CAPE COD COMMISSION

2011 Traffic Counting Report for Cape Cod Massachusetts

Prepared in cooperation with:

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

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Executive Summary

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The Cape Cod Commission (formerly the Cape Cod Planning and Economic Development Commission) has completed 28 summer seasons in the ongoing Traffic Counting Program. The Cape Cod Commission adds new locations and updates existing ones each year. Over 1,100 different locations on Cape Cod have been counted at least once, and over 4,900 counts have been performed since the program began. The result of the Traffic Counting Program is a useful database of traffic volume information for transportation planning.

In 2011, the Commission's Traffic Counting Program included 227 weekday automatic traffic recorder (ATR) counts, listed in Appendix A. Over a 10-year period (2001-2011), summer traffic Cape-wide has decreased an average 0.9% per year. The past year (2010-2011) has seen little overall change in summer traffic volumes with and overall decrease in Cape-wide summer traffic of 0.1%. Data obtained through the Massachusetts Department of Transportation's permanent counting stations are included in tables separate from the counts done by the Commission's program. This year, the Commission's staff also collected 7 weekend counts, which are included in a separate appendix.

In addition to ATR counts, in total, the Traffic Counting Program has completed over 800 turning movement counts (TMCs), over 300 park and ride lot observations, close to 200 hours of travel time studies, and many bicycle and pedestrian studies. 2011 also represents the first full year of data from the Commission remote counting station at the intersection of Route 137 and Route 39 in Harwich. Results of these efforts are presented in the appendices.

Local, state, and federal officials, engineers, transportation planners, and many other organizations and individuals use the traffic counting data. The information is used to perform traffic impact studies for new developments, analyze existing traffic demands on Cape Cod's roads, and identify ways to improve traffic flow and safety. The Commission expects to continue to expand and update this important database for transportation planning.

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1. Introduction

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This report summarizes traffic counts conducted between 2001 and 2011 by the Cape Cod Commission (previously the Cape Cod Planning and Economic Development Commission). Traffic count locations are selected based on recommendations from the Massachusetts Department of Transportation (MassDOT), town officials, members of the Cape Cod Joint Transportation Committee, and the Cape Cod Commission transportation staff.

Since 1989, the Commission staff has used automatic traffic recorders (ATRs) to conduct traffic counts. Earlier counts used "paper-punch" traffic counting equipment. ATR technology has advanced over the past decade to allow many different types of studies. All of the counters in the Commission's ATR fleet now have the ability to do speed and classification studies as well as volume counts. Simple collection of traffic volumes is still the most frequent type of study conducted by the Commission, but vehicle speed and vehicle classification studies are conducted upon request from MassDOT or local officials.

Cape Cod's Traffic Counting Program began in 1984. Since the first count, the Commission staff has obtained 4,928 weekday counts and 511 weekend counts at over 1,100 different locations. In 2011, Commission staff collected 227 weekday counts and 7 weekend counts. Directional traffic volume counts were conducted at most of the locations where possible. Directional information is important when performing traffic studies because direction of travel can vary significantly by time of day. The Commission staff also fulfilled special requests such as vehicle speed and classification studies during the summer. The following table summarizes the activities of the Traffic Counting Program for the past 28 traffic counting seasons. Appendix A includes a summary of all ATR counts obtained in 2011.

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TABLE 1: CCC TRAFFIC COUNTING PROGRAM ACTIVITY

Year	Weekday Counts	Weekend Counts	Total	New Locations
1984	70	0	**70**	*70*
1985	69	0	**69**	*47*
1986	121	7	**128**	*77*
1987	265	5	**270**	*181*
1988	156	18	**174**	*86*
1989	196	18	**214**	*67*
1990	175	38	**213**	*45*
1991	105	6	**111**	*44*
1992	100	3	**103**	*3*
1993	98	0	**98**	*6*
1994	218	7	**225**	*57*
1995	213	26	**239**	*45*
1996	226	29	**255**	*50*
1997	166	12	**178**	*29*
1998	212	21	**233**	*42*
1999	167	23	**190**	*37*
2000	170	20	**190**	*15*
2001	118	17	**135**	*13*
2002	151	36	**187**	*7*
2003	141	13	**154**	*13*
2004	225	90	**315**	*15*
2005	202	13	**215**	*17*
2006	231	24	**255**	*44*
2007	198	14	**212**	*13*
2008	236	4	**240**	*22*
2009	246	32	**278**	*44*
2010	225	28	**253**	*46*
2011	227	7	**234**	*12*
Total	4927	511	**5438**	*1147*

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2. Using the Traffic Counting Data

Appendix B contains all weekday traffic counts performed between 2001 and 2011. The traffic counts for each town are contained in individual data sets. At locations with directional volumes, the information is first provided for the total of both directions, with the directional volumes following below. Counts performed on numbered routes are listed first in numerical order. Subsequently, named streets are listed in alphabetical order. If a roadway has more than one name it may be necessary to look under both names for the desired information, such as Central Road and Great Neck Road North in the Town of Mashpee. Traffic count data followed by an asterisk (*) represents counts performed by MassDOT or another agency (e.g., the Town of Barnstable's engineering department). These counts are primarily located on Route 6 and roads of local interest. Each column of data is explained in the sections that follow.

2.1. TOWN

Traffic counts are grouped by the town in which the count took place. The towns are ordered geographically, beginning with Bourne in the Upper Cape region and ending with Provincetown in the Outer Cape. A map of the town order is included in Appendix B to help navigate through the count data.

2.2. ROUTE/LOCATION INFORMATION

The roadway where the traffic count was taken is listed first for each count location. As part of the description, the orientation of the location with respect to the nearest cross street or notable geographic detail is also listed. For example, "Rt 3A S of Bour/Plym TL" is shorthand for "Route 3A, south of the Bourne/Plymouth town line." Note that the counts performed on a town line are listed twice in the report. For each count

location taken at a town line, the count location is given under both town names. This allows the data to be analyzed more effectively. For a complete listing of abbreviated terms please refer to the Glossary of Abbreviations on page 27.

2.3. DATE OF STUDY: (YR), (BEGIN DATE), (END DATE)

Under each location, all available counts are listed in reverse chronological order, with the most recent appearing first. The year, begin date and end date of a count are listed in the first three columns. Not all locations are counted every year, and some may be counted more than once in a given year. Generally, counts are conducted for a 48-hour period, although some cover longer periods. In order to monitor summer weekday traffic, most counts are conducted Monday through Friday during the summer season.

When comparing counts taken in different years, it is important to consider fluctuations in seasonal visitation to the area as well as year-to-year growth. For example, a July 2006 count will generally be higher than an April 2007 count, mainly because of the seasonal visitation differences. Even the comparison of a count performed in July 2006 to June 2007 could be misleading due to the increase in traffic experienced during the month of July. However, if a count conducted in April 2007 shows an increase over a count performed in July 2006, for example, the effect may be a result of area growth. Seasonal adjustment factors can allow for a better comparison of data between different months. See Section 5 for a greater description of seasonal adjustment factors.

Another variable to consider when comparing counts is the day(s) of the week in which the counts were performed. Comparison of weekend counts can also be used for estimating growth. However, a comparison of a count performed over a weekend and a count obtained during the weekdays could be misleading. Therefore, when estimating annual growth in traffic in an area, it is best to compare counts taken at the same location at the same time of year and on the same type of days (weekday or weekend). The Commission has separated weekday and weekend data into two different databases in order to prevent any confusion during analysis. No counts in Appendix B were performed on Saturdays,

Sundays, or holidays. These weekend traffic counts are contained in Appendix C.

2.4. WEATHER CONDITIONS: (WEATHER)

Weather conditions may influence traffic volumes on Cape Cod. Cloudy days often contribute to increased traffic congestion except on beach access roads. On rainy or cloudy days, people engage in sightseeing or shopping rather than spending time at home or a favorite sunny-day location. In the data tables, brief descriptions of weather conditions during the count period are given. This information should be regarded with caution, as weather conditions may change considerably throughout a single day on Cape Cod. The Commission staff records the weather conditions of a count when setting down and picking up the traffic counting equipment. Of all the data provided in the tables, this category is the most subjective.

2.5. DIRECTION OF TRAVEL: (DIRECTION)

Direction identifies the direction of travel for the traffic on a roadway. Each traffic count is divided into three rows. The first row, "Total," lists the data for the sum of the two directions. The next two rows list the directional data, with the direction of travel for the row indicated by the Direction column. If the count was done on a one-way road, only data for the one direction are listed and are identical to the information listed in the Total column. If the traffic counter did not separate the counts into the directional movements, only the data for the summation of both directions are listed.

2.6. AXLE ADJUSTED AVERAGE DAILY TRAFFIC: (AXLE ADJ. ADT)

Axle Adjusted Average Daily Traffic (AxADT) is an estimate of the average number of vehicles over a 24-hour period. Many of the older counters

recorded pairs of "axle hits," not vehicles. This meant that multiple-axle vehicles were counted as more than one vehicle (i.e., two 5-axle trucks were recorded as 5 vehicles). This method produced an estimated number of vehicles that was higher than the actual number. Axle correction factors are used to adjust, as necessary, the ATR data. See Section 4 for a more detailed description of axle correction factors.

2.7. PEAK HOUR DATA: (DATE&DAY), (HOUR), (VOL)

The Peak Hour is the highest one-hour traffic volume observed during the period counted. Three columns offer data on the Peak Hour of a count. The date and day of the week (Date&Day) in which the peak occurred is listed first. The hour of the day (Hour) representing the Peak Hour is listed in the second column using 24-hour time (e.g., "16" means that the Peak Hour occurred beginning at 4:00 p.m. and ending at 5:00 p.m.). The Peak Hour Volume (Vol) is listed in the third and right-most column. Please be aware that the two-way Peak Hour volume may not be equal to the sum of the two directional Peak Hour volumes. Instead, it may represent the hour within the period counted when the sum of traffic in both directions was greatest. Starting in 2011, peak hour volumes for each direction of travel correspond to the peak hour combined travel. This is to conform to MassDOT reporting requirements. Axle correction factors were used as necessary. Please see Section 4 for more information on axle correction factors.

Peak Hour information is significant for transportation planning. First, it indicates the highest traffic demands on a roadway. Second, it can show how close a roadway's use is to its capacity. For example, if counts taken in different years or during different months of the same year indicate a change in average daily traffic without a corresponding change in Peak Hour traffic, the roadway may be experiencing capacity constraints during peak times.

2.8. 4:00–5:00 P.M. TRAFFIC: (FOUR~FIVE)

The "Four~Five" column indicates the average traffic volume recorded between 4:00-5:00 p.m. during the count period. As with the other

categories of data, the 4:00-5:00 p.m. volume is given for the total of both directions first, and then for each corresponding direction. The two-way 4:00-5:00 p.m. average volume is equal to the sum of the two directional 4:00-5:00 p.m. average volumes. Axle correction factors were used as necessary. Please see Section 4 for more information on axle correction factors.

The 4:00-5:00 p.m. volume has been included as an aid to transportation planners and engineers. In addition to these purposes, the 4:00-5:00 p.m. volume also provides useful information when compared to the Peak Hour volume for a particular location. For example, during the years 1984-1993, Cape-wide, the Peak Hour for the entire day generally fell between the hours of 4:00-5:00 p.m. (Rush Hour). The entire dataset supports this finding. It is still the case that the 4:00-5:00 p.m. volume is often the Peak Hour for the location.

2.9. ANNUAL AVERAGE DAILY TRAFFIC: (AADT)

The Annual Average Daily Traffic (AADT) is calculated by multiplying the AxADT by a seasonal adjustment factor for the month of the count. MassDOT supplies these factors based on six permanent traffic-counting stations on Cape Cod. Note that this year-round AADT is only an estimate, based on seasonal changes in traffic volumes at these six locations. A description of the techniques used by MassDOT to develop the seasonal adjustment factors can be found in Section 5.

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3. Weekend Traffic Counts

A feature added to this report in 1999 is a listing of traffic counts taken during weekends and holidays. Since then, the database has been expanded to include weekend counts performed in both earlier and later years. In 2011, 7 weekend counts were added for a total of 511 weekend counts recorded since the Traffic Counting Program began in 1984. This weekend database continues to grow each year and is included in Appendix C. Many of the headings are similar to those of the weekday database discussed in Section 2. The counts presented are representative of specific days and dates (Saturdays, Sundays, and holidays) and therefore have not been averaged or seasonally adjusted.

Counts are listed in geographical order, starting with Bourne and ending with Provincetown. Within each town's listing, counts are listed by route name. Counts performed on numbered routes are listed first in numerical order. Subsequently, named streets are listed in alphabetical order. If a roadway has more than one name it may be necessary to look under both names for the desired information, such as Central Road and Great Neck Road North in the Town of Mashpee.

3.1. AXLE ADJUSTED AVERAGE DAILY TRAFFIC: ([SAT.], [SUN.], AND [HOLIDAY])

As with the Weekday Counts (see Section 2.6), Axle Adjusted Average Daily Traffic (AxADT) is an estimate of the average number of vehicles over a 24-hour period. Many of the older counters recorded pairs of "axle hits," not vehicles. This meant that multiple-axle vehicles were counted as more than one vehicle (i.e., two 5-axle trucks were recorded as 5 vehicles). This method produced an estimated number of vehicles that was higher than the actual number. Axle correction factors are used to adjust the ATR data, as necessary. See Section 4 for a more detailed description of axle correction factors.

Three columns list AxADT volumes. The first represents counts recorded on Saturdays. The second represents counts recorded on Sundays. The

final column represents counts recorded during holidays, such as Independence Day or Labor Day. Many counts do not contain information from all three categories. For each traffic count period, all available data are listed. None of the AxADT volumes have been seasonally adjusted, since counts performed on weekends and holidays are representative of specific days and not of annual data. For more information on seasonal adjustment factors, see Section 5.

3.2. PEAK HOUR DATA: ([SAT.], [SUN.], AND [HOLIDAY] VOLUME & TIME OF DAY)

As with the Weekday Counts (see Section 2.7), the Peak Hour is the highest one-hour traffic volume observed during the period counted. Peak Hour volumes and time of day are given for counts recorded on Saturdays, Sundays, and holidays. Using 24-hour time (e.g., "16" means that the Peak Hour occurred beginning at 4:00 p.m. and ending at 5:00 p.m.), the time of day representing the Peak Hour is listed in the right column of each day's two-column set. The Peak Hour Volume is listed in the left column of each day's two-column set. Please be aware that the two-way Peak Hour volume is not equal to the sum of the two directional Peak Hour volumes. Instead, it represents the hour within the period counted when the sum of traffic in both directions was greatest. Axle correction factors were used as necessary. Please see Section 4 for more information on axle correction factors.

Peak Hour information is significant for transportation planning. First, it indicates the highest traffic demands on a roadway. Second, it can show how close a roadway's use is to its capacity. For example, if counts taken in different years or during different months of the same year indicate a change in average daily traffic without a corresponding change in Peak Hour traffic, the roadway may be experiencing capacity constraints during peak times.

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4. Axle Correction

Standard volume counts by the Automatic Traffic Recorders (ATRs) record pairs of axle hits. The ATRs then divide the number of axles by two in order to estimate the volume of the road. This is called the "divide-by-two" method. However, not all vehicles have only two axles. Trucks, for example, can have from three to seven or more axles. A truck with three axles would be counted as 1.5 cars under the divide-by-two method. In order to obtain more accurate estimates, the data must be corrected to account for vehicles with multiple axles. Each year MassDOT publishes a series of "axle correction factors." The appropriate factor for each count must be determined based on the year of the count, the road classification of the count location, and whether the count location is within an urban area.

Classification and speed studies as well as volume counts performed by certain ATR models do not need to be axle corrected because they do not use the divide-by-two method. Instead, they record the actual number of vehicles traveling on a roadway. As a result, the counts included in the Appendices requiring axle correction have had the appropriate axle correction factor applied, while those counts not needing axle correction are unchanged.

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TABLE 2: AXLE ADJUSTMENT FACTORS FOR CAPE COD

	Rural Axle Factors							Urban Axle Factors							
	R-1	R-2	R-3	R-5	R-6	R-7	R-0	U-1	U-2	U-3	U-4	U-5	U-6	U-7	U-0
2011	0.95	0.97	0.98	0.98	0.98		0.98	0.96	0.98	0.98		0.98	0.99		0.99
2010	0.93	0.97	0.98	0.98	0.98		0.98	0.96	0.97	0.97		0.98	0.98		0.98
2009	0.92	0.96	0.98	0.99	0.99		0.99	0.96	0.96	0.96		0.98	0.98		0.98
2008	0.91	0.94	0.97	0.98	0.98		0.98	0.96	0.97	0.97		0.99	0.99		0.99
2007	0.90	0.93	0.98	0.98	0.98		0.98	0.96	0.97	0.97		0.99	0.99		0.99
2006	0.90	0.96	0.97	0.97	0.97		0.97	0.96	0.97	0.97		0.99	0.99		0.99
2005	0.90	0.98	0.99	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.99	0.99	0.99	0.99
2004	0.91	0.98	0.98	0.98			0.98	0.96	0.97	0.97	0.97	0.99	0.99		0.99
2003	0.93	0.97	0.98	0.98			0.98	0.96	0.97	0.97	0.97	0.99	0.99		0.99
2002	0.93	0.97	0.97	0.98			0.98	0.94	0.98	0.98	0.98	0.99	0.99		0.99
2001	0.94	0.96	0.97	0.98			0.98	0.93	0.97	0.97	0.97	0.99	0.99		0.99
2000	0.93	0.97	0.97	0.98			0.98	0.93	0.97	0.97	0.97	0.99	0.98		0.99
1999	0.92	0.97	0.97	0.97			0.97	0.94	0.97	0.97	0.97	0.99	0.99		0.99
1998	0.92	0.97	0.97	0.97			0.97	0.94	0.98	0.98	0.98	0.99	0.99		0.99
1997	0.90	0.97	0.97	0.96			0.97	0.94	0.98	0.98	0.98	0.99	0.99		0.99
1996	0.90	0.97	0.98	0.97			0.98	0.94	0.98	0.98	0.98	0.99	0.99		0.99
1995	0.89	0.97	0.97	0.97			0.97	0.95	0.98	0.98	0.98	0.99	0.99		0.99
1994	0.90	0.97	0.97	0.98			0.97	0.95	0.98	0.98	0.98	0.99	0.98		0.99
1993	0.89	0.97	0.97	0.98			0.98	0.95	0.98	0.98	0.98	0.99	0.98		0.99
1992	0.90	0.97	0.96	0.98			0.98	0.96	0.98	0.98	0.98	0.99	0.99		0.99
1991	0.90	0.96	0.97	0.97	1.00		1.00	0.95	0.98	0.98	0.98	0.99	0.97		0.99
1990	0.87	0.98	0.98	0.98	0.96		0.98	0.94	0.98	0.98	0.98	0.99	0.99		0.99
1989	0.96	0.95	0.97	0.99	1.00		1.00	0.94	0.98	0.98	0.98	0.99	0.99		0.99
1988	0.89	0.96	0.98	0.97	0.97		0.98	0.98	0.97	0.98	0.99	0.99	0.98		0.99
1987	0.92	0.94	0.94	0.97	0.97		0.97	0.90	0.96	0.96	0.96	0.98	0.98		0.98

Source: Massachusetts Highway Department / Mass DOT

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5. MassDOT Data and Seasonal Adjustment Factors

Observed traffic volumes at a given location can often vary from month to month. This is especially true on Cape Cod, where summer traffic volumes are higher due to seasonal tourism. In order to compare traffic volume data collected in different months, seasonal adjustment factors must be applied.

5.1. PERMANENT TRAFFIC COUNTING STATIONS

MassDOT currently collects year-round traffic volumes from the following permanent traffic counting stations:

- Route 3 north of the Bourne/Plymouth town line
- Route 6 east of Route 149 (Exit 5)
- Route 6 at the Sagamore Bridge
- Route 28 at the Bourne Bridge
- Route 28 in Yarmouth, east of Higgins Crowell Road
- Route 28 in Barnstable, west of Old Post Road (Cotuit)

Also included in this report is a count station that discontinued in 1997:

- Route 28 in Barnstable, east of Main St (Cotuit)

Table 3, found on the following page, presents the Annual Average Daily Traffic (AADT) and summer Average Daily Traffic (ADT) for the Bourne and Sagamore Bridges. The table 4 presents the AADT and summer ADT for the other permanent traffic counting stations. The summer ADT for a particular year represents the July ADT of that year. If no traffic volumes for July were available, then the August ADT was used instead. Please note that data are not available for all years.

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TABLE 3: CANAL BRIDGES PERMANENT TRAFFIC COUNTING STATIONS

	#707 Bourne Bridge		#708 Sagamore Bridge		#712 Combined (both bridges)	
	Yr.Round	Summer	Yr.Round	Summer	Yr.Round	Summer
2011	42,505	58,467	51,489	70,674	93,994	129,141
2010	44,717	59,665	50,272	69,323	94,988	128,988
2009	44,839	58,031	50,052	69,256	94,890	127,287
2008	42,396	55,492	51,019	67,854	93,415	123,346
2007	43,506	57,042	52,559	70,407	96,065	127,449
2006	43,909	57,411	51,916	67,020	95,824	124,431
2005	43,873	58,858	52,282	69,279	96,155	128,137
2004	44,688	59,615	54,143	69,274	98,832	128,889
2003	44,635	60,430	54,114	70,716	98,749	131,146
2002	43,981	60,059	54,905	71,207	98,886	131,266
2001	40,561	54,639	54,309	70,025	94,869	124,664
2000	41,805	56,892	53,832	68,997	95,637	125,889
1999	43,013	59,595	52,434	68,833	95,447	128,428
1998	42,427	58,063	51,490	69,195	93,918	127,258
1997	40,216	56,204	49,716	66,513	89,932	122,717
1996	39,304	54,195	48,071	66,277	87,375	120,472
1995	38,885	52,503	47,994	67,385	86,879	119,888
1994	36,406	52,078				
1993	35,413	49,753				
1992	34,899	49,120				
1991	33,926	48,194	45,667	62,564	79,593	110,758
1990	34,818	49,010	46,571	65,240	81,388	114,250
1989	33,936	49,137	40,814	53,024	74,751	102,161
1988	32,735	46,709	39,822	54,556	72,557	101,265
1987	29,675	39,300	38,078	56,575	67,753	95,875
1986	26,858	35,035	40,870	57,224	67,728	92,259
1985	26,136	36,800	36,877	53,441	63,014	90,241
1984	26,179	41,571	34,244	50,441	60,423	92,012
1983	23,276	29,685	31,695	48,788	54,971	78,473
1982						
1981	15,223	25,427				
1980						
1979	19,480	29,930	30,090	43,792	49,570	73,722
1978	22,256	31,823	28,310	50,557	50,566	82,380
1977	23,113	41,307				
1976	23,173	41,130	26,693	45,260	49,866	86,390
1975	23,484	41,900	24,140	43,095	47,623	84,995
1974	20,971	41,087	23,728	38,979	44,699	80,066
1973	21,635	40,682	25,691	44,824	47,327	85,506
1972	19,479	30,964	23,034	32,742	42,513	63,706
1971	19,280		22,050		41,330	
1970	20,250		22,000		42,250	
1969	16,000		19,400		35,400	

Source: Massachusetts Highway Department / Mass DOT

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TABLE 4: OTHER CAPE COD PERMANENT TRAFFIC COUNTING STATIONS

	#20 Rt 3 N of Bourne TL		#15 Rt 6 E of Rt 149, Exit 5		#712 Rt 28 E of Main St, Cotuit		#7351 Rt 28 W of Old Post Rd		#709 Rt 28 E of Higgins Crowell Rd	
	Yr.Round	Summer	Yr.Round	Summer	Yr.Round	Summer	Yr.Round	Summer	Yr.Round	Summer
2011		45,803		67,799			25,758	31,444		23,780
2010	34,822	50,178	50,100	72,002			27,025	32,631	18,320	24,054
2009	34,826	47,308	48,753	70,394			26,906	32,584	18,480	23,959
2008	35,418	46,031	48,619	67,646			26,607	31,967	18,587	24,090
2007	36,302	47,486	50,643	70,177			27,512	32,552	19,065	24,337
2006	34,136	41,840	51,093	69,891			27,003	32,725	20,212	24,995
2005	33,482	42,123	52,391	72,580			27,845	33,564	20,125	25,961
2004	34,477	41,669	53,619	73,154			28,130	33,818	20,736	26,180
2003	54,570	45,570	53,402	74,384			27,373	33,309	20,970	26,662
2002	38,508	45,921	53,845	73,891					21,597	27,025
2001	34,186	42,191	51,940	71,798					21,408	26,632
2000	33,381	41,625	50,128	64,832					21,080	26,747
1999	32,990	41,797	50,257	71,579					21,369	27,530
1998	32,873	42,656	48,524	69,195					21,040	27,422
1997	31,838	41,793	45,961	66,626	20,249	24,570			20,299	27,115
1996	31,074	41,377	44,530	64,672	19,619	24,697			19,730	26,241
1995	30,832	42,070	42,689	61,506	19,800	24,649			19,352	24,782
1994					19,299	24,837				
1993			39,714	60,111	18,709	24,229				
1992	29,510	40,893	39,572	59,549	18,504	24,113				
1991	28,747	38,652	39,156	55,072	18,218	23,668				
1990	28,509	39,930	39,535	57,585	18,087	23,501				
1989	28,474	41,266	38,997	58,217	18,300	23,467				
1988	27,908	40,154	38,646	57,002	18,681	24,210				
1987	27,615	42,757	37,228	55,040	17,510	22,910			21,286	27,714
1986	27,743	40,461	36,452	53,890	16,939	23,569			21,068	27,190
1985	23,227	32,466	33,836	53,043	15,016	20,010			18,158	21,861
1984	20,849	31,212	31,426	49,500	13,709	17,893			17,569	21,193
1983	16,431	28,528	29,006	48,206	12,870	18,000			17,828	21,415
1982	17,396	28,227							17,013	21,214
1981	19,440	35,500	26,740	41,971	12,364	18,035			19,619	26,037
1980	21,535	34,981	26,098	42,174	10,658	15,674			18,361	23,437
1979	19,009	29,831	24,643	38,416	14,816	20,772			19,644	26,597
1978	19,457	31,906	25,536	45,256	10,455	16,762			19,634	27,184
1977	18,648	28,858	24,324	42,845	10,025	15,350				
1976	16,668	27,349	23,048	39,947	15,190	24,651			26,261	32,652
1975	15,721	26,844	21,638	39,222	9,070	14,808			23,897	31,085
1974	15,373	26,230	20,315	36,812	8,660	14,458			23,798	31,261
1973	16,637	29,679	22,049	37,653					22,571	29,316
1972	15,716	28,024	19,824	36,653					21,513	30,357
1971	14,900		18,350						25,000	
1970	13,650		17,200						19,850	
1969	13,300		15,450						19,900	

Source: Massachusetts Highway Department / Mass DOT

5.2. SEASONAL ADJUSTMENT FACTORS

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Using the data collected from the permanent traffic counting stations, MassDOT determines the seasonal adjustment factors for the next year. These factors indicate relative traffic volumes throughout the year. For example, weekday traffic in January is approximately half the weekday traffic in July. By multiplying by the Average Daily Traffic (ADT) of a traffic count by a seasonal adjustment factor, an estimate of annual ADT can be produced for that location. ADT volumes from all months can in this way be converted into annual ADT volumes and properly compared.

The seasonal adjustment factors only produce an estimate of annual ADT for several reasons. First, the adjustment factors for 2011 are based on 2010 (or earlier) data, since the MassDOT counting stations have not yet completed recording data for the current year. Moreover, the permanent stations are located on state highways. Seasonal traffic fluctuations may be different on local roadways and streets. Also, none of the permanent stations are located east of Yarmouth. This is significant because seasonal traffic fluctuations are generally greater in areas with higher seasonal population changes, such as the Outer Cape.

Since 2011 adjustment factors are created using data from 2010, 2010's factors are replaced with those 2011 factors. When 2012 adjustment factors arrive, counts from 2011 will be updated using those factors.

For a complete listing of all seasonal adjustment factors since 1983, please see the table on the following page.

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TABLE 5: MONTHLY ADJUSTMENT FACTORS FOR CAPE COD

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	1.26	1.25	1.20	1.06	0.96	0.89	0.76	0.76	0.92	0.99	1.08	1.14
2010	1.26	1.25	1.19	1.08	0.95	0.88	0.77	0.76	0.93	1.00	1.08	1.15
2009	1.26	1.25	1.19	1.08	0.95	0.88	0.77	0.76	0.93	1.00	1.08	1.15
2008	1.21	1.25	1.19	1.08	0.96	0.89	0.78	0.76	0.93	1.00	1.07	1.14
2007	1.25	1.21	1.17	1.06	0.96	0.86	0.78	0.79	0.93	1.00	1.08	1.14
2006	1.26	1.20	1.18	1.04	0.96	0.86	0.78	0.79	0.93	0.99	1.07	1.12
2005	1.27	1.23	1.18	1.06	0.96	0.85	0.77	0.78	0.93	0.99	1.08	1.15
2004	1.27	1.23	1.18	1.06	0.96	0.85	0.77	0.78	0.93	0.99	1.08	1.15
2003	1.29	1.23	1.16	1.06	0.99	0.87	0.79	0.77	0.95	0.99	1.07	1.14
2002	1.30	1.24	1.16	1.06	0.98	0.86	0.79	0.78	0.93	0.97	1.08	1.14
2001	1.34	1.27	1.18	1.06	0.97	0.86	0.78	0.78	0.94	0.97	1.08	1.13
2000	1.37	1.28	1.20	1.07	0.96	0.87	0.77	0.78	0.93	0.97	1.09	1.14
1999	1.37	1.29	1.23	1.09	0.96	0.87	0.76	0.77	0.94	0.99	1.10	1.15
1998	1.39	1.27	1.23	1.11	0.95	0.87	0.76	0.76	0.93	0.99	1.10	1.16
1997	1.38	1.29	1.22	1.10	0.96	0.86	0.76	0.75	0.92	0.99	1.10	1.19
1996	1.41	1.30	1.22	1.07	0.96	0.86	0.75	0.75	0.91	0.99	1.10	1.19
1995	1.36	1.33	1.24	1.07	0.97	0.86	0.75	0.75	0.90	0.99	1.10	1.19
1994	1.35	1.31	1.25	1.06	0.93	0.86	0.73	0.74	0.89	0.97	1.09	1.15
1993	1.35	1.30	1.24	1.07	0.92	0.85	0.75	0.75	0.90	0.99	1.10	1.17
1992	1.37	1.32	1.29	1.08	0.94	0.87	0.75	0.76	0.90	1.01	1.14	1.21
1991	1.39	1.30	1.22	1.08	0.94	0.87	0.76	0.77	0.95	1.02	1.12	1.20
1990	1.31	1.26	1.16	1.06	0.96	0.85	0.73	0.74	0.94	0.99	1.10	1.22
1989	1.37	1.38	1.25	1.13	0.99	0.89	0.72	0.73	0.94	1.03	1.15	1.17
1988	1.38	1.30	1.21	1.10	0.99	0.83	0.72	0.73	0.91	1.02	1.11	1.15
1987	1.40	1.39	1.23	1.10	0.94	0.85	0.71	0.73	0.96	1.02	1.18	1.25
1986	1.35	1.31	1.21	1.09	1.05	0.84	0.73	0.75	0.96	1.04	1.17	1.22
1985	1.31	1.26	1.17	1.07	0.96	0.92	0.84	0.83	0.97	0.97	1.14	1.16
1984	1.55	1.36	1.46	1.12	1.03	0.85	0.73	0.73	0.94	1.07	1.14	1.24
1983	1.53	1.51	1.30	1.15	0.98	0.82	0.65	0.66	0.87	1.07	1.23	1.30

Source: Massachusetts Highway Department / Mass DOT

6. Cape Cod Commission Remote Counting Stations

In additional to MassDOT permanent count stations, continuous, year-round data is collected at Cape Cod Commission remote count locations. At these locations vehicles counts are recorded hourly for each approach lane of the intersection.

In 2011 one remote count location, Route 137 @ Route 39 in Harwich, was operation. Following a system calibration in December 2010, a full year of data was collected in 2011. The year-round average total daily traffic entering the intersection was 20,219 vehicles. As represented by data from the month of July, the summer average total daily traffic entering the intersection was 28,210 vehicles.

Additional remote count locations at anticipated to be added in 2012.

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7. Results and Analysis

After seeing sustained growth for the second half of 20th century, traffic patterns on Cape Cod have been less consistent early in the 21st century. Over the last ten years (2001-2001), there has been an overall 8.56% decrease in Cape-wide traffic. During that time, the highest traffic levels were observed in 2002 with volumes generally decreasing from 2002 to 2008. A modest upward trend has been observed since 2008.

7.1. PERMANENT COUNTING STATIONS AND BRIDGE CROSSINGS

The Massachusetts Department of Transportation maintains several dozen permanent traffic counting locations throughout the state. Five of those counters are located on Cape Cod, with a sixth being on Barnstable County's periphery. The Cape Cod-relevant permanent count locations are all located on heavily traveled roadways: Route 6, Route 3, Route 28, and the two bridges over the Cape Cod Canal.

As can be seen in the following table, traffic volumes on Route 6 and Route 28 have decreased over the last ten years. Route 3 north of the Bourne/Plymouth town line has seen over 11.49% growth since 2001. Both bridges have remained fairly level since 2001. All but one site saw a decrease in traffic from 2010 to 2011. This, at least is part, is due to high measured traffic volumes in the early 2000's.

TABLE 6: PERMANENT COUNTING STATIONS AND BRIDGE CROSSINGS

Permanent Traffic Counting Station	10 Year Total Growth	10 Year Average Annual Growth Rate	One Year Growth Rate 2010-2011
#15: Rt 6 E of Rt 149 (Ex. 5)	-6.56	-0.68	-5.84
#20: Rt 3 N of Bourne TL	11.49	1.09	-8.72
#707: Bourne Bridge	0.14	0.01	-2.01
#708: Sagamore Bridge	-1.35	-0.14	1.94
#709: Rt 28 E of Higgins Crowell	-13.42	-1.43	-1.14
#7351: Rt 28 W of Old Post Rd	-6.77*	-0.7*	-3.64
All MassDOT Stations	**-1.94****	**-0.23****	**-3.24**

*Site #7351 started 2003; growth estimates are based on 2003-2011

**Does not include site #7351 (due to lack of data)

With the Bourne and Sagamore Bridges providing the primary access to and from Cape Cod, observing traffic trends at these stations can provide useful insight into annual and seasonal traffic trends. In total, over 17 million vehicles traveled onto the Cape over the bridges in 2011. The busiest days coming onto the Cape were July 1st, May 27th, and August 12th respectively. The busiest days going off the Cape were July 5th, May 30th, and August 14th respectively. The slowest day of the year was February 2nd.

Traffic data have been collected at permanent count stations at both bridges since 1972. Carrying roughly twice as many vehicles today as in 1972, the story of traffic over the bridges is the story of traffic on Cape Cod.

As shown in Figure 1, both summer and annual average daily traffic (ADT) over the bridges showed an overall upward trend from the early 1970's through the early 2000's, reaching a maximum in 2002. Traffic volumes, on average, dropped from 2002 to 2007 before trending slightly upward over the last three years.

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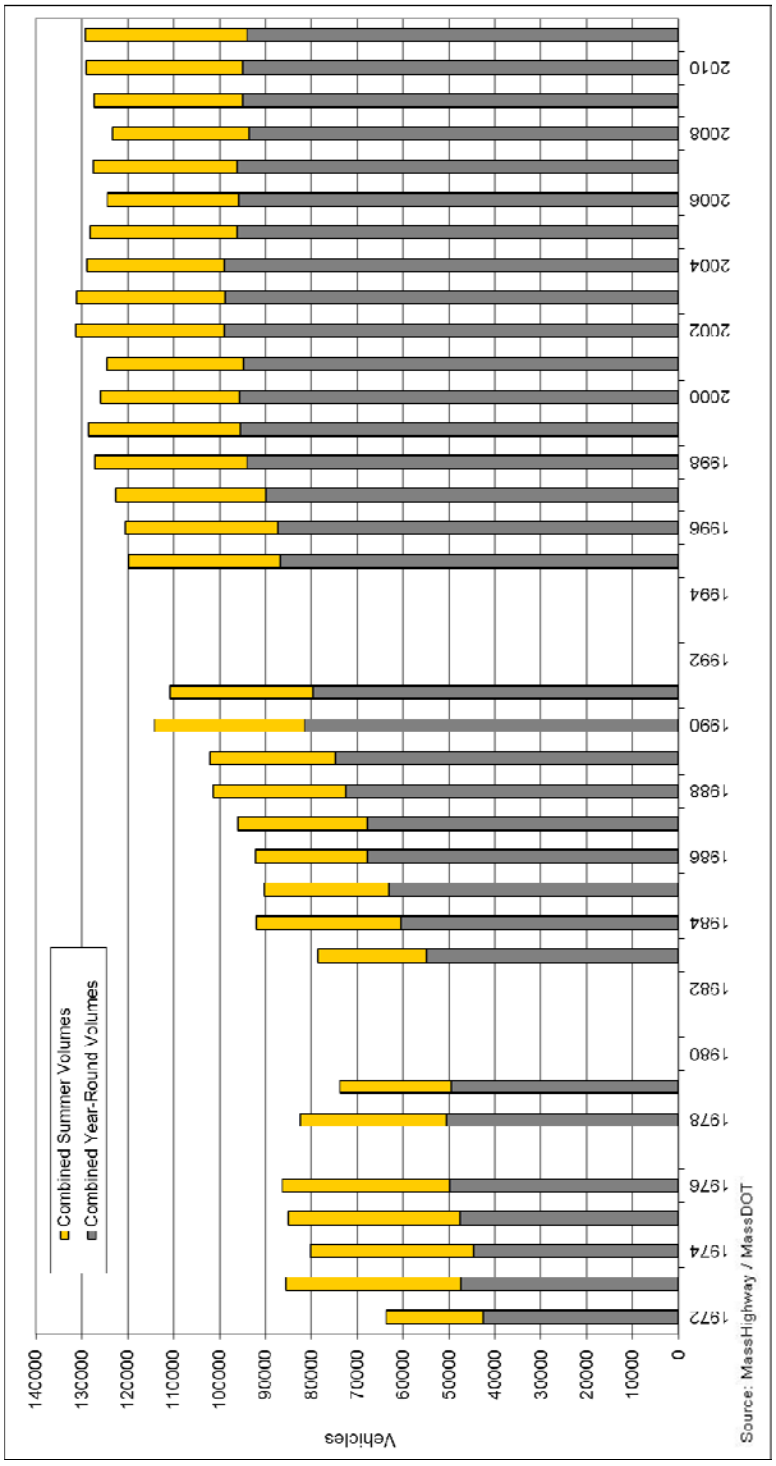
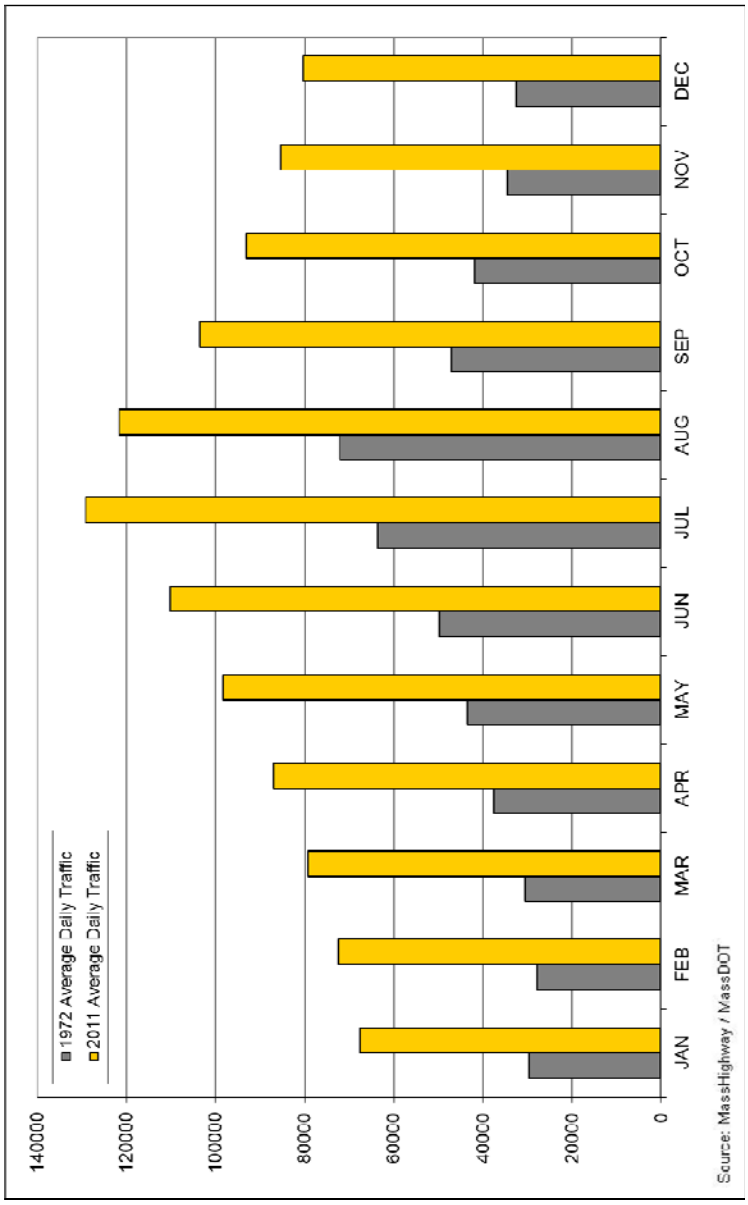
FIGURE 1: COMBINED AVERAGE DAILY TRAFFIC OVER BOURNE AND SAGAMORE BRIDGES



Seasonal traffic trends over the bridges have also changed considerably over the years. Since 1972, traffic has tended to be more spread out over 12 months as opposed to concentrated during the summer months. As shown in Figure 2, this trend, along with the overall increase in traffic, has resulted in 2011 traffic volumes throughout almost the entire year in excess of 1972 traffic volumes in the summer.

FIGURE 2: HISTORIC COMPARISON OF COMBINED AVERAGE DAILY TRAFFIC OVER THE BOURNE AND SAGAMORE BRIDGES



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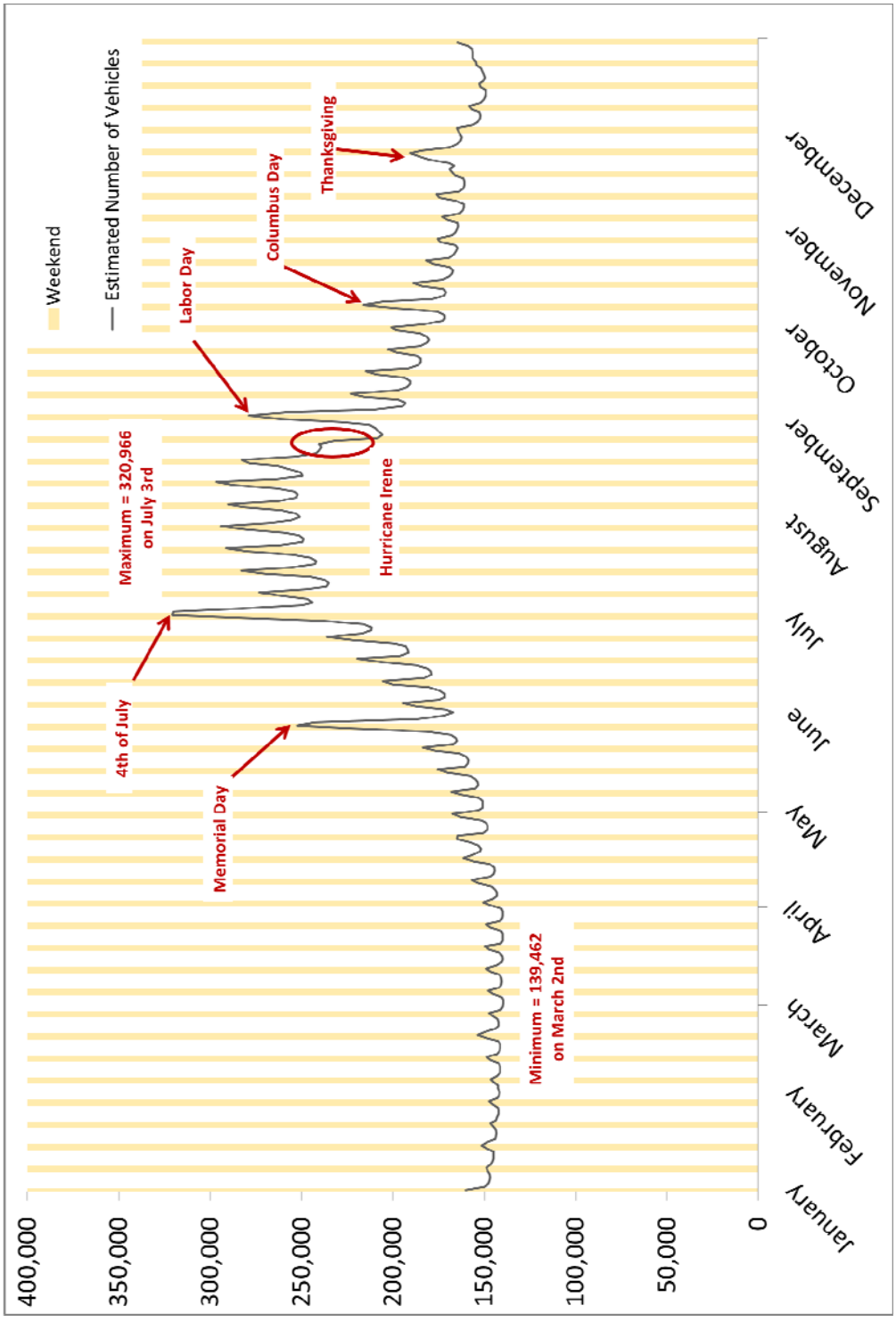
Combined bridge crossing serve as an indicator of the weekly and seasonal variations of the number of vehicles on Cape Cod. A baseline of 163,906 vehicles on Cape Cod on January 1st was assumed from estimates published in the US Census Bureau 2010 American Community Survey. The daily number of vehicles added of subtracted to this baseline was estimated by the difference in crossing south and north over the bridges. While this does not strictly account for every vehicle entering or exiting the region, it is a reasonable estimate of the overall trend.

Adjustments were made to account for any counting errors or one-way trips over the year to end up with assumed increase in in the number vehicle of 0.5%. This assumption was based a strong correlation to estimates of increased housing over the course of 2011.

Figure 3 shows the estimated number of vehicles Capewide for each day of 2011. The weekends are shaded to highlight the peaks where vehicles tend to arrive on Fridays and return on Mondays. The larger the peak the more vehicles visited Cape Cod on that weekend. This weekly trend continues through the year with large peaks during the summer months.

Some of the busiest weekends of the year, those corresponding to major holidays, are denoted with a red arrow. Noted with a red circle is one weekend, that of August 27th, 2011, when very few vehicles came onto the Cape. This anomaly corresponds to Hurricane Irene hitting Cape Cod.

FIGURE 3. ESTIMATED NUMBER OF VEHICLES CAPEWIDE



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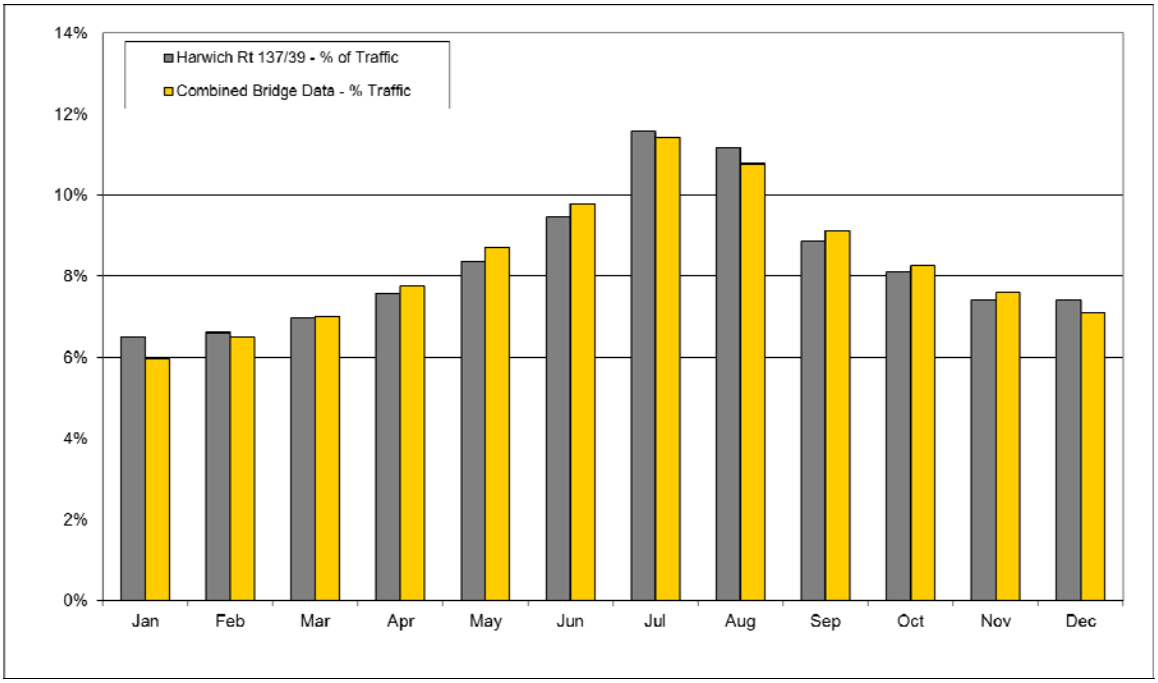
7.2. CCC REMOTE COUNTING LOCATIONS

With the first full year of calibrated data, the results from the Harwich Route 137 / Route 39 remote monitoring location provide useful insight into traffic trends on the Lower Cape.

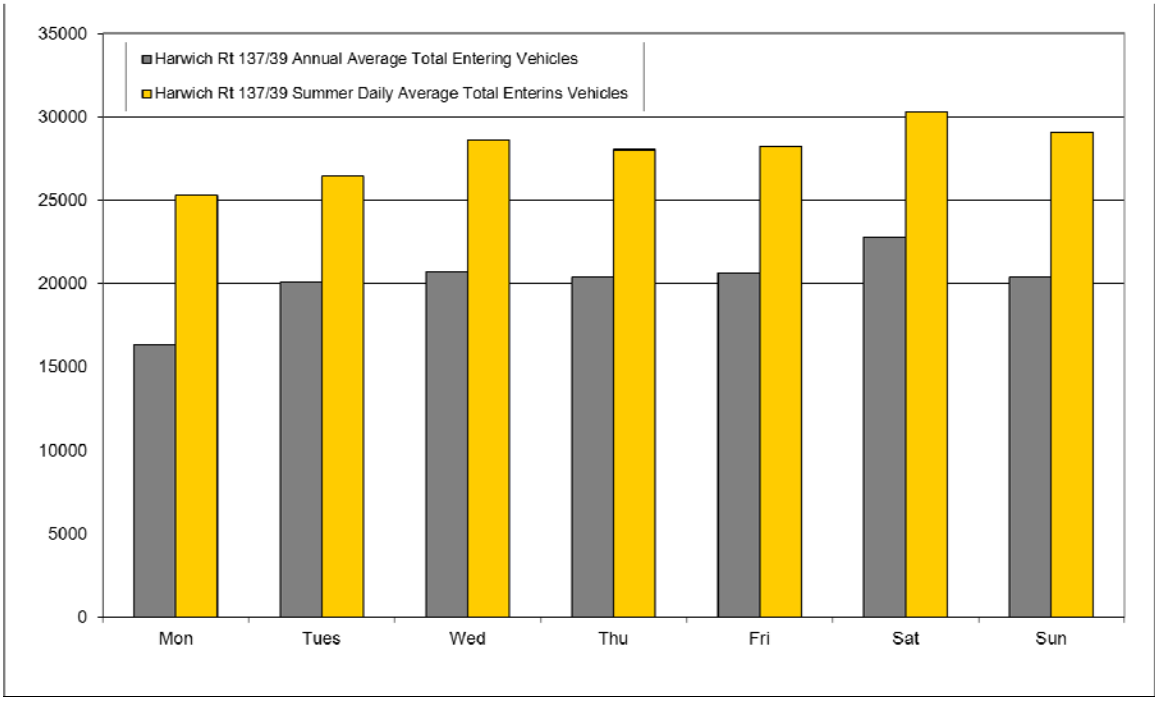
Aggregating the traffic traveling through the Route 137 / Route 39 intersection by month we see a very similar trend to the traffic coming on and off Cape Cod over the two bridges. As shown in Figure 4, the summer months of July and August experienced the highest traffic volumes. The Harwich traffic however showed a slightly less serve peaks in July and August with a comparatively greater percentage of traffic experienced in the months of March through June and September through November.

FIGURE 4. MONTHLY COMPARISON OF HARWICH RT 137/39 WITH BRIDGE CROSSING



Aggregating the data by the day of the week, interesting trends emerge for the summer and year-round traffic conditions. As shown in Figure 5, for both summer and year-round conditions, Saturday is the busiest day of the week and Monday is the slowest. Over the course of the year, on average, traffic is significantly slower on Mondays. This is likely due to the large number of holidays that occur on Monday that typically result in lower traffic volumes.

FIGURE 5. DAY OF WEEK COMPARISON OF HARWICH RT 137/39 TRAFFIC DATA



Over the course of the day, the Harwich remote counting location showed traffic variations significantly different than those seen at permanent count locations on the Upper Cape. Comparing the Harwich Route 137/39 traffic distributions with vehicles traveling over the Bourne and Sagamore Bridges, significant differences are evident. As shown in Figure 6, traffic is focused more between the hours of 8:00 AM and 5:00 PM at the bridges where as volumes are more spread out across the day at the Harwich location.

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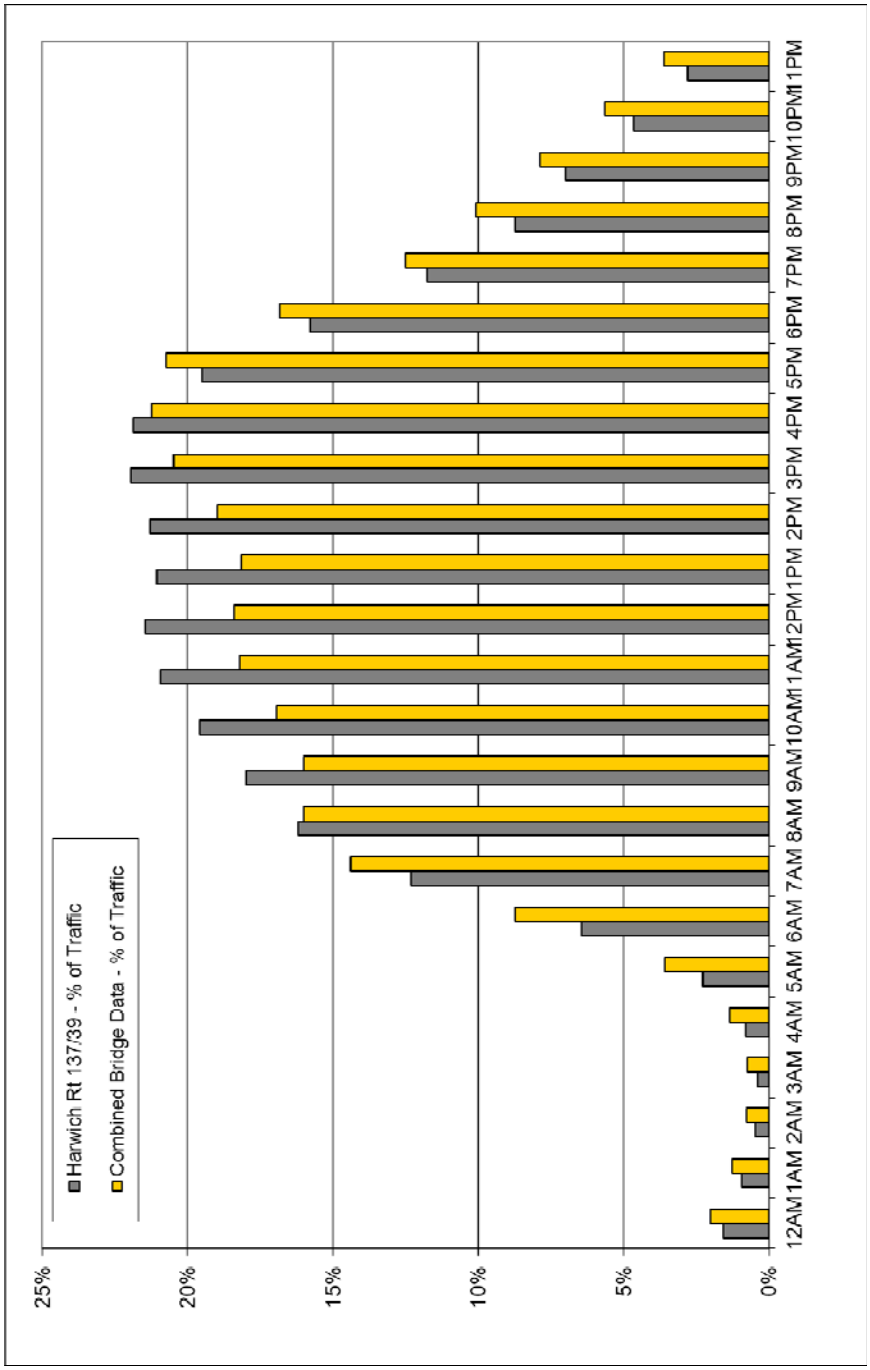
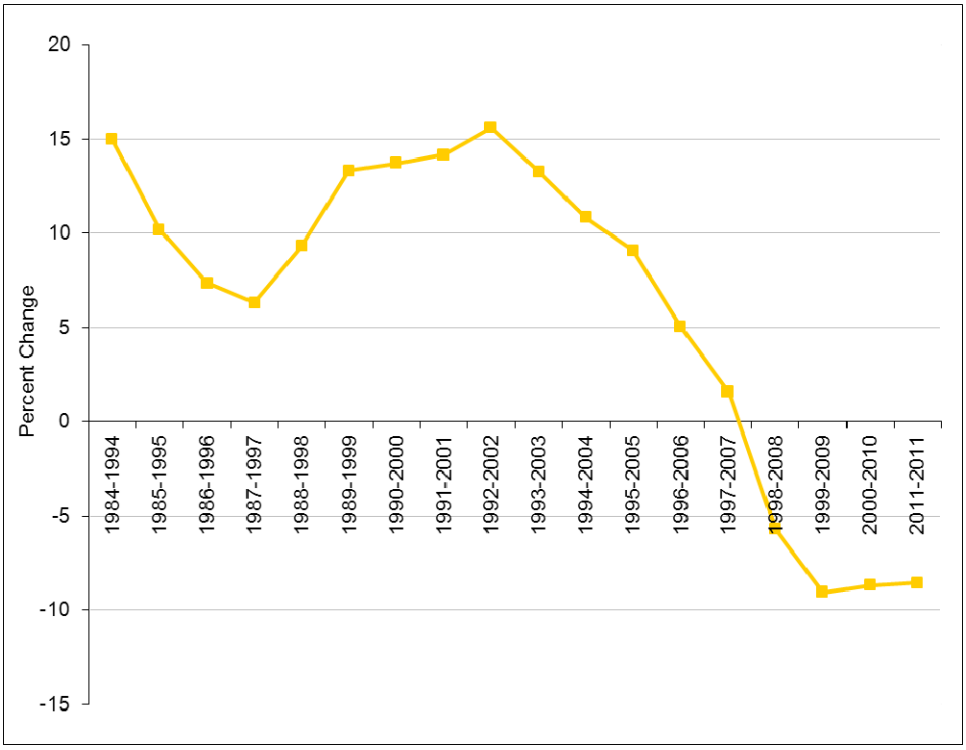
FIGURE 6. HOURLY COMPARISON OF HARWICH RT 137/39 WITH BRIDGE CROSSING



7.3. Cape-wide Traffic

The ten-year period between 2001 and 2011 was the fourth consecutive ten-year period of negative growth. Each ten-year period prior to the 1998-2008 decade experienced positive growth. 1994 was the first year the Cape Cod Commission's Traffic Counting Program had sufficient data to run a ten-year analysis (since the program began in 1984), and this period had almost 15% growth. As the following chart shows, even though the percent change for the five sets of 10-year periods ending after 2002 had been decreasing, it was still a positive change. Between 2002 and 2007, traffic volume changes during overlapping 10-year periods have been increasing, albeit at a slower pace each year.

FIGURE 7: PERCENT CHANGE FOR TEN-YEAR PERIODS



In 2009, we see the most severe 10-year drop in traffic volumes since the CCC has been keeping track of the statistic (-9.05%). While one may be tempted to assume this means traffic has decreased in 2009 since 2008, it is important to remember that the 10-year period ending in 2008 includes comparisons beginning with 1998 – a year that had significantly lower

traffic volumes than the year 1999. 1999 volumes are included in the 10-year analysis for 1999-2009, and contribute to the 10-year decline for the period. Cape-wide traffic actually increased from 2008 to 2009 by 4.51%.

This same pattern continues in 2011, where the ten-year period from 2001-2011 shows 8.56% decline.

The following table shows the growth rates for various sub-regions and roads of Cape Cod over a 10-year period. The average annual growth rate between 2001 and 2011 is -0.9% for all of Cape Cod. From 2001 to 2011 all regions experienced traffic declines with the greatest declines observed on the Outer Cape, followed by the Lower and Mid-Cape, with the most modest decline seen on the Upper Cape. The 2010-2011 however suggest that this trend may be reversing with traffic growth observed on the Outer and Lower Cape and traffic decline in the Mid and Upper Cape regions.

TABLE 7: CAPE COD SUMMER TRAFFIC GROWTH BY SUBREGION

Region*	Number of Comparisons**	10-Year Total Growth	10-Year Annual Average Growth Rate	One-Year Growth Rate 2010-2011
Upper Cape	105	-4.91	-0.51	-0.69
Mid-Cape	98	-9.48	-1	-0.6
Lower Cape	69	-11.87	-1.26	0.87
Outer Cape	60	-17.30	-1.89	4.48
All Roads	**332**	**-8.56**	**-0.9**	**-0.1**

*Upper = Bourne, Sandwich, Falmouth, Mashpee | Mid = Barnstable, Yarmouth, Dennis
Lower = Harwich, Chatham, Brewster, Orleans | Outer = Eastham, Wellfleet, Truro, Provincetown

** Corresponds to ten-year analysis only

In regards to the traffic volume change from 2001 to 2011, it is unclear what is responsible for the notable decrease. The Cape-wide population has shown only a moderate decline during this time period (see Table 8), and conventional trip generators (commercial establishments, residences, etc.) have not been reduced. While the aggregate ten-year decrease in the permanent counting stations' traffic is fairly small (Table 6), the two counting stations located on-Cape and off of the major highways show a greater decrease. The decreases these stations (#709 and #7351) show are more consistent with the Cape-wide 8.56% decrease. The other permanent count stations, located at Route 6, Route 3, and at the bridges,

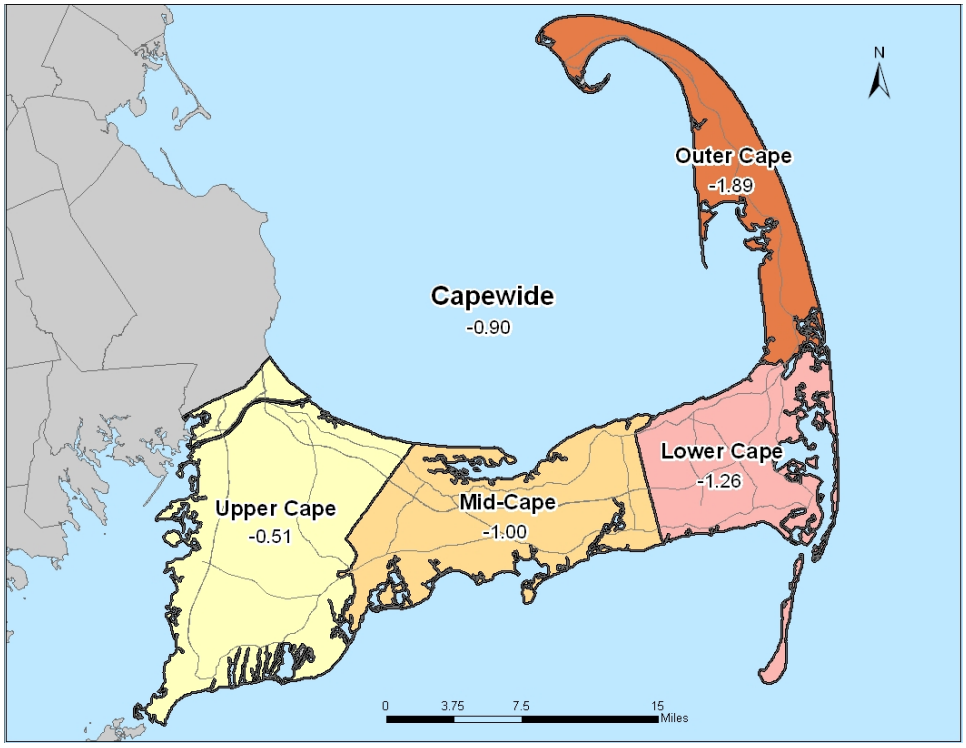
either remained somewhat steady or increased. These data are indicating that while local traffic appears to be decreasing, the major highways appear level.

TABLE 8: BARNSTABLE COUNTY POPULATION ESTIMATE

	1990	2000	2010	% Change 2000-2010
Population	186,605	222,230	215,888	-2.85%

Source: U.S. Census Bureau, Census 2010, Census 2000, Census 1990

FIGURE 8: SUBREGION TEN-YEAR ANNUAL AVERAGE GROWTH RATE (%)



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Glossary of Abbreviations

TOWN NAMES:	ABBREVIATION	TOWN
	BARN	BARNSTABLE
	BOUR	BOURNE
	BREW	BREWSTER
	CHAT	CHATHAM
	DENN	DENNIS
	EAST	EASTHAM
	FALM	FALMOUTH
	HARW	HARWICH
	MASH	MASHPEE
	ORLE	ORLEANS
	PROV	PROVINCETOWN
	SAND	SANDWICH
	TRUR	TRURO
	WELL	WELLFLEET
	YARM	YARMOUTH
DEFINITIONS:	**ABBREVIATION**	**DEFINITION**
	AADT	ANNUAL AVERAGE DAILY TRAFFIC
	ADT	AVERAGE DAILY TRAFFIC
	AXADT	AXLE ADJUSTED AVERAGE DAILY TRAFFIC
	E, W	EAST, WEST
	EB	EASTBOUND
	LN	LANE
	N, S	NORTH, SOUTH
	NB	NORTHBOUND
	RD	ROAD
	ROT	ROTARY
	RT	ROUTE
	SB	SOUTHBOUND
	ST	STREET
	TL	TOWN LINE
	TEV	TOTAL ENTERING VEHICLES
	WB	WESTBOUND

FIGURE 9: CAPE COD ROAD NETWORK

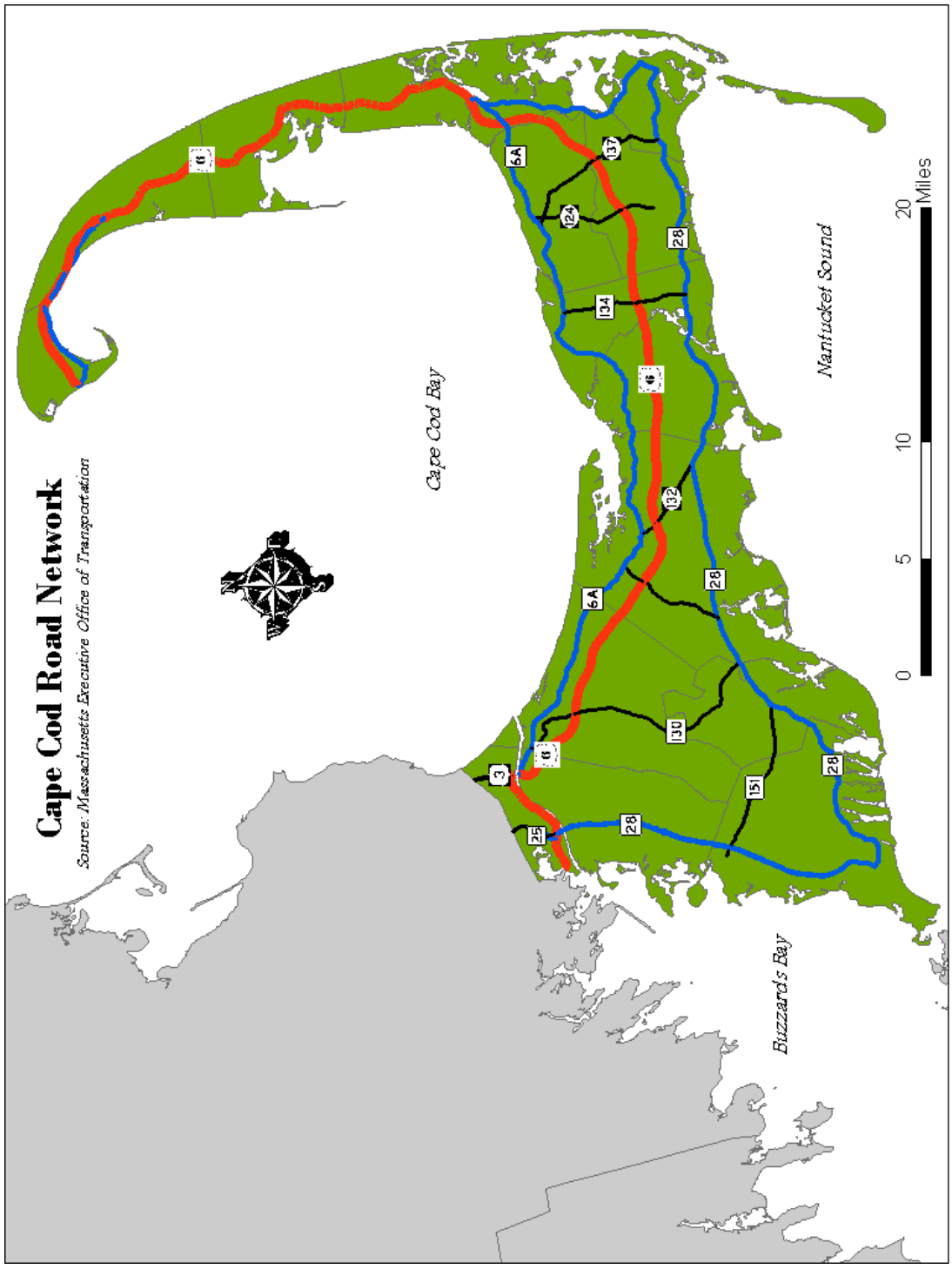
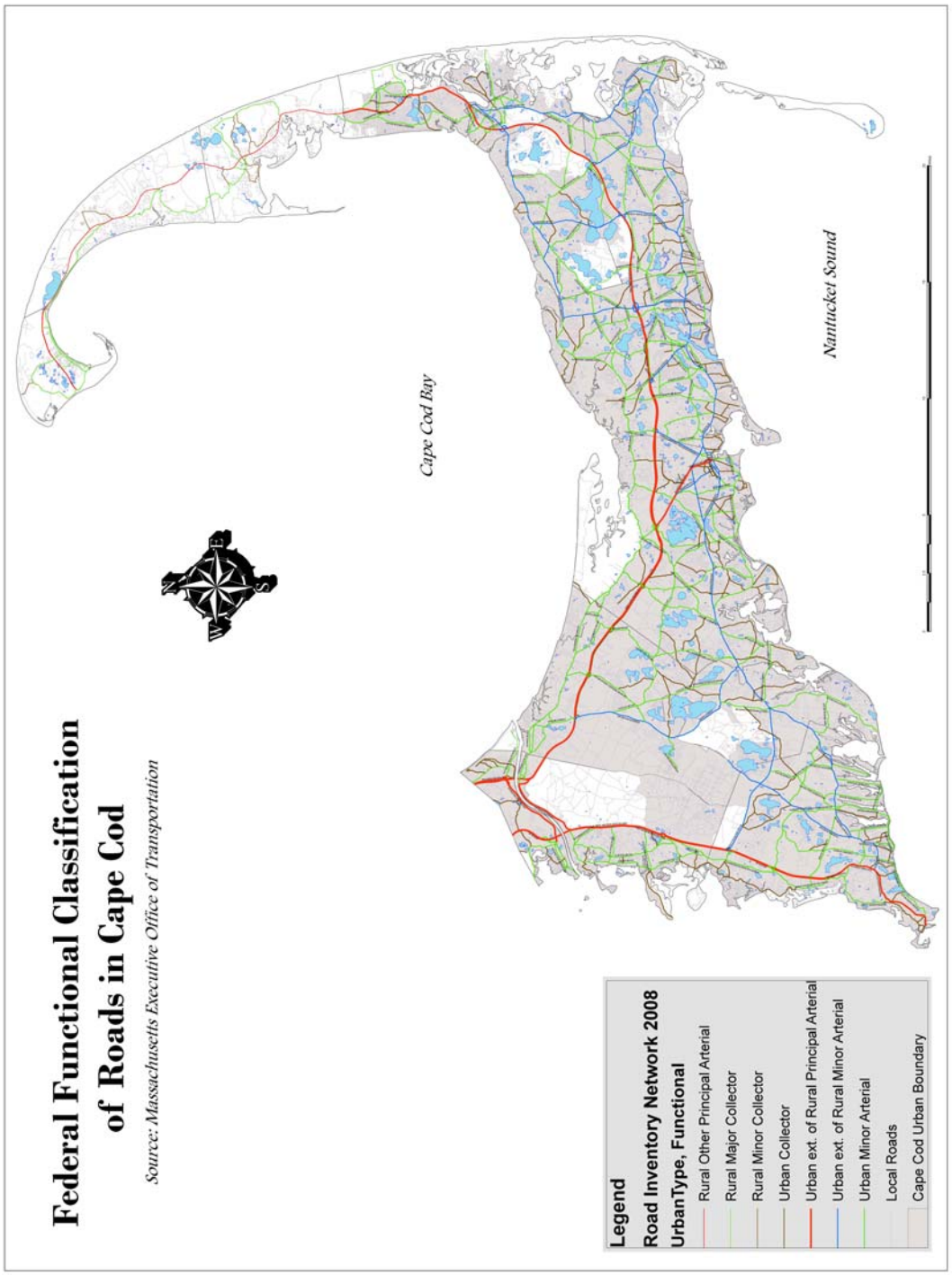


FIGURE 10: CAPE COD ROAD NETWORK FUNCTIONAL CLASS



Appendices

CAPE COD COMMISSION

The appendices contain traffic count data collected since 2001. Appendix A includes a summary of all ATR counts obtained in 2011. Appendix B makes up the body of the Traffic Counting Report. It includes all ATR counts obtained from 2001 to 2011, arranged geographically by town (starting in the Upper Cape area at Bourne and ending in the Outer Cape area at Provincetown). Appendix C includes a listing of counts taken on weekends arranged by town and then by route name. Appendix D is a collection of turning movement counts performed at Cape Cod intersections from 2001 to 2011. Appendix E summarizes bicycle pedestrian counts conducted over the last four years. Appendix F is a summary of park and ride lot capacity counts. Appendix G details travel time studies on Cape Cod. Appendix H details data collected at the Cape Cod Commission remote monitor location in 2011.

CAPE COD COMMISSION

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