CHAPTER 1

INTRODUCTION

1.1 Background

From the beginning of mankind, transportation, especially land transportation has been a main aspect in human lives. Communication and trade would not have been possible without it. For this purpose, thousands kilometers of road have been built over the world.

Started from the pavements built on Crete during the Minoian period (2600 -1150 B.C.) mankind continuously develop the construction of road. The famous ancient road construction was built by the Romans. It should be noted that these pavements were remarkably well designed. From those early days of the Roman Empire to the interstate highway system in the United States, roadway networks as well as roadway construction have been developed. In its development, pavements can be broadly classified into two types, flexible and rigid pavement, as shown in Figure 1.1. and 1.2 for Flexible and Rigid Pavement respectively. [1]

Flexible pavement layers consist of surface layer which usely made from asphaltic concrete base and subbase layer, and subgrade layer of the bottom layer. Rigid pavement structure which consist concrete slab as surface layer, optionally base or subbase layer, and subgrade layer as the bottom layer. The other different of flexible and rigid pavement is on tire load spreading, on calculating their layer thickness.

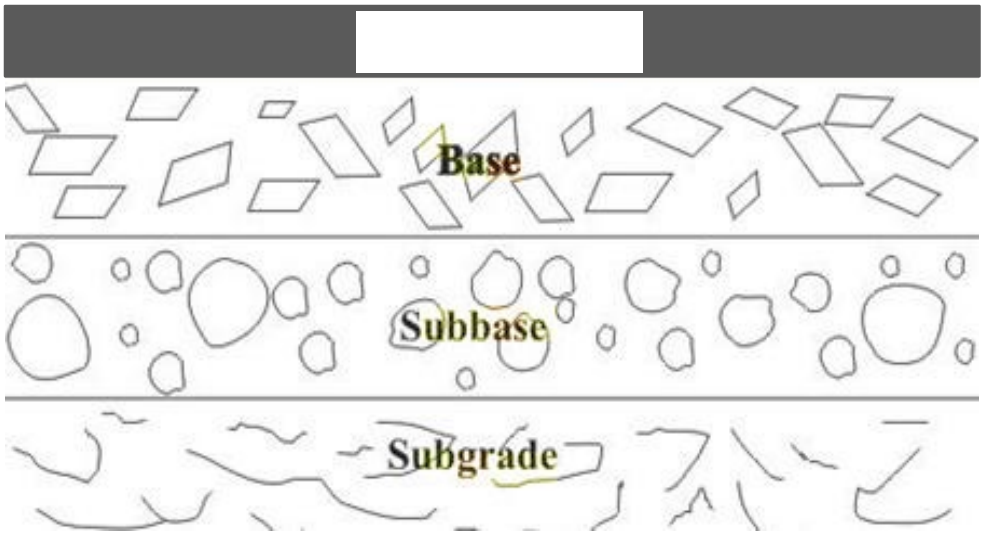

Figure 1.1. Flexible pavement structure [Source : 1]

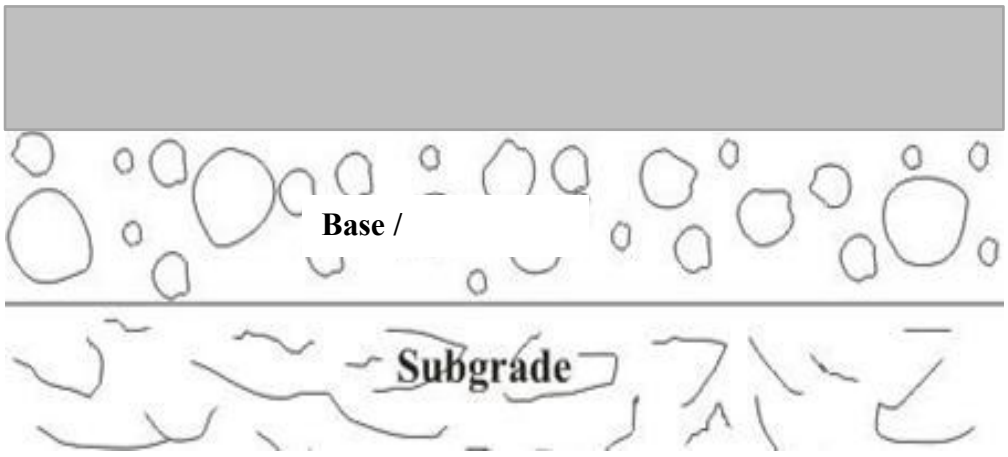

Figure 1.2. Rigid pavemet structure

In flexible pavement, as shown in figure 1.3 tire load is spreaded from the surface of the pavement to the bottom of subbase layer in force of triangle which have angle 45°. Therefore the pressure to the subgrade is small depend on the thickness of the pavement structure.

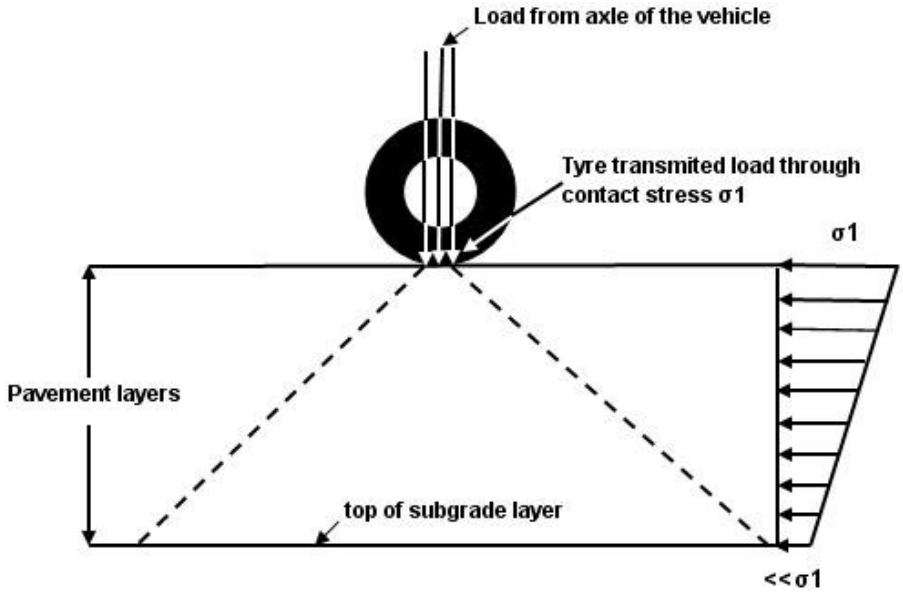

Figure 1.3. Load distributions on flexible pavement

Different with flexible pavement, in rigid pavement tire load is spread equally to the bottom of concrete slab as shown in figure 1.4.

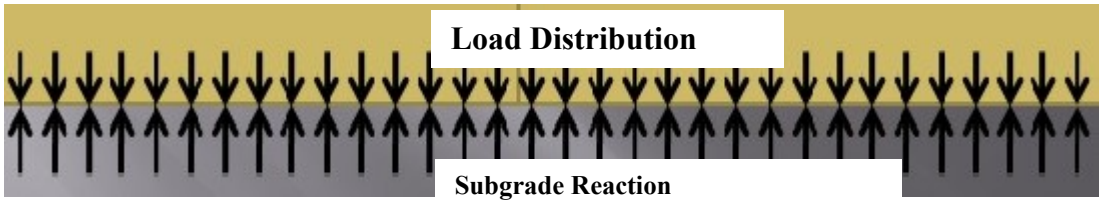

Figure 1.4. Load distributions on rigid pavement

Subgrade reaction as tire pressure, therefore subgrade in the rigid pavement have to have high strength. In rigid pavement the strength of subgrade is measured by modulus of residient MR instead of CBR.

1.2 Problem Limitations

The topic of this final assignment is design comparison between flexible and rigid pavement and making the comparison some limitation are given:

1. Using AASHTO 1993 design method for calculating pavement structure.
2. Use natural soil of the road Km 16+000 to Km 64+800 of Semarang – Purwodadi.
3. Use traffic volume of Semarang – Purwodadi road of the year 2016 for loading pavement calculation.
4. Use unreinforced concrete for rigid pavement.

1.3 The Objective of the Study

From the background and problem statement above, the objectives of this Final Assignment is Design of flexible pavement and rigid pavement of Semarang – Purwodadi road using AASHTO 1993 design method.

1.4 Scope of Study

To achieve this objective, this study begins with a literature review of information relating to the planning of flexible pavements and rigid pavements. Several books, journals, papers related to flexible pavement planning and rigid pavement and cost comparison of the implementation of flexible pavement and rigid pavement on the Semarang - Purwodadi road section will be reviewed. The literature review will then be followed by the methodology. In the methodology chapter, LHR data, land CBR and traffic volume will be specified. The calculation

of pavement thickness and construction cost will be given in Chapter 4, while the results will be given and discussed in Chapter 5.