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Executive Summary Report

EFFECTIVENESS OF CRACK SEALING ON PAVEMENT SERVICEABILITY AND LIFE

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Project Background

Sealing of cracks in asphalt surfaced pavements has long been one of the widely practiced pavement maintenance strategies by the highway agencies in including Ohio Department of Transportation. Crack sealing is performed with intent to reduce water infiltration, prevent pumping and avoid the need for premature base and pavement repair. A successful crack sealing project can result in numerous benefits such as - improved pavement condition, increased safety, extended service life, reduced maintenance and rehabilitation needs and overall, lower life cycle costs. A host of factors namely: sealing materials, placement techniques, equipment, pavement types and condition, type and severity of crack sealed, regional environmental and traffic conditions, evaluation procedures and so on are known to directly influence the level of success that can be attained in a crack sealing project. These variables often act individually or collectively to affect the outcome of a crack seal project. Despite the intended benefits, crack sealing may also affect the pavement in many ways like, 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.***

In 2000, the Ohio Department of Transportation initiated a 10-year study to ‘statistically verify the effectiveness of its current force account crack sealing program on pavement condition and life’. The efforts included setting up test sections, applying crack seal treatment, monitoring the test sites, generating long-term performance data for field verification of the effectiveness of ODOT’s current crack seal practices. The study resulted in identifying best practices for future application of crack seal practices in Ohio.

Study Objectives

The primary objective of this study is to evaluate the effectiveness of crack sealing procedures currently practiced in Ohio. A field experiment was developed to collect long-term performance data. By



analyzing this long term performance data, it was desired that the study will resolve the following key issues:

- Do existing crack sealing practices within ODOT enhance pavement performance?
- What are the conditions under which crack sealing treatment yield enhanced performance?
- What is the optimum timing for crack seal treatment?

Description of Work

During the period 2000 through 2002, ODOT set up over 700 test sections, each 1000 feet long, in asphalt surfaced pavements. The test sections were treated by crack sealing materials at various time periods reflecting varied pavement conditions. Control sections were set up in adjacent areas which served as ‘do-nothing’ treatments. The county managers were provided with guidelines describing the pavement limits, crack sealing schedule, required documentation and reporting. All these tasks were well coordinated by the Office of Pavement Engineering and ODOT’s district and county offices.

The test sections were surveyed annually to record their pavement condition ratings from the time prior to crack sealing and for a period of five years after sealing. Pavement condition survey was conducted in accordance with ODOT’s guidelines for pavement condition rating, (PCR) by visually observing surface distresses and recording their severity and extent. The performance data was analyzed to derive two performance measures of effectiveness namely:

- Average Performance Gain due to crack sealing, and
- Service life comparison of treated and control sections.

The difference in PCR values of the treated and control section for each test section was calculated for each year, up to five years. The average of these differences was denoted as ‘Average Performance Gain’. Performance prediction models were developed to determine the service life of the pavements.

Research Findings & Conclusions

The average performance gain of all the crack sealed pavements, regardless of pavement type and prior pavement condition, ranged from 2 to 7 PCR points with an overall average of 3.9. The difference was found to be statistically significant at 95% confidence interval. The performance models revealed that the treated pavements have an additional service life of 0.1 to 3.66 years, depending on the pavement type and condition of pavement prior to crack sealing.

The analysis was continued to identify a set of conditions and optimal timing of treatment that would maximize the performance of pavements. The results showed conclusive evidence that the effectiveness is more pronounced when crack sealing is performed on pavements with prior pavement condition rating ranging from 66 to 80. The cost analysis using a common metric such as the Net Present Value illustrates that crack sealing, as a maintenance strategy, is economically viable for pavements in the prior PCR range of 66-70. From a practical point of view, it is hereby recommended that ODOT develops a policy to allow crack sealing as a strategy for pavement preventive maintenance for all pavements in the prior PCR range of 66 to 80.