

# COLORADO

# SPIRS

STRATEGIC PLAN FOR  
IMPROVING ROADWAY SAFETY





# COLORADO

## STRATEGIC PLAN FOR IMPROVING ROADWAY SAFETY

**Working Every Day to Decrease Fatalities and Reduce Injuries**



STATE OF  
C O L O R A D O

STRATEGIC PLAN FOR IMPROVING ROADWAY SAFETY  
(SPIRS)

FIRST EDITION

Approved:



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**Tim Harris**  
Governor's Highway Safety Representative

Date:

October 1, 2006

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MESSAGE FROM THE  
COLORADO DEPARTMENT  
OF TRANSPORTATION

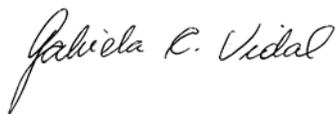
In the State of Colorado, we have witnessed a significant decrease in the number of fatalities and injuries due to motor vehicle crashes. It is our mission to continue this downward trend as Colorado continues to be one of the fastest-growing states in the nation. As the state grows, the need for an efficient and safe transportation system necessitates coordination and planning at all levels of government.

This year marks an unprecedented step in roadway safety planning in Colorado with the creation of the inaugural Colorado Strategic Plan for Improving Roadway Safety (SPIRS). The Colorado Department of Transportation (CDOT) is the champion of this statewide plan. This is a three-year planning document that will integrate safety planning efforts of all safety stakeholders into one document that serves as a tool for future planning efforts across the state. The SPIRS is a statewide collaborative effort with many safety stakeholders who played an integral part in contributing to the overall creation of the plan, as well as to the individual focus areas that shape Colorado's safety plan's vision.

This plan focuses on the "four E's" of roadway safety – Education, Enforcement, Engineering and Emergency Services. Each of these roadway safety priorities has been collaborated into 18 focus areas. The SPIRS brings together all of the focus areas as a comprehensive plan to address roadway safety in the state.

The State of Colorado remains committed to being a leader in the United States in creating innovative, measurable and effective safety programs.

As partners in roadway safety, we are committed to continuing to move this Plan forward as a unified team to reduce fatalities and injuries in Colorado.



**Gabriela C. Vidal, P.E.**  
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# INTRODUCTION

This Colorado Strategic Plan for Improving Roadway Safety (SPIRS) has been developed to implement strategies that have been identified to reduce traffic crashes in Colorado. It contains both strategic and action elements. Goals and objectives are included along with a number of specific performance measures.

The passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) mandates that the Colorado Department of Transportation coordinate with all stakeholders in the development of the Colorado SPIRS. The Colorado SPIRS is a three-year planning document for the State of Colorado. Comprehensive, collaborative and functional safety strategies have been developed with other stakeholders in Education, Enforcement, Engineering and Emergency Services. Although

this isn't a requirement, we will revisit the SPIRS every three years in coordination with the Federal Highway Administration (FHWA).

As a planning document, the Colorado SPIRS will serve as a guide each year for the development and updating of stakeholder safety plans. Each year, Colorado develops a Problem Identification Report to determine traffic and safety problem locations and focus areas that need to be addressed within the state.

Through the work of all of Colorado's safety stakeholders, the Colorado SPIRS builds upon the planning and coordination of all areas of roadway safety to communicate a plan that is all encompassing. Partnerships have been developed between the Governor's office, the legislature, federal agencies, state agencies, local agencies, political

subdivisions, metropolitan planning organizations, community groups and the private sector, which has resulted in the development of a comprehensive approach to solving identified roadway safety problems.

In developing the Colorado SPIRS, stakeholders identified the following process:

- Coordinate with Stakeholders
- Focus Area Identification
- Problem Statements
- Strategies
- Performance Measures

Objectives and strategies will be measured through the use of performance measures. Priority will be given to these strategies and objectives through collaboration with other safety stakeholders.



## MISSION

Colorado's mission is to reduce the incidence and severity of motor vehicle crashes and the associated human and economic loss to fellow Coloradans.

## VISION

Create and further develop a safe and efficient roadway system that will serve all users of Colorado's roadways.

## GOALS

- Reduce the fatal crash rate per 100 million vehicle miles traveled to 1.00 by 2008 and maintain 1.00 through 2010.
- Reduce the injury crash rate per 100 million vehicle miles traveled to 67.5 by 2008 and 65.3 by 2010.
- Increase seat belt usage to 82.5% by 2008 and 85.0% by 2010.
- Reduce alcohol-related fatal crashes as a percentage of all fatal crashes to 29.5% by 2008 and 29.0% by 2010.

## CORE STRATEGIES

In developing the Colorado SPIRS, the plan focuses around four core strategies that will work together to maximize the level of safety on Colorado's roadway system.

**Education** – Education is needed at all levels of safety planning. Information and resources must be provided to citizens and Colorado's safety stakeholders about traffic safety and the long-term health of the people of Colorado. Education programs must be provided to all people in a community with culturally significant and effective messages.

**Enforcement** – Enforcement of Colorado's driving laws is an effective method in the prevention of traffic crashes. A police officer stopping a vehicle for a violation could mean the difference between an everyday drive and a traffic crash.

**Engineering** – Roadway design can influence the occurrence of motor vehicle crashes. Modification of the roadway, in many cases, offers a long-term solution to crash problems in a given location. Safety design can often reduce human error and the severity of crashes.

**Emergency Services** – Emergency Service vehicle preparedness can, many times, mean the difference between life and death for people involved in traffic crashes. Each day, Emergency Service workers work in collaboration with traffic safety educators, law enforcement, traffic data experts and traffic engineers to ensure a safe and efficient roadway system.



# COLORADO

## SAFETY STAKEHOLDERS

American Automobile Association of Colorado	Colorado Fire Chiefs' Association	International Association of Chiefs of Police
Association of County Engineers	Colorado Geological Survey	Mothers Against Drunk Driving
Association of County Sheriffs	Colorado Motor Carriers Association	Metropolitan Planning Organizations
Bicycle Advocacy Groups	Colorado Municipal League	National Highway Traffic Safety Administration
Bureau of Indian Affairs	Colorado Public Utilities Commission	Persistent Drunk Drivers Advisory Committee
Colorado Attorney General's Office	Colorado Operation Lifesaver	Prevention Leadership Council
Colorado Department of Education	Colorado Sheriffs' Association	State Emergency Medical and Trauma Services Advisory Council
Colorado Department of Human Services	Colorado State Patrol	Statewide Child Passenger Safety Advisory Council
Colorado Department of Justice	Colorado State University	Statewide Traffic Records Advisory Committee
Colorado Department of Public Health and Environment	Colorado State University Institute of Transportation Management	Statewide Transportation Advisory Committee
Colorado Department of Public Safety	County Health Departments	United States Fish and Wildlife Service
Colorado Department of Revenue	Federal Motor Carrier Safety Administration	United States Forest Service
Colorado Department of Transportation	Federal Highway Administration	University of Colorado
Colorado Division of Wildlife	Federal Railroad Administration	
	Federal Transit Administration	

# PROCESS

Colorado SPIRS is a new Federal requirement of the SAFETEA-LU (23 USC §148(a)) legislation. In anticipation of the new federal requirement, many stakeholders involved with roadway safety met and began to work together on developing this planning process. The stakeholders with whom CDOT worked are representative of the four E's: Engineering, Education, Enforcement and Emergency Services.

CDOT's Safety and Traffic Engineering Branch initiated the SPIRS planning process at NHTSA's February 14, 2006, videoconference to which NHTSA's Rocky Mountain Region office invited CDOT and other safety stakeholders to learn about the SAFETEA-LU planning process. NHTSA involved the Safety and Traffic Engineering Branch in this process, as the Branch is responsible for Federal and State funding for many roadway safety programs across the state. CDOT

continued to coordinate the SPIRS writing process with a series of meetings with other stakeholders. For example:

1. April 13, 2006, and subsequently – Statewide Traffic Records Advisory Committee (STRAC) meeting.
2. April 21, 2006, and subsequently – Statewide Transportation Advisory Committee (STAC) meeting. CDOT Division of Transportation Development and the CDOT Safety and Traffic Engineering Branch gave a presentation to STAC regarding the development of the SPIRS and asked for input.
3. April 24, 2006, and subsequently – Statewide Metropolitan Planning Organization (MPO) meeting. The Colorado Governor's Highway Safety Representative gave a presentation about the development of the SPIRS and asked for input. Also met with individual MPOs about the SPIRS planning process.
4. May 11, 2006, and subsequently – Persistent

Drunk Driver (PDD) Meeting

5. June 14, 2006 – Colorado Transportation Commission presentation.
6. June 22, 2006 – Safety and Traffic Engineering Branch Manager sent a draft of the SPIRS to stakeholders.
7. June 28, 2006 – Meeting with CDOT, FHWA and Metropolitan Planning Organizations. CDOT Safety and Traffic Engineering Branch updated the stakeholders on the development of the SPIRS and explained the Hazard Elimination project selection process.
8. June 29, 2006, and subsequently – Colorado Prevention Leadership Council (PLC) meeting.

The safety stakeholders' input was incorporated into the final SPIRS document and presented to FHWA on September 1, 2006.



## PERFORMANCE MEASURES

The performance measures in this document were developed based on crash and fatal record data and on strategies created by Colorado safety

stakeholders. The performance measures were established in order to have a uniform method of evaluating and measuring the focus areas' effectiveness.

The performance measures are listed in the individual focus areas that are in the next section of this document.





# LOCATIONS WITH POTENTIAL FOR CRASH REDUCTION

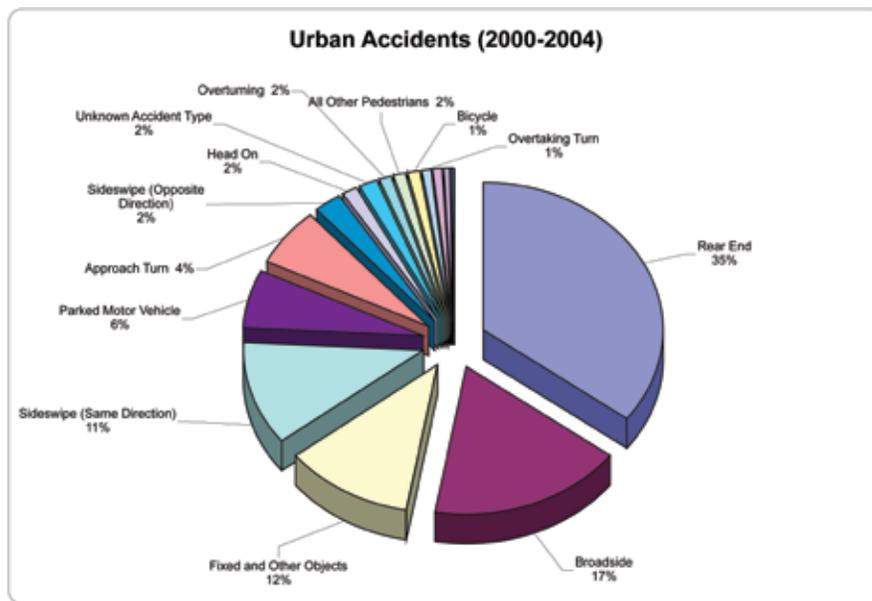
## Problem Statement

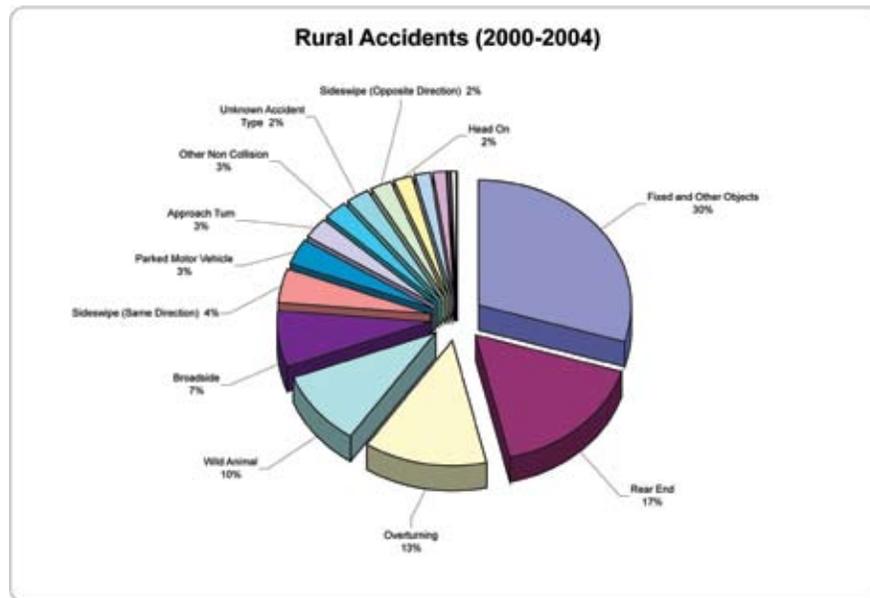
Addressing safety concerns on Colorado roadways is an important part of this effort. The responsible investment of resources in improving safety on Colorado’s roadways is, however, a difficult task. The objective is to maximize accident reduction within the limitations of available budgets by making road safety improvements at

locations where it does the most good or prevents the most accidents. Through the use of geographically referenced traffic crash data and statistically-driven data evaluation criteria, locations that exhibit atypical crash history can be identified. Evaluation methodologies, such as pattern recognition analysis and roadway diagnostic safety assessments, provide the current best practice in targeting

appropriate locations for safety improvements and effective utilization of limited safety funds.

The charts below display the prevalent crash type and its relative frequency of occurrence as experienced recently in designated urban and rural Colorado environments.





### Elements and Strategies

Implementing cost-effective safety improvement programs and safety enhancements on individual projects is dependent on the positive identification of problem areas. Methodologies are used to identify locations exhibiting an over-representation of specific crash types, (e.g., run-off-road crashes or intersection-related crashes) as well as to define over-represented crash types at planned engineering study sites. From the broad spectrum of identified locations with accident reduction potential, funding subsets will be extracted that are related to, but not necessarily limited to, the following elements:

- Reduce the frequency of roadway departure-type

crashes and mitigate the effects of leaving the road;

- Reduce crashes at intersections and provide funding for traffic signal installation or upgrades;
- Select qualifying sites for safety improvement projects including the Federal Hazard Elimination Program and High Risk Rural Roads Program; and
- Provide continuing support to involved stakeholders on traffic and roadway engineering studies and solutions.

### Safety Improvement Strategies

- *Reduce the frequency of roadway departures and mitigate the effects of leaving the road.* Implement a comprehensive program to enhance driver

guidance through improved pavement markings, delineation and sign replacement. The program will seek to minimize the consequences of leaving the road by providing adequate clear zones and installing improved roadside safety hardware such as bridge rail, guardrail and cable guardrail systems.

- *Reduce crashes at intersections and provide funding for traffic signal installation or upgrades.* Systematically improve the safety of intersections through innovative programs such as “Dilemma Zone Pre-emption.” Other typical improvements include enhancing signal head visibility with LED heads, sight distance improvement and intersection delineation. At unsignalized intersections,

access improvements, installation or modification of medians, and sight distance improvements are typical measures utilized. Historical crash pattern analysis and operational reviews provide insight as to what methods should be used to improve safety.

- *Select qualifying sites for safety improvement projects including the Federal Hazard Elimination Program and High Risk Rural Roads Program.*

Develop and implement comprehensive safety projects, statewide, at locations with potential for accident reduction. These projects range from low-cost, spot safety improvements on locally controlled public roads to corridor-scope activities on state roadways.

- *Provide continuing support to involved stakeholders on traffic and roadway engineering studies and solutions.*

Detecting and resolving safety problems that have developed in a particular location is the primary method of implementing necessary safety improvements and provides the best opportunity to achieve the objective of providing a safe and efficient transportation system. Often, this is accomplished simply as a response to a stakeholder's request for an engineering study or as an adjunct to a construction project.

## Performance Measures

- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Reduce the fatal crash rate (number of crashes) from 1.62 per 100 million VMT in 1995 to 1.00 by the year 2008 and maintain at 1.00 through 2010.
- Reduce the injury crash rate from 87.3 per 100 million VMT in 1995 to 67.6 by 2008 and 65.3 by 2010.
- Reduce fatalities (individual deaths per crash) per 100 million VMT from 1.83 in 1995 to 1.00 by 2008 and maintain through 2010.





# ROCKFALL

## Problem Statement

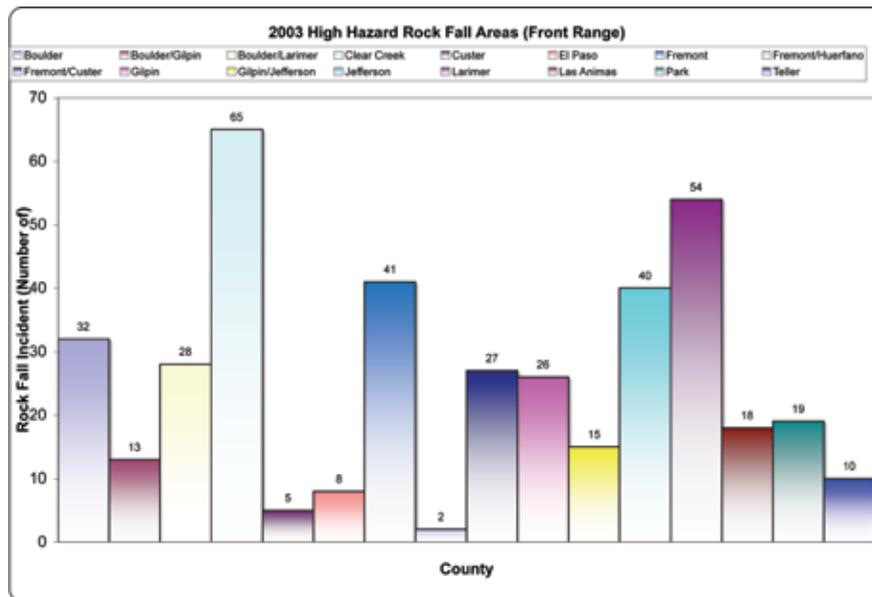
Rockfall hazards have been the direct cause of several traffic accidents, traffic delays, injuries and fatalities along Colorado’s mountain corridors. As tourism increases so will traffic volumes along these roadways. As a result, the consequences of rockfall incidents will be magnified as was shown by two events in 2005 on US 6

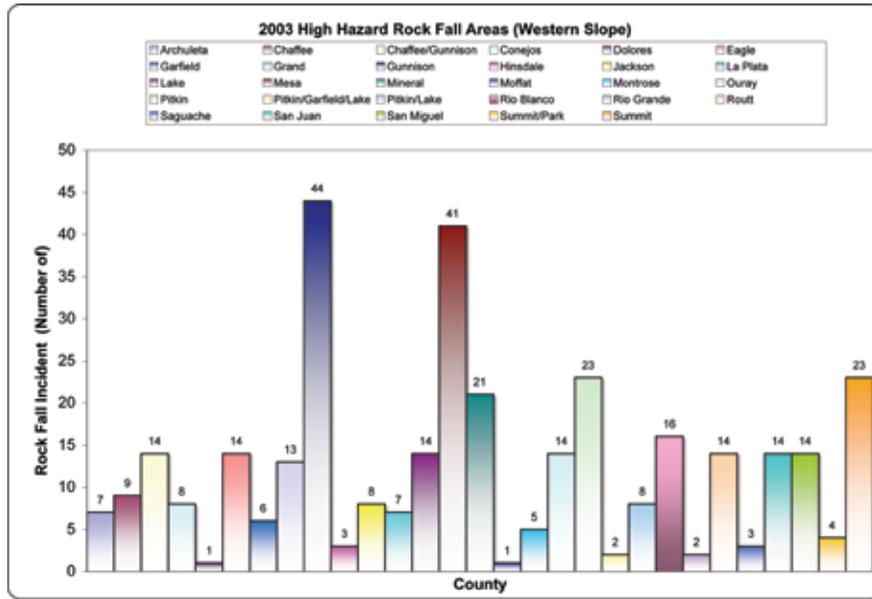
in Clear Creek Canyon and on I-70 near Idaho Springs.

Rockfall is recognized in Colorado as a significant natural hazard that is sporadic and unpredictable. The purpose of implementing rockfall mitigation is to reduce the risk of rockfall at specific locations. Completely eliminating the rockfall risk is typically not feasible and in many cases

would require that the hazard be completely avoided.

Over 750 locations statewide are recognized as having chronic rockfall hazards. The attached figure shows some of the state’s main corridors passing through slopes considered to have chronic rockfall.





### Elements and Strategies

- Perform site inspections during project construction of all rock cuts;
- Identify first responders to rockfall-related emergencies;
- Develop a rockfall mitigation emergency contractor list;
- Modify rock slope design, as necessary, to accommodate the anticipated rockfall hazard and rockfall protection;
- Evaluate and prioritize rockfall locations by using a Rockfall Hazard Rating System. The system combines slope data, traffic data and geological data to rank rockfall sites according to the severity of the rockfall risk; and
- Prioritize rockfall locations according to their hazard ranking.

### Performance Measures

- Measure the completion percentage of the sites listed in a Rockfall Mitigation Project Plan.





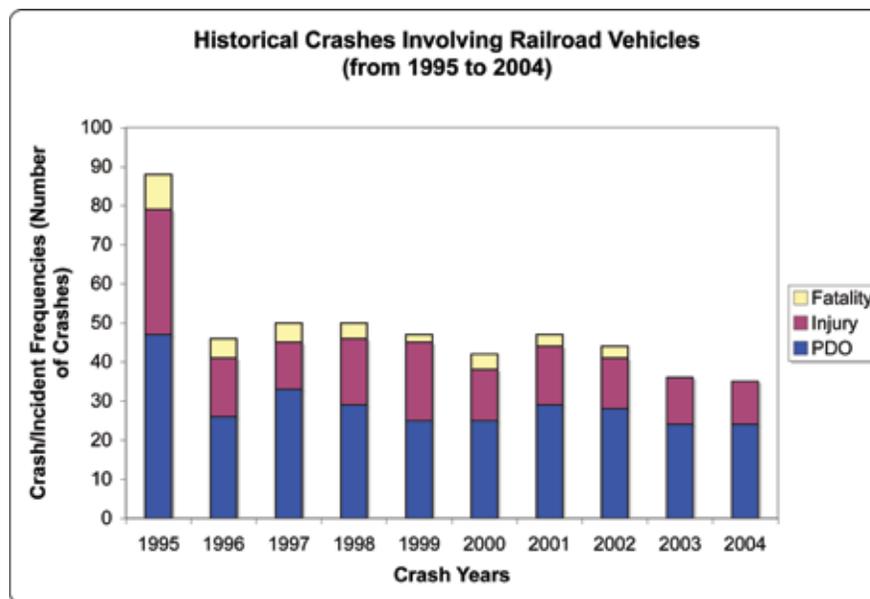
# RAILROAD CROSSINGS

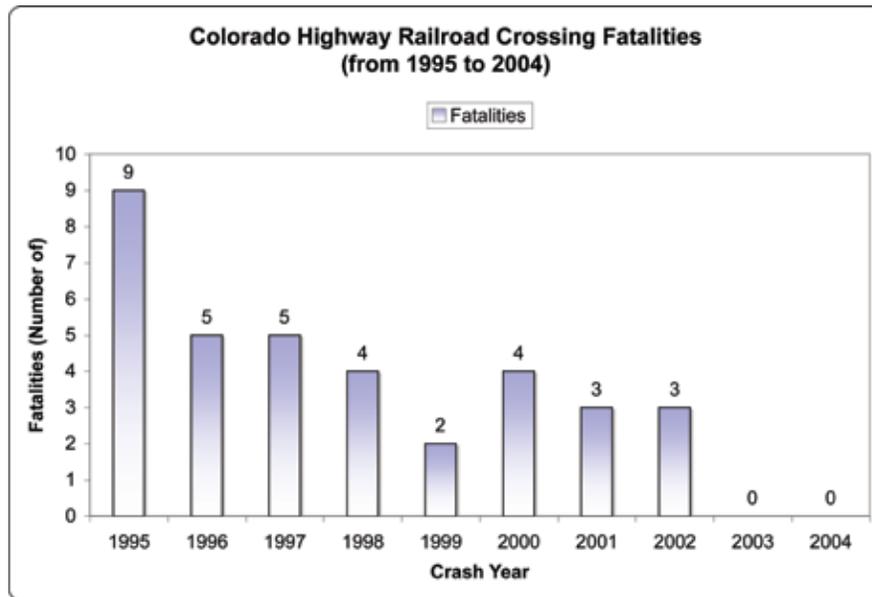
## Problem Statement

Roadway-railroad intersections involve two distinct modes of transportation with different operating authorities and operating characteristics. Roadways and railways may intersect at-grade, or may be grade-separated by a bridge or other structure that carries the roadway over or under the railway. The majority of Colorado's rail-roadway crossings are at-grade, where most accidents occur.

An at-grade rail-roadway crossing is characterized by continuous vehicular traffic, interrupted periodically by a train's passage. The intermittent nature of train operations may dull a driver's attentiveness to a train's possible approach or may tempt a driver to disregard warnings and try to beat a train through the crossing. Except in highly unusual circumstances, trains have the right of way at a crossing because a train's huge mass and operating speed often require stopping distances

of a mile or more. Further, the great disparity in size and weight means that vehicle-train collisions are almost always severe and are often fatal to the vehicle occupants. Providing sufficient advance notice of the crossing, alerting drivers of a train's approach or presence and, as appropriate, physically preventing vehicles from entering the crossing, are approaches to address safety at rail-roadway grade crossings.





### Elements and Strategies

Strategies for improving at-grade crossing safety include:

- Upgrade warning devices;
  - Build grade-separated structures;
  - Install highly retroreflective signing and pavement markings;
  - Improve the crossing's physical characteristics (e.g. geometry, sight distance, and ride quality);
- Install train-activated devices at passive railroad crossings;
  - Provide public education campaigns; and
  - Increase law enforcement efforts.
  - Upgrade warning devices;
  - Build grade-separated structures;
  - Install highly retroreflective signing and pavement markings;
  - Improve the crossing's physical characteristics (e.g. geometry, sight distance, and ride quality);
- Install train-activated devices at passive railroad crossings;
  - Provide public education campaigns; and
  - Increase law enforcement efforts.

Consolidation or closure of unnecessary crossings improves safety by eliminating accidents at the closed crossings and by allowing limited safety funds to be concentrated on the remaining crossings. This approach, which is strongly endorsed by the federal government, is also evaluated for feasibility before the design of active warning devices is initiated.

Passive crossings lack active warning devices and rely on signs and pavement markings to identify the crossing location. Passive crossings have higher risk for crashes because they exercise less direct control over the actions of drivers. Where passive crossings remain in place, enhanced sign systems may increase driver awareness and responsiveness.

When a roadway-rail grade crossing is located within the limits of a planned roadway construction project, the crossing, along with any existing devices,

should be evaluated and assessed for safety, and all appropriate crossing safety measures should be included in the project. Also, the horizontal and vertical roadway alignment at the crossing can sometimes be adjusted to provide improved sight distance for the motorist.

Colorado safety stakeholders will consult with the US DOT to find ways to use innovative, active and passive devices at existing accident-prone roadway-railroad crossings.

Further safety strategies at roadway-railroad crossings will include the following:

- Develop partnerships among the railroad companies, CDOT, the state Public Utilities Commission (PUC) and local agencies in the implementation of a streamlined process for the federal Section 130 roadway-railroad crossing safety improvement projects;
- In collaboration with Operation Lifesaver, railroad companies, schools and local agencies, develop educational materials and campaigns aimed at teaching young people about the dangers of roadway-railroad crossings;

- Design better signal interconnects to avoid vehicles being trapped between roadway intersection traffic signals and highway-railroad signals. Use advanced preemption timings as opposed to simultaneous preemption timings to clear out queues so vehicles don't become trapped between the railroad crossing and the intersection;
- Implement innovative passive warning devices at selected roadway-railroad crossings and approaches;

- Build four-quadrant automatic gate and sensor systems and raised medians at roadway-railroad crossings with a history of gate violations;
- In partnership with Colorado State Patrol, Colorado PUC and local law enforcement agencies, develop ways to reduce roadway-railroad gate violations; and
- Develop an updated and comprehensive crossing data inventory on all public crossings.

### Performance Measures

- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Strive to increase the number of passive railroad crossings that are upgraded with active warning devices.
- Strive to limit new and eliminate existing at-grade railroad crossings on Colorado roadways.

- Identify accident-prone railroad crossings and crossings with heavy violations (e.g. failure to yield, failure to stop at stop signs, driving around gates) and target those crossings for frequent patrol.
- Strive to reduce total accidents at highway-rail crossings.





# ACCESS MANAGEMENT

## Problem Statement

Access management has proven to play a significant role in creating safer transportation facilities through the reduction of traffic conflict points and crashes.

## Elements and Strategies

The safety benefits of access management are: fewer traffic conflict points; and allowing drivers additional time to respond to potential conflicts. To protect public health and safety and to maintain smooth flow of traffic, Colorado has implemented a State Highway Access Code to control access points to State Highways.

Local agencies should consider developing a similar approach.

The following elements and strategies should be included in the development of an access management program:

- Access locations, spacing and design;
- Roadway classification and access categories;
- Corridor access management plans;
- Median and continuous two-way left-turn lanes;
- Access permitting;
- Land development and access;
- Rights of way and legal consideration;
- Internal and

intergovernmental coordination; and

- Public involvement in access management.

## Performance Measures

- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Consolidate or remove access points when possible.
- Reduce the number of conflict points near intersections that create safety and congestion problems.





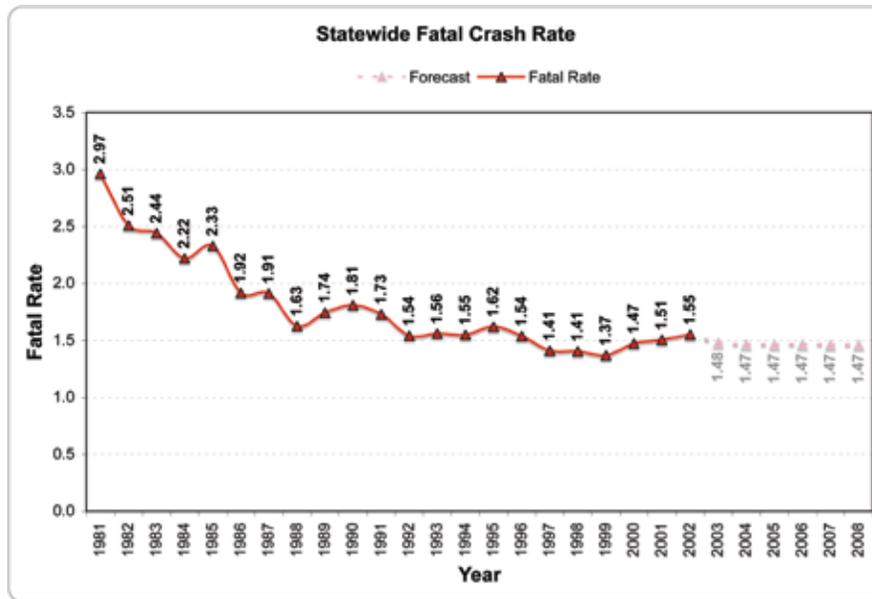
## ROADWAY ENGINEERING SAFETY

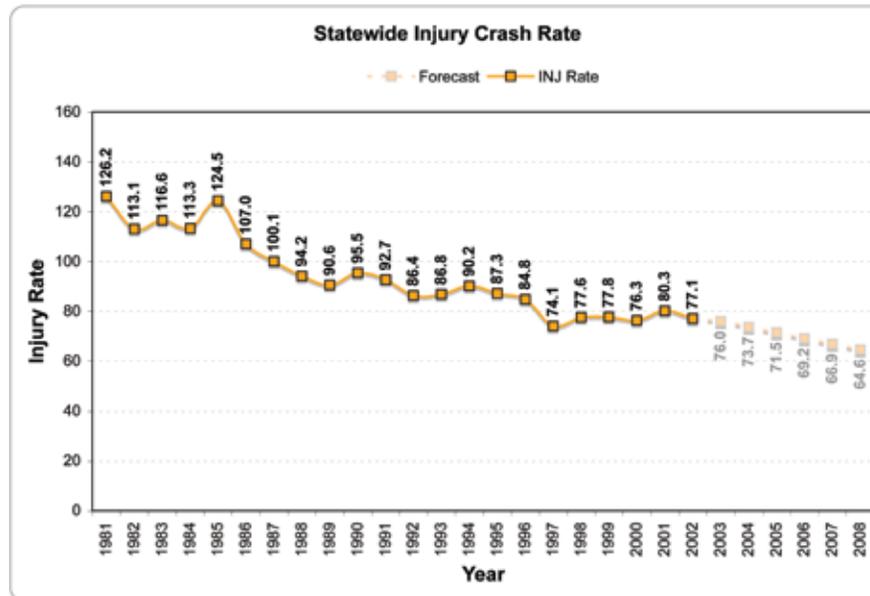
### Problem Statement

A roadway engineering safety program should successfully address the reduction of crash rates and severity. It should

be data driven and should identify locations that have the potential for accident reduction. Between 1999-2003, Colorado's population and vehicle miles traveled increased by 26.2%

and 33.5%, respectively. During this same time period, fatal and injury crash rates decreased by 14.0% and 21.3%, respectively.





### Elements and Strategies

The following elements and strategies should be included in the development of a roadway engineering safety program:

- Signing;
- Pavement markings;
- Parking;
- Traffic flow;
- School zones;
- Railroad crossings;
- Construction work zones; and
- Roadside obstacles.

The following strategies should be considered:

- Provide roadway safety education seminars for local personnel responsible for traffic engineering;
- Provide flagger training for local personnel through the Colorado Local Technical Assistance Program;
- Offer training classes to traffic safety professionals;
- Provide technical publications to the public; and
- Reward maintenance and construction personnel for contributing to roadway safety.

### Performance Measures

- Evaluate roadway engineering safety program effectiveness every four years.
- Train approximately 130 individuals annually from local entities in basic traffic engineering.
- Provide at least six traffic engineering studies per year for towns with populations of 20,000 or less.





# TRAFFIC CRASH DATA SYSTEMS

## Problem Statement

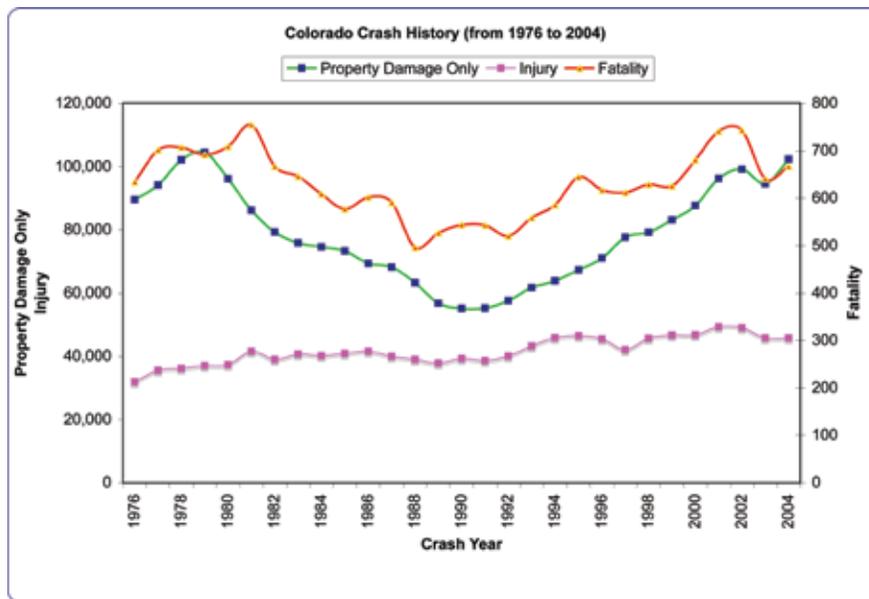
Timely, accurate and reliable information is critical to making decisions and effectively managing transportation safety programs. Problem identification, efficient allocation of resources and the measurement of results all depend on the availability of data and information. One of the most important challenges facing safety stakeholders is understanding and using

information to the greatest advantage.

In order to develop effective transportation safety programs, comprehensive information on existing traffic safety problems is critical. Historically, agencies have looked at problems in terms of where crashes are occurring. This process continues to be essential to developing safety countermeasures. Recently, more emphasis has been given

to delivering traffic safety programs at the community level.

The development and management of safety and traffic information systems in Colorado is essential for the development of a strategic plan. The history of crashes in Colorado is illustrated below.



### Elements and Strategies

- Strengthen the organizational structure for guiding improvements to Colorado's Traffic Records System;
- Establish common standards (data dictionary) to ensure compatibility of data systems and data comparability;
- Meet user requirements for traffic safety information;
- Ensure expeditious collection, management and accurate transfer of data among state and local jurisdictions;
- Provide an environment for (data-driven) analysis, decision making, policy formulation and resource allocation;

- Develop an event-based, collaborative data warehouse and ensure that crash and citation information, including emergency medical services, pre-hospital and court disposition data, are transferred electronically to the data warehouse from the source of the information;
- Evaluate the effectiveness of programs or legislative changes through the use of this comprehensive information (data warehouse); and
- Work in collaboration with state and local agencies to determine the impact of driver behavior (e.g. speed) on the number and severity of crashes.

### Performance Measures

- Create a statewide coalition of state and local agencies that will address each of the 80 traffic records recommendations through strategic planning by 2008.
- Fully-automate traffic records data system by 2010.
- Improve timely collection of data from two years to thirty days by 2010.





# WORK ZONES

## Problem Statement

In Colorado, from 1994 to 2003, work zone accidents increased at a faster rate than overall accidents. However, in 2004, work zone accidents decreased. While it was the driver who was most often injured or killed, roadway workers were also injured or killed in work zone crashes.

Work zone safety programs improve traffic safety on Colorado roadways by decreasing fatal and injury

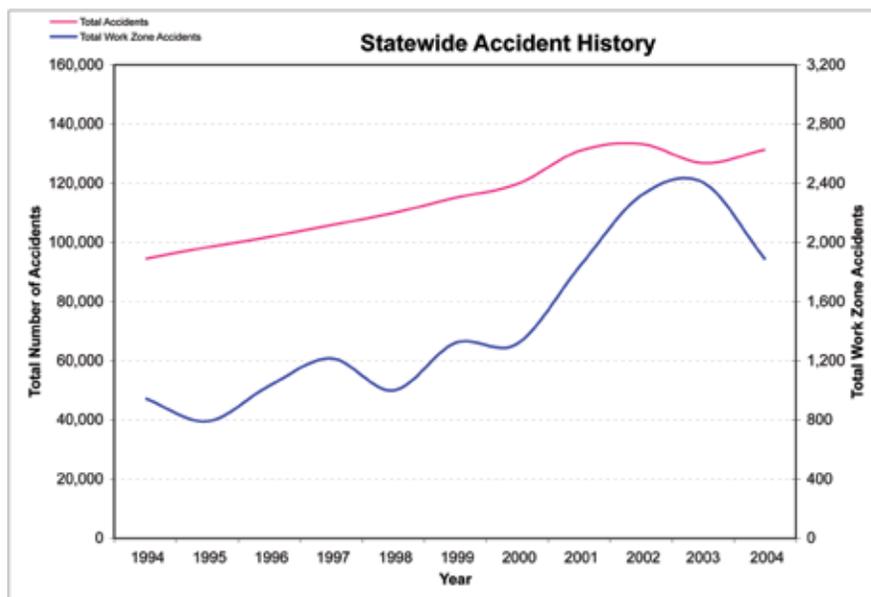
crashes in work zones.

Preliminary evidence of these programs' impact can be seen in the decrease in overall work zone accidents from 2,406 in 2003 to 1,886 in 2004.

## Elements and Strategies

- Develop new work zone standards that include nighttime work zone plans, and develop and implement procedures and specifications that can be implemented in response to special nighttime work zone situations;

- Issue bilingual updated work zone safety guidelines and training materials for industry personnel;
- Revise legislation to strengthen laws governing traffic violations in work zones and create a construction workers' safety account. Funding may be used for work zone safety signage, equipment, and additional enforcement for roadway work zones;
- Encourage the implementation of SAFETEA-LU Section 1402





- (Worker Injury Prevention And Free Flow of Vehicular Traffic) statewide at all levels of work zone safety;
- Continue increased media and enforcement activities stressing motorist safety within work zones;
  - Provide police enforcement in work zones;
  - Conduct traffic control reviews of active construction and maintenance projects;
  - Improve the quality of temporary traffic control; and
  - Evaluate the overall quality and effectiveness of work zone traffic control, identify areas where improvement is needed, facilitate open discussion of traffic control issues and address and correct project-specific and general work zone issues.

### Performance Measures

- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Reduce the fatal crash rate (number of crashes) from 1.62 per 100 million VMT in 1995 to 1.00 by the year 2008 and maintain at 1.00 through 2010.
- Reduce the injury crash rate from 87.3 per 100 million VMT in 1995 to 67.6 by 2008 and 65.3 by 2010.
- Reduce the number of motorcycle crashes per 1,000 motorcycle registrations from 19.0 in 2002 to 15.0 by 2008 and maintain at 15.0 through 2010.

- Reduce the involvement in crashes of drivers ages 21 to 34 from 68.0% in 1995 to 32.5% by 2008 and 32.0% by 2010.
- Reduce fatalities (individual deaths per crash) per 100 million VMT from 1.83 in 1995 to 1.00 by 2008 and maintain through 2010.
- Reduce construction and maintenance work zone crashes by 5% by 2010.
- Increase public awareness of work zone safety requirements of the driver by increasing the number of campaigns from two in 2006 to four by 2010.





# W I L D L I F E

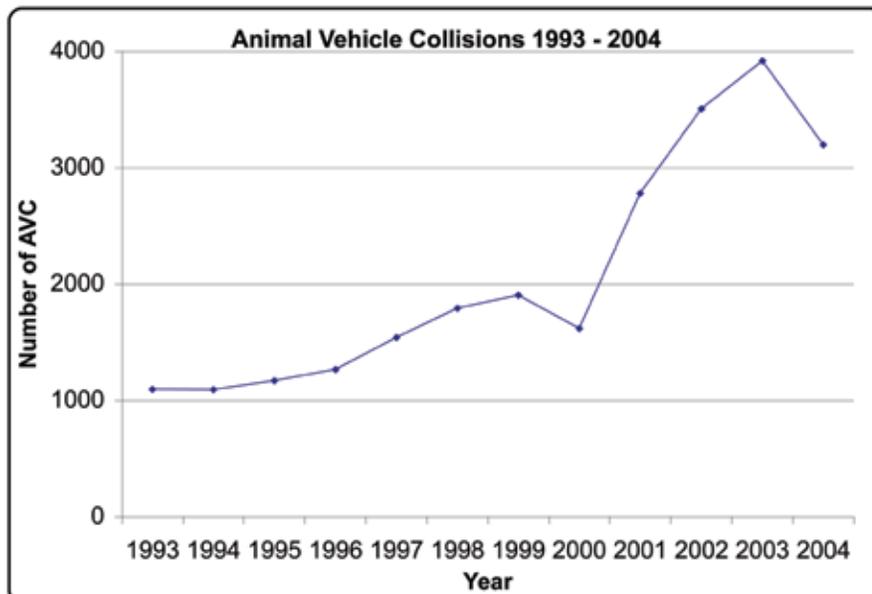
## Problem Statement

Wildlife in Colorado pose a significant safety hazard to users of the state's transportation infrastructure as evidenced by the steady increase in the number of Animal Vehicle Collisions (AVC) over the past decade. According to State Patrol data, 24,747 AVC were documented on Colorado roadways between 1993 and 2004. Of these, 18 were reported as fatalities, 2,241 as injuries and 22,488 as Property Damage Only (PDO). The number of accidents per year has increased steadily over

time. In 1993, the number of AVC reported was 1,096. In 2004, the number was 3,196, an increase of almost 300% over twelve years. (Note: Records of Colorado State Patrol (CSP) data in 2003 contain a large number of AVC with no corresponding location record. These data were included on the assumption that the vast majority of these AVC occurred on the state highways even though their locations were not recorded). The contributors to the rise in AVC include: expanding road networks and land development; increasing traffic flows; and increasing

traffic pulses in the morning and early evening (when commuting and wildlife activity peak simultaneously). Unless specific efforts are made to alleviate these collisions the number of AVC is likely to continue to increase.

The number of AVC reported by the Colorado State Patrol is known to underestimate the number of actual animals killed because it only represents accidents reported to CSP. CDOT has begun collecting data from maintenance patrols on the number of animals killed and removed from



the roads. An additional 2,460 animals killed were documented through maintenance patrols in 2005. This data will serve as a supplement to CSP accident data. Although drivers may not have reported these collisions as accidents, each animal killed represents a significant safety concern due to the collision of two large moving objects (the vehicle and the animal). The presence of the dead animal itself presents an additional obstacle in the road or on the shoulder, which may cause additional accidents due to swerving, braking and other hazardous driving activities. The number of accidents caused by

the presence of an animal on the roadway consisted of 11.9% of the total crashes investigated by the Colorado State Patrol on state roadways.

During the past three calendar years, motor vehicle crashes involving an animal are ranked as the third leading cause for accidents. The following table provides the top five causal factors:

### Elements and Strategies

Large animals such as deer and elk represent the vast majority of AVC reported in Colorado. Other wildlife involved in AVC

include pronghorn antelope, sheep, bear and coyote. Roadways are built in virtually every habitat in Colorado including those with high densities of deer and elk. Often these roads form a barrier or partial barrier to natural wildlife movement. AVC are the result of failed attempts of wildlife to cross this barrier.

In general two major groups of factors affect AVC rates: 1) traffic volume and speed; and 2) proximity of roads to habitat cover and wildlife movement corridors. Both of these factors can be adjusted to reduce AVC.

<b>Top Five Motor Vehicle Accident Causal Factors Investigated by the Colorado State Patrol</b>			
<b>Primary Factor</b>	<b>Calendar Year 2003</b>	<b>Calendar Year 2004</b>	<b>Calendar Year 2005</b>
<b>Inattentive to Driving</b>	<b>22.1%</b>	<b>20.7%</b>	<b>20.3%</b>
<b>Exceeded Safe Speed</b>	<b>15.0%</b>	<b>16.3%</b>	<b>16.2%</b>
<b>Animal Caused</b>	<b>12.1%</b>	<b>11.3%</b>	<b>11.9%</b>
<b>Lane Violation</b>	<b>8.6%</b>	<b>9.2%</b>	<b>9.9%</b>
<b>Following Too Closely</b>	<b>8.1%</b>	<b>8.3%</b>	<b>7.7%</b>

Source: Colorado State Patrol

In 2006, Colorado State University conducted phase 1 of a research project funded by CDOT titled “Roadway Corridor Wildlife Mitigation/Habitat Connectivity Study” (Crooks, et al. 2006). The CSU study identified locations where large mammals attempted to cross roadways and prioritized these segments based on human health and safety concerns using 18 years of AVC data. Their prioritization of the most important 5-mile roadway segments in the state is based on AVC data. These are the segments where mitigation efforts will be the most critical, because they have the most animal-vehicle collisions, and thus are of the highest safety concern in the state. Potential mitigation strategies

for reducing the number of AVC include:

- Wildlife fencing;
- Construction of wildlife underpasses or overpasses;
- Lower speed limits;
- Warning signs;
- Roadway lighting systems;
- Habitat alteration; and
- Raising public awareness.

#### Performance Measures

- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Reduce the fatal crash rate (number of crashes) from 1.62 per 100 million VMT in 1995 to 1.00 by the year 2008 and maintain at 1.00 through 2010.

- Reduce the injury crash rate from 87.3 per 100 million VMT in 1995 to 67.6 by 2008 and 65.3 by 2010.
- Reduce fatalities (individual deaths per crash) per 100 million vehicle miles traveled from 1.83 in 1995 to 1.00 by 2008 and maintain through 2010.
- Identify the highest priority roadway segments in the state based on Animal Vehicle Collision (AVC) rates, and evaluate the effectiveness of roadway underpasses for certain wildlife species.
- Compare the “before” and “after” rates of AVC and evaluate the success of the mitigation.
- Collect, compile and distribute AVC data to stakeholders.





# OCCUPANT PROTECTION

## Problem Statement

Overall safety belt usage by adult occupants of vehicles has increased substantially from 50% in 1990 to 79.2% in 2005. Child safety seat use has increased substantially from 79% in 1997 to 87% in 2005. Safety belt usage for children ages 5 to 15 has also increased from 48.8% in 1997 to 69.5% in 2005. Rural areas of the state have lower safety belt usage rates (72.6%) than the

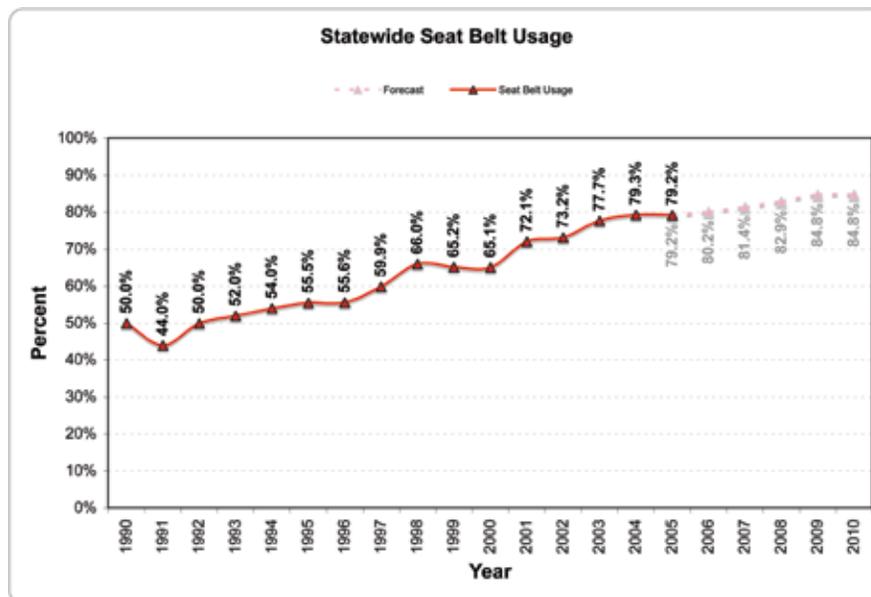
state as a whole, as do drivers and passengers of pickup trucks (66.6%). The 2005 Colorado teen seat belt usage rate is 70.4%.

Safety belt programs strategically targeted to high-risk populations including children, teens and pick-up truck drivers are essential to increasing safety belt use. The following cities and counties have low safety belt use: cities of Loveland, Thornton, Longmont,

Lakewood, Pueblo and Arvada; and the counties of Saguache, Costilla, and Conejos. This also includes the cities and counties along the Western Slope and Eastern Plains.

## Elements and Strategies

- Provide training support to law enforcement to support Colorado's restraint laws;
- Provide occupant protection education to parents, caregivers, and to the general public;



- Educate teen drivers. Colorado’s teen safety belt programs will educate teens in safety belt use and other teen driving safety issues, including the Graduated Driver License (GDL) program;
  - Participate in and support the Statewide Teen Motor Vehicle Leadership Alliance to comprehensively address teen driving issues;
  - Continue traffic safety programs focusing on minorities and involving community organizations to educate adults and children;
  - Target child passenger safety and booster seat usage, by supporting “CPS Team Colorado” program and administering the [www.careseatscolorado.com](http://www.careseatscolorado.com) website;
  - Support the “Click It or Ticket” high-visibility enforcement programs. The “Click It or Ticket” campaign consists of a high-profile enforcement effort every year to encourage safety belt use for all Coloradans;
  - Encourage state legislators to pass a primary safety belt law;
  - Encourage state legislators to meet federal child passenger safety recommendations; and
  - Provide public education campaigns to target pickup truck drivers.
- Performance Measures**
- Increase the statewide overall seat belt use rate from 55.5% in 1995 to 82.5% by 2008 and 85.0% by 2010.
  - Increase seat belt usage in rural Colorado from 50% in 1995 to 79.1% in 2008 and 81.0% by 2010.
  - Increase the use of seat belts by front seat occupants of passenger cars from 61.0% in 1995 to 86.1% by 2008 and 88.0% by 2010.
  - Increase the use of seat belts by front seat occupants of light trucks from 36.1% in 1995 to 70.1% by 2008 and 72.0% by 2010.
  - Increase the car seat use for children from 79.0% in 1997 to 90.0% by 2008 and 92.0% by 2010.
  - Increase seat belt use by children ages 5 to 15 from 48.8% in 1997 to 76.5% by 2008 and 80.0% by 2010.





# IMPAIRED DRIVERS

## Problem Statement

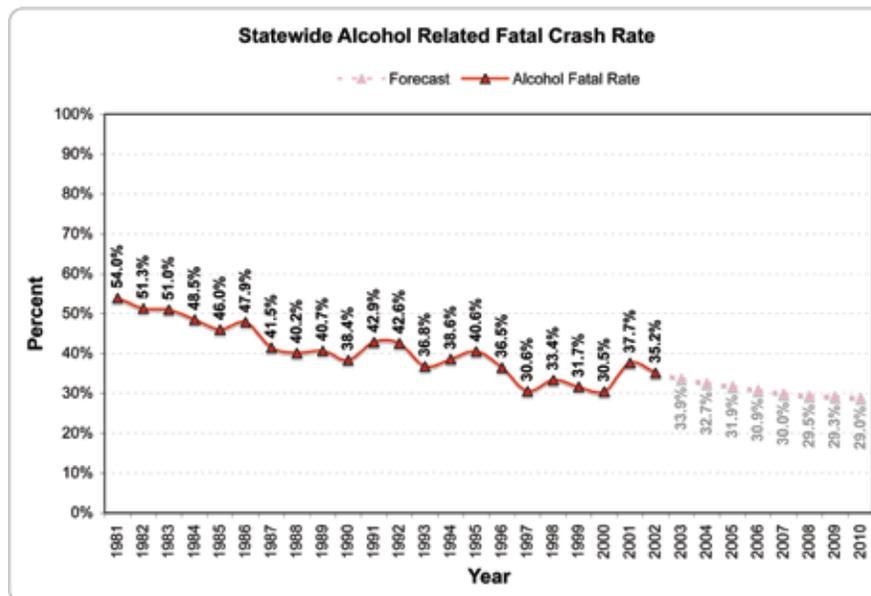
In 1980, 54% of the fatal crashes in Colorado were alcohol related. In 2004, the percentage dropped to 35.9%. Although significant progress has been made, underage drinking and driving is still a problem. The following cities and counties are over-represented: the cities of Denver, Pueblo, Lakewood, Colorado Springs, Greeley, Westminster, and Arvada; and the counties of Pueblo, Adams, Weld, Arapahoe and El Paso.

The rate of alcohol-related fatal crashes involving underage drinking drivers has been reduced from 37% in 1991 to 11.5% in 2003. In these fatal crashes, underage male drivers are more than twice as likely as underage female drivers to drink and drive.

## Elements and Strategies

- Continue high-visibility enforcement and education programs. In 1982 the Colorado Legislature

established the Law Enforcement Assistance Fund (LEAF) to increase and improve the enforcement of laws pertaining to alcohol- and drug-related driving offenses. LEAF funds are collected through the assessment of a \$90 fine that people convicted of Driving Under the Influence (DUI) must pay as part of their debt to society for driving while under the influence of drugs or alcohol. Local police departments and sheriff's offices are eligible to receive



- LEAF grants. LEAF agencies have been consistently responsible for over 60% of all impaired driving arrests the last four years;
- Increase public awareness through “The Heat is On” media campaign;
  - Continue enforcing DUI laws on sections of roadway with high incidence of alcohol-related fatalities through the provision of DUI checkpoints;
  - Provide training to law enforcement officers in the detection of alcohol and drugs in drivers;
  - Create and maintain DUI Courts;
  - Target high-risk groups of drivers for impaired-driving education and prevention programs, especially males age 21-34;
  - Work with community groups throughout the state to develop and implement impaired driving programs appropriate to the needs of their populations;
  - Support efforts to strengthen and enforce Persistent Drunk Driving legislation; and
- Work with state and local agencies in the implementation of the Statewide DUI Taskforce. Agencies from across Colorado work together to educate drivers about drinking and driving laws and also establish and manage campaigns from the state and federal level to enforce Colorado’s drinking and driving laws.

## Performance Measures

- Reduce the percentage of alcohol-related fatal crashes from 44.6% in 1995 to 29.5% by 2008 and 29.0% by the year 2010.
- Reduce the average BAC at the time of arrest from 0.155 in 1995 to 0.095 in 2008 and 0.090 by the year 2010.
- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Reduce the rate of involvement in alcohol-related fatal crashes of underage drinking drivers from 16.8% in 2004 to 12.9% in 2008 and maintain through 2010;
- Reduce the percentage of drivers involved in alcohol-related fatal crashes who are between the ages of 21 and 34 from 46.7% in 1995 to 36.7% by the year 2008 and maintain through 2010.





# Y O U N G   D R I V E R S

## Problem Statement

Young Driver involvement in motor vehicle crashes is a serious concern within Colorado. In 2005, 80 teen drivers and passengers ages 16 to 20 died in traffic crashes. Nearly two-thirds of the teenage victims were not using seat belts. In addition, approximately 80% of the teen passengers who died were in crashes that involved teen drivers. Sixteen-year-old drivers have the highest crash involvement rate of any age group in Colorado. This is also true of fatal traffic crashes. Sixteen-year-old drivers are nearly three times more likely to be involved in a fatal crash than the average of all drivers.

## Elements and Strategies

Since the implementation of the Graduated Driver License (GDL) law in 1999, there has been a general downward trend in fatal crash rates among 16- and 17-year-old drivers. These trends will continue to be monitored in the future and programs implemented to further reduce crashes.

- Continue high school peer education network and underage drinking prevention programs;
- Target high school seat belt usage educational programs and peer seat belt safety challenge programs;
- Continue partnerships with state and local prevention agencies to develop statewide prevention programs targeting teen motor vehicle safety;
- Continue development of

the Prevention Leadership Council's goals and objectives of collaboration and creation of effective roadway safety programs;

- Continue to provide teens and their parents information via the website [www.coteedriver.com](http://www.coteedriver.com);
- Continue to work with law enforcement in the support of enforcing Colorado's traffic laws to prevent drinking and driving, decrease speeding, and increase compliance with GDL law;
- Develop programs at the community level to deter the purchase and consumption of alcoholic beverages by minors;
- Continue community coalition building;
- Conduct a needs assessment and perform strategic planning, including data collection;

- Provide enforcement of underage drinking laws through stings and party patrols; and
- Increase public awareness through prevention education and media campaigns.

### Performance Measures

- Reduce the percentage of alcohol-related fatal crashes from 44.6% in 1995 to 29.5% by 2008 and 29.0% by the year 2010.
- Reduce the average BAC at the time of arrest from 0.155 in 1995 to 0.095 in 2008 and 0.090 by the year 2010.
- Reduce the total number of crashes per 100 million VMT from a high of 307.1 in 2002 to 292.0 by 2008 and 289.7 by the year 2010.
- Reduce the fatal crash rate (number of crashes) from 1.62 per 100 million VMT in 1995 to 1.00 by the year 2008 and maintain at 1.00 through 2010.
- Reduce the injury crash rate from 87.3 per 100 million VMT in 1995 to 67.6 by 2008 and 65.3 by 2010.
- Increase the statewide overall seat belt use rate from 55.5% in 1995 to 82.5% by 2008 and 85.0% by 2010.
- Increase seat belt usage in rural Colorado from 50% in 1995 to 79.1% in 2008 and 81.0% by 2010.
- Increase the use of seat belts by front seat occupants of passenger cars from 61.0% in 1995 to 86.1% by 2008 and 88.0% by 2010.
- Increase the use of seat belts by front seat occupants of light trucks from 36.1% in 1995 to 70.1% by 2008 and 72.0% by 2010.
- Reduce the rate of involvement in alcohol related fatal crashes of underage drinking drivers from 16.8% in 2004 to 12.9% in 2008 and maintain through 2010.
- Reduce fatalities (individual deaths per crash) per 100 million VMT from 1.83 in 1995 to 1.00 by 2008 and maintain through 2010.





# AGGRESSIVE DRIVERS

## (DISTRACTED DRIVERS)

### Problem Statement

It has been estimated that improper driver behavior is responsible for 85% of all crashes. Improper driver behaviors include but are not limited to running red lights, passing on the shoulder, speeding, improper lane changes, following too closely, careless and reckless driving and DUI. (The other 15% are due to conditions that are out of the driver's control.) Historically, these behaviors have resulted in the majority of citations for traffic violations. In recent years, aggressive driving, which is defined as two or more of the above noted violations exhibited together, has become a significant traffic safety issue.

Another element that affects people's behavior behind the wheel is the unreasonable reduction of speed limits. Unreasonable reduction of the speed limit contributes to traffic flow turbulence, therefore, accidents increase. Speed differential is what causes traffic turbulence for vehicles. It also

increases lane changes, need for sudden braking, causes accidents and makes people angry.

### Elements and Strategies

Targeted traffic enforcement programs are very effective in changing driver behavior including aggressive driving behavior and are essential in reducing crashes at high hazard locations. Comprehensive enforcement and education programs over a longer period of time are even more effective in reducing fatalities, injuries and the societal costs associated with motor vehicle crashes. Strategies include:

- Identify and rank specific areas of risk within the state for intensified enforcement in order to prevent aggressive driving behavior;
- Deploy law enforcement officers at the state and local level to perform high-visibility saturation patrols;
- Target specific geographic areas of the state for intensive enforcement programs such as checkpoints and saturation

patrols;

- Conduct targeted enforcement in the prevention of aggressive driving, distracted driving and speeding on Colorado's roadways and highways; and
- Increase driver awareness of a direct hotline to contact Colorado State Patrol to report aggressive driving (\*CSP).

### Performance Measures

- Decrease alcohol-related motor vehicle crashes by 5% by 2008.
- Increase DUI citations by 5% by 2008.
- Compare and analyze "before" and "after" statistics (citations and crash data) for specific geographic areas that required intensive enforcement.
- Compare the number of calls to the Colorado State Patrol's aggressive driving hotline, "before" and "after" the awareness campaign.





# AGING DRIVERS

## Problem Statement

The number of elderly people age 65 years and older has increased steadily in Colorado in recent years. Currently, people age 65 years and older comprise 13% of the population. According to the Colorado Department of Human Services, the projected number of people 65 years and older is expected to grow to approximately 19% of the population in Colorado by 2020. This is due in part to the fact that people are living longer due to healthier lifestyles and medical advances.

Aging drivers face challenges when it comes to driving behaviors. Aging drivers may be more likely to have physical limitations such as:

- Effects of medications;
- Reduced strength and physical capability;
- Limited neck rotation;
- Reduced overall range of motion;
- Visual impairments;
- Medical impairments;

- Decreased ability to focus attention; and
- Decreased reaction time.

## Elements and Strategies

Although Colorado does not have a current problem with traffic crashes in this age group, Colorado is aware that with a growing population, this could become a problem. Colorado safety stakeholders will work together to identify safety programs and strategies that will reduce traffic fatalities and injuries in this age group. As this population continues to increase, Colorado will remain proactive in identifying ways to keep older citizens mobile, educated and safe. Colorado will accomplish this through the following strategies:

- Create more alternatives to driving;
- Enhance driver capabilities;
- Provide education and training to increase the public's awareness of mobility alternatives;

- Educate city planners, developers, students, engineers and community groups about how to prepare and manage senior mobility issues in their communities;
- Continue partnerships with state and local government agencies, law enforcement, other coalitions and interest groups to collaborate on strategies to assist aging drivers and their families with identification and solutions; and
- Create statewide partnerships with state and local agencies for more visible roadway signing, lighting and efficient sidewalk design.

## Performance Measures

- Reduce the percentage of crashes for people age 65 and older from 13% in 2004 to 12% by 2010.
- Increase the number of high-visibility roadway signs.
- Increase the letter size on roadway signs.





# MOTORCYCLES

## Problem Statement

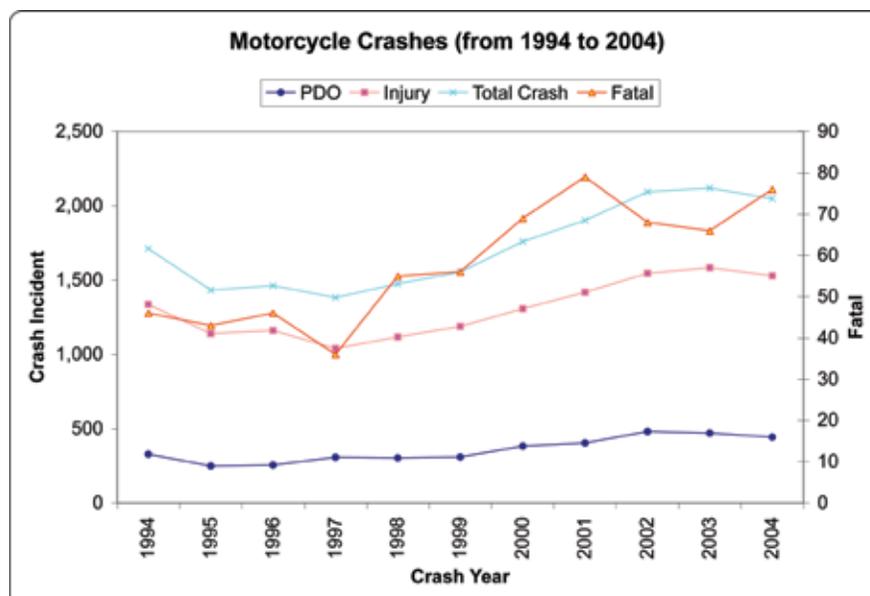
Motorcycle crashes in Colorado increased from 2,093 in 2002 to 2,146 in 2003.

Riders in the larger, front-range, metro areas are more likely to be involved in crashes than riders statewide. Cities having populations of 50,000 or greater represented more than half of all motorcyclists involved in an injury crash in 2000. To counter these accident rates, the State of Colorado is committed to continuing to train and license all riders, both novice and experienced.

## Elements and Strategies

The Motorcycle Operator Safety Training (MOST) Program is an effort conducted by CDOT to train beginning and experienced motorcyclists. The MOST Program provides tuition reimbursement to students, and is funded with a \$2 fee on motorcycle license endorsements and a \$4 fee on motorcycle registrations. Over 64,000 people have been trained through the MOST since 1991.

- Expand the MOST Program to underserved areas of the state;
- Work with the MOST Program to ensure motorcyclists are properly licensed;
- Educate motorcyclists statewide about the dangers of drinking and operating a motorcycle;
- Build a partnership with the Colorado State Patrol and local law enforcement agencies to develop an enforcement program that targets motorcycle riders who violate Colorado traffic laws;



- Expand the number of motorcycle training sites, contractors and instructors, and actively pursue more rural training sites;
- Utilize and develop more programs to reach males in the peer group to take rider education courses and avoid drinking and riding;
- Reach under served rural areas using federal and state grant funding;
- Encourage state legislation for mandatory motorcycle helmet use;
- Conduct media events in conjunction with Colorado State Patrol and other stakeholders to promote MOST classes especially for the at-risk age group;
- Utilize Colorado State Patrol and other law enforcement agencies for intensified enforcement at or in the area of motorcycle events where alcohol may be served; and
- Work with the Colorado Motorcycle Dealers Association to ensure that training information and material is distributed to motorcycle purchasers and prospective purchasers.

### Performance Measures

- Reduce the number of motorcycle crashes per 1,000 motorcycle registrations from the high of 19.0 in 2002 to 15.0 by the year 2008;
- Reduce the number of alcohol-related motorcycle crashes from 20 in 2005 to 13 by 2010.





## BICYCLES AND PEDESTRIANS

### Problem Statement

Roadway Safety should not only include the safety of motorists, but also the safety of pedestrians and bicyclists and other alternative transportation mode users that are part of the everyday roadway environment.

In 2004, there were 11 fatalities involving bicycles in Colorado. Those fatalities comprise approximately 1.2% of all fatalities in the state. There were 850 injury crashes in 2004, which comprises 2.9%

of the total injury crashes in Colorado. The availability and use of bicycle paths and trails is widespread for this alternate mode of transportation.

Nevertheless, unsafe situations exist between bicyclists and motorists where a dedicated bicycle trail is not available. Many bicyclists use the roadway right-of-way when no bicycle path exists, which can pose a safety problem. Schools and other groups will be targeted for bicycle safety educational programs.

There were 69 pedestrian fatalities in 2004. Those fatalities comprise approximately 7.5% of all fatalities in the state.

Since more children will be encouraged to walk and bicycle to and from schools, it is imperative to educate and inform them about both bicycle and pedestrian safety. Partnerships have been developed to deliver pedestrian safety educational programs at schools.

### Elements and Strategies

- Create partnerships statewide with bicycle user groups to ensure the availability and maintenance of roads for bicyclists;
- Continue to pursue the development of dedicated bicycle paths to reduce the conflict between bicycle and cars;
- Continue bicycle safety programs, including the importance of using helmets;
- Develop partnerships between state, regional and local stakeholders to create sustainable plans for the current and future access to safe pedestrian walkways and bicycle access on the roadways and on paths/trails;
- Continue to monitor pedestrian crash trends;
- Implement educational programs at schools and other locations;
- Identify locations having high numbers of bicycle and pedestrian crashes and allocate funding;
- Increase lighting at high-crash locations;
- Increase shoulder width and improve striping to delineate bike lanes and pedestrian crossings;
- Provide pedestrian crosswalks and improve access in accordance with the Americans with Disabilities Act (ADA); and

- Update or prepare new guidelines for bicycle facilities.

### Performance Measures

- Reduce the percentage of bicycle-related crash fatalities from 1.2% in 2004 to 1.0% by 2008.
- Reduce the percentage of pedestrian-related crash fatalities from 7.5% in 2004 to 5.5% by 2008.
- Increase the number of people reached through educational training classes, and the number of students targeted from 3,000 in 2004 to 5,000 in 2008.





## SAFE ROUTES TO SCHOOL

### Problem Statement

Less than 40 years ago, walking and biking to school were commonplace – in 1969, roughly half of all 5- to 18-year-olds either walked or biked to school. Times have changed, and today, nearly 90% of Colorado youth are driven to school either by bus or individual car. This change in transportation mode has added to traffic congestion, a reduction in air quality and the deterioration of Colorado children's health. As much as 27% of the country's morning traffic is made up of parents driving their children to school.

### Elements and Strategies

Safe Routes to School (SR2S) is a new program to enable and encourage children, including those with disabilities, to walk and bicycle to school. The program also seeks to make walking and bicycling to school safe and more appealing. The goal is also to facilitate the planning, development and implementation of projects that will improve safety, and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.

- Build or improve sidewalks;
- Widen road shoulders on high-volume roads;

- Increase bicycle parking and install more bike racks;
- Improve signage;
- Mark pedestrian and bicycle crossings;
- Increase knowledge about biking and walking to school;
- Increase public awareness;
- Develop safe infrastructure that enables more children to walk and bike to school;
- Install or improve sidewalks, signing, street striping;
- Provide additional education and encouragement programs. These include teaching children, parents and teachers various safety aspects of biking and walking to school;

- Conduct biking and walking audits to identify best routes to school; and
- Implement incentive programs that motivate children to participate.

### Performance Measures

- Require every SR2S grant recipient to identify a

methodology for determining how their program will prove its success or failure.

- Collect and compare the number of children who bike and/or walk to school, “before” and “after” the SR2S program was implemented. (Primary measurement)
- Collect and assess the number of parent and teacher participants, as well as levels

of awareness regarding safe procedures, routes to school, and benefits of biking and walking to school, “before” and “after” the SR2S program was implemented. (Secondary measurement)





# LARGE TRUCKS

## Problem Statement

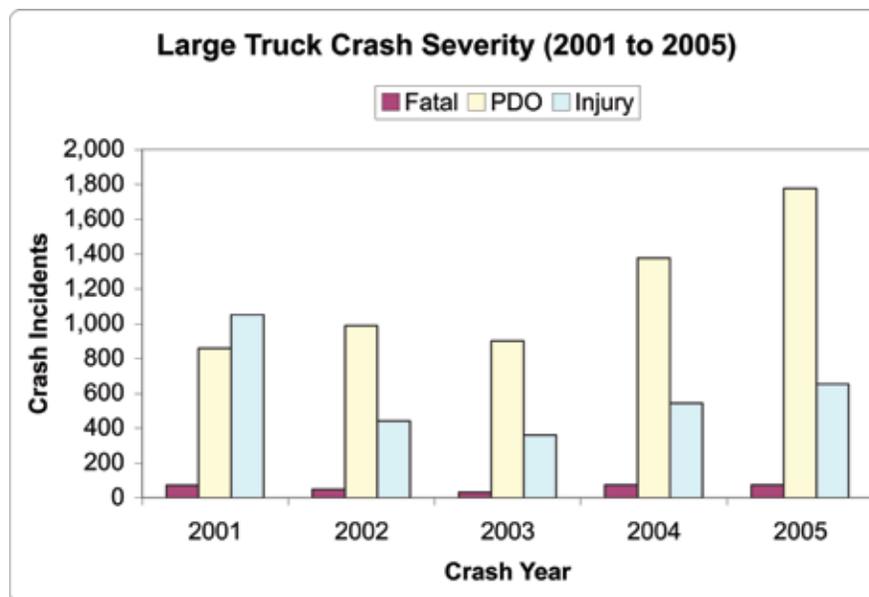
During the period from 2001 to March 31, 2006, there were a total of 10,339 Colorado crashes entered into the Motor Carrier Management Information System (MCMIS) that involved large vehicles. A majority of these crashes, 6,211 (60%), involved a truck or bus and another vehicle in motion. Trucks or buses overturned 418 times (4%), and ran off the road 1,546 times (15%).

In 1990 in Colorado, there were 462,919 commercial vehicles registered compared to 621,186 in 2000. Additionally, from 2001 to 2003, the number of commercial motor vehicles involved in injury and fatal crashes decreased from a high of 1,135 crashes in 2001 to a low of 421 crashes in 2003. However, in 2004 those numbers climbed to 605 total crashes. In 2005, there were 653 commercial motor vehicles involved in injury crashes.

Human behavior is the major problem in crashes involving large trucks.

## Elements and Strategies

- Continue large truck safety education campaigns targeted at the large truck driver population;
- Support public information campaigns and public education programs in schools and for community groups;



- Install rumble strips on the side of the road to reduce run-off-the-road crashes;
- Install rumble strips on the centerline to reduce head-on collisions;
- Install cable-rail on roadway right-of-way to prevent crashes;
- Implement commercial driving license requirements mandated by the Motor Carrier Safety Improvement Act of 1999;
- Utilize the website/Internet system that will allow drivers to view the Corridor as well as real-time weather scans prior to driving the Corridor;
- Identify high crash corridors and initiate appropriate engineering and enforcement interventions;
- Create and disseminate a video/DVD which will provide a visual representation of the I-70 Mountain Corridor with particular emphasis on safe driving techniques, hazardous locations along the corridor and speed/space management;
- Utilize NCHRP Report 500-13: A Guide to Reduce Collisions Involving Heavy Trucks;
- Pursue use of ITS devices to communicate high-congestion areas;
- Maintain and ensure safety of designated routes for the transportation of hazardous materials within the state of Colorado;
- On an annual basis, conduct at least four hazardous materials route surveys on designated materials routes, or route segments;
- On an annual basis, conduct at least one hazardous materials commodity flow study in each of the nine Colorado All-Hazards Emergency Management Regions (AHEMR);
- On an annual basis, conduct a minimum of two transportation security surveys at locations identified as critical infrastructures within the State's highway and roadway network;
- Continue enforcement of large trucks and hazardous material transport by the Colorado State Patrol; and
- In collaboration with state and federal agencies, continue to:
  - Collect post crash data from commercial and non commercial truck crashes;
  - Conducts commercial driver/vehicle inspections;
  - Targets at-risk motor carriers for compliance reviews; and
  - Develops public education and awareness for motor carriers.

### Performance Measures

- Reduce by at least 5% the number of crashes investigated by the Colorado State Patrol for commercial trucks in Calendar Year (CY) 2006.
- Reduce by at least 4% the number of highway incidents investigated by the Colorado State Patrol involving hazardous materials in CY 2006.





# EMS VEHICLES

## Problem Statement

Emergency Medical Services (EMS) are generally provided by fire departments or ambulance services. Their role is to help stabilize and transport victims of a traffic crash in their service area. EMS is part of the overall response effort.

The availability, quality of service, and timeliness of emergency response units have a vital part in creating a safe and efficient roadway system. The distance between major metropolitan areas in Colorado creates a wide area of urban, suburban and rural regions that creates a unique response effort for each area. EMS personnel procedures are different across the state. There is no plan

addressing strategies to improve response times and to improve care at the site of the crash.

## Elements and Strategies

The strategies for EMS vehicles and personnel are to:

- Develop and implement a model comprehensive approach that will ensure appropriate and timely response to the emergency needs of crash victims;
- Develop and implement a plan to increase the education and involvement of EMS personnel in traffic safety efforts;
- Develop an educational program regarding ground ambulance transportation safety that will focus on public

education as well as EMS providers and the medical community;

- Develop a best practice manual for EMS response to crashes for urban, suburban and rural areas of the State;
- Identify and analyze EMS performance data, including data collected with the statewide Data Collection Program;
- Implement a Global Positioning System (GPS) to give EMS personnel the ability to locate crash victims on the state's roads and highways;
- Develop and implement an emergency preparedness plan for each of the unique interstate highway settings, which include urban, rural and wilderness;

- Develop and support integrated EMS/public health/public safety information and program activities;
- Determine if regulatory changes are needed in the Ground Ambulance Rules to address scene, response and roadway safety;
- Continue to develop and support regional pre-hospital trauma algorithms and pre-hospital trauma triage destination guidelines;
- Develop standards for Critical Care Ground Transports;
- Develop a statewide assessment and plan for EMS response and operation throughout the state; and
- Improve EMS response times and roadway access in rural areas.

### Performance Measures

- Develop and implement a model comprehensive approach to ensure timely response to emergency crashes by 2010.
- Develop and implement a plan to increase the education and involvement of EMS personnel in traffic safety efforts by 2008.
- Develop an educational program regarding ambulance transportation safety by 2010.
- Develop a best practice manual for emergency response to crashes by 2010.
- Implement a GPS System for EMS personnel by 2010.
- Develop and implement an emergency preparedness plan for urban, rural and wilderness highway settings by 2010.

- Develop at least two integrated EMS/public health/public safety information programs by 2008.
- Develop standards for Critical Care Ground Transports by 2010.
- Develop a statewide assessment and plan for EMS response and operation by 2010.



## N E X T   S T E P S

The next steps of this Plan are to develop action items through the collaboration of all of Colorado's partners which will include:

- Priority programs;
- Priority funding;
- Collaboration between and within coalitions; and

- Integrated efforts toward the state safety goals.

This Plan serves as the overall mission and vision of Colorado to secure the safe transport of all people on the roads and roadways. This document will be available on the CDOT website not only for safety

stakeholders in the state, but also for the roadway user that is interested in learning more about Colorado's Strategic Plan to reduce fatalities and injuries on Colorado's roadways.

The CDOT website address is [http://www.dot.state.co.us/Traffic\\_Manuals\\_Guidelines/](http://www.dot.state.co.us/Traffic_Manuals_Guidelines/).

## DISCLAIMER

The Colorado SPIRS is a planning document for state safety stakeholders to work together to reduce fatalities and injuries on Colorado's roads and roadways. As a three-year planning document, the elements and strategies in this document are indicative of the

current strategies and future planning of each of Colorado's safety partner agencies.

The elements and strategies in this Plan may change in the next three years because of unforeseeable circumstances or new focus areas within

the State of Colorado. As agencies dedicated to roadway safety, we will continue to work together, as times change, to bring the best safety programs to Colorado's roads and roadways.



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