

CHAPTER I

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. The materials used for roadway construction have progressed with time.

In its development, pavements can be broadly classified into two types, flexible and rigid pavement. The basic flexible and rigid pavement structure can be shown in Figure 1.1. and in Figure 1.2. respectively. The different between flexible and rigid pavement are in their surface pavement and base as well subbase layer. Surface pavement of flexible pavement is a hot mix asphalt mixtures called asphlatic concrete, and have minimum 5 cm thickness, while the surface pavement of rigid pavement is slab cement concrete have thickness about 20 to 30 cm. The other different of both pavement is in base course layer. Surface pavement of flexible pavement is laid over base and subbase layer, while rigid pavement can be laid directly over road bed soil. Base or subbase layer in the rigid pavement is optional, just to prevent form occuring of pumping. However, both of pavement structure are laid over selected road bed soil called subgrade.

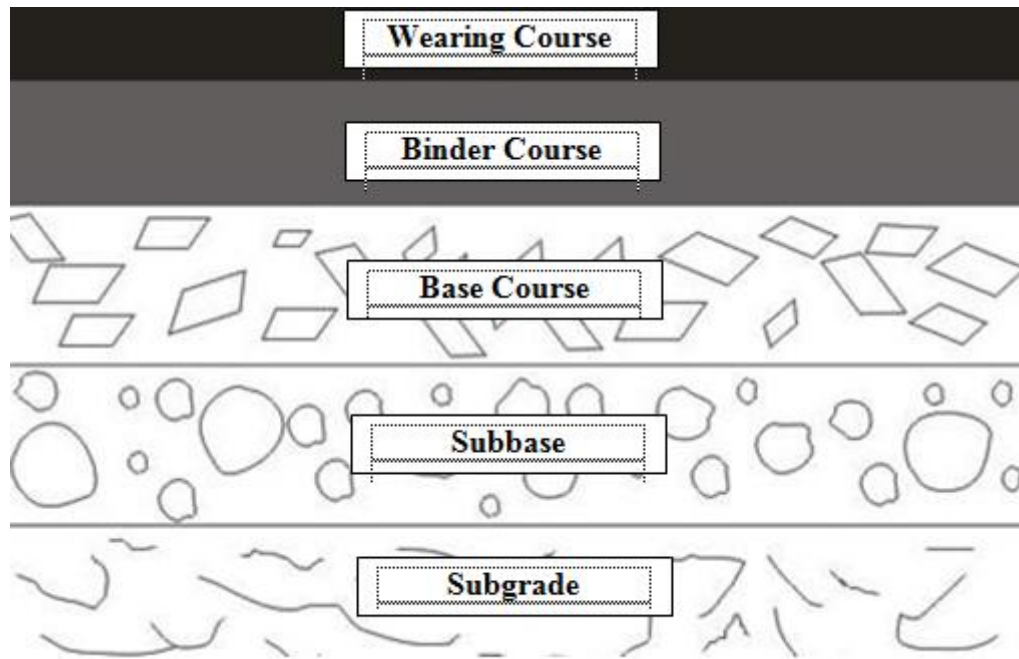


Figure 1.1: Basic flexible pavement structure

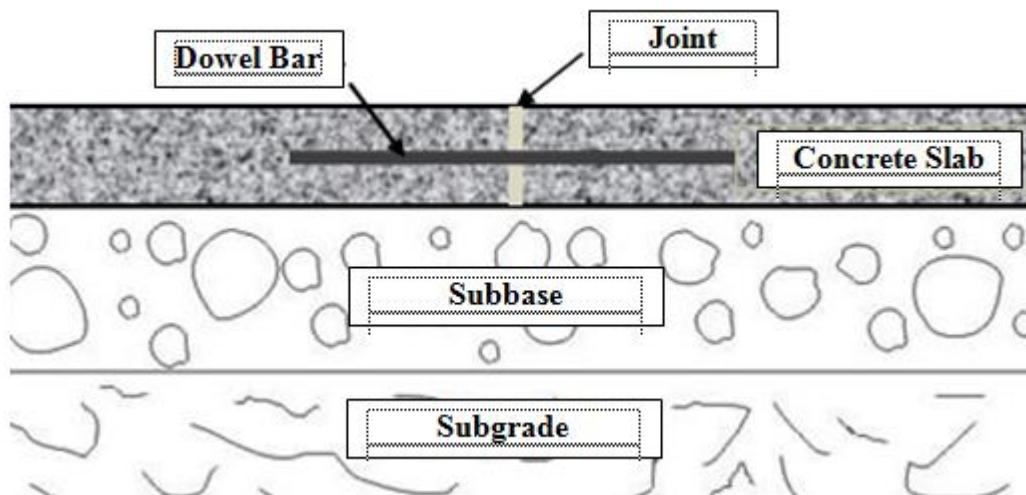


Figure 1.2: Basic rigid pavement structure

Most of pavement structure in Central Java are laid over poor subgrade which have lowest bearing capacity and if measure by CBR is about under 2%. That situation cause many pavements damage far before the design live are reached. Based on that reality, some efforts to improve bearing capacity of the road bed soil have been conducted, among other by using geotextile and soil stabilization. Yet the result of both system was not satisfy, pavement is still damage early. Therefore, in this research construction of Sarang Laba-

Laba (SLL) foundation (there is no English term for SLL since this construction was found by Indonesian expert, Ir. Ryantori and Ir. Soetjipto in 1975) will be applied to strengthen the road bed soil of the pavement, especially in Semarang – Purwodadi road, the road in the North-East of Central Java.

Sarang Laba-Laba foundation is the combination of construction of wall-ribs, consist of construction rib, settlement rib, and distribution rib, as shown in Figure 1.3.

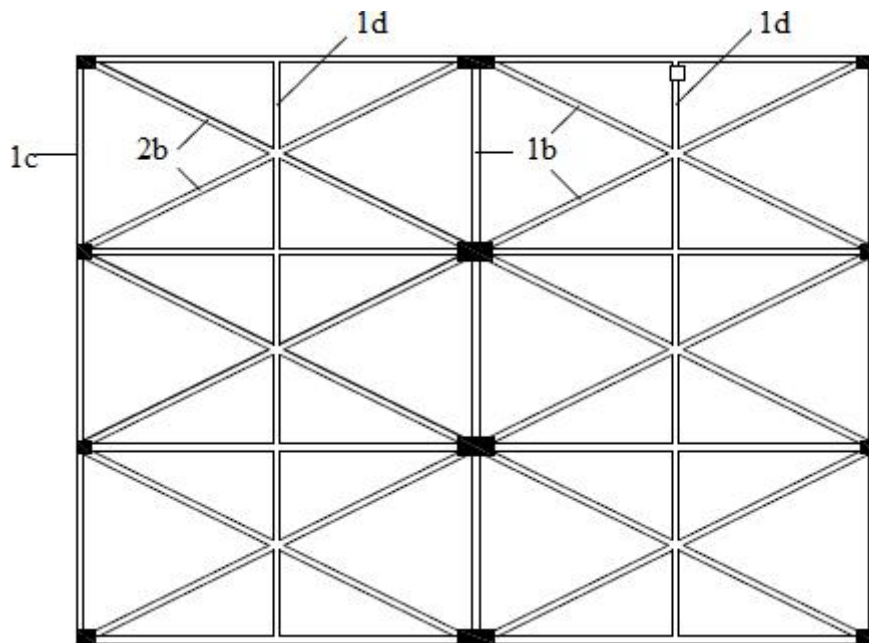


Figure 1.3. Upper side of Construction Sarang Laba Laba foundation

Those configuration of ribs formed a foundation like web which have high stiffness, and if soils are filled in between ribs, the strength of the soil will improve. To use as foundation of column in the building, those ribs are covered with thin concrete slab. Yet, if to use as subgrade of the pavement, concrete slab over the ribs is not used, as shown in Figure 1.4.



Figure 1.4. Preparing Sarang Laba-Laba foundation use as subgrade of the pavement

Using the theory of bearing capacity of soil, the improving original soil strenght of if put in the space between ribs of SLL foundation will be analyzed. Soil in the SLL foundation where their strenght expectedly improved, then will be used as subgrade of the pavement. Design of pavement using SLL foundation as subgrade layer and compare to the pavamant using original road bed soil as subgrade then will be conducted.

1.2. Objectives of the study

From the above discriptions, it is obviuous that strenghtening the subgrade is very important to in order the pavement can withstand until the desig life reach, and using the other method to improve the road bed soil is need to be analyzed. For that purpose, this research has the following objectives :

1. To investigate the feasibility of using Sarang Laba-Laba foundation as the subgrade of pavement,
2. To formulate strenghtening of the soil which is fillied in the Sarang Laba-Laba foundation,

3. To evaluate how far the influence of using Sarang Laba-Laba foundation as subgrade in the pavement structure thickness.

1.3. Scope of the study

To accomplish those objectives, this study started with a literature review of the information pertaining to the relationship of Sarang Laba-Laba foundation for the subgrade of the pavement. Based on the results of literature review, a research design was developed involving the improvement the strength in side of or in between the ribs of Sarang Laba-Laba foundation. In order to know whether Sarang Laba-Laba foundation feasible to use as subgrade of the pavement, design of pavement, both flexible or rigid pavement will be conducted. The design use both original soil and Sarang Laba-Laba foundation as subgrade of the pavement. To analyze that pavement using Sarang Laba-Laba foundation as subgrade have resistance from deformation, PLAXIS computer programme will applied.