

"DESIGN OF THE ELECTRICAL SERVICES OF  
AN OFFICE BLOCK"

by

*Constantinidou Maria*

*Project Report*  
*Submitted to*  
*the Department of Electrical Engineering*  
*of the Higher Technical Institute*  
*Nicosia Cyprus*  
*in partial fulfillment of the requirements*  
*for the diploma of*  
**TECHNICIAN ENGINEER**

**IN**

**ELECTRICAL ENGINEERING**

**JUNE 1990**

HIGHER TECHNICAL INSTITUTE	PROJECT NO.  1617
----------------------------------	-------------------------

## SUMMARY

"ELECTRICAL SERVICES OF AN OFFICE BLOCK"

BY

CONSTANTINIDOU MARIA

The project deals with the electrical services design of an office block.

The objectives of this project are:

1. To design the electrical installation of an office block.
2. To study the illumination engineering work involved.
3. To design the Telephone Installation
4. To provide all necessary diagrams, schedule of materials and costing, including labour.

The whole work was carried out successfully and in a way that all the objectives have been satisfied.

First, the illumination design was studied carefully and any problems arose have been solved. After the design calculations, all the lighting fitting points have been marked on the drawings.

As a second step, all the necessary regulations concerning the electrical installation have been studied. All these are shown in the project. After the design calculations all the results have been tabulated and the diagrams for the electrical connections were drawn. All the drawings are attached in the project.

The main conclusion arising out of this design is that in order to make an electrical installation design it requires, not only to study and work at home, but to go out in such works and see in reality all the problems that the engineers are facing and what solutions can be found in each case. Personal experience as an engineer will help tremendously in such design.

# CONTENTS

PAGE

ACKNOWLEDGEMENTS  
SUMMARY  
INTRODUCTION

## PART A

### CHAPTER 1            ILLUMINATION DESIGN

1.1	INTRODUCTION	1
1.2	ADVANTAGES OF GOOD ILLUMINATION	1
1.3	DEFINITIONS AND UNITS	2
1.4	AVERAGE ILLUMINANCE	6
1.5	GLARE	6
1.6	SELECTION OF LIGHTING FITTINGS	8
1.7	RULES FOR ENERGY EFFICIENT LIGHTING	8
2.	ILLUMINATION DESIGN PROCEDURE	
2.1	METHODS OF ILLUMINATION CALCULATIONS	10
2.2	GENERAL	10

### CHAPTER 2            ELECTRICAL INSTALLATION

1.1	Requirements of an electrical installation	23
2.	SELECTION OF LIVE CONDUCTORS	
2.1	MAIN PARTS OF A CABLE	26
2.2	GENERAL REQUIREMENTS	27
2.3	CO-ORDINATION OF CONDUCTORS AND OVERLOAD PROTECTORS	28
2.4	DETERMINATION OF CONDUCTOR SIZE	29
3.	PROTECTION	
3.1	General	32
3.2	OVERCURRENT	32
3.3	ELECTRIC SHOCK PROTECTION	35
4.	MAIN SWITCHGEAR	
4.1	INTRODUCTION	41

	<u>PAGE</u>
4.2 ISOLATION AND SWITCHING	41
4.3 DISTRIBUTION	42
 <u>CHAPTER 3</u>	
1. GENERAL	
2. DESIGN CALCULATIONS OF A TYPICAL RING CIRCUIT	44
3. DESIGN CALCULATIONS OF A TYPICAL RADIAL CIRCUIT	49
4. DESIGN CALCULATIONS OF A TYPICAL LIGHTING CIRCUIT	
5. STAIRCASE SWITCH	
 <u>CHAPTER 4 INSPECTION AND TESTING</u>	
1.1 Introduction	58
1.2 Visual inspection	58
1.3 Sequence of tests	58
1.4 Completion Certificate	62
 <u>CHAPTER 5 SUPPLY TO WATER PUMPS</u>	
1.1 General	63
1.2 Type of pumps	64
1.3 Actual design	54
2. SUPPLY FOR LIFT ROOM	
 <u>CHAPTER 6 DISTRIBUTION OF ELECTRICITY IN THE BUILDING</u>	
1.1 General	70
2. DESIGN CALCULATIONS OF THE SIZE OF DBS AND SUPPLY CABLES	72
2.1 CHECK FOR VOLTAGE DROP LIMITATIONS	73
2.2 FAULT LEVEL CALCULATIONS	73
3. THE USE OF RCCBS	75
3.1 Applications	75
3.2 Sensitivities	76

	<u>PAGE</u>
CHAPTER 7            DESIGN OF TELEPHONE INSTALLATION	
1.1    Number of lines	79
1.2    CABLE REQUIREMENTS	79
1.3    CONDUIT DIAGRAM	80
1.4    WIRING DIAGRAM	83
1.5    LIST OF CONNECTIONS	84

PART B

CHAPTER 8            COSTING

1.1    Introduction of proper costing	86
1.2    Methods available	86
1.3    Estimating procedure	87

CONCLUSIONS

PART C

APPENDICES