An Evaluation of the Cost Effectiveness of Michigan DOT's Preventive Maintenance Program

Midwest Pavement Preservation Partnership

Bismarck, North Dakota

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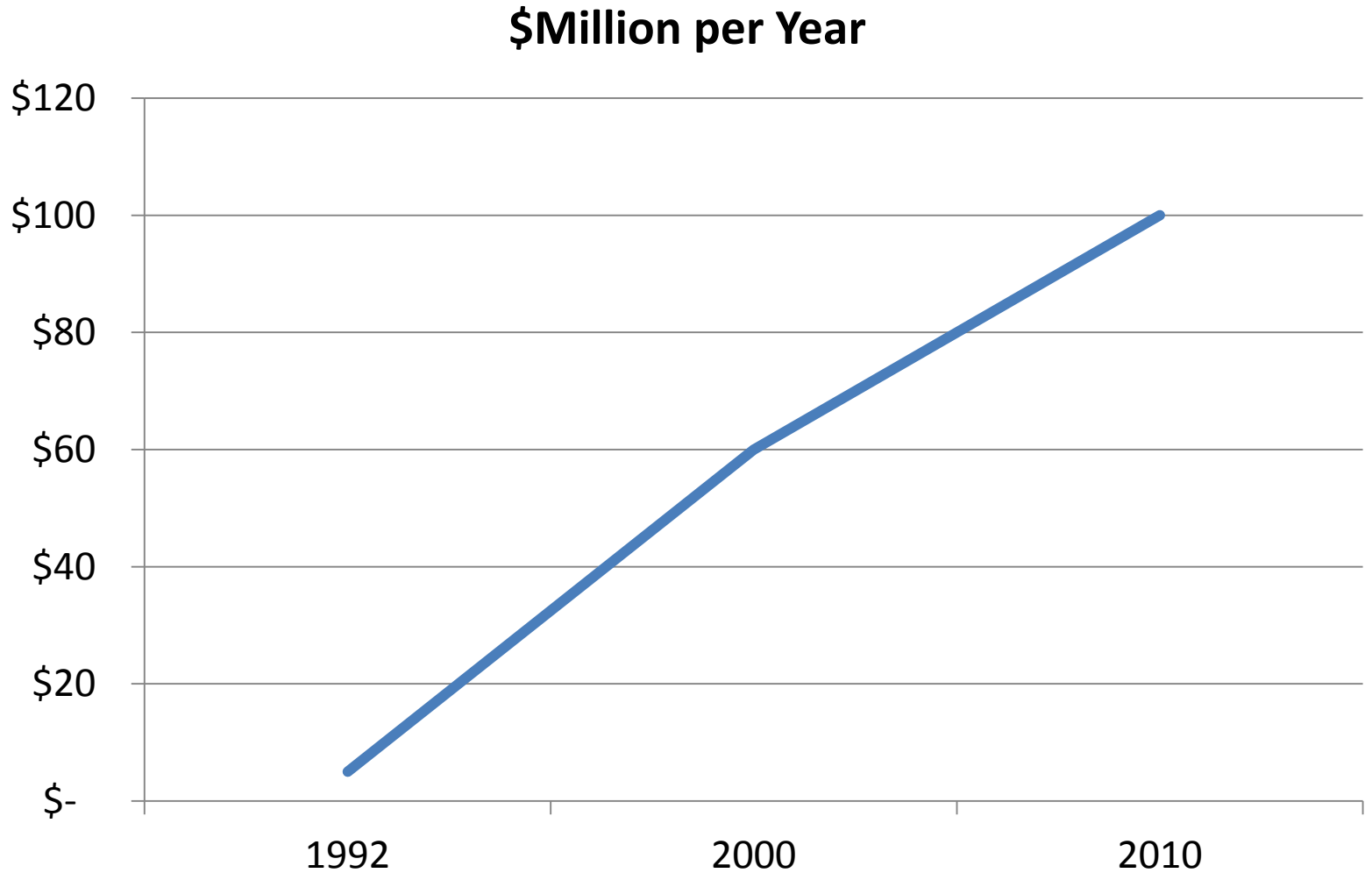
applied pavement TECHNOLOGY

providing engineering solutions to improve pavement performance

Presentation Outline

- MDOT background in preventive maintenance
- What cost effectiveness is and is not
- Project objectives and significance
- Project approach
- Current status

MDOT and Pavement Preservation



Project Objectives

- Determine costs and benefits of each pavement preventive preservation option used by MDOT
- Determine cost and benefits of the MDOT pavement preservation program
- Identify variability in costs and benefits of each pavement preservation option relative to types of pavement distress and timing of treatment applications
- Establish a relational matrix for the selection of time, location, and pavement preservation option for a given pavement project and pavement surface distresses

Project Significance

- Cost effectiveness is important
- Better guidance will contribute to better practice
- Program benefits will be realized
- Limited funds will be spent more rationally
- MDOT will be better able to respond to program challenges

What Cost Effectiveness Is

- Change in performance over time compared to the costs of obtaining that change
  - Benefits defined as “area under the curve”
  - Can be graphed to compare alternatives
- When benefits exceed costs
  - e.g., B/C > 1
  - Does it matter what the units of “benefits” are?

What Cost Effectiveness Is Not

- Typical preventive maintenance costs less than other rehabilitation or reconstruction
- “We saved **X** % with our preventive maintenance program”
- Preventive maintenance extends the life of our pavements
- Treatment **Y** lasts longer than Treatment **Z***

Calculation of Benefit

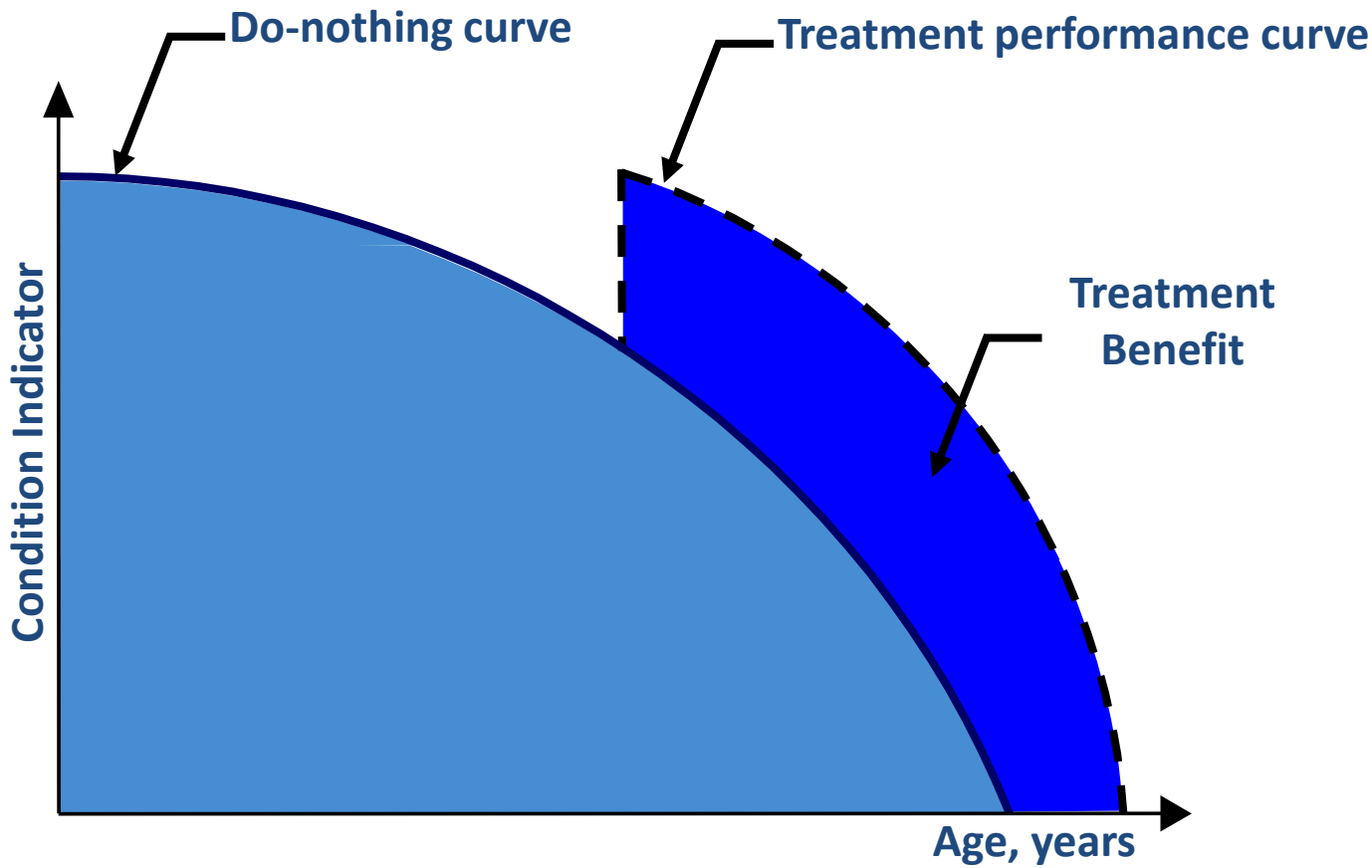
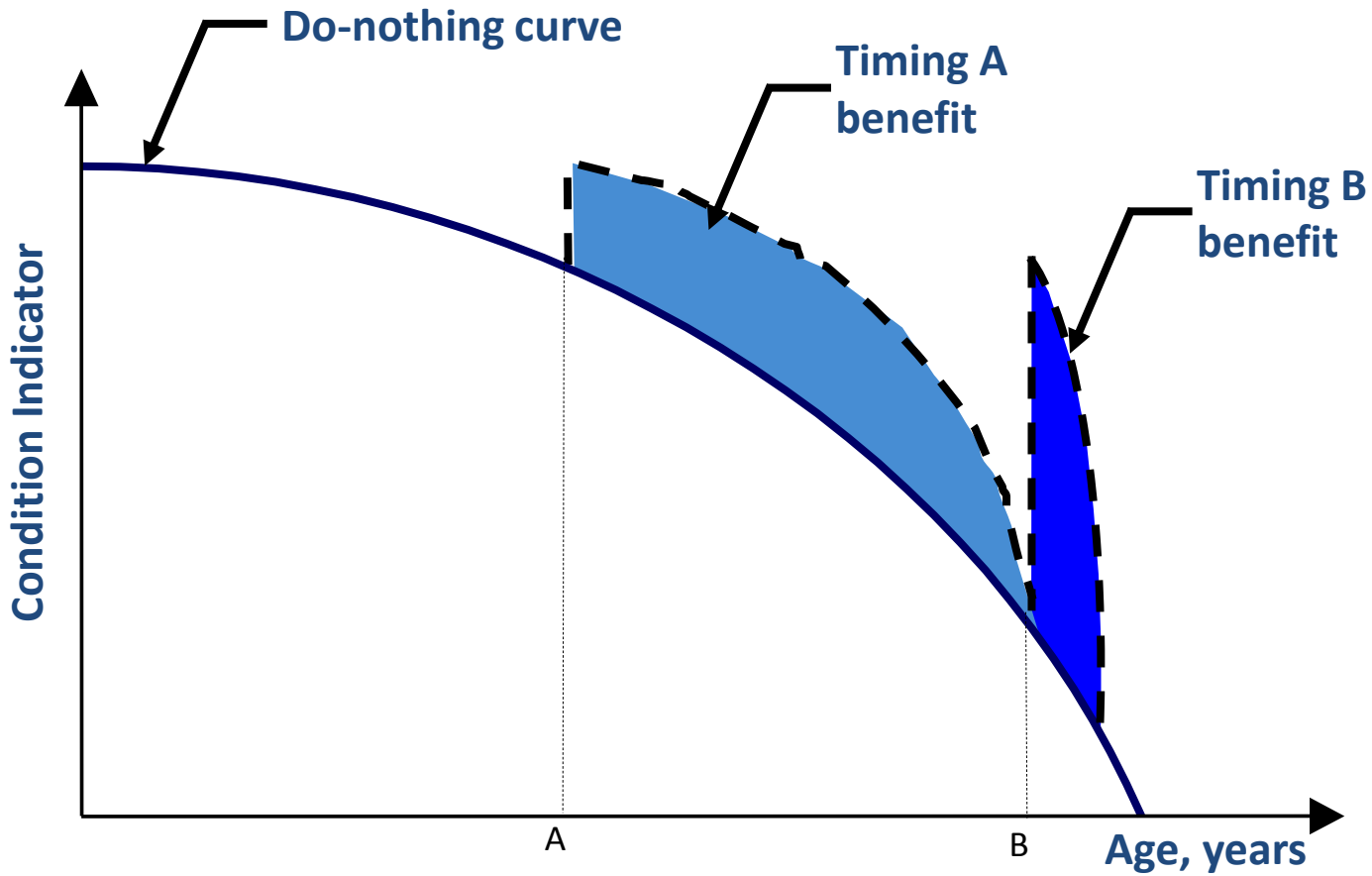


Illustration of Different Benefits



Calculation of Costs

Focus should be on life-cycle costs

- Initial construction plus subsequent maintenance and rehabilitation
- These represent true impact of treatments (and strategies)
- Need treatment lives/time of subsequent treatments or triggers when next treatment would be applied

Research and Identified Needs

- NCHRP 77, Evaluation of Pavement Maintenance Strategies (1981)
- NCHRP 153, Evolution and Benefits of Preventive Maintenance Strategies (1989)
- NCHRP 223, Cost-Effective Preventive Pavement Maintenance (1996)
- NCHRP 20-07 (184) Pavement Preservation: Practices, Research Plans, and Initiatives (2005)
- Transportation System Preservation Research, Development, and Implementation Roadmap (2008)

Project Approach

- Collect data
- Analyze data
- Deliver results/write report

Data Collection

- Identify treatments
- Locate treatment locations
- Document condition and age at application
- Document performance since treatment
- Gather cost data
- Quantify untreated performance

Which Treatments to Include?

Pavement Seal	Functional Enhancement
• HMA Crack Treatment • Concrete Crack Treatment • Concrete Joint Resealing With Minor Spall Repair • Overband Crack Fill—Pretreatment • Chip Seals • Micro-surfacing • Ultra-Thin HMA Overlay—Low and Medium Volume (< 1 inch thick) • Paver Placed Surface Seal • Shoulder Fog Seal	• Non-Structural HMA Overlay (1.5 inches) • Surface Milling with Non-Structural HMA Overlay (1.5 inches) • HMA Shoulder Ribbons • Full Depth Concrete Pavement Repairs • Diamond Grinding • Dowel Bar Retrofit • Concrete Pavement Restoration* • Underdrain Outlet Clean Out and Repair

* Includes Joint Spall Repair, Surface Spall Repair, Joint/Crack Sealing, Full Depth Repairs and Diamond Grinding.

Treatments and Available Projects

CPM Treatment	No. of Projects
HMA Crack Treatment, HMA Crack Seal	950, 250
Concrete Crack Treatment	8
Concrete Joint Resealing w/ Minor Spall Repair	50
Overband Crack Fill Pretreatment	300
Chip Seal (Single, Double)	200, 70
Microsurfacing (Single, Double)	400, 28
Ultra-Thin HMA Overlay	60
Shoulder Fog Seal	-
Paver Placed Surface Seal	30
Non-Structural HMA Overlay	250
Surface Milling w/ Non-Structural HMA Overlay	700
HMA Shoulder Ribbons	2
Full Depth Concrete Pavement Repairs	16
Diamond Grinding	3
Dowel Bar Retrofit	3
Concrete Pavement Restoration	120
Underdrain Outlet Clean Out and Repair	1

Selected Treatments

CPM Treatment	# of Projects
HMA Crack Treatment, HMA Crack Seal	950, 250
Concrete Joint Resealing w/ Minor Spall Repair	50
Overband Crack Fill Pretreatment	300
Chip Seal (Single, Double)	200, 70
Microsurfacing (Single, Double)	400, 28
Ultra-Thin HMA Overlay	60
Paver Placed Surface Seal	30
Non-Structural HMA Overlay	250
Surface Milling w/ Non-Structural HMA Overlay	700
Full Depth Concrete Pavement Repairs	16
Concrete Pavement Restoration	120

Project Status

- Michigan Technological University just completed database assembly
- Database structure and content needs to be reviewed
- Analysis can begin soon
- Expected completion September 2012

Suggestions and Observations

- Engineer your preservation program
- Track where you are truly doing pavement preservation
- Measure what you need to know to evaluate benefits
- If you don’t have the right information, learn what you need and go collect it
- If the needed information is housed in different locations, assemble it in one place
- Addressing some of these is the function of pavement management

Questions/Discussion

Thanks!

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