ΚΑΠΕ
CRES

AIDA
AFFIRMATIVE
INTEGRATED
ENERGY
DESIGN
ACTION

ΔΗΜΟΣ
ΛΟΥΤΡΑΚΙΟΥ ΠΕΡΑΧΩΡΑΣ
ΑΓΙΩΝ ΘΕΟΔΩΡΩΝ

Nafplio

17 October 2014

- .....meet the team
- **Giorgos Gionis** Mayor
- **Giannis Mavroeidis** Mayors Advisor on Technical and Environmental Issues
- Manos **Mavrogonatos**-2013, Giorgos **Zogkas** 2014- Directors of the tecchnical department
- Dimitris **Makridis** Supervisor
- Miltos **Papadimitropoulos** Athina, **Stergiou** Municipal Architects
- Giannis **Tsolakis,** Dimitris **Gionis** Mechanical Engineers
- **Cubus hellas** Civil Engineers
- CRES was introduced in the initial stages of the project as a partner assisting in design decisions through a detailed report that was commissioned by the Municipality through a Project Agreement.

MUNICIPALITY'S GREEN STRATEGY

- Commitment to green dimensions in urban design through application of bioclimatic principals not dispite but because of the economic crisis in Sustainable use of resources particularly the famous water of Loutraki

  Future buildings and improvement of existing

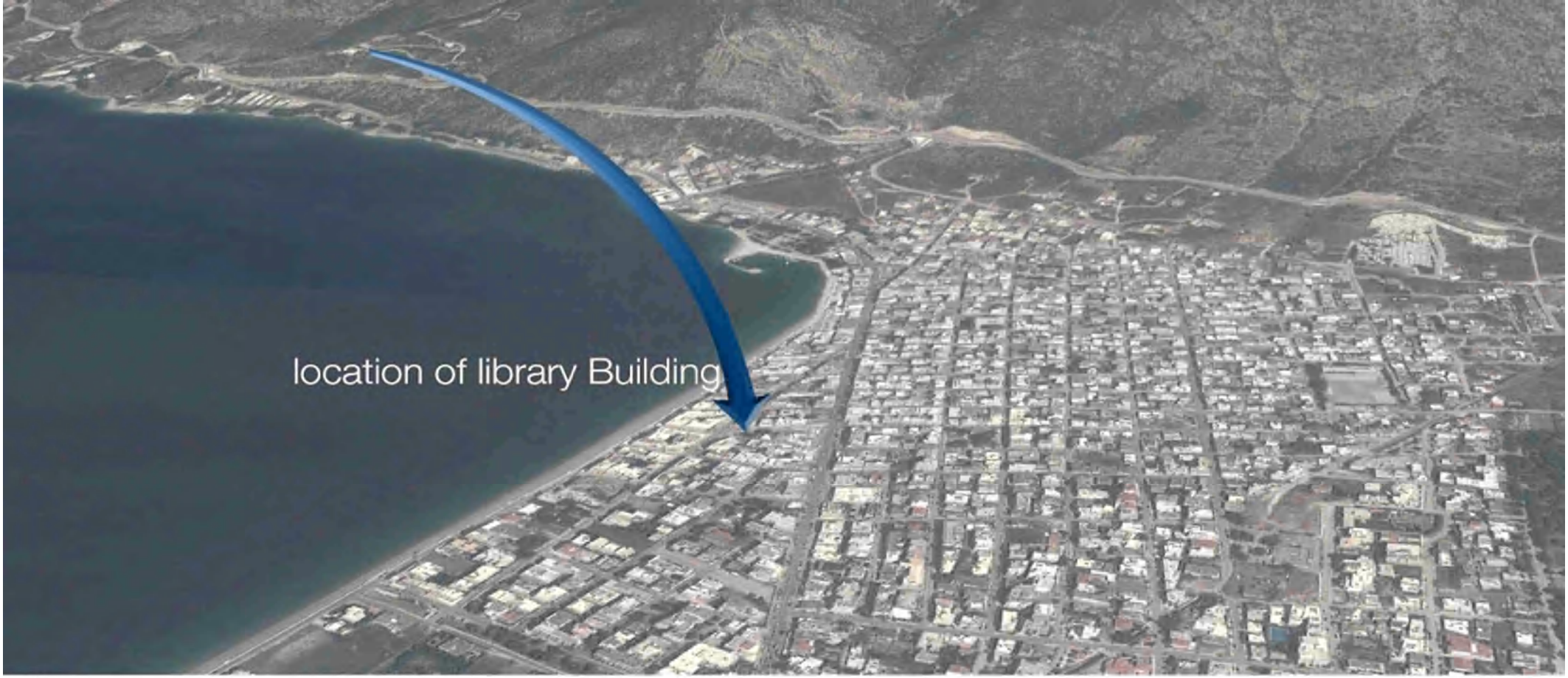
  Planning of transportation encouraging the use of bicycles and public

  transport through low emission busses, reuse of decommissioned rail track and introduction of

  municipal bicycles at the car parking spaces

  Participation in environmental projects such as "The Covenant of Mayors" and

  "Exikonomo"



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History of the project

In 2006 the municipality of Loutraki-Agioi Theodoroi decided to build a new library building on the site of the Hatzopoulos residence in Loutraki.

This house was a landmark for Loutraki since its owner was a renowned member of the local society.

Upon his death the building was bought by the municipality in early 2000‘s from his heirs.

It occupied one of the few blocks the city that were left unbuild by blocks of flats in the first wave of construction during the 60’s, 70’s and 80’s.

Site Photos

west view

south view

north view

previous condition of the Hatzopoulos residence site of the Loutraki library

We all know the financial turmoil that affected Greece subsequently so the project had great difficulties in payments to an extend that it seemed at some point that it would never materialise
However through persistance of both parties its nearing complition hopefully within 2014 .....

pre-existing staircase looking down

The project went through Tender process according to the Greek legislature and the Contractors G&N Askounis and co were awarded the project in 2009.

pre-existing fire place

Policy Decisions

One of the most important policy decisions was not to demolish the existing building but to reuse it adding an extention in the south part to be used as a reading room allowing the sourrounding area of the building to be used as a recreational grounds for the community.

The object of this Project was to provide the city with a contemporary building, with the simplest expression where details and the play of sun and shade would stand out.
While grasping for the simplicity of form and integrating these principles to the original building, itself a “modernist” house of the 50‘s, it was also important to apply bioclimatic principles and integrating passive solar, enhance and reinforce insulation, optimize the use of air flow and geothermal systems for heating and cooling, in order to save energy and maximize energy efficiency of the building.

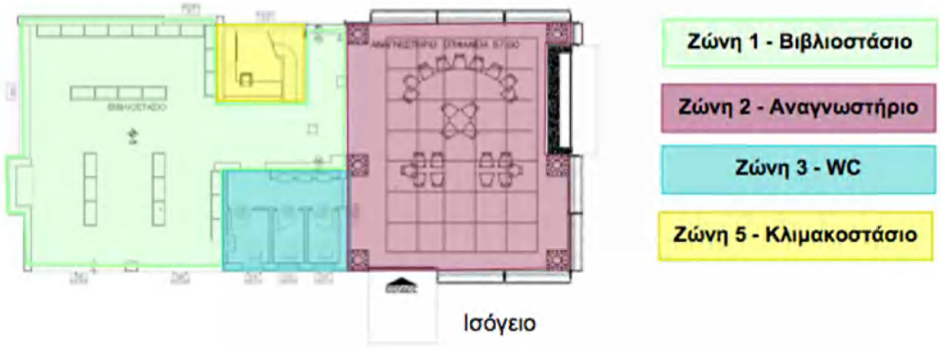
Key parameter in the design of the library building was its is functionality - providing for appropriate internal arrangement of the stacks and of the reading room providing the users with a space of ergonomic funcionability avoiding glare at desks and space, and to ensuring visual and thermal comfort conditions with proper sizing and distribution of glazing surfaces.
Furthermore, it was important to incorporate the principles of energy planning , since library buildings usualy have high energy consumption , mainly due to high demands thermal and visual comfort and extensive opening hours .
This Project focused on solving these problems not relying heavily on mechanical thermal input but instead on energy saving interventions involving the shell and in particular, improvements in the thermal properties of selected systems and shell materials and external shading systems .

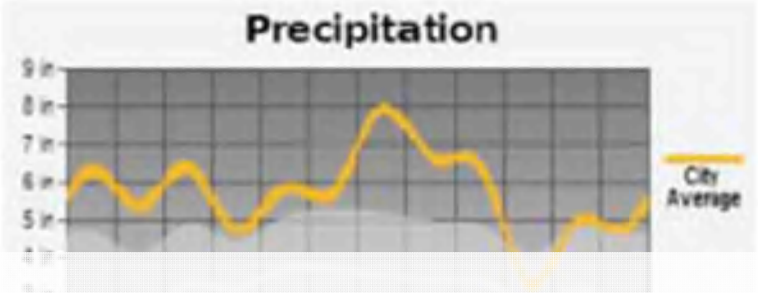
Brief Description of Building

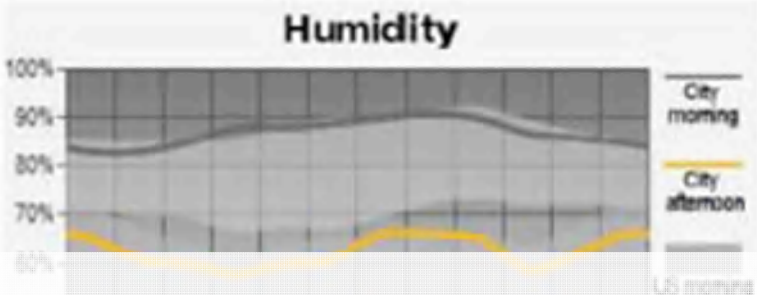
The original house was a two storey building with total ground floor area of150m2, the addition of the extension attached to the south side of the building on the ground floor increased this by an area of 57 m2.

The ground plan is rectangular , with the long axis parallel to the north-south axis . The main access to the building is through the western side.

The main areas of the building are the Bookstack on the north and reading room on the south, both located on the ground floor and the PC room which is to be located on the first floor, akso and there are secondary uses (WC and staircase) which are sited on both floor







Climate Analysis

In order to formulate the priorities planning, the optimum saving energy strategy is necessary to fully understand the local climatic conditions and peculiarities .

The climate of the region is one with long hot summers and mild winters.

Winds are mainly northerly direction throughout the year , except during April, May and June where prevailing winds are north-westerly direction.

The average monthly wind speed is about 2,7 m / sec during the winter months and 2,6 m / sec during the summer months.

The average monthly air temperature for January (coldest month for the region) is 10.2 ° C - with an average maximum of 13.2 ° C and average minimum 7oC .

Respectively for July , the warmest summer month, the average air temperature is 27.2 ° C - with an average maximum of 30.8 ° C , average minimum of 22.1 ° C .

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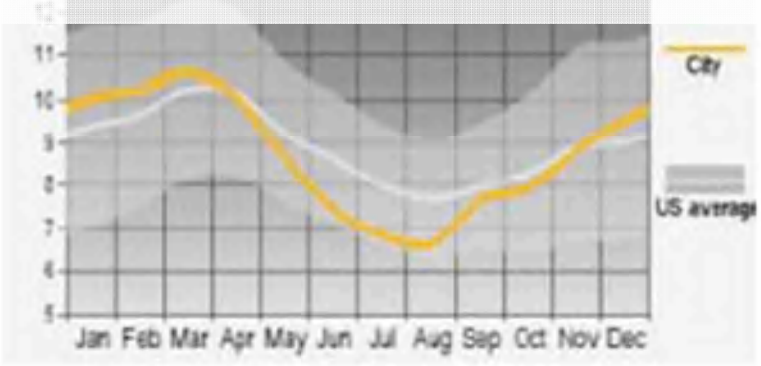
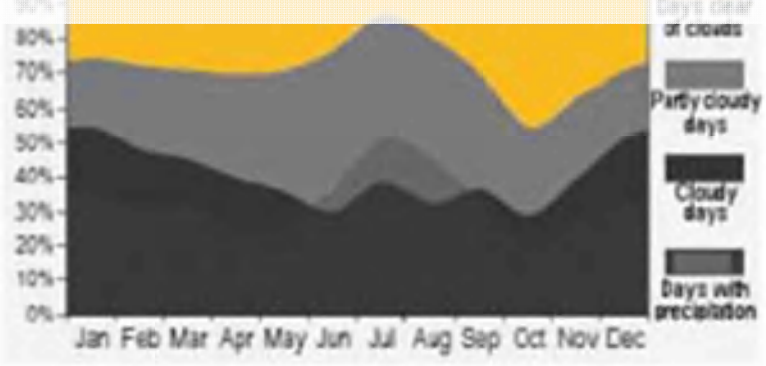
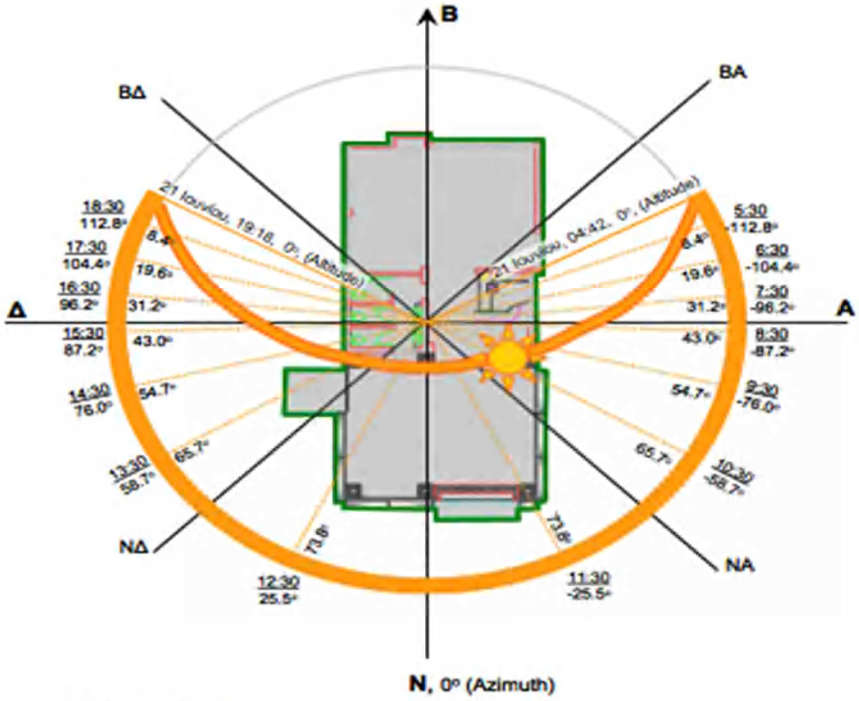




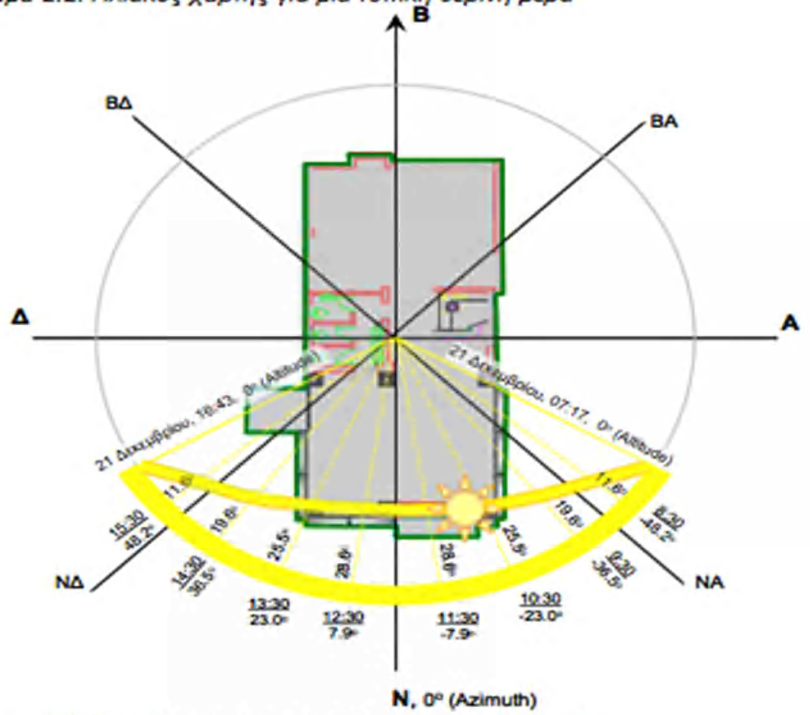
sun path diagrams summer/winter

Shows the solar map of the building, on an annual and seasonal basis , incorporating the prevailing winds (speed and direction) and the movement of the sun from sunrise to sunset , for winter and summer.

The numbers inside the circle refer to the height of the sun (altitude) for each hour of the day while the numbers outside of the circle referred to the deviation from the south (azimuth) for the corresponding hours.



Διάγραμμα 2.2. Ηλιακός χάρτης για μια τυπική θερινή μέρα



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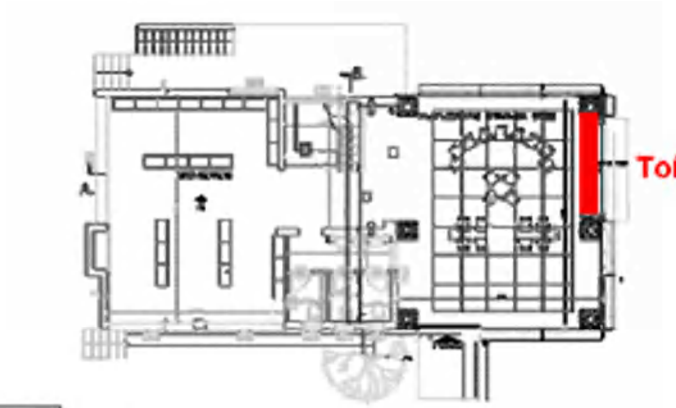
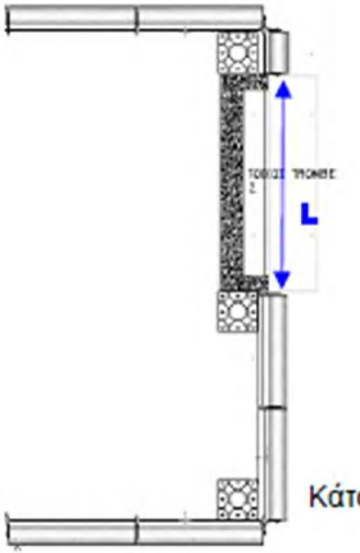
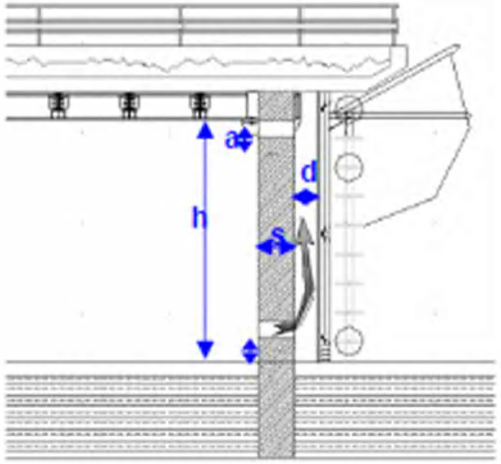


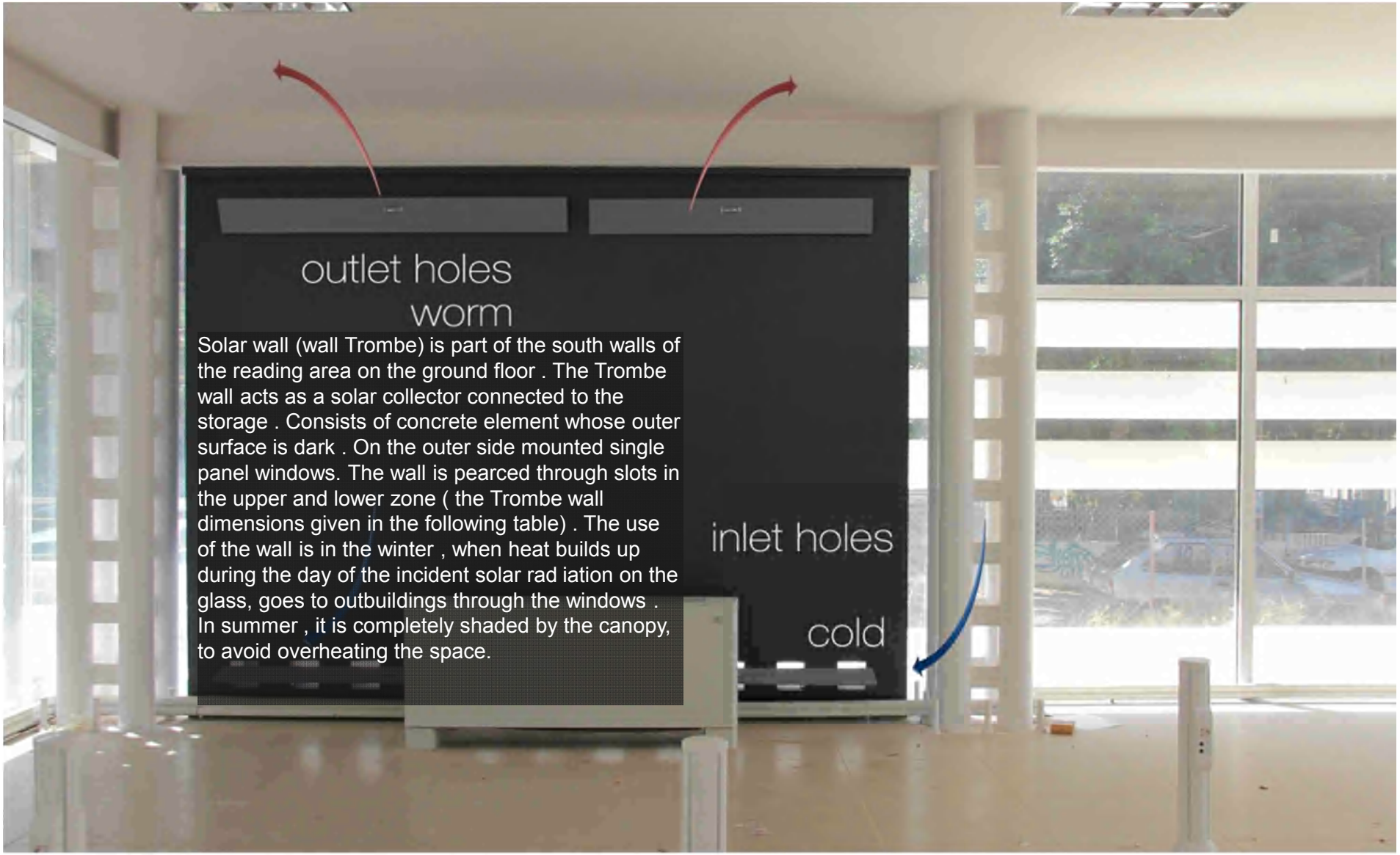


Κάτοψη



Τομή

Διαστάσεις τοίχου Trombe	
Ύψος (h):	2.7m
Μήκος (L):	3.5m
Απόσταση μεταξύ τοίχου και γυάλινης επιφάνειας (d):	0.10m
Πάχος μάζας μπετόν (s):	0.20m
Διαστάσεις οπών:	0.15m x 0.15m
Πλήθος οπών, στο άνω και κάτω τμήμα του τοίχου:	10 +10
Απόσταση των οπών από το άνω/κάτω μέρος του τοίχου (a):	0.15m



4 interior view of the trombe wall

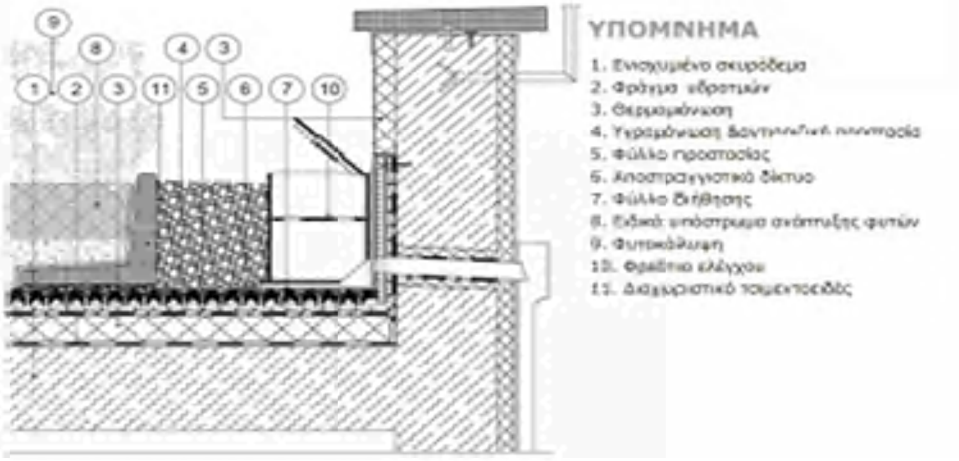
the use of microclimatic conditions has materialised by the use prevailing winds for natural ventilation / cooling the building during the summer months , reducing in this way the needs of the building for cooling (amplified by the sourounding landscape of trees , water features , etc.)
Maximum use of solar radiation for passive space heating in southern countries , thus reducing the need for heating the building.

Wall dimensions Trombe
Height (h):
2.7m
Length (L):
3.5m
Distance between wall and glass (d):
0.10m
Concrete mass thickness (s):
0.20m
Dimensions holes:
0.15m x 0.15m
No. of holes in the upper and lower portion of the wall :
10 10
Distance of the holes from the top / bottom of the wall (a):
0.15m

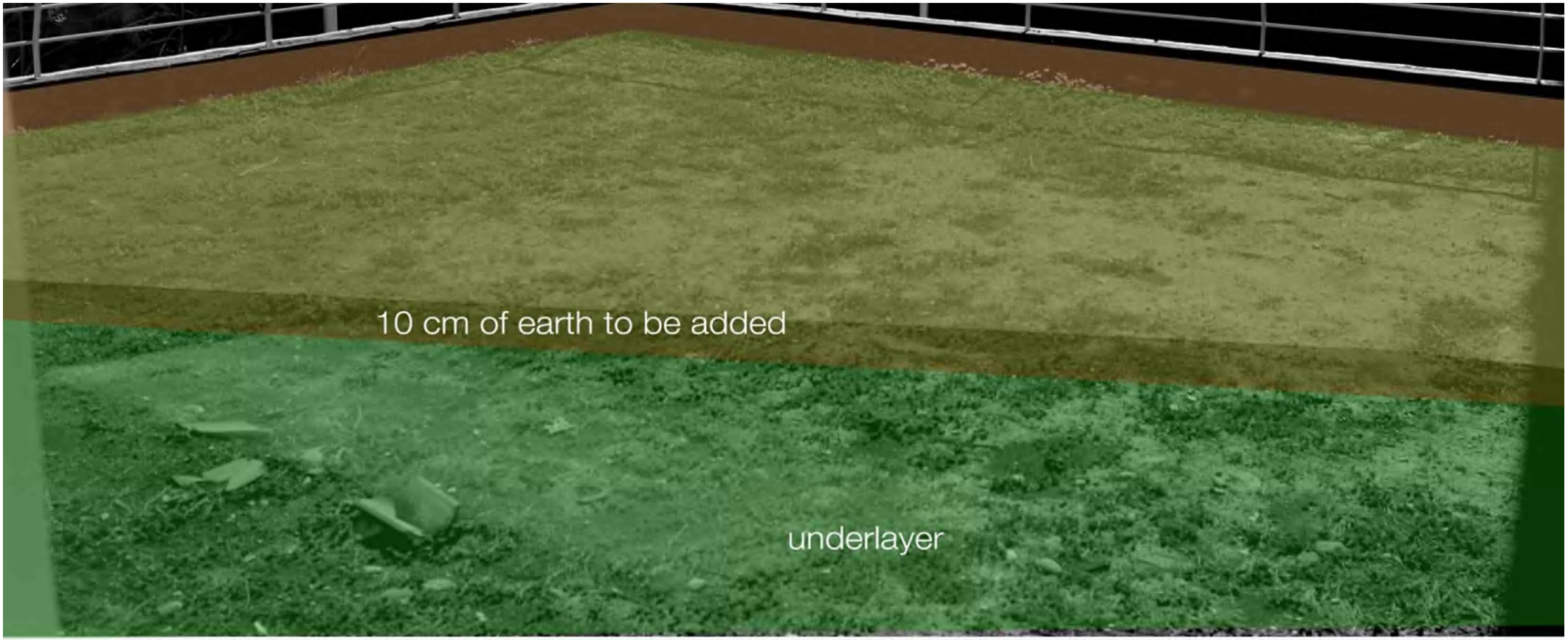
facing south through bookstack area

Green Roof

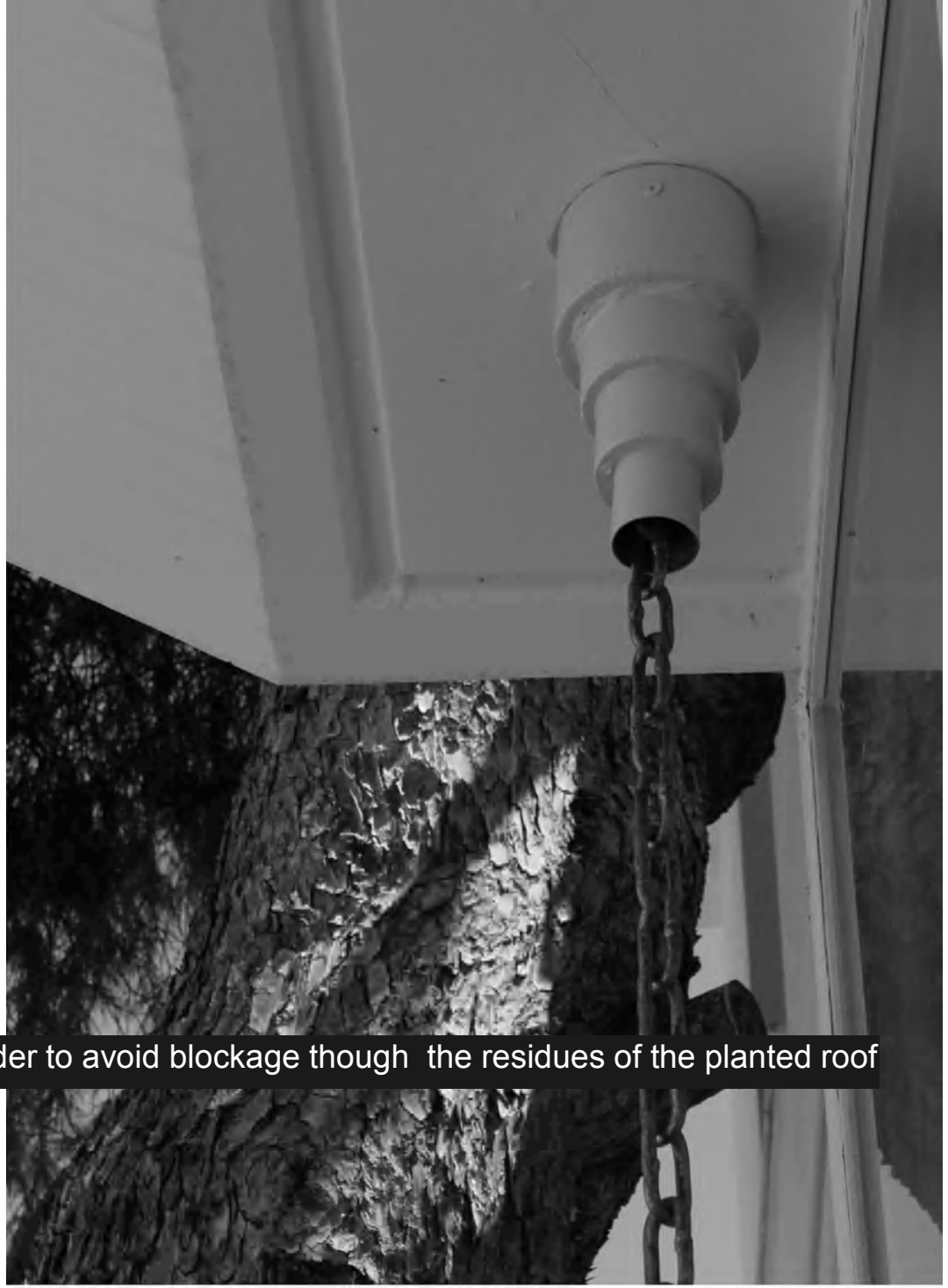
The planting of the roof is an energy saving technique and improve thermal comfort conditions in the building and especially the underlying areas. The green roof helps reduce the heating load and cooling as it improves the thermal performance of the building element to which they apply (roof) .



In test construction, the applicable intensive green roof type (tall vegetation - shrubs , forest trees , grass) in the reading (adding the building) , with the following stratification



green roof

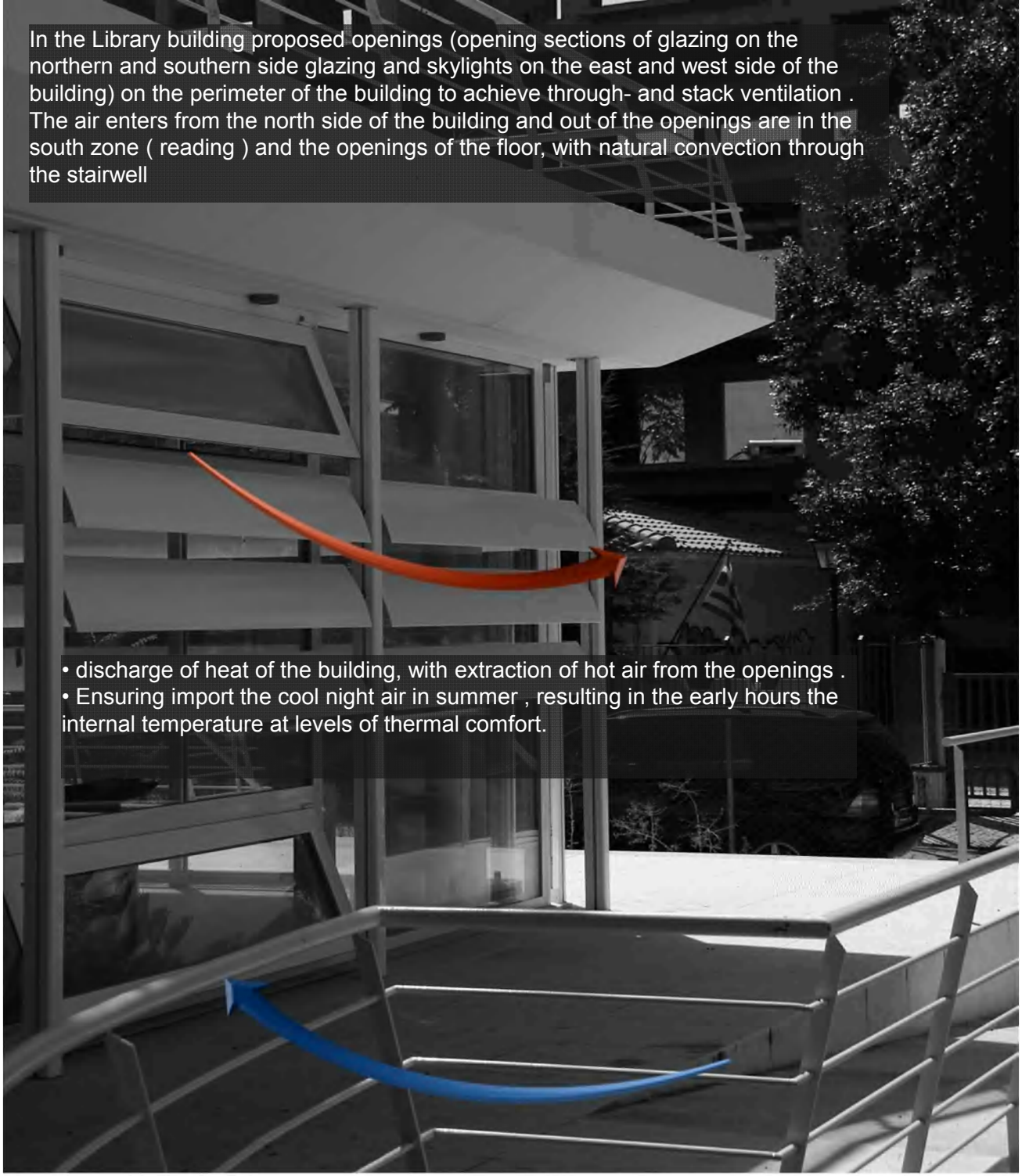


chain gutters were used in order to avoid blockage though the residues of the planted roof

chain gutter

Natural ventilation

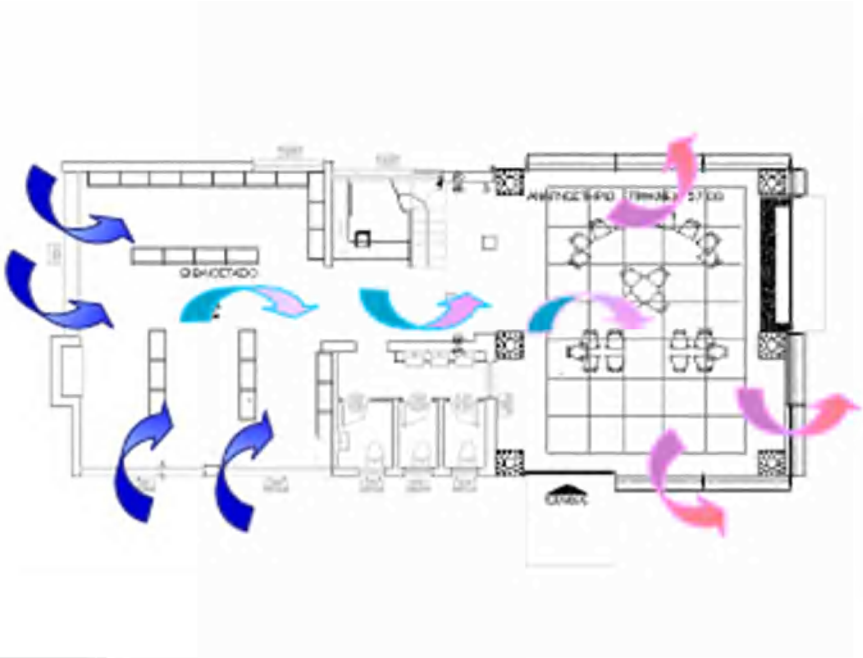
Buildings using libraries, which include reception areas together, but bear large glass surfaces - in order to provide adequate natural light - characterized by increased energy demands for cooling because of high internal gains from lighting system and individuals , but also solar gains from transparent elements.
Airing as a natural process , is a key technique natural cooling of buildings and a key factor for improving the thermal performance of buildings and ensure thermal comfort conditions inside. Based on the utilization of the natural flow (circulation) of air -through or vertical (through horizontal or vertical openings) ventilation of the interior , both during the night and during the day.

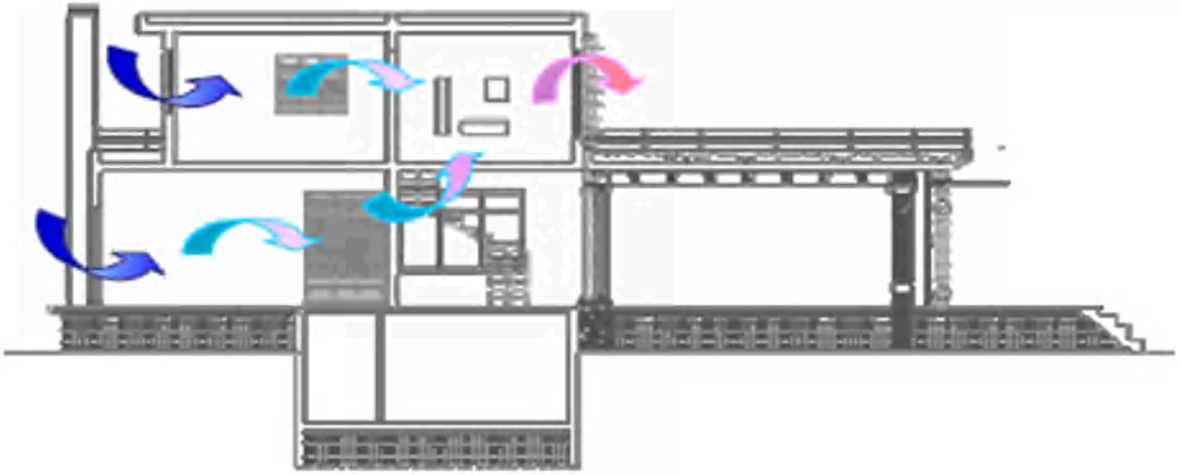


air flow through western Facade

Schematically the circulation of air in the building.

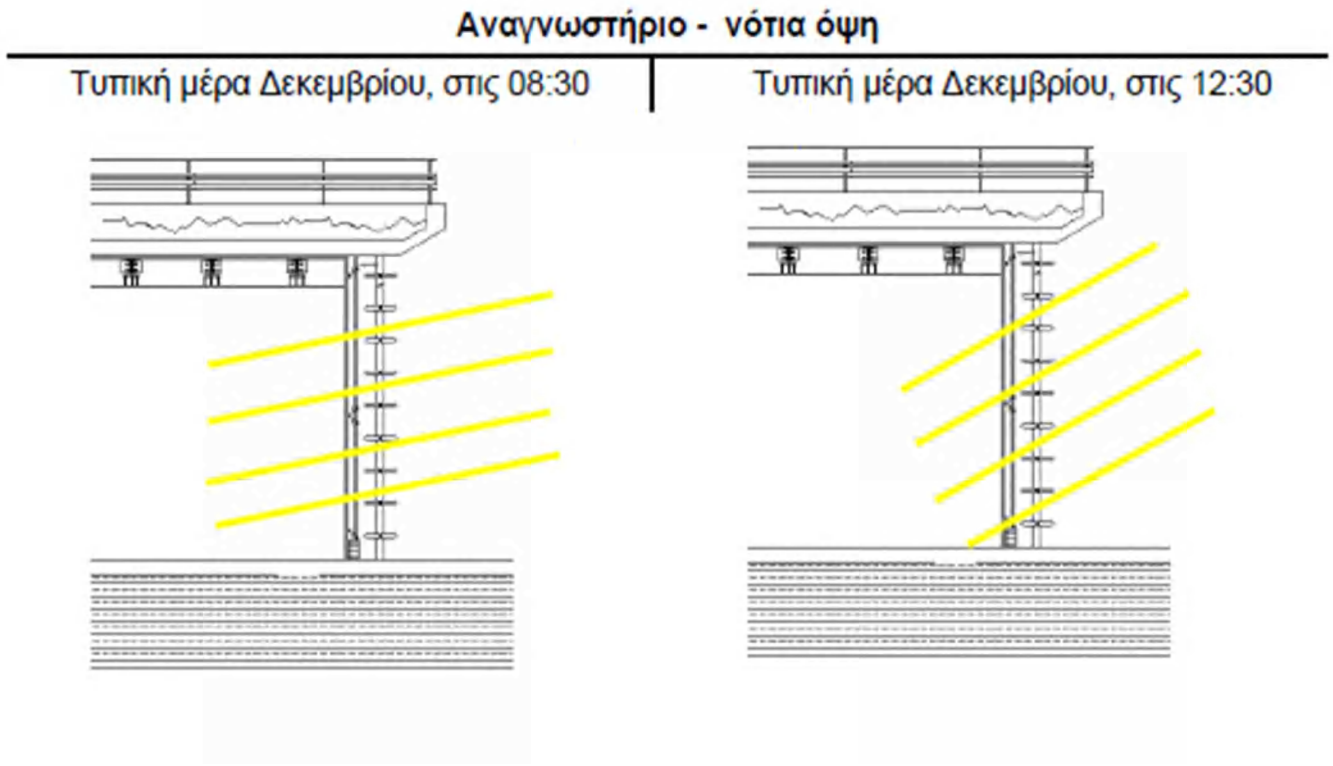
The air enters from the side B and NW exposures indoors (Vivliostasion and hall / Y) - due to pressure difference - and out warm from the south, SE and SW openings (reading room and E / H) .





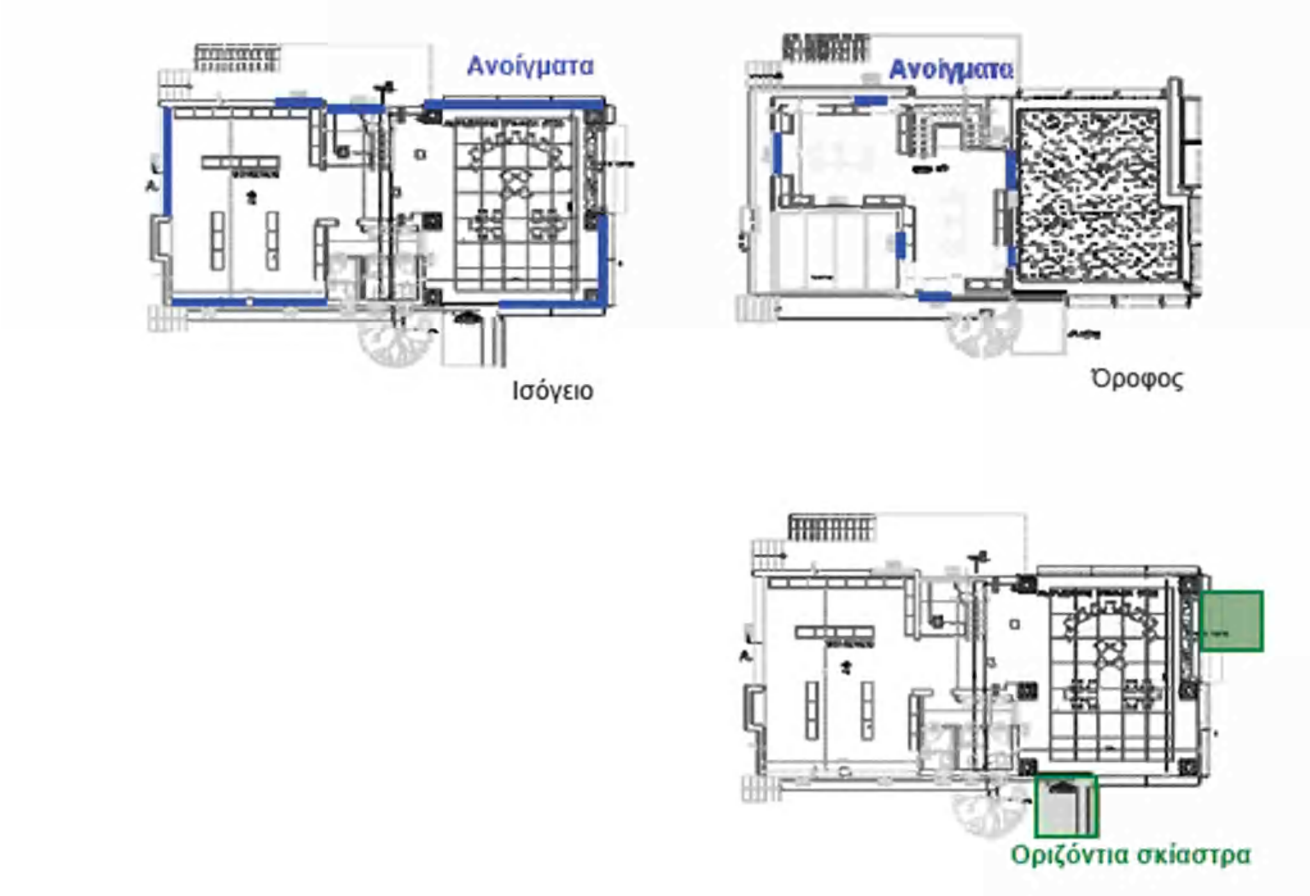
Shading

Successful shading varies depending on the orientation and the use of the premises, having always driven to create optimal conditions for thermal and visual comfort.
In particular, in the contemplated building, the transparent surfaces are 39% of the east and west side , 29.3 % of the northern side and 25 % of the south facade .
The sun protection on those exposures is important in all areas and particularly for the southern areas (reading room on the ground floor hall / Y in the floor).



The vertical louvres were not considered necessary because the neibouring high storey buildings of East and West allow for low angle protection during early morning and late night.
In summer particularly during the month of June, the shading achieved in Trombe wall the horizontal sunshade is around 85%. The width of the horizontal canopy is fully satisfactory since it shades the transparent wall surface of the Trombe wall.

The shading is a fundamental technique for reducing energy consumption for cooling (especially in climatic zones with intense sunlight), while the controlled input solar radiation provide significant benefits during the winter.
The protection of openings with appropriate shading during the summer should basis so as to achieve:
 limiting the entry of direct solar radiation in space , thus avoiding overheating problems and reducing the required heat load during the winter from the utilization of incoming solar radiation , which is converted to heat (passive heating).



Generally it can be concluded that, despite EU and local legislation, encouraging green building not many energy efficient-buildings in public and private realm have materialized in Greece at the moment.

This leaves plenty of room for improvement not only in terms of incentives provided for the promotion of such practice but more importantly for the cultivation and awareness of sustainable principles to the construction team and to the general public alike, to an extent that it becomes fully understood that is not a matter of choice or luxury but of bare necessity to lower the environmental footprint of our life.