Pavement Preservation

*Maintenance Strategies & Budgeting*

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What is Pavement Preservation?

Why should an agency use it?

How much annual funding should agencies budget for pavement maintenance?

What strategies does it include?

Pavement Preservation

What is it?

Simply stated, Pavement Preservation is the process of utilizing time proven and lower cost preventive maintenance activities to extend the useful life of asphalt pavements and thereby lower annualized resurfacing costs as well as future resurfacing costs.

Pavement Preservation

Why should agencies use it?

The Hole Story

Available from the APWA Bookstore here at the conference!

Includes information provided by several pavement maintenance professionals, Transportation Research Board, USACOE, Michigan DOT and Federal Highway Administration.
Pavement Preservation

Why should agencies use it?

Since January 2000, the cost of Asphalt Cement has increased approximately 160%.

The cost of AC has increased 100.8% in the past 24 months.

In 2005, the cost of AC increased 22.42%, which was a substantial increase from a typical increase of 4% to 10%

Historically, hot-mix and resurfacing prices have followed the same “trendline” as that of the cost of asphalt cement.
From 2000 thru July 2005 the price of Asphalt Cement remained constant with fluctuations of 5% to 12% a year. It was possible to estimate future AC prices as they remained somewhat close to the trendline.

Also, from 2000 thru July 2005 the cost of resurfacing remained constant with fluctuations of 4% to 10% a year.

Then, in 2005 Katrina hit and crude oil prices soared causing Asphalt Cement prices to escalate.

In the past 12 months the price of asphalt cement has escalated from $195 to $390 per liquid ton. In one ton of asphalt there is typically 120 pounds of asphalt cement. A liquid ton price of $390 per ton equates to a price of 19.5 cents per pound, which means the AC alone in one ton of hot-mix now cost $23.40.

In 2005 when AC was $195 per liquid ton, the cost of AC in one ton of hot-mix was $11.70. Thus, the increase in AC cost alone has caused hot-mix to increase $11.70 per ton over 2005 prices.

Factor in increases in fuel costs, aggregate, labor and equipment, it becomes easy to understand why resurfacing costs have increased from a 2005 average cost of $40 per ton to the current cost of $65 per ton.
What does this have to do with Pavement Preservation?

Be patient, we’re getting there......

As noted earlier when AC cost were consistent, trendline projections could be used to somewhat project future costs.

There was a general correlation between the AC trendline and resurfacing costs trendlines.

Now, the good news... and the bad news.

The good news.....

Trendlines are still somewhat useful in predicting future costs.......  

The bad news.............

The trendline projections do not look good...
Using AC cost for the 24 month period of August 2004 through August 2006, a trendline projects an August 2007 AC cost of about $405 per liquid ton.

Using the costs for the past 12 months, a trendline projects an August 2007 AC cost of $545 per liquid ton.

This equates to a cost of $32.70 for AC alone in 1 ton of hot-mix. This and increases in fuel and other cost could result with resurfacing cost of $85-$95 per ton and maybe higher.

What does this mean for cities & counties?

Further escalation of resurfacing costs which agencies cannot keep up with!

Typical Cost for Resurfacing on 1 mile of 22’ wide roadway with 1.5” overlay:

- 2005 @ $40 per ton = $42,600
- 2006 @ $65 per ton = $69,225
- 2007 @ $85 per ton = $90,525

This is bad news for cities and counties as most have historically been 30% to 50% underfunded in resurfacing budgets for many years,...... and were already in trouble with high amounts of deteriorated pavements.

Continued increases in AC and hot-mix costs could further cause these agencies to be 70% to 125% underfunded or worst.
Many cities have not provided adequate funding for resurfacing for various reasons.

Many that once had adequate levels fell behind as they did not increase budgets to keep up with higher resurfacing costs.

And many agencies apparently just do not understand about pavement deterioration and therefore do not have a real clue of how much annual funding they should have.

Pavement deterioration is not really rocket science and not that difficult to understand!

Pavement surfaces have a typical cost-effective useful life of 12-15 years.

As such, annual funding levels should allow for replacing pavement surfaces on a 12-15 year cycle.

To determine approximate funding levels adequate for proper maintenance agencies simply need to divide their total centerline miles of streets by 15 to determine the minimum number of miles they need to resurface annually.

Then multiply those miles by the average cost of resurfacing one mile of street 25’ wide.

**Formulas to use:**

\[
\text{CL Miles} / 15 \times \text{Cost Per Mile}
\]

or

\[
\text{CL Miles} \times .066 (6.6\%) \times \text{Cost Per Mile}
\]

 Cities that do not provide adequate funding will be allowing their average pavement conditions to drop each year.

These cities will eventually end up having to borrow money at some point to play catch-up and resurface many streets and possibly rebuild others.
Ideally, agencies will have an equal amount of pavements with the same age.

This city would resurface 6.6% or 10 miles of street every year and increase budgets to keep up with increasing resurfacing costs.

Problems occur when inadequate funding is provided, i.e. in this graph for 10 years.

15 years of inadequate funding and increased resurfacing costs = Major Problem & Borrowing.

This is a problem because of this...

The poorer the pavement condition, the higher the cost to get it back in good condition or back to the top of the curve.

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Now........this is where Pavement Preservation comes into play...
Pavement Preservation

Lower cost activities performed while pavements are near the upper part of the curve.

- Rejuvenators
- Surface Seal
- Slurry Seal
- Micro-surfacing
- Crack Filler

Lower cost rejuvenators can be used on good pavements (1 to 5 years old) to keep them in good condition and aid in preventing them from cracking and raveling. By replenishing lost asphaltic oils they rejuvenate the asphalt cement and restore the pavement's flexibility and ability to retain fines. They can extend pavement life by 5 to 10 years and cost approximately $4200 per lane mile.

Reclamite® rejuvenator application

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Black coating SURFACE SEALS, SLURRY SEALS AND MICRO-SURFACING can be used on severely raveled pavements to add an extra 3-5 years before the pavement needs to be resurfaced with a hot-mix overlay. These typically cost approximately $5200 to $10,000 per lane mile depending on the type of seal used.

Micro-surface application

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Preventive Maintenance activities bring pavements back toward the top of the condition curve for a fraction of normal resurfacing costs.

The useful life of the pavement is thereby extended, essentially “re-starting” the deterioration curve.

Thin Hot-Mix Overlays

Using fine-graded surface mixes, agencies can use 1/2”, 3/4” and 1” hot-mix overlays on many streets depending on surface condition and at a less expensive cost per lane mile than a conventional 1-1/2” overlay.

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<th>Overlay Depth</th>
<th>LBS/SY</th>
<th>TONS/LM</th>
<th>Cost @ $65/ton</th>
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<tr>
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RESURFACING COST COMPARISONS PER LANE MILE

Thin Hot-Mix Overlays

1/2” Hot-mix Overlay Application

Image from APWA’s Publication “The Hole Story”
Pavement Preservation

Uses the RIGHT TREATMENT on the RIGHT PAVEMENT at the RIGHT TIME

Some agency officials may think their resurfacing budgets do not include funding for Pavement Preservation,... so they think can’t afford to implement a program.

The truth is agencies can’t afford to not implement a program, especially now that resurfacing costs are escalating at the current record rates and beyond what their budgets can keep up with.

Any agency can afford to implement a Pavement Preservation program by simply deferring the resurfacing of one or more streets and then use this money to fund and implement a pavement preservation program.

Regardless of their budget levels, agencies need to annually address as many miles of pavement as their funding allows.

By deferring the resurfacing of a few miles of street and using the saved funds for implementing pavement preservation activities, agencies will be able to overall address more miles of pavement with the same amount of funding.

Using conventional 1.5" resurfacing only, this agency would spend $680,000 and address 10 miles of street.

By deferring resurfacing of 1 mile of street the agency can use those funds for rejuvenating 6.6 miles of streets and still resurface 9 miles. For the same $680,000, the agency has now addressed 15.6 miles of street.
By deferring resurfacing of 2 miles of street the agency can use those funds for rejuvenating 13.24 miles of streets and still resurface 8 miles. For the same $680,000, the agency has now addressed 21.2 miles of street.

By deferring conventional resurfacing of 2 miles of street the agency can use those funds for rejuvenating 13.24 miles of streets and then use both 1” and 1.5” overlays to resurface 10 miles. For the same $680,000, the agency has now addressed 23.24 miles of street.

Summary

Lower cost and time proven Pavement Preservation activities can allow agencies to address more miles of pavement each year and extend pavement life by 5 years or more.

Extending pavement life aids in reducing future resurfacing costs!

Any Questions?

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