Development of a Methodology for Pavement Maintenance Optimization and Prioritization for Provincial Road Network in Sri Lanka

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Degree of Master of Science

Department of Civil Engineering

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Thesis submitted in partial fulfillment of the requirements for the degree

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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ABSTRACT

Pavement management system is a decision support system that is used by highway agencies to maintain its road networks, extending their useful life within the available budget and resource constraints. Methodology of selecting maintenance strategies for authorities is an integral component of the pavement management system. Most current systems cannot be customized to reflect the local conditions with resources available and required extensive data collection and calibration, which are not sustainable for those authorities especially in developing countries. Thus, the identification of new approaches, which have been suited for the relevant factors in developing countries in pavement management, is a major requirement.

The study focused on the existing pavement management systems, first it aims to identify the main constraints that affect the pavement maintenance planning and for formulation of the maintenance strategy in road agencies at provincial level. The main constraints and priority factors were identified by the opinion survey from the Engineers of road agencies. Based on the opinion survey five main priority factors were finalized namely pavement condition, traffic volume, connectivity to local road network, land use pattern and importance to community.

An optimization model was developed to maximize the overall network condition whilst incorporating the priority factors identified in the study. Priority index of each pavement sections computed from the prioritization model is incorporated to optimization model. The proposed model is capable of determining the optimum maintenance activities for each road sections considering the budgetary, network condition and road section priority considerations. Applicability of the proposed model is illustrated using a case study consists with pavement sections with different attributes. Results from a case study using the proposed method show that the suggested maintenance and rehabilitation plans make sense from engineering and socio-economic considerations.

Keywords: Pavement management systems, Pavement Maintenance, Optimization, Prioritization

DEDICATION

To My Loving Parents for Their Guidance for Success in My Life

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