



**MICHIGAN DEPARTMENT OF TRANSPORTATION**

**State Long Range Transportation Plan  
2005-2030**

# Highway Safety Technical Report

Prepared by  
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of Transportation  
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With assistance from



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Table of Contents

Chapter 1. Highway Safety..... 1

    1.1 Introduction..... 1

    1.2 Highways..... 1

        1.2.1 Crash Facts ..... 1

    1.3 Approach to Making Michigan Roads Safe ..... 5

    1.4 Discussion..... 8

        1.4.1 Decision-Making Process and Information Systems..... 8

        1.4.2 Lane Departure ..... 10

        1.4.3 Intersection Safety ..... 11

        1.4.4 Work Zone Safety ..... 13

        1.4.5 Commercial Vehicle Safety ..... 14

        1.4.6 Occupant Protection..... 15

        1.4.7 Alcohol/Drug Impaired Driving ..... 16

        1.4.8 Other Driver Behavior and Awareness..... 18

        1.4.9 Elderly Mobility and Safety ..... 19

        1.4.10 Drivers Age 24 and Younger ..... 20

        1.4.11 Motorcycle Safety ..... 21

        1.4.12 Non-Motorized Transportation Safety ..... 22

    1.5 Conclusions ..... 25

    1.6 Recommendations ..... 25

    1.7 Implementation..... 27

        1.7.1 United States Road Assessment Program (USRAP)..... 27

        1.7.2 AAA Michigan Road Improvement Demonstration Program ..... 27

        1.7.3 Assessing Community Traffic Safety (ACTS) Tool ..... 28

        1.7.4 Michigan NETS (Network of Employers for Traffic Safety) ..... 28

        1.7.5 Michigan Signal Summit ..... 29

        1.7.6 Incident Management..... 30

        1.7.7 Southeast Michigan Snow and Ice Management (SEMSIM)..... 30

        1.7.8 Red-Light Running..... 30

        1.7.9 Area Agency on Aging 1-B (AAA 1-B) You Decide: Senior Driving Awareness Program (SDAP)..... 31

        1.7.10 The Mature Driver Workshop ..... 31

        1.7.11 AARP 55 Alive ..... 31

        1.7.12 Crash Redesign Project (CRP) ..... 31

        1.7.13 Law Enforcement Agency Management System (LEAMS) Project ..... 31

        1.7.14 MDOT Access Management ..... 32

        1.7.15 Pedestrian Safety Class..... 33

        1.7.16 Public Act 51, Section 10k..... 33

        1.7.17 Commercial Vehicle Strategy Team (CVST)..... 33

Chapter 2. MDOT’s Comprehensive Safety Program..... 34



Chapter 3. Integration of Highway Safety..... 37  
 3.1 Travel Segments Sensitive to Safety Risk ..... 37  
 3.2 Safety Sensitive Activities..... 37  
 3.3 Integrating Safety..... 38

**List of Tables**

Table 1: Intersection Safety by Year (MDOT 2004)..... 12  
 Table 2: Comprehensive Safety Program Dollar Allocation (MDOT 2006) ..... 26

**List of Figures**

Figure 1: Crash Data Comparison - 1996 to 2004..... 2  
 Figure 2: Michigan Crash Watch..... 3  
 Figure 3: Michigan Fatality Rate per 100 Million Vehicle Miles Traveled (2000 to 2004)..... 4  
 Figure 4: Michigan Traffic Deaths ..... 5  
 Figure 5: Fatal Crashes (Single Vehicle Run-off-Road)..... 10  
 Figure 6: Fatal Crashes (Head-On) ..... 11  
 Figure 7: Intersection Crashes by Year..... 12  
 Figure 8: Fatalities (Work Zones)..... 13  
 Figure 9: Fatal Crashes (Commercial Vehicles) ..... 15  
 Figure 10: Fatalities (Belts Not Used) ..... 16  
 Figure 11: Fatalities (Drug & Alcohol Impaired)..... 18  
 Figure 12: Fatal Crashes (Speeding) ..... 19  
 Figure 13: Fatal Crashes (Drivers Age 16 to 24 Involved)..... 21  
 Figure 14: Fatalities (Motorcyclists)..... 22  
 Figure 15: Fatalities (Pedestrians)..... 24  
 Figure 16: Fatalities (Bicyclists) ..... 24

**Appendices**

Appendix A: 2005 MDOT Safety Program Accomplishments.....A-1



# Chapter 1. Highway Safety

## 1.1 Introduction

Preservation and the safety of Michigan's existing transportation system remain the Michigan Department of Transportation's (MDOT) highest priorities. In 2005 MDOT invested more than \$1 billion on system preservation through the repair and maintenance of Michigan's roads and bridges. In addition, more than half the 2005 investment programmed for capacity improvements went toward preserving existing roadway adjacent to those new lanes, thereby helping to grow Michigan's economy simultaneously through both preservation and capacity enhancement. The investments in Michigan's transportation system also focused on a comprehensive safety program and increased emphasis on senior mobility and expanded work zone safety efforts. As part of MDOT's 2005 Highway Safety Program, \$58 million or nearly 4.5 percent of the highway transportation program was committed to the design, construction, and placement of signs, pavement markings, guardrail, traffic signals, and other safety improvement projects on the state trunkline system. The funding of the department's Highway Safety Program has increased 47 percent since 1996 (\$39.4 million).

## 1.2 Highways

### 1.2.1 Crash Facts

Since 1995 both the crash rate and the death rate in Michigan have been decreasing although vehicle miles traveled have been increasing. In 2004, 373,028 reported traffic crashes, 99,680 injuries, and 1,159 fatalities occurred on Michigan's roads. The 2004 death rate was 1.14 deaths per 100 million vehicle miles traveled (VMT) which is below the ten-year average of 1.56 deaths per 100 million vehicle miles traveled (1995-2004). The national average rate, during the same time frame, is 1.44 fatalities per 100M VMT. The 1,159 persons killed were the result of 1,055 fatal crashes for an average of 1.1 deaths per fatal crash; 613 (52.9%) were drivers of vehicles, 277 (23.9%) were passengers in motor vehicles, 140 (12.1%) were pedestrians, 79 (6.8%) were motorcyclists, 21 (1.8%) were bicyclists, 14 (1.2%) were snowmobile operators, 12 (1.0%) were ORV/ATV operators, two (0.2%) were operators of farm equipment, and one (0.1%) was a moped operator.

Of all fatal crashes 26.0 percent occurred at intersections and 46.2 percent involved one vehicle. However, from 1998 to 2004 there have been significant reductions at intersections. There have been 20 percent fewer intersection crashes, 26 percent fewer fatalities at intersections and 47 percent fewer crashes involving an injury or death at intersections. Only 8.1 percent of crashes occur outside the shoulder of the road, but these crashes account for 20.7 percent of the fatal crashes. Single Vehicle, Head On, and Angle crash types produce the highest number of fatal crashes (81.6%). Single Vehicle crashes include rollovers, which are particularly severe crash types. Rear End-Turning and Sideswipe crashes produce the lowest number of fatal crashes (3.8%). Most fatal crashes occurred on dry roadways (70.8%) in clear weather conditions (48.4%).

The majority of all fatal crashes occurred during daylight hours (61.0%). Dark conditions created the greatest hazard, as they were overrepresented in fatal crashes. In 2004:

- More fatal crashes occurred between 3:00 and 5:59PM than any other time period;
- More fatal crashes occurred on both Friday and Saturday than any other day; and
- More fatal crashes occurred in November than any other month.

Of the 10,112,620 persons living in Michigan, one out of every 8,725 was killed in a traffic crash, and one out of every 101 persons was injured. For each person killed 86 persons were injured per year. The 2004 "Michigan Traffic Crash Facts" estimates that the annual economic loss due to traffic crashes in Michigan was over \$9.3 billion. If costs were spread across the state's population this would translate into a loss of \$930 per state resident. This estimate is based on the National Safety Council's cost estimate procedures.

The substantial impact within the local community relative to medical costs, lost wages, insurance costs, taxes, police, fire and emergency services, legal and court costs, as well as, property damage is significant. Although total numbers have decreased over the past decade deaths and injuries caused by traffic crashes are a serious public health concern, and are not conducive to the high quality of life expected in the state of Michigan. According to figures provided by the Michigan Department of Community Health, accidental death for children in motor vehicle crashes routinely outpaces the next two frequent causes: fire and drowning. In addition four out of five accidental deaths for teenagers and young adults (ages 15 - 24) are due to motor vehicle crashes.

Crash statistics for fatalities, injuries, crashes, and fatality rates during 1996 to 2004 are provided below in **Figure 1**, Crash Data Comparison - 1996 to 2004. A breakdown of crashes, injuries, and fatalities per unit time is provided in **Figure 2**, Michigan's Crash Watch 2004.

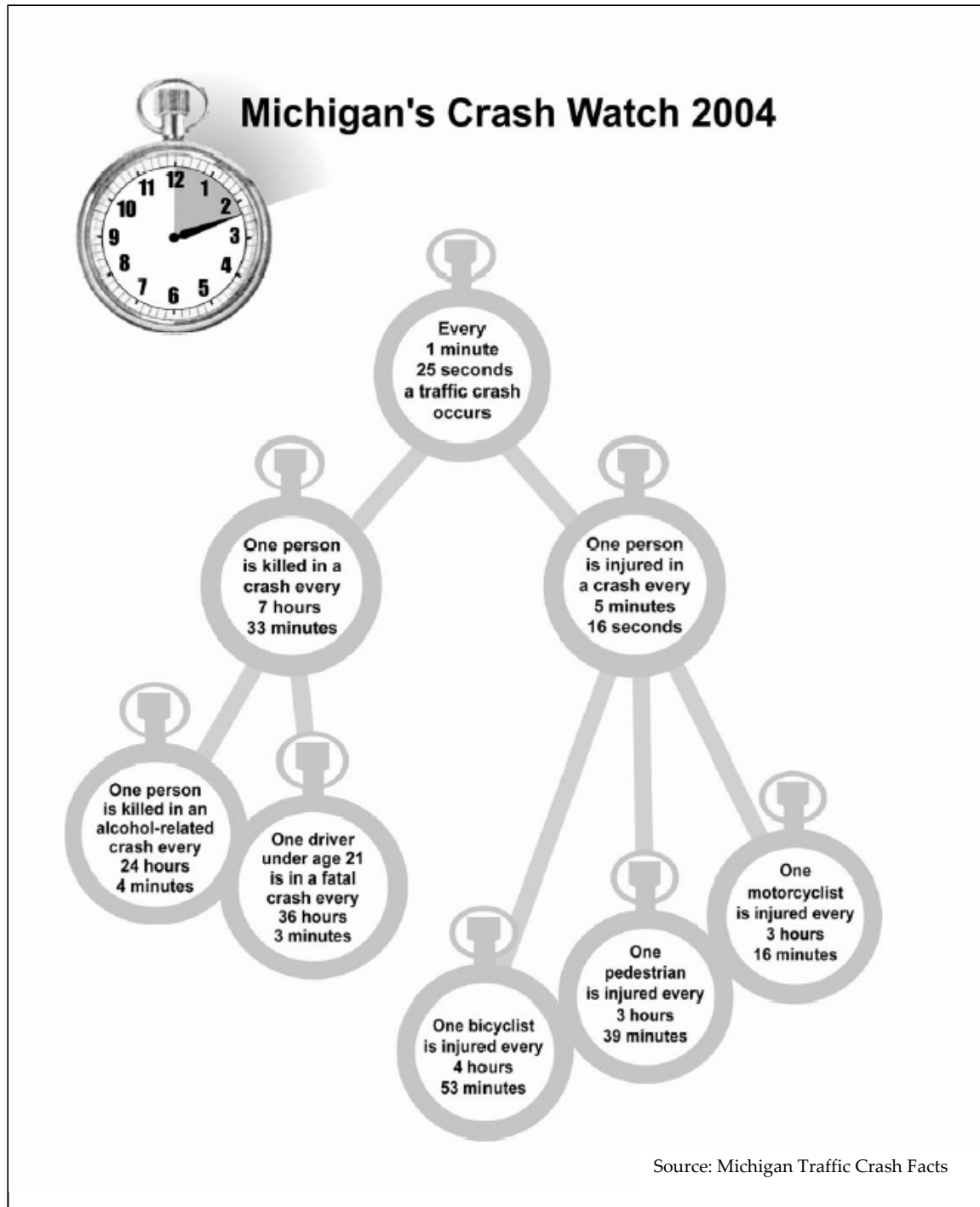
**Figure 1: Crash Data Comparison - 1996 to 2004**

<i>1996-2004 Compare</i>	1996	1997	1998	1999	2000	2001	2002	2003	2004	<i>% Change 96-04</i>
Total Crashes	435,477	425,793	403,766	415,675	424,867	400,813	395,212	391,485	373,028	-14.3%
Fatal Crashes	1,339	1,283	1,235	1,249	1,237	1,206	1,175	1,172	1,055	-21.2%
People Injured	142,553	137,548	131,575	124,601	121,832	112,292	112,484	105,555	99,680	-30.1%
People Killed	1,505	1,446	1,367	1,386	1,382	1,328	1,279	1,283	1,159	-23.0%
Death Rate (100M VMT)	1.72	1.62	1.49	1.49	1.46	1.38	1.3	1.28	1.14	-33.7%
Fat. Crash Rate (100M VMT)	1.53	1.44	1.35	1.34	1.3	1.25	1.2	1.17	1.06	-30.7%
VMT (Billions)	87.7	89.2	91.6	93.1	94.9	96.4	98.2	100.2	101.8	+16.1%
Registered Vehicles (Millions)	8.11	8.12	8.23	8.41	8.57	8.6	8.69	8.71	8.57	+5.7%
Registered Drivers (Millions)	6.98	7.09	7.15	7.22	*7.04	*7.09	*7.14	*7.19	*7.23	+3.6%
Population (Millions)	9.59	9.77	9.82	9.86	9.93	9.99	10.05	10.08	10.12	+5.5%

\*Registered Drivers are calculated as Licensed Drivers by SOS. Trend data from 1999 back cannot be calculated accurately.

Source: Strategic Highway Safety Plan

Figure 2: Michigan Crash Watch



Overall, Single Vehicle (34.4%), Rear End (26.3%), and Angle (18.9%) crashes account for the majority of the 373,028 reported traffic crashes on Michigan’s highways in 2004. Most crashes occurred on dry roads (64.4 %), in good weather (48.3%) and during daylight hours (61.0 %). In the review of crash reports the common driver hazardous action listed were: Unable to Stop (13.2 %), Failed to Yield (8.7 %), and Speed Too Fast (5.9%). “None” was listed as the hazardous action prior to crash in 48.2 percent of crashes. A detailed breakdown of 2004 crashes is available in the 2004 Michigan Traffic Crash Facts (<http://www.michigantrafficcrashfacts.org/>).

Although the 2004 statewide fatality rate was 1.14 per 100 million vehicle miles traveled, this rate is not evenly distributed among the entire statewide highway system (see **Figure 3**). On the state trunkline system, the rate in 2004 was 0.93 per 100 million vehicle miles traveled and 1.37 on Michigan’s local road system. While 53 percent of traffic is found on the 9,720 miles of state trunkline, traditionally 60 percent of the traffic fatalities occur on the remaining 110,870 miles of county and city roadways (see **Figure 4**).

**Figure 3: Michigan Fatality Rate per 100 Million Vehicle Miles Traveled (2000 to 2004)**

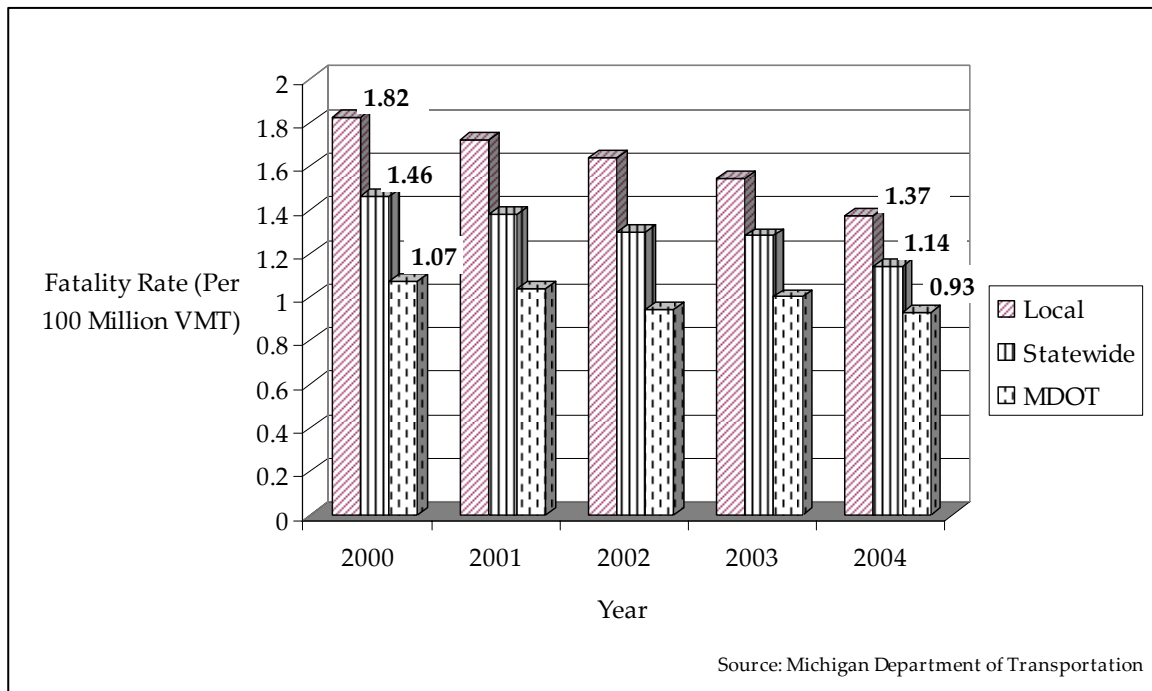
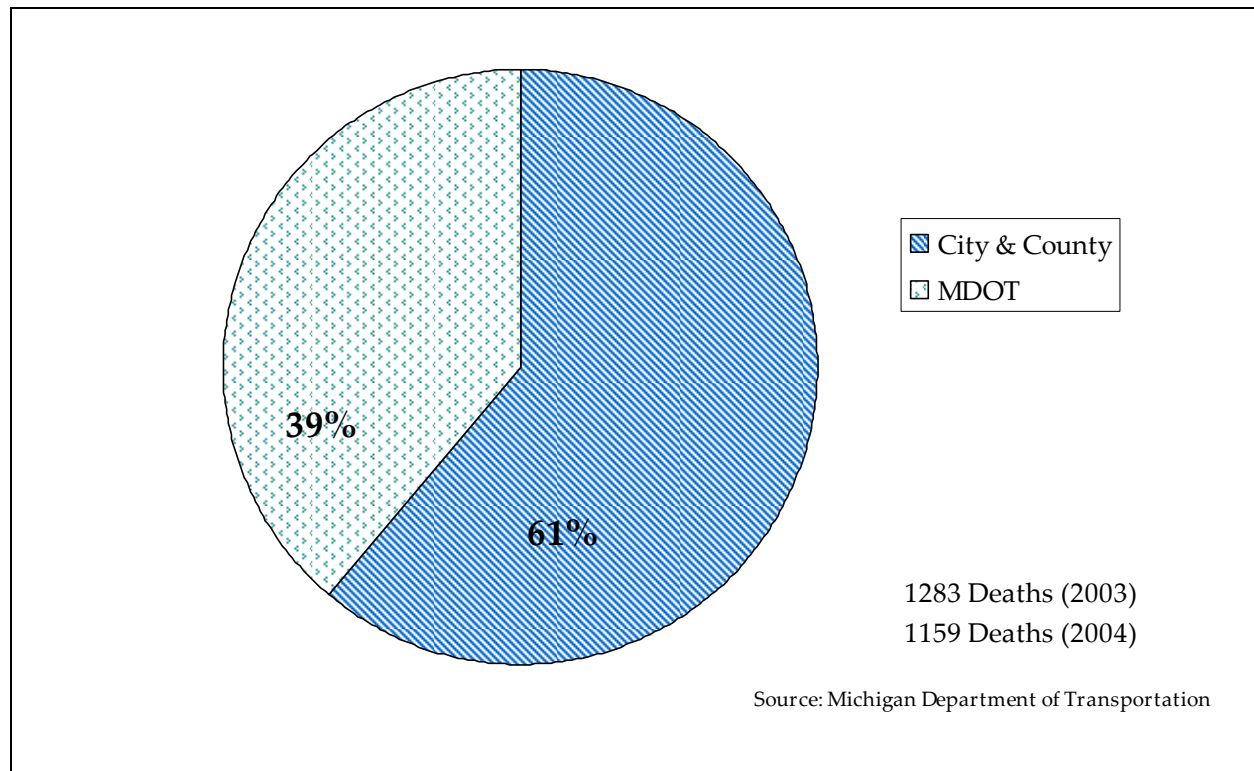


Figure 4: Michigan Traffic Deaths



### 1.3 Approach to Making Michigan Roads Safe

It is critically important to provide a safe and efficient roadway system. The primary “measuring sticks” for safety are reductions in the rate of fatalities and injuries that occur because of motor vehicle crashes across the state each year. The state of Michigan strives to enhance its safety program to ensure roadway systems are as safe as possible through Education, Engineering, Enforcement, and Emergency Response Systems.

In December 2003, a Transportation Summit was held to identify key issues that need to be addressed in order to create a vision of Michigan's transportation system that will support Michigan as a magnet for jobs, growth, people and economic activity. Transportation industry partners, citizens, members of the legislature, academia, and the federal government were invited to help MDOT create a vision and a set of action plans for the future of transportation in Michigan. It was agreed upon that the vision must be fiscally responsible, improve our quality of life, and provide for problem solving at a regional level. Safety was identified as one of nine key issues in transportation in the state of Michigan.

With many agencies being involved in safety analysis and information, there are more opportunities for coordination among these agencies and helps to foster an environment where safety considerations can go hand-in-hand with various design alternatives. Investments in safety are a measurable item with a payback of saving lives. The end result of the Summit was

the formation of a Safety Action Team whose charge was to develop implementation plans to address priority safety action items. These items are:

- Provide information and education for road authorities regarding low cost/high benefit safety improvements;
- Expand/enhance partnerships of all transportation stakeholders to find ways to use technology to reduce crashes;
- Continue education for drivers and non-drivers beyond initial license requirements and increase enforcement; and
- Define and improve data collection.

The final recommendation of the Safety Action Team was that the most appropriate group to oversee and monitor the implementation of these plans is the Governor's Traffic Safety Advisory Commission (GTSAC). The GTSAC was formed in 2002, by an Executive Order from the Governor, to serve as the state's major forum for identifying key traffic safety challenges, and developing and implementing action plans to address these issues. Prior to 2002 safety on Michigan's roadways was promoted by the Michigan State Safety Commission (MSSC). The MSSC, which was legislatively established in 1944, was limited to those state departments with a vested interest in safety. The GTSAC, through interagency cooperation, is committed to reducing traffic crashes, injuries, and deaths in Michigan by promoting safety programs. The GTSAC consists of the Governor (or a designee), the Directors (or their designees) of the Departments of Community Health, Education, State, State Police, and Transportation, the Office of Highway Safety Planning, the Office of Services to the Aging, and three local representatives from the county, city, and township level.

Based upon the implementation plans proposed by the Transportation Summit Safety Action Team, the state of Michigan *Strategic Highway Safety Plan* was developed by state safety partners in cooperation with county, city, and township representation and the Federal Highway Administration. The GTSAC formed a comprehensive highway safety work group consisting of the following agencies:

- AAA Michigan;
- Federal Highway Administration (FHWA);
- Federal Motor Carrier Safety Administration (FMCSA);
- Michigan Center for Truck Safety;
- Michigan Department of Community Health (MDCH);
- Michigan Department of Information Technology (MDIT);
- Michigan Department of State (MDOS);
- Michigan Department of State Police (MSP);
- Michigan Department of Transportation (MDOT);
- Michigan Sheriffs Association (MSA);
- Mothers Against Drunk Driving (MADD);

- Office of Highway Safety Planning (OHSP);
- Office of Services to the Aging;
- Road Commission of Macomb County; and
- Southeast Michigan Council of Governments (SEMCOG).

The purpose of a Strategic Highway Safety Plan (SHSP) is to identify the key safety needs in the state and guide investment decisions to achieve significant reductions in highway fatalities and serious injuries on all public roads. The plan allows all highway safety programs in the state to work together in an effort to align and leverage their resources, and positions the state and its safety partners to collectively address the safety challenges on all public roads.

A SHSP should define a system, organization, and process for managing the attributes of the road, the driver, and the vehicle to achieve the highest level of highway safety by integrating the work of disciplines and agencies involved. These disciplines include the planning, design, construction, operation and maintenance of the roadway infrastructure (engineering), injury prevention and control (emergency response services), health education, and those disciplines involved in modifying road user behaviors (education and enforcement).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) requires each state department of transportation to develop and implement a SHSP. In order to obligate funds apportioned under the Highway Safety Improvement Program, a state shall have a SHSP in effect that identifies and analyzes highway safety problems and opportunities. This plan should be evaluated on a regular basis to ensure the accuracy of the data and the propriety of proposed improvements. An approved plan must be completed by October 1, 2006. The state of Michigan *Strategic Highway Safety Plan* was adopted in December 2004, by the GTSAC.

The state of Michigan SHSP provides a mission, vision, and goal:

- MISSION: Provide leadership to improve traffic safety by fostering communication, coordination, and collaboration among government and other public and private entities in Michigan.
- VISION: All roadway users arrive safely at their destinations.
- GOAL: 1.0 fatalities per 100 million vehicle miles traveled (100M VMT) by 2008, which amounts to a 10.4 percent reduction (1,283 to 1,150) in fatalities and also a reduction in serious injuries (9,531 to 8,540). Please note 2003 crash values were the basis for the reduction. In 2004 costs the 10.4 percent reduction would result in a savings of approximately \$690 million.

To achieve the goal of this SHSP, data driven emphasis areas and strategies to reduce the number of fatal and serious injury crashes have been identified. Comprehensive, coordinated, and communicative safety initiatives of Engineering, Enforcement, Education, and Emergency Response have been developed and will be implemented for the 12 emphasis areas. To advance the saving of lives, priority will be given to funding safety initiatives/projects to support the safety goal.

The state of Michigan SHSP Emphasis Areas are:

1. Decision-Making Process and Information Systems;
2. Lane Departure;
3. Intersection Safety;
4. Work Zone Safety;
5. Commercial Vehicle Safety;
6. Occupant Protection;
7. Alcohol/Drug Impaired Driving;
8. Other Driver Behavior and Awareness;
9. Elderly Mobility and Safety;
10. Drivers Age 24 and Younger;
11. Motorcycle Safety; and
12. Non-Motorized Transportation.

## 1.4 Discussion

The background, recommended strategies, and relevant crash data are provided for each emphasis area as follows:

### 1.4.1 *Decision-Making Process and Information Systems*

#### 1.4.1.1 Background

Understanding and making optimal use of information technology is a critical challenge facing Michigan's highway safety professionals. Knowing the how, when, where, who, and why traffic crashes have occurred is the foundation of a comprehensive traffic safety analysis system. Crash, traffic, citations, medical, judiciary, and driver records must be available so proper decisions can be made, and effective safety policies and projects can be developed and implemented.

Knowing and using integrated traffic records to plan and assess safety programs, as well as leverage critical resources, is needed to protect public safety. Systems currently in place must be assessed and improved to meet the needs of our safety professionals. Michigan's traffic records systems were reviewed by a team of professionals from the National Highway Traffic Records Administration (NHTSA) in October of 2004. Recommendations from the assessment were provided to the Traffic Records Coordinating Committee (TRCC). Michigan was recognized for making great strides in providing timely, accurate, complete, integrated, uniform, and accessible crash information. The TRCC is taking aggressive action to improve other areas of their comprehensive traffic safety analysis system.

A complete traffic records program is necessary for planning (problem identification), operational management or control, and evaluation of a state's highway safety activities. The statewide program should include, or provide for, information for the entire state. This type of program is basic to the implementation of all highway safety countermeasures and is the key ingredient to their effective and efficient management.

#### 1.4.1.2 Safety Awareness

Safety awareness involves an appreciation of the importance of highway safety and an understanding of the opportunities to improve safety through the strategic commitment of highway dollars toward traffic safety. Safety Conscious Planning (SCP) considers projects and strategies to increase the safety and security of the transportation system for motorized and non-motorized travel. SCP's proactive approach brings safety partners together to identify key issues and implement targeted practical strategies to prevent or reduce traffic fatalities and injuries.

#### 1.4.1.3 Review of Traffic Crash Data

Reviewing traffic crash data is the foundation of problem identification. As more data becomes computerized and the Michigan safety agencies develop their organizational capacity for data analysis, the review of crash data has become a continual process rather than an annual event. Through a partnership with the University of Michigan Transportation Research Institute (UMTRI), a compilation of Michigan's traffic crash data is completed annually and published as the Michigan Traffic Crash Facts. This data is available in hard copy, on CD-ROM and web based formats. In addition, traffic crash data from 1992 to the present is available on the UMTRI web site, <http://www.umtri.umich.edu/>.

#### 1.4.1.4 Strategies

- Improve timeliness and accuracy of data collection, analysis processes, accessibility, distribution and systems including the linkage of crash, roadway, driver, medical, Crash Outcome Data Evaluation System (CODES), enforcement, conviction, homeland security data, etc.
- Expand the local agencies' role, funding, and other resources to improve safety, and application of appropriate geometric, roadside and *Manual on Uniform Traffic Control Devices* (MUTCD) standards.
- Provide highway safety training and technical assistance to state and local personnel.
- Increase coordination, communication, and cooperation among various public and private organizations that share responsibilities for highway and transportation safety in Michigan.
- Institutionalize safety conscious planning to include safety criteria at the state and local level.
- Improve public and legislative awareness of critical highway safety issues.

## 1.4.2 Lane Departure

### 1.4.2.1 Background

Lane departure related crashes accounted for over 650 fatalities (more than 50 percent of all the fatalities). The primary objective of this section is to identify cost effective strategies that reduce unintentional lane departure as well as alert the driver should a departure occur. The secondary objective is to assist the driver in returning to the travel lane safely and minimize the consequences of departure by creating clear zones along the roadside.

### 1.4.2.2 Strategies

- Identify corridors, locations, and/or roadside features with a disproportionately large number of actual and/or potential for run-off-road and head-on crashes.
- Develop standard operating procedures for the implementation of roadway safety system-wide improvements such as: centerline rumble strips and stripes, shoulder rumble strips and stripes, all weather pavement markings, longitudinal and median barriers, elimination of roadside hazards, and consideration of motorcyclists in design, construction and maintenance.
- Selective enforcement specific to identified problems or needs.

**Figure 5: Fatal Crashes (Single Vehicle Run-off-Road)**

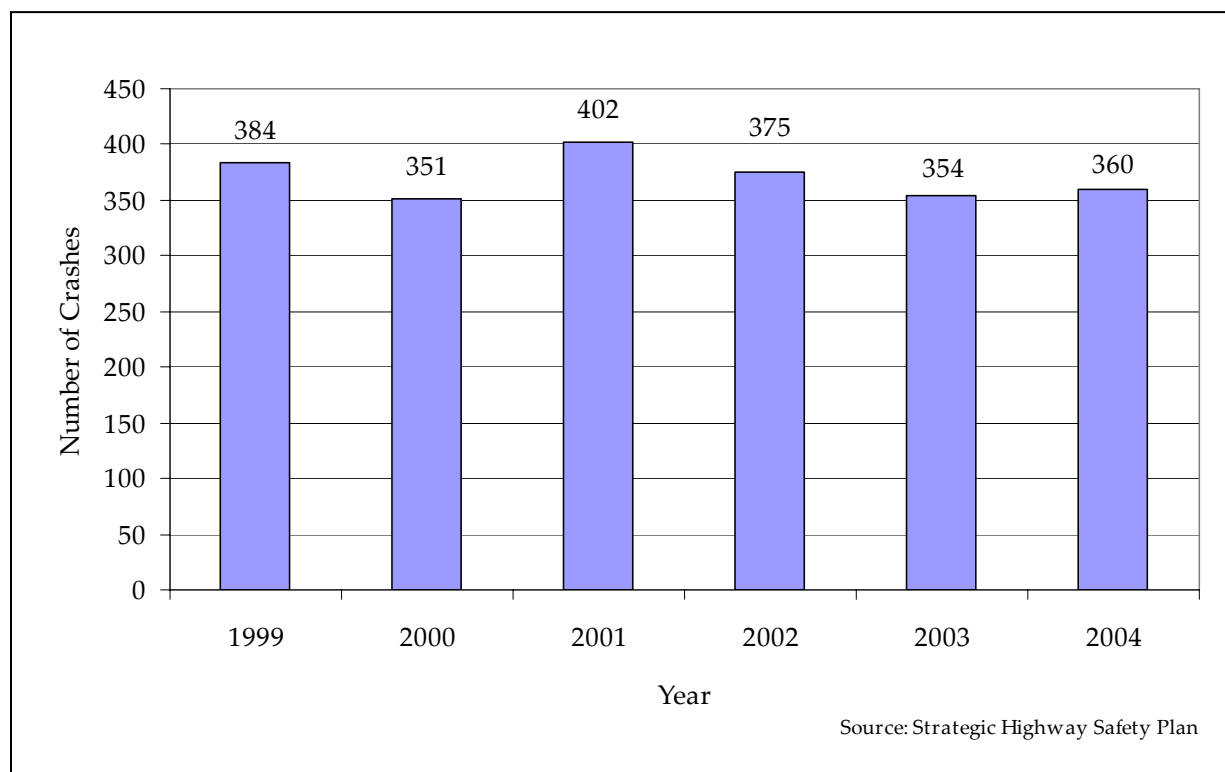
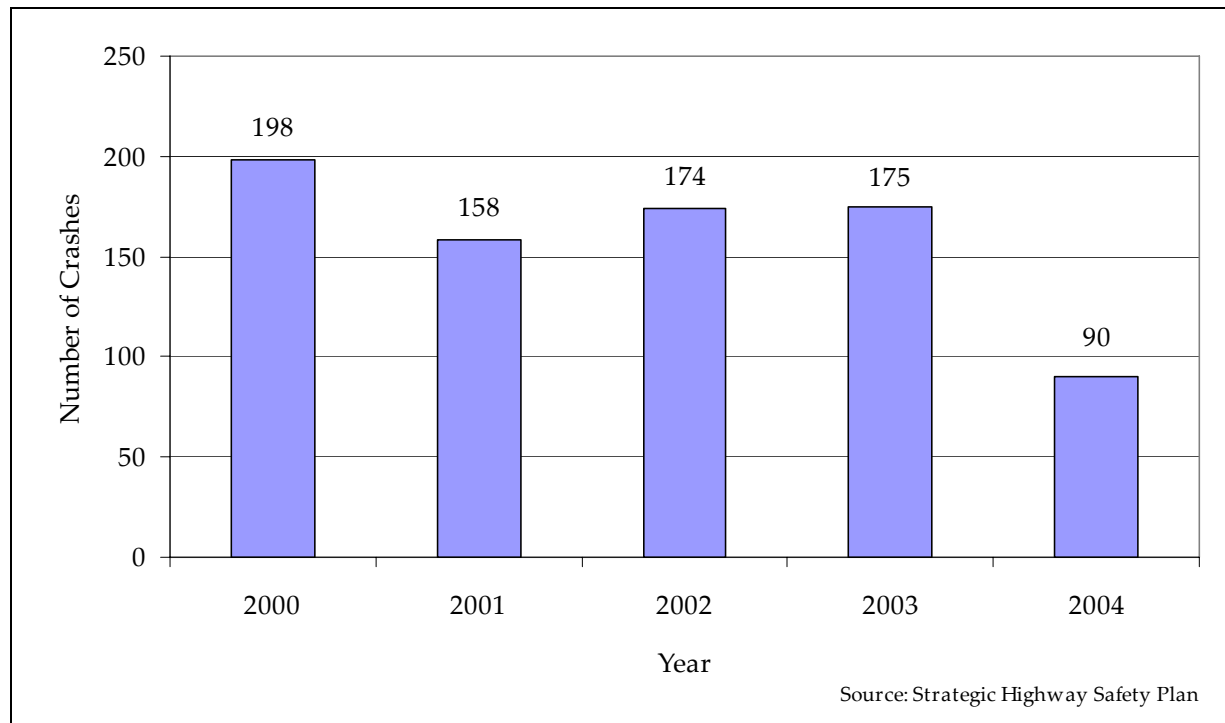


Figure 6: Fatal Crashes (Head-On)



### 1.4.3 Intersection Safety

An intersection crash is any crash occurring at an intersection or at a driveway within 150 feet of an intersection. Intersection crashes also include crashes coded by the reporting officer as being related to an intersection, regardless of actual distance to the intersection.

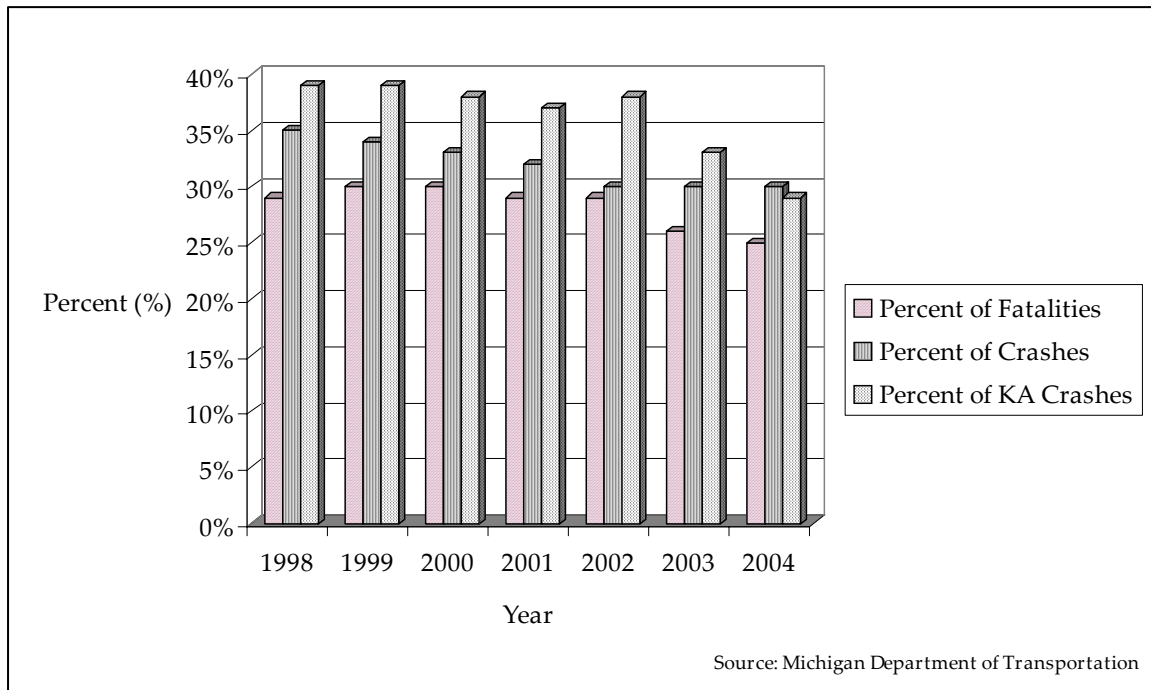
#### 1.4.3.1 Background

In Michigan, there were 113,373 intersection crashes in 2004 representing 30 percent of all the reported crashes. These intersection crashes resulted in 296 fatalities (25% of all Michigan highway fatalities) and 3,327 incapacitating injuries (32% of all Michigan incapacitating injuries). As depicted in the table, there is a positive, downward trend in the number of intersection crashes, fatalities, and injuries in Michigan. *There were 20 percent fewer intersection crashes, 26 percent fewer fatalities and 47 percent fewer KA injuries in 2004 than in 1998.* A “K” injury is a death; “A” injury is incapacitating. Use of “KA” refers to any crash in which “K” or “A” injury occurs.

Table 1: Intersection Safety by Year (MDOT 2004)

Year	Intersection Crashes	Percent of Intersection Crashes to Total Crashes	Intersection Fatalities	Percent of Intersection Fatalities to Total Fatalities	KA Intersection Injuries	Pct. of KA Intersection Injuries to Total KA Injuries
1998	142,441	35%	403	29%	6,068	39%
1999	141,052	34%	420	30%	5,569	39%
2000	140,654	33%	413	30%	5,020	38%
2001	126,892	32%	381	29%	4,336	37%
2002	122,361	30%	373	29%	4,071	38%
2003	119,360	30%	337	26%	3,774	33%
2004	113,373	30%	296	25%	3,227	29%

Figure 7: Intersection Crashes by Year



Intersection crash data indicates signalized intersections have a high number of right angle and head-on left turn crashes. These crashes are also responsible for a higher incidence of the “K” and “A” type injuries (defined previously). **Figure 7** above displays the data in **Table 1**. The driver behavior that results in these crashes often involves running a red light. Developing safety initiatives aimed directly at changing driver behavior related to stopping at traffic signals would provide substantial reductions in crashes and related serious injuries.

### 1.4.3.2 Strategies

- Implement Michigan's Intersection Safety Action Plan developed by the GTSAC.

## 1.4.4 Work Zone Safety

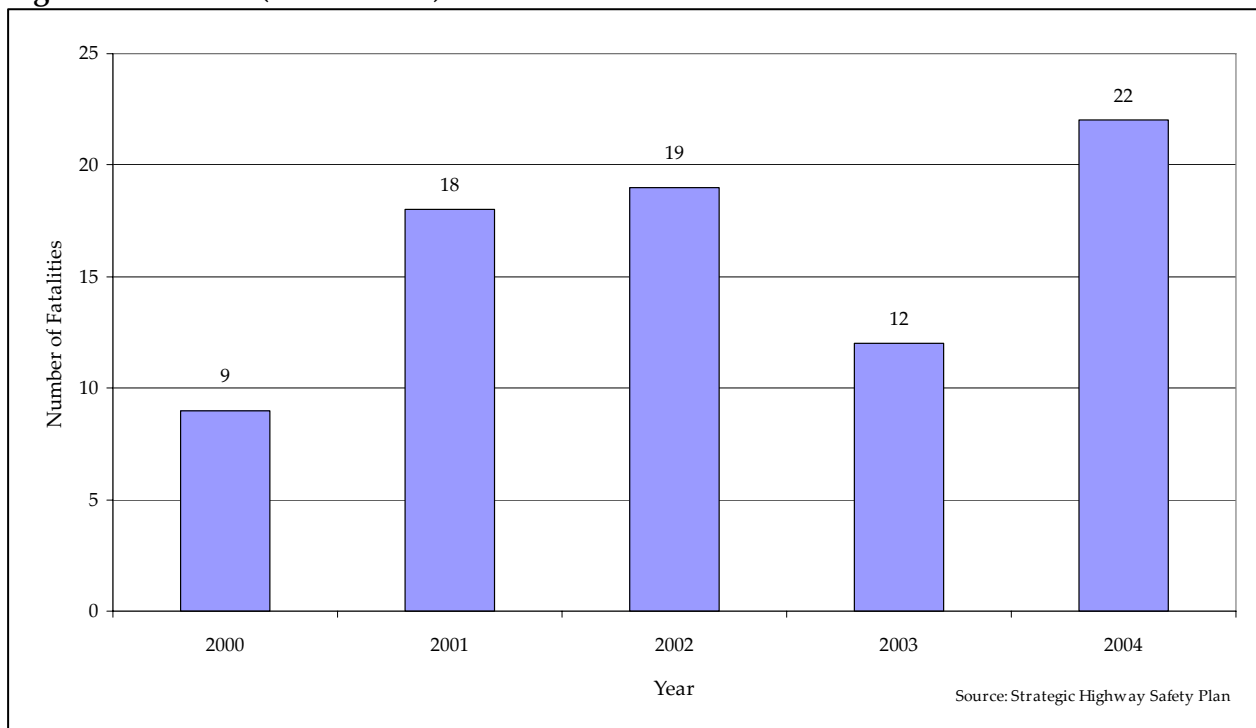
### 1.4.4.1 Background

Each year, there are hundreds of work zones which present hazards, inconvenience, and delay. In 2004 there were 6,584 crashes in Michigan work zones resulting in 22 fatalities. Increased communication, coordination, and cooperation are key factors in improving work zone safety. With emphasis on several items identified in this section, a reduction can be made in the number of fatal crashes in Michigan's work zones.

### 1.4.4.2 Strategies

- Provide work zone training and information for public agencies and industry personnel;
- Prepare and air public service announcements (PSAs);
- Achieve increased safety through the implementation of innovative designs and technology; and
- Set realistic speed limits within work zones and continue funding the work zone law enforcement program.

**Figure 8: Fatalities (Work Zones)**



### 1.4.5 Commercial Vehicle Safety

#### 1.4.5.1 Background

Heavy trucks are defined as vehicles having a gross vehicle weight rating (GVWR) over 10,000 lbs. In 2004, a total of 16,696 commercial vehicle (CMV) crashes occurred, in which 129 people were killed and 4,156 were injured. Heavy trucks were involved in 4.7 percent of all traffic crashes in Michigan in 2004.

CMV-involved crashes and injuries make up a fairly small percentage of the overall crashes and injuries, 4.5 percent and 3.0 percent respectively. CMV involved fatalities though, represent over 11 percent of fatalities. Since 1998 even though the total number of crashes, injuries, and fatalities has declined, the percentage they represent of the total has remained constant. From 2000 to 2004 there has been little change in the number of commercial vehicle registrations but a 7 percent increase in the number of commercial driver licenses issued.

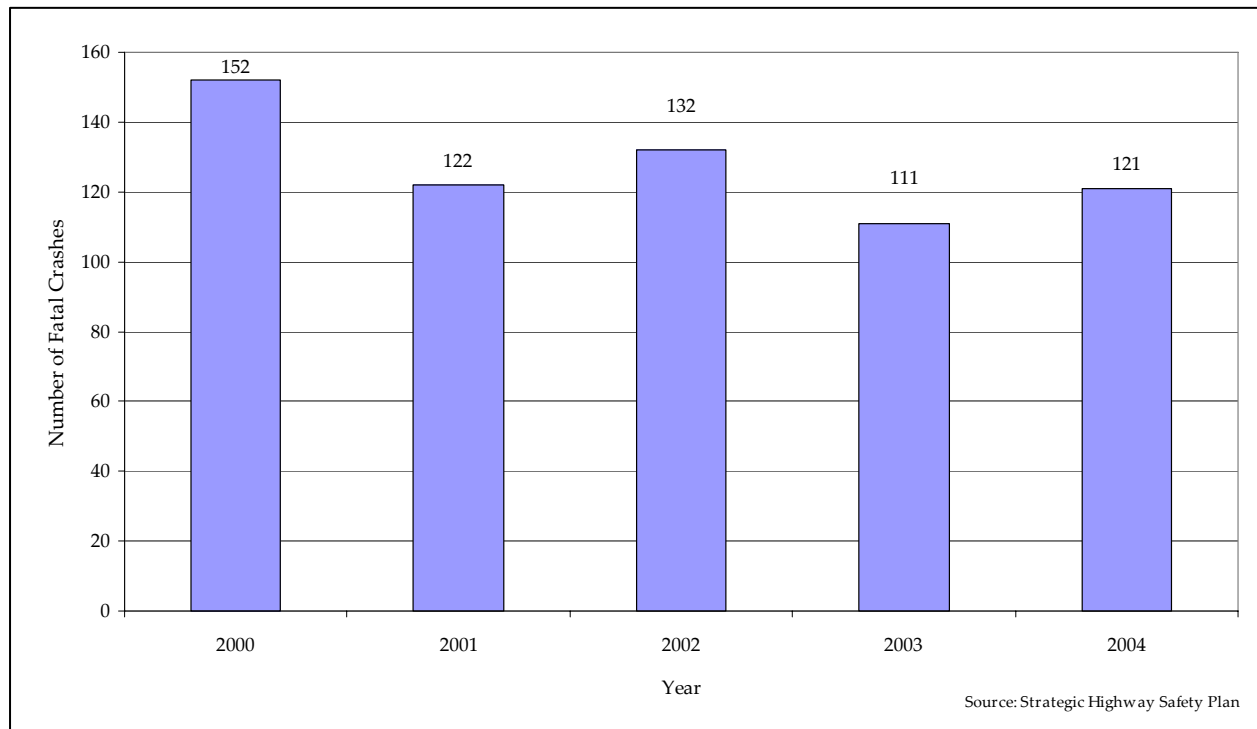
Heavy truck/bus crashes differ from other vehicle crashes in a number of ways, many reflecting the size and use of these vehicles. When compared to the overall crash picture, heavy trucks/bus crashes involve:

- More turning, backing and changing lanes;
- More separation of units, fire/explosion, jackknife, cargo loss/shift, and other non-collisions;
- Fewer single-vehicle crashes but more sideswipes;
- Fewer drivers indicated to be speeding and failing to yield, but more drivers indicated to be making backing, lane use, and turning errors;
- More on the road crashes;
- More crashes between the hours of 6:00 a.m. and 2:59 p.m., but fewer crashes between 3:00 p.m. and 5:59 a.m.; and
- More weekday crashes.

#### 1.4.5.2 Strategies

- Reduce fatigue related crashes;
- Strengthen CDL programs;
- Increase knowledge and education (“Share the Road”);
- Improve maintenance of heavy trucks;
- Identify and correct unsafe roadway infrastructure and operational characteristics;
- Improve and enhance truck safety data; and
- Promote industry safety initiatives.

Figure 9: Fatal Crashes (Commercial Vehicles)



### 1.4.6 Occupant Protection

#### 1.4.6.1 Background

Proper use of passenger restraints is the single most cost effective and immediate means of reducing death and injury. Of the 657,198 drivers and injured passengers involved in 2004 crashes, 558,069 or 84.9 percent were reported to have been using occupant restraints. Restraint usage among fatal victims where usage was known was reported to be 58.6 percent. Occupants in crashes were 29 times more likely to be killed if they were not wearing their restraints.

However, a direct observation study estimated overall safety belt use was 91.3 percent for passenger cars, 92.3 percent for sport-utility vehicles, 91.3 percent for vans/minivans, and 85.3 percent for pickup trucks in 2004. Statewide belt use for all vehicle types was 90.5 percent.

Young men are the most likely to be in a crash and the least likely to be wearing a safety belt. For all vehicle types (passenger, sport-utility, van/minivan, and pickup truck) safety belt use was higher for females than for males, and about the same for drivers and passengers. Improving safety belt use in this group (young men) that is over-represented in crash data will significantly affect fatalities.

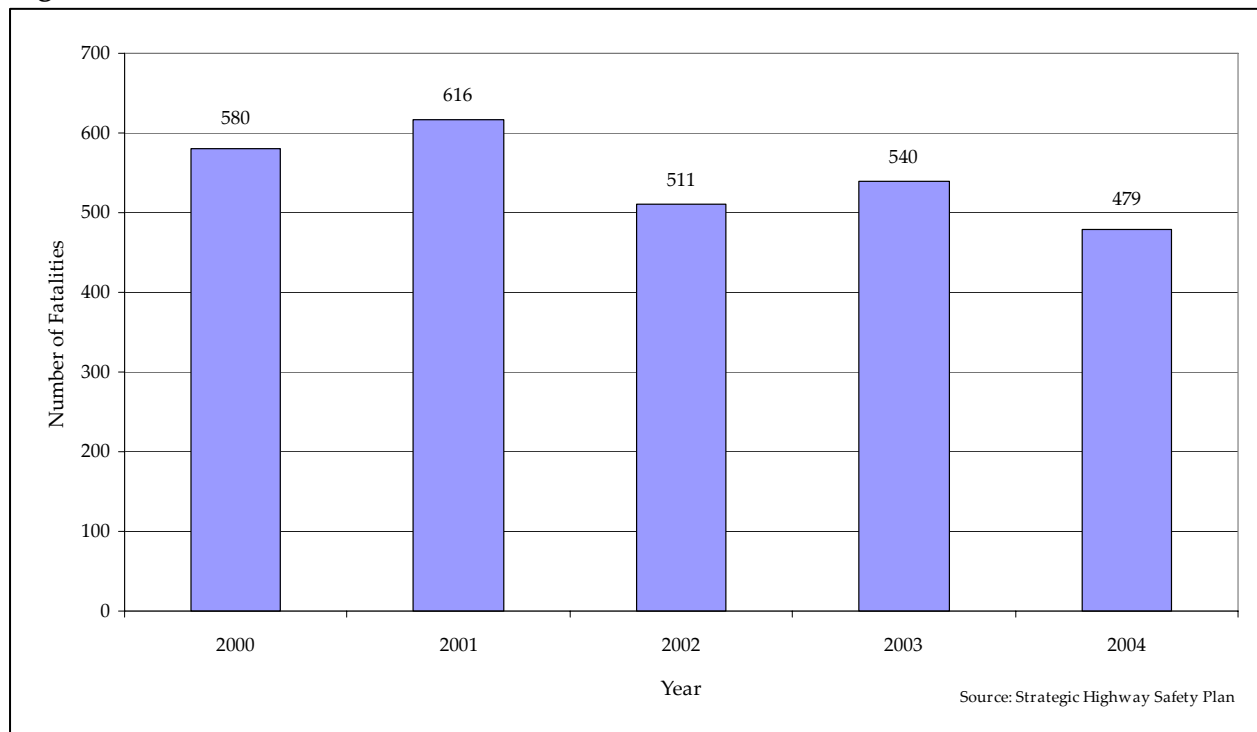
The effectiveness of safety belts and child restraints for reducing injury and preventing death is well documented. Child restraint devices are neither as easy to use nor to enforce

as safety belts, but they are essential to protecting children in the event of a crash. While child restraint use is high in the infancy to age four group, usage significantly declines thereafter. Children age 11 to 15 had the lowest reported restraint usage (78.8%).

#### 1.4.6.2 Strategies

- Increase perceived threats of receiving a citation through high visibility law enforcement efforts;
- Support public information and education campaigns including earned and paid media; and
- Implement Michigan's current Child Passenger Safety Strategic Plan.

**Figure 10: Fatalities (Belts Not Used)**



### 1.4.7 Alcohol/Drug Impaired Driving

#### 1.4.7.1 Background

In 2004, Michigan had 430 fatalities related to alcohol/drug impaired driving. Crashes involving drinking tend to be more serious than non-drinking crashes. The percentage of fatalities is almost eight times higher than in all crashes and the most serious injury level (incapacitating) is almost five times higher.

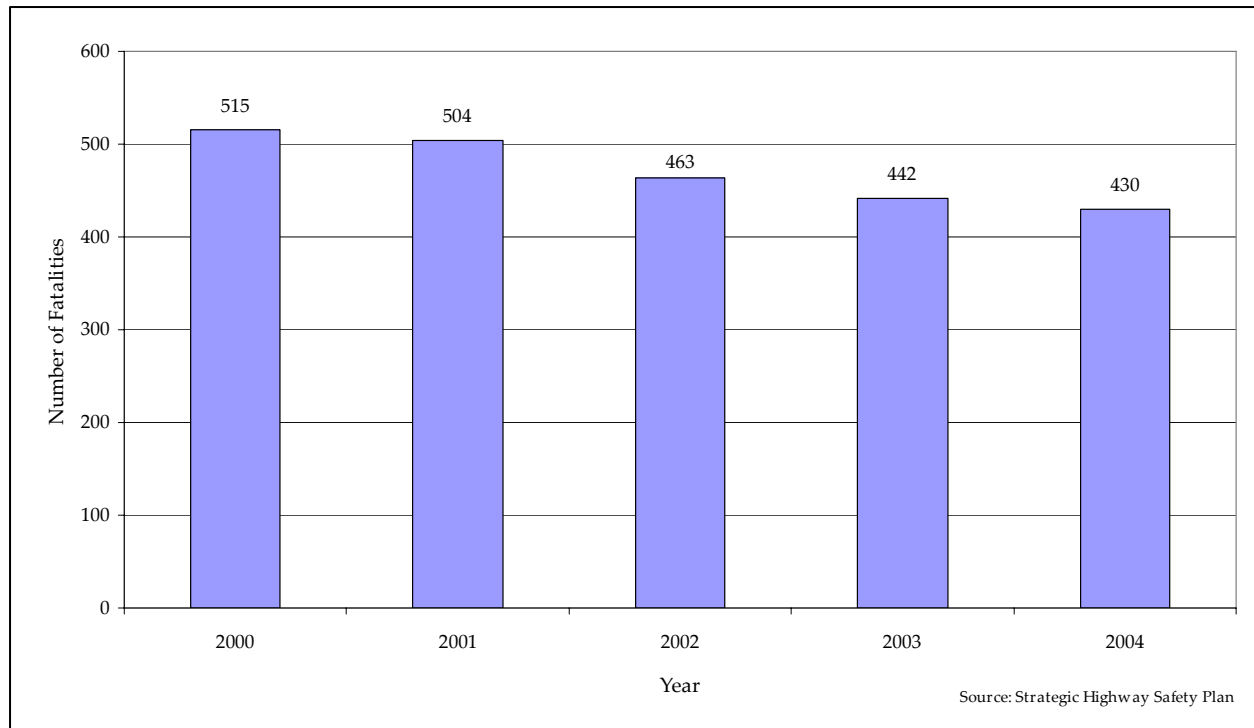
Fatal crashes involving one vehicle were alcohol-related 63.9 percent of the time. Of the pedestrians killed in 2004, 38 deaths were the result of a had-been-drinking crash and 32 (84.2%) of these pedestrians had been drinking. Of the motorcyclists killed in 2004, 25 deaths were the result of a had-been-drinking crash and 22 (88.0%) of these motorcyclists had been drinking. Of the bicyclists killed in 2004, six deaths were the result of a had-been-drinking crash and three (50.0%) of these bicyclists had been drinking. Of the snowmobilers killed on Michigan roadways in 2004, four deaths were the result of a had-been-drinking crash and all of these snowmobilers had been drinking. At least one drinking operator or pedestrian was involved in 32 percent of all fatal crashes.

The highest number of had-been-drinking fatal crashes, 50, occurred in August. The 12:00 a.m. to 2:59 a.m. time period had the highest rate of had-been-drinking fatal crashes (66.2%), while the late morning hours had the lowest (4.4%). Saturday and Sunday had the highest proportions of alcohol-related fatal crashes. There were 497 weekend fatal crashes; 192 (38.6%) involved drinking. Of the 14,421 (gender reported) drinking drivers involved in crashes, 11,179 (77.5%) were male and 3,242 (22.5%) were female. The drinking drivers in crashes were age 24 and younger in 4,384 (30.4%) of the (gender reported) cases. Michigan recognizes underage male drivers, young male drivers, and weekend crashes as prominent in alcohol/drug related crashes.

#### 1.4.7.2 Strategies

- Support year round drunk driving enforcement, with a special emphasis during national crackdown periods;
- Support a strong public information and education campaign to increase driver awareness and the perceived threat of arrest;
- Increase training for sectors of the criminal justice community including law enforcement, prosecutors, judges and probation;
- Sponsor efforts to improve cooperation in drunk driver prosecution and adjudication such as increased use of alcohol/drug courts in order to reduce recidivism;
- Support initiatives to reduce underage alcohol use and underage drunk driving;
- Support rehabilitation programs for offenders;
- Support increased cooperation and information sharing between the Department of State and impaired driving adjudicatory; and
- Support the use of new technologies for all components of the criminal justice system.

Figure 11: Fatalities (Drug &amp; Alcohol Impaired)



### 1.4.8 Other Driver Behavior and Awareness

#### 1.4.8.1 Background

Nationally more than 60 percent of drivers see unsafe driving by others as a major personal threat to themselves and their families. The problem of unsafe driving is becoming more prevalent and is increasing in severity.

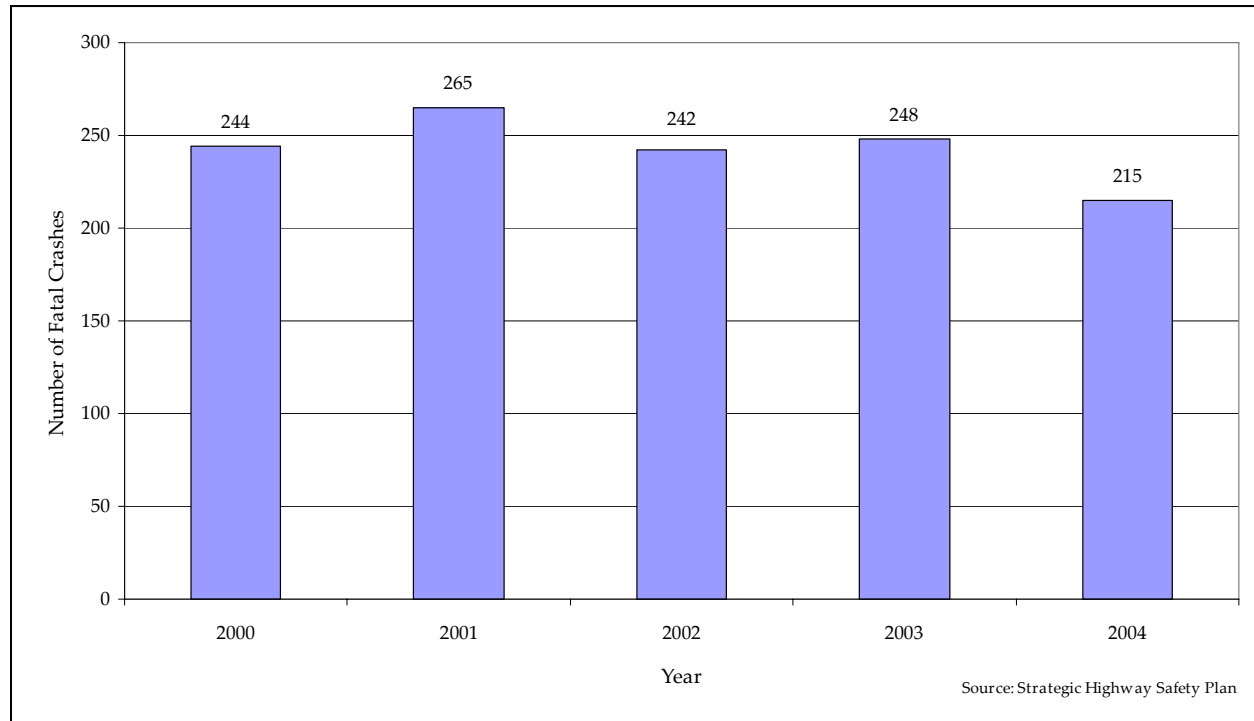
Addressing inappropriate or hazardous driver behavior is a critical factor in reducing fatal and serious injury crashes. Unsafe driving behavior may include but is not limited to: aggressive driving, excessive speeding, railroad grade crossing violations, distracted driving such as cell phone use, drowsy and fatigued driving, unlicensed driving (suspended, revoked, or never licensed), and riding a motorcycle without an FMVSS 218 compliant helmet. Therefore, enforcement, engineering, and education should be emphasized in the corresponding strategies.

#### 1.4.8.2 Strategies

- Develop and implement programs aimed at unsafe driving behavior;
- Define and/or determine the scope of aggressive driving;
- Provide for the development of comprehensive traffic safety public information and education programs that are designed to motivate change in unsafe driving behaviors; and

- Work with national partners, advertisers, and media to deliver consistent safety messages to counter negative messages promoted by the advertising industry.

**Figure 12: Fatal Crashes (Speeding)**



### 1.4.9 Elderly Mobility and Safety

#### 1.4.9.1 Background

In 2004, there were 1,044,354 older (65 and older) licensed drivers in Michigan, representing 14.5 percent of all licensed Michigan drivers. The number of older licensed drivers in Michigan has increased approximately 30 percent in the past 10 years while the total number of Michigan drivers has increased only five percent.

While the data show that most older drivers are quite responsible (e.g. have high safety belt usage, lower alcohol-related crash rates), national fatality rates per 100M VMT for the oldest drivers mirror the high rates for teen drivers. Plus, the inherent frailty of older drivers reduces their chances of surviving a crash, once it occurs. Current crash data show that older drivers were involved in only 6.8 percent of total Michigan crashes in 2004, but 11.6 percent of the fatal Michigan crashes. Older drivers were more involved in angle type crashes than younger drivers. Older drivers also had the highest incidence of failed to yield, disregard of traffic control, improper lane use, improper turn, and improper backing as a hazardous action in all crashes. Of the 191 persons (65 and older) killed in traffic crashes, 122 (63.9%) of them were drivers. In addition 7,542 persons age 65 and older were injured

in traffic crashes. If current fatality rates remain unchanged, the growth in the number of older drivers will lead to a tripling of traffic deaths among those over age 65 by 2030.

#### 1.4.9.2 Strategies

- Serve as a “lead state” in implementation of the NCHRP Series 500 (17-18) guide *A Guide for Reducing Collisions Involving Older Drivers*;
- Implement *Michigan’s Elderly Mobility and Safety Final Plan of Action* dated August 1999.

### 1.4.10 Drivers Age 24 and Younger

#### 1.4.10.1 Background

Young drivers ages 16 - 24 continue to be over-represented in fatal and injury crashes. There were 283 persons (16 - 24 years old) killed in traffic crashes, including 171 (60.4%) drivers. The 16 - 24 age group accounted for 24.4 percent of all traffic deaths. In addition 26,819 teenagers and young adults were injured in traffic crashes. There were 1,067,700 licensed drivers in the 16 - 24 age group in 2004. Of these drivers, 150,220 (14.0%), were involved in crashes (396 in fatal crashes). The 16 - 24 age group represented 14.8 percent of Michigan's active driving population, yet drivers in this group were involved in 23.6 percent of all crashes and in 22.9 percent of all fatal crashes. Generally, younger drivers were more involved in single-vehicle and off-road crashes, had the highest incidence of collision with ditches and trees, and were least likely to be alone in their car at the time of the crash.

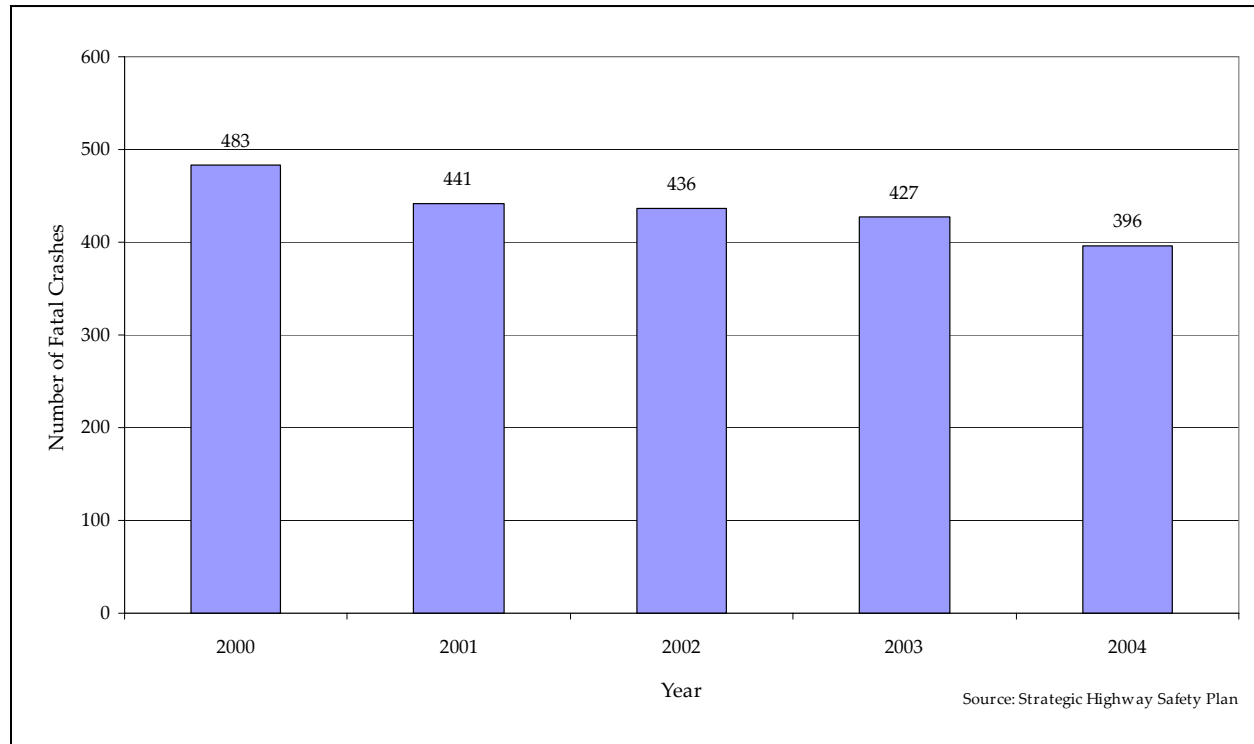
The five major contributing factors for youthful drivers’ fatal crashes are: speeding, traveling on the wrong side of road, failure to yield, reckless driving, and drinking. According to the Michigan Department of Community Health, four of five accidental deaths for teenagers and young adults (ages 16 - 24) are due to motor vehicle crashes.

#### 1.4.10.2 Strategies

- Provide high-risk driver education programs targeting drivers age 16 – 24 with injury prevention, occupant protection, driving under the influence, speed, and attention messages.
- Develop public information and education campaigns with activities targeting behaviors that endanger younger drivers. Employ selective targeting of ages with tailored messages.
- Participate with national legislative advocacy groups.
- Enhance effective existing safety programs such as graduated licensing and drivers’ education.
- Increase the monitoring of new and existing high school driver education programs and private driver training school programs.

- Standardize the driver education curriculum required for both the classroom and behind the wheel driver education.
- Upgrade the driver education teacher preparation and continuing education programs.
- Explore possible engineering countermeasures.
- Enforce laws prohibiting underage drinking, serving, and purchasing of alcohol.

**Figure 13: Fatal Crashes (Drivers Age 16 to 24 Involved)**



### 1.4.11 Motorcycle Safety

#### 1.4.11.1 Background

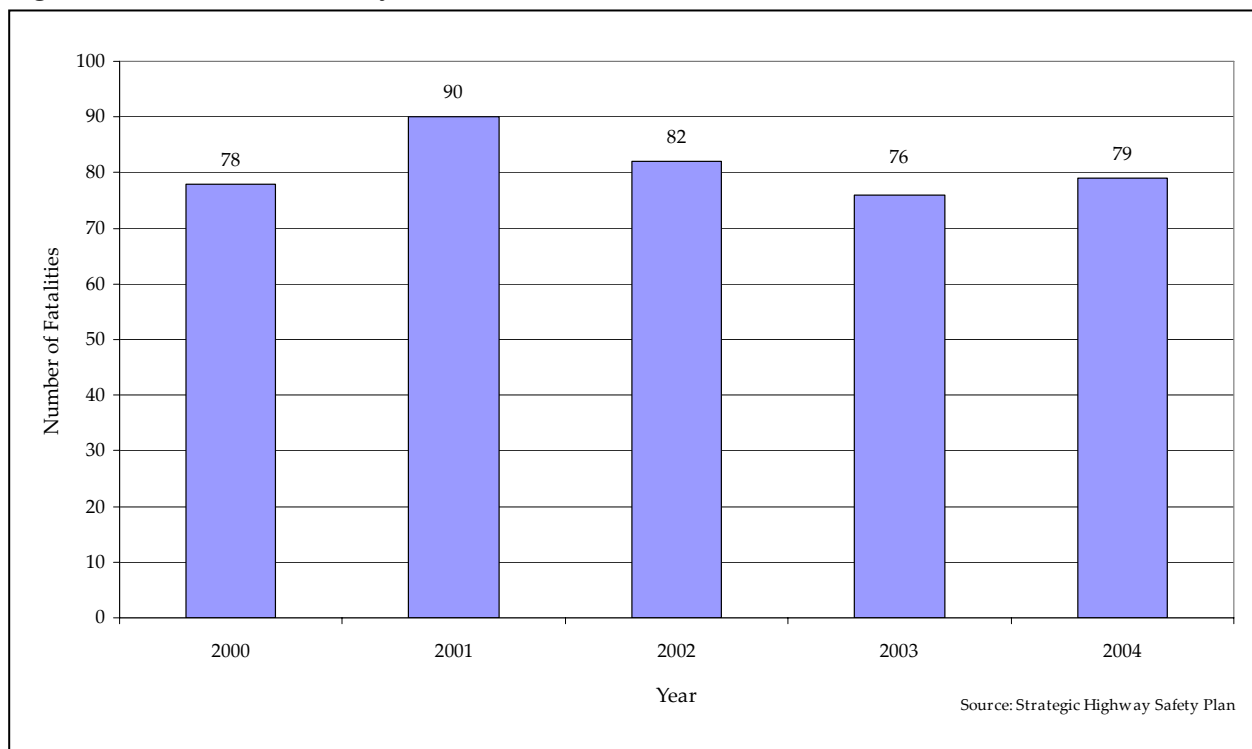
From 1999 to 2004, motorcyclist crashes increased from 2,820 to 3,276, a 16 percent increase. In 2004, 79 motorcyclists were killed and 2,679 injured. The fatality rate for 2004 for motorcyclists was 12.0 per 100 million vehicles traveled compared to the overall rate of 1.14 per 100 million vehicles traveled. Injuries to motorcyclists were also proportionately more severe than injuries to persons in other motor vehicles. Because motorcycles have a low profile, they tend to be less visible than other motor vehicles. Of the motorcyclists killed, 63 (79.7%), were reported by police as “going straight ahead” just prior to the crash.

Of the motorcyclists killed in 2004, 95.0 percent were male. A recent trend shows an increase in fatalities among older motorcyclists (40 years old and older). Furthermore, there has been an increase of unendorsed motorcyclists.

#### 1.4.11.2 Strategies

- Maintain helmet laws and enforce the use of FMVSS 218 compliant helmets;
- Expand the availability of motorcycle rider and safety education courses through public and private sponsors and increase public awareness;
- Implement the motorcycle safety assessment program; and
- Decrease the number of unendorsed motorcyclists.

**Figure 14: Fatalities (Motorcyclists)**



### 1.4.12 Non-Motorized Transportation Safety

#### 1.4.12.1 Background

Since 1995, a total of 1,707 pedestrians have been killed, accounting for 12.5 percent of all traffic crash deaths during that period. In 2004, 140 lives (a decrease of 20.7% from 2003) were lost and 2,403 were injured in pedestrian crashes. Approximately 23 percent of the fatalities were impaired pedestrians. Of the pedestrians killed, 29.3 percent were killed while crossing streets other than at intersections, and 17.1 percent were pedestrians in the roadway with traffic. In addition, 16.4 percent of pedestrians killed were under the age of

21 and 21.4 percent were 65 and older. Most pedestrian crashes occurred during the evening hours (6:00 p.m. to 8:59 p.m.) under clear conditions. However, most pedestrian fatalities occurred during hours of darkness. Saturday was the deadliest day for pedestrians in 2004 with 26 fatalities.

Bicyclists were involved in 2,246 motor vehicles crashes in 2004 resulting in 21 fatalities and 1,796 injuries. Three of the bicyclists killed were impaired. Of the bicyclists killed, 12 (57.1%) were reported by police to be "going straight ahead" just prior to crash. Of the bicyclists involved in motor vehicle crashes, 80.8 percent of the total and 12 of the 21 bicyclists killed were riding during daylight hours. The hours between 3:00 p.m. and 5:59 p.m. were the peak time for bicyclist involvement in all crashes and injuries to bicyclists. The hours between 3:00 p.m. and 5:59 p.m. were the peak time for bicyclist fatalities. Children under the age of 16 accounted for 33.3 percent of bicycle deaths.

Through research of crash statistics the following driver and pedestrian/bicyclist behavior traits have been found to contribute to these crashes:

#### *1.4.12.1.1 Driver Behavior*

- Disregard signal;
- Failure to yield right-of-way;
- Inattention;
- Speeding; and
- Impairment.

#### *1.4.12.1.2 Pedestrian and Bicyclist Behavior*

- Disregard signal;
- Inattention;
- Impairment; and
- Mid-block crossing.

#### **1.4.12.2 Strategies**

- Identify locations with a disproportionately large number of actual or potential for fatal and serious injury pedestrian and bicyclist crashes;
- Increase enforcement and education in high crash zones;
- Identify and implement engineering countermeasures;
- Promote dissemination and use of Michigan's *What Every Bicyclist Should Know* handbook; and
- Promote the use of bike helmets.

Figure 15: Fatalities (Pedestrians)

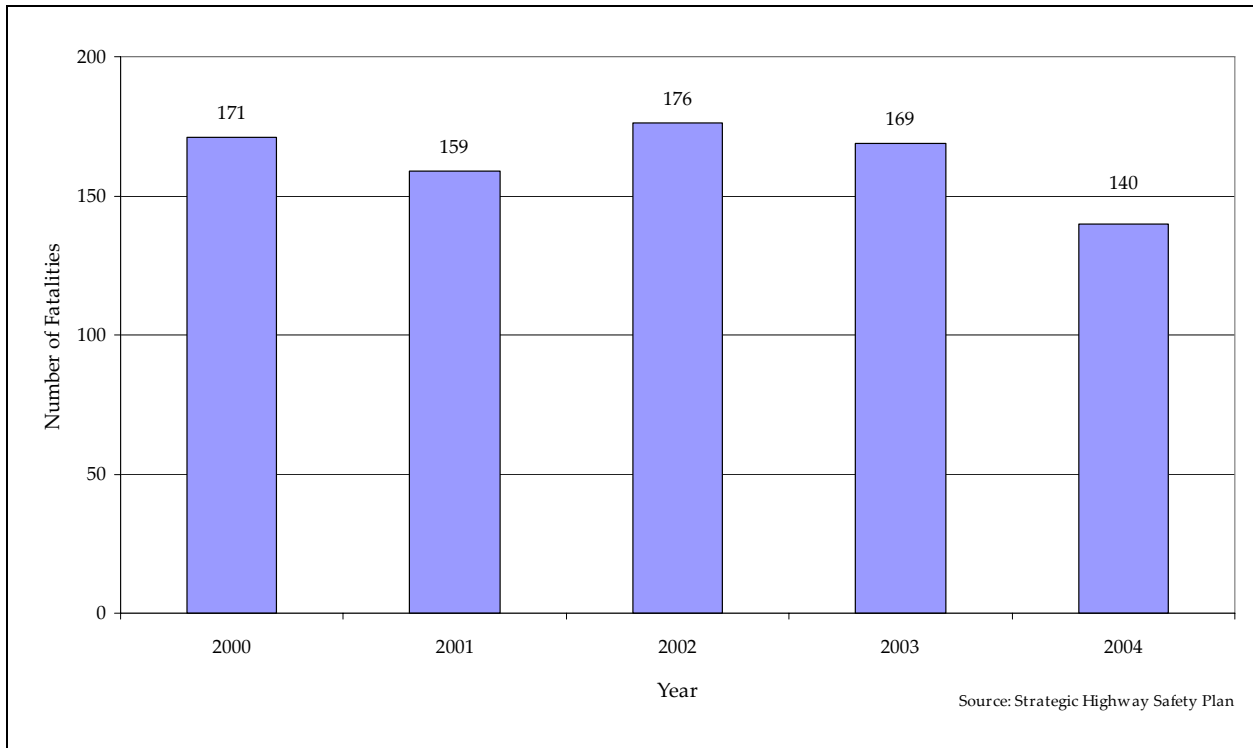
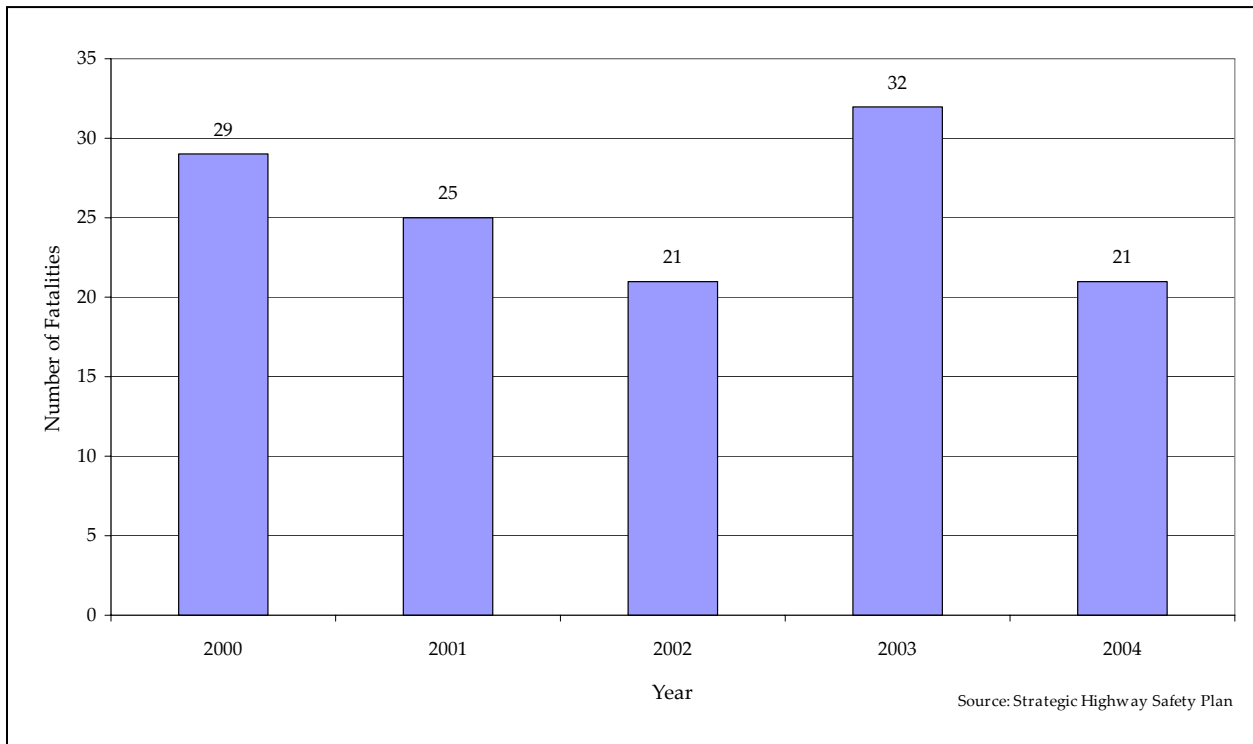


Figure 16: Fatalities (Bicyclists)



## 1.5 Conclusions

A Strategic Highway Safety Plan (SHSP) has been developed for the state of Michigan to address roadway safety. The vision of the SHSP is that all roadway users arrive safely at their destinations. The goal is a fatality rate of 1.0 per 100 million vehicle miles traveled by 2008; nationally the rate was 1.44 in 2004. This goal would result in a 10.4 percent reduction in fatalities and injuries on Michigan's roadways. In 2003, which was the latest year of crash data used in the development of the SHSP, the state rate was 1.28 per 100 million vehicle miles traveled. In 2004, the rate was 1.14.

The SHSP identifies 12 key safety needs with strategies which will guide future safety investment decisions. The Governor's Traffic Safety Advisory Commission (GTSAC) whose role is to provide leadership to improve traffic safety by fostering communication, coordination, and collaboration among government and other public and private entities in Michigan will oversee and monitor the SHSP. The GTSAC, through state interagency cooperation, is committed to reducing traffic crashes, injuries, and deaths in Michigan by promoting safety programs. Per the directive of the GTSAC, 12 Action Teams have been identified or formed to develop their own strategic plans for each of the emphasis areas identified in the SHSP.

The goal of reducing fatalities is for all Michigan roadways. The 2004 statewide rate was 1.14 per 100 million vehicle miles traveled. On the state trunkline system, the rate in 2004 was 0.93 per 100 million vehicle miles traveled and 1.37 on Michigan's local road system (see **Figure 3**). In review of crash rates and total fatalities for state trunkline and local roads, it is evident that a shared effort is required by MDOT, the counties, and municipalities. While 53 percent of traffic is found on the 9,720 miles of state trunkline, traditionally 60 percent of the traffic fatalities occur on the remaining 110,870 miles of county and city roadways (see **Figure 4**).

To address the crash fatality rate on the local road system, MDOT has implemented the Local Agency Safety Initiative as part of its Safety Improvement Program. Department staff has been dedicated to assisting interested counties and municipalities in identifying high crash locations on their road systems. This effort is being done in cooperation with the Michigan Municipal League and the County Road Association of Michigan in conjunction with the Local Agency Assistance Program (LTAP). MDOT has contracted with Michigan Technological University which houses the LTAP Center to make improvements to crash identification computer software used by local agencies. The support services include the compilation and analysis of highway crash data, joint field investigations of sites, and development of alternative countermeasures to reduce crashes. This focus will be on engineering treatments to improve safety.

## 1.6 Recommendations

Strategic plans have been drafted for each of the 12 emphasis areas by the Action Teams and will be presented for approval to the GTSAC in 2006. To ensure success for each strategic plan and the overall SHSP, the GTSAC needs to foster communication, coordination, and collaboration among government and other public and private entities, in particular state

interagency cooperation. Implementation of the recommended strategies will be guided and monitored by the GTSAC. A medium for delivering the SHSP to those with a vested interest in safety is the GTSAC sponsored annual Michigan Traffic Safety Summit. The Summit provides general and breakout sessions that should be used to present the latest findings in the 12 emphasis areas and provide a feedback opportunity to the GTSAC and the Action Teams on the progress of the individual strategic plans. The 12<sup>th</sup> Annual Summit is March 13–15, 2006 in Lansing. Law enforcement, traffic engineers, public health/EMS, private industry, non-profits, and local, state, and federal agencies are invited.

To address the higher number of fatalities on the local roadway system and thus push the fatality rate on this system closer to the statewide rate, additional funding needs to be identified. A goal of MDOT in their local safety initiative is to provide matching funds to local roadway authorities beyond what is currently available for safety countermeasures. Of particular interest are high benefit/low cost solutions that can be implemented at locations of high crash concentrations and proven low cost system type improvements. An example of such low cost improvements can be found in the Michigan *Traffic Safety Fundamental Handbook*. The purpose of this handbook is to improve safety education, increase the knowledge about the basic causes of crashes, and to reinforce the link between highway-design decisions and safety ([http://www.michigan.gov/msp/0,1607,7-123-1593\\_3504\\_21777-84464--,00.html](http://www.michigan.gov/msp/0,1607,7-123-1593_3504_21777-84464--,00.html)).

In addition to the strategies developed for each of the 12 emphasis areas, the strategies discussed in the NCHRP Report 500 Series Implementation Guides are available to members of the Engineering, Education, Enforcement, and Emergency Services communities (<http://safety.transportation.org>).

As part of its Five Year Plan, MDOT will continue with the current Traffic and Safety Program and its evaluation of devices in five identified areas: Senior Mobility, Traffic Operations, Pedestrians, Roadway Delineation, and the Safety Improvement Program. When additional funding sources have been identified it is recommended to increase the Comprehensive Safety Program to \$73 million.

**Table 2: Comprehensive Safety Program Dollar Allocation (MDOT 2006)**

	<i>Proposed</i>	<i>2005</i>
<b>Signing</b>	\$16.5 M	(\$13 M)
<b>Pavement Marking</b>	\$15.0 M	(\$13 M)
<b>Traffic Signals</b>	\$14.5 M	(\$8 M)
<b>Guardrail</b>	\$5.0 M	(\$5 M)
<b>Safety Programs</b>	\$22.0 M	(\$19 M)
<b>Proposed Total</b>	\$73.0 M	(\$58 M)

The department's return on its investment in the Traffic and Safety Program will be:

- Make Michigan's highway system one of the safest in the country.
- Raise our Traffic and Safety equipment/material standards up to the rest of the country. (Clearview font, wider pavement markings, longer life pavement markings, delineation visible in inclement weather, far side traffic signal displays, pedestrian countdown signals, and brighter sign sheeting)
- Reduce crashes and fatalities.
- Improve Senior Mobility and Safety.

A breakdown of the proposed increases is shown in **Chapter 2**, MDOT's Comprehensive Safety Program.

## 1.7 Implementation

Beyond the development of the 12 strategic plans by the Action Teams, several initiatives have already been implemented by public and private agencies in the state of Michigan. Below is a summary of these efforts:

### *1.7.1 United States Road Assessment Program (USRAP)*

USRAP is a cooperative effort involving the AAA Foundation for Traffic Safety, AAA Michigan and the Michigan Department of Transportation to develop maps of the relative accident risk of specific roadway sections and to develop ratings of the safety features of specific road sections. Ultimately, USRAP has two goals. The first goal is to make motorists more aware of the relative safety risks of the roads they use. The second goal is to assure that strategic safety improvements to the roadway system are rationally based on consideration of accident risk. USRAP is currently a pilot program in several states funded principally by a grant from the AAA Foundation for Traffic Safety.

### *1.7.2 AAA Michigan Road Improvement Demonstration Program*

In 1996, AAA Michigan developed the AAA Road Improvement Demonstration Program (AAA RIDP). The AAA RIDP is a public/private partnership designed to enhance traffic safety by reducing the frequency and severity of crashes at high-risk urban intersections. This program is based on engineering research that has shown that strategically placed traffic signals with larger heads for improved visibility, adjustments in signal timing for better traffic control, improved signage, pavement markings, dedicated left-turn lanes, and protected green signal arrows will contribute to reduced numbers of crashes in urban areas. Working with state, county and city partners, AAA Michigan has implemented these relatively low-cost engineering changes at hundreds of intersections in Detroit and Grand Rapids to date with hundreds more still in the works. The results are an overall reduction in crashes by over 25 percent, and even more importantly, a reduction in injury crashes of more than 40 percent.

### ***1.7.3 Assessing Community Traffic Safety (ACTS) Tool***

The purpose of the ACTS tool is to assist communities in taking the first step in problem and solution identification. It provides community coalitions a means of identifying their resources (assets) to address traffic safety problems (deficits). The ACTS requires the identification of a coalition facilitator who will take the lead in encouraging members of the coalition and other key community leaders to complete the various surveys in the tool.

The tool consists of 21 surveys which coalition leaders and their members distribute to those groups and individuals central to solving community traffic safety problems. For example, individuals in law enforcement, the courts, community planning, education, the media, the general community, major employers, health departments, MSU Cooperative Extension, and youth are asked to give their opinions about the extent to which traffic safety assets are in place to fight various deficits. A profile can then be developed and used to create a Safe Community Asset Development Plan (ADP) for building key community traffic safety assets. The ACTS is available on the web at [www.townsafety.com/actsweb](http://www.townsafety.com/actsweb).

Michigan Safe Communities is a program that invites local community leaders, organizations and citizens to work with the Michigan Office of Highway Safety Planning (OHSP) to prevent traffic crashes, violence, and substance abuse in their communities.

The benefits of becoming a Safe Community include:

- Potential decrease of traffic crashes, injuries, and fatalities;
- Savings in health care costs;
- Local data to document the need for traffic and other safety improvements;
- Opportunities for funding of a traffic safety prevention program; and
- Increase community spirit.

Safe Communities Services Center (SCSC), [www.nhtsa.dot.gov/safecommunities](http://www.nhtsa.dot.gov/safecommunities), offers materials, technical assistance, and advice to Safe Communities coalitions as well as to individuals and organizations that want to start a coalition. Nine agencies within the US Department of Transportation (USDOT) are working together to promote and implement a safer national transportation system by combining the best injury prevention practices into the Safe Communities approach to serve as a model throughout the nation. The USDOT established the SCSC to serve as an information and technical assistance marketplace to advance Safe Communities nationwide. The Center provides one-stop shopping for local community needs for materials and resources related to building and strengthening Safe Communities.

### ***1.7.4 Michigan NETS (Network of Employers for Traffic Safety)***

Michigan NETS provides information, products, and services that improve the safe driving behavior of all employees. Since its inception, Michigan NETS has been successful in promoting traffic safety in the workplace and now has over 800 members. Michigan NETS was

created in 1994 by the state of Michigan, Office of Highway Safety Planning (OHSP) with the assistance of the National NETS organization. Michigan was one of seven pilot states in 1994 who adopted the philosophy of bringing together private and public sector officials interested in reducing loss of life and the economic costs of on-and-off-the-job crashes. Over the last seven years, Michigan NETS has encouraged businesses in the state to establish or expand work place traffic safety programs in their own organizations and communities.

#### 1.7.4.1 Program Goals

- Lower health care costs;
- Reduce workers' compensation costs;
- Improve productivity;
- Lower operating costs;
- Reduce absenteeism;
- Improve quality of life for the employee and the community; and
- Improve employee morale.

Statewide Safety Conscious Planning Forums - the Office of Highway Safety Planning has been working with MDOT and the Metropolitan Planning Organizations (MPOs) on a Safety Conscious Planning project for the past two and one-half years. This project began as part of a national level project that was started as a result of the passage of the Transportation Equity Act for the 21st Century (TEA-21), which required state and local departments of transportation and MPOs to consider safety as a planning factor. As part of this project, each MPO region within the state held a traffic safety forum during 2003. At each forum, regional traffic crash data was presented. In addition, these forums brought together traffic safety partners within the region to discuss traffic crash issues and begin looking at solutions. Finally, the Office of Highway Safety Planning (OHSP), MDOT, and the Federal Highway Administration (FHWA) are partnering once again with the Michigan Association of Regions to conduct safety forums in the rural areas of the state similar to what the MPOs have done.

#### 1.7.5 Michigan Signal Summit

This group of stakeholders have come together to address the issue of retiming traffic signals (regionally). They have also come to address other signal needs: capital, operating, and maintenance. Subcommittees have been created to address and develop both short and long-term strategies regarding hardware, retiming (e.g., clearance intervals, use of all red intervals), coordination of goals, and discussion of rising issues and innovative improvements (box- vs. diagonal-spans, use of count-down pedestrian signals).

### ***1.7.6 Incident Management***

Southeast Michigan has an extensive collaboration of agencies utilizing technology to address roadway incidents. Lead by the Metro Detroit Incident Management Coordinating Committee, these stakeholders utilize technology (cameras, pavement loops) to identify incidents, dispatch assistance (Michigan State Police (MSP), Freeway Courtesy Patrol (FCP), etc.), and inform drivers (through radio, the Internet, and changeable message signs) of current traffic patterns. Other partners include MDOT (The Michigan Intelligent Transportation Systems (MITS) Center), MSP, FCP operators, and the Road Commission for Oakland County traffic operation center.

### ***1.7.7 Southeast Michigan Snow and Ice Management (SEMSIM)***

The Southeast Michigan Snow and Ice Management project joins the Road Commission for Oakland County (RCOC), Wayne County Department of Public Services, the city of Detroit, and the Road Commission of Macomb County in a partnership that will benefit motorists in all four jurisdictions. The Suburban Mobility Authority for Regional Transportation (SMART) is also a partner, meaning that regional mass transit will also benefit from the project. SEMSIM represents the first time that four governmental road agencies have joined forces to implement such a project. SEMSIM is introducing cutting-edge technologies that will result in safer roads across the region and more efficient use of resources for the partner agencies. It is also minimizing the historic, geographic, jurisdictional, and institutional barriers between the four agencies.

### ***1.7.8 Red-Light Running***

Red-light running is a cause of the most severe crashes at Michigan intersections, but is also the subject of some controversial debate regarding the strategies to mitigate it. The use of unmanned monitoring devices (i.e., cameras) has surfaced from year to year, but without legislation allowing for the violator to be ticketed via photographs, this solution is not possible. Legislation has been proposed in the state but has never been enacted. However, some agencies have developed policies regarding the implementation of such cameras. Secondly, in the city of Troy (Oakland County) the road authority has allowed the installation of a device (“rat tail”) that allows law enforcement officers to observe the light indications of a traffic signal from the opposite side of the intersection – so if a person runs the red light the officer will be able to observe the violation and apprehend the violator without also having to proceed through the intersection during the red. Finally, AAA Michigan and URS Corporation are studying the occurrence, issues, and solutions to red-light running in the city of Grand Rapids. This project is in the beginning stages.

Rural ITS and 911 Needs – Approximately 60 percent of all traffic fatalities in Michigan occur on the local road system. Recognizing this, both the GTSAC and MDOT’s ITS Strategic Plan will focus on crash reduction and improvement of Emergency Medical Services in remote rural areas. In the future, this may involve the expansion of communication systems such as cellular phones, ONSTAR type vehicle systems, GPS technology, and the expansion of the rural 911

emergency systems. The focus will be on crash reduction and the expediting of response to crashes that do occur.

### ***1.7.9 Area Agency on Aging 1-B (AAA 1-B) You Decide: Senior Driving Awareness Program (SDAP)***

The SDAP is an educational, peer support and counseling program designed to assist older adults with driving safely for as long as possible. The program also assists with identifying mobility options when driving is no longer safe. The program offers monthly education at eight locations in southeast Michigan. One-on-one assistance is available via phone and website at [www.aaa1b.com](http://www.aaa1b.com).

### ***1.7.10 The Mature Driver Workshop***

Sponsored by the Transportation Improvement Association of Oakland County, the Mature Driver Workshop offers driver training utilizing the AAA Michigan materials throughout southeast Michigan. The program also incorporates Useful Field of View (UFOV) technology and has an on-the-road driver evaluation component. This is a low-cost, confidential program that runs two days with a third day of on-the-road evaluation.

### ***1.7.11 AARP 55 Alive***

AARP 55 Alive is offered throughout the state of Michigan as a low-cost driver education/refresher course. The program generally runs two days for four hours per day.

### ***1.7.12 Crash Redesign Project (CRP)***

Crash Redesign Project (CRP) is a multi-agency initiative by the Department of State Police, State, Transportation, and Information Technology to redesign and upgrade the state's traffic crash processing system. Improvements include streamlined data processing, improved coordination, and sharing of crash data among state agencies; the ability of web based reporting for law enforcement agencies, reducing processing costs and an improvement in the quality of crash data, and certifying the ability for agencies to electronically submit crash forms.

### ***1.7.13 Law Enforcement Agency Management System (LEAMS) Project***

The Law Enforcement Agency Management System (LEAMS) project is a state-of-the-art law enforcement agency management system. The Department of State Police has worked with local law enforcement agencies to develop the requirements for this new system. LEAMS will take full advantage of the latest technology. It is being developed to include at least, incident reporting, crash reporting, citations, intelligence reporting, and activity reporting modules. This future browser-based system is proposed to transmit data over the upgraded Michigan Public Safety Commission's 800 MHz radio system. Since open architecture will be used, it will provide the opportunity to integrate with many other records management systems, so information can be shared, allowing the criminal justice community to be more efficient and effective in solving crimes.

### 1.7.14 MDOT Access Management

Access management is a set of proven techniques that can help do the following:

- Reduce the number of crashes and improve safety;
- Reduce traffic congestion;
- Preserve the flow of traffic;
- Preserve the public investment in roads by managing the location, design and type of access to property; and
- Enhance the value of private land development.

Access Management can extend the function of a roadway while assuring safe and reasonable access to adjacent properties. Poor access management is most obvious along major non limited access trunkline arterials that are lined with narrow lots with commercial uses and driveways located too close to one another. There is a need to promote an understanding of access management and improve state and local coordination.

In many instances, preserving the flow of traffic and reducing crashes along the state highway system can be accomplished through a local program of highway-land use access management. MDOT's priority investment strategy into the state highway system is to improve the condition, safety, and ride quality of our existing roads. With the cooperation of local units of government and with the development and adoption of coordinated corridor access management plans, capacity and safety elements of the highway system can be preserved for the benefit of the motoring public. In order to accomplish this, future highway corridor improvement strategies will include an access management component. This component shall include local adoption and implementation of an access management plan that utilizes local land use regulations and controls to enforce the plan.

Successful access management requires cooperation between property owners, local land use authorities, and local, county and state transportation agencies in order to provide safe access to private property and protect the public's investment in roads. In 2001, the department developed an access management guidebook and began a public outreach program to educate property owners, business persons, MDOT staff, and local land use decision makers of the benefits of and how to properly manage access to the state and local roadway system. The program describes the planning process and links access management principles with land use planning to show the big picture and ensure appropriate relationships between present and future transportation needs. Therefore, the department's access management program initiative is in direct alignment with the Governor's land use initiative. For a copy of the access management guide book contact the Michigan Society of Planning at [www.planningmi.org](http://www.planningmi.org).

MDOT's access management program has been funded under a federal grant program for statewide planning and research activities. In 2004, MDOT delivered eight statewide corridor access management plans and an educational outreach program. The corridor locations targeted in 2004 are as follows:

- M-96 in Calhoun County;
- US-131 in St Joseph County;
- US-24 in Monroe County;
- M-153 in Wayne County;
- M-15 in Genesee and Oakland Counties;
- M-104 in Ottawa County;
- M-37 in Barry County; and
- US-31 in Manistee County.

### ***1.7.15 Pedestrian Safety Class***

Pedestrian fatalities account for about 11 percent of all traffic fatalities nationally. Based on 2003-2004 data Michigan has been identified as one of 13 “Focus States,” and Detroit as one of five Focus Cities for improving pedestrian safety through FHWA technical assistance and focus workshops. In May of 2006 MDOT hosted a series of trainings in Grand Rapids and Lansing on “Designing Streets for Pedestrian Safety”. Facilitated by national experts from the FHWA, the state of Oregon, and TY Lin International, MDOT staff along with engineering and community planning professionals participated in a two day design training and field exercise. The training focused on “Effective Engineering Countermeasures” to promote pedestrian safety. Participants learned first hand how to apply these countermeasures and best practices for new construction or to retrofit existing infrastructure in ways that will improve pedestrian safety. Additional trainings will be hosted in the Detroit area in the fall of 2006.

### ***1.7.16 Public Act 51, Section 10k***

Public Act 51 of 1951 is the state law that covers many transportation funding issues in the state. Act 51 creates the Michigan Transportation Fund (MTF) into which specific transportation taxes are deposited, and prescribes how these revenues are to be distributed and the purposes for which they can be spent. Section 10k of Act 51 requires that a minimum of one percent annually of eligible road agencies MTF receipts must be used for non-motorized transportation facilities (based on a ten year average). Such facilities can be in conjunction with or separate from a road. This portion of PA 51 was amended on March 29, 2006 by PA 82 of 2006 to specifically clarify that construction and preservation of sidewalks, within cities and villages, are eligible non-motorized expenditures. These funds help communities provide safe facilities for pedestrians and other non-motorized users.

### ***1.7.17 Commercial Vehicle Strategy Team (CVST)***

Through the Commercial Vehicle Strategy Team (CVST), MDOT and the Department of State Police - Motor Carrier Division (MSP-MCD) are partnering to enhance highway safety, security and infrastructure.

CVST's goals are: to create and maintain an effective partnership, to improve highway safety and security, to protect highway infrastructure, and to enforce commercial motor vehicle laws through targeted enforcement and wise investment of resources. Objectives are: to reduce crashes involving commercial vehicles (CMVs) on the open road and in construction zones, to reduce safety violations and security breaches involving CMVs, to control/reduce highway deterioration caused by CMVs, and to use enforcement to support highway design and operation.

Through CVST, MDOT and MSP-MCD will develop a fully integrated, multi-year, strategy that incorporates the wisest investments.

## Chapter 2. MDOT's Comprehensive Safety Program

The Michigan Department of Transportation (MDOT), working in partnership with other state agencies through the GTSAC, has adopted the state of Michigan SHSP and the goal of reducing fatalities on all Michigan roadways to 1.0 per 100 million vehicle miles traveled by 2008. The 2004 statewide rate was 1.14 per 100 million vehicle miles traveled while the nationwide average was 1.5. On the state trunkline system the rate in 2004 was 0.93 per 100 million vehicle miles traveled and 1.37 on Michigan's local road system.

To maintain this goal on the state trunkline system and reach 1.0 by 2008 for all roadways, the Department's Comprehensive Safety Program is focused on the department's assets of traffic control devices and driver information systems in an effort to improve the safety of the driver, another asset. The program provides:

- Improved driver guidance;
- Warning for motorists who leave the roadway;
- Minimal consequences of leaving the roadway;
- Improved safety at identified locations; and
- Uniform application and replacement of traffic control devices for the efficient and safe operation of our roadway system.

With Safety as a separate goal within MDOT's strategic plan, five focus areas have been identified to concentrate additional funds. These focus areas are Senior Mobility, Pedestrians, Traffic Operations, Roadway Delineation, and Safety Improvement Program. Cost beneficial improvements, in particular low cost solutions, are to be taken in consideration within these focus areas. MDOT has developed an asset safety proposal increasing the funding from \$58 million in 2005 to a total program of \$73 million.

In 2001, 16 percent of drivers were 65 or over. By 2020, this figure will increase to 25 percent. MDOT recognizes the influence of the elder driver and their impact on the safety and traffic operations on Michigan's roadways. The 2005 Safety Program implemented many efforts to improve driver safety including improved driver guidance through improved pavement

markings, signing, and traffic signal visibility. The reflectivity and legibility of freeway guide signs and the width of pavement marking edge lines were increased for the benefit of senior drivers and improved overall driver guidance. These efforts are a direct result of the 2004 North American Elderly Mobility Conference, sponsored by the department, demonstrating best practices in the area of safety and traffic control devices. For 2006 the Department has adopted the box span signal display as its standard signal design. This design provides enhanced motorist visibility, thus is a positive contribution to Senior Mobility. In addition, this design will improve the safety of the maintenance worker and motorist when work is being performed on a traffic signal.

The evaluation of brighter signs has not stopped for the department. Beyond the changing of standards in 2005 for yellow warning signs to fluorescent yellow and improving the recognition and legibility of freeway guide signs, brighter sign materials are being evaluated. The emphasis of this 2006 evaluation will be on the remaining signs used by the department. Examples of such signs are stop, yield, and speed limit signs.

In regard to Senior Mobility, the proposed Safety Program Expansion includes:

- Brighter sign legends - \$2.0 million per year cost increase;
- Clearview font on guide signs - \$1.5 million per year cost increase; and
- Traffic signal display improvements - \$4.0 million per year cost increase.

Pedestrians are another concern of the department. In response MDOT has developed pedestrian signal guidelines for the uniform application of such devices including audible pedestrian signals. In addition, the department is evaluating countdown pedestrian signals to determine the appropriate placement criteria. Countdown pedestrian signals provide additional information to pedestrians on how much time is remaining to cross the roadway thus allowing them to adjust walking speed and providing peace of mind.

Studies have shown properly timed signal systems improve corridor travel time, reduce individual intersection delay by 37 percent, and result in a nine percent fuel savings. Such improvements will address aggressive driving on our roadways. The reduction in aggressive driving should result in an improvement in safety; however no crash studies have been conducted on corridors that have been retimed. Such studies need to be conducted in conjunction with future improvements. In 2005, 300 traffic signals in Metro Region including the city of Detroit (both trunkline and non-trunkline) were retimed. While a major undertaking, traffic signal corridors need to be retimed on a periodic basis to ensure efficient operation. MDOT's proposed goal is to re-time corridors every eight years. The current re-timing cycle is 15 years.

Another tool in MDOT's operations tool box is the roundabout. This type of intersection treatment replaces traffic signals with a free-flowing traffic facility, which has been shown to significantly reduce intersection crashes when applied to appropriate locations. A roundabout was constructed in Macomb County at M-53 and 18½ Mile Road in 2005, and another is being planned in 2006 for the I-75 and M-81 ramps.

In regard to Pedestrian/Traffic Operations, the proposed Safety Program Expansion includes:

- Retiming signals every eight years – 2.5 million per year;
- Countdown pedestrian signals – costs included in Traffic and Signal Display Improvements.

For Roadside Delineation the department does not want to stop with its efforts of wider edge line pavement markings. The use of a pavement marking in a rumble strip has proven to act as a wet, nighttime delineation system. The department is in its third year of a pilot project of placing a marking in the rumble. When used on a new rumble, which is located closer to the travel lane than the previous standard, the combination provides a positive nighttime delineation system. Typical pavement markings do not functional fully when covered by a film of water. Additional roadside delineation in the form of larger and brighter delineators is also being evaluated.

In regard to Roadway Delineation, the proposed Safety Program Expansion includes:

- Wider edge lines and gore markings - \$1.0 million per year cost increase;
- Roadside delineation - \$0.5 million per year;
- Urban island painting - \$0.2 million per year; and
- Centerline rumbles - \$0.3 million per year.

The Safety Improvement Program has been proven successful with the construction of road improvement projects in response to correctable traffic crash patterns. All projects are justified through a cost benefit analysis and typically involve improving safety at high crash intersections and along short corridors. To ensure equality in the identification of projects throughout the state, the Safety Improvement Program is part of the department's Call for Projects. Safety funds are distributed to each region based on the number of high crash locations identified. The Safety Program is a three year submittal with the first two years rolling. This allows the regions to update and revise the last two years of the previous Call for Projects and provide an additional year of new safety projects. The average statewide Time of Return (TOR) was 4.9 years in FY 2009. This is lower than the 7.2 years and 6.1 years realized in FY 2007 and FY 2008, respectfully. This decrease in TOR is due to the regions' efforts to select more appropriate safety improvements. Because of this success the department proposes increasing the existing \$19 million budget.

The Local Agency Safety Initiative is an addition to the Safety Improvement Program to address the crash fatality rate on the local road system. Department staff have been dedicated to assistance interested counties and municipalities in identifying high crash locations on their road systems. A goal of the initiative is to provide matching funds to local roadway authorities beyond what is currently available from the department for safety countermeasures.

With ever increasing technology comes new innovations in the area of Traffic and Safety. With the existing budgets and commitment of funds it is difficult to properly evaluate new technologies to address a specific issue. With the addition of a safety innovation program in

MDOT's Comprehensive Safety Program the department can readily try new technologies on its roadway system without hindering any projects in the annual program.

In regard to Safety Improvement, the proposed Safety Program Expansion includes:

- Safety Innovation Fund - \$1.0 million per year;
- Local Agency Safety Initiative - \$2.0 million per year;

MDOT's 2005 Safety Program Accomplishments are provided in the appendices.

## Chapter 3. Integration of Highway Safety

### 3.1 Travel Segments Sensitive to Safety Risk

The risk associated with roadway travel affects all segments of Michigan's population. Unsafe environments for highway travel; as well as pedestrian travel, freight movement, and intermodal connections affect different segments of the population (and sectors of Michigan's economy) in different ways. **Chapter 1** detailed the degree to which elderly and younger driver cohorts are affected by Michigan crashes. The *Travel Characteristics* and *Land Use* technical reports provide greater detail into the needs and trip purposes of these segments. Consequently, safety needs are referenced in the integration sections of these reports.

Because bicycle and pedestrian crashes have higher fatality rates than highway crashes overall; safety for pedestrian, bicycle and transit-dependent segments of the population must be considered when these modes are affected by roadway improvement strategies and projects. Examples include the effects of roadway expansion and accessibility to transit stops, implications of roadway projects in mixed-use developments (where trip origins and destinations are within walking distance), and the development of projects appropriate for areas with large cycling populations (especially children, who are shown in **Chapter 1** to account for a significant proportion of bicycle fatalities). The programs described in this report offer building blocks for strategically integrating safety and are referenced in other integration sections.

Michigan's business and industrial transportation system users are also sensitive to safety risk, as a lack of safe access to intermodal connections or major freight generators can serve to inhibit development and increase the costs of doing business. **Section 1.4.5**, Commercial Vehicle Safety, describes some highlights of Michigan's commercial trucking safety issues; however, other technical reports will further address how these impacts are felt by Michigan's economic sectors. The costs of crashes for businesses are considered both in the freight technical report, and more explicitly in the Economic Outlook and Economic Impact elements of this plan.

### 3.2 Safety Sensitive Activities

As referenced throughout this report, the distinctive challenges of night-time driving and travel indicate safety is of particular concern for activities occurring at night. While the majority of

crashes occur in the afternoon hours (as described in **Section 1.2, Highways**, of this report), this is largely a function of exposure (more trips occurring in the afternoon peak). It is reported that the fatal crash rate is higher in the evening hours, and this is especially true for bicycle and pedestrian crashes as well as impaired driver incidents.

Consequently, safety-oriented transportation alternatives for late night drivers, pedestrians and cyclists will be relevant in the technical reports addressing non-highway modes. Safe transportation alternatives for evening recreational activities, when alcohol involvement is most prevalent, are potential areas for integrated transportation solutions. Also, community pedestrian safety alternatives for evening walkers and travelers will have potential linkages in other technical reports.

### 3.3 Integrating Safety

Integrating safety into Michigan's long-range planning entails identifying in greater detail those situations where improvements to highway, bicycle/pedestrian, freight and transit oriented projects may provide the opportunity to offer safer access to key activities. Recreational and night-time activities (including walking) are particular safety targets of interest given the findings of this report. The *Travel Characteristics* report provides insight into such activities, especially for the elderly and younger segments identified in this technical report.

The findings of this safety report regarding the segments with specific crash risks, the time of day of crashes and alcohol involvement form the basis for integrating safety with travel characteristics, bicycle/pedestrian planning, land use planning, transit and issues further addressed in the other technical reports.

## References

Governors Traffic Safety Commission minutes

Michigan Criminal Justice Information Center, Michigan Traffic Crash Decade at a Glance

Michigan Strategic Highway Safety Plan

Michigan Transportation Summit minutes

Office of Highway Safety Planning, Michigan State Police, 2004 Crash Facts

## Appendix A: 2005 MDOT Safety Program Accomplishments

## 2005 MDOT Safety Program Accomplishments

As part of MDOT's FY 2005 safety program, \$58 million was committed to the design, construction, and placement of signs, pavement markings, guardrail, traffic signals, and other safety improvement projects. Accomplishments in FY 2005 included adding 150 million feet of pavement markings statewide and replacing special markings in approximately 40 of Michigan's counties. MDOT also upgraded signs on 557 miles of non-freeway facilities and 247 miles of freeway. The department replaced or upgraded deteriorated, non-standard guardrail and crash attenuators along 40 miles of roadway, installed 12 new traffic signals and upgraded/modernized 261 traffic signals and beacons, two school devices, two fire station warning devices, and re-timed 500 signals in FY 2005. Several safety improvement projects were constructed in response to traffic crash analysis.

As a result of the FY 2005 Highway Safety Program, MDOT estimates the number of crash reductions at 279 minor injury and property damage crashes, and 45 severe injuries and fatalities. In recent years, MDOT's comprehensive Safety Program has implemented many efforts to improve driver safety. These efforts include:

### A. Keeping Vehicles on the Roadway

Running off the roadway is one of the most severe types of crashes. Forty-eight percent of all fatal crashes involve a vehicle departing the roadway.

In order to reduce injuries and fatalities due to vehicles leaving the road, several efforts have been targeted in the last five years and will continue to be targeted in 2006.

#### 1. Improved Driver Guidance

A comprehensive program has been implemented to improve driver guidance and visibility during hours of darkness through improved signing and pavement markings.

MDOT has been working with private industry to produce pavement markings with longer life expectancy and improved reflectivity, particularly during wet, inclement night conditions.

Also of benefit to motorists is the use of reflective backgrounds and legends on all new signs. To assure visibility at night, signs are replaced based on age. In the past five years, MDOT has reduced its replacement cycle from 19 years to approximately 15 years as a result of implementing new strategies. As part of this program, MDOT has revised its standard for freeway guide signs increasing the reflectivity and legibility of the sign legends to accommodate senior drivers. This revision will improve overall driver guidance on freeways.

FY 2005 accomplishments include adding 150 million feet of pavement markings statewide and replacing special markings in 40 of Michigan's counties. In this program, the widths of all edge lines and interchange gore markings have been increased for the benefit of the senior driver and improved driver guidance. High quality pavement markings are also being used by MDOT on its long-term

pavement fixes. The use of such a system on these pavements will limit exposure to contractors and motorists and provide a multi-year marking system. MDOT also upgraded signs on 557 miles of non-freeway facilities and 247 miles of the freeway system.

## 2. Warning for Motorists Who Leave the Roadway

Department analysis has indicated “drift-off-the-roadway” crashes on Michigan freeways are a concern. Analysis revealed 17 percent of the “drift-off-the-roadway” crashes on Michigan’s freeways that occurred on roadways without rumble strips, resulted in severe injury or death to at least one crash victim. For comparison, only three percent of all Michigan freeway crashes result in severe injury or death. These types of crashes can be minimized by rumble strip installation in the shoulders.

Michigan’s experience shows a 40 percent reduction in “drift-off-the-roadway” crashes with rumble strips in place. In response to the significant crash decrease, MDOT adopted milled-in rumble strips as standard. Since 2000, 10 stand-alone rumble strip projects were constructed on 786 miles of freeway. These projects prevent an estimate 177 crashes annually, including four fatal and 20 severe crashes.

## 3. Minimizing the Consequences of Leaving the Road

In addition to strategies to keep vehicles from leaving the road, several efforts have been undertaken to minimize the consequences if a vehicle does leave the road.

The Guardrail Improvement Program has replaced or upgraded deteriorated, non-standard guardrail, and crash attenuators along 40 miles of roadway in 2005. Crash history has indicated more fatalities and serious injuries occur when impacting the ends of barrier systems. MDOT has placed more than 5,000 guardrail endings during the past five years to mitigate this type of impact.

## B. Safety Improvement Road Construction Projects

Safety improvement projects are constructed in response to traffic crash analysis. These projects typically involve improving safety at high crash intersections.

During 2005, 33 safety improvement projects were implemented in response to traffic crashes. Of these projects eight were done as part of the road and bridge programs. Additionally, \$1.4 million was spent on minor safety improvements on the trunkline system including minor intersection improvements, culvert extensions, right and left-turn lanes, passing lanes, and minor guardrail improvements.

## C. Operations

In 2005 the department installed 12 new and upgraded 261 traffic signals and beacons, two speed limit signs, two fire station warning devices, and re-timed 500 signals. Through the use of other funding, 300 additional traffic signals in the Metro Region including the city of Detroit (both trunkline and non-trunkline) were retimed. Studies

have shown properly timed signal systems improve corridor travel time, reduce individual intersection delay by 37 percent, and result in a nine percent fuel savings.

#### **D. Senior Drivers**

MDOT recognizes the influence of the senior driver and their impact on the safety and traffic operations on Michigan's roadways. To gain an increased understanding of what can be done for this driving population MDOT, as part of the 2004 North American Conference on Elderly Mobility, sponsored a demonstration roadway in downtown Detroit of various traffic control devices.

From this effort, the department has implemented the following initiatives: Clearview font for overhead guide signs, LED traffic signals, fluorescent yellow warning signs, wider pavement markings, and various improved traffic signal displays.

#### **E. Work Zone Safety**

MDOT has identified locations across the state where increased law enforcement in work zones may help keep motorists and workers safer during the construction season. The department provides funding to cover overtime costs of state and local police officers patrolling work zones.

These added patrols along with the increased fines and penalties for traffic violations in work zones help protect not only the highway workers, but also the drivers within these work zones.



*Providing the highest quality integrated transportation services  
for economic benefit and improved quality of life*

