

CE 890 Graduate Seminar

DATE: February 4, 2009
TIME: 4:00 p.m. (refreshments served at 3:45 p.m.)
PLACE: Fiedler 2144
SPEAKER: Daba Gedafa, Ph.D., Research Associate
TOPIC: “Estimation of Remaining Service Life of Flexible Pavements from Surface Deflections”

ABSTRACT

Remaining service life (RSL) has been defined as the anticipated number of years that a pavement will be functionally and structurally acceptable with only routine maintenance. The Kansas Department of Transportation (KDOT) has a comprehensive pavement management system, network optimization system (NOS) that uses the RSL concept. A rolling-wheel deflectometer (RWD), which measures surface deflections at highway speed as opposed to the Falling Weight Deflectometer (FWD), is an alternate and fast method of pavement-deflection testing for network-level data collection. Thus, a model that can calculate RSL in terms of deflection under the load (the only deflection measured by RWD) is desired for NOS.

In this study, RWD deflection data was collected under an 18-kip axle load at highway speed on non-Interstate highways in northeast Kansas. FWD deflection data collected over six years were also analyzed. A nonlinear regression procedure in Statistical Analysis Software (SAS) and Solver in Microsoft Excel were used to develop the models in this study. Results showed that a sigmoidal relationship exists between RSL and load plate-center deflection of FWD. Sigmoidal RSL models have very good fits and can be used to predict RSL based on center deflection from FWD or RWD. Sigmoidal equivalent fatigue crack-models have also shown good fits, but with some scatter that can be attributed to the nature and quality of the data used to develop these models. Predicted and observed equivalent transverse-crack values do not match very well, though the difference in magnitude is insignificant for all practical purposes.