

An old market as a receptacle of the city's history.

Rehabilitation of the Mercat del Born, Barcelona, Spain.

Type of intervention

Restoration Rehabilitation / Renovation

Concerned elements on the intervention project

- 1. Foundations and underground structures
- 2. Vertical structures
- 3. Horizontal structures and vertical connections
- 4. Roof and terraces
- 5. Façade and building envelope
- 6. Finishes and completion elements
- 7. Integrate services
- 8. General strategies for building recovery

Site Mercat del Born, Plaça Comercial 12, Barcelona 08003, Spain

Objectives Rehabilitation of an old market as a cultural center and protection of archaeological remains of the medieval city preserved "in situ".

Property City Council of Barcelona

Designer Archs. Rafael de Cáceres & Enric Sòria;
Collaborators: Francisco Javier Pazos & Joaquim Pàmies (Technical Archs.); Joan Margarit, Carles Buixadé & Ramón Ferrando (Structures); Amaya Arizmendi & Ingrid Cardelus (Facilities/Equipment); Contractor: SAPIC SA / Tau Icesa

Date 2006-2012



Background to the intervention

Built between 1874-1878, following the project of the master builder Josep Fontseré i Mestres, the building served as the city's central market until 1971. After an initial restoration in 1977, in 2002 the archaeological remains of the ancient medieval city were discovered when work began on the building to house the Provincial Library of Barcelona.

With this discovery, it was necessary to rethink the whole project and work on a new one that contemplated the conservation of this historical site. This is how the idea of the new El Born Cultural Center was born, which also houses the museum on the War of Succession in Catalonia, as well as several rooms for cultural uses.

The open debate about the future of the Born and the work carried out on the compatibility between the ruins and the Provincial Library concluded with the municipal decision to propose a Cultural Center that would incorporate the site as an active part of the new facility. Once this purpose had been decided, the building annexed to the Born was constructed at 5 Commercial Street, essential for locating the technical elements of the installations (air conditioning, electricity supply, transformer station, etc.). Simultaneously to the construction of the Annex Building, a platform was built inside the Old Market, to protect the site and to recover the work plane on which to proceed with the restoration and construction of the cultural center.

In December 2008, the execution project for the restoration of the Market building and the structure of the new building was released. Broadly speaking, the main restoration tasks focused on: the construction of the new roof and its structural consolidation, the restoration of the cast-iron elements (pillars, gutters, structural and ornamental elements, the central lantern, the exterior stairs and walkways, the interior staircase leading to the roof, etc.), the closing of the façades (cast-iron

elements, glass, skylights, brick walls, etc.), and the water drainage system. The project included structural operations aimed at the reuse of the Market as a Cultural Center, specifically the structure of the floor slabs that will form the upper level of the site and that will be directly related to the exterior space of the future Cultural Centre and the rainwater drainage network of the complex. This project was awarded in 2009 and completed in December 2012.

Description of the building

The old Mercat del Born, built in the 19th century and in use until 1971, was the main food supply market in Barcelona for a century. It was built in the "passeig de l'Esplanada", when in 1869 the Ciutadella fortress was demolished, according to a project by Josep Fontserè, inspired by the iron architecture of the buildings of the Parisian market of Les Halles, seeking to ensure the healthiness and functionality with the lightness of these new structures to create large, covered, closed and well-ventilated spaces. Its construction began in 1874 and it became operational in 1876.

The building has a basilica-style floor plan, with a large central nave and two side naves of lesser span and height. At the meeting of the longitudinal and transversal naves there is a large octagonal dome. The horizontal structure is of cast-iron in the load-bearing elements (trusses and double girders) and the vertical structure of cast-iron columns. The exterior walls are made of brick in two colors forming decorative patterns and iron sheets as shutters. The roof is of two-color glazed flat ceramic tile, also forming geometric patterns.

Due to the fact that it is located in a historical area of the ancient medieval city demolished in the 18th century during the war of succession, archaeological remains of this period

were found in a perfect state of preservation in its subsoil.

The diagnosis of the building (values and state)

The main pathology detected in the old iron market was the loss of section of the structural elements. This made it necessary to change sections of the profiles, which required a careful study of the necessary shoring. After doing test and trials to assess the structural state of the cast-iron elements that concluded that the iron was not of great quality, it was therefore decided that all structural cast-iron elements that were cracked or broken would be replaced with new parts.

Some 30 cast-iron pillars were filled with concrete at some point in history, were filled with cement at some point in history, so they needed to be deburred. The market's roof, consisting of laminated steel, wood rafters and ceramic tiles, was in a bad state of conservation.



Fig.1: View of an access stair to the archeological remains.

Rehabilitation works

The installation of a raised floor was planned to facilitate the passage of all the installations, to make them accessible at certain points and as a base for the installation of the underfloor heating system. The installation process required a layout of the floor slabs and beams.

Since it was not possible to create a continuous raised floor, due to its interruption by the beams of the floor slab, it was necessary to brace the different panels that made up the raised floor to support the required dynamic loads.

The restoration and rehabilitation of the Mercat del Born was complex as a result of the convergence of two overlapping systems: the market building being restored, listed as a Historical-Artistic Heritage of Barcelona and heir to the iron architecture of the nineteenth century, and the city rediscovered in the excavation site, declared a Cultural Asset of National Interest.

The archaeological site is located between -2.00m and -3.40m from the level of the Mercat del Born, which made it necessary to create a system of work platforms that, in addition to protecting the site, constituted the work plane from which to act both at street level and underground, and was also the basis for the scaffolding, thus resolving the interior accessibility of the work since much of the restoration was between 7.00m and 23.00m (the height of the roof of the lantern).

RESTORATION PHASES

Underpinning of the foundation, construction of the perimeter retaining wall and archaeological excavation: This delicate operation consisted in replacing the original foundation of each of the pillars and the construction of a perimeter diaphragm wall inside the Old Market, so that

archaeological studies could be carried out without affecting the stability of the building.

"Once the archaeological site was discovered in its entirety and in accordance with its historical and urban importance, the debate on the fate of the Old Market began, and the work carried out on the compatibility between the site and the Provincial Library led to the municipal decision to build a Cultural Center that would incorporate the site as an active part of the new facility, as a place to visualize it, interpret it and with the capacity to promote the exchange of ideas and culture" said Javier Pazos, from the team of architect Enric Sòria i Badia, for K Report.

Execution of a work platform: The location of the archaeological site prevented intervention in the interior of the Born, a fact that forced the design of a complex system of

platforms to save the topography imposed by the rediscovered ancient city. Topography that marked the level of the site between -2.50 and -3.50; with more depressed areas such as the Rec Comtal at an elevation of -5.00 meters with respect to the primitive level of the Old Market.

Foundation reinforcement for the new Cultural Center facility: Micro piling operations for the reinforcement of the pile caps initially constructed in the first operation of the discovery of the medieval remains.

This operation required the provision of special systems for the evacuation of the slurry without affecting the archeological site, and the use of machinery and auxiliary systems suitable for working with the limitations imposed by the working platform.



Fig.2: View of the interior of the market and the archeological remains.

Restoration of cast-iron elements, both structural and ornamental: The main cast-iron elements were columns, column-channel nodes, channel beams, brackets, windows and doors, lantern elements, spiral staircase access to the roof, stairs and roof walkways, railings, and ornamental elements.

Preliminary work consisted of tests and trials to check the compatibility of the cast-iron with the welding and its reliability. These tests showed that the existing cast-iron was of poor quality and that the welded joint system did not offer sufficient guarantee. It was therefore decided that all structural cast-iron elements that were cracked or broken would be replaced with new parts.

Restoration, repair, and reinforcement of the laminated steel structure of the roof: The structural elements to be restored were the trusses of the central and lateral naves, the trusses of the octagon, and the elements to be replaced were the purlins, rafters, and battens.

The main pathology detected was the loss of section of the structural elements. This made it necessary to change sections of the profiles, which required a careful study of the necessary shoring.

Intervention on the skylights: In order to close the four side naves, new skylights were designed under the existing ones, preserving the original zenithal illumination. These were raised about 50 cm to accommodate the smoke evacuation systems. Restoration of rainwater collection and drainage systems: Previously, 30 pillars that were concreted were deburred. This operation was carried out by means of a drilling machine with diamond core bits, acting from platforms at different points of the roof.

The interior of the downspouts pillars was waterproofed (Epipe system), after mechanical cleaning. The cast iron channels were treated with waterproofing products.

Roof replacement: The existing roof was composed of tiles fixed on wooden battens. The work has maintained the formal characteristics of the roof, guaranteeing with current construction systems the watertightness, safety, and thermal and acoustic insulation required for the new use of the building.

The total replacement of the roof required a previous study and careful planning due to the demands imposed by the nature of the archaeological site. To prevent the roof from getting wet, a system was created to dismantle the roof, combined with the installation of tensioned awnings.

The supporting structure has been protected against fire with intumescent paint. The roof is made of 11-centimeter-thick sandwich panels, on which a system of double waterproof breathable membranes was installed, and a double wooden lathing to receive the glazed tiles.

Preserving the original rhomboidal calligraphy by using new tiles required a precise layout. Different tile samples were made until the desired coloration was achieved.

Restoration of the façades: The restoration of the façade consisted mainly in the treatment of the metal elements (cast-iron), the replacement of the glass louvers and the reconstruction of the perimeter enclosure wall formed by the solid brick walls and the sandstone plinth.

Execution of the new floor slab and the new sewage system: The execution of the new floor slab at the level of the surrounding streets required the coordination of its

construction with the simultaneous dismantling of the working platform. In the construction of the floor slab, the main difficulty consisted of moving and placing beams weighing 6,500 kg that span fifteen meters. To this difficulty was often added the need to avoid the feet of the scaffolding used for restoration, without being able to operate from the site. This operation required the design of auxiliary equipment based on pulleys, ferrules, trolleys, etc.



Fig.3: View of the execution of the new floor slabs, and the archeological excavations underneath.

Interior Architecture and Facilities: This phase was intended to accommodate the new function - the Cultural Center - while maintaining coherence with the original architecture. The general criterion is to conceive the interior of the Old Market as a covered square, a protected space. A space that acts as a shelter from other buildings that demanded a particular comfort, and at the same time protects the remains of the 17th century city.

The intervention in this phase consisted of enclosing and adapting the spaces that needed climatic conditioning to

ensure their use, making the Cultural Center enclosures match the four side naves.

The construction of the enclosures based on metal structure and glass, of considerable dimensions, required a complex strategy to allow their movement and placement inside the Born. The access and movement limitations, the archaeological site protection measures, and the loads that the new slab could withstand were all taken into account.

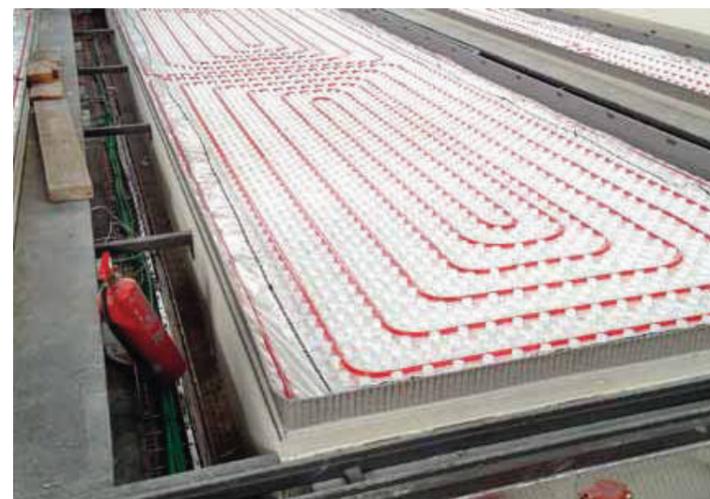


Fig.4-5: Installation of the new elevator, and radiant floor systems.



Fig.6: Construction of the new steel and glass enclosures.

Assessment of the results

The most innovative aspect of this rehabilitation is the decision to keep the archaeological site "in situ" and visitable, and the creation of a cultural and memory center essentially aimed at the interpretation of the medieval and modern history of this area of the city. Of course, this challenge has required a very special architectural project, capable of meeting these demands and keeping the values of the iron market building intact.

References

Magazines

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Additional Photos



Fig.7: View of the undergoing archeological excavations of the unearthed ruins of a long forgotten part of the city.



Fig.8: View of a guided tour group visiting the archeological remains on the now finished rehabilitation of the Born Market.



Fig.9: Satellite image of the Born Market's situation on the edge of El Born neighbourhood and the Ciutadella Park.