

3D MODELING OF THE *MOSTEIRINHO DE SÃO FRANCISCO* IN PAUDALHO (BRAZIL) FOR AN ADAPTIVE REUSE PROPOSAL

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Abstract

The *Mosteirinho de São Francisco* was built around 1635, in a period when the Dutch dominated the northeast of Brazil. It is a building of simple architecture but representative of this singular historical context. It was declared as national heritage in 1966, but today it is abandoned, in an advanced state of degradation, and involved in a judicial process regarding its property. This paper presents the main results of the architectural and conservation studies on the building, as well as the methodology to create a 3D model of its current state as a basis for designing an adaptive reuse proposal that seeks to rescue its heritage values.

Keywords: Architectural heritage; Religious heritage; 3D model; Dutch Brazil.

1. INTRODUCTION

The *Mosteirinho de São Francisco* is located in the rural area of the city of Paudalho, in the province of Pernambuco, one of the first regions colonized by the Portuguese when they arrived in Brazil in the XVI century. The evangelization of the territories was carried out mainly by Franciscans, who built several convents in the region.

In 1630 the Dutch invaded the capital of the province of Pernambuco, thereby a large part of the Franciscan friars who inhabited the Convent of Olinda decided to flee inland in search of shelter in a Portuguese camp, fearful of possible religious persecution by the protestant invaders (Wätjen 1938). After the camp was taken over by the Dutch in 1635, the friars sought shelter further inland, at a sugar cane mill managed by Benedictines (Mueller 1949). Later, they received help from Mr. Bernardo Gonçalves Lobo, who gave them land to build the *Mosteirinho*, a simple and compact chapel and hospice. They lived there until they returned to their old convent after the expulsion of the Dutch from Brazil in 1654 (Jaboatam 1858).

The building has been protected at a national level since 1966. It is included in the Municipal Master Plan as part of the Special Preservation Ensembles and Properties, and in the Zone of Historical and Cultural Interest since 2006. However, nowadays it is abandoned, in an advanced state of decay and in judicial process regarding its property.

2. OBJECTIVE AND METHODOLOGY

The objective of this paper is to present the graphical survey of the *Mosteirinho de São Francisco* and the main results of the architectural and conservation analysis of the building. The creation of a 3D model of its current state helped the design and elaboration of a proposal to reuse the building and preserve its heritage values.

The documentary sources used in this work were obtained from public and private archives, both through physical and digital repositories. One of them was the physical archive of the *Instituto do Patrimônio Histórico e Artístico Nacional (IPHAN)* in Pernambuco, where old photographs, administrative processes documentation, historical documents, and reports of inspections and interventions carried out on the building were available.

Due to the judicial process, visits to the building were initially not allowed, and only one was subsequently authorized to take direct measurements and photographs and visually analyze the building. The dense vegetation, the risk of collapse of the structure, and the lack of the possibility of using an equipment such a laser scanner did not allow a more detailed survey of the building. To complement the field data, the work of Almeida (1990) and the reports of the inspections carried out by the IPHAN were used.

For the graphic restitution, the Autodesk® Revit® 2020 BIM and Lumion® 11 software were used, both in their educational version.

Revit® 2020 was used in two phases: first, for the 3D modeling of the current state of the building, based on the scanned plans of Almeida (1990) and the data collected *in loco*; and second, to design and develop the reuse proposal of the building as a restaurant, using the 3D model of its current state as a graphical basis. From Revit® 2020, all plans, sections and 3D views of both current stay and proposal were created.

Lumion® 11 was used synchronized with Revit® 2020 through the Lumion® LiveSync® for Autodesk® Revit® plugin to optimize the layout management of the project and generate rendered images of the internal and external spaces of the building intended to facilitate the understanding of the proposal.

3. ARCHITECTURAL FEATURES

The *Mosteirinho* has a single nave plan connected to the chancel and two lateral altars to the crossing arch. The nave is flanked by corridors enclosed by arcades with benches. Above the lateral corridors there are second floor galleries.

The main facade has a symmetrical composition with a triangular pediment, and a central wooden door flanked by two small windows. Above them, on the second floor, there are two arched windows with wooden railings.

The atrium is flanked by two buttresses to which two benches are attached. On their external side, two arches give access to the lateral corridors, one on each side; above them, two more arched windows with wooden railings and characteristic belfries are found.

The building was constructed with load-bearing rubble masonry walls originally coated with clay

mortars and roofed with a wooden structure and ceramic tiles. Pavements were made of fired clay bricks on the first floor and wooden boards on the second floor.

The internal decorative elements date from the 18th and 19th centuries and show the evolution from Baroque to Rococo in Pernambuco.

4. CONSERVATION STATUS

Moisture caused by leaks, fungi and termites have degraded the wooden beams of the roof structure of the nave, making them to lose their functionality and transferring thrusts to walls, which caused them to shift. In 1989, the central part of the nave wall on the epistle side could not withstand the thrust and collapsed, causing also the collapse of almost the entire nave roof and its decorated panels.

Gradually, almost all the wooden roofs and floors of the building disappeared. Only a few parts of the main altar and the decorated panels of the nave, stored by the IPHAN in 1990, remained. The rest was lost due to theft and weathering.

Fissures and cracks in walls are aggravated by instability of the structure and damage caused by plant roots. The external walls conserve part of the plastering, in spite of a number of pathologies; internal walls plastering is in a very poor state of conservation, with detachment of the coating in several points.

5. ADAPTIVE REUSE PROPOSAL

According to English Heritage (2010), keeping historic buildings in use is the best way to ensure they remain in good condition. In the case of redundant places of worship, repurposing becomes necessary to provide a sustainable future while preserving their heritage values. The Paris Declaration (ICOMOS 2011) added that

new uses and functions must be adapted to the existing structure and not the other way around, and that conservation of historic buildings should be linked to the development of cultural tourism.

After conducting a feasibility analysis, a restaurant was identified as a use that could adapt to the current conditions of the *Mosteirinho*. This new use would allow public visitation, which would increase the identification of local population with the site and attract new visitors, thus promoting tourism and regional economy. In the designed proposal the basic services of a restaurant are adapted to the existing spaces seeking maximum functionality. The chancel is converted into a kitchen, due to its central location and with the purpose to keep its symbolic importance in the building, while the nave turns into a central multipurpose space. General criteria adopted are minimal intervention, reversibility of added elements, use of compatible materials with the originals and, when it is necessary to reintegrate lost volumes, new parts must be distinguishable from the original ones.

6. CONCLUSIONS

With the goal to highlight the singularity and interest of this building and the potentialities that its conservation offers, this academic work presents a preliminary proposal for the adaptive reuse of the *Mosteirinho de São Francisco*. With the available limited means, a 3D model of the current state of the building was created in BIM as the basis for studying the building and as a tool for the design exercise.

This 3D model facilitated the understanding of the current state of the building, helped the identification of the still existing architectural values and served as the graphical medium for the elaboration of a proposal for its preservation.

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Fig. 1. (left) *Mosteirinho de São Francisco* in 1955 (Source: Rede de Arquivos IPHAN); (right) *Mosteirinho de São Francisco* in 2020 (Renan Rolim).



Fig. 2. (left) *Mosteirinho de São Francisco* in 1955 (Source: Rede de Arquivos IPHAN); (right) *Mosteirinho de São Francisco* in 2020 (Renan Rolim).

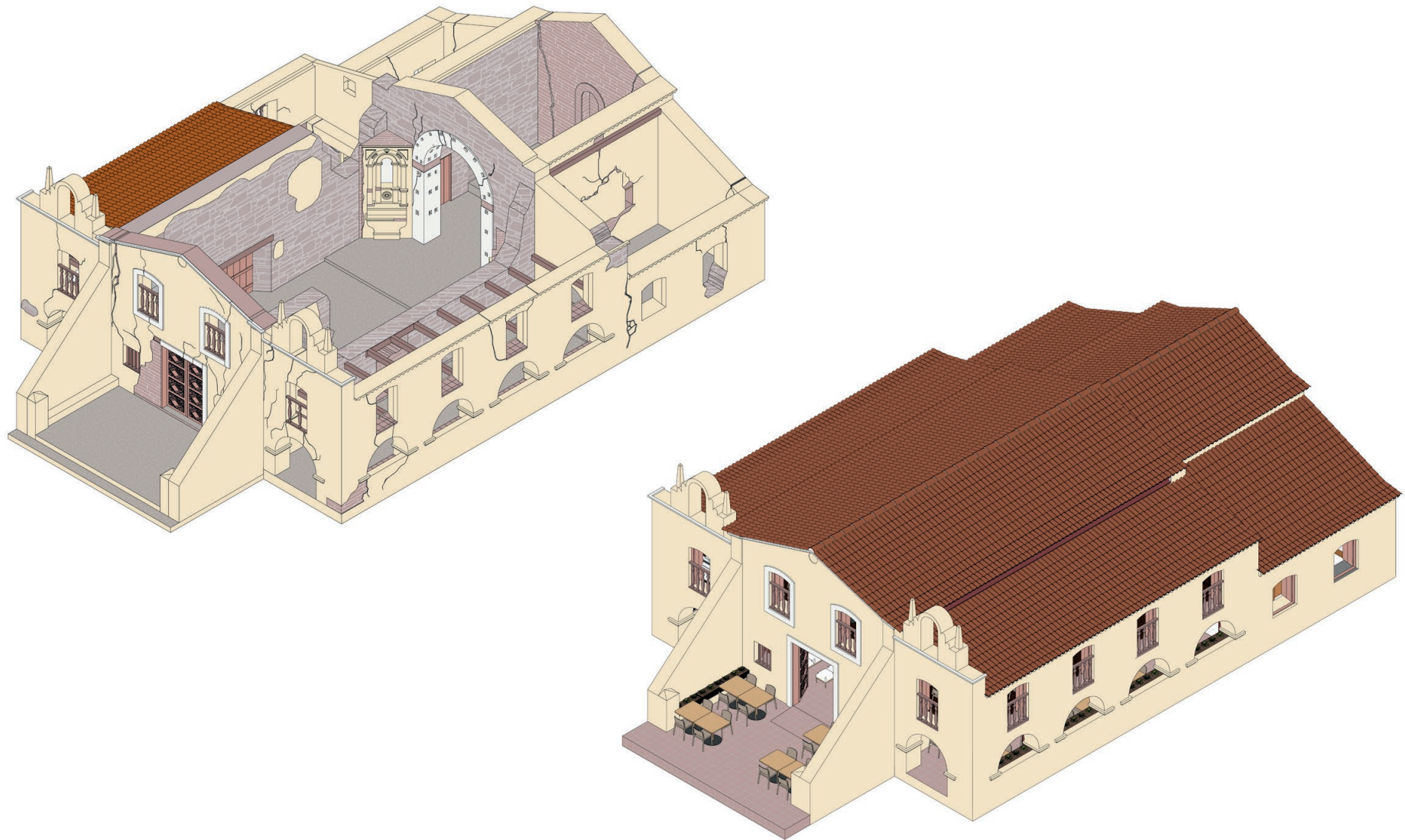


Fig. 3. 3D model of the *Mosteirinho de São Francisco*, current state (upper left), and proposal (lower right).

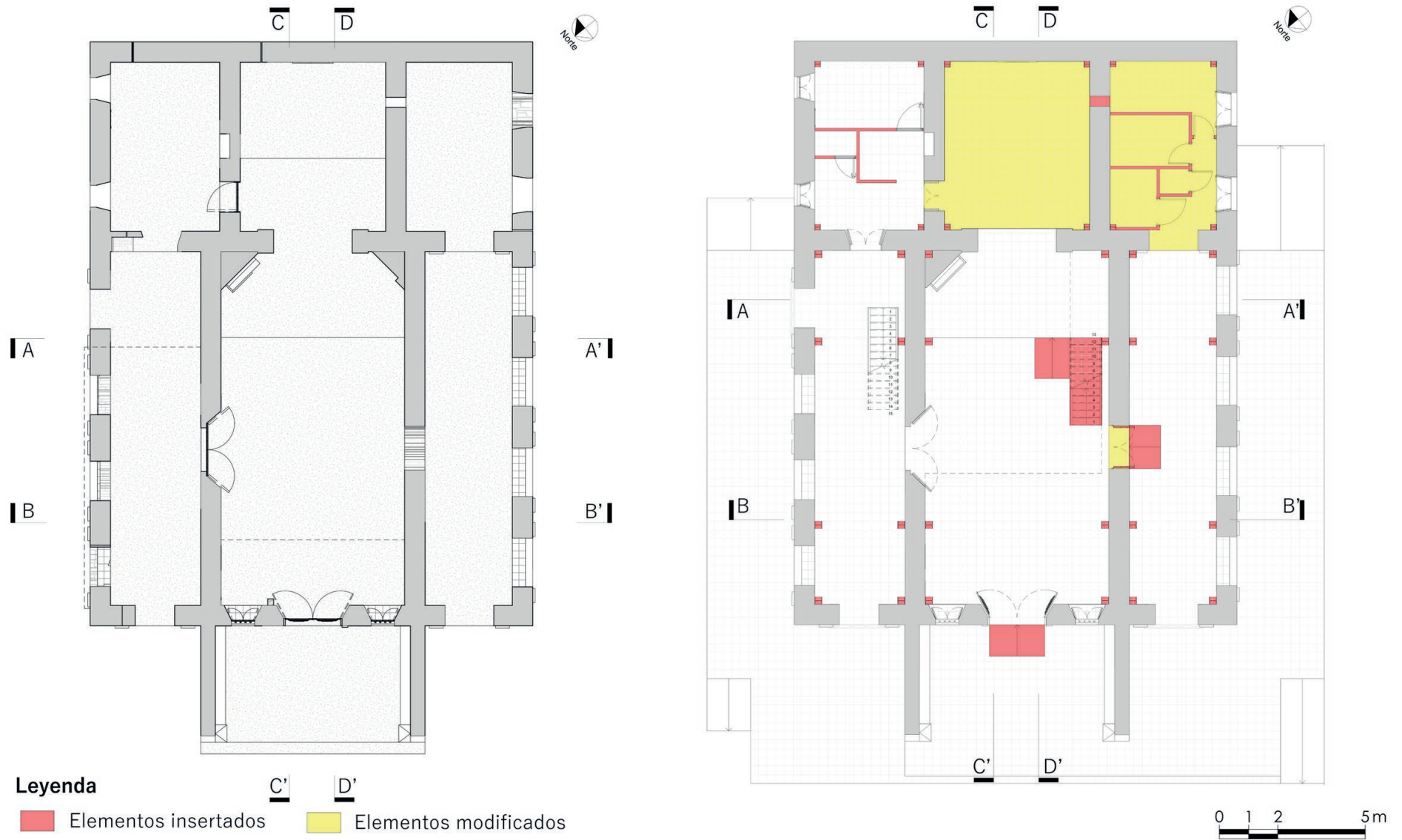


Fig. 4. First floor plan of the *Mosteirinho de São Francisco*, current state (left), and proposal (right).

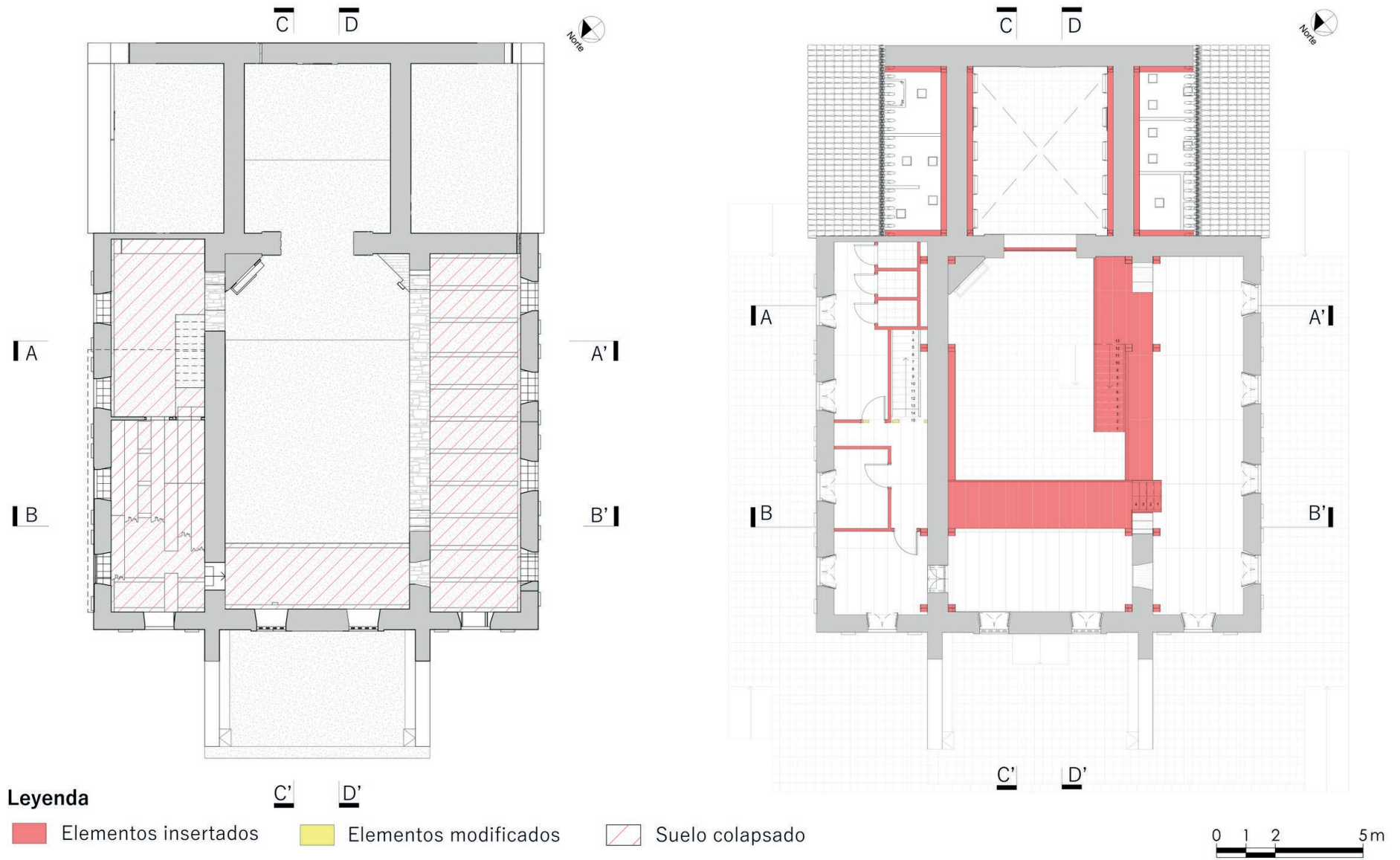


Fig. 5. Second floor plan of the *Mosteirinho de São Francisco*, current state (left), and proposal (right).

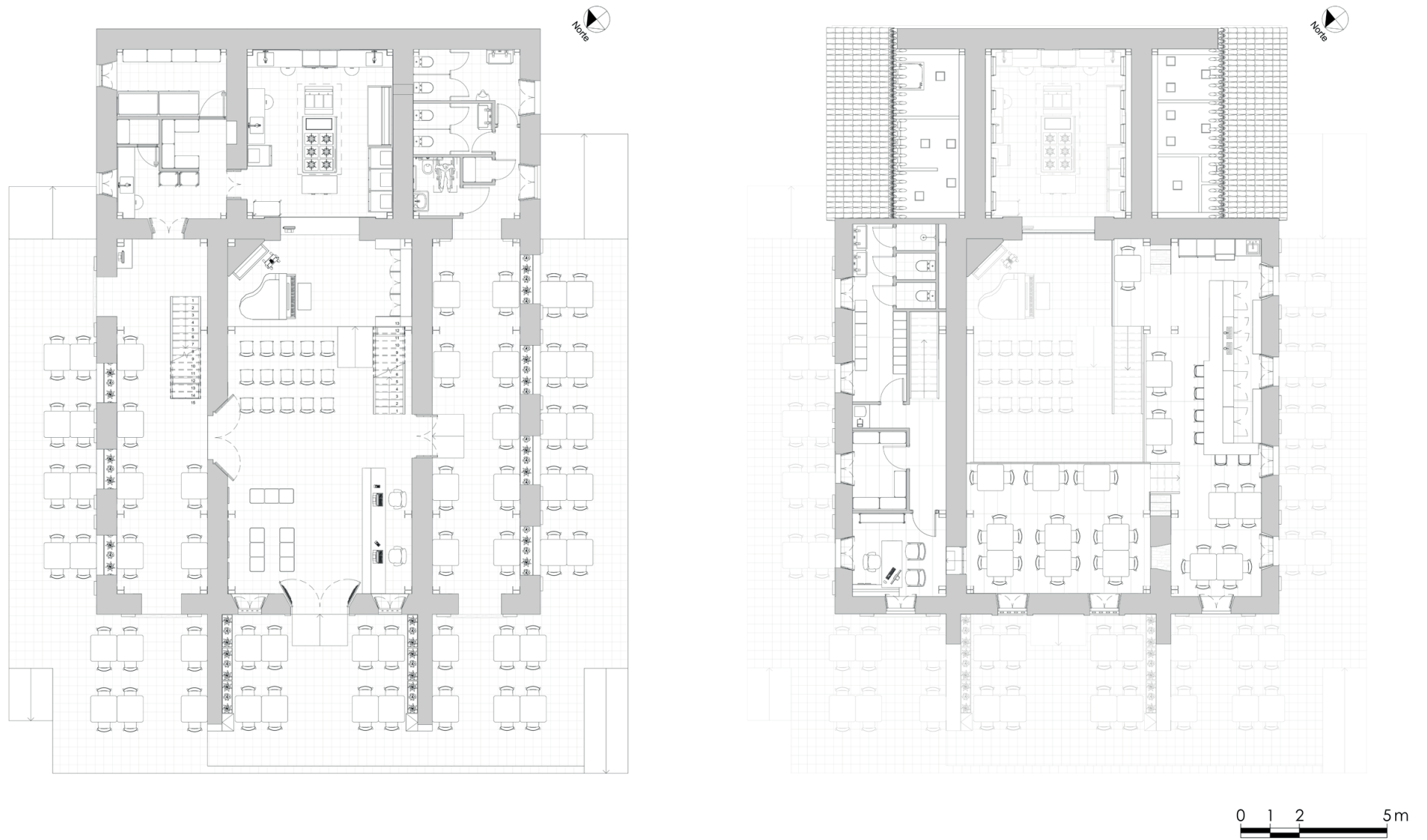


Fig. 6. Proposal layout plan of the *Mosteirinho de São Francisco*, first floor (left), and second floor (right).

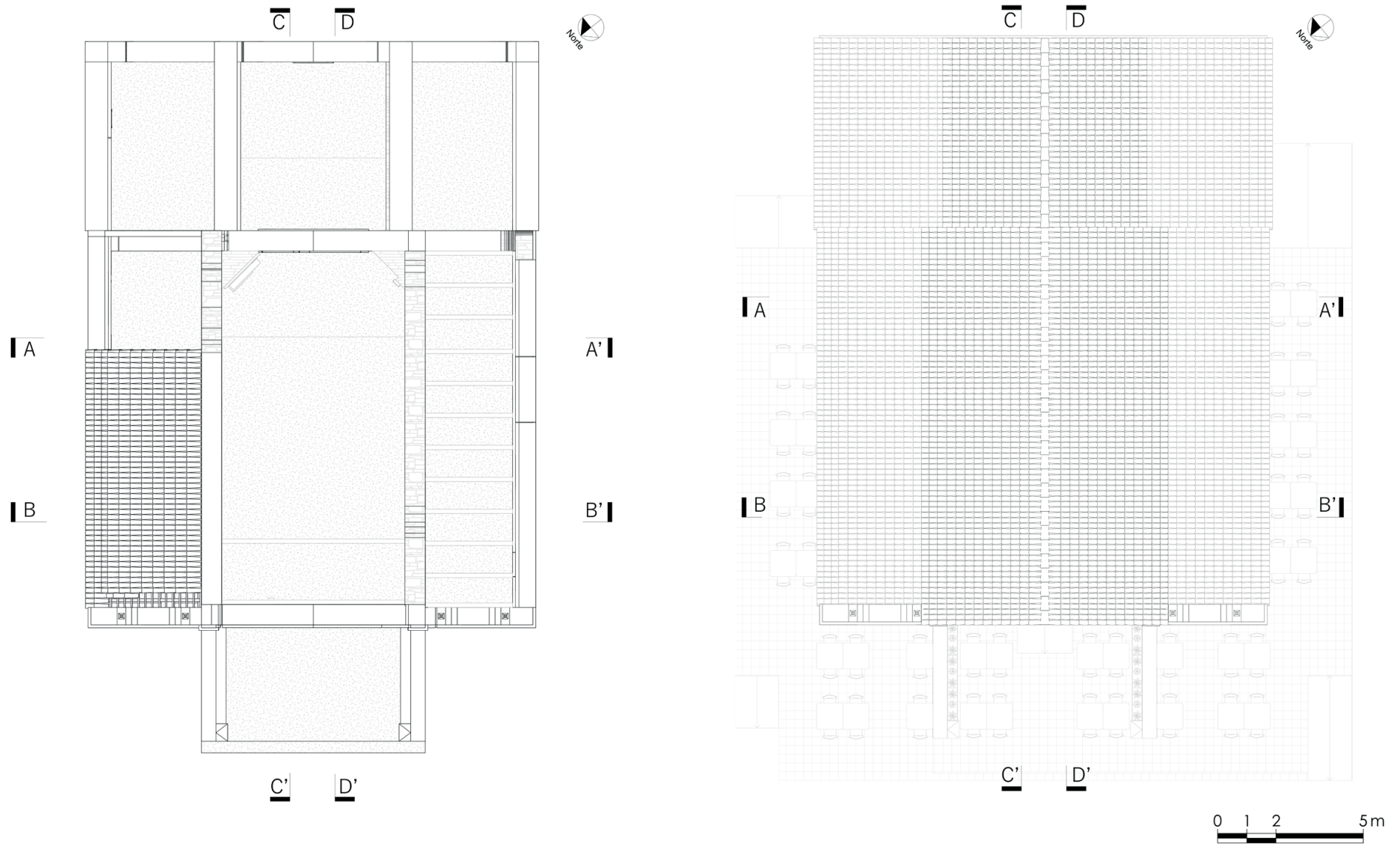


Fig. 7. Roof plan of the *Mosteirinho de São Francisco*, current state (left), and proposal (right).



Fig. 8. Section B-B' of the *Mosteirinho de São Francisco*, current state (upper left), and proposal (upper right), Section A-A' of the *Mosteirinho de São Francisco*, current state (lower left), and proposal (lower right).

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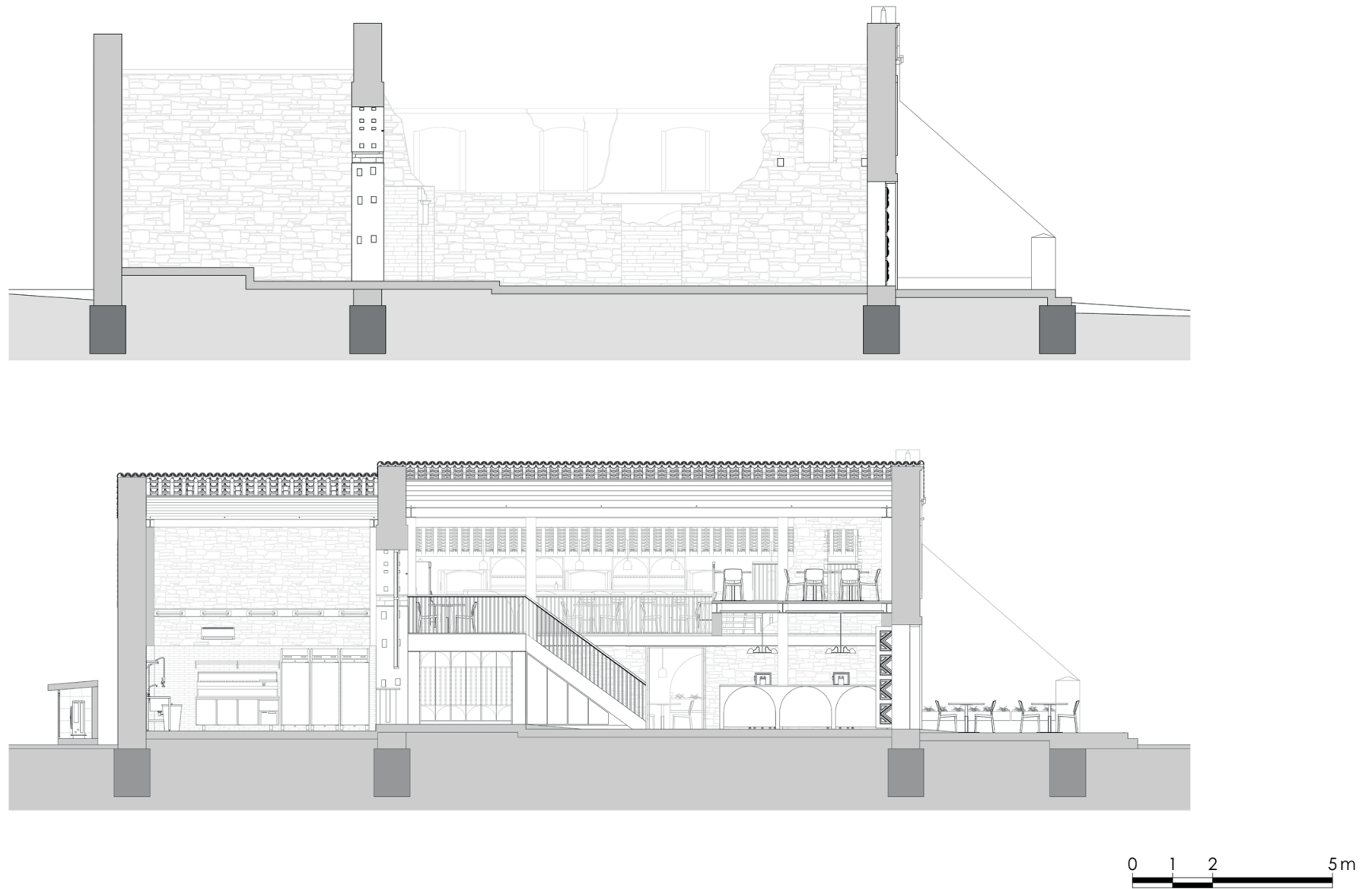


Fig. 9. Section D-D' of the *Mosteirinho de São Francisco* in its current state (upper) and with the adaptive reuse proposal (lower).

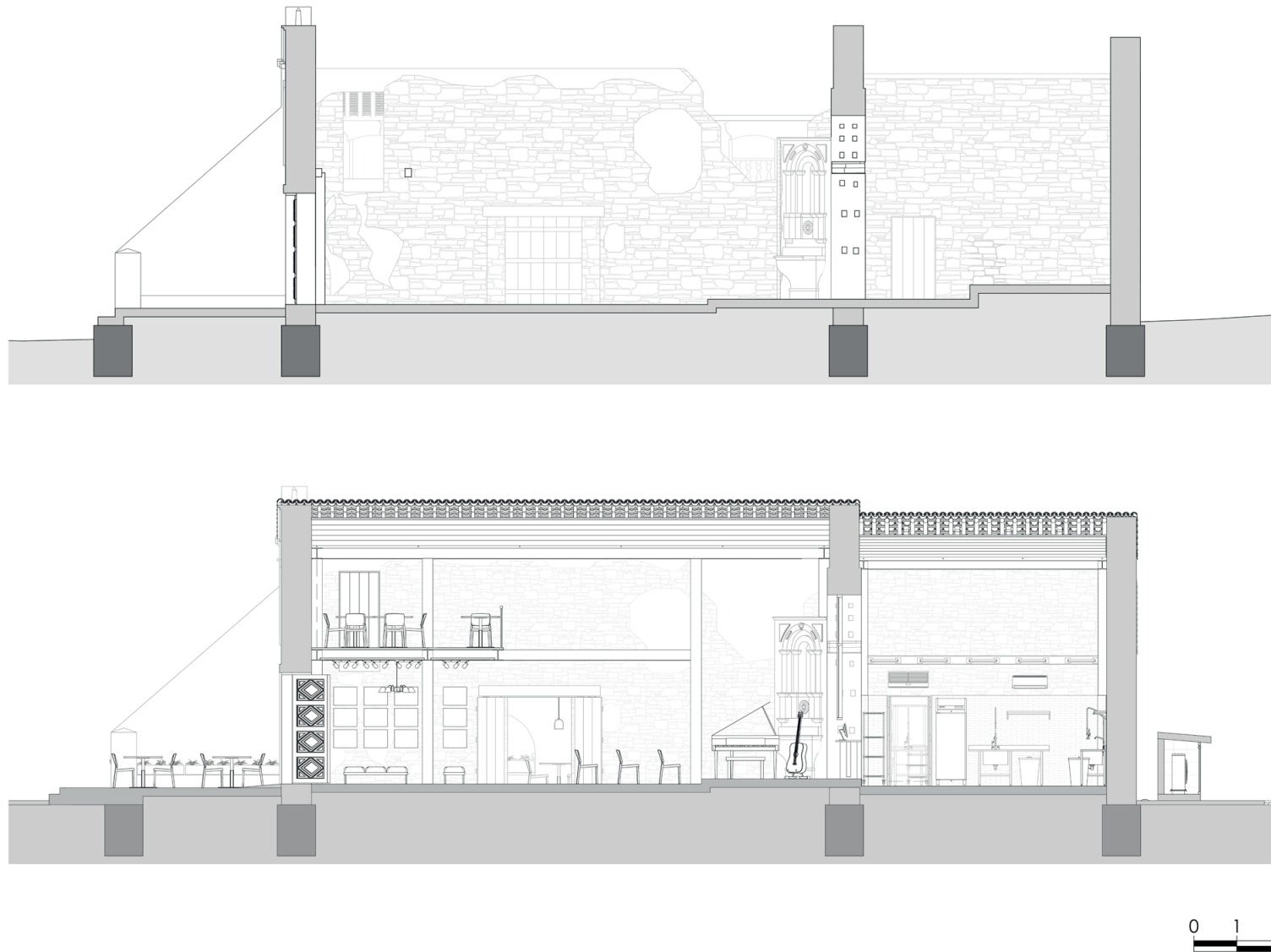


Fig. 10. Section C-C' of the *Mosteirinho de São Francisco* in its current state (upper) and with the adaptive reuse proposal (lower).

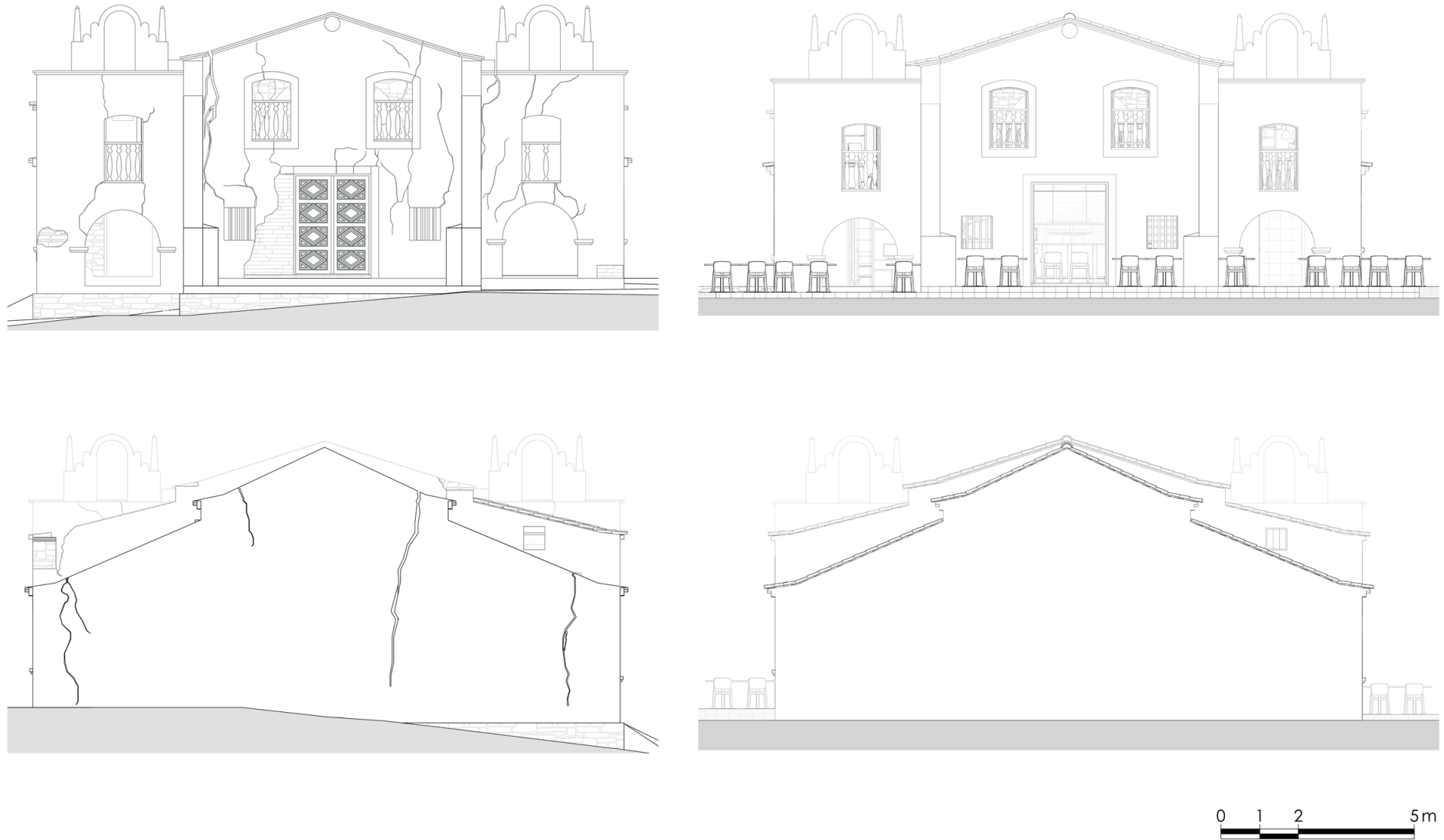


Fig. 11. North elevation of the *Mosteiro de São Francisco*, current state (upper left), and proposal (upper right). South elevation, current state (lower left), and proposal (lower right).

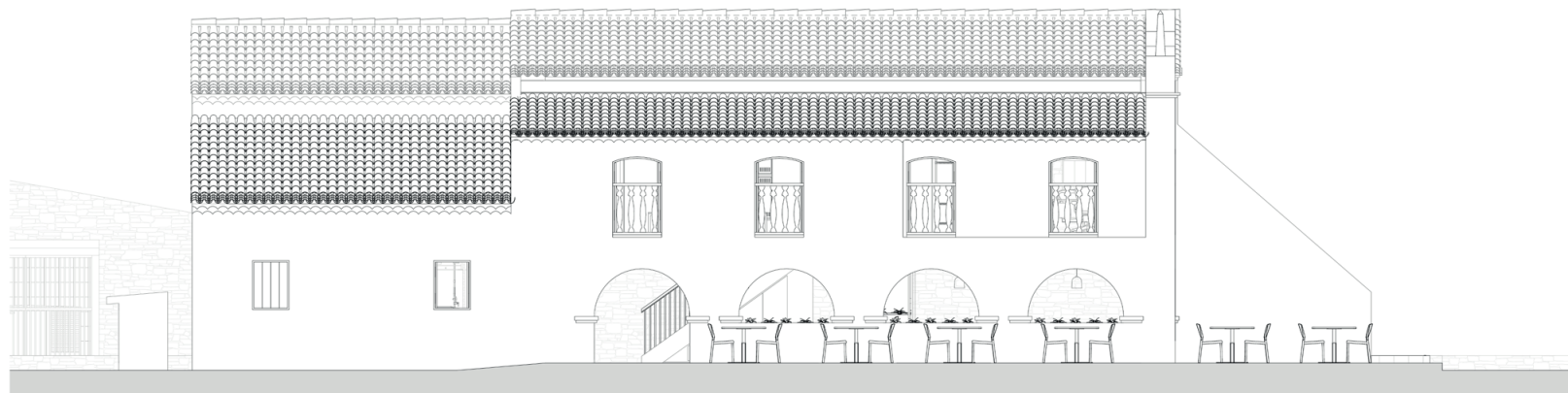
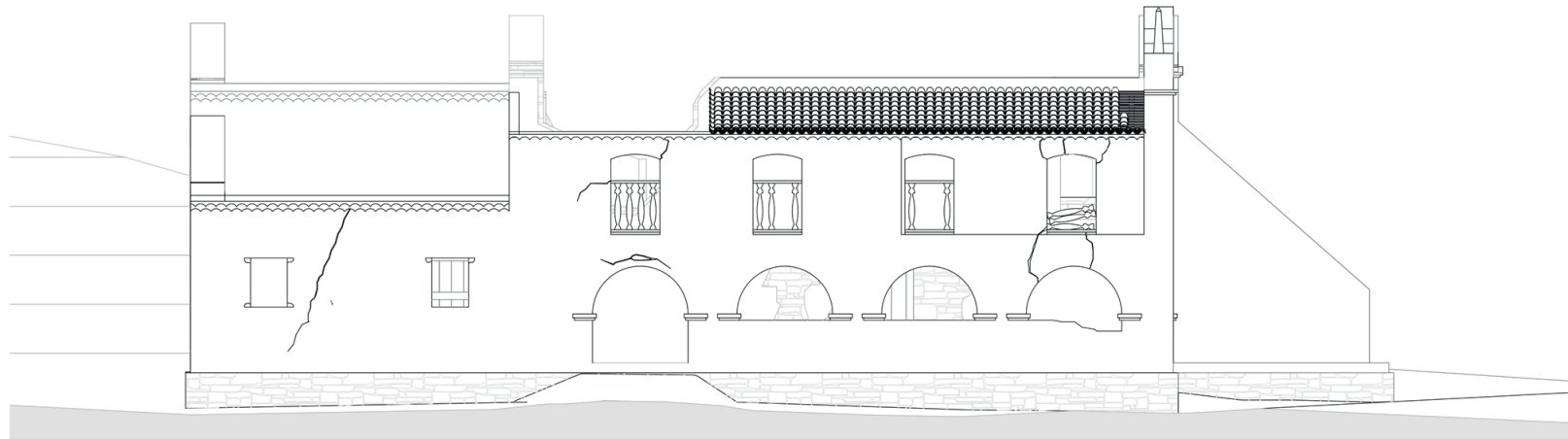


Fig. 12. East elevation of the *Mosteirinho de São Francisco* in its current state (upper) and with the adaptive reuse proposal (lower).

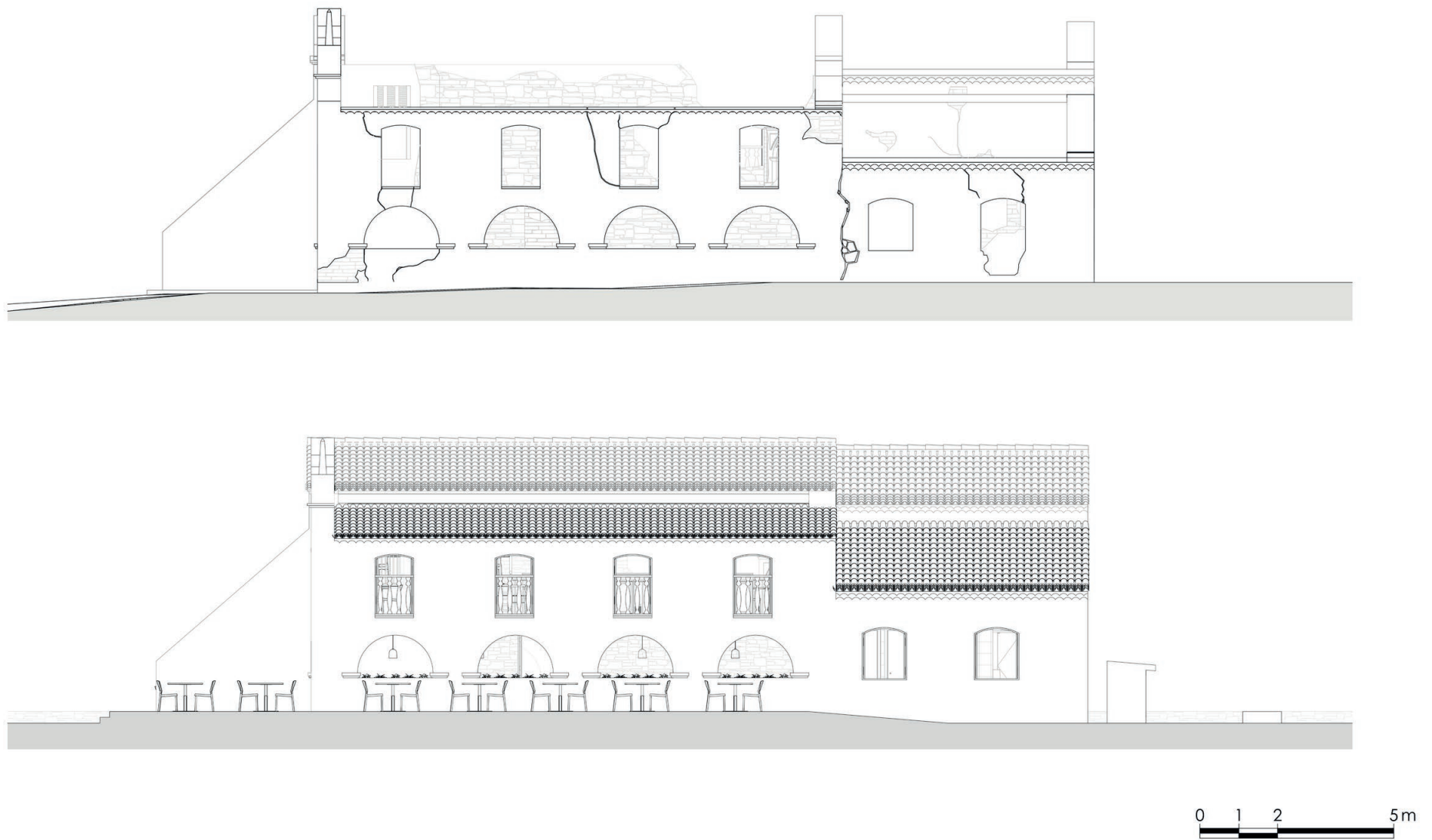


Fig. 13. West elevation of the *Mosteirinho de São Francisco* in its current state (upper) and with the adaptive reuse proposal (lower).

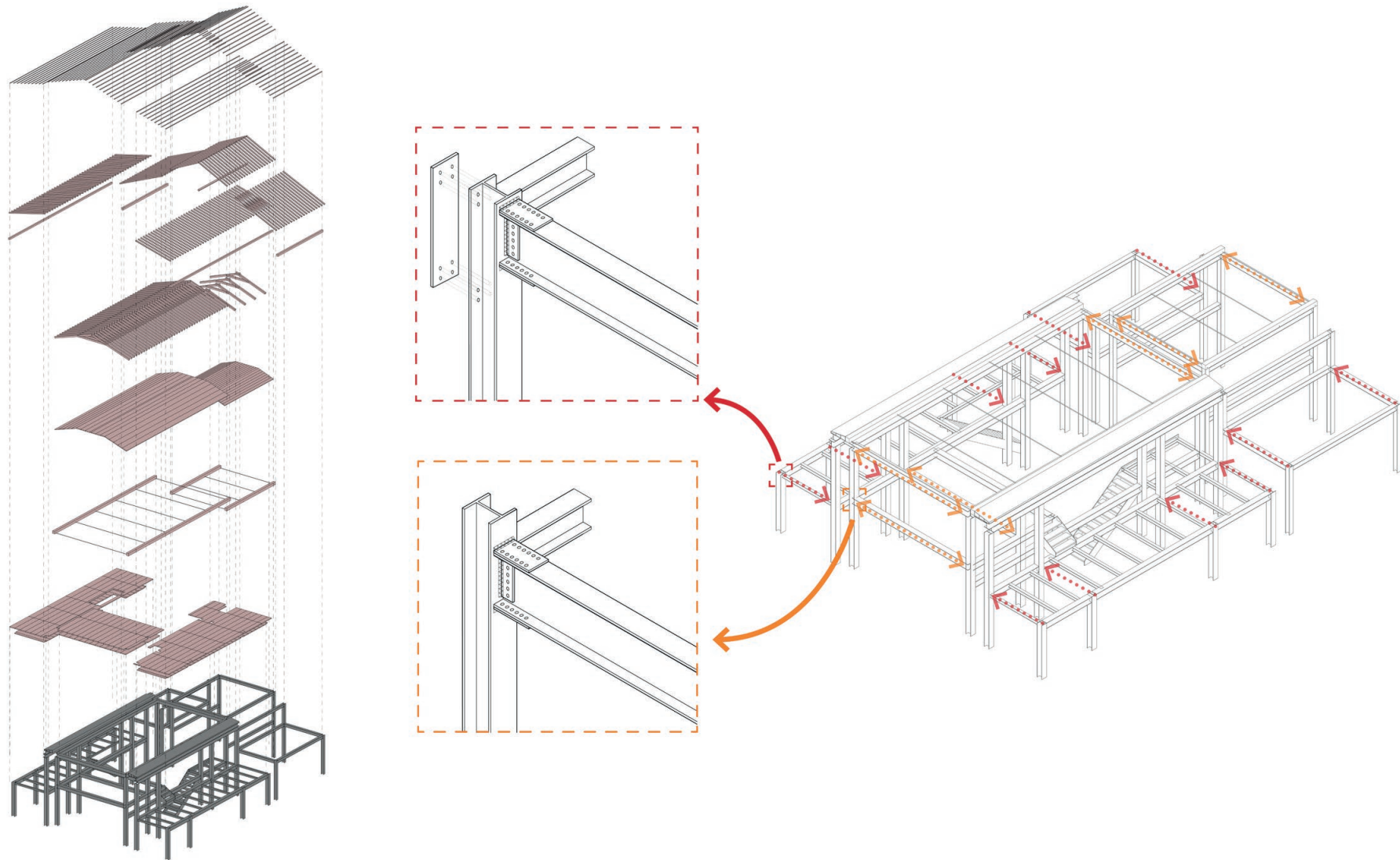


Fig. 14. New structure proposed: exploded axonometric view (left), details of connections to existing walls (central), and 3D model of metallic structure (right).



Fig. 15. Adaptive reuse proposal. Main facade view.



Fig. 16. Adaptive reuse proposal. View from East



Fig. 17. Adaptive reuse proposal. Nave / multipurpose room view.



Fig. 18. Adaptive reuse proposal. High choir / mezzanine view.



Fig. 19. Adaptive reuse proposal. Chancel / kitchen view.



Fig. 20. Adaptive reuse proposal. View of the West side aisle.