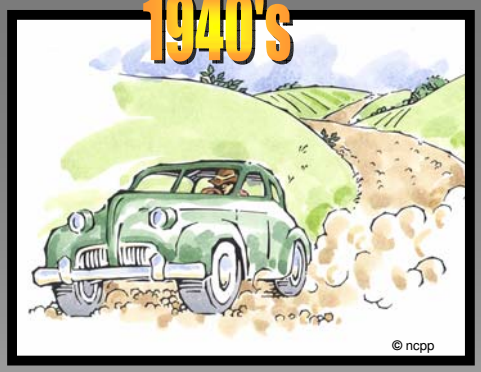
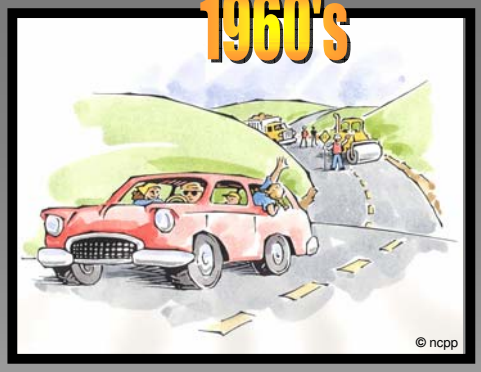
Back to Basics: Pavement Preservation

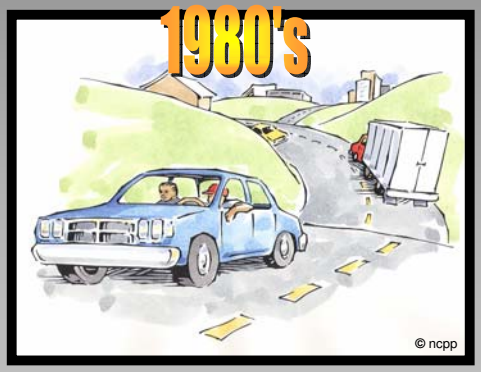
2009 Purdue Road School

Larry Galehouse, PE, LS, Director
National Center for Pavement Preservation

MICHIGAN STATE UNIVERSITY







MICHIGAN STATE UNIVERSITY

ASCE NEWS ISSN—0197—4076
Postmaster: Send address changes to ASCE, 1801 Alexander Bell Dr., Reston, VA 20191-4400

MARCH 2005 VOLUME 30, NUMBER 3

ASCE | The newspaper for members of the American Society of Civil Engineers

MARCH 2005 VOLUME 30, NUMBER 3

grades in
ed declin
and energy fell from a D^+ to a D; wastewater

In the four years that have elapsed since ASCE's last assessment of the nation's infrastructure—which conferred an overall grade of D^+—the nation has failed to heed the call. Indeed, there has been further decline, as witnessed by the overall grade of D meted out in the *2005 Report Card for America's Infrastructure*. Released on March 9 at a press conference held in Washington, D.C., at the National Press Club, this latest assessment suggests that the nation's infrastructure—principally its roads, bridges, drinking water systems, mass transit systems, schools, and systems for delivering energy—may soon fail to meet society's needs.

This is the third full report ASCE has issued on the nation's infrastructure. The first was in 1998. Additionally, the *Progress Report for America's Infrastructure*, released in 2003, surveyed developments in the hope of finding improvements.

In part because of the effect of ASCE's first assessment of national infrastructure, the imporels. In 2001 ASCE estimated that it would take $1.3 trillion and five years to bring the country's infrastructure to a satisfactory level. Two years later, however, the Society's progress report gave scant grounds for optimism.

The advisory council that helped ASCE prepare this latest assessment comprises 24 distinguished civil engineers whose specialties and areas of expertise cover a broad spectrum. The performance and condition of each category of infrastructure were assessed on the basis of federal sources, and these sources also were used in the forecasts. The capacity of infrastructure and the current and pending levels of state, local, and federal funding were weighed against need.

"Grades were assigned on the basis of condition and capacity, the funding versus the needs, and generally following a traditional grading scale," said Patrick J. Natale, P.E., ASCE's executive director, during the press conference. "By that I mean that if seventy-seven percent of our roads were in good condition or better, that would earn a grade of C. Base grades were then reviewed by the advisory council and adjusted—usually with a plus or minus but some-

In the report, civil engineering professionals maintain that conditions have worsened. Of the 14 infrastructure categories assigned grades—aviation, bridges, dams, drinking water, energy, hazardous waste, navigable waterways, public parks and recreation, rail, roads, schools, solid waste, mass transit, and wastewater—10 receive grades in the D range. Of those 10, 7 represented declines since 2001: hazardous waste, roads, and energy fell from a D^+ to a D; wastewater and drinking water dropped from a D to a D^-; mass transit went from a C^- to a D^+; and navigable waterways sank from a D^+ to a D^-. ASCE estimates that a total investment of $1.6 trillion will be needed over the next five years to make the necessary improvements.

According to recent assessments, nearly 50 percent of the navigation locks on the more than 19,000 km of inland waterways operated by the U.S. Army Corps of Engineers are functionally obsolete. By 2020 analysts estimate that the percentage will have risen to 80. Yet despite the importance of U.S. waterways to the global economy—the freight on these waterways amounting to *(continued on page 7)*

Conference

Patricia D. Galloway, P.E., ASCE's immediate past president, will lead a discussion on professional ethics at the 2005 Offshore Technology Conference (OTC), which will be held in Houston at the Reliant Convention Center May 2–5. More than 50,000 people representing more than 110 nations—engineers, scientists, technicians, and management executives—are expected to attend the conference to discuss new technologies and exchange ideas on finding and extracting oil and gas in challenging offshore environments. This year's conference, the 36th in this annual series, will have the theme "A Sea of Resources—An Ocean of Knowledge." As in the past, industry professionals will be sharing information on ways to develop offshore resources through drilling, exploration, production, and environmental protection.

Galloway is scheduled to speak at a breakfast session on May 2 that will address professional ethics questions facing engineers today in the international offshore profession, including licensure, sustainability concepts,

ASCE news
FEBRUARY 2009 • VOLUME 34 • NUMBER 2
The newspaper for members of the American Society of Civil Engineers

ASCE's Infrastructure Report Card Gives Nation a D, Estimates Cost at $2.2 Trillion

that conferred four years ago, the projected | the report card components of our 2009 | The Society's 1998 infrastructure

Roads **D-** Americans spend 4.2 billion hours a year stuck in traffic at a cost to the economy of $78.2 billion, or $710 per motorist. Poor conditions cost motorists $67 billion a year in repairs and operating costs. One-third of America's major roads are in poor or mediocre condition and 45 percent of major urban highways are congested. Current spending of $70.3 billion per year for highway capital improvements is well below the estimated $186 billion needed annually to substantially improve conditions.

The Society released its *2009 Report Card for America's Infrastructure* at the National Press Club, in Washington, D.C., on Wednesday, January 28. On hand to discuss the grades with journalists were

ASCE Offers Suggestions For Economic Stimulus Plan

NATIONAL news

For decades, ASCE has attempted to turn

commerce and bind us together." As a strong supporter of the president's plan, the Society has prepared a document entitled "Principles for Infrastructure Stimulus Investment" and presented it to Obama's transition team as well as to congressional leaders.

The principles were developed by ASCE

ncpp National Center for Pavement Preservation
MICHIGAN STATE UNIVERSITY

Americans spend 4.2 billion hours a year stuck in traffic at a cost to the economy of $78.2 billion, or $710 per motorist. Poor conditions cost motorists $67 billion a year in repairs and operating costs. One-third of America's major roads are in poor or mediocre condition and 45 percent of major urban highways are congested. Current spending of $70.3 billion per year for highway capital improvements is well below the estimated $186 billion needed annually to substantially improve conditions.

MICHIGAN STATE UNIVERSITY

Overview

- ✓ Definitions
- ✓ Basic Concepts of RSL
- ✓ Life Cycle Cost Analysis
- ✓ Agency Programs
- ✓ Network Tools
- ✓ NCPP & TSP·2

MICHIGAN STATE UNIVERSITY

"Definition"

Pavement Preservation
is
Applied Asset Management

- ✓ Combines Engineering,
- ✓ Business,
- ✓ Economic Theory

- Routine Maintenance
- Preventive Maintenance
- Minor Rehabilitation

- Sustainable Financing
- Long-Term Network Planning
- Cost-Effective Decision Making
- Pavement Management System
- Optimization

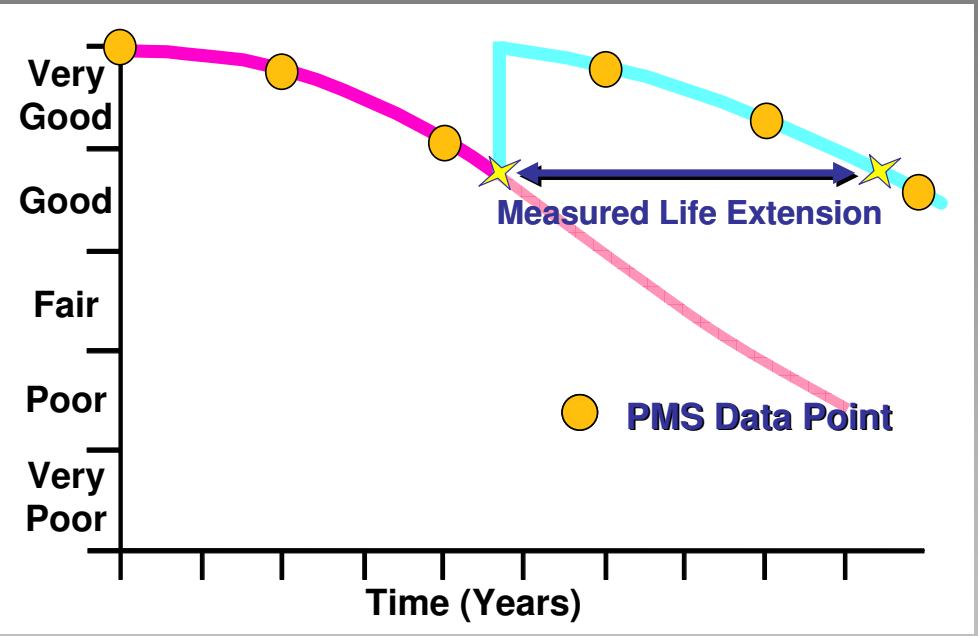
"Definition"

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.

Typical Life Extensions
(Years)

Treatment	Good Condition (PCI=80)	Fair Condition (PCI=60)	Poor Condition (PCI=40)
Crack Fill	1 - 3	0 - 2	0
Crack Seal	1 - 5	0 - 3	0
Fog Seal	1 - 3	0 - 1	0
Chip Seal	4 - 10	3 - 5	0 - 3
Micro-Surfacing	4 – 8	3 - 5	1 - 4
Thin HMA	4 - 10	3 - 7	2 - 4

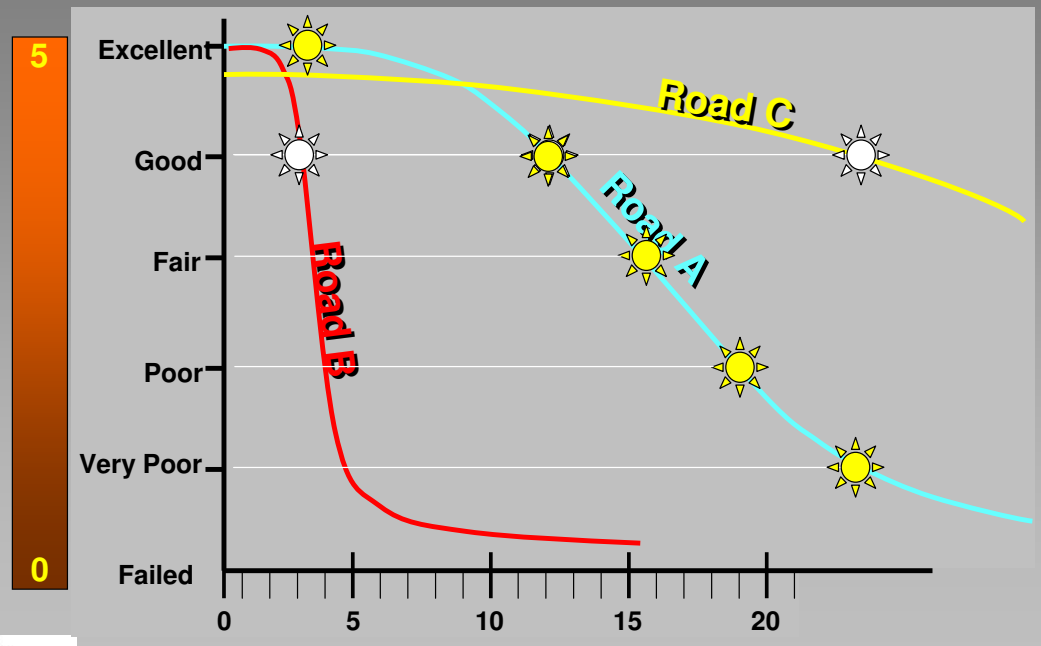
Life Extension



Basic Concepts of RSL
(Remaining Service Life)

ncpp
MICHIGAN STATE UNIVERSITY

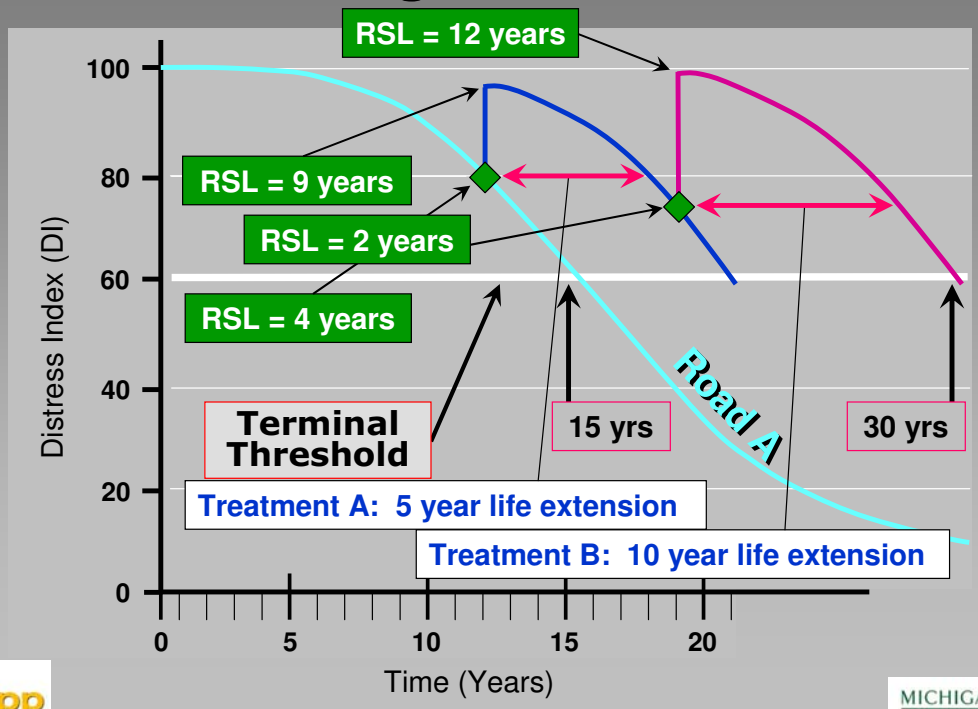
Present Serviceability Index (PSI)



Remaining Service Life

Remaining Service Life (RSL) is the estimated number of years, from a specified date, until a pavement section reaches the threshold distress index. RSL is a function of the distress level and rate of deterioration.

Remaining Service Life



Life Cycle Cost Analysis (LCCA)

ncpp
MICHIGAN STATE UNIVERSITY

Life Cycle Cost Analysis

Traditional Alternative

ACTIVITY	D.I. (Before)	D.I. (After)	AGE	LIFE EXTEND (Years)	R.S.L. (Years)	COST (Lane-Mile)	COMMENTS
New Construction		100	0		25	$508,000 $ 21,000	Construct Cost User Cost
Reconstruct	49	0	25		25	$ 463,000 $ 19,000	Construct Cost User Cost
Total						$ 971,000 $ 40,000	Construct Cost User Cost

D.I. – is distress index, a measure of pavement condition. Scale values: 100=no distress, 50=when reconstruction is required.

R.S.L. – is remaining service life, the time remaining that a pavement can be preserved.

Life Cycle Cost Analysis

Traditional Alternative

Analysis Period - 25 yr.

Construction = $ 508,000 per lane mile

Preservation = $ 0 per lane mile

(Remaining Service Life = 0 years)

Salvage = $ 0 per lane mile

Total Cost = $ 508,000 per lane mile

Life Cycle Cost Analysis

Preservation Alternative

ACTIVITY	D.I. (Before)	D.I. (After)	AGE	LIFE EXTEND (Years)	R.S.L. (Years)	COST (Lane-Mile)	COMMENTS
New Construction		100	0		25	$ 508,000 $ 12,600	Construct Cost User Cost
Crack Sealing	89	94	5	2	22	$ 5,162 $ 350	Construct Cost User Cost
Thin Overlay	79	0	10	8	25	$ 40,808 $ 350	Construct Cost User Cost
Crack Sealing	84	92	14	1	22	$ 5,162 $ 350	Construct Cost User Cost
Slurry Seal	67	0	20	5	21	$ 16,935 $ 700	Construct Cost User Cost
Chip Seal	86	93	25	2	18	$ 12,582 $ 350	Construct Cost User Cost
Total						$ 588,649 $ 23,100	Construct Cost User Cost

Life Cycle Cost Analysis

Preservation Alternative

Analysis Period - 25 yr.

Construction = $ 508,000 per lane mile

Preservation = $ 80,649 per lane mile

(Remaining Service Life = 18 years)

Salvage =($ 333,360) per lane mile

Total Cost = $ 255,289 per lane mile