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BERGAMO

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RESTORATION AND TECHNOLOGIC ADAPTATION OF TEATRO SOCIALE DI BERGAMO

The Social Theatre of Bergamo town was built at the beginning of the 1804 following the design of Leopold Pollack, follower of the great architect G. Piermarini designer of the Teatro La Scala in Milan. After opening in 1808, the noble theater in Città Alta (Uptown) lived ups and downs, until all activity ceased in 1929. From that moment took turns a variety of uses of the building such as cinema or space for exhibitions and numerous projects were drawn up in order to swap to other functions (lecture halls, shopping mall etc..) calling for its complete abandon and destruction; the fact of being almost ruined was also its fortune because no work was realized for 80 years.

Before the re-opening of the building yard (2008), the architecture of the theater was in a very advanced state of degradation: the rows of boxes, were unsafe for the neglect of the time and inaccessible for any use; the area of the audience and the rooms of the theater had undergone rearrangements and did not meet any current standards.

The philosophy adopted for restoration was not inspired by the school of pure conservation, nor the in-style recovery, although philological; the designers have been inspired by a sort of "Critical and Conservative Restoration", an approach that includes measures not deliberately prevaricating or breaking compared to traditional materials found in the building, with an approach that does not want to stand out on the existing, but to restore decorum and unity only if possible, without the need to retain outright or to act with imitative integrations and additions.

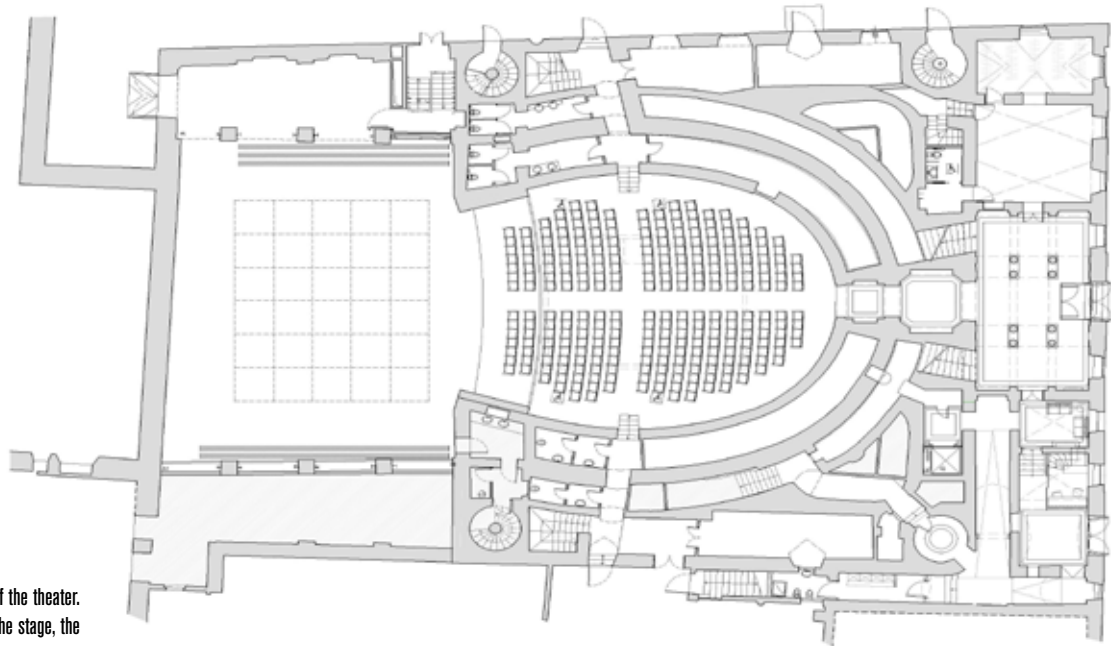
The system and structural adaptation of an old nineteenth-century wooden theater involves the study of new routes for audience and spaces to hold ducts and machineries and, at the same time, keep them hidden to avoid altering the original appearance; Similarly, all the static reinforcements must ensure compliance with new regulatory requirements without overcoming the ancient wooden structures.

The design team had to deal with complex and conflicting requirements as the preservation of the



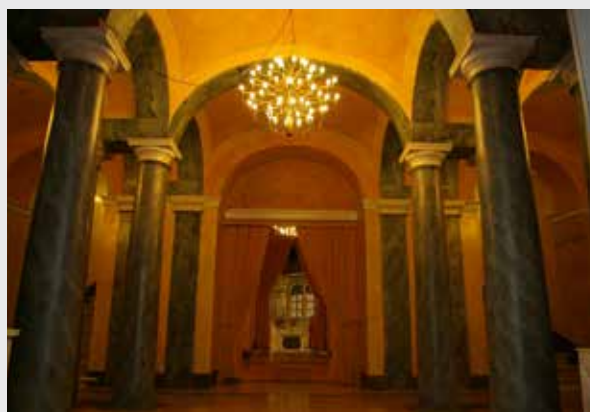
The main hall of the theater and the wooden parapet of the boxes before the beginning of the restoration. The advanced state of degradation can easily be noticed.





The ground floor of the theater.
From the left to the right: the stage, the
main hall and the entrance area

historic look of the building and of its decorations, respecting the present requests for accessibility, comfort and safety. In fact, the disciplines involved in the restoration of a theater are many: to name the main ones, just think of the architectural aspects, plant, structural, conservation, scenic, art restoration, acoustic, audience comfort, safety, management of the yard in the historic center, public contracting, coordinating with local energy suppliers. Each of these disciplines has interacted during the design and execution of the work to achieve the most efficient way to adapt to regulatory requirements (fire prevention, barrier removal, etc.), the design of new stage machinery and technical areas, the creation of a new lighting system, the definition of the finishing of the floors and walls, restoration and recovery of the decorations and finally the integration of all these decisions with the need for structural reinforcement and technological systems.



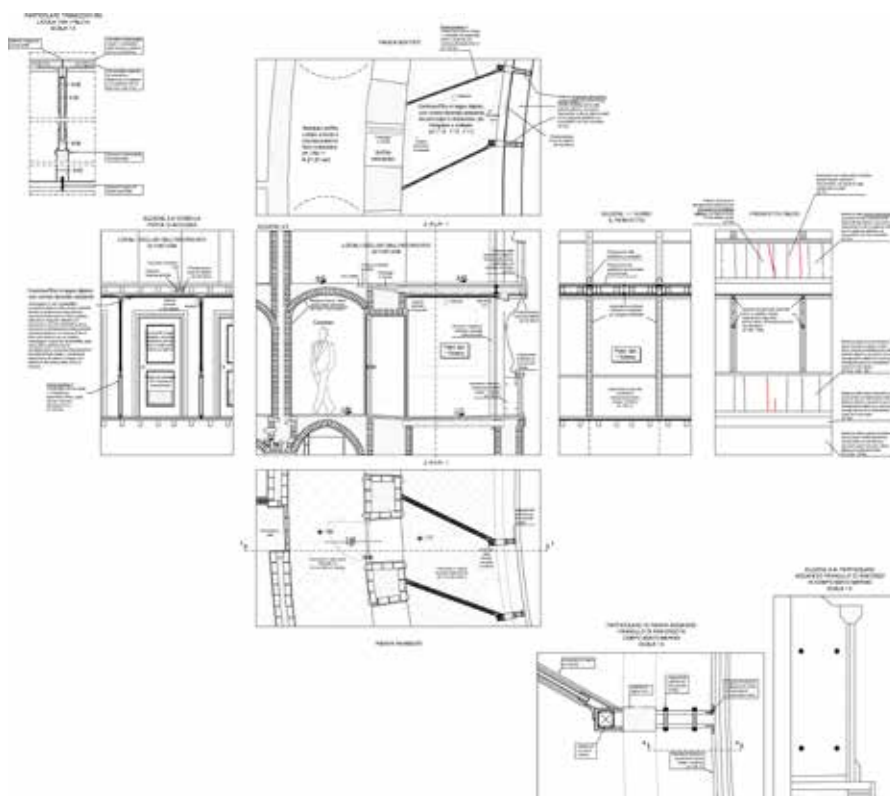
The entrance foyer of the theater before
and after the restoration.

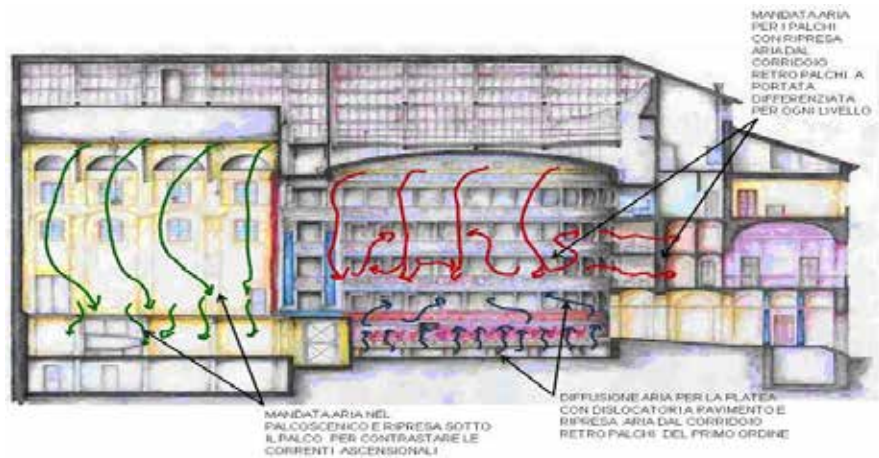
From the left to the right: the stage, the
main hall and the entrance area

To better explain the complexity of interventions on the “machine” of the Teatro Sociale, we can schematically identify three major areas: the entrance area overlooking the main street, the stalls and rows of boxes, the stage and the stage machinery.

THE RESTORATION OF STALLS AND ROWS OF BOXES

The reorganization of the stalls in the main hall was a key moment of the project, since it represents the operating fulcrum of the entire theater. The area of the stalls was designed as a versatile space that can accommodate the audience during the shows, and eventually – if the chairs are removed – can hosts temporary exhibitions. The wooden structure of the boxes, deteriorated from the prolonged disruption of the roof in the second half of the twentieth century, has been fully conserved and strengthened with a steel counter-structure which is completely invisible but can also provide static resistance in case of fire for more than 90 minutes. In this way, it was possible to combine the preservation of the structure as it was with the practicability. After a long research and a very long debate, the division of the boxes has been reported in the original condition: wooden partitions between the boxes were added to the first, second and third row, so as to create a succession of individual boxes able to host four spectators each instead of one single area in the balcony (as before the restoration). The new walls were built with wood panels with a neutral color coherent with the color and finishing of the stage and the old boxes.





A schematic drawing of the air-flows in the main hall and on the stage.
The technical areas of the air-conditioning system that host the main treatment units
The corridor of the boxes used as an air duct (plenum)

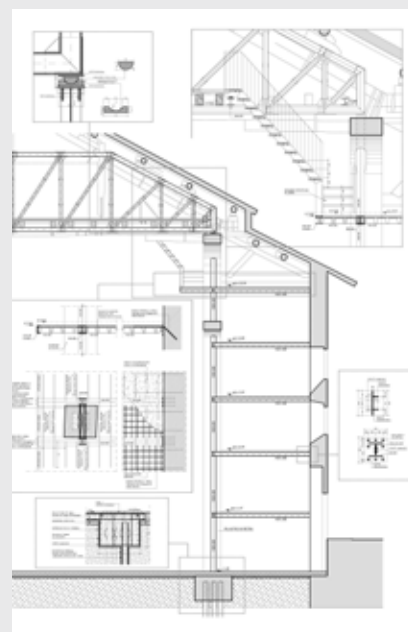
The reopening of the three levels to the public requested new toilets on each floor for the public and artists, as well as two important safety stairways to ensure the exodus of people safely in the event of fire.

The design-idea that made it possible to reuse the old theater has been to employ each perimeter corridor that connect the boxes as an air ducts for the air conditioning system (plenum). This ensures proper cooling of the audience and of the different rows of boxes, without the need for bulky and intrusive pipes that would have distorted the historical walls of the building.

The air distribution in the volume of the stage and of the fly loft is designed to counteract the typical hot rising air currents and to avoid interference with the scenes, which could cause fluctuations: in fact, the air is fed from above and took back from the floor of the stage.

Even the boxes and the stalls area are, like the stage, a difficult volume to be air conditioned: the elevated height of the stalls-room causes the thermal stratification and the limited interstory heights of the boxes make it difficult to realize a branched fluid distribution. That's why the volume has been divided into two main areas: the stalls and boxes. The latter are conditioned by the air that is placed above the gallery, and that is taken inside the boxes in a different way for each row of boxes. Instead of realizing metallic air ducts, the perimeter corridors that connect the rear stages have been exploited as return air ducts for air conditioning system (plenum). The temperature of the first level is controlled independently from that of the second and the third, which are higher and therefore subject to the effect of rising hot air, to prevent their over-heating. The audience, which is located at a lower level, is served by an air distribution system installed on the floor, thus ensuring low input speed and a widespread distribution. The separation of air the stage from the main-room also allows to make "neutral" the orchestra pit, thus avoiding any air currents particularly troublesome for musicians.





On the left, the new stage and the area of the new dressing rooms.

In the center, the new wooden fly system and the steel trusses that supports it. On the right, a technical drawing of the area of the stage and the dressing rooms.

The structural consolidation and a new air conditioning system were not the only requirements for the reopening of the rows of boxes to the public; it was necessary to create a comprehensive smoke detection and fire extinguishing system with automatic water sprinklers in each box to comply with fire regulations. Thanks to these measures, the total capacity of the theater now exceeds six hundred and fifty seats, in perfect compliance with the regulations for new theater.

THE STAGE MACHINERY

In addition to the spaces for the audience, even the technical area of the stage has been the subject of important functional and structural interventions. Here really stands out the complexity of integrating modern and functional systems within a building which wasn't designed to have space available for air-handling units, heating units, air ducts and scenic automation. A completely new stage was realized with a removable floor made of solid wood boards to ensure both excellent acoustic performance and versatility.

To guarantee the correct functioning of the "theatrical machine", a new fly system has been built above the stage and new dressing rooms were inserted in the existing space on the side of the stage. Such needs have prompted a massive intervention of structural consolidation of the trusses, which were complemented by new composite steel-trusses, to support the huge loads of the fly system and scenes (over 130,000 kg of steel added); everything has been supported by a "surgical" intervention made with steel elements, side by side to old brick pillars, based on new foundations with concrete micro-poles.

The area of the orchestra pit has been upgraded thanks to the endowment of a new electromechanical lifting platform at three levels, for maximum versatility of the scene for the different types of shows and with a seating capacity of 75 musicians.



The room in the basement that hosts the main pump of the water sprinkler system

The occurrence of a violent phenomenon as a fire requires the presence of extinguishing systems. The areas with wooden structures (boxes and roof) are protected by an automatic extinguishing system (water sprinkler) and throughout the theater are installed adequate fire, fed by the water stored in a special tank realized under the stalls (100,000 liters), again avoiding to steal precious space to the theater.

ART RESTORATION

Finally, we focus on the restoration of decorated surfaces that deserve particular attention, since they represented a particularly complex and delicate aspect of the restoration as well as it represents what visitors mostly see and judge, taking for granted all the aspects discussed earlier. The first step approaching the works was done making a thoroughly historical research, surveys and specific diagnostic tests on the building:

- laser scanners survey
- survey of degradation and of building materials
- endoscopic investigations in the masonry
- specialized investigation on wooden structures
- surveys on concrete structures
- surveys and tests on decorations made by restorers
- laboratory investigations on decorated surfaces
- structural analysis using finite element modeling

Through these studies it was possible to reconstruct the pictorial layers that were superimposed during the different periods of life of the theater and create a reliable frame of the historical phases of intervention on decorations.

The excavation necessary to realize the water tank under the floor of the main hall.



Different types of lighting devices installed in accordance with the materials, with the colors and the function of the areas



The layers of decorations
discovered under the superficial
layer of paint

This knowledge served as a reference for the general definition of the approach to restoration, which has tried to summarize various needs and requirements, not always compatible with each other: to preserve and restore all the original decorations, to complete the gaps, the missing parts and those of new construction so as not to conflict with the original portions, to stop the degradation but not delete it as not to alter the old and damaged appeal which the city of Bergamo was used to, to avoid a theater with a new and “fake” look and not to erase 200 years of history made even of degradation and carelessness. The final result was to deliver a theater in order as if it had been well maintained over time, softening the effects of degradation and abandonment: “The best restoration is the one that people can’t appreciate and see.”



