

Vernacular morphology as a preventive solution of local seismic culture

G. Duarte Carlos, M. Correia, D. Leite Viana & F. Gomes

CI-ESG, Escola Superior Gallaecia, Vila Nova de Cerveira, Portugal

ABSTRACT: Most of the seismic resistant research is focused on the mechanical capacity of modern materials. The reinforcement intervention on structural damaged or at risk heritage addresses most of the time, monumental heritage. To overcome this gap, the Project Seismic-V is presently developing a research based on the identification and reinforcement of the seismic resistant vernacular solutions, considering that through the centuries, communities repaired and retrofitted their houses, in response to strong or frequent earthquakes. This paper intends to address this vernacular heritage still in-use, through the study of Castro Marim vernacular heritage, a village located in Algarve region. The present paper aims to reflect if specific vernacular morphology, concerning the spatial configuration of the houses can be considered also, as a valid response against seismic hazard occurrences. The research focus is on the vernacular houses reinforced with seismic resistant features, but also on the preventive morphological approach addressed through the years by Castro Marim inhabitants.

1 INTRODUCTION

On the framework of the research project “SEISMIC-V: Vernacular Seismic Culture in Portugal”, the identification and characterization of the Local Seismic Culture in Portugal (LSCP) is being undertaken (Correia et al., 2013). The project SEISMIC-V is funded by the FCT (Fundação para a Ciência e a Tecnologia), the Portuguese National Agency for R&D. The project is coordinated by CI-ESG, the Research Centre of the Escola Superior Gallaecia, in a partnership with the University of Aveiro and the University of Minho, through their Departments of Civil Engineering. This research is nationally supported by the Ministry of Culture and internationally supported by ICOMOS-CIAV, ICOMOS-ISCEAH, Chair UNESCO-Earthen Architecture and the European University Centre for Cultural Heritage, in Ravello, Italy.

The overall findings addressed on this paper were drawn during the accomplishment of the Atlas of Local Seismic Culture in Portugal, the first formal result of the project. This Atlas aimed to present the findings that emerged from the location, the identification, the characterization and the comparison of the vernacular forms, regarding seismic resistant approaches in the Portuguese territory.

Through the analysis of each case study, it was possible to verify that most of the identified building cultures are no longer active. However, the overall study of their legacy identified a wide range of approaches, rich in specific solutions that can be preventive and/or reactive to earthquake occurrence. These features also diverged in scale, principle

and nature, regarding strategies of the settlement morphology, building typology, constructive system performance, material properties improvement and/or structural reinforcement solutions.

2 RESEARCHING LOCAL SEISMIC CULTURE IN PORTUGAL

Deprived from planning and numeric calculation, traditional architecture originated, developed and matured a wide range of solutions. These are mainly based on the spatial relation of elements and geometrical inherent properties, regarding the whole performance of the building as a unit and also considering its urban framework. Due to its geographical restriction, vernacular buildings can be, by their intrinsic nature, exponential examples of these approaches. Special cases, as for instance in the southeast region of Portugal, combine a local building culture based on structurally poor materials with a history of regular, but low-medium seismic activity. The selected case studies are suitable to provide interesting seismic resistant strategies, within the aforementioned approach.

2.1 Literature review

When addressing the literature review, it was observed that for a long time, preventive or reactive seismic retrofitting was focused on monumental heritage and very little on vernacular heritage. In the last years, there has been an emergent interest on seismic resistant design and solutions, especially