

Location: D-99423 Weimar
Client: Ver. Waldorfpädagogik Weimar e.V.
Architects: Heinrich Nummert Dinger, Weimar
Earthen building: Bauer-Bau, Erfurt
Constructed: 1997-1999

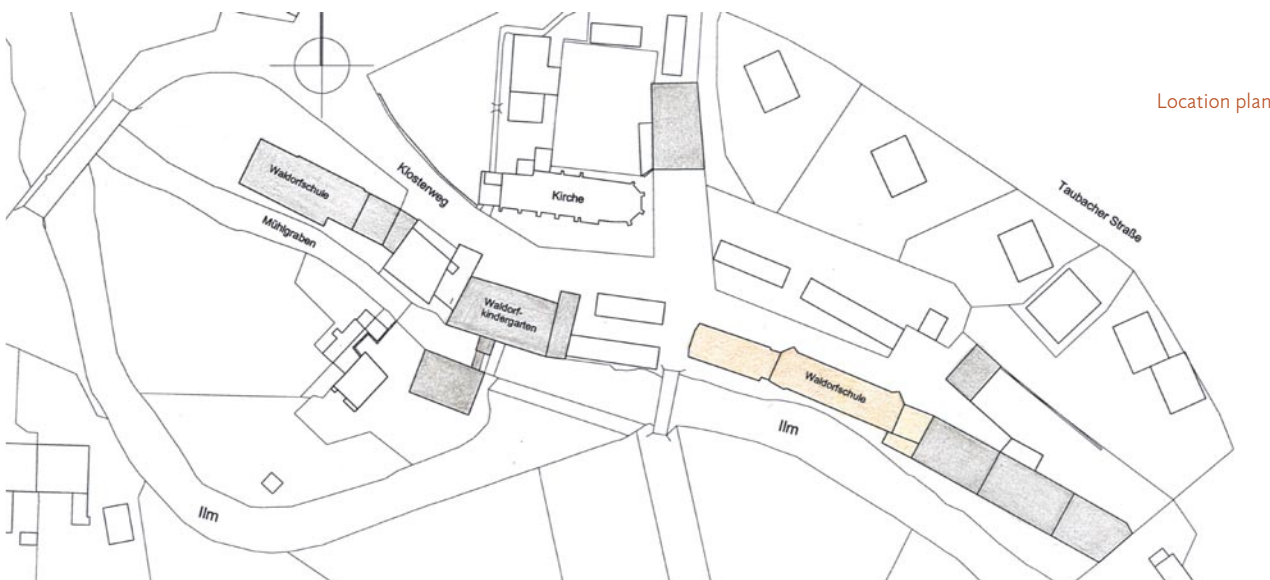


Freie Waldorfschule Weimar, Germany



The upper school of the Waldorf school in Weimar is situated in an historic factory building and an adjacent new extension. Its configuration as a series of buildings alongside the river is characteristic of its location. As can often be seen in traditional buildings of the region, the school consciously chose to employ earth as a building material in conjunction with wall heating for a healthy indoor environment.. As far as is possible, the building uses

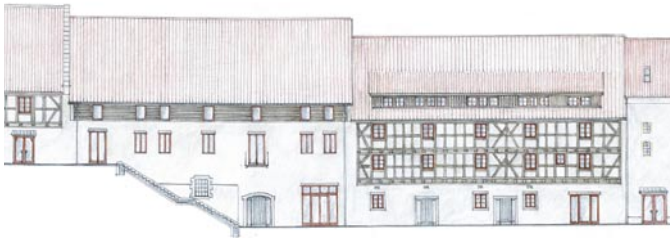
healthy and biologically sound materials as it was a primary concern to provide a humane architecture that respects and reflects in form and colour the impulses of the Waldorf philosophy. It is not without irony that a building which was once used to produce intoxicating brews often responsible for clouding understanding, has now become the surroundings for a place in which young people are encouraged to develop a clear understanding.



earthen building · case study

Net floor area:	1447 m ²
Usable floor area:	1010 m ²
Building costs:	1,733 Mio €
Building cost/m² NGF:	1197 €/m ²
Heat demand:	95 kWh/m ² a

Elevations – Existing buildings, new buildings



School building regulations for several-storey buildings require a fireproof floor and supporting structure. A reinforced concrete frame therefore serves as a structural system enabling the non-structural elements to be executed as rammed earth. Room-height ladders made of timber roof battens were erected between the concrete pillars at approx. 70 cm intervals and serve as non-load-bearing frames for the wall and as rails for the mobile shuttering boards. Loose earth was applied between the shuttering boards and compacted layer by layer.

To improve the thermal insulation of the external walls a mineral-based light clay mixture (clay, limestone sand, expanded slate, sawdust, organically

produced wheat straw) with a material density of 650-700 kg/m³ (30 dB) was applied to the inner surfaces of the external walls.

For better noise insulation internal walls were made with a more dense mixture of heavy clay with a material density of approx. 1600 kg/m³ (> 47 dB). All earth and clay was sourced in the region.

A second building stage envisages the use of earth as a 20 cm interior wall lining for the historic timber frame houses as a means of improving insulation and thermal mass.

All rooms are heated using integrated wall heating incorporated in the wall surface. In addition to keeping the building wall material dry the warm surfaces

of the walls provide for higher indoor comfort levels at a lower input temperature. Warmth provided by larger surface radiation reduces convection currents and dust distribution indoors, as well as the so-called “dry-nose effect” which often afflicts allergy-sufferers.

Heating pipework is laid along the interior surfaces of colder building elements and plastered over with an earthen plaster. Colder building elements do not therefore have a detrimental effect on the indoor room temperature. The temperature can be reduced to less than 20°C saving on heating costs. With an increased pipe length this kind of heating can be driven by low-temperature sources such as that resulting from solar collectors.



Rammed earth construction of the non-load-bearing walls. Mobile 'slidable' shuttering on timber posts was used and shifted upwards with each new layer of rammed earth.