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Rehabilitation based on original building plans of 1905 designed Bistrita Cultural Centre, Romania

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Abstract

The Cultural Center "George Cosbuc" in Bistrita city, Romania is a "A"class monument of national interest that was designed in 1895-1897 in Wien by architect Paul Brang and was erected in the following years until 1905. This paper presents the study work that was done in the archives on the original project, the premises for the rehabilitaion design and the project challanges in the construction phase. One of the the main focus to be described is on the innovative ventilation system that was designed at that time, distroyed in communist interventions and revealed partialy during the construction phase. The design was changed and adapted from initial phase when presumtions were made based on archive files and the final proposal that had to deal with partial solutions discoverd on site behind walls and finishes. The paper also describes the beauty of the hidden aspects that revealed their self during the construction phase. The project was designed by a team of experts in architecture, engineering and rehabilitation experts from the Technical University Cluj Napoca together with Bogart Construct and Utilitas. The design and built process started in 2008 and was finalised in 2016.

Rezumat

Centrul culturla "George Coșbuc" din Bistrița este un monument de arhitectură național clasa A, proiectat in 1895-1897 la Viena de arhitectul Paul Brang si a fost construit in anii următori până în 1905. Acest articol prezintă munca de cercetare în arhive asupra proiectului original, stabilirea premiselor de proiectare in raport cu proiectul original si provocările din timpul santierului. Una din temele principale descrise este sistemul de innovativ la acea dată de ventilație distrus de intervenții asupra clădirii în perioada comunistă și descoperit prin sondaje in timpul lucrărilor de intervenții. Proiectul de reabilitare a fost modificat in cursul lucrărilor pentru a corela intențiile inițiale cu elementele identificate in santiere după decapări cu intentia de a aduce cat mai aproape de solutia originală functionlaitatea clădirii. Articolul mai descrie frumusețea diverselor detalii găsite sub tencuieli in timpul etapei de construcție. Proiectul a fost elaborat de o echipă de experți in arhitectură, rezistență și instalții de la Universitatea Tehnică Clluj Napoca împreună cu companiile Bogart Construct și Utilitas. Procesul de proiectare a durat din 2008 până în 2016.

Keywords: rehabilitation, cultural center, energy efficiency, sustainability, archives, ventilation

1. Introduction

The Cultural Center "George Cosbuc" in Bistrita city, Romania is a "A"class monument[1] of national interest. The building was designed in 1895-1897 in Wien by architect Paul Brang[2] and was erected in the following years until 1905. The building was owned by Bistrita Craftsmen Association and was converted as Cultural Center "George Cosbuc".

The building has a Neoclassic aspect and was designed to the latest construction solutions of that period. It is a D+P+1E story height building that has a large auditorium in the centre, two stories height. The construction system is made of stone foundations, brick structural walls, brick arches at the basement, wood and concrete slabs at upper floors and wood roof structure. Forty years of communism brought a neglected use of the building and several misunderstood interventions. All of these lead the building to a unsuitable use of it and partial unusable.

The building was diagnosed with: deep dampness in higher elevations, deformation of the slabs, fissure of walls and arcs, torsions and deformations of the roof frames, missing of certain structural wood beams and several finish degradations. The buildings concert hall was also diagnosed having very bad ventilation and heating system, bad visibility chair placement towards the scene and a lot more minor problems.[3]

Figure 1 - Before and after Main access of the Cultural Center "George Cosbuc"
credits: Rares V. DRAGAN

2. Methods

All the main degradations seemed to have been caused by bad conception not obvious by bad exploitation. We asked our selves how could this be possible considering the apparently mature design of the building and it's importance for the city.

We started our research in the National State Archives of Bistrita-Nasaud[4] were we found the original drawings [Figure 2,3] of the building. The plans revealed a very good structural conception of the whole elements of the building and also an energy efficient system for ventilating and heating the building.

1 Mentioned in the List of Monuments of Bistrita County as building on Albert Berger Street nr.10 , code: LMI: BN-II-A-01449
[2] Paul Brang, 1852-1925, viennese architet
[3] Petrina T., Socaciu N., Dragan R., Petrina B., Hulea R., Rehabilitation and sustainable efficiency redesign of the 1905 constructed Bistrita Cultural Centre, Romania; published in WTA International Proceedings, Brno, 2011
[4] National fund no.187, National State Archives Bistrita Nasaud

First thing to do was to study in very deep detail all the drawings and understand how the building was designed, how was built and what were its key parts. Second step we measured and inventory all the buildings geometry, deformations, degradations and materials. We had also done a questionnaires research in the administration and old employed people to find out about the recent(40 years) history of the building. With all these data collected we created a comparative model of the projected building done in 1895 and the actual building. The model revealed all the lately interventions and considering its functional history we were able to date all of these and understand their purpose and intentions.

We could easily understood that all the interventions have been done without any specialists opinion just with the help of builders at the order of different administrations. We have found out clear miss-understanding of the very good projected structural, installation and architectural systems.

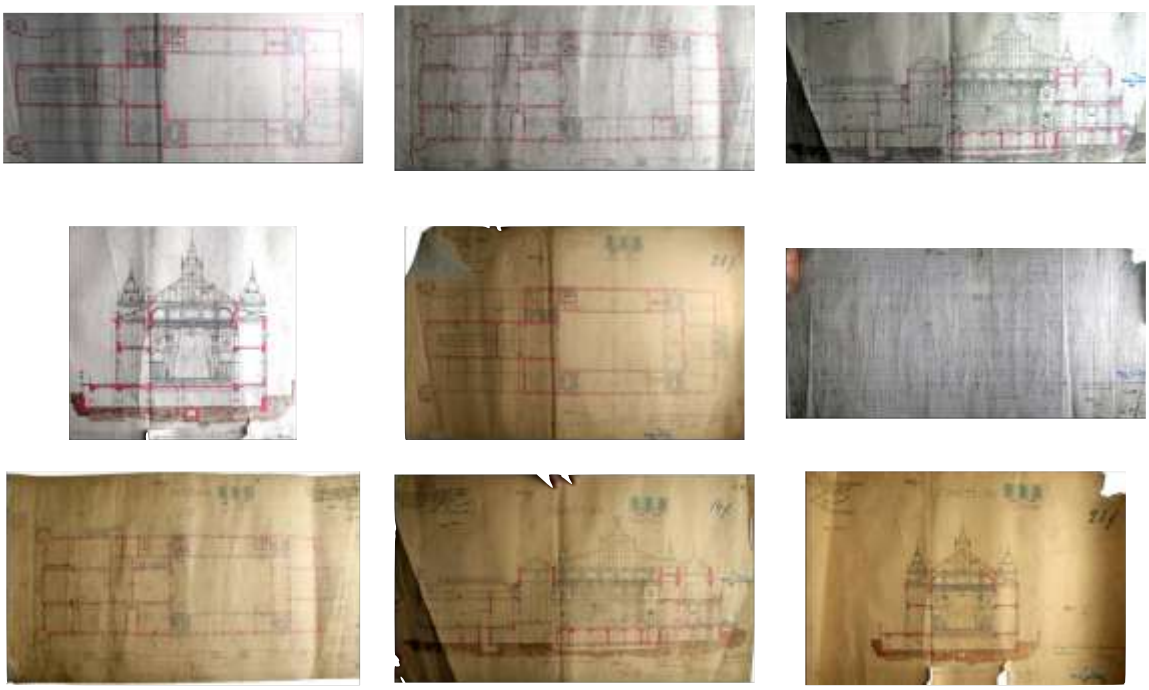


Figure 2 - Examples of original plans found in the National State Archives

One of our main supposition that we based on research upon, was that the building was initially built without modifications, according to the initial plans of architect Brang. Our research required a lot of successively visits to the building in order to verify the existence or traces of different building parts or systems that existed or were replaced, removed or hidden. With few exceptions we had found on site the evidence of transformations of the building that we could identify by the use of old plans. There were also historic studies of each element, microbiology studies of wood, chemical studies of land, foundation and walls and structural studies.

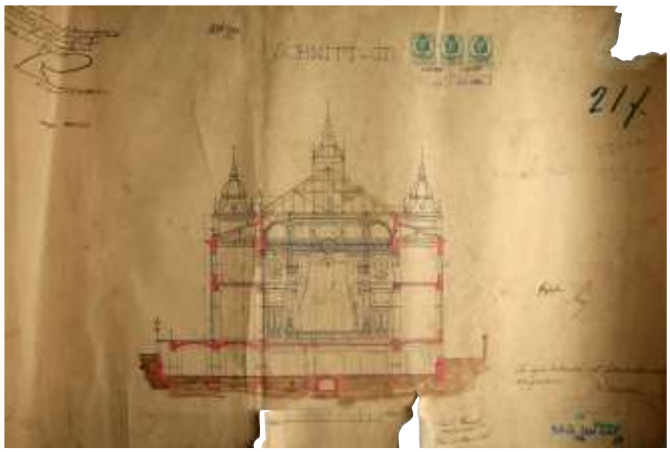


Figure 3 - Short Section - original plan 1895 - source: National State Archives

We could than classify and group the interventions by time they were done and effects upon the building. This revealed the good conception of the initial building and we could justify the actual state and the problems of the building. Knowing the cause of problems was the aim in our diagnose in order to be able to give the wright solutions.

3. Results and Discussions

Our studies revealed certain problems of the building that were the effect of missunderstanding of who the building was designed and how it functions.

There a lot of examples as that we found extreme deformations and torsions of elements in the roof structure because of late intervention that tried to consolidate the structure by removing certain elements and stiffen others considered more important. The effect was a transformation of the static scheme of whole roof structure that created in time tensions in elements witch further in

time lead to modified the geometry of the structure.

Figure 4 - Distortions of roof structure, credits: Rares V. DRAGAN

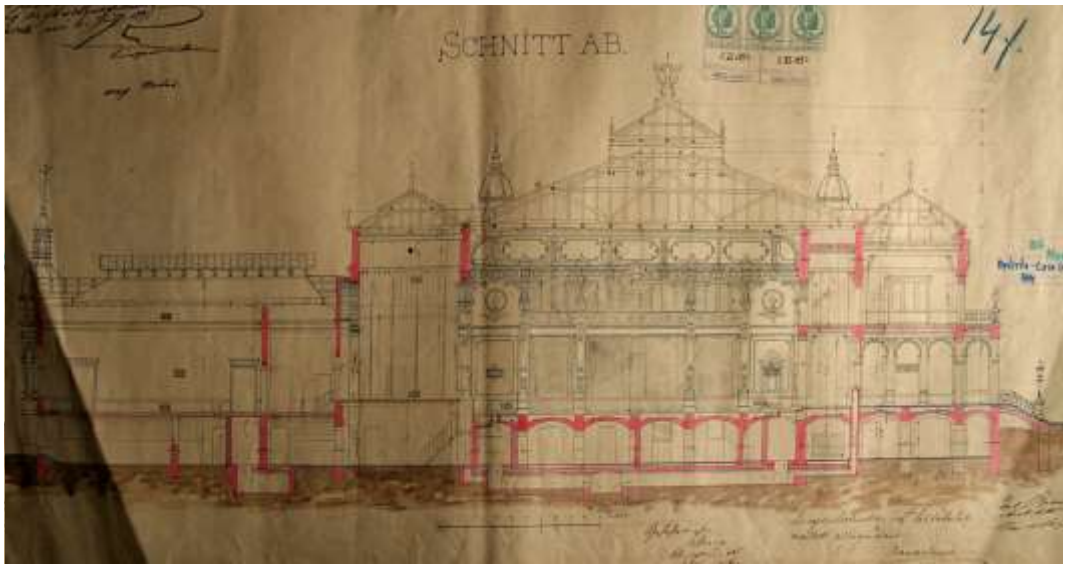
There was also found deep dampness in higher elevations starting from the basement. We searched first for the cause and the attitude was to remove it and than recreate the initial state. The basement was finished lately with concrete slabs and plaster that led the water to infiltrate in the walls hidden to owners until severe deformations and fissures appeared together with water infiltration to the first floor. Lack of ventilation because of plastic window replacement and inappropriate function of basement floor were also a key factors in the degradations. The solution

was to remove all the concrete flooring system and plaster, ventilate the basement, change the windows and doors with wood ones and change de usage of the basement.[5]

The auditorium designed initial smaller was extended at the middle of XXth century so it needed a change of vertical seating distribution. Because of lack of knowledge the slope of the seating floor was a straight line starting from second row. This conception lead to extremely bad viewing angle that made the viewers almost impossible to view the stage. Unfortunately the building was used so for half a century. We proposed the reconstruction of the viewing slope for the seats and integrated in the obtained space below it a per seat ventilating system integrated in the building as presented further in the text.

There were also great deformations of the stage floor and unacceptable shock absorbance in performing on it. We discovered a series of successive and very simple-minded intention to improve the scenes elasticity that could have cause in time severe problems in its substructure. We have proposed to return to the initial structural solution and improve it by using new wood material and removing all added pillars that made the scene rigid and leave the floor with no shock absorbency. We have also proposed the floor to executed in multi layer and massive structure in order to be both elastic and shock absorbent.

Among others one of the most interesting discoveries in the original plans was the existence of an natural working system for ventilation, cooling and heating the building. The current administration of the building was not aware of it but we could identify traces of its existence according to the plans. In communist period in an modernization intention, the building was gifted with a classic radiator heating system; but the system was integrated in the building in existing niches that who's functionality were ignored. These niches were originally part of a very complex



system integrated in the buildings structure that was used for a naturally powered air circulation.

Figure 5 Long Section - original plan 1895 - source: National State Archives

This system we discovered in the original designed plans was a ventilation, cooling-heating, re-circulation and evacuation of air using the physics laws of gases and temperature. The system was designed to absorb air from outside the building, pass it through a heating room, distribute it in the main auditorium and foyers, absorbed 30 % of the used and already heated air for recirculation

[5] Petrina T., Socaciu N., Dragan R., Petrina B., Hulea R., Rehabilitation and sustainable efficiency redesign of the 1905 constructed Bistrita Cultural Centre, Romania; published in WTA International Proceedings, Brno, 2011

by the physics law of fluids, absorb the heated air in the attic as thermic tampon and smoothly evacuate it to the outside. Heating the air in winter was done with hot steam.

All this system made this large building an energy efficient one and it was used so until late 60'. We even had proofs that it worked so from mentions of old employes that couldn't understand how the building had a very freshly air feel 50 years ago without specific installations and how it lost its quality in time.

The original drawings expressed very clear how the system function indicating by arrows the air flows in the buildings structure. The walls as can be seen in the above figures are full of integrated tunnel-pipes that had each a role in the whole system. Income or outgoing air niches figured in sections could have been identified on site under certain decorations elements or finishes. Understanding this system we discovered enclosed under finishes all the puzzle elements that created the whole system.

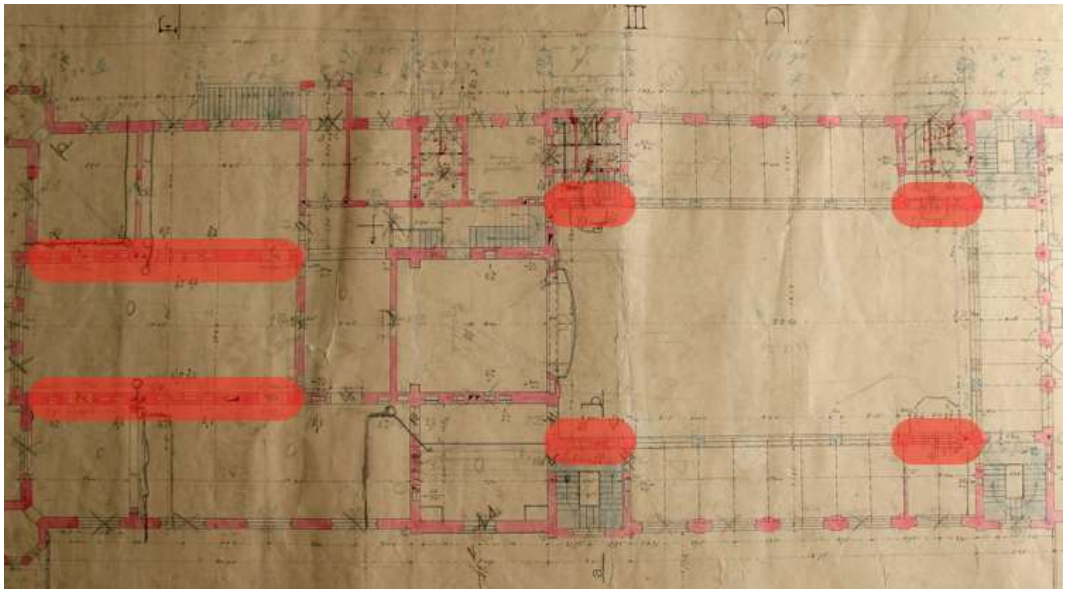
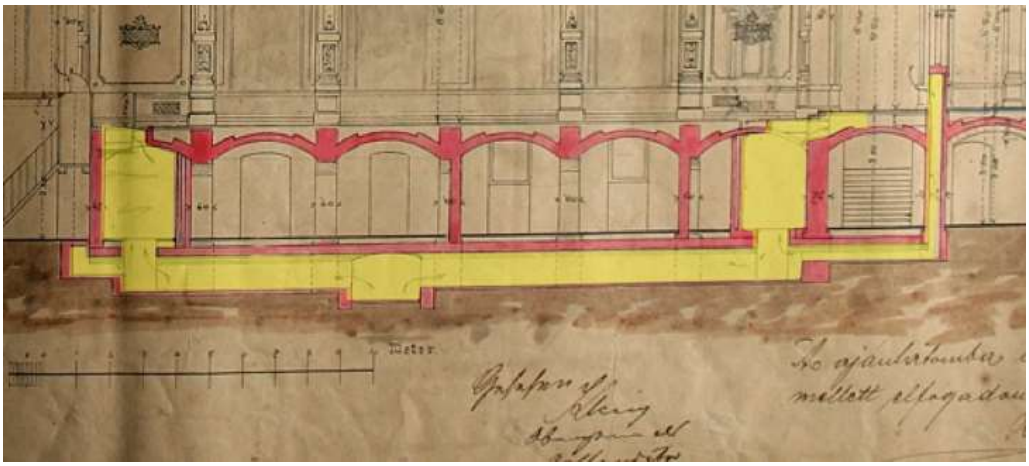


Figure 6 - Ventilation tunnels marked disposal marked on plan - original plan 1895 -



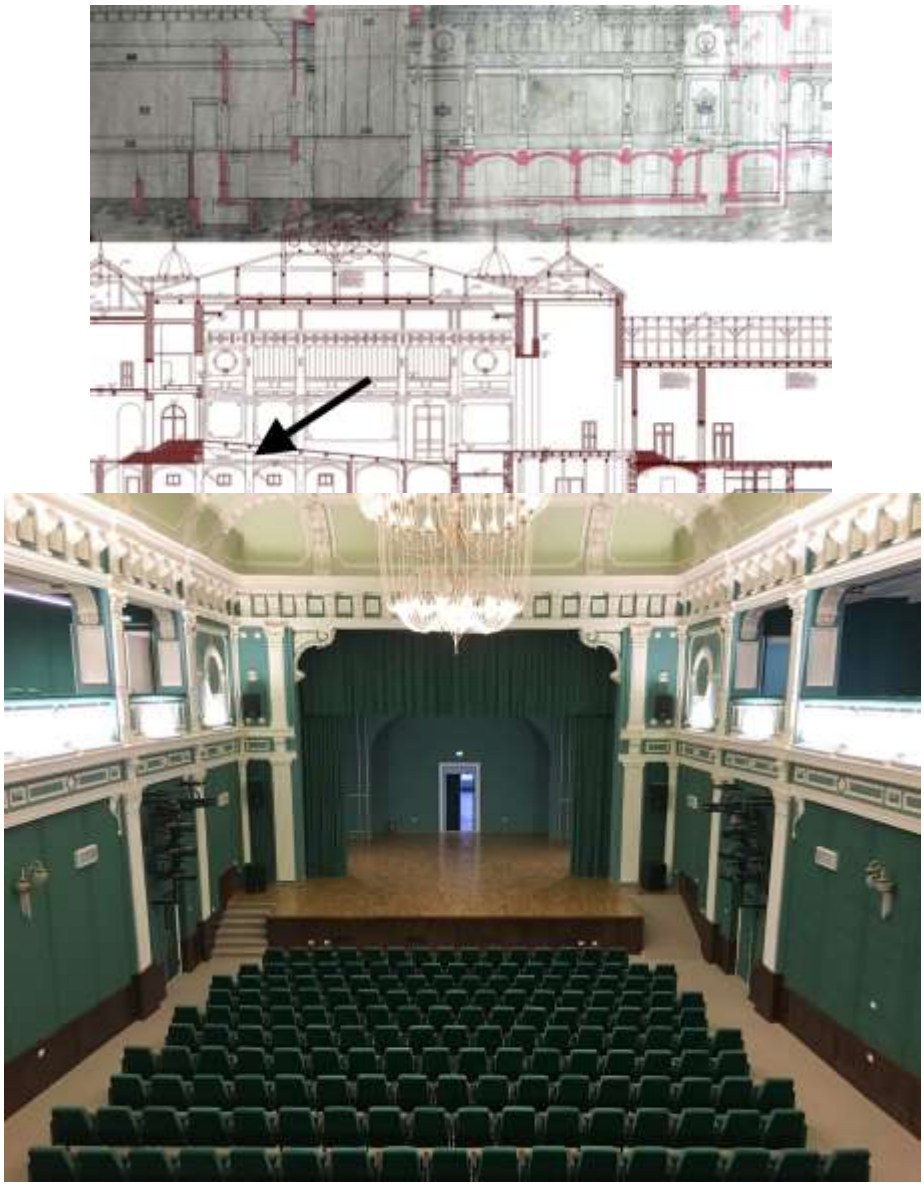
source: National State Archives

Figure 7 - Long Section Detail Ventilation system - original plan 1895 - source: National State Archives

The first attitude towards the buildings restoring project was to recreate the original ventilation system. This was a complex problem that involved structural engineers, plumbing engineers, architects and restorers. The main problem was that the subdivision of the building was changed in the middle of the XXth century and just clearing the tunnels and the beginning and end niches was not enough. The system as designed in 1895 had to be extended and modified according to the new room subdivision, but using the same concept and the same thinking of architect Brang.

In construction phase we did not find the tunels under the building but we did find the vertical pipes in the walls. We uderstood that the system existed once as a whole so the team decided to recreate the horizontal ventilation tubes with concrete tubes under the cellar, in an optimized and more efficent solution.

In order to adapt to actual ventilation needs and requirements the a new solution was adapted to be able to pump large volumes of air in the main room without using tubes or other anestetically options. The solution was to use an unaccesible space that was created under the main room floor when the floor was lifted in the ’60s for visibility reasons. The solutions was to open the floor under the seats, clean it, and make it an ventialtion air buffer that would bring fresh air to almost each seat. The space was equipped with filtered and treated air input and 200 ventilation



grids under the seats in order to produce good ventilation with low air velocity and sound.

Figure 8 - Long Section, 1905 vs 1960; new unaccesible space under the floor

Another impact intervention was the identification of ininital colours of the interior spaces of the building. Ont he construction site there were identified 7 layers of diffrent or similiar paints in the main auditorium room. Our decision was to redesign the coolors of the interior details based on the oldest color, that was belifed to be the original color. The new palette was chosen close to Green colors, so all the detalis and materials including main curtain were changed to different green tones.

Figure 9 - Main auditorium, 2016; Credits: Rares V. DRAGAN

4. Conclusions

The designed project for the rehabilitation gathered hundred of pages and of course there are a lot of problems identified that ended with solutions like: original windows restoration, slabs and ceilings consolidation, decoration restoration, finish rehabilitation but the actual paper focused in presenting the most interesting of them focusing on the ventilation system that proofing that energy efficient buildings are not a a matter of new buildings matter but just an adaptation of old well known[2] design elements.

Our current work was to identify and localize all the bad interventions done to the monument during the past century, understand their effects upon the building, understand the reasons they were done, remove the causes and create solutions for all the problems in the attempt to bring the building to its initially parameters designed 100 years ago.

Our aim was to preserve the cultural heritage, to minimize the visible interventions. Regarding the ventilation system we proposed to enhance the old ventilation solution in order to hide any plumbing and heating clasical systems and obtain better energy performance using the natural air flow and basment air cooling solution toghther with few modern equipment easier to be hidden in the restoration procces.

The execution of the restoration and rehabilitation finished in spring 2016.

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