

**CALIBRATION OF FINES CONTENT EFFECT IN SAND ON  
GEOSYNTHETICS PULL-OUT RESISTANCE USING  
FINITE ELEMENT METHOD**

Final Project Report

As one of the requirements to receive Bachelor Degree of  
Universitas Atma Jaya Yogyakarta

**By:**

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**INTERNATIONAL CIVIL ENGINEERING PROGRAM**

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**UNIVERSITAS ATMA JAYA YOGYAKARTA**

**2019**

**APPROVAL SHEET**

Final Project

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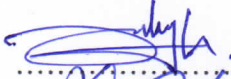
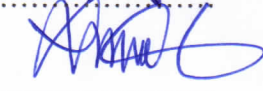
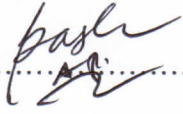


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## PREFACE

The research is one of the requirements of fulfilling bachelor degree of Universitas Atma Jaya Yogyakarta. This research is finished under “3+2 Program” in Taiwan, where **Universitas Atma Jaya Yogyakarta** and **National Cheng Kung University** has an agreement and collaboration. The background of this research is to study and validate the effect of fines content in sand conducted by Hegde & Roy in 2018 using pull-out test by numerical simulation. Sand and geotextile will influence the soil-reinforcement interaction mechanism in Reinforce Earth Wall. Thus, the study of fines content in sand will be discussed in this report.

Chapter I of the report contains the introduction before getting onto research’s references in chapter II which is literature review. Chapter III contains all the basic theories on writing this report. Chapter IV is methodology, which explains the method or steps on doing the study. Chapter V is the numerical simulation result and discussion. The last section is Chapter VI which is conclusion and suggestion of this study. Author realizes that this report is not perfect and thus author apologize profusely.

Tainan, Taiwan, July 5<sup>th</sup> 2019

Author

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## ABSTRACT

**CALIBRATION OF FINES CONTENT EFFECT IN SAND ON GEOSYNTHETICS PULL-OUT RESISTANCE USING FINITE ELEMENT METHOD**, Finsen Prayogo, Student Number 151315759, the Year 2019, Field of Specialization Geotechnical Engineering, International Civil Engineering Program, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.

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Reinforced earth (RE) wall has been known since 1971 in the United States and the construction of reinforced earth wall has been very popular lately in the application of a retaining wall. Many benefits are obtained when we choose to use RE wall, besides the low price, easy application, and good durability, RE wall also proven has a good performance for extreme loading conditions. Soil-reinforcement interaction mechanism is a very important factor that must be considered, the mechanism will plays a big role when the wall receives extreme loads. Sand is one of the constituent components of a wall that has an important role and will influence the performance of the wall. The soil used to build RE wall is usually granular material such as sand, because it has good interlocking behaviour. Fines content in sand might affect the soil-reinforcement interaction mechanism in the structure. Pull-out testing has also been done numerically by using various finite element software. Numerical studies using finite element method (FEM) are considered more economical, faster, and the result tend to be more rigorous than laboratory test. This study will validate the procedure of the numerical study conducted by Hegde & Roy in 2018 and calibrate the pull-out model. Numerical modelling will be done in Plaxis 2D.

**Keywords:** Reinforced earth wall, Soil-reinforcement interaction, Sand, Fines, Pull-out, Finite element method