

Environmental Design Criteria for a Maritime Landfill

Florianópolis, Brazil

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Abstract: This research presents the expansion of maritime landfills constructed since the 2000s in the metropolitan coastline of Florianópolis, city capital of the State of Santa Catarina, Brazil. The purpose of this study is to examine urban implications with the construction of the maritime landfill in the county of São José, which is planned to connect the metropolitan territory with the island of Florianópolis by a highway system. Considering the consequences of urban fragmentation and environmental deterioration, a gradual process of projects implementation was developed envisioning an urban plan for the maritime landfill of São José. Physical categories in view of design solutions to spatial problems are associated to fluxes, boundaries, barriers and rupture, addressing the following topics: Spatial arrangements to connect neighbourhoods to the seafront; articulate the open space created between the city and the sea; spatial continuity for pedestrian accessibility to public space; explorative studies of specific spatial arrangements; strategic projects at local and intermediate scales; and, environmental regeneration.

Key words: Florianópolis, maritime landfills, fluxes, boundaries, barriers.

1. Introduction

Urban waterfronts, where the land of city meets a body of water, are unique and finite. As transition areas in between the city and the sea, initial landfills built in the early 20th century in Florianópolis featured urban forms related to the coastal urban landscape of public buildings, warehouses and row houses. In these transitional spaces, social and economic relations emerged historically linked to maritime transportation between the Island of Santa and the Continent (fig.2). At the beginning of the twentieth century, advances in building technology contribute to urban growth, creating new services and infrastructure, such as the use of cast iron in the construction of the bridge Hercílio Luz in 1926 in Florianópolis (fig. 1). Hercilio Luz Bridge made the connection of The Island of Santa Catarina to the Continent possible, favoring the expansion of middle income housing, trade, and services in the mainland. However, many transformations within an idea of urban progress affected urban areas along the seaside. The main city pier “Miramar” was overthrown (fig. 3). The development of landfills in the historical center of Florianópolis started in the 1950s for the construction of roads, buses stations and parking. As a consequence, the urban boundary of the current Historical Center loses its seaside character by its gradual detachment

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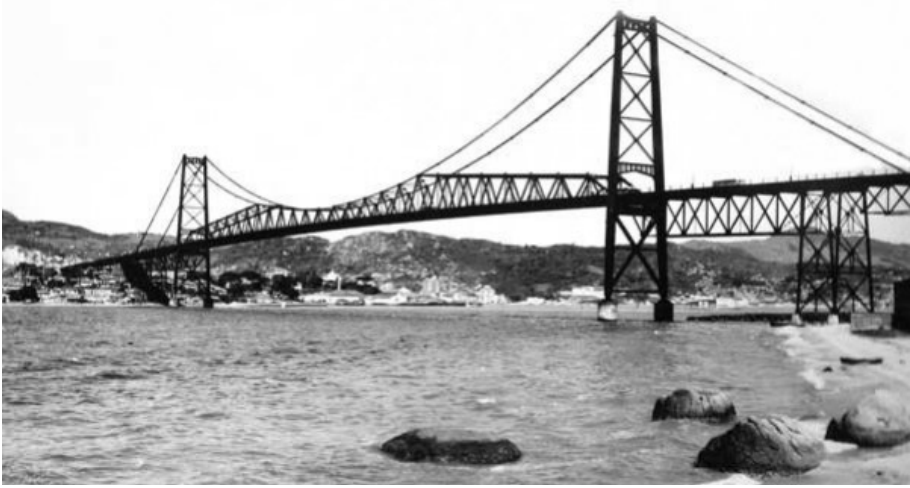


Fig.1. Hercilio Luz Bridge



Fig.2. Historic Florianópolis seafront

from the sea. The decline of boats crossing stems results from the use of buses in the transposition to the mainland. In the 1970's, landfill expansion in marine areas of the North Bay of Florianópolis was planned for traffic lanes along the coast (fig. 4). The expansion of the urban boundary and the consequent displacement of the marine edge of the natural site generated a separation of buildings and public spaces linked to the waterfront. With the separation between the city and the sea, a 220 mt large landfill emerged for the construction of a highway system and for real estate capital investments. Actually, the rise of high buildings defines a visual and physical barrier that separate the city from the new seaside. The sea becomes a scenario for the view at high rise buildings' residents. As for public spaces, was built a walking path by the new marine edge (fig. 5). Similarly to the North Bay of Florianópolis, the landfill of the South Bay had been planned for the flow prioritisation through motorways to the airport and to south of the Island. Without a local plan in the affected areas, dramatic changes in neighbourhoods along the coast had been created. The lack of traffic con-

nection to the motorway interferes in local streets, impacting neighbourhoods that evolved at the edge of the sea. This situation is illustrative in the continental region of Florianópolis, particularly in the maritime landfill in the county of São José, which presents urban-environmental problems that are recurrent and specific to Florianópolis. Since the 2000s, the expansion of landfills in the continental region has created the separation between urban areas and the sea along the county of São José. The master plans for the flow of traffic remains unchanged. Without the provision of local plans, rework is needed for site-specific solutions.

The São José Maritime Landfill

The consequences of the construction of maritime landfills in Florianópolis are seen in São José exemplifying the common problems and specific potentials that can be the object of urban–architecture projects at various urban scales. The São José landfill was planned for the construction of motorways interconnecting Florianópolis to the metropolitan area and BR-101 federal highway. However, in 2002, the State Court embargoed the construction in the historical area (fig. 6), judging from the popular action of the Association of Residents of the Historical Council of São José. The embargo stated that the environmental impact assessment report by the Brazilian Institute of Environment and Renewable Natural Resources did not consider the consequences to cultural heritage.



Fig.3. Pier Miramar, 1928.



Fig.4. Public Market, 1898.



Fig.5. North Bay landfill, 2013.



Fig.6. São José historical area, 2012.

Due to the judicial embargo still in force, the maritime landfill is located in between the edge of the historical town of São José and the Araújo River (fig. 7). At the urban edge, the landfill is surrounded by former highways planned through mangroves (fig. 8) near the urban boundary of the metropolitan trade area. Motorway fluxes and the former warehouses and depots create a physical barrier to access the new ground and the seafront. This barrier is enhanced by a binary flux around the trade area that constrains the pedestrian accessibility. The lack of planning between local and metropolitan traffic arises from this conflict, being a challenge to spatial connectivity. If a pedestrian goes to the seafront, they have to transverse a range of 90m surrounded by motorized flow; reaching the landfill, find voids, isolated buildings and paved parking areas. On the seafront, a retaining wall restricts access to the beach every 150m. The lack of planning between local and metropolitan traffic arises from this conflict, being a challenge to spatial connectivity. The buildings in metropolitan commerce are not physically open to the landfill neither visually with the sea. The monotony of the stores is only broken with the graphite draws in the walls blind to the sea. There are some parking areas with loading and unloading spaces, but to date few buildings were constructed with facades facing the sea, a situation that is starting to change in the new buildings.

Environmental Degradation in São José landfill is the result of pollution of watercourses under urban areas that drift into the Araujo River and flows into the Atlantic Ocean. Polluted water can be clearly identified in satellite photos, being also evident by the expelled odor on site. In the rainy season, polluted water contributes to the flooding of the River Araújo. Soft infra-structure, such as active systems for environmental regeneration could be applied at watercourses and along the seashore, but nothing has been implemented due to the lack of political interest. The search for political convergence is needed to address the coordination and regulation of the environmental sanitation system in the metropolitan area of Florianópolis. Considering that the environmental problems have increased due to urban growth, political and technical solutions depend of the union of municipalities for their solution. Adaptation to climate change has been neglected and sea level rise has affected housing areas along the urban seaside, enhanced by the informal occupation over dunes and construction over mangroves.



Fig.7. Araújo River, 2013.



Fig.8. Mangrove, 2013.

Design Process

In this article, the urban-environmental improvement of São José landfill is studied in design proposals in order to link the city to the sea, from the urban edge to the waterfront. The research considers the methods applied in study works with the inclusion of design projects in urban sections, offering new visions for change, and hence the importance of the design articulation in the urban section (Fig 9-10).

Exploratory spatial arrangements refers site-specific proposals, considering:

- Longitudinal sections that interconnect the city to the sea; and
- Cross sections of the urban facade and the seafront

In longitudinal sections, the transitions among fragmented urban areas are treat-

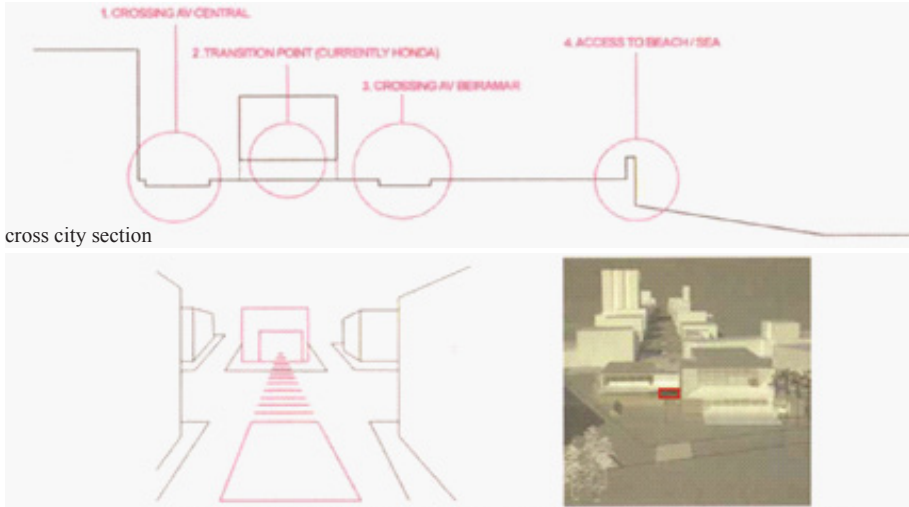


Fig.9. Partial view of the metropolitan trade area.



Fig.10. Envisioning a project in the metropolitan trade area.

ed as urban seams – intermediate scale projects – to overcome barriers and ruptures generated by buildings, voids, and fluxes. This, being referred to the orientation of passages on the ground floor of new buildings, and the qualification of existing alleys would allow the physical permeability and an appealing visual to the seaside, creating a sense of openness through urban apertures to the sea and the mountains. In cross sections, proposals for the new ground and seafront envision the transformation of the urban edge and a cultural notion of front (city) and back (sea). The site planning does not exist for buildings neither for open spaces. Due to the lack of qualification for open areas in the new ground, fences around buildings were built, creating voids in site. The urban design proposals aim to qualified void spaces in between buildings linked to pathways towards the sea. Local surveys identified the uses for recreation and leisure along the seafront as well as everyday activities. Thus far, the sidewalk along the seafront is most used even though is not connected to public spaces interspersed with public facilities. Thus, it is necessary to design spaces for public interaction to create a livable space along the seafront. Throughout an urban plan, a new dynamic will create new potential for urban spaces, such as the transformation of motorways into boulevards. It is important to point out that maritime transportation between the island and the continent could lead the implementation of an integrated regional maritime system, linking light rail (LRT) and ferry by an intermodal transport. To that effect, the use of water as a natural connection could create a balance between coastal areas according to specific demands of fluxes. A new urban condition with the qualification of the landfill is needed in order to qualify this new ground, enhancing local services and facilities, and qualifying pre-existing housing areas. This will contribute to avoid gentrification processes in course, allowing the permanence of a diverse social community that is linked to the sea.



Passage crossing Ave. presidente Kennedy towards the sea (Frida Boström, 2010)

Fig.11. Urban seams, 2010.

Design Guidelines

Guidelines at urban edges aims to implement urban links, such as:

- Urban connectivity from the neighbourhood to the waterfront.
- Qualification of streets and passages.
- Definition of transition spaces in between trade area and landfill site.
- Preserve residential areas, avoiding gentrification processes.
- Development of partnerships to foster public and private activities.

Guidelines for the new ground seeks landscape projects, such as:

- Transforming motorways to boulevards.
- Qualify open areas around the buildings.
- Create areas of convergence in landscape projects.
- Accessibility to headlands, river, mangroves and viewpoints.

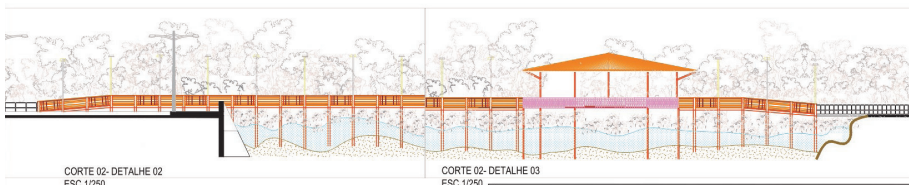


Fig.12. Soft infrastructure over coastal wetlands.

Passages over the mangrove (Erica Monteiro, Raquel Veiss, 2013)

RESILIENCY AND COASTAL CITIES

Guidelines for intervention in the seafront seeks:

- Improve beaches for public access.
- Recover natural shoreline vegetation (*Ammophila arenaria*) for the stabilization of dunes.
- Light construction for public spaces and infrastructure.



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| <ul style="list-style-type: none"> — Main Acces — Landfill of Florianópolis 1) São José landfill 2) Estreito landfill 3) Via Expressa Sul landfill 4) Baía Sul landfill 5) Beiramar Norte landfill | <p>Areas for project implementation in São José</p> <ul style="list-style-type: none"> ● Transition spaces ■ Mangrove ○ Sewage flow — Metropolitan trade area — Watercourses |
|--|--|

Fig.13. Areas for projects implementation in São José Landfill



Seaside



Transversal local lanes to the sea



New ground site and urban edge trade are



Metropolitan highways



Mangrove



Araújo river



Local passages to the sea

Fig.14.São José Landfill photos

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