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## THE BAROQUE HISTORICAL LOAD-BEARING STRUCTURE - A CASE STUDY: THE GREEK CATHOLIC CATHEDRAL “SCHIMBAREA LA FAȚĂ” FROM THE CITY OF CLUJ-NAPOCA, TRANSYLVANIA

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**ABSTRACT:** The Greek-Catholic Cathedral “Schimbarea la Față” it is one of the most important and well-known baroque historical monuments from the city of Cluj-Napoca, in Transylvania. From the beginning of the construction, until the end of the 90’s this church had a tumultuous history and it survived in very good conditions. What the author presents are the structure with its three main historic load-bearing sub-units, the historic structural elements, where there are positioned and how they work. All this is made with an analysis based on photos, measurements and other information collected from the site.

**KEYWORDS:** baroque, historic structure, masonry, suspended dome

### INTRODUCTION

The Minorite Order came to the city of Cluj-Napoca in 1486. Only in 1724 they received the construction authorization to build their own church. After almost 60 years of struggle with money problems, authorizations and construction problems, they finished the Greek Catholic Cathedral named “Schimbarea la Față”. [1]

In the city of Cluj-Napoca, the Greek-Catholic Cathedral, it is a well-known historical monument. The architecture it is baroque and it is one of the most well preserved historical buildings of its kind. As far as the plane geometry, the cathedral has a rectangular shape, with a basilical structural system in the coir section. It is a brick masonry structure, with arches, suspended domes, pilasters and a load-bearing wall with direct foundation. [2]

The author presents during this article, the structure with its main historic load-bearing structure subunits.

### METHODOLOGY OF RESEARCH

The research is an analysis of the structure from an historic structure engineering point of view. It is divided in three sections: the roof framing, the main nave and the choir section. The author presents the most representatives baroque historical load-bearing structures and elements.

In the analysis where used photos and blueprints made by the author in order to understand what are the elements that are used, where are they and what role they play. Every historic load-bearing structure sub-unit is analysed and historical load-bearing baroque elements are explained.

### RESULTS

In this section the author describes in details the three historic load-bearing structure sub-units of the building:

- The roof framing: is made out of soft wood with truss frames doubled by rafters until the level of the crossbar, double king strut and tie-beam. All the main trusses and the secondary trusses are held together with intermediate purlins and eaves purlins, both having crossbars in the rafters section between the two purlins. A system of double wall plate supports the whole roof framing structure. Between the suspended domes there are two main trusses, with one secondary truss in the middle of them. Along of the each suspended dome, there are four secondary trusses held with crossbars in the rafter section. [1], [2] View Figure 1, 2, 3.
- The main nave: In the main nave there are four vault segments (or bays). The first one is also divided in three, forming three covered spaces with a balcony sustained by two pillars. On the masonry structure, on pillars and arches, there are suspended domes that discharge their forces. View Figure 4, 5.

The bays are limited by pilasters built in curve-reversed curve system. On top of these pilasters there are brick masonry arches which support the suspended dome. At each window from the main nave there is an archivolt that starts from the pilaster and on which discharges the short arm of the dome. View Figure 8.





Figure 1. The roof framing



Figure 2. Main and secondary (the short ones) trusses



Figure 3. Crossbars in the rafter section

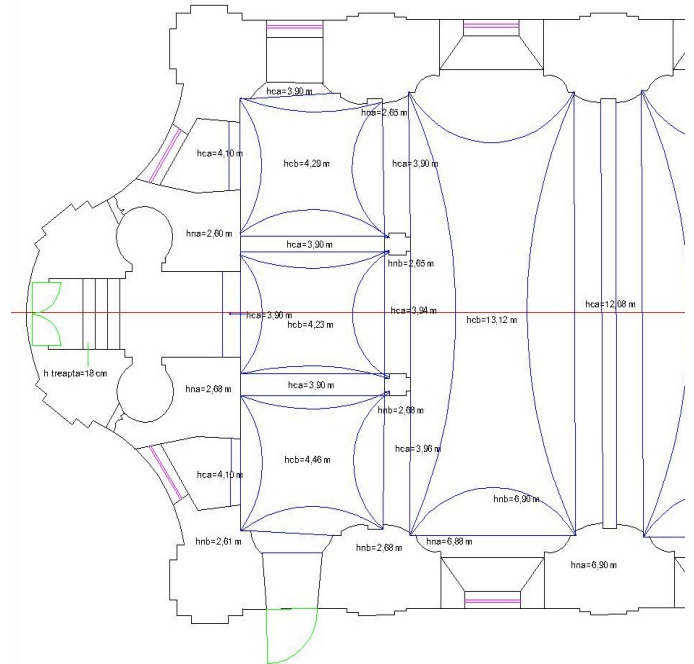


Figure 4. Blueprint. Masonry structure. Main nave, first vault segment.

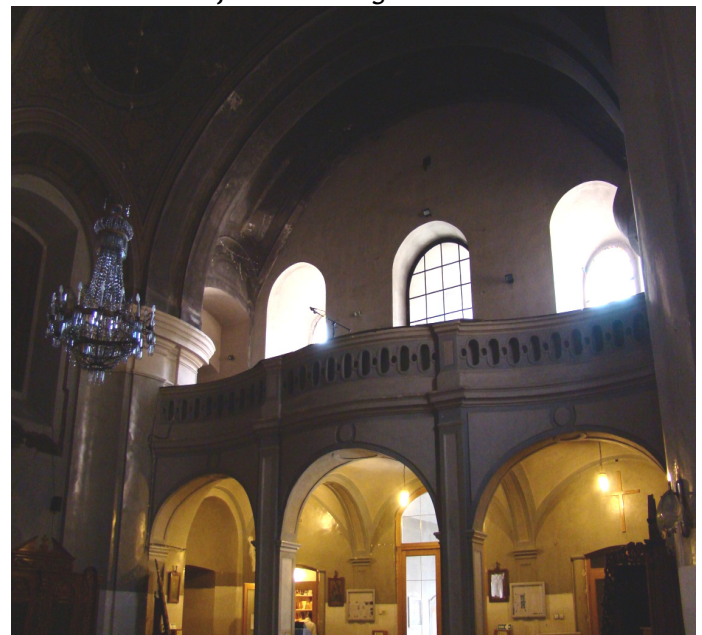


Figure 5. First vault segment

All the vaults are suspended domes. They have a distinctive characteristic: the rectangular plane geometry with a proportion of 1 to 3. Because of this they look more like torus dome than a sphere dome. View Figure 6.

Another important characteristic of the vaults is that they do not have ribs on the back of it, and the construction technology is in swallow-tailed style. [2] View Figure 7.

The Triumphal Arch is situated at the end of the main nave and the beginning of the choir section of the church. It is defined by two stronger pilasters, which are more robust than all the other ones. These two pilasters are united, at the main nave side, by an amplified arch, an archivolt. [1], [2] View Figure 8.

□ The choir section: presents a retraction towards the main nave and it ends with a sanctuary section that has a straight wall. View Figure 9.



In the choir section there are two bays (or vault segments) and two suspended domes. View Figure 10.



Figure 6. Suspended domes with rectangular plane geometry



Figure 7. Swallow-tailed technology



Figure 8. Main nave. The triumphal Arch, suspended domes and pilasters

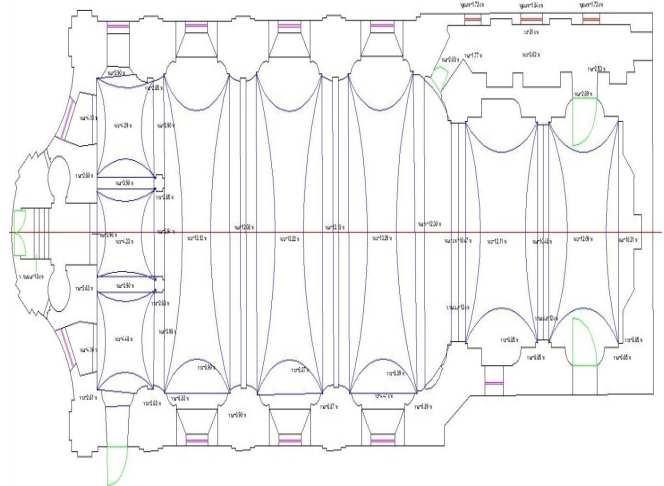


Figure 9. Blueprint. The ground floor.

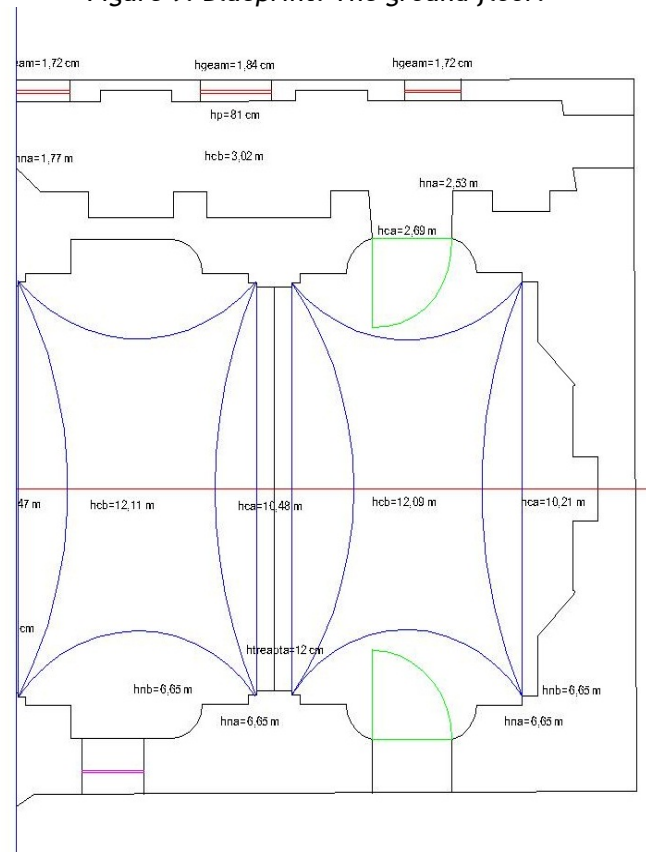


Figure 10. Blueprint. The choir section

**CONCLUSIONS**

In the case study of the Greek-Catholic Cathedral “Schimbarea la Față”, the baroque historical load-bearing structure is divided in three historic load-bearing structure sub-units: the roof framing, the main nave and the choir section. Each of these is also divided in other structure elements. The roof framing is made in specific baroque style, and is supported by the masonry structure, which also supports the suspended domes, held by arches, that discharge on walls and pilasters.

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