

# Resilient Angra

Portugal



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Disaster

Construction

Sheltering

Memorial

Protected area  
Classified area: Heritage

Angra do Heroísmo

### IDENTIFICATION OF THE CONTEXT:

Angra do Heroísmo is located in the south shore of Terceira Island. This island belongs to Azores, a portuguese archipelago located in the North Atlantic. The Terceira's foundation dates back to the second half of the 15th century when portuguese people started the maritime discoveries due to its excellent location, Terceira was an important strategic point. Nowadays, it still represents a relevant location that led to the implantation of the Aerial Base of Lages.

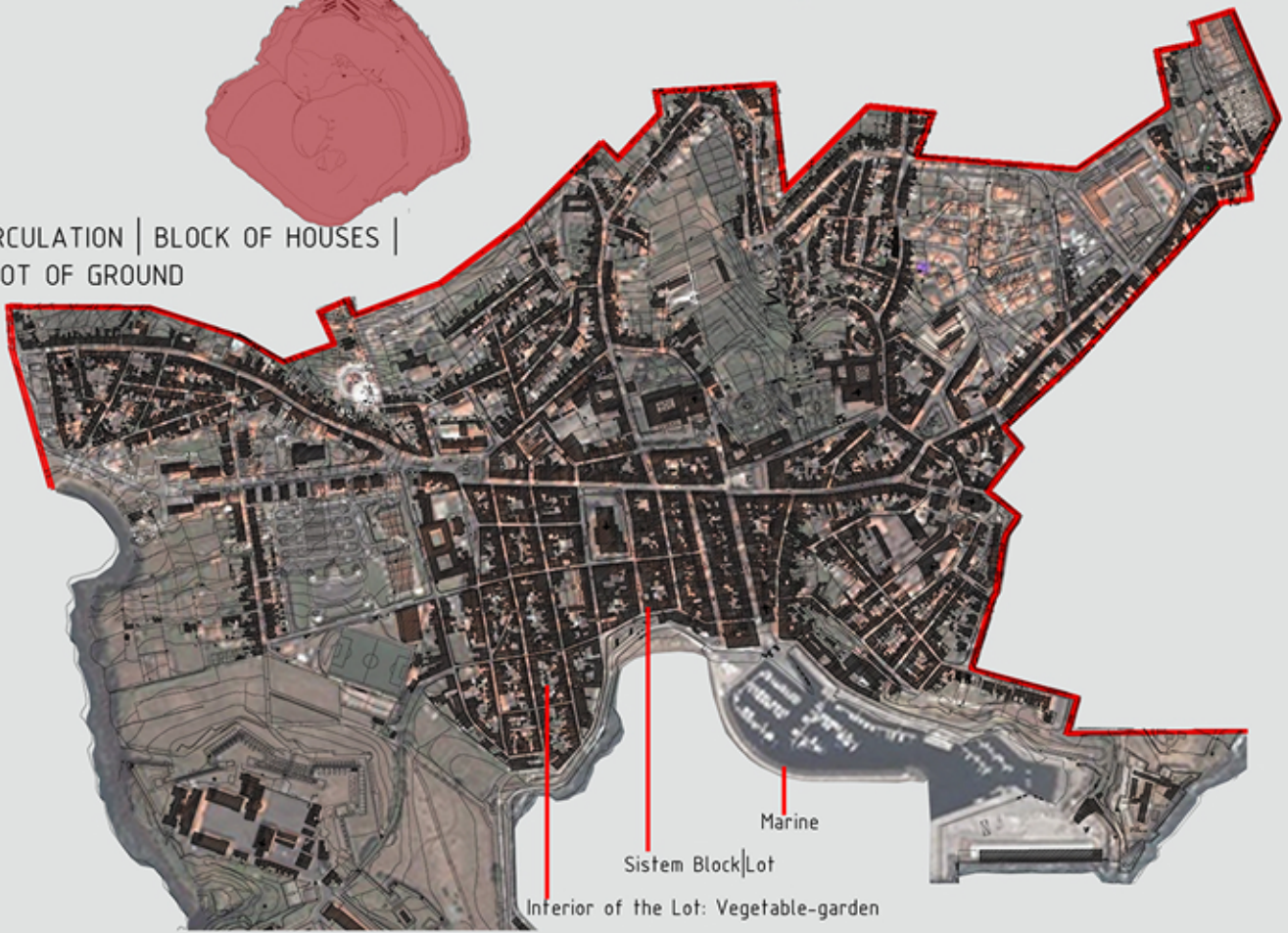
From its defensive and commercial function, the city presents a renaissance influenced urban plan that adapts wisely to the topography and dominant wind directions. The main streets guide us to the port, where there are two notable fortresses. The main streets are crossed by other streets defining the blocks of houses. The typical construction is usually defined by stone masonry in the ground floor and lath-and-plaster wall in the upper levels. The interior of the blocks of houses are used as courtyards or vegetable-gardens.

The island has good renewable sources to encourage sustainable construction solutions, particularly the geothermal energy. In addition to the energy sources, we looked for other kind of sources that can quickly supply building materials after disasters. After the research we concluded that the most common materials that could be used in the construction of shelters would be pallets, straw and wood.

In 1980, Angra do Heroísmo was shaken by an earthquake and since the island sits over a rift, there is a great probability of new earthquakes. That is why it took our interest in studying the city learning from the past. After the 1980 earthquake, the intention to preserve the city's architectural heritage while improving its safety and conditions, led to a great community participation in the reconstruction works. In order to achieve this goal, new structural solutions were applied in buildings (stone masonry and taipa) and also in the circulation layout and city's materialization.

Due to its exemplary reconstruction, that respected and preserved the historical values, Angra do Heroismo was classified Cultural Heritage of Humanity by UNESCO.

### CIRCULATION | BLOCK OF HOUSES | PLOT OF GROUND



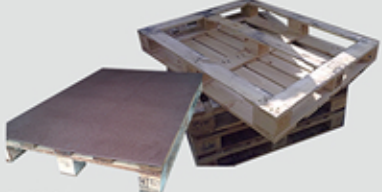
### MATERIALS | POTENTIAL



Basaltic rock



Wood



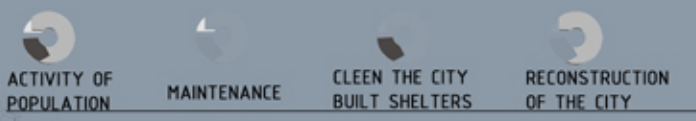
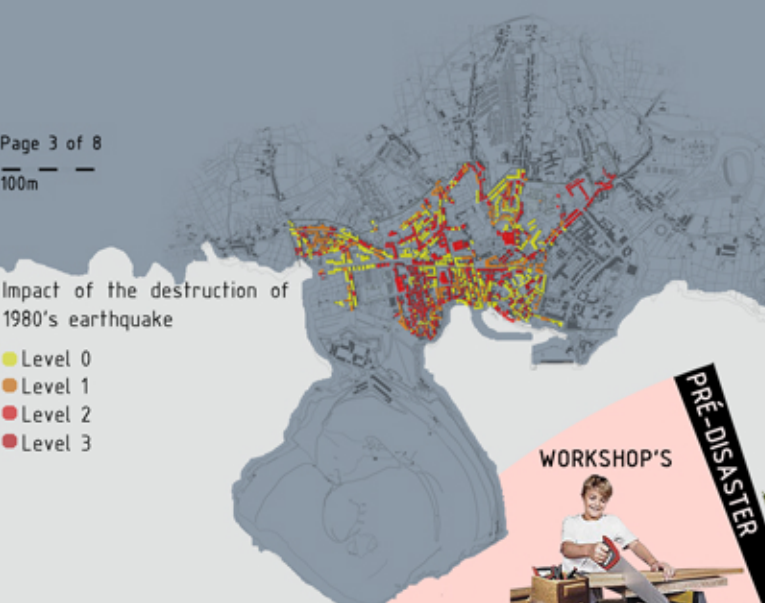
Pallet



Straw

Impact of the destruction of 1980's earthquake

- Level 0
- Level 1
- Level 2
- Level 3



Focusing the pre and post-disaster strategies on people and local culture, we believe that the sense of community and proud would be strengthened and help victims to overcome the effects of a disaster.

REUSE OF MATERIALS

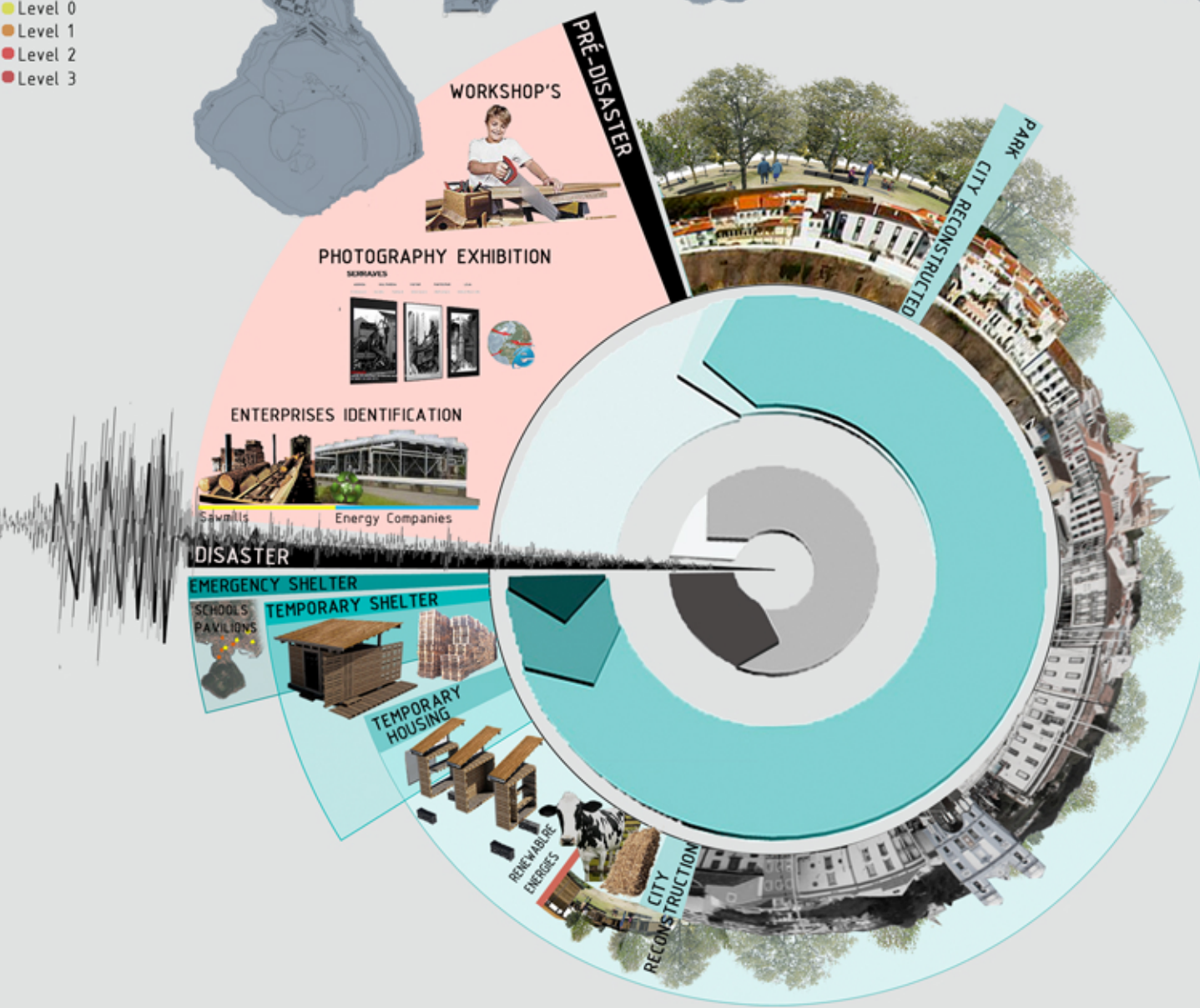


STRATEGY

The post-disaster plan designed is based on two points of action, in order to shelter the homeless people and clean the city. In the first step, schools and sports pavilions would be used as emergency shelters [Plan A (see map page X)] because this kind of buildings provide wide spaces, appropriate conditions for personal hygiene and canteens. If some of these buildings suffer any damages, victims should be gathered in open fields as football pitches, churches, industrial pavilions or even in the city's fortresses. The second step would be involving local community to help in the city's cleaning works. The temporary shelters should be built with the materials supplied by the companies referred and the gathered pallets. This process should not last more than 7 days, to quickly rehouse people, and community would be involved in the activities, which is extremely useful to help them psychologically.

After the shelters construction, it is necessary to start the city's reconstruction respecting its cultural importance to maintain the UNESCO classification. In order to improve comfort, geothermal energy may be used, as well as the wood wreckage from the damage buildings and the wastes from sawmills to produce biomass energy.

After their intended period of usage, the temporary housing's materials may be reused in the permanent houses, avoiding waste of materials. In the same way, after the remotion of temporary units the site would be transformed in a city park.



Plan A of the action  
Plan B of the action

### WORKSHOP'S

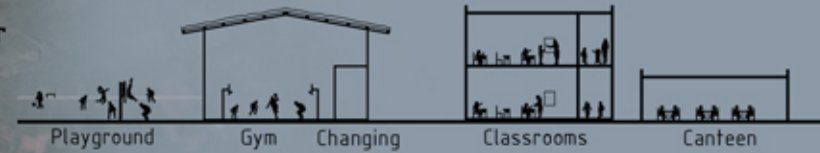


Approach to the material - wood construction

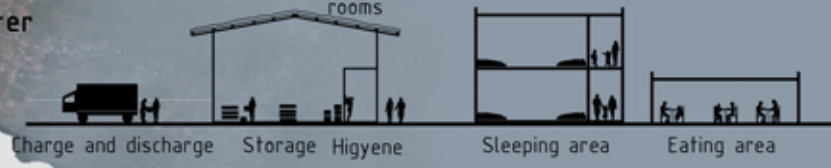


Sawmills      Energy Companies      Construction Company      Agriculture company

### Pre-disaster



### Post-disaster



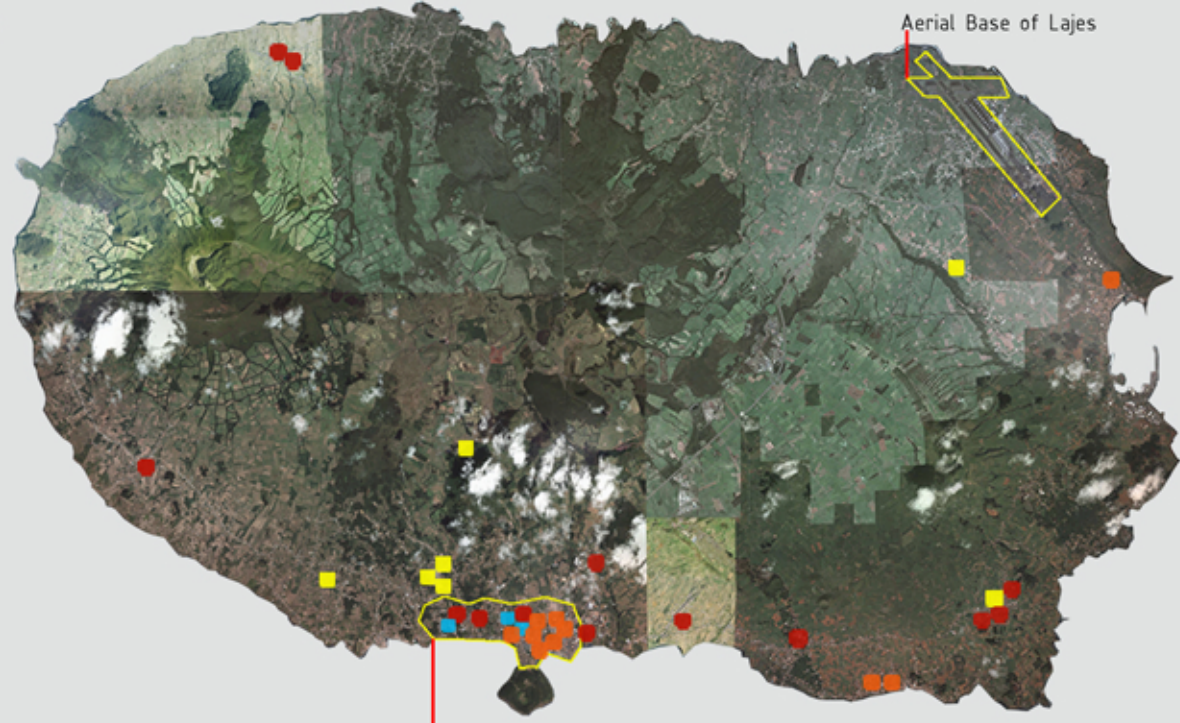
### PRE-DISASTER

Disaster situations require a rapid response and the first actions are usually taken by local people. Therefore, the strategy was designed considering mainly Angra's community participation. It is suggested the organization of workshops to train people for emergency scenarios, and simulacrum activities to test the ability of medical and safety organizations.

It is also intended to create monetary funds to be used in periodic maintenance of the buildings. So Additionally, it would be created a photographic exhibition ("Angra do Heroísmo World Heritage: 30 Years - 30 Measures") about the 1980 earthquake that could run the world most known art galleries with a symbolic ticket value that would reverse for a monetary fund. Likewise, this exhibition would be an opportunity to make people aware of this issue.

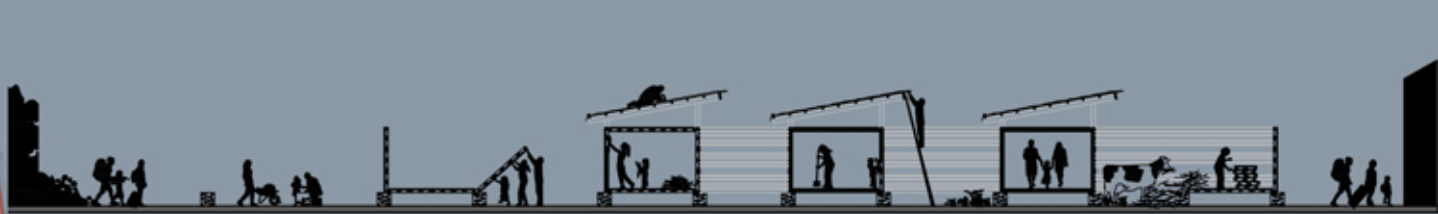
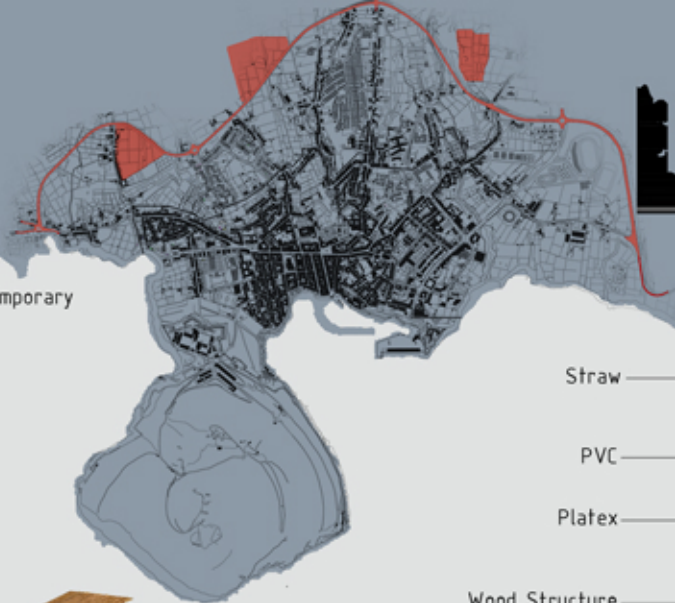
Finally, the strategy incorporates a research about the kind of companies that exist in the island. It is suggested the establishment of agreements and partnerships in order to guarantee that those companies would provide materials and assistance on the construction of shelters in case of disaster.

### PHOTOGRAPHY EXHIBITION



Angra do Heroísmo      Location of Companies - Terceira Island

● Location of temporary settlements

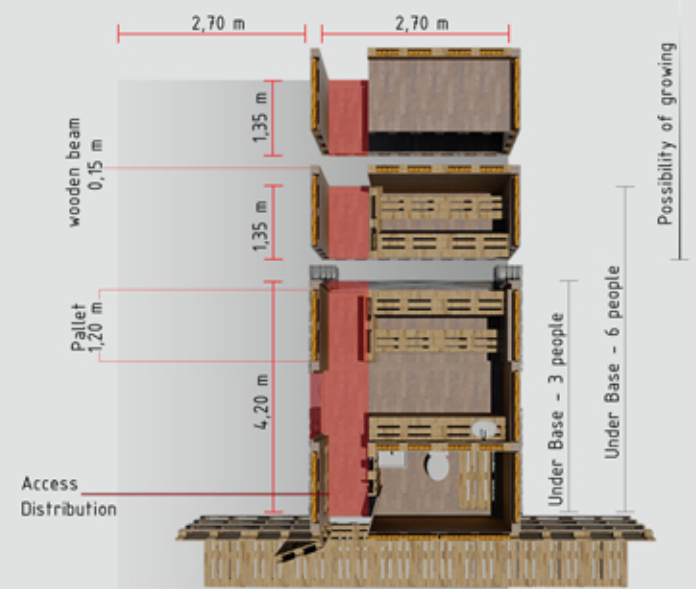
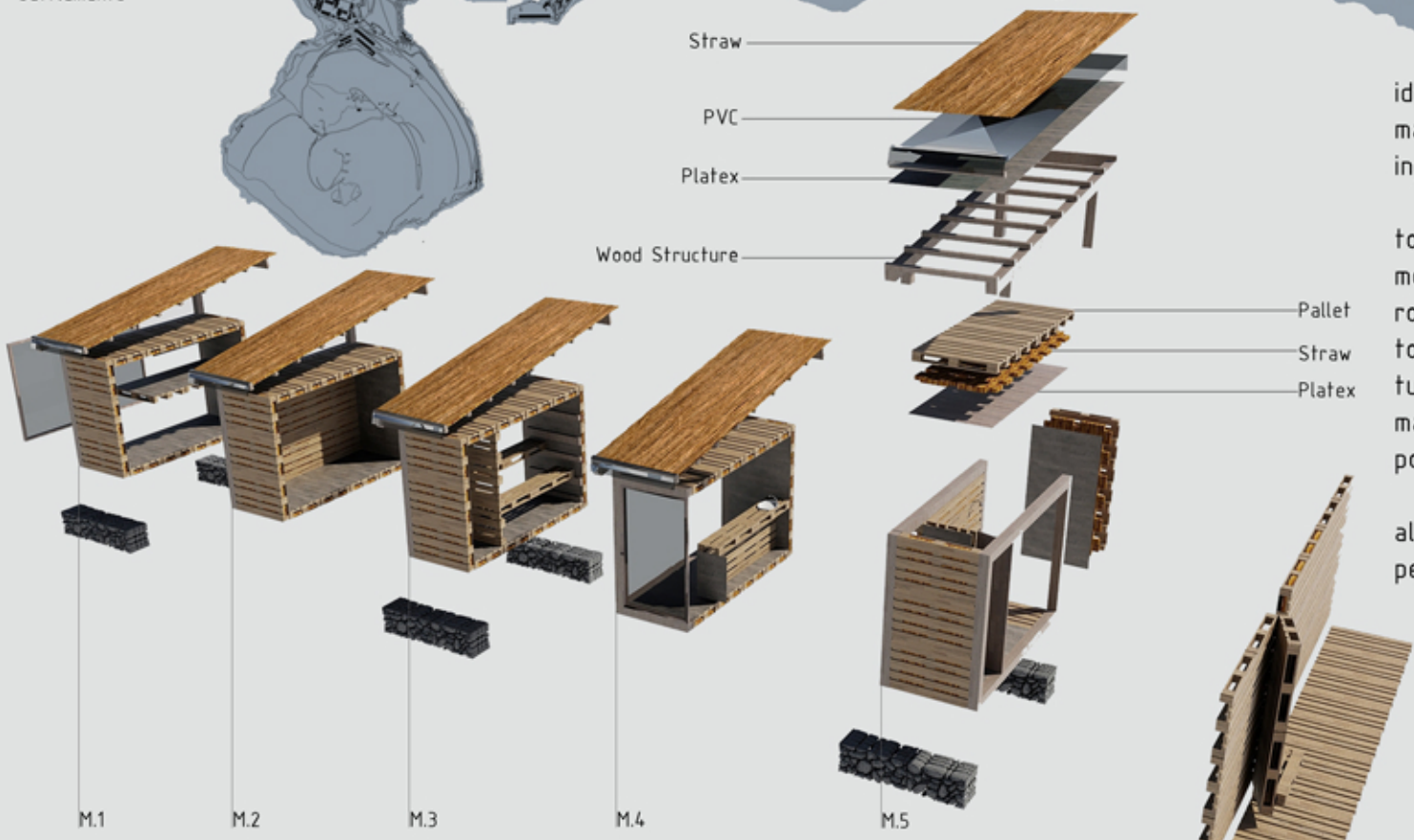


### THE SHELTER TEMPORARY HOUSE

The temporary houser was designed based on the identified available materials. Using pallets as the main material of construction, the solution is design considering a flexible and modular configuration.

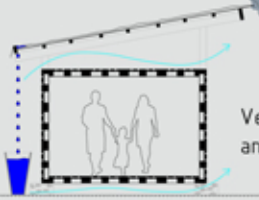
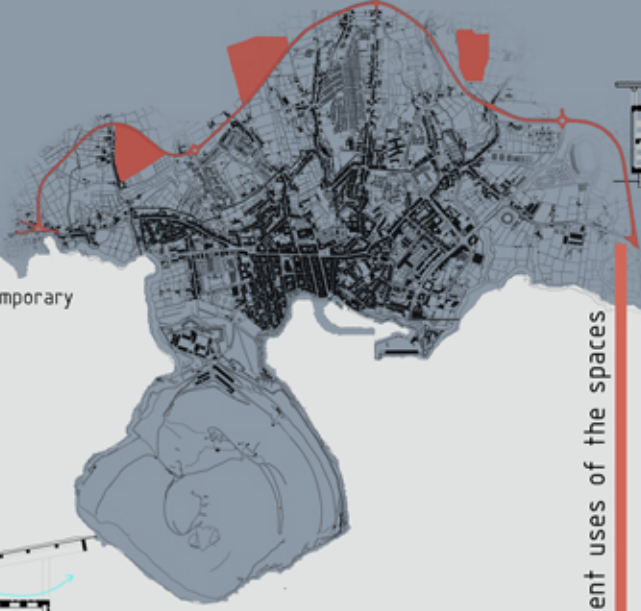
In a first phase may be built 3 or 4 modules according to the number of people who will live inside. The first two modules are the core, concentrating kitchen and bathroom. These spaces are together and close to the outside top of the unit to be easily connected to an infrastructural channel. The other modules are multifunctional and may be added according to users' needs, expectations and possibilities.

Therefore, the unit allows progressive growing and also comfort improving, increasing thermal, acoustic, etc., performance.



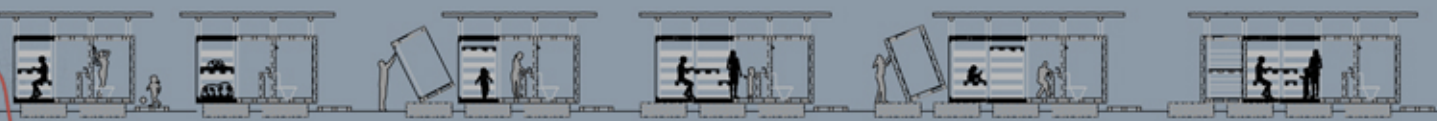


● Location of temporary settlements

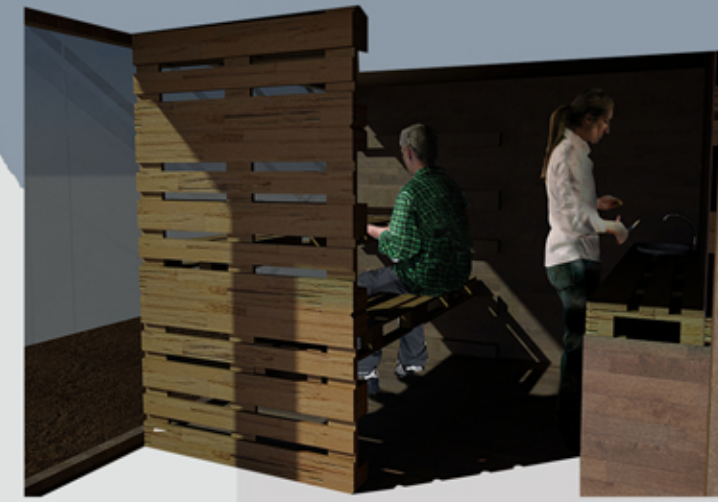


Ventilation of the house and reuse of rain water

Different uses of the spaces



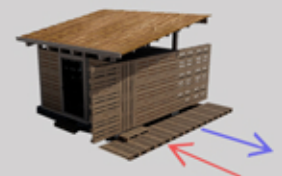
Interior view - night



Interior view - day



GEOTHERMAL ENERGY



Heat from the inside of the earth House and water heating

BIOMASS



RENEWABLE ENERGIES

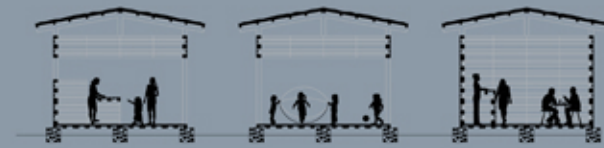
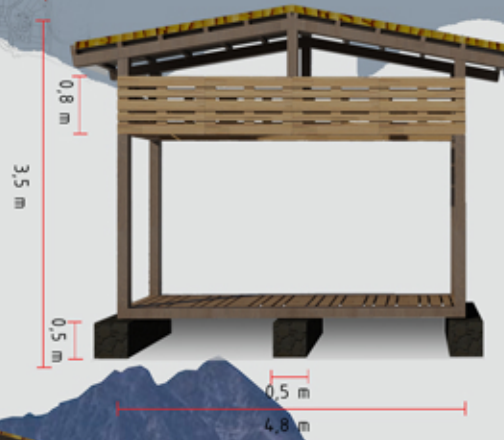


● Location of temporary settlements



## PUBLIC BUILDING

Base module for diferentes public uses. Ex. Market



## BUILDINGS TO SUPPORT THE COMMUNITY

The public building is based on the same construction system and materials of the temporary houses. However, it is flexible to allow modifications according to the function and spial needs. In order to obtain a longer vain a pallet beam system has been designed made up with pallets and standard metallic connectors, which replace the wood beam.

The flexibility of this structure allows it to create different types of building like toally open, half closed or totally closed as the needs of the programmatic issues.

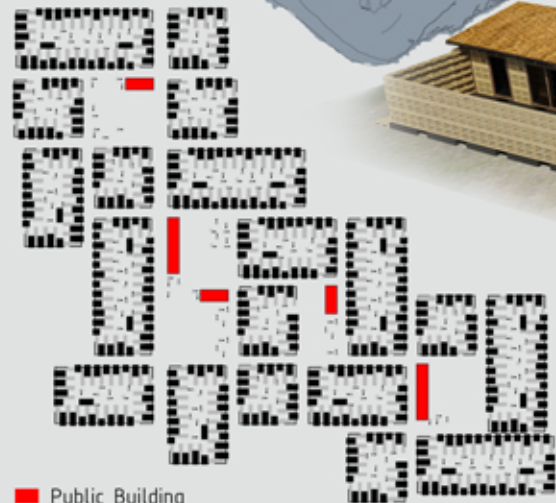
It will be localized in the public squares created outside the blocks of houses, based on the same logic that exists in Angra.



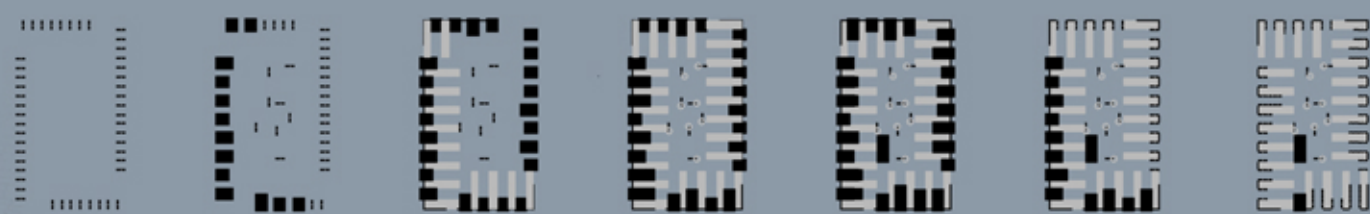
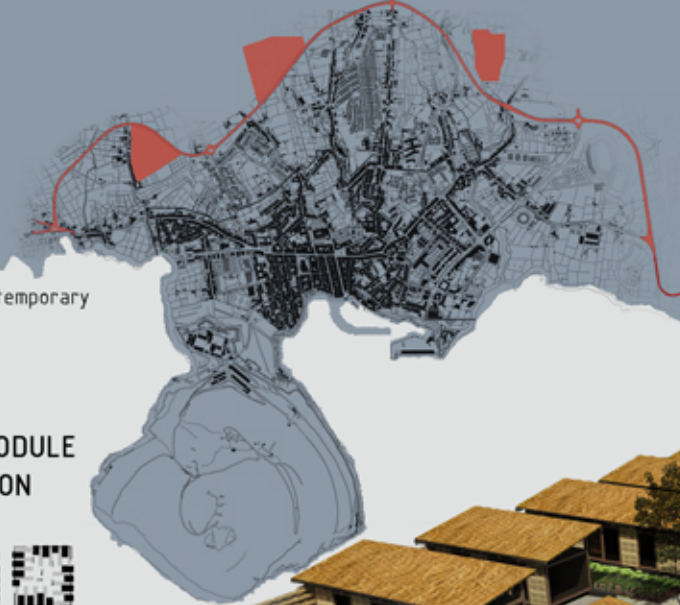


● Location of temporary settlements

### URBAN MODULE AGRIGATION



■ Public Building  
Flexible Aggregation



### URBAN MODULE

The block of houses is presented as a reinterpretation of the standard block of houses found in the city. It is closed to outside, creating a feeling of massive block, and wide open to the interior, where there is a large common and semi-public space in the center that gives the block a community sense. Every house has a vegetable garden to growing fresh produce, thus improving the familiar economy.

The organization of these blocks creates public streets and squares.

After the reconstruction period, the units are dismantled and the materials are reused. The temporary settlements are gradually transformed in parks, garden, etc., providing the city with public spaces. If another disaster happens, these spaces are already prepared to be used as temporary settlements again.

The public buildings may remain, adapting their programs to the park facilities, as coffee-shops.

