PROHITECH '17

12-15 JULY 2017 LISBON | PORTUGAL

3rd INTERNATIONAL CONFERENCE ON PROTECTION OF HISTORICAL CONSTRUCTIONS

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TITLE
Prohitech'17 – 3.ª International Conference on Protection of Historical Constructions

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DESIGN
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PAGE LAYOUT
Marcos Mateus

COORDINATION AND GRAPHIC ART PRODUCTION
Manuela Morais | IST Press

PRINTED AND BOUND BY
Guide - Artes Gráficas, Lda.

ISBN
978-989-8481-58-0

NATIONAL LIBRARY CATALOGUE
N.º 427586/17

1.ª EDITION
300 copies, July 2017

IST Press
Director: Pedro Lourtie
Instituto Superior Técnico
Av. Rovisco Pais, 1
1049-001 Lisboa
Portugal
ist-press@tecnico.ulisboa.pt
Tel.: 351 218417686 / 21 8417659
istpress.tecnico.ulisboa.pt

FIRST PUBLISHED IN PORTUGAL IN 2017
BY IST PRESS COPYRIGT@ 2017, FUNDEC, INSTITUTO SUPERIOR TÉCNICO

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MEASURES FOR RESOURCE AND SUSTAINABLE PRACTICES MANAGEMENT IN BUILDING REHABILITATION

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KEYWORDS: Materials, Resources, Rehabilitation works, Sustainability, Management, Buildings.

ABSTRACT

The rehabilitation of buildings is a kind of practice that involves an improvement of the comfort and building habitability conditions through the reuse of existing resources. However the rehabilitation process has not, at present, standard solutions different of those from new construction, and sometimes requires ingenious solutions and specific knowledge by all stakeholders, especially designers and builders. Portugal has many buildings with rehabilitation needs, and this pattern concern not only old buildings but also the more recently built ones.
The reuse of material resources existing in buildings that aligned with the adoption of environment concerns materials could balance the embodied energy and water and also emission reduction. In addition, the reuses of these materials decrease the natural resources extraction and could promote buildings energy efficiency when compared to new construction practices.
On the other hand, the human resources chosen must have experience and expertise in rehabilitation works but this is not always an easy task. Most of construction companies involved in building rehabilitation works, as well some designers and other construction technicians, treat them as new construction, disregarding the specificities of the former works. However, efficient construction procurement could facilitate this process, if it is done though design/build proposals. The construction procurement could also adopt a management contracting process which requires a specialized contractor presence to support the design phase development.
This article describes a set of measures to support the project management process during building rehabilitation works. These measures stem from the results of a questionnaire survey conducted on designers and other technicians involved in the design and construction of building rehabilitation works. The set of proposed measures could facilitate the skilled labour and material resources management, which is focused on the principles and assumptions of sustainability. In addition, it could also give a contribution to devising different ways to organize and manage works in buildings with rehabilitation needs.

CONCLUSIONS

The article presents a study of several structural options that can bring sustainability benefits in the rehabilitation of an eighteenth-century building. The survey of the existing constraints was exhaustively described and analysed in the project design phase and supported by the "*Retrofitting management system for buildings located in consolidated urban areas*", hereafter called management system [1]. This management system adds to the management of old buildings rehabilitation works, compiling in 50 parameters various practices to support the management of building rehabilitation works. A set of 3 possible structural options were considered to meet the structural requirements and constraints of the building, namely:
- Option A – Foundation in concrete. Wood flooring on wooden structure (similar to existent ones) with some metallic elements for reinforcement;

- Option B – T beam and block system slabs. Pillars, beams and foundations are in concrete (similar to new construction).
- Option C – Foundation in concrete, beams and pillars in steel structure and steel decking for concrete floors slabs.

A decision support was devised considering a scale of interest ranging from 1 (least interesting) to 3 (most interesting) and attributing percentage levels to the analyzed variables [2]. The assignment of the percentage levels was the following: Factor F1 - 30% for recommendations and solutions from management system parameters [1]; Factor F2 - 30% for advantages and disadvantages; Factor F3 – 40% for environmental impact categories quantification [3]. Table 1 presents the percentages, scale decisions choice and calculations results between different options.

Table 1: Calculation results of structural options studied

Option	Factor F1 (30%)	Factor F2 (30%)	Factor F3 (40%)	Results
A	1	1	3	1,8
B	3	2	1	1,9
C	2	3	2	2,3

The option C has better results and involves the use of a steel structure (beams and pillars in steel structure and steel decking for concrete floors slabs), figure 1. On the other hand, the option A is the one that has the lowest results in the quantification of environmental impact categories, but option C is the one that has the most advantages in relation to the specificities of the building. It allows reversibility, quick assembly and is the one that best responds to the existing constraints.

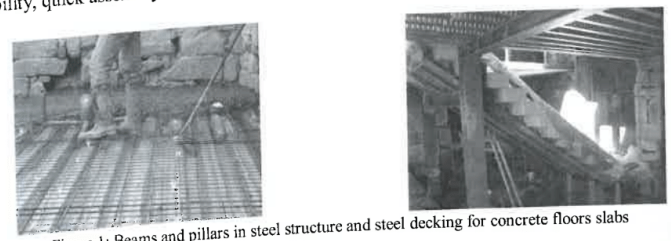

Figure 1: Beams and pillars in steel structure and steel decking for concrete floors slabs

In addition to these facts, Option C allows greater durability and does not require large maintenance requirements during the time frame of the works: demolitions, structure and roofs in 2012 and only equipment's and finishing in 2025. This weighting also allows us to understand that the reuse of existing materials makes the intervention more sustainable and with less impact on the environment [3]. This paper presents in a simple way the analysis of several requirements that are expected to be considered in building rehabilitation projects. In this sense, it sheds more light on the importance of rehabilitation. The main goal of this paper is guarantee a more effective response to the specific problems and constraints of each rehabilitation work, related to planning, deadlines, cost increases, changes, non-contractual works, among others, raising a sustainable construction [1].

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