



Cairo University

# **3D FINITE ELEMENT STUDY OF SOIL-NAILED WALL**

By

**Amr Moamen Mamon**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**MASTER OF SCIENCE**  
in  
**Civil Engineering - Public Works**

**FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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Under the Supervision of

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**Title of Thesis:**

### **3D FINITE ELEMENT STUDY OF SOIL-NAILED WALL**

**Key Words:**

Soil Nailing; PLAXIS 3D; Soil Reinforcement

**Summary:**

In this study, a three-dimensional (3D) finite element (FE) model was developed to simulate the performance of an instrumented full scale soil-nailed wall reported by the French national research project CLOUTERRE. The 3D-FE model was used to conduct a parametric study to investigate the effects of wall inclination, backslope inclination, nail inclination, facing stiffness, nail horizontal spacing, nail length, and soil properties on each of the wall global factor of safety, horizontal displacement of the wall, and the tensile forces developed in the nails. Finally, a series of design guideline charts were developed based on the results of the parametric analyses to help geotechnical engineers with the preliminary design for specific configurations of soil-nailed walls.





## **Disclaimer**

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Amr Moamen Mamon

Date: 10/01/2019

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