



## What's Different?

#### **Traditional Approach**

Reduce Crashes

**Speed Management** 

Safety "Four E's"

Apply Countermeasures at High Crash Locations

Examine crash records to identify causes or "deficiencies"

"Balance" Safety vs. Mobility





Safe System Approach

**PARADIGM SHIFT** 

**Eliminate Fatalities & Serious Injuries** 

Kinetic Energy Management

**Five Safe System Elements** 

Proactively Apply Countermeasures in a "Systemic" Approach

Strengthen all elements to reduce "system failures"

Only "Safe Mobility"

Death/serious injury is unacceptable

NEW PARADIGI AHEAD





Responsibility is shared





# The Rural RwD Component of Fatalities

U.S. Traffic Fatalities 37,336 FHWA Roadway Departure (RwD) Definition: A crash in which a vehicle crosses an edge line, a center line, or otherwise leaves the traveled way.



#### Why <u>do</u> drivers leave the roadway?

#### **Roadway Condition**

#### **Vehicle Component Failure**

# Collision Avoidance Driver Error





### **Contributing Causes of Crashes**



The Driver is weakest link in this system, so we must design around human needs.

FROM: Lum & Reagan, Public Roads Magazine, Winter 1995, "Interactive Highway Safety Design Module" Where would you invest to reduce roadway departures?





## Fatal crash locations

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### **Most Harmful Event**

EVENT	2014
Trees	25
Collision with other moving vehicle	5
Ran off Road	2
Ditch	5
Overturn (Rollover)	7
Bank or Ledge	7
Guard Rail	2
Fence or Post	1
Sign, Traffic Signal	0
Mailbox	2
Cross Centerline	0
Tunnel, Bridge, Underpass, Culvert, etc.	1
Other Non-Collision	1
Animal	0
Other Fixed Object	0
Other	0



## Fatal crash <u>types</u> are predictable

### Systemic Safety Improvements

#### **Systemic**

- Based on Risk
- Correlated with particular severe crash types



23 USC 148 (a)(12) Systemic safety improvement.—The term "systemic safety improvement" means an improvement that is widely implemented based on **highrisk roadway features** that are correlated with **particular crash types**, **rather than crash frequency**.

http://safety.fhwa.dot.gov/systemic/index.htm



#### Systemic Safety Improvements

- Particularly applicable when a significant number of severe crashes happen over a wide area:
  - Rural Roadways
  - Local Roadways



- You don't have to wait until a severe crash occurs to make improvements
- Supplements traditional site analysis
- May include treating locations that **haven't** experienced crashes based on risk potential.



### Systemic Safety Improvements

What are "**high-risk roadway features**" for Roadway Departure? They could be:

#### Roadway Features

#### Lane width

Shoulder width

Horizontal curve radius

Horizontal curve density

Presence of visual trap

Presence of an intersection

#### Exposure/Severity

Annual average daily traffic

Operating speed
Posted speed limit

Speed differential for curve advisory



Roadside
Features
Edge risk assessment
Roadside hazard rating
Steep slopes
Ditch shape
Trees





1<sup>st</sup> - Keep vehicles on the road



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





#### 1<sup>st</sup> - Keep vehicles on the road

Improved curve delineation

# Friction treatments in curves and other spot locations

Edge line, shoulder & center line rumble strips.







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

Shoulders

SafetyEdge<sup>SM</sup>

Maintained clear zones

Traversable roadside slopes







#### 3<sup>rd</sup> - Minimize the severity

### **Breakaway Features**

- Signs and luminaire supports
- Utility poles

# Barriers to shield obstacles including:

- Trees and shrubbery
- Other fixed objects
- Slopes





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