

New Bud In Sichuan

ZHU Jingxiang, CUHK





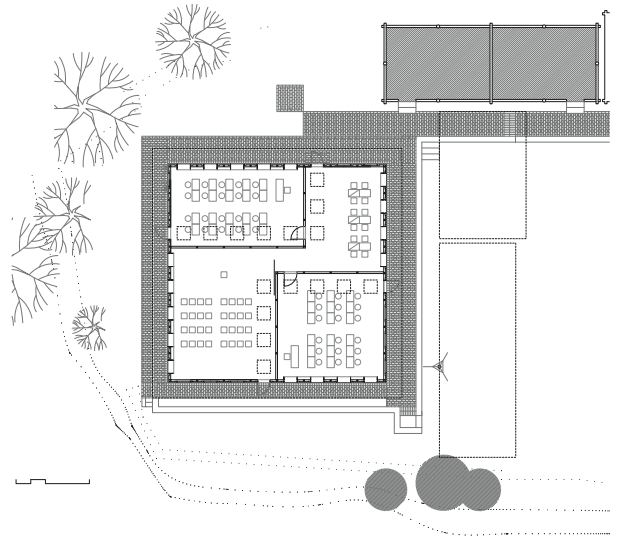
The tremendous loss of life and property caused by the 5.12 Sichuan Wenchuan Earthquake reveals the absence of decent structural design and adequate monitoring of the construction process in the region. Reconstruction has been difficult and a large number of temporary shelters that are neither durable nor thermally comfortable have been built in an attempt to meet the urgent needs of those affected. These shelters, when demolished later, will give rise to new construction waste.

A research team led by Prof. Zhu Jingxiang of the School of Architecture at The Chinese University of Hong Kong (CUHK) has developed an integrated light-structure system for the reconstruction. With the support of the Hong Kong Dragon Culture Charity Fund and the CUHK New Asia Sichuan Redevelopment Fund, they have completed Xiasi New Bud Primary School in 2009, and Dazu New Bud Study Hall in 2010, helping the little children to study in a nearby school. The buildings are safe and durable, and the cost of construction is low. It also looks attractive and features good thermal performance and a high energy-saving capacity.

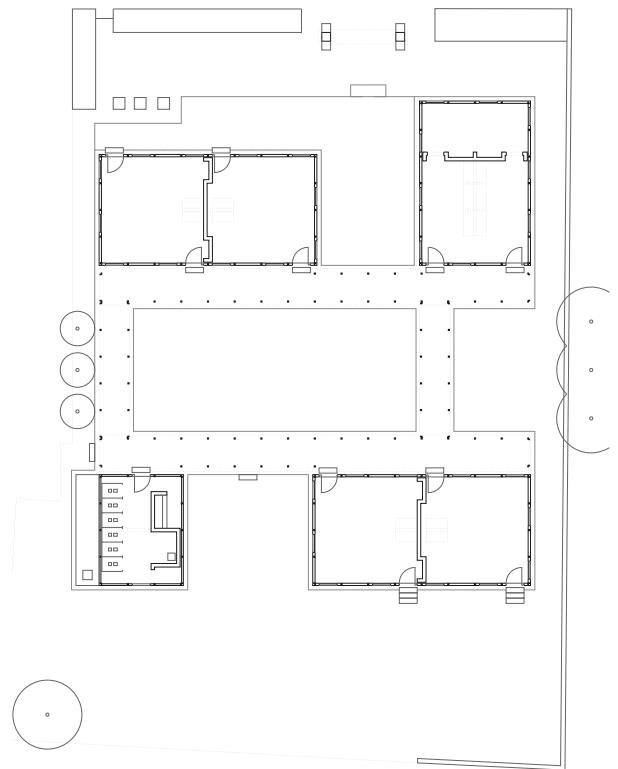
The primary load-bearing part of the school is a light-gauge steel frame, which is strengthened by a prefabricated panel system. These two parts are bound together by mechanical fasteners to form a strong but light composite structure. Although the wall is only 16cm thick, the system is able to resist high seismic forces. Under the protection of the outer panel and surface coating, the life of the skeleton is expected to last over 20 years.

The school features high thermal performance, thanks to the use of thermal insulation and storage materials. It also adopts a multi-layered envelope system where the position and ratio of the doors and windows are carefully designed to ensure that classrooms will be cool in summer and warm in winter. The decentralized opening system brings in enough day-light and natural ventilation by chimney effect, which greatly reduces energy consumption.

Additionally, the design incorporates environmental concepts by mostly using mechanical joints instead of chemical compounds to avoid toxic emission and to facilitate maintenance and disassembly in the future. In Xiasi New Bud school, solar water heater and an eco-friendly toilet are equipped to improve rural sanitation; in Dazu New Bud study hall, a wind turbine is used to provide clean energy to power the LED lights installed.

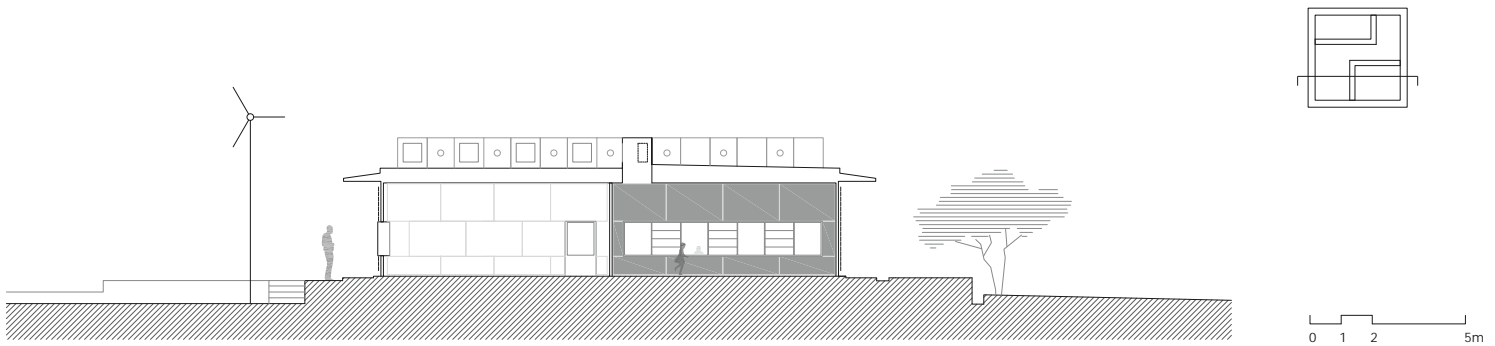


Dazu New Bud Study Hall, Plan, 1:200



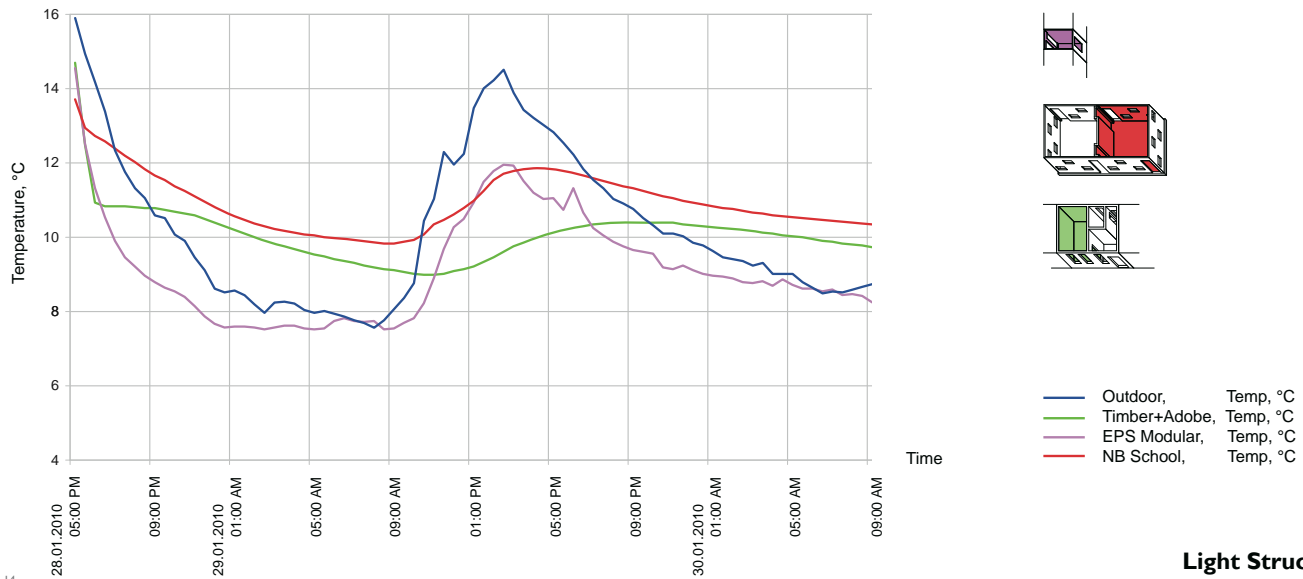
Xiasi New Bud Primary School, Plan, 1:200

The principle of sustainability is also reflected in the choice of materials. Materials dismantled from the old school are reused as paver, spacer or thermal mass. Some of the stone bases discarded by the villagers are also reused to furnish the courtyard. Besides, no other materials except cement were purchased for construction. Old bricks, stones and tiles are reused to achieve terrazzo effects in the flooring. This encourages local workers to preserve and develop their crafts, while reducing dependence on industrialized building materials. As all superstructure components are prefabricated in factories in Shenzhen and Chengdu, on-site assembly became an easy



Dazu New Bud Study Hall, Section, 1:200

Performance Comparison—Winter Without Temporal Heating



Light Structures

Thermal test of New Bud, traditional and temporary shelters, 2010 winter.

task. With the guidance of CUHK researchers, professional workers built them within only two weeks.

It takes many years for me to conceive, experiment and, finally, put such a light-structure system into practice. The success of the construction of New Bud Primary School demonstrates the significance of articulating research in design. The research brings about new ideas and methods, while the design transforms such ideas and methods into a building. This research has also ironed out the long-existing contradiction

between construction speed and quality. It does not only integrate the potential ability of different manufacturers, but also provides an opportunity to unite different communities and disseminate knowledge.

In each of the real constructions, 30 volunteers including university students from the mainland and Hong Kong, as well as architects, took part. This enabled them to experience innovative building technology and the symbiotic relationship that can exist between the rural and the urban.

Project Information:

2009 Xiasi New Bud Primary School
 Architect : ZHU Jingxiang, Nelson TAM Sin Lung, XIA Heng
 Floor Area : 450 sq m
 Total cost : 600,000 CNY (around 1300 CNY/ sq m)
 Completion Date : September 2009

2010 Dazhu New Bud Study Hall

Architect : ZHU Jingxiang, Nelson TAM Sin Lung, XIA Heng
 Floor area : 260 sq m
 Total cost : 420,000 CNY (around 1600 CNY/ sq m)
 Completion Date : August 2010

Professor Zhu Jingxiang teaches architecture design, materials and construction. His research is in the area of design methodology, new articulation of structures and space, and study of vernacular architecture.