

Cost Comparison of HMA and PCC

for

Kansas Rural
Interstate Pavements

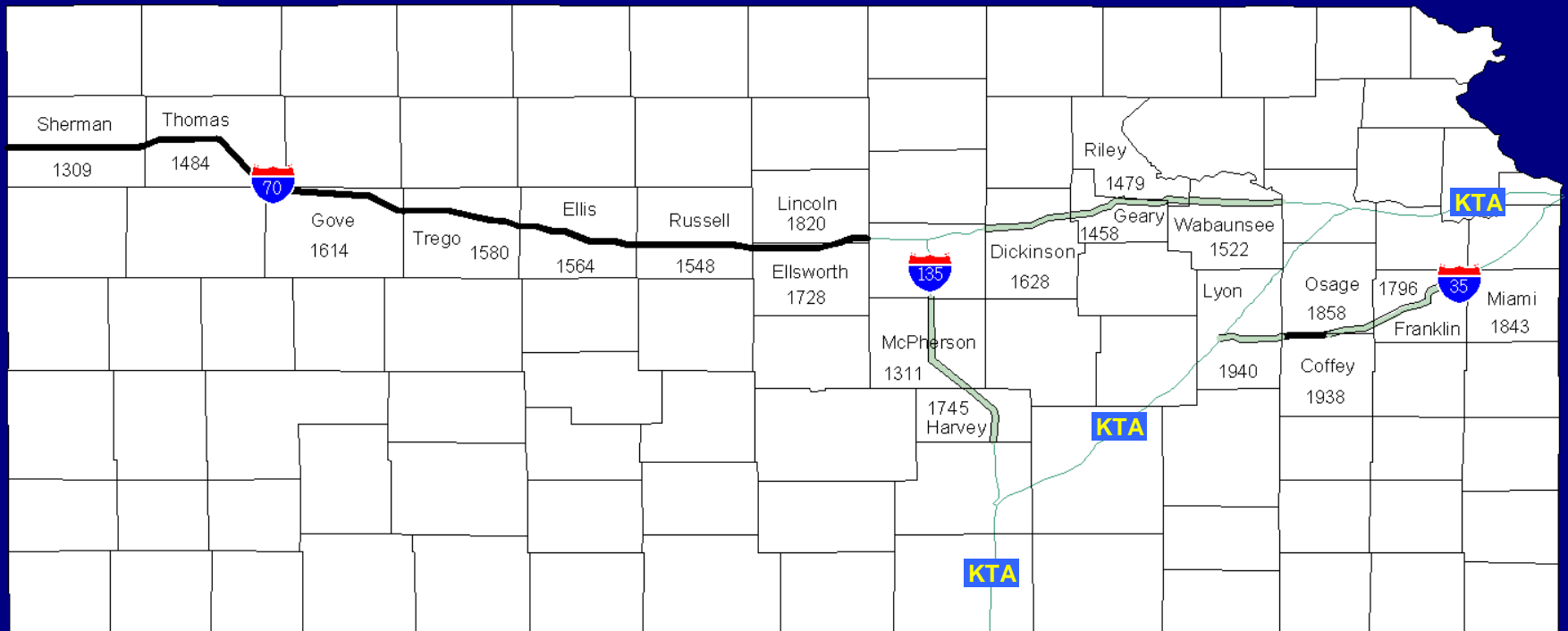
Authors





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University of Kansas



-   Interstate/Kansas Turnpike
-  PCC Pavement (184 miles)
-  HMA Pavement (244 miles)

Miles of Pavement

Route	HMA	PCC
I-70	249.7	95.1
I-35	12.1	55.4
I-135	0	68.4
Totals	261.8	218.9

Average 1-Way Traffic

	HMA	PCCP
AADT	5,085	7,120
ESAL	1,140	1,230
Trucks	1,580	1,600

Basis of Analysis

- Expenditures per 4-Lane Mile of Mainline Paving
- Actual Dollar Basis
- Constant 2001 \$ Basis
 - 3.5% Annual Inflation Rate

Analysis by Section

Each Section has
Discrete Beginning and
Reconstruction or
Rehabilitation Date

- HMA
- 24 Sections
- 4.0 - 23.2 miles
- PCCP
- 32 Sections
- 1.9 - 13.1 miles

Miles	W CO L												US 75 N Co L		
	0	1	2	3	4	5	6	7	8	9	10	11	12	12.1	13.2
1970															
1971															
1972															
1973															
1974															
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1996															
1997															
1998															
1999															
2000															
2001															

35-16 I 35-3 (103) 143 Grading 12.088 mi

35-3 (98) 155 G

35-16 I 35-3 (104) 143 Paving 12.093 mi

35-3 (99) 155 P

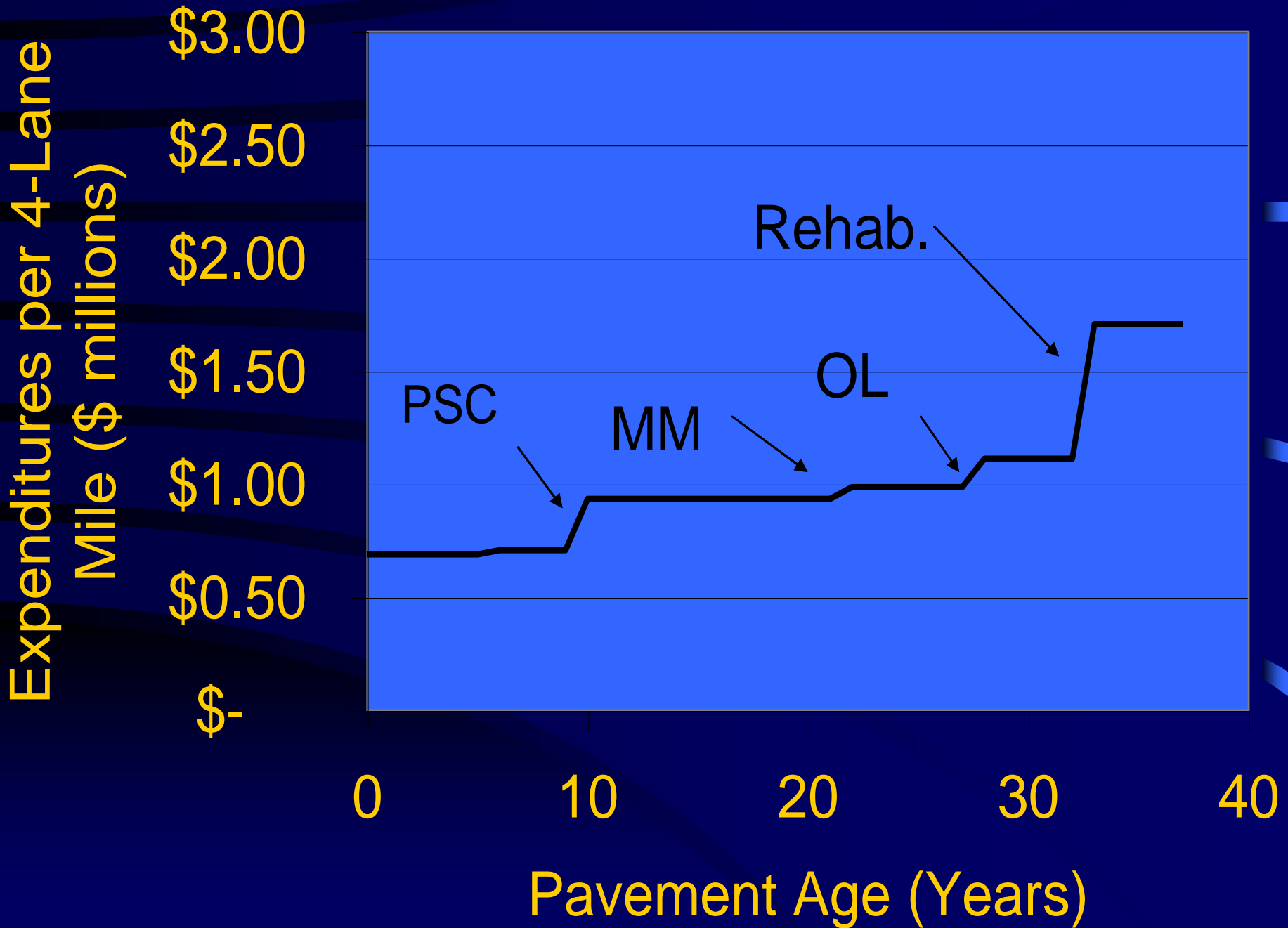
35-16 M 0740-01 Seal 11.976 mi

35-106 K3595-0

K5571-01 3" HM

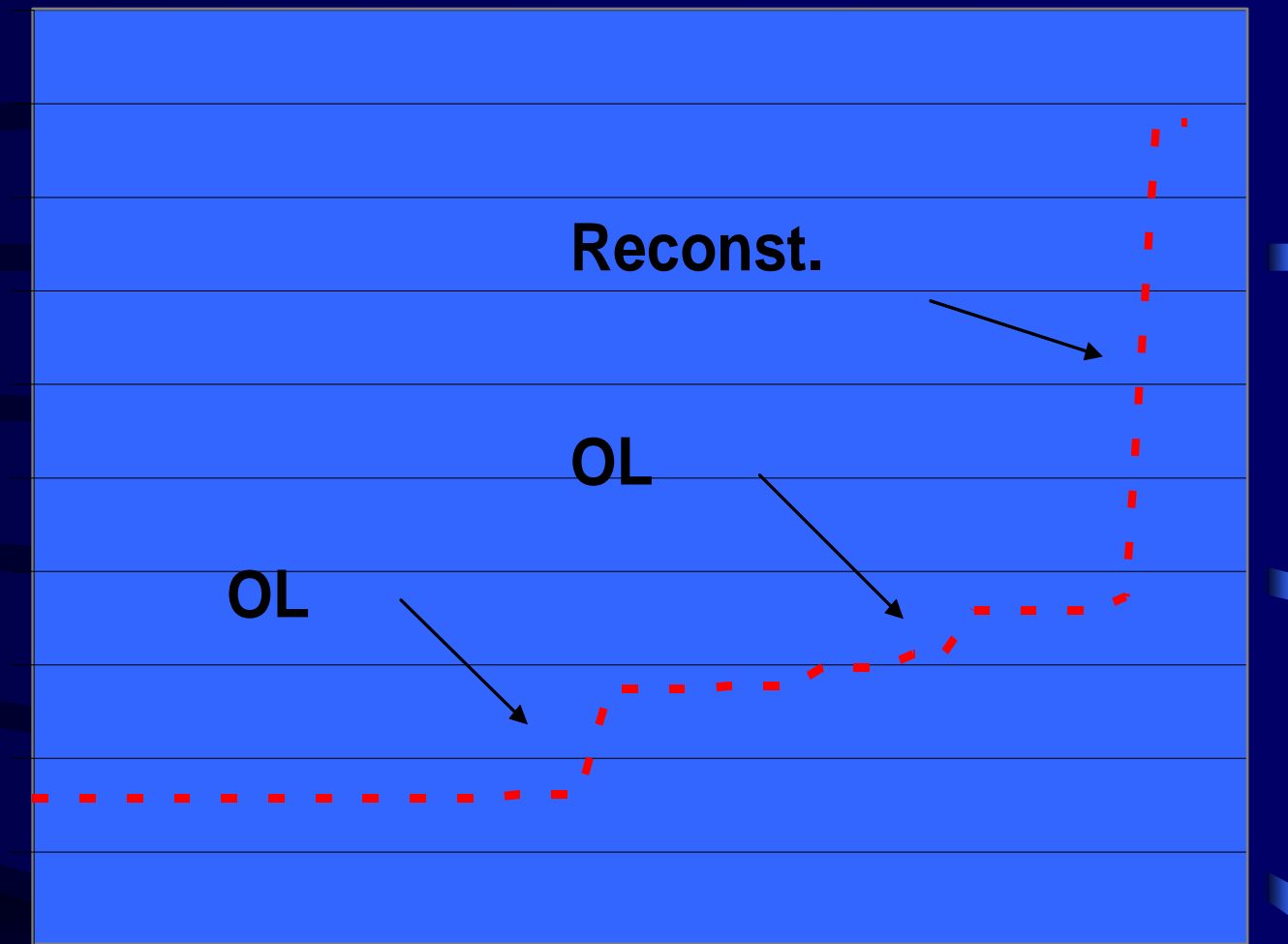
I35-016-M 1807-01 3" HMA Overlay 12.276 mi

I35-016-K 7704-01 Shoulder 20 km



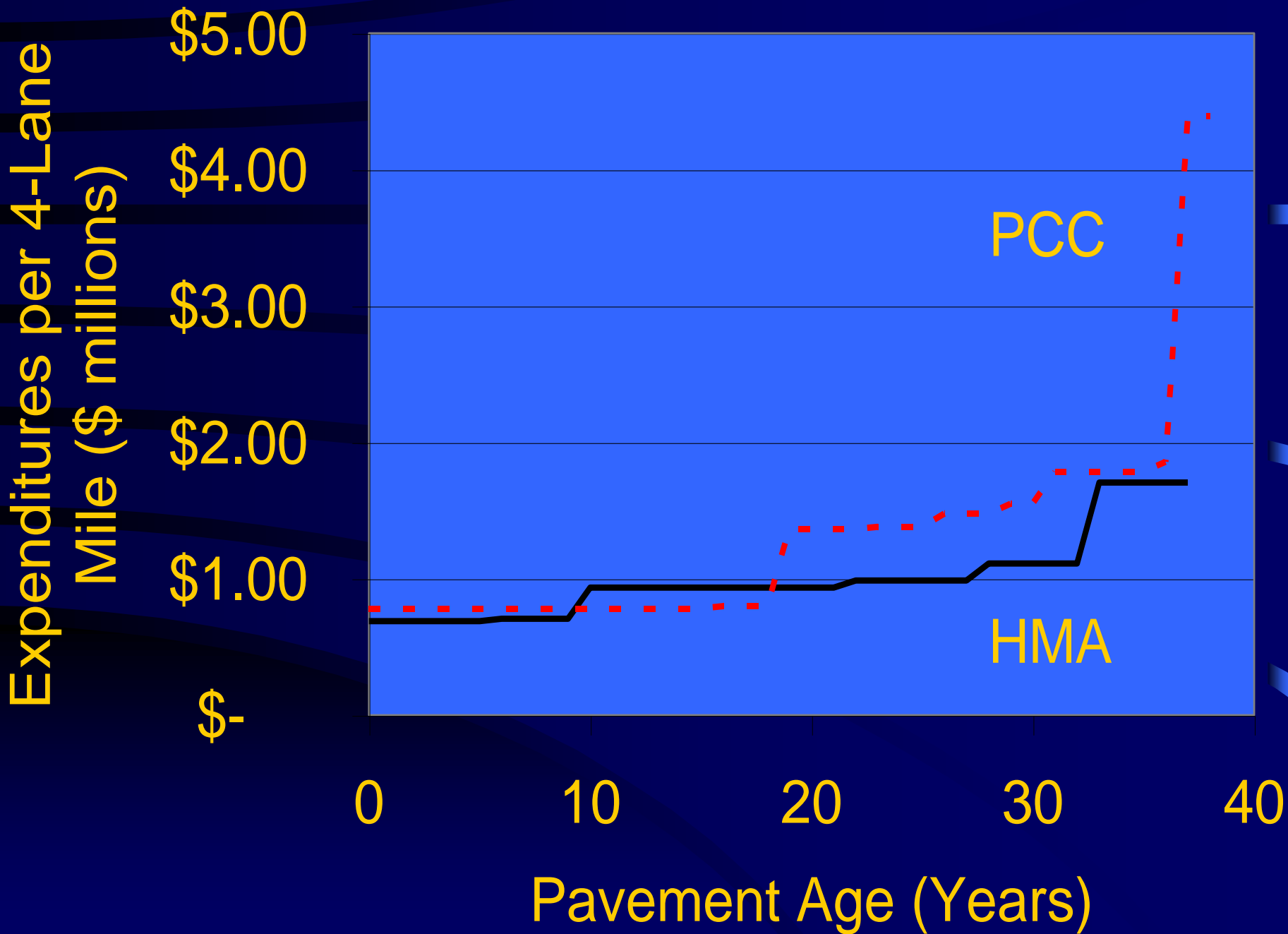
Expenditures per 4-Lane
Mile (\$ millions)

\$5.00
\$4.50
\$4.00
\$3.50
\$3.00
\$2.50
\$2.00
\$1.50
\$1.00
\$0.50
\$-

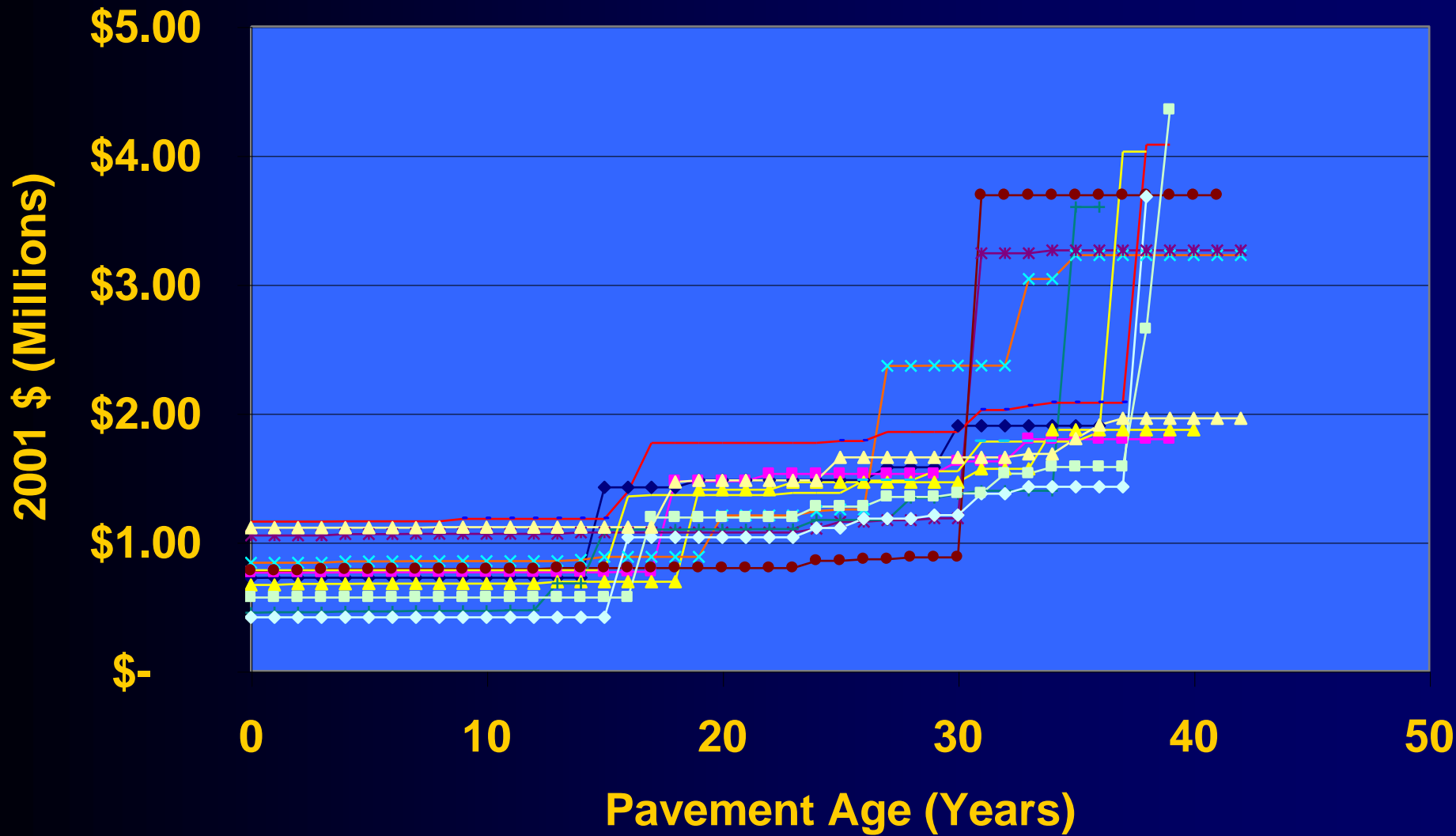


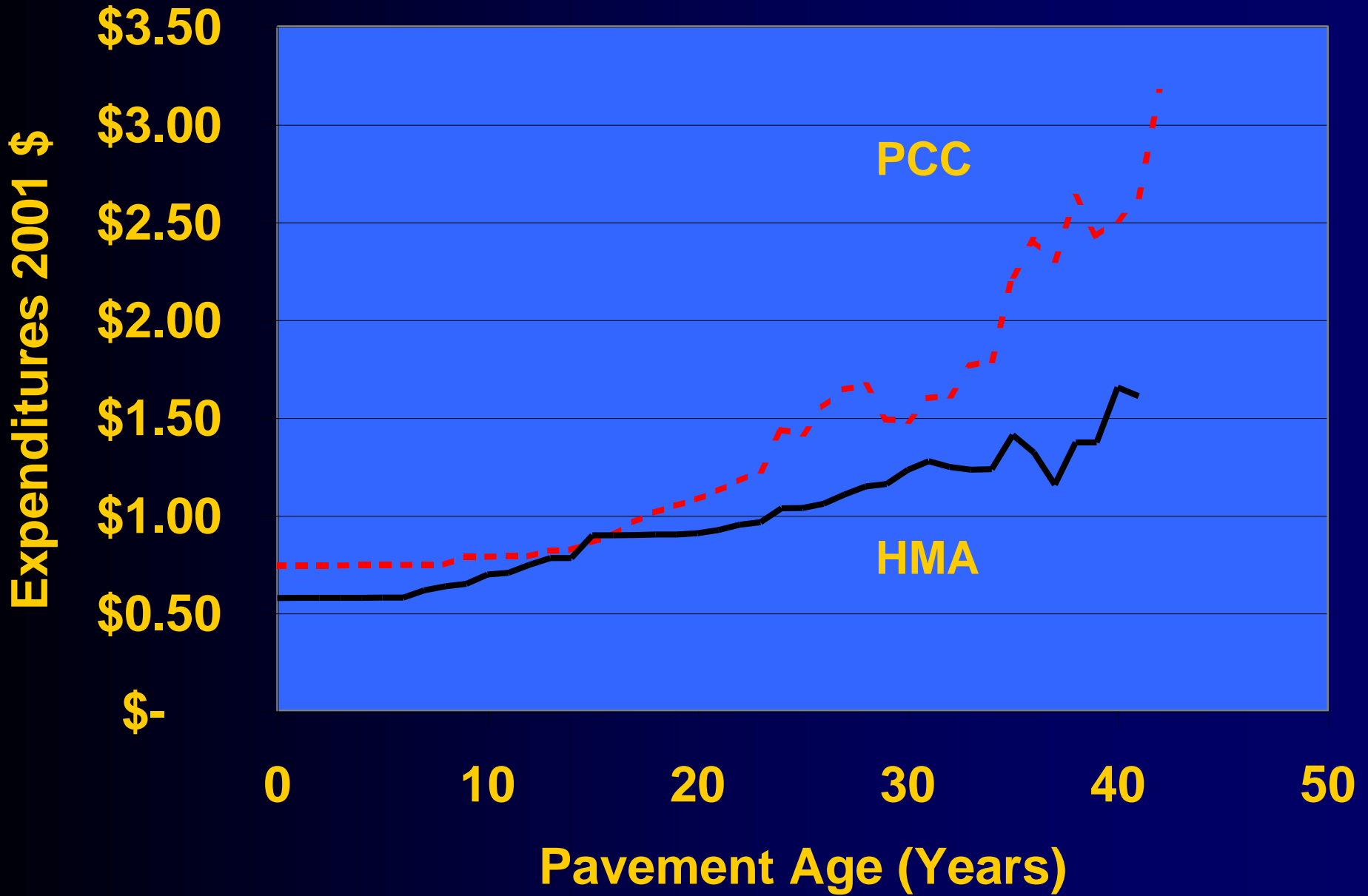
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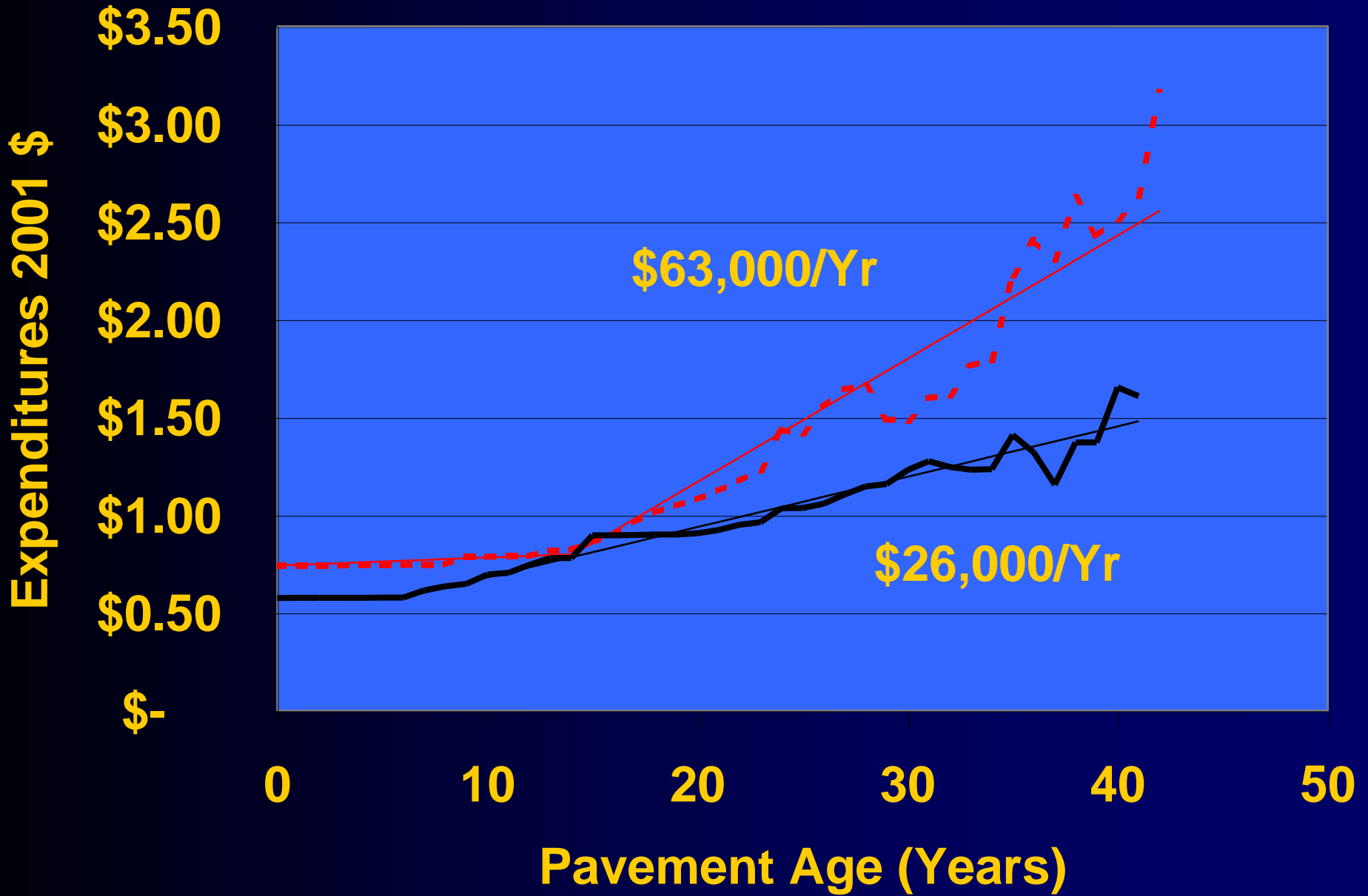
Pavement Age (Years)



I-70 PCC







Total Expenditures (Millions)

	HMA	PCCP
Actual	\$279.5	\$481.6
2001 \$	\$489.2	\$693.6
Miles	262	219

Why The Difference?

Major Distress:

- HMA
- Thermal Cracking
- PCCP
- Joint Deterioration

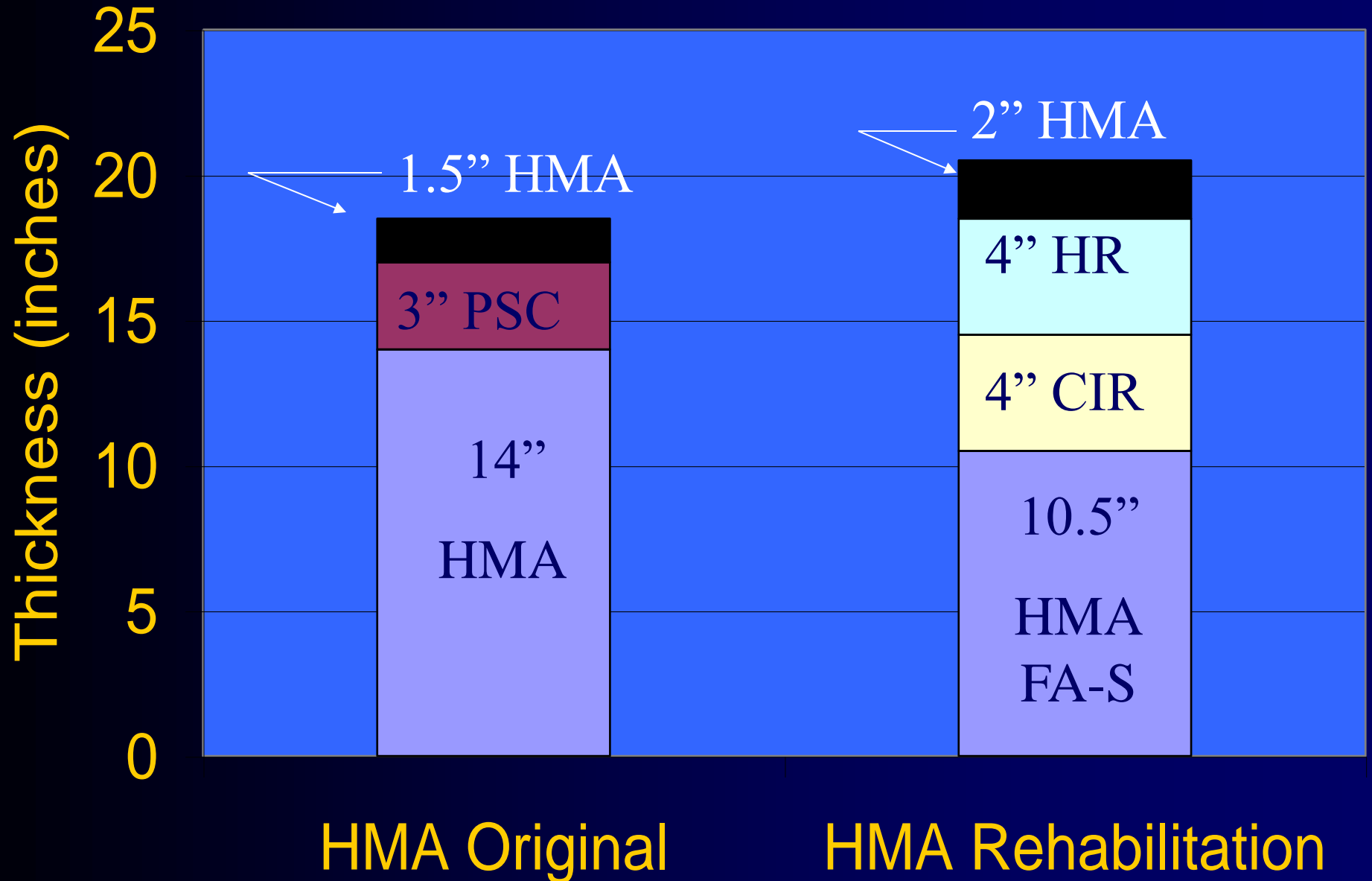


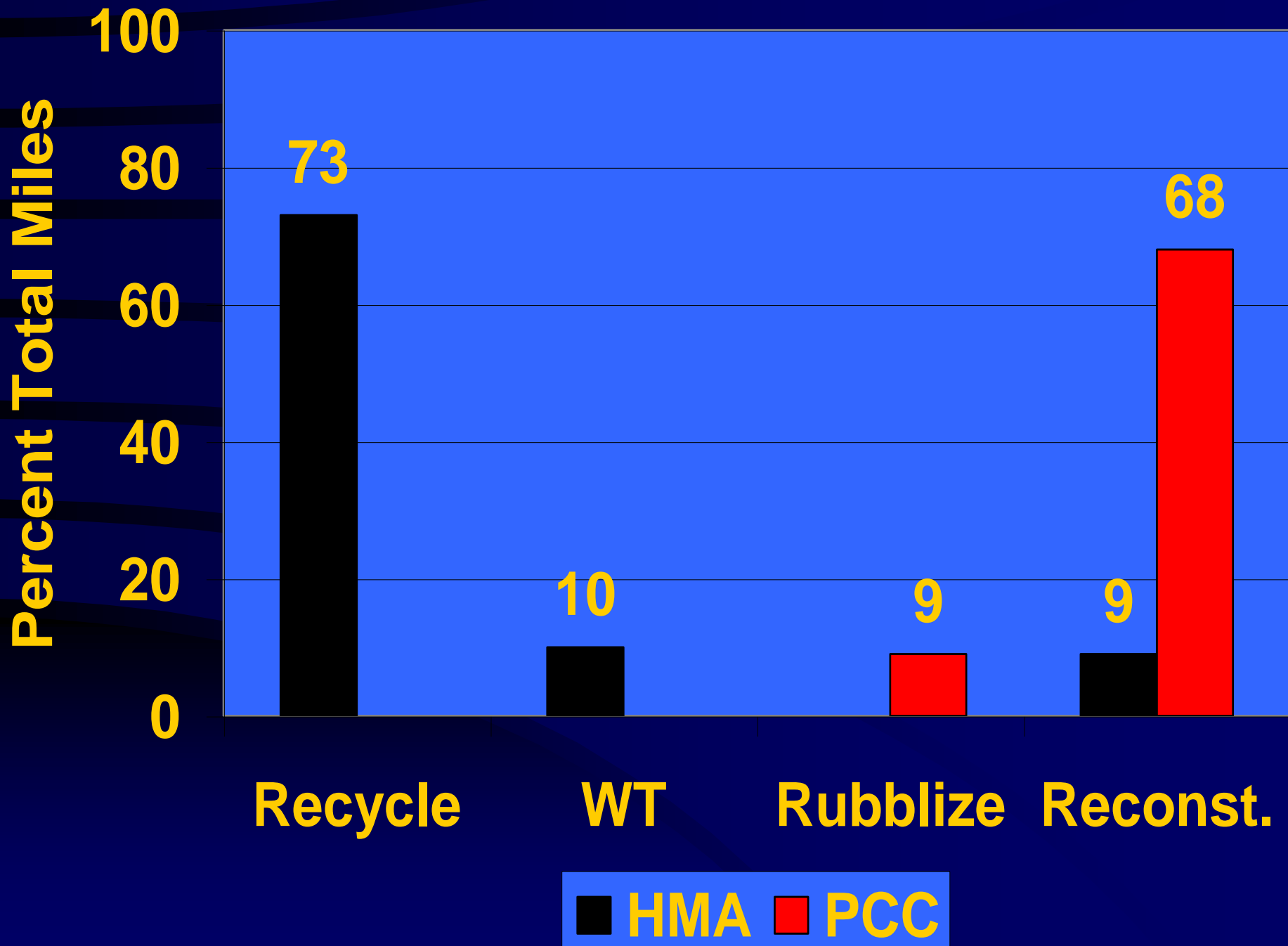




24 8 13

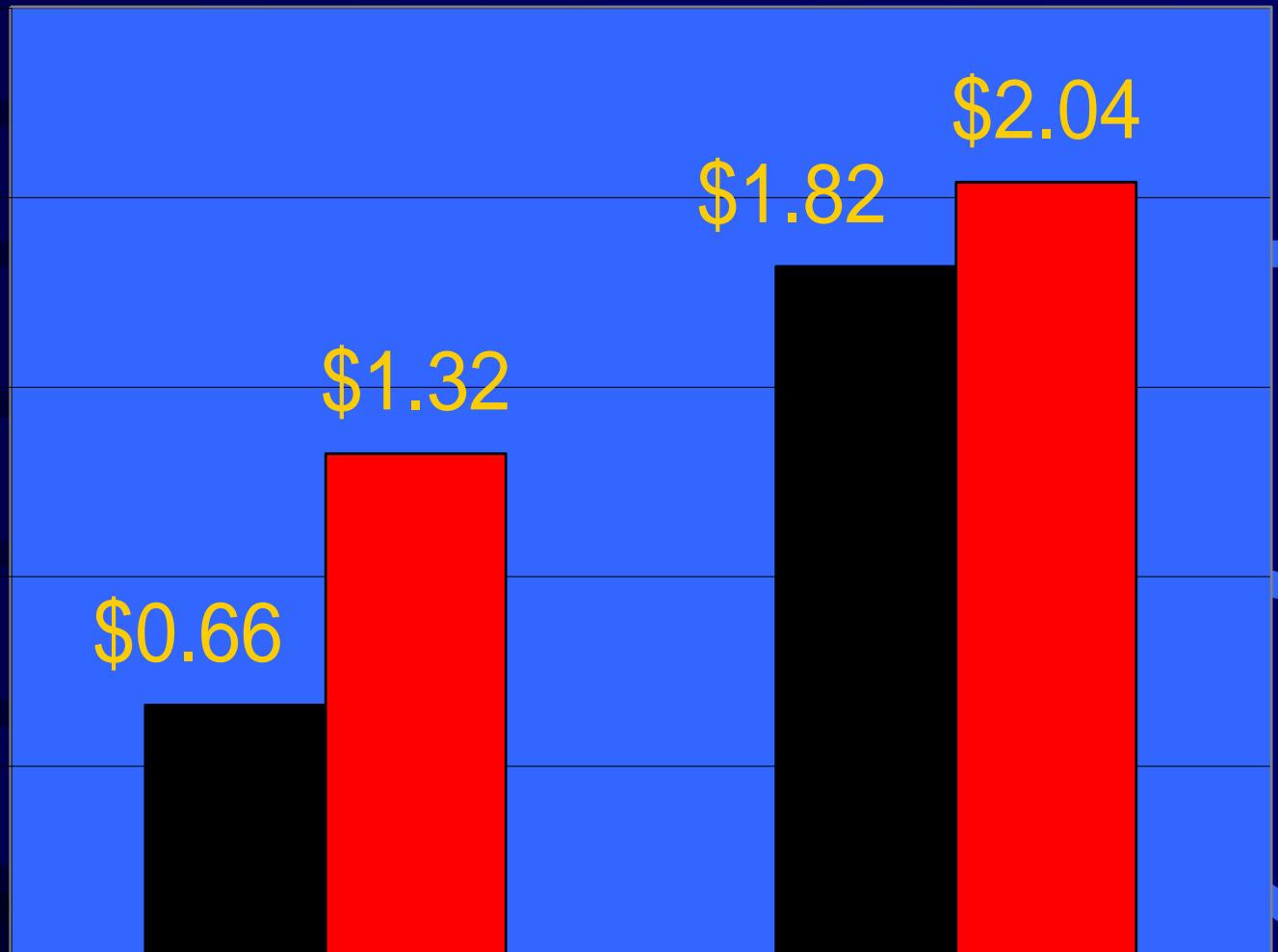
I-70 HMA





Total Expenditures per 4-Lane
Mile (\$ millions)

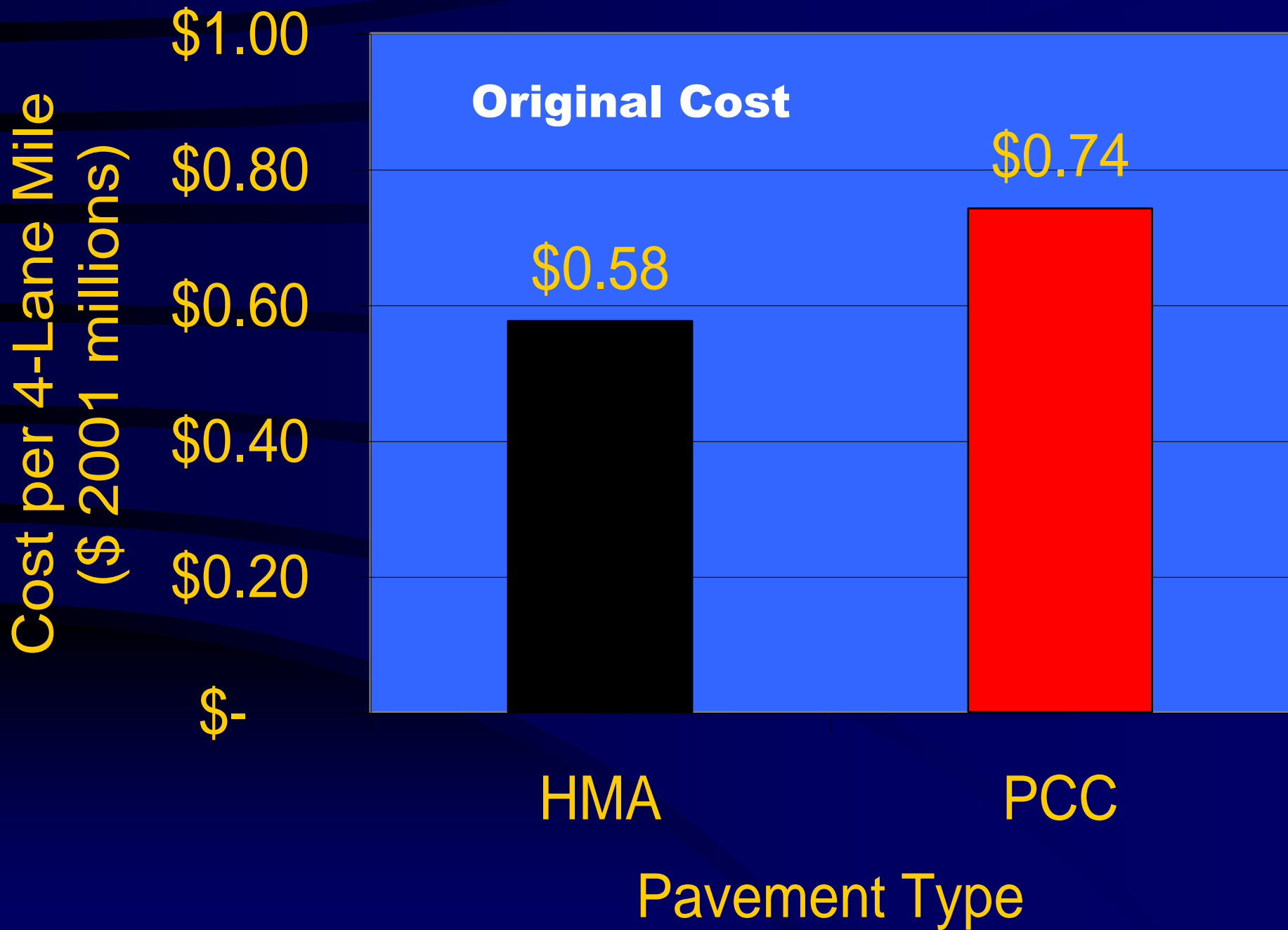
\$2.50
\$2.00
\$1.50
\$1.00
\$0.50
\$-



Recycle

Reconstruct

■ HMA ■ PCC



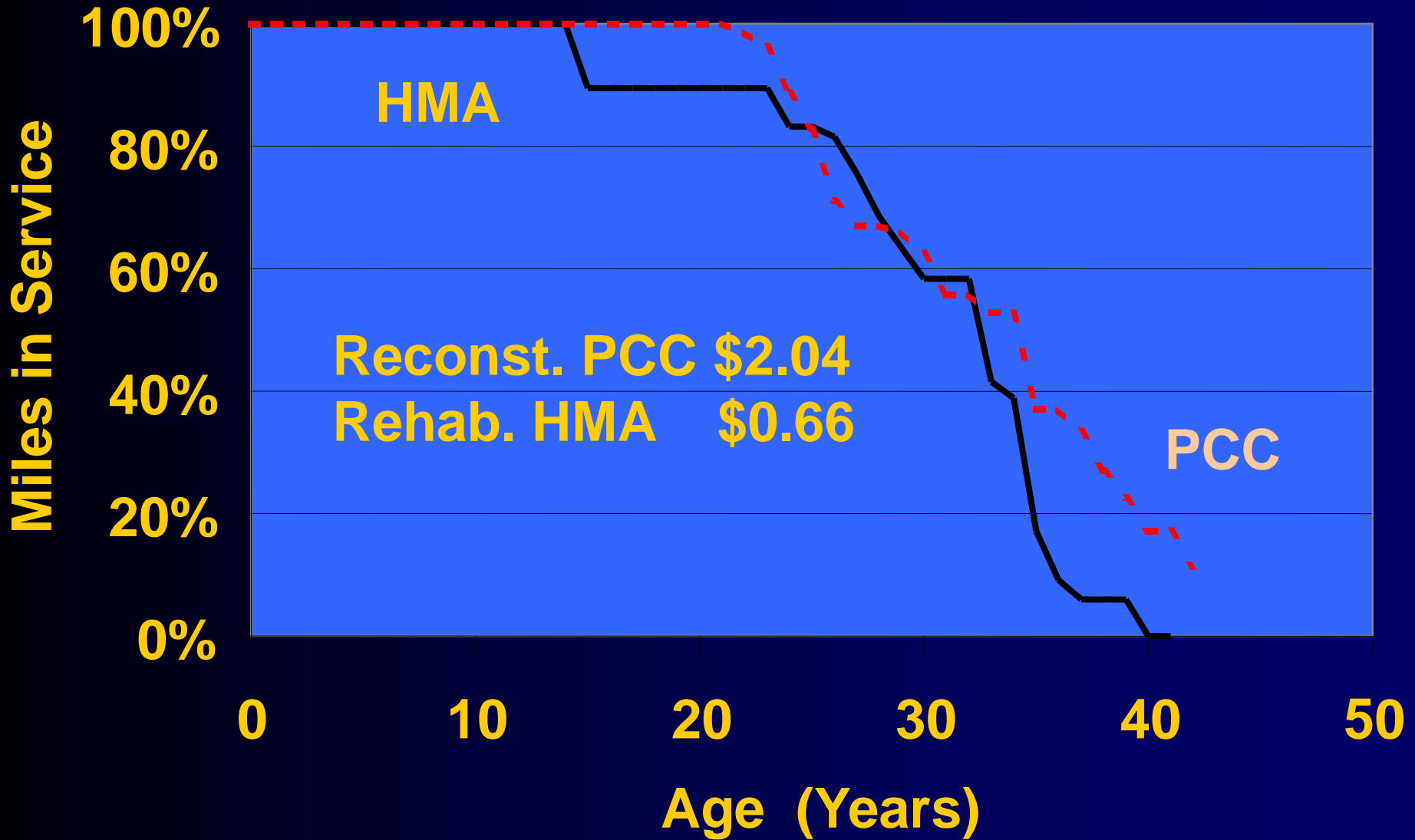
Life-Cycle Cost

Performance / Cost History

Minimum Life-Cycle Recommendations*

**The opinions presented are those of the authors and do not necessarily reflect the position of KDOT*

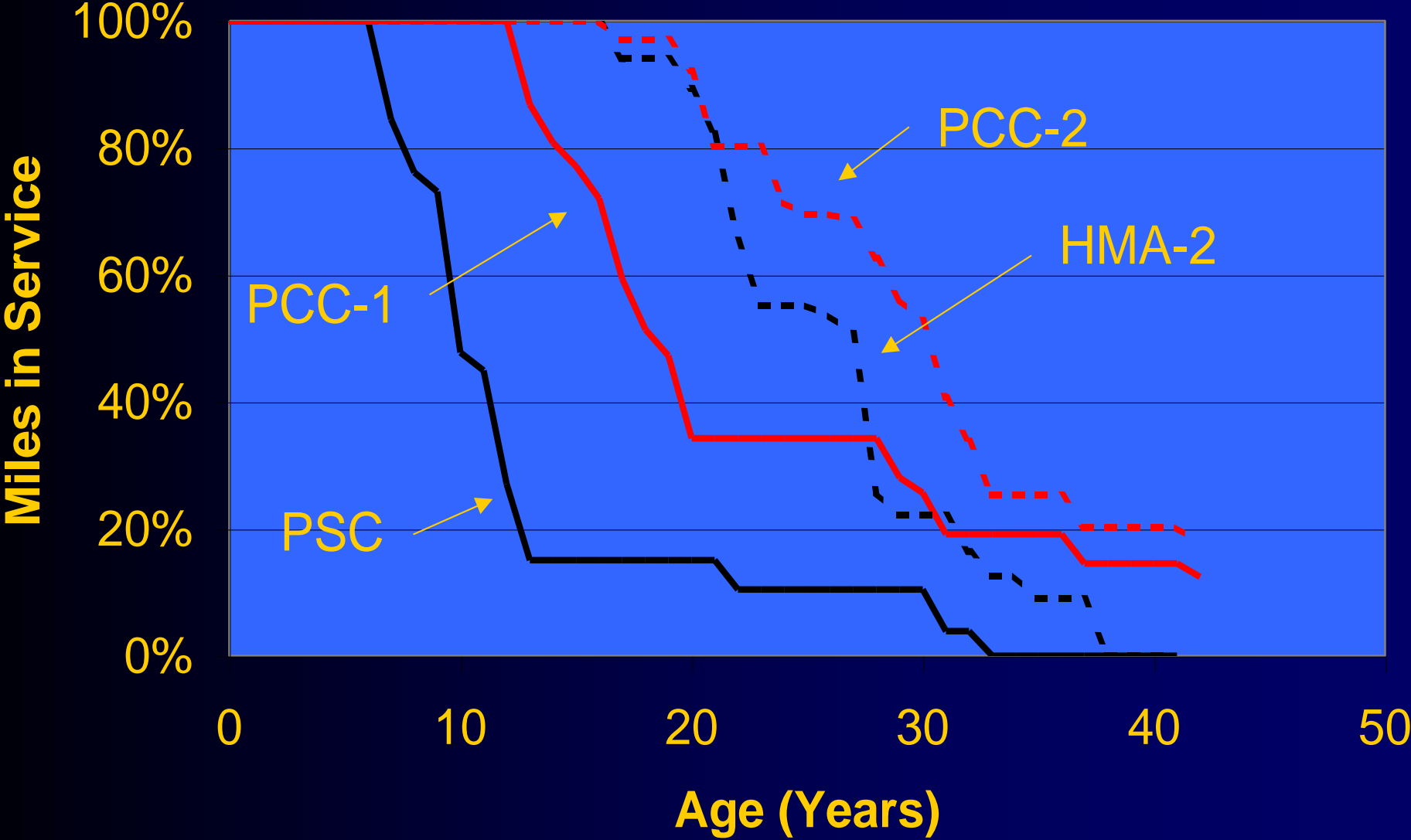
Reconstruction / Rehabilitation



Rehabilitation / Reconstruction

- HMA
- 33 Years
- 15-40 Range
- \$0.66 M per 4-Lane Mile
- PCCP
- 34 Years
- 22-42 Range
- \$2.04 M per 4-Lane Mile

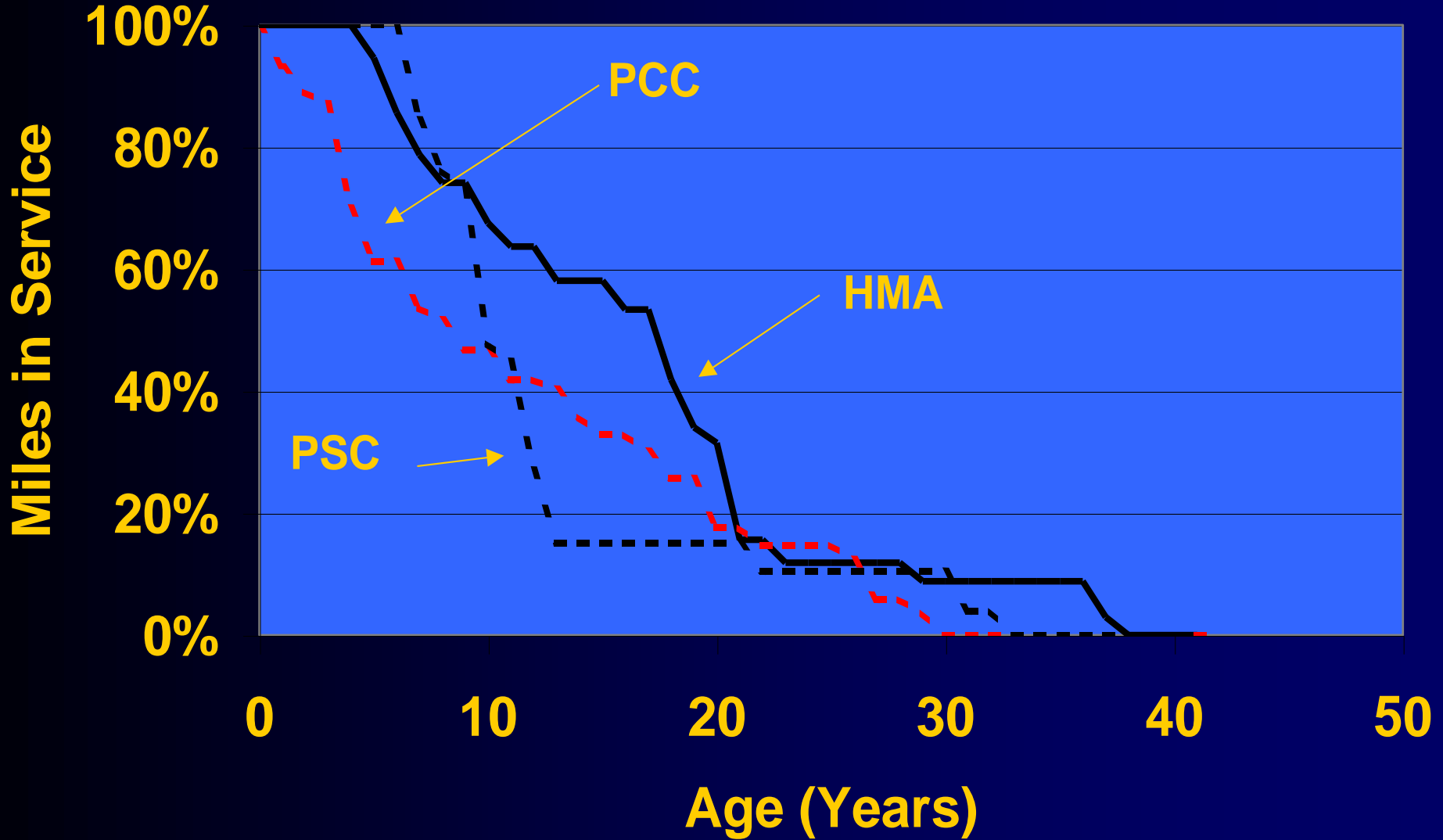
Structural Overlays



Structural HMA Overlays

- HMA
- PSC at 10 Yrs.
7-13 Range
- HMA at 27 Yrs.
17- 37 Range
- PCCP
- HMA at 18 Yrs.
13-42 Range
- HMA at 31 Yrs.
17-42 Range

Minor Maintenance Treatment



1st Minor Maintenance Treatment

- HMA
- at 10 Years PSC
- at 18 Years:
 - Cold Milling
 - Seals
 - Surface Recycle
 - 5-27 Yr Range
- PCCP
- at 9 Years:
 - PCCP Patch
 - Mudjacking
 - Crack Seal
 - 1-29 Yr Range

Conclusions

- HMA Pavements:
- Similar Heavy Truck Traffic
- Lower Initial Costs
- Lower Rehabilitation Costs
- Lower Total Expenditures

Conclusions

- Expected Service Life HMA
- at 10 Years PSC Overlay
- at 18 Years Seal
- at 27 Years HMA Overlay
- at 33 Years Rehabilitation

Conclusions

- PCC Pavements
- Similar Heavy Truck Traffic
- Higher Initial Cost
- Higher Maintenance Cost
Last 25 Years
- Higher Total Expenditures

Conclusions

- Expected Service Life PCC
- at 9 Years Maintenance
- at 18 Years HMA Overlay
- at 31 Years 2nd Overlay
- at 34 Years Reconstruction

Lessons Learned

- Treatment Life has a Significant Effect on LCCA
 - Use Defendable, Reasonable, Values

Other Performance Studies

- Washington State
 - Eastern:
 - 12.4 years 1st OL, 12 years 2nd OL
 - Western: 18.4 years 1st OL

GPS-6 (FHWA-RD-00-165)

Most OL > 15 years, Many > 20 years

Lessons Learned

- Determine Your Own Input Values Based on:
Performance/Cost Studies
With Your Materials,
Traffic and Climate

Questions ?

Life History of Actions on I-70 (KDOT)

