

Executive Summary

This Manual Will Show You How to Accomplish a Balance of Preventive & Corrective Maintenance

Pavement Management is a process that assists in roadway management decision-making. It includes a software program to store and analyze data and generate reports that can help achieve the goal of a long and useful life for your roads at the lowest possible cost. A continually growing database of information on road segments is used to assess the condition of a road, anticipate trends and weigh alternatives. Then predetermined strategies are recommended to help decision-makers identify where and when funds should be spent. Pavement Management will help you balance needs with long-term benefits in order to get the best return from your funds.

“Worst First” vs. “Best First” Maintenance Policy

Funds are typically spent on more visible activities such as pothole patching or snow removal, or on very expensive repairs involving substantial rehabilitation or complete road reconstruction. When you focus primarily on expensive rehabilitation or reconstruction, a small number of roads will quickly deplete your budget, leaving little for preservation of the roadway system. Over time, this “worst first” management practice of repairing the worst roads first will delay maintenance on the majority of roads and will eventually prove to be very costly.

In reality, a “best first” policy is preferable. A proactive, “best first” management practice using low cost treatments will help to retard significant deterioration. Routine maintenance, such as patching and crack sealing, and preventive maintenance, such as global surface treatments, will help to keep environmental factors at bay. Studies have shown that preventive maintenance, when applied at the appropriate time, is 3 to 6 times more cost-effective than rehabilitation techniques.

Preventive Maintenance Will Lengthen Road Life and Reduce Costs

It is tempting to spend the lion’s share of road repair budgets on fixing the worst problems first, while delaying preventive maintenance on newer roads. However, as you will see from examples given later in this manual, that strategy leads to only a temporary – and very costly – solution. In the long run, it costs a lot less to keep your agency’s roads in good condition through a planned program of preventive maintenance. Of course, major safety problems call for immediate repairs. If a pothole is swallowing tires, it must be fixed as soon as possible. The point this manual makes, however, is that rather than concentrating only on reconstructing roads after they have seriously deteriorated, we must invest in preventing that deterioration from happening in the first place.

All roads eventually need to be replaced. The good news is there are ways to extend a road’s useful life by making repairs sooner. This proactive, as opposed to a reactive, approach requires some hard decisions by those who control repair budgets. Elected officials must inform their constituents of their proactive road management policy because there is constant pressure to use limited resources to, in effect, “put out fires” without addressing what is causing them. The solution is to find a balance between attending to immediate needs and using an escalating percentage of discretionary budgets to prevent future deterioration.

Effect Of Growth

Further complicating decisions on pavement management is growth. Besides visible pavement distresses, a road's age, traffic volumes and truck volumes are all major factors in understanding how and when to apply various techniques for maintaining asphalt or concrete pavements.

Additional strains are placed on budgets with each new subdivision or commercial development:

- 1) Continued growth leads to new roads that must be maintained.
 - New highways
 - Widening of other roads
 - New local roads and subdivision streets
- 2) Increased truck traffic deteriorates roads quickly.
 - A large, heavily loaded truck does thousands of times more damage to a pavement than does a car
- 3) Existing roads not built for today's traffic loads are unable to support current growth



Figure 0-1: A street in a new subdivision that has failed structurally

Why Proper Timing and Communication Are Critical

For pavement management to be cost-effective, proper timing is critical. That means applying a surface treatment to the pavement surface before significant deterioration has occurred. Once the average person can see that a road is in need of repair, it is too late for inexpensive repairs.

It is difficult to explain why you are fixing a road that has a few cracks now, when two miles away there is a road that is falling apart. You will need to communicate to your constituents that preventative maintenance saves money and help them understand why.

Pavement Management System

Obviously, deciding how to allocate limited highway monies is a complex process. Fortunately, Pavement Management System (PMS) software programs are available and can be of great assistance in performing an analysis of all possible “what-if” scenarios to select the most cost-effective combination of projects for your district. A road’s age, traffic volumes and truck volumes are all major factors in understanding how and when to apply various techniques for maintaining asphalt or concrete pavements.

The backbone of most modern day Pavement Management Systems is a software program. Although software programs can vary greatly in complexity, they typically consist of 3 general components:

- 1) **A Database** containing an inventory of the physical characteristics of the road system: pavement condition data; history of repairs; repair costs and life of repairs; and other data such as truck volumes or accident history.
- 2) **A Data Analysis Package** that makes recommendations about how and when to allocate resources to potential Preventive Maintenance, Rehabilitation & Reconstruction (repair strategies) projects. It analyzes and sorts data,

generates reports and provides recommendations based upon a prioritization equation. For local governments, the analysis is based on the current condition of the pavement. Most agencies, with a little help from a computer spreadsheet can realistically project a four to five year budget assuming that the majority of asphalt pavements, which have not been treated during this period, will degrade one repair strategy level.

However, larger agencies with more sophisticated software programs are able to forecast future conditions based on pavement performance models. This type of system requires a significant allocation of resources (both time and money) to properly implement.

- 3) **A Feedback Process** to verify and improve the reliability of the Pavement Management System. For a PMS to be truly effective, it requires the support of everyone involved in the process. Over time as the system is fine-tuned and several years of accurate data are input into the system, the information generated will become more reliable.

CONCLUSION: Balance is the “Real World” Solution

While maintaining your agency’s roads using a “best first” policy would result in savings in the long term, in the short term you need to balance that goal with the realities of public demands to remedy “worst case” problems. One way to do that is to allocate an increasingly larger portion of the available funds toward preventive maintenance. Even small amounts can begin to make a difference. Using strategies provided in the Pavement Management System process, you will see an improvement in the condition of your agency’s road network. Over time, preventive maintenance will reduce the number of roads changing from good to poor condition.