

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

DESIGN OF THE ELECTRICAL SERVICES
OF A HOTEL

E.1156

TELEMACHOU NICOLAS

JUNE 98

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**DESIGN OF THE ELECTRICAL SERVICES
OF A HOTEL**

PROJECT NUMBER : E.1156

TELEMACHOU NICOLAS

JUNE 98



2891

DESIGN OF THE ELECTRICAL SERVICES OF A HOTEL

PROJECT NUMBER : E.1156

**PROJECT REPORT SUBMITTED TO THE DEPARTMENT
OF ELECTRICAL ENGINEERING OF
HIGHER TECHNICAL INSTITUTE**

**IN PARTIAL FULFILMENT
OF THE REQUIREMENTS
FOR THE DIPLOMA OF
TECHNICIAN ENGINEER
IN ELECTRICAL ENGINEERING
OF THE
HIGHER TECHNICAL INSTITUTE
CYPRUS**

**STUDENT / : TELEMACHOU NICOLAS 3EL1
SUPERVISOR : Mr EFSTATHIOS MICHAEL**

JUNE 1998

2891

CONTENTS

Acknowledgements

Summary

Chapter 1	ILLUMINATION DESIGN	1
1.1	Introduction	2
1.2	Advantages of good illumination	
1.3	Proper illumination	2
1.4	Units and definitions	3
1.5	Glare	6
1.6	Colour rendering	6
1.7	Flicker and stroboscopic effect	6
1.8	Light Sources	7
1.9	The lumen method of design	8
1.10	Calculation of illumination design on basement area	9
1.11	Total results for illumination design on basement area	18
1.12	Calculation of illumination design on ground floor	21
1.13	Total results for illumination design on ground floor	27
1.14	Calculation of illumination design on mezzanine floor	29
1.15	Total results for illumination design on mezzanine floor	32
1.16	Total results for illumination design on first floor	34

1.17 Total results for illumination design on typical floor	36
1.18 Total results for illumination design on terrace floor	38
1.19 Total results for illumination design on swimming pool level	40
Chapter 2 LIGHTING CIRCUITS	42
2.1 General	42
2.2 Procedure of lighting circuits design	42
2.3 Shaver outlets	42
2.4 Emergency lighting	43
2.5 Escape lighting	43
2.6 Stand-by lighting	43
2.7 Types of emergency luminaires	44
2.8 Assumptions must be made	44
2.9 Examples of lighting circuits	45
2.10 Total results for lighting circuits on basement floor	57
2.11 Total results for lighting circuits on ground floor	58
2.12 Total results for lighting circuits on mezzanine floor	60
2.13 Total results for lighting circuits on first floor	62
2.14 Total results for lighting circuits on typical floor	64
2.15 Total results for lighting circuits on terrace floor	66
2.16 Total results for lighting circuits on swimming pool level	67

Chapter 3	POWER CIRCUITS	68
3.1	Socket outlet circuits	69
3.2	Assumptions must be made	69
3.3	Typical calculations for ring circuit	70
3.4	Typical calculations for radial circuit	75
3.5	Total results for socket outlets circuits on basement floor	84
3.6	Total results for socket outlets circuits on ground floor	85
3.7	Total results for socket outlets circuits on mezzanine floor	86
3.8	Total results for socket outlets circuits on first floor	87
3.9	Total results for socket outlets circuits on typical floor	89
3.10	Total results for socket outlets circuits on terrace floor	91
3.11	Total results for socket outlets circuits on swimming pool level	92
3.12	Calculation for Cold Room Control Panel	93
3.13	Calculation for Toaster Kitchen	96
3.14	Calculation for Coffee Machine-Bar	99
3.15	Calculation for Microwave Oven-kitchen	102
3.16	Calculation for Ice Machine and Refrigerator-Bar	105
3.17	Calculation for Dishwasher	108
3.18	Calculation for Cooker Circuit	112
3.19	Calculation for Lift motor	116
3.20	Calculation for Fire alarm control panel and TV equipment	119
3.21	Calculation for Fan Coil Units	123

3.22 Calculation for Chiller	130	
3.23 Calculation for refrigerator (1KW)	132	
3.24 Calculation for Water pump (2Hp)	135	
3.25 Calculation for Swimming pool control panel	137	
Chapter 4	FINAL CIRCUIT ARRENGMENT	139
4.1 General	140	
4.2 Emergency supplies (Stand-by generator)	140	
4.3 Total results for diversity	141	
4.4 Calculation for distribution board (rooms) supply cable	156	
4.5 Calculation for STAND-BY distribution board supply cable	159	
4.6 Example for distribution board supply cable	161	
4.7 Total results for typical distribution boards supply cable	163	
4.8 Total results for distribution board supply cable	165	
Chapter 5	FAULT LEVEL CALCULATIONS	169
5.1 General	170	
5.2 Results for fault level calculations	170	

Chapter 6	REQUIREMENTS FOR SAFETY	185
Chapter 7	SWIMMING POOL	187
7.1	General	188
7.2	Classification of zones	188
7.3	Electrical equipment	189
7.4	Lighting	190
7.5	Socket outlet	190
7.6	Local supplementary bonding	190
7.7	Size of supplementary bonding	191
7.8	Boilers and pumps for swimming pool	191
Chapter 8	EARTHING	192
8.1	General	193
8.2	Reasons for earthing	193
8.3	Characteristics of good earth connection	193
8.4	Earthing system	193
8.5	Earth fault loop impedance	194

8.6 Bonding	195	
8.7 Definitions used in earthing	196	
8.8 Methods of earthing	197	
Chapter 9	INSPECTION AND TESTING	198
9.1 General		199
9.2 Visual Inspection		199
9.3 Sequence of tests		200
Chapter 10	STAND-BY GENERATOR	201
Chapter 11	TELEPHONE SERVICES	203
11.1 General		204
11.2 External line plant		204
11.3 Installation of the conduit network		204
11.4 Conduit and conduit size		205
11.5 Installation of the distribution case		205
11.6 Installation of telephone lines (DEL)		206
11.7 Earthing		207

11.8 EPABXs

207

11.9 Typical calculations for conduit size

208

Appendix 1: Tables for illumination design

Types of luminaires

Appendix 2: Tables for lighting and power design

Appendix 3: Tables for diversity

Appendix 4: LSP technical data

Appendix 5: Method of back-calculation

Appendix 6: Fault level calculations

Appendix 7: Tables

Appendix 8: Stand-by systems

Appendix 9: Electrical fittings

APPENDICES

Appendix 1 : Tables for illumination design

Types of luminaires

Appendix 2 : Tables for lighting and power design

Appendix 3 : Table for diversity

Appendix 4 : Lift technical data

Appendix 5 : Method of installation

Appendix 6 : Fault level calculations

Appendix 7 : Testing

Appendix 8 : Stand-by generator

Appendix 9 : Electrical fittings

ACKNOWLEDGEMENTS

I would like to express my thanks to my project supervisor Mr. E. Michael for his valuable help and guidance given to me throughout the project period.

I would also like to express my thanks to everybody from industry who helped me, in any way, to carry out and complete this project.

SUMMARY

This project deals with the electrical services of a hotel regarding :

- a) Illumination design work in order to decide the quantity, type and luminaires in accordance with the CIBS code.
- b) Lighting and power services based on the 16th edition of the IEE wiring regulations and the local EAC conditions of supply.
- c) Stand-by emergency supply will be designed in such a way so as the hotel to be able to continue its operation even if the main supply fails.
- d) Telephone services were based on CYTA requirements.