from several local streets and provide a connection to a major thoroughfare or regional highway. Traffic on these collector streets may very well be from adjacent neighborhoods within town or even in some cases from neighborhoods in adjacent towns. Traffic on these collector streets cannot be called cut-through if they are from adjacent neighborhoods. If long distance commuter traffic is using it, than that street can be classified as a cut-through street.

Good examples of the above distinction in Arlington are Jason Street and Appleton Street. Upper Jason Street, which goes through a residential neighborhood, experiences cut-through traffic by commuters looking to avoid the traffic congestion at the intersection of Massachusetts Avenue and Pleasant Street/Mystic Street. On the other hand, Appleton Street is simply a collector street as most of the traffic on Appleton Street is from residential neighborhoods accessing Route 2, the primary regional highway in the area.

While the problem on cut-through streets is higher traffic volumes, a greater problem is usually higher traffic speeds. Cut-through traffic looking to avoid congestion hot-spots and save time tends to travel at speeds higher than what is typical to residential and neighborhood streets. This has led to safety problems on residential streets, especially related to pedestrians and more so in and around school zones.

The Arlington Police have been continuously collecting traffic data including volumes and speeds on many residential streets where residents feel it may be used as a cut-through street. Table 2 lists the various streets included in their study along with the average daily traffic and the average speeds on those streets.

Table 2: Special Speed Study by Arlington Police

Street Name	Year	Avergare Daily Traffic (vehicles per day)	Northbound/Eastbound		Southbound/Westbound	
			85% Speed	Speed Limit	85% Speed	Speed Limit
Jason Street	1999	n/a	16.2	25	40.9	25
Hillsdale Road	1999	1062	28.1	30	31.6	30
Russell Street	2000	1686	40.8	30	22.8	30
Lake Street	2000	n/a	35.3	30	34.3	30
Bow Street	2000	3155	33.4	20	30.0	20
Cutter Hill Road	2001	530	33.2	30	33.2	30
Oak Hill Drive	2001	1825	41.0	25	23.7	25
Westmoreland Avenue	2001	550	22.5	30	17.4	30
Highland Avenue	2001	3877	23.8	25	24.2	25
Westminster Avenue	2001	1262	32.4	30	29.2	30

The study results provide for the following conclusion. On many of the so-called cut-through streets, it appears that traffic speeds are a much greater problem than traffic volumes. Traffic volumes in the range of 500 - 3,000 vehicles per day are considered normal on any local street. Many of the so-called cut-through streets have volumes that fall in this range. Most of these streets experience traffic speeds in excess of the speed limit. Continued police enforcement of the speed limit will help in controlling the traffic speeds and should help towards maintaining traffic safety.

An exception to the about discussion is Jason Street, which is a classic cut-through street. Given the poor traffic operations at the intersection of Massachusetts Avenue and Pleasant Street/Mystic Street and the long queues on Pleasant Street, traffic tends to divert to this residential street which runs parallel to Pleasant Street. Jason Street experiences higher than normal traffic volumes, and a directionality in traffic similar to a commuter route.

There are two parallel approaches to deal with the issue of cut-through traffic. One is to improve the congestion hot-spot that is causing the traffic diversion while at the same time implementing certain traffic calming measures on the cut-through route. In this regard, the town should focus their attention towards improving the traffic operations at the intersection of Massachusetts Avenue and Pleasant Street/Mystic Street. Improving this intersection would alleviate cut-through problems on Jason Street and on many other residential streets in and around the Town Center (example: Russell Street, Water Street).

Traffic calming has been cited as effective in controlling traffic volumes and speeds on cut-through streets. There are several types of traffic calming measures. A list of such measures are included in the appendix of this report. One commonly used measure is the speed hump to help control traffic speed. Application of any traffic calming measure should be done judiciously. Measures should not be implemented on one local street that would transfer the problem onto another local street. As a test case, the town is looking to install a raised crosswalk on

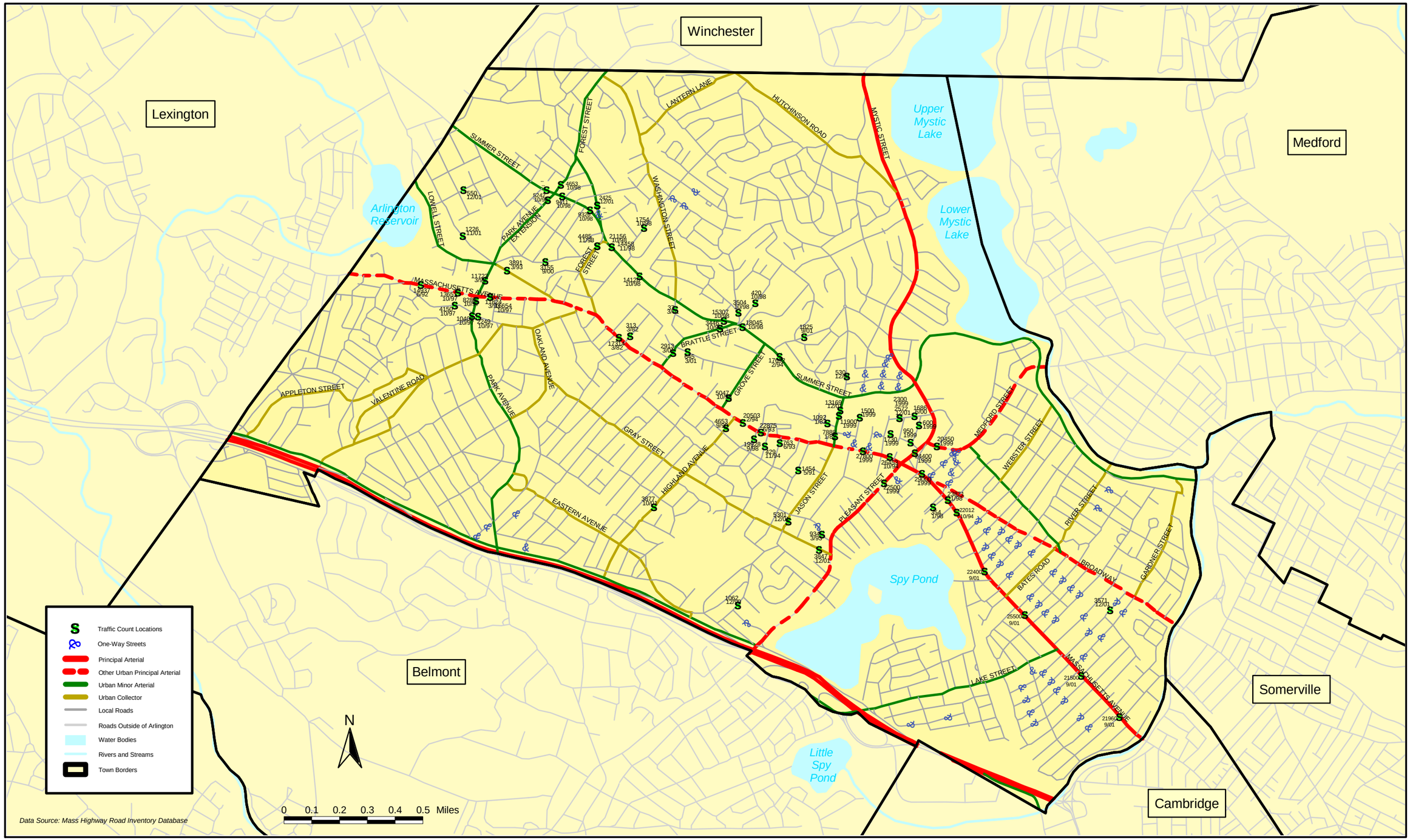


Figure 4
Functional Classification

The Louis Berger Group, Inc.

Transportation Assessment Study
Town of Arlington, MA

Jason Street across from Brantwood Road to help deal with cut-through traffic and improve pedestrian safety.

Before any widespread implementation of traffic calming measures, the town should adopt a functional classification system for their streets. This functional classification system classifies all streets in Arlington into a hierarchy of one of four categories: principal arterial, minor arterial, collector, and local street. It is common knowledge that traffic is akin to water; if you choke the flow at one point, it simply finds an alternative route. The ideal condition would be to keep the traffic moving well along the arterials and collectors.

It is usually the responsibility of the state to develop a functional classification map. Figure 4 presents such a map developed by the Central Transportation Planning Staff for MassHighway. A functional classification map is produced every ten years to coincide with the census. The one presented in Figure 4 was originally developed approximately ten years back. At that time, every town and city in the Commonwealth was provided an opportunity to comment and request a re-designation. Irrespective of that, the state has to have a certain mileage for every functional classification, as specified by the Federal Highway Administration of the US Department of Transportation in Washington DC. Since the year 2000 census data are available now, the state will develop a new functional classification map. The town of Arlington will have the opportunity to review it and request modifications. The town should review the functional classification shown in Figure 4 and develop a consensus for modifications. Such a classification will allow the town to treat each street based upon its classification: arterials to receive treatment that improve mobility and local streets to receive treatment to control traffic volumes and speeds, perhaps through certain well-engineered traffic calming measures.

Traffic Safety

Several intersections were mentioned during the neighborhood meetings as being problematic. In addition, the Arlington Police cited a few intersections in need of investigation. To confirm this, Berger conducted a traffic safety analysis by investigating the number of crashes at each of those intersections. The crash information was obtained from the MassHighway Traffic Operations and Safety Unit for the Years 1998 to 2000. Table 3 presents the list of problem intersections cited by the residents and the corresponding number of crashes in the three year period. While the majority of the intersections did show a high number of crashes, a few of them did not.

Berger also extracted other locations with a high number of crashes. Table 3 shows those other high crash locations.

Table 3: List of Problem Intersections

List of Problem Intersections Cited by Residents	Crashes (1998-2000)
Route 16 at Massachuetts Avenue	79
Massachusetts Avenue at Pleasant Street	61
Massachusetts Avenue at Lake Street	19
Downing Square	11
Jason Street at Norfolk Road	0
Joyce Road at Oak Hill Drive/Woodside Lane	0
Summer Street at Oak Hill Drive	2
Summer Street at Grove Street	13
Summer Street at Mystic Street	13
Rhinecliff Street at Dow Avenue	2
Other High Crash Locations	
Massachusetts Avenue at Appleton Street	16
Mystic Street at Chestnut Street	9
Massachusetts Avenue at Cleveland Street	16
Mystic Street at Winslow Street	17
Massachusetts Avenue at Park Avenue	21

Traffic Volumes

Figure 4 also includes available traffic volume information with the town's Planning Department as well as some new counts conducted by the Arlington Police and Berger. The graphic shows the total volume in a 24-hour period along with the month/year during which the traffic count was conducted.

Traffic volumes along Massachusetts Avenue vary between 14,000 vehicles per day (vpd) at the Lexington Town Line to as high as 27,000 vpd in the Town Center. There does not appear to be significant growth in traffic volumes on Massachusetts Avenue. Summer Street experiences traffic volumes in the range of 9,000 vpd close to the Lexington Town Line and as high as 18,000 vpd close to Mystic Street. Pleasant Street, close to the Town Center, carries roughly 22,000 vpd, while Park Street has about 10,000 vpd. Other streets with relatively high traffic volumes include Forest Street close to Summer Street, and Grove Street between Summer Street and Massachusetts Avenue.

An important observation from Figure 4 is that traffic volumes on Mill Street, between Summer Street and Massachusetts Avenue, have increased from about 8,000 vpd in 1982 to about 12,000 vpd in 2000. Also, upper Jason Street carries traffic volumes uncharacteristic of a typical residential street, at about 5,000 vpd. This lends credence to the concerns voiced by residents on Jason Street that the street is used as a major cut-through.

Based upon the above traffic safety analysis, a list of ten intersections were selected by Berger to collect detailed turning movement counts during the AM period of 7:00-9:00 and the PM period of 4:00-6:00. The list of intersections studied is shown in Table 4 below. Figure 5 shows the peak hour traffic volumes for

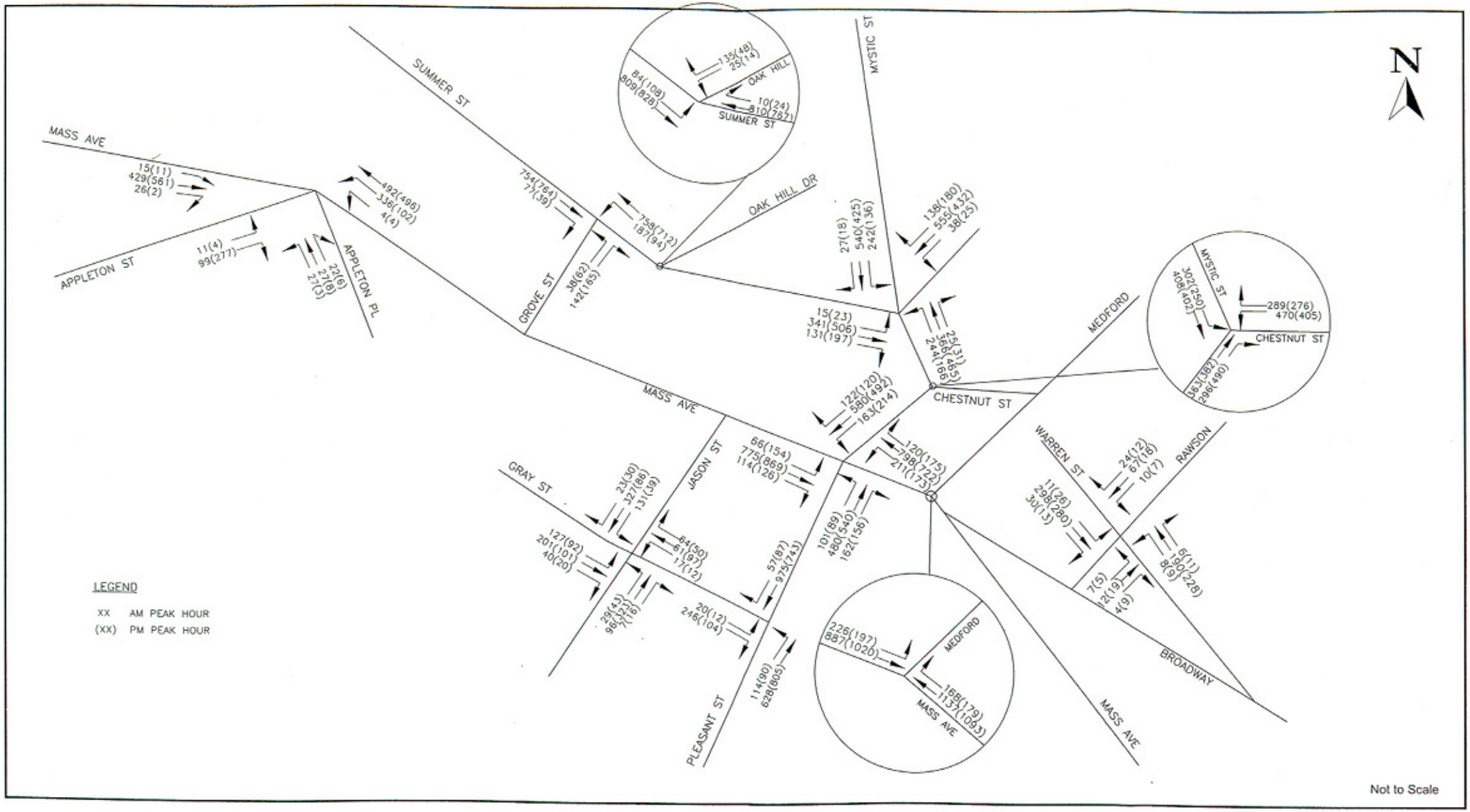


Figure 5
Peak Hour Turning Movement Volumes
Transportation Assessment Study
Town of Arlington, MA

The Louis Berger Group, Inc.

each of the ten intersections included in this study for the AM and PM peak hours.

Table 4: List of Study Intersections

Massachuetts Avenue at Pleasant Street
Summer Street at Oak Hill Drive
Summer Street at Grove Street
Summer Street at Mystic Street
Massachusetts Avenue at Appleton Street
Mystic Street at Chestnut Street
Massachusetts Avenue at Medford Street
Gray Street at Jason Street
Pleasant Street at Gray Street
Warren Street at Rawson Road

Observations from the peak hour traffic volumes in Figure 5 are:

- There does appear to be some level of traffic using the combination of Oak Hill Drive and Grove Street.
- Jason Street shows a significant level of directionality in traffic between the AM and PM peak hours.
- Gray Street between Jason Street and Pleasant Street is being used by commuters to bypass traffic congestion on Massachusetts Avenue at the Town Center.

Level-of-Service - Existing

Each of the ten intersections selected for this study was subjected to a thorough traffic analysis using procedures developed by the Federal Highway Administration and documented in the 2000 Highway Capacity Manual (HCM). A software package called SYNCHRO, which implements the 2000 HCM procedures, was used to analyze each intersection during the AM peak hour and during the PM peak hour. The results are presented in Tables 5 and 6.

Level-of-Service (LOS) is a common measure used to determine if an intersection is operating at so-called acceptable levels. The LOS are categorized into six levels with designations A through F. LOS A indicates the best traffic operating conditions with the LOS F to be the worst with stop-and-go traffic and long delays. The traffic engineering profession considers LOS A through D to be acceptable traffic operations within urban areas and LOS E and F to be at unacceptable levels.

Among the ten intersections selected for this study, four of them are signalized intersections and six are unsignalized intersections. Traffic analysis results for each of these two groups of intersections are shown separately in Tables 5 and 6. Of the four signalized intersections, Massachusetts Avenue at Pleasant Street and Mystic Street, and Summer Street at Mystic Street currently operate at unacceptable levels with delays exceeding an average of about 50-60 seconds per vehicle. Long queues were observed at these two intersections.

Table 5: Levels-of-Service for Existing Condition (2001) - SIGNALIZED INTERSECTIONS

INTERSECTION	APPROACH	LANE GROUP	QUEUE (ft)		DELAY (sec)		Level-of-Service	
			AM	PM	AM	PM	AM	PM
Massachusetts Avenue at	NB	L	114	102	37.2	36.7	D	D
Mystic Street/Pleasant Street		T	515	603	73.3	109.7	E	F
		R	242	141	119.5	109.9	F	F
	SB	L	208	208	55.5	56.7	E	E
		T	623	500	104.9	59.4	F	E
		R	162	105	49.4	49.9	D	D
	EB	L	80	197	36.0	49.8	D	D
		T	319	403	31.9	40.5	C	D
		R	155	176	46.8	54.0	D	D
	WB	L	287	221	98.7	55.1	F	E
		T	345	284	32.4	29.0	C	C
		R	164	254	48.7	117.9	D	F
	Intersection				**59.2**	**59.8**	**E**	**E**
Massachusetts Avenue/Medford Street	EB	L	68	46	6.0	4.0	A	A
		T	0	0	0.0	0.0	A	A
	WB	TR	152	146	5.0	4.9	A	A
	Intersection				**3.3**	**2.8**	**A**	**A**
Mystic Street/Chestnut Street	NB	T	262	260	18.1	16.0	B	B
		R	42	47	2.4	1.7	A	A
	SB	L	123	95	6.3	6.1	A	B
		T	168	159	6.7	6.4	A	A
	WB	L	175	150	19.8	19.5	B	A
		R	58	58	3.2	3.3	A	A
	Intersection				**10.4**	**9.0**	**B**	**A**
Summer Street/Mystic Street	NB	L	284	125	128.3	18.0	F	B
		TR	233	318	17.5	20.4	B	C
	SB	L	149	85	20.2	12.4	C	B
		TR	302	208	12.7	11.6	B	B
	EB	LT	371	497	111.8	81.4	F	F
		R	84	123	16.4	16.5	B	B
	WB	LT	343	478	97.3	146.5	F	F
		R	45	109	16.3	16.2	B	B
	Intersection				**57.3**	**51.8**	**E**	**D**

Legend:	Approach	Lane Group
	NB-Northbound	L-Left
	SB-Southbound	R-Right
	EB-Eastbound	T-Through
	WB-Westbound	TR-Through/Right
		LT-Left/Through

Table 6: Levels-of-Service for Existing Condition (2001) - UNSIGNALIZED INTERSECTIONS

INTERSECTION	APPROACH	LANE GROUP	DELAY(sec)		LEVEL-OF-SERVICE	
			AM	PM	AM	PM
Rawson Road/Warren Street	NB	L	9.3	8.9	A	A
	SB	L	9.5	8.7	A	A
	EB	L	12.0	11.3	B	B
	WB	L	10.2	9.9	B	A
	Intersection		**10.9**	**10.5**	**B**	**B**
Gray Street/Jason Street	NB	L	14.8	22.0	B	C
	SB	L	96.5	12.0	F	B
	EB	L	30.3	14.8	D	B
	WB	L	15.2	12.0	C	B
	Intersection		**52.5**	**16.7**	**F**	**C**
Gray Street/Pleasant Street	NB	L	14.6	11.0	B	B
	SB	-	-	-	-	-
	EB	L	306.1	106.9	F	F
	EB	R	923.4	27.8	F	D
Grove Street/Summer Street	NB	L	937.3	372.9	F	F
	NB	R	22.0	25.8	C	D
	EB	-	-	-	-	-
	WB	L	11.0	10.3	B	B
Oak Hill Street/Summer Street	SB	L	114.2	109.8	F	F
	SB	R	27.5	17.3	D	C
	EB	L	10.2	10.4	B	B
	WB	-	-	-	-	-
Massachusetts Avenue at	NE		-	-	-	-
Appleton Street/Appleton Place	NW		-	-	-	-
	EB		-	-	-	-
	WB		8.0	7.4	A	A

Legend:	Approach	Lane Group
	NB-Northbound	L-Left
	SB-Southbound	R-Right
	EB-Eastbound	
	WB-Westbound	

Of the six unsignalized intersections, the following operate at unacceptable levels: Gray Street at Jason Street, Gray Street at Pleasant Street, Summer Street at Grove Street, and Summer Street at Oakhill Drive. A few of the delays shown in Table 6 may appear to be excessive and unrealistic. This is due to the limitations of the existing analysis procedures. The analysis procedures rely heavily upon the Gap Theory in which motorists on the minor street look for an acceptably long gap in the traffic stream on the main street to either cross or turn onto the main street. This acceptable gap length used in the analysis procedures is based upon a nationwide study, and perhaps is overly conservative for the Boston area and the local driving habits. Notwithstanding, a LOS of E or F at an unsignalized intersection does confirm the need for the minor street traffic to wait for extended periods before they find it safe to either cross or turn onto the main road.

Level-of-Service - Future

While certain intersections may be operating within acceptable levels under existing conditions, it is necessary to confirm if they would continue to do so in the future with normal increases in traffic volumes.

Given the normal changes in economic activity within any metropolitan region, traffic volume can be expected to change. An increase in economic activity also results in an increase in the level of traffic - more people have jobs and drive to work. Traffic volume increases result from a change in demographics. In recent years, the number of households in the United States are increasing in conjunction with a decrease in the size of the household. The number of automobiles per household has not decreased and remains more or less the same or even increased slightly. This has contributed to an increase in traffic volumes. Another reason for a greater amount of traffic on our streets is due to a higher number of drivers within our population. Every one has heard that the population in the United States is aging. The median age of our population is increasing due to higher numbers of citizens living longer. Finally, traffic volumes at specific locations may increase due to new developments and land use changes.

To capture the above myriad and complex reasons for traffic volume changes, traffic engineers typically review historic traffic volume trends to extrapolate the anticipated changes in the future. This method of extrapolating historic trends is only for short duration forecasting, typically over five years or less. For time horizons greater than five years, traffic engineers use more complex travel demand forecasting models. As there is not a great deal of historic traffic volume data within the town of Arlington, it is very difficult to estimate a traffic growth rate. A few traffic counts conducted over the years on Massachusetts Avenue show either the traffic volumes remain the same or decline. In such conditions, traffic engineers assume a nominal one percent growth per year.

Using the nominal growth rate in traffic volumes, the existing peak hour traffic volumes were increased at one percent per year compounded annually over a five-year period.

Similar to the level-of-service analysis under existing traffic volumes, the future year traffic volumes were also used to conduct level-of-service analysis under future conditions. This future condition assumes that there is no change in the roadway system. It attempts to answer the question what would happen given the expected increase in traffic volumes if no improvements to the transportation system are implemented.

Tables 7 and 8 present the level of service analysis results for the future year for both the signalized and unsignalized intersections. The results are similar to that under existing conditions. Those

intersections currently operating at unacceptable levels will continue to deteriorate in their level of traffic operations. Those intersections at acceptable levels of traffic operations will continue to operate within acceptable levels even in future.

Table 7: Levels-of-Service for Future Condition (2006) - SIGNALIZED INTERSECTIONS

INTERSECTION	APPROACH	LANE GROUP	QUEUE (ft)		DELAY (sec)		LOS	
			AM	PM	AM	PM	AM	PM
Massachusetts Avenue at	NB	L	120	102	38.3	36.7	D	D
Mystic Street/Pleasant Street		T	551	603	88.9	109.7	F	F
		R	255	231	132.7	109.9	F	F
	SB	L	221	208	61.6	56.7	E	E
		T	664	500	125.2	59.4	F	E
		R	171	159	52.8	49.9	D	D
	EB	L	83	197	36.1	49.8	D	D
		T	362	403	34.3	40.5	C	D
		R	168	176	52.2	54.0	D	D
	WB	L	308	221	122.1	55.1	F	E
		T	374	284	35.0	29.0	C	C
		R	176	257	55.2	117.9	E	F
	Intersection				**68.2**	**59.8**	**E**	**E**
Massachusetts Avenue/Medford Street	EB	L	90	63	8.1	6.0	A	A
		T	0	0	0.0	0.0	A	A
	WB	TR	165	158	5.0	4.9	A	A
	Intersection				**3.5**	**3.0**	**A**	**A**
Mystic Street/Chestnut Street	NB	T	147	152	19.6	17.6	B	B
		R	118	225	19.4	21.7	B	C
	SB	L	63	52	7.5	6.7	A	A
		T	91	93	7.9	7.3	A	A
	WB	L	174	156	20.2	23.0	C	C
		R	244	242	21.7	24.9	C	C
	Intersection				**16.1**	**17.4**	**B**	**B**
Summer Street/Mystic Street	NB	L	310	138	179.7	19.5	F	B
		TR	247	354	17.8	22.3	B	C
	SB	L	174	109	32.1	15.8	C	B
		TR	329	223	13.1	11.5	B	B
	EB	LT	401	539	145.8	125.3	F	F
		R	88	130	16.5	17.2	B	B
	WB	LT	583	529	163.8	226.6	F	F
		R	88	113	16.2	16.5	B	B
	Intersection				**76.6**	**75.2**	**E**	**E**

Legend:	Approach	Lane Group
	NB-Northbound	L-Left
	SB-Southbound	R-Right
	EB-Eastbound	T-Through
	WB-Westbound	TR-Through/Right
		LT-Left/Through

`

Table 8: Levels-of-Service for Future Condition (2006) - UNSIGNALIZED INTERSECTIONS

INTERSECTION	APPROACH	LANE GROUP	DELAY(sec)		LOS	
			AM	PM	AM	PM
Rawson Road/Warren Street	NB	L	9.1	9.0	A	A
	SB	L	9.6	8.8	A	A
	EB	L	12.3	11.8	B	B
	WB	L	10.3	10.2	B	B
	Intersection		**11.1**	**10.8**	**B**	**B**
Gray Street/Jason Street	NB	L	15.7	22.7	C	C
	SB	L	181.6	11.9	F	B
	EB	L	38.1	13.4	E	B
	WB	L	16.3	12.1	C	B
	Intersection		**89.6**	**16.1**	**F**	**C**
Gray Street/Pleasant Street	NB	L	15.6	11.4	C	B
	SB	-	-	-	-	-
	EB	L	627.6	145.6	F	F
	EB	R	-	32.4	-	D
Grove Street/Summer Street	NB	L	-	720.8	-	F
	NB	R	24.6	30.1	C	D
	EB	-	-	-	-	-
	WB	L	11.4	10.6	B	B
Oak Hill Street/Summer Street	SB	L	163.3	156.7	F	F
	SB	R	32.3	18.4	D	C
	EB	L	10.5	10.7	B	B
	WB	-	-	-	-	-
Massachusetts Avenue at	NE	-	-	-	-	-
Appleton Street/Appleton Place	NW	-	-	-	-	-
	EB	-	-	-	-	-
	WB	-	8.0	7.6	A	A

Legend:	Approach	Lane Group
	NB-Northbound	L-Left
	SB-Southbound	R-Right
	EB-Eastbound	T-Through
	WB-Westbound	TR-Through/Right
		LT-Left/Through

Chapter Four: Pedestrian Safety

As discussed previously, the greatest number of comments from Arlington residents at the neighborhood meetings were related to pedestrians. Comments pertained to sidewalk availability, presence of crosswalks (near schools and bus stops), and sidewalk maintenance (snow removal, shrub removal).

Townwide Sidewalk Conditions

The town maintains a detailed inventory of the streets in Arlington with information including data such as whether the sidewalks are present on one side or both, length of sidewalk, and the condition of the sidewalk. The sidewalk condition is a subjective assessment into one of three categories: good, fair, or poor.

The town's street inventory database was extracted, processed, and transferred to a Geographic Information System (GIS) database to allow the developed of maps for further investigation. Figure 6 presents the condition of sidewalks throughout the Town. It also shows if sidewalks are present on a particular street or not.

In general, most areas of the town have either good or fair sidewalks. A few streets were assessed to have poor sidewalks. The areas of the town with limited sidewalks are primarily the north west corner around Appleton Street closer to Route 2 and the areas adjoining Ridge Street and the Stratton School.

Sidewalk availability is essential near commercial centers, schools, and bus stops. Most commercial centers in the town, predominantly along Massachusetts Avenue have good sidewalks. A subsequent section of this report discusses assessment of sidewalk conditions around each of the schools in Arlington. Given the nature and budget of this study, an assessment of sidewalks near bus stops could not be done and is to be pursued in a subsequent phase of this study.

Sidewalk Availability Near Schools

Typically, students who walk to schools do so up to a distance of 1/4th mile. Using this rule-of-thumb, a circle was drawn around each school. Next, the length of sidewalk under each category of good, fair, poor and "no sidewalk" was extracted from the GIS database. Table 9 presents the percentage of sidewalk within each category around each of the schools in Arlington.

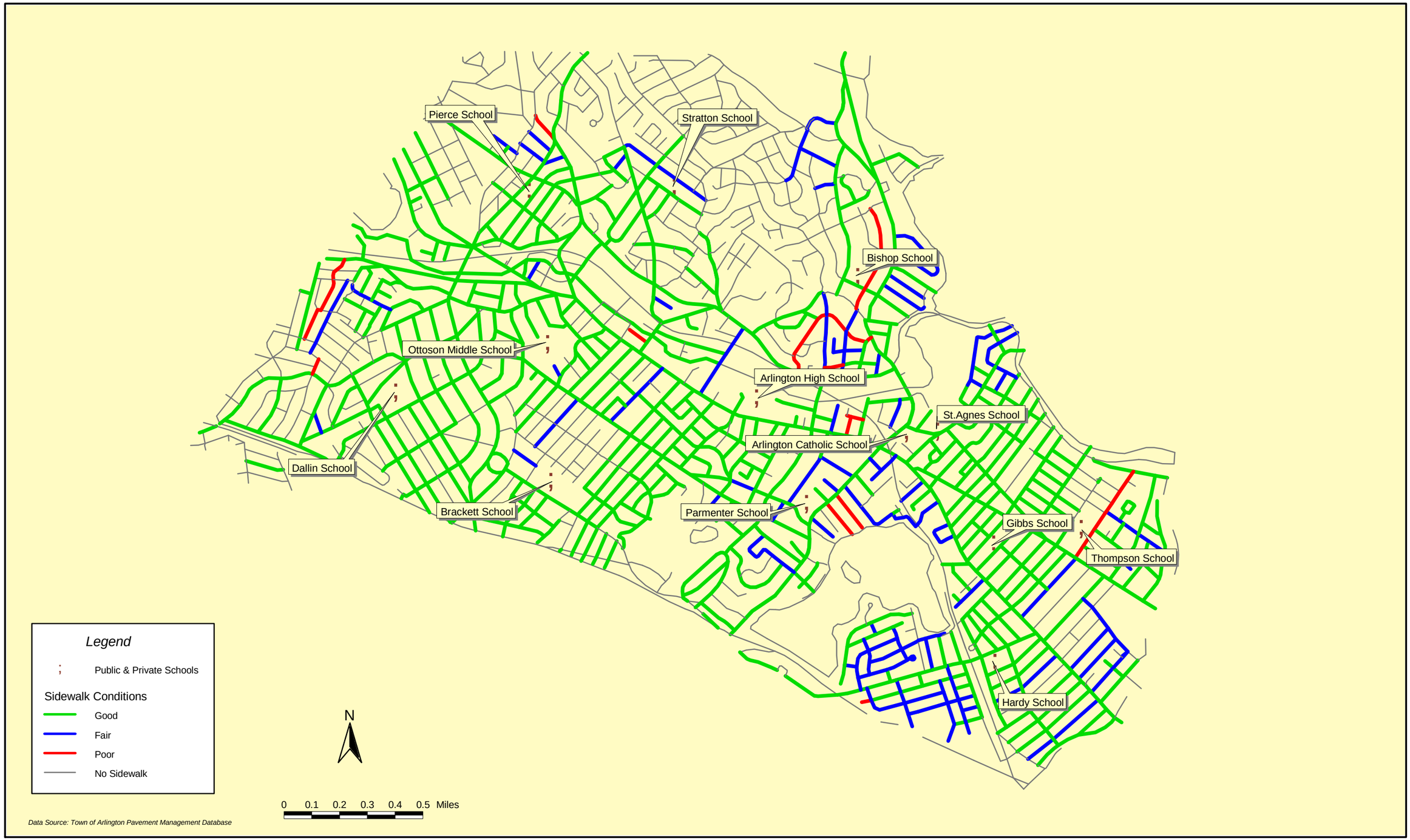


Figure 6
Sidewalk Conditions

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Town of Arlington, MA

Table 9: Sidewalk Condition Around Schools (within 1/4 mi radius)

SCHOOL	SIDEWALK CONDITION			
	Good	Fair	Poor	No Sidewalk
Arlington High School	63%	6%	2%	30%
Bishop	32%	16%	12%	40%
Brackett	49%	5%	0%	46%
Catholic	63%	9%	2%	27%
Dallin	67%	0%	0%	33%
Gibbs	82%	4%	0%	13%
Hardy	56%	18%	0%	26%
Ottoson	80%	3%	0%	16%
Parmenter	56%	20%	6%	18%
Pierce	57%	6%	2%	35%
Stratton	35%	7%	0%	59%
Thompson	68%	9%	5%	18%

The Ottoson school is located in an area of Arlington with predominantly good sidewalks. The Bishop, Brackett, and Stratton schools are in areas with lesser amounts of good sidewalks. The rest are in areas where the majority of the streets have good sidewalks.

Case Study: Thompson School

To get a better understand of the pedestrian facilities near schools, the Thompson School was selected for a detailed field investigation. Figure 7 provides a detailed depiction of the pedestrian related facilities near that school. Sidewalk conditions along North Union Street were rated as poor. The east side of Everett Street does not have a clear sidewalk. While there are an adequate number of crosswalks near the Thompson School, the condition of these crosswalks needs improving. Specifically, the markings have deteriorated and need to be replaced. Finally, there are sufficient facilities along Broadway to allow for safe crossing of that busy street including signals at Bates Road and Cleveland Street and a flashing pedestrian signal at the intersection of Oxford Street and North Union Street. There is also a crossing guard at Everett Street during school opening and closing hours.

Town Center Pedestrian Traffic

When traffic counts were conducted at the intersections in the Town Center, detailed information was also collected on the number of pedestrians crossing each of the crosswalks at the intersections on Massachusetts Avenue. Figure 8 presents the results of the pedestrian counts between the hours of 7:00-9:00AM and 4:00-6:00 PM. At the intersection of Massachusetts Avenue and Pleasant Street/Mystic Street, most of the pedestrians use the crosswalks across Pleasant Street and Mystic Street. The crosswalks across Massachusetts Avenue had a much lower number of pedestrians. The number of pedestrians at the intersection of Massachusetts Avenue and Medford Street is greater than at the intersection at Pleasant Street/Mystic Street.

LEGEND

- (F) FLASHING SIGNAL
- (S) SIGNAL
- CROSS WALK
- STOP SIGN
- SIDEWALK: Good, Fair, Poor

Scale: 1" = 500'

Figure 7
Sidewalk Condition around
Thompson School

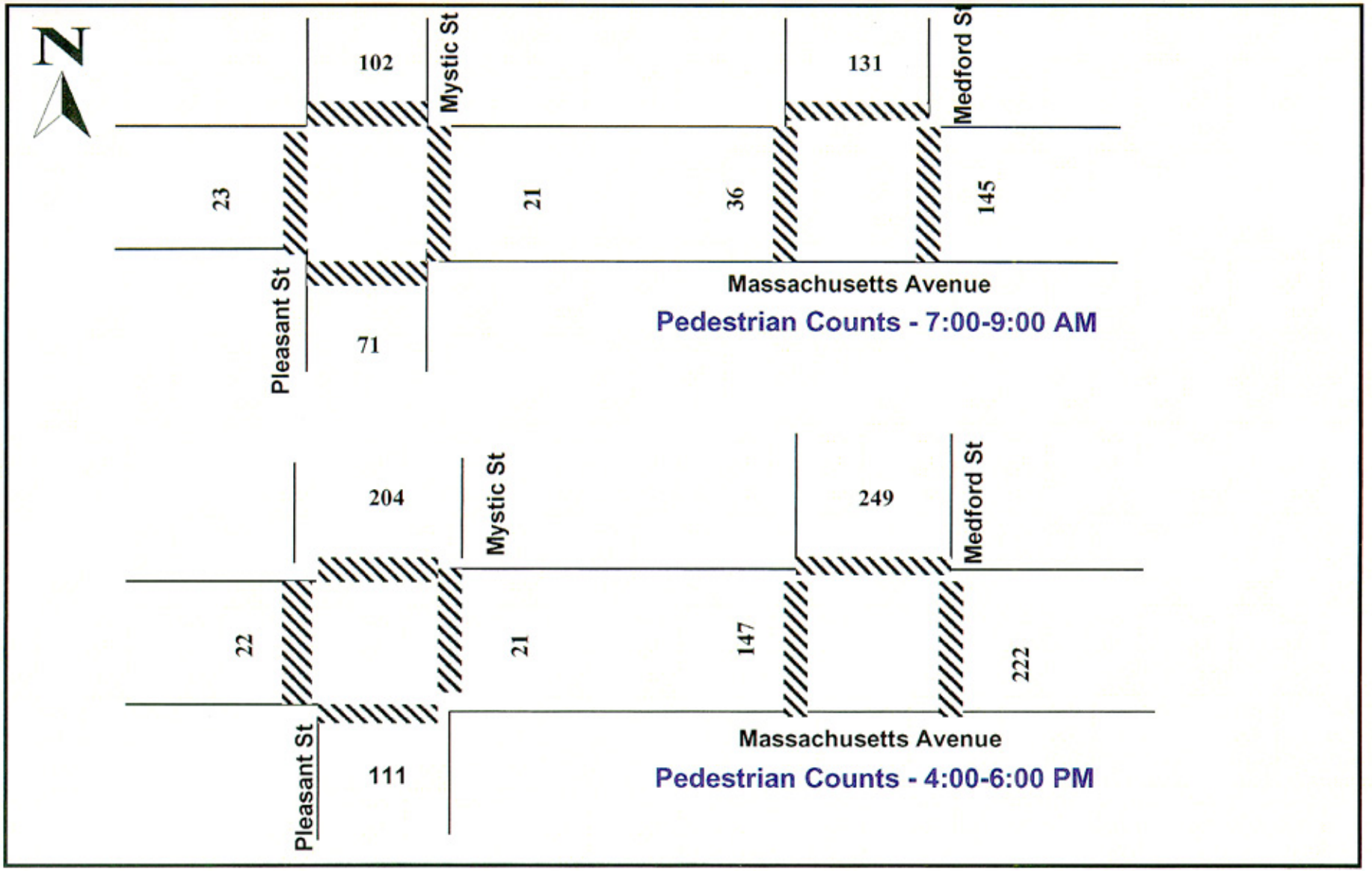

Figure 8

Pedestrian Counts

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Chapter Five: Bicycle Accommodations

The town of Arlington is among the few communities in the Commonwealth with a high-class bicycle facility running the entire length of the town. The Minuteman Bikeway runs parallel to Massachusetts Avenue from the Lexington town Line in the west to the Cambridge City Line to the east. The Minuteman Bikeway is a multi-use trail with a lot of skaters and general pedestrians on the facility, especially during the summer months.

There are no streets within Arlington with an exclusive bike lane. Currently, the town is reviewing sections of Massachusetts Avenue, particularly the eastern section from Franklin Street to Alewife Brook Parkway, to determine if a designated bike lane would be appropriate. Figure 9 presents a color-coded map based upon the width of the various streets in Arlington. As can be seen, there are only a limited number of streets within the town that are wide enough to accommodate the combination of a bicycle lane and existing on-street parking. On the other hand, several streets are wide enough to allow for convenient lane sharing between motorists and cyclists. The town could utilize the information presented in Figure 9 along with information regarding on-street parking and roadway grades to designate certain bike routes. While designating bike routes, it is important to bear in mind that the width of the roadway is only one of several factors in determining whether a road is attractive for cycling. Traffic volumes, on-street parking and terrain are also important. In fact, for most residential Arlington streets, it is the presence/absence of on-street parking that determines whether a motorist can safely pass a cyclist.

Issues raised by residents regarding the Minuteman Bikeway were either in reference to inadequacy of lighting, bikeway maintenance during the winter months, or locations where the bikeway crosses public rights-of-way. Many residents requested that the bikeway be provided with additional lighting to allow for usage during the fall seasons when it begins to get dark earlier. Some asked that the snow be plowed in the winter along the bikeway.

The significant issue related to the bikeway is its crossing of public rights-of-way. Most of the crossings are grade-separated such as at Park Avenue, Lowell Street, and Brattle Street. Some crossings are at grade such as Water Street, Lake Street, and Massachusetts Avenue. The town is working with the Arlington Bicycle Advisory Committee to review each of the bikeway crossings and upgrade the existing signing to international standards.

The Bikeway crossing at Mill Street, as noted by residents, has a poor line-of-sight, especially for traffic turning from Summer Street onto Mill Street and immediately crossing the bikeway at this location. This crossing is in need of immediate improve-

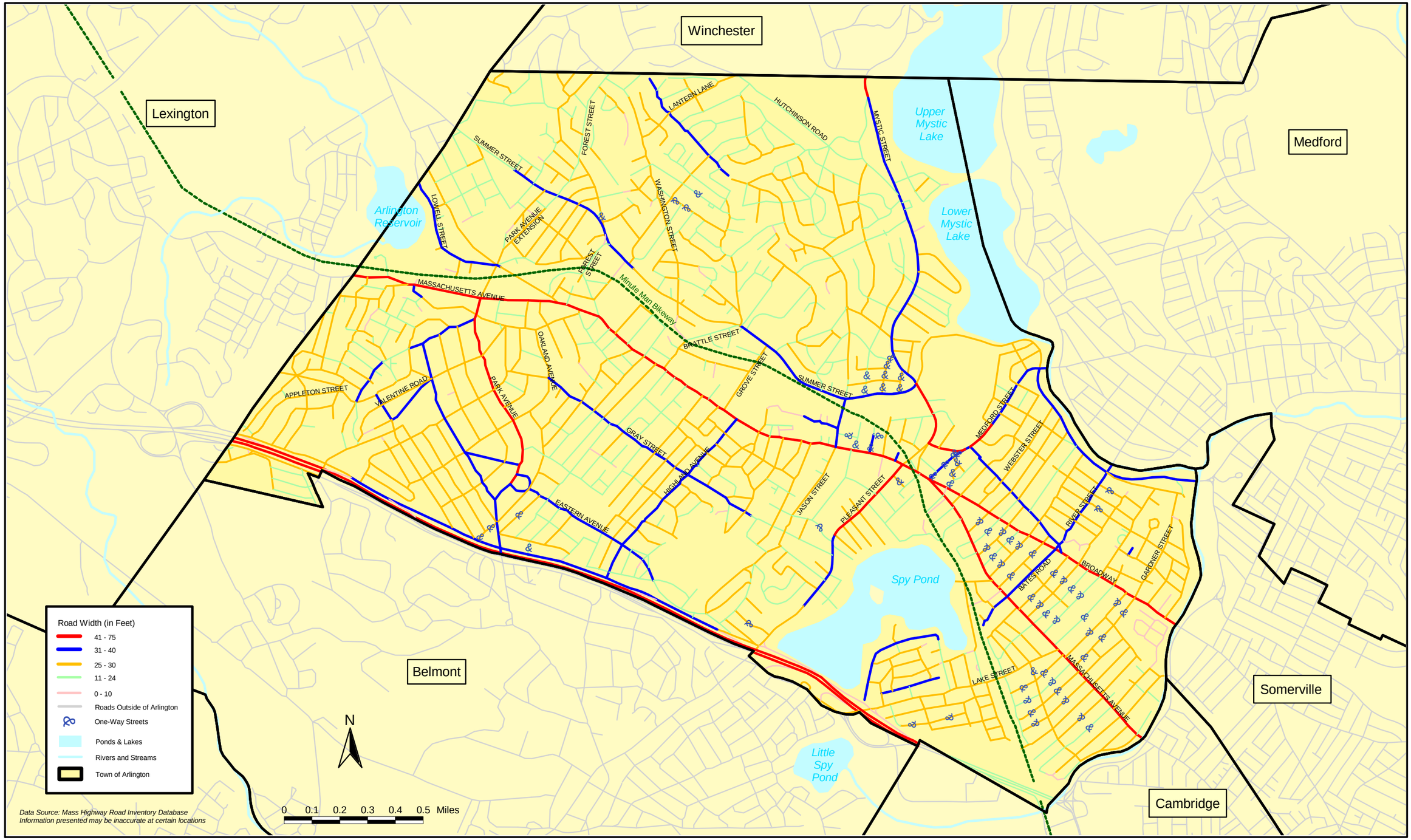

Figure 9
Road Surface Width

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ments. One possible measure at this location would be to install raised flashing crosswalk markers. These flashers are imbedded into the pavement and are activated by pedestrians or, in this case, cyclists. The flashers are meant to attract the attention of motorists to the bikeway crossing.

The bikeway crossing in the Town Center has been an issue for a long time, but with no easy solutions. Currently, the bikeway terminates at Mystic Street just north of Massachusetts Avenue and later continues from Swan Place on towards Cambridge. Cyclists are expected to either ride on Massachusetts Avenue in mixed traffic between Water Street and Swan Place, or to walk their bikes on the sidewalks between Mystic Street and Swan Place. This adds to the already high pedestrian traffic at this intersection, and with heavy traffic volumes, traffic operations at this intersection are at unacceptable levels.

To address the bikeway crossing problem within the Town Center, Berger has develop two alternative solutions described under the section titled Conclusions and Recommendations in this report.

Chapter Six: Public Transportation

MBTA Red Line

The northern terminus of the Red Line at Alewife Station is located a few hundred feet from the Arlington border. Commuters throughout the region, including Arlington, use its park-and-ride facilities which serves over 2000 cars and 1000 bicycles. Alewife Station also has a direct pedestrian/bicycle connection to the East Arlington neighborhood and the Minuteman Bikeway. This connection is used by hundreds of Arlington residents each workday, during every month of the year.

MBTA Bus Routes

Due to its proximity to Cambridge and Boston, the town of Arlington currently has a relatively good MBTA bus system. Figure 10 shows the various bus routes in Arlington.

Table 10 shows the number of bus trips on each route during a 24-hour period on a weekday as well as on Saturday and Sunday. The most frequent is the Route 77 bus that originates at Arlington Heights and travels along Massachusetts Avenue to Harvard Square in Cambridge. Bus Routes 67, 79 and 84 do not have service on Saturdays, while the same routes and bus routes 62 and 76 do not have Sunday service. With this weekend schedule, certain sections of Arlington, particularly the Arlington Heights and Turkey Hill areas which enjoy a fairly good service during the weekdays, experience a drop in the frequency of MBTA buses. This issue of reduced MBTA bus service on weekends was mentioned by some residents at the neighborhood meetings.

Table 10: Transit Analysis - Number of Buses Per Day

ROUTE #	Weekday	Saturday	Sunday
350	31	17	15
62	22	14	NS
67	24	NS	NS
76	23	12	NS
77	133	129	68
78	47	18	19
79	49	NS	NS
80	45	31	18
84	11	NS	NS
87	53	**	**

NS - No Service

Table 11 presents the passenger boardings on each of the MBTA bus routes in Arlington. The numbers shown in Table 11 are not the total ridership on the bus route but only the number of passengers boarding each bus route within the Town of Arlington. It is interesting to note that ridership on the MBTA bus routes in

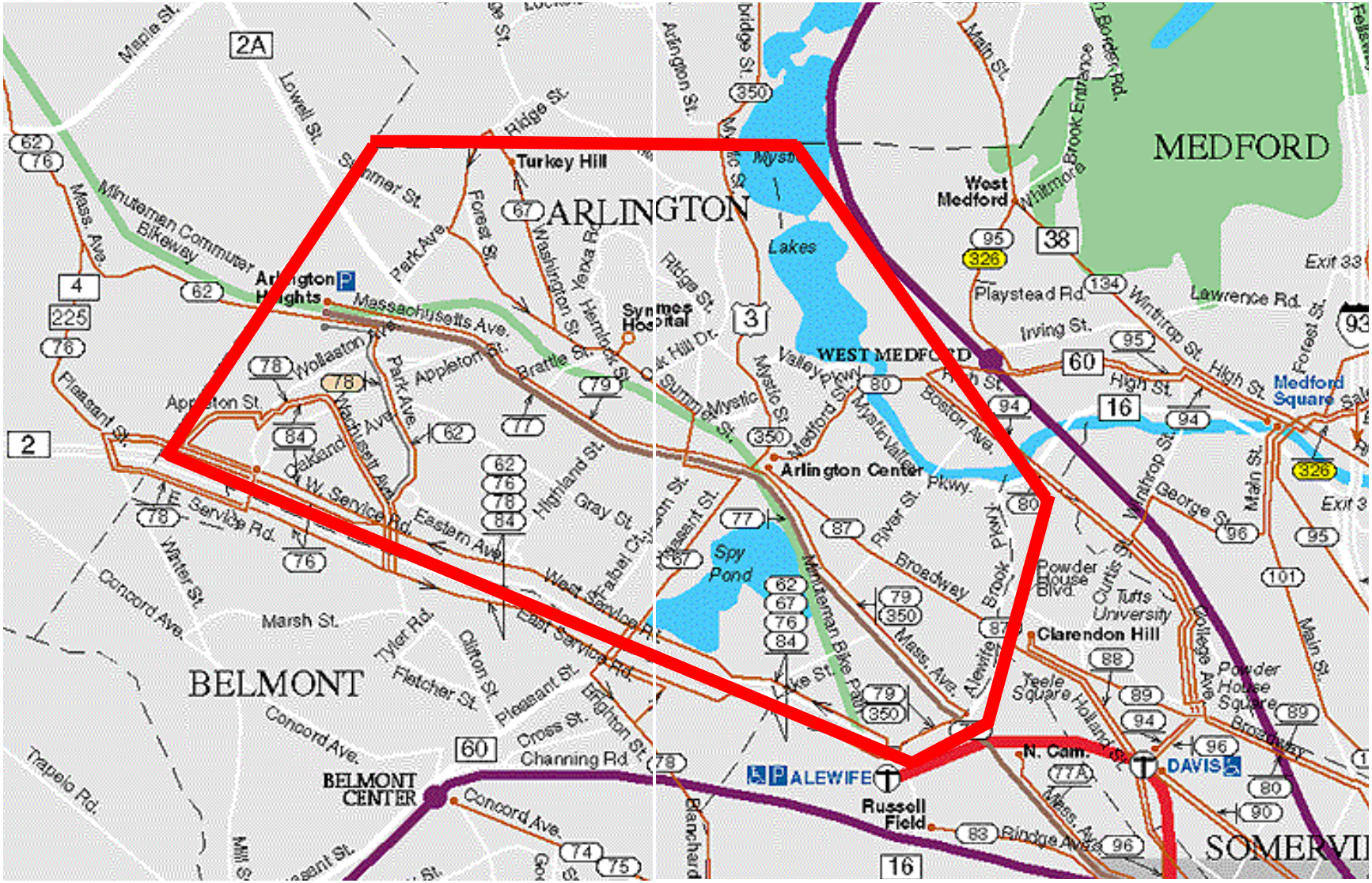


Figure 10
MBTA Transit System in Arlington

Arlington are relative high. If one compares the boardings on Route 77 that runs along Massachusetts Avenue during a weekday at around 2,700 (or 5,400 round trips) to the average daily traffic (ADT) on Massachusetts Avenue at around 24,000 vpd, the transit riders account for 20% of the ADT on Massachusetts Avenue. This relatively high level of transit ridership has helped control the growth in vehicular traffic on Massachusetts Avenue.

Table 11: Boardings Per Day Within Arlington

ROUTE #	<---------- Inbound ---------->			<---------- Outbound ---------->		
	Weekday	Saturday	Sunday	Weekday	Saturday	Sunday
350	131	42	28	217	155	50
62	69	19	NS	89	32	NS
67	348	NS	NS	113	NS	NS
76	33	14	NS	9	9	NS
77	2692	2010	1145	628	578	285
78	191	62	50	1	2	1
79	822	NS	NS	327	NS	NS
80	199	90	65	1	1	0
84	141	NS	NS	0	NS	NS
87	396	0	0	16	0	0

NS - No Service

Arlington residents not only use the MBTA buses to commute to/from Boston, Cambridge and other areas, but also use it to commute within the town itself. If one were to look at the outbound boardings on Route 77 and Route 79, it would demonstrate this point. Further, it appears that the MBTA buses may also be enabling reverse commutes where transit riders use the bus to commute to points away from Boston and Cambridge. A good example is Route 350 which has a higher number of outbound boardings than inbound boardings.

There appears to be a fairly high demand for transit during the weekends. If one were to look at the boardings, both inbound and outbound, for Route 77 and compare them between weekday, Saturday, and Sunday, it shows a fairly high number of transit users. This point needs to be considered by the MBTA when deciding which bus routes they cannot sustain for weekend service. It is understandable that given budgetary constraints, as well as weak transit demand, the MBTA might decide to eliminate weekend service on certain routes. However, there may be certain routes that could benefit from weekend service. One good example is Route 67, which services the Turkey Hill area. This bus route has no Saturday or Sunday service. Based upon the weekday inbound boardings of 348, and based upon weekend service on other routes such as Route 78 and 80, perhaps the Route 67 bus could have as many as 100-150 transit riders during a Saturday and around 80-100 during a Sunday. The Town should contact the MBTA and suggest instituting weekend service on Route 67 on a limited time basis to determine if such a service would be utilized as estimated above. However, making changes to routes that serve other communities in addition to Arlington could be difficult. The TAC inquired as to whether it might be possible to consider special weekend routing that does not paral-

lel the weekday routing to get better circulation and better serve demand on weekends.

Residents in the southwest corner of Arlington have complained of the lack of bus service to the Town Center from their part of town While that particular area is served by two MBTA bus routes, only one of which goes through Town Center. To reach the Town Center, these residents need to transfer to another bus at the Arlington Heights bus terminus. An alternative to the routing for the Route 84 bus mentioned above could involve a route through the Town Center.

Route 77 maintains a consistently high level of service throughout the day and even during weekends. Figure 11 presents the boardings per bus trip on a typical weekday for this route. The data is presented for the inbound direction (i.e., going towards Boston). This route is heavily utilized during the peak hours. Even during the off-peak periods, this route is fairly well utilized by commuters. To support this level of demand, a consistently low headway is maintained by the MBTA. Figure 12 presents the headway by time of day for the Route 77 bus.

Figure 11: Route 77 Boardings Per Bus Trip

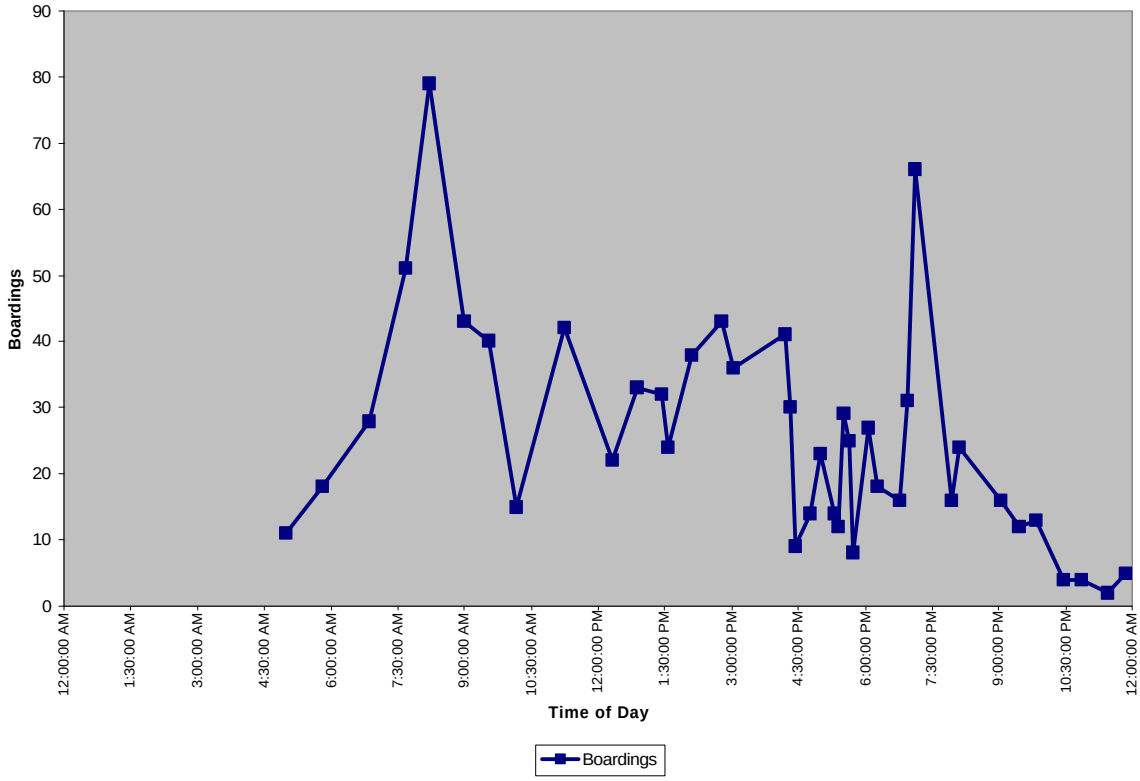
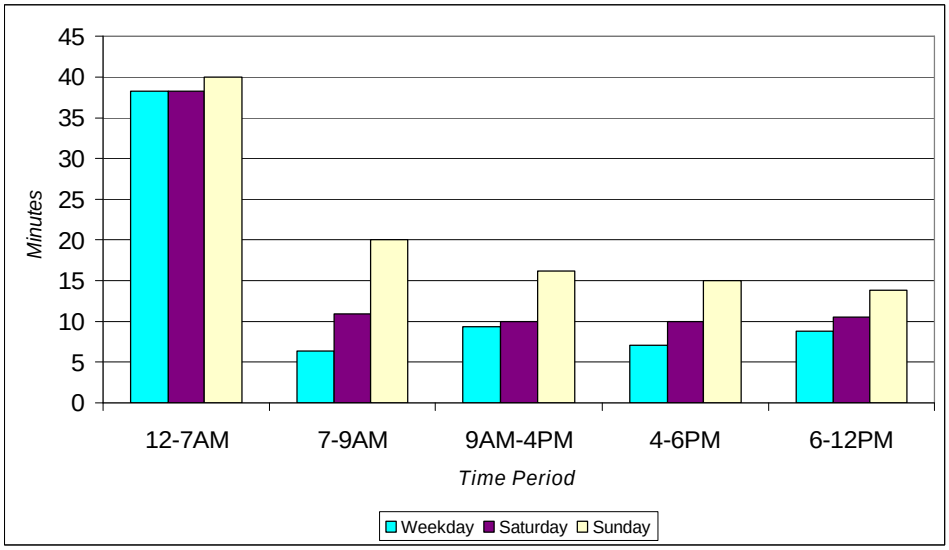


Figure 12: Route 77 Headway



To verify if the bus routes are appropriate for the demographic distribution within Arlington, data were extracted from the 2000 Census. Typically, the transit riders are from within the senior citizen population and from within the student population (ages 5 through 17). Figures 13 and 14 show the distribution of these two population groups within Arlington. It appears that the MBTA buses travel on streets close to areas with higher numbers of senior citizens and students. One potential change that could be investigated is to have a bus service running along Highland Avenue to service areas close to the Menotomy Rocks Park. One possible alternative would be to have the Route 84 bus travel from Appleton Street onto Gray Street up to Highland Avenue and then onto West Service Road and cross Route 2 at Park Avenue and continue as before. In the return direction, the bus could turn right from West Service Road onto Highland Avenue, left onto Gray Street and then onto Appleton Street and continue as before. Whether seed funding from the MBTA to initiate such a service in Arlington can be obtained and whether this service would be financially feasible given Arlington's budgetary constraints needs to be investigated and could be taken up in a subsequent study phase.

Community Bus Service Case Study: Lexpress

Supplementing the MBTA buses, some residents inquired if the town could institute an intra-town bus service similar to the Lexpress in Lexington. Information was obtained from the Town of Lexington regarding the revenue and expenses involved in operating the Lexpress bus system. There are a total of six buses on the Lexpress bus system. It is operated by a private company. The total expense per year is approximately $450,000. Lexpress collects about $70,000 at the farebox and from monthly

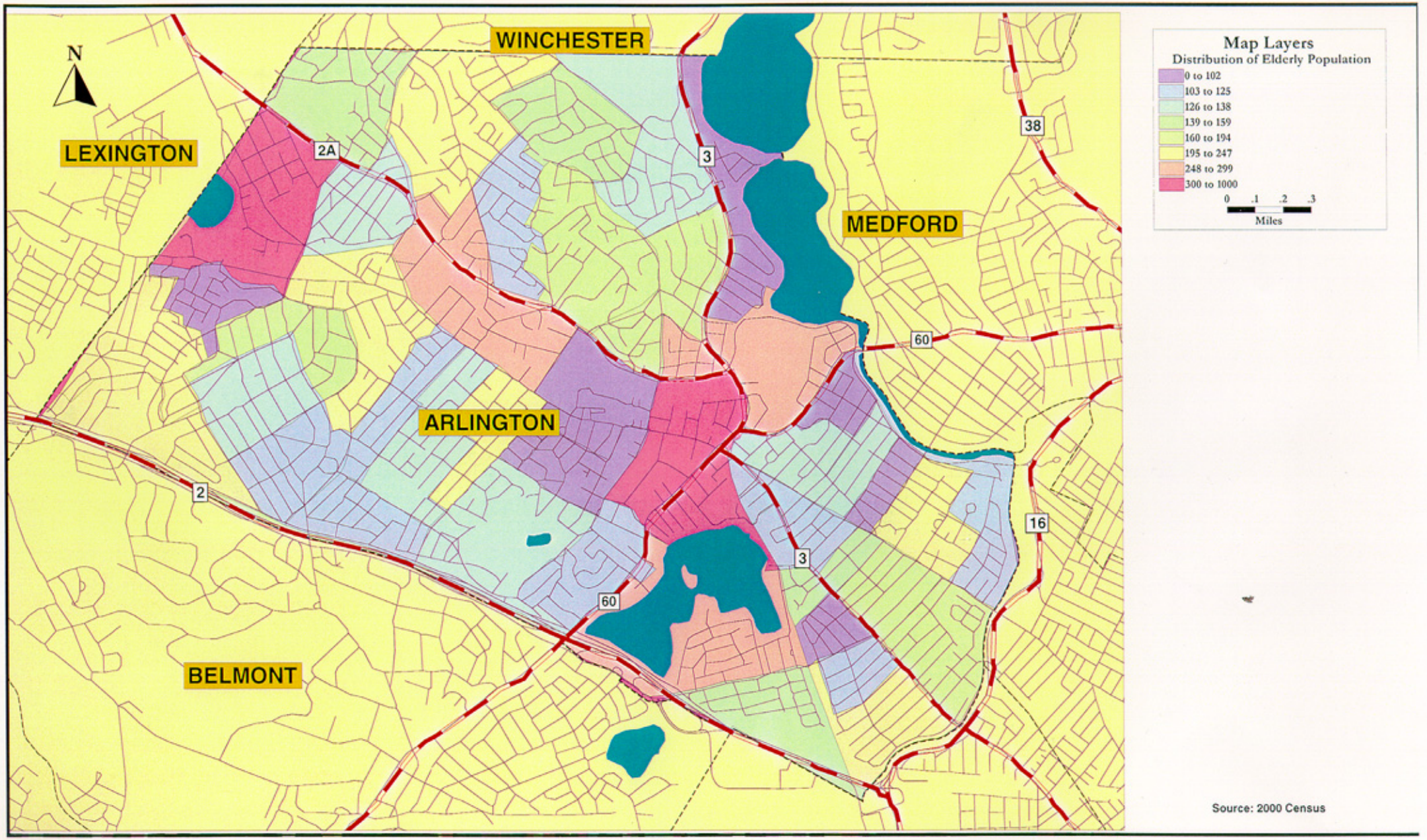


Figure 13
Distribution of Elderly Population

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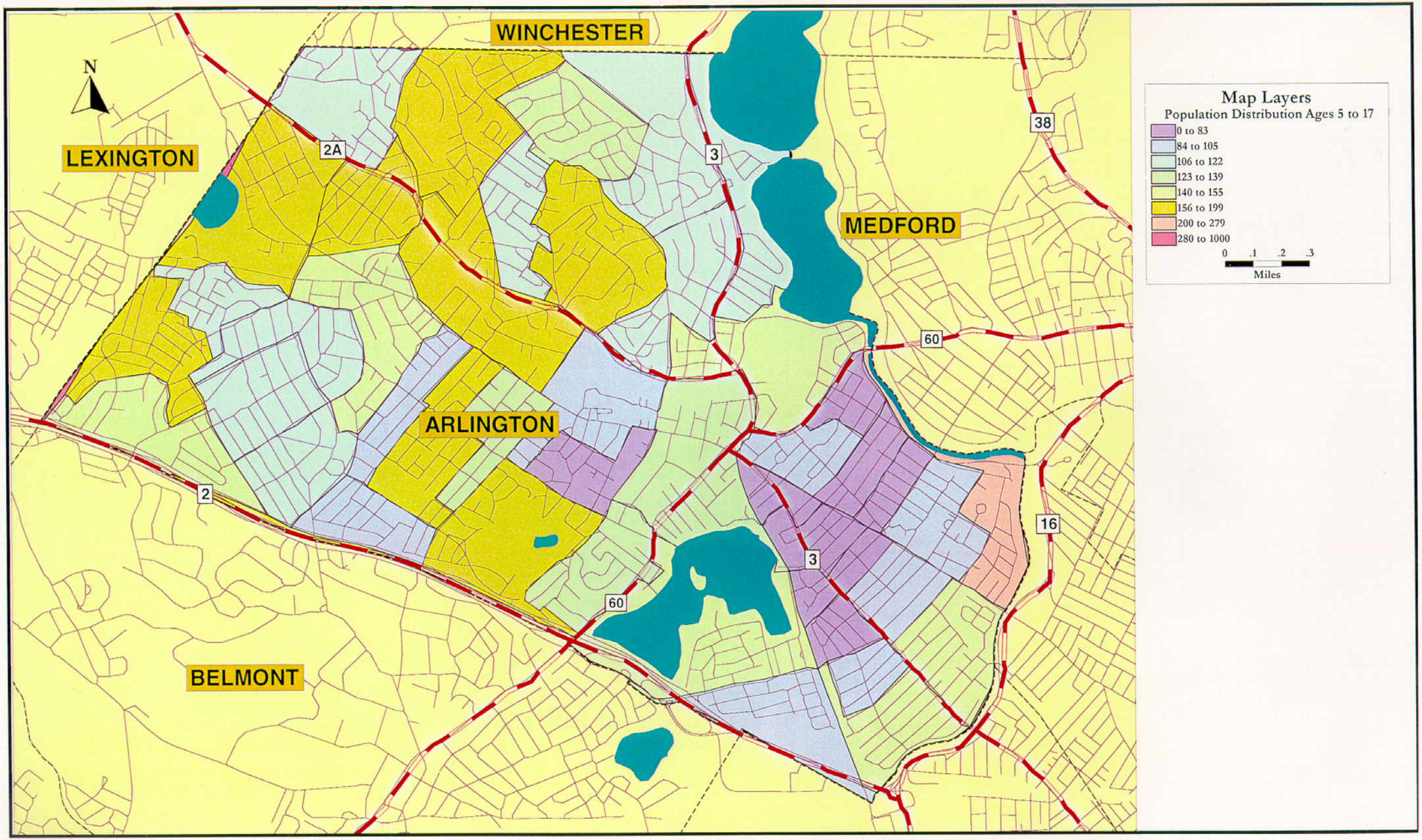

Figure 14
Population Distribution Ages 5 to 17 years

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passes. It also receives $80,000 from the MTBA as a grant for a total income of $150,000. This leaves about $300,000 that is subsidized by the town of Lexington.

Existing Paratransit Facilities

The town of Arlington has other paratransit systems operating in the town. There are school buses for special needs students which are used throughout the day to transport students. The Council on Aging (COA) also operates vans that are bought and operated using special grants from the state which restrict usage of the vans for specific purposes and not for general commuting. There are other private vans such as the SCM Transportation, which provides Medicare and Medicaid transportation on an as-needed basis. The Town Planning Department had once thought that perhaps some of these existing paratransit system could be used for general public transportation purposes. This would have the advantage of utilizing an existing transportation capital investment while meeting the transit demands within the town particularly during the weekend and off-peak hours. Based upon discussions with the Arlington public schools and the Council on Aging, such a dual use of existing paratransit vehicles warrants further examination.

In a previous study conducted by the firm, Multisystems, Inc, for the Arlington Council on Aging, it was identified that the COA vans were underutilized during off-peak periods. The study suggested that the Town explore using the underutilized buses to provide services to the broader community in such a manner as to not use the Older Americans Act federal funding for those specific trips. Some states around the country, including Florida, are active in coordinating senior paratransit service with off-peak transit service to a broader population.

Chapter Seven: Parking

Given the limited scope of this initial transportation assessment study, a detailed parking supply and demand study could not be conducted. If such a study is warranted, it could be performed as part of a subsequent phase. In this section, two previous studies are reviewed. Figure 15 presents the zoning land use and the existing parking facilities in the town. This information was provided by the Planning Department from the Geographic Information System (GIS) database on land use.

Arlington Center

The Arlington Department of Planning and Community Development conducted a parking study in August and September of 1987 at the Water Street/Mill Street lot and the Russell Common lot.

The Water Street/Mill Street lot has a total of 89 parking spaces. The parking occupancy study conducted in August 1987 indicated the peak demand to be around noon time when the parking lot was 95% full. During the morning and evening peak periods, the parking was approximately 70-80% occupied.

The Russell Common lot has 234 parking spaces. The parking occupancy study conducted in September 1987 also showed that the peak demand is during noon time. Parking demand during the morning peak period was 90 percent while in the afternoon time periods the parking demand was around 60-70 percent.

Recommendations from the department were focused towards providing a more balanced approach to meeting the parking needs within Arlington Center. The recommendations called for certain spaces reserved for short-term parkers, metered parking, and the rest of those with parking stickers. With this allocation of spaces, the needs of the business community would be balanced against long term parking by area employees and residents.

Arlington Heights

In March 1998, a consultant study resulted in a memorandum on the findings of the Arlington Heights Neighborhood Business District parking study. This study was conducted in response to a demand for employee parking for more than 200 full-time and 100 part-time employees in the area. The study reported that there are 420 parking spaces along the Massachusetts Avenue corridor with 212 off-street parking and 208 on-street. The demand for parking was the highest on a Saturday at 324 parking spaces while the weekday peak parking demand was 254 spaces. One of the recommendations from this study was to provide 30 to 35 spaces within the proposed MBTA commuter parking lot for long term employee parking. However, this MBTA commuter parking lot is no longer in existence and has been replaced with the an assisted living facility residential buildings.

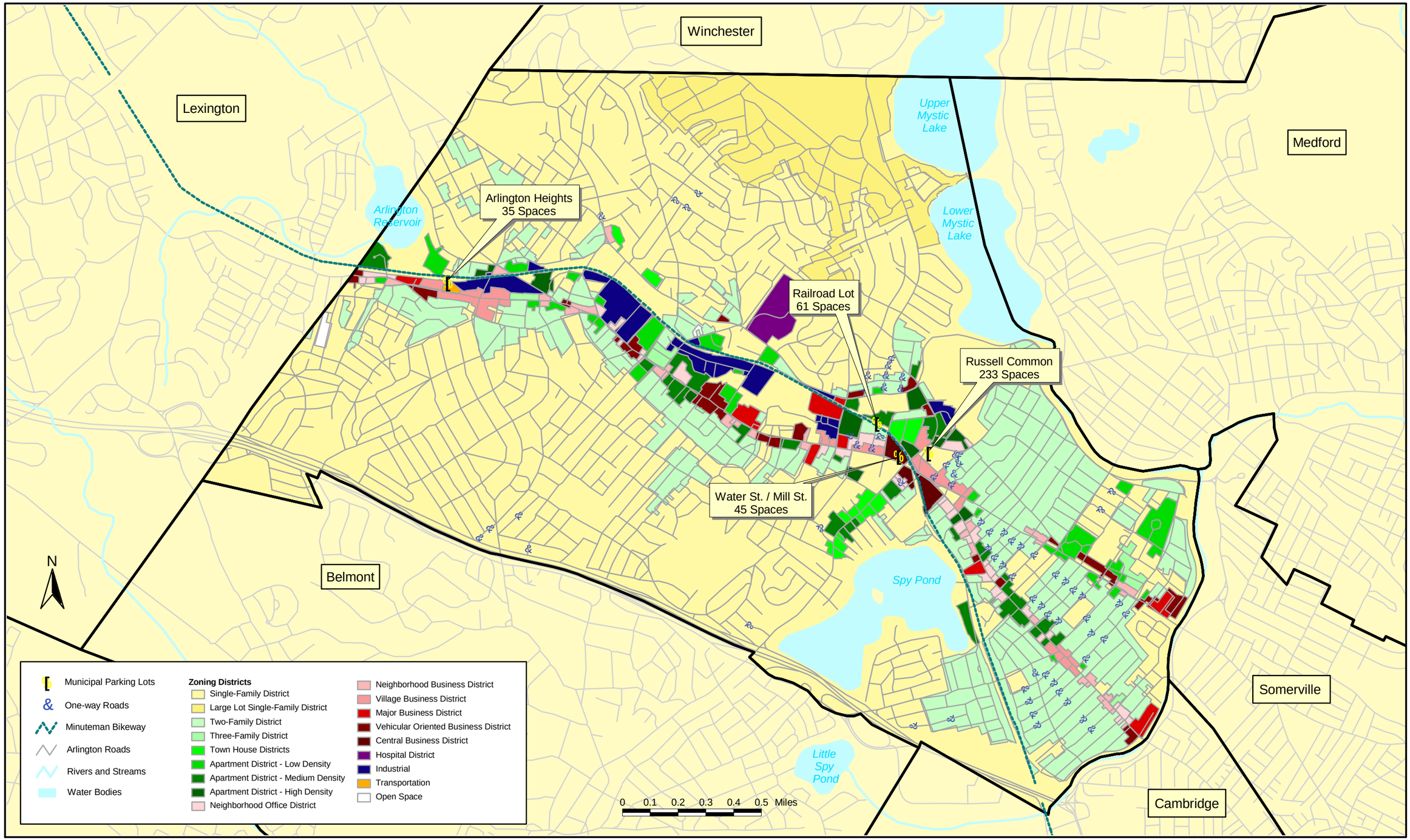

Figure 15
Relationship Between Parking and Zoning

Chapter Eight: Conclusions & Recommendations

Conclusions

Based upon the comments received by the residents, input provided by town officials in work sessions and the analysis presented above, there are three major conclusions from this study:

1. Traffic operations at the Town Center are having a profound impact on traffic operations in many other parts of town. Given the poor traffic operations and long delays/queues at the intersections of Massachusetts Avenue and Pleasant Street/Mystic Street, traffic in the north-south direction is diverting from Pleasant Street and seeking alternative routes. Most of these alternative routes happen to be on residential streets which are not designed to handle high traffic volumes. Most notable examples of cut-through streets are upper Jason Street and Russell Street. It is true that the phenomenon of cut-through is also caused by some of the regional traffic congestion problems. However, it appears that the contribution of the Town Center traffic problem is greater.

2. Having a good pedestrian infrastructure is important to the residents of Arlington. This was clearly demonstrated at the neighborhood meeting where the greatest number of comments were related to pedestrians. While a majority of the town streets have adequate sidewalks, the problem is more related to the painted crosswalks. The paint at many crosswalks has deteriorated and is in need of replacement.

3. There is a fairly high demand for public transportation in the town based upon the ridership data on the various MBTA bus routes operating in the town. While weekday bus service appears to respond to this demand, weekend bus service is at a much lower level. The town needs to work with the MBTA to enhance bus service during weekends and perhaps re-organize some routes to reach a greater market within the town.

It is important to note that this phase of the study is only a preliminary phase. Many of the analyses conducted in this study need additional work. The recommendations indicated below need further investigation and design work.

Recommendations

The town has been actively involved in addressing the above mentioned transportation issues. Several alternative improvements have already been considered, while there are perhaps many more to be considered. Virtually every improvement alternative is bound to have advantages and disadvantages. The town needs to consider a whole range of transportation improvment alternatives before deciding on a suitable course of action.

Provided below are a few more transportation improvement alternatives that the town may consider in conjunction with other alternatives under consideration by the town. The intent of the following transportation recommendations is almost entirely to promote further discussion and exchange of ideas to solve the Town's transportation problems.

Town Center Improvements

The following presents a concept to improve traffic operations and better manage the bikeway crossing through the Town Center. The concept envisions changing the existing lane configurations on Pleasant Street and Mystic Street from the existing left-through-right lane configuration to a left-through-through+right configuration. This concept will provide two lanes on Pleasant Street and Mystic Street at the approach to the intersection with Massachusetts Avenue for through traffic. This would provide additional capacity for through traffic in the north-south direction on Pleasant Street and Mystic Street.

This concept would change the existing exclusive right lanes on Pleasant Street and Mystic Street to through-right lanes. This would mean that the existing concurrent pedestrian phase across Massachusetts Avenue cannot be supported as this would involve potential conflicts between the pedestrians and the right turning traffic on Pleasant Street and Mystic Street. To address this problem, there are two alternatives. The more extreme alternative would be to eliminate the existing crosswalk across Massachusetts Avenue and have pedestrians use the existing crosswalks at Medford Street or at a potentially new pedestrian signal at Water Street. The more practical alternative would be to retain the existing crosswalk across Massachusetts Avenue and to sign the intersection requiring right turning traffic to yield to pedestrians on the crosswalk.

Two alternative concepts are suggested to deal with the Minuteman Bikeway crossing. One concept envisions diverting the bikeway onto Water Street and a pedestrian signal at Water Street and the Library Driveway. There are some problems with this concept including the existing width of Water Street to accommodate a bike lane and the feasibility of installing a pedestrian signal at Water Street/Library Driveway. The second concept involves relocating a portion of the bikeway from its current location at Swan Place to an existing private driveway opposite to Medford Street. The existing private driveway could then be moved to Swan Place. The latter concept has several advantages. First, the existing private driveway is currently not under the signal control even though it clearly is within the signalized intersection of Massachusetts Avenue and Medford Street. Entry and exit maneuvers to/from the driveway tend to impact traffic operations on Massachusetts Avenue. It would be safer if the private driveway were off of Swan Place. Finally, signing for the bikeway would be simpler and more effective as the entrance to the bikeway would be opposite to the crosswalk. It would also reduce the level of pedestrian traffic at the Massachusetts Avenue

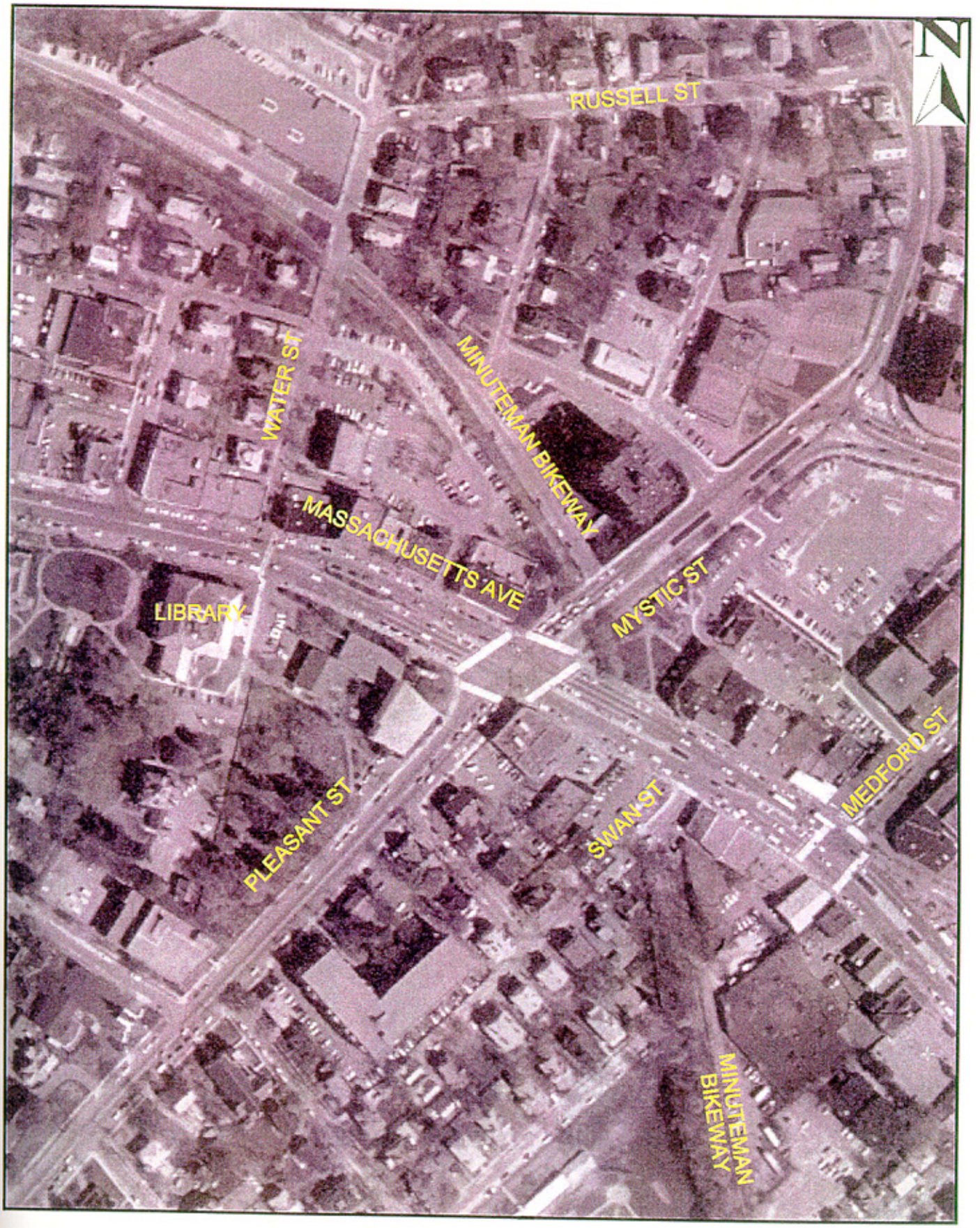

Figure 16
Arlington Town Center

Transportation Assessment Study
Town of Arlington, MA

The Louis Berger Group, Inc.

and Pleasant Street/Mystic Street intersection, thereby allowing more time for vehicular movements and hence a better level of traffic operation.

Functional Classification

The town, working with the Transportation Advisory Committee, should adopt a functional classification system which clearly designates the principal arterial, minor arterial, collector, and local streets. This functional classification could also be used to reflect town policy of giving predominance to mobility on arterial streets and restricting mobility with traffic calming measures on local streets. There could be some collector streets that warrant traffic calming, however it should be implemented with proper engineering study and clear justification.

The report contains the functional classification for roads within Arlington as developed by the Massachusetts Highway Department. The town and the TAC could review and make necessary modifications. One of the key inputs in the refinement of the functional classification would be traffic volume data. Currently, traffic volume information is mostly restricted to the Massachusetts Avenue corridor or the Summer Street corridor. Data on some of the important collector and local streets has not been collected. This study collected data on some of these streets, and the Arlington Police Department is also in the process of collecting data. However, there are still many streets for which traffic count information is not available.

Traffic Signal System

There are several traffic signals in the town, some of which are out-dated. The town should conduct a detailed inventory of the traffic signals. There are commercially available software programs that can be used to maintain the inventory in a database or GIS format. A database will assist the town in determining how to program for traffic signal upgrades based upon availability of funds.

In addition, there are some signals in the town that should be coordinated and should be among the first to be upgraded. The signals that need coordination include:

Sub-System 1:

- Massahcusetts Avenue at Pleasant Street/Mystic Street
- Massachusetts Avenue at Medford Street
- Massachusetts Avenue at Franklin Street
- Mystic Street at Chestnut Street
- Mystic Street at Summer Street

Sub-System 2:

- Massachusetts Avenue at Highland Avenue/Stop & Shop
- Massachusetts Avenue at Lockeland Avenue

Pedestrians

The report includes a detailed evaluation of the pedestrian facilities around the Thompson School. A similar study is recommended for the other schools to determine areas of improvements on sidewalks and crosswalks. The Town also should review their pavement marking program as well as the material used for the markings. Markings on major streets (new pavement) with higher traffic volumes could be provided with the more expensive thermoplastic markings while the streets (existing pavement) with lower traffic volumes could get painted pavement markings.

Public Transportation

The report provides an analysis of the existing MBTA bus service in Arlington. The Town should work with the MBTA in instituting additional bus service during the weekend. One potential route that should be reviewed for weekend service is Route 67 to the Turkey Hill Area. The other change recommended would be to have one of the bus routes to travel along Gray Street and Highland Avenue. One possibility would be to have the existing Route 84 travel on Park Avenue to Gray Street to Highland Avenue.

This study did not allow for a detailed assessment of bus stops. In general, it is recommended that bus stops be moved to the far side of the intersection and that every bus stop is provided with painted crosswalks.

Institutional

There are two institutional issues that were brought up by residents during the neighborhood meetings. The first one is regarding having a Traffic Engineer in the town. Larger cities such as Newton, Waltham, and Somerville have a Traffic Engineer whose primary focus is related to vehicular traffic operations, traffic signal systems, and parking. However, many smaller towns do not have the resources to have a separate Traffic Engineer and neither do they have the magnitude of traffic problems common to the larger cities. In such cases, towns resort to having their Town Engineer or an official in the Public Works Department also take on the role of a Traffic Engineer. It is unrealistic to expect these officials to posess all the necessary traffic engineering skills. Opportunities to attend training courses, meetings, conferences and seminars conducted by the Institute of Transportation Engineers or one of the local educational institutions of higher learning would be a cost effective measure.

The second issue is related to the organization and function of the Transportation Advisory Committee (TAC). The Town should be commended for having taken the step to set up the TAC at the initial stages of this study. The input, comments, and suggestions from the TAC have been crucial to this study. The Town should now formalize their structure so that the TAC can effectively contribute to improving the transportation system in the town.

The existing TAC is very well organized with public officials from the Planning, Public Works, and Police departments along with representatives from the neighborhoods, School Committee, Businesses, and other interest groups.

The TAC should establish a set of clear standard operating procedures on how transportation-related issues brought up by Arlington citizens are dealt with. This procedure should be accepted by various Town agencies and well-publicized to the community at large.

Once a transportation issue has been investigated by the TAC and a recommendation is made, it should be given considerable support by the Town and the Board of Selectmen. This would bring some level of consistency and engineering judgement to resolving transportation issues in the Town. In order for the TAC to address certain issues, they may need certain established design criteria and warrants (such as the All-Way STOP warrant). These design criteria and warrants could be developed by the town planning, public works and police departments with assistance from transportation consulting firms if necessary. Funds that enable these departments to obtain as-needed consulting assistance should be provided.

In most cases, recommendations from the TAC should be considered final in resolving a transportation issue. In certain special cases, the Board of Selectmen could decide to conduct an independent review of the TAC's recommendation. However, use of this privilege should be applied judiciously.