



## 2010 On Site Review Report

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*by Fuad Mallick*

# Bridge School

*Xiashi, China*



### **Architect**

*Li Xiaodong (Atelier)*

### **Client**

*Xiashi Village*

### **Design**

*2008*

### **Completed**

*2008*



## **Bridge School**

*Xiashi, China*

### **I. Introduction**

The Bridge School is a two-classroom school in the small village of Xiashi, up in the mountains of the Fujian Province in China. It is so called because it bridges the two parts of the village that lie on either side of a small creek that runs about ten metres below the village. Suspended from the structure of the school and below it is a pedestrian bridge for people to use. There are two abandoned *tulous* on either side of the creek. The *tulou* is a fortress-like housing typology that dates back about 400 years. They housed extended families within the thick circular earthen wall that rises up to four storeys in height. Along the peripheral mud wall are living quarters and the central space is for community use. The *tulous* here belonged to rival families. The rivalries are long gone and the *tulous* almost abandoned. The Bridge School is like a symbol of a truce.

The architect Xiaodong Li is professor and chair of the prestigious architecture school of Tsinghua University in Beijing. He has a particular interest in designing in rural areas and has designed several small buildings in them, all of which are known for their design qualities. His designs are innovative and display an aesthetic vocabulary new to rural China. He has designed a school in another village similar in program to the Bridge School which has had earned him fame and awards. He does not have any formal office and the people who work for him are his students. He received his first degree from the university where he is now a teacher, and has graduate degrees from the Netherlands. He has also taught at National University of Singapore.

The building is small and modern in design. It has no reference to traditional building styles of the area but is set in place as if it always belonged there. The idea of a building as a bridge, although not unknown in other parts of the world, is a new concept here, and appreciated by the local community. It has a quiet and dignified presence and is striking for its simplicity. It has been able to transform the way the people of the village think about buildings and to introduce new aesthetic values to them.

The way it is placed and addresses its surroundings, including the two *tulous*, has resulted in the creation of public space for the village, something the village did not have, and has added new dimensions to village life. Compared to the two *tulous*, which are massive, the school is much smaller and a complement to them. The school gives them new meaning by opening up views towards them and thus reminding one of the building traditions of the past.

The functional spaces, two classrooms on either side of a hall, and the bridge that hangs below the structure, are very simple. They work very well and their simplicity makes one feel welcome and relaxed.

## **II. Contextual Information**

### **A. *Brief Historical Background***

Xiashi is a small village, 450 years old, in the Fujian province of China, which lies 1,000 metres above sea level. It is home to 300 families and has a population of 700. China's urban population is close to 50% now and it is expected to be 70% in 20 years time. In this scenario Xiashi is a tiny village and the population is quite poor. The main occupation is grapefruit farming, which Fujian produces in abundance. The village landscape is also changing. Not many people live in the traditional earthen walled and tiled roofed housing. Concrete frame structures with brick infill are the trend of the day.

It would seem from what remains of traditional structures that the village was quite a prominent one in the past. The two large *tulous* on either side of the creek that runs through the village bear testimony to this. They were occupied by large extended families that had a long history of rivalry. From what remains inside the structures it seems as though they were quite lively places. Although 400 years old, their outer mud walls are still in good condition, which suggests commendable building skills.

### **B. *Local Architectural Character***

Xiashi contains the physical memory of what villages in rural Fujian were like. The traditional houses, now mostly abandoned, are of mud walls and tiled roofs set along the contour lines of the undulating landscape. These are of heavy wall construction with timber doors and windows nicely disposed like terraced houses in some parts. The two *tulous* are imposing circular forms 15m high that are a strong presence here. They are massive, unique and quite impressive in terms of their structure.

With modernisation the traditional structures are giving way to concrete building. Quite a few concrete buildings exist and operate as houses and businesses and a number of them are under construction. These new structures are yet to take over the village as the predominant form but it seems likely that they may in the next few years. There is a very busy brick-making factory nearby. The road to the village is paved but the inner pathways are mostly earthen and sometimes stone paved.

Overall the village is fast losing its traditional character. The Bridge School, although modern, is politely so and sensitive to the scale of the village.

### **C. *Climatic Conditions***

There is no weather data for the village itself. Information from the nearby city of Pinghe defines the climate as subtropical with hot summers when the temperatures are between 25°C and 35°C and mild winters with temperatures between 15°C and 10°C. The average annual temperature is 21.3°C. The annual rainfall is 1,700mm, most of which is in the summer months. Xiashi is at a slightly higher altitude than Pinghe and can therefore be assumed to be cooler.

#### **D. *Site and Surroundings***

A creek runs through the village and approximately at the centre of the village, it is spanned by the Bridge School. The school runs north-south and on either side of it lie the two *tulous*. The one on the north is axially in line and separated from the school by a public space paved with stones. The one on the south is oval shaped and slightly shifted from the school's axis to the east and the space in between is larger, and also paved with stone.

There is vegetation along the banks of the creek with the occasional palm tree and bamboo groves. There is a tree right next to the school on its northern side, which has been carefully preserved.

The buildings in the village are scattered, except around the *tulous* where there seems to be some geometrical reference to their shape. They are mostly single or double storied.

#### **E. *Topography***

The village is on hilly location and gently slopes down to the west from where it is approached. The ground near the school is flat or had been made so when the *tulous* were built. The surroundings are mountainous.

### **III. Programme**

#### **A. *History of the Inception of the Project***

A senior year student of the architect comes from a nearby village. While visiting his home he ventured into Xiashi and in talking to the locals and the village chief he learnt that they needed a primary school. The architect had built a similar school in another village, which had won praise and many awards. Knowing that he would be interested in designing another school, the student approached the architect, who was immediately interested. The local government could not make available funds for the entire building – they only came up with half the money that was needed. The architect then embarked on raising the rest. He was successful in getting a sizeable donation from a film star friend in Singapore, and he donated the rest himself.

The authorities not only agreed to the project, but also were also very cooperative in getting the proper permissions, and so the project got underway.

#### **B. *How were the Architects and Specialists chosen?***

The architect was not chosen; rather he volunteered to do the work. His student agreed to stay in the village and supervise the construction. The basic steel structure was conceptualised by the architect and he consulted the structural engineer to make the calculations.

### **C. Objectives**

The objective was to design a two classroom school for children of grades one and two, with about 15-20 children in each classroom. In deciding to make a building like a bridge, the architect saw that it would be practical to add a pedestrian bridge for the villagers too.

Another requirement was for a small library for books that the architect intended to donate.

Apart from containing teaching facilities, the classrooms had to be well lit and ventilated.

The architect compares his objectives to that of 'acupuncture' where the treatment is not only for a local medical problem but healing the body as a whole. This translated into architectural thought would entail finding the right spot for the building that would not only solve the problem of not having a school, but one that would also unite and rejuvenate the entire community by its presence.

### **D. Functional Requirements**

The functions to be provided were two classrooms for 15 students each and a library or hall. As the concept of the bridge developed a pedestrian crossing was also incorporated. In designing the bridge there was some extra space in the concrete support on the southern end (higher than the one on the north) where a small shop could be incorporated.

## **IV. Description**

The school bridges the small creek in the village with the actual pedestrian bridge below it and suspended from its structure. The structure is of two steel trusses that span the creek and the space between them makes up the functional spaces of the school. Each truss has three sections: the ones at the two ends support the two classrooms and the middle part is the hall or library. Cantilevering out from each of the end sections of the main truss but opposite to each other are the corridors sloping up to the central space from which the classrooms are accessed. The circulation route through the school therefore shifts from one side to the other via the central space.

The overall structure is like a tube across the creek. Not a straight one but one that shifts axis at the centre. The shape is also not straight but tapers in from the one bank of the creek become straight at the centre and then tapers to the other bank. The classrooms are thus wedge-shaped with a stepped gallery floor.

Attached to the steel structure in the longer directions on both sides are steel frames with timber strips 1cm wide and 1.5cm deep, spaced 2cm apart. This is the 'skin' or the facade. The two ends of the school, which are also the end of the each classroom, can be opened up; on the north by a folding wooden wall, and on the south by a number of smaller wooden panels, each of which pivots around its centre. From the northern classroom a small wooden stage on a steel frame cantilevers out, with the *tulou* as its backdrop. The southern classroom can also be

reached through a sloped steel surface housed with a rectangular steel archway. This is used happily by the children to slide down to the ground.

Steel members connect the trusses in the east-west direction and support the timber floors and the timber roof.

The pedestrian bridge is suspended from the structural members of the floor of the school with steel cables making an irregular pattern. It is not a straight bridge but gently zigzags diagonally across. The deck is also timber, with steel railings.

The trusses transfer the load of the structure by resting on concrete bases on either side of the creek. The one on the northern side is shallow and the one on the south higher, allowing a small shop to be nestled within it.

Overall the Bridge School is like a tube that spans the creek. Its surfaces are given a uniform texture by thin vertical wooden strips. The shape follows the angular lines of the truss behind it.

**A. *Project data***

Site area:	1550	m <sup>2</sup>
Building area:	240	m <sup>2</sup>
Building height:	6.5	m <sup>2</sup>

**B. *Evolution of Design Concepts***

There was the need for a primary school in the village for which no specific site was allocated. The architect looked at the project not only as a school but also a building that would rejuvenate the entire community through the creation of a setting for the school.

The creek physically divides the village and there had been no crossing over it for a long time. A concrete bridge had been built downstream from the school's location some years ago. One reason why there were no bridges could be because of the rivalry of the two families who lived in the *tulous* on either side of the creek.

The architect saw an opportunity in the presence of the creek, the history of the village and its state of social stagnation. The idea of a bridge thus emerged. Not only could it house the simple functions required for the school, it could also be a bridge for the community separated by the creek. This was not only to be a bridge in physical terms, but also a symbol of unification of the community.

The positioning of the school and the spaces around it would have to bring new life to the community. Besides functioning only as a school it could feature elements that involved the villagers, hence the bridge underneath and the stage that cantilevers out from one of the classrooms.

### *Response to Physical Constraints*

The architect chose the site and therefore the constraints that came with it. There was the physical issue of spanning the creek and preparing the open spaces on either side.

The architect responded to this by conceiving a steel-trussed structure with the landscaping of the areas around it.

### *Response to User Requirements*

The main users of the school are the children and the teachers. They needed functional well-lit and well-ventilated spaces, which the classrooms provide, from three sides. There is ample light and air. The space between the classrooms is where the circulation corridors meet and acts as the library. The pedestrian bridge serves a public function and although a part of the structure it is separated in level from the school proper and its use does not disturb the classroom functions. The school office is in a different building.

The spaces on either side were given new meaning for the villagers to use and the cantilevered stage from the northern classroom can be used for performances.

### *Purely Formal Aspects*

The mass of the building is well proportioned and the surface treatment gives it a light and airy look.

### *Landscaping*

The spaces on either side are paved with stone and not much was needed in terms of landscaping. The trees that existed were allowed to remain in place. The structure itself can be likened to an element that complements the natural landscape around it.

## **C. *Structure, Materials and Technology***

### *Structural System*

The structure of the building is of steel trusses with steel members for supporting the roof and the floor.

### *Materials*

Structure:	Steel, painted over
Walls:	Timber and glass
External screen:	Thin vertical strips of wood attached to a steel frame
Floor:	Wood
Roof:	Wood
Railings:	Steel
Outside areas:	rough stone, paved

## *Technology*

Partially local with parts manufactured elsewhere

### *Origins of Technology, Materials, Labour Force, Professionals*

The technology of steel structure is new to the village. The components of the trusses and the frames were manufactured elsewhere and assembled locally with specialised equipment and labour brought in by the contractor.

All the woodwork is local, carpentered and assembled locally.

The main designer is Xiaodong Li assisted by a team of students. The project was supervised all through its construction by Jianshen Chen, a student of the architect who had originally identified the need for the project.

A local associate was needed for official formalities and is from Xiamen.

## **V. Construction Schedule and Costs**

### **A. *History of Project Design and Dates***

The project was initiated by the architect, as a result of information he was given by one of his students. The local government collaborated with half the funds and official procedures.

Design period:	July- October 2008
Construction period:	2008-2009
Completion:	2009

### **B. *Total Costs and Main Sources of Financing***

Total cost:	Around USD 100,000 (RMB 650,000)
Total construction area:	240 m <sup>2</sup>
Main source of financing:	50% from government funds, 50% from donations including that by the architect.

### **C. *Qualitative Analysis of Cost***

Cost/m<sup>2</sup> = USD 300 (RMB 2,025) including landscaping and site preparations.

### **D. *Comparative Costs***

The cost per square metre is higher than conventional school buildings in that area by about USD 50 per square metre.

**E. *Maintenance Costs***

There has been virtually no maintenance cost till now. They will be incurred when the structure needs repainting and wood needs re-polishing. A villager has been employed for about USD 30 (RMB 200) per month as a caretaker.

**F. *Ongoing Costs and 'Life Performance' of Building***

The ongoing costs are that of periodic maintenance. Technically, if maintained well the building could last forever.

**VI. *Technical Assessment***

**A. *Functional Assessment***

The arrangement of the two classrooms is very simple. If compared to the standard school typology of corridor and classrooms this arrangement is much better because 3 sides of the classrooms are exposed to the outside and there is ample light and airflow.

The classrooms are of the gallery type with the children sitting on the steps with desks in front of them. The heights are suited to the ergonomic requirements of children.

The stage that cantilevers out from classroom on the north is appropriate for performances by the children or others. The performance can be viewed from the classroom gallery or from the public space outside depending on its nature.

The pedestrian bridge makes an interesting crossing of the creek with its zigzags and does not disturb the functioning of the school.

**B. *Climatic Performance***

The building has a simple and effective approach to climate control. It is of one room depth and there is light from both sides (from three sides if the folding or pivotal partitions are opened up). During summer the windows in the steel frame can be opened and air flows through the classrooms. The facade treatment of the narrow timber strips helps moderate the light and keep the interior in shade. During winter, the cold is kept out by shutting the windows.

Water and rainfall: There is no water supply in the building as there is no need for it. Toilets and water supply sources are close by. Water drains from the roofs and falls through two metal spouts into the creek. Driving rain can be kept away from the indoors by shutting the windows.

Environmental response: The building has no footprint since it is a bridge. The ground covered by the two concrete abutments on which the trusses rest is negligible. Some training

of the creek banks has been made with stones. The natural setting around the building has been left as it is.

**C. *Choice of Material and Technology***

Steel was used for the main structure, considered appropriate for its strength and economy of size, durability and ease of maintenance. It is not local technology and the members were fabricated elsewhere and assembled on site. Concrete was cast on site with local labour.

The pinewood used for the floors, ceiling and the facades is available locally and was fabricated by local carpenters.

**D. *Response to Emergency Situations***

In the event of a fire the building can be easily evacuated. The area is not prone to natural disasters.

**E. *Ageing and Maintenance***

The building is relatively new and has not undergone major maintenance work yet. With time the steel will have to be repainted and the wood polished.

**F. *Design Features***

The building has a simple enough presence. It is well proportioned and the subtle twists of the volume are pleasant. Because of the surface treatment the mass appears quite light. Although it is unconventional in its approach and technology it does not compete with the surrounding structures, rather it complements them.

**G. *Impact of Project on the Site: Circulation, Vehicular Movement and Infrastructure***

There are hardly any cars in the village. The building is not on any internal circulation route of the village. Rather it adds to the ease of its pedestrian circulation because of the bridge under it.

**H. *Durability and Long-term Viability of the Project***

It is an unconventional structure in its setting, but comfortably so. It is a viable alternative to conventional schools, in fact a pleasant departure from them.

**I. *Ease and Appropriateness of Furnishings***

The architect designed the classroom furniture. It is simple, with a minimalistic quality. The children sit on the steps of the gallery and work on wooden desks. For adults these desks become stools. There are bookcases along the end wall that are also simple in design. All furniture is locally made and of pinewood.

## **VII. Users**

### **A. *Description of those who use or Benefit from the Project***

The children and the teachers use it on a daily basis. Other than that the school belongs to the village and all have something to do with it. Apart from the practical use of the bridge below, it has become a part of their lives. The villagers are generally poor farmers, in a low-income bracket. The salary of the schoolteachers is about US\$75 (RMB500) per month. There is a general feeling of exhilaration among all the users about the project, and all comments to me about the building were positive and full of praise.

### **B. *Response to the Project by Clients, Users, Community***

It is very apparent from the way children move and play around in the building that it's a place that they like. When asked, what if the building were to be moved away from here, there was a chorus of opposition.

Wengang Lin, the head teacher, has had many years of experience as a schoolteacher. He thinks that this school is like no other and its multifunctional quality is very much appreciated by him. The classrooms are much better in terms of light and ventilation than conventional schools. The children like coming to school and they become the centre of the village and can be seen by all. He prefers to keep the folding doors open when teaching class.

QinYi Shi, a first grade teacher, said she likes teaching here and is particularly fond of the open spaces on either end.

Zishen Lin, a villager, thinks that the cultural life in the village has changed with the school. Adults come here at night to read. A public space has been created and festivals can be held.

QingFeng Zeng, a county official, said the school has integrated well into the environment and is inspiring for the students and teachers. It is very different from other schools.

Xiu Ging Shi, the elected village headwoman and also the project client, said she was quite apprehensive about the project in the beginning. She didn't quite understand what it would be like. Now she and all the villagers are happy. They are the envy of other villages. She has never seen so many foreigners before. From the practical point of view she thinks that uniqueness of the school helps retain teachers. Social life has changed because the school has given them a village centre. She thinks the school will bring prosperity to the village.

I discussed the project with the student of architecture who helped initiate the project and supervised the entire construction. There were no other architects nearby. I had some discussions with architects elsewhere, and communication by email with a professor at the School of Applied Art in Vienna, who is familiar with the project.

### *Architectural Professionals and Cultural Intelligentsia*

For Jiashen Chen, the architecture student who supervised the project, it has changed his way of thinking. He is now aware that really good projects of small scale can be made in rural areas. This project has 'purified' the whole environment. It has turned negative space into positive. It is sometime necessary to have something unconventional to raise consciousness. The project has brought unity among the villagers and they are conscious that common materials can be put to good use. Neighbouring villages now seek inspiration from the school. The government was also very cooperative in the project.

Other architects think that Xiaodong Li is a trendsetter for a new architecture in China with his sensitive, small-scale projects. He is able to bring new life into rural China with his unconventional approaches. He is very much revered as a teacher and has many followers.

Professor Lefavre of the School of Applied Art in Vienna was very moved by the project. She said that although unconventional and unlike anything the villagers had ever seen in their lives, the project has been received very well. It has given the village a central space and a reason to be felicitous. In addition, the architect has displayed sensitivity with regard to the commonplace reality of village life and the project is all about common sense; and the villagers responded to it with their common sense. She was also appreciative of the architect embarking on this non-profit venture and helping to raise funds for it.

### *Popular Reaction to the Project*

The project attracts many visitors; many come to see for themselves what they have heard from others. There is a general feeling of wonder.

### *Neighbours and those in the Vicinity*

During the site visit, one day of which fell on the weekend, there were quite a few visitors to the project, some ordinary villagers from elsewhere and some townsfolk who came in cars and motorbikes. There was also an official from another county, who had come to see the project to see if it could serve as an example for a school project in his area.

## **VIII. Persons Involved**

<i>Architect:</i>	Xiaodong Li /atelier
<i>Project team:</i>	Jiansheng Chen, Ye Li, Chuan Wang, Qiong Liang, Mengjia Liu, Junqi Nie
<i>Collaborator:</i>	Hedao Architecture design (Fujian, Xiamen)
<i>Structural Engineer:</i>	Zaimou Chen
<i>Contractor:</i>	Mingbiao Ma / Zhangzhou Steel
<i>Client:</i>	Xiashi Village

## **IX. Selected Bibliography**

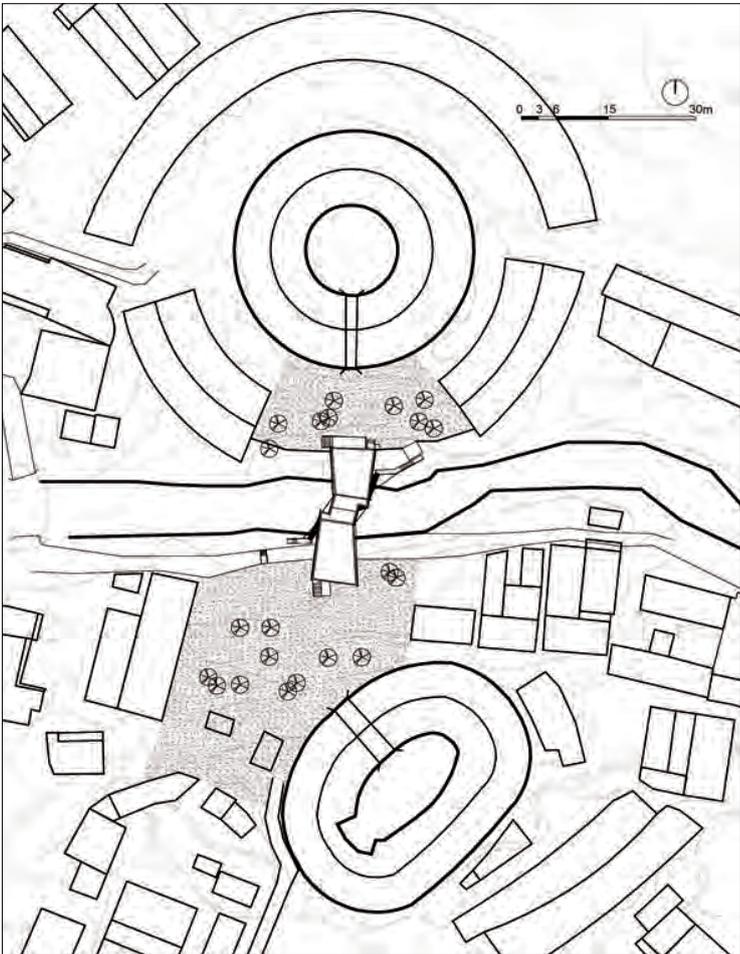
1. Architecture Review (UK November 2009)
2. C3 (Korea February 2010)
3. Domus (China November 2009)
4. World Architecture (China, January 2010)
5. Homeland (China, February 2010)
6. Urban Environment Design (China December 2009)
7. Dezeen (Germany December 2009)
8. Archdaily (January 2010)

To be published (dates unconfirmed):

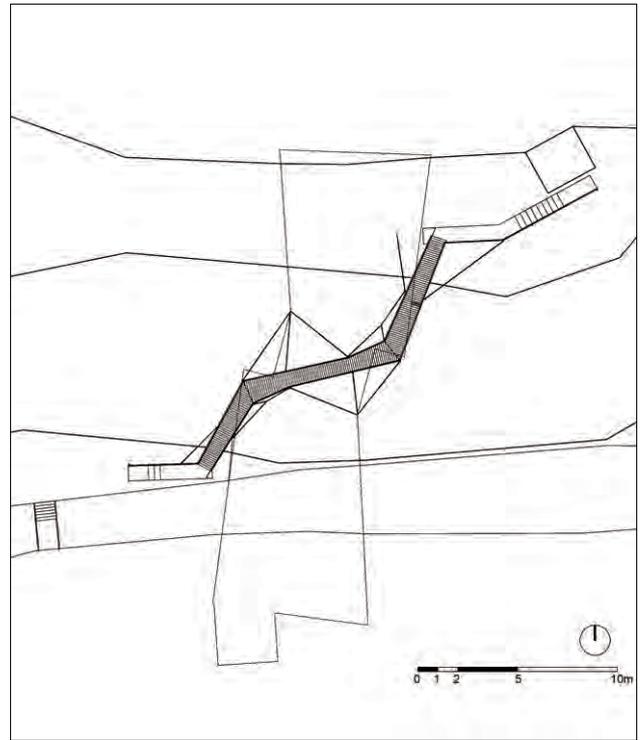
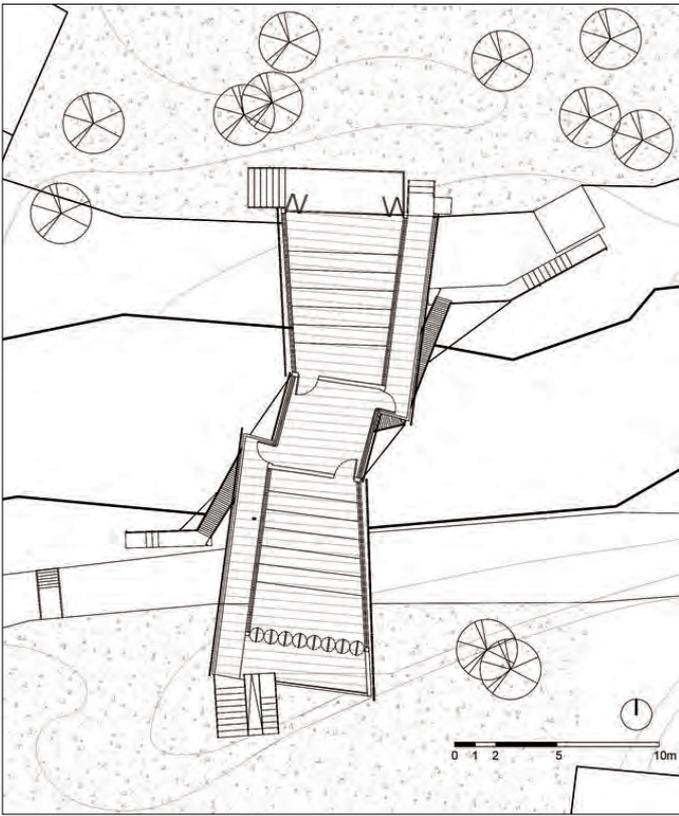
9. Architectural Records (US)
10. Casabella (Italy)
11. Channelbeta (Italy)
12. AV/Arquitectura Viva Spain)
13. Contemporary Architecture in China (China)
14. Design like you give a damn! (US, Book Publication by Architecture For Humanity);

**Fuad Mallick**

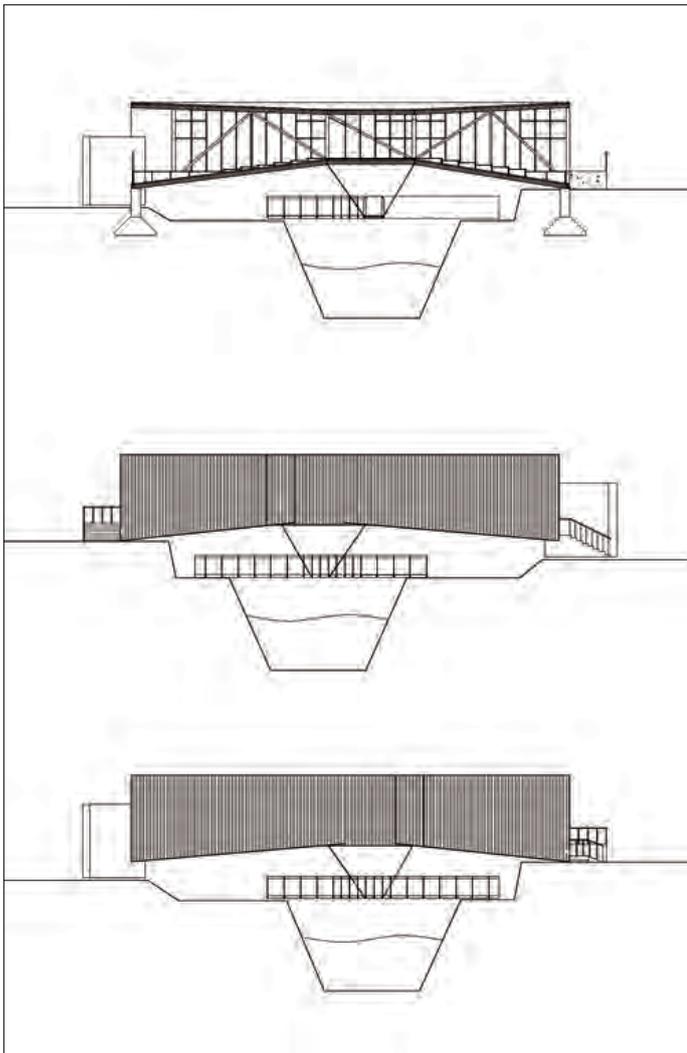
*April 2010*



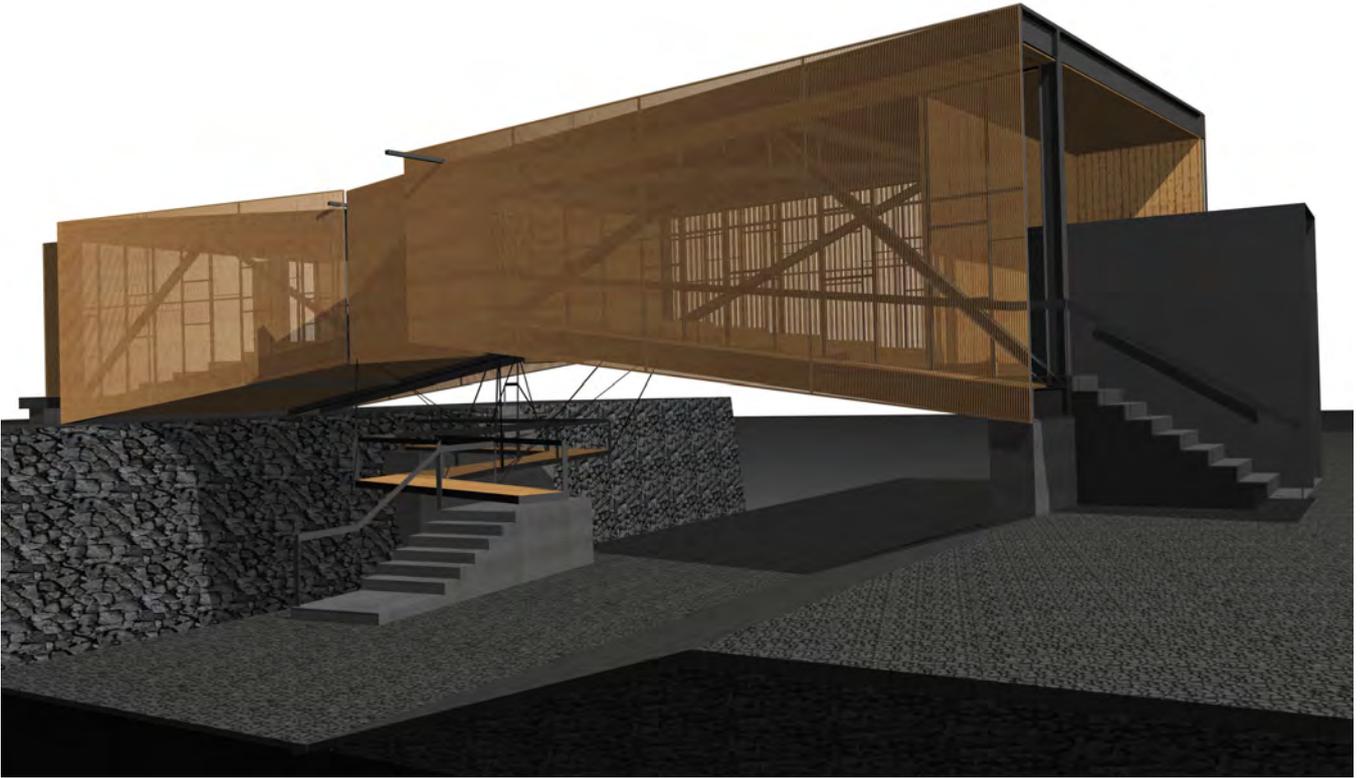
Master plan.



School and bridge plans.



Sections.



3d model of the Bridge school.

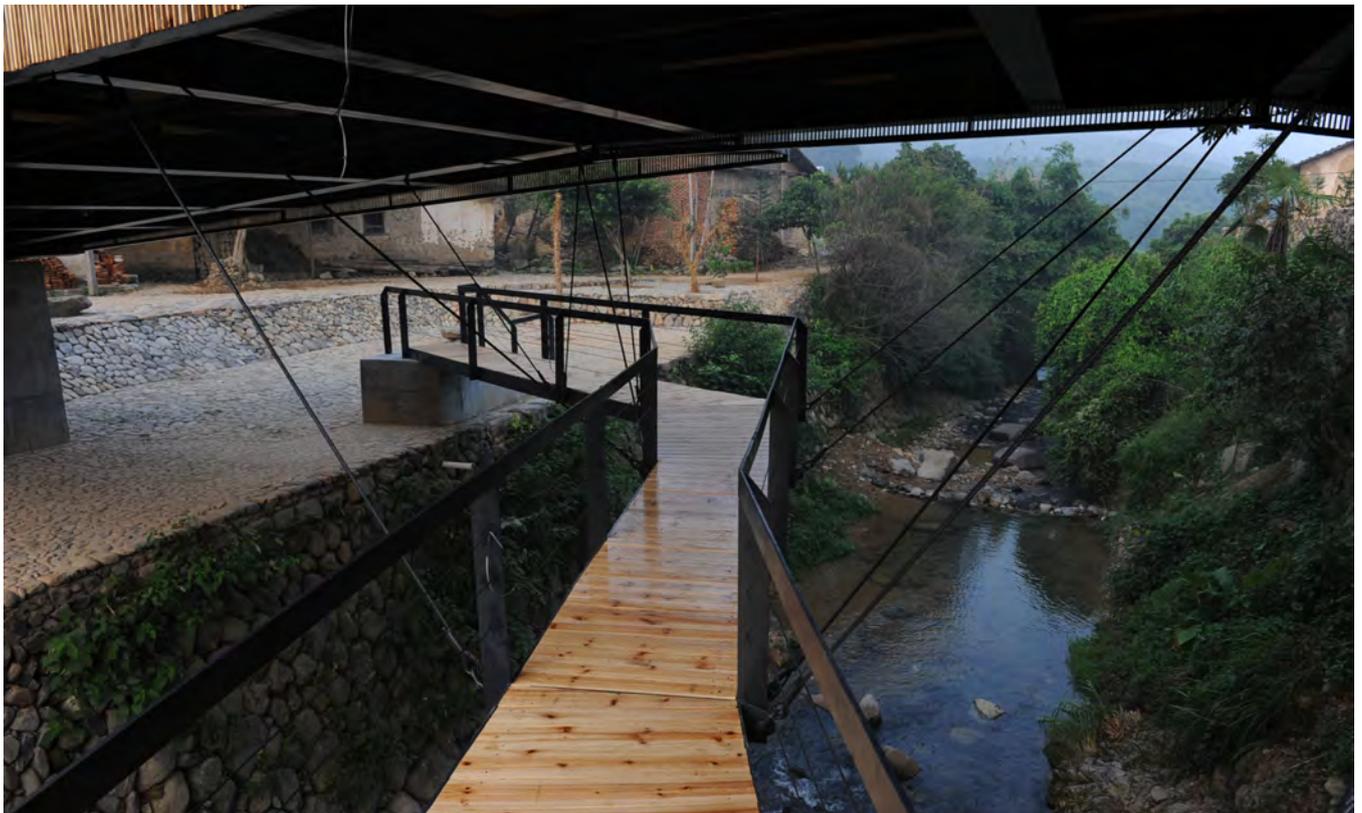
South view of the entrance.





North entrance of the building, in front of the Hakka Castle.

Hanging bridge across the river.





Playing box at the south end.

View of the corridor from outside.





Access stairs to the hanging bridge over the river, from the west bank

Children on the hanging bridge across the river.





Bridge across the river.

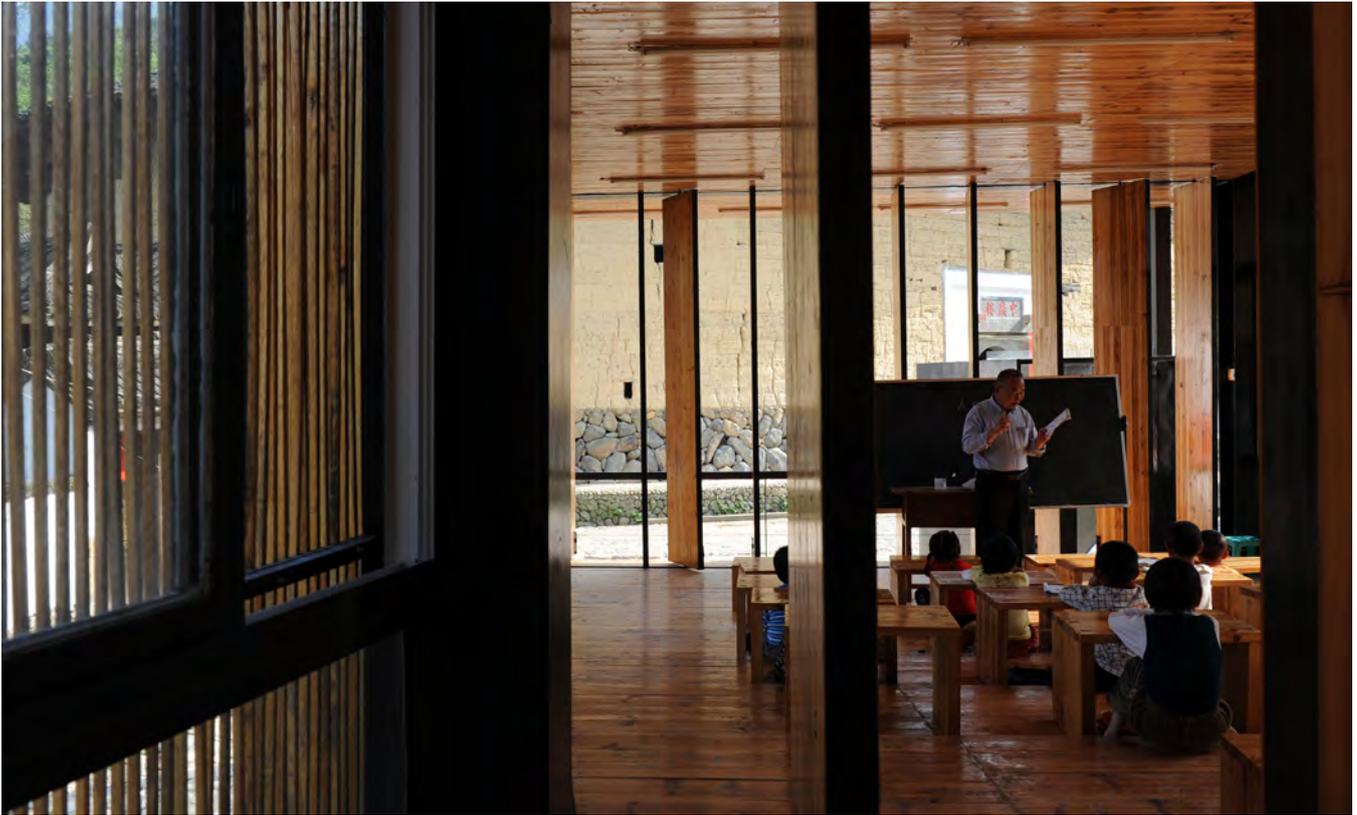
North view of the Bridge school with stage.





Corridor looking outside.

Classroom, interior.





View of the silk-like wooden façade.

Classroom, interior.



