

# 2013 Massachusetts Safety Belt Usage Observation Study

*Prepared for*

**Highway Safety Division**  
Office of Grants & Research  
Executive Office of Public Safety & Security  
10 Park Plaza, Suite 3720  
Boston, MA 02116  
Phone: (617) 725-3301

*Prepared by*

**University of Massachusetts Traffic Safety Research Program**



University of Massachusetts Amherst  
139 Marston Hall  
Amherst, MA 01003  
Tel 413.545.0228 / Fax 413.545.9569  
[UMassSafe@ecs.umass.edu](mailto:UMassSafe@ecs.umass.edu)

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## Introduction

This report presents the results of the 2013 safety belt observation study conducted within the Commonwealth of Massachusetts. The observations and report were completed by the University of Massachusetts Traffic Safety Research Program (UMassSafe) located at the University of Massachusetts Amherst. This observational study was conducted as part of an effort to evaluate safety belt usage in the Commonwealth as directed by the Executive Office of Public Safety and Security's Highway Safety Division (EOPSS-HSD).

The reported safety belt usage in Massachusetts, a secondary safety belt law state, has consistently had an observed usage rate lower than the national average. The survey results of safety belt observation usage in Massachusetts from 2000 - 2012 are presented in Table 1 below.

**Table 1 Massachusetts Safety Belt Usage Rates, 2000-2012**

<b>Observation Year</b>	<b>Observed Safety Belt Usage Rate (Weighted and Rounded)</b>
2000	50%
2001	56%
2002	51%
2003	62%
2004	63%
2005	65%
2006	67%
2007	69%
2008	67%
2009	74%
2010	74%
2011	73%
2012	73%

Source: Highway Safety Division, 2012 Massachusetts Safety Belt Usage Observation Survey

In 2013, the safety belt study consisted of a single stage statewide survey to assess safety belt usage in the Commonwealth of Massachusetts in compliance with the newly released federal requirements of Uniform Criteria for State Observational Surveys of Seat Belt Use (23 CFR Part 1340).

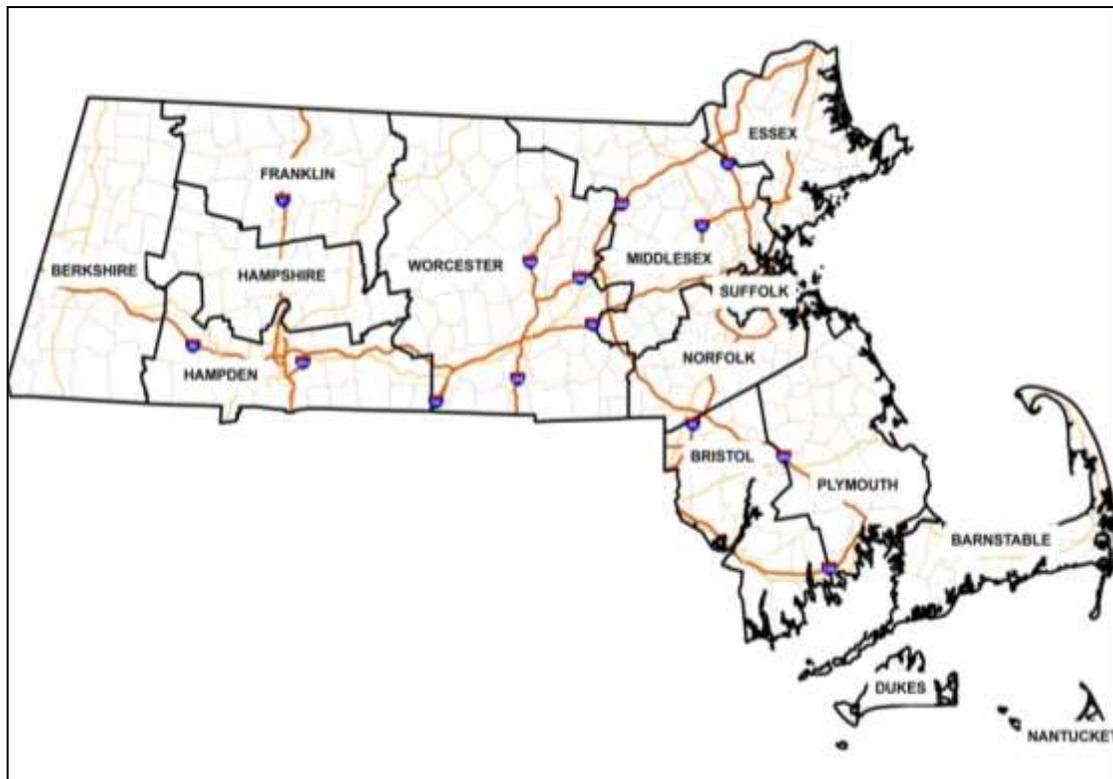
The sampling model used in this effort was developed and approved by the National Highway Traffic Safety Administration (NHTSA) prior to the 2012 study. The sampling plan adopted in 2012 was a departure from the previous protocol which had been employed since 2009. The most significant difference is the sampling of segments for inclusion based upon roadway lengths proportional to the total length within the given stratum. The previous model utilized the Massachusetts Statewide Travel Demand Model to stratify roadways in Massachusetts with the probability of a segment being selected dependent on the proportion of road segment traffic volumes to the total volumes of all segments in the corresponding stratum. Roadways were stratified on the basis of: roadway classification, and geographic region, while the observation time period was randomly selected to ensure adequate representation of daylight hours.

## Review of Sampling and Observation Approach

Massachusetts is composed of 14 counties, 12 of which account for approximately 99 percent of the passenger vehicle crash-related fatalities according to the Fatality Analysis Reporting System (FARS) data average for the period of 2007 to 2011. The regions were initially identified using both geographic proximity to one another and the annual traffic fatality count (a measure of importance within the revised sampling guidelines). As a result, the sampling plan included selection of roadways from 7 regions that are comprised of 12 counties (all but Nantucket and Dukes) as presented in Table 2 and Figure 1. Within each region, 20 or 21 hour-long observations were made at randomly assigned time of day/day of week combinations. In total, the observation teams visited 145 locations across the Commonwealth.

**Table 2 Passenger Vehicle Fatality Counts by Developed Region (2007 to 2011)**

Region	County	County		Region	
		Number of Fatalities	Percent of Statewide Fatalities	Number of Fatalities	Percent of Statewide Fatalities
1	Berkshire	65	4%	291	16%
	Franklin	27	1%		
	Hampden	159	9%		
	Hampshire	40	2%		
2	Worcester	269	15%	269	15%
3	Middlesex	278	15%	278	15%
4	Essex	180	10%	180	10%
5	Norfolk	163	9%	298	16%
	Suffolk	135	7%		
6	Bristol	230	13%	230	13%
7	Barnstable	98	5%	271	15%
	Plymouth	173	9%		
Non-Sampled Counties	Dukes	4	0%	5	0%
	Nantucket	1	0%		



**Figure 1 Massachusetts Counties**

Using 2010 TIGER data developed by the U.S. Census Bureau, a listing of road segments was selected. These have been classified by the U.S. Census Bureau using the MAF/TIGER Feature Class Code (MTFCC). There are primarily three roadway classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads (See Table 3 for detailed definitions). In addition, the listings include segment length as determined by TIGER. This descriptive information allowed for stratification of road segments. A systematic probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites.

**Table 3 Massachusetts MTFCC Codes Included by Default in the Road Segment File**

Code	Name	Definition
S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway, State Highway or County Highway System. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	These are generally paved non-arterial streets, roads, or byways that usually have a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

Although not a variable used for sampling, the day of week/time of day observations were aggregated for analysis consistent with previous years for comparison purposes. The aggregation was as follows and corresponds to the observation periods:

- Weekday A.M. Peak Period (7 am to 10 am)
- Weekday Midday Peak Period (10 am to 3 pm)
- Weekday P.M. Peak Period (3 pm to 7 pm)
- Weekend Period (7 am to 7 pm)

Once at a given location the two-person teams observed and recorded the following attributes for occupants of passing vehicles:

- Vehicle information:
  - Vehicle type (passenger, pickup truck, SUV, minivan, small commercial passenger vehicle)
  - State of vehicle license plate (MA, NH, other)
- Shoulder belt usage:
  - Driver seat belt usage
  - Front seat outboard passenger seat belt usage
- Vehicle occupant information
  - Driver gender
  - Driver age category (teenager, adult, elderly adult)
  - Driver apparent race (white, black, Hispanic, other)
  - Passenger gender
  - Passenger age category (child, teenager, adult, elderly adult)
  - Passenger apparent race (white, black, Hispanic, other)

Please note that the approved sampling plan called for the addition of sites as needed if the calculated variance did not achieve plus/minus 2.5 percent as required with NHTSA protocol, although this was not needed. The majority of sites observed in 2013 were consistent with those observed during the previous year.

## ***Results and Discussion***

Between June 4 and June 25, 2013 a total of 18,939 drivers and front outboard passengers in a total of 15,627 vehicles were observed at the 145 observation locations. The statistically weighted percentage of front seat occupants properly using seat belts during the observation study was **74.77 percent**. Based upon the variation in the sampling plan, the 95% confidence interval ranges between 73.15 and 76.38 percent with a relative error well below the required 2.5 percent threshold. This number is representative of the highest observed seat belt usage rate in Massachusetts. In an unweighted format, the percentage of belt usage was 74.83, an increase from the value of 74.33 percent in 2012. Table 4 presents a breakdown of observed variables, in a weighted format and as compared to both 2011 and 2012. Also presented in Table 4 is the change in percent (i.e., not percent change) of usage by variable from 2012 to 2013.

Given the more than 2 percentage point increase (72.74% to 74.77%) in the observed weighted seat belt usage rate, additional consideration across variables is warranted. Some of the interesting findings include, but are not necessarily limited to the following:

- There is still evidence to suggest (as reported in 2012) that the revised sampling approach employed in 2012 and again in 2013 resulted in an overall usage rate that would have been higher had the previous design been utilized. More specifically, the current design with segment selection proportional to length (as compared to VMT with functional classification as an equal sampling variable) resulted in an increase in the frequency of observations made at non-interstate and non-arterial locations where the usage rate is typically lower.
- Nevertheless, there was an increase in the overall usage rate from 71.13% to 73.00%, on roadways categorized herein as local, which were comparable to functionally classified collectors and locals in previous years (i.e., pre-2012). The usage rate also increased along primary roads (from 79.93% to 82.91%) and secondary roads (from 74.47% to 76.93%).
- The seat belt usage rate among males increased significantly from 2012 (from 65.16% to 69.12%), but was once again significantly lower than females (69.12% vs. 81.19%).
- The belt usage for both adults and teens increased 2.57 and 3.30 percentage points, respectively as compared to the 2012 rates. Elder adults saw a slight decrease from 83.43% to 81.91%; however this age group once again had the highest observed usage rate (other than children observed in the front seat (90.15%).
- Consistent with previous years, the belt usage of occupants driving out of state vehicles (other than New Hampshire) was significantly higher than that in those of Massachusetts vehicles (85.29% versus 74.30%). Vehicles registered in New Hampshire had a lower belt usage rate than in 2012, a drop from 72.60% to 65.89%.
- Observed belt usage for occupants in pick-up trucks (57.30%) and passenger style CMVs (51.30%) was again lower than that of other vehicle types; however the reported CMV rate was significantly higher than that observed in 2012 (43.69%). Increases in the observed usage rates for occupants within SUVs (up 2.39 percentage points) and passenger cars (up 1.57 percentage points) were also encouraging.
- Regionally, the observed belt usage was highest in Region 1 (Berkshire, Franklin, Hampden and Hampshire Counties), Region 3 (Middlesex County) and Region 2 (Worcester County); Region 1 saw the greatest increase, from 71.69% to 79.28%. The lowest rates were observed in Region 6 (Bristol County) and Region 4 (Essex County); Region 6 was the only region with an observed decrease (from 68.18% to 65.53%).
- Consistent with previous observation data, the observed seat belt usage rate was highest along primary roads (82.91%), while local and secondary roadways had lower observed usage rates (73.00% and 76.93%, respectively). On a positive note, increased usage rates were observed along all roadway types.
- Drivers with passengers were more likely to be belted than those without passengers (76.42% vs. 73.52%). The observed usage rate among front outboard passengers was 76.82%.
- The most significant increase observed from the primary study variables was the 11.56 percentage point increase (from 59.01% to 70.57%) among occupants with an observed apparent race of black.

**Table 4 Summary of Weighted Study Data by Observation Variable with Known Belt Status**

Observation Variable	2013 Data		2012 Data	2011 Data	Change in Percentage (2013 vs. 2012)
	Total Observed Occupants with Known Belt Status	Weighted Percent Belted	Weighted Percent Belted	Weighted Percent Belted	
All Vehicle Occupants	18,939	74.77	72.74	73.22	2.09
<b>Gender</b>					
Male	10,068	69.12	65.16	67.57	3.96
Female	8,803	81.19	81.08	80.17	0.11
Unknown	68	80.82	68.71	68.00	12.11
<b>Apparent Age</b>					
Child (passenger <12)	212	91.91	88.81	87.64	3.10
Teen	727	75.18	71.88	68.85	3.30
Adult	16,166	73.71	71.14	72.87	2.57
Elder Adult (>65)	1,808	81.85	83.43	79.19	-1.58
Unknown	26	96.08	73.94	50.55	22.14
<b>Apparent Race</b>					
Black	841	70.57	59.01	65.47	11.56
Hispanic	879	52.86	53.41	54.39	-0.55
White	16,258	75.88	74.46	74.30	1.42
Other	815	80.92	78.43	78.97	2.49
Unknown	146	73.91	70.11	70.58	3.80
<b>State of Vehicle Registration</b>					
Massachusetts	17,565	74.30	72.21	72.37	2.09
New Hampshire	323	65.89	72.60	72.60	-6.71
Out of State (Other)	1,031	85.29	80.46	83.98	4.83
Unknown	20	94.92	85.18	60.95	9.74
<b>Vehicle Type</b>					
Passenger Car	10,082	76.19	74.62	75.76	1.57
Pick-up Truck	1,606	57.30	57.18	59.40	0.12
SUV	5,205	80.34	77.95	77.72	2.39
Van	1,115	80.74	79.93	78.71	0.81
Commercial Vehicle	931	51.30	43.69	47.30	7.61
<b>Time of Day / Day of Week</b>					
A.M. Peak – Weekday	2,681	73.94	73.45	72.14	0.49
Middy Peak – Weekday	8,933	73.12	70.37	69.90	2.75
P.M. Peak – Weekday	4,819	76.74	74.34	75.58	2.40
Weekend	2,506	77.79	75.22	74.76	2.57
<b>Observation Region</b>					
Region 1	2,353	79.28	71.69	N/A	7.59
Region 2	2,276	77.97	76.11	N/A	1.86
Region 3	3,094	78.25	76.87	N/A	1.38
Region 4	2,187	70.41	69.39	N/A	1.02
Region 5	3,869	78.10	74.64	N/A	3.46
Region 6	3,652	65.53	68.18	N/A	-2.65
Region 7	1,508	76.00	70.24	N/A	5.76
<b>Occupant Role</b>					
Driver Alone	11,989	73.52	71.00	72.55	2.52
Driver with Passenger	3,670	76.42	75.49	75.24	0.93
Passenger	3,327	76.82	75.78	73.71	1.04
<b>Functional Classification</b>					
Primary (Interstate)	1,956	82.91	79.93	79.70	2.98
Secondary (Arterial)	3,624	76.93	74.47	71.89	2.46
Local (All others)	13,359	73.00	71.13	67.97 <sup>a</sup>	1.87

<sup>a</sup> Represents a combination of functionally classified local and collector roadways observed in 2011