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## Characterization of the Tensile Mechanical Behavior of Wooden Construction on Materials from Historic Building

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### Abstract

Ancient structures are part of the inheritance our elders left us. These historical inheritance needs to be preserved, so the historic structures need to be rehabilitated and restored, protecting the cultural patrimony and attending to the comfort and habitability required nowadays. In order to accomplish a good and economic rehabilitation is essential to study the behaviour of traditional structures elements (masonry and wood) in order to develop adequate assessment measures and techniques. In this context it was carried out an experimental campaign to characterize the tensile mechanical behavior of the woods from the “sequeiro” wood structure, integral part of the “Quinta de Lobeira de Cima” farm. This building from the 20<sup>th</sup> century is located in Minho, Portugal. Tensile Tests were carried out for two different species of wood, chestnut and oak. The tensile tests were performed to obtain the tensile strength parallel to the fibers, using the digital image correlation (DIC) for the extension measurement.

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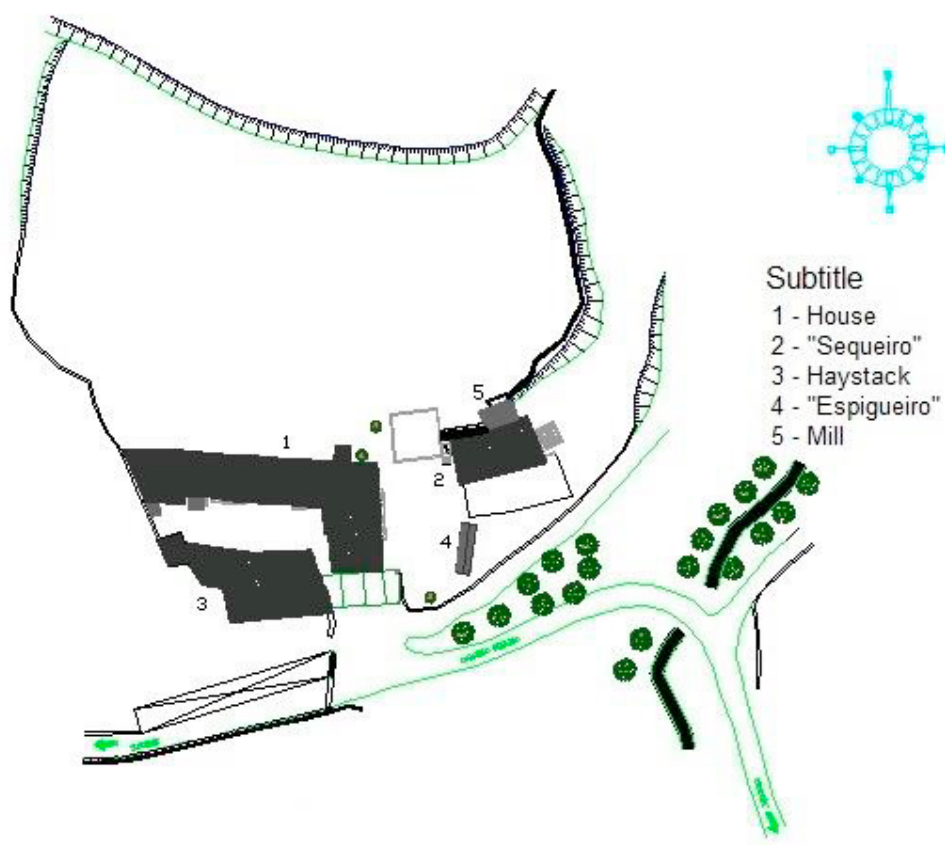
E-mail address: [praposo@inegi.up.pt](mailto:praposo@inegi.up.pt)

## 1. Introduction

Economic and cultural advantages can lead to the choice of preserve the built heritage. In Portugal the rehabilitation isn't a very representative activity in terms of construction volume, so standards or standards/rules to promote rehabilitation of the antique structures are in progress. This paper centers in a "sequeiro" of the "Quinta de Lobeira de Cima" farm, which is an example of various similar constructions existing in Minho (Portugal). In Guimarães county there is various dimensions, materials, dispositions of the sections that composes the houses, etc., but there is three typologies that stand out, which are the house, the "sequeiro" and the "espigueiro" [1]. Few of those secular structures survived till present days, and fewer have their original characteristics, as a consequence of the negligible rehabilitation, such as excerpt and patches [2, 3]. The "Lobeira de Cima" agricultural complex, a typical rural house of Minho, is from the final of the XVII century and beginning of the XVIII century. The farm is composed by a house and annex constructions. The "sequeiro" structural woods from roof (oak and chestnut) were the object of the tensile mechanical characterization presented in this work.

### 1.1. Case-study building

The case-study building is part of a farm located in Felgueiras, Portugal, which has a house and annex constructions such as: "sequeiro", "espigueiro", haystack and mill (see Fig. 1 (a)). In "sequeiro", "espigueiro" and threshing-floor take place the transformation and storage of cereals and other agricultural products. The woods (oak and chestnut) of the roof of "sequeiro" (Fig. 1 (b)) were the object of tensile mechanical characterization in this work.



(a)

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