UNIVERSITI TEKNOLOGI MARA

THE EVALUATION ON THE SURFACE CONDITIONS OF FLEXIBLE PAVEMENT: CASE STUDY OF SELANGOR FEDERAL ROAD

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ABSTRACT

High quality roads are essential to economic and social growth. However, road damages may inhibit the function of the roads. Therefore, the damages are a concern not only to maintenance authorities, but also to road users. The identification of the main factors contributing to road damages is a prerequisite to finding the best remedial measures and lasting solutions. Hence, in this study, road damages that occur on the road surface of the Federal Road Route One (FT01) in Selangor were observed and identified. The most common types of damages found at FT01 are fatigue cracks (30%), longitudinal cracks (15%), rutting (15%), patch deteriorations (14%) and edge drop-offs (12%). From the findings, the possible causes of the main damages were determined through careful triangulation, a review of extant literature and by considering the surrounding factors. A case study was also conducted twice at five stations along the FT01 to compare and measure the changes of the road performance. The number of damages and the seriousness-level were found to increase at all stations after six months the first data collection. To avoid bias between party responsible for the road performance and the party that uses the road i.e., road users, questionnaires were randomly distributed to assess the performance of roads and the factors contributing to road damages by criticality index. According to 500 questionnaire responses received, road users establish that overloading of vehicles is the major cause of road damages. The findings were confirmed by a developed model using Structural Equation Modelling (SEM) to: (i) determine the validity of the theories used to identify the factors contributing to road damages, and (ii) validate whether the results obtained from the site observations and the hypothesis were similar. From 12 hypotheses tested, seven were accepted. It is anticipated that the findings are useful as it scientifically identifies the cause of road damages, therefore providing a starting point for improving road designs.

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CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF RESEARCH

Roads play an important role in the trade and transportation system throughout the world and there is a rapid increase in the pavement infrastructure development in Malaysia. However, some roads have reached the terminal end of their service life earlier than the designed period (Judin, 2011). The three main factors that have led to this damage are the increase in the number of vehicles every year (Road Transport Department, 2011) especially commercial vehicles (Judin, 2011), insufficient pavement structure, and weather effect (Abdullah, Karim & Yamanaka, 2010; Ali & Hamzah, 2004; Judin, 2011; Samsuri, 2009). Combinations of these factors have resulted to the damage in some parts of the road networks as the roads cannot withstand the increasing loads (Abdullah *et al.*, 2010).

Road functional and structural failures are dangerous to drivers (Zakaria, 2011). Drivers face high risk of getting involved in accidents as there are a lot of severe damages on the road surface such as cracking and potholes (Kumar & Gupta, 2010). A research conducted by the Malaysian Institute of Road Safety Research (MIROS) revealed that Malaysia suffered socioeconomic losses of about RM9 billion due to road accidents in 2010 and it is a disturbing fact that the accidents rate is increasing every year (Mersat, 2011). Figure 1.1 shows the total number of road accidents from 2001 to 2010 in each state of Malaysia.