Pavement Preservation Concepts

Alaska Asphalt Summit
Dec 11, 2003

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Field Engineer
From Rough Beginnings...

Courtesy UW Library
With a lot of Hard Work ...
and Investment...

Source: Asphalt Institute
...We now have a Highway System that is a:

Well Performing
Dependable
Critical
Valuable
Infrastructure Asset
“With the construction of the Nation's Interstate highway system virtually complete, State and Federal highway agencies are shifting their attention to preserving and operating this $1 trillion investment in highways and bridges.”

--FHWA FOCUS Newsletter
May 2000
Outline

• Background
• Pavement Preservation in a Nutshell
  – “Right Treatment on the Right Pavement at the Right Time”
• Benefits and Challenges in Implementing a Pavement Preservation Program
• New Directions
Preventive Maintenance

• Planned Strategy
• Using Cost-Effective Treatments
• Contributes to long-term performance
  – Preserve System
  – Retard Deterioration
  – Maintain or Improve Functional Condition
• Example: Chip Seal

Source: AASHTO Standing Committee on Highways
Corrective Actions

- Reactive
- Localized
- Often serve as a Stop-Gap Solution
- Does not contribute to long-term performance
- Examples: Patching, Pothole Repair

Source: National Highway Institute
Rehabilitation

- Improves or restores functional performance and/or structural capacity of the pavement
- Extends the service life of a pavement
- Examples: HMA Overlay

Source: NHI
Pavement Preservation is the sum of all activities undertaken to provide and maintain serviceable roadways; this includes corrective maintenance and preventive maintenance, as well as minor rehabilitation projects

--National Highway Institute
Typical Pavement Performance Curve

- Good Pavement Condition (Functional or Structural)
- Poor

Time (Years)

Source: NHI
**Timing**

![Graph](source:image)

- **Good** Pavement Condition
- **Poor** Pavement Condition

- **Critical Condition**
- **Preventive Maint.**
- **Corrective Actions, Rehabilitation**

Source: US Army Corps of Engrs
Cost Effects of Timing

Source: NHI
Anticipated PM Benefits

Source: NHI
Anticipated PM Benefits

Source: NHI
Applying the right treatment

. . . To the right pavement

. . . At the right time

Source: Foundation for Pavement Preservation
Benefits of a Pavement Preservation Program

- Higher customer satisfaction
- Better informed decisions
- Improved strategies and techniques
- Improved pavement condition
- Costs savings
- Increased safety

Source: NHI
Customer Satisfaction

**NQI Survey of Users**

- Moderate level of satisfaction with highway system
- Considerable opportunity to improve customer satisfaction
- Prefer permanent over temporary repairs
  – “Get in, Stay in, Get out, Stay out.”
- Complete construction in a timely fashion

Source: NHI
Customer Satisfaction

Washington State Survey

• Roadway surface maintenance is the highest priority maintenance activity

• Public is willing to pay more:
  – to achieve desired levels of maintenance
  – to reduce future costs

Source: NHI
Customer Satisfaction

Arizona Survey

• #1 priority: safety (85 %)
• #2 priority: preservation (74 %)
• Over 60 % would be willing to pay more taxes to improve maintenance service levels
• 90 % would be willing to spend more now to save money in the long term

Source: NHI
Customer Satisfaction

California Survey

• Ranking of public priorities
  – Maintenance response to accidents/disasters
  – Safety
  – Pavement conditions
  – Traffic flow

Source: NHI
Better Informed Decisions

• Program relies on proper treatment selection and treatment timing
• Need information to make decisions
• Successful programs have been integrated with Pavement Management Systems (PMS)

Source: NHI
P² Encourages Use of PMS Data to Support Decisions

Source: NHI
Improved Strategies and Techniques

• One size cannot fit all
• Agencies benefit when they have multiple rehabilitation options

Source: NHI
Improved Pavement Condition

- Preventive maintenance helps to preserve a pavement and extend its performance
- Overall condition of network improves
  - Fair, Poor, and Failed Pavements are reconstructed and returned to a high pavement condition
  - Excellent and Good Pavements are kept in high condition

Source: NHI
The Intent of $P^2$ is to Increase Overall Pavement Condition

Source: NHI
Cost Savings

• Most persuasive argument for shifting to preventive maintenance strategies

• Forms of cost savings
  – Less expensive treatments
  – Longer pavement life
  – Reduction of user delay costs

Source: NHI
Cost Savings

• Michigan
  – Initial preventive maintenance costs 14 times less than rehabilitation or reconstruction
  – $700 million savings from 1992 to 1996
  – Overall LCCA appears to be 6:1

• California
  – 4:1 to 6:1 overall cost benefit with preventive maintenance treatments
Increased Safety

• Safety is the #1 priority of users
• Explicit benefits
  – Improved surface friction
  – Fewer defects
• Implicit benefits
  – Better pavement condition
  – Fewer and less disruptive repairs
Increased Safety

• Importance of Work Zone Safety
• Work Zone Opportunities
  – Shorten the zone
  – Consider future needs
  – Improve communication
  – Improve markings
  – Encourage innovation
Additional Benefits

- Agencies have a stable budget
- Agencies have stable workforce
- Contractors have stable workforce
- Not affected by upswings and downswings
Past Funding Practice

• In the past, eligibility for Federal funding required that the pavement be improved structurally.

• Highway bills in the 1990s changed the way preventive maintenance is funded.
ISTEA

• First highway bill to allow Federal funds for preventive maintenance activities

• Restrictions
  – Demonstrate that treatments are a cost-effective means of extending pavement life
  – Projects must address safety deficiencies

Has not become a widespread practice
The Federal Government Encourages Pavement Preservation

Source: NHI
Transportation Reauthorization

- Reauthorization expected in 2004
- Current Proposals
  - SAFETEA slightly increases level of funding over TEA-21
    - $255B over 6 years
  - TEA-LU significantly increases funding by 72 percent over the TEA-21 levels
    - $375B over 6 years
- Both Proposals Recognize the Importance of Preserving the Highway Infrastructure

Source: Missouri DOT and US House of Representatives
Challenges to Implementation

- Agencies that have implemented a preventive maintenance program report extremely positive results.
- Why isn’t everyone doing it?
- Barriers, both real and perceived...

Source: NHI
Public Perceptions

- Public averse to steering maintenance dollars toward pavements in good condition
- Agencies more likely to receive complaints about specific defects than overall network
- Need to educate the public about new philosophy

Source: NHI
Management Perceptions

- Need commitment from management to succeed
- Maintenance not traditionally given a high priority
- Need to create awareness of benefits
- Personnel changes disrupt continuity

Source: NHI
Summary

• Anticipated benefits
  – Higher customer satisfaction
  – Better informed decisions
  – Improved strategies and techniques
  – Improved pavement condition
  – Cost savings
  – Increased safety
  – Stability

Source: NHI
• Challenges are widespread
  – Public perception
  – Management perception

Source: NHI
New Directions for Pavement Preservation
Foundation for Pavement Preservation

• Established in 1992
• Industry Partnership
  – President—Bill Ballou
• Mission
  “FP2 supports research to educate government and industry professionals in the economical, safety and performance advantages of pavement preservation. ”
• The Asphalt Institute is a Supporter of the Foundation

Source: FP2 website: www.fp2.org
National Center for Pavement Preservation

• Established in November 2003
• Hosted at Michigan State University
  – Director—Larry Galehouse
• Mission
  “lead collaborative efforts among government, industry and academia in the advancement of pavement preservation”

Source: MSU Today website: www.msutoday.msu.edu
Findings of FHWA Scanning Tour

- France, South Africa, and Australia
  - Recognized leaders in Pavement Preservation

- Key Findings:
  - Successful preservation begins by building initially high structural capacity pavements
  - Only high quality materials used:
    - 100% crushed aggregate
    - Polymer Modified Asphalt Binders

Source: FHWA, 2002