

CE 890 Graduate Seminar

SPEAKER: Md. Shaidur Rahman (Advisor: Dr. Mustaque Hossain)

TOPIC: “Effectiveness of thin surface treatment in Kansas”

DATE: April 21, 2010

TIME: 4:00 p.m. (refreshments at 3:45 p.m.)

PLACE: 2144 Fiedler Hall

ABSTRACT

Preventive maintenance strategy is applied to bring it back to appropriate serviceability after it starts to deteriorate right after its construction due to several factors, e.g., traffic loading, deterioration of pavement materials and climatic effects. In recent years, more and more highway agencies are adopting preventive maintenance strategies and moving away from rehabilitation actions since rehabilitating pavements at near failure is not a cost-effective pavement management technique. A variety of preventive maintenance treatments or thin surface treatments are available to bring pavements back to appropriate serviceability for road users. In Kansas, the Kansas Department of Transportation (KDOT) adopts several preventive maintenance treatments including thin overlay, ultra-thin bonded asphalt surface (nova chip), chip seal and slurry seal. This report discusses the effectiveness of thin surface or preventive maintenance treatments applied in 2007 on sixteen highway sections in Kansas. Three types of thin surface treatments, 1” Hot Mix Asphalt (HMA) overlay, ultra-thin bonded asphalt surface (nova chip), and chip seal, were applied in this study. These treatments were applied on three types of surface preparation, namely, bare surface, 1” surface recycle (1” SR) and 2” surface recycle (2” SR). The effectiveness of the thin surface or preventive maintenance treatments for mitigating typical distresses and enhancing pavement performance was evaluated by conducting before and after (BAA) comparison. All data required for this study were extracted from the Pavement Management Information System (PMIS) of KDOT. It was observed that transverse and fatigue cracking significantly decreased and rutting condition was better after the thin surface treatments were applied. The roughness condition was observed to be better on the highway test sections treated with 1” HMA and nova chip treatments while the effects of chip seals on reducing roughness were not obvious. The benefit and performance levels of the pavements were observed to go up after the thin surface treatments were applied.

Hamburg Wheel-Tracking Device (HWTD) test was conducted on the core samples taken from sixteen highway sections under this study. The laboratory test results showed that most projects exceeded the maximum rut depth limit (20 mm) specified for 20,000 wheel passes and the number of wheel passes to failure varied significantly among the projects. Cores from only three projects, two treated with nova chip and one with 1” HMA, carried 20,000 wheel passes without exceeding the maximum rut limit of 20 mm. Pair-wise comparisons or contrasts among the treatments were also performed with the statistical analysis software, SAS. Air void of the HWTD test cores was found to be a significant factor affecting the performance of thin surface treatments.