

DRAFT

High Friction Surface Treatment Benefit/Cost 2016



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Pennsylvania Statistics

From 2010 to 2014 there were 615,947 reportable crashes with 6,323 fatalities (1.03%) and 16,701 major injuries (2.71%) in Pennsylvania. According to Pennsylvania's Crash Data Analysis Retrieval Tool (CDART) from 2010 to 2014, wet pavement crashes accounted for 104,733 or 17.0% of all reportable crashes. Because of the severity of this type of crash, they accounted for 14.89% of all fatalities.

To reduce the number of wet pavement crashes, PennDOT has installed a High Friction Surface Treatment (HFST) on two lane roads.

Candidate locations for installation are locations where:

- Drivers may brake excessively going around curves
- Drivers may brake excessively going down steep grades
- Drivers may brake excessively while approaching intersections

The road surface can become prematurely polished, reducing pavement friction and causing vehicles to skid when drivers brake. Wet road surfaces can also reduce pavement friction and cause skidding or hydroplaning. HFST uses high-quality, wear-resistant aggregates (such as bauxite) to provide increased friction on pavements. This helps to keep vehicles in their lane on slippery pavement around curves and allows drivers to stop. The epoxy-binder used to bond the aggregates together is designed to set quickly so there is minimal impact to the traveling public. HFST may be installed on two-lane roads with pavement widths of 20 feet or greater. They can also be applied on undivided multi-lane roads.

Pennsylvania's HFST Locations

Throughout Pennsylvania, approximately 27.55 mile (140 locations) of HFST has been implemented on state roadways. Of those, 1.18 miles (4.58%) were implemented between 2007 and 2012.

In an effort to gauge the effectiveness of applying the HFST, an analysis of crash data was performed for 15 locations consisting of approximately 1.18 miles of roadway with HFST installed between the dates of June 2007 and October 2012. To capture the long term effects of HFST, for the purpose of this report only the 15 locations that have been installed for three-years or longer will be included.

Benefit/Cost Analysis

This Benefit/cost analysis was performed to ascertain whether or not a project's cost is justified by the cost saving benefit to society as a result of reduction in crashes and injuries. This information is based on the study of fifteen (15) locations in Northampton and Lehigh County. The average cost to install HFST is \$35.00 per square yard for all 15 locations.

PennDOT has estimated the economic loss due to reportable traffic crashes using the following average cost to society for the different categories below (in 2008 dollars).

Deaths.....	\$6,474,138
Major Injuries.....	\$1,412,675
Moderate Injuries.....	\$92,465
Minor Injuries.....	\$7,510
Property Damage Only.....	\$3,004
Unknown Injuries.....	\$7,510

Due to differences in installation dates, 1 location (Pilot) has 8-years before and after data, 14 locations have 3-years before and after data. For each location crash data was reduced to an average annual level then combined to give an annual crash reduction per location.

Average Cost Benefit Table (15 locations)

	Crashes	Fatalities	Major	Moderate	Minor	PDO	Unknown Severity	Economic Savings Due to Reduction in Fatality/Injury
All 15 locations Annual Reduction	49.13	.58	.79	2.13	13.04	30.71	13.92	\$5,361,406
Annual Reduction per Intersection	3.30	0.04	0.05	0.14	.87	2.05	.93	\$357,427.08

The installation fee \$17,440.41 per location (Average area of 985 Square yards per location). With an annual economic savings due to reduction in fatalities and injuries of \$357,427 the benefit/cost ratio is 20.49:1.

Findings

The benefit to cost ratio indicates that the benefit exceeds the cost by a large amount. The crash data shows that the installation of HFST at one location averaged .04 lives saved. The 15 locations where HFST treatments have been installed have basically saved one life per year.