

## **STRUCTURAL BEHAVIOUR ASSESSMENT AND MATERIAL CHARACTERIZATION OF TRADITIONAL ADOBE CONSTRUCTIONS**

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### **Abstract**

In Aveiro district, Portugal, earth construction with adobe blocks was a widely applied technique till the middle of the 20th century. Presently, adobe can still be found with abundance in rural and urban buildings, many of which are of architectonic recognized value, and also in walls for the delimitation of land properties and in water wells.

A great number of the existing adobe constructions are in the imminence of ruin, due to pronounced structural damage. This generalized negligence results, in great part, from the lack of maintenance and the limited available knowledge concerning the mechanical behaviour of these structures. In this context, it is recognised the urgency for the development of research work in the structural analysis, rehabilitation and strengthening of this important legacy. The development of this research work is of great value to the reduction of the seismic risk associated to these adobe constructions, the major part of which were conceived and constructed without any seismic concern.

The University of Aveiro has been developing studies and tests to help filling the technical information gap concerning the structural behaviour of existing adobe constructions. The mechanical characteristics of adobe units and mortar samples taken from houses and walls were investigated. Cylindrical adobe specimens were subjected to compressive and “splitting” tests, and prismatic mortar specimens were also subjected to compressive tests. Small wallets, constructed at scale 1:3, with materials representative of those found in existing adobe constructions, were subjected to compression tests, perpendicularly and diagonally to the bed joints. The structural non-linear response of adobe walls has also been investigated in a series of full-scale tests, in the laboratory and *in situ*, with constant vertical load combined with imposed horizontal cyclic displacements.

This article describes the studies carried out and discusses the principal results. These studies aim to establish a basis of knowledge that can support the interpretation of structural pathologies, calibration of numerical models, structural safety assessment, and design of strengthening solutions for the existing adobe constructions, and even support the design and execution of new edifications.