

OVE the

69th Annual Kansas Asphalt Paving Conference

Asphalt Myths Debunked

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Contact Info

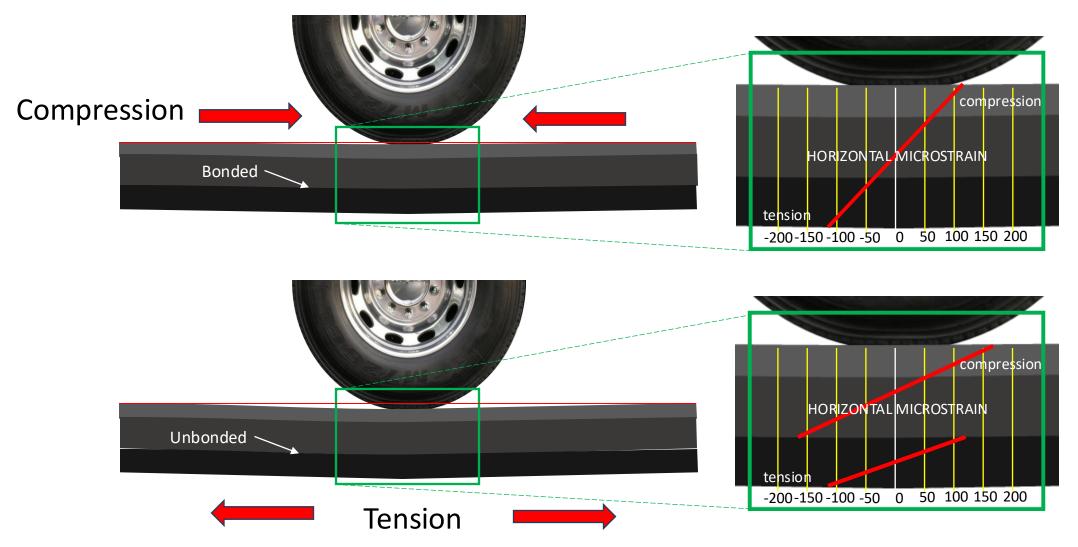
Myth #1 Tack is overrated





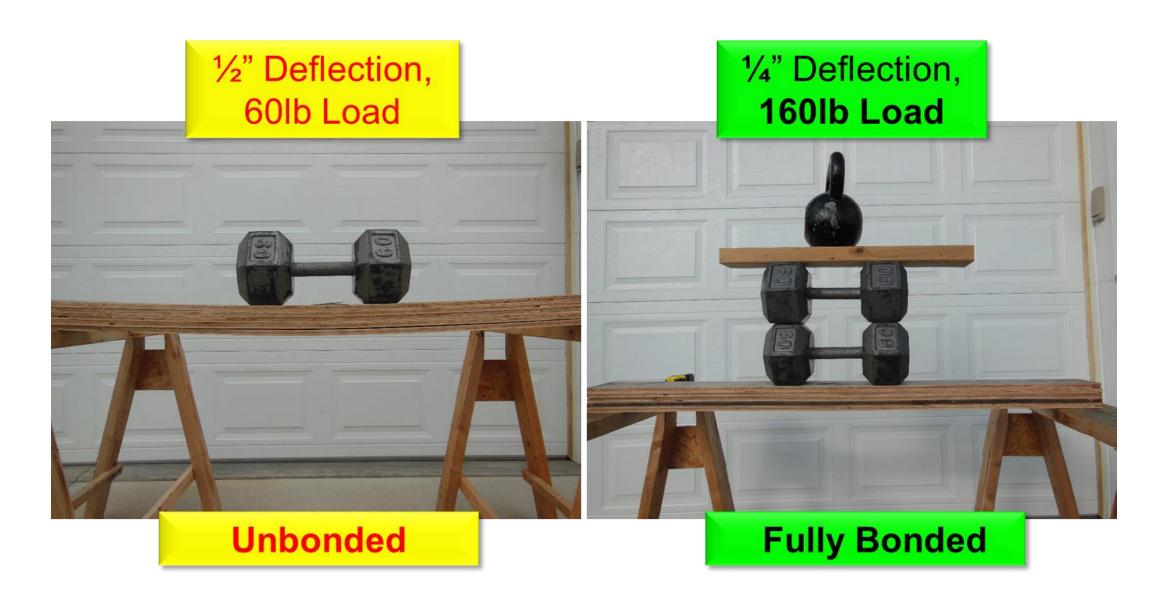
Consequences of Debonding





Bonding Effects





Consequences of Poor Bonding



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

Direction of traffic?





8–10 years est. Interstate Pavement





Cores Showing Debonding



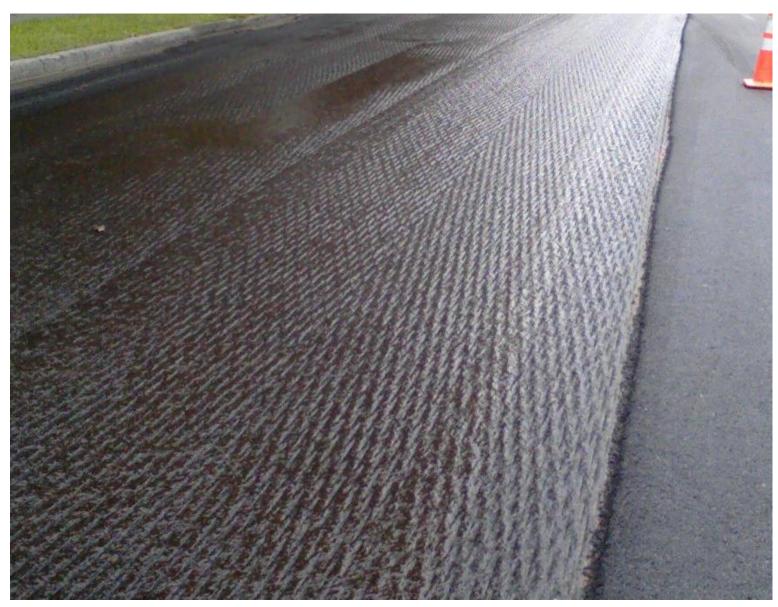
Bonding Failures



Successful Tack Coat



The Ultimate Goal:
Uniform, complete,
and adequate
coverage



Myth #2 – Large Stone Mix is Stronger





NMAS definition

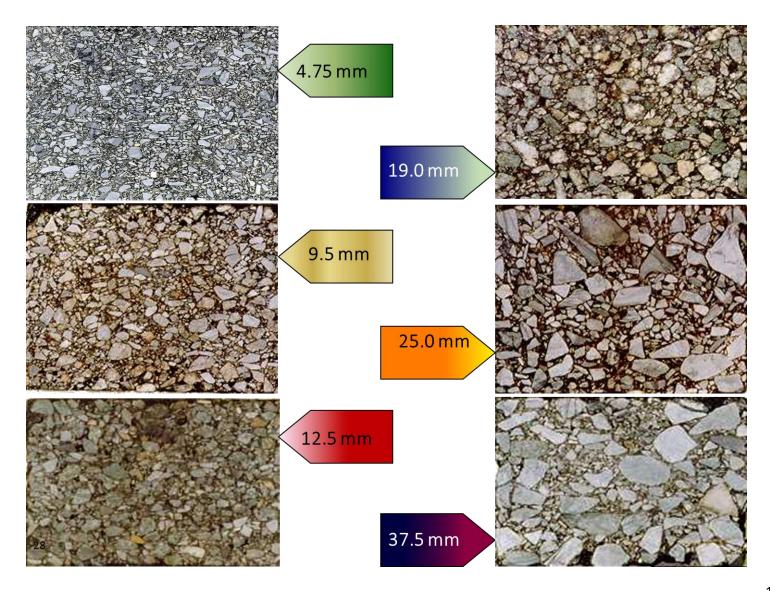


Nominal Maximum Aggregate Size

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

Mixture Aggregate Sizes





NCAT Test Track 1st Cycle





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 ASPHALT INSTITUTE





Lift Thickness

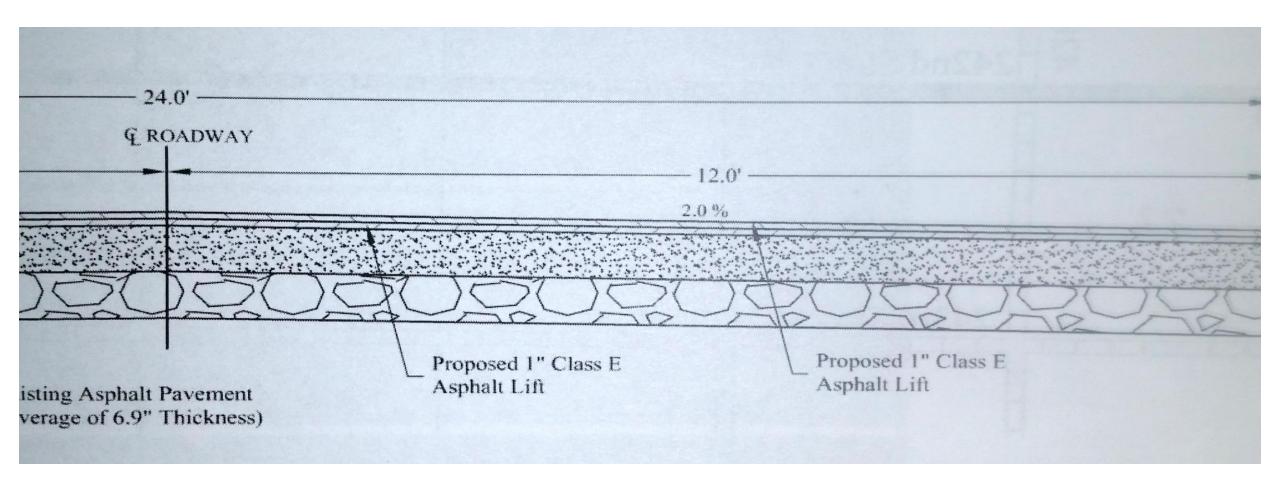




Thin lift overlays require finer mixture types!!

Lift Thickness





Improved Density



Why are thicker lifts easier to compact?

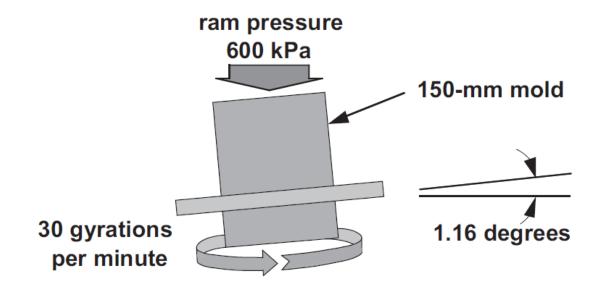
- Slower paver speed.
- Mix cools slower, providing longer compaction time.
- More room to manipulate the mix into a denser mass.

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 Gyratory Compactor at different thicknesses and measured for %Gmm Compaction.

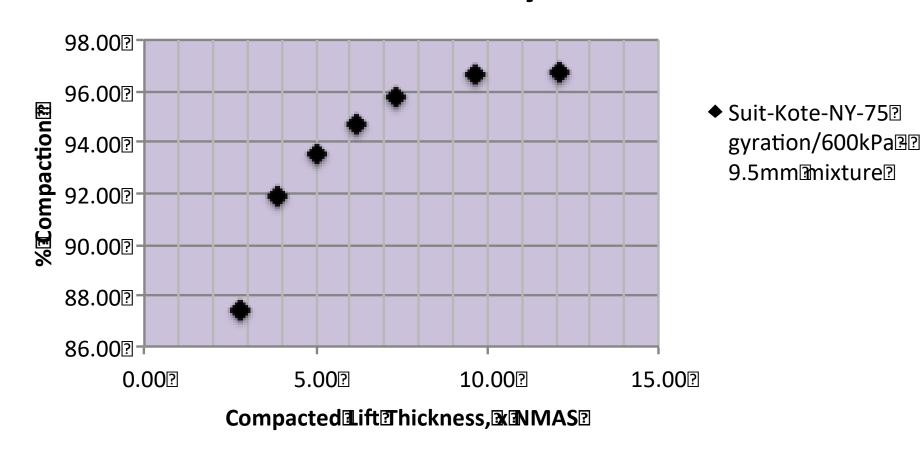






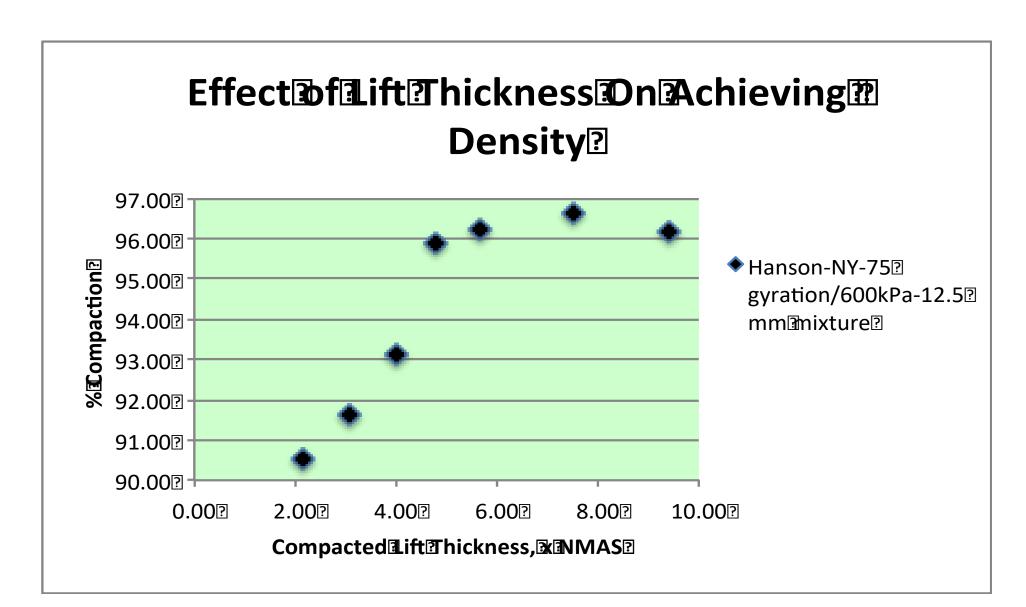


Effect a falift Thickness On Achieving **Density**?



12.5 mm Limestone mix @ 75 gyrations





Myth #4 - PMA is Too Expensive!





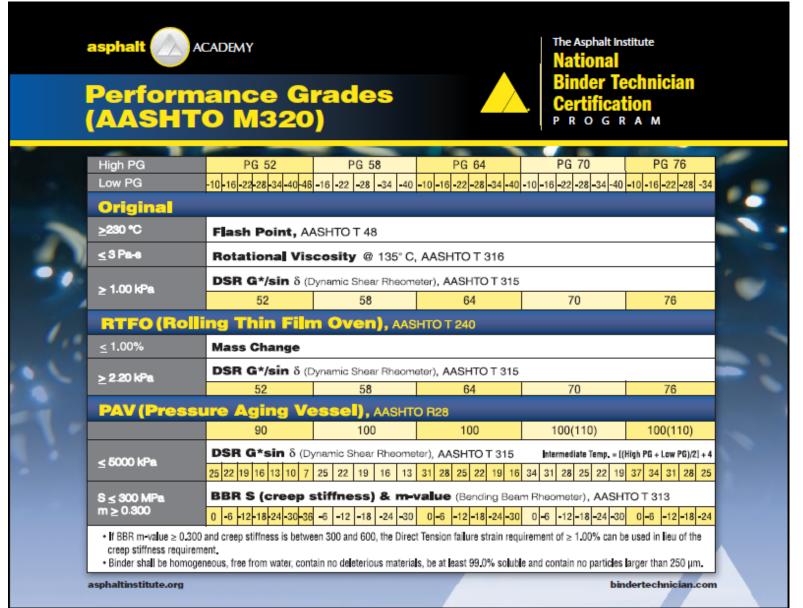
"Rule of 92"

PG 64 - 34 => 64 - - 34 = 98
Probably modified

Depends on asphalt source

Original SuperPave PG Specifications





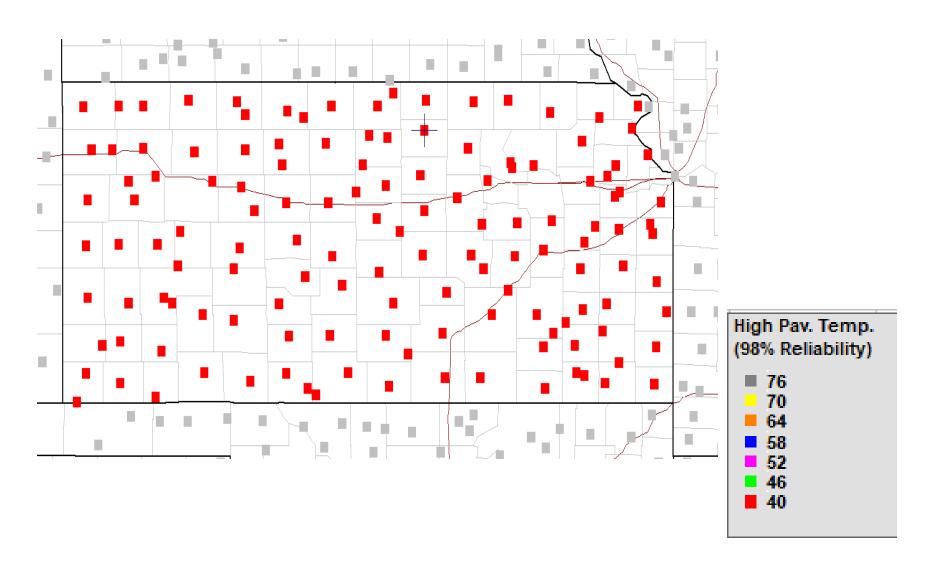
1992 Recommended LT Grades





1992 Recommended HT Grades







Download LTPPBind 3.1

There are many "polymer" grades

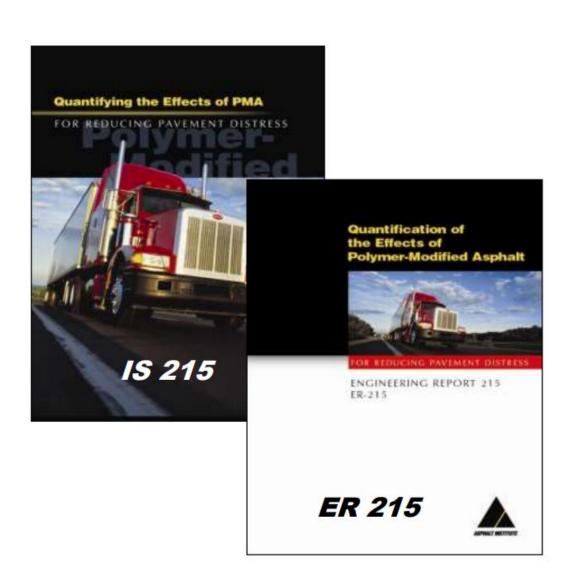




High PG	PG 52	PG 58	PG 64	PG 70	PG 76	
Low PG	-10-16-22-28-34-40-46	-16 -22 -28 -34 -40	-10 -16 -22 28 -34 -40	-10 -16 -22 -28 -34 -40	-10 -16 -22 -28 -34	
Original						
≥230 °C	Flash Point, AASHTO T 48					
<3 Pa-s	Rotational Viscosity @ 135°C, AASHTO T 316					
≥ 1.00 kPa	DSR G*/sin δ (Dynamic Shear Rheometer), AASHTO T 315					-
2 1.00 N G	52	58	64	70	76	
RTFO (Rolling Thin Film Oven), AASHTO T 240						

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.

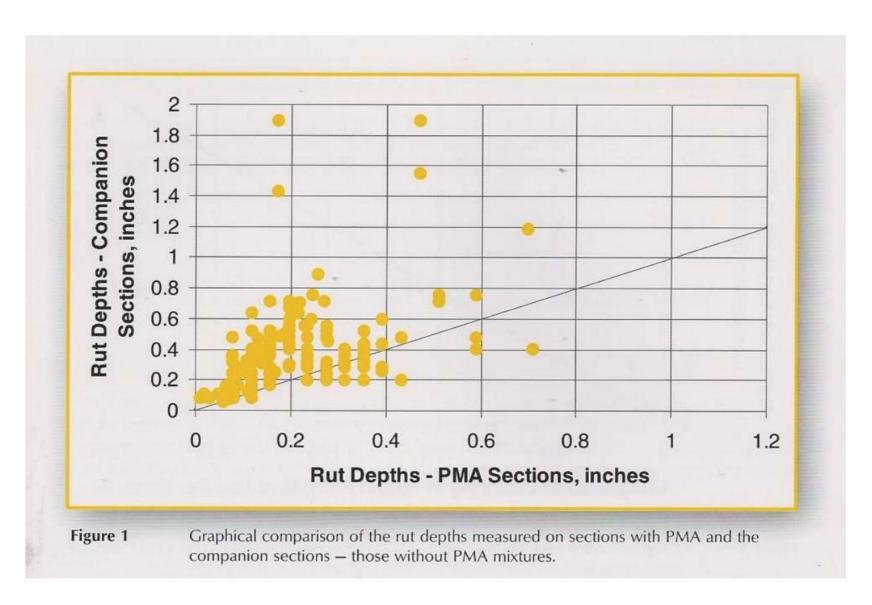
IS-215 Survey of 49 States



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%

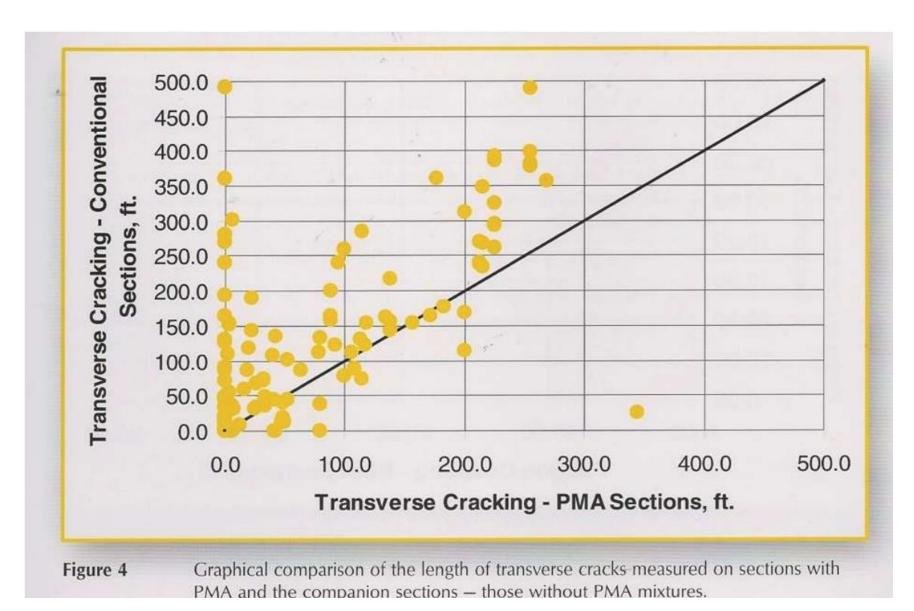
IS-215 LTPP Rut Depth Data





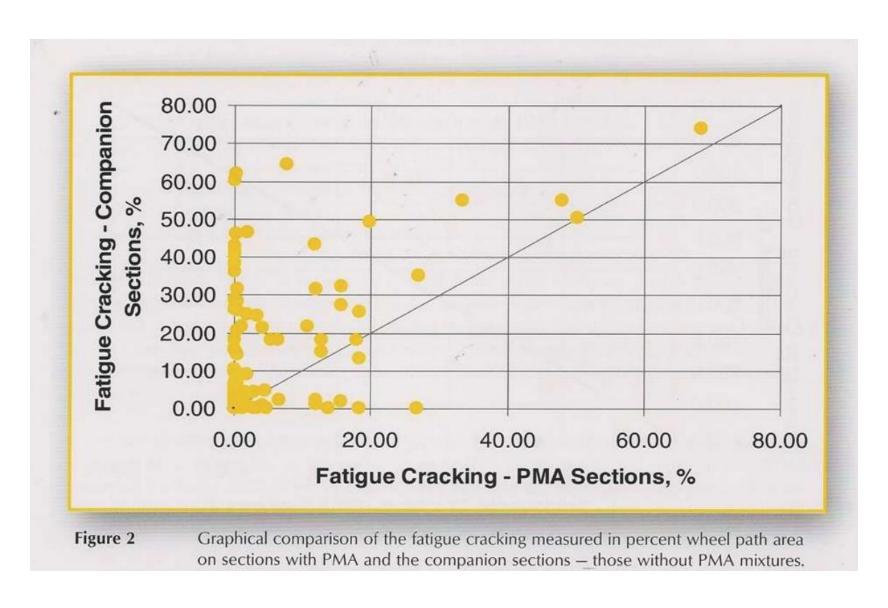
IS-215 LTPP Reflective Cracking Data





IS-215 LTPP Fatigue Cracking Data





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



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

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

Expected Increase in Service Life, Yrs ASPHALT INSTITUTE



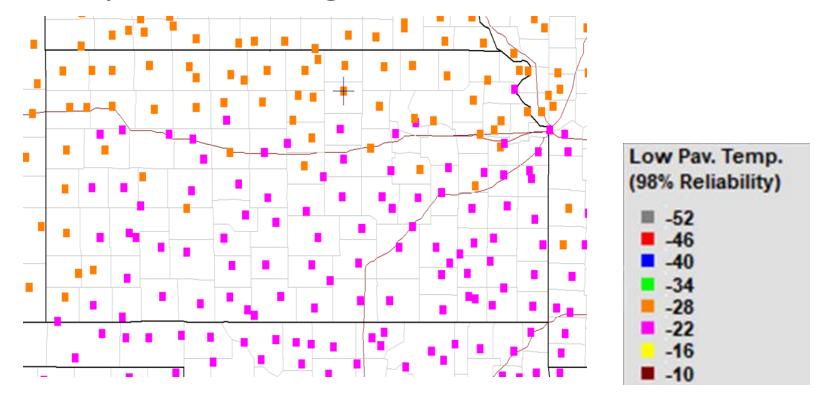
Assumptions: Unmodified sections designed for 20 yr. life. Also, PMA in top 4 inches.

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

Recommendation for New Construction



- Use -28 binders to minimize thermal cracking!
- 30+ year old design recommendations.



LTPPBind v3.1 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







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But what does it cost?



2016 DOT Ave. Unit Bid Prices

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



10 mile 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



1 mile 3-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 ASPHALT INSTITUTE

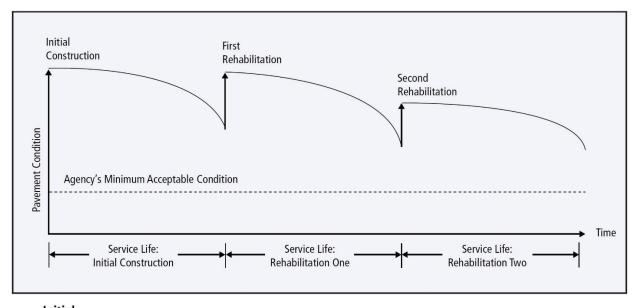


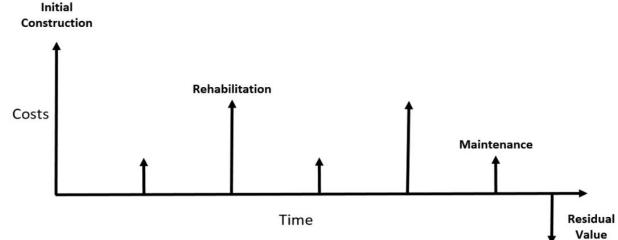


Pavement Management Sytems



A PMS is crucial to track pavement performance!!







RoadResource.org





Additional Educational Opportunities

















Thanks to our members





































































































































































































































































Thank You - Questions?