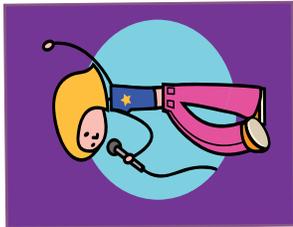


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The Asphalt RAP

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Understanding the Importance of Maintaining our Pavements

FIX IT NOW OR FIX IT LATER

One of the biggest challenges facing agencies throughout Colorado is that much needed road improvements are being deferred due to budget shortfalls. In some agencies, the funding shortfalls are significant and there is a huge gap between what is needed to maintain a road system in good condition and what is available. The result of deferred repairs and having a "wait until next year" approach is that roads are deteriorating to poor condition and the overall cost of maintaining a roadway system increases dramatically.

A fundamental concept of pavement management is that as a road deteriorates from good to fair and to poor condition, the proper "fix" shifts from preventive maintenance such as crack filling and surface treatments, to resurfacing and rehabilitating, and then to reconstructing. The problem with this "fix it now or fix it later" dilemma is that the cost of reconstructing a road tomorrow increases by as much as 5 to 10 times the cost of resurfacing it today.

The Colorado DOT has determined that the cost to reconstruct a roadway in poor condition costs approximately 8 times the cost to maintain it in good condition.

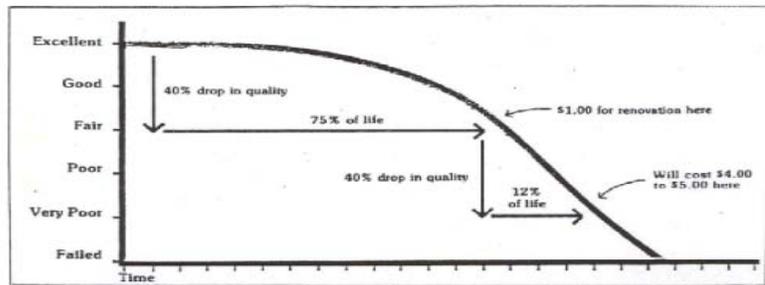


Figure 1: Pavement Life Cycle.⁽⁶⁾

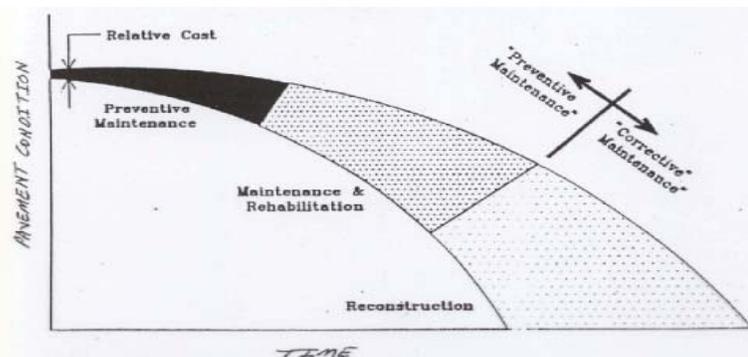


Figure 2: Pavement Repair Strategies and Relative Costs.⁽⁷⁾

Understanding the Importance of Maintaining our Pavements

One unintended consequence of having a budget constrained road improvement program is the limitation placed on project design and scoping. Many agencies have implemented sophisticated pavement management systems (PMS) that effectively optimize program funding and provide guidance on using the right repair strategy at the right time on the right projects. However, with a goal of “stretching the taxpayers dollar” and repairing as many miles as possible, it’s not uncommon for an agency to substitute a “functional” overlay or repair (i.e.. Band-aid repair) for what is actually the right fix recommended by the pavement management system.

According to Chris Jacobsen, Infrastructure Maintenance/Operations Engineer – City of Lakewood, “Street maintenance is one of the few municipal services where making the choice to provide a high level of service to citizens by properly funding an annual street resurfacing and repair program is also the most inexpensive choice in the long run.

When an agency can not optimize the program due to limited funding, the network condition worsens and a “worst first” approach to roadway improvements may develop. A “worst first” approach creates a situation where it becomes increasingly more difficult to maintain system quality. Reconstruction costs are much higher than conventional preventive maintenance and rehabilitation treatments that attempt to maintain a roadway while it is in good or fair condition. “Once a roadway reaches a certain point it is no longer cost effective for some treatments as they will not perform,” stated Jay Goldbaum, CDOT Pavement Design Program Manager.

With budget cuts and rising maintenance costs it all comes down to money and the balancing act of resource allocation. Local agency officials have tough decisions on how to spend the limited taxpayers dollars. We can only hope that they understand the engineering of pavement management (i.e.. Fix it now or fix it later) and the consequences and long term budgetary impacts of deferring road improvements.

Commercial Pavement Maintenance

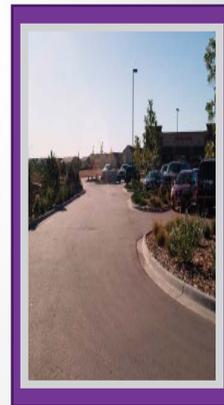
In today's business market, property owners and managers constantly seek ways to maintain and upgrade their facilities while dealing with static or shrinking budgets. Often, they ponder technological upgrades, general building repairs, landscaping and other aesthetic treatments, such as painting or re carpeting.

There is another aspect to consider, especially when thinking of long-term cost savings and the first-blush appearance of your property when a visitor or tenant drives up.

When maintenance priorities are developed for properties, upkeep of the asphalt pavements are often at the bottom of the list.

In many instances, pavement maintenance is usually delayed to the point where it's no longer serviceable and in need of reconstruction, resulting in a much higher expense than would have been needed with proper care.

Take, for example, a private facility located in east Denver that had a deteriorating, small, asphalt parking lot. A pavement evaluation was performed in 1998 that identified select areas of low-to-moderate severity distress in the form of embrittlement, cracking and weathering of the asphalt surface. Recommendations were given for preventative maintenance to rejuvenate the parking lot surface and delay major repairs for several years.



Regular upkeep can extend life of asphalt pavement

The Results of Inadequate Pavement Funding

A worst first approach is taken.

Repair costs increase tremendously

The black eye effect due to a deteriorating roadway system

ASPHALT THE SMOOTH QUIET RIDE

Understanding the Importance of Maintaining our Pavements



At this time, the estimated cost of the preventative maintenance was \$3,700 to \$5,500. The property owner lacked the money in the budget and chose to delay the work.

Fast forward to 2003. Portions of the parking lot were visibly, significantly in disrepair. The pavement evaluation now identified moderate-to-high-severity distress throughout the entire lot. The whole parking lot had to be reconstructed at a cost of \$35,500. Had the preventative maintenance recommendations provided five years earlier been implemented, the pavement life could have been significantly extended at a much lower cost.

A maintenance strategy can increase the overall life and serviceability of your asphalt pavements at a significantly reduced cost when compared to delaying maintenance to the point where reconstruction is the only option. Development and implementation of a preventative maintenance program will slow the rate of deterioration, essentially delaying the need for rehabilitation for several years.

The delay in rehabilitation, combined with the lower cost of preventative maintenance treatments, can result in dramatic cost reduction over the life cycle of the pavement. Other benefits of a preventative-maintenance program include: Higher overall performance of the asphalt pavements. The ability to make better, more informed decisions on an objective basis. The more appropriate use of maintenance techniques. Improved pavement condition over time. Reduced overall costs for maintenance of the facilities pavements.

Though there are substantial benefits to implementing such a plan, starting the program is a big undertaking. Implementation often requires a fundamental shift in the philosophy of the property owner/manager, as they must understand the benefits to taking actions sooner than later. It's recommended that property owners/managers implement a number of maintenance measures.

The climate in the Denver area can be particularly damaging on asphalt pavements due to the significant temperature changes between winter and summer. Environmental factors accelerate



deterioration by hardening the asphalt, making it susceptible to cracking, as well as weathering away of the asphalt binder, making the surface susceptible to raveling, which leads to the generation of

potholes.

Maintenance for asphalt pavements varies depending upon the property owner/manager's budget and preferences. However, a typical schedule for asphalt pavement maintenance for the Denver area should include the following:

Annual preventative maintenance:

- Visual pavement evaluations should be performed each spring or fall.
- Documenting the progress of distress to provide information on effective times to apply preventative maintenance treatments.
- Cleaning and sealing cracks.

Three-to-five-year preventative maintenance:

- Budgeting for a preventative treatment at approximate intervals of three to five years to reduce oxidative embrittlement problems.

Five to 10 year corrective maintenance:

- Corrective maintenance may be necessary, as dictated by the pavement condition, to correct rutting, cracking and structurally failed areas.
- Corrective maintenance may include full depth patching, milling and overlays.
- In order for an asphalt pavement to provide a 20-year service life, at least one major corrective overlay can be expected.

If implemented correctly, a preventative maintenance schedule should extend the life of asphalt pavements, improve its overall serviceability and reduce general maintenance costs. If maintenance isn't provided, asphalt pavements can be expected to deteriorate prematurely.

The delay in rehabilitation, combined with the lower cost of preventative maintenance treatments, can result in dramatic cost reduction over the life cycle of the pavement.

PERFORMANCE OF ASPHALT PAVEMENTS

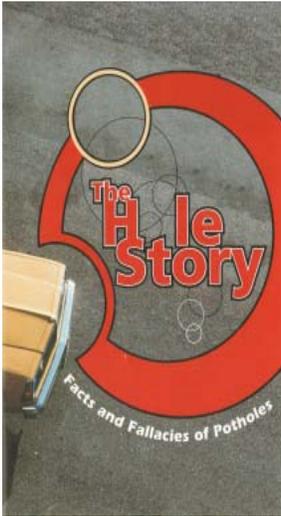
Q: How long do asphalt pavements last?

A: Longer than most people think. Don't confuse the number of years to the next resurfacing (10, 12, or 15 years or more) with how long the pavement is in place. Most asphalt pavements in Colorado have been in place since the original construction. For example, the core shown to the right was taken from Interstate 25, and originally placed in 1962. The pavement received an overlay in 1979 and again in 1994. In 2007, 4 inches of the roadway was milled and 4 inches replaced. So this is a pavement that has been in place for nearly 50 years with only resurfacing needed approximately every 15 years.

Pavement Core, I-25 N. of Pueblo, original construction - 1962



Maintaining Pavements: Preventing the Pothole



Potholes are Caused By : Traffic, Loading, Water/Snow/Ice, Age, Deferred Maintenance. Potholes are created when the pavement or the material beneath it – called the base or subbase – cannot support the weight of the traffic it carries. Two factors are always present in such a failure: Traffic and Water. In the final analysis good design, high quality materials, continuous maintenance can substantially prolong the life of pavements and minimize the emergence of potholes. Water accelerates the cracked pavement problem. In cold-climates, the deterioration process is further accelerated due to the freeze-thaw action. Facing the squeeze of increased costs, less revenue, and citizen resistance to tax increases, many state and local governments have chosen to make “low profile” or “painless” budget cuts. One way to trim operating budgets is to defer preventive maintenance procedures on streets and highways. Research and field experience have repeatedly shown that over the long run maintaining good roads in good condition costs substantially less per year than allowing them to deteriorate to the point that major rehabilitation or reconstruction is required. The Results of Inadequate Roadway Funding. Agencies cannot do the right repair at the right time. A worst first approach is taken. Repair costs increase tremendously. The black eye effect.

This edition of “The Asphalt RAP” was authored by Thomas Peterson, P.E. Executive Director CAPA. Other acknowledgements: The Hole Story, Facts and Fallacies, APWA, 2003.

Regular upkeep Article, Denver Business Journal, April 2005 authored by Damon Thomas, P. E. and Mike Skinner, P.E. CTL/Thompson, inc.

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