Diagnosis and Rehabilitation of Loreto's Church Roof

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Abstract Located in the heart of Chiado, Lisboa, Nossa Senhora do Loreto Church may be found between Largo das Duas Igrejas and Largo de Camões. This case study is focused on the problems observed inside the church as an effect of structural and construction systems of the gabled roof of the central nave. The main problems observed are due to the presence of water that affects the interior coatings, inciting their deterioration, the spread of humidity and also consequence of the degradation of the timber elements that compose the roof and floor system.

Keywords Diagnosis, rehabilitation, timber, truss

Figure 1 – Nossa Senhora do Loreto Church – South and West facade

Located in the heart of *Chiado*, *Lisboa*, *Nossa Senhora do Loreto* Church may be found between *Largo das Duas Igrejas* and *Largo de Camões*.

In 1518, sponsored by the Italian business community living in *Lisboa*, the construction of the Church begins, in one of the most important exit to West of the city – *Portas de Santa Catarina*.

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Throughout the years the church suffered two major fire episodes, in 1651 and 1755 (the latter as a result of the earthquake that destroyed the city), that forced the reconstruction of the building.

With a rectangular floor plan, the central nave, with the north to the top, presents small little chapels along the sides, and the high chapel at the top. High and thick masonry walls outline the perimeter of the building, being wood the main construction material for interior floors and roofing structural system. This case study focuses on the problems observed inside the church, as a consequence of structural and construction systems of the gabled roof of the central nave.

The roof is composed of thirteen structural timber trusses; bellow the trusses a wood framework supports the painted stucco-work arched ceiling.

The main problems observed are due to the presence of water that affects the interior coatings, inciting their deterioration, the spread of humidity and also the degradation of the timber elements that compose the roof and floor system.

During the course of this study several problems were identified, and a rehabilitation plan for the Church building was made. The most significant features observed were roof cladding degradation, detachment and disaggregation of interior coatings, general cracking, disaggregation of hand painted stucco, humidity spread in walls and ceilings, rottenness of timber elements and a number of *xylophagous* attack.

Adding to the identification of anomalies, a three-dimensional structural analysis to the timber truss was made, in accordance with the present regulations, which confirmed that the existing timber elements do not require structural retrofitting.

The intervention plan leaned over treatment and reconstruction of the degraded elements, and reformulating of the entire water-proof roof system, particularly in exposed spots such as eaves, gutters and alongside periphery walls.



Figure 2, 3, 4 – Broken and out of joint tiles; detachment and disaggregation of interior coating; rottenness of timber elements

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