

3.3.2 Limited-Access Highways

3.3.2.1 Average Observed Travel Speeds⁸

The speeds experienced along roadway segments during the peak travel periods have been summarized for all the limited-access highways in the region. During the period 1999–2000, travel speeds were collected for nearly 550 miles⁹ of limited-access highways, including interstate highways and regional expressways. (Please refer to Appendix B for the full list of highways.) Travel speeds were collected during the morning peak commute hours, from 6:00 to 10:00 AM, and during the evening peak hours, from 3:00 to 7:00 PM. For the CMS summary of travel speeds, the observations are averaged over a 2.5-hour morning peak period (6:30–9:00 AM) and a three-hour evening peak period (3:30–6:30 PM), which match the summary periods used for the arterial roadways. (A half-hourly breakdown of travel speeds and times is provided in a separate CTPS report.)¹⁰

Figures 3.7 and 3.8 illustrate the average observed travel speeds on the limited-access highways during the morning and evening peak periods. Appendix B contains additional diagrams depicting the speeds; these diagrams are organized by subregion of the Boston metropolitan region. The subregional diagrams also illustrate the average observed speeds on CMS-monitored arterial roadways that approach interchanges with the limited-access highways.

Summary of Average Observed Travel Speeds

Table 3.15 provides the percent of highway miles that have average traffic speeds in the specified ranges. Overall, about 20 percent of the monitored miles of limited-access highways experience travel congestion (LOS F) during the peak travel periods. Considering that the above summary is based on travel speeds averaged over the peak periods, it is likely that additional highway segments also experience congestion at some point during the peak periods, particularly those with average travel speeds in the LOS E range. (The LOS E range of speed indicates slowing down of travel speeds, but with flows above stop-and-go traffic.) Hence, based on this data, as much as a third of the monitored highway system might experience congestion during peak periods.

Interestingly, the data seem to indicate more congested travel on the highways in the morning peak period than in the evening period. One reason for this is that morning inbound traffic coming toward the I-95/Route 128 circumferential route—on highways such as Route 3, I-95 South, and Route 24—experiences major bottlenecks at the freeway interchanges. However, in the evening, the roads leading away from those interchanges may only experience slowdowns somewhere further away from the core suburban Boston area and possibly outside of our monitoring area. Thus, traffic bottlenecks, especially at I-95/Route 128, have a greater impact on inbound morning traffic than on evening outbound traffic. Furthermore, morning traffic is typically less variable than evening traffic: morning trips are mostly comprised of routine commute trips to work and school; evening traffic includes not only commute trips—which tend to be less routine in the evening than in the morning—but also

⁸ These findings are based on speed and delay data collected prior to the opening/start of the following facility/service changes: I-90 Extension, Ted Williams Tunnel (opening for restricted use), and Tobin Bridge toll increase, July 2002; I-90 connector to Ted Williams Tunnel, I-93 northbound to I-90 eastbound connector, and I-90/Ted Williams Tunnel (opening to all traffic) in January 2003; I-93 Central Artery northbound, March 2003; I-90 westbound to I-93 southbound connector and I-93 Central Artery southbound, December 2003; and Tobin Bridge toll increase, April 2004.

⁹ Miles include both directions of travel.

¹⁰ Tom Nixon, *Speeds and Travel Times on Limited-Access Highways in the Boston Metropolitan Region: 1999–2000*, Central Transportation Planning Staff, 2001.

discretionary trips, such as shopping trips, and other kinds of trips. Hence, congestion levels vary more in the evening.

Table 3.15. Regional Summary of Peak-Period Travel Speeds on the Limited-Access Highway Network, 1999–2000

Percent of miles monitored (both directions) with the following average observed travel speeds (also expressed in levels of service)

Morning Peak Period (6:30 to 9:00 AM)

LOS F < 30 mph	LOS F 30 mph to <45 mph	LOS F 45 mph to <50 mph	LOS E 50 mph to <55 mph	LOS D 55 mph to <60 mph	LOS A,B,C 60+ mph	Total Miles
<i>Percent of Miles Monitored with Average Speeds in the Ranges Above</i>						
6	9	7	9	12	57	546

Evening Peak Period (3:30 to 6:30 PM)

LOS F < 30 mph	LOS F 30 mph to <45 mph	LOS F 45 mph to <50 mph	LOS E 50 mph to <55 mph	LOS D 55 mph to <60 mph	LOS A,B,C 60+ mph	Total Miles
<i>Percent of Miles Monitored with Average Speeds in the Ranges Above</i>						
3	8	6	9	17	57	546

Percentages are rounded to the nearest whole number.

3.3.2.2 Comparison between 1994–1995 Data and 1999–2000 Data

A comparison of the results from the first travel-speed data collection effort (conducted in 1994 and 1995) and the most recent effort (in 1999 and 2000) for the limited-access highway network is presented in Table 3.16. This table presents the percent of monitored miles of limited-access highways that have average observed travel speeds in the specified speed ranges, for the weekday morning and evening peak periods. (Please note that this comparison is made only for the 380 miles [in both directions of travel] of roadway that were monitored in both periods.)

A dramatic change in the observed travel speeds on limited-access highways occurred in the morning peak period. The table illustrates that between the data collection in the mid-1990s and the collection at the end of the decade, there was an increase of approximately 8 percentage points in the number of roadways experiencing travel congestion during the morning peak period (congestion being defined as an average observed travel speed of less than 50 mph). However, the monitoring results for the evening period indicate that overall congestion for that time of day did not significantly change from the earlier to the later collection period: the same percentage of the highway network had average travel speeds of less than 50 mph in 1999–2000 as five years earlier.

Figures 3.9 and 3.10 illustrate the segments of the monitored limited-access highways where observed travel speeds decreased between the 1994–1995 and 1999–2000 monitoring periods. The maps

highlight the locations where an increase or decrease of 5 mph or more in average observed speeds occurred between the two periods.

Table 3.16. Comparison between 1994–1995 and 1999–2000 Travel Speeds on the Limited-Access Highway Network

Percent of miles monitored (both directions) with the following average observed travel speeds (also expressed in levels of service)

Morning Peak Period (6:30 to 9:00 AM)

	LOS F < 30 mph	LOS F 30 mph to <45 mph	LOS F 45 mph to <50 mph	LOS E 50 mph to <55 mph	LOS D 55 mph to <60 mph	LOS A,B,C 60+ mph	Total Miles
<i>Percent of Miles Monitored with Average Speeds in the Ranges Above</i>							
1994–1995	5	8	8	14	21	44	380
1999–2000	8	12	9	12	14	44	380

Evening Peak Period (3:30 to 6:30 PM)

	LOS F < 30 mph	LOS F 30 mph to <45 mph	LOS F 45 mph to <50 mph	LOS E 50 mph to <55 mph	LOS D 55 mph to <60 mph	LOS A,B,C 60+ mph	Total Miles
<i>Percent of Miles Monitored with Average Speeds in the Ranges Above</i>							
1994–1995	4	10	11	12	28	35	380
1999–2000	4	12	9	12	22	41	380

Percentages are rounded to the nearest whole number.

3.3.2.3 Traffic Volumes

The most recent traffic counts from the past six years are presented in Appendix B. Counts, which are collected regularly by MassHighway, are expressed as average daily traffic (ADT) volumes.

3.3.2.4 Roadway Safety

The region's top 60 crash locations for limited-access highways are listed in Table 3.17. Most of the crash locations on this list are at major interchanges and other connections between high-volume roadways. The source and nature of the data have been explained earlier in Section 3.3.1.6.

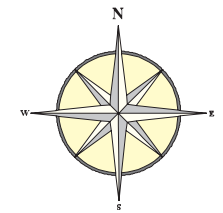
Maps illustrating these locations are provided in Appendix B.

FIGURE 3.7







**AVERAGE OBSERVED
TRAVEL SPEEDS ON
LIMITED-ACCESS
HIGHWAYS
and Connecting Urban
Principal Arterials**

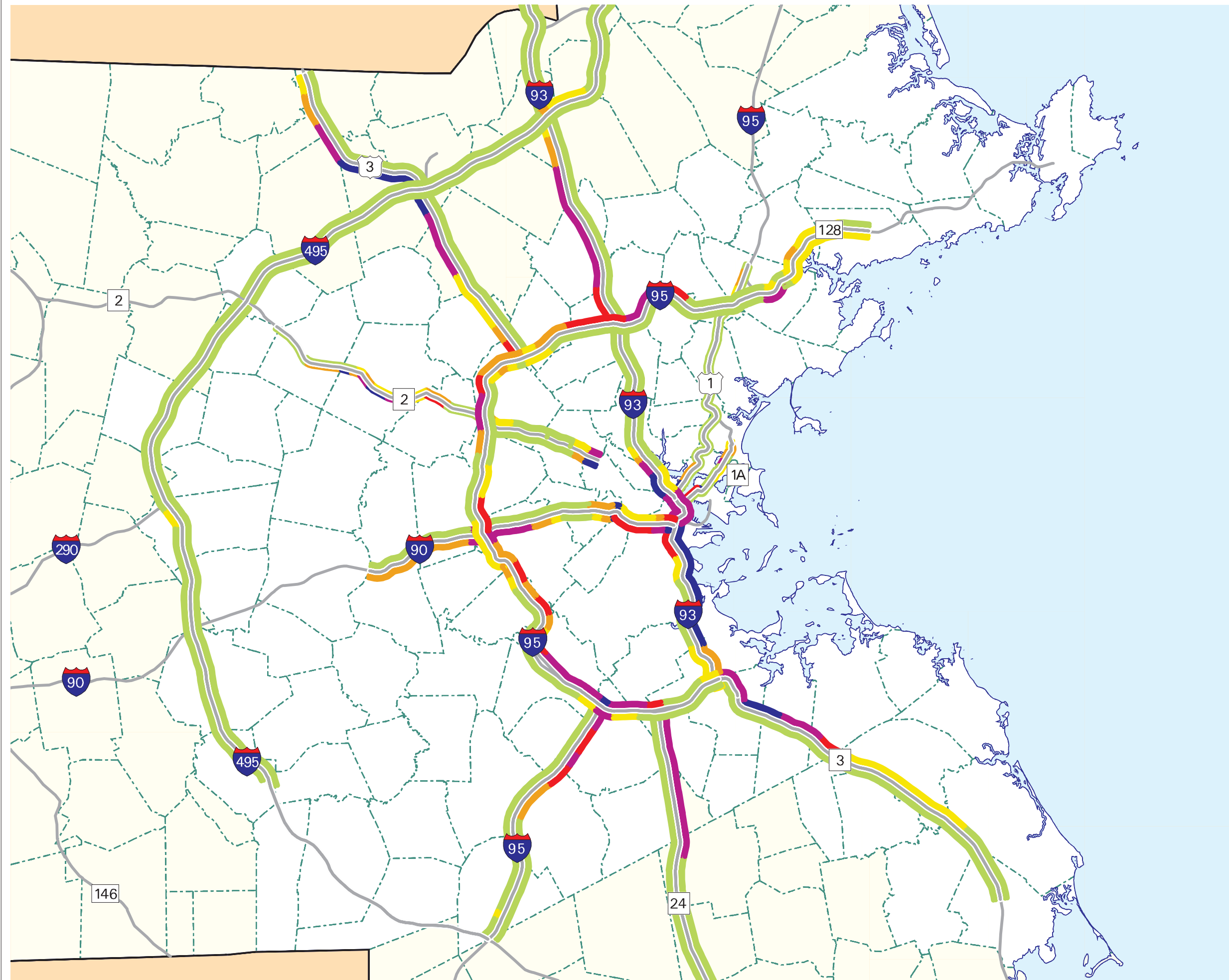
(1999 - 2000)

**AM Peak Period
(6:30 AM - 9:00 AM)**



Limited-Access Highway  Connecting Urban Principal Arterial 

1 - 29 mph		1 - 16 mph
30 - 44 mph		17 - 21 mph
45 - 49 mph		22 - 27 mph
50 - 54 mph		28 - 34 mph
55 - 59 mph		35 - 42 mph
60+ mph		43+ mph



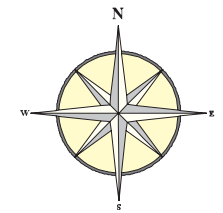
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Management
System**

FIGURE 3.8







**AVERAGE OBSERVED
TRAVEL SPEEDS ON
LIMITED-ACCESS
HIGHWAYS
and Connecting Urban
Principal Arterials**

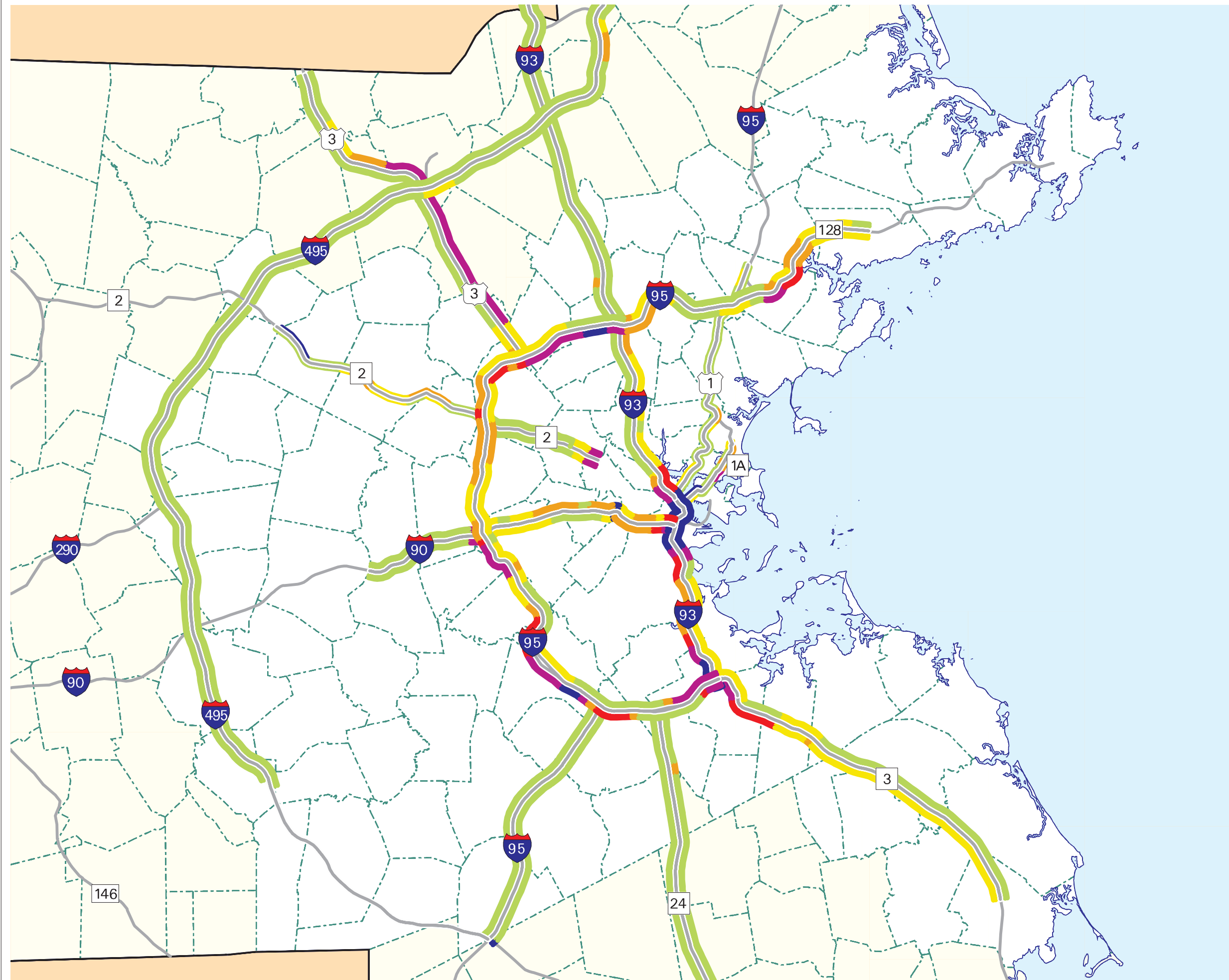
(1999 - 2000)

**PM Peak Period
(3:30 PM - 6:30 PM)**



Limited-Access Highway  Connecting Urban Principal Arterial 

1 - 29 mph		1 - 16 mph
30 - 44 mph		17 - 21 mph
45 - 49 mph		22 - 27 mph
50 - 54 mph		28 - 34 mph
55 - 59 mph		35 - 42 mph
60+ mph		43+ mph



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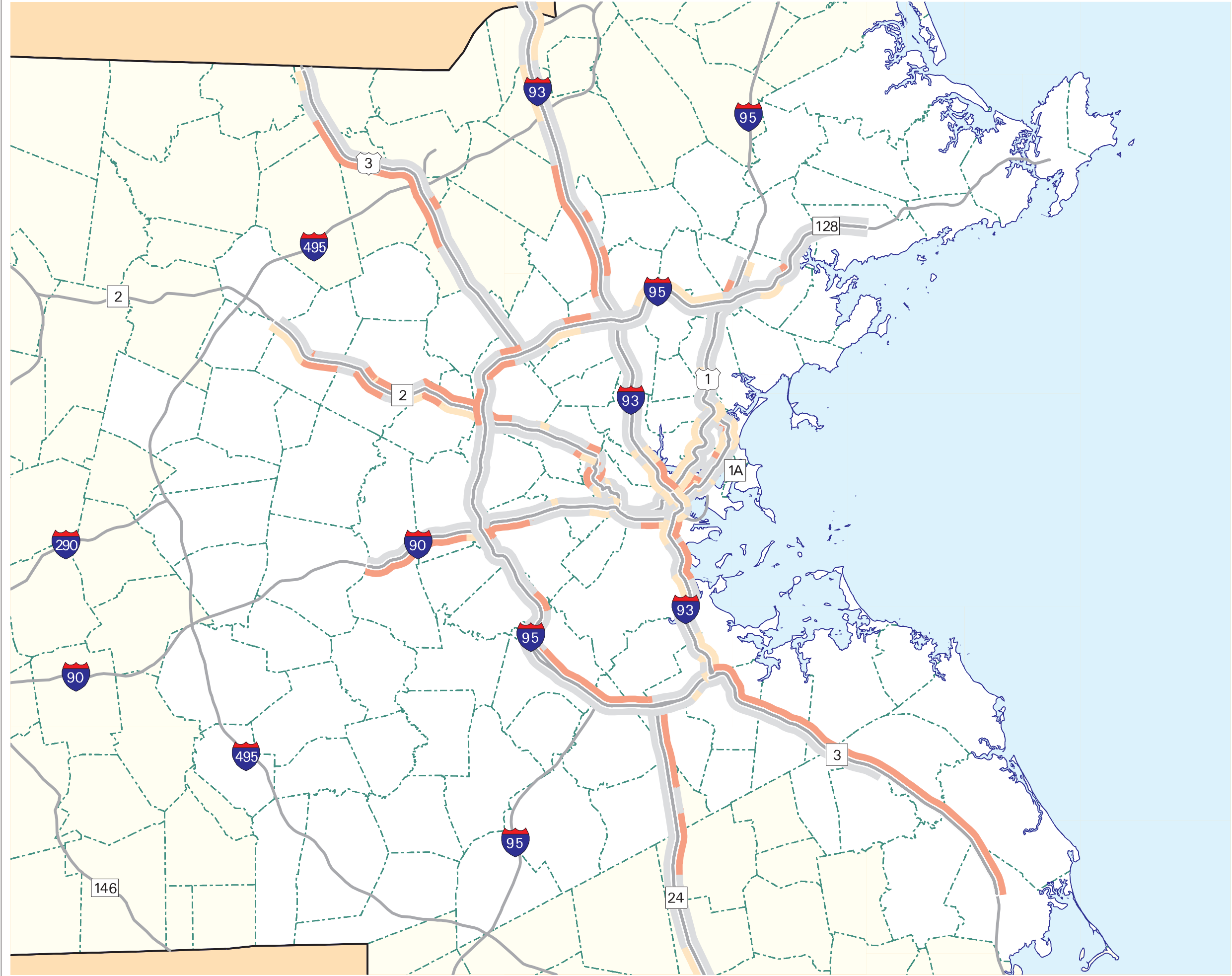
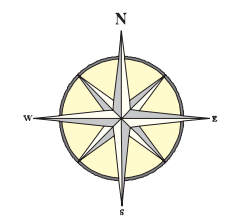


FIGURE 3.9
CHANGE IN AVERAGE OBSERVED TRAVEL SPEEDS ON LIMITED-ACCESS HIGHWAYS and Connecting Urban Principal Arterials
1994/1995 vs. 1999/2000
AM Peak Period (6:30 AM - 9:00 AM)



- Increase
- No significant change
- Decrease

Highways without colored bands: observations are not available for 1994/1995 vs. 1999/2000.

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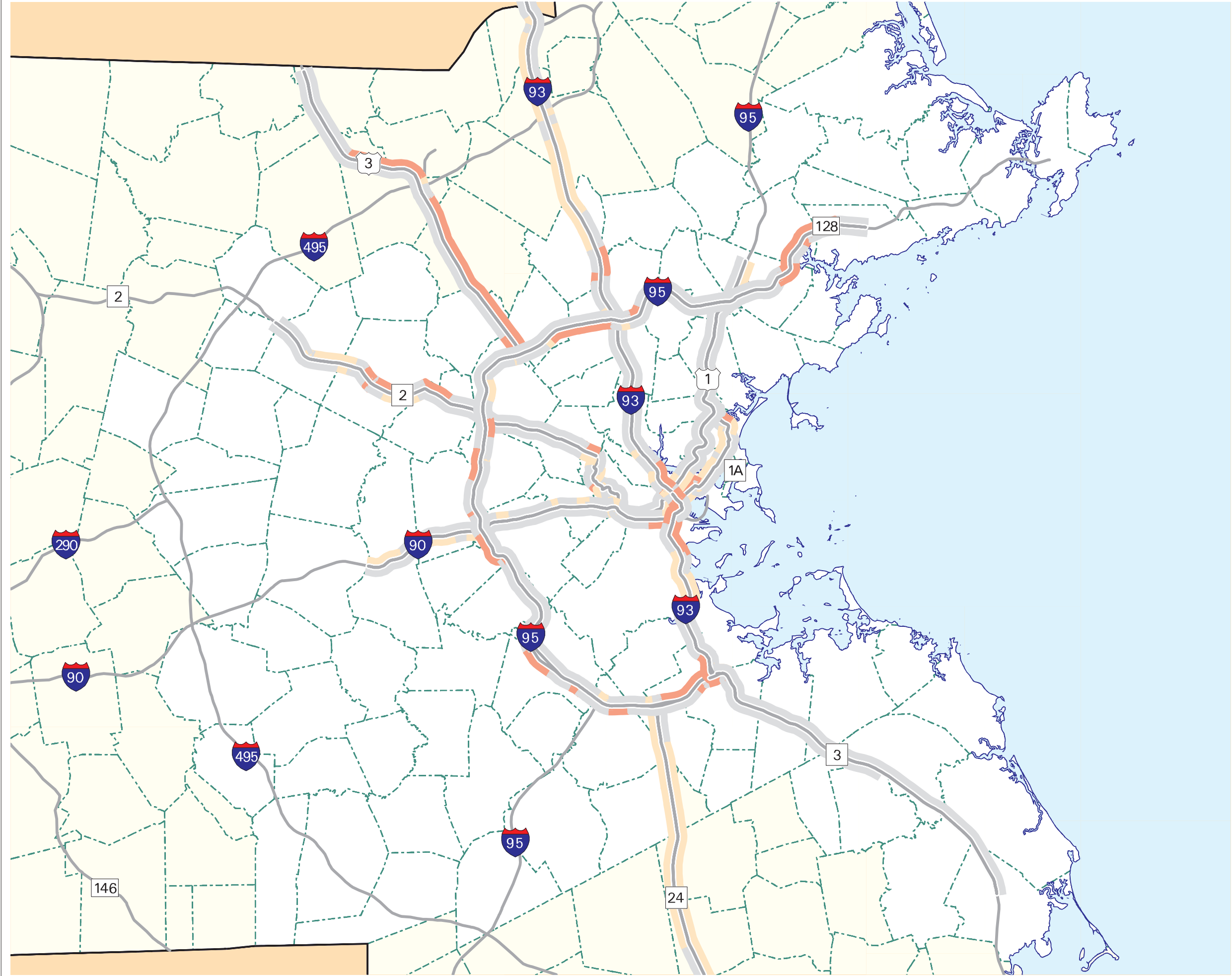
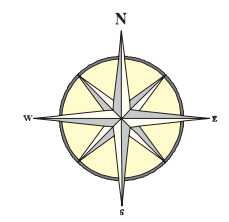


FIGURE 3.10
CHANGE IN AVERAGE OBSERVED TRAVEL SPEEDS ON LIMITED-ACCESS HIGHWAYS and Connecting Urban Principal Arterials
1994/1995 vs. 1999/2000
PM Peak Period (3:30 PM - 6:30 PM)



- Increase
- No significant change
- Decrease

Highways without colored bands: observations are not available for 1994/1995 vs. 1999/2000.

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Table 3.17. Top 60 Crash Locations on Limited-Access Highways in the Boston Region (1997–1999) (page 1 of 2)

Rank	City/Town	Roadway		Intersecting Street		Crashes	
		Rte. No.	Street Name	Rte. No.	Street Name	Total No.	Weighted Score
1	Reading	I-95	Yankee Division Highway	I-93	Interstate 93	678	1618
2	Revere	1	Cutler Highway	60	Robert M. Copeland Circle	466	1335
3	Boston	I-90	Massachusetts Turnpike	I-93	John F. Fitzgerald Expressway	461	1029
4	Somerville	38	Mystic Avenue	I-93	Interstate 93	415	1152
5	Boston	3	Leverett Circle	3	Leverett Circle	393	894
6	Weston	I-90	Massachusetts Turnpike	I-95	Yankee Division Highway	378	686
7	Waltham	I-95	Yankee Division Highway		Winter Street	368	768
8	Saugus	1	Blue Star Memorial Highway	129	Walnut Street	350	958
9	Danvers	1	Newbury Street	114	Andover Street	316	792
10	Braintree	37	Granite Street	I-93	Interstate 93	313	845
11	Woburn	I-95	Yankee Division Highway		Washington Street	301	769
12	Canton	I-95	Yankee Division Highway	I-95	Interstate 95	295	779
13	Medford	16	Mystic Valley Parkway Connector	I-93	Interstate 93	295	727
14	Burlington		Middlesex Turnpike	I-95	Yankee Division Highway	280	685
15	Boston	I-93	Gen. Casimir Pulaski Skyway		Massachusetts Avenue	263	675
16	Woburn		Montvale Avenue	I-93	Interstate 93	261	657
17	Boston	I-93	Dewey Square Tunnel	I-93	John F. Fitzgerald Expressway	254	610
18	Bellingham	126	Hartford Avenue	I-495	Interstate 495	247	483
19	Boston	1	Temporary ramp	I-93	Interstate 93	246	618
20	Boston		Charlesgate West		Storrow Drive	244	588
21	Wellesley	I-95	Yankee Division Highway	9	Worcester Street	241	541
22	Quincy		Furnace Brook Rotary	I-93	Interstate 93	236	668
23	Weymouth	18	Main Street	3	Pilgrim Highway	232	616
24	Medford	28	Roosevelt Circle	I-93	Interstate 93	225	569
25	Boston		Columbia Road	I-93	Gen. Casimir Pulaski Skyway	221	553
26	Burlington	3	Cambridge Street	I-95	Yankee Division Highway	221	541
27	Waltham	I-95	Yankee Division Highway	20	Weston Street	219	463
28	Braintree	3	Pilgrims Highway	I-93	Interstate 93	216	552
29	Boston	1A	Callahan Tunnel	I-93	John F. Fitzgerald Expressway	216	544
30	Randolph	24	Amer. Vets. Memorial Highway	I-93	Interstate 93	213	569

Table 3.17. Top 60 Crash Locations on Limited-Access Highways in the Boston Region (1997–1999) (page 2 of 2)

Rank	City/Town	Roadway		Intersecting Street		Crashes	
		Rte. No.	Street Name	Rte. No.	Street Name	Total No.	Weighted Score
31	Peabody		Lowell Street	128	Yankee Division Highway	213	541
32	Hopkinton	I-90	Massachusetts Turnpike	I-495	Interstate 495	213	442
33	Braintree	3	Pilgrims Highway		Union Street Rotary	207	555
34	Saugus		Main Street	1	Blue Star Memorial Highway	206	610
35	Saugus		Essex Street	1	Blue Star Memorial Highway	205	601
36	Woburn	I-95	Yankee Division Highway	38	Main Street Circle	204	481
37	Needham		Highland Avenue	I-95	Yankee Division Highway	197	509
38	Peabody	114	Andover Street	128	Yankee Division Highway	191	507
39	Lexington	4	Bedford Street	I-95	Yankee Division Highway	190	474
40	Westwood		East Street Rotary	I-95	Yankee Division Highway	187	411
41	Danvers		Endicott Street	128	Yankee Division Highway	176	452
42	Weston	I-95	Yankee Division Highway	30	South Avenue	175	407
43	Marlborough	I-290	Interstate 290	I-495	Interstate 495	166	450
44	Boston		Cambridge Street	I-90	Massachusetts Turnpike	163	335
45	Boston	I-93	Gen. Casimir Pulaski Skyway		Southampton Street	156	380
46	Lexington	I-95	Yankee Division Highway	2	Concord Highway	149	322
47	Peabody		Lowell Street	1	Newburyport Turnpike	148	368
48	Medford	60	Salem Street Circle	I-93	Interstate 93	145	369
49	Milton		Granite Avenue	I-93	Sgt. William G. Walsh Expressway	138	378
50	Canton	I-93	Yankee Division Highway	138	Washington Street	134	374
51	Newton	I-95	Yankee Division Highway	16	Washington Street	133	341
52	Danvers	35	High Street	128	Yankee Division Highway	127	332
53	Braintree	3	Pilgrims Highway		Washington Street	126	298
54	Waltham	I-95	Yankee Division Highway		Trapelo Road	126	286
55	Danvers	128	Yankee Division Highway	62	Elliott Street	125	297
56	Peabody	1	Route 1 Connector	I-95	Yankee Division Highway	123	331
57	Stoughton	139	Lindelof Avenue	24	Amer. Vets. Memorial Highway	121	353
58	Wilmington	62	Route 62	I-93	Interstate 93	120	312
59	Dedham	1	Boston Providence Turnpike	I-95	Yankee Division Highway	117	281
60	Randolph	28	North Main Street	I-93	Interstate 93	116	324

Source: CTPS and the Massachusetts Highway Department—Traffic Operations and Safety Unit, *Top 1000 High Crash Locations Report (1997–1999)*, August 2002.