

Sao Paulo, a fluvial metropolis

The Metropolitan Water Ring of Sao Paulo

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Abstract: In partnership with State and Federal Agencies in Sao Paulo Brazil, the Fluvial Metropolis Research group at FAU USP developed an integrated Metropolitan Water Ring, the Hidro Anel Metropolitano de Sao Paulo. Partially using existing resources as rivers and reservoirs, it creates a navigable circuit linking the city's peripheral areas and providing them with an urban and industrial transportation waterway that hosts Eco-ports, Recreational areas, and Flood Protection to the adjoining low income neighborhoods. The article makes the case for the refocusing the urban decisions on the infrastructural aspects and the river patterns.

Key words: Urban Waterways, Canal-City, Fluvial neighborhoods, artificial archipelagos of artificial deltas

Urban Waterways of the Sao Paulo Metropolis.

Fluvial transportation of goods and passengers Metropolitan Waterways system of parks and fluvial ports aiming at the fluvial transportation of goods and passengers.

When the Portuguese occupied the water basin of the High Tiete' River, nearly five centuries ago, they found a network of native villages, situated in the hills among rivers, in the confluence of the water bodies. The rivers were navigable routes of communication between these villages' fluvial ports. We had there the embryo of the desired Sao Paulo as a Fluvial Metropolis. Among the dozens of village's fluvial ports in existence at the time of occupation, the Portuguese chose the one that had the most strategic location from a military point of view, to become the main port, or general port. The other villages that were occupied formed a ring of control ports of the navigable ways, and of protection of the general port- a citadel fortified by the waters and by the fields of the basins of the Piratininga: Sao Paulo of Piratininga, or Sao Paulo of the Piratininga River-presentetly the river Tamanduatei. Probably along thousands of years, or at least centuries, the indigenous populations that inhabited the watershed of the High Tiete' knew how to construct the architecture of their place. Along the first period of the Colonial times, the Portuguese took advantage of the places, the trails and the navigable ways of the indigenous people. Starting in 1850, with the passing

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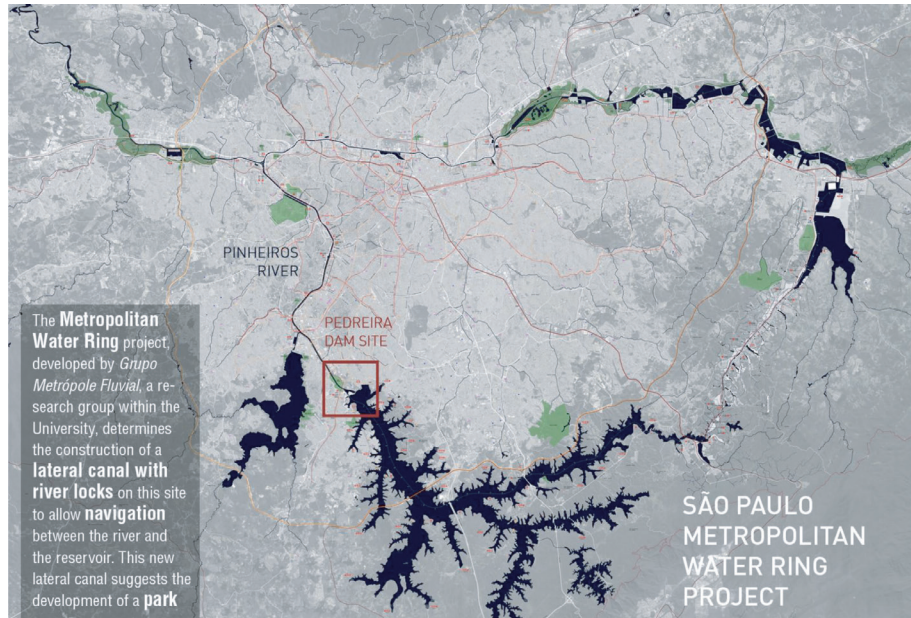


Fig.1. São Paulo metropolitan water ring project.

of the water laws and the land laws, when Brazil evolved from the regimen of concessions of land to a system of market of lands, the river beds and the flood plains began to be invaded, parcelled and sold.

In less than one hundred and sixty years, what should have been the main public place of the citizens of the Sao Paulo Metropolis, the main riverbeds of the river Piratininga,(now called Tamanduati) the Grande River (now called Pinheiros) and the Principal River, (now called Tiete' or True River) were invaded, parcelled and sold. And the minor beds of these rivers-narrow and shallow channels that run slowly along the bottom of the larger water-beds were rectified, transformed in open sewage channels and confined by urban roadways in the lower valleys –peripheral avenues for express and rapid transit- that collaborated to degrade the river urban environment and permanently isolated the remainder of rivers – the present narrow an shallow channels- from the rest of the city. We built the greater part of our Sao Paulo Metropolis within the larger riverbeds of rivers and streams that constitute the High Tiete' river basin, the main public urban places of humans within water territories. We built a desert metropolis where there was a latent river Metropolis, as an improvised camping ground of more than twenty million citizens. It is a picture of our institutional fragility in the collective construction of the public domain. After a hundred and twenty years, we are still building a democratic republic, in fact participative.

Sao Paulo and other Brazilian cities are subject to an extreme mercantile and road driven urbanism that degrades urban environmental structures, the urban landscape, and the human relationships that look for the individual and collective wellbeing of citizens. The city turned their backs towards their rivers, the population cannot envisage anymore the virtues of living close to their urban rivers, to walk along roadways

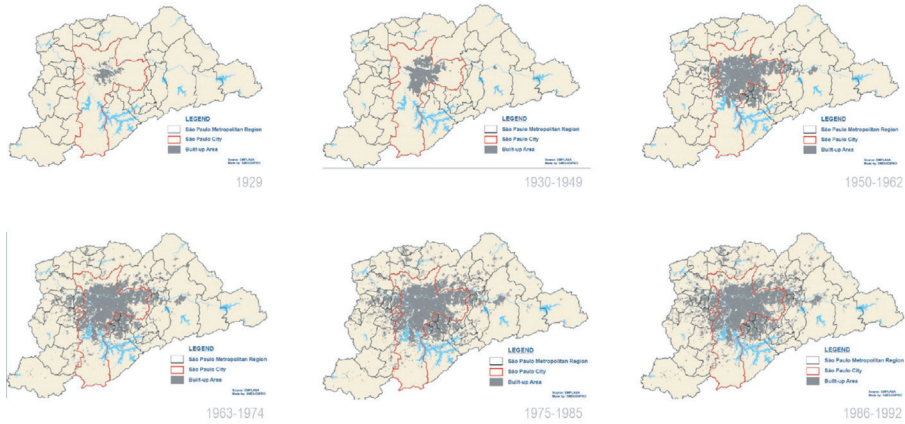


Fig.2. Evolution of urbanization of São Paulo.

and shaded pedestrian ways, to access daily urban river parks with beaches and piers: the dulled and resigned look of the citizens that lost the panorama of an urban river landscape. The root of this blindness is in the mentality behind the infrastructure. The most important architecture, the one that interests us all, is the architecture of place, that is, the collective construction - conquest - with the objective of the health and wellbeing of all. To invest in the quality of the urban environmental structures means to prioritize investments in sewage and health. Cities are unfinished works of art, in a good sense that is open works of art that can be modified, collective authorship works of art, authors that are alive at the same time together with those that are no more alive and those who have no yet been born. This masterwork of humanity depends upon continual investments in education and culture—philosophy and art. Otherwise it will become rather than the collective open and unfinished work of art, the misery of the disaster and the indignities of an improvised perpetual unhealthy camping ground where urban rivers are narrow open air sewage channels confined by urban highways.

The cities, the largest and most extraordinary work of art of mankind,—our home—this open and unfinished work of collective art, that allow us all together to be able to completely change our place, our constructed nature, towards an improvement in the quality of life for all depends upon critic and collective action with the poetic intention to supply shelter for all, esthetic-technical proficiency to structure this poetic shelter, and ethical incentive to support the esthetic structure that intends to sustain the poetic dimensions of the shelter of the city.

The deep foundations of this ethical incentive lie in the four fundamental roots of the humanistic social, public, and collective critique and action dimensions, an active life that happens in the public space and transforms the architecture of the place and its program: of meetings of trust, of conviviality of the different cultures: parks, ports and public infrastructure for education, culture sports, leisure social and health needs, along the margins of urban rivers. Housing that faces parks and river ports, slow urbanism, a living street and light infrastructures are concepts that reinforce the virtues of living, studying and working close by, to walk, to cycle and to navigate

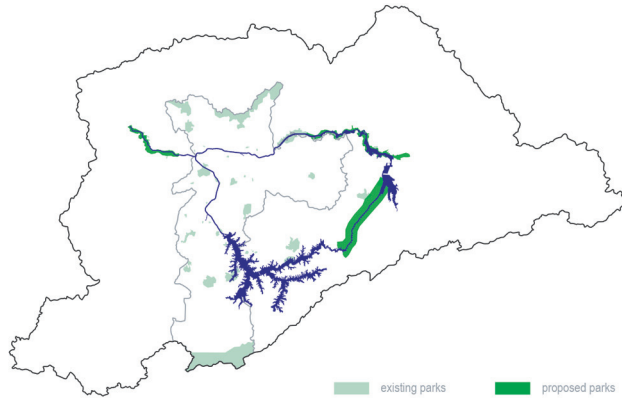


Fig.3.Current and future parks.

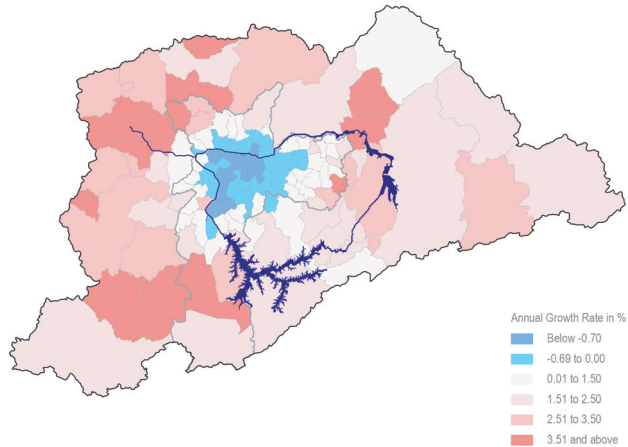


Fig.4.Annual growth rate in %.

within and urban environmental structure in the presence of water and trees: blue and green urban infrastructure of capillary nature present in all the urban fabric and necessary to physical and mental health, the wellbeing and the pleasure of constructing the imagined wished for interior, necessary to the human and the urban conditions.

The Metropolitan Water Ring of Sao Paulo and the Metropolitan Waterways System, constituted by a network of navigable channels and lakes interconnected through locks.

This System is subdivided in three subsystems:

- 1) Carapiculba-western Subsystem arch. It is constituted by the channels of the rivers Tiete' and Pinheiros, as well as by the dam lake of Guarapiranga. The section of the Tiete' channel that is part of this subsystem lies between the dam Edgar de Souza and the Penha dam.
- 2) Itaquaquecetuba Subsystem- The Eastern Arch of the Water Ring, is constituted by the three new lakes (channel-lakes of Penha, Sao Mighel ZPaulista and Itaquaquecetuba) that will be formed by the Tiete' River, upstream from the Penha Dam, starting by the installation of the two mobile dams (the mobile Penha dam already exists) and three locks, towards the mouth of the Taiacupeba River, in the limits between the municipalities of Suzano and Mogi das Cruces. The canals and lakes of the Taiacupeba

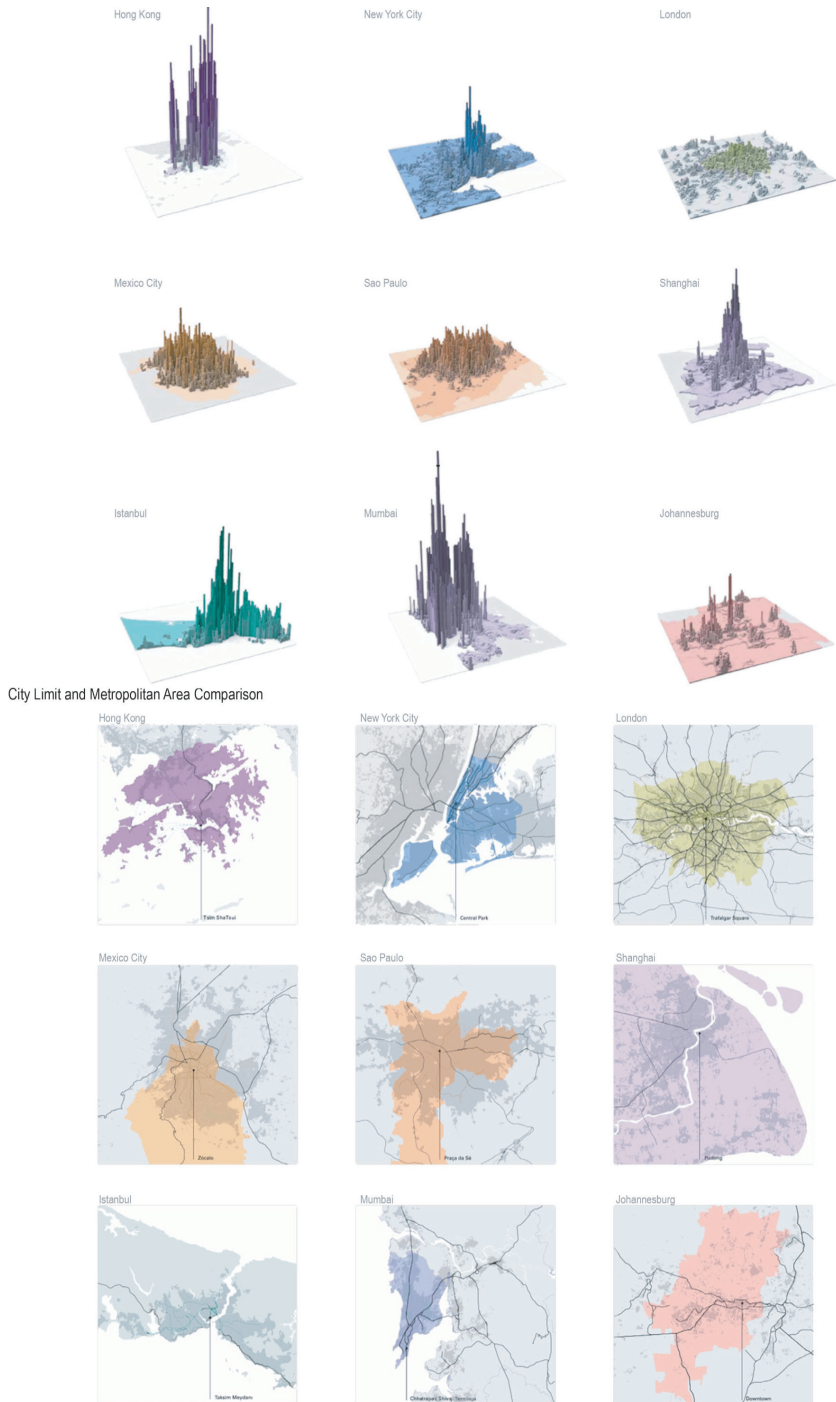


Fig.5. Density distribution comparison.

Mirim River, are also part of the Subsystem of the Itaquaquecetuba. The Water Ring Project proposes the construction of a lateral channel, a mobile dam and lock in the mouth of the Taiacupeba and Tiete' Rivers, the formation of a Channel-Lake between the mouth of the Taiacupeba and the existing dam. It also includes the construction of a lateral channel and lock in the existing Taiacupeba dam. The Eastern Arch of the Water Ring is completed by the construction of a lateral channel, with a staircase of locks, in the Taiacupeba Mirim and the Canal de Cumeeira, in the Ouro Fino District, in the Municipality of Ribeirao Pires.

3) The Rodovia Anchieta Dike Subsystem (in Sao Bernardo do Campo)- Southern Arch of the Water Ring, is constituted by the sections of the Billings Dam, Pedreira and Rio Grande.

We can say that presently, it already exists seven "urban waterways" in latency, contiguous but not interlinked. They are: 1) Urban Waterway of the navigable channel of the Tiete' River of approximately 44 kilometers. 2) Urban Waterway of the lower channel of the Pinheiros River of approximately 10 Kilometers. 3) Urban Waterway of the Higher channel of the Pinheiros River, approximately 15 Kilometers. 4) Urban Waterway of the Guarapiranga Lake with ecoports. 5) Urban Waterway of the Pedreira Lake with ecoports . 6) Urban Waterway of the Rio Grande Lake with ecoports. 7) Urban Waterway of the Taiacupeba Lake.

The Hidroanel, Water Ring project indicates the construction of locks to link 6 of these waterways. The lake formed by the dam Taiacupeba is not contiguous to the 6 waterways, and it will be linked only after the three lakes waterways of the Eastern Arch of the Water Ring will be constructed. Two new sections of the Water Ring will be constituted by mobile dams and locks, described in detail in the Portuguese text. Counting the existing and in construction locks, the Metropolitan Waterway system will have 22 locks, and will form an interconnected network of navigable urban waterways of 170 Kilometers.

Urban Fluvial Transport of goods, freight and passengers. Vessel's typology

1) Fluvial urban transport of public freight (dredge sediments of the channels and lakes, products from the water treatment plants, treated and untreated urban garbage, construction arids, soil extracted from excavations)

2) Fluvial urban transport of commercial goods (produce, building materials, urban distribution of goods)

3) Fluvial urban transport of passengers (lake crossings, tourism integrated to the urban transportation systems of busses, trains and metro through a unified ticketing system)

4) The navigation vessels for the channels that are narrow and shallow will be BUC, Urban freight vessels self-propelled, with electrical engines for the transport of public and commercial freight in containers

5) Small, medium and large self-propelled vessels for the transport of passengers, an equivalent to taxis, minibuses and urban buses.

Port Types

1) Ecoports. The ports of origin of the public freight goods of garbage, and refuse,

recycling materials, produce, and general markets goods.

2) Transports. The ports origin of untreated freight, and destination ports for commercial goods

3) Triports. Destination ports of public freight, industrial plants for their processing, considering concepts as “industrial ecology” and “reverse logistics”. Ports of origin of pionner freight.

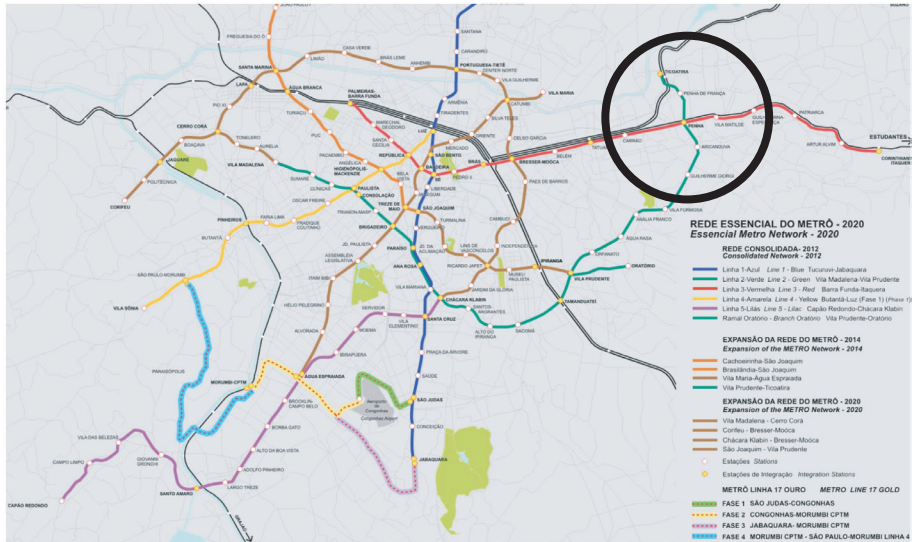


Fig.6. Essential metro network -2020.

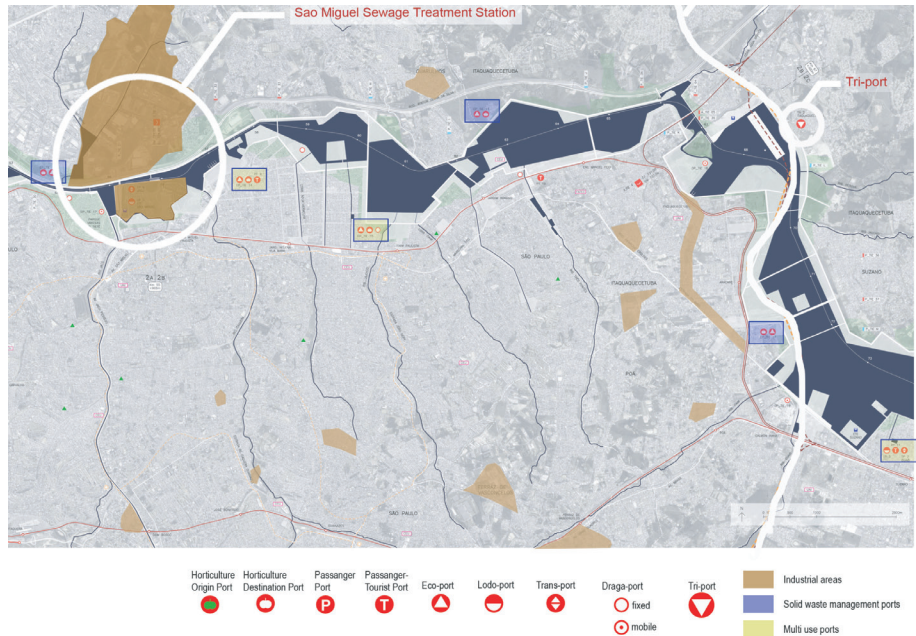


Fig.7. Hidroanel

4) Dradaports. Floating fixed and mobile ports installed in the mouth of the rivers and navigable channels for the mission of dredging, 365 days per year the sediments of the rivers and lakes. They are the ports of origin of the sediment materials. The fixed ones are installed in the main affluent, that transport high volumes of water and displace sediments, like the rivers Tamanduatei to the Tiete' and the Pirajussara to the lower Pinheiros.

5) Lodoports. These ports are installed next to the water treatment plants ETE and ETA

Research Group Fluvial Metropolis

The Research Group Fluvial metropolis, of FAUUSP, Faculty of Architecture and Urbanism of the University of Sao Paulo in Brazil, elaborates studies related to the Urban Waterways System of the Metropolis of Sao Paulo, with an emphasis on "multipurpose" and "intersecretarial" aspects of the project, as well as its consequences and influences to the development, urban, social and economic of the RMSP, Metropolitan Region of Sao Paulo, with particular interest in 1) The Billings-Taiacupeba channel, 2) the Small Water Ring (Tamanduatei' Channel, Meninos, Couros Billings), Billings-Couros channel; 3) The Guarapiranga lake waterway, interlacing the concepts of multiple use for the water resources.

The navigable Channel Billings-Taiacupeba could enlarge its water storage capacity for the supply of the Tiete' Cabeceiras system, including the Rio Grande sector of the Billings reservoir. The three navigable channel-lakes s of the Itaquaquecetuba subsystem, the eastern arch of the Water Way, beyond contributing to the macro drainage, by regulating through its mobile dams, the flow of the Tiete', contributes to a better landscape and beyond that, to the quality of the environmental urban structure of this region. It makes possible the implementation of parks and fluvial ports, transforming the quality of life of the inhabitants, through the articulation of projects and public works regarding the urban infrastructure, public equipment, and social housing, facing the new fluvial waterfront.

The Billings-Couro channel, that completes the Small Water Ring, can contribute to the macro drainage of the RMSP, diminishing the flows in the mouth of the Tamanduatei' during the intense rain period, and diminishing the pollution charge that presently enters into the Pedreira da Billings section, by reversing the upper channel of the Pinheiros River. The movable dams and the lateral channels that constituted the Small Water Ring regulated the flow to the Tamanduatei, Meninos and Couros, and eventually in emergency situations, would allow the reversal of its waters towards the Pedreira Sector, that would probably be less polluted than the waters of the channel of the high Pinheiro River, contributing thus to clean the Billings reservoir.

The large Water Ring and the small Water Ring could help maintain not only the cleanliness of the Pedreira sector of the Billings reservoir, but could as well contribute to clean the higher and lower channels of the Pinheiros. The multi scope dimension of the Water Ring of the RMSP could contribute to solve multiple inter-linked issues. The coordination of the public policies regarding the water resources, refuse, and urban mobility is the real reason to justify the investment in projects and public works of the Metropolitan Water Ring of Sao Paulo. The aim to achieve zero

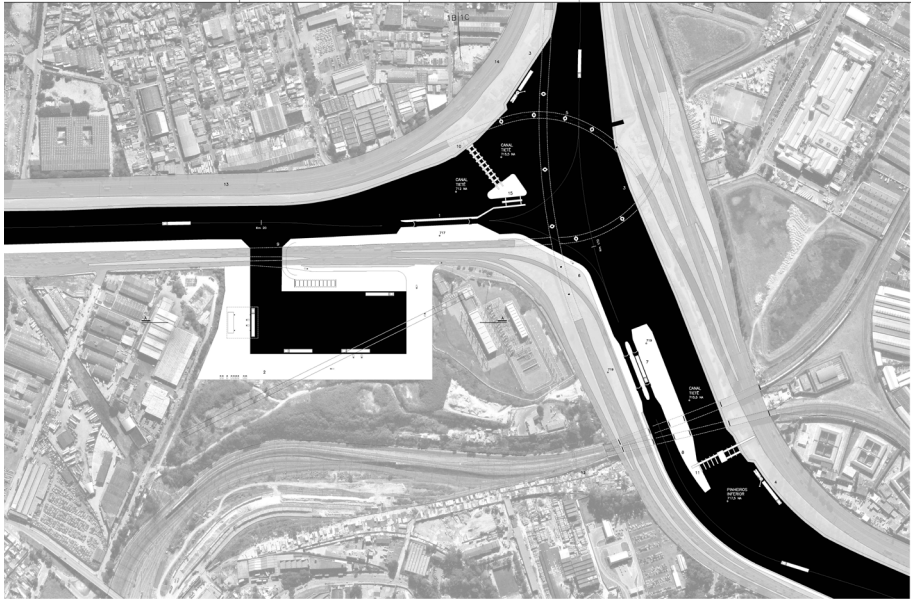


Fig.8. Darsena and Triport

dredging and zero filling make urban quality viable in the metropolitan environment, and consequently in the quality of life of its citizens.

This is the motivation, according to the Research Group Fluvial metropolis, that affirm that the construction of the system Metropolitan Water Ring for Sao Paulo, and prompted the FAAUSP to present in 2011, to the Water Management Department of the Secretary of Logistics and Transportation of the Governement of the State of Sao Paulo this proposal, through the Articulation Agreement in Architecture and Urban planning, of the Technical, Economic, and Enviromentalm Pre-factibility.

Note: It can be studied further in the conceptual paper in www.metropolefluvial.fau.usp.br.



Fig.9. Triport