

# Printing Instructions

## Commercial Print

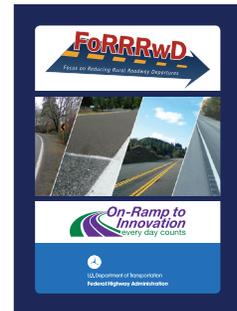
Send the Commercial Print PDF called **RRRwD\_TradingCards\_Commercial.pdf** to a local commercial print shop or the Government Printing Office if required. The file is print ready, full color, has bleed and prints on both sides.

### Card Specs:

*Final Size:* 2.5"x3.5"

*Paper:* 16pt card stock

*Ink:* 4/4 with Gloss UV Coating



# FORRRWD

*Focus on Reducing Rural Roadway Departures*



**On-Ramp to  
Innovation**  
every day counts



U.S. Department of Transportation  
**Federal Highway Administration**

COUNTERMEASURE

# Edge Line and Shoulder Rumbles



Source: FHWA

Edge rumble strips are milled corrugations in pavement to alert inattentive drivers that they are leaving the roadway to reduce:

- **Run-off-road crashes**
- **Fixed object crashes**
- **Rollovers**
- **Distracted/drowsy driver crashes**

[https://safety.fhwa.dot.gov/roadway\\_dept/pavement/rumble\\_strips](https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips)

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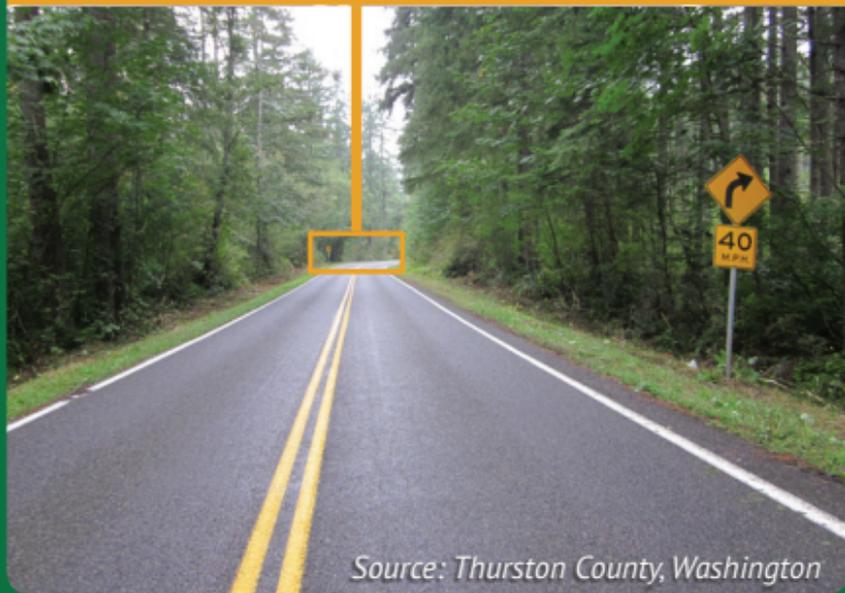
<b>Fatal and Injury Reductions</b>	
Run-Off-Road <i>(two-lane rural)</i>	36%
Run-Off-Road <i>(rural freeways)</i>	17%



Source: CMF Clearinghouse IDs 3454 and 3447

## COUNTERMEASURE

# Curve Signing



Source: Thurston County, Washington

Advance curve warning signs alert a driver to changes in the road alignment and chevrons delineate the curve. These countermeasures are effective to reduce:

- **Curve crashes**
- **Nighttime crashes**

[https://safety.fhwa.dot.gov/provencountermeasures/enhanced\\_delineation/](https://safety.fhwa.dot.gov/provencountermeasures/enhanced_delineation/)

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### Crash Reductions for Installing Chevrons

Nighttime Crashes on curves	25%
Non-intersection Fatal and Injury crashes	16%



Source: CMF Clearinghouse IDs 2438 and 2439

COUNTERMEASURE

## Edge and Center Line Markings



*Source: Thurston County, Washington*

Retroreflective pavement markings improve nighttime highway visibility. Wider lines (6"–8") have an increased safety effect, reducing:

- **Curve crashes**
- **Nighttime crashes**
- **Head-on crashes**

[https://safety.fhwa.dot.gov/roadway\\_dept/night\\_visib/pavement-markings.cfm](https://safety.fhwa.dot.gov/roadway_dept/night_visib/pavement-markings.cfm)

<b>Crash Reductions</b>	
Adding edge and center line marking	24%
Wider edge lines	22%



Source: AASHTO Highway Safety manual, CMF Clearinghouse IDs 101 and 4792

## COUNTERMEASURE

# Center Line Rumbles



Source: FHWA

Center rumble strips are milled corrugations in pavement to alert inattentive drivers that they are crossing the center line to reduce:

- **Head-on crashes**
- **Run-off-road left crashes**
- **Distracted/drowsy driver crashes**

[https://safety.fhwa.dot.gov/roadway\\_dept/pavement/rumble\\_strips](https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips)

### Fatal and Injury Reductions

Head-On RwD <i>(two-lane rural)</i>	45%
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Source: CMF Clearinghouse ID 3360

COUNTERMEASURE

# SafetyEdge<sup>SM</sup>



Source: FHWA

SafetyEdge<sup>SM</sup> is a paving technique producing a durable 30-degree edge to prevent tire-scrubbing, which often results in:

- **Head-on crashes**
- **Rollovers**
- **Run-off-road crashes**

<https://safety.fhwa.dot.gov/safetyEdge>

### **Crash Reductions on Two-Lane Rural Roads**

Drop-Off	35%
Run-Off-Road	21%
Head-On Rwd	19%
Fatal & Injury	11%



Source: CMF Clearinghouse IDs 9221, 9211, 9217, and 9205

COUNTERMEASURE

# High Friction Surface Treatment



Source: FHWA

HFST is a pavement surface treatment using calcined bauxite that provides exceptional skid-resistant properties at high friction demand locations such as curves, ramps, or intersections where problems with wet conditions, speed, or geometrics contribute to:

- **Run-off-road crashes**
- **Head-on crashes**

[https://safety.fhwa.dot.gov/roadway\\_dept/pavement\\_friction](https://safety.fhwa.dot.gov/roadway_dept/pavement_friction)

<b>Crash Reductions on Curves</b>	
Total	24%
Wet Crashes	52%



Source: CMF Clearinghouse (CMF ID's 7900 and 7901)

COUNTERMEASURE

# Slope Flattening



Source: FHWA

Flattening steep slopes provides a better opportunity for vehicles to traverse the slope, reducing the likelihood of:

- **Rollovers**
- **Fixed object crashes**

### Crash Reductions (%) for Single Vehicle Crashes

Before Sideslope	After Sideslopes		
	1V:4H	1V:5H	1V:6H
1V:2H	10	15	21
1V:3H	8	14	19
1V:4H	–	6	12
1V:5H	–	–	6

Source: AASHTO Highway Safety Manual

COUNTERMEASURE

# Clear Zone



*Source: FHWA*

Establishing and maintaining a clear zone provides an unobstructed, traversable area where an errant driver can recover to reduce:

- **Fixed Object Crashes**
- **Rollover Crashes**

[https://safety.fhwa.dot.gov/roadway\\_dept/countermeasures/safe\\_recovery/clear\\_zones/](https://safety.fhwa.dot.gov/roadway_dept/countermeasures/safe_recovery/clear_zones/)

Increase Distance to Trees By	Crash Reduction
3 feet	22%
5 feet	34%
8 feet	49%
10 feet	57%
13 feet	66%



Source: NCHRP Report 440

## COUNTERMEASURE

# Center Line Buffer Area



Source: Thurston County, Washington

A center line buffer area provides extra space between the two solid center line markings, further separating opposing directions of traffic to reduce:

- **Head-on Crashes**
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Facility Type	Buffer Width	*Head-on Rwd Crash Reduction
2-lane	2 feet	35%
2-lane	4 feet	64%
2-lane	10 feet	90%
4-lane	Not significant	

*\*Preliminary results from NCHRP Project 17-66*

## COUNTERMEASURE

# Barriers



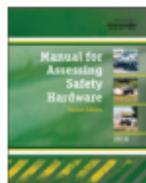
Roadside and median barriers are designed to redirect and slow vehicles while shielding them from obstacles likely to result in a more severe crash, such as:

- **Rigid fixed objects**
- **Bodies of water**
- **Steep slopes**
- **Opposing traffic**

[https://safety.fhwa.dot.gov/roadway\\_dept/countermeasures/reduce\\_crash\\_severity/](https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/)

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The crashworthiness of barriers is evaluated through crash testing. The current crash test criteria is contained in the AASHTO Manual for Assessing Safety Hardware (MASH) 2016.



## COUNTERMEASURE

# Shoulder Widening



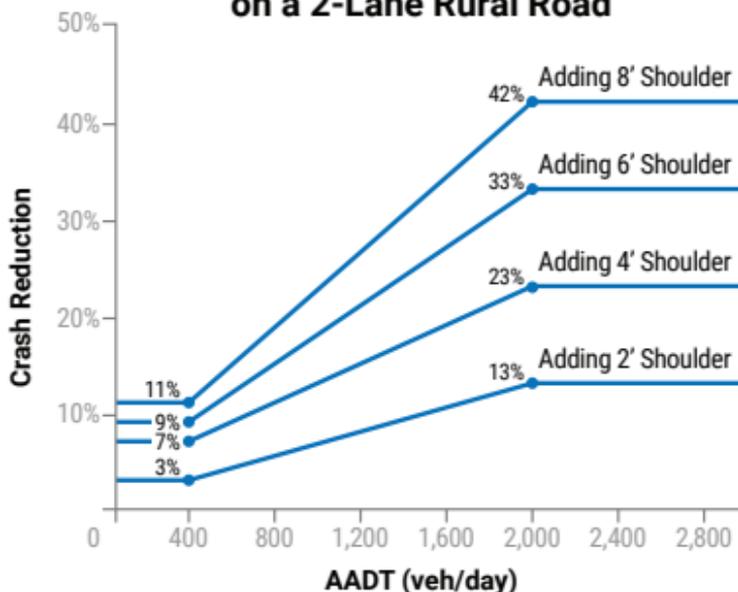
Source: FHWA



Source: FHWA

Adding a paved shoulder provides an errant driver an opportunity to regain control. Shoulders have been shown to be effective at reducing all roadway departure crashes. Adding shoulders may also allow for installation of rumble strips and the SafetyEdge<sup>SM</sup>.

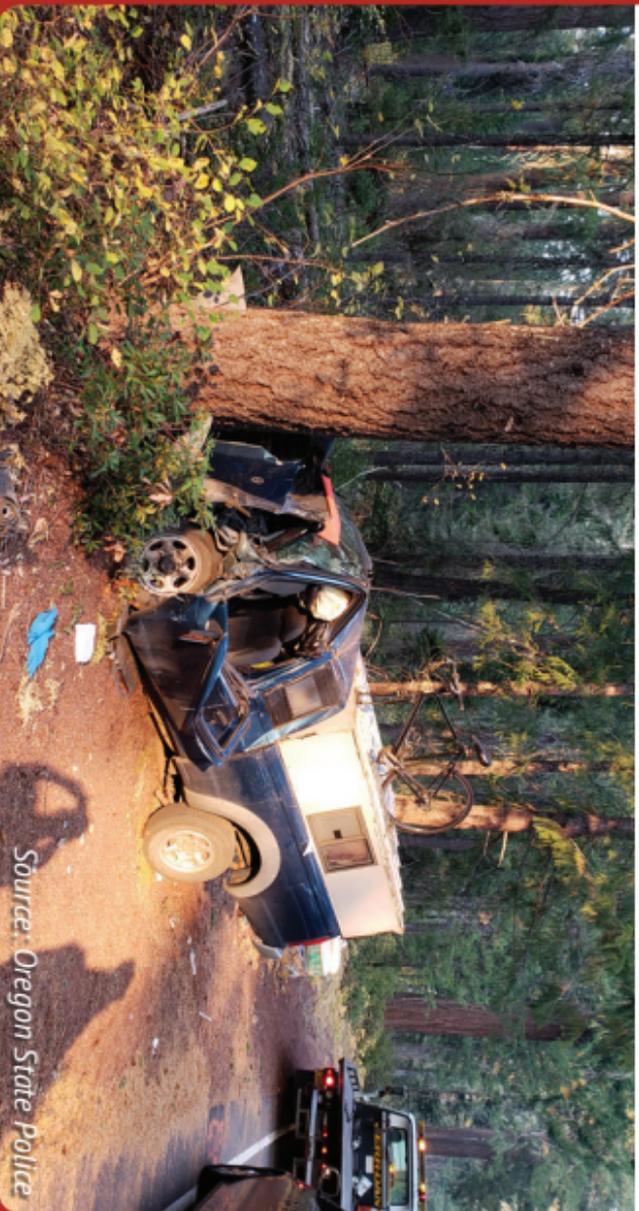
### Crash Reductions for Adding a Shoulder on a 2-Lane Rural Road



*Adapted from the AASHTO Highway Safety Manual (HSM) for 2 lane rural roads with no existing shoulder. For existing shoulders to be widened, see the HSM.*

**CRASH TYPE**

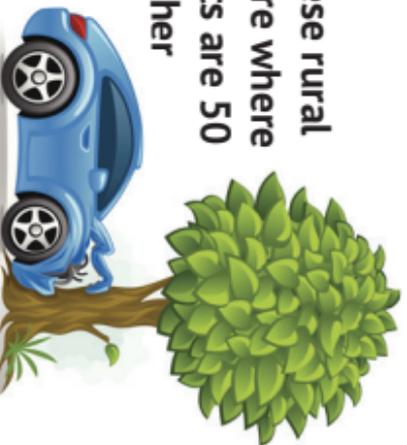
## **Tree Crashes**



*Source: Oregon State Police*

Tree crashes result in over 2,300 fatalities each year on rural roads, which is 19% of Rural RWD fatalities.

- 50% of these rural fatalities are on curves
- 63% of these rural fatalities are where speed limits are 50 mph or higher



*Credit: skalapendra/iStock/Thinkstock*

## Countermeasures

- Removal
- Maintain Clear Zone
- Rumbles
- Friction
- Barrier



## CRASH TYPE

# Head-On Crashes



*Source: Oregon State Police*

Head-on Rwd crashes (which include opposing direction sideswipes) result in over 3,300 fatalities each year on rural roads, which is 28% of Rural Rwd fatalities.

- **32% of these rural fatalities are on curves**
- **84% of these rural fatalities are where speed limits are 50 mph or higher**



*Credit: skalapendra/iStock/Thinkstock*

## **Countermeasures**

- Center Line Markings
- Rumbles
- SafetyEdge<sup>SM</sup>
- Center Buffer Area
- Median Barrier



**CRASH TYPE**

# **Rollover Crashes**



*Source: FHWA*

Rollover crashes result in over 3,600 fatalities each year on rural roads, which is 30% of Rural Rwd fatalities.

- **44% of these rural fatalities are on curves**
- **78% of these rural fatalities are where speed limits are 50 mph or higher**



*Credit: Bigmouse/iStock/Thinkstock*

## **Countermeasures**

- Flatten Slopes
- SafetyEdge<sup>SM</sup>
- Rumbles
- Friction
- Barrier



**CRASH TYPE**

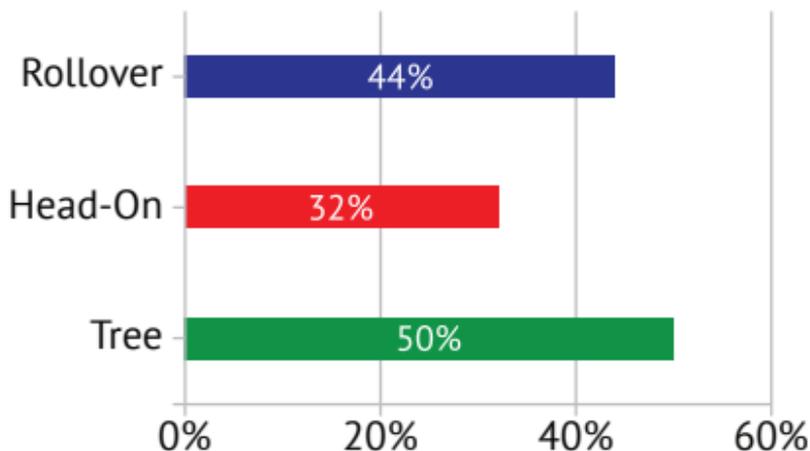
# Curve Crashes



*Source: FHWA*

Curve crashes account for 42% of rural Rwd fatalities.

## Curve-Related Rural Rwd Fatalities



### Countermeasures

- Warning Signs
- Pavement Markings
- Friction
- Clear Zone
- Barrier



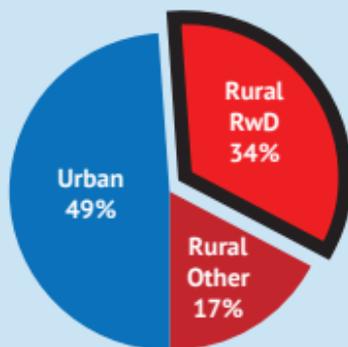
## CRASH TYPE

# Rural Roadway Departure Crashes



*Source: Oregon State Police*

Rural Roadway Departures account for 34% of all fatalities.



## Objectives to Reduce RWD Crashes

**1<sup>st</sup> - Keep vehicles on the roadway.**



**2<sup>nd</sup> - Reduce the potential for crashes.**



**3<sup>rd</sup> - Minimize the severity of crashes.**

# LOCAL ROAD SAFETY PLANS

START HERE!

Identify Stakeholders

Choose Proven Solutions

Use Safety Data

Implement Solutions

Help Get People Home Safely

TOOL

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## LRSP Benefits

- Defines and prioritizes achievable safety investments
- Serves as a communication tool
- Supports funding applications
- Creates a sustainable safety effort and greater awareness of road safety
- Supports development of lasting partnerships
- Supports reduction in severe crashes

[https://safety.fhwa.dot.gov/  
provencountermeasures/local\\_road/](https://safety.fhwa.dot.gov/provencountermeasures/local_road/)

“Do what you  
can, with what  
you have,  
where you are.”

*-Theodore Roosevelt*



## TOOL



# Rx Systemic Analysis

How healthy is your road system?

### Symptoms

Severe roadway departure crashes on curves.

#### Possible Risk Factors:

- 🚗 Avg. Daily Traffic > 1,000 vehicles
- Ⓟ Curve Radius < 1,000 feet
- + Intersection within Curve
- 🚦 Visual Trap within Curve
- ⚡ Severe Crash within Curve

### Treatment

Prioritize highest risk sites and treat with low-cost countermeasures such as chevron signs or rumble strips.

### Follow-Up

Track and evaluate safety improvements. Further remediation can be implemented as needed.

### Diagnosis

11% of all curves have 3 or more risk factors.

#### Lab Results:

- Curve A 🚗
- Curve B 🚗 Ⓟ + 🚦 ⚡
- Curve C 🚗 +
- Curve D 🚦
- Curve E Ⓟ 🚦 ⚡

### Systemic vs. Systemwide

Systemic does not mean treating all locations. It allows agencies to treat the highest-risk sites within limited budgets.



A “systemic safety improvement” means a proven countermeasure(s) that is widely implemented based on high-risk roadway features that are correlated with particular severe crash types, rather than crash frequency.

*(23 CFR Part 924.3)*

<https://safety.fhwa.dot.gov/systemic/>

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Systemic improvements:

- Supplements traditional analysis
- Used for crash types that are not concentrated such as rural roadway departures



You don't have to wait for a crash to happen to save lives!



Reduce the potential for serious injury and fatal roadway departure crashes on all public rural roads by increasing the systemic deployment of proven countermeasures.

## **BENEFITS**

- ▶ Partnerships
- ▶ Data-driven Deployment
- ▶ Safer Rural Roads



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