Benefits of Pavement Preservation

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LA DOTD

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What is PAVEMENT PRESERVATION?

Network level program
Long term strategy
Cost effective practices
Extends life
Improves surface conditions
Why is Pavement Preservation Essential?

• Our lane-mile assets age with time
• By applying low cost treatments to appropriate roadways, the pavement life can be extended 3 to 10 years (Right treatment on the Right roadway at the Right time)
• Analogies
LOW COST TREATMENTS TO EXTEND OUR LIVES
WHY LOW COST TREATMENTS?

- Purpose is to seal surface cracks and prevent water from deteriorating the foundation and/or improve surface texture and correct minor surface defects
TYPICAL TREATMENTS
PREVENTIVE MAINTENANCE

Preservation Treatment

- Chip seals
- Micro-surfacing
- Thin Overlays (< 1.5”)
- Joint Resealing
- Crack Sealing
LIGHT MINOR REHABILITATION

Preservation Treatment
• Concrete and Asphalt Patching without overlay
• Single Lift Overlay (2”) with no patching or cold planing
• Pavement Grinding/Grooving without overlay
• Load Transfer Restoration only
MINOR REHABILITATION

- Patching with single lift overlay ≤ 2”
- Cold Plane with single lift overlay ≤ 2”
Current Pavement Condition

- Excellent: 22%
- Good: 28%
- Fair: 43%
- Poor: 7%
- Very Poor: 1%
Poor Asphalt Roadway
Poor Jointed Concrete Roadway
HOW DO WE MEASURE SUCCESS?
One tool provided to Districts is:

Lane-Mile-Years Calculations
What is the Lane-Mile-Years Concept?

- Our Highway System includes 37,167 lane miles of paved roadways.

- Without intervention, the system will age 37,167 lane-mile-years per year.
“To offset the deterioration over the system, the agency needs to annually perform a quantity of work equal to the total number of lane-mile-years lost to maintain the status quo.”
THE FORMULA

Lane Miles × Life Extension of Treatment
= Lane-Mile-Years Treated
Applying this Concept to DOTD

<table>
<thead>
<tr>
<th>District - 58-Chase ; Category - PR/NI-Preservation/Non-Interstate ; Lettings - From Jul 2009 to Jun 2010</th>
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<tbody>
<tr>
<td><strong>Project</strong></td>
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<td>815-07-0007</td>
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<td><strong>TOTAL Q1</strong></td>
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<td>178-02-0021</td>
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<tr>
<td><strong>TOTAL Q2</strong></td>
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<tr>
<td>186-30-0009*</td>
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</table>
Treated vs. Non-Treated Lane Mile Years
2007-2008
Includes Surplus
% cost of treatments used

2008-2009 Pavement Preservation Program
Cost Allocated to Preventive and Non Preventive Treatments
Another Scenario

• The SHS (State Highway System) contains 14,886 lane miles of roadway
• $220 million/year investment in the SHS, using a mix of treatments, will treat an average of 14,886 lane-mile-years
• Without including preventive and minor rehabilitation treatments, it will require $260 million in major rehabilitation treatments to meet the same goal
• This is an 15% savings
• Mix of treatments includes 26% of the budget for preventive maintenance and minor rehabilitation with 74% for major rehabilitation
SHS $220 MILLION/YEAR BUDGET

$161,823,519, 74%

$58,153,271, 26%

PREVENTIVE MAINTENANCE
NON-PREVENTIVE MAINTENANCE
WHY INVEST IN PREVENTION TREATMENTS?
Expected Benefits
Improved Pavement Performance

- Preventive Maintenance
- Rehabilitation
- Reactive Maintenance
Roadway Example – LA 565

- LA 565
- Concordia Parish
- ADT = 1230
- Major Collector
- Length = 8.48 miles
- 2 Lanes = 16.96 Lane-Miles
- Major Reconstruction in 1990
- Initial Cost (1990) = $877,271
- Surface Treatment Completed in 2000
- Cost (2000) = $68,792
- Surface Treatment Completed in 2009
- Cost (2009) = $348,000
CS 815-17, LA 565
Concordia Parish
Actual Roadway Application

Random Cracking
815-17
Concordia Parish

Index Value

Data Year
AST 2000 OVERLAY 2003

Test Index Random Index 1 Random Index 2
Thin Overlay Polynomial (Test Index) Polynomial (Random Index 1) Polynomial (Random Index 2)
Linear (Trigger for Overlay) Polynomial (Thin Overlay)
# Actual Life Cycle Cost Analysis

**LIFE CYCLE COST ANALYSIS**  
CONTROL SECTION 815-17  
CONCORDIA PARISH

<table>
<thead>
<tr>
<th>ALTERNATE</th>
<th>PV FACTOR 0.6756</th>
<th>PV FACTOR 0.6006</th>
<th>PV FACTOR 0.4746</th>
<th>END OF LIFE</th>
<th>PRESENT VALUE TOTALS</th>
<th>TOTAL SAVINGS</th>
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<tbody>
<tr>
<td>A1 NO PREVENTIVE MAINTENCE</td>
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<td>$877,271</td>
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<tr>
<td>PV Cost</td>
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<td>$1,702,243</td>
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<tr>
<td>PV Cost</td>
<td>$877,271</td>
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<td>$165,161</td>
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<td>$1,088,908</td>
<td>36%</td>
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TOTAL INVESTMENT LIFE (27 YEARS)
RETURN ON INVESTMENT

• Initial investment of $1,088,908 using preventive treatments vs. an investment of $1,702,243 without preventive treatments yields an overall savings of **36%**
• For every $1.00 invested in preventive treatments during the life of this roadway, a savings of $3.90 in major construction costs was realized.
Roadway Example

- LA 127
- Caldwell Parish
- ADT = 814
- Major Collector
- Length = 6.12 miles
- 2 Lanes = 12.24 Lane-Miles
- **Major Reconstruction in 1982**
- Initial Cost (1982) = $545,570
- **Surface Treatment Completed in 2001**
- Cost (2001) = $68,250
- **Surface Treatment Completed in 2008**
- Cost (2008) = $157,396
Control Section 127-04

Random Cracking
Caldwell Parish
127-04

Index Value

TRIGGER FOR THIN OVERLAY (2")

TRIGGER FOR MEDIUM OVERLAY (3.5")

Data Year


New Asphalt
Chipseal (2001)
Chipseal (2008)
Linear (New Asphalt)
Linear (Chipseal (2001))
Linear (Chipseal (2008))
## Life Cycle Cost Analysis

<table>
<thead>
<tr>
<th>ALTERNATE</th>
<th>PV FACTOR 0.4746</th>
<th>PV FACTOR 0.3607</th>
<th>PV FACTOR 0.2636</th>
<th>Present Value Totals</th>
<th>Total Savings</th>
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<td><strong>YEAR 0</strong></td>
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<tr>
<td>A1 NO PREVENTIVE MAINTENCE</td>
<td>NEW ASPHALT PAVEMENT $545,570</td>
<td>NO ACTION</td>
<td>NO ACTION</td>
<td>MEDIUM OVERLAY (REHABILITATION) $485,760 * 6.12 = $2,973,851</td>
<td>$783,907</td>
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<td>NEW ASPHALT PAVEMENT $545,570</td>
<td>ASPHALTIC SURFACE TREATMENT $68,250 $32,391</td>
<td>ASPHALTIC SURFACE TREATMENT $157,396 $56,773</td>
<td>ASPHALTIC SURFACE TREATMENT $63,250 * 6.12 = $387,090</td>
<td>$102,037</td>
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<td>$102,037</td>
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<tr>
<td>A3 WITH PREVENTIVE MAINTENCE</td>
<td>NEW ASPHALT PAVEMENT $545,571</td>
<td>ASPHALTIC SURFACE TREATMENT $68,250 $32,391</td>
<td>ASPHALTIC SURFACE TREATMENT $157,396 $56,773</td>
<td>THIN OVERLAY (REHABILITATION) $270,710 * 6.12 = $1,646,745</td>
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### Year-by-Year Analysis

**A1 NO PREVENTIVE MAINTENCE**
- Year 0: NEW ASPHALT PAVEMENT $545,570
- Year 19: NO ACTION
- Year 26: NO ACTION
- Year 34: MEDIUM OVERLAY (REHABILITATION) $485,760 * 6.12 = $2,973,851

**A2 WITH PREVENTIVE MAINTENCE**
- Year 0: NEW ASPHALT PAVEMENT $545,570
- Year 19: ASPHALTIC SURFACE TREATMENT $68,250 $32,391
- Year 26: ASPHALTIC SURFACE TREATMENT $157,396 $56,773
- Year 34: ASPHALTIC SURFACE TREATMENT $63,250 * 6.12 = $387,090

**A3 WITH PREVENTIVE MAINTENCE**
- Year 0: NEW ASPHALT PAVEMENT $545,571
- Year 19: ASPHALTIC SURFACE TREATMENT $68,250 $32,391
- Year 26: ASPHALTIC SURFACE TREATMENT $157,396 $56,773
- Year 34: THIN OVERLAY (REHABILITATION) $270,710 * 6.12 = $1,646,745

### Total Investment Life (34 Years)

- **A1**: $1,329,477 (0%)
- **A2**: $736,771 (45%)
- **A3**: $1,068,816 (20%)
Control Section 127-04

Random Cracking
Caldwell Parish
127-04

- TRIGGER FOR THIN OVERLAY (2")
- TRIGGER FOR MEDIUM OVERLAY (3.5")

Data Year:
- New Asphalt
- Chipseal (2001)
- Chipseal (2008)

Index Value:

Linear (New Asphalt)
Linear (Chipseal (2001))
Linear (Chipseal (2008))
## Control Section 127-04

### Life Cycle Cost Analysis

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<td>ASPHALTIC SURFACE TREATMENT</td>
<td>ASPHALTIC SURFACE TREATMENT</td>
<td>6 YEARS REMAINING UNTIL REACHING TRIGGER FOR MEDIUM OVERLAY</td>
<td>RSL = 6 YEARS (6/34)*783,907 = $138,336</td>
<td>TOTAL INVESTMENT LIFE (34 YEARS)</td>
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<tr>
<td>$545,570</td>
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<td>$157,396</td>
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<td>PV Cost</td>
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<td>$56,773</td>
<td>($138,336)</td>
<td>$496,398</td>
<td>9%</td>
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</table>
Life Cycle Return on Investment

• For every $1.00 invested in preventive treatments during the life of this roadway, a savings of $1.50 - $4.10 major rehabilitation costs.
No Matter How You Slice It -

• All examples show moderate (9%) to large savings ($1.00 vs. $4.10)
• Preventive maintenance and minor rehabilitation make sense.
RECOMMENDATIONS

- Dedicate 25%-30% of overall Pavement Preservation Budget to Preventive Maintenance and Minor Rehabilitation Treatments
Resources

NCPP – National Center for Pavement Preservation
www.pavementpreservation.org

DOTD Pavement Management Section
DOTD Pavement Design Section
DOTD Systems Preservation Section
www.dotd.la.gov/highways/systemsengineering/syspreservation/
QUESTIONS

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THANK YOU