



# **Safety Policy**

## **Background Paper**

*Prepared by:*



**HDR Engineering, Inc.**  
1001 SW Fifth Avenue, Suite 1800  
Portland, OR 97204  
Phone: 503.423.3700  
Fax: 503.423.3737

**Table of Contents**

I. Introduction ..... 1

II. Existing OTP Policies Regarding Safety ..... 3

III. Safety Procedures Evolving from OTP ..... 4

IV. Safety Performance Objectives ..... 6

V. Current and Emerging Safety Issues ..... 9

VI. Emerging Safety Improvements ..... 12

VII. What Other States and Countries are doing ..... 16

VIII. Policy Implications for OTP Update ..... 20

IX. Recommendations for the OTP Update ..... 22

**List of Figures**

Figure VI.1 Siemens Radar-Based Blind Spot Detection Technology..... 12

Figure VI.2 ODOT Closed-Circuit TV Cameras..... 13

Figure VI.3 Photo from Closed-Circuit TV Cameras..... 13

Figure VI.4 In-Pavement Lighting..... 14

Figure VI.5 Pedestrian Countdown ..... 14

Figure VI.6 Animated Eyes Display Signal..... 14

Figure VI.7 Red Light Violation Camera Detecting violation,  
identifying license plate number, following progress of violator ..... 15

**List of Tables**

Table IV.1 Safety Performance Goals ..... 7

Table V.1 Primary Fatality Accident Types in Oregon 2002 ..... 9

## Executive Summary

In line with national trends, accidents have been steadily decreasing in Oregon. In fact, the rates for fatalities and injuries resulting from accidents in Oregon are lower than the national average, and Oregon is often cited in the literature for many of its innovations and successes in the area of safety.

These benefits have occurred because of the attention and collaborative efforts of many organizations, including federal, state and local regulatory, enforcement and operating agencies, emergency response organizations, the judicial system, the insurance industry, school districts, and trucking, pedestrian, bicycle and several non-profit organizations. In order to continue this positive trend, it's essential to stay abreast of new developments in safety research and program implementation, and to monitor new trends in transportation behavior, facility design, and vehicle functions. That is, because the factors that contribute to traffic accidents -- including the ways that people use streets -- are always changing, Oregon safety experts must follow these trends and develop and implement new prevention mechanisms in order to reduce the number of accidents that occur on state and local roadways.

Despite the significant attention to safety and Oregon's success in reducing accidents and the injuries and damage that results from accidents, safety programs have not always been successful in dealing with the major hazards in the transportation environment, including impaired driving, bicycle helmet usage, violation of safety rules, understanding of safety rules, and mechanical defects in vehicles.

Moreover, our progress in reducing road fatalities is impeded by the challenge of coordinating the variety of transportation safety needs, and applying the most appropriate responses. That is, there is no process to comprehensively evaluate whether an education program, emergency response effort, infrastructure improvement, enforcement campaign, or a combination of the above, would be the best remedy to our ongoing transportation safety hazards.

Finally, our safety efforts have also not always fully considered the safety environment and usage of our public transportation, air, rail, marine, pedestrian and bicycle systems; and they haven't always coordinated or established the best mix of education, engineering, emergency response and enforcement efforts to address a safety problem.

The purpose of this paper is to:

- Describe ongoing and emerging safety problems occurring throughout the U.S., including Oregon, and some of the innovations -- i.e., equipment, devices and public programs -- that are helping to provide additional protection in accident reduction.
- Review multimodal safety issues to ensure that they are fully represented in our Safety Policy.
- Identify whether or not there are gaps in Oregon's existing safety policy.

- Link safety policy with actions by ODOT and other organizations involved in transportation safety.

### **Safety Issues and Countermeasures**

The safety issues that are discussed in this paper include:

- Ongoing issues – impaired driving, traffic violations, bigger vehicles, work zone safety, educational needs, unmet road maintenance, and inadequate funding for enforcement, emergency response, forensics, prevention programs.
- Emerging issues – growing travel and congestion levels, increasing dangerous behaviors and driver distractions, aging population, increasing urbanization, and new modes which have yet to be fully regulated.

The safety innovations that are discussed in this paper include:

- Onboard vehicle systems – collision warning systems, night vision systems, GPS contact assistance lines, devices that maintain safe headways between other vehicles, and instruments that determine whether driver is falling asleep.
- Roadway systems – closed-circuit television, incident management, remote traffic control and surveillance, technology that captures violators and issues tickets, improved pedestrian crossing technology.
- Safety programs – coordinated information databases, research on safety countermeasures, vulnerability centers, and improved traffic command centers and emergency response procedures.

### **Relevance to OTP Update**

Providing for the safety of users of its systems is one of ODOT's most critical responsibilities. It is also a very broad responsibility, as safety encompasses a wide variety of diverse activities within Oregon covering the traditional areas of education, enforcement, emergency response, engineering, and now, the area of communications and incident response, and in the near-term, monitoring conditions.

Our awareness and commitment to improve safety in our public facilities is growing and is expected to dominate many public discussions of our transportation investments over the life of the Oregon Transportation Plan Update (i.e., the next 0- 20 years). Both state and local jurisdictions are establishing new policy and corresponding investments to improve the safety and security of their transportation systems. It's clear that safety will continue to be a primary ingredient of any retrofit or future expansion of our alternative passenger transportation systems.

In this regard, understanding the trends and measures the federal government and other states, research and advocacy organizations are using to improve safety is critical to our future plans and is an area of interest in the development of the OTP Update.

**Use of this Paper**

The audience for this paper is the Oregon Transportation Plan Update Safety Policy Committee. The information provided here is intended to assist the committee in the consideration of amendments of existing policies and development of new policies and actions for transportation safety. The committee will draft policies and strategies to support advancement of the Oregon Transportation Plan Update process.

## I. Introduction

This paper is intended to provide a framework for the Oregon Transportation Plan Safety and Security Policy Committee in developing and delivering safety measures to consider emerging trends and factors in reviewing current state policy on safety for the OTP Update.

As used in this paper, the term “safety” refers to the degree to which users of transportation vehicles, facilities and services are free from personal injury and property loss. Safety is also defined as the ability to promote and enforce safety rules, and to design and create transportation infrastructure that organizes and manages users in a safe physical environment. For example, ODOT follows highway design standards to ensure safe highway geometries.

For this paper, safety is distinguished from “security,” which refers to safety from criminal activity, including terrorist attack. Security is also a significant element of the OTP Update, and like this document, a policy paper prepared by ODOT staff is being used by the project Safety Policy Committee.

Oregon’s efforts to improve the safety of its facilities and the safety of users of those facilities is very much a collaborative effort among federal, state and local regulatory, enforcement and operating agencies, the state’s judicial system, school districts, and members of the private sector including the insurance industry, automobile and trucking organizations, and transit, pedestrian and bicycle user organizations. As travel behaviors change and vehicle and transportation facilities technology evolve, these organizations need to continually rethink their roles and responsibilities for transportation safety. Much of their efforts are focused on prevention and other pro-active activities, including forensic research of accidents that occur to evaluate how they can be prevented in the future.

Efforts to improve safety in our transportation systems – primarily in the areas of education, enforcement, emergency response and engineering -- have been successful in reducing the number of accidents that have occurred in these facilities over the past twenty years. New facility designs and education and enforcement methods are being evaluated and tested throughout Oregon and the rest of the world to help continue this trend, several of which are discussed here.

Despite these successes, 436 individuals were killed on Oregon roadways in 2002, and we need to continue to evaluate and update our efforts to recognize and resolve safety hazards in the roadway. In addition, we need to better understand the relationships between these hazards and the most appropriate means to prevent accidents involving them. Some jurisdictions have combined the resources of their various education, engineering, emergency response and enforcement tools to overcome these hazards. We must ensure that we’re approaching the safety conflict with the best combination of measures.

ODOT's mission is to "ensure the safety of transportation system users," which is demonstrated in the priority given to safety in the state's policies and programs. Through its implementation and programmatic authority, the OTP Update represents an essential means to further reinforce safety as the department's most important priority.

## II. Existing OTP Policies Regarding Safety

The Oregon Transportation Plan (OTP) provides the policy framework for state and local safety projects, programs and regulatory/enforcement efforts. The OTP's Policy 1G describes the plan's policy toward safety as:

*“It is the policy of the State of Oregon to improve continually the safety of all facets of statewide transportation for system users including operators, passengers, pedestrians, recipients of goods and services, and property owners.”<sup>1</sup>*

The policy is accompanied by 12 action steps focused on education, engineering, outreach and enforcement activities, a listing of which is provided in Appendix A.

Since adoption of the OTP in 1992, modal plans for highways, public transportation services, bicycle and pedestrian systems, and passenger and freight rail have been adopted. Each of these also addresses, or reinforces, the Policy 1G on safety.

In particular, the 1999 ODOT Highway Plan Policy 2F, Traffic Safety, states that improving safety for users of the highway system requires “using solutions involving engineering, education, enforcement, and emergency medical services,”<sup>2</sup> followed by several specific actions for implementation. Similarly, the adopted 1995 Oregon Transportation Safety Action Plan contains 70 specific actions for the department covering engineering, education, emergency response, enforcement, and collaboration among agencies, other organizations, for all transportation system modes (air, surface and marine).

---

<sup>1</sup> Oregon Department of Transportation, “Oregon Transportation Plan,” Policy 1G, 1992, page 43.

<sup>2</sup> Oregon Department of Transportation, “1999 Oregon Highway Plan,” 1999, page 97.

### III. Safety Procedures Evolving from OTP

Adopted in 1995 and scheduled for update in 2004, ODOT's Transportation Safety Action Plan provides a description of safety activities and programs underway and/or being considered in Oregon (i.e., the 70 action steps mentioned above). The intent of the Transportation Safety Action Plan is to program efforts for organizations involved in transportation safety throughout Oregon.

The description of the 1995 TSAP actions is presented below to provide background and context for the Policy Committee:

- Enforcement (Actions 1-8) – including training, equipment, additional personnel, and strategies designed to better enforce safety rules and regulations. Several actions require legislative action, including the creation of a dedicated funding source for law enforcement services. One of the actions requiring legislative approval – allowing for the use of photo radar for issuance of traffic citations – was in fact approved.
- Public Awareness, Education and Training (Actions 9-17) – continuation and improvement of current Oregon education, outreach and training activities.
- Facility Design, Construction and Maintenance (Actions 18–28) – require that the safety of all modes be considered in all of ODOT's activities, that enforcement and emergency services personnel review safety projects, that research be conducted of motorists' behaviors during unusual traffic conditions (e.g., icy roadways), and several other specific safety considerations and reviews of ODOT design, construction and maintenance efforts.
- Emergency Medical Services (Actions 29-30) – maintain quality of 911 assistance program and seek to develop a statewide emergency medical service system to assist in responses to transportation-related accidents.
- Interagency Cooperation (Actions 31-36) – improve education and awareness of ODOT's safety programs internally and to federal and local agencies, as well as other state agencies.
- Transportation Records (Actions 37-38) – establish a comprehensive record keeping system for reporting and disseminating accident information, programming accident evaluations throughout other systems, and for supporting investment decisions.
- Impaired and High Risk Operators (Actions 39-51) – multiple actions designed to reduce the number of impaired motorists and system users, several of which are relatively aggressive pro-active steps requiring legislative approval.
- Transportation System User Safety and Security (Actions 52-58) – establish the COMET and other incident management programs, access to child safety seats, and a comprehensive training and education program aimed at youth and the elderly.
- Truck Safety (Actions 59-60) – expand the authority of the PUC to enforce regulations governing shipment of hazardous materials and uniformity of commercial vehicle inspections (ODOT took over this authority and implemented these actions since publication of the Transportation Safety Action Plan).

- Rail Safety (Actions 61-65) – reinforce and expand current rail safety activities including inspections of track, maintenance facilities, and upgrading warning devices at crossings and evaluating the use of video to record highway/rail crossings violations.
- Transit, Pedestrian and Bicycle Safety (Actions 66-70) – expand education and awareness programs about bicycle and pedestrian safety, and seek to correct deficiencies within those systems.

## IV. Safety Performance Objectives

The adopted 1995 Transportation Safety Action Plan established performance goals (see Table IV.1) for each program with responsibility for safety, taking into consideration data sources that are reliable, readily available, and reasonable as representing outcomes of the program. Both long-range and short-range measures are utilized and updated annually. These safety performance measures incorporate elements of the Oregon Benchmarks, Oregon Transportation Safety Action Plan, the Safety Management System, and nationally recognized measures. The measures also address all age groups, transportation modes, unsafe transportation behaviors, and vehicle safety, though many more performance measures have been generated by other jurisdictions.

As with several other performance measure-setting exercises, the Transportation Safety Action Plan's performance measures were established without a comprehensive estimate of their costs and/or their interrelationship with ongoing planning and development processes at ODOT. Further, these measures were not used to establish priorities in the Statewide Transportation Investment Program (STIP).

The update of the Transportation Safety Action Plan (TSAP) is underway which is timely because, as shown in Table IV.1, many performance objectives have been achieved ahead of schedule. The Oregon Transportation Safety Committee, the group directing the TSAP update, should evaluate whether those earlier objectives were appropriate at the time of their adoption and whether they were based solely on what could have been accomplished given trends and expectations of funding at that time.

Prior to establishing and adopting transportation safety performance measures, it is recommended that the Safety Policy Committee suggest completion of additional analyses of the relative priority, effectiveness, and achievability of those measures. These objectives can be accomplished through a series of risk assessment exercises and understanding of the costs required to implement them. Once these analyses are completed, it will be possible to better integrate safety performance and programs into future investments by state agencies, and private and non-profit organizations.

<b>Table IV.1 Safety Performance Goals</b>			
	<b>Goal</b>	<b>Deadline</b>	<b>Achieved</b>
<b>Bicyclist Safety</b>	<ul style="list-style-type: none"> <li>Reduce # of bicyclists injured in crashes with motor vehicles from 658 (in 2002) to 575.</li> </ul>	2005	
<b>Driver Education</b>	<ul style="list-style-type: none"> <li>Implement consistent, statewide standards for the driver education curriculum and the driver education</li> </ul>	2004	
<b>Employer Safety</b>	<ul style="list-style-type: none"> <li>Reduce # of on-the-job vehicle related crashes from 1,004 in 2001 to 1,000/year</li> </ul>	2005	<b>Yes</b>
<b>Impaired Driving</b>	<ul style="list-style-type: none"> <li>Reduce % of traffic fatalities that are alcohol involved to 36.6%, or 165 (from 163 in 2002).</li> </ul>	2005	<b>Yes</b>
	<ul style="list-style-type: none"> <li>Reduce % of traffic fatalities that are drug involved to 8% or 35 (2002 data not available).</li> </ul>	2005	
<b>Motorcycle Safety</b>	<ul style="list-style-type: none"> <li>Reduce fatal crashes involving motorcycles from 28 (in 2002) to 18 by: <ul style="list-style-type: none"> <li>Reducing # of alcohol involved motorcycle fatal traffic crashes from 53.6% (2002 level) to 25%.</li> <li>Reducing # of injury crashes involving motorcycles from 345 (2002 level) to 275.</li> <li>Increasing motorcycle helmet use to 100% (from 99% in 2002).</li> <li>Continuing the present TEAM OREGON Motorcycle Safety Program training site locations and increase course offerings statewide.</li> </ul> </li> </ul>	2005 o 2005 o 2005 o 2005 o 2005	
<b>Occupant Protection</b>	<ul style="list-style-type: none"> <li>Increase population using safety restraints to 95% (from 91% in 2002).</li> <li>Increase use of child restraints from 69% (in 2002) to 75%.</li> <li>Increase proper use of child restraints for children under age four from 20% (in 2002) to 30%.</li> </ul>	2005 2005 2005	
<b>Pedestrians</b>	<ul style="list-style-type: none"> <li>Reduce # of pedestrian fatalities to 53 (from 48 in 2002).</li> </ul>	2005	<b>Yes</b>
	<ul style="list-style-type: none"> <li>Reduce # of pedestrian injuries to 570 (from 595 in 2002).</li> </ul>	2005	<b>Yes</b>
	<ul style="list-style-type: none"> <li>Reduce # of pedestrians killed in intersections to 18% (from 17% in 2002).</li> </ul>	2005	
	<ul style="list-style-type: none"> <li>Reduce # of pedestrians injured while crossing in crosswalk or intersection to 45% (from 55% in 2002).</li> </ul>	2005	

<b>Table IV.1 Safety Performance Goals, continued</b>			
<b>Goal</b>		<b>Deadline</b>	<b>Achieved</b>
<b>Law Enforcement</b>	<ul style="list-style-type: none"> <li>Reduce #of fatal traffic crashes involving speed to 38% or 190 (from 225 in 2002).</li> </ul>	2005	
<b>Region 1 Goals</b>	<ul style="list-style-type: none"> <li>Reduce fatalities to 95 (from 122 in 2002).</li> <li>Decrease # of annual alcohol-related fatalities to 40 (from 43 in 2002).</li> </ul>	2005 2005	
<b>Region 2 Goals</b>	<ul style="list-style-type: none"> <li>Reduce fatalities to 110 from 161 (in 2001).</li> <li>Reduce # of alcohol involved fatalities to 35 from 48 (in 2001).</li> <li>Reduce all fatal and injury crashes per 1000 population below the statewide average from 2001 statewide average of 5.31 to 5.25.</li> </ul>	2005 2005 2005	<b>Yes</b>
<b>Region 3 Goal</b>	<ul style="list-style-type: none"> <li>Decrease fatalities to 70 (from 68 in 2002).</li> </ul>	2005	<b>Yes</b>
<b>Region 4 Goal</b>	<ul style="list-style-type: none"> <li>Reduce fatalities to be proportionate with the state's relative population percentage; from 13.97% (in 2000) to 7.44%.</li> </ul>	2005	<b>Yes</b>
<b>Region 5 Goal</b>	<ul style="list-style-type: none"> <li>Maintain or reduce # of fatalities by 5% or to 39 (from 33 in 2002).</li> <li>Reduce # of alcohol involved fatalities by 10% or to an average of 14%.</li> </ul>	2005 2005	<b>Yes</b>
<b>Roadway Safety</b>	<ul style="list-style-type: none"> <li>Reduce the Oregon traffic fatality rate to 0.99 (from 1.26 in 2002).</li> <li>Reverse the rural secondary fatality rate trend downward, as reported in the ODOT Crash Rate Tables (from 0.98 in 2002).</li> </ul>	2010 2005	
<b>Safe Communities</b>	<ul style="list-style-type: none"> <li>Increase # of community transportation safety programs from 57 (in 2003) to 100.</li> </ul>	2005	
<b>Vehicle Standards</b>	<ul style="list-style-type: none"> <li>Decrease # of vehicle-deficient crashes to 500 or lower (from 470 in 2002).</li> <li>Establish 25 partnerships with equipment manufacturers and retailers for public education.</li> </ul>	2005 2005	<b>Yes</b>
<b>Work Zone</b>	<ul style="list-style-type: none"> <li>Maintain # of fatalities in work zones at or below ten (from 5 in 2002).</li> </ul>	2010	<b>Yes</b>
<b>Youth (0-14) Goals</b>	<ul style="list-style-type: none"> <li>Reduce # of fatalities of children ages 0-14 to 18 (from 21 in 2002).</li> <li>Reduce # of injuries of children ages 0-14 to 2,200 (from 2,301 in 2002).</li> </ul>	2005 2005	
<b>Youth (15-19) Goal</b>	<ul style="list-style-type: none"> <li>Reduce the over-representation of drivers age 19 and under in fatal and injury crashes to 1.80 (from 2.15 in 2002).</li> </ul>	2005	

## V. Current and Emerging Safety Issues

### Current Safety Issues

In 2002, there were over 48,000 crashes on Oregon roads that killed 436 individuals and injured nearly 28,000 people. While these numbers represent an improvement over prior years – particularly, given the state’s increased population – there are several ongoing safety issues and emerging safety issues that need careful attention to more dramatically reduce the number of crashes, fatalities and injuries that occur on Oregon roads.

As shown in Table V.1, analysis of the state’s Crash Analysis and Reporting database finds that the primary ongoing safety areas that impact safety are:

- Traffic violations – including speeding, illegal maneuvers and safety deficient vehicles
- Impaired motorists and other users of the transportation system
- Motor carrier related – including speeding, following too closely to other vehicles, and improper lane changes
- Pedestrian related – majority are the fault of motorists, and more than three-quarters of pedestrian fatalities occur when pedestrians are crossing in a crosswalk or at an intersection
- Bicyclist related – Nearly half of all fatal accidents occurred at intersections where motorists failed to yield right-of-way to bicyclists, and 90% where bicyclists disregarded traffic control messages (note, some fatal accidents involved both motorist and bicyclist violations).
- Motorcyclist related – 69% of motorcyclist fatalities involved speeding, and 36% involved motorcyclist impairment (note, some fatal accidents involved both speeding and impairment).
- Vehicle defects – these involved a wide variety of defects related to steering and braking systems, tire failure, broken trailer connections, and loss of hood, wheel and loads while in operation.

<b>Table V.1 Primary Fatality Accident Types in Oregon 2002</b>		
	<b>Total Fatalities</b>	<b>Total injuries</b>
<b>Statewide TOTAL</b>	<b>436</b>	<b>27,791</b>
Speeding*	225	8,724
Impaired Drivers*	163	na
Motor Carrier-related*	57	522
Pedestrian-related	48	595
Vehicle Defects	8	297
Motorcycle Safety*	28	345
Bicyclist Safety*	6	658

**Source:** Annual Evaluation: Oregon Traffic Safety Performance Plan, Fiscal Year 2003, Oregon Department of Transportation, December, 2003

\* Some crashes involved multiple factors – e.g., impaired drivers who were speeding, or trucks that were speeding, impaired motorists having an accident with a bicyclist or pedestrian.

### **Emerging Safety Issues**

According to several national research organizations (including the National Highway Traffic Safety Administration, the American Association of State Highway and Transportation Officials, the Transportation Research Board, the Transit Cooperative Research Program, and the Federal Highway Safety Office), there are a number of new safety issues which have not been given adequate attention notice or funding at the state and local level. Several selected emerging safety issues that have relevance to Oregon are described below. These issues are not specifically monitored by ODOT's databases, but they are represented in the national literature on safety.

**Aging Population** – Oregon's elderly population (persons over 65 years of age) is growing at a rapid pace primarily due to an in-migration of retirees (between 1980 and 2000, there were an additional 303,057 elderly persons living in Oregon<sup>3</sup>). While being elderly doesn't automatically equate with diminished driving abilities, the elderly population is over-represented in Oregon's road crashes that result in fatalities and injuries. The +55 age groups actually experience fewer deaths by road crashes than every age group but the youngest drivers, but they are more likely to be seriously hurt in an accident, often have medical conditions which may be exacerbated in an accident, and often do have diminished capabilities in cognitive and motor response to stimuli presented in the road environment.<sup>4</sup>

**Personal Behaviors** – Motorists and other users of the road system are very often distracted from events taking place in the roadway. With so many potential hazards in the roadway, diminished attention is a serious factor in keeping transportation safe. A recent study by the Automobile Association of America Foundation for Traffic Safety found that motorists spend between 15% and 20% of their time behind the wheel involved in secondary activities,<sup>5</sup> such as:

- Talking on cell phones
- Eating
- Adjusting vehicle controls
- Smoking
- Reading
- Writing
- Grooming
- Sleeping

**Increased travel by auto and other modes** – Oregonians are traveling more often and during all times of the day and week. More frequent travel increases the exposure of people to accidents.

---

<sup>3</sup> Oregon Department of Transportation, "Transportation Overview -- Oregon Transportation Plan Update," February 13, 2004, page C-14.

<sup>4</sup> Center for Transportation Safety at the Texas Transportation Institute, "Older Driver Involvement in Injury Crashes in Texas 1975-1999," February 2004.

<sup>5</sup> Automobile Association of America Foundation for Traffic Safety, "Pay Attention" brochure, 2004.

**Increasing congestion** – Congested conditions in the state’s urban and suburban areas are a major threat to safety. More vehicles on the road translate into increased exposure. Moreover, congested conditions are often associated with aggressive behavior (including road rage, tailgating, frequent lane changing) which may lead to a more threatening roadway environment.

**Vulnerability in public transportation systems** – Passengers of public transportation systems are often intimidated by the lack of personal security provided at bus stops, light rail transit stations, transit terminals, and pedestrian systems leading to and from these transit facilities. Poor lighting, lack of orientation/schedules, lack of enforcement personnel and lack of amenities contribute to a sense of vulnerability.

**Increasing urbanization/density** – These land use events often lead to dramatic changes in the way people use roadways. With more travel in more compact environments, road functions may need to change to accommodate traffic calming operations and to accommodate a larger number of pedestrians and bicyclists.

**Unmet road maintenance requirements** – These may come in the form of damaged pavements which can alter vehicle movements and/or present injury to pedestrians, bicyclists and motorcyclists. Deferred maintenance of traffic control and safety devices in the roadway can also diminish the safety initially intended by these devices.

**Transit/highway grade crossings** – With some of the Portland area’s new rail transit systems has unfortunately also come some pedestrian fatalities at grade crossings. With frequent transit service and concentrated groups of pedestrians embarking and disembarking from trains in the same limited space, there is an increased exposure rate for pedestrians.

**New modes** – New modes of transportation which operate at speeds between that of a pedestrian and a motor vehicle are making their way onto our roads and sidewalks. Vehicles such as Segways, motorized golf carts, and motorized and non-motorized scooters are relatively unregulated, yet they may conflict with pedestrian, bicycle and motor vehicle traffic.

## VI. Emerging Safety Improvements

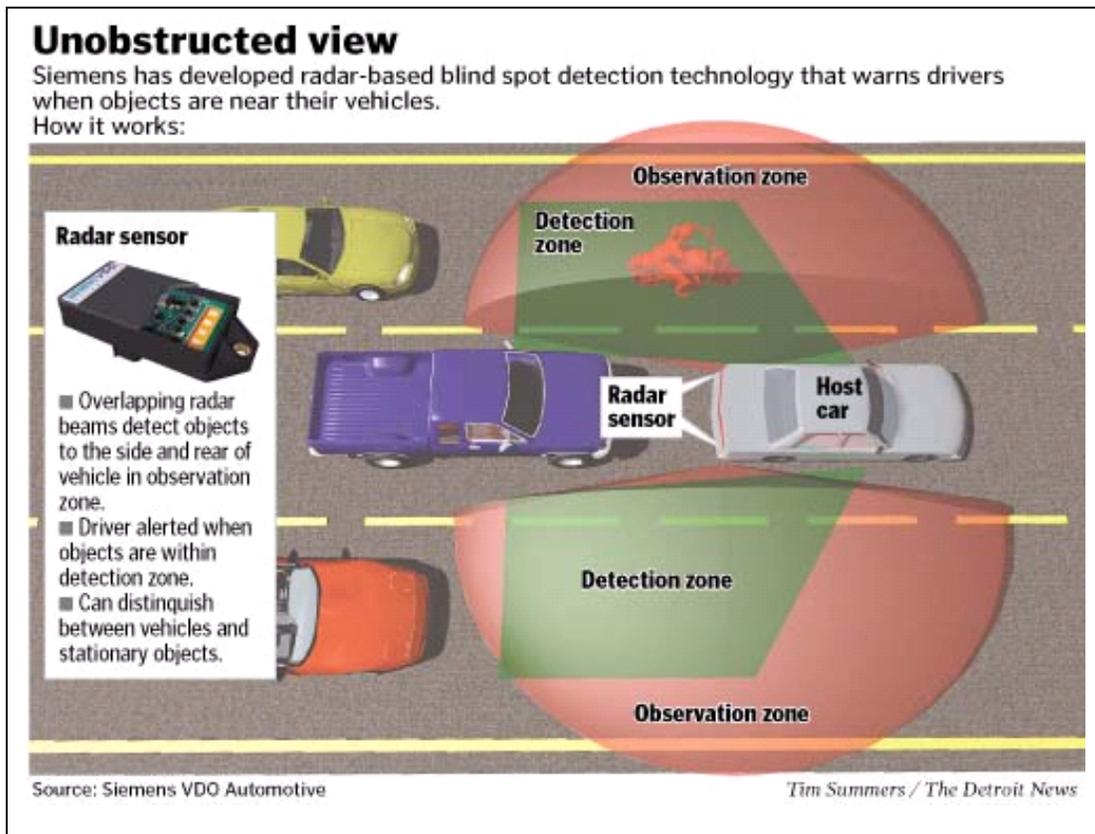
As the OTP Safety and Security Policy Committee considers modifications to current safety policy, it's useful to review and reference national research efforts into roadway safety improvement and to monitor the progress of certain safety programs. Some of the more significant safety improvements under development are presented below:

**Onboard vehicle safety systems** – There are several breakthroughs being made in the testing and manufacture of on-board vehicle safety systems. Several manufacturers provide GPS-based wireless systems to call centers so that motorists may be able to contact emergency personnel and get assistance in case of vehicle malfunction and information on directions.

In the late testing phase are technologies designed to:

- Warn of a collision
- Detect blind spots through radar
- Provide easily read dashboard displays of roads when darkness or weather impedes a motorist's sight
- Provide a cruise control that maintains a safe headway distance between cars in front and in back of a vehicle.

**Figure VI.1 Siemens Radar-Based Blind Spot Detection Technology**



**Improved safety devices on vehicles** – While several of these devices (e.g., front and side air bags, independent braking systems, more responsive steering and acceleration performance, stronger body structures, navigation devices) have been available for over a decade, their cost has come down considerably and are often offered as standard equipment on even moderate- and economy-priced vehicles.

**Improved traffic control and communication** – These improvements provided by additional signal detection, closed-circuit television (see Figures VI.2 and VI.3) and microwave transmitters have led to establishment of responsive incident management systems (such as the COMET program in the Portland metropolitan area), real time information posted on variable message signs, and use by enforcement personnel to reroute traffic in case of certain events.

**Figure VI.2, ODOT Closed-Circuit TV Cameras**



**Figure VI.3, Photo from Closed Circuit TV Cameras**



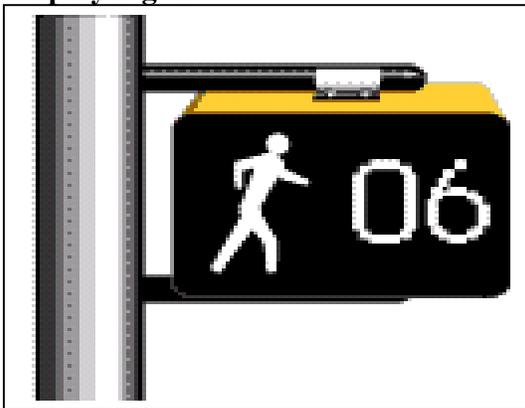
**Pedestrian crossing technology** – There are many new devices in place at crosswalks and intersections that are designed to improve perception of pedestrians by motorists and to reinforce appropriate pedestrian crossing behaviors. In Figure VI.4, motorists are assisted with blinking embedded lights which form crosswalks and are activated when a pedestrian begins crossing the street – which is often detected through a microwave signal or through manual activation of the pedestrian crossing signal.

**Figure VI.4, In-Pavement Lighting**

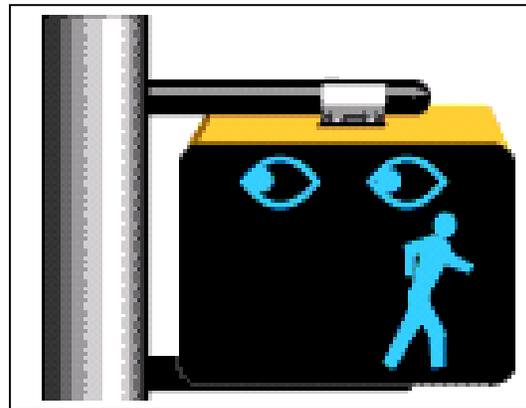


Figures VI.5 and VI.6 depict new indications in pedestrian signal heads to inform pedestrians of how many seconds of crossing time are left in the phase (Figure VI.5) and to reinforce looking both ways when crossing (as shown in Figure VI.6).

**Figure VI.5, Pedestrian Countdown Display Signal**



**Figure VI.6, Animated Eyes**



**Increasing use of technology by enforcement personnel sources** – With the state legislature allowing for tickets to be issued based on information provided by cameras, enforcement personnel have a big advantage in their efforts to identify motorists who violate speed limits, red lights, highway/railroad crossings controls, and other traffic control devices.

**Figure VI.7, Red Light Violation Camera –  
Detecting violation, identifying license plate  
number, following progress of violator**



## VII. What Other States and Countries Are Doing

Several U.S. states and foreign countries are also providing evidence of the success of programs that they've either initiated or taken to a higher level. The selected programs below provide useful information for the OTP Safety and Security Policy Committee to consider when modifying Oregon's safety policies and actions.

### Selected Initiatives of Other States

**Wisconsin** – An innovative feature of Wisconsin's comprehensive safety improvement program is its Corridor and Community Traffic Safety and Safety Outreach program. This program focuses a concentrated level of education, emergency response, engineering and enforcement activities on 15 populous communities which accommodate 40% of the state's population, and 33% of the state's traffic fatalities and serious injuries. Problems are identified, strategies developed, and treatments implemented by teams of professionals seeking to improve safety in segments of road corridors as well as throughout specific communities. These efforts are in addition to Wisconsin's statewide safety improvement programs.

**New York State** – Since 1984, New York State's Public Transportation Safety Board has been completing safety evaluations and audits of all public transit systems in the state that receive state funding. The board's mission is to reduce accidents that occur in transit systems resulting from vehicle, facility and /or track and signal malfunctions. These evaluations include safety audits, forensic examinations, development of new safety measures, and legislation supporting the board's recommendations on improved transit safety.

**Iowa** – Like Oregon's work on its Safety Management System, Iowa has invested significant funding and effort in its integrated data management solution – the Comprehensive Safety System Model. Iowa's model contains roadway characteristic information from the state DOT, as well as municipalities, counties, service districts and other jurisdictions. This information is combined with data from law enforcement agencies, judicial organizations, insurance providers and others to help complete forensic examinations and to support the development of designs and education, emergency response and enforcement programs to overcome potential safety hazards at a location. In many instances, analysts enter information into databases equipped with routines to evaluate and develop potential responses to resolve safety conflicts. The model provides multiple field-based reporting areas (such as motor carrier safety inspections, citations, DUI forms, and incident reports). These programs are valuable toward both preventative and pro-active treatments of safety problems. Iowa joined with the Federal Highway Administration to build a national model that is applicable for other states. A software was developed – Traffic and Criminal Software-TCS – which simplifies the data collection and analytical processes of crash investigation

**North Carolina** – On the Norfolk Southern Railroad’s mainline between Raleigh and Charlotte are 172 public highway/railroad at-grade crossings, and 43 at-grade crossings. In the mid-1990s, the State of North Carolina and the Norfolk Southern began a program to significantly improve the safety protection provided at each of those crossings into what’s termed a “sealed corridor” of protection. The devices at these crossings include four-quadrant gates, longer gate arms, median separators, and new signage and pavement markings, which are overcoming most of the safety violations that were observed via closed circuit television cameras. These cameras now photograph violators, and the documentation is used to issue citations. In addition, each crossing has a state of the art “Intelligent Signal Monitoring System” which notifies railroad personnel of any malfunctions in the crossing and signal equipment.

### **Washington State’s “Target Zero”**

In 2000, the Washington Traffic Safety Commission, Washington State Patrol, and the Washington State Department of Transportation jointly sponsored a process which culminated in the adoption of: “Target Zero: A Strategic Plan for Highway Safety.”<sup>6</sup> The title is based on the Washington Traffic Safety Commission’s thirty year vision to achieve “a transportation system with no deaths or disabling injuries.”

The Target Zero plan resembles ODOT’s Transportation Safety Action Plan in outlining the state’s safety problems and the array of investigative and preventative tools that organizations throughout the state use to try to resolve safety hazards/conflicts. The Traffic Safety Committee that developed the plan is, like Oregon’s, inclusive of the spectrum of public, private and non-profit organizations that are involved in transportation safety and uses similar databases and processes for developing safety projects.

Rather than establish performance measures, the Target Zero plan identifies key objectives for each “emphasis area” (e.g., aggressive drivers, impaired drivers, pedestrian safety, emergency response) and a set of strategies – substituting the word “strategies” for “actions” – for accomplishing the objectives. Interestingly, the plan also proposes a set of implementation steps, including:

- “Incorporation of Target Zero initiatives into the plans and programs of key traffic safety agencies;
- “Commitment of agency resources and funding for Target Zero strategies; and
- “Disclosure of information including progress reports on the implementation of strategies and the impact to statewide traffic safety.”

Washington State’s Target Zero plan has not yet resulted in a funding formula for safety projects that is significantly different from Oregon’s. In fact, what is most different about Target Zero and is worthy of consideration by the Safety Policy Committee is that Washington State has developed an ambitious goal of zero fatalities based on what they *want* to accomplish rather than what they *think they can* accomplish. By doing so,

---

<sup>6</sup> This document can be reviewed at: <http://www.wsdot.wa.gov/biz/trafficoperations/pdf/targetzero.pdf>

they've set the bar higher for the discussion of safety prevention and are establishing resource needs based on the zero fatalities goal.

The Target Zero strategy is being re-evaluated in the update of Washington State's Transportation Plan and will be initiated through a "safety conscious planning workshop" to identify the top safety issues on both the state and local transportation systems.

### **Minnesota's "Toward Zero Deaths"**

Like Washington State, Minnesota has adopted a zero death objective guided by the mission statement: "To move Minnesota toward zero deaths on our roads, using Education, Enforcement, Engineering, and Emergency Services."<sup>7</sup> Minnesota's transportation safety programs are coordinated jointly by the Department of Public Safety and the Department of Transportation, who have focused their attention on coalition building. That is, the parties interested in transportation safety are very well organized and conduct research, create multi-dimensional corridor safety programs and promotional campaigns as a group. From a pilot project on Highway 55, the coalition has now initiated similar comprehensive (i.e., addressing education, engineering, enforcement and emergency response) corridor safety improvement programs for Highways 95 and 65.

The Safety Policy Committee should appreciate the strength and clarity of Minnesota's mission message, as well as its hands-on approach to safety improvement.

### **Sweden's "Vision Zero" Road Safety Program**

Even though Sweden enjoys one of the world's lowest traffic fatality rates, it has continued to improve its road safety program. Safety experts and authorities in Sweden treat safety as a public health issue and report that its public and industries are very responsive to safety initiatives, rules and goals. The Swedes take a pro-active approach to safety and monitor safety events wherever a safety improvement has been installed or put into place. The Swedish national and local plans for safety include the following<sup>8</sup>:

- Objective of a zero fatality rate.
- Inclusion of all municipalities and Swedish auto makers in development of safety programs.
- Several unique laws, e.g.,
  - Blood alcohol content (BAC) levels of 0.02 can result in a fine and license suspension; a BAC level of 0.10 or higher is punishable by imprisonment, license suspension, and requirement to take a driving test to obtain a new license. Oregon's BAC level is 0.08.
  - Winter tires are required on cars between December 1st and March 31<sup>st</sup>.
  - Vehicles must use headlights 24 hrs/day, even during daylight periods.
  - Required driver training to earn a driver's license. Persons may earn a learner's permit at 16 and may drive under the supervision by an older driver who must be certified for the role by a county administrative board; earning a

<sup>7</sup> Entire plan can be accessed through: <http://www.tzd.state.mn.us/index.html>

<sup>8</sup> See [http://www.sweden.se/templates/FactSheet\\_\\_\\_5527.asp](http://www.sweden.se/templates/FactSheet___5527.asp)

driver's license can occur at 18 years of age but only after fulfilling two years of driver's training.

- Focus on the most dangerous roads.
- Municipalities receive national funds for development of safety programs.
- A voluntary bicycle safety standard has been developed.
- Instructions have been distributed to public transportation agencies to implement safety initiatives.
- Sponsorship of new technologies, such as ignition locks that prevent drunk driving and electronic driver's licenses.
- Establishment of alternative forms of financing safety improvements.

Several of these programs are worth consideration in the development of the updated Transportation Safety Action Plan and are compelling strategies for the Safety and Security Policy Committee to evaluate as it reviews safety policy for the OTP Update.

## VIII. Policy Implications for OTP Update

Several of the safety issues and programs discussed above can lead to improved safety conditions for all users. Incorporation of most of these measures will not significantly impact operations or programmatic requirements of the Transportation Safety Division. With respect to safety policy, these and other new measures can be incorporated into Oregon's approach to safety. The objectives and underlying strategic values of Oregon's safety policies may need to be reviewed in light of these emerging measures and innovations.

There are at least four areas where the OTP Safety and Security Policy Committee may wish to consider refinements in establishing and adopting safety policy.

These are:

1. **Programming safety into the project development process.** Transportation safety programs are implemented in a variety of ways in Oregon. ODOT's region traffic engineering staff is involved in identifying traffic safety issues and completes a series of evaluations (e.g., the Hazard Elimination Program work sheets, and the Safety Priority Index System - or SPIS). The Safety Division and several of the modal groups are also involved in establishing and implementing safety programs in education and in coordinating enforcement, engineering and emergency response campaigns. Safety is considered in the design process and is also associated with meeting safety standards for geometric design.

Another means of developing transportation projects in Oregon is the ongoing planning and transportation project development processes, which are focused on mobility and developing infrastructure projects to overcome future congestion levels and meet state land use requirements for future transportation system development. Transportation safety is not generally addressed during these initial efforts. Moreover, safety programs are implemented independently of system and corridor plans. In addition, the protocol for completing transportation planning in Oregon does not generally address education, enforcement or emergency response in resolving a safety hazard, even if these kinds of programs would have more promise than an infrastructure improvement.

Full incorporation of safety into the planning and development processes, therefore, may lead to efficiency and effectiveness in our overall system development.

2. **Reviewing feasibility of current measures.** The safety performance measures established and adopted for the 1995 Transportation Safety Action Plan have not been carefully examined for their financial or operational feasibility. The Transportation Safety Action Plan is in the process of being updated. During this update process, ODOT and its partners in transportation safety have an opportunity to more comprehensively evaluate the value and appropriateness of these measures and the safety improvement treatments that could support the corresponding measures and actions. Understanding the cost of implementation of these measures and how they

can be programmed with other plans and investments will go a long way toward building support for them in the Statewide Transportation Investment Program (STIP) process. In fact, use of technical methods such as risk assessment and cost-benefit analysis can produce a compelling case for incorporation of safety improvements into already advancing projects. Without this level of technical information, the safety programs may have less credibility than other programs (e.g., rehabilitation and modernization) do in the investment process.

In addition to examining the feasibility of performance measures, it's useful to consider measures that the Policy Committee truly wants to achieve – e.g., a zero fatality target – rather than targets that are achievable based solely on given current and anticipated trends and funding.

3. **Suggestions for public transportation, freight/passenger rail, air and marine safety.** At present, Oregon's approach to the transportation safety of non-highway modes and facilities – public transportation, rail, air, and marine safety – is generally carried out in an independent manner by multiple jurisdictions that do not always pull together resources and expertise to address concerns as is done for highway safety issues. There are exceptions where these systems meet highway systems – such as at a railroad/highway grade crossing. Oregon needs to evaluate whether the proper safety approaches and responses are in place for these non-highway modes, and where economies can be achieved in coordination of practices and funding sources (e.g., improved emergency response time efforts assist all systems, not just highways).
4. **Developing measures for emerging trends.** Our society is rapidly changing, and the travel behaviors which support those changes are creating new potential safety conflicts. As Oregon has addressed ongoing hazardous behaviors and safety problems, these emerging safety issues will also require thoughtful and comprehensive evaluation and countermeasure development. Oregonians interested in transportation safety need to stay abreast of new research being conducted at the Federal Highway Administration, Federal Transit Administration, Federal Railroad Administration, and the Federal Aviation Administration, all of which support and sponsor innovative safety research. Further, several research organizations including the National Highway Traffic Safety Administration, American Association of State Highway and Transportation Officials, Transportation Research Board, and the Automobile Association of America provide relevant and sophisticated research by members of the planning and engineering professional communities. Several of these research efforts are focused on new safety issues and innovations, and report on how different jurisdictions have dealt with emerging safety problems.

## IX. Recommendations for the OTP Update

As Oregon's population and employment increase, the state's highways, transit systems, passenger terminals, air, marine and rail systems, and sidewalks and bikeways will experience corresponding growth in the number of trips citizens and visitors make within and along these systems. Oregon's focus on safety has paid off with great successes in reducing fatality and injury accidents, and its program is poised to further improve safety.

For the purposes of the OTP Update, four recommendations are identified below for consideration by the Safety and Security Policy Committee.

**Recommendation #1:** The management and success of Oregon's approach to transportation safety can be enhanced with more fully developed incorporation of safety into local and state activities in planning, development and programming of new infrastructure projects. Safety can be viewed in the same vein as mobility is currently emphasized in statewide modal plans, regional plans and local transportation system plans, and is recommended as an area of consideration for a new policy and set of strategies for the Safety Policy Committee.

**Recommendation #2:** For safety to achieve a higher level of credibility and success in the investment programming process, it will be important for ODOT and its partners in transportation safety to complete a series of feasibility assessments of their performance measures and to develop a set of priorities for those measures. It will also be important to distinguish where and how an educational or an enforcement effort may have more or less merit than an infrastructure modification or an emergency response improvement.

Prior to establishing and adopting transportation safety performance measures in the updated Transportation Safety Action Plan (currently in process), it is recommended that the Safety and Security Policy Committee suggest completion of additional analyses of the relative priority, effectiveness, and achievability of those measures. These objectives can be accomplished through a series of risk assessment exercises and understanding of the costs required to implement them. Once these analyses are completed, it will be possible to better integrate safety performance and programs into future investments by state agencies and private and non-profit organizations.

**Recommendation #3:** Establishing coordinated and fully developed approaches to safety in our non-highway modes is also necessary to achieve the goals of the multimodal OTP Update. It is recommended that the Safety and Security Policy Committee establish a panel of experts from the committee who are involved in the safety of users of these other modes – public transportation, air, marine and rail systems – to assist the committee in development of appropriate policies and strategies for these modal systems. It is further recommended that this exercise occur in concert with the update of the Transportation Safety Action Plan.

**Recommendation #4:** As prevention is the ultimate countermeasure, attention needs to be paid to both current safety problems and the emerging ones. Oregon safety experts must continue to stay current with safety research and carefully monitor conditions related to 1) safety improvements that have been implemented, and 2) situations that suggest potential safety conflict.

As with any policy exercise, it's essential to understand what may occur in the future and to develop policies that address those expectations. This is an ambitious subject and it is recommended that the Policy Committee first suggest completion of technical and policy analysis of these emerging trends before adopting measures to counter trends that are not yet fully understood.



## Reference Links

- NCHRP Committees -- [www.trb.org/directory/divd.asp?c=nchrp](http://www.trb.org/directory/divd.asp?c=nchrp)
- TCRP Committees -- [www.trb.org/directory/divd.asp?c=tcrp](http://www.trb.org/directory/divd.asp?c=tcrp)
- TRB Committees -- [www.trb.org/directory/comm\\_homepages.asp](http://www.trb.org/directory/comm_homepages.asp)
- FHWA Safety Office -- [http://safety.fhwa.dot.gov/whats\\_new.htm](http://safety.fhwa.dot.gov/whats_new.htm)
- AASHTO Strategic Safety Plan -- [safety.transportation.org/default.aspx](http://safety.transportation.org/default.aspx)
- WSDOT -- <http://www.wsdot.wa.gov/>
- Iowa DOT -- <http://www.dot.state.ia.us/sitemap.htm#safety>
- Wisconsin DOT -- <http://www.dot.state.wi.us/safety/index.htm>
- N. Carolina DOT -- <http://www.bytrain.org/safety/>
- NYS DOT -- <http://www.dot.state.ny.us/traffic/tehsdmain.html>
- PedSmart -- <http://www.walkinginfo.org/pedsmart/home.htm>
- Mulvihill Intelligent Systems -- <http://www.redlightcamera.com/>

## Appendix A: OTP Action Steps Associated with Policy 1G

### POLICY 1G – Safety

*It is the policy of the State of Oregon to improve continually the safety of all facets of statewide transportation for system users including operators, passengers, pedestrians, recipients of goods and services, and property owners.*

#### **ACTION 1G.1**

Develop a Transportation Safety Action Plan addressing air, land and water transportation to reduce fatal, injury and property damage crashes among system users.

#### **ACTION 1G.2**

Improve the enforcement of transportation safety laws and regulations intended to reduce injury and property damage. Emphasize

- Enforcement of laws and regulations involving excessive speed, alcohol and other drug use,
- Use of safety belts and use of helmets for motorcycle drivers and passengers

#### **ACTION 1G.3**

Develop and deliver a comprehensive safety awareness, education and training program for all system users.

#### **ACTION 1G.4**

Improve the safety in design, construction and maintenance of new and existing systems and facilities for the users and benefactors including the use of techniques to reduce conflicts between modes using the safe facility or corridor. Target resources to dangerous routes and locations in cooperation with local and other state agencies.

#### **ACTION 1G.5**

Improve the delivery of emergency medical services to transportation-related crashes.

#### **ACTION 1G.6**

Increase interagency cooperation among federal, state and local governments and private enterprises in order to implement more effective community-based safety programs.

#### **ACTION 1G.7**

Develop and implement a comprehensive and coordinated transportation records and reporting program to manage and evaluate transportation safety.

**ACTION 1G.8**

Develop effective efforts to reduce the number of alcohol and other drug impaired and high-risk operators.

**ACTION 1G.9**

Build, operate and regulate the transportation system so that users feel safe and secure as they travel.

**ACTION 1G.10**

Promote high safety standards for trucks and truck operators.

- Work with national transportation organizations to accurately determine the safety implications of alternative truck sizes, weights and configurations.
- Expand the truck inspection program and have strong sanctions for consistent violators of trucking regulations. Continue to develop and institute a mobile enforcement plan to provide more effective weight enforcement utilizing weigh-in-motion, automatic vehicle identification and other Intelligent Vehicle Highway System technologies.
- Take action to minimize roadway conflicts between trucks, automobiles and recreational vehicles.

**ACTION 1G.11**

Enforce high safety and compliance standards for operation, construction and maintenance of the rail system.

**ACTION 1G.12**

Reduce navigational conflicts on waterways between commercial and recreational users, including windsurfers, in cooperation with the U.S. Coast Guard.