Office of Safety
Proven Safety Countermeasures

Safe Roads for a Safer Future
Investment in roadway safety saves lives

These nine countermeasures address crashes that occur in the focus areas of intersections, pedestrians, and roadway departure.



Improving safety is a top priority for the U.S. Department of Transportation, and FHWA remains committed to reducing highway fatalities and serious injuries on our Nation's highways. We are highly confident that certain processes, infrastructure design techniques, and highway features are effective and their use should be encouraged.

Memo 2012 "Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures" (HTML, PDF 20 KB)

In 2008, FHWA issued a "Guidance Memorandum on the Consideration and Implementation of Proven Safety Countermeasures" which highlights when and where we believe certain processes, design techniques, or safety countermeasures should be used. Many of the countermeasures promoted in 2008 have been widely applied and FHWA is updating its previous guidance. While agencies should still consider the application of all of the countermeasures listed in the 2008 memo, the 2012 "Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures" supersedes that from four years ago and takes into consideration the latest safety research. Safety practitioners are encouraged to consider this new set of countermeasures that are research-proven, but not widely applied on a national basis.

Click on one of the nine countermeasures below for more information and a downloadable fact sheet.


Roundabouts


Corridor Access Management


Backplates with Retroreflective Borders


Longitudinal Rumble Strips and Stripes on Two-Lane Roads


Enhanced Delineation and Friction for Horizontal Curves


Safety Edge SM


Medians and Pedestrian Crossing Islands in Urban and Suburban Areas

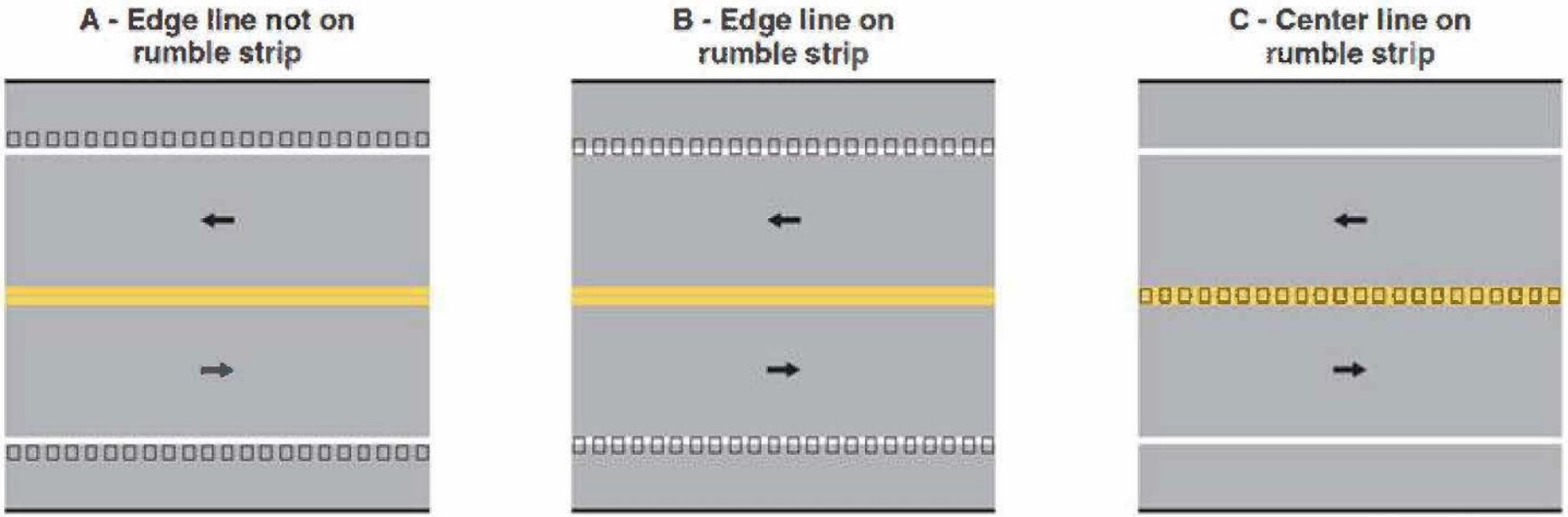

Pedestrian Hybrid Beacon


Road Diet

You may need the Adobe Reader to view the PDFs on this page.

Shoulder and center line rumble strips

Figure 3J-1. Examples of Longitudinal Rumble Strip Markings



Note: Edge line may be located alongside the rumble strip (Option A) or on the rumble strip (Option B). Center line markings may also be located on a center line rumble strip (Option C).

Shoulder and center line rumble strips

Shoulder Rumble Stripe

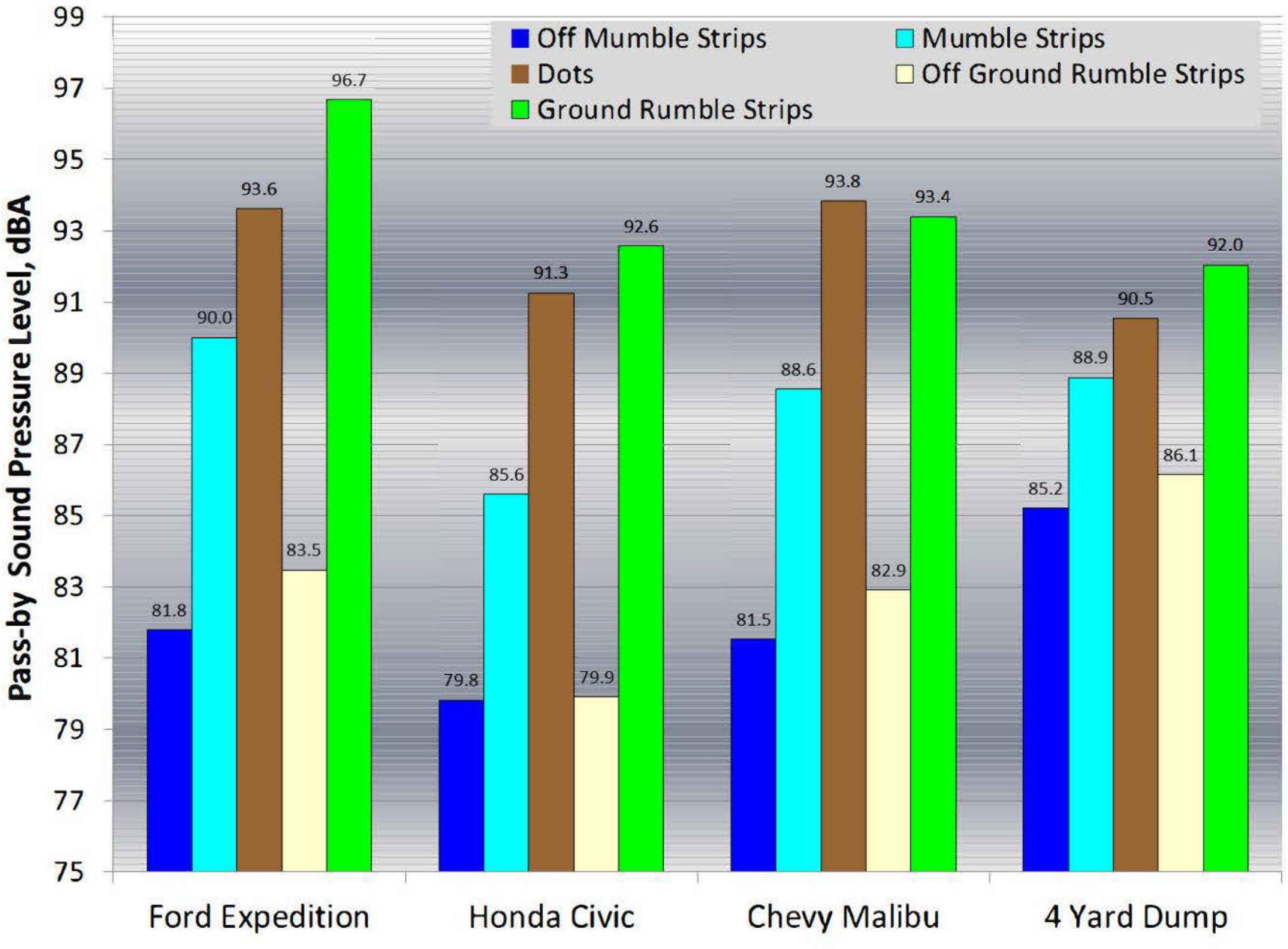
SR 84 in bay area
Courtesy of Google

Shoulder and center line rumble strips

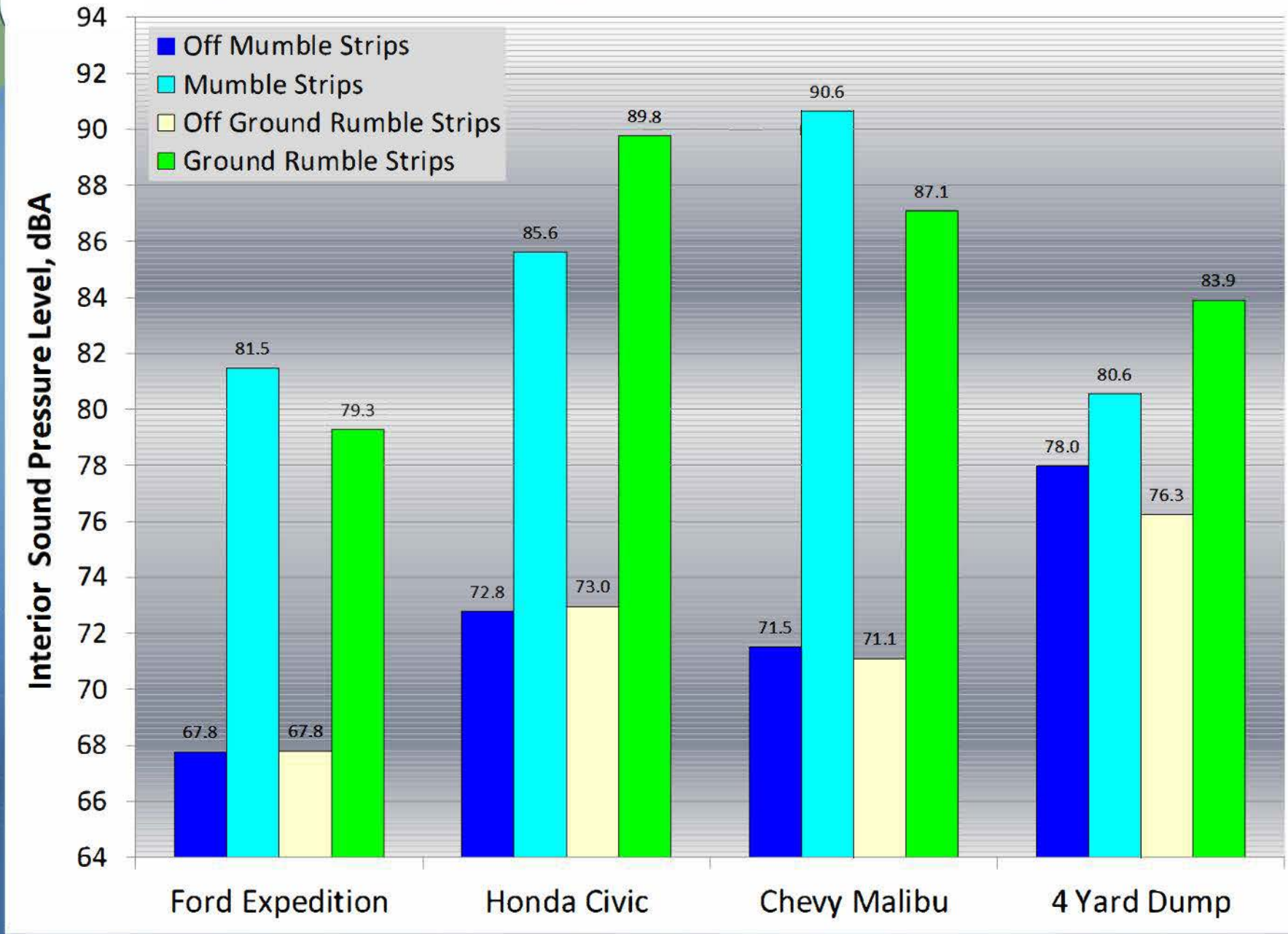
- Low-cost: Cost varies based on the application. Prices range between $0.20 and $3.00 per linear foot.
- >250 Crash Modification Factors (CMFs) for longitudinal rumble strips. Range from 0.9 – 0.5.
  - www.cmfclearinghouse.org
  - Ex: Centerline rumble strip
    - rural head on/sideswipe; fatal/injury
    - Segment
    - A: 20 [crashes/yr] x **0.55** = 11 crashes/yr

Caltrans (patent pending) Mumble Strip Evaluation

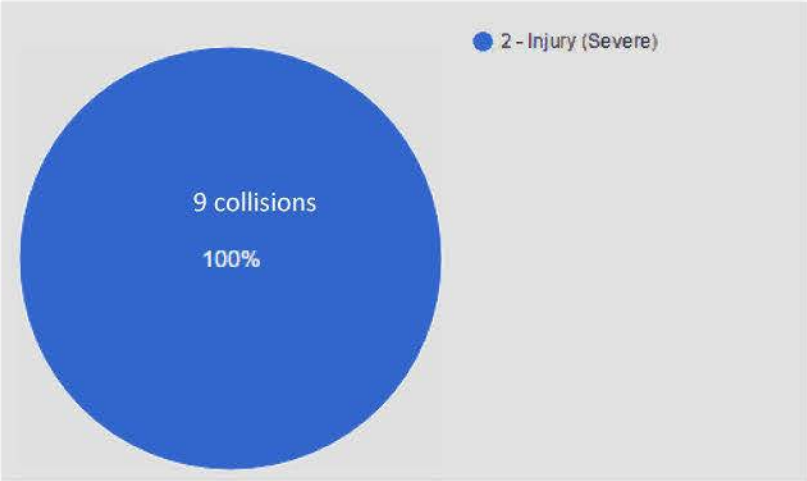
Overall Pass-by Noise Levels



Overall Interior Noise Levels

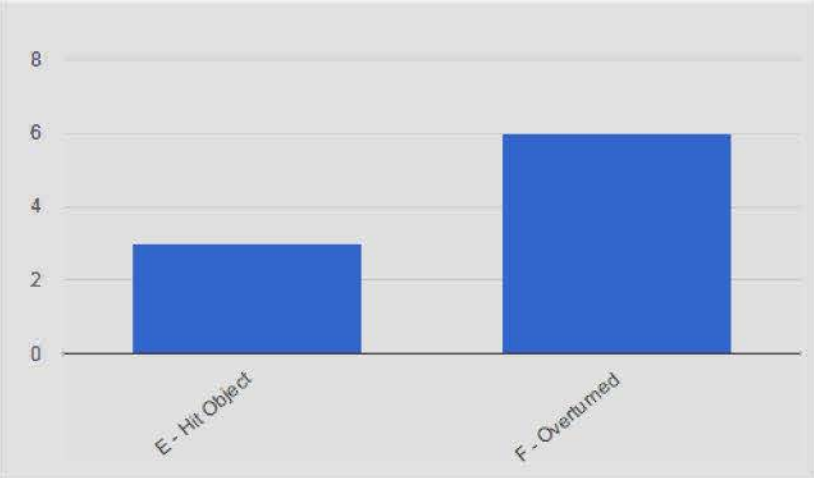


Mariposa County Focus Area



- Summary statistics for 9 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	5	55.6%
Unsafe Speed	4	44.4%

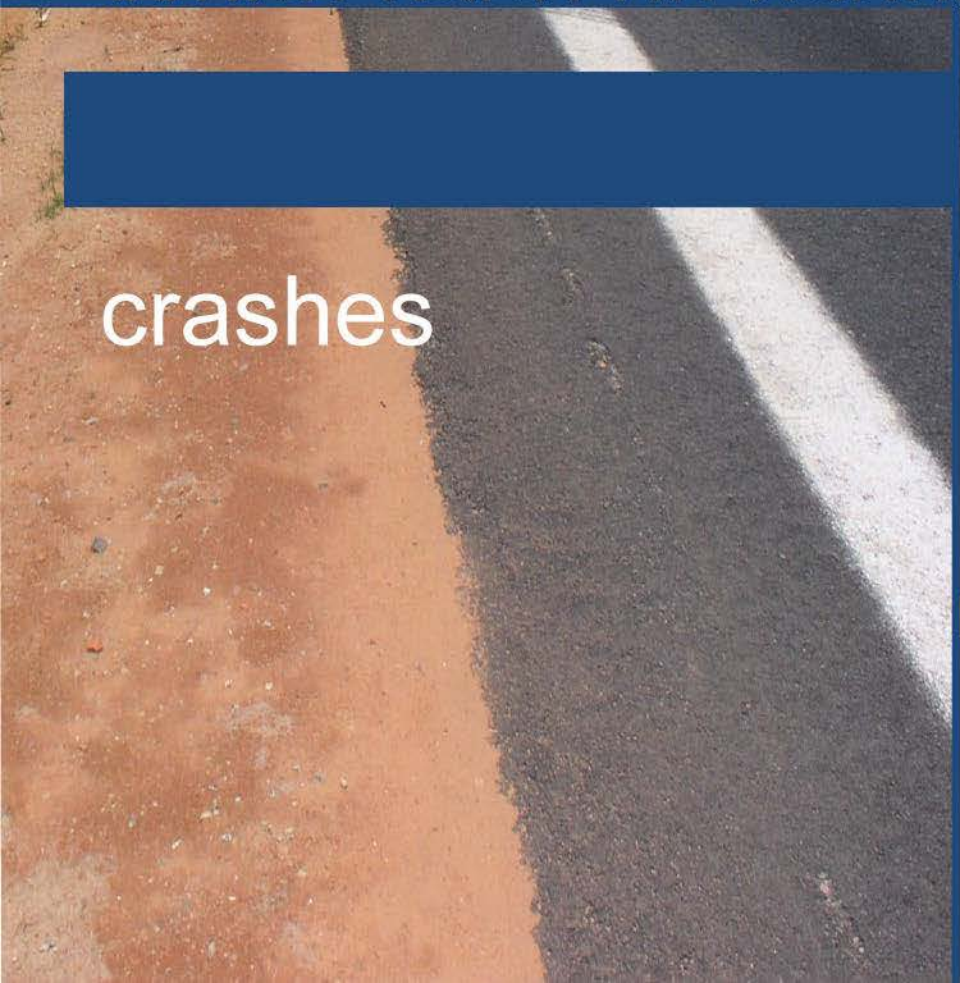


Motor Vehicle Involved With	Collisions	Percentage
Non-Collision	6	66.7%
Fixed Object	3	33.3%

What Is the Safety Edge?

When used on asphalt pavement, the

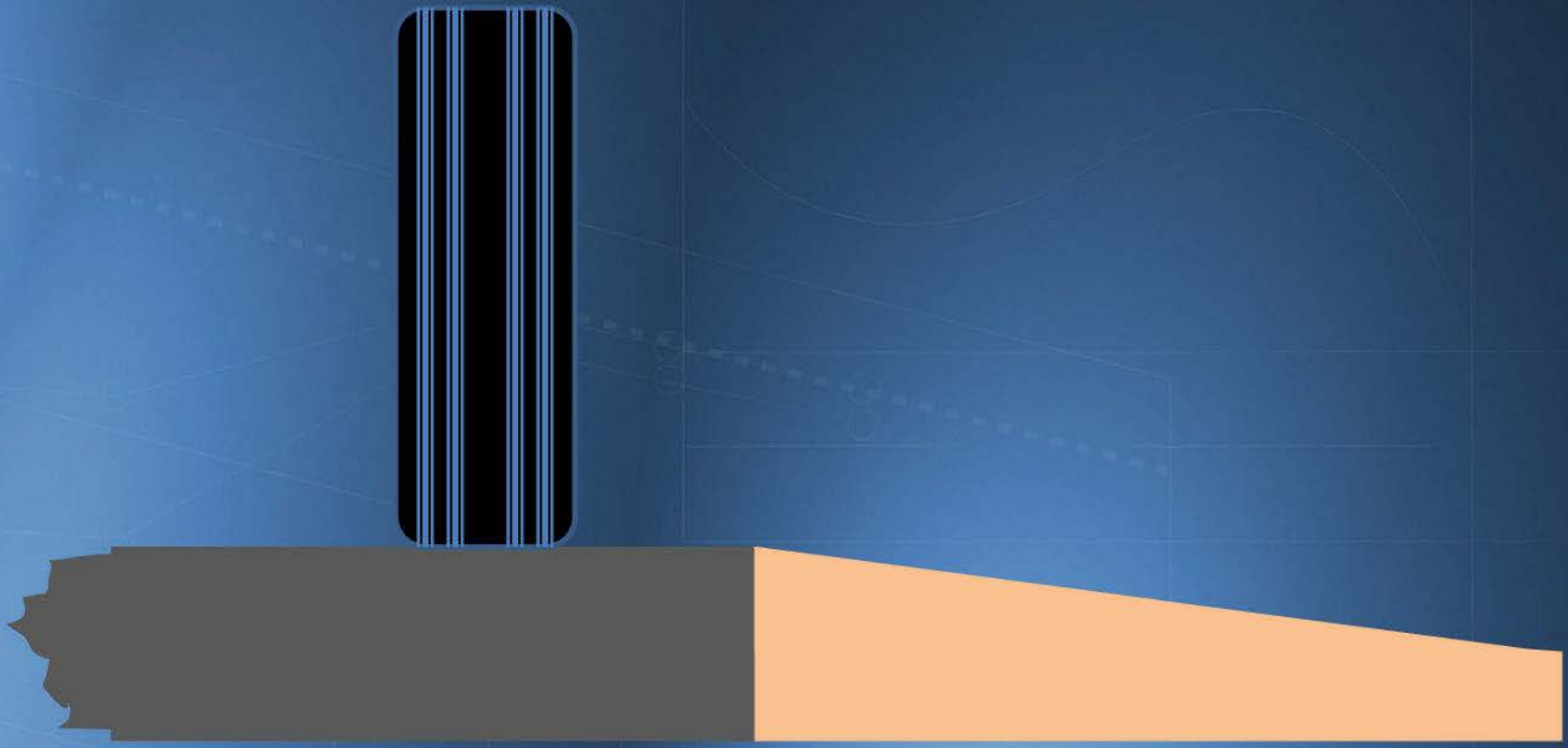
crashes



Key Message

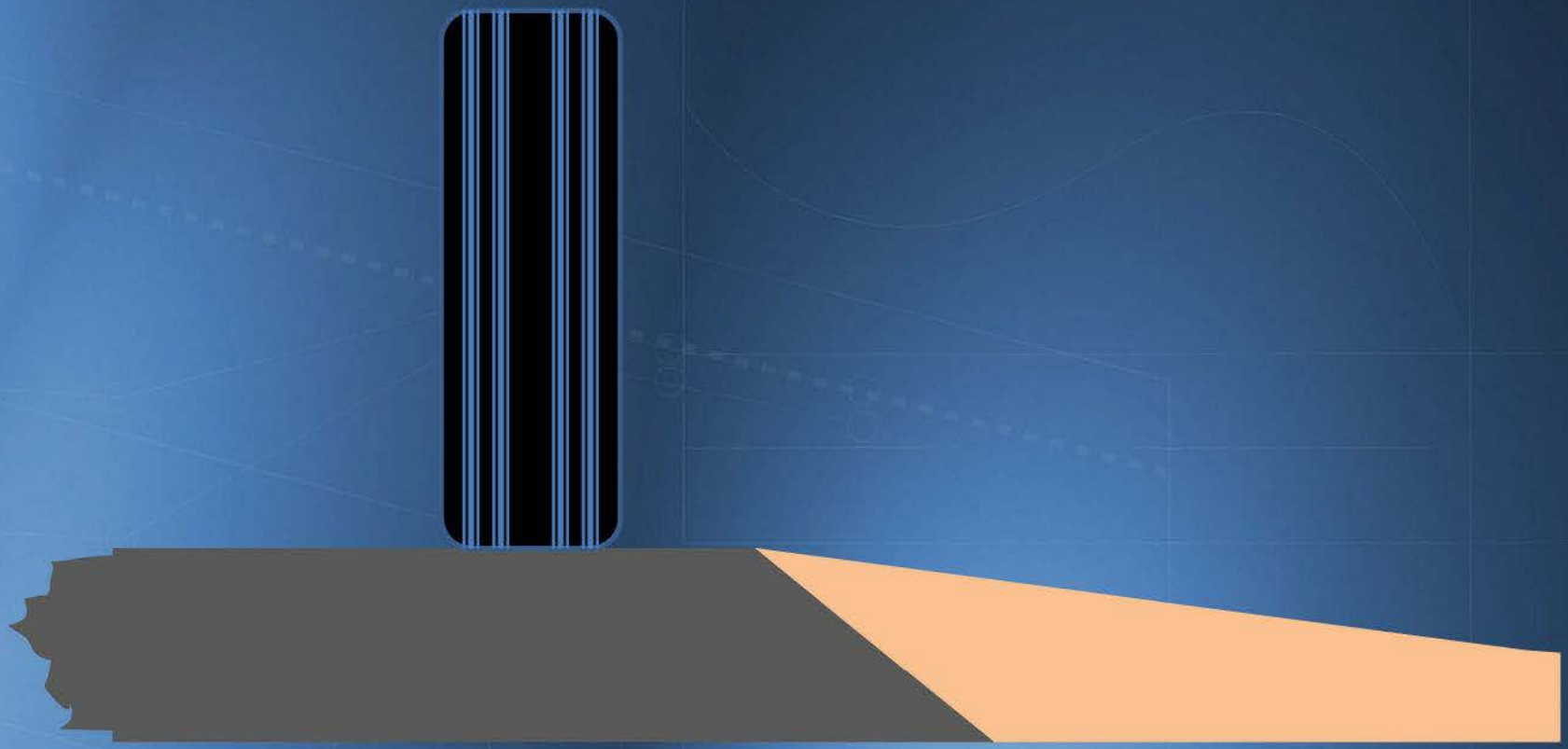
- **Saves Lives**
  - Allows vehicles to safely return to the travel lane
- **Improves Durability**
  - Reduces edge raveling
- **Low Cost**
  - Minor change to paving operations

Basic Principle



Without a Safety Edge

Basic Principle

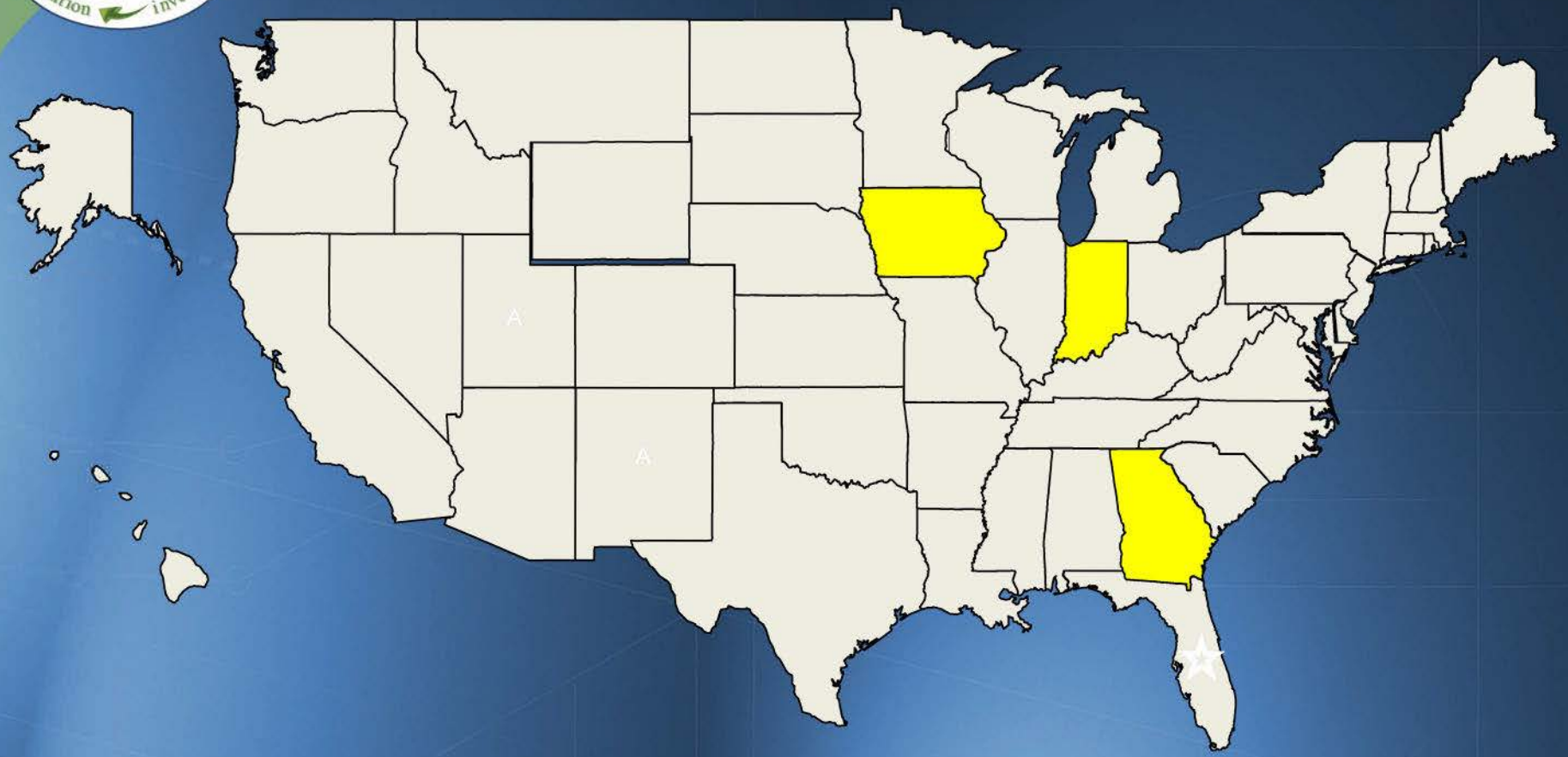


With Safety Edge

Locations at High-Risk for Drop-Offs

- Horizontal Curves
- Near Roadside Mailboxes
- Turnarounds/Unpaved Pull-Outs
- Shaded Areas
- Eroded Areas
- Edge ruts
- Asphalt Pavement Overlays

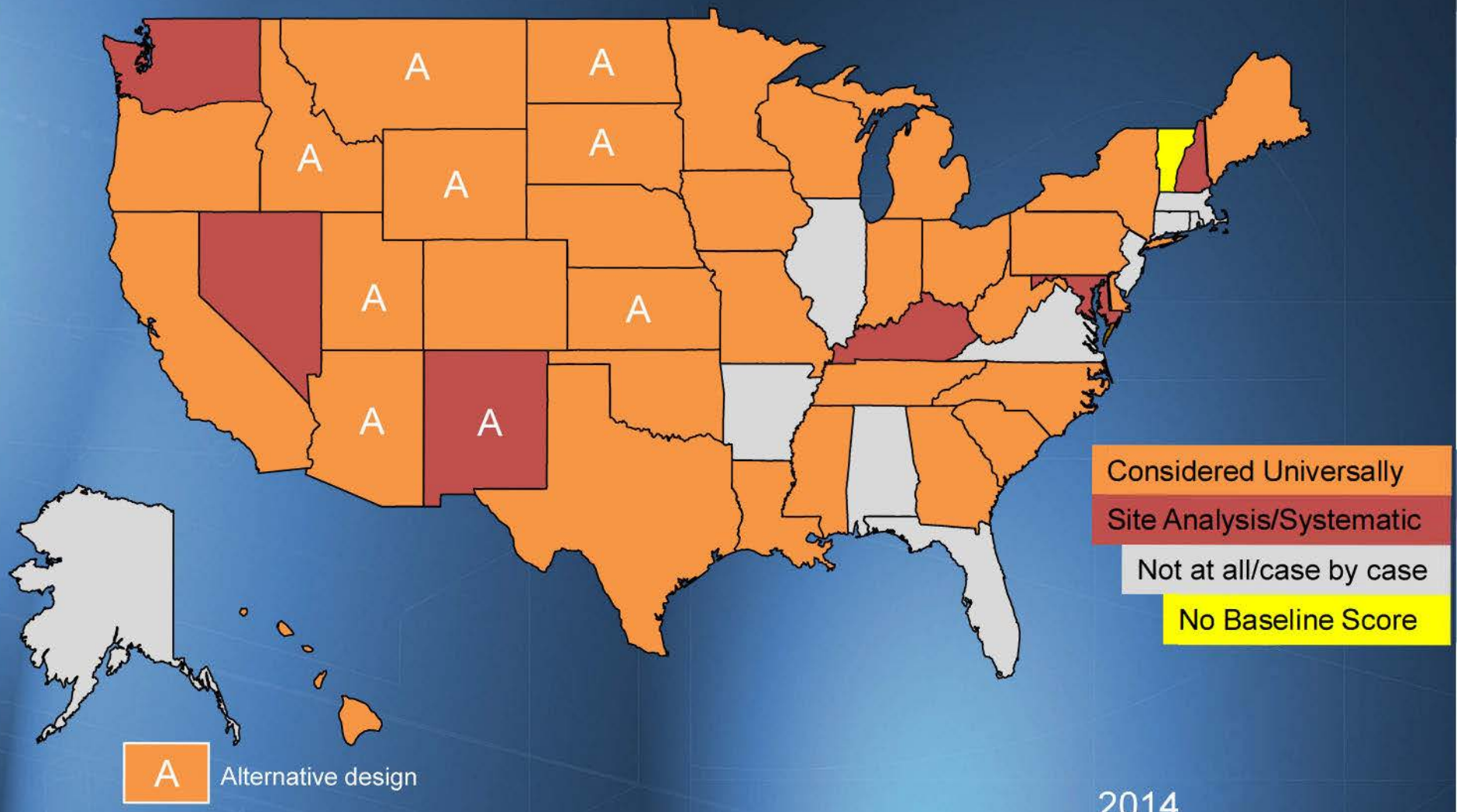
Safety Edge pre EDC



State DOT Projects Built

2007

Where We Are: Safety Edge℠



The Hardware

Costs of the Safety Edge

- Hardware
  - Approximately $1400-$4500 per device
  - Reusable
- Material
  - Minor additional asphalt

  (depends on shoulder condition)
- Paving Process
  - No change in paving speed or rolling patterns
  - No additional operation
  - Minimal monitoring
- Surface Details
  - No change in smoothness/ride quality

Enhanced Delineation for Horizontal Curves

- Data collected from states of Connecticut and Washington
- Delineation improvements for horizontal curves on two-lane rural roads
- 117 mile/years of before and after data (228 sites total)
- Chevron, curve ahead, horizontal or suggested speed limit signs
- Fluorescent sheeting, increased size or additional signs

Example of Enhanced Delineation

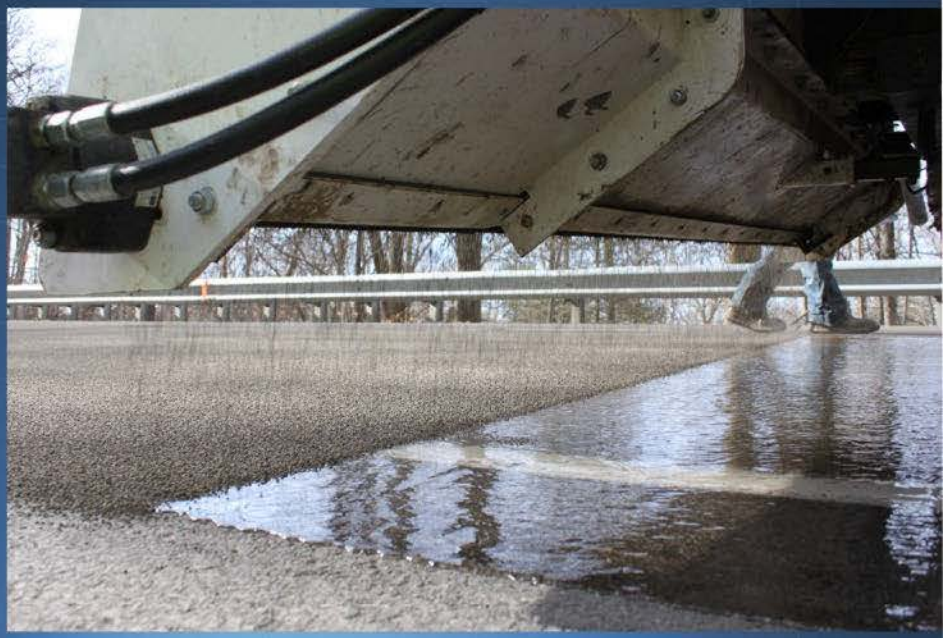
Results from Study

Table 3. Summary of crash reduction factors.

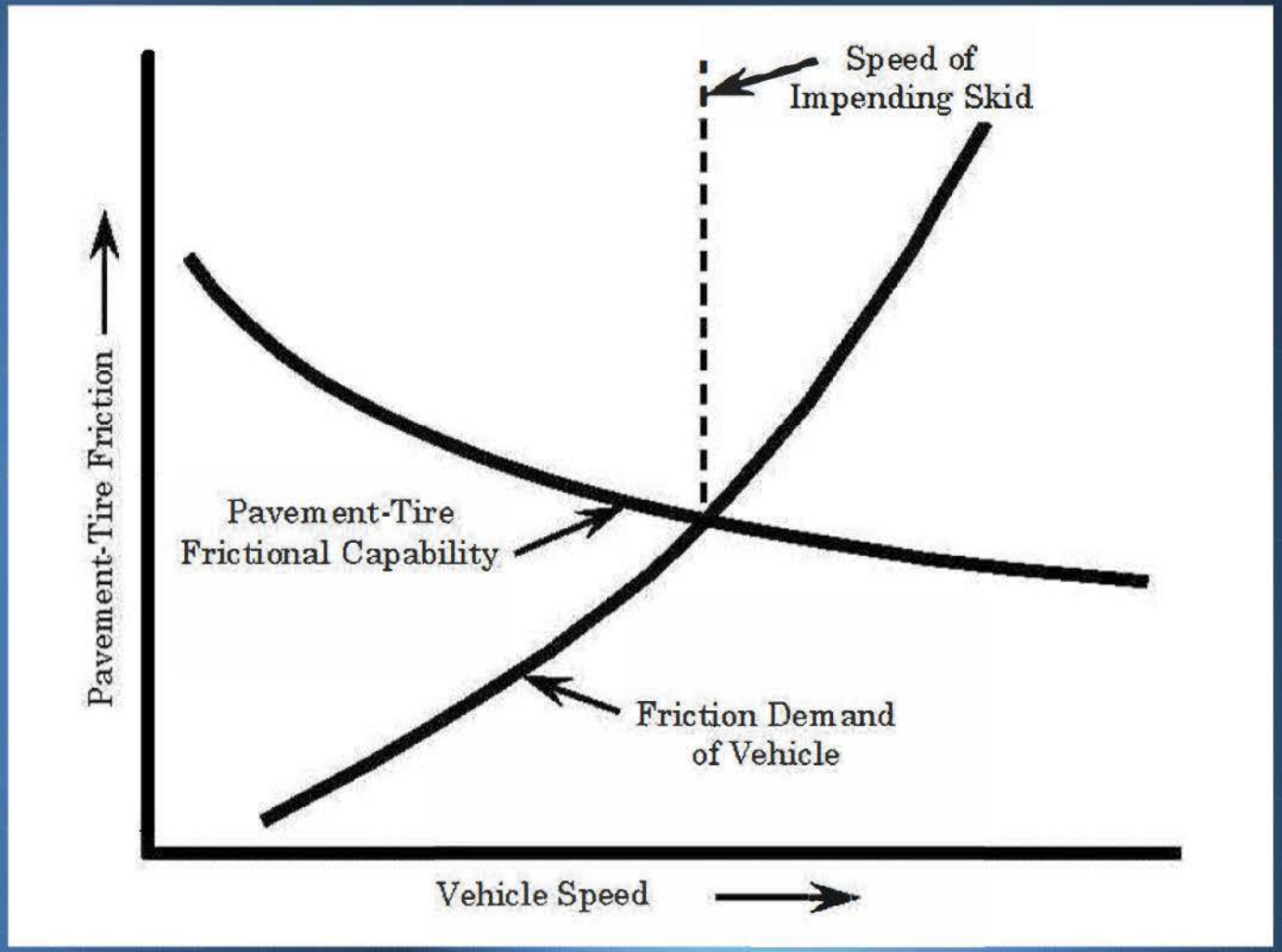
Crash Type	Recommended Crash Reduction Factors (Point Estimate)	Standard Error
Injury and fatal curve crashes	18	8.6
Curve crashes during dark conditions	27.5	7.3
Lane departure crashes on curves during dark conditions	25.4	7.8

* Improving curve delineation with signing improvements, is a very cost-effective treatment with a B/C exceeding 8:1. The greatest enhancements can be seen at locations with more hazardous roadsides, higher volumes and smaller curve radii.

High Friction Surface Treatments



Conceptual Relationship Between Friction Demand, Speed and Friction Availability



Source NCHRP 108

Key Messages

- ***HFSTs reduce crashes -> Reduce injuries and fatalities***
- Additional messages include:
  - the durability and longevity of the pavement surface 8 – 10 years
  - $20 - $40 / yd2
  - minimal impact to traffic during construction
  - negligible environmental impact

Case Study: DN-199

- All 28 collisions in 3 years occurred under wet pavement conditions.
- District had used many low cost countermeasures with little change in collision pattern.
- District proposed curve realignment.

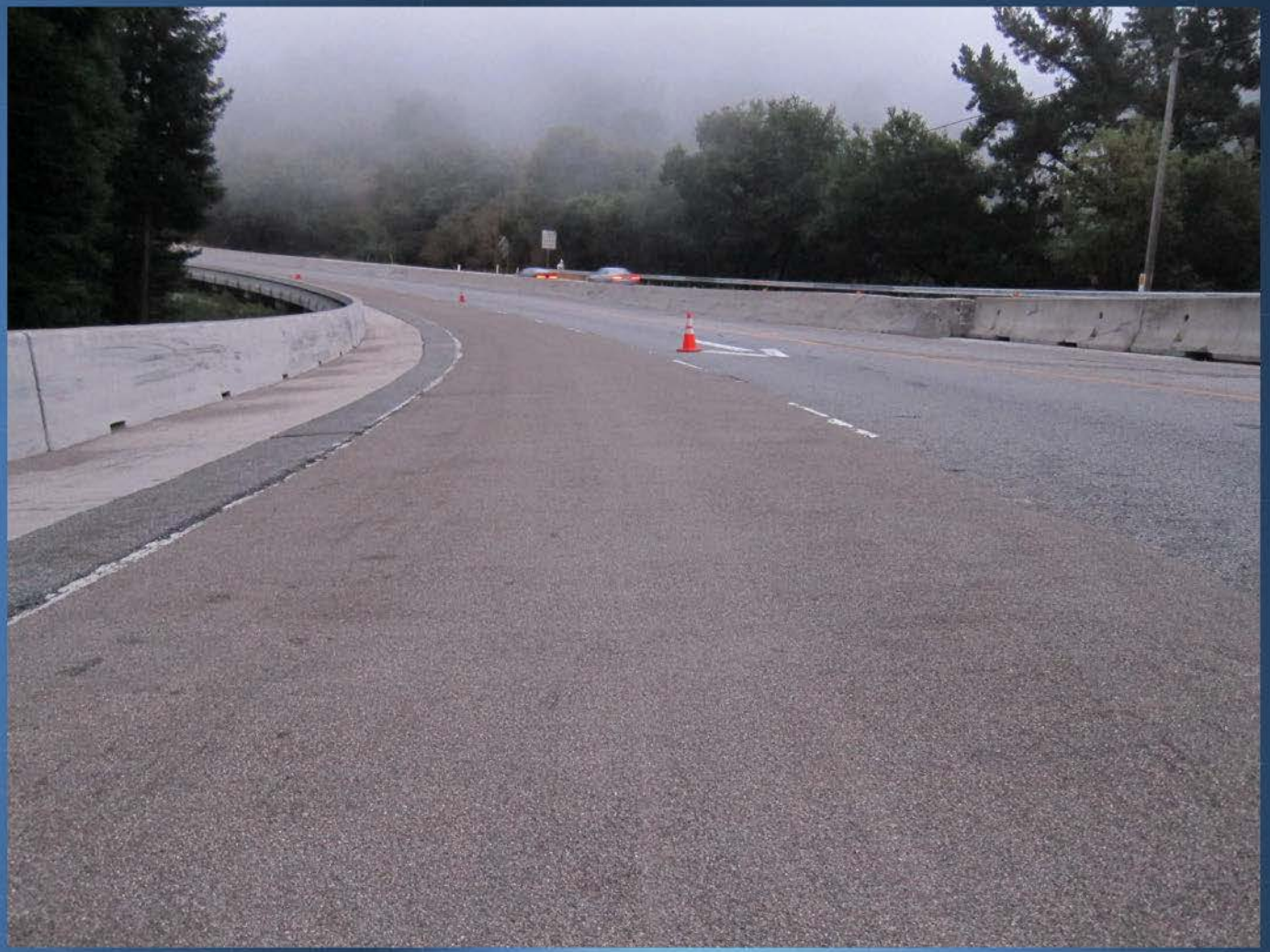

30
30
NB 01-DN-199 PM 8.2

Case Study: DN-199

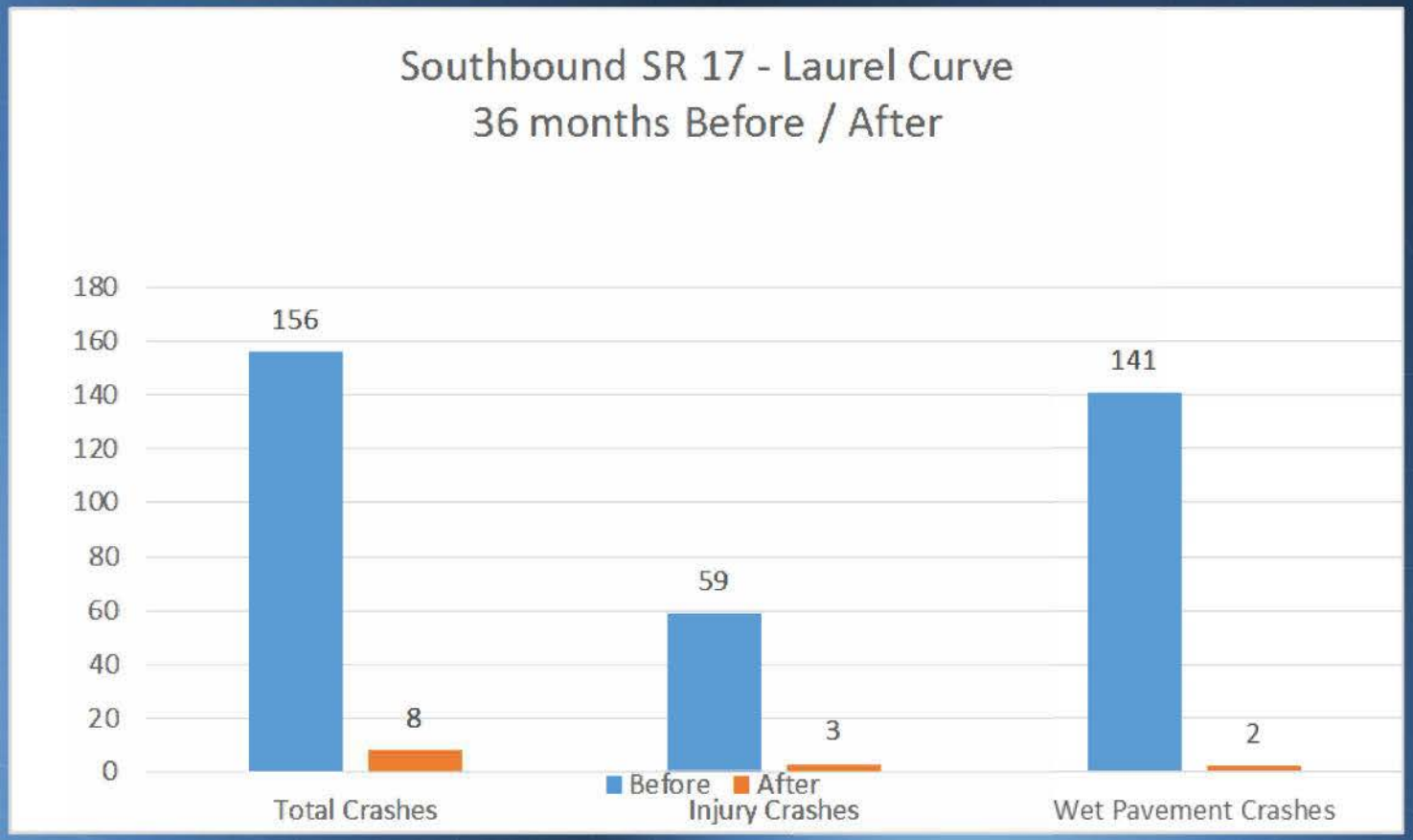
- Initial proposed project was to realign curve.
  - $14 M project; approx. 5 years to get through environmental, design and construction
- Realignment project put on hold to install HFST
  - $250 K project; approx. 6 months to get through environmental, design and construction
  - No crashes since installation (Summer 2012)

Case Study: Hwy. 17 at Laurel Canyon

SR-17, Laurel Curve near Santa Cruz



Study: Hwy. 17 at Laurel Canyon



94.8% collision reduction!!

B/C – 183 to 1

Questions and Discussion