



DEFENSE OF THE COAST: OUTÃO

Volume I

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ABSTRACT

TITLE Defense of the Coast- Outão
Due to the long littoral coast, Portugal has had several defensive systems along the coast throughout history. From medieval fortifications to modern artillery batteries and bunkers, the fortifications were placed strategically along the coast and were crucial for developing the territory and urban areas.

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This research focuses on a specific place crucial for the defense of Lisbon and Setubal, The Outão. Due to its strategic location right at the entrance of the Sado River, this place witnessed military occupations of different chronological periods. The first military occupation was a Fortification of the XII century, followed by a complementary Fortification of the XVII and a modern Artillery Battery constructed after the Second World War.

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Nowadays, the battery is deactivated, and the place is left abandoned. In this sense, there is an opportunity to reflect on the future of this heritage place. This research aims to analyze the place going through different scales closely. Starting from the architectonic evolution of the fortification, passing through the defense of Lisbon and Setubal from the first defensive towers to the Artillery Batteries and Bunkers. This research will give me background knowledge and understanding of the place to have a critical proposal to transform this place in the practical part.

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I INTRODUCTION

1.1 CONTEXT

The surface of the foothills is known as “Outão” (Portocarrero, 2003); a term which is used specifically when referring to the foothills of the Arrábida Mountains. They are located in the southern part of the Setúbal Peninsula, at the entrance of the Sado estuary, and have unique and remarkable characteristics in both natural and cultural terms (Kullberg, Pais, Almeida, & Mateus, 2012).

Both the Sado estuary and the Tagus estuary have always held a strategic position for the defense of Lisbon and Setúbal, with their first military occupation dating back to 1390 (Berger, Soares, & Anselmo, 2005). This location has three military fortresses: the Santiago Fort, the Old Fort, and the 7th Battery of Outão. The Santiago Fort suffered many transformations over the years, eventually becoming (Portela, 1882; Nunes, 2015; Pinho, 2020) an orthopedic hospital, which continues to operate to this day; the other two have since been abandoned.

The first military occupation of this area was the occupation of the Santiago Fort in the 12th century, which is situated on the extremity of the margin of the sea. In the 17th century, a new fortification was built, named the Old Fort, placed on top of a cliff to complement the previous one. After the Second World War, a modern Artillery Battery was erected next to the last fortification (Berger, Soares, & Anselmo, 2005; Machado, 2008; SIPA). This battery is named the 7th Battery, since it is part of a larger plan to defend the coast of Lisbon, the Barron Plan, which consists of eight batteries in total (Berger, Soares, & Anselmo, 2005; Machado, 2008; SIPA).

The 7th Battery was built in 1944 (SIPA) and became operational ten years later (Alves, 2000). During this period, the battery was never used in a war scenario – only training exercises were carried out biannually (Gonçalves, 2019; Machado, 2008). The battery includes the Old Fort, the barracks, and the battery itself, as well as other support buildings scattered across the landscape (SIPA).

In 1992, within a peaceful political context where no external conflicts were foreseen, the battery was eventually deactivated (SIPA;). Since then, the 7th Battery has been deserted, subject to vandalism and destruction. We have witnessed widespread concern expressed by many authors about its state of desolation (Pais, Hoffmann, & Campos, 2021; Berger, Soares, & Anselmo, 2005;), pointing to the inaction of the responsible entities/bodies ().

The lack of effective initiative to put an end to the uncertain fate of the 7th Battery is evident in the fact that the first concrete initiative for the determination of its future use emerges only 30 years after its initial deactivation. The initiative is a public bid which is being promoted by the Portuguese State (General Directorate of Cultural Heritage, General Directorate of Treasury and Finance, General Directorate of National Defense Resources and Tourism of Portugal), under the REVIVE program- Rehabilitation, Heritage and Tourism. This program envisages the concession of the 7th Battery for tourism purposes for a period of 50 years. However, the future of the 7th Battery has not yet been determined because we do not know if the program will actually be implemented, as is the case with many other public bids in Portugal, which are not led to fruition.

Currently, we are witnessing a greater awareness and recognition of the value of cultural heritage as a refuge of a collective identity, which in current days has become a structuring and strategic axis for the sustainable development of the territory (de Campos & Murtinho, 2017).

There is no question regarding the heritage value of the Old Fort and the Santiago Fort (Nunes, 2015; Nunes, 2017; Pinho, 2020), nor that of the batteries (Garret & Klinke, 2019;). When it comes to the 7th Battery, authors defend its heritage value as well (Pais, Hoffmann, & Campos, 2021; Berger, Soares, & Anselmo, 2005; Mascarenhas, 2014) however, there is still a lack of awareness of its heritage importance in isolation and this is even more so the case when referring to the entire Barron Plan ensemble (Pais, Hoffmann, & Campos, 2021).

Bunkers are based on horizontal rather than vertical vision, which precisely emulates the movement of the observer's eye through the crosshairs of an automatic weapon while looking at the horizon (Postiglione, 2008). Bunkers play a key role as monuments of war (Virilio, 1975).

However, bunkers have not received the attention they are due, and have been described as an inglorious memorial (Hirst, 2005). It is only recently that we have seen an increased interest in bunkers on the part of artists, architects, archaeologists (Beck, 2011), journalists and academic researchers, and they are now the focus of an interdisciplinary debate and attention (Garret & Klinke, 2019). Numerous publications have emerged from this interdisciplinary debate (Beck, 2011; Garret & Klinke, 2019; Lecardane & Tesorie, 2011; Stromberg, 2017; Violeau, 2019) which reports us back to the underground space and to the concept of the experience of the sublime, which has also been investigated (Park, & Kang, 2021).

The underground space is associated with the world of the dead and with the mythology of fear (Park & Kang, 2021). Its negative image did not allow its diversification or appreciation (Broere, 2016). The aesthetic value of the underground space should be valued (Park & Kang, 2021). In turn, the sublime is a feeling that is associated with pain and danger when there is no threat to life, and it is the opposite of beautiful (Burke, 1998).

Thus, the underground spaces are simultaneously spaces of fear and pleasure, for the infinite space of the unknown. This dark space becomes progressively light, expanding into the space of sublime experience (Park & Kang, 2021).

The bibliography on the defensive structures of Outão is scarce. To our knowledge there are only four master's academic researches, and only two scientific studies published in peer-reviewed journals. Regarding dissertations, one is about the Forts at Tagus river's mouth (Santos, 2012) three are about the Santiago Fort, of which two are about the Sanatorium installed there (Nunes, 2015; Nunes, 2017); and one is specifically about the 7th Battery (Mascarenhas, 2014). There is no thesis that addresses all the defensive structures, i.e., Fort Santiago, Old Fort, and the 7th Battery as a whole with the ultimate goal of making an architectural design for this location.

As for scientific research on the topic, there is Berger, Soares, and Anselmo, 2005, which analyzes the historical context in which the battery is inserted, characterizing it, and Pais, Hoffmann, and Campos (2021), which is more recent and takes on an approach that aims to recover the historical and cultural heritage of the Barron Plan. This scientific research aims to find out if it is possible to use the forgotten and dispersed post-military heritage throughout the territory as a climate action strategy to protect the riverfronts, namely the expected rise in seawater level, by mitigating its effects.

This analysis of cultural heritage as an instrument of climate emergency seems innovative and pertinent to us insofar as the proposal is not limited to current policy, i.e. active policy employed for the protection of international heritage in the face of climate change, but in fact it goes further by taking advantage of the intervention of military heritage to combat climate change itself. Nonetheless, although it is done with great methodological and scientific rigor, we still feel that the study lacks the proper assessment of the fundamental conclusions to enable the realization of the architectural project.

In light of the above, it seems pertinent and innovative to conduct well-founded and systematized research on the Outão site, which is to be intervened, in order to create a useful and indispensable document for the realization of an intervention project, the next stage of our work. This project will consider the heritage value of the existing military structures, as war testimonies more specifically, preserving the architectural values with greater heritage interest and on the other hand, addressing those of less interest in a more contemporary reading. The options adopted should be based on the study we are presenting.

This paper is organized into five chapters: Introduction, Coastal Defence, Outão, The Poetics of Bunkers, and Closing Remarks. In this first introductory chapter, we contextualize the topic, address the underlying motivation that instigated the work, define the object and objectives of the study and finally, present the description of the methodology that was applied.

In the next chapter, Coastal Defence, we will analyze the need for defense as a basic human need, the importance of the defense of the capital over time and its relationship with the sea and then we will address the evolution of the typologies of the defensive systems of Lisbon and Setúbal. A chronology of the fortifications used for the defense of the capital, including Lisbon and Setúbal, will also be presented.

To better organize the information, and by taking into account the objective of our research, we have defined three different time periods based on the evolution of the coastal fortifications' typologies. These will be used as subsections and were named in chronological order: Tours, Bastions, and Bunkers.

Finally, nine fortresses of Lisbon and Setúbal will be presented, in order to analyze and interpret their full and empty volumes.

In the third chapter entitled Outão, the object of our study, we will characterize its territory and landscape, and then present the three military structures of Outão in chronological order: Santiago Fort, Old Fort and 7th Battery, ending each of these descriptions with our own original drawings. With regards to the Santiago Fort, we will describe the functions performed in the space throughout history (military, royal residence and fighting tuberculosis) and when it comes to the Old Fort, we will characterize the site itself. In the sub-section referring to the 7th Battery we will contextualize the battery and insert it in a more comprehensive set of which it is part, the Barron plan. We will also characterize the 7th Battery's specific case by presenting the current state of neglect and abandonment that it finds itself in. It will also include a brief analysis on heritage and military memory.

The fourth chapter, entitled The Poetics of Bunkers, will be dedicated to the reflection of Camouflage design, with the motto "Seeing without being seen", we will present this subpoint and another one entitled Working with topography and landscape. In this chapter, we will also present the Sublime Experience. In this last section, themes such as Astonishment and Terror, Underground Space and Some Degree of Terror Can Turn to Good and Discovery Path will be addressed

In the last chapter of this paper, we will present the conclusion and final considerations. Reference notes, such as bibliography and filmography will be presented at the end of the final chapter.



fig. 1 | Family Photo in Fort São Filipe Setúbal, 2009

1.2 MOTIVATION

Ever since I was a little boy, I have enjoyed exploring abandoned places. This interest was fostered in me by my father who always liked to wander aimlessly, without destination and without any time frame. Family trips were always impromptu and by surprise, without plans. As we drove along the road, my father would see something that would spark his interest and lead us to explore. As a child I enjoyed observing, exploring, discovering and getting to know these places. However, I also remember the endless hours we spent in one place, which to me seemed like eternity. I remember visiting convents in ruins, destroyed factories, deactivated silos, abandoned churches, menhirs, cromlechs, hills, wells, norias and more. Unique places that still remain in my memory, although I cannot pinpoint where they are located. In a way, this spirit of adventure, discovery and improvisation associated with a need to observe and record these moments has remained in me, guided my academic path and marked my way of life.

The discovery of the 7th Battery was personally rewarding. During a Google Earth search for places near the coast to intervene, I discovered a unique place: Outão and its abandoned battery. Intrigued by the site, I went there with my younger brother. It was a hot summer day, with intense sun and clear skies, allowing me to enjoy the landscape of the mountains and the sea. When I arrived at the place, my memories came back to me and I was happy to realize that I had been there before with my family. Later, my father confirmed this fact. So, my first real discovery of the site was when I was 9 years old (fig.1). From this moment on, I had no doubt that this would be the object of study of my research.

1.3 OBJECT

The object of study is the site of Outão, in particular its military occupation and its role in the defense of the coast of Lisbon and Setúbal. The notion of defense is directly linked to the notion of attack as it always arises as a response to an attack. Likewise, the evolution of fortifications' design appears as a response to the evolution and improvement of artillery.

Given the strategic location of Outão, this location is characterized by several fortifications over time. The site is composed by three fortifications from different periods: Santiago Fort, 16th century, Old Fort, 17th century and the 7th Battery, 20th century. The research site has these three different chronological periods of fortifications which were part of a more extensive system of the defense of Lisbon and Setúbal. For this reason, it is necessary to have a broader context of the coastal defensive systems of the capital throughout history.

With the marks of history engraved in its structure, Outão resists time, demonstrating the plasticity of its military buildings. Faced with the abandonment of the 7th Battery, the time has come for the Outão site to undergo new changes in order to once again be experienced and not forgotten. It is in this context, that the need to intervene by making an architectural proposal arises.

1.4 OBJECTIVE

The goal of this research is to conduct an in-depth study of the site, making an interpretative reading of Outão's military structures, which will later form the basis for making an architectural proposal.

To tackle this general goal, we have defined the following specific objectives:

1. Study the site in its relationship with sea, territory and landscape;
2. Understand its architectural values with patrimonial interest;
3. Interpret the concepts associated with bunkers, such as camouflage, underground space, and sublime experience in order to integrate them in the proposal;
4. Create a document that will be of real and effective use at the time of the architectural proposal;
5. Create a book of photographs registered by the author;
6. Systematize the principles and considerations that will guide the architectural project.

1.5 METODOLOGY

This research encompasses two areas of knowledge: the history of military architecture and the construction and conservation of military-historical heritage. In order to approach the object of study, we start from more general perspectives to more specific ones, aiming to contextualize the topic throughout this work.

It seems important to us that the methodology used encompasses several methods of information collection. In fact, the object of study itself, the Outão site, determined the method to be used. Thus, we used primary sources, such as literary sources, cartography, iconography, and cinematography.

Thereby, we carried out several visits to the site, worked on an extensive photographic and audiovisual survey, measurements, and written and graphic records, where observation played an essential role in the research process. The photographic survey will result in a notebook of photographs taken by the author.

We consider that an investigator's eye, with a background in architecture, can help the interpretative reading of the object of study. Thus, we also collected information in loco. We carried out a photographic and audiovisual survey, and measurements where observation played an indispensable role in the research process. The photographic survey was successful.

Thus, we think that it is through the crossing of the information collected in loco and from our primary sources, that we are able to make a more correct reading of the site to better intervene in historical heritage, with the purpose of enhancing it. For example, we found ourselves comparing the written information in our possession with iconography, cinematography and our own photographic survey numerous times. Also, it happened that we only found information through old photographs, and we did not find written records about it. It is very interesting to note that this work of crossing information triggered in us a desire for discovery, typical of a researcher.

To collect the sources we went to the following institutions and entities: Portuguese Army Library, National Library of Portugal, Municipal Public Library of Setúbal, SIPA (Information System for Architectural Heritage), National Library of Portugal, Association of Friends of the Portuguese Coast Artillery, REVIVE - Rehabilitation, Heritage and Tourism and the Museum of Coast Artillery. From these contacts, we highlight Colonel José Paulo Berger, author of several publications, who shared maps and photographs. We also informally contacted some authors of academic works in order to promote sharing of knowledge and material. Responses from the authors to our contact were quite satisfactory.

II DEFENSE OF THE COAST

It is indisputable that one of mankind's basic needs, which has been consistently expressed throughout history, is the need for security and protection. Mankind has always needed to settle in a place, protect its territory and defend itself against attacks from animals, natural disasters and even from mankind itself.

This brings us back to the analysis of Maslow's pyramid, presented in the psychologist's 1974 article named "Theory of the Hierarchy of Human Needs." In his theory, Maslow describes human beings' five basic needs hierarchically, where the need for security and stability comes in as the second most basic human need. He argues that man's motivations are influenced by his needs, which are manifested in degrees of importance. Whereas physiological needs are the most basic needs, personal fulfilment needs are the most high-level needs. Each human need influences the motivation and fulfilment of the individual which in turn makes him/her proceed to other needs. All of which ultimately make up a hierarchical pyramid.

In the context of our study, it is poignant to analyze our first two basic needs, as they are related to survival and have been evident since the onset of humanity. Thus, at the base of the pyramid, we have the physiological needs which consist of the needs related to the body, such as food, sleep, excretion, etc. When these are satisfied, security needs arise. This is the need to feel protected and safe in face of some kind of danger (violence, natural disasters). It is this need for safety and protection that has led mankind to develop techniques of attack and defense.

2.1 DEFENSE OF LISBON: RELATION WITH THE SEA

The geographical location of countries is crucial in terms of protecting their populations and defending their territory. In Portugal's specific case, the sea has always played a key role since the country is located in the westernmost part of Europe, bathed by the Atlantic Ocean to the north and west, with a coastline of 943 km and bordered by Spain to the north and east. Portugal also has volcanic Atlantic islands, Madeira and the Azores, which represent strategic positions in the Atlantic Ocean.

Lisbon is bathed by the Tagus River, which narrows at the mouth forming an estuary, and then flows into the Atlantic Ocean opposite the coastal area of Oeiras. In the estuaries of the Tagus and the Sado river lies the Setúbal Peninsula, in the Lisbon and Tagus Valley region. Both the cities of Lisbon and Setúbal have a privileged location for the implantation of military fortifications.

Portuguese fortifications were deployed along the coast and at border areas, in places conducive to the entry of enemies due to favorable geographical conditions, such as the orientation and type of terrain, water courses, among others (Noé, 2015). The author identifies five axes used by enemies in entering Portuguese territory, among which is the Tagus Valley. According to Noé (2015), it was along and around these axes that there was more investment in modernizing the defensive systems, building or rebuilding fortifications over the centuries.

The location of the fortresses is directly related to the defensive tactics required on each frontier. In this context, Mandar (1801) identified three types of fortifications: those for the defense of flat countries, for countries with rugged terrain, and on maritime borders. Particularly along the west and south coasts, fortifications were built on maritime borders.

Given Portugal's geographical situation, described above, Lisbon was one of the country's most important areas from a strategic point of view throughout history. Namely in the Christian reconquest of the Arabs in the 12th century. It was along the Portuguese coast that the reconquest took place, with the conquest of Lisbon as the primary objective, since it guaranteed access to the basins of the Tagus and Sado, and later to the ports along the coast up to Sagres (Berger, 2005).

At this time, the sea was the subject of inspiration for medieval songbooks, illustrating its importance in the life of the Portuguese and in the making of their history. We highlight Martim Codax and Mendinho in the 13th century, for whom the sea is seen from Earth, with waves and frightening tides, which can even be confidants to hearts in love.

In Martim Codax's cantiga de amigo ("A Song of Friends"), the maiden asks the waves of the sea if they have seen her beloved and when he will return. To understand this plea, it is important to mention that at the time long journeys were made by sea.

Fig.2. The symbol of the city of Lisbon comes from this representation: a small ship with two crows facing each other. This representation is a illuminated manuscript from the book "Carmesim" of 1502.

This specific representation is of such high importance that we can find the exact same one carved in the coat of arms of the pediment of the City Council's façade, which is many centuries younger.

The same image is also present in the Portuguese pavement that surrounds the statue that honours Marqués de Pombal in the Square named after him.



fig. 2 | Ship With Two Crows, "Livro Carmesim", 1502



fig. 3 | Friend song "Ai flores, ai flores do verde pino", 1279

"O sea waves at Vigo
Have you seen my beloved?
God help me, is he coming?

O sea waves that swell,
Have you seen my friend?
God help me, is he coming?

Have you seen my friend?
Who makes my heart troubled?
God help me, is he coming?

Have you seen my friend?
Who makes my heart fret?
God help me, is he coming?"

(Martim Codax, 13th century, english version by Richard Zenith)

In the cantiga de amigo ("A Song of Friends") by Mendinho, the sea is the setting for the love match between the damsel in love and her beloved. The maiden goes up to the little chapel of St. Simon, waiting for her lover. However, she feels helpless and afraid of dying at high tide, for she is alone on an island surrounded by waves, where she cannot count on the help of the boatman.

"Sitting at St. Simon's chapel, alone,
soon I was surrounded by the rising ocean,
waiting for my lover, still waiting.

Before the altar of the chapel, waiting,
Soon I was surrounded by the ocean's waves,
waiting for my lover, still waiting.

Soon I was surrounded by the rising ocean,
without a boatman and unused to rowing,
waiting for my lover, still waiting.

Soon I was surrounded by the ocean's waves,
without a boatman to row me away,
waiting for my lover, still waiting.

Without a boatman and unused to rowing,
I'll die, a fair girl, in the high-waving ocean,

waiting for my lover, still waiting.

Alone, without a boatman to row me away,
I'll die, a fair girl, in the ocean's waves,
waiting for my lover, still waiting."

(Mindinho, 13th century, english version by Richard Zenith)

It is under the reign of D. Afonso Henriques (1106 or 1109 or 1111-1185), the first king of Portugal, that Portugal first becomes aware of the advantages of combining attack and defense by sea and land on the villages south of the Condado Portucalense (County of Portugal), in order to guarantee its borders as an autonomous state (Berger, 2005). However, the second king of Portugal, D. Sancho I, is faced with a kingdom with uncertain borders, a small population, a relatively reduced fishing industry and castles which are far apart from each other. Not everything was unfavorable however, as there was a good war fleet in Lisbon and a feeling of nationality in the city. Thus, the king implemented a new policy which consisted of: organizing the counties' troops, building new castles and restoring the existing ones, which by concentrating the population and permanent troops, allowed for the defense and increase of the national territory. This policy would be used by his successors until the conquest of the Portuguese territory with the borders as we now know them (Berger, 2005).



fig. 4 | Manuscript of Friend Songs by Martin Codax's, 12th century

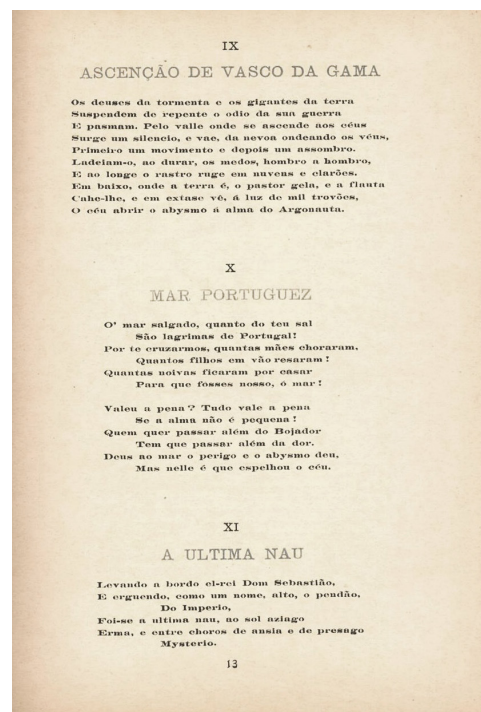


fig. 7 | Original publication of the poem Mar Portuguez, 1922

In the mid-19th century and early 20th century, Spain, France, England and Germany are a threat to Portugal. At the end of the 19th century, with the imminent risk of the fall of the monarchy, it becomes crucial to reformulate national defense, with Lisbon once again taking on this focus.

It was not only medieval songbooks and Luís de Camões who made reference to Portugal's relationship with the sea, this is evoked by many over the course of history, among whom we highlight Fernando Pessoa, Portuguese poet, whom in 1986 presents the sea as a source of glory and disgrace for the Portuguese people.

PORTUGUESE SEA

“Oh salty sea, how much of your salt
 Are tears of Portugal!
 To cross you, how many mothers cried,
 How many sons, in vain, prayed!
 How many brides were never married
 To make you ours, oh sea!
 Was it worth it? Everything is worth
 When the soul isn't small.
 Those who want to go beyond Bojador,
 Must go beyond pain.
 God gave peril and the abyss to the sea,
 Yet, in it He mirrored heaven”.

(Fernando Pessoa in Mensagem, 1986, loosely translated by the author)

Over the centuries, the defense of the coast and, in particular, the defense of the Lisbon area, consisting of the Tagus and Sado basins, assumed a crucial role in the shaping of history, marked by the role of military forces in the protection and consolidation of the Portuguese coast. According to Berger (2005), the history of coastal artillery is closely linked to the history of Portugal. Without it, Portugal's destiny would have taken another course.



fig. 8 | Drawing of Lisbon ("Lisbona"), 1572

2.2 EVOLUTION OF THE TYPOLOGIES

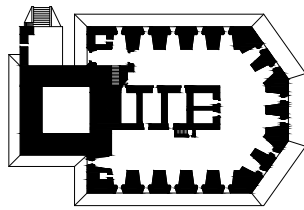
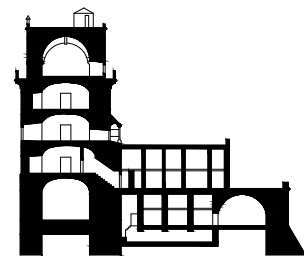


fig. 9 | Drawings of Tour of Belém

It is important to mention that it is not our goal to perform an in-depth description of the evolution of defensive systems throughout history, we focus only on the evolution in the three time periods already mentioned (Tour, Bastion and Bunker), knowing that there are periods in the history of defense architecture that will not be further elaborated, nor referred to. Likewise, we do not intend to make a strict correspondence between these three types of typologies and a specific era, insofar as the fortifications resulted from successive transformations according to the evolution and requirements of war artillery.

First period: Tour

The most relevant early defense systems in history are the Roman walls, erected around cities or in strategic locations for defense. Although they have foundations, these walls are linear, made of stone or brick, high and thick to hinder the passage of people, animals and the scarce mechanical means existing at the time (Pais, Hoffmann, & Campos, 2021).

Noé (2015) distinguishes two types of castles in the medieval period: the Romanesque castle, in the period of the Christian reconquest, and the Gothic castle, after this period. According to the author, medieval castles are closely linked to the Christian reconquest process and, consequently, to the development and organization of the Portuguese territory.

In Portugal, castles had a military, political and strategic character, since they belonged to the king and defended the kingdom, storing the soldiers' garrisons and sheltering the nearby populations in dangerous situations. Besides the castles, defensive enclosures were built (Noé, 2015; Pais, Hoffmann, & Campos, 2021), a process known as incastling (Noé, 2015). The Christian reconquest was carried out from north to south, although with advances and retreats, building a significant network of Romanesque castles in border areas or along the communication routes. The possession of the castles, according to Noé (2015), allowed the possession of all the surrounding territory, as well as the safety of the population.

According to Noé (2015), the main innovation of the Romanesque castle was the introduction of the keep. The existence of this watchtower is also referenced by other authors, such as Pais, Hoffmann and Campos (2021) and Próspero (2016). The tower would be erected in the highest place inside the fortification courtyard, preferably on rocky outcrops, to allow for shooting over the parts of the castle at lower elevations. The keep consists of a first floor without openings, used as a prison, warehouse or cistern, and a door on a higher level, with a perfect round arch. The access to the door was made by a mobile ladder that could be raised, isolating the tower inside the enclosure itself in situations of danger. In Portugal more specifically, in the bars of the Tagus and Sado rivers, the first fortifications that appear are watchtowers of medieval architecture (Santos, 2012). Berger (2005) corroborates this statement by arguing that the defense of estuaries, coasts and the western coast of the Iberian Peninsula began long before the use of torsion artillery.

At this stage, urban fences also existed (Noé, 2015; Pais, Hoffmann, & Campos, 2021), which were square-plan cubes of reduced dimensions. External fences autonomous to the walls of the town could be built to shelter the population, animals and goods when their protection was in danger. The cistern, well or fountain, located mainly in the castle courtyard, is another structure pointed out as being crucial in fortifications, since long-lasting sieges were only possible with access to drinking water (Noé, 2015).

After the definitive banishment of the Muslims from the southernmost territory, the Algarve, in 1249, the political and military strategy, as well as the organization of the territory underwent a profound transformation. Consequently, starting at the end of the 13th century, the castles present different characteristics with gothic elements, allowing not only for defense, but for offense as well (Barroca, 2003; Noé, 2015). Noé (2015) presents the changes and characteristics of medieval castles in detail in the transition from the Romanesque to the Gothic castle, of which we highlight the following: they rise on flatter sites; they present more regular plans, with a geometric character; the ramparts are wider and of better quality; the battlements are wider and lower due to the increased precision of the firing weapons and the progressive use of fire hydrants; the battlements are torn by arrowslits and crenels; the openings are smaller and inclined towards the outside to allow for throwing stones and scalding liquids or the use of fire hydrants; and the number of towers and cubes increases due to the decrease of the space between them.

Regarding the keep, the author mentions that it is now integrated into the wall circuit, appearing in the midst of the wall panels or at one of the angles. Although the tower is predominantly square and rectangular, new plans appear, including polygonal, pentagonal, octagonal, hexagonal and heptagonal, better suited to protection and shooting. The tower becomes progressively taller and wider, as it reconciles the military character with a residential one. This residential function, during the second half of the 14th century and throughout the 15th century, takes on a more significant dimension, where it is possible to observe an expansion of the keep, with upper floors of wide and decorated open spaces enabling the lighting and ventilation of the interior spaces. New elements that increase comfort appear, such as fireplaces, chimneys and wooden ceilings. Around the towers, in some castles, residences and palaces were built.

Until the mid-14th century, the artillery in use was called tension/torsion artillery. In this type of artillery, weapons were used as a propulsive element, their force resulting from bending or twisting, such as the bow and arrow, the crossbow and the catapult (Pais, Hoffmann, & Campos, 2021). In this period of tension/torsion artillery, defense constructions were characterized, as we have already mentioned, by very high walls, with a central tower, turrets and punctual doors (Próspero, 2016).

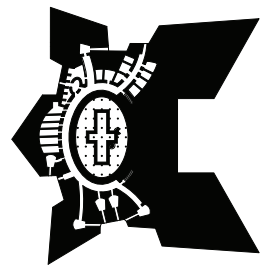


fig. 10 | Drawings of Fort of São Julião da Barra

Second period: Bastion

The first firearms appear on the war scene in Europe in the 14th century, in the 40s (Barroca, 2003). Berger (2005) supports this information by stating that the first reference to powder artillery in Portugal was made by Fernão Lopes, in 1381. Initially the cannons were not very efficient due to their weight and poor accuracy of shot, however, during the 15th century they were improved by using gunpowder (Pais, Hoffmann, & Campos, 2021). The high medieval walls and towers became an easy target to tear down with the improvement of powder artillery.

With the progressive and widespread use of gunpowder in firearms and powder artillery starting in the mid-15th century, the strategy of attack changes, requiring modifications in medieval fortification, which becomes no longer effective (Noé, 2015; Prospero, 2016) and, consequently, in the design of fortifications as well (Pais, Hoffmann, & Campos, 2021).

Barroca (2003) identifies two phases in this process where medieval fortifications were adapted to receive artillery. In the first phase, until 1508-10, there were minor and occasional improvements so that firearms could be used, while maintaining the medieval structure. In the second phase, after 1510, the changes were more profound and radical, whereby new buildings were made from scratch. The author also highlights the crucial role of the brothers and architects Diogo and Francisco Arruda in this phase.

With the development of artillery, these towers were gradually transformed into small embrasures in the form of bastions (Pais, Hoffmann, & Campos, 2021), which were aligned in several directions, especially towards water (Santos, 2012). Therefore, the bastion fortifications have lower and thicker walls, which is the main modification that characterizes them (Pais, Hoffmann, & Campos, 2021; Santos, 2012) and also acute angles to resist the cannons (Pais, Hoffmann, & Campos, 2021).

This transition from the tension/torsion artillery era to the powder artillery era is noticeable in the first towers that are adapted for the use of gunpowder. Hence, that is why we observe towers with a bulwark area facing the water from where it is possible to perform shallow shooting (Próspero, 2016). This typology is found in a period of time between the medieval tower and the modern bastion (Santos, 2012), that is, in the transition from tension/torsion to powder artillery (Pais, Hoffmann, & Campos, 2021; Santos, 2012), known as transitional architecture.

Third period: Bunker

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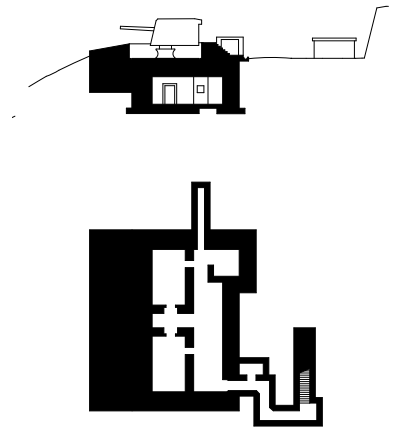


fig. 11 | Drawings of Bunker of 7th Battery

2.3 DEFENSE OF LISBON AND SETUBAL

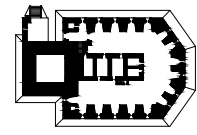
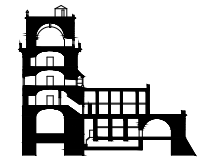


In order to systematize the information chronologically, we created a timeline presented in the next pages with the main coastal fortifications of the Tagus and Sado estuaries over time, divided into three phases: Tower, Bastion and Bunker (Figures 9,10,11). As can be seen in the timeline, the fortifications related to the object of our study, Outão, are highlighted in red. We will present a summary description of the towers, followed by the bastions and finally the bunkers.

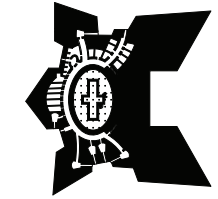
Fig.12 | This map was drawn by a spy in service of the king of Spain, Filipe IV. The Map is intitle "Ciudad de Lisboa, 1661, a 4 de febrero. Verdadera Relación del porto de Lisboa y sus fortificaciones modernas que aún non están acabadas " Which means: City of Lisbon, 1661, 4th February. True Relation of the port of Lisbon and its modern fortifications that are not yet finished. The map shows the importance of the defense of the two estuaries, Tagus and Sado, to guarantee the safety of the capital.

fig.12 | Map of the Costal Defense of Lisbon and Setubal, 1661

TIMELINE OF FORTIFICATIONS OF THE COAST OF LISBON AND SETÚBAL



TOWER



BASTION

COASTAL FORTIFICATIONS

1390	1488	1493	1515	1553	1572	1582	1590	1594	1596	1641	1644	1670
Whatchtower Capariaca	Whatchtower Outão	Towe Santo António Cascais	Tower São Sebastião Caparica	Tower São Vicente Belém	Fort São Julião da Barra Oeiras	Fort São Filipe Setubal	Fort of São Lourenço Bugio	Fort of Nossa Senhora Cascais	Fort Santo Antonio da Barra São João do Estoril	Fort of São Jorge de Oitavos	Fort of São João das Maias	Fort of Santa Marta

DEFENSIVE SYSTEMS

Plan Joanino

HISTORICAL EVENTS

1580
Conquist of Spain

1640
Independence of Portugal

LEADERS

1385 - 1433
D. João I

1481 - 1495
D. João II

1495 - 1521
D.Manuel II

1557 - 1578
D.Sebastião I

1581- 1598
Filipe I

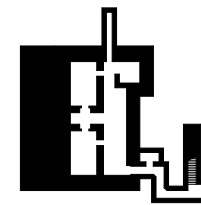
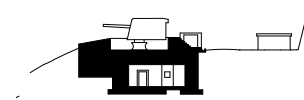
1560- 1556
D.João IV

DYNASTIES

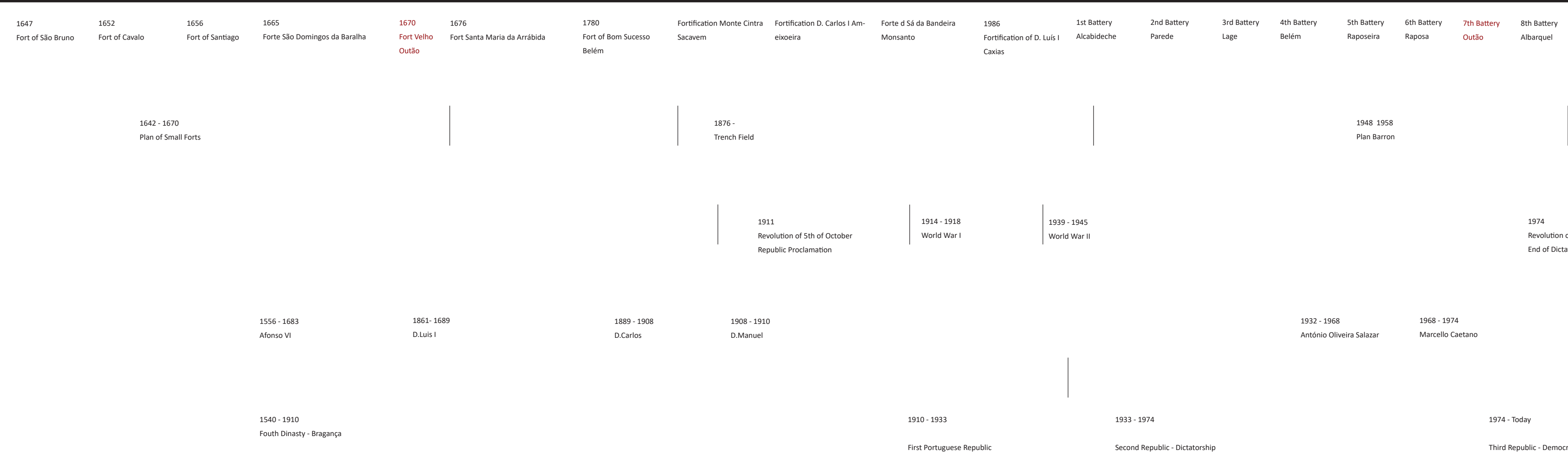
1385 - 1580
Second Dynasty - Aviz

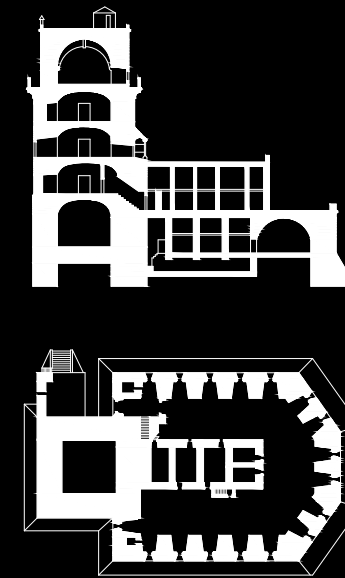
1580 - 1640
Third Dynasty - Filipina

1580 - 1640
Third Dynasty - Filipina



BUNKER







TOWER

- 0a. Watch Tower Caparica
- 0b. Watch Tower Outão

Plan Joaninho 1448 - 1515

- 1a. Tower of Santo António Cascais
- 1b. Tower of São Vicente Caparica
- 1c. Tower of São Sebastião Belém

2.3.1 DEFENSE OF LISBON AND SETUBAL CRONOLOGY - TOUR



fig. 13 | Belém Tour by Serres, 1796

It is difficult to pinpoint precisely when the first coastal defensive intervention in the capital of Portugal took place. However, the defense of the port of Lisbon was a concern of the monarchs over several dynasties. According to Berger (2005), the oldest fortification in the scope of Lisbon's coastal defense dates from the time of D. João I (1385-1433).

The first tower to be built was the Old Tower, next to Porto Brandão, on the south bank of the Tagus River, to defend the port of Lisbon, in an area where the banks narrow and where, later, the Lazareto was built, a quarantine hospital (Berger, 2005; Santos, 2012). The precise date of its construction is unknown, however it was built during the reign of the monarch D. João I. This medieval-style tower had a quadrangular base next to the river and worked together with some artillery boats that anchored in strategic locations (Santos, 2012).



fig. 14 | Old Tour of Caparica by Serres, 1801

It was also D. João I who ordered the construction of the Outão Tower, built in 1390 at the mouth of the Sado River, near Setúbal, continuing the fortification of the port begun by D. Afonso IV (Berger, 2005). Given the purpose of this research we will elaborate on this at a later stage.

At the end of the 15th century, D. João II proposed the first major plan for the defense of the capital's coast. The plan, known as the Joanino plan, consisted of three defensive rounds adapted to low artillery fire; two on the north coast at Cascais and Belém, and one on the south coast at Caparica. The latter, the Old Tower, was already built, but required adaptations to new warfare techniques and warlike equipment. The fortifications were placed at the Tagus River mouth. One is at the extreme left point where the coast turns west, and the other two are placed on a narrower stretch of the river opposite each other, working together in crossfire. The three promenades were a mixture of medieval promenades and front bulwark.

Under this plan, the first tower to be built was the Santo António Tower (1488) in Cascais. The bay of Cascais was a natural port with an intense transit of ships that entered and left Lisbon to supply fresh produce from the surrounding areas and waiting for favorable conditions for safe navigation due to the dangerous shallows of the Tagus bar. Due to this heavy traffic, the bay was the target of pirate attacks that damaged trade and jeopardized the very image of the kingdom. Faced with this, D. João II wanted to put an end to piracy and, in 1488, the tower was built with a square structure of three floors, surrounded by a wall where the artillery pieces were hidden. The Tower of Santo António, near the bay of Cascais, is depicted in the lower left corner of figure 15

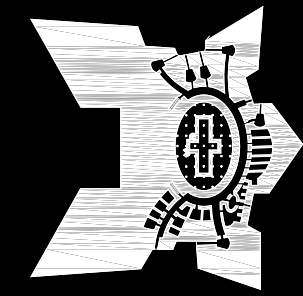
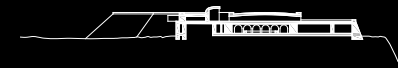
Also in the late 15th century, the Old Tower was rebuilt and consequently renamed São Sebastião da Caparica Tower (1493). It is composed of three elements: a compact tower with a rectangular top near the edge of the cliff, a watchtower; a rail with a trapezoidal deck on the rocks at the base of the cliff, which was the most innovative element since the revolutionary finish by the water; and a basalt wall on the cliff's unevenness, ensuring the communication between the two previous elements, through interior stairs.

The last fortification of D. João II's defense plan to come to fruition was the São Vicente Tower in Belém (1515), which would only be built during the reign of D. Manuel I (1495-1521), by architect Miguel de Arruda (Figure 6).

This promenade replaced the Artillery Ship placed in the middle of the Tagus River mouth, completing the triangular defensive system with extremities in Cascais, Caparica and Belém. The implementation of this plan began in the reign of D. João II (1481-1495) and only ended in the following reign of D. Manuel I (1495-1521), so we can observe the transition between the tension/torsion artillery and the powder artillery era in the first towers, with the inclusion of a bulwarked area facing the water plane, which allowed a low shot. Thus, the Old Tower (Noé, 2014) and the Santo António Tower (Noé, 2014; Próspero, 2012) and the S. Vicente Tower (Próspero, 2012) are all examples of transitional architecture, which combine fire with mobile defense consisting of ships anchored in the bay of Cascais (Noé, 2014) with mixed characteristics of a medieval tower for defense and coastal lookout and at low elevation for gunpowder fire, the bulwark (Próspero, 2012).



fig. 15 | Lisbona and Cascale, 1572





BASTION

First Forts 1553 - 1596

- 2a. Fort of São Julião da Barra Oeiras
- 2b. Fort of Santiago Outão
- 2c. Fort of São Filipe Setúbal
- 2d. Fort of Nossa Senhora Cascais
- 2e. Fort of São Lourenço Bugio
- 2f. Fort of Santo Antonio Estoril

Small Forts 1642- 1850

- 3a. Fort of São Jorge de Oitavos Cascais
- 3b. Fort of Santa Marta Cascais
- 3c. Fort of São João das Maias Oeiras
- 3d. Fort of Cavalo Sesimbra
- 3e. Fort of Santiago Sesimbra
- 3f. Fort Velho Outão
- 3g. Fort São Domingos da Baralha Sesimbra
- 3h. Fort Santa Maria da Arrábida Portinho da Arrábida

2.3.2 DEFENSE OF LISBON AND SETUBAL CRONOLOGY - BASTION

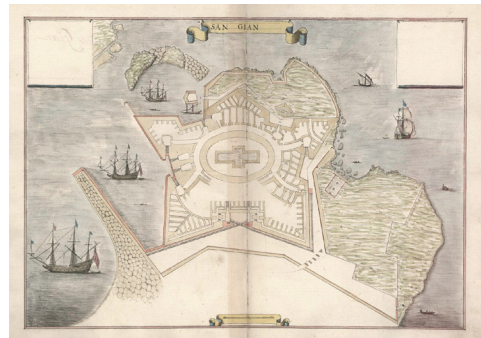


fig. 16 | Plan of Fort San Gian, 1655



fig. 17 | Photo Fort Bugio

With the publication of treaties on bastion typologies in the 16th century came their expansion across borders throughout Europe. These new constructions were characterized by having several bastions aligned in various directions, especially towards the water (Próspero, 2012). The first treaty printed on the study of bastion fortifications to reach Portugal was the *Tratado sobre a Fortificação de Cidades, Fortalezas e Vilas* (Treaty on the Fortification of Cities, Fortresses and Towns), written by Albrecht Dürer in 1527. This was an essential tool for the construction of the first fortifications in Portugal until the mid-16th century.

The first fortification with a bastion design in Portugal was Fort São Julião da Barra, in Oeiras. In 1533, D. João III ordered the construction of a huge fortress on the tip of São Gião. It was designed by architect Miguel de Arruda, appointed Master of the Kingdom's Fortification Works, places Beyond and the Indies. The fortification uses a fortified design inspired by the Italian Renaissance school. It is characterized by an irregular, pentagonal plan, with a moat topped by walls of great architectural complexity. One of the highlights is the central cistern, with three naves and cross vaults (Vieira, 2017) (fig.16).

In 1572, during the reign of King D. Sebastião, a bulwarked fence was erected around the existing watchtower in Outão, and the name of the fort was changed to Outão Fort. These works were in the hands of master of works of fortifications of the time, Afonso Álvares.

In 1580, faced with the instability of the kingdom of Portugal with the death of King Sebastian and the succession crisis, the Castilian army under the command of the Duke of Alba invades Portugal. It lands in Cascais and takes the tower of Cascais, without meeting much resistance, followed by the Fort São Julião da Barra and then wins the battle of Alcântara. Filipe II of Spain is crowned king of Portugal as Filipe I, uniting the two countries, Portugal and Spain. Given the vulnerability of the defense of the Tagus bar, demonstrated during the Spanish invasion, King Philip I invests in strengthening the defense of the coast.

In 1582 the construction of the Fortress S. Filipe began, with a project by the architect and military engineer Filippo Terzi. This was of notable importance, as it was the largest fortification in the area. It stands in a dominant position on a rock, at the entrance of the Sado River, crucial for the defense of Setúbal.

In 1589, the Fortress Nossa Senhora da Luz is built to defend the bay of Cascais given the vulnerabilities of the old tower.

In 1590 D. Filipe I, implementing the studies previously made by D. Sebastião, ordered the construction of the Fort São Lourenço da Cabeça Seca in Bugio. The location was in the middle of the ocean, in a place with a small sandy beach called Cabeça Seca (Dry Head). The fort, featuring a circular plan, was a cross-fire with São Julião, marking a defensive axis at the entrance of the Tagus estuary. Nowadays the fort is called Forte do Bugio. (fig.17)

In the same year in which the construction of the Fort São Lourenço was ordered, the construction of the

Fortress Santo António da Barra begins. It is based on Renaissance ideas of a strong bastion, positioned halfway between Cascais and the São Julião da Barra Fort. These three fortifications, São Julião da Barra, Santo António da Barra and São Lourenço establish a new defense at the entrance of the Tagus.

In 1640 Portugal's independence is proclaimed and a vast plan of fortifications is created to defend both sea and land borders from the Spanish.

The reign of D. João IV marked a long period of wars on national territory. Once again, the coastal defense system had to be strengthened. However, due to the 28 years of war, the kingdom was in great economic difficulties and it was decided that several smaller scale fortifications should be built along the coast of Lisbon and the Setúbal peninsula, instead of larger and more expensive ones.

On the north coast, from Cabo da Roca to Lisbon, we highlight the Fort São Jorge de Oitavos, the Santa Marta Fort, the Fort São João das Maias and the São Bruno Fort. On the south coast, from Cape Espichel to Setúbal, the highlights are Cavallo Fort, Fort Santiago de Sesimbra and the Old Fort of Outão.



fig. 18 | Map of Lisbon with Fortifications, 1833

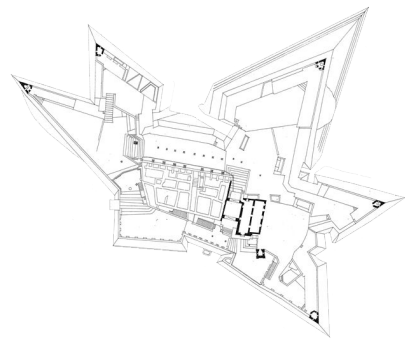


fig. 19 | Plan of Fort São Filipe

In the Setúbal peninsula it is also important to point out Fort São Domingos da Baralha and Fort Santa Maria da Arrábida, which were built in 1655 and 1670, respectively.

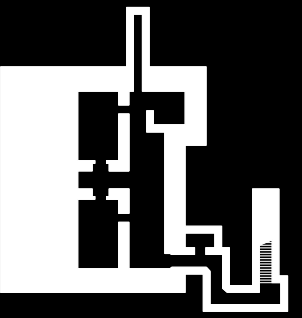
Although the Seven Years' War (1756 to 1763) was a conflict between England and France over land in North America and the Asian continent, it also involved other countries, namely Portugal and Spain, which were on the verge of going to war with each other. At this juncture, in the following reigns of D. José (1750-1777), interventions were made to different forts. Later, in D. Maria's reign, the Bom Sucesso Fort was built in Belém to help defend the old tower.

In the first half of the 18th century we once again witnessed the last interventions of recovery and rehabilitation of the forts. These were due, firstly, to the French invasions and later, to the civil war between liberals and absolutists, where the succession of the Portuguese throne was at stake.

By the end of the first half of the nineteenth century, most forts had been dismantled, due to the absence of threats from the outside and the evolution of warfare techniques. The military constructions that followed gave up bastions and placed greater emphasis on long-distance batteries, which will be the focus of analysis in the following chapter.



fig. 20 | Photo of Fort São Filipe





BUNKER

Trench Field 1876

- 4a. Fortification Monte Cintra Sacavem
- 4b. Fortification D. Carlos I Ameixoeira
- 4c Forte do Marquês de Sá da Bandeira Monsanto
- 4d Fortification of D. Luís I Caxias

Plan Barron 1948 - 1958

- 1st Battery Alcabideche
- 2nd Battery Parede
- 3rd Battery Lage
- 4th Battery Belém
- 5th Battery Raposeira
- 6th Battery Raposa
- 7th Battery Outão
- 8th Battery Albarquel

2.3.3. DEFENCE OF LISBOA AND SETUBAL CRONOLOGY - BUNKERS

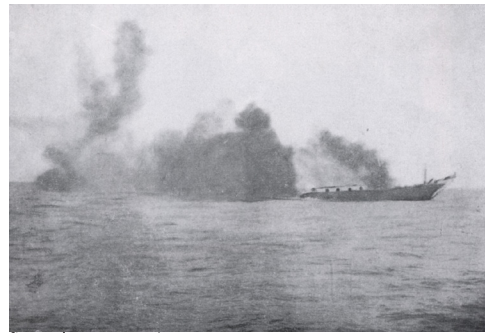


fig. 21 | Army exercise near Cascais, 1902

During the 19th century, defensive strategies changed radically and, consequently, so did military architecture.

Entrenched Field

During the 19th century Portugal was the target of several invasions and external military interventions: French invasions, landings of liberal troops, British, French and Spanish interventions. Faced with these threats, in 1876 a new plan was developed for both land and sea defense of the capital, called the Lisbon Entrenched Camp, which was Portugal's main means of defense during the first half of the 20th century.



fig. 22 | Battery of São Gonçalo Visit from the Army School, 1935

Barron Plan

During the Second World War, a Luso-British commission, coordinated by the British general Barron, developed a coastal defense plan in the areas of Lisbon and Setúbal. The plan, called the Barron plan, was composed of eight fixed batteries, camouflaged in the landscape in the form of bunkers, installed along the banks of the rivers Tagus and Sado. Between 1948 and 1958, the batteries were activated, some of which were installed in fortifications consisting of bunkers and underground armouries, while others were built from scratch in strategic places, slightly away from the bank.

It was at this time that the Coastal Defense Command changed its name to Coast Artillery Regiment (RAC in Portuguese). In 1976 this regiment became the only coastal artillery unit of the Portuguese Army. It therefore takes on, besides its operational functions, the function of a practical school of coastal artillery.

On June 30, 1999, the Coast Artillery Regiment was completely deactivated due to a restructuring of the Portuguese Army. Today, three of the eight batteries of the Barron Plan, which includes the 7th Battery of Outão, are abandoned and face a new battle against their destruction and oblivion.

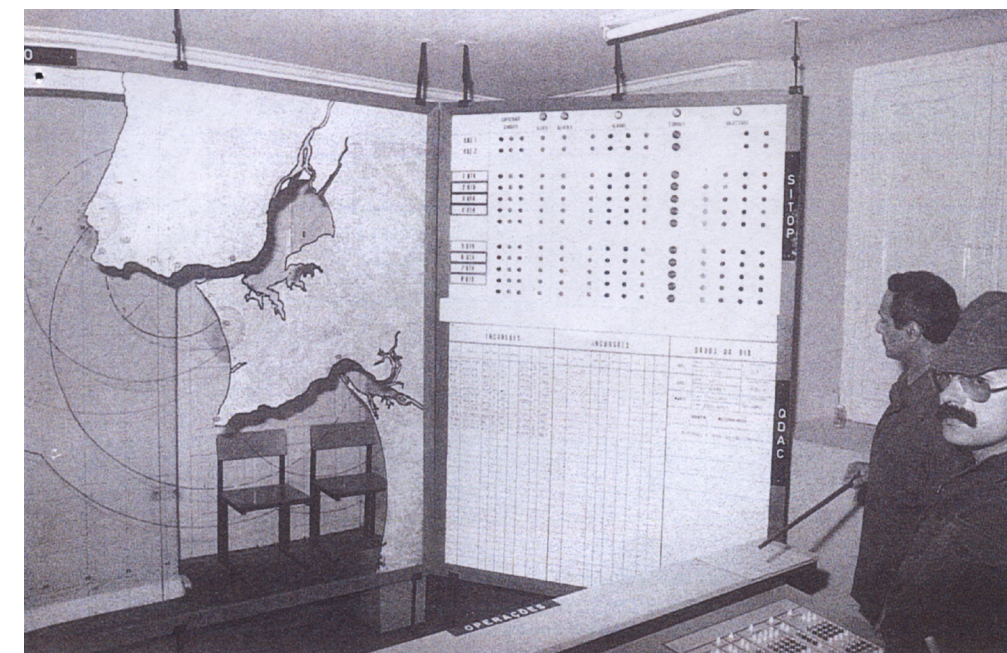
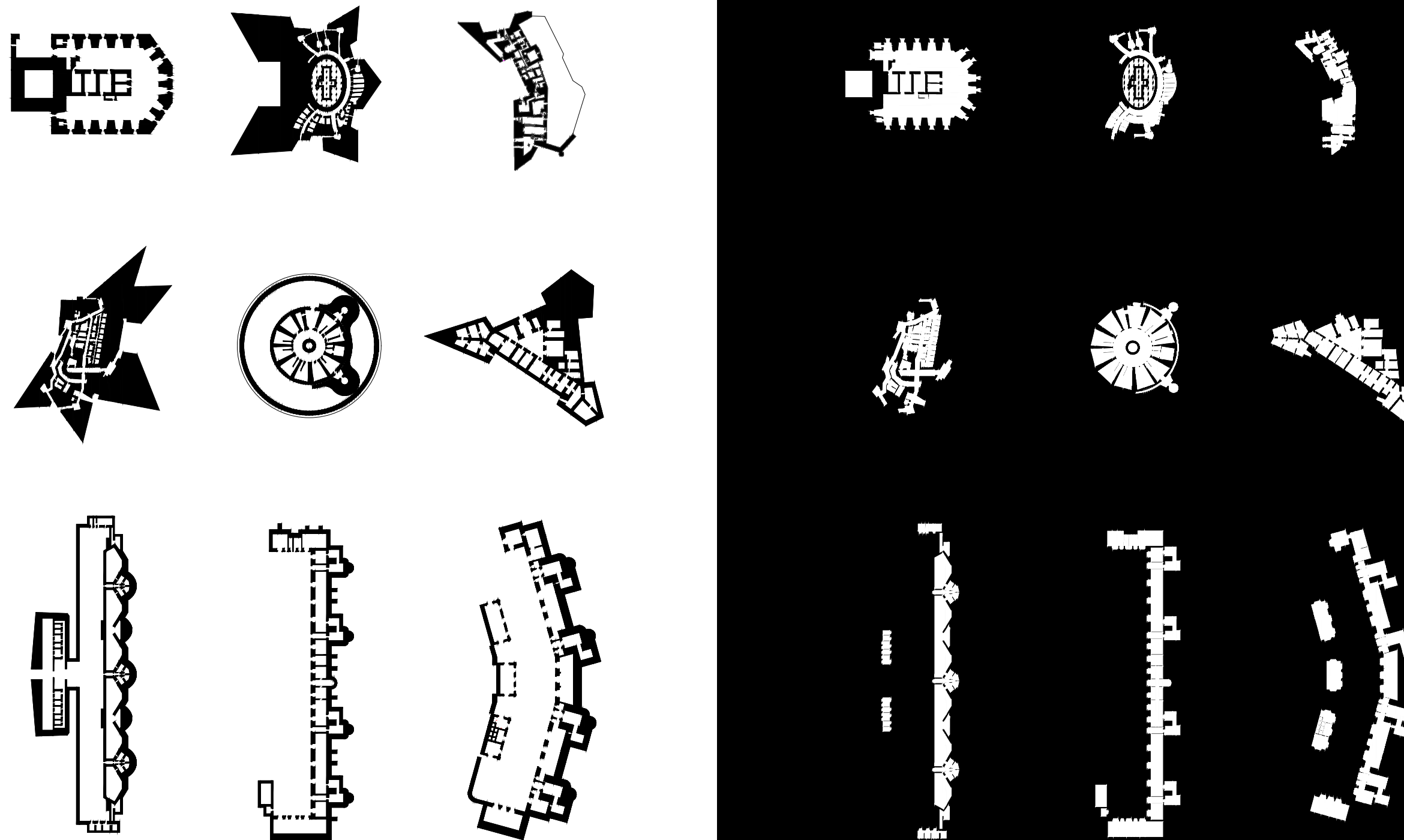


fig. 23 | OACTA (Coast Artillery Operations Command Center), 1982

2.3.4 DEFENCE OF LISBOA AND SETUBAL
MASS VS VOID



- | | | | |
|----|--------------------------------|----------|------|
| 1. | Tower of São Vicente | Belém | 1515 |
| 2. | Fort of São Julião da Barra | Oeiras | 1553 |
| 3. | Fort of Santiago | Outão | 1572 |
| 4. | Fort of São Filipe | Setúbal | 1582 |
| 5. | Fort of São Lourenço | Bugio | 1590 |
| 6. | Fort of Nossa Senhora da Luz | Cascais | 1594 |
| 7. | 2nd Battery | Parede | 1904 |
| 8. | 5th Battery of Raposeira North | Trafaria | 1911 |
| 9. | 5th Battery of Raposeira South | Trafaria | 1911 |

fig. 24 | Drawings of "Mass vs Void" - Coastal Fortification of Lisbon and Setúbal

III OUTÃO



fig. 25 | Outão Seen by the Sea

This chapter is dedicated to a more in-depth study of one of the batteries of the Barron Plan, namely the 7th Battery, in order to support the practical part of the thesis where a proposal will be carried out in this place. Thus, we first describe the territory and the passage where Outão is inserted, which will be analyzed in a separate sub-point. Next, we will address in chronological order the local fortifications: the Santiago Fort, highlighting its different functions over time (military, royal residence and to combat tuberculosis); the Old Fort; and finally, the Fort Velho and 7th Battery of Outão.

3.1.1 TERRITORY AND LANDSCAPE ARRABIDA MOUNTAIN



fig. 26 | View from the top of The Portinho and the beach



fig. 27 | The Portinho and the Beach, 1950

Outão is located in the Arrábida Mountain Range, on the north bank of the Sado river bar, in Setúbal's municipality. The climate is temperate maritime with rugged terrain reaching 501 meters high, at Pico do Formosinho. This place is extremely rich in biodiversity, with about 1400 plant species, and unique flora and ecosystems. Although the flora and fauna are still very diverse, great changes have occurred since the 19th century. For example, in the early twentieth century the park still had wolves and deer. Currently, we are witnessing a considerable increase in wild boars due to the absence of natural predators. In terms of flora, the Mediterranean plant species stand out, such as the holm oak, the cork oak and the oak tree.

This mountain range together with the mountain ranges of Louro, Risco, São Luís, Gasteiros, Longa, São Francisco form the Arrábida Natural Park, with an area of approximately 10,800 hectares (Trindade, 1988), distributed in a strip of 6 kilometers with 35 kilometers of extension. In this place, carbonate rocks from almost all Mesozoic emerge, and there are archaeological remains from the Lower Paleolithic up to the moment of Christian reconquest (Kullberg, Pais, Almeida, & Mateus, 2012).

The Arrábida Natural Park was created in 1976 and is classified as a Site of Special Interest for Nature Conservation. This was proposed to UNESCO as a mixed World Heritage Site, based on two cultural and four natural criteria (Kullberg, Pais, Almeida, & Mateus, 2012). After a long application process, that lasted from 2009 to 2013, the park was not classified as a World Heritage Site. UNESCO opinion states that Serra da Arrábida Natural Park is important in the context of the region, however, it does not have characteristics of international relevance. The existence of a cement plant (Secil) nearby, but outside the area to be classified, was pointed out negatively, with its long-term impact being irreparable (Soares, 2014).

The hermits of the Franciscan order, including Friar Agostinho da Cruz (1540-1619), lived in the Arrábida mountains. After 45 years in the Santa Cruz Convent in the hills of Sintra as a Franciscan monk, the Friar asked to live as a hermit in the Arrábida mountains, staying there for 14 years until he died. It is the simplicity of monastic life and the encounter with nature that make the Arrábida mountains a source of inspiration for his poems.¹

The landscape of the Arrábida mountains was the subject of photographer Américo Ribeiro (1906-1992). We present two photographs of this mountain range and two of its beaches taken by the photographer, originally from Setúbal, in the 1950s (fig..26,27,28 and 29).

1. "In Serra D'Arrábida
In the middle of this mountain, where rises
That longing for a pure soul,
Who finds softness in the hard boulder.
From the bird, I hear a melody,
I see the grove dressed in greenery,
Vary in the sky another painting,
That in many feelings varies me.
Wondering how badly life is spent
Who on earth wants to go up to heaven
For walking in the end no one doubts.
Less of the narrow life you chose,
Of your most chosen most followed,+
Christ Jesus, who died on a Cross".

Frei Agostinho da Cruz, loosely translated by the author



fig. 28 | Postcard Arrábida Mountain - The Portinho and the Stone of Anixa, 1950

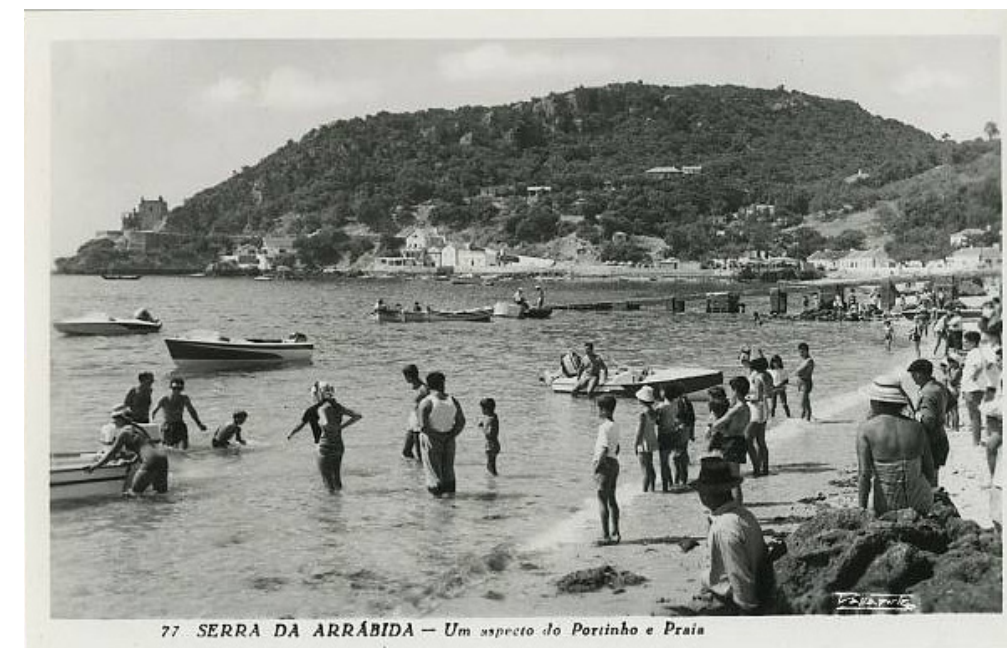


fig. 29 | Postcard Arrábida Mountain- The Portinho and the Beach, 1950

TERRITORY AND LANDSCAPE
3.1.2 ENTRANCE OF SADO RIVER



Outão, due to its geographical location at the entrance of the Sado River in the area of the shortest distance with the Tróia peninsula, was of outstanding importance for the defense of Setúbal and even Lisbon, since its defense systems were part of a larger scale system in the defense of the Lisbon and Setúbal region

fig. 30 | Map of Sado Estuary, 1699-1743

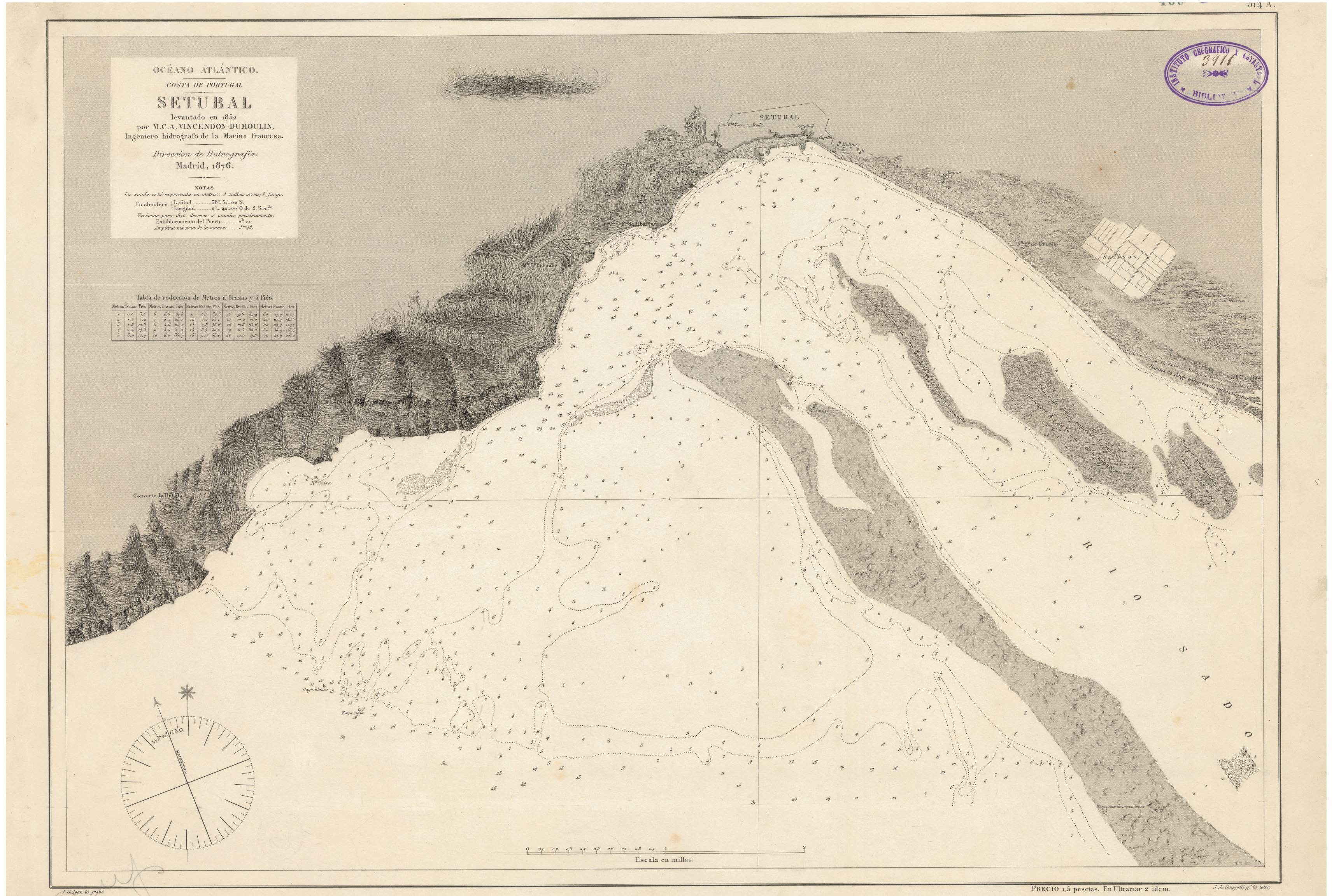


fig. 31 | Hydrographic Map Sado Estuary



Fig. 32 | Orthophotomap of Sado Estuary

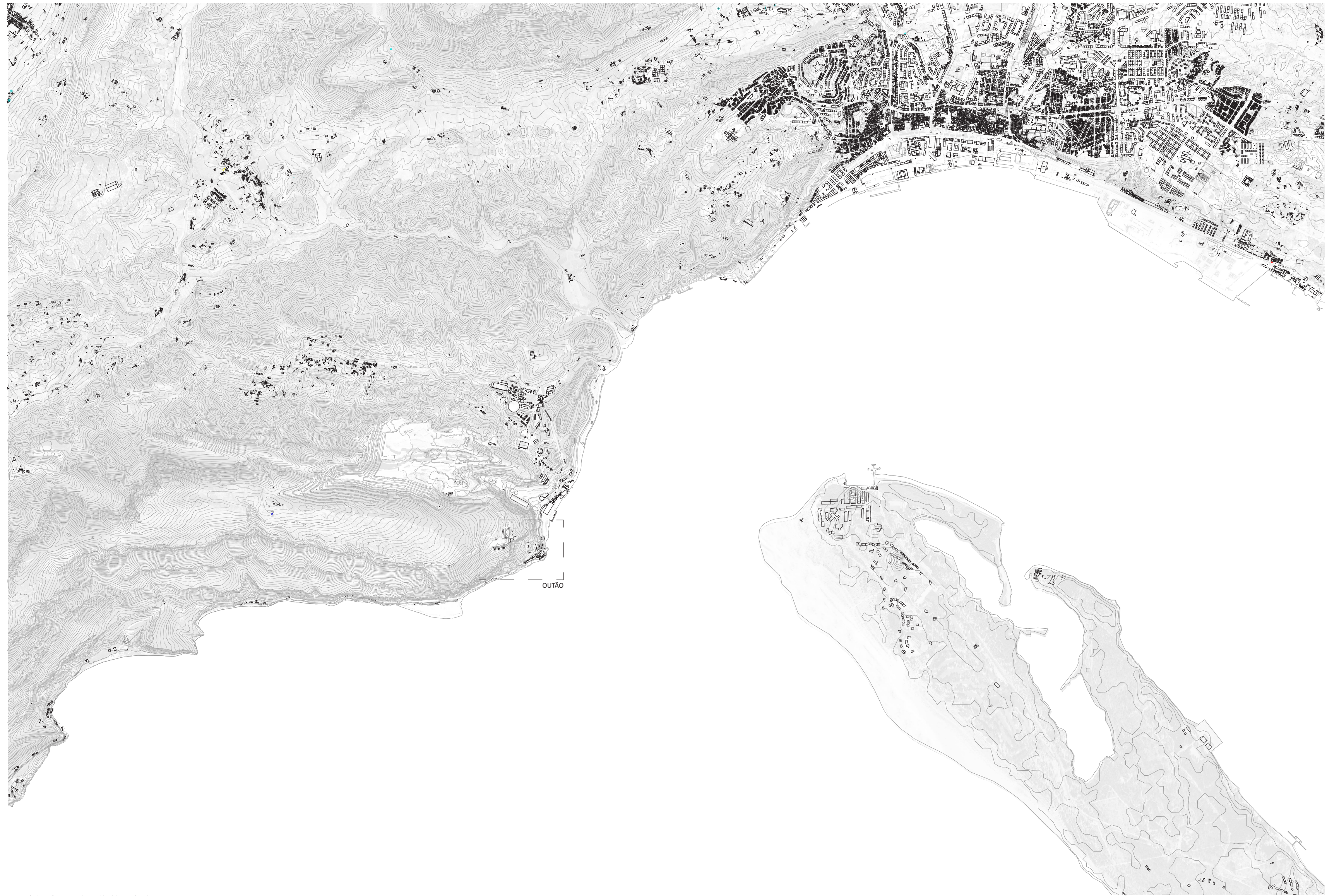
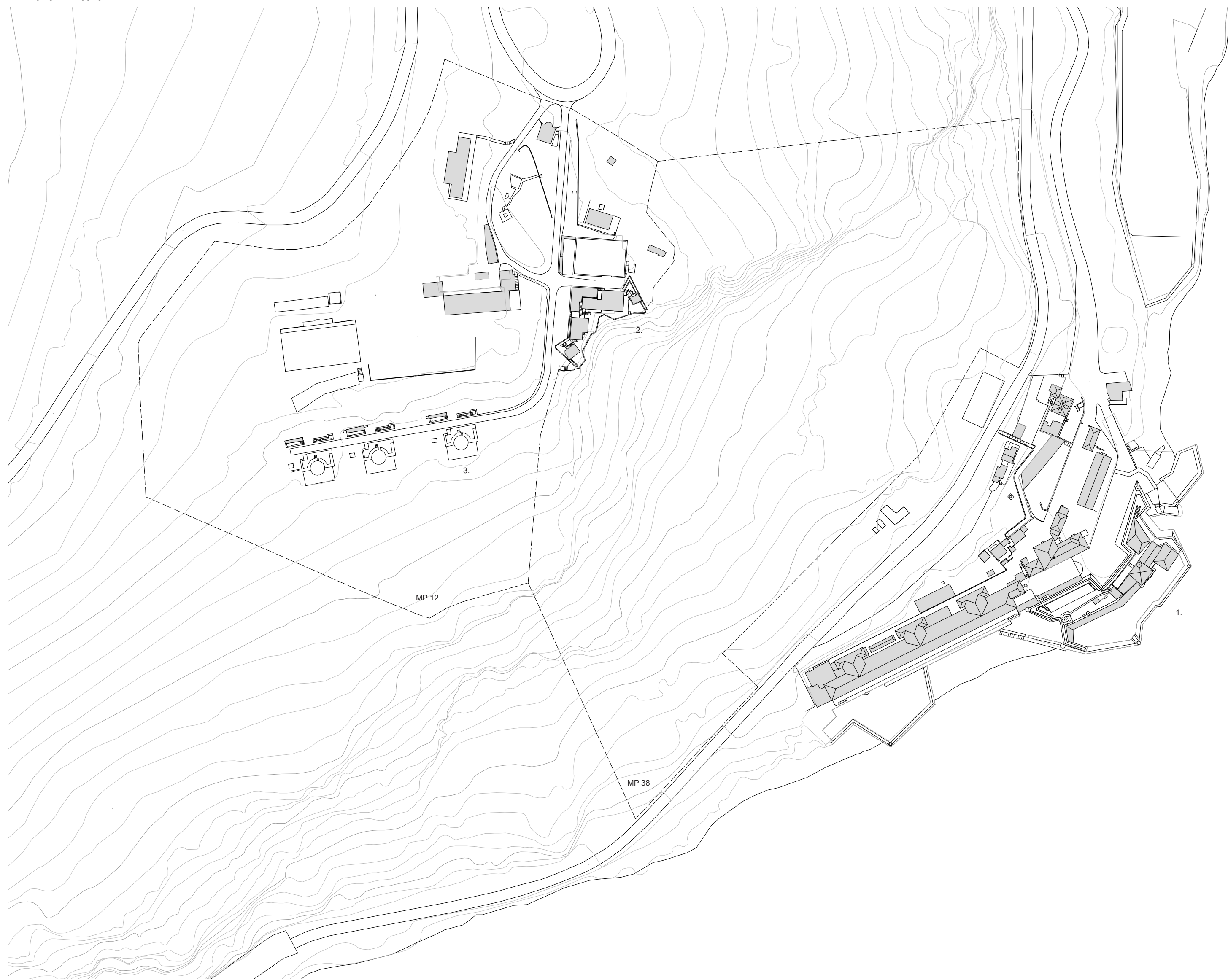


Fig. 33 | Plan of topography and buildings of Sado Estuary



Fig. 34 | Orthophotomapping of Outão



- 1. Fort Santiago
- 2. Fort Velho
- 3. Battery

Military Property (MP) 38:	48 582 m2
Military Property (MP) 12:	57 636 m2
Total:	106 218 m2

Fig. 35 | Plan Drawing of Outão

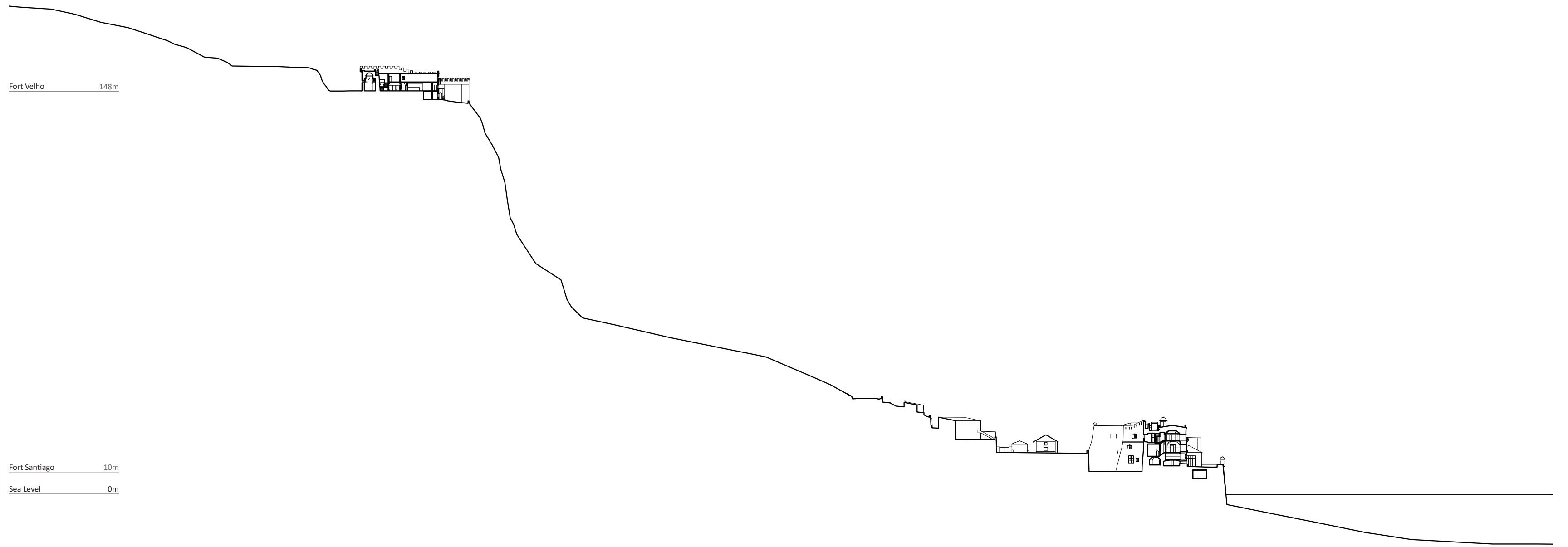


Fig. 36 | Section Drawing of Outão

3.2 FORT OF SANTIAGO



Fig. 37 | Fort of Santiago and the Orthopedic Hospital, 2022

3.2.1 FORT OF SANTIAGO FUNCTION: MILITARY

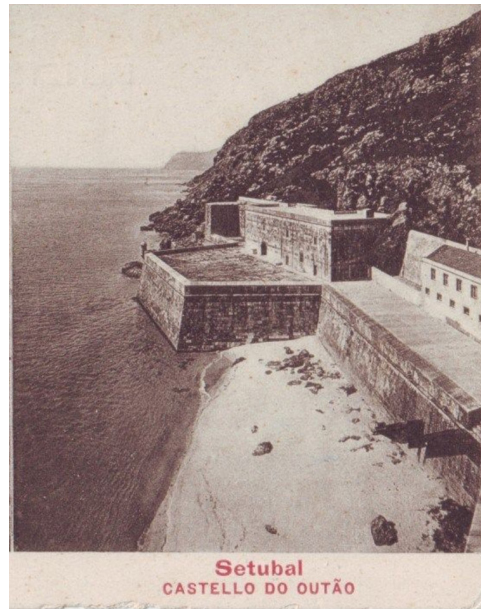


fig. 38 | Fort of Santiago, West Side

The primary occupations identified in the place were of Roman origins. During construction in the 16th century for the extension of the fortification, multiple Roman remains were found there, such as coins of the emperors Julius and Tiberius, and pieces of a bronze statue representing Neptune, God of waters and seas (Portela, 1882). This may lead one to think that there may have existed a Roman temple dedicated to Neptune there.

These artifacts bring a possible theory that the land of Tróia, where the ruins of Cetobriga (Roman ruins of fish-preserving center) existed, was in previous times connected to Outão. Possibly the residents of the city of Cetobriga would go to this temple to worship Neptune (Portella, 1882).

The first military occupation identified in the area was a watchtower from the end of the 14th century, in 1390 (Portela, 1882). As mentioned in the previous chapter, this tower is one of the first coastal fortifications in the history of Portugal. The tower was constructed, by demand of D. João I, in a small hand-land close to the Arrábida mountains at the entrance of the estuary of River Sado, defending the city of Setúbal.

The choice of this place was strategically well made, as there are two entrances to the Tagus estuary, one to the south and one to the north. However, the southern entrance could only be used at low tide and by small boats. There were recommendations for vessels to access the port of Setúbal by the northern entrance, having to move towards the Outão Tower, and before reaching it they would turn northeast entering the estuary (Loureiro, 1909). An interesting curiosity pointed out by Portocarrero (2015) lies in the fact that the tower is covered by a lilac stone, a rather bright stone that on sunny days strongly increases its presence.

Given the Roman remains that suggest the existence of a Roman temple at the site, Nunes (2015) hypothesizes that the temple platform/embankment was reused for the initial tower, a hypothesis that seems quite plausible to us. According to Nunes, there were probably no changes in terms of artificialization of the site, except for the construction of a watchtower among the rocks. Currently, we still find this construction in the middle of the rock mass in the central body.

Given the construction period, the tower structure did not implicate significant artificial changes to the site. It would have been a simple watchtower placed on top of some rocks, as represented in the drawing (Nunes, 2015). Nowadays, the tower is surrounded by different annexes, although we can still quickly identify the facade facing the ocean. The massive stone structure stands out from the surroundings. There are two deep openings on the bottom floor that stand out on the facade which were meant for shooting.

The Outão Tower underwent numerous repairs and extensions in order to meet the needs of the defence of the Sado bar and the evolution of military artillery (Portela, 1882; Pinho 2020). One of the first changes was, in the reign of D. Sebastião, the introduction of a lower and bastion fence around the initial tower

(Pinho, 2020; Nunes, 2005), transforming it into a fortification and inevitably increasing its area (Nunes, 2005). At this point, the gothic tower remained in a bastioned fence for long-range cannons (Moreira, 1986) This work was under the supervision of the master of fortifications, Afonso Álvares.

Then, after the death of the king and the consequent succession crisis, the Santiago Fort, in 1580, with 110 men and 47 cannons commanded by Mendo Mota, resisted the Spanish under the command of Duke Alba (Pimentel, 1879). At this time, this fortress is the most important on the coast of Arrábida and the Sado river (Nunes, 2015). During this time, the fortification underwent numerous changes and strategic improvements. In 1625, during the Philippine Dynasty, a lighthouse was built in the fort to guide the ships in the Setúbal bar.



fig. 39 | Fort of Santiago, West Side



Fig. 40 | Magazine Occidente, 1890

Two years after the restoration of independence, D. João IV, foreseeing the long war with Spain, ordered major enlargements to the fort and incited the Jesuit friar, mathematician and military engineer, João Cosmader, to the works of repairing the military buildings in Setúbal. It was the friar's intention to destroy the tower, but the king did not allow it (Macedo & Pinho, 2019). Thus, works begin on the fort in 1643, during which the fort undergoes a significant expansion (Nunes, 2015), responding to the new military techniques in effect that would only end in the following reign of D. Afonso VI, in 1657. The general image of the fort we see today is mostly the result of these major works ordered by D. João IV.

The next function that the fort would adopt would be that of a state prison. The prisoners were kept in the Outão Tower (Portela, 1882).

During the reign of D. Pedro II (1683-1706) the fort was again subjected to interventions (Pinho, 2020). The existing lighthouse was not visible on foggy days, compromising the navigational aid. Thus, in 1710 the decision was made to transfer the lighthouse to the Outão Tower. Following this work, the chapel dedicated to Santiago, the Fort's patron saint, was remodeled. This chapel has precious carved woodwork (Portela, 1882) and a coating of blue and white tiles, which can still be appreciated today.

João Rodrigues Mouro, a military engineer who designed and executed works in the Santiago Fort (Quaresma, 2009; Macedo & Pinho, 2019), namely a bastion and barracks (Quaresma, 2009; Leitão, 2018), drew up his plan in 1693 where the following spaces are identified: the Square of Weapons; the Keep; two drawbridges (one for land and one for the sea); the Fort's Pit and the Fort's Gate. The development of the fort towards the west is evident (Pinho, 2020). After the French Revolution in 1793, allied with England, Portugal went to war with France. It became urgent to reinforce all the forts on the coast, including Santiago's.

In the second half of the 19th century, attacks from abroad are practically non-existent and we witness a progressive decay of the coastal forts and the Santiago Fort is disbanded, like so many other coastal forts that, according to Aurelio (2019), in 1834 most were not functional.

It is important to reinforce that in 1882, Portela was already aware of the importance of preserving heritage, particularly the Outão Tower, arguing that despite its reduced use, it should be preserved as a national monument given its public interest for its history and architecture.



Fig. 41 | Postcard Sanatorium of Outão

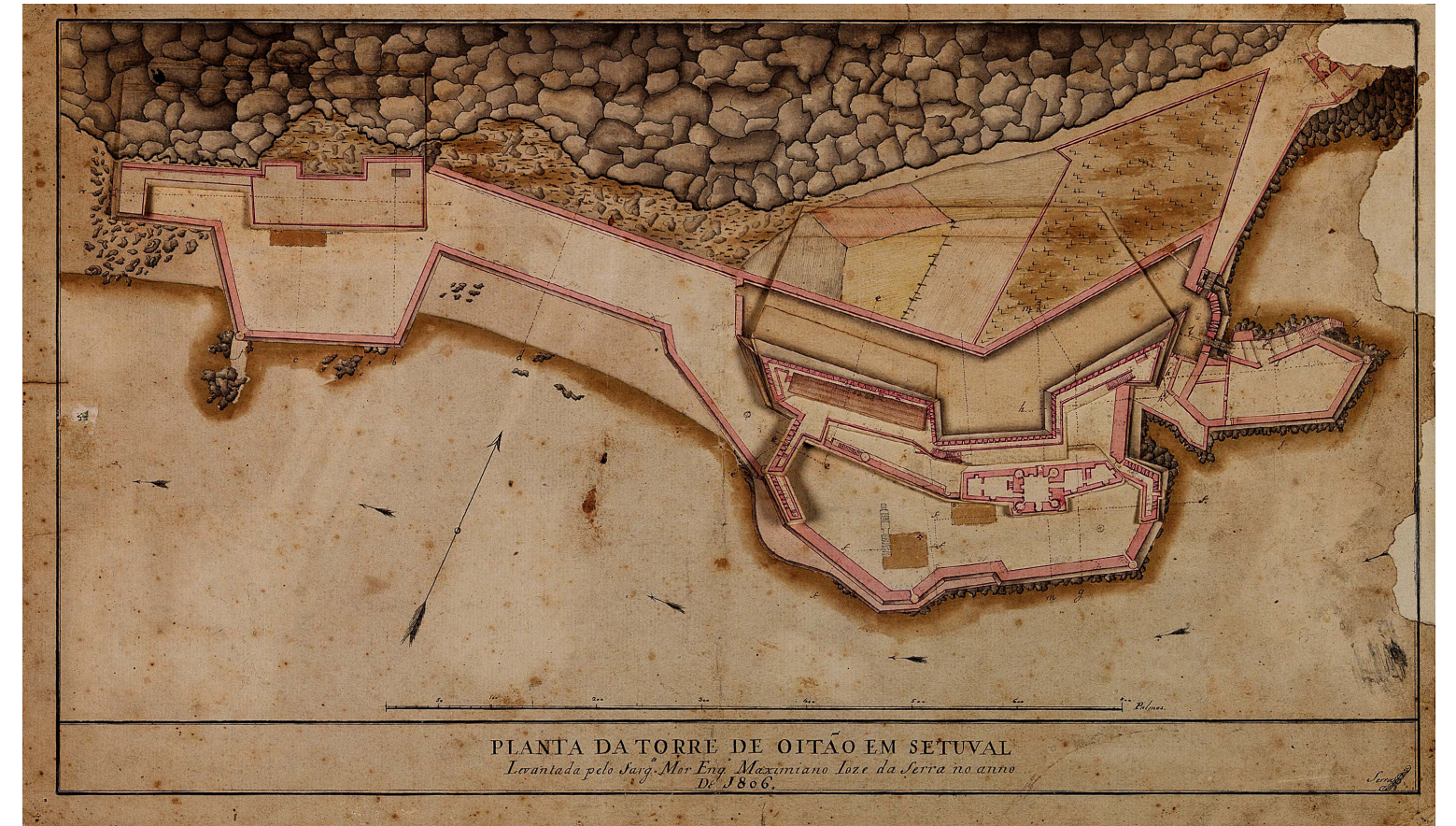


Fig. 42 | Map of Fort Santiago, 1699 - 1743

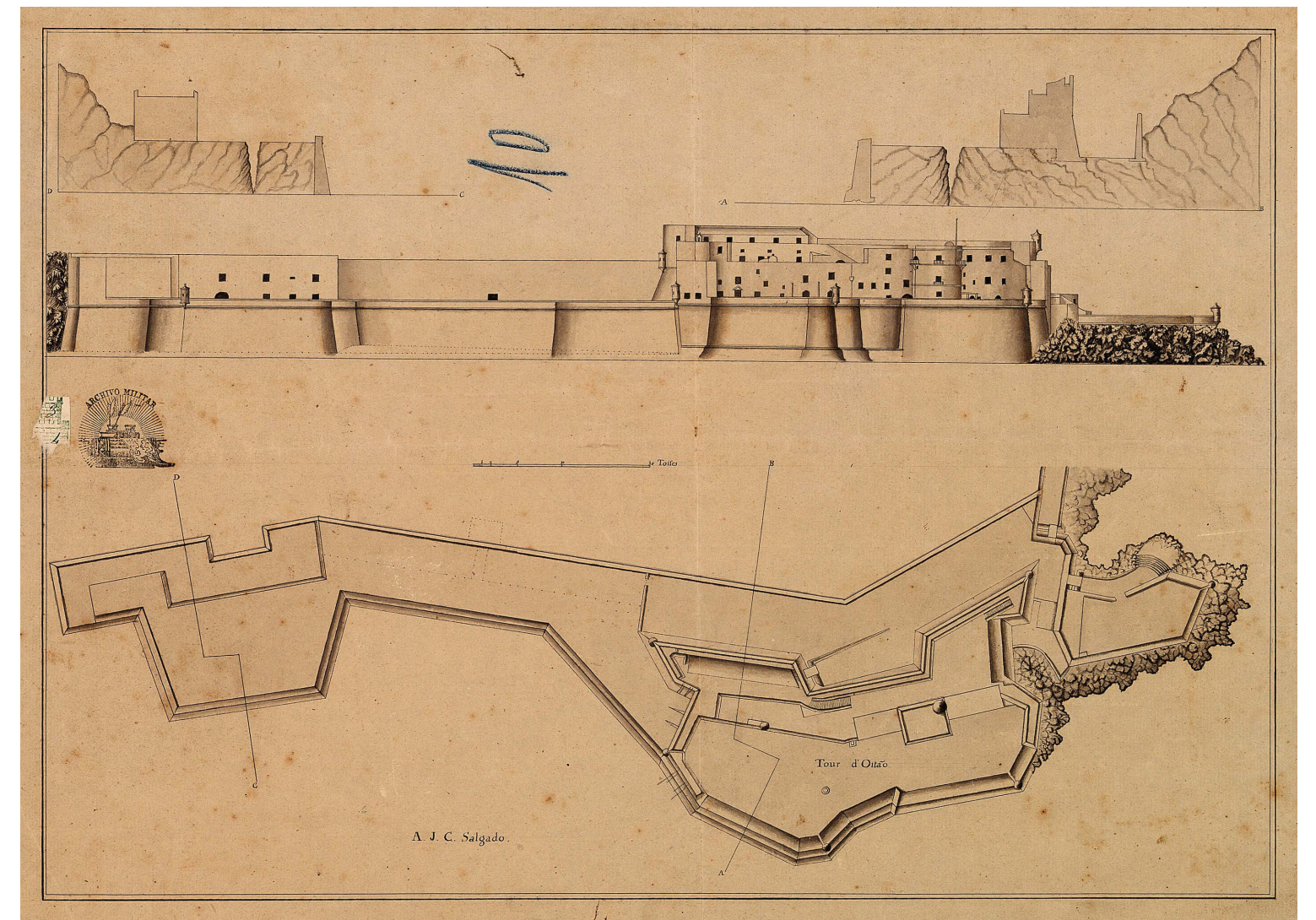


Fig. 42 | Map of Fort Santiago, 1699 - 1743

3.2.2 FORT OF SANTIAGO FUNCTION: ROYAL RESIDENCE



fig. 45 | Transformation in Royal Residence, Detail Door Handle



fig. 46 | Transformation in Royal Residence, Detail of the Ceiling

Given the loss of the military importance of the Santiago Fort and the unique geographical location of the fort, which provided a unique landscape where the mountains and the sea meet, D. Carlos I chose the fort as his summer residence. The construction works were under the direction of engineer Xavier da Silva, who created rooms decorated with mural paintings and carved woodwork.

The monarchy's spending was criticized by anti-monarchists, such as poet Guerra Junqueiro, whom in his poem *Finis Patriae*, dated 1890, criticizes the royalty's wastefulness in face of the people's poverty. The poet announces the end of the fatherland in a dark scenario where several characters of different social types and institutions speak, such as "peasants' shanties," "workers' pigsties," "fishermen's huts," "hospitals," "ruined schools," "jails," "convicts," "dismantled fortresses," "razed monuments," and "heroes' statues." Guerra Junqueiro includes the Outão Tower in this poem, to show a poor and undeveloped Portugal that contrasts with the royal luxuries (Afonso & Arango, 2010).

"Who are you then, who are you then, sinister Fortress,
That rises singing in this desolation!
The castle:
Night! Let it sing who's drinking at the table...
Silence! Long live the King! I am the tower of Outão!"
Guerra Junqueiro, in *Finis Patrie*, 1890, loosely translated by the author

This new function of the fortification had the short duration of three years, between 1889-1991 (Junior, 1901; Pinho, 2020), ceasing to be a summer residence due to the strong and dominant republican opposition in Setúbal, which stood in the way of the luxury of royal life when enjoying vacations at the Santiago Fort.



fig. 47 | Transformation in royal residence

3.2.3 FORT OF SANTIAGO FUNCTION: COMBAT OF TUBERCULOSIS

In 17th century Europe, tuberculosis kills approximately 300 to 400 per 100,000 inhabitants per year. The agglomeration of populations and the greater coexistence between them, resulting from the Industrial Revolution, contributed to this calamity. In addition to this situation, poverty, malnutrition (Doria, Duarte, & Saraiva, 2017), poor sanitation, stale air, and other factors resulting from the uncontrolled population growth and industrialization (Nunes, 2015) are experienced by the population in the 19th century, that which was forced to migrate to the cities. This scenario, which lasted until almost the middle of the 20th century (Nunes, 2015), is a public health problem that worried doctors, populations, and rulers (Doria, Duarte, & Saraiva, 2017), who were all directly or indirectly affected.

Portugal is no exception to the rule, and tuberculosis is responsible for the death of a significant portion of the population. According to Teixeira (1902), mortality from tuberculosis was 20,000 deaths per 4,500,000 inhabitants per year. There are records of the death of the monarch D. Pedro IV in 1834 and his daughter, Princess D. Maria Amélia, in 1852 from tuberculosis (Doria, Duarte, & Saraiva, 2017).

Cesário Verde (1855-1886), the Portuguese poet dies at the age of 31 from tuberculosis and writes the poem "Nós" about the death of his brother, also a victim of the same disease.

"We had returned to the accursed capital,
I came from polishing this quietly,
When a cruel misfortune befell us,
As one of us suddenly fell ill.

Tuberculosis opened caves for him!
I'm still feeling his deep coughing!
And I will always sadly remember the tender words,
With which he said goodbye to everyone and to the world!

Poor, strong, and full of future boy!
I don't know of any immense misfortune like yours!
He saw his end come like a dreadful wall,
And, unintentionally, afflicted and astonished, he died!

In such a way that I'm still disgusted and sour
With so much cruelty and so many injustices,
If I still work, it's like prisoners in exile,
With revenge plans and unsubmitive ideas.

And now, my life is so hard,
I have bad moments, so sad, so perverse,
That I only feel disdain for literature,
And I even despise and forget my beloved verses!"

Cesário Verde, O Livro de Cesário Verde (The Book of Cesário Verde), loosely translated by the author.

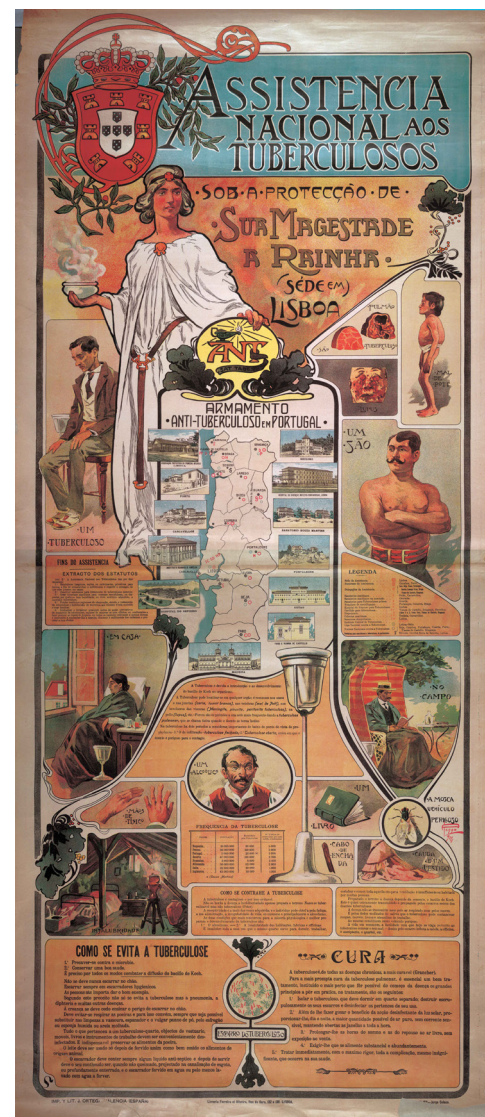


Fig. 48 | First Poster of National Tuberculosis Assistance, 1904

Fig.44 | "Tuberculosis is the greatest scourge of humanity alone; it kills more people than all other epidemic and contagious diseases put together"

Fig 45 | "Six million people die from tuberculosis every year: 600 millions died from tuberculosis in one century, approximately half the total population of the earth".



Fig. 49 and 50 | Article about the Tuberculosis in Portugal in "Revista Illustração Portuguesa", 1910



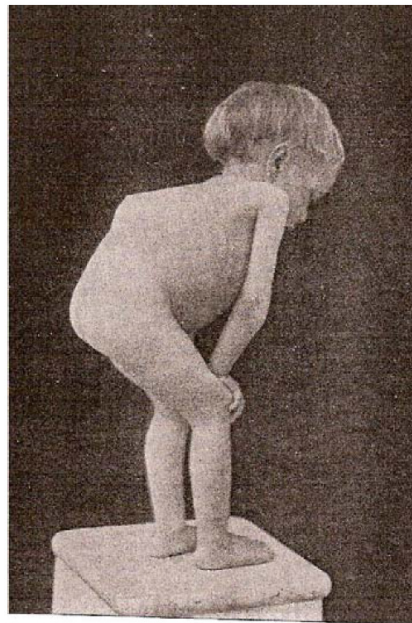


Fig. 22 — A. C. — Agosto de 1919.

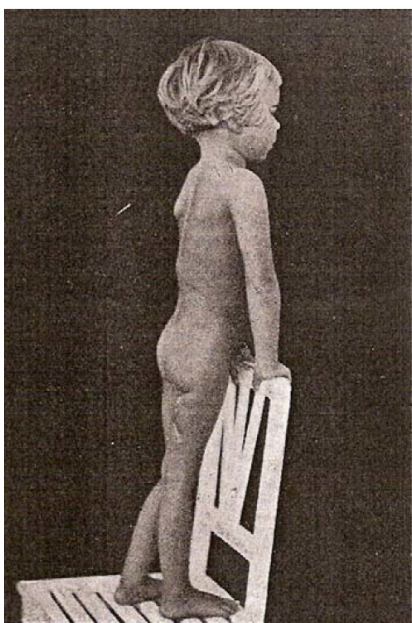


Fig. 23 — A. C. — Agosto de 1922.

fig. 51 | Evolution Treatment of a Sick Child with Tuberculosis, From 1919 to 1922

There were several variants of tuberculosis, including bone tuberculosis, which caused deformations in the vertebrae, long bones and hip and knee joints (Pinho, 2020). At the time, therapies were restricted to suction cups, diets, inhalations and sprays, ointments, iodide solutes, pills and pharmacy fortifiers. The idea that climate could be beneficial for treatment led to the construction of numerous sanatoriums. First, there were high-altitude sanatoriums which provided clear, fresh air for the treatment of pulmonary tuberculosis, then maritime ones for the treatment of bone tuberculosis in children. By this time, the antiseptic advantages of solar radiation had already been proven, and maritime sanatoriums had the added advantage added of the iodine emanating from the sea (Doria, Duarte, & Saraiva, 2017). In view of this catastrophe, in 1899, Queen Amélia founded the National Assistance to Tuberculosis Patients. Likewise, the Queen decided to offer the Santiago Fort to install a sanatorium for the treatment of tuberculosis and to head this new project (Doria, Duarte, & Saraiva, 2017). This generous initiative is praised by several authors of the time (Júnior, 1901; Lopez, 1900; Costa, 1900), and the Queen is named patron of the sanatorium (Costa, 1900).

It is by means of the creation of the sanatorium that the Santiago Fort definitely ceases to have the function for which it was conceived (military defense), instead being put at the service of health (welfare function). According to Lopez (1900), the Santiago Fort continued to have a combat function, although this was very different from the previous one, because now the combat is against the invisible bacteria of tuberculosis, which threatens to destroy the most precious thing mankind has, its health.

About the excellent conditions of the area, Lopez (1900) states that "Life in full freedom in the pure sea air, plenty of sunlight, proper nutrition, healthy climate and meticulous care of hygiene, all found in Outão for the little patients. There, the air, due to its maritime quality, is exciting; rich in ozone and electricity and contains remarkable proportions of sodium chloride, bromine and iodine, it is free of dust and organic impurities, as well as large fluctuations in temperature, humidity and pressure. The ground, limestone and permeable, is so dry that it is necessary to go far away to fetch the water needed for the hospital services, since the only water available is the one that accumulates in the fort's vast cisterns. The climate, tempered by the shelter provided to the north by the nearby Arrábida mountain range, is not harmed by any other settlement, since there is none nearby" (Lopez, 1900, p.9).

Given the natural and topographical features of the Santiago Fort site, such as the protection from cold winter winds by the Arrábida mountain range, the sea winds, a slope facing the sun with intense light, the steepness of the terrain allowing rapid water runoff, the predominant rainfall at night, and the almost non-existence of fog (Junior, 1901), this made it the perfect place for the effective treatment of tuberculosis.

On June 6, 1900, the Marine Sanatorium is inaugurated (Almeida D'Éça, 1900; Costa, 1900; Júnior, 1901; Lencastre, 1900; Lopez, 1900), becoming the first establishment of National Assistance to Tuberculosis in Continental Portugal. This is because, in 1862, Hospice Princesa D. Maria Amélia had been built in Funchal, in Madeira island, for the same purpose (Doria, Duarte, & Saraiva, 2017).



fig. 47 | Postcard of Northern Maritime Sanatorium, Valadares - Sunlight Healing



fig. 53 | Postcard of Northern Maritime Sanatorium, Valadares - The Company of The Sick Children



fig. 54 | The Nurses in the Operations Room, Sanatorium of Outão, 1934



fig. 55 | The Sick Children During a Birthday Party, Sanatorium of Outão, 1932

It was the beginning of a long journey in the adaptation of the fort to the health service that remains until today, now as an orthopedic hospital. Costa (1900) argues that Outão Sanatorium was not exclusively for the treatment of tuberculosis, but rather a sanatorium to prevent diseases through the action of air, light, and proper nutrition.

The Sanatorium was intended for children (Costa, 1900; Lopez, 1900; Almeida D'Eça, 1900; Lencastre, 1900; Junior, 1901; Doria, Duarte, & Saraiva, 2017) under 12 years of age, coming from poor households, with no electricity, space, comfort or hygiene, who could enjoy a unique landscape; below the extensive Sado estuary, above the Arrábida mountain range and between them a path of abundant vegetation (Lopez, 1900). According to the author, Nature, foreseeing this new function of the fortress, garnished itself with the blue of the sea, the mountains and the green of the vegetation. We think that, later, the sanatorium opened its doors to adults because we found photographic records that prove it, although we did not find written records that mention it. Only Costa (1900) states, when considering the temporary premises, that they intended to have a definitive sanatorium within a year and later extend it to adults.

Lopez (1900) does not forget the tower, stating that in the same way it "fought" against the violence of the sea, when contemplating it, children will have the strength to fight against the tuberculosis bacillus. Similarly, Almeida D'Eça (1900) contrasts the tower's initial function where the governors planned defense plans and severe punishments, with the new function where the superior of the religious order performed holy works of dedication and love for humanity.

Initially, the tower was used as it was, housing 38 female children. Although the tower had several compartments, only the larger ones and those with more light were used (Lopez, 1900), that is, 36 rooms (Junior, 1901). The rest were used for services (Junior, 1901), such as dining rooms, classrooms, nurses' dormitory, storerooms, among others (Lopez, 1900). The bulwark, protected by awnings, was intended for the children's outdoor stay (Almeida D'Eça, 1900; Lopez, 1900). An extensive esplanade was reserved, to the east, to later build an isolated space where the children should stay during the first week in order to diagnose the possibility of other infectious diseases, besides tuberculosis (Lopez, 1900).

However, Costa (1900) emphasizes the importance of works to build the definitive sanatorium, which should be completed after a year, and defines the main characteristics of the project to house 128 children, now of both sexes. These are: a long building on the great tower battery, where the main facade would face south, at a distance of a few meters from the sea, and the opposite side would be sheltered from the north winds by the slope of the Arrábida mountain; building with two floors, the first floor would be destined for the dining rooms, study and recreation rooms and the second floor would be used as dormitories.

The sanatorium's designer was engineer José Abecassis Junior, with a program outlined by the Technical Commission of the "National Assistance to Tuberculosis Patients" and supervised by the Lisbon District Public Works Service.



Fig. 56 | Postcard Maritime Sanatorium of Outão



fig. 57 | Sunbathing on the terrace of the old tower of Outão

A year later, in 1901, in the descriptive and justificatory memory of the Outão Sanatorium, in addition to the old tower, the project would have a 110 m long main building composed of three connected bodies, where the central one would have three floors and the side ones two floors. Around the main building were the nursing wards, the dining rooms, the study and recreation rooms, the electrical installations for lighting, the kitchen, the slaughter house, the annexes, the laundry, the disinfection services, the stables, the hayloft, the reservoirs for fresh and salt water and the lifting machines.

Pinho (2020) describes the distribution of these spaces by compartments in detail. The first floor of each of the side bodies is organized in a symmetrical and linear way, with a central hall. The hall gives access to two distinct and opposite areas: the dining area and support facilities on one side; and the study and recreation area and support facilities on the other. It is through the hall that one has access to the upper floor via a staircase. On the upper two floors there are two symmetrical wards connected by the duty nurse's room. The sanitary facilities were in an annex pavilion that was accessed through the north wall of the main building. In the central body there were rooms common to all the children hospitalized in the two side bodies. Around the main building to the north we could find the kitchen, the sanitary facilities, the laundry, the disinfection services, the steam pump house and the hayloft and the hayloft; to the west, the porch for washing; to the east, space for recreation and gymnastics practice; and in the lower battery, the two-story lazaretto, ensuring an isolated space for the children when they arrived at the sanatorium. By and large, this project would come to be fulfilled.

The existence of 74 windows on the main façade and 51 on the rear façade (Costa, 1900) denotes a concern with luminosity. Similarly, according to Nunes (2015) these were designed with air circulation in mind to ensure ventilation, with air entering near the ground and exiting near the ceiling, a system adopted in other health establishments at the time. The division of the sanatorium into three distinct bodies separated by firewalls and main walls, prevented the possibility of fire. According to Pinho (2020), Júnior, the designer, in aesthetic terms, opted for a language that respected the first function of the fortification, contrary to the trends of the time. Likewise, the concern with the costs of the job is also notorious, and the designer chose to take advantage of pre-existing constructions, for simple solutions, both in the interior decoration and in the infrastructure. For example, salt water was piped to the toilets, fresh water to the sinks, and both fresh and salt water to the bathtub. Electric lighting was produced by a steam engine.

Successive adaptations were made to keep up with medical progress in the area of tuberculosis treatment. Thus, there were solarium balconies, clinical analysis laboratories, radiology, and operating rooms, among others. There were even changes to the main façade of the building, but it is not known when they were made. Pinho (2020) mentions two alterations. The first was the construction of a body of balconies attached to the main facade of the west side body, which later extended to the entire facade, in order to increase the terraces towards the wards to allow immobilized patients to enjoy the outside. The second consisted in the expansion of one floor in the side bodies, leaving the building in one volume, the current day appearance.

Since tuberculosis treatments were prolonged and could last up to several years, the sanatorium, in addition to treating children, was also a home, where they lived as a family (Pinho, 2020). Teaching, cultural and even work adaptation activities were also created, which were design to be effortless and fatigue-free, according to the length of hospitalization, personality and aptitude of the children (Costa, 1900). Thus, the school was outdoors, the children practiced educational gymnastics and there were various workshops.

At the beginning of the 20th century, the Portuguese population was mostly Catholic, and religious orders played an important role in assisting the needy. The Outão Sanatorium mirrors this reality experienced in Portugal. In this context, it seems interesting to refer that Almeida d'Eça (1900) presents a schedule that was strictly followed by the children in treatment, which only the doctor would have the competence to change. Here, the author argues that although religious exercises were indispensable in a children's home, these should not be a cause of fatigue, neither by their duration nor by their frequency. Respecting already at that time the freedom of religion and belief, the author ensures that all children who do not profess the Catholic faith will have all the conditions to practice their services in the sanatorium. ccc

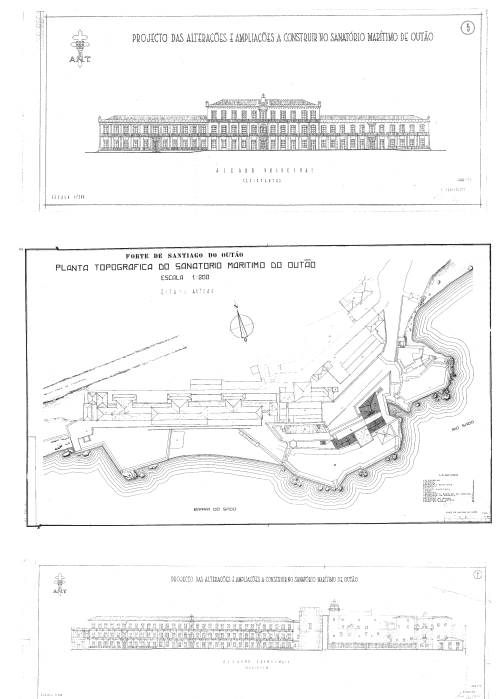


fig. 59 | Drawings of the Extension Project of the Sanatorium

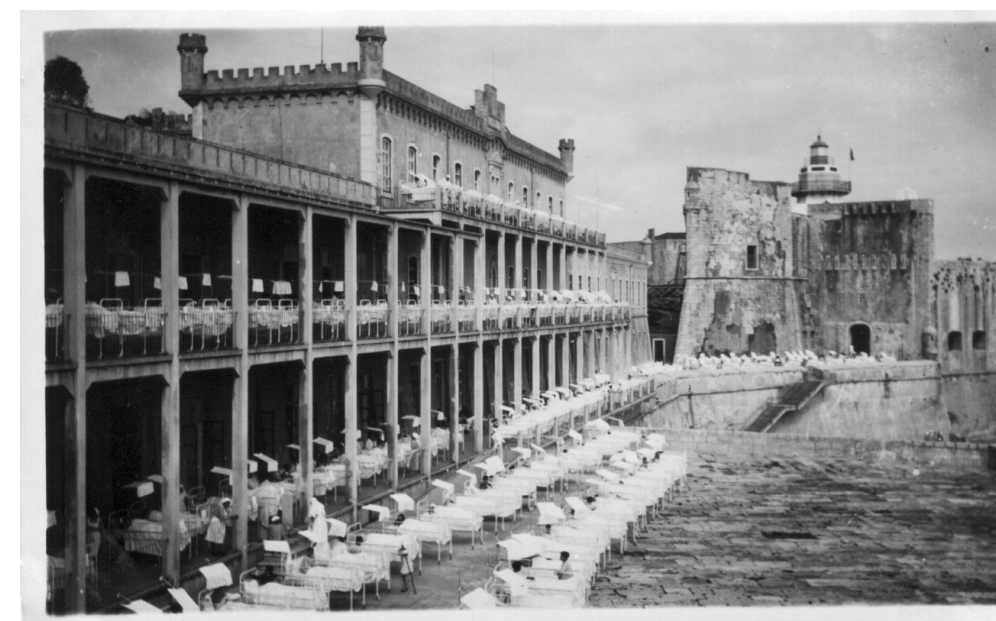


fig. 58 | Sunbathing on the galleries and terrace, Sanatorium of Outão

FORT OF SANTIAGO

3.2.4 AUDIOVISUAL AND PHOTOGRAPHIC ARCHIVES

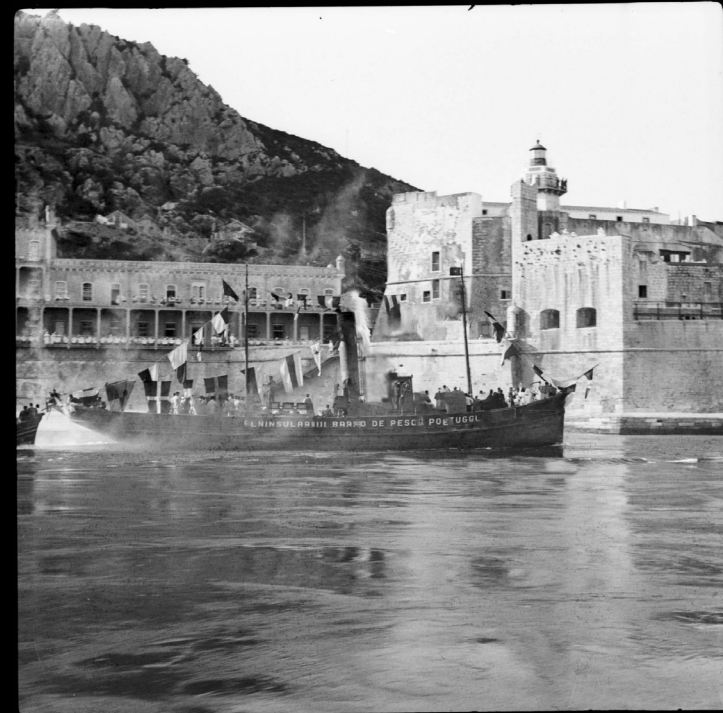


There are photographic and audiovisual records that depict the environment experience by the children in the sanatorium.

The figures are stills from the short film entitled "Setubal Sanatório do Outão" by the director Virgílio Nunes, in 1930 archived in Cinemateca Portuguesa: <http://www.cinemateca.pt/Cinemateca-Digital/Ficha.aspx?obraid=5321&type=Video>

In the following pages we present photographs of the Procession of Corpus Christi on June 5th, 1947 by the photographer Americo Ribeiro





3.2.5 FORT OF SANTIAGO
DRAWINGS



Fig. 80| Photograph of the Fort of Santiago from a sea

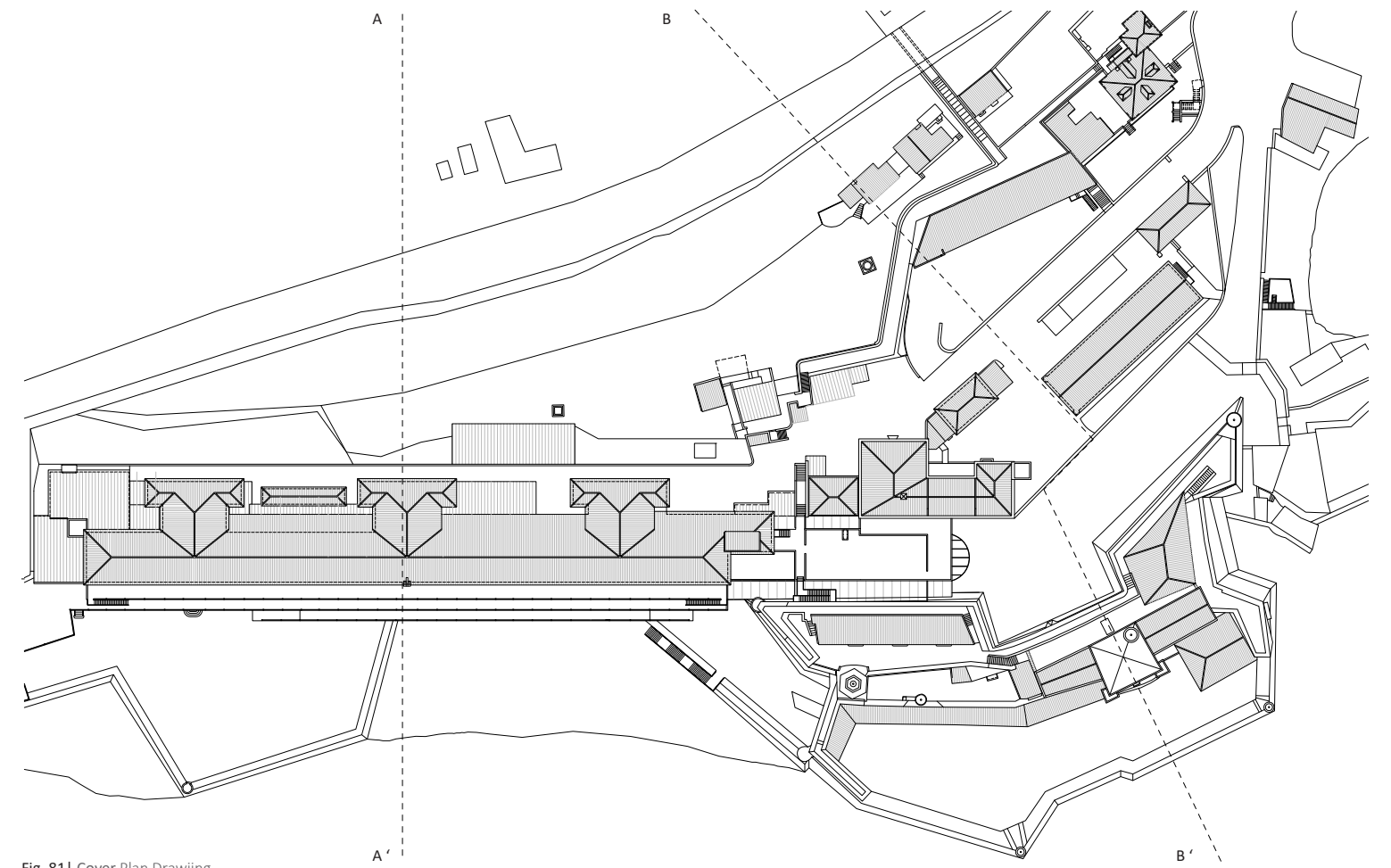


Fig. 81 | Cover Plan Drawing

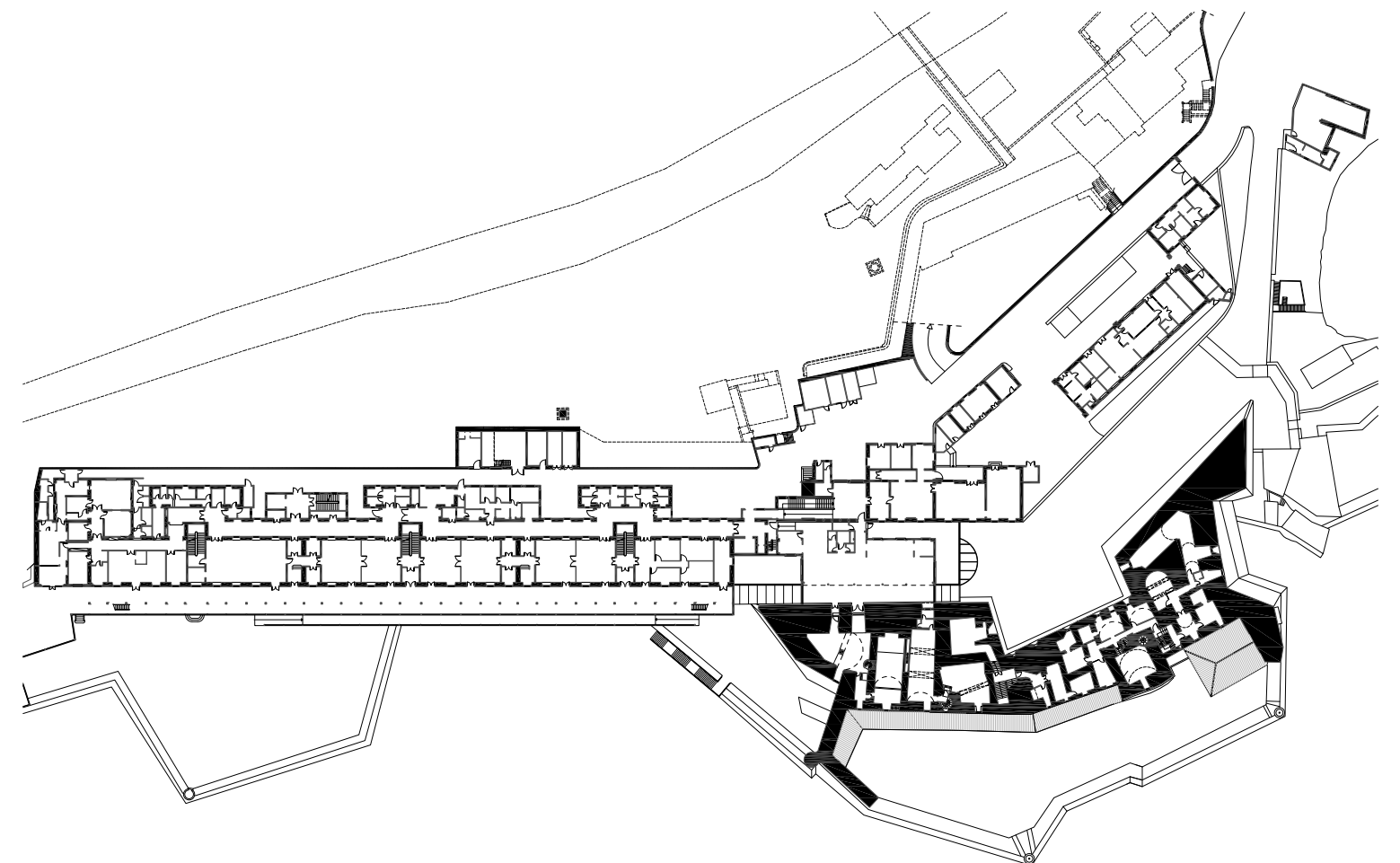


Fig. 82 | Plan Drawing of the second floor

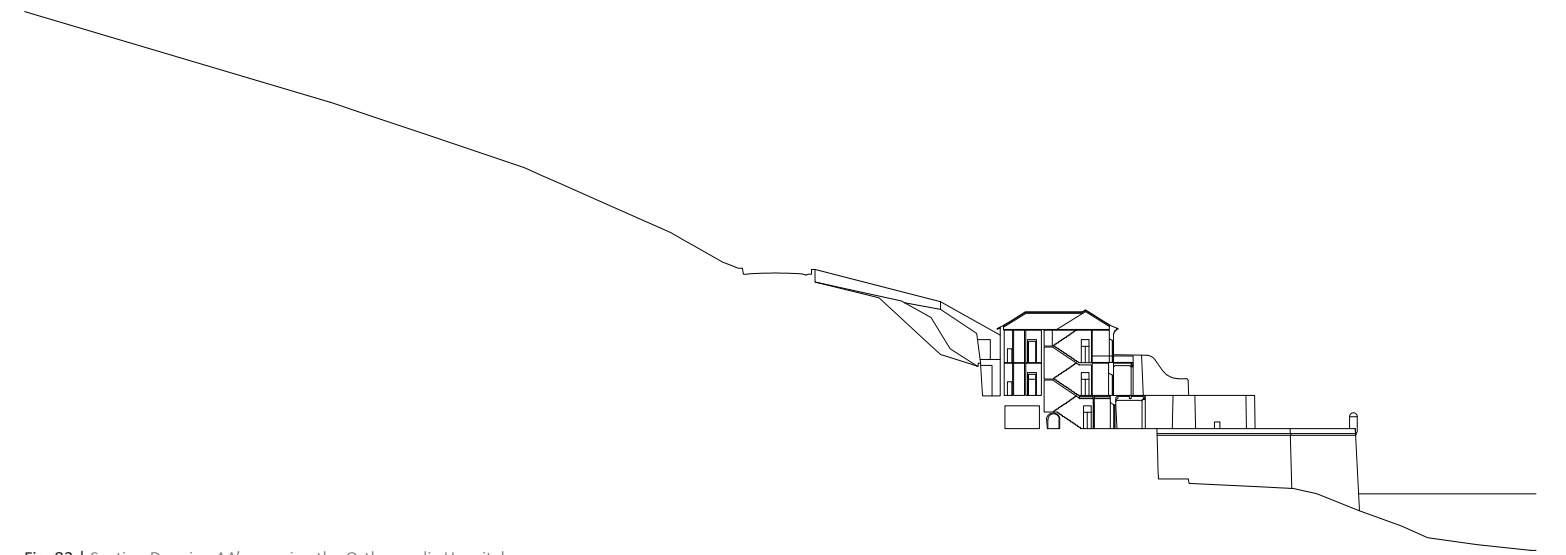


Fig. 83 | Section Drawing AA' - crossing the Orthopaedic Hospital



Fig. 84 | Photograph of Fort of Santiago from the west side

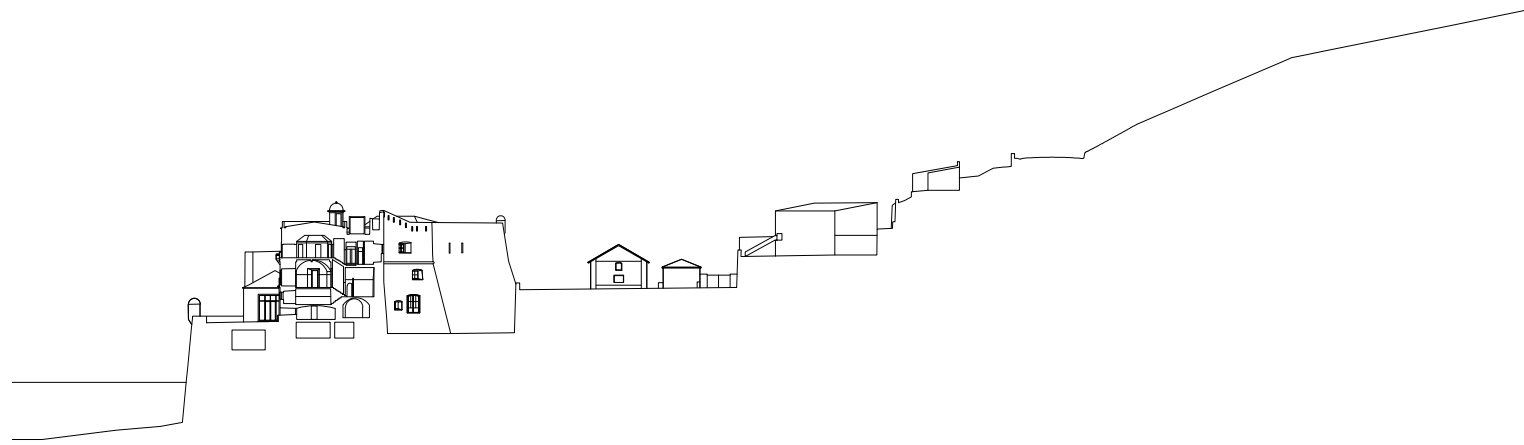


fig. 85 | Section Drawing BB' - crossing the Old Tower



fig. 86 | Photograph of Fort of Santiago from the east side

3.3 FORT VELHO



fig. 87 | Photograph of Fort Velho, 2022

*Atalhão que Mandou fazer Principe Dom Pedrozis na Serra da Labida, Prxima da Torre
 de Outão, de Senhado pelo Mestre de Campo Gaspar Pinheiro Lobo que Senho no Brasil.
 segue seu de Pontões e sua Estrada em cuberta de Injezita.*

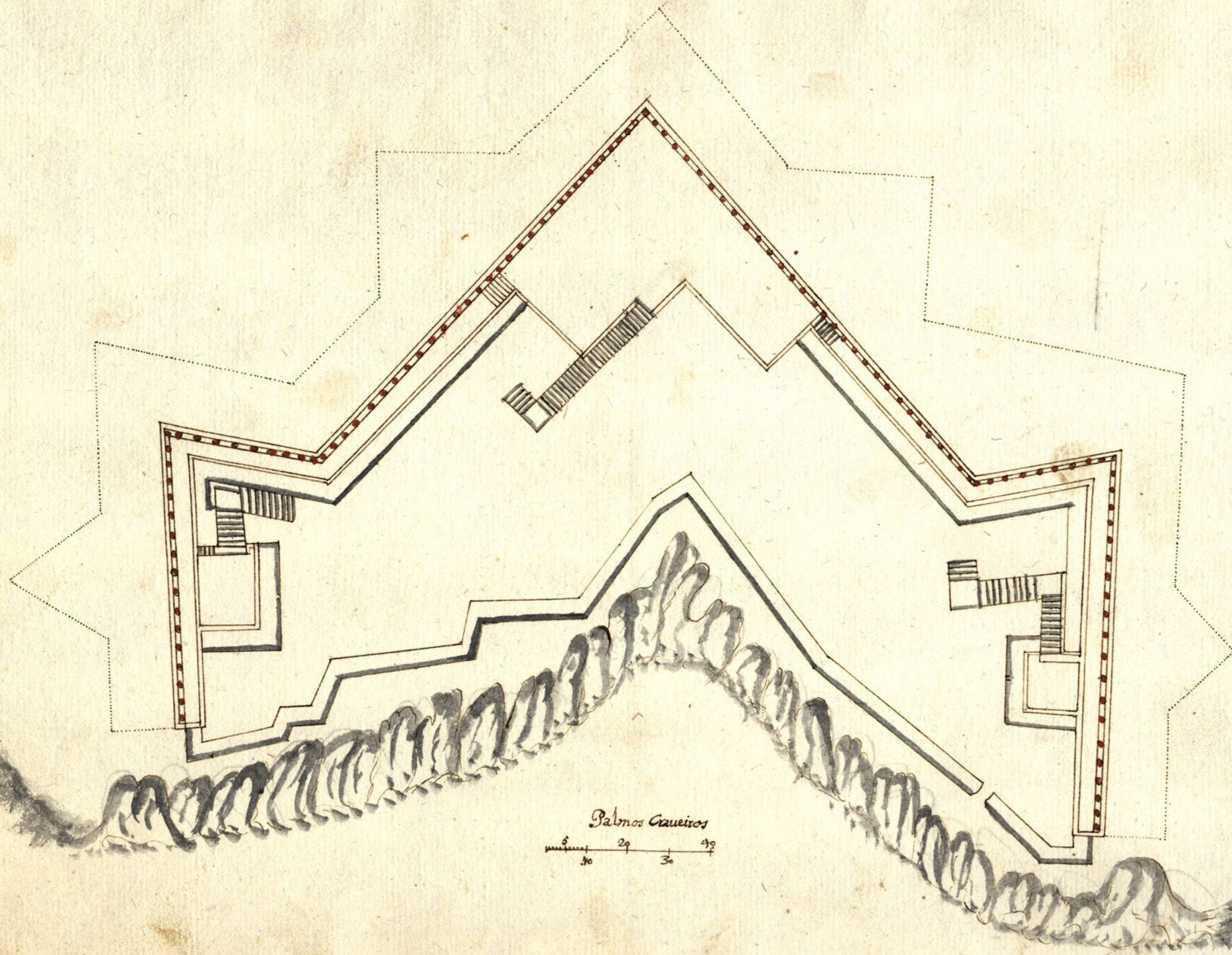


Fig 88 | Plan of Fort Velho.

3.3.1 FORT VELHO THE PLACE

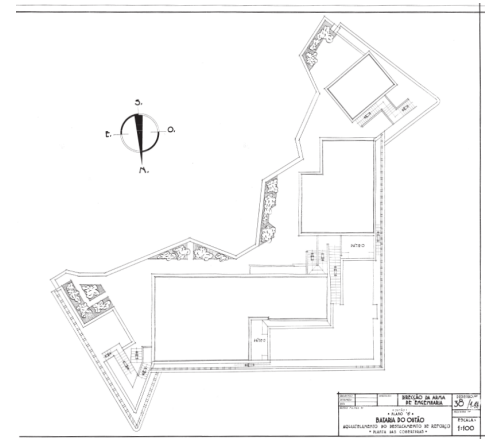


fig 89 | Drawing of Outão Battery: Cover Plan of Fort Velho

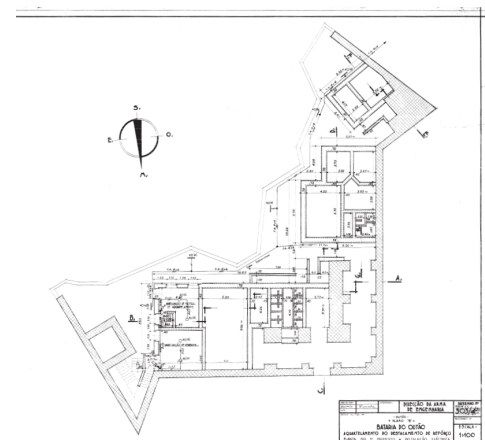


fig 90 | Drawing of Outão Battery: Ground Floor Plan Fort Velho

In 1580, the Spanish attack the Santiago Fort by land and not by sea, as would be expected, and were defeated in this invasion. Faced with the inability of land defense, the need arises to erect a tower on top of the rocky overhanging cliff, reinforcing the defense of the Sado bar. Thus, 9 years after the restoration of independence, i.e. 1649, the construction of the Old Fort began, also known as Atalaia or Atalaião, with its works completed in 1655. João Rodrigues Mouro, who was a military engineer, was responsible for some of its extensions (Quaresma, 2009). Mascarenhas (2014) hypothesizes that there was already a watchtower on the site, which seems very likely to us.

According to the Architectural Heritage Information System (known as SIP in Portuguese) of the Directorate General of Cultural Heritage, the Old Fort facing east is "built on a bastion platform, is articulated in staggered volumes, and has its respective terrace roofs with staggered plans; its whole presents a circuit of high, vertical walls that end in a balcony, hollowed out (where there could have been dog-kills (...)) is surrounded by wide openings, with terraces at different levels, with some slope for draining rainwater, communicated by stone staircases; the platform is polygonal in plan, irregular, with the tympanum traced in roundels, around the flanks facing Barra; the open gate on the facade facing N. is the access that serves the tower and the entrance to the tower. is the access that serves the tower and the barracks; it is in full-turn arch, rusticated, on which stands a coat of arms in stone with the weapons relating to the barracks based on the wall, the same that appear on the facade of the guardhouse."

Mascarenhas (2014) draws a parallel between the Old Fort and the Santiago Fort, mentioning that the positioning that each one has with the surroundings mirrors the differences between both. "The Old Fort, on top, is in a staggered position, hard, without water. It conceals itself in the crest of the rocky slope, leaving only the most attentive observer to guess its presence. Built to support the magnificence of the Santiago Fort, the Fort assumes itself as its faithful servant, hidden in the landscape. In opposition, we have the Santiago Fort, "below, at the noble level of the clear sea, in its proud sovereignty, it is bright and jovial. The volume of the old sanatorium itself gracefully displays the rhythmic facade, almost festive, receiving with dignity those who enter the Sado bar" (p. 74). The author concludes this analogy by stating that the Old Fort represents a place of isolation and the Santiago Fort represents a place of communion.

We find it strange that the fort is called "Old", since it was built three centuries after the Santiago Fort. It is probably due to the fact that, although it is more recent, the Old Fort has a more hidden, shadowy, sinister, misty presence high up on the cliff compared to the splendor, light and brilliance of the more visible and exposed Santiago Fort towards the sea.

Although the Old Fort is not a coastal fort, it can be seen as belonging to the coastal defence system (Mattos, 1941; Portocarrero, 2003), as it was possible to visually control a huge geographical area (Portocarrero, 2003) from it, extending the surveillance of the Sado (Mascarenhas, 2014), as well as reinforcing the defensive power of the Santiago Fort (Mascarenhas, 2014; Portocarrero, 2003). The military importance of Outão is, after the restoration, marked by the existence of the Old Fort and the Santiago Fort (Mascarenhas, 2014).



fig 91 | Drawing of Outão Battery: Perspective View of Fort Velho from North, 1947



fig 92 | Drawing of Outão Battery: Perspective View of Fort Velho from South, 1947

3.3.2 FORT VELHO DRAWINGS

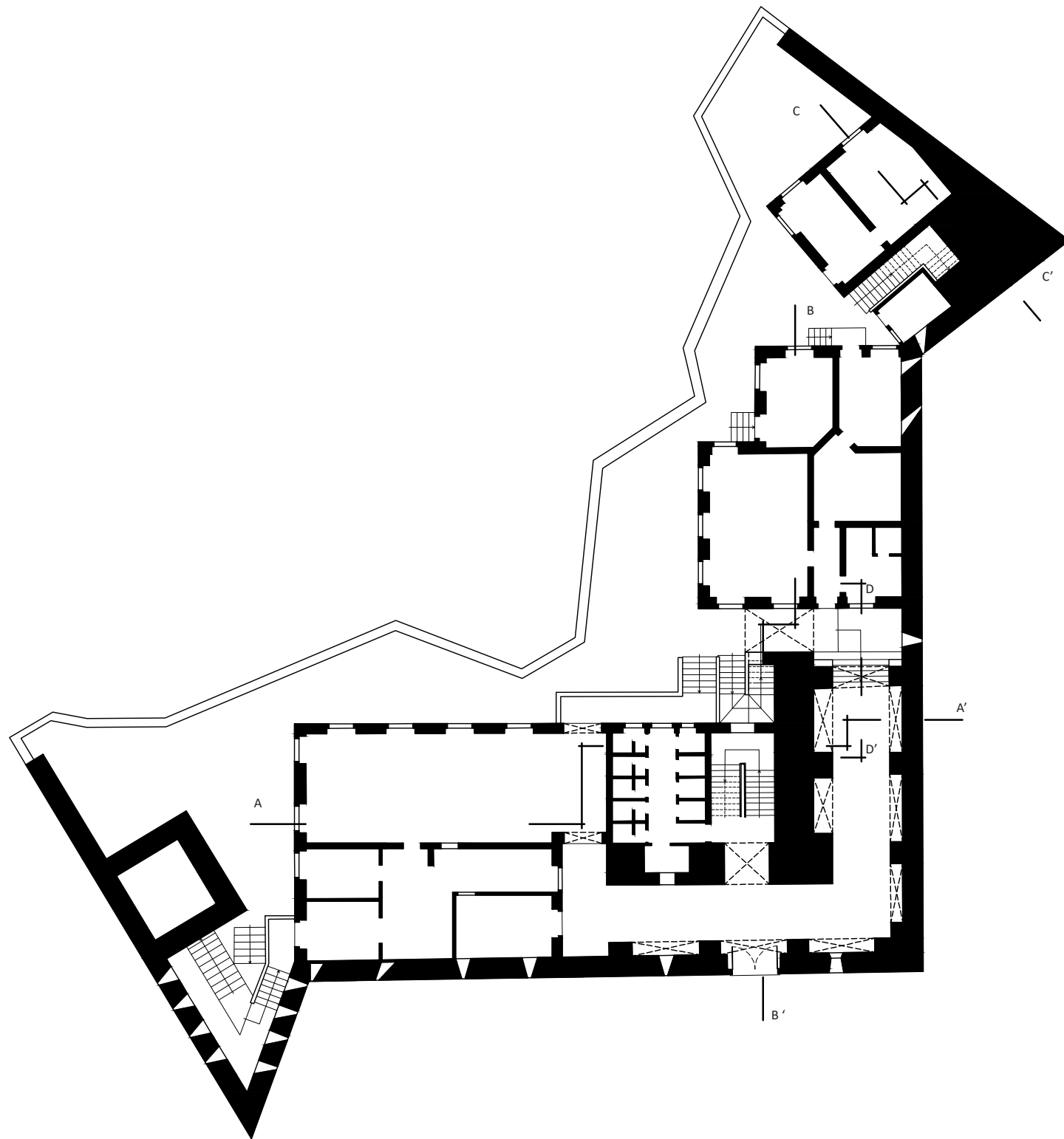


fig 93 | Ground Floor Plan of Fort Velho

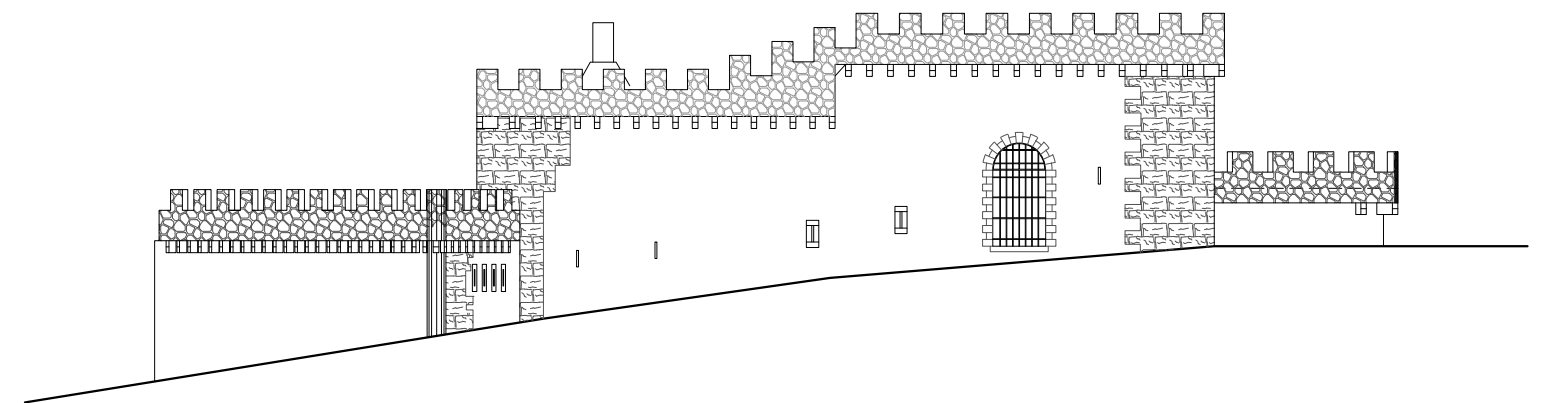


fig 94 | Main Facade of Fort Velho



fig 95 | Section AA'

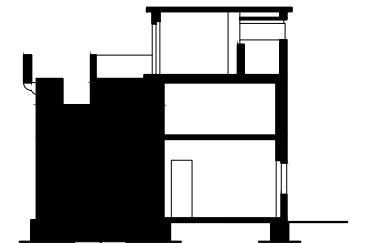


fig 96 | Section CC'

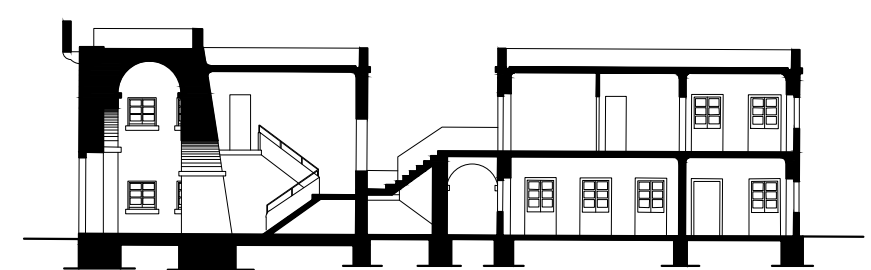


fig 97 | Section BB'

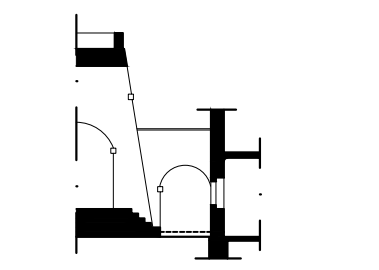


fig 98 | Section DD'

3.4 7TH BATTERY



fig. 99 | Photograph of a canon, 7th Battery, 2022



fig 103 | Firing exercise. Placing grenade and load in the ammunition elevator. Battery of Raposa, 1998



fig 104 | Firing exercise, Canon of British Material Vickers Armstrong of 9"2 (359). Battery of Raposa, 1998

(Pais, Hoffmann, & Campos, 2021). The Barron Plan was the last profound reorganization of the Coast Artillery (Machado, 2008). The Barron Plan required the construction of new fortifications and the modification of existing ones (Berger, Soares, & Anselmo, 2005; Pais, Hoffmann, & Campos, 2021) and other constructions, namely: command posts; observation posts; shelters for projectors and other equipment; buried cables or submarines for data transmission, barracks; among others (Pais, Hoffmann, & Campos, 2021).

The strategy used for the plan consisted of first identifying areas in the Lisbon and Setúbal region likely to be hit by shots from Washington Naval Treaty cruiser cannons, with a maximum range of 32 kilometers. From the midpoints of these areas, arcs of circles with a radius of 32 kilometers were drawn, and a line (bombing arc) was drawn on the outline of the set of arcs that delimits the space from which enemy ships can hit the vulnerable areas (Pais, Hoffmann, & Campos, 2021).

Initially the plan foresaw: a Coastal Defense Command; two Counterbombardment Coastal Artillery Groups (Lisbon and Setúbal) and two telemetry and observation networks; two Close Defense Coastal Artillery Groups (on the Tagus and Sado) and two defenses against small naval units, two illuminated zones, two discovery projector zones, a commanded mine belt, a river barrier for inner harbor protection and anchorages and moorings for inspection (Machado, 2008).

The Barron Plan is composed of eight fixed batteries, that is, firing base units installed along the banks of the rivers Tagus and Sado and camouflaged in the landscape, the batteries had the appearance of bunkers. Most batteries were placed in bunkers and underground armouries with high-caliber pieces (Aurelio, 2019). Similar to other coastal defense plans of Lisbon, Plan B is divided into north and south sectors. The north sector aimed to defend the Tagus River and the port of Lisbon and the south sector, the Sado River and the port of Setúbal (Aurélio, 2019).

The northern sector is formed by 4 batteries located respectively in Alcabideche, Parede, Laje and Belém, each consisting of three pieces Krupp or Vickers, with a calibration ranging between 5.6 cm (Belém) and 23.4 cm (Alcabideche). The southern sector also consists of 4 batteries, with three Krupp or Vickers pieces each, located in Raposeira, Raposa, Outão and Albarquel. The calibration varies between 15 cm and 23.4 cm, which is very high. The batteries were initially equipped with Krupp parts and later with Vicker parts, due to advances in artillery equipment (Limão, 2011). The former are German steel, with tube casting in one piece (Almeida, 1994) and the latter are English material. At the time the pieces were acquired the Krupp material was the best, but when it would eventually be needed, in World War II, it had become outdated (Machado, 2008).

This plan was executed in phases over ten years, i.e. between 1948 and 1958 (Aurélio, 2019; Machado, 2008). The first battery to be set up was in Parede, in 1948, and the last one in Raposa, overlooking Fonte da Telha beach, in 1958. However, due to financial difficulties, it was not fully implemented (Berger, Soares, & Anselmo, 2005; Machado, 2008).

Fig.12 | As represented in the picture the garrison of each canon is executed by nine men, one commander and eight serventes. Each one had a number on the back of his uniform, so that they could easily identify each ones tasks.



fig. 105 | Garrison of a Canon of Coastal Artillery C 15,2cm/47 m/44, Battery of Parede, 1982



fig. 106 | Canon of Coastal Artillery of Plan Barron, 1982

3.4.2 7TH BATTERY THE PLACE

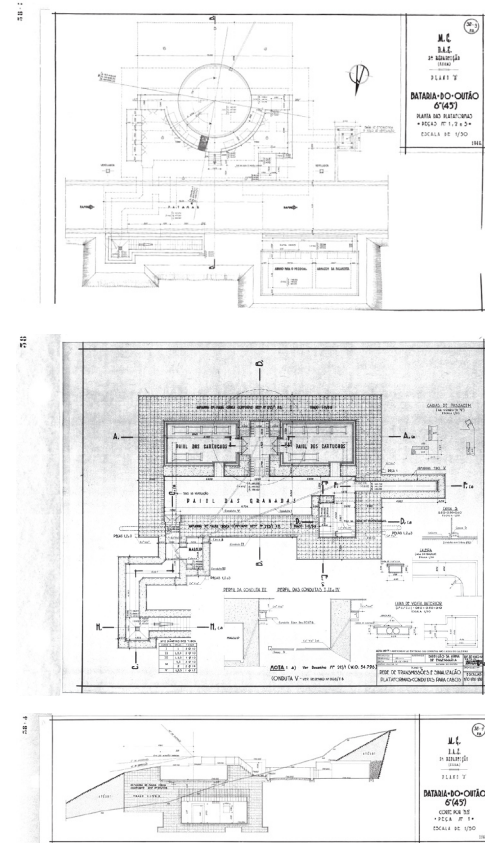


fig. 107 | Technical Drawings of an Artillery Piece of Outão

The beginnings of the 7th Battery of Outão date back to the year 1910, when construction of the Chã do Zambujal Battery began, for modern defense near the Old Fort. This was known as Antiga Bateria (Old Battery), although we only know of the existence of an opening of the accesses and excavations of significant depth in the East-West direction (Mascarenhas, 2014).

It is here that the 7th Battery of Outão was born, from works of expansion and restructuring of the Old Battery (Mascarenhas, 2014). However, facing southeast, this battery consists of the Old Fort, the barracks and the battery itself. In this set, scattered through the landscape, we still find the guardhouse, the officers' residence, the barracks, the covered workshop for vehicles, the generator, the water tank, the predictor and the rangefinder. These last two have the function of directly supporting the battery (SIPA). Outside the perimeter of the battery there are two projectors with their central generators (SIPA).

The Old Fort, already analyzed in the previous subsection, underwent changes since the battery barracks, with its respective command post, were built in the fort itself, both erected on an out-door pavement, covered by a roof terrace (SIPA).

The Outão battery itself was built after World War II in 1944, becoming functional in 1954. Besides defending the port of Setúbal and the Sado river, it increases the firepower of the 6th and 8th batteries (Alves, 2020). It is composed of 3 Vickers artillery pieces, of English origin, 15.2 cm (Berger, 2005; Machado, 2008), with a range of 24 km (Mascarenhas, 2014) directed toward the south; The garrison of each piece is formed by a commander and eight servants (Mascarenhas, 2014).

According to the testimony of Alpedrinha Pires, in Gonçalves (2019), since the artillery pieces had to "hit the whole mirror" it made it impossible to build in height above them. This fact had an impact on the urban profile of the Lisbon coastal strip.

Although the 7th Battery was never used for the purpose for which it was designed, i.e. an offensive military structure against a real target, fire drills were conducted with some regularity (Machado, 2008), usually twice a year, at the end of each recruit (Gonçalves, 2019). The military panorama was not a battlefield one, but one from a defense system (Pais, Hoffmann, & Campos, 2021). In view of this apparent uselessness of this battery and the others that made up the Barrow Plan, in his interview to the Público newspaper, Colonel Alpedrinha Pires argues that its function as a deterrent should not be disregarded because general officers from friendly countries and diplomats were invited to attend the firing exercises, showing the defense capacity and effectiveness of the nation.

During the exercises, air and sea traffic in the Lisbon and Setúbal areas was interrupted and the population in the areas surrounding the batteries was warned because the exorbitant and deafening bang of the shots made the earth shake and its effect was felt in the nearby buildings. "They would play that typical tsunami siren for people to open their blinds and windows, make the shots and then ring again to

warn that they had finished the test" recalls Marco Neves, a local resident, in the interview by Gonçalves (2019).

The shooting exercises were only possible because the batteries were located near protected coastal areas, where housing construction is not allowed (Machado, 2008), as is the case with the 7th Battery.

According to the author, the moment is described as extremely stressful for the soldiers; "Everything was shaking in a bestial, deafening way. There was always some soldier who got scared, ran away, or was in a state of shock," reports Assistant-Sergeant Luís Figueiredo (Gonçalves, 2019).



fig. 108 | The Three Canons of the 7th Battery

3.4.3 7TH BATTERY OBLIVION AND ABANDONMENT

With the total commitment of the Portuguese Armed Forces in the Portuguese Colonial War (1961-1974) against the forces organized by liberation movements of Portuguese colonies in Africa (Angola, Mozambique, and Guinea Bissau), the Coastal Artillery lost its functionality. Only at the end of the conflict, due to the Revolution of 25th of April of 1974, the operability lost in the 60's was regained. According to Berger (2005), from 1976, cutting edge technology was introduced because of financial constraints- it was a less expensive national solution but equally viable compared to those existing abroad. The Coast Artillery Regiment was extinct due to a Portuguese Army's restructure and allegedly there was a lack of personnel for all artillery pieces. In 1999, due to those factors, the future of the batteries was uncertain and at the mercy of chance, with no forecast for a cultural classification and proper history of its heritage.

With a progressive urbanization of areas where the batteries were installed and no threats coming from abroad, in this political context in Portugal after the 25th of April, most of the batteries were deactivated. According to Coronel Alpedrinha's testimonies (Gonçalves, 2019), the approach to the urban tissue had an important role in deactivating the batteries, as the effects of shooting exercises were so harmful (broken glass, fallen false ceilings, beeping car alarms, etc.), that was planned some compensation for its damage and a team traveled through the area and visited the population to calculate damage.

Located in areas with protected landscape where construction is restricted, Outão and Raposo Batteries were closed down later, first in Outão (1992), and later in Raposo (1998). On the morning of December 10, 1998, Raposo's battery opened fire for the last time (Gonçalves, 2019; Berger, 2005). Almost 100 grenades weighing more than 170 kilograms each were fired from the three cannons and the impact of grenades on the sea was felt at land (Gonçalves, 2019).

The 1st Battery in Alcabideche was transformed into a public-private hospital in 2010. The end of this battery is surreal to say the least. Initially, destruction of artillery's three pieces was planned, but explosives were spent on the first one. Faced with this unusual event, Pais and colleagues (2021) ironically stated that this bunker would never succumb to a traditional demolition as it was designed to withstand war bomb explosions. The project was changed, and the hospital was built on top of a defensive underground structure and only one cannon is visible, serving as a roundabout in the hospital parking lot (Gonçalves, 2019).

There is a plan to restore the 2nd Battery in Parede, in a Military Museum of Coastal Artillery since 2014. However, up to date, the project has remained as a set of good intentions on paper and the structure is in complete abandonment, vandalized and coated with graffiti. To make matters worse, part of the collection for the future museum was stolen.

3rd Battery's current state, in Laje, contrasts with the 4th Battery's one, in Belém: the 3rd is neglected and the 4th is one of the best preserved. Having been recovered by Association of Commandos (Associação dos Comandos), on the 4th Battery was installed a museum dedicated to military action throughout the history of Portugal, entitled Museum of Combatants' League (Museu da Liga dos Combatentes). There is a plan to create three spaces, in the old bunkers to perpetuate the history of commands, of their associ-

ation and of 3rd Battery itself. Until then, this space is open to the public with other purposes, such as a restaurant, and areas for tree climbing, slide, camping, and picnic. Southern batteries, 5th and 7th, are in a state of general disrepair, where we find rubble and shrapnel scattered throughout the rooms in the 7th Battery. 6th Battery will be managed by the region's municipality to guard beaches and reinforce fire-fighting. The 8th Battery, the last battery in the south region, was sold to a private entity, which intends to build a real estate project.

In specific situations, concerns about the future of batteries in ruins can be felt. As an example, there is the main prize in an international competition with a project to recover the 6th Battery in a center for observation and study of coastal strip's conditions. However, this was never carried out. Coronel Alpedrinha states that "a complete battery as this one, in its state of conservation, is unique in the world." Likewise, in the 7th Battery, a public tender taking place with the intent of exploring it for tourist purposes, with a hotel or other projects related to tourism.

The word "heritage" is part of our daily lives, and it is associated with something positive and important in life, an asset that must be preserved at all costs. It is used in several areas, namely in culture, environment, tourism, advertisement, among others. (Cabral, 2011). Thus, cultural heritage, both tangible and intangible, assumes an increasingly central role in our lives in society.

Regarding Barrow Plan, it should be seen as heritage with a particular cultural interest that is associated with recent memories of war (Pais, Hoffmann & Campos, 2021). As we have already mentioned, for these authors, authorities and local society are not aware of the interest and cultural relevance of these military batteries. This awareness becomes even smaller when we think of batteries as a set compared to each one individually. This erroneous and unacceptable thought, according to the authors, justifies the individual sale of batteries, without any overall consideration or asset classification.

Colonel Alpedrinha, in an interview with newspaper "Público", also accuses the entities in charge of a deliberate disinterest in the batteries, allowing their degradation to the limit, in order to nullify their cultural and historical value and, thus, justify options that best suit them (Gonçalves, 2019). Alpedrinha is sorry for this abandonment, referring that "This situation is unfortunate because of the pernicious way in which the heritage is managed and released" (p.).

Political inaction on the batteries' degraded and unacceptable state led to founding Association of Friends of Portuguese Coast's Artillery (Associação dos Amigos da Artilharia de Costa Portuguesa), which aims to classify artillery for the sake of preserving an extremely valuable human heritage.

Due to its extraordinary location with a panoramic view over the sea and the mountains, 7th Battery of Outão is frequently visited, even though it is vandalized and obsolete. In our understanding, its problem lies in the fact that its military structures are dispersed and disconnected, and that they are from different historical periods. In this sense, there is a need for a new identity/intervention that connects the spaces and guides the visitor to understand and discover the place in the best way.

3.4.4 7TH BATTERY MILITARY MEMORY AND HERITAGE

Since the site of intervention carries a historically relevant military building, which is currently abandoned, it is important to reflect on military memory to discuss its future. "Military heritage always brings an intensive debate about military symbolism and memory about the exercise of power over space, freedom and well-being." These structures are charged with "memories of war, aggression, and power" (Pais, Hoffmann, & Campos, 2021, p. 4615). In this sense, we cannot reflect on military memory without considering the conservation of its historical-military heritage.

We highlight the international conference "Military Landscapes. A Future for Military Heritage" international conference, in 2017, had as a theme "that of abandoned military structures, for a new reconversion to military, civil, cultural and tourist use of an important and strategic part of our culture heritage, in a dimension of great divulgation" (Marota, 2018, p.184). The main objective, architectural and landscape heritage reflection, not only as a historical-testimonial reflection, but also in its relationship with the socio-anthropological implications in which this heritage is embedded.

Specifically addressing the bunker debate, Beck (2011) states that "the bunker as a site of power in much of the work discussed is approached not only as a historical artifact, but as a deeply ambivalent structure that speaks to contemporary anxieties about the location and accountability of the systems of authority and control that the bunker represents" (p. 80).

When discussing batteries, we cannot fail to mention architect Paul Virilio (1932-2018). In his book "Bunker Archeology", from 1975, there is a subtle reflection of Le Corbusier as they both share the same passion for reinforced concrete and the robust way in which it is used. Several authors mention this recognition, such as Leach (1999) when he found that "In Virilio's textures images of these massive concrete forms, with their crude imprints from the wooden shuttering, one senses a fascination that parallels Le Corbusier's passion for *baton brut*, the conscious use of these imprints, which became a form of architectural signature" (p.73). Virilio read the bunkers as a "defensive architecture" (Virilio, 1975). A "survival machine" in Virilio's words.

For Garrett & Kindle (2019), since the Cold War bunkers have not been properly attended to according to the pace of change, nor have they been viewed with the evolving space archetype. Instead, bunkers have been neglected as a re-emerging form that is connected to the past, but different from it.

According to the authors, Virilio's thought was responsible for the prevailing concept of bunkers, that is, as a defensive architecture, a concrete casting and a ruin, having made impossible a debate about their function, materiality and temporality. Disagreeing with the passive-aggressive nature and merely concrete materiality of the bunker proposed by Virilio, Garrett and Kindle (2019) state that they do not conceive the idea of the bunker as a simple human protection space and advocate a more expansive conceptualization that is attentive to the bunker as a site of extermination; one should assume the concrete materiality of the bunker through an expanded typology, using a diversity of materials and environments;

and one should conceive of it as an obsolete preciousness, enabling the continuous construction, re-appropriation, and re-imagination of this architectural form. In short, they argue for its aggressive nature, complex materiality, and its continued importance for the appreciation of batteries.

While understanding the importance of bunker monumentality according to Virilio, Pais, Hoffmann, and Campos (2021) argue that bunkers, including those in the Barron Plan, should combine cultural and natural heritage with sustainable development.

It is important to do a retrospective, albeit succinct, to understand the current framework of cultural and natural heritage Cultural internationalism stemmed from World War I, with the creation of the League of Nations. After World War II, in a scenario of destruction of historical buildings, cities and landscape (Pais, Hoffmann, & Campos, 2021), characterized by issues of cultural superiority, among others (Gomes, 2020), there is a greater interest in the past and its importance for the well-being of the individual and societies (Pais, Hoffmann, & Campos, 2021).

It is in this context that the United Nations (UN) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) emerge (Sousa, 2018). This body, with its Centre for World Heritage (PM), has as its advisors the Rome-based International Centre for the Study of the Conservation and Restoration of Cultural Property (ICCROM), the International Council on Monuments and Sites (ICOMOS) and the International Union for the Conservation of Nature (IUCN) (de Campos & Murtinho, 2017).

Over time new historical heritage values have been included, such as the natural value and the intangible value of culture. "Cultural heritage does not define static identities. It is by incorporating and assuming new realities and new modes of use, based on the dynamics of recognition and appropriation, that emotional bonds of belonging are created, between communities and heritages, in a guarantee of continuity of use of memory machines, both in the present time and for the future" (De Campos & Murtinho, 2017, p.147).

In the 17th edition of the World Heritage Convention, the value of nature was considered for the first time as a cultural interest of Man. In this document, we can read: "Noting that the cultural heritage and the natural heritage are increasingly threatened with destruction not only by traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction; Whereas the deterioration or disappearance of any item of cultural or natural heritage constitutes a detrimental impoverishment of the heritage of all nations of the world" (UNESCO, 1972, p. 1).

Currently, we are witnessing a greater awareness and recognition of the value of cultural heritage as a refuge of a collective identity, which in current days has become a structuring and strategic axis for the sustainable development of the territory (de Campos & Murtinho, 2017).

7TH BATTERY 3.4.5 DRAWINGS

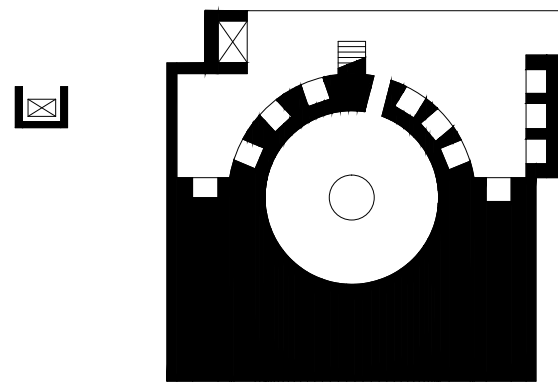
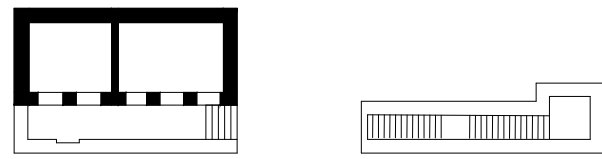


fig. 109 | Overground Plan

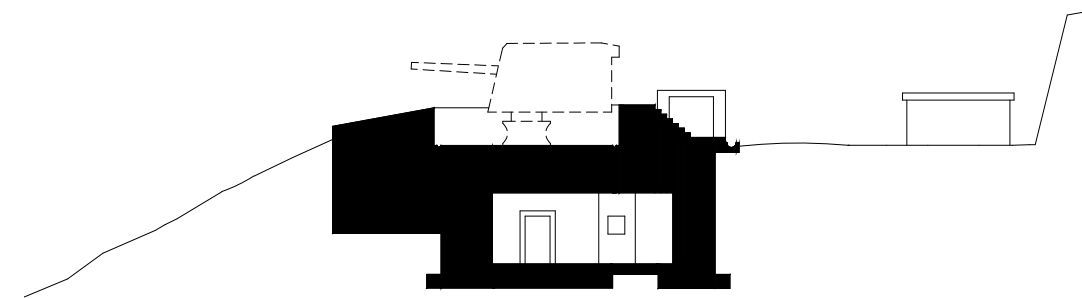


fig. 111 | Transverse Section

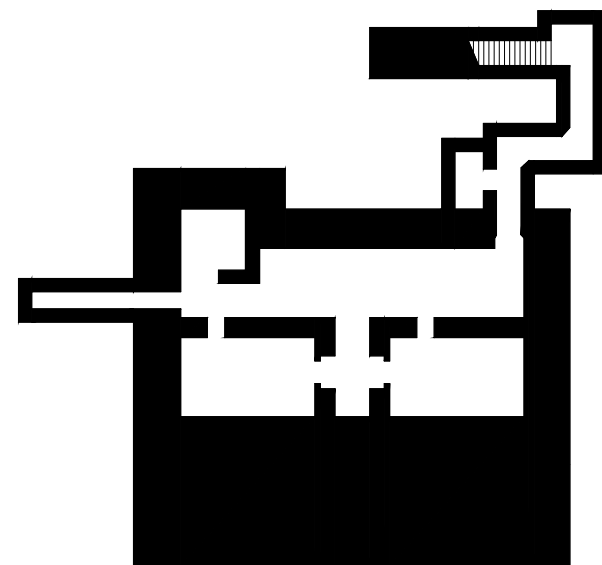


fig. 110 | Underground Plan

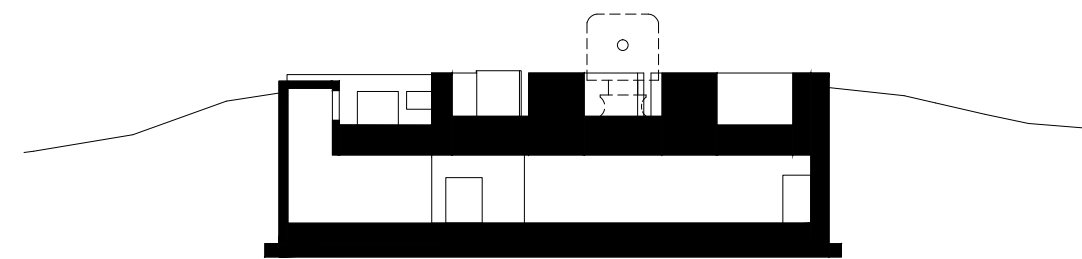


fig. 112 | Longitudinal Section

IV THE POETICS OF BUNKERS

4.1.1 CAMUFLAGE DESIGN SEEING WITHOUT BEING SEEN

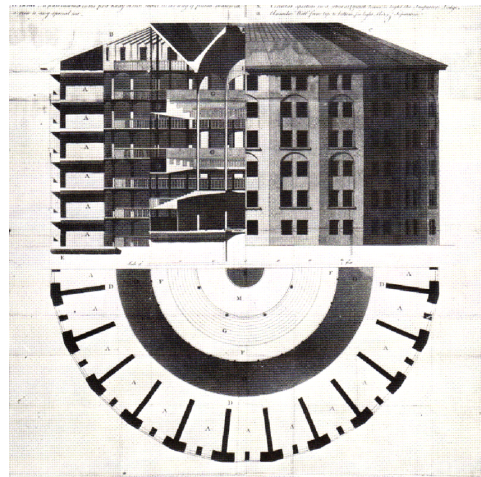


fig. 113 | Drawing of Panopticon Prison, 1791

With the understanding of the evolution of coastal defense typologies described in the first chapter (Tour, Bastion and Bunkers) we can succinctly mention that fortifications over time have become lower and lower, getting closer to the ground, and when it comes to bunkers, they have evolved to become partially underground.

While fortifications before bunkers were true symbols of power and dominance, expressive marks in the natural landscape as clear messages of intimidation that should be seen from a long distance (Mascarenhas, 2014), the bunker typology is actually characterized by the technique of concealment in the territory. This consists of small, mostly underground constructions, galleries and storerooms, usually made with camouflage devices. According to modernist concepts, the bunker's construction is extremely resistant and the use of cast iron in combination with reinforced concrete stands out. It is comprised of more or less continuous entrenchments, shooting batteries and fast communication routes (Pais, Hoffmann, & Campos, 2021).

These fortifications, like the Barron Plan batteries, were well adapted to the terrain and concealed from the landscape, in order to decrease their visibility, allow fire from a protected position and surprise the enemy with the shot when entering the cannon's range. The bunkers were designed as a response to the new control and surveillance devices (Foucault, 1975), representing a pragmatic response to the evolution of artillery and radar.

The first coastal fortifications such as towers and bastions were located over the sea at the extremities of the shore. The new fortifications (firing batteries) were now located on higher points away from the coast, so as not to be seen, having a wide field of view. This remoteness is due to the significant increase in the range of the cannons, as is the case of the Barron Plan, where there is a range of 24 km, allowing less visibility and a more direct relationship with the landscape and topography.

The principle of "seeing without being seen" (Bentham, 1791) is fully present in the fortifications of this era and refers to Jeremy Bentham's panopticon concept of control, where people obey rules and norms when they know they may be being watched. This theory was developed 200 years ago, when Bentham created an architectural prison model and an innovative control system, which has been viewed as the most thorough combination of physical and social engineering ever devised (Strub, 1989).

Its main feature was an architectural design that allowed continuous surveillance of all prisoners by a single guard. Bahamueller (1981) describes it as "invisible omnipresence" (p.189), to describe the illusion of the guard being divine. Although it is physically impossible to observe all the cells simultaneously, the fact that the inmates are not able to see the guard and are therefore unaware of when they are being observed, they are motivated to behave as if they are being observed.

"Accordingly, it was modeled after a wheel with hundreds of cells in several stories circling the perimeter and facing the center. At the hub in the middle of the circle was a cylindrical observation tower of several levels. The huge intermediate space between the tower and cells was to be covered by a glass skylight resulting in a bright, air enclosure" (Strub, 1989, p. 41).



fig. 114 | "Seeing without being seen", Lookout Post, Battery of Parede

CAMOUFLAGE DESIGN

4.1.2 WORKING WITH TOPOGRAPHY AND LANDSCAPE



fig. 115 | Site Plan of Chichu Art Museum

The idea of the building adapting to the terrain and reducing its impact on the landscape is something that has been seen in the contemporary architecture of our time. As an example, there is the Japanese architect Tadao Ando with several projects hidden in the landscape and in extreme harmony with it. One of Ando's characteristics is that his buildings have a reduced impact on the landscape, in fact they adapt to it and work with the topography.

"What I constantly thought about was how to lower the architecture into the contours of the ground so as not to ruin the natural topography and landscape. In other words, my concept was to bury the architecture into the nature."

Tadao Ando (Pallasmaa, Mrduljaš, Šerman, Skansi, & Bedenko, 2018).

Tadao Ando was responsible for creating conceptualized museums, often located in natural areas. In his work, the role of territory and landscape, as preliminary to architecture, becomes omnipresent.

Tadao Ando built the Chichu Art Museum in 2004 on the island of Naoshima, Japan, turning it into an island of art. The museum was built on the southern slope of a hill, where there was a pile of salt. The architect takes the notion of underground excavation to the extreme, as the entire building is buried, preserving the salt flats. The building is completely hidden in the topography; in an aerial view, the only visible part of the building are the courtyards with pure geometric shapes dug into the hill, as if it were a bunker sunk into the landscape. From the building's entrance one cannot see the museum. The building is reminiscent of an archaic coastal military defense.

The museum comprises a trunk of galleries connected to an entrance hall and offices, where each one is organized around a sunken courtyard (triangular and square respectively). Both parts are connected by a long narrow open-air pathway, reminiscent of a trench. The museum features the permanent collection of Claude Monet and contemporary artists Walter De Maria and James Turrell. It is interesting to note that the artworks on display are very diverse, namely painting, sculpture, and the study of natural light. The artists and Tadao Ando work closely together to create unique environments for each piece.

According to Park and Kang (2021), the Chichu Art Museum is a *"representative underground museum in terms of sustainable relationships between architectural spaces and nature, such as through light, dark, and geometric form, with sublime experiences based on the correlations between architectural spaces and artworks"*(p. 2).

Although it is important to understand the relevance of Virilio's bunkers' monumentality and form, we believe that it is more pertinent to look at the camouflage aspect of the bunkers and its harmony with the topography and landscape. In other words, in contemporary area, in our opinion, it is more relevant to minimize the impact of a building and to have balance between the construction and the landscape,

rather than imposing a structure on the surroundings. The idea of harmony and understanding the context is more interesting to us than creating a physical form that can be placed anywhere, like some modernist ideas.

"What is important are the ideas and the creativity to read the context of a place. This means that an urban project does not necessarily need to result in architecture that has physical form. Indeed, I believe that this is where the key that will lead to the architecture of the next generation lies."
Tadao Ando (Pallasmaa, et.al., 2018)

One characteristic of underground spaces that is relevant in this regard is that when they are built they do not create a visible form, offering greater freedom in terms of design. Often architects are bound by a limit of form. In the underground space, designing is different, that way it is done changes, it becomes freer as there is no concern with visible form from the outside.

Since the intervention area of the 7th Battery is a place of protected landscape and has historical monuments that are considerably imponent, we consider that the most appropriate intervention will be to work with the topography and preserve the landscape by having a low and partially underground building without taking the protagonism away from pre-existing buildings. In a way, the act of burying architecture is directly related to the idea of camouflage that bunkers use.



fig. 117 | Buried in the Hillside, Chichu Art Museum

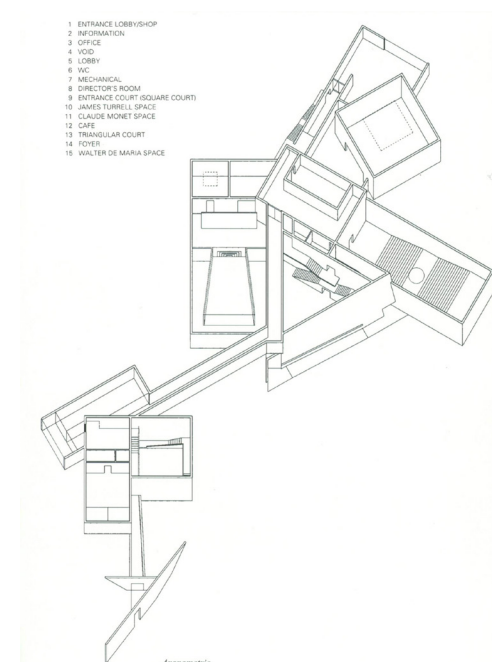


fig. 116 | Axonometry of Chichu Art Museum

4.2.1

SUBLIME EXPERIENCE ASTONISHMENT AND TERROR



fig. 118 | Painting Sea Shore in Moonlight, 1836



fig. 119 | Painting The Third of May 1808, 1814

Philosophers have debated the concept of the Sublime since the 1st century AD, such as the philosopher pseudo Longinus, who wrote the book "On the Sublime". The author defines the sublime in literature as "the echo of great soul" (Longinus, 1907, p. 61). According to the author, greatness in literature is ascribed to qualities innate in the writer: elegant and eloquent phrasing intended to inspire passion. This work was a source of inspiration to some philosophers, such as Edmund Burke (1729-1777). It is Burke who develops the concept of sublime in aesthetic terms. He believes the sublime is our strongest passion, and is grounded in terror (Burke, 2020).

"The passion caused by the great and the sublime in nature, when those causes operate most powerfully, is Astonishment; and astonishment is that state of the soul, in which all its motions are suspended, with some degree of horror" (Burke, 2020, p. 74).

In modern days, we usually use the word sublime to describe something extremely beautiful. In contrast, Burke (2020) describes the bases of beauty and sublime as being actually opposite. Unlike the beautiful, the sublime experience is a feeling related to pain or danger that is not threatening to life. Beautiful refers to small things that may be smooth, diverse, delicate, clear, or bright, while the sublime connotes great qualities, such as uniformity, power, obscurity, and sobriety (Shelley, 2006).

"For beauty is nothing but the beginning of terror which we are barely able to endure, and it amazes us so, because it serenely disdains to destroy us. Every angel is terrible" (Virilio, 1975, p.139), says Rainer Maria Rilke (1875-1926), Austrian poet and novelist, in his collections of poetry titled "Duino Elegies".

In the painting of "The Third of May 1808", created in 1814 by Francisco Goya, we can see the aspect of power and horror. We can experience the sublime through the painting because there is a sense of fear, but it is not threatening to the spectator's life that watches from a distance. We need to be safe to experience the sublime.

The notion of obscurity is a strong characterization of the sublime. The ocean can be terrifying because of its vastness where we cannot see the end, and we do not know what it is underneath the surface (Sea Shore in Moonlight). The darkness, light, and shadow can also contribute to the sublime experience. A punctual light in a dark environment can be astonishing and contribute to this experience (Fig. Sea Shore in Moonlight).

To sum up, "the sublime is more than simply an aesthetic trend; it is a holistic experience, encompassing all aspects of life" (Park, & Kang, 2021, p. 3). According to Burke (2020), by offering an alternative and aesthetic direction to understanding modernity, the sublime enables a new architectural discourse. Park and Kang (2021) add that new paths that open up with sublime help in understanding space's architecture, especially underground spaces, which we will focus on next.



fig. 120 | Painting Isle of the Dead, 1880

4.2.2 SUBLIME EXPERIENCE UNDERGROUND SPACE

Underground space seems to have been associated with death ever since ancient times. For example, we have the Hypogeum of Hal Saflieni in Malta, which is the oldest specimen of a prehistoric hypogeum from the year of 4000 B.C. It was initially a sanctuary and later a necropolis. The hypogeum has three underground levels, with galleries, tunnels, and small rooms connected together, over an area of 500 m². Its beauty lies in the complexity of its system of galleries, as it is one of the two most complex and monumental systems in the Mediterranean, whose interior construction structure mirrors a highly elaborate symbolic and cultural diversity (Jener, 2006).

In the Greek civilization, "the fear of emptiness or of a supraterritorial world of despair" is at the origin of the Cults of Ministry, such as the Mysteries of Eleusis, religious rituals with extreme symbolic value performed between the sixth and fourth century BC (Frontisi-Ducroux, 2017). In Ancient Rome, throughout the thirteen years of its empire, there was an evolution in customs and the appearance of new religious currents. This meant that the lack of space and the price of land led to "the expansion of surface necropolis with the annexation of underground parts, the hypogeums and the famous "catacombs", when the nature of the soil allowed" (Voisin, 2017).

In classical antiquity, death was believed to be a natural process of life, similar to what is believed today (Godelier, 2017). However, in these civilizations, where Hades was the god of the underworld and the realm of the dead, the underworld is seen as a conceptual space, where fear is close to terror and horror, rather than a substantive space (Park & Kang, 2021).

The underground space is both a space of fear, which drives man away, and a space of death, from which man wants to distance himself, even though death is a natural state. However, these spaces are not only marked by fear, but their darkness is also pleasant due to the unknown infinite space that emerges and offers new possibilities by expressing a vision of underground spaces not yet known (Park & Kang, 2021). Thus, "the underworld is something entirely different, neither nasty nor beautiful" (Park & Kang, 2021, p. 5).

In his book "Journey to the Center of the Earth," Jules Verne (1828-1905), writes about the journey of three characters to the center of the earth and the underworld. Wrapped up in intense darkness, the characters long for occasional moments of light, which illuminate the spaces that are hidden by the darkness. The emotions experienced are simultaneously a source of fear and a source of pleasure that arises from the unknown. The author describes the anguish felt by one of the characters who finds himself alone in a dark, silent space. Sensations of abandonment, loneliness, claustrophobia, powerlessness and terror are experienced by the character, who finds himself trapped in a layer of rocks.

"The dark spaces are where the psychological space expands to become the experience of the sublime. Through intense light ... darkness expands into the space of the sublime experience" (Park & Kang, 2021, p. 4).

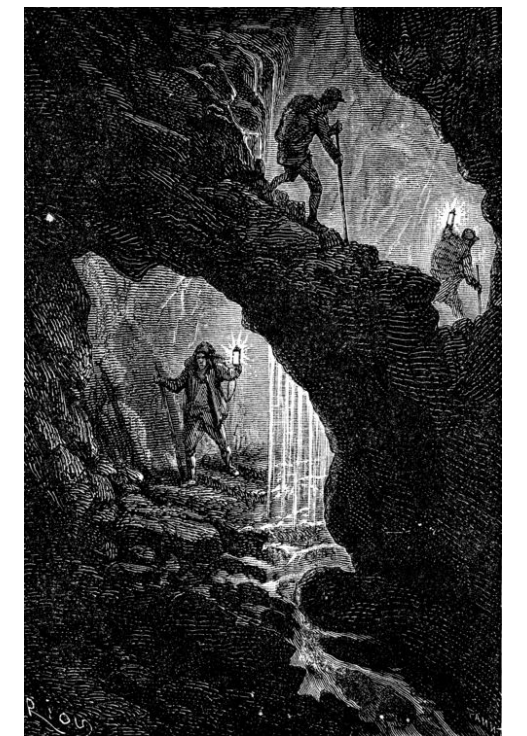
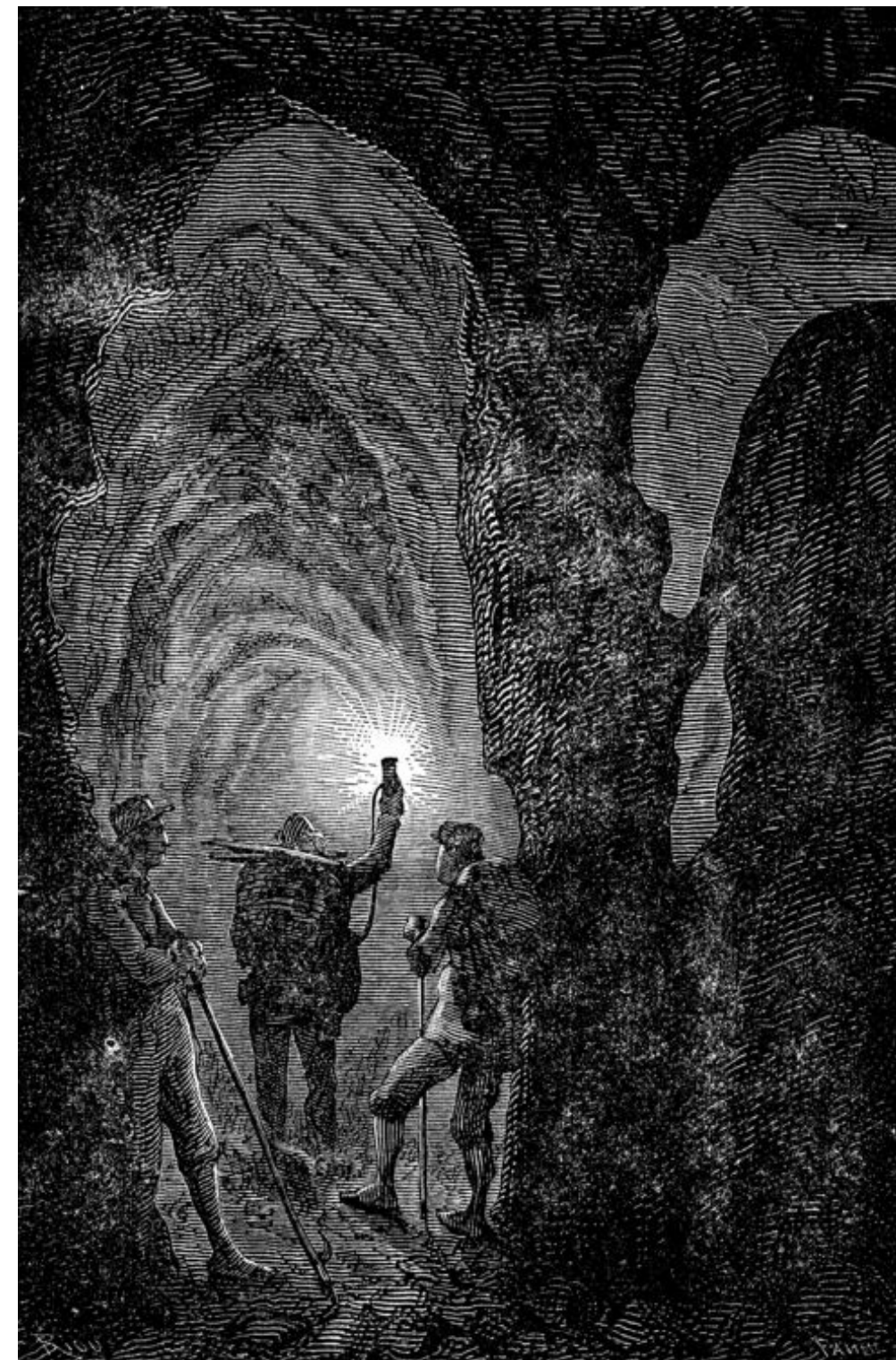


fig. 121 and 122 | Illustrations for the novel "Journey to the Center of the Earth" by Jules Verne, 1864



fig.123 | "Underground", Battery of Alpena

Park and Kang (2021) systematize the characteristics of sublime experience in underground imagery. These are: underground spaces are simultaneously spaces of fear and pleasure, for the infinite space of the unknown; dark space becomes progressively light, broadening into the space of sublime experience; and infinite spaces are approached with contrast between light and dark to trigger the imagination.

The idea that sublime has some degree of terror, fear and power creates a direct link with the characteristics of the bunkers and underground spaces. The bunkers are structures of power that can be terrifying, obscure and unknown, which make us feel impotent and insignificant and that is the reason for making us feel astonished and amazed.

"For me the bunker is a kind of metaphor for suffocation, asphyxiation, both what I fear and what fascinates me" (Virilio, & Lotringer, 2002, p. 23).

We cannot help but make reference to the architect Paul Virilio (1932-2018) when we talk about batteries. In this quote by Virilio (2002), there is a direct connection with the idea of Burke (2020) that describes the sublime with this connection between passion and fear. In the presence of fear, all capacity to act and reason is compromised. There is no other passion whose effect is greater than that of fear. Since fear is an apprehension of pain or death, fear acts in such a way as to look like real pain (image of the bunker).

According to Burke (2020), the obscurity and darkness can amplify the sublime experience. Although light itself can also be sublime. Imagining we are in darkness in an underground space, like the bunker, and to then go outside to a place full of light, that experience can also be profound and sublime.

In his book "Bunker Archeology", Virilio (1975) catches one's attention is the hauntingly sublime images of the silent monuments of war, set against the natural beauty of the Atlantic coast. Rainer Maria Rilke says: "The beautiful is just the first degree of the terrible" (Virilio, 1975, p.139). This is where we begin to sketch an important feature of Virilio's thought, the obsession with the sublime (Leach, 1999).

4.2.3 SUBLIME EXPERIENCE SOME DEGREE OF HORROR CAN TURN TO GOOD

The sublime experience, despite coming from a place of fear, can be essential and helpful for our life. It is helpful for a strange reason; it makes us feel insignificant and impotent. We usually hate to feel small; we cannot stand being humbled or reminded of our insignificance.

When we feel small in some ways, we become good and large in other dimensions. Parts of egoism and pride seem less impressive, so we might be moved to be more tolerant and less wrapped up in our concerns. It lets us feel impotent, more humble, compassion, and forgiving. Burke saw the sublime as a useful corrective it restores perspective. It is a psychological maneuver that can benefit us in many ways and shows its utility whenever there is an excessive tendency to get caught up in the details of an immediate situation. It lets us put things in a bigger perspective and prioritize what is essential and the short time we have to live, making us live a more fulfilled life.

The sublime emerged, at first, in connection with the power of nature and the arts, but its contribution to existence is broad. Architecture that asserted the heritage of a thousand years, like churches and temples, makes us feel imponent and part of a hole in humanity. Nowadays, we get caught up in our routines and do not have time to stop and remind ourselves of our insignificance. We can meet the sublime by watching the greatness of nature, the vast ocean, the enormous mountains, thunderstorms, the stars, the deserts, the icecaps. We can also experience it in art by going to a museum, theatre, or cinema.

“The allotted function of art is not, as is often assumed, to put across ideas, to propagate thoughts, to serve as an example. The aim of art is to prepare a person for death, to plough and harrow his soul, rendering it capable of turning to good.”

— Andrei Tarkovsky

The movies of Tarkovsky are perfect examples of this experience. His sublime shots project strong emotions in the spectator and can make the spectator feel astonished and reflective about the meaning behind them. This opportunity to have a posse, be amazed, and reflect is crucial. We collectively need new occasions to meet the sublime in a reliable, frequent way so that we can be made feel small in the most helpful way on a regular basis.



fig. 124| Burning House Scene, Film Mirror of Tarkovsky, 1975



fig. 125| Levitation Scene, Film Mirror of Tarkovsky, 1975

4.2.4 SUBLIME EXPERIENCE DISCOVERY PATH



fig.118 | Koshino House, Tadao Ando

Tadao Ando has always been my greatest reference as an Architecture student and as an individual. His work arouses my interest in terms of the emotion it creates. His architecture is not indifferent architecture; on the contrary, he pushes his ideas to a limit. Whereas modernist architecture was based on the open space that was completely recognizable from the outside and understood in its entirety almost immediately, Ando is concerned with the surprise of the building's path of discovery and prepares the visitor emotionally for it. He builds successive spaces with different atmospheres and different events, introducing the element of surprise.

The first piece of work by this architect I visited was the congress hall at the Vitra Museum in Basel. Of all the extraordinary buildings by Pritzker architects, the one that struck me most and is still present in my memory is the work of Tadao Ando. I was on a guided tour, in a scattered group chatting with people nearby, and as I approached the building, my eyesight could only reach a medium-height wall. As we went around the wall, we came across a narrow path that ran alongside it. We were therefore forced to walk in a single line, and the entire surroundings changed dramatically. All the visitors stopped talking and remained absolutely silent, preparing for the entrance to the building. The entrance was narrow and dark. Upon entering, there was a hallway connected to the courtyard through a narrow, curved corridor, which was slightly buried.

This detailed description reveals how this succession of spaces triggered in me strong emotions of desire to be surprised by something unexpected in each space I entered, and that left me progressively more and more dazzled. A strong feeling of rapture, of ecstasy, was growing in me, longing for my eyes to witness new environments and for these to remain in my mind.

Without ever having visited the Chichu Art Museum, by means of the plans, the sections, and the photographs, I can understand Tadao Ando's concern in preparing the spectator and creating different environments and atmospheres through the succession of spaces. I can imagine myself entering an underground tunnel, then being surprised by an open-air courtyard, entering a stairway with Walter De Maria's Sphere, and, after traveling through underground spaces with reduced light, reaching the cafeteria terrace and, finally, discovering the magnificent landscape with the radiant sun.

"Darkness rather than the light, below ground rather than above — the Chichu Art Museum is the most direct expression of this feeling rooted deep inside me"

Tadao Ando

Another important element in Tadao Ando's architecture is the extreme importance given to light. Tadao Ando uses mostly reinforced concrete. This simplicity of materials makes him focus entirely on light.

The play of light and shadow is illustrated in the literary work "Praise of Shade" by Tanizaki (1886-1965), about the differences between the West and the East. For Westerners, beauty is associated with light

and the absence of shadows. In contrast, in traditional Japanese aesthetics, the shadow and its effects play a crucial role.

The scarcity of something emphasizes its importance and leads to its greater praise and attention. In this way, due to having little light, the underground spaces, when they are revealed, their contemplation is amplified.



fig.119 | Koshino House, Tadao Ando

V CLOSING REMARKS

5.1. CONCLUSION

The general goal of this work was to carry out an in-depth study of the site, making an interpretive reading of Outão's military structures, which will later be the basis for an architectural proposal. To create a document that has real and effective use at the time of the architectural proposal, and a book of photographs taken by the author, were also goals, even though more specific ones.

To better complete this study, we chose to systematize a set of considerations that should guide the project. We are aware that, in the course of the project, others will arise and we will use this document throughout all phases of the project. Our considerations are the following:

1. Create a new identity/intervention that connects the spaces and guides the visitor to understand and discover the place in the best way possible, since the military structures are dispersed and disconnected;
2. Embrace the concrete materiality of the bunker;
3. Perform readings of the bunker as an obsolete relic, highlighting its continuous construction, reinterpreting and incorporating the notions of camouflage, "seeing without being seen" and sublime experience;
4. To work with the topography and have a low and partially underground building without taking away the protagonism of pre-existing structures and preserve the landscape. In a way, the act of burying the architecture is directly related to the idea of camouflage that bunkers use.
5. Showing the landscape occasionally in order to frame the view at the right moments.

In relation to the systematization of a set of considerations that should guide the project, we are aware that more will emerge during the course of the project and that we will make use of this document during all the phases of the project.

5.2 ICONOGRAPHY

Fig.1 | Family Photo in Fort São Filipe Setubal, 2009
Source: Author's Photograph

Fig.2 | Ship With Two Crows, "Livro Carmesim", 1502
Source: National Geographic Portugal
Available at: <https://nationalgeographic.pt/historia/grandes-reportagens/1094-descobrimentos-edespecial>

Fig.3 | Friend song "Ai flores, ai flores do verde pino" by King D.Dinis
Source: National Geographic Portugal
Available at: https://pt.wikipedia.org/wiki/Cantiga_de_amigo

Fig.4 | Manuscript of Friend Songs by Martin Codax's, 12th century
Source: National Geographic Portugal
Available at: https://pt.wikipedia.org/wiki/Cantiga_de_amigo

Fig.5 | Candido's Planisphere Map, Representing the Portuguese Maritime Discoveries, 1502
Source: Estense Library, Italy
Available at: https://pt.wikipedia.org/wiki/Planis%C3%A9rio_de_Cantino

Fig.6 | The Lusiad by Luis de Camoens, canto 1, 1st verse, 1655
Source: Camões, L. (1655). The Lusiad or Portugals historical poem. Humphrey Moseley, at the Prince's Arms in St Pauls Church-yard.

Fig.7 | Original publication of the poem Mar Portuguez, 1922
Available at: https://pt.wikipedia.org/wiki/Mar_Portugu%C3%AAs

Fig.8 | Drawing of Lisbon ("Lisbona"), 1572
Source: Book "Civitates Orbis Terrarum", Braun e Hogenberg, 1572.
Available at: <https://sanderusmaps.com/our-catalogue/antique-maps/europe/spain-and-portugal/antique-map-with-two-bird-s-eye-views-of-lisbon-and-cascale-by-braun-and-hogenberg-23897>

Fig.9 | Drawings of Belém Tour
Source: Author

Fig.10 | Drawings of Fort of São Julião da Barra
Source: Author

Fig.11 | Drawings of a Bunker of the 7th Battery
Source: Author

Fig.12 | Map of the Costal Defense of Lisbon and Setúbal, 1661
Source: "Ciudad de Lisboa, 1661, a 4 de febrero. Verdadera Relación del porto de Lisboa y sus fortificaciones modernas que aún non están acabadas"
Available at: http://www.4gatos.es/MemoriaAusente/mapas/030_LisboaEspia.htm

Fig.13 | Belém Tour by Serres
Available at: <http://acervo.museudelisboa.pt/ficha.aspx?ns=216000&id=747&Lang=PO&IPR=5308>

Fig.14 | Old Tour of Caparica by Serres, 1801
Available at: <http://lisboa-e-o-tejo.blogspot.com/2020/03/a-exposicao-de-1960-no-british-council.html>

Fig.15 | Map "Lisbona and Cascale" "Lisboa e Cascais", 1572.
Source: Book "Civitates Orbis Terrarum" by Braun e Hogenberg, 1572.
Available at: <https://sanderusmaps.com/our-catalogue/>

antique-maps/europe/spain-and-portugal/antique-map-with-two-bird-s-eye-views-of-lisbon-and-cascale-by-braun-and-hogenberg-23897

Fig.16 | Plan of Fort San Gian, 1655
Source: Atlas del Marqués de Heliche Plantas de diferentes Plazas de España, Italia, Flandes y las Indias
Available at: <http://www.4gatos.es/MemoriaAusente/idiomas/portugues/fichas/letra5/sjuliao30.htm?lis=m3>

Fig.17 | Postcard Fort Bugio
Source: Forte do Bugio, Faróis de Portugal em postais históricos
Available at: <http://www.leuchtturm-welt.net/HTML/PGPK/Pg.HTM>

Fig.18 | Map of Lisbon with Fortifications, 1833
Source: Mapa de Lisboa, seu porto, portos e arredores com um pequeno roteiro de Portugal elaborado por Le Cher. Calmet Beauvoisin, 1833.
Available at: <https://purl.pt/4007>

Fig.19 | Plan of Fort D.Filipe
Source: SIPA
Available at: http://www.monumentos.gov.pt/Site/APP_PagesUser/SIPA.aspx?id=2007

Fig. 20 | Photo of Fort S.Filipe, Sistema de Informação para o Património Arquitetónico
Available at: <http://www.portugalweb.net/castelos/ribatejo/setubal.asp>

Fig.21 | Army exercise near Cascais, 1902
Source: José Paulo Berger, CEIMAC

Fig.22 | Battery of São Gonçalo Visit from the Army School, 1935
Source: José Paulo Berger, CEIMAC

Fig.23 | OACTA (Coast Artillery Operations Command Center), 1982
Source: José Paulo Berger, CEIMAC

Fig.24 | Drawings of "Mass vs Void" - Coastal Fortification of Lisbon and Setúbal
Source: Author's Drawing

Fig.25 | Outão Seen by the Sea
Available at: http://ww3.aeye.pt/avcult/Secjeste/Arkidigi2/Album1928_2/Slide_060.htm

Fig.26 | View from the top of The Portinho and the beach
Source: Photo of Américo Ribeiro

Fig.27 | The Portinho and the Beach, 1950
Source: Photo of Américo Ribeiro

Fig.28 | Postcard Arrábida Mountain - The Portinho and the Stone of Anixa, 1950
Source: Photo of Américo Ribeiro

Fig.29 | Postcard Arrábida Mountain- The Portinho and the Beach, 1950
Source: Photo by Américo Ribeiro

Fig.30 | Map of Sado Estuary, 1699-1743
Source: João Tomás Correia, 1699-1743 Biblioteca Nacional Digital
Available at: <http://purl.pt/12158>

Fig.31 | Hydrographic Map Sado Estuary
Source: Instituto geografico y catastral Biblioteca
Available at: <https://www.ign.es/web/catalogo-cartoteca/re-sources/html/000172.html>

Fig.32 | Orthophotomap of Sado Estuary
Source: Google Earth

Fig.33 | Plan of topography and buildings of Sado Estuary
Source: Author

Fig.34 | Orthophotomap of Outão
Source: Google Earth

Fig.35 | Plan Drawing of Outão
Source: Author's Drawing

Fig.36 | Section Drawing of Outão
Source: Author's Drawing

Fig.37 | Fort of Santiago and the Orthopedic Hospital, 2022
Source: Author's Photograph

Fig.38 | Fort of Santiago, West Side
Available at: https://www.delcampe.net/en_US/collectibles/

Fig.39 | Fort of Santiago, West Side
Available at: https://www.delcampe.net/en_US/collectibles/

Fig.40 | Magazine Occidente, 1890
Source: Revista Occidente, 1890

Fig.41 | Postcard Sanatorium of Outão
Available at: <http://www.leuchtturm-welt.net/HTML/PGPK/Pg.HTM>

Fig.42 | Plan of Fort Santiago, 1699-1743
Source: Biblioteca Nacional Digital
Available at: <http://purl.pt/12158>

Fig.43 | Plan of Tour of Outão, by Sargento Mor Eng Maximiano José da Serra, 1806
Source: Biblioteca do Exército
Available at: <https://bibliotecas.defesa.pt/ipac20/ipac.jsp?uri=full=3100024~1277636~10&ri=13&aspect=basic&menu=search&source=~ldglb&profile=bde>

Fig.44 | Plan of Tower of Outão, by A. J. C. Salgado, 1700- 1900
Source: Biblioteca do Exército
Available at: <https://bibliotecas.defesa.pt/ipac20/ipac.jsp?uri=full=3100024~1283049~11&ri=13&aspect=basic&menu=search&source=~ldglb&profile=bde>

Fig.45 | Transformation in Royal Residence, Detail Door Handle
Source: Nunes, J. (2015). Sanatório do Outão: a evolução da arquitectura no combate à tuberculose.

Fig.46 | Transformation in Royal Residence, Detail of the Ceiling
Source: Nunes, J. (2015). Sanatório do Outão: a evolução da arquitectura no combate à tuberculose.

Fig.47 | Transformation in royal residence
Source: Nunes, J. (2015). Sanatório do Outão: a evolução da arquitectura no combate à tuberculose.
Fig.48 | First Poster of National Tuberculosis Assistance, 1904
Source: Biblioteca Nacional Digital
Available at: <https://purl.pt/16998>

Fig.49 | Article about the Tuberculosis in Portugal in " Revista

Ilustração Portuguesa", 1910
Source: Revista Ilustração Portuguesa, 1910, nº236, p.257

Fig.50 | Article about the Tuberculosis in Portugal in " Revista Ilustração Portuguesa", 1910
Source: Revista Ilustração Portuguesa, 1910, nº236, p.258

Fig.51 | Evolution Treatment of a Sick Child with Tuberculosis, From 1919 to 1922
Source: Vivências Educativas da Tuberculose no Sanatório Marítimo do Norte e Clínica Heliântica, 2007

Fig.52 | Postcard of Northern Maritime Sanatorium, Valadares - Sun Healing
Available at: https://www.delcampe.net/en_US/collectibles/

Fig.53 | Postcard of Northern Maritime Sanatorium, Valadares - The Company of The Sick Children
available at: https://www.delcampe.net/en_US/collectibles/

Fig.54 | The Nurses in the Operations Room, Sanatorium of Outão, 1934
Source: Photograph of M.P.Santos Costa, 1934
Available at: <https://www.flickr.com/photos/rco-chofel/5346940577/in/photostream/>

Fig.55 | The Sick Children During a Birthday Party, Sanatorium of Outão, 1932
Source: Photograph of M.P.Santos Costa, 1932
Available at: <https://www.flickr.com/photos/rco-chofel/5346940577/in/photostream/>

Fig.56 | Postcard Maritime Sanatorium of Outão
Source: Biblioteca Nacional de Portugal

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Fig.58 | Sunbathing on the galleries and terrace, Sanatorium of Outão
Source: Photograph of M.P.Santos Costa, 1933
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Fig.59 | Drawings of the Extension Project of the Sanatorium
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