

**SHEAR STRENGTH OF POLYURETHANE-RESIN  
STABILIZED VOLCANIC SAND**

**Final Project Report  
as a requirement to obtain Bachelor degree from  
Universitas Atma Jaya Yogyakarta**

**by:**

**YOHANES MEINATA PERMANA  
Student ID Number: 11 13 14048**



**INTERNATIONAL CIVIL ENGINEERING PROGRAM  
DEPARTMENT OF CIVIL ENGINEERING  
FACULTY OF ENGINEERING  
UNIVERSITAS ATMA JAYA YOGYAKARTA  
YOGYAKARTA  
2016**

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Who made the remarks,

Yohanes Meinata Permana

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Final Project Report

## SHEAR STRENGTH OF POLYURETHANE-RESIN STABILIZED VOLCANIC SAND

by:

YOHANES MEINATA PERMANA  
Student ID Number: 11 13 14048

has been approved by Supervisor

Yogyakarta, 27<sup>th</sup> July 2016

Advisor

Ir. John Tri Hatmoko, M.Sc

Head of Civil Engineering Department

Januar Sudjati, ST, MT

## Final Project Report

Signature \_\_\_\_\_ Date \_\_\_\_\_

27/7/18

27/7/2018

27.07.2018

## ACKNOWLEDGEMENT

First and foremost, I would like to thank to Jesus Christ for his blessing, therefore I can prepare and finish this final project well.

In this opportunity, I would like thank to:

1. Ir. John Tri Hatmoko, M.Sc., as my advisor, for his advice and counseling that has been given for the final project arrangement.
2. Dr. Eng. Luky Handoko, as the coordinator of Civil Engineering International Program.
3. J. Januar Sudjati, ST., MT., as the head of Civil Engineering Department of Atma Jaya Yogyakarta University.
4. All lecturers in civil engineering especially in international program who had educated me, therefore I can graduate from Atma Jaya Yogyakarta University.
5. Mr Wiko and Mr. Drajat, as the staff of Civil Engineering International Program, for the help and friendship.
6. Mr. Oktoditya, as the staff of Soil Mechanics Laboratory, for the help and friendship.
7. My parent, Ir. B.A. Tjipto Sujitno, MT, APU – Agnes Sujarwati, BA and my sister, Yasinta Yerry Permana Sari, for their love and support.
8. My girlfriend, Theresia Putri Ratnawati, for his love and support.
9. My best friend I Wiratama Made, Arief Rachman, Garudea Martha, Kartika Zebua, Justiadi Kalvianto, Andreas Dhony, and Nicolaus Zaluku for their friendship, and support.

10. My comrades, Yohanes Aditya, Andreas Ryan, Ignatius Andi, and Judha Herdanta, for their love and motivation.

11. My best junior, Monika Brenna Hernindia Ratri, Digna Diva Koa, and Wikan Danastya, for their love, support, and help.

12. All my friends especially in Civil Engineering International Program, for their friendship and support.

13. All parties that can not be mentioned all, thank you for your support and help.

I realize, this report has some mistakes. Therefore, I would like to apologize for that. Finally, I hope this report may be useful for the reader and me.

Yogyakarta, June 2016

The Author

Yohanes Meinata Permana

11 13 14048

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## MEANING OF SYMBOLS AND ABBREVIATIONS

$w$  = Water Content (%)

$\gamma_{wet}$  = Wet Volume Weight (gr/cm<sup>3</sup>)

$\gamma_{dry}$  = Dry Volume Weight (gr/cm<sup>3</sup>)

$G$  = Specific Gravity

$c$  = Cohesion (kg/cm<sup>2</sup>)

$\phi$  = Internal Friction Angle (°)

$\sigma$  = Normal Stress (kg/cm<sup>2</sup>)

$\tau$  = Soil Shear Strength (kg/cm<sup>2</sup>)

## ABSTRACT

In construction project, knowing the type and characteristics of the soil is a very important thing. Not all soil have a good performance to support the structure above it. If the construction building is 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. Therefore, an effort to change the soil characteristics to increase its engineering performance is highly required. Experiments to improve the strength of volcanic sand by the polyurethane-resin (PU) as additive material conducted in this research. The objectives of this research is to investigate the effects of adding polyurethane-resin for soil shear strength improvement. Specimens were prepared by adding different amount of polyurethane-resin (2%,4%,6%, and 8%) to volcanic sand. The shear strength of specimens determined with direct shear test and compared to each other with the different curing time condition (0 and 7 days) to get the effect of polyurethane-resin on volcanic sand. The results of this research indicated that the addition of polyurethane-resin improve the shear strength of sample. The optimum level of shear strength on sand + 8% PU at 7 days curing time with the average shear stress value is  $0.131 \text{ kg/cm}^2$ , it is increase 14.91% compared with the original soil shear strength. However, polyurethane-resin enhanced the strength of samples after 7 days of curing time, but the strength of 0 day curing time is less than the original soil without additive material.

**Keywords:** stabilization of volcanic sand, shear strength, polyurethane resin, direct shear test, curing time