

# LEVS

**PRIMARY SCHOOL**

**TANOUAN IBI**

TANOUAN IBI, DOGON, MALI

**CLIENT**

FOUNDATION DOGON EDUCATION

**FINAL DESIGN**

20 | 09 | 13

**LEVS ARCHITECTEN**

**1203<sub>SDO</sub>**



# TANOUAN IBI

**PRIMARY SCHOOL TANOUAN IBI**  
PROJECT: SCHOOL ENSEMBLE  
LOCATION: TANOUAN IBI,  
DOGON, MALI, WEST-AFRICA  
PHASE: FINAL DESIGN  
PROJECT NUMBER: 1203  
IDENTIFYING MARK: SDO  
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## INTRODUCTION

Primary School Tanouan Ibi is a sustainable building which stands at the edge of a village in the vast plain of the Dogon country in Mali. The school consists of three 7 x 9 meters classrooms for in total 180 pupils, a principal's office, a depot and a sanitary building. In the evening the school is used for teaching women.

In the tradition of the Dogon there is a doubtless spiritual connection between men, culture and nature. Their minimalism in building with clay, the plasticity and immediacy of the detail are remarkable. It is "wealth in restrictions". Nuances, personality and soul define the building; a majestic gesture is not necessary.

The Dutch design is inspired by this architecture tradition. Yet it is realized with rather modern technology and built by local, newly trained masons. The contractor and the craftsman work closely together with the students of the Technical College in Sevaré. They are involved in all stages of the construction process in order to improve and to refine the construction methods, linked to already existing techniques, traditions and know-how.

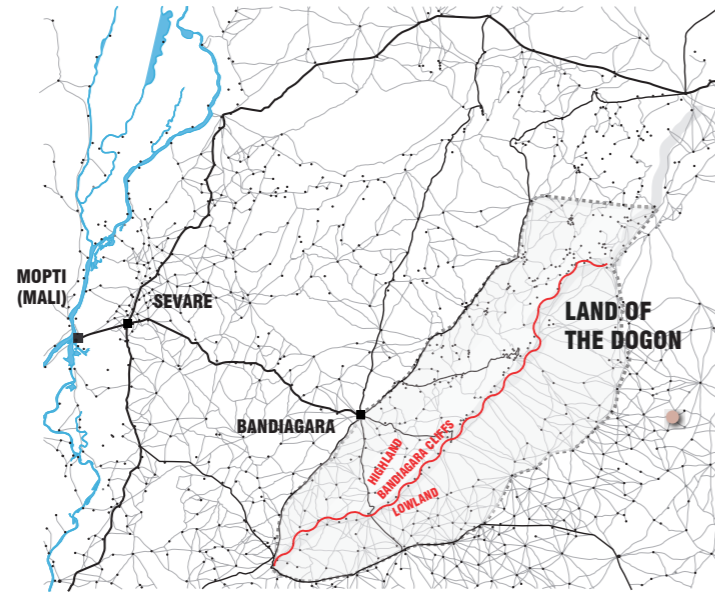
The school is made out of Hydraulic Compressed Earth Blocks (HCEB). These "bricks" are non-fired. They are produced using the soil on site which reduces production costs and the environmental degradation immensely. They are not only sustainable but can also withstand the climate of both hot sunlight and heavy rainfall much better than the traditional clay buildings. The interior climate created is significantly cooler, too. The continuity of using the HCEB-bricks for floor, walls and roof and the color of these bricks leads to a supple integration of the building into the environment. This corresponds to the way how the Dogon villages fit into the landscape.

LEVS architecten  
September 2013

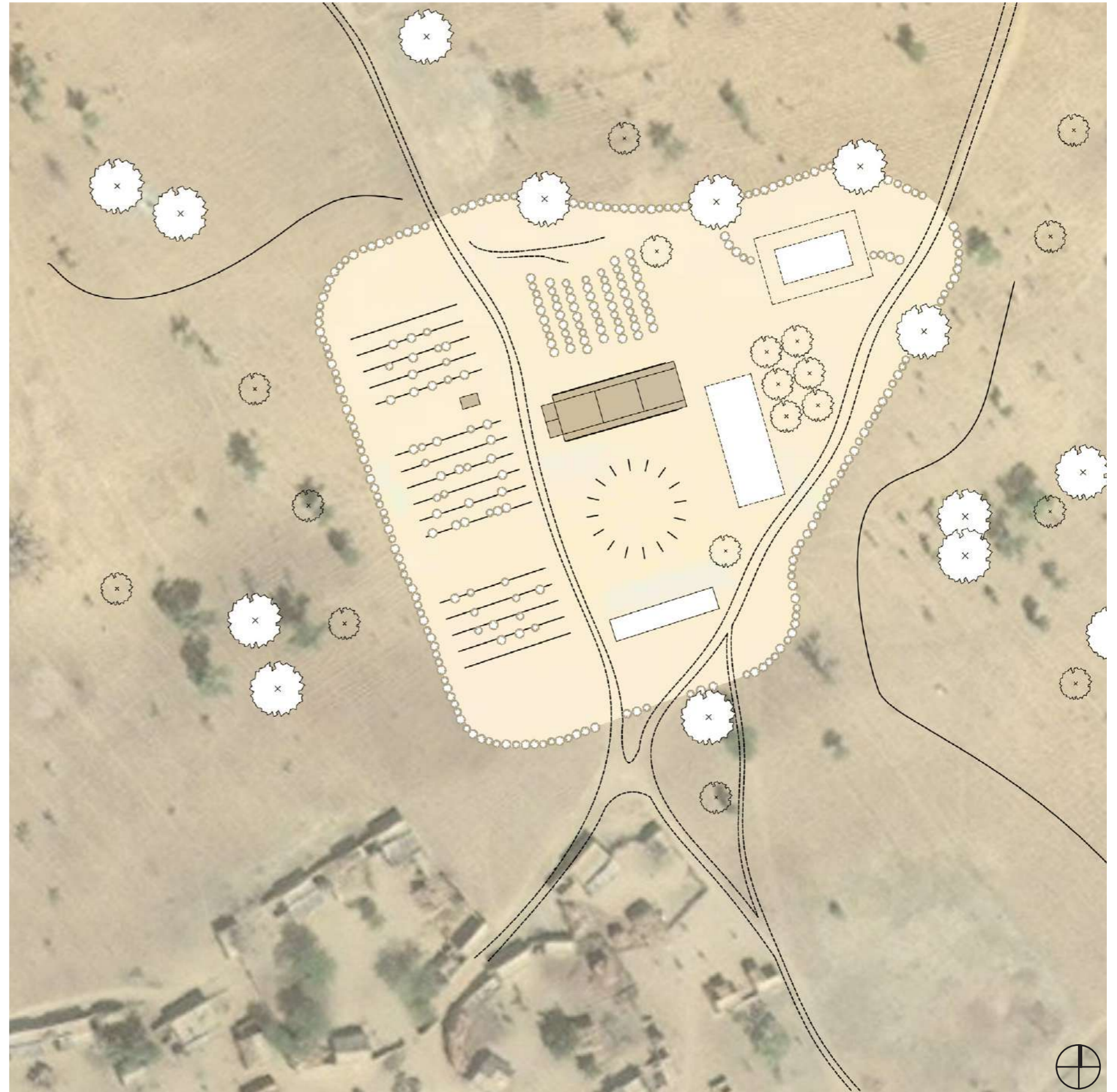
Project	primary school
Architect	LEVS architecten Amsterdam
Client	Foundation Dogon Education
Project organization	ADI, Mopti Sevaré
Contractor	Enterprise Dara (Sevaré, Mopti) and contractor Amayoko Tagadiou, in collaboration with students of the Technical school in Sevaré and the local population of Tanouan Ibi.
Commission	2012
Construction	March – July 2013
Year of completion	October 2013
Gross floor	200 m <sup>2</sup>
Terrain	2.5 ha
Costs	45.000 Euro

# LOCATION

The village Tanouan Ibi is situated on the plain, one hour driving from the main village Koundou in Dogon Country, next to the Clift of Bandiagara in Mali (World Cultural Heritage of Humanity, Unesco 1986). The two villages, Tanouan and Ibi are inhabited by catholic and protestants Dogons, who are also in the same time animists. Together with the nearby area, there are around 150 families, which means about 2500 people. Already for years, the village disposes of a traditional school built in clay with a traditional roof. What is more important is that there are a director and two motivated teachers, who live in the houses built by the villagers. The school counts about 200 students and, of course is growing. ADI, local counterpart organization, estimated that this school responds well at our most important demand that is a motivated community, which, in collaboration with us, could realize a new ensemble of a school with classrooms, a school terrain enclosed by trees and a sanitary block.



Map of the Mopti region



Map of the project area



## BEYOND CONSTRUCTION

During the laying of the foundation stone, laid by a member of the board of the Foundation Education Dogon, Jan Joost Peskens, the Mayor of Madougou delivered an ardent and warm speech regarding the meaning of education.

However, his point was that the inhabitants did not only come to celebrate the festivities of laying of the foundation stone, but also to show that they would provide the necessary support during construction. The second speaker, the Sous-préfet of the Madougou region, Umma Demble, doubled these efforts considerably, saying that "money is expensive for everyone" (*l'argent est chère pour toute le monde*), and that education is much more than learning languages and mathematics, because it is also about progress, food and agriculture. He also pointed out that equal numbers of girls and boys in classes is important, but it is even more important that girls actually complete their education and are not pregnant prematurely. The collaboration in the cooperatives in agriculture is of crucial importance to Mali, and education on an adequate base belongs to that.



# STARTING POINTS

## THE USE OF LOCAL MATERIALS

One of the most important starting points was the use of resources and local materials. The goal is to realize in this way an affordable but sustainable building, fitting well into the landscape and being linked to local and traditional construction methods.

## THE PROCESS OF EDUCATION AND COMMUNITY INVOLVEMENT

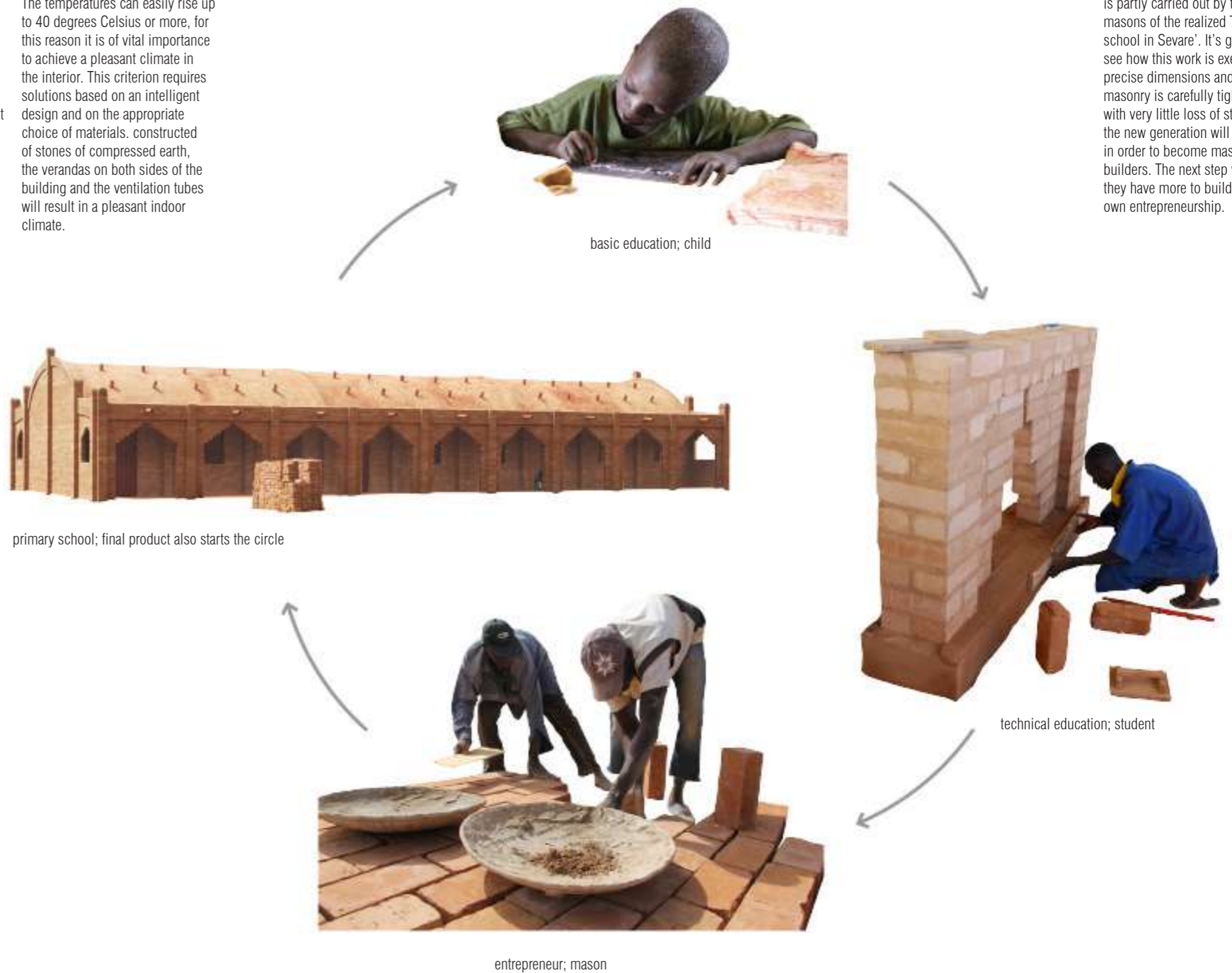
As always, it is not the building that is our goal, but it is education. The local contractor and craftsmen work closely with the newly trained students of the Technical School. They are involved in all the stages of the construction process. Prudent steps are set in order to improve and to refine the construction methods, linked to already existing techniques, traditions and local knowledge. The local population was mobilized amongst others to dig holes, to supply water and stone, including their transportation. It is very satisfying to observe that the approach of stricter agreements with the village has worked well. The choice to go ahead with the construction, in reality depended very much of this change. This change should also have a downward impact on the building costs.

## A PLEASANT INDOOR CLIMATE

The temperatures can easily rise up to 40 degrees Celsius or more, for this reason it is of vital importance to achieve a pleasant climate in the interior. This criterion requires solutions based on an intelligent design and on the appropriate choice of materials. Constructed of stones of compressed earth, the verandas on both sides of the building and the ventilation tubes will result in a pleasant indoor climate.

# FROM STUDENT TO MASON

The execution of the construction is partly carried out by trained masons of the realized Technical school in Sevaré'. It's great to see how this work is executed in precise dimensions and how the masonry is carefully tight and tidy, with very little loss of stones. Also, the new generation will be skilled in order to become masons and builders. The next step will be that they have more to build from their own entrepreneurship.



## DESIGN

The project consists of an ensemble of the actual school building, sanitary block and a common outdoor space. The terrain will be enclosed by *Jatropha* trees in order to offer some protection against animals.

The school is complying with the demands imposed by the government and by the CAP (Centre d'Animation Pédagogique). A classroom has a surface of 7 x 9 m<sup>2</sup> and offers space to about 60 students. In total the school delivers space to minimally 180 students (3 classrooms) and an office with storage facilities for the director.



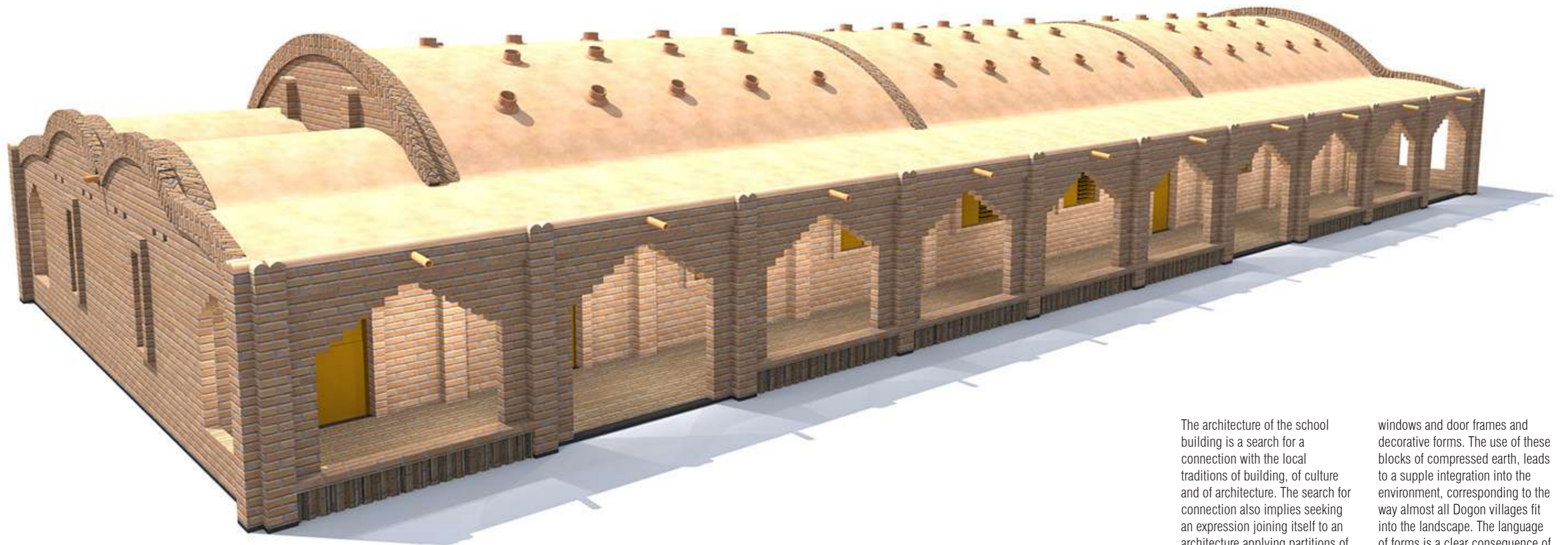
The wall openings of the classrooms



The steel frame functions as a part of the auxiliary structure

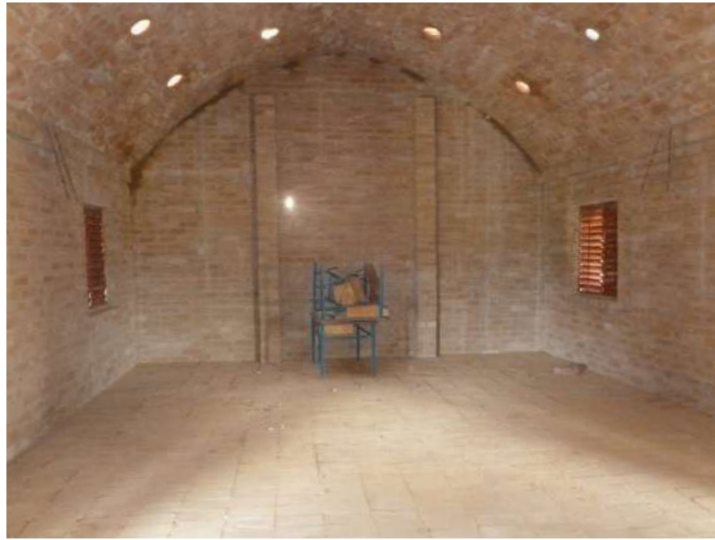


Playful floor patterns



The architecture of the school building is a search for a connection with the local traditions of building, of culture and of architecture. The search for connection also implies seeking an expression joining itself to an architecture applying partitions of surfaces, openings and closures,

windows and door frames and decorative forms. The use of these blocks of compressed earth, leads to a supple integration into the environment, corresponding to the way almost all Dogon villages fit into the landscape. The language of forms is a clear consequence of functional requirements.



A classroom with openings in the roof



The handmade roof openings improving daylight and ventilation

The structure of the school building is unique with two verandas running parallel to the class rooms. The two verandas operate like buttresses to be able to capture the weight of the barrel vaults in the roofs over the classrooms. Next to this, the verandas, equipped with small stone benches, offer pleasant exterior room to the students. The verandas have been built in strokes of blocks of compressed earth. At the entries the blocks follow the tension lines of the arcs, which lead to characteristic openings.

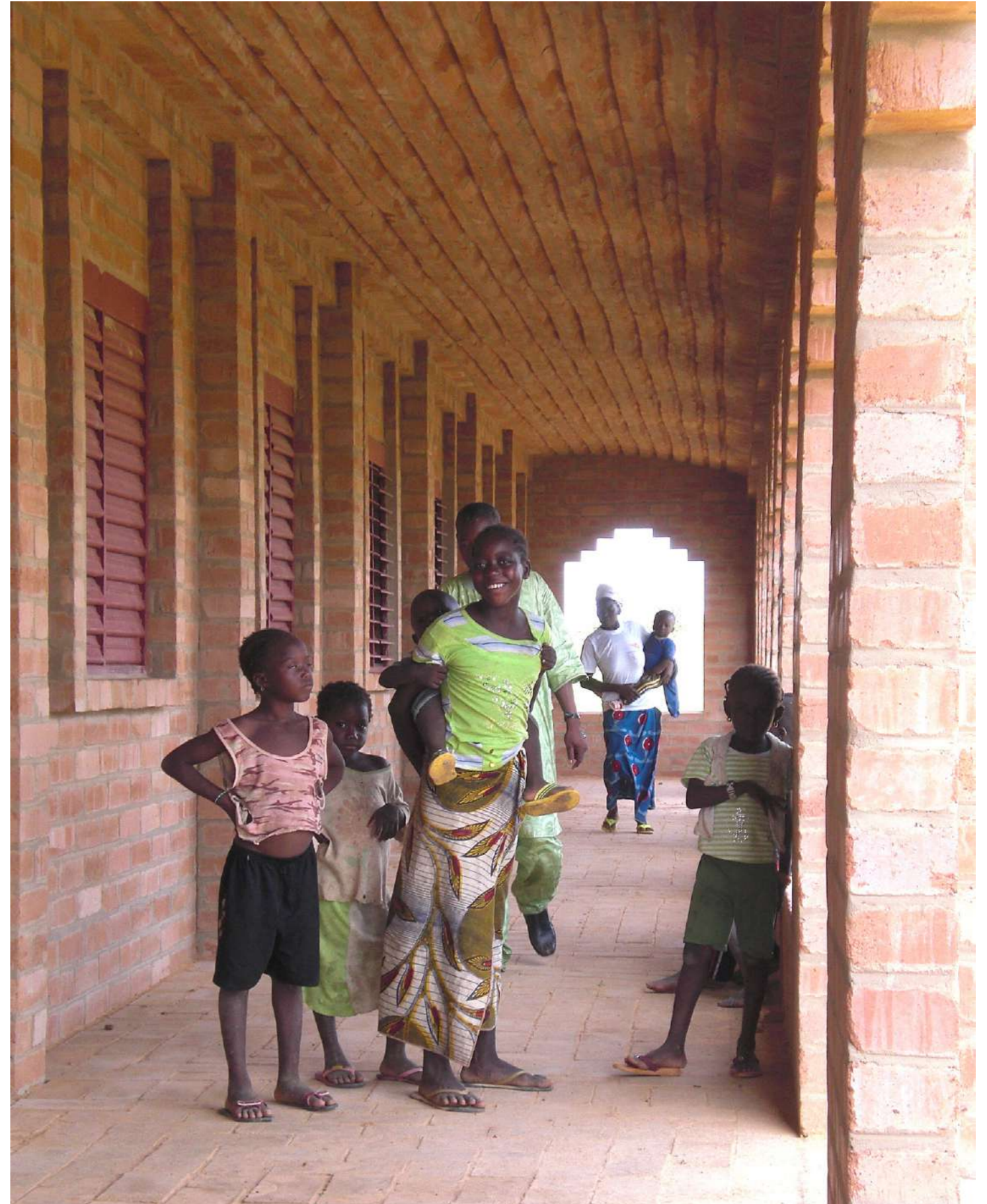
The roof and the eaves have been accentuated by an additional layer of stones and by dilatation stones, separating the barrel vaults. The roof has been covered by a thick layer of 20-30 mm of red earth, mixed with cement in order to achieve a water proof and water resistant layer. The gargoyles, manufactured by the local people named Bozo, guarantee the swift drainage of rainwater. In the roof, custom made ceramic tubes have been inserted, providing ventilation for a pleasant inside climate and

allowing daylight through the roof, like a starry sky. During the rainy season (2 months), taking place out of the school period, these tubes can be closed.

The openings in the facades, with their window frames and with blinds, are painted in a fresh and yellow color. The floor stones have been laid down in a decorative pattern.



View of the section and the interior



The children are already making use of the porch





# CONSTRUCTION

In Dogon country, several building methods are applied, also influenced by the specificities of the location. Clay is the mostly used building material. But also in this case, many varieties prevail, because of the fact that several specimens of clay are available in the Dogon area. Also in Tanouan Ibi, clay was the most evident choice.

It is very important to build as much as possible with locally available materials. Economically and financially this is more interesting than the import of materials. It is a more sustainable solution and moreover the material is easy to deal with. The whole building, which comprehends bearing walls, curved roof and floors are made of newly developed hydraulic-compressed earth blocks (HCEB), non-fired and produced from the soil on site. The brick compressing machine is mobile, consequently the bricks can be manufactured directly on site from locally mined clay by local trained people. In fact, educating people is an integral part for the development of the construction.

The stone compressing machine is mobile, which implies that the stones might be produced on the construction site itself, and the bricks might be laid on the same spot with a mortar in which also earth has been mixed. Each stone weighs 8,5 kg and could support a pressure of 15 N-mm<sup>2</sup>. In order to make the stones water resistant, 3 – 4 % cement is added. The foundations are made in poured concrete. Since the use of local materials



The clay bricks in different sizes and colors



The walls of the classroom



The roof is plastered

is an important starting point, the supporting structure is not used. This way not only creates a unique clay building, but also leads to designing solutions that increase its quality, such as the verandas on both sides of the building. In addition, the use of clay in the walls, the roof and floors ensures a very pleasant climate in the interior. In the roof, custom made ceramic tubes have been inserted, providing perfect ventilation and allowing daylight through the roof.

During the rainy season (2 months), taking place out of the school period, these tubes can be closed. The use of wood was avoided for many reasons. First of all, locally available hardwood is scarce, but it is also very laborious and demanding in terms of maintenance and it is likely to be eroded by termites. The steel frames of the windows are made by artisans in Mopti who are familiar with the technique.

## EXECUTION

The execution of the building has been organized by " l'homme de Yaye" as we used to call him, but his real name is Amayoko Tagadiou. The great dedication of the people in all the fields has produced many benefits. Excavating, supplying water, piling up stones, mixing masonry mortar, digging the pit for the new toilet are all done by the people of the village. It is gratifying to note that the clearly established

agreements with the village are really working. In the future we would like the decision to build or not depending from this approach. This approach should also influence the costs of building, which, as far as we are concerned should come down to be able to realize more. During the construction, we have paid a lot of attention to the quality of the foundation and of the expansion of the three classrooms

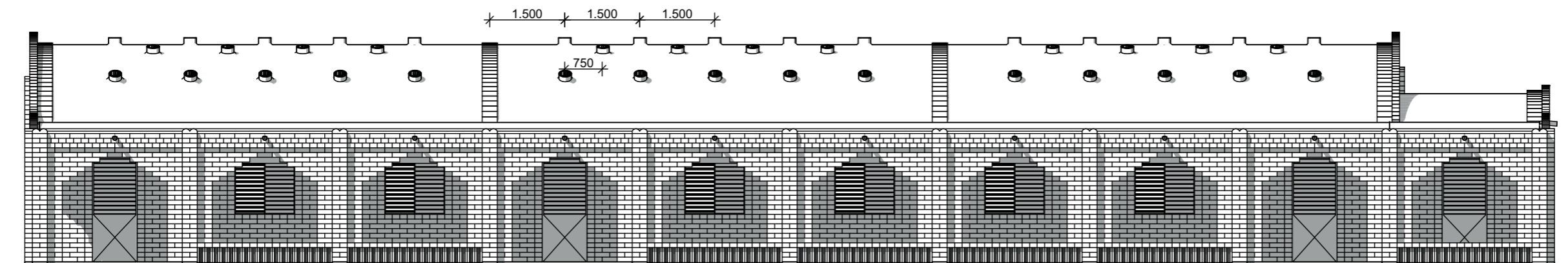
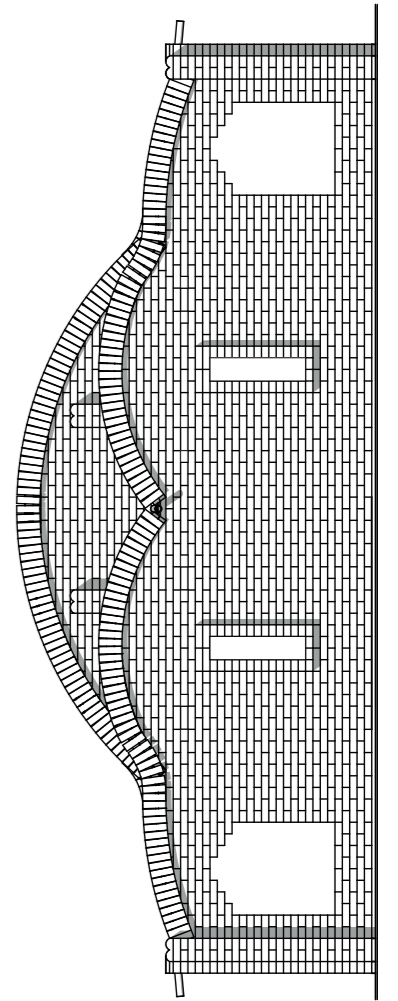
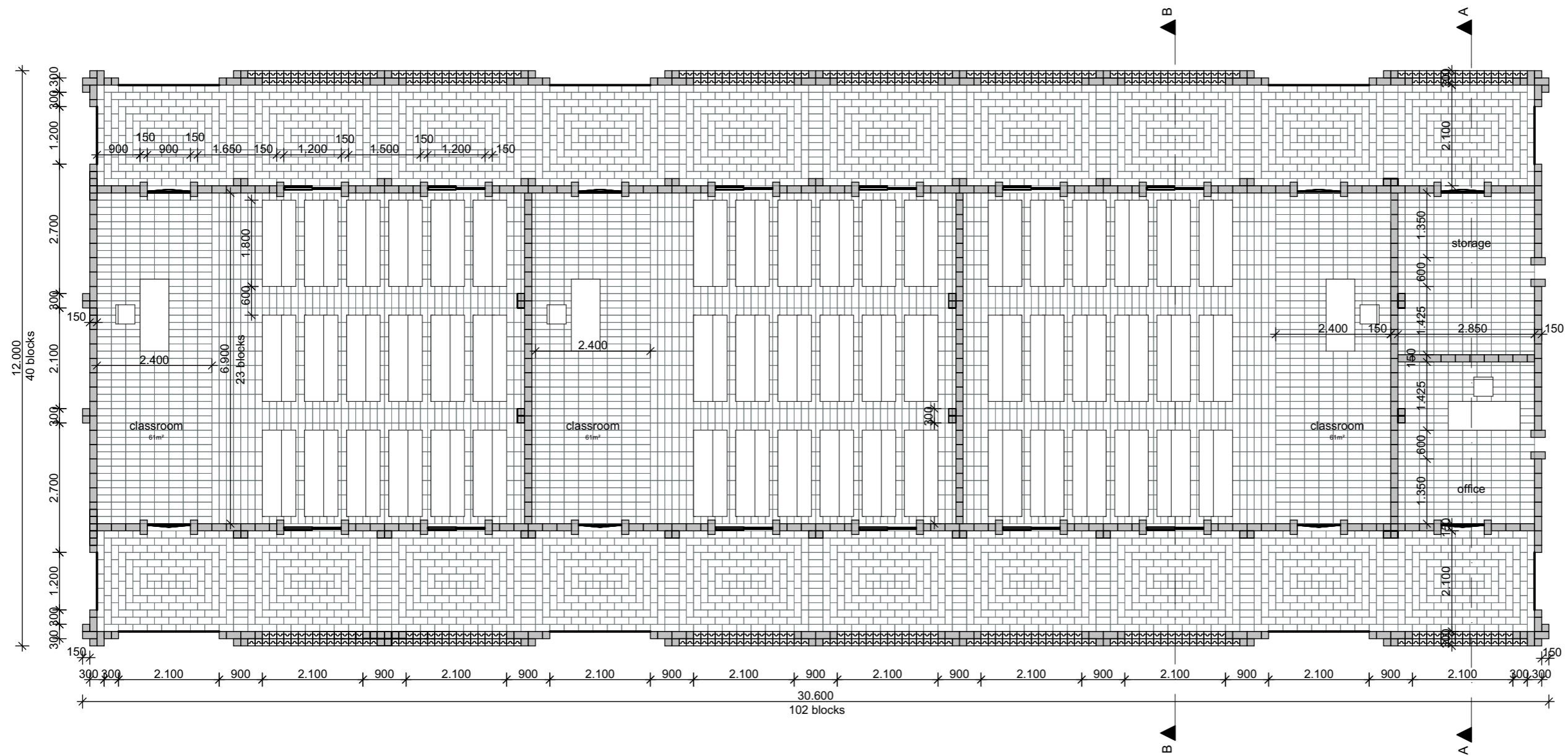
in order to achieve a sustainable building in all aspects. During the construction, the villagers have started, on their own initiative, with the planting of trees. We will support this initiative with a hedge of *Jatropha* plants.





# GROUND FLOOR

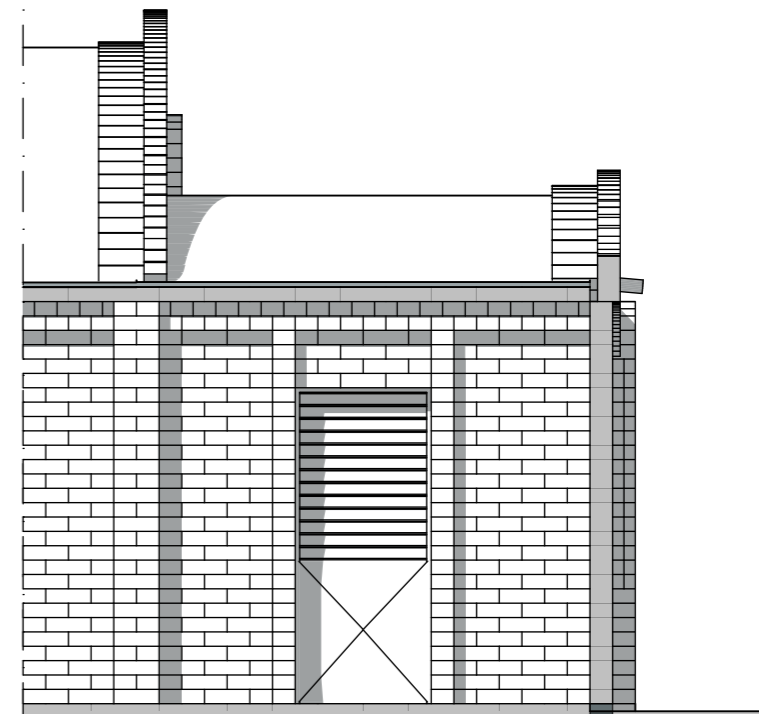
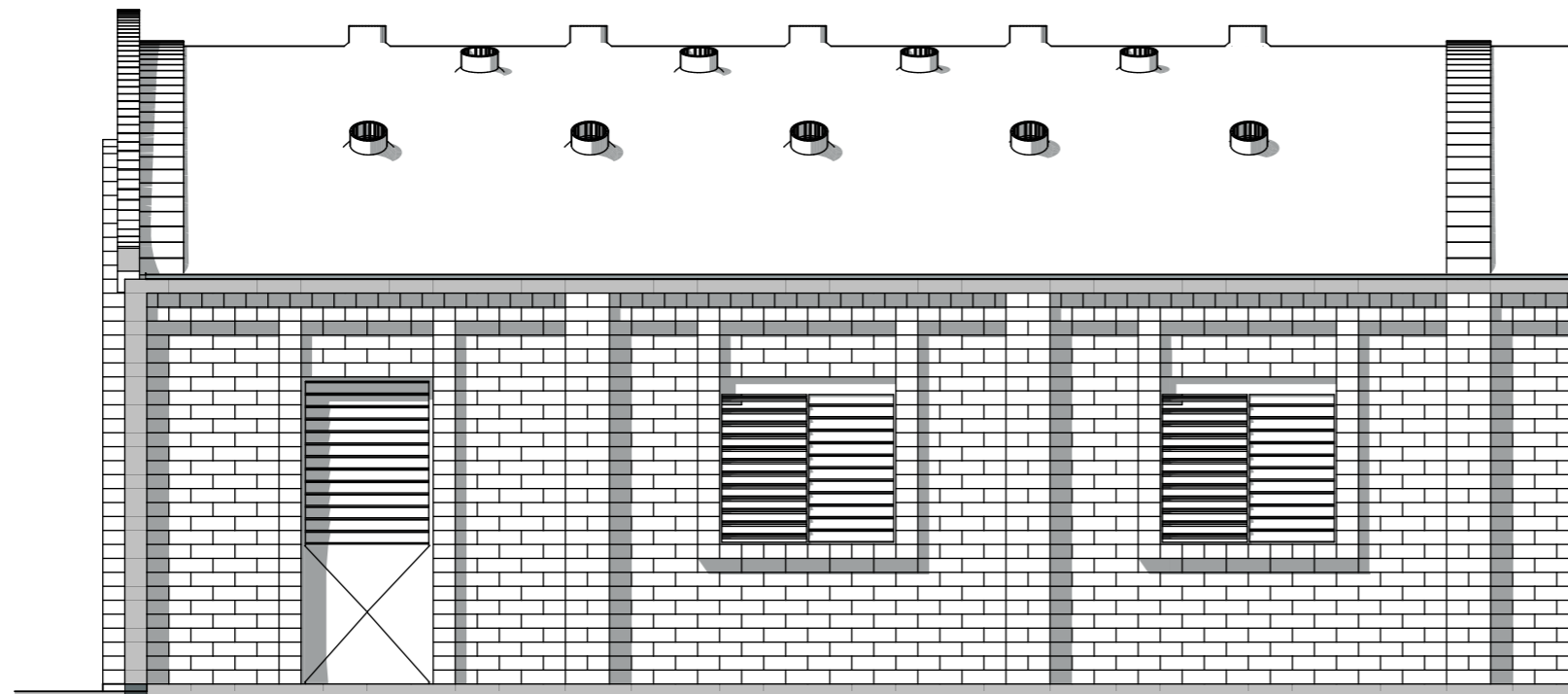
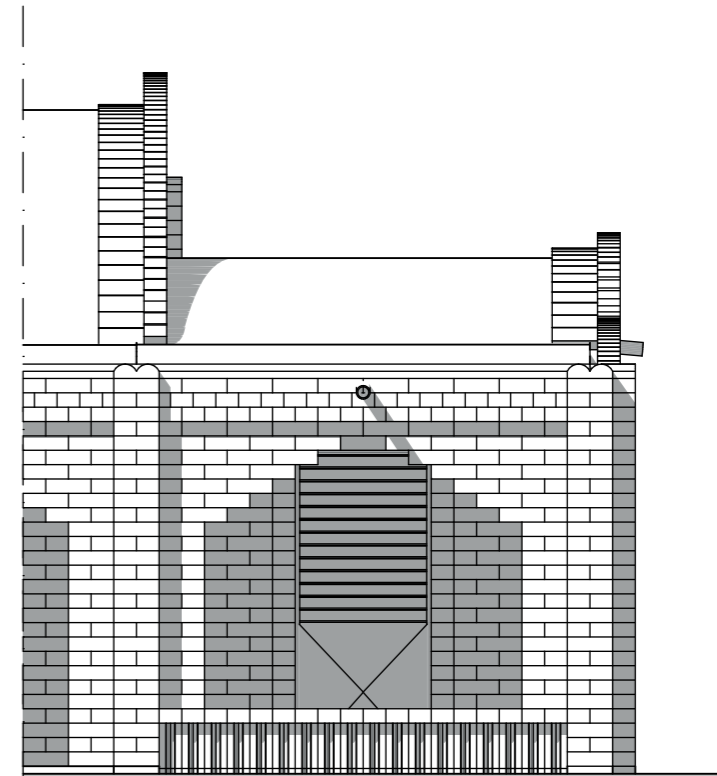
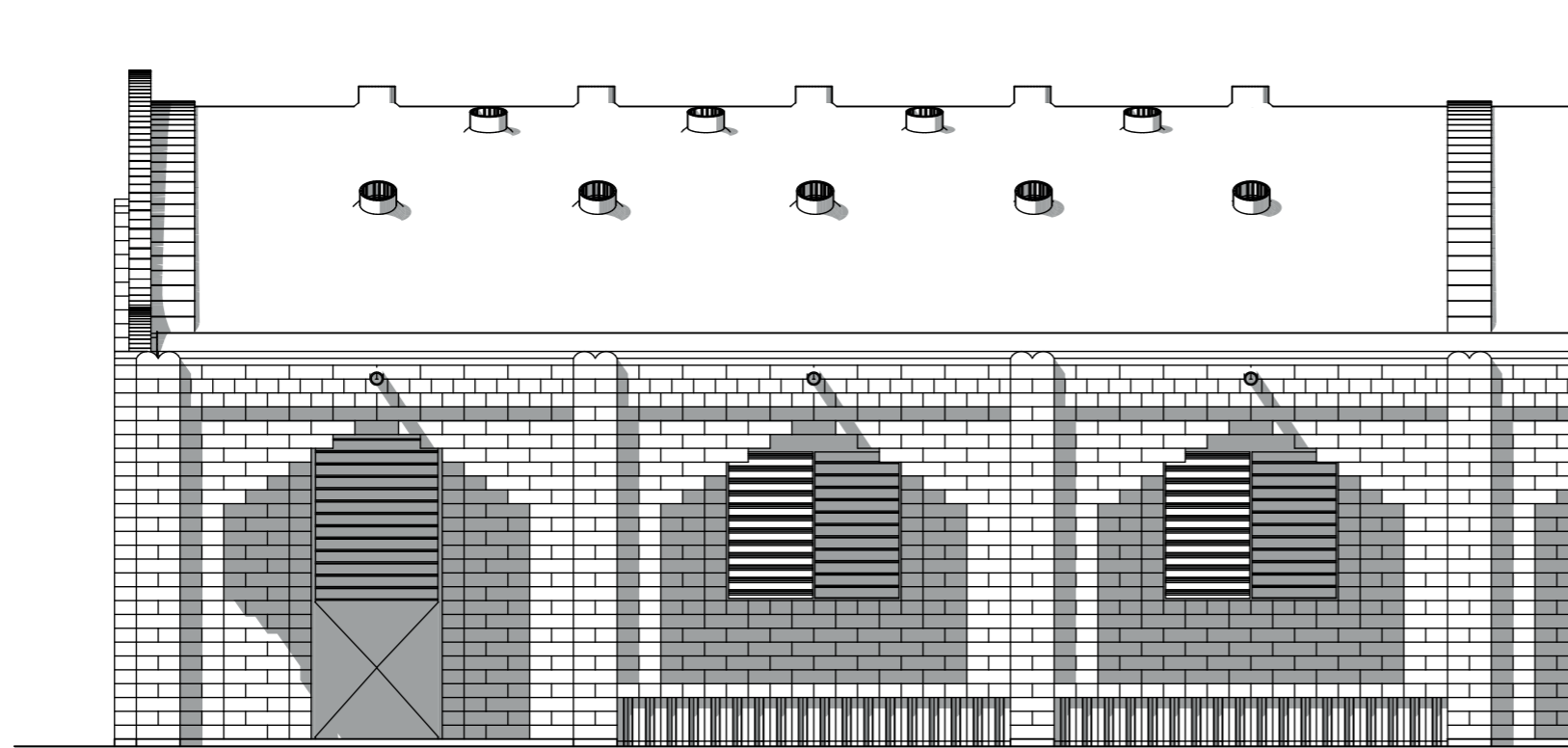
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# ELEVATIONS

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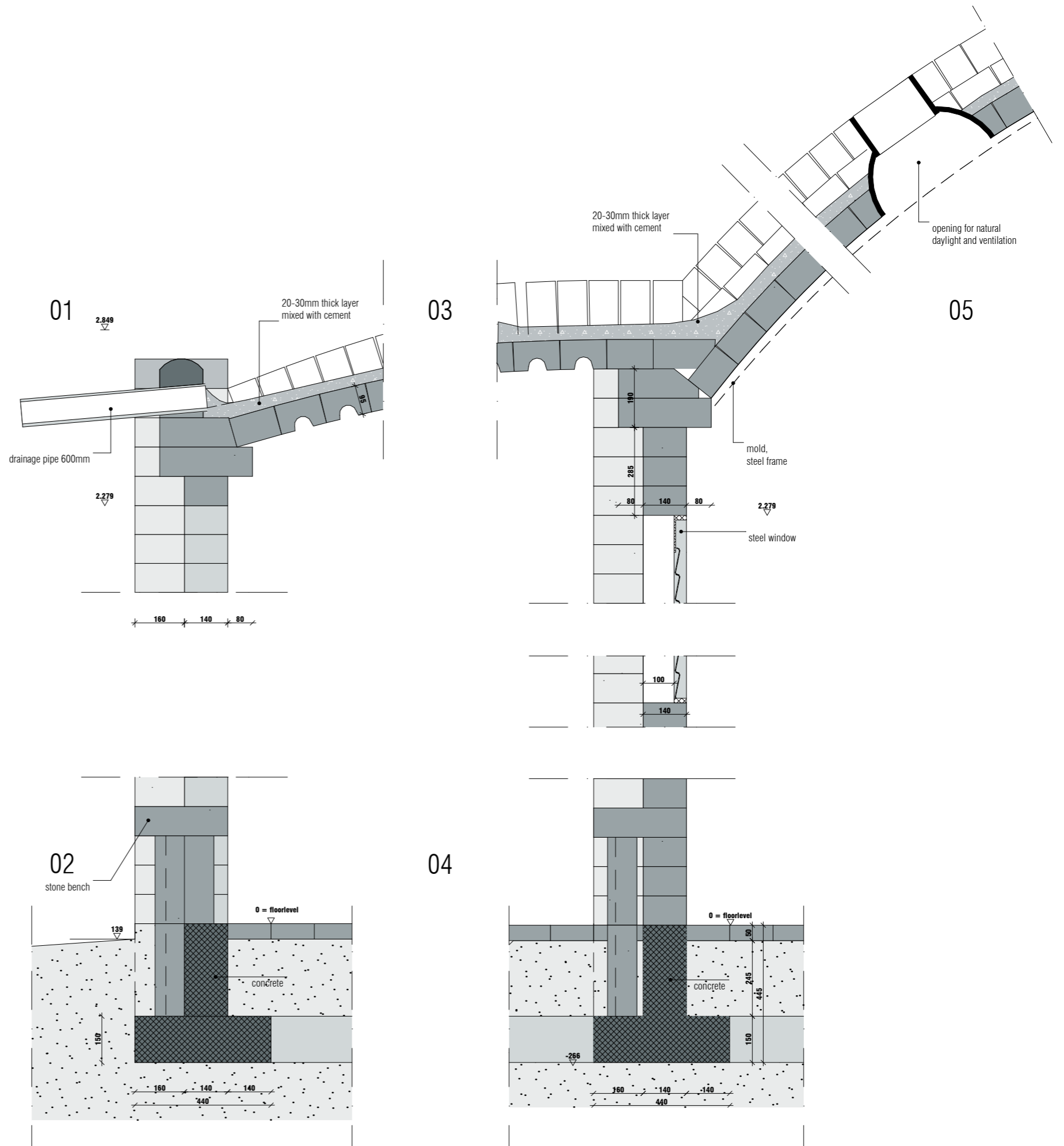






# DETAILS

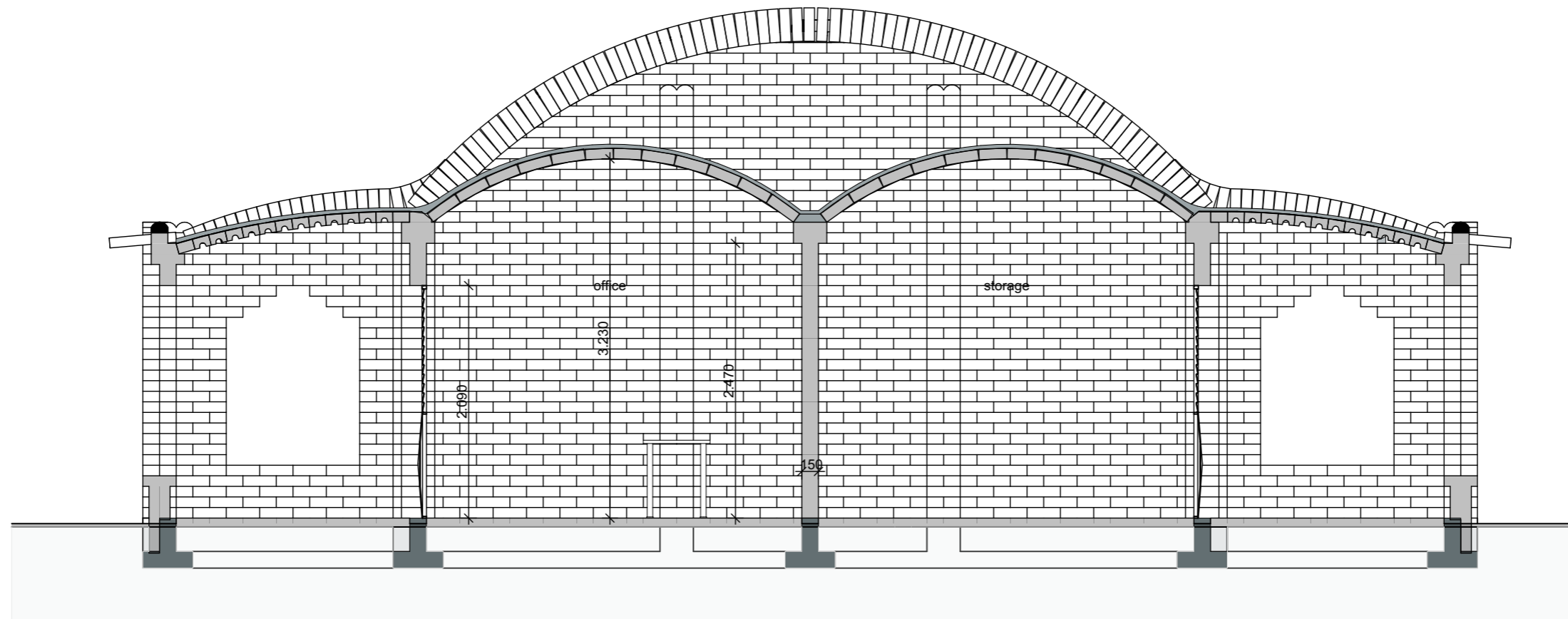
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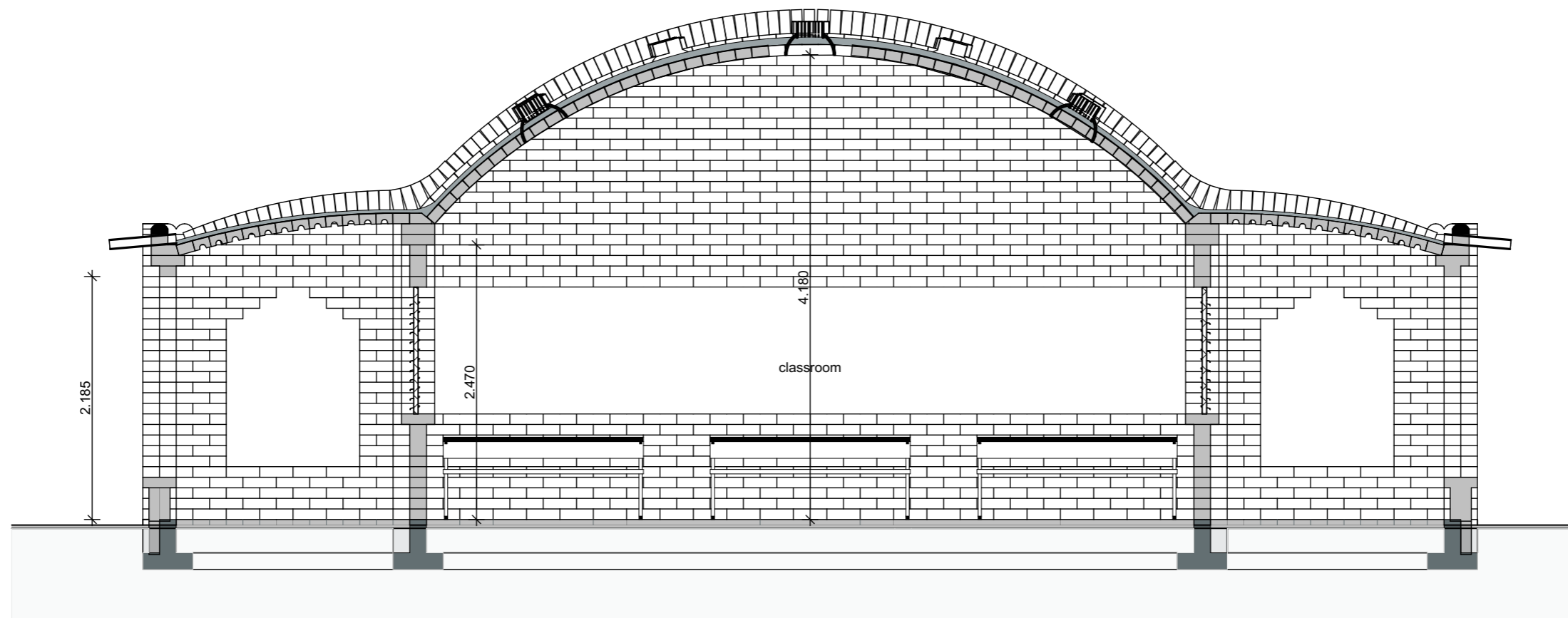


# SECTIONS

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Section A-A



Section B-B

## HYDRAULIC COMPRESSED EARTH BLOCKS (HCEB)

Building using compressed earth bricks demands a new approach to the construction and the architecture. It also offers many benefits; using local materials, in building physics terms it creates agreeably “cool” buildings which “move” with the climate and cool down quickly at night. The stones have a very high compressive strength, so they can be used to build bearing walls, even in multiple layers. Producing the stones, the composition and way of processing them are still constantly in development. The objective is to minimize the amount of cement which is very valuable and needs to be imported by Mali. Even for the compressed earth bricks, which don't even contain 5% cement, it makes up 85% of the cost per brick.



The compressed earth blocks and the machine



The compressed earth blocks



The construction process of a curved roof



The mobile machine for the production of compressed earth blocks on site



The construction of the wall with bricks



Internship of 10 students of the Technical School in Sévéré; the construction of the vault



Prix de Joop 2013 ("Joop Price 2013"), the competition of the bricklayers



Internship of 8 students of the Technical School in Sévéré; the construction of the storage facility for onions



Prix de Joop 2012 ("Joop Price 2012"), the competition of the bricklayers



Internship of 8 students of the Technical School in Sévéré; the construction of the storage facility for onions

LEVS

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