Non-structural daubed earth wall in a store structure, Calatañazor, Soria, Castilla y León.

( photo: Valentina Cristini with José Ramón Ruiz Checa)
Introduction

Earthen architecture has undeniable value within the culture of construction materials of the Iberian Peninsula, both for its remote origins and level of preservation and the way it adapts itself perfectly to the environment. The fact that many of these techniques are still valid and that they have survived practically unaltered for so many centuries, is full proof of their capacity to handle technical and constructive problems.

Types and features of earthen architecture

There are many factors in Spain that have lead either to the perfection or to the abandonment of the several constructive techniques over the centuries. Among the main factors, we have the availability of natural resources and the productive social and economic systems. However, as water has always been a cause of vulnerability for these earthen structures, the long search for resistance against water damage has created a whole repertoire of formal, material and dimensional answers.

Adobe

Adobe can usually be found both in homes and in auxiliary buildings for animals and storage. We find these in Meseta Norte (region of Tierra de Campos) and along the regions of the basins of the rivers Guadalquivir, Ebro, Turia (Andalucía, Aragón, Cataluña, Comunidad Valenciana), Júcar (Cuenca, Albacete). In Comunidad Valenciana its specific use is known in the adobe houses of the orchards and wetlands (barracas).

Rammed earth walls

In Spain we usually have three basic types of rammed earth wall, with the following features.

Simple rammed earth wall: the simplest technique, which uses tamped soil within the formwork. The soil is previously prepared by airing and slight dampening.

Improved rammed earth wall: the soil used is enriched by adding different sized gravels or rocks, so as to obtain a more compact mass. Very frequently lime is added in order to guarantee a better consistency and duration of the face.

Reinforced rammed earth wall: the soil is reinforced with other constructive elements to give the modules more consistency in its grip to the eventual render. These additions are put on the outside of the margin of the formwork before tamping each earth layer.

Improved rammed earth wall

Rammed earth wall with lime render (tapia acerada). This is a rammed earth wall with a protective lime render, a mortar garnishing made out of lime and sand. This mix gives the external parts a new look and represents a reinforce-
ment of the faces. (Andalucía, Castilla la Mancha, Baleares, Castilla y León, Cataluña).

**Rammed earth wall with gypsum layers (tapia con brencas).** This is a rammed earth wall which presents some reinforcements shaped like a crescent moon on the inferior part of the formwork. They can be found especially in Aragón (the most western part of the Comunidad Valenciana), in rural houses, walls and storage rooms and, sometimes, they may also be found in Murcia and Castilla y León.

**Rammed earth wall reinforced with lime strata (tapia calicostrada).** This is a type of rammed earth wall, which presents a regular strata of lime among the layers of soil. It is mostly found in Andalucía, Castilla la Mancha, Castilla y León and Murcia. It is much more common in military architecture than in residential. Important examples of buildings where this technique is used are the Alhambra in Granada, the Alcázar in Sevilla or in city walls of Niebla, Huelva, etc.

**Reinforced rammed earth wall**

**Rammed earth walls with stones or bricks.** These are rammed earth walls that boast different kinds of reinforcement elements mixed with the soil layers. It is possible to find both rough stones and ashlars or bricks (in this latter example it is usually called tapia valenciana).

**Mixed rammed earth walls.** This is a type of rammed earth wall that has structural reinforcements that take most of the loads withstood by the wall. These reinforcements are usually called buttresses. The rammed earth walls with adobe buttresses are of the same type as those with brick buttresses, replacing the material for adobes (Castilla y León, Extremadura, Andalucía, Aragón).

The rammed earth walls with gypsum buttresses are made of gypsum reinforced with rubble or rough stones (region of Rincón de Ademuz (Comunidad Valenciana) and the village of Albarracín).

**Half-timber with adobe filling**

This construction technique can be found in almost all of the Iberian Peninsula, but especially in the central region of the mountain chain towards the north, meaning in País Vasco, Navarra, La Rioja, Asturias, Galicia, Extremadura, Castilla la Mancha and Castilla y León. This type of construction is almost certainly to be found in stables, storage rooms, houses and in areas that are rich in forests (wood for sawing).

**Wattle and daub**

These solutions can be found in the third part of the northern peninsula (País Vasco, Navarra, Riojas, Asturias, Galicia), but also in areas of the Extremadura and more precisely in Castilla, the surroundings of Soria and Aragón. Generally, these structures are found as internal partition walls, which are not directly exposed to the climatic conditions.

**Present situation and perspectives**

Currently, in Spain, the main lines of academic investigation are promoted by CIAT (the Center of Traditional Architectural Investigation), lead by the Polytechnic University of Madrid, and there are also specific lines of investigation promoted by members of other autonomous universities (Barcelona, Valencia, Valladolid, Granada, Sevilla, Zaragoza, etc.). The organization of the ConstruTierra network stands out and presents the common efforts for the documentation and promotion of the soil as construction material (with the
collaboration of the Universities of Madrid, Palencia, Valladolid, Alcalá de Henares...).
Also some associations have been born in order to promote important actions of cooperation for the development and encouragement of the constructive quality. Among them, the most famous is Habitat Tierra, founded in Madrid with its head office also in Peru, or Proterra a multilateral and international group for technical cooperation that promotes the investigation and development of soil construction.
On the other hand, referring to associations that aim towards professional development, we have to take into consideration, without any doubt, the pioneer experience of the Center of Studies of Navapalos. Also business concerns such as Adobera del Norte, Cannabric, Terrablock or Bioterre Promotions, have a great influence on the market. As for promotion, there are magazines such as Ecohabitar or Ecoconstruction.
Generally, compressed earth brick production (in Spanish BTC) is a tangible reality in the peninsula, represented by Amayuelas, a small village in the province of Palencia, which aims towards total ecology and soil and BTC construction materials.
At the same time, in Spain, an important work of maintenance and conservation is in progress related to earthen architecture, with first-rate interventions both vernacular and monumental (fortresses and citadels from the province of Castellón, Murcia, Granada, Córdoba). Professionals show interest in the study of historical constructive techniques and its reproduction and are also turning their attention towards the conservation of the surface patina and materiality.

Conclusions
In Spain, the relationship between contemporaneous and traditional vernacular architecture has a real potential that should be explored and developed. This complex repertoire could really be an excellent field of experimental investigations that could deepen the close relationship between traditional constructive techniques and the criteria of energetic efficiency. On the other hand, the process of normative regulation, partly completed and partly still in progress, guarantees the quality of current earthen architecture. The lack of a systematic network that could embrace all the different projects and contexts weakens and devalues important initiatives that do not get the opportunity to have a major impact, but their mark remains at best at an exclusively regional level, and only within the reach of specialists.