



شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم



شبكة المعلومات الجامعية
@ ASUNET



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of
15-25- c and relative humidity 20-40%

بعض الوثائق الأصلية تالفة

بالرسالة صفحات لم ترد بالاصل



AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
IRRIGATION AND HYDROLIC DEPARTMENT

**EVALUATION OF RECENT TECHNOLOGY
FOR INSTALLATION OF SUBSURFACE DRAINAGE
IN EGYPT**

B6907

Thesis

Submitted in partial fulfillment of the degree
of master of science in civil engineering

**BY
MAGDY RASHAD AHMAD ALI**

B.Sc. Civil engineering

SUPERVISED BY

Prof. Dr. Abd El-Mohsen El-Mongy
Professor of Harbor & Coastal Engineering
and Inland Navigation
Irrigation and Hydraulic Department
Faculty of Engineering
Ain Shams University

Prof. Dr. Mohamed M. Nour El-Din
Professor of Irrigation and Drainage
Irrigation and Hydraulic Department
Faculty of Engineering
Ain Shams University

Prof. Dr. Mohamed Hassan Amer
Professor of Irrigation and drainage
Drainage Research Institute
National Water Research Center

Dr. Mohamed Bakr Abd El-Ghany
Head of Covered Drainage
Department, Drainage Research
Institute, National Water Research Center

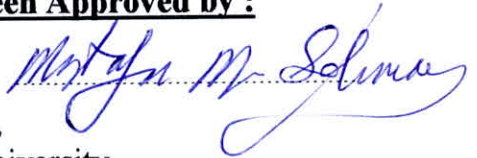
APPROVAL SHEET

THESIS : EVALUATION OF RECENT TECHNOLOGY
FOR INSTALLATION OF SUBSURFACE
DRAINAGE IN EGYPT

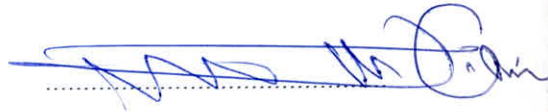
BY : Eng. Magdy Rashad Ahmad Ali

This Thesis for M.Sc. Degree has been Approved by :

Prof. Dr. Mostafa Mohamed Soliman
Professor of Irrigation and Hydraulics,
Faculty of Engineering, Ain Shams University.



Prof. Dr. Talaat Mohamed Owais
Head of Water Engineering Department,
Faculty of Engineering, Zagazig University.



Prof. Dr. Abd El-Mohsen El-Mongy
Professor of Harbor & Coastal Engineering,
Faculty of Engineering, Ain Shams University



Prof. Dr. Mohamed Hassan Amer
Professor of Drainage Research Institute,
National Water Research Center.



Date of Examination 28/8/1997

STATEMENT

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Civil Engineering.

The work included in this thesis was carried out by the author in the Department of Irrigation and Hydraulics, Ain Shams University, from September 1994 to June 1997.

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

Date : 28/8 1997

Signature : 

Name : Magdy Rashad Ahmed Ali

Acknowledgments

First and foremost, I thank God the most beneficial and the most merciful for his help.

I wish to express my gratitude to Professor Dr. Abd-El Mohsen El-Mongy, professor of Harbor & Coastal Engineering and inland Navigation, for his overall guidance and support, Professor Dr. Mohamed Nor El-Dean, professor of irrigation and drainage for his assistance and follow up, Professor Dr. Mohamed Hassan Amer professor of the Drainage Research Institute and Dr. Mohamed Bakr Abdel Ghany Head of Covered Drainage Department, Drainage research Institute for their efforts and guidance throughout the course study.

My appreciation and gratitude to Professor Dr. Safwet Abdel Dayeam, director of the Egyptian Public Authority for Drainage Project, and Professor Dr. Shaden Abd-El Gwad, director of the Drainage Research Institute for their support. Without their support this study would not have been emerged.

Special thanks to Dr. W.F. Vlotman team leader of Drainage Research Project, Mr. Pieter J. Hoogenboom and Eng. Maged Hassan Hsean for their support and helping

Finally I would like to express my special thanks to my family specially my mother for her patience and support.

ABSTRACT

IN Egypt approximately 1.75 million hectares has been provided with subsurface drainage. When the construction of drainage systems reached the fringes of the Nile Delta, unstable soils and heavy sticky clay soils were encountered. The commonly used trenching technique faced substantial construction problems when such soils were encountered. The trenchless drainage system technique executed with the V-plow type of trenchless machine provides a good alternative. A V-plow trenchless drainage machine was imported and used under Egyptian irrigated field conditions and was thoroughly tested.

A total of 141 km of lateral drains were constructed during a 13 weeks period, in semi-unstable, medium textured and fine textured soils. During the experiment, extensive data were collected on the performance of the machine. Speed and production of the V-plow are tested against depth, soil type, soil moisture status, soil resistance, land surface condition (wetness, type of crop), number of irrigation canals to be crossed, days after irrigation, and experience of the operator.

It was found that the production per hour of the trenchless machine was 1.6 times higher than the trencher machine. The installation costs per kilometer length of drains with the trenchless machine proved to be 25% lower than the trencher machine. No difficulties were encountered in any of the soil types and virtually no machine maintenance was needed. However, also some disadvantages of the trenchless technique were observed: (i) an excavator is required full time, (ii) not all wet (irrigated) fields could be crossed (approx. 1% of all drains), and (iii) visual inspection of the installed drains was not possible. The trencherless experiment was considered successful to be applied in similar soils in Egypt.

