4 ROUTE 28 ORIGIN-DESTINATION TRAVEL PATTERNS

One of the concerns discussed early on by the Advisory Committee was the role of Route 28 as a facility serving both regional travel needs and those of area residents. It was felt that Route 28 is used as a "release valve" for traffic diverting off of I-93 at times of incidents on that freeway or at times of extreme congestion during special events in the Boston core. In addition, committee members and citizens expressed concern about the modification of use and redesign of Rutherford Avenue and the impacts of that Charlestown improvement on Route 28. Furthermore, committee members favored a vision of Route 28 being transformed from a higher-volume, higher-speed, "other freeway"–class roadway into a boulevard with enhanced urban design and aesthetic improvements.

In order to be able to assess these concerns and this vision in the context of actual travel pattern data, the Advisory Committee and staff designed an origin-destination study based on a vehicle license plate survey. More specifically, the purpose of the survey was twofold: it would identify the origin town of drivers observed on Route 28 at selected locations, and it would match vehicles observed at selected locations. The objective of the first task would be to identify the Route 28 market area; the objective of the second task would be to find the extent to which the roadway is used for long-distance travel that may actually "belong" on I-93.

Staff conducted the survey at two roadway locations along Route 28 southbound, on June 3, 2003, between 7:00 AM and 9:00 AM. Note that the survey was taken after demolition of the Rutherford Avenue viaduct at Sullivan Square and before the opening of the Central Artery tunnel. Patterns were likely different from what they had been before the demolition and were likely worse than they have been since the opening of the tunnel.

The two data collection locations were the pedestrian bridge over Route 28 (located west of Broadway) and in front of the Museum of Science building (between Gilmore Bridge and Museum Way). Images of the license plates of vehicles passing the survey locations were recorded on videotape and then later transcribed and analyzed.

4.1 DATA COLLECTION

Staff used special-purpose video camcorders to record images of license plates of vehicles passing the two survey locations. The survey was conducted simultaneously at the two locations to capture southbound commuter traffic on Route 28 headed towards Cambridge, Boston, and other points south. Three cameras were used at each location, one for each lane of traffic. Each camera was aimed and focused to record images of license plates. Twelve hours of license plate data was captured on video by the six cameras (two hours on each camera). The survey took place during

the morning peak period, when travel is more concentrated in time and space and, therefore, patterns are easier to identify.

Each legible license plate number on the videotapes was transcribed. In addition, the videotapes were used to count the total number of vehicles on the roadway. The license plate numbers were entered into an Excel computer file.

4.2 SURVEY RESULTS AND ANALYSIS

Table 4.1 shows the statistical significance of the data. The table lists the total number of vehicles observed, the number of plates read, the number of plates matched for each survey location, and the margin of error for the 95 percent confidence level for the origin data. The 95 percent confidence level means that for any location, the estimate of the proportion of vehicles originating in any given community falls within the range of plus or minus the margin of error 95 percent of the time.

Table 4.1 Traffic and License Plate Statistics

Route 28 Location	Observed Vehicles	Vehicle Plates Read	Read Rate	Vehicle Plates Matched	Match Rate	Margin of Error
Pedestrian bridge (Between Broadway and Pearl Street)	5,777	5,540	96%	4,782	83%	±0.6%
Museum of Science (Between Land Boulevard and Museum Way)	3,645	3,124	86%	2,801	77%	±0.9%

At the pedestrian bridge location 96 percent of the license plates were readable; at the Museum of Science location 86 percent of the plates were readable.

The readable license plate data were matched with Registry of Motor Vehicles (RMV) files to determine the community in which each vehicle is garaged. These data are used as way of determining the origin of the vehicle trip. The pedestrian bridge location had a match rate of 83 percent of the total observed traffic, and the Museum of Science location had a match rate of 77 percent. The lower match rate at the Museum of Science is due to the lower percentage of readable plates. At this location the pavement markings for the lanes were not well defined, so vehicles did not stay within a defined lane, and focusing the cameras on the license plates was difficult.

Matching between the counting stations indicated that there were 520 vehicles that passed by the pedestrian bridge location and continued through the Museum of Science location. Table 4.2 shows the origin communities of the vehicles observed at both survey locations.

Table 4.2 Vehicles Matched between the Two Survey Locations

Community	Vehicles	Percent
Medford	85	16%
Malden	75	14%
Somerville	72	14%
Melrose	31	6%
Everett	22	4%
Boston	20	4%
Stoneham	15	3%
Wakefield	11	2%
Woburn	8	2%
Reading	8	2%
Revere	7	1%
Winchester	6	1%
North Reading	6	1%
Cambridge	6	1%
Other Mass. communities	101	20%
Non-matched plates to RMV*	47	9%
Total:	**520**	**100%**

* These plates, while matched at both locations, could not be matched with RMV data.

Tables 4.3 and 4.4 show the origin communities of vehicles observed at each location, based on the September 2003 RMV file for vehicle garaging. The origins for each city and town are listed by total number and percentage. Tables 4.5 and 4.6 contain Boston-neighborhood-specific information based on the origin-community zip codes from the same RMV file. Figures 4.1 and 4.2 are graphical representations of the origins of vehicles.

Table 4.3 Origins of Vehicles at Pedestrian Bridge

Community	Vehicles	Percent
Malden	618	13%
Medford	529	11%
Somerville	490	10%
Melrose	272	6%
Everett	259	5%
Stoneham	173	4%
Woburn	149	3%
Boston	135	3%
Cambridge	127	3%
Revere	105	2%
Reading	104	2%
Wakefield	104	2%
Wilmington	99	2%
Andover	95	2%
Winchester	90	2%
Lynn	82	2%
Billerica	79	2%
Saugus	71	1%
Chelsea	68	1%
Tewksbury	68	1%
Burlington	67	1%
North Andover	60	1%
North Reading	59	1%
Haverhill	50	1%
Peabody	48	1%
Methuen	47	1%
Arlington	42	1%
Lowell	42	1%
Chelmsford	34	1%
Dunstable	29	1%
Salem	29	1%
Danvers	25	1%
Other Mass. communities	511	11%
Total:	**4,782**	**100%**

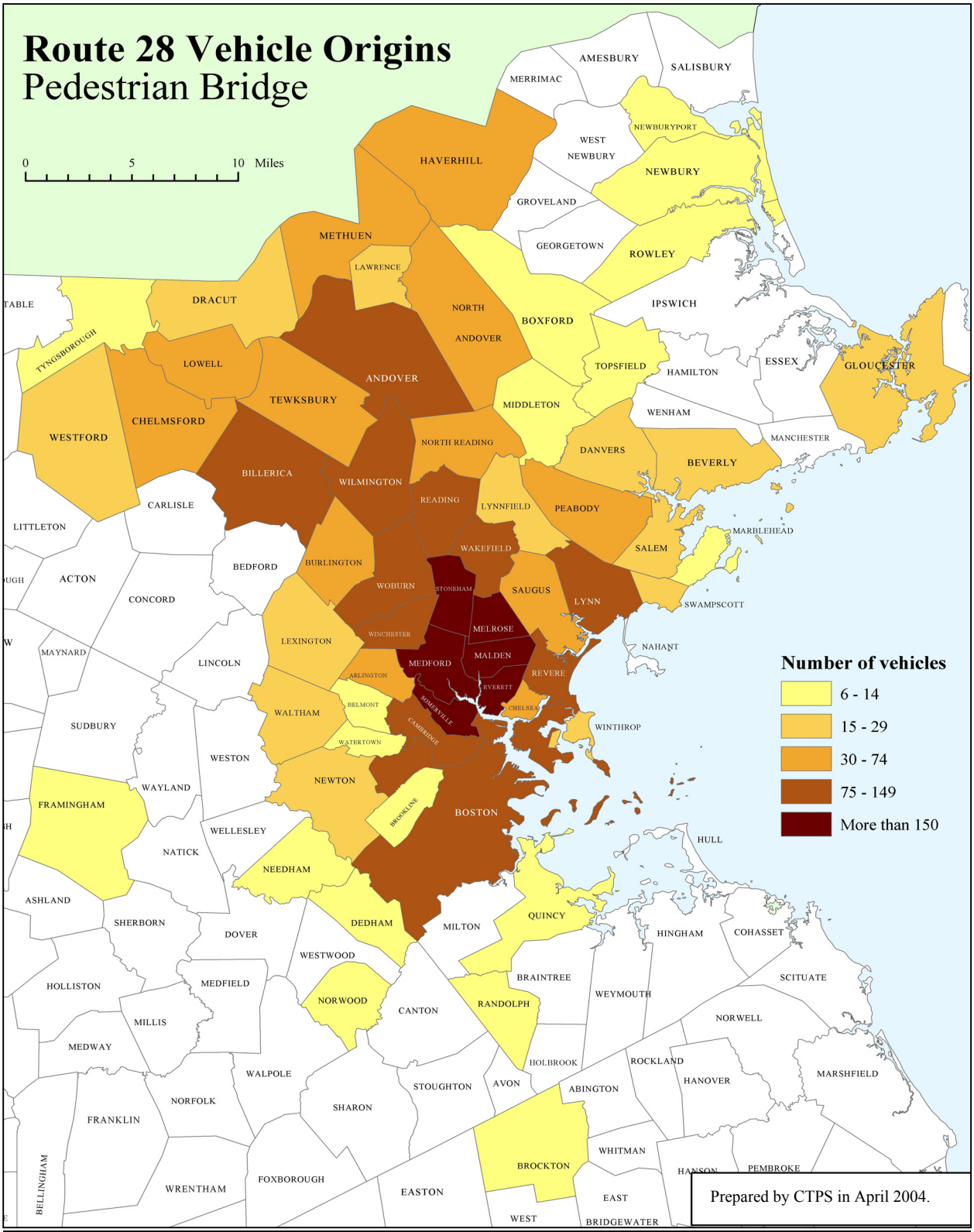

FIGURE 4.1
Route 28 Vehicle Origins:
Pedestrian Bridge Survey Station

CTPS

Toward a Route 28 Corridor Transportation Plan: An Emerging Vision

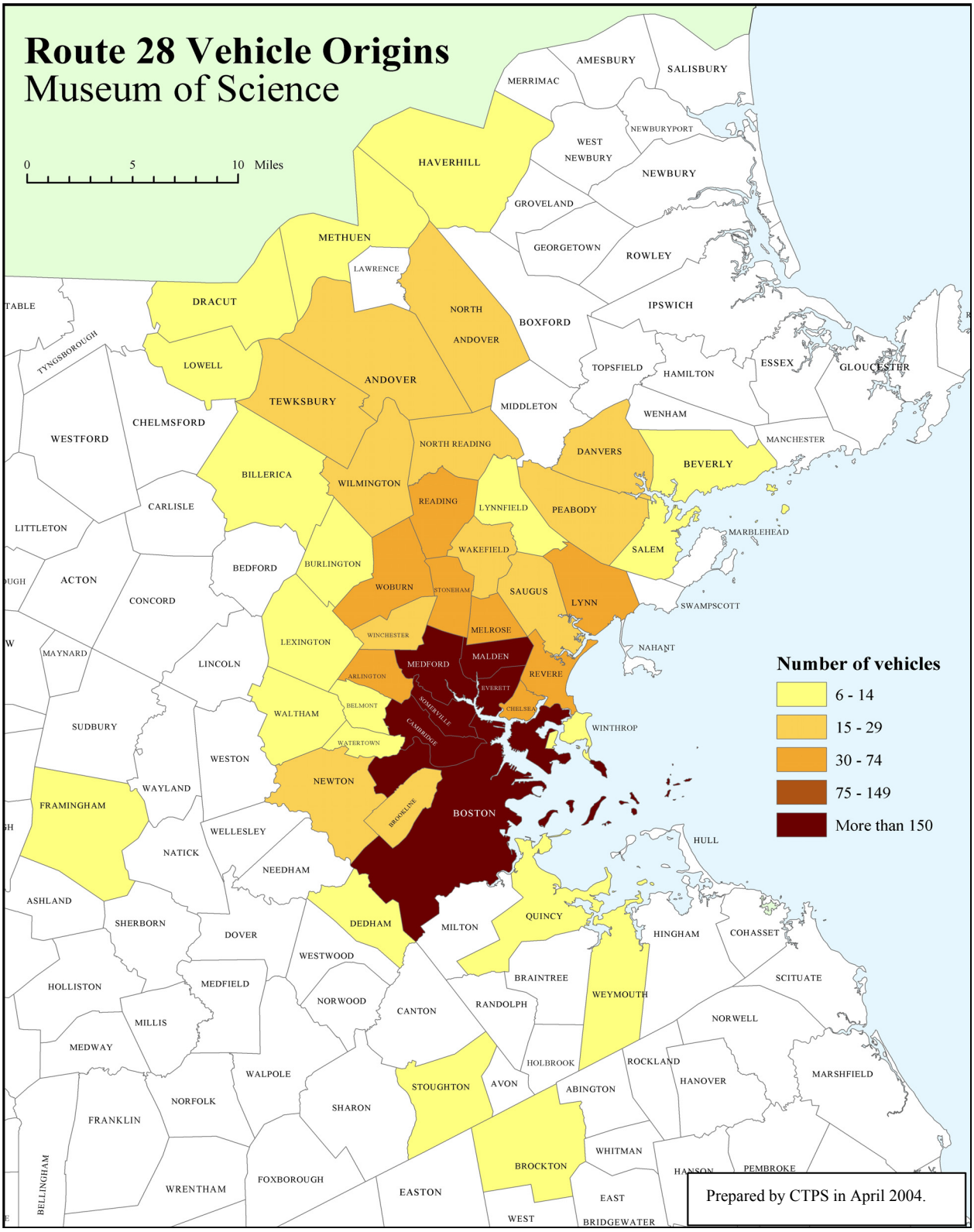

FIGURE 4.2
Route 28 Vehicle Origins:
Museum of Science Survey Station

CTPS

Toward a Route 28 Corridor Transportation Plan: An Emerging Vision

Table 4.4 Origins of Vehicles at Museum of Science

Community	Vehicles	Percent
Somerville	536	19%
Boston	395	14%
Cambridge	256	9%
Medford	197	7%
Everett	185	7%
Malden	182	6%
Revere	74	3%
Melrose	62	2%
Chelsea	52	2%
Lynn	46	2%
Woburn	38	1%
Arlington	35	1%
Reading	35	1%
Stoneham	35	1%
Wakefield	27	1%
Brookline	26	1%
Newton	25	1%
Andover	21	1%
Winchester	21	1%
Saugus	20	1%
Peabody	17	1%
Tewksbury	17	1%
North Andover	16	1%
Wilmington	16	1%
Other Mass. communities	467	17%
Total:	**2,801**	**100%**

Table 4.5 Origins of Vehicles at Pedestrian Bridge: Boston Neighborhoods

Neighborhood	Vehicles	Percent
Allston	8	0.17%
Back Bay	4	0.08%
Beacon Hill	4	0.08%
Brighton	3	0.06%
Charlestown	16	0.33%
Dorchester	16	0.33%
Downtown Boston	6	0.13%
East Boston	18	0.38%
Fenway/Longwood	6	0.13%
Hyde Park	4	0.08%
Jamaica Plain	1	0.02%
Mattapan	4	0.08%
Roslindale	7	0.15%
Roxbury	1	0.02%
South Boston	4	0.08%
South End	6	0.13%
West Roxbury	4	0.08%
Non-Boston address	23	0.48%
Boston Total:	**135**	**2.82%**

Table 4.6 Origins of Vehicles at Museum of Science: Boston Neighborhoods

Neighborhood	Vehicles	Percent
Allston	18	0.64%
Back Bay	7	0.25%
Beacon Hill	7	0.25%
Brighton	26	0.93%
Charlestown	136	4.86%
Dorchester	22	0.79%
Downtown Boston	7	0.25%
East Boston	19	0.68%
Fenway/Longwood	25	0.89%
Hyde Park	9	0.32%
Jamaica Plain	9	0.32%
Mattapan	6	0.21%
Roslindale	9	0.32%
Roxbury	10	0.36%
South Boston	17	0.61%
South End	6	0.21%
West Roxbury	8	0.29%
Non-Boston address	54	1.93%
Boston Total:	**395**	**14.10%**

4.3 DISCUSSION OF RESULTS

At the pedestrian bridge (see Table 4.3), a total of 4,800 vehicles were surveyed; 58 percent of them originated in communities within, or in the immediate vicinity of, the study area. This includes communities that contributed 3 percent or more of the southbound traffic. The majority of these travelers appear to reach this location through study area collector or local roads that connect with Route 28 (travelers from Somerville and Cambridge) or by entering the study area via Route 28 itself (travelers from Malden, Medford, Melrose). Forty-two percent originated in communities in the northern and northwestern parts of the region, specifically communities with good access to southbound I-93. These drivers seem to leave I-93 at Exit 31 (Route 16) and Exit 30 (Mystic Avenue).

At the Museum of Science survey location (see Table 4.4), a total of 2,800 vehicles were surveyed. The first observation is the traffic volume difference between the two locations, about 2,000 vehicles. This implies that over 2,000 vehicles left Route 28 between the two survey locations, likely far more than 2,000, as significant additional traffic entered Route 28 southbound from the Gilmore Bridge and Cambridge Street eastbound. Significant loss of traffic likely occurred at Third Street, Gore Street, First Street, and Land Boulevard, roadways leading to additional East Cambridge locations and others in the region served well by Memorial Drive and other principal arterials. In fact, a community-to-community comparison between the two tables shows that the traffic volume contribution from the majority of the communities dropped at the Museum survey location by 70 to 80 percent. Communities for which contributions increased at the Museum location were Somerville, Boston, and Cambridge, clearly downstream additions from the Gilmore Bridge (Boston and Somerville) and from Cambridge Street (Cambridge and Somerville).

4.4 CONCLUSIONS

The survey results indicate that, in the AM peak period, southbound Route 28 through the study area is used in two ways. It is used by local Somerville and Cambridge traffic or by communities such as Medford, Everett, and Malden that are in the immediate vicinity. It is also used as a collector/distributor carrying regional traffic, largely from I-93, to destinations in Cambridge and onto other facilities (likely Memorial Drive and Soldiers Field Road) to reach communities south of the study area.

The survey showed that on a typical commuter morning, the roadway is used far less as a through facility to Boston than as a collector/distributor facility between origin and destination towns that are not served well by I-93. Less than 11 percent of the Route 28 traffic observed at the pedestrian bridge was also observed at the Museum of Science. Also, it did not show that Route 28, in the study area, is used on a regular basis as an alternative to I-93 southbound by traffic destined to the various neighborhoods in Boston, although this is probably the case on days that there are incidents on I-93.

In closing, Route 28 is used for local and regional traffic, consistent with its designation as “other freeway”; however, it still provides local access to business/residences, as a principal arterial does.