بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE

GEOELECTRICAL AND SEISMIC STUDIES ON EL SHURUQ CITY, EGYPT

A THESIS
SUBMITTED IN PARTIAL FULFILLMENT FOR
THE REQUIREMENTS OF THE MASTER DEGREE
IN GEOPHYSICS

By

MOHAMED ABDOU EL MELHEM
B.Sc. in Geophysics (1990)

TO

Geophysics Department
Faculty of Science
Ain Shams University

SUPERVISED BY

Dr. Salah El Deen A. Mousa
Assistant Prof. of Geophysics,
Geophysics Department,
Faculty of Science,
Ain Shams University.

Dr. Mounir A. Ismail
Lecturer of Geophysics,
Geophysics Department,
Faculty of Science,
Ain Shams University.

B
9710

CAIRO – 1999


بسم الله الرحمن الرحيم
«قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْحَكِيمُ »
صدق الله العظيم
«سورة البقرة -آية ٣٢»

NOTE

The present thesis is submitted from **Mr. Mohammed Abdou El Melhem** to the Faculty of Science, Ain Shams University in partial fulfillment for the requirements of Master of Science in Geophysics.

Beside the research work materialized in this thesis, the candidate attended and successfully passed post-graduate courses for one academic year in the following topics:

1- Geophysical Field Measurements.

2- Numerical analysis and computer programming.

3- Potential theory.

4- Electrical methods.

5- Magnetic methods.

6- Gravity methods.

7- Shape of the earth.

8- Plate tectonics.

9- Electromagnetic and telluric current methods.

10-Radiometric methods.

He has successfully passed the final examination of these courses. In addition, the student has successfully passed the language examination.

Head of Geophysics Department,

Prof. Dr. Nasser M. Hassan

ACKNOWLEDGMENTS

My all gratitude is due to almighty God guided and helped me to bring-forth the present study.

I would like to express my deepest appreciation to **Dr. Salah El Deen A. Mousa**, Assistant Prof. of Geophysics, Geophysics Department, Faculty of Science, Ain Shams University, for his kind supervision, guidance, and encouragement throughout this study and for critical reading of the manuscript.

I am also grateful to **Dr. Mounir A. Ismail**, Lecturer of Geophysics, Geophysics Department, Faculty of Science, Ain Shams University, for his generous supervision, encouragement and critical reading of manuscript.

I wish to express my honest and deepest gratitude to **Dr. Aly Mohamed**, Geology Department, Faculty of Science, Ain Shams University for his help in geological review, and to **Dr. Hosam Eldin Gamal**, Geophysics Department, Faculty of Science, Ain Shams University for his help during carrying out the seismic field survey.

I would like to thank my friends **Mr. Mohamed Shokry, Mr. Bachar J. Faiad** and **Dr. Mohamed K. Yzbek** for their valuable assistance.

The author wish to thank all the staff members, Geophysics Department, Ain Shams University headed by **Prof. Dr. Nasser M. Hassan** for their help and encouragement. Finally, my deep appreciation to my family and to all individuals who assisted in preparing this thesis.

Abstract

El Melhem, Mohamed Abdou. Geoelectrical and seismic studies on El-Shuruq area, Egypt. To M. Sc., Ain Shams University, Faculty of Science, Geophysics Department, 1999.

The main purpose of this thesis is to study some geophysical details about the bedrock foundations to determine the risk zone in the area of El-Shuruq city. The aim of Egyptian government is to construct new cities inside the desert to overcome the population in the old cities. The suggested locations need some studies, like: geological, electrical, shallow seismic refraction and geotechnical studies. These studies aim to determine the geotechnical properties and their reliability for the best foundation purposes of soil materials. The link between geophysical studies and civil engineering projects depends mainly upon material competence, thickness of the weathered layer and nature of the bedrock foundations. The most important problems that may affect the stability of the city are the swells in the claystone beds, which are found in the subsurface and resist the settlement of building above it. If they are saturated or wet.

The study area is located in the area between Cairo-Ismailia road and Cairo Suez road which lies between longitudes 31° 36\' and 31° 39\' E and latitudes 30° 05\' and 30° 11\' N. The area consists of rocks related to Miocene deposits which are of shales and fossiliferous calcareous sandstone and limestone. The topography ranges between 120 to 230 m and slopes in main direction NW-SE. It is a part of Heliopolis basin.

Geoelectrical resistivity survey has been carried out using Schlumberger 4-electrode array. The maximum current electrode half spacing (AB/2) is equal to 500 m. 19 vertical electrical sounding stations (VESes) have been conducted. These VESes were qualitatively and quantitatively interpreted to determine the geoelectric parameters (resistivity and thickness). These parameters were used to construct three geoelectrical profiles, in addition to isoapach and depth maps for the near surface clay layer. Geoelectrical succession has been achieved and identified. On the other hand, the geoelectric parameters: Transverse resistance (T), Transverse resistivity (ρ_t), Longitudinal conductance (S_L), the average longitudinal resistivity (ρ_L) and Anisotropy (λ) have been drawn and evaluated.

Shallow seismic refraction survey, employing both P- and S-waves, has been carried out using ES-1225 EG & G Geometrics 12 channel seismograph by applying In-line spread and In-line offset spread. Two spots were studied in details, in which 67 shots well distributed

along 11 profiles have been acquired with geophone-geophone distance of 3 and/or 4 m. A group of records showing the arrival times of the refracted waves at each geophone were resulted. The two spots are covered along 1300 m^2 (first spot) and 3600 m^2 (second spot). Three interpretation methods have been applied to determine the thickness of each layer and its velocity. These methods are the delay time, the intercept time and the ray tracing methods.

Geoseismic cross sections and maps for layers thickness and their velocities were constructed. On the other hand, different elastic moduli (Poisson's ratio, Kinetic rigidity modulus, Young's modulus, Bulk modulus and Standard Penetration Test) have been calculated from the values of velocities of each spot. Also, Material competence scale and foundation material bearing capacity were evaluated.

Two-layer model was obtained indicating weathered sandstone overlain by compact sandstone with clay intercalations.

Material competence parameters, based on seismic refraction measurements, have revealed fairly to moderate competent to competent materials.