

Putting Pavement Preservation to Work in the Real World

Rex W. Eberly
National Center Pavement Preservation



MICHIGAN STATE
UNIVERSITY

Who is NCPP?

- } The National Center for Pavement Preservation
 - NCPP was established by Michigan State University and FP2, Inc. to lead collaborative efforts among government, industry, and academia in the advancement of pavement preservation by advancing and improving pavement preservation practices through education, research and outreach.

What Does NCPP Do?

} Collaborate

- AASHTO
 - TSP2 Preservation Partnerships
 - Emulsion Task Force (ETF)
- MnROAD, NCAT, PPRA

} Advance

- National Pavement Preservation Conference (NPPC)
- Research Projects
- Training and Education Survey

} Improve

- National Pavement Preservation Certification Program
- Agency and Industry Training

Pavement Preservation Is...

- } “Programs and activities employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and improve motorist satisfaction while saving public tax dollars”.
- The treatment must:
 - Address pavements while they are still in good condition
 - Reduce aging
 - Extend Pavement Life
 - Restore Serviceability

Define the Definition

- **Network Level**
 - All Pavements (Urban, Rural, Airports)
 - Asphalt and Concrete
- **Long-Term Strategy**
 - Budgeted Expense
- **Integrated**
 - Department Wide
 - All Stakeholders
- **Cost-Effective**
 - Right Treatment, Right Road, Right Time
- **Improve Road User Satisfaction**

Why Develop a Preservation Mindset?

} Budgets

- Few agencies can afford a strategy of Build It, Rehab It, Build it Again

} Pavement Performance

- FHWA Performance Thresholds will be difficult to meet without Preservation.

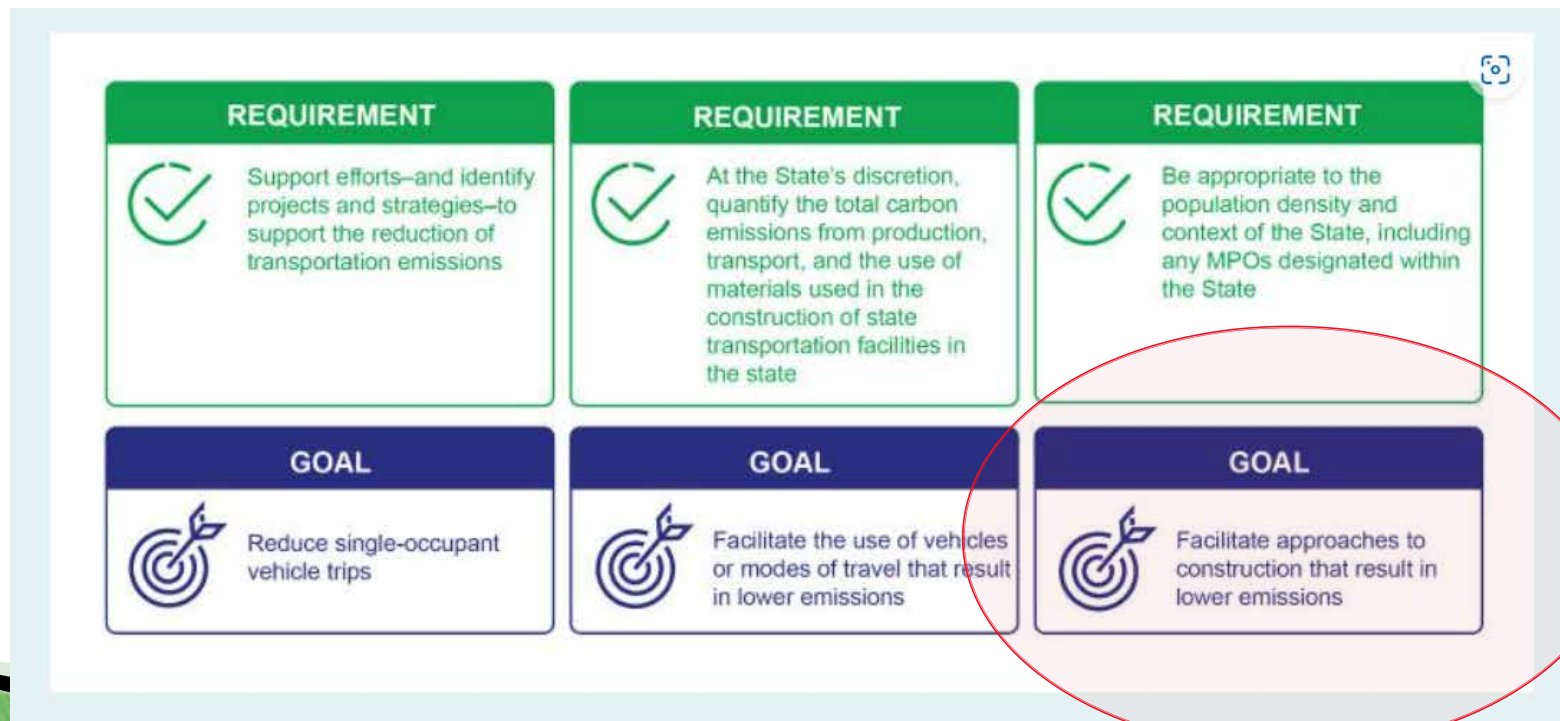
} Material Changes

- Pavements don't seem to be lasting as long. Preservation stretches the service life of your pavements

} Sustainability

- Carbon Reduction Act
- Environmental Product Declarations (EPD's)

Alaska Carbon Reduction Strategy



THE BEST REASON IS – IT WORKS!



Park Avenue
January 12, 2016

Bridgeport, CT
2004: 2" Mill & Fill

Fairfield, CT
2004: 2" Mill & Fill
2010: Crack Sealing & Microsurfacing

Pavement Preservation Saves Money!

Measuring the Benefits

MnROAD & NCAT



**NCAT & MnROAD PAVEMENT
PRESERVATION GROUP STUDY TPF-5(375)**

A Quick Check of Your Highway Network Health

by Larry Galehouse, Director,
National Center for Pavement Preservation
and

Jim Sorenson, Team Leader,
FHWA Office of Asset Management

Remaining Service Life (RSL)

Treatment

- Single layer chip seal ✓
- Rejuvenating fog seal
- FiberMat chip seal

Condition

- Fair
- Good ✓
- Poor

Time

- 0.0
- 0.5
- 1.0
- 1.5

Single layer chip seal

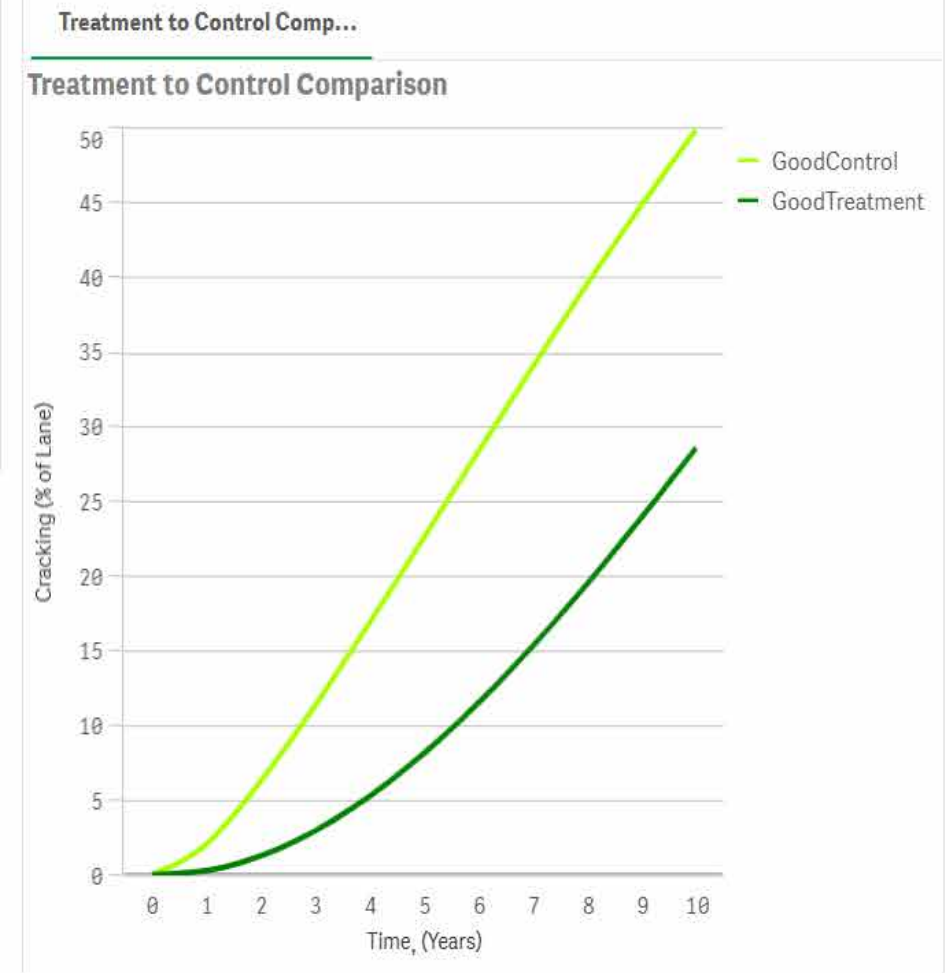
IRI (in/mile) for Treatment

Rutting (mm) for Treatment



Time to Poor (Control) Crack Reduction (Average) Time to Poor (Treatment)

4.5 13.3 7.9



Overall Section Condition

FAIR

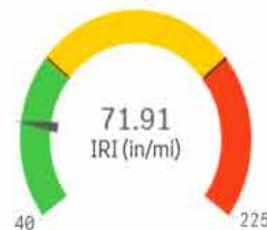
Cracking % of Area



Rutting (mm)



IRI (in/mile)



A Quick Check of Your Highway Network Health



Remaining Service Life (RSL) Concept

- } Every road segment has a Remaining Service Life
- } 200 lane-miles with NO REPAIRS or MAINTENANCE in a given year, will lose 200 lane-mile-years of Remaining Service Life
- } Schedule annual work plans to match condition goals ("outcome-based budgeting")

Added Network Service Life =

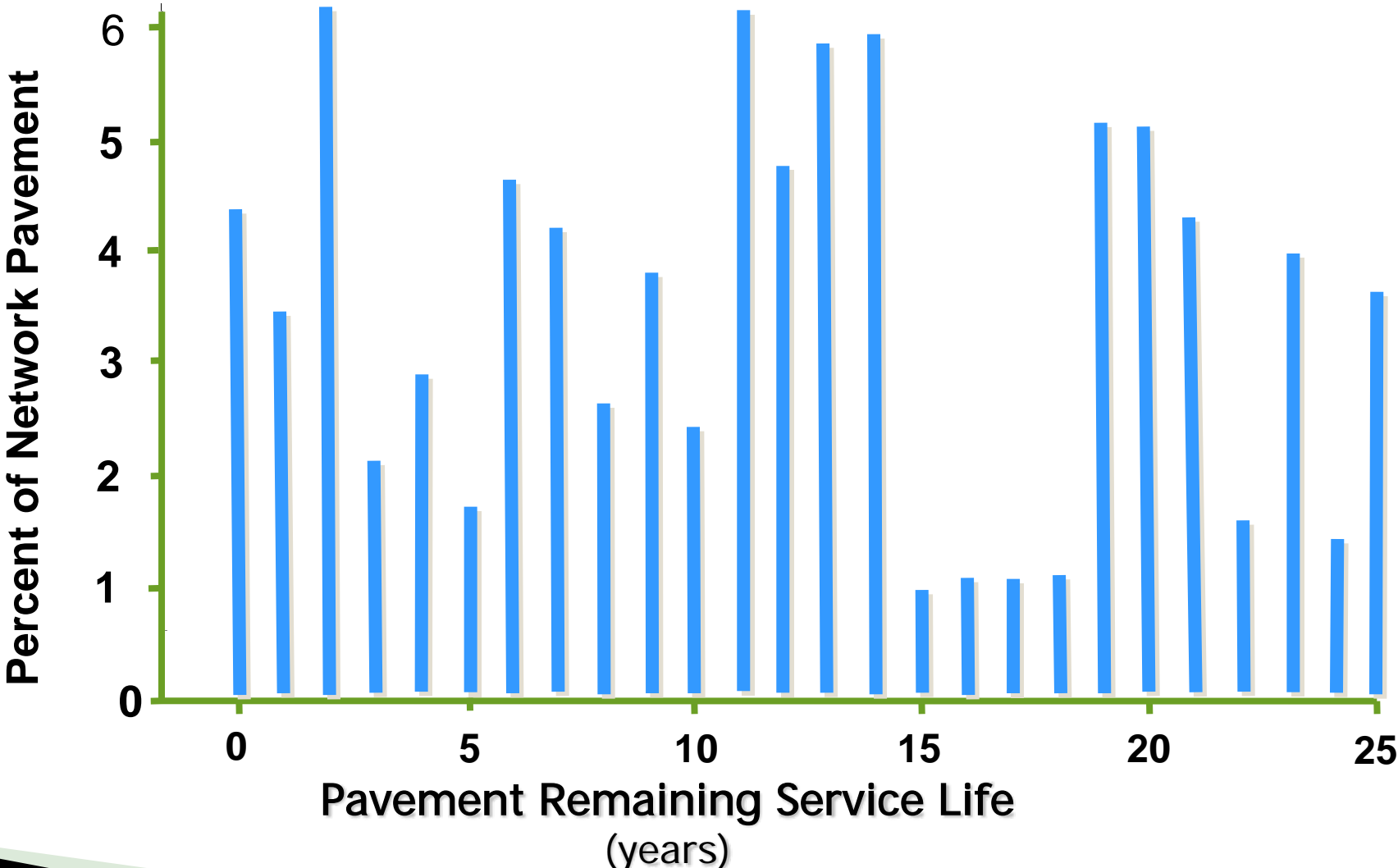
$$\begin{array}{c} \text{Miles} \\ \text{of} \\ \text{Treatment} \end{array} \times \begin{array}{c} \text{Service} \\ \text{Life of} \\ \text{Treatment} \end{array} = \text{Mile / Years}$$

Example:

Agency Highway Network

Network Size = 4,356 lane miles

Current Condition

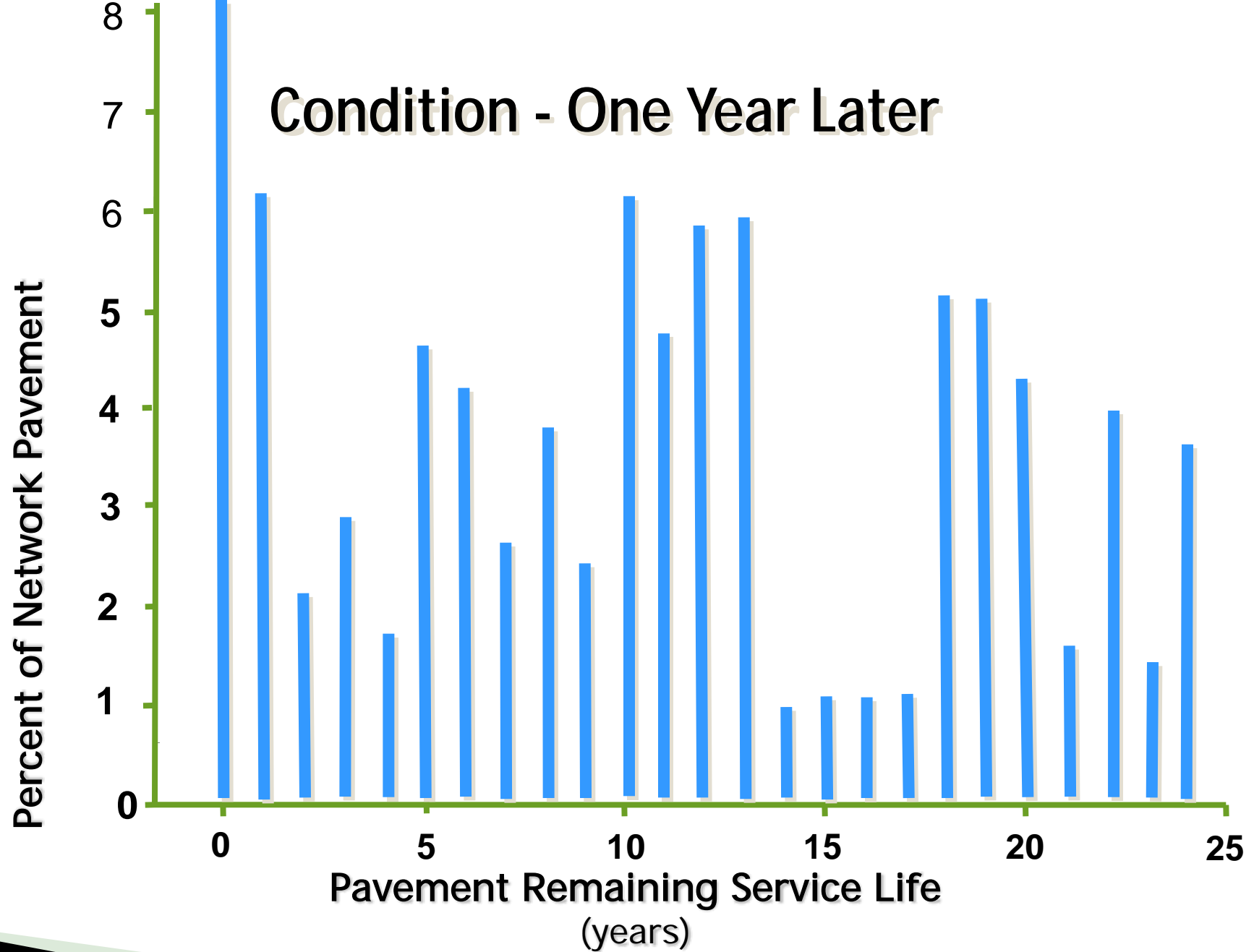


Agency Highway Network =
4,356 lane miles

Each year the network will lose

4,356 lane mile years

Condition - One Year Later



Reconstruction Evaluation

<u>Project</u>	<u>Lane Miles</u>	<u>Design Life</u>	<u>Lane Mile Years</u>	<u>Lane Mile Costs</u>	<u>Total Cost</u>
#1	22	25 yrs	550	\$463,425	\$10,195,350
#2	18	30 yrs	540	\$556,110	\$10,009,980
Total		=	1,090		\$20,205,330

Rehabilitation Evaluation

<u>Project</u>	<u>Lane Miles</u>	<u>Design Life</u>	<u>Lane Mile Years</u>	<u>Lane Mile Costs</u>	<u>Total Cost</u>
#3	22	18 yrs	396	\$263,268	\$5,791,896
#4	28	15 yrs	420	\$219,390	\$6,142,920
#5	32	12 yrs	384	\$115,848	\$3,707,136
Total		=	1,200		\$15,641,952

Pavement Preservation Evaluation

<u>Project</u>	<u>Lane Miles</u>	<u>Life Ext.</u>	<u>Lane Mile Years</u>	<u>Lane Mile Costs</u>	<u>Total Cost</u>
#101	12	2 yrs	24	\$2,562	\$30,744
#102	22	3 yrs	66	\$7,743	\$170,346
#103	26	5 yrs	130	\$13,980	\$363,480
#104	16	7 yrs	112	\$29,750	\$476,000
#105	8	10 yrs	80	\$54,410	\$435,280
Total		=	412		\$1,475,850

Network Trend

Required: 4,356 lane mile years

Programmed Activity	<u>Lane Mile</u> <u>Years</u>	<u>Total Cost</u>
Reconstruction <i>(40 lane miles)</i> \$\$\$\$	1,090	\$20,205,330
Rehabilitation <i>(82 lane miles)</i> \$\$\$	1,200	\$15,641,952
Pavement Preservation <i>(84 lane miles)</i> \$	412	\$1,475,850
Total =	2,702	\$37,323,132

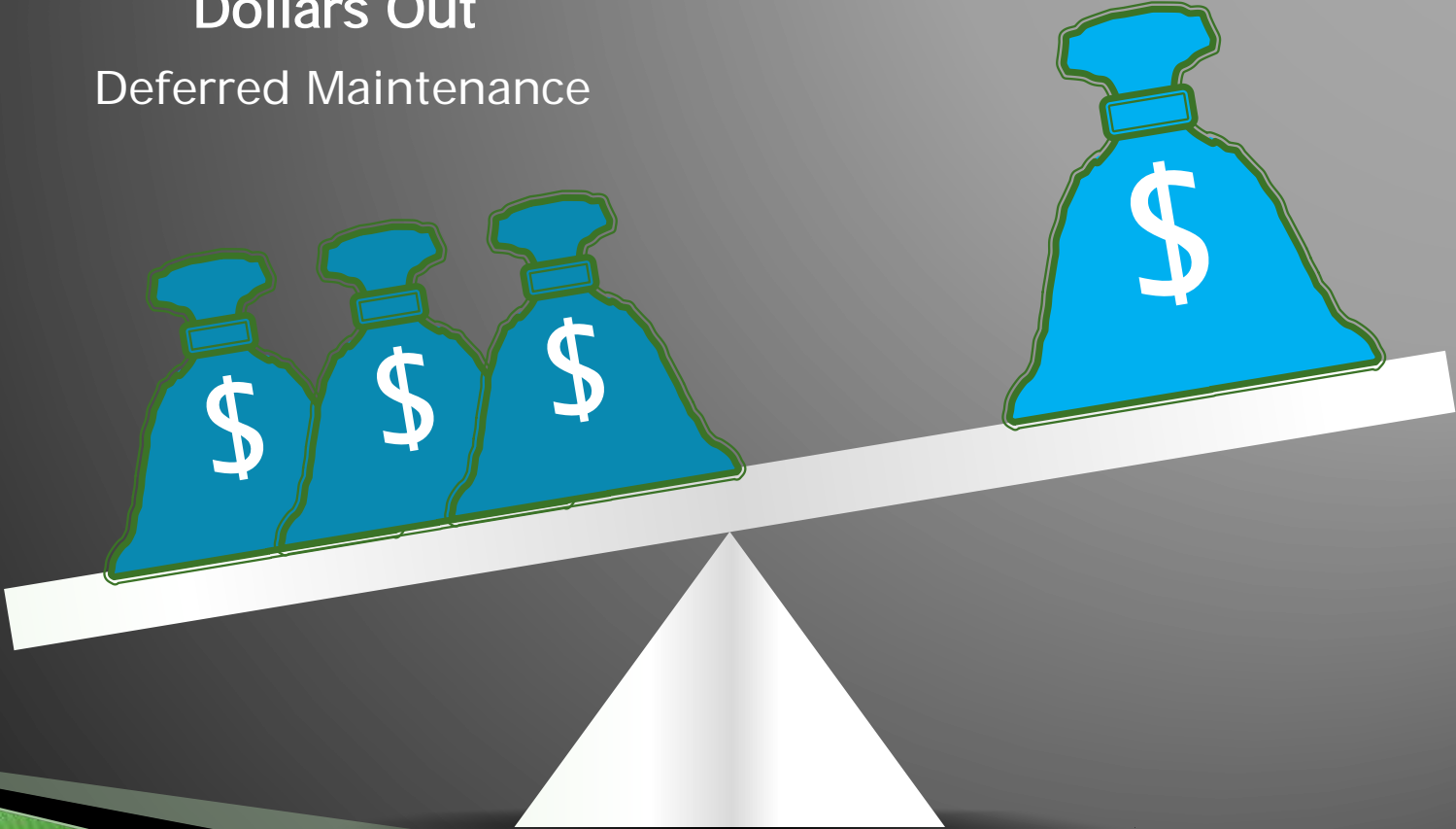
Network Needs Summary

Network Size (<i>needs</i>)	4,356 <i>(lane mile years)</i>
Programmed Activity	2,702 <i>(lane mile years)</i>
Deficit = 1,654 <i>(lane mile years)</i>	

Network is Out of Balance

Dollars In
Additional Service Life

Dollars Out
Deferred Maintenance



Steps to Address Minimal Needs

Required: 4,356 lane mile years

Programmed Activity	Lane Mile Years
Reconstruction (31 lane miles) (40 lane miles)	820 1,090
Rehabilitation (1,125 lane miles) (1,200 lane miles)	1,125 1,200
Pavement Preservation (84 lane miles)	412
Total =	2,357 2,702

Savings = \$ 6.1 M

Program Modification

Savings = \$ 6,101,940 Needs = 1,999 LMY

<i>Preservation Treatment</i>	<i>Life Ext</i>	<i>Lane Miles</i>	<i>Lane Mile Years</i>	<i>Total Cost</i>
Concrete Reseal	4 yrs	31	124	\$979,600
Thin HMA Overlay	10 yrs	16	160	\$870,560
Micro-surfacing	7 yrs	44	308	\$1,309,000
Chip Seal	5 yrs	79	395	\$1,104,420
Crack Seal	2 yrs	506	1,012	\$1,296,372
			1,999	\$5,559,952

Revised Network Strategy

Required: 4,356 lane mile years

Programmed Activity	<u>Lane Mile Years</u>
Reconstruction (31 lane miles)	820
Rehabilitation (77 lane miles)	1,125
Pavement Preservation (2,083 lane miles)	2,411
Total =	4,356

Net Savings = \$ 541,988

Balanced Network

Dollars Out
Deferred Maintenance



Dollars In
Additional Service Life



Quick Assessment Method

- Establishes Network Need
- Evaluates
 - Reconstruction
 - Rehabilitation
 - Preventive Maintenance
- Incorporates
 - Design Life
 - Life Extensions

From Theory To Practice

- } A Worst-First Rehabilitation Program Won't Save Your Network.
- } Deferring Preservation Maintenance does **NOT** save \$\$\$
- } A balanced approach is best
- } Use Planned, Lower Cost Treatments To Extend Remaining Service Life

PRESERVATION VS. PRESERVATION MAINTENANCE

} PRESERVATION

- GOAL IS TO PLACE A TREATMENT THAT PRESERVES THE SURFACE AND EXTENDS RSL (REMAINING SERVICE LIFE)
- TIME BASED
 - EARLY AND OFTEN
- ADD SERVICE LIFE
- GENERALLY, LESS EXPENSIVE TREATMENTS

} PRESERVATION MAINTENANCE

- GOAL IS TO REPAIR SURFACE DEFECTS, PRESERVE THE SURFACE AND EXTEND RSL (REMAINING SERVICE LIFE)
- TIME AND CONDITION BASED
 - PLACED AS EARLY AS POSSIBLE WHEN DEFECTS OCCUR.
- STOP THE DETERIORATION AND ADD SERVICE LIFE.
- MORE AGGRESSIVE PRESERVATION TREATMENTS
 - COMBINATION TREATMENTS

PRESERVATION VS. PRESERVATION MAINTENANCE

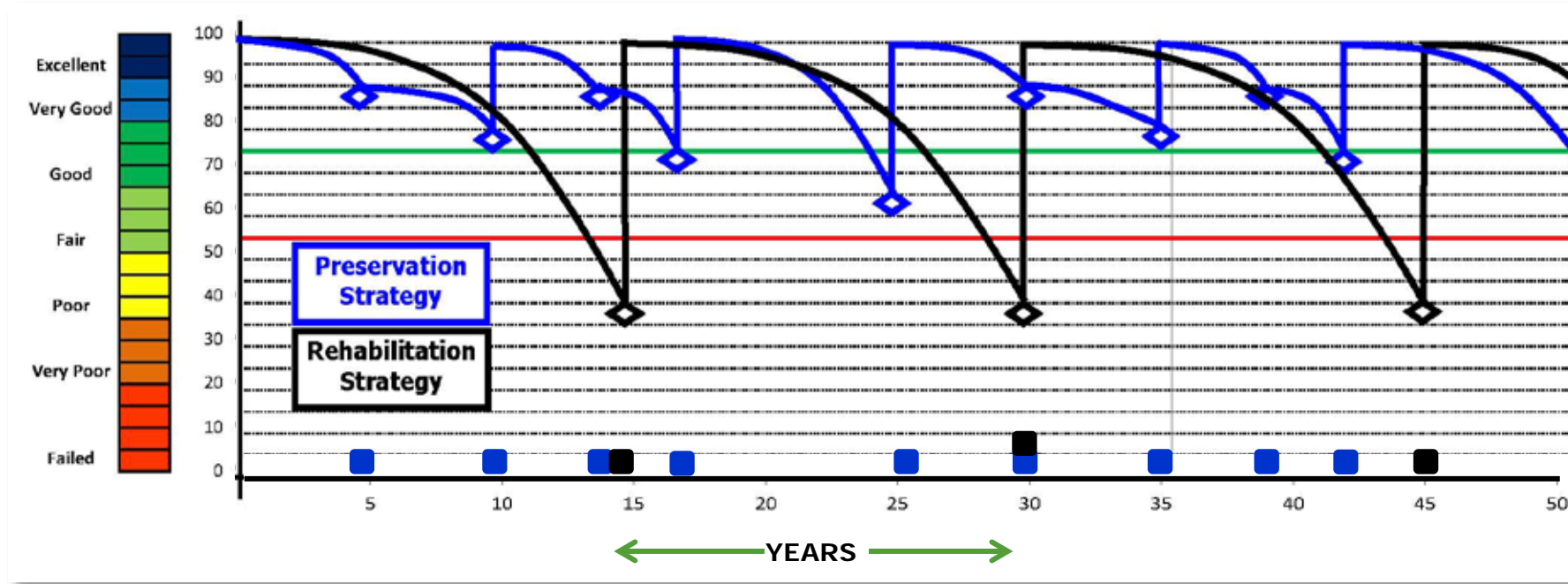
◦ PRESERVATION PROCESSES

- FOG SEAL
- REJUVENATORS
- CRACK SEAL*
- CHIP SEAL
- SLURRY SEAL

◦ PRESERVATION MAINTENANCE PROCESSES

- CRACK SEAL / CRACK FILL / MASTIC
- CHIP SEAL
 - SCRUB SEAL
 - FIBER MAT
- PRESERVATION HMA OVERLAYS
- MICRO SURFACING
- CAPE SEALS

Preservation vs. Rehabilitation



PRESERVATION STRATEGY:

Years 5, 14, 30 & 39: Crack sealing
 Years 10 & 35: Microsurfacing (Double)
 Years 17 & 42: Cape Seal
 Year 25: Mill & Pave
TOTAL COST/SY OVER 50 YEARS = \$72.00

REHABILITATION STRATEGY:

Year 15: FDR plus 4" Hot Mix Overlay
 Year 30: FDR plus 4" Hot Mix Overlay
 Year 45: FDR plus 4" Hot Mix Overlay
TOTAL COST/SY OVER 50 YEARS = \$120.00

GETTING STARTED



- } PICK A NEWLY PAVED ROAD
- } BUDGET NOW TO DO A LOW-COST PRESERVATION TREATMENT IN 2025
 - FOG SEAL OR CHIP SEAL
- } BUDGET NOW TO DO A PRESERVATION MAINTENANCE PROJECT IN 2029
 - CRACK SEAL WITH CHIP SEAL
- } WASH / RINSE / REPEAT

PRESERVATION IN EXTREME CONDITIONS

} MINNESOTA DOT

- IMMEDIATE FOG SEAL OF NEW CHIP SEALS
 - LOCKS IN CHIPS AND REDUCES PLOW DAMAGE
- USE OF HOT-POUR MASTICS TO MANAGE DEEP THERMAL CRACKING
- EXPERIMENTING WITH SOFTER BASE ASPHALT EMULSION IN MICRO SURFACING
 - ADDS FLEXIBILITY
- MICRO-MILL PRIOR TO PRESERVATION PROJECTS
 - REDUCES PLOW DAMAGE AND IMPROVES RIDE

PRESERVATION IN EXTREME CONDITIONS

} SASKATCHEWAN, MANITOBA, ONTARIO PROVINCES–

- ALL RELY HEAVILY ON CHIP SEALS AND MICRO SURFACING
 - NO CHANGES TO STANDARD SPECIFICATIONS



NEXT STEPS

- } LEARN MORE
 - ROADRESOURCE.ORG
 - PAVEMENT PRESERVATION.ORG
- } CALCULATE RSL FOR THE ROADS YOU MANAGE
- } BUDGET FOR AND SCHEDULE PRESERVATION
- } CHOOSE PRESERVATION MAINTENANCE OVER REHAB

THANK YOU

REX W. EBERLY
EBERLYRE@MSU.EDU
785-819-1403

