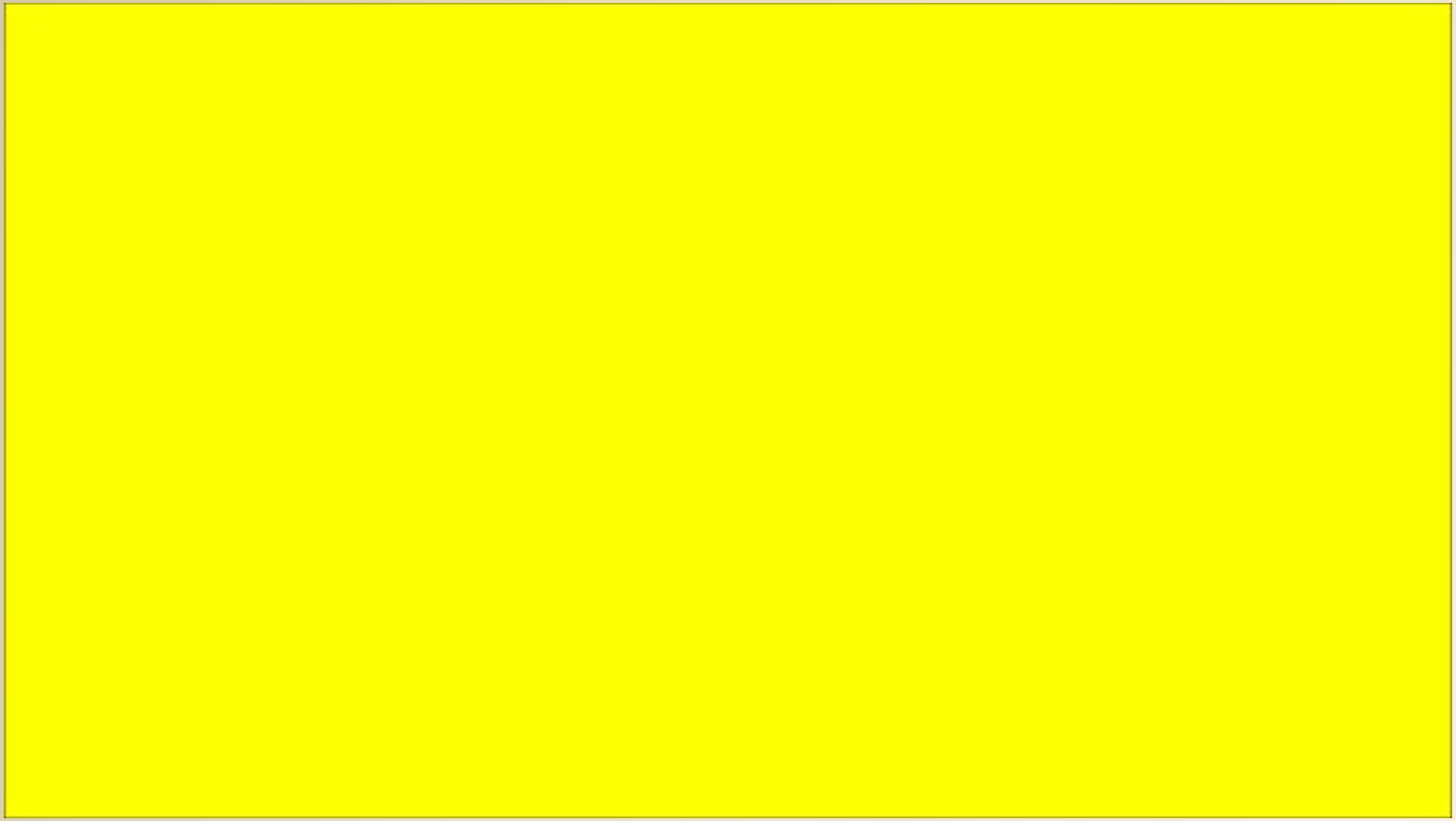
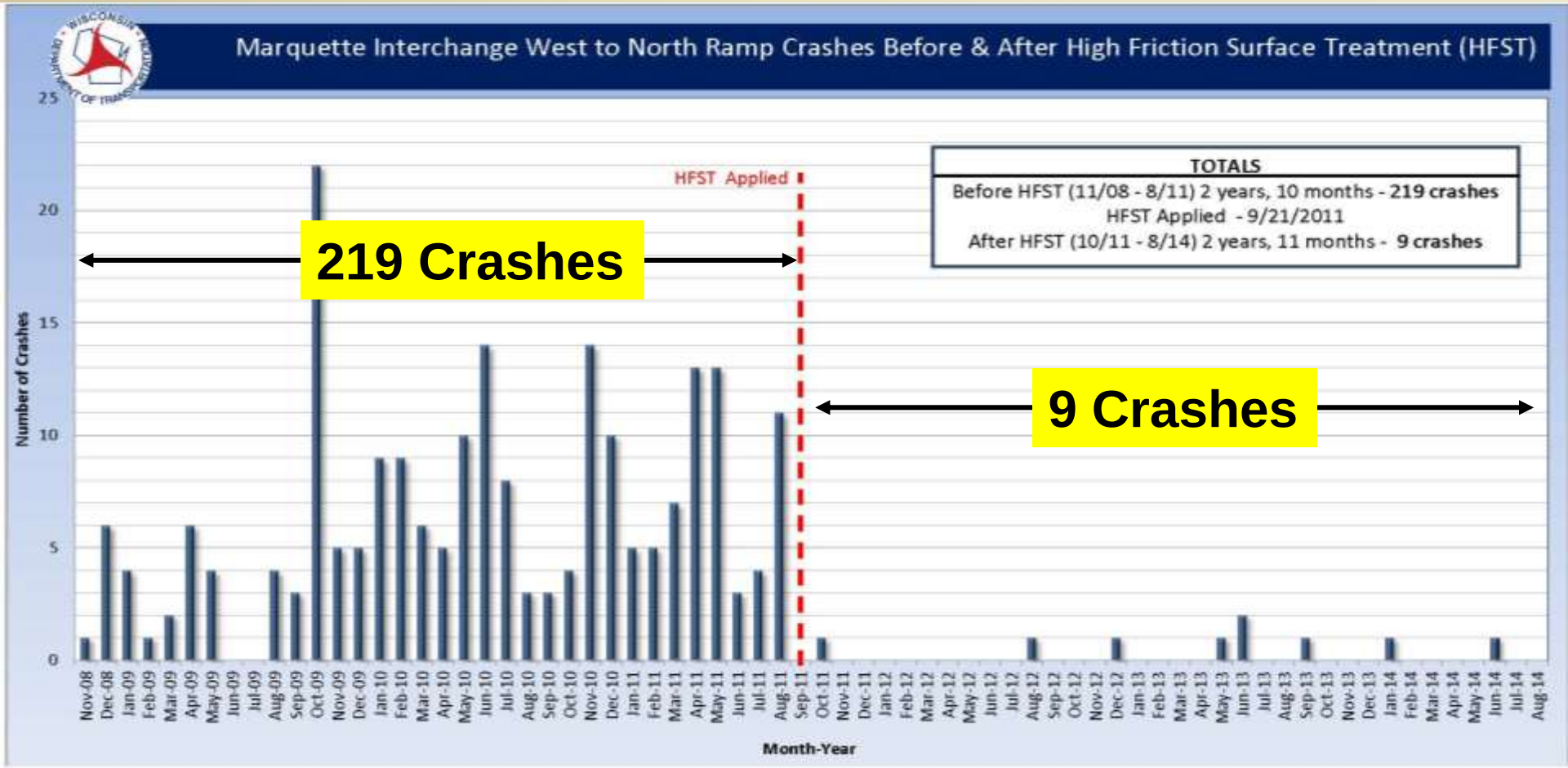
SAVE LIVES:

HIGH FRICTION SURFACE TREATMENTS

Marquette Interchange Wisconsin




Marquette Interchange West to North Ramp Crashes Before & After High Friction Surface Treatment (HFST)
HFST Applied
TOTALS
Before HFST (11/08 - 8/11) 2 years, 10 months - 219 crashes
HFST Applied - 9/21/2011
After HFST (10/11 - 8/14) 2 years, 11 months - 9 crashes
219 Crashes
9 Crashes
Number of Crashes
Month-Year

Kentucky HFST Program

(As of 6/22/2015)

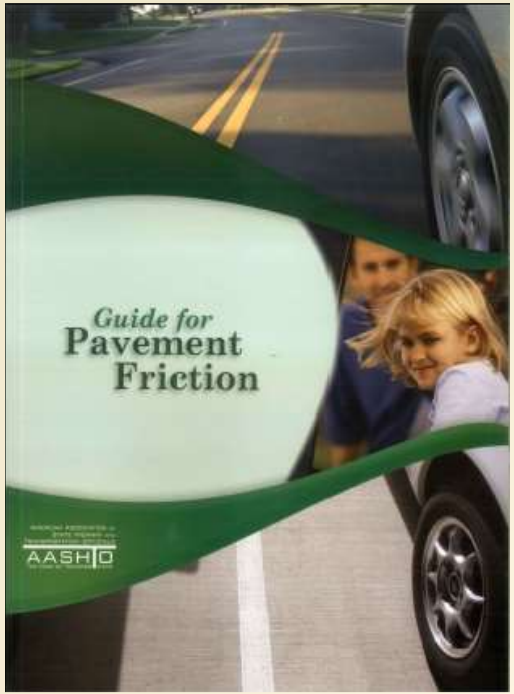
Crash Reduction %

Annual	ALL	RAMPS	CURVES
Wet Avg.	90%	90%	84%
Dry Avg.	77%	78%	80%
Total Avg.	87%	95%	87%

Where to Use HFST:

- Wet weather crash locations
- Curves
- Intersections
- Ramps

Generally applied in **short sections** to improve spot locations where friction demand is critical.



What is a HFST?

- Extremely polish resistant aggregate
  - Calcined Bauxite
- Polymer Binder with high shear resistance
  - 2 part epoxy
  - Polyester
  - Acrylic

www.atssa.com/Resources/HighFrictionSurfacing/StateSpecifications.aspx

Epoxy Binder Materials

Thin layer that allows for 50% aggregate embedment

HFST Aggregate

Calcined Bauxite


Friction
IRM
Interstate Road Management
USDOT 486431

Why Calcined Bauxite?

In-place friction characteristics:

- 65 FN40R
- AASHTO T 242

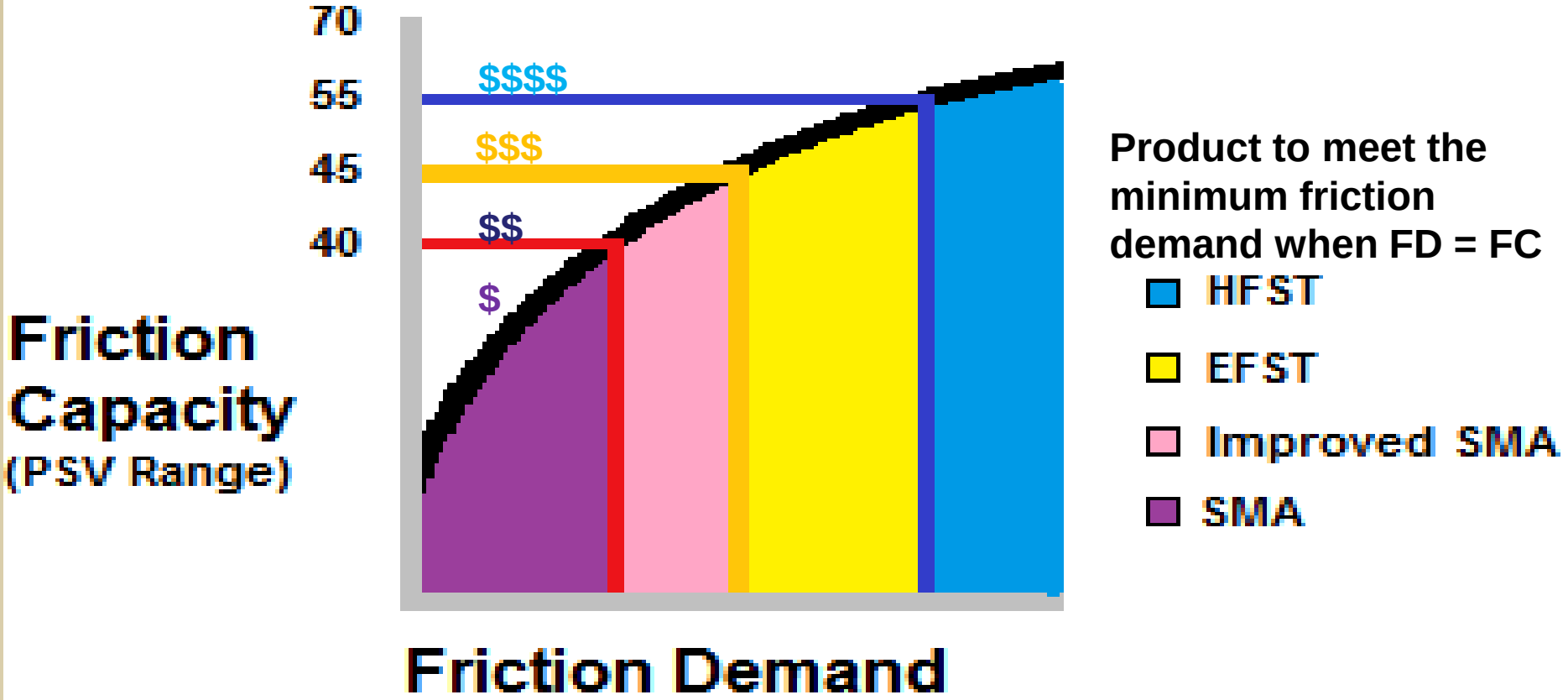
Some States are using values greater than 65

Reclaim Excess Aggregate

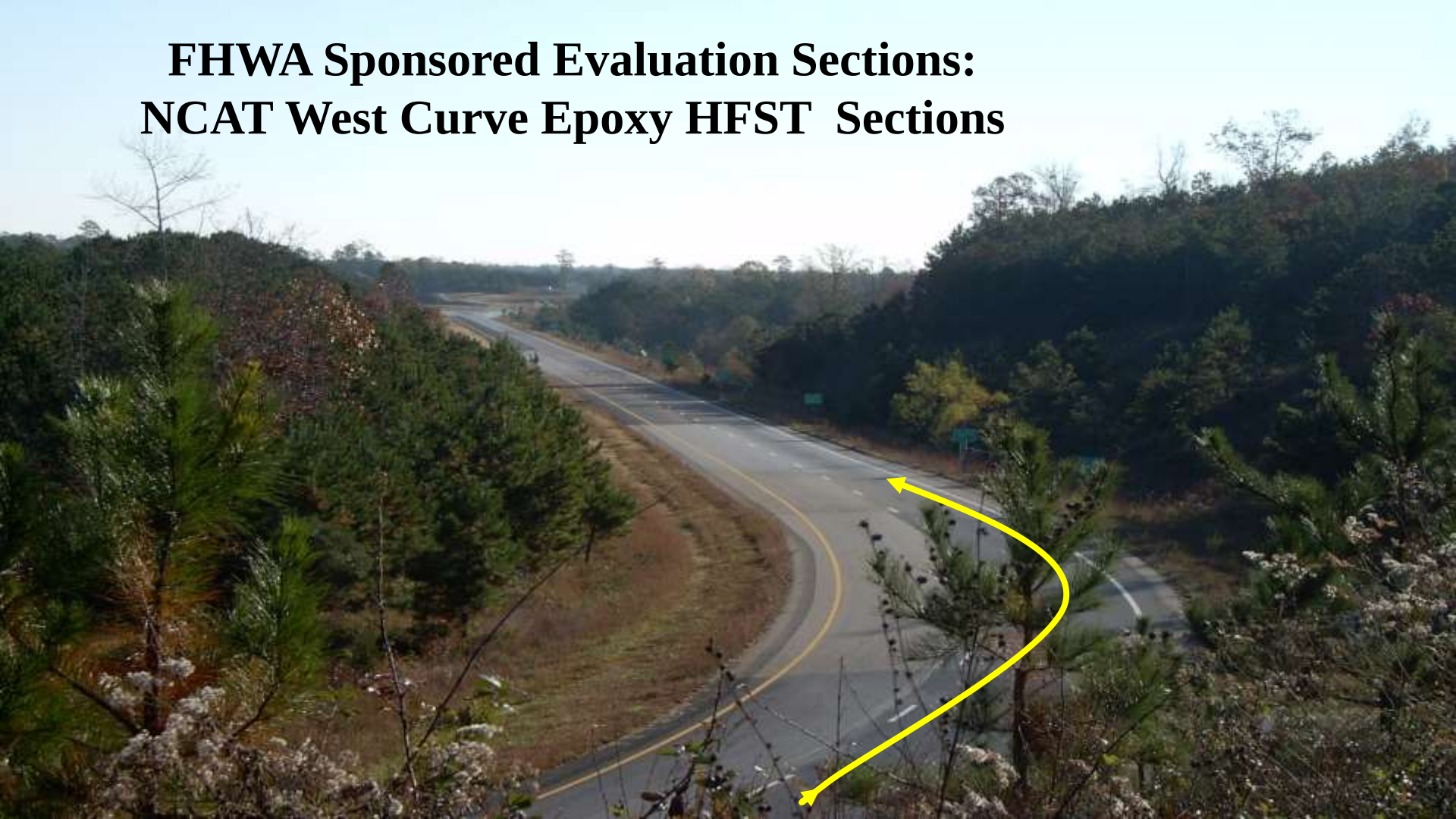
Semi-Automated Installation

HFST Finished Surface

Application Concept for Enhance Friction Surface Treatment



FHWA Sponsored Evaluation Sections: NCAT West Curve Epoxy HFST Sections

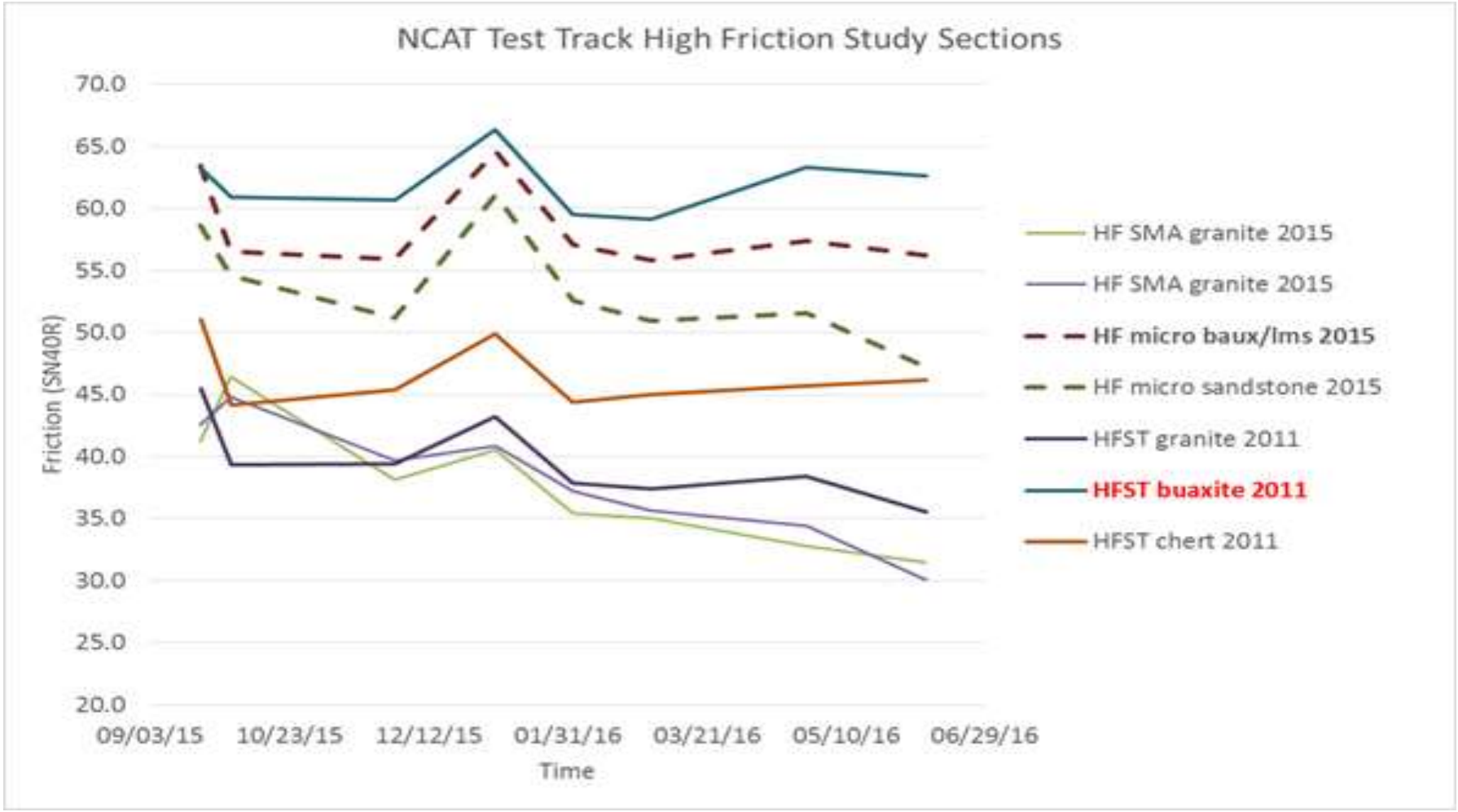


Asphalt Based Enhanced Friction Treatment

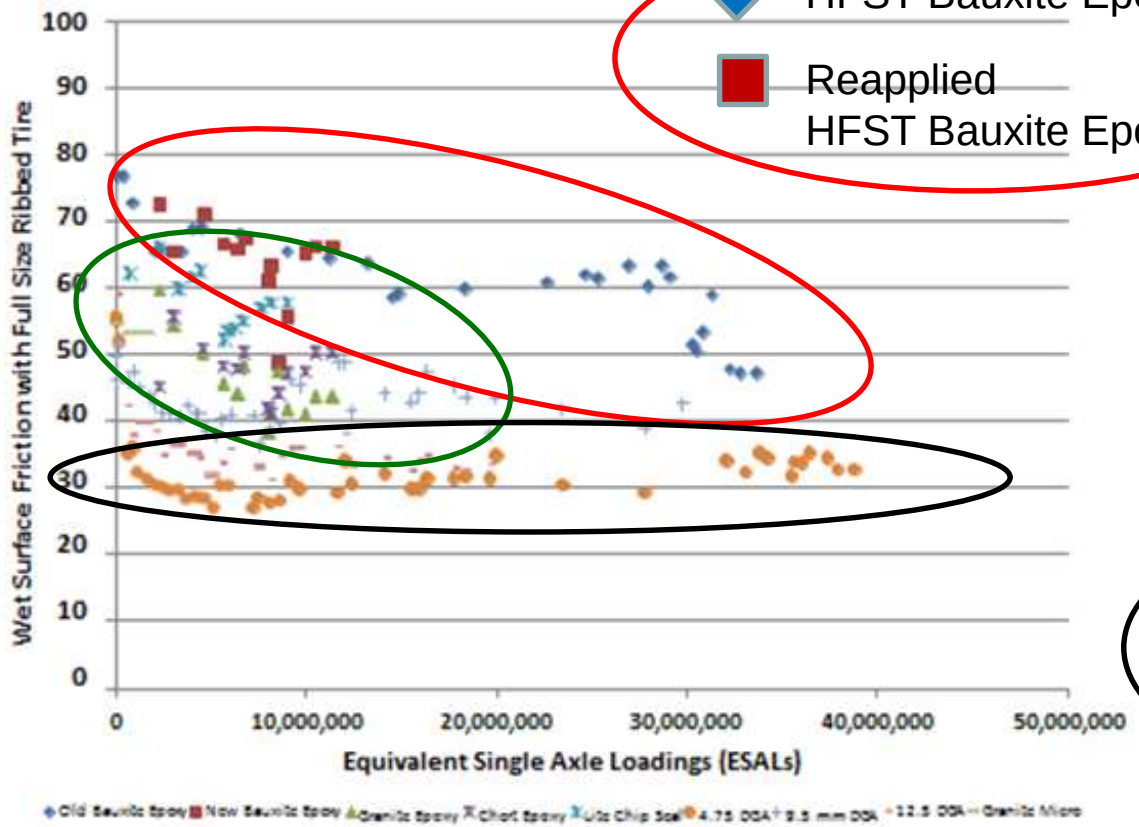
Enhanced Friction micro slurry at NCAT Test Track

Enhanced Friction Micro Slurry

- Agg Coarse Fraction(+#4)
  - 50% Limestone / 50% Calcined Bauxite
- Agg. Fine Fraction (- #4)
  - Limestone Screenings
- Binder
  - Highly Polymer Modified Emulsion
  - Shear resistance


NCAT Test Track High Friction Study Sections
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
Friction (SN40R)
09/03/15
10/23/15
12/12/15
01/31/16
03/21/16
05/10/16
06/29/16
Time
HF SMA granite 2015
HF SMA granite 2015
HF micro baux/lms 2015
HF micro sandstone 2015
HFST granite 2011
HFST buaxite 2011
HFST chert 2011

Friction Lifespan



Conventional Aggregate(s) Epoxy

Conventional Dense Graded Asphalt

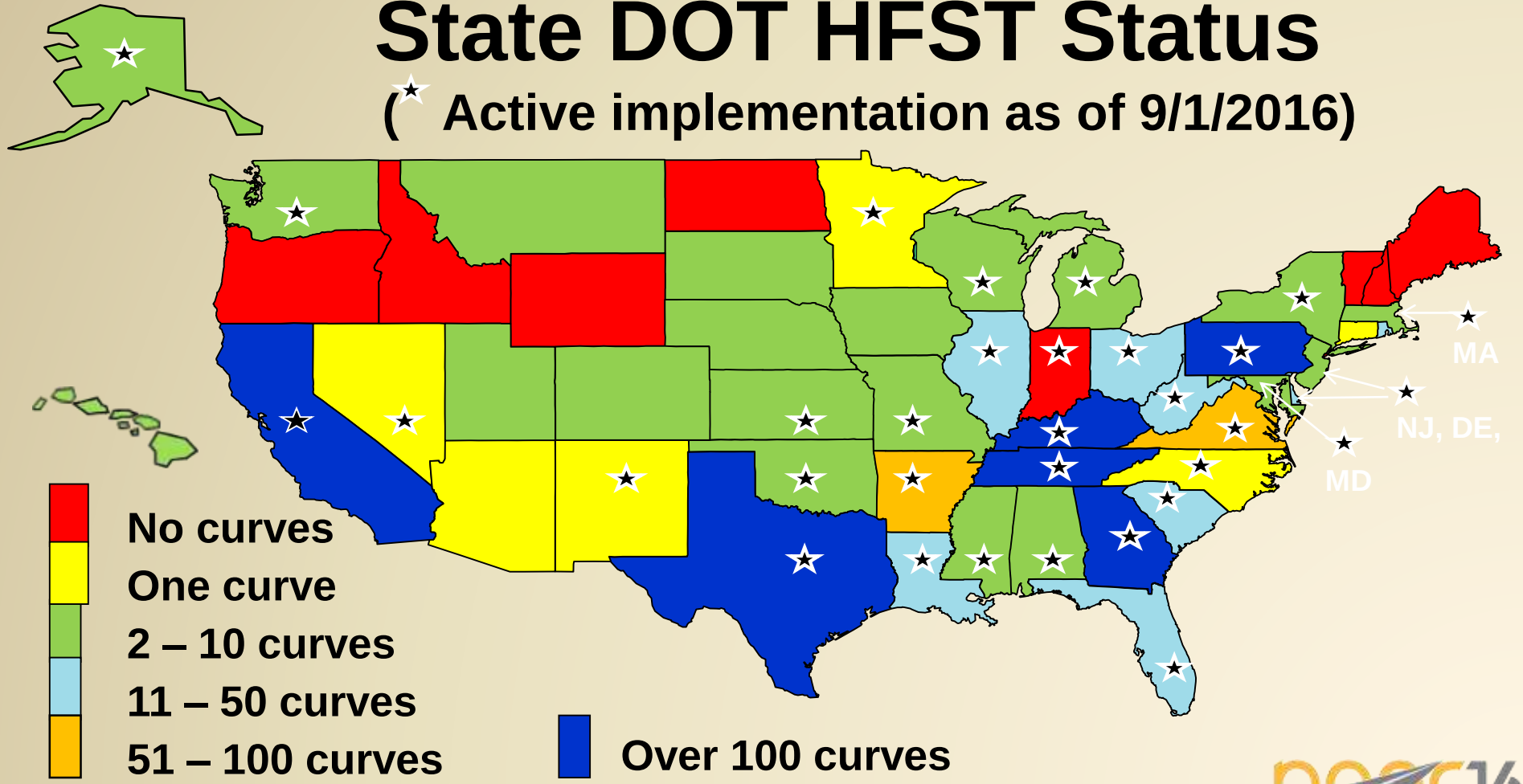
Friction Engineering Toolbox

Technology	Pavement Preservation Life	Application	Cost (Estimate)	Friction Capacity
Epoxy HFST	N/A	Spot treatment	$20-$30/sy	Very High
Asphalt Based Enhanced Friction Surface Treatment	5-10 yrs (est)	Spot treatment or Total length of Roadway	$5-$10/sy	High
High Friction Thin Lay	10-15 yrs (est)	Total Length of Roadway	$3-$5/sy	Medium

Figures in this table are for illustrative purposes

State DOT HFST Status

(★ Active implementation as of 9/1/2016)



npsc16

Questions?

- www.fhwa.dot.gov/innovation/everydaycounts
- www.atssa.com

Chris Wagner, P.E.
Team Manager – Pavement and Materials TST
FHWA Resource Center
Christopher.Wagner@dot.gov