#### **RESEARCH ARTICLE**



# Adaptive reuse of vernacular built heritage: learnings from Alcino Cardoso House (1971–1991) by Álvaro Siza

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## Abstract

The Alcino Cardoso House (first phase: 1971–1973; second phase: 1988–1991), located in northern Portugal, was one of the first interventions in pre-existing buildings undertaken by the Pritzker Prize-winner architect Álvaro Siza (1933) to receive national and international acclaim. The design consisted of the conservation of vernacular farm buildings and their transformation into a holiday home and tourist accommodation. This intervention echoes the concerns of the critical revision of modern architecture in the Portuguese context (the so-called 'third way' as coined by Fernando Távora) marked by an innovative reinterpretation of tradition: modern principles such as spatial fluidity, curtain wall glass façade, architectural promenade are introduced while respecting the pre-existence landscape and character by integrating vernacular design principles and construction techniques. This early Álvaro Siza intervention in a rural context has become a reference case-study for the School of Porto architects and provides us with lessons on contemporary reuse of built heritage.

**Keywords** Adaptive reuse · Vernacular architecture · Built heritage · School of Porto · Architectural conservation · Álvaro Siza

# 1 Introduction

#### 1.1 Context

As stated by the UN Agenda 2030 for Sustainable Development, the current consumption of resources and vulnerability at a global scale holds irreversible socio-cultural, environmental and economic consequences [1]. Although 'building

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on the built' has always been a constant reality in the work of architects, contemporary demands for a more sustainable management of resources have dictated a renewed awareness about these topics.

Vernacular built heritage constitutes a paradigm of sustainability by combining the preservation of cultural values and collective identities together with landscape integration, namely through the application of bioclimatic strategies, the use of local materials, the transmission of artisan knowhow and the use of traditional construction systems [2, 3]. However, the rural exodus and agricultural mechanization, ongoing since the mid-twentieth century, have contributed to the functional obsolescence of the vernacular constructions in many rural areas, that suffer from abandonment or inadequate conversion. Therefore, it is essential to preserve the lessons of traditional constructions while providing these rural buildings with uses compatible with their preservation. This complex issue requires the appropriate synthesis of apparently opposing concepts, such as modern and traditional, local and universal, industrialised and handmade. In this context, this paper intends to discuss approaches and strategies to accommodate contemporary requirements

(functional, comfort, technological and spatial) while respecting the pre-existing features.

In Portugal, the desire to combine the emerging modern principles with the vernacular legacy has arisen in the middle of the twentieth century [4–9]. In 1945, Fernando Távora wrote an influential manifesto entitled O Problema da Casa Portuguesa [10], in which he defended the so-called third way, that is, "an evolution of modern architecture with the capacity to identify with tradition" [11]. This booklet reflected the ambitions of a new generation of architects who rejected the superficial and decorative use of traditional elements but did not renounce the expression of their own time and cultural identity. Hence, they demanded to update the stagnant Portuguese architecture, but at the same time distrusted the standardized and universal forms extended by Modern Movement. Indeed, Távora encouraged research into vernacular buildings as they had modern principles of functionality, formal clarity, material sincerity and social engagement - "because it is the most functional and less fanciful and, in short, the one that is closest to the new inten*tions*" [10] – and co-directed an extensive survey on regional architecture, known as Inquérito à Arquitectura Popular em Portugal (1955–1961) [12]. The findings of this study strongly influenced the students of the Porto School of Fine Arts (origin of the current Faculty of Architecture), including Álvaro Siza, who at that time was already working in Fernando Távora's office and took on the same concerns and interests [13]. The renewed interest in local traditions, the careful observation of construction techniques or the compositional features (all of which are directly related to the uses and needs of the people and the material resources of the site) led to a return to the consideration of site-specific physical and human circumstances as fundamental factors of architectural practice.

The review of the literature shows that numerous studies on *Adaptive Reuse* have been published in recent years ("Adaptive Reuse", Scopus, N=1038). This emerging disciplinary field links design, heritage conservation and the pursuit of sustainability [14–18]. However, not many of them have specifically addressed this issue relating to vernacular architecture ("Adaptive Reuse" AND "Vernacular architecture", Scopus, N=101) [19], and even less from the perspective of design practices. Moreover, despite the socalled School of Porto and its main figures have attracted the attention of Portuguese and international critics since the last quarter of the twentieth century [20–27], there are not many studies with a specific focus on intervention in pre-existing buildings.

Thus, this paper aims to present and discuss on the Alcino Cardoso House, located in northern Portugal, which can provide important lessons on the reuse of vernacular built heritage. The works started in 1971, and it rapidly became one of Álvaro Siza's first renovation projects to achieve national and international acclaim. At the time, the intervention criteria advocated by the DGEMN (General Directorate of National Buildings and Monuments) were moving on from the stylistic restoration promoted by the Salazar dictatorship to the operational practices of archaeological restoration and the theoretical principles of scientific restoration. This change of direction reflects the influence of the Venice Charter (1964), which began contemplating the cultural value of historical and rural architectural ensembles [28–31].

In the beginning of the 1970s, along with the Alcino Cardoso House, two other works commissioned by the DGEMN must be mentioned - the Pousada de D. Dinis, by Alcino Soutinho (1972-1982) and the Pousada de Santa Marinha da Costa, by Fernando Távora (1972-1989) -, which combined contemporary creation with the preservation of pre-existing features, renewing the stagnant practices of conservation and renovation of monuments in Portugal. The methodological approach consisted on the use of history as a design tool, the preservation of the values of the ancient artefact, as well as the addition of new features in a contemporary language capable of establishing a relationship of continuity with the new and old [32]. These interventions also express the School of Porto's approach to interventions in pre-existing buildings, rejecting any separation between design and conservation. According to Siza "Conservation is not a specialization; it is simply about architecture. It has a strong historical and scientific basis, but it also has something that any architectural intervention has" [33],

## 1.2 Methodology

This paper is part of a broader project aimed at introducing new and deeper perspectives on selected practices of intervention in the built heritage by architects of the School of Porto [34]. This research conducts a diachronic analysis of the whole transformation process (before, during and after the intervention), in order to reveal design principles and operational methods that are often overlooked when only the end result is examined (as it is common practice in specialized publications). This approach intends to disseminate reference works that may also constitute pedagogy for the future practice of architects. Within this objective, this article provides new insights into a specific case study by the architect Álvaro Siza, which is analysed according to four predefined parameters:

- Landscape, place, pre-existence: characterization of the previous building, namely the aspects relating to its cultural context (historical, geographical, agro-productive, landscape, etc.), as well as its state of conservation prior to the intervention.
- (2) Design strategy and old-new relationship: study of the design principles and decisions regarding the adapta-

tion of previous spaces and structures to new functions, as well as other preservation and transformation actions.

- (3) Tectonics, materiality, detail: concerning the tectonic and constructive features, the choice of materials and techniques, finishing details, furniture, etc.
- (4) Critical Reception: impact of the work in the specialised architectural literature.

The research methodology is thus based on the crossreferenced analysis of different sources and adopting drawing as a privileged research tool:

- Literature review: compilation and analysis of a wide range of publications covering this case study (journal articles, book chapters, master's and doctoral thesis, exhibitions, and websites, among other contributions).
- (ii) Archival research: compilation of information currently scattered in public and private archives (mainly in the Álvaro Siza Archives in the Calouste Gulbenkian Foundation in Lisbon, the Serralves Foundation in Oporto and the Canadian Centre for Architecture (CCA) in Montreal)
- (iii) Oral history: collection of memories at risk of being lost through interviews with different actors (Álvaro Siza, collaborators, owner, and others), whose testimonies provided precious information on the conception, design and construction processes.
- (iv) Drawings: production of analytical graphic contents, including red and yellow drawings (essential for any deep understanding of the transformations effectively carried out on that pre-existences), interpretative schemes of the construction phases and of the compositional and geometric principles in the relationship between new and old, and even of the construction detail analysis.
- (v) Photographs: Compilation and analysis of photos in the different phases of the process (of the previous state, of the works and of the final state), which constitute a valuable document to determine the evolution of the project.

This paper is framed within two research projects funded by the Portuguese Foundation for Science and Technology (FCT). On the one hand, "Siza ATLAS: Filling the Gaps in World Heritage", aiming at addressing a comprehensive inventory of all of Siza's built works, and to develop a detailed documentation and analysis of the properties selected for the World Heritage List. On the other hand, the research project "Atlas of Architectural Heritage Design: contributions of the School of Porto", focusing on design methodologies and practices in the built heritage developed by architects of the School of Porto. Both research projects are integrated within the UNESCO Chair "Heritage, Cities and Landscapes. Sustainable Management, Conservation, Planning and Design" fostering the dissemination and implementation of best practices of architectural intervention in the built heritage.

# 2 Alcino Cardoso by Álvaro Siza (1971– 1973; 1988–1991)

## 2.1 Landscape, place, pre-existence

The Alcino Cardoso House is located in *Lugar da Gateira*, a small village within the municipality of Moledo (in the northern Portuguese region of Alto Minho). It is located halfway up a hillside, taking advantage of the views over the ocean, in a tangled territory of narrow paths between houses, vineyards and small agricultural fields (*minifúndios*). This captivating village started to become popular in the mid-twentieth century as the holiday destination for several artists and politicians, who thus avoided the crowded beaches of southern Portugal.

The Cardoso family bought this  $1780 \text{ m}^2$  countryside estate attracted by the charm of two plum trees with juicy fruits they had found while exploring this semi-abandoned and overgrown property. Attached to its perimeter walls, two small buildings circumscribe a patio on the main entrance. On one side, an  $80 \text{ m}^2$  rectangular construction; on the other, a slightly more irregular one, with  $90 \text{ m}^2$  distributed over two floors. A few years later, they also bought the adjoining estate to the west, now known as Casa da Eira. There were three buildings arranged around a courtyard next to the entrance gate, and two *espigueiros* (raised granaries).

Both ensembles define a rural complex common in the Portuguese northwest landscape, following a constructive and typological model established over the course of the seventeenth and eighteenth centuries. These smallholdings were dominated by the cultivation of maize and vines, in combination with other horticultural and fruit crops, as well as the raising of livestock, allowing for small-scale but diversified production.

Hence, in a typical farm estate (*quinta*) there are structures for drying cereals (the *sequeiro* and the *espigueiro*), stables or outbuildings for the wine press and for storing tools. In the main house, while the ground floor was used to keep the animals or as cellars, the upper floor was the farmers' residence. The dwelling usually consisted of a kitchen, one or more rooms and alcoves and a porch (*varanda*). The construction systems were simple and involved few materials as briefly described in the Survey on Popular Architecture: "*walls, pillars and lintels of stone [granite]. Tile roof, placed on a wooden frame. The internal framework, floors, partitions and doors are also made of wood"* [12].

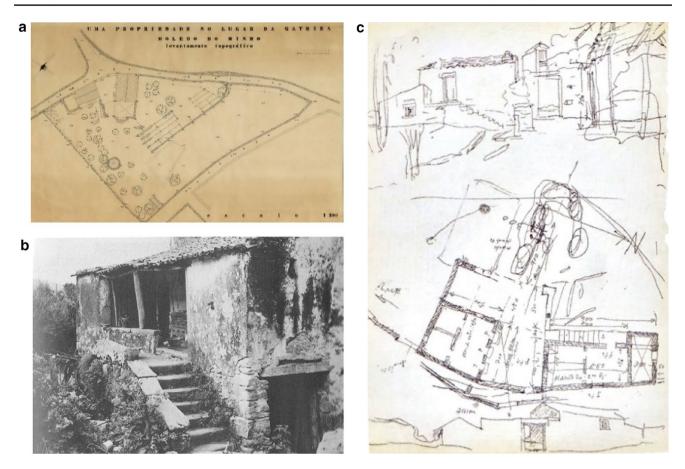


Fig. 1 Previous state: a Topographic survey, 1970 (Fundação Serralves, PT-FS-ASV-12–3-4–0009); b Casa da Eira before intervention [21]; c Sketch before intervention [15]

At the time of both commissions, the buildings were in an acceptable state of preservation (see Fig. 1). The structures stood upright despite years of neglect, as confirmed by the ante operam surveys-albeit of little detail (scale 1:100) -, some photographs (only of the Casa da Eira) and the direct testimonies of those involved in the process.<sup>1</sup> The most worrying deterioration concerned the wooden structures of the floors and roofs, which were partly damaged by water infiltration and material decay. Similarly, the window and doorframes were also quite deteriorated. On the other hand, the granite masonry walls suffered minor pathologies, with localized loss of consistency, surface alteration and proliferation of parasitic vegetation being the most common pathologies. Only one wall of the wagon shelter of the Casa da Gateira was partially collapsed. The best-preserved rooms were on the upper floor of the Casa da Eira, adorned with detailed and refined elements-cornices and wooden ceilings-rather unusual in a rural dwelling.

#### 2.2 Design strategy and old-new relationship

#### 2.2.1 First phase (1971–1973)

Alcino Cardoso, an employee at the Pinto & Sotto Mayor bank office in Oliveira de Azeméis (also designed by Álvaro Siza, 1971–1974), and his wife Zilda Cardoso commissioned the renovation and extension of the existing buildings to accommodate a holiday house for their family. Siza completely altered the interior layout of the old house, transforming the space into a large living room and kitchen, separated by a light partition. However, the stone walls were maintained and the roofs were renovated, thus preserving volumetry and character.

The rest of the use programme (five bedrooms and bathrooms) was incorporated into a triangular-shaped annex, connected to the old construction by means of sharp geometry. Following the premise of "*reducing the new to the minimum*" [35], this new volume is semi-buried and has a flat roof so as not to disturb the scale and predominance of the previous building [36]. This annex is laid out in parallel to the walls of the property and placed on a sort of plinth,

<sup>&</sup>lt;sup>1</sup> Interview to Álvaro Siza's collaborator architect José Luís Gomes (22/07/2022).

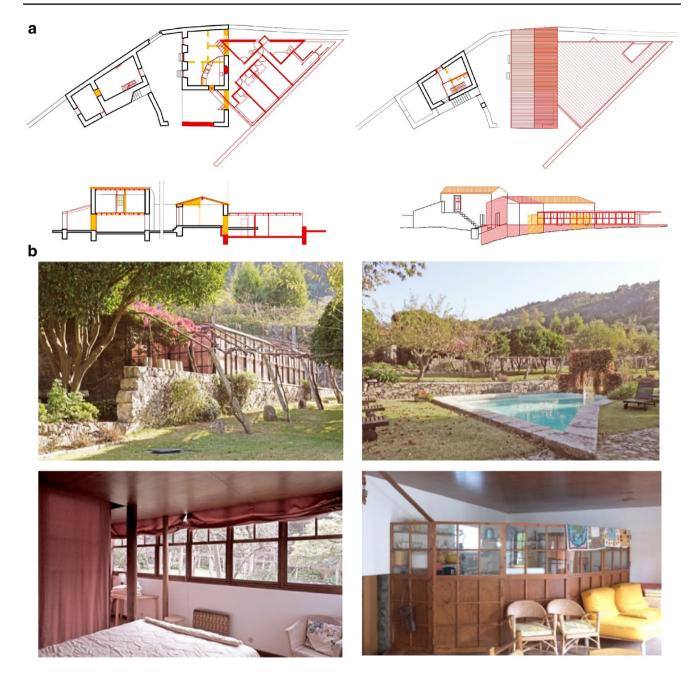


Fig. 2 Design strategy and old-new relationship. Phase 1 (1971–1973): a Demolitions (yellow) and additions (red); b Views of the interior and the exterior

as a new terrace in the landscape. Although the owners initially intended to replace the existing vineyard with an orange grove, the architect decided to keep it to preserve the *genius loci* of the place, taking advantage of the vine arbour as a brise-soleil and as a reference pattern to modulate the rhythm and height of the new structure [37] (see Fig. 2).

The new partitioning is adapted to a regular grid that forms a 45° angle, embedded in a triangular plan that recalls the geometries of the Ocean Swimming Pool, in Leça da Palmeira, and Frank Lloyd Wright's Taliesin West. Unlike the rough and heavy masonry walls of the old building, this volume has a light structure and a large curtain wall facing the vineyard so that the glass façade dematerialises as it reflects the vegetation. However, although Siza himself refers to a contrast, the materiality and design solutions inspired by traditional carpentry, as well as the geometric alignment with the vineyards, provide a strong sense of continuity between the old and the new: "*There was an attempt to recover the character of the* [existing] *buildings and of the landscape. The extant and* 

the new elements establish a clear contrast and interpenetrate themselves violently" [38].

On the opposite side of the entrance patio, the other building in ruins was transformed into an autonomous two-storey dwelling. A few years later, Álvaro Siza also designed a swimming pool for the garden, taking advantage of an old irrigation tank. On one of its sides, the architect created "*an invented ruin from the memory of a number of things belonging either to the landscape of Minho or to other landscapes, which intends to relate itself with everything that surrounds it—the new and the old as if it was an intermediary or an (im)possible synthesis*" [38]. Other elements found at the site, of unknown origin, such as walls, benches and ashlars were rearranged and "constitute a kind of undated archaeo*logical field*" [39].

#### 2.2.2 Second phase (1988-1991)

Álvaro Siza was again invited to Moledo in order to design the conservation and renovation of the constructions in the adjacent plot with the intention of establishing a rural accommodation business. Thus, the buildings were transformed into three independent houses (A: 178 m<sup>2</sup>; B: 59 m<sup>2</sup>; C: 29 m<sup>2</sup>). As the architect described: "*The project consists of preserving the morphological characteristics of the houses (designated A, B and C) and providing them with acceptable conditions of habitability*" [38].

Unlike the first phase, Siza developed a very surgical intervention, without extending the limits of the pre-existing structures with new additions. It involved the preservation of the structures and roofs, and the redesign of the traditional window frames following the existing models. Some new features (windows, floors, coverings, furniture), faithfully inspired by tradition, were introduced without being clearly distinguishable from the pre-existing ones in order to maintain the ambience of the site. However, other subtly innovative actions also took place to ensure contemporary living standards. Thus, the most significant changes included the addition of new partition walls and some excavation works (see Fig. 3).

#### 2.3 Tectonics, materiality, detail

Due to the remote location of the property and the unavailability of experienced labour, Álvaro Siza made use of common materials (stone and wood) and the traditional construction techniques known to local workers. The existing buildings were carefully restored: the stone masonry walls repaired and the roof tiles either preserved or replaced with similar pieces.

However, as previously stated, the design and materiality of the new annex provides an ambiguous relationship between contrast and continuity. On the one hand, the flat zinc roof makes a clear distinction between the old and the new. Moreover, the glass curtain wall also constitutes a modern feature. Nevertheless, it is said that the pre-existing wooden structure was taken to the workshop and used as a reference for designing and constructing the new curtain wall. This glass façade is detached from the roof structure. This detail simultaneously dissimulates the thickness of the roof beam and allows it to conceal both the drainage channel and the blind hangings. The eastern extremity of the thick masonry wall of the new volume starts out as a parapet, later progresses to support the light frame, before ultimately sinking further westwards to become an indented hollow patio (see Figs. 4, 5).

In the interior, the combination of wood with textiles in reddish tones gives rise to a warm and intimate ambience. Another important contemporary resource stems from the division of spaces by means of either light wooden panels or even curtains, which provide a strong sense of continuity and express a possible Japanese influence. Thus, the separation between the living room and the kitchen is only suggested by a light wooden panel, similar to a folding screen (which does not reach the ceiling), partially glazed and with movable sections. These elements emphasise the almost provisional character of the new building and introduce modernity to a rural house by providing spatial fluidity, greater luminosity, transparency and sensory tectonics. A tension is consequently created between the stereotomy and fragmentation of traditional domestic spaces and the light and permeable condition of the new arrangements in accordance with more dynamic and changing lifestyles.

## 2.4 Critical reception

Regarding the reception of this built work by architecture critics, the Alcino Cardoso House was not featured in some of the most important publications on Álvaro Siza in the 1970s and 1980s. The Portuguese Revolution of 1974 and its consequences for the field of architecture led to the influential journal *L'Architecture d'Aujourd'hui* publishing a dedicated issue in 1976 [40], with essays by Vittorio Gregotti and Oriol Bohigas. Alcino Cardoso was also not included in the works selected for the exhibition on Álvaro Siza, curated by Gregotti at the Padiglione di Arte Contemporanea (PAC) in Milan (1979) [41]. However, this work was included in the famous publication *Álvaro Siza: Poetic Profession* in 1986 [42], that counted on critical contributions by Kenneth Frampton, Nuno Portas, Alexandre Alves Costa, Pierluigi Nicolin, Oriol Bohigas, and Bernard Huet.

Also, we should also mention how the Alcino Cardoso House did feature in a vast set of monographs on Álvaro Siza since the early 1990s, which proliferated after he was awarded the Pritzker Prize in 1992 [35, 39, 43–50]. Furthermore, this project is described by the owner's wife in

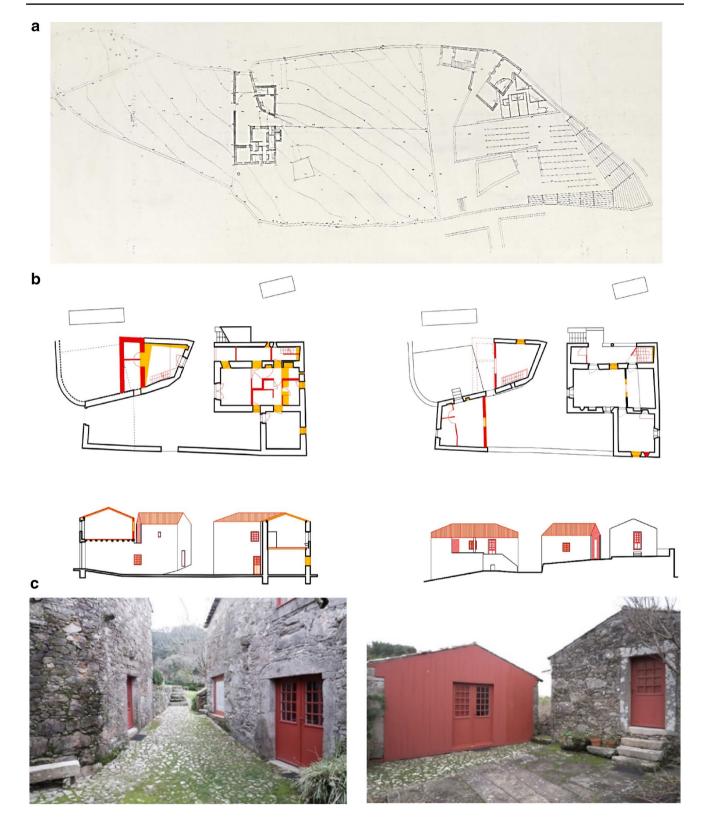
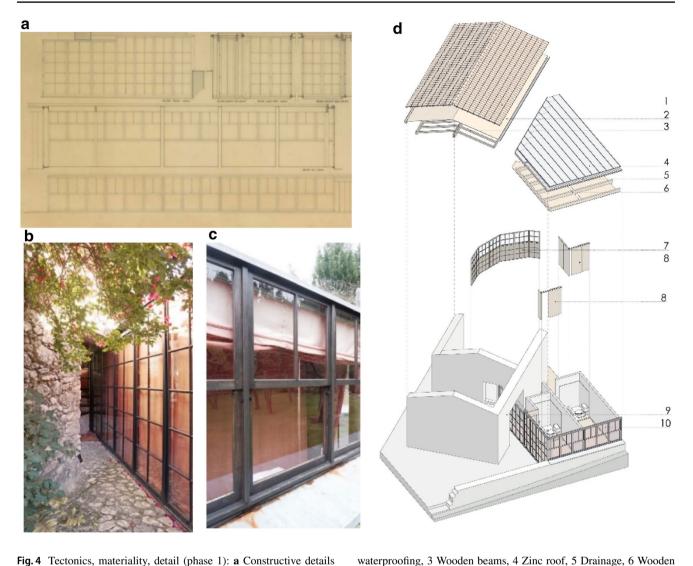


Fig. 3 Phase 2 (1988–1991): a Ground floor plan, 1990 (Fundação Serralves, PT-FS-ASV-22-1-2-0005); b Demolitions (yellow) and additions (red); c Views of exterior spaces



**Fig. 4** Tectonics, materiality, detail (phase 1): **a** Constructive details of the glass curtain wall; **b** Stone wall and wooden curtain wall; **c** Wooden curtain wall; **d** Legend: 1 Roman tile, 2 Wooden ceiling with

a series of web and printed publications, which detail the emotional relationship the owners maintain with the house, as well as the capacity of Álvaro Siza to respond positively to the client's requests and expectations [51]. However, there are no monographic studies and the published material is relatively limited considering the importance of this work to introducing the *third way* in the architectural renovation of pre-existing buildings, rather than either rupture or contrast, by affirming modern living standards and design principles while preserving the character and identity of the pre-existing building within its surrounding landscape.

To sustain the importance of this work in Siza's career, the Alcino Cardoso House features among the 18 works selected for the "Ensemble of Alvaro Siza's Architectural Works in Portugal", submitted to the World Heritage Tentative in 2017.

Stone wall, 10 Curtain wall
3 Discussion: Alcino Cardoso's House

beams and plywood, 7 Folding screen, 8 Wood sliding panels, 9.

## 3 Discussion: Alcino Cardoso's House learnings for the School of Porto

The methodological approach of Siza in the intervention on the Alcino Cardoso House was simultaneously and in subsequent years deepened and enriched by other colleagues of the so-called School of Porto (including Fernando Távora, Alcino Soutinho, Souto Moura, among others). Indeed, the search for continuity, the application of local materials and construction techniques closely interrelate to his mentor Fernando Távora search for a *third way* (bridging modernism and tradition), a reflection that Siza grasped and reformulated in his own way. Hence, the new glass façade for the Convent of Santa Marinha da Costa in Guimarães (Fernando Távora, 1972–1985) and that of the Alcino Cardoso House represent different materializations of the same concern to update the image and tectonics of vernacular solutions.

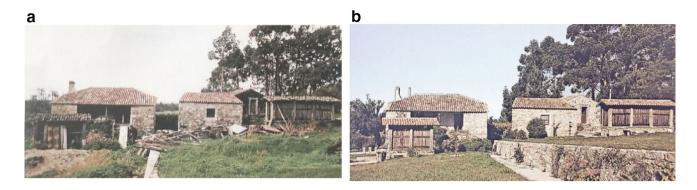


Fig. 5 Casa da Eira: a 2ª phase before intervention; b after intervention

Nevertheless, it is in the second phase of Alcino Cardoso project where even more evident similarities with Távora's works emerge, not only through the adoption of the garnet red colour for the carpentry and woodwork but also due to the careful morpho-typological and constructive conservation of the rural ensemble, thereby aligning with other renovation projects by Fernando Távora, such as the Casa da Cavada in Briteiros (1989–1991) or Casa de Pardelhas (1993–1999) [52]. This respect for the old matter, however, did not prevent the implementation of important interior modifications to adapt these spaces to their new purpose as tourist accommodation.

The influence of the Alcino Cardoso in other works of Álvaro Siza showcase the evolution of the search for continuity in the relationship sought between the pre-existing features and the new elements. In the José Manuel Teixeira House (1980–1991), Siza preserves the main house while the new added volumes are built around it with granite exterior walls, seeking a relationship with the existing building. In the Santo Ovídio Estate (1988–2002), the manor house is also fully preserved, and a new zinc coated building articulates with a pre-existing annex building. In these interventions, we can clearly see Siza's wish not to disturb the main features of the pre-existences – the spaces of arrival for example, more representative or present in the collective memory.

Although Eduardo Souto de Moura emerged under the auspices of Siza, also absorbing his interests, he then directed his career along autonomous paths of development. Nevertheless, like his predecessors, Souto de Moura works reveal strong anchorage to the place, resorting to the materiality of stone and ruins as a means of linking with previous memories. The false ruin of Alcino Cardoso's swimming pool – which can even be related to Fernando Távora's manipulation of vestiges in the Quinta da Conceição – anticipates the *romantic* vision of ruins which characterises some of Souto Moura's projects. This way of dealing with built heritage, very different to that of Távora or Siza, particularly emerges in the Monastery of Santa Maria do Bouro. The ruin is therefore consolidated for aesthetic enjoyment while taking advantage of the evocative capacity of the old walls.

## 4 Conclusions

The first phase of the renovation of the Alcino Cardoso House expresses a will clear difference between the new and the old, even though they merge and create relations of dialogue and continuity. The housing programme was incorporated into a triangular annex whose strange geometry, the integration of industrial materials (the flat zinc roof), and its condition as a modern curtain wall in the landscape identify it as a contemporary artefact. At the same time, the use of stone and wood, as well as the reinterpretation of the traditional carpentries, refer to the vernacular constructive solutions of north-western Portugal. Siza thus manages to critically revise modern axioms, such as the glass curtain wall, integrating international compositional grammars into the Portuguese context, but he also succeeds in establishing a dialectic relationship between the new and the old, softening the formal contrast and endowing unity on the whole. On the other hand, in the second phase, even though the programmatic needs and the area available differ, Siza was able to preserve the main features of the house without new volumetric additions. However, localized interventions seek to improve currents standards of comfort and use (new bathroom excavated in the basement, new window for improved lightening in the interior spaces) while including delicate modernity in the details.

Indeed, the Alcino Cardoso echoes the ambitions pursued by the *third way* (bridging modernism and tradition), which emerged in the heat of the Survey on Regional Architecture in Portugal, and reflects Siza's own evolution on the search for continuity in the intervention in pre-existing buildings. Rather than directly copying traditional solutions, architects such as Fernando Távora and Álvaro Siza proposed a reinterpretation of some vernacular archetypes. This cunning formula allowed harmonious insertions of contemporary concepts, requirements, and aesthetics within the pre-existing buildings and spaces. This case also reflects how the site becomes living matter, subject to alteration by the architect. Siza manipulates the previous building with great freedom, nonetheless assessing and respecting its main features, aware that old buildings "*have fantastic possibilities for adapting to new functions*" [53].

The current situation of vulnerability at a global scale has determined a recent increase in the search for new sustainable design practices. However, since the 1970's, Álvaro Siza's approach in the Alcino Cardoso House was able to reconcile the legacy of the past with the contemporary needs. It has become a reference case-study in the way architects can reshape pre-existences while preserving its ambience, and its influence is notorious in other works by architects of the School of Porto (Fernando Távora, Alcino Soutinho, Eduardo Souto Moura and many others).

This case is also a good materialization of Alvaro Siza's aphorisms such as "the idea is in the place" [54], "Architecture has no meaning unless in relation to nature" [55] or "it is not necessary to destroy to transform." [56]. Hence, the client's wife highlights "the easiness with which he harmonized modernity with the traditional. [...] Without ostentatious inventions, he transformed what he had found taking the course of history into account in an excellent architecture-nature relationship" [51]. By understanding the place before intervening, this case provides us with learnings for sustainable and adaptive reuse of such as need to preserve the lessons of traditional constructions (relation with the place, social issues, local materials and craftsmanship) while providing these rural buildings with uses compatible with their preservation.

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Author contributions TCF has coordinated and developed the main outline and written several parts of the article. DO-C worked on the context, discussion and conclusions, EF and MFC worked on the casestudy analysis and drawings and TTC contributed to the constructive axonometry and text/references formatting.

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#### Declarations

Conflict of interest The authors declare no competing interests.

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