Case Study on Preventative Maintenance for Asphalt Pavements

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Abstract. The U.S. highway industry has seen increasing use over time of preventative maintenance treatments on its asphalt pavements. Performance of the most prevalent treatments employed by the state DOT in the case study – Thin Asphalt Overlay (Thinlay) and Microsurfacing – has yet to be examined in-depth in-situ analysis. This paper describes the data collection process to find the Pavement Condition Index (PCI) of each preventative maintenance site in the state from the last 10 years. With PCI from each site, deterioration curves were generated for each treatment – providing the estimated life extension benefit of each. The analysis then converted life extension to annualized costs to determine which product was more cost effective. Cost effectiveness would be the definitive metric in determining which product is of higher quality.

1. Introduction

In recent years, the paving industry has seen Microsurfacing, Thinlay, and other preventative maintenance treatments being increasingly applied to asphalt pavements. Lemer (2004) found that the perceived value of preventative maintenance of roadway pavements was recognized by State Transportation Agencies in addressing transportation infrastructure system preservation. The United States Federal Highway Administration (FHWA) defines preventative maintenance as "a planned strategy of cost effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without significantly increasing the structural capacity)" (FHWA 2005). Rajagopal (2010) examined the effectiveness of Microsurfacing on pavement rehabilitation and found that the method can be effective when applied to pavements that have experienced only minor detrition. Peshkin et al. (2004) examined the optimal timing of pavement preventative maintenance methodologies and stated that, "proper analysis of data identifies the optimal time to apply [preventative maintenance] treatments" (p. 63) and noted that future research is needed to develop optimal timing on preventative maintenance and that additional in-situ investigations of preventative maintenance technologies are needed to develop a better understanding of the performance of the methodology. The current work extends this previous research by investigating the performance of these preventative maintenance treatments in terms of life-cycle economics. To perform this investigation, data on all preventative maintenance projects in the state over the previous 10 years was compiled. The projects span a large variety of traffic conditions, age, and pre-existing surface age. With the large variety of conditions represented, some general conclusions can be made about the different paving materials.

2. Product Descriptions

Although both products are used in preventative maintenance applications, they have very different properties and construction practices. These properties range from the gradation of the mix to the simple thickness of the mat. Figure 2.1 below illustrates some of these differences.