CHAPTER I

INTRODUCTION

1.1. Backgroundand Problem Statement

Soil is one of nature's most abundant construction materials.Almost all of the civil engineering constructions is built with or upon soil, most of all pavement construction, because all of the pavement construction are laid over the soil or called subgrade or road bed soil as shown in Figure 1.1. for flexible pavement and Figure 1.2. for rigid pavament.

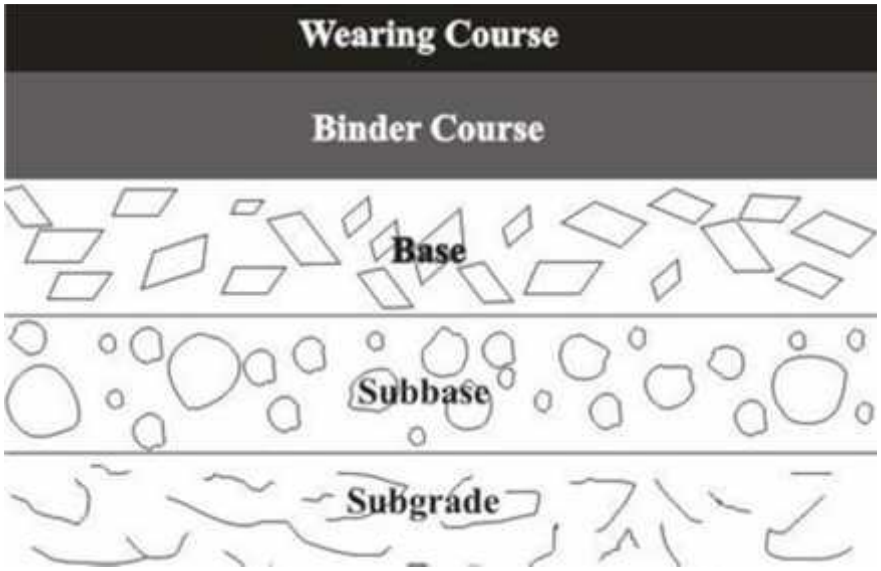

Figure 1.1: Basic flexible pavement structure

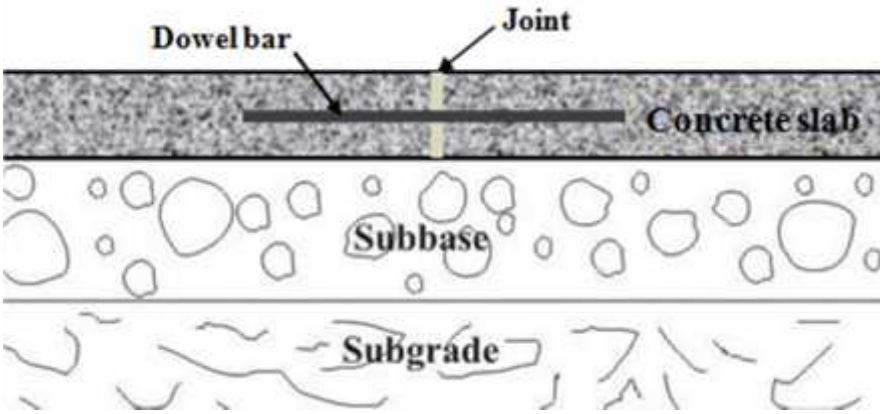

Figure 1.2: Basic rigid pavement structure

When unsuitable construction conditions are encountered, the following four options can be selected to be conducted: a) Find a new construction site; b) Redesign the structure so it can be constructed on the poor soil; c) Remove the poor soil and replace it with good soil; d) Improve the engineering properties of the site soil. Option is being used more often today and isexpected to dramatically increase in the future [1].Improving on-site (in-situ) soil's engineering properties is referred to as either "soil modification" or "soil stabilization"The term "modification" implies a minor change in the properties of soil, while stabilization means that the engineering properties of the soil have been changed enough to allow field construction to take place. Soil stabilization, which every civil engineer is concerned with, is closely associated to the structures and mineralogy of he clay particles, clay-water interactions, clay particles' ionic exchange capacity and the clay organic or clay-inorganic interaction. The majority of road failures are associated with the action of water, or perhaps more precisely,the interaction between water and the clay particles under the road pavement [1, 2].

Type of the soil in the area of Eastern-North of Central Java is generally an expansive clay which consists of montmorillonite mineral. That kind of soil have high shrinkage and swelling. In the that type of soil, the pavement of the road connecting Semarang to Purwodadi, about 64kms length, are laid. As the reason, the road condition is always damage and in worst condition, as shown in the Figure 1.1a. to 1.1c. some types of damage like a pot-hole, deformation and

crocodile crack. Most efforts have been conducted to solve the damage or to reduce the swelling and shrInkage potential among other by using goetextile, constructing sand-drian etc., but no one of those efforts success.

Figure 1.1a.

Figure 1.1b.

Figure 1.1c.

1.2. Objectives of the research

From the above descriptions it is obvious that subgrade or road bed soil should be engineered to improve its strength and to reduce its swelling and shrinkage potential or in order to with stand the pavement and traffic load pressure. For that purpose, this research has the following objective:

a. To investigate the feasibility of using Buton Natural Rock Asphlat (BNRA) as a soil stabilizer,
b. To formulate the mix between BNRA and expansive clay soil that will result in a new soil stabilizer with better physical and mechanical properties.
c. To evaluate the use of BNRA as a soil stabilizer in pavement.

1.3. Scope of the Study

To accomplish those objectives, this study started with a literature review, given in chapter 2, of the information pertaining to the relationship of expansive montmorilolonite clay, BNRA as the material for soil stabilizer, and characteristics of the present BNRA in the expansive montmorillonite clay in some different water content, and also tests which have to be conducted to the soil stabilization. Based on the results of the literature review, a research design and methodology, given in chapter 3, was developed involving preliminary research to find the appropriate stabilizer, in this study was Buton Natural Rock Asphalt (BNRA) as control, as well as an extensive laboratory testing and experiments. Data obtained from the test were analyzed and conclusions and recommendations were made in chapter 4, and chapter 5.