



Enhanced Delineation and Friction for Horizontal Curves

SAFETY BENEFITS:

CHEVRON SIGNS

25%

Reduction in nighttime crashes

16%

Reduction in non-intersection
fatal and injury crashes

Source: CMF Clearinghouse, CMF IDs 2438 and 2439

HIGH FRICTION SURFACE TREATMENTS

52%

Reduction in wet road crashes

24%

Reduction in curve crashes

Source: CMF Clearinghouse, CMF IDs 7900 and 7901

This proven safety countermeasure for reducing crashes at curves includes a variety of potential strategies that can be implemented in combination or individually. These strategies fall into two categories: enhanced delineation and increased pavement friction.



Chevron signs installed along a curve.

Source: Thinkstock

Enhanced Delineation

Enhanced delineation treatments can alert drivers in advance of the curve and vary by the severity of the curvature and operating speed. Price ranges for these strategies are low to moderate. Treatments include the following:

- Pavement markings.
- Post-mounted delineation.
- Larger signs and signs with enhanced retroreflectivity.
- Dynamic advance curve warning signs and sequential curve signs.

Increased Pavement Friction

High friction surface treatment (HFST) is another highly cost-effective countermeasure. HFST compensates for the high friction demand at curves where the available pavement friction is not adequate to support operating speeds due to one or more of the following situations:

- Sharp curves.
- Inadequate cross-slope design.
- Wet conditions.
- Polished roadway surfaces.
- Driving speeds in excess of the curve advisory speed.

To implement these proven safety countermeasures, agencies can take the following steps:

1. Develop a process for identifying and treating problem curves.
2. Use the appropriate application for the identified problem(s), consider the full range of enhanced delineation and friction treatments.
3. Improve consistency in application of horizontal curve guidance provided in the *Manual on Uniform Traffic Control Devices* for new and existing devices.
4. Review signing practices and policies to ensure they comply with the intent of the new guidance.

→ For more information on this and other FHWA Proven Safety Countermeasures, please visit <https://safety.fhwa.dot.gov/provencountermeasures>.

