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A STUDY ON THE PATHOLOGIES OF FOUNDATIONS ELEMENTS IN ANDALUSIA

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1. Introduction

The adequate knowledge of the building pathologies is one of the key aspects that help to understand the performance of the building elements, the intrinsic and extrinsic factors affecting them as well as the errors that can be potentially committed in their execution, both at the project or implementation stages. Andalusia in one of the largest regions in Europe and, to the best of our knowledge, no specific study dealing with the most common pathologies related to the various elements that constitute the foundation of the buildings was available to the date. Only a precedent analyzing structural pathologies nationwide has been found in the Ph.D. Thesis of Vieitez-Chamosa [1]. This research aims at gathering the results obtained through the expert reports of incidents occurred in recent years, obtaining and classifying them to draw useful conclusions that may be of interest for the directors of execution of the work [2]. In this connection, it must be born in one's mind that, according to Professor Lasheras [3], it can be stated that a defect is a lack of quality in origin.

2. Methods

According to Zanni [4] the diagnosis is the most important step in any rehabilitation or conservation work, especially now that the new constructions should not be the main focus of the building sector. In accordance with this criterion, in order to proceed to determine the causes that make it necessary to repair or preserve our housing stock, the pathological causes that lead to pathologies must be known.

To weigh this situation up, the Musaat Foundation promotes this research that has benefited from a documentary source never before used. Court rulings with a judgment, based on the claims registered in 2008, 2009 and 2010 were studied. All these performances were insured in terms of its civil responsibility for the Mutual of quantity surveyors and technical architects of Spain [5] [6] [7]. The total of available data (100% of claims) [8] corresponding to the building facilities under study were analyzed and classified within the following building types:

Building typology	Nr. of pathologies	% of pathologies
Detached house	22	33%
Housing block	20	30%
Semi-detached and terraced houses	11	16%
Rehabilitation Housing block	3	4%
Detached, semi-detached or terraced house rehabilitation	2	3%
Other (residential and industrial)	9	13%
TOTAL	67	100%

Table 1: Pathologies according to building typology.

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3. Results and Discussion

Once the referred expert reports of incidents and the court rulings with judgement were analyzed, the results obtained are shown in Tables 2 and 3 and in Figure 1.

Foundation element	Nr. Patholg.	% Patholg
Walls	36	54%
Slabs	20	30%
Footings	8	12%
Piles	1	1%
Slab on grade	2	3%
TOTAL	67	100%

Table 2: Pathologies according to the foundation element.

Symptom or damages	Nr. Patholg.	% Patholg
Infiltration humidity	42	63%
Fissures of the element	14	21%
Fissures in walls or flooring	10	15%
Slipping	1	1%
Other damages	0	0%
TOTAL	67	100%

Table 3: Pathologies according to symptoms or damages.

Among the five different types of foundation elements that make up the study, the first of them has a remarkable presence; and, more interestingly, the most common damage has a direct involvement with this element, which gives it a very strong impact on the results.

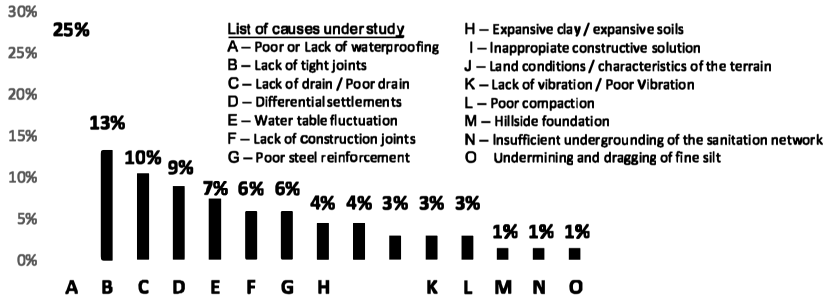

Figure 1: Direct and indirect causes of the pathologies

4. Conclusions

From the results of this study the following conclusions may be drawn:

a-The most frequently affected (84%) building elements are walls (54%) and slabs (30%).

b-The most usual pathology is not related with the lack of mechanical resistance or with the characteristics of the terrain, but with infiltration moisture.

c-There is a significant relationship between the elements exhibiting the largest number of pathologies and the most redundant damages.

d-In accordance with all the above exposed, causes A, B and C in Figure 1 are also the most frequently found with 48% (25%+13%+10%) of the total.

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