

CHAPTER I

INTRODUCTION

I.1 Background

Some of construction project in Indonesia are built on clay. Clay consists of very small grains and always shows the plastic and cohesive behavior. Generally, clay is a bad base-soil material, this condition is due to its low shear force, and so the construction in this soil layer always has some problem, for example: low bearing capacity, large settlement due to consolidation, long consolidation, and high swelling-shrinkage of soil.

To evaluate the possibility of those conditions, it is required to predict the behavior of clay. A high compressibility behavior generally indicates that the soil bearing capacity is low. Sensitivity to water content alteration is the most special characteristic of clay. Based on the clay behavior the research is done by using fly ash to increase the shear force of clay.

Research about stabilization of clay with many kind stabilizers such as cement, lime soil, cane pulp ash are commonly done. The addition of stabilizer intends to reduce the swelling potential and plasticity index of soil. Especially expansive clay, that has high plasticity index and swelling potency. Therefore, study of clay stabilization soil is still interesting subject to be investigated.

Nowadays, coal is one of the primary energy sources, especially for electricity (steam energy electric power station). Coal used as a fuel for burning process. From this phase there is a residue from the coal burning, it called fly ash.

The amount of this residue estimated will increase in a row with increasing of coal consumption for electricity power plant.

Commonly, fly ash dumped in landfill or being ignored in industrial area. This matter will harmful the environmental around those industrial area.

Fly ash, as a waste material in Indonesia, is one of the most potential wastes from manufacturing industry. It is continuously available due to population's increasing demand in energy uses, utility services and infrastructures in several cities. As a waste material in Indonesia, fly ash will influence to the pollution if not utilized. To reduce the pollution problem, fly ash is better used as stabilization material.

In this research fly ash is used as a stabilizer of clay due to its low price and availability. However, generally fly ash is considered as pozzolana which is not cementitious itself. It has an ability to combine with Ca-rich materials such as lime, cement, etc. to form cementitious ones; e.g. calcium silicate hydrate (CSH), calcium aluminate hydrate (CAH), calcite (CaCO_3), etc. among soil particles due to the hydration and long-term pozzolanic reaction.

I.2 Problem Statement

Clay is strong enough in dry condition; however it will be very weak on saturated condition. This research will cover the problem of:

1. Does fly ash have the possibilities increase the shear strength?
2. What is the best combination to get the maximum result of optimizing and stabilizing clay soil?

I.3 Problem Limitation

The limitation of this research:

1. Clay is taken from Dusun Ngablak, Desa Sitimulyo, Kecamatan Piyungan, Kabupaten Bantul, DIY.
2. Fly ash is taken from PLTU Karang Kandri (PT. S2P) Cilacap, Central Java.
3. The conventional triaxial apparatus is going to be used to measure shear strength of clay.

I.4 Research Objectives

The objectives of this research are:

1. To find alternative material as a clay stabilizer.
2. To find combination of clay and fly ash, in order to increase the shear strength.
3. To find the combination of clay and fly ash to set maximum shear strength.

The result of this research will be useful for technology development, especially soil improvement technology that is the invention of new material as a clay stabilizer with relative low cost than other. Besides this research can reduce the environmental pollution caused by the wasted fly ash.

I.5 Research Originality

There are a lot of researches about soil (clay) stabilization, especially clay stabilized with fly ash that tested with various methods. But, the research of fly ash stabilized clay which is tested with triaxial method has not been executed by other researchers according to the writer's knowledge.

