

Binder Selection Process



Andy Cascione
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Chocolate

Cookies N' Cream

**Michigan
Pot Hole**

Vanilla

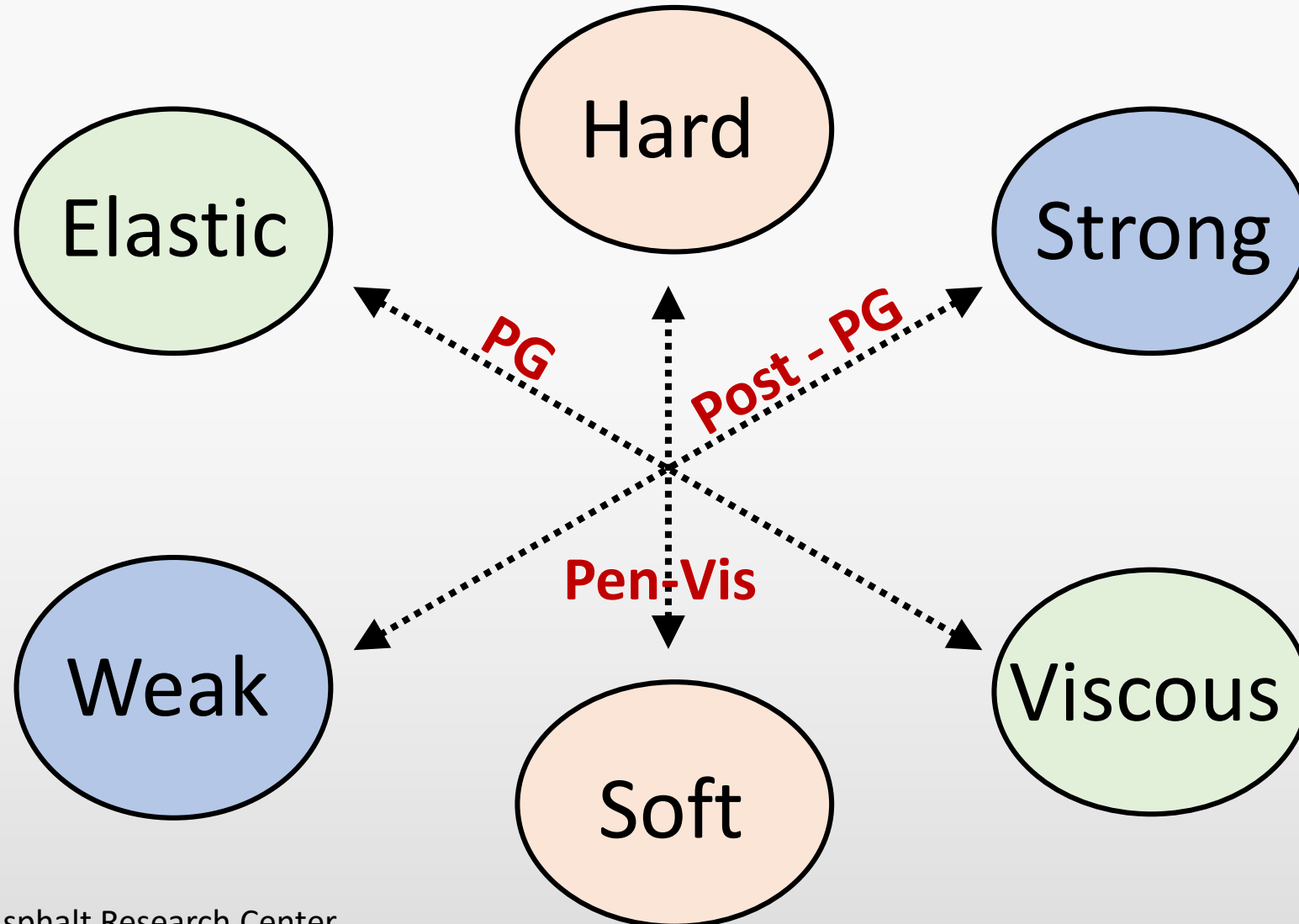


How to Prevent Your Roads From Becoming the Next Ice Cream Flavor

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



Evolution of Asphalt Specifications



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

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

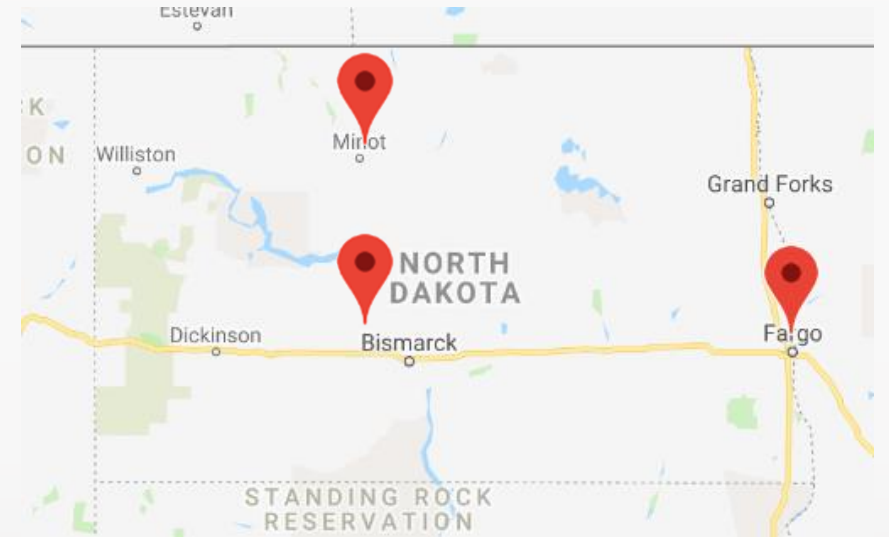
-40°C



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, °C:	-43.1	-40	-42
Low Air Temp Standard Dev, °C:	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

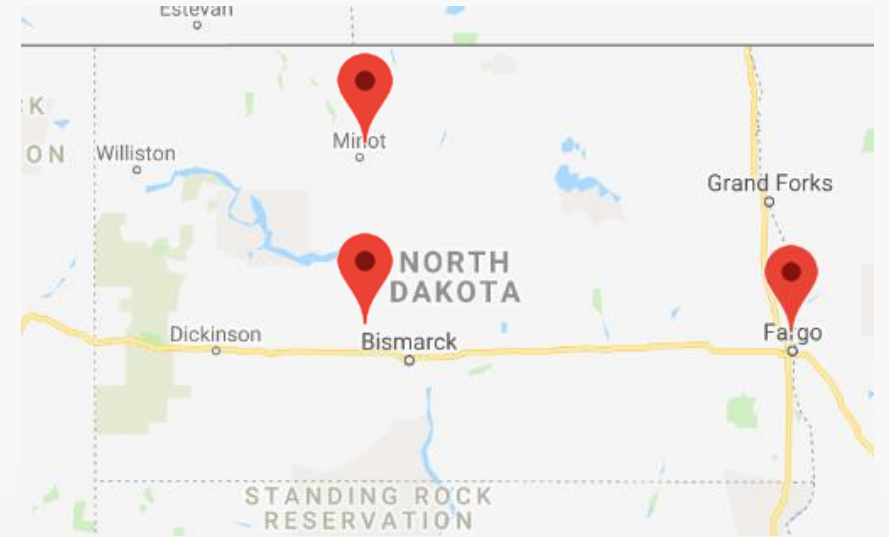
70°C -34



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

58 **S** -34

58 **H** -34

58 **V** -34

58 **E** -34



MSCR Grades Available

Standard Traffic

Heavy Traffic

Very Heavy Traffic

Extremely Heavy Traffic

Difference Between MSCR Traffic Levels

58 S - 34

0% Recovery

58 H - 34

30% Recovery

58 V - 34

55% Recovery

58 E - 34

75% Recovery

Neat Asphalt
Air Blown/Oxidized
Chemical Modification
Plastomers

Elastomeric
Polymer

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)

Elastic Recovery
AASHTO T301

PG 58V-34 vs PG 64-34
Polymer Modified vs **No Polymer**

Both binders pass PG 64 specs

But have very different properties...



Comparative Performance of Elastomer Modified and Unmodified Binders

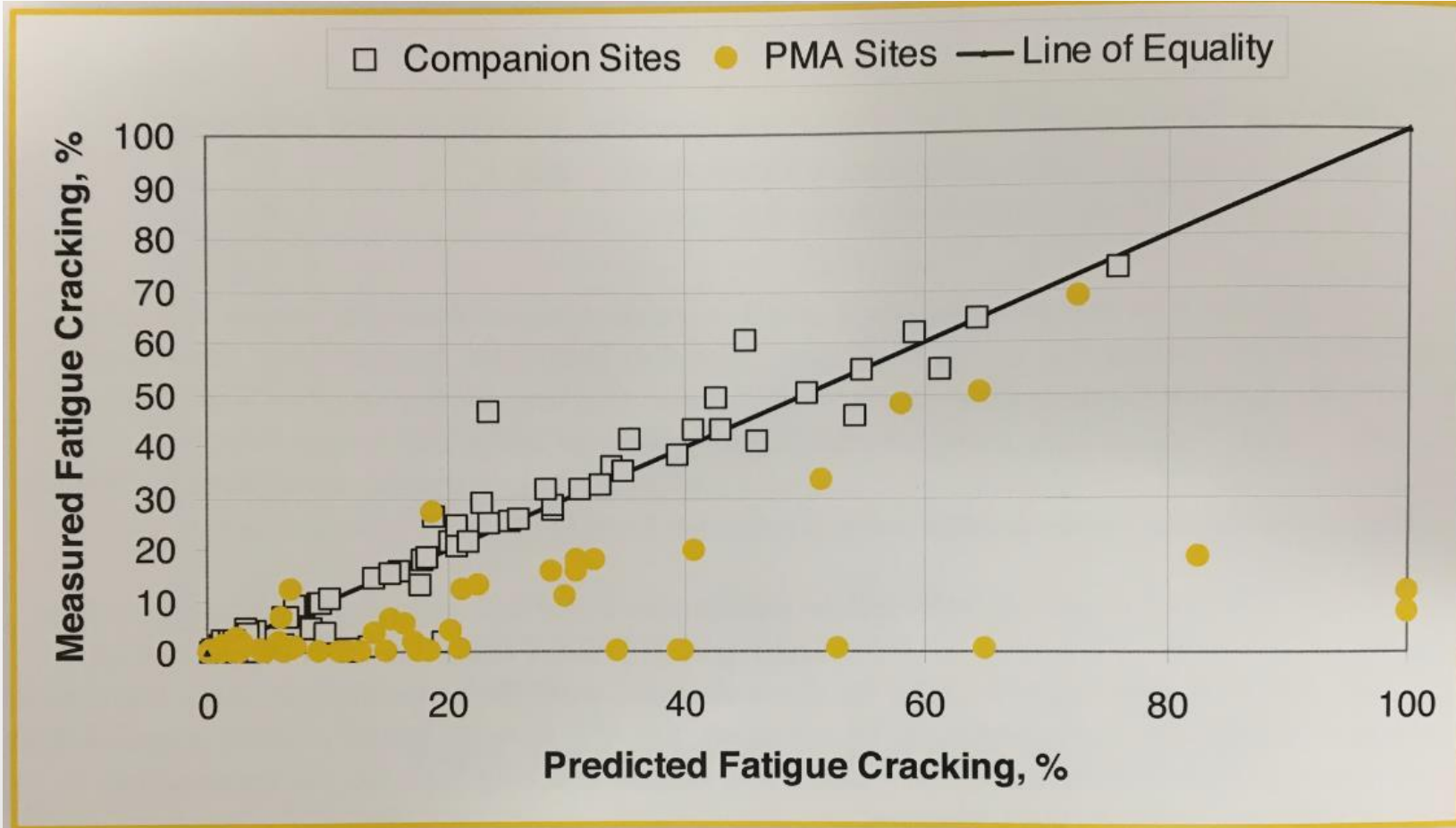
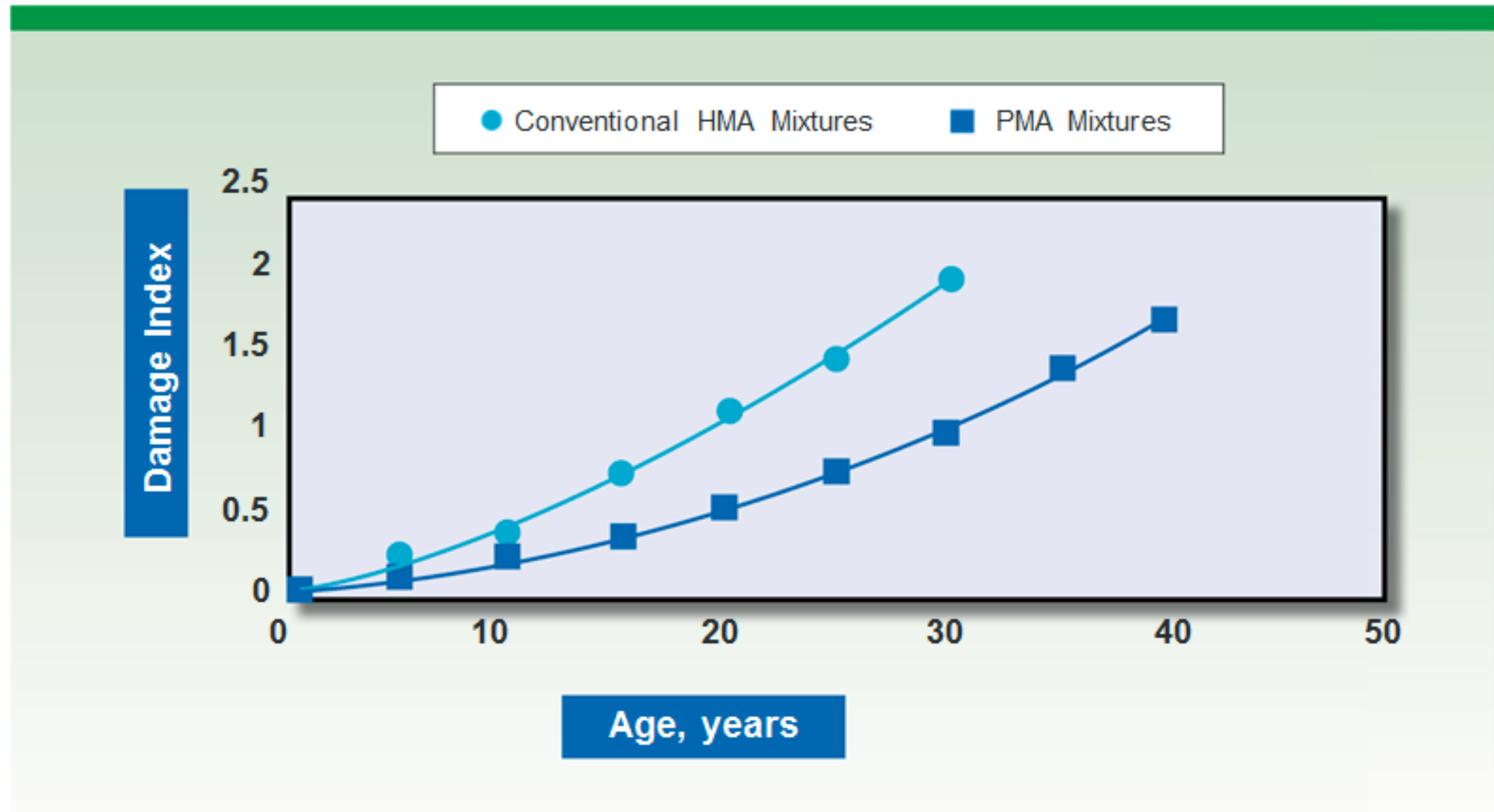


Figure 8

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

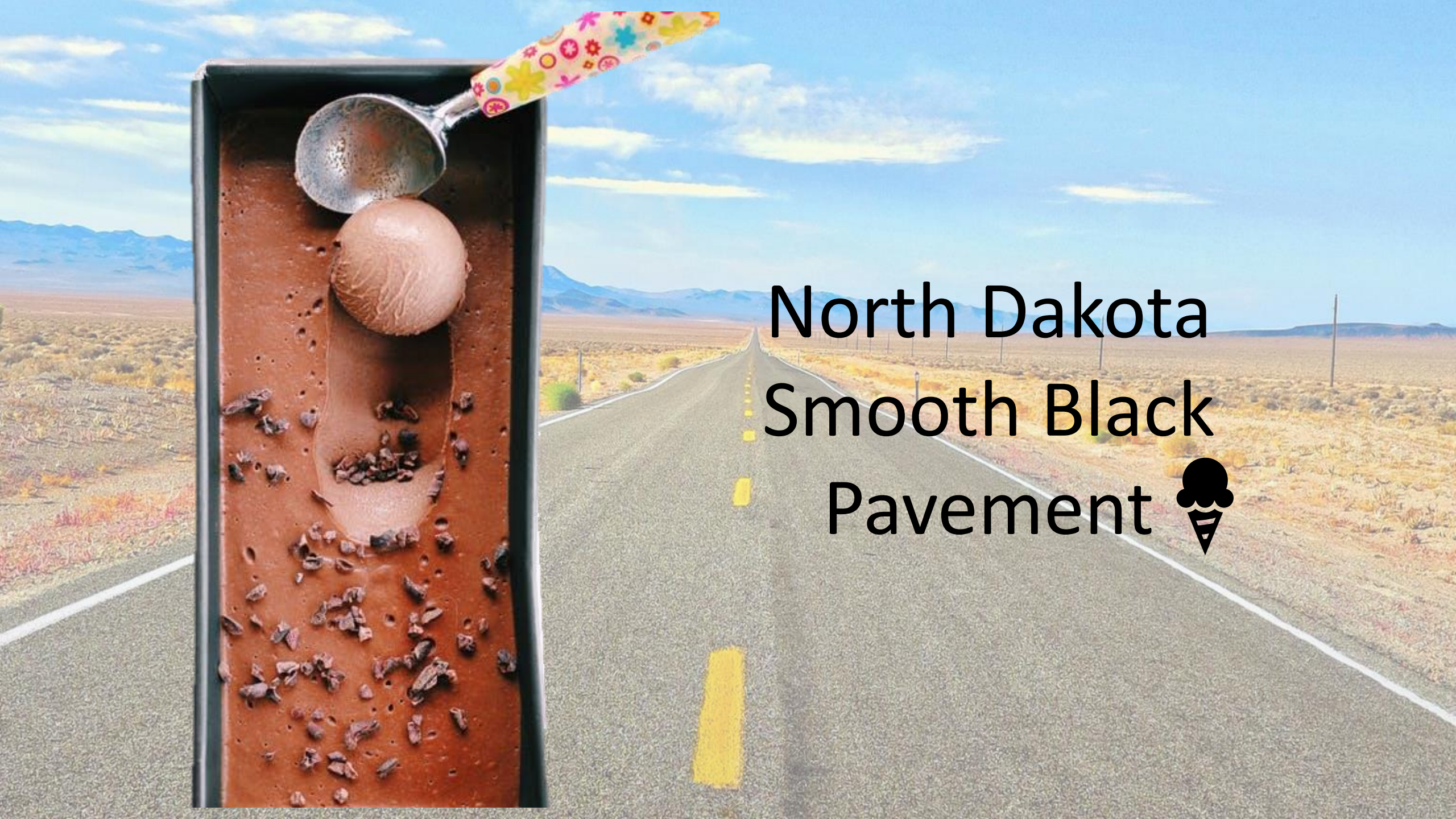
Expected Performance of Elastomer Modified versus Unmodified Binders



*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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