

The spirit preserved: an ancient palace reconverted to high standard dwellings.

Retrofitting of Can Armengol in Palma de Mallorca, 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 Can Armengol Palace, carrer de Sant Jaume 8, Palma de Mallorca, Balearic Islands, Spain

Objectives Restoration / Retrofitting of an ancient palace to transform it into an 8 dwellings apartment building

Property Private

Designer Chief architect: Claudio Hernández Alcover;
Collaborators: Archs. Belén Onecha & Alicia Dotor, structural safety compliance, fire protection, energy & acoustic performance, and dampness protection.
Interior designer: Isabel López Vilalta
Facilities team: AMM Technical Group

Date Project development: 2018-19
Works: 2019-21



Background to the intervention

Can Armengol Palace results from the merge and retrofitting of 2 palaces from different historical periods. The first texts about the building dates from 1685, though the area where the building stands, together with the archaeological remains discovered and the inclusion of several gothic elements on the aerial structures of the building, would suggest an earlier origin. In 1810, a relevant neoclassic remodelling took place joining both palaces, modifying the façades of one of the courtyards, and creating several noble rooms on the first floor, decorated with mural paintings. At the beginning of the 20th century another significant intervention took place, this time following the “noucentista” style, affecting the building perimeter and the height and composition of the south and west façades.

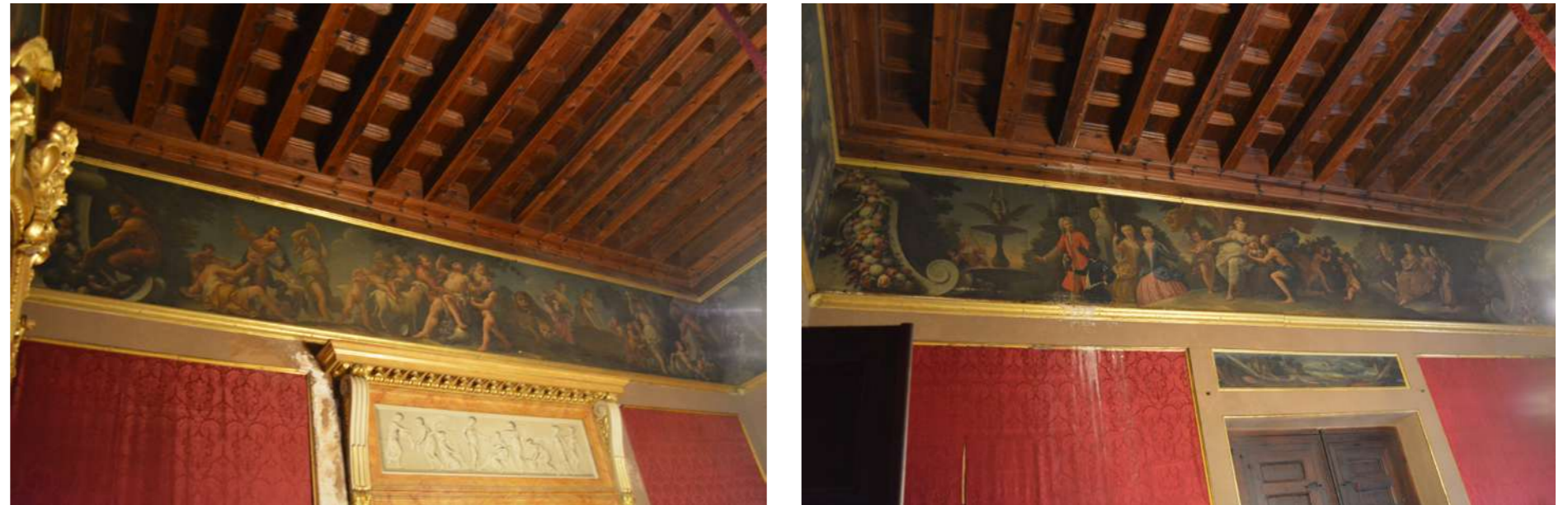


Fig.1-2: 1722-45. Remodelling of the building, from the Gothic palace to the Baroque palace.

Description of the building

Can Armengol is located in the city centre of Palma de Mallorca, and it presents each of the traditional building strategies and elements of the surrounding area, like: loading walls made of Marès Stone as vertical elements; while the horizontal structure is constituted by wood beams, Marès stone vaults and a dome.

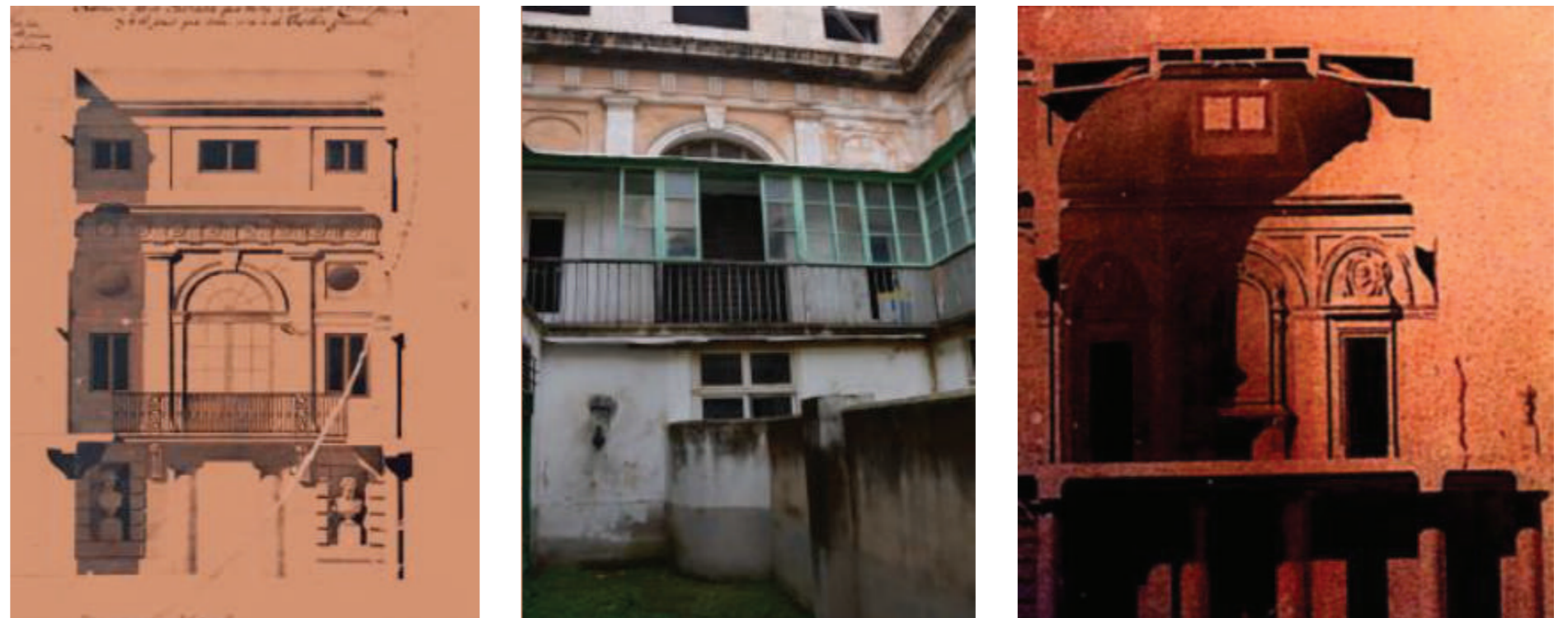


Fig.3-5: Beginning of 19th century. Original plans by Isidro Vázquez. Second great renovation to Neoclassical Style, courtyard and octagonal room.

**Every picture that follows are made by architects Claudio Hernández, Belén Onecha and Alicia Dotor or from the Historical report by M. Sastre, D. Javaloyas and S. Rebassa.*

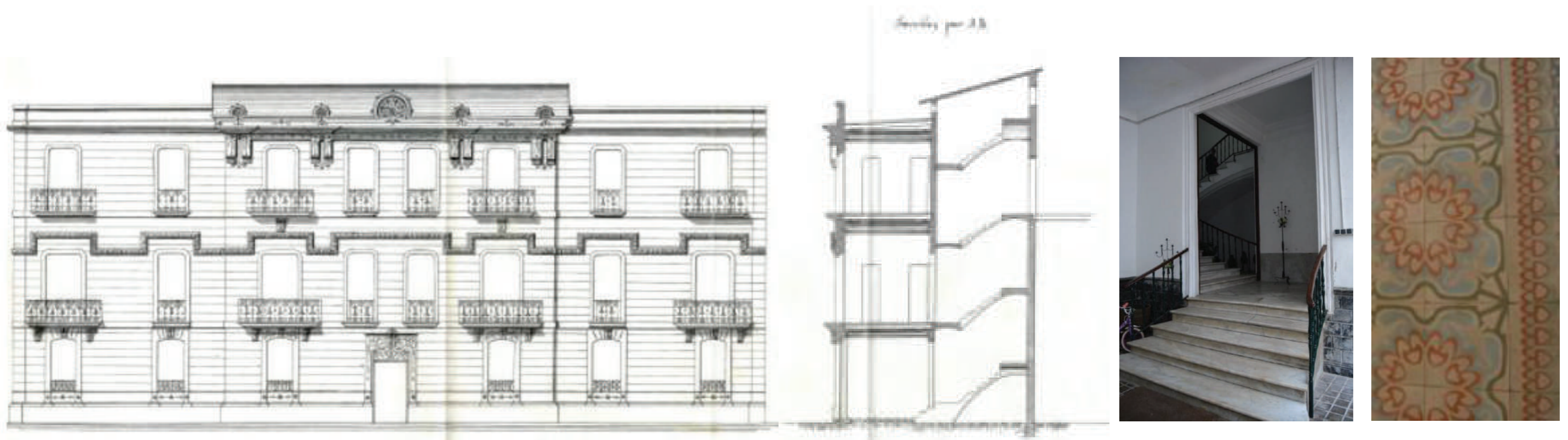


Fig.6-9: 1907. Third great renovation to Modernist and Eclectic Style: south façade, main stairs, and pavements.



Fig.10-11: Site and Location



Fig.12: Initial state Main façade



Fig.13: Neoclassical courtyard



Fig.14: Noucentista courtyard



Fig.15: Marés stone load-bearing walls and wooden beams. Initial state.



Fig.16: Marés stone vault, arches, and walls. Initial state.

The Diagnosis of the building (values and state)

The building was almost in perfect conditions. Barely any structural damages and dampness on the ground floor. The proposal was based on providing structural safety and habitability conditions to the building, following the current requirements and regulations and, in addition, restoring the historical and artistic elements it contains.

Many different values can be recognised on the building:

Documentary values: Archeological remains, Guillem Mesquida paintings, neoclassical and “noucentista” elements, and inner courtyards.



Subjective values: the site with views to St. Jaume church, Oval room with frescoes, modernist wall paintings and pavements.



Usage values: the accomplishment of the legal requirements by every element of the building.



Restoration and rehabilitation works

The ancient palace will become a multi-family building with 8 apartments.

Keeping Marés load bearing walls and façades with waterproofing thermal insulation in the interior face and a ventilated air chamber (to avoid dampness).

Substitution of the roofs because of their huge degradation. Keeping the same composition over a new structure of laminated wood beams, adding thermal insulation and waterproofing on the bottom side.

The slabs have been preserved, just adding a reinforcement of tongued and grooved laminated wood beams, both connected. Fire protection strategies for the wood beams: when possible, hidden inside a ceiling with fire-resistant boards. When, due to their cultural values, they should be contemplated, the structural reinforcement is thicker to obtain a figured wood beam in “T” shape.

Acoustic strategies: floating floor over a 3cm shock pad layer + suspended ceiling with shock absorbers, fill of acoustic insulation. Airtight windows.

Energy Efficiency strategies: Internal insulation of the whole envelope, carpentries substitution, aerothermal systems with radiant floors and mechanical ventilation with a double flux including a heat recovery system. Also, a high-efficiency system was chosen to generate heating, cooling, and sanitary hot water, based on the principle of the aerothermal pump. The installation is decentralized, as an aerothermal system is provided for each home. Each system provides air conditioning and sanitary hot water and is composed of an outdoor unit and an indoor unit equipped with a hot water generation device.

Energy Certificate qualification: C. Energy consumption results

are penalised for this building because of its location in Palma de Mallorca, whose conversion factor coefficient for primary electricity is higher than that used in mainland Spain. If Can Armengol were located in an equivalent climatic zone, B3, within mainland Spain, a B rating would be reached for carbon emissions, and a C for primary energy consumption, which is closer to a B final rating.

Assessment of the results

Preservation of the whole historic vertical and horizontal structure thanks to a lightweight structural reinforcement with dry systems of laminated wood beams, tongue-and-groove, to make a kind of wood slab connected to the original beams. This system is so light that avoids foundations reinforcement. The FSC new laminated wood beams and slabs have a low environmental impact.

Acoustic insulation compliance as if it was a new building in the north of Europe, where requirements are higher than in Spain
Waterproofing with poliurea systems: no joints results and the poliurea projected over the roofs can adopt any kind of shape.

References

The pictures presented in this document are made by architects Claudio Hernández, Belén Onecha and Alícia Dotor or from the Historical report by M. Sastre, D. Javaloyas and S. Rebassa.

https://www.arquitecturaydiseno.es/casas/asi-se-vive-atico-de-ntro-palacio-gotico-palma_6575

<https://upcommons.upc.edu/handle/2117/352024>

Plans & Drawings

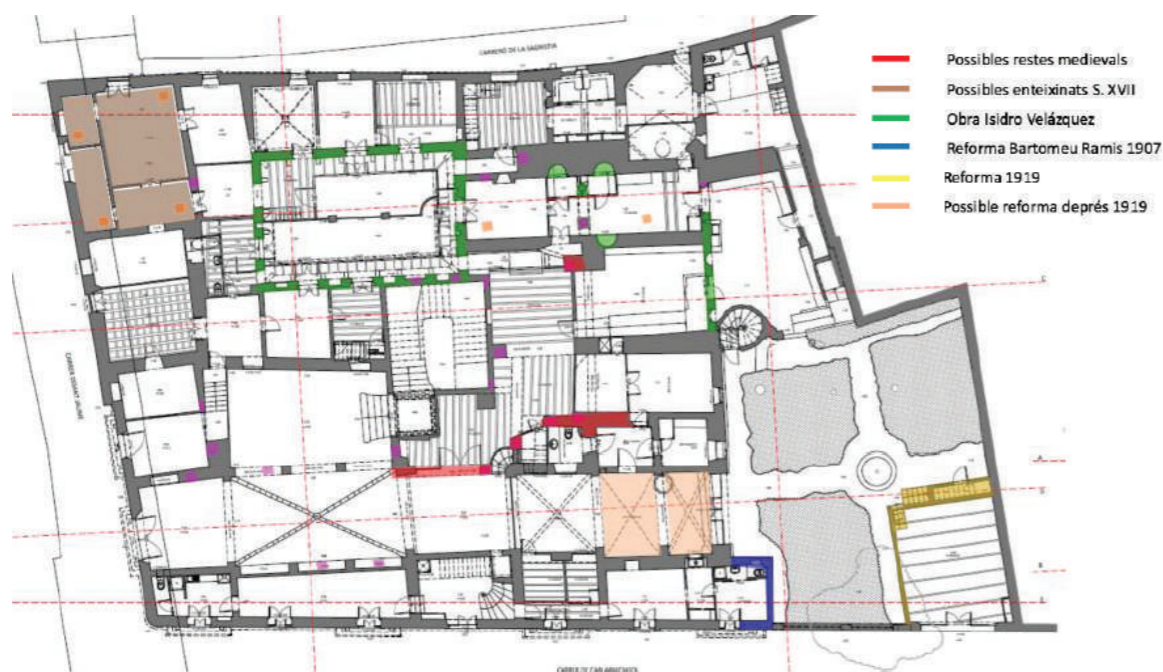


Fig.18: Initial state: Ground Floor.



Fig.20: Initial state: First Floor.

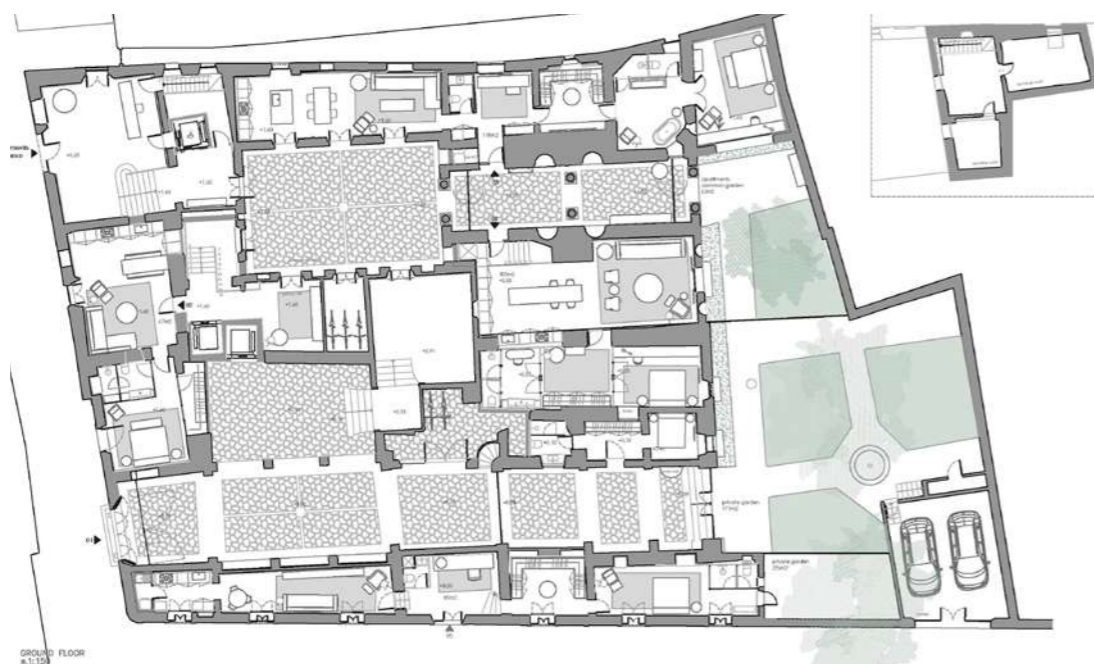


Fig.19: Proposal state: Ground Floor.

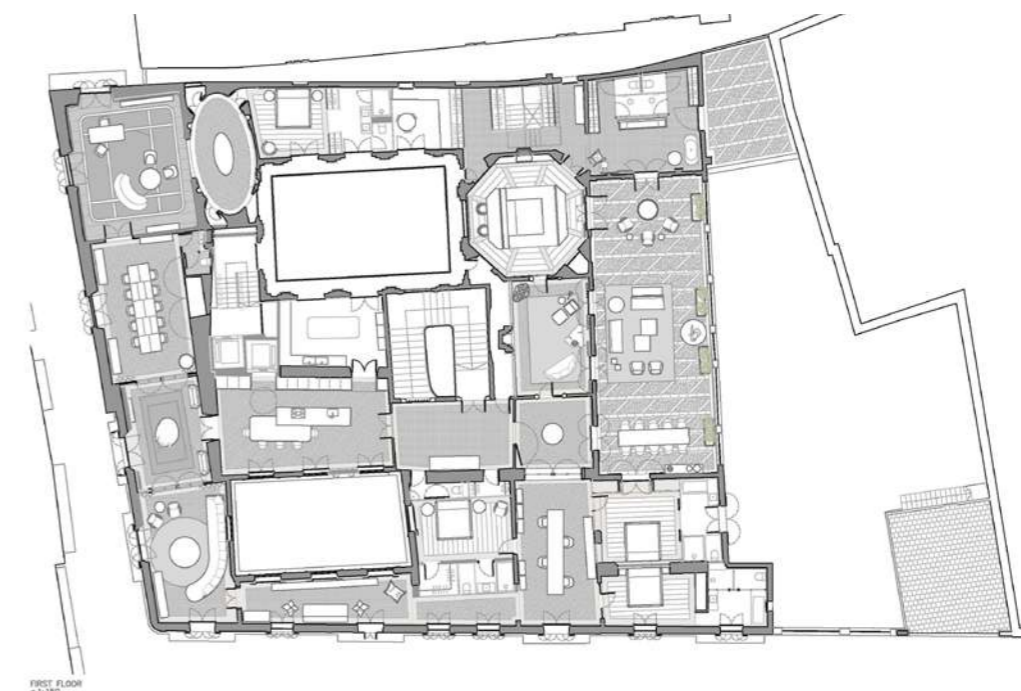


Fig.21: Proposal: First Floor.

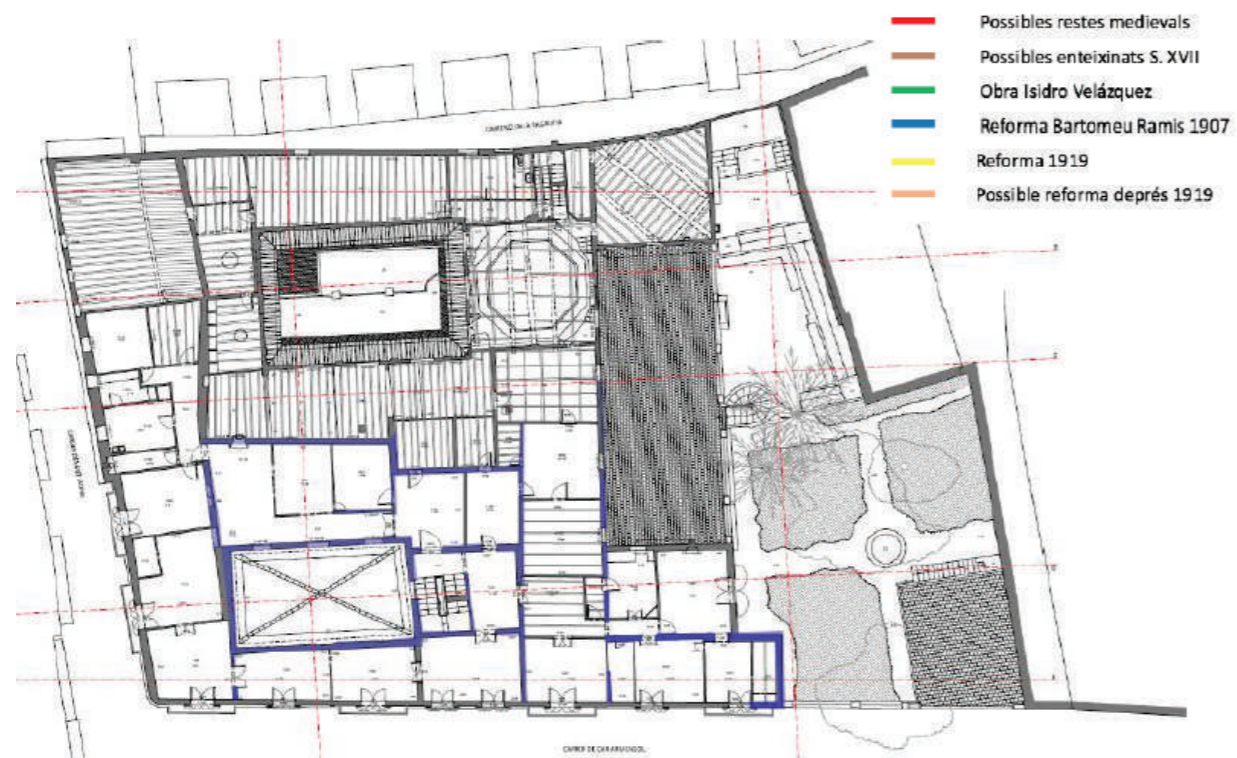


Fig.22: Initial state: Second Floor.



Fig.24: Floor slabs intervention.

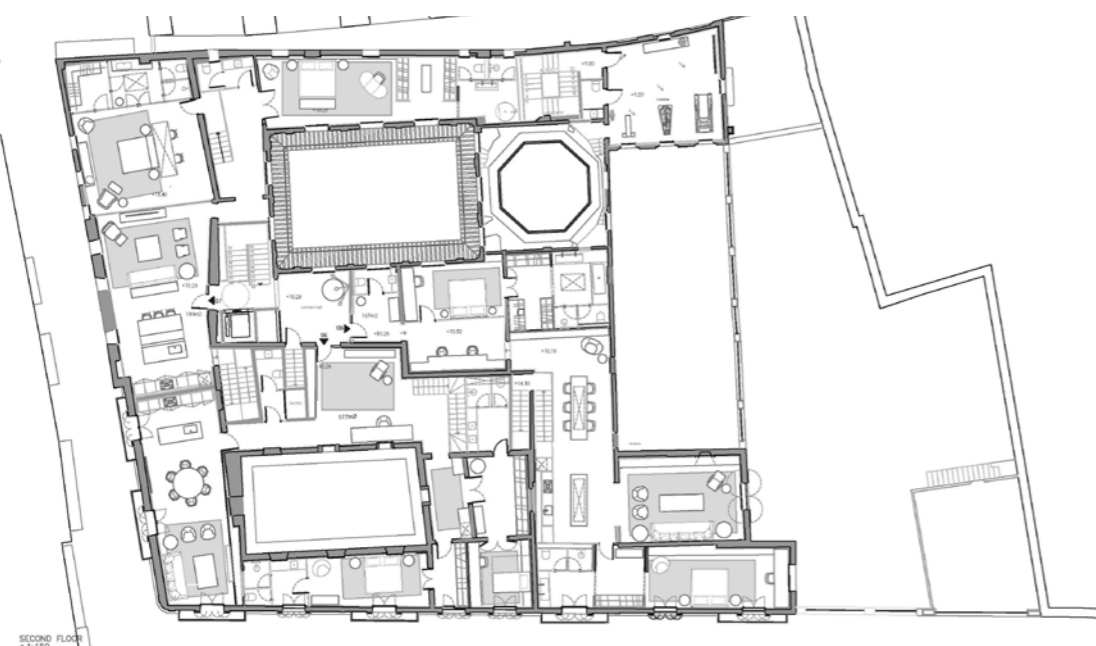
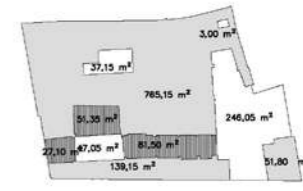


Fig.23: Proposal: Second Floor.



Fig.25: Roofs intervention.



- CRITERIOS GENERICOS INTERVENCIÓN ESTRUCTURAL
- A. FORJADOS VOJETA METÀL·LICA
CORTE DE CABEZAS OXIDADAS Y APOYO SOBRE NUEVA VIGA PAREDEIRA. SUSTITUCIÓN ZOE VOLETAS
 - B. FORJADOS VIGA MADERA-ENTREVIADO YESO
SUSTITUCIÓN ZOE CABEZAS Y ZOE VIGAS
 - C. FORJADOS VIGA MADERA-ENTREVIADO TABLERO
REFUERZO SUPERIOR CON MACHEMBRADO DE MADERA LAMINADA
 - D. BÒVEDAS PIEDRA DE MÀRES
CONSERVACIÓN Y RECONSTRUCCIÓN POR ANÀSTOLOS
 - E. CÒPIA PIEDRA DE MÀRES
CONSERVACIÓN
 - F. BÒVEDA ENCAMONADA
SUSTITUCIÓN ZOE CABEZAS Y CAMONES
RESTAURACIÓN CARZO Y PINTURA BÒVEDA
 - NUEVOS FORJADOS

PROYECTO BÁSICO DE REFORMA DE CAN ARVENÇOL
ANEXO A
CIT CRITERIOS INTERVENCIÓN 1 DICIEMBRE 2019
 FORJADOS ENTRE P8 Y P1 E A3.1.200 E A3.1.100
 SITUACIÓN Calle Simó i Pons, 8, Palma
 CLIENTE UJMAN IIG, S.L.
 ARQUITECTO Claudio Hernández Alcover
 ASESORA CTE B. Ochoa, J.L. González, A. Dotor
 Arquitectos Universitat Politècnica de Catalunya

Construction Phase photos



Fig.26: Wooden Floor Slabs.



Fig.28: Oval Room, load-bearing walls, and not load-bearing walls.



Fig.27: Steel beams.



Fig.29: Ornamentation.



Fig.30: Archeological remains in the patio.



Fig.32: Archeological remains inside the building.



Fig.31: Discovery of original wall paintings.



Fig.33: Vaults.



Fig.34: Works on roofs.



Fig.36: New roofs' thermal insulation.



Fig.35: New laminated wood beams.



Fig.37: Finishing the roofs with a combination of recovered old tiles and new ones.



Fig.38: Works on different roofs.



Fig.40: Reinforcement of ancient wooden beam.



Fig.39: New laminated wood structure covered with ancient ceramic roof tiles.



Fig.41: Existing wooden floor slab under restoration.



Fig.42: New laminated wooden floor slab.

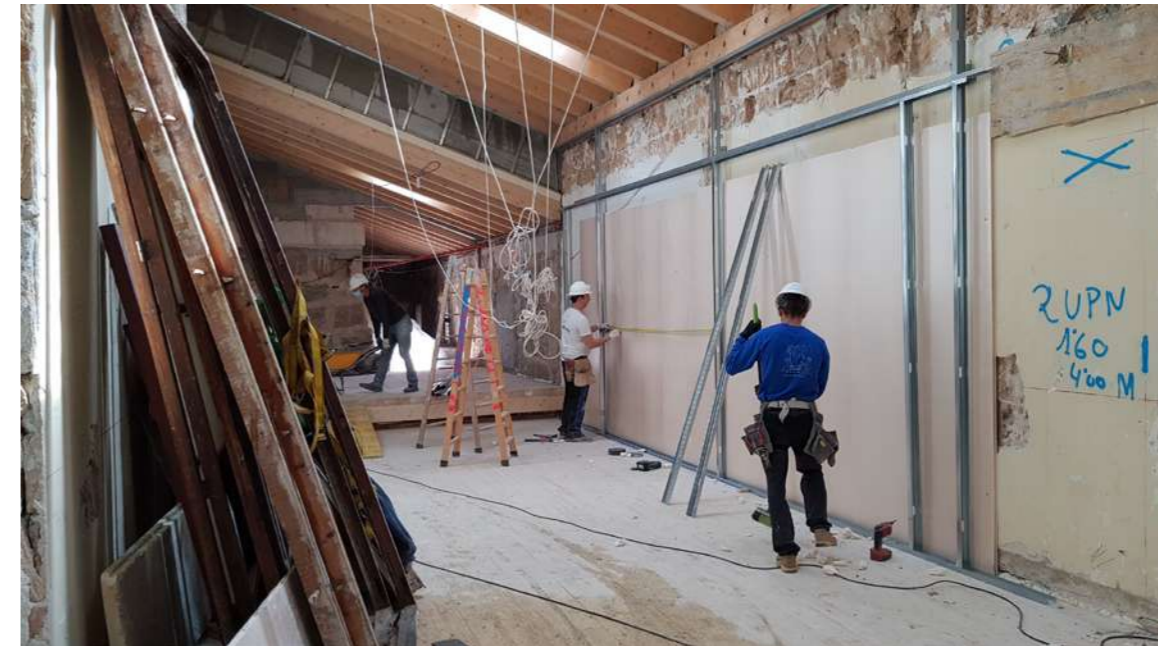


Fig.44: Thermal insulation on the inside layer of the original marés stone walls.



Fig.43: Reinforcement of ancient floor slabs through “tongued and grooved” laminated wood beams, both connected.

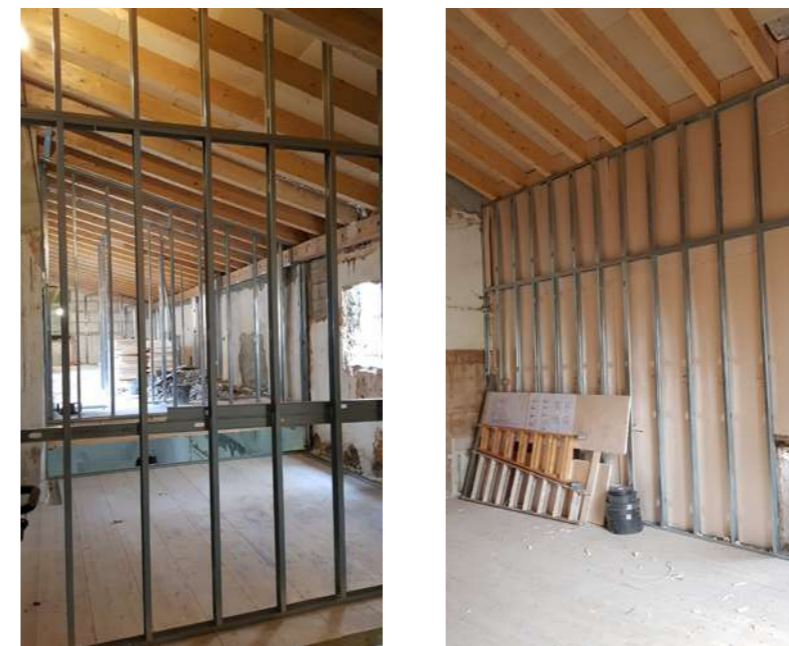


Fig.45: New interior partitions and its thermal insulation.

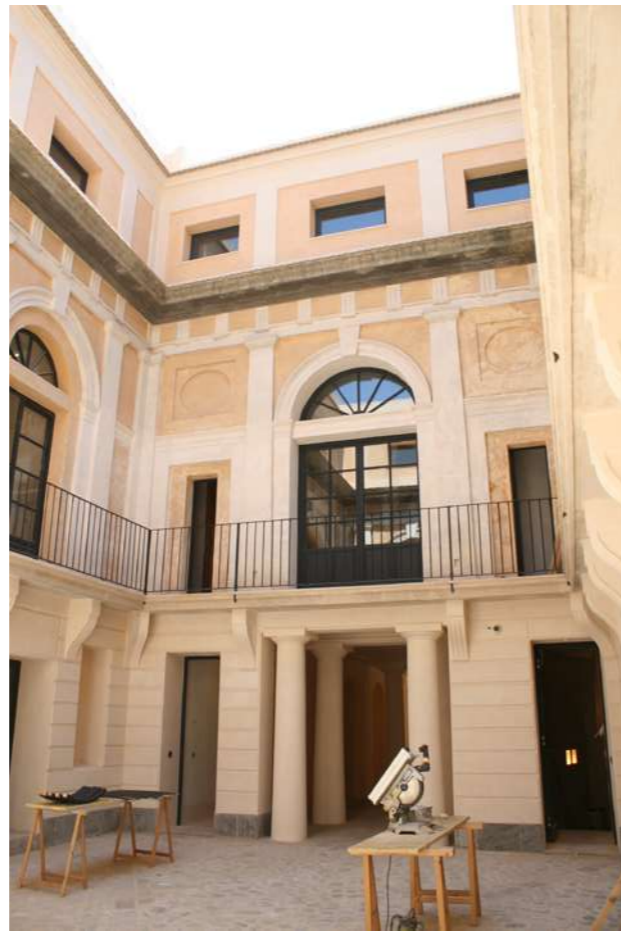


Fig.46-47: Before and after of the Neoclassical Style courtyard.



Fig.48-49: Main and side façades.