Building North Carolina’s Pavement Preservation Program

Louisiana Maintenance Conference
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NCDOT

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 outlining North Carolina DOT Structure, the 3 R’s of Pavement Preservation and Rehabilitation, Implementation Strategy including training, research, and dedicated funding.
Outline

- North Carolina DOT Structure
- The Three R’s of Pavement Preservation and Rehabilitation
- Implementation Strategy
  - Training
  - Research
  - Dedicated Funding
## North Carolina Mileage

<table>
<thead>
<tr>
<th>Category</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Miles</strong></td>
<td>78,615</td>
</tr>
<tr>
<td>Primary</td>
<td>14,705</td>
</tr>
<tr>
<td>Secondary</td>
<td>63,910</td>
</tr>
<tr>
<td>Pavement</td>
<td>58,117</td>
</tr>
<tr>
<td>Unpaved</td>
<td>5,793</td>
</tr>
</tbody>
</table>
Why Pavement Preservation?

- Cost Effective Approach
  - Planned vs. Reactive Strategy
  - Up to a 6:1 savings ratio vs. “worst first”

- Good Pavements stay good
  - Prevents failures before they occur
  - Results in smoother, safer roads
  - Reduces vehicle operating costs
  - Improved highway/user satisfaction
  - Reflects favorably on agency and paving industry
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The Three R’s of Preservation & Rehabilitation

- **Retreatment** - generally surface treatments.
- **Resurfacing** - with 1-1.5 inches of plant mix.
- **Rehabilitation** - more work is required.
Retreatment: The 1st R

- Pavement is in good condition, but may be declining.
- Pavement is oxidizing.
- Pavement is structurally adequate (has enough thickness with enough strength) to carry loads for the life of the surface treatment.
Retreatment Types

- Chip Seals
  - Mat and Seal
  - Straight Seal
  - Split Seal
  - Triple Seal
- Slurry Seal
- Microsurfacing
Application of a single lift of plant mix to an existing roadway.

Roadway condition before resurfacing may be fair to good. Patching of failed areas is required for good performance.

Provides some structural improvement.
Resurfacing Mix Selection

- Superpave is now used for resurfacing
- New Mixes: S4.75A and SF9.5A
Rehabilitation: The 3rd R

- Pavement condition fallen from fair to poor
- Used when traffic volumes (particularly trucks) make the current pavement layers inadequate for future use.
- The pavement is structurally inadequate.
- Load related distresses (fatigue or rutting) are present.
Rehabilitation Investigation

- Coring and DCPs to learn thickness and condition of existing pavement.
- FWD to determine strength of existing pavement.
- Detailed pavement condition notes to locate areas requiring more work.
- Traffic counts.
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Training

- NHI Pavement Preservation Courses
  - Pavement Preventive Maintenance
  - Pavement Preservation : Selection
  - Integrating Pavement Preservation Practices and Pavement Management

- Participation in Conferences
Training

- Obtain “Buy In” from Field Personnel
  - Roads are selected for treatment at the local level, not central.
- Worst First vs. Preservation Strategy
- Integration of a Maintenance Management System (MMS)
- Integration of a Pavement Management System (PMS)
- Created new Performance Measures
Performance Measures

Evaluate Performance in:

- Roadside
- Pavements
- Maintenance
- Bridges
- Traffic & ITS
- Construction
Example - Ride Quality

Condition Indicator: Roughness

(IRI value 145 or greater or severe on PCS)

Performance Measure:

Lane Miles that meet Condition Indicator

LOS A: 0 % in Poor Condition
LOS B: <5 % in Poor Condition
LOS C: <15 % in Poor Condition
LOS D: < 25% in Poor Condition
LOS F: More than 25% in Poor Condition
Example - Structure or Quality

Condition Indicator: PCR

(Pavement Condition Survey Rating of 80 or lower)

Performance Measure:

Road miles that meet Condition Indicator

- **LOS A:** No more than 5% of road miles
- **LOS B:** Road miles is between 5% and 15%
- **LOS C:** Road miles is between 15% and 25%
- **LOS D:** Road miles is between 25% and 40%
- **LOS F:** Road miles is greater than 40%
New Product Evaluations

Research Projects at North Carolina State University
- “Optimizing Gradations for Surface Treatments”
- “Quantifying the Benefits of Improved Rolling of Chip Seals”
- “Performance Based Analysis of Polymer Modified Emulsions in BST”
Dedicated Funding: Legislative Initiatives

- Senate Bill 1005: 2001 - 2004
- North Carolina Moving Ahead: 2003 - 2005
- System Preservation: 2006
- Road Oil Incentive Program: 2002 - to date
2001 Legislation “Jumpstarts” Program

- Senate Bill 1005
  - Landmark Legislation
  - Allowed use of Trust Fund cash balances
  - $423 Million investment over 3 years
  - Focus on preserving Primary Highway System
  - Contract Resurfacing Funds Increased
SB1005
2002 - 532 miles completed
2003 - 499 miles completed
2004 - 486 miles completed
Primary Route Preservation Projects
SB 1005 (Years 1, 2, & 3)

Legend
- SB 1005 Projects
- Interstates
2003 Legislation: NC Moving Ahead!

- **Background**
  - Used unexpended bond monies
  - $630 Million investment over 2 years
    - $560 Million to Highway Projects
    - $70 Million to Bridge Projects

- **Program Development**
  - MPO’s, RPO’s, local governments, and legislators had input in the program
  - Programs were developed by the 14 Divisions
2003 Legislation: NC Moving Ahead!

- Program Goals
  - Enhance safety
  - Reduce congestion
  - Reduce accidents
  - Reduce fatal crashes
  - Improve safety and operation of intersections
  - Provide wider and smoother pavements
  - Extend pavement life
  - Rehabilitate or replace deficient bridges
  - Enhance night time visibility
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$57 Million Allocation for Pavements, Bridges, and Traffic

Pavement Treatment Types:
- Crack Sealing
- Chip Seals
- Slurry Seals
- Microsurfacing
- Ultra-thin Bonded Wearing Coarse
- Thin HMA Overlays
- Diamond Grinding
- HMA mill and fill
Implementation Strategy

- Utilize non recurring funds to address highways in fair to poor condition
  - SB1005 focused on heavy maintenance and rehabilitation of major primary corridors, increasing pavement structure to meet traffic demands
  - NCMA focused on the backlog of resurfacing needs on all systems

- Utilize recurring funding to preserve highways in fair to good condition on all systems
  - Contract Resurfacing Fund
  - Highway Maintenance Fund
  - Interstate Maintenance Fund
  - System Preservation Fund
Accomplishments

- **NC Moving Ahead**
  
  2004 - 1200 miles (Annual program - $255 Million)

- **Contract Resurfacing**
  
  2002 - 2615 miles completed
  2003 - 2240 miles completed (Annual program - $157 Million)
  2004 - 2350 miles completed
  2005 - 1350 miles completed
  2006 - 1932 miles completed (Annual program - $186 Million)
  2007 - Funding Increased to $269 Million
Secure sufficient recurring funding for contract resurfacing & maintenance to sustain improved conditions

Biennial report to Transportation Oversight Committees
Maintenance Condition Report

NC Department of Transportation

December 2004
Dedicated Funding: Legislative Initiatives

- Senate Bill 1005: 2001 - 2004
- North Carolina Moving Ahead: 2003 - 2005
- System Preservation: 2006
- Road Oil Incentive Program: 2002 - to date
Road Oil Incentive Program

- One of two pilot programs to test incentive pay for employees as a means of increasing efficiency and productivity
- Incentive award was (0.25%) of the budget allocation, increased to (0.50%)
- Incentive payments based on:
  - exceeding previous years production rates, measured in square yards per man-hour
  - maintaining good safety record and no disciplinary action
Road Oil Operations

- 2,580 Miles paved in 2002
- 2,655 Miles paved in 2003
- 2,876 Miles paved in 2004
- 1,985 Miles paved in 2005
- 2,518 Miles paved in 2006
Types of Treated Roads

- Secondary Roads
- Primary Roads
- Typically 2,000 ADT or Less (10,000 ADT)
- All Regions:
  - Coastal
  - Piedmont
  - Mountains
Condition of Treated Roads

- Preservation Treatment
- Pavement must be in good condition
  “Keep Good Roads Good”
Quality Materials

- Lightweight Aggregate
- Single Sized Stone
- Polymer Modified Emulsion
- Combination Roller
Program Administration

- DOT Oversight Committee
- Include all 14 Division Road Oil Units
- Divisions perform Quality Control Audits
- Central office Monitors:
  - Bi-weekly Production Rates
  - Quality Control by performing field audits
  - Quality Assurance by performing reporting audits
## Statewide Totals (2001-2005)

<table>
<thead>
<tr>
<th>Year</th>
<th>Miles</th>
<th>Budget</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1,934</td>
<td>$20.7M</td>
<td>81 (sq yd/man hr)</td>
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<tr>
<td>2002</td>
<td>2,580</td>
<td>$26.8M</td>
<td>103</td>
</tr>
<tr>
<td>2003</td>
<td>2,655</td>
<td>$27.5M</td>
<td>111</td>
</tr>
<tr>
<td>2004</td>
<td>2,876</td>
<td>$27.6M</td>
<td>117</td>
</tr>
<tr>
<td>2005</td>
<td>1,985</td>
<td>$24.4M</td>
<td>108</td>
</tr>
<tr>
<td>2006</td>
<td>2,518</td>
<td>$37.6M</td>
<td>118</td>
</tr>
</tbody>
</table>

Miles and Productivity are in the context of square yards per man hour.
Statewide Incentive Award Totals

Calendar Year

Statewide Award

2002
2003
2004
2005
2006

$0.00
$20,000.00
$40,000.00
$60,000.00
$80,000.00
$100,000.00
$120,000.00
$140,000.00

$0.00
$20,000.00
$40,000.00
$60,000.00
$80,000.00
$100,000.00
$120,000.00
$140,000.00

2002 2003 2004 2005 2006

Calendar Year

Statewide Award
Statewide Trend - Miles Paved

Year
1999 2000 2001 2002 2003 2004 2005 2006

Miles
1093.61 1798.4 1934.05 2579.62 2654.96 2876.35 1984.35 2518.32

0 500 1000 1500 2000 2500 3000
Statewide Pavement Condition Ratings increased 64.5 to 70.5

Divisions utilizing Preservation Strategy have PCR’s in the 80’s

Divisions transitioning to Preservation Strategy increased PCR’s from low 70’s to low 80’s
Advantages

- Higher productivity
- More efficient operations
- More miles paved
- Lower unit costs
- Promotes employee initiative
- Encourages creative thinking
- Improves roadway conditions (Preventive Maintenance)
- Best Practice Management
## Impacts of Preservation - 2004

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Budget (Millions)</th>
<th>Miles Complete</th>
<th>Percent of Budget</th>
<th>Percent of Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC Moving Ahead</td>
<td>$255</td>
<td>1,080</td>
<td>58.01%</td>
<td>17.12%</td>
</tr>
<tr>
<td>Contract Resurfacing</td>
<td>$157</td>
<td>2,350</td>
<td>35.71%</td>
<td>37.24%</td>
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<tr>
<td>Chip Sealing</td>
<td>$27.6</td>
<td>2,880</td>
<td>6.28%</td>
<td>45.64%</td>
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<tr>
<td><strong>Total:</strong></td>
<td><strong>$439.6</strong></td>
<td><strong>6,310</strong></td>
<td></td>
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</tbody>
</table>
Summary

- North Carolina DOT Structure
- Concept of Pavement Preservation
- Implementation Strategy
  - Training
  - Research
  - Dedicated Funding