



Rammed earth and bricks, farm, Sainte-Agathe-la-Bouteresse, Loire, France. (photo: René Guérin)

Earthen architecture in Southwestern Europe: Portugal, Spain and Southern France

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The Iberian Peninsula and the South of France are extraordinarily rich in earthen techniques, especially rammed earth, half-timber, adobe and wattle-and-daub. These traditional earthen architectural heritage examples are nowadays being studied and in some cases, restored. Simultaneously, all this historical built background serves as a basis for interesting development of newly built earthen buildings, that claim not only the continuity with local tradition, but also the ecological, practical and sustainable aspects of this building material.

In 732 AD, the arrival of the Muslims to Poitiers, France, left historical and architectural vestiges throughout the occupied territories. Muslims were the principal disseminators of rammed earth in their conquered lands (Ribeiro, 1969, p.39). Areas where they remained more than 500 years (700 in the case of Granada) have a stronger presence of earthen vernacular architecture. This is the case of rammed earth and adobe construction in the south of Portugal and the south of Spain. The etymological origin of both techniques is consistently common in both countries. The English term 'rammed earth' is 'tapia' in Spanish and 'taipa' in Portuguese, which are originated from the Arab word '*tabiya*'. The same occurs with adobe (Eng) (Sp) (Pt) that originated from the Arab word 'Tüb' or 'atôb' (Monjo Carrió, 1998, p.40). The origin of earthen architecture in Portugal, however, is Pre-historic, probably from the Middle Palaeolithic Age (Varela Gomes in Fernandes Et Correia 2005, p.126). The first document to refer to rammed earth in Spain was written by Pliny in the 1st century AD. (*Naturalis Historia*), but earthen architecture may be

Dovecote, stones, adobe and bricks, Nègrepelisse, Tarn-et-Garonne, France.
(photo: René Guérin)





considered as old as the first human shelters and settlements in the country (Monjo Carrió, 1998, p.31). In France, the oldest clear testimony is from 400.000 years ago – early Palaeolithic (Varela Gomes, 2005, p.125). These remains reveal a common antiquity of earthen architecture in the region.

In general, the Iberian Peninsula has a similar relationship with the use of earthen materials. This is predominantly observed in the northwest of the Peninsula and the southwest of France, with the use of half-timber structures with earth in fill. In Portugal and France, the use of wattle and daub in fill for half-timber structures is more common but in Spain, an in fill in adobe is usually used. In the south of the Peninsula, adobe and rammed earth walls are very common in both countries. It is interesting to notice that in general, the same use of the earth material cross borders, which proves how important are the geographic characteristics and the building cultures of each area.

There are also particularities of each country that bring out unique characteristics. For instance, in Spain, it is more common to observe the use of several different techniques in the same traditional wall. Sometimes, new techniques emerge from this intermix, which brings a richness to Spanish earthen architecture. This is the case of the 'entramado', a wooden structure with an adobe in fill identified in the area of Castilla y León. In Portugal, several different techniques can be observed in the same building, but in general, they will be applied in different walls (e.g. exterior walls in rammed earth and interior walls in adobe or in wattle and daub). The particularities of each country also occur in terms of language. Both Spain and France have specific words for earthen architecture within each regional dialect. As Portugal has no dialects, differences are related with the use of the terms, following Muslim occupation. In the north 'taipa' is the term for wattle and daub and in the south 'taipa' means rammed earth.

Portugal and Spain also share a wide variety of rammed earth typologies (Correia, 2007) (Cristini and Ruiz, 2009, p.285-294). Spain presents a refined use, with an extensive range of rammed earth variants with specific termi-

Rammed earth farm, Bioule, Tarn-et-Garonne, France.

Adobe masonry stable, Nègrepelisse, Tarn-et-Garonne, France.

(photos: René Guérin)

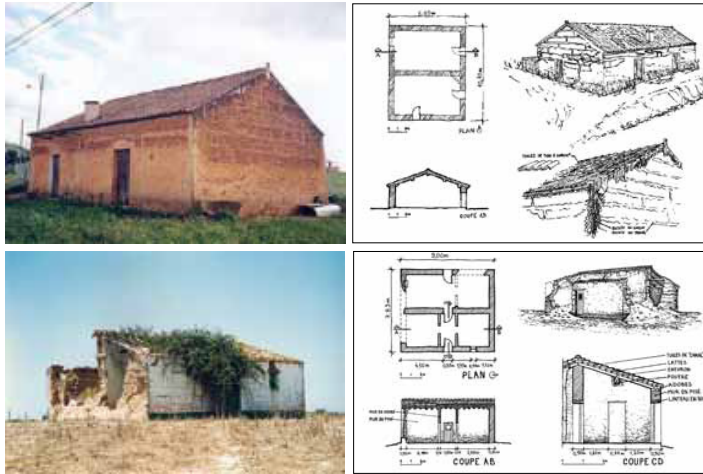
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Wattle and daub house, Saint-Sauvy, Gers, France. (photo: René Guérin)

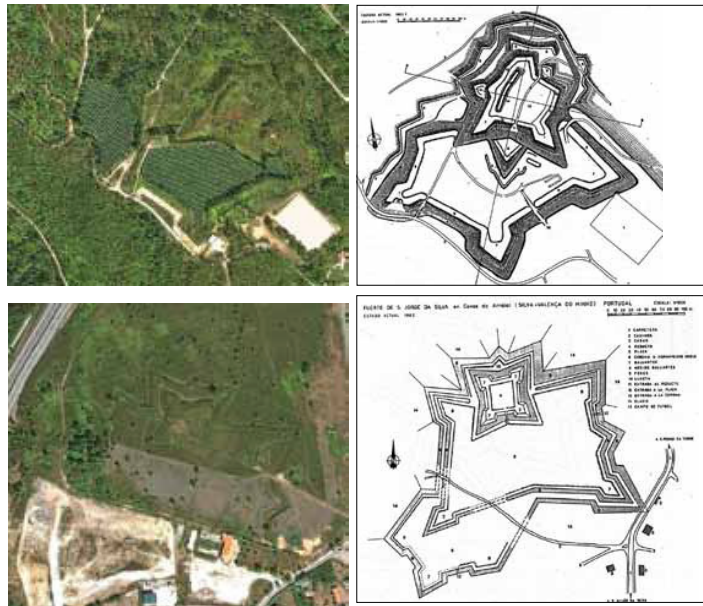
Rammed earth house, Vales Mortos, Serpa, Portugal. (photo: Mariana Correia)

Rammed earth house, Ferragudo, Reguengos de Monsaraz, Portugal. (photo: Mariana Correia)





Rammed earth house in Telheiro, Reguengos de Monsaraz, Portugal.
Rammed earth house in Vale da Eira, Santiago do Cacém, south of Portugal.
(photos and survey drawings: Mariana Correia)



Earthen Fortress of Santiago Carrilho, Tomiño, Spain
Earthen Fortress of S. Jorge da Silva, Valença, Portugal.
(photos: Google Earth; drawings: Jaime Garrido)

nology, as 'taipa Valenciana'; 'tapia real'; 'tapia calicostrada'; 'tapia acerada'; etc. (Font, 2005, p.121-122). This is also observed by its use in civil architecture such as churches, manor houses, bullfight rings, pigeon houses, etc. In Portugal, rammed earth is more commonly observed in vernacular architecture both in urban and rural areas. Portuguese rammed earth is also very rich, but the common use of corrective materials to improve the earth mixture or the addition of other natural materials to reinforce the construction illustrates that rammed earth typologies have a more adaptive use to the environment, mason's know-how and local resources.

There is also a monumental military heritage in the centre and south of the Iberian Peninsula near the major navigable rivers, the coast, or crossing the access routes to the coast. Most of these earthen fortresses were built during the Muslim historical period (8th to 15th century) and consist of a very strong and compacted material, known as 'military rammed earth'. Portugal and Spain have a very important military earthen heritage, with some fortresses having more than 1000 years. To date, Portugal and Spain conserve hundreds of earthen military structures and fortresses. Both countries have had major works addressing the conservation of several of these historical monuments (Vegas and Mileto, 2011).

Cob is rarely used in the Iberian Peninsula and the South of France. Until now, it has only been observed in the area along the border of the Minho International River (north of Portugal and south of Galicia, Spain). In this area, several earthen fortresses were built in the 17th century, during the Restitution War (*Guerra da Restauração*) between the Portuguese and the Spanish kingdoms, resulting in Portugal's independence from Spain in 1640 (Carlos and Correia, 2009, p.425-436). These fortresses are not protected and present a high risk to disappear. The fortresses can be seen more clearly on aerial photographs.

Currently, most earthen architecture research developed in Portugal, Spain and France is undertaken by universities and their research centres. Escola Superior Gallaecia (Portugal), Universidad Politecnica de Valencia (Spain) and CRAterre-ENSAG (France) - have been working closely in European funded research in the last years. National associations and national entities are starting to take a lead. This is the case of the Portuguese Association Centro da Terra, the Spanish network Construtierria and the French association AsTerre. These networks and associations unite common national efforts for the study and documentation of the use of earth, as a building material. However, there is still not enough coordinated research and actions in the re-



Stone and adobe, Mahamud, Burgos, Spain; Rammed earth built between stone masonry pillars (Tapia mixta encadenada), Calabazanos, Palencia, Spain; Rammed earth reinforced with gypsum, Gálvez, Toledo, Spain; Earthen chimney, Vidriales, Zamora, Spain; Rammed earth reinforced with gypsum, Monreal, Teruel, Spain. (photos: Juana Font)

gion. Efforts are isolated and emerge from individuals and a few institutions. A strategic and more systematic research should be embraced to avoid repetition and to respond to different aims, as well as the coordination of efforts

for the development of projects that reach a major impact. This is just possible through an increasing network and commitment among institutions.