



High Friction Surface Treatments

PROJECT CASE STUDY

Since Roads can be dangerous, maintaining the appropriate amount of pavement friction is critical for safe driving. Over time, pavement friction can be affected by things like excessive braking and severe weather conditions. This can cause vehicles to skid, leading to high crash rates.

High Friction Surface Treatment (HFST) is an emerging, proven technology that combats friction loss. At spot locations where friction demands far exceed existing pavement friction, high-quality aggregate is applied to help motorists maintain better control in dry and wet driving conditions. This can dramatically reduce crashes and related injuries and fatalities.

While most applications of HFST occur at curves, intersections can also benefit from HFST. Vehicles at intersections require greater longitudinal friction force to come to a safe stop. HFST can provide this friction, and this helps to compensate for other safety issues at intersections, such as the lack of adequate sight distance and the need for additional braking distance at a downgrade approach.

The following case study illustrates the benefits of applying HFST at a downgrade approach to a signalized intersection.

HFST at the intersection of Forest Drive and Cole Creek Parkway in Bellevue, Washington results in 78 percent fewer accidents per year *Associated accident costs dropped by 83 percent*

The City of Bellevue in Washington State installed the HFST 'Tyre-grip' on the westbound approach of Forest Drive at its intersection with Cole Creek Parkway in Bellevue in October 2004 (resurfaced again in May 2007 due to a surface water issue). This is a downgrade intersection approach often affected by icy weather conditions. Approximately 35,000 vehicles use the westbound approach weekly. Bellevue tried several countermeasures, including installing a large flashing warning sign at the bottom of the grade, additional road markers, new street lights, and raised pavement buttons, but did not achieve the desired result. After applying HFST, accidents at this intersection dropped 78% and costs associated with accidents declined by 83%.



ADVOCATING FOR HFST

The HFST product speaks for itself – because it works. State and local DOTs, however, are often at the mercy of tight budgets and resources. The key to proving the value of HFST is to highlight its durability over the product life cycle. When measured over time, HFSTs are more cost-effective than traditional paving because they last longer. This also means less labor resources are used to fix pavement friction issues, and fewer construction projects reduces the number of construction-zone related accidents. HFST can also be applied as a spot treatment only on areas where friction is affected, rather than treating the entire road—saving time, money, and resources.

Keys to Success

- ▶ Emphasize cost savings over time when compared to geometric improvements, or removal and replacement of existing pavement
- ▶ Highlight Rapid Implementation and product durability over the life cycle
- ▶ Demonstrate the value of spot-treating low friction areas, rather than treating or repaving the entire road
- ▶ Communicate the benefits to the public and elected officials

BENEFITS OF HFST

Safety	Operations	Cost
<ul style="list-style-type: none"> ▶ Enhances safety by improving driver control of vehicles and reducing stopping distances ▶ Reduces skidding in both wet and icy weather conditions (on both roads and pedestrian walkways) ▶ Significantly reduces primary and secondary crashes, fatalities, and injuries 	<ul style="list-style-type: none"> ▶ Customizable to a wide range of uses—road owners can identify and spot treat areas where friction demand is the highest, such as: <ul style="list-style-type: none"> • <i>two-lane urban/rural roads at horizontal curves</i> • <i>areas near steep grades</i> • <i>areas at or near lane changes</i> • <i>urban intersections</i> • <i>bus or bike lanes</i> • <i>surfaces that tend to ice</i> (such as bridges or pedestrian walkways) ▶ Uses highly-durable aggregates that are polish and wear resistant and develops texture to prevent water buildup on wet surfaces ▶ Designed to set quickly—HFST can be applied by machine at a similar speed to other paving surface treatments ▶ Can be installed over virtually all pavement types, and can be colored for delineation purposes ▶ Requires minimal additional pavement thickness (1/8"– 1/4") in areas where overhead clearance is limited 	<ul style="list-style-type: none"> ▶ Initial installation costs are higher than conventional pavement, but the durability of HFST and limited use in critical locations make it a lower-cost option over its life cycle. Life expectancy of HFST is 5 to 7 years under heavy traffic and 10 to 15 years for light traffic ▶ Less expensive than geometric improvements (such as superelevation) or removing and replacing existing pavement ▶ A range of HFST treatment products are available now, and other, more cost-effective products are in development

ADDITIONAL RESOURCES

- ▶ Federal Highway Administration, EDC Initiatives, <http://www.fhwa.dot.gov/everydaycounts/edctwo/2012/friction.cfm>.
- ▶ Public Roads Magazine, Gaining Traction In Roadway Safety: <http://www.fhwa.dot.gov/publications/publicroads/08july/05.cfm>
- ▶ Mark Poch, Bellevue City Government, Washington State, MPoch@bellevuewa.gov

For additional information, please contact:

Joseph Cheung, P.E.
 High Friction Surface Treatment Lead
 Safety & Design Engineer
 FHWA Office of Safety
joseph.cheung@dot.gov



Every Day Counts (EDC), a State-based initiative of FHWA's Center for Accelerating Innovation, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery



Highway

Department of Transportation

FHWA-CAI-14-016