**Title of Thesis:** **Total Pages：151**

Development of Performance Prediction Models for Flexible Pavements

**Name of Institute**：Graduate Institute of Civil Engineering, Tamkang University

**Graduate date**：June, 2006 **Degree Conferred**：Master of Science

**Name of student**：Pei-Hua Wu **Advisor**：Dr. Ying-Haur Lee

吳 佩 樺 李 英 豪 博士

Abstract

Performance predictive models have been used in various pavement design, evaluation, rehabilitation, and network management activities. The improved 2002 AASHTO guide adopted mechanistic empirical pavement design approach which considerably depends upon the accuracy of pavement performance predictions. The prediction accuracy of existing flexible pavement performance prediction models was first investigated using the Long-Term Pavement Performance database (http://www.datapave.com or LTPP DataPave Online) and the results showed that it is greatly in need for improvement. Thus, this study strives to develop improved rutting and fatigue cracking prediction models for flexible pavements using the aforementioned database.

Exploratory data analysis (EDA) of the response variables indicated that the normality assumption with random errors and constant variance using conventional regression techniques might not be appropriate for prediction modeling. Therefore, without assuming the error distribution of the response variable, generalized linear model (GLM) and general additive model (GAM) along with quasi-likelihood estimation method were Poisson distribution were adopted in the subsequent analysis. Box-Cox power transformation technique, visual graphical techniques, as well as the systematic statistical and engineering approach proposed by Lee were frequently adopted during the prediction modeling process.

The goodness of the model fit was further examined through the significant testing and various sensitivity analyses of pertinent explanatory parameters. The tentatively proposed predictive models appeared to reasonably agree with the pavement performance data although their further enhancements are possible and recommended.

**Keywords**：Flexible Pavement, Rutting, Fatigue Cracking, LTPP, Performance, Prediction Model.