Binder Selection Process

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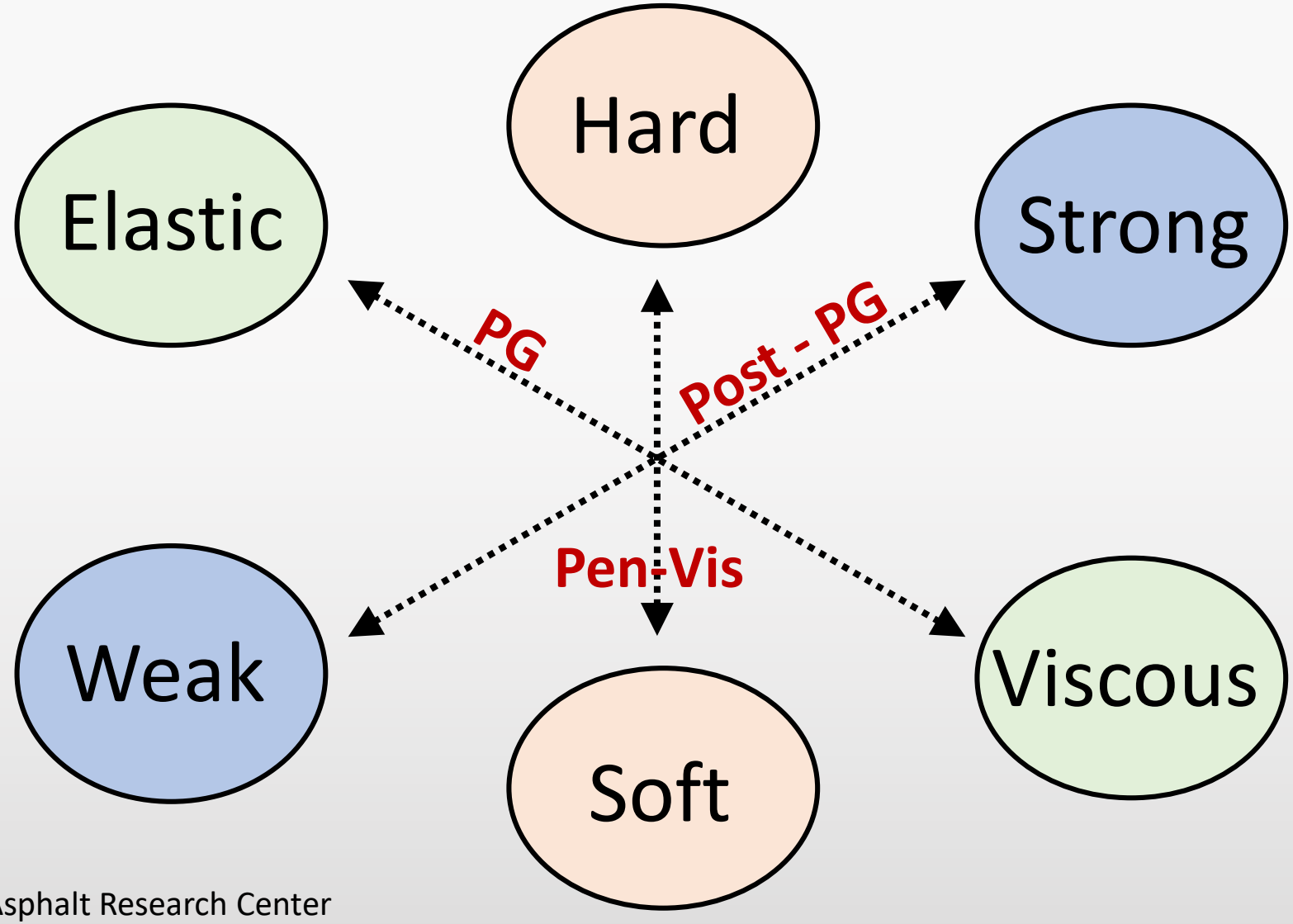
Chocolate
Cookies N' Cream
Michigan
Pot Hole
Vanilla

How to Prevent Your Roads From Becoming the Next Ice Cream Flavor

1) Proper Aggregate
2) Mix Design
3) Good Compaction
4) **Select the Right Asphalt Binder**

Evolution of Asphalt Specifications



From H. Bahia - Modified Asphalt Research Center

Distresses to Consider When Selecting a Binder

Thermal Cracking

- Correlates most significantly with the binder properties

Rutting

- More related to mixture shear strength
- Binder can still contribute

Fatigue Cracking

- Affected by pavement structure and traffic
- PG Specs promote compliant/elastic binders

Photos from the MnDOT Website & Maintenance Manual

What the Numbers Mean

Average 7-day max pavement design temp (Resist Rutting)

Performance Grade

PG 58V - 34

Traffic Level (Rutting Resistance)

Min pavement design temp (Thermal Cracking)

Selecting the Right Low Temperature PG to Prevent Thermal Cracking

-22°C

-28°C

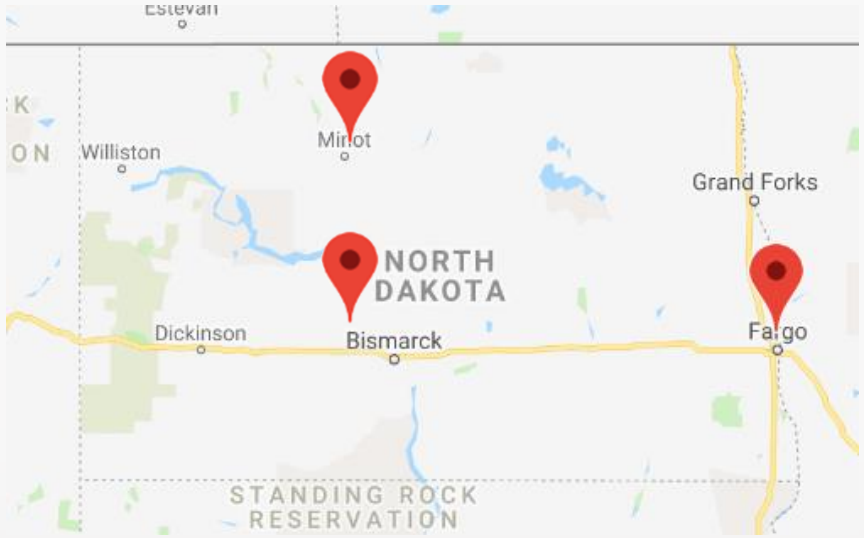
-34°C

-40°C

Performance Grades Available

LTPPBind Online – Low PG

- FHWA web-based tool to help select the asphalt binder PG for a particular site.
- Uses climate data collected by NASA



	Fargo	Bismarck	Minot
Lowest Yearly Air Temp, ºC:	-43.1	-40	-42
Low Air Temp Standard Dev, ºC:	5.11	4.75	5.06
Low Pavement Temp 50% Reliability:	-32.49	-30.44	-32.26
Low Pavement Temp 98% Reliability:	-41.2	-38.7	-40.9

Selecting the Right High Temperature PG to Prevent Rutting

52°C -34

58°C -34

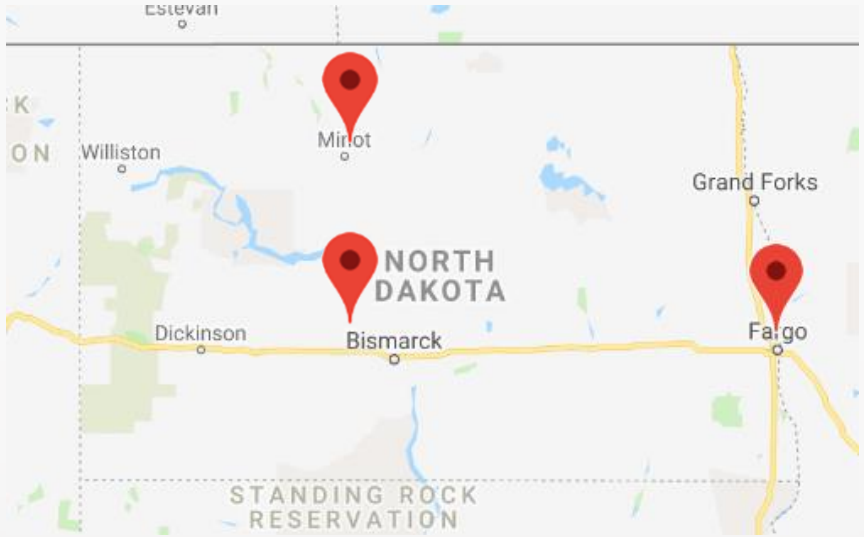
64°C -34

70°C -34

Performance Grades Available

LTPPBind Online – High PG

- FHWA web-based tool to help select the asphalt binder PG for a particular site.
- Uses climate data collected by NASA



	Fargo	Bismarck	Minot
High Air Temperature of high 7 days:	34.27	34.29	33.11
Standard Dev. of the high 7 days:	2.9	2.36	2.36
High Avg Pavement Temp of 7 Days 50%:	55.12	55	53.73
High Avg Pavement Temp of 7 Days 98%:	59.72	59.34	58.08

Selecting the Right Traffic Level to Prevent Rutting

58S -34

58H -34

58V -34

58E -34

MSCR Grades Available

Standard Traffic

Heavy Traffic

Very Heavy Traffic

Extremely Heavy Traffic

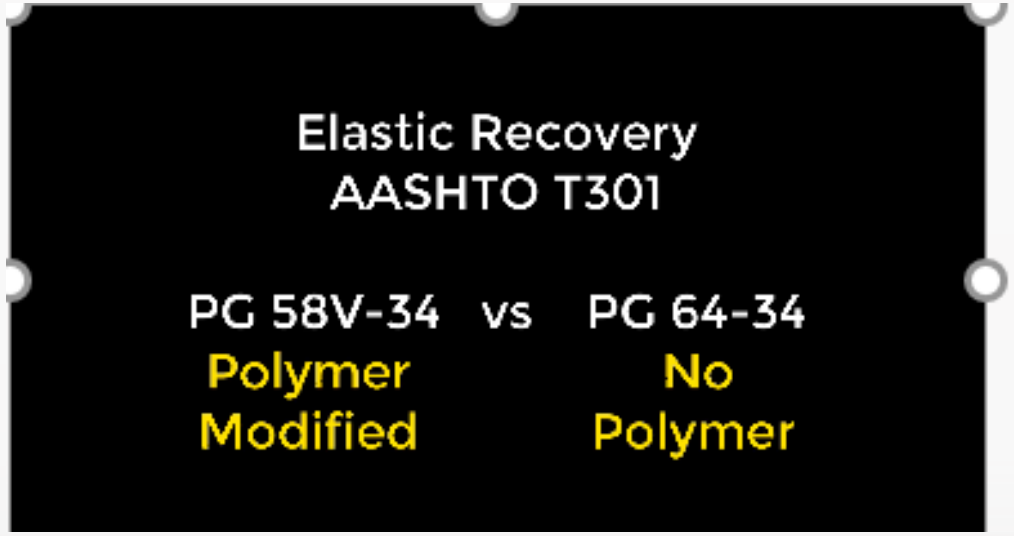
Difference Between MSCR Traffic Levels

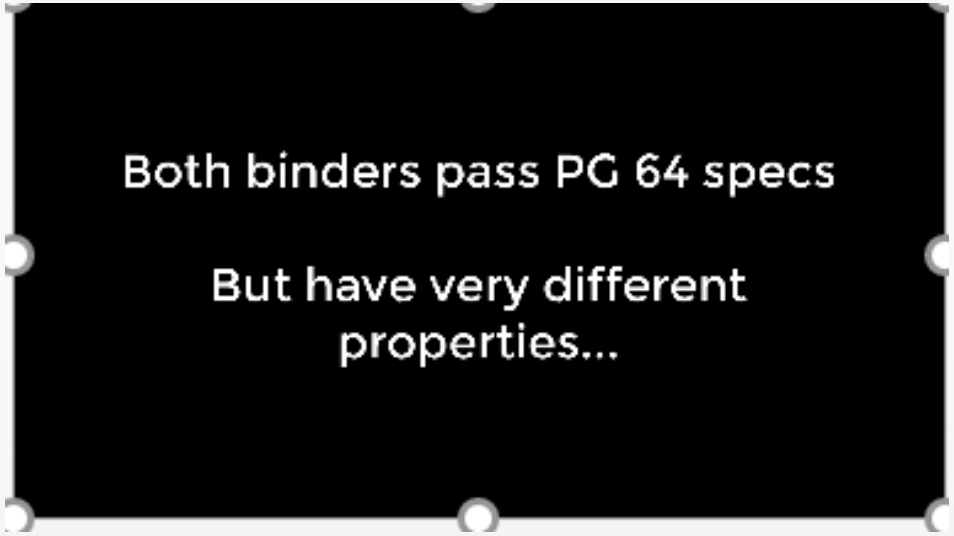
58 S - 34	0% Recovery	Neat Asphalt Air Blown/Oxidized Chemical Modification Plastomers
58 H - 34	30% Recovery	Elastomeric Polymer
58 V - 34	55% Recovery	
58 E - 34	75% Recovery	

What About those Old PG Products?

Polymer Modified MSCR Grades		Same PG Temp Spread, but an elastomeric polymer isn't required
58H - 34	≈	**58 – 34**
58V - 34	≈	**64 – 34**
58E - 34	≈	**70 – 34**

Difference Between Polymer Modified and Non-polymer Modified Binder (Video Stills)





Comparative Performance of Elastomer Modified and Unmodified Binders

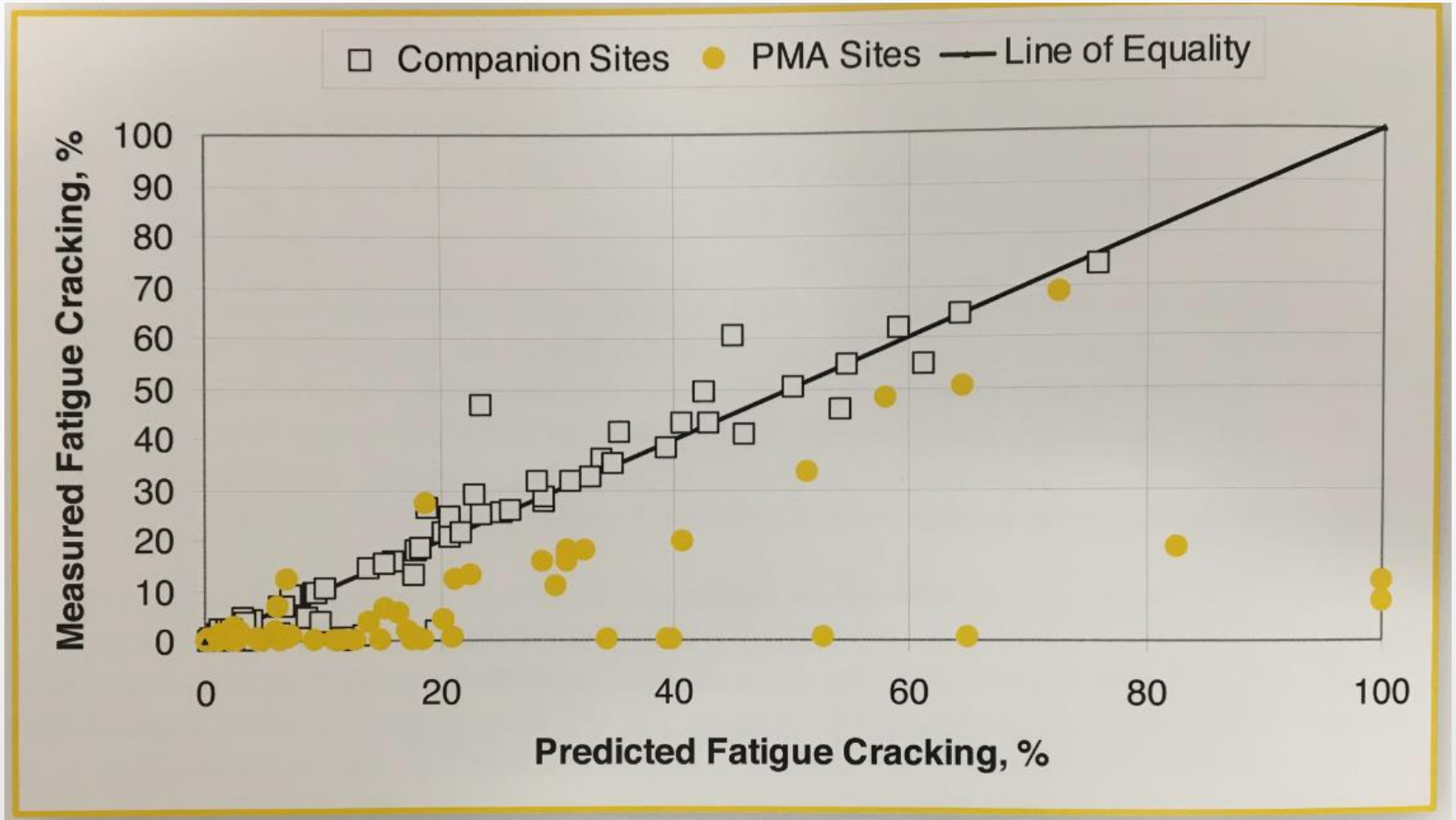
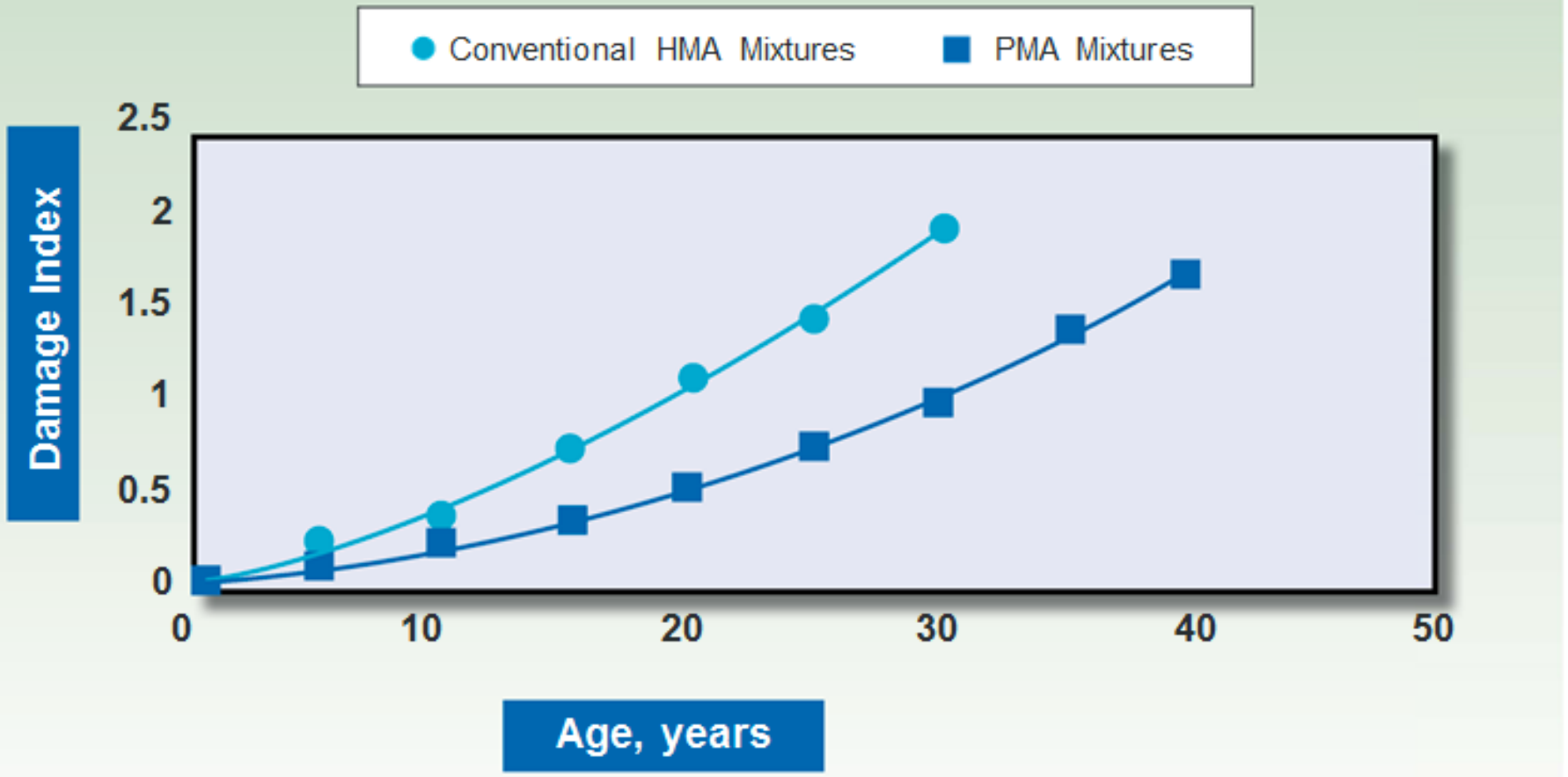


Figure 8 Comparison of the predicted and measured fatigue cracking for the companion sites and those sections with PMA mixtures.

Herold von Quintus, Asphalt Institute Engineering Report 215

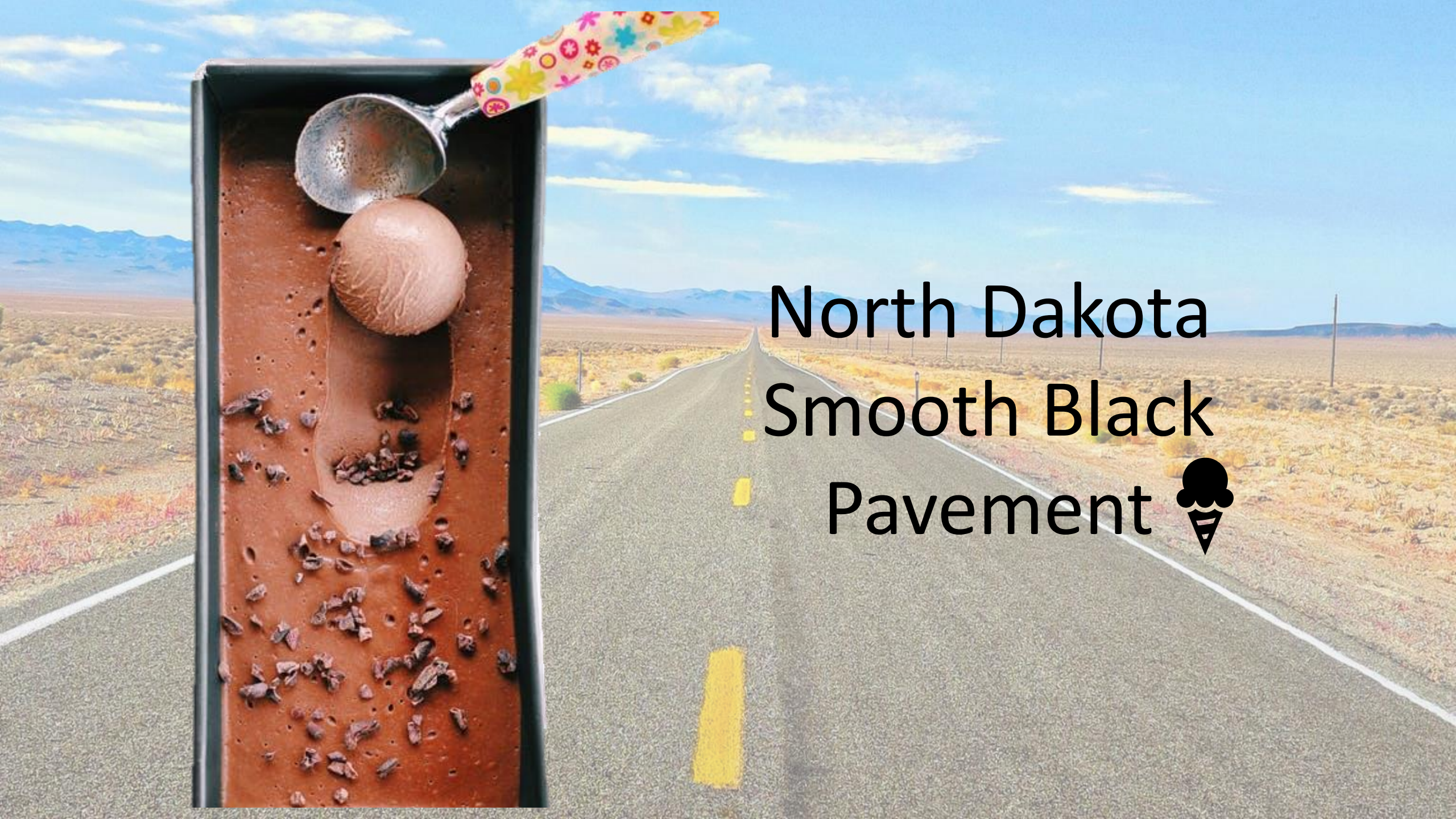
Expected Performance of Elastomer Modified versus Unmodified Binders



*Harold von Quintus, "Polymer-Modified Asphalts–Enhancing HMA Performance," AMAP Annual Meeting, February 10, 2004

Summary

- Select PG -34's to reduce the risk of thermal cracking in North Dakota
- Select PG 58's to reduce the risk of rutting in North Dakota
- Select H, V, & E grades for improved pavement performance from polymer modified asphalt
- Follow this selection process and the next ice cream flavor will be….


North Dakota
Smooth Black
Pavement

Questions?

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