CHAPTER I
INTRODUCTION

A. Background

Construction design will not be avoided from soil improvement activity. Soil is very important, because it serves as a structure which is support the load from a construction, even used as building materials such as making bricks and tiles.

Definition of soil according to Terzaghi is "soil consists of granulars result of weathering massive rock mass, where the size of each grain can be as big as gravel-sand-silt-clay and contact between grains not cemented included organic materials".

There are various types of soil one of them is the soft clay soil. This soil type has poor characteristics, usually characterized by extreme water content, large compressibility, and small permeability coefficient. In Indonesia it easy to find this type of soil, for example in the area of Central Java includes Klaten, Ngawi, Solo, Sragen, Wates, Yogyakarta, Purwodadi, Kudus and Blora. If we are going to construct a building in areas that have poor soil characteristics, so we must improve the characteristics of soil first.

There are several methods to improve soil characteristics such as by replacing or mixing the soil material, using geosynthetic, and vertical drainage column. The aims of vertical drainage are to increase the shear strength in the soil, reduce soil compressibility, prevent the large settlement and the possibility of damage to the building structure. Vertical drainage is generally used on soils with low bearing capacity as the soft clay and organic soil. In principle, vertical drainage technique is a method of soil improvement by reducing the water content in the soil (dewatering). There are many material of vertical drainage; geosynthetic materials, sand, and lime. The dimensions of vertical drains also varied; 10 cm, 15 cm, and 20 cm.

Based on this problem, the research of influence diameter variation of lime column above sand column in soft clay soil stabilization is conducted. Because the

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dimentions of vertical drains column also affects the rate of reduction of the water content in soil thus increasing the permeability of soil.

B. Problem Formulation

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

1) How large is the influence diameter variation of lime column above sand column in terms of Cv, Cc, and Sc value in soft clay soil stabilization?
2) What is the effect of diameter variation of lime column above sand column in terms of Cv, Cc, and Sc value in soft clay soil stabilization?
3) How does the influence the distance of lime column above sand column in terms of Cv, Cc and Sc value in soft clay soil stabilization?

C. Objective and Benefits Research

1) Research Objective

a) To determine the influence of soil stabilization with lime column above sand column method on soil have low permeability or soft clay.

b) Determining comparison value the Cv, Cc, and Sc the soft clay from Pedan districts of Klaten regency with diameter variation 10 cm and 20 cm of lime column above sand column.

c) Determining the effect of distance sampling the value of Cv, Cc, and Sc on soft clay stabilized with lime column above sand column whose diameter varies.

2) Research Benefit

a) To give more information about soil stabilization using vertical drain.

b) To determine the alternative improvement of soft clay soil with lime column above sand 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:

a) The research was conducted in a laboratory soil of Civil Engineering Universitas Muhammadiyah Surakarta.

b) Soil samples is soft clay soil from Troketon village, Pedan districts, Klaten regency of Central Java Indonesia.

c) This research used a sand from nearby store around of campus Universitas Muhammadiyah Surakarta.

d) Lime which used is slaked lime from nearby store around of campus Universitas Muhammadiyah Surakarta.

e) The research uses box with dimensions of 1m x 0.4 m x 0.4 m.

f) The research uses two diameter variations of column that are 10 cm and 20 cm.

g) The position of lime column is above sand.

h) Separator between lime and sand column is using triplex.

i) The distance between the columns are installed parallel is 1 m.

j) Distance variation sampling is 16.67 cm and 50 cm from vertical drain column.

k) Each distance variation sampling take 3 sample of soil, that is first layer which is using lime column, second layer is a half lime and a half sand, third layer is sand column.

l) The research using the addition load 50 kg.

m) This research aims to determine the specific gravity of soil (Gs), atterberg limits, coefficient of consolidation (Cv), compressibility index (Cc), and settlement of consolidation (Sc).

E. Research Authenticity

Soft clay soil stabilization research with titled "Influence Diameter Variation of Lime Column Above Sand Column In Soft Clay Soil Stabilization" has not previously conducted at the Universitas Muhammadiyah Surakarta. However, research in the area Pedan districts of Klaten regency Central Java Indonesia is already done by Merdhiyanto, P (2015) with titled "Sand-Lime Column

Stabilization On The Consolidation of Soft Clay Soil". The differences of this research with Merdhiyanto research that is Merdhiyanto compare influence sand-lime column and without sand-lime column, while this research is influence diameter variation of lime column above sand column. Moreover, soft clay soil stabilization research done by Satriyana (2014) using sand column with sample soil taken from Sragen. And Lutfiarta (2014) using lime columns with distance variation of soil sampling and also soil samples similar with Satriyana (2014).