

HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

WALL AND ROOF FINISHING AND
INSULATION FOR BUILDINGS IN CYPRUS

C/880

DEMETRIOU MARIA

JUNE 1999

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HIGHER TECHNICAL INSTITUTE	PROJECT NO. 2945
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WALL AND ROOF FINISHING AND INSULATION

FOR BUILDINGS IN CYPRUS

by

DEMETRIOU MARIA

Project Report

Submitted to

the Department of Civil Engineering

of the Higher Technical Institute

Nicosia-Cyprus

in partial fulfillment of the requirements

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TECHNICAL ENGINEER

in

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*To my
family*

ACKNOWLEDGEMENTS

I would like to express my gratitude to my supervisor Dr Despina Sergides, Senior Lecturer, Civil Engineering Department, HTI.

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HIGHER TECHNICAL INSTITUTE
NICOSIA-CYPRUS

CIVIL ENGINEERING DEPARTMENT

Academic Year 1998/99

Diploma Project Number: C/880

TITLE: *Wall and Roof Finishing and Insulation for buildings in Cyprus.*

Objectives:

1. Survey of methods, techniques and climatic consideration of traditional and contemporary finishing of roofs and walls.
2. Testing of the thermal impact of the insulation on the finishing.

Terms and conditions

1. The study is to cover the structural material used in traditional and contemporary buildings in Cyprus as far as their insulating properties are concerned.
2. Information in the form of bibliography, publications and notes will be provided by the supervisor.
3. The instrument and the equipment used for the experimental part of the project will be provided by the Civil Engineering Department.
4. Professional guidance on thermal insulation will be provided by the supervisor.

Student : Maria Demetriou
Supervisor : Dr D Serghides
External assessor : A Kyprianou



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SUMMARY

The achievement of thermal comfort conditions results with the proper design of the composite elements of the building envelope. Each one of the building elements, which are used for the erection of a house, has their own thermal properties. The thermal comfort can be influenced by the type of the material used and its order combined with the other materials.

In traditional houses, the materials used were such to provide adequate thermal insulation. The finishes were capable to protect the envelope from the weather conditions. Therefore, the heat losses and gains were minimized, thus creating a comfortable environment.

However, in contemporary buildings, the availability of the different construction materials encourages their combination to achieve thermal comfort conditions. By the use of thermal insulation, the building envelope acts as a thermal mass during winter and, as a reflector of the solar radiation during summer. An effective construction results after insulating the external surface of the building. By putting the insulating material on the external layers, the building heat losses are reduced thus resulting to considerable energy savings and a comfortable environment is maintained throughout the year.

The different types of finishes have also a considerable influence on the protection of the building envelope. The experimental part of this project tests the thermal impact of the external insulation on the finishes but also the influence of the solar radiation and humidity.

ABSTRACT

This is a study of the wall and roof finishing and insulation for buildings in Cyprus. Both the traditional and contemporary buildings are examined in terms of the building contribution to energy savings.

Chapter-I deals with the Cypriot traditional house and the thermal properties of the envelope composite materials for the achievement of thermal comfort conditions.

Chapter-II deals with the contemporary buildings. The construction of walls and roof and their composite materials are the main subjects, which are analyzed in this chapter.

In Chapter-III, there is a general approach of the thermal comfort, the modes of heat transfer and heat losses and gains through the building fabric. What is analyzed furthermore is the achievement of thermal comfort conditions with the use of insulating materials to both walls and roofs.

The last chapter, Chapter-IV, is the experimental part of this project. Three different finishes were used to render polystyrene slabs fixed on different oriented walls. The aim was to compare the three finishes and the effect of their orientation.

INTRODUCTION

From ancient years, human beings had the need of a shelter, which would be comfortable from all points of view. Protection from animals, different enemies, weather conditions. The need of thermal comfort is a necessity of everyday life. Everyone needs a comfortable environment to live, which can be achieved by obtaining the benefits of a good siting and orientation of the building with respect to the sun and wind, by choosing a shape for the building that will control thermal losses and utilize the natural energy resources. The appropriate design of the building envelope in terms of thermal mass, insulation appropriate choice and order of materials lead to considerable energy savings.

Traditional houses evolved as a result of an integrated design approach based on a trial and error process transmitted through generations. The lack of building materials encourages the correct design of the houses for the achievement of comfort conditions. Proper orientation of the house on the south side and the building of walls with small openings were the main rules for the construction of the traditional house.

The varying climatic conditions and topography of Cyprus incurred different types of houses. Cyprus although of small size is divided into three different climatic zones. Those are the coastal, mountainous and inland areas. Their main differences are between the construction materials used for the building of walls and the type of roof. However, the international influences and local themes throughout the years slowly oscillate the traditional architecture.

The mass media, the faster pace of life, colonialism and the consequent independence of the island which coincide with the abrupt, overweening modern movement and the irrational tourist development, all inflicted sudden changes. The recent urbanization movement of the last three decades and since 1960 threatens to destroy the qualities and values reflected in ecologically sound building, whose elements are sympathetic to the idea of close links with nature. The traditional house used to compromise with the environment. Compared with the contemporary way of building, the mass mobilization from rural to urban areas had as a result the towns to get bigger so that to satisfy the needs of the rustic population. Although the heavyweight buildings is not a preference of the Cypriots, concrete and reinforcement are the main materials used for the erection of well stabilized structures.

As far as the thermal problems of buildings are concerned, can be minimized with proper design of the building elements and adequate thermal insulation for sufficient control of heat losses and considerable energy savings.

Concluding, the thermal comfort is a necessity for any building. It depends primarily on the maintenance of the thermal environment of the house by proper design of its building elements and by the appropriate choice and order of the materials.