CHAPTER I

INTRODUCTION

1.1 Background

Road as a transportation infrastructure is an important element in the development of life of a nation and state, in fostering the unity and unity of the nation, state territory, and community functions as well as in advancing general welfare as referred to in the Preamble 1945 Constitution of the State of the Republic of Indonesia.

Roads as part of the national transportation system play an important role in supporting the economic, social and cultural and environmental sectors and are developed through regional development approaches to achieve equilibrium and equitable regional development, establish and strengthen national unity to strengthen national defense and security, space in order to realize the national development goals. (1)

Indonesia, have about 440.617 kilometers of roads consist of 47.837 km of national road or 11%, 46.486 km of provincial road or 11%, and 346.294 km of district road or 78%, as shown in Table 1.1. (2) Increasing the number of populations, bring to the consequency on increasing of traveling especially land trasportation, and in turn incressing the length of road. Almost of 440.617 km of roads are constructed with modern pavement structure as shown in Figure 1.1a and 1.1.b for flexible and rigid pavement respectively.

Table 1.1 Length and condition of road in Indonesia

Road Status	Length (km)	Percentage of Total Road Length	Stable Road Condition	Authority
National Road	47,017 (non toll road) 820 (toll road)	11%	86%	Central Gov't
Provincial Road	46,486	11%	70,99%	Provincial Gov't
Municipal / Regency Road	346,294	78%	57,01%	Municipal / Regency Gov't
Total	440,617	100%		

(Source:2)

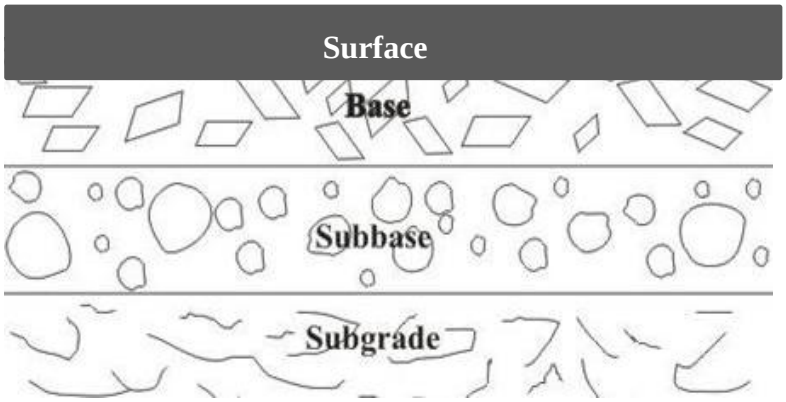

Figure 1.1a. Flexible pavement structure

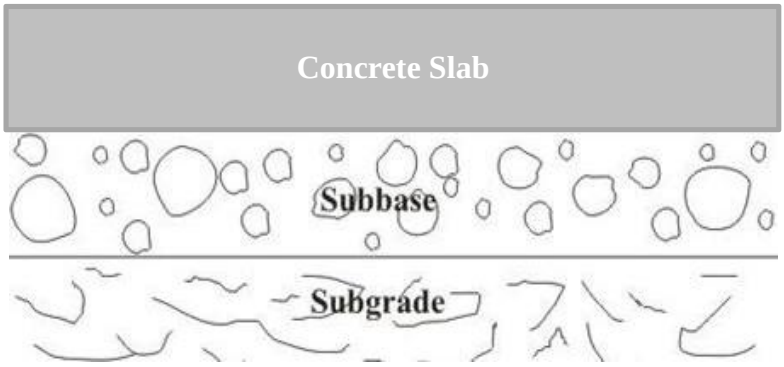

Figure 1.1b. Rigid pavemet structure

Figure 1.2a. and 1.2b. show the surface pavement of flexible and rigid pavement respectively.

Figure 1.2a. Flexible pavement surface

Figure 1.2b. Rigid pavement surface

From Figure 1.1a show the flexible pavement structure which generaly from the top to the bottom consist asphalt surface layer, base course layer, subbase course layer, and subgrade as a road bed soil. Figure 1.1b. show the rigid pavement layer which consist of portland cement concrete surface layer, optional base or subbase layer, and subgrade. It can be seen that both types of pavement

are laid over the subgrade as road bed soil. Therefore, the performance of the pavements structure are depend on the strength or quality of the subgrade.

The most important function of the pavement is to withstand the load applied from a vehicle such as a truck or an aircraft, without deforming excessively. The layered structure of the pavement is meant for ensuring that the road is spread out below the tire, such that the resultant stress at the bottom layer of the pavement, te sub grade, is low enough not to couse damage. The most significant load applied to a pavement surface comes from a truck or an aircraft tire. The approach in flexible pavement is to spread the load in such a way that the stress at the subgrade soil level is small enough so that is can sustain the stress without any major deformation. When the existing soil is not stiff enough to support the relatively small stress, than there is a need to improve the soil. There is also a need to improve the soil if it is susceptible to moisture. Such a problem can be solved by treating the soil by an adictive, such as lime and a Portland cement. (3)

1.2 Problems Statement

Most pavements in Indonesia, especially in the North-East of Central Java to East Java laid over the weak subgrade cause the road are always in worst conditions. Some effort has been conducted to solve the subgrade problem or to improve the subgrade strength, among other by chemically process, i.e. by stabilizing natural soil using cement, lime, sand, and other stabilizing materials, by mechanically process, among other by vertical sand drain, yet no one success to solve the damage problem of the pavement.

In this final assignment, Cakar Ayam Foundation, a foundation system that was invented by Indonesia Civil Engineer Prof. Dr. Ir. Sediyatmo in 1981 will be studied to use as road bed soil replacing the existing subgrade soil. The pavement

of Semarang – Purwodadi road located at North-East of Central Java will be used as a case study.

1.3 Objective of the Research

From the background and problem statement, the objectives of this study are:

1. To know possibility Cakar Ayam foundation to replace existing subgrade.
2. To make design of pavement structure both flexible and rigid using Cakar Ayam Foundation as road bed soil

1.4 Scope of the Study

To achieve those objectives, the study began with reviewing all of the literatures especially pertaining on Cakar Ayam Foundation, subgrade soil, and design of pavement structure. Study will continue with Methodology, where methods to fulfil the objectives will be describe, continue with design of Cakar Ayam Foundation and design of road and runway pavement structure. Design and calculation of pavement structre will given in chapter 4 and chapter 5 will give a conclusions and recommendations of the study.