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AFRICAN DESIGN: Challenging the orthodox



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CHALLENGING THE ORTHODOX





The challenge in building 60 classrooms at the Mbera Refugee Camp in Mauritania was to provide an alternative to transitional structures, usual in arid contexts, by combining materials and techniques. Instead of common solutions such as concrete slab, metal frame, corrugated iron sheets and plastic enclosures, FAREstudio combined sandbag masonry for massive walls and plastic sheets on metal trusses as lightweight roof, with a do-it-yourself approach inherently loose and apt to combine what is locally available.



In Mauritania between 2012 and 2014 FAREstudio operated at the Mbera Refugee Camp as 'construction expert' for Italian NGO INTERSOS, an implementing partner of a UN agency within the framework of a primary education program aimed at improving teaching-and-learning provisions in the camp and nearby communities. The brief was to provide 60 classrooms, 'transitional' yet better, in terms of comfort and durability, than the tents usually provided to front an emergency. Mbera Camp is located in the southeast corner of Mauritania [50km from the Malian border] and provides hospitality to 68.000 refugees escaped from Mali after the 2012 crisis.

The region has a long history as a refugee destination: in the 1990s the area was occupied by displaced people from Mali; the remnants of those days are still in place in the form of two compounds, Mbera I (Arab Berbers), Mbera II (Touareg). These settlements are now consolidated to the point of being termed host communities, same as the nearby (20km North West) village of Bassikonou. As expected, the local climate is very hot. Year-round temperature variations are contained, yet diurnal variations can be extreme. Rainfall is insufficient and irregular.

The Harmattan, a hot, dry and dust-laden wind, blows from the Sahara throughout the long dry season. Wind-borne dust is a scourge that afflicts the whole region, infiltrating every corner and making it easier to get used to it rather than trying to fight it.

Initially, FAREstudio's construction expert was in charge of implementing an existing 'design model', setting off its production, selecting and coordinating a local works supervision consultant. The construction expert role included the ability to suggest design improvements, an opportunity that has been taken up in the light of the limitations found

in the model received. Such model consisted in a simple hangar-like envelope of 8x5m based on similar structures already in use in the camp, with a steel and timber structural frame mounted on a concrete slab and completed by a corrugated iron roof and PVC sheets used as environmental enclosure. No drawings were available, only a very schematic Bill of Quantities for a total cost estimate of \$3 300 per unit.

The design, conceived by the Mauritanian Ministry of Education and de facto accepted by UNICEF and UNHCR, was a combination of the typical UNICEF prime intervention tent and the traditional Mauritanian tent, both with major limitations: the prime intervention tent performs badly in the usual wind-swept conditions of the area, while the traditional tent is not intended for didactic purposes. Moreover, the proposed materials - corrugated iron roof and PVC enclosure - would have resulted in a non-durable, and above all unbearable, 'building' for the users, both kids and teachers, in terms of comfort. In addition, the model would have featured a pole in the middle of the space.

In accordance with INTERSOS, FAREstudio decided to propose and test an alternative. The idea was simple and based on a straightforward assumption: since transport is expensive and sand largely available on site, sand should be the main construction material. On this basis, the sandbag technique came naturally to prominence. The use of superimposed bags filled with sand as masonry, with cement plaster applied on chicken wire to both sides of the wall, is used in various parts of the world and can be regarded as a consolidated technique.

The classrooms are covered with a light roof structure realized with a sequence of curved metal trusses locally produced and based on a typology widely used in the area (production takes place in Bassikonou), then wrapped in a layer of PVC truck tarpaulin [9x7m].

The horizontal roof is aimed at minimizing the effects of wind and assuring natural ventilation and lighting in the internal room. It has a crucial role in the overall scheme because both of these conditions are rarely attained in traditional buildings or in what is locally produced.

Once the project reached its final configuration, a tender package was prepared and the contract awarded to a local contractor. As part of the contract, the General Contractor had to provide a prototype, verify and optimise technical choices, and familiarize the workers with the system.

After some initial reticence and stoppages, the prototype was discussed with all those involved, from UN Agencies (UNHCR and UNICEF) to refugee leaders, positively received, and eventually adopted.

Yet once he realized that his profit (largely based on transported materials) was going to be dramatically reduced by the new building technology (compared to the mark-ups possible with the 'conventional' model), the general contractor started a tough confrontation with the rest of the project team that led to his eventual setting aside. In the new formula, a sort of unusual, hybrid Construction Management arrangement, materials' purchase, site coordination, suppliers selection and the rest are under FAREstudio's control [and responsibility],

CLIENT: INTERSOS
ARCHITECTS: FAREstudio;
Riccardo Vannucci, Joao Sobral
LOCATION: Mbera refugee camp,
Mauritania

CONSTRUCTION WORKS:
January – July 2014
NUMBER OF CLASSROOMS: 60
COST PER CLASSROOM: \$3 000
CLASSROOM SURFACE: 40m²

TARPAULIN

from Nouakchott
1,87 US\$/sqm



STEEL PIPES

from Nouakchott
890 US\$ total



TEXTILE

from Nouakchott
2,2 US\$/sqm



CHICKEN WIRE

from Nouakchott
0,93 US\$/sqm



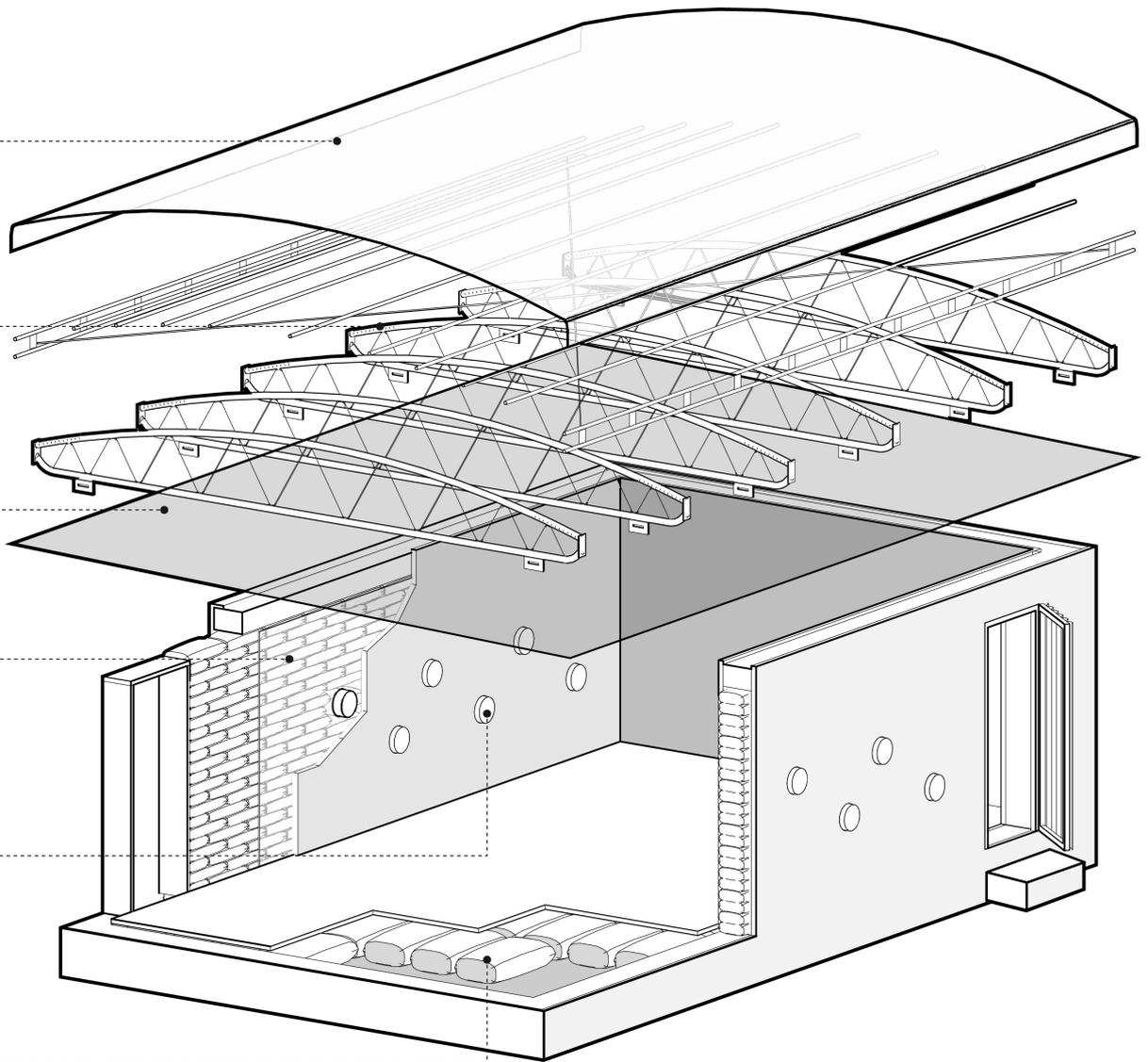
PLASTIC PIPES

from Nouakchott
37 US\$/unit [600 cm]
> 3 US\$/opening



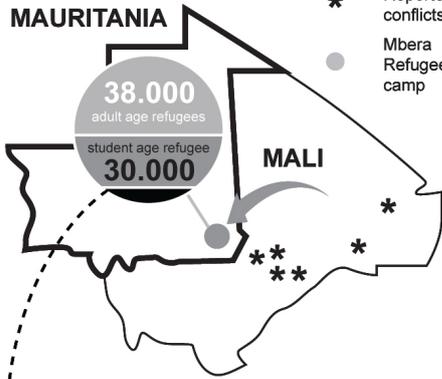
1200 SANDBAGS

SAND from site, 0 US\$/mc
BAGS from Nouakchott
0,25 US\$/unit



MAURITANIA

- * Reported conflicts areas
- Mbera Refugees camp



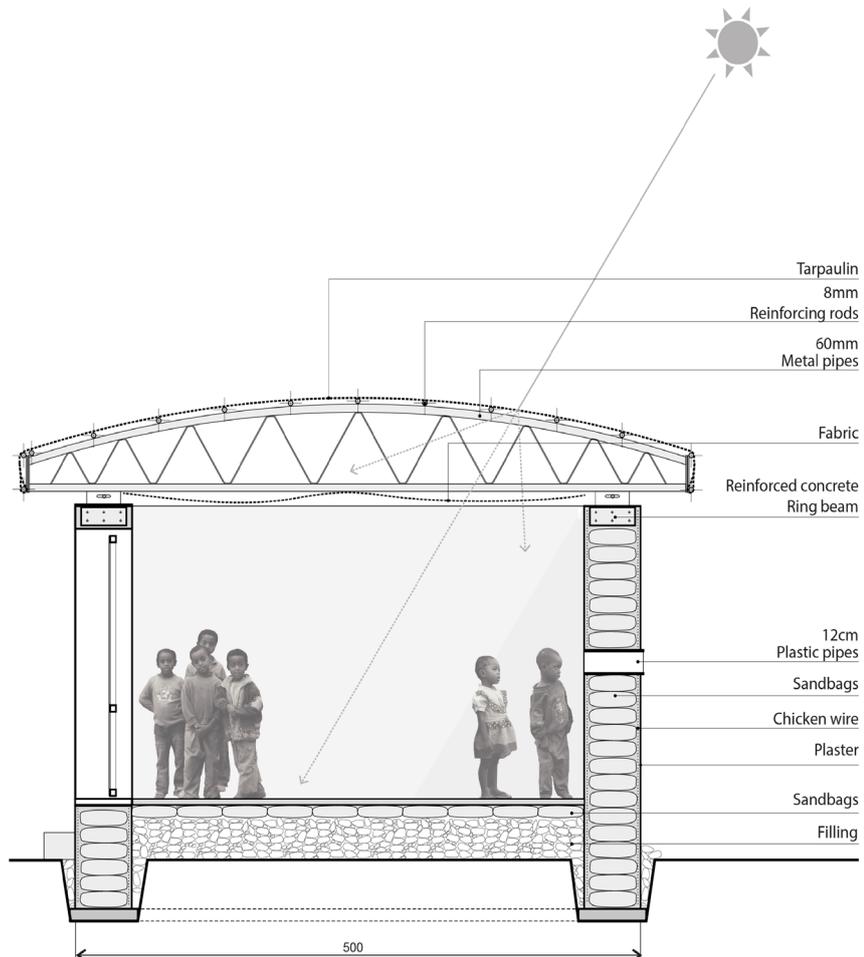
“only 17% of children in the camp are attending official schools”



4.300
of 14.000
primary
school-aged children
attending official
schools

800
of 16.000
secondary
school-age children
not enrolled

* IRIN_nouvelles et analyses humanitaires



with the valuable support of the local consultant.

The program started full production on December 2013 and by the end of July 2014 the 60 hangars are expected to reach completion in four different areas of Mbera camp. 'Mass production' of the units has introduced minor variations to the original scheme. The rectangular windows in the sandbag walls have been replaced by round openings at child's eye height in order to enhance natural ventilation while allowing kids to glance outside the classroom. The position of the doors has also been modified so to have them on opposing walls.

In terms of the social impact of the project, such a labor intensive solution fosters a 'cash for work' strategy, which gives refugees the opportunity to earn some money by actually working. However, it must be stressed that even though no special

competencies are necessary and the skills required are basic, the construction technique is not immediately accessible. It demands training and cannot be regarded as a panacea for the informal building industry. The construction of the walls requires professional bricklayers, and the welded steel structure well trained workers. Nevertheless, unskilled workers can be employed, and the simplicity of the technique makes capacity-building a realistic perspective.

Once experienced the thermal performance of the prototype, its solidity, and its resistance against strong local winds (this in the occasion of a desert storm that hit the camp destroying the majority of other shelters), both the host community and the refugee leaders have been enquiring about the possibility to adapt the technique to other building types. A major recognition for FAREstudio, given the circumstances. 

Further recommended viewing: Mali refugees in Mauritania