

Roumeli settlement

Greece

PROJECT SUMMARY

The municipality of Kekropia remise to DEPOS an area of 548.422 m² for the construction of a village named "Roumeliotiko". The central aim of the Greek government is the conservation of the Greek cultural identity. The responsibility for the planning and the construction of the creation of the village "Roumeliotiko" was taken by the Ministry of Public Works and DEPOS. Greek government offers these houses to people that have migrated Greece and are returning. DEPOS aims to give at emigrants the opportunity to buy a house friendly with the environment with low cost.

The idea is about a completed ideal village at the site "Paleros" of Kekropia, in Aitolioakarnania, on the west coast of Greece. The village "Roumeliotiko" is 103 km far from Mesologi, 17km far from Bonitsa and 2,5km far from "Paleros" community.



The aim of the project is the invention of resource methods so that people do not have problems of heating and cooling in the houses. The proposed solutions have to be friendly to the environment and of course do not create financial problems.

As a result, a group of scientists and engineers developed interesting ideas about the heating, the ventilation and the cooling of the houses, as a conclusion of calculations and simulations.

In the next pages, there is a specific description about of the structure of buildings in the village as well as a piece of information about the possible scenarios for the best solution in the problem of cooling and heating the place with resource methods and refurbishments.

SUMMARY STATISTICS

THE SITE

Site description, landscape and climate

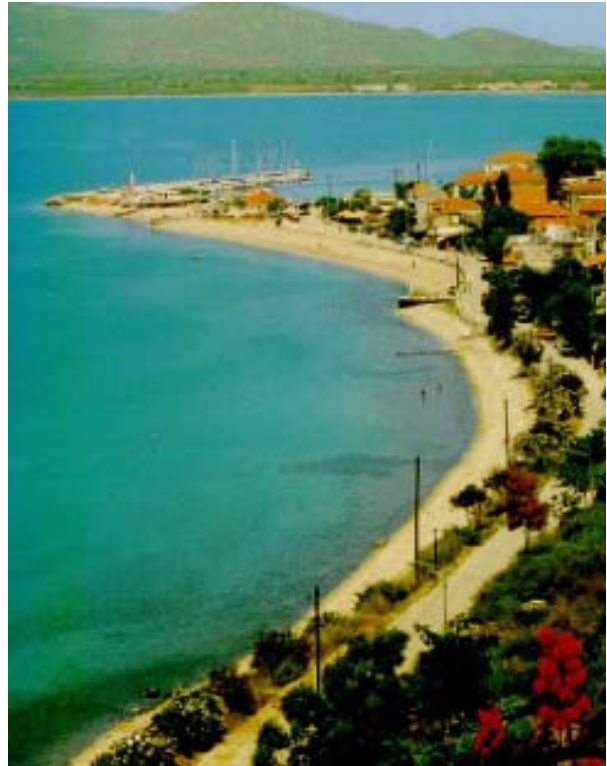
The village "Roumeliotiko" is situated very close to the sea, near the site "Paleros" of Kekropia, in Aitolioakarnania. The nearest village is a village named Bonitsa, and the nearest town is Mesologi. The latitude is 35,4°N and the longitude is 24,7°W. It offers view of Leukada and Skorpis Islands.

The village "Roumeliotiko" intends to provide:

- a) Properties of 400 sq. meters area each, containing a vacation house.
- b) One central plaza of 6.500 sq. meters.
- c) Athletic centres (football, basket, volley, tennis) of 9700 sq. meters.
- d) Playgrounds of 2300 sq. meters.
- e) One cultural centre.
- f) A church.
- g) Small shops

The terrain of the site is a hill with not much vegetation present. Tree planning will be made on such a way that solar control will be optimised. The village "Roumeliotiko" is situated very close to the sea; a typical example of a traditional Greek village in a rocky region. The terrain is amphitheatric and 70% has a slope of 10 to 30%. The region expands in a beach of 900 meters that is offered for maritime activities.

The climate of the region is maritime. In summer months, high temperatures appear. West and north-east winds present but vary with time of the year. Sea breeze is present and will be taken advantage for day-night cooling. The sun shines extraordinary 1800 hours per annum ; with a global radiation of 1100 kWh/m² a. Average wind speed is 3 m/s and the average temperature is 14°C.



PROJECT DESCRIPTION

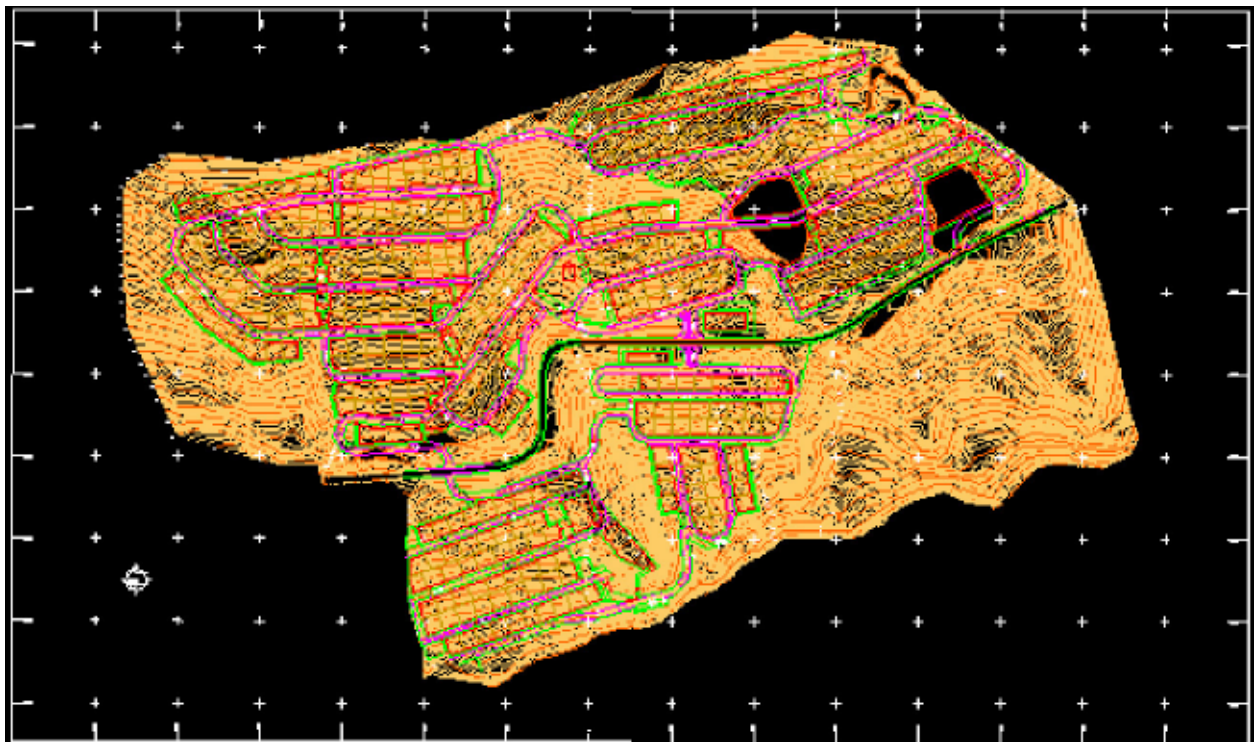
The aim of the project is to propose global strategies that will realise a series of vacation houses that optimises:

- Cost effective implementation of advanced techniques in the building of the village
- Development and assessment of methodologies to improve local microclimate with the use of energy efficient techniques
- Assessment of the potential of methodologies to improve the design of the buildings constructed by maximizing the use of environmental sources
- Decrease of energy consumption
- Low cost housing
- Improvement of indoor and outdoor living conditions

This site is intended for the building of a series of one or two store detached houses. The village is intended mainly for summer use but some people might leave there in the winter as well (mainly retired).

As this is a resource village, for people on vacation, there are being no offices, factories, etc. Some small shops may be present. Ownership is private and has been partly subsidised by the government. Some architectural restrictions apply concerning the image of the whole village that must be preserved at a traditional, Greek seaside style village.

This village is part of a series of villages that have been built or will be built in the future at selected sites of the country. They offer full or part time housing and are fully supported by technical installations for health and leisure activities. The program intends to provide people with properties of 500 sq meter areas each. Road networks, together with water, electricity and telephones are supplied.



BASE CASE

HOUSING ARRANGEMENTS

The village "Roumeliotiko" is situated very close to the sea and this is one of the main attractions of the site. They have been constructed using concrete framework filled with brick-walls. Some wood is also present. There are three main types of houses. As mentioned before their difference is mainly in the size but there are also some structural details that differentiate them. A description of the housing arrangements is shown below:



Roads

The approach to the village "Roumeliotiko" gets by the county road of Astakos-Mytika-Paleros-Bonitsa. A network of road has been designed specifically for the needs of this village. The site has access to main roads, and public transport.

Airports

There is an airport in Aktio, 16 km west from Vonitsa and 29 km from Paleros that is used from CHARTER' s flights.

District Heating

A district heating / cooling network will be incorporated. The use of seawater for cooling is also an option.

Water

The water supply will get by the central water pipe of Paleros community. The local authority provides it. Sewage is also already available.

Supply Of The Electric Power

The supply of the electric power will be done by PPC (Public Power Company, the main supplier of electric power in Greece). The grid already exists.

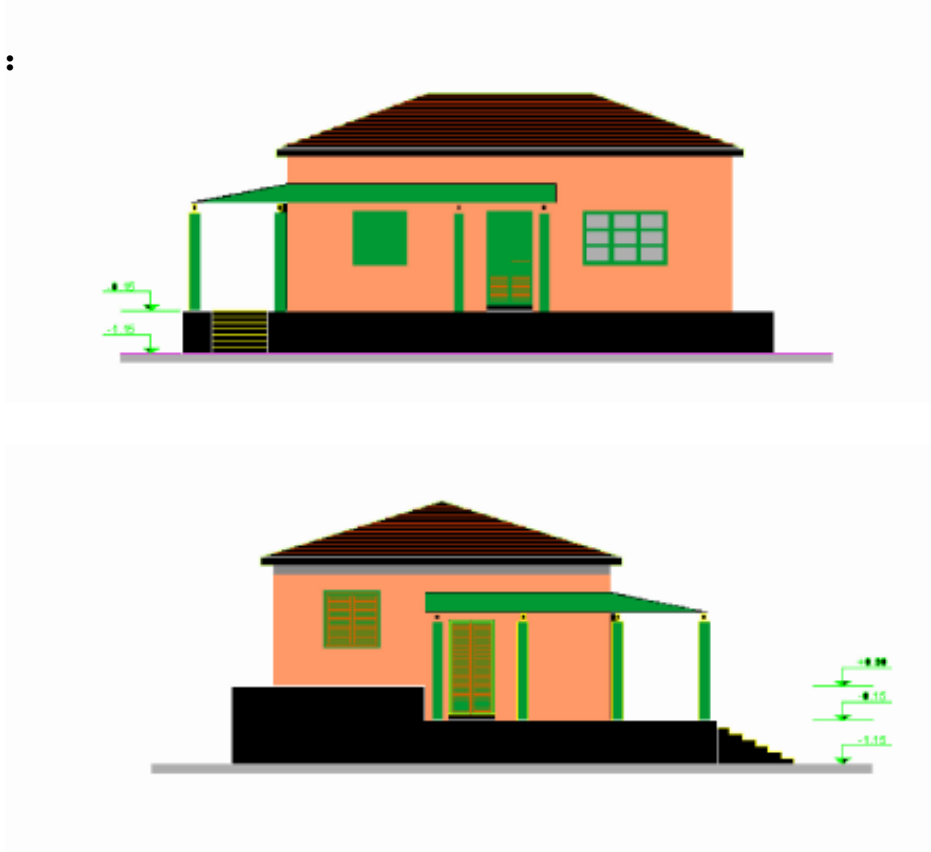
People can choose between three different kinds of houses. Although most houses are semi-detached or row houses, due to the nature of the site, there are different size areas of housings; a) 60-75sq.meters, b) 90-105 sq.meters and c) 120-140 sq.meters.

Every house can be modified to increase its size.

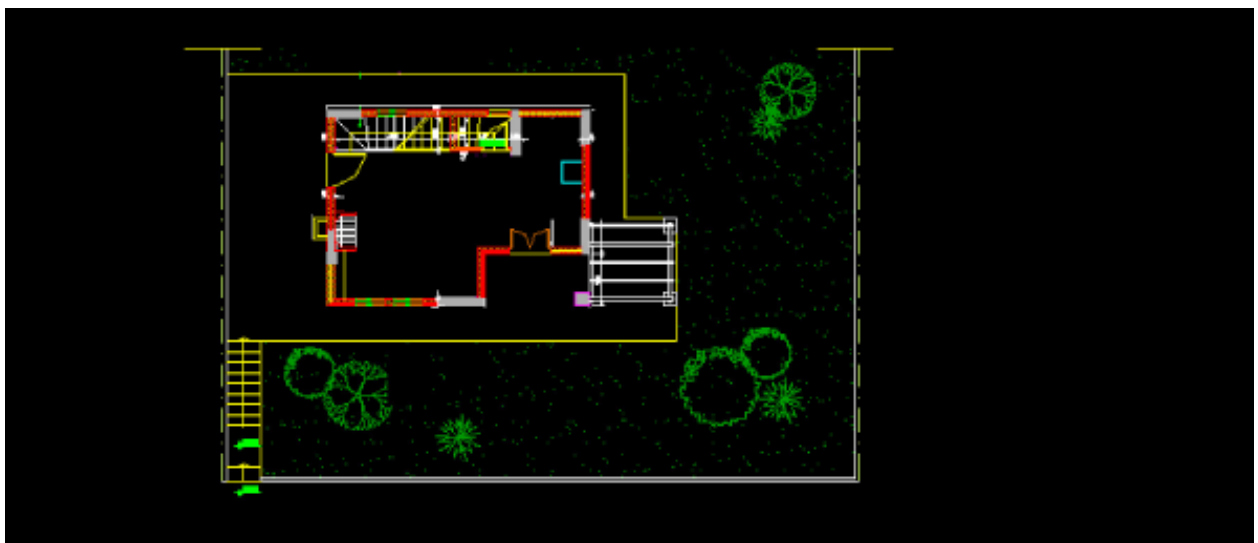
Most houses have also been adapted to the natural slope of the site. There is also a small number of houses that have been grouped together to form what is called "condominium". They have their own gardens and common leisure facilities.

Type a (60 to 75 sq. meters) Type c (120 to 140 sq. meters):

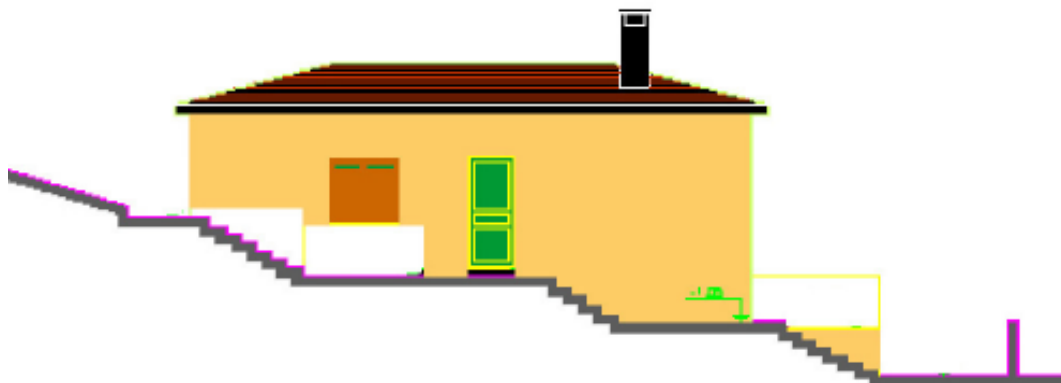
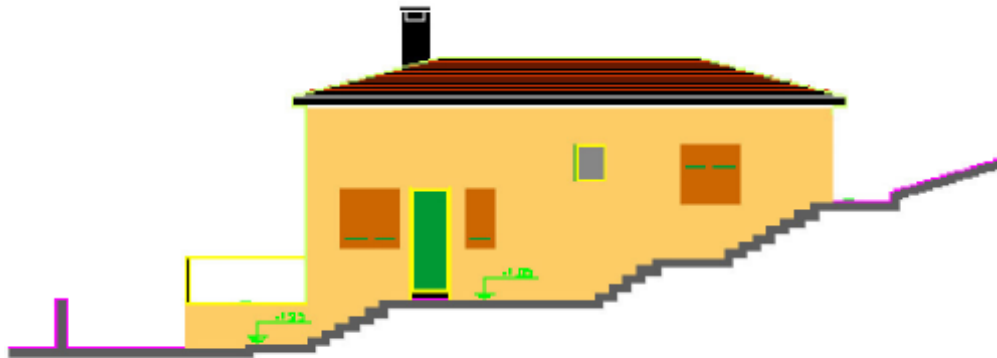
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Side views of a typical sea-side house on the village is shown above.

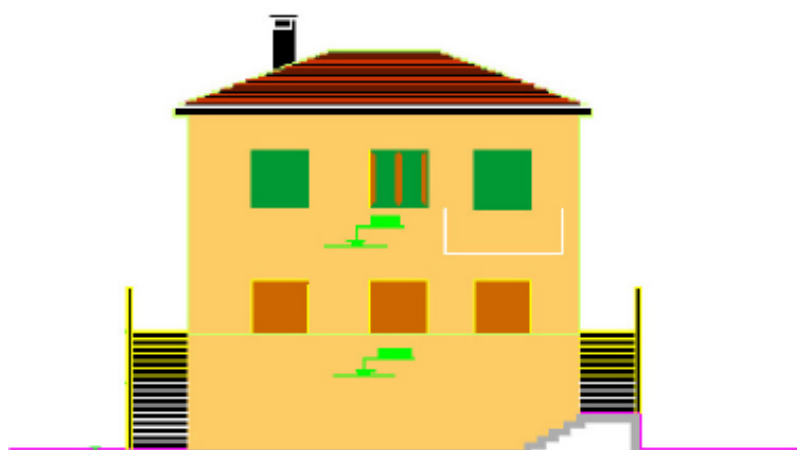
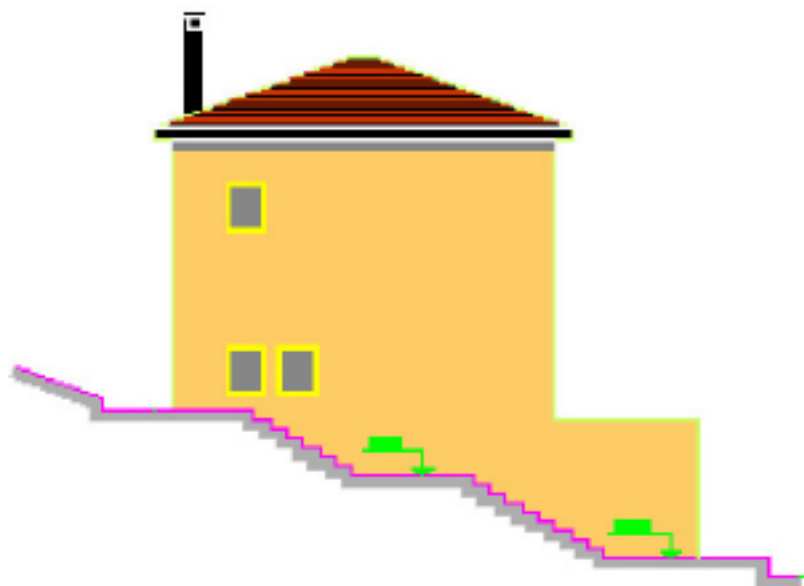


Type b (90 to 105 sq. meters):





Type c (120 to 140 sq. meters):





MICROCLIMATE IMPROVEMENTS

Emphasis will be given mainly in the summer performance of the building, as this is mainly a village for summer holiday tenants. Microclimate will be controlled by:

A) Vegetation: Trees and green spaces contribute significantly to cool our cities and save energy. Trees can provide solar protection to individual houses during the summer period while evapo-transpiration from trees can reduce urban temperatures. Trees also help mitigate the greenhouse effect, filter pollutants, mask noise, prevent erosion and calm their human observers. The effectiveness of vegetation depends on its intensity, shape, dimensions and placement. But in general, any tree, even one bereft of leaves, can have a noticeable impact on energy use. Shading of space will control microclimate by vegetation and with the extended use of cool materials. Tree shade reduces cooling energy use inside buildings in three ways:

- Preventing direct solar radiation through windows,
- Reducing the amount of heat reaching the interior through the envelope,
- Keeping the soil around the buildings cool ("heat sink" effect).

B) Night ventilation: Night ventilation will be employed through the optimisation of the openings. A very important factor for the ventilation is the sea breeze.

BUILDING INTEGRATED RES TECHNOLOGIES

A) District cooling: The possibility of solar assisted district cooling will be employed. The network of pipes will be incorporated in the infrastructure of the village from the construction stage. This way, problems associated with retrofitting and cutting through existing structures will be eliminated. The potential energy savings are great. The fact that cool seawater is available enables the use of highly efficient centralised chillers.

B) Other appropriate technologies:

The use of biomass mainly from local vegetation will be employed. As far as passive cooling is concerned this will be covered by ceiling fans and buried (earth) pipes.

The two main advantages of this village are:

1. Sea breeze for night ventilation
2. Seawater for the efficient cooling of central chillers.

Also, extensive use of natural materials, sustainable collection and use of waste and recycling techniques will be employed. Raining water will be collected and used for sewage.

BUILDING ENVELOPE, PASSIVE HEATING / COOLING

Plant types have been selected in such a way to block solar radiation in the summer and allow in the winter.

- **Building envelope:** State of the art applications will be made in the following areas: Insulation, solar control, advanced glazing (double glazing systems). Natural ventilation will be employed through the optimisation of the openings.
- **District cooling:** Solar assisted district cooling will be employed.
- **Low energy options:** Passive cooling for the summer, cool materials, exploitation of sea breeze. District cooling and heating with the integration of RES, mainly solar and biomass. District cooling and heating will be based on renewable energy sources. This should have great benefit on the cost of energy supply and will have an appeal to inhabitant's ecological conscience. Natural materials will be preferred and sustainable collection and use of waste and recycling techniques will be employed. Management of raining water and recycling of water is an option that will be considered in conjunction with the use of grey water.

DEMAND SITE MANAGEMENT

A governor's plan will be supplied. This is going to determine who is going to maintain the system, how it will operate and how these features will be advertised.

ENVIRONMENTAL IMPROVEMENTS / SUSTAINABLE BUILDING

The optical characteristics of materials used in urban environments and especially the albedo to solar radiation and emissive to long wave radiation have a very important impact to the urban energy balance.

Use of high albedo materials reduces the amount of solar radiation absorbed through building envelopes and urban structures and keeps their surfaces cooler. Materials with high emissivity are good emitters of long wave energy and readily release the energy that has been absorbed as short wave radiation. Lower surface temperatures contribute to decrease the temperature of the ambient air, as heat convection intensity from a cooler surface is lower. Such temperature reductions can have significant impacts

EVALUATION: BASE CASE / SCENARIOS

Even though the village has not yet been built, the base case scenario is very well defined. Advanced case scenarios include improvements in the envelope (namely wall and roof insulation, glazing, and ground cooling) and in all other aspect of microclimate, demand site management.