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## THE NECESSITY OF PERFORMING CURRENT MAINTENANCE WORK ON BUILDINGS

BY

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**Abstract.** The built environment on the national territory is permanently affected by the lack of current maintenance work on buildings. This can have serious consequences on medium and long term. Often, the costs of ensuring a specialist for observation and current maintenance work are much lower than the cost of repair work due to lack of maintenance. This paper presents a series of degradations that are currently found on buildings, as well as some case studies of buildings with severe degradation caused by the lack of current maintenance work.

**Keywords:** buildings; degradations; health monitoring; maintenance.

### 1. Introduction

The construction industry nowadays is so focused on developing new materials, techniques in order to be more time and money effective that sometimes forgets about the existing built environment. This is why many buildings are poorly maintained leading to increase their vulnerability for its inhabitants and even in case of a natural hazard (Suffian Ahmad, 2013). The maintenance of a building may seem a complex and expensive process, but if it

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is carried out wisely it could save money besides potentially extending the life of the construction. The preventive and corrective processes are usually involved. The paper presents first some general common defects which could be corrected by proper maintenance and in the second part some examples of buildings damaged to different degrees due to poor maintenance.

## 2. Classification of Common Building Defects

Construction's maintenance after commissioning it is essential. Among the works that need to be carried out are: cleaning gutters, removing snow from the roof in case of massive snow falls, checking the water and gas pipes, treating wood elements against insects and mites, the metallic elements against corrosion and so on.

The defects to the background can occur in various shapes and to different extents no matter the age of the building. The varieties of building materials used, construction techniques, use of unsuitable construction details, extreme site conditions undermining performance codes, natural deterioration are among the causes from this category.

The aging of the material represents an important cause for structural degradation. Fig. 1 presents to what refers the aging of the material. The technological sheets of the materials have specifications for the maintenance work in order for the materials to behave similar to its original state. The Building Book contains information on the life span of the materials, offering suggestions on when they should be replaced (installations, wood elements, bitumen roof). In special constructions the chemical agents effect can lead to non-structural and even structural damage.

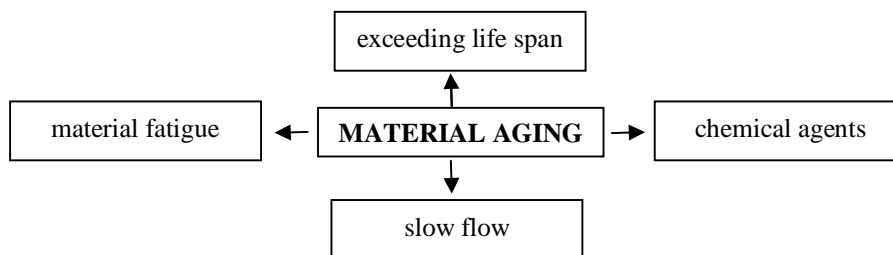


Fig. 1. Causes for material aging

The causes for building defects are complex and usually when referring to poor maintained more factors are involved (Building Maintenance Guidebook). A list of common defects should include:

- defective concrete, spalling or loose of plaster in the ceiling;

- water infiltration from external walls, window, roof or from ceiling;
- structural cracks in walls, columns and beams;
- non-structural cracks;
- defective external wall finishes/mosaic or ceramic tiles/stone cladding/curtain wall.

In order to avoid defect in building services installation is recommended to have a planned schedule for foreseeable servicing and replacements of the components which have shorter life span in comparison with the building structure. Is good to avoid the exhaustion of such components, in this way preventing sudden breakdown of services that causes undesirable or even disastrous consequences. All types of installations may suffer defects: the water supply system, the electricity supply, the fire services, lifts and escalators and the air conditioning/heating.

On a larger scale defects at the slopes and retaining walls may cause serious damage to buildings. In this category should be considered the problems that may occur at the foundation soil. Among the causes which lead to foundation problems are: the increase with 1mm of the groundwater every year due to heavy rain, water infiltration due to rain or poorly designed drainage system or leakages from the pipes, and the missing of supplementary measures for wet-sensitive soils.

### 3. Examples of Maintenance Mistakes

Generally, monuments are among the most affected buildings by the lack of maintenance due to the fact that the authorities imply frequently the lack of funds. However, most of the observed defects are found also at common buildings. The encountered problems vary from very simple to complex ones.



Fig. 2 – Damaged roof of a historical building.

In Fig. 2 a damaged roof of a monument is presented. This occurs either due to lack of funds or due to difficult access in order to do the maintenance work. This can lead to water seepage which initially harmless can become a danger for the masonry structure.

A common maintenance problem is represented by gutters and pipes absence for rainwater drainage, Fig. 3. This lead to visible degradation of the exterior plaster and sometimes even the masonry.



Fig. 3 – Exterior damage of a historical monument due to rainwater leakage.



Fig. 4 – Sidewalks degradation allowing water infiltration.

More dangerous are the damages that we do not see. Here are included the water infiltration due to sidewalks degradation, Fig. 4. These waters may reach the basement and even the soil underneath the foundation generation different settlements.

The different settlements lead to vertical cracks which damage the structural system, as you can see in Fig. 5. The rehabilitation of this type of building is very difficult, a more economic solution being to demolish it and rebuilt a new one.



Fig. 5 – Damaged house due to problems at the foundation soil level.

A relatively new hospital has come to need extensive rehabilitation works due to poor maintenance of the installation system. After a second expertise it was stated that the building presents significant damages at the level of structural elements in the basement due to inappropriate exploitation (in this case water and chemical leakage from the laundry and kitchen). The found damages may affect the strength and stability capacity of the structural elements of the building. Fig. 6 shows the state of degradation for the technical basement due to the seepage of the sewer system which caused aggressive waste water to stay for many years. The effects were: the carbonation of the concrete and the corrosion of the reinforcement from column, beams and floors. No significant structural degradation occurred yet.



Fig. 6 – Structural elements degradation due to poor maintenance at the water system.



Fig. 7 – Extensive reinforcement corrosion of the slab over a technical basement due to water and chemical seepage.

The extensive corrosion of the bottom reinforcement for the slab above the basement is the result of the water and chemical vapor, Fig. 7. The reinforcement state which has completely disappear in some parts, endangers the ground floor of the building by the possible collapse of the floors.

In order to rehabilitate the basement of the hospital, the following solutions were proposed: column strengthening by angle profile, which does not increase significantly the load on the foundation systems and slab rehabilitation with composited sheets. Both of the methods have simple technology and do not require restrictions regarding the use of the hospital.



Fig. 8 shows what can happen if periodical maintenance works are not performed, not only at the structural system, but also at the installation system. Is the case of four floors building with apartments where the inhabitants have reported the smell of gas, but no action was taken. The result was an underground explosion which destroyed the floor and the ground floor of the block of flats. Beside the material losses and temporary evacuating the building, two innocent people have died in this accident. Further investigations and undergoing in order to determine the responsible.



Fig. 8 – Explosion effect due to gas seepage.

In Fig. 9 a decayed building body from an old factory is presented. This type of degradation can be seen all over the country. Thousands of square meters are occupied by damaged buildings and no positive change will happened in the next future due to lack of money or concern.



Fig. 9 – Decayed building.

In addition to the examples presented in the article are many more. The main objective of the paper is to show the effect of negligence during the lifetime of a building and that always prevention is better than cure. For each damaged building there is at least one person responsible for its state.

#### 4. Conclusions

The maintenance of a building could save money and extend the life of the construction. The preventive and corrective processes are initiated by a specialist responsible with the building health monitoring. General common defects which could be corrected by proper maintenance and examples of buildings damaged to different degrees due to poor maintenance are presented. The understanding among beneficiaries, investors or public institutions regarding the need to prioritize current maintenance works will lead to an overall improvement of the buildings health state as well as to the reduction of repair costs.

#### REFERENCES

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#### NECESITATEA EXECUȚIEI LUCRĂRILOR DE ÎNTREȚINERE CURENTĂ A CLĂDIRILOR

(Rezumat)

Fondul construit de pe teritoriul național și nu numai este afectat continuu de lipsa lucrărilor de mentenanță asupra imobilelor. Neurmărirea comportării în exploatare a clădirilor și a stării de degradare a acestora poate avea consecințe grave pe termen mediu și lung. De cele mai multe ori costurile pentru asigurarea personalului de urmărire a comportării în exploatare și eventualele lucrări de mentenanță curentă sunt cu mult mai mici decât costul lucrărilor de reparație cauzate de lipsa mentenanței. Această lucrare prezintă o serie de degradări care se întâlnesc în mod curent la clădirile neîntreținute, precum și câteva studii de caz ale unor clădiri cu degradări grave cauzate de lipsa execuției unor lucrări de mentenanță. Conștientizarea de către beneficiari, investitori sau instituții publice privind necesitatea prioritizării lucrărilor curente de întreținere va conduce la o îmbunătățire de ansamblu a stării imobilelor precum și la reducerea costurilor de reparație.