

Each year roadway departure crashes account for more than half of the highway fatalities in the United States. The Federal Highway Administration (FHWA) Roadway Departure (RwD) Team developed this Strategic Plan to provide a common vision for research, policy, and implementation to address these crashes.

The FHWA Roadway Departure Vision, Mission and Goal

Vision – Pursue a proactive approach that will lead Toward Zero Deaths and serious injuries involving roadway departure events.

Mission – Exercise leadership in the highway community to reduce the risk of roadway departure fatal and serious injury crashes from occurring. The RwD Team’s primary leadership role is with the engineering community and includes:

- Developing, evaluating, and deploying life-saving countermeasures; and,
- Promoting data-driven application of safety treatments

Goal - Reduce national roadway departure fatalities by a minimum of 500 per year from the existing 17,000 per year to 8,500 per year by the year 2030. This goal will be accomplished through internal and external influences per the FHWA Joint Safety Strategic Plan (SSP), with an emphasis on the following goals from that plan:

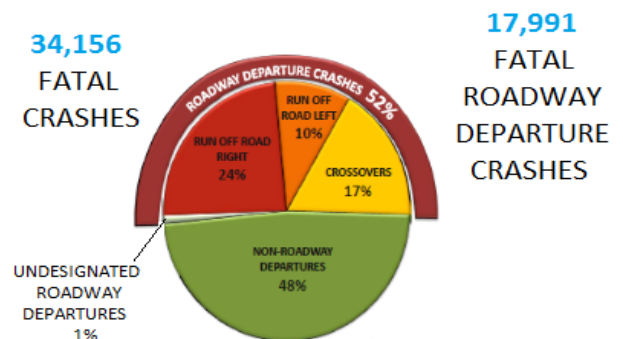
- *Enhance the effectiveness of FHWA safety professionals (SSP Goal 1.3)*
- *Employ a strategic planning process to guide the safety units and align resource allocation decisions (SSP Goal 2.1)*
- *Enhance strategic highway safety planning (SSP Goal 3.2)*
- *Develop and promote roadway safety improvements (SSP Goal 3.3)*
- *Champion FHWA safety policies and programs to advance safety improvements (SSP Goal 4.1)*
- *Articulate the benefits of roadway safety investments (SSP Goal 4.4)*

Overview

Highway fatalities in the United States continue to be a major national safety issue, killing tens of thousands of our family, friends, and neighbors every year. In addition, millions of people are injured in highway crashes each year. While injuries are a concern, safety performance is typically expressed in terms of fatalities and fatal crashes because more extensive data is available for these crashes.

Across the United States in the last few years, there has been a downward trend in both the fatal crash rates and number of deaths on our highways. However with more than 30,000 fatalities each year, much work still needs to be done to address this issue. To focus efforts for improving safety on our highways, AASHTO has embraced a vision of “Towards Zero Deaths” and a goal of cutting fatalities in half by 2030. To accomplish this goal, the number of fatalities would have to be reduced by approximately 1,000 per year.

Roadway departures consistently account for more than half of the fatalities and fatal crashes in the United States (see Figure 1 for a breakdown of fatal crashes). Clearly, reducing RwD fatal and severe crashes must be a major emphasis if we are to achieve the national safety goals stated above. Each State has developed a Strategic Highway Safety Plan (SHSP) to provide direction for their efforts and guide their investments. The majority of the SHSP’s identified RwD or a related crash type as one of the primary issues to be addressed for States to meet their goals. The FHWA RwD Team has prepared this Strategic Plan to determine where to focus limited resources to most effectively reduce RwD fatalities by a minimum of 500 per year - a number that is proportionally consistent with the AASHTO goal.



**Figure 1: RwD Role in U.S. Fatal Crashes
Average for 2007-2009**

This Strategic Plan provides a clear framework on which the RwD Team will focus its efforts. It also facilitates awareness of current safety needs, future priorities, and collaboration opportunities with other program areas. The RwD Team will continue to prioritize efforts to: 1) Keep vehicles on the roadway, in their appropriate directional lane, 2) Reduce the potential for crashes when vehicles do leave the roadway or cross into opposing traffic lanes, and 3) Minimize the severity of crashes that do occur.

The FHWA Roadway Departure Team

Three safety units within FHWA support the RwD Team. Those units and their primary roles in reducing RwDs are:

- The Office of Safety, which serves to develop and update policy and guidance related to new and existing research
- The Office of Safety R&D, which serves to understand and analyze RwD issues; and
- The Resource Center, which serves to deliver knowledge critical in saving lives via technical assistance.

To accomplish the goal, the RwD Team members collaborate with each other and with stakeholders and partners at the Federal, State and local levels. While the team's primary function is engineering and technology transfer to the engineering community, it recognizes that fostering a culture of safety and a 4E (Engineering, Education, Enforcement, and Emergency Medical Services) approach will be required for success.

The Role of the Roadway Departure Strategic Plan

This Strategic Plan is a living document that primarily serves as a tool to provide long-term focus for the RwD Teams efforts through data analysis. The primary areas of emphasis for the current plan are:

- A. Overturn crashes**
- B. Opposite direction crashes**
- C. Roadside trees and shrub crashes**

In addition, the analysis shows four additional crash types that will be monitored as secondary emphasis areas. The Strategic Plan supports the Joint Safety Strategic Plan, guides internal efforts and provides a framework to influence external efforts.

Internal Efforts

Roadway Departure Roadmap

The RwD Roadmap specifies short- to mid-term efforts to achieve the objectives of the Strategic Plan, but is open to promising opportunities for exploratory work in related areas. It is reviewed and updated annually. Efforts in the RwD Roadmap include identifying and assessing RwD problems, developing analysis methods and tools, developing and evaluating countermeasures, and delivering products.

Unit Plans and Individual Performance Plans

The primary emphasis areas of this Strategic Plan and the activities listed in the roadmap function as a guide to members of the various safety units for including appropriate strategies and actions in unit and individual performance plans.

Influence on External Efforts

Implementation

States with high incidence of fatal crashes in each of the emphasis areas will be encouraged to include strategies to address these crash types in their implementation plans, policy or guidance.

Research

NHCRP proposals will be submitted, and proposed projects supported, based on the expected insights/outcomes on primary emphasis area crash types. Similarly, other external research will be proposed and supported where opportunities exist.

Technology Transfer and Peer Exchanges

Implementation of countermeasures that will reduce RwD crashes will be accelerated through effectively communicating internal and external research findings and guidance to the highway community and encouraging agencies to share their experiences across borders.

RwD Crash Definition and Data

► **Definition:**

The FHWA defines a RwD crash as: *A non-intersection crash in which a vehicle crosses an edge line, a centerline, or otherwise leaves the traveled way.*

► **Data Analysis:**

RwD Crashes were analyzed using data compiled by the National Highway Traffic Safety Administration (NHTSA) in the Fatality Analysis Reporting System (FARS). The magnitude and percentage of RwD fatal crashes, broken down by the Most Harmful Event (MHE), are shown in Figures 2 and 3. The corresponding data for fatalities are similar, but are not shown here.

Roadway Departure Fatal Crashes by Most Harmful Event (FARS 2007-2009)

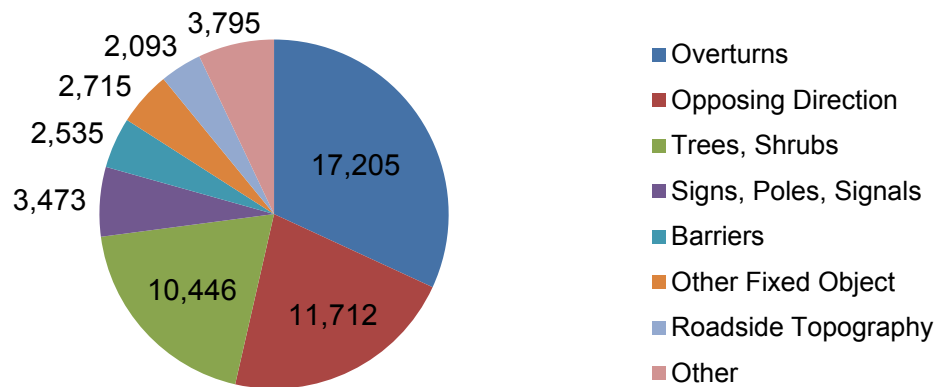


Figure 2: Magnitude of RwD Fatal Crashes by Most Harmful Event

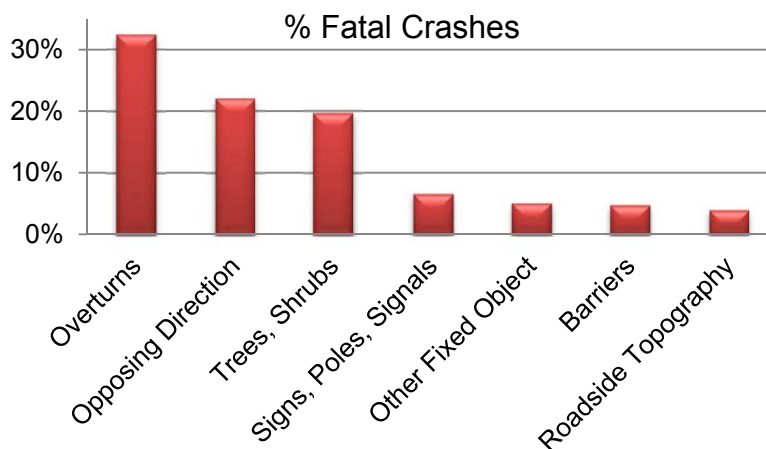


Figure 3: Percentage of RwD Fatal Crashes by Most Harmful Event

As depicted in these figures, the top three crash types account for nearly three-quarters of all RwD fatal crashes:

- I. Overturns or rollovers (32 percent)
- II. Opposing direction crashes (22 percent)
- III. Crashes involving trees and shrubs (19 percent)

In addition to these three primary emphasis areas, the RwD Team will continue to provide a secondary focus on the four categories of MHEs that comprise another 20 percent of total RwD fatal crashes as shown in Figure 3. A discussion of the focus for efforts in each of the primary emphasis areas follows. The analysis is based on factors contributing to the fatal crashes in each area.

Trend Line Analysis

The FARS data used to develop this Strategic Plan was combined to depict trend lines (see Figures 4 and 5). These data show that RwDs follow a trend similar to all crashes, as do the three RwD emphasis area crash types.

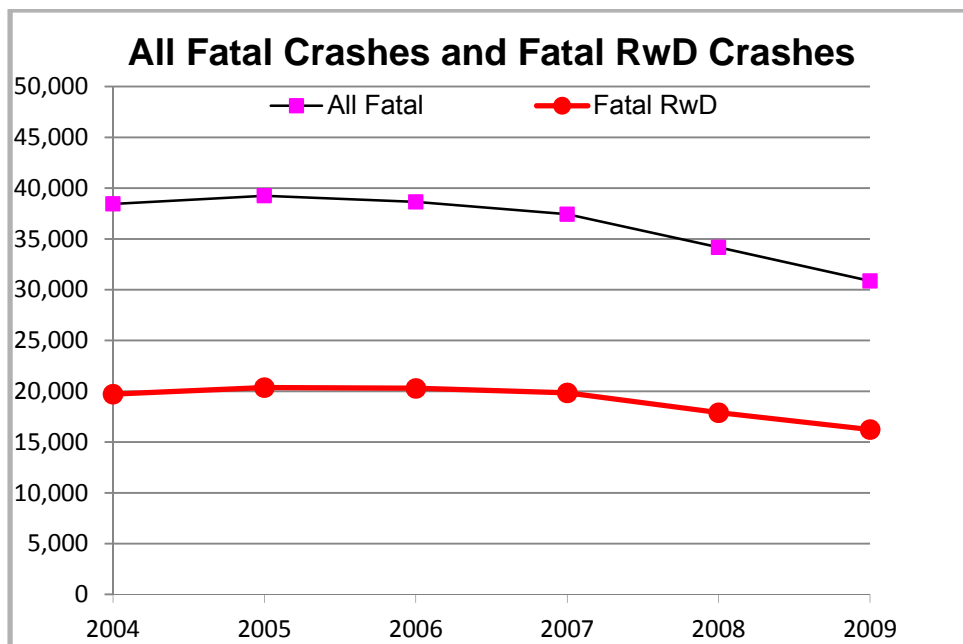


Figure 4: Trend Lines for All Fatal Crashes and Fatal RwD Crashes

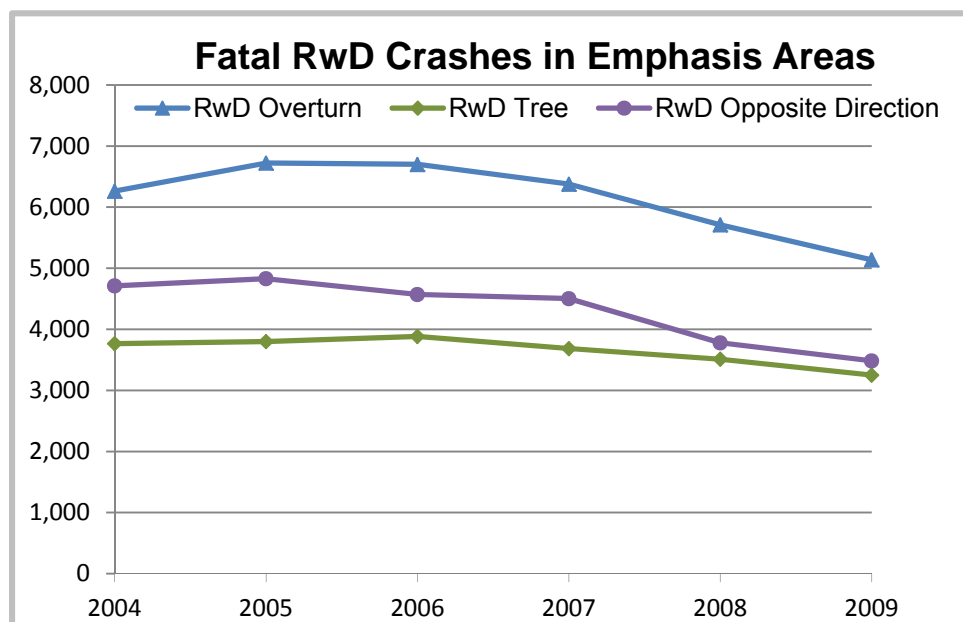


Figure 5: Trend Lines for Primary Emphasis Areas

I. Emphasis Area – Overturn Crashes

The MHE in 32 percent of fatal RwD crashes is an overturn or rollover type of event. As shown in Figure 6, approximately three-quarters of these fatal crashes occur in rural areas and/or where posted speed limits are at or above 50 mph. Additionally, curves are over-represented.

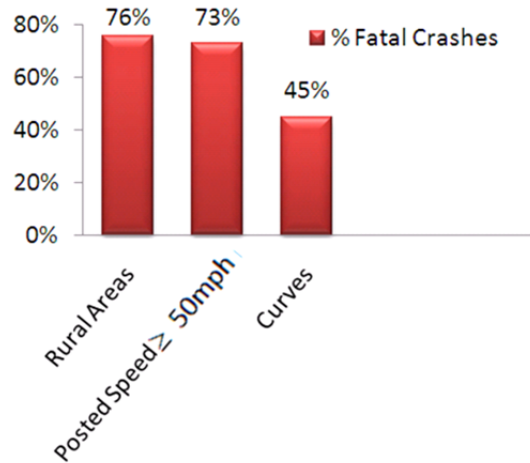


Figure 6: Critical Locations for Overturn Crashes

The current objectives and strategies to address overturns are as follows:

Objective 1: Keep vehicles on the roadway, in their appropriate directional lane. Strategies to achieve this objective include installation of:

- Improved curve delineation;
- Friction treatments in curves and other spot locations; and
- Edge line and shoulder rumble strips.

Objective 2: Reduce the potential for crashes when vehicles do leave the roadway or cross into opposing traffic lanes. Strategies to achieve this objective include application of:

- The Safety EdgeSM for all paving projects;
- Maintained clear zones; and
- Traversable roadside slopes.

Objective 3: Minimize the severity of crashes that do occur. Strategies to achieve this objective include appropriate specifications and installation of:

- Barriers to shield hazards, including:
 - Trees and shrubbery
 - Other fixed objects
 - Slopes
- Other Safety Hardware

Action Items for Reducing Overturn Crashes within the Next 5 years:

- A. Develop High-Friction Surface Treatments (HFST) screening tool to identify priority locations.
- B. Provide additional installation training for Safety EdgeSM and HFST. Encourage all state and local agencies to adopt the practices systemically.
- C. Encourage best practices of successful application of clear zones that avoid slopes and obstacles with the potential to overturn errant vehicles, and educate on when barrier is needed.
- D. Evaluate benefit/cost and/or develop CMFs for shielding various shapes of cut slopes and fill slopes, develop associated guidance and encourage States to adopt it.
- E. Develop research-based guidance to encourage selection of the best barrier to reduce the potential for overturns.
- F. Explore the potential effects of anticipated vehicle changes on rollover and impacts with hardware.

II. Emphasis Area – Opposing Direction Crashes

RwDs involving cross center line or cross median events that resulted in vehicle collisions were the MHE in 22 percent of fatal RwD crashes. Although the cross center line crash has not traditionally been an emphasis area for FHWA, as Figure 7 indicates, this constitutes 79 percent of opposing direction roadway departure fatal crashes, and additional countermeasures need to be researched and developed. Crash data also indicate that the initial focus should be on rural areas and high-speed roadways, as well as on tangents and curves. Adverse pavement conditions are also over-represented.

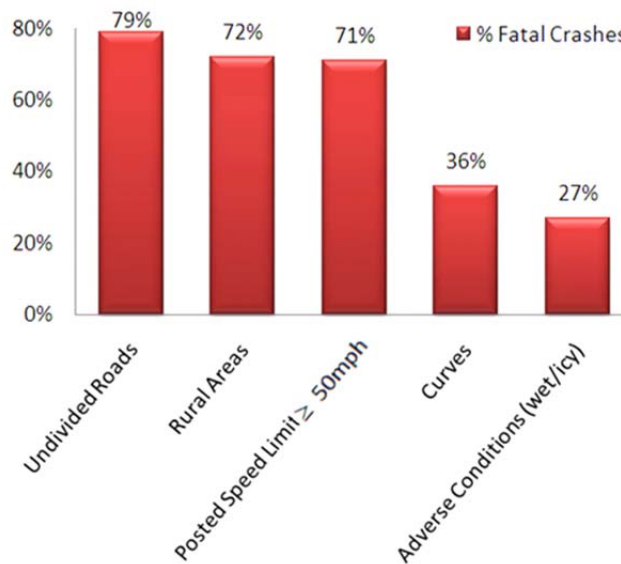


Figure 7: Critical Locations for Opposing Direction Crashes

The current objectives and strategies to address opposite direction crashes are as follows:

Objective 1: Keep vehicles on the roadway, in their appropriate directional lane. Strategies to achieve this objective include installation of:

- Center line rumble stripes; and
- Friction treatments in curves.

Objective 2: Reduce the potential for crashes when vehicles do leave the roadway or cross into opposing traffic lanes. Strategies to achieve this objective include application of:

- Increased Separation between Opposing Lanes, particularly in curves.

Objective 3: Minimize the severity of those crashes that do occur. Strategies to achieve this objective include appropriate specifications and installation regarding:

- Design and placement of barriers in medians

Action Items for Reducing Opposing Direction Crashes within the Next 5 years:

- A. Develop joint material specifications with ATSSA and AASHTO for HFST to mainstream.
- B. Provide best practices for applying centerline rumbles on undivided highways and develop an optimization tool addressing safety, bike use, noise, and pavement maintenance.
- C. Develop CMF's for increasing separation between opposing traffic on two-lane undivided highways for various pavement widths and traffic volumes.
- D. Provide technical assistance to improve standards for placement of barrier in medians.
- E. Develop case studies and data-driven guidance on the use of barrier on previously undivided roads.
- F. Identify new countermeasures to address this crash type.

III. Emphasis Area – Crashes with Roadside Trees

The MHE in 19 percent of fatal RwD crashes involves trees or shrubs on the roadside. A renewed emphasis on removing or otherwise addressing these roadside obstacles and maintaining the clear zone is in order. As shown in Figure 8, the crash data indicate the need to address this in both rural and urban areas (high- and low-speed) to meet the RwD goals. Additionally, curves are over-represented and should be considered in coordination with other program areas. Trees are unique from other fixed objects in that (with some exceptions) they are not “installed”. In addition, they present a greater hazard the larger they grow, and they multiply over time, encroaching ever closer to the roadway if maintenance is not addressed.

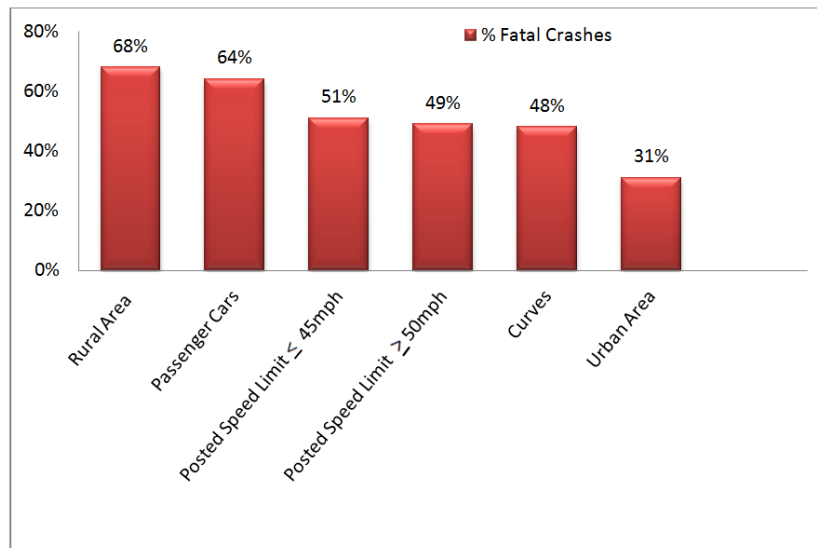


Figure 8: Critical Locations for Crashes with Roadside Trees

The current objectives and strategies to address Crashes with Roadside Trees are as follows:

Objective 1: Keep vehicles on the roadway, in their appropriate directional lane. Strategies to achieve this objective include installation of:

- Edge line and shoulder rumble strips;
- Improved curve delineation; and
- Friction treatments in curves.

Objective 2: Reduce the potential for crashes when vehicles do leave the roadway or cross into opposing traffic lanes. Strategies to achieve this objective include application of:

- Clear zone improvements and maintenance, particularly on the outside of curves.

Objective 3: Minimize the severity of crashes that do occur. Strategies to achieve this objective include appropriate specifications and installation regarding:

- Design, Selection and Placement of Barriers.

Action Items for Reducing Tree Crashes within the Next 5 years:

- A. Evaluate the effectiveness of and promote best practices for HFST, delineation, and tree and shrub removal in curves.
- B. Develop joint guidelines with the Office of Planning, Environment, and Realty for landscaping clear zones, and encourage States to adopt and implement them.
- C. Encourage States to adopt maintenance guidelines for continuous mowing/clearing of clear zones.
- D. Develop research-based recommendations for using barriers with roadside trees.