

# Accessibility adaptation of a building in a historical city centre

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## ABSTRACT

This paper will discuss the accessibility adaptation of an old building located in the historical centre of Guimarães, Portugal. The city of Guimarães is located in the region of Minho, in the northwest of Portugal. The history of Guimarães is close related with the foundation of the Portuguese nationality. The city old centre has a unique atmosphere of old buildings, narrow streets and squares giving a meaning to the cultural heritage, which is the everyday reality for the local population. In 2001 the historical centre received the UNESCO World Heritage award.

Having in mind transforming this old and historical building in a place more convenient to receive and provide support for handicapped persons, a study was performed in order to verify the possibilities of changing its accessibility. To carry out that study, an inquiry of the needs and expectations of the users was done. Several accessibility technologies and technics were checked in order to verify their adequacy with the regulations and space possibilities for their adoption. The architectural integration of the technically adequate solutions was considered and thus the range of usable solutions was even more restricted. Finally, the remaining two possible solutions were detailed studied in terms of project design and financial costs. The selected solution was not the less expensive but the one that can be implemented quicker and with less interference with the architecture.

## 1. INTRODUCTION

The Municipality of Guimarães has managed to rebuild an old facility dating back to the 19th century. The building has lately become to be the Municipality's office for social support to handicapped persons, named Social Action Division. As the building was not adapted to this new function, the users are having huge difficulties in accessing the services and offices. The rehabilitation project gave a good opportunity to study various technical and architectural options to improve a better accessibility as well as their value and impact in relation to the other design aspects like preserving cultural heritage. The studies for the building project were made in a close collaboration environment between the Municipality and the University of Minho.

The goal of the renovation project was to achieve a good level of accessibility and functionality for all groups of users and visitors of the building. In the parallel study, the possibilities of adopting the principles of the Design-for-All approach were analysed as a starting point. In the architecture and urbanization, the accessibility has been a constant concern in the last decades, becoming an important need for the development and the right to the citizenship.

## **2. DESIGN-FOR-ALL**

### ***2.1. Needs to a new design approach***

The accessibility concept doesn't just mean to allow that handicapped people participate in activities that include the use of products, services and information, but also, the involvement and enlargement of the use of these, for all the population, including the people with physical limitations. Any building should be endowed with the best exterior and interior accessibilities, to minimize the difficulties for the people with reduced mobility.

The solutions can be for instance ramps, lowered large hewn stone walks, lifts, and a wide panoply of mechanical means with the purpose of serving and facilitating the mobility of their users, always respecting the adequate dimensions in order to make possible the accessibility for all.

The accessibility learning outcome is achieved through the analysis of the architectural limitations imposed nowadays. The recognition of the existing architectonic barriers will help the designers to understand the difficulties and will make them to apply the concepts of social integration to the built environment.

The introduction of the accessibility concept close to those professionals will serve as catalytic factor so that the design guidelines and legislation are applied in the best possible manner and in this way the built spaces can satisfy the requirements of the population, independently of people's physical and sensorial characteristics.

### ***2.2. Principles of Design-for-All***

The principles of the Design-for-All (Universal Design) help to develop the built environment and its technologies in such a way that cities will be pleasant and supportive places for everybody.

The market of Design-for-All includes everyone at some point in their lives.

In the Norwegian Document "Universal Design - Planning and Design-for-All", guidelines are given for architecture and design process in the following way:

- the building should be of equitable use and accessible for everybody
- the building and its design should be easy to understand and to use by all people
- the design of the building should demand low physical effort, and be used efficiently and with a minimum fatigue
- the whole building/project should be designed for use by all people, regardless user's body size, posture and mobility
- the building's use of materials and the indoor climate should not lead to uncomfortable conditions

### ***2.3. Existing legislation***

According to the United Nations Organization, 10 to 15% of the population has some kind of deficiency. In Portugal, the legal context that supports this significant part of the society dates from the middle of 1997, Decree-Law no. 123/97 of May 22, 1997, issued by the Solidarity and Social Safety Ministry and, ever since, no significant alterations were made.

The Decree-Law no. 123/97 has a quite wide application area relatively to the mandatory elimination of architectonic barriers in the access to the facilities of public services and private buildings. This legislation is one of the best examples of a code that thoroughly explains almost all the technical norms for the improvement of the citizens' accessibility with conditioned mobility. Urban planning, accesses and mobility at the buildings are some of the areas of specific intervention to which this legislation offers support.

### 3. REHABILITATION OF THE ACCESSIBILITY OF A SERVICE BUILDING LOCATED IN GUIMARÃES' HISTORICAL CENTER

Although the building in study is of public character, it does not gather the accessibility conditions that make possible its normal operation and it does not accomplish with the applicable legislation.

The building is located in Guimarães' historical centre that possesses, according to the last censuses, 7199 people with deficiency, 16323 inhabitants with 65 years or more and 45 victims of serious wounds in accidents, and in the total there are about 25594 people with reduced mobility.

This paper intends to study and to analyze several construction solutions and equipments that can improve the accessibility for all to the building, based on the principles of the Universal Design. The study intends to achieve the better solution for the adaptation of the building.

#### 3.1. Characterization of the building

The building to which this study refers belongs today to the Municipality of Guimarães and was built in the 19th century. It was designed to be a residential building and in the beginning of the 20th century was transformed into a Police-station. Some years later, the building was transformed into an elementary school and lately became the Municipality's office for social support to handicapped persons, named Social Action Division. Figures 1 and 2 present the East and North façades of the building. As the building was not adapted to this new function, the users are having huge difficulties in accessing the services and offices that are located in the upper floors and even, in some cases, to move in the same floor due to the difference in level observed between adjacent compartments.



Figure 1 – East Façade of the Municipality's office for social support.



Figure 2 – North Façade of the building.

#### 3.2. Study of the needs and expectations of the users

In order to understand the needs for the rehabilitation of the building accessibilities, a detailed site inspection was carried out and an inquiry to the users of this public service was also realized.

The inquiry was constituted by fifteen direct answer questions being half of them of personal nature and the other half about collective issues. In the last question the users were asked to express their own opinion about the solutions that they would propose to improve the building accessibility and comfort. The inquiry was performed during three working days and was answered by fifty persons.

The personal questions were meant to characterize the persons that frequently visit the building and they were very helpful to know the background of the given answers. The average age of the answering persons is about 50 years and most of the people who use this service is between 20 and 50 years old. The frequency of the users' visits to this service is about 5 times per month.

The questions placed to the users had the aim of verifying people's sensibility to this theme and of knowing their opinion about the location of this service, the quality of the external and interior accesses, the quality of the materials, the architectonic barriers and

the impact of these subjects on the quality of this service. It was also asked what is the users' believe regarding the architects and engineers sensibility about subject "accessibility".

The results of the inquiry showed that the users' opinions are almost unanimous. The major conclusion is that the building is well located in the city however, in what concerns the external and internal accessibilities, the building does not have operation conditions to be used by all of the people, namely by those with reduced mobility and elder people. The main flaws that stand out are: steep stairs, high walk guides, inexistence of handrails, anti-slippery materials and of floor high-relieves that can guide blind people (Figure 3).

It is important to enhance that the answer relatively to the architects and engineers sensibility about this subject of the accessibility it is unanimous: all inquired answered that does not exist care or sense when the accessibilities are created.



Figure 3 – Accessibility problems observed in the building.

## 4. STUDIED SOLUTIONS

### 4.1. Description of the studied alternatives

After frequent and detailed site observations it could be concluded that the necessary intervention will be limited by the appearance, the location, as well as the age of the building, because it presents characteristics that do not offer great flexibility to perform adaptations. Consequently, only a limited number of solutions ought to be studied:

- Implementation of an interior vertical lift in the East area of the building;
- Implementation of a panoramic vertical lift in the North area of the building;
- Implementation of a smooth tilted access ramp surrounding the building;
- Implementation of a lifting platform for wheel chairs and for standing persons in the main staircase of the building;
- Implementation of lifting chairs in the external and interior stairways of the building.

The referred solutions were analysed in detail from several points of view like the architectonic integration, the occupied space, the structural fixing solutions, the time needed for the intervention and functional implications, the fulfilment of the legal requirements and all the respective associated costs.

### 4.2. Selected solutions to be adopted

- Vertical communication:
  - Interior vertical lift in the East area of the building
  - Lifting platform for wheel chairs and for standing persons in the main staircase of the building
- Horizontal communication:
  - Ramps for wheel chairs or equivalent to access the building and ground-floor interior compartments

Figures 4, 5 and 6 present a sketch of the three solutions selected.

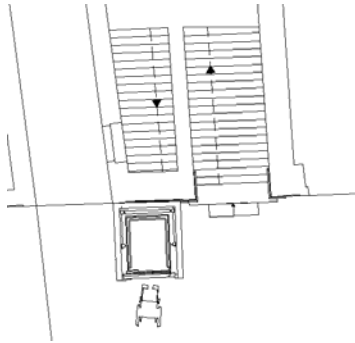


Figure 4 – Vertical lift.



Figure 5 – Lifting platform.



Figure 6 - Ramps to access the building.

These solutions differentiate from others by their excellent functionality, minor aesthetical impact and the better relationship between the price and the correspondent benefit. All of these selected solutions fulfil the legal requirements established by the national legislation.

#### 4.3. Criteria for the selection of the solutions

The most relevant data that based the choice of the selected solutions to improve the vertical and horizontal accessibility is presented below:

- **Vertical communication:**
  - Interior lift without machine room

Two international companies were invited to present their best solution to improve the vertical communication in the building. Both companies proposed interior lifts without machine room to be installed in the East area of the building. The essential points to compare both proposals are presented in Table 1.

Table 1 – Comparison between the two proposals for implementation of a vertical lift.

Description	Proposal A	Proposal B
Maximum travels per hour	240	180
Saving energy system	Yes	No
Time of delivery and assembly	4/6 months	6 months
Doors' Fire Resistance	90 minutes	60 minutes
Price	21359€ + VAT	21000€ + VAT

From the analysis of the two proposals it can easily be concluded that proposal A is the most advantageous in what concerns technical characteristics in spite of being slightly more expensive than proposal B.

As this building is a service building, it is expected that the number of uses is high and so the maximum number of travels per hour becomes an important parameter. As proposal A ensure a number of travels 33% higher than proposal B, proposal A is more advantageous. In this proposal, the doors to the landing of the staircase have also a higher fire resistance and a delivery time that can be 2 months less than proposal B. The price of proposal A is a little bit higher than proposal B but, as the lift of proposal A has a saving energy system, the long run costs will be lower for lift A than for lift B. Taking into account all the technical and economic aspects, it was decided to accept proposal A, instead of the cheaper proposal B.

- Lifting platform for wheel chairs and for standing persons in the main staircase of the building

As in the previous case, two companies were invited to present their best solution to implement a lifting platform for wheel chairs and for standing persons in the main staircase of the building. Both proposals were equivalent in terms of technical characteristics and price. The prices offered for the implementation of a lifting platform were similar to the cost of the vertical lift. The selection criteria will be the shortest time for delivery and assembly that each company will guarantee.

- **Horizontal communication:**
  - Portable access ramps

In order to improve the horizontal communication at the ground level of the building, several portable access ramps will be installed. Since for the implementation of this kind of solution it is not necessary to make changes in the building structure and it is not requested specialized work, prefabricated ramps will be selected. A brief market inquiry showed that the prices of portable access ramps are not very expensive and vary between 184€ to 500€.

## 5. CONCLUSION

The accessibility concept stands for the complete social inclusion, being present at very different levels, as for instance at the level of public transportation, means of communication, work places and public roads, among others. Although, it is easy to verify that in reality these locals and/or equipments of common access do not have the necessary conditions of accessibility for all people. Consequently, some of the basic citizenship rights are blocked for all the people with reduced mobility.

The Design-for-All is fundamental for the complete integration of whole society, creating a built environment appropriate to anybody independently of their physical capacities. The development and improvement of the Design-for-All should be performed through tests to the users, in an analysis process, that allows to understand which is the best scenario and which is the best solution to adopt in a specific situation.

After a careful analysis of the building, several solutions were considered and evaluated in terms of their characteristics and implications with the structure and/or functionality of the building. The analysis was based on several parameters as the aesthetic impact, the duration of the works, the conflicts with the operation of the services, the useful space taken, the associated costs, having in mind the fulfilment of all legal requirements stated in the national legislation.

The final solutions adopted were: two solutions for the vertical communication, that are the implantation of a vertical lift without machine room supported by a metallic structure and a lifting platform for wheel chairs, with the possibility of transporting seating and standing people. The solution for the horizontal communication consists in the installation of portable ramps in the building's ground-floor. This solution solves easily the problem created by the existent unevenness of the interior spaces.

The results of this project emerged from a close collaboration between University of Minho, Municipality of Guimarães, stakeholders and the end-users. This new approach could bring together different knowledge and perspectives that made possible to learn the real needs and problems of disabled people and to achieve, in advance, effective rehabilitation solutions.

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