THREE DIMENSIONAL ANALYSIS OF SINGLE LATERALLY LOADED HELICAL PILES IN COHESIONLESS SOIL

By

Omar Mohamed Elhamy Anwar Taha

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

Prof. MOSTAFA A. ABU KIEFA

…………………………….

Professor of Geotechnical Engineering
and Foundations
Public Works Dept.
Faculty of Engineering, Cairo University

Dr. SHERIF A. AKL

…………………………….

Assistant Professor of Geotechnical
Engineering and Foundations
Public Works Dept.
Faculty of Engineering, Cairo University

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Approved by the Examining Committee

____
Prof. Dr. Mostafa A. Abu Kiefa, Thesis Main Advisor

____
Prof. Dr. Mohamed I. Amer, Internal Examiner

____
Prof. Dr. Khalid M. El-Zahaby, External Examiner
(President of Housing & Building National Research Center)

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2016

Engineer's Name:	**Omar Mohamed Elhamy Anwar**	
Date of Birth:	**12/03/1990**	
Nationality:	**Egyptian**	
E-mail:	omar.elhamy12@gmail.com	
Phone:	**+2 01007321557 – 02/35837980**	
Address:	**18, El Salam St., El Haram St., Giza**	

Registration Date:	**01/10/2012**
Awarding Date:	**…./…./2016**
Degree:	**Master of Science**
Department:	**Civil Engineering-Public Works**
Supervisors:	**Prof. Dr. Mostafa A. Abu Kiefa**
	Dr. Sherif A. Akl
Examiners:	**Prof. Dr. Mostafa A. Abu Kiefa**
	Prof. Mohamed I. Amer
	Prof. Khalid M. El-Zahaby
	(President of Housing & Building National Research Center)

Title of Thesis:

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Key Words: Helical piles, Numerical modeling, Soil structure interaction, Strain Wedge

Summary:

Helical piles represent an efficient deep foundation system that has been widely used to support variety types of onshore and offshore structures. Predrilling process prior installation alleviates the need for large torque to install high capacity helical piles. This research used three dimensional Finite Element program (Plaxis 3D) to evaluate the performance of vertical single helical pile subjected to lateral loading. A comparison between the numerically predicted response and four lateral load tests were conducted using full-scale helical piles is presented to assess the adequacy of the adopted numerical model. This study presents a simulation for predrilling process of helical piles using two different approaches. The parametric study involved helical piles installed in dry sand. The study aims to highlight the effect of different parameters on lateral capacity of helical piles. Furthermore, the strain wedge zone pattern mobilized around long and short helical piles were also investigated in addition comparisons were performed between the results of p-y curves method and results of the three dimensional finite element analysis for short helical piles.

Dedication

To my loving and caring parents,

Mohamed Elhamy Anwar and Magda Aly

To my beloved sister,

Yara M.Elhamy

Thanks for all your love and support.

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