

May 2011

RESEARCH PROJECT TITLE

Development of Updated Specifications for Roadway Rehabilitation Techniques

SPONSORS

Iowa Highway Research Board
(IHRB Project TR-598)
Iowa Department of Transportation
(InTrans Project 08-341)

PRINCIPAL INVESTIGATOR

Chuck Jähren
Associate Professor, Civil, Construction
and Environmental Engineering
Iowa State University
515-294-3829
cjahren@iastate.edu

FOR MORE INFORMATION

www.instrans.iastate.edu

**Institute for Transportation
Iowa State University
2711 S. Loop Drive, Suite 4700
Ames, IA 50010-8664
515-294-8103**

The mission of the Institute for Transportation (InTrans) at Iowa State University is to develop and implement innovative methods, materials, and technologies for improving transportation efficiency, safety, reliability, and sustainability while improving the learning environment of students, faculty, and staff in transportation-related fields.

The sponsors of this research are not responsible for the accuracy of the information presented herein. The conclusions expressed in this publication are not necessarily those of the sponsors.

Development of Updated Specifications for Roadway Rehabilitation Techniques

tech transfer summary

Since Iowa's road network is mostly established, maintenance and rehabilitation efforts will be an increasingly large proportion of future investments.

Objectives

This research project investigated ways to improve Iowa Statewide Urban Design and Specifications (SUDAS) and Iowa Department of Transportation (DOT) documents regarding asphalt roadway maintenance and rehabilitation. Researchers led an effort to review and help ensure that the documents supporting proper selection, design, and construction for asphalt maintenance and rehabilitation techniques reflect the latest research findings on these processes: seal coating, slurry sealing, micro-surfacing, and fog sealing.

Problem Statement

As our nation's highway system continues to age, roadway maintenance and rehabilitation techniques have become increasingly important. The deterioration of pavement over time is inevitable. Preventive maintenance is a strategy to extend the serviceable life of a pavement by applying cost-effective treatments that slow the deterioration of pavement and extend its usable life.

Thin maintenance surfaces (TMSs) are preventive maintenance techniques that can effectively prolong the life of pavement when applied at an opportune time. Common TMSs include bituminous fog seal, bituminous seal coat, slurry seal, cold in-place recycling (CIR), and micro-surfacing.

Research Description

Literature Review

Resources from state agencies, local jurisdictions, trade associations, and academia were reviewed to identify relevant information that would improve the current state of SUDAS and Iowa DOT standard specifications. The primary resources from recently-completed research were for projects conducted at Iowa State University (ISU) and the Institute for Transportation (InTrans), which was formerly the Center for Transportation Research and Education (CTRE).

In addition to recent research conducted at ISU, specifications and other documents were obtained from neighboring state highway authorities, local jurisdictions, and professional associations. Specifications for each of the states surrounding Iowa were reviewed to identify differences in comparison to the Iowa DOT and SUDAS specifications.

Practitioner Surveys

In addition to performing a literature review, input from practicing individuals was also obtained and reviewed. A TMS questionnaire was given to attendees at the following conferences:

- County Engineers Conference, December 2008
- Greater Iowa Asphalt Conference, March 2009
- American Public Works Association (APWA) Conference, Spring 2009

The results of these interviews helped researchers to focus in areas where the need for improvement and the interest in the maintenance techniques were the greatest. General information regarding treatment options and project selection and then specific information regarding seal coats were identified as areas where focus would be most beneficial.

Questions regarding proper TMS application and construction were also asked to members of the technical advisory committee (TAC) for the project, as well as contractors who perform asphalt pavement maintenance and rehabilitation, to obtain perspective on TMSs from practicing professionals. Phone interviews were conducted to obtain the opinions of surveyed individuals.

Summary of Recommendations

Following is a summary of the specification updates that were recommended.

Fog Seal

- Harmonize temperature requirements with neighboring jurisdictions by allowing a lower minimum application temperature. At the high end of the range would be 50°F and 40°F would be in the middle of the range.
- Make the specification more robust for municipal use by including a requirement to protect manhole covers, valve covers, and other appurtenances.
- Also consider striking the word “Shoulder” from the title.

Seal Coating

- Include additional fine aggregate (1/4 inch and No. 4) gradations.
- Include high float emulsions in material specifications.
- Harmonize emulsion temperature requirements with recommendations of the American Emulsion Manufacturers Association (AEMA).
- Reduce suggested aggregate end emulsion application rates to match the experience with application rates developed in previous Iowa research projects.

- Specify earlier end of season limits with flexibility to make exceptions under specific circumstances.
- Update equipment requirements.

Slurry Seal

- Require a higher proportion of fine material in the Type III (coarse) slurry seal gradation.
- Harmonize requirements for component materials in mix designs and application rates with guidance from the International Slurry Surfacing Association (ISSA).

Micro-Surfacing

- Require a higher proportion of fine material in the Type III (coarse) micro-surfacing gradation.
- Adjust material requirements to allow limestone aggregate with low clay content and good wear characteristics.

Implementation Benefits

Several benefits will result from this research. Maintenance and rehabilitation projects can be selected, designed, and constructed more efficiently, because the targeted documents will reflect improvements recommended by recent research.

Incorporation of research results in the targeted documents is an efficient method for affecting improvement, because changes in these documents usually result in a change in the standard operating procedure for TMSs. The targeted documents are concise and widely read; therefore, they are accessible to a wide audience.

Since Iowa’s road network is mostly established, maintenance and rehabilitation efforts will be an increasingly large proportion of future investments. Therefore, an investment that improves maintenance and rehabilitation projects is effective in providing benefits to road users and other transportation stakeholders.

Implementation Readiness

The Iowa DOT is starting an effort to increase the investment in pavement maintenance. This will likely involve increased use of the maintenance treatments addressed in this study. Appropriate training and insightful project selection will enhance the success of this effort. It is recommended that treatment selection guidelines developed in previous research and the revised specifications be used and evaluated as this program ramps up.