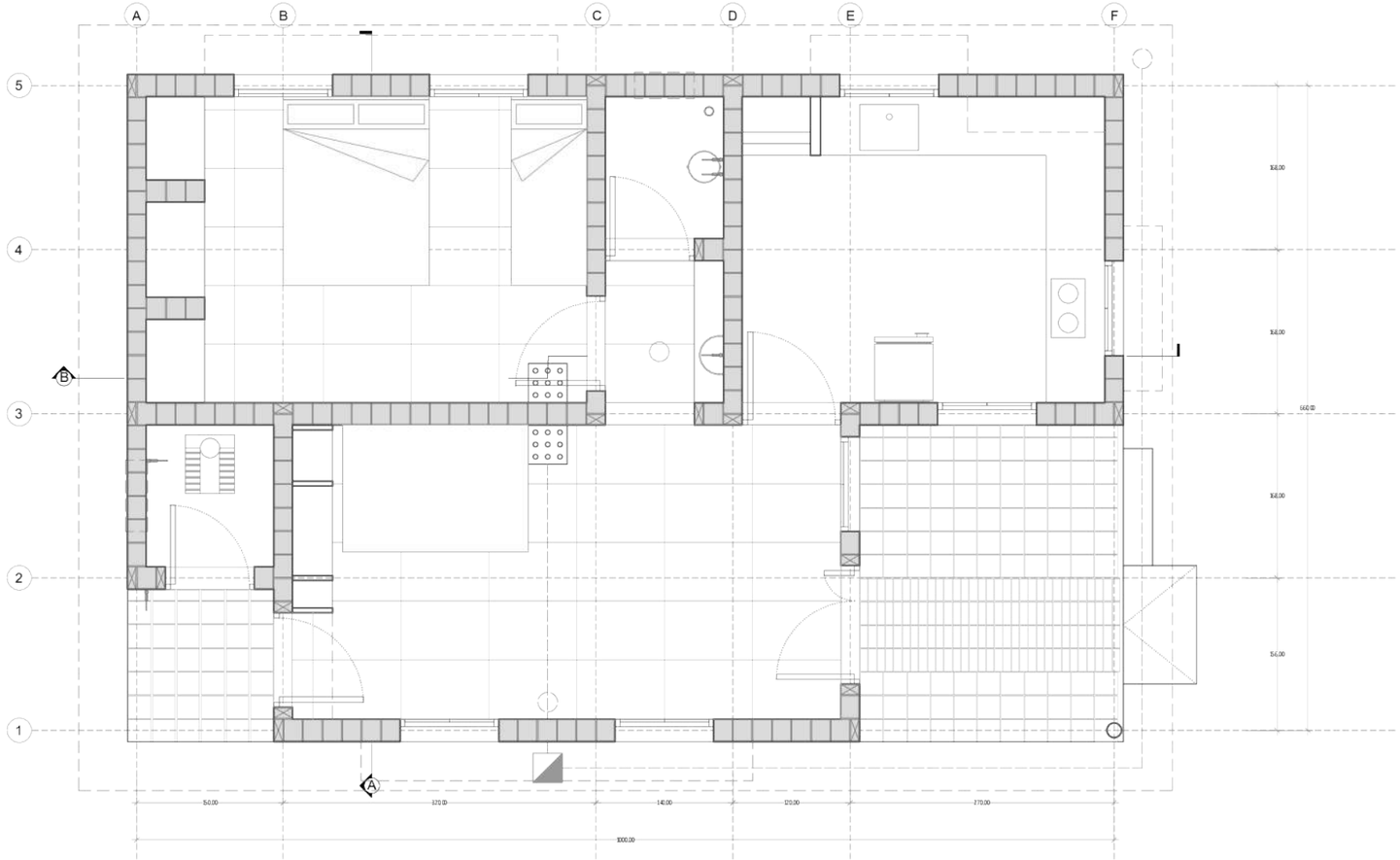


PROJECT DESCRIPTION

This Sustainable Prototype House project aims to be an integral approach for the following habitat and construction projects in the region, focusing on sustainability and people's participation and appropriation, as well as including a livelihoods project with the implementation of a workshop for the manufacture of the main construction material (Compressed Stabilized Earth Block).

This first project consists on a 58 sqm house (total of 70 sqm including the exterior verandas), with two rooms, kitchen and separate bathroom and toilet, in the district of Anantapur, Andhra Pradesh, India.
Two main changes are being tested with this prototype: the introduction of several bioclimatic strategies and sustainable materials to overcome summer's extreme heat, and a change on the plan design according to people's new demands.

These new techniques, if successful and accepted by people, will serve in the near future to be a model of reproducible example on a large scale that serves the NGO Rural Development Trust as a base to change the housing projects that are currently being developed as well as extrapolated to other upcoming projects like schools or community centres.
The project aims to promote the association of people, community work and entrepreneurship through the creation of a small brick manufacturing industry to make the project sustainable in the long term.

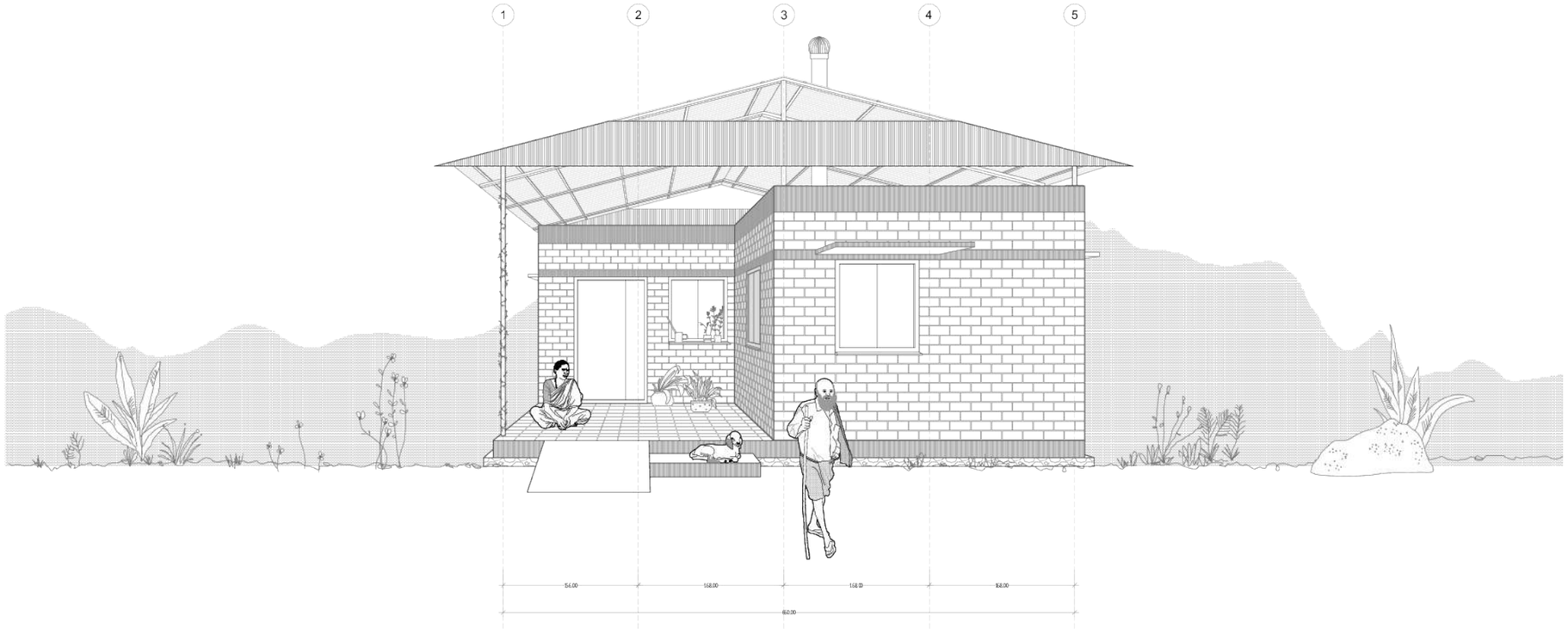
The entire project has been conceived to cover all the stages that are part of the constructive process of a house, from the participatory design, the obtaining of the raw materials to final materialisation. All these stages are based on the principles of bioconstruction, such as:

- Environmental benefits: reduce emissions, consumption of non-renewable resources and adapt buildings to the environment.

- Social benefits: increase the quality of life, well-being and comfort, as well as participatory work.

- Economic benefits: reduction of the consumption of resources and the cost of construction to make it affordable.

SUSTAINABLE PROTOTYPE HOUSE IN ANANTAPUR, INDIA
CANDELA NADAL AND IVAN PUERTA FOR RDT/ FVF



ACCORDING TO THE CONCERNS RAISED IN THE HASSELT CHARTER

10.Defend, promote and enable access to adequate and dignified habitat for all as a 'Fundamental Human Right'.

Restricted access to land ownership is one of the main hinders for families to attain decent housing in India. Many homes can be categorised as substandard. Often the entire family has to share the same one room to sleep, or they are forced to sleep outside during the summer months due to overheating inside the houses, adding on the feeling of insecurity.

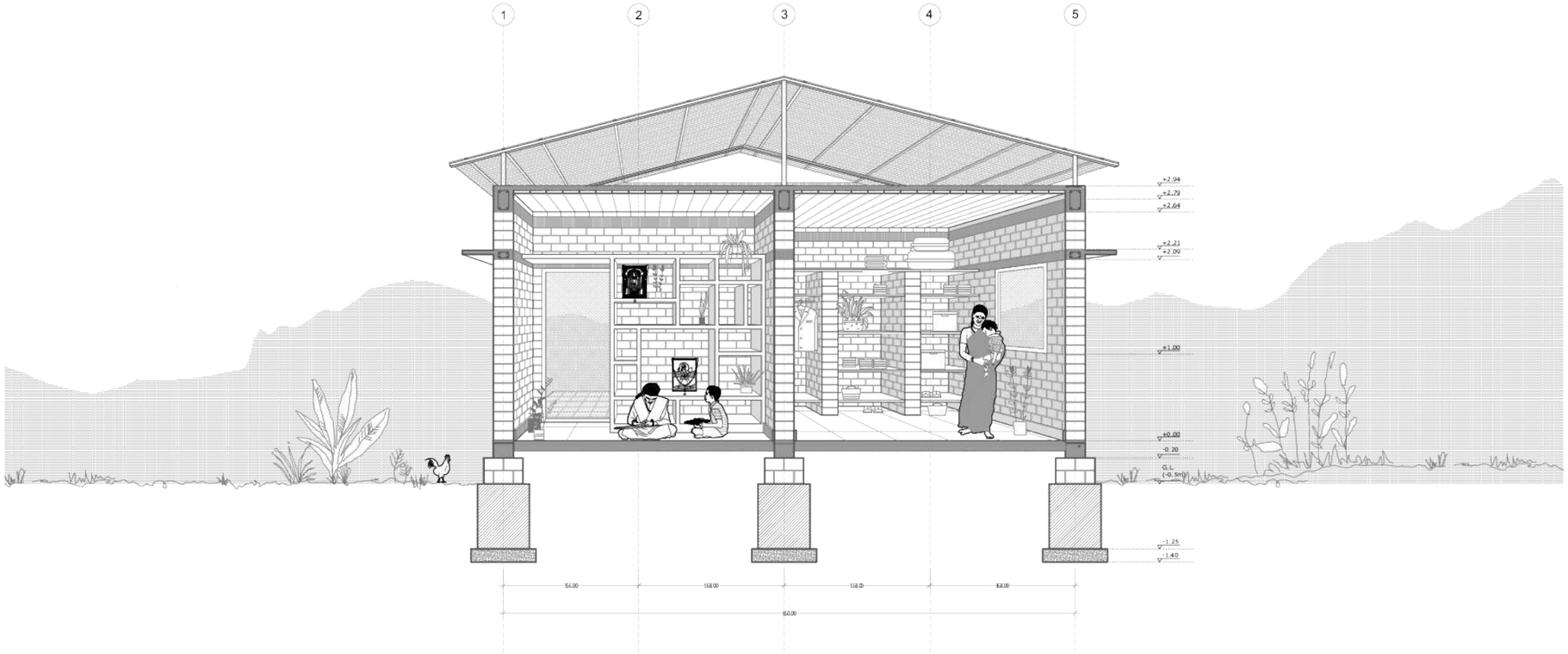
Kitchens are often simply a storage space and people choose to cook outside. Furthermore, elements like the smoke from the combustion of firewood, the pollution, the quality of the indoor air added to the poor condition of the dwellings, makes it difficult to attain the minimal standards for a healthy and dignified life.
Many of these factors are addressed in this project and greatly reduced with bio-construction techniques because:

- they can be economically affordable;
- the dependence on the exterior is reduced, as the prices of materials that are reduced like concrete or steel is highly unstable.
- and they are healthier, as passive and bioclimatic techniques increase the comfort of homes and the use of earth as building material instead of cement reduces the temperature and the quality of the indoor air is increased.

Until the date, NGO Rural Development Trust has given a huge strength to the women in all housing projects, specially by giving the houses under the women's name, that gives a security of tenure in case of divorce or death of the husband.

This project tries to go deeper on addressing gender issues, by introducing the women also in the design process, so the house can meet their requirements specially in privacy and safety issues.

SUSTAINABLE PROTOTYPE HOUSE IN ANANTAPUR, INDIA
CANDELA NADAL AND IVAN PUERTA FOR RDT/ FVF

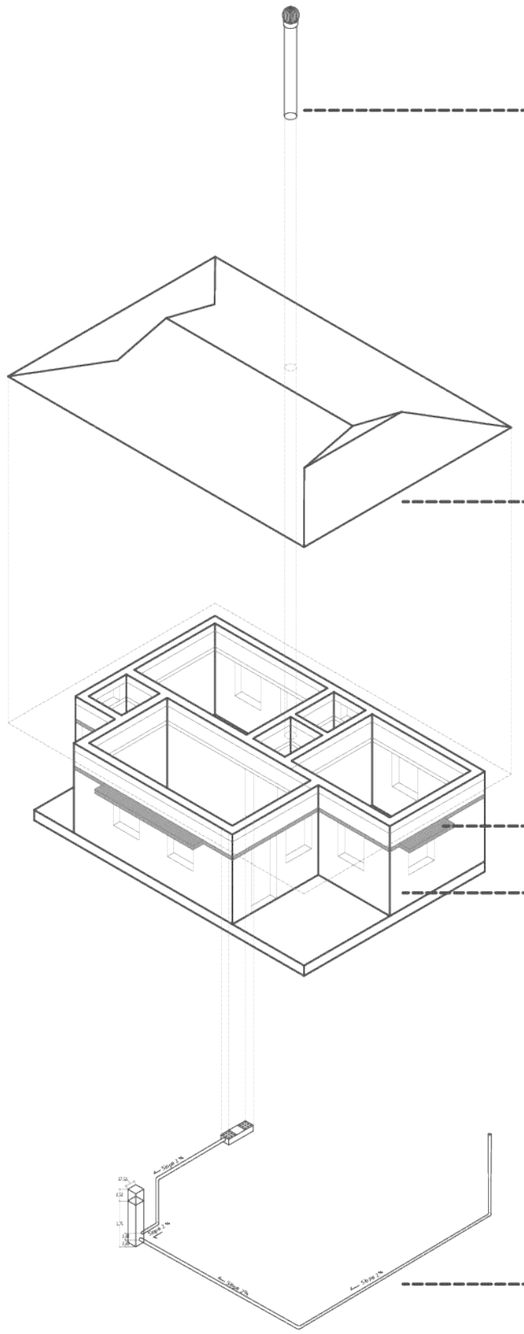


8. Support participatory, democratic, multicultural and interdisciplinary processes and approaches in strengthening community solidarity as a factor of rural and urban social development.

The project has been developed with the help of the NGO Rural Development Trust with extensive presence in the area and especially in the district of Anantapur, Andhra Pradesh, India, where it has been implementing its programmes since 1969. The entire project was carried out through a participatory process with the local population. Surveys were made to gather the opinions of the future users of the houses, adapting the design to their requirements.

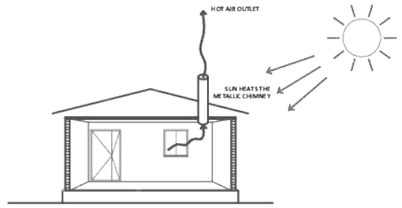
According to these surveys, some changes were introduced such as:
- Separation of the bathroom, sink and toilet areas, for hygiene, privacy and a greater usability in extended families.
- The kitchen size was increased as per women's requests, providing enough storage space and appropriate height of the working benches.
- The bedroom's entrance has been designed to provide privacy from the main room and the street.
-A place for offerings has been introduced, as it was shown as one of the priorities for most of the interviewed population.
All these elements were specifically designed to be culturally appropriate, following Vaastu rules for the orientation and relation of the different elements and cultural habits regarding privacy and hygiene habits.

On the other hand, in relation to the material, several workshops and demonstrations were conducted with local labours and future inhabitants to teach both the production process and correct use and maintenance of the bricks and the benefits of working with earth.
RDT's Habitat Sector, has built more than 64.000 houses in the district for people living in dilapidated conditions. In the heart of RDT's approach, lies the promotion of self-organisation at the grassroots and the process involves the participation of the users in the construction process. Communities are trained to be able to claim for land certificates from the Government, always under the name of the woman.
This project goes deeper into that concept, igniting a sense of belonging since external factors are minimised and people can take control of the materials from the beginning to the final finishes.



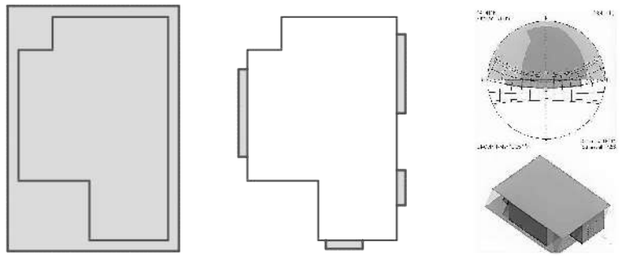
SOLAR CHIMNEY

This passive cooling method uses the natural convection, were the air, when it receives heat, becomes less dense and arises. With this simple system, the inside hot air is extracted through a pipe in the ceiling.



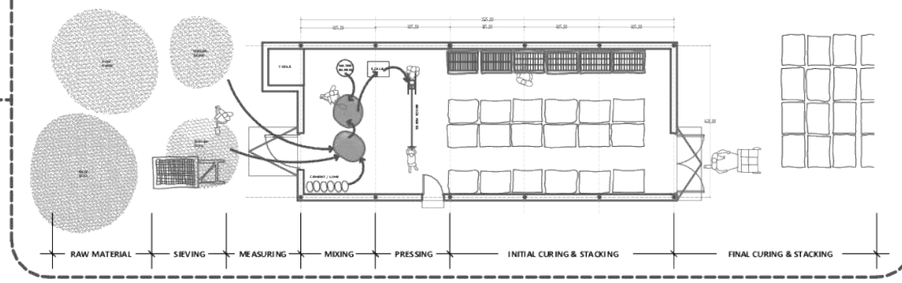
DOUBLE ROOF AND WINDOW SUNSHADES

Anantapur is located in latitude 14.5, with the use of the sun chart, solar protection strategies have been designed. The size of the sun shades on top of the windows gives shadow during the hottest time of the day. Solar radiation is also very strong in this area, it hits the roof of the buildings producing the overheating that´s why the house is provided by a double roof.



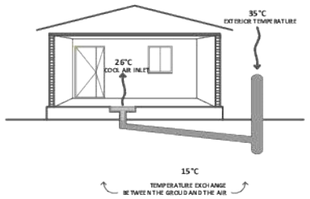
COMPRESSED STABILIZED EARTH BRICK (CSEB) ON SITE MANUFACTURE

Conduction is the responsible of transmitting the heat through the mass of a body. Concrete bricks and CSEB have been compared to show the difference and benefits in terms of insulation. While a cement bricks wall transmittance is 2.3 W/m2K, a CSEB (Compressed Stabilished Earth Blocks) wall's transmittance is only 1.77W/m2K.



CANADIAN WELL

This is another method that uses the natural convection phenomenon, in this case to bring cool air inside the house, by cooling the outside air through the exchange of temperature with the ground with an underground pipe that runs surrounding the house. This system is combined with chamber with water inside the house, to produce evaporative cooling.



5. Facilitate the use of appropriate technologies, materials and labour adequate to local values, to the cultural specificity and responsive to the natural environment.

The global project has been developed, trying to cover the whole construction process, from the origin, with the raw materials to the end of the finished house.
The city of Anantapur in the district of Andhra Pradesh, India, is located in a semi-desert area with the second lowest rainfall in India, hence earth as a construction material is ideal in this location. Anantapur is also an eminently rural city, were it is challenging to find skilled construction labourers. Most of the workers are farmers, who complement their income from the land with construction work.

For these reasons, the proposal consisting of the manufacture of compressed earth blocks, CSEB, through a manual press using earth obtained from their surroundings adjusts to the local skills. It not only makes it a very simple process, it also enables the creation of a small industry sustainable in the future and facilitates the use of such bricks to avoid cement blocks making the project much less dependent on external factors.

In the rural villages where the NGO Rural Development Trust works, earth construction has been the traditional way of building for their houses, as only in the few recent years concrete has stepped as the fashion into the construction tradition, and is already showing as inappropriate for the specific climate conditions and facing several quality and maintenance problems. That's why, CSEB is considered as an appropriate material for this area, as it means an improvement of the traditional way of building, respecting the traditions and the environment.

All the new technologies introduced, like a double roof, a solar chimney or a canadian well, are very simple low-tech passive techniques, using cheap and easily available materials, such as PVC and steel pipes or metal sheet, that are also familiar for the local labours.

The projects ends with the construction of a prototype housing that brings together many bioclimatic techniques that improves the quality of life and the comfort of the family who is going to dwell the house.