

# CHAPTER I

## INRODUCTION

### **1.1 Background**

The development of construction industry especially in Indonesia automatically encourage the use of land. Soil that used for land, not all has a good performance to support the construction buildings or other civil engineering structures above it. The effort to change the soil characteristics to increase its engineering performance is known as soil stabilization. In soil stabilization, the soil properties that has alteration are mechanical properties, volume stability, permeability, and durabililty. If the construction buildings and all structures that constructed above the weak soil, it is risky and susceptible to collapse because such soil has a differential settlements due to its poor shear strength and high compressibility.

Commonly, two types of soil stabilization are traditional and non-traditional stabilization. Stabilization methods by using various combination of lime, cement, bitominous, also fly-ash materials that all known by traditional methods. These stabilization methods usually require lengthy cure times and need large amount of additives for significant strength improvement. In recent years, non-traditional stabilization additives have become increasing available for buildings construction applications such as polymer modified mortar and polyurethane foam soil grouting. The polymeric materials used for soil stabilization may be natural or synthetic. For example, liquid asphalts

(natural) used for stabilizing and surfacing of low-volume roads (Mamlouk and Zaniewski, 1999).

In this current study investigates the potential of polyurethane-resin to enhance the strength of sand.

### **1.2. Problems Statement**

This research will cover the problem of:

1. Does the polyurethane-resin as a additive material have a possibility to improve the characteristics of volcanic sand ?
2. What the effects of polyurethane-resin contents variation as a sand stabilizer due to the strength of volcanic sand ?
3. What the effects of curing time variation of polyurethane-resin to get maximum result for stabilizing volcanic sand ?

### **1.3. Objectives**

The objectives of this research are:

1. To identify the effects of polyurethane-resin admixture to the strength of volcanic sand.
2. To investigate the effects of polyurethane-resin contents variation as a sand stabilizer due to the strength of volcanic sand.
3. To investigate the effects of curing time variation of polyurethane-resin admixture to the strength of volcanic sand.

#### **1.4. Problems Limitation**

1. The sample of volcanic sand that used for this study is from Merapi. All the test performed at Soil Mechanics Laboratory of Universitas Atma Jaya Yogyakarta.
2. Polyurethane-resin that used for this study using LUX automotive furnish (Clear Coat).
3. The variation of PU-Resin contents that will be test are 2%, 4%, 6% and 8% by weight of volcanic sand.
4. There are no chemical testing for all materials.
5. The curing time variations for testing at 0 and 7 days.
6. The Direct Shear Test will be used to measure the shear strength of specimens.