

HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

BUILDINGS WITH ENERGY EFFICIENT LANDSCAPING,  
SITING, ORIENTATION AND SHAPE

C / 818

BY: PHOTIOU MARIOS

JUNE 1997

**HIGHER TECHNICAL INSTITUTE**

**CIVIL ENGINEERING DEPARTMENT**

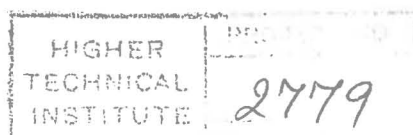
**DIPLOMA PROJECT**

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**PHOTIOU MARIOS**

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HIGHER TECHNICAL INSTITUTE  
NICOSIA-CYPRUS

CIVIL ENGINEERING DEPARTMENT

Academic Year 1996/97

Diploma Project Number: C/

Title Buildings with Energy Efficient Landscaping, Siting, Orientation and Shape.

Objectives:-

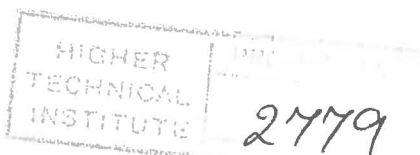
1. To study and analyse the passive design principles of landscaping, siting, orientation and shape for cooling and heating for the Cyprus conditions.
2. To carry out a photographic and drawing survey of buildings employing landscaping, siting, orientation and shape for achieving:
  - a. Solar gain in winter
  - b. Shading and cooling in the summer.

Terms and Conditions

1. The study is to cover both Traditional and contemporary buildings in Cyprus.
2. Information in the form of bibliography will be provided by the supervisor.
3. Professional guidance on bioclimatic design will be provided by the supervisor.

Student : Photiou Marios  
Supervisor : Dr D Serghides  
External Assesseor: Kyprianou Andreas

DS/DP  
ds



## **ACKNOWLEDGEMENT**

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I would also like to thank Mr A. Pelekano that provided me with many valuable informations for the attainment of this project.

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Finally, I thank the owners of the houses in Photos for their assistance and letting me to take photographs of their houses for this project.

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## **SUMMARY**

This project is intended to examine the strategies for promote solar gain in winter and providing shading and cooling in summer.

First we analyze the method used for winter in order to increase solar gain and reduce losses from the building.

The sun during the winter time is the most effective nature energy for heating the building. For this season the sun during the cooler months of winter must be unobstructed. This is achieved by the use of sun path chart that show the sun path for any day and time of year. The height of the existing buildings also has a major role for unobstructed sun. In Traditional house the existing building was very closed and sometimes there may have a common wall. Therefore, the only way from where the building received solar gain was from the back courtyard.

The orientation of the building is better to enlogate the long axis at east - west direction that is generally more exposed to the sun.

Vegetation during winter around the perimeters of building protects it from the unwanted winter winds and reduces the lossen of thermal radiation from the house.



Existing structures and landscaping is another way to control winds. The presence of water may also change the outdoor air temperature.

Then we analyze the method used for summer in order to reduce solar gain and provide shading.

The sun<sup>summer</sup> during period is much more and the sun path is higher.

To achieve shading during summer we have a widely use of vegetation.

Vegetation is used to provide shading in many ways. Deciduous trees are placed on south side to protect the building from solar radiation. On west and east sides where the amount of sun is three times greater than south and north , therefore dense tall trees and shrubs are used.

Vegetation can be also used in forms of ground cover to reduce extreme air temperature by provide shading. May also reduce outdoor high air temperature through its evaporate process.

Summer breezes can also be maximized by the use of vegetation by channel air flow toward the structure.

Another way to reduce solar gain during summer is the use of courtyards. Courtyards that used widely for traditional building provide different ways of cooling. The presence of water in court in pond's form or fountains reduce the air temperature. The hot air around the building pass through the water that is cooler and make it cooler.