

CHAPTER I

INTRODUCTION

A. Background

Soil is the basis of a construction, whether it is road construction and building construction. There is a type of soil that has properties that bad, and usually the soil often cause problems include soil that has a high value of plasticity, low shear strength and large shrinkage.

Currently, many roads were damaged in Java, especially in Sub Sukodono, Sragen. Condition of roads in this area were damaged include potholes, bumpy roads and relatively short life of the main problems in this area. Especially during the rainy season raised a puddle of water in holes in the road, and the road becomes bumpy and the surrounding soil becomes highly plastic and sticky. In the dry season the soil around the road become cracked and hard.

In the previous research conducted by Prasetyo (2016), shows the soil in Sukodono a high plasticity clay, with a value $LL = 85.73\%$, $PL = 24.69\%$, $PI = 61.04\%$ (Appendix 1). In the test chemical elements that do Analytical Chemistry Laboratory MIPA UGM, Sukodono soil contains soil chemical element = 16.86% Al_2O_3 , $CaO = 0.92\%$ = 10.81% Fe_2O_3 , $MgO = 1.35\%$, and $SiO_2 = 63.25\%$ (appendix 2). Based on the value of $PI = 61.04\%$ (over 17%) and the soil requiring corrective action. In order to overcome the problems existing soil conditions in the area Sukodono, it is necessary to study soil improvement that is by stabilizing the soil.

Soil stabilization is an effort by adding an additive such as salt, lime, cement and other materials with the aim to make the soil become better soil quality. In addition to giving the added material, stabilizing soil compaction can also be done by using mechanical devices.

Soil stabilization have done a lot to improve the quality of the clay. In this study, using material added wood charcoal powder as an ingredient in stabilizing the soil in order to achieve conditions and soil properties better with sekunder

data. Wood charcoal powder has the ability to improve the circulation of water and air, can sequester carbon, easily accessible, and economical price.

B. Problem Formulation

Based on this background, the problem can be formulated as follows:

1. How does the physical properties and mechanical native soil from the District Sukodono, Sragen?
2. How does the physical properties and mechanical ground of the District Sukodono, Sragen that has been stabilized using wood charcoal powder?
3. What is the magnitude of the values of Consolidation Coefficients(C_v), Compression Index (C_c) and Consolidation Settlement (S_c) soil from Sukodono, Sragen with an increase of wood charcoal powder.

C. Objectives and Benefits

1. Research Objectives

- 1) Knowing the physical properties and mechanical native soil from the District Sukodono, Sragen.
- 2) Knowing the physical properties and mechanical ground of the District Sukodono, Sragen that has been stabilized using wood charcoal powder.
- 3) Know the magnitude of Consolidation Coefficients (C_v), Compression Index (C_c) and Consolidation Settlement (S_c) soil from Sukodono, Sragen by the addition wood charcoal powder.

2. Benefit Research

- 1) Improving soil from district Sukodono , Sragen with stabilized using wood charcoal powder.
- 2) provide solutions and alternative material added to stabilization soil loam of wood charcoal powder by consolidation test , completing research preexisting .
- 3) As an input to the agency about the condition of the soil, so it can plan a safe construction.

D. Limiting Problem

In order to prevent the expansion of the discussion of this final project, this research needs to their scope as follows:

1. The study was conducted in the laboratory of Civil Engineering Muhammadiyah University of Surakarta.
2. Sample is clay with undisturbed conditions (disturbed) taken from the District Sukodono, Sragen with soil depth of approximately 50 cm.
3. Variations addition of charcoal as a stabilizing agent that is equal to 10%; 15%; and 20% of the weight of the sample with the conditions of optimum water content (w_{opt}) and maximum volume weight of dry soil ($\gamma_d \text{ max}$).
4. The powder used for charcoal is wood charcoal powder from Surakarta to the size of the number 40 sieve
5. The use of secondary data for wood charcoal powdered and clay Sukodono (Sangeroiz, 2016 and Prasetyo, 2016)
6. Testing taken include:
 - a) Testing the physical properties of the soil in the form of specific gravity (G_s) (ASTM D8554-58), water content (w) (ASTM D2216-71), the limits of Atterberg (ASTM D423-66), and grain size analysis (ASTM D421 -58).
 - b) Testing of soil density with Standard Proctor (ASTM D 698) on the native soil and soil mix.
 - c) Consolidation test (AASHTO T-216-74, ASTM D-2435- 89).

E. Authenticity Research

Research the characteristics of clay from Sukodono, Sragen stabilized using chemical methods with materials of wood charcoal with the title “Tinjauan Kuat Dukung Tanah Lempung Sukodono Kabupaten Sragen Dengan Penambahan Prosentase Bahan Stabilisasi dari Bubuk Arang Kayu” has not previously been carried out research at the Faculty of Engineering Department of Civil Engineering, University of Muhammadiyah Surakarta.

Similar research had previously been done Sangeoris (2016) entitled “Pemanfaatan Bubuk Arang Kayu Sebagai Bahan Stabilisasi Terhadap Kuat Dukung Tanah Lempung Sukodono dengan Variasi Perawatan ”, this study uses wood charcoal powder as a soil stabilization material with a percentage of 0%; 5%; and 7.5% and the testing performed is strong to support the soil (California Bearing Ratio).

Similar research had previously been done Karaseran (2015) with the title "Pengaruh Bahan Campuran Arang Tempurung Terhadap Konsolidasi Sekunder Pada Lempung Ekspansif”, this study uses coconut shell charcoal as a soil stabilization material with a percentage of 0%; 4%; 6%; 8%; and 10% and the tests were conducted Consolidation test.