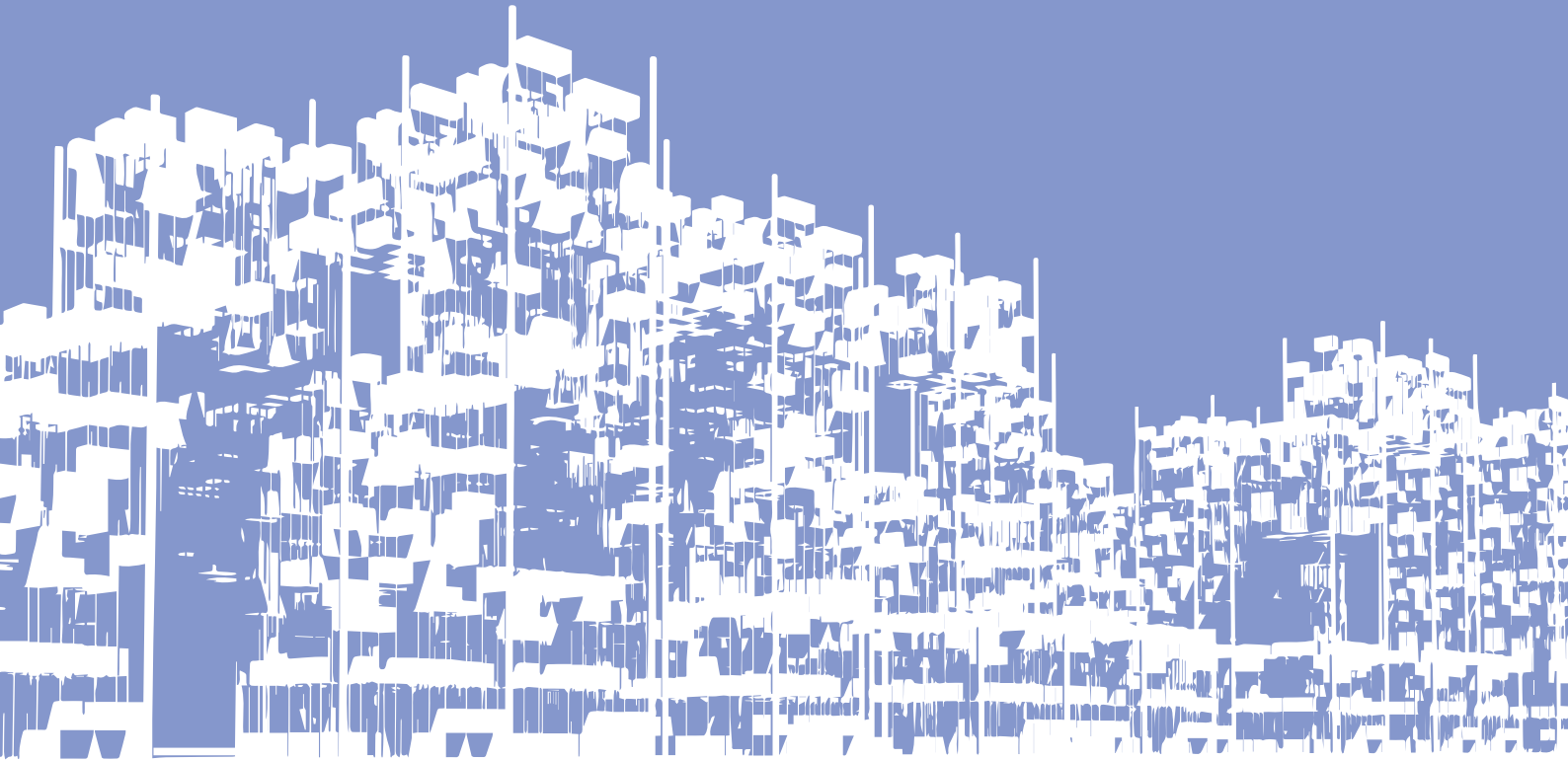


# SKYHIVE

PATRICK NAUMANN  
TJARK GALL







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URBAN TRANSFORMATION SÃO PAULO

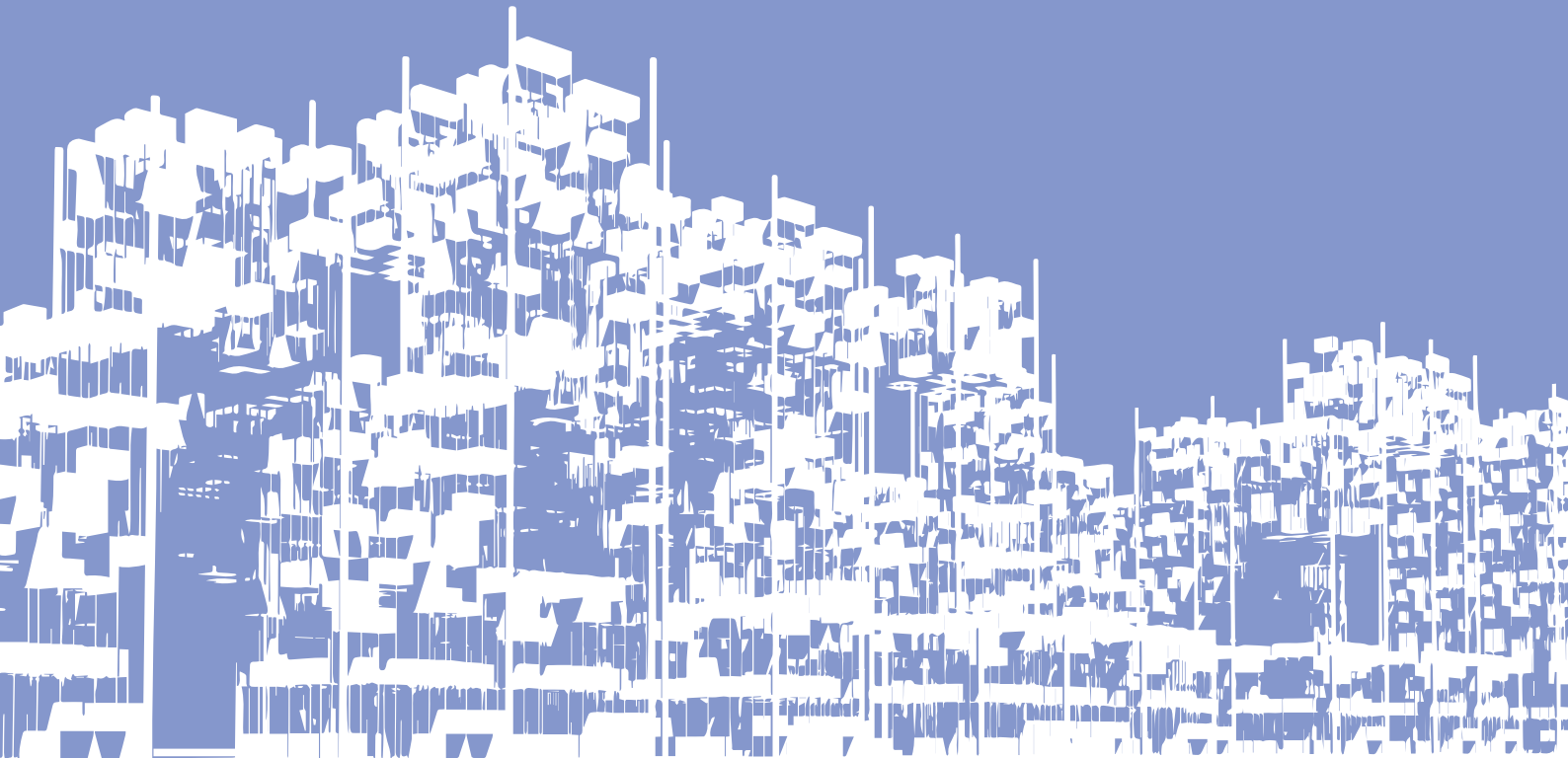


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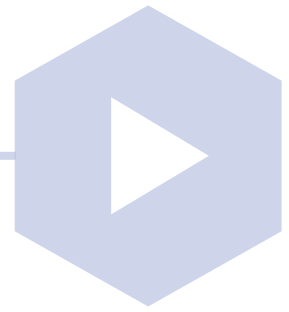


# INTRODUCTION

URBAN TRANSFORMATION SÃO PAULO  
DESIGN STUDIO (ME) – SUMMER 2017







### ABSTRACT | TASK PAPER

“Cities and urban regions are the habitat of most people. The urban system, the layout of cities and regions, plays a crucial role in sustainable development. Buildings (their construction, their heating and cooling etc.) and infrastructure (the access to mobility etc.) account for a high amount of energy and resources (an estimated 65%) as well as associated carbon emissions and waste. Facing the current growth in population a more sustainable form of growing urban regions is necessary – and possible. Dense urban environments often represent the promise of a better life for many – but also challenge and site of opportunity for a more sustainable future. However, their development also represents “a grand challenge” (EU, 2012) – in particular in fast growing and urbanizing countries such as Brazil.

São Paulo is an important case in studying the development and evolution of fast growing regions. In recent years, the agglomeration (Greater São Paulo) – registering an estimated population of 19.9 mio. – has a population growth of 0.5% a year. (<http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf>). In São Paulo, just like in many other rapidly developing urban regions, the population growth is not always formally planned or managed. A large share of the “new” population settles in “informal” conditions, such as favelas. On the other hand the municipality has been receiving awards for the newest city Masterplan in regards to social and sustainable aspects. In the context of the recent flow of refugees, even German cities such as Berlin experience a need for rapid housing production. Temporary buildings like container homes and tents can only serve as an interim solution.

On the long run, sustainable urban planning is key to managing population growth in an environmentally sound, economically robust, and socially responsible manner. Planning for urbanization requires the integration of essential services, such as water and energy supply, consideration of low-emission forms of mobility, local climate conditions, and affordable and socially appropriate housing.

The studio – a cooperation by ISU, Technische Universität Braunschweig (TUBS) in Germany and LAPAC, University of Campinas (UNICAMP) in Brazil – seeks to explore sustainability criteria in urban design concepts, to test design tools and to experience a multicultural learning environment.” (ISU Taskpaper, 2017)









# INTRODUCTION

AERIAL PHOTO SAO PAULO (GoogleEarth)



0 6 km

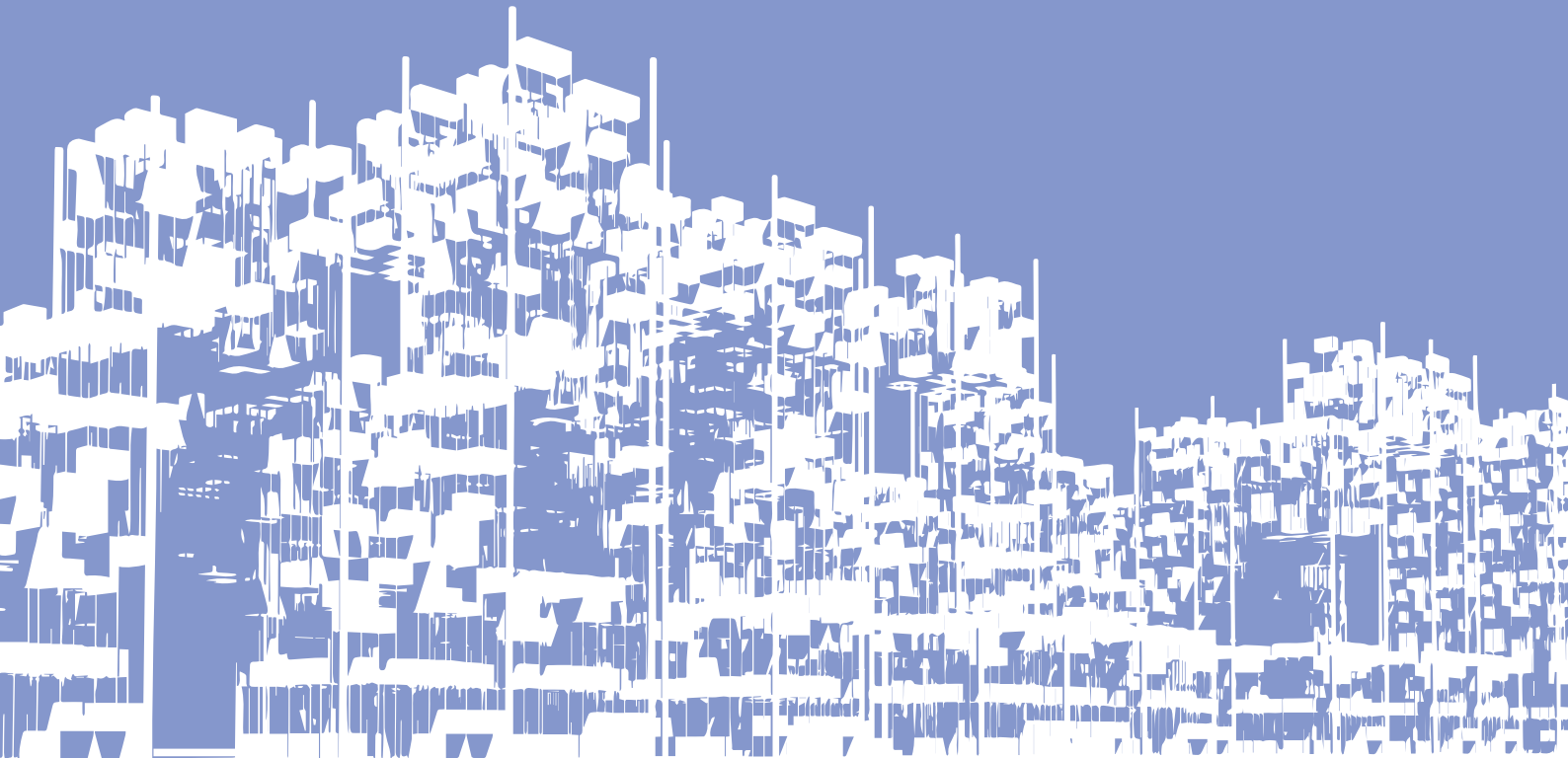






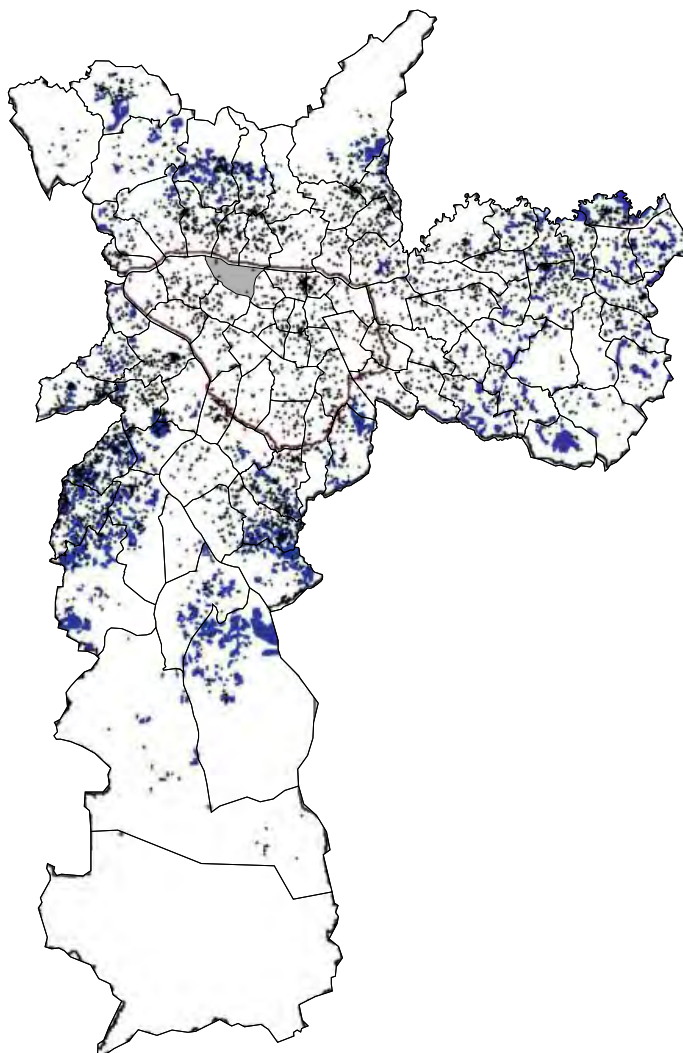
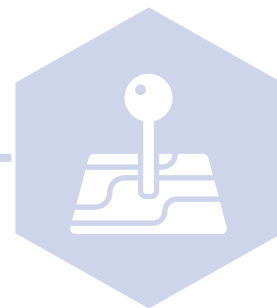
# MAPS + DATA

URBAN TRANSFORMATION SÃO PAULO



## TOPOLOGY





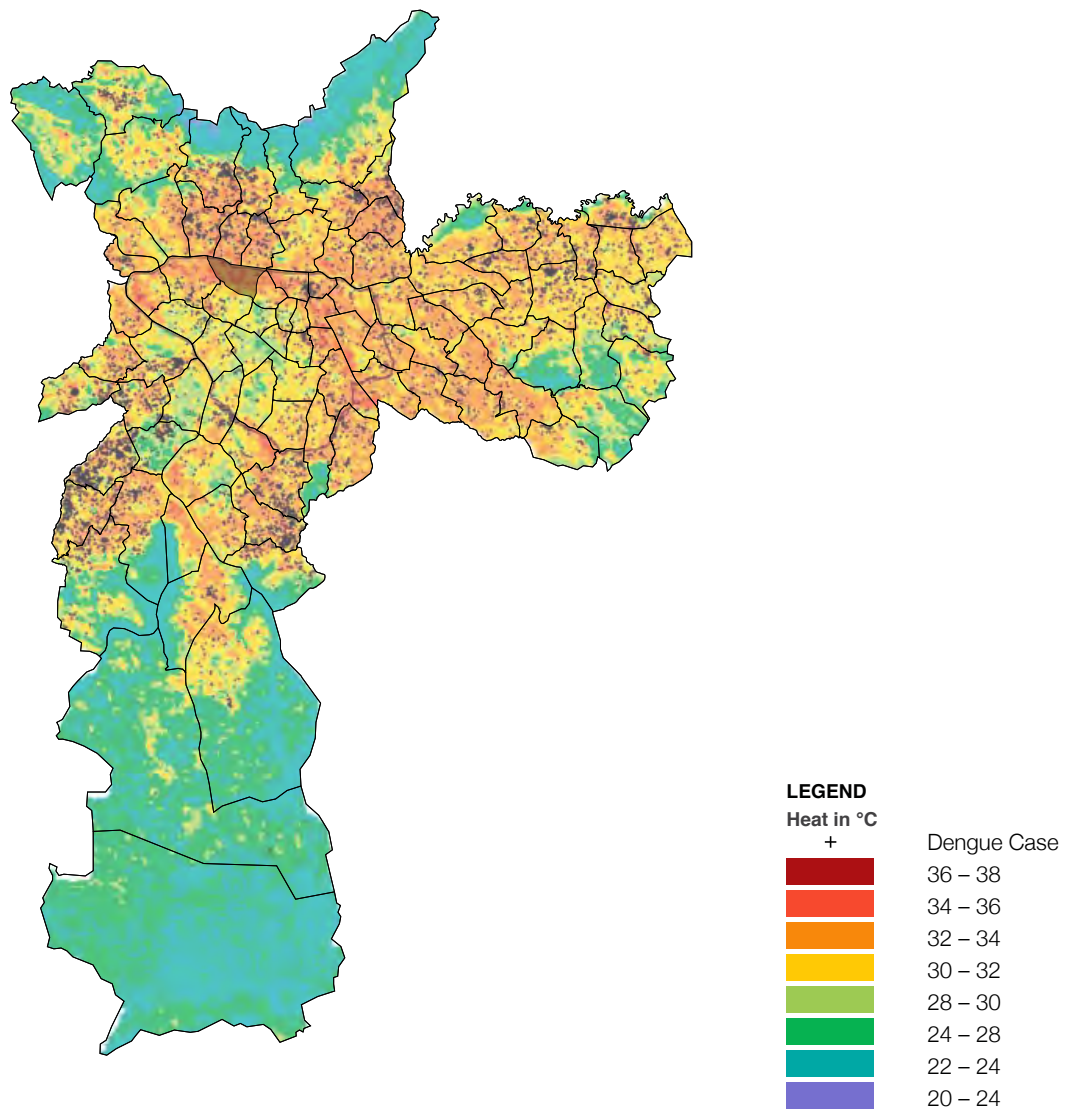
### LEGEND

- + Dengue Cases
- Slum-like Area

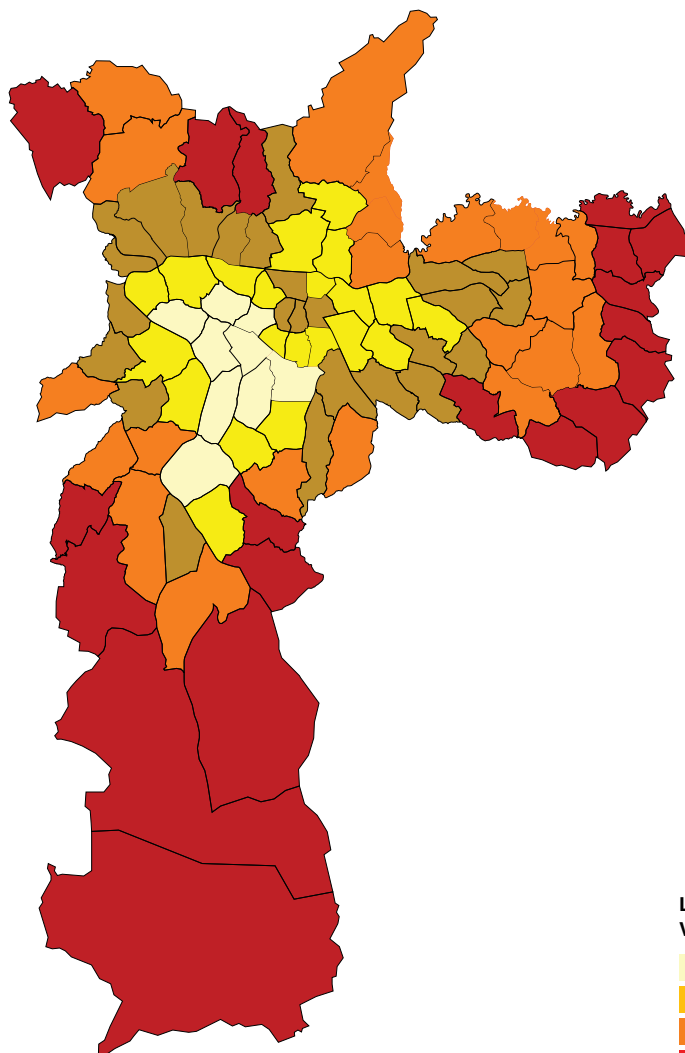
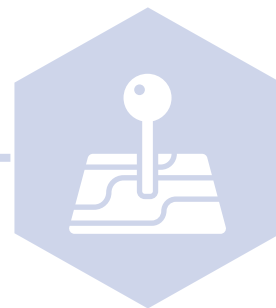
0 10 km



## HEAT MAP

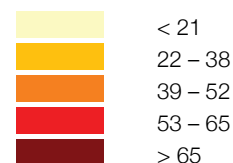






### LEGEND

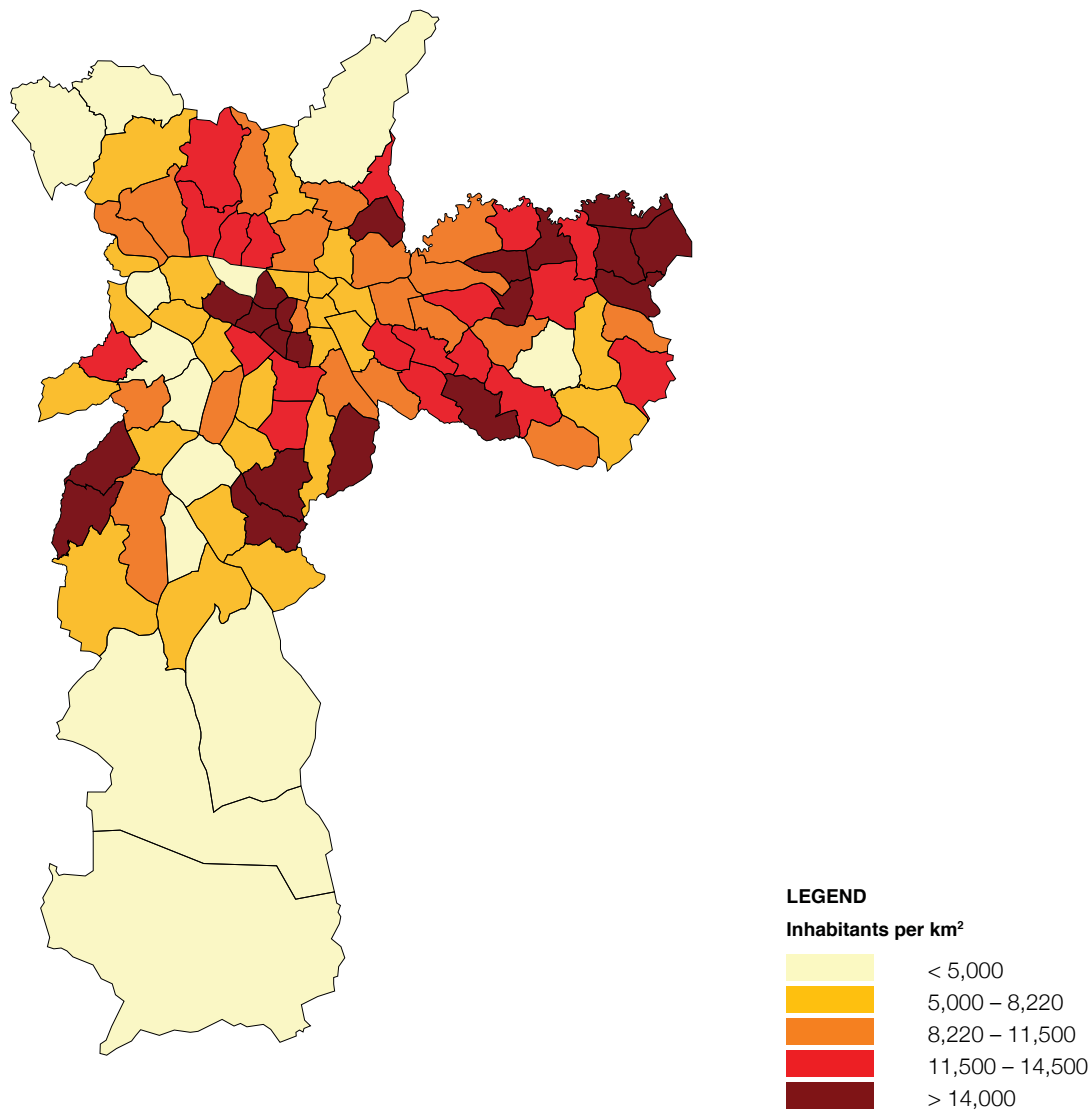
Vulnerability in points

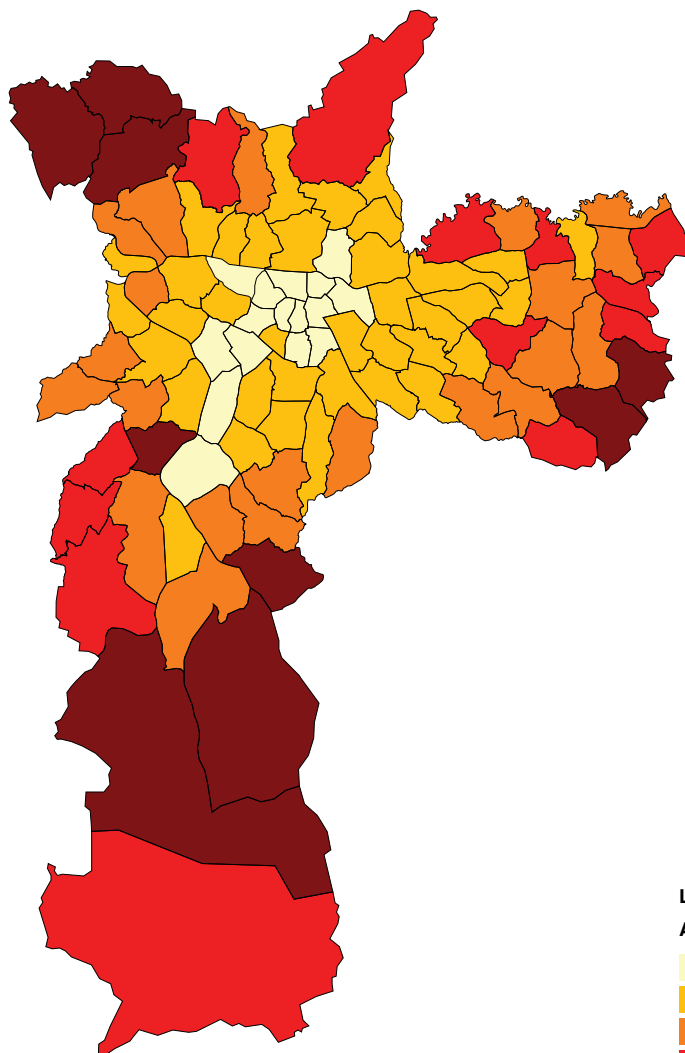


0 10 km



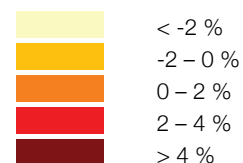
## DENSITY





### LEGEND

Annual Growth between 1991 – 2000

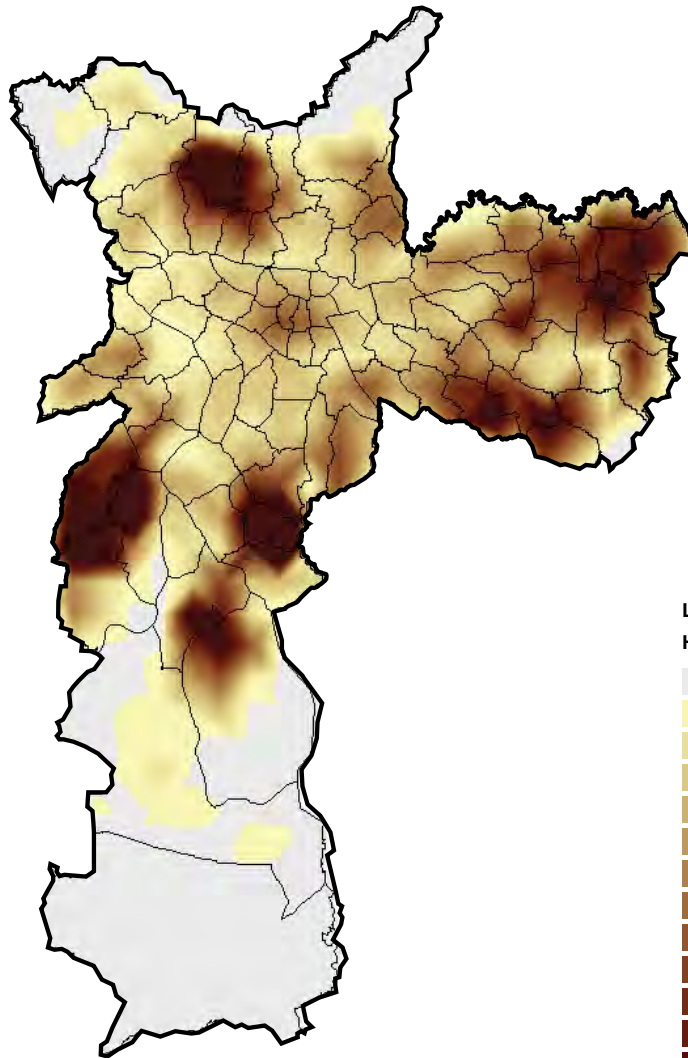


0 10 km



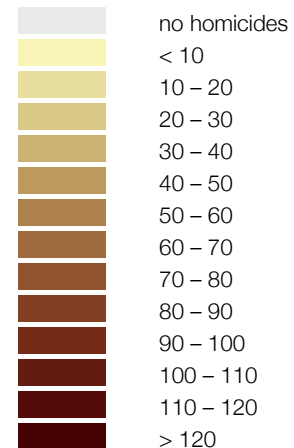






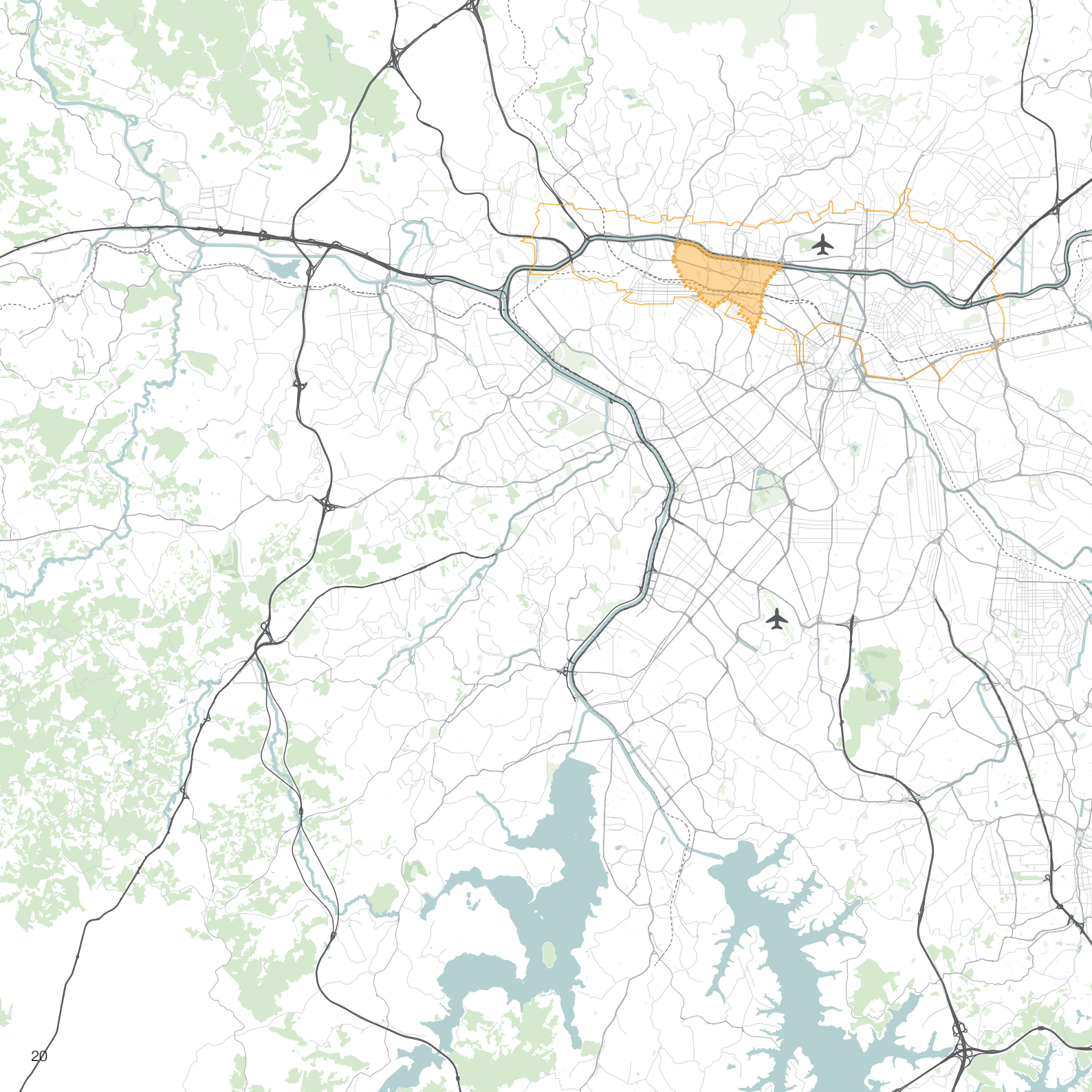
### LEGEND

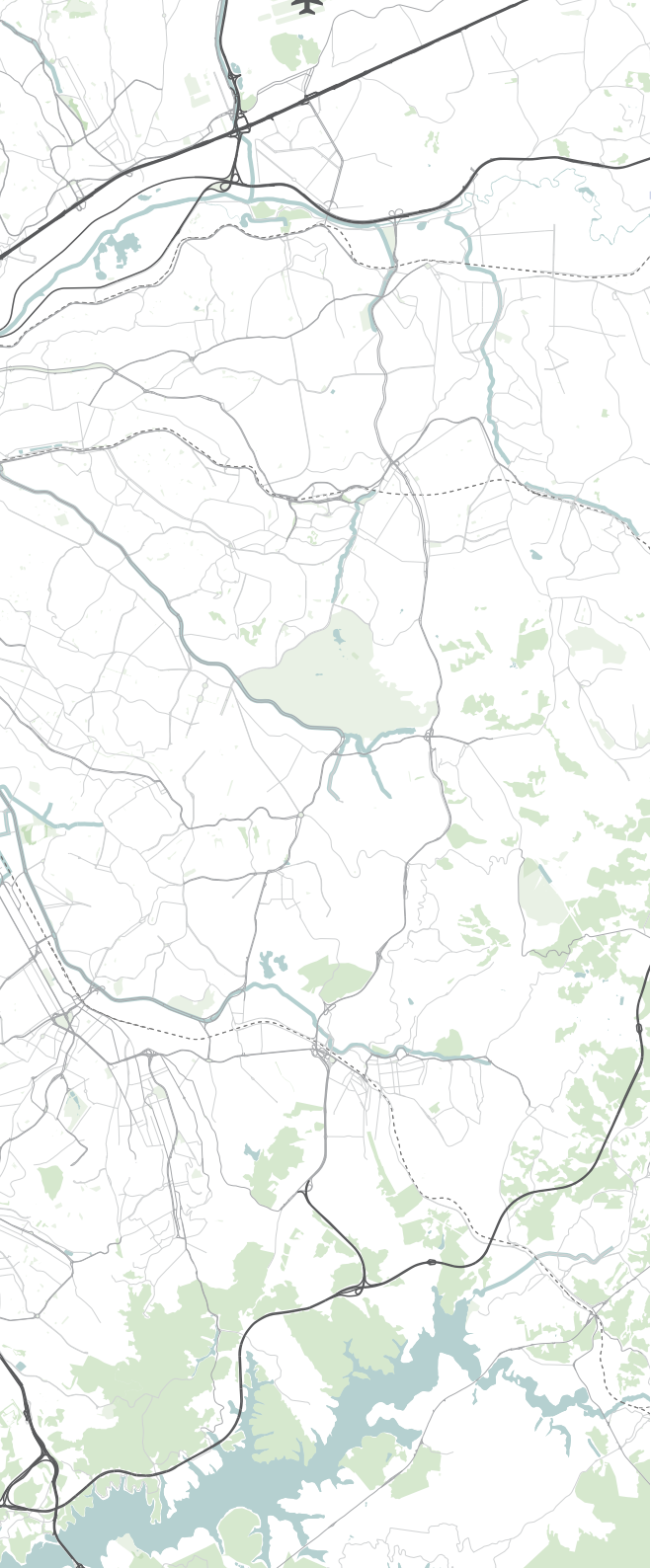
Homicides per 100 M inhabitants (1998 – 2000)



0 10 km







# MAPS + DATA

## INFRASTRUCTURE







# MAPS + DATA

## PUBLIC GREEN & PARKS







# MAPS + DATA

## CULTURAL FACILITIES



### LEGEND

#### CULTURAL FACILITIES

-  Library
-  Cultural Spaces
-  Museums
-  Theaters / Cinemas

0 1 km







# MAPS + DATA

## HEALTHCARE



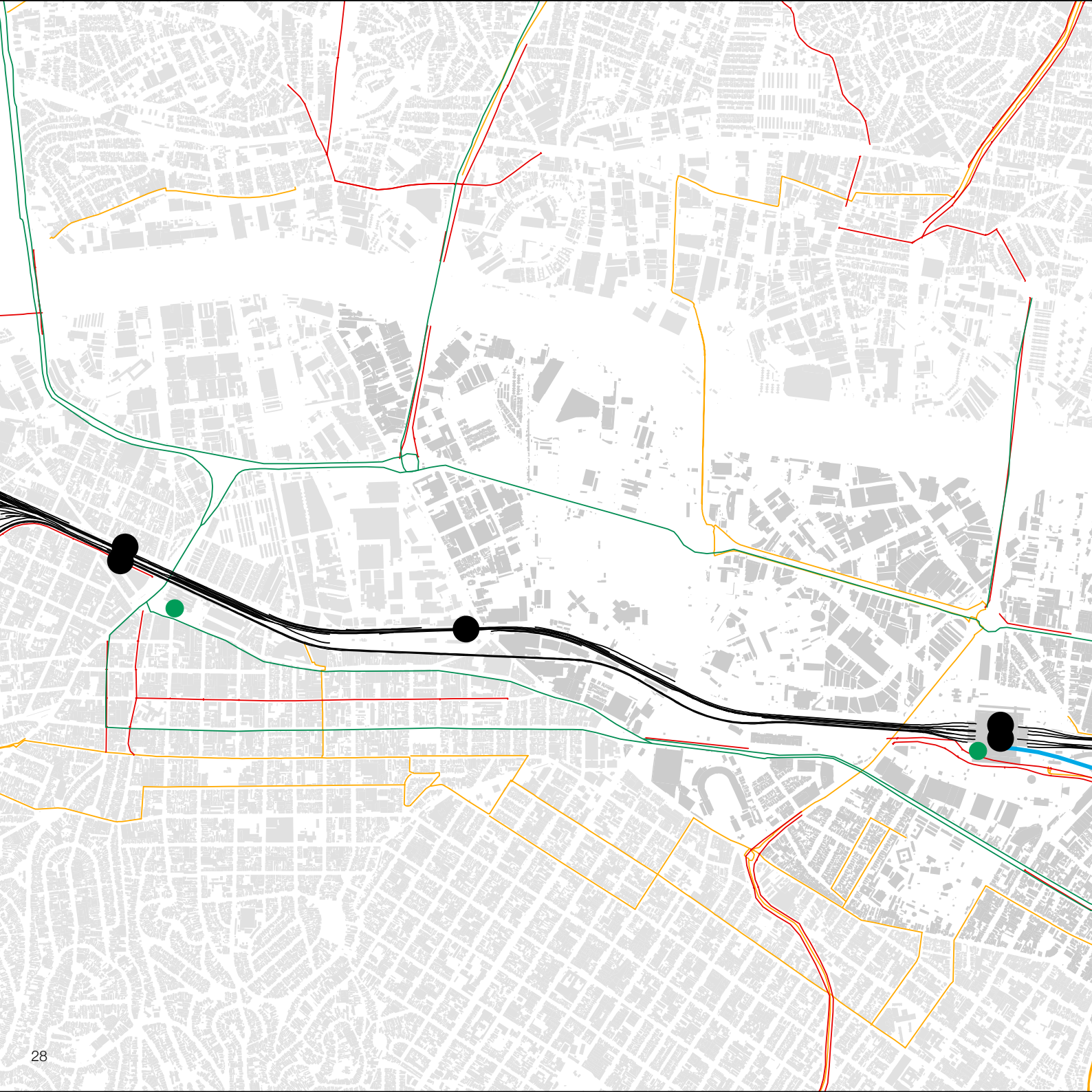
### LEGEND

#### HEALTHCARE FACILITIES

- Specialized Clinics
- Mental Clinics
- Health Centers
- Emergency Stations

0 1 km











# MAPS + DATA

## PUBLIC TRANSPORT



### LEGEND

#### Public Transport

-  Train Station
-  Bus Terminal
-  Railway
-  Metro-Line
-  Bus-Lines
-  Exclusive-Bus-Lines
-  Road-Network

0 1 km













# MAPS + DATA

## PUBLIC SERVICES



### LEGEND

#### Public Services

-  Town Hall
-  Consulate
-  Post Office
-  Cab-Service
-  Regional Government
-  Cemetery

0 1 km

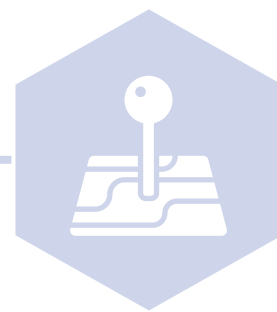






# MAPS + DATA

## SPORT FACILITIES



### LEGEND

#### SPORT FACILITIES

-  Sport Center
-  Sports Club
-  Community Sports Club
-  Sports Stadium

0 1 km









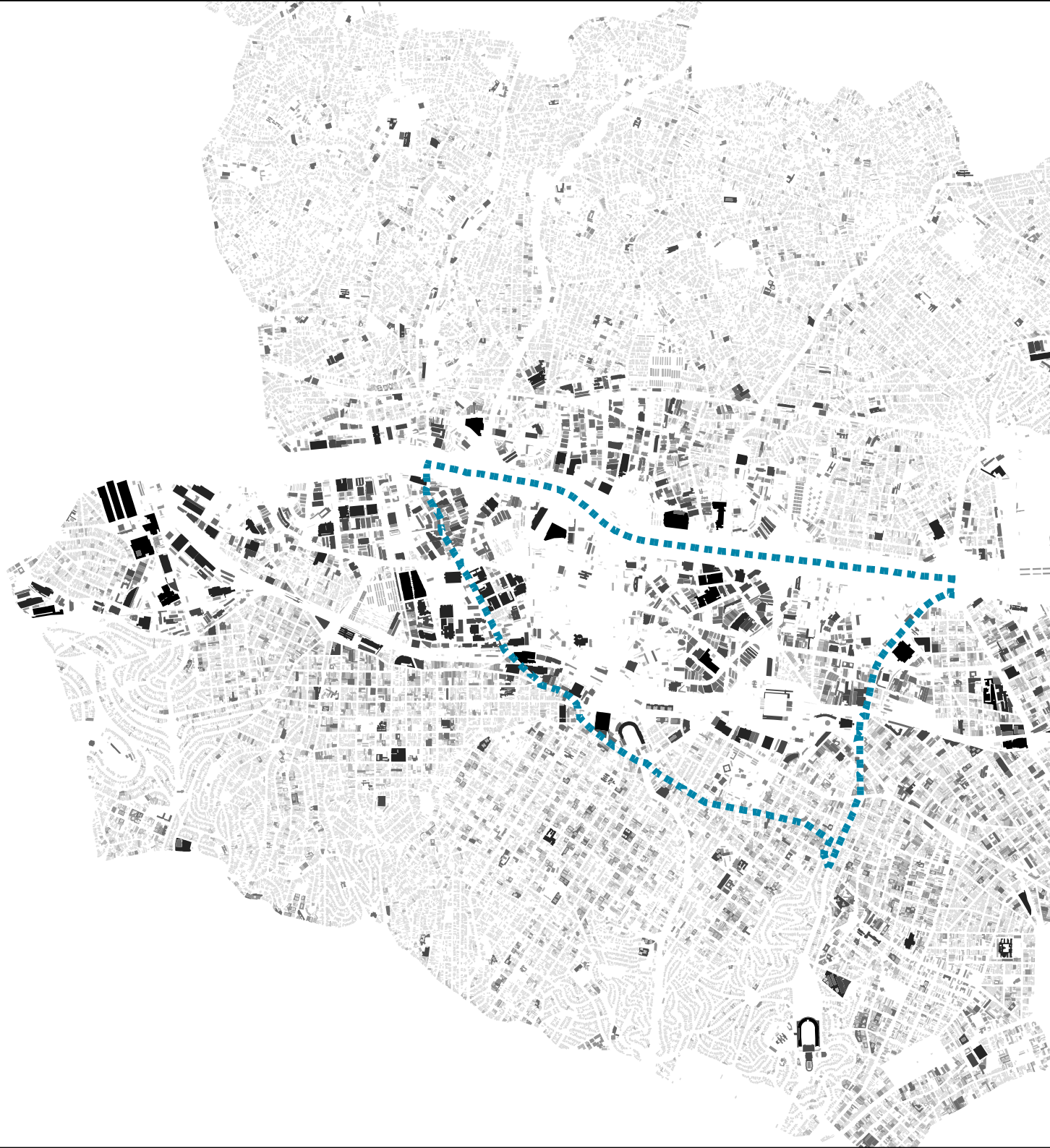
# MAPS + DATA

## STRUCTURE PLAN



0 1 km





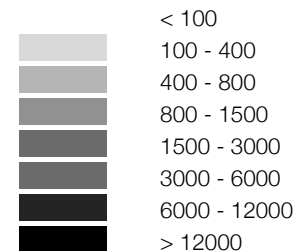
# MAPS + DATA

## BUILDING AREA

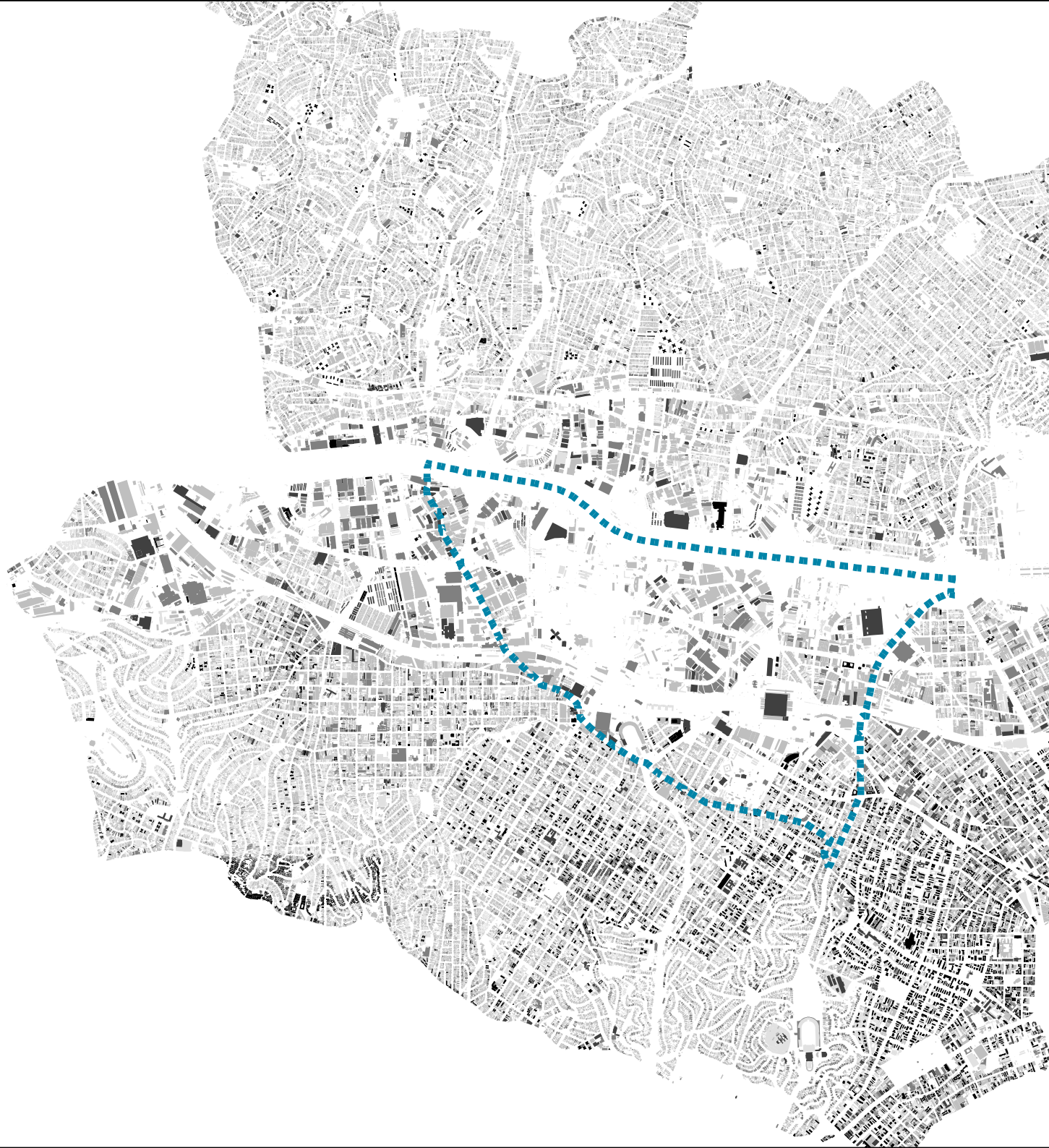


### LEGEND

Area in sqm







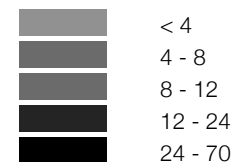
# MAPS + DATA

## BUILDING HEIGHT



### LEGEND

Height in m



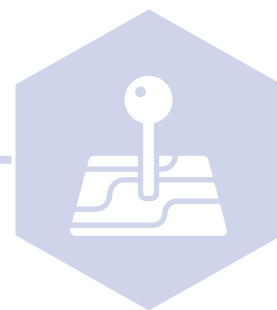






# MAPS + DATA

COPY + PASTE | BARCELONA



0 500 m









# MAPS + DATA

COPY + PASTE | NEW YORK



0 500 m

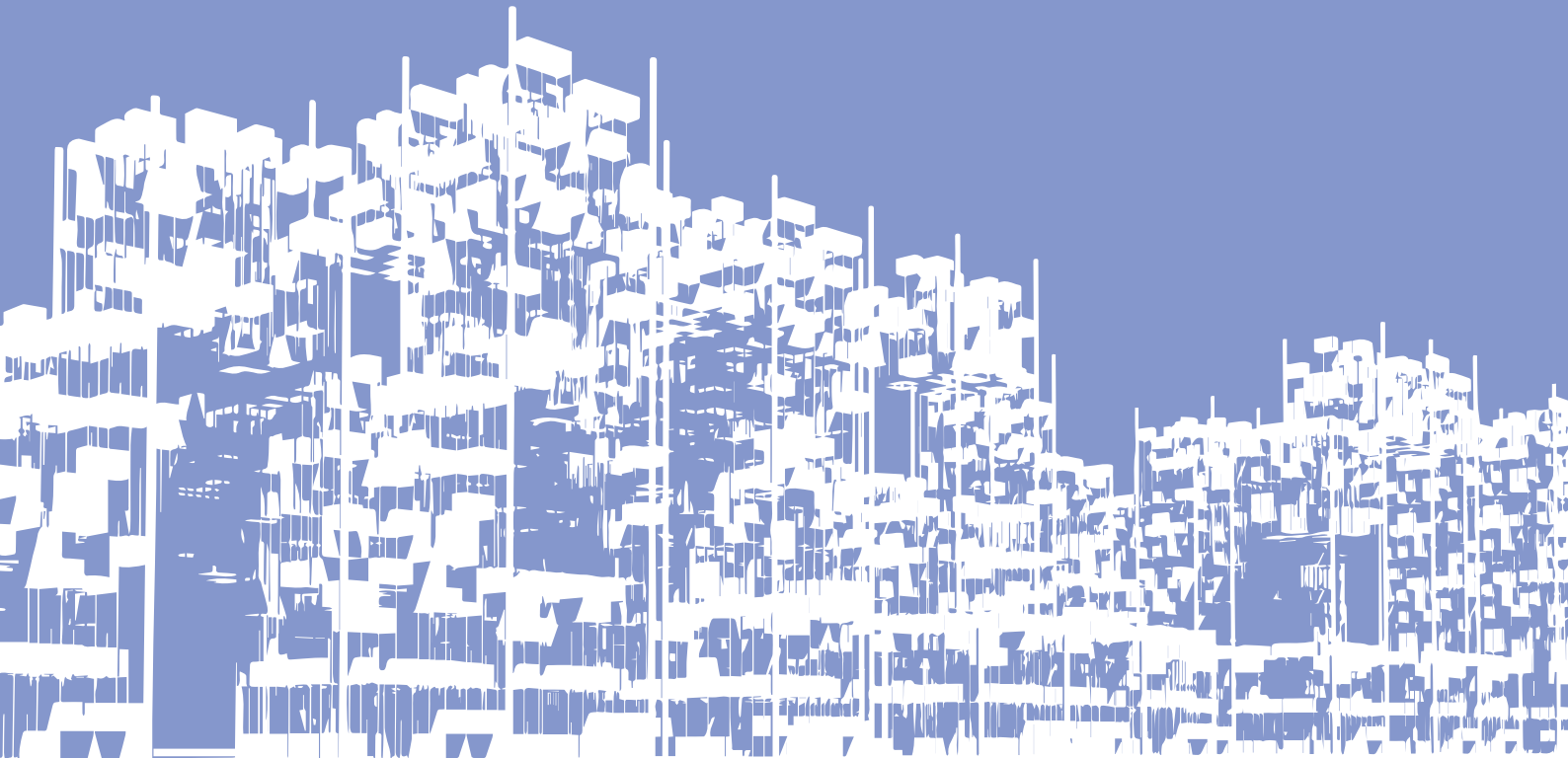






# ANALYSIS

URBAN TRANSFORMATION SÃO PAULO



---

Looking at the districts of Sao Paulo, Barra Funda has a comparatively small population and development density. But when we look at Sector I, there is a very dense building and living compared to the other sectors. All sites are almost entirely built up and have partly no open spaces.

The high density of Sector I is probably due to the proximity to Sao Paulo's center. Moreover, there is a university and other educational facilities nearby. With various museums, theaters and other venues, there is also a cultural offer in the neighborhood.

The sector is directly connected to the long-distance rail transport. In addition, public transport is available in the form of bus- and metro lines, especially in the peripheral areas of the sector.

The construction of the district is clearly illustrated by the fact that there has been a lot of work in the building industry in the last few years. Many of the tallest high-rise buildings were constructed within the last five to ten years.

The development of the area is based on two main typologies. On the one hand there is a dense building with two-storey buildings, on the other hand, there are the high-rise buildings with partly more than 25 floors.

Most of the small houses are located in the eastern part of the sector. Here you can find mainly residential buildings, but also a large number of commercial use. While private plots are bordered by a fence, the commercial buildings are freely accessible and offer the customer space for

parking or a community stay.

A third variation of small buildings can be found at the corners of the crossroads. These buildings are often used for gastronomic or commercial purposes and are partly accessible from two sides. Some of them include small restaurants, which have a varying building shape and color. Apart from the small two-storey houses, there is a high density of high-rise buildings in Sector I. Most of them are used as housing estates, but some for business purposes. As well as the small houses, the high-rise buildings also have different typologies. Some of the private residences are also separated from the public space by fences. Others are located on an extensive ground floor which, for example, includes a parking garage. The main uses in



Sector I are, therefore, residential and gastronomic or other commercial use, but there are also some banks, hotels, and hostels in this sector. The road network is relatively clearly structured. The main traffic route runs west-east towards the city center. Another main road runs along the eastern border of the sector in the north-south direction. Another busy street runs parallel to the central main street. The use of the buildings of this street is largely based on gastronomic and commercial use. The secondary roads are almost orthogonal to the main roads. Here, instead of public buildings, mainly residential buildings are located.

Comparing Barra Funda with other major cities such as Hong Kong or London, it becomes clear that there

is a high potential of agglomeration in this district. One exception is Sector I, which already has a relatively high density. In this sector, the share of public green space and squares is worth improving. When looking at online images, there is also an extremely high traffic density on the streets. This is, however, a problem that can be attributed to the entire city of Sao Paulo.

The intermixing of high-rise buildings and many small houses appears to be meaningful at first sight. It is now necessary to examine the increasing development of huge housing estates with regard to urban development functionality and the quality of public spaces.

Our vision is the utopia of a car-free city with a high population density liv-

ing in a multilayer structure. Developments are made on higher levels so that there is no sealing of the ground. This results in the creation of extensive green areas, which can also be used as sports facilities. The regional problem of floods can therefore also be counteracted.







# ANALYSIS

BARRA FUNDA – SECTOR I





HOTEL





RESTAURANT

# ANALYSIS

## EXISTING TYPOLOGIES



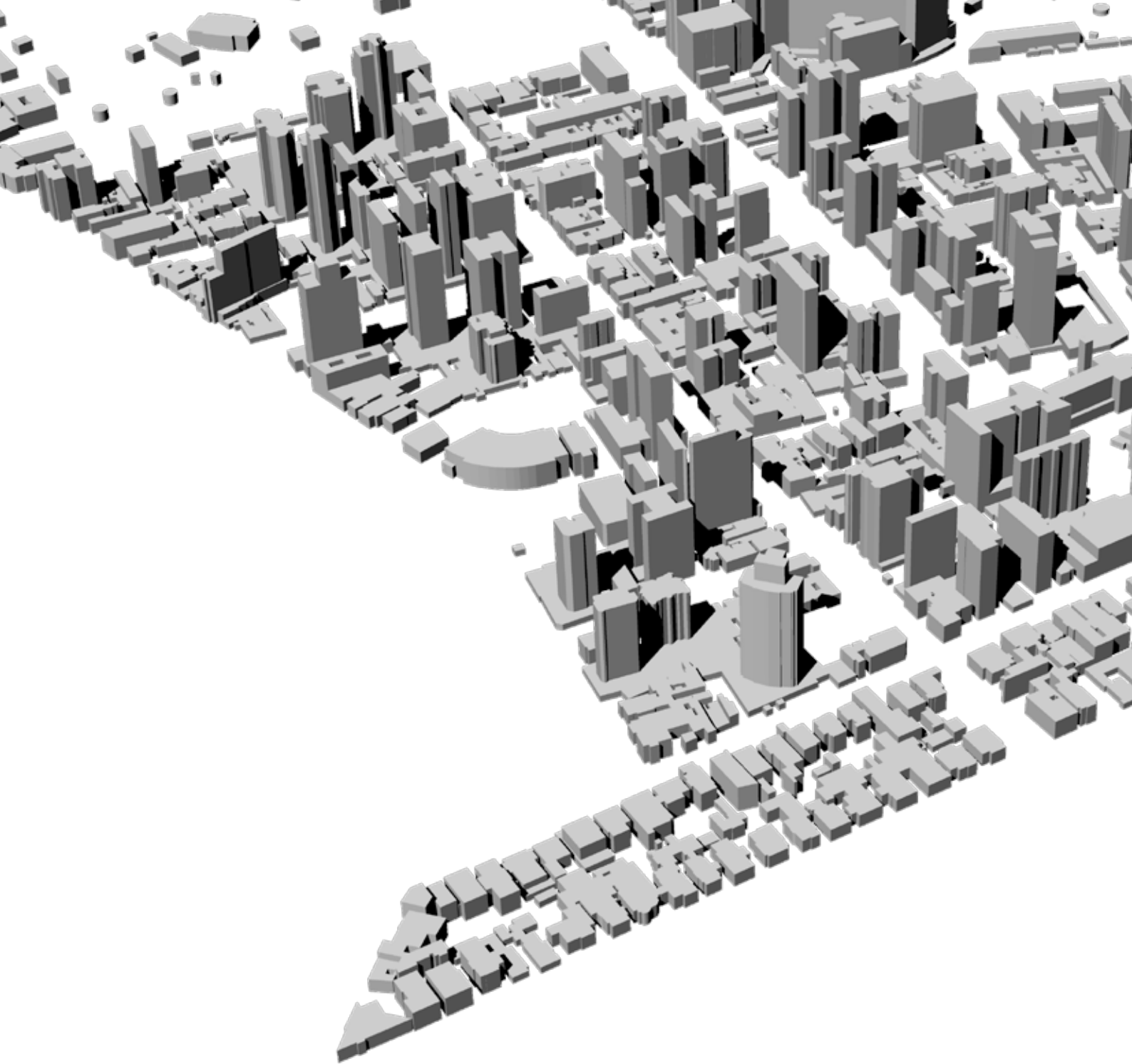
RES. TOWER



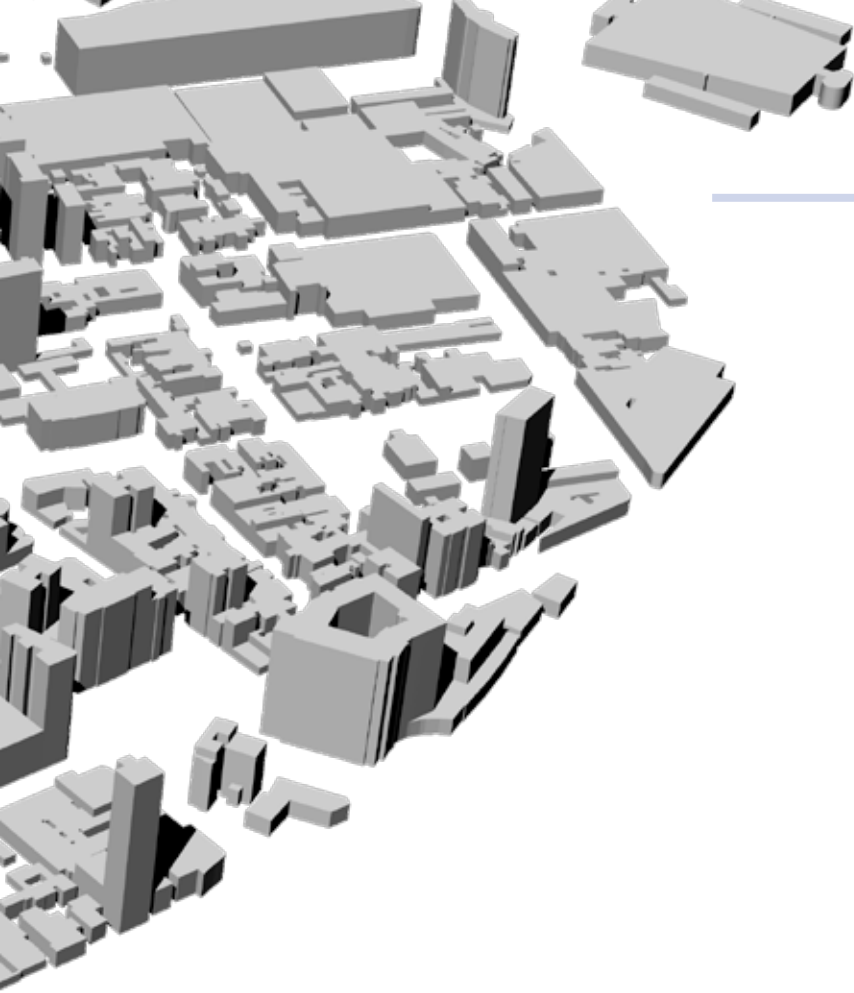
BANK



HEALTH CARE







# ANALYSIS

VISUALIZATION SECTOR I





# ANALYSIS

ROAD TYPE 1









# ANALYSIS

ROAD TYPE 2







# ANALYSIS

ROAD TYPE 3



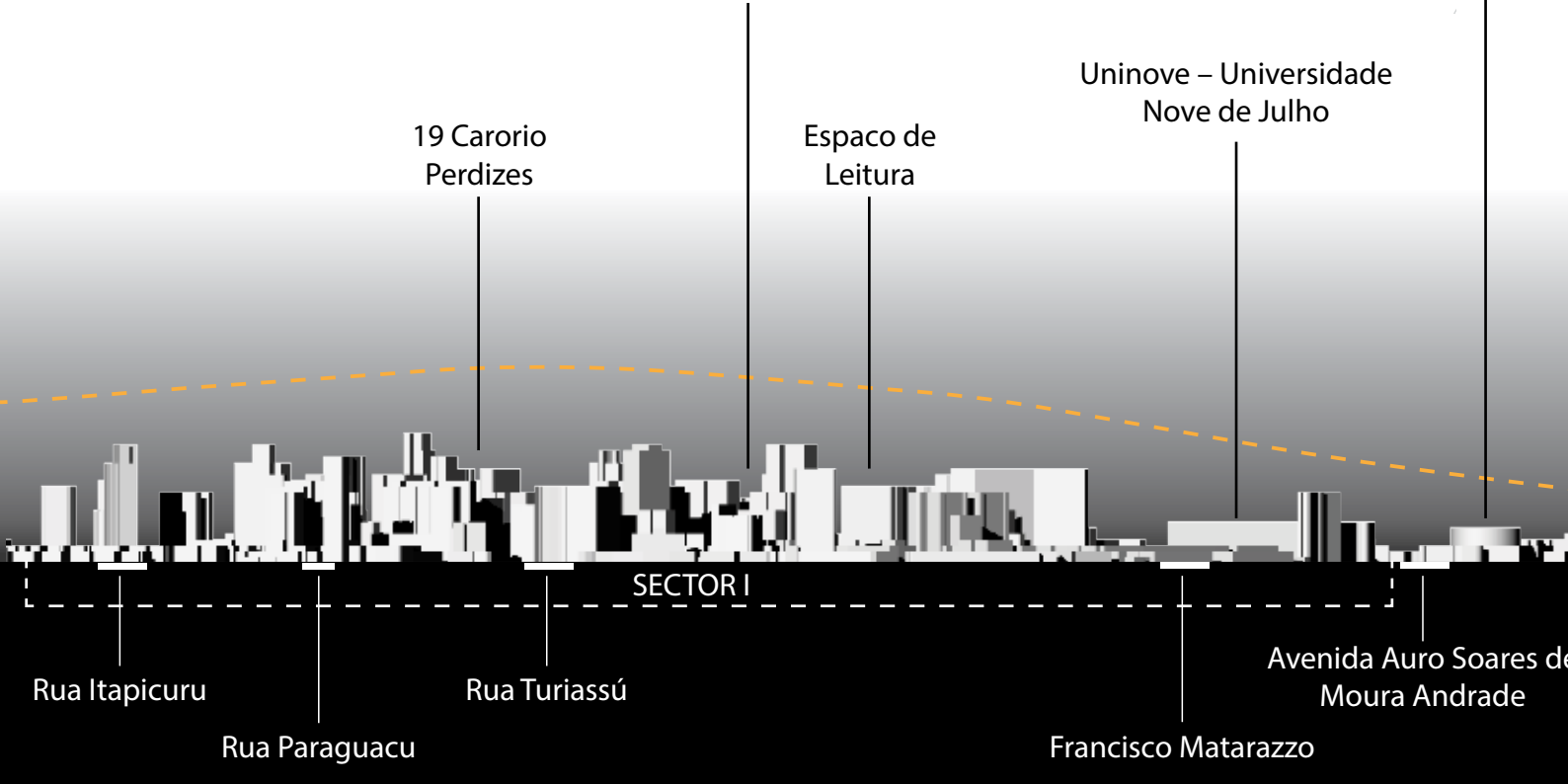
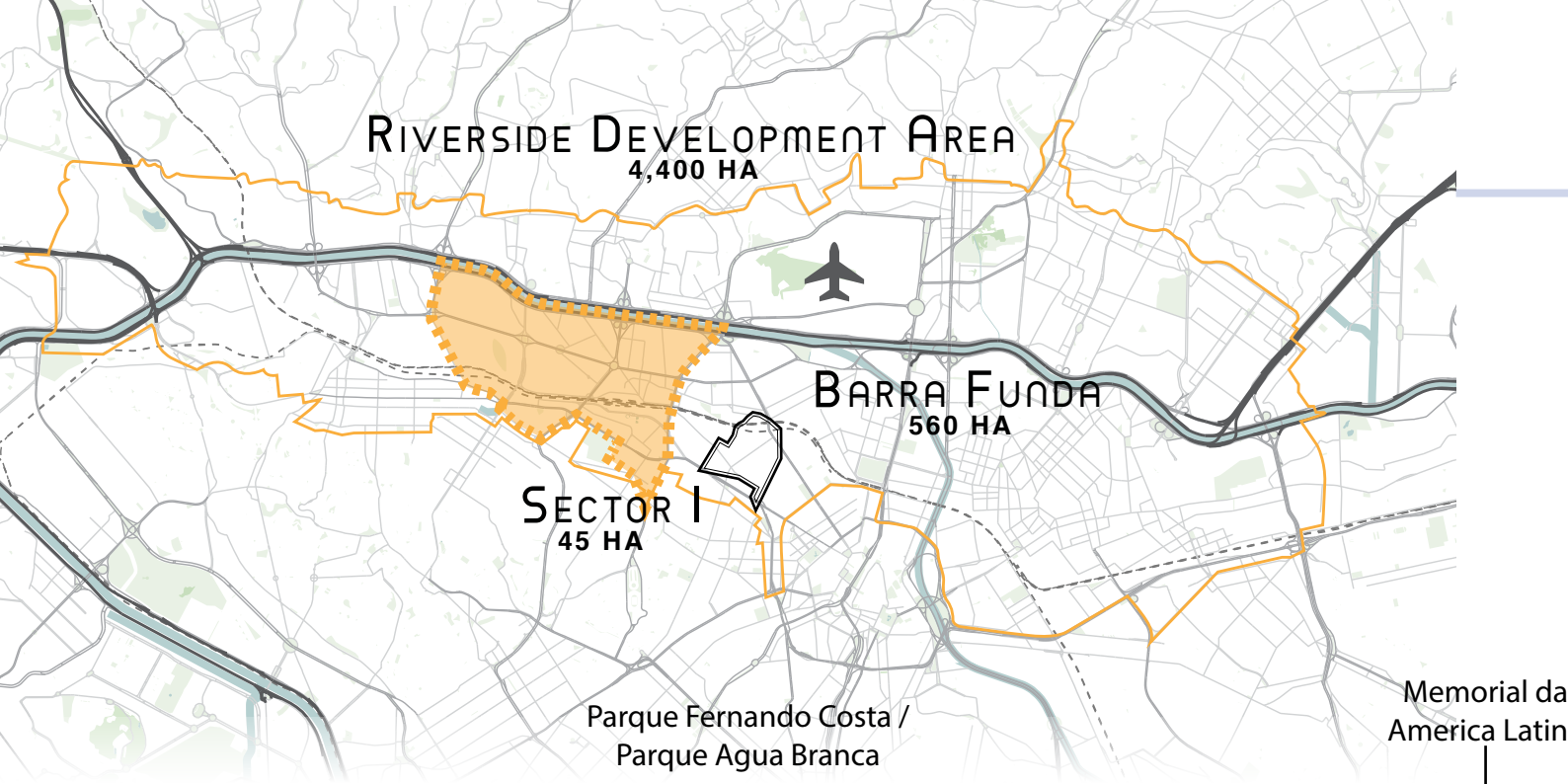




# ANALYSIS

ROAD TYPE 4





# ANALYSIS

## OVERVIEW SECTOR I



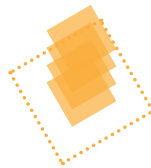
Population

**8,500**



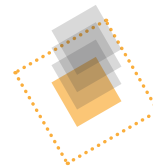
Density (ppl/ha)

**190**



FAR

**1.44**



SOI

**0.47**

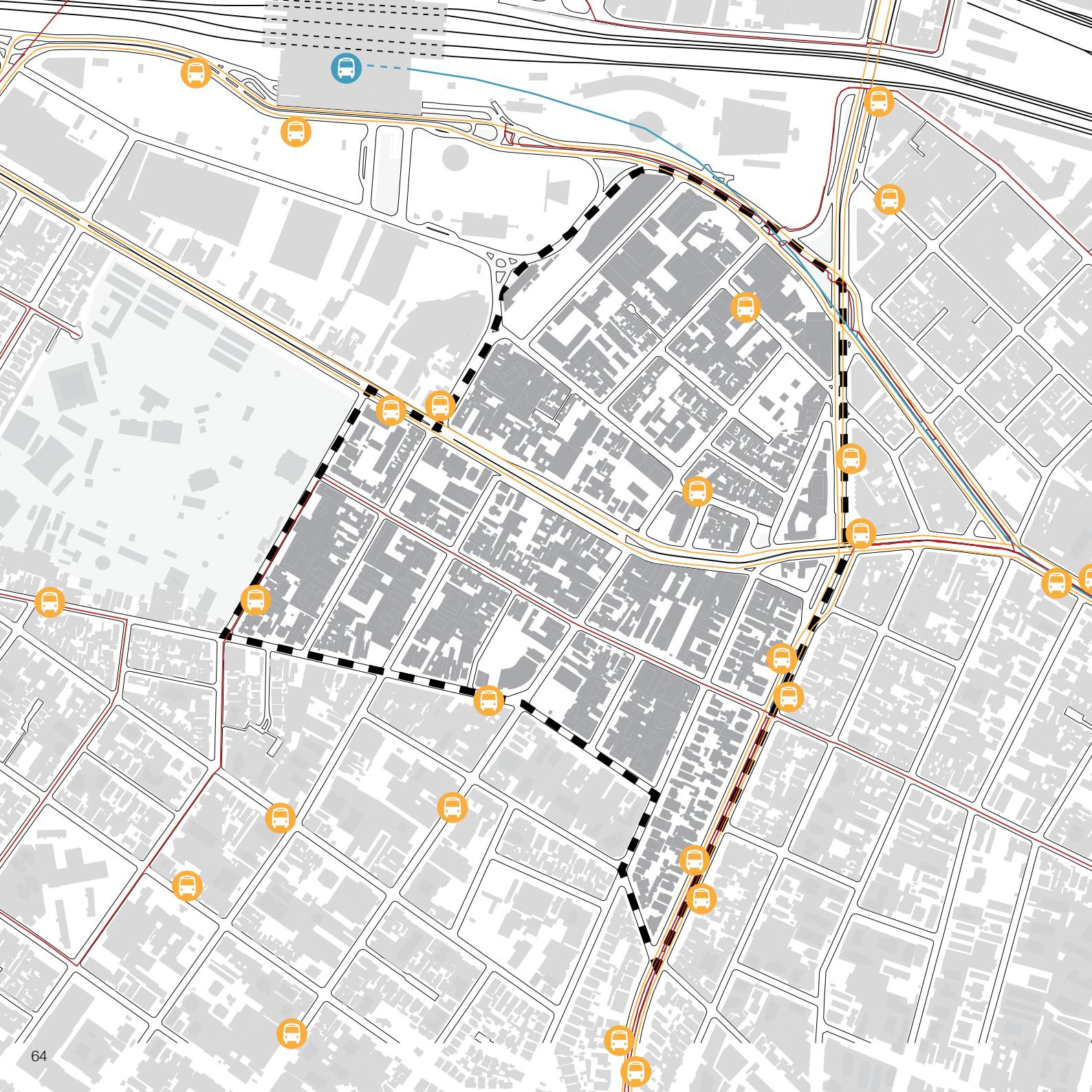
Terminal Rodoviário  
Barra Funda

Tiete  
River

Railway

Avenida Marques  
de São Vicente

Avenida  
Marginal Tiete








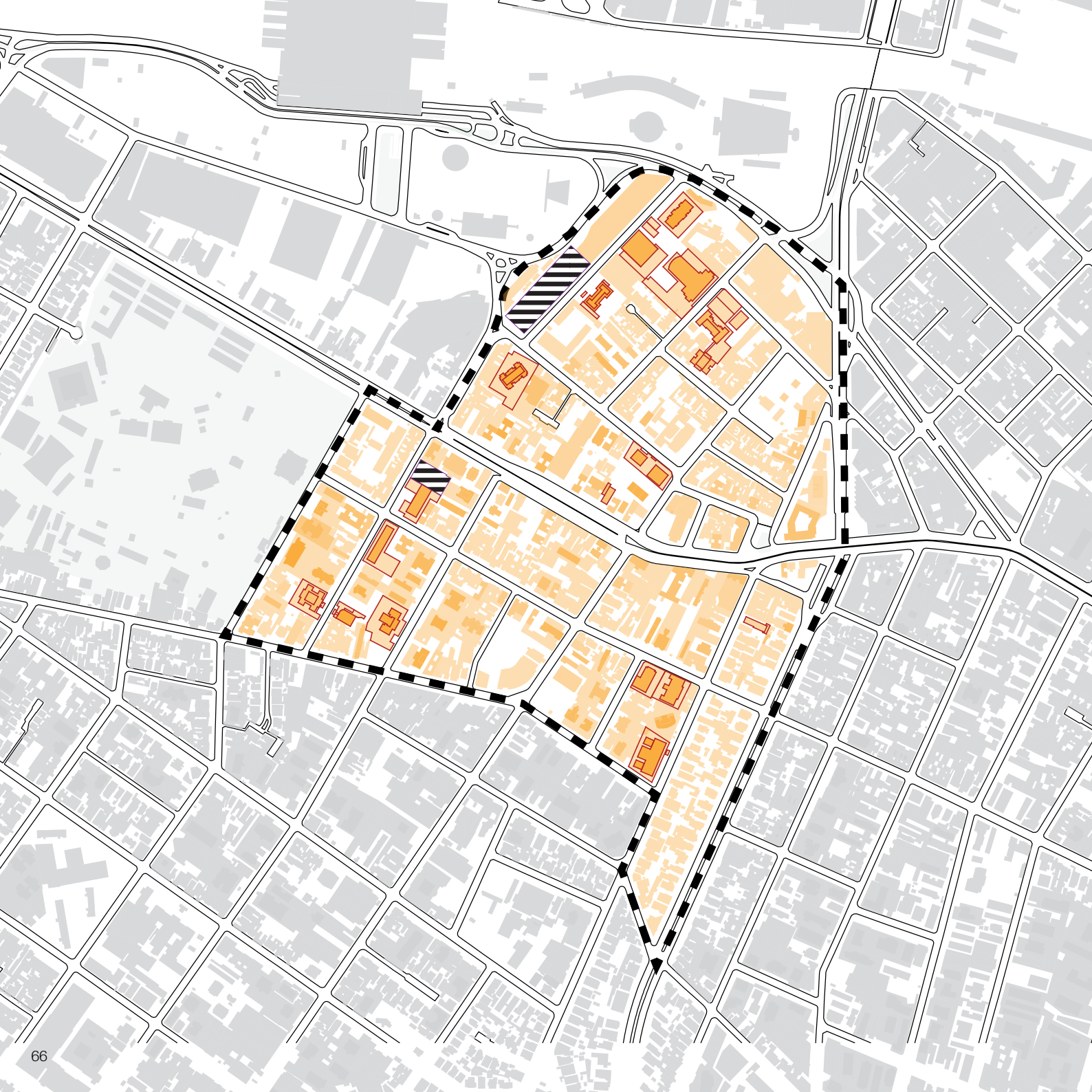
### LEGEND

#### Infrastructure

-  Bicycle Lane
-  Bus Lane
-  Metro Line
-  Railways

0  250 m





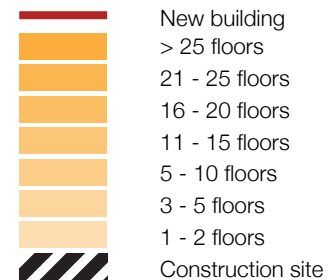
# ANALYSIS

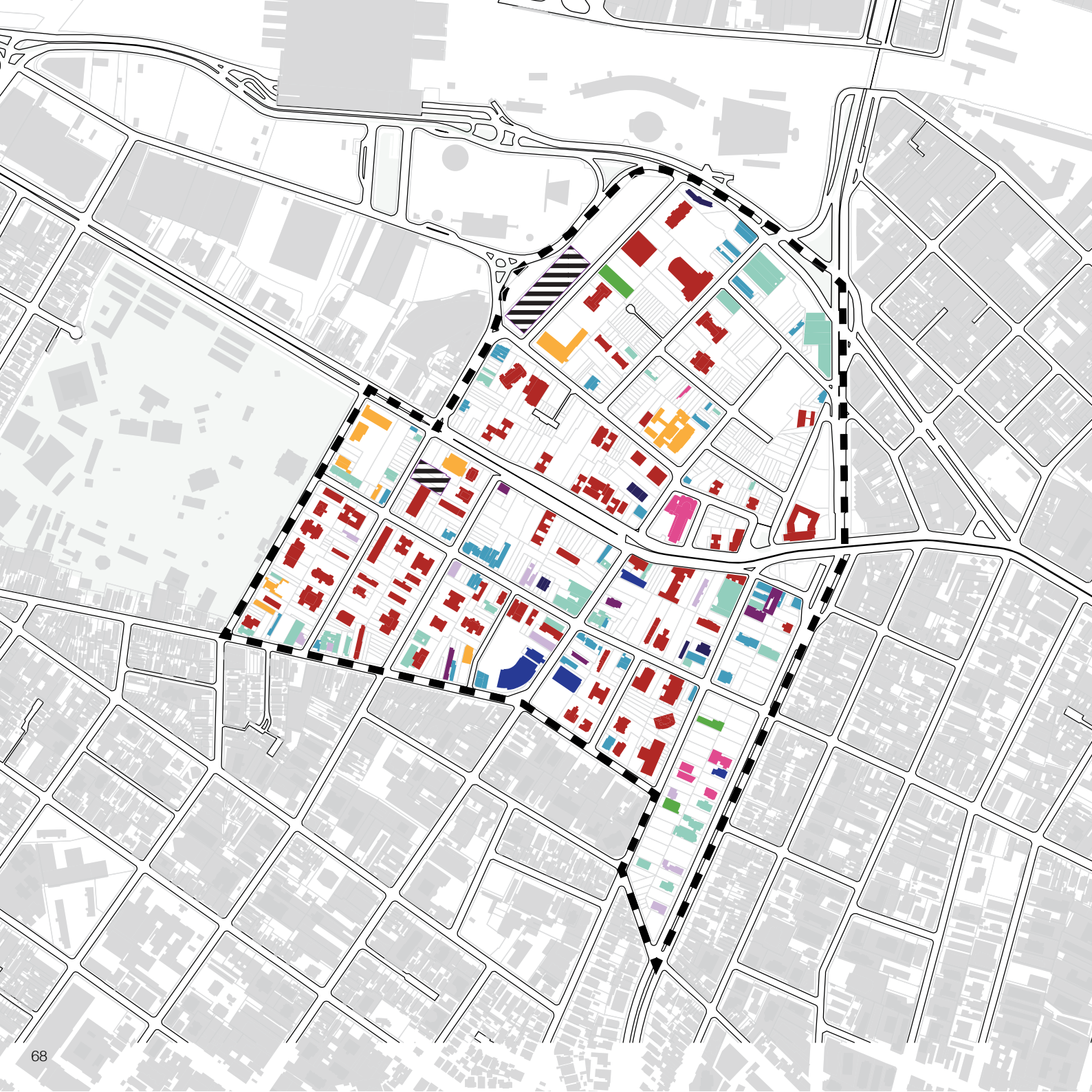
## BUILDING HEIGHT



### LEGEND

#### BUILDING HEIGHT IN FLOORS







# ANALYSIS

## FUNCTIONS



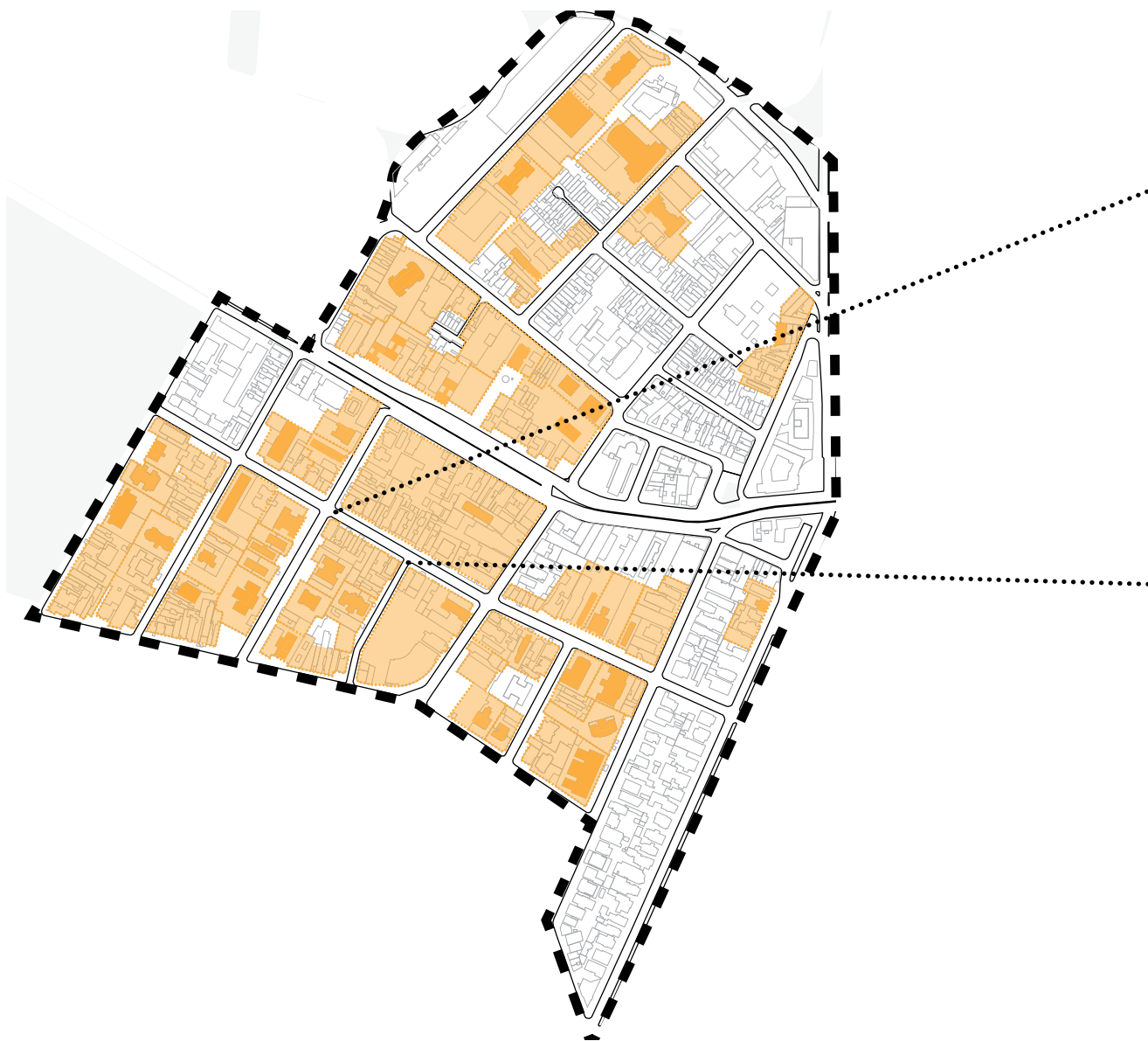
### LEGEND

#### FUNCTIONS

	Gastronomy
	Retail
	Housing Estate
	Education
	Financial Service
	Business Center
	Medicine / Cosmetic
	Hospitality
	Religious Facilities
	Recreation

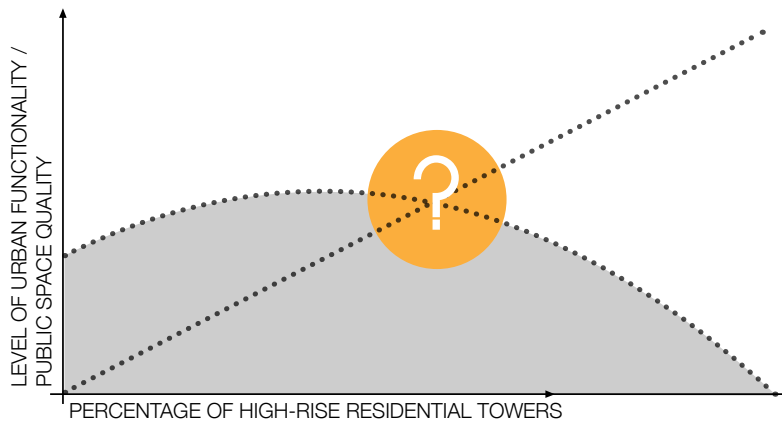
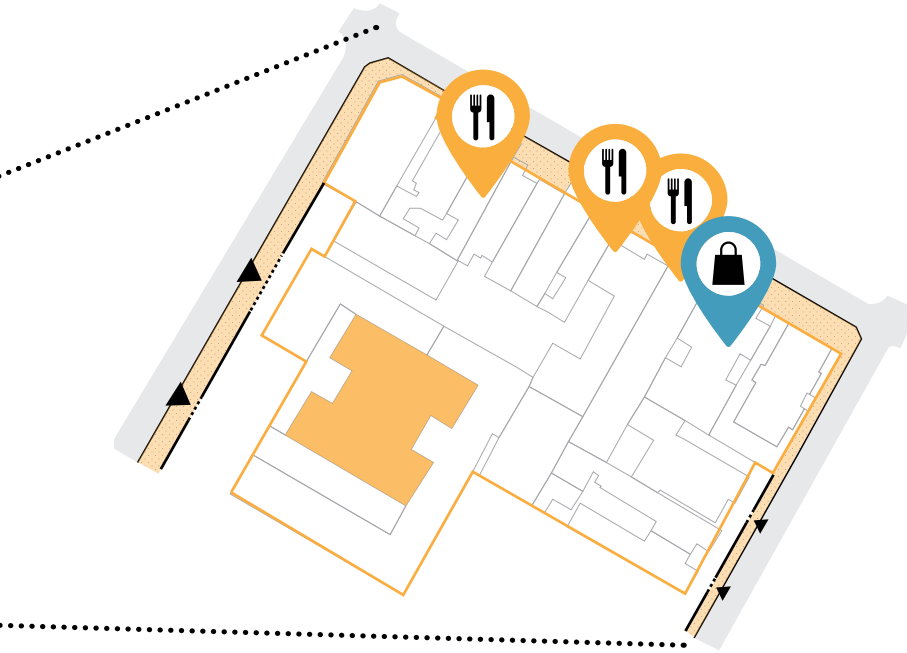
0 250 m



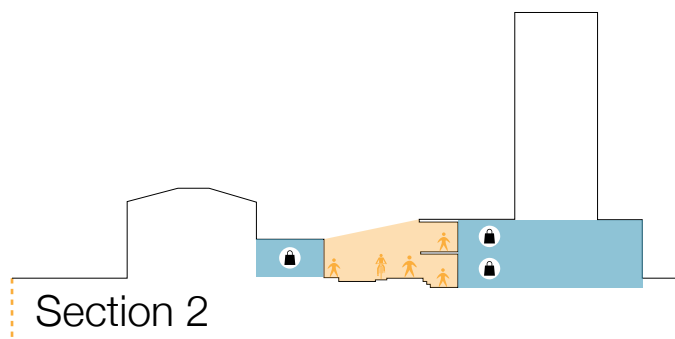
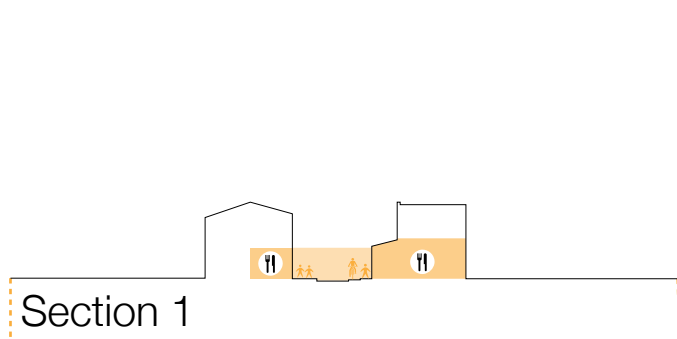
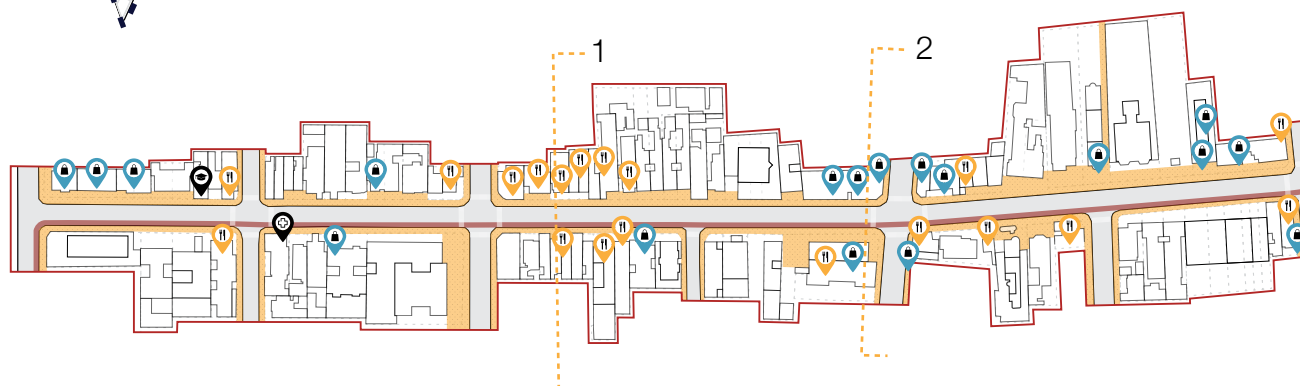
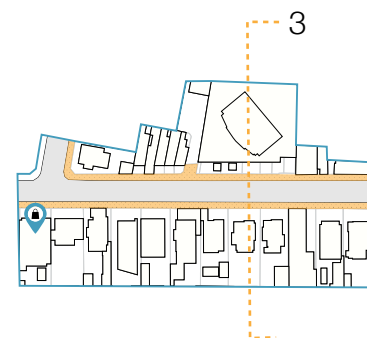
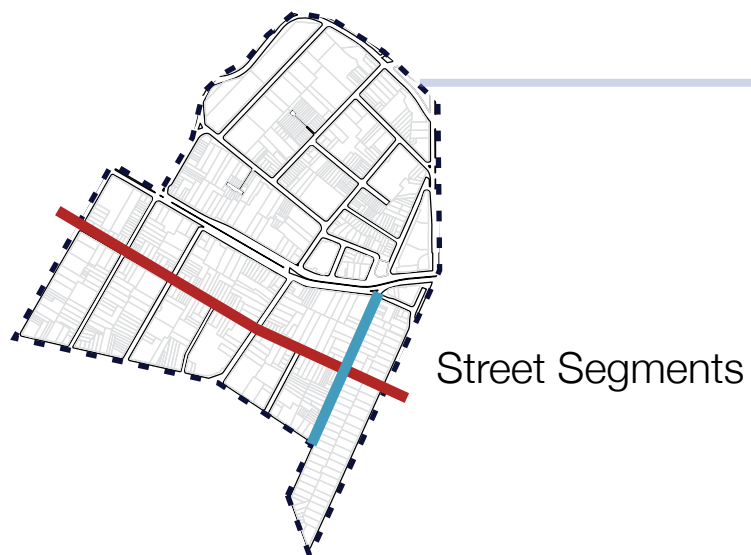


# ANALYSIS

## RATIOS & RELATIONS

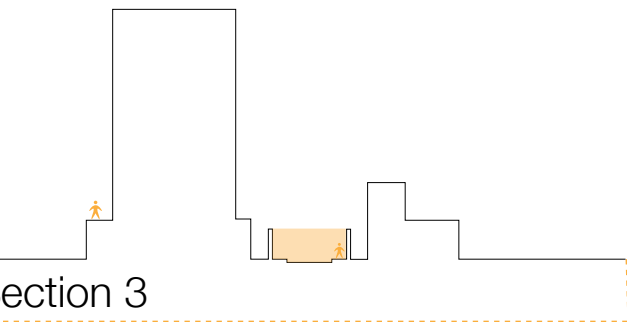
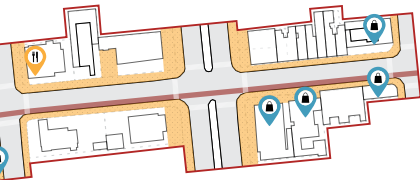
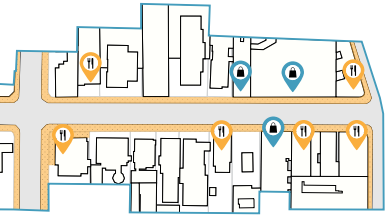




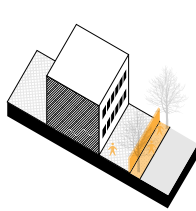


# ANALYSIS

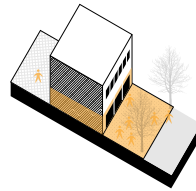
## STREETS & SPACES



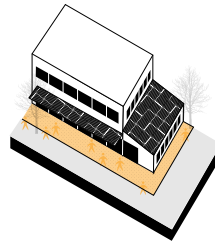




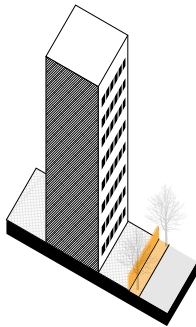
**TYPOLGY 1**  
small residential,  
private, fenced



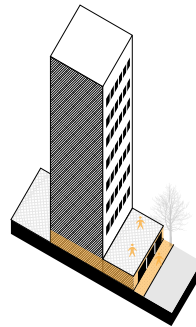
**TYPOLGY 2**  
small residential,  
commercial, open



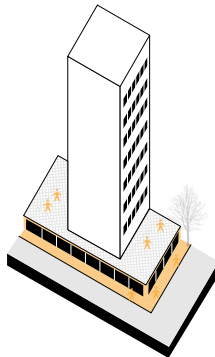
**TYPOLGY 3**  
corner, small,  
semi-public, open



**TYPOLGY 4**  
large, new  
gated community



**TYPOLGY 5**  
large, new  
semi-public ground-  
floor



**TYPOLGY 6**  
corner, large, new  
semi-public ground-  
floor

### LEGEND TYPOLOGIES

	Typology 1
	Typology 2
	Typology 3
	Typology 4
	Typology 5
	Typology 6

0 250 m





## BARRA FUNDA | TODAY

Population: 12,965  
Density: 23 ppl./ha.  
FAR: 0.74  
SOI: 0.3



## REFERENCE Hong Kong (max.)

Population: 620,000  
Density: 1,111 ppl./ha.  
FAR: 6.6  
SOI: 0.7





## DENSITY DATA

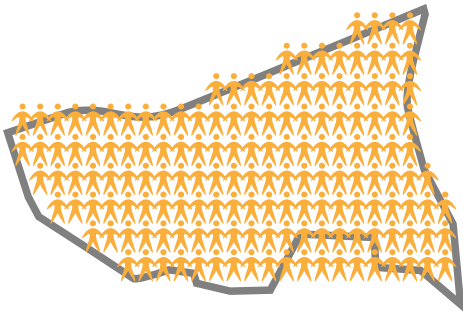
## REFERENCE SECTOR I

Population: 106,400  
Density: 190 ppl./ha.  
FAR: 1.44  
SOL: 0.47



## REFERENCE LONDON (max.)

Population: 150,000  
Density: 271 ppl./ha  
FAR: 2.1  
SOL: 0.65



## LEGEND



1,000 Inh.



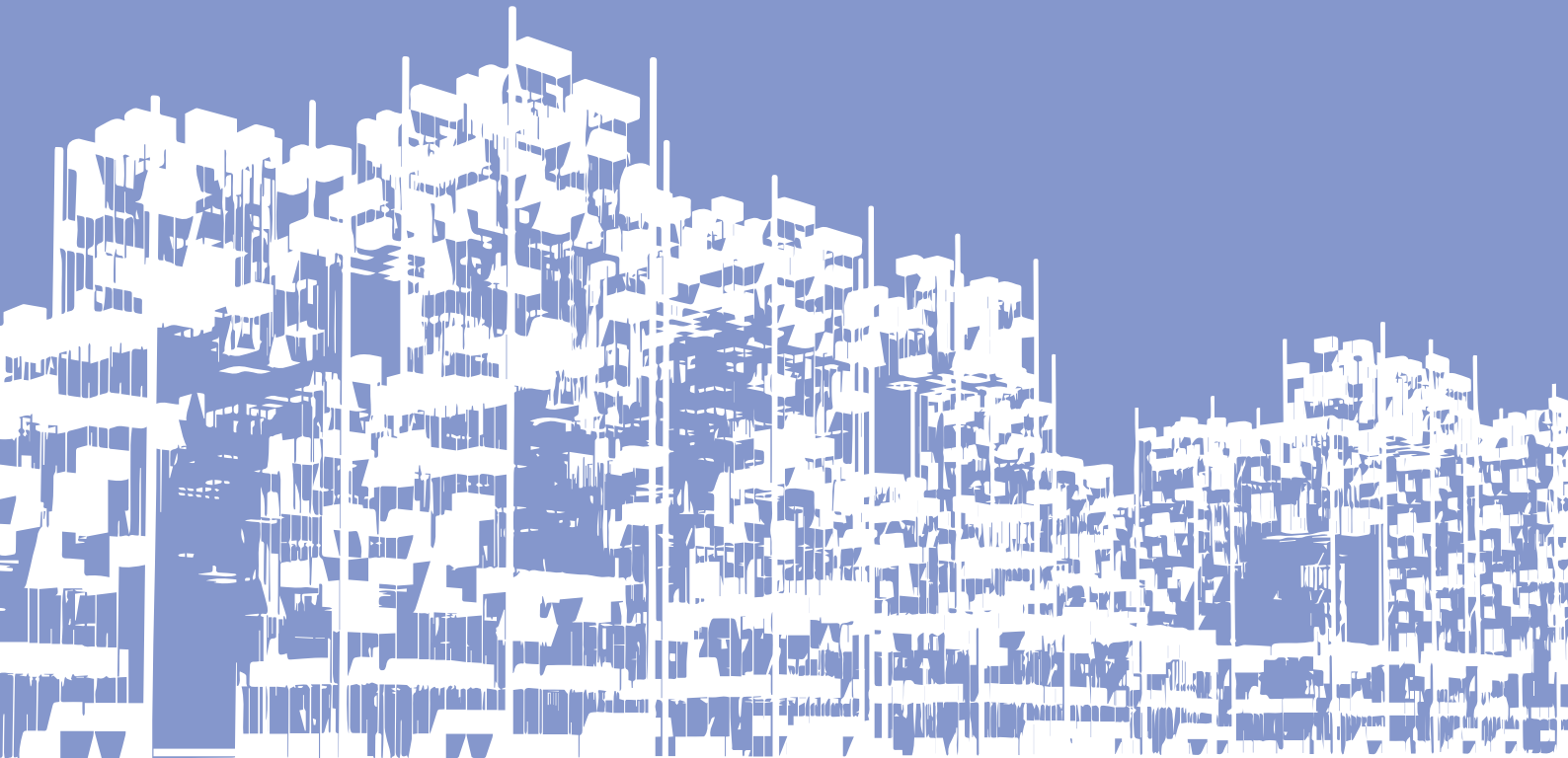
Sector I

Development area



# IMPRESSIONS

URBAN TRANSFORMATION SÃO PAULO





# EXPERIENCES





REEN

SPACES

DENSITY

MEMORY



## PARQUE ÁGUA BRANCA - água branca





PARQUE IBIRAPUERA - vila mariana

---





PARQUE BUENOS AIRES - higienópolis



## CENTRO CULTURAL - liberdade





SESC POMPEIA - vila pompeia



SESC POMPEIA - vila pompeia





ELEVADO PRESIDENTE JOÃO GOULART - campos elíseos



AVENIDA PAULISTA - cerquiera César



## FAU USP - butantă





## BARBECUE - vila buarque







## VIEW FROM EDIFICÍO COPAN - centro



VIEW FROM EDIFICÍO MARTINELLI - centro





VIEW FROM EDIFICÍO COPAN - centro







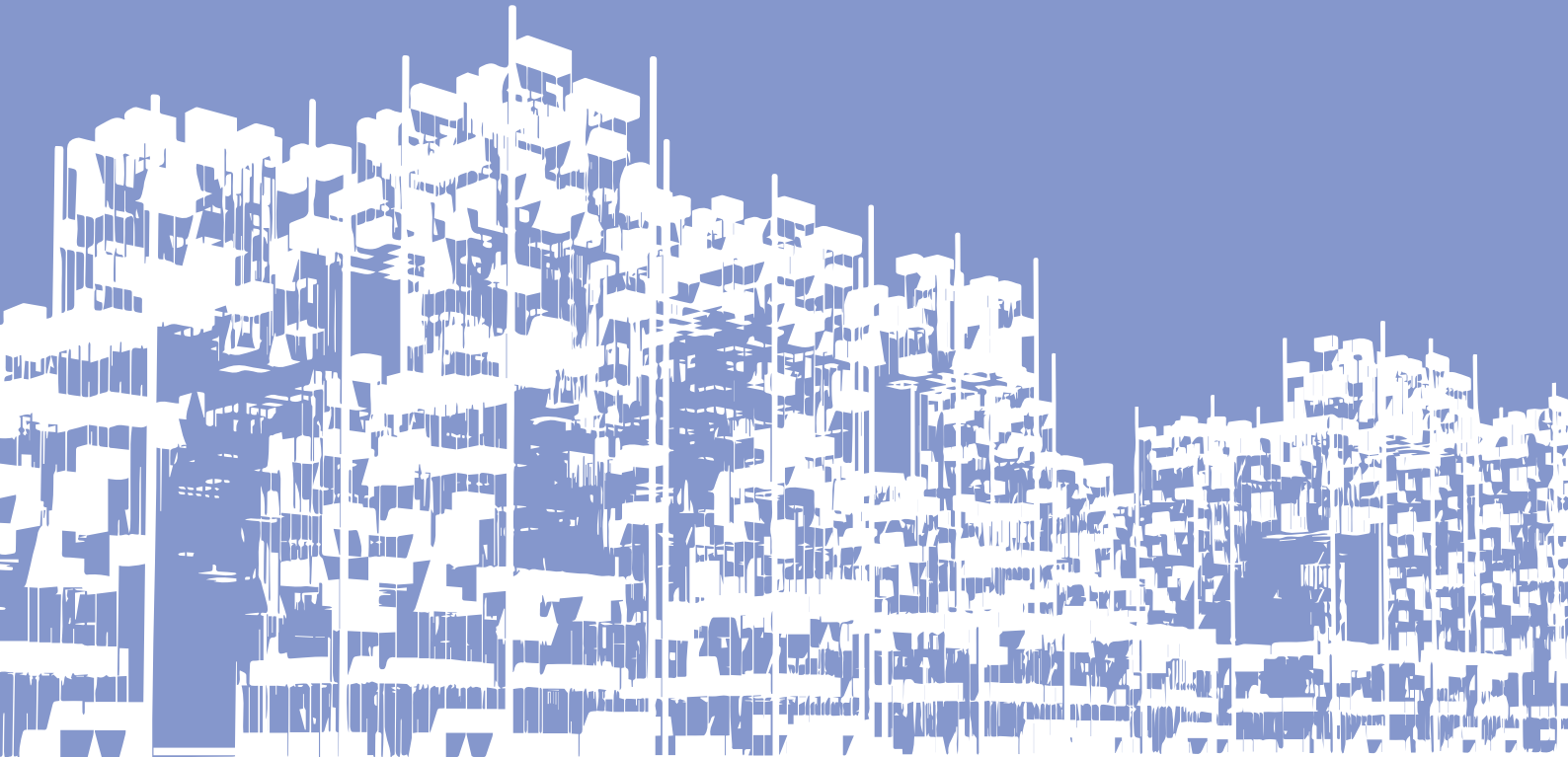
## FAVELA PARAÍSOPOLIS - paraísopolis





# SITE VISIT BARRA FUNDA

CHALLENGES AND POTENTIALS





# WATER

## CANAL NETWORK



## RIO TIÊTE



CULTURE

## MEMORIAL DA AMÉRICA LATINA



## MEMORIAL DA AMÉRICA LATINA





# non SPACES

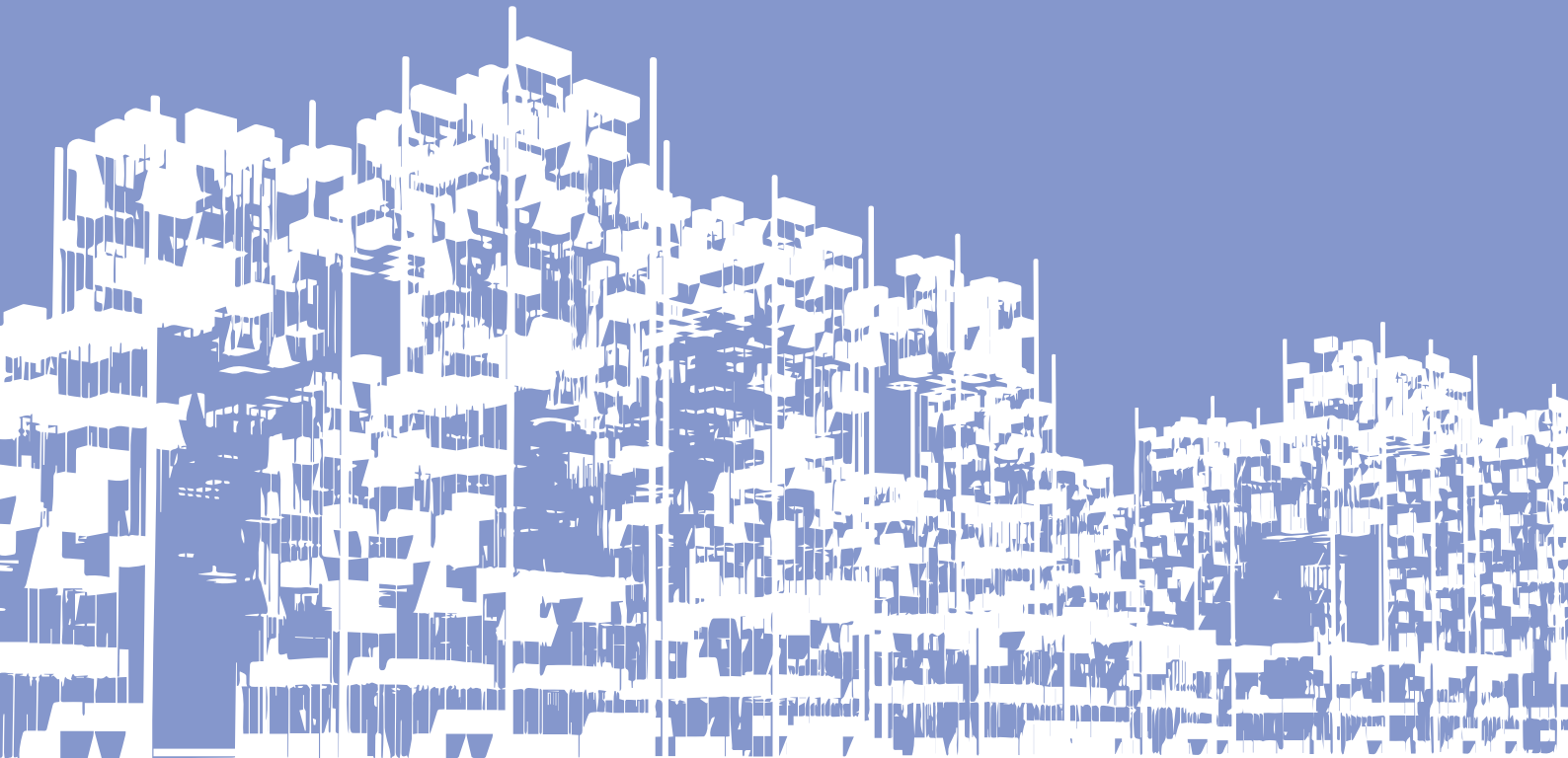






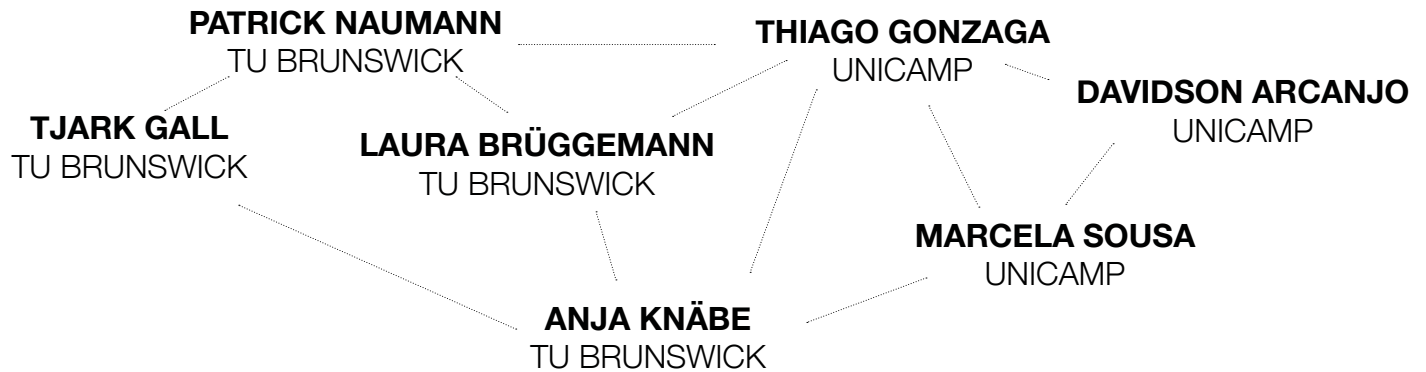
# WORKSHOP CAMPINAS

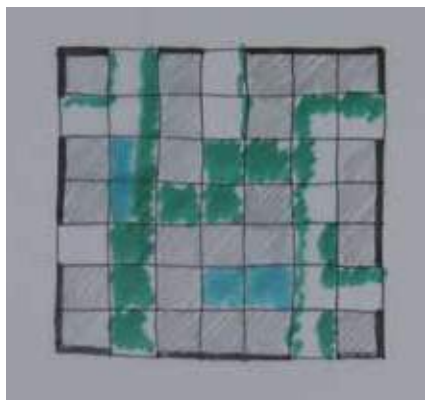
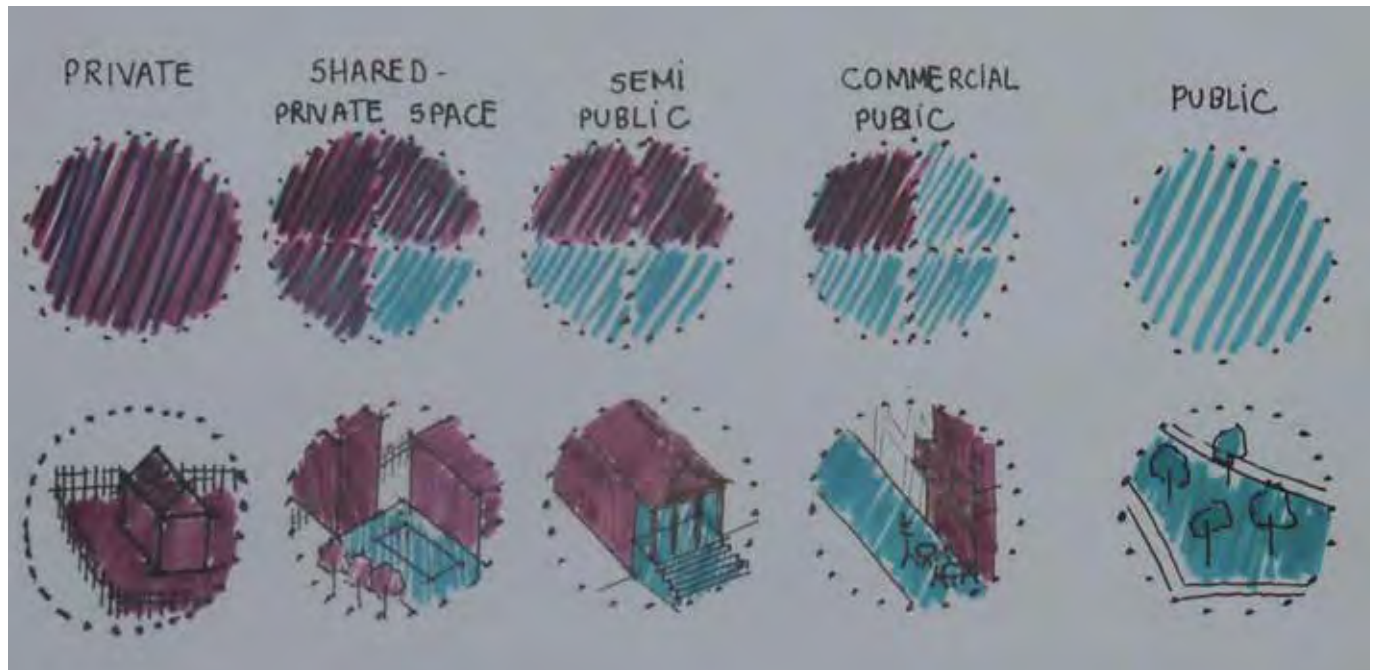
CREATING BASIC RULES

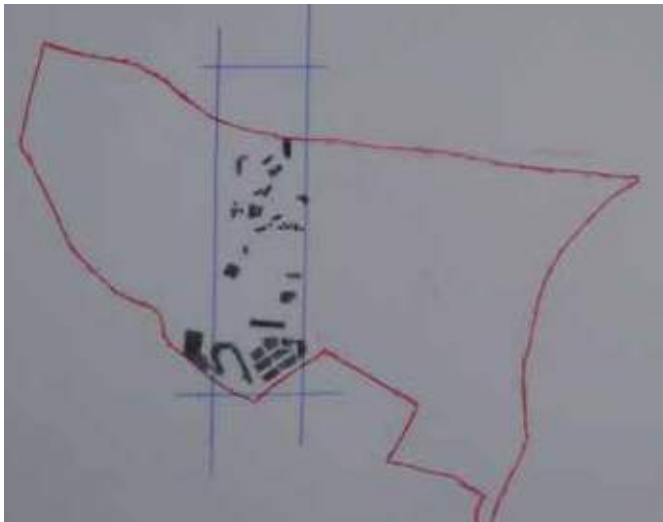
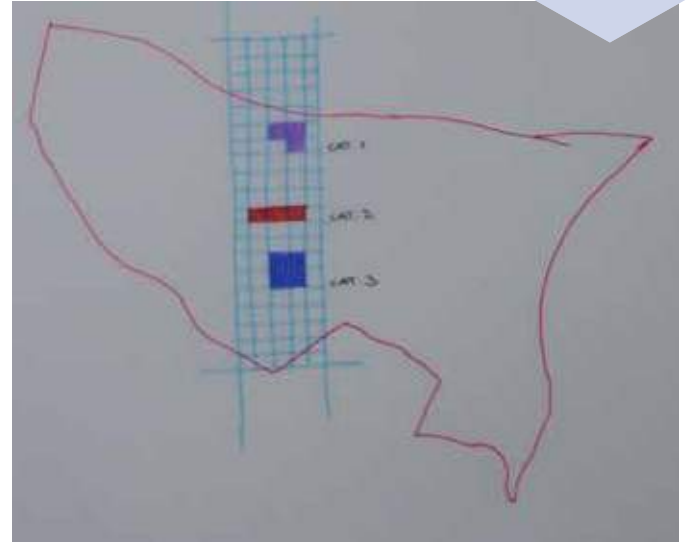




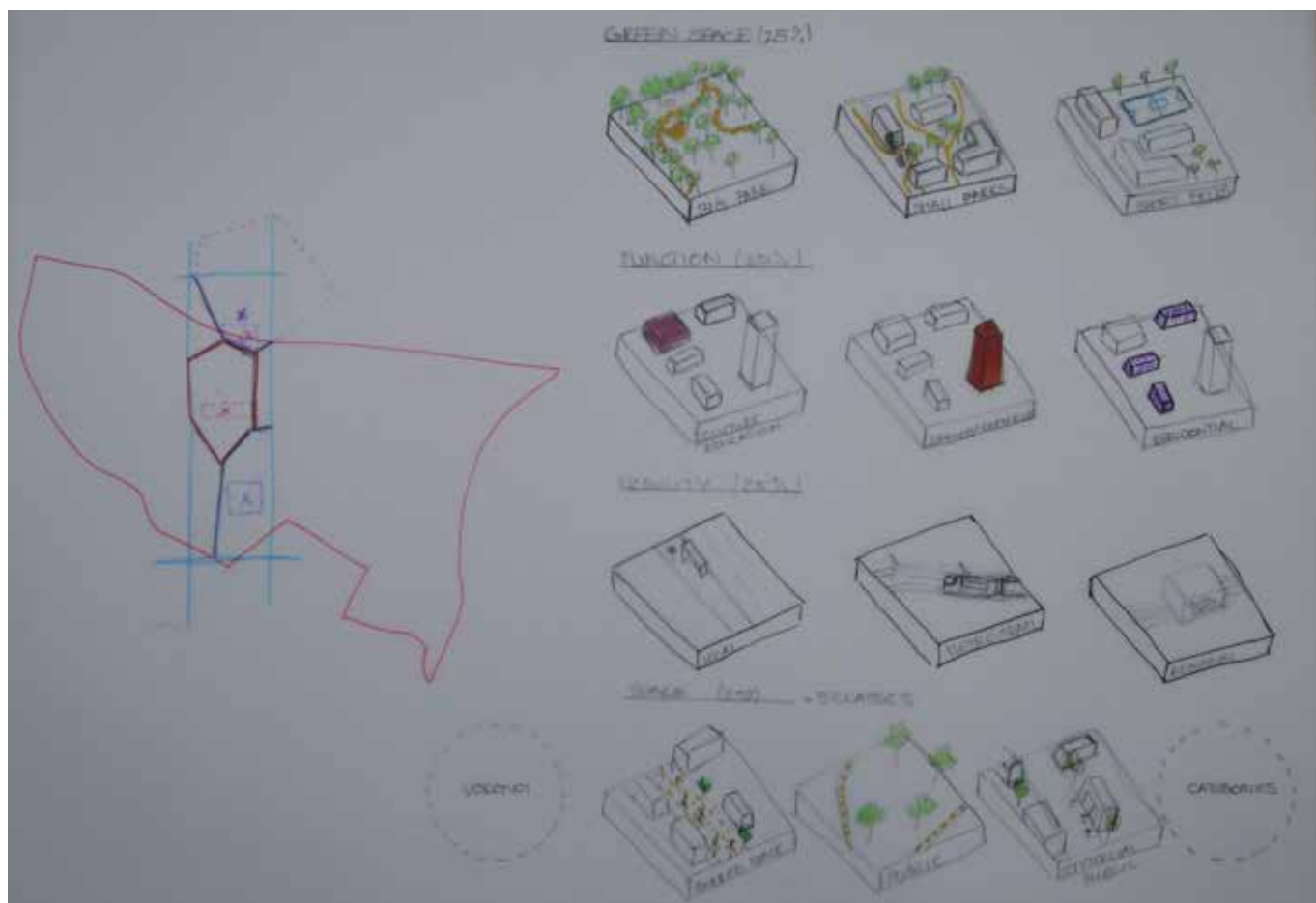


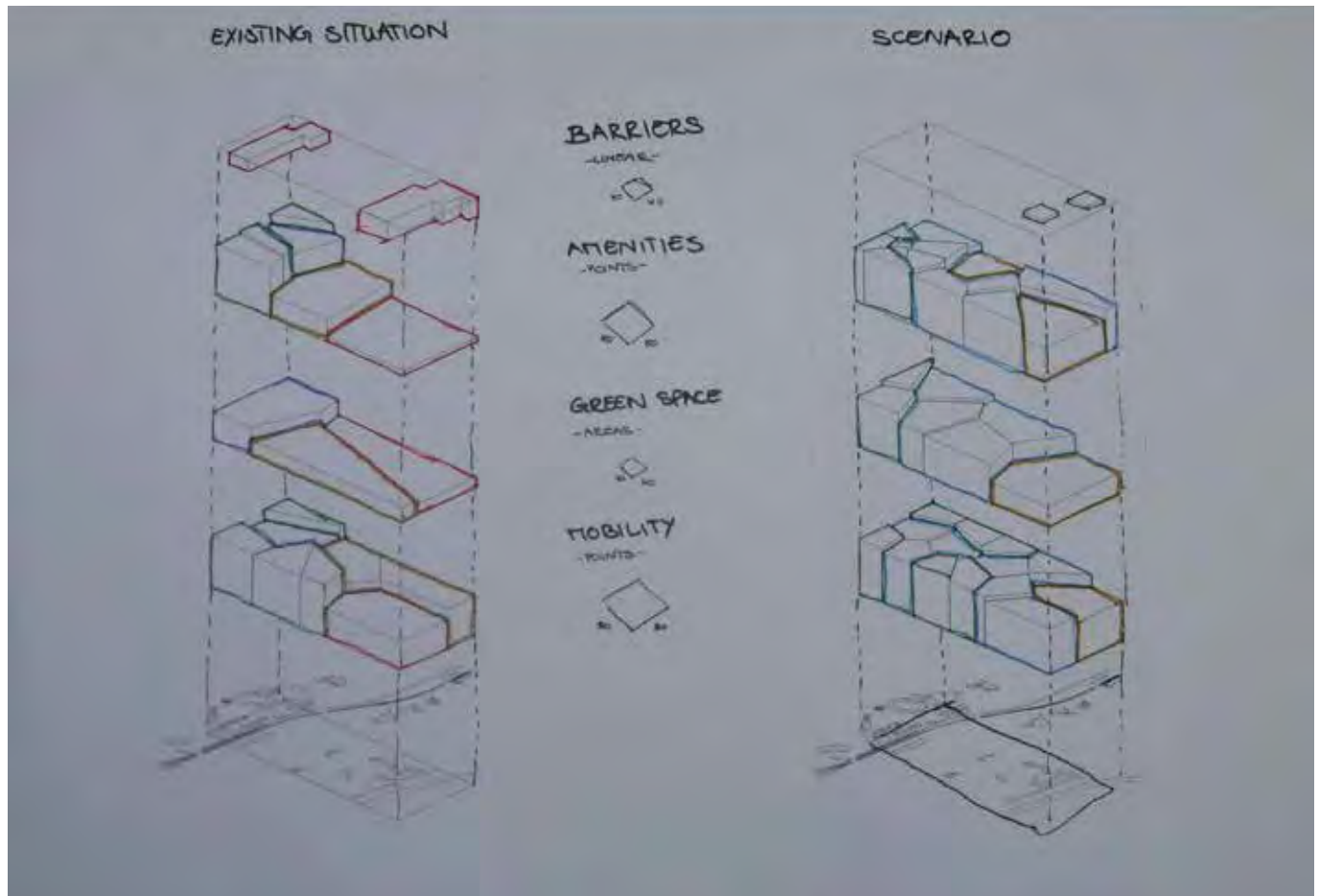








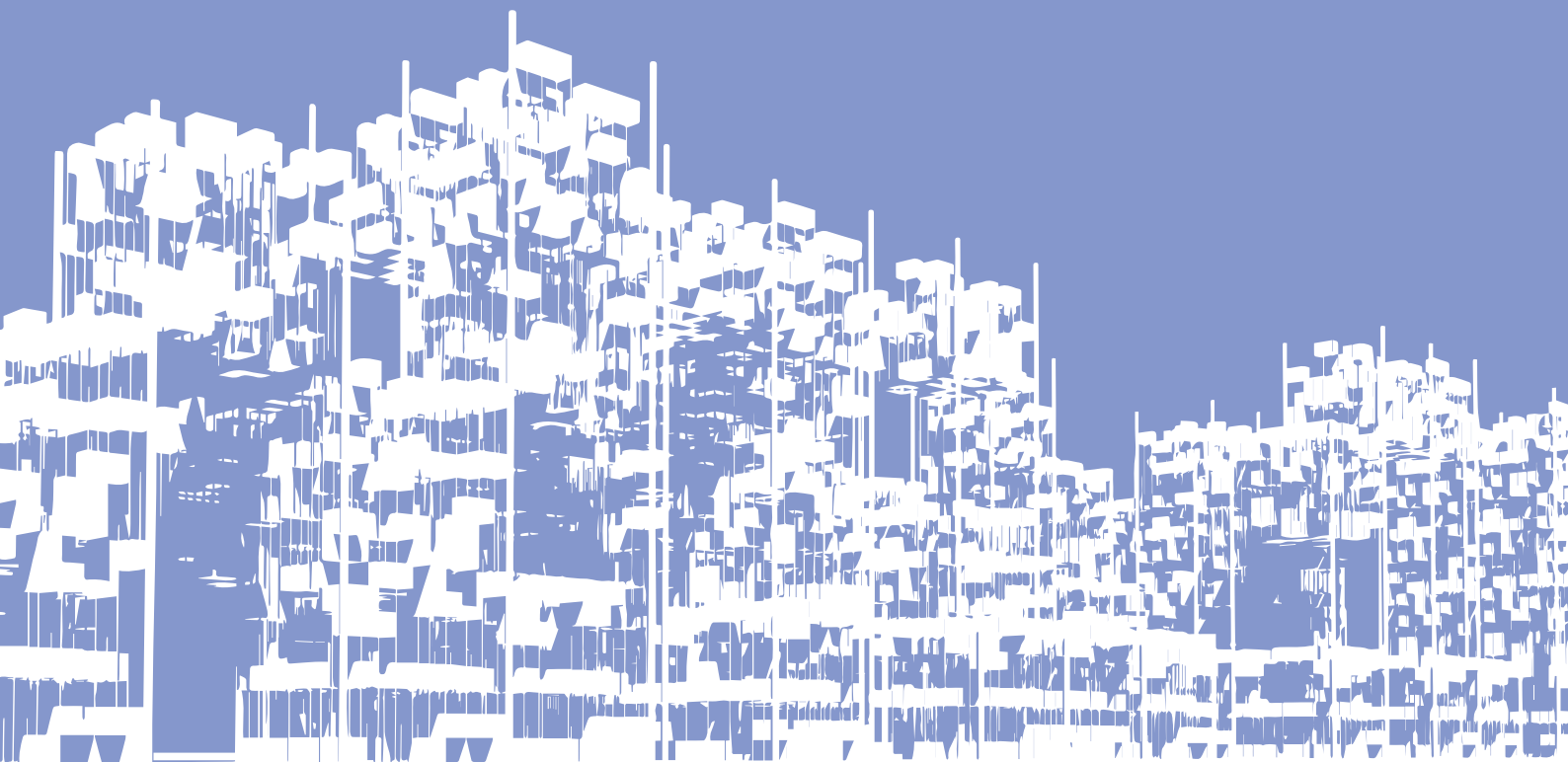






# CONCEPT

IDEAS AND APPROACHES

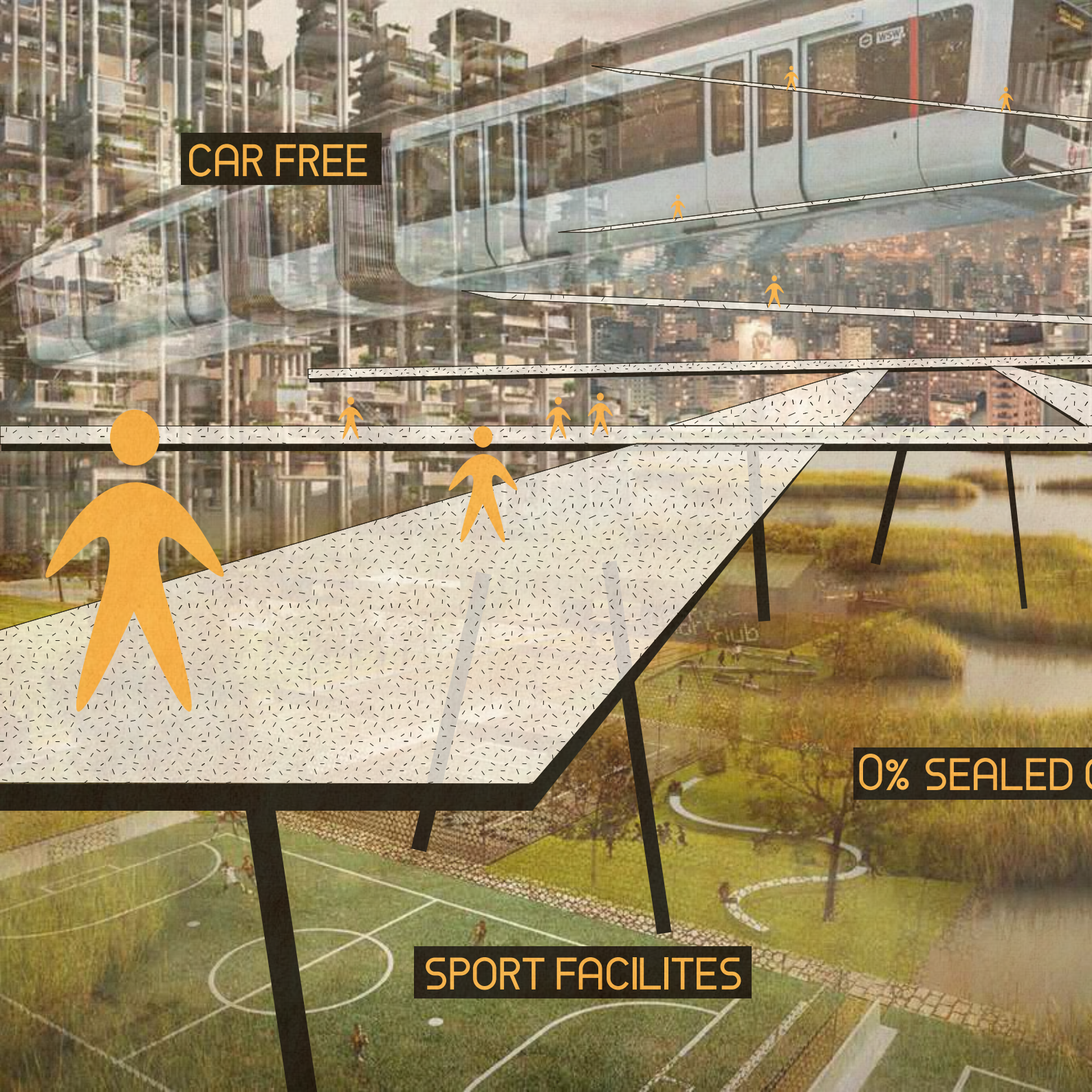




CAR FREE

0% SEALED

SPORT FACILITIES







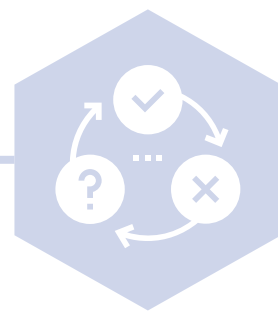
MULTILAYER

HIGH DENSITY

GROUND

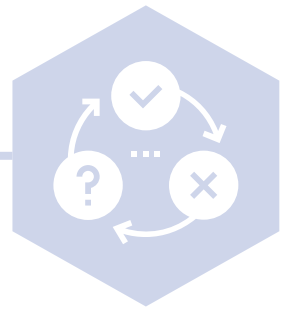
CONCEPT

FIRST VISION



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São Paulo seems to be an urban jungle, without access to nature, water and with the human out of scale. Further, it is characterized by the division of rich and poor and, in case of Barra Funda, cut by major infrastructural elements without possibilities for non-vehicle commuters to move freely and save. Due to the surrounding mountains, there is no space to further expand and declining areas like Barra Funda must become a new functional part of the city. But how can densification take place, while creating space for potential flooding, people's interaction, urban farming, and avoiding single-use residential developments, only accessible for its inhabitants?



To tackle this challenge, the conceptual design 'SkyHive' first looks at the existing infrastructure and built environment and defines the spaces with potential to develop. In the next step, smaller and covered streams shall be opened again and transform the character of water from a backyard to an important part of recreation and everyday life. For the strengthening of the theme and the historical overlay, the former path of the Tiete is an integrated element which creates an activated linear room for special functions like a new mobility hub, connections across the river, recreational and exhibition space. In between of those, a grid consisting of distributor and local access roads, as well as car-free zones is created. Additionally, a new tram line is situated along the riverfront and the currently at the Bar-

ra Funda Station ending metro line as well as the bicycle express ways are continued through the design area. Between the created major green park area along the river and smaller green axes along the small streams, a network of quarter parks adds another layer of welcoming opportunities to walk around. Three different zones define the density, maximum heights and functional mixture of the area. The main concept is, however, the handling of the space in between. Based on a density of up to 1,200 people per hectare, an estimated amount of gross floor area is calculated and according to set rules condensed in blocks of 30 x 30 x 30 m. These work as 3-dimensional plots which verticalize the development while creating semi-public and public spaces as well as a mixture of func-

tions and typologies over a third axis. At the same time, the built ground is reduced to a minimum and connecting elements in upper spheres allow to rethink space, privacy, interaction, and mobility.

The spaces in between, on top and underneath can be used for different currently not existing elements like farming space while maximizing the permeability of the ground and contributing an important part to the natural cleaning process of water and air in São Paulo.

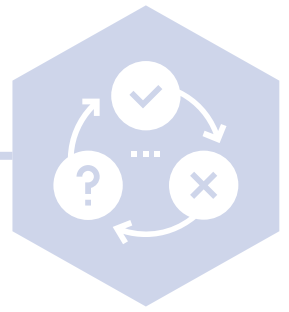


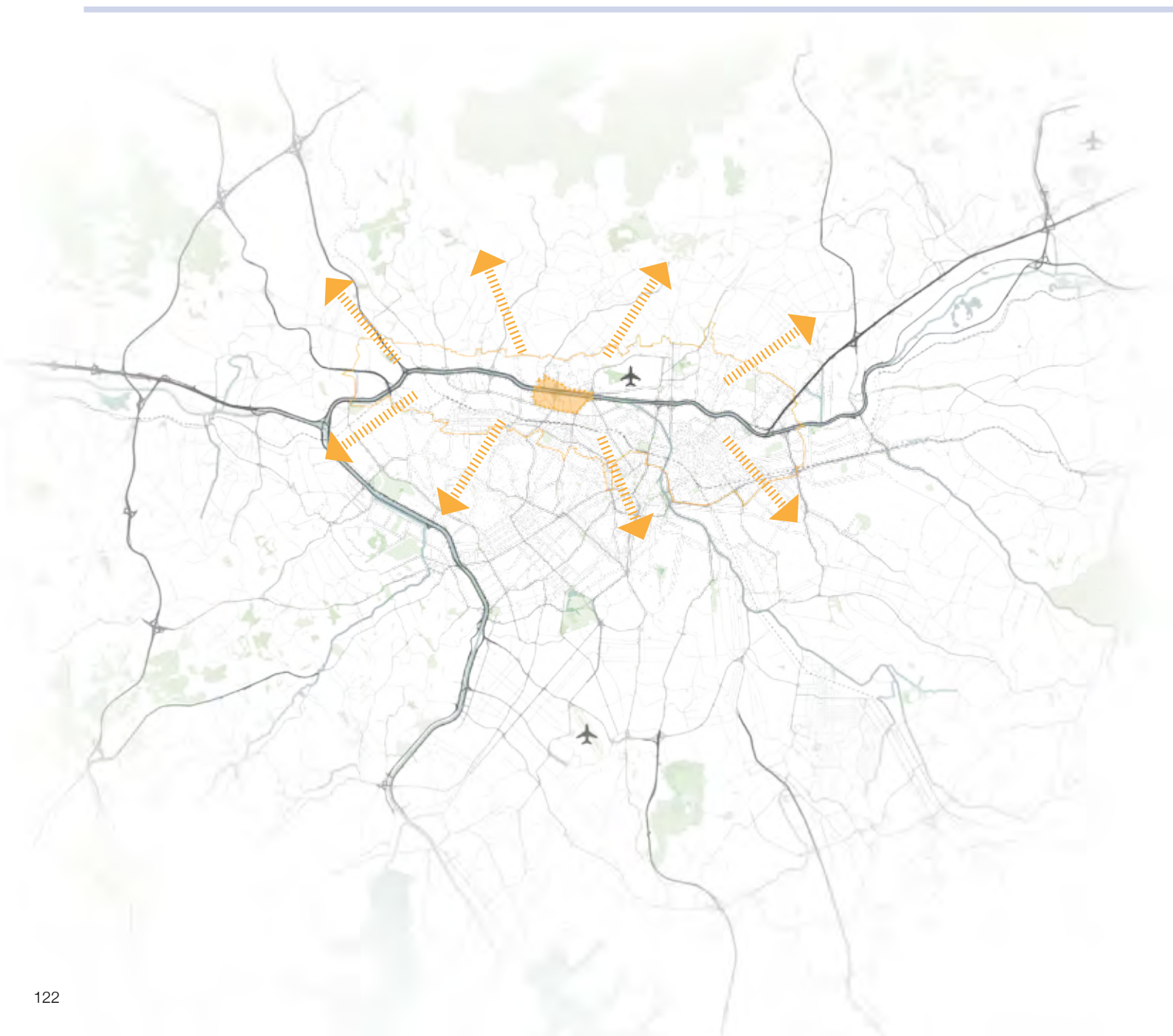




# CONCEPT

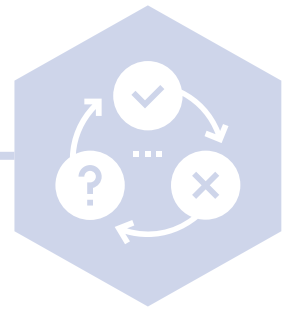
TIETE FLOW 1897





# CONCEPT

INTERVENTION AREA

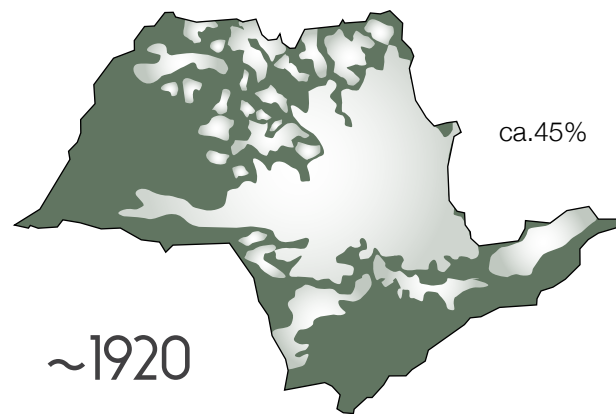
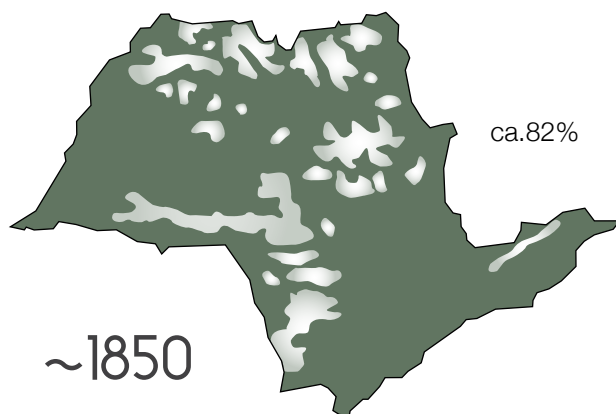


## TARGET VALUES

TOTAL AREA:	170 HA
DENSITY:	1000 PPL./HA
POPULATION:	170,000 PPL.
RES. AREA:	3,000,000 M <sup>2</sup> RES.
COMMERCIAL:	+50%
OFFICE:	+25%
PUBLIC:	+15%
CULTURAL:	+10%
GREEN:	150 HA

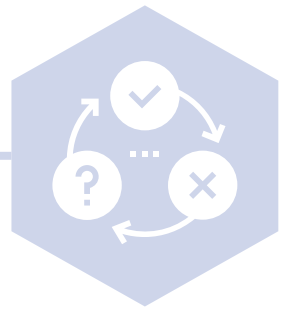


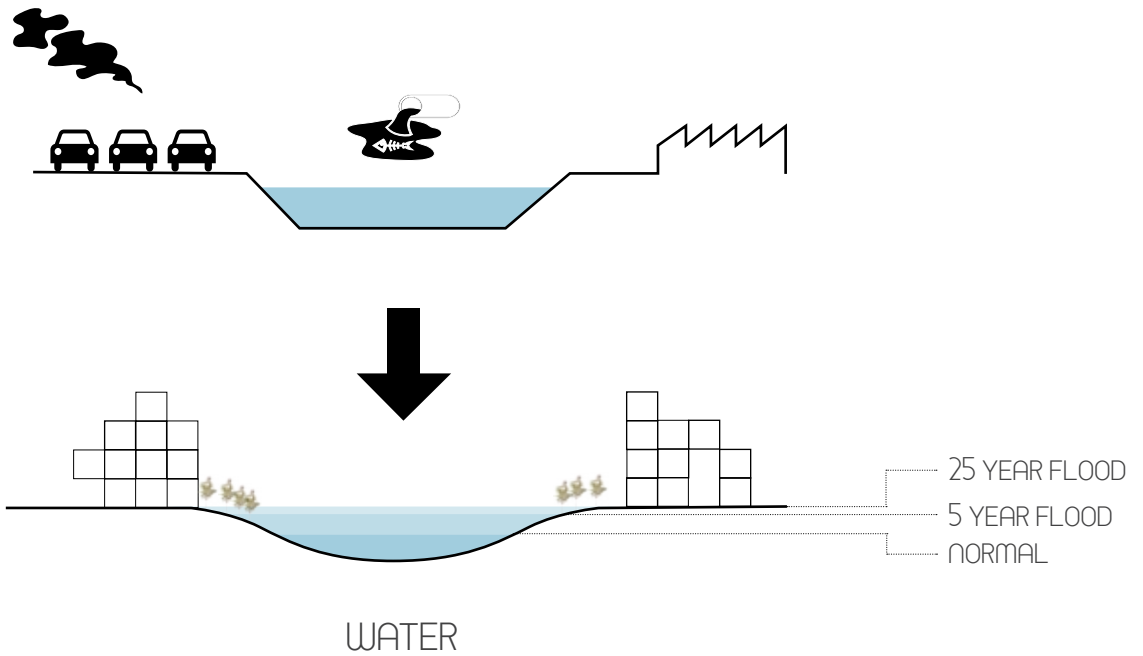




# CONCEPT

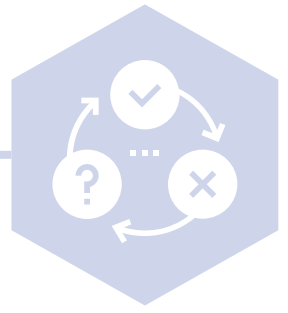
## DEFORESTATION





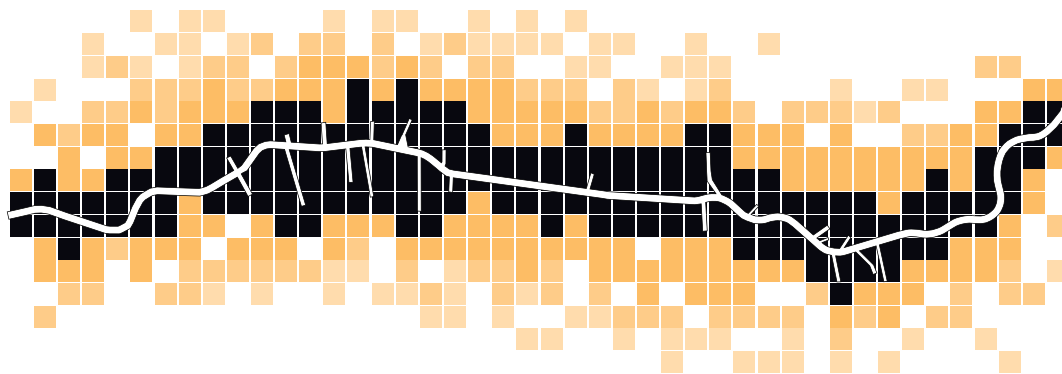
# CONCEPT

POTENTIALS



UNDER-UTILIZED / VAST SPACE

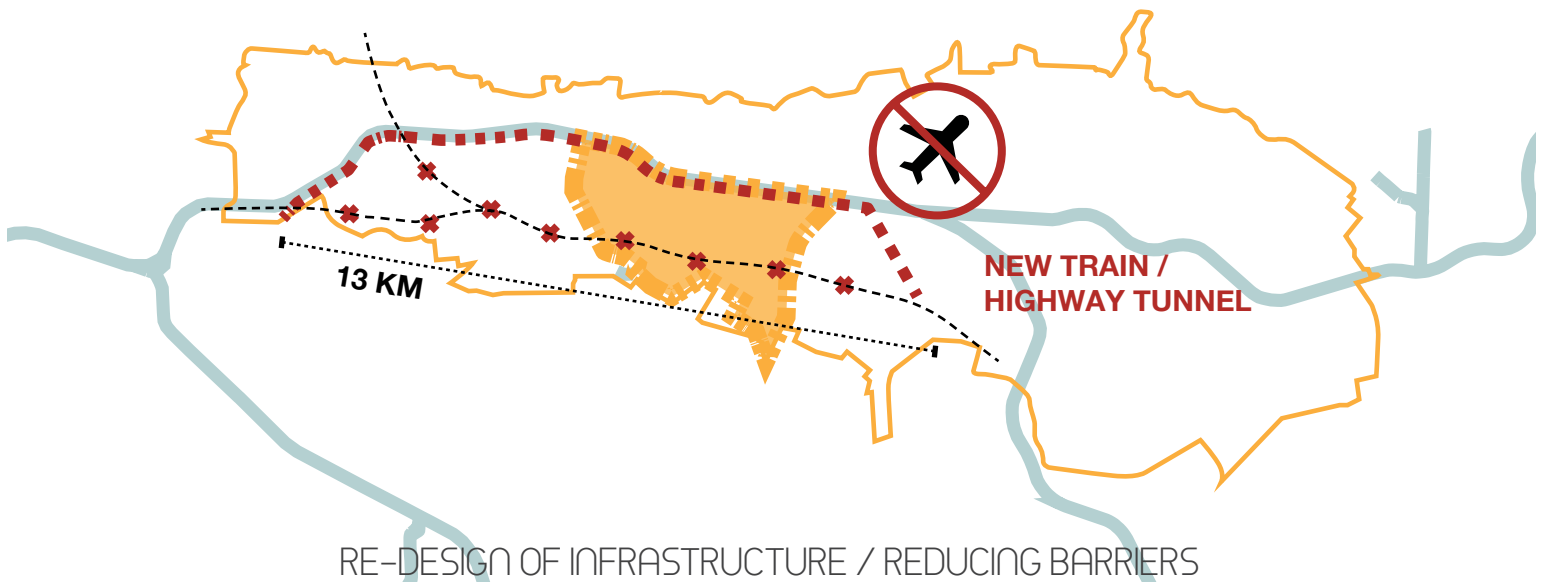
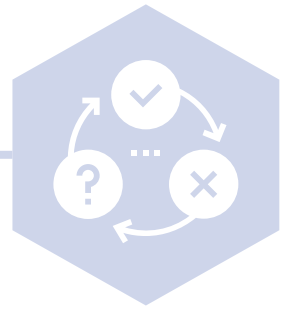


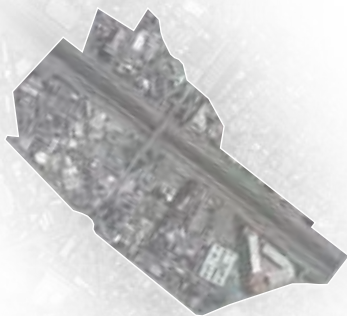


DENSIFICATION FROM THE RIVER INWARDS

# CONCEPT

LARGE SCALE CONCEPT





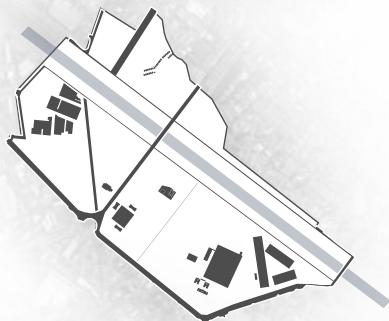
## CURRENT SITUATION

The intervention area is currently dominated by industry, vacant buildings and large unused spaces. The river is completely disconnected from the area by the multi-lane highway.



## NEW NETWORK

Integrating a few of the current roads, a new structure is developed, emphasizing the pedestrian and cyclist. Cars are mainly kept outside and can only access at certain points for delivery or other special situations.



## PRESERVATION

A few buildings are kept. They are chosen based on their location, construction type and character. Either, they have an industrial character and can therefore be used for cultural uses or are new residential towers, which demolition would be unsustainable.



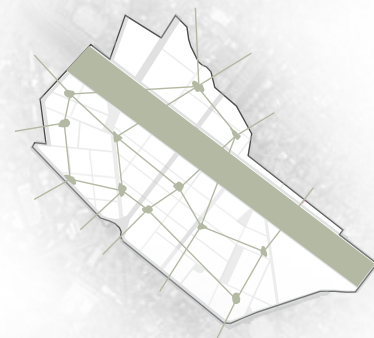
## MULTI MODALITY

Several modes of transport shall become an integrated part of the design. At one hand, existing lines are extended through the area, at the other a new mobility hub will be a central attractor along the river, replacing the Barra Funda station. It combines park and ride from the tunnels, regional train, metro and tram as well as water-based vehicles.



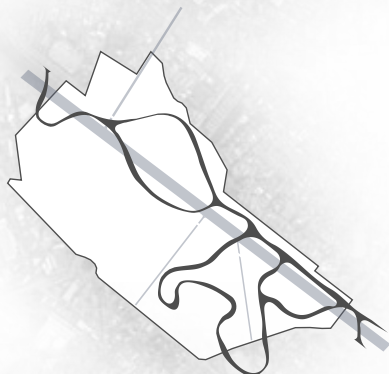
## OPEN STREAMS

Three streams in the intervention area are opened or re-designed to pull the water inside the area and change the perception of it as an valuable urban element instead of a waste dump.



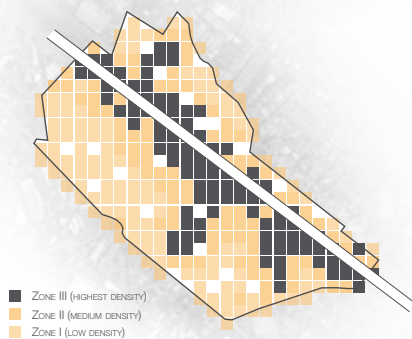
## GREEN NETWORK

Based on different needs of park sized in walking distance to each inhabitant, district parks are situated throughout the area and connected by a network of green axes.



## OLD TIETÊ

The old position of the Tietê becomes a main element in the design. It flows through the district and has many active elements and functions situated at the sides. At the same time, parts in between it and the current river, are used for potential flooding areas.

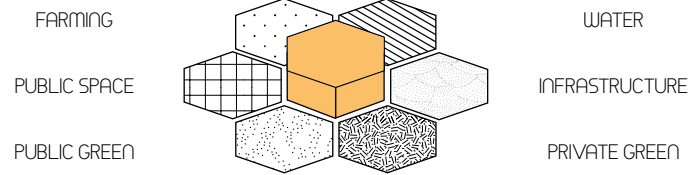
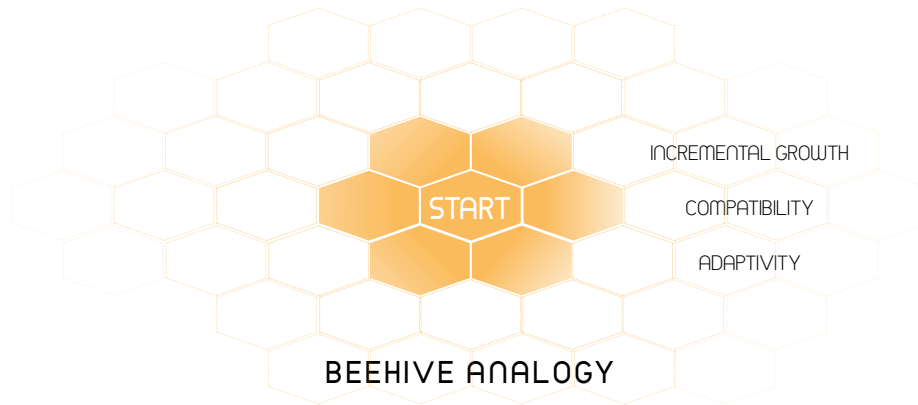
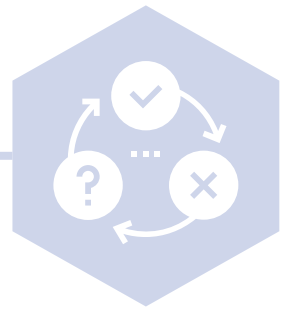


## DENSITY ZONING

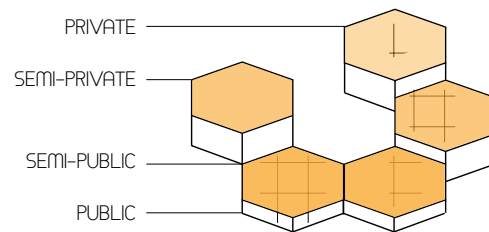
Three different density zones are defined, with the densest along the river gradually fading out towards the existing city. The density is controlled by height and ground coverage rules.

# CONCEPT

## LARGE SCALE CONCEPT

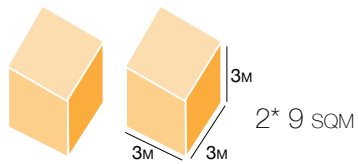


## SURFACE TYPES

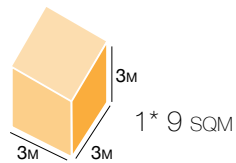


## SPACE VERTICALIZATION

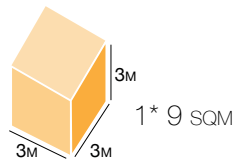




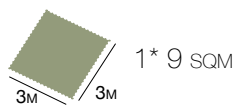
RESIDENTIAL PER PERSON



COMMERCIAL PER PERSON



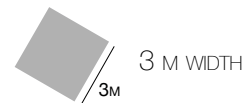
OTHER SPACE PER PERSON  
(OFFICE | CULTURE | PUBLIC | ...)



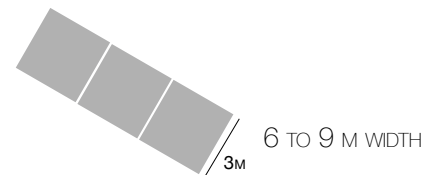
GREEN PER PERSON



TREES PER PERSON



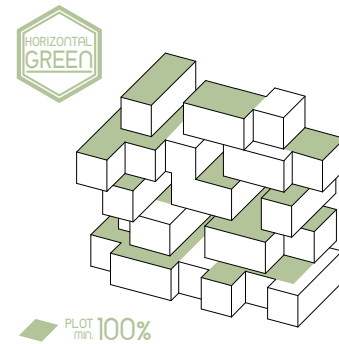
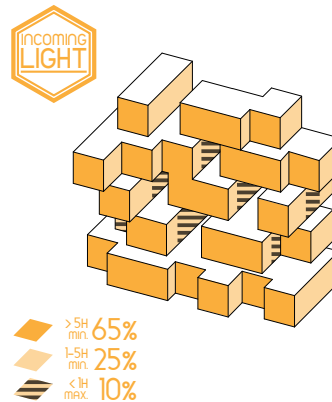
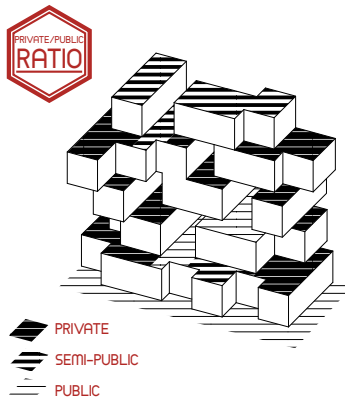
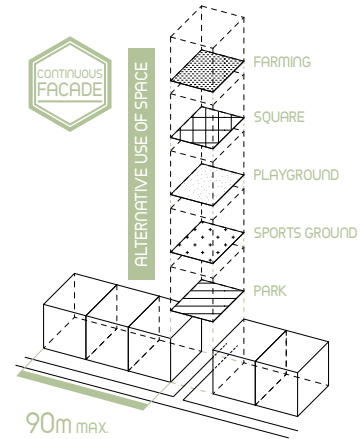
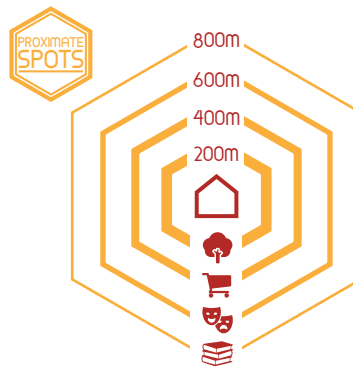
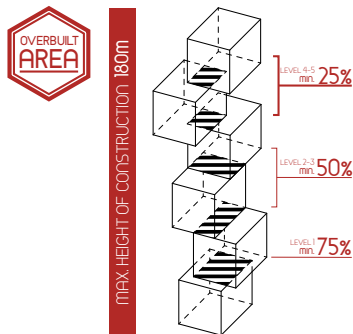
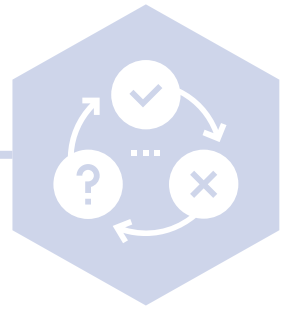
BIKE & PED. PATHS

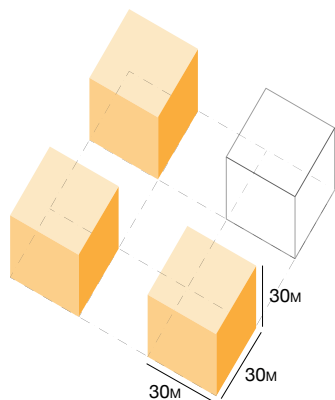


MAJOR STREETS

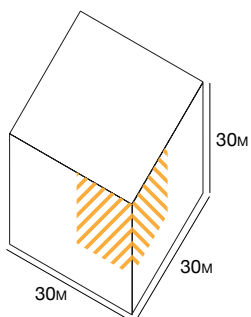
# CONCEPT

## CUBES, UNITS, AND RUES

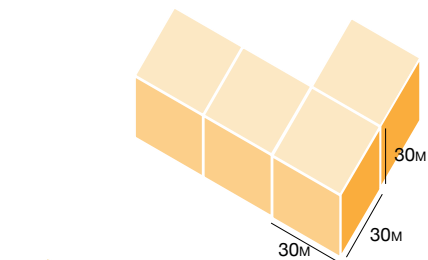




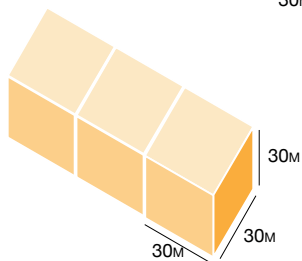
MIN. 3 OF 4  
CORNERS DEFINED



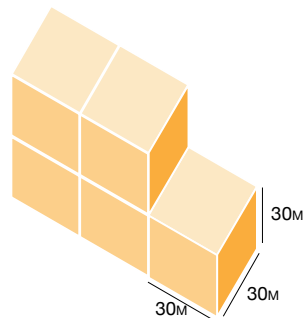
MIN. 30 % FACADE  
PERMABILITY



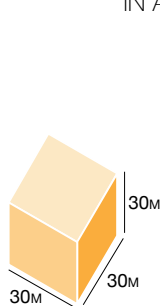
MAX. 4  
DIRECTLY  
CONNECTED



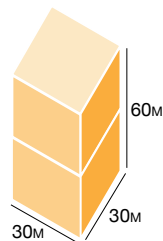
MAXIMAL 3  
IN A ROW



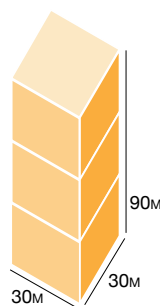
MAX. 5 IN  
CONNECTED  
FACADE



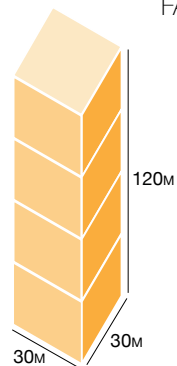
ZONE 0



ZONE 1



ZONE 2

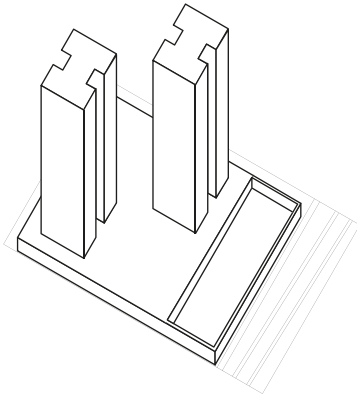


ZONE 3

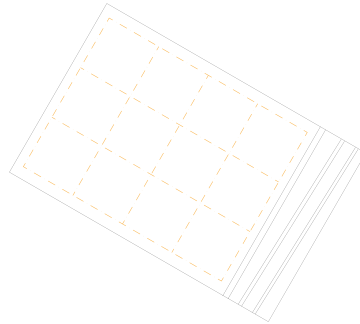
MAXIMUM NUMBER OF CUBES

# CONCEPT

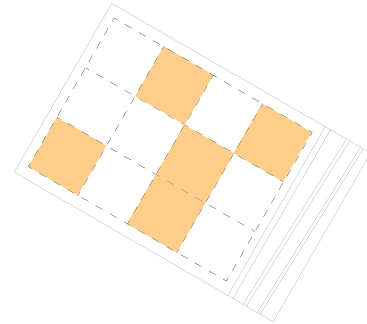
## CUBES, UNITS, AND RULES



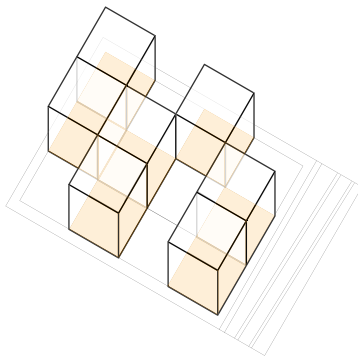
TYPICAL  
HIGH-RISE BUILDING



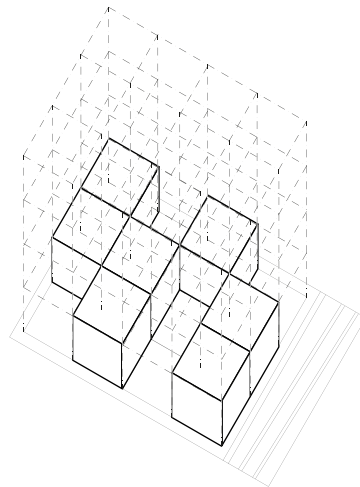
NEW  
30\*30 m GRID



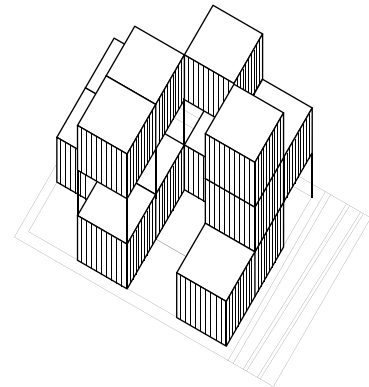
SPACE  
(PUBLIC | PRIVATE | GARDEN)



GROUND CUBES  
(ACCORDING TO RULES)



GROWING STRUCTURE  
30\*30\*30 m GRID



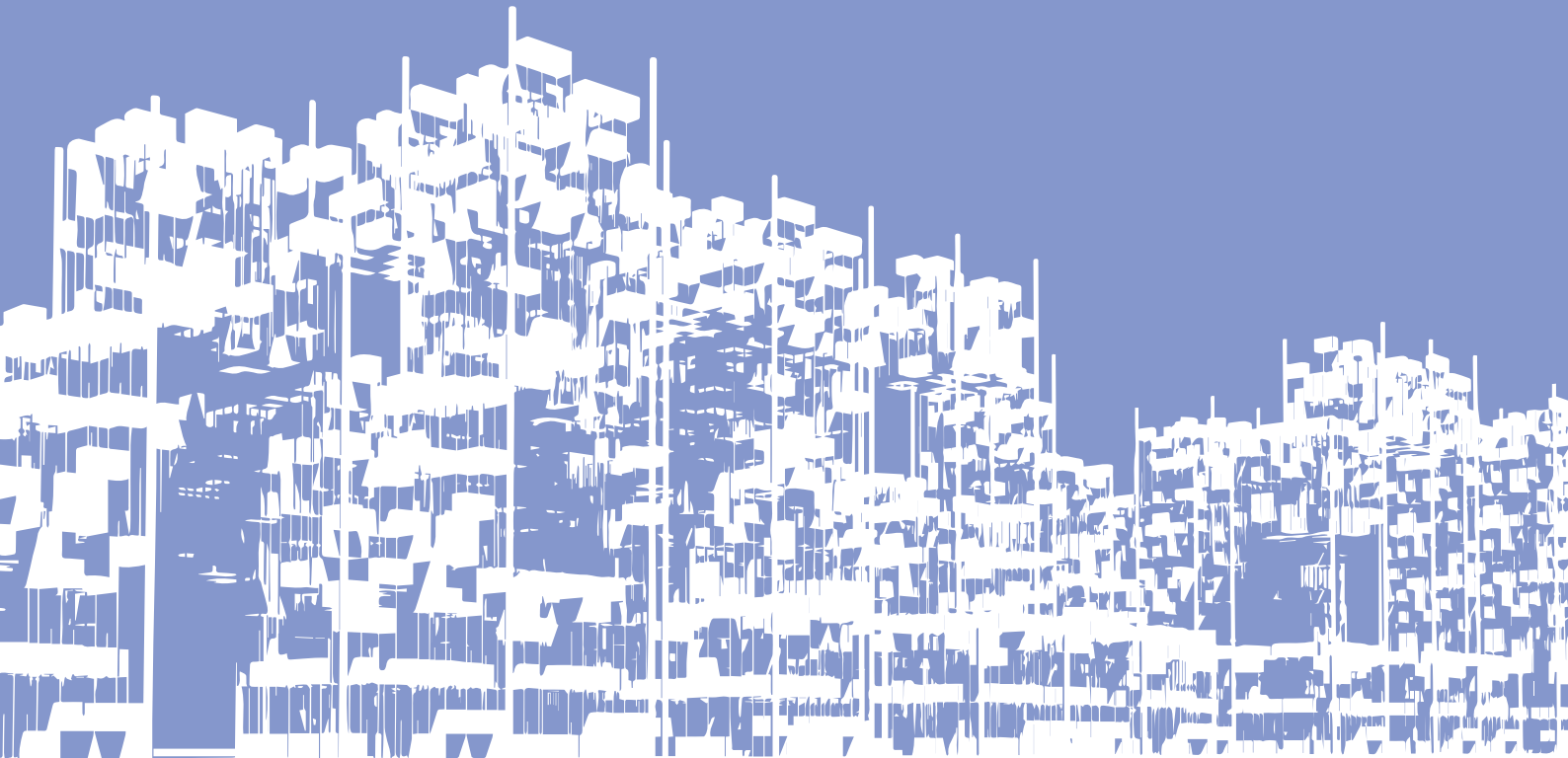
FILLED BLOCKS  
(SUB-DIVIDED IN UNITS)

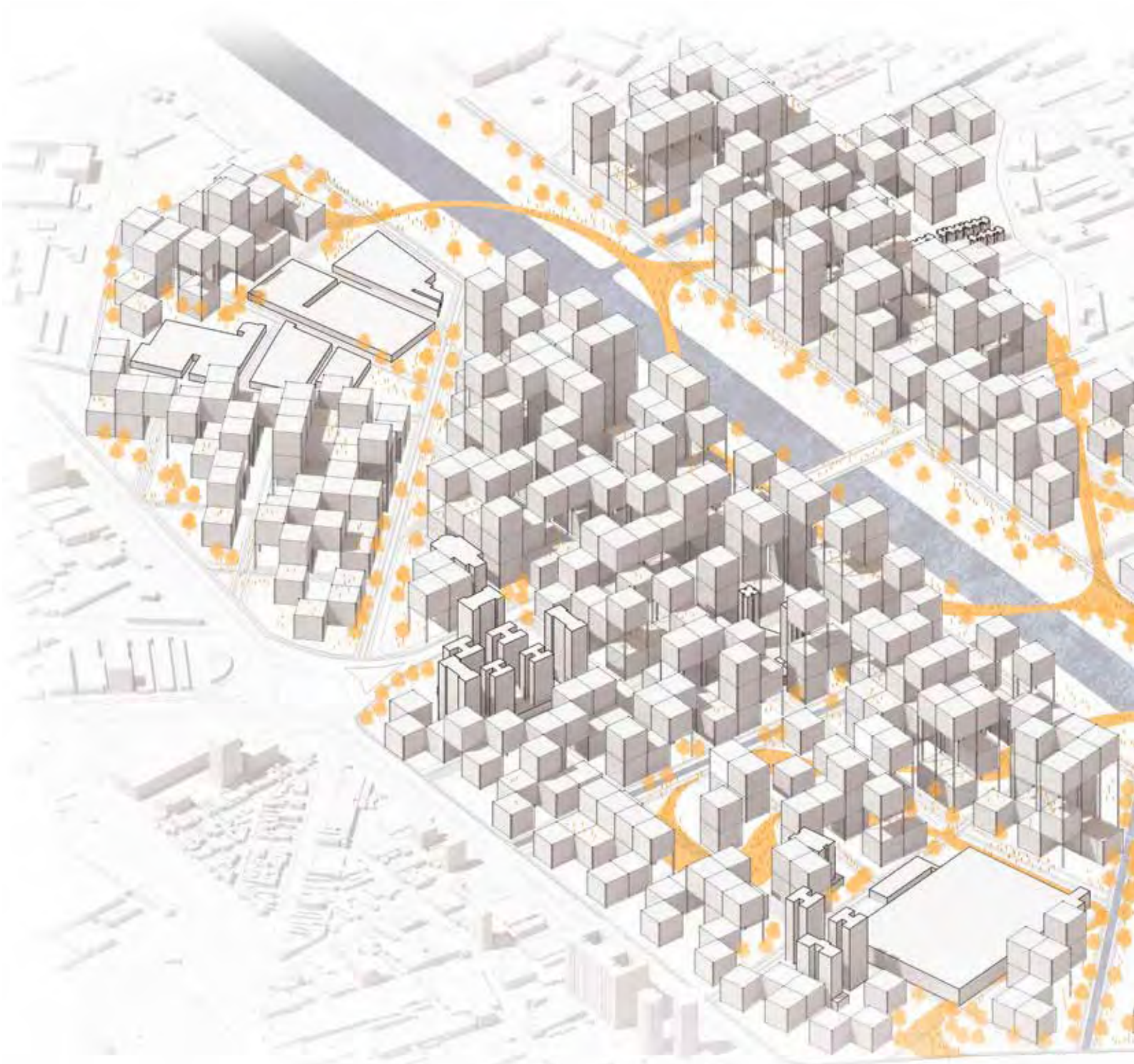


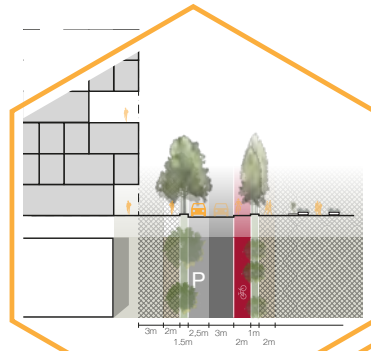


# DESIGN

## INCREMENTAL HOUSING

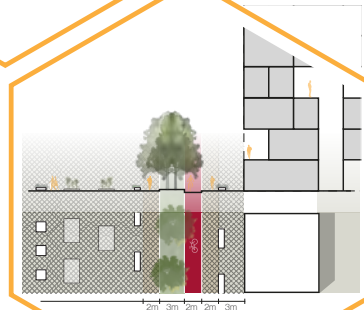






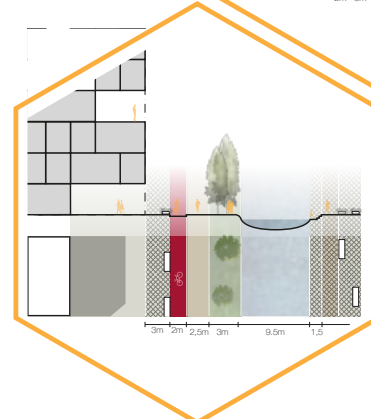
### DETAIL A

The first section shows the local access street layout, which includes a one way road for cars with roadside parking, sidewalks and cycle tracks as well as green elements.



### DETAIL B

The second section shows a typical road, which is normally not accessed by cars and is designed as shared spaces, where cars only enter in specific cases and have no possibility to use it as shortcuts through the area.



### DETAIL C

The last section shows one side of the road along the redesigned streams. These area are in the densest zone and shall become central commercial and public elements, leading people from and to the river.



FACADE VIEW  
PEDESTRIAN



STRUCTURE  
STREET



DESIGN

VISUALIZATIONS



CUBE  
TERRACES



SEMI-PRIVATE  
COURTYARD







DESIGN

MASTER PLAN

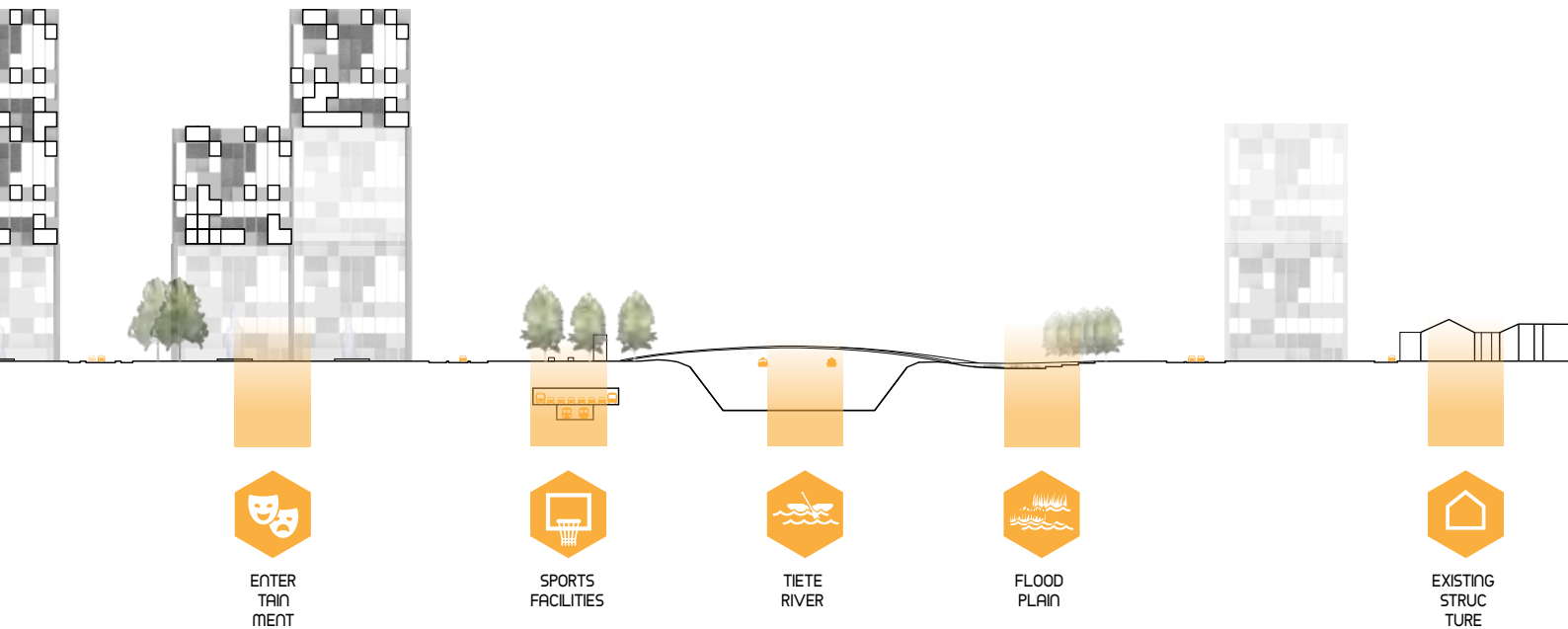






# DESIGN

## SECTION A







# DESIGN

## DETAILED PLAN





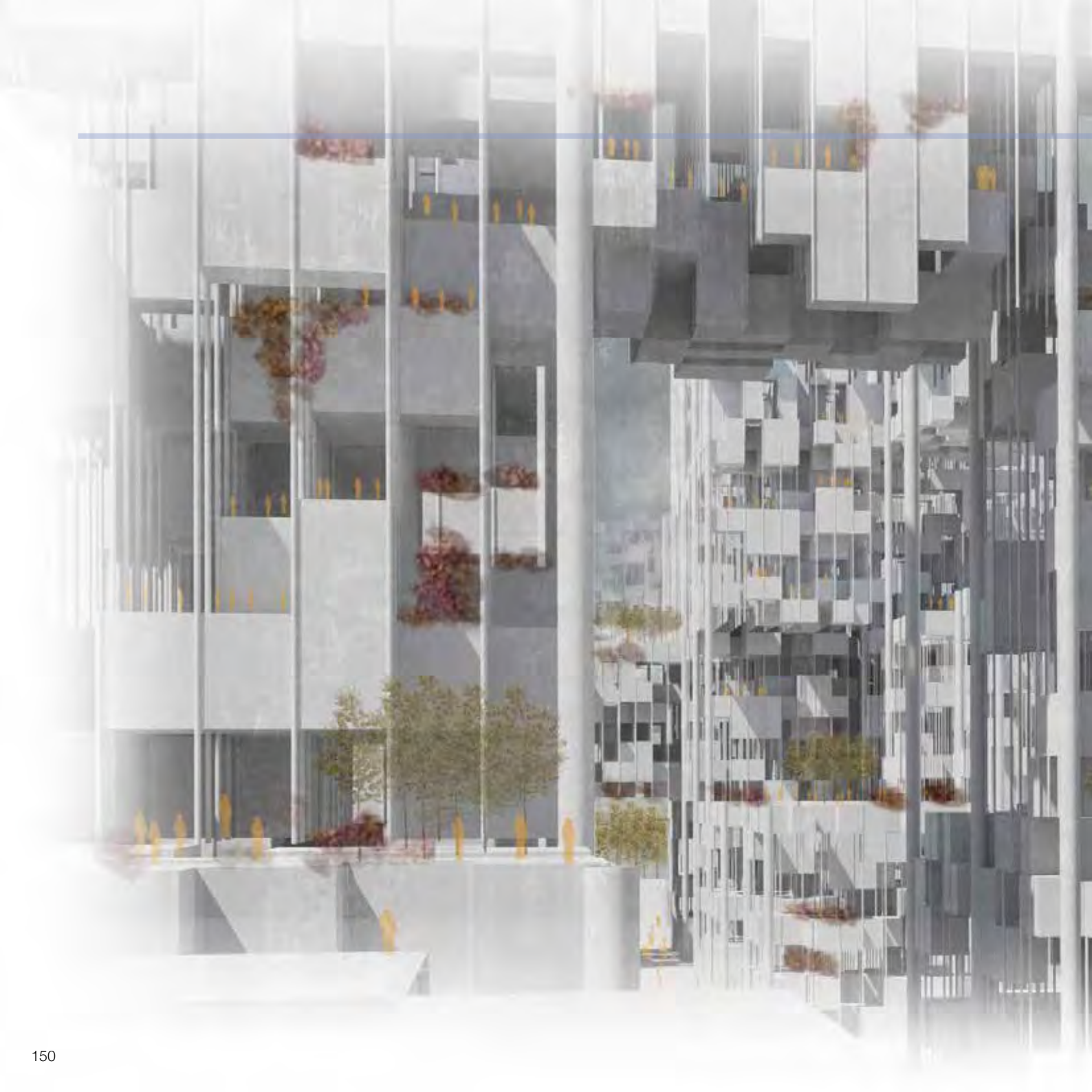


# DESIGN

VISUALIZATION RIVER FRONT









DESIGN

VISUALIZATION FROM THE INSIDE





PATRICK NAUMANN  
TJARK GALL

