2016 Road Conference: Pavement Management Best Practices, Lowest Cost

Summary of a Technology Transfer Event Organized and Conducted By:
Isaac L. Howard – Mississippi State University
Dan Cordell – Civil-Link, LLC
Darryl Gardner – Ergon Asphalt & Emulsions, Inc.
Tim Harrawood – Vance Brothers, Inc.
Mark Holley – Mississippi Department of Transportation (MDOT)
Mike Morgan – Greenberg Farrow/First Step Pavement Management
Earl Stone – Kimes & Stone Construction Co., Inc.
Mike Tagert – MDOT Northern District Transportation Commissioner
Larry Tomkins – Ergon Asphalt & Emulsions, Inc.
Amy Walker – Ergon Asphalt & Emulsions, Inc.
Stacy Williams – University of Arkansas
Stan Williams – Ergon Asphalt & Emulsions, Inc.

Document Number
CMRC WS 16-1
March 2016
# TABLE OF CONTENTS

Acknowledgements.................................................................................................................. 2
Road Conference Summary........................................................................................................ 2
Attendance .................................................................................................................................... 3
Individual Presentations.............................................................................................................. 4
Panel Discussion .......................................................................................................................... 4
Presentation Slides Used During Individual Presentations.......................................................... 8
Acknowledgements

Greenberg Farrow and Ergon Asphalt & Emulsions, Inc. provided financial support to this event. Merri Kilpatrick of Mississippi State University assisted with several planning and logistical activities ahead of the event.

Road Conference Summary

The Road Conference was held on March 23, 2016 at The Mill Conference Center in Starkville, MS. The event was hosted by the Mississippi State University (MSU) Construction Materials Research Center (CMRC). A conference announcement was circulated widely within Mississippi and somewhat in surrounding states. For example, the ASCE Mississippi Section sent the conference announcement to all their members. The first announcement of this conference was mid-December of 2015.

Figure 1 provides some general photos taken at the Road Conference. For example, door prizes were given out throughout the day (Figure 1e). Attendees were able to earn 4 PDH’s for attending all activities, which are summarized in Table 1. Interior televisions mounted throughout the conference center scrolled photos and pavements information throughout the day. At the time this document was completed, a video of this event was available at the following link. https://www.youtube.com/watch?v=PvsWv8cbQAg&feature=youtu.be. The remainder of this document provides information on attendance, individual presentations (9:30 AM to 1:30 PM), the panel discussion, and concludes with the slides used by presenters when giving individual presentations.

Table 1. Road Conference Schedule of Activities

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker or Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 to 9:50 AM</td>
<td>Opening Remarks</td>
<td>Isaac L. Howard, Commissioner Mike Tagert</td>
</tr>
<tr>
<td>9:50 to 10:50 AM</td>
<td>Pavement Preservation, Concepts / Conditions</td>
<td>Stacy Williams, Michael G. Morgan</td>
</tr>
<tr>
<td>10:50 to 11:00 AM</td>
<td>Break</td>
<td>---</td>
</tr>
<tr>
<td>11:00 to 12:00</td>
<td>Best Practice, Lowest Cost / Case Study</td>
<td>Dan Cordell, Darryl Gardner</td>
</tr>
<tr>
<td>12:00 to 1:00</td>
<td>Lunch</td>
<td>---</td>
</tr>
<tr>
<td>1:00 to 1:30</td>
<td>Pavement Preservation in Mississippi</td>
<td>Larry Tomkins</td>
</tr>
<tr>
<td>1:30 to 3:00</td>
<td>Panel Discussion</td>
<td>Isaac L. Howard (moderator), Mark Holley, Tim Harrawood, Earl Stone, Stacy Williams, Michael G. Morgan, Dan Cordell</td>
</tr>
</tbody>
</table>
Attendance

A total of 180 attendees could be accounted for via sign-up sheets, photographs taken, and similar, which are described in Table 2. It is believed that slightly over 180 were actually in attendance, though there are no records to verify more than 180 attendees. The website www.eventbrite.com was used for registration, and a total of 228 tickets were either sold ($25 registration fee), or were complimentary to, for example, program participants. Note that during opening remarks that a registered attendance of 227 was reported, but there was one additional registrant just before the event. A sign-up sheet was at the registration desk and was sent around during the program, which is how all but a few of the 180 documented attendees were identified, but it is believed that everyone did not have an opportunity to sign this sheet.

Most attendees did not have an opportunity to sign the sheet during registration due to the large volume of attendees at the desk. Registration was not handled in a way that tickets could always be identified to an individual. In several cases, one person registered multiple people, and they did not always indicate who they were registering. The Eventbrite system generated a ticket, which was how attendees were allowed into the event. In summary, the event was well attended, and a minimum of 180 attendees were present including representatives from 11 counties, 16 consulting firms, 5 material suppliers, 10 cities, 7 contractors, 2 roadway services groups, 2 universities, the Mississippi Department of Transportation (MDOT), and the US Army Corps of Engineers (USACE) – United States Air Force (USAF).

Table 2. Estimated Attendance Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Different Groups Within Category (Where Applicable)</th>
<th>Total Attendance of Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>County Representatives</td>
<td>11</td>
<td>40</td>
</tr>
<tr>
<td>Engineering or Architectural Consultants</td>
<td>16</td>
<td>37</td>
</tr>
<tr>
<td>MDOT</td>
<td>---</td>
<td>25</td>
</tr>
<tr>
<td>USACE or USAF</td>
<td>---</td>
<td>17</td>
</tr>
<tr>
<td>Material Supplier</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>City Representatives</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Contractor</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>State Aid or Park Services</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>---</td>
<td>7</td>
</tr>
<tr>
<td>Academia</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>All Identified Attendees</strong></td>
<td><strong>---</strong></td>
<td><strong>180</strong></td>
</tr>
</tbody>
</table>

--Note that these categories are best estimates, but in some cases judgments were made (e.g. a group that is a material supplier and a contractor was put into one category or the other). Note that in some cases the individuals in attendance may not have been there representing the group where they were placed in this table.
Individual Presentations

Figure 2 provides photographs of the seven individuals that gave presentations during the 9:30 AM to 1:30 PM time frame. These presentations are provided beginning on page 8 of this report. Each of these presentations was intended to complement each other, while collectively providing an overall picture of what is needed to manage a pavement network (large or small network). The content presented during individual presentation was recorded and used to produce the video mentioned previously.

Panel Discussion

A panel discussion was held from 1:30 to 3:00 PM that was not recorded to encourage more open dialogue between the panel and attendees. There were 6 panel members (Mike Morgan, Stacy Williams, Dan Cordell, Mark Holley, Tim Harrawood, Earl Stone), a moderator (Isaac L. Howard), and two facilitators (Larry Tomkins and Stan Williams). Figure 3 provides photographs of the panel discussion. Questions and comments were taken from the audience, which filled the majority of the time. During periods where there was not a question or comment initiated by the audience, the moderator had a set of questions that were asked during those periods. An email requesting questions from attendees ahead of the event was sent out, and questions were provided by conference participants. Overall, the panel discussion addressed several topics ranging from policy, financing, material selection, suitable techniques for given distresses, decision making, and setting priorities.
a) Welcome Sign Beside Registration Desk  

b) Overall View of Audience

c) Local View of Audience (1 of 2)  
d) Local View of Audience (2 of 2)

e) Stan Williams (left) and Mike Morgan Awarding a Door Prize  
f) Outdoor View of The Mill Conference Center

Figure 1. Venue, Overall Views of Audience, and Door Prizes
a) Opening Remarks From Mike Tagert (Standing) and Isaac L. Howard

b) Pavement Preservation Concepts Presented by Stacy Williams

c) Pavement Preservation Conditions and First Step Principles Presented by Mike Morgan

d) Case Study Presented by Dan Cordell

e) Best Practice, Lowest Cost Concepts Presented by Darryl Gardner

f) Pavement Preservation in Mississippi Presented by Larry Tomkins

Figure 2. Opening Remarks and Presentations on Individual Topics
a) Overall View of Panel and Moderator

b) Panel Member Mark Holley

c) Panel Members (From Left to Right) Earl Stone, Mike Morgan, and Dan Cordell

d) Panel Members (From Left to Right) Stacy Williams and Tim Harrawood

e) Moderator Isaac L. Howard (Standing) Interacting With Audience

f) Attendee Joe Lauderdale Discussing Pavements with Panel and Audience

**Figure 3. Panel Discussion**
2016 Road Conference: Pavement Management Best Practices, Lowest Cost

March 23, 2016
Starkville, MS

Host:
Isaac L. Howard, PhD, PE
Materials and Construction Industries Chair
Civil and Environmental Engineering Dept.
Mississippi State University
662-325-7193, ilhoward@cee.msstate.edu
Welcome to Starkville!
(Home of Mississippi State University)

• Who is here?
  – Registered Attendance: 227
  – City/County Engineers/Representatives
  – DOT/USACE
  – Contractors
  – Material Suppliers
  – Research/University
  – Consultants
  – Other

• Welcoming Remarks by MDOT Northern District Transportation Commissioner Mike Tagert
Today’s Goals

1. **Introduce** overall picture of managing a pavement network

2. **Present** a philosophy founded on:
   1. Understanding your current pavement condition
   2. Understanding your current and projected finances
   3. Understanding maintenance/preservation treatment options
   4. Making use of this understanding toward informed decisions

3. **Explain** pavement preservation treatments (e.g. chip seals, crack sealing, micro/slurry, scrub seals, thin-overlays, others....)

4. **Facilitate** conversations between attendees (to be successful, this needs to be a two way event)
Key Points For Today’s Conference

• **Myths:**
  – A Pavement Management Plan will fix all my roads
  – Any Pavement Management Plan will suit my needs

• **Facts:**
  – Pavement Management is a set of tools to help set priorities and optimize spending of available maintenance or rehabilitation funds
  – Pavement Management tools improve over time, but you must start somewhere to gain any benefits
Key Points for Today’s Conference

• **Today’s Program Goals:**
  – Provide information to help develop cost-effective tools that assist the client with decision making
  – Focus information toward:
    1. what do we have?
    2. what do we know?
    3. how do we start?

• **Not Today’s Program Goals:**
  – To focus too much on any one part of this process, or on any one treatment
  – To leave you with the belief that there is one right answer to all pavement preservation questions
<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker or Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 to 9:50 AM</td>
<td>Opening Remarks</td>
<td>Isaac L. Howard and Commissioner Mike Tagert</td>
</tr>
<tr>
<td>9:50 to 10:50 AM</td>
<td>Pavement Preservation, Concepts / Conditions</td>
<td>Dr. Stacy Williams and Michael G. Morgan</td>
</tr>
<tr>
<td>10:50 to 11:00 AM</td>
<td>Break</td>
<td>---</td>
</tr>
<tr>
<td>11:00 to 12:00</td>
<td>Best Practice, Lowest Cost / Case Study</td>
<td>Dan Cordell and Darryl Gardner</td>
</tr>
<tr>
<td>12:00 to 1:00</td>
<td>Lunch</td>
<td>---</td>
</tr>
<tr>
<td>1:00 to 1:30</td>
<td>Pavement Preservation in Mississippi</td>
<td>Larry Tomkins</td>
</tr>
<tr>
<td>1:30 to 3:00</td>
<td>Panel Discussion</td>
<td>Isaac L. Howard (moderator), Mark Holley, Tim Harrawood, Earl Stone, Dr. Stacy Williams, Michael G. Morgan, Dan Cordell, Larry Tomkins</td>
</tr>
</tbody>
</table>
Logistics and Reminders

1. Please remember to silence phones
2. Restrooms located just outside meeting room
3. The Mill Open (no password) for internet access
4. PDH certificates are available at the front desk along with sign up sheets (we want to have a record of attendance with contact information)
5. Presentations from 9:50 AM to 1:30 PM are being videoed [panel discussion not videoed]
6. Photos are being taken throughout the event
7. Check CMRC website a few weeks after event for downloadable content posted from today ([http://www.cee.msstate.edu/cmrc/](http://www.cee.msstate.edu/cmrc/))
Thanks to Our Sponsors! (Let’s Have A Good Discussion)

Begin Presentation by Dr. Stacy Williams and Michael G. Morgan
PAVEMENT MANAGEMENT CONCEPTS

STACY G. WILLIAMS, PH.D., P.E.
UNIVERSITY OF ARKANSAS
LEVELS OF DECISION MAKING

• Crystal Ball
  • Strategic Level Planning
  • Decisions may be based on speculation or politics

• Bird’s Eye View
  • The BIG picture with real data

• Project Level
  • Family Groups
  • Individual Projects

We need tools to help set priorities and optimize maintenance $$$
What do we have?

What do we know?

How do we Start?
REINVENT THE WHEEL?

- Common Platforms
  - Existing maps (state, regional, county)
  - Emergency Services
  - Political Zones
- Use Existing Resources
  - Coordination
  - Establish responsibilities (updates, etc.)
- Document Existing Knowledge
## DOCUMENT EXISTING KNOWLEDGE

### ROADWAY DATABASE / ROAD BOOK

<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>SURFACE TYPE</th>
<th>MILES</th>
<th>WIDTH</th>
<th>STATE AID</th>
<th>ZONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMBER LAKE EST</td>
<td>ASPHALT</td>
<td>0.5</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>HICKORY RIDGE RD</td>
<td>SEALED</td>
<td>0.5</td>
<td>21'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>RIVER RD N (S SIDE)</td>
<td>ASPHALT</td>
<td>0.8</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>WESTLAKE DR</td>
<td>ASPHALT</td>
<td>0.3</td>
<td>21'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>ARBUCKLE ISLAND RD</td>
<td>GRAVEL / SEALED</td>
<td>1.2</td>
<td>22'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>CASON BOTTOMS RD</td>
<td>ASPHALT / GRAVEL / SEALED</td>
<td>1.0</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>COURTHOUSE SLOUGH RD</td>
<td>GRAVEL</td>
<td>0.9</td>
<td>23'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>HICKMAN BLUFF RD (S SIDE)</td>
<td>ASPHALT</td>
<td>0.5</td>
<td>23'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>KHILLING RD</td>
<td>GRAVEL / SEALED</td>
<td>1.0</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>LAKEHILL DR</td>
<td>ASPHALT</td>
<td>0.2</td>
<td>21'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>NIXON RD</td>
<td>ASPHALT</td>
<td>0.7</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>PARK RD</td>
<td>ASPHALT</td>
<td>1.3</td>
<td>23'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>RIVER RD S</td>
<td>ASPHALT</td>
<td>1.2</td>
<td>23'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>WESTHILLS DR</td>
<td>ASPHALT</td>
<td>0.3</td>
<td>21'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>18TH ST N</td>
<td>SEALED</td>
<td>1.1</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>BIG CREEK BEND</td>
<td>SEALED</td>
<td>0.3</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>BLOOMER RD</td>
<td>SEALED</td>
<td>1.5</td>
<td>21'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>BOYS RANCH RD</td>
<td>SEALED</td>
<td>1.0</td>
<td>24'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>BUGSCUFFLE RD</td>
<td>ASPHALT</td>
<td>1.9</td>
<td>22'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>BURKETT LN</td>
<td>SEALED</td>
<td>0.5</td>
<td>23'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>CEDARLAKES CIR</td>
<td>ASPHALT</td>
<td>0.2</td>
<td>24'</td>
<td>State Aid</td>
<td>1</td>
</tr>
<tr>
<td>CHAPMAN CT</td>
<td>SEALED</td>
<td>0.7</td>
<td>20'</td>
<td>State Aid</td>
<td>1</td>
</tr>
</tbody>
</table>
INVENTORY

• Roads, streets, segments?
• Route designation – ownership?
  - New subdivisions
  - Private drives
• Segment Length
• Pavement Width, # Lanes
• Pavement Type / Surface
• Shoulder Type / Width
• Political Zone

• Construction History
  - Date of Construction
  - Layer type / thickness
  - Material properties
  - Subgrade type
  - Cost data

• Traffic
  - Traffic counts / level
  - % Trucks

CONDITION?
How do we Start?

NETWORK LEVEL CONDITION ASSESSMENT
DISTRESS DATA

TYPE OF DISTRESS
- SURFACE CRACKING
- STRUCTURAL DISTRESS
- POTHOLEs / EDGE FAILURES
- RIDE QUALITY

SEVERITY OF DISTRESS

AMOUNT OF DISTRESS

HEALTH, SAFETY & WELFARE ITEMS

ADDITIONAL INVENTORY ITEMS
- BRIDGES
- STRIPING
- ROAD SIGNS
- DRAINAGE
HOW DO I GET THIS DATA?

Pavement Condition Index (PCI)
FIRST STEP
PAVEMENT MANAGEMENT
PAVEMENT DETERIORATION

Major Factors: Traffic and Weather Conditions
PAVEMENT DETERIORATION

KEEP GOOD ROADS IN GOOD CONDITION

- New Construction
- Good
- Fair
- Critical
- Lost

AGE OF PAVEMENT (Years)

- $2.00 for Preventive Maintenance Here
- 40% Drop in Quality
- 75% of life
- $4.00 for Reactive Maintenance Here
- 40% Drop in Quality
- 10% of life
- $10.00 for Reconstruction Here

($) PREVENTIVE
($) CORRECTIVE
($$) CORRECTIVE + LOCALIZED M&R
($$$$$) RECONSTRUCTION
REMAINING LIFE

• Each year, every mile in the network loses 1 year of remaining service life
  • OR – Every year, we ‘spend’ 1 year of pavement life
• To ‘break even’, we must generate 1 year of pavement life for every mile
  • Every year.
• Dollars ≠ Years
  • Every maintenance treatment has a cost and a benefit
  • Cost is a function of the treatment
  • Benefit is largely a function of timing

Maintain: to keep in an existing state; preserve from failure
HOW TO CHOOSE?

• Time
• Condition
• Complaints

WORST FIRST
PAVEMENT DETERIORATION

Do the **RIGHT TREATMENT** at the **RIGHT TIME**

**KEEP GOOD ROADS IN GOOD CONDITION**

- **New Construction**
- **Good**
- **Fair**
- **Critical**
- **Lost**

**AGE OF PAVEMENT (Years)**

- **$2.00 for Preventive Maintenance Here**
- **$4.00 for Reactive Maintenance Here**
- **$10.00 for Reconstruction Here**

**PAVEMENT CONDITION**

- **($) PREVENTIVE**
- **($) CORRECTIVE**
- **($$$) CORRECTIVE + LOCALIZED M&R**
- **($$$$$) RECONSTRUCTION**
<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>SURFACE TYPE</th>
<th>CONDITION</th>
<th>MILES</th>
<th>WIDTH</th>
<th>STATE AID</th>
<th>ZONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMBER LAKE EST</td>
<td>ASPHALT</td>
<td>CRITICAL</td>
<td>0.5</td>
<td>20'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>HICKORY RIDGE RD</td>
<td>SEALIED</td>
<td>FAIR</td>
<td>0.5</td>
<td>21'</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>RIVER RD N (S SIDE)</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>0.8</td>
<td>20'</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>WESTLAKE DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.3</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>ARBUCKLE ISLAND RD</td>
<td>GRAVEL / SEALIED</td>
<td>POOR</td>
<td>1.2</td>
<td>22'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CASON BOTTOMS RD</td>
<td>ASPHALT / SEALIED</td>
<td>FAIR</td>
<td>1.0</td>
<td>20'</td>
<td>STATE AID - PART</td>
<td>4</td>
</tr>
<tr>
<td>COURTHOUSE SLOUGH RD</td>
<td>GRAVEL</td>
<td>CRITICAL</td>
<td>0.9</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>HICKMAN BLUFF RD (S SIDE)</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.5</td>
<td>23'</td>
<td>STATE AID</td>
<td>2</td>
</tr>
<tr>
<td>KILLING RD</td>
<td>GRAVEL / SEALIED</td>
<td>POOR</td>
<td>1.0</td>
<td>20'</td>
<td>STATE AID</td>
<td>2</td>
</tr>
<tr>
<td>LAKEHILL DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.2</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>NIXON RD</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>0.7</td>
<td>20'</td>
<td>STATE AID</td>
<td>3</td>
</tr>
<tr>
<td>PARK RD</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>1.3</td>
<td>20'</td>
<td>STATE AID - PART</td>
<td>2</td>
</tr>
<tr>
<td>RIVER RD S</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>1.2</td>
<td>23'</td>
<td>STATE AID</td>
<td>1</td>
</tr>
<tr>
<td>WESTHILLS DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.3</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>18TH ST N</td>
<td>SEALIED</td>
<td>POOR</td>
<td>1.1</td>
<td>20'</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>BIG CREEK BEND</td>
<td>SEALIED</td>
<td>CRITICAL</td>
<td>0.3</td>
<td>20'</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>BLOOMER RD</td>
<td>SEALIED</td>
<td>GOOD</td>
<td>1.5</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>BOYS RANCH RD</td>
<td>SEALIED</td>
<td>GOOD</td>
<td>1.0</td>
<td>24'</td>
<td>STATE AID</td>
<td>5</td>
</tr>
<tr>
<td>BUGSCUFFLE RD</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>1.9</td>
<td>22'</td>
<td>STATE AID</td>
<td>5</td>
</tr>
<tr>
<td>BURKETT LN</td>
<td>SEALIED</td>
<td>FAIR</td>
<td>0.5</td>
<td>23'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CEDARLAKES CIR</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>0.2</td>
<td>24'</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>CHAPMAN CT</td>
<td>SEALIED</td>
<td>POOR</td>
<td>0.7</td>
<td>20'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>ROAD NAME</td>
<td>SURFACE TYPE</td>
<td>CONDITION</td>
<td>MILES</td>
<td>WIDTH</td>
<td>STATE AID</td>
<td>ZONE</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------</td>
<td>-----------</td>
<td>-------</td>
<td>-------</td>
<td>-----------------</td>
<td>------</td>
</tr>
<tr>
<td>WESTLAKE DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.3</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>HICKMAN BLUFF RD (S SIDE)</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.5</td>
<td>23'</td>
<td>STATE AID</td>
<td>2</td>
</tr>
<tr>
<td>LAKEHILL DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.2</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>RIVER RD S</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>1.2</td>
<td>23'</td>
<td>STATE AID</td>
<td>1</td>
</tr>
<tr>
<td>WESTHILLS DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
<td>0.3</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>BLOOMER RD</td>
<td>SEALED</td>
<td>GOOD</td>
<td>1.5</td>
<td>21'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>BOYS RANCH RD</td>
<td>SEALED</td>
<td>GOOD</td>
<td>1.0</td>
<td>24'</td>
<td>STATE AID</td>
<td>5</td>
</tr>
<tr>
<td>HICKORY RIDGE RD</td>
<td>SEALED</td>
<td>FAIR</td>
<td>0.5</td>
<td>21'</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>RIVER RD N (S SIDE)</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>0.8</td>
<td>20'</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>CASON BOTTOMS RD</td>
<td>ASPHALT / GRAVEL / SEALED</td>
<td>FAIR</td>
<td>1.0</td>
<td>20'</td>
<td>STATE AID - PART</td>
<td>4</td>
</tr>
<tr>
<td>NIXON RD</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>0.7</td>
<td>20'</td>
<td>STATE AID</td>
<td>3</td>
</tr>
<tr>
<td>PARK RD</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>1.3</td>
<td>20'</td>
<td>STATE AID - PART</td>
<td>2</td>
</tr>
<tr>
<td>BUGSCUFFLE RD</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>1.9</td>
<td>22'</td>
<td>STATE AID</td>
<td>5</td>
</tr>
<tr>
<td>BURKETT LN</td>
<td>SEALED</td>
<td>FAIR</td>
<td>0.5</td>
<td>23'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CEDARLAKES CIR</td>
<td>ASPHALT</td>
<td>FAIR</td>
<td>0.2</td>
<td>24'</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>TIMBER LAKE EST</td>
<td>ASPHALT</td>
<td>CRITICAL</td>
<td>0.5</td>
<td>20'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>COURTHOUSE SLOUGH RD</td>
<td>GRAVEL</td>
<td>CRITICAL</td>
<td>0.5</td>
<td>20'</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>BIG CREEK BEND</td>
<td>SEALED</td>
<td>CRITICAL</td>
<td>0.3</td>
<td>20'</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>ARBUCKLE ISLAND RD</td>
<td>GRAVEL / SEALED</td>
<td>POOR</td>
<td>1.2</td>
<td>22'</td>
<td>STATE AID</td>
<td>1</td>
</tr>
<tr>
<td>KHILLING RD</td>
<td>GRAVEL / SEALED</td>
<td>POOR</td>
<td>1.0</td>
<td>20'</td>
<td>STATE AID</td>
<td>2</td>
</tr>
<tr>
<td>18TH ST N</td>
<td>SEALED</td>
<td>POOR</td>
<td>1.1</td>
<td>20'</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>CHAPMAN CT</td>
<td>SEALED</td>
<td>POOR</td>
<td>0.7</td>
<td>20'</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
- **PAVEMENTS IN CRITICAL CONDITION**

  PREVENT FROM BECOMING LOST.
  GENERALLY THE HIGHEST IMPORTANCE.

<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>SURFACE TYPE</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMBER LAKE EST</td>
<td>ASPHALT</td>
<td>CRITICAL</td>
</tr>
<tr>
<td>COURTHOUSE SLOUGH RD</td>
<td>GRAVEL</td>
<td>CRITICAL</td>
</tr>
<tr>
<td>BIG CREEK BEND</td>
<td>SEALED</td>
<td>CRITICAL</td>
</tr>
</tbody>
</table>

HIGHEST RISK

- **PAVEMENTS IN GOOD TO FAIR CONDITION**

  PREVENTIVE MAINT FOR PAVEMENTS IN GOOD CONDITION.
  CORRECTIVE MAINT FOR PAVEMENTS IN FAIR CONDITION.

<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>SURFACE TYPE</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WESTLAKE DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
</tr>
<tr>
<td>HICKMAN BLUFF RD (S SIDE)</td>
<td>ASPHALT</td>
<td>GOOD</td>
</tr>
<tr>
<td>LAKEHILL DR</td>
<td>ASPHALT</td>
<td>GOOD</td>
</tr>
<tr>
<td>HICKORY RIDGE RD</td>
<td>SEALED</td>
<td>FAIR</td>
</tr>
<tr>
<td>RIVER RD N (S SIDE)</td>
<td>ASPHALT</td>
<td>FAIR</td>
</tr>
<tr>
<td>CASON BOTTOMS RD</td>
<td>ASPHALT / GRAVEL / SEALED</td>
<td>FAIR</td>
</tr>
</tbody>
</table>

LOWEST COST

- **LOST PAVEMENTS**

  REQUIRE FULL RECONSTRUCTION.
  A LOST PAVEMENT WILL BE LOST NEXT YEAR (A LOW PRICE FOR DELAYING ACTION).
  KEEP SAFE, BUT LOST PAVEMENTS ARE EXPENSIVE TO RECONSTRUCT (BUDGET KILLERS).

<table>
<thead>
<tr>
<th>ROAD NAME</th>
<th>SURFACE TYPE</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARBUCKLE ISLAND RD</td>
<td>GRAVEL / SEALED</td>
<td>POOR</td>
</tr>
<tr>
<td>KHILLING RD</td>
<td>GRAVEL / SEALED</td>
<td>POOR</td>
</tr>
<tr>
<td>18TH ST N</td>
<td>SEALED</td>
<td>POOR</td>
</tr>
</tbody>
</table>

HIGHEST COST
**REMAINING LIFE ‘ACCOUNT’**

Lane miles × Added Life (yrs) = Lane mile years

(Assume 10 LM network)

<table>
<thead>
<tr>
<th>Status</th>
<th>Treatment Description</th>
<th>Additional Life (yrs)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOOD</td>
<td>Preventive Trmt @ $3,000/mi., adds 3 yrs</td>
<td>3</td>
<td>10 LM × 3 Y = 30 LMY @ $30,000</td>
</tr>
<tr>
<td>FAIR</td>
<td>Corrective Trmt @ $4,000/mi., adds 3 yrs</td>
<td>3</td>
<td>10 LM × 3 Y = 30 LMY @ $40,000</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>Correct/Repair Trmt @ $60,000/mi., adds 8 yrs</td>
<td>8</td>
<td>10 LM × 8 Y = 80 LMY @ $600,000</td>
</tr>
<tr>
<td>POOR</td>
<td>Reconstruct @ $150,000/mi., adds 12 yrs</td>
<td>12</td>
<td>10 LM × 12 Y = 120 LMY @ $1,500,000</td>
</tr>
</tbody>
</table>

$1,000/LMY  $  
$1,333/LMY  $  
$7,500/LMY  $$  
$12,500/LMY $$$

**Must make some ‘deposits’ in this account every year!**
HOW TO FIX IT?

• Best Practices
  • Match the treatment to the distress
  • Must know what caused the distress
  • Drainage, Drainage, Drainage
  • Right treatment – right time
  • Weather conditions, upcoming projects

• Other Decision Points
  • What are the alternatives?
  • Equipment and expertise?
  • In-house work or contract?

Rutting:
  • Mixture
  • Subgrade

Cracking:
  • Fatigue
  • Thermal
  • Base Failure

Drainage:
  • Roadside Features
  • Underground Springs
  • Water Lines
EXAMPLE

• Alligator Cracking

• Options
  • Do nothing
  • Crack sealing
  • Mass crack treatment
  • Divert water
  • Overlay
  • Remove & Replace

• Deterioration curve
  • Preventive won’t add much time

• Upcoming projects

• Traffic Level
TRAINING OPPORTUNITIES

www.cttp.org/t2
• Tools
  • Manual / digital – paper & pencil, Excel spreadsheet, database, etc.
  • Geo-referenced video and mapping
  • Distress identification (manual, automated, semi-automated)
  • Roughness measurements

• Policy Tables – list preferred actions for specific distresses
  • Identify root cause of distresses
  • Match distresses to appropriate treatments
  • Timing – when to get greatest benefit / best practices for treatments
  • Determine benefit of keeping good pavements in good condition

Avoid ‘Worst-First’ approach!
Think about a reasonable timeline (Not a quick process!)
- Identify projects
- Create estimates
- In-house work or contract?
- Create bid documents – new specs needed?
- Legal Review
- Choose Contractor
- Acquire equipment / Order materials
- Permits and approvals
- Establish QA/QC procedures
- Weather Interruptions

Fall Planning for Spring / Summer Construction
- **Public Perception**
  - Have a Plan – Publicize the Plan (but not too much?)

- **Evaluate**
  - Document Successes and Failures
  - Search for root cause of issues
  - Increase knowledge of roadway network

- **Leave a Legacy**
  - It’s OK to start small – the system will grown over time.
  - Done right, the system will last longer than we do!
2016 Road Conference: Pavement Management Best Practices, Lowest Cost

March 23, 2016
Starkville, MS

Michael G. Morgan
First Step Pavement Management
Inventory & Condition Mapping
GreenbergFarrow Architects, Inc.
MMorgan@GreenbergFarrow.com
479.422.7687
FIRST STEP
PAVEMENT MANAGEMENT

Not a Company – YOUR Pavement Management Team

Planning Development Districts

MISSISSIPPI Geospatial Clearinghouse

MARIS Mississippi Automated Resource Information System

and Local GIS Resources

CMRC Construction Materials Research Center

Arkansas Technology Transfer University of Arkansas

Ergon Asphalt & Emulsions, Inc.
a company that works™

Greenberg Farrow

Civil Link
FIRST STEP
PAVEMENT MANAGEMENT

Planning Development Districts

Base Map – Road Inventory

and
Local GIS Resources
Base Map – Road Inventory
Base Map – Road Inventory
2016 Road Conference

ASTM-6433

EXCELLENT
GOOD
FAIR
CRITICAL
LOST

1
#
2
##

Roadway Patrol – Geo-Located Video
Base Map – Road Inventory + Conditions
FIRST STEP
PAVEMENT MANAGEMENT

Planning Development Districts

MISSISSIPPI Geospatial Clearinghouse

and Local GIS Resources

Shared Information
FIRST STEP
PAVEMENT MANAGEMENT

Wall Maps, Condition Maps, Pothole Books
CITY OF SOUTHWEST MISSISSIPPI'S PAVEMENT PRESERVATION PROGRAM
DANNY CORDELL

PRINCIPLE

dcordell@civil-link.com
662-510-2169

5779 Getwell Road
Southaven, MS

BARRETT BURNWORTH

GIS MANAGER

bburnworth@civil-link.com
662-510-2169

5779 Getwell Road
Southaven, MS
ROADWAY BACKGROUND

RAPID GROWTH OVER 30 YEARS

1980
POP. 16,071

Incorporated
Relatively new infrastructure

No infrastructure maintenance plan

2000
POP. 28,977

Continued growth
Infrastructure built by quick development growth with little on-site inspection

Maintenance plan consisted of patching and overlays when budget allowed

2010
POP. 48,982

Growth plateaus
30 year old infrastructure
Still no maintenance plan is in place
ANNUAL PAVEMENT OVERLAY INITIATIVE

MAINTENANCE PROGRAM STARTED IN 2014

EVALUATION
Roads are chosen based on visual inspections by the street department and also by citizen complaints

BUDGET
Initiative is budgeted $1,000,000 annually

REPAIRS
Program includes base repairs, patching and pavement overlays

INSPECTION
Very little on-site inspection and oversight by city representatives
PROGRAM EVALUATION & REFORM

BETTER THAN NOTHING BUT IMPROVEMENTS STILL NEEDED

By late 2014 two main problems with the program had surfaced. The program was going over budget while at the same time the work was not going as far as the City wanted.

The Public Works department requested that Civil-Link evaluate the program. We agreed to evaluate and help with the program. We recommended continuing the existing plan of work to the end of that budget year. We held off implementing any changes until the next program cycle.

The initial request for evaluation was out of concern for the poor performance of the program. We did find areas for improvement on the ground. However, our evaluation also led us to expand and improve the underlying approach, or strategy, of the program.

With a limited budget we needed to make our dollar cover as much ground as it could and the existing plan was not doing that very well. We worked to find a strategy that would improve our roads but also let us ‘catch-up’ and get ahead with maintenance in order to keep the entire roadway system well maintained.

We believe that a successful roadway maintenance program requires BOTH quality work on the ground and a solid approach.
STRATEGY

HOW CAN WE ACHIEVE LONG TERM GOALS

The initial implementation of the program was reactive and typically focused on the worst which are the most expensive to rehab. If we wanted to get serious about a road maintenance plan we needed to plan ahead. Establishing a proactive maintenance plan would require more forethought than just reacting to citizen complaints.

We took a city-wide road condition inventory of the existing road infrastructure. Using this as a starting point we could then plan ahead our future work.

IMPLEMENTATION

HOW CAN WE IMPROVE WHAT IS DONE

Our evaluation determined that we could improve in two main areas on the ground: oversight/inspection and treatment choices.

Better oversight and inspection of the work will allow the City to be aware of any major issues that may come up and will help us keep an eye on the program’s budget.

We also explored more treatment options for the program as a whole. Pavement overlay has its place but so do crack/joint seals and seal coats. These other options can also help extend the life of our roads while at the same time allowing us to impact more road miles than we could with just a pavement overlay.
IMPROVING OUR STRATEGY

CREATING A SOLID FOUNDATION

The first year of the program we started with a list of 32 roads to maintain. We soon realized that we had no real concept of the actual size of Southaven's road infrastructure.

SOUTHAVEN HAS OVER 1100 NAMED ROADS

We hired Greenberg-Farrow to video assess and inventory the existing roads city-wide. We requested that they survey potholes and structural problems along with the general condition of the roads. A trained inspector evaluated and reviewed each city street and classified it based on the condition of the road.

This survey was vital for us by providing an unbiased look at the existing conditions of the road infrastructure as a whole. From here we could plan and make informed decisions to maintain and improve our roadways. This initial survey gave us the information we needed to look ahead and revamp our long-term strategy.
EXPANDING OUR OPTIONS

A NEW PLAN OF ACTION

We can impact more road miles by tailoring specific treatments to the condition of the road. This is a very effective way for the City to be scrupulous with its road maintenance budget.

The better condition a road is in the cheaper it is to maintain.

This is the key for Southaven to get ahead with its road maintenance.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Maintenance Cost Per Mile (20' Width)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOOD</td>
<td>$5-10k</td>
</tr>
<tr>
<td>FAIR</td>
<td>$10-30k</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>$30-100k</td>
</tr>
<tr>
<td>POOR</td>
<td>$250-300k</td>
</tr>
</tbody>
</table>

* Estimated Costs
**FORECASTING OUR NEEDS**

**IMPACT DOWN THE ROAD**

Using the estimated costs of treatments we assigned a ratio of money across all four condition categories. We found that we were lacking in funds to keep good and fair roads on a maintainable schedule.

Using the street condition inventory from Greenberg-Farrow as a planning tool allowed us see potential shortcomings in our existing budget. We can plan our budget increases to help prevent the majority of our good and fair roads from becoming critical and lost.

Taking proactive steps now will help save the City a lot of money in the future.
PROPOSED PROGRAM CHANGES

WE NEED MORE MONEY IN THE FUTURE

To keep our roads on a sustainable maintenance plan we need to meet the demands of our infrastructure. We have to be able to maintain the 343 miles of good and fair roads that we currently have. The budget allocations that we are currently working with just won’t stretch that far.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>TOTAL MILES</th>
<th>PROPOSED BUDGET</th>
<th>MILES MAINTAINED / YEARLY ROTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOOD</td>
<td>69</td>
<td>$0 – STREETS DEPT.</td>
<td>0 MILES</td>
</tr>
<tr>
<td>FAIR</td>
<td>274</td>
<td>$1,300,000</td>
<td>41 MILES / 7 YEARS</td>
</tr>
<tr>
<td>CRITICAL</td>
<td>44</td>
<td>$500,000</td>
<td>6 MILES / 7 YEARS</td>
</tr>
<tr>
<td>LOST</td>
<td>4</td>
<td>$200,000</td>
<td>.67 MILES / 6 YEARS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$2,000,000</td>
<td>6-7 YEAR SCHEDULE</td>
</tr>
</tbody>
</table>

We want the Street Department to take over crack/joint seals as part of their maintenance activities.

We want to find another $1,000,000 to help tackle the total mileage of fair roads.
Pothole Repairs

More Money for Maintenance

As an added benefit we have a city-wide pothole database which can be integrated into the yearly overlay program.

Work-orders and maps can be generated for the Street Department’s road crews to systematically repair potholes across the city. We can specifically target those roads that will see treatment next. This allows road crews to prepare those roads in advance of treatment.

By getting road crews out in front of the treatments we have effectively shifted overlay program money that would have been spent repairing potholes into the street department’s routine maintenance activities.

This is one more way we have helped to stretch the City’s overlay budget.
ANY QUESTIONS?
CONTACT INFO
LET US HELP

662-510-2169
DCORDELL@CIVIL-LINK.COM
FACEBOOK/CIVIL-LINK
2016 Road Conference:
Pavement Management Best Practices, Lowest Cost

Project Prioritization Toolbox
Darryl Gardner, Ergon A & E, Inc.
A PAVEMENT MANAGEMENT PROGRAM

Typically has 3 Parts:

1. A system to regularly collect road condition data

2. A database to store and sort the collected road data

3. An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.
Typically has 3 Parts:

1. A system to regularly collect pavement condition data

2. A database to store and sort the collected data

3. An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.
A PAVEMENT MANAGEMENT PROGRAM

An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.

— MAKING SENSE OF WHAT WE SEE AND HAVING A PLAN TO DO SOMETHING ABOUT IT
An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.

- Project Prioritization Tools
  - Equivalent Annual Cost (EAC)
  - Cost Benefit Value (CBV)
  - Remaining Service Life (RSL)

- This repair job requires not just one tool, but all of them
  - Recommend using EAC & CBV within the framework of RSL
  - Plan should be repeatable and long-term
  - It will get better over time.
A PAVEMENT MANAGEMENT PROGRAM

An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.

- Project Prioritization Tools
  - Equivalent Annual Cost (EAC)
  - Cost Benefit Value
  - Remaining Service Life
A PAVEMENT MANAGEMENT PROGRAM

TYPICAL PAVEMENT LIFE REGRESSION CURVE

KEEP GOOD ROADS IN GOOD CONDITION

- New Construction
- Good
- Fair
- Critical
- Lost

1. $2.00 for Preventive Maintenance Here
2. $4.00 for Reactive Maintenance Here
3. $10.00 for Reconstruction Here

- $( ) PREVENTIVE
- $( ) CORRECTIVE
- $( ) CORRECTIVE + LOCALIZED M&R
- $( ) RECONSTRUCTION

AGE OF PAVEMENT (Years)
Always match the treatment to the distress...right treatment to the right road at the right time.

A PAVEMENT MANAGEMENT PROGRAM

1. Crack Sealing*, Fog Seal/Rejuvenator
2. Slurry Seal, Chip Seal or Microsurfacing (Single)
3. Chip Seal or Microsurfacing (Double)
4. Cape Seal
5. HMA Overlay
6. In-Place Recycling & Overlay
7. Mill & HMA Overlay
8. Full Depth Reconstruction

* Crack Sealing to also be used in conjunction with other applications and as needed
A PAVEMENT MANAGEMENT PROGRAM

EQUIVALENT ANNUAL COST (EAC)

<table>
<thead>
<tr>
<th>Treatment Alternative</th>
<th>($/Lane-Mile) *</th>
<th>($/SY)</th>
<th>Estimated Service Life (years)</th>
<th>EAC ($/SY/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crack Seal</td>
<td>3,520</td>
<td>0.50</td>
<td>2</td>
<td>0.25</td>
</tr>
<tr>
<td>Fog Seal</td>
<td>7,040</td>
<td>1.00</td>
<td>3</td>
<td>0.33</td>
</tr>
<tr>
<td>Single Chip Seal</td>
<td>14,080</td>
<td>2.00</td>
<td>5</td>
<td>0.40</td>
</tr>
<tr>
<td>Double Chip Seal</td>
<td>29,920</td>
<td>4.25</td>
<td>8</td>
<td>0.53</td>
</tr>
<tr>
<td>Thin Overlays</td>
<td>49,280</td>
<td>7.00</td>
<td>10</td>
<td>0.70</td>
</tr>
<tr>
<td>Mill-and-Fill</td>
<td>84,480</td>
<td>12.00</td>
<td>12</td>
<td>1.00</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>119,680</td>
<td>17.00</td>
<td>15</td>
<td>1.13</td>
</tr>
<tr>
<td>Reconstruction</td>
<td>176,000</td>
<td>25.00</td>
<td>20</td>
<td>1.25</td>
</tr>
</tbody>
</table>

* Based on 12' Lane Width

Based on EAC, our **goal** should be to devote more of our time to the upper end of the right column because it costs us less per SY/Year. This means we can reach more of our pavement network. Spending the majority of our budget on the lower end of the column is a “budget killer” and gives us the least amount of reach with our budget.
A PAVEMENT MANAGEMENT PROGRAM

An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.

— Project Prioritization Tools
  • Equivalent Annual Cost
  • Cost Benefit Value
  • Remaining Service Life
A PAVEMENT MANAGEMENT PROGRAM

COST BENEFIT VALUE (CBV)

• A project prioritization tool that gives a value score to each potential project so that the decision makers can discern how to best spend the limited dollars.

• Uses Average Daily Traffic, Service Life Extension, Treatment Cost, and Pavement Condition Index as priority coefficients.

• Can be utilized to compare values of both similar & different types of project treatments.
A PAVEMENT MANAGEMENT PROGRAM

COST BENEFIT VALUE (CBV)

CBV = (Traffic) x (Service) x ($/SY) x (PCI)
A PAVEMENT MANAGEMENT PROGRAM

COST BENEFIT VALUE (CBV)

CBV = (Traffic) x (Service) x ($/SY) x (PCI)

If the service life extension, cost, and pavement condition were the same on two projects, we would get more value by tending to the project with the most traffic.
COST BENEFIT VALUE (CBV)

\[ CBV = \text{(Traffic)} \times \text{(Service)} \times \left( \frac{\$}{\text{SY}} \right) \times \text{(PCI)} \]

If the traffic count, cost, and pavement condition were the same on two projects, we would get more value doing the project with the highest service life extension.
A PAVEMENT MANAGEMENT PROGRAM

COST BENEFIT VALUE (CBV)

\[ \text{CBV} = \text{(Traffic)} \times \text{(Service)} \times \left(\frac{\$}{SY}\right) \times \text{(PCI)} \]

If the traffic count, service life extension, and PCI were the same on two projects, we would get more value by doing the job with the lowest cost.
A PAVEMENT MANAGEMENT PROGRAM

COST BENEFIT VALUE (CBV)

\[ \text{CBV} = (\text{Trafﬁc}) \times (\text{Service}) \times (\$/\text{SY}) \times (\text{PCI}) \]

If the trafﬁc count, service life extension, and cost were the same on two projects, and the PCI was in the same classiﬁcation range, we would get more value by working on the project with the lower PCI.
## Worst-First Prioritization Approach

<table>
<thead>
<tr>
<th>Street Name</th>
<th>PCI</th>
<th>Recommended Repair Type</th>
<th>Unit $</th>
<th>ADT</th>
<th>Service Life of Repair (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Road</td>
<td>30.2</td>
<td>Full-Depth Reclamation</td>
<td>$25.00</td>
<td>300</td>
<td>20</td>
</tr>
<tr>
<td>Bulldog Ave</td>
<td>30.5</td>
<td>Full-Depth Reclamation</td>
<td>$25.00</td>
<td>5000</td>
<td>20</td>
</tr>
<tr>
<td>Williams Ave.</td>
<td>59.7</td>
<td>Mill and Overlay</td>
<td>$12.00</td>
<td>700</td>
<td>12</td>
</tr>
<tr>
<td>Beach Street</td>
<td>60</td>
<td>Mill and Overlay</td>
<td>$12.00</td>
<td>4000</td>
<td>12</td>
</tr>
<tr>
<td>Williams Ave.</td>
<td>71.1</td>
<td>Double Surface Treatment</td>
<td>$4.25</td>
<td>500</td>
<td>8</td>
</tr>
<tr>
<td>Adams Street</td>
<td>71.4</td>
<td>Double Surface Treatment</td>
<td>$4.25</td>
<td>3500</td>
<td>8</td>
</tr>
<tr>
<td>Thom Avenue</td>
<td>87.9</td>
<td>Crack Seal</td>
<td>$0.50</td>
<td>800</td>
<td>2</td>
</tr>
<tr>
<td>Midway Road</td>
<td>88.1</td>
<td>Crack Seal</td>
<td>$0.50</td>
<td>5000</td>
<td>2</td>
</tr>
<tr>
<td>Street Name</td>
<td>PCI</td>
<td>Recommended Repair Type</td>
<td>Unit $</td>
<td>ADT</td>
<td>Service Life of Repair (years)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>--------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>State Road</td>
<td>30.2</td>
<td>Full-Depth Reclamation</td>
<td>$25.00</td>
<td>300</td>
<td>20</td>
</tr>
<tr>
<td>Bulldog Ave</td>
<td>30.5</td>
<td>Full-Depth Reclamation</td>
<td>$25.00</td>
<td>5000</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>59.7</td>
<td>Mill and Overlay</td>
<td>$12.00</td>
<td>700</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>Mill and Overlay</td>
<td>$12.00</td>
<td>4000</td>
<td>12</td>
</tr>
<tr>
<td>Williams Ave.</td>
<td>71.1</td>
<td>Double Surface Treatment</td>
<td>$4.25</td>
<td>500</td>
<td>8</td>
</tr>
<tr>
<td>Adams Street</td>
<td>71.4</td>
<td>Crack Seal</td>
<td>$0.50</td>
<td>3500</td>
<td>8</td>
</tr>
<tr>
<td>Thom Avenue</td>
<td>87.9</td>
<td>Crack Seal</td>
<td>$0.50</td>
<td>800</td>
<td>2</td>
</tr>
<tr>
<td>Midway Road</td>
<td>88.1</td>
<td>Crack Seal</td>
<td>$0.50</td>
<td>5000</td>
<td>2</td>
</tr>
</tbody>
</table>

**CBV Prioritization Approach**
An analytical program to evaluate pavement preservation strategies and suggest cost-effective projects to maintain road conditions.

Project Prioritization Tools
- Equivalent Annual Cost
- Cost Benefit Value
- Remaining Service Life

EAC and CBV are GREAT tools to help us prioritize treatments/repair choices, and value. The final consideration, RSL attempts to answer the question, “How do we know that when we do the right thing to the right road at the right time that we are doing enough to maintain our entire pavement network?”
A PAVEMENT MANAGEMENT PROGRAM

REMAINING SERVICE LIFE

– Every pavement in a network has a remaining service life, expressed as a “Lane-Mile-Year.” Lane-miles are utilized since many pavement networks have multiple lanes routes. 100 miles of 2-lane pavement = 200 lane-miles.

– If nothing was done to preserve a 200 lane-mile system in a given year, the system would lose 200 lane-mile-years.

– Within a given budget, our projects must add back into the system the same amount of lane-mile-years that we lose if we are to maintain the current PCI of our network. (like a bank account)
# A Pavement Management Program

## Remaining Service Life (RSL)

### 2016 Lane Mile Year Project Planning

**Gardner County Road & Bridge**

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Length (miles)</th>
<th>Lanes</th>
<th>Lane Miles</th>
<th>Condition</th>
<th>Treatment</th>
<th>Life Extension Years</th>
<th>Lane Mile Years Extension</th>
<th>Contract/Internal?</th>
<th>Cost/Lane Mile</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple St</td>
<td>2.4</td>
<td>2</td>
<td>4.8</td>
<td>Good</td>
<td>Rejuvenating Fog</td>
<td>3</td>
<td>14.4</td>
<td>Internal</td>
<td>$1,600</td>
<td>$7,680</td>
</tr>
<tr>
<td>Plum St</td>
<td>2.2</td>
<td>2</td>
<td>4.4</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>13.2</td>
<td>Internal</td>
<td>$1,600</td>
<td>$7,040</td>
</tr>
<tr>
<td>Kiwi St</td>
<td>2.5</td>
<td>2</td>
<td>5.0</td>
<td>Fair</td>
<td>UTBWC</td>
<td>10</td>
<td>50.0</td>
<td>Contract</td>
<td>$32,000</td>
<td>$160,000</td>
</tr>
<tr>
<td>Orange St</td>
<td>3.4</td>
<td>2</td>
<td>6.8</td>
<td>Fair</td>
<td>Double Chip &amp; Fog</td>
<td>8</td>
<td>54.4</td>
<td>Contract</td>
<td>$23,000</td>
<td>$156,400</td>
</tr>
<tr>
<td>Peach St</td>
<td>3.6</td>
<td>2</td>
<td>7.2</td>
<td>Fair</td>
<td>Chip Seal</td>
<td>5</td>
<td>36.0</td>
<td>Contract</td>
<td>$13,000</td>
<td>$93,600</td>
</tr>
<tr>
<td>Watermelon St</td>
<td>2.9</td>
<td>2</td>
<td>5.8</td>
<td>Fair</td>
<td>Chip Seal</td>
<td>7</td>
<td>40.6</td>
<td>Internal</td>
<td>$7,000</td>
<td>$40,600</td>
</tr>
<tr>
<td>Cantelope St</td>
<td>7.5</td>
<td>2</td>
<td>15.0</td>
<td>Critical</td>
<td>Scrub &amp; ACHM</td>
<td>15</td>
<td>225.0</td>
<td>Contract</td>
<td>$57,500</td>
<td>$862,500</td>
</tr>
<tr>
<td>Grape St</td>
<td>3.1</td>
<td>3</td>
<td>9.3</td>
<td>Critical</td>
<td>Scrub &amp; Fog</td>
<td>5</td>
<td>46.5</td>
<td>Internal</td>
<td>$9,000</td>
<td>$83,700</td>
</tr>
<tr>
<td>Pear St</td>
<td>4.1</td>
<td>3</td>
<td>12.3</td>
<td>Critical</td>
<td>ACHM</td>
<td>12</td>
<td>147.6</td>
<td>Contract</td>
<td>$50,000</td>
<td>$615,000</td>
</tr>
<tr>
<td>Banana St</td>
<td>3.9</td>
<td>2</td>
<td>7.8</td>
<td>Poor</td>
<td>Reconstruction</td>
<td>15</td>
<td>117.0</td>
<td>Contract</td>
<td>$125,000</td>
<td>$975,000</td>
</tr>
<tr>
<td>Blackberry St</td>
<td>4.0</td>
<td>2</td>
<td>8.0</td>
<td>Poor</td>
<td>Reconstruction</td>
<td>15</td>
<td>120.0</td>
<td>Contract</td>
<td>$125,000</td>
<td>$1,000,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>Total</strong></th>
<th></th>
<th><strong>Total</strong></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LMY Extension Need:</td>
<td>1,600.00</td>
<td></td>
<td>Total LM Extension:</td>
<td>627.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4,001,520</td>
<td></td>
</tr>
<tr>
<td>LMY Need Gain/Deficit:</td>
<td>-972.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## A PAVEMENT MANAGEMENT PROGRAM

### Remaining Service Life (RSL)

#### EXAMPLE B

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Length (miles)</th>
<th>Lanes</th>
<th>Lane Miles</th>
<th>Condition</th>
<th>Treatment</th>
<th>Life Extension Years</th>
<th>Lane Mile Years Extension</th>
<th>Contract/Internal?</th>
<th>Cost/Lane Mile</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple St</td>
<td>2.4</td>
<td>2</td>
<td>4.8</td>
<td>Good</td>
<td>Rejuvenating Fog</td>
<td>3</td>
<td>14.4</td>
<td>Internal</td>
<td>$1,600</td>
<td>$7,680</td>
</tr>
<tr>
<td>Bean St</td>
<td>18.4</td>
<td>3</td>
<td>55.2</td>
<td>Good</td>
<td>Rejuvenating Fog</td>
<td>3</td>
<td>165.6</td>
<td>Internal</td>
<td>$1,600</td>
<td>$88,320</td>
</tr>
<tr>
<td>Black St</td>
<td>2.3</td>
<td>2</td>
<td>4.6</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>13.8</td>
<td>Internal</td>
<td>$1,600</td>
<td>$7,360</td>
</tr>
<tr>
<td>Blueberry St</td>
<td>8.9</td>
<td>2</td>
<td>17.8</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>53.4</td>
<td>Internal</td>
<td>$1,600</td>
<td>$28,480</td>
</tr>
<tr>
<td>Brown St</td>
<td>5.0</td>
<td>2</td>
<td>10.0</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>30.0</td>
<td>Internal</td>
<td>$1,600</td>
<td>$16,000</td>
</tr>
<tr>
<td>Carrot St</td>
<td>9.2</td>
<td>2</td>
<td>18.4</td>
<td>Good</td>
<td>Rejuvenating Fog</td>
<td>3</td>
<td>55.2</td>
<td>Internal</td>
<td>$1,600</td>
<td>$29,440</td>
</tr>
<tr>
<td>Pickle St</td>
<td>9.3</td>
<td>2</td>
<td>18.6</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>55.8</td>
<td>Internal</td>
<td>$1,600</td>
<td>$29,760</td>
</tr>
<tr>
<td>Plum St</td>
<td>2.2</td>
<td>2</td>
<td>4.4</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>13.2</td>
<td>Internal</td>
<td>$1,600</td>
<td>$7,040</td>
</tr>
<tr>
<td>Potato St</td>
<td>11.0</td>
<td>2</td>
<td>22.0</td>
<td>Good</td>
<td>High Perf Fog</td>
<td>3</td>
<td>66.0</td>
<td>Internal</td>
<td>$1,600</td>
<td>$35,200</td>
</tr>
<tr>
<td>Red St</td>
<td>1.9</td>
<td>2</td>
<td>3.8</td>
<td>Good</td>
<td>Rejuvenating Fog</td>
<td>3</td>
<td>11.4</td>
<td>Internal</td>
<td>$1,600</td>
<td>$6,080</td>
</tr>
<tr>
<td>Blue St</td>
<td>3.8</td>
<td>2</td>
<td>7.6</td>
<td>Fair</td>
<td>Chip Seal</td>
<td>5</td>
<td>38.0</td>
<td>Internal</td>
<td>$7,000</td>
<td>$53,200</td>
</tr>
<tr>
<td>Cyan St</td>
<td>3.3</td>
<td>2</td>
<td>6.6</td>
<td>Fair</td>
<td>Chip Seal</td>
<td>5</td>
<td>33.0</td>
<td>Internal</td>
<td>$7,000</td>
<td>$46,200</td>
</tr>
<tr>
<td>Green St</td>
<td>6.7</td>
<td>3</td>
<td>20.1</td>
<td>Fair</td>
<td>Chip Seal</td>
<td>7</td>
<td>140.7</td>
<td>Internal</td>
<td>$7,000</td>
<td>$140,700</td>
</tr>
<tr>
<td>Kiwi St</td>
<td>2.5</td>
<td>2</td>
<td>5.0</td>
<td>Fair</td>
<td>UTBWC</td>
<td>10</td>
<td>50.0</td>
<td>Contract</td>
<td>$32,000</td>
<td>$160,000</td>
</tr>
<tr>
<td>Orange St</td>
<td>3.4</td>
<td>2</td>
<td>6.8</td>
<td>Fair</td>
<td>Double Chip &amp; Fog</td>
<td>8</td>
<td>54.4</td>
<td>Contract</td>
<td>$23,000</td>
<td>$156,400</td>
</tr>
<tr>
<td>Peach St</td>
<td>2.4</td>
<td>2</td>
<td>4.8</td>
<td>Fair</td>
<td>Microsurface</td>
<td>8</td>
<td>38.4</td>
<td>Contract</td>
<td>$18,000</td>
<td>$86,400</td>
</tr>
<tr>
<td>Purple St</td>
<td>12.5</td>
<td>2</td>
<td>25.0</td>
<td>Fair</td>
<td>Crack Seal &amp; eFlex</td>
<td>7</td>
<td>175.0</td>
<td>Contract</td>
<td>$27,500</td>
<td>$687,500</td>
</tr>
<tr>
<td>Tomato St</td>
<td>14.4</td>
<td>3</td>
<td>43.2</td>
<td>Fair</td>
<td>Chip Seal &amp; Fog</td>
<td>6</td>
<td>259.2</td>
<td>Internal</td>
<td>$9,000</td>
<td>$388,800</td>
</tr>
<tr>
<td>Watermelon St</td>
<td>2.9</td>
<td>3</td>
<td>5.8</td>
<td>Fair</td>
<td>Chip Seal</td>
<td>7</td>
<td>40.6</td>
<td>Internal</td>
<td>$7,000</td>
<td>$40,600</td>
</tr>
<tr>
<td>White St</td>
<td>7.6</td>
<td>3</td>
<td>22.8</td>
<td>Fair</td>
<td>Fog &amp; Crack Seal</td>
<td>3</td>
<td>68.4</td>
<td>Internal</td>
<td>$4,000</td>
<td>$91,200</td>
</tr>
<tr>
<td>Yellow St</td>
<td>8.9</td>
<td>3</td>
<td>26.7</td>
<td>Fair</td>
<td>Chip Seal &amp; Fog</td>
<td>6</td>
<td>160.2</td>
<td>Internal</td>
<td>$9,000</td>
<td>$240,300</td>
</tr>
<tr>
<td>Cantelope St</td>
<td>7.5</td>
<td>2</td>
<td>15.0</td>
<td>Critical</td>
<td>Scrub &amp; Micro</td>
<td>7</td>
<td>105.0</td>
<td>Contract</td>
<td>$57,500</td>
<td>$862,500</td>
</tr>
<tr>
<td>Grape St</td>
<td>3.1</td>
<td>3</td>
<td>9.3</td>
<td>Critical</td>
<td>Scrub &amp; Fog</td>
<td>5</td>
<td>46.5</td>
<td>Internal</td>
<td>$9,000</td>
<td>$83,700</td>
</tr>
<tr>
<td>Pear St</td>
<td>4.1</td>
<td>3</td>
<td>12.3</td>
<td>Critical</td>
<td>Scrub &amp; ACHM</td>
<td>12</td>
<td>147.6</td>
<td>Contract</td>
<td>$57,500</td>
<td>$707,250</td>
</tr>
</tbody>
</table>

**Total LMY Extension:** 1,835.80

**LMY Need Gain/Deficit:** 235.80

**LM Extension Need:** 1,600.00

**Total LMY Need:** $4,000,110

---

**Notes:**
- LMY Extension Need: 1,600.00
- Total LM Extension: 1,835.80
- LMY Need Gain/Deficit: 235.80
A PAVEMENT MANAGEMENT PROGRAM

SUMMARY

1. Collect condition data
2. Keep a database to sort data
3. Use project prioritization tools
   • Equivalent Annual Cost
   • Cost Benefit Value
   • Remaining Service Life
4. Update and improve

Know where you’re going?
THANK YOU!
Pavement Preservation Treatments

March 23, 2016

Presented by:
Larry Tomkins, P.E.
PAVEMENT PRESERVATION TREATMENTS
PAVEMENT CONDITION INDEX

- Excellent
- Good
- Fair
- Poor
- Very Poor
- Failed

AGE OF PAVEMENT

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

40% drop in quality
75% of life

$2.00 for PP Here

$4.00 for RM Here
Reactive Maintenance
Results will vary based on PCI

Will Cost $12.00 to $16.00 for Rehabilitation Here

PP = Pavement Preservation
RM = Reactive Maintenance
SOME PREVENTIVE MAINTENANCE TREATMENTS

Crack Treatments
Construction Joint Seals
Fog Seals
Chip Seals
Scrub Seals
Slurry Seals and Micro-surfacing
Thin Lift Overlays
Cape Seals
Combination Treatments
Preservation Candidate?
Preservation Candidate?
Crack Treatments

Eliminates moisture intrusion into base

Maintains flexible seal of crack if surface fractures

Cost effective combination. Surface Treatments alone are thin, brittle overlays w/little crack penetration
Fog Seals

Light application of diluted, slow-setting asphalt emulsion used without cover aggregate

**Purpose**

Seal the pavement
Inhibit raveling
Enrich hardened/oxidized asphalt
Provide delineation with shoulder
Rejuvenating Fog Seal

Polymer
Durable
Medium setting emulsion (CMS-1PF)
Same site criteria as conventional fog
Diluted 50/50
Application rate same as conventional
Life span 2-3 years, can re-apply
Great for shoulders and OGFCs
Chip Seals

Uniform application of asphalt binder on a sound surface followed by placement of cover aggregate then seated with roller

**Purpose**

Protect from water intrusion
Seal cracks
Polymer modified for quicker return to traffic & increased chip retention
Can be placed in multiple layers using different sized aggregate
Traditional Spray Application
Double Chip Seal Benefits
Keys for a Successful Project

Weather
Aggregate
Binder
Equipment
Sequence of Construction
Scrub Seal

Description
Application of sand or small-sized aggregate on a broomed layer of polymer-modified asphalt

Purpose
- Fill and seal small cracks and voids
- Enrich hardened/oxidized asphalt
- Preparation for another treatment
Emulsion Wave
Mississippi Hwy 35
Scrub Seal
Stand alone wearing course

Scrub Seal BOP
Mississippi Hwy 35
Scrub Seal =
Stand alone wearing course
Mississippi Hwy 35
8 years old
**Slurry Seal Systems**

- Blend of crushed aggregate, asphalt emulsion, water, & other additives
- Three (3) types of systems available depending on aggregate size.
- Mixed and spread in a mobile operation as thin wearing surface
- Mix design is required
Benefits of Slurry Systems

- Extending Pavement Service Life
- Decreasing Pavement Permeability
- Improving Surface Friction
- Correcting Moderate Bleeding/flushing (in Chip Seals)
- Leveling and Rut Filling
### Key Differences

<table>
<thead>
<tr>
<th>Slurry Seals</th>
<th>Micro Surfacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anionic or cationic</td>
<td>Always Cationic</td>
</tr>
<tr>
<td>Slow set ((\text{evaporative})) or quick set</td>
<td>Always Quick set</td>
</tr>
<tr>
<td>Conventional or modified</td>
<td>Always Polymer modified</td>
</tr>
<tr>
<td>Three Gradations of aggregate (I, II, III)</td>
<td>Requires more robust application equipment</td>
</tr>
<tr>
<td>No night work</td>
<td>Two Gradations of aggregate (II &amp; III)</td>
</tr>
<tr>
<td>One stone thickness</td>
<td>Faster Return to Traffic</td>
</tr>
<tr>
<td></td>
<td>Night Work</td>
</tr>
<tr>
<td></td>
<td>Stone stacking ability</td>
</tr>
<tr>
<td></td>
<td>Can repair larger deviations</td>
</tr>
</tbody>
</table>
Micro-surfacing
Thin HMA Overlays

• Non-structural overlays
  ▪ Thin Bonded Wearing Course
  ▪ 4.75 mm HMA
  ▪ 1” or less
  ▪ Mixture for low volume roads

• Place on prepared surface
  ▪ Micro Milled
  ▪ Crack sealed
  ▪ Rut Filled w/Microsurfacing
  ▪ Option for local contractor/supplier
SR 370 Lee/Prentiss

\(\frac{3}{4}\) Inch

Before

3 Month

15 Month
SR 371 Prentiss
1 Inch

Before

3 Month

15 Month
Combination Treatments

- Chip/Scrub Seal with fog seal application
- Stress Absorbing Membrane Interlayer (SAMI)
- Cape Seal - A surface treatment application consisting of a chip seal or scrub seal followed by a final surface treatment of a Slurry/Micro or Thin Lift
- Minimum of 24 hours (3 days preferably) cure time before placing 2\textsuperscript{nd} phase of the combination treatment.
Chip Seal with Fog Seal
SAMI on Hwy 98 (Hattiesburg, MS)
Cape Seal

Chip Seal

Microsurfacing
Pavement Preservation
Not Good Candidates for Preservation
Good Candidates for Preservation
The industry resource for pavement preservation

Welcome to the premier educational site for agency and consulting engineers, roadway planners and contractors looking to expand their knowledge of pavement preservation. Here you'll find facts and statistics about pavement treatments as well as product recommendations to best solve road challenges and preemptively protect the overall health of your roadway network.

Learn how to:
- Get 40 years of life from your roads
- Plan roadway budgets
- Balance needs and resources
Any Questions?