6 HIGH-OCCUPANCY-VEHICLE (HOV) LANES AND TRAVEL DEMAND MANAGEMENT (TDM) PROGRAMS

Travel demand management (TDM) programs enable roadways, which have a fixed capacity, to accommodate more travelers without increasing traffic congestion. TDM programs accomplish this in three ways: (1) by encouraging the use of high-occupancy vehicles, which means that more people need to rideshare (either in private vehicles such as cars or vans, or by using mass transit), so that fewer vehicles are on the road; (2) by encouraging travelers to consider—when possible for particular trips—either making the trip during off-peak (low-demand) time periods or not making the trip at all (for example, telecommuting); and (3) by supporting a travel mode shift to nonmotorized means of travel, such as bicycling and walking.

The Boston area has programs that support all of these TDM approaches. One program is the use of HOV lanes along the I-93 corridor; these lanes handle inbound traffic approaching downtown Boston from the north and the south during the morning peak period, and outbound traffic traveling southbound from Boston during the evening peak period. Another program, administered by Mass*RIDES* (previously by CARAVAN for Commuters) and various transportation management associations (TMAs), involves assisting employers and commuters to engage in TDM activities.

Section 6.1 reports the results of HOV lane monitoring (data collection) and performance. In Section 6.2, the following state-supported TDM initiatives are described: commuter education, information, and ridematching; worksite-based programs; the vanpool program; and TMA services.

6.1 HIGH-OCCUPANCY-VEHICLE (HOV) LANES

Two HOV lanes operate in the Boston metropolitan region: a reversible, barrier-separated lane on I-93/Southeast Expressway that connects downtown Boston and Route 3 at the Braintree split interchange, and a southbound, buffer-separated lane on I-93 North that approaches Boston from the north (see Figure 6.1). MassHighway constructed these lanes to encourage ridesharing and to improve the flow of general-purpose traffic along the I-93 corridor.

6.1.1 Background and Description of HOV Operations

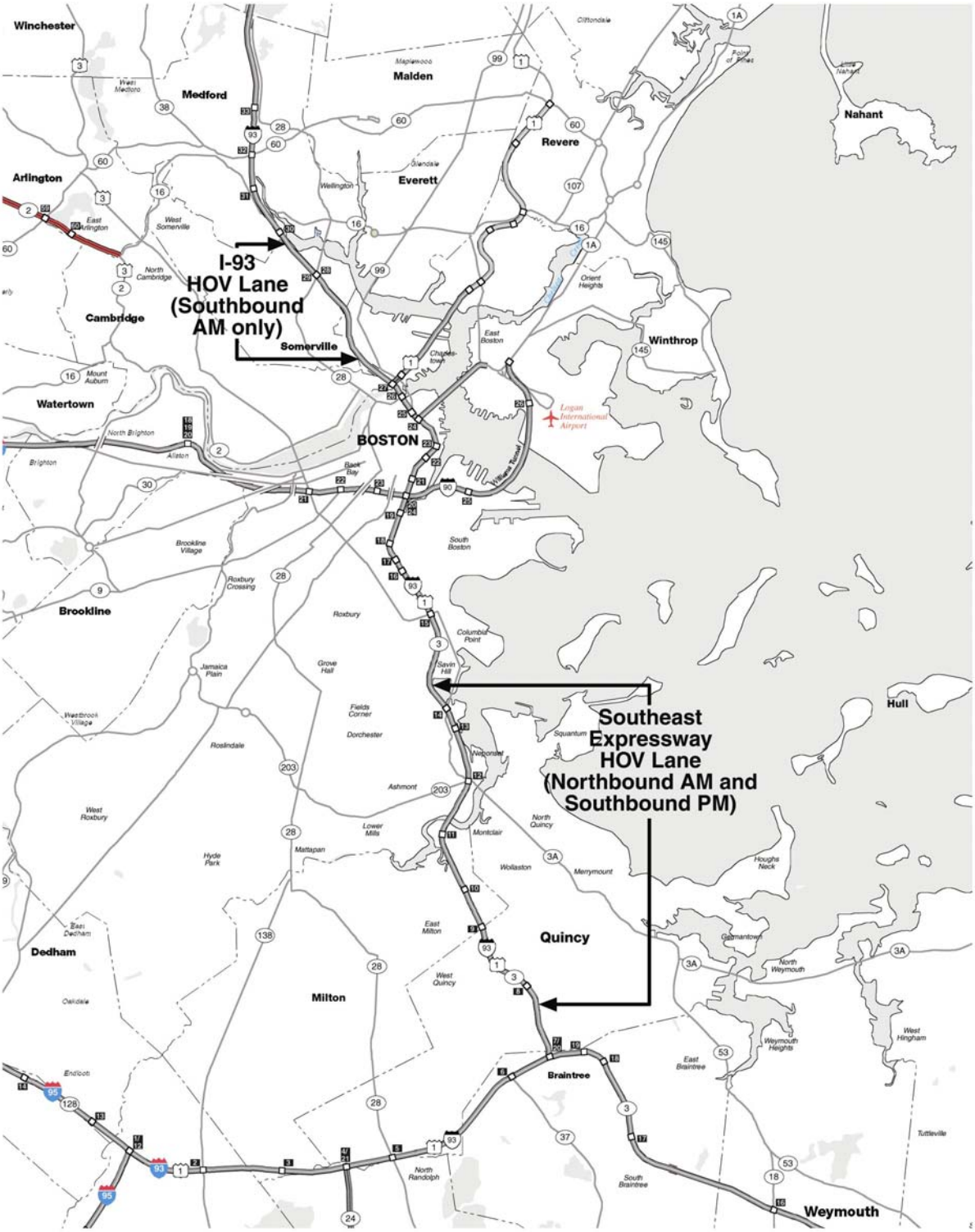
MassHighway opened the HOV lanes in 1995. At first, only vehicles with three or more occupants were allowed to use them.[1] On June 1, 1999, MassHighway changed the occupancy requirement to allow any vehicle with two or more occupants to use the lanes (without any special permits); this did not result in any negative effects to either the general-purpose or HOV lanes.[2]

The 5¼-mile-long I-93/Southeast Expressway HOV lane has one terminus south of Columbia Road (Exit 15) and another located south of Furnace Brook Parkway (Exit 8) in Quincy just north of the Braintree Split (Exit 7) and Route 3 (Exit 20). On weekdays (except some holidays), it is open to northbound traffic between 6:00 AM and 10:00 AM and to southbound traffic between 3:00 PM and

[1] With the exception of a limited number of permits (stickers) for two-vehicle carpools that were valid on alternate days (arbitrarily assigned to either the odd or even calendar days).

[2] Tom Lisco and Kate Wall, "Short-Term Speed and Travel Time Effects of the Change to a Two-Plus Occupancy Requirement for Use of the Southeast Expressway Carpool Lane," a memorandum prepared by the Central Transportation Planning Staff for Luisa Paiewonsky, then Director of MassHighway's Bureau of Transportation Planning and Development, June 9, 1999.

Figure 6.1. HOV Lane System in the Boston Area



Graphic by Kenneth A. Dumas, 2002.

7:00 PM. The HOV lane's contraflow system "borrows" a freeway lane from the general-purpose lanes in the off-peak direction and converts it to a peak-direction HOV lane that is open to carpools, vanpools, buses, and motorcycles.

The two-mile I-93 North HOV lane runs southbound between the Mystic Avenue on-ramp in Medford and the Lower Deck at the I-93/Route 1 merge in Boston. The I-93 North HOV lane is open to vehicles with two or more occupants and to all motorcycles between 6:00 AM and 10:00 AM, Monday through Friday. The lane is open to all traffic at all other times.

MassHighway continuously monitors the traffic volumes of the I-93/Southeast Expressway HOV lane. Before June 1, 1999, when the occupancy rule of the HOV lane changed, the lane carried an average daily total of about 3,500 high-occupancy vehicles. The total volume increased after that date, and from 2001 to 2003 it remained stable, at a daily average of about 8,700. This volume corresponds to an estimated daily average of 33,660 persons. Approximately 95 percent of the vehicles are automobiles with carpooling passengers; the remainder includes vanpool vans, public and private transit buses, and motorcycles. (No volume data are available for the I-93 North HOV lane.)

Based on vehicle occupancy counts from an October 30, 2003, survey by CTPS, 21,142 vehicles traveled northbound in the four general-purpose lanes of I-93/Southeast Expressway between 6:00 AM and 10:00 AM, corresponding to an estimated 23,406 occupants—a ratio of 1.11 occupants per vehicle. That same morning, 4,193 vehicles traveled in the HOV lane, a volume that carried an estimated 12,451 occupants—a ratio of 2.97 occupants per vehicle.

6.1.2 HOV Lane Performance Measure: *Travel Time Savings*

HOV lanes are located along the same corridor as general-purpose freeway lanes. Thus, a direct method of assessing performance is to compare the average travel time for vehicles using the HOV lane to the average travel time for vehicles driving in the general-purpose lanes. The intended benefit of the HOV lane is that it can provide a shorter travel time over the usually congested general-purpose lanes.

According to a Massachusetts Department of Environmental Protection regulation,[3] the HOV lanes must provide a travel time savings of at least one minute per mile compared to the general-purpose lanes.

6.1.3 Data Collection Method

Seasonal performance data are collected on the two HOV lanes as part of an ongoing, mandated monitoring program. Travel time data samples are obtained by using probe vehicles. During the hours of operation of the HOV lanes, these vehicles drive in both the I-93 general-purpose lanes adjacent to the HOV lane and the HOV lanes themselves, collecting travel speeds through the use of global positioning system (GPS) equipment. In addition, other users of the HOV lanes, such as MBTA express bus riders and CARAVAN-sponsored vanpool participants, have provided travel time data for the HOV lanes.

6.1.4 HOV Lane Corridor Travel Time Observations

The travel time observations presented here are from the years 2002 and 2003. The 2002 data were collected before the opening of the northbound lanes of the Central Artery tunnel, which occurred in March of 2003, and 2003 data were collected after the tunnel opened.

[3] Massachusetts Department of Environmental Protection (DEP) regulation 310 CMR 7.37 calls for a sample of HOV and adjacent general-purpose-lane travel time data to be collected throughout the year. This data should represent weekday commuter travel periods during the operation times of the HOV lanes.

The following three tables (Tables 6.1–6.3) provide a summary of HOV-lane corridor operations in 2002 and 2003, organized by half-hour, hour, and full operation time periods. The summary accounts for both spring and fall data collection; these collection times generally correspond to the data collection periods for the CMS arterial roadways.

For I-93 North southbound traffic, the savings in travel time in the HOV lane seem to have improved between 2002 and 2003. The HOV travel times have not seemed to change, but the general-purpose lane travel times have increased.

The I-93/Southeast Expressway traffic seemed to remain more consistent between 2002 and 2003 than the I-93 North HOV lane traffic, in both the morning and evening peak directions. The observations show an improvement in travel-time savings of the HOV lane over the general-purpose lanes, particularly between the hours of 7:00 AM and 9:00 AM, for northbound traffic, and between 3:30 PM and 6:00 PM for traffic headed southbound from Boston.

Table 6.1. Average Travel Times in I-93 North HOV Lane Corridor, Southbound, Morning

Time Periods *AM*	Spring and Fall 2002			Spring and Fall 2003		
	Average Travel Time (min.)		Average Travel Time Savings in HOV Lane	Average Travel Time (min.)		Average Travel Time Savings in HOV Lane
	HOV Lane	General-Purpose Lanes		HOV Lane	General-Purpose Lanes	
6:00–6:30	03:42	04:19	00:37	06:58	06:28	No avg. savings
6:30–7:00	06:00	07:10	01:10	05:36	09:35	03:59
6:00–7:00	*05:05*	*06:36*	*01:31*	*05:55*	*07:24*	*01:29*
7:00–7:30	07:25	08:37	01:12	06:13	08:57	02:44
7:30–8:00	10:20	11:55	01:35	05:18	12:41	07:23
7:00–8:00	*08:08*	*09:30*	*01:22*	*05:57*	*10:49*	*04:52*
8:00–8:30	05:47	09:59	04:12	05:45	12:10	06:25
8:30–9:00	06:05	10:08	04:03	04:04	15:21	11:17
8:00–9:00	*05:57*	*10:04*	*04:07*	*04:50*	*14:05*	*09:15*
9:00–9:30	03:24	08:59	05:35	03:49	17:05	13:16
9:30–10:00	03:10	07:57	04:47	02:32	12:17	09:45
9:00–10:00	*03:17*	*08:33*	*05:16*	*03:21*	*14:41*	*11:20*
6:00 to 10:00	**06:00**	**08:44**	**02:44**	**05:28**	**12:01**	**06:33**

Table 6.2. Average Travel Times in I-93/Southeast Expressway HOV Lane Corridor, Northbound, Morning

Time Periods *AM*	Spring and Fall 2002			Spring and Fall 2003		
	Average Travel Time (min.)		Average Travel Time Savings in HOV Lane	Average Travel Time (min.)		Average Travel Time Savings in HOV Lane
	HOV Lane	General-Purpose Lanes		HOV Lane	General-Purpose Lanes	
6:00–6:30	08:17	11:28	03:11	07:11	10:06	02:55
6:30–7:00	09:52	17:37	07:45	09:16	17:08	07:52
6:00–7:00	*09:24*	*14:32*	*05:08*	*08:01*	*13:53*	*05:52*
7:00–7:30	09:27	15:20	05:53	07:32	14:23	06:51
7:30–8:00	09:30	13:33	04:03	08:38	15:26	06:48
7:00–8:00	*09:28*	*14:18*	*04:50*	*08:03*	*14:57*	*06:54*
8:00–8:30	09:07	17:37	08:30	12:16	23:11	10:55
8:30–9:00	06:30	11:48	05:18	07:34	14:14	06:40
8:00–9:00	*08:18*	*14:56*	*06:38*	*09:04*	*18:13*	*09:09*
9:00–9:30	06:25	09:05	02:40	08:24	15:14	06:50
9:30–10:00	05:54	09:03	03:09	05:38	06:37	00:59
9:00–10:00	*06:08*	*09:04*	*02:56*	*06:49*	*10:56*	*04:07*
6:00 to 10:00	**09:06**	**13:25**	**04:19**	**08:01**	**13:50**	**05:49**

Table 6.3. Average Travel Times in I-93/Southeast Expressway HOV Lane Corridor, Southbound, Evening

Time Periods *PM*	Spring and Fall 2002			Spring and Fall 2003		
	Average Travel Time (min.)		Average Travel Time Savings in HOV Lane	Average Travel Time (min.)		Average Travel Time Savings in HOV Lane
	HOV Lane	General-Purpose Lanes		HOV Lane	General-Purpose Lanes	
3:00–3:30	07:15	09:36	02:21	06:06	09:48	03:42
3:30–4:00	07:04	11:44	04:40	08:06	13:10	05:04
3:00–4:00	*07:09*	*10:32*	*03:23*	*07:36*	*11:09*	*03:33*
4:00–4:30	07:52	12:46	04:54	07:08	13:27	06:19
4:30–5:00	06:53	10:36	03:43	07:18	15:01	07:43
4:00–5:00	*07:18*	*11:31*	*04:13*	*07:13*	*13:54*	*06:41*
5:00–5:30	07:50	13:03	05:13	07:59	15:09	07:10
5:30–6:00	07:12	12:09	04:57	07:50	17:52	10:02
5:00–6:00	*07:37*	*12:36*	*04:59*	*07:56*	*15:54*	*07:58*
6:00–6:30	07:04	09:39	02:35	08:51	14:21	05:30
6:30–7:00	06:39	09:21	02:42	06:59	07:43	00:44
6:00–7:00	*06:49*	*09:31*	*02:42*	*08:19*	*10:44*	*02:25*
3:00 to 7:00	**07:21**	**11:02**	**03:41**	**07:38**	**12:23**	**04:45**

6.2 TRAVEL DEMAND MANAGEMENT (TDM) PROGRAMS

A key component of congestion mitigation and mobility improvement is the application of travel demand management (TDM) programs, which help to reduce the demand for drive-alone (also known as single-occupant-vehicle or SOV) travel on roadways by offering alternatives to driving alone.

In order to facilitate the implementation of TDM activities, the Commonwealth of Massachusetts sponsors a statewide commuter services program to help educate travelers and provide them with alternatives to driving alone. Through 2003, a nonprofit organization, CARAVAN for Commuters, Inc. (CARAVAN), provided these services. Since January 2004, URS Corporation has been under contract with MassHighway to manage the new statewide travel options program, called Mass*RIDES*. The new travel options contract refocuses the program on delivering customized services to travelers.

Mass*RIDES* is funded through the Massachusetts Highway Department and the Federal Highway Administration to provide TDM program assistance to commuters, employers, and noncommuter populations that need assistance with travel throughout the commonwealth. Its TDM programs and services are offered at no charge to all Massachusetts commuters and to the business community, including commuters and businesses in the Boston region. These programs aim to improve air quality, reduce traffic congestion, and maximize mobility. A detailed description of Mass*RIDES*'s services is provided in this section.

6.2.1 Description of Services

6.2.1.1 Commuter Education, Information, and Ridematching

Mass*RIDES* provides commute planning assistance directly to commuters through its statewide commuter information line (1-888-4-COMMUTE), which serves as a single source of information on over 50 public and private transportation providers statewide. An obstacle to ridesharing is finding someone with whom to share a ride. Commuters interested in alternatives to driving solo can receive a match-list from the statewide ridematching database (information on people with whom they may carpool or vanpool) or information on transit options. Phone callers can receive bilingual assistance on weekdays during Mass*RIDES*'s hours of operation, and after hours they can be automatically connected to other transportation agencies around the state. The program's website, www.commute.com, gives commuters direct access to ridematching capabilities.

6.2.1.2 Worksite-Based Programs

Mass*RIDES* does extensive outreach to dense employment sectors throughout Massachusetts. Outreach coordinators work throughout the state in: Lowell and north suburban areas throughout the northeastern part of the state; Worcester, Springfield, and other western Massachusetts communities; the southern regions of Brockton, Fall River, New Bedford, Cape Cod, and the islands; and the Boston metropolitan area. Staff members provide consultation and analysis of worksite conditions, map commuters' home locations and travel patterns, and identify opportunities for expanding on-site travel options programs. They also provide ongoing technical assistance to businesses on such initiatives as: on-site ridematching, program marketing, travel incentives, tax benefits, parking management strategies, alternative-work-hour programs, on-site transit pass programs, telework assistance, and shuttle analyses. A Mass*RIDES* training series began in the fall of 2004; the series consists of small workshops on transportation issues affecting local businesses in different geographic districts, and larger training seminars on transportation issues shared by common industry partners (e.g., university communities).

6.2.1.3 Vanpool Program Operation

Mass*RIDES* helps commuters form vanpools, recruits drivers and riders, and coordinates third-party, company-sponsored, and/or owner-operated vanpool programs. Currently, more than 40 vans have origins or destinations in urban and suburban locations in the Boston region, with an average daily round-trip mileage of 113 miles. Significant vanpool markets include commuters traveling from Cape Cod, southern New Hampshire, Worcester, and west of Worcester.

According to CARAVAN, the number of Massachusetts vanpools and vanpool commuters has been decreasing over the past few years, a trend consistent with the national trend. Typically, vanpools appeal to commuters with long trips. Therefore, as the Worcester and Old Colony commuter rail extensions were completed, CARAVAN believed many vanpool commuters switched to commuter rail. Mass*RIDES* is working aggressively to build the fleet of vans from its current level.

To further support ridesharing initiatives, CARAVAN secured over 100 free and discounted parking spaces, in cooperation with the Central Artery/Tunnel Project, MassHighway, the MBTA, the City of Boston, the Massachusetts Turnpike Authority, and private property managers. *MassRIDES* is working with the City of Boston to establish specially-designated boarding areas for vanpools.

6.2.1.4 TMA Services

Mass*RIDES* offers training, guidance, and technical assistance to all of the local urban and suburban TMAs throughout the state, and offers marketing and promotional materials that can be customized to meet the unique needs of each business district served by a TMA. It also offers ongoing technical support to TMAs for their delivery of commuter services, including ridematching services, mapping of member origin locations, commuter tax benefits, incentives for operating programs, vanpool formation, and on-worksite commuter assistance.

Most TMAs offer ridematching, emergency-ride-home programs, mode incentives, and public transit information; several also operate shuttles.[4] The TMAs that offer these services and the areas where they recruit member companies are the following:

- 128 Business Council – Lexington, Needham, Newton, Waltham, and Wellesley
- Artery Business Committee (ABC) TMA – Boston's downtown/financial district and the Back Bay neighborhood
- Charles River TMA – Cambridge
- CommuteWorks/MASCO – Boston's Longwood medical and academic area
- Logan Airport Employee TMA – Logan Airport
- MetroWest/495 TMA – Ashland, Framingham, Holliston, Hopkinton, Hudson, Marlborough, Natick, Southborough, and Westborough
- Neponset Valley TMA – Canton, Norwood, and Westwood
- Seaport TMA – South Boston waterfront
- TranSComm (Transportation Solutions for Commuters, Inc.) – Boston University Medical Center (South End)

[4] Consult www.commute.com or www.masscommute.com for details on the services.

6.2.2 Utilization of TDM Services: Ridematching, Vanpools, and Suburban Transit Shuttles

6.2.2.1 Ridematching

CARAVAN's statewide ridematching database averaged about 1,300 to 1,500 commuters each year. In the first nine months of operation, Mass*RIDES* increased the size of the ridematching database to approximately 3,000 commuters.

CARAVAN reported that in 2002, 82 percent of commuters who requested ridematching assistance received information on at least one alternative option to driving alone. Furthermore, 33 percent of commuters seeking ridematching assistance from CARAVAN either switched from driving alone or a began a new shared-ride commute. The mode shift percentage fluctuated a few percentage points from year to year, but regularly exceeded the national average of about 25 percent. Commuters who switched from driving alone or who began a new commute chose the following travel options: bus (37 percent), carpool (19 percent), commuter rail (26 percent), subway (9 percent), and vanpool (9 percent).

6.2.2.2 Vanpools

According to a 1995 memorandum from CTPS to MassHighway that reported on CARAVAN's activities between 1994 and 1995, 144 vans were in operation in March 1995.[5] CARAVAN vanpool surveys regularly found average trip lengths of 100–110 roundtrip miles daily.

In 2004, Mass*RIDES* reported operating 40 vanpools, with an average daily roundtrip of 113 miles. Mass*RIDES* staff commented that the number of vanpools and vanpool commuters in Massachusetts has been decreasing over the past few years. This trend is consistent with national vanpool trends, which also have experienced declining numbers. In eastern Massachusetts this trend can be attributed, in part, to the extensions of the Worcester and Old Colony commuter rail lines; many of the vanpool commuters are believed to have switched to commuter rail, since vanpools typically appeal to commuters with long trips. Another contributor to the decline in vanpool numbers is simply the increase of employment areas in the suburbs.

6.2.2.3 Suburban Transit: Shuttle Services

Ridership on four different suburban transit shuttles is reported in CTPS's *Suburban Transit Opportunities Study*.[6] The results are as follows:

- The two Alewife Shuttles of the Route 128 Business Council TMA carried an average of 326 passengers a day during the first six months of 2003.
- The Burlington "B" Line ridership averaged 250 to 275 boardings per day between 1995 and 2000.
- The Town of Framingham's LIFT service's Route 7, which is promoted by the Metrowest/495 TMA, averaged 201 passengers per day in fiscal year 2003.
- The two lines of the Natick Neighborhood Bus handled an average of 118 boardings a day, based on October 2002 numbers. The routes were reorganized in late 2003.

[5] Alicia P.Wilson, "Effectiveness of CARAVAN's Services and Programs in Assisting Commuters with Alternative Transportation Options," a memorandum from CTPS to MassHighway's BTP&D, September 28, 1995.

[6] Steven D.Santa Maria, *Suburban Transit Opportunities Study,* CTPS, 2004.