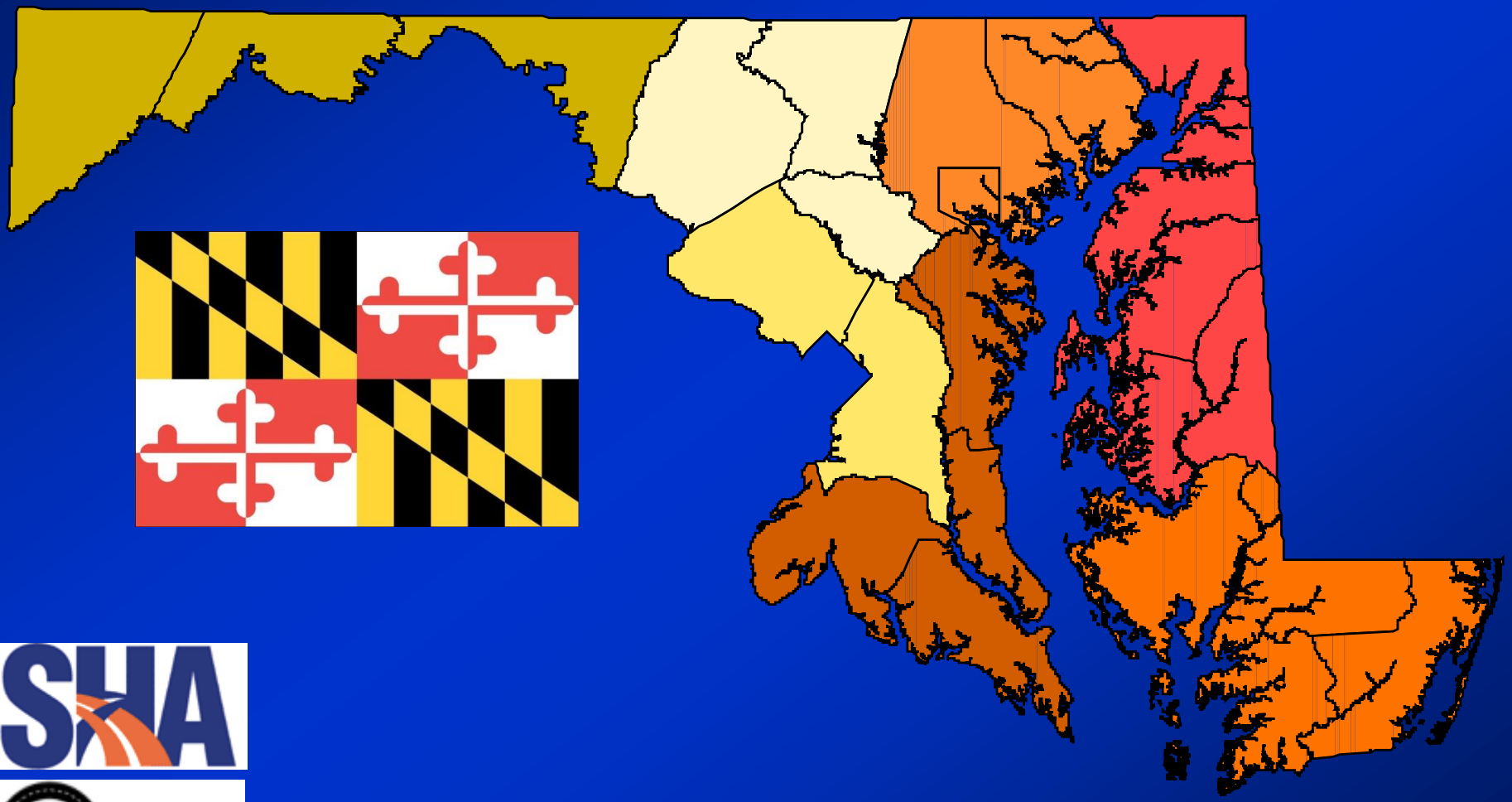
Maryland State Report

A Pavement Management Perspective



SHA

OMT

OFFICE OF MATERIALS & TECHNOLOGY

Nate Moore
2013 NEPPP

Bear with me…

Maryland SHA Pavement Preservation

- Annual Optimization of Resurfacing & Rehab Fund
- Performance Models
  - Ride
  - Cracking
  - Friction
  - Rutting
- Recent Projects and Studies
- Specifications
- Next Steps for MD

Maryland SHA Pavement Network

- 23% of Statewide Lane Miles (17,054)
- 71% of Statewide Vehicle Miles Traveled

- Mostly Asphalt Surfaced
  - **61%** Flexible Pavement
  - **37%** Composite Pavement
  - **2%** Rigid Pavement

- Resurfacing & Rehab Fund ~ **$170M** Annually
  - Also addresses ADA, Signal, Drainage, Markings

Annual Optimization

By Treatment Types

Targets:	Budget	Benefit (LMY)	LM	Estimated $/LM	Avg Life Extension (Years)	$/LMY
	$163M	**7,207**				
Rehab	**$139M**	**5,796**	**331**	**$420k**	**19**	**$23,975**
Preservation	**$21M**	**1,116**	**126**	**$165k**	**12**	**$18,680**
Maintenance	**$3M**	**295**	**74**	**$45k**	**4**	**$11,343**

Annual Optimization

By District

District	Budget	Benefit (LMY)	Suggested LM	$/LM
1	$8,616,050	775	81	$106,370.99
2	$9,291,467	643	61	$152,319.13
3	$57,112,704	2,145	158	$361,472.81
4	$32,729,263	1,534	79	$414,294.47
5	$21,942,554	1,039	70	$313,465.06
6	$11,624,119	405	28	$415,147.11
7	$21,835,062	666	54	$404,353.00

Annual Optimization

By Functional Class

Functional Class	Budget	Benefit	Suggested LM	$/LM
Rural Interstate	$112,049	9	2	$56k
Rural Principal Arterial - Other	$990,944	115	18	$55k
Rural Minor Arterial	$438,251	43	2	$219k
Rural Major Collector	$211,159	43	2	$105k
Rural Minor Collector	$0	0	0	$0 k
Rural Local	$15,648,082	528	48	$326k
Urban Interstate	$17,202,703	596	84	$204k
Urban Principal Arterial - Other Freeways	$20,353	4	1	$20k
Urban Principal Arterial - Other	$82,998,993	4,023	272	$305k
Urban Minor Arterial	$5,821,774	294	16	$364k
Urban Collector	$26,136,853	1,267	61	$428k
Urban Local	$13,570,059	286	25	$543k

Annual Optimization

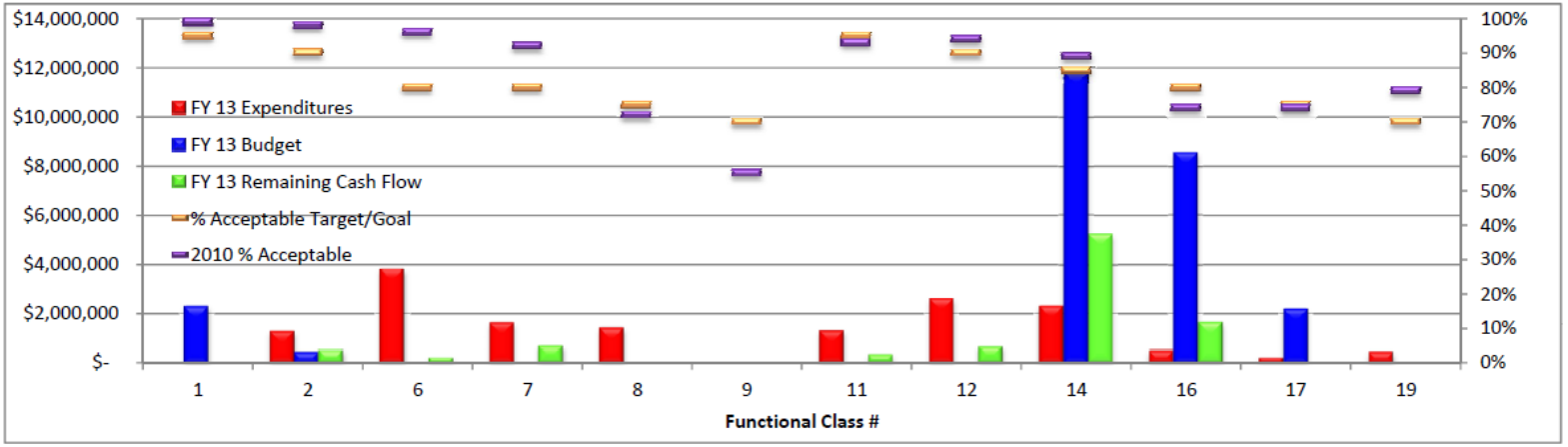
By Remaining Service Life

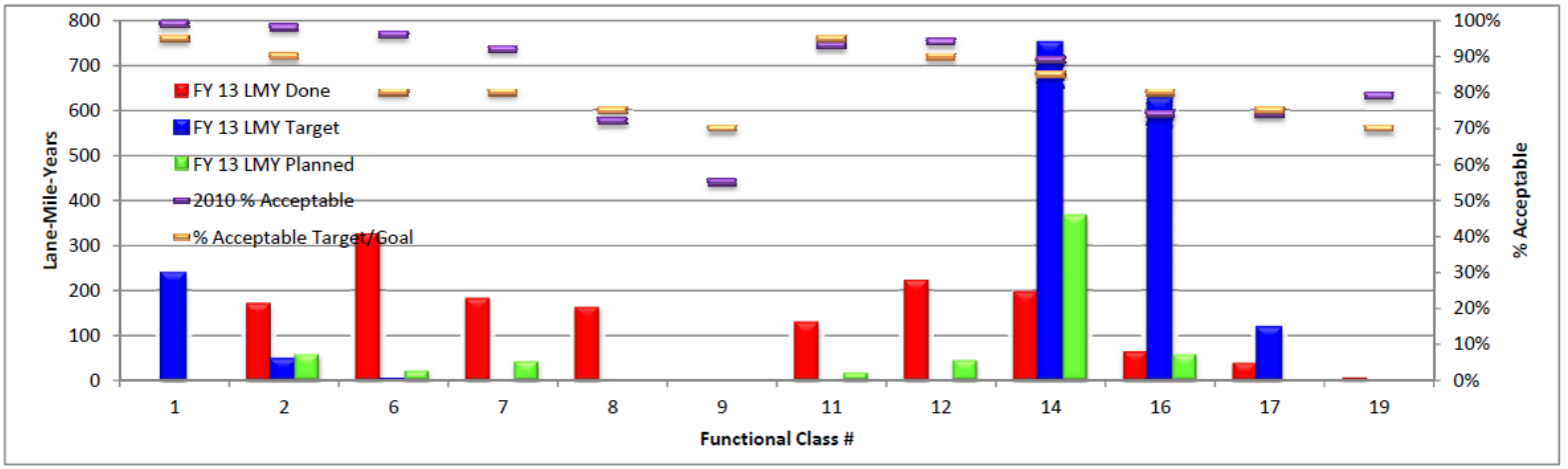
RSL Category		Budget	Benefit	Suggested LM	$/LM
40 to 50 yrs	A	$ 990,944	115	18	$ 54k
30 to <40 yrs	B	$ 112,049	9	2	$ 50k
20 to <30 yrs	C	$ 9,083,893	485	32	$ 286k
10 to <20 yrs	D	$ 46,516,024	2181	200	$ 232k
<10 yrs	E	$ 67,816,748	2818	188	$ 360k
0 yrs	F	$ 38,631,560	1600	90	$ 427k

Annual Optimization

Tracking Project Selection and Benefit

District 5 FY 13 Functional Class Report

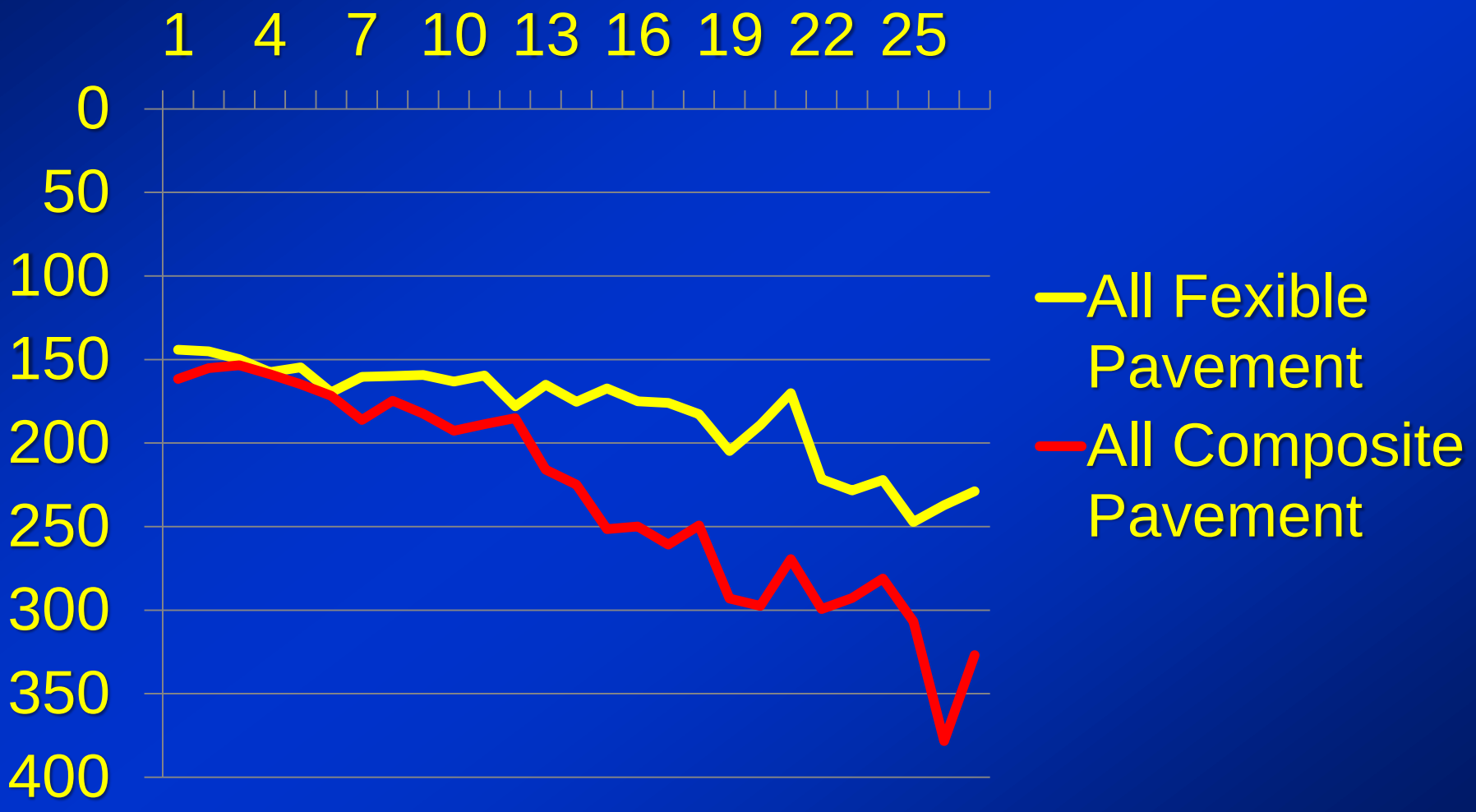




Annual Optimization

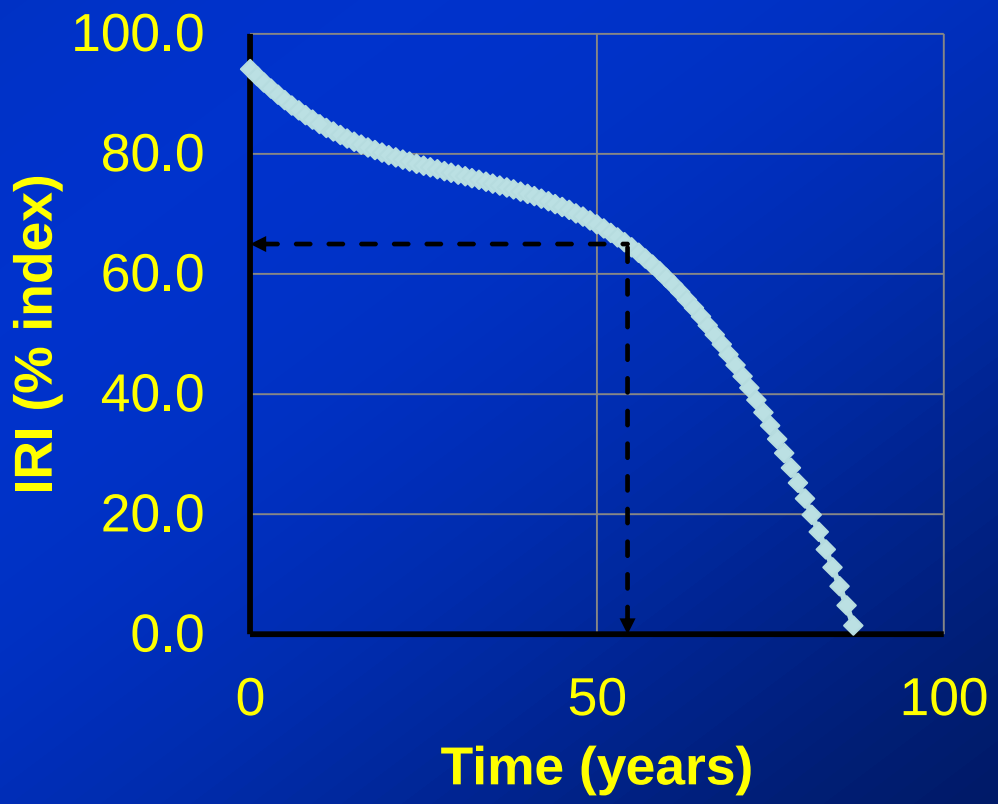
- Developed using:
  - Construction History and Inventory
  - Performance Data
  - 26 Treatments
    - Historical Costs by District, Functional Class & Condition
    - Treatment Decision Tree Triggers
    - Treatment Decision Tree Impacts
  - Performance Curves
  - Performance Goals
  - Good Software
  - Lots of iterations

Performance Models- IRI



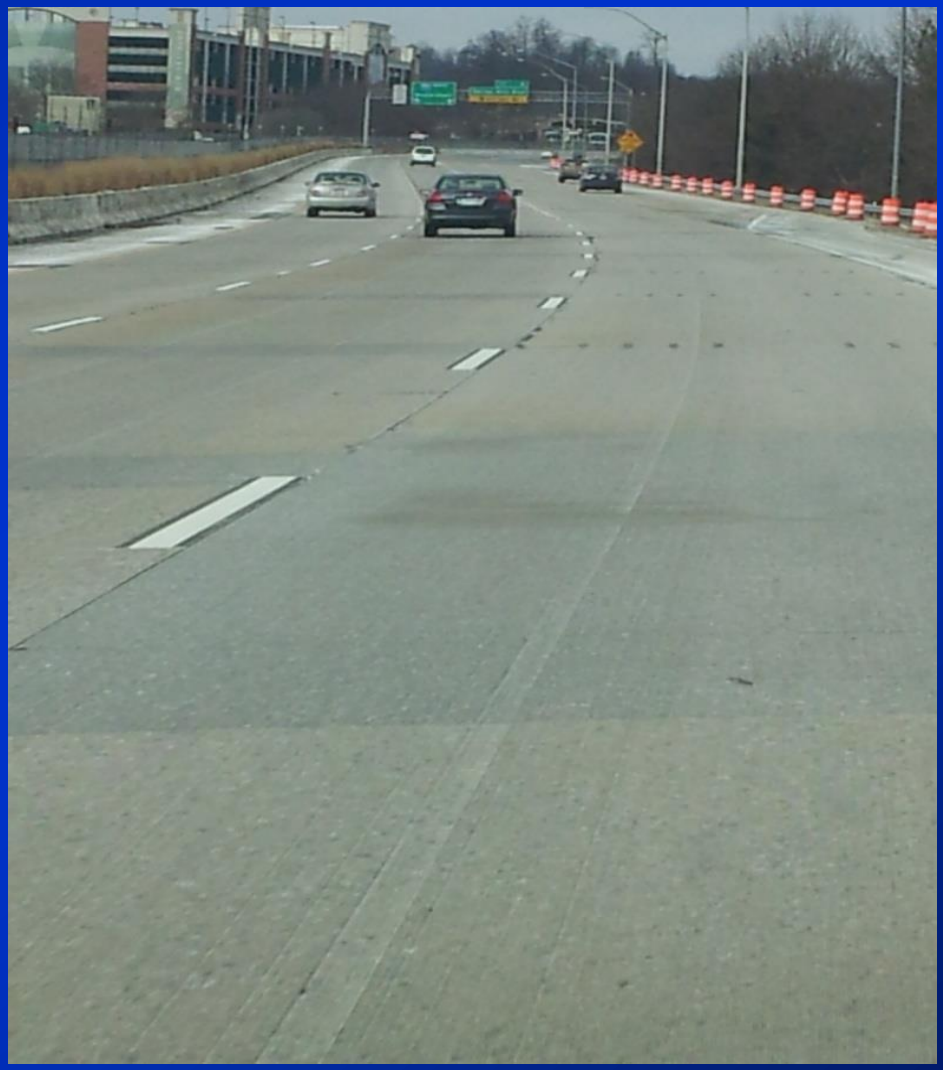
Performance Models for IRI

- 25 Models Last Updated in 2009
- Grouped by
  - Geographic Region
  - Traffic Level
  - Pavement Type
  - Last Treatment



Concrete Pavement Restoration – IS 795

- 10” JRCP
- 40’ Joints
- Built in 1985
- 117,000 ADT
- 7% Trucks
- 30 Lane
- 1,000 Patches
- Dowel Bar Retrofit
- Diamond Grinding
- Fog Seal Shoulders



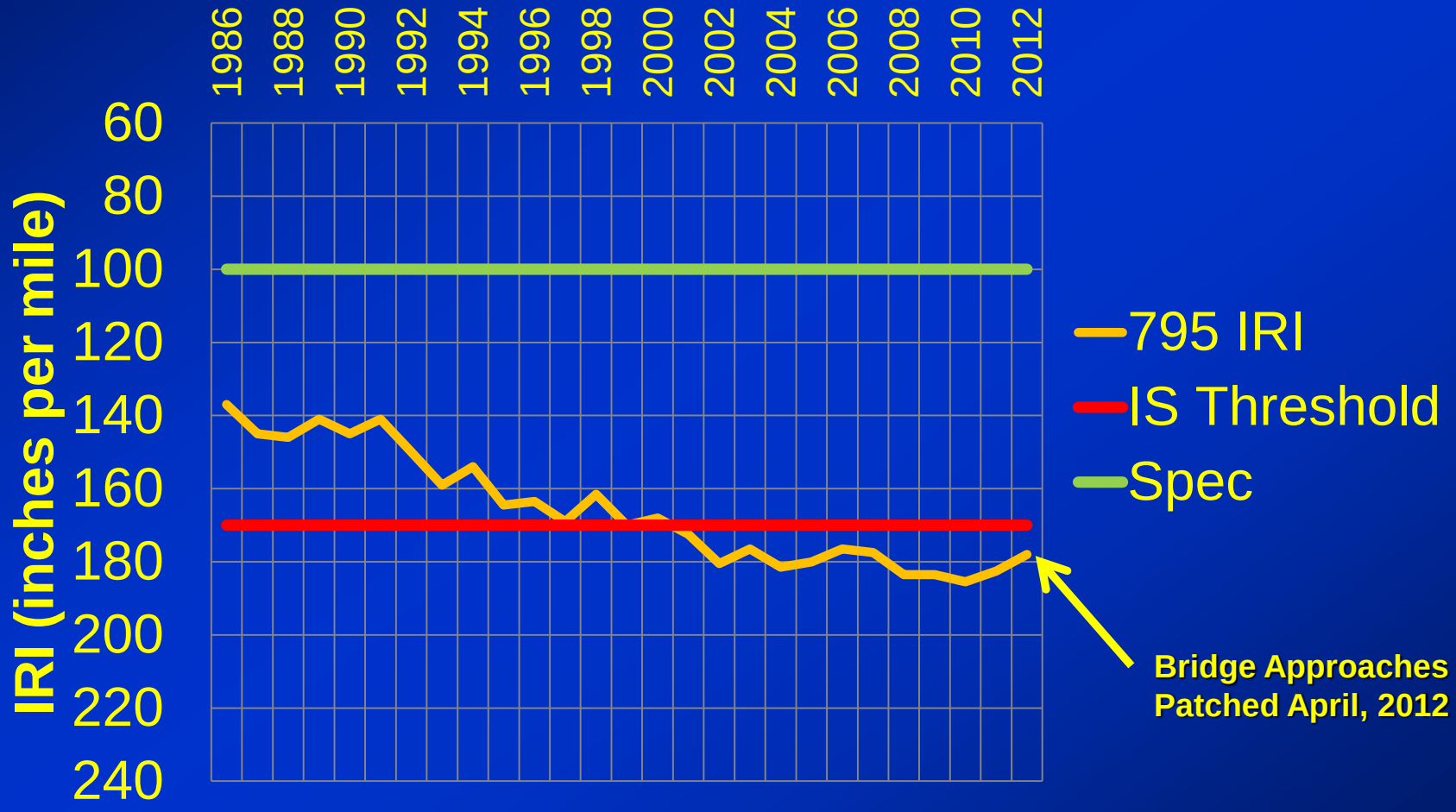
Dowel Bar Retrofit

Diamond Grinding

Credit: International Grooving and Grinding Association

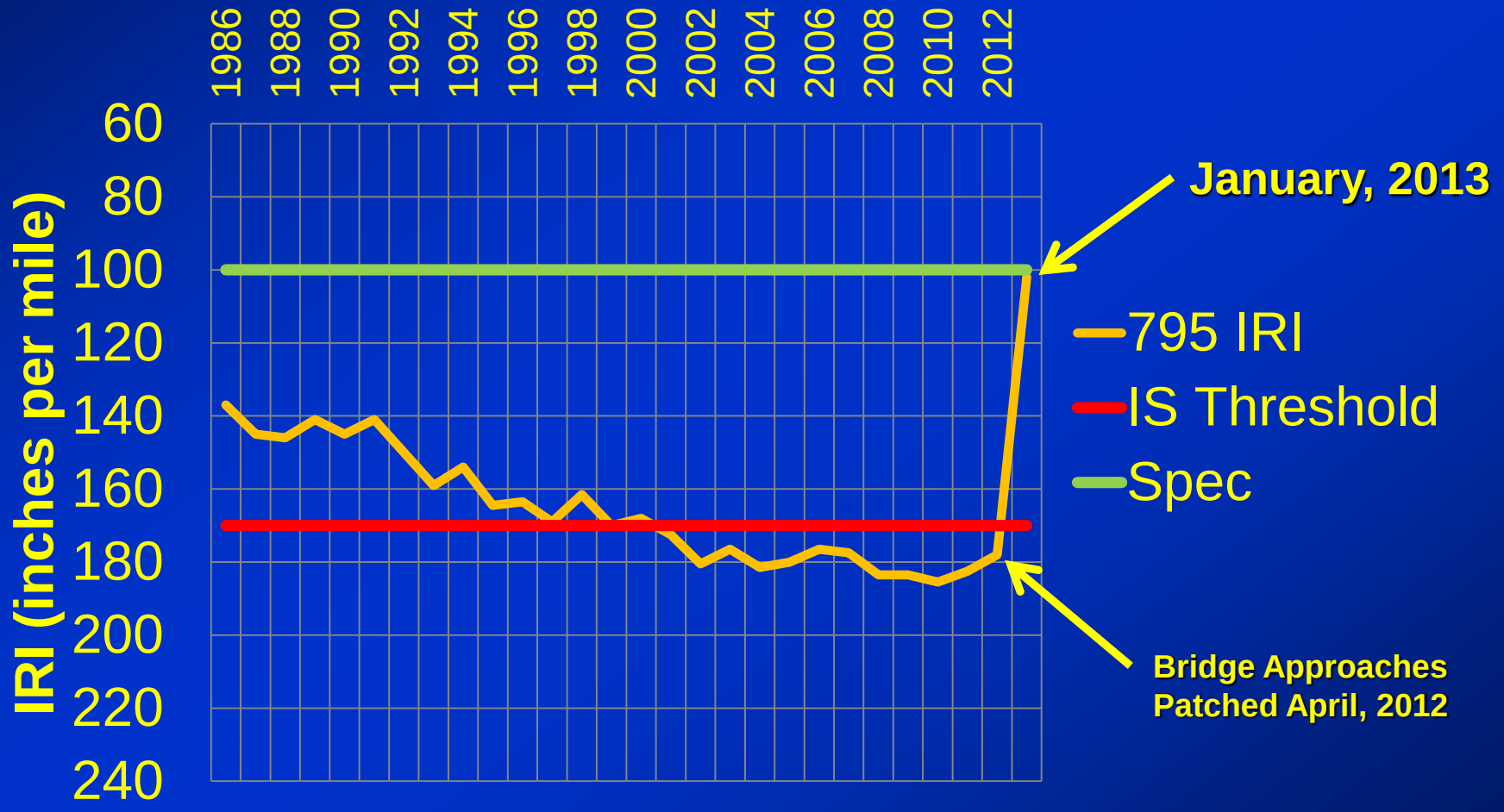
Before Diamond Grinding

Ride Quality on IS 795 from IS 695 to MD 940



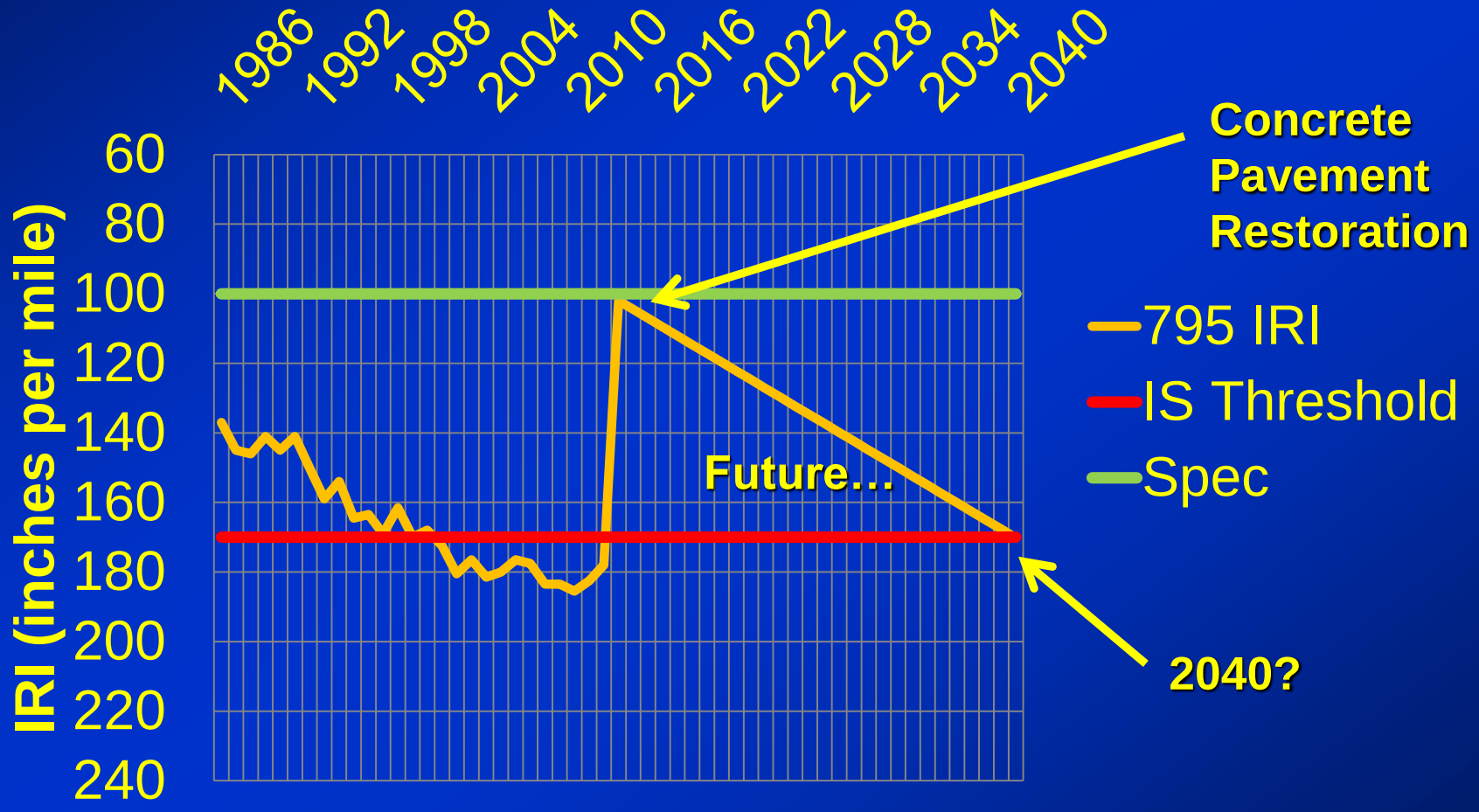
After Diamond Grinding

Ride Quality on IS 795 from IS 695 to MD 940



Long Term IRI Improvement on PCC

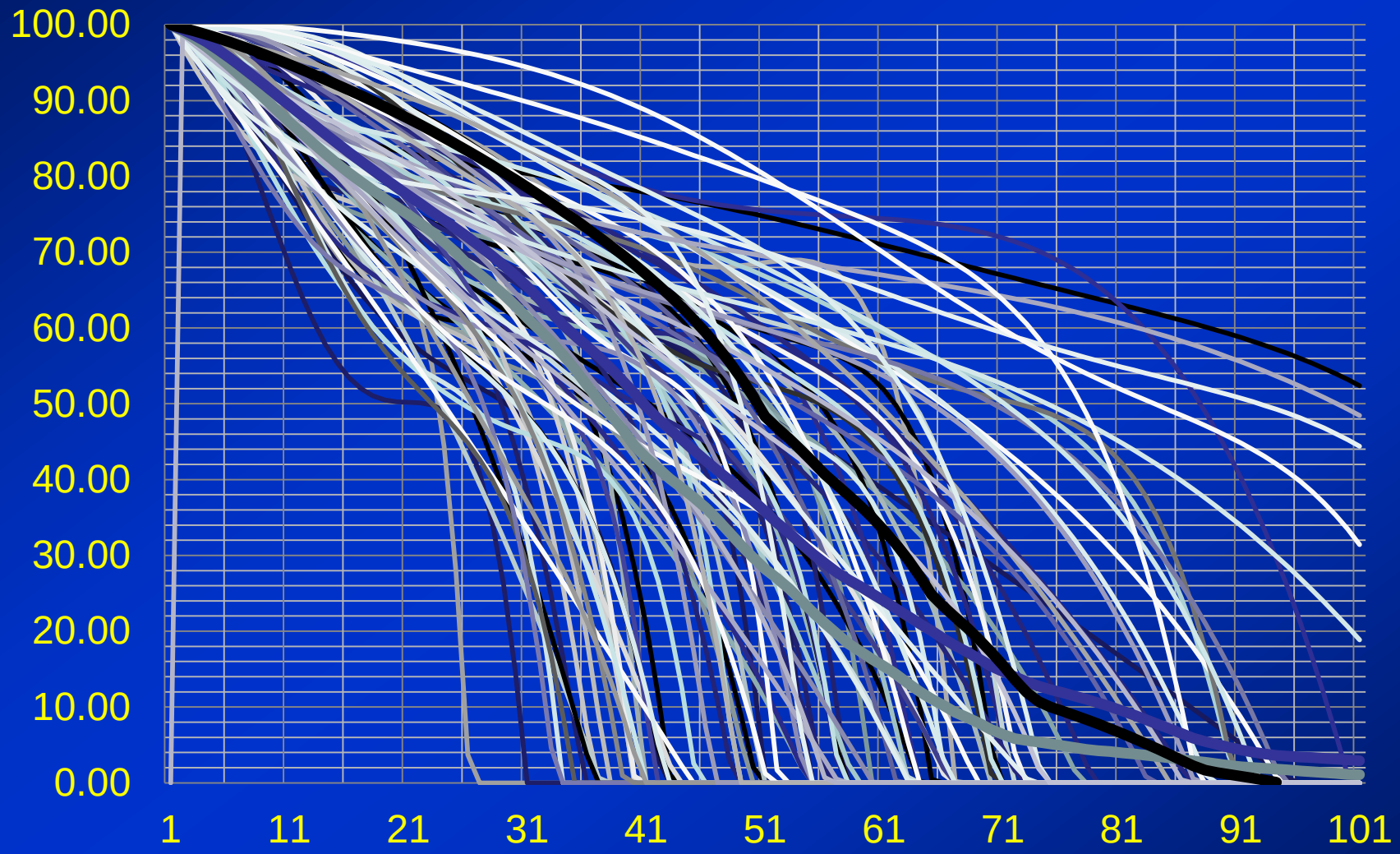
Ride Quality on IS 795 from IS 695 to MD 940



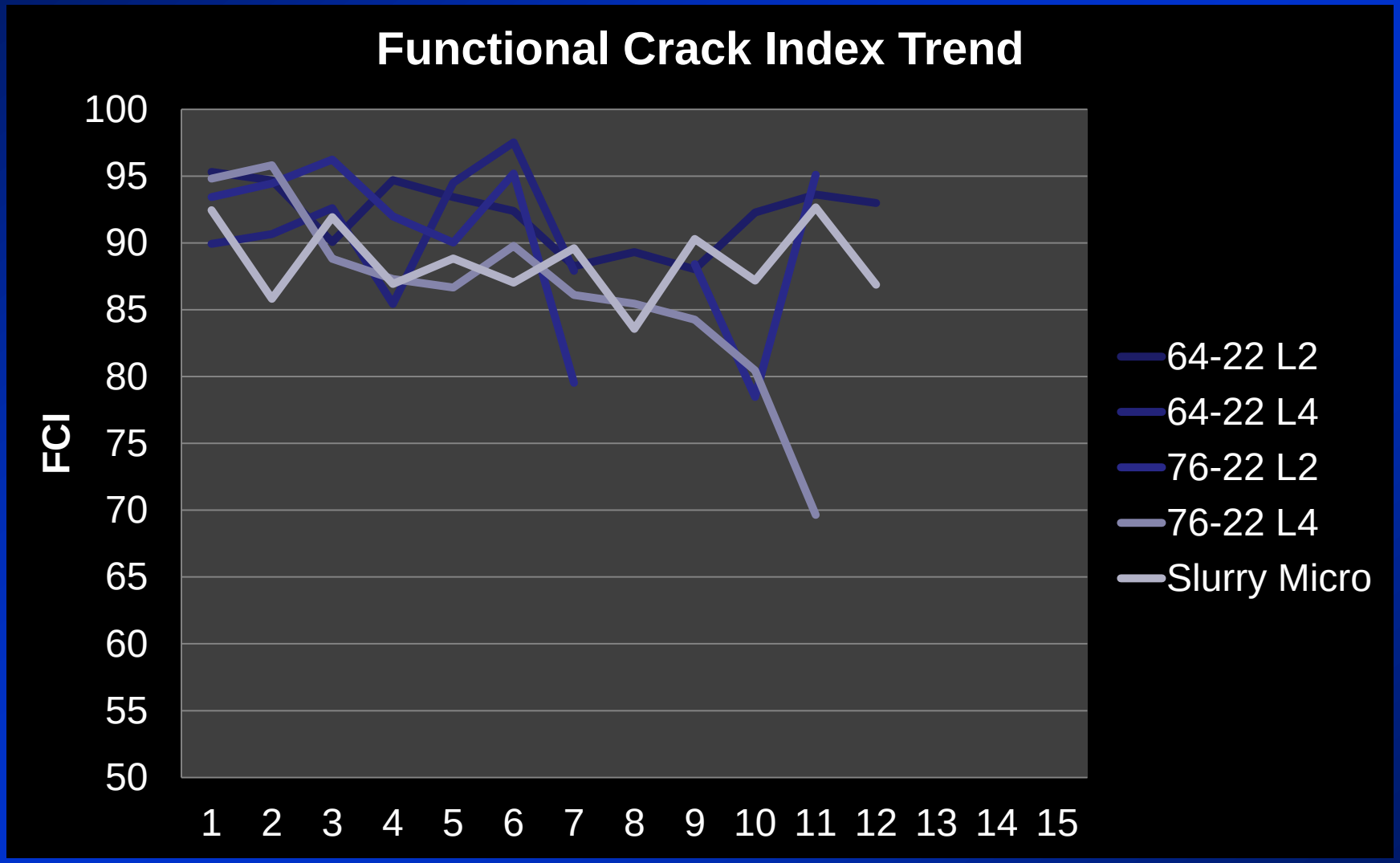
Performance Models - Cracking

- Developed in 2012
- 49 Functional Cracking Models
- 49 Structural Cracking Models
- Grouped by
  - Region
  - Functional Class
  - Pavement Type
  - Last Treatment
  - Dense or SMA Surface

Performance Models - Cracking



Microsurfacing and Superpave Cracking



Comparing Superpave and SMA

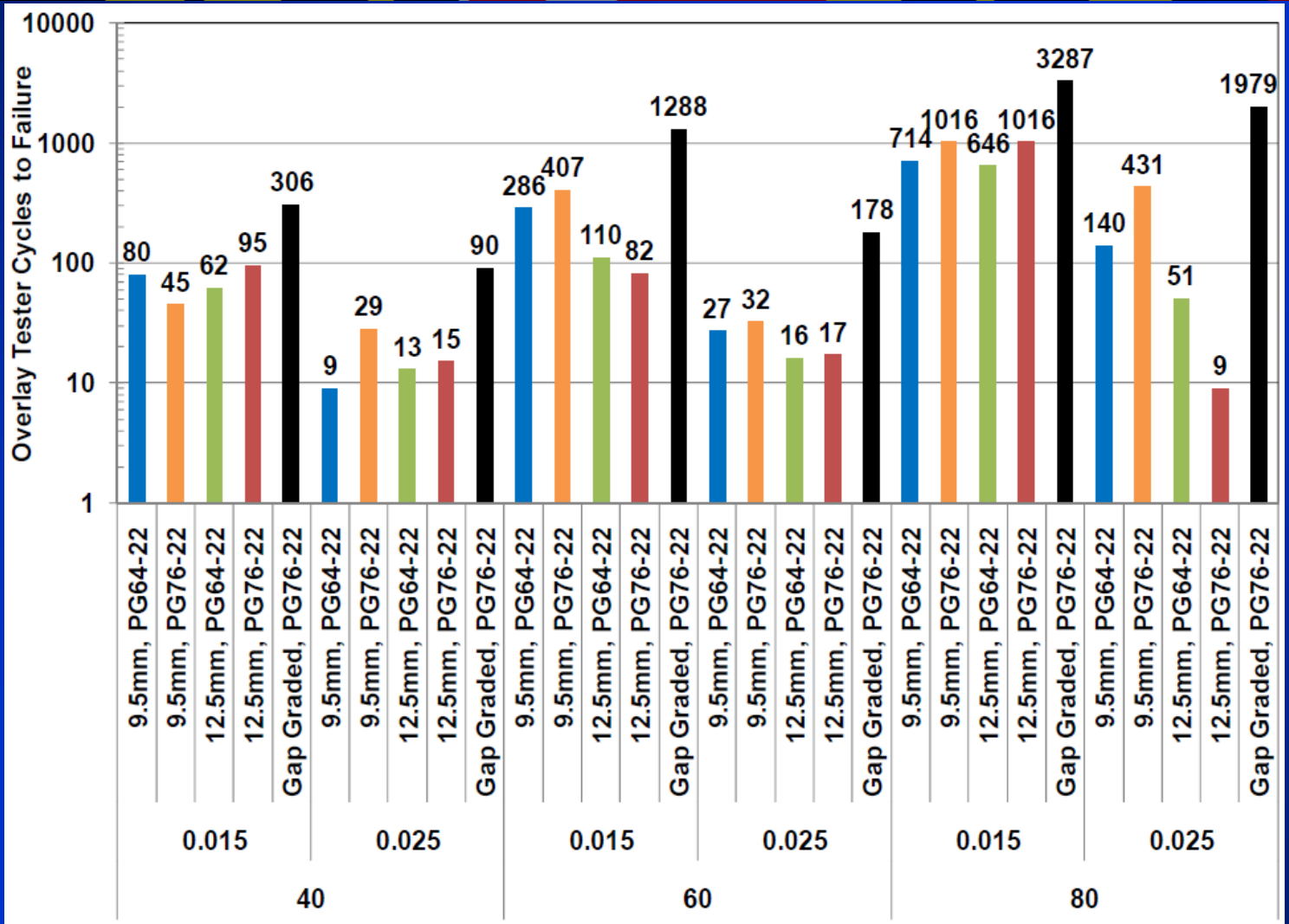
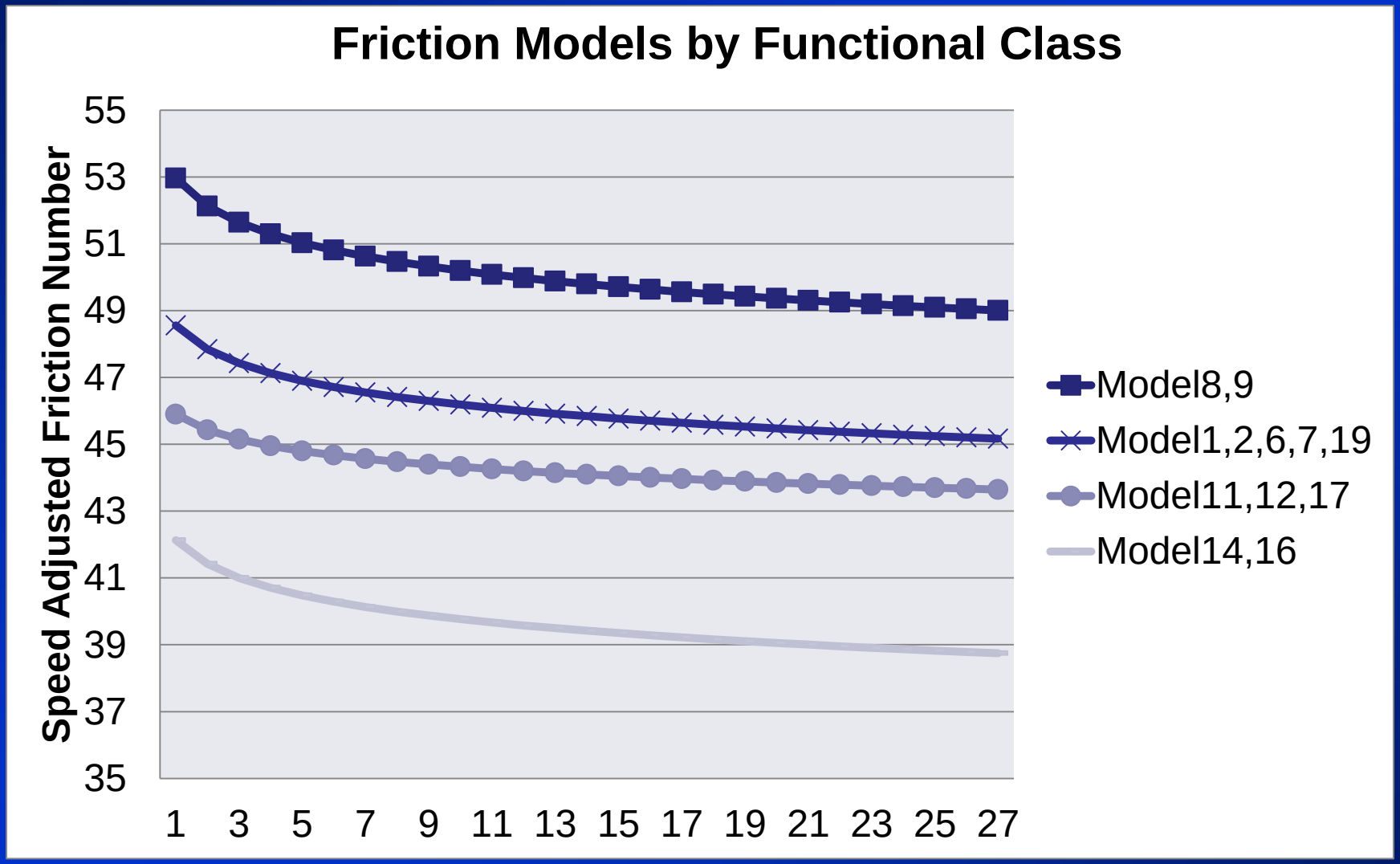


Figure 9 – Average Results from Overlay Tester Fatigue Life Evaluation

Texas Overlay Tester Results - Tom Bennert (2011)

Gap Graded SMA is 3 to 5 times more Crack resistant

Performance Models – Friction



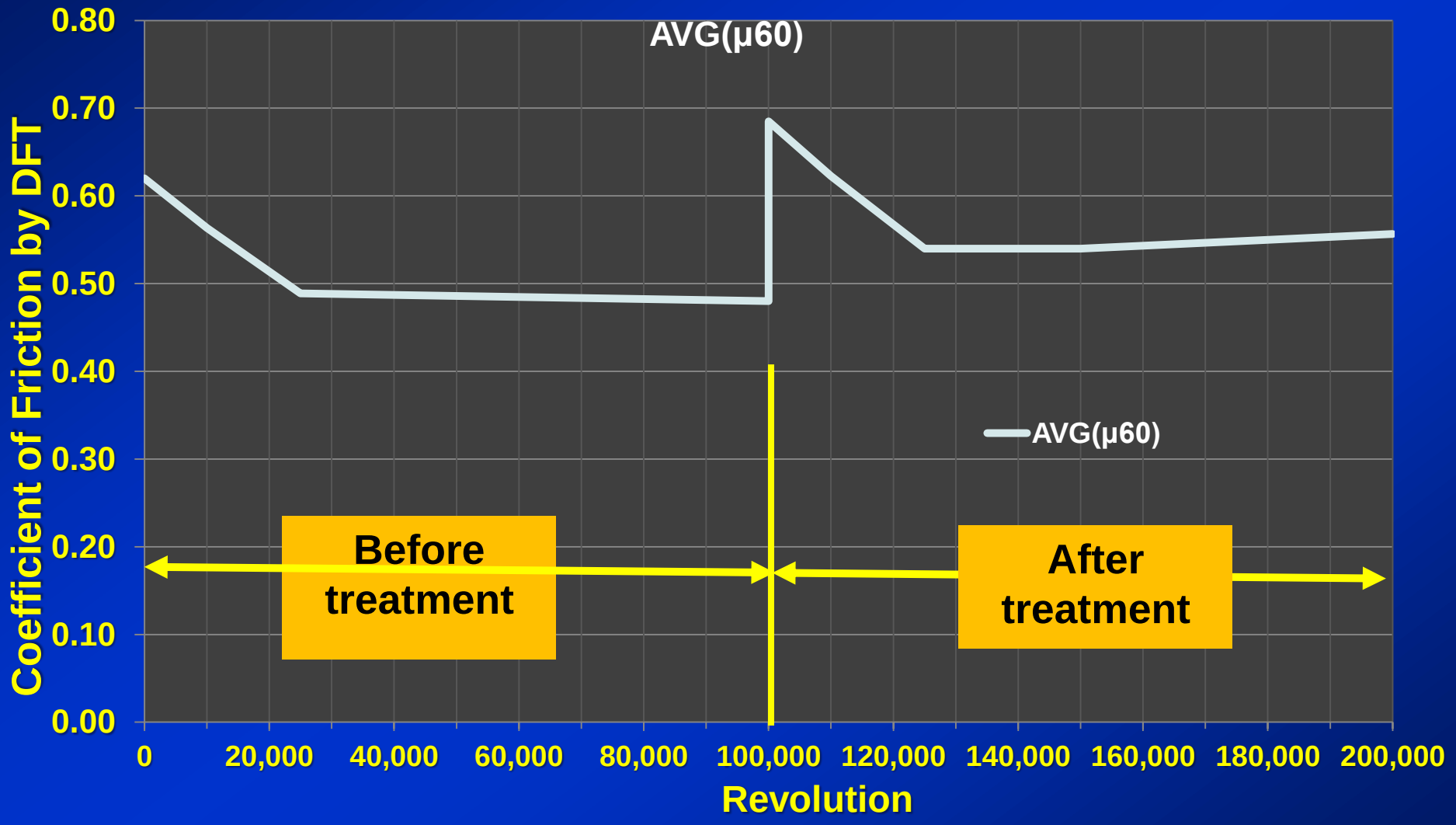
Surface Abrasion Pilot – April, 2013

- Experimental Feature
- US 1 in Howard Co
  - NB Slow Lane
  - Urban Arterial
  - One Lane Mile
- Existing Friction
  - 26 (FN40R)
- Initial Improvement
  - 59 (FN40R)

Surface Abrasion Pilot – April, 2013

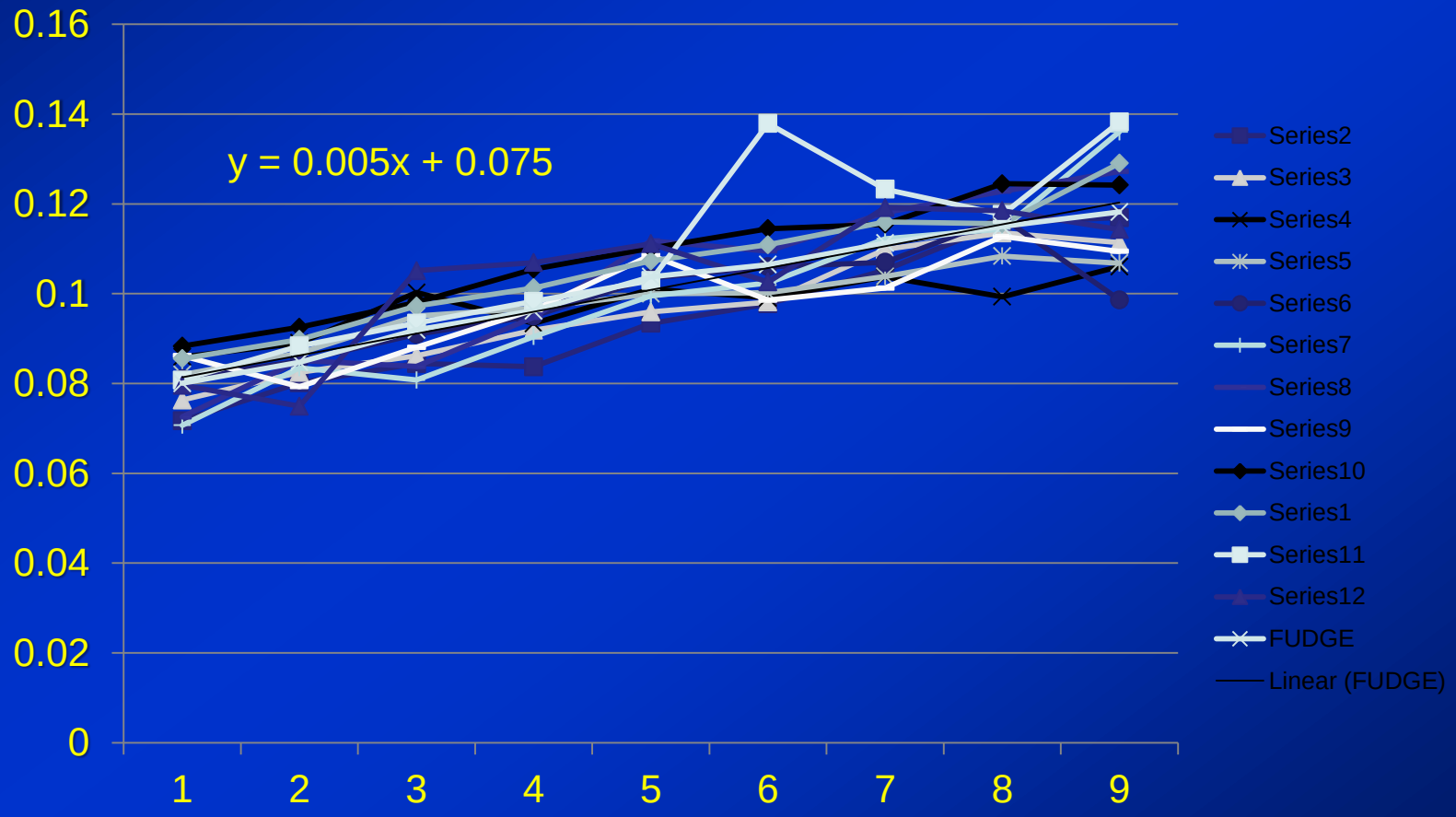
Abraded Aggregate Sample for accelerated testing

Performance Models – Abraded Friction



Performance Models – Rutting

- Work In Progress. Currently by Functional Class.
- Need to conduct ground truth study.



Specifications

Recently Created / Updated:	Now Developing:
High Friction Surface Treatment	Surface Abrasion
Microsurfacing / Slurry Seal	Chip Seal
Cold In Place Recycling with Emulsion	Foamed Asphalt Stabilized Base
Full Depth Reclamation	Rejuvenator
Fog Seal	Ultrathin Bonded Wearing Course
Dowel Bar Retrofit	AR OGFC
Diamond Grinding	
Spall Repair	
Open Graded Friction Course	

Next Steps

- Incorporating SHA Pavement Preservation Guide into the Annual Optimization
- Developing and Updating Strategic Specs
- Calibrating the MEPDG using Pavement Management Data
- Update All Models, especially Rutting and IRI
- Link aggregate Sources, traffic patterns and accident data with Friction data.
- Document Pavement Asset Management Plan.