



Number Six
June 2001

## **Building Technology File**

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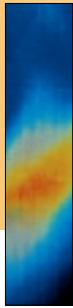
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Earth-wall construction in Australia has a history dating from the earliest buildings of 'wattle and daub' and extending to two-storey contemporary dwellings and even to three-storey blocks of flats. Earth wall construction has now been used for large public constructions including visitor centres, hospitals and community facilities. There are earth-wall buildings here over 100 years old that can be expected to give many more years of service if adequate maintenance is continued. The strength of earth walls increases with their age. The heavyweight construction is conducive to comfortable thermal conditions indoors, particularly in regions where the climate is predominantly hot and dry.

There has been some improvement in the methods, structural details and equipment used in present-day earth-wall construction, so that a reliable result is ensured provided that good workmanship is employed and suitable earth material is used. This Building Technology File compares the methods of construction and discusses the choice of soil.

# Earth-wall construction

## METHODS OF CONSTRUCTION

Of the ancient methods of earth-wall construction, wattle and daub, cob, and clay lump are obsolete and are mentioned only for general interest. However, pisé or rammed earth and adobe, mud brick or puddled earth are still being used in this country mainly in locations where conventional walling materials are in short supply or transport costs are high. The modern trend with these basic constructional systems is to use a stabilised earth material instead of natural soil. A brief summary of the methods now in use is given in the table below.

The marked difference in method between pisé and adobe construction arises from the clay and silt content, including the colloidal fraction that is required to bind the sand and granular particles together. Where the clay content is less than 50% it is necessary to use ramming in formwork (pisé) in order to obtain adequate binding; but there is not sufficient clay for its drying shrinkage to cause cracking problems. A clay content of more than 50% is needed to bind adobe blocks; but cracking in the wall is limited because the blocks are left to complete their large drying shrinkage before being built into the wall.

Brief summary of methods

	<i>Pisé</i>	<i>Adobe</i>	<i>Stabilised earth bricks</i>
Description	Earth rammed in forms	Earth puddled and moulded into blocks (straw binder or cement stabilised)	Stabilised earth made into bricks
Soil type	>50% sand; remainder clay and silt	>50% clay and silt; remainder sand and granular material	>50% sand; remainder clay, silt and cement
Construction	In situ	Sun-dried precast blocks	Bricks, usually machine-made
Moisture	7–10%	15–20%	Approx. 10%
Equipment	Formwork and rammer	Simple bottomless multi-unit mould	Brick-making plant
Stabilisation	Now usual (cement preferred)	Adobe (cement preferred)	Essential (cement preferred)



Interior wall of rammed earth (photo courtesy Ramtec Pty Ltd)