The True Value of Pavement Preservation

Don Newell
Marion County, Oregon
Two fold mission of Public Road Agencies (Public Works):

- reserve the public's
Current trends in local NW governments (2011):
Understand Your Road System

Understand Changes

You Will Know What You Should Next
Pavement Management define:

Systematic method of routinely collecting and processing decision-making data needed to make maximum use of limited preservation dollars.

Decision Making Tool
Decision Making Tool
Pavement Management aids in:

Applying the correct pavement treatment
At the correct location
At the correct time.

*Decision Making Tool*
The Pavement Deterioration Curve

- **Very Good**: $ - Routine Maintenance
- **Good**: $$ - Preventive Maintenance
- **Fair**: $$$ - Rehabilitation
- **Poor**: $$$$ - Reconstruction

Time – life of highway
My career PaveMngt reference base:
Pavement Condition is the “Y” axis
Pavement Condition

PCI = 88

Your Agency’s Infrastructure Investment
Pavement Condition

Critical PCI = 65 - 70
Critical PCI

- Preventive Maintenance
- Critical PCI
- Corrective Maint, Rehabilitation, or Reconstruction

Pavement Condition Index vs Time
Preventive Maintenance

![Graph showing the relationship between pavement condition and time, with preventive maintenance highlighted.](image)
Corrective Repairs

Pavement Condition vs. Time

Corrective Maintenance/Repair
Reconstruction

Reconstruction

Pavement Condition

Time

20

$
Rehabilitation

Pavement Condition

Time

Rehabilitation
Where are we today?

We have been using Pavement Management Software Systems for time now.....

Our work is now recognized - examples:

Improved Tools – i.e. GIS; Web presence

2001 - GASB 34

2009 - Obama Stimulation Package

Public Engagement / Informed – Even Electives!
You come a long way baby!
Understand Your Road System

+ Understand Changes

You Will Know What You Should Do Next
Understand Your Road System
Very Good to Excellent
Condensed Categories

Percentage of Roads

Very Good to Excellent
Fair to Good
Poor, Very Poor & Failed

FY '97 - '98
FY '98 - '99
FY '99 - '00
FY '00 - '01
FY '01 - '02
FY '02 - '03
FY '03 - '04
FY '04 - '05
FY '05 - '06*

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Weighted PCI Averages: Districts & System
Based on Fiscal Years
Understand Your Road System

You Will Know What You Should Do Next

Understand Changes
Understand Changes
PCI Points Lost per Year
Model for Pavement Life of 30 years

Financial liabilities increase rapidly as the pavement deteriorates down the waterfall.

Loss of 2-4 PCI Points per Year
Loss of 8-12 PCI Points per Year
Loss of 1-6 PCI Points per Year
Modeling:
Trending sub-groups range performances
Well Maintained Barn

Road Condition: **Excellent** PCI: 91 - 100

Treatments: **Minimal to None**

Service Cost: **Minimal to None**

Inventory Trend: **Severe Decrease**

![Graph showing the downward trend of the number of Excellent Roads from 1995 to 2010.]
**Minor Repairs**

Road Condition: **Very Good** PCI: 80 - 89

Treatments: **Seals & Patching**

Service Cost: $1/Sq Yd

Inventory Trend: **Slight Decrease**

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**Very Good**

**Downward Trend of the number of Very Good Roads**

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>1995</td>
<td>20%</td>
</tr>
<tr>
<td>1998</td>
<td>15%</td>
</tr>
<tr>
<td>2001</td>
<td>10%</td>
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<tr>
<td>2004</td>
<td>5%</td>
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<tr>
<td>2007</td>
<td>5%</td>
</tr>
<tr>
<td>2010</td>
<td>0%</td>
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Major Repairs

Road Condition: **Good-Fair** PCI: 55 - 79
Treatments: **Overlays**
Service Cost: $7/Sq Yd
Inventory Trend: **Flat – moving downward**

Good & Fair

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</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>66%</td>
<td>64%</td>
<td>66%</td>
<td>64%</td>
<td>66%</td>
<td>64%</td>
</tr>
</tbody>
</table>

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*Note: The image shows a bar graph indicating the percentage of roads in the 'Good & Fair' category from 1995 to 2010.*
**Time to Rebuild!**

Road Condition: **Poor-Failed**  PCI: O - 54

Treatments: **Generally Reconstructions**

Service Cost: **$25/Sq Yd**

Inventory Trend: **Increase**

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**Poor & Failed**

**Increase of the number of Poor-Failed Roads**

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>15%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
<td>35%</td>
</tr>
</tbody>
</table>
You shouldn’t be remodeling the kitchen if the roof is leaking!
Understand Changes
Your Network PCI is only a Snapshot in time of how your system is performing – just like your child’s report card grade.

What is key is identifying change as it occurs - that is your homework.
An Analogy

Process is continuous and inevitable

The rate of water flow increases as condition decreases

The effort to pump water increases with decreasing condition
When you can, tie your Pavement Performance Data to $
Link your data to $\$

What will our money buy?
Modeling: Predicting the Future Performance
$200 K Budget / 5 yrs

Overlay Budgets
’06 = $200K
’07 = $200K
’08 = $200K
’09 = $200K
’10 = $200K

Industry Standard of Optimum Range for PCI

Overlay Budgets

Annual Budget
$1.5 M / yr for year 1;
$200K = years 2-5

Industry Standard of Optimum Range for PCI

Overlay Budgets
’06 = $1.5M
’07 = $200K
’08 = $200K
’09 = $200K
’10 = $200K
Maintain Current PCI

Overlay Budgets

'06 = $1.5M
'07 = $1.5M
'08 = $1.5M
'09 = $1.5M
'10 = $1.5M

Industry Standard of Optimum Range for PCI

Overlay Budget
Chip Seal Budget
County System PCI
Modeling: Overall Impacts of Treatment Choices
Untreated Road System

700-miles, 10-miles of each PCI value: 31-100

average PCI = 65.5
Treated Road System - Scenario #1: Asphalt Concrete Overlays - 2"
10-miles of PCI value: 55 (new 100 PCI) @ $180K/mile = $1.8M
new average PCI = 66.14 + 0.64 increase
Treated Road System - **Scenario #2:** Chip Seals

50-miles of PCI values: 71-75 (new 90 PCI) @ $36K/mile = $1.8M

new average PCI = 66.71  + 1.21 increase  47% above AC Overlays

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Pavement Condition Index Values (PCI's)
Treated Road System - **Scenario #3**: Chip Seals

60-miles of PCI values: 70-75 (new 90 PCI) @ $30K/mile = $1.8M

new average PCI = 67 + 1.5 increase 57% above AC Overlays
Treated Road System - Scenario #4: 50% AC Overlays; 50% Chip Seals

Overlays: 5-miles of PCI value: 55 (new 100 PCI) @ $180K/mile = $0.9M

Chip Seals: 30-miles of PCI values: 73-75 (new 90 PCI) @ $30K/mile = $0.9M

new average PCI = 66.51 + 1.01 increase
Contract Overlays & Public Works / Operations Preservation Treatments

Chart 2

- PW / Operations Treated Miles
- Contract Overlays Miles

Miles Treated

Multi-year Treatment Planning

Do you know what roads are candidates for treatments 4-years from now?
Modeling:

Long-term Real Costs
Chart 1 - General PCI Failure Curve
35-year life of a Non-maintained 24-foot wide County Road
chart 1 - General PCI Failure Curve
35-year life of a Non-maintained Road

- Non-maintained
- accumulative average PCI
- 35-year average PCI
- Poly. (Non-maintained)

PCI
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35
Years

55.7 Avg PCI
chart 2 - PCI over time - 75 years

- Preferred
Standard
80 to 85 PCI

- Non-maintained
- Maintained
- Industry
- Standard

Years
Non-maintain $1.59M
Maintain $1.25M

Non-maintain $4.8M with 2.5% inflation
Maintain $2.8M with 2.5% inflation

Inflation = 2.5% yearly

chart 4 - $ Costs over time - 75 years

Years

$0
$500,000
$1,000,000
$1,500,000
$2,000,000
$2,500,000
$3,000,000
$3,500,000
$4,000,000
$4,500,000
$5,000,000

Non-maintained
Maintained

Non-maintain
Maintain

$1.59M
$1.25M
chart 5 - Buying Power Index (BPI) = PCI per $ spent
( Accumulative PCI / Accumulative $ spent / $100,00 ) = BPI
Buying Power Index (BPI) = PCI per $ spent
(Accumulative PCI / Accumulative $ spent / $100,000) = BPI

With 2.5% a year inflation
# In Summary

<table>
<thead>
<tr>
<th></th>
<th>Non Maintained</th>
<th>Maintained</th>
<th>Difference</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>$ spent</strong></td>
<td>$1,590,000</td>
<td>$1,250,000</td>
<td>$340,000</td>
<td>27%</td>
</tr>
<tr>
<td><strong>$ spent w/o Cap</strong></td>
<td>$1,060,000</td>
<td>$720,000</td>
<td>$340,000</td>
<td>47%</td>
</tr>
<tr>
<td><strong>PCI</strong></td>
<td>58.1</td>
<td>84.5</td>
<td>26.3</td>
<td>45%</td>
</tr>
<tr>
<td><strong>$ spent w/ inflate</strong></td>
<td>$4,772,813</td>
<td>$2,838,868</td>
<td>$1,933,945</td>
<td>68%</td>
</tr>
<tr>
<td><strong>$ spent w/ inflate w/o Cap</strong></td>
<td>$4,242,813</td>
<td>$2,308,868</td>
<td>$1,933,945</td>
<td>84%</td>
</tr>
<tr>
<td><strong>BPI</strong></td>
<td>3.7</td>
<td>6.8</td>
<td>3.1</td>
<td>85%</td>
</tr>
<tr>
<td><strong>BPI w/inflate</strong></td>
<td>1.2</td>
<td>3.0</td>
<td>1.8</td>
<td>144%</td>
</tr>
</tbody>
</table>
Budget \times \text{Efficiencies} = \text{Performance}

\text{Management, Workmanship, PCI, Remove Risks / Hazards}
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- reserve the public’s
The True Value of Pavement Preservation

3. Understanding Your Road System, It’s Changes and What To Do Next
4. Applying the correct pavement treatment at the correct location at the correct time.
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