

JOINT TRANSPORTATION RESEARCH PROGRAM

Principal Investigator: Professor Makarand Hastak, Purdue University, hastak@purdue.edu, 765.494.0641

Program Office: jtrp@purdue.edu, 765.494.6508, www.purdue.edu/jtrp

Sponsor: Indiana Department of Transportation, 765.463.1521

SPR-3416

August 2011

Benefits and Assessment of Annual Budget Requirements for Pavement Preservation

Introduction

The capacity and condition of highways has been deteriorating due to low maintenance budgets, environmental effects, poor weather conditions, and a rapid growth in the use of highways by consumers. It has become increasingly important to take steps that would both meet the nation's needs and satisfy consumers; however, allocating more funds for pavement rehabilitation or reconstruction is not the solution (NCPPI 2010). Instead, most agencies have begun to allocate funds for pavement preservation. According to the Federal Highway Administration (FHWA), pavement preservation is "a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations." The Indiana Department of Transportation (INDOT) has already begun a Pavement Preservation Initiative. The two main objectives of this research are: 1) to determine the benefits of pavement preservation techniques; and 2) how much budget to allocate for these activities. To satisfy these objectives, research was conducted in three stages:

- Data collection through literature review, surveys, and telephone interviews.
- Data analysis and recommendations.
- Development of a methodology to determine allocation of funds.

Findings

Initiatives for pavement preservation by U.S. Departments of Transportation (DOTs) have significantly increased. Pavement preservation has offered various benefits, including life extension of the pavement, cost benefits, consumer satisfaction, improved pavement condition, enhanced safety, and fewer construction delays. This research seeks to enable INDOT to quantify these benefits and find an optimum budget that should be allocated for pavement

preservation activities. In order to fulfill these objectives and collect the required data, various DOTs were contacted through Surveys and telephone interviews.

Quantification of the Benefits of Pavement Preservation

DOTs use various methods to calculate the benefits of pavement preservation. INDOT uses lane mile years. It was determined that the Michigan DOT uses a Road Quality Forecasting System (RQFS), Louisiana uses a Highway Health Index, Maine uses DTIMS software, Maryland uses lane mile years, and New Mexico and Washington use an Annualized Costs method to quantify the benefits of pavement preservation. After analysis of these methods, the research team recommended that INDOT use an Annualized Costs method for calculating and quantifying the benefits of pavement preservation. A detailed description of the method is presented in this report.

Budget Allocation for Pavement Preservation Activities

Allocation of budget for pavement preservation activities is another objective of the research. Discrepancy still exists in the budget requirements from one year to the next. In order to overcome this, the concept of resource leveling was adopted, which would level budget requirements over the entire life cycle of a project. A model was established based on the concept of resource leveling and the minimum moment algorithm. INDOT then conducted a case study comprising 196 projects to be completed in three years, between 2010 and 2012. All of the projects had different duration and costs associated with their respective maintenance treatments. Performance of all the treatments was projected over a period of 15 years based on frequency of use and estimated life of the treatment. The algorithm was run for these projects and leveled budgetary requirements were obtained. The algorithm reduced the variance in the budgetary requirements from one year to the next and offered a more consistent budget requirement.

Implementation Recommendations

This research provides significant advantages for INDOT in implementing pavement preservation strategies. The research provides an overview of how to quantify all the benefits of pavement preservation and also how to allocate an optimum budget for preservation activities. It includes some of the new methods of calculating benefits from pavement preservation which are not currently implemented by INDOT. The budget allocation methodology developed by the research team can be implemented by INDOT for their budget allocation purposes. All the data collected would thus be used by INDOT for various implementation activities. The findings and recommendations will be introduced to the INDOT Pavement Preservation Subcommittee for assisting the network level pavement preservation strategy.

References

Hastak, M., Lee, J., Shah, H., Yoon, Y. (August 2011) "Benefits and Assessment of Annual Budget Requirements for Pavement Preservation," Joint Transportation Research Program Technical Report Series. Report SPR-3416, DOI: 10.5703/1288284314620

