

**Report of the Transportation Advisory Committee
to the
Arlington Board of Selectmen**

6 June, 2005

Downing Square Trial

Downing Square Working Group: Elisabeth Carr-Jones (TAC, Group Leader), Geoff Edgers (Neighbor), Ralph Elwell (TAC, Neighbor), Susan Harter (Neighbor), Jack Johnson (ABAC Chairman, Neighbor), Lt. Jim McHugh (APD), Michael Rademacher (TAC), Ron Santosuosso (Town Engineer).

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SUMMARY OF RECOMMENDATION

Downing Square Trial

Downing Square (the six-way intersection of Park Avenue, Lowell Street, Park Avenue Extension, Bow Street and Westminster Avenue) is among Arlington's most complex intersections. The Square is an active commercial and civic center for the community and presents several challenges for motorists, pedestrians and cyclists. The TAC has developed a plan for addressing specific transportation safety concerns at Downing Square and has voted to recommend to the Board that a temporary trial of the plan be conducted to examine its impact. Figure 1 illustrates the features of the plan and Figure 2 illustrates the existing conditions. The plan incorporates the following modifications.

Curb Extensions are incorporated to allow motorists to see the entire intersection when they are stopped at a stop sign, rather than creeping into the intersection in order to gain visibility. The extensions also decrease the length and increase the visibility of the crosswalks, allowing pedestrians to move more safely through the intersection. During the trial, curb extensions are to be delineated with sand bags, stop signs are to be moved and new stop lines and crosswalks are to be delineated with paint. Curb extensions are to be tested between Bow Street and Lowell Street, between Bow Street and Park Avenue Extension, between Westminster Avenue and Lowell Street, and on Park Avenue. The curb extension on Park Avenue also serves to define the northern end of the parking area in front of the Park Avenue businesses and discourage illegal parking at the corner. The parking area in front of the Park Avenue businesses may also be further defined with paint during the trial; both angled and parallel schemes are being considered.

A raised crosswalk is incorporated at the Park Avenue approach to the Square to increase pedestrian and vehicular safety for this approach, the only one not controlled by a stop sign. For the trial, the raised crosswalk will be a temporary device made of recycled tires that can be reused at other sites in Arlington. Raised crosswalks are also being considered for the other approaches to the intersection as part of the final recommendations. A warning sign will be erected on Park Avenue in advance of the raised crosswalk during the trial.

An emergency vehicle turn lane is incorporated between Lowell Street and Bow Street to facilitate emergency vehicle access following the installation of the curb extension. During the trial, the turn-off will be fitted with collapsible plastic bollards at each end. Because a full-access turn-off is being considered, the plastic bollards may be removed at some point during the trial to allow all vehicles to make this right turn.

The TAC recommends that the Town Engineer be instructed to implement the trial in June, with evaluation and modifications to the plan taking place during the summer and into the fall. Recommendations for permanent modifications to the Square will be developed by the TAC based on an analysis of the trial, and brought before the Board of Selectmen.

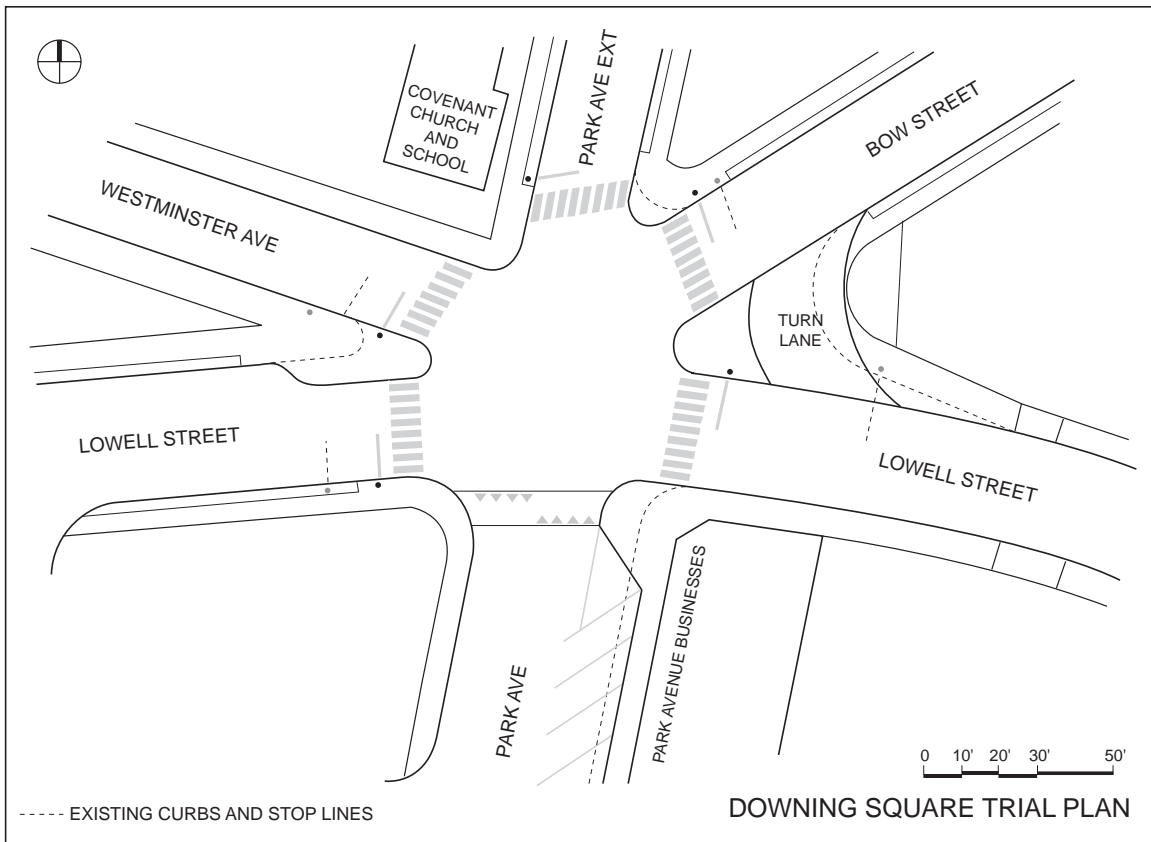


Figure 1 Redesign Trial Plan for Downing Square

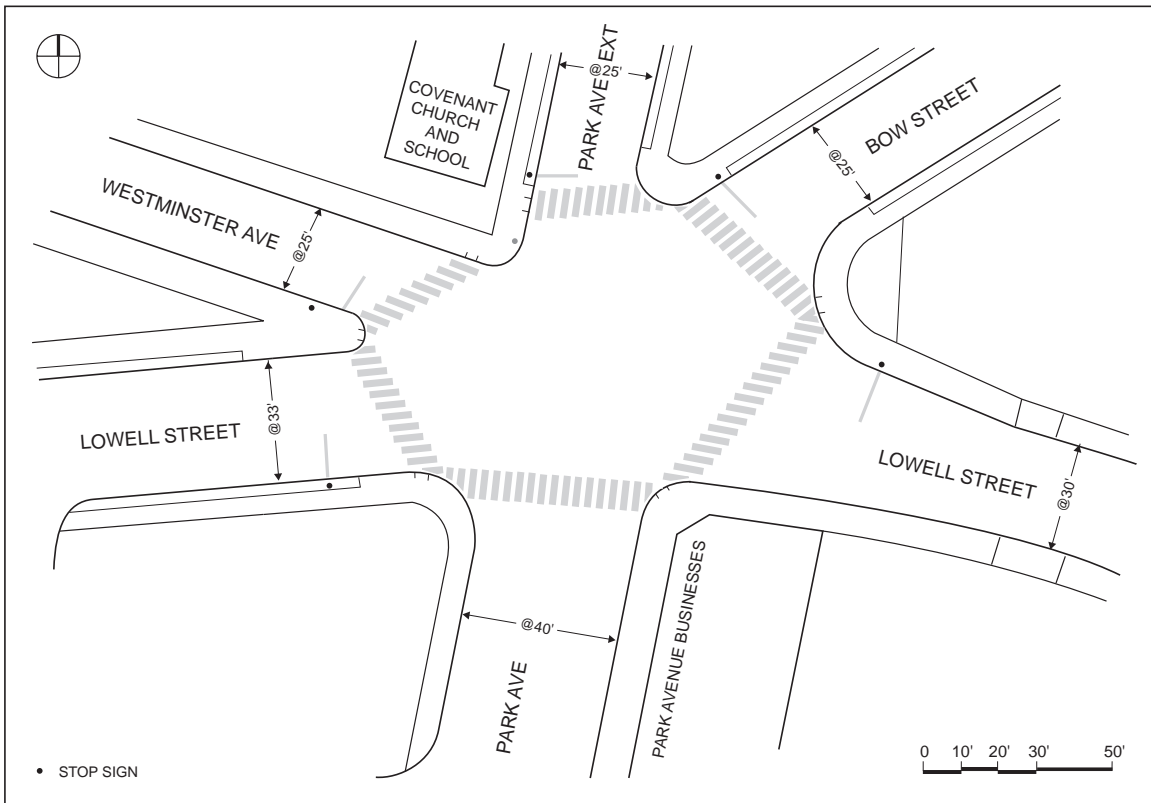


Figure 2 Existing Conditions for Downing Square

SUPPLEMENTAL MATERIALS

Downing Square

1. Background (draft section for final report)
2. Process (draft section for final report)

BACKGROUND

Downing Square

Downing Square was named in memory of Captain James F. Downing and M. Sergeant Cornelius Downing, brothers killed during World War II. The Square is situated in Arlington Heights, between Massachusetts Avenue and Summer Street (see Figure 3).

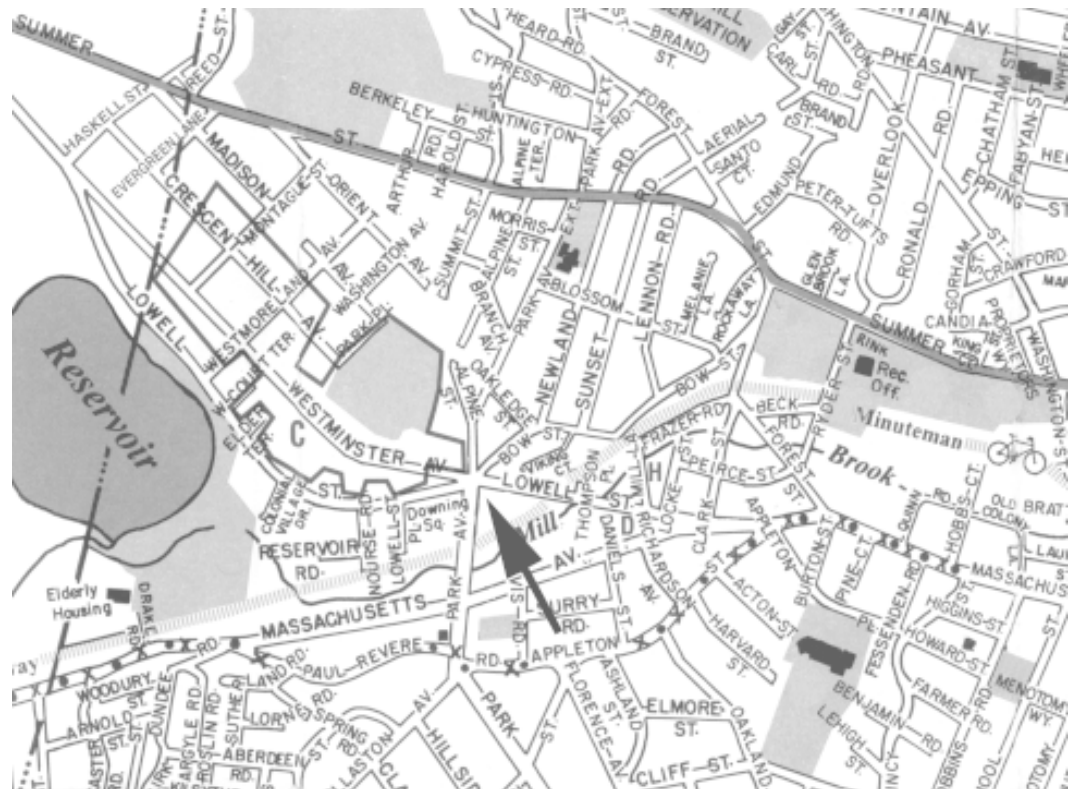


Figure 3 Locus Map

Three of the roadways forming the Square are classified as minor arterials according to the MassHighway Road Inventory database: Park Avenue, Park Avenue Extension and Lowell Street west of the Square. Lowell Street east of the Square is classified as an urban collector roadway; Westminister Avenue and Bow Street are classified as local roads.

The Square is adjacent to the Marquis Minuteman Bikeway. The Mass Highway controlled bridges on Park Avenue and Lowell Street spanning the Bikeway were rebuilt in 1997. There are three access points to the Bikeway in the vicinity of Downing Square: via a stair on the west side of the Park Avenue bridge and via ramps at Bow Street and the parking lot of 30 Park Avenue (Gold's Gym).

The Square is an active commercial and civic center for the community and acts as a bridge to the larger Arlington Heights business district. In the

immediate vicinity of the Square are retail, service industry, food, day care and a church (see Table 1).

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1. Peter Pan Superette, 2 Park Avenue 02474
 2. MacDonald Plumbing Company, 8 Park Avenue 02474
 3. PSMG Gun Company, 10 Park Avenue 02474
 4. Harry's Tailor Shop, 12 Park Avenue 02474
 5. Arlington Health Foods, 14 Park Avenue 02474
 6. Citgo, 19 Park Avenue 02476
 7. Gold's Gym, 30 Park Avenue, 02476
 8. Alpha Auto Body, 30 Park Avenue 02476
 9. Sunshine Cleaners, 40 Park Avenue 02476
 10. Arlington Coal & Lumber, 41 Park Avenue 02476
 11. Davison Insurance Agency, 1 Park Avenue Extension 02476
 12. Covenant Church & School, 9 Westminster Avenue 02474
 13. Chariot Adult Day Health Program, 20 Westminster Avenue 02474
 14. Arlington Heights Nursery School, 127 Lowell Street 02474
 15. Sun's Chinese Kitchen, 90 Lowell Street 02474
 16. Knight Chiropractic, 90 Lowell Street 02474
 17. Park West Salon, 90 Lowell Street 02474
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Table 1 Business List for Downing Square Area

Roadway volumes for the six approaches to Downing Square range from an average daily traffic of close to 12,000 vehicles on Park Avenue to just over 1,000 vehicles on Westminster Avenue. Park Avenue Extension, Lowell Street and Bow Street are roughly within the 3,000 to 6,000 vehicle range (see Table 2). Traffic speeds for the surrounding roadways range from 25 mph on one section of Bow Street to 39 mph on Lowell Street near Westmoreland Avenue.

Street	ADT (average daily traffic)	Speed (85th percentile)
Park Avenue	11,704	29
Park Avenue Extension	6,100	35
Lowell Street (west of Square)	5,193	39
Lowell Street (east of Square)	3,293*	34
Bow Street	3,551	25
Bow Street	3,132	33
Westminster Avenue	1,229	31

All data from Arlington Police Department traffic counts.

* Count taken during summer, so probably somewhat lower than average.

Table 2. Traffic Volume and Speed Counts

Five of the six roadways approaching the Square are controlled with stop signs. Only the Park Avenue approach is uncontrolled. Total crashes from 1990 to 2001 in Downing Square rank it the sixteenth most dangerous in the Town (see Appendix C). Between 2001 and 2003, there were 12 reported crashes in Downing Square (see Table 3).

	2001	2002	2003
Park Ave & Lowell St	2	1	2
Lowell St & Westminster Ave	0	0	0
Lowell St & Bow St	0	1	0
Park Ave Ext & Lowell St	0	1	2
Park Ave & Westminster Ave	0	1	0
Park Ave & Bow St	0	1	1
TOTAL CRASHES/YEAR	2	5	5

(data from Arlington Police Department)

Table 3. Downing Square Crash Data

For pedestrian and bicycle crashes from 1990 to 2001, the Square also ranks in the top twenty (see appendix C). More significantly, Downing Square is one of only two pedestrian and bicycle crash sites not along Massachusetts Avenue. There have been 4 reported pedestrian crashes in Downing Square during the past 10 years (see Table 4).

	date	time	day	conditions
Park Ave & Lowell St	03/11/96	7 PM	weekday	clear & dry
Park Ave & Lowell St	08/22/96	3 PM	weekday	clear & dry
Park Ave & Lowell St	04/21/99	10 AM	weekday	clear & dry
Park Ave Ext & Lowell St	05/20/03	7 PM	weekday	cloudy & dry

(data from MassHighway Operations and Safety Unit)

Table 4. Downing Square Pedestrian Crash Data

The number of reported crashes between 2001 and 2003 for the roadways connecting to Downing Square ranges from 2 on Westminster to 81 on Park Avenue (see Table 5).

	2001	2002	2003	Total
Bow Street	2	7	2	11
Lowell Street	7	5	9	21
Park Avenue	27	25	29	81
Park Avenue Extension	11	13	14	38
Westminster Avenue	1	1	0	2

(data from Arlington Police Department)

Table 5. Connecting Roadways Crash Data

Many of Downing Square’s transportation problems are due to its complex geometry. Motorists are unsure of the right-of-way, causing confusion and frustration. There are also significant visibility problems with many of the current approaches. Westbound motorists on Lowell Street can’t currently see oncoming Park Avenue traffic when stopped at the stop sign. This condition is often exacerbated by vehicles parked illegally near the corner. Motorists on Park Avenue Extension also can’t currently see traffic stopped on Westminster Avenue until they enter the intersection.

The pedestrian environment in Downing Square is perceived as unsafe by the neighbors. There are crosswalks on all six approaches, but many of the crosswalks are long, poorly sheltered from traffic and not easily visible from all approaches. Due to the proximity of the Nursery School, the Covenant School and the Peirce School, a Traffic Supervisor is on duty at the intersection in the morning and afternoon. Stop sign compliance in the Square is generally poor, with the worst approaches being from Park Avenue Extension and Lowell Street west of the Square.

A Town-wide inventory of Arlington’s principal and minor arterial roadways (see Table 6) reveals that two of the four roadways without continuous sidewalks on both sides intersect at Downing Square. Lowell Street west of the Square and Park Avenue between Massachusetts Avenue and Downing Square have sidewalks on only one side of the roadway.

Roadway	ADT (maximum)	Continuous sidewalk (N or E side)	Continuous sidewalk (S or W side)
Massachusetts Avenue	32,000	Y	Y
Mystic Street	24,000	Y	Y
Pleasant Street	22,500	Y	Y
Medford Street	20,500	Y	Y
Summer Street	18,000	N	N
Mill Street	13,000	Y	Y
Park Avenue	12,000	N	Y
Broadway	11,500	Y	Y
Lake Street	11,500	Y	Y
Park Ave Extension	6,000	Y	Y
Warren Street	6,000	Y	Y
Concord Turnpike	5,000	Y	n/a
Grove Street	5,000	N	Y
Lowell Street	5,000	N	N

Table 6. Sidewalk Inventory of Principal and Minor Arterial Roadways

No MBTA bus routes traverse Downing Square. The nearest public transportation is via Park Avenue to Massachusetts Avenue, where buses provide service to Harvard Square, Alewife Station and points west. It is important to note that the outbound Massachusetts Avenue bus stop is located on the east side of the Park Avenue intersection. The lack of sidewalk on the east side of Park Avenue thus requires riders disembarking from these buses to cross Park Avenue at Massachusetts Avenue in order to safely access Downing Square. The inbound Massachusetts Avenue bus stop is located on the west side of the intersection with Park Avenue, which provides better access to Downing Square via the existing sidewalk.

An inventory of the traffic signs in the area of Downing Square (see Figure 4) indicates several long-standing conditions. In the quarter mile stretch of Lowell Street between West Court Terrace and Nourse Road, there are four DANGER SLOW signs. In the quarter mile stretch of Westminster Avenue straddling Westmoreland Avenue there are four SPEED LIMIT signs and two CHILDREN warning signs. And Bow Street is posted at both ends with 20 MPH SPEED LIMIT signs and CAUTION CHILDREN signs. The signs are evidence of a pattern of excessive traffic speeds on these residential roadways.

PROCESS

Downing Square

Following receipt of a request from the Board of Selectmen in January of 2004, the TAC formed a Working Group to investigate and make recommendations for Downing Square. The Working Group held five independent meetings, conducted a public meeting that was attended by over fifty neighborhood residents, and hosted a portion of the September 2004 TAC meeting with several residents from the public meeting in attendance.

Information on the area from outside the Working Group was gathered through public meetings, personal interaction and email exchanges. The neighborhood was active and interested in the prospect of improving conditions in the area. As is often the case, this outreach led to the investigation of problems on the surrounding roadways. The TAC intends to submit a separate report to address these transportation problems.

Once the problems of the intersection were defined (see Table 7) the Working Group outlined three basic approaches to addressing them.

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- complex intersection geometry
 - unclear right-of-way for motorists
 - poor definition of space, excessive open pavement
 - poor motorist visibility of intersection from stop lines
 - poor stop sign compliance, especially on Park Ave Ext & Lowell St W
 - unsafe crosswalks, especially on Park Ave
 - unsafe and insufficient parking
-

Table 7 Perceived Problems

One approach utilized curb extensions between the roadways to improve the specific visibility problems within the intersection. Another approach reconfigured the Square into a mini-roundabout to clarify the intersection's right-of-way conflicts. A third approach converted some of the streets forming the Square into one-ways, reducing the number of conflicting traffic directions.

The three approaches were vetted by the Working Group, presented to the neighborhood at the Public Meeting and discussed by the TAC. The following conclusions were drawn.

1. The curb extension approach adequately addresses the intersection's poor definition of space, poor motorist visibility and unsafe crosswalks, but is less successful at addressing the complex geometry and unclear right-

of-way. This approach may increase stop sign compliance and increase parking safety.

2. The mini-roundabout approach adequately addresses the intersection's complex geometry, right-of-way conflicts, poor definition of space and poor motorist visibility, but presented insurmountable application problems. A properly designed mini-roundabout requires a 110' curb-to-curb diameter (see page C-1) to allow adequate space for sight lines and protected crosswalks. Unfortunately, Downing Square's curb-to-curb diameter is limited to 70' (measured diagonally between the convenience store and the Covenant Church). In addition, mini-roundabouts are designed to be used with yield signs instead of stop signs. Given the high pedestrian use, poor sight lines and lack of stop sign compliance in the current intersection, the neighborhood has been unwilling to accept additional potential risk to pedestrian safety that a roundabout could present.

3. The one-way street conversion approach addresses the intersection's complexity, but is less successful at addressing the line of sight, right-of-way and pedestrian safety. Westminster Avenue, Park Avenue Extension, Bow Street and Lowell Street east of the Square were all considered for one-way conversion. Although the TAC recognizes the advantages of reducing the intersection's complexity, we are reluctant to recommend this type of change in mobility unless it is absolutely necessary.

The working group and the TAC concluded that the curb extension approach would address many of the intersection's problems, while leaving open the option of one-way street conversions if and when they become necessary. However, the intersection is sufficiently complex that a trial of the modifications using inexpensive and temporary materials is advisable before committing to the plan. The trial should take place over several months to allow users of the intersection to acclimate to the changes and include part of the school year. If the trial is successful, then recommendations can be made for permanent modifications.

APPENDIX

Downing Square

- A. Darcy Devney letter of 18 November 2003
- B. Roundabout Information Sheet
- C. TAC "Crash Hot Spots"
- D. TAC "Pedestrian and Bicycle Crash Hot Spots"

November 18, 2003

To: Arlington Board of Selectmen

Re. Traffic Problems at 6-Way Intersection of Park Ave., Lowell, Westminster, Bow, Etc.

As you know, the 6-way intersection of Park Ave., Lowell St., etc., is a problematic intersection in Arlington Heights. I live in East Arlington and don't go through the intersection very often, but I think it should be a higher priority than it currently seems to be. I am formally requesting that you ask the Transportation Advisory Committee to study this intersection and make recommendations.

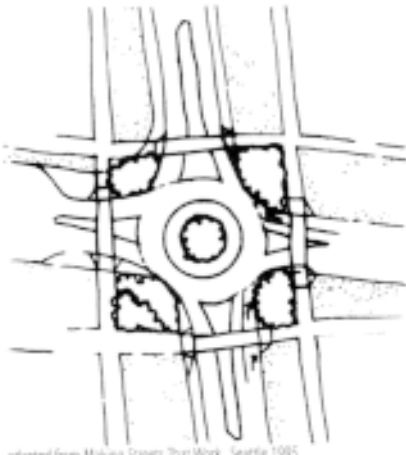
My own suggestion for the painful intersection is: Put a very small round Island in the middle of that intersection (what England would call a mini-roundabout). This would cut way down on accidents/near-accidents (and slow everyone down, plus pedestrians would get a clue as to where drivers are aiming for....). I normally do not approve of rotaries, but in this situation it is appropriate. I cannot be the only person that every thought of that solution. As for cost - do it today, use 3 or 5 of the orange barrels filled with sand and puit up a few rotary signs as a test for a few months. Simple temporary fixes would take less than 2 days and very little money, so I am hoping this can be accomplished before significant snowfall, or at the least by the end of 2004.

Thank you for your time and attention to this matter. If you have any questions, you may call me at 781.641.0045.

Sincerely,

Darcy C. Devney

110 Thorndike St
Arlington, MA



adapted from Making Streets That Work, Seattle 1995

Roundabout and Mini-Roundabout

A roundabout is a circular, raised island with deflector islands that form a hub for the traffic that flows around it and the streets that shoot off it. Roundabouts are located at the intersection of a collector or arterial street with one or more crossing roadways.

As with mini-circles on collector or residential streets, traffic circulates within roundabouts in a counter-clockwise direction and exits the roundabout by turning right onto the desired street. Therefore, no left-turning movements are needed. Unlike a signalized intersection, drivers select gaps in the traffic to enter the roundabout from each approaching street without having to stop.

Roundabouts are usually less expensive to install and maintain than traffic signals. They reduce crashes 50-90% at intersections previously controlled with traffic signals or stop signs. They can also handle 30% more traffic than intersections with signals and eliminate the need to widen roads to increase intersection capacity.

Roundabouts need to be constructed to accommodate pedestrians and bicyclists with crossing points and medians. Crosswalks should be placed about one car length beyond the yield line so that drivers exiting the roundabout have a full view of pedestrians. The design should not permit a motorist to travel faster than 15-20 mph.

■ Used for

- Managing vehicle movements where the existing intersection is unusually large, complex and/or has more than four approach legs.
- Improving an existing signalized or four-cross intersection which is experiencing heavy traffic backup and congestion.
- Improving safety of motorists, pedestrians and bicyclists.
- Creating a gateway into a downtown, neighborhood, waterfront or other area.
- Increasing pedestrian access across complex roadways.

■ Considerations

- Street widths and/or available right-of-way need to be sufficient for a properly designed roundabout. Generally, all size vehicles and turning movements are supported with 110' from two diagonal corners. Smaller spaces can accommodate a roundabout, especially if the design vehicle or certain turns are restricted.
- Vehicle deflection must be set to reduce speed to 15-18 mph.
- Larger deflections create safety problems for all users.
- Use splitter islands entering and exiting roundabout to control deflection and turning movements.

■ Cost

- A landscaped roundabout ranges from \$45,000 to more than \$150,000. Can often be built for less than the cost of installing conventional signal system.



This Fort Pierce, Florida, roundabout was constructed to reduce speeding, improve safety, and enhance the aesthetics of the community.



Crash "Hot Spots" Town of Arlington (1990-2001)

Notes:
 1. Crash information comes from summaries of motor vehicle accident reports filed with the Commonwealth. It covers the 12 years from 1990-2001.
 2. This chart only shows the 25 "hot spots" with 30 or more crashes; it does not depict all crashes that occurred. These "hot spots" account for approximately 16% of all reported crashes.

Mass / Pleasant / Mystic	230
Mass Ave / Park Ave	103
Mass Ave / Jason / Mill	87
Mystic / Summer St	78
Summer St / Park Ave Ext	76
Mass Ave / Lake St	72
Park Ave / Appleton St	56
Pleasant St / Rt 2	52
Lake St / Rt 2	51
Summer /Brattle / Hemlock	46
Mystic Valley Pkwy / Medford	44
Mass Ave / Orvis / Grafton	43
Mass Ave / Brattle St	43
Medford St / Warren St	43
Mass Ave / Cleveland St	39
Park / Lowell / Bow / Westm'er	39
Mystic St / Winslow St	36
Mass Ave / Grove St	36
Summer St / Grove St	36
Mystic Valley Pkwy / River	34
Mass Ave / Appleton St	34
Park Ave / Oakland	33
Mass Ave / Highland Ave	33
Mass Ave / Water St	30
Mass Ave / Franklin St	30





location	ped	bike
Mass / Pleasant / Mystic	9	4
Mass Ave / Orvis / Grafton	7	4
Mass Ave / Park Ave	5	3
Mass Ave / Marathon St	7	0
Mass Ave / Grove / Coleman	6	0
Mass Ave / Highland Ave	4	2
Mass Ave / Water St	6	0
Mass Ave / Academy St	3	2
Mass Ave / Appleton St	3	2
Mass Ave / Bartlett Ave	4	1
Mass Ave / Jason / Mill	4	1
Mass Ave / Lake St	4	0
Mass Ave / Cleveland St	4	0
Mass Ave / Davis St	4	0
Mass Ave / Wyman	4	0
Minuteman Bikeway / Mill St	1	3
Mass Ave / Brattle St	3	0
Mass Ave / Forest St	0	3
Mass Ave / Foster / Linwood	3	0
Park / Lowell / Bow / Westm'er	3	0

- Notes:
- Crash information comes from summaries of motor vehicle / pedestrian and motor vehicle / bicycle accident reports filed with the Commonwealth. It does not include pedestrian or bicycle falls, or collisions where no motor vehicle was involved. It covers the 12 years from 1990-2001.
 - This chart shows the 20 "hot spots" with 3 or more reported crashes; it does not depict all crashes that occurred. These "hot spots" account for approximately 36% of all reported motor vehicle / pedestrian crashes and approximately 18% of all motor vehicle / bicycle crashes.

Pedestrian & Bicycle Crash "Hot Spots" Town of Arlington (1990-2001)

