

Gernot Minke

BUILDING WITH EARTH

**Design and Technology of
a Sustainable Architecture**

Fourth and revised edition

Bayalpata Hospital Acham, Nepal

Architects: Sharon Davis Design, New York;
Ethicons-EWES J/V, Nepal

Builder of earth walls: Subedi-Associate J/V

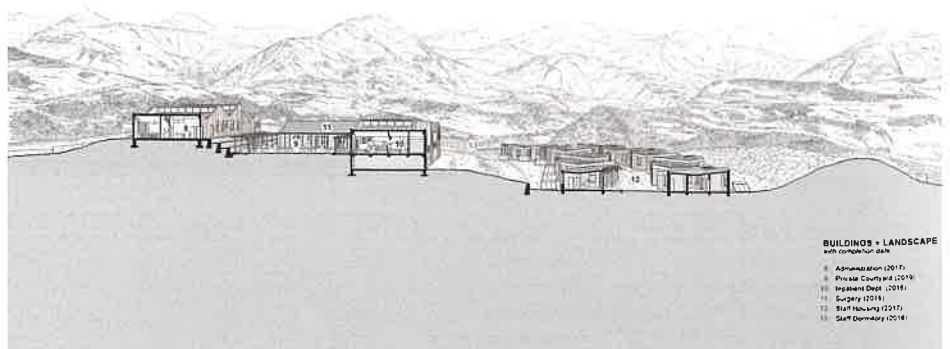
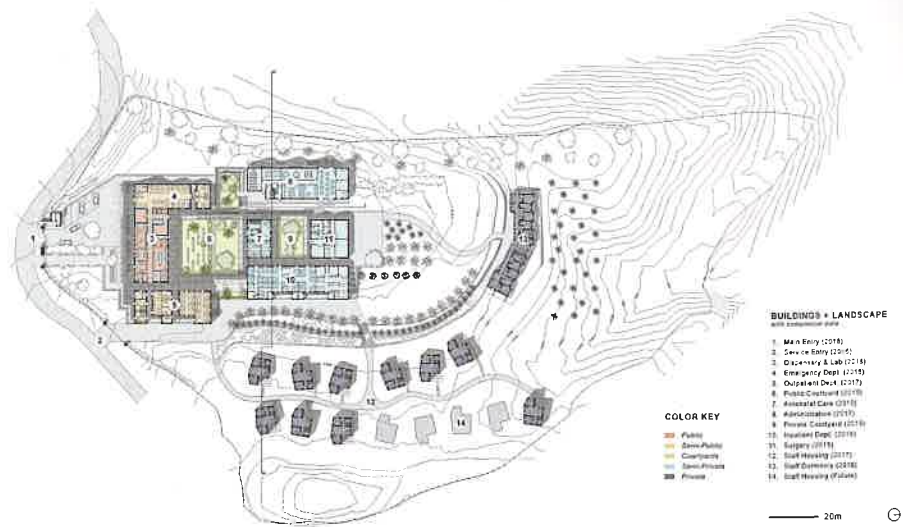
Completion: 2019

Wall system: Reinforced rammed earth

Floor area: 4227 m²

The new Bayalpata Hospital, made possible through a collaboration between the government of Nepal and the NGO Possible Health, transformed an aged and overrun clinic into a model of sustainable rural health care facility. The 3-hectare campus with a built area of 4227 m² is set on a hilltop and surrounded by the terraced slopes of the Seti River valley. It includes five medical buildings that house outpatient, inpatient, surgery, antenatal and emergency facilities for 70 beds, plus clinical functions, such as pharmacy, radiology and laboratory spaces. An administration block with offices and a 60-seat canteen, plus ten single-family houses and an eight-bedroom dormitory, serve the hospital's staff and their families. Bayalpata delivers low-cost, high-quality care to more than 100,000 patients a year from Achham and its six surrounding districts, more than eight times of the hospital's original capacity. The facility now serves a population of 1 million.

The architects used the locally available clayey soil stabilised with 6% of cement and vertical steel rebars for the rammed earth walls and the local stone for foundations and retaining walls. Photovoltaic cells on all south-facing roofs generate more energy on site than the campus requires. Passive heating and cooling are essential to the design, only the operating theatre within the surgery building is mechanically conditioned.





Earth, in common use for architectural construction for thousands of years, has in recent years attracted new attention as a healthy, environment-friendly and economical building material. An impressive number of buildings has been realized not just in hot and dry regions but also in the colder climates of Europe and North America. Technical innovations such as prefabricated rammed earth components and clay panels facilitate the use of this sustainable material.

This manual, now in its fourth and revised edition, describes the building technology of rammed earth. The physical properties and characteristic values are explained in a hands-on manner: With proper moisture protection, earth buildings are very durable, and in particular the combination with wood or straw allows a wide spectrum of design options. Twenty-six international built examples demonstrate the range of applications for this fully recyclable material.



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