CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Malaysia is moving towards becoming a developed country. Roads play an important part in the trade and transportation planning throughout the cosmos, and it has become rapidly increased in the pavement infrastructure development in Malaysia, mostly road linking the state capitals, airports, railroad stations and ports, gazetted under Federal Roads Ordinance. Presently, Malaysia has more than 80,300 km roads, and the roads are divided into three primary classes, namely toll expressway 1,700 (km), federal roads 17,500 (km) and state roads 61,100 (km) and the life spans are between 10 to 15 years (Zakaria, 2005). Local authority road (city mall, municipal or local council) or village (district office) street depend on the areas and naturally kept up by the responsible local authority (Haron, 2004).

Yearly, the increases of heavy vehicles due to the high demand from industries, subjected the pavements to heavy axle loads. Yet, conflicting to the prevailing literature and the other road users’ speculations, the Pan Malaysia Lorry Owners Association (PMLOA) objects to the fact that its trucks bearing any danger to other road users or damage to the (Golias I., 2001).

The heavy vehicle load on the pavement subjects it to high stresses causing damage. However, not all tracks have the same harmful effects; the damage to the road pavement depends on wheel loads, number and location of axles, load distributions,
number of wheels, tire types, inflation pressure and other factors (Gillespie T.D., 1993). Heavy truckloads are the major cause of pavement damage. The size and configuration of vehicular loads together with the environment have an important impact on induced tensile stresses within flexible pavement (Yu H.T., 1998).

The length of the bulge front/rear, Height of vehicles, impacts on the increasing carrying capacity of vehicles. Furthermore, this will immediately increase load axis of the vehicle making the axle load greater than is permitted. This produces the problem of excessive load or overloading. The impact of overload conditions on the road pavement is premature failure, that is, a condition that the damage can shorten the lifespan of roads before the design lifetime of the road is reached, (Badan Litbang Kementerian Pekerjaan Umum, 2004).

Wheel load on the pavement results in distribution and reduction of stresses throughout the Pavement structure, specifically for flexible pavement, stresses induced in a pavement structure by traffic loads are highest in the upper layers and diminishes with depth. A stress acting on an elemental cube of the pavement system experience normal and shear stresses along the opposite sides of the block, as the paving material is subjected to traffic load, the principal stresses are independent of the chosen coordinate system. When a pavement structure is subjected to loads induced by traffic wheel, it is classed as a dynamic load. The resultant stress consists of horizontal, vertical and shear component. These stresses are routinely changed as the wheel load pass (Lekarp, 1999).

This improves a comprehensive theoretical framing of driver performance, stating the relations amongst the dissimilar factors of driving performance. Several sources of information must be used in order to estimate models based on the framework. This study uses the observation method to gather information. Heavy vehicles also led to the Damage of the road; there were 19.3 million registered vehicles on the Malaysia’s road, and the government spent RM5 billion between 2001 and 2010 to continue its sustenance on all the Federal roads (Kordi et al., 2010).

Damages on the roads are mainly caused by the heavier axle loads associated with large commercial trucks (Croney, 1997). For this cause, every state has legislated maximum axle load limit and maximum gross vehicle weight to be followed (Rezqallah,
The repetition of load and overloading of heavy trucks allegedly affect the road pavements; the design life of the pavements becomes shorter, although the same quality standard is used during design and construction (Mulyono, 2010), as much research confirms that the Roads are damaged by heavy trucks, and every researcher has implements different method from another to reach this conclusion. Although most of those methods are time consuming, costly, unsecure, can’t be done individually; none of them had confirmed when and how these roads got damaged. This thesis will present a sample method to measure the road damage and to confirm when and how these roads got damaged.

The causes of pavement failures are separated into two types, which are an internal and external failure. Internal failures of pavement are frequent because of lack of pavement mixture, weaknesses of component materials and poor construction. In the meantime, external failures are as a result of overloading, diesel spillage, flooding, sinkholes and other unforeseen reason such as earthquake, volcanoes and others. The failures of flexible pavement are separated into four categories, which are surface deformation, surface defects, cracking and patching and potholes (AASHTO, 2001).

1.2 PROBLEM STATEMENT

Statistics is the mathematical science involving the data collection, analysis and interpretation of data. A number of specialties have evolved to apply statistical theory and methods to various disciplines. Certain topics have "statistical" in their name but relate to manipulations of probability distributions rather than to statistical analysis. To think statistically is to know that the measurements taken in an experiment are subject to systematic and random sources of variation, and that it is beneficial to base methods of data analysis on probabilistic models. For many types of data analysis problems, there are no more than a couple of general approaches to be considered on the route to the problem's solution. Within the different approaches for a specific problem type, there are usually at most a few competing statistical tools that can be used to obtain an appropriate solution. The most type of data analysis problems is that selection of the best statistical method to solve the problem is largely determined by the goal of the analysis and the nature of the data. Model building, however, is different from most