CHAPTER 6

SAFETY

The Pioneer Valley Planning Commission (PVPC) works according to the principles and guidelines adopted by Massachusetts Department of Transportation's (MassDOT) Traffic and Safety Engineering Division to ensure the attainment of a safe and dependable transportation system in the region. MassDOT's Highway Safety Division has established a set of several long and short term traffic safety related goals based on performance measure related strategies. PVPC works in cooperation with MassDOT as well as all the member communities to adopt these strategies at the regional level.

The overarching goal set by MassDOT is to: "Actively manage the nation's safest transportation system to minimize injuries whenever, wherever and to whomever possible."

The Highway Safety planning process in Massachusetts is undertaken through several plans, activities and policies broadly classified under four main categories:

- Roadway Safety Audits
- Strategic Highway Safety Plan
- Highway Safety Improvement Program
- Traffic Safety Toolbox

A. STRATEGIC HIGHWAY SAFETY PLAN

Under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users ACT 2005 (SAFETEA-LU) each state was required to prepare a Strategic Highway Safety Plan (SHSP). This continues under MAP-21.

The purpose of a SHSP is to identify the State's key safety needs and guide investment decisions to achieve significant reductions in highway fatalities and serious injuries on all public roads. The SHSP brings together all highway safety partners in the State and draws on their strengths to align and leverage resources to collectively address the State's safety challenges. The most important benefit of an SHSP is that statewide goals and safety programs are coordinated to most effectively reduce highway fatalities and serious injuries on all public roads.

1. 2013 Update to the Strategic Highway Safety Plan

In the years since the first Massachusetts SHSP was prepared in 2006, Massachusetts experienced a steady decline in the number of traffic-related crashes throughout the Commonwealth. Comparing the five-year averages from the implementation of the SHSP in 2006 (2002-2006) to current data (2007-2011), fatalities dropped by 19 percent and serious injuries (hospital stays for nonfatal traffic injuries) also declined by 19 percent. Massachusetts completed a revised SHSP in September 2013 and is now actively implementing the various strategies.

To simplify the SHSP organization and direction, safety stakeholders grouped the emphasis areas into three tiers to focus attention on the traffic safety problems exhibited by each area. These three tiers are labeled: Strategic, Proactive, and Emerging.

A Strategic emphasis area is one that represents at least 10 percent of annual fatalities or severe injuries on Massachusetts roadways. The nine emphasis areas in this Tier are:

- Impaired Driving
- Intersections
- Lane Departures
- Occupant Protection
- Speeding/Aggressive Driving
- Young Drivers
- Older Drivers
- Pedestrians
- Motorcycles.

A Proactive emphasis area is one that represents less than 10 percent of annual fatalities or severe injuries. . In these areas, the focus is to further reduce the already low number of fatalities and incapacitating injuries. The four areas are:

- Bicycles
- Truck/Bus-Involved Crashes
- At-Grade Crossings
- Safety of Persons Working on Roadways

Emerging emphasis areas focus on continuously improving the data systems used to analyze traffic safety patterns and generate data on safety topics where the data currently are inconclusive. These areas include:

- Data Systems
- Driver Inattention.

The updated Massachusetts SHSP is consistent with requirements outlined in the most recent Federal transportation legislation, Moving Ahead for Progress

in the 21st Century (MAP-21). One requirement is to establish goals and performance measures. Goals in the Massachusetts SHSP include:

- Reduce motor vehicle fatalities and hospitalizations by 20 percent in the five-year period following adoption of the SHSP (Short-Term Goal)
- Halve the number of fatalities and serious injuries by 2030 (Interim Goal); and
- Move Toward Zero Deaths and eliminate fatalities and serious injuries on the roadways (Long-Term Goal)

a) Process of Updating

The update of the plan began with the identification of stakeholders to participate in the SHSP update process and enhance collaboration across public and private organizations. An important step in the update process was to engage stakeholders from across Massachusetts. Volunteers who participated in the 2006 SHSP development process along with new stakeholders identified by safety leaders in the State participated in the update process by offering their views on the strategies and future action steps in the plan along with recommendations on short-term and interim goals.

Recruit stakeholders to participate in Executive Leadership Committee, Steering Committee, and Emphasis Area Teams. A series of interviews were held with members of the Executive Leadership Committee (ELC), made up of traffic safety leaders from a wide cross section of agencies to determine safety needs in the State and to confirm their participation. The ELC's role is to provide oversight and review progress on implementing the updated plan. Each ELC agency/organization also identified staff to serve on the SHSP Steering Committee, which has primary responsibility for the day-to-day implementation of the plan. Members of the Steering Committee, other staff from participating agencies, and stakeholder volunteers also serve as members of the various emphasis area teams, which are responsible for implementing the plan's strategies and achieving emphasis area goals.

Conduct stakeholder meetings. Joint Executive Leadership Committee/Steering Committee meetings were held in July 2012 and April 2013 to review SHSP drafts based on an examination of the 2006 SHSP, a careful review of the data, and input from ELC interviews and meetings. Stakeholders provided feedback in October 2012 and May 2013 and will take active roles in developing action plans for each emphasis area. The Emphasis Area teams met during August 2013 and early September 2013 to review and update the strategies and actions, ensure each is supported by at least one agency or organization, develop performance measures, and finalize the emphasis area plans.

Complete evaluations of transportation safety, crash data, and emphasis area strategies. As the plan moves forward, each emphasis area will track performance measures in addition to the fatality and serious injury objectives to determine overall success. Because data are a critical part of the implementation process, a subcommittee of the Traffic Records Coordinating Committee (TRCC) will work with the ELC and Steering Committee to ensure data are available for SHSP reporting and evaluation. The TRCC is a multiagency committee that regularly meets to plan and implement safety data improvements.

b) Implementation

The SHSP implementation is based upon on-going communication and coordination among all stake holders. The Action Plan of SHSP details the strategies in each of the emphasis areas through which a majority of the implementation will be undertakes as well as monitored. Each emphasis area is monitored by a lead agency that volunteered to take on the important task of developing an action plan supplemented by performance measures to track effectiveness.

The Executive Leadership Committee (ELC) meets periodically to provide leadership and oversight of the SHSP implementation process. The Steering Committee meets more frequently than the ELC to review progress in each of the emphasis areas; provide assistance to overcome barriers or solve problems; receive regular updates on SHSP-related campaigns, training, or other programs; provide guidance on future programs, activities, etc.; make recommendations to the ELC; and determine the need and design of future SHSP updates.

The lead agency for an emphasis area coordinates with key stakeholders to track the progress of strategies, celebrate successes, and identify barriers. Activities for an emphasis area include developing action plans; discussing action step implementation progress; coordinating next steps; identifying problems or barriers; reporting to the Steering Committee; determining whether changes are needed in strategies and action steps as the plan moves forward; and tracking and reporting progress. SHSP is a dynamic document that stakeholders will update, review, and improve.

B. ROADWAY SAFETY AUDIT

A Roadway Safety Audit (RSA) is undertaken at a location to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team.

RSA program in Massachusetts commenced in 2007 and since then has proven to be an effective low cost tool to make significant safety improvements at any number of stages ranging from project development and planning through existing operation. MassDOT has developed a thorough process and a set of guidelines to be followed for each RSA to make the process formal, uniform, and effective.

PVPC participates in RSAs around the region and provides comments and recommendations to make effective traffic safety related improvements. PVPC also works in cooperation with MassDOT and local Police departments at some of the locations to help provide most recent crash data and other relevant traffic volume and congestion data for the RSA team to study and review.

Road Safety Audits have also become an integral part of the Highway Safety Improvement Program (HSIP). In fact the HSIP guidelines specifically state, "All HSIP candidate locations will require an accompanying Road Safety Audit (RSA) report, or an engineering or planning report to determine eligibility." Additionally, if all or a portion of a project area is considered HSIP-eligible, a road safety audit shall be conducted prior to submitting the 25% design plans. Therefore, the RSA program greatly expanded to cover additional locations that have been identified as high crash locations. Table 6-1 enlists some of the latest Roadway Safety Audits that have been conducted in the region.

Table 6-1 – Roadway Safety Audits Completed in the Pioneer Valley Region

No.	Community	Location
1	Agawam	Feeding Hills Intersection
2	Agawam	Route 57
3	Agawam	Route 159 & CT Line to Route 75 & South River
4	Chicopee	Broadway Street and Memorial Drive (four locations)
5	Chicopee	Mass Pike Interchange 6, I-291 and Burnett Road
6	Granby	Chicopee Street & Carver Street
7	Granby	Route 202
8	Hadley	Route 9 and 47
9	Hadley	Russell Street (Route 9) at North and South Maple Streets
10	Holyoke	Cherry Street
11	Holyoke	Dwight Street at Maple Street and Dwight Street at High Street
12	Ludlow	Center Street (Route 21) at Mass Pike Interchange 7/Harding Avenue
13	Northampton	Conz St & Pleasant St
14	Northampton	Damon Road
15	Northampton	King Street and Damon Road
16	Southwick	College Highway
17	Springfield	Summer Ave- Abbot Street
18	Springfield	I-91 Viaduct
19	Springfield	Route 20
20	West Springfield	I-91
21	West Springfield	Route 20 & Boulevard St
22	Granville	Route 57

Source: MassDOT

C. HIGHWAY SAFETY IMPROVEMENT PROGRAM

Congress established the Highway Safety Improvement Program under SAFETEA-LU and continued it under MAP-21 to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on tribal lands. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance.

A Massachusetts HSIP Task Force was established to develop guidelines for HSIP-eligible projects and programs. The Task Force consists of FHWA, MassDOT Highway, MassDOT Planning and MARPA (Massachusetts Association of Regional Planning Agencies).

An HSIP eligible cluster is one in which the total number of "equivalent property damage only" crashes in the cluster is within the top 5% of all clusters in that region. "Equivalent property damage only" is a method of combining the number of crashes with the severity of crashes based on a

weighted scale where a fatal crash is worth 10, an injury crash is worth 5 and a property damage only crash is worth 1.

A highway safety improvement project is any strategy, activity or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem. To obligate HSIP funds, a State must develop, implement and update a SHSP, produce a program of projects or strategies to reduce identified safety problems, and evaluate the SHSP on a regular basis. Workforce development, training, and education activities are also an eligible use of HSIP funds.

PVPC works in cooperation with MassDOT and local communities in identifying and advancing potential projects that can be eligible for HSIP funding through its Transportation Improvement Program (TIP). Table 6-2 enlists HSIP projects that have been advertized in last five years.

Table 6-2 – HSIP Projects Advertised since 2011

Community	Project Description
Springfield	Signal & intersection improvements @ Summer Ave., Allen St., Abbott St., & Harkness Ave.
Agawam	Agawam, Rte 57 cable rail system
Regionwide	I-91 cable rail system
Holyoke	Holyoke Cherry Street Signal Installation
Northampton	Northampton - Signal and intersection improvements on Rte. 9, Bridge Road and Look
West Springfield	West Springfield- Guide sign replacement
Holyoke / West Springfield	Improvements & related work on I-91 / Route 5 / I-90 Connector Road
Agawam	Reconstruction of Rt. 159 (Main St.) from Connecticut S.L. to Rt. 75, including Br. Rehab
Holyole	Improvements & related work on I-91 / Route 5 / I-90 Connector Road
Holyoke	Cherry Street Signal Installation
Longmeadow/West Springfield	Traffic signs replacement on I-91
Southwick	Reconstruction Route 10 and Route 202
South Hadley	Resurfacing related work on Route 202 from Doouglas Street to Route 33
West Springfield	Westfield Street Route 20 reconstruction

Source: MassDOT

D. TRAFFIC SAFETY TOOLBOX

Traffic Safety Toolbox consists of a series of fact sheets regarding several traffic safety related topics. MassDOT publishes the Traffic Safety Toolbox to provide a resource of information for municipal practitioners. Specifically, the provide guidance and information regarding selected traffic safety and engineering topics.

These fact sheets also provide information about some potentially valuable resources, including web links to several other related information sources. All these fact sheets are available online on MassDOT website.

Topics addressed in the Traffic Safety Toolbox:

- New MUTCD Sign Retro Reflectivity Requirements
- General Traffic Safety Information
- Advanced Warning Signs
- Crosswalks
- Low Cost Intersection Safety Fixes
- Low Cost Non Intersection Safety Fixes
- Pavement Markings – Center lines and Edge Lines
- Pavement Markings - Others
- Roadway Safety Audits
- Retro Reflectivity
- Sight Distance
- Speed Limits and Speed Limit Setting
- Stop Sign Installation
- Work Zones

E. EXISTING CONDITIONS

1. Crash History

MassDOT maintains a database of crashes by collecting the records from the Registry of Motor Vehicles. PVPC utilizes this information as well as crash information collected locally from the police departments to analyze and evaluate the existing problems at different intersections in the region that have safety related problems.

A summary of the total number of crashes reported by each community to the Massachusetts Registry of Motor Vehicles over the last ten years is provided in Table 6-1. This information consists of crashes that either resulted in a personal injury or fatality, or resulted in greater than $1000.00 worth of property damage.

The City of Holyoke experienced the greatest number of crashes (16,956) over the ten year period and the highest number of crashes per roadway mile. The City of Springfield was under reporting their crash data until recently and therefore the number of crashes reported for the city showed notable increase within last couple of years. In the year 2012, Springfield alone accounted for a maximum number of crashes with a total of 4,501, followed by Holyoke (1,636), and Chicopee (1,390).

MassDOT also publishes and updates a report which summarizes the top 200 high crash locations in the state. The most recent report uses the crash data

from the calendar years of 2010 - 2012 Table 6-3 lists the top high crash locations in the Pioneer Valley which are ranked amongst the top 200 high crash locations in the State.

PVPC published the list of the top regional high crash intersections and roadway segments utilizing the crash data for years 2007-2009. The top high crash locations are ranked on the basis of Equivalent Property Damage Only (EPDO) index, which is based on the number of crashes weighted by the severity of each crash (fatal crashes are weighted by 10, injury crashes are weighted by 5, and property damage only or non-reported is weighted by 1). Due to the age of this data, some of these locations may have realized improvements to safety as a result of transportation improvement projects. Traditionally, rotaries with a history of crash problems such as the Route 5/20 rotary in West Springfield do not appear on the MassDOT list because the crash data is summarized by the individual intersections that comprise the rotaries rather than the rotary itself.

A total of 24 locations from Hampshire and Hampden counties were included in Top 200 high crash locations of the state. Springfield and Holyoke were leading with 9 and 7 locations each. The crash cluster in the vicinity of the Holyoke Mall in the City of Holyoke likely incorrectly attributes too many crashes to the main entrance. Figure 6-1 depicts the locations of these top 24 clusters in the region on a map.

Table 6-3 – Ten Year Community Crash History

Town	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total Crashes	Average Crashes/ Year	Average Crashes/ Roadway Mile
AGAWAM	759	687	704	541	603	586	521	569	545	494	6,009	600.9	4.00
AMHERST	162	132	238	222	218	182	96	449	450	390	2,539	253.9	1.87
BELCHERTOWN	239	256	289	223	215	221	261	232	229	230	2,395	239.5	1.54
BLANDFORD	72	67	62	55	72	72	60	78	76	77	691	69.1	0.77
BRIMFIELD	75	67	75	67	68	85	45	57	75	77	691	69.1	0.87
CHESTER	20	19	14	13	17	16	9	18	13	12	151	15.1	0.23
CHESTERFIELD	5	7	11	9	11	9	9	3	11	19	94	9.4	0.16
CHICOPEE	963	1,626	1,670	1,519	1,624	1,471	1,462	1,448	1,510	1,390	14,683	1468.3	5.64
CUMMINGTON	14	10	10	14	9	9	4	3	0	4	77	7.7	0.12
EAST LONGMEADOW	529	491	485	449	452	452	447	393	446	384	4,528	452.8	4.82
EASTHAMPTON	121	151	212	168	135	124	80	287	276	303	1,857	185.7	2.10
GOSHEN	15	23	22	16	23	17	6	11	18	14	165	16.5	0.38
GRANBY	157	178	187	150	150	165	140	117	138	166	1,548	154.8	2.29
GRANVILLE	31	16	21	16	18	22	10	23	18	12	187	18.7	0.25
HADLEY	435	381	372	383	388	319	327	266	257	290	3,418	341.8	4.11
HAMPDEN	57	65	62	57	55	63	40	55	47	37	538	53.8	1.00
HATFIELD	50	51	48	42	50	32	19	36	37	29	394	39.4	0.67
HOLLAND	15	12	12	12	5	7	10	12	6	9	100	10.0	0.27
HOLYOKE	1,832	1,609	1,749	1,627	1,342	1,654	1,716	1,724	2,067	1,636	16,956	1695.6	9.77
HUNTINGTON	25	17	15	8	13	19	21	23	19	21	181	18.1	0.33
LONGMEADOW	257	265	314	239	284	238	246	185	213	216	2,457	245.7	2.49
LUDLOW	233	433	462	417	479	449	462	438	459	448	4,280	428.0	3.31
MIDDLEFIELD	6	1	5	2	7	5	0	2	1	3	32	3.2	0.08
MONSON	108	108	137	108	117	110	87	51	67	50	943	94.3	0.83
MONTGOMERY	28	21	21	7	9	8	15	18	16	17	160	16.0	0.52
NORTHAMPTON	786	725	811	671	706	670	613	627	635	565	6,809	680.9	3.77
PALMER	477	503	498	441	429	379	294	425	436	347	4,229	422.9	3.70
PELHAM	14	16	28	21	20	11	13	8	8	17	156	15.6	0.34
PLAINFIELD	8	3	4	4	9	7	9	4	7	10	65	6.5	0.13
RUSSELL	58	54	59	35	36	45	30	40	46	50	453	45.3	1.25
SOUTH HADLEY	289	270	308	253	289	276	247	288	258	261	2,739	273.9	2.64
SOUTHAMPTON	49	69	69	57	62	50	53	46	51	44	550	55.0	0.74
SOUTHWICK	226	232	221	190	194	202	194	102	236	179	1,976	197.6	2.58
SPRINGFIELD	836	675	1,032	1,070	911	805	573	489	4,656	4,501	15,548	1554.8	3.12
TOLLAND	6	8	2	4	3	1	2	2	4	5	37	3.7	0.09
WALES	13	10	12	13	6	12	8	8	7	5	94	9.4	0.33
WARE	151	176	149	177	181	162	194	213	233	196	1,832	183.2	1.57
WEST SPRINGFIELD	213	174	194	194	150	145	531	618	860	823	3,902	390.2	2.72
WESTFIELD	906	969	944	878	850	755	732	820	815	778	8,447	844.7	3.42
WESTHAMPTON	20	27	21	16	17	20	17	14	18	20	190	19.0	0.40
WILBRAHAM	313	330	391	358	334	308	295	359	363	317	3,368	336.8	3.02
WILLIAMSBURG	46	34	29	57	65	67	61	39	64	54	516	51.6	1.03
WORTHINGTON	10	12	8	10	9	14	6	1	5	4	79	7.9	0.12
TOTAL	**10,629**	**10,980**	**11,977**	**10,813**	**10,635**	**10,264**	**9,965**	**10,601**	**15,696**	**14,504**	**116,064**	**11606.4**	**2.68**

Source: MassDOT

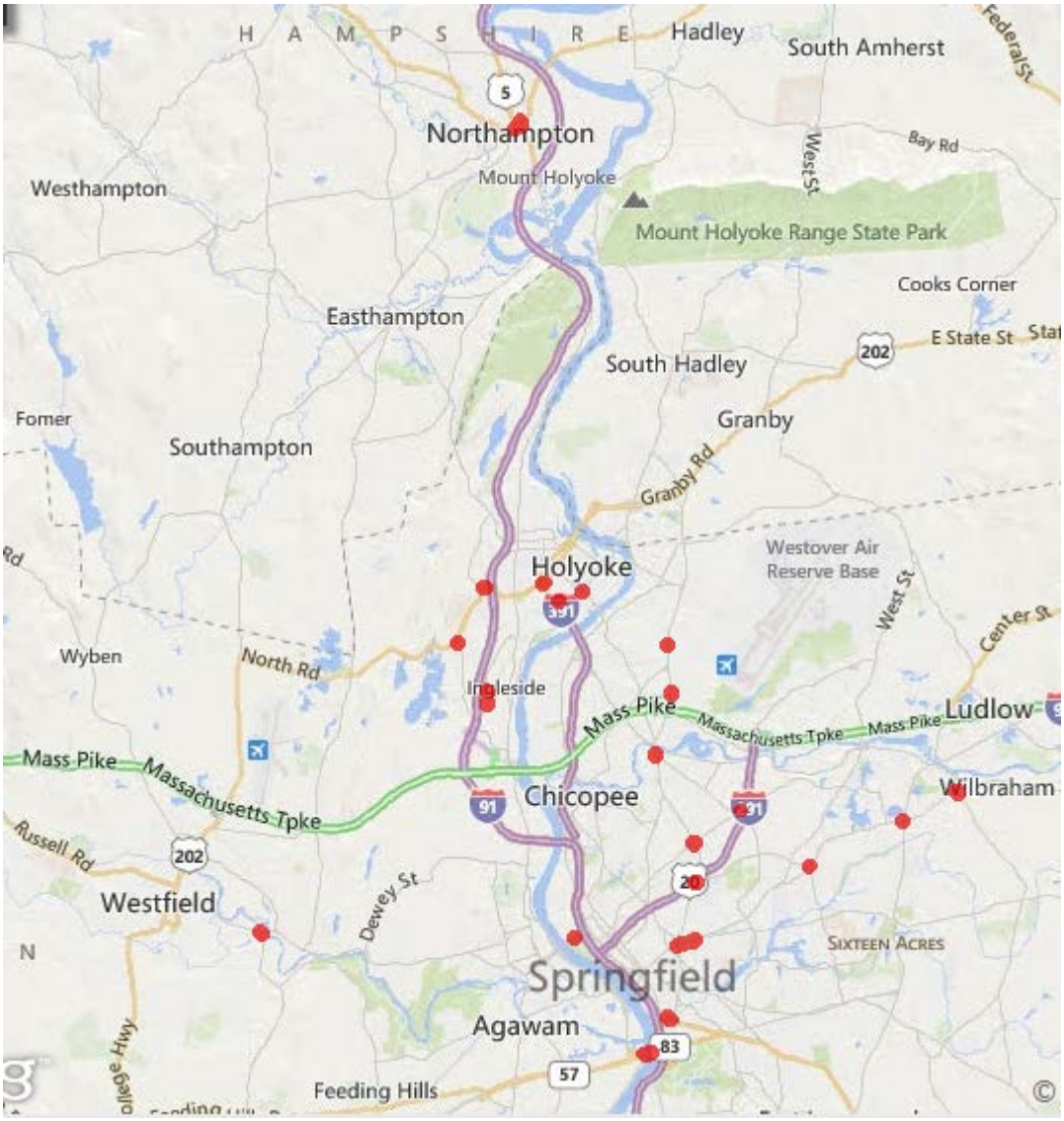
Table 6-4 – High Crash Locations in the Pioneer Valley on the Top 200 Locations in Massachusetts List

No.	Rank	Community	Location/Intersection	Total Crashes (2010-2012)	EPDO*	Fatal Crashes	Injury Crashes	Property Damage Only
1	1	Holyoke	Holyoke Street and Holyoke Mall	235	367	0	33	202
2	24	Chicopee	Broadway and East Main Street (Route 141)	78	166	0	22	56
3	30	Agawam	South End Bridge (Route 5)	69	153	0	21	48
4	38	Westfield	East Main Street (Route 20) and Little River Road (Route 187)	52	144	0	23	29
5	45	Chicopee	Memorial Drive (Route 33) and Pendleton Avenue	52	136	0	21	31
6	59	Wilbrham	Boston Road (Route 20) and Stony Hill Road	78	130	0	13	65
7	59	Springfield	State Street and Saint James Avenue	38	130	0	23	15
8	92	Northampton	Main Street (Route 9) and Strong Avenue	64	112	0	12	52
9	100	Holyoke	Beech Street (Route 202) and West Franklin Street	52	108	0	14	38
10	100	Springfield	Mill Street and Locust Street	40	108	0	17	23
11	100	Springfield	Saint James Boulevard and Saint James Avenue	40	108	0	17	23
12	113	Holyoke	Main Street (Route 116) and Cabot Street	53	105	0	13	40
13	126	Holyoke	Jackson Street and Commercial Street	43	103	0	15	28
14	126	Norhampton	Main Street (Route 9) and King Street (Route 5)	50	103	1	11	38
15	131	Springfield	Plainfield Street (Route 20) and West Street (Route 20)	34	102	0	17	17
16	137	Springfield	State Street and Thopmson Street	33	101	0	17	16
17	145	Holyoke	Lower Westfield Road and Whiting Farms Road	51	99	0	12	39
18	145	Springfield	State Street and Orleans Street	3	99	0	17	14
19	145	Springfield	Boston Road (Route 20) and Parker Street (Route 21)	39	99	0	15	24
20	153	Holyoke	Cherry Street (Route 202) and Soldier's Home Road	46	98	0	13	33
21	153	Springfield	Roosevelt Avenue and Page Boulevard (Route 20A)	30	98	0	17	13
22	159	Holyoke	Westfield Road (Route 202) and Homestead Avenue	53	97	0	11	42
23	159	Chicopee	Memorial Drive (Route 33) and Chicopee Market Place	41	97	0	14	27
24	173	Springfield	Saint James Avenue and Tapley Street	39	95	0	14	25

*EPDO – Equivalent Property Damage Only

Source: MassDOT

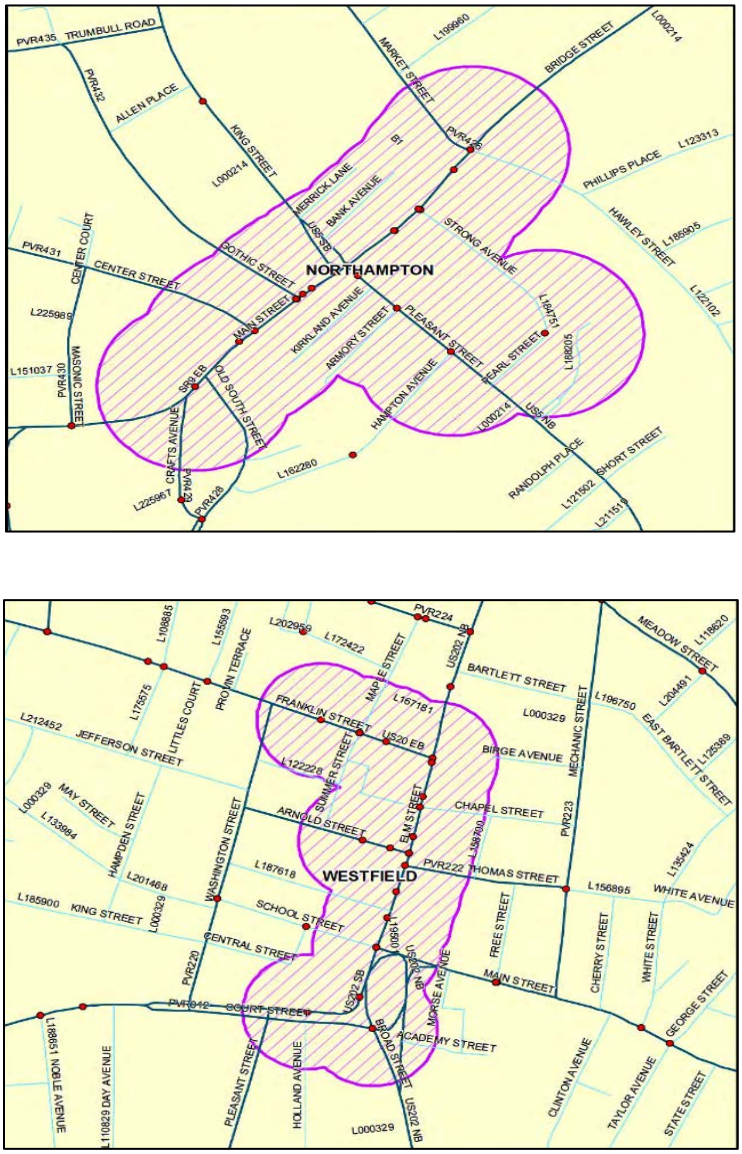
Figure 6-1 – High Crash Locations in the Pioneer Valley on the Top 200 Locations in Massachusetts List



Bicycle / Pedestrian Crash Clusters: The top 200 high crash locations report also includes the top 10 pedestrian and top 10 bicycle crash clusters in the State. The clustering analysis used for the top bike and pedestrian crash locations utilized crash data from the eleven year period of 2002-2012 because of the relatively small number of reported crashes per year.

A cluster of 28 bicycle crashes along Main Street and its intersecting streets in Northampton is ranked 5th and a cluster of 27 bicycle crashes along Elm Street and its intersecting streets in Westfield is ranked 6th amongst the top 10 bicycle crash clusters in the State. Figure 6-2 depicts the above mentioned bicycle crash clusters.

Figure 6-2 – Top Bicycle Crash Clusters in the Region



Source: MassDOT

2. Crash Data Trends

The Commonwealth of Massachusetts Highway Safety Performance Plan 2012 report summarizes crash data trends in the State which enlists the total number of fatalities and other crash related statistics.

The State of Massachusetts experienced a declining trend in the number of traffic-related crashes throughout the Commonwealth since the implementation of the Massachusetts Strategic Highway Safety Plan in the year 2006. As per SHSP update, comparing the five-year averages from (2002-2006) to current (2007-2011), crash fatalities in the state dropped by 19 percent and serious injuries (hospital stays for non-fatal traffic injuries) also declined by 19 percent. That also is the same time period Massachusetts was implementing a comprehensive, multidisciplinary approach to improving safety on our roadways.

Since 2006, there has been a consistent decreasing trend in the number of speeding related fatalities. Increased awareness and vigilant enforcement can reduce these numbers even further.

The updated Strategic Highway Safety Plan for the Commonwealth of Massachusetts adopts both a short-term (five years, 2013-2017) goal to reduce fatalities and hospitalizations by 20 percent by 2017 and an interim goal of reducing the number of fatalities[2] and serious injuries by one-half over two decades. The short-term goal is to reduce the five-year average fatalities from 367 to 294 and five-year average hospitalizations from 4,834 to 3,867 by 2017.

One area of concern is the number of motor cycle crash related fatalities which has not decreased over the last ten years. This may require special safety improvement initiatives. Many of the MassDOT reported crashes have an injury status listed as ‘Unknown’ or ‘Unreported’. Further action is required to improve this data collection process to be able to have more accurate information regarding the severity of each crash.

[2] The numbers of fatalities is different from the number of fatal crashes as some of the fatal crashes are responsible for more than one fatality.

Table 6-5 – Crash Data Trends in Massachusetts

Crash Data Trends	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fatalities (Actual)	477	459	462	476	441	429	434	364	340	314
Number of Serious Injuries	N.A.*	5279	5370	5033	5052	4579	4182	3983	3384	3048
Number of Speeding-Related Fatalities	144	176	156	158	145	148	143	97	69	62
Fatality Rate / (100 million VMT#)	0.9	0.86	0.86	0.87	0.8	0.78	0.79	0.67	0.61	N.A.*
Fatalities involving driver with BAC@ $\geq$ 0.8	181	178	156	169	148	144	155	124	108	N.A.*
Number of Motorcyclist Fatalities	53	58	35	60	56	50	62	42	52	54
Number of Pedestrian Fatalities	79	58	86	81	76	61	66	75	46	51
Percent observed belt use for front seat outboard	56%	51%	62%	63%	65%	67%	69%	67%	74%	74%
Unrestrained Passenger Vehicle Occupant Fatalities	195	189	177	165	171	158	148	120	79	94

*Not Available
#Vehicle Miles Travelled
@Blood Alcohol Content

Source: Commonwealth of Massachusetts Highway Safety Performance Plan, 2012

3. Crash Rates

Crash Rate comparison method is devised to evaluate the safety conditions of an intersection or a roadway segment in relation to conditions elsewhere in the region. The combination of crash frequency (crashes per year) and vehicle exposure (traffic volume or miles traveled) results in the development of a crash rate. Crash rates are expressed as 'crashes per Million Entering Vehicles' (MEV) for intersection locations and as 'crashes per Million Vehicle Miles Traveled' (MVMT) for roadway segments. By calculating the crash rate it can be determined how conditions along a roadway or at an intersection compare to the average condition of other similar locations. The MassDOT website provides the crash rates for intersections and segments based upon roadway classification for all Massachusetts Highway Districts.

The latest intersection crash rates on the MassDOT website are based on the averages derived from 2010 crash data which was queried on January 23rd, 2013. The roadway segment crash rates are based on 2012 crash data which was queried on August 13th, 2014. Table 6-6 summarizes these crash rates for MassDOT Highway Districts and Table 6-7 summarizes crash rates along roadway segments.

Table 6-6 – Intersection Crash Rates by MassDOT District

Location	Signalized Intersections	Unsignalized Intersections
Statewide	0.8	0.6
District 1*	0.92*	0.43*
District 2	0.82	0.68
District 3	0.89	0.66
District 4	0.77	0.58
District 5	0.77	0.58
District 6	0.76	0.58

* District 1 should use Statewide Rates due to low sample total

Table 6-7 – Roadway Segment Crash Rates by Functional Classification

Roadway Functional Classification	Rural	Urban
Statewide	0.97	2.08
Interstate	0.59	0.54
Principal arterial - other freeways and expressways	0.83	0.65
Principal arterial - other	0.69	3.35
Minor arterial	0.9	3.74
Major collector	1.61	3.62*
Minor collector	1.94	-
Local	1.03	1.9

* This rate is for all Urban Collector Roads, including both Urban Major Collector and Urban Minor Collector roadways.
If a crash occurred at an intersection or along two different functional classifications, the crash was assigned to the higher order roadway

Source: MassDOT

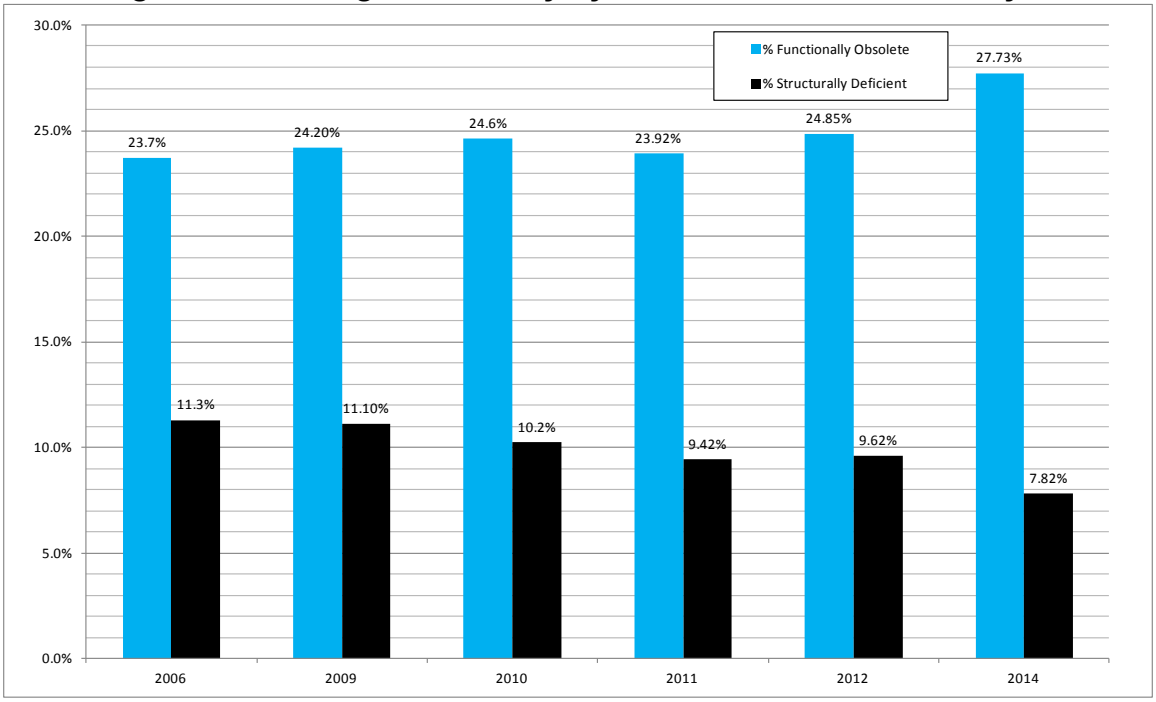
4. Bridges

All of the bridges throughout the state undergo routine structural inspection. Using a generally accepted rating system developed by the American Association of State Highway and Transportation Officials (AASHTO), MassDOT surveys and rates the state bridges. This process identifies bridges that are structurally sufficient, functionally obsolete and structurally deficient. Figure 6-3 summarizes the status of bridge conditions within the Pioneer Valley Region.

A bridge is classified as functionally obsolete when deck geometry, local capacity, clearance or alignment of the approach roadway no longer meets the usual criteria for the highway it serves. A bridge is classified as structurally deficient when the structural scores are below the acceptable sufficiency rating. Sufficiency rating is a function of the structural adequacy and safety, functional obsolescence, and serviceability of a bridge. The

percentage of structurally deficient bridges decreased by nearly two percent from 2012 to 2014, however there is an upward trend in the percentage of functionally obsolete bridges. A summary of deficient bridges by community is presented in Table 6-8.

Figure 6-3 – Bridge Deficiency by Year for the Pioneer Valley



5. At-grade Railroad Crossings

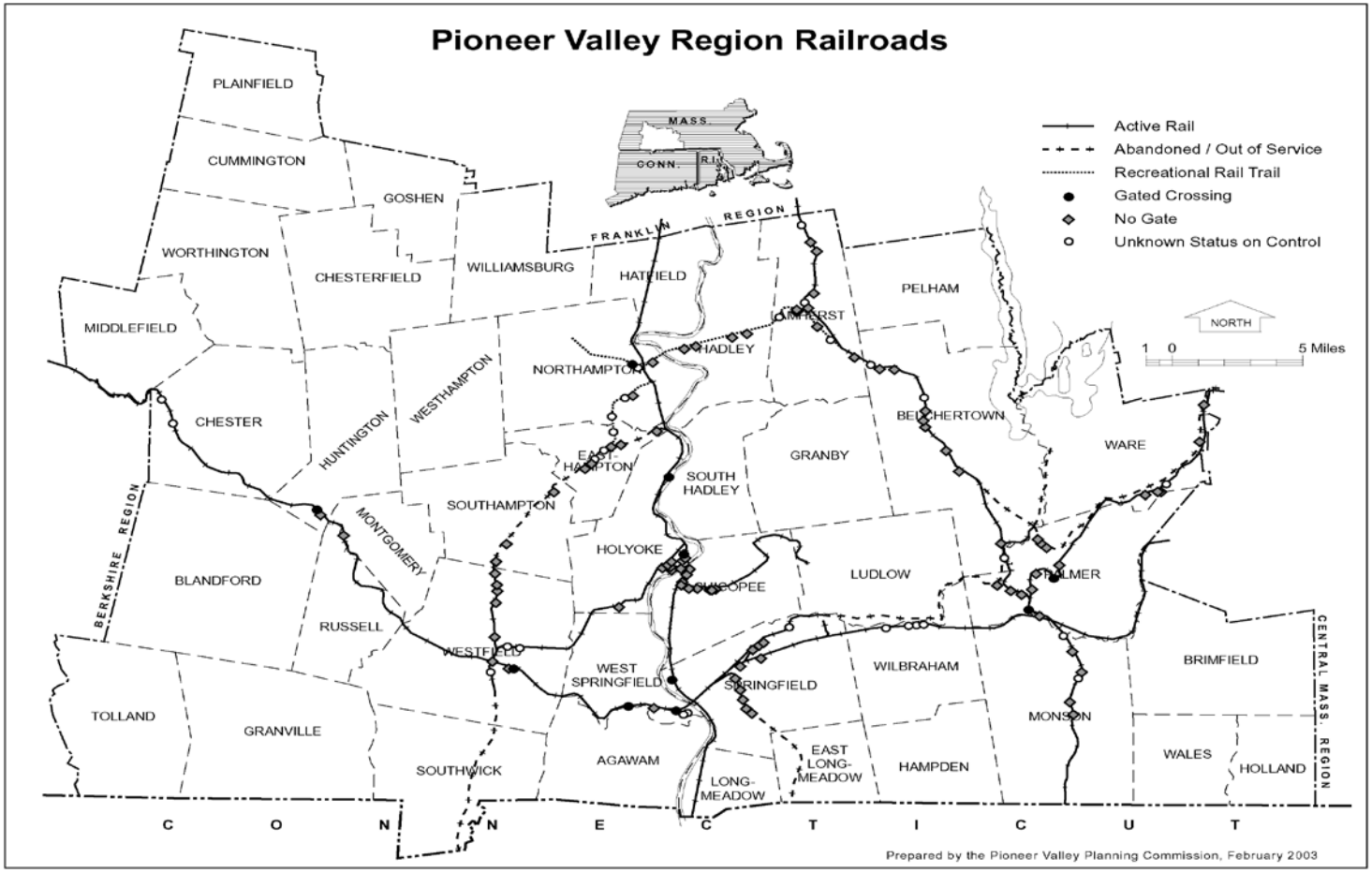
Information on the location of all at-grade rail crossings in the Pioneer Valley Region is shown on Figure 6-4. There are currently 136 railroad crossings in the Pioneer Valley Region. A total of 95 of these crossings are located on active rail lines. However, less than 10 percent of all active rail crossings in the region are controlled by automatic gates to stop vehicle traffic. Many of the at-grade railroad crossings in the PVPC region do not have safety gates to separate motor vehicle traffic from railroad traffic. In addition, supplemental warning devices such as flashing lights, warning signs, and pavement markings require routine maintenance in order to provide maximum effectiveness. It is important to maintain an inventory of these at-grade crossings in order to determine when increases in traffic and surrounding developments require the installation of safety gates and other appropriate devices.

Table 6-8 – Deficient Bridges in the PVPC Region

Community	Functionally Obsolete	Structurally Deficient	Total Deficient Bridges	Total Bridges	% Deficient	% Functionally Obsolete	% Structurally Deficient
Agawam	4	1	5	18	27.8%	22.2%	5.6%
Amherst	1	2	3	15	20.0%	6.7%	13.3%
Belchertown	5	1	6	12	50.0%	41.7%	8.3%
Blandford	1	0	1	12	8.3%	8.3%	0.0%
Brimfield	6	0	6	26	23.1%	23.1%	0.0%
Chester	4	2	6	25	24.0%	16.0%	8.0%
Chesterfield	1	2	3	9	33.3%	11.1%	22.2%
Chicopee	11	2	13	50	26.0%	22.0%	4.0%
Cummington	1	2	3	13	23.1%	7.7%	15.4%
Easthampton	6	0	6	19	31.6%	31.6%	0.0%
East Longmeadow	0	0	0	0	0.0%	0.0%	0.0%
Goshen	0	0	0	4	0.0%	0.0%	0.0%
Granby	2	0	2	8	25.0%	25.0%	0.0%
Granville	1	1	2	8	25.0%	12.5%	12.5%
Hadley	2	2	4	10	40.0%	20.0%	20.0%
Hampden	1	1	2	8	25.0%	12.5%	12.5%
Hatfield	7	1	8	15	53.3%	46.7%	6.7%
Holland	0	0	0	1	0.0%	0.0%	0.0%
Holyoke	7	3	10	49	20.4%	14.3%	6.1%
Huntington	5	1	6	8	75.0%	62.5%	12.5%
Longmeadow	0	0	0	4	0.0%	0.0%	0.0%
Ludlow	7	1	8	22	36.4%	31.8%	4.5%
Middlefield	2	1	3	9	33.3%	22.2%	11.1%
Monson	6	4	10	23	43.5%	26.1%	17.4%
Montgomery	4	0	4	5	80.0%	80.0%	0.0%
Northampton	16	5	21	43	48.8%	37.2%	11.6%
Palmer	10	2	12	30	40.0%	33.3%	6.7%
Pelham	1	2	3	3	100.0%	33.3%	66.7%
Plainfield	2	0	2	2	100.0%	100.0%	0.0%
Russell	3	0	3	15	20.0%	20.0%	0.0%
South Hadley	1	0	1	11	9.1%	9.1%	0.0%
Southampton	3	0	3	10	30.0%	30.0%	0.0%
Southwick	1	0	1	3	33.3%	33.3%	0.0%
Springfield	27	5	32	60	53.3%	45.0%	8.3%
Tolland	0	0	0	0	0.0%	0.0%	0.0%
Wales	0	1	1	1	100.0%	0.0%	100.0%
Ware	3	2	5	16	31.3%	18.8%	12.5%
West Springfield	12	3	15	26	57.7%	46.2%	11.5%
Westfield	13	3	16	36	44.4%	36.1%	8.3%
Westhampton	4	2	6	14	42.9%	28.6%	14.3%
Wilbraham	1	0	1	4	25.0%	25.0%	0.0%
Williamsburg	7	1	8	17	47.1%	41.2%	5.9%
Worthington	0	0	0	14	0.0%	0.0%	0.0%
2014	188	53	241	678	35.5%	27.7%	7.8%

Source: MassDOT

Figure 6-4 – Rail Crossings Map



6. Dams in the Pioneer Valley Region

There are approximately 268 dams in the PVPC region that are regulated by the Office of Dam Safety. To be regulated, these dams are in excess of 6 feet in height (regardless of storage capacity) and have more than 15-acre feet of storage capacity (regardless of height). There are also many dams in the region that because they fall below these parameters are known as non-jurisdictional dams. Of the regulated dams in the region:

- 43 have a hazard index rating of high,
- 134 are rated significant hazard, and
- 91 are rated low hazard[3]

Hazard index rating is a level of risk determined by the likelihood that a dam failure (an uncontrolled release of impounded water) would result in loss of life or substantial property damage.[4]

Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners. The financial burden associated with these responsibilities can vary greatly, depending on the number of dams for which an owner is responsible, and the dam's condition and hazard index rating. A dam in poor or unsafe condition can involve very costly repairs, and a hazard index rating also brings with it different requirements related to frequency of inspections by engineers and the need for development of emergency action plans.

More recently enacted regulations seek to promote greater dam safety by extending the requirement of emergency action plans to significant hazard dams (in addition to high hazard dams), strengthening the authority of the Office of Dam Safety by increasing fines for non compliance, and establishing the Dam and Sea Wall Repair and Removal Fund, an annual grant and loan program available to dam owners.

Problems remain however. Within the region there are 18 high and significant hazard dams in poor or unsafe condition. There are an additional 14 low hazard dams in poor or unsafe condition. It is important to note that most of these dams are located upstream of important roadway infrastructure. See Table 6-9 for a listing of specific dams.

[3] These numbers are estimates based on periodic and partial updates to PVPC's dams data base from the Massachusetts Office of Dam Safety.

[4] Dams that are "likely" to cause such damage are classified as "high hazard"; dams that "may" cause such damage are classified as "significant" hazard; dams that "may cause minimal property damage to others" where "loss of life is not expected" are classified as "low" hazard. Dams that fall into these classifications are regulated by the Office of Dam Safety.

Table 6-9 – Dams in the Pioneer Valley in Poor or Unsafe Condition

Dam Name	Location	Hazard index	Condition	Notes
Upper Highland Lake Dam	Goshen	H	Poor	
Lower Highland Lake Dam	Goshen	H	Poor	
Roberts Meadow Upper Reservoir Dam	Northampton	H	Poor	Slated for removal 2015
Van Horn Park Lower Dam	Springfield	H	Poor	
Bondsville Upper Dam	Belchertown	S	Poor	
Knights Pond Dam	Belchertown	S	Poor	
Aldrich Lake Dam	Granby	S	Unsafe	
Lake Warner Dam	Hadley	S	Poor	
D.F. Riley Grist Mill Dam/Advocate Dam	Hatfield	S	Poor	
Springfield Sportsman's Club Dam	Monson	S	Unsafe	
Pulpit Rock Pond Main Dam	Monson	S	Poor	
Pulpit Rock Pond West Dam	Monson	S	Poor	
Forest Park Upper Pond Dam	Springfield	S	Poor	
Monsanto Chemical Co. Upper Dam	Springfield	S	Poor	
Van Horn Park Lower Dam	Springfield	S	Poor	
Wards Pond Dam	Tolland	S	Unsafe	
Beaver Lake Dam	Ware	S	Unsafe	
Strathmore Paper Dam	West Springfield	S	Poor	
Nine Lot Dam	Agawam	L	Poor	
Quenneville Dam	Granby	L	Unsafe	Impoundment has been drained
Bahre Pond Dam	Granville	L	Poor	
Clear Pond Dam	Holyoke	L	Poor	
Virginia Lake Shore Dam	Middlefield	L	Poor	
Shepard Upper Pond Dam	Monson	L	Poor	
Rocky Hill Pond Dam	Northampton	L	Poor	
Lithia Springs Reservoir Dam	South Hadley	L	Poor	
Putnam's Puddle Dam	Springfield	L	Poor	
Van Horn Park Upper Dam	Springfield	L	Poor	
Camp Kinderland Dam	Tolland	L	Poor	
Vinica Pond Dam	Wales	L	Poor	
Norcross Pond Dam #2	Wales	L	Poor	
Lyman Pond Dam	Westhampton	L	Unsafe	

Source: Massachusetts Office of Dam Safety.

In Table 6-9, Dams labeled as "POOR" are dams with major structural, operational, maintenance and flood routing capability deficiencies. This category also includes

unsafe-nonemergency dams. An "UNSAFE" dam indicates a dam whose condition, as determined by the Commissioner, is such that a high risk of failure exists. Among the deficiencies which would result in this determination are: excessive seepage or piping, significant erosion problems, inadequate spillway capacity and/or condition of outlet(s), and serious structural deficiencies, including movement of the structure or major cracking.

With the more frequent larger storm events in the northeastern United States, these and other dams will be tested and dam failure may increase in likelihood.[5] The extreme storm flows produced by Tropical Storm Irene in 2011, for example, led to the failure of at least two dams in the Pioneer Valley Region. An unnamed private dam in Blandford failed, sending a surge of water downstream to inundate and damage nearby roads. At the Granville Reservoir Dam owned by the City of Westfield, the spillway failed when waters overwhelmed and then undermined the structure. Since then, the City of Westfield has had to spend $3 million in repairs and improvements to the dam and spillway.

These storm events raise questions about dams and their current capacity to pass more frequent extreme flows. Poor condition dams in the region—as may have been the case in Blandford—will certainly be tested, but so will other dams—such as the Granville Reservoir Dam, which was reportedly in fair condition at the time of the storm.

Where a dam is no longer providing a specific beneficial function, such as water supply or power generation, it makes sense to focus resources on removal to avoid what could be the larger costs of damages in the wake of a failure. Throughout the state, there have been some 38 dam removal projects in the past 8 years, with permitting and costs decreasing as professionals, local boards, and state agencies gain more experience with design, permitting, and construction. Within the Pioneer Valley, there is a good recent example of a dam removal in Pelham along Amethyst Brook that can help inform other local projects going forward. The project in Pelham involved removing the 20-foot high/170-foot wide significant hazard Bartlett Rod Shop Co. Dam. Located upstream of West Pelham Road and Route 9, the dam was in poor repair and estimated costs to bring it to good condition were $300,000. Removal, funded through a combination of grants, cost a total of $193,000, and involved a coalition that included the Massachusetts Department of Fish & Game, and the Pelham and Amherst conservation commissions.

[5] A study examining climate records, found that New England has experienced the greatest change, with intense rainstorms and snowstorms now happening 85 percent more often than in 1948. This study also found that the biggest rainstorms and snowstorms are getting bigger. Extreme downpours are more frequent *and* more intense. See: *When it Rains, It Pours: Global Warming and the Increase in Extreme Participation from 1948 to 2011*, Environment America Research & Policy Center, Summer 2012.

F. FATAL CRASHES

A summary of fatal crashes in the State from 2002 to 2012 is presented in Figure 6-3. Fatal crashes in the state have reduced by more than 16% in last decade. There are some yearly fluctuations and some increases from year to year basis, however long term averages have reduced. Once again the rate of reduction has increased since the implementation of the Strategic Highway Safety Plan.

The average of five-year total of fatal crashes in the Pioneer Valley dropped by almost 20% from (2002-2006) to (2007-2011). However there was a slight increase in the number of fatal crashes in the year 2012. A vast majority of the crashes occurred in the Hampden County, which has higher population and larger urban centers. In the year 2012, the City of Springfield alone accounted for 9 fatal crashes followed by Chicopee and Westfield with 5 fatal crashes each.

Figure 6-5 – Fatal Crashes in Massachusetts

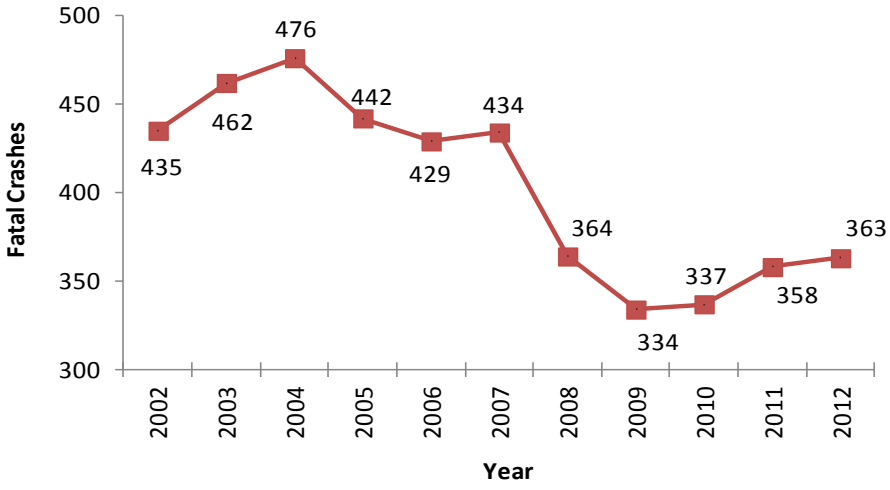
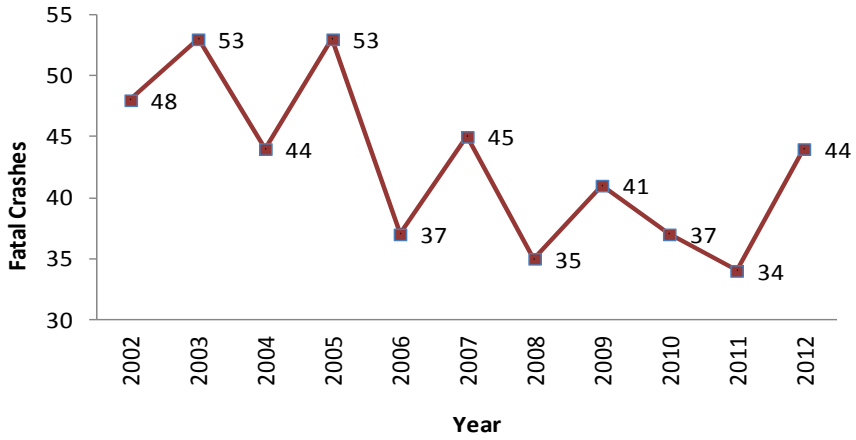
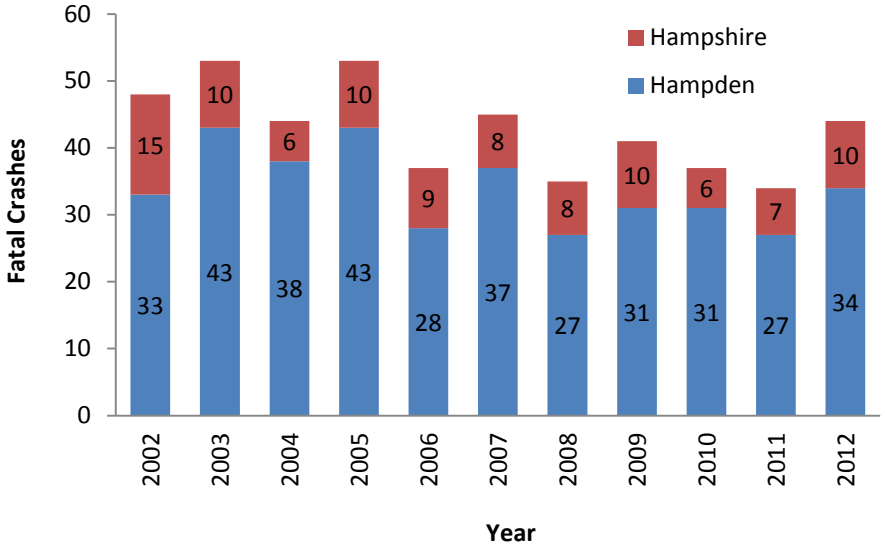


Figure 6-6 – Fatal Crashes in the Pioneer Valley



Source: MassDOT

Figure 6-7 – Fatal Crashes in Hampshire and Hampden Counties

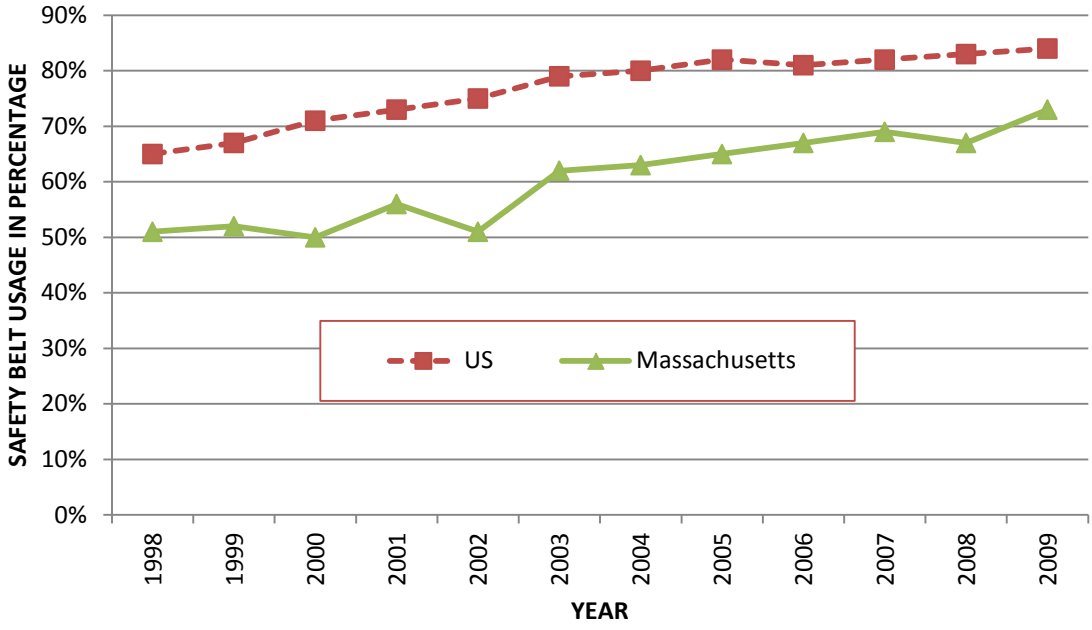


Source: MassDOT

G. SAFETY BELT USAGE

Personal injuries and fatalities resulting from motor vehicle crashes can be linked to safety belt usage. Although the use of safety belts in the Commonwealth of Massachusetts has increased over time, it still falls short of the national average. This information is shown on Figure 6-8.

Figure 6-8 – Safety Belt Use in Massachusetts compared to U.S.



Source: UMassSafe, National Occupant Protection Use Survey (NOPUS) National Highway Traffic Safety Administration

Information from the 2009 Massachusetts Safety Belt Usage Observation Study report indicates that observed safety belt usage in communities in the Pioneer Valley was on average 75%. This is higher than the statewide average of 74% from the same study, but still falls well below the national average of 84%. Table 6-10 summarizes the subsample data of observed safety belt usage at 6 locations in the Pioneer Valley between the time period of June 1 and June 30, 2009.

Table 6-10 – Safety Belt Usage in Pioneer Valley Communities

Community	Observation Location	Safety Belt Usage in Percentage
Chicopee	Center Street	74.35%
Holyoke	Beech Street	72.10%
Ludlow	Center Street	65.67%
Monson	Main Street	75.92%
Palmer	Palmer Ramp Route 32 to Route 90	82.75%
Springfield	West Columbus Avenue Exit	76.47%

Source: 2009 Massachusetts Safety Belt Usage Observation Study, UMassSafe

H. SAFETY STUDIES

As a part of PVPC's Unified Planning Work Program (UPWP), prime locations in the region which have a history of safety related issues are identified every year as proposed traffic study locations and short and long term recommendations are made to improve the conditions at such locations. As discussed earlier, the guidelines set by the Massachusetts Department of Transportation in Strategic Highway Safety Plan and Traffic Safety Tool Box are utilized for analysis to ensure the safe operations of all the transportation components in the region. Crash Data information obtained from MassDOT's crash database and local police departments is used in this analysis. In the past such study reports published by PVPC have been helpful to the towns and communities in providing them with preliminary guidelines for future safety measures as well as for obtaining appropriate funding to implement the recommended safety measures. Some of the Safety Studies that have been conducted in past include:

- *Route 9 at North and South Maple Street Safety Study*
- *Massachusetts Turnpike Exit 6 at I-291 Safety Study*
- Route 5 at Conz Street Safety Study
- Feeding Hills Center Safety Study – Agawam
- Florence Road at Burts Pit Road Safety Study – Northampton
- *Boston and Maine Railroad Bridge Safety Study – Northampton*
- West Street at Pantry Road Safety Study – Hatfield
- *Main Street at Jackson Street Safety Study – Holyoke*
- Route 141 Safety Study – Easthampton and Holyoke

- I-291 Exit 6 off ramp at Shawinigan Drive Safety Study – Chicopee
- Route 141 Safety Study Updates – Easthampton and Holyoke
- *Feeding Hills Center Transportation and Safety Study Final Report*
- Adams Road Safety Study – Williamsburg
- Feeding Hills Center Crash Data Review – Agawam
- *Granby Road at McKinstry Avenue and Montgomery Street Safety Study – Chicopee*
- Maple Street at Resnic Boulevard Safety Study – Holyoke
- Dwight Street at Worthington Street Safety Study – Springfield
- *North Main Street at Wilbraham Street, Sykes Street, and Shearer Street Safety Study – Palmer*
- Williamsburg Pedestrian Safety Study
- Brimfield Safety Study
- *Route 116 at Route 33 and Lyman Street Safety Study – South Hadley*
- *East Street at Winsor Street and Hampden Street Study – Ludlow*
- *West Avenue at Fuller Street Study – Ludlow*
- Greenleaf Community Center Safety Study
- Springfield Crash Data Analysis
- Cottage Street at Robbins Road Safety Study – Springfield, MA
- Route 9 (Locust Street) at Hatfield Street Safety Study – Northampton, MA
- *Route 9 (Federal Street) at Bay Road Safety Study – Belchertown, MA*
- *Cottage Street, Robbins Road and Industry Avenue Intersection: Springfield Safety Study*