

Cost Benefit Analysis of Including Microsurfacing in Pavement Treatment Strategies & Cycle Maintenance

EXECUTIVE SUMMARY

The overall value of using thin surfacing maintenance treatments to extend and preserve the performance of existing pavements has been widely recognized. This study has focused on evaluating the cost effectiveness of commonly used individual treatments. In addition, an effort was made to identify additional beneficial treatments for consideration by PennDOT.

This work consisted of three tasks, conducting a literature review, carrying out a survey of other states, and performing cost benefit analysis of maintenance treatments. Each task produced specific results. The literature review searched for information about the successful use of thin surface maintenance treatments and documentation of cost effectiveness. In addition to identifying commonly used treatments several less common treatments were researched as well. E-krete was identified as an additional thin surface treatment which has the potential to be beneficial. It has been approved by PennDOT for evaluation. Some questions about the effect of this material on asphalt pavement recycling were not answered in the literature.

A simple electronic survey was developed to gather certain information from other states about their experience with thin maintenance treatments, including typical performance and costs for each of the treatments identified in the literature review. Thirteen of 16 states with similar climatic conditions, topography, or broad experience with treatments provided responses to the survey. A few of the treatments from the literature review were identified as having little or no use among the other highway agencies polled. The states did report valuable performance and cost information for the commonly used treatments which could be used later in the cost benefit phase of the project. The Virginia and New York DOTs also reported the successful use of specially developed thin overlays of less than one inch thickness, which appear to merit additional investigation by PennDOT. Similarly, Minnesota has reported very good success with chip seals, since a specification transition making the contractor responsible for windshield damage. This was accompanied by improvements in design and construction process control.

The cost benefit analysis was conducted for the commonly used treatments on the basis of three separate data sets; information provided by other states, the Department's in-house costs, and PennDOT contract prices. All the treatments included in the evaluation were found to be beneficial in extending the life of an existing pavement. Life cycle cost analysis (LCCA) indicated that there is an optimum pavement condition, and associated age (or sometimes a range of condition or age) when the benefit cost associated with a chosen treatment is maximized. Results from these evaluations concluded that while some differences can be observed depending upon the source of the cost and pavement performance data used, and the cost benefit analysis method employed, the relative ranking of the treatments remains consistent. Crack sealing was added to the treatment evaluation, since information was available and it fits with the theme of surface maintenance, even though it is not a thin surfacing.

The rank of treatments in the order of cost effectiveness is provided below.

1. Crack Seal
2. Chip Seal (PennDOT seal coat)
3. Microsurfacing
4. Thin overlay
5. Novachip

The direct PennDOT experience with Novachip has been limited to relatively high volume highways in relatively good condition. Recent PennDOT experience indicated that chip seals have largely been used on lower volume roads, but the experience of several other states indicates that they could be used on somewhat higher volume highways. They also indicate benefits from the use of additional types of asphalt binders, and alternative aggregate gradations.

The performance experience shared by other states indicates that additional improvements can potentially be realized in the application of chip seals and thin overlays. The project also developed a cost benefit analysis methodology which the Department can use in the future to update the analysis conducted, and to potentially improve the application timing of treatments.