Training center for sustainable construction, Marrakesh, Morocco

Project data

<table>
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<th>Project group</th>
<th>Building and civil engineering works</th>
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<td>Client</td>
<td>Fondation–Allianzes pour le Développement durable</td>
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<td>Project background</td>
<td>Private investment</td>
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<td>Estimated start of construction</td>
<td>January 2013</td>
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Main author

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Further author(s)


Comment of the Holcim Awards jury Africa Middle East

The project is the transformation of natural immediate and locally available resources on the lowest possible level of entropy, with maximum benefit for the local population, into beautiful architecture with strong local identity. The purpose of the building is to create a training center for sustainable construction. 30% of the youth in Morocco at the age of 15 to 25 are illiterate. Vocational training is essential to avoid unemployment. The construction sector in Morocco is growing, but there is a lack of models for sustainable construction that are appropriate in technology as well as sensitive to the cultural identity and the resources of the context. The Training Center for Sustainability in Chester offers the youth from the suburbs of Marrakesh the opportunity to learn a future-oriented profession.

Analyzing the local context we found that one major traditional building material for any kind of purpose and size, earth, is nowadays only used for fencing walls and housing in poor, mainly rural areas. There is a lack of improved building technology to treat earth as an adequate building material for modern structures. In this project we adopt traditional know-how supplemented with appropriate modern technologies in order to meet the needs in safety (including earthquakes) and comfort of the present society. A key strategy for sustainability, not on sophisticated technical solutions that can be used by a minority of the world’s population. We want to promote a high level of sustainability based on an intelligent use of natural building resources, grafted with modern technologies and passive design mechanisms, which motivates through a strong, modern architecture.

All structures of this project are formed out of earth with a diversity of techniques: simple repetitive building techniques as well as modes of prefabrication that are important for a maintenance of a plugg industry in both, industrialized and developing countries. Morocco is a country of great culture in architecture and craftsmanship. The design of the project wants to use and celebrate this traditional know-how in order to keep this treasure of cultural know-how as a free by-product on site. With the choice of a labor intensive building material and regional handicraft products (ceramics, tadelakt, weaving), a major part of the profit remains with the people. The project is of high positive influence for the small local economy. Maintenance is minimized to 19.9 kwh/m2/annum. 100% of that energy is covered by 333 m2 solar panels. The supply air is pre-conditioned in the ground heat exchanger (foundations). From there it will be distributed through the precast, hollow core earth elements. Wind catchers transport the water-cooled air into courtyards and the affiliated gangways. Rainwater will be collected on all roof areas and courtyards (1384 m2).

Environmental quality and resource efficiency – Planet

No CO2 emissions and no fossil energy are needed for the transport of the main building material raw earth. Earth construction is based on human labor. The walls can be recycled at the lowest level of entropy – with water and human labor or can be decomposed. A calculation of every construction material showed that 155 Mt and 110 kg CO2/gross m3 embodied energy is needed. Simulations prove that the energy consumption for the building’s use is minimized to 19.9 kw/m2/annum. 100% of that energy is covered by 333 m2 solar panels. The supply air is pre-conditioned in the ground heat exchanger (foundations). From there it will be distributed through the precast, hollow core earth elements. Wind catchers transport the water-cooled air into courtyards and the affiliated gangways. Rainwater will be collected on all roof areas and courtyards (1384 m2).

Economic performance and compatibility – Prosperity

The earth walls can be built out of the excavation material, which is a free by-product on site. With the choice of a labor intensive building material and regional handicraft products (ceramics, tadelakt, weaving), a major part of the profit remains with the people. The project is of high positive influence for the small local economy. Maintenance is minimized to design that allows the aging process of the natural materials’ surfaces. Repairing work is easy with local craftsmen.

Contextual and aesthetic impact – Proficiency

The design is inspired from two Moroccan archetypes: the rural ksar, as the compact place of community life and the urban medina devoted to the training of students. A dynamic architectural sculpture that surrenders patios and gardens plays with sun and shades, static massiveness and rhythmic, rough surfaces and refined shining renderings. It shows a new language for an old material that is deeply rooted in the culture while meeting the needs and dreams of the present society.

Innovation and transferability – Progress

The use of the main material earth is planned in different techniques and scales of technology. Traditional hand ramming with improved shuttering for the fencing wall, prefabricated rammed earth elements, which include the technical support for tempering the offices and classrooms, and a concrete load bearing structure filled with precast straw-earth blocks, with a plastering of tadelakt (lime plaster) for the auditorium. The necessary shading of the walls will be done with a transformed traditional element of earthen structures: horizontal layers of locally produced ceramic tiles (used as protection against water erosion) with a graphical perforation added. It will protect the wall from direct sunlight with an agile ornament of constantly changing shadows.

Ethical standards and social equity – People

The project area is lacking public meeting places. The center offers a variety of places: a spacious garden, an exhibition hall, a café, a library and an auditorium that can be used also by the public. Visitors will experience the atmospheric, aesthetic and technological quality of the constructions and natural cooling systems. Since earth construction is labor intensive, many laborers from the surrounding, including women who traditionally work with mud, will be involved in the construction.

Relevance to target issues by author

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