CE 890 Graduate Seminar

DATE: September 17, 2008

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

PLACE: Rathbone 1052

SPEAKER: Mbaki Onyango

TOPIC: **"**Verification of Mechanistic Prediction Models for Asphalt Mix Permanent Deformation (Rutting) Using Accelerated Pavement Testing"

ABSTRACT

Permanent deformation (rutting) is the most critical load-associated distress that develops on asphalt pavements significantly affecting their performance. Past research work focused on improving the performance of asphalt mixes using either empirical prediction models or utilizing elastic material behavior for prediction models. In recent years, mechanistic and mechanistic-empirical prediction models have been developed to take into account asphalt material behavior (viscoelastic or viscoplastic) and material response to loading. This research project aims to evaluate some mechanistic prediction models for permanent deformation (rutting) by comparing computed permanent deformation to that measured in a full-scale accelerated pavement test. Six pavement sections were constructed in the Civil Infrastructure Systems Laboratory (CISL) at Kansas State University with asphalt mixes from Kansas, Missouri and Iowa States. The sections were loaded with up to 700,000 load repetitions of a 22,000lb single axle and the transverse profiles at the pavement surface were measured periodically. For material characterization, asphalt mix samples were fabricated in the laboratory using a Superpave gyratory compactor, and were subjected to dynamic modulus ($|E^*|$), static creep - flow time (F_t), dynamic creep - flow number (F_n), triaxial and uniaxial strength tests. Layer modulus of elasticity was obtained using back calculation of road sections constructed at CISL. The finite element software Abaqus is used to simulate and evaluate creep model and elastic visco-plastic model and predict permanent deformation of asphalt mixes for the six pavement sections.