Title of Thesis: **Total Pages:125**

A Prototype Pavement Network Database and Geographic
Information System Structure

Name of Institute: Graduate Institute of Civil Engineering, Tamkang University
Graduate Date: December, 2000   **Degree Conferred:** Master of Science
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Abstract:

The main purpose of this study is to develop a prototype database and geographic information system structure for "network level" pavement management. The characteristics and features of pavement database management and geographic information system and the integration of them are first investigated. An efficient database structure is the key to the success of a pavement management system. A well-organized database can provide valuable and adequate information for pavement network management purposes with convenience and efficiency. Upon the completion of this study, guidelines for the integration and collections of domestic pavement network management databases will be provided and discussed.

The concepts of "sampling" and "uniform section" are proposed for domestic pavement network database structure and collection procedures based on the considerations of specific, measurable, achievable, relevant, and timely principles. Relational database structure of a commercial software package is adopted in this study. Many tables of pavement inventory, rehabilitation, traffic, and survey data are recorded in their original data collection formats for the ease of recording and updating. A systematic approach using various sorting and matching techniques is developed to overcome the current deficiencies of such relational databases based on the principle of "dynamic segmentation." Summarized uniform section databases can be automatically generated for different survey years.

Consequently, a prototype program for "Pavement Network Dynamic Segmentation Database (NETDSD)" structure is developed using Microsoft Visual Basic and Access software packages. The main features of the program include many user-friendly interfaces for recording, updating, summarizing, query and reporting of the pavement databases. Moreover, the applicability of various commercial Geographic Information System (GIS) software packages is investigated for pavement management purposes. A concise GIS presentation feature is also added to the NETDSD program. This prototype program can be used as the core for future development and integration of our domestic network pavement databases and network optimization analysis. By doing so, a better organized pavement database and efficient network pavement management system can be developed and enhanced.

Keywords: Pavement Management, Network Level, Database, Uniform Section, Dynamic Segmentation, GIS, NETDSD.