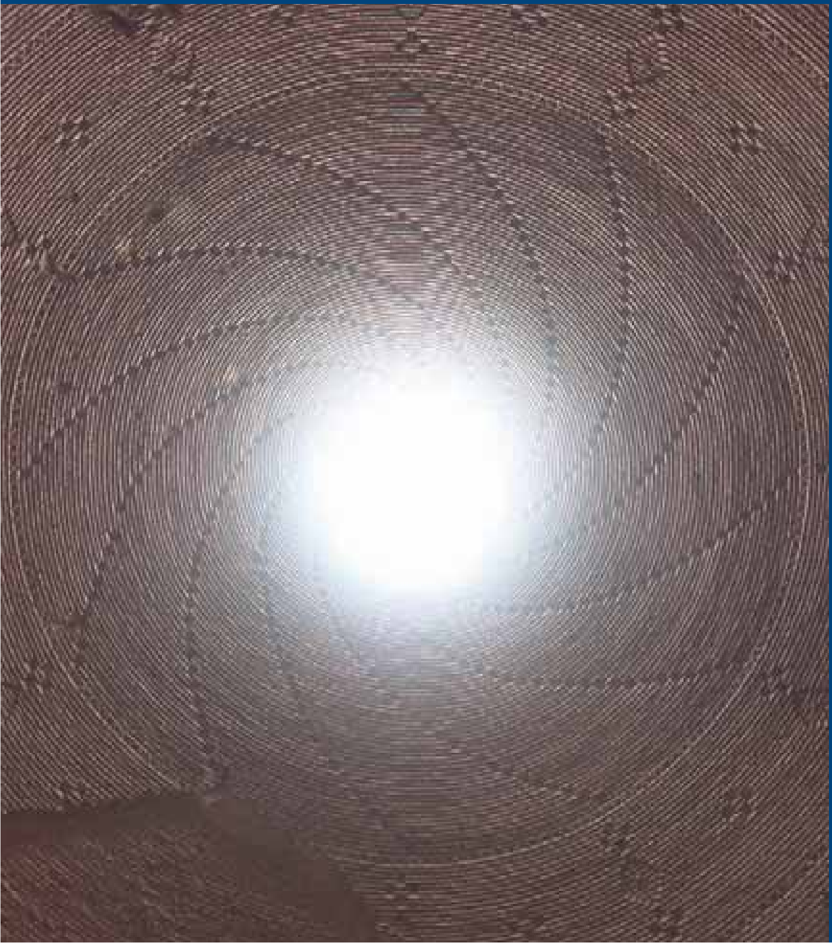
EARTH MASONRY
Design and construction guidelines

Tom Morton

Foreword by Rab Bennetts

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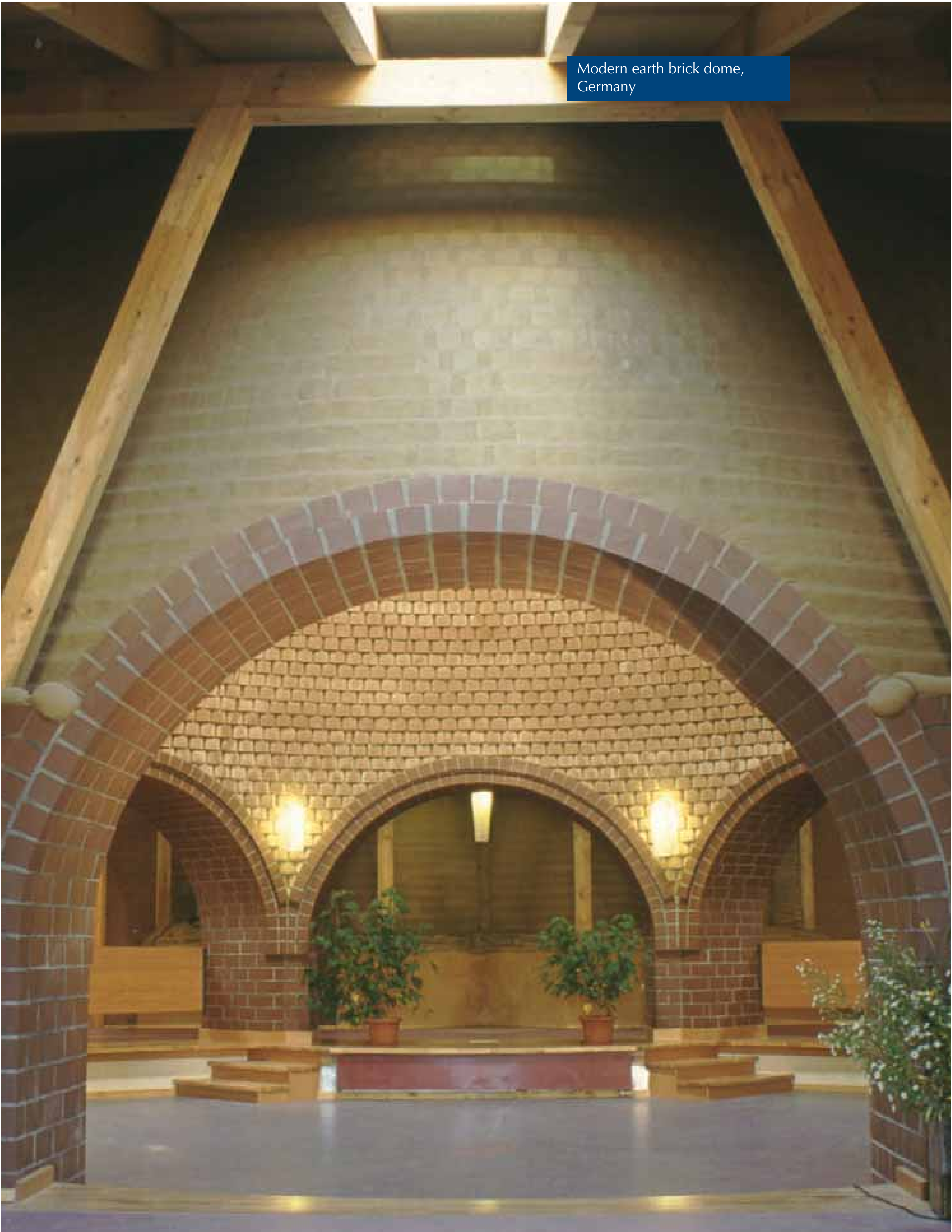

Modern earth brick dome, Germany

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Mains of Branshogle,
Stirlingshire

FOREWORD

Rab Bennetts
Bennetts Associates

With public opinion finally endorsing the need for higher levels of sustainability, this book is a timely reminder that some all-but-forgotten forms of construction offer a signpost to the way ahead.

Earth masonry – unfired bricks, adobes and cob blocks that are free from cement additives – is one of those ancient technologies that all but died out in western society, but has remained alive and well in parts of the world untouched by industrialisation and conventional measures of prosperity. Now that the search is on for building techniques and materials that have far less impact on the environment than the bricks and blocks of modern construction, earth masonry has once again emerged as a sound and practical alternative.

Like rammed earth, recycled materials or planted roofs, earth masonry is not alone in being 'rediscovered' but the post-war dominance of products that rely on energy-intensive, relatively cheap manufacture means that our ability to use these low impact methods is hampered by a simple loss of traditional knowledge or the instinct required to avoid routine failures of performance. Even natural ventilation and passive solar control for larger buildings now have to be proven by computer analysis to gain acceptance in our risk-averse markets, because centuries of intuitive understanding has virtually disappeared.

The primary purpose of this book, then, is to fill in the considerable gaps in our understanding of earth masonry, with a factual account of issues such as density, moisture control, strength and construction details. But there is a secondary role for this book, which is to explore the cultural background to earth masonry, with a refreshing enthusiasm for the subject born of conviction for its potential, even for sizeable projects. The key to unlocking this potential is to think in local terms – the available raw materials, the labour force, the means of manufacture, distribution and of course the climate. As with much else in the search for sustainability, globalisation of the construction industry is being questioned as never before, not simply for its harmful environmental effects but also for its tendency to steamroller construction cultures across the world into uniformity. Earth masonry represents part of the fightback towards a more responsive, environmentally benign approach.

The Earth Store, The Genesis Project , Somerset College of Arts and Technology

2 PRELIMINARY DESIGN CONSIDERATIONS

This chapter describes the main factors influencing a decision on whether and how earth masonry is appropriate for a particular project. It outlines suitable applications of earth masonry, including monolithic walls, infill to timber frame walls, vaults and floors. Design codes, testing and compliance with UK building standards are discussed. Key factors in using earth masonry in a construction and procurement process are also highlighted.

2.1 APPROPRIATE APPLICATIONS

Earth masonry can be used in a variety of ways in buildings. The limits of what is appropriate vary with climate and culture, as do the potential benefits thereby gained. For example, hot dry locations can exploit thermal mass in monolithic walls and vaulted roofs, while cool wet situations will benefit from the regulation of internal humidity in layered constructions.

Modern architectural and engineering design has considerable potential to transcend the constraints of vernacular use. However, such work is in its infancy, as is the availability of progressive high-performance unfired clay products.

This section therefore describes the situation as it exists today, which remains essentially based on traditional models of masonry design. The potential of market applications to develop in the future is described in section 7.1.3.

2.1.1 External walls

Earth masonry can be used for external walls, with two key points governing its use.

Thermal conditions

Earth masonry gives good thermal mass, but not good thermal insulation. In UK conditions, solid earth masonry walls are usually appropriate only for unheated buildings that have a diurnal, rather than a seasonal, heating need. That is, the mass of earth masonry can balance a hot day against a cold night, but it cannot stretch this effect to balance a hot summer against a cold winter. In heated buildings, earth masonry should be used in an insulated, layered construction. Here, the earth masonry

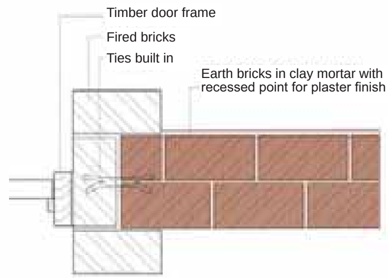

Fig. 4-51: Door jamb 6.
(See Fig. 7-3.)

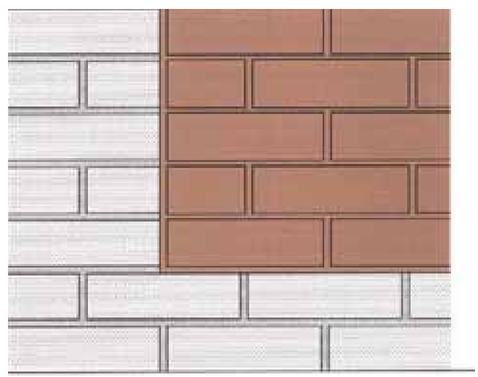

Fig. 4-52: Door jamb 6: elevation.