



TECHNICAL UNIVERSITY OF CRETE
DEPARTMENT OF ARCHITECTURAL ENGINEERING

URBAN PLANNING II

Rebuilding Cities and Restoring Communities: the case of San Jose de Chamanga in Ecuador

8TH SEMESTER

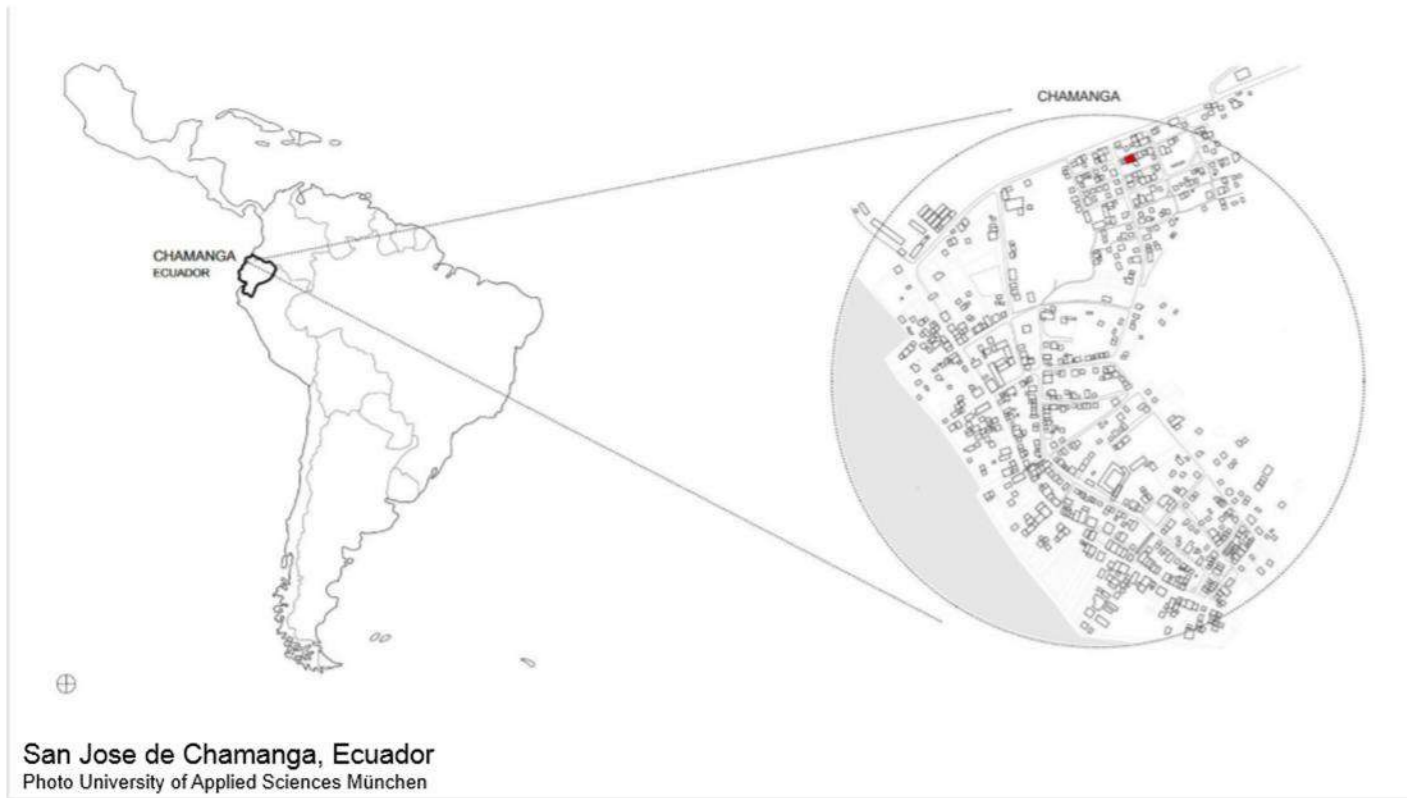
A.Y. 2019-2020

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SAN JOSE DE CHAMANGA, ECUADOR – ANALYSIS



GEOLOGY



Ecuador is split down the middle by the Andes. This natural division creates 3 geographic regions:
 The Pacific Coast (La Costa)
 The Andes (La Sierra)
 The Amazon (El Oriente)

- Ecuador is one of the world's most bio-diverse countries per square kilometer
- One of the most seismically active regions in the world, located near 7 geologic tectonic plates
- 3 primary types of earthquakes

TOPOGRAPHY

CLIMATE

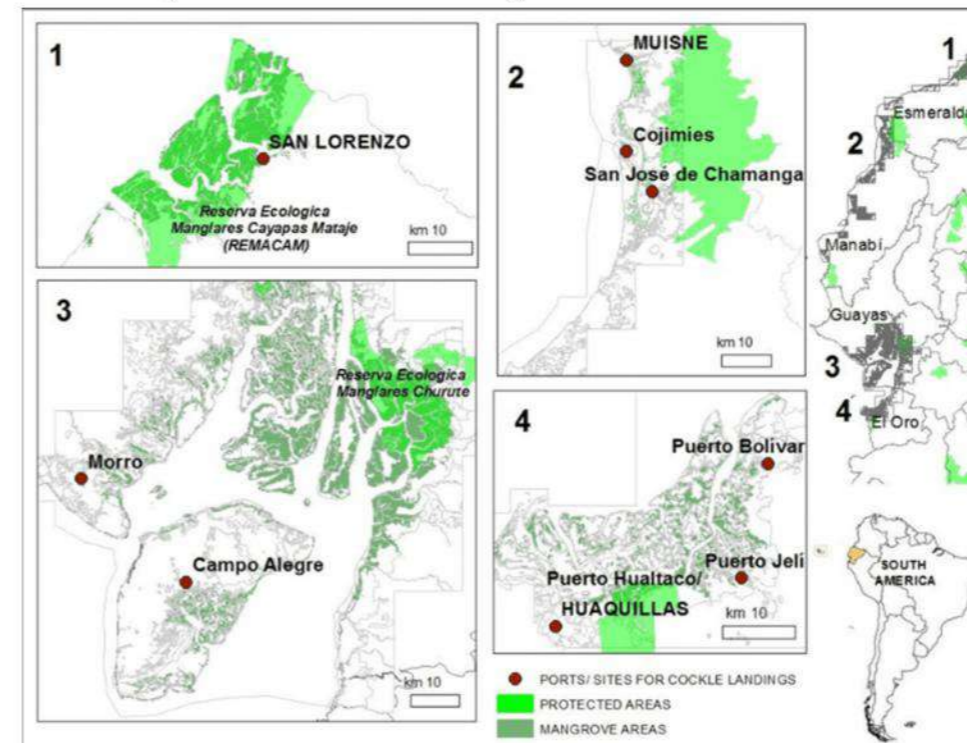


HYDROLOGY – ECOSYSTEM

the water system is from the rivers of the Amazon, Andes and Pacific Ocean



- One of the 17 mega-diverse countries in the world □ most biodiversity per square kilometer
- 1600 bird species, 16000 species of plants, 106 endemic reptiles, 138 endemic amphibians, 6000 species of butterfly
- 6 major ecosystems in the Costa region: mangrove forest, rain forest, savannah, scrub land and dry forest.



Mangrove population



Rain Forest



Mangrove Forest



Savanna



Dry Forest

EARTHQUAKE

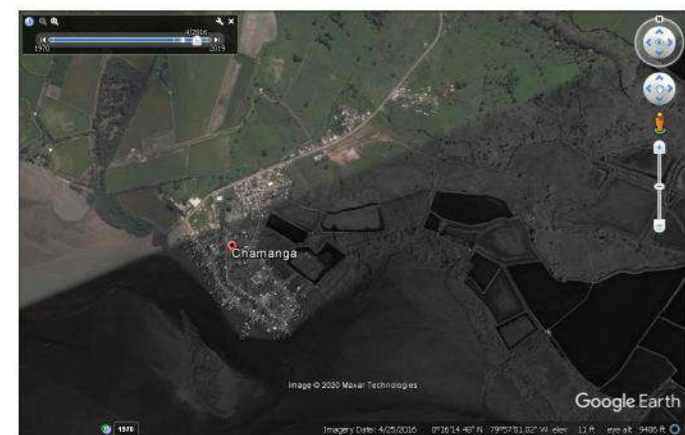
16/4/2016 – earthquake of 7.8 magnitude



Chamanga still requires urgent attention, such as housing supply (almost 80% of homes destroyed), drinking water and sanitation, community services and sources of income.



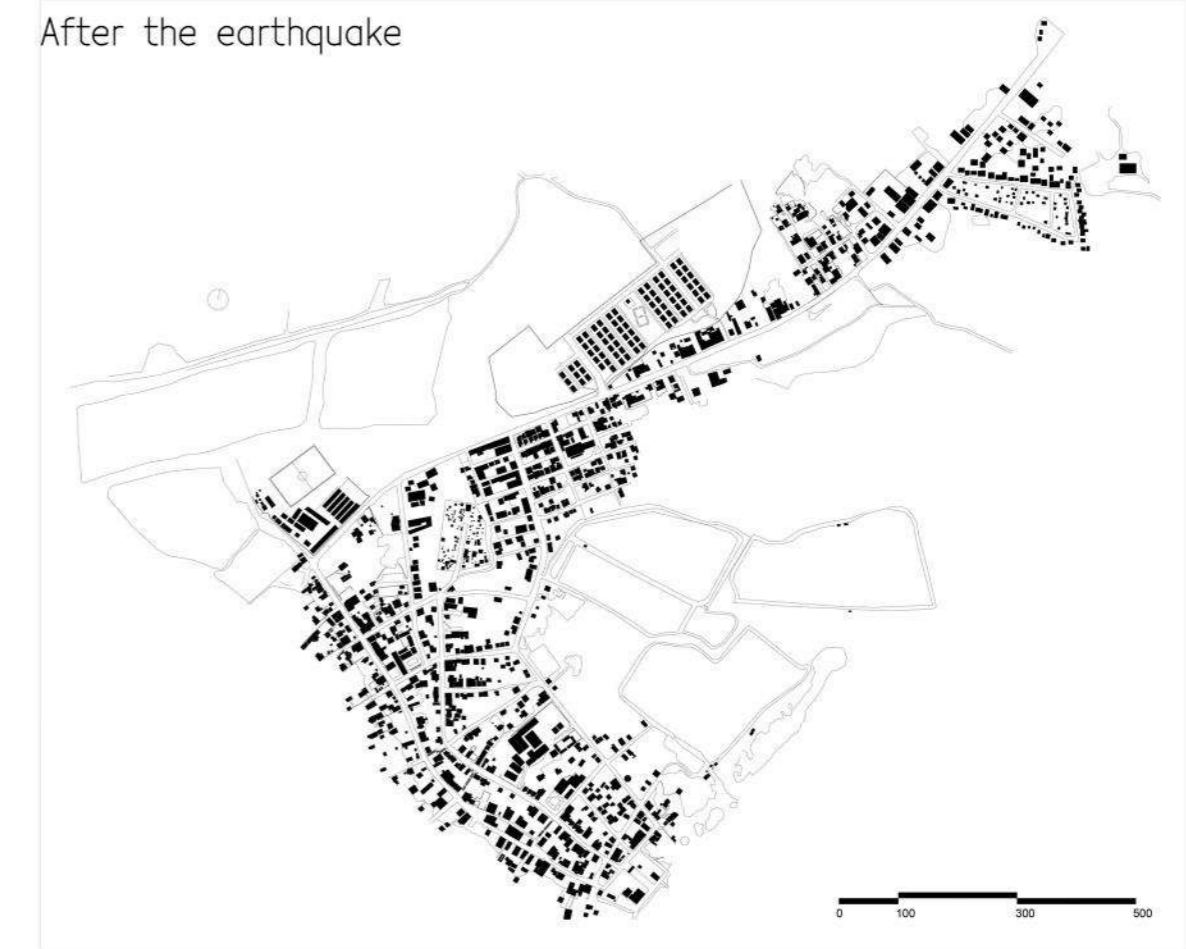
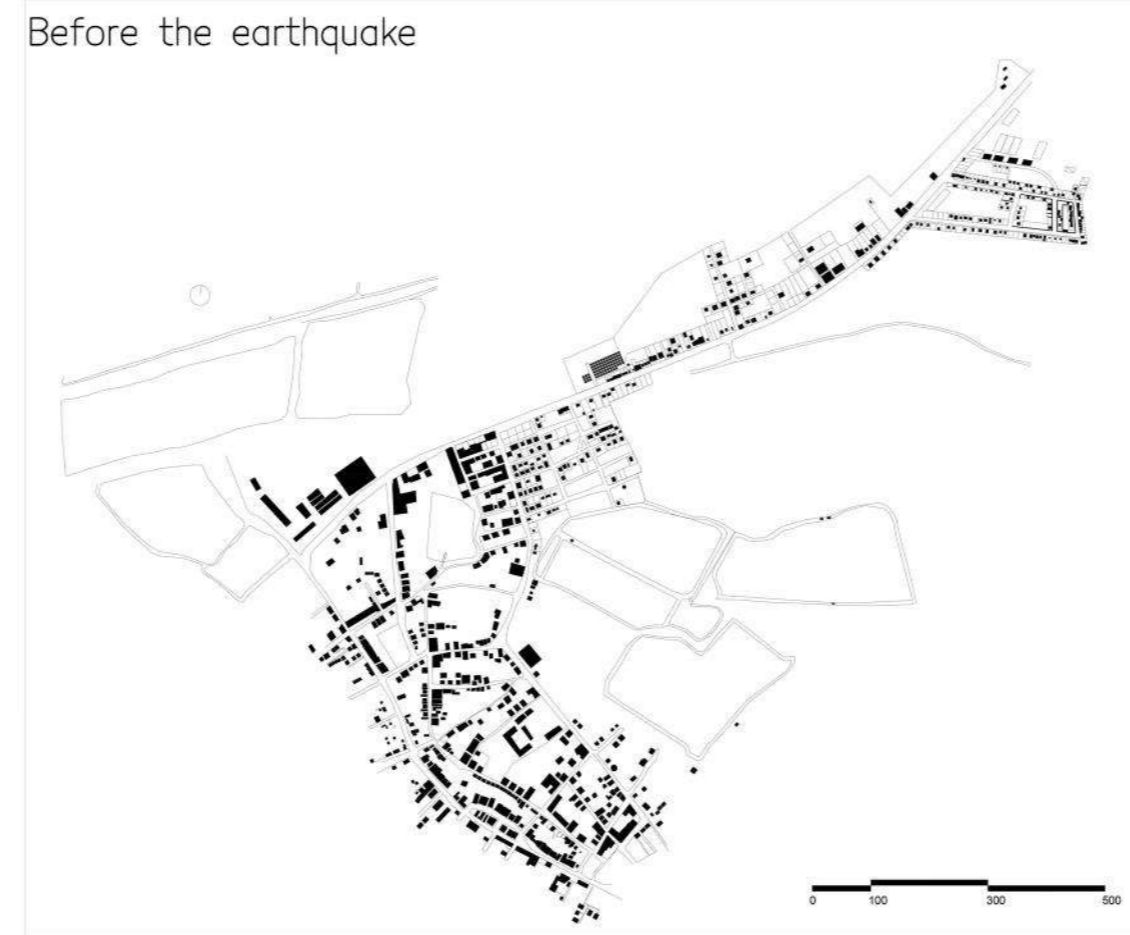
Chamanga, 2009



Chamanga, 2016



Chamanga, 2019

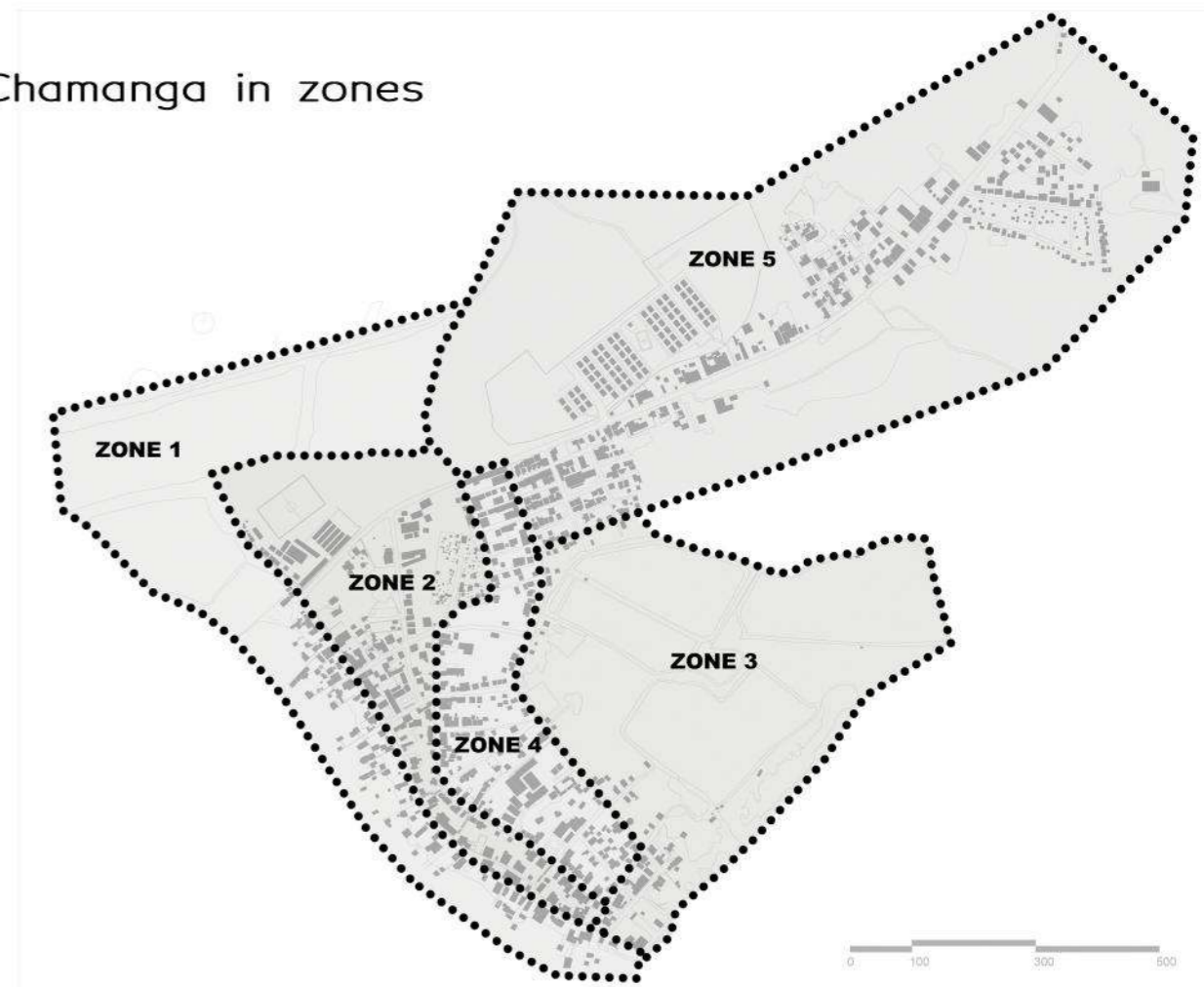


900 victims 16,600 injured

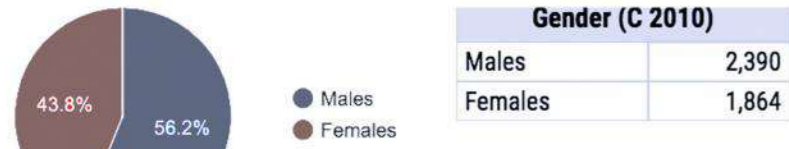
CRITICAL NEEDS

- drinking water and sanitation system
- housing
- reconstruction of public parks and gathering places
- capacity of the local local government council to secure funding for reconstruction

Chamanga in zones



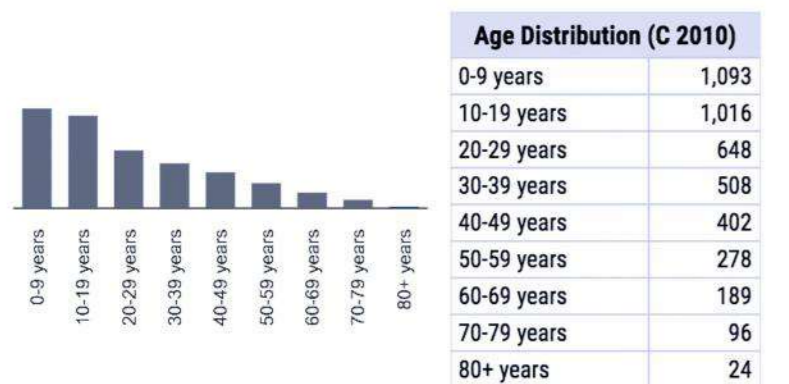
DEMOGRAPHICS



Gender & age groups



Ethnic group & literacy



Age distribution & urbanization

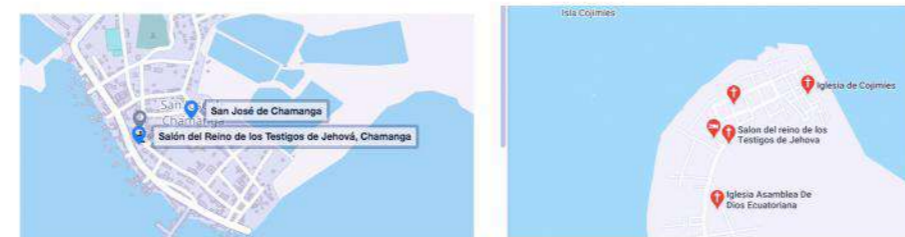
LANGUAGE

Official language: Spanish,
10 native languages are spoken

RELIGION

Roman Catholic, & other
Christian faiths.
Indigenous Ecuadorians
have blended their
traditional beliefs.

-Salon del reino de los Testigos
de Jehova
- Iglesia Asamblea De Dios
Ecuatoriane
-Iglesia de Cojimes

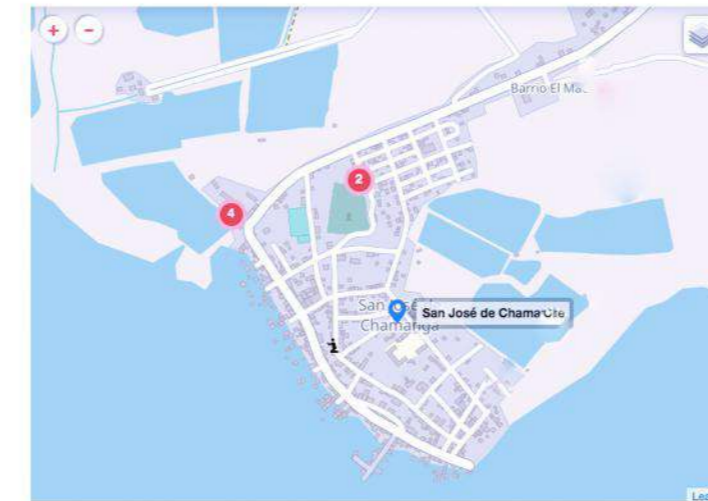


ETHNIC GROUP

Indigenous 253
Afro-Ecuadorian 1,092
Montubios 147
Mestizos 2,558
White 142
Other Ethnic Group 62



EDUCATION AND SCHOOLS



1. Centro ed comunitaria interc bilingüe ed B comingo

8 teachers 192 students
EGB 8 years of studying
students 6-13 y.o
2 language school

2. Unidad educativa fiscal chamanga

offers basic and bachelor education
The only school from nearest cities that
offers bacherlor



Educational units in the wider region



10km radius
19 schools
found



PROBLEMS

Within the town, 80% of the residents
work in fishing, shrimping, or shellfish
collecting industries, 10% work in tourism
and transportation related industries and
10% work services such as shop owners,
food establishments etc

The average income is \$8,300 per year.



Population under 18 = all older generations.
school attainment is still low and many
school children leave to earn income for
their families

As a result, the remaining group of young
persons is unemployed and uneducated, lea-
ding to high poverty rates.



CIRCULATION



 main street

MEANS OF TRANSPORTATION



Bus



Cars



Tricycle



Motorcycle



Bicycle

HOUSE TYPOLOGIES

TRADITIONAL

light, elastic materials

structural integrity
(certain, visible and reviewable connections of structural elements)
- better seismic behavior
- possible to improve and renew the elements and joints

in case of collapse
- less deadly injuries

CHARACTERISTIC STRUCTURES

STAIRS

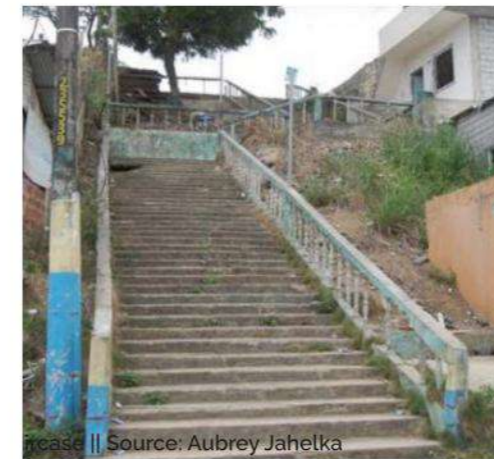
- informal public spaces
- important and characteristic connection of the waterfront with the upland
- connective arteries social interaction panorama
- best view of the waterfront

MODERN

heavy, rigid materials

often no structural integrity
- concrete elements reinforced unsufficiently and incorrectly

in case of collapse
- deadly injuries



WATERFRONT

- heart of the city
- originally - fishing town
- founded on the waterfront
- expanded later in the land
- traditional houses out of wood and bamboo
- today represent cultural heritage



Gable		-Concrete -Masonry -Steel -Wood	*Typical in Chamanga -excellent thermal loads -decent seismic resiliency -familiar building method and technology	
Stilt House		-Wood	*Typical in Chamanga -climate responsive -excellent seismic resiliency -familiar building method and technology	
Frame and Gable		-Steel -Masonry	*Typical in Chamanga -excellent thermal loads -week seismic resiliency -familiar building method and technology	
Two Story Rise		-Concrete -Masonry	*Typical in Chamanga -excellent thermal loads -week seismic resiliency -familiar building method and technology	
Two Story Rise With Deck		-Concrete -Masonry	*Present in Chamanga -excellent thermal loads -week seismic resiliency -familiar building method and technology	
Columns and Slabs		-Concrete -Masonry	*Present in Chamanga -excellent thermal loads -week seismic resiliency -familiar building method and technology	
Low Rise With Arcade		-Concrete -Masonry	*Non-Existant in Chamanga -excellent thermal loads -week seismic resiliency -familiar building method and technology	
Two Story Rise With Deck and Arcade		-Concrete -Masonry	*Present in Chamanga -excellent thermal loads -week seismic resiliency -familiar building method and technology	

Building Typologies of the Ecuadorian Coast || Source: PennDesign LARP 701 regional analysis collective



UPLAND RESIDENCES

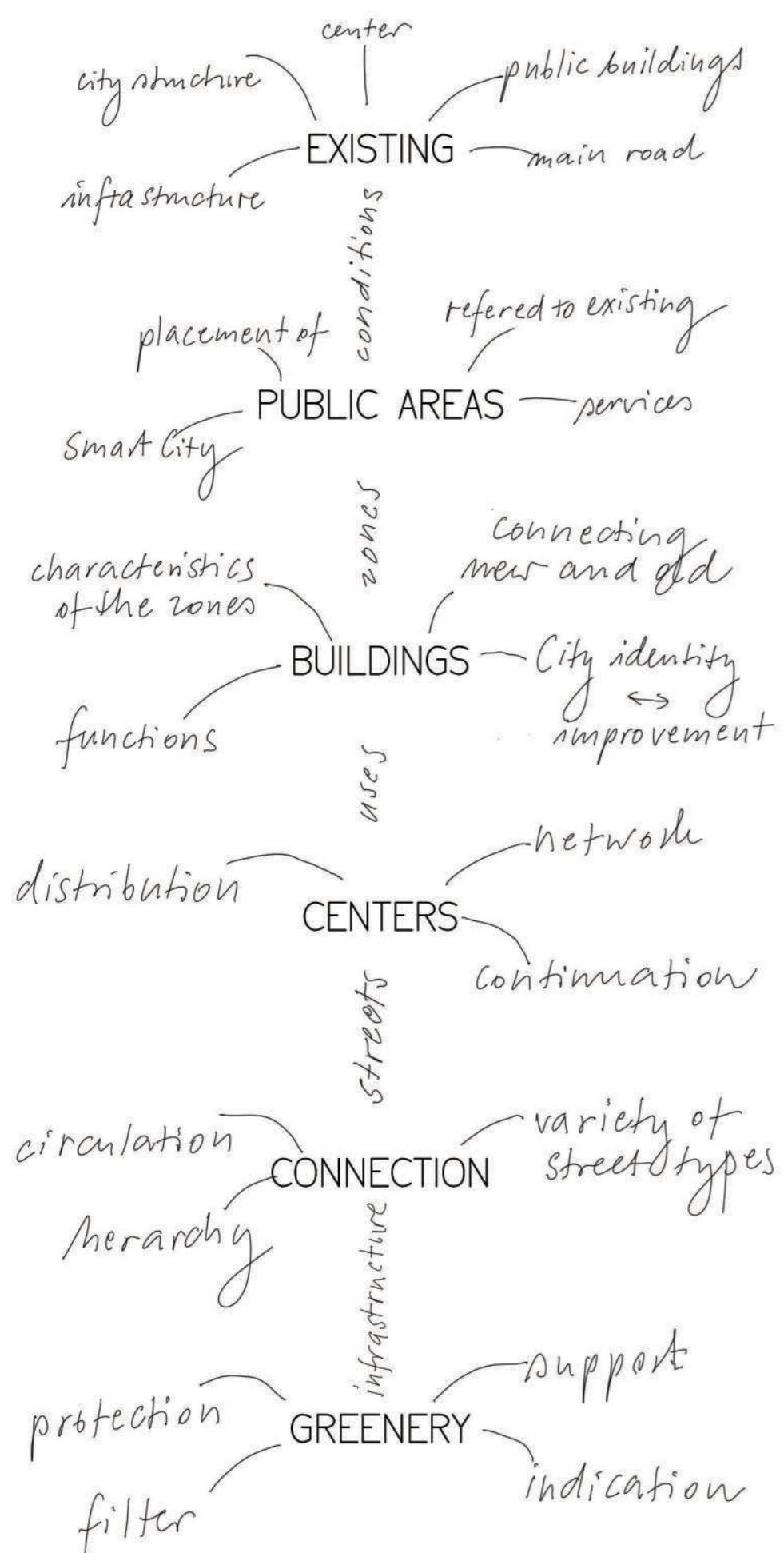
- Lower density
- Large houses
- bigger distances between the residences:
- ground around available
- food security (farming)

'60s EXPANTION

- commercial and residential
- mixed use scheme:
- store on the bottom floor
- housing in the back of the 1st and/or on the 2nd floor
- in the recent past new materials (concrete, masonry, steel)
- symbol of financial status
- > preferred over traditional



INTERVENTION STRATEGY



EXISTING

LINEAR CIRCULATION

one large main street

CONCENTRATION

of the public functions
in the waterfront proximity

WATERFRONT

high damage of the buildings
light structures used as warehouses
show best response to the earthquake

INFRASTRUCTURE

existing - highly damaged
NO POTABLE WATER



PUBLIC AREAS

CREATE new ATTRACTIVE CENTERS - Squares
with water supply, playgrounds, shadowed spaces,
commercial and leisure services nearby)

REGULARLY DISTRIBUTED in all the city

-> collocating new important PUBLIC BUILDINGS
in the proximity of the squares

-> ensure comfortable and inviting connection

-> offer services on the square

SMART CITY STRATEGY:

SQUARES - Water Supply and Dialog
between Community and City Administration



BUILDINGS

RENOVATION

of the survived buildings for maintaining CITY IDENTITY

RECONSTRUCTION

of the urban tissue in the damaged part of the city

BUT

RETHINKING the use in the always endangered

ZONE 1 WATERFRONT - extremely high flood risk
structures destined for fishing industry, warehousing, depot,
some shops (fishing and alimentary) rarely residential use

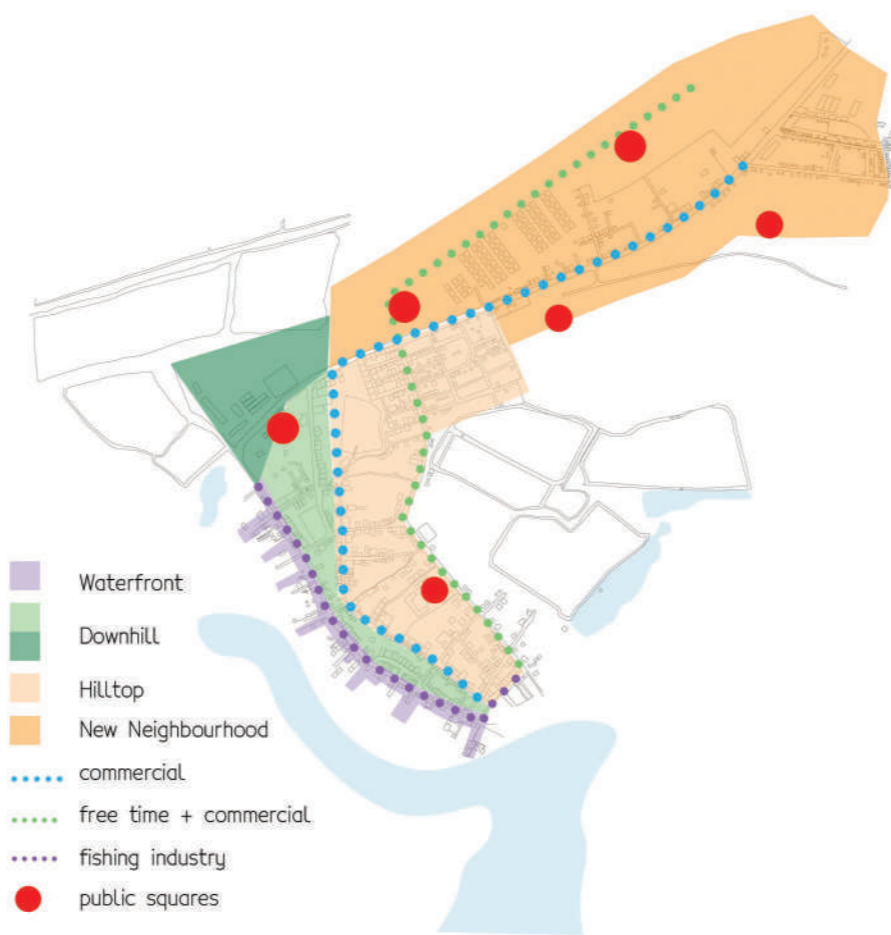
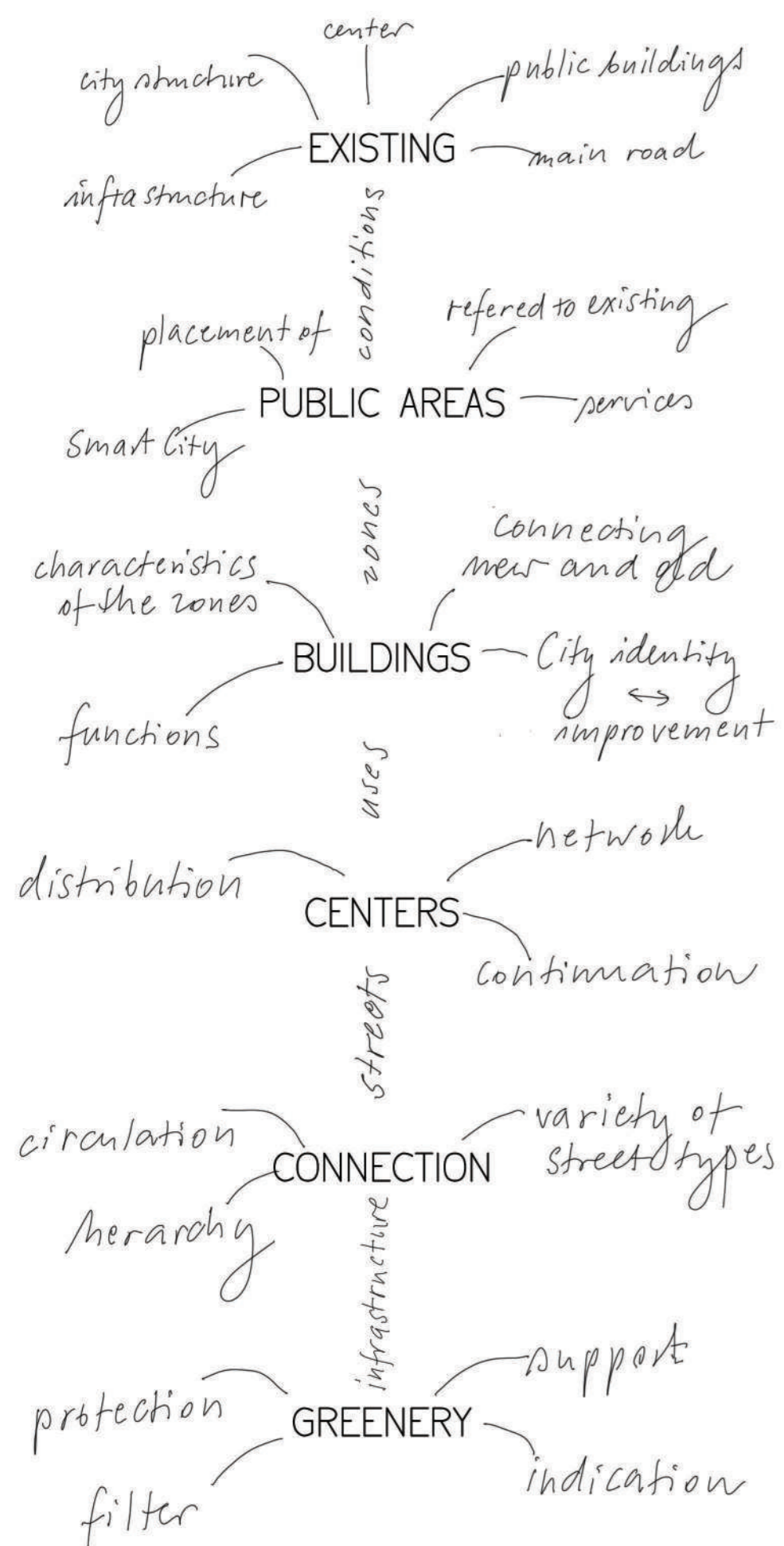
ZONE 2 DOWNHILL - high flood risk
Mixed residential and commercial uses
-> a lot of small open spaces for public and commercial use

ZONE 3 HILLTOP - no flood risk, but evacuation issues
Mostly residential area of medium-low density
-> a lot of open spaces (private gardens and public areas),

ZONE 4 NEW NEIGHBOURHOOD - no flood risk, good evacuation conditions.
Mostly residential area of medium density -> a lot of shared yards

-> CITY EXTENTION

INTERVENTION STRATEGY



CENTERS

SQUARES included into CITY CENTER NETWORK

Linear 'CENTERS'

wide main road: highly commercial
different types of shops, also
bigger shops and services connected to industry

wide pedestrian street: commercial and free time
many shops and services connected to
the free time activities, also cafè's and restaurants,
cultural and educational (f.e. library, bookshop, cinema)

waterfront street dedicated to fishing industry,
warehouses, outdoor market

Smaller walking streets ↔ hill stairs,
free time (sport, relax) some commerce and services



CONNECTION

CIRCULATION SYSTEM

no dead ends, easy traffic flow
-important in case of emergency

DIFFERENT STREET TYPOLOGIES

developed roads hierarchy
also streets dedicated only to pedestrians

PUBLIC NETWORK

comfortable and quick connection passages
between the most important public buildings

ENSURING comfortable large roads
with pedestrian and bicycle lanes

INSERTING GREENERY



GREENERY

ACCOMPANY

trees along the connecting streets

SUPPORT

parks, urban green - in proximity
of the public areas

PROTECT

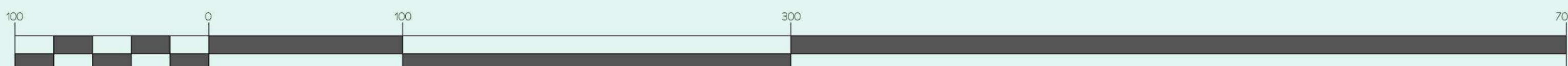
support the existing mangrove forest
-support maximal expansion on the lower
levels (water level)

TRANSITION

create natural filter-

DEDICATE

bigger areas for urban parks
walking paths in the bigger parks
in relation to the city circulation





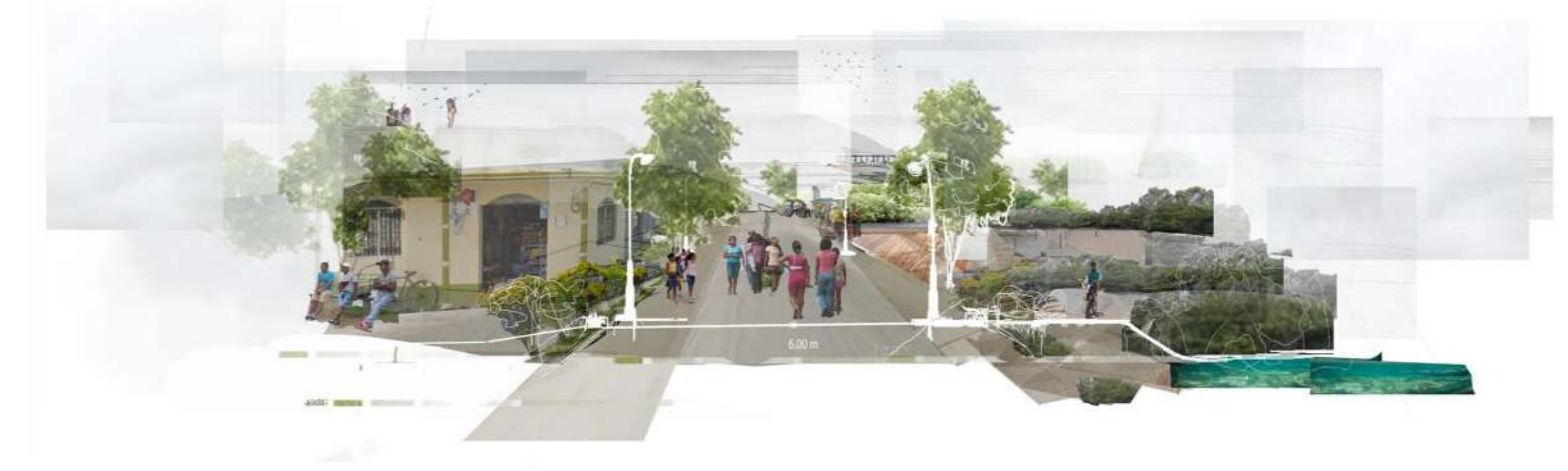
PUBLIC SPACES AND VISUALIZATION



section 1-1



section 2-2

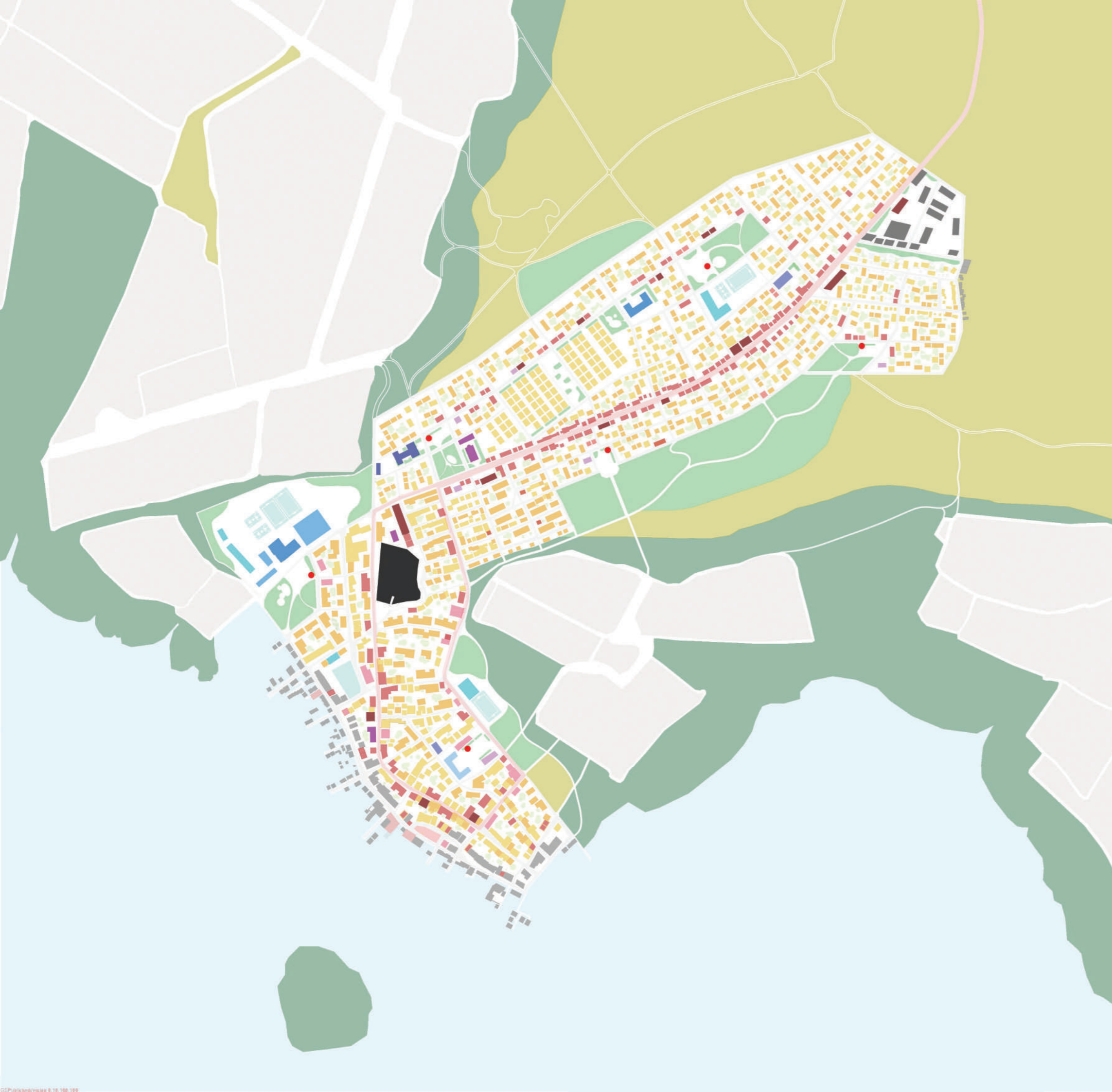


section 3-3

USES AND FUNCTIONS

GOALS:

- BALANCED distribution of the public functions and the gathering zones
- PROMOTE steady and regular occupation of all zones (housing for season workers mixed within the residential tissue - no 'ghost neighbourhoods' outside the season)
- CREATE city centers of different character (commercial busy main street, free time/commercial pedestrian street, calm walking path along the park with sport facilities)



- housing**
 - Residence
 - Residence with guests' apartment
- commerce**
 - Outer commerce
 - Local commerce - groceries; technical services; personal services
 - Outdoor Market
 - Amusement/food
- admin.**
 - Municipality
 - Health
- education**
 - Professional
 - High school
 - Primary school
- sport**
 - Sport indoor
 - Sport outdoor
- culture**
 - Culture
 - Religion
- cemetery**
 - Cemetery
- industry**
 - Industry
 - Warehouses
 - Schrim pools
- greenery**
 - Urban - parks
 - Private/semiprivate - gardens, yards
 - Natural - meadows/forests
 - Mangroove forests
- main street

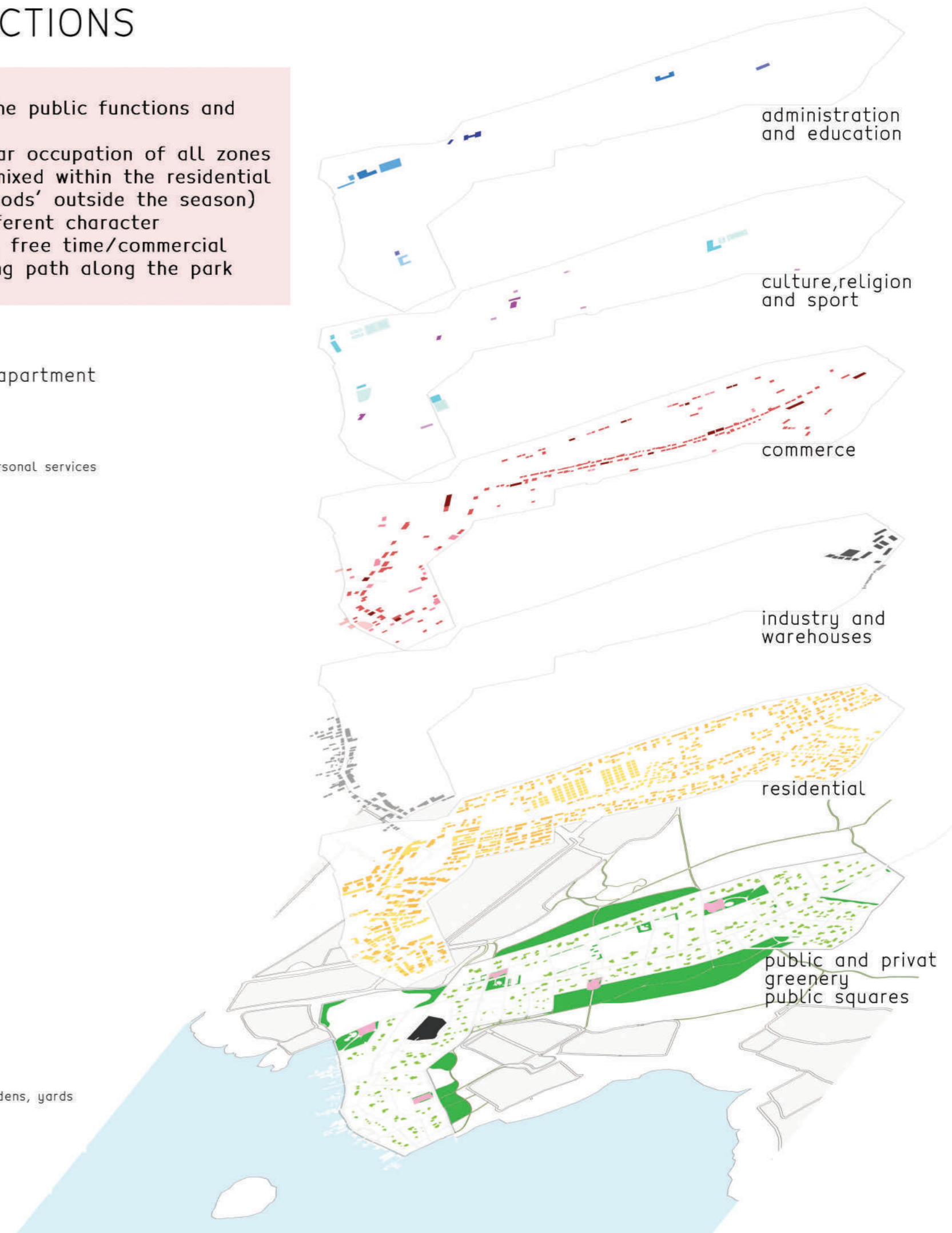
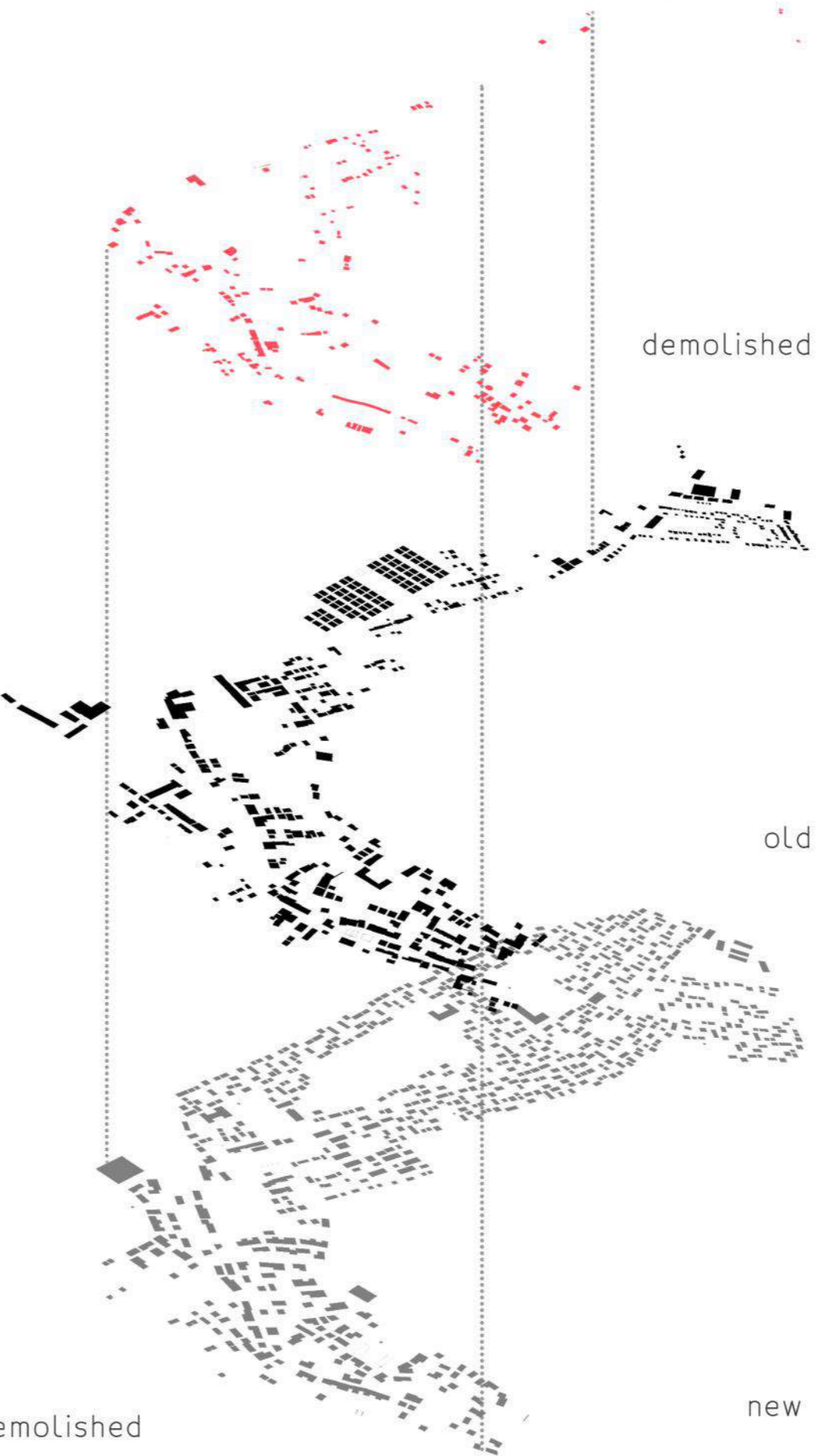


DIAGRAM OF DEMOLISHED, OLD & NEW BUILDINGS



- demolished
- old
- new

demolished buildings



old buildings





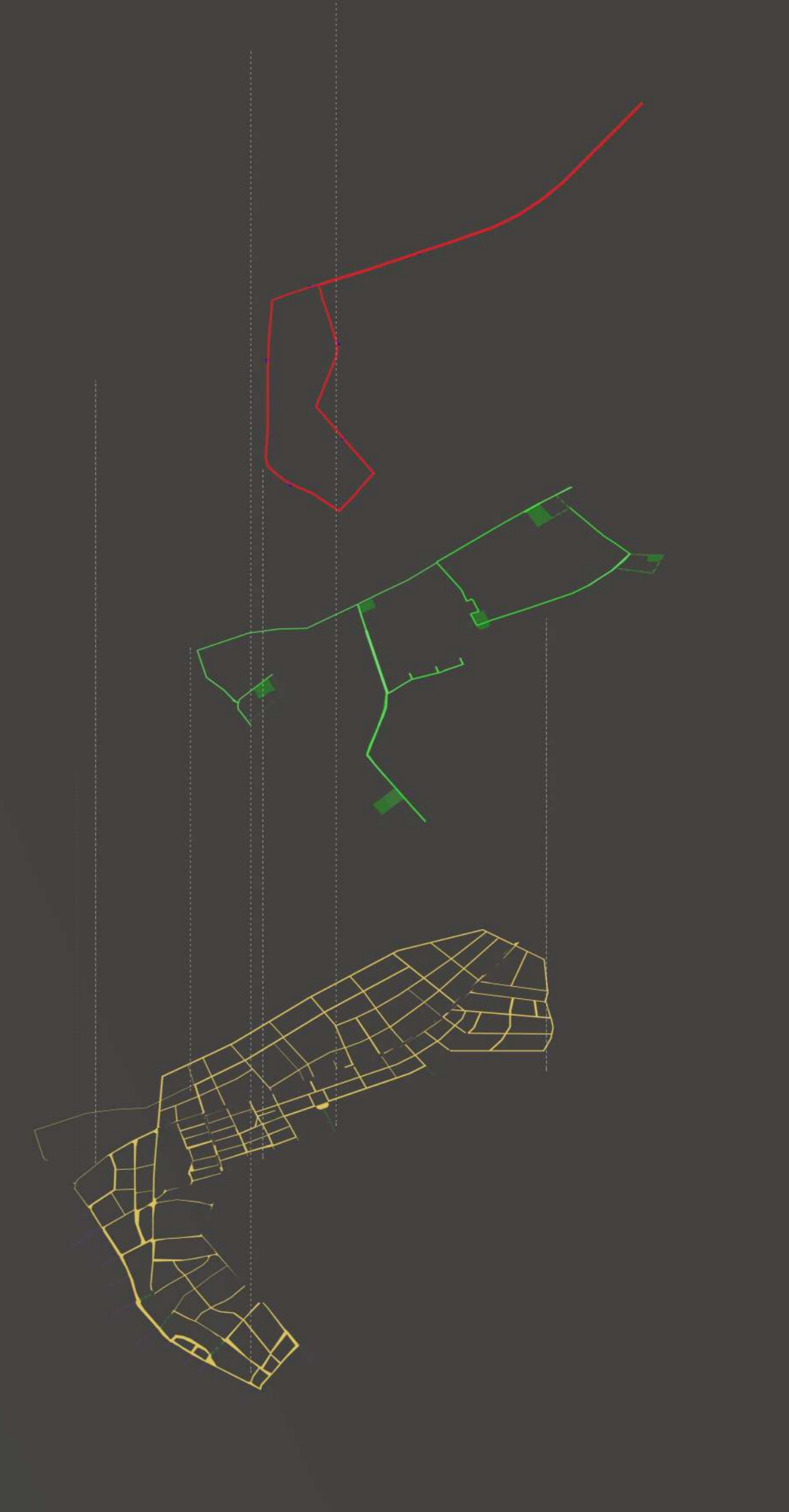
CIRCULATION NETWORK

primary road
 ^v 2 way street : Mixed + Public Transport Access,
 ^ 1 way street 2 pedestrian Lane and 2 bicycle Lane

bus stop

walking street
 Pedestrian only lane
 - - - walking path or stairs
 — nature path
 [] decks

secondary road
 2 way street : small vehicles only, motorbikes, cars
 1 way street 2 pedestrian Lane and 2 bicycle Lane
 waterfront



CIRCULATION SECTIONS



main street

1



4



7



2



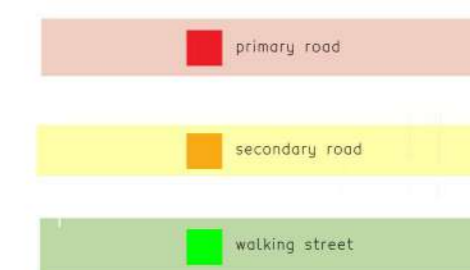
5



3



6



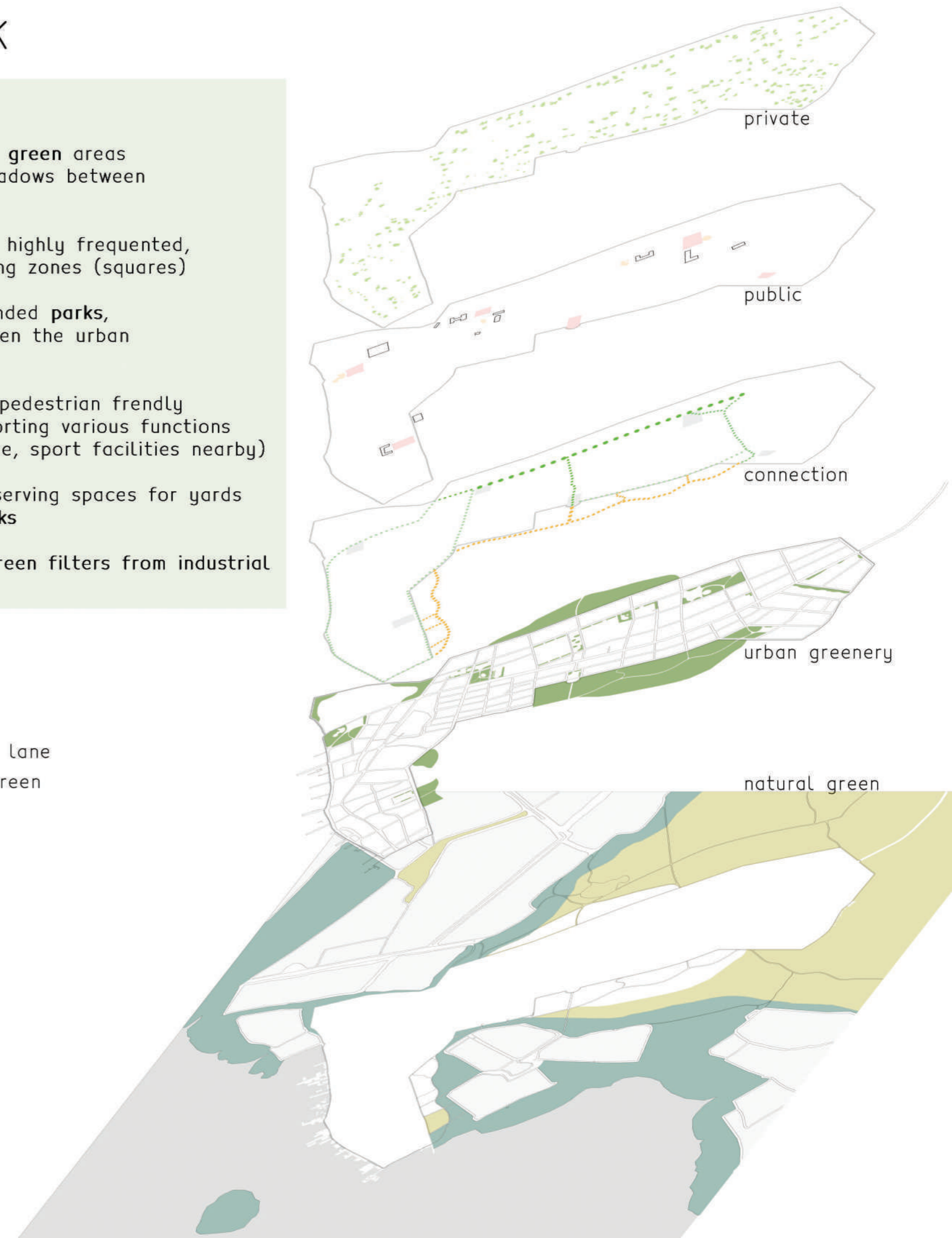
GREEN NETWORK

GOALS:

- PRESERVE and ENLARGE natural green areas (mangroove forest and natural meadows between the shore and urban tissue)
- CREATE quality public greenery, highly frequented, in proximity of the public gathering zones (squares)
- DEDICATE bigger areas for extended parks, creating natural TRANSITION between the urban and the natural environment
- CONNECT the urban greenery by pedestrian friendly paths of different typology, supporting various functions and uses in the city (f.e. commerce, sport facilities nearby)
- IMPROVE living conditions by reserving spaces for yards and gardens inside the urban blocks
- PROTECT residential areas by green filters from industrial or traffic zones

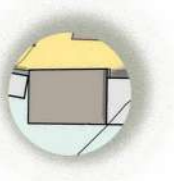
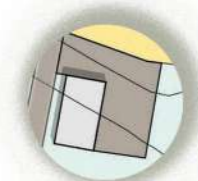
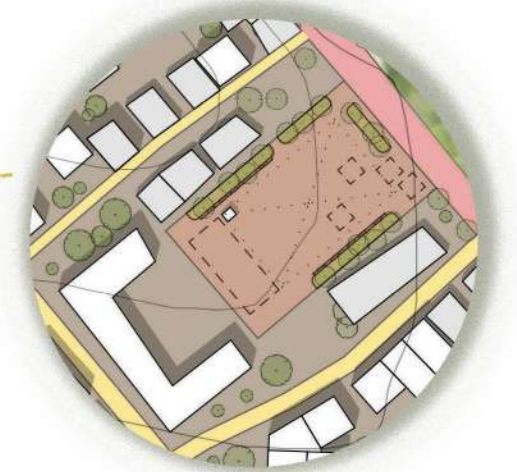
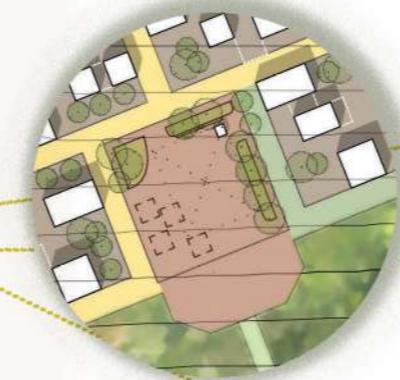
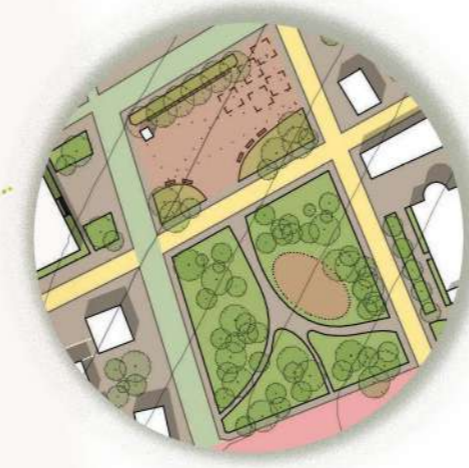
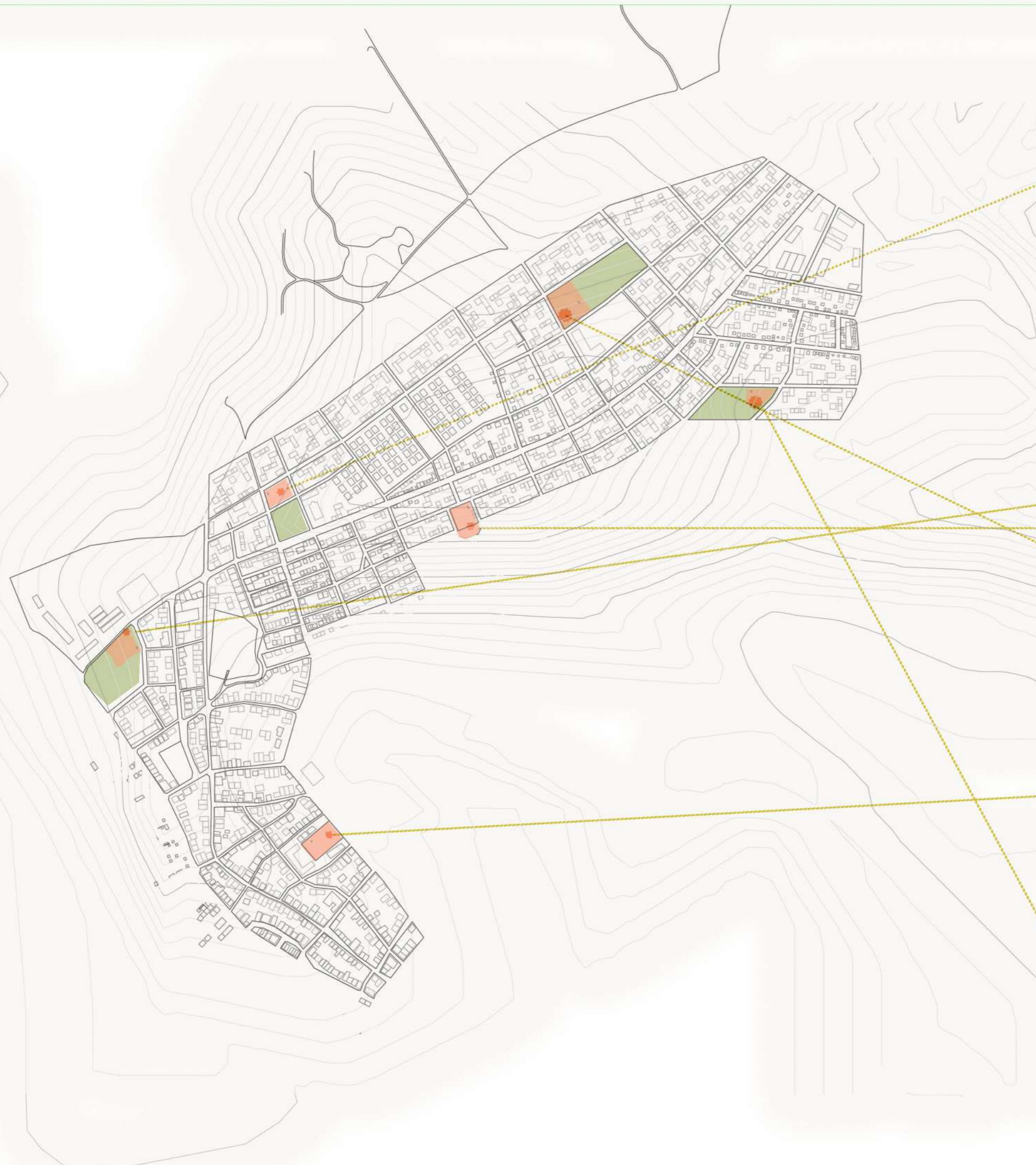
- only pedestrian promenade, services - free time
- only pedestrian - connecting green
- extra large pedestrian lane or limited traffic - walking along the green
- paths in the nature

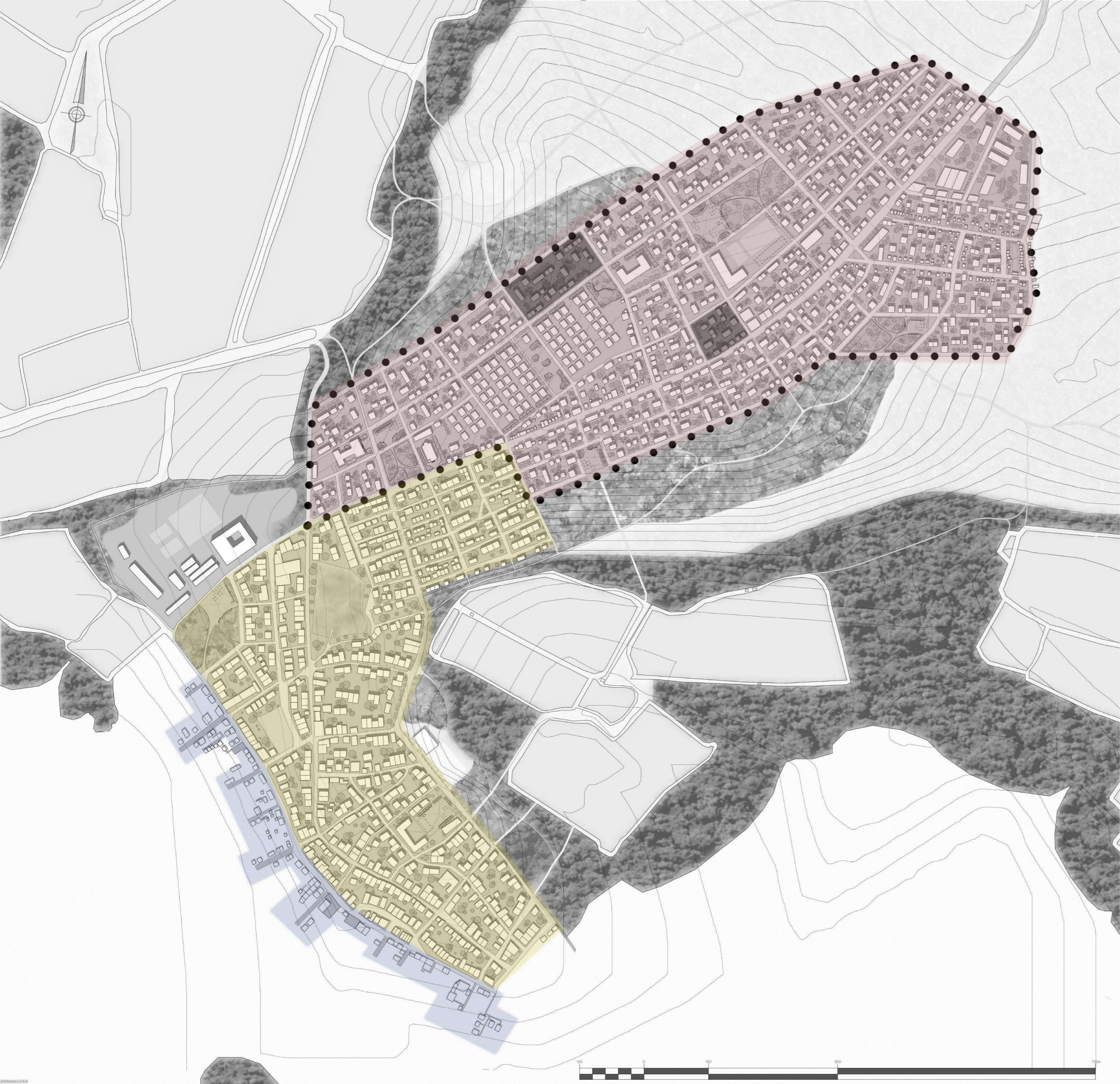
- public squares
- playground
- urban green
- semiprivate green
- natural green
- mangrooves



PUBLIC SQUARES AND OPEN SPACES

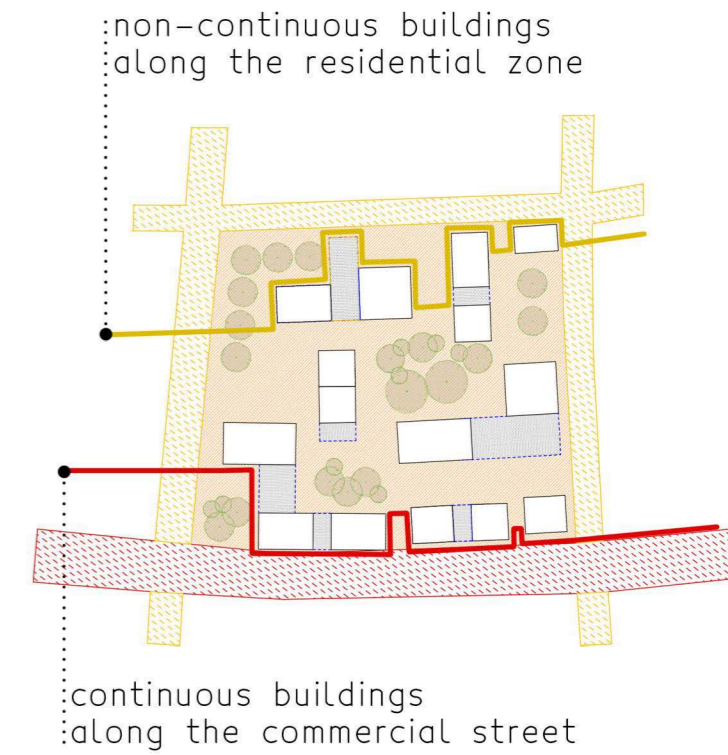
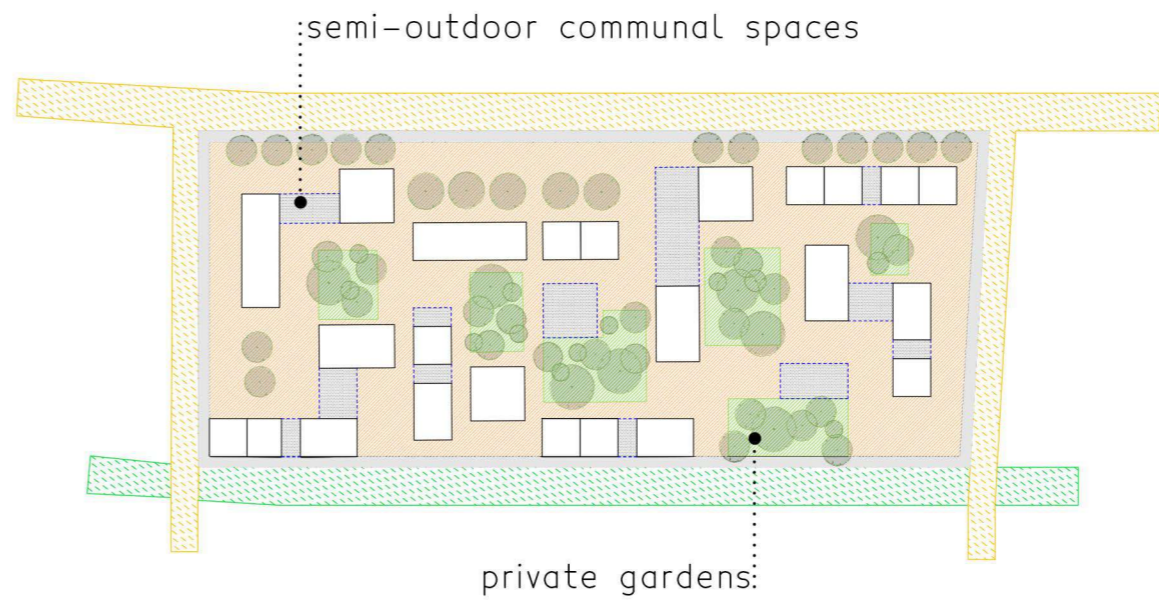
- Squares with water supply, playgrounds, shadowed spaces, commercial and leisure services nearby)
- collocating new important PUBLIC BUILDINGS in the proximity of the squares
- ensure comfortable and inviting connection
- offer services on the square



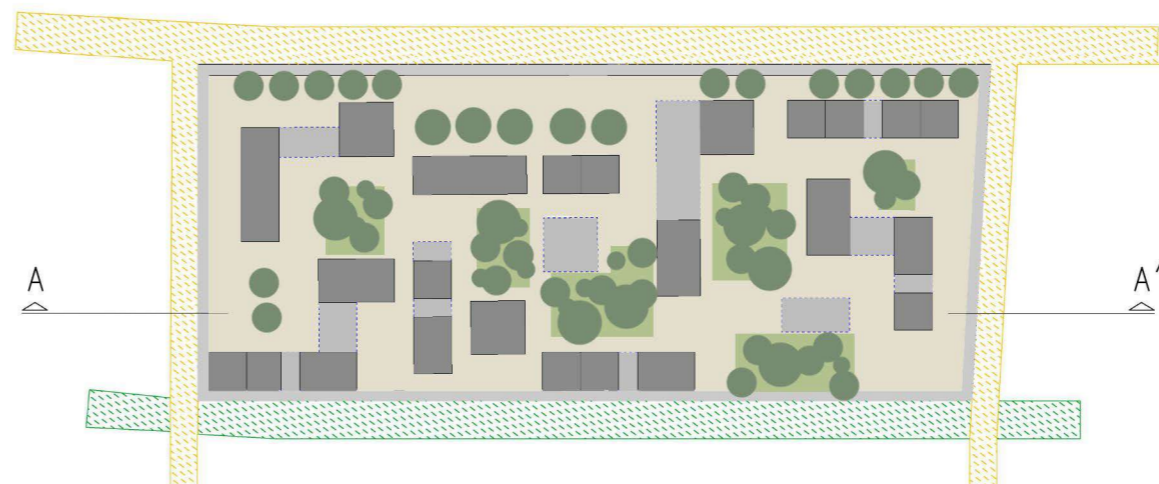
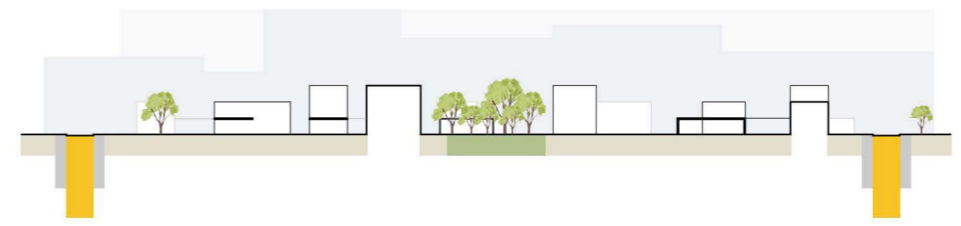


TYOLOGIES OF BUILDING BLOCKS

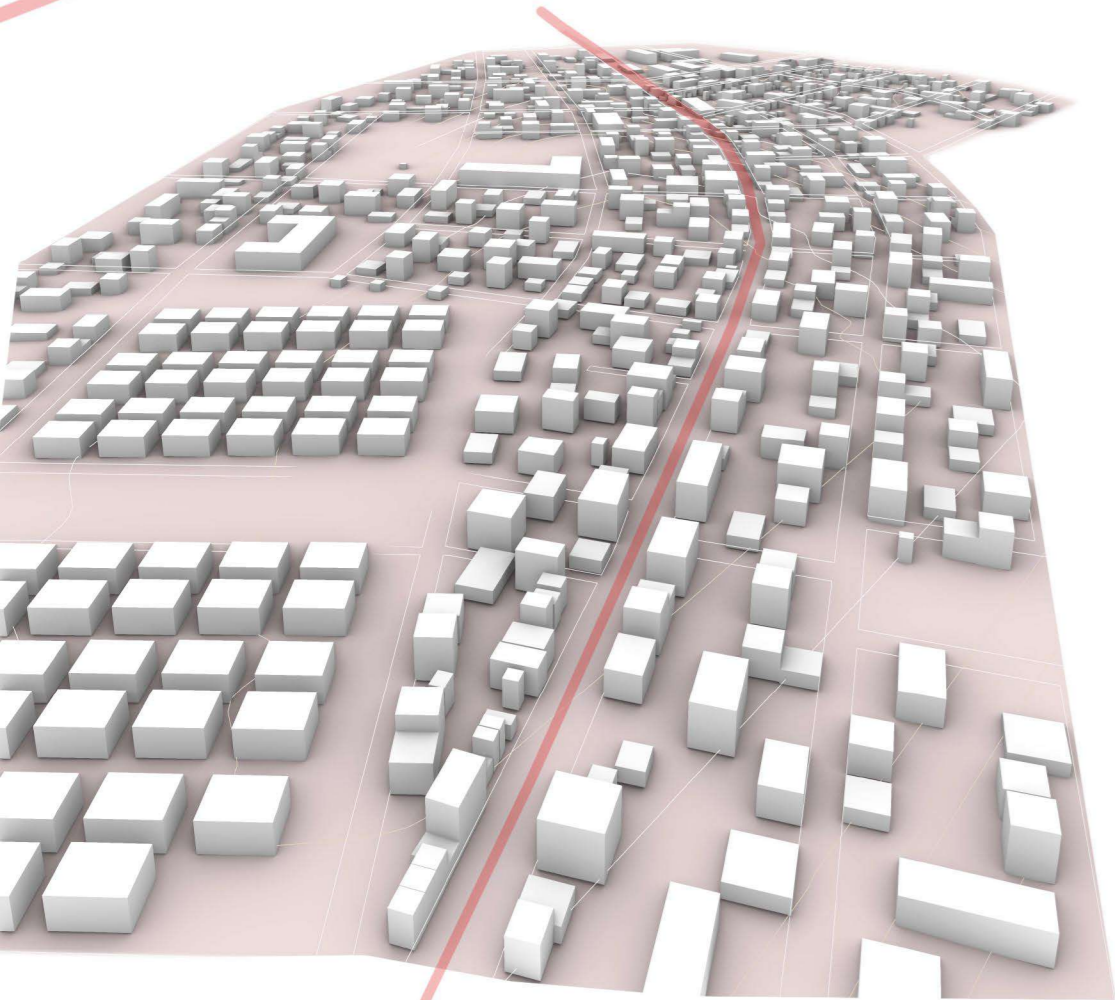
Diagrams of open spaces:



NORTH ZONE



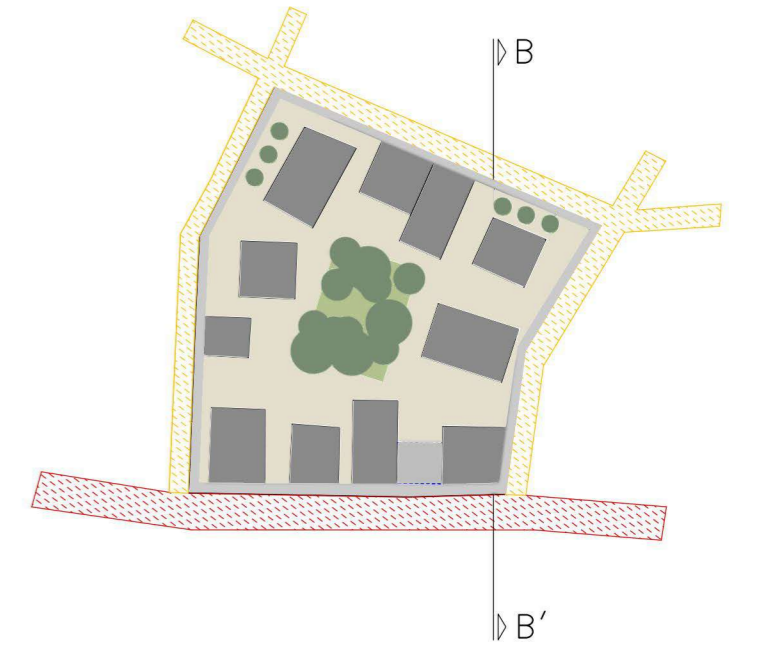
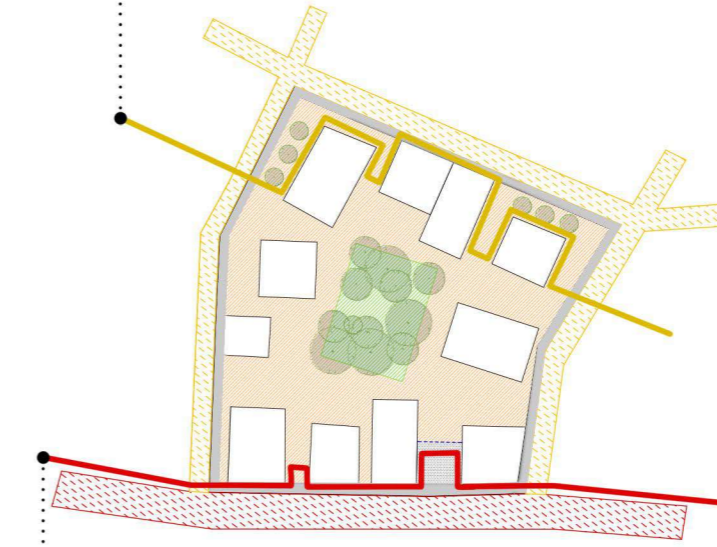
3D representation
of North zone



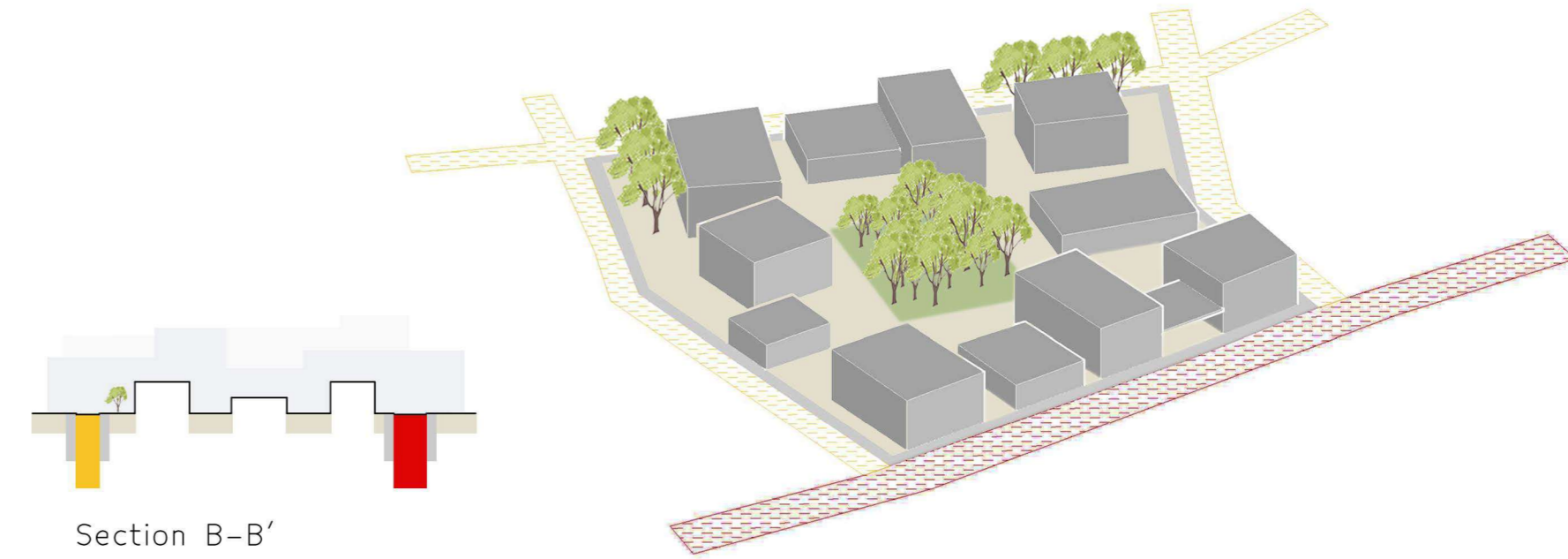
TYOLOGIES OF BUILDING BLOCKS

HILLTOP ZONE

non-continuous buildings
along the residential zone



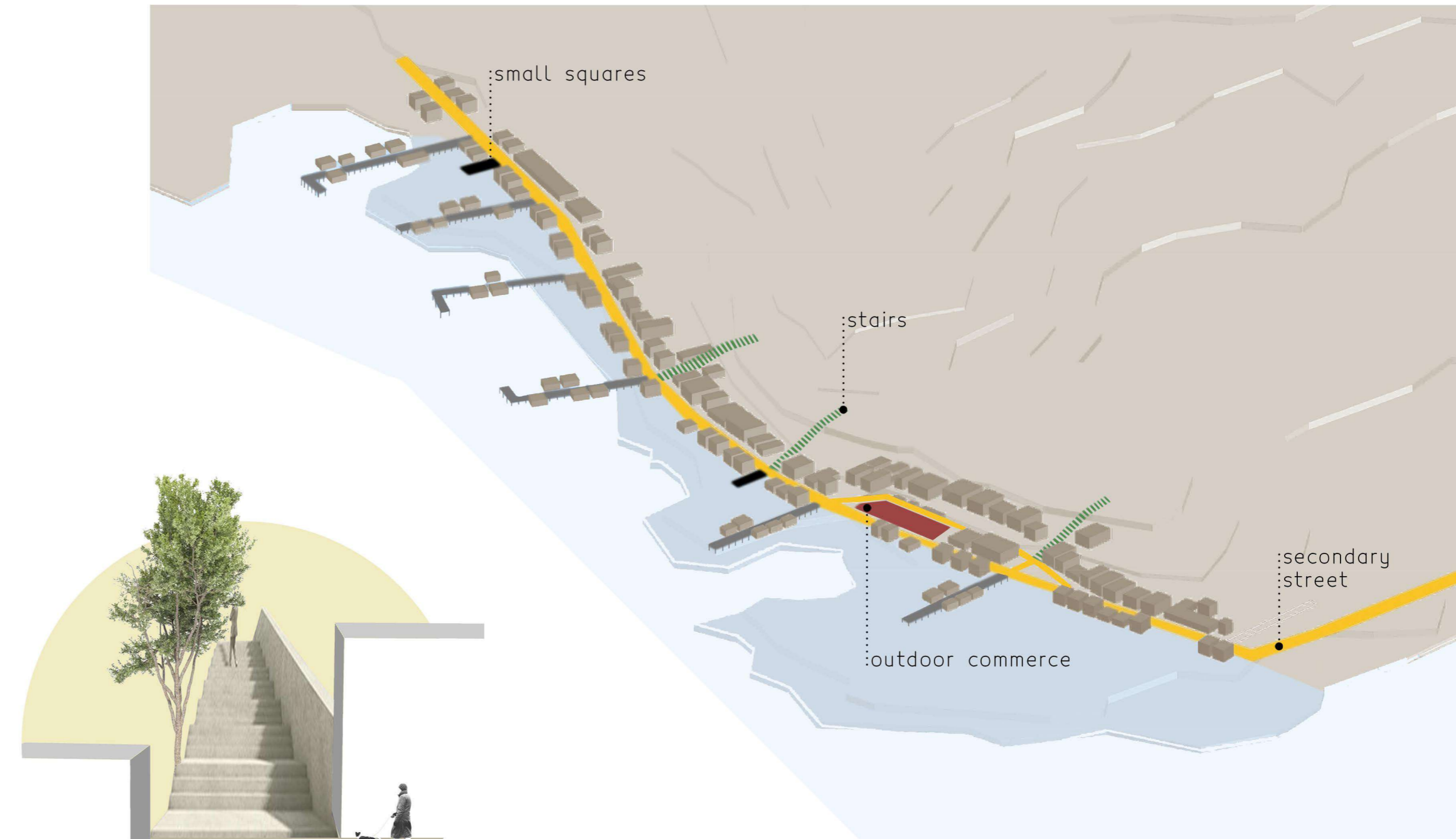
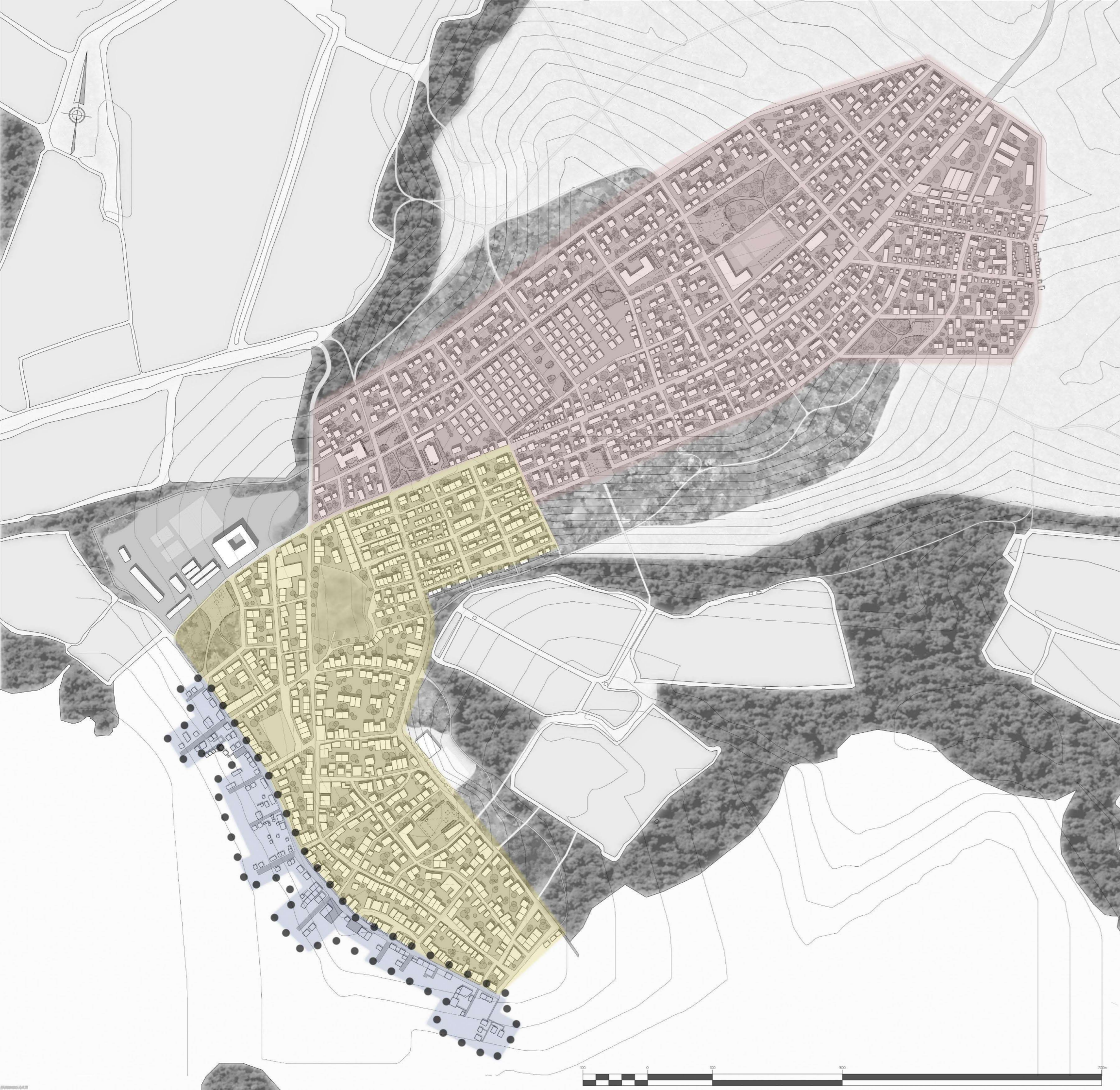
continuous buildings
along the commercial street



Section B-B'

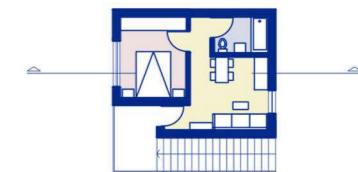
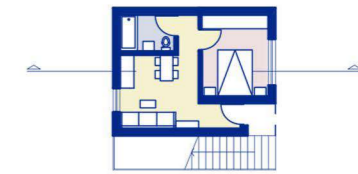
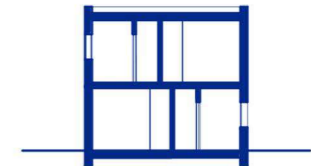
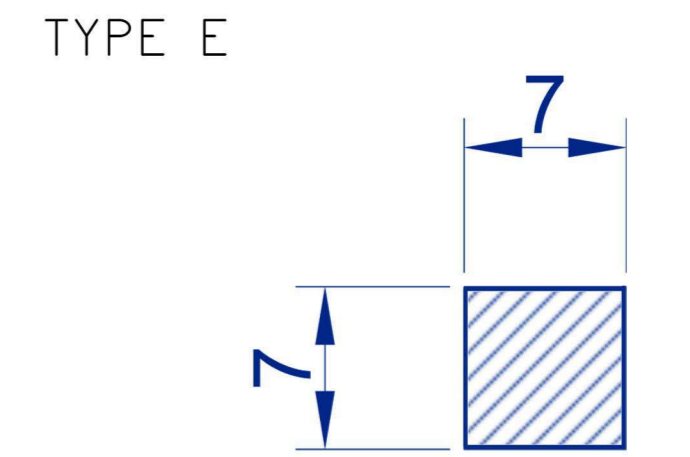
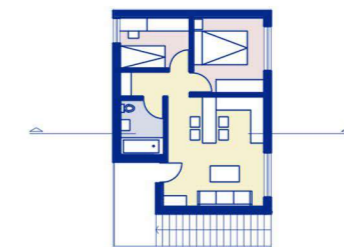
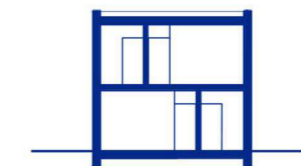
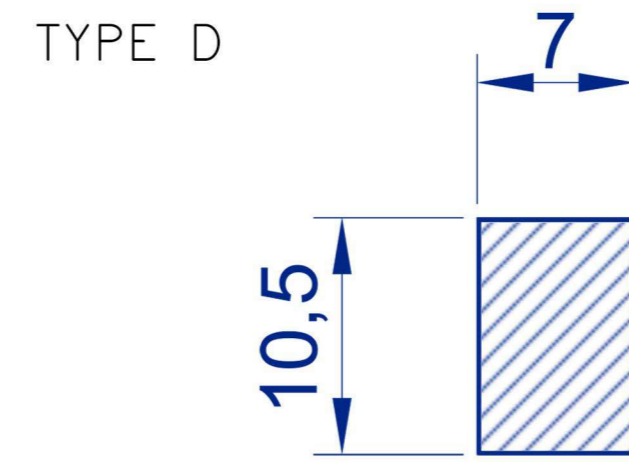
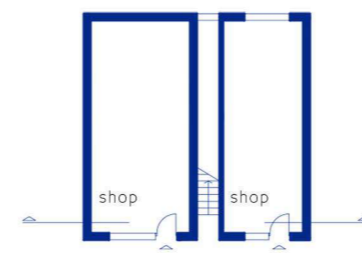
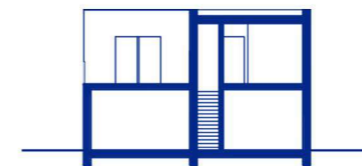
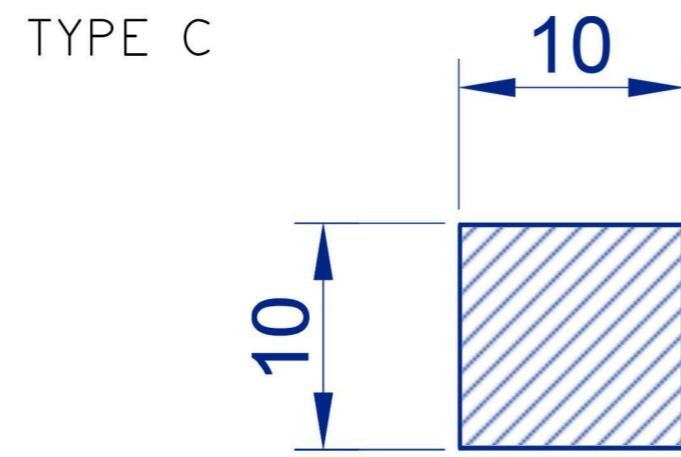
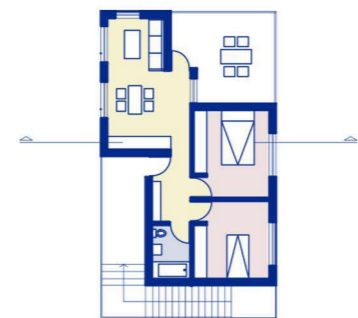
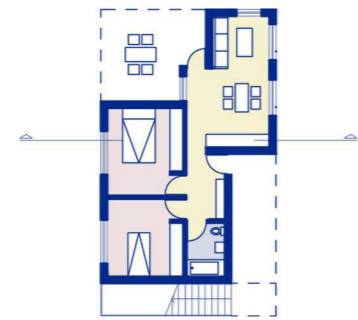
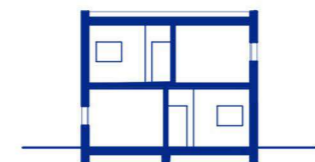
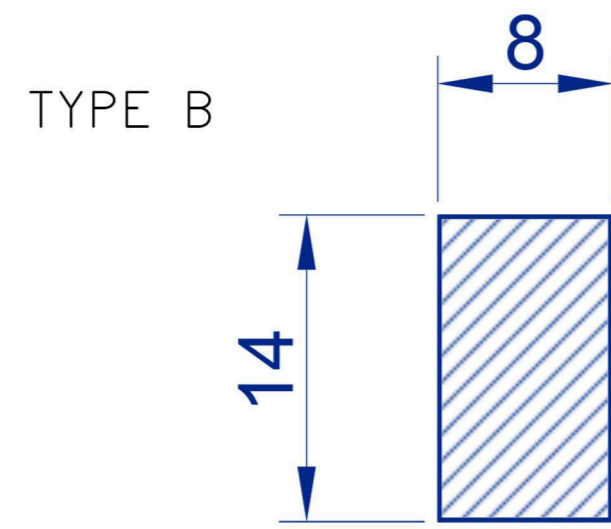
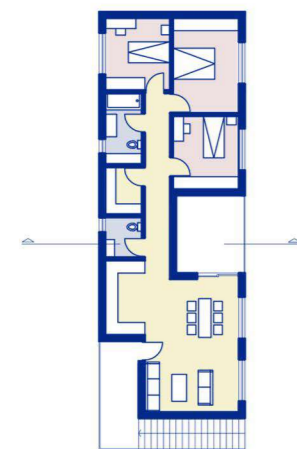
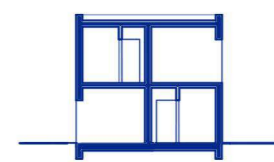
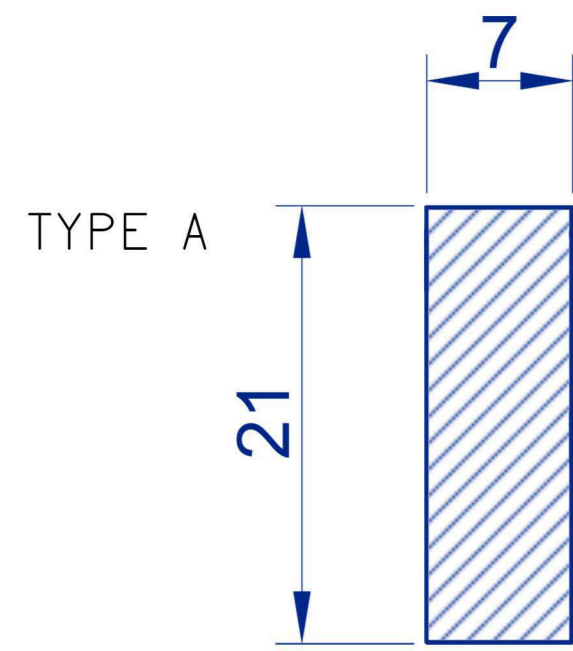
TYOLOGIES OF BUILDING BLOCKS

■ WATERFRONT ZONE



conceptual view
relation between platform, buildings & stairs

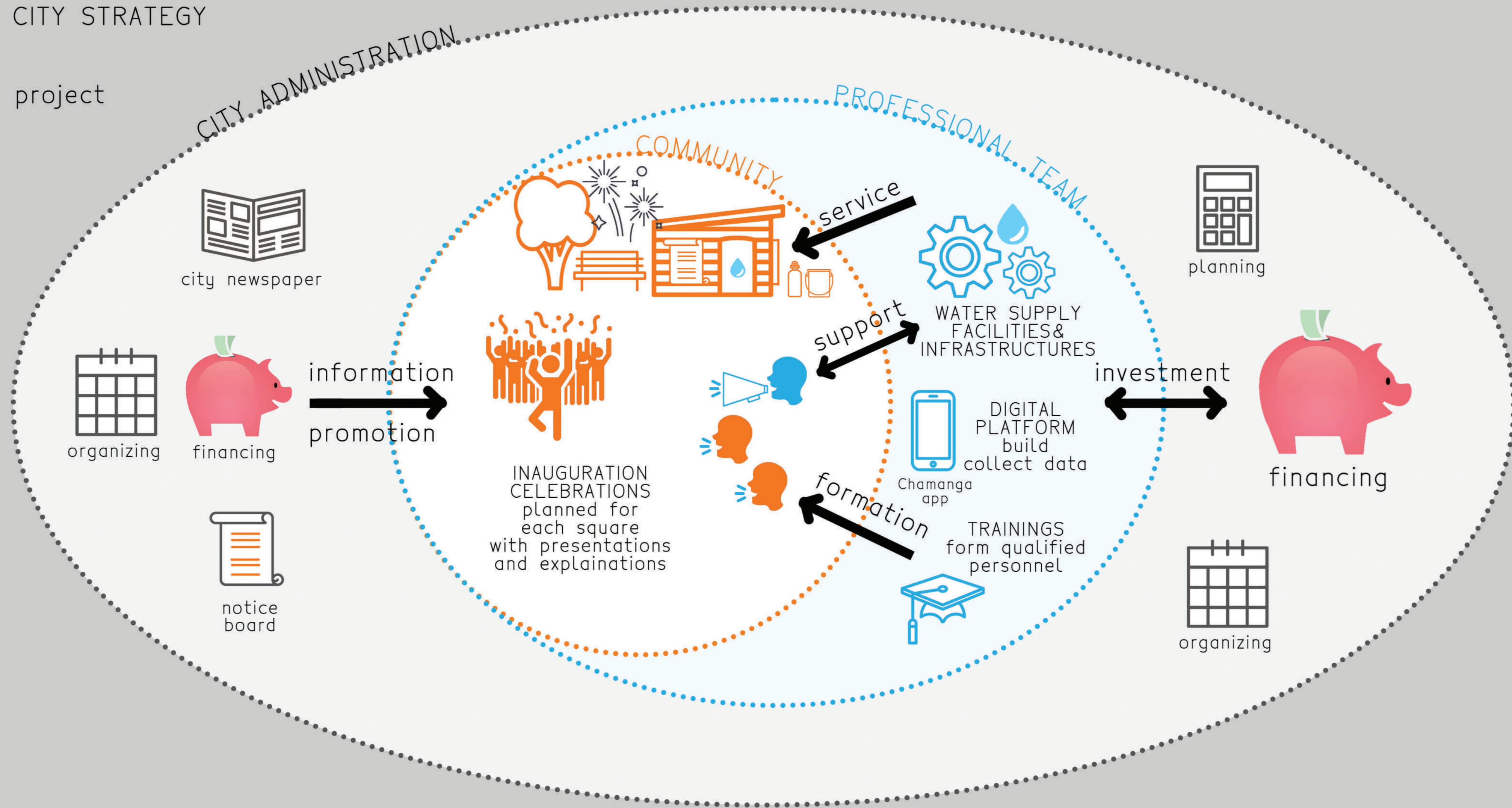
HOUSE TYPOLOGIES



night zone
day zone
W.C.

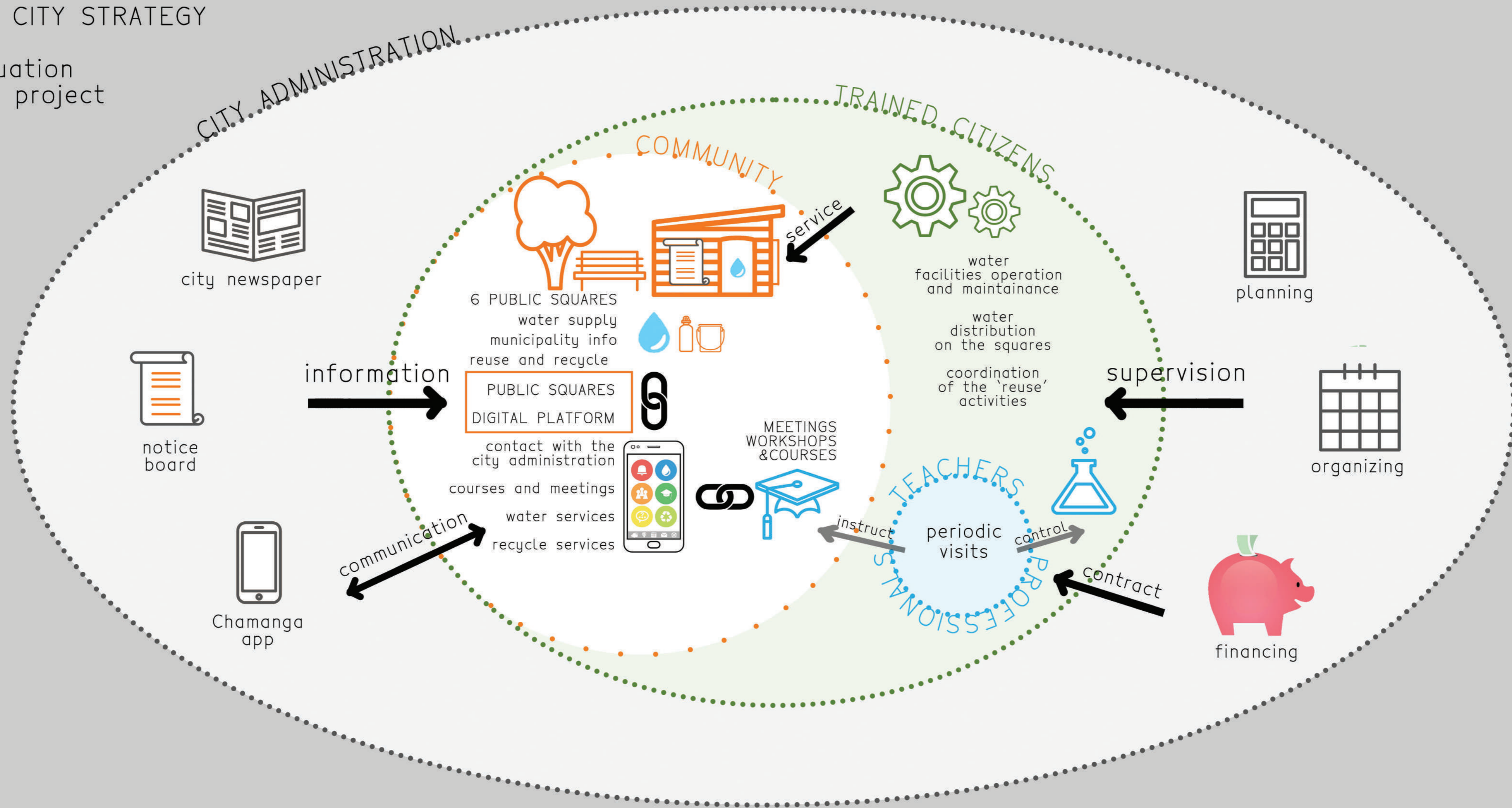
SMART CITY STRATEGY

start of the project



SMART CITY STRATEGY

continuation
of the project

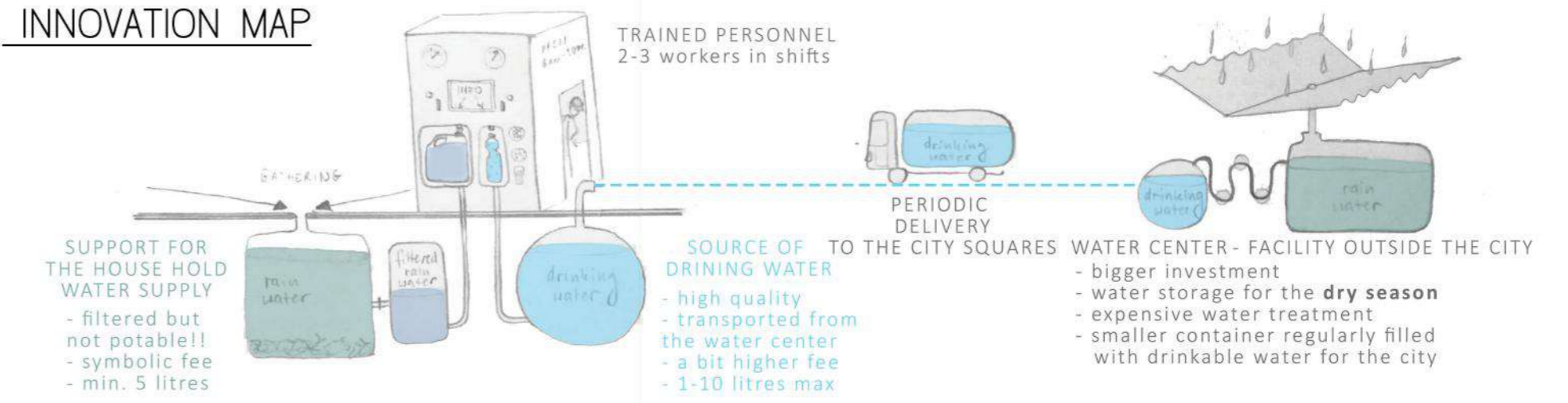




SMART CITY

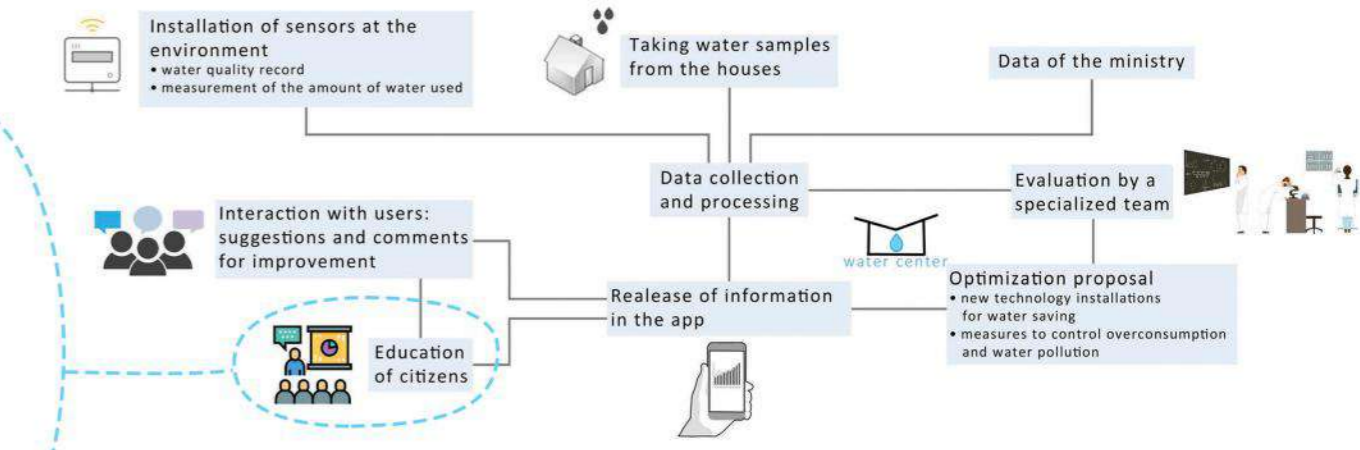
🎯 important points of town

INNOVATION MAP



TIMELINE

Season	Week	Workers	Citizens	Official
March (mid-wet season)	1	Formation for technicians and instructors	Regular use and small parties - each SUNDAY different square	Opening Short talks Short talks Short talks Short talks
	2			
	3			
	4			
April	5	Regular shifts and formation for instructors	Regular use and introductory courses on weekends	Short talks Short talks Short talks
	6			
	7			
	8			
May (end-wet season)	9	Regular shifts, presenters and formation for instructors	Regular use.	Celebration
	10			
	11			
	12			
June (beginning of the dry season)	13	Regular shifts and formation for instructors Extra shifts and formation for instructors	BIG CELEBRATION EVERY SQUARE	IN
	14			
	15+	Regular shifts for everyone		

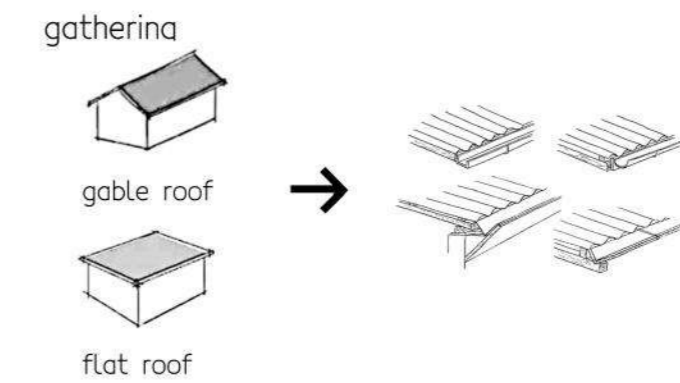


FRESH WATER

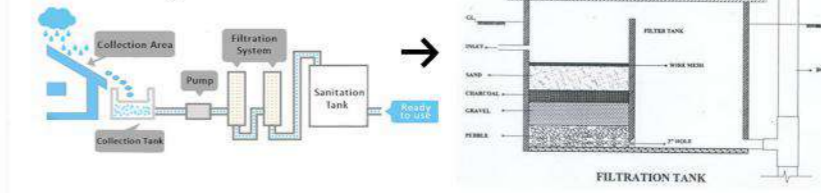
WATER DISTRIBUTOR WITH COOLING AND CONTINUOUS WATER QUALITY CONTROL

- Rainwater harvesting system
- Water squares
- Gully plugging
- Service offered by municipality (limited for each family)

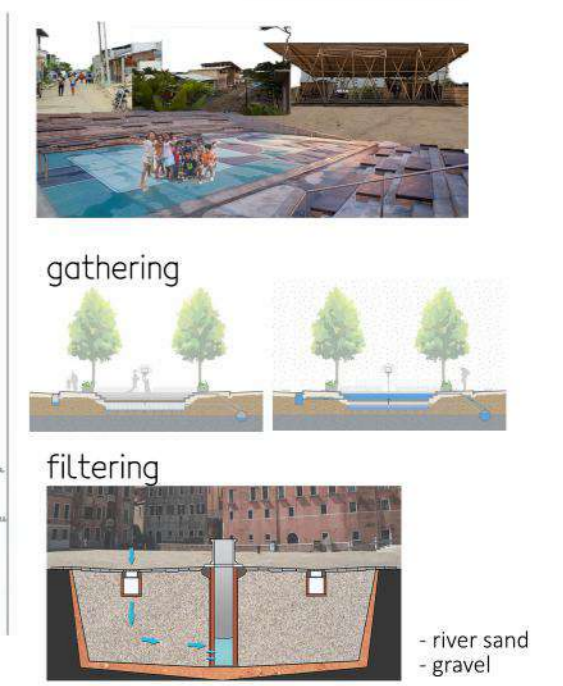
BUILDINGS



filtering



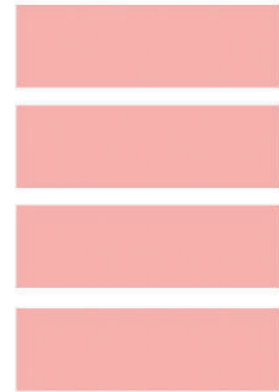
SQUARES



SMART CITY STRATEGY

digital platform – Chamanga App

city news



local announcements

news and announcements directly from the city administration

> the same notice board on the *Smart Squares*

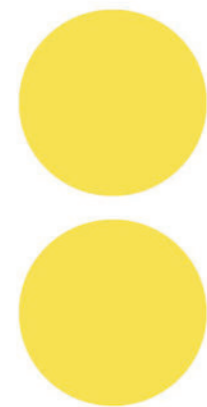
community chat



city forum

- chat regarding city governing created by the municipality
> active participation of the inhabitants in the decision-making of the city administration, real time survey

mail with municipality offices



contact

- direct contact with the municipality
- personal request and questions
- Reports from citizens will be dispatched in real time to the related official



water supply

- MAP with water level info on each square
- sensors data water quality
- DRY SEASON- water count down
motivate inhabitants to careful usage



simple information about the water distributors

education

- my courses > materials, appointments
- inscribe > workshops, professional courses
- my profile > allready finished courses ...



notifications about the meetings trainings and courses

recycle

- notice board - products, materials given away by the inhabitants can be taken/aquisted
- picking up point- *Smart Square*, announced by the city employee
- other picking up point- announced by anybody



announcements about given away used objects