EFFECTIVENESS OF CRACK SEALING ON PAVEMENT SERVICEABILITY AND LIFE

Problem
Sealing cracks in pavements with an asphalt surface is a preventive maintenance activity performed by most highway agencies including the Ohio Department of Transportation (ODOT). A range of materials and methods are in use within Ohio for this purpose. The choice of a specific material/method depends on the county manager’s understanding of the historical performance of various materials, pavement type (flexible or composite), regional conditions, availability of funds, and so on.

Sealing cracks may minimize water infiltration, prevent pumping and avoid the need for premature base and pavement repair. However, crack sealing may also have a negative effect on a pavement, namely, tracking of sealing material by tire action, reduced skid resistance, a rougher pavement etc. Crack sealing is beneficial if pavement life is increased while maintaining serviceability. Within ODOT, the primary concern is to investigate and document the effectiveness of crack sealing with respect to: (i) economic benefits, (ii) maintaining and/or improving serviceability, and (iii) extending pavement life.

This study was carried out to establish a field experiment to statistically evaluate the effectiveness of ODOT’s current crack sealing practices on pavement serviceability and life. The report provides a complete description of the experimental plan, testing, evaluation and proposed analysis procedures.
Objectives
To design and develop a project to statistically evaluate the cost-effectiveness of ODOT’s current crack sealing program.

Description
In this study, the effectiveness of crack sealing of flexible and composite pavements will be determined through a series of well-controlled field evaluations conducted over a period of nearly ten years. The experimental plan has been carefully designed to obtain statistically valid conclusions. The design of experiment included several tasks namely, identification of experimental variables, determining the required sample size, defining a measure of effectiveness, selecting test sections, conducting field studies, determining type and frequency of data to be collected, and developing a database. The data collected would be used by the ODOT to address the following specific issues:

- Do existing crack sealing practices within ODOT enhance pavement performance?
- Are crack sealing practices cost beneficial?
- What is the optimum timing for treatment?

Based on an evaluation of crack sealing practices in Ohio, a review of published literature, and a discussion with ODOT’s engineers, the primary design factors selected for the field experiment were pavement type, type of aggregate in the surface layer and Pavement Condition Rating (PCR) level. In addition, environmental conditions, functional classification, crack sealing material type and placement procedures were considered as secondary variables.

Pavement condition data was and still is being collected on all test sections prior to crack sealing and at regular intervals after crack sealing. In addition, the International Roughness Index (IRI) and Skid data are being compiled using the data in ODOT’s inventory. Photographs of typical cracks are also being collected for a visual comparison of pavement condition.

An interactive database has been developed to assist the ODOT in (i) data gathering, (ii) data storing, (iii) data processing, and (iv) data analysis. This database termed ODOT - ECS (Ohio Department of Transportation - Database to Evaluate Crack Sealing Practices in Ohio) is a comprehensive MS Windows-based software developed in MS Visual Basic and MS Access. This research will help ODOT to objectively assess the effectiveness of its crack sealing practices.

Conclusions & Recommendations
Final conclusions on the effectiveness of ODOT’s current crack sealing practices can be reached after applying the suggested analysis procedures to the data collected according to the guidelines developed in the study. However, it is strongly recommended that an analysis and an interim report be prepared for the data up to 2005.

Implementation Potential
For the crack sealing program in the State of Ohio, this study will help establish ‘what’ (with respect to the type of material and method) and ‘when’ (with respect to age and/or condition of pavement) it is most cost-effective to seal a pavement with the objective of improving its condition and extending its life.