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Aspects Regarding the Monitoring of Heritage Buildings

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***Abstract* – In this paper, the authors analyze the deficiencies found in heritage constructions in urban sites, the cause of the identification of the facts and at the same time propose conservation and monitoring measures in order to save the existing heritage, the valuable constructions, the identity of the community.**

The case studies analyzed are the results of research made in the Historical Center of Brăila Municipality, identifying an appreciable number of buildings, some historical monuments, others included in the historical center, having valuable elements for which a constructive attitude of conservation and restoration must be adopted.

For an immediate future stage, the authors do not consider the need to promote a restoration project but an attitude of conservation and protection.

Keywords – causes of degradation of historical buildings, examples of structural degradation, heritage buildings Brăila Municipality

1. INTRODUCTION

The monitoring activity involves analyzing the behaviour of buildings over time in order to take appropriate measures for their conservation and protection.

We mention the fact that in Romania the protection of historical monuments is more than 150 years old, considering that in 1890 the first structure with such attributions was created, namely the "Honorary Commission of Public Monuments".

The position of this Commission was strengthened by the appearance of the first Law on the conservation and restoration of public monuments.

Approximately over 10 years later, in 1913, the law is supplemented and harmonized with principles regarding the research of historical monuments in order to apply suitable restoration measures.

Through this law, notions such as: protection zone or expropriation for a cause of major interest, are introduced.

Through the adopted procedures, a series of principles are regulated for the first time regarding methods and techniques, compatible and suitable materials for monuments.

Subsequently, the Venice Charter also called the International Charter for the Conservation and Restoration of Monuments and Sites, formulates a series of very clear principles, emphasizing the research of the monument before the adoption of intervention measures, the recording of the intervention, the principle of the reintegration of the monument, the principle that no intervention should damage the monument, the intervention be reversible, legible, with materials and compatible methods.

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Any heritage building is found to face a more or less aggressive degradation process during its operation, degradation consisting both of external factors that damage the monument but also through human activity when traditional or contemporary crafts and practices are not mastered.

This concept was developed after 1975, respectively after the Amsterdam Declaration when the concept was accompanied by the phrase "integrated conservation".

At the present time, we appreciate that special emphasis must be placed on measures aimed at conserving the monument, blurring the degradation process or slowing it down.

This stage is known as the 3rd phase in conservation and restoration and is attributed to protection and monitoring activities.

2. CAUSES OF DEGRADATION OF HERITAGE BUILDINGS

Recently, we are faced with a less pleasant image of some buildings that used to shine through their imposing architecture as well as their occupants.

We find that in many situations their non-use, but also an improper administration accentuates the degradations, their impact on the construction structure being progressively geometric.

We find that equally, the lack of maintenance work and an attitude of artisanal restoration bring important damage to the image of these buildings.

One of the important factors that depreciate buildings is moisture.

Moisture in its various forms, such as the penetration of rainwater through non-tight roof coverings, through degraded or improperly dimensioned gutters and downspouts, cause significant damage to facades, as well as the moisture that persists in the soil caused by exfiltration from water-carrying pipes, or the lack of protective sidewalks, aspects that lead to the appearance of cracks, the initiation and development of a state of deformability.

Such situations have degraded the heritage building to the point of non-recovery, being subject to demolition.

Fig. 1 Moisture due to the penetration of rainwater through degraded gutters

Fig. 2 Moisture due to the penetration of rainwater through degraded gutters

Fig. 3 38 B-dul Al.I.Cuza Street – Grinding effect of plaster due to moisture

Fig. 4 10 Marăsti Street – Degradation of the brick due to the phenomenon of repeated freeze-thaw of stagnant water on the surface of the wall

Fig. 5 6 Danube Street - Degradation of the brick due to the phenomenon of repeated freeze-thaw of stagnant water on the surface of the wall

Another factor is degradation by salt crystallization. It is a phenomenon found in porous materials, including brickwork.

The crystallization of salts leads to the degradation of the brick and the substantial decrease of the characteristic resistances. The water that infiltrates into the pores of the material carries polluting substances that it previously dissolved and which, with the evaporation of the water, crystallize in the pores of the material. Therefore, let's understand that the phenomenon of crystallization of salts presents a great danger for the durability of a historical structure.

Another degrading factor is degradation by pollutants that are different from the mineral salts that appear dissolved in rainwater. These being atmospheric pollutants, acid rain. It is a degradation caused by inorganic or biological chemicals that act on both the stone and the bonding mortar. The most harmful are sulfate compounds that can create an acidic environment in the presence of water.

As is well known, rain is naturally acidic. In conditions of low humidity, the effect of atmospheric pollutant deposits is very low, but with the appearance of humidity (moisture from the ground or humidity due to exfiltration from pipes) it is observed that the effect is more aggressive.

Another cause of degradation is degradation by biological attack. This is caused by plant mosses, fungi and bacteria growing on the bonding mortar often acting on the masonry stone.

Another cause of masonry degradation is the possible fires that have occurred over time and which considerably reduce the resistance of the bricks, but additionally the effect of fire extinguishing water at the level of the bridge can generate the appearance of fungi or other bacteria that degrade the wood.

The authors of the article did an in-depth analysis on brick masonry constructions in the South-Eastern area of Romania, constructions that are historical monuments or that are part of the historical centre.

It should be mentioned that the Municipality of Brăila has a valuable built fund, built mainly in the second half of the 19th century by large merchants, large ship owners of different nationalities, given the fact that Brăila was considered a multicultural center being the only port in Europe where the price of grain was set.

This aspect contributed to the development of the city through the presence of European-level economic relations, the establishment of many Greeks, English, Italians who built important edifices.

Among them, we can mention buildings made on the basis of projects designed by famous architects, such as:

- Residential buildings:

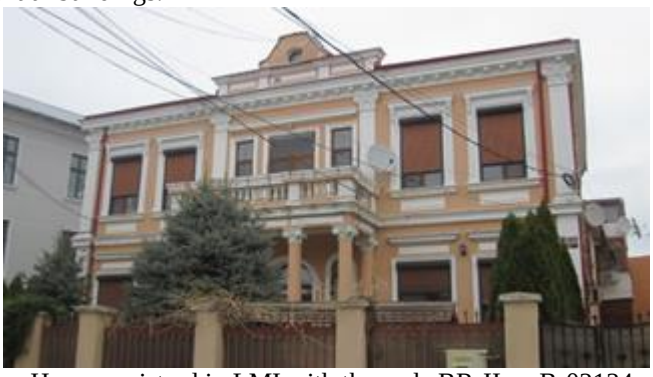

Fig. 6 Manos House registred in LMI with the code BR-II-m-B-02124 – from 1912

Fig. 7 Embericos House, today "Nicăpetre" Cultural Centre registred in LMI with the code BR-II-m-B-02068

- -Administrative buildings:

Fig. 8 "Rally" Theatre, today "Maria Filotti" Theatre registered in LMI with the code BR-II-m-B02097, which over time bore the following names: Rally Theatre, Royal Theatre, Communal Theatre, State Theatre

- Places of worship:

Fig. 9 Greek Church "Buna Vestire" registred in LMI with the code BR-II-m-B02076

- Industrial buildings:

Fig. 10 Violatos Mill registred in LMI with the code BR-II-m-B02127

Fig. 11 Valerianos Lykiardopoulos Factory registred in LMI with the code BR-II-m-B02133

The studies and research made by the authors have highlighted the persistence of moisture in most of the historical facades, its effect being mostly the degradation by grinding the external masonry, in many cases this due to a lack of attitude on the part of the owners or administrators leading to the collapse of the buildings.

Fig. 12 Mold on the damp wall

Fig. 13 Mold on drywall

From the tests made by the authors on bricks that were subjected to the phenomenon of moisture and then were dried, they found that the volume of the brick is reduced by drying, but in many situations the compressive strength is also affected.

Another effect generated by brick drying is the decrease in adhesion between mortar and brick, which is why it is recommended that after applying the masonry drying process, the walls should be treated with a moisture blocker.

As we shown, brickwork can deteriorate through biological attack.

Another degrading factor for masonry is the unauthorized interventions, such as the use in the finishing system of cement-based plasters that do not allow the penetration of water vapour from the brick to the outside. In this context, a decisive role is the analysis of the constituent material so that the finishes are compatible with the mortars with which the masonry was made.

The authors studied the degradations that appeared over time at the buildings located in the Historical Centre of Brăila Municipality.

As is known, the studied site is characterized by a macro porous soil sensitive to wetting. Or, not infrequently, the exfiltrations from the water-carrying pipes generated deformations by cracking the masonry, differential settlements, sometimes the collapse of some walls, where underground galleries ("hrube") were also identified on the site.

An important factor is the behaviour of heritage buildings in seismic actions.

In general, such constructions having a massive structure did not have important depreciations.

Fig. 14 11 Vapoarelor Street – Weakening of the chimney section

The main degradations identified after a seismic movement were the separation of the blind walls, the failure of some metal braces, the failure of the gables, cracks or collapse of the chimneys, and for the buildings with a level regime over 4 m, cracks were recorded in the brick walls above the window.

Of course, all these depreciations were also favoured by a series of degradations that appeared over time, such as: the lack of proper anchoring of the blind walls on the attic area or the lack of anchoring elements for the gables, or the weakening of the chimney sections due to smoke losses through the wet element (smoke becomes aggressive for masonry in the presence of moisture).

After each seismic action, in most situations no appropriate consolidation measures were taken, so that every time the old constructions face the effects of the seismic action under the conditions of a reduced load-bearing capacity.

Fig. 15 7 Vapoarelor Street – Inclined crack extended over several asises

Fig. 16 9 Calea Călărașilor Street – Vertical separation crack

Some social aspects are also important such as the fact that the most valuable heritage buildings in the List of Historical Monuments were built with the function of housing, for a family, with a functional space suitable for people with financial power at the time of construction.

After nationalization, they were administrated by the state and were occupied by a much larger number of people, sometimes for the larger constructions they became collective housing.

In the years that followed, the tenants built or refunctionalized their space through artisanal partitions, by connecting additional facilities, so that each family could secure a housing unit according to their own requirements.

These interventions were done independently, artisanal, often without approvals and agreements; in most cases such works causing substantial damage to the monument constructions.

Fig. 17 11.Frumoasă Street – Interventions on historical constructions: modification of window openings by nonwoven masonry fillings

Fig. 18 9 Rubinelor Street – Interventions on historical buildings: modification of window openings by masonry fillings

All these interventions contributed to their degradation.

After this period, with the retrocession of the buildings of the former owners, some expressed the desire to return the building to the requirements and demands of the past, but many also abandoned the building, following a process of natural depreciation generated by non-use, by the lack of intervention works.

Fig. 19 11 Malului Street – Abandoned building

Fig. 20 Building on Mihai Eminescu Street – Collapsed floor

In this context, at the current stage, as it was shown in the first part of the article, the local public authority through various methods and measures wants to acknowledge the obligation of the owners and administrators in the conservation and monitoring procedure in order to take the necessary measures to ensure limited safety, to stop the degradation process by eliminating the causes and initiating an attitude of respect for the principles of integrated protection.

3. CONCLUSIONS

In order to protect the heritage buildings, it is necessary for the interventions to be made by certified specialists in the field of architecture, engineering, biology, chemistry,

physics, restoration of artistic components, landscaping, who propose solutions to restore the monuments while preserving the historical substance.

An important factor in the maintenance activity of historical monuments is monitoring.

The monitoring is concluded by making a report that should contain an assessment of the actual technical condition, an assessment of the state of conservation as well as an assessment of culturally valuable elements, monuments or protection areas.

Another important element of the report is the establishment of the plan of measures and their evaluation. The plan of measures is an integral part of the monitoring documentation.

The monitoring reports must be following up by specialized, certified personnel, and they are made both for historical monuments and for historical protection areas, historical centres.

It is recommended to provide an annual report, as well as some summary reports at a period that UNESCO recommends every 6 years.

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Note:

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