U.S. Department of Transportation
Federal Highway Administration

PAVEMENT PRESERVATION

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Pavement and Materials Engineer

FHWA Resource Center (Lakewood, Colorado)

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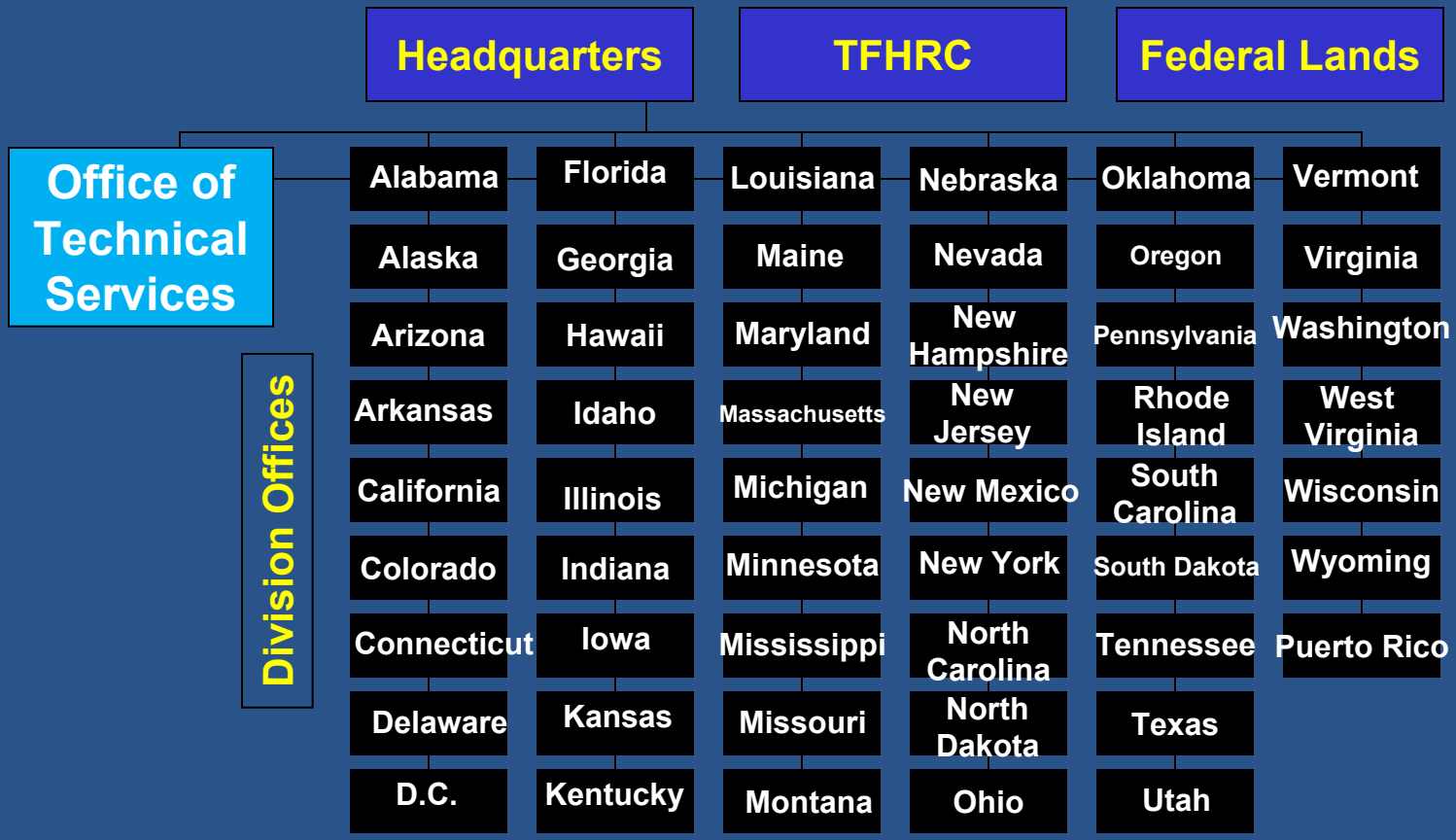
Presentation Outline

1. Background / Statistics
2. Institutionalizing Pavement Preservation – 20 years of history
3. Training
4. Research
5. Marketing / Communications

FHWA Organization



The RC is Serving customers nationwide

U.S. Department of Transportation
Federal Highway Administration

RC Technical Services Teams

Without Pavement, We Would Be Stuck in the Mud!

Washington-Richmond road, 1919
NMAH, Archives Center, API Collection

Office of Asset Management, Pavement and Construction

4 Teams

- **Design and Analysis**
- **Materials**
- **Construction**
- **Asset and Pavement Management**

New –
Office of Program Performance Management
also with 4 New Teams

U.S. Department of Transportation
Federal Highway Administration

FHWA Asset Management, Pavement and Construction

Points of Contact

Butch Wlaschin, Director

- **Suneel Vanikar**
  Design and Analysis Team Leader
- **John Bukowski**
  Materials Team Leader
- **Bryan Cawley**
  Construction and Construction Management Team Leader
- **Steve Gaj**
  Asset Management and Pavement Management Team Leader

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Statistics We All Need to Know:

1. How Big is the U.S. Roadway Network?
   _____ Centerline-Miles.

2. What Percentage of the Roads are Owned by:
   A. Federal Government? _____%
   B. State Government? _____%
   C. Local Government? _____%

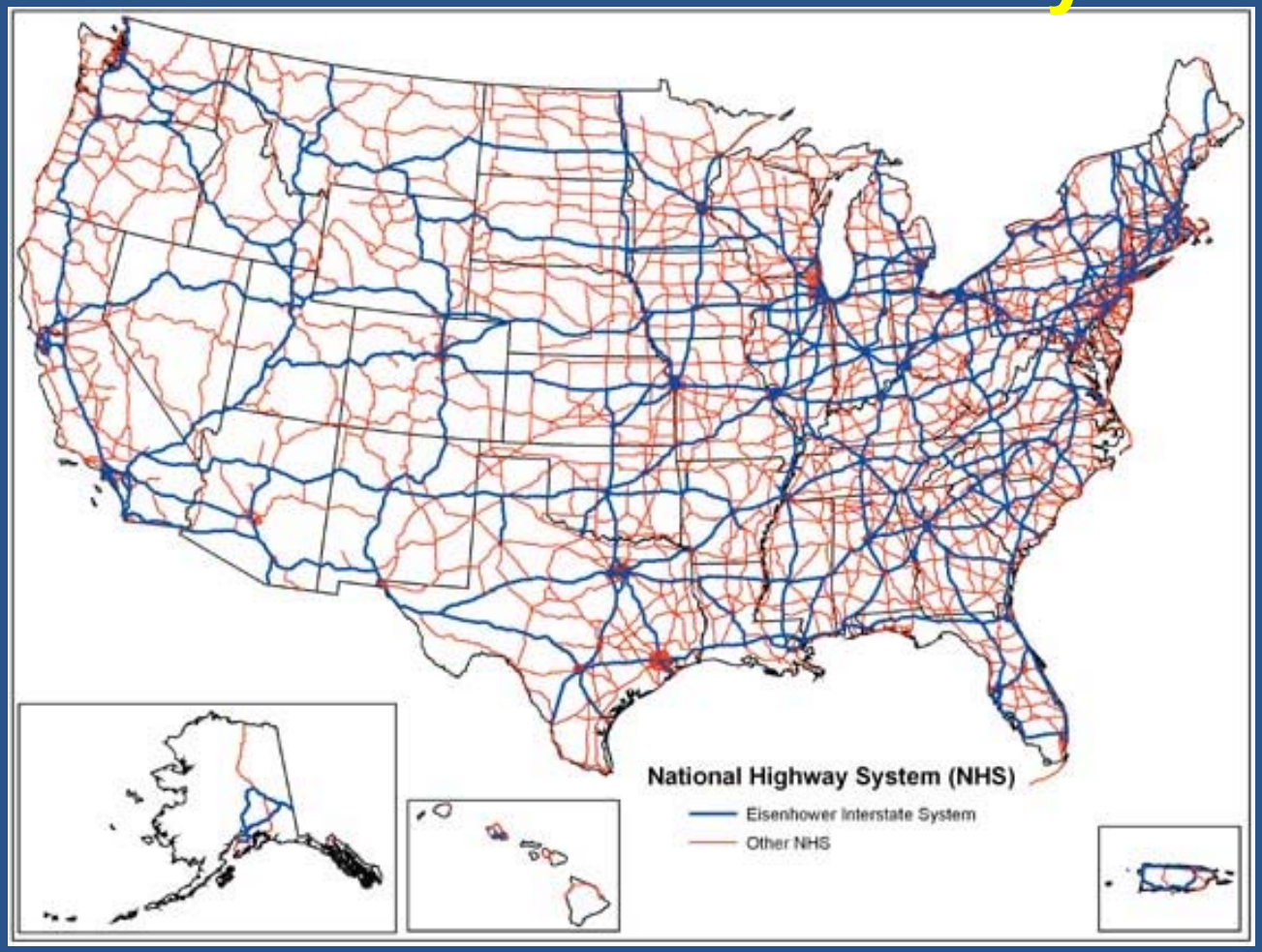
3. How Much of the Network is Paved? _____ %
   Unpaved? _____%

Less Than 100 Years Ago…

We've Come a Long Way …

National Statistics:

4,059,340 miles of Roads 603,310 Bridges
2.99 trillion vehicle-miles / year



Public Highway Ownership

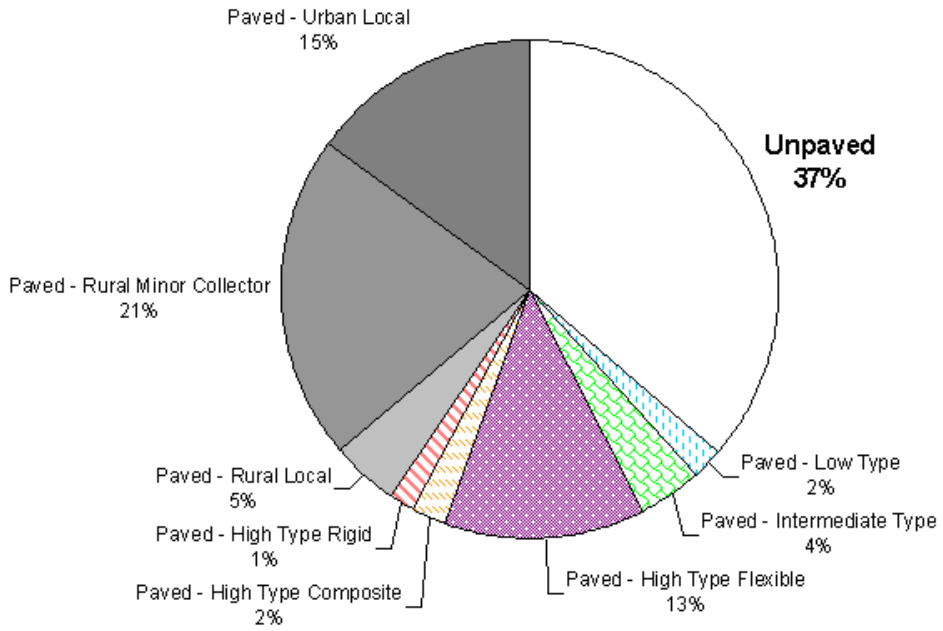
Jurisdictions	Miles	Percentage
Federal	131,559	3
States	784,310	19
Locals	3,143,471	78
TOTAL:	**4,059,340**	**100%**

2010 Conditions and Performance Report, FHWA

http://www.fhwa.dot.gov/policy/2010cpr/chap2.htm#1

National Statistics:
2.5 Million Miles of Paved Roads

Paved vs. Unpaved Roadways-U.S. Total
2,523,468 miles vs. 1,438,727 miles



FHWA's "3 E's"

ENGINEERING

- Use Good Engineering Design to Assure Long-Life Pavements and Assets.

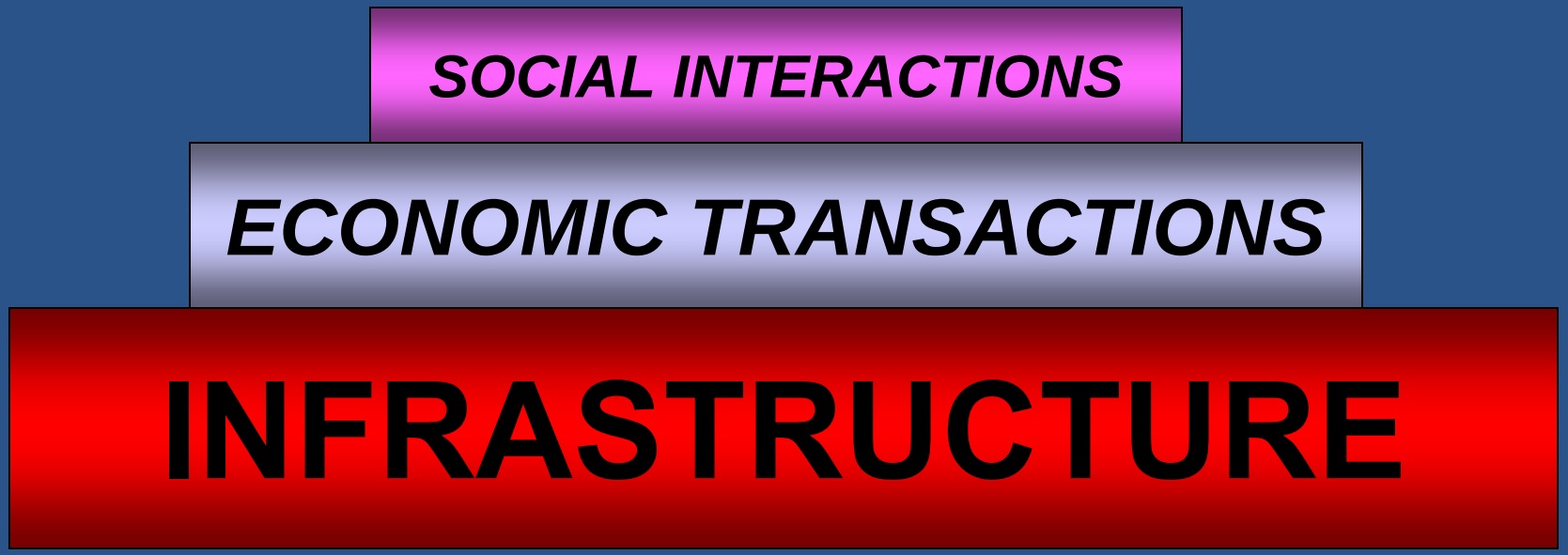
ECONOMICS

- Use Life-Cycle Cost Analysis for Project Selection.

ENVIRONMENT

- Consider Recycling First
- Be Good Stewards of the Environment

OUR SOCIETY DEPENDS ON OUR INFRASTRUCTURE FOR THE MOVEMENT OF BOTH PEOPLE AND GOODS!



Roads, Bridges, Airports, Water Systems, Wastewater Systems,
Gas, Electric, Telephones, Waterways, Coastal Facilities, Parks, Etc.

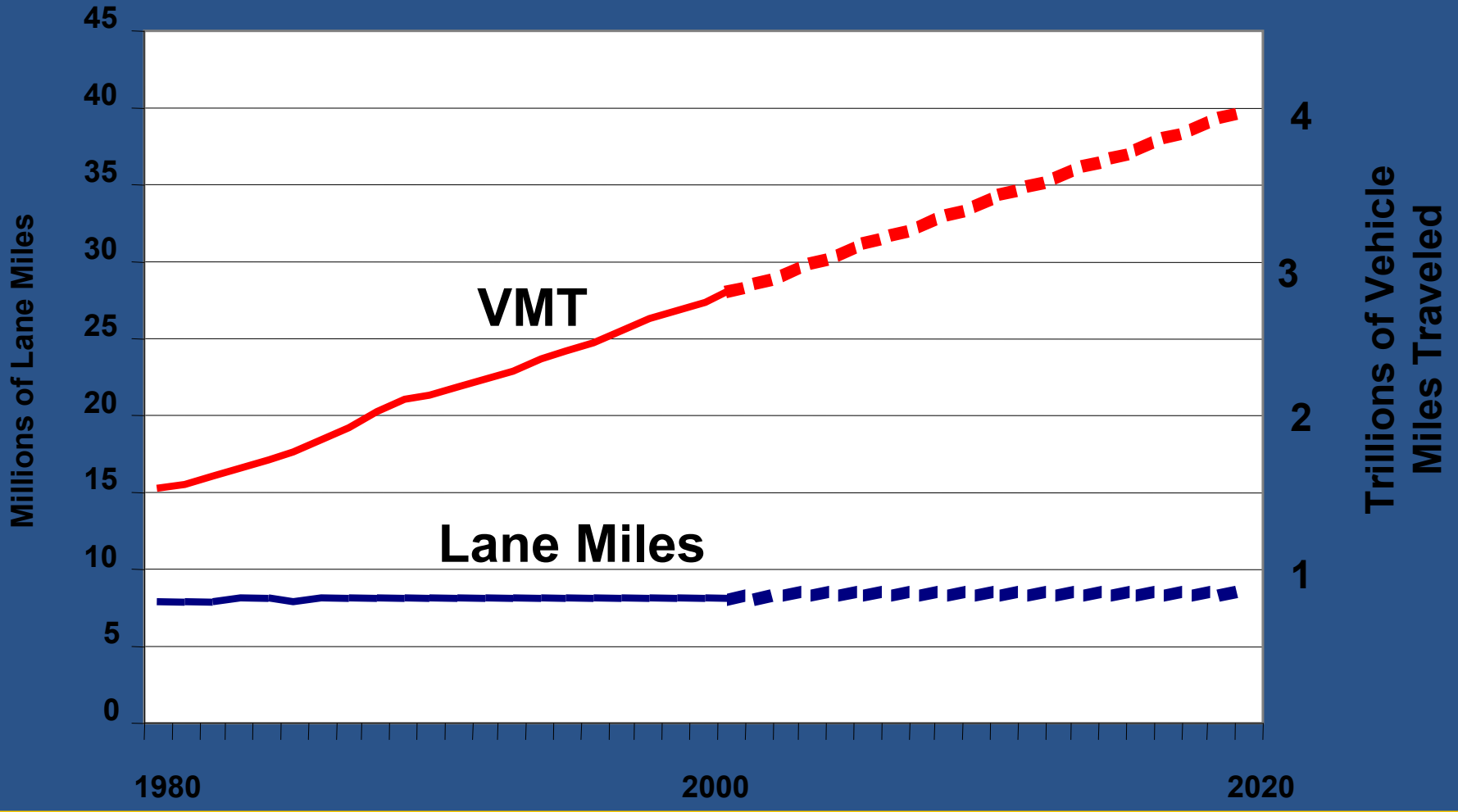
2003 Challenges

Congestion

Aging Infrastructure

Freight Movement

New Construction → Preservation



What is Pavement Preservation?

Applying the *right* treatment...

…to the *right* road.

…at the *right* time...

What is Pavement Preservation?

Includes:

Preventive Maintenance

Minor Rehabilitation
(non-structural)

Some Routine Maintenance

Does Not Include:

New Pavement Construction

Reconstruction

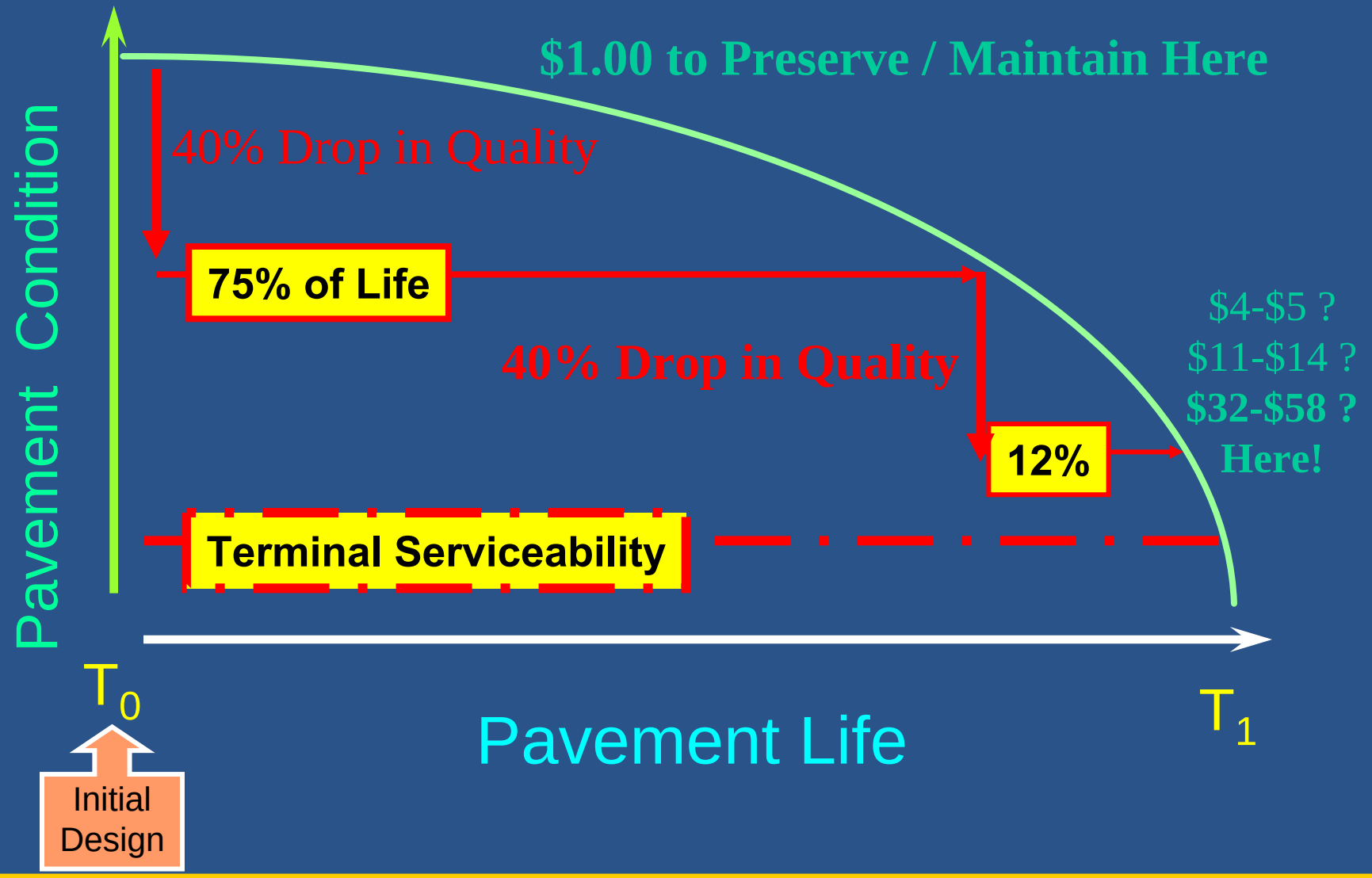
Major Rehabilitation
(increase in structural capacity)

Corrective Maintenance

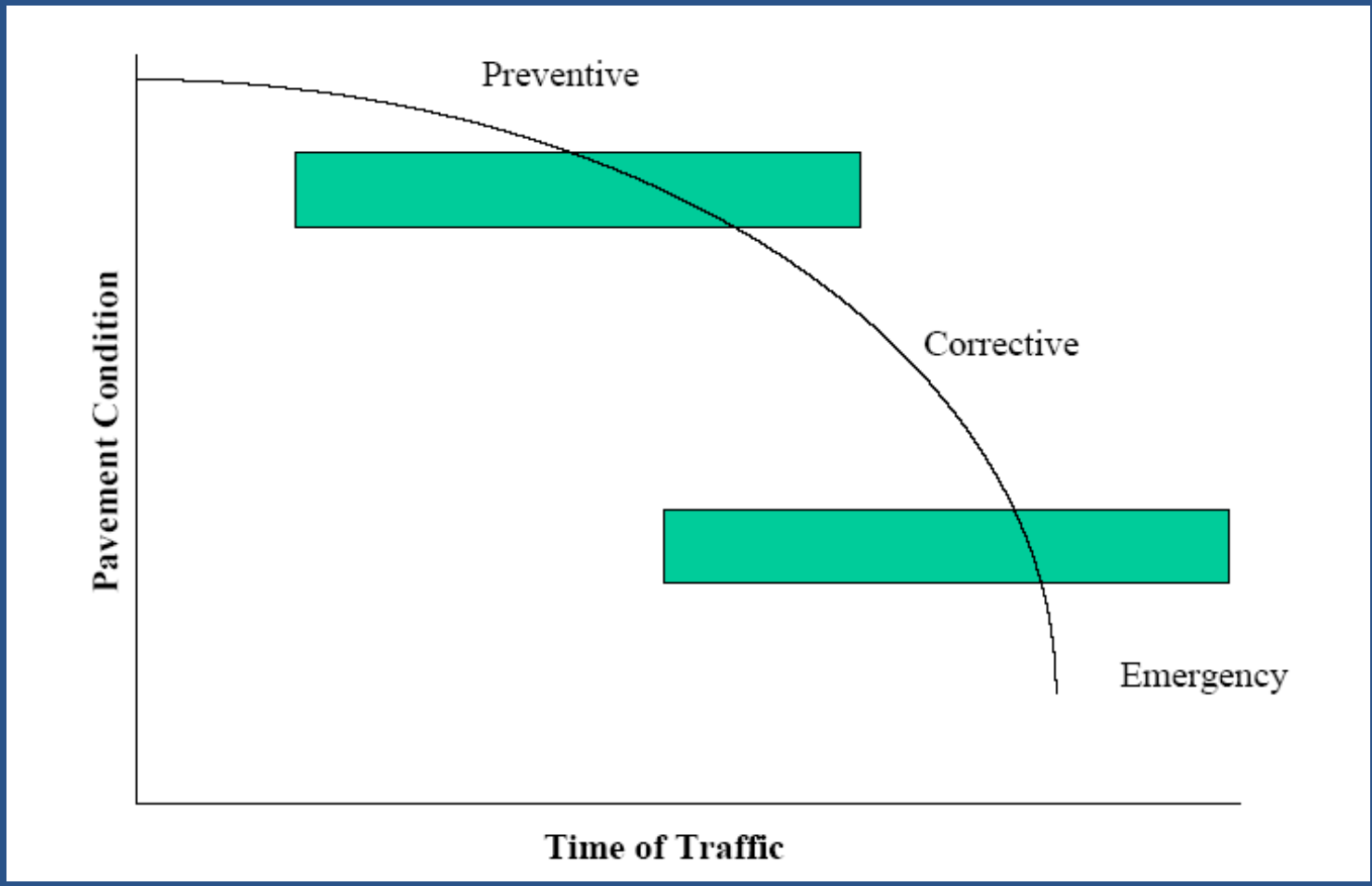
NCPP Pavement Preservation "Definition"

Pavement preservation is a program 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 meet motorist expectations.

Performance Curves / Costs of Repairs

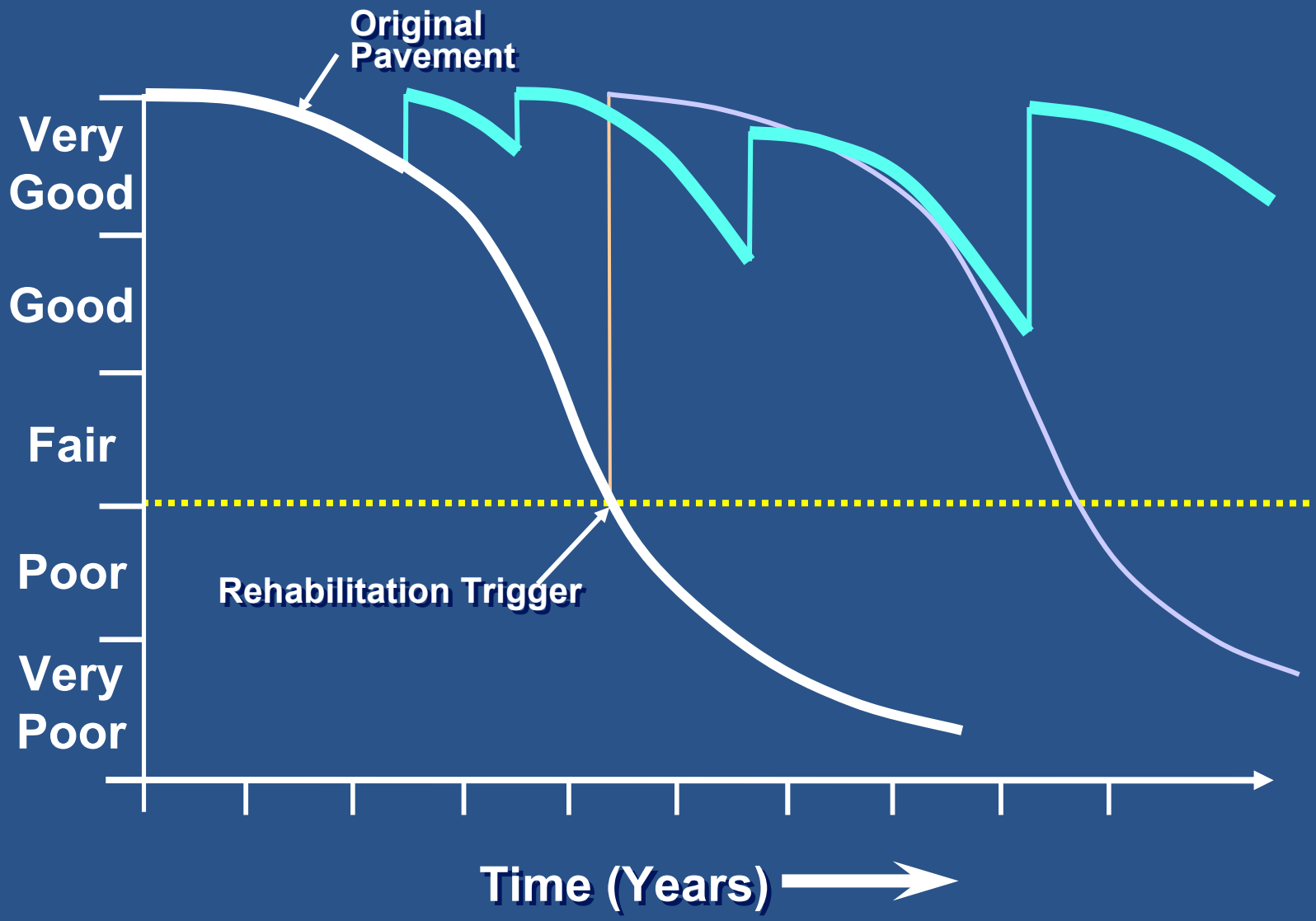


TYPES OF MAINTENANCE



"Selecting a Preventive Maintenance Treatment for Flexible Pavements"
Dr. R. Gary Hicks, P.E., Stephen B. Seeds, P.E., David G. Peshkin, P.E., March 2000

The Pavement Preservation Concept



Presentation Outline

1. Background
2. Institutionalizing Pavement Preservation – 20 years of History
3. Training
4. Research
5. Marketing / Communications

The Federal Role:

Promote uniformity, quality, and safety aspects of highway construction and maintenance.

Develop, promote, and provide new technologies and training.

Stewardship of the Federal-aid program ***and its investments.***

Pavement Preservation Expert Task Group (PPETG)

Brainchild of Jim Sorenson

Formed in 1992

Composed of Representatives from State DOTs, Industry, and Academia

Purpose: Advise and Support FHWA efforts.

Benefits of Preservation

Improved Customer Satisfaction

- Keeps them (and you) happy.

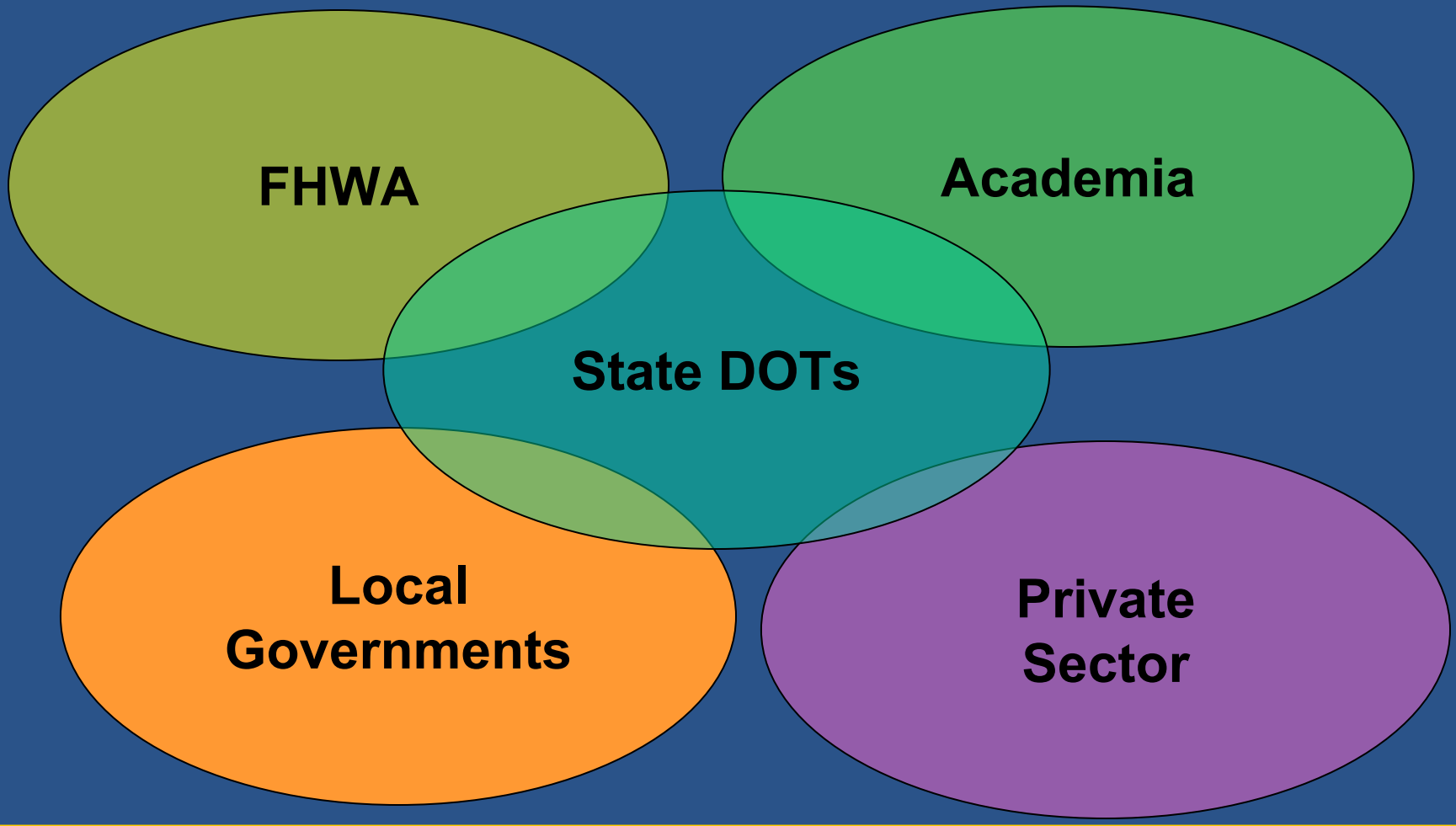
Lowers User and Agency Costs in the Long-Term

- Saves them (and you) money.

Improved Safety

- Keeps them (and you) safer.

Partnerships Are Required



Foundation for Pavement Preservation

- Formed in 1992
- AEMA, ARRA, ISSA founding members
- Worked with FHWA and PPETG to produce many products
- Jerry Eller, former FHWA Chief Engineer eventually became the Executive Director

AASHTO Subcommittee on Maintenance

Pavement Task Force

STATEMENT OF DIRECTION

"The purpose of the Pavement Task Force is to promote the preservation of pavements."

AASHTO Support for Pavement Preservation

Subcommittee on Maintenance, Charleston, SC

INDUSTRY / ACADEMIA

National Center for Pavement Preservation

A formal agreement between –

Foundation for Pavement Preservation & Michigan State University

FP²

MICHIGAN STATE UNIVERSITY

NCPP Grand Opening Ceremony

October 17, 2003

Memorandum on Preventive Maintenance Eligibility

From: King W. Gee, Associate Administrator for Infrastructure

Dated: October 8, 2004

http://www.fhwa.dot.gov/preservation/100804.cfm

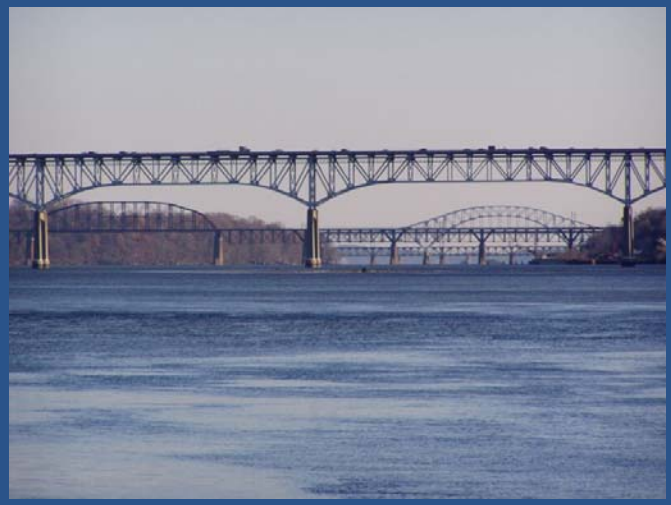
Eligible Activity Examples

Roadway Activities:

- Crack Sealing and Joint Repairs
- Seal Coats (fog seals, slurry seals, chip seals)
- Pavement Patching and Thin Overlays
- Shoulder Repair
- Restoration of Drainage Systems

Bridge Activities:

- Seismic Retrofit
- Scour Countermeasures
- Painting.



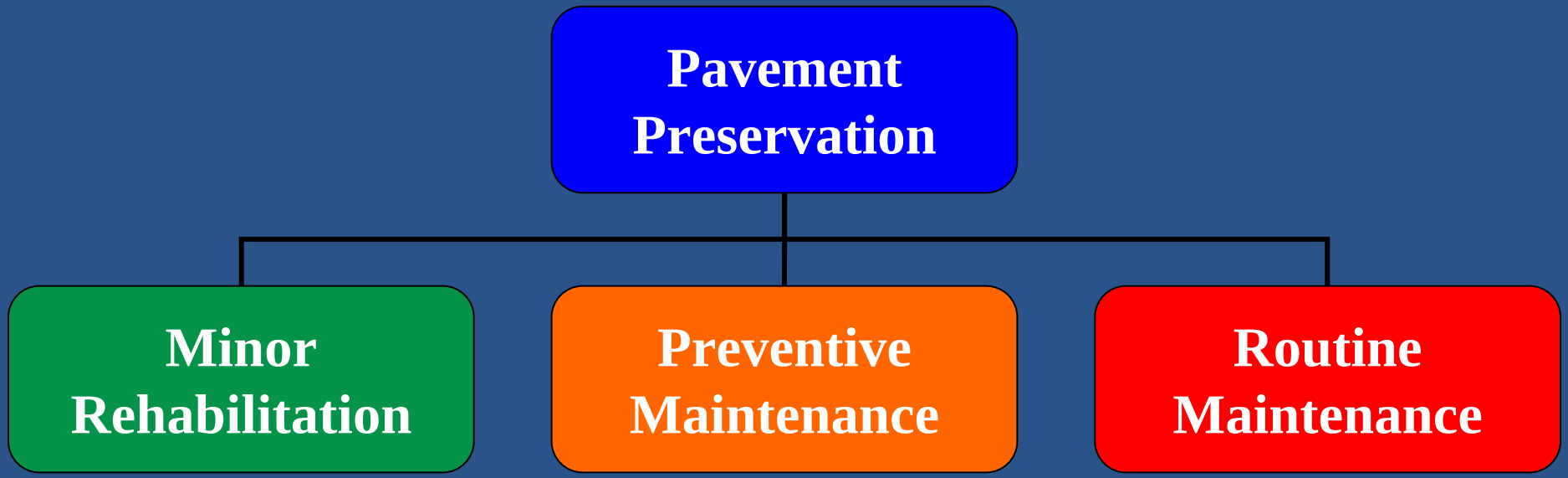
Definitions Memorandum

From: David R. Geiger, P.E.
Director, Office of Asset Management

Dated: September 12, 2005

http://www.fhwa.dot.gov/pavement/preservation/091205.cfm

Categories of Pavement Preservation



Pavement Preservation Guidelines

	Type of Activity	Increase Capacity	Increase Strength	Reduce Aging	Restore Serviceability
	New Construction	X	X	X	X
	Reconstruction	X	X	X	X
	Major (Heavy) Rehabilitation		X	X	X
	Structural Overlay		X	X	X
Pavement Preservation	Minor (Light) Rehabilitation			X	X
Pavement Preservation	Preventive Maintenance			X	X
Pavement Preservation	Routine Maintenance				X
	Corrective (Reactive) Maintenance				X
	Catastrophic Maintenance				X

Stresses and Strains -- but Preservation is Non-Structural!

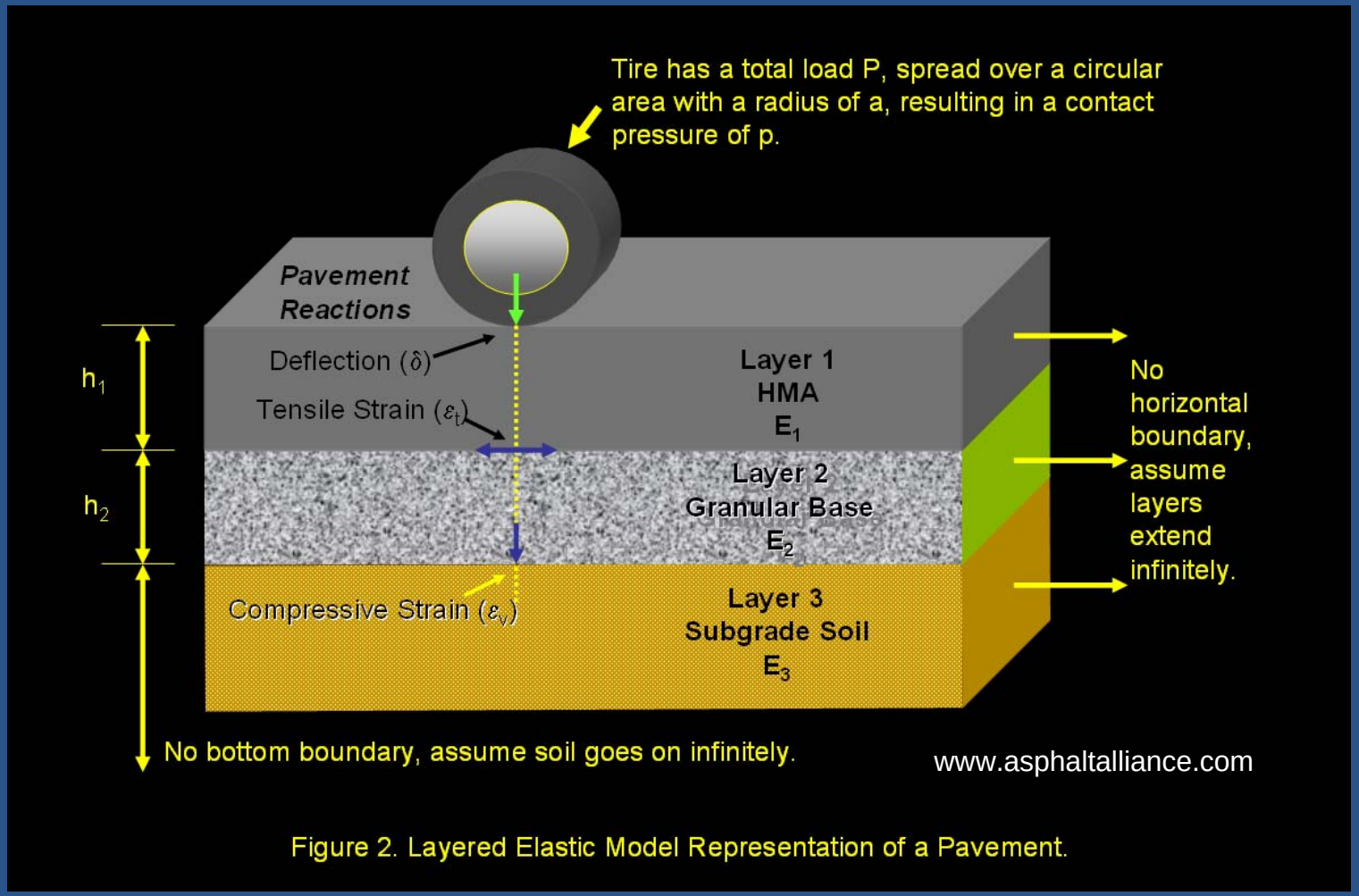


Figure 2. Layered Elastic Model Representation of a Pavement.

Transportation System Preservation Technical Services Program

Resolution PR-10-05

Approved by the Board of Directors

May 8, 2005

Transportation System Preservation Technical Services Program (TSP^2)

Phase 1: Pavement Preservation

Phase 2: Bridge Preservation

Phase 3: Regional Partnerships

The TSP^2 Website: www.tsp2.org

- Bulletin Board System
- LISTSERV Email Lists
- Technical and Document Resource Library for Pavement and Bridge Preservation
- Help Desk Requests
- Education / Training Materials

www.tsp2.org

National Center for Pavement Preservation

Regional Partnerships

www.pavementpreservation.org

Midwestern
Northeast
Southeastern
Rocky Mountain West

www.tsp2.org

American Association of State Highway and Transportation Officials
AASHTO
The Voice of Transportation

Pavement Preservation Partnerships

If your State, Municipality, or County is not a member yet…

Please get a flyer ….

And Join Us in preserving our existing assets in good condition!

FP², Inc.

In 2007, the Foundation for Pavement Preservation was dissolved, and FP2, Inc. was created.

Changed from a 501 c(3)
To a 501 c(6) organization to enable a higher level of political involvement under the IRS codes.

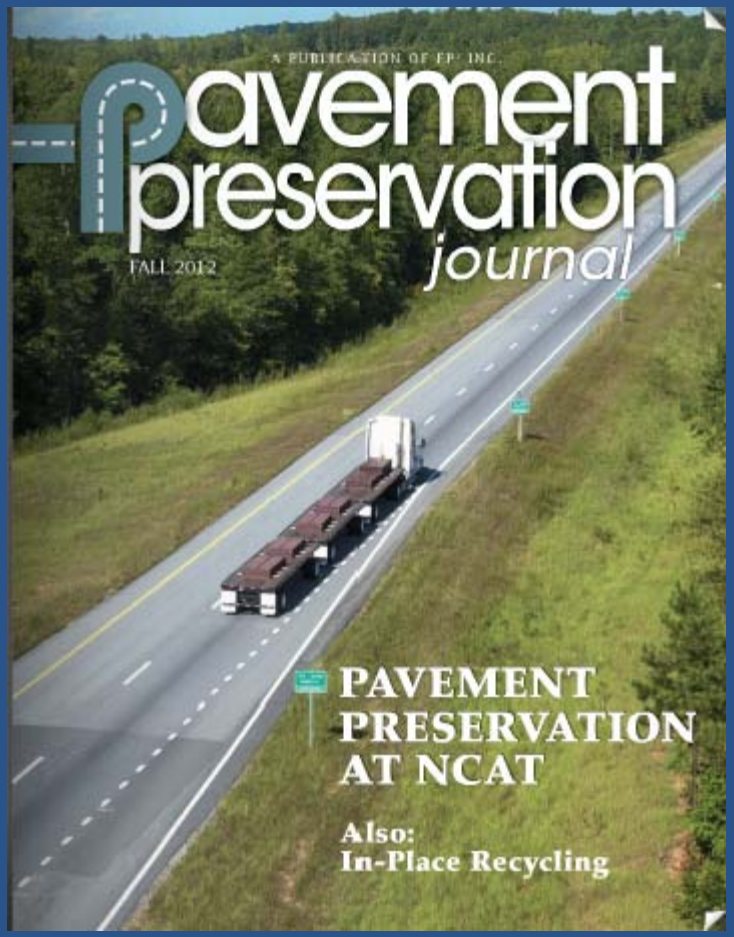
Pavement Preservation Journal

Published by FP2, Inc.

1st Published in 2007

Supported through advertising

www.fp2.org



MAP-21 – the New Law

Moving Ahead for Progress in the 21st Century Act (MAP-21) surface transportation legislation enacted July 6, 2012 contains language both specifically, and more generally, helpful to pavement preservation. (quote from www.fp2.org)

http://www.fhwa.dot.gov/map21

MAP-21: Performance Management

Focus the Federal-aid program on the following national goals:

1) *SAFETY*
2) *INFRASTRUCTURE CONDITION*
3) *CONGESTION REDUCTION*
4) *SYSTEM RELIABILITY*
5) *FREIGHT MOVEMENT / ECONOMIC VITALITY*
6) *ENVIRONMENTAL SUSTAINABILITY*
7) *REDUCED PROJECT DELIVERY DELAYS*

Summary of Key Points

1992 – PPETG and the Foundation for Pavement Preservation were formed.

FHWA, AASHTO, Industry, and Academia have worked hard to advance Pavement Preservation in many different ways.

MAP-21 has codified Pavement Preservation into Federal Law.

Local Involvement can be stronger!

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National Highway Institute Training

131103 A, B, C – Pavement Preservation: Design and Construction of Preventive Maintenance Treatments

131104 – Pavement Preservation: Integrating Pavement Preservation Practices into Pavement Management

131106 – Transportation Asset Management

131114 - Pavement Preservation: Optimal Timing of Pavement Preservation Treatments

131115 – Pavement Preservation: Preventive Maintenance Treatment, Timing, and Selection

131116A – Pavement Management: Characteristics of an Effective Program

www.nhi.fhwa.dot.gov

NHI Preservation Training - FREE

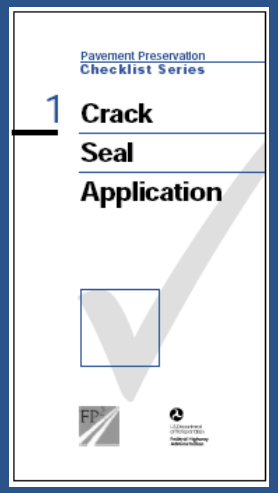
131110 – Pavement Preservation Treatment Construction – WEB-BASED

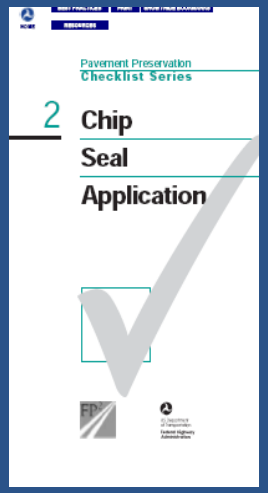
- HMA Treatments
- PCC Treatments
- HMA Overlay Inspection

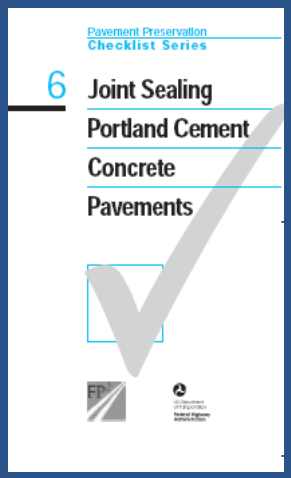
TCCC: www.nhi.fhwa.dot.gov/tccc

14 CHECKLISTS

- Crack Seal Application
- Chip Seal Application
- Thin Hot-Mix Asphalt Overlay
- Fog Seal Application
- Slurry Seal Application
- Microsurfacing Application
- Hot In-Place Recycling
- Cold In-Place Recycling
- Fabric Interlayer Application
- Joint Sealing
- Diamond Grinding
- Dowel Bar Retrofit
- Partial-Depth Repair
- Full-Depth Repair







Download the FREE Checklist Apps

Using your smart phone,
go to the Android Marketplace or Blackberry App World to download the FREE app.

Just do a search on "FHWA" and the application will pop up!

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

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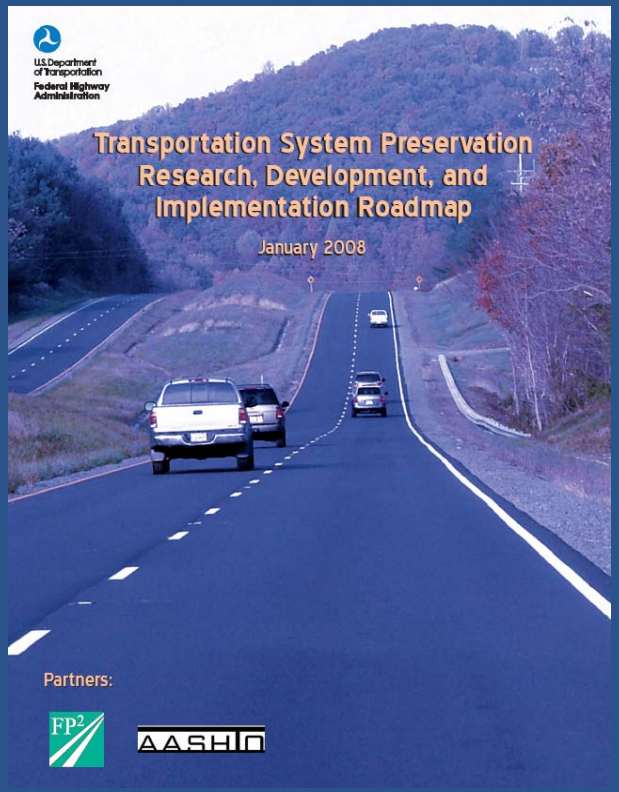
Transportation System Preservation Research Roadmap



http://www.tsp2.org/roadmap/index.php

Research Efforts through the Transportation Research Board

TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Pavement Preservation (AHD18)

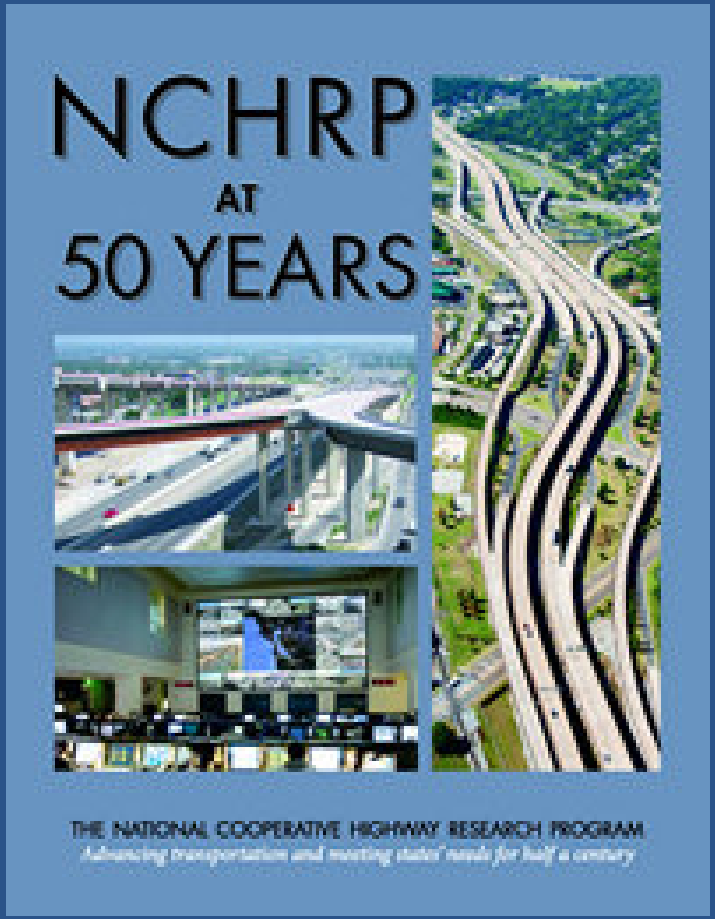
Committee Scope:

This Committee is concerned with identifying and supporting research on the application of scientific principles to quantify preservation activities and their benefits to the transportation roadway infrastructure; developing, applying and evaluating scientific approaches to assess materials, processes, methods and procedures involved in cost-effectively extend the performance-life of transportation pavement sections and networks; and, promoting an understanding and use of effective preservation practices and procedures through dissemination and education activities for practitioners and researchers.

http://pavementpreservationcommittee.org/

NCHRP:
National Cooperative Highway Research Program

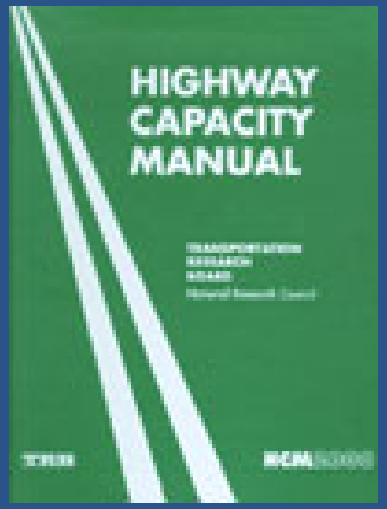
Founded in 1962.

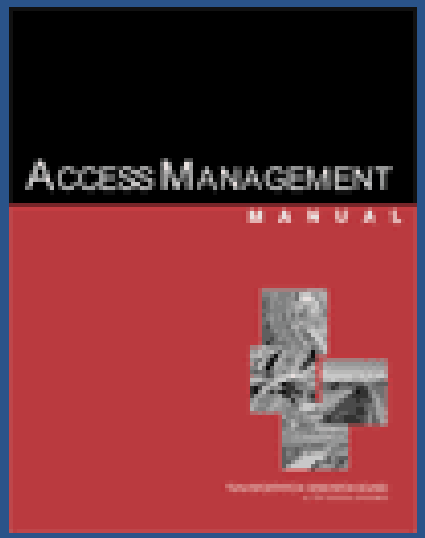


NCHRP: National Cooperative Highway Research Program

$34 Million per Year

under SAFETEA-LU





www.trb.org

Research Examples

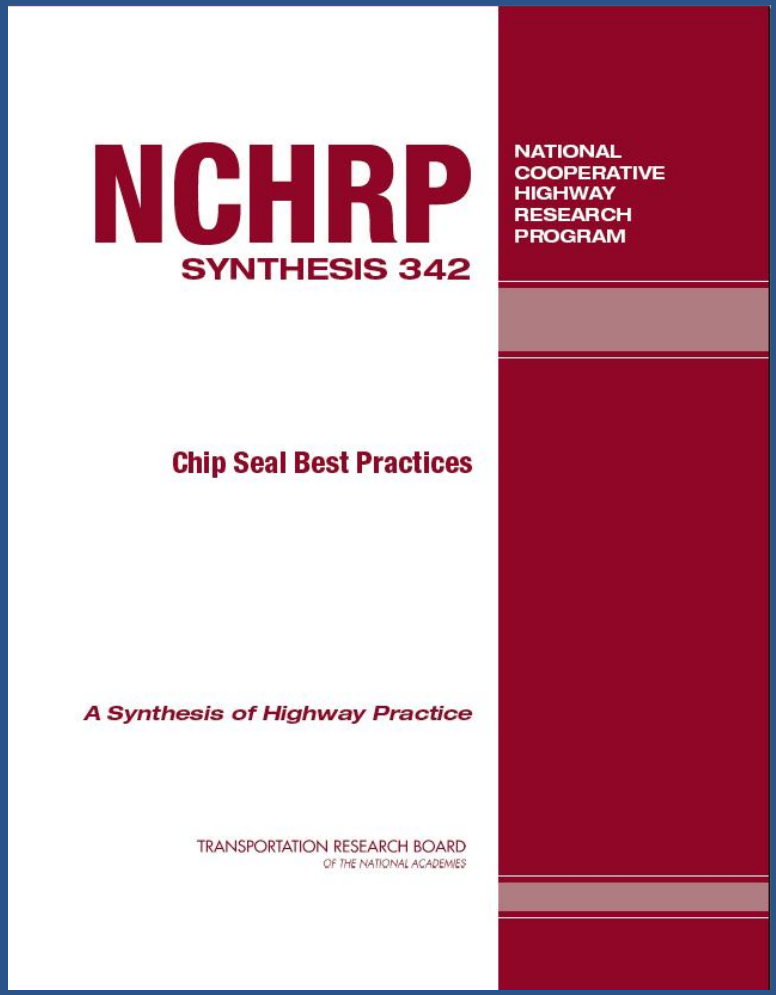
"CHIP SEAL BEST PRACTICES"
NCHRP Synthesis 342 (2005)
"MICROSURFACING"
NCHRP Synthesis 411 (2010)

SYNTHESIS STUDY

Overview of Successful Practices in the United States, Canada, and Overseas.

Literature Search and Surveys.

43 BEST PRACTICES IDENTIFIED



120 Pages

U.S. Department of Transportation
Federal Highway Administration

NCHRP Project 20-07/Task 339

Synthesis Study on Best Practices for Crack Sealing and Crack Filling of HMA Pavements

Federal Highway Administration RESOURCE CENTER

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FHWA WEBSITE

www.fhwa.dot.gov/preservation

www.fhwa.dot.gov/pavement

Articles

TRNews Sept-Oct ‘03

Focus Magazine

Accelerating Infrastructure Innovations

Reprinted from

FOCUS

May 2003

"Applying the right treatment to the right road at the right time allows highway agencies to get the most out of their maintenance dollars."

Pavement Preservation: A Call to Action

Ensuring that roads that are in good condition stay that way is the goal behind pavement preservation efforts nationwide. These efforts are paying off, but highway agency resources are often limited, slowing progress, and there is still much to be done. Recent surveys of road conditions show that 32 percent of major U.S. roads are in poor or mediocre condition. Driving on roads in need of repair, meanwhile, costs U.S. motorists $40 billion a year in vehicle repair and operating expenses. Improving these numbers and establishing a coordinated national pavement preservation research effort brought representatives from across the country together at a Pavement Preservation "Think Tank" meeting held in McLean, Virginia, in February. Attendees represented State highway agencies, industry, the American Association of State Highway and Transportation Officials (AASHTO), Transportation Research Board (TRB), and the Federal Highway Administration (FHWA), among others.

State and local highway agencies are applying more and more preservation treatments to their roads, such as the chip seal shown here.

The new initiative will build upon the work accomplished over the last 7 years by the AASHTO Lead State Team on Pavement Preservation, Foundation for Pavement Preservation (FP2), AASHTO Subcommittee on Maintenance, and FHWA Pavement Preservation Expert Task Group. This work has resulted in greater acceptance nationwide of the need for pavement preservation treatments. Some State highway agencies, such as North Carolina, for example, have created pavement preservation engineer positions. Highway agencies, trade associations, and members of academia have united to form the Midwestern Pavement Preservation Partnership to share knowledge and best practices in pavement preservation. And local agencies and municipalities are applying more and more preservation treatments to their roads to make their investment last longer.

Pavement preservation treatments may include various types of surface seals, thin lift overlays, and crack sealing for asphalt pavements. Treatments for concrete pavements might include crack and joint sealing, diamond grinding, and retrofit dowel bars. The key is to apply the treatments when the pavement is still in good condition, with no structural damage. Placing a treatment too late will result in poor performance, while applying treatments too early can cause other pavement problems and use up funds before

(more)

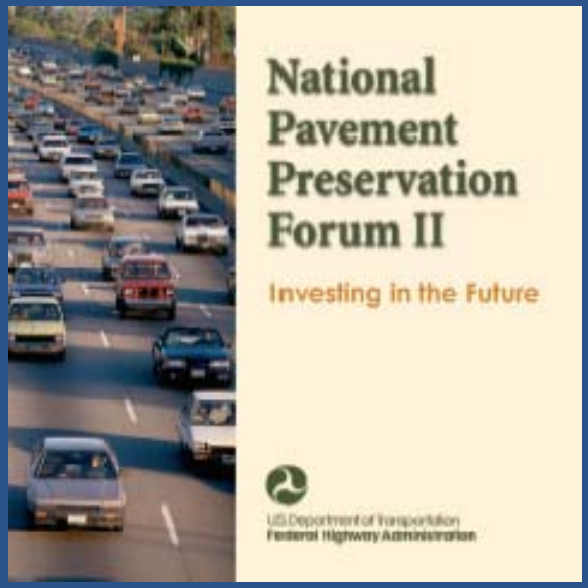
U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration
RESOURCE CENTER

CD's

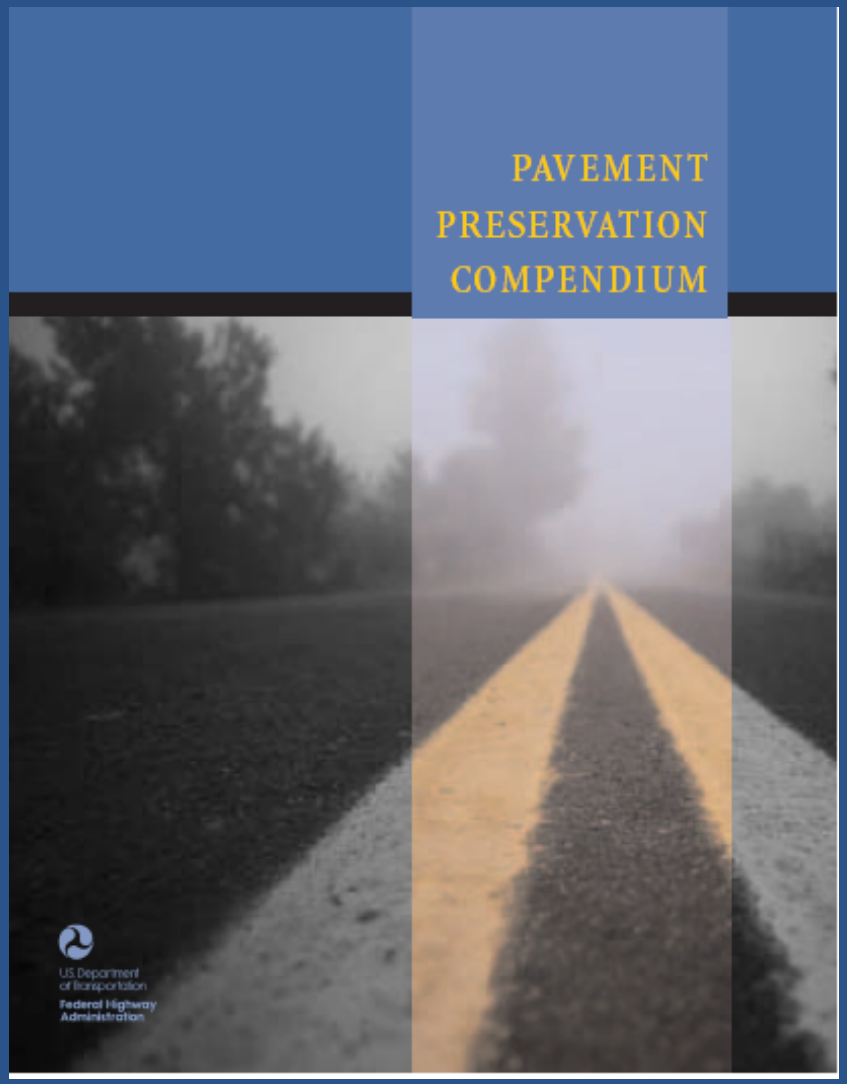
Pavement Preservation 2: State of the Practice

National Pavement Preservation Forum II



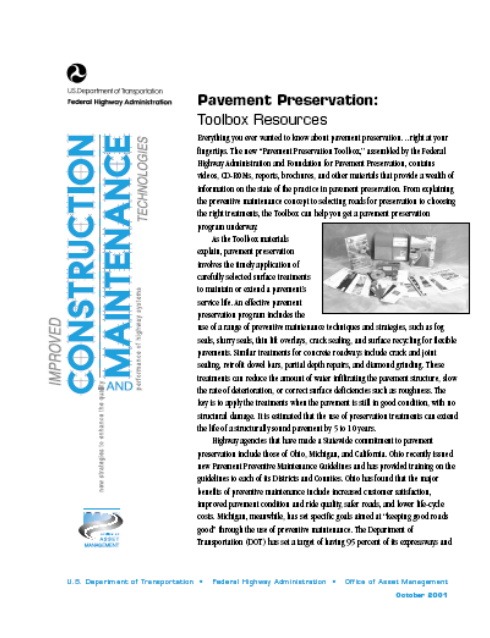
COMPENDIUM

A collection of articles about Pavement Preservation that have been published over the past couple of years.



Factsheets

19 Factsheets from 2000-2005



U.S. Department of Transportation
Federal Highway Administration

IMPROVED CONSTRUCTION AND MAINTENANCE TECHNOLOGIES
new strategies to enhance the quality and performance of highway systems

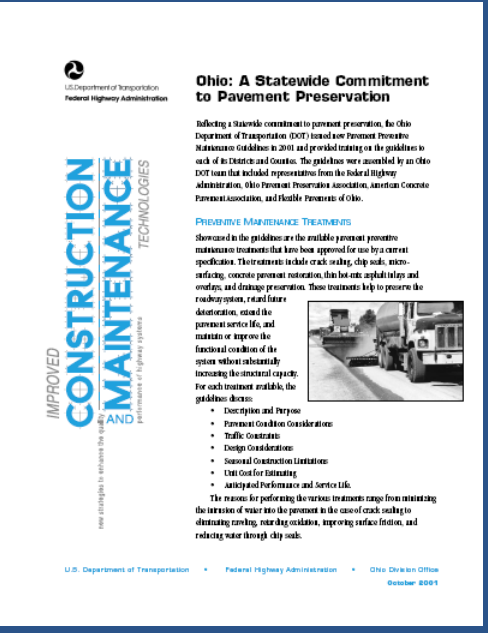
Pavement Preservation:
Toolbox Resources

Everything you ever wanted to know about pavement preservation…right at your fingertips. The new "Pavement Preservation Toolbox," assembled by the Federal Highway Administration and Foundation for Pavement Preservation, contains videos, CD-ROMs, reports, brochures, and other materials that provide a wealth of information on the state of the practice in pavement preservation. From explaining the preventive maintenance concept to selecting roads for preservation to choosing the right treatments, the Toolbox can help you get a pavement preservation program underway.

As the Toolbox materials explain, pavement preservation involves the timely application of carefully selected surface treatments to maintain or extend a pavement's service life. An effective pavement preservation program includes the use of a range of preventive maintenance techniques and strategies, such as fog seals, slurry seals, thin HI overlays, crack sealing, and surface recycling for flexible pavements. Similar treatments for concrete roadways include crack and joint sealing, retrofit dowel bars, partial depth repairs, and diamond grinding. These treatments can reduce the amount of water infiltrating the pavement structure, slow the rate of deterioration, or correct surface deficiencies such as roughness. The key is to apply the treatments when the pavement is still in good condition, with no structural damage. It is estimated that the use of preservation treatments can extend the life of a structurally sound pavement by 5 to 10 years.

Highway agencies that have made a Statewide commitment to pavement preservation include those of Ohio, Michigan, and California. Ohio recently issued new Pavement Preventive Maintenance Guidelines and has provided training on the guidelines to each of its Districts and Counties. Ohio has found that the major benefits of preventive maintenance include increased customer satisfaction, improved pavement condition and ride quality, safer roads, and lower life-cycle costs. Michigan, meanwhile, has set specific goals aimed at "keeping good roads good" through the use of preventive maintenance. The Department of Transportation (DOT) has set a target of having 95 percent of its expressways and

U.S. Department of Transportation • Federal Highway Administration • Office of Asset Management
October 2001



U.S. Department of Transportation
Federal Highway Administration

IMPROVED CONSTRUCTION AND MAINTENANCE TECHNOLOGIES
new strategies to enhance the quality and performance of highway systems

Ohio: A Statewide Commitment to Pavement Preservation

Reflecting a Statewide commitment to pavement preservation, the Ohio Department of Transportation (DOT) issued new Pavement Preventive Maintenance Guidelines in 2001 and provided training on the guidelines to each of its Districts and Counties. The guidelines were assembled by an Ohio DOT team that included representatives from the Federal Highway Administration, Ohio Pavement Preservation Association, American Concrete Pavement Association, and Flexible Pavements of Ohio.

PREVENTIVE MAINTENANCE TREATMENTS

Showcased in the guidelines are the available pavement preventive maintenance treatments that have been approved for use by a current specification. The treatments include crack sealing, chip seals, micro-surfacing, concrete pavement restoration, thin hot-mix asphalt inlays and overlays, and drainage preservation. These treatments help to preserve the roadway system, retard future deterioration, extend the pavement service life, and maintain or improve the functional condition of the system without substantially increasing the structural capacity. For each treatment available, the guidelines discuss:

- Description and Purpose
- Pavement Condition Considerations
- Traffic Constraints
- Design Considerations
- Seasonal Construction Limitations
- Unit Cost for Estimating
- Anticipated Performance and Service Life.

The reasons for performing the various treatments range from minimizing the intrusion of water into the pavement in the case of crack sealing to eliminating raveling, retarding oxidation, improving surface friction, and reducing water through chip seals.

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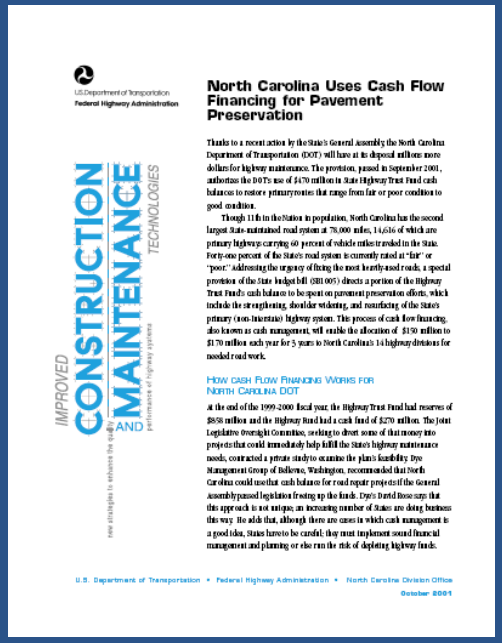
October 2001



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North Carolina Uses Cash Flow Financing for Pavement Preservation

Thanks to a recent action by the State's General Assembly, the North Carolina Department of Transportation (DOT) will have at its disposal millions more dollars for highway maintenance. The provision, passed in September 2001, authorizes the DOT's use of $470 million in State Highway Trust Fund cash balances to restore primary routes that range from fair or poor condition to good condition.

Though 11th in the Nation in population, North Carolina has the second largest State-maintained road system at 78,000 miles, 14,636 of which are primary highways carrying 60 percent of vehicle miles traveled in the State. Forty-one percent of the State's road system is currently rated at "fair" or "poor." Addressing the urgency of fixing the most heavily-used roads, a special provision of the State budget bill (SB 005) directs a portion of the Highway Trust Fund's cash balances to be spent on pavement preservation efforts, which include the strengthening, shoulder widening, and resurfacing of the State's primary (non-Interstate) highway system. This process of cash flow financing, also known as cash management, will enable the allocation of $150 million to $170 million each year for 3 years to North Carolina's 14 highway divisions for needed road work.

HOW CASH FLOW FINANCING WORKS FOR NORTH CAROLINA DOT

At the end of the 1999-2000 fiscal year, the Highway Trust Fund had reserves of $858 million and the Highway Fund had a cash fund of $270 million. The Joint Legislative Oversight Committee, seeking to divert some of that money into projects that could immediately help fulfill the State's highway maintenance needs, contracted a private study to examine the plan's feasibility. Dye Management Group of Bellevue, Washington, recommended that North Carolina could use that cash balance for road repair projects if the General Assembly passed legislation freeing up the funds. Dye's David Roos says that this approach is not unique; an increasing number of States are doing business this way. He adds that, although there are cases in which cash management is a good idea, States have to be careful; they must implement sound financial management and planning or else run the risk of depleting highway funds.

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October 2001

Advances in Technology Mean New Opportunities….

Webinars – APWA, LTAP Centers, TLN system, and many more.

On-Line Libraries:

NCPP – www.pavementpreservation.org

Electronic Journals: The Pavement Preservation Journal

PowerPoint Presentation Postings –

RMWPPP presentation….

Cost of Delaying Maintenance

Timing Belt Replacement: $400

Engine Replacement: $2,500

Cost of Delaying Maintenance

Teeth Cleaning: $75

Root Canal: $1,000

Nothing Beats a Conference

Northwest Pavement Management Association

Thank You for the Invite!

Concluding Remarks

http://www.pavementvideo.org/CPAR/CPAR%20Video.mp4

1997 Challenges for Preservation

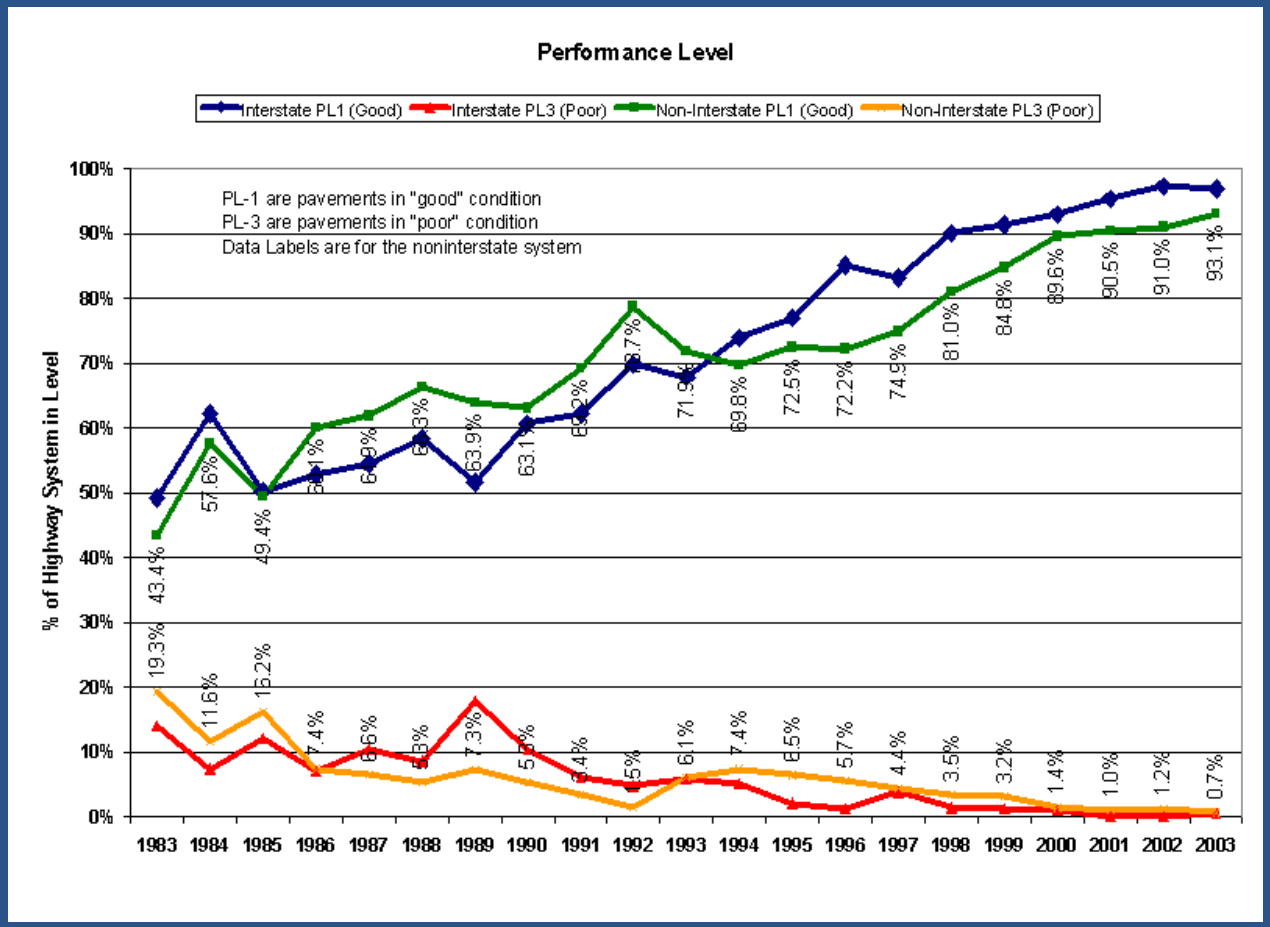
- Public perception
- ***Management perception***
- ***Shortage of applicable research***
- ***Absence of relevant training***
- Poor data tracking
- Dedicated funding
- ***Safety – TEA-21 required a plan to address safety issues for Federal funding.***

RESEARCH NEEDS REMAIN…

1. Treatment Impact on Pavement Performance (Service Life Extension)
2. Economic Evaluation of Treatment Effectiveness
3. Construction and Monitoring of Treatment Test Sections

Preservation and Asset Management

won't bring short-term glory, but they will bring long-term satisfaction!



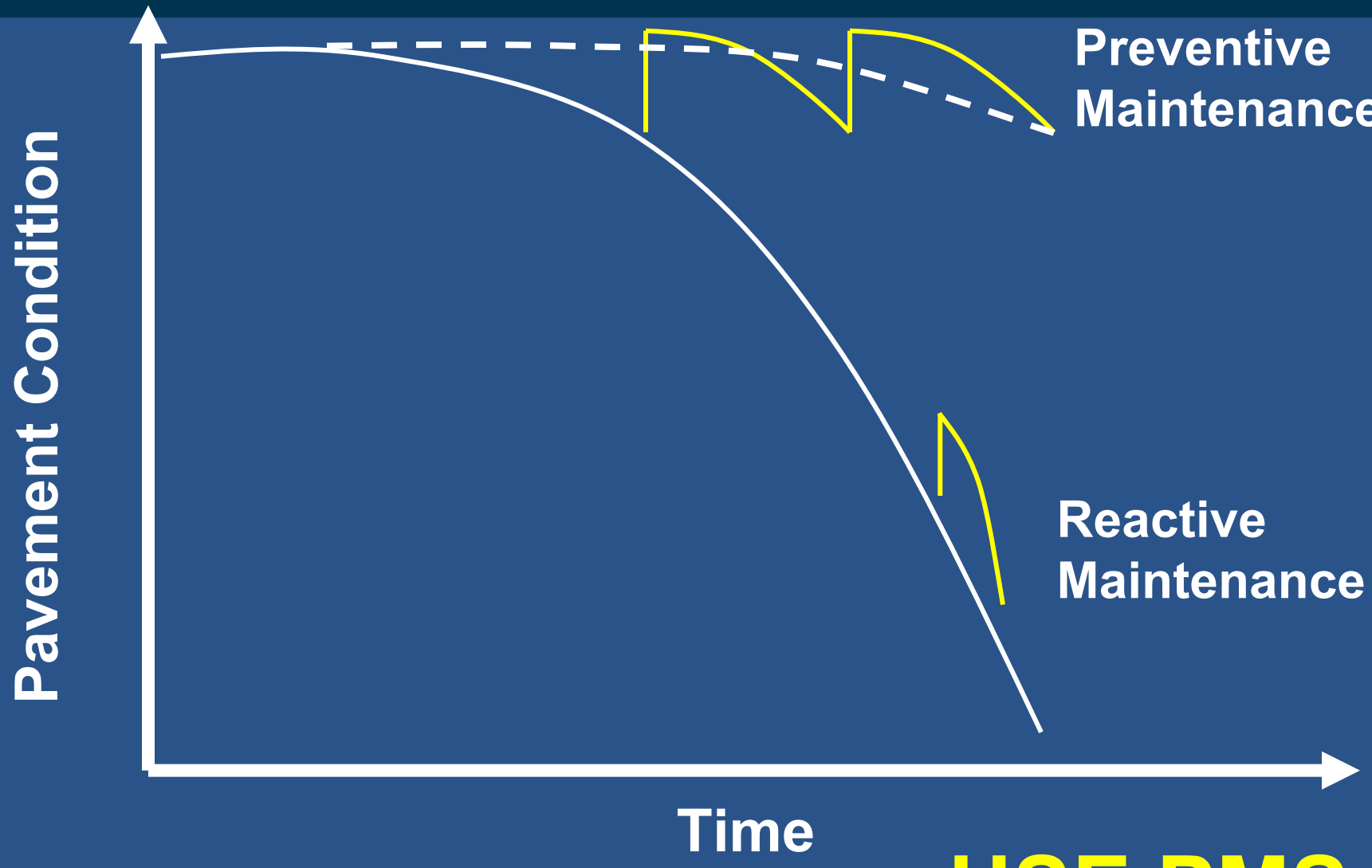
Pavement Preservation Mantra:

Apply the *right* treatment...

…to the *right* road…

…at the *right* time.

Use Engineering!



…*Right* Road… *Right* Time.

USE PMS

Partnerships are Required

1 FHWA

52 State DOTs (including DC and PR)

3,034 County governments;

35,933 Municipal, Town and Township governments.

4,140 Colleges and Universities

____ contractors/industry reps.

UNITED WE STAND….

U.S. Department of Transportation
Federal Highway Administration

FHWA Supports Pavement Preservation!

Left to right: Associate Administrator for Infrastructure King Gee; Administrator Tom Madison; James B. Sorenson, Highway Engineer; and Executive Director Jeff Paniati.

THANK YOU!

Steve Mueller

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Pavement and Materials Engineer
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