INSTITUTO
UNIVERSITÁRIO
DE LISBOA

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions.

Gabriela Büchner Strachman

Mestrado Integrado em Arquitetura

Orientadora:
Doutora Soraya de Fátima Mira Godinho Monteiro Genin
Professora Auxiliar
ISCTE -Instituto Universitário de Lisboa

Co-Orientadora:
Doutora Teresa Marquito Marat-Mendes
ISCTE -Instituto Universitário de Lisboa

Outubro, 2023

TECNOLOGIAS
E ARQUITETURA

Departamento De Arquitetura e Urbanismo

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions.

Gabriela Büchner Strachman

Mestrado Integrado em Arquitetura

Orientadora:
Doutora Soraya de Fátima Mira Godinho Monteiro Genin
Professora Auxiliar
ISCTE -Instituto Universitário de Lisboa

Co-Orientadora:
Doutora Teresa Marquito Marat-Mendes
ISCTE -Instituto Universitário de Lisboa

Outubro, 2023

Bairro Da Malagueira

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions.

Gabriela Büchner Strachman

Project work submitted as a partial requirement to obtain the
Master's degree in Architecture

Iscte - Instituto Universitário de Lisboa,

October 2023

Acknowledgements

I would like to express my heartfelt appreciation to all my family, friends, and coordinatos for helping me through this highly challenging phase of my studies. Your endless support and motivation at every moment were precious.

Vera, thank you, Grandma, for being there in all the toughest times, providing me with the most loving support I could ever ask for. We accomplished this together for my mom, and we know she would be unbelievably proud if she were with us today.

Niels, your presence, humor, and positivity brightened even the darkest times.

Myrthe, your guidance and endless motivation were immensely important to me.

Beatriz, your kind friendship and endless support were deeply appreciated.

Daniel, your humor and constant support, in both better and worse times, brought laughter instead of tears.

Daniela, your patience and support in my times of greatest need were truly indispensable.

Beatriz, Daniel, and Daniela, I cannot wait to celebrate with you all as we should be truly unbelievebly proud of what we have achieved together.

This milestone would not have been attainable without your endless support and encouragement. Thank you all for being an vital part of this journey.

The true strength of society is measured by how we treat those who need some extra support. My deepest inspiration comes from Caetana Proença, who tirelessly faces the challenges of mobility limitations, and from Michael Morrice, who is sadly no longer with us but was affected by ALS, which affected his mobility. They continue to teach us the value of perseverance and the meaning of true inclusion.

Abstract

The Bairro da Malagueira (the Malagueira Neighborhood) is a social housing neighborhood designed by the acclaimed Portuguese architect Álvaro Siza in 1977. Its original purpose was to enhance the quality of life for the residents of Évora. However, as time passes, people and circumstances evolve. Over five generations have passed since the project was initiated, leading to shifts in how people live, their activities, and their identities. Naturally, these changes have influenced housing design, adapting to shifting needs and expectations. This thesis investigates envisioning how dwellings in the neighborhood would look if designed today. It particularly focuses on the societal and construction shifts that have spanned over five generations.

The primary research goal is to adapt Siza's typologies, emphasizing an unrealized western Malagueira residential plan. The aim is a typology aligned with current sustainable design and construction methods, addressing contemporary societal needs. The methodology involves comprehensive fieldwork, visiting significant Siza structures like the Escola Superior de Educação de Setúbal and Malagueira locations. Extensive bibliographic research on Álvaro Siza Vieira's writings, questionnaires, and data from Câmara Municipal de Évora documents was conducted. Project evolution and elements were analyzed, culminating in a SWOT analysis.

This research will inform a new Malagueira residential neighborhood, considering existing residences' strengths and limitations, demographic insights into Évora and Malagueira, and resident recommendations. In summary, this thesis reimagines Bairro da Malagueira in light of sustainable construction methods and societal shifts, bridging the past and present for a modernized and harmonious living environment.

Key-Words:

Álvaro Siza; Bairro Da Malagueira; Rehabilitation; Typology; Sustainability; Housing.

Resumo

O Bairro da Malagueira, projetado pelo arquitecto Álvaro Siza em 1977, buscava melhorar a qualidade de vida em Évora. Ao longo de mais de cinco gerações, mudanças na forma de vida das pessoas influenciaram o design das habitações para atender às novas necessidades. Esta tese se concentra em como seriam as habitações hoje, com ênfase em mudanças sociais e de construção ao longo de cinco gerações.

O objetivo principal é adaptar as tipologias de Siza, especialmente um plano habitacional não realizado na Malagueira ocidental, alinhando-o com métodos de design e construção sustentável atuais. A metodologia inclui amplo trabalho de campo e pesquisa bibliográfica nos escritos de Siza Vieira, questionários e análise de documentos da Câmara Municipal de Évora, resultando em uma análise SWOT.

Os resultados informarão o desenvolvimento de um novo bairro residencial em Malagueira, considerando as forças e limitações das residências existentes, dados demográficos de Évora e Malagueira, e as recomendações dos residentes. Em resumo, essa tese reimagina o Bairro da Malagueira com métodos de construção sustentável, criando um ambiente de vida modernizado e harmonioso que une passado e presente.

Palavras-Chave:
Álvaro Siza; Bairro Da Malagueira; Rehabilitação; Tipologia; Sustentabilidade; Habitação.

Index

List Of Figures

Introduction

The Bairro da Malagueira, a housing project designed by the renowned Portuguese architect Álvaro Siza in 1977, had the initial purpose of improving the quality of life for the residents of Évora. However, as time has evolved, people, their ways of life, and the world surrounding them have undergone transformations. Across five generations, societal transformations have left various changes on housing design. This thesis embarks on a journey of reimagining contemporary Malagueira residences, with a keen focus on the evolving societal and construction landscapes.

At the core of this research lies the primary objective: to adapt and contemporize Siza's architectural typologies. The never-constructed residential plan located in the western extremities of the Malagueira was the focus of the project. The mission was to adapt Siza's typology that seamlessly aligns with modern sustainable design and construction practices,catering to the current needs of society. With the addition of a new typology, catering to those who have needs that cannot be adapted in the previously projected typology by Siza.

To achieve this objective, the methodology consisted of fieldwork, field visits to architecturally significant structures designed by Álvaro Siza, including destinations like the Escola Superior de Educação de Setúbal and various locations within Malagueira. Additionally, bibliographic research was conducted, exploring Álvaro Siza's own writings, while also engaging in the collection of data through surveys and documentation from the Arquivos da Câmara Municipal de Évora. The evolution of the projects and their elements will be analyzed, culminating in a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, further enhancing the comprehensiveness of the collected data.The results of this research guided the development of a new residential neighborhood in Malagueira, based on the findings. These findings include an understanding of the strengths and weaknesses of Malagueira's current housing, insights into the demographics of Évora and Malagueira, and practical recommendations from the area's current residents.

In summary, this thesis aims to adapt a part of the Malgueira Neighborhood for current societal needs and sustainable practices. By researching and analyzing Siza's works,contemporary sustainable practices, and societal needs, and harmonizing Siza's vision with the demands of today's world.

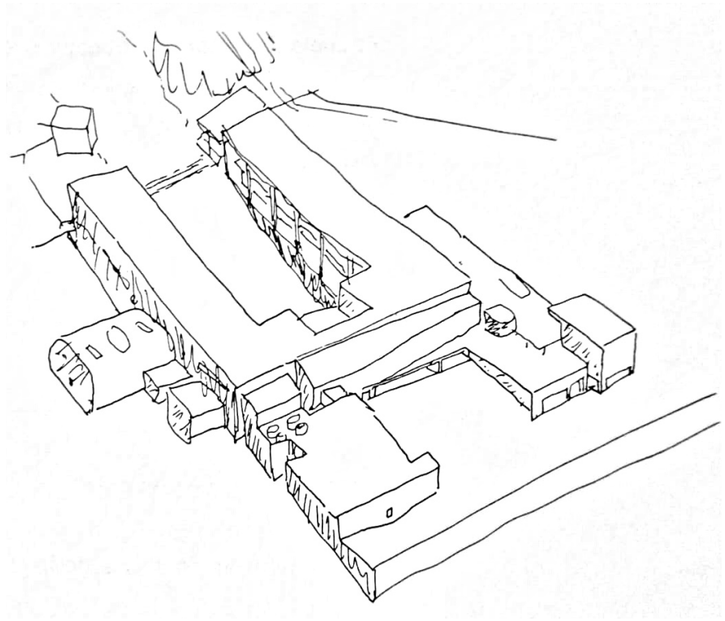


Figure 1. *Álvaro Siza's Escola Superior de Educação de Setúbal Sketch*
(A Cidade Branca, n.d.).

Chapter 1

In this chapter, Álvaro Siza's architectural philosophy, emphasizing the transformative power of design and the crucial role of drawings as tools of innovation. The chosen texts highlight his diverse architectural portfolio, his belief in the potency of drawings, and his attention to harmonizing designs with their surroundings. These insights align with the goal of adapting the housing in the Malagueira neighborhood.

The chapter explores into Siza's various projects, from residences to public housing, demonstrating his ability to balance historical preservation with modern innovation. It also explores the historical context and design structure of Malagueira, providing insight into its intentions and housing typologies.

Additionally, the chapter addresses existing challenges faced by residents in the Malagueira, such as insulation and water issues, while describing the goals for improvement, including sustainability, energy efficiency, accessibility, and community engagement. Considering these challenges, the chapter outlines a vision for improvement that embodies sustainability, energy efficiency, accessibility, and community engagement.

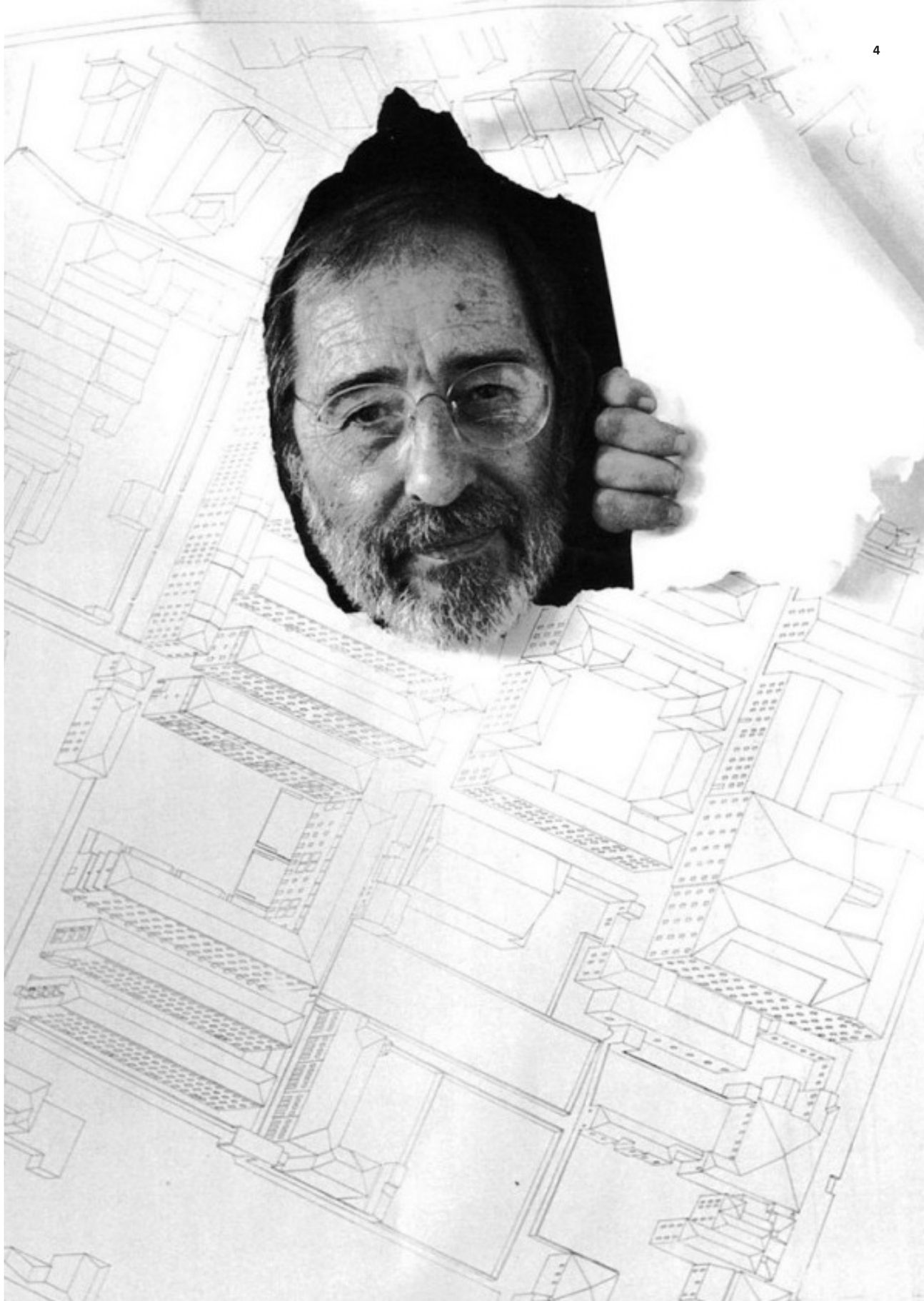


Figure 2. *Photograph of Álvaro Siza*
(Michalarou,n.d)

1.1 Álvaro Siza

Álvaro Siza is a world-renowned Portuguese architect who explored modern Portuguese architectural elements. His works had a wide variety of structures including swimming pools, institutional buildings, residential multi and single-family homes, aqueducts and the list goes on. A common denominator of his structures was the meaning behind them, he designed them with a specific purpose keeping the mind the function, and how it unified with the surrounding environment and cultural and architectural traditions. Before becoming an architect, Siza had an intention of becoming a sculptor which in one way could have assisted the aspect of imagination in architecture (ArchDaily Team, 2022). This may be the reason for his more abstract way of thinking than one could imagine an architect would be like.

In the early stages of his career, he focused on building small residences but later at the beginning of the 1970s (Britannica, 2023), he shifted his focus to designing mass public housing one of them being the “Bairro da Malagueira” in 1977. He worked closely with the government-supported organization SAAL* (Local Ambulatory Support Service), which has a mission to improve the conditions of urban slums (Britannica, 2023). His works in the 1970s were initiated in his hometown, Porto, with the Bouça and São Victor housing projects in 1977. Also in that year, he began the works of the Quinta da Malagueira development in Évora, 20 later years time. After those projects, he became more widely known and started to work outside Portugal, mostly in eastern European countries. As he had a great interest in urban development, around the 1980s he initiated a renovation plan in The Hague and also in a neighborhood in Lisbon, Chiado. As his success grew, his projects were slowly widening horizons. Nowadays he has projects in Brazil, Spain, China, Korea, Portugal, Germany, Netherlands, and many more places.

His philosophy was “Architects don’t invent anything; they transform reality” (Slessor, 2015). Siza’s works were characterized as modernism, with their simple beauty forms playing with light. Siza strongly believes that emotion plays a significant role in Architecture, without it we would feel incompleteness. His design process initiates in the sketching phase, he sketches the imaginable solutions for the project with the basic information he received. Siza confesses that the concepts change entirely until the conclusion of the project, he also expressed how every stage is indispensable in the creative process as it advances innovation which is essential in the design. He believes that tradition is a challenge to design. “Tradition is important when it contains moments of change, when it is not just outward form, and when it also implies an idea of what goes on inside a building, of conflicts and potential for innovation. Otherwise, tradition just means being stuck in a rut” (Britannica, 2023). Some methods he used to work out issues during the design process were photographing the site and generating models. It would instantly give him a comprehensive picture of the problems that needed to be resolved during the design process, but the ideas that go in might or might not work out in the absolute best output. , “You have to feel what you are doing, and not be so rational that you just solve the problems, like material and space and so on, because emotion is very important. Without it, something is missing.”(Madanmohan, 2021). Siza also believes that an architect must know how much time is available to complete the design and construction. For him the time was never sufficient because buildings never finish, there is always something else that can be done. “ He believes that an individual changes with time and experience and so does his perspective to design” (Britannica, T. Editors of Encyclopaedia,2020). The style of the designer can alter in the future, not due to him or her being unsatisfied with the process done previously, but due to the evolution of the person in the current day. “His work reflects this philosophy and has constantly evolved with time and change” (Encyclopaedia Britannica, 2020).

1.11 Texto 01

In Siza's book "Texto 01" it is evident that Siza has diverse portfolio in modern architecture including a wide range of structures, reflecting his meticulous consideration of function, environment, and cultural traditions. Due to his original interest in being sculpturer, this experience most likely aided him develop a special way of thinking about architecture.

Siza's emphasis on drawing as an independent language of communication is a central theme. His text "A Importância de Desenhar" (Siza & Morais, 2009, p. 37) underscores that despite technological tools, conventional drawing remains essential in organizing, calculating, and spatially designing. The creative freedom of drawing allows architectural ideas to exceed constraints.
Passionate about his craft, Siza believed architects transform reality through their designs, making drawings integral to the creative process. He highlighted the role of drawings as both memory keepers and transformative tools. "Desenhar um Swatch" (Draw a Swatch)(Siza & Morais, 2009, p. 253) revealed his dedication to capturing ideas and memories through drawings, embodying the essence of architecture.

Siza's approach extended to his travel experiences, where he found solace in sketching his surroundings, allowing time to pass unnoticed. "Desenho de Viagem" (Travel Drawing)(Siza & Morais, 2009, p. 49) demonstrated his method of appreciating and documenting different places, influencing his architectural vision. This approach, similar to keeping a diary, highlights his commitment to capturing memories and fostering inspiration.

Within his works, Siza's attention to detail is evident. His furniture designs, discussed in "Sobre a dificuldade de desenhar um móvel"(About the difficulty of designing a piece of furniture)(Siza & Morais, 2009, p. 95), emphasized the challenge of creating pieces that harmonize with their surroundings. His belief that furniture design should integrate seamlessly aligns with his broader architectural philosophy.

Siza's drawings, although creatively free, serve specific purposes. "Desenhos- Exposições no Japão"(Drawings- Exhibitions in Japan) (Siza & Morais, 2009, p. 273) reveals how drawings unconsciously assistance to his project research, marking the foundation of a larger design process. His text "Objeto de Vidro" (Glass Object)(Siza & Morais, 2009, p. 275) explores into the difficulty of having absolute creative freedom. Choosing a paperweight as a representative object, he emphasizes functionality, simplicity, and user suitability in design.

Overall, Álvaro Siza's legacy rests on his impact within modernist architecture. His works embody simplicity, clarity, and functionality, showcasing his skill in harmonizing designs with spaces. This book expresses Siza's architectural philosophy, where drawing is not only a medium of expression but also a tool for innovation and memory preservation.

Figure 3. *Álvaro Siza's Malagueira Sketch.*
Drawing Matter Collection (1933).

1.12 An Insight to His Projects

The Chiado Reconstruction

As part of the investigation process for the thesis, the researcher had the opportunity to visit two completed projects by Álvaro Siza. One of the project visits conducted was the Reconstruction of Chiado, located in the center of Lisbon, Portugal—a remarkable milestone in Siza's architectural journey. This outcome demonstrates his exceptional ability to harmonize historical preservation and modern innovation, reshaping a once-devastated historical corner of Lisbon. The Chiado area, damaged by a destructive fire in 1988, Siza used this as a way to blend the past and present proficiently.

Siza's architectural approach was rooted in reverence for the Chiado's historical essence while introducing contemporary elements. By seamlessly blending modern architectural facets with the district's traditional charm, he directed the delicate balance between contrasting styles. His careful composition of this fusion showcases his mastery in architectural harmony.

Central to Siza's design was the rejuvenation of urban spaces. Beyond rebuilding structures, he revitalized the very essence of the area. Siza's dedication extended to crafting public spaces that fostered social interaction and cultural engagement, injecting life into the community. This transformation metaphorically was a symbol of strength, bringing new energy to a place with a lot of historical meaning.

Through attention to materials and detailing, Siza ensured the new structures seamlessly harmonized with the existing fabric while preserving their contemporary character. His architectural language, characterized by simplicity, clean lines, and functional elegance, bridged temporal gaps. The project's achievement received worldwide recognition, highlighting Siza's exceptional skills in addressing complex urban issues with careful consideration and creative thinking (Caballero, 2021,Designboom & Andrea Chin I., 2016).

The legacy of the Chiado Reconstruction extends beyond architecture. It started new novel approaches to urban revitalization and historic preservation, offering insights to future architects and urban planners. With a positive social impact, the project not only brought back a beloved location but also created a lively venue for cultural events,reinforcing its role as a communal asset. In its continued relevance, the Chiado Reconstruction signifies how architectural interventions can both honor cultural heritage and invigorate contemporary urban life.

Figure 4. *Photograph of Chiado*
(Arquivos Fotográfico da Câmara de Lisboa, 2015).

Figure 5. ***Chiado Before and After the Fire***
(Before LUSA After Pedro Soares Botelho / MadreMedia, 2018).

Escola Superior de Educação de Setúbal

The Escola Superior de Setúbal is located in Setúbal, Portugal, this project significantly demonstrates Siza's ability to craft spaces that are both practical and inspiring for learning, reflecting his exceptional understanding of design.

Siza's design philosophy, characterized by the seamless integration of architecture with its surroundings, finds expression in this project. The school has a harmonious integration between the urban landscape and the building interventions, this thoroughly demonstrates his ability to design according to the surroundings as a whole and not as an individual element.

The spatial arrangement of classrooms, communal areas, and pathways reflects Siza's extreme attention to detail. His designs also has great emphasis on natural light and ventilation is evident in this project. The strategic placement of windows and openings creates an inviting atmosphere, ensuring a comfortable and conducive environment for both students and faculty.

The Escola Superior de Setúbal's architectural aesthetics embody Siza's unique style, characterized by clean lines, simplicity, and elegance. furthermore, the school's impact extends to the community. It serves as a cultural and architectural landmark, contributing to the identity of Setúbal and valuing the urban fabric.Siza's projects specifically this one has a special focus on material selection and construction methods to not only look aesthetically pleasing but also to require minimal maintainces afterwards.

Ultimately, principles derived from Siza's philosophy and designs accentuate the contextually sensitive designs, this includes the harmony between the surrounding environment and intervention, the maximizing of natural light, the emphasis on human experience in the space, proportion, and lastly functionality. All these aspects are crucial to make an outstanding architectural design, as designing spaces goes beyond a singular purpose.

Figure 6. *Photograph of Escola Superior de Educação de Setúbal* (Instituto Politécnico de Setúbal, n.d.).

Figure 7. ***Photograph of the Escola Superior de Educação de Setúbal*** **(Strachman,2022)**

1.2 The Malagueira Neighborhood

1.21 Historical Context

The Bairro da Malagueira is a project by the architect from Porto, Portugal; Álvaro Siza (1933-) which took place between 1977 and 2005. The neighborhood was built following the West Expansion Plan of Évora, following the experience of the SAAL (Local Ambulatory Support Service) project, which had as its main concern solving the problems of social housing in the country. After all, Malagueira came to far exceed it, originating a residential area with the social and cultural diversity of its inhabitants.

The proposal for Bairro da Malagueira was provoked by the lack of housing that existed at the time. In “the mid-1940s, the need arose to occupy the territory both with housing districts, as well as with equipment and structures” (Santos, 2017, p. 16), and a few years later, the Expansion Plan for the West Zone of Évora City Council emerged. . “27 hectares of the property called Quinta da Malagueira, […] land formerly belonging to the Conde da Ervideira”(Câmara Municipal de Évora, 2012, p. 4) and located less than a kilometer away from the city wall of Évora, were expropriated.

A big factor that is still commonly discussed today is the proposed public spaces that were never built. Public funds were needed to cover the costs of the conduct infrastructure, which was not predicted in the initial budget. It was only after two negotiations with the multiple entities relating to water, electricity, telephone, and gas networks that an agreement could be reached, mainly because ‘the reduction of maintenance costs made intervention more economical in the medium-long term. Álvaro Siza extolled the collaboration of Engineer João Araújo Sobreira, who reached a solution that proved more economical, light, and easy to build. However, some projects remained unfinished.

Figure 8. *Street In The Malagueria Neighborhood - Rua Samora Machel* (Strachman,2022).

Despite the relevance of the Malagueira Neighborhood project, not only in the work of Álvaro Siza but also for national and international architecture, it is necessary to consider that this project, 40 years after its genesis, remains incomplete. It is certain that the houses are there, however, there are several spaces that remain free, waiting for the equipment that would populate the neighborhood.

These types of public spaces would make this neighborhood become a functional, active part of a city, as Álvaro Siza had dreamed. It would be essential for the Semi-Dome to be built. It is a project for an iconic building, unique in contemporary architecture, that would be necessary to articulate the Zeca Afonso Square and the surrounding open spaces. There are some published papers that show the intention to replant the trees destroyed during construction and to relocate the tank that stood in front of the tree. The Semi-Dome would be overtaken in relation to the terrain, reducing its footprint and allowing this space to be permeable both physically and visually from the duct (or rather the circulation space covered by the duct) to the full extent of the landscape.

Figure 9. *Photograph of a Green Area In The Malagueria Neighborhood* (Strachman,2022).

1. 22 Location and Design Structure of Plan

The intervention area is located less than a kilometer from the medieval wall of the historic center of Eborense and has 27 hectares, where one could find, amongst areas of holm oaks and olive trees, several farms for recreation and production, mixed with built complexes of clandestine dwellings, such as Santa Maria, Nossa Senhora da Glória and Fontanas. The planned urban occupations found are Bairro da Cruz da Picada, configuring, as a whole, a periphery still of a rural nature, which slowly became integrated with the extension outskirts of the city.

By definition of the structure of the plan, the tracing of two perpendicular axes was essential. The main axis- the radial route in the east-west direction, which comes towards the Porta de Alconchel from the wall, will have to accentuate the connection between clandestine neighborhoods, and from which the distribution of the secondary roads that form the road structure is made. In the development of this axis, there is an old rural property that derives the name of Siza's project "Bairro da Malagueira" which translates to "The Malagueira neighborhood), and that is integrated into the new plan as a public park. The first constructions of the farm, which at the time belonged to António Luís Ribeiro, took place in the mid-17th century, containing in its interior an immensity of waterfalls with statuettes, arbors that were built after the extinction of the religious orders in 1834 when the convent it was transformed into a smaller scale "Park of Versailles", designed by José Perdigão de Carvalho (1862 – 1941)- the 1st Count of Ervideira.

On Siza's plan, Quinta da Malagueira culminates in another north-south axis, which extends to the road to Lisbon, and where there should still be built: an aparthotel, a medical clinic, the Headquarters of the Cooperativa da Boa Vontade and a language school, enabling a visual connection with pre-existence through this route. Other equipment in the proposal: "Broadway 2", the Semi-Dome and Cafeteria, Parish Council (Junta de Freguesia da Malagueira) , Restaurant/Tea House, fit adjacent to the radial road (east–west axis) that crosses the neighborhood, and equipment: Philharmonic Headquarters of Accordions, S. João Bosco Parish Complex, Open Air Theater, were designed along the radial roads that delimit the neighborhood to the north and south, and finally, "Broadway 2" is located inside the blocks to the northeast.

Figure 10. *Figure Demonstrates The Description Of The Plan (Axis In The Plan Connected To A Main Road (N144) Which Leads To Lisbon Marked In Blue)* (Strachman,2022).

The layout of the main road axes took into account the natural aspects of the plan, where the slight slopes, green areas (which occupy a third of the Malagueira neighborhood) stand out, the natural drainage system, represented by the Ribeira da Torregela, which accompanies and it crosses the east-west route and inflicts to the south where it follows the north-south route. The landscape intervention project carried out by the landscape architect João Gomes da Silva under the guidance of Siza, allowed a connection with the ecological system, preserving and enjoying the space in which Lago da Malagueira was created since it made possible the valorization of the water course and provided the link between the city and the non-urbanized area.

The design of the conduct (elevated and accessible) for water, electricity, telephones, gas, and television networks, next to the main avenue of the neighborhood, which branches out through the secondary roads of the blocks, allows for the articulation of different spaces, marking a visible element in the landscape, establishing a dialogue between Malagueira and the city of Évora, creating an approximation to the Água de Prata Aqueduct. Also similar to that, it receives a gallery with commercial and service spaces, protecting pedestrians from the sun and rain, just like the gallery that runs along Praça do Giraldo.

Keeping in mind the 1975 project by the General Directorate of Urbanization Services, which he had already implemented in part (Bairro da Cruz da Picada), Siza will replace the previous plan that envisaged the construction of some residential buildings with a height of between five and seven floors. The new proposal was delimited by a low-rise expansion, which was adapted to the topography of a gentle slope, extending to the wall and the hill of the city, constituting a dense and continuous fabric, composed of courtyard houses of one or two floors, with the intention of not altering the profile of Évora emerging in the landscape.

Figure 11. *Map Demonstrating the Aqueduct Path (the drainage system)* (Strachman, 2022).

1.23 Housing Typologies

The lots of houses were defined in a rectangle of 8 by 12 meters and the first designs of the houses had a courtyard in front (designated as Typology A) and could be T2, T3, T4, and T5. At the same time, the Type B house appeared- with a backyard- with an elevation occupying the entire available area. The project brought the concept of evolutionary typology that allows the increase of the house or allows the construction of one to five rooms. Later, other typologies were created, currently counting thirty-three types and subtypes of houses.

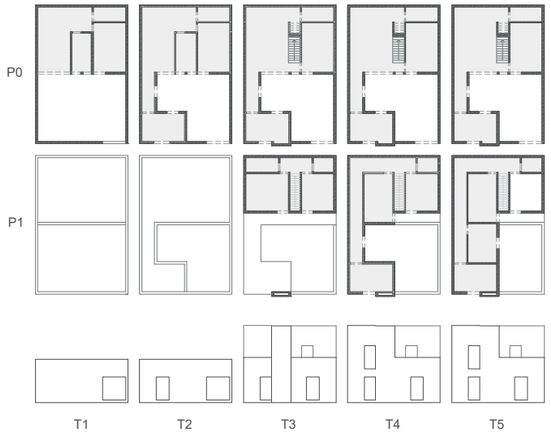
The first phase was developed between 1977 and 1980 and the built housing typologies were the Ab. During this phase, the semi-dome that marked “the centralized square of the neighborhood” and the headquarters of the Cooperativa da Boa Vontade were designed, both of which were never built.The second phase was developed between 1980 and 1986 and in it two different housing typologies were built, namely Ca and Ac. At this stage there were two pieces of equipment that were designed but never built, namely a shopping street called “Broadway 2” and an aparthotel.

The third and final phase, developed between 1987 and 1997, involved the construction of two housing typologies, namely D and X. In this phase, several pieces of equipment were designed but never built: a parish complex, a restaurant/house of tea, a language school, and a medical clinic.Still simultaneously with public and cooperative funding, a small number of lots were sold to private individuals, which developed over the 3 phases, and housing typologies E, Ab, Bb, and Ac predominated.

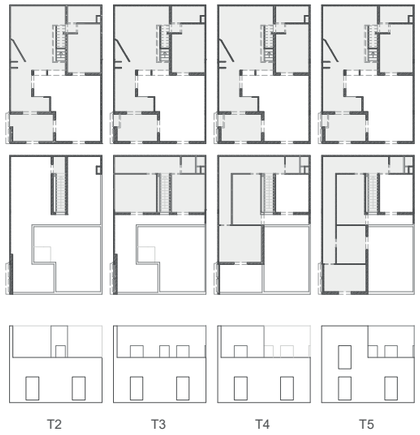
“Built in several phases, the project encompasses a set of 1200 dwellings, infrastructures and public buildings’’ (Santos, 2017, p. 10) and its “development and execution was largely in charge of the Cooperativas Giraldo Sem Pavor and Boa Vontade, who built a total of 652 dwellings. FFH (Fundo de Fomento da Habitação) was assigned 400 dwellings and a small number of lots were sold to private individuals, who undertook to respect the standard plan drawn up by Siza Vieira.” (Câmara Municipal de Évora, 2012: 4)

Figure 12. *Álvaro Siza’s Housing Sketch*
(Drawing Matter Collection Caderno 13 PG 25, n.d).

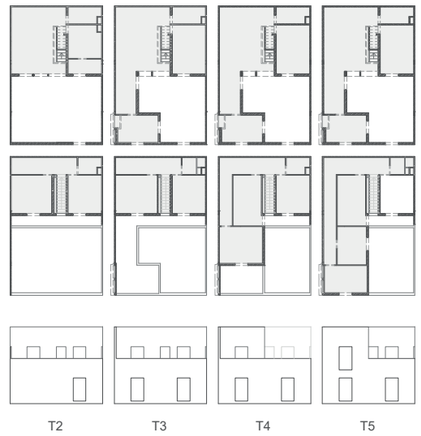
Typology Aa | 1977 (not built)



Typology Ab | 1978



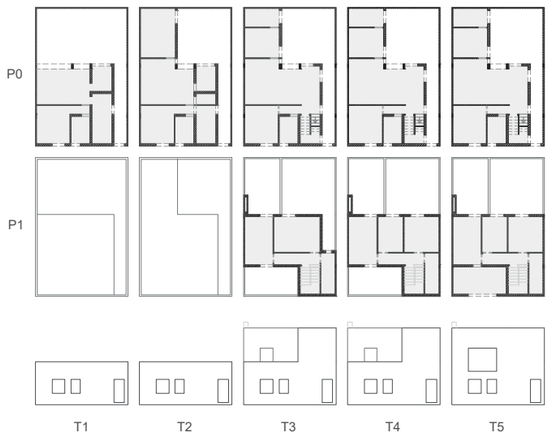
Typology Ac | 1980



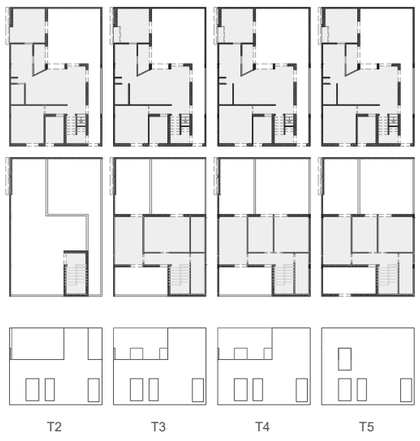
Typology Ad | 1996

Typology Ae | Nd.

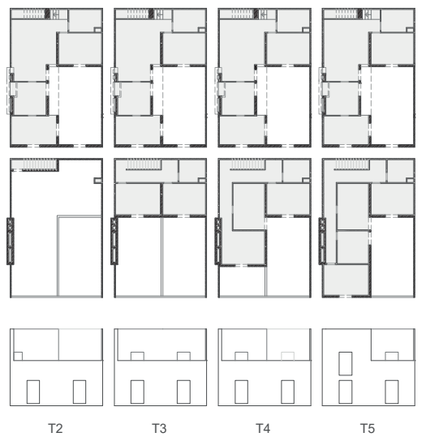
Typology Ba | 1977 (not built)



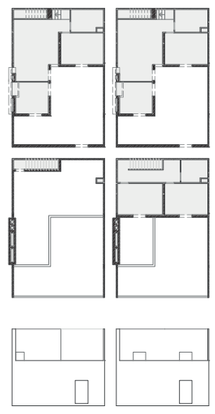
Typology Bb | 1978



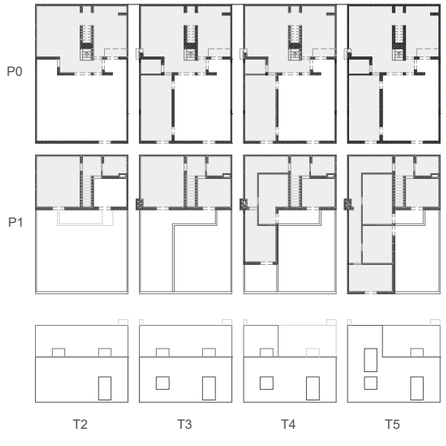
Typology Ca | 1985



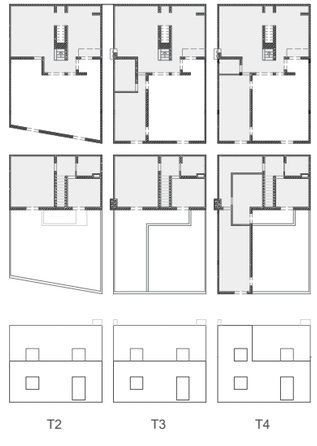
Typology Cc | 1985



Typology Da | 1988



Typology Db | 1995



Typology E| 1984

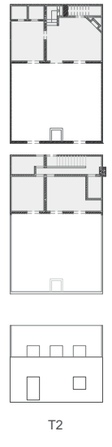


Figure 13. *Housing Typologies That Were Projected For The Bairro Da Malagueira* (Henrique, 2023).

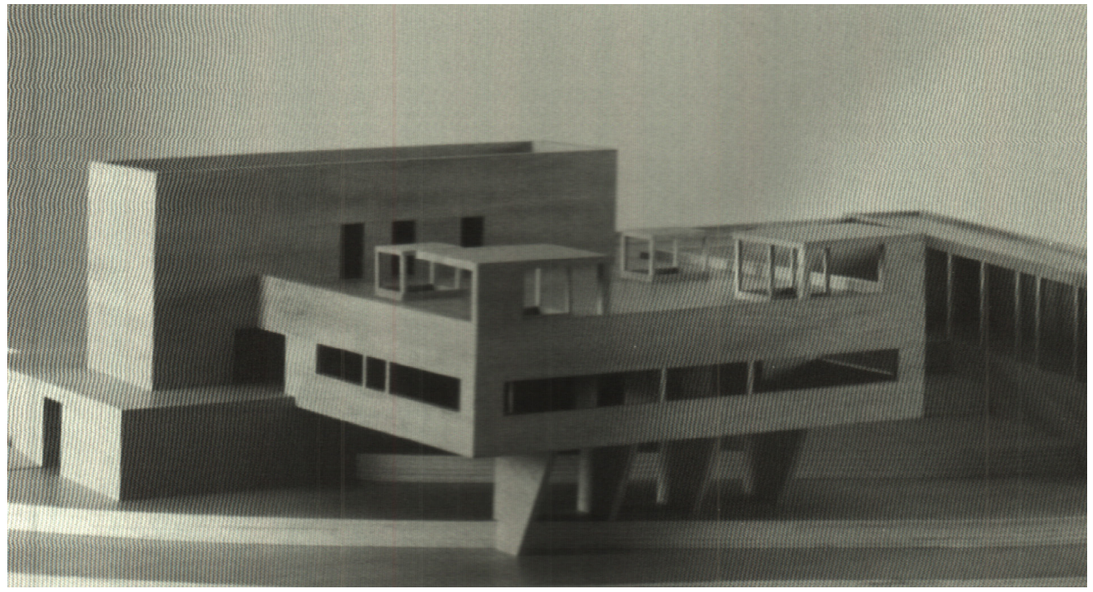


Figure 14. *Casa De Chá* (Arquivos da Câmara Municipal de Évora, 2022).

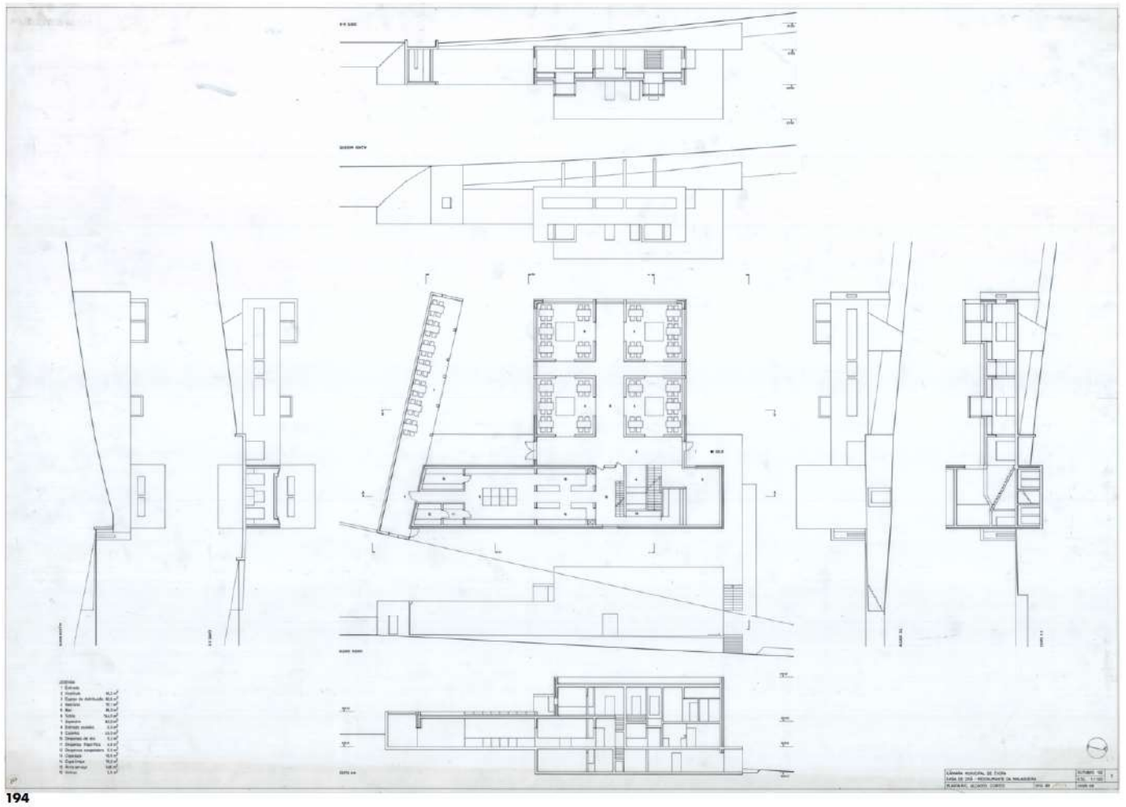
1.24 The Proposed Equipments That Were Never Built

There needed to be public funds to cover the costs of air infrastructure conduct, as it was not forecast in the initial budget. It was only after two negotiations with the multiple entities relating to water, electricity, telephone, and gas networks that an agreement could be reached, mainly because 'the reduction of maintenance costs made intervention more economical in the medium-long term. Álvaro Siza extolled the collaboration of Engineer João Araújo Sobreira, who managed to reach a solution that proved more economical, light, and easy to build. However, some projects remained unfinished.

Despite the relevance of the Malagueira Neighborhood project, not only in the work of Álvaro Siza but also for national and international architecture, it is necessary to take into account that this project, 40 years after its genesis, remains incomplete. It is certain that the houses are there, however, there are several spaces that remain free, waiting for the equipment that would populate the neighborhood. These types of equipment would make this neighborhood become a functional, active part of a city, as Álvaro Siza had dreamed. It would be essential for the Semi-Dome to be built. It is a project for an iconic building, unique in contemporary architecture, that would be necessary to articulate the Zeca Afonso Square and the surrounding open spaces. There are some published papers that show the intention to replant the trees destroyed during construction and to relocate the tank that stood in front of the tree. The Semi-Dome would be overtaken in relation to the terrain, reducing its footprint and allowing this space to be permeable both physically and visually from the duct (or rather the circulation space covered by the duct) to the full extent of the landscape.

Another key piece of equipment is to be erected in the Parish Complex. Due to the specificity of its social and religious program, this would probably be the ideal option to make the transition between the Malagueira neighborhood and the Neighborhood of Santa Maria and the Cross Sting, since it is an area of conflicts and social difficulties. In the case of the restaurant, its construction also seems relevant. This point-view building would establish the necessary relationship with the city, at various scales, in addition to restraining the east-west axis of the Malagueira neighborhood.

At the other end of the neighborhood, the Goodwill Cooperative's Staff, the Aparthotel, and the Clinic would be implemented. For the most part, the hotel equipment of the city of Évora is located within the historic center or very close to its walled strap. It would therefore be relevant to build the Aparthotel project in the Malagueira district to break gentrification in this part of the city. As for the shopping street- "Broadway" it seems inappropriate to leave the core of the block, with the planned program or with another that, in the meantime, was defined more pressingly.



194

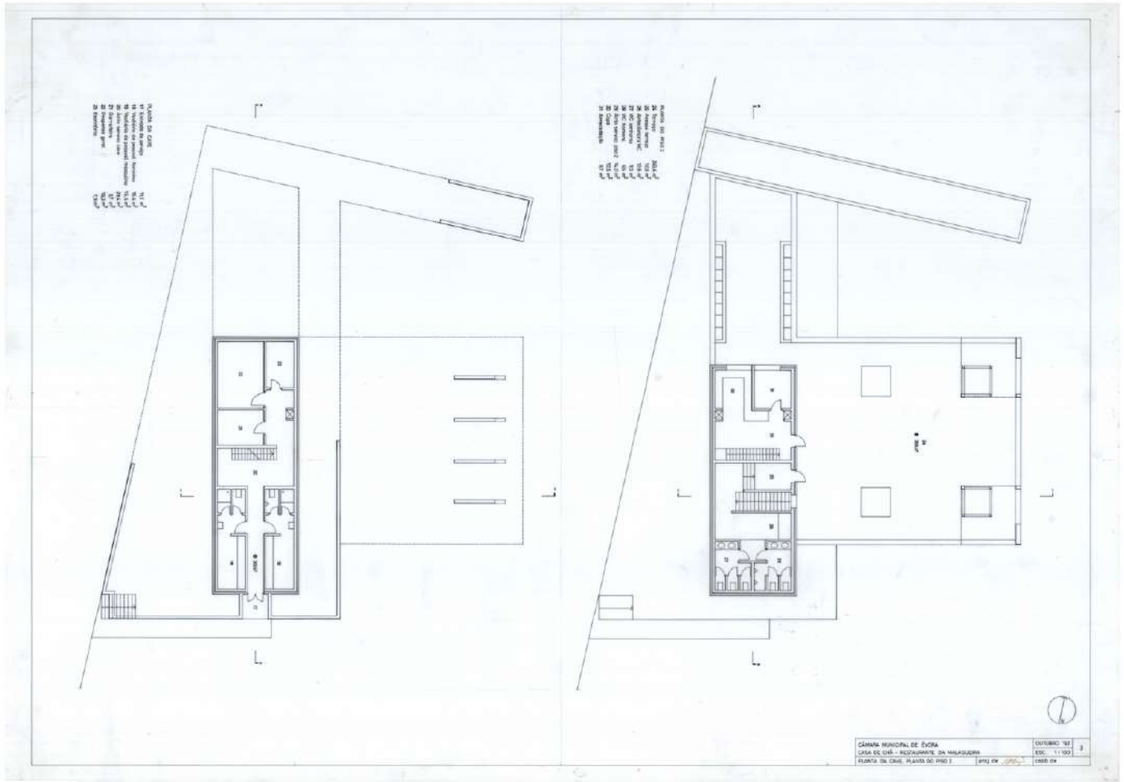


Figure 15. *Original Drawings Of The Casa De Chá, Which Was Never Constructed* (Santos, 2017, p. 172,173)

Scale 1:5000

Legend

Proposal Site With Original Layout (Also Never Built)
Housing Typologies
Green Areas
Aquaduct
Axis from the Malagueira to the Historical Center

Elements Never Built:

1. Broadway 2 - 1983
2. Restaurante / Casa De Chá - 1986
3. Associação Orquestra de Acordeões de Évora - 1988
4. Complexo Paroquial 1989
5. Aparthotel - 1992
6. Escola de Linguas - 1992 ; Clínica Médica - 1997
7. Semicúpula - 1999
8. Sede Da Cooperativa Boa Vontade - 2005
9. Junta Da Freguesia 2001

Figure 16. *Map Illustrates The Elements That Were Never Built,the Aqueducts, Green Areas, the axis to the Historical Center from the Malagueira and Housing Complexes* (Turma 4 PFA 2022/2023).

1.25 The Existing Condition

Seeing and walking around Malagueira, multiple things could be changed in the floor plans and surroundings of the houses to better accommodate and adapt to today's living standards and practices. From speaking to residents around, it was made clear that most residents have outgrown their space and utilize the garage as a workshop area to do crafts projects, people have been parking in the car in front of their houses in an area that was originally supposed to be a pedestrian area, people have been closing their chimneys located in the kitchen as it makes the house very cold in winter,changing window frames and doors (also due to the insulation issues).Residents also mentioned issues with mold and mildew inside and on the exterior and interior walls of the homes and garages. These problems may be caused by the lack of insulation and water intrusion due to the construction method and age. Lastly with all this large green areas around the house, people often do not take advantage of those spaces since there are no benches for people to sit or intended areas for kids to play.

With the recent current events around the World, Portugal especially has been experiencing a huge increase in living costs in terms of utilities but also purchasing basic food parcels. With that in mind, insulating homes to reduce the usage of heating is a must from now on to keep the costs of residents in Malagueira as low as possible. From speaking to a resident during one of the site visits, the information gathered indicates that most residents chose to close the chimneys in their houses to keep the cold air away and also change the door and windows as newer windows and doors have better thermal insulation than the original ones.

Figure 17. *Photograph Demonstrates Damaged And Restored Walls In The Garage Complex Located On Street Rua Da Lomba* (Strachman,2022)

Goals to Improve the Malagueira

From researching and analyzing the findings, the following goals were identified for the Bairro da Malagueira. The transformation of the Malagueira social housing project, built between 1977 and 2005, is guided by a series of focused objectives aimed at enhancing residents' living conditions and overall community well-being. Initiating with a dedicated commitment to improving housing quality, the integration of modern technologies becomes essential to improve comfort and energy efficiency. This involves the enhancement of wall insulation and the introduction of triple-glazed windows, all aligned with passive design principles, ultimately optimizing thermal comfort and energy usage.

Increasing the functional green spaces in the community will be great for the community as they gather and enjoy activities. These green areas serve a dual purpose by providing both shading and aiding temperature regulation, air quality improvement, and flood risk mitigation. Strengthening community engagement and interaction stands as a priority, as cultural facilities and social gathering spaces, notably the reintroduction of the Casa De Chá concept, are introduced. An innovative green space, centered around water reuse for the surrounding landscape, which provides a pleasant setting for social interactions among families and friends.

Given the project's social housing foundation, the addition of businesses and services, including the reintroduction of the Casa De Chá initiative, emerges as a strategic avenue to bolster economic growth and job creation within the low-income community.

The importance of energy efficiency becomes clear when dealing with the limitations of older buildings. The integration of triple-glazed windows and advanced insulation not only mitigates energy loss and gain but also minimizes energy consumption, leading to substantial utility bill savings. This strategy includes comprehensive methods, ranging from upgraded wall insulation to passive design principles guiding house orientation.

Further refining living conditions necessitates the adaptations of building systems, surounding electrical, plumbing, and structural components. Embracing a steel frame construction system, renowned for its sustainability and high recycled material content, contributes to reduced waste during both production and on-site processes. Additionally, implementing passive design methods ensures optimal insulation for walls, doors, and windows, thus fostering energy efficiency and thermal comfort. Innovative recycling mechanisms, such as repurposing gray water from residences for garden irrigation, further underscore the commitment to sustainability.

A challenge of the transformation is the commitment to accessibility, eliminating barriers posed by older building designs for individuals with disabilities. Universal design principles are embraced, encompassing compliant door accesses, bathrooms, and kitchens, complemented by strategically installed ramps in areas necessitating stair alternatives.

Finally, the project envisions the enhancement of common areas to elevate communal spaces in both aesthetics and functionality. This endeavor encompasses the rejuvenation of a designated lot through the introduction of green spaces and the realization of the Casa De Chá concept, collectively elevating the quality of life for all residents. Essentially, any alterations done to the typologies in the Malagueira should have the intention to improve the quality of life for the residents whilst preserving the features and historical value of the neighborhood.

Conclusion

This chapter provides a overview of Álvaro Siza's life, work, and architectural philosophy. From his beginnings as a sculptor to his celebrated architectural career, Siza's journey is one of innovation and a commitment to reshaping reality through design. Further more his book "Texto 01" was analyzed expressing how important he believes of drawing is in creative process and examined his diverse portfolio, following with insights about his significant projects such as the Chiado Reconstruction and the Malagueira Neighborhood. Additionally, the issues in the Malagueira were further analyzed leading to the goals for this project. These goals, focusing on housing quality, energy efficiency, accessibility, and community engagement, and sustainable practices. Moving forward, the next chapters will explore the practical aspects of realizing these objectives, adapting the Western area of the Malagueira while upholding Álvaro Siza's architectural legacy.

Chapter 2

In this chapter, we explore the original construction method chosen by Siza and Steel Frame construction with the application of Passive House Design. Both methods were researched and analysed indepth utilizing SWOT analysis to assess their suitability.

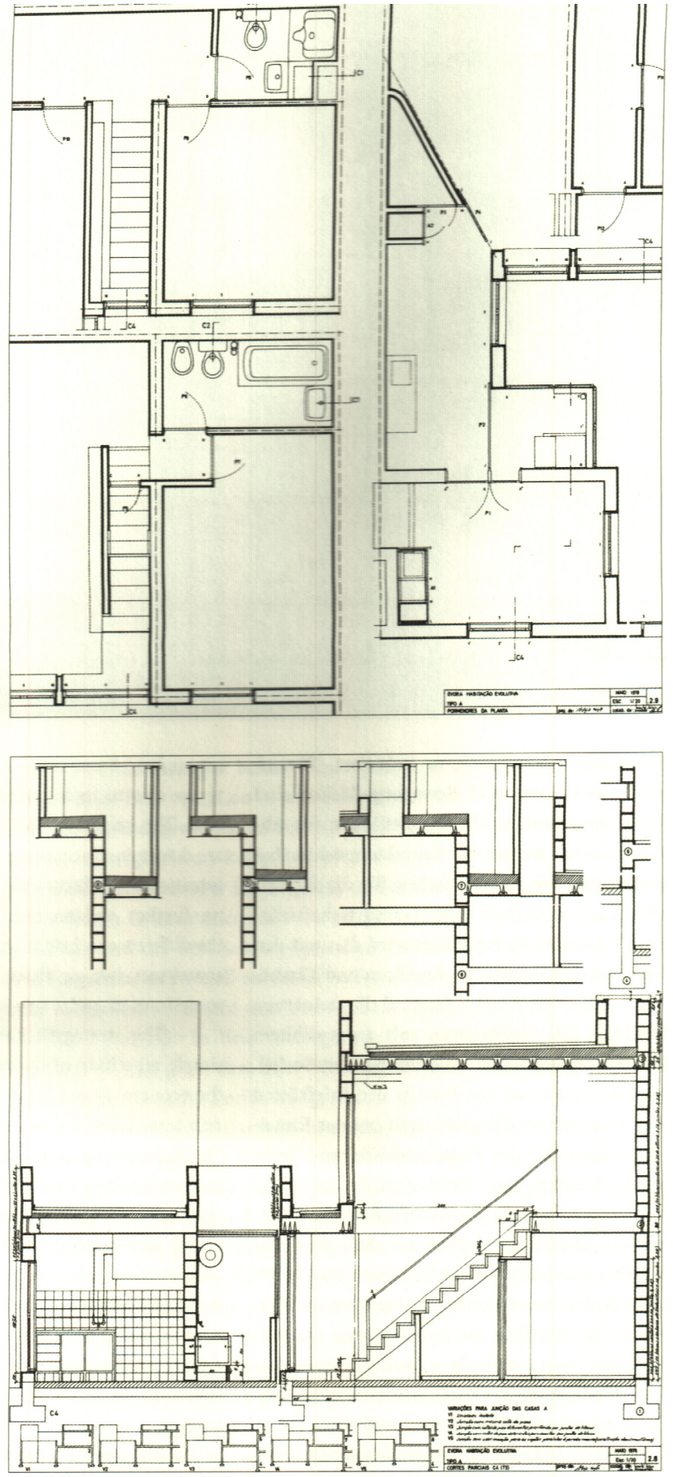


Figure 18. *Housing Typologies Technical Drawings*
(Arquivos da Câmara Municipal de Évora, 2022).

2.1 Sustainable Construction Methods

2.11 Passive Design

Passive House Design is an energy-efficient design and construction method in the industry today. It is able to consume up to 90% less heating and cooling energy than an ordinary traditional construction building. This design may be applied to any building type or design .” The Passive House high-performance building standard is the only internationally recognized, proven, science-based energy standard in construction delivering this level of performance” (Norris, 2019). It is fundamental for this energy efficiency design and construction to follow the following five principles: “ 1) super-insulated envelopes, 2) airtight construction, 3) high-performance glazing, 4) thermal-bridge-free detailing, and 5) heat recovery ventilation.” (Norris, 2019).

2.12 Steel Frame

Construction generally generates a tremendous amount of waste, besides that, when a building is deconstructed or demonstrated, it also generates waste as expected. The waste consists of packaging from materials to surplus materials due to ordering more than necessary and inaccurate estimates of materials. As steel frame comes prefabricated and ready for installation, it generates less waste and steel is also a recyclable material.

In conventional construction, however, materials are estimated to the best of their ability. Nonetheless, bricks for instance are sold in fixed quantities so therefore in most cases, it needs to be over-ordered to have a sufficient amount. At last, this generates more waste, and materials such as bricks are not recyclable and do not continue in the circular economy* (American Institute of Steel Construction, n/d).

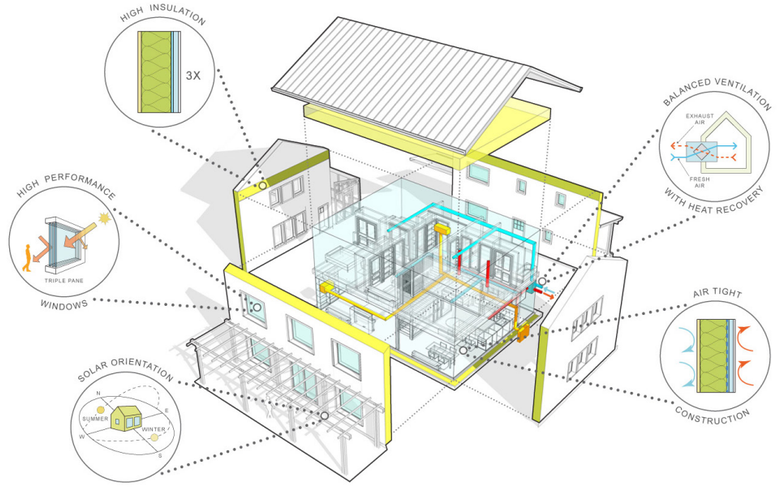


Figure 19. *Figure Demonstrates The 5 Principles of Passive Design* (Richard Pedrant Architect, n.d).

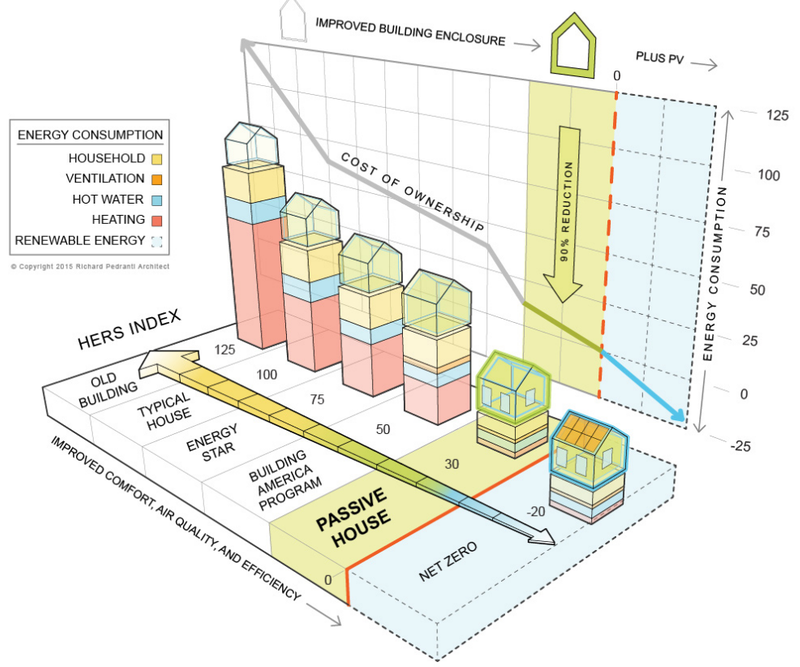


Figure 20. *Figure Demonstrates The Energy Consumption And Cost Of Ownership Of Various Types Of House* (Richard Pedrant Architect, n.d).

2.13 Materials

With the increase in concern with environmental impacts, new and more sustainable materials have been created and discovered. As mentioned previously, stainless steel is a more sustainable construction method as it is made from recycled steel and all of it can be recycled afterward, therefore generating less waste. Sinks, showerheads, and toilets have been developed for more water efficient and less wasteful water usage which can be utilized in virtually any house, business, and facility. Water sense certified products meet the EPA criteria, which is to “use at least 20 percent less water, save energy, and perform as well as or better than regular models” (US EPA,2022). PaperStone is a beautiful and heavy-duty composite surface known for its performance (Paperstone,n.d.) That has a similar strength span to steel and stone, which can be worked as dense hardwoods. This countertop is sustainable as it is made of “100% post-consumer recycled paper, petroleum-free resins, and natural pigments, then compressed using heat and pressure.” (Paperstone,n.d).

2.2 The Malagueira Construction Method

2.21 Description of Project Specifications

Siza's chosen construction method featured a reinforced concrete foundation structure comprising pillars, beams, a lightened roof slab, a substantial slab on the first floor, and a floor slab. The external walls were designed to consist of double hollow brick masonry, with a 20 cm thickness on the outer side and seven cm on the inner side. These walls were thermally insulated using expanded polystyrene, plastered, and whitewashed on the exterior. The interior walls of the main house were constructed using 11 cm or 15 cm hollow bricks (15 cm doubles halved) (Arquivos da Câmara Municipal de Évora, 2022, p. 8).

For the garage, both exterior and interior walls will be built with 20 cm thick hollow bricks, which will then be tinned and painted. The flooring within the building will vary: glazed mosaic will be used on the first floor, varnished wooden blocks on the second floor, and Epoxy in the garage and annex. Enameled wood frames will be utilized for both interior and exterior windows, with double glazing for the exterior frames. The outdoor flooring will be made of granite pavement. Thermal insulation using extruded polystyrene and a waterproof PVC layer will be applied to the non-accessible flat roof. The accessible flat roof will also feature a brick finish (Arquivos da Câmara Municipal de Évora, 2022, p. 8).

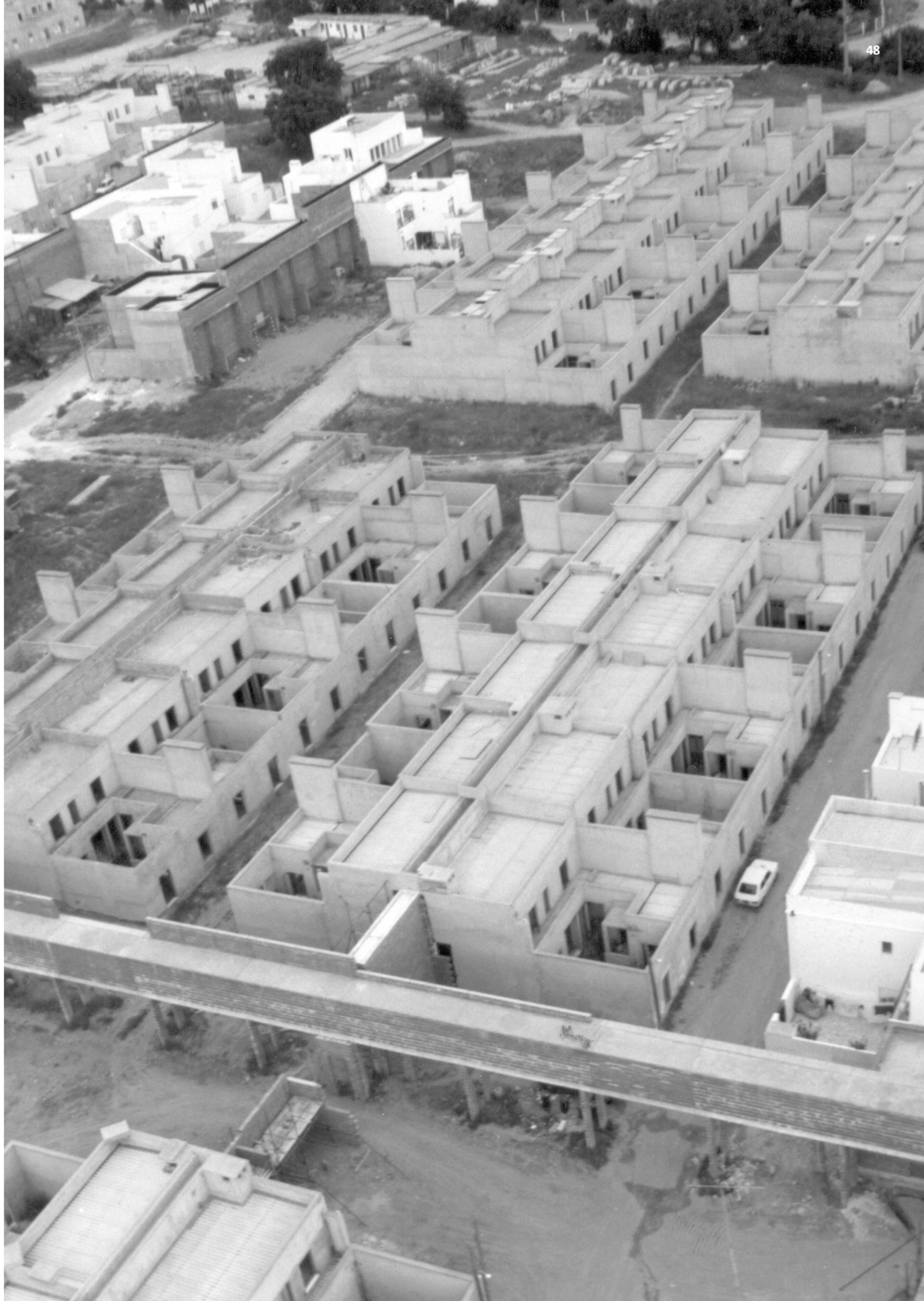


Figure 21. *The Malagueira Neighborhood Under Construction*
(Arquivos da Câmara Municipal de Évora - AC_11.20_28, 2022)

2.22 Advantages and Disadvantages

This construction method from the Malagueira presents a range of advantages and drawbacks. On the positive side, the reinforced concrete foundation offers robust structural support, ensuring the building's stability and long-lasting durability. The incorporation of thermally insulated external walls enhances energy efficiency by minimizing heat transfer, potentially leading to reduced heating and cooling expenses. Moreover, the use of hollow brick masonry provides design flexibility, allowing for diverse architectural aesthetics and layouts.

The application of tinning and painting on both interior and exterior walls further boosts their resilience, safeguarding them against wear and tear over time. The variation in flooring materials, including glazed mosaic, varnished wooden blocks, and resin, tailors surfaces to each area's specific usage and function. Enameled wood frames with double-glazed exterior windows improve insulation and contribute to noise reduction, contributing to a more comfortable living environment.

Granite pavement for exterior flooring and a brick finish for the accessible flat roof add to the overall aesthetic appeal of the construction. However, it is worth noting that according to residents, the neighborhood's thermal comfort during winter was not fully addressed despite these efforts.

On the downside, there are several considerations to keep in mind. The production of reinforced concrete and steel components may result in a higher carbon footprint due to energy-intensive manufacturing processes. The construction process, involving reinforced concrete and multiple materials, could potentially be time-consuming, leading to delays in project completion. The exterior plastered and whitewashed walls might require regular maintenance to preserve their aesthetic appearance and protective qualities.

The mixture of various materials and finishes may introduce complexity, possibly leading to coordination challenges and quality control issues. Despite thermal insulation efforts, the relatively thin 7 cm inner layer of external walls may still allow some heat transfer, impacting energy efficiency. The use of reinforced concrete, multiple materials, and finishes might contribute to higher initial construction costs.

2.3 Advantages and Disadvantages of Steel Frame Construction Method

Steel frames offer several sustainability benefits and waste reduction advantages. Firstly, steel is highly recyclable. as structural steel is 93% recycled and it can later on be 100% recycled. (American Institute of Steel Construction, n/d). Allowing frames to be easily dismantled and reused at the end of a building's life, reducing the need for new steel production and minimizing waste. Additionally, steel frames are lightweight compared to materials like concrete, potentially leading to reduced foundation sizes and material usage. The prefabrication of steel frames off-site can result in faster construction times and less on-site wastage. Furthermore, steel's durability makes for longer-lasting buildings with lower maintenance needs, while integrated insulation in steel frames improves energy efficiency and reduces heating and cooling demands.

The design flexibility afforded by steel enables versatile architectural layouts, providing creative options for sustainable and efficient building designs. Moreover, steel frames exhibit excellent seismic performance, making them suitable for earthquake-prone regions, potentially minimizing damage and waste during seismic events.

However, certain drawbacks associated with steel frames also need consideration. The production of steel involves high energy consumption and carbon emissions, contributing to a significant embodied carbon footprint. The construction of steel frames can be energy-intensive, particularly during the manufacturing and transportation of steel components. Additionally, steel's high thermal conductivity may lead to increased heat transfer, potentially reducing overall energy efficiency. Corrosion concerns, especially in humid or coastal environments, might necessitate additional protective coatings and maintenance. Transporting heavy steel components over long distances can lead to heightened carbon emissions if not locally sourced, and the fabrication process itself can result in material wastage if not carefully managed.

To address these sustainability and wastage concerns, efforts should be directed towards using recycled or low-carbon steel, optimizing the design to minimize steel usage, employing efficient construction methods, considering locally sourced materials, and incorporating insulation and energy-saving measures into the building envelope. Embracing sustainable practices and circular economy principles can substantially enhance the environmental performance of steel-frame buildings

2.4 SWOT Analysis Of Both Construction Methods

Concrete Foundations with Hollow Brick Masonry and Steel Frame Construction can be suitable options for building in Évora, Portugal. They each have different strong points and drawbacks that match the area's needs.

Concrete Foundation with Hollow Brick Masonry:

Strengths:

The combination of a reinforced concrete foundation and hollow brick masonry forms a robust structural base, ensuring enduring stability and longevity of the construction.

Thermally insulated external walls not only enhance energy efficiency but also promise potential cost savings, a significant advantage given Évora's fluctuating temperatures.

The versatility inherent in hollow brick masonry facilitates diverse architectural designs, aligning with Évora's distinctive aesthetic and spatial preferences.

The application of tinning and painting to both interior and exterior walls confers durability, providing protection against wear and tear over extended periods.

The judicious use of various flooring materials, thoughtfully chosen for different areas, serves dual purposes of functionality and visual appeal, harmonizing the construction's overall design.

Weaknesses:

The production of reinforced concrete and steel components introduces a potential drawback in terms of a relatively higher carbon footprint, raising ecological concerns in a sustainability-conscious era. Using different materials and finishes might unintentionally make the construction take longer, which could impact when the project is completed and how feasible it is.

Ongoing maintenance demands could arise from the need to uphold the appearance and protective qualities of exterior plastered and whitewashed walls, posing potential challenges.

The integration of diverse materials could introduce complexities during the construction phase, potentially impeding coordination and increasing the risk of quality control issues.

Despite the incorporation of thermal insulation, the relatively thin inner layer of external walls might compromise energy efficiency, warranting careful consideration.

Higher initial construction costs may be incurred due to the utilization of reinforced concrete and a variety of materials, impacting the project's financial viability.

To ensure long-term functionality and performance, thorough waterproofing and consistent maintenance of the accessible flat roof are imperative considerations.

Opportunities:

As technology keeps improving, there is a chance to make this construction method better and more sustainable.

Threats:

Shifts and changing preferences toward more ecologically sustainable or economically viable alternatives could impact the demand and viability of this construction method in the region.

Steel Frame Construction:

Strengths:

The inherent recyclability of steel frames aligns with sustainability targets, actively reducing the demand for virgin steel and diminishing waste, a crucial environmental advantage. The lightweight nature of steel frames offers the prospect of reduced foundation sizes and material usage, ultimately contributing to cost-effective construction methods.

The materials being prefabricated off-site expedites the construction timelines, minimizing on-site wastage and disruptions, an aspect particularly valuable in Portugal as the shortage of housing is becoming a bigger issue every day. The incorporation of integrated insulation within steel frames enhances energy efficiency by withholding heating and cooling demands, aligning well with Évora's energy conservation goals.

Steel's natural durability, complemented by excellent seismic performance, becomes particularly pertinent in Évora's seismic-prone region. The design flexibility afforded by steel frames allows for innovative and contemporary architectural designs that harmonize with Évora's evolving urban landscape.

Weaknesses:

The inherent energy-intensive nature of steel production gives rise to an embodied carbon footprint, potentially conflicting with sustainability aspirations and environmental considerations.The construction process involving steel components, particularly during the manufacturing and transportation stages, may yield energy-intensive outcomes.

Steel can easily get damaged by rust in Évora's weather. To prevent this, extra coatings and frequent check-ups are needed, which could use up a lot of resources. The transportation of heavy steel components over long distances could inadvertently increase carbon emissions if locally sourced alternatives are not prioritized.

Opportunities:

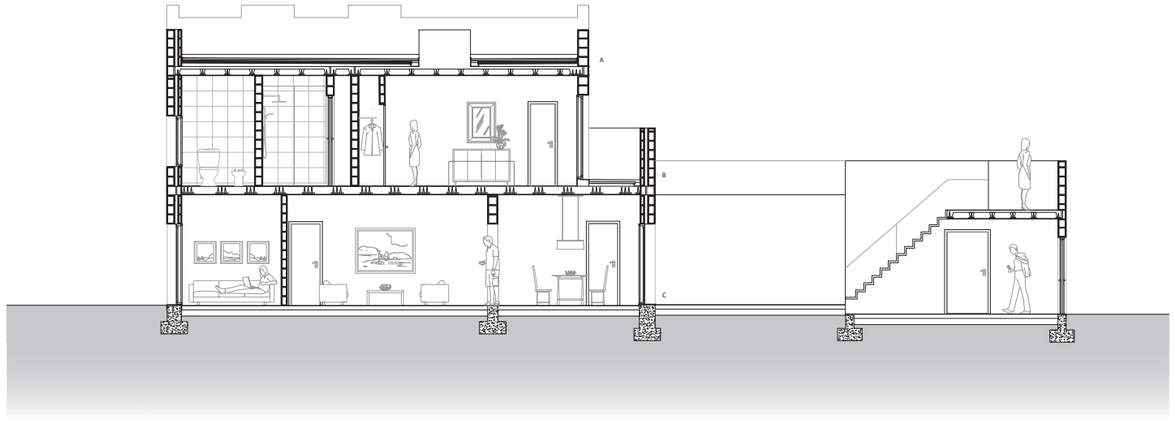
Embracing sustainable practices, such as the utilization of recycled or low-carbon steel and the optimization of design, holds the potential to amplify the overall ecological viability of this construction method.

Exploring innovative insulation solutions offers an opportunity to address potential concerns related to thermal conductivity, enhancing energy efficiency and comfort.

Threats:

It could become harder to make and use steel in Évora, depending where steel frame suppliers are located and also how to adapt it too the climatic conditions (treatment or special finishes on the steel to maintain its integrity).

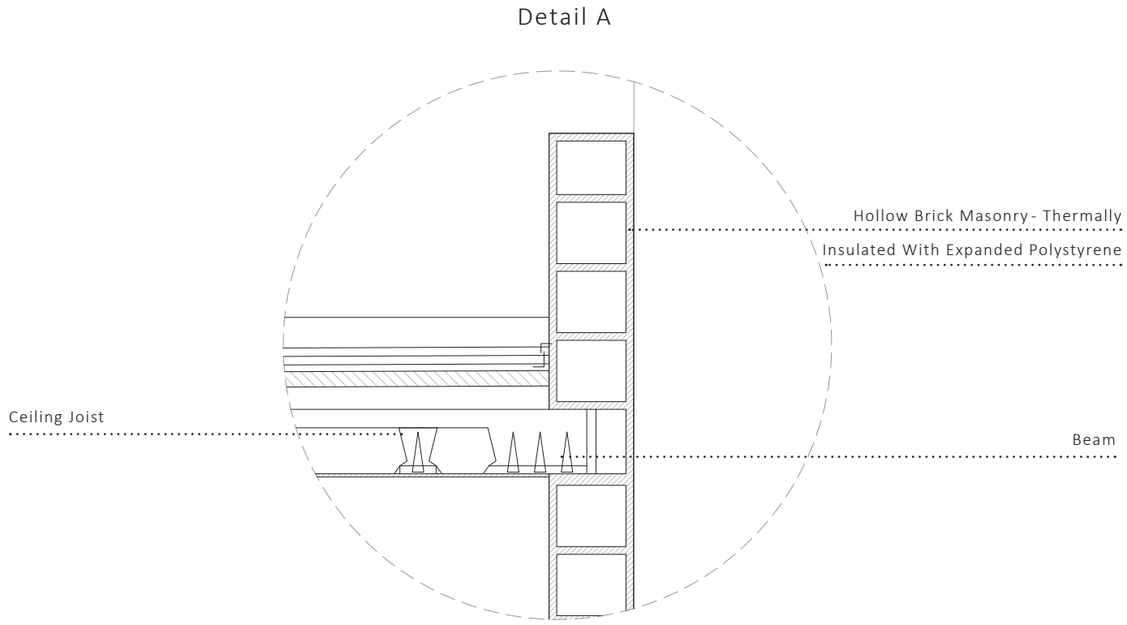
Taking into account that everything has positive and negative aspects, it is important to evaluate the priorities in the project to choose which construction method would suit best. In this case, the steel frame is evident to be the best construction method, as energy efficiency and thermal comfort are two major priorities in Évora during both summer and winter. Additionally, it is a compatible construction method with passive design. The steel frame is also a much faster construction method, which would be better at the moment as Portugal is experiencing labor shortages. Thus, having prefabricated pieces and faster execution would be the ideal situation. Lastly, the steel frame generates less waste and has a circular economy as it is recyclable and reusable.



Malagueira's Construction Method
Siza's Special T4 Typology - 1994

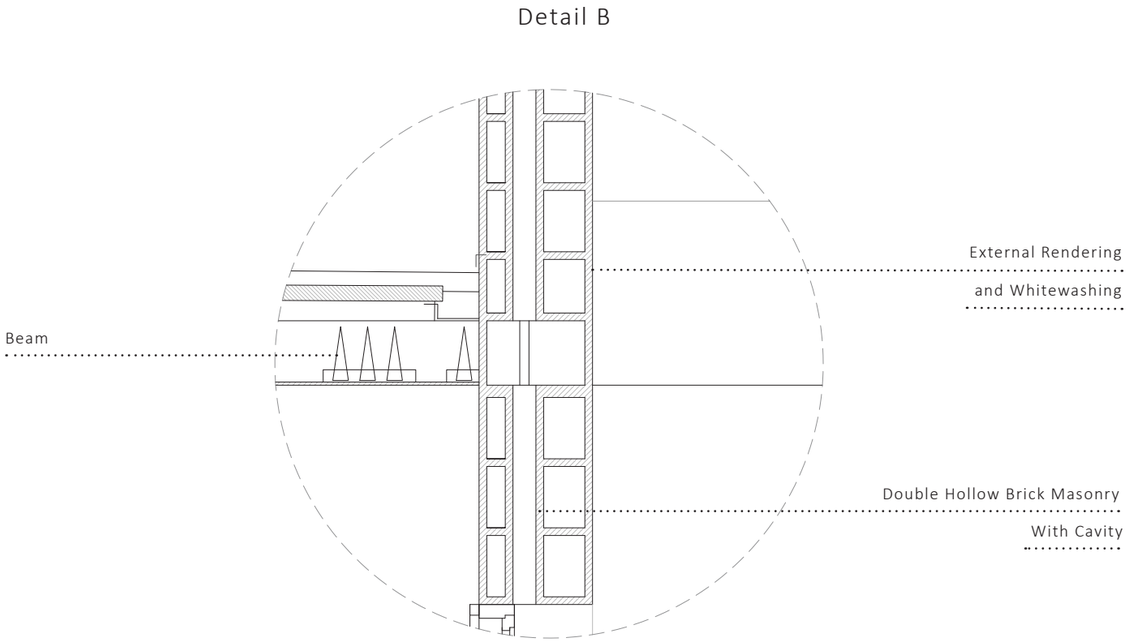
Scale 1:150

Figure 22. *Presents The T4 Special Typology Cross Section Based On A Drawing Provided By The Arquivos da Câmara Municipal De Évora - Illustrating A Traditional Construction Method.* (Strachman, 2023).



Scale 1:20

Figure 23. *Details Of The Malagueira's Construction Method* .(Strachman,2023)



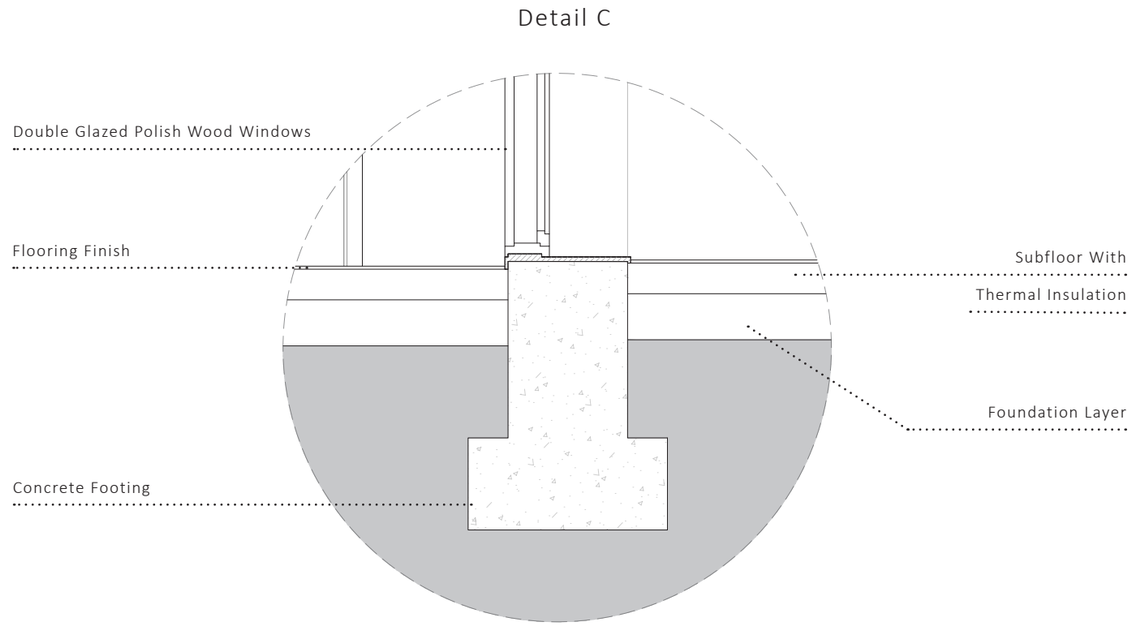


Figure 24. *Details Of The Malagueira's Construction Method*
.(Strachman,2023)

Figure 25. *Details Of The Malagueira's Construction Method*
.(Strachman,2023)

2.5 Steel Frame and Passive Design

Steel frame construction may be utilized with passive design principles. Which includes maximizing natural heating, cooling, and ventilation in a dwelling to reduce the need for mechanical intervention for heating and cooling systems. The features that can maximize passive design in steel frame construction consists of strategic placement of windows to maximize natural lighting and ventilation, the use of shading devices to reduce heat gain and keep away direct sunlight, and well-insulated walls and roofs. As a matter of fact, steel frame construction has multiple advances concerning passive design. Steel is a resilient and durable material that ensures a variety of building sizes and shapes can be designed to maximize ventilation and natural lighting. Essential Factors when designing with passive design and steel frame include orientation of the dwelling, adequate shading, insulation, and ventilation to establish a thermally comfortable, and energy-efficient building.

2.51 Construction Specification Details

As previously mentioned, the steel frame is the construction method chosen for this project. A bit of background on steel frames: they are also known as light steel frames and consists of a structural system made of steel, providing support for various construction types, ranging from high-rises to residential buildings and everything in between. Steel is incredibly versatile as a building structure because it allows more open, column-free floor plans and interior spaces. This structure consists of vertical columns, horizontal beams, wall studs, ceiling and floor joists, all interconnected to the building's skeleton to sustain significant loads such as the weight of the building itself, occupants, furniture/equipment, and environmental forces, an example in particular are seismic waves, as steel frame is an ideal building structure for places where earthquakes occur often (SFIA, 2021).

Since steel frames offers an incredible versatile structure, it is able to implement passive design principles. In terms of exterior wall construction, they allow the core of the walls to house wall studs, insulation, and necessary infrastructure while adding extra layers to create an "airtight" structure, a principle of passive design. Similarly, interior walls contain the same core structural elements, though they may have acoustic insulation or none at all, depending on their location within the building. Interior wall exteriors are often made of drywall with a paint finish or other materials like tiles, as they do not require insulation or protection

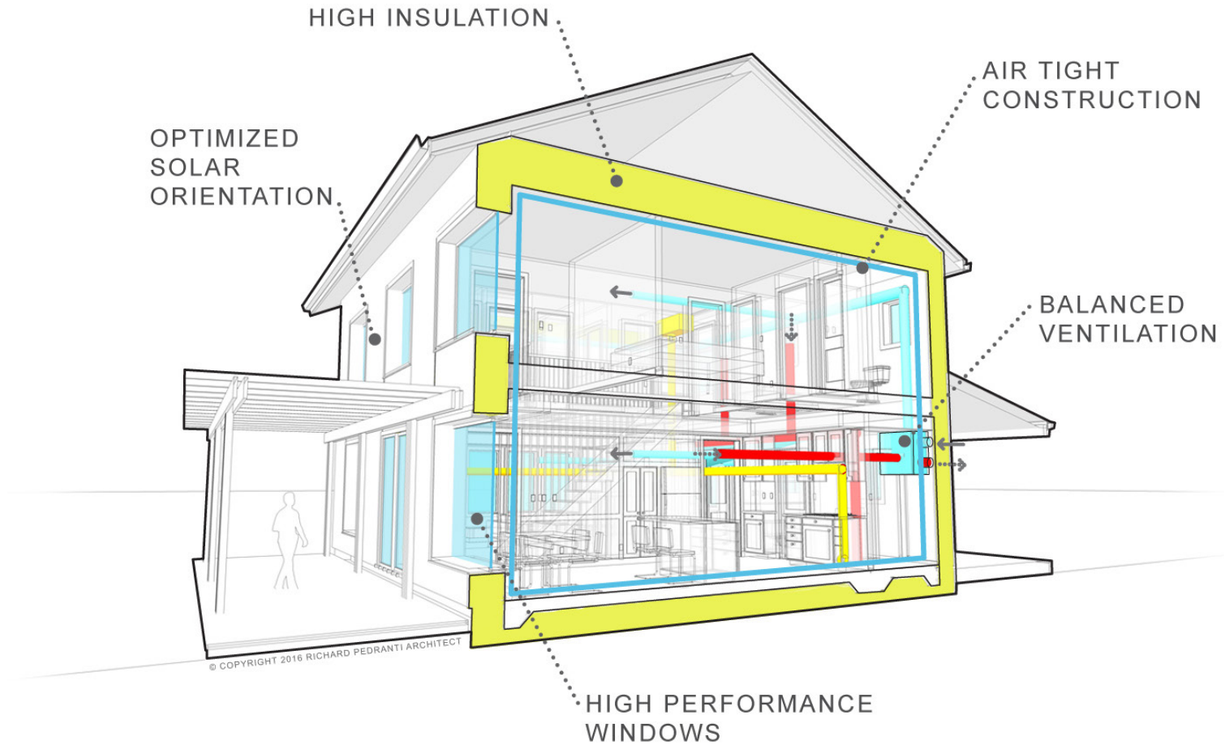
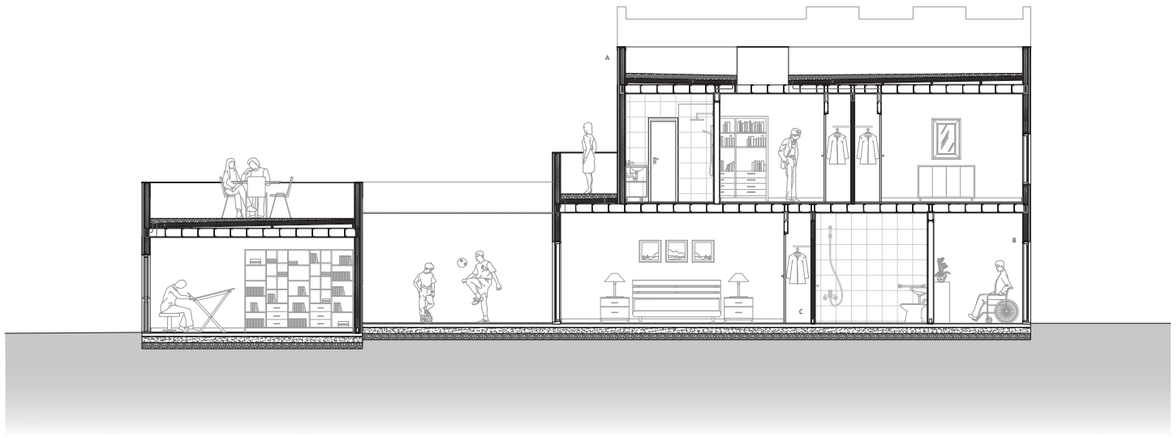


Figure 26. *Figure Demonstrates The Principles of Passive Design* (Richard Pedrant Architect, 2015).

from external environmental factors. However, wet areas, such as bathrooms and kitchens, are treated with water-resistant materials and finishes, such as eggshell-finish paint or bathroom and kitchen emulsion paint. These areas may also include waterproofing membranes, which come in various forms, like liquid, sheet, or foam-based varieties, and are used to prevent moisture damage, including mold, which is a common issue in homes in the Malagueira Neighborhood.

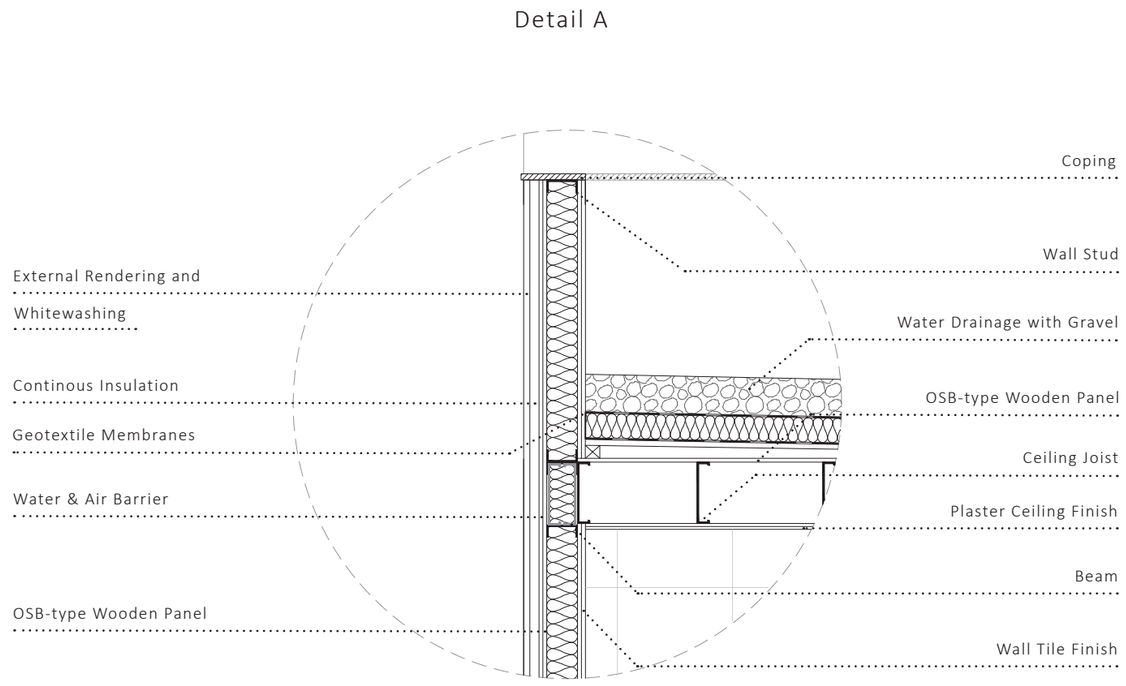
The windows and doors proposed for this project are made of PVC, as they are durable, low maintenance, environmentally friendly (as they are often made of recyclable materials), watertight, airtight, affordable, versatile in design, capable of providing efficient ventilation and airflow due to the variety of configurations they offer, and, most importantly, have excellent thermal insulation. This aligns with the principles of passive design, making the house more energy-efficient by minimizing heat loss and, therefore, reducing heating and cooling costs (China Lesso Group Holdings Limited, 2021; The Double Glazing & Conservatory Quality Assurance Ombudsman Scheme (DGCOS, 2019).



Steel Frame Construction Method
Siza's Adapted T4 Typology - 2023

Scale 1:150

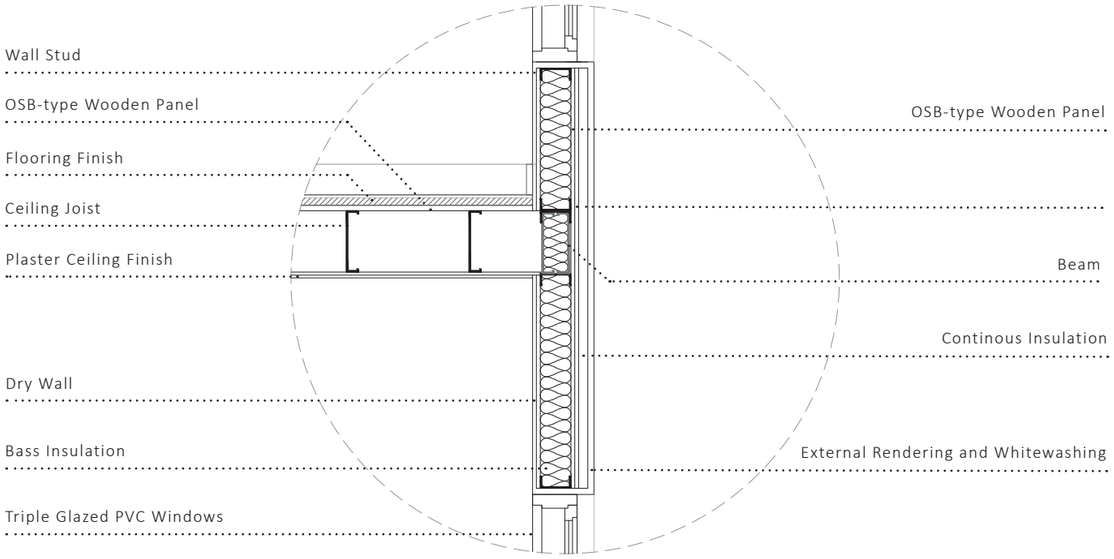
Figure 27. *Presents The T4 Special Typology Cross Section Based On A Drawing Provided By The Arquivos da Câmara Municipal De Évora - Illustrating A Steel Frame Construction Method With Passive Design* (Strachman, 2023).



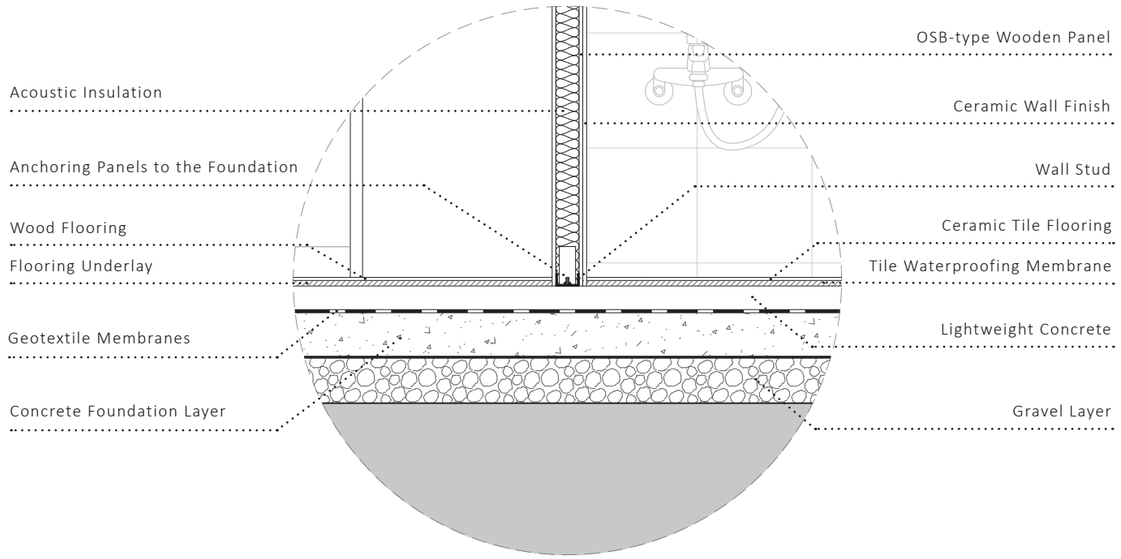
Scale 1:20

Figure 28. *Details Of Steel Frame Construction Method With Passive Design* (Strachman,2023).

Detail B



Detail C



Scale 1:20

Figure 29. *Details Of Steel Frame Construction Method With Passive Design* (Strachman,2023).

Figure 30. *Details Of Steel Frame Construction Method With Passive Design* (Strachman,2023).

Conclusion

This chapter explored sustainable construction methods for the Malagueira Neighborhood adaptation project, focusing on Passive House Design and Steel Frame Construction. Passive House Design offers outstanding energy efficiency through five core principles, making it adaptable to various designs. On the other hand, Steel Frame Construction is sustainable, reduces waste, and addresses time-efficient construction. Both methods were analysized through a SWOT analysis, disclosing that Steel Frame Construction aligns better with the priorities of this project, emphasizing energy efficiency and waste reduction. It was also discussed how Steel Frame Construction can integrate with passive design principles, creating energy-efficient living spaces. Upon conclusion, Steel Frame Construction, when integrated with passive design principles, offers a sustainable solution for this project.

Chapter 3

In this chapter, the program proposal, site selection, and various analyses that form the foundation for the subsequent architectural and design considerations are discussed. The proposal aims to develop a new part of the neighborhood that was never built while adapting Siza's original plan to meet sustainable solutions and social group needs.The site selection, surrounding context, topography, and insolation to inform the design decisions are explored indepth. Additionally, considerations include the social groups in Évora, life expectancy, and contemporary societal requirements, including the need for adaptable housing were further researched and analyzed using SWOT analysis. Furthermore, a new typology is introduced to address the needs of individuals with limited mobility, disabilities, and those in their late stages of life. Thermal considerations, landscaping plans, drainage, and irrigation systems are also discussed to ensure a sustainable and comfortable living environment.

Figure 31. *Photograph of the Bairro da Malagueira* (FG + SG,2020).

3.1 The Program Proposal

The proposal was to develop a new part of the neighborhood in the proposed area with adaptations to the previous plan proposed by Siza and a new housing typology to meet today's standards and social group needs. Specifically to explore the solutions to adapt Siza's Special Typologies to social groups that are adequate for his typology, introduce a new typology for those social groups that are not suitable for his typology, and introduce construction advancements to his project.

3.2 Site Selection

With an overall analysis and understanding of Malagueira the proposal arose from seeing the area that was meant to have the "Casa De Chá" and a special typology built. The area of intervention for the program is located in the west side of the neighborhood, where currently it is abandoned, with minimal to no maintenance done to it, no usage or purpose, and also as it is located in one of the extremities of the neighborhood; it is isolated from the other zones of the neighborhood.

The "Casa De Chá" was developed initially by the Câmara Municipal de Évora with the purpose of this intervention which was to serve high-quality catering in the Malagueira neighborhood. The project was the result of a competition held on the 27th of May, 1992 with the architect Álvaro Siza, Eduardo Souto Moura, and António Madureira as guests. The objective of the competition was to publicly auction the lot and have the winner of the competition construct their project along with public areas surrounding the building to enhance it. The construction of the building would take place once the lot was sold, and the owner could participate in the development of the project that won the competition.

The typology that was supposed to be built in the area of intervention was made differently than the rest of the neighborhood. It was built around 1992 to 1994, intended for a higher income demographic. This new typology project consisted of 20 T4s, with enclosed garages, and patio with the garage would be a passageway to the entry of the house.

Figure 32. *Site Location*
(Google Earth,2023)

3.3 Analysis of Surroundings and Current Situation

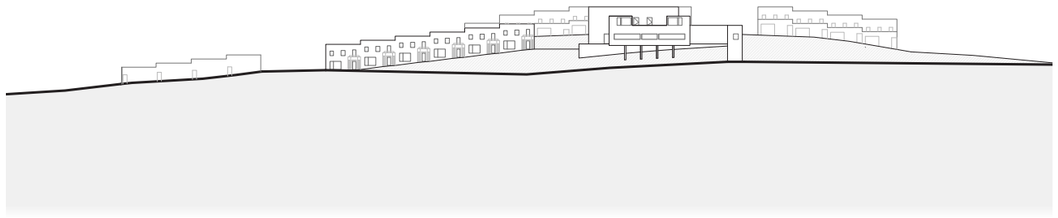
3.31 Topography Explanation

The topography of the selected site has a main hill located by the “Casa De Chá” that was positioned to overlook the historic center of Évora, located in the east side of the city. The steepest point is by the “Casa De Chá” and it slopes in all directions, consequently, the houses are implanted in various topographic curves in a downward direction.

3.32 Insolation Study

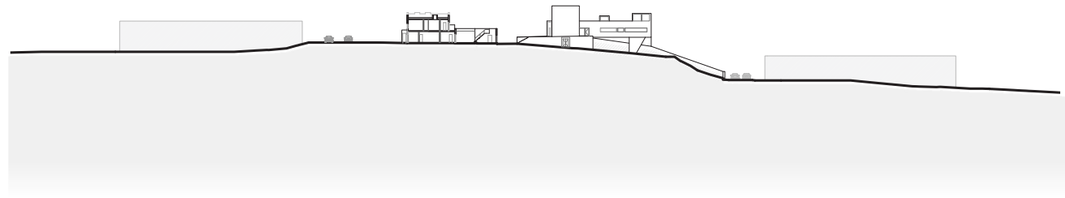
When designing dwellings, the organization of environments and how they are experienced is crucial for those who will experience them. The project is not only successful due to the layout and measurements, but it also needs to have good performance. This is accomplished by positioning the dwellings in the terrain according to the solar orientation, which will work in harmony with thermal comfort and sustainability. The ideal orientation for dwellings in the Northern Hemisphere is South facing, as it will get the most sunlight throughout the day. In terms of a floor plan, bedrooms, balconies, and most commonly used spaces of the dwellings during the day should be prioritized to south facing, those spaces will have better thermal comfort and lighting during most of the day. North-facing, however, does not receive direct sunlight, therefore spaces where sunlight is not essential should be located in that direction, the spaces could vary from garages, stairs, storages, and service areas. The east facing facades will receive the morning sun and the west facing facade receives the afternoon sun, therefore depending on the priorities of the temperature of the room during the day, the bedrooms can be placed in either of these directions. If the location of the dwelling tends to have extremely hot summers, east-facing bedrooms would be better to avoid overheating in the afternoon as it is cooler in the morning versus the afternoons. But if the location of the dwelling is colder in winter, it would be ideal to gain that heat from the sun in the afternoon as the day gets cooler at night (Gandolfi, 2020).

Figure 33. *Photograph of Proposed Intervention Site Facing North* (Ramos,2023)



Section AA
Scale 1:1500

Figure 34. *Figure Illustrate The Site's Topography - Section AA*
(Strachman,2023).



Section BB
Scale 1:1500

Figure 35. *Figure Illustrate The Site's Topography- Section BB*
(Strachman,2023)

3.33 Social Groups in Évora

Social groups in Évora consist of students; from the University of Évora which is significantly attracted by local and international students, and senior citizens; Évora has an increasing population of retirees as it is a relaxed city with a nice climate, residents; which include professionals from various specialties varying from healthcare, education, agriculture, public administration, and tourists; due to the numerous historically rich sites such as museums, art galleries, chapels, temples, etc in Évora.

Figure 36. *Photograph of the Proposed Intervention Site Facing the Historical Center - Facing East* (Ramos,2023).

3.34 Life Expectancy

The life expectancy of a person living in Évora, Portugal, varies depending on various factors such as gender, lifestyle, and other demographic characteristics. According to the World Health Organization (WHO,n.d), the life expectancy at birth for Portugal as a whole was 81.6 years in 2020. However, it is worth noting that this figure is for the entire country, and life expectancy can vary by region and city. According to the Portuguese National Institute of Statistics (INE), the life expectancy at birth for the Évora district was 79.4 years for men and 84.2 years for women in 2019.

3.35 Adequate Social Groups For The Proposal

Álvaro Siza designed the T4 special typology for higher socioeconomic class families. He also did not like the idea of shared housing, therefore, the social groups that fit those circumstances are local families, middle-aged to senior citizens. Since this area was intended for a higher economic level, it was evident that students would not fit the circumstances Álvaro Siza had in mind when he designed this typology.

3.36 Contemporary Societal Requirements

As wonderful and well-designed Siza's proposal is, societal needs and standards have changed over the last decades. The main changes include the number of habitants in each household and their life expectancy. According to the 2021 Census of Portugal, the average household size in Évora was 2.2 people. This means that on average, there were approximately 2 to 3 occupants per house in Évora in 2021. Thus, his T4 typology could be adapted to a T3 or T2 as the number of habitants per household decreases. Also with the advancements in medicine, the life expectancy in Évora has certainly increased. As of 2019 the Portuguese National Institute of Statistics (INE), the life expectancy for men was 79.4 years and 84.2 for women. Therefore, having an accessible and age-adaptable house would be the ideal option for future house construction. Nonetheless, The Portuguese Technical Standards for Accessibility in the Built Environment (Portaria n.º 163/2006) (INCM, 2006) recommend that all new buildings, including homes, be designed and constructed with accessibility in mind. This includes providing accessible entrances, corridors, elevators, stairways, bathrooms, bedrooms, and other spaces.

With various cultures influencing Portugal, one cultural aspect that has been embraced is the practice of homeschooling, often seen in the United States. This adaptation has led to the need for homes to provide multiple spaces to accommodate various activities, similar to those found in traditional schools. To determine where these spaces should be located within a home, consideration of their intended users and purposes is essential. For example, it is advisable to have a designated playroom or homeschooling area within the home, allowing parents to closely supervise their children's activities. On the other hand, spaces like a photography studio or craft studio, intended for more independent users, can be positioned further away from the core living areas. Additionally, it is prudent to consider acoustic levels when arranging these spaces. For instance, a music room or a movie room might be better suited for placement outside the main living areas to prevent disturbing other occupants of the home. Additionally, separating one's workspace from their living space can have psychological benefits for individuals. This division can contribute to a healthier work-life balance and improve overall well-being.

With these ideas and the fact that residents in the Malagueira already have outgrown their homes and utilize the garage not as a garage anymore, the initial design intention from Siza has roads for only pedestrians and not cars. The decision has been made to move the garage to the front of the house so the garage spaces can be utilized for other purposes.

Incorporating Passive Design Principles, the maximization of open space was achieved by eliminating unnecessary walls to enhance airflow. Additionally, if the occupants of the home do not wish to have four bedrooms on the second floor, the bedrooms facing west can be converted into an open space for other purposes. This allows the bedrooms to face east, where it is cooler in the morning when occupants are resting, while the open space remains cooler in the afternoon when it will be most frequently used.

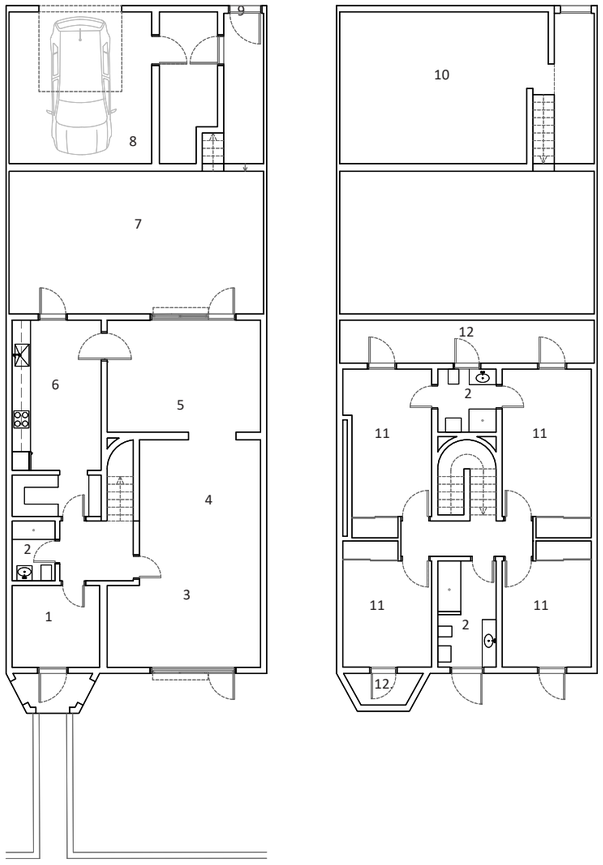
With the aim of creating more open spaces for improved airflow, the decision was made to open up the kitchen. Cooking has evolved significantly over the past five generations, shifting from a traditional household chore to a hobby, especially after the COVID-19 pandemic. Nowadays, it has become a social activity enjoyed by friends, families, and couples.

81

82

Scale 1:1000

Figure 37. *Original Site Layout Based On Drawing Provided By The Arquivos da Câmara Municipal de Évora* (Strachman,2023)



Ground Level

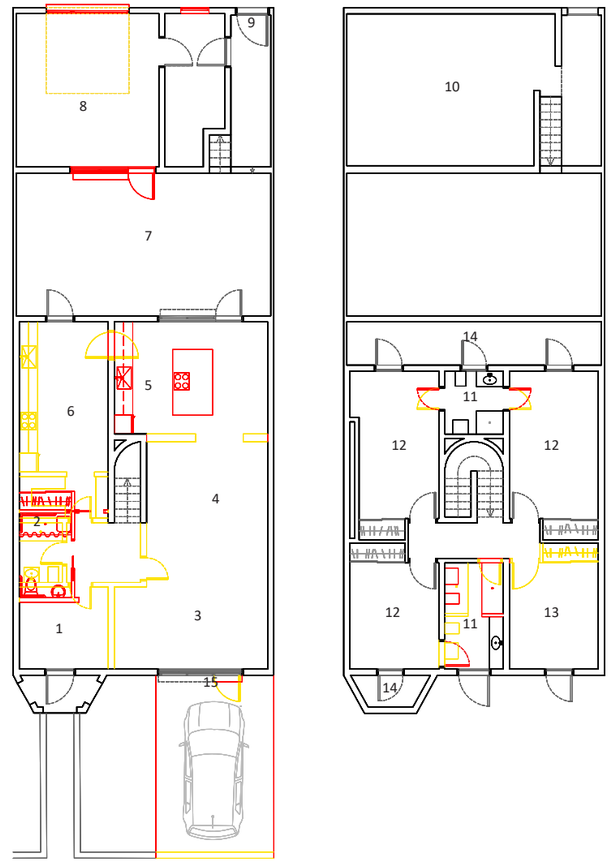
Upper Level

Legend

1. Entry
2. WC
3. Living Room
4. Sitting Room
5. Dinning Room
6. Kitchen
7. Patio
8. Enclosed Garage
9. Rear Entry
10. Roof Top Patio
11.Bedrooms
12. Balcony

Scale 1:200

Figure 38. *T4 Special Typology By Álvaro Siza Based On Drawing Provided By the Arquivos da Câmara Municipal de Évora* (Strachman,2023).



Ground Level

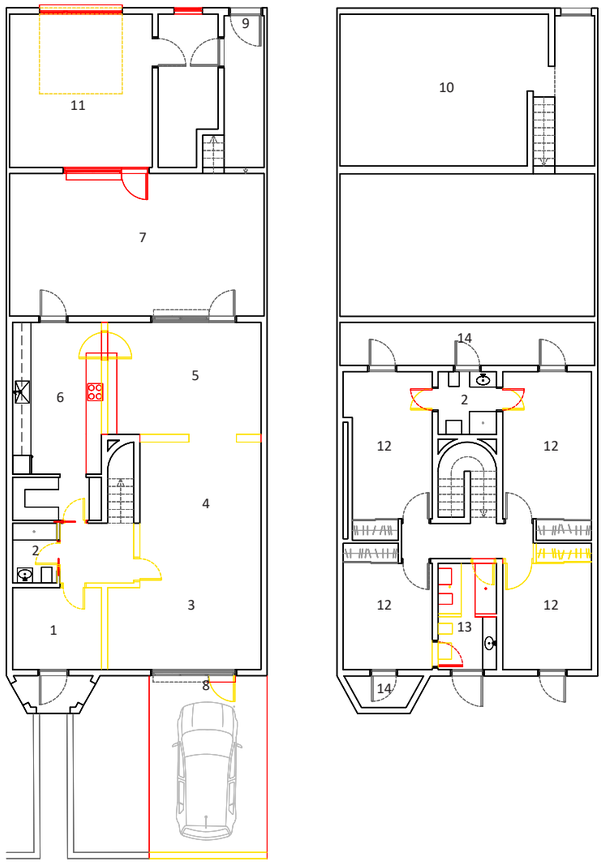
Upper Level

Legend

1. Entry
2. Accesible WC
3. Living Room
4. Dinning Room
5. Kitchen
6. Accessible Bedroom
7. Patio
8. Flex Space
9. Rear Entry
10. Roof Top Patio
11.WC
12. Bedroom
13. Flex Space
14. Balcony
15. Open Garage

Scale 1:200

Figure 39. *Siza's Adapted T4 Typology - Yellows and Reds Plan* (Strachman,2023)

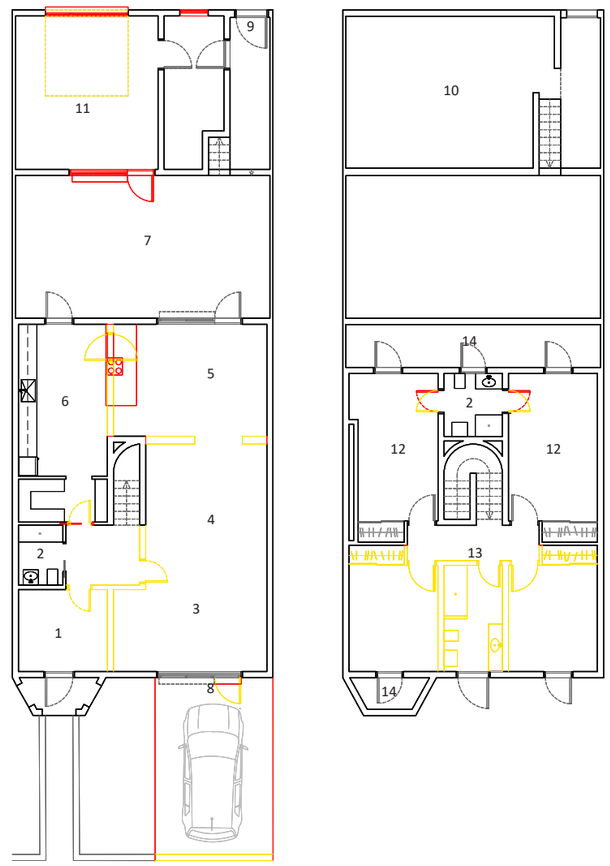


Ground Level

Upper Level

Scale 1:200

Figure 40. *Siza's Adapted T3 Typology - Yellows and Reds Plan* (Strachman,2023).



Ground Level

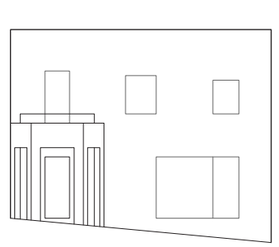
Upper Level

Legend

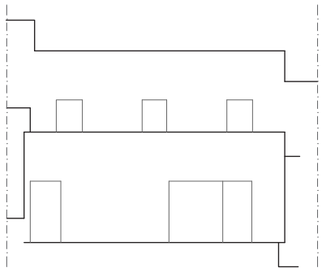
1. Entry
2. Accesible WC
3. Living Room
4. Dinning Room
5. Kitchen
6. Accessible Bedroom
7. Patio
8. Flex Space
9. Rear Entry
10. Roof Top Patio
11.WC
12. Bedroom
13. Flex Space
14. Balcony
15. Open Garage

Scale 1:200

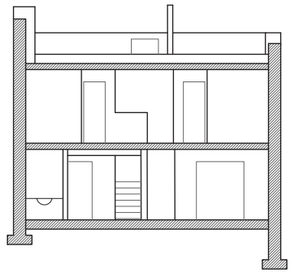
Figure 41. *Siza's Adapted T2 Typology - Yellows and Reds Plan* (Strachman,2023).



Front Facade



Rear Facade

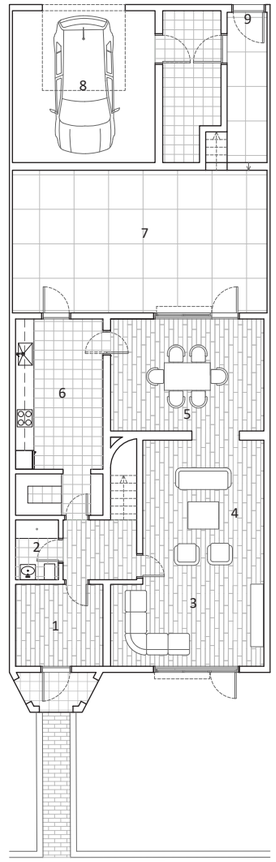


Section A

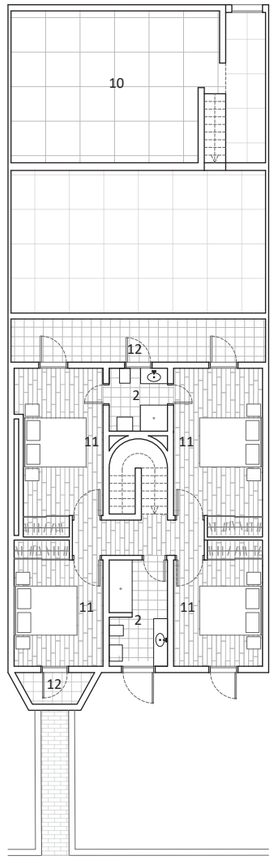
Section B

Scale 1:200

Figure 42. T4 Special Typology Facades And Cross Sections By Álvaro Siza, Based On A Drawing Provided By The Arquivos da Câmara Municipal De Évora (Strachman, 2023).



Ground Level



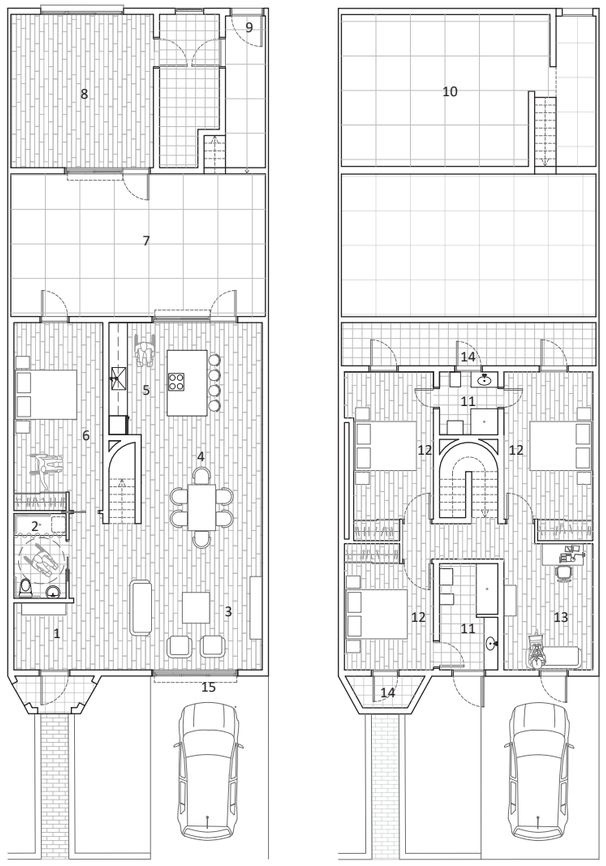
Upper Level

Legend

1. Entry
2. WC
3. Living Room
4. Sitting Room
5. Dining Room
6. Kitchen
7. Patio
8. Enclosed Garage
9. Rear Entry
10. Roof Top Patio
11.Bedrooms
12. Balcony

Scale 1:200

Figure 43. *T4 Special Typology By Álvaro Siza Based On Drawing Provided By the Arquivos da Câmara Municipal de Évora* (Strachman,2023).



Ground Level

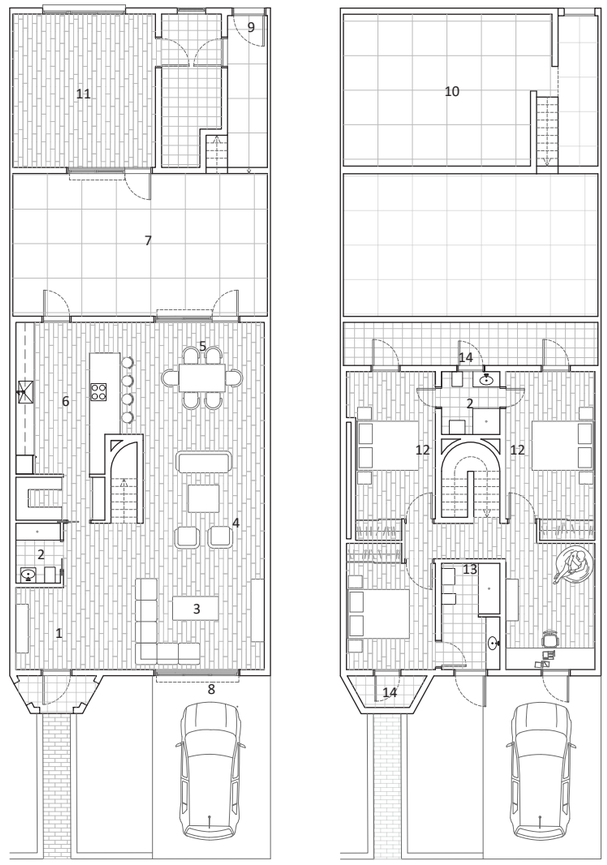
Upper Level

Legend

1. Entry
2. Accesible WC
3. Living Room
4. Dining Room
5. Kitchen
6. Accessible Bedroom
7. Patio
8. Flex Space
9. Rear Entry
10. Roof Top Patio
11.WC
12. Bedroom
13. Flex Space
14. Balcony
15. Open Garage

Scale 1:200

Figure 44. *Siza's Adapted T4 Typology* (Strachman,2023).



Ground Level

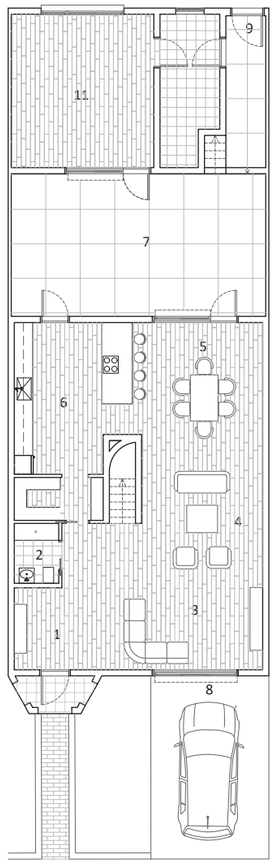
Upper Level

Legend

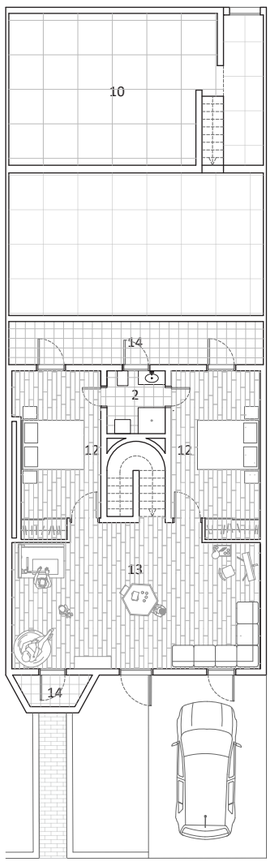
1. Entry
2. Accesible WC
3. Living Room
4. Dining Room
5. Kitchen
6. Accessible Bedroom
7. Patio
8. Flex Space
9. Rear Entry
10. Roof Top Patio
11.WC
12. Bedroom
13. Flex Space
14. Balcony
15. Open Garage

Scale 1:200

Figure 45. *Siza's Adapted T3 Typology* (Strachman,2023).



Ground Level



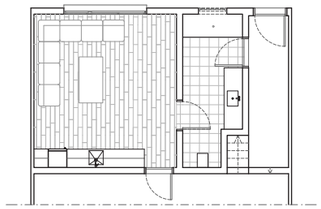
Upper Level

Legend

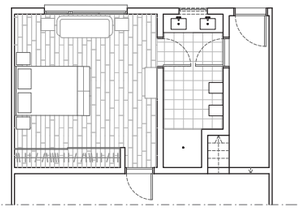
1. Entry
2. WC
3. Living Room
4. Sitting Room
5. Dinning Room
6. Kitchen
7. Patio
8. Open Garage
9. Rear Entry
10. Roof Top Patio
11.Flex Space
12. Bedroom
13. Flex Space
14. Balcony

Scale 1:200

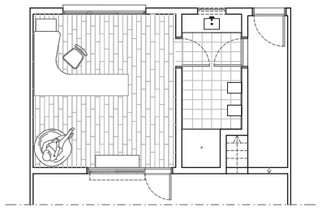
Figure 46. *T4 Special Typology With Alterations According To Contemporary Societal Requirements* (Strachman,2023)



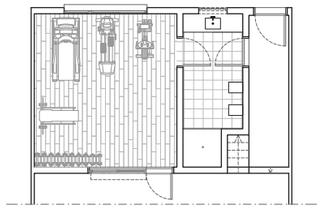
Movie Room



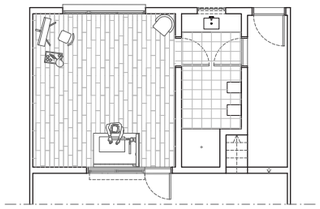
Guest Suite



Home Office



Home Gym



Arts & Crafts Studio

Scale 1:200

Figure 47. *Alternative Uses For Garage Space* (Strachman,2023).

3.37 Thermal Considerations

As discussed previously, the thermal comfort of the dwellings is a major factor to consider in Évora. The garages in the buildings located on the west side of the lot receive the morning sun and east vice versa. Regardless of these circumstances, that entire lot just receives a significant amount of sunlight during the day simply the orientation of the dwelling is not sufficient to ensure the best thermal conditions. Therefore, the use of passive design in the construction method and landscaping are the ideal methods to address this issue.

Figure 48. *Figure Demonstrates The Number Of Hours The Area Is Exposed To During The Day At A Given Specific Date.* (Shademap,N.d).

3.4 New Typology

The new typology proposed was for the social group that is not adaptable to Siza's T4 Typology proposed in this site, which are elderly and people with disabilities. The thought behind this was firstly the fact that as medical advances are constantly progressing consequently increasing people's life expectancies thus houses need to be made or adapted to the phases later in life with physical challenges such as going up the stairs, secondly, advocacy for people with disabilities to be able to be more independent has been emphasized, not only for wheelchair users but also those who are visually impaired, amputees, live with amyotrophic lateral sclerosis (ALS) or multiple sclerosis (MS), cerebral palsy, and etc. Lastly, as mentioned previously The Portuguese Technical Standards for Accessibility in the Built Environment (Portaria n.º 163/2006) (INCM, 2006) recommend that all new buildings, including homes, be designed and constructed with accessibility in mind.

The specific changes thathave been done to these typologies to meet these requirements include wider corridors, doorways, clearances, bedroom and bathroom sizes that can adequately be adapted to a wheelchair user if necessary, more open spaces to facilitate the travel from one area to another, and having only one level to avoid the need of stairs or elevators. As the dwellings are connected to each other, it was limited to differentiate typologies. However, the two dwellings located in the each end of the block has an advantage as they may have windows located on the side walls.The new typologies proposed by me are T2s with the thought that a person with a disability might need another family member or medical assistant at some point to support them.

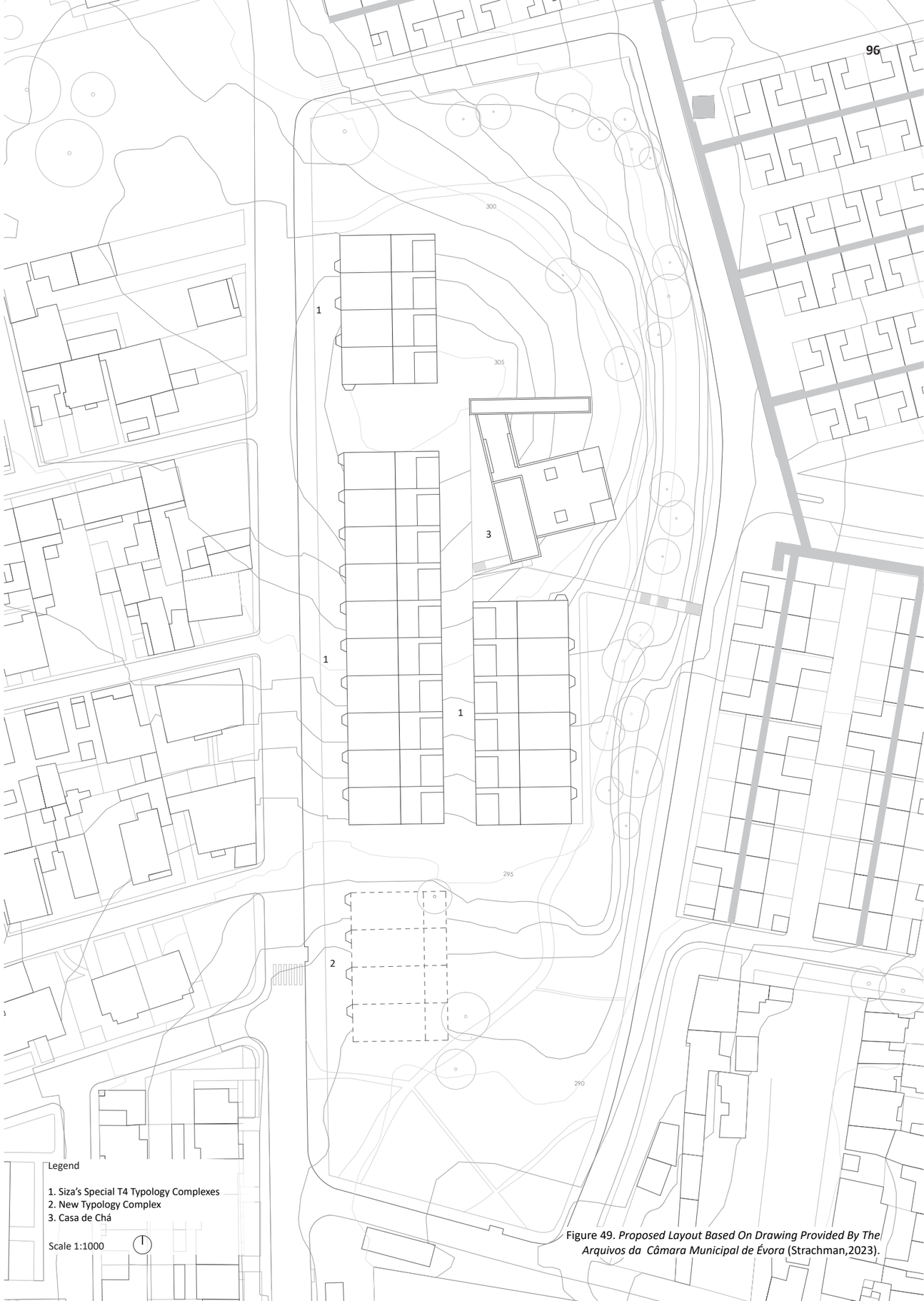


Figure 49. *Proposed Layout Based On Drawing Provided By The Arquivos da Câmara Municipal de Évora* (Strachman,2023).

97

98

290

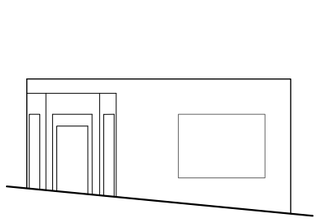
295

305

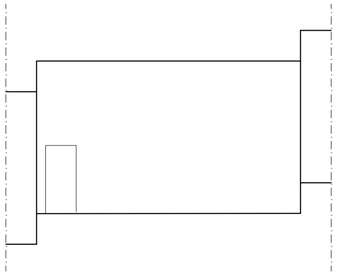
300

Scale 1:1000

Figure 50. *Final Proposal Plan* (Strachman,2023).

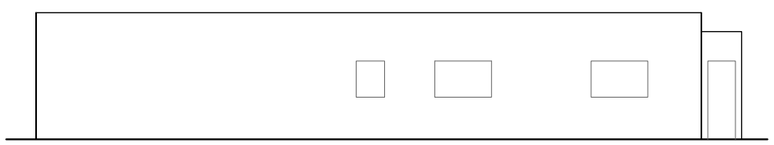


Front Facade



Rear Facade

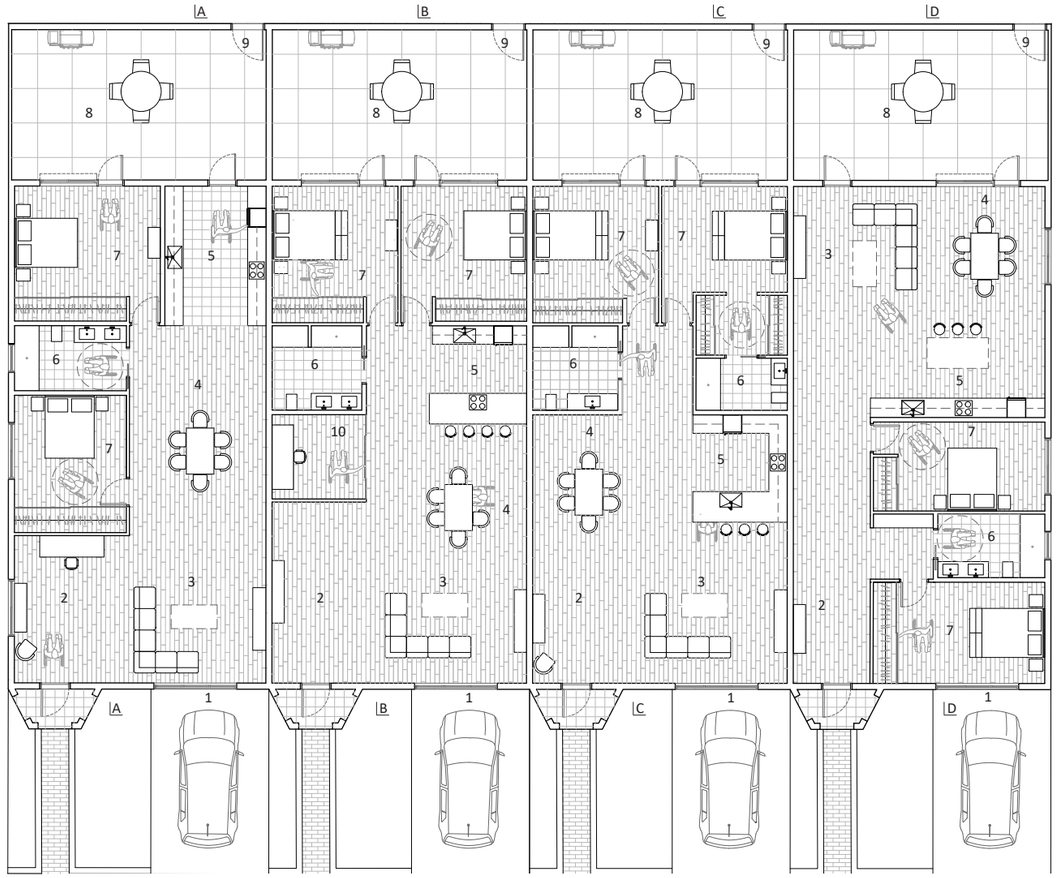
South Facing Facade



North Facing Facade

Scale 1:200

Figure 51. *New Typology Facades* (Strachman,2023).



Legend

1. Garage
2. Entry
3. Living Room
4. Dining Room
5. Kitchen
6. Bathroom
7. Bedrooms
8. Patio
9. Rear Entry
10. Office

---------- Items On Casters

Obs. Bathrooms are dimensioned according to universal design standards for potential adaptation purposes.

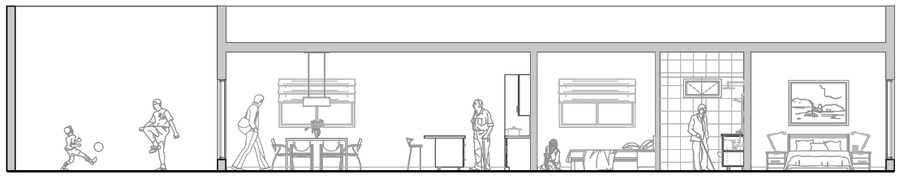
Scale 1:200

Figure 52. *New Typology Floor Plans* (Strachman,2023).

T2 Typology A- Section A

T2 Typology C- Section C

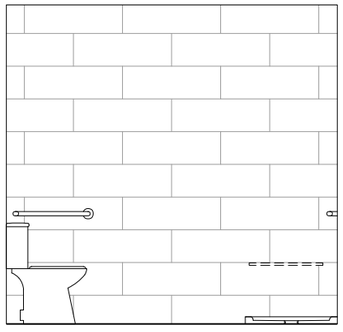
T2 Typology B- Section B



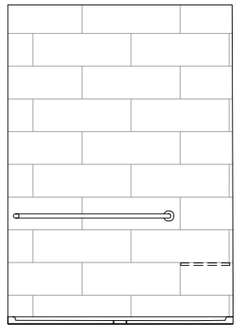
T2 Typology D- Section D

Scale 1:150

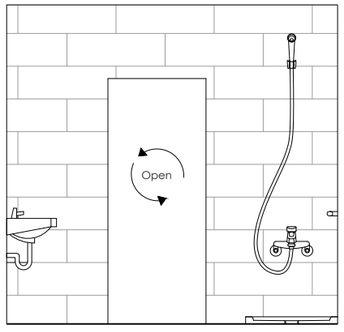
Figure 53. *New Typology Sections* (Strachman,2023).



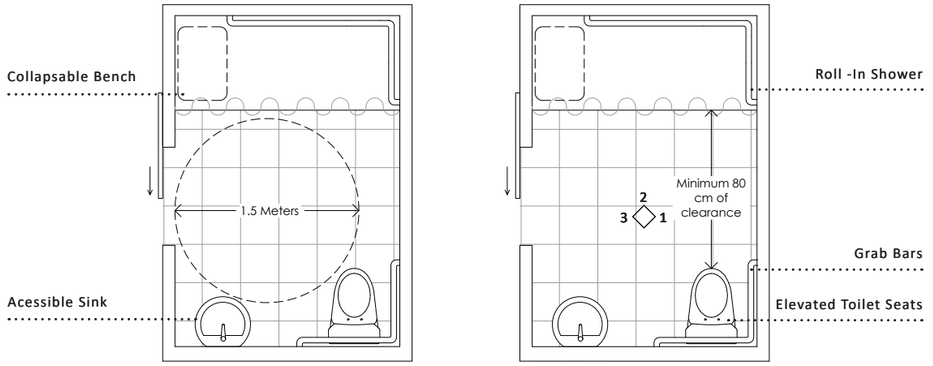
Elevation 1



Elevation 2



Elevation 3

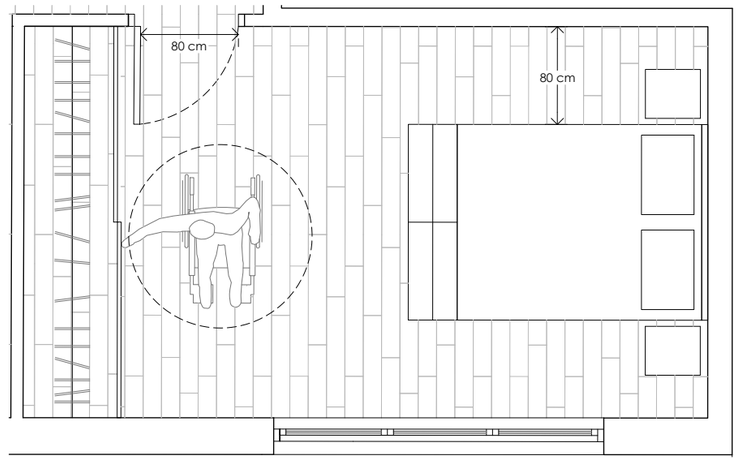


Floor Plans & Elevations
Scale 1:50

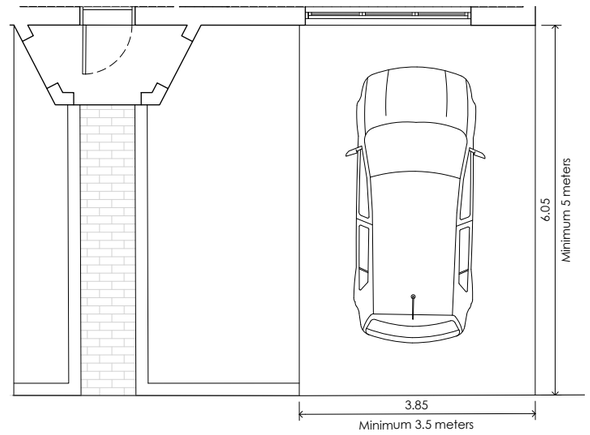
Portuguese Accessibility Legislations:

-Doorways and passages must be atleast 80 centimeters (it is recommended to have a completely clear width, thus not counting doors swings).
-Accessible bathrooms must have 80 centimeters of clear space.
-Every space must have a 1.5 meters turning radius for the wheel chair be able to turn.
-Washroom must also have raised toilet seats, grab bars, and a roll-in shower.

Figure 54. *Accessible WC Specifications*
(Strachman,2023)



Acessible Bedroom
Scale 1:50



Acessible Parking
Scale 1:100

Figure 55. *Accessible Bedroom And Parking Example*
(Strachman,2023).

3.5 SWOT Analysis on Contemporary Societal Requirements

Strengths:
Converting the garage into a functional space introduces a valuable expansion of usable area within the house, accommodating a range of activities beyond car storage. Additionally, the incorporation of a guest suite presents a host of benefits, offering a versatile and adaptable living space that caters to diverse family members' requirements, simultaneously enhancing the property's value and providing privacy for both the guests and the host.

Weaknesses:
While repurposing the garage creates functional space, there is a potential trade-off in terms of reduced storage area. Nonetheless, it is worth noting that this newly gained space could serve as an alternative storage solution, addressing the potential loss.

Opportunities:
The transformation of the garage into a usable area opens up opportunities for engaging in activities that were previously constrained by space limitations. This shift also allows for performing tasks within the limits of the property while still maintaining some separation from the primary living areas, which is especially appropriate in the case of the garage. Additionally, the integration of a guest suite offers a flexible and accommodating living arrangement, catering to the specific needs of various family members while simultaneously increasing the property's value.

Threats:
There may be concerns among certain users who prefer a closed car garage over an open one. However, these preferences are inherently subjective and dependent upon individual needs. It is important to recognize that while some might have reservations, others may see the benefits and potential of repurposing the garage for alternative usage.

3.6 Landscaping Plan

As mentioned previously, another manner to aid thermal comfort can be in the form ofthe addition of trees essentially improving the air quality, and overall temperature, and also providing shading. Évora has similar weather conditions in Mediterranean climates, which typically experience dry hot summers and wet cold winters, luckily there is a wide range of tree species that are adapted to those weather conditions. Factors to take into account when selecting them includes, the local climate, soil condition, and the amount of maintenance needed. Trees that are tolerant to high temperatures and drought include olive trees, cork oaks, cypresses, and Quercus suber, which is a common tree species grown in Alentejo. One of the important factors of planning this landscape is to ensure there is regular watering in the area especially during their establishment phase to support the growth of a strong root system. Once they have been established in the area, they can withstand dry hot conditions for extended periods. Another important factor to take into account is the heavy prolonged rainfall, as it may cause waterlogging and some species of trees may not handle it so well. Even though the topography of the site is quite sloped, taking advantage of that water to be utilized elsewhere is ideal.

109

110

300

295

290

305

300

295

290

Legend

Water Tanks

Pavement Water Collection

Tree Bed Water Collection

Drainage Pipes

Underground Irrigation Zone

Scale 1:1000

Obs. The entire intervention area slopes downward, except for the peak.

The graywater collection method is extracted from the houses.

Figure 56. *Landscaping Plan* (Strachman, 2023).

3.7 Drainage and Irrigation System

Being mindful of the landscaping plan and environmental considerations, a comprehensive drainage and irrigation system has been carefully designed to achieve the best possible results. The drainage system to harvest the rainwater is called PICP (permeable interlocking concrete pavement) Stormwater Runoff System. This plan consists three key components, the first component is the drainage system, responsible for collecting rainwater from the path flooring, tree planters, and graywater from the houses within the lot. Secondly, this collected water undergoes filtration processes to ensure its quality and cleanliness. Lastly, the filtered water is then distributed through an irrigation system, which is programmed to activate as needed, evenly distributing water throughout the landscape to provide adequate hydration for the trees and plants (Commercial rainwater harvesting systems,n.d , ICPC, n.d.).

The use of graywater is essential to establish a sustainable source for plant irrigation, especially during periods of minimal rainfall. While these plants are resilient in dry climates, having an irrigation system in place minimizes leaf loss during the hotter months, consequently offering more shading and aesthetic appeal. Rainwater collection areas have been strategically placed where the topography slopes downward. It is important to note that the tree bed collection areas are surrounded by greenery but are not designed to submerge the grass, which serves as an absorption tool. This approach aims to prevent excessive water saturation of the grass, particularly during Evora's extremely heavy rainfalls, thereby preserving the health of the grass and landscape.

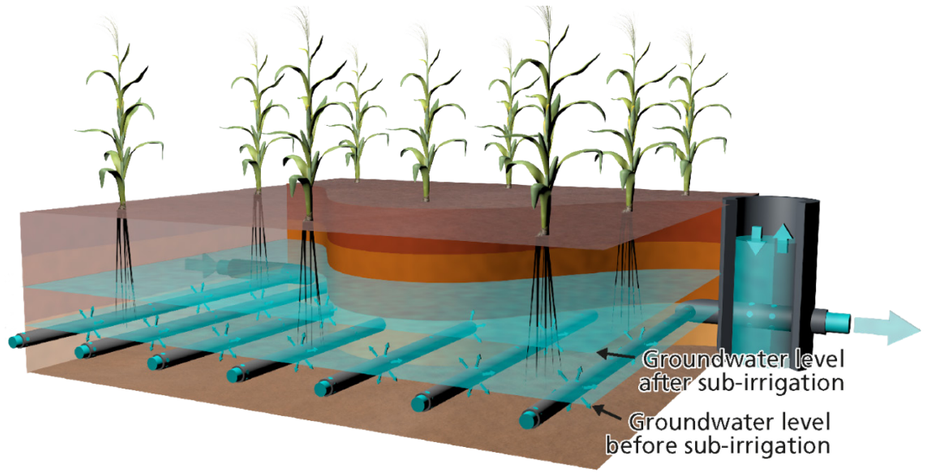
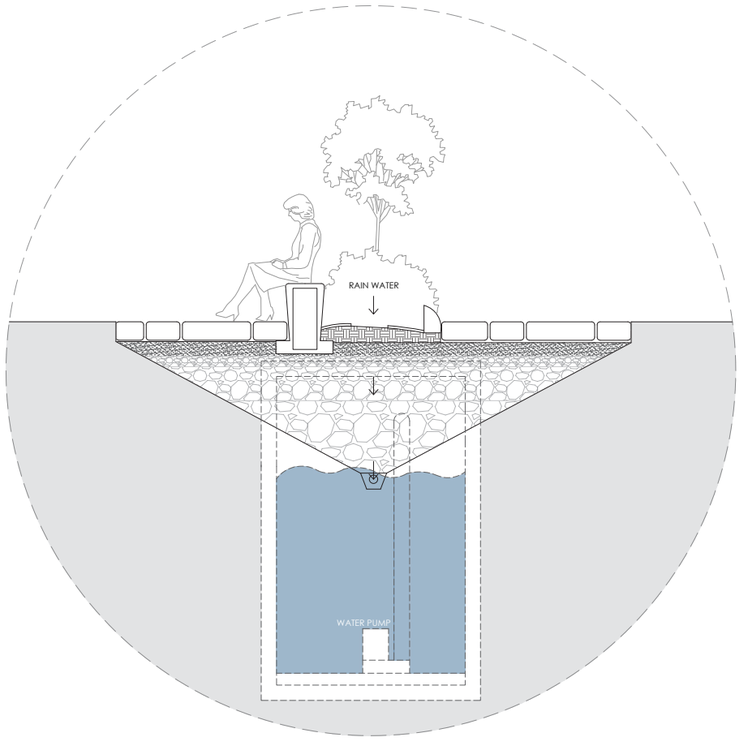
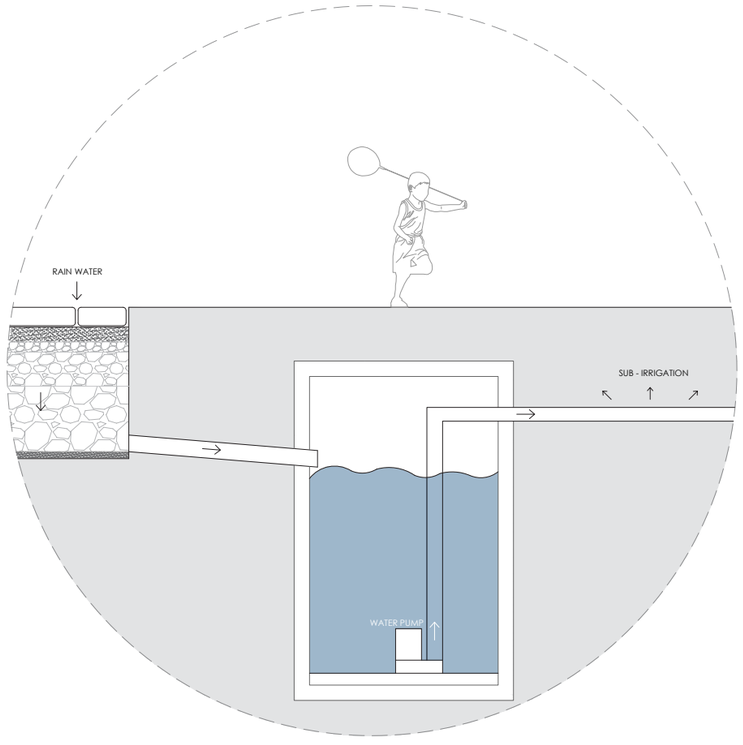


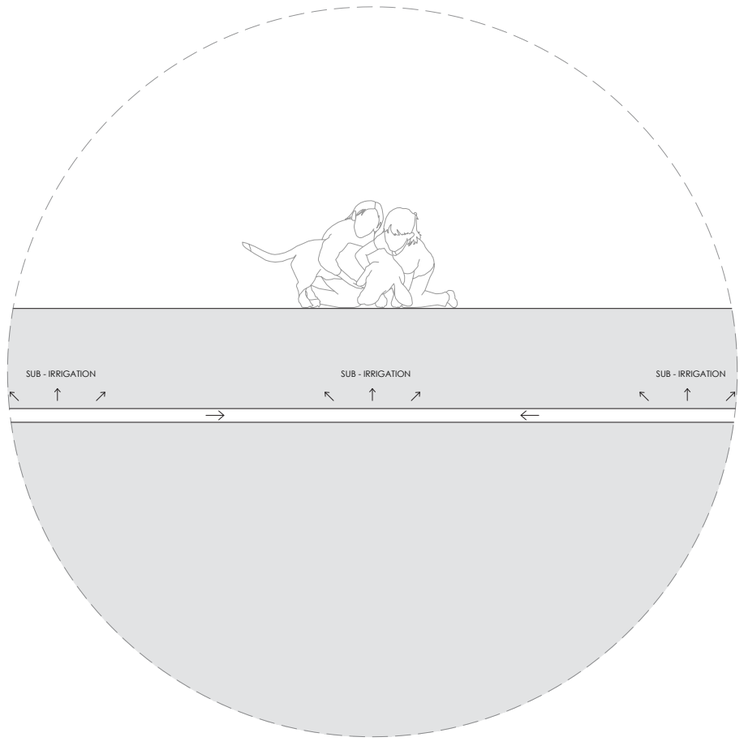
Figure 57. *Figure Demonstrates A Underground Irrigation System*
(Narain-Ford ©.,2020).



Tree Bed Water Collection



Pavement Water Collection



Underground Irrigation

Scale 1:20

Figure 58. *PICP Stormwater Runoff System & Sub Irritation System Scheme* (Strachman,2023).

3.71 Graywater Reusage

With the increasing focus on sustainability in recent years, water has become a more common source of irrigation. Graywater refers to the reuse of water from sinks, showers, tubs, washing machines, and any water that has not come into contact with feces (Water Action, 2018). Even though it may contain traces of dirt, food, grease, and other substances, it is still safe for irrigation purposes (Water Action, 2018). The reuse of water helps conserve water, reduce sewer pollution, and reconnect people with the water cycle.

Water can be utilized to irrigate plants and fruit trees, but it should not be used on edible crops. Important guidelines for using water include not storing it for over 24 hours to prevent odor, minimizing human or animal contact, and ensuring that the water soaks into the ground. Considering all of these guidelines, the idea is to have this water source for an underground irrigation system primarily used during the drier months when there is no rainfall.

To address the odor issue that may arise from storing water for more than 24 hours, a solution is to redirect the water to the sewer system when there is a sufficient supply of rainwater for the irrigation system. While utilizing all available water is ideal, there are situations where this may not be necessary. In such cases, proper sanitation and safe disposal methods must be employed to ensure the environment remains healthy and safe for all residents.

Gray water can also supplement the rainwater irrigation system when needed, such as during a drought. Consequently, the underground irrigation system is not only environmentally conscious but also conserves water, utilizing a quarter less water than a traditional sprinkler system (Nuland, 2020). Therefore, it is the most ideal irrigation system for the drier months in Évora.

Conclusion

This chapter focused on the architectural and design strategy for the project, incorporating numerous crucial components to achieve the best possible outcome. It focused on creating a balance between Álvaro Siza's original plan and addressing today's societal needs. It was crucial for the site selection, surroundings, topography, and the insolation study to be critically analyzed to comprehend how the goals were going to met with the circumstances faced. In addition to that, a study on the demographics in Evora was done to better comprehend the social groups there, the life expectancy of the residents, and overall requiments that needed to be met to improve the quality of the life of the residents of the Malagueira. The proposal introduced adapted alternatives to Siza's T4 plan and also more typologies catered to those with limited mobility, all with an emphasis on sustainability. This chapter served as comprehensive plan for a adaptavitve,inclusive, and sustainable conscious transformation of Western part of the Malagueira.

Final Conclusions

In conclusion, Siza's architectural proposal, while phenomenal in its design, had the necessity to evolve in response to changing societal needs and environmental considerations. The changes in household demographics, including smaller family sizes and increased life expectancy, requires adjustments to the typology of Siza's T4 special typology design. As demonstrated by the 2021 Census, the average household size in Évora has decreased, making adaptations like transitioning from T4 to T3 or T2 layouts essential. In addition to that, with advancements in medicine, designing houses that are accessible and adaptable to older age groups has become uncompromisable.

The Portuguese Technical Standards for Accessibility highlights the importance of creating buildings with accessibility in mind, including features such as accessible entrances, corridors, restrooms, and more. While maintaining the neighborhood's aesthetic, adaptating the houses to incorporate sustainable construction practices is crucial. This involves utilizing renewable and recyclable materials, minimizing energy consumption during construction, and reducing overall waste.

The modified design can include elements such as solar panels located in the roofs, passive design, environmentally friendly insulation, triple-glazed glass, water recycling, and incorporation of recyclable and durable materials. Adapting to the modications to work environments and time spent at home escalated by the COVID-19 pandemic, the houses should accommodate remote workspaces, and also more spaces for activities that may be performed from home such as hobby areas, and diverse activity spaces. With the increase of immigrants and new cultural aspects introduced to Portugal recently, these adaptations to the houses should support various needs, including multi-purpose spaces for homeschooling, home offices, and independent studios.

To address thermal challenges, passive design principles, and thoughtful and effective landscaping can contribute significantly. The orientation of the dwellings and the intense sunlight exposure require strategic approaches to ensure thermal comfort. While not all scenarios offer an ideal orientation, adapting to challenges remains key to achieving optimal thermal comfort. In this context, a sustainable construction method like steel frame was explored, offering structural integrity and environmental benefits. Fundamentally, the evolution of Siza's proposal must align with the evolving demands of society, embracing sustainability, accessibility, and flexible living spaces. Combining these considerations creates a harmonious balance between architectural aesthetics, societal needs, and environmental responsibility.

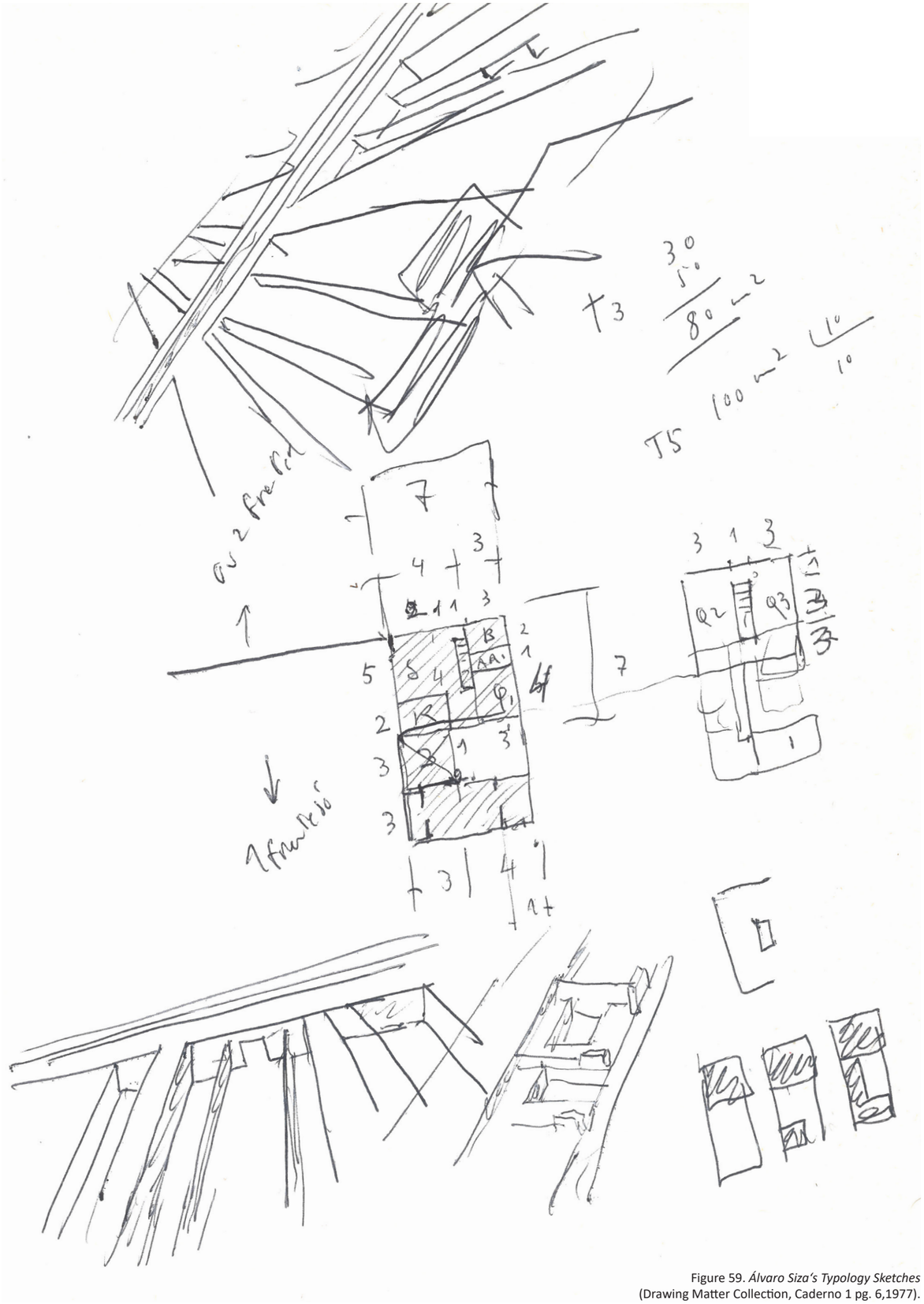


Figure 59. *Álvaro Siza's Typology Sketches*
(Drawing Matter Collection, Caderno 1 pg. 6,1977).

References

American Institute of Steel Construction. (N.d). *Why Steel - Sustainability*. https://www.aisc.org/why-steel/sustainability/

ArchDaily. (Trans. Quirk, Vanessa). https://www.archdaily.com/520156/fernando-guerra-s-stunning-images-of-alvaro-siza-s-most-inspiring-works

ArchDaily Team. (2022, June 25). *Álvaro Siza, between Modern and Traditional* [Álvaro Siza, entre o moderno e o tradicional].

Arquivos da Câmara Municipal de Évora. (2022). *Memória Descritiva - Conjunto habitacional não construído (1994),* p 8.

Britannica, T. Editors of Encyclopaedia. (2023, June 21). *Álvaro Siza*. Encyclopedia Britannica. https://www.britannica.com/biography/Alvaro-Siza

SFIA . (2021, March 11). *Exterior insulation for cold-formed steel framed walls*. BuildSteel.org. https://buildsteel.org/framing-products/wall-panels/exterior-insulation-cfs/

Caballero, P. (2021, January 13). *Urban renewal of Chiado neighborhood / álvaro Siza + Carlos Castanheira*. ArchDaily. https://www.archdaily.com/954700/urban-renewal-of-chiado-neighborhood-alvaro-siza-plus-carlos-castanheira

China Lesso Group Holdings Limited. (2021, March 31). *All you need to know about UPVC windows*. LESSO Blog. https://en.lesso.com/blogs/upvc-window-guide/#:~:text=uPVC%20stands%20for%20unplasticized%20polyvinyl,are%20both%20water%20and%20airtight.

Designboom, andrea chin I. (2016, February 9). *Alvaro Siza restores the district of Chiado in Lisbon*. https://www.designboom.com/architecture/alvaro-siza-restores-the-district-of-chiado-in-lisbon/

Encyclopedia Britannica. (2020, March 4). *Pritzker Prize*. https://www.britannica.com/topic/Pritzker-Prize

Gandolfi, B. (2020, June 4). *Orientação Solar: Como Funciona? Domingos de Arquitetura*. https://domingosdearquitetura.com/orientacao-solar-como-funciona/

Instituto Nacional de Estatística (INE). (n.d.). *Censos 2019*. https://censos.ine.pt/xportal/xmain?xpgid=censos21_main&xpid=CENSOS21&xlang=pt

Instituto Nacional de Estatística. (n.d.). *Instituto Nacional de Estatística - web portal*. https://www.ine.pt/xportal/xmain?xpgid=ine_main&xpid=INE

IPS ESE. (2008, June 8). *Edifício da Escola Superior de Educação de Setúbal*. https://www.si.ips.pt/ese_si/web_base.gera_pagina?P_pagina=28207

Greywater Reuse. *Greywater Action*. (2018, October 30). https://greywateraction.org/greywater-reuse/

ICPC. (n.d.). *Permeable interlocking concrete pavement drawings*. ICPI. https://icpi.org/permeable-interlocking-concrete-pavement-drawings

INCM, SA (Ed.). (2006, August 8). *Regime da acessibilidade aos edifícios e estabelecimentos que recebem público, via pública e edifícios habitacionais*. https://pgdlisboa.pt/leis/lei_mostra_articulado.php?nid=3110&tabela=leis

Madanmohan, M. (2021, November 22). *Alvaro siza- understanding the philosophy of the 1992 Pritzker winner - rtf: Rethinking the future. RTF | Rethinking The Future*. https://www.re-thinkingthefuture.com/know-your-architects/a897-alvaro-siza-understanding-the-philosophy-of-the-1992-pritzker-winner/#:~:text=%E2%80%9CYou%20have%20to%20feel%20what,is%20essential%20to%20an%architect.

Norris, N. (2019, January 1). *Five principles of passive house design and construction. Passive House Accelerator.* https://passivehouseaccelerator.com/articles/five-principles-of-passive-house-design-and-construction

Nuland, E. van. (2020, September 26). *Underground irrigation system reduces water consumption by a quarter. Innovation Origins*. https://innovationorigins.com/en/underground-irrigation-system-reduces-water-consumption-by-a-quarter/

PaperStone. (n.d.). *Our story. PaperStone® Products*. https://paperstoneproducts.com/

Siza, Á., & Morais, C. C. (2009). *01 Textos* (p. 37,49, 95, 253, 273, 275). Porto: Parceria A. M. Pereira.

Slessor, C. (2015, March 2). *AR issues: Architects don't invent, they transform*. ArchDaily. https://www.archdaily.com/604164/ar-issues-architects-don-t-invent-they-transform.

The Double Glazing & Conservatory Quality Assurance Ombudsman Scheme (DGCOS). (2019, March 12). *10 benefits of UPVC Windows & Doors. The Double Glazing and Conservatory Quality Assurance Ombudsman Scheme*. https://www.dgcos.org.uk/help-advice/the-benefits-of-upvc-windows-doors.

World Health Organization 2023 data.who.int. (n.d.). *World Health Organization Data - Portugal* . World Health Organization (WHO). https://data.who.int/countries/620

Visual References

A Cidade Branca. (N.d.). *Black & White Sketches | 017 | Álvaro Siza Vieira*. https://acidadebranca.tumblr.com/post/24240161737/black-white-sketches-017-%C3%A1lvaro-siza-vieira

Arquivos Fotográfico da Câmara de Lisboa. (2015). *"Curious survival of an apartment building, 1st floor, and attic - the Casa Fanny building - in 1957. Photograph taken by Judah Benoliel on a winter morning from the walkway of the Santa Justa Lift."* . Bic Laranja.Retrieved September 15, 2023, from https://biclaranja.blogs.sapo.pt/2015/10/08/.

FG + SG. (2014). *Photograph of the Bairro da Malagueira*. Area. New Business Media Srl. Retrieved August 5, 2023, from https://www.area-arch.it/en/malagueira-district-complex/. Elaborated by Gabriela Büchner Strachman.

Google Earth. (2023). *Site Location : Bairro da Malagueira, Évora*. Elaborated by Gabriela Büchner Strachman.

Greywater Reuse. *Greywater Action*. (2018, October 30). https://greywateraction.org/greywater-reuse/

Instituto Politécnico de Setúbal. (2005). *File:Campus do Ips em Setúbal.jpg*. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Campus_do_IPS_em_Set%C3%BAbal.jpg. Elaborated by Gabriela Büchner Strachman.

Narain-Ford ©. (2020, September 26). *Figure Demonstrates A Underground Irrigation System* E. van Nuland, Innovation Origins. https://innovationorigins.com/en/underground-irrigation-system-reduces-water-consumption-by-a-quarter/

Michalarou, E. (n.d.). *Photograph of Álvaro Siza . Dream Idea Machine*. https://www.dreamideamachine.com/?p=5269

Ramos, B. (2023). *Photograph of the Proposed Intervention Site Facing the Historical Center - Facing East.* Elaborated by Gabriela Büchner Strachman.

Ramos, B. (2023). *Photograph of Proposed Intervention Site - Facing North.* Elaborated by Gabriela Büchner Strachman.

Richard Pedranti Architect. (n.d). *Passive House Design Illustrations*. https://richardpedranti.com/passivehouse/

Santos, J. A. G. dos. (2017). *A Malagueira como nunca foi: Volume II - Original Drawings Of The Casa De Chá.*(p. 172, 173). Dissertação de Mestrado, Évora: Departamento de Arquitetura da Universidade de Évora.

ShadeMap for 38°34'14"N 7°55'50"W. ShadeMap. (n.d.). https://shademap.app/@38.57064,-7.9308,17.26023z,1691418770037t,-66.97802b,45p,1m!1691386772667!1691437090183,qZXZvcmEg!38.57143!-7.9135 Elaborated by Gabriela Büchner Strachman.

Archives/Libraries

Arquivo Câmara Municipal de Évora- Divisão de Gestão Urbanística
(Archive of Évora Municipal Council- Urban Planning Management Division)

Arquivo Câmara Municipal de Évora- Divisão de Ordenamento e Reabilitação Urbana
(Archive of Évora Municipal Council- Urban Planning and Urban Rehabilitation Division)

Arquivo Fotográfico da Câmara Municipal de Évora
(Photographic Archive of Évora Municipal Council)

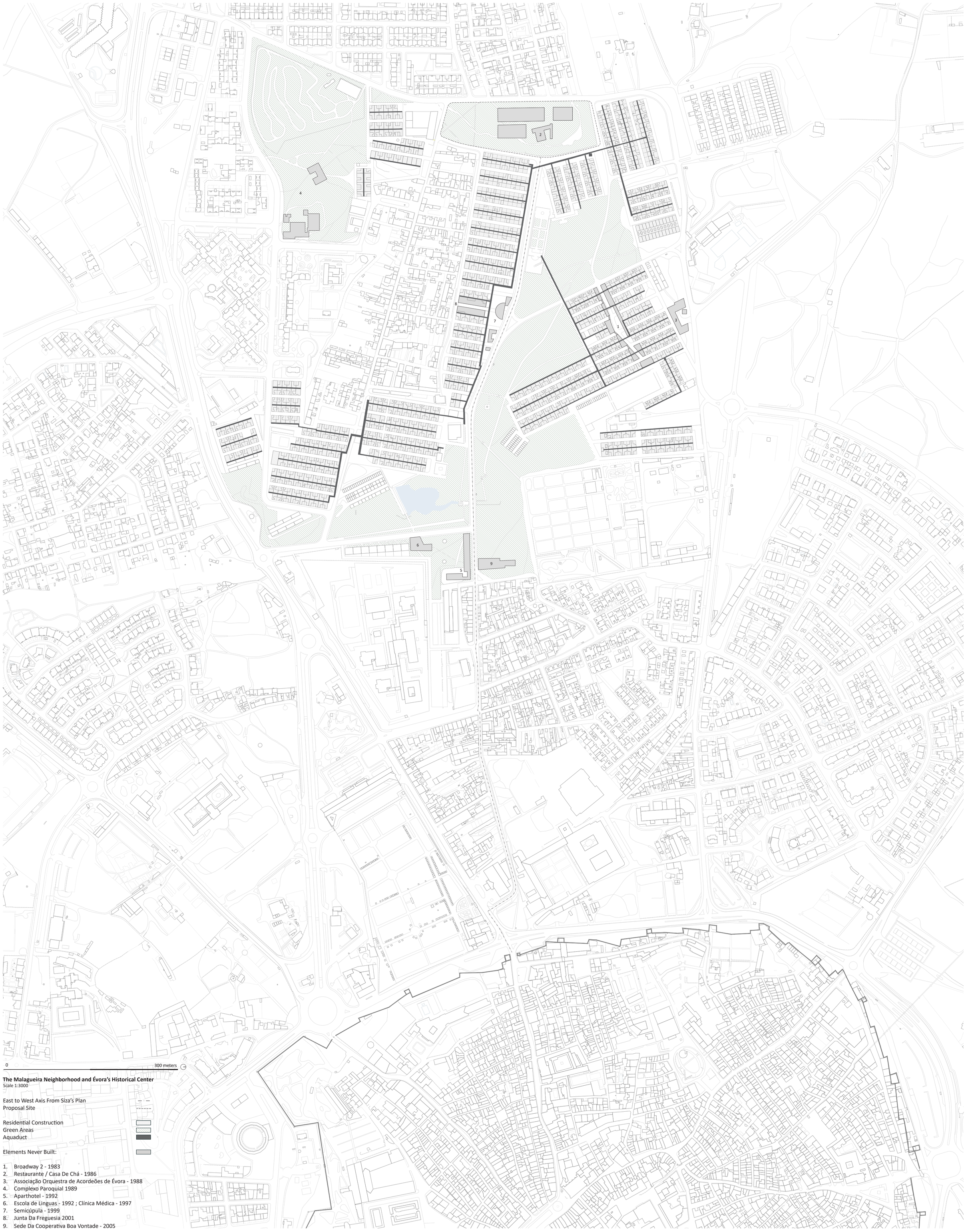
Arquivos Fotográfico da Câmara de Lisboa
(Photographic Archives of the Lisbon City Council)

Drawing Matter Collection

Figure 60. ***The Malagueira Neighborhood*** **(Strachman,2022).**

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions

Final Architecture Project
2023



The Malagueira Neighborhood and Évora's Historical Center
Scale 1:3000

East to West Axis From Siza's Plan
Proposal Site

Residential Construction
Green Areas
Aquaduct

Elements Never Built:

1. Broadway 2 - 1983
2. Restaurante / Casa De Chá - 1986
3. Associação Orquestra de Acordeões de Évora - 1988
4. Complexo Paroquial 1989
5. Aparthotel - 1992
6. Escola de Linguas - 1992 ; Clínica Médica - 1997
7. Semicúpula - 1999
8. Junta Da Freguesia 2001
9. Sede Da Cooperativa Boa Vontade - 2005

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions

Final Architecture Project
2023

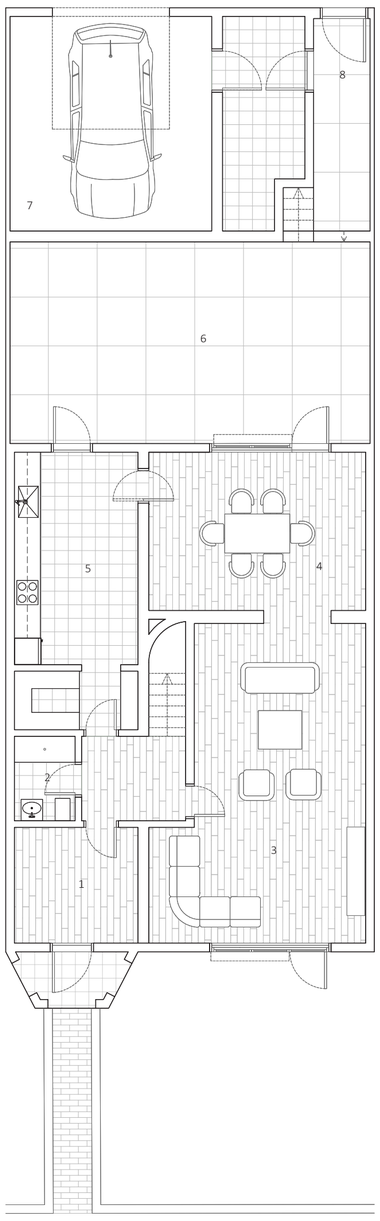
Adapted Proposal Site Plan
Scale 1:500

1. Siza's T4 Typology
2. New Typology
3. Casa De Chá
4. Path Designated For Pedestrians Only
5. Path Designated For Pedestrians And Cars

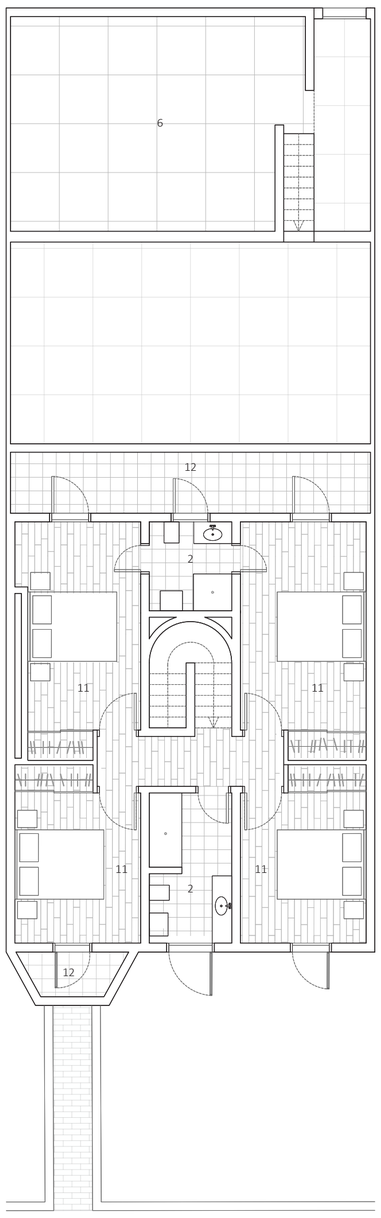
Gabriela Büchner Strachman

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions

Final Architecture Project
2023

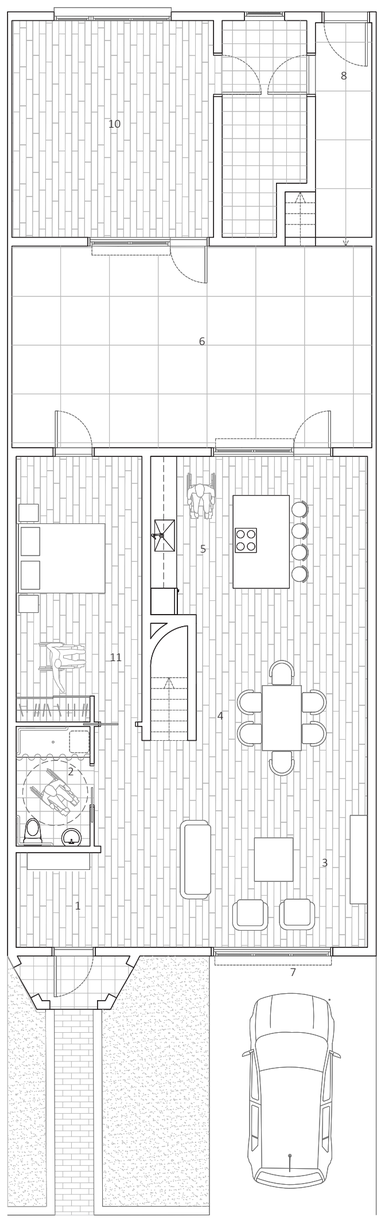


Ground Level

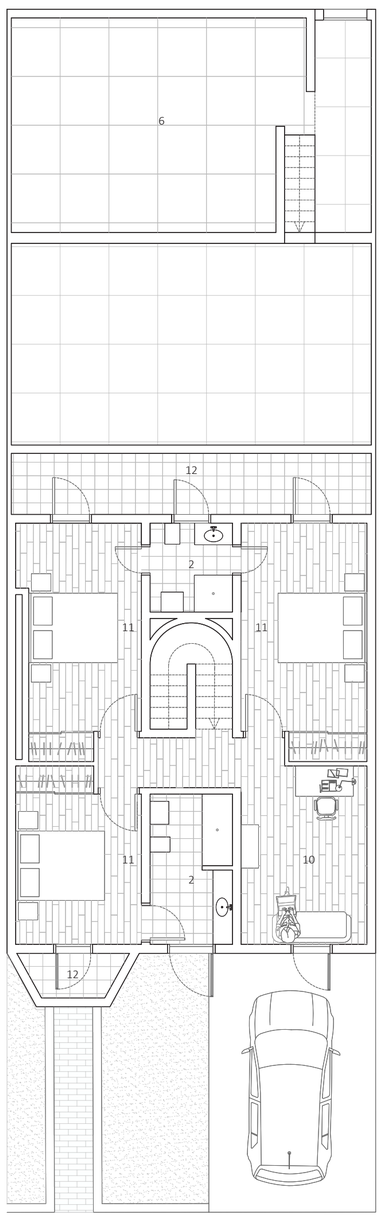


Upper Level

Álvaro Siza's Special T4 Typology
1994

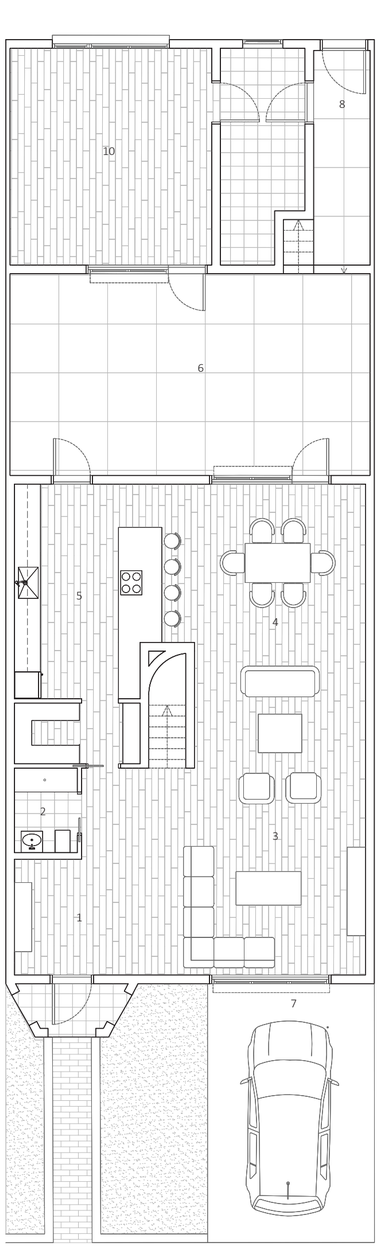


Ground Level

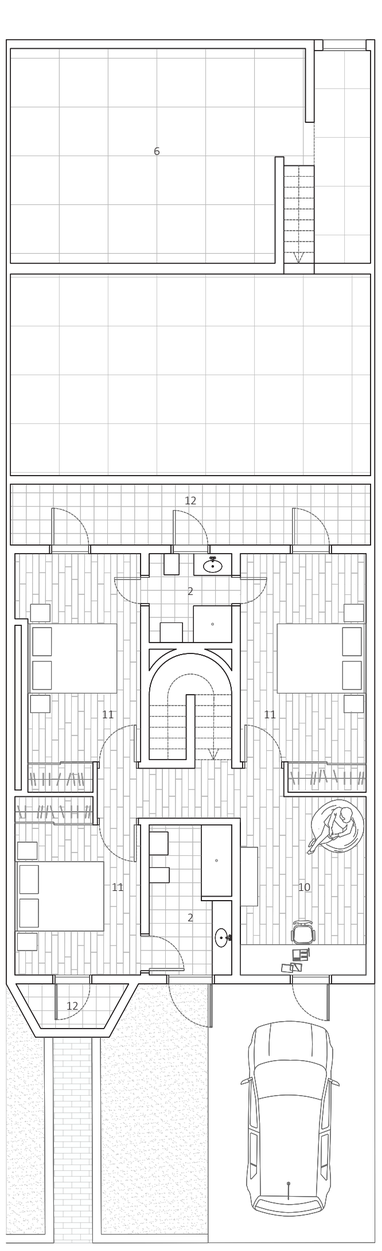


Upper Level

Siza's Adapted Typology- T4
2023

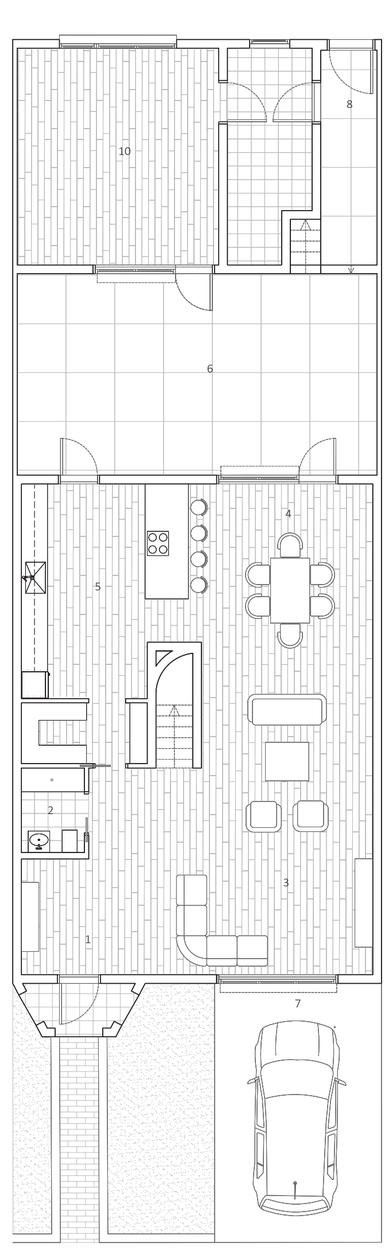


Ground Level

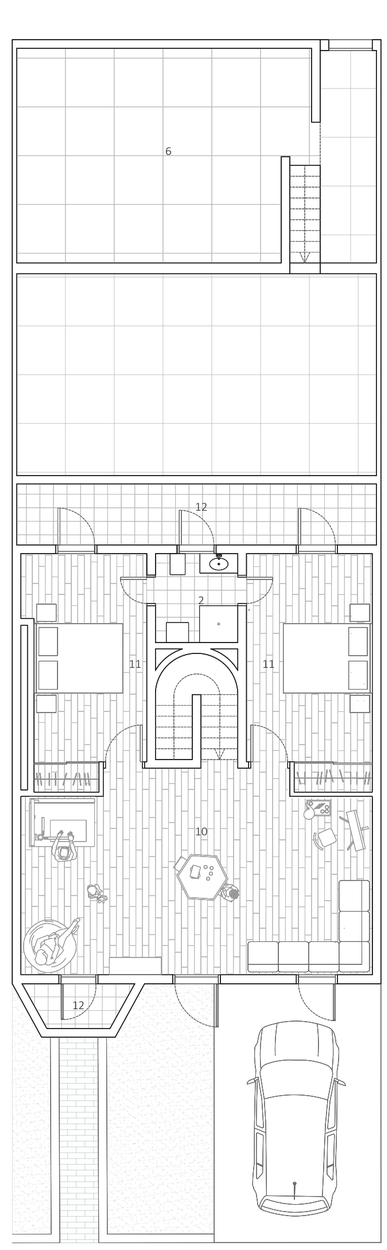


Upper Level

Siza's Adapted Typology - T3
2023



Ground Level



Upper Level

Siza's Adapted Typology- T2
2023

0 3 m

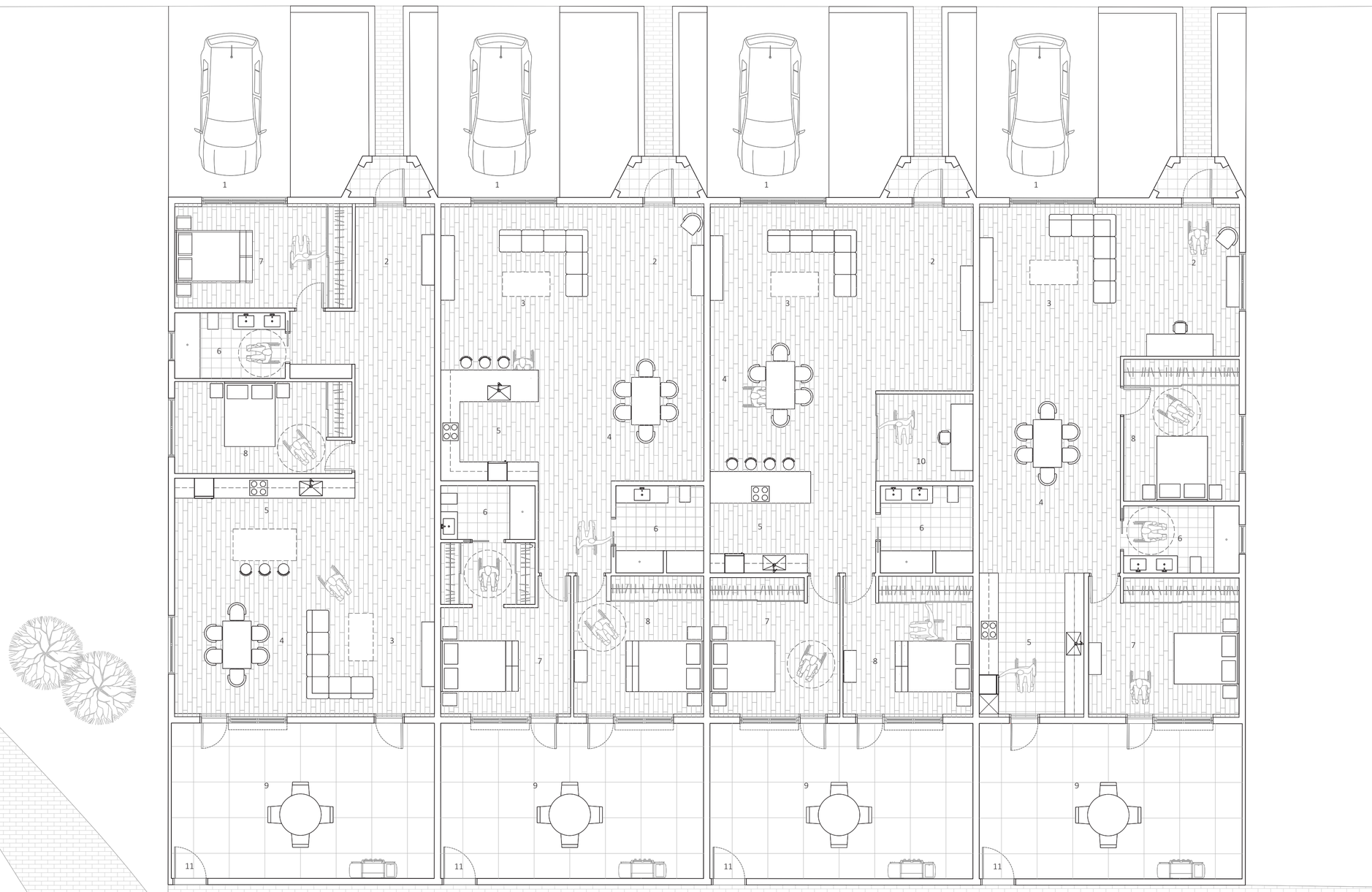
Siza's Adapted Typologies Floor Plans
Scale 1:100

1. Entry
2. WC
3. Living Room
4. Dining Room
5. Kitchen
6. Patio
7. Car Parking
8. Rear Entry
9. Roof Top Patio
10. Flex Space
11. Bedroom
12. Balcony

Gabriela Büchner Strachman

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions

Final Architecture Project
2023

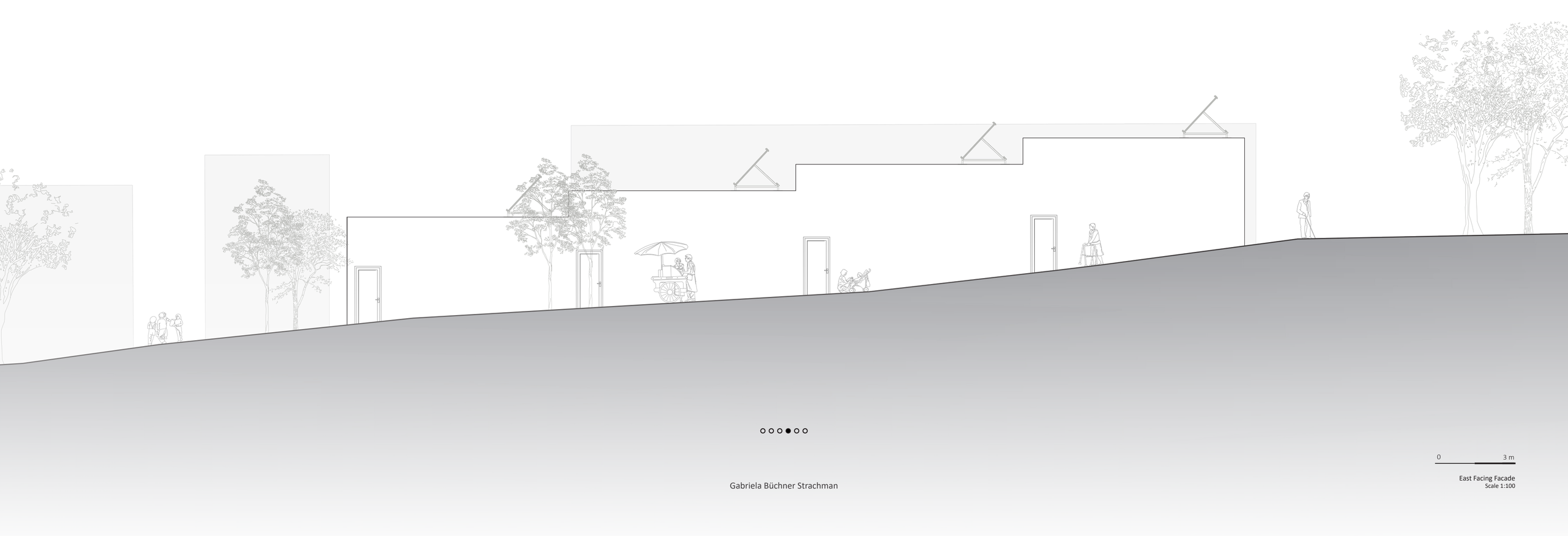


0 3 m

New Typology Floor Plans
Scale 1:100

1. Garage
2. Entry
3. Living Room
4. Dining Room
5. Kitchen
6. Bathroom
7. Bedroom 1
8. Bedroom 2
9. Patio
10. Office
11. Rear Entry

..... Items On Casters



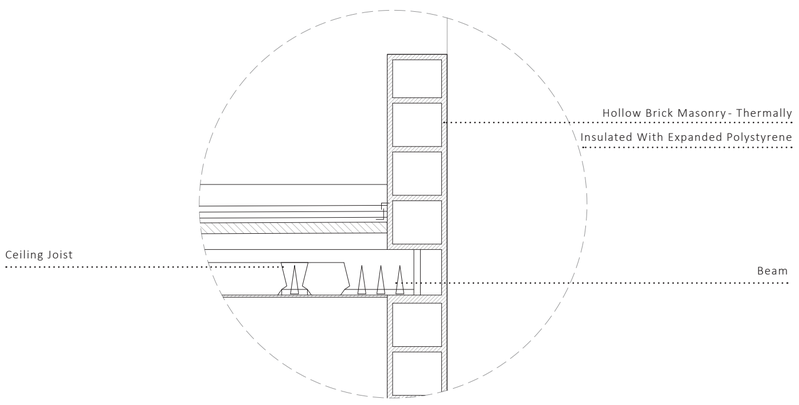
0 3 m

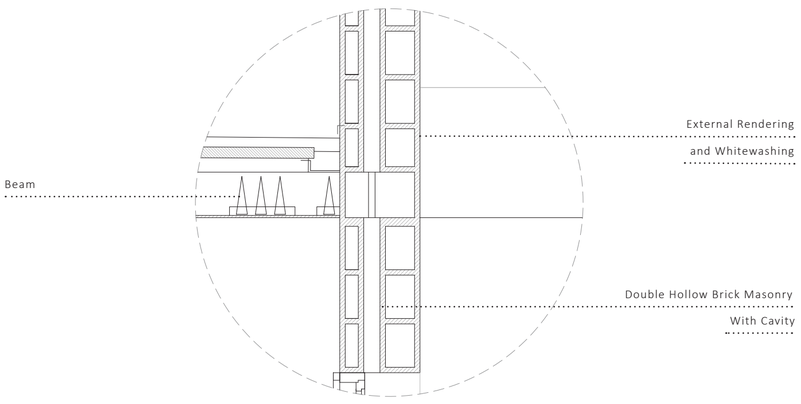
East Facing Facade
Scale 1:100

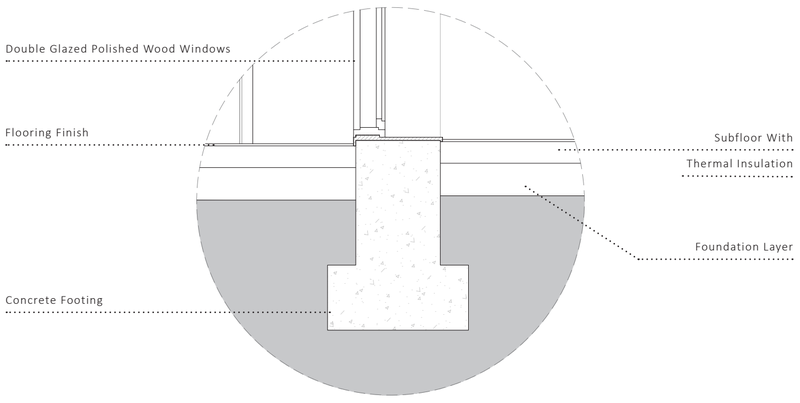
New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions

Final Architecture Project
2023

The Malagueira's Construction Details

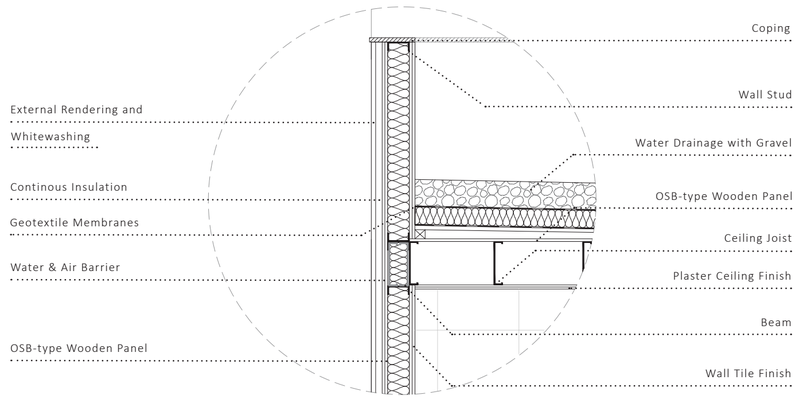




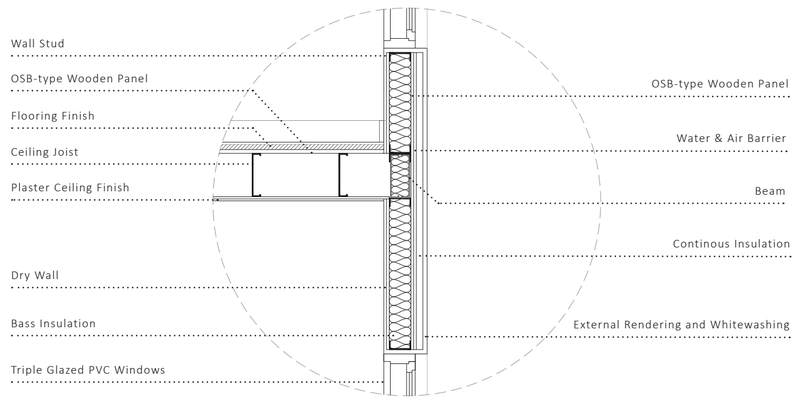


Steel Frame Construction Details

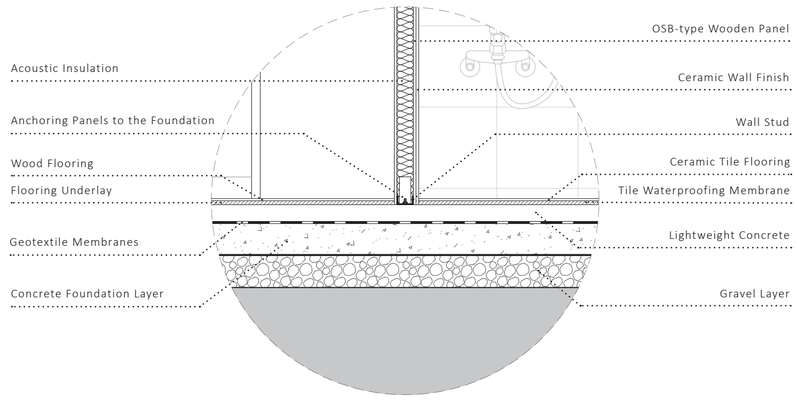
Detail A



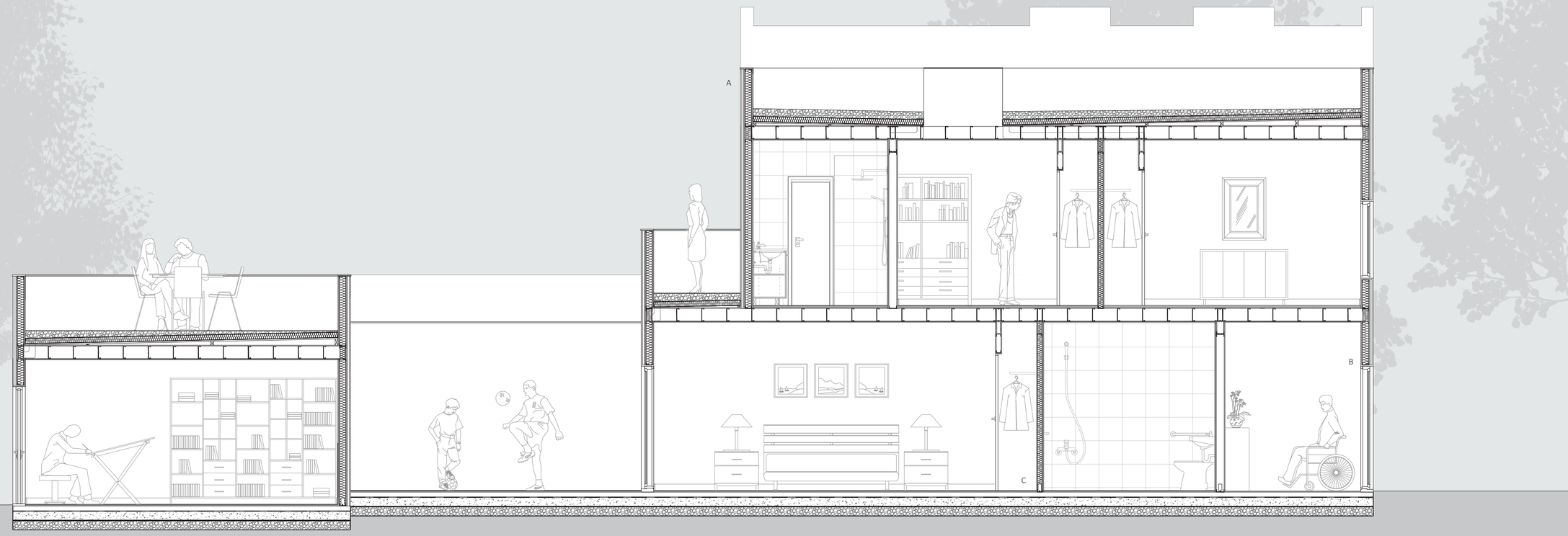
Detail B



Detail C



Construction Details
Scale 1:20



0 3m

Adapted T4 Construction Cross-Section
Scale 1:50

New Typologies For The Malagueira Regarding The Current Generations And Sustainable Solutions

Final Architecture Project
2023

0 20 m

Lanscaping Plan
Scale 1:500

Legend

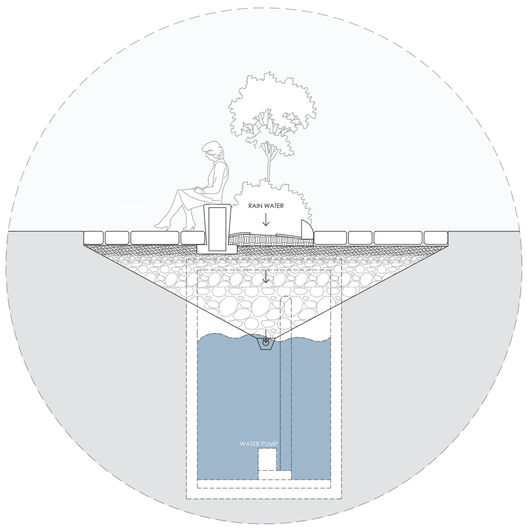
Water Tanks

Pavement Water Collection

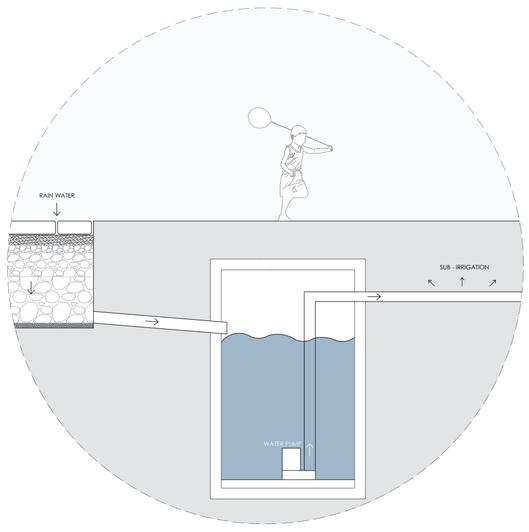
Tree Bed Water Collection

Drainage Pipes

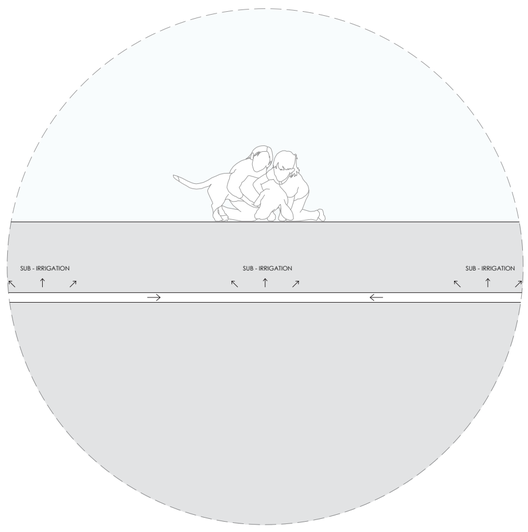
Underground Irrigation Zone



Tree Bed Water Collection

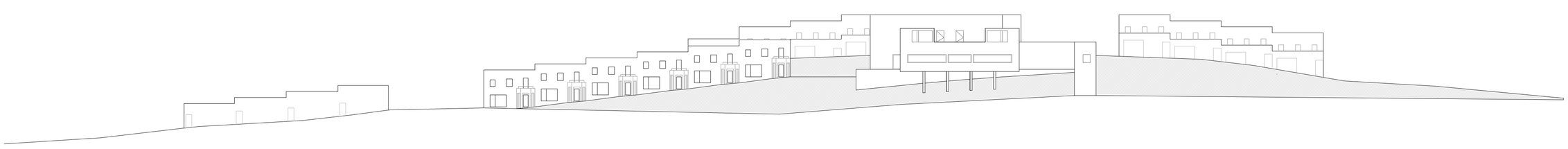


Pavement Water Collection

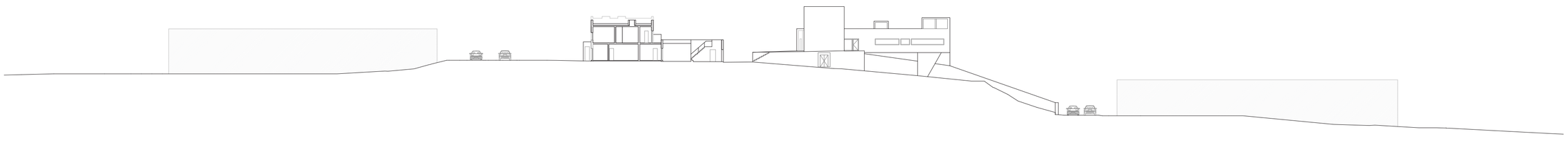


Underground Irrigation

PICP Stormwater Runoff System & Irritation Scheme
Scale 1:20



Section AA
Scale 1:500



Section BB
Scale 1:500

Gabriela Büchner Strachman