



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون أية 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 %



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بعض الوثائق الأصلية تالفة



شبكة المعلومات الجامعية



بالرسالة صفحات
لم ترد بالأصل

**CONTRIBUTION OF THE GEOGRAPHIC
INFORMATION SYSTEMS IN THE GEOTECHNICAL
APPLICATIONS OF THE HURGHADA-SOHAG ROAD,
EASTERN DESERT, EGYPT.**

A THESIS SUBMITTED

BY

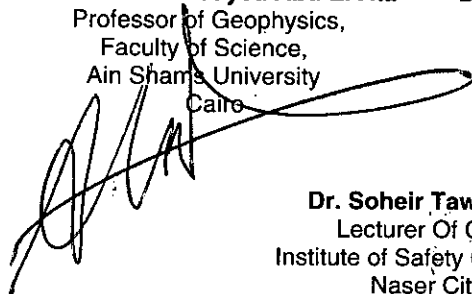
KAISSER HUSSEIN SABER SALEH
B.Sc. in Geophysics, Cairo University, 1985

For

. M.Sc. Degree In Geophysics

Under the Supervision of

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To
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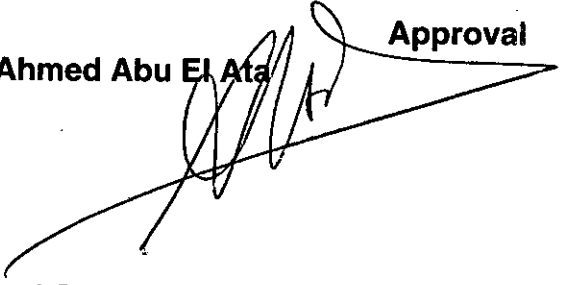
Thesis title :

**Contribution Of The Geographic Information
Systems In The Geotechnical Applications Of The
Hurghada-Sohag Road, Eastern Desert, Egypt.**

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Approval

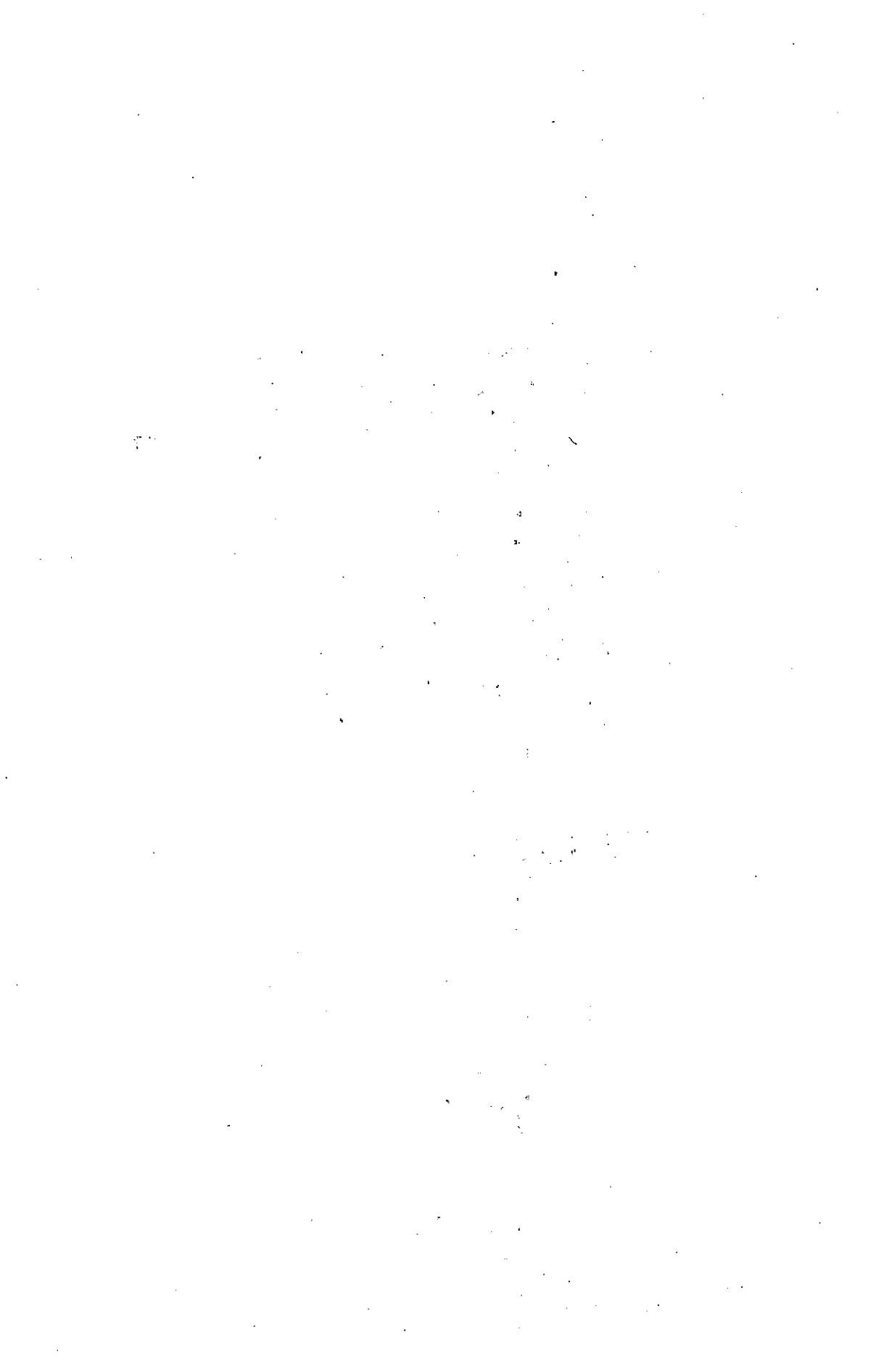


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NOTE

The present thesis is submitted by

KAISSER HUSSEIN SABER SALEH

is partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN GEOPHYSICS.

Beside the research work materialized in this thesis, the candidate has attended graduate courses for one year in the following topics:

- 1 - Geophysical field measurements.
- 2 - Data processing.
- 3 - Filtering techniques.
- 4 - Seismic methods.
- 5 - Elastic wave theory.
- 6 - Engineering seismic.
- 7 - Seismology and earthquakes.
- 8 - Deep seismic sounding.
- 9 - Earth structures.
- 10- Numerical analysis and computer programming.

He had successfully passed the final examination of these courses.

In addition, the student has successfully passed the English language examination.

Head of Geophysics Department

Prof. Dr. Nasser M.H. Abu Ashour

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I would like to take this opportunity to express my gratitude, thanks and my great love to my family for their encouragement during this work.

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ABSTRACT

KAISSER HUSSEIN SABER SALEH : CONTRIBUTION OF THE GEOGRAPHIC INFORMATION SYSTEMS IN GEOTECHNICAL APPLICATION OF THE HURGHADA-SOHAG ROAD, EASTERN DESERT, EGYPT.

The study area is situated in the central part of the Eastern Desert, between latitudes $26^{\circ} 30'$ & $27^{\circ} 30'$ N and longitudes

$31^{\circ} 00'$ & $34^{\circ} 00'$ E. The proposed desert road (of about 260 km length) is a vital traffic artery crossing the Eastern Desert and linking the River Nile at Sohag city to the Red Sea at Hurghada city. The geotechnical application and engineering properties of the foundation soil will be applied for design purposes along the suggested desert road and settlements. The geological, geophysical and seismological data, as well as the soil engineering data input reflect the regional seismicity or risk map due to the geological conditions, variation of soil properties and flood risk zoning maps. All the data are accessed and accumulated in software Erdas Imagine 8.2, under database management with the geographic information systems.

Qualitatively, the reduced to the magnetic pole anomalies are structurally trending NE-SW, NW-SE, E-W and N-S. The quantitative interpretation is carried by Powell's method (1967) on fifty four scattered profiles. The results are contoured producing a subsurface - surface configuration for the basement surface and structures along the desert road, where the basement depth under the Nile valley is about 3.5 km, under the Maaza plateau is 2.5 km and under Wadi Qena is 1.5 km. The running faults have the trends: NE-SW, NW-SE and E-W. Moreover, the basement under the Red Sea coastal plain is ranged between 1 and 4 km towards the sea water. The major faults run from Wadi Qena to the Red Sea, in which in Abu Shaar area there exists an intrusive body of strong magnetic anomaly for basic to ultra-basic plutons. It is considered the extension of Ash El Malaha Ridge.

The interpretation of seventeen seismic reflection lines is conducted in Abu Shaar area to map the subsurface geological structures intervening the tops of Zeit Formation, Belayim Formation and the basement surface. Their trends are ENE-WSW, NE-SW, NW-SE and N-S. There exists an intrusive body in the area of Abu Shaar of NNW-SSE direction with horsts and grabens trending ENE and sounding to the Red Sea opening.

The shallow seismic refraction survey is done and the output data are analyzed, in which fourteen geoseismic sections are plotted. Also, the elastic moduli and the engineering properties of the foundation materials for seven seismic sites are calculated. The elastic moduli are: the P-waves that range between 599.8 and 873.8 m/s, the S-waves that range between 271.1 and 504.5 m/s, the Young's Modulus varies from 0.09×10^{11} to 0.14×10^{11} dynes/cm², the shear strength ranges between 0.01×10^{11} and 0.06×10^{11} dynes/cm², the bulk modulus varies from 0.03×10^{11} to 0.09×10^{11} dynes/cm², the Poisson's ratio equals 0.25 and indicates that the type of rock is sandstone. The engineering properties of the foundation materials are: the concentration index that equals 5.0, the density gradient equals 1.8, the stress ratio equals 0.33, the standard penetration test is ranged between 25.4 and 157.3 m/s, the ultimate bearing capacity varies from 762 to 4719 m/s. The allowable bearing capacity ranges

between 381 and 2359.5 m/s. All these indicate that, the engineering properties of the foundation soil is moderate-good competent.

Regarding the remote sensing interpretation, a digital mosaic of landsat thematic mapper scenes is generated using the following ratios of thematic mapper bands : (5/4.3/4R,5/1G,5/7B) for the basement area. They are sensitive to Fe bearing aluminosilicate, spectrally opaque and hydroxyl bearing or carbonate bearing minerals, respectively. The structural trend analysis, as deduced from landsat, reveals N-S, NE-SW, E-W and NW-SE trends.

The calculation of the morphometric parameters for the Red Sea and River Nile drainage basins, which cutting the proposed desert road reveals that, the bifurcation ratio varies from 2 to 5.25, the elongation ratio ranges between 0.4 and 0.9, the circular ratio ranges between 0.2 and 0.8, the stream frequency varies from 0.05 to 0.8 and the drainage densities range between 0.3 and 1.49. The surface drainage lines at the basement area are believed to be structurally controlled, while at the western part of the Eastern Desert the drainage lines within the sedimentary rocks are controlled by gravity, lithology and structures.

The geo-environmental hazards mitigation and control along the desert road are predicted, in which the zone of Abu Shaar area is very danger. This is due to the which active faults related to the opening of the Red Sea, the earthquake intensity for the area is XII, the maximum acceleration at the earthquake epicenter $a = 0.606 \text{ m/sec}^2$ and the earthquake coefficient $a/g = 0.0618$. This necessitates the change of the path of the desert road from the area of Abu Shaar southeasterly to the asphaltic road of Hurghada Airport directly.

The Maaza plateau consists of beded limestone, silt, marl and minor dolomite and sandstone. The continued removal of limestone by water over great periods of time results in a cavy rock masses, passageways, vertical joints, fractures and faults in the rocks. These have been enlarged by solution to form rock pinnacles and narrow vertical caverns. The natural karstic landscape absorbs all the water falling on it, in which an amount of water are supplied to the ground water giving rise the landsliding by raising ground water levels. It is impossible to control the ground water levels in the progressing slide mass with addressing both the elevation of the reservoir and the rate of rainfall. Shallow caves are also formed and the collapes have created separated closed depressions called sinkholes. Managing the risk of sinkhole formation requires not only knowledge of the site geology, but also control of ground-water levels.

The flood risk zoning that cut the desert road in different places through the construction of artificial dikes, 3 m at least height across the main wadis, the construction of artificial channels on both sides of the road in wadi Qena path during flooding of great speed and the establishment of monitoring and warning system, as will as training of capable intervention crews. Geographical information systems is an automated tool for the storage and presentation of geographic data available along the proposed desert road under software ERDAS imagine 8.2. The whole recommendations have to put in consideration during the design and construction of this desert road.