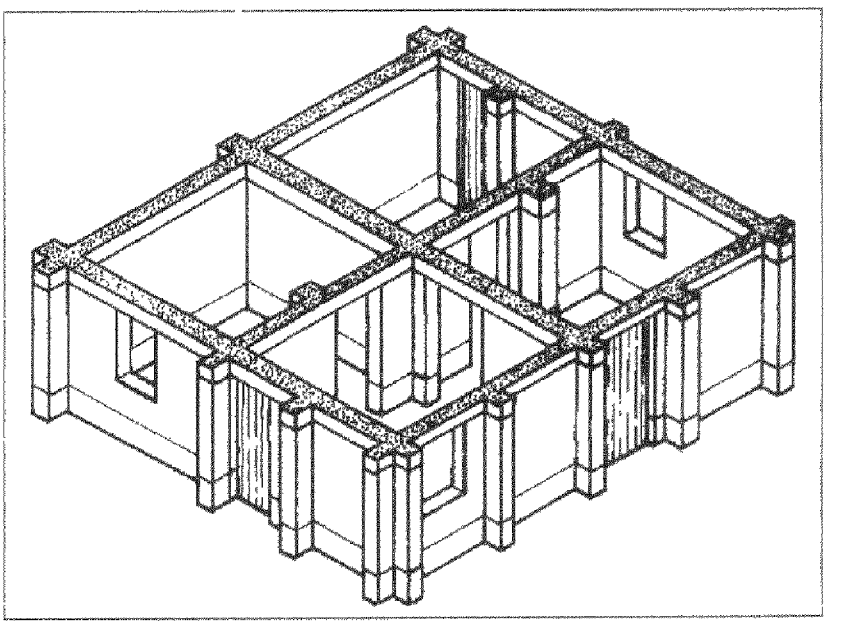
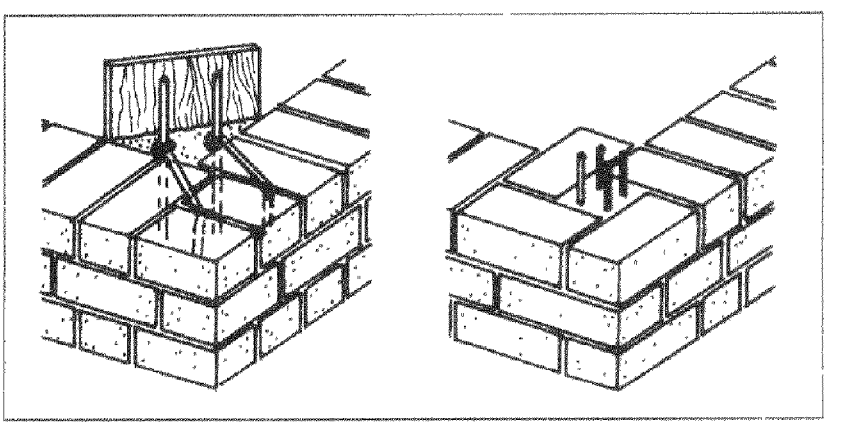
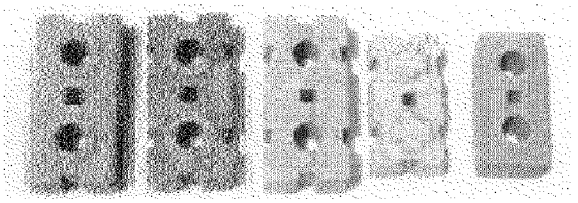
7-8 Educational centre Acomayo, Perú (Pereira 1995)



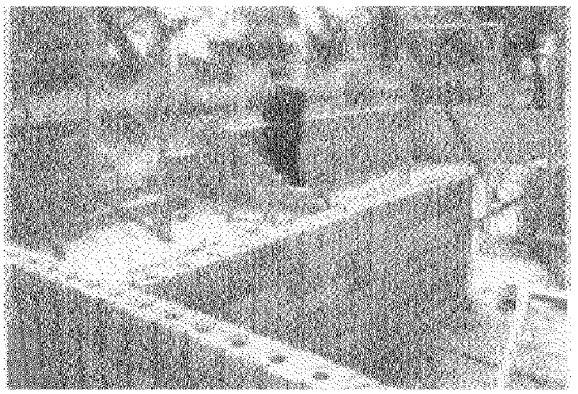
7 9 Adobe walls reinforced by buttresses

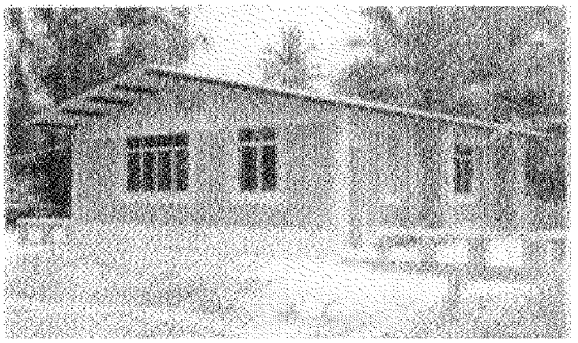


7-10 Stabilized corners

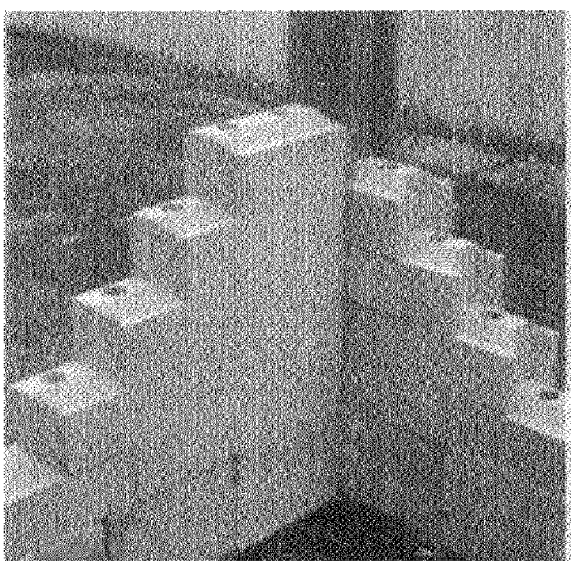


7-11 Interlocking blocks (Weinhuber 1995)





7-12 and 7-13 Prototype house, Thailand 1984 (Weinhuber 1995)



7-15 Improved interlocking system of FEB, Kassel, 2001

7.3 Interlocking blocks

Walls without mortar can be built with interlocking blocks. The blocks have holes for vertical reinforcement elements from steel rods or bamboo canes fixed by pouring cement sludge into the holes. The blocks are pressed in special molds and normally stabilized with cement, see Fig. 7-11. If they have enough vertical reinforcement elements, at least at corners and intersections, and if these are well fixed to the plinth and the ring beam, these walls are supposed to be earthquake-resistant due to their flexibility. The system was developed at the Asian Institute of Technology, Bangkok. Figs. 7-12 and 7-13 shows the first demonstration building, built in 1984 in Thailand. In this case the holes were filled with a mixture of cement and sand in the ratio 1:3

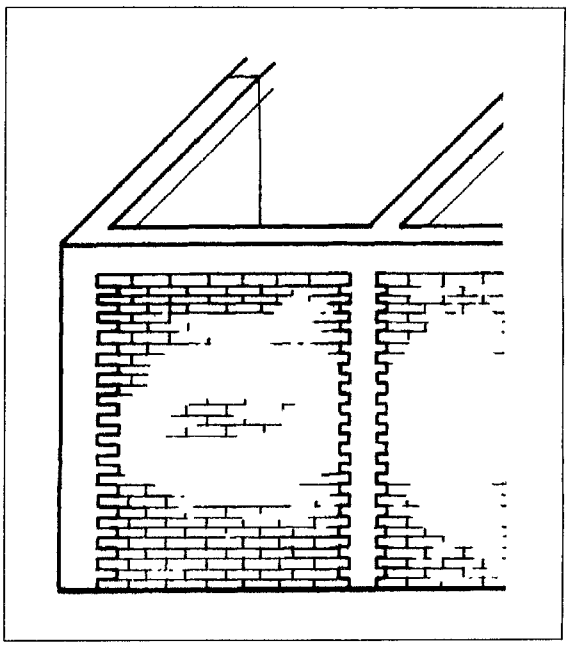
Fig. 7-14 shows a similar system, developed by the University of the Andes, Mérida, Venezuela. The blocks have grooves and tongues which interlock. Horizontal ring beams of reinforced concrete are placed at a height of 1.20 m and on top of the wall.

If stacked without mortar these walls do not show any high resistance to horizontal forces as the interlocking effect is only given by a height of some millimeters.

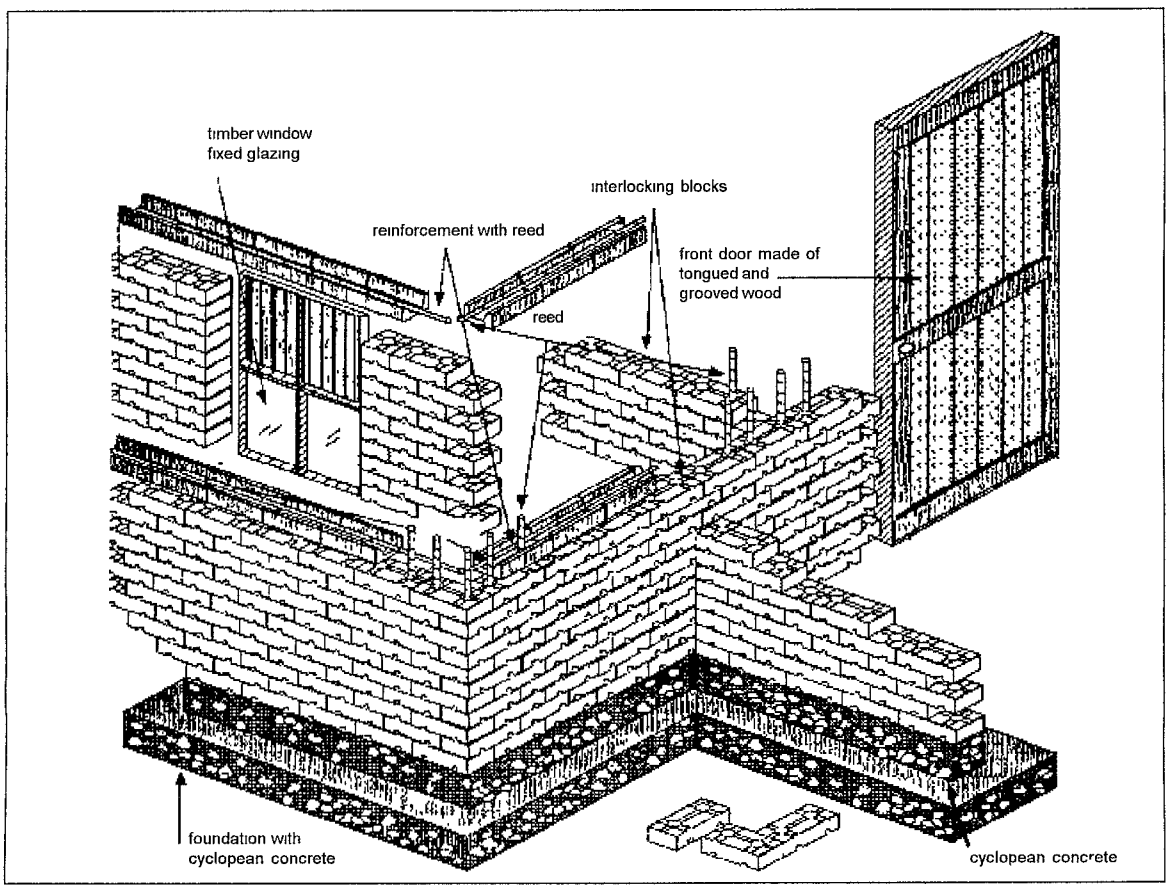
Therefore the author developed an improved interlocking system, with blocks showing tongues and grooves 40 mm high, in horizontal as well as in vertical joints, see Fig. 7-15. If these blocks are displaced or lifted up by seismic shocks, they always fall back into their normal position. The holes act as gripholes for easy0 handling, but can also be used to install vertical reinforcement elements. But these additional reinforcement elements are not necessary if the wall corners are formed by concrete columns, which interlock with the block as shown in Fig. 7-15, and these columns are interconnected by a ring beam.

7.4 Concrete skeleton walls with adobe infill

Normal masonry walls are not very stable against seismic shocks. Therefore, nowadays the masonry walls are often framed by concrete which forms a skeleton structure with adobe (or brick) infill, see Fig. 7-2 and 7-3. The vertical concrete columns should have 4 steel bars of at least 14 mm diameter. It is important that the concrete and the adobes interlock, as shown in Fig. 7-16. For low-cost housing projects this solution is normally too expensive. Moreover it shows hardly any flexibility.



7-16



7-14 Building system invented by Universidad de los Andes, Mérida, Venezuela (Pereira 1995)