

CHAPTER I

INTRODUCTION

A. Background

The area in Indonesia has many kinds of soft clay, can be found in Central Java area includes Blora, Purwodadi, Solo, Sragen, Klaten and Yogyakarta. It exposes a problem when building on soft clay sites. Therefore, to improve infrastructure, many construction activities increasingly focus on the behavior of the soil. Especially with different soil conditions not always the same in each area of construction that requires accuracy in the planning and execution of construction itself. To overcome the soil conditions are not as expected, then there are several techniques used in order to improve the quality of a particular soil, among which are add other materials (lime) and the vertical drain technique.

In general, lime is used in many projects for soil stabilization. This method is used in a variety of conditions such as on transportation projects and many of the project structure. The use of lime in the comparatively very low cost because the lime is obtained in several regions in Indonesia. Later known in the fishing world, lime is used as a media to raise the pH of the soil on farms to improve soil conditions by lowering the permeability. In the world of civil engineering lime used for the stabilization of problematic soils. From the description above is intended for mixing lime to raise the pH (Potential of Hydrogen) of the soil where the soil pH rises and the permeability will go down, so soils will be more stable.

Vertical drain basically intended to improve the shear strength of the soil, reducing the compressibility of the soil, and prevent a high settlement and possible damage to the building structure. Vertical drain is generally used on soils with low bearing capacity as the soft clay and organic soil. The soil type typically has the following characteristics: extreme moisture content, high compressibility, and permeability coefficients are little. In

principle, the technique is a method of vertical drains soil reinforcement by reducing the water content in the soil (dewatering).

Based on the problems above, this research try to study influence of stabilization sand-lime column for consolidated soft clay soil. Because lime normally used for soil stabilization and sand vertical drain has benefit to reduce moisture content thereby increasing the permeability of the soil.

B. Problem State

Based on the background of the problems described above, the formulation of the problem in this study include :

- 1) What is effect that occurs between sand-lime column to the consolidation on soft clay?
- 2) How large is the coefficient consolidation (C_v), compression index (C_c), settlement consolidation (S_c) on soft clay used.
- 3) What is the effect of sand-lime column in soil consolidation (C_v, C_c, S_c), due to sampling spacing variation.

C. Objective and Benefits Research

1. Research Objective

- a) To determine the influence of soil stabilization with sand-lime column method on soil have low permeability or soft clay.
- b) To determine the rate of C_v, C_c, S_c for soil with sand-lime column.
- c) To determine the effect of sampling spacing variation to the sand-lime column on consolidation value (C_v, C_c, S_c).

2. Research Benefit

- a) To determine the influence of sand-lime column to the behavior of soft clay soil.
- b) To determine the alternative improvement soft clay soil with sand-lime column method.

D. Limitation Problems

In order to prevent the expansion of the discussion in this research, then in the study were given the following limitations :

- 1) The research was conducted in a laboratory soil of Civil Engineering Universitas Muhammadiyah Surakarta.
- 2) Soil samples were soft clay soil from Troketon Pedan Klaten Central Java Indonesia.
- 3) This study used a sand and lime from nearby store around of campus Universitas Muhammadiyah Surakarta.
- 4) The research using box with dimensions of 1m x 0.4 m x 0.4 m.
- 5) The research uses two sand-lime columns with a diameter of 15 cm.
- 6) The distance between the columns are installed parallel is 1 m.
- 7) Specimen were taken at distance of 16,67 cm, 33,33 cm and 50 cm from the as of column.
- 8) The research using the addition of load 50 kg.
- 9) The research determine the physical properties such as specific gravity and Atterberg limits. The mechanical properties such as coefficient of consolidation (Cv), compressibility index (Cc) and settlement consolidation (Sc).
- 10) This consolidation testing started on the ninth day after soil saturation and giving additional load.
- 11) Separator between the sand-lime column using a multiplex, with lime above and sand below.

E. Research Authenticity

Similar research previously conducted by Luthfiarta (2014) with the title Stabilisasi Tanah Lempung Lunak Dari Ds.Jono Kec.Tanon Kab.Sragen Menggunakan Kolom Kapur Dengan Variasi Jarak Pengambilan Sampel. This research only uses lime column.

Similar research previously conducted by Satriyana (2014) with the title Tinjauan Jarak Pengambilan Sampel Pada Tanah Lempung Lunak Dari Ds.

Jono Kec. Tanon Kab. Sragen Yang Distabilisasi Dengan Kolom Pasir. This research only uses sand column.

The research soil stabilization using sand-lime column entitled “Sand-Lime Column Stabilization On The Consolidation Of Soft Clay Soil” has not previously conducted at the Universitas Muhammadiyah Surakarta.