

## **I. RESEARCH PROJECT TITLE**

*Kansas Pavement Preservation Initiative: Development of a Seal Coat Design and Construction Manual and Investigation of Design of Seal Coats with Light Weight Aggregates*

## **II. RESEARCH PROBLEM STATEMENT**

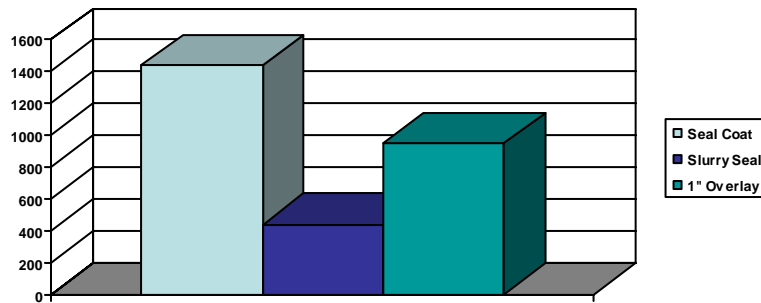
Like many other states, dwindling budgets for pavement preservation program are forcing KDOT to look closely at the pavement preservation techniques. Pavement preservation has been a hall mark of KDOT pavement management system – NOS. The KDOT pavement preservation program actions for asphalt-surfaced pavements include route and crack seal, chip seal, 1- to 4-inch overlay, 1- to 4-inch inlay, heater scarification, cold in-place recycle (4-inch), ultra-thin bonded bituminous surface (Nova chip), modified slurry seal, and cold milling. For most part, these methods are selected either based on historical experience or based on the manufacturer's recommendations for the proprietary ones. Thus there are large knowledge gaps in terms of effectiveness, durability, and other important factors. A review of use of these methods on the KDOT system indicates that approx. 1,450 miles of conventional seal (chip seal) has been placed from 2001 to 2005. This strategy, by far, is the most widely used pavement preservation technique in Kansas as illustrated in Figure 1. With anticipated reduction in substantial maintenance money in the near future, the use of seal coat is expected to rise. It may also be mentioned that seal coat is a very popular treatment with the local agencies too. Under funding from the KSU University Transportation Center (UTC), the Principal Investigator and the Consultant of this project will be offering a 1-day training class on thin surface treatments for the administrators and engineers, and a 2-day training class (open to all) on thin surface treatments in the Spring of 2008. However, because of widespread use, requests have been made by the KDOT engineers to put together a class on chip seal only. The states that have become very successful in applying this strategy have also developed their own training and associated seal coat manual. This project proposes to develop such a training class and manual for Kansas. Again, current seal coat design methods were developed for regular aggregates. KDOT exclusively uses light-weight aggregates. There have been some recent problems with seal coats in Kansas and light-weight aggregates have been blamed for these problems. Almost no information is now available on seal coats with light weight aggregates. Thus the design methods need be to be reinvestigated for the light-weight aggregates.

## **III. RESEARCH PROPOSED**

The objectives of this project are: (i) To develop a 1-day training class and a seal coat design and construction manual for KDOT, and (ii) To evaluate the use of light-weight aggregates in chip seal in Kansas. It is expected that the seal coat manual will include information on the proper use of light-weight aggregates. In year one of the Kansas Pavement Preservation Initiative, two training classes (one 1-day and one 2-day) on thin surface treatments have been offered. A research project to quantify benefits and effectiveness of pavement preservation in Kansas based on historical data is also under

way. The proposed projects (in Year 2) are the continuation of the effort for a planned and coordinated education, research, innovation, and implementation plan for pavement preservation in Kansas. The following tasks are proposed to be accomplished in this study:

*Task 1:* Do a literature search regarding existing seal coat design manuals and light weight aggregate seal coats



**Figure 1 Thin Surface Treatment Mileage by KDOT (2001-2005)**

*Task 2:* Develop a seal coat design and construction manual for Kansas

*Task 3:* Develop and offer a 1-day pilot training class on seal coat design and construction in Spring, 2010

*Task 4:* Investigate the current seal coat design procedure in Kansas in light of use of light weight aggregates

*Task 5:* Develop recommendations for a new seal coat design procedure

*Task 6:* Write a final report

#### **IV. ESTIMATE OF FUNDING AND RESEARCH PERIOD**

***Project duration:*** 24 months (07/01/08-06/30/10)

***Budget:*** \$130,000

#### **V. URGENCY AND PAYOFF POTENTIAL**

The research should have a high priority. All highway agencies are currently trying to stretch the maintenance dollars through cost-effective pavement preservation strategies. This initiative has the potential to make a pavement preservation strategy more successful and save millions of dollars in alternative maintenance treatments. This would result in a big return in exchange for the small investment in this research project.

#### **VI. IMPLEMENTATION STRATEGY**

Implementation of this study is expected to be carried out by the Bureau of Materials & Research.

**VII. PROJECT PERSONNEL**

This project will be carried out under the direction of **Mustaque Hossain**, Principal Investigator in close cooperation with KDOT. **Mr. Dean Testa** of DMT Enterprise, Inc. in Topeka will be a consultant in this project and will work primarily on the seal coat manual and training class. One graduate students and one undergraduate student in civil engineering will also work on this project. **Mustaque Hossain** is a professor of Civil Engineering at Kansas State University. His areas of expertise are pavement materials, pavement design, performance, management and non-destructive evaluation using Falling Weight Deflectometer (FWD).