بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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MONA MAGHRABY

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

PERFORMANCE OF ROCK-SOCKETED PILES UNDER COMPRESSION LOADS

A Thesis
Submitted to the Structural Engineering Department
Faculty of Engineering
Ain Shams University
for the Fulfillment of the Requirements of M. Sc. Degree
In Civil Engineering (Structural Engineering Department)

Prepared by

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B.Sc. in Civil Engineering, July 2014
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Date: / / 2020

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DEDICATION

This work is dedicated to my ***Father;*** for his help, support, patience, and encouragement to finish this work.

Thanks are due to my ***brother*** for his support and help.

This thesis is dedicated to my ***Mother*** for her huge role, support and encouragement.

STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering, and structural engineering department for the degree of M.Sc. in Civil Engineering (Soil Mechanics and Foundation Engineering).

The work included in this thesis was carried out by the author in the Department of Structural Engineering, Faculty of Engineering, Ain Shams University, from 2015 to 2020.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

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ABSTRACT

In terms of the importance of constructing mega projects in Egypt with innovated superstructures subjected to very high loads, this research was initiated with the objective of investigating the performance of rock-socketed piles under compression loads, numerically (Plaxis V8.6) for 3 study cases. Primarily, objectives were set and research methodology was put forward to attain such objectives. The methodology encompassed 5 studies (Theoretical, Numerical Modelling, Study Cases Simulation, Analytical Studies, and Inferential Studies).

Theoretical Study of literature in the field of rock-socketed piles was accumulated, studied, scrutinized, and categorized into groups. All through ***Numerical Modelling Study***, theoretical approaches (finite element) were investigated. In addition, modelling of rock-socketed piles was elaborated. During ***Study Cases Simulations Study***, several models were applied to tune their parameters to produce similar results to measured values (calibration process). This was achieved to 3 study cases. Moreover, through this study, models results were verified against measured values, where it was clear that Jointed Rock Model provided results similar to measured values. Accordingly, trials were achieved to adjust its parameters (i.e. $E_{rockmass}$ and $\varphi_{rockmass}$).

Analytical Study was achieved to the impact of the different parameters on the pile behaviour (i.e, dip angle, socket length, settlement ,and roughness angle), in terms of empirical equations and models for 3 study cases. During the ***Inferential Study***, conclusions were drawn and recommendations for future research and Engineering practice were suggested.

The ***research prioritized*** the need of modified reduction factors and the establishments of a practical design for rock-socketed piles, as most of the available methods provide conservative predictions. This design method

would assist designers to predict pile actual settlement and estimate the distribution of loads along the rock socketed pile portion, in terms of the parameters of piles (i.e, dip angle- socketed length - diameter ratio (Ls/D)).

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