PUBLIC GROUND AS COASTAL DEFENCE
IMAGINING THE MEDITERRANEAN BEACHFRONT BY THE ATLANTIC

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The article explores the role of public ground composition design as a defence element for coastal agglomerations vulnerable to sea level rise in extreme weather events scenarios. It addresses one of the pilot case studies of the [ENTRA]MAR Urban form intertwined with the sea research project, Quarteira, a coastal city located in the Algarve region of southern Portugal, which is vulnerable to flooding and erosion phenomena. The article provides an opportunity to systematise the reading and interpretation phases and also the research by-design phase based on scenario development that was conducted during the fourth-year design studio at the Lisbon School of Architecture of the Universidade de Lisboa and therefore, to share its preliminary results on "imagining the Mediterranean beachfront by the Atlantic". Attributing Mediterranean values and characteristics to Quarteira involves, as Braudel wrote in Les Mémoires de la Méditerranée, observing the coastal landscapes over and over again, until the physical and urban characteristics are eloquently revealed and named. Finally, it is underlined the need to design the space between land and sea based on the inherited memory of the coastal landscape and the operative role the public ground design may have as coastal defence.

Keywords: *sea level rise, seashore street, research by design, design scenarios, Quarteira.*

1. A Mediterranean coast facing the Atlantic

Coast, from the Latin *costa*, takes on a polysemic character in Latin-based languages, passing from the anatomical meaning to that of the back of a book, the rib of a leaf, of a dome, or of the outer planking of ships, a steep mountain section but also the limit between the land and the sea.

"Portugal is Mediterranean by nature, Atlantic by position" (Pequito Rebelo, 1929: 55). These words synthesise the dual nature of the landscape that Orlando Ribeiro identified, years later, in the geographical characteristics of the Portuguese continental territory. The author in the text "Portugal, o Mediterrâneo e o Atlântico" identifies four geographical regions in the Portuguese territory: North Atlantic, Pre-Atlantic, Pre-Mediterranean, and Mediterranean (Ribeiro, 1945). The geographical divisions coincide with orographic relief, river basins, soil conformation, and different characteristics of vegetation cover. In the climatic-territorial subdivision proposed by Orlando Ribeiro, the coast is distinguished by two zones, Atlantic (northern and central part) and Mediterranean (southern part), subdivided respectively into Pre-Atlantic and Pre-Mediterranean. If the boundaries of the Atlantic and Mediterranean are given by geographical references, the boundaries between the Pre-Atlantic and Pre-Mediterranean are more blurred in the landscape. The wetlands of the Tejo estuary up to promontory of Sines are identified as pre-Mediterranean; these areas include the cities of Cascais, Lisbon, Sesimbra, and Setúbal, among others. Ribeiro presumably identifies the beginning of the area defined as Mediterranean in the city of Portimão, whose limit is marked by the Arade River. Moreover, in 1945 Orlando Ribeiro described the Algarve region in these words, "apart from a few large fishermen's agglomerations, what is most impressive are the vegetable gardens, the shacks in the shade of the trees, the intensive polyculture that stops only at the edge of the cliffs or lapped by the tide" (Ribeiro, 1945: 170-172).

In the previous description of Portuguese bathing tourist areas compiled by Ramalho Ortigão in 1876, the territory was limited to the south by Setúbal, extending from the north of the country to Tróia, therefore excluding the Alentejo and Algarve region from the inventory. It was not until the 1920s, with the 1923 decree, that the beaches of the Algarve were identified, and thus promoted to the public, as seaside resorts. This political act of land-use planning aimed to promote tourism in those urban areas that were still mainly devoted to agriculture and fishing.

The specificity of the southern coast when compared with the western coast of Portugal is acknowledged not only in the geographical character of the land but also anthropologically regarding its relation to the sea. The protection from the waves and prevailing north-westerly winds provided by the topography of the area, as well as the specific fish fauna of the seabed of the Algarve coast, contribute to the Algarve region being considered a Mediterranean region due to its natural characteristics. Furthermore , fishermen have distinct traditional fishing techniques from the ones used on the Portuguese western coast, using also distinct boats which are more similar to the ones of the Mediterranean coastal areas (Silva Lopes, 1975). Therefore, we might argue that the Algarve coast shares a stronger bond with the neighbouring Mediterranean coasts than with the Portuguese Atlantic west coast. Indeed, we believe that the sea has connected far more than it has separated and has always been a generator of relations.

Imagining the Mediterranean beachfront by the Atlantic, is framed in the research project [ENTRA]MAR, Urban form intertwined with the sea, and systematises the different design approaches to the urban margin of Quarteira vulnerable to the effects of rising mean sea level, such as erosion and flooding, carried out during the design course at the Lisbon School of Architecture of the University of Lisboa. The article firstly frames and addresses the urban evolution and characterization of the city's contact with the sea and subsequently characterises and orders the distinct academic proposals according to the composition principle and the proposed materiality. Considering the public space of coastal cities as the first infra-structural system for the adaptation and transformation of the city, lines structure the shoreline space, as matricial guidelines that allow the project to be formed.

2. The transformation of Mediterranean coastal cities

Over time, the space between the land and the sea has been transformed in its territorial morphological characteristics until it has become a threshold place between the city, the urban system, and the sea. In the threshold space, especially when the coast is low and sandy, different uses and functions have followed one another. Indeed, it was initially a place dedicated to fishing activities, where boats were housed, nets were spread, and fish was traded.

From the late 19th and early 20th century, coastal agglomerations facing the Mediterranean underwent several processes of transformation. As a result of the Grand Tour phenomenon, punctual architectural elements –such as cottages, hotels, and thermal establishments– that dotted the coastal landscape began to be built throughout Europe (Lobo, 2014). In order to meet the new needs, not only buildings are being constructed but also public spaces such as belvederes, wide tree-lined avenues, and gardens, as well as infrastructure such as piers and docks to accommodate shipping. Although these elements

were initially conceived as singular buildings constructed at scenic places in the landscape, in the course of the historical process they were incorporated into the city or were themselves the driving force behind the formation of the urban agglomeration.

Although punctually the transformation of coastal agglomerations began in the first half of the twentieth century, it is since the 1950s that, thanks to the economic boom, the greatest transformation takes place. The advent of mass tourism, also facilitated by the advent of the automobile as an accessible commodity, contributed to the construction of various infrastructure systems, including seashore streets, and hotels and tourist infrastructure were built in the vacant urban areas.

A new concept of the urban space bordering the sea, bounded by a homogeneous built front, in which the main social and economic activities of tourist cities take place, began to take shape during this historical period. With the formation and consolidation of the street by the sea, both fixed structures, such as stairs and ramps that facilitated the transition from urban public space to the sand, and temporary seasonal structures, such as beach tents and sun shading structures, began to be built. Population growth in the urban coastal belt during the 20th century has contributed to the vulnerability of coastal areas (EC, 2016). The increase in urban vulnerability nowadays is mainly due to the effects of sea level rise and extreme weather events (Sampath et al, 2019).

3. Quarteira's contact with the sea

The city of Quarteira is located in the municipality of Loulé, in the Algarve region (southern Portugal), between the Quarteira and the Almargem streams, close to a three-kilometer-long stretch of sand surrounded by pine forests. The city of Quarteira has more than 20.000 inhabitants, a number that triples during the summer months with the fluctuating population, attesting to the city's tourist seasonality.

Over time, the relationship established between the built-up area, the beach and the sea has undergone successive transformations. The historic nucleus was originally built relatively far from the coastal strip, it was connected to the beach through a single structural axis, the ancient pathway whose incision corresponds to Rua Vasco da Gama Street. In the 1940 and 1950, Quarteira was known as the "Grande Praia Popular do Algarve" (Relvas, 2010: 44). The identity of this coastal landscape is strongly related to the population that lived from the sea. The sea, as a communication infrastructure and productive space, determined the occupation of the beach, which was appropriated as a natural ramp to moor boats, extend and repair nets and fishing gear, and support small built structures dedicated to the construction and maintenance of boats and support for fishing activities. (Fig. 1)

Fig. 01. (I) Urban Layout of Quarteira in 1934. Source: Author's Edition; (II) Houses and boats in Quarteira beach. Source: Artur Pastor. Arquivo Fotográfico Municipal de Lisboa ref.: PT/AMLSB/ART/011402.

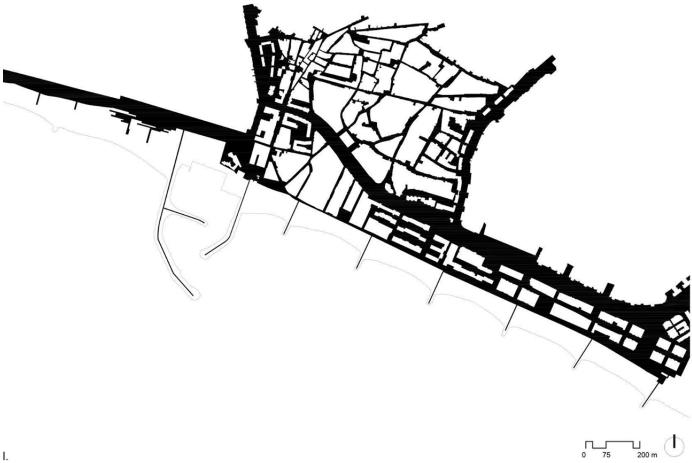
Until before the urban transformation that affected the town of Quarteira, the shore was not delimited by rigid boundaries but with blurred edges, and there were small fishermen's houses built directly on the sand next to the boats lying dry. As the city evolved, the construction of the street parallel to the sea, on the edge of the sandy beach, introduced a change in the ancient relations between the urban agglomeration and the sea. Indeed, the introduction of the rigid infrastructural element into the natural environment led to a transformation of the economic and social activities that took place along the shoreline. The seashore street allowed the construction of a number of summer cottages, during the 1940's decade, disposed along the road infrastructure and facing the sea (Lobo, 2013) that are already well established and evident in photographs of 1950. The development of a new urban front also entailed a change in the social occupation of the beachfront: first occupied by the poorer social class, fishermen, then by the wealthy families of the neighbouring town of Loulé. During this period, different uses on the beach started to coexist: the working one, related to fishing; and the pleasure one related to the new need and trend of sea and sunbathing. (Fig. 02)

In the 1970s, urbanisation began on the land of the former Quinta de Quarteira (est. 1974) of the tourist resort of Vilamoura, together with the construction of the marina at the mouth of the Ribeira de Quarteira (est. 1974). These events, combined with Quarteira's proximity to Faro and the international airport (est. 1965); as well as the natural characteristics of the landscape, have promoted the conversion of the fishing agglomeration to a city dedicated to the new social paradigm: the "sun and sea tourism". (Fig. 03) Since the second half of the 20th century, in fact, tourism has been the driving force behind the formation and transformation of new types of coas-

Fig. 02 (I) Urban Layout of Quarteira in 1972. Source: Author's Edition; (II) Quarteira seashore street and beachfront. Source: Fototeca CM Loulé.

tal settlements, stimulated by the drafting of the Portuguese Tourism Fund in 1956 (Lobo, 2010). It was therefore from the 1970s onwards that, following the consolidation of the street by the sea, the contemporary urban front began to be built, composed of buildings mostly dedicated to accommodating tourism-related functions. The public space that divides and connects the beach to the city stretches for approximately 3 kilometres with an average width of about 60 metres; established at a variable elevation between 4 and 5 metres above mean sea level, it is nowadays, due to the effects of the rise in mean sea level, vulnerable to flooding and erosion.

Moreover, coastal erosion, caused by the prevailing swell from West to East, was accentuated with the construction of the Vilamoura marina breakwaters and also with the most recent construction of the fishing harbour defense infrastructure (est. 1999). According to Teixeira (2004), "Quarteira corresponds to the section of the Algarve coastline where the highest levels of coastal erosion are currently occurring" (Teixeira, 2004:11), which causes the constant transformation in the morphology of the coast. The built-up front of the seafront, supported by a wall on the beach, has been protected from erosion caused by the sea waves by breakwaters built in the 1970s and by frequent artificial sand feedings. However, on the leeward side (in this case east side) of the breakwaters, erosion has intensified and the retreat of the coastline has caused successive falls of the cliff. Causing, for example, the collapse of Forte Novo in the early 1980s, of which only submerged ruins remain. (Fig. 04)




II.


III.

Fig. 03 (I) Contemporary Urban Layout. Source: Author's Edition; (II) Quarteira from the sea. Source: Artur Pastor. Arquivo Fotográfico Municipal de Lisboa ref.: PT/AMLSB/ART/030137; (III) Quarteira from the sea. Source: Artur Pastor. Arquivo Fotográfico Municipal de Lisboa ref.: PT/AMLSB/ART/030140.

For the urban seafront of Quarteira, PIAAC-AMAL, the intermunicipal plan of climate change adaptation of the Algarve region, includes predictable scenarios of coastline retreat in the coastal urban front and suggests continuing the artificial feeding of the beach during the next decade. However, this solution implies maintenance and becomes unfeasible in relation to the cost-benefit in the long run, therefore subsequently proposes the construction of a dune over a dike (dike-in-dune), while addressing the need to remove and relocate the seafront first built line from 2040 onwards (Dias & Santos, 2019).

I.

II.

Fig. 04 (I) Quarteira beachfront from the sky. Source: Nawaf Al Mushait, 2022, [ENTRA]MAR Archive; (II) Forte Novo Ruins submerged, Source: Nawaf Al Mushait, 2022, [ENTRA]MAR Archive.

4. Public ground as coastal defence

In a context in which climate change drives the gradual but inevitable rise in mean sea level, and the related increased frequency of extreme weather events, addressing the urban form of vulnerable coastal cities becomes an unavoidable exercise. Moreover, we achieve that planning and designing the coastal city as an organism with complex interrelations with the sea, adds to the uncertainty that urban design has to deal with.

The urban edge, the seashore street, of Quarteira thus constitutes a representative and propaedeutic case study to test "the systematic development of possible futures, which adopt the form of narratives and stories" (Gerber et al, 2018: 60). In other words, an architectural approach to possible futures based on the development of scenarios. "Scenarios seem to be suggestive, are convincing, foster interest and polarise, so that the future becomes tangible, and crucial decisions can be made" (Gerber et al, 2018: 61).

In the academic sphere, it is possible to test through speculative projects, which are freer of constraints but firmly based on the conditions of the territory and the wishes and desires of the inhabitants. Jacques Herzog (2020) wrote: "We can't change society. But at least single projects, like our study of the Swiss landscape, can succeed in being incorporated into real politics. Which means our work can actually be political but, paradoxically, only if we work and think as architects so that the "utopia" takes physical shape. Becomes tangible." Exploring alternative design strategies by debating the form of cities, their formation and evolution, in relation to mean sea level rise becomes an apparently utopian exercise. Nevertheless, following these words of Jacques Herzog in his letter to David Chipperfield, it is thinking through

design that utopia, oscillating between fiction and reality, becomes plausible.

"The aquatic city as an archetype of imagination and as a structure that responds to fundamental anthropological needs. «I believe in the future of water cities, in a world populated by countless Venice. The force with which Venice acts on the imagination is that of a living archetype that faces utopia»" (Calvino, 1985). Understanding the archetype facing utopia allowed the students of the fourth-year design studio –Integrated Master in Architecture with a specialisation in Urbanism at the Lisbon School of Architecture of the Universidade de Lisboa– to test architectural responses for the transformation and adaptation of the urban beachfront of the city of Quarteira to the mean sea level rise and extreme weather events predicted effects.

The objective is, through research by design, to enrich the debate centred on the future of urban waterfronts. Research by design based on scenarios allows us to develop and compare distinct equal stories that "liberates one from the urge to deliver a generally accepted solution for a problem" (Gerber et al, 2018: 60). In fact, what is described in this article is part of that research by-design process, in which different designs for the same question are tested, allowing in a subsequent phase to be compared and debated by a wider audience, receiving feedback for the future development of the urban margin.

As explained above, until the moment, the strategy for the coastal defence in Quarteira has been based on the creation of hard defensive infrastructure, the breakwaters, and the cyclical feeding of sand on the beachfront. Working in an academic context allowed workgroups to develop distinct design strategies for the urban coast defence based on the design of the public ground and enabled students to experiment with freedom in a controlled context where complexity was gradually added and answered in the design research.

Although utopic as the academical designs seem at first, stemming from the comprehension of the place and the gradual input of the reality complexity allows to ground an "emotional reconstruction" (Zumthor & Lending, 2018) of the urban seashore and the essential condition of developing plausible design scenarios. Moreover, it was not aimed at finding the best or most probable future, rather it is the comparison of all outcomes that enriches the comprehension of the question.

In the design of the thickness of the urban margin between land and water; the form of the city is studied as the result of processes of sedimentation and metamorphosis (Dias Coelho et al, 2014). Processes that translate into the theoretical phases of: (a) the agglomerate establishment; (b) the elementary addition of elements; (c) the geometrization of the margin; and (d) the partition and embellishment (Barreiros Proença, 2018a) to which new

layers can be superimposed that take into account the dynamism of the sea (Barreiros Proença, 2018b). References and theories to support the design strategy can then be incorporated to respond to contemporary needs for protection taking in consideration the complexity of time in shaping the space generated by the juxtaposition and overlap between land and sea. Understanding the public edge of the city as structuring, a formal and material response must be composed for the *emotional reconstruction*, understood by Peter Zumthor as "the formal and material qualities my buildings should have when they speak about the time of their place" (Zumthor & Lending, 2018: 68), of the beachfront.

Methodologically, the semester of the design studio, coordinated by [author name to be included] and tutored by [author name to be included], was structured in three phases to allow students to understand the territory and the theme of the study. Following a series of sequential steps, from reading to design, the main objective was to imagine a "material urbanity" (Solà-Morales, 2010) for the margin of the city of Quarteira, where public space should act as a coastal defence in the case of extreme events scenario of rising sea levels.

Direct experience with reality allows students to research the territory for contributions and suggestions for the definition, transformation, and design of public land in the coastal city. Understanding the territory as a *tabula plena*, as opposed to the idea of *tabula rasa* (Roberts, 2016: 11-12), enables projects to be drawn up in continuity, i.e. acknowledging the meaningful fragments with origin in distinct periods of the formation of the territory and are part of the essence of the place. Thus, three essential phases are considered:

1. Reading consists of the territory interpretation and the elaboration of an atlas of architectural elements of the seashore for the theoretical and formal foundation of the design;

2. Concept fosters thinking about urban transformation through the conception of scenarios and speculative solutions from a combination of systems and elements (present, to be subtracted and to be added). The resulting masterplan thus comprises the formal materialisation of a concept of spatial and functional organisation, as well as the foreseeing of consequent project actions;

3. Project consists of public space design. At this stage, the creation of an urban place in continuity between the private space for public use, the public space and the beachfront natural system is presupposed, creating a cohesion and spatial nexus between them.

The present article focuses on the role of architectural thinking and exploration in the design of the public ground as a coastal defence for urban beach-

front. *Concept* and *Project* phases address the design of the public ground as coastal defence, considering the public space form and materiality can act as a defensive infrastructure regarding sea level rise and extreme weather events. Therefore, the ordered description of the outcomes of the second and third phases of the developed work may contribute to this reflection.

4.1. Lines along the shore: design strategies for coastal defence

Reading has revealed architectural elements that, over time, have succeeded one another in the intertidal space between the land and the sea. Among the elements that have marked the evolution of the urban settlement are the boats and fishing nets; the fish laid for the fish auction; the road by the sea and the transversal street structure; the beach structures and sunshades; and the breakwaters.

Furthermore, it also evidenced that the positioning and direction of these elements share similar composition principles that can be considered as atemporal composition grids of the threshold space between the city and the sea. Characteristics shared with other urban beaches along the Portuguese coast (Proença, Dal Cin, Monteiro, 2021). Over time, lines have been drawn on the beach, spatial interweaving, between fixed and cyclical elements that enable us to ground the design of the thickness of the margin on the atemporal composition grids of the coastal landscape.

Aware that the architectural idea generates form and builds meaningful relationships with place, each of the projects developed pursued a coastal defence design strategy that was supported by the acknowledgments of the *Reading* phase. Thus, the public ground design based its composition on the themes and the underlying form of the margin for the definition of the intertwined space between the land and the sea, with the purpose of creating a meaningful public space that doubled as coastal defence infrastructure.

According to Hill (2015), the definition of coastal defence infrastructures by typologies is relevant for defining design strategy alternatives; indeed, the categorization allows the comprehension of the different design solutions.

Looking retrospectively at the outcomes of the student's semester work, the different design strategies for public ground and coastal defence design it is possible to define types of solutions according to the overall composition layout: (a) *lines parallel to the sea*; (b) *lines perpendicular to the sea*; and (c) *lines in the sea*.

4.1.1. Lines parallel to the sea

One of the design strategies followed in the imagination of a future scenario for the Quarteira margin consisted of emphasising alignments parallel to

the sea and thus to the seashore street. This type of composition resulted in different approaches regarding the materiality or even the choice on how to deal with the sea level rise scenario, nevertheless sharing the same principle of prioritising parallel lines to the margin in the design composition although other elements might be, and are, present.

Fortificatio[1] consists of a fortification system to defend from rising sea level, composed of a thick wall and singular elements that dot the margin articulated with the pre-existing Quarteira urban layout, generating enclosed spaces between the edge of the city and the wall, as represented in the compositional diagram. The thickness of the projected wall allows the existence of interstitial spaces to define a system of excavated passages, terraces, and patios that articulates the city and the beachfront with multiple connections and levels of observation. If Fortificatio, recalls the idea of the fortified city, enclosed within high walls and connected to the outside through gates, in the collage having added seated children allows the linear element to be read not as a barrier, but as a connection between the city and the sea. (Fig. 05)

A different approach to the creation of parallel lines of defence was carried out in *Continuity2*, by removing the impermeable hard pavements and proposing the renaturalization of the water lines continuity and the constitution of two lines longitudinally along the urban fabric of Quarteira. A dune cord along the margin and a pine corridor in the interior of the city. The artificially created dune cord gives continuity to the recent *Passeio das Dunas* (PROAP), extending it from west to east along the urban beachfront to the Almargem stream. The dune cord acts as a wave dissipator and paths are defined that enable walking between the city and the beach and along the dunes, parallel to the sea. As depicted in the compositional diagram in the first built-up area, lines parallel to the sea are imagined, fragmenting and

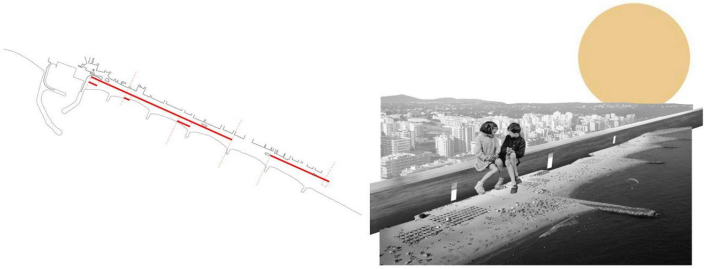


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Fig. 05 Lines parallel to the sea: (I) composition diagram of Fortificatio. Source: Author's Edition based on proposal of Francisca Grosso and Anastasya Vasileuskaya, 2021; (II) conceptual collage of Fortificatio. Source: Francisca Grosso and Anastasya Vasileuskaya, 2021.

1 *Fortificatio was designed and developed by Francisca Grosso and Anastasya Vasileuskaya (Lisbon School of Architecture,Universidade de Lisboa).*

2 *Continuity was designed and developed by Anne-Claire Delattre and José Ignacio Gomez (Lisbon School of Architecture,Universidade de Lisboa).*

interrupting the spatial relationship as we know it today, to reproduce a more natural landscape. (Fig. 06)

Fortificatio and *Continuity*, although conceptually corresponding to distinct approaches for the redesign of the margin, both ground the composition in structuring elements parallel to the shoreline. The first creates an elevated thickness along the seashore street to cope with the extreme weather event sea level rise scenario. The mineralisation of a thick linear defence in front of the city generates possibilities for its appropriation but also creates a barrier between the city and the sea that was addressed by excavating the thickness of the wall. The second resorts to porous and adaptable systems based on

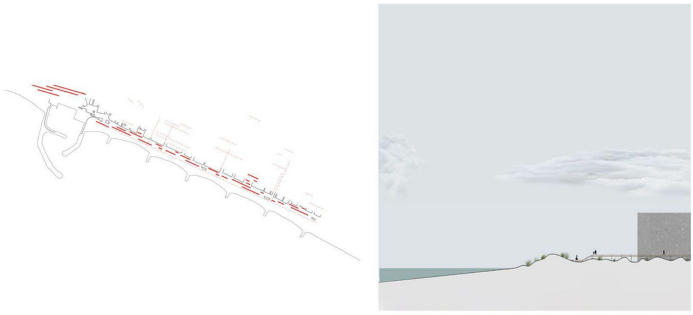

Fig. 06 Lines parallel to the sea: (I) composition diagram of Continuity. Source: Author's Edition based on proposal of Anne-Claire Delattre and José Ignacio Gomez, 2021; (II) type section of Continuity. Source: Anne-Claire Delattre and José Ignacio Gomez, 2021.

natural elements to compose permeable and evolving linear structures that extend parallel to the seashore, both in the margin or inland.

4.1.2. Lines perpendicular to the sea

Quarteira's most distinctive coastal features are the breakwaters that rhythmically extend perpendicularly from the land to the sea. Elements that create a geometric rule that defines segments in the otherwise continuous sand of the beach. The recognition of the elements as singular features in the landscape, and the consequent recognition of the compositional lines, allows for a second design strategy, in which lines perpendicular to the sea prevail.

Rhythm[3] proposes either to create new breakwaters or to critically consider whether to restore or let existing breakwaters gradually fall into ruins. Furthermore, the projected breakwaters are arranged in continuity with the alignment of the urban layout axis perpendicular to the shore, such as the streets,

3 *Rhythm was designed and developed by Inês Aragão and Monika Markauskaite (Lisbon School of Architecture,Universidade de Lisboa).*

thus extending the public ground of the city into the sea. It is proposed that these elements might have under passages to enable sand drift to occur from one side to the other of the breakwaters. During the summer season, it is proposed to "colonise" the beach and the breakwaters with temporary elements: floating docking finger piers in the sea and beach tents or shading structures in the sand. Therefore, fixed elements are proposed to cope with sea level rise and extreme weather events and cyclical elements are foreseen to appropriate the beach and water answering the expansion needs of the seasonal floating population. Rhythms, conceives the re-appropriation of the space of the margin according to cyclical times, that of winter and summer and the consequent needs that the two seasons draw; that is, protection in the winter months and the possibility of appropriation, through flexible elements, in the summer months to meet tourist and recreational needs. (Fig. 07)

Transitions4 stems from the understanding of the comb structure of the breakwaters as evidence of a composition grid that structures the seashore of Quarteira. Composition wise, tidal pools advance from the limit of the seashore street into the sea, acting as breakwaters, within the strict grid that is based on the pre-existing elements, incorporating them in the built structure of the pools. Furthermore, it proposes to elevate part of the urban ground of the seafront. The space below the elevated boardwalk, opening to the beach, ac-

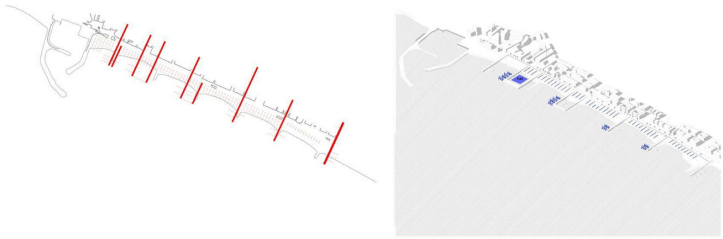

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Fig. 07 Lines perpendicular to the sea: (I) composition diagram of Rhythm. Source: Author's Edition based on proposal of Inês Aragão and Monika Markauskaite, 2021; (II) axonometric view of Rhythm. Source: Inês Aragão and Monika Markauskaite, 2021.

commodates temporary, seasonal uses during the summer months, allowing the public ground to extend from the city to the beachfront. (Fig. 08

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4 *Transitions was designed and developed by Lea Jain and Farida Sedky (Lisbon School of Architecture,Universidade de Lisboa).*

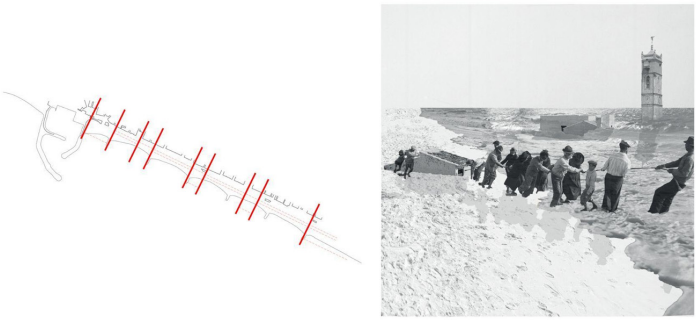

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Fig. 08 Lines perpendicular to the sea: (I) composition diagram of Transitions. Source: Author's Edition based on proposal of Lea Jain and Farida Sedky, 2021; (II) conceptual collage of Transitions. Source: Lea Jain and Farida Sedky, 2021.

4.1.3. Lines in the sea

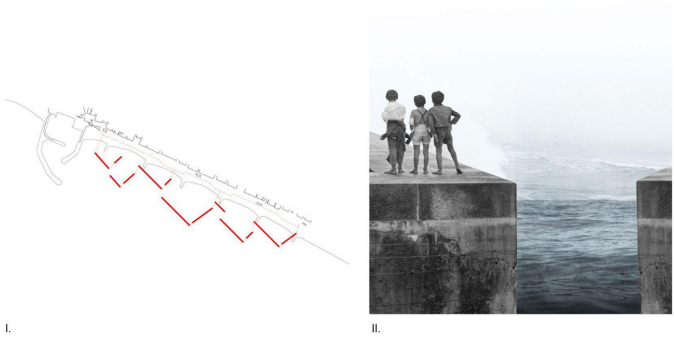
Considering that undulation and storm surge are significant factors contributing to sea level rise during an extreme weather event, a project strategy was to define defensive structures to dissipate the force of the waves before they could reach the urban coastline. *Habitable Partition*[5] and Aparelhar [6] (Rigging) refers to different principles of composition that nonetheless propose design solutions in which the pivotal elements are defensive elements in the sea, autonomous from the shoreline.

The design composition of Habitable Partition stems from the direction of the harbour breakwaters. A composition grid autonomous from the shore is the base for the placement of anthropic elements in the sea in front of the urban beachfront, as depicted in the composition diagram. As fragments placed along the shore, their positioning envisages the disruption and dissipation of wave strength, nevertheless it doesn't interrupt the sand drift process and thus prevents coastal erosion on leeward side. Furthermore, during the summer season, when the sea is calmer, it is envisioned that floating walkways connect the fragments and the breakwaters are appropriated by facilities that support leisure and tourism and enable bathers' presence as an extension of the beach. As in Rhythm, the project imagines that the construction takes place in distinct phases with the possibility in the summer months to juxtapose flexible and ephemeral elements that respond to social needs. (Fig. 09)

Aparelhar [*Rigging*] acknowledged the underlying matrix grid of the urban layout of the seafront of Quarteira. The definition of a compositional matrix

5 *Habitable Partition was designed and developed by Anna Panfilova and Manuel Amaral (Lisbon School of Architecture,Universidade de Lisboa).*

6 *Aparelhar [Rigging] was designed and developed by Carolina Lombardi and Guilherme Mateus (Lisbon School of Architecture,Universidade de Lisboa).*

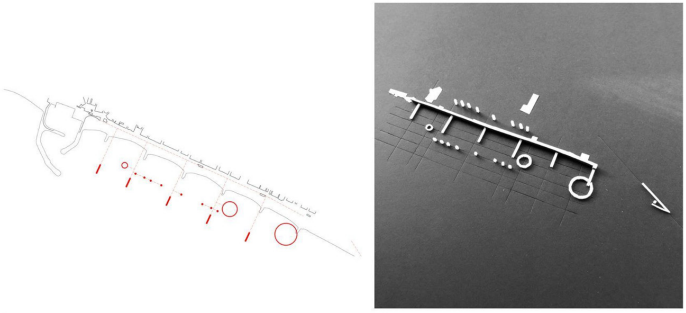


I. II.

Fig. 09 Lines in the sea: (I) composition diagram of Habitable Partition. Source: Author's Edition based on proposal of Anna Panfilova and Manuel Amaral, 2021; (II) conceptual collage of Habitable Partition. Source: Anna Panfilova and Manuel Amaral, 2021

made it possible to order the design of the proposed elements in sequence with the alignment of the city's public spaces. Solid, fixed elements are placed within the composition grid as fragments in the water to diverge and dissipate wave strength before reaching the shore. Compositionally, it is reminiscent of the musical score on which the dotted elements interweave the lines creating shapes and spaces. These also act as foundations that can be rigged in the summer with temporary structures that foster human appropriation in these surfaces, such as masts that support sails as shading cloths. The grid is slightly shifted with respect to the existing breakwaters that, in this scenario, are destined to continue their process of decay and ruin, resignified as monuments, in the etymological sense of *monumentum*, from the Latin verb *monere*, to remember or to warn. Similarly, the nearby ruins of Forte Novo recall the fragility of the human constructions in face of Nature. (Fig. 10)

4.2. Imagining the public ground material urbanity



I. II.

Fig. 10 Lines in the sea: (I) composition diagram of Aparelhar [Rigging]. Source: Author's Edition based on proposal of Carolina Lombardi and Guilherme Mateus, 2021; (II) conceptual collage of Habitable Partition. Source: Carolina Lombardi and Guilherme Mateus, 2021.

Manuel de Solà-Morales (2010) defined *material urbanity* as "the ability of urban material to express civic, aesthetic, functional and social meanings". Materialising the form of each design strategy then becomes essential for its definition... The precision of the built form must therefore be present in the design choice of materials and in the way of building, which are not independent of each other. Indeed, if we recall the words of Frank Lloyd Wright (1943) on the integral ornament, we can read: "the nature pattern of actual construction (...) not only surface qualified by human imagination but imagination giving natural pattern to structure."

Materialising lines that compose the public ground in the distinct design strategies, more than a reference board for the construction of the urban beachfront, may therefore be understood as the deepening and study of the implementation of a component of the strategy defined. In this way, the detailed project of a part of the system of public spaces on the margin follows the design strategy enunciated by each group, entangled with the intrinsic nature of the place.

The wall thickness of *Fortificatio* was excavated with patios and inner spaces analogous to the fortresses that dot the Algarve coast, and the materialisation of the surfaces resorted to the use of prefabricated concrete blocks composing a stereotomic retaining wall. Protected spaces integrated public space traditional materials of the city beachfront such as sand and *calçada portuguesa* (portuguese cobblestone), thus connecting to the memory of the place. (Fig. 11)

The use of large prefabricated concrete blocks was also the main element for the construction of the lines of *Transitions*. In this case, the precise stereotomy and considerable dimension of the blocks characterise the space of relation between the sea and the city, referring to the pier construction we may find in harbours along the Portuguese coast since the late XIX century (Loureiro, 1904-1909).

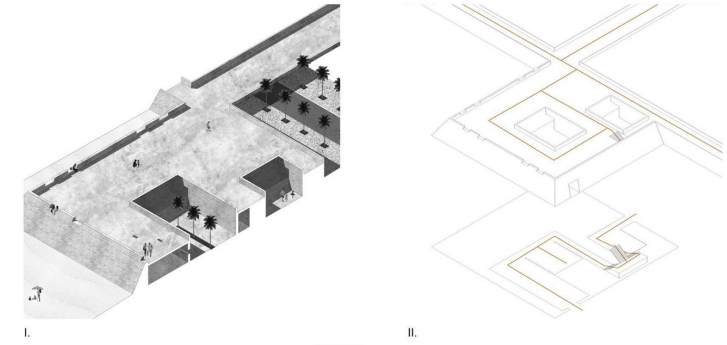
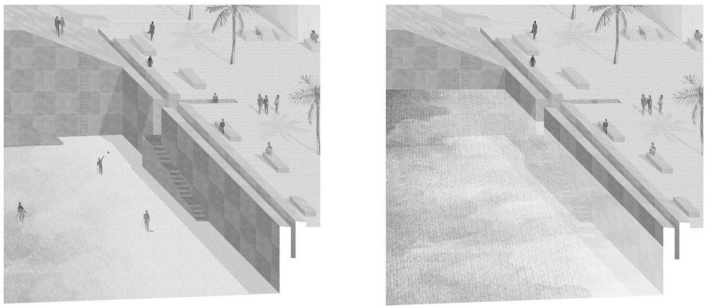


Fig. 11 Fortificatio axonometric section (I) and circulations diagram (II). Source: Francisca Grosso, 2021.

The use of simple urban furniture, reinforcing the composition alignment, contributes to the spartan fixed elements that frame human activities and accommodate the variable nature of the sea. (Fig. 12)

Continuity focuses on the creation of an idealised dune cord between the city and the sea leading to researching systems of establishment and retaining of a dune landscape. The speculative nature of this proposal acknowledges the complex nature of time in the creation of the landscape. The dynamic nature of this process implies that the image of the form is not fully controlled apart



I. II.

Fig. 12 Transitions axonometric sections in summer (I) and in sea level rise scenario (II). Source: Lea Jain, 2021.

from the fixed elements on the edge of the city or the autonomous paths that either fly over or submerge overlapped by the sand of the continuously changing dunes. (Fig. 13)

The understanding of the public ground as a frame or a stage for the unravelling of human life was a characteristic common to the diverse approaches.

I. II.

Fig. 13 (I) Continuity exploded axonometric. Source: Anne Claire Delattre, 2021; (II) Desertification control workers making straw checkerboard barriers in the Tengger Desert in northwest China's Ningxia Hui Autonomous Region. Source: Xinhua/Feng Kaihua, 2020, available at: https://english.cas.cn/newsroom/cas_media/202106/t20210618_272235.shtml.

Also, in *Rhythm* is evident the spartan and matricial nature of the construction of the infrastructural elements that double as public space. Allowing the sand and the sea to be the protagonists of the design, along with the cyclical elements that each summer return to their positions. (Fig. 14)

Similarly, *Habitable Partition* materialised the proposed fixed elements recurring to technology currently in use for the construction of breakwaters, on top of which the moulded *in situ* concrete would create the spaces that could support the expansion of the beach life during the summer tourism season and also act as piers and anchoring support. (Fig. 15)

5. Les Mémoires de la Méditerranée

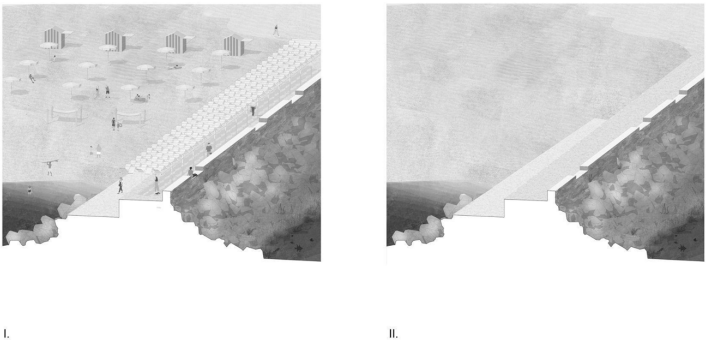


Fig. 14 Rhythm, axonometric sections in summer (I) and winter (II). Source: Monika Markauskaite, 2021.

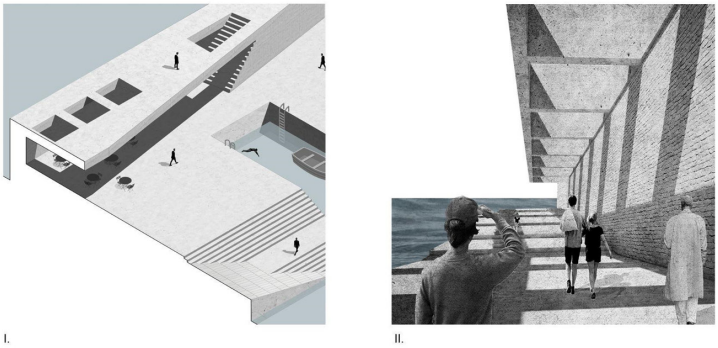


Fig. 15 Habitable Partition, axonometric section (I) and collage (II). Source: Anna Panfilova, 2021.

Since the beginning of the 20th century, urban transformations have been guided by theories that favoured the rigid channelling of watercourses, i.e., through pipelines and the construction of –river and sea– rigid embankments. The seashore street is a marginal area, fragile and subtle, where multiple interactions take place between the city and the water. It is not a boundary or a limit, on the contrary, it is a meeting space, an area of interchange, a zone of transition. Moreover, the reconfiguration of the interface, of the space between the land and the sea, through the introduction of a rigid line –the street by the sea– in the natural environment, as a dynamic system, has changed the relationship between the city and the water.

Therefore, we consider that as Braudel (1998) wrote in "Les Mémoires de la Méditerranée", it is important to urge the reader to observe coastal landscapes over and over again, until the physical and urban features are eloquently revealed and named. It is an exercise of observing the urban phenomena that allows one both to decode the contemporary and ground design responses. As memories of the Mediterranean, all traces of the past can be asserted and depicted, which we turn to nowadays in order to imagine the future. As such, the design approach for the urban space between the land and the sea in these academic proposals considered the inherited memory read in the evolution of the coastal urban landscape for its development.

Jacques Herzog's letter to David Chipperfield renders clear how architectural thinking can contribute to society. How interpretative studies and design answers, even speculative approaches of a utopian nature, can support a transformation in continuity. One of the contributions of these speculative scenarios is the testing of how coastal defensive infrastructures should be designed as part of the public ground of coastal cities, allowing for expansion and breathing of the public life of the city.

It is considered that the compositional exercise, although applied only to the case of Quarteira might, through typological transfer as proposed by Christ and Gantenbein (2015), become references of compositional principles to other urban contexts with similar coastal characteristics.

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