

2025

MN ASPHALT CONFERENCE & TRADE SHOW

December 9 – 10, 2025
St. Cloud River's Edge
Convention Center



Asphalt Myths Debunked

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Asphalt Institute

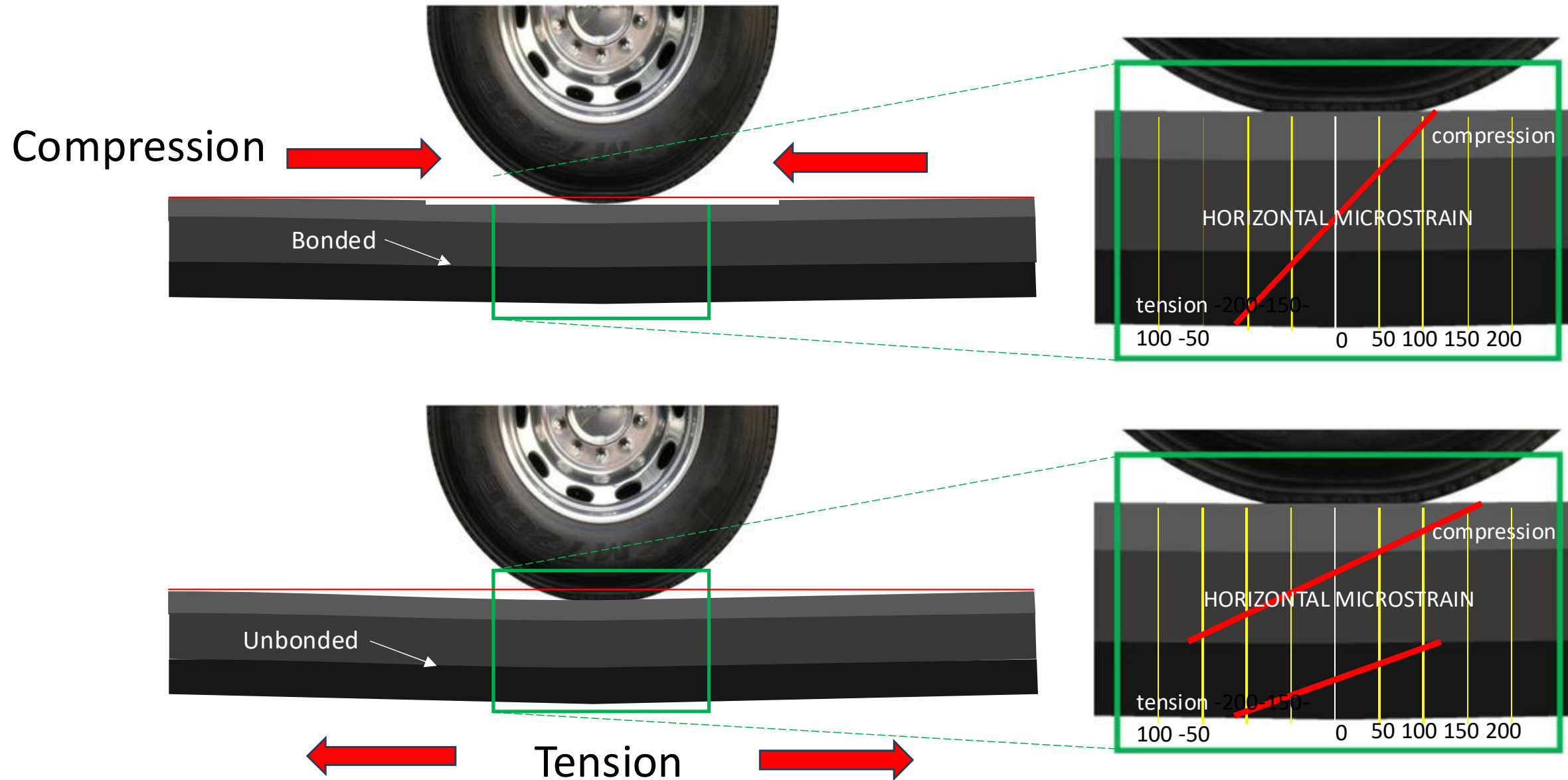


Contact Info

Myth # 1 Tack is overrated



Consequences of Debonding



Consequences of Poor Bonding

- Layer independence
 - Reduced fatigue life
 - Increased rutting
 - Slippage ◦
Shoving
- Compaction difficulty

Direction of traffic?



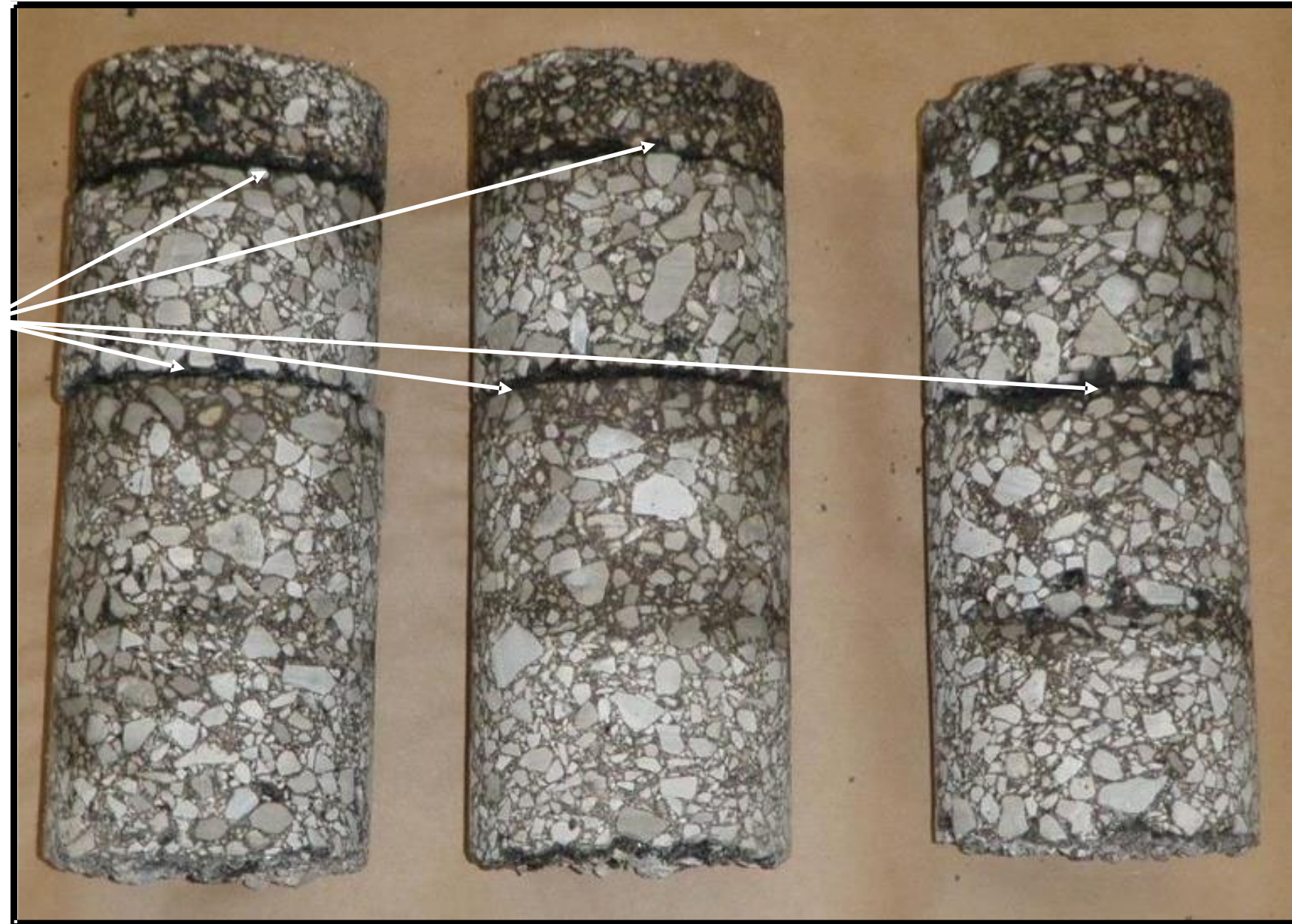
8–10 years est. Interstate Pavement



Courtesy of MoDOT

Cores Showing Debonding

Bonding
Failures



Successful Tack Coat

The Ultimate Goal:
Uniform, complete,
and adequate
coverage



Myth #2 –Large Stone Mix is Stronger



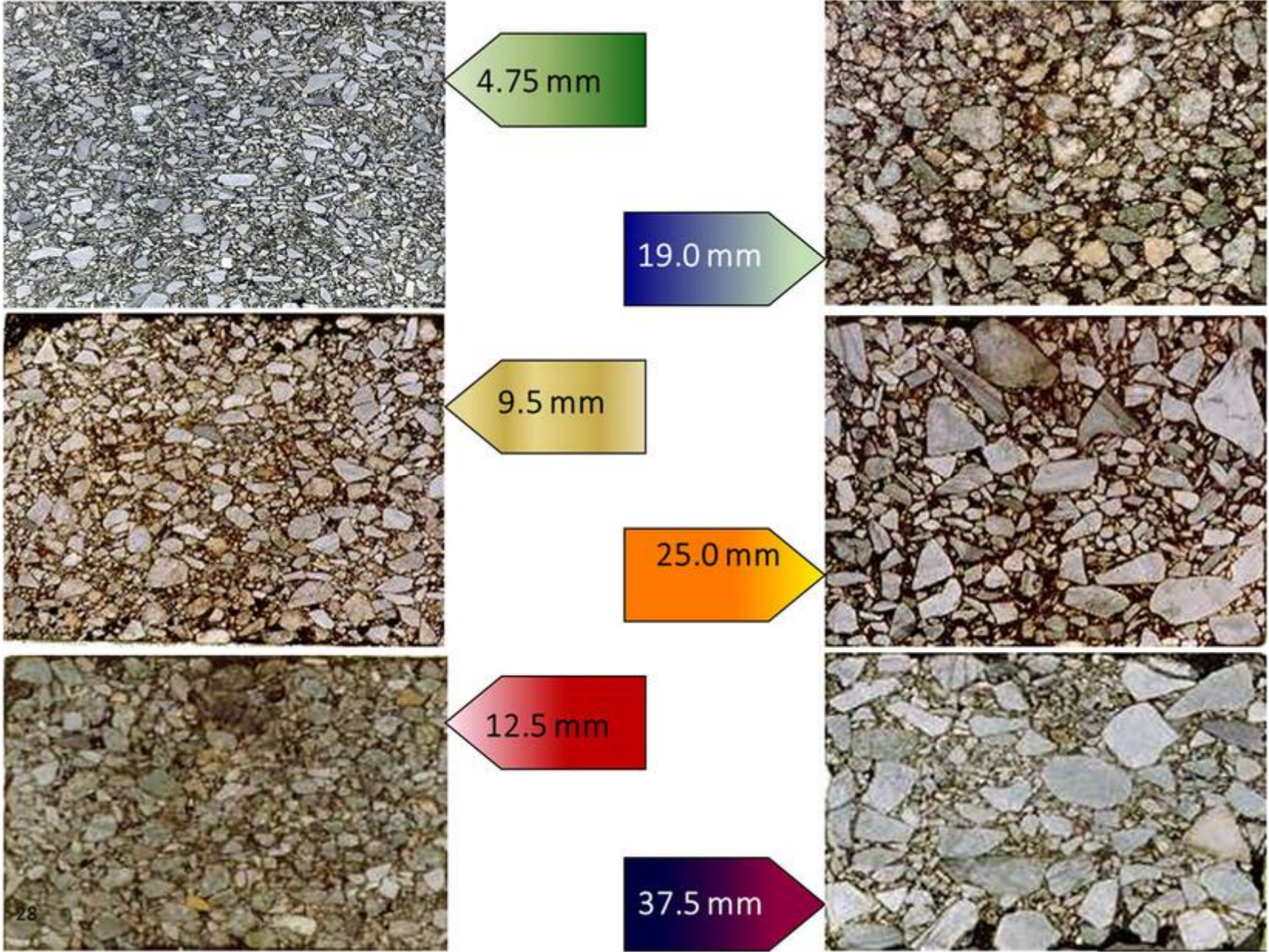
NMAS definition



Nominal Maximum Aggregate Size

One sieve size larger than the first sieve to retain (cumulative) morethan 10%

Mixture Aggregate Sizes



NCAT Test Track 1stCycle



Coarse, intermediate, and fine gradations.

No differences in rutting performance!

Courtesy of NCAT

Aggregate Size vs. Strength



Mixture Facts:

- Larger Aggregate Size ≠ Increased Strength
- Higher coarse aggregate = lower asphalt content
- Finer aggregate mixtures are less permeable, more compactible and more durable

Mixture Strength is determined by:

- Aggregate shape, strength and texture
- Binder type and quantity
- Field placement and compaction

Mix Type



NMAS grading is different than older “Topsize” Grading

Old Rule of Thumb - Minimum lift thickness =
2x Topsize

NMAS - Minimum compacted thickness ≥ 4 times
nominal aggregate size ≥ 3 times nominal
aggregate size for fine graded
mixtures

Minimum -----NOT MAXIMUM !

Myth #3 –Thin lifts are easier to compact

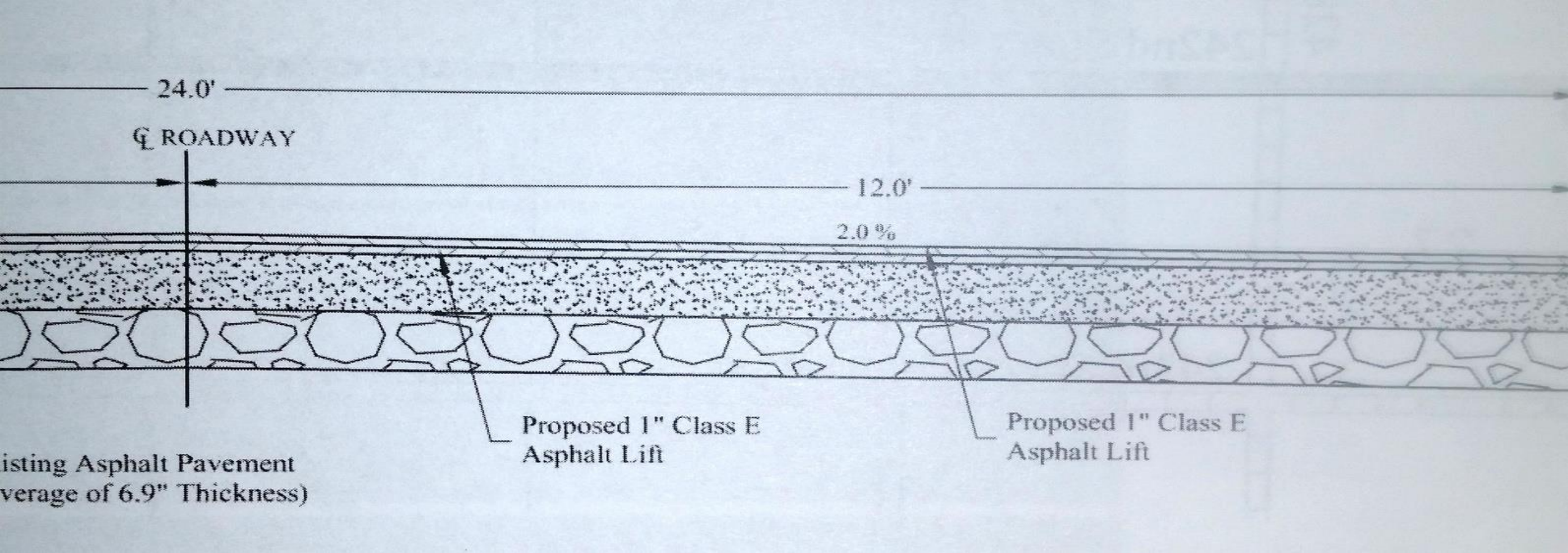


Lift Thickness



Thin lift overlays require finer mixture types!!

Lift Thickness



Improved Density



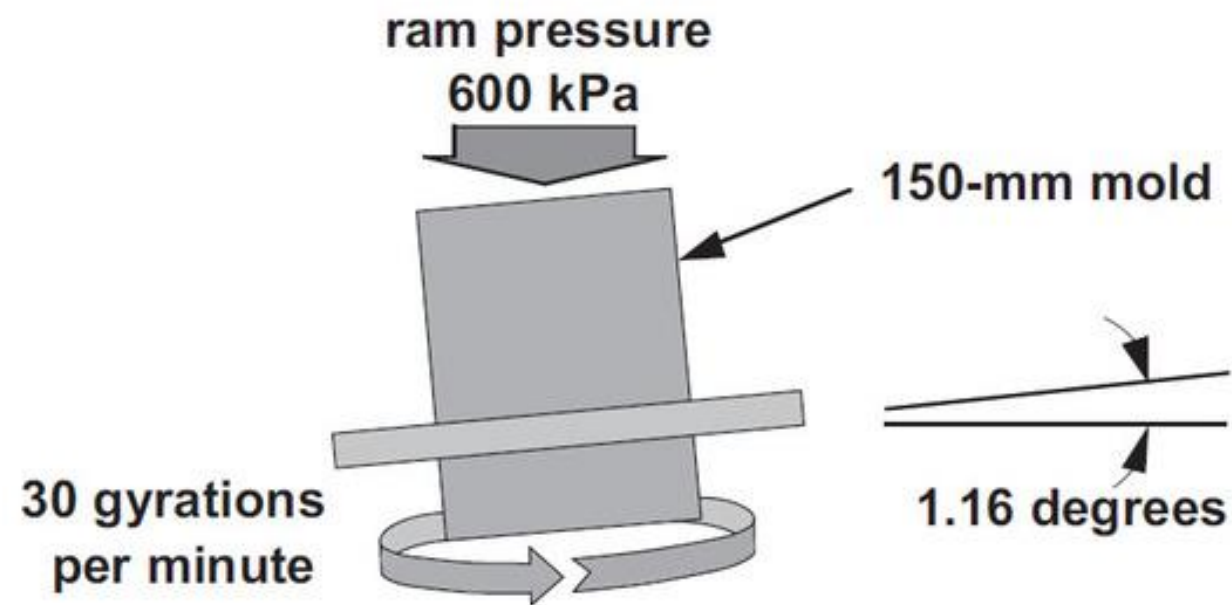
Why are thicker lifts easier to compact?

- Slower paver speed. Mix cools slower, providing
- longer compaction time. More room to manipulate
- the mix into a denser mass.

1 " T	13' W	350 Tph	83 fpm
3 " T	13' W	350 Tph	28 fpm

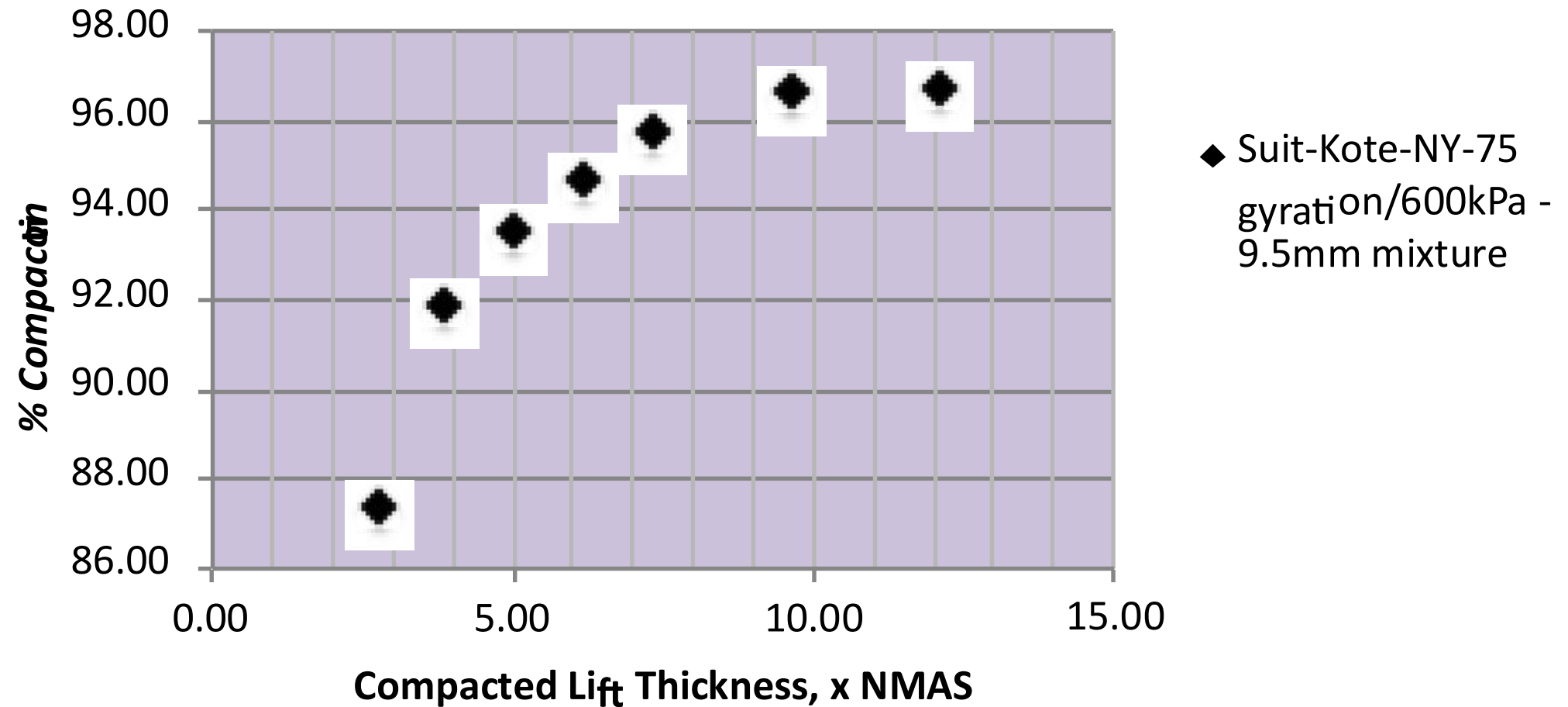
Lab Testing Lift Thickness in a SGC

Two different mixtures were tested in a Superpave Gyrotory Compactor at different thicknesses and measured for %GmmCompaction.

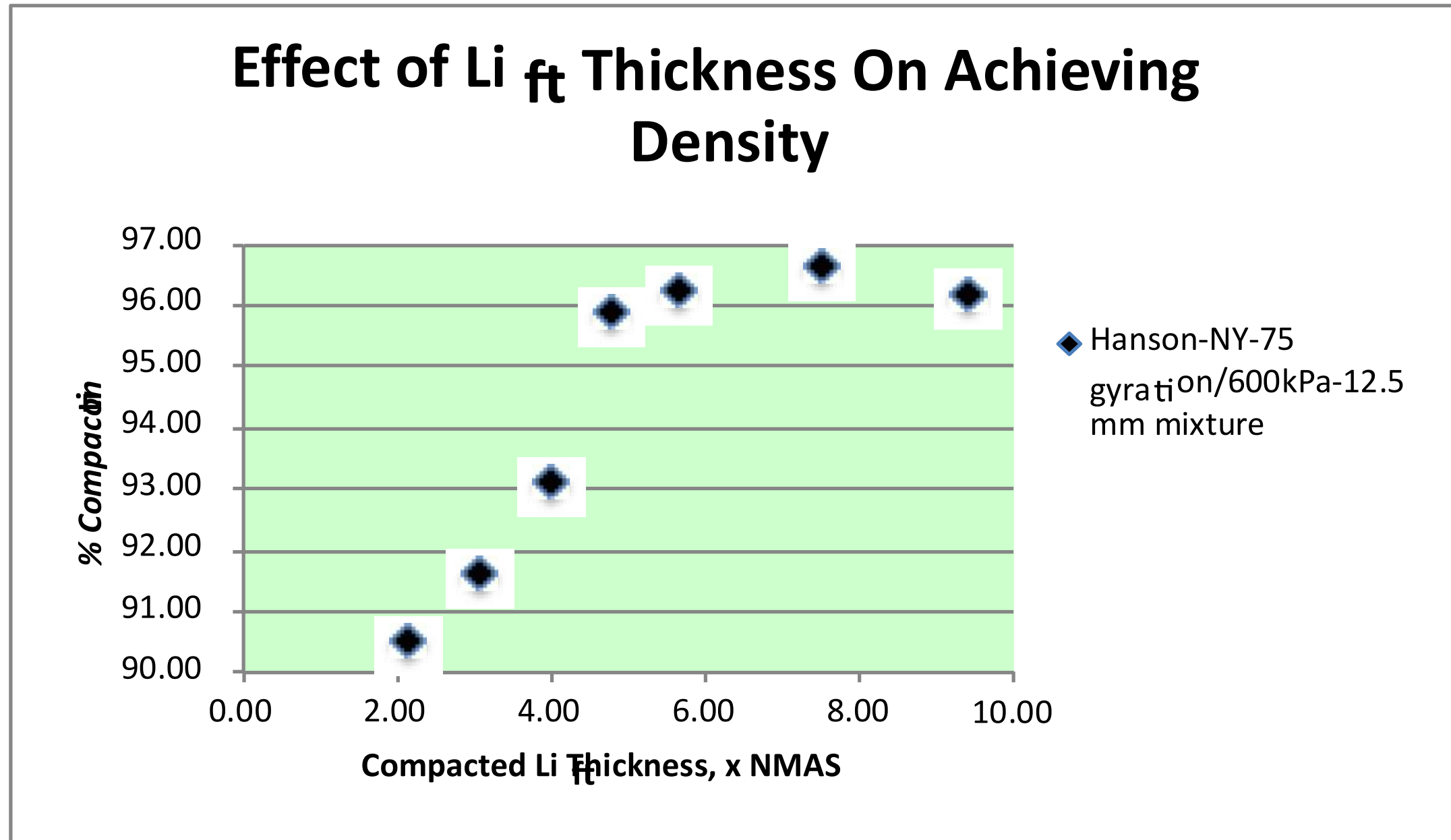


9.5 mm crushed gravel @ 75 gyrations

Effect of Lift Thickness On Achieving Density



12.5 mm Limestone mix @ 75 gyrations



Myth #4 -PMA is Too Expensive!



“Rule of 92”

PG 64 -34 => 64 --34 = 98

Probably modified

Depends on asphalt source

Original SuperPavePG Specifications



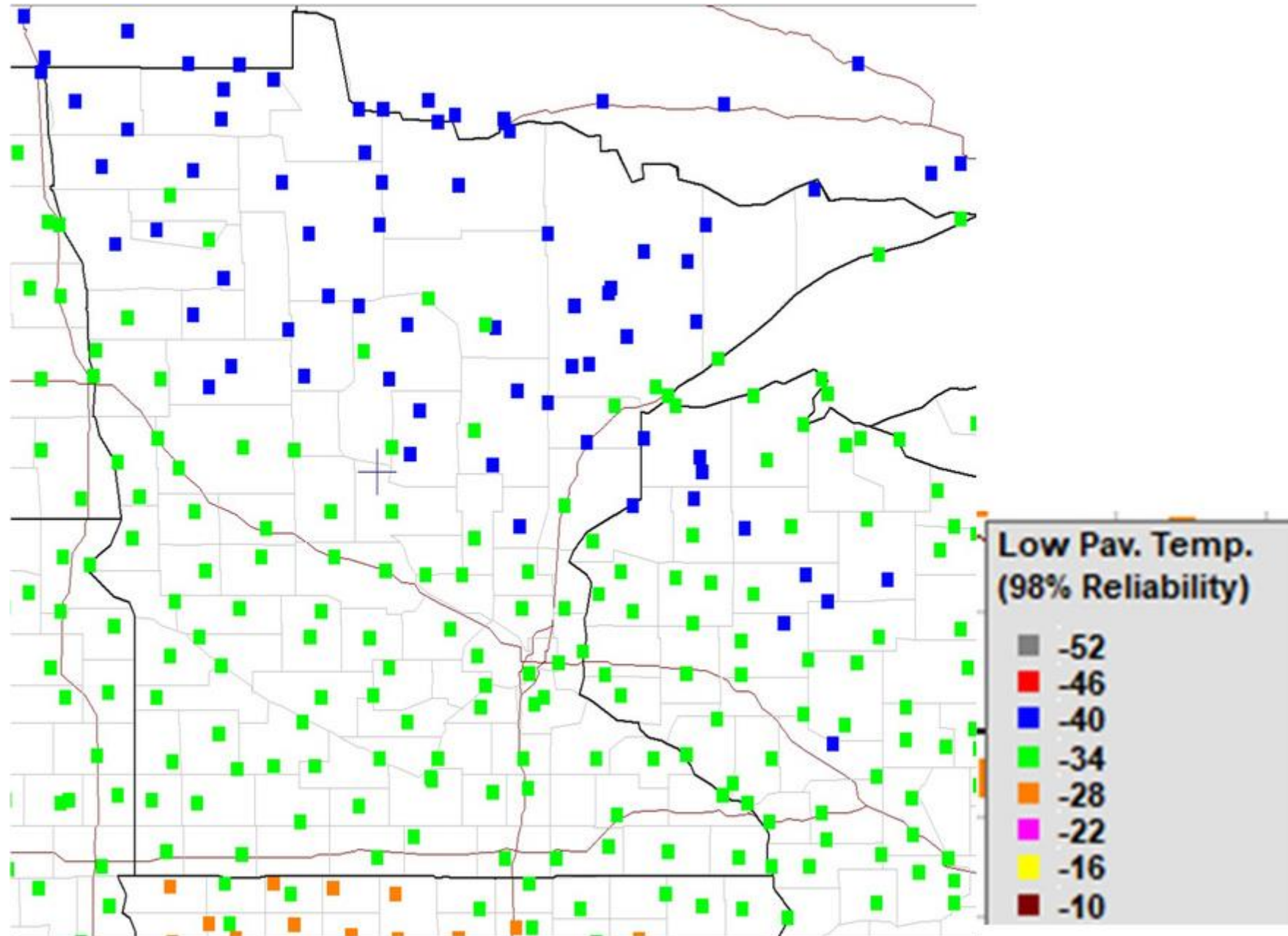
The Asphalt Institute
**National
 Binder Technician
 Certification
 PROGRAM**

Performance Grades (AASHTO M320)

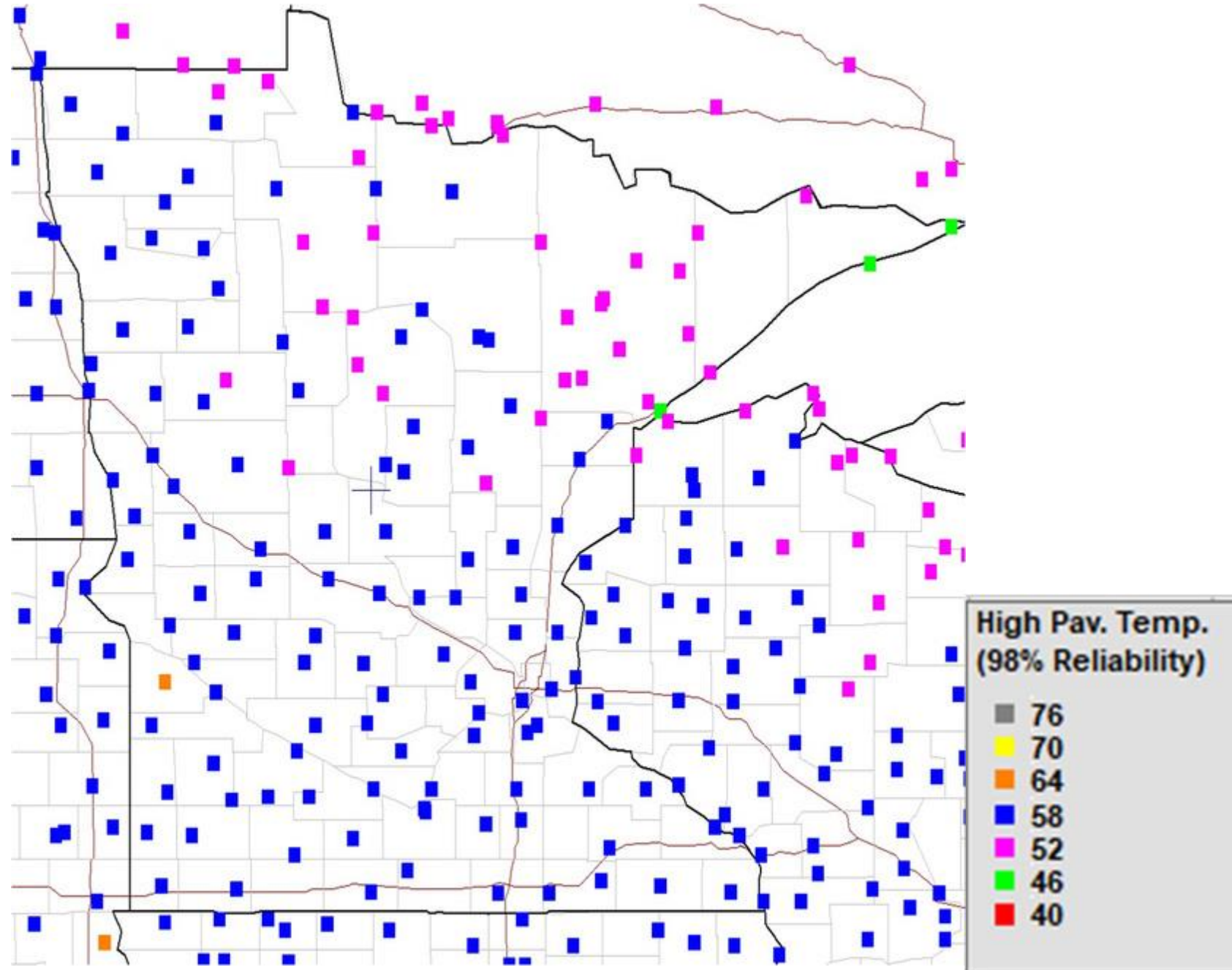
High PG	PG 52				PG 58				PG 64				PG 70				PG 76												
Low PG	-10	-16	-22	-28	-34	-40	-46	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34
Original																													
≥ 230 °C	Flash Point , AASHTO T 48																												
≤ 3 Pa-s	Rotational Viscosity @ 135° C, AASHTO T 316																												
≥ 1.00 kPa	DSR G*/sin δ (Dynamic Shear Rheometer), AASHTO T 315																												
	52				58				64				70				76												
RTFO (Rolling Thin Film Oven) , AASHTO T 240																													
$\leq 1.00\%$	Mass Change																												
≥ 2.20 kPa	DSR G*/sin δ (Dynamic Shear Rheometer), AASHTO T 315																												
	52				58				64				70				76												
PAV (Pressure Aging Vessel) , AASHTO R28																													
	90				100				100				100(110)				100(110)												
≤ 5000 kPa	DSR G* sin δ (Dynamic Shear Rheometer), AASHTO T 315 Intermediate Temp. = [(High PG + Low PG)/2] + 4																												
	25	22	19	16	13	10	7	25	22	19	16	13	31	28	25	22	19	16	34	31	28	25	22	19	37	34	31	28	25
$S \leq 300$ MPa $m \geq 0.300$	BBR S (creep stiffness) & m-value (Bending Beam Rheometer), AASHTO T 313																												
	0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	0	-6	-12	-18	-24	-30	0	-6	-12	-18	-24	-30	0	-6	-12	-18	-24
<ul style="list-style-type: none"> • If BBR m-value ≥ 0.300 and creep stiffness is between 300 and 600, the Direct Tension failure strain requirement of $\geq 1.00\%$ can be used in lieu of the creep stiffness requirement. • Binder shall be homogeneous, free from water, contain no deleterious materials, be at least 99.0% soluble and contain no particles larger than 250 μm. 																													

asphaltinstitute.org
bindertechnician.com

1992 Recommended LT Grades



1992 Recommended HT Grades



Download
LTPPBind 3.1

There are many “polymer” grades



Performance Grades (AASHTO M320)



The Asphalt Institute
**National
 Binder Technician
 Certification
 PROGRAM**

High PG	PG 52				PG 58				PG 64				PG 70				PG 76												
Low PG	-10	-16	-22	-28	-34	-40	-46	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34
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	52				58				64				70				76												

RTFO (Rolling Thin Film Oven), AASHTO T 240

MnDOT PG Binder Guidelines-MSCR



April 4, 2024

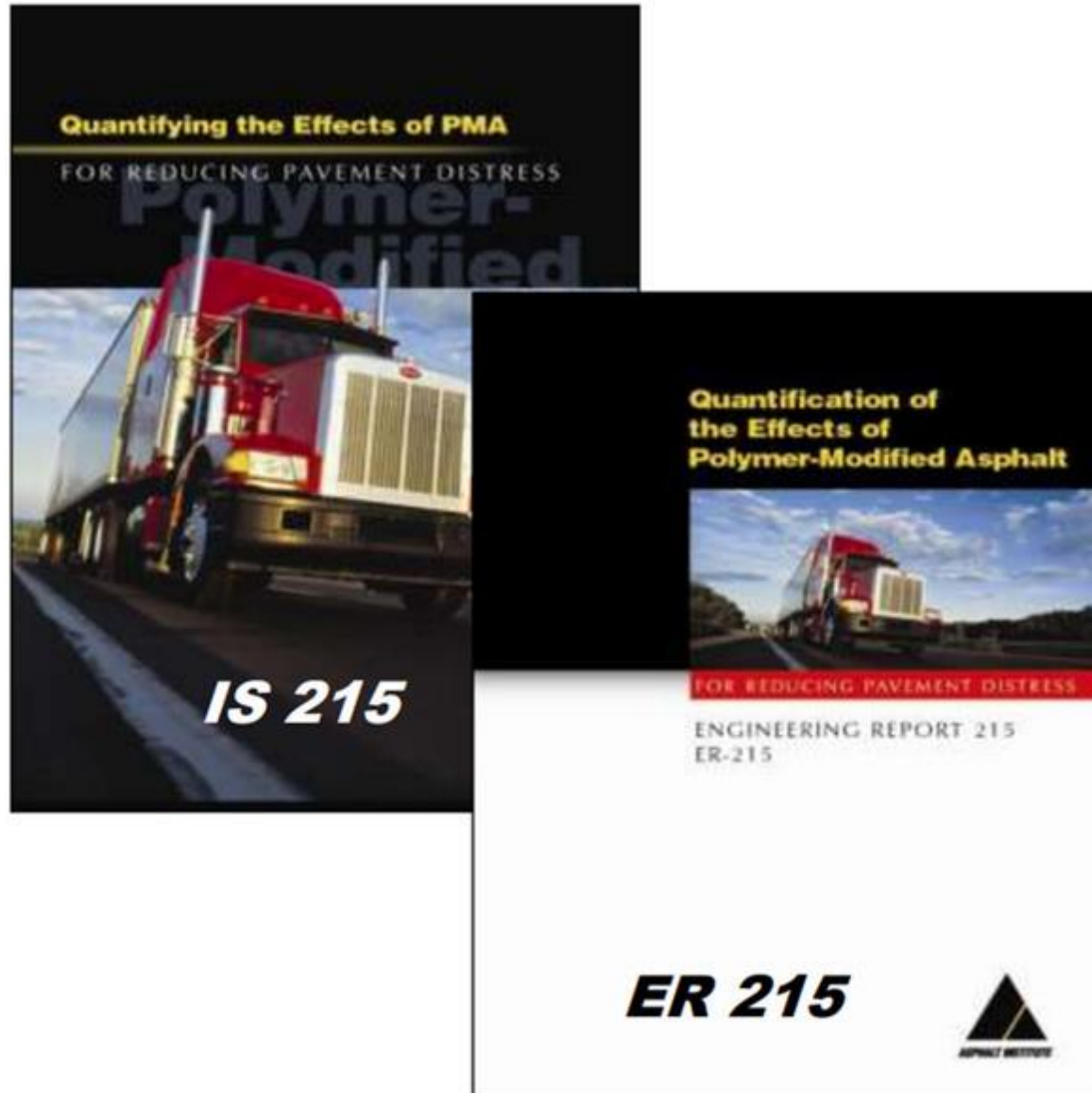
MnDOT PG Binder Guidelines-MSCR

Following AASHTO M332 (MSCR) the PG grading designations for Minnesota will all be PG58, followed by traffic loading designation and minimum pavement design temperature. For example: PG58S-XX, PG58H-XX, PG58V-XX, and PG58E-XX.

S, H, V or E grade designations must be specified for standard, high, very high or extremely high traffic loading, respectively.

Type of Construction	Recommended Asphalt Binder for < 3 Million ESALs (20 yr)	Recommended Asphalt Binder for 3 - 10 Million ESALs (20 yr)	Recommended Asphalt Binder for > 10 Million ESALs (20 yr)
Overlay Wearing Mixture (Top 4'') ³	PG 58S-28	PG 58S-28 ¹	PG 58H-28 ¹
New Construction ² Wearing Mixture (Top 4'') ³	PG 58H-34	PG 58H-34 ¹	PG 58V-34 ¹
All Non-Wear Mixture (Below 4'' from Surface)	PG 58S-28		

Quantifying the Effects of PMA



This study (published in Feb 2005) used national field data to determine enhanced service life of pavements containing polymer modified binders versus conventional binders. The data is from a variety of climates and traffic volumes within North America.

IS-215 Survey of 49 States



Table 1. Summary of Reasons Why Agencies Use PMA Mixtures

Reason for Using PMA Mix	Rutting	Thermal Cracking	Fatigue Cracking	Stripping, Moisture Damage	Durability	Raveling	Tenderness
Primary	58%	21%	0%	0%	0%	0%	0%
Secondary	37%	47%	0%	21%	47%	11%	11%
Total	95%	68%	0%	21%	47%	11%	11%

IS-215 LTPP Rut Depth Data

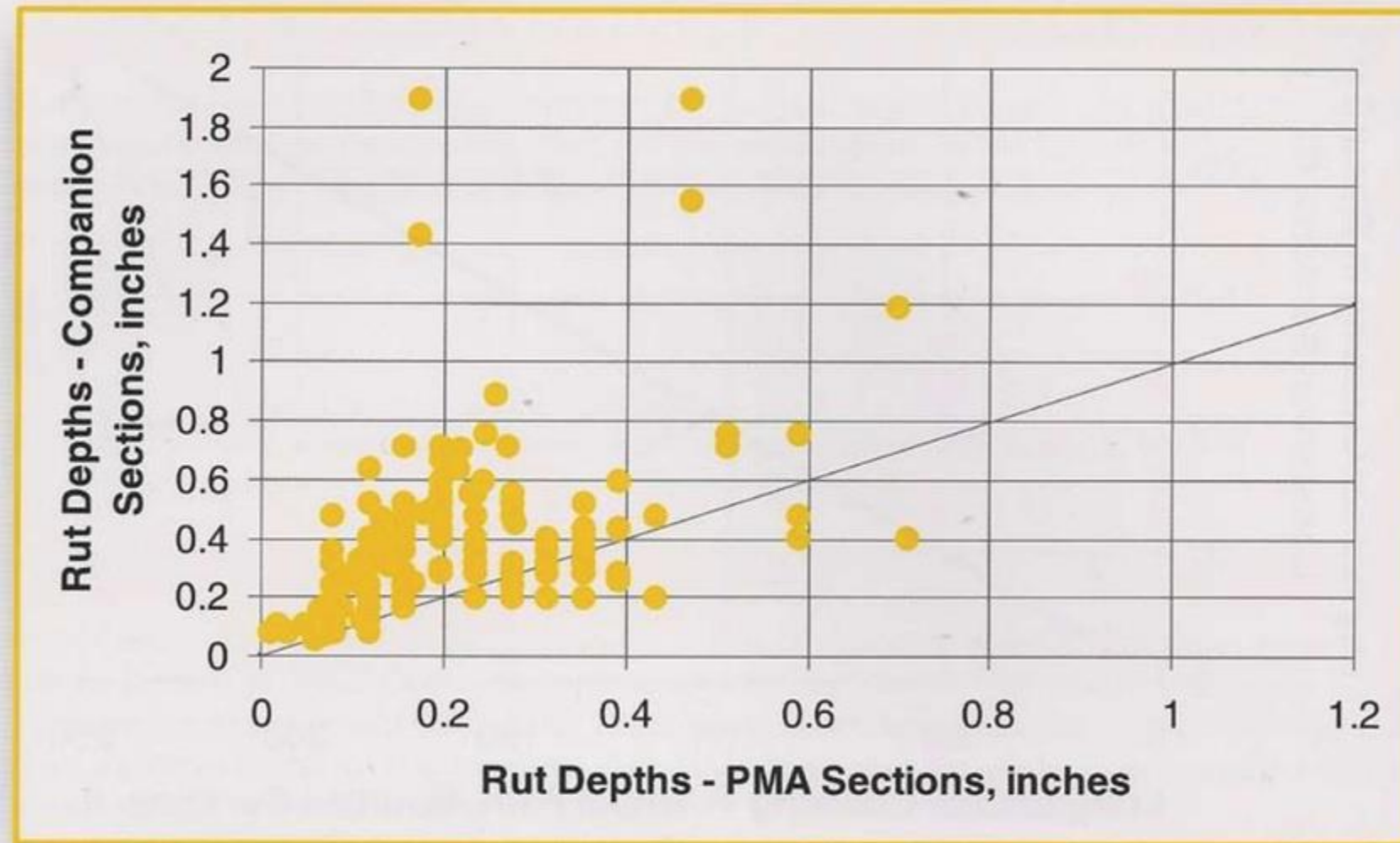
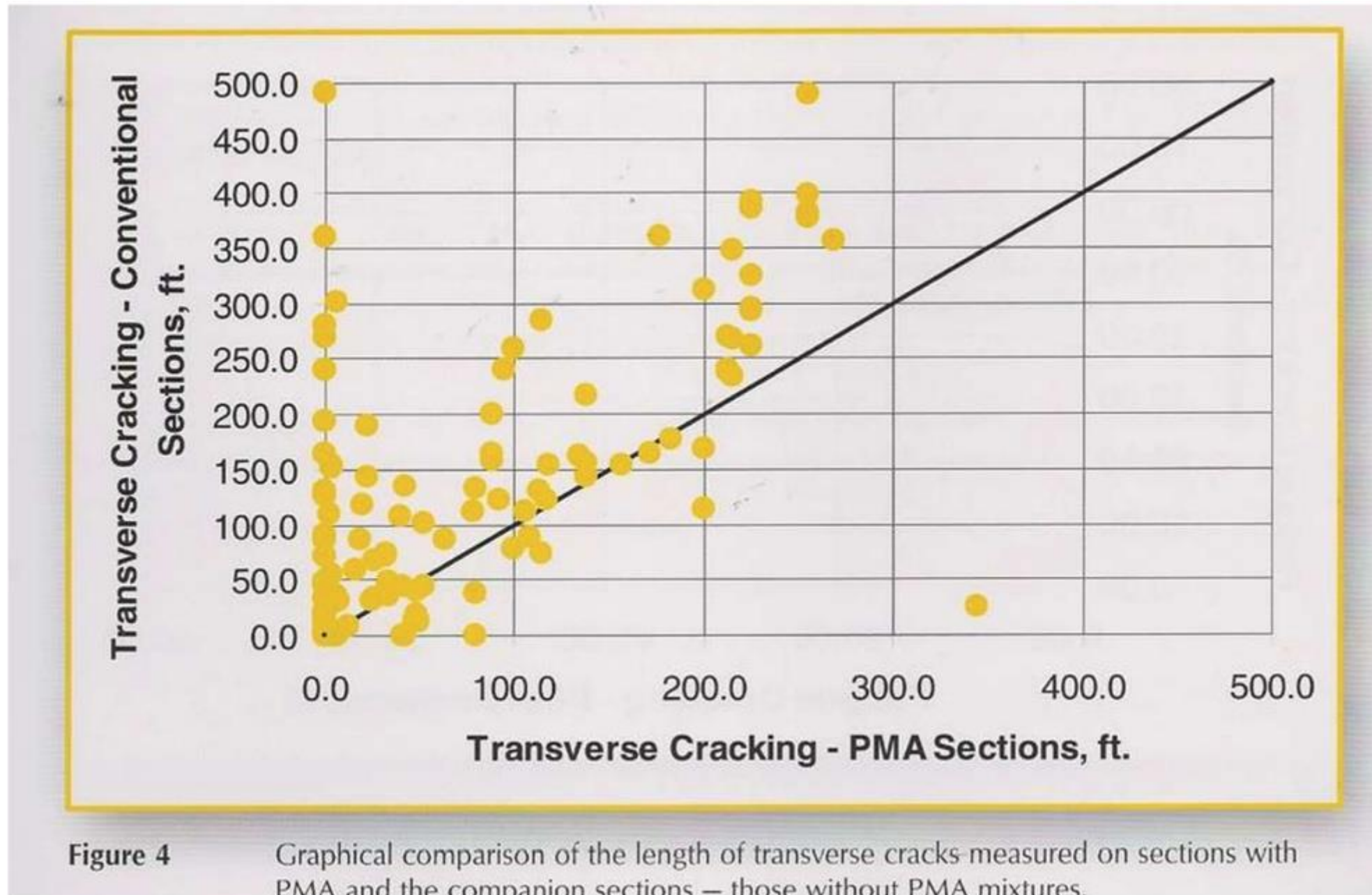


Figure 1

Graphical comparison of the rut depths measured on sections with PMA and the companion sections – those without PMA mixtures.

IS-215 LTPP Reflective Cracking Data



IS-215 LTPP Fatigue Cracking Data

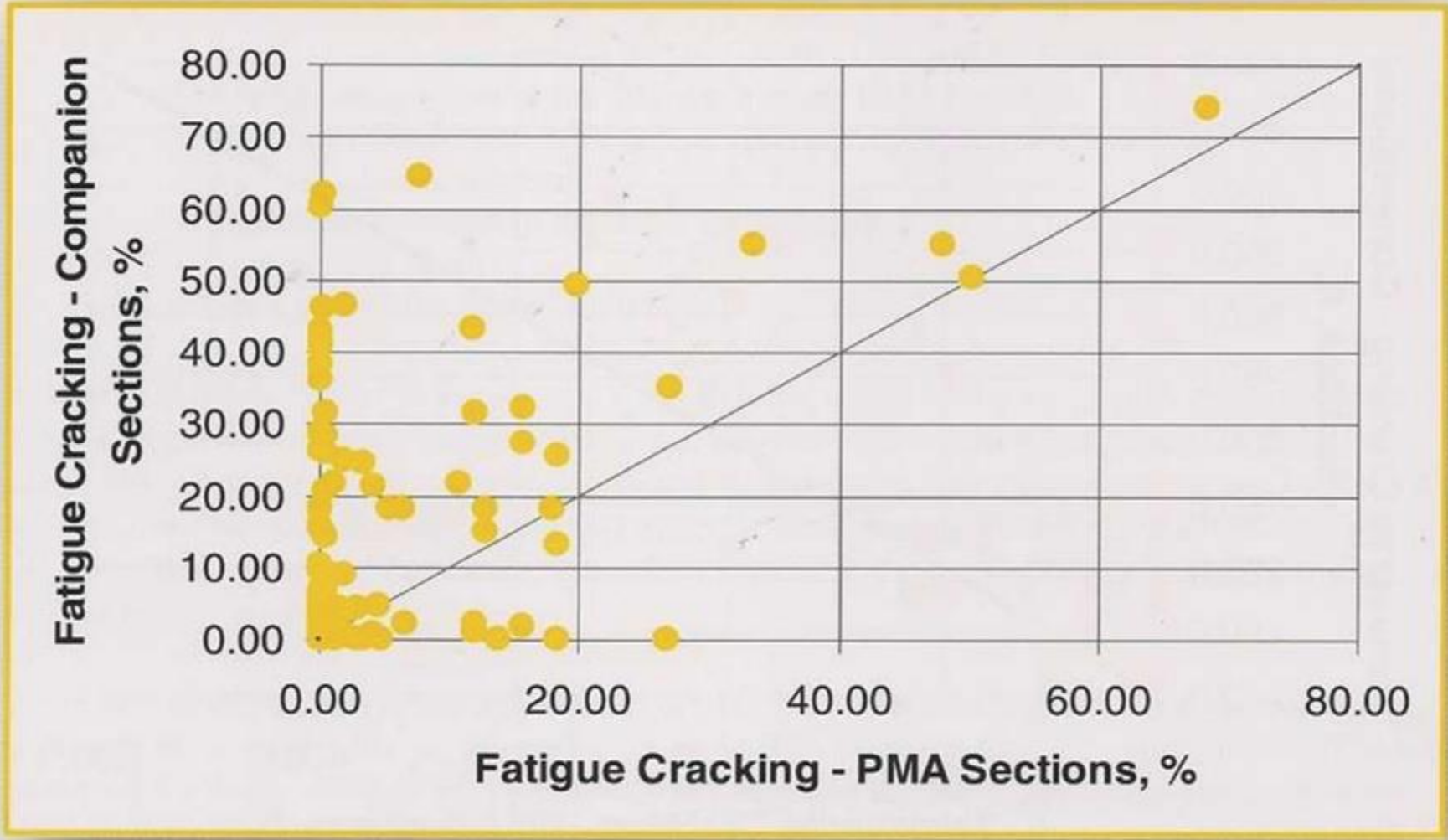


Figure 2

Graphical comparison of the fatigue cracking measured in percent wheel path area on sections with PMA and the companion sections – those without PMA mixtures.

Summary of Expected Increase in Service Life, Years, Based on M-E Damage Based Analysis



Assumptions: Unmodified sections designed for 20yr. life. Also, PMA in top 4 inches.

Site Factor	Condition Description		Added Life
Foundation	Non-expansive, coarse soils		5-10 2-5
	Expansive and plastic soils (PI>35)		2-5 5-10
	Frost Susceptible in cold climate		5-8 0-2 5-
Water Table & Drainage	Deep		10 1-3 3-6
	Shallow; adequate		0-2
	Shallow; inadequate		
Existing Pavement Condition	HMA	Good	
		Poor-extensive cracking	
	PCC	Good	
		Poor-faulting & cracking	

Expected Increase in Service Life, Yrs



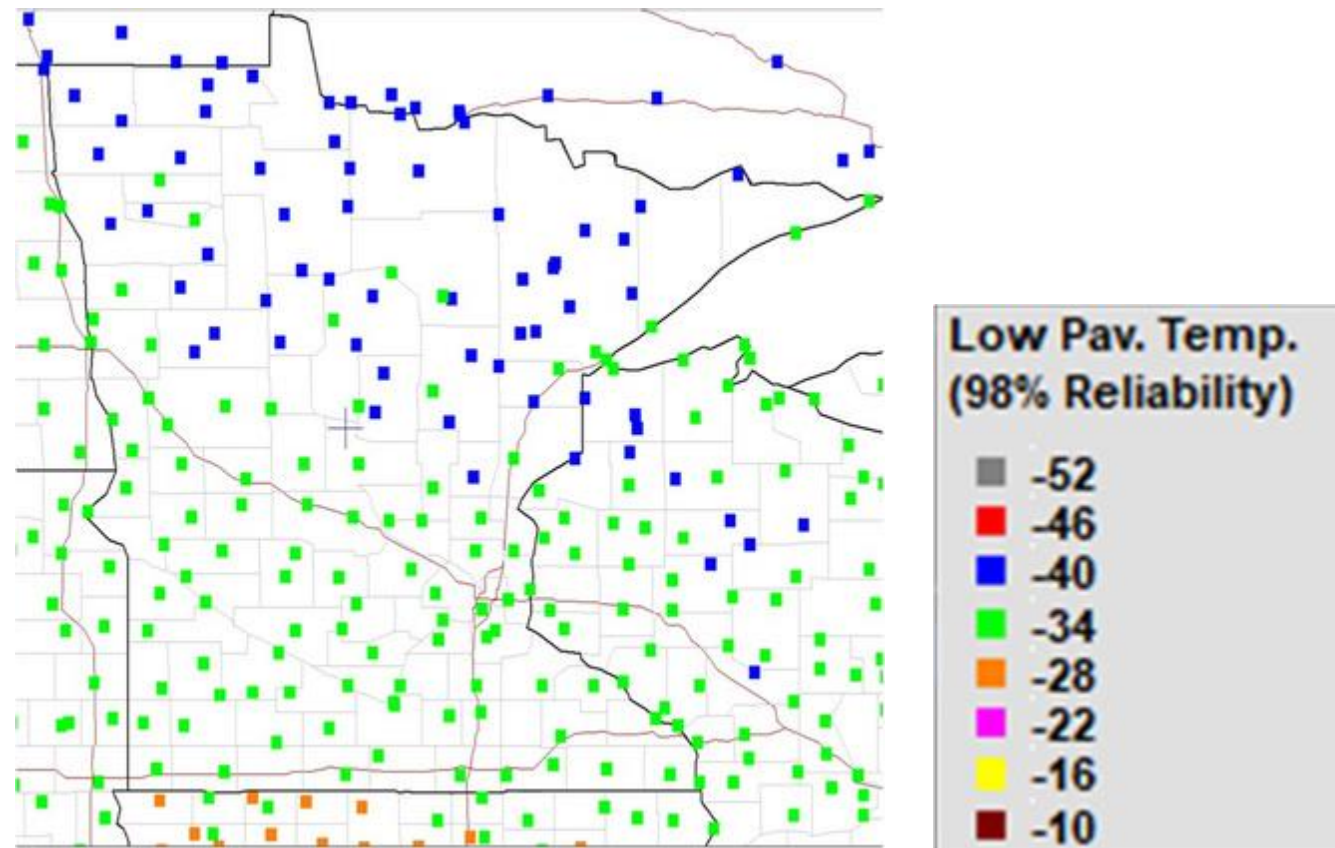
Assumptions: Unmodified sections designed for 20yr. life. Also, PMA in top 4 inches.

Site Factor	Condition Description		Added Life
Climate; Temp. Fluctuations	Hot	Hot Extremes	5-10 2-5
	Mild		3-6 5-10
	Cold	Cold Extremes	3-6 5-10
Traffic, Truck Volumes	Low	Intersections	5-10 5-10
		Thoroughfares	
		Heavy Loads	
	Moderate		
	High		

Recommendation for New Construction



- Use -34 binders to prevent thermal cracking!
- 30+ year old design recommendations.



LTPPBINDv3.1

https://infopave.fhwa.dot.gov/Page/Index/LTPP_BIND

Additional Benefits



Consider high performance binders on overlays

- Reduced rutting
- Reduced cracking
- Better crack seal performance
- Maintain existing crack resistance

Example -Use caution when placing an overlay with -22 binder on a pavement built with a -34 binder.

Better Joint Performance

Interstate Saw and Seal

- Orig. 1962 PCC
- 1999 -3" HMA
- 2004 -1.5" SMA
 - ☐ PG 70-28
- 2004 -Saw/Seal
- 2009 -Sealed secondary cracks
- Photo taken in 2018





But what does it cost?



2016 DOT Ave. Unit Bid Prices

Description	Unit	Total Quantity	Average Bid Price
PG 58-28Asphalt Binder	Ton	15,547.30	\$433.74
PG 58-34Asphalt Binder	Ton	125,661.00	\$485.86
PG 64-22Asphalt Binder	Ton	519.60	\$470.63
PG 64-28Asphalt Binder	Ton	182,175.80	\$457.38
PG 64-34Asphalt Binder	Ton	61,502.20	\$499.15

**Highest to Lowest Difference = \$65.41/ binder ton
@ 6% Binder = \$3.92 / ton of mix**

Simple County overlay



10mile overlay, No milling Original Contract

Amount	\$ 1,500,814.57
1,575.5 contract binder Tons @ \$462.07/ton	\$ 727,991.29
1,575.5 Tons X \$65.41 per ton increase	\$ 103,053.46
Increase in Project Cost	6.87%

Years needed to recover additional 6.9% expenditure		
10 year assumed life	0.69	years
20 year assumed life	1.374	years

Complicated Interstate overlay



20 + mile overlay, extensive traffic control, underdrains, etc.

Original Contract Amount	\$ 22,565,024.00
12,976.4 contract binder Tons @ \$425.78/ton	\$ 5,525,138.00
12,976.4 Tons X \$65.41 per ton increase	\$ 848,786.32
Increase in Project Cost	3.76%

Years needed to recover additional 3.8% expenditure		
10 year assumed life	0.38	years
20 year assumed life	0.75	years

Small Town Urban / Grading



1mile3-Lane,grading,C&G, sidewalks,lighting and new asphalt surface

Original Contract Amount	\$3,521,707.00
9518.5 Ton recycled mix bid @ 4.7% binder	
447.7 contract binder Tons @ \$730.00/ton	\$326,821.00
571.1 (6%) virgin binder Tons X \$795.41 per ton	\$454,258.70
Project Binder cost increase	\$127,437.70
Increase in Project Cost	3.62%

Years needed to recover additional 3.62% expenditure		
10 year assumed life	0.36	years
20 year assumed life	0.72	years

That Small Town Project Today



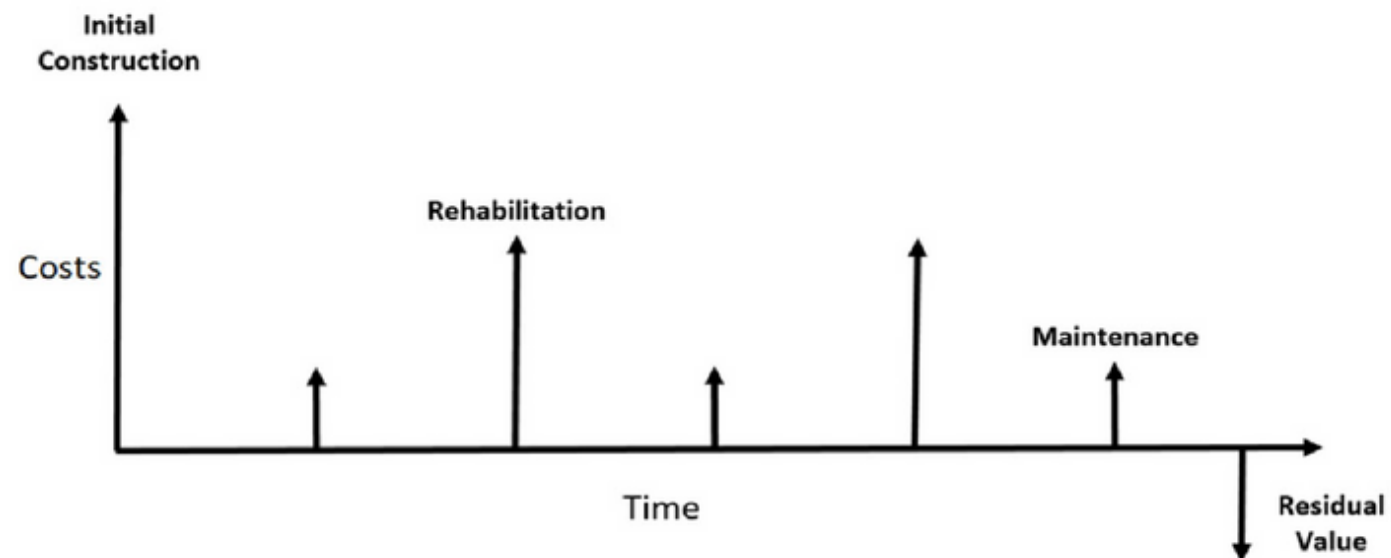
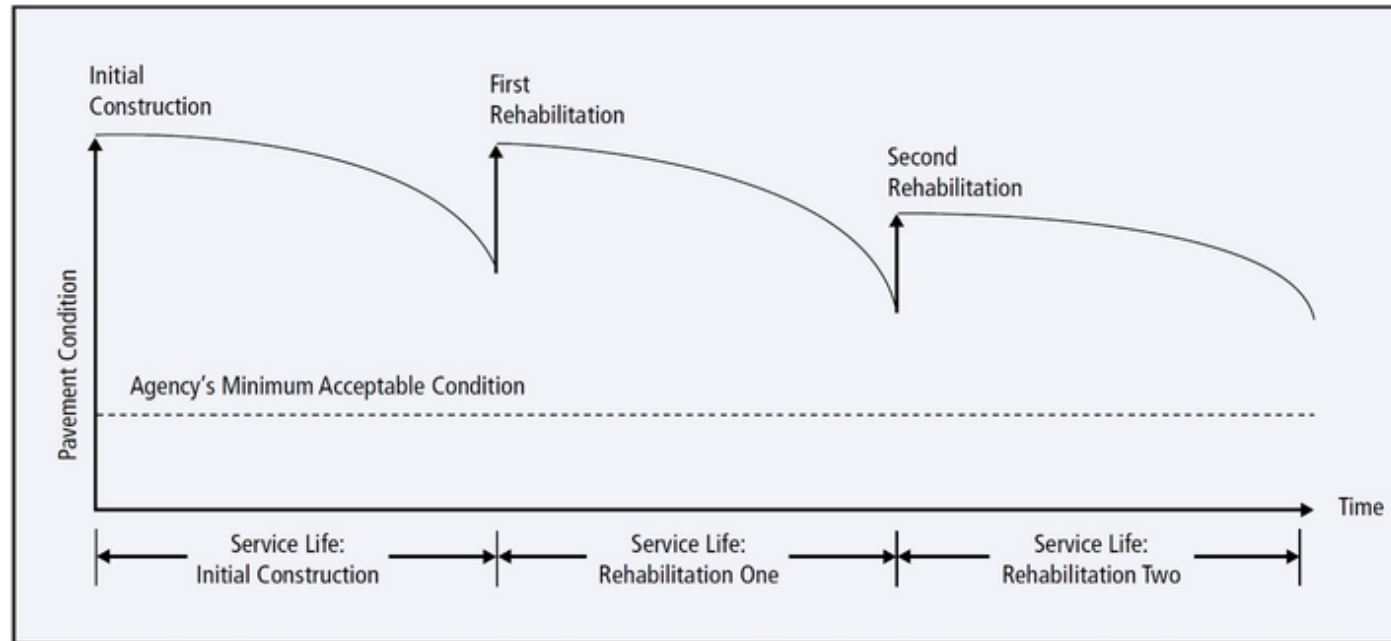
That Small Town Project Today



Pavement Management Systems



A PMS is crucial to track pavement performance !!





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With the Optimized Approach

-  IMPROVE YOUR OVERALL NETWORK CONDITION
-  GET THE LOWEST LIFE CYCLE COST PER ROAD
-  MAXIMIZE YOUR ECO BENEFIT

Additional Educational Opportunities



<https://www.asphaltinstitute.org/training/seminars/>

Thanks to our members



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Contact Info

Thank You -Questions ?