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ELECTRICAL ENGINEERING

DEPARTMENT

DIPLOMA PROJECT

DESIGN OF ELECTRICAL SERVICES

OF A BUILDING

E/1000

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MAY 1996

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

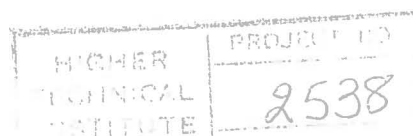
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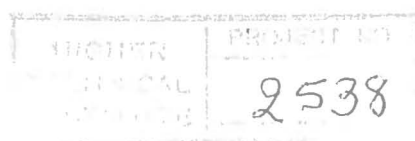
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E.1000

In partial of the requirements for the diploma award
of the technician engineer in
electrical engineering department of the

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To my parents and especially to the girl I love...

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ARCHITECTURAL DRAWINGS
(ILLUMINATION)
(LIGHTING)
(SOCKET OUTLETS)
(FIXED APPLIANCES)
(EARTH EQUIPOTENTIAL BONDING)
(TELEPHONE INSTALLATION)
(SYPPPLY CABLE)

SINGLE LINE DIAGRAM

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SUMMARY

DESIGN OF ELECTRICAL SERVICES OF A BUILDING

(By: GEORGE CHRISTOFI)

Before a building is constructed, a variety of designs must be applied in such a way so that it governs any rules of being functional safe, and accessible for maintenance. One of the most important services in a building is the ELECTRICAL SERVICES.

Some of the Electrical Services in the building that are applied are: The Illumination design, the Power design and the Telephone design.

The illumination design is composed of the design of the sufficient illumination level of each interior satisfying its needs and a calculation of the exact position of luminaries in a room in accordance of C.I.B.S. code for interior lighting.

The power design is applied based on the Three-Phase 415Vrms 50Hz, T.T. earthing system. This is the largest chapter in the whole project, composed of the installation of various loads such as Lighting, Socket Outlet, Cooker, Water Pump, Lift Motor and air-conditioning installation, balancing of the Three-Phase loads, application of Diversity, calculation of the supply cable and Fault Level calculations. All these are designed in accordance of I.E.E. Wiring Regulations 16th Edition and Electricity Authority of Cyprus General Conditions of supply.

The telephone design is composed basically on the installation of a 16/48 Electronic Private Automatic Branch Exchanges serving the whole building for internal and external telecommunication based on the Cyprus Telecommunications Authority.

Finally, the costing of such services is applied including material, labour costing and profit.

INTRODUCTION

The reader will forward realise that this project deals with the design of the Electrical Services of a Building. It is divided into 6 chapters, in which, each one deals with a different subject. In each chapter the relevant regulations relating to our needs are highlighted and then an example of the calculations is made. Then, all the results are tabled. After that, four Appendices are provided so that to help the reader to find the informations needed. In the chapters, the reader is kindly asked to look for informations at the back in the Appendices with the phrase (see Appendix...,page...).Finally, the actual architectural drawings are shown designed on an A3 size of paper.

Chapter 1 deals with the illumination design. The illumination design is made in order to calculate the adequate number of luminaires in an interior (offices, corridors etc) providing a sufficient amount of light for the purpose the interior is needed. For this reason, the exact position of luminaries in the room is calculated.

Chapter 2 deals with the power design. All the materials that will be used are approved by British Standards or other approved standards. For each one of the circuits calculated (such as lighting, Socket outlet, Cooker, Water Pump, Lift Motor, air-conditioning installation), all the appropriate materials are stated. Moreover, the wiring is calculated including the needed tests such as: Selection of a circuit breaker, selection of phase conductor, selection of circuit protective conductor, test for thermal constraints, test for the energy let through and selection of conduit sizing.

Chapter 3 is also a part of the power design and deals with the balancing of phases, since the supply is 3-phase 415Vrms, and also with the diversity applied on the loads, the calculation of the cables interconnecting the distribution boards plus the main supply cable and finally, the calculations made to protect the installation if a fault occurs.

Chapter 4 deals with the Earth Equipotential Bonding and also with the appropriate tests applied to the installation in order to check its safety and functionality.

Chapter 5 deals with the telephone installation. The positions of the telephone points are shown providing needs for direct exchange lines communicating directly outside the building within secrecy, extensions from the Electronic Private Automatic Branch Exchanges providing internal communication in the building and external communication to the outside world, test sockets and auxiliary test sockets for testing purposes and fax lines providing services in this field. Conduit diagrams, wiring schematics and analytical tables are shown.

Chapter 6 deals with the costing of the installation. Two tables of costing are applied, one concerning the illumination and the power fields and the other concerning the telephone field. The whole costing is applied with the analytical method which includes the material costing and the quantities needed, the labour costing and the profit.

Appendix 1 refers to the information concerning the illumination design. Appendix 2 refers to the information about the power design. Appendix 3 refers to the information about the telephone design and Appendix 4 refers to some specifically regulations frequently used in this text for the readers convenience.