Name of student：Ming-Hui Lin   **Advisor**：Dr. Ying-Haur Lee
                     林 明 輝   李 英 豪 博士

Abstract:

An efficient database structure is the key to the success of a pavement management system. A well-organized database can provide adequate and valuable information for pavement network management purposes with convenience and efficiency. The main purpose of this study is to integrate a prototype database structure into a commercial geographic information system (GIS) for "network level" pavement management. The characteristics and features of pavement database management and its integration with network rehabilitation optimization algorithms are also investigated.

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 (or SMART) principles, given the resources available and the prescribed time frame. The relational database structure of a commercial software package (Microsoft Access) and its existing features are used for the easy of implementation and possible future enhancements. The database structure consists of inputting pavement inventory data, recording multi-year traffic and condition survey data (or historical data), and updating major pavement maintenance information in their original data formats.

The "dynamic segmentation" procedure provided by a commercial software package (ArcView 9.0) is adopted to automatically and efficiently generate dynamic segmentation (or summarized uniform section) databases based on the historical data imported from different survey years. Consequently, a prototype computer program for pavement network dynamic segmentation database structure is developed. The main features of the program include many user-friendly interfaces for recording, updating, integrating, summarizing, query, reporting, and graphical representation of the network pavement databases.

In addition, various optimization algorithms of alternative strategies in pavement network rehabilitation management were also implemented in this prototype system (named TKUNET2). In which many user-friendly interfaces could be used to assist high-level pavement management officials in answering various "what … if …" questions such as the determination of future rehabilitation needs, cost-effectiveness studies, tabular and graphical

query, network summary and presentations of optimized budget allocation problems. The prototype system can be further expanded with ease and efficiency so as to assure the best use of our limited resources for network pavement rehabilitation through minimum time, effort and cost.