

**UNIVERSITI TEKNOLOGI MARA**

**DETERIORATION EMPIRICAL MODELLING OF  
ASPHALT TO MALAYSIAN WEATHER AND  
TRAFFIC IN PLUS BHD**

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## ABSTRACT

Highways are crucial for providing personalized and efficient passenger transportation services. Highways can increase traffic demand, promote socio-economic development, and enhance quality of life. Economic growth is rapidly increasing, but at the same time transportation patterns also change as the economy expands. Asphalt pavement deterioration can be caused by various factors, including traffic, construction, materials, environment, and age. These factors influence the pavement's condition and longevity. There is a lack of research on the condition of flexible pavement condition under influence of traffic loading in equivalent standard axle units and precipitation in highway. The purpose of this research is to determine deterioration empirical modelling of asphalt to Malaysian weather and traffic loading. 2-year timeframe was chosen to provide a thorough and inclusive dataset that encompasses a wide range of meteorological and traffic variables that impact the pavement. The study's results also indicated that the condition of the pavement worsened as traffic volume grew, and the most significant climatic factors were precipitation, which aligns with previous studies. While previous research highlighted the significance of rain precipitation, the results of this investigation revealed that precipitation exerted a more substantial impact. Prior studies on pavement degradation have predominantly concentrated on the isolated effects of traffic or meteorological conditions on pavement conditions. The main objective of this research was to evaluate the separate and combined effects of traffic loads and precipitation conditions on the long-term condition of the pavement. According to this study, this study is crucial for accurately estimating the quality of pavements in metropolitan areas. This, in turn, allows for better anticipation and prioritization of maintenance and rehabilitation efforts. This research aims to assist highway administrations in transitioning from reactive maintenance practices on rural road networks to proactive maintenance practices on urban roads.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of Study

Highways are crucial for providing personalized and efficient passenger transportation services. Highways can increase traffic demand, promote socio-economic development, and enhance quality of life. Economic growth is rapidly increasing, but at the same time transportation patterns also change as the economy expands. Malaysia's positive progress in industrialization has led to the expansion of its highway network. Travel is becoming increasingly popular due to the ongoing need for mobility in manufacturing sectors to meet demand and supply. Rapid urbanization and population growth contribute to the demand for travel. It is the largest toll expressway operator in Malaysia and one of the largest in Southeast Asia as stated by (Asrah et al., 2017). Rapid increase in number of vehicles on the road and demand increase of road network throughout Malaysia. Due to this growth, pavement maintenance works form a major component of the annual expenditure. When indicators of surface distress are detected, suitable remedies for maintenance and rehabilitation of existing pavements are required for asset protection. Such pavement defects, if not corrected, might compromise the structural integrity of pavements and the degree of service provided to road users by (Shahid, 2019).

Pavement deterioration is the process by which distresses develop in pavement because of traffic loading and environmental conditions. Pavement deterioration has a significant impact on road serviceability, safety, and ride quality. Roads deteriorate with age because of use, so they must be maintained to ensure that the safety, efficiency, and durability standards are met. New paved roads typically deteriorate slowly for the first ten to fifteen years of their life, after which they deteriorate much more rapidly unless timely maintenance is undertaken (Ali Muhammad Anwar et al., 2022).

Flexible pavements, which are often made up of asphalt layers, are prone to different types of distress, such as cracking, rutting, and surface deterioration, which are impacted by environmental conditions and traffic loads (Kazi Tamrakar, 2019). According to (Hashim et al., 2021), a good flexible pavement demonstrates acceptable elasticity to traffic loading; it is constructed with a relatively thin layer of hot-mix