

SOFIA SALEMA

ssalema@uevora.pt
University of Évora

PEDRO GUILHERME

pg.sspg@gmail.com
University of Évora

ISABEL IMAGINÁRIO

isabelimaginario@gmail.com
sspgarquitectos

ABSTRACT

Forte do Guincho is situated on a promontory in a protected landscape. It was built in the 17th century and was part of an extensive line of defensive forts on the Cascais coast which protected the entrance to the Barra do Tejo. The particular nature of the location and the heritage value of Forte do Guincho were fundamental factors used in designing the architectural solution. Conservation and preservation are underlying concepts of the proposal. The pre-established use and programme intended to qualify the monument implied the need for a new construction, linked to the already existing structures but tectonically separated, thus potentially reversible, from the fort. The decision to plaster the walls of the fort or leave them unplastered was one of the most sensitive issues during the development of the project, since it would influence the integration of the fort in the landscape and its conservation. The aim of the (yet unbuilt) project was to achieve, through an integrated transdisciplinary project, a unity of form and materials between the pre-existing structures and the contemporary additions, thus giving renewed life to the monument while preserving its authenticity.

KEYWORDS

Forte do Guincho, rehabilitation, conservation, preservation, heritage, plaster, tea house

INTERVENTION IN FORTE DO GUINCHO

SEA HERITAGE – CONSERVATION AND ARCHITECTURE PROJECT

CONTEXT

Forte do Guincho (Figures 1 to 3), also called Forte das Velas, is situated on a promontory to the north of Praia do Guincho (Guincho beach) and south of Praia do Abano (Abano beach) in a protected landscape area (Sintra-Cascais Natural Park) in the municipality of Cascais, district of Lisbon. Forte do Guincho is classified as National Heritage¹ and has also been listed in the Municipal Master Plan for Cascais since 1996.² It is described, in accordance with the IGESPAR³, as belonging to the category of “Military Architecture” and as a “Fort”.

It is still currently unoccupied and in a state of decay, even though several studies have been conducted concerning its use to house the visitors’ centre for the Natural Park, the Al Gore Portuguese Headquarters or a small tea house.

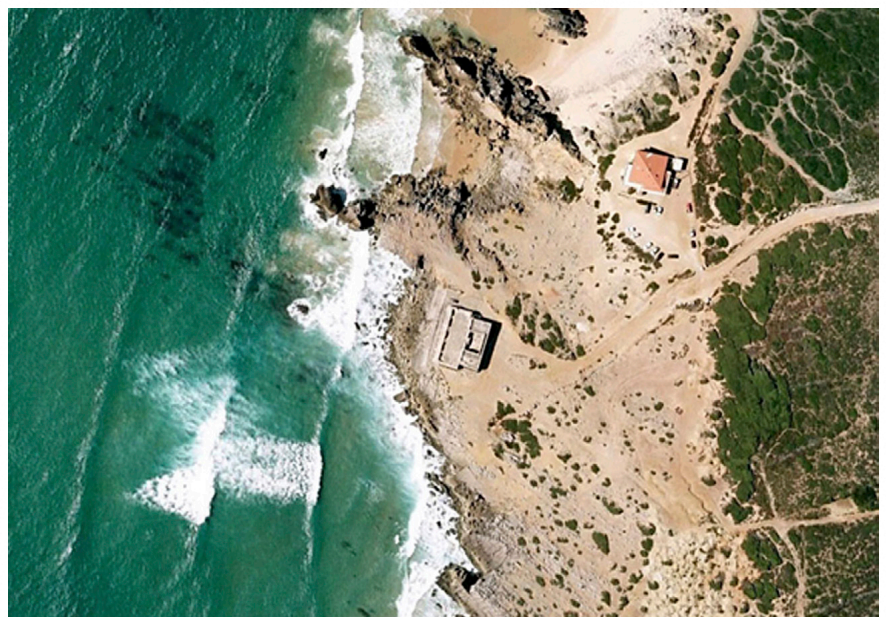


Figure 1 – Site of the Forte do Guincho

HISTORICAL BACKGROUND

During the 15th and 16th centuries Lisbon became a strategic point of departure and anchoring for commercial ships and stood in the middle of some of the most important maritime routes linking the Mediterranean Sea to Northern Europe. Lisbon grew larger and richer with its lively port, and a vast network of smaller ports flourished in its surroundings, both inside and outside the Tagus estuary, including the port of Cascais.

Despite the global importance of its port, and the need to defend the capital from foreign invasions and pillage, Lisbon never really had a consolidated fortified defensive line along the sea until the generalization

¹ Classified as *Imóvel de Interesse Público* (Property of Public Interest) by the Portuguese Government (Decree-law no. 129/77 of 29 September 1977).

² Approved by the City Council in 1996 and published in *Diário da República* (Portuguese Official Journal) on 19 June 1997.

³ IGESPAR – Instituto de Gestão do Património Arquitectónico e Arqueológico (Institute for the Management of Architectural and Archaeological Heritage).

of commercial sea trade with India and the Portuguese colonies. Facing the most obvious attack to the capital from the sea, and in order to defend the maritime access to the city and the port against pirates and enemies, a strategic line of well-positioned military forts was established after the 15th century along the *Linha da Barra do Tejo*, from Torre de Belém (the Belém Tower) to Cabo da Roca (Cape Roca).

Thus, over an extended period of time, a range of military constructions, built in several stages, emerged around the wide river mouth. These included the following:

- fortified towers structurally adapted for artillery: Caparica, Belém and Cascais (1468–1520);
- bulwarks: S. Julião da Barra (primitive core), Santa Catarina de Ribamar and small forts built with ephemeral construction materials (1553–80/1578–80);
- the fortresses of Nossa Senhora da Luz, Santo António da Barra and S. Lourenço da Cabeça Seca, the expansion of the fort of S. Julião da Barra and the restructuring of the citadel of Cascais (1583–96) during the Third Dynasty (Philippine Dynasty);
- the construction of small forts along the coast between Belém and Cabo da Roca (including Forte do Guincho), and conclusion of the Forte do Bugio and construction of the citadel of Cascais (1642–48) during the Restoration;
- the rebuilding campaign of King José I, with work undertaken on almost every fortified structure and construction of several new ones: the batteries at Praia do Guincho and the Forte de Catalezete in Oeiras (1762–63);
- the building, expansion and modernization campaign of Queen Maria I, involving most of the fortifications, with substantial repairs on the fortifications on the eastern coast of Cascais (1793–94);
- the rebuilding campaign of King Miguel I, particularly the fortifications on the western coast of Cascais and the construction of a new battery called Forte Novo (1831–33).

Forte do Guincho is one of the forts built during these campaigns. It was built around 1642 during the reign of King João IV, in the Post-Restoration period, by order of António Luís de Meneses, at the time Governor of Cascais. It was part of an extensive line of defensive forts erected along the Cascais coast which protected the entrance to the Tagus.⁴ This particular maritime fortification is an example of Mannerist military architecture and was intended to keep watch over the sea, control possible landings on the nearer beaches, and counter the attacks that could arise from the east.

The fort, built of irregular stone masonry with corners of cut stone, has a rectangular plan and is divided into two separate spaces. The smaller space, facing east, consists of a central courtyard and two cantonments

⁴ Entrance to the port across the Tagus River.

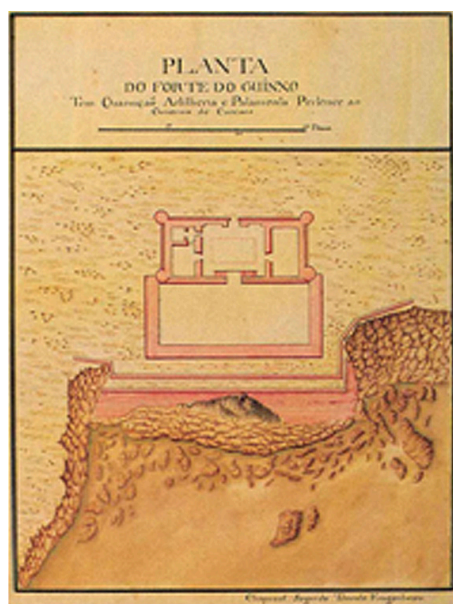


Figure 2 – Forte do Guincho, drawn by Chapuzet in 1798 (DSFOM)

that served as housing; the other space, facing west, consists of the battery platform, which originally housed seven pieces of artillery.

Forte do Guincho retains several features and architectural elements of its original layout and configuration. Other characteristics remain only in written testimonies in past descriptions. In the original design, the Fort had a rather square configuration, with the symmetry axis located at the main entrance. In the eastern zone there were three rooms of rectangular layout with domed ceilings. Today, only two are preserved, corresponding to the two side compartments – the cantonments. The third dome was in the courtyard attached to the main fort entrance. Inside, the access stairs to the battery platform are also located in the same internal enclosure. The terraces, over the domes, with stone flooring and parapets, are accessed from the battery via a lateral staircase.

The proximity of the sea and the consequent erosion of building materials, accelerated by strong winds and sea salinity, justify the numerous restoration projects that the fort has been subjected to. Among the first restoration works reported, dated from June 1720, there is a description of some repairs made to the walls, and also the replacement of doors. There is also a report⁴ dated from 1758 which describes the repair of the kitchen chimney walls, the guardhouse and the existing barracks at the fort.

In the late 18th century (Figure 2), due to the threat of collapse of the rock platform where the fort is built, major changes were made to its entire structure. A seawall in the basement rock on which the fort's battery stands was built to create an obstacle to the destructive action of the sea. The work, which began in 1793, created a new space, although the interior layout remained unchanged from the original construction. Compared to the original fortification, the major changes were to the intermediate compartment of the cantonments, in the battery and in the outside walls. The intermediate compartment was significantly enlarged and occupied an area corresponding to twice the size of each side compartment (barracks, kitchen, warehouse storage and gunpowder). In the process of restructuring, the main gate of the fort was rebuilt and the entry courtyard reorganized. The cistern was also expanded, occupying a central position. The most extensive work was carried out on the battery. The fort's foundations, which were under threat of crumbling, due to the continuous impact of the sea waves on the rocks, were rebuilt and the fort's walls thickened. In this new layout, the new foundations were added to the continuation of the exterior walls of the cantonments, which resulted in a larger rectangular enclosure.

Probably in the early 19th century, further construction work was carried out at the fort: seven supports for cannons in the parapets of the battery were built. It is also possible that, during this work four extra watch-towers, which today are in ruins, were built.

In the early 1830s the fort was subjected to new renovation and adaptation works, justified by the disputes between absolutists and liberals. These

⁴ Anonymous report, 1751: A.H.M., 3.^a Divisão, 9.^a Secção, Caixa 1, undated, annotated by Eugénio dos Santos Carvalho on 14 April 1758.

works, carried out between 1831 and 1832, included: the full restoration of the parapets, battlements and cannon supports; plastering of walls; plastering of tanks; tiling of the gunpowder store; and, finally, the replacement or restoration of the wooden doors and windows.

In 1934 the fort belonged to the Ministry of Finance. Later it was used by the National Camping Club. During the period in which the fort was under the responsibility of the latter, records exist of minor restoration works and the construction of a toilet in the battery area that changed the look of the northern elevation.

In 1970 there was the intention to install a customs post in the fort. This plan, which was never carried out, led to its abandonment for five years. In 1975 the fort was handed over to the National Camping Club, which pledged to preserve it. However, acts of vandalism led to it being closed in 1977, in the same year it was classified as a building of public interest. Despite this classification, the fort was not treated with the respect that its age and importance demanded.

Today, it stands in ruins (Figure 3).

CHARACTERIZATION OF THE FORT'S CONSTRUCTION

In general, the materials with which the fort was built are stone, ceramics, wood and metal, most probably from sites nearby.

The masonry that forms the walls consists of irregular-sized and shaped stones with joints of variable dimensions, originally filled with lime and sand mortars, except for the corners and the arch that encircles the main entrance, which are in cut stone.

There are masonry areas covered with Portland cement mortars, as well as areas of gaps filled with bastard mortars and ceramic material such as ceramic bricks. Visually these areas have a rather dissonant image from the original structure. The use of solid bricks is also present in the three arches in the courtyard area.

In sheltered areas, where the masonry is in reasonable condition, there are visible remains of plastered surfaces. Taking into account the reports of the work done at the fort, we are inclined to consider that the fort used lime plasters as a “sacrifice” layer to be renewed cyclically.

The battery and exterior terrace floors have stone slabs arranged in a regular stereotomy with several gaps. The bathroom recently built is in ruins and constitutes an unqualified and vandalized piece of construction. The courtyard has a boulder floor and some areas with stone slabs.

STATE OF CONSERVATION

The state of conservation of Forte do Guincho is directly related to its history and decay after its deactivation process, as well as to the erosion caused by the proximity of the sea and the violent winds that flog the site.



Figure 3 – Forte do Guincho: side view

The proximity of the sea has remarkably accentuated the pathologies that occur naturally in stone walls. Nevertheless, a former coating layer acted as a light protective “layer” against erosive agents. The limestone used, and the solidity of the remaining areas of plaster, seem to prove the existence of a previous layer of exterior plaster, probably covering the majority of walls, and the quality of its application. However, in some areas (especially those which are directly facing the sea), the walls are in an advanced state of degradation, and their structural sustainability is questionable.

The observed pathologies that justify and substantiate the options taken in the proposed intervention are: biological colonization and vegetation, stains and wall runoff, gaps, granular disaggregation/sanding, ruin, fracture/cracking, displaced elements, unwanted metal and cement plasters, and open and/or non-functional joints.

Briefly, we emphasize a series of situations that characterize the structure’s state of conservation:

- wall weakening, especially on the outside, with block disconnection and material detachment and significant gaps. This creates continuous lines that increase rainwater infiltration, the appearance of plants and, consequently, increased deterioration;
- erosion and diffuse disaggregation of stones and mortars filling masonry joints, where the phenomenon is more serious, accentuating the degradation process;
- infestation of plants, which enhance deep mechanical stresses, causing displacement of the elements and facilitating the movement of water within the walls; some areas of the walls are also colonized by mosses, organisms that interact with the surface substrate;
- collapse of seawall blocks, caused by wave action;
- existence of unwanted materials like corroded metal and cemented areas of plaster.

THE ARCHITECTURAL INTERVENTION

The identity of the site, the heritage value of the fort and its integration in the landscape are key concepts for the conceptual and architectural response. Taking into account the growing awareness of the need to interlink architectural heritage and the environment, this project operated from a perspective of landscape affirmation, in the context of a broader territorial intervention.

Conservation and preservation are both concepts that sustain this intervention in the approach to the landscape and to the monument, with all its implications at the architectural level. In addition, the proposal is guided by strict criteria of authenticity, integrity and reversibility.

The regeneration of the monument will allow its enjoyment by the population and, in return, its use is expected to contribute to its preser-



Figure 4 – Three-dimensional simulation: fort walls with and without plaster

vation. However, this strategy implies the need to enlarge the covered area, and the construction of a new architectonic object, which, although linked to the pre-existing structure, is interpreted as autonomous. It was intended to ensure harmony between the built space and the territory, among pre-existing and contemporary symbols, and through formal and material unity. The proposal for the conservation and rehabilitation of Forte do Guincho was based on the conservation and restoration of the existing building and on the placement of an additional independent object inside the fort, maintaining the focus on the understanding of the different stages and layers of construction and the full reversibility of all new constructions.

The preliminary study

In 2005, before the start of the project, the Municipality of Cascais ordered a preliminary study⁵ that included the construction of a concrete slab whose weight would be simply discharged on the perimetral monumental walls covering the entire open courtyard. The IPPAR⁶ (later renamed IGESPAR) made some remarks and suggestions based on the reversibility criteria.

The new design team (sspg arquitectos) was invited to design a new conceptual methodology that met the IPPAR's requirements. The proposed design solution was based on a wooden portico fixed on a concrete slab which incorporated closing glass walls. Since this structure would be self-supporting it overcame the issue and solved the problem of discharging the weight of the concrete slab on to the fort walls, in as much as the structure would stand on the floor of the battery and the courtyard and would self-sustain the roof. It was also decided to move the new object away from the entrance wall, in order not to close the entire courtyard and to keep the idea of the previous open courtyard.

The final project

In order to ensure the conservation of the monument, the sustainability of the intervention and its maintenance over time, it was essential to define a minimal use for the monument. It was thus suggested to adapt the fort into a tea house, allowing it not only to be open to the public, but also to keep the monument alive.

Since the existing space did not ensure the necessary customer area, it was proposed that the new piece of contemporary design (Figures 5 and 6) would allow the two existing cantonments to be interconnected, thus increasing the covered area of the fort. Although this piece would enable connections to the existing structures, it was assumed as a separate object. It keeps the idea of the existence of the lower, smaller courtyard as an exterior chamber preceding the main public covered area. It would contain a tea lounge, served by the facilities arranged in the cantonments. This intermediate space would make it possible to enforce a universal design on the project.

⁵ Preliminary study executed by Maria Ramalho and Diogo Capucho.

⁶ IPPAR: Instituto Português do Património Arquitectónico (Portuguese Institute of Architectural Heritage).

The placement of the wooden structure in a longitudinal direction shades the interior space, due to the size of the porticos and the metric repetition of blank and occupied spaces, keeping the concepts of transparency and lightness from the architectural solution and providing aligned views of the surroundings. This new piece promotes the balance between a contemporary image and a cosy inner atmosphere providing different ceiling heights. The direct relationship to its surroundings and the variations in light during the day emphasize the unique characteristics of the place and the presence of the Atlantic Ocean.

Some minimal technical areas had to be placed in the cantonments. The northern quartering, lit by a small south-facing opening, contains the kitchen area, optimized for this purpose. The south quartering, which receives overhead light through an opening in the roof, is occupied by toilets. All new constructions and installations in the cantonments are built with no connections to the existing physical limits of the monumental spaces, thus being a box within a box. The terrace, which is accessed from the battery, and covers these two spaces, is still open to the public and permits a higher view of the sea and the surrounding landscape.

Larger technical equipment needed to ensure heating (AVAC) standards was located outside the fort, on the exterior plateau, hidden from immediate view. Thus a hidden, buried building structure was designed to cater for the need to retain sewage, according to the park's nature regulations, and to keep the larger air conditioning equipment out of sight.

Juxtaposed plasterboard walls and plastered ceilings painted white on the inside and technical wood flooring mounted on adjustable pedestals allow the reversibility of the architectural solution in the courtyard. Inside the cantonments, all self-supported walls and floors are kept apart from all existing structures.

On the northern and east facade (in the extended area), a weathering-steel (COR-TEN steel) security guard was applied. The choice of this material took into account the chromatic integration into the surroundings and the clear and unequivocal understanding of the intervention.

As previously stated, Forte do Guincho is part of a larger intervention area composed by three distinct areas: the surroundings of the restaurant near to the fort and its parking area; the fort's surroundings and its access route; and the walkway connecting the fort to the existing car park. The landscape of Ponta do Abano, which is the name of the promontory where the fort was built, is strongly marked by the Atlantic, which has a decisive influence on the plant species that colonize the territory. Undisciplined car access and soil compaction interfere with these highly sensitive ecological ecosystems. To solve these problems and preserve the local vegetation, a large landscape architectural and reforestation

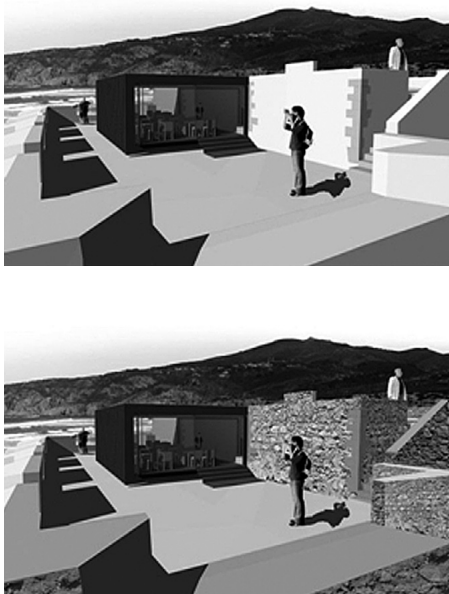


Figure 5 – Three-dimensional simulation of the tea house structure: fort walls with and without coverage

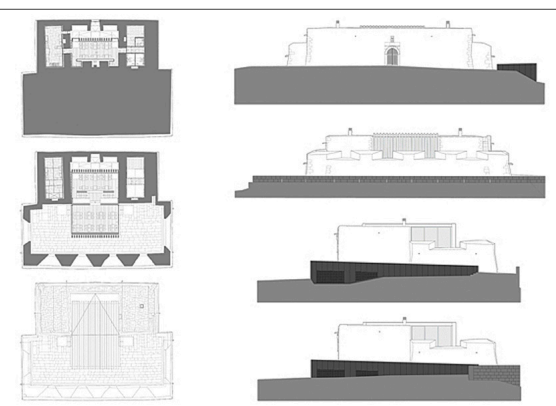


Figure 6 – Proposed plans and elevations

project, privileging the existing ecological diversity and specificity of the intervention area, was proposed.

The project proposed a single car park concentrated in the area already used for this purpose, next to the nearby restaurant, eliminating the need for another car park near the fort. It also proposed recovering the pavement that encircles the building and the installation of a pedestrian path between Guincho beach and the fort, built as an elevated wooden platform, shaped by the existing land topography and allowing the landscape to be enjoyed without damaging the existing natural ecosystem.

The landscape project (Figure 7) proposed by NPK⁷ ensured a minimal paved area surrounding the building and confining its access, built with a stone-paving material similar to the already existing. The limits and sizing of the pavement were adapted to the terrain, outlining the existing rocky outcrops. A linear connection between the fort and the parking area was proposed for use by pedestrians and emergency and service vehicles, in order to regulate both the flow of people and vehicles in the area surrounding the building.

Since the rarity of this remarkable landscape and botanical ecosystem was recognized, its importance was ensured through the promoting of a respectful in-situ contact with it. From this perspective, people are encouraged to park in the existing car park at Guincho beach and then walk along the pedestrian path from that point up to the fort on an elevated wooden platform. The path, about four hundred metres long and coinciding with existing natural pedestrian tracks, shaped by the existing land topography, allows users to enjoy and interact with the ecosystem without damaging it. The design of this wooden walkway aims to eliminate all existing motor-vehicle paths in the coastal cliffs area; to minimize obstruction to the spreading of vegetation (a fundamental process to ensure ecosystem sustainability); and to maintain access as far as possible at current existing levels, preventing the destruction of the land morphology and existing vegetation. At the end of the walkway, near the fort, the wooden path becomes an irregular stone pavement, continuing the pavement surrounding the fort and minimizing its presence. Besides these issues, the project foresees the placement of informative signs about nature and biodiversity conservation in protected areas.

The restaurant car park was planned in the area already used for this purpose to minimize the negative impacts. The proposed design optimizes and controls the space and maximizes the number of available places and, at the same time, eliminates the need to create a new car parking area near the fort.

The intervention proposes the creation of a permeable area with native species in an area close to the restaurant, to reduce the extent of the paved surface. This proposal results in a surface integrated into the surrounding landscape. It is further proposed that all exotic and invasive species in the intervention area be manually removed. The removal

⁷ NPK – Arquitectos Paisagistas Associados (NPK – Associated Landscape Architects) with Leonor Cheis de Sousa.

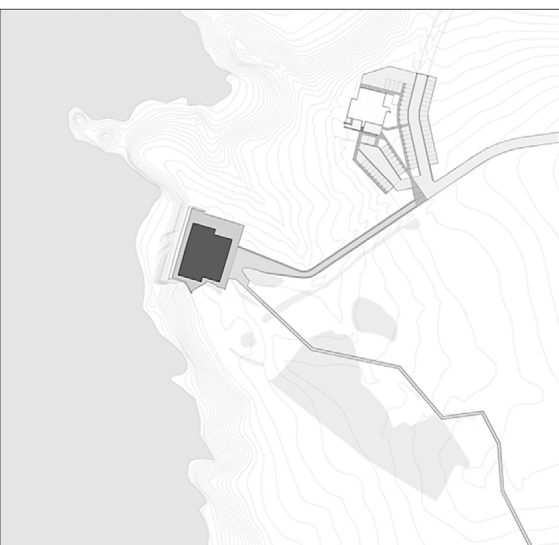


Figure 7 – Landscape architecture project

would be progressively monitored and include all necessary treatments for species control, until their final eradication.

Detailed proposed conservation actions for the fort

The conservation aims to maintain the existing building and facilitate future maintenance actions. Thus, the following actions were identified:

Preliminary photographic survey

The preliminary photographic documentation of the most significant aspects/elements constituted the starting point for the conservation work and a memory of the existing ruin.

Cleaning

The first phase of the conservation work should start with a general cleaning of the walls, floors and all fort areas. At this initial stage, all of the items are gathered – all of the decorated stone fragments that are loose or unstable should be collected, identified and recorded in an architectural survey –by code and number, thus preventing their loss. Later, all of the fragments found and collected must be fixed again to the support. At the same time, all fragments should undergo pre-cleaning and the removal of any efflorescence, thereby avoiding the circulation and deposition of salts in adjacent areas.

Treatment of infesting vegetation

This treatment is carried out by applying herbicides to all vegetation, and includes the repetition of the process over a period of time. Whenever necessary, and if possible, the herbicides should be used at the whole-wall level. This methodology allows greater efficiency by intervening in different cycles of vegetation, anticipating the technical times needed for the active ingredients to work. In all treated areas, a manual eradication of dry biomass will be required, including, where necessary, the cutting of roots in order not to affect the more unstable areas. There may be situations in which roots are functioning as anchors for elements already detached from the support.

Vegetation disinfestations will be performed in two consecutive phases and without interruption: 1) chemical treatments, with specific herbicides for dry vegetation; 2) manual removal of dry vegetation and actions that limit growth of new plants. After the removal of living vegetation, an application of mortar in all joints and horizontal planes of the wall tops is required. In those cases where it is not possible to complete the extraction of plants because their roots are too deep, and removal may endanger the stability of the structure, all holes will be cut and closed with mortar caps. In the manual removal of vegetation, areas where the plants are anchored should be left perfectly clean.

Treatment of biological colonization

The biocide treatment aims to eliminate the biological colonization of stones and shall be performed by applying a product with a quaternary

ammonium base. Depending on the progress of the treatment, a slight manual brushing of all the stones should be undertaken in order to prepare the surfaces for subsequent actions.

Gap reintegration and injury fill

Intervention should be taken first in all areas that demonstrate instability. Gaps will be filled with stone materials of the same lithological type that exists in contiguous areas, respecting the typology and the stereotomy of the masonry where it will be inserted. The interstices between the larger blocks should be filled with smaller elements and different types of cuts and sizes should be adopted. This phase of stabilization and gap filling, since it is statically precarious, should be carried out carefully to prevent any collapse of existing historic structures. The new additions of stone should always be based on lime mortar, based in the binder or with hydraulic lime kind mortars, with pozzolanic additive and/or drying, careful selection of inerts and aggregates, properly calibrated and washed to maximize the integration of wall colours and textures.

Treatment of joints, micro-plastering, fissures and fractures

The joint-treatment phase should be addressed with all the other work that should be done with lime mortar, such as fractures and cracks micro-plastering. The non-functioning of reclosing mortars in joints is one of the characterizing features of the state of conservation of the walls. The joints' lack of sealing capability allows water infiltration into the structures, mortar leaching and the subsequent appearance of instability phenomena in the stone elements. In general, the treatment of joints should involve removal of the degraded and unstable existing mortars, lowering of the cement mortar, the removal of the loose interior materials from the joints, filling of the structural gaps and the reclosing of the surface with the indicated mortars.

The approach to opening joints should consist of: 1) removal of all non-functional mortar in the process of disaggregation or powdery; 2) elimination of the mortar overlaying the stones and lowering of un-aesthetic mortar; and 3) lowering of the joints filled with cement, since they are functional. In the joints where fracturing and imminent detachment of the edges are observable, attachment/consolidation work should be performed. After opening, joints should be cleaned in order to improve the adhesion of mortars, by compressed air, controlled washing with water and brushing, to remove earth deposits.

In the filling of deep and superficial joints, the lime mortars to be used at different stages of the work should have similar mechanical and physical properties to the existing mortars, namely: a coefficient of thermal expansion similar to the former; a coefficient of vapour permeability as similar as possible to the original material; a lower-compression tensile strength and higher porosity than the rock; less or equal resistance to compression than the old mortar, and a porosity greater or equal to that of the old mortar.

The need to use different mortars in colour and texture, varying the siliceous and/or calcareous aggregates in terms of particle size and colour, in order to obtain textures and sets of colours adequate to the pre-existing mortars in adjacent areas, should be evaluated. These fillings, as other fillings, should be preceded by a cleaning of the disaggregated and incoherent materials.

The filling operation should be performed in two stages. The first consists of filling in depth, and the second relates to surface finish. During the application of the mortar, the mortar surface should be exposed, particularly in places where the joints are quite broad. It is noteworthy that, in many areas, only after the deteriorated mortar is removed and the joints cleaned does some static instability become obvious. In many cases, the lack of material in the joints and the poor connection between stones lead to structural instability.

Particular attention should be given to the finish treatment applied on the horizontal surfaces of the wall tops, in order to facilitate rainwater drainage and to restrict infiltration in the structures. A careful analysis of the walls and, when necessary, a regularization of the surfaces, in the aim of an overall preventive treatment, is required. This intervention should aim, on the one hand, to extinguish weak points in the structure, to consolidate interdependent surfaces and, on the other hand, to ensure some aesthetic and visual uniformity in the monument.

Finally, during the work, an extra evaluation should be carried out in order to assess the opportunity to improve the aesthetic integration in filled areas where more recent mortars have been applied and in case of visible dissonance. A treatment based on a patina made with lime water and pigments should be considered, while maintaining a clear chromatic differentiation, and without simulating the existing patina.

Any existing cracks and fractures should also be worked upon from a structural perspective, whenever they present unstable situations – in this case, micro-injections may be required and consolidation made with epoxy resins. Stabilized situations where there are no structural issues, yet which constitute points of infiltration, fissures and fractures should be injected with micro-mortars formulated with binders of fine inert. In areas with micro-fissuration and stone detachment, the micro-injection of fluid epoxy resin could be used, in continuity lines, in order to create anchoring points.

THE ARCHITECTURAL SURFACE QUESTION

One of the most difficult subjects to address was how to deal with the exterior surface of the fort (ruin) and how to address its conservation in terms of image and as an architectonic communication tool. It was clear to the team that conservation would imply a full analysis of all pathologies of the existing fort and a detailed study of the ways to address all the detected problems. This would constitute the basis of any conservation effort. However, there was an ongoing architectonic discussion regarding

the communication of the building, based on its history, but also on the aesthetic memory of the decay, that sparked another field of research.

The issue of maintaining visible walls and corner stones and their joints, as opposed to covering them, was considered a sensitive issue in the project, which conditioned the choice of wood for the construction of the new object. On the one hand, the fort's current image and its integration into the landscape depend on its chromaticity and masonry texture, while, on the other hand, the lack of a surface coat aggravates the erosion caused by atmospheric agents and, consequently, the conditions of the monument's conservation.

Any intervention on built heritage includes tasks which directly or indirectly aim to prolong a monument's life by interrupting the intensity of alteration processes and by reducing the probability of new events, in order to maintain physical, cultural and functional integrity.

In general, the current state of conservation of the fort is related mainly to the degradation of the stone, which is exposed to strong wind and water action. The absence of a plaster coating, along with the degradation of the joints and the use of hydraulic mortars, accelerates the process of rock detachment.

The decision to treat the joints resulted from a critical analysis of the following aspects:

- the advantages and disadvantages of the possible options;
- the principles and concepts that should guide any heritage-based intervention;
- the state of conservation of the fort;
- the understanding of Forte do Guincho individually and in comparison to the other forts along the coast;
- samples taken at the site, over a long time span;
- the evaluation of real needs, both from the technical and human aspect.

The application of a new covering would have technical, economic and historical advantages, although it would be an aesthetic intervention with immediate consequences for the fort's image and its integration into the landscape. The existence of several gaps at the top of the walls and lack of historical military information did not allow the walls' limits to be established and meant it was impossible to make a technical (military) assessment (mostly based on the military changes in artillery warfare). Since there was no accurate data about these limits, the option of covering the fort would have led to its reconstruction and a false historical creation.

The pre-existence of mortars on the masonry, at the existing joints on the extensions, built in the 19th century, with traces of old plaster and its use as an external sacrifice layer, was observed and verified. The

presence of such traces of mortar and plaster, the existence of some written testimonies and the comparison with other maritime fortresses confirmed the hypothesis that the fort had been completely plastered on the outside. However, existing data is insufficient to determine the type of covering, its extension, limits and the finish used. It was also noted that the image of the unplastered fort has been present in the collective memory since the 20th century. It was further noted that other fort intervention projects had chosen to apply plaster to all exterior surfaces and thus it was considered pedagogic to undertake an analysis of the different presentation options for monuments, including that of ruin.

Therefore, the option of applying a plaster coating over the walls did not fit the project design principles, because changing the formal identity of the fort precludes an adequate understanding of the new piece and the monument. Taking the concept of “minimal intervention” and the aim of prolonging the monument’s life as basic assumptions, the option to treat the joints caused fewer injuries to the original materials than covering the walls totally and did not invalidate future studies and research on the evolution of the fort’s construction, since it retained all of the mortars and plasters. A proper execution would reduce erosion intensity and the probability of new pathologies, avoiding water entry in the walls, and would permit the conservation of the building. Another advantage of treating the joints, both at the functional and aesthetic level, is the facilitation of future maintenance, since the application of the new mortar is always less intrusive than the repair of an area of deteriorated plaster. Moreover, the application of new plaster would always create an area where the existing and new plaster would come together and both would have different colours, due to the different carbonation stages. Whilst this might happen to the mortar used in the treatment of joints, the application area is very small, which significantly reduces the visual impact.



Figure 8 – Joint treatment and wall coating plaster tests

Taking into account all of these aspects, the micro-plastering of joints was adopted in the final project, because in the analysis of different factors it out-performed the applicability of a new coating.

During the tests (Figure 8) conducted in 2008, it was found (under normal conditions, in strong winds) to be difficult to ensure a slow and gradual drying of the plaster executed with lime mortar. This control was easier to ensure in small areas than in large plaster areas. Thus, in treating the joints, it is also easier to guarantee proper execution.

The intervention on the walls, without applying a new coating, involved a careful and slow joint-treatment process, because it implies practical difficulties in execution and maintenance due to the widespread loss of stone limits in large areas. A successful aesthetic result of this task clearly depends on the proper execution, ensuring compatibility and stability between the materials and products used and the reversibility of the systems, by minimizing the aesthetic variations. For this reason, joint micro-plastering constitutes an intervention framed within the field of restoration expertise.

CONCLUSIONS

Forte do Guincho is situated on a promontory to the north of Guincho beach, between it and Abano beach, an area included in the Sintra-Cascais Natural Park. The maritime fortification was built in the 17th century and was an integral part of an extensive defensive line erected during the reign of King João IV which defended the entrance to the mouth of the Tagus River.

The fort was built from irregular stone masonry, except for the cut stone corners. The presence of mortar and cement in gap areas on the masonry, and occasionally on the corner stones, can be seen. After a careful observation of existing traces of mortar, traces of exterior plastering were detected on a brick wall built during the expansion of the battery. Although these mortars are visible, the characteristic visual appearance of the fort is not that of plastered masonry, but rather that of irregular unplastered masonry.

However, the presence of these traces of mortar, the existence of several written testimonies and the comparison with the remaining maritime fortresses confirm the hypothesis that the fort was plastered on the outside. Nevertheless, with the existing data it is not possible to state the kind of plaster used or its extent, finish and colour.

Initially, the authors were led to believe that the best approach might be to cover all walls of the fort, because this plaster would also work as “sacrifice” layer to retard erosion. However, by carefully considering this option, it was noted that:

- Existing traces of mortar do not allow, through a visual analysis, certainty about when the plaster was applied or its type and finish, nor how the plaster was applied and/or if it was applied to all surfaces/facades of the fort.
- The existence of several gaps in the upper part of the walls, which in some cases has resulted in the imprecision of the upper wall, forced rethinking the option to cover the monument since it would reconstruct these limits. Since there are no accurate data about these limits, it could have led to historical inaccuracy.
- The fort is subject to very aggressive weather conditions, with very strong wind carrying sand and sea salts, making plaster application very difficult. This situation is easily observable in other coastal forts, exposed to similar but not as extreme situations, where immediately after applying the plaster certain areas with a lack of mortar are visible.
- Lastly, there is the issue of the fort’s image. In fact, when one looks at the landscape, the visual image of the fort, built in masonry stone, either in colour or texture, is perfectly integrated into the natural landscape, raising concerns about the visual impact on the landscape implied by the covering option. Moreover, this image of the visible masonry is present in the collective memory, as the fort has been as it now stands since the early 20th century.

Based on the assumption of the key concept of “minimal intervention”, advocated by most conservation and restoration doctrines, the joint-treatment option seems to be the right one. Some aspects that led to the choice of this solution are:

- From the point of view of the principles and concepts in conservation and restoration, it seems that the minimal intervention choice – joint treatment – is the right one because any action taken with regard to heritage, however careful, introduces injuries to the original materials, determining a loss of authenticity. Thus, the tasks and processes that involve direct intervention in a monument’s conservation should be kept to a minimum and be consistent with the proposed objectives. In the aim of prolonging the monument’s life, the joint-treatment option allows the reduction and/or interruption of the intensity of the alteration processes and reduces the probability of new events, since it does not allow the entry of water into the structures.
- Another prominent feature is the fact that this option keeps all traces of old mortars and plasters as testimonies, and does not invalidate future studies and research on the fort, especially in terms of its constructive history. Plastering the fort would invalidate these studies because traces and testimonies would be covered with new mortar.

The chosen option may raise problems in terms of praxis, since the joint treatment may have a negative visual impact. The definition and characterization of the type and method of execution cannot guarantee the aesthetic result, so this approach can lead to major problems. Four trials on the fort’s walls, with the objective of supporting the decision-making process, were performed and served as a model of good practice for a future intervention, guiding the operators towards the desired result. This solution facilitates future maintenance actions, because the area of application of the new mortar is always less than that of the repair of deteriorated plaster, which always presents a junction area of the two plasters. The new plaster will never have the same chromatic appearance as the existing one, due to different stages of carbonation. Although this situation can happen with the mortar applied in the treatment of the joints, the area is very small, so the visual impact is less significant. It should be noted that it was decided to perform the joints treatment in order to keep all existing mortar traces and the maintenance actions should repeat the same methodology.

FINAL REMARKS

The architectural intervention mainly seeks to restore the monument and assign it a new function, in the aim of conserving this important example of historical Portuguese heritage and allowing it to be used and enjoyed by the public.

The distinction between the existing and new architectonic objects depends not only on the new structural and aesthetic solution, but also on the approach to the fort walls. The systematic and careful

treatment of joints seemed more appropriate, both at the functional and aesthetic level, because it is based on criteria of architectural and historical authenticity, integrity and reversibility. Thus, the option of leaving the masonry joints in full view is the one that most benefits the monument, from the technical and methodological points of view, in terms of materials and products applied, respecting the correct praxis in conservation and ensuring compatibility, stability and reversibility of the systems, thus minimizing the material and aesthetic intrusions.

Finally, the authors would like to mention that the option to treat joints and not plaster the fort was shared by the entire team, and this was supported by the municipal and government architects who oversee and manage the monument.

REFERENCES

- ANONYMOUS REPORT. 1751. A.H.M., 3.^a Divisão, 9.^a Secção, Caixa n.º 1. Annotated by Eugénio dos Santos Carvalho on 14 April 1758. A.H.M., 3.^a Divisão, 9.^a Secção, Caixa n.º 1.
- ASHURST, J. and N. ASHURST. 1989. *Practical building conservation. Mortars, plasters and renders*, vol. 3. English Heritage Technical Handbook. London: Gower Technical Press, Ltd.
- AVRAMI, E., R. MASON, and M. DE LA TORRE. 2000. *Values and heritage conservation*. Los Angeles: The Getty Conservation Institute. http://www.getty.edu/conservation/publications_resources/pdf_publications/valuesrpt.pdf (accessed September 2011).
- BOIÇA, J.M.F., M.F.R. BARROS, and M.M. RAMALHO. 2001. *As fortificações marítimas da costa de Cascais*. Cascais: Câmara Municipal de Cascais.
- COSTA, D.M.R. 1998. *Métodos de avaliação laboratorial de tratamentos de conservação aplicados em rochas graníticas*. Lisbon: LNEC.
- GONZÁLEZ-VARAS, I. 1999. *Conservación de bienes culturales. Teoría, historia, principios y normas*. Madrid: Ediciones Cátedra, S.A.
- HENRIQUES, F. 2003. *A conservação do património: Teoria e prática*. In 3.º ENCORE, *Encontro sobre Conservação e Reabilitação de Edifícios*, vol. I. Lisbon: LNEC.
- LOPES, F., ed. 1996. *Cartas e convenções internacionais*. Lisbon: MC/IPPAR.
- MUÑOZ-VIÑAS, S. 2010. *Teoría contemporánea de la restauración*. Madrid: Editorial Síntesis.
- OLIVEIRA, C., n.d. Forte do Guincho, ou Forte das Velas – detalhe. Pesquisa de património, nota histórico-artística. <http://www.igespar.pt/pt/patrimonio/pesquisa/geral/patrimonioimovel/detail/74121/> (accessed 25 May 2012).
- UNESCO. 1983. *Conventions and Recommendations of UNESCO concerning the protection of the cultural heritage*. Paris: UNESCO.

DESIGN PROJECTS:

- CÂMARA MUNICIPAL DE CASCAIS. 2004. *Forte do Gincho – Projecto de conservação e valorização. Projecto de arquitectura – Estudo prévio*.
- NPK – ARQUITECTOS PAISAGISTAS ASSOCIADOS. 2011. *Projecto de conservação e valorização do Forte do Guincho*. Câmara Municipal de Cascais – *Projecto de arquitectura paisagista*.
- SSPG ARQUITECTOS. 2011. *Projecto de conservação e valorização do Forte do Guincho*. Câmara Municipal de Cascais – *Memorando dos revestimentos*.
- SSPG ARQUITECTOS. 2011. *Projecto de conservação e valorização do Forte do Guincho*. Câmara Municipal de Cascais – *Projecto de arquitectura*.