



STABILITY ANALYSIS OF DEEP EXCAVATIONS IN CLAYS

By

Amr Mohamed Abd El-Samea Ahmed

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

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Summary

In this research, the stability of deep excavations in clays is discussed. This thesis also introduces how the input parameters used to represent the soil properties affect the excavation stability in undrained conditions. The soil properties are represented in undrained type (A) and undrained type (B) using Mohr-Coulomb total stress analysis (TSA), effective stress analysis (ESA), and the undrained strength analysis (USA) using SHANSEP concept. To capture this effect, series of numerical models are carried out using 2D finite element PLAXIS. In these models, the concrete diaphragm wall is used as a support system with horizontal struts installed at different levels. The soil properties used in this research have the same properties of Northwest Sinai clay. Moreover, this study discusses different factors affect the excavation stability such as; excavation geometry and wall stiffness. For each numerical model, surface settlement, lateral wall deformations and straining actions on side supports are presented.

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Dedication

I thank Allah for Allah has blessed me with the best family in the world. I dedicate this thesis to my parents who taught me the keys to success and happiness: honest, moral, ethics, hard work, education, and respect. My parents lead me to the university and always encouraging me to set and attain high goals. Deepest gratitude to my sister for setting an extremely high standard and making me sure that I have everything that I need want.

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