W8_BIOCLIMATIC THERMAL BATH FACILITIES in Aegina, Greece_ 2021

ECOWEEK
... habits change ... climate change

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ROOF PLAN 1:500

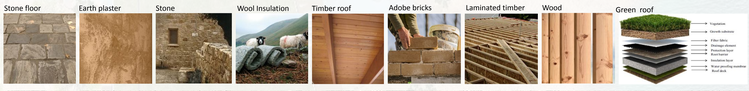
Architectural Concept

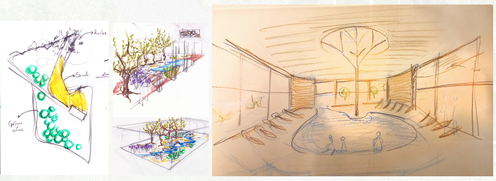
The aim of this project is to revive the thermal springs of Souvala in Aegina through a bioclimatic Design study of a small-scale thermal bath facility for medical and spa tourism, next to the thermal springs. The thermal baths in Aegina were well known since the antiquity. The area of Souvala used to be a spa resort until the 1950's. The chlorinated sodium thermal springs have been abandoned for many decades now.

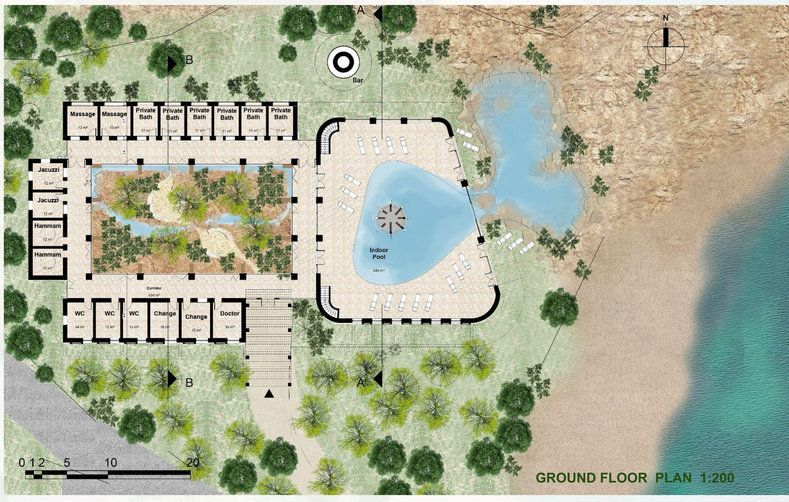
The design proposal is a small thermal therapy and wellness center. The purpose is to attract people from all ages with the possibility to extend the touristic period in the winter. Emphasis is given in ecological, environmental and historical issues as well as in health aspects incorporating nature into architecture, and following Hippocrates' moto, c. 460 BC, "nature heals disease". The small complex is estimated for an average 50 persons/h, with a thermal water of approx. 45m3/h

The new ground floor complex of 1.200m2 is positioned near to the old building of Souvala thermal springs viewing towards the sea and Souvala bay. The old building is reused as a reception area with exhibition space. Both buildings are connected with a sun protected path with trees. The atrium surrounded by the building volumes and their arcades, plays the role of embracing the users, and gives access to all spaces connecting at the same time through a natural environment in its heart. Walking paths for therapies, as well as kiosks and seating areas are designed under the trees on the outdoor areas.

Microclimate improvement is achieved through tree planting, shading, green roofs and pergolas. Summer temperature decreases. The winter thermal comfort conditions are achieved with reduced winter speed. New evergreen and deciduous trees facilitate bioclimatic design. All trees and plants are endemic and of low maintenance.



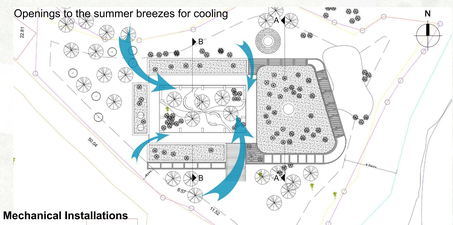




GROUND FLOOR PLAN 1:200

Bioclimatic design is achieved with the buildings facing 100% south for maximum thermal gains in the winter and for easy sun protection in the summer. The main building has a smaller northern elevation. **Passive thermal gains** are achieved through southern windows, Trombe walls and a wintergarten on the southern part of the atrium, which is converted to an outdoor space in the summer. Its glazing is removed in cupboards in front of the atrium columns. **Natural cooling** is achieved through shading the elevations with arcades and their green roofs. Moveable horizontal tents protect the southern windows and Trombe walls in the summer. Vertical moveable blinds hanging from the outer edge of the eastern pergola protect from the hot eastern summer sun. The eastern pergola plays the role of a cooling corridor, which enables northern summer breezes cooling the façade. Atrium plays an important role for cooling in the summer, enabling northern and NW summer breezes penetrating into its heart, cooling the elevations. Water and trees in its center enhance natural cooling. In the main building, the big roof skylight opening acts as a cooling chimney with vertical ventilation and stack effect. The operation of all skylights is connected to the Energy Management System BEMS. Triple glazing is provided for the northern side. Ample natural lighting is achieved everywhere. Reflectors provide visual comfort. Rain water is collected in underground reservoirs and streams. Part of it is used for plant watering and cleaning.

Natural materials are used, as local stone, local earth, wool insulation, tadelakt, hydraulic earthen plasters and wood. The supporting construction is reinforced concrete and all roofs laminated timber. The old building is insulated and Trombe walls are provided with glazing in a southern inclination, as well as pergolas with climbing vine. All northern pergolas keep a cool environment on the side, where cooling breezes penetrate into the building. The complex consumes the least possible energy only with its passive design.



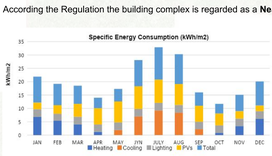
Mechanical Installations

All mechanical equipment and facilities are placed in a basement under the main building. For the additional heating, the energy of the geothermal thermal water is exploited via the assistance of a central geothermal heat pump, providing all the essential auxiliary energy required during the extreme winter days or when the thermal water is not sufficient. The hot water is distributed via a two-pipe (one supply and one return pipe) heating distribution system that conclude to fan coil units that transfer the heat in the spaces. The cooling of the building in extreme hot conditions is achieved via the reverse operation of the same geothermal heat pump via the existing network of the fan coil units. For the minimization of the buildings' energy consumption, photovoltaic panels (PVs) are placed on the roof of the parking slots. A minimum area of 170 m² of PVs is foreseen for installation.

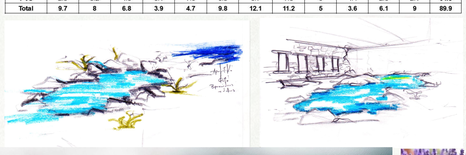
Energy Rating

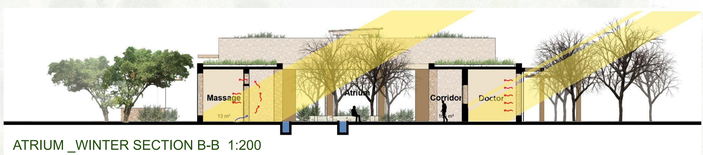
The energy performance of the building was estimated according the Hellenic Buildings' Energy Performance Regulation (KENAK). According to the energy simulation the building is ranked in **Energy Category A+ with a specific energy consumption of 89,60 kWh/m²**.

According the Regulation the building complex is regarded as a **Nearly Zero Energy Building**

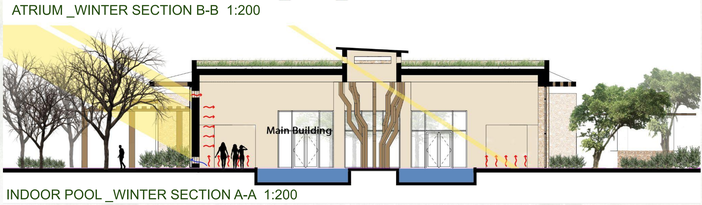


Energy Consumption (kWh/m²)													
Months	JAN	FEB	MAR	APR	MAY	JYN	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
Heating	6.8	5.4	4	1.2	0	0	0	0	0	0.8	3.4	6.1	27.6
Cooling	0	0	0	0	1.9	7	9.2	8.4	2.2	0	0	0	28.7
Lighting	2.9	2.6	2.9	2.8	2.9	2.8	2.9	2.9	2.8	2.9	2.8	2.9	33.6
PVs	2.5	3.2	4.8	6.1	7.8	8.5	8.7	7.8	6	4.4	2.8	2.1	64.8
Total	9.7	8	6.8	3.9	4.7	9.8	12.1	11.2	5	3.6	6.1	9	89.9

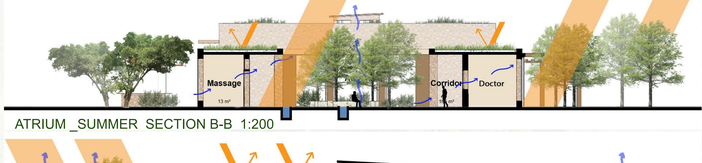




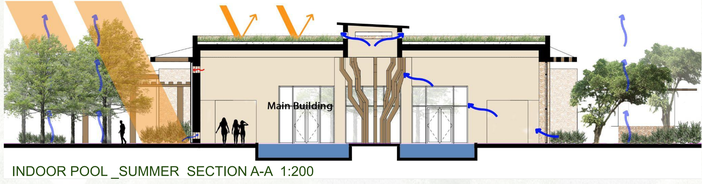
ATRIUM _WINTER SECTION B-B 1:200



INDOOR POOL _WINTER SECTION A-A 1:200



ATRIUM _SUMMER SECTION B-B 1:200



INDOOR POOL _SUMMER SECTION A-A 1:200