

Opportunities for rehabilitation of facades of historic buildings in Moldova with limestone elements

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Abstract. Most buildings of historical and architectural value located in the Republic of Moldova are built of limestone or brick. The facades are decorated with columns, semi-columns and pilasters, balusters, bas-relief, and consoles. The degradation of historic buildings over time leads to the need for rehabilitation and restoration. Often privately owned buildings are repaired with the application of modern materials without taking into account the original materials, without researching the original elements and materials. Authentic decorative elements are replaced by polyurethane foam elements, which due to their easy installation and relatively low cost, can significantly reduce the financial costs of finishing and decorating facades. The interior walls of the brick are covered with plasterboard. The exterior walls of limestone are plastered with cement-based mortar instead of lime-based mortar. In some cases, the walls were covered with polystyrene. All these replacements reduce the architectural and historical value of the buildings lead to the loss of their authenticity. In order to preserve the value of historic buildings, it is necessary to use local materials. This research examines the possibilities of using limestone both for the rehabilitation of masonry and for the restoration of the decorative elements of buildings built in the XVIII-XX centuries.

1. Introduction

Historical buildings have an important cultural significance and impact on the development of the younger generation.

A current problem for the whole world is the maintenance, consolidation, and rehabilitation of heritage buildings. Historical buildings are highly vulnerable due to the way they are built and the way they are constructed.

In Chisinau, the capital of the Republic of Moldova, there are many historical buildings in an inadequate condition, which require reconstruction or complete rehabilitation [1]. A series of historical buildings in Chisinau have been destroyed and others are in ruins or in an advanced state of decay [2]. Since the early 1990s, architectural monuments have been destroyed to be replaced by hotels, shopping centres and residential buildings.

The purpose of this work is to highlight the limestone elements that can be used to restore the exterior walls of historic buildings.

In this article the author examines the diversity of limestone elements that can be used in the rehabilitation of historic building facades. The technical characteristics of the architectural elements and the technologies for the rehabilitation of facades of historical buildings in Chisinau are examined.



The authors use a variety of research methods such as historical methods, analysis, and synthesis to make it possible to highlight the historical building elements restored with limestone; inspection and technical evaluation make it possible to determine the restoration project to be carried out; comparative analysis can choose the most appropriate method. To repair the building under study.

2. The diversity of limestone elements for the rehabilitation of historic building facades

The historical buildings in Chisinau in 18th-20th centuries were built in an eclectic style with rococo elements.

The majority of the facades of the historical buildings were clad with natural stone and limestone elements. Over the years, the facades become deplorable for several reasons.

New trends in the rehabilitation of historical facades by replacing stone elements with decorative polystyrene elements lead to the loss of the architectural and historical value of the building.

The Republic of Moldova has sufficient resources of limestone, which allows the rehabilitation of historical buildings with original elements. The buildings rehabilitation with limestone elements allows to preserve not only their shape but also their unique architectural value.

From an architectural point of view, various elements shown in Figure 1 can be rehabilitated using limestone.



Figure 1. Limestone elements for façade.

Figure 1 shows the basic limestone elements of a facade, which can be custom-made depending on the architectural style of the historical building.

The natural stone *columns* are based on limestone, which is extracted from mines from the Republic of Moldova on demand. Their properties are unique, so no artificial material can be compared to a natural and environmentally friendly product.

In construction, the limestone used for making columns is of the brand M50 or M75. In the mines of the Republic of Moldova limestone is of 2 types: oolite and of shell. For the precise shape of the columns, oolitic limestone should be used, as it is more compact than the shell limestone.

The limestone columns have a seismic resistance up to 8 degrees on the Richter scale. The density of the columns can reach 1900 kg/m^3 . High durability and wear resistance are some of the advantages of using natural elements in reconstruction. The limestone does not destroy as quickly as concrete and is less affected by moisture and temperature changes.

Decorative stone columns serve as load-bearing columns in a building. For example: they support the roof, or the platform of the veranda, the balcony. The use of this material guarantees the durability and safety of the construction.