CHAPTER I

INTRODUCTION

1.1 Background

Roads are defined as land transportation infrastructure that has an important role for economic growth, socio-culture, tourism area development, and defense and security to support national development. [1]. Meanwhile, the definition of pavement is an arrangement of layers that function to transmit the load of the vehicle wheel to the subgrade consisting of (from top to bottom), cover layer or often referred to as wear layer, top foundation layer, and bottom foundation layer. The three layers, known as pavement, are placed on the subgrade. Therefore, apart from being able to withstand wheel loads, the pavement structure must also be safe and comfortable for vehicles to pass, including having adequate skid resistance. Then the stress caused by the wheel load will be reduced enough, so it will not exceed the bearing capacity of the subgrade [2].

Beginning in 2600 to 1150 BC in the Minoian period, road pavements were built on the Greek island of Crete. In the days of the Roman Empire, road pavements were designed with excellent engineering. Pavement technology then continues to develop until the composition of the pavement layers we know today. The development of the road pavement layer is marked by the use of increasingly strong pavement materials, namely the use of asphalt as a surface layer material. In terms of the materials used, it is known that there are flexible pavements and rigid pavements. Flexible road pavement is pavement using hot asphalt mixture as the surface layer, while rigid road pavement uses cement concrete as the surface layer, as can be seen in Figures 1.1a to 1.2b.

In most countries in the world, including Indonesia, the use of flexible pavement is more than that of rigid pavement. In Indonesia, which has a total length

of roads, both National Roads, Provincial Roads and Regency Roads 542,310 km, 61% or 329,926 km are roads with flexible pavement. [4].

Malaysia, which have 91.620 kilometers length of their road network is 87.626 kilometers or 95.64% are flexible pavement, and the remaining 343 kilometers or 0.37% are rigid pavement.

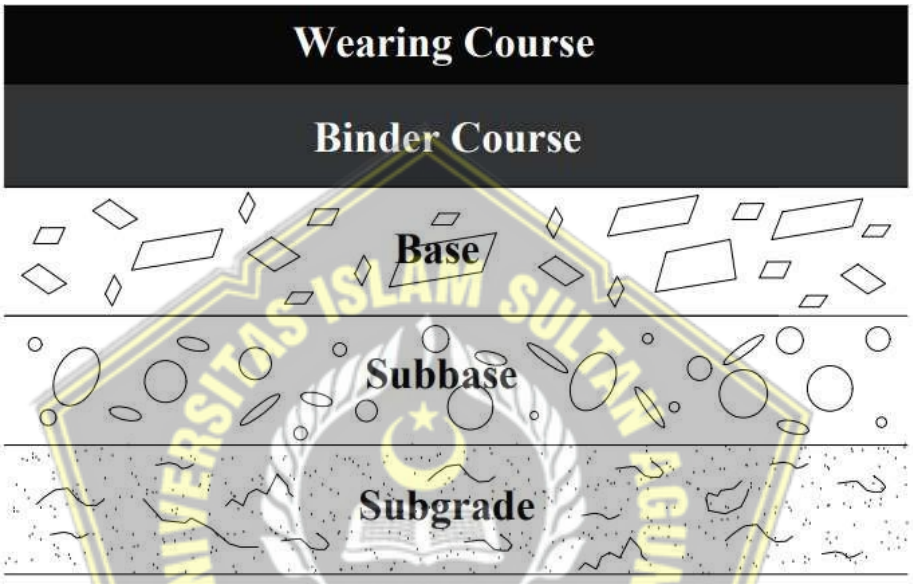

Figure 1.1a. Flexible Pavement Structure.

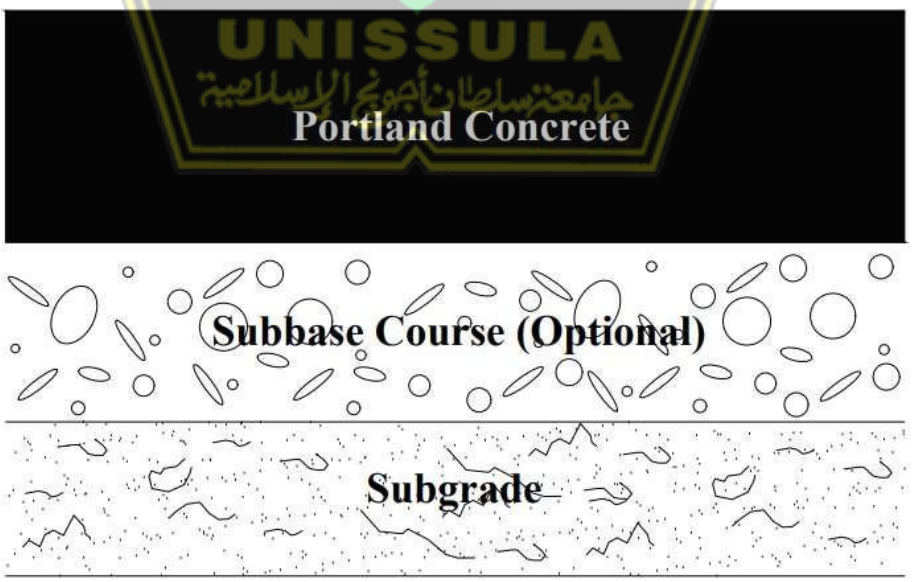

Figure 1.1b. Rigid Pavement Structure.

Figure 1.2a. Photograph of Flexible Pavement.

Figure 1.2b. Photograph of Rigid Pavement.

Japan, one of the developed country, have road network 1,21 million kilometres consist of 973.000 kilometers paved road and 237.000 kilometers unpaved road. From 973.000 kilometers of paved road, 632.450 kilometers or 65% are flexible pavement and 340.550 kilometers or 35% are rigid pavement. The other country that have flexible pavement much more than rigid pavement is USA which have a length of roads more than 6,58 million kilometers become the country with

the longest road in the world [5], 4.3 million kilometres are paved roads which consist of 4.04 million kilometers or 93.99% are flexible pavement and 0.26 million kilometers or 6.01% are rigid pavement [6].

Become question why flexible pavement is used more than rigid pavement. It is also a question why Indonesia has recently been using more rigid pavements, especially for toll road construction.

1.2 Problem Statement and Problem Limitations

There are many aspects that differentiate between Flexible and Rigid Pavement. Beside the surface layer, these differences include the subgrade, the base layer, the implementation of its construction, its maintenance etc. These differences will be studied in this Final Assignment, but due to time constraints, not all differences will be studied.

1.3 Objective of the Final Assignment

From the problem limitations given in sub section 1.2 above, the objective of this Final Assignment is to study the differences between Flexible and Rigid pavements. The study includes:

1) The subgrade and base/subbase layer strength;
2) Distribution of traffic loads to subgrade;
3) The design life of the pavement construction;
4) Determination of Traffic Loading;
5) Damage and maintenance of Flexible Pavement and Rigid Pavement;
6) Skid resistance of the surface layers.

1.4 Scope of the Study

To be able to achieve this goal, the study began by conducting a literature review related to the difference between flexible and rigid pavement covers what has been mentioned in subsection 1.3 above. Literature are review then continued with methodology which will be given in Chapter III, followed with Chapter IV calculation of the flexible pavement thickness Chapter V calculation of the rigid pavement thickness. Chapter VI discussion, and finally conclusion will be given in Chapter VII.