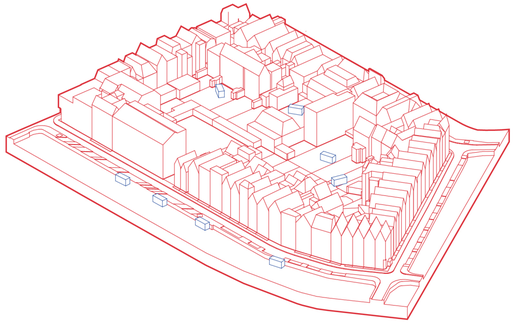
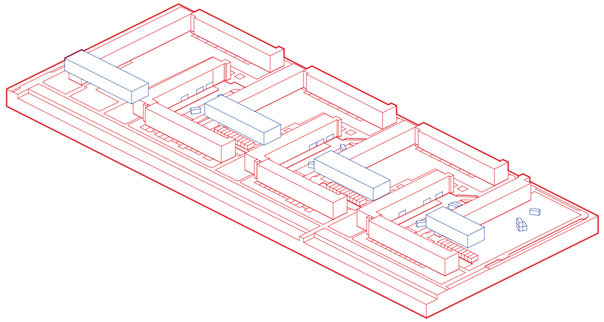
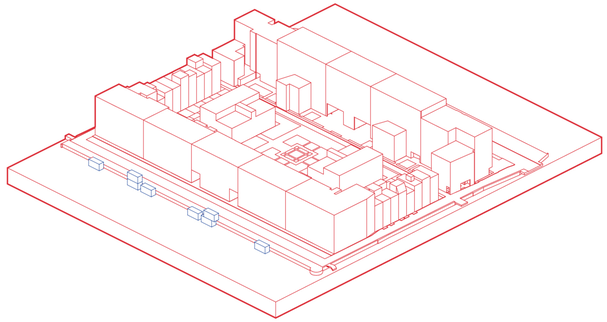
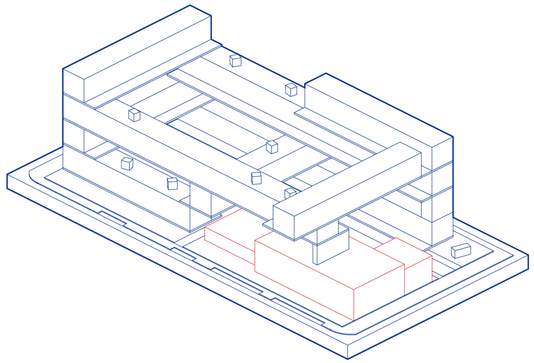
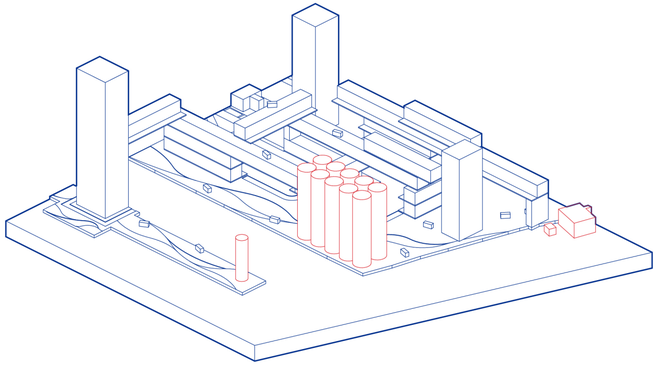
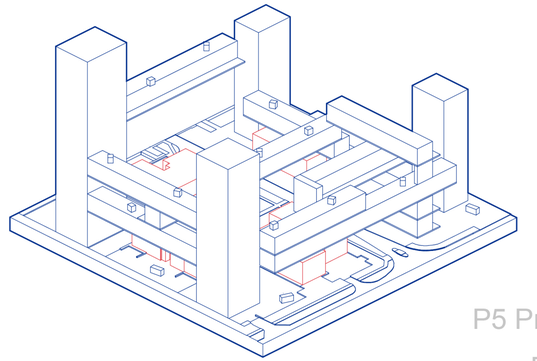




The Future of Urban Block:

Spatial Properties, Capacity and Quality of life

A Study on Densification and Livability towards The Coming Era of Automated Mobility in Amsterdam

P5 Presentation

Feng Siyun

Jan 27 2020

Studio Topic: Automated Mobility



Source: https://mondaynote.com/autonomous-cars-the-level-5-fallacy-247ae9614e14

"Automated vehicles could completely change mobility in the coming years and decades."

- Soteropoulos et al., 2018

Studio Topic: Automated Mobility

Application of A New Technology as An ‘Urgency’

vs.

Utilization of A New Technology as Tools for Other Unrgencies

Problem Clarification

Population Boom

Globalization

Compact City

Social Segregation

Sustainability

Livability

Public Health

What are the real urgencies?

Poverty

Sprawl

Technological Advance

Urbanization

Pollution

Cummunity Vitality

Densification

Climate Change

Urban Redevelopment

Problem Clarification







A Global trend:

Explosive Urban Population

&

AMS context:

Pressures on space

"...**150,000** new inhabitants are expected to migrate into Amsterdam by 2040, placing great burdens on a city economically, physically and socially."

-Future cities, 2015

1.https://www.flickr.com/photos/irievibrations/4568133240/in/photostream/lightbox/
2.https://www.hawkinsbrown.com/projects/millharbour-village
3.https://www.brusselstimes.com/all-news/belgium-all-news/health/56158/amsterdam-to-ban-all-fossil-fuel-vehicles-by-2030-brussels-looks-to-follow-suit/

Increasing spatial demands X Compact policies

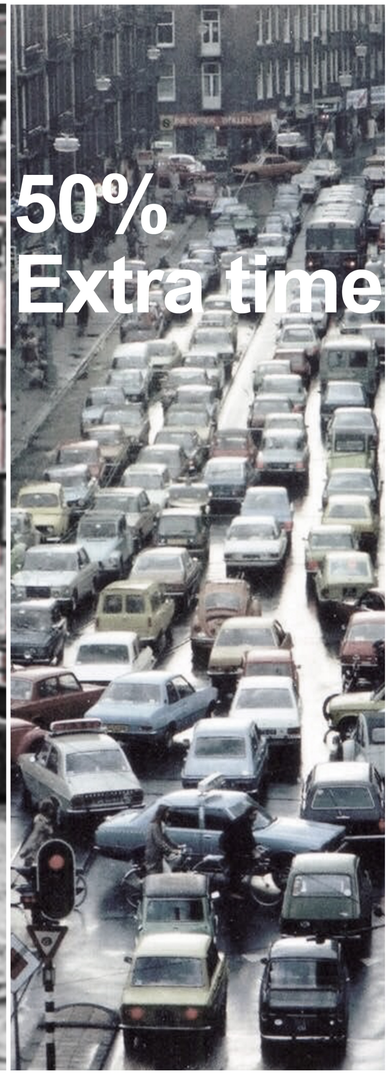
↓

Necessity of high-density development

Problem Clarification







Densification vs. Livability Concerns

“...there is a perception that highdensity development poses too great a cost on individuals’ quality of life..”

- Howley et al., 2008

1.https://www.reuters.com/article/us-environment-europe/harmful-road-traffic-noise-affects-a-quarter-of-europeans-study-idUSKBN0JX15B20141219

2.http://www.west8.com/projects/all/borneo_sporenburg/

3.https://twitter.com/brenttoderian/status/906727163101036544

Problem Clarification



Grachtengordel, Amsterdam. Source: photo from HollandLuchtfoto;
Data from Atlas of Dutch Urban Block

Grachtengordel, Amsterdam (1613)

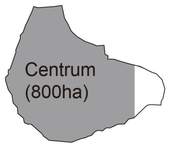


Density: 31 dwellings/ha
To realize 70,000 dwellings: ~2,258ha



Buitenveldert, Amsterdam. Source: photo from Bram van de Biezen;
Data from Atlas of Dutch Urban Block

Buitenveldert, Amsterdam (1960s)

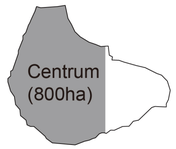


Density: 99 dwellings/ha
To realize 70,000 dwellings: ~707ha



Lijnbaan, Rotterdam. Source: photo from @vroegahNL;
Data from Atlas of Dutch Urban Block

Lijbaan, Rotterdam (1955)

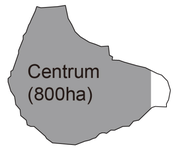


Density: 117 dwellings/ha
To realize 70,000 dwellings: ~600ha



Java Isalnd, Amsterdam. Source: photo from KCAP;
Data from Atlas of Dutch Urban Block

Java Island, Amsterdam (1995/6)



Density: 108 dwellings/ha
To realize 70,000 dwellings: ~648ha

From the Built-evironmental perspective:

Collapse of Present Forms of Urban Block

With regard to the ambition of 70,000 new dwellings built within A10, the present common forms of urban block are at the point of collapse due to its limited spatial capacity for the demands of densification and its performances on the livablity concerns.

Problem Clarification

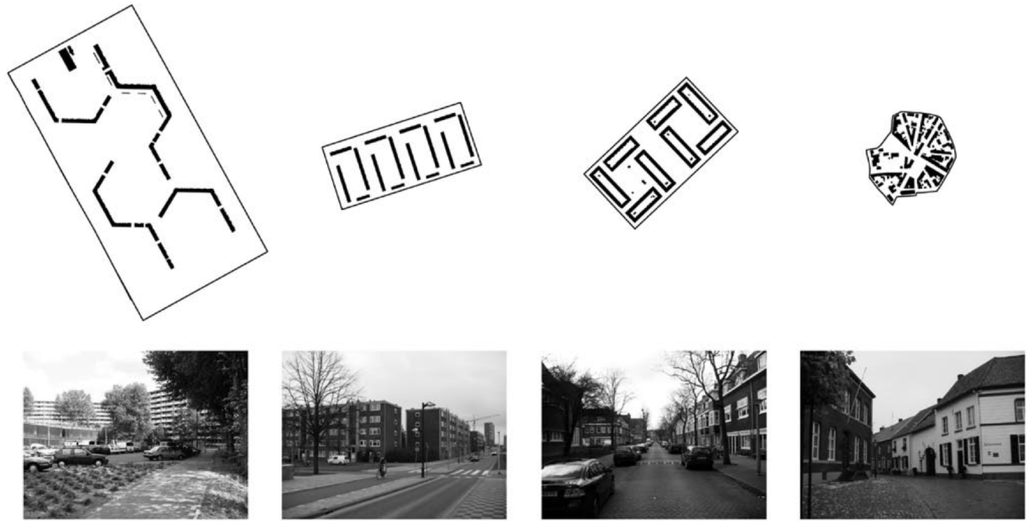
From the professional perspective:

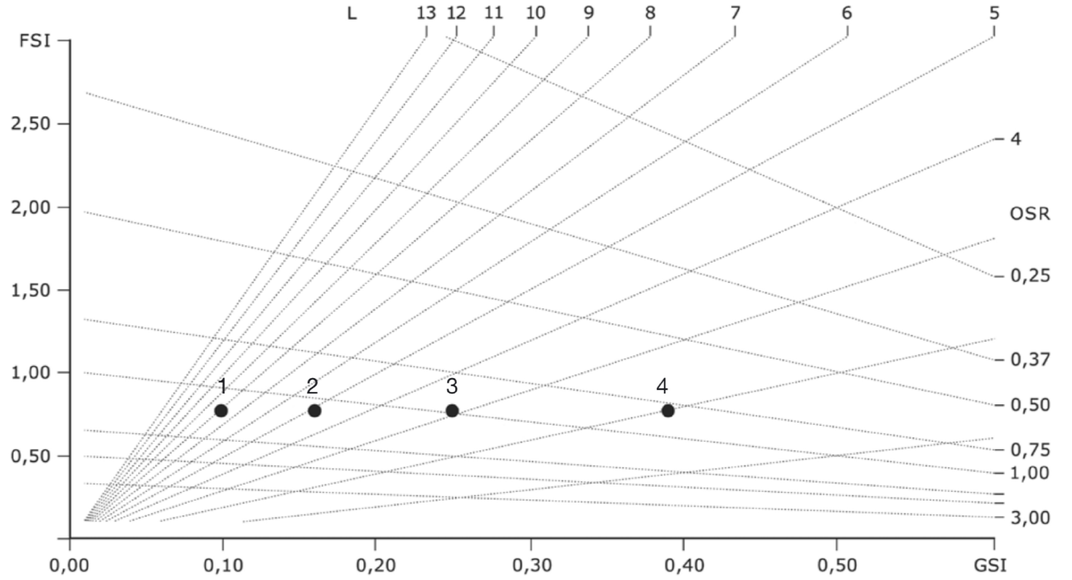
A Underestimated Concpet:

Statistical vs. Designed

“...critics have argued ... it is perceived as a too elastic concept that poorly reflects the spatial properties... density should be treated as a multivariable phenomenon, ... convey more about the performance of an urban fabric”

- BERGHAUSER PONT & HAUPT, 2009





4 different spatial layout examples with FSI 0.7 and their position in SpaceMate. Source: Berghauser Pont & Haupt, 2005

Research Aim

To

Professional level

clarify relationship among urban form, density and livability

quantitatively and quantitatively,

with deepened understanding of planning and design of urban block,

for

Built-environmental level

creation of possible forms of future blocks in Amsterdam

towards the

Context given

coming era of automation mobility.

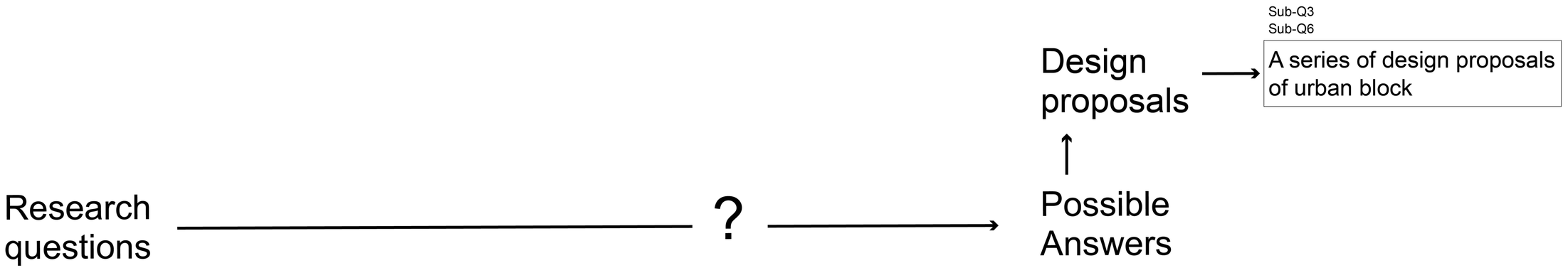
Main Research Question

Scope

Aim

What kinds of forms and programs of the urban blocks should be created with respect to the demands of higher density and better quality of life in Amsterdam for the coming era of automated mobility?

Context


Sub-Q3
Sub-Q6
Design proposals
A series of design proposals of urban block
Research questions
?
Possible Answers

I. Identify key factors from literature

Urban Form & Livability

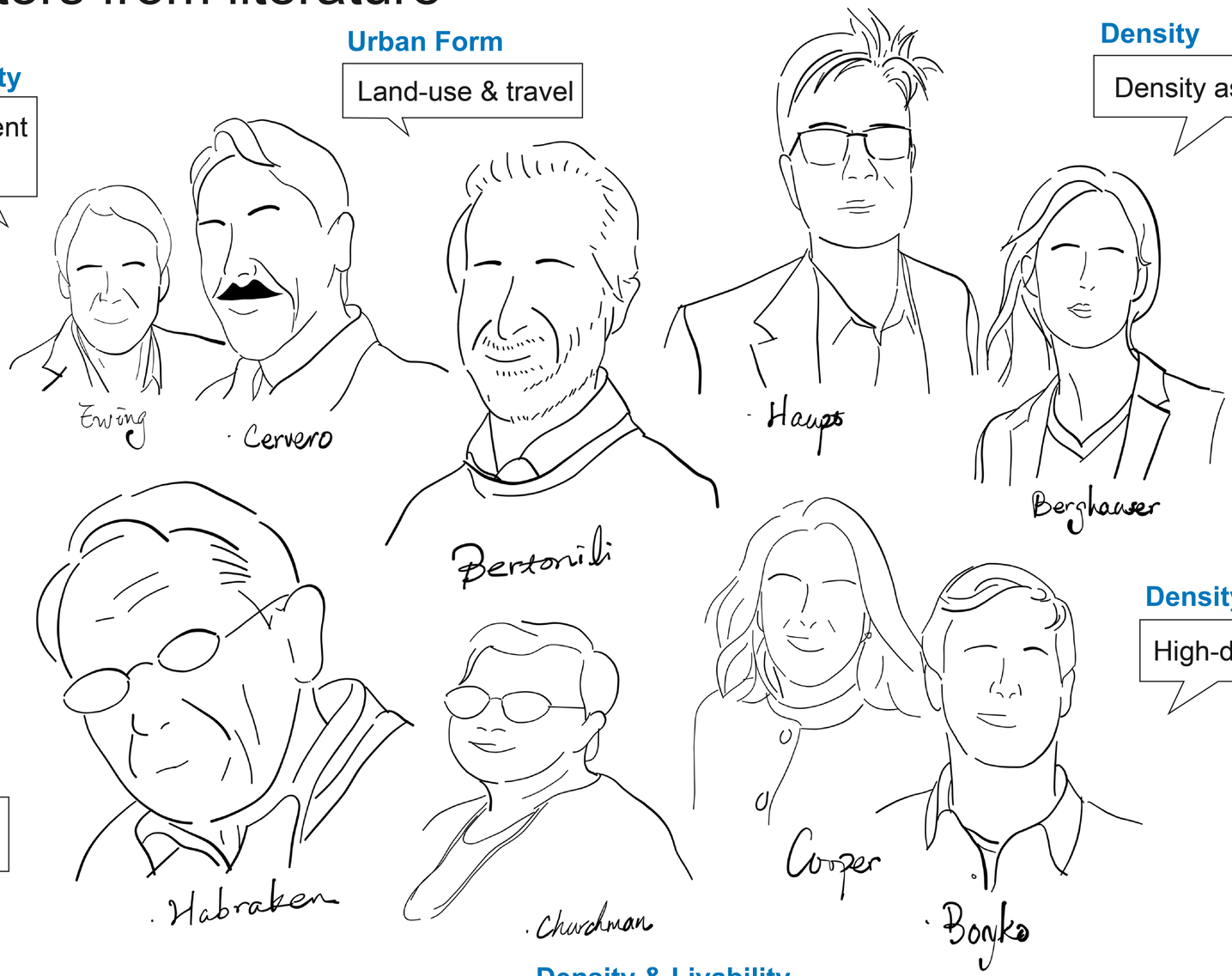
5Ds of built environment on travel demands...

Urban Form

Land-use & travel

Density

Density as multivariable spatial concept...



Density & Livability

High-density impacts living environment

Urban Morphology

Hierarchy of enclosure..

Density & Livability

II. Measure the factors on sites

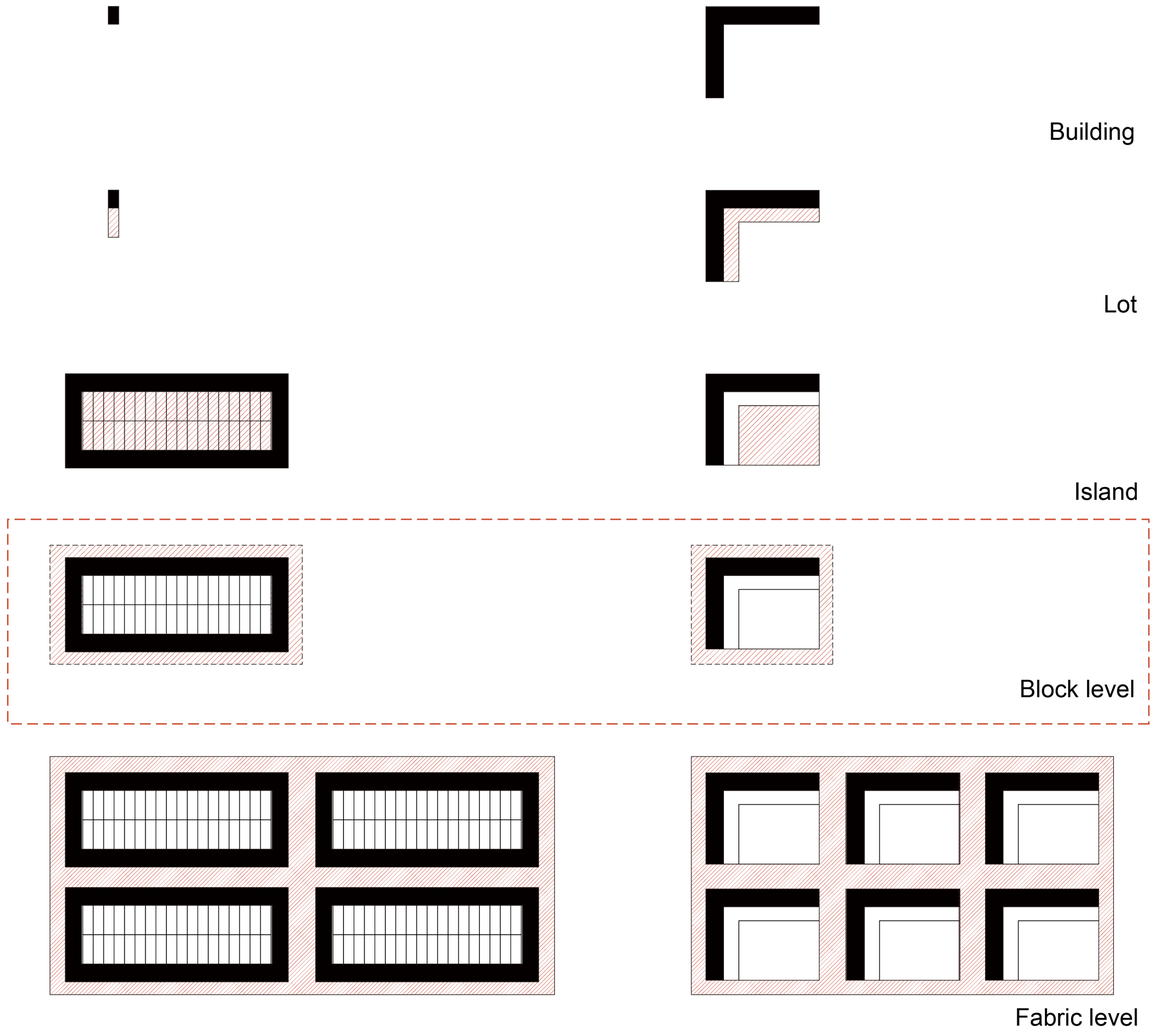
Form (spatial properties)	Density (spatial capacity)	Livability (spatial performance)
- Hierarchical composition Building Lot Island Block Fabric	- Intensity of use of space SpaceMate - Program density Program bar	- Housing types; housing affordability - Mixed-use degree - Groups demands vs. offers - Mode choices & quality - Opportunity of public interaction - Access to open space - Capacity of surfaces to absorb rainfall - Accessibility to public facilties & service

II. Measure the factors on sites

An Intermediate Level:
Scale of Urban Block

“urban block, a fragment of the urban fabric. ... it sucess-fully links the architecture of buildings to urban form and, ... reveals land status and use and allows the clearest possible debate on urban form and the organization of the fabric.”

- Komossa et al., 2005



Boundary of area and tare space defined at each level of scale
Source: Author, based on the work of Berghauser Pont & Haupt, 2009

Qualitative Approach: Hierarchical Analysis

Urban tissue		
Street (Simple tissue)		
‘Block’ (island)		Street space
Plots		
Buildings	Open areas	
Rooms		
Structures		
Materialas		

Materialas		
Structures		
Rooms	Open areas	Street space
Buildings		
Plots		
Island		
Block redefined		
Urban tissue		

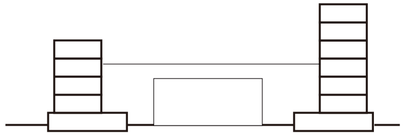
Buildings → **Layers/ Unit layout/ Openning**



Compositional Plan

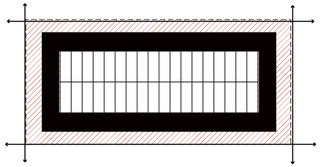
Plots → **Private built/ unbuilt area**

Island → **Collection of plots**



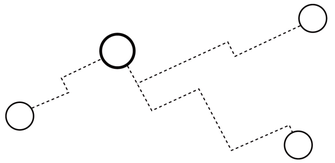
Cross Section

Block → **Public network/ private land**

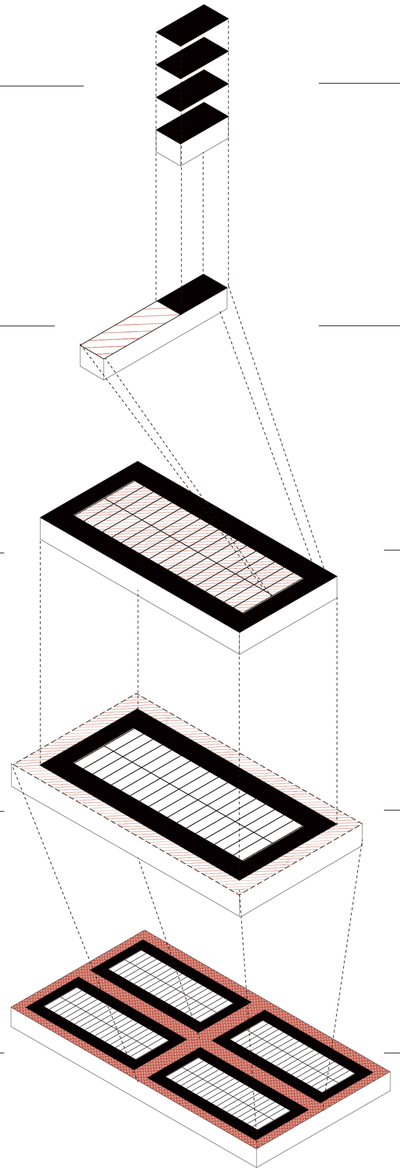


Block layout

Urban tissue → **Distance to transit/ modes**



Accessibility



Quantitative Approach:

SpaceMate

Basic indicators: FSI, GIS, N

+

Main variables: A, B, F, l

↓

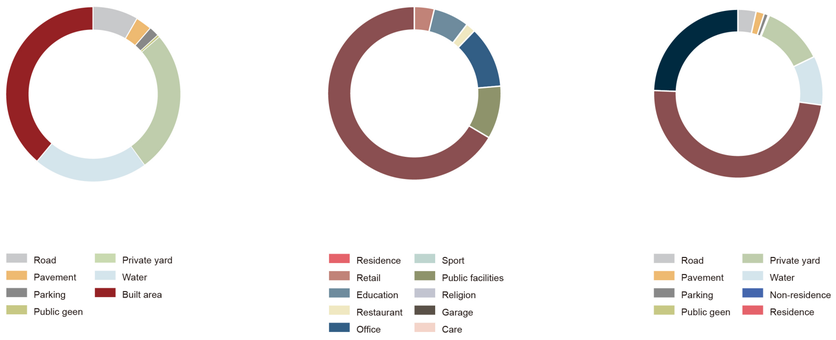
Density indicators of built mass (FSI, GSI, OSR, L/ A, B, F) + Network indictors (N/ l)

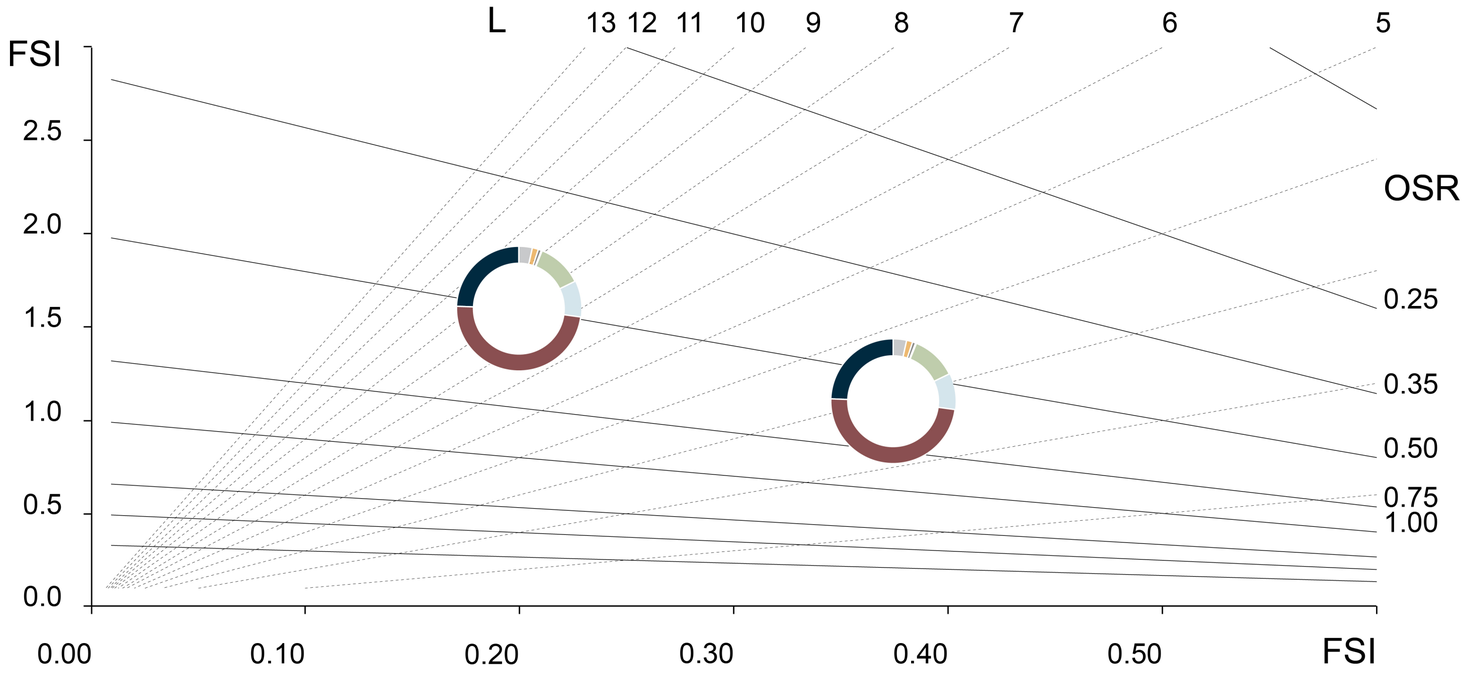
↓

Performance indicators

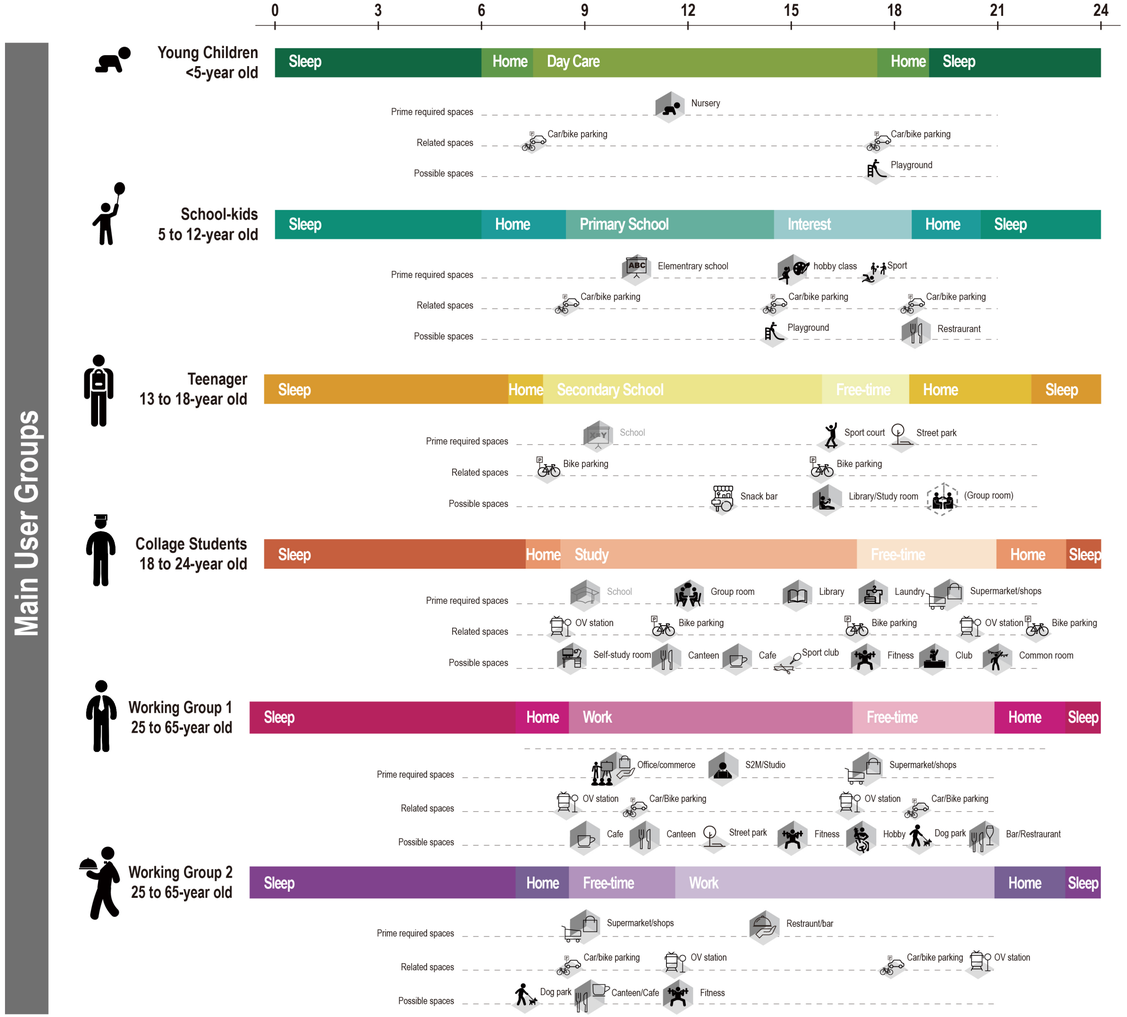
Parking capacity= r_p*N_f*root(1-T_f); Parking need= FSI_f*n_p/100
ΔOSR =OSR_f-OSR_i; Exposure ratio= facade length/A
Possibility for public/commercial function= FSI/N
....

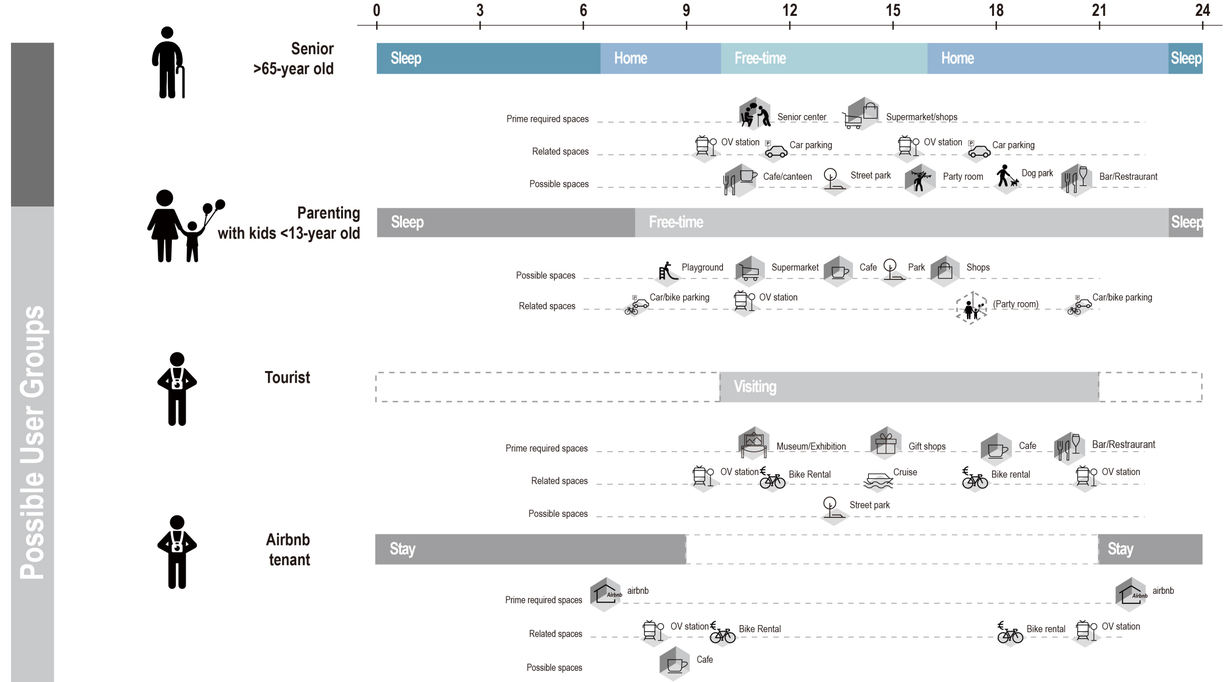
Program bar





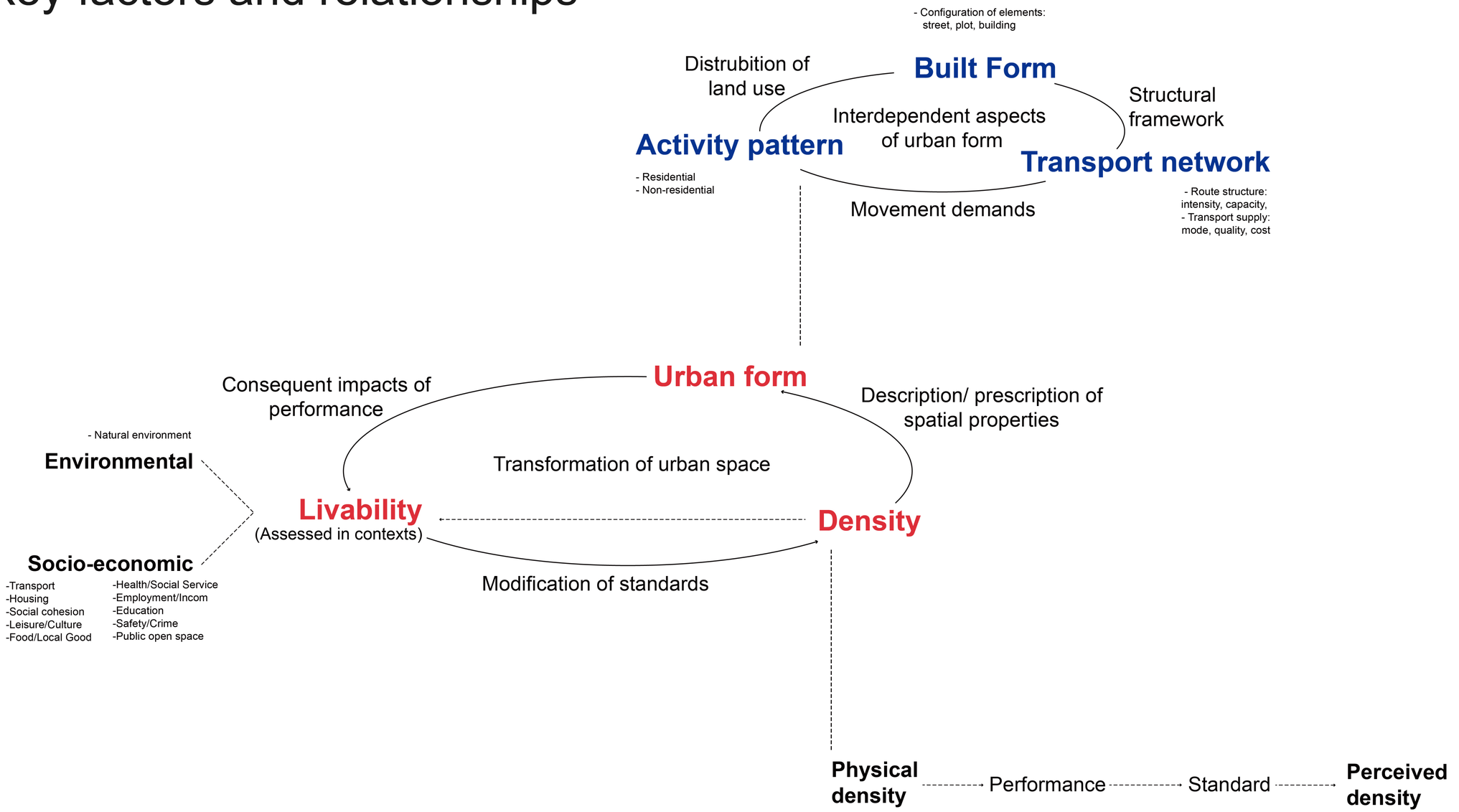
II. Measure the factors





Time Use difference between groups

I. Identify the key factors and relationships



II. Measure the factors



Urban Program

Activity/Time use

6 12 18

Dwellings
Airbnb
Playground
Court
Street park
Snack bar

Dog pak
Supermarket
Local shops
Market
laundry
Service(hair salon)

Cafe
Restaurant
Bar
Club
Sport club
BBQ

Reading space
Hobby class
Fitness
Hobby association
Common room
Group room

Office
S2M
Meeting space
Studio

Civic Program

Nursery
Clinic
Senior Center

Primary school
Library
Community center

Auditorium
Cinema
Exhibition space

Mobility Program

Bike parking
Car parking
OV station
Bus station
Quay
Ferry
Repair

Vetical bike parking
Electric car charging
Mini-OV(AV) station
Sharing AVs spot
Automated boat quay
Automated water program
Storage

Vertical car parking
Automated mobile program
Automated mobile surface
Automated delivery
UAV delivery

Time use intensity

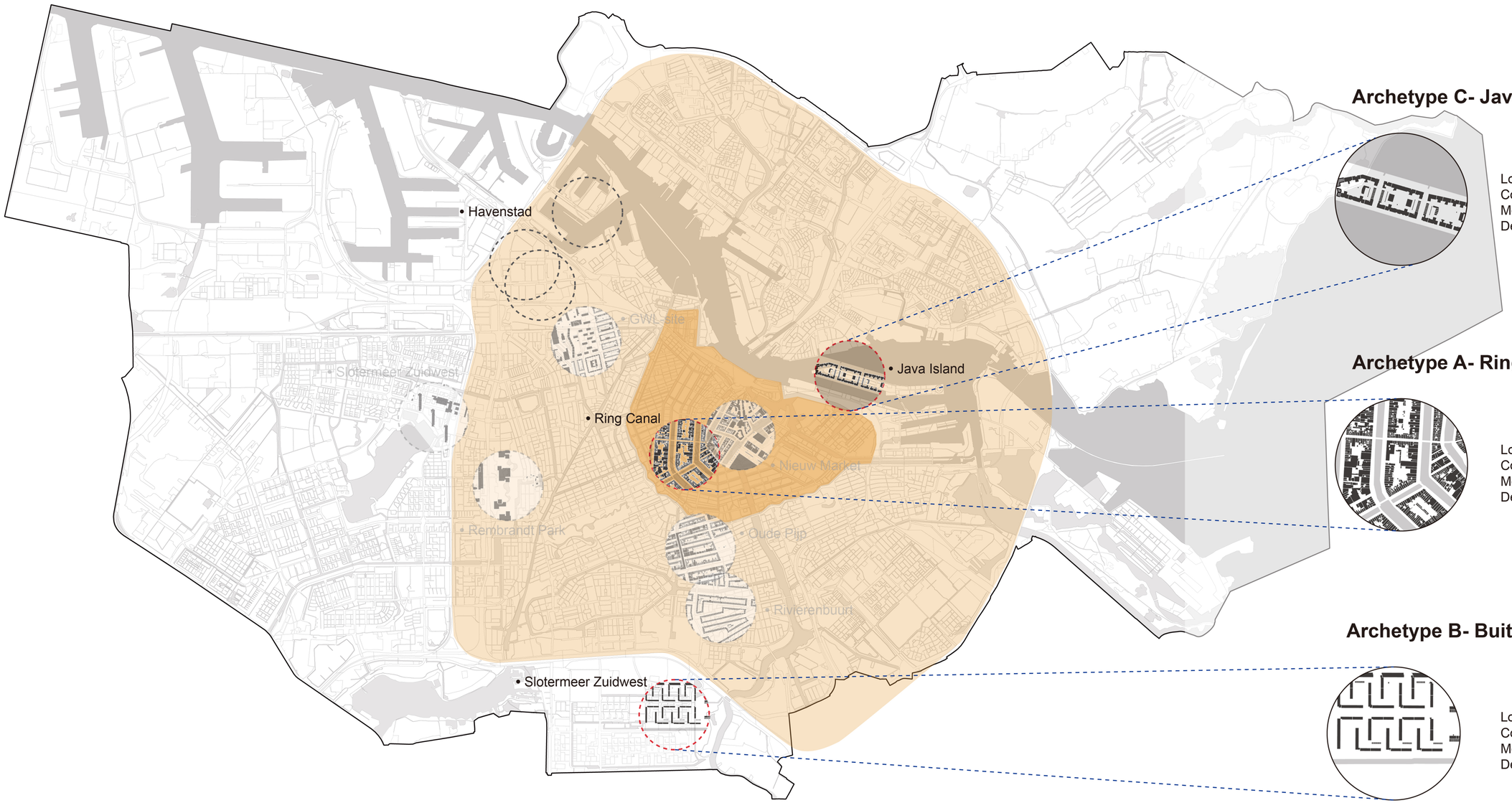
Time Use difference between programs

II. Measure the factors on sites

Selection of Archetypes of Urban Residential Block

Period	Case	Code	Morphological pattern									
			Building types			Solutions			Network pattern			
			Point	Strip	Block	Low-rise	Mid-rise	High-rise	Xs-size	S-size	M-size	L-size
1400-1815	Grachtengordel	$B.M_1.M.$			○		○				○	
1815-1900	Sarphatipark	B.M1.M.			○		○				○	
1900-pre WWII	Amsterdam-Zuid	B.M1.M/Xs.			○				○		○	
after WWII-1970	Buitenveldert	$S.M_1.M.$		○		○					○	
after WWII-1970	Slotermeer Zuidwest	L.H.S.		○				○				○
after WWII-1970	Rembrandt Park	L.H.P.	○					○		○		○
1970-	Pentagon	B.M2.XS.			○		○		○			
1970-	GWL-site	P.M2.L.	○				○					○
1970-	Java-island	$B.M_2/H.M.$			○		○	○			○	

Analytical studies



Archetype C- Java Island

Location: IJ canal
Construction year: 1995
Morphogical code: $B.M_2.H/M$
Development type: Redevelopment

Archetype A- Ring Canal

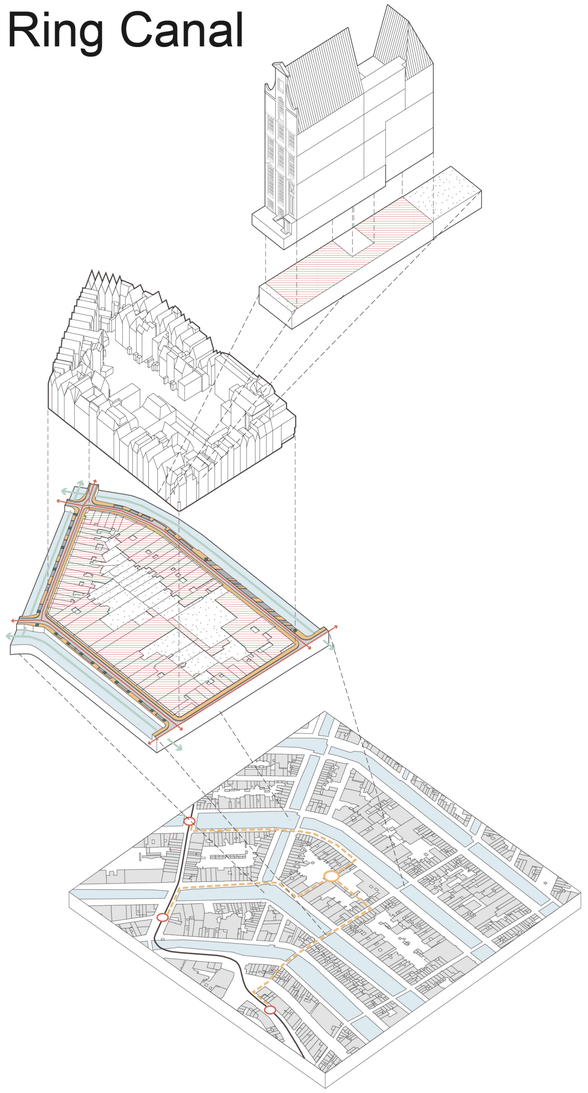
Location: Centrum
Construction year: 1613
Morphogical code: $B.M_1.M$
Development type: Old fabric

Archetype B- Buitenveldert

Location: Amsterdam-Zuid out of A10
Construction year: 1960
Morphogical code: $S.M_1.M$
Development type: Modernism

III. Understand the conflicts and potentials of blocks

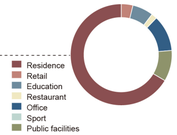
Ring Canal



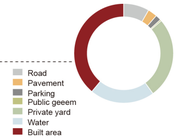
Building
B_b= 274m²
F_b= 1095m²
(incl. basement + attic)

Lot
A_l= 363m²
B_l= 274m²
F_l= 1095m²
FSI_l= 3.02
GSI_l= 0.75
OSR_l= 0.08
L_l= 4

Island
A_i= 16778m²
B_i= 10733m²
F_i= 44704m²
FSI_i= 2.66
GSI_i= 0.64
OSR_i= 0.14
L_i= 4.2

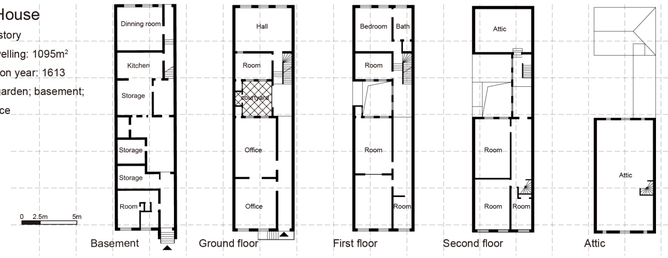


Block
A_b= 27516m² PIL= 0.61
B_b= 10733m² w= 100
F_b= 44704m² b= 21.9
FSI_b= 1.62 T= 0.39
GSI_b= 0.39
OSR_b= 0.38
L_b= 4.2
Network Length= 570m
N= 0.02

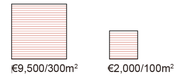


1km² Fabric
Aver. distance to transit: 352m
Mode of transit: tram

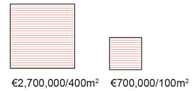
Town House
Height: 5-story
Size of dwelling: 1095m²
Construction year: 1613
* Private garden; basement; front space



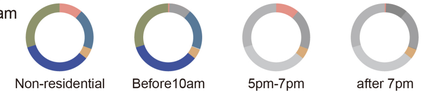
Housing Value
Rent/mon.



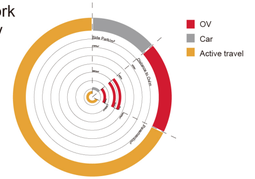
Buy



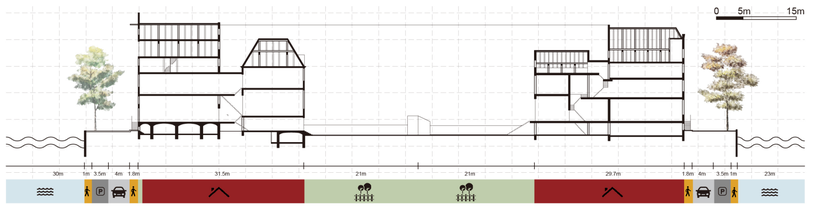
Active program



Network quality



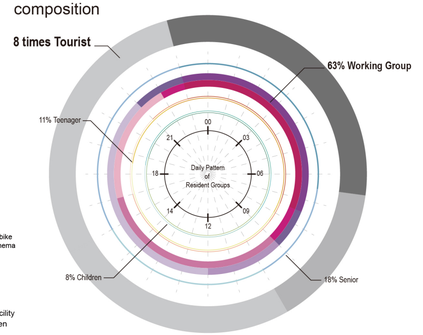
Enclosed block profile



Accessibility of facilities



User groups composition



*Individual town house
- own access from street
- large private open space

*High housing value
- luxury 11% single-family house
- separated multi-family by floors

*High level of mixed use
- office/tourist programs mainly
- barely programs after working hours

*Lack of walking space
- High share of mode of active travel
- Limited walkable area

*Narrow public space
- large interior private space
- narrow profile for mobility/public use

*Tourists vs. residents
- Working grousp as main residents
- tourist' size 8 times than residents'

*Good accessibility
- diverse and dense facilities/services

III. Understand the conflicts and potentials of blocks



Main Coflicts

*Tourists vs. Residents
- more programs for tourists driven by profits
- barely programs for residents especially after working hours

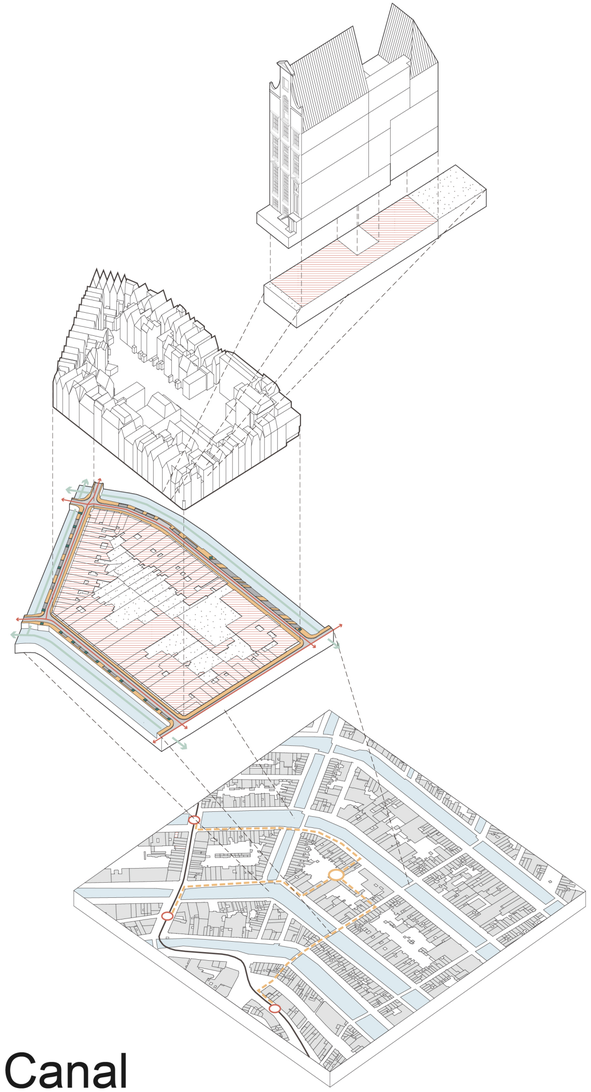
*Narrow public space vs. Large private interior
- tourists and residents compete for public space in narrow exterior
- large interior poorly used
(89%multi-family housing/ ground commerce/office/public building)

Cultural preference

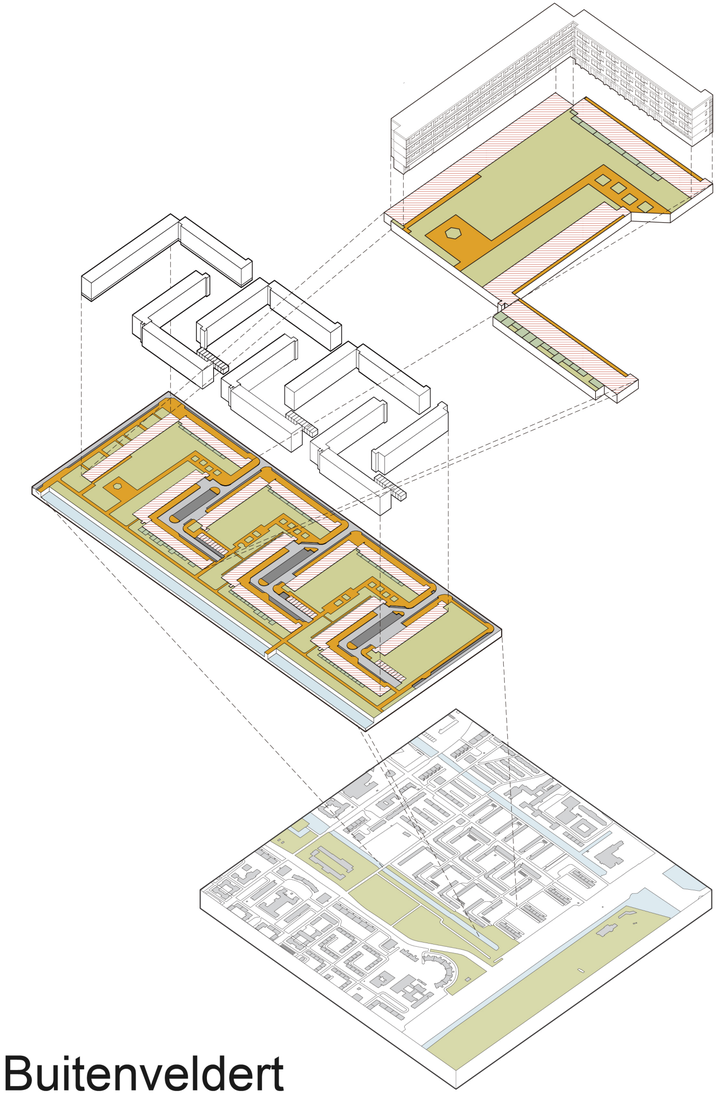
*Individual access from street
- single-family: steps up to main entry/dowm to basement
- multi-family: own door each floor via stair from street

*Private open space
- large back graden
- light well in the middle
- tiny front space

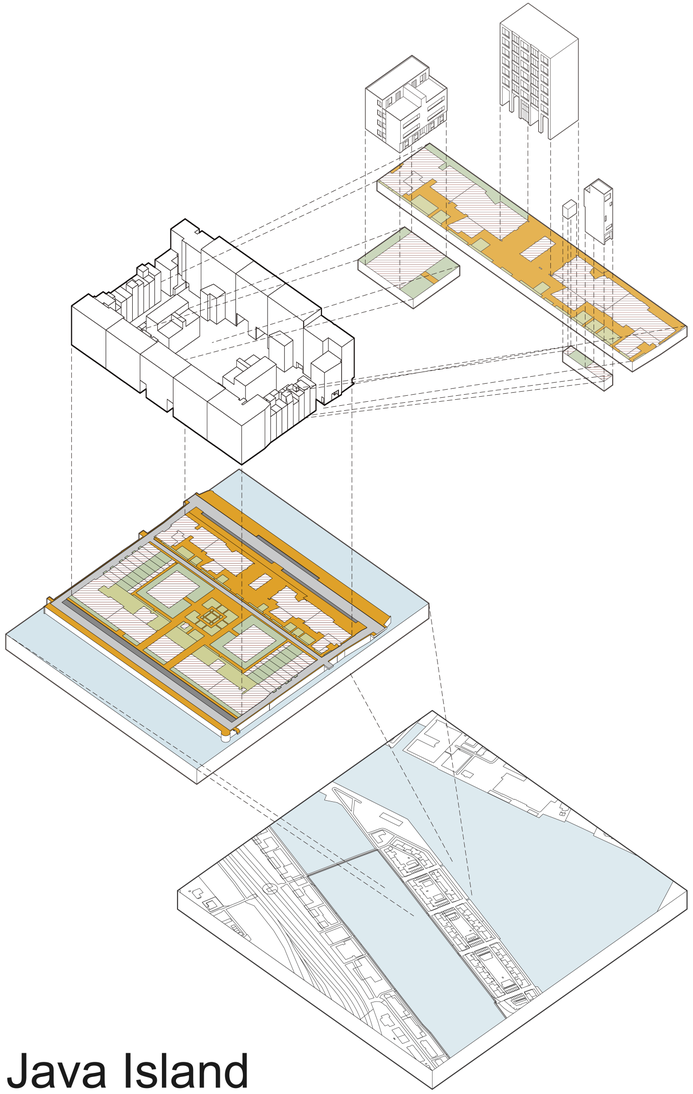
III. Understand the conflicts and potentials of blocks



Ring Canal



Buitenveldert

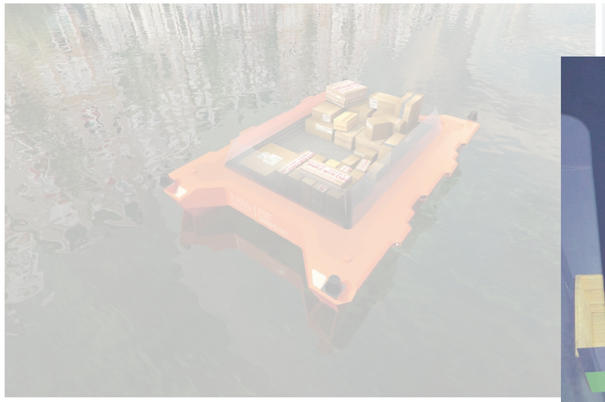


Java Island

IV. Inspiration from automated mobility

More than vehicles

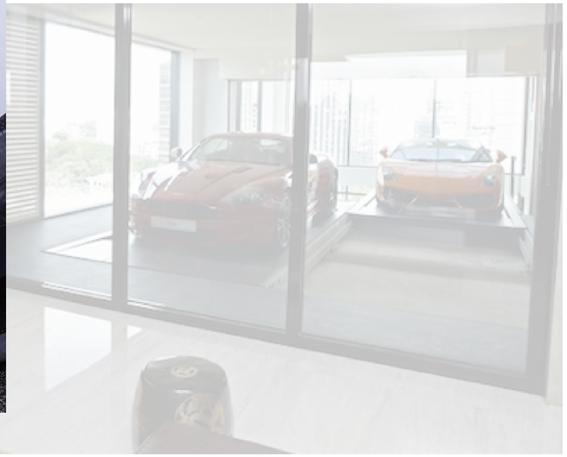
1) MIT ROBOAT; 2) DHL intelliget aerial machine; 3)First Mini bus in Swden; 4) Robomart ; 5) Bufalino 6) T-log; 7) Hamilton Scotts
Source: MIT News; SmartCitiesWolrd; TheSpoon; The Local se; News Altas; Motor1.johnchow











IV. Inspiration from automated mobility

Feature	Principle	Benefit
Self-driving (No driver required)	- Self-operation	- Less travel time
		- Saving parking space
Safety (Co-exist with other flows)	- More inclusive	- Encouraging travel of previous exclusive groups
	- Mixed use of street parking zone	- Higher efficiency on space utilization
Precision (Smart driving)	- Less mobility space	- Narrow lane
		- Compact parking
Vertical network (Move off the ground)	- Release level of ground	- Separating conflicted flows
		- Better rainproof
	- Multilevle street	- Activate upper level of high-rise

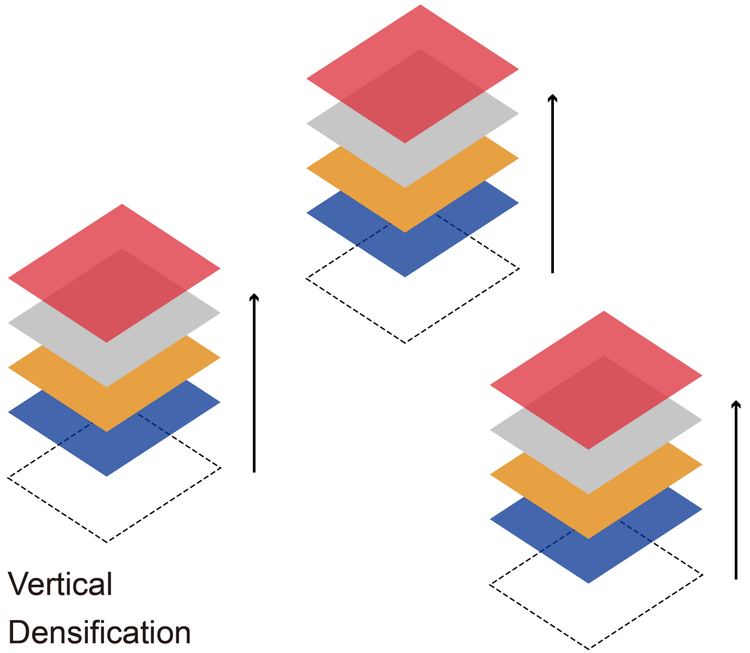
Feature	Principle	Benefit
Diverse forms (Not limited to vehicle)	- Smart share	- Reduce car ownership
		- Higher share of OV
	- Mobile program	- More programs on same space
		- Same progams serve more space
	- Make use of water	- Flexible water transport
		- Possibiities of programs on water
	- Smart devlivery	- Automated delivery
		- Aerial delivery

IV. Inspire from automated mobility

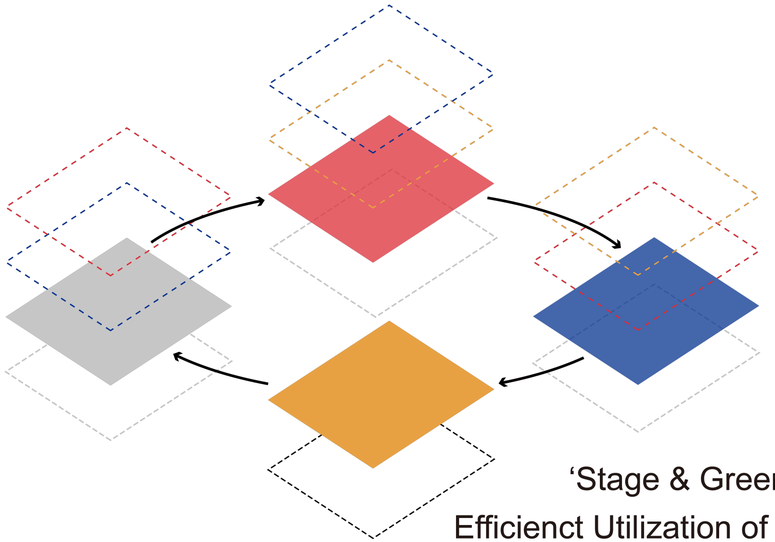
A New Way of Densification:
Vertical or Movable

- Increasing land supply
  Vertical development, hyper skyscrapers

-Increasing land productivity
  Concept of ‘stage & greenroom’,
    right activities in right places at right time

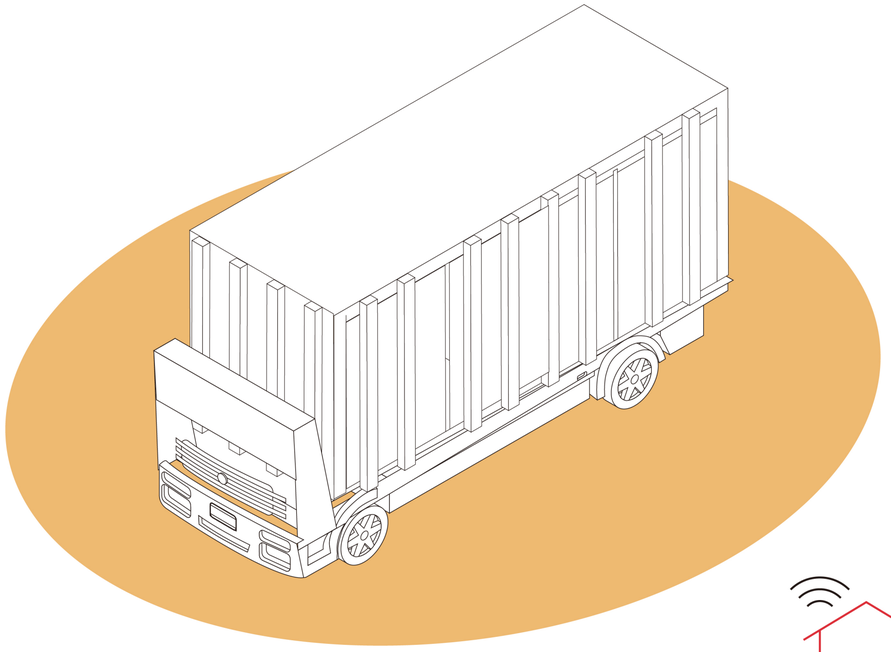


Vertical
Densification

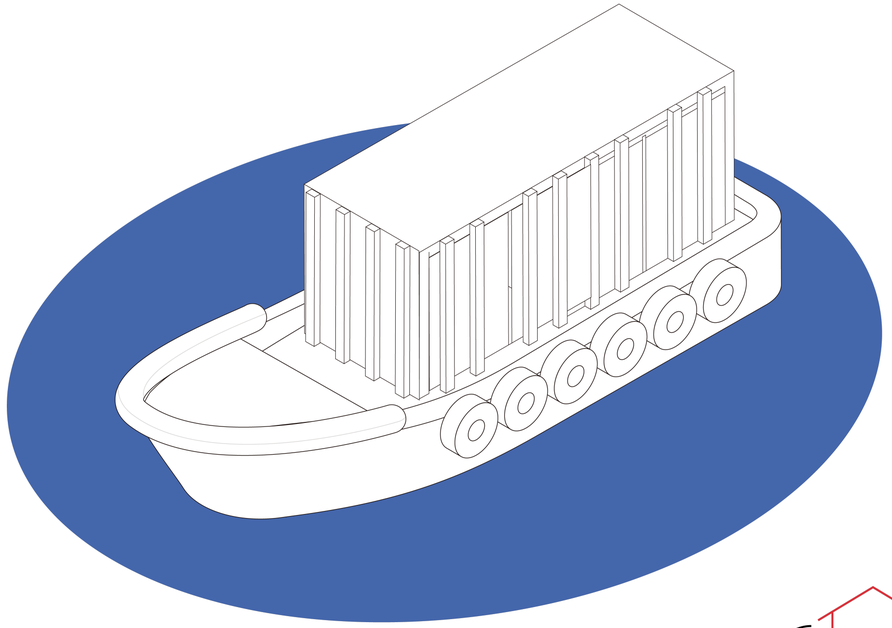


‘Stage & Greenroom’
Efficienct Utilization of Space

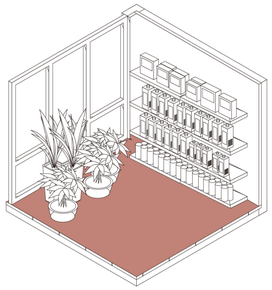
IV. Inspire from automated mobility

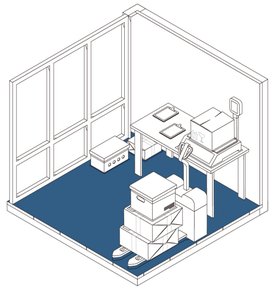


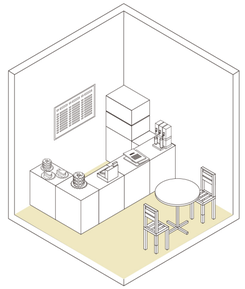
Mobile program on wheel

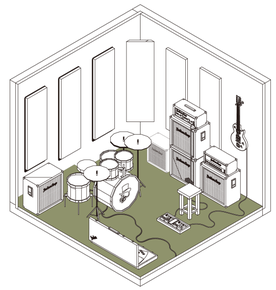


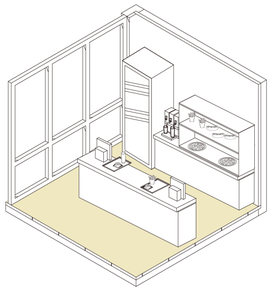
Mobile program on water

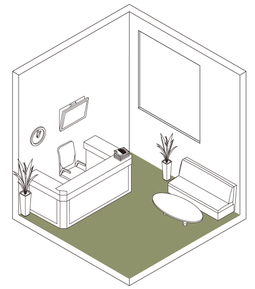










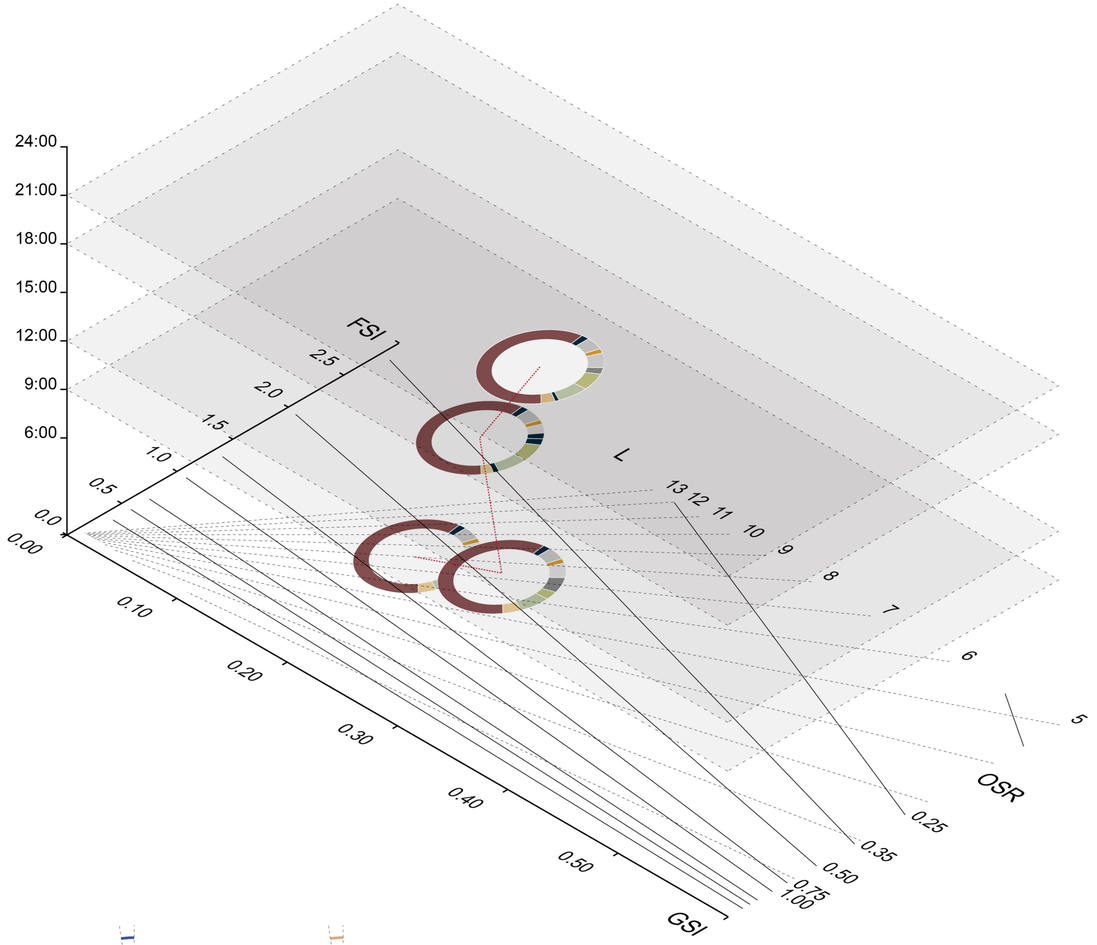


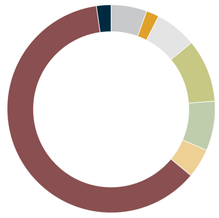
IV. Inspire from automated mobility

Another Dimension:
Time

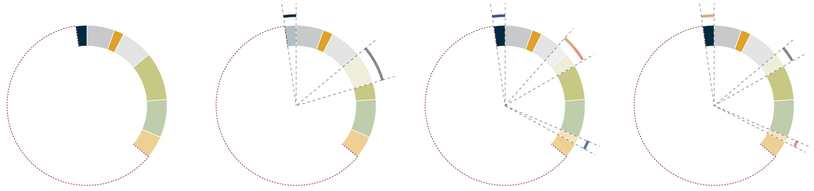
X

Stage & Greenroom:
Movable Programs





Program bar
/All surfaces



Non-residential designed surfaces

Before 7am

9am - 5pm

After 7pm

Road
Pavement
Parking
Public geen
Private yard
Water
Non-residence
Residence

Sites X Inspiration from Automated Mobility

VI. Spatial Interventions on Archetypes



Ring Canal

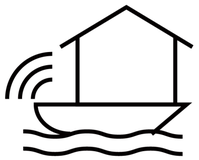
-Tourists vs. Residents

-Narrow profile of network

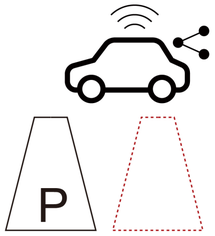
X



Flexible mobile program

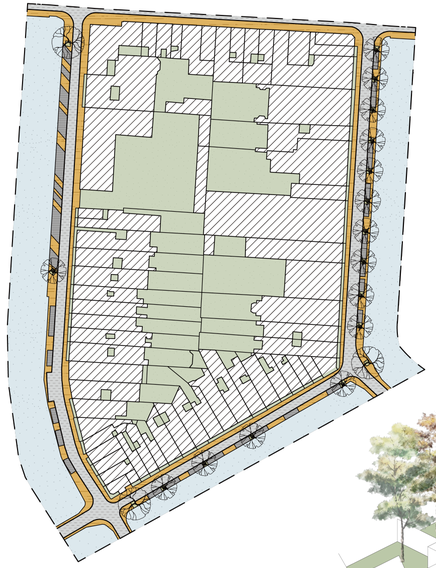


Mobile program on water



Smart parking

VI. Spatial Interventions on Archetypes

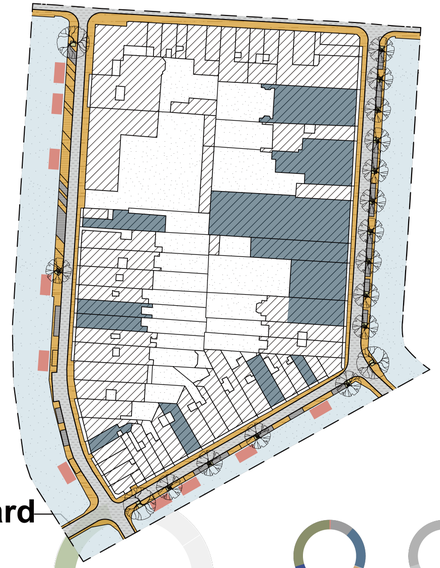


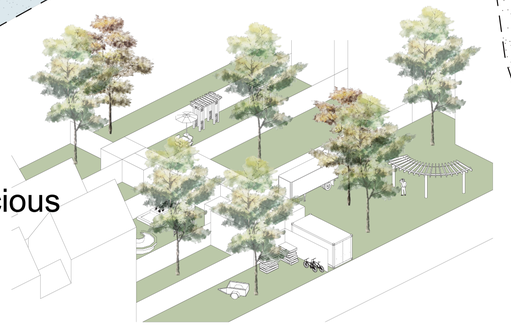
Flows separation

Daytime



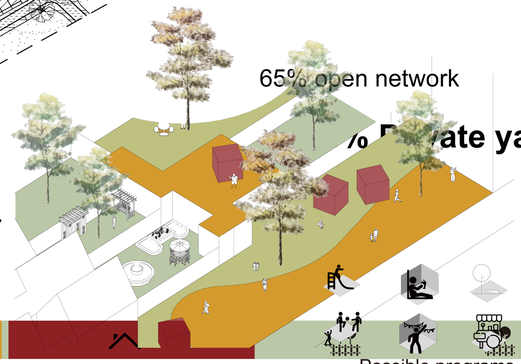
After working hours





Inactive spacious interior

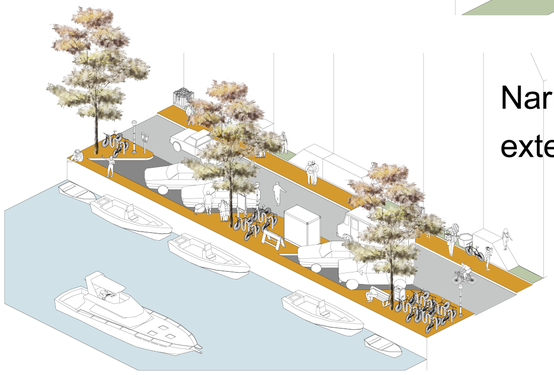
Collective interior for community



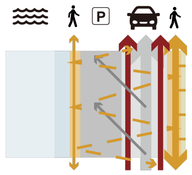


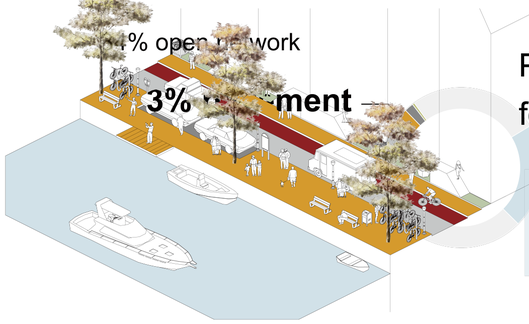


Active riverbank for residents

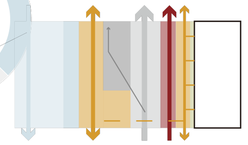


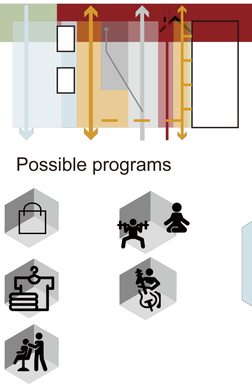
Narrow crowded exterior

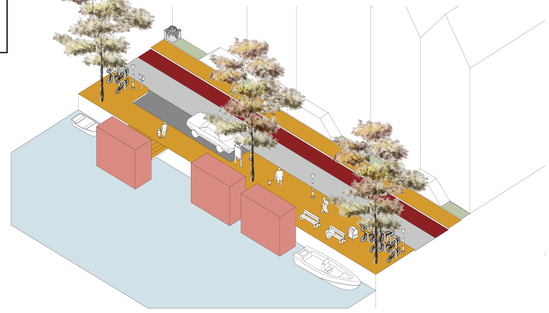


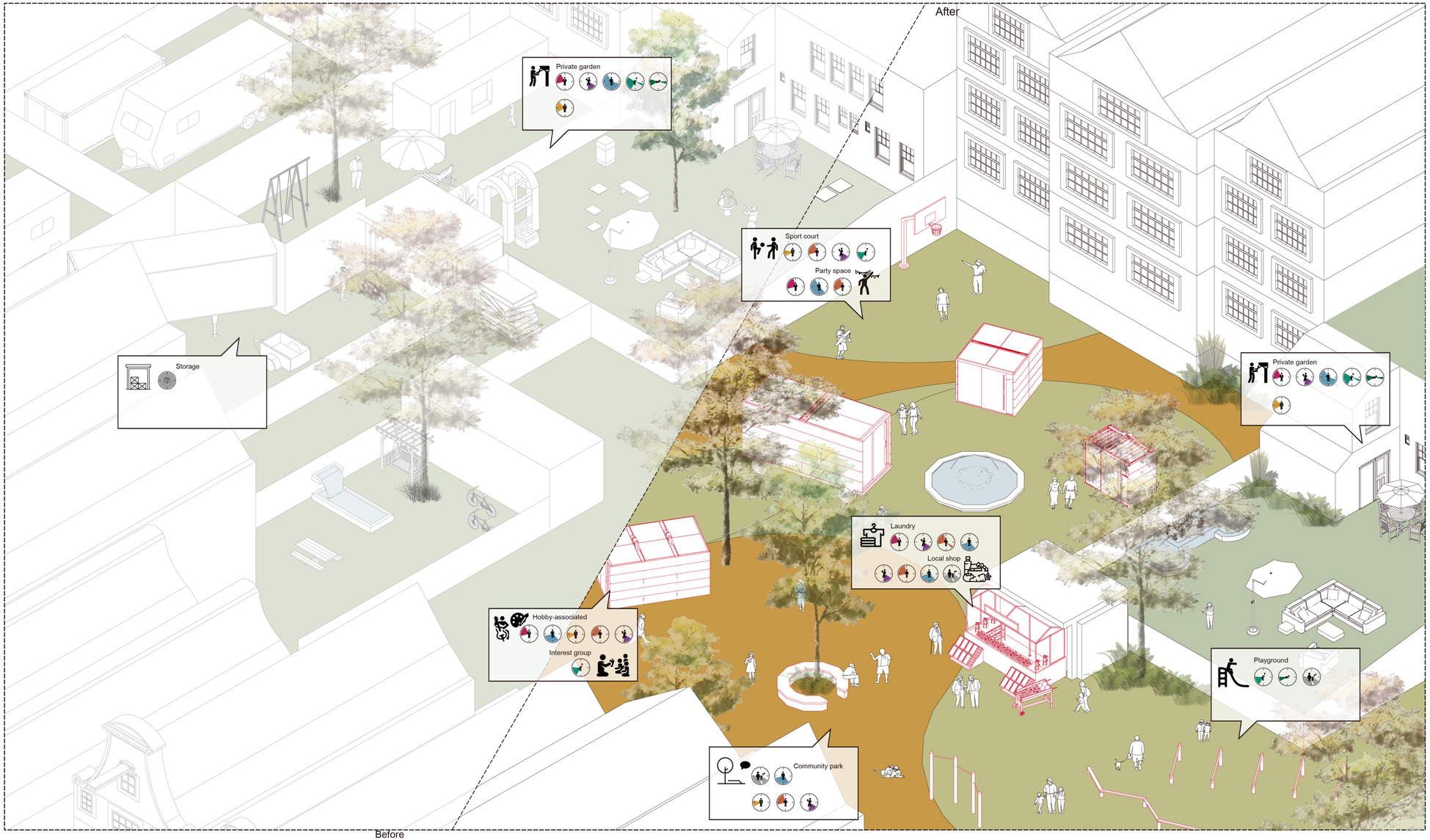


Public exterior for visitors









Urban Program

Sport court

Party space

Laundry

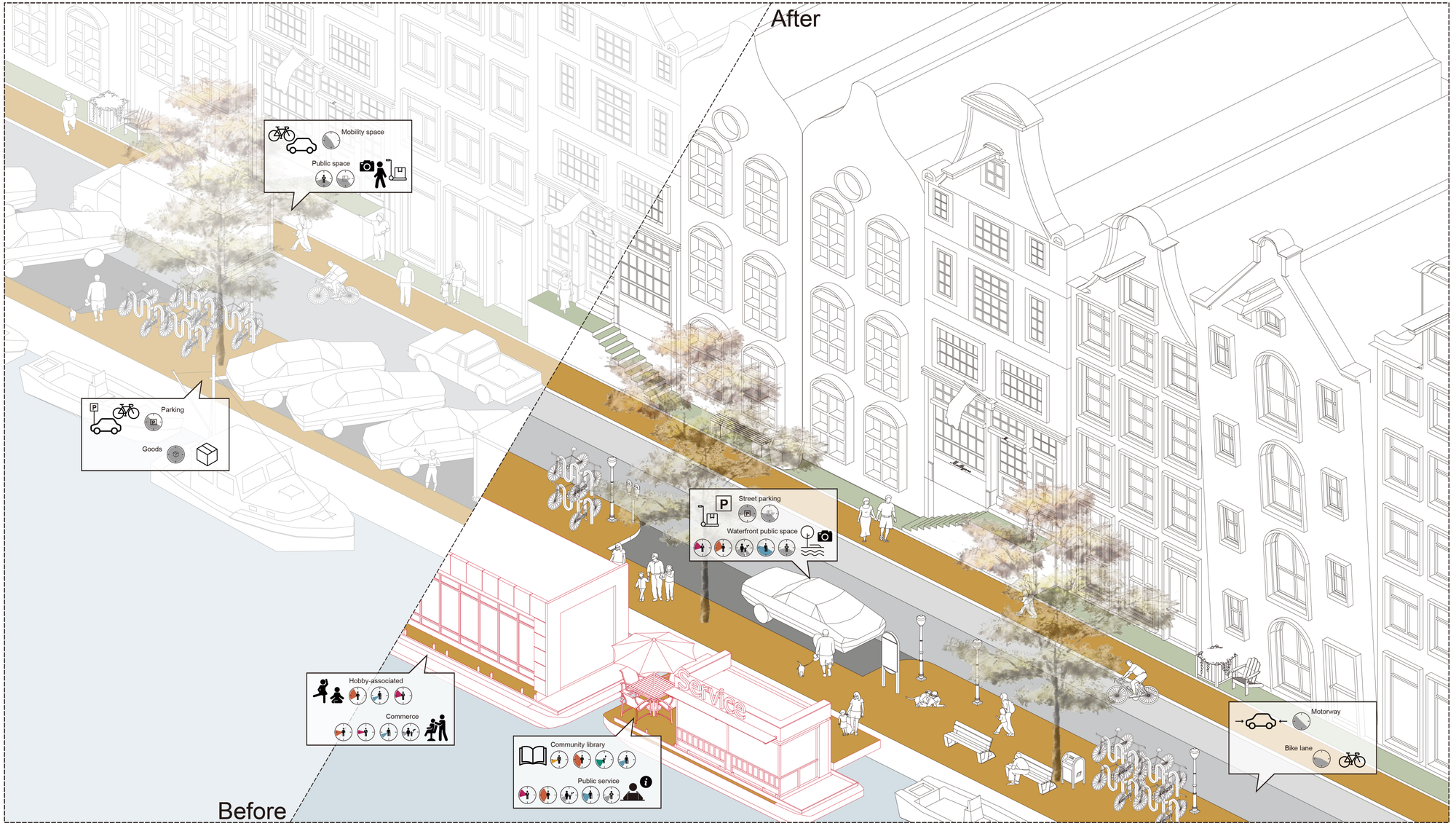
Local shop

Hobby-associated

Interest group

Community park

Playground



Urban Program

Waterfront public space

Hobby-associated

Commerce

Civic Program

Community library

Public service

Mobility Program

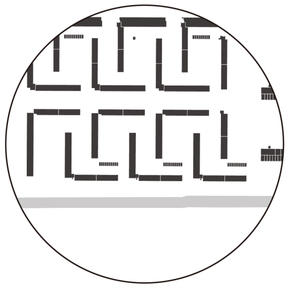
Street parking

Collective interior



Public exterior

VI. Spatial Interventions on Archetypes

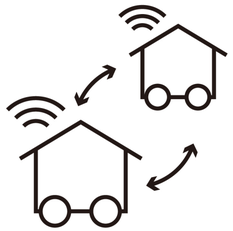


Buitenveldert

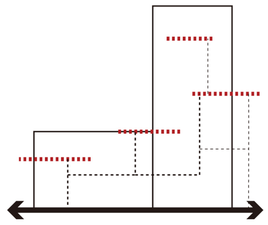
-Mono-fucntional

-Misplacement courtyard X2

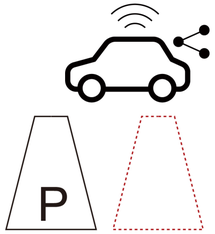
X



Flexible mobile program



Active upper level



Smart parking

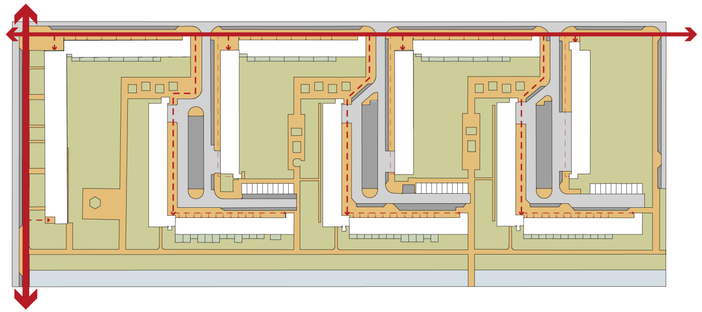


Shared car

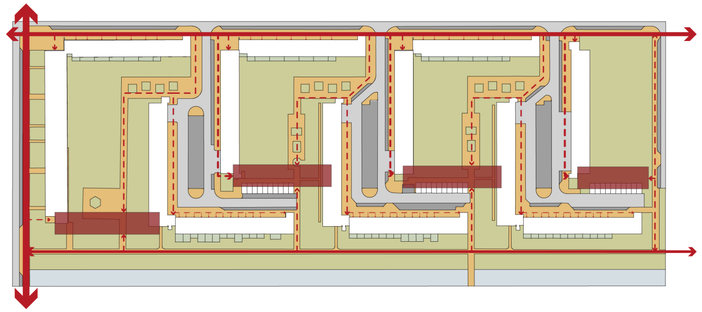


Mini-OV

VI. Spatial Interventions on Archetypes



Misplacement of flows
on 2 courts

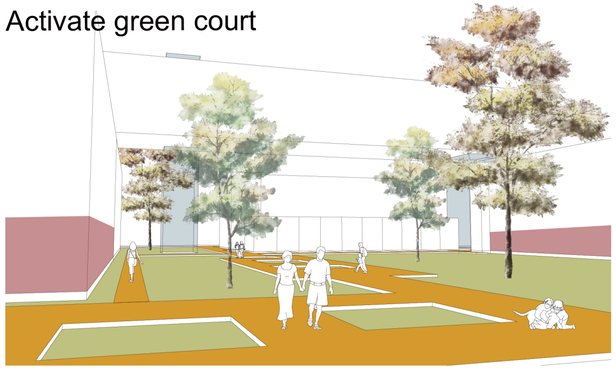


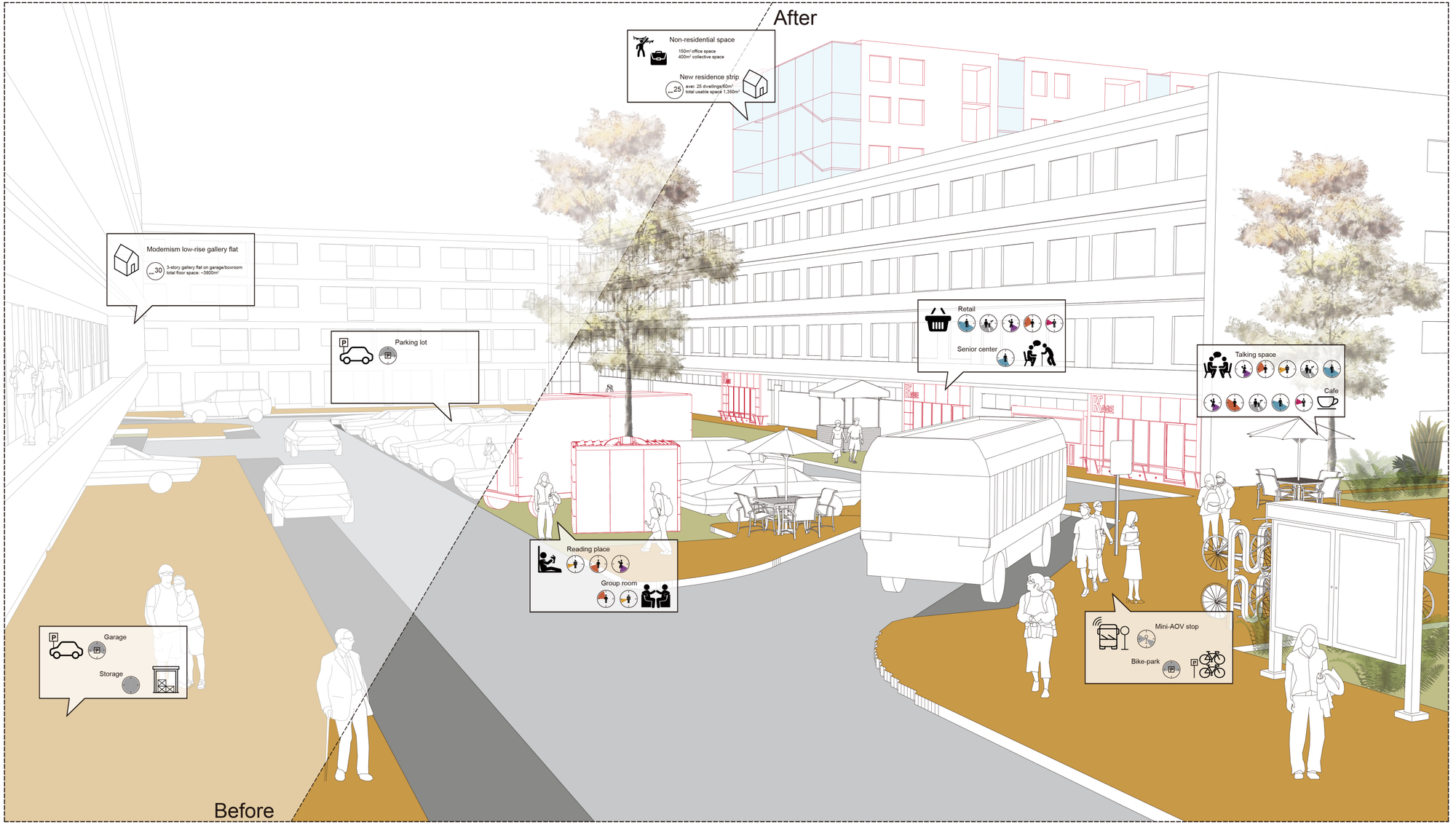
Reorganization of flows
on 2 courts

Activate access court



Activate green court





Urban Program

Reading place

Group room

Talking space

Cafe

Retail

Civic Program

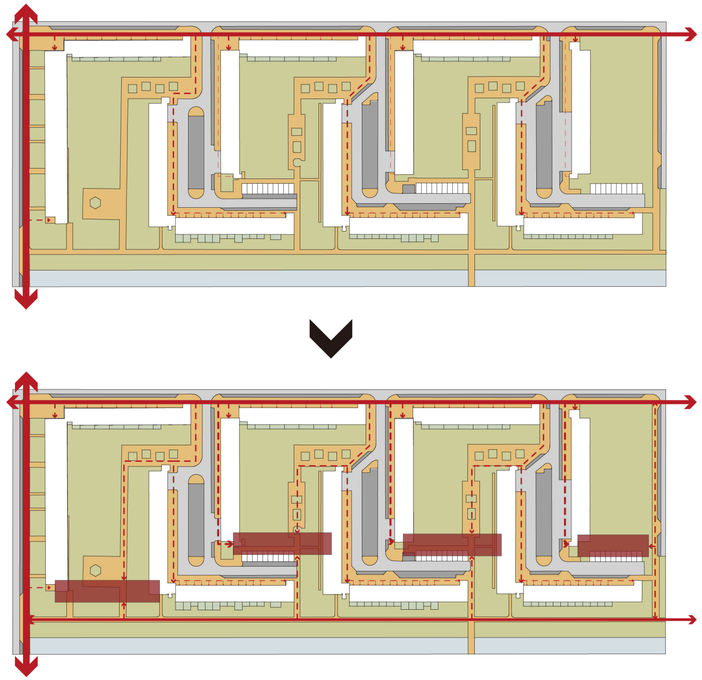
Senior center

Mobility Program

Mini-AOV stop

Bike-park

VI. Spatial Interventions on Archetypes



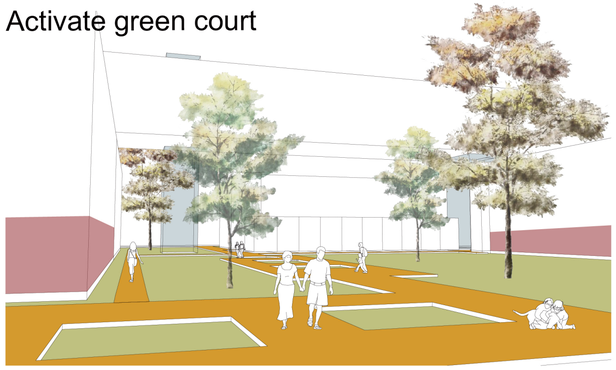
Misplacement of flows
on 2 courts

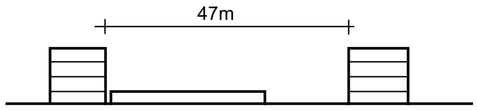
Reorganization of flows
on 2 courts

Activate access court

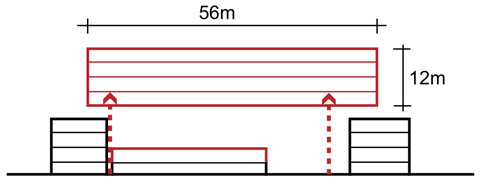


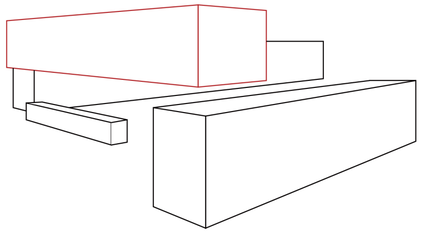
Activate green court



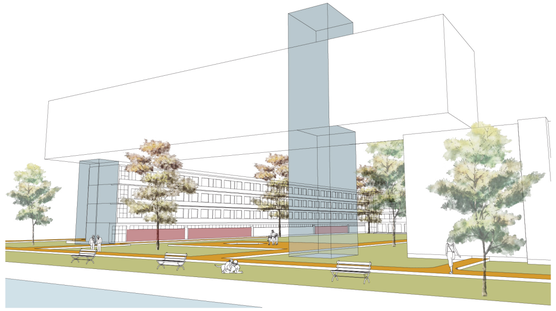


Densified

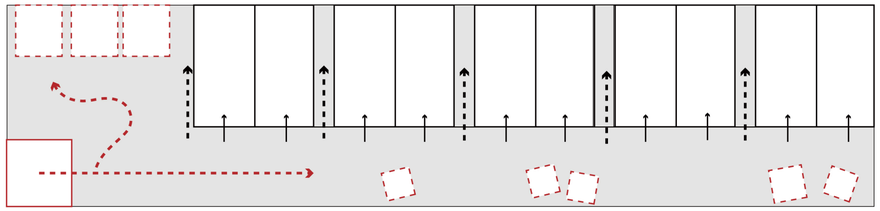




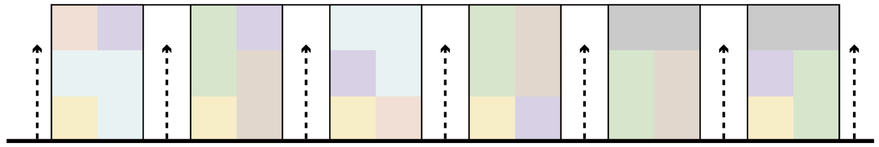
New Volum

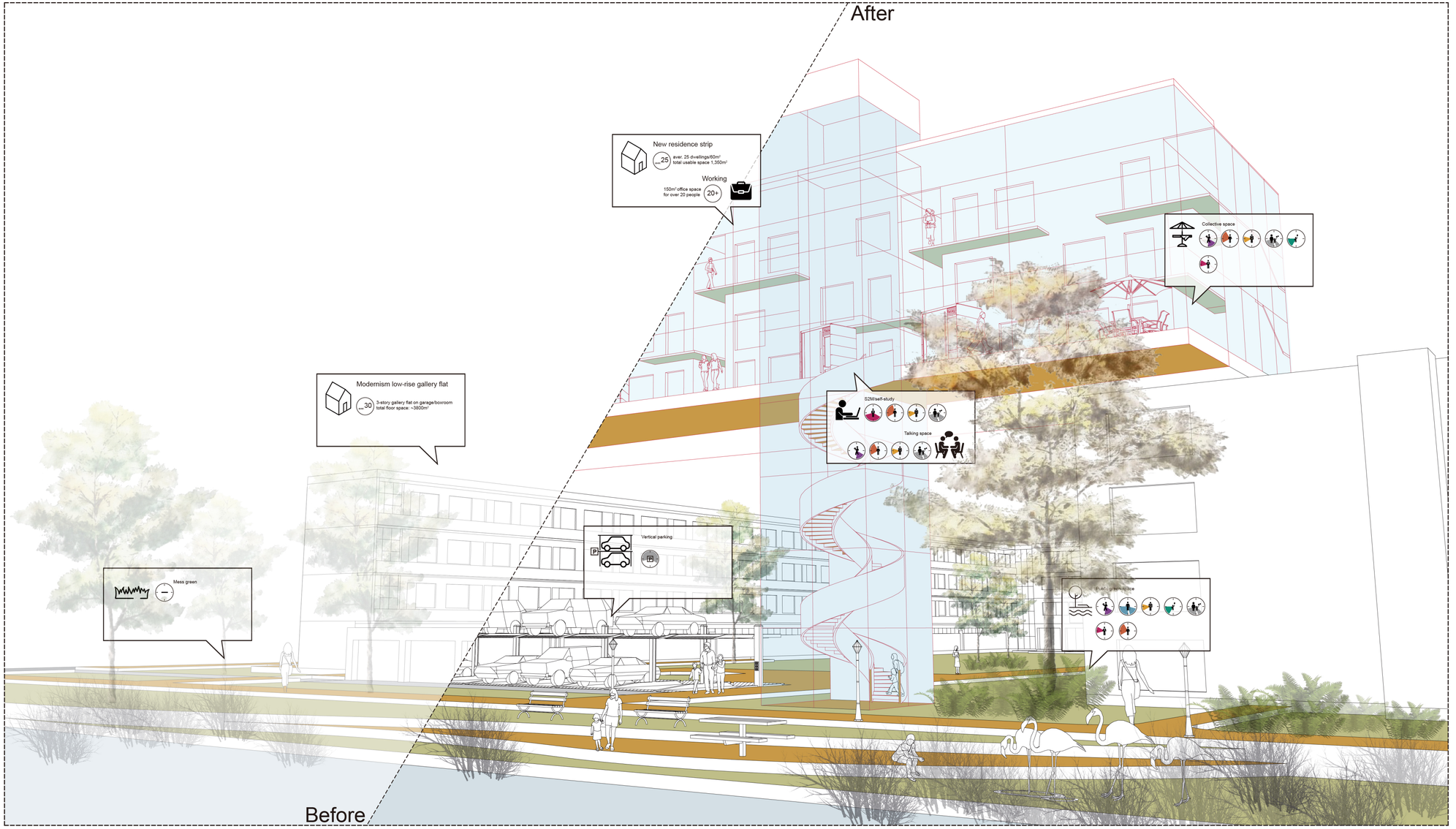


+1 Level of new volum



Individual access in strip development





Urban Program

New residence strip

aver. 25 dwellings/60m²
total usable space 1,350m²

aver. 25

Working

150m² office space
for over 20 people

20+

Collective space

S2M/self-study

Talking space

Public green space

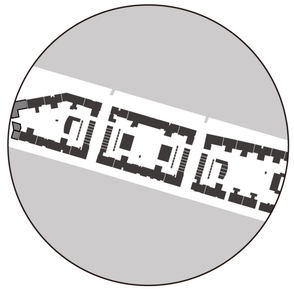
Mobility Program

Vertical parking

P


Community court
New Volume
olli
Edificio
Building

VI. Spatial Interventions on Archetypes

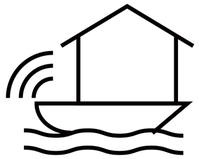


Java Island

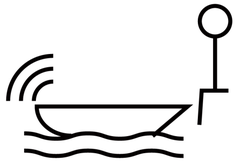
-Low level of mixed use

-Water as barrier to connectivity

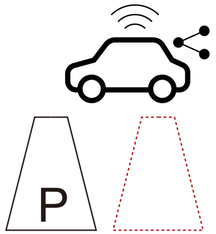
X



Mobile program on water



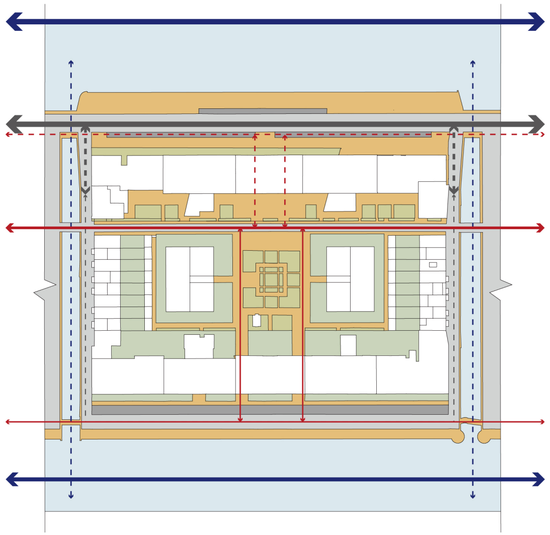
Mini-OV by water



Smart parking

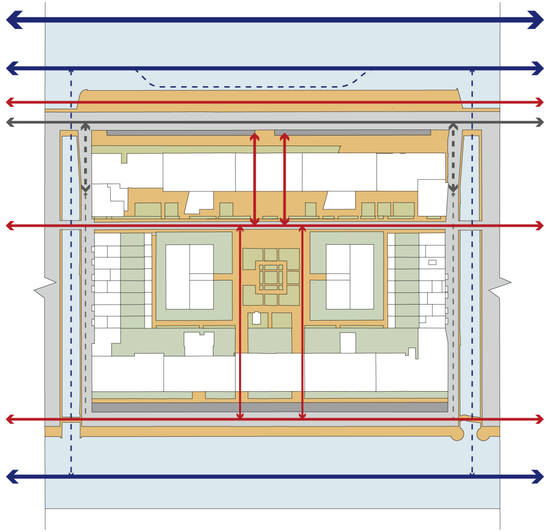
VI. Spatial Interventions on Archetypes

North bank:
Traffic artery of cars

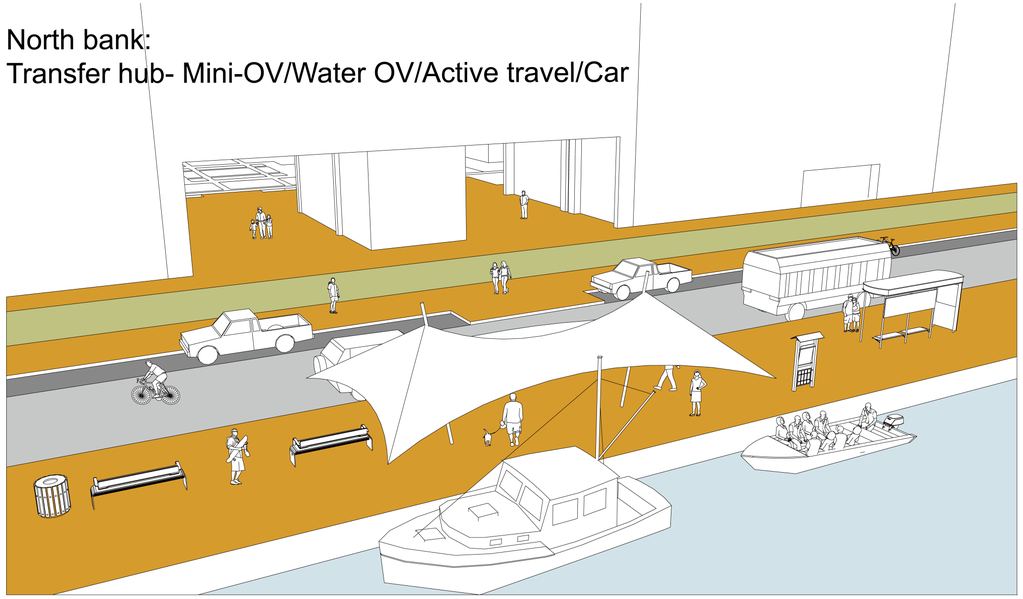


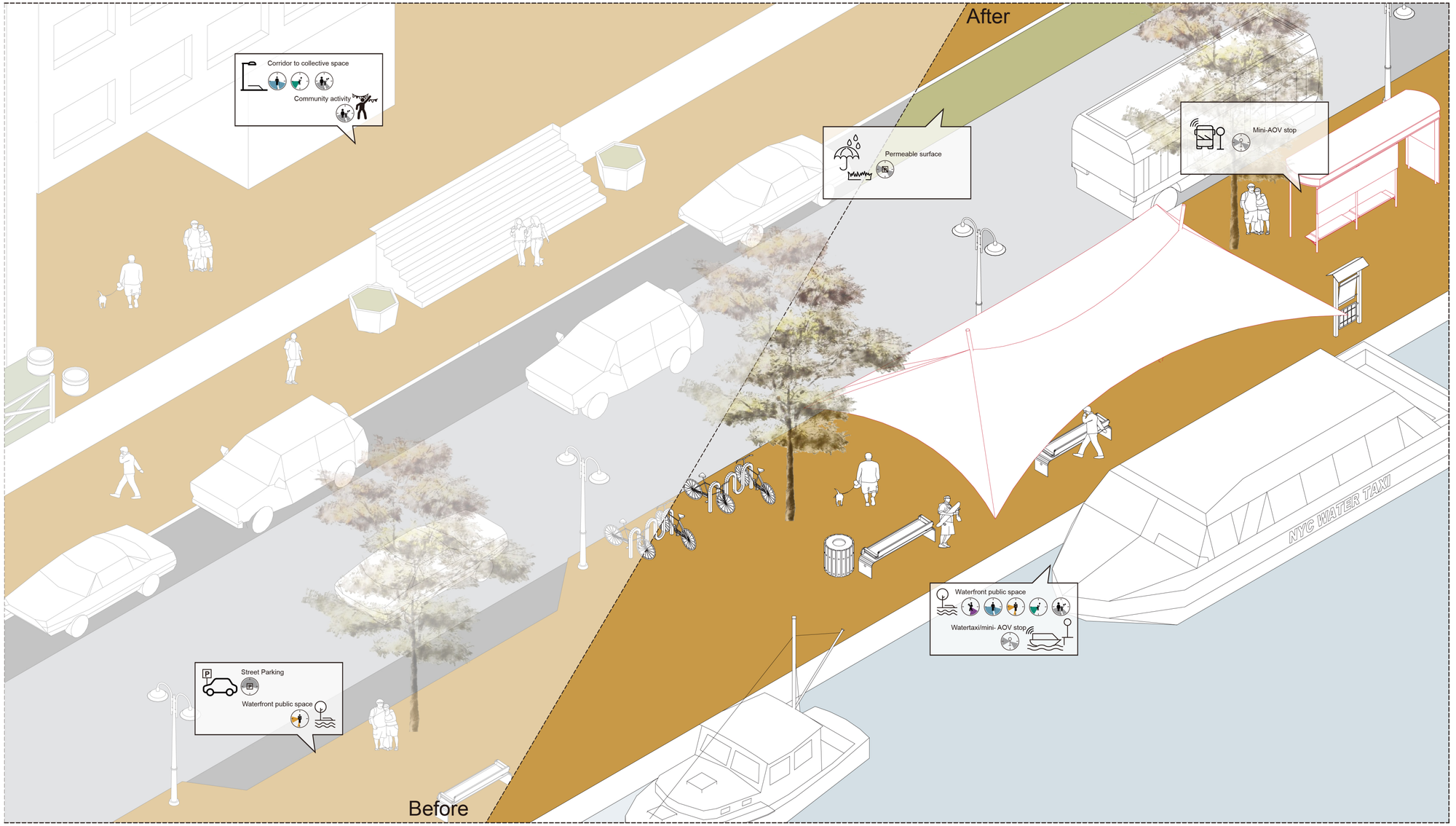
South bank:
Home-zone parking

North bank:
Main access point of mixed modes



North bank:
Transfer hub- Mini-OV/Water OV/Active travel/Car





Urban Program

Waterfront public space

Community activity

Mobility Program

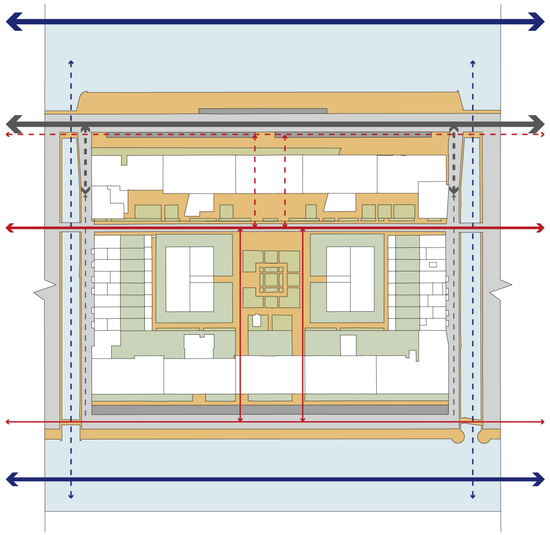
Permeable surface

Mini-AOV stop

Watertaxi/mini- AOV stop

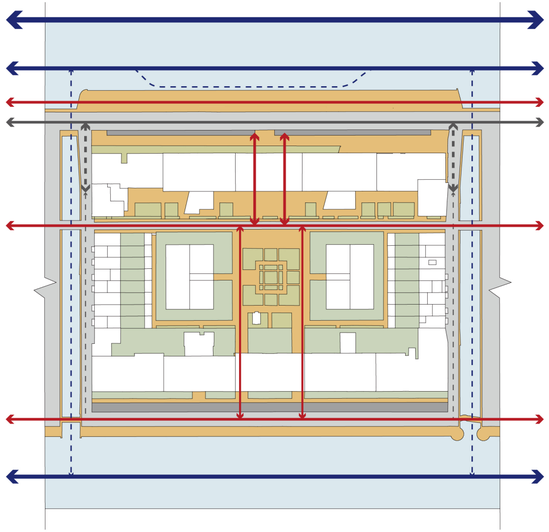
VI. Spatial Interventions on Archetypes

North bank:
Traffic artery of cars

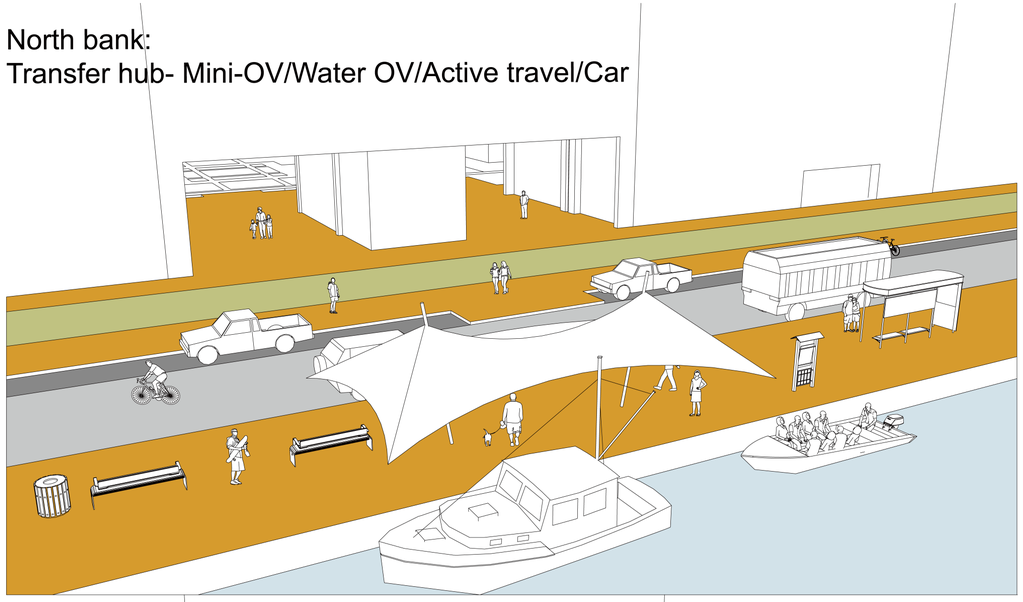


South bank:
Home-zone parking

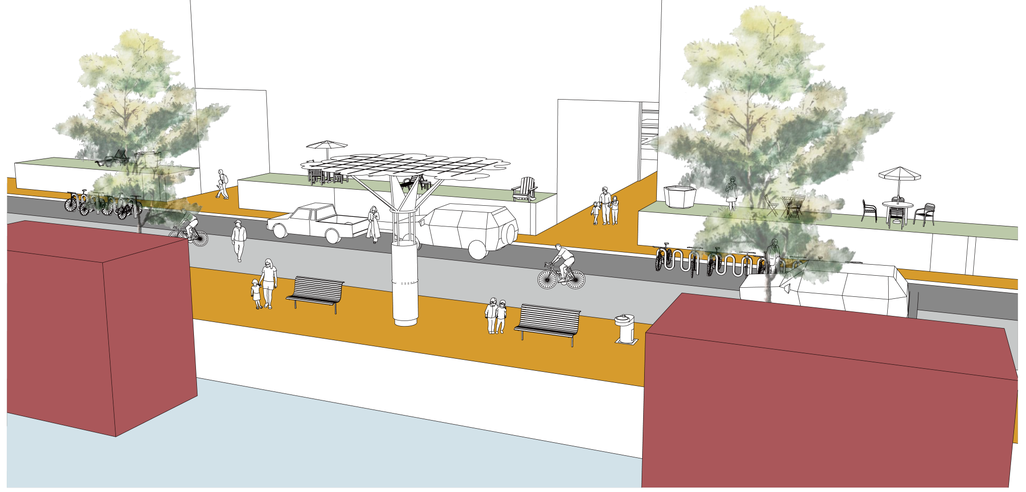
North bank:
Main access point of mixed modes

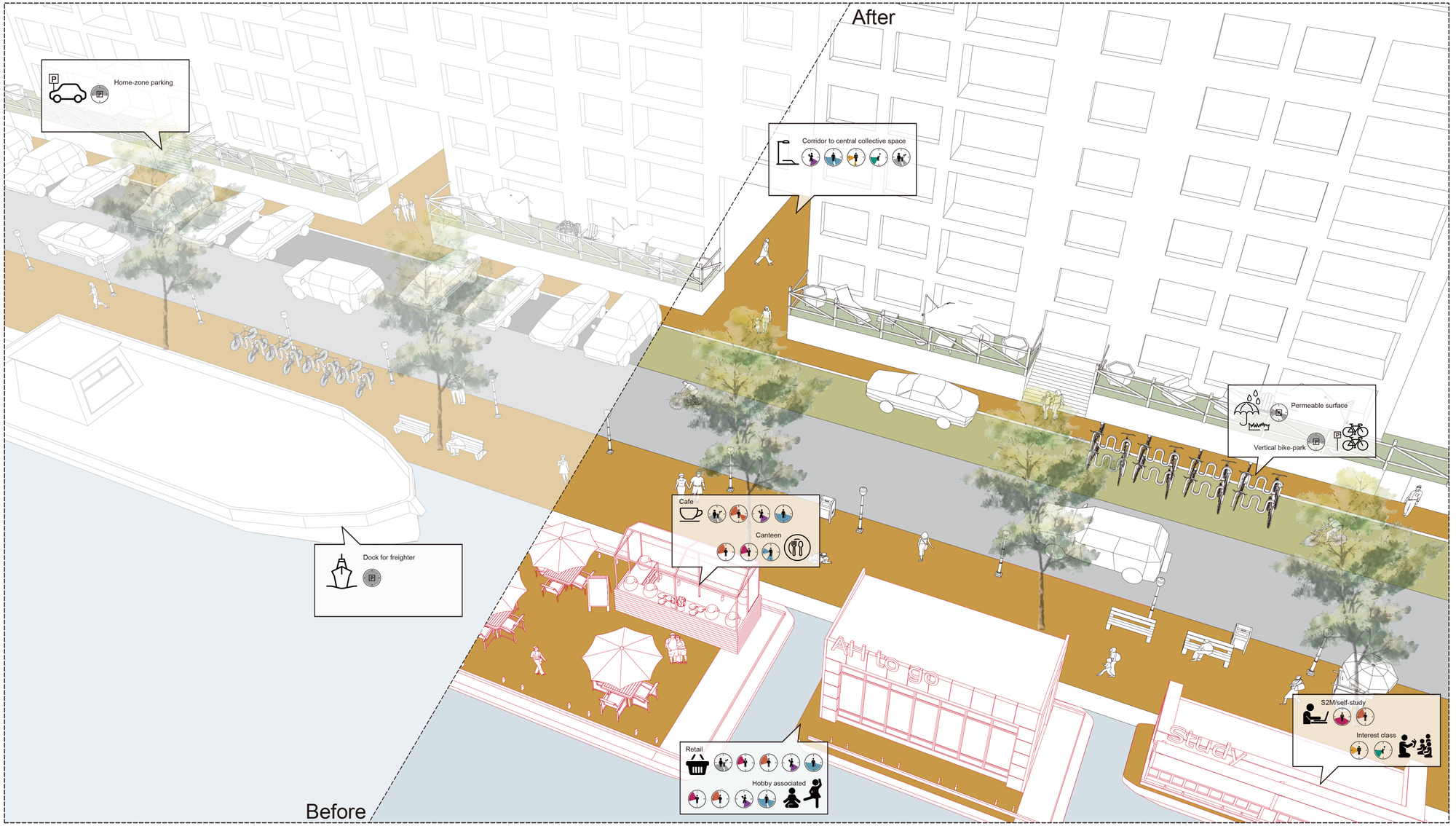


North bank:
Transfer hub- Mini-OV/Water OV/Active travel/Car



South bank:
Waterfront- Flexible water mobile programs





Urban Program

S2M/self-study

Interest class

Retail

Hobby associated

Cafe

Canteen

Corridor to central collective space

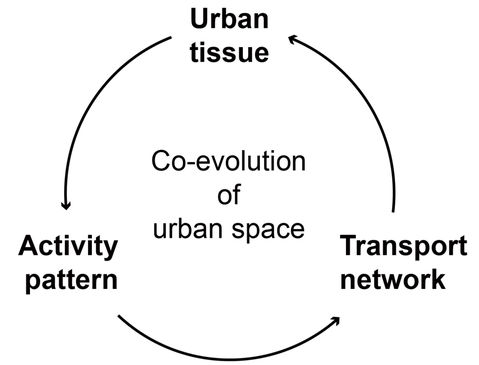
Mobility Program

Vertical bike-park

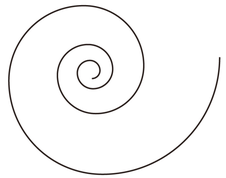

Northern bank
Southern bank
YOU
OTTOLINA
LOVE

Rethink:

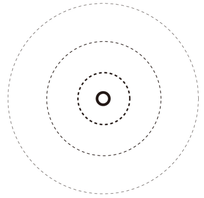
Built-environment:
As A Coevolutionary System



Notion of Co-evolution of Urban Space



a) Consecutive Co-evolution

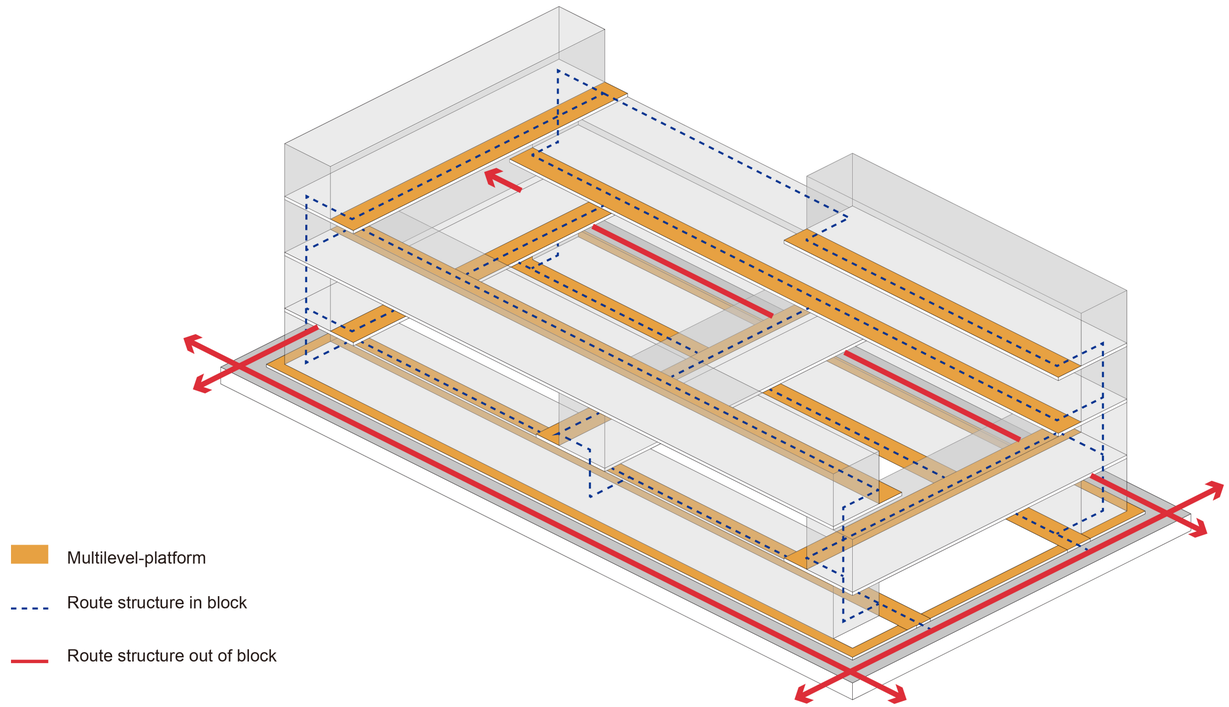


b) Sequential Co-evolution

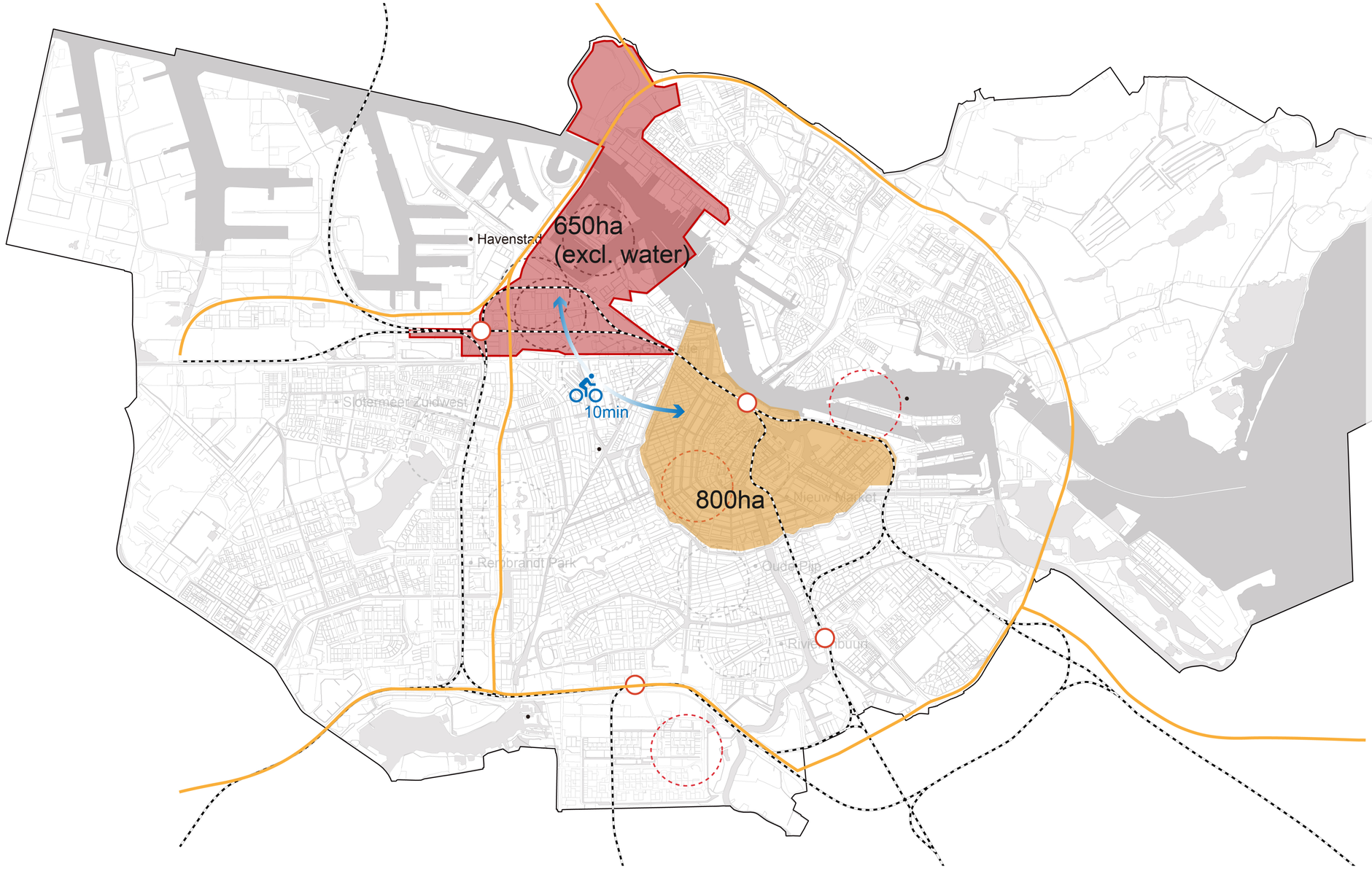
Rethink:

Platforms & Corridors:

As Upper Levels of Public Network



Prototypes Design:
Formation of New Urban Blocks



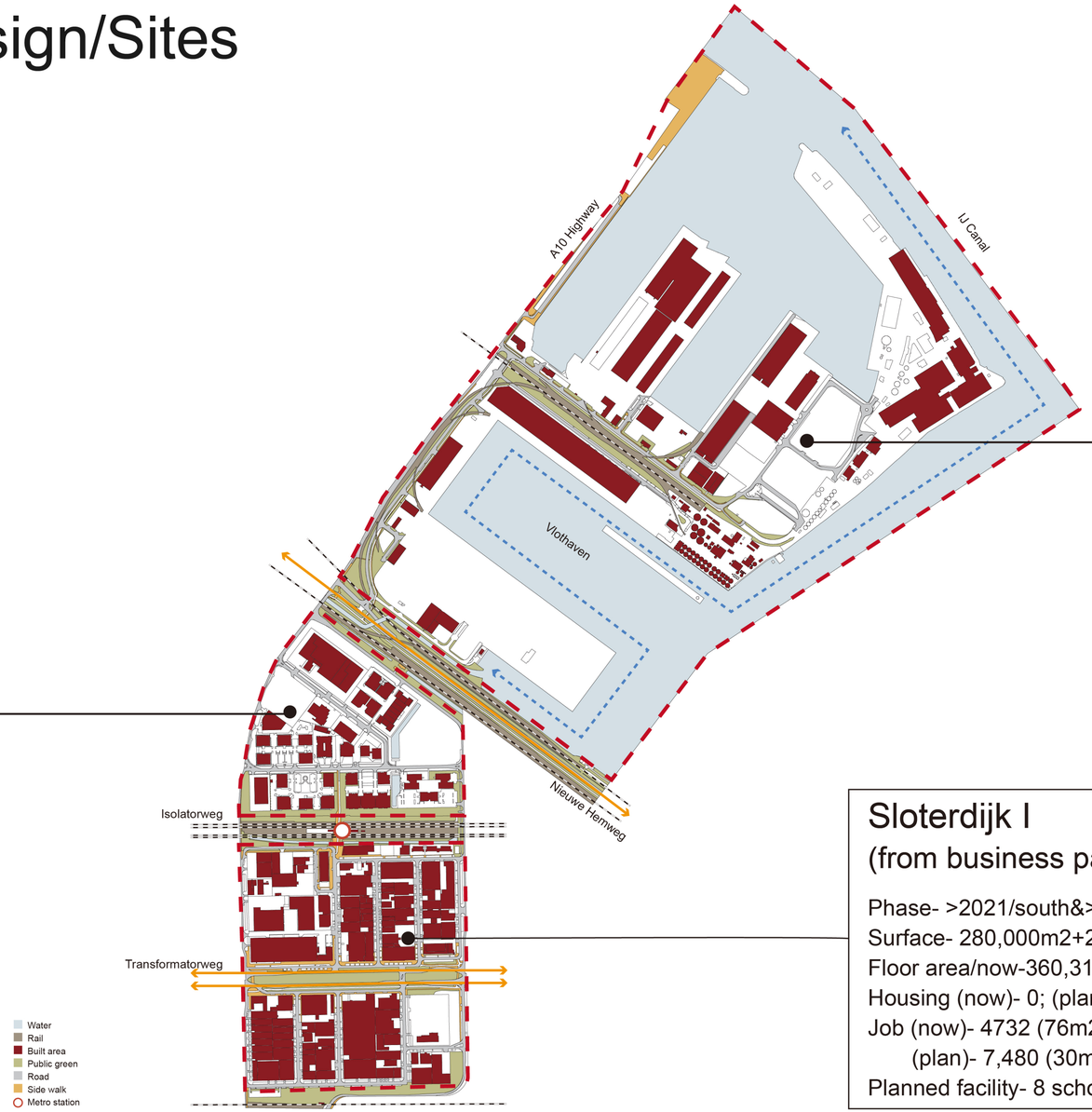
Why Havenstad?

- Strategic location
- Promissing size
- Ambition Plan

VII. Prototypes Design/Sites

Alpha Triangle
(Infrastructure; High-rise cluster)

Phase- >2029; Surface- 260,000m2
Floor area/now-5,437m2; plan-520,000m2
Housing (now)- 0; (plan)- 5,200 dwellings
Job (now)- 20 (61m2/per)
(plan)- 3,467 (30m2/per)
Planned facility- 4 schools;4 health care
26,000m2 sport



Coen & Vlothaven
(Island/Waterfront; Car-free)

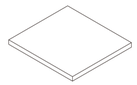
Phase- >2040
Surface- 770,000m^2
Current floor area-204,810m^2
Planned floor area-1,540,000m^2
Housing (now)- 0
(plan)- 15,400 dwellings
Job (now)- 869 (235m^2/per)
(plan)- 10,267 (30m^2/per)
Planned facility- 11 schools
11 health care
77,000m^2 sport

Sloterdijk I
(from business park to mixed urban area)

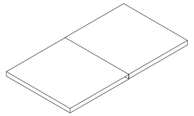
Phase- >2021/south&>2029/north;
Surface- 280,000m2+280,000m2
Floor area/now-360,311m2; plan-1,122,000m2
Housing (now)- 0; (plan)- 11,220 dwellings
Job (now)- 4732 (76m2/per)
(plan)- 7,480 (30m2/per)
Planned facility- 8 schools;8 health care;56,000m2 sport

VII. Prototypes Design/Process of Assembling

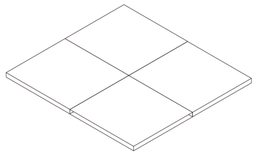
Functional Rooms



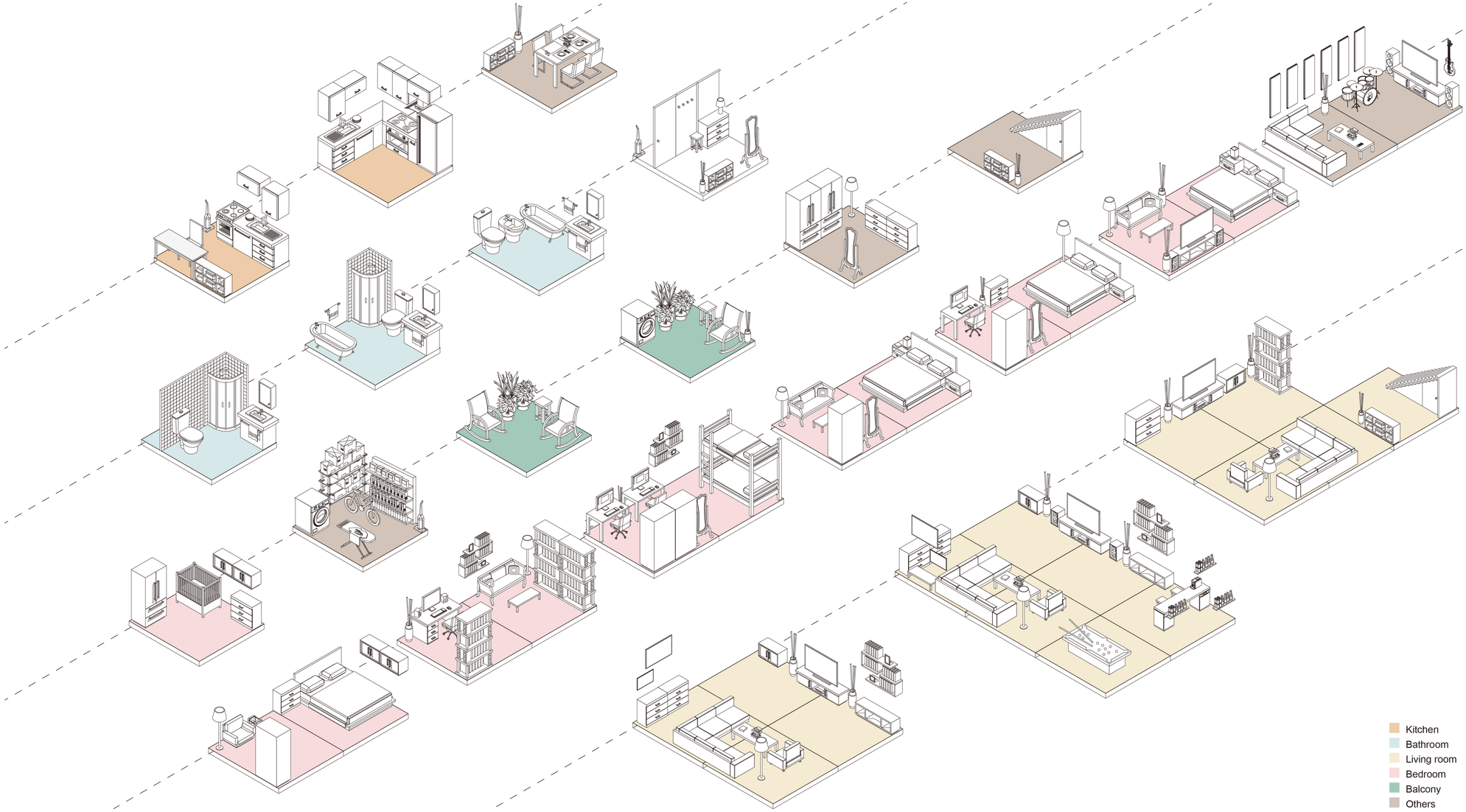
Modular unit of 5m²



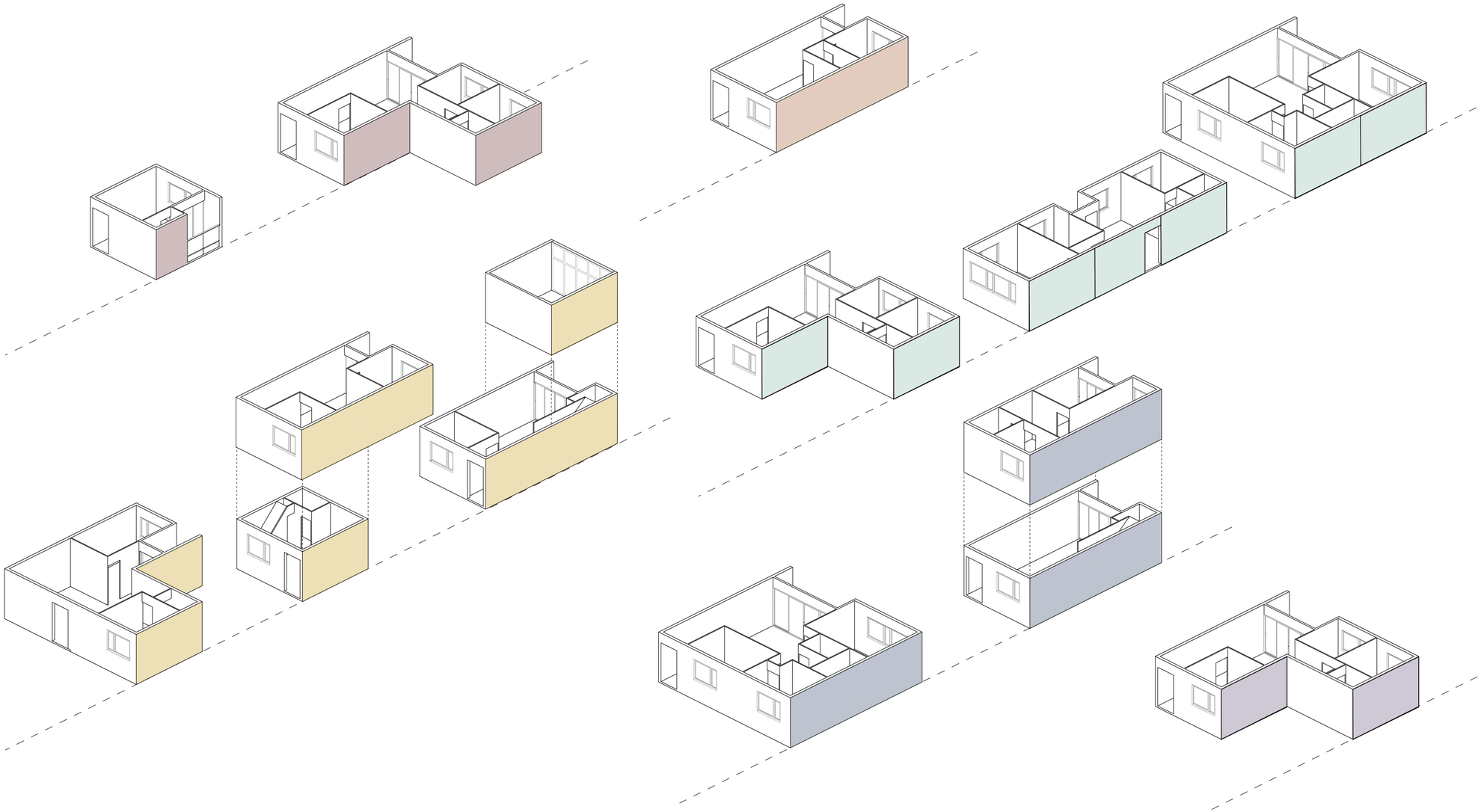
Modular unit of 10m²



Modular unit of 20 ~ 30m²



VII. Prototypes Design/Process of Assembling



Housing types

25m² studio
for a student
/75m² flats
for 3 students

50m² flat
for a starter

75m² flat/loft
for a couple

75m² /100m² flat
for a famliy

100m² flat/loft
for an expert

75m² flat
for a senior

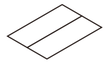
VII. Prototypes Design/Process of Assembling

Non-residential mobile programs

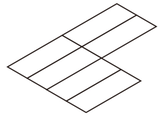
Modular unit of 30m²



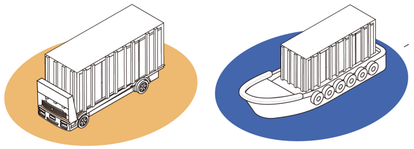
Modular unit of 60m²

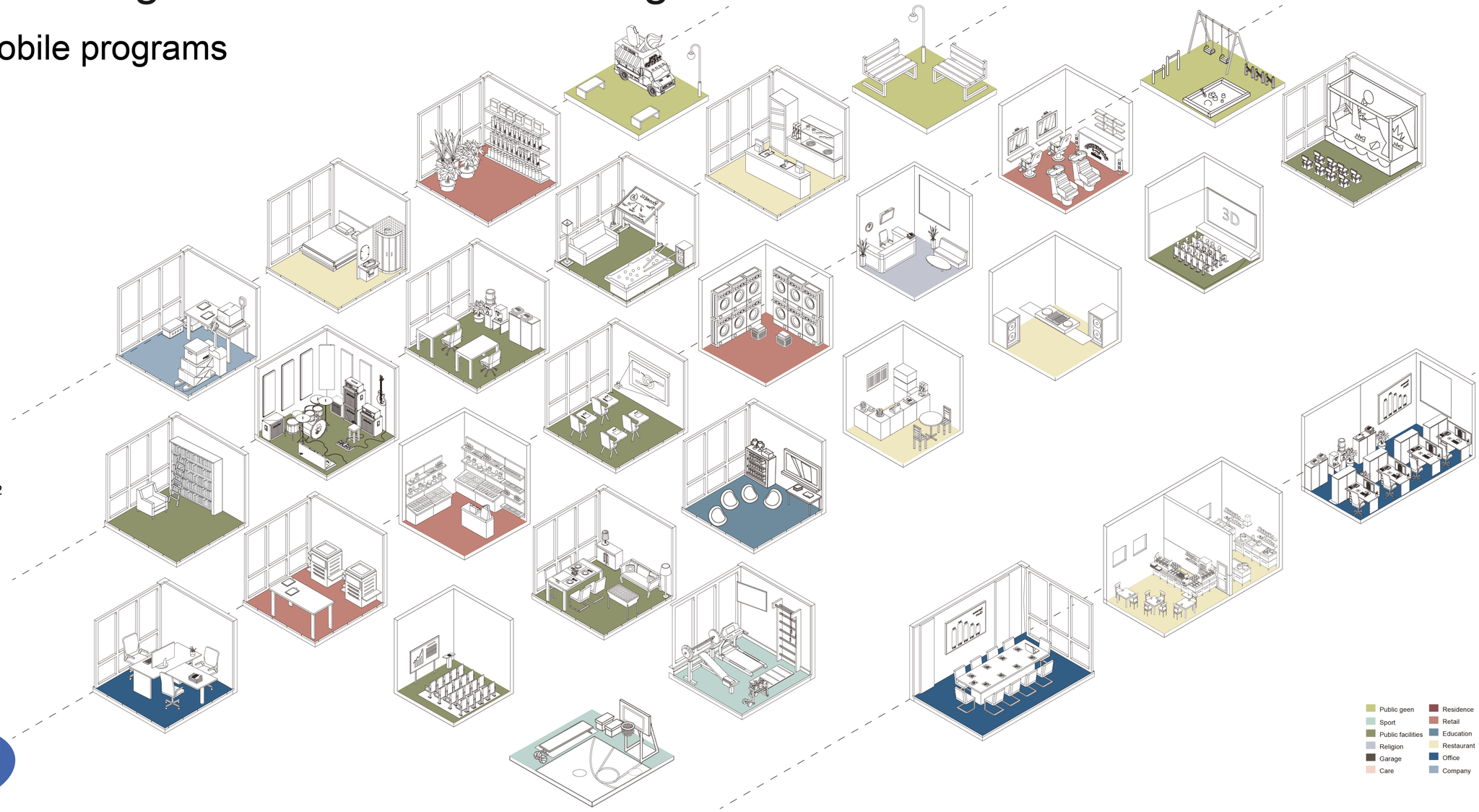


Modular unit of 60 ~ 200m²



2 mobile forms

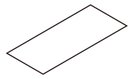




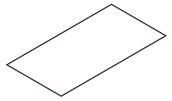
VII. Prototypes Design/Process of Assembling

Non-residential fixed programs

Modular unit of 500 ~ 2000m²



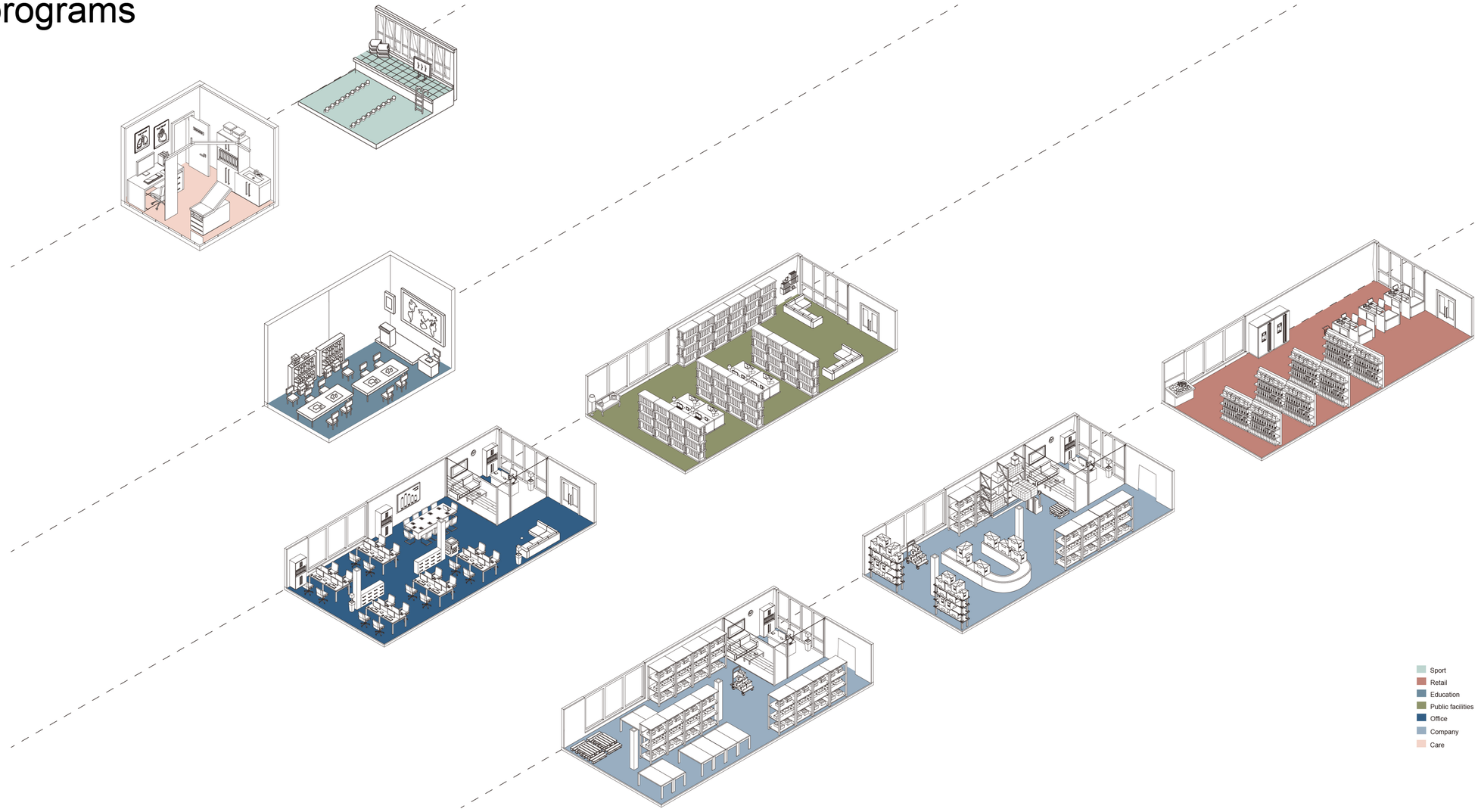
Modular unit over 2000m²



Make use of original buildings

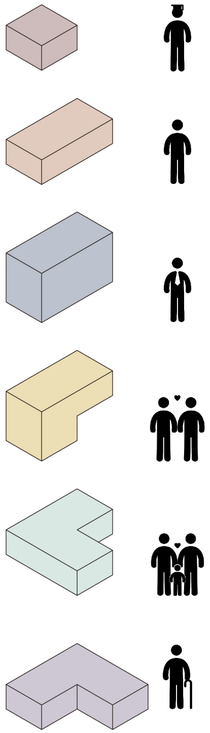


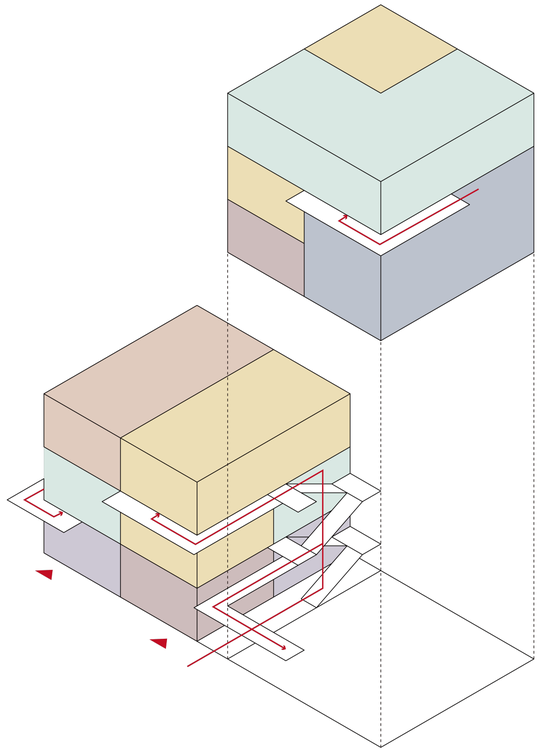
Large-scale industrial buildings

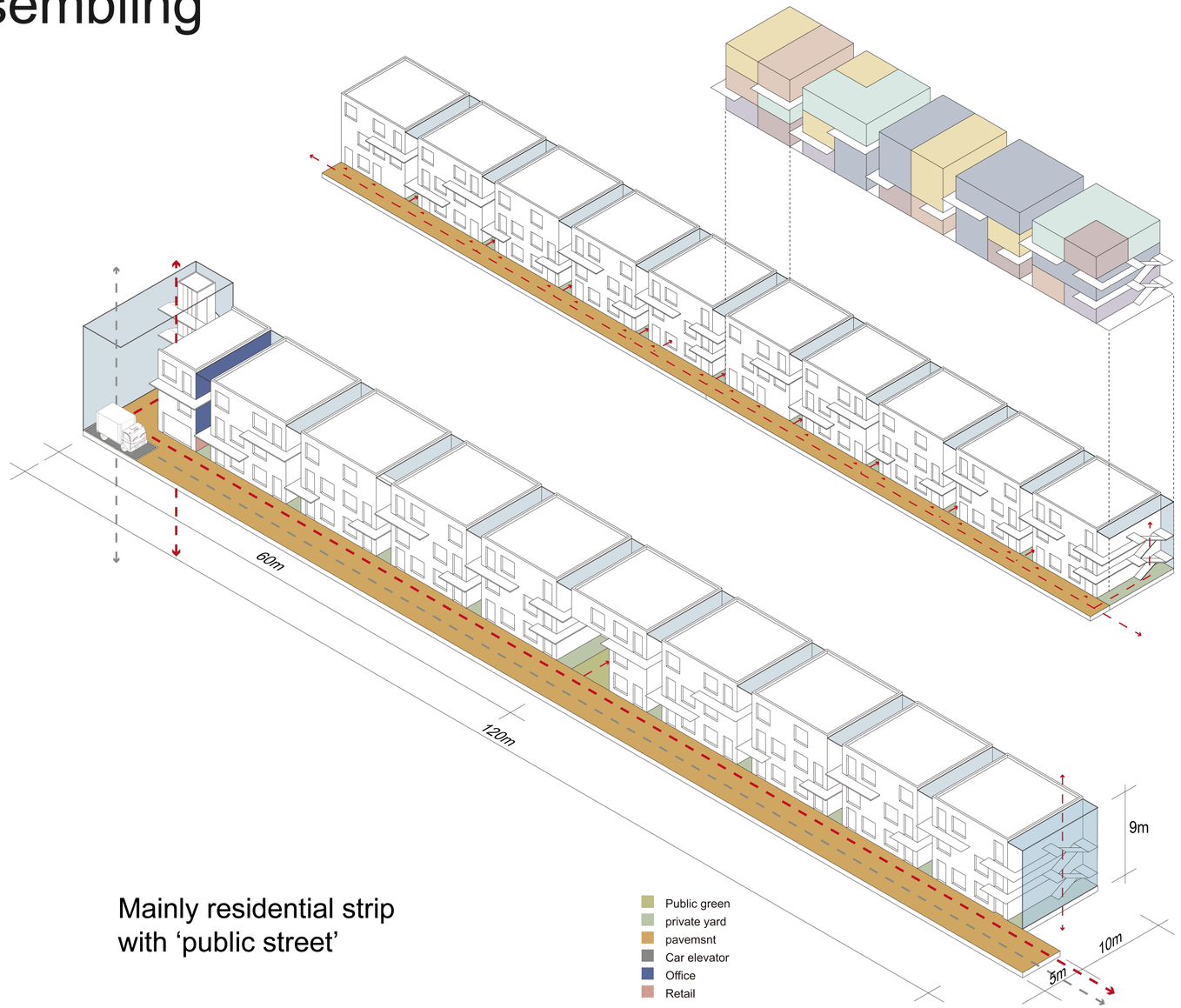


VII. Prototypes Design/Process of Assembling

Residential Strips







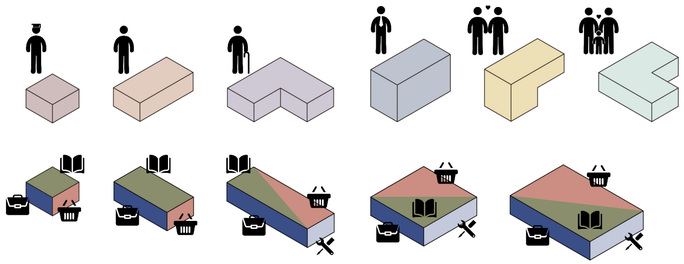
Diverse housing types

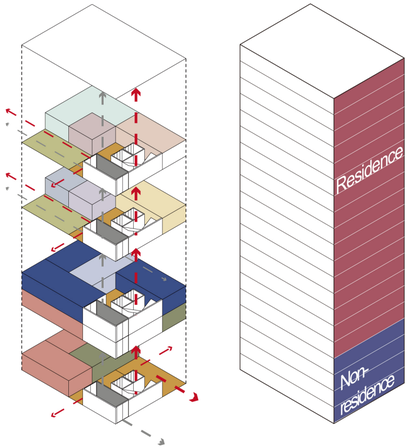
Mixed housing units with own access

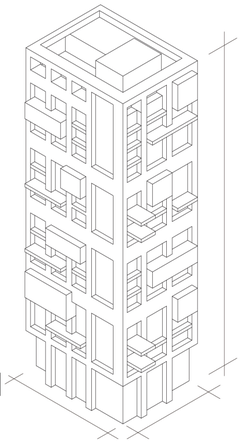
Mainly residential strip with ‘public street’

VII. Prototypes Design/Process of Assembling

Mixed Towers

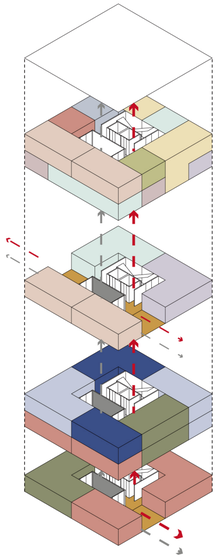






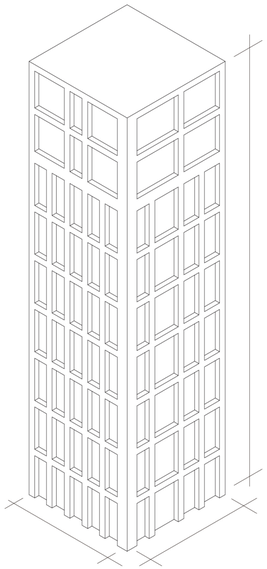
Public green
private yard
pavemsnt
Car elevator
Office
Retail
Company
Public facility

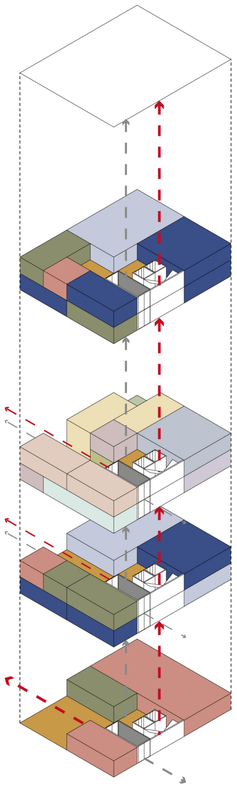
A.
60m tower
mainly residential

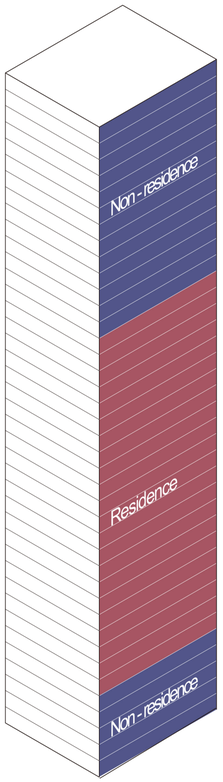




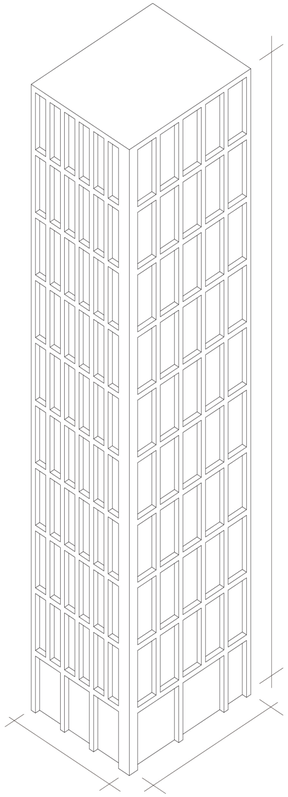
B.
80m tower
mixed-use







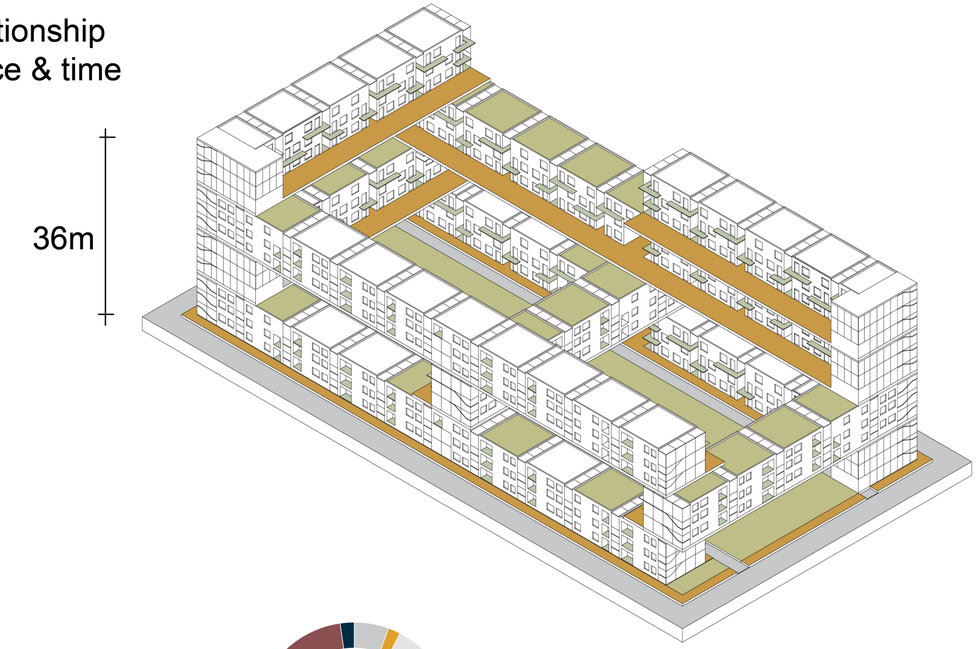
C.
100m tower
highly mixed



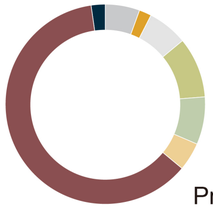
VII. Prototypes Design/Basic Block

New Residential Block

-Dynamic relationship between space & time



Motorway
Public paved space
Public open green
Private outdoor space



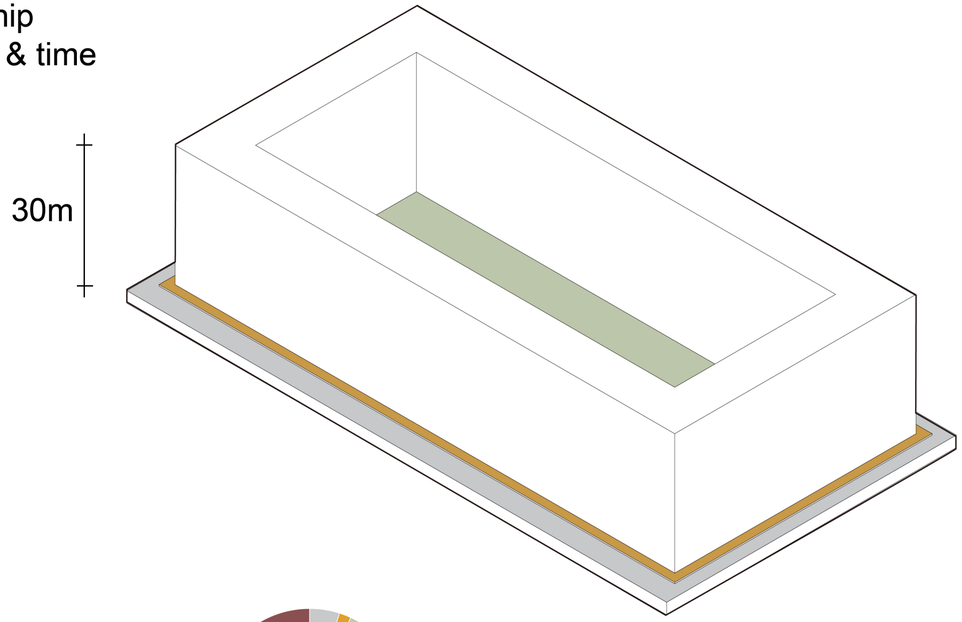
Program bar/All surfaces

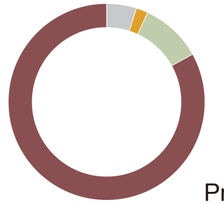
Private yard
upper pavement
Non-residence
Residence
Road
Pavement
Upper road
Public geen

FSI-2.86
GSI-0.24
L-12
OSR-0.27

Common Closed Block

-Fixed relationship between space & time



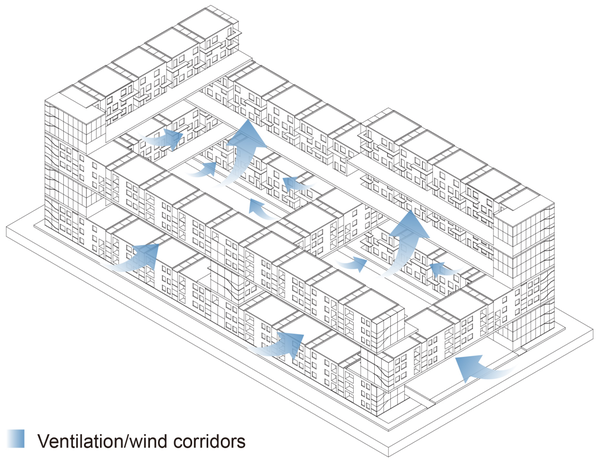


Program bar/All surfaces

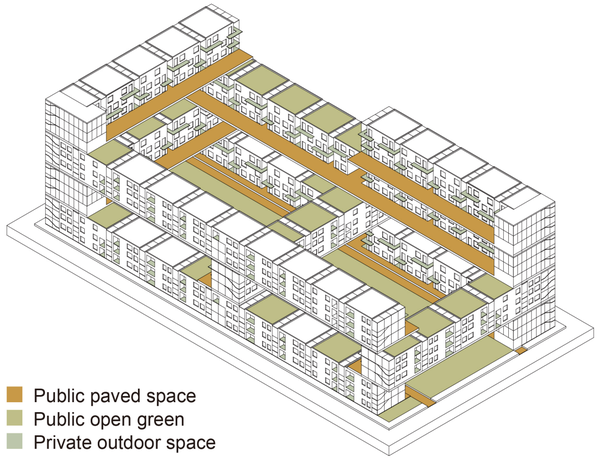
FSI-3.31
GSI-0.33
L-10
OSR-0.20

VII. Prototypes Design/Basic Block

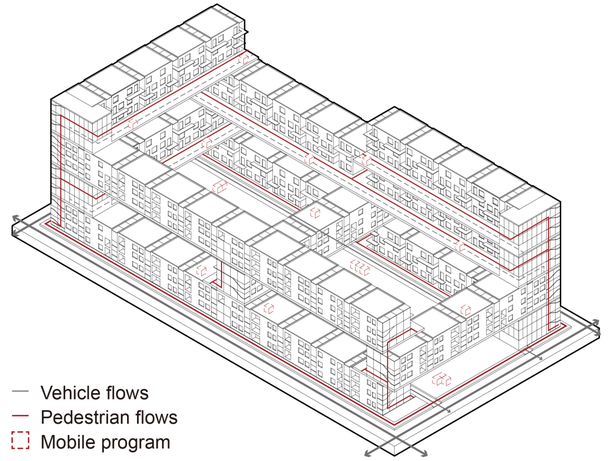
Interlaced Volume



Multilevel Public Spaces



Vertical Mobility

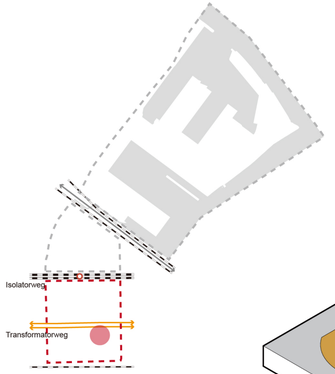


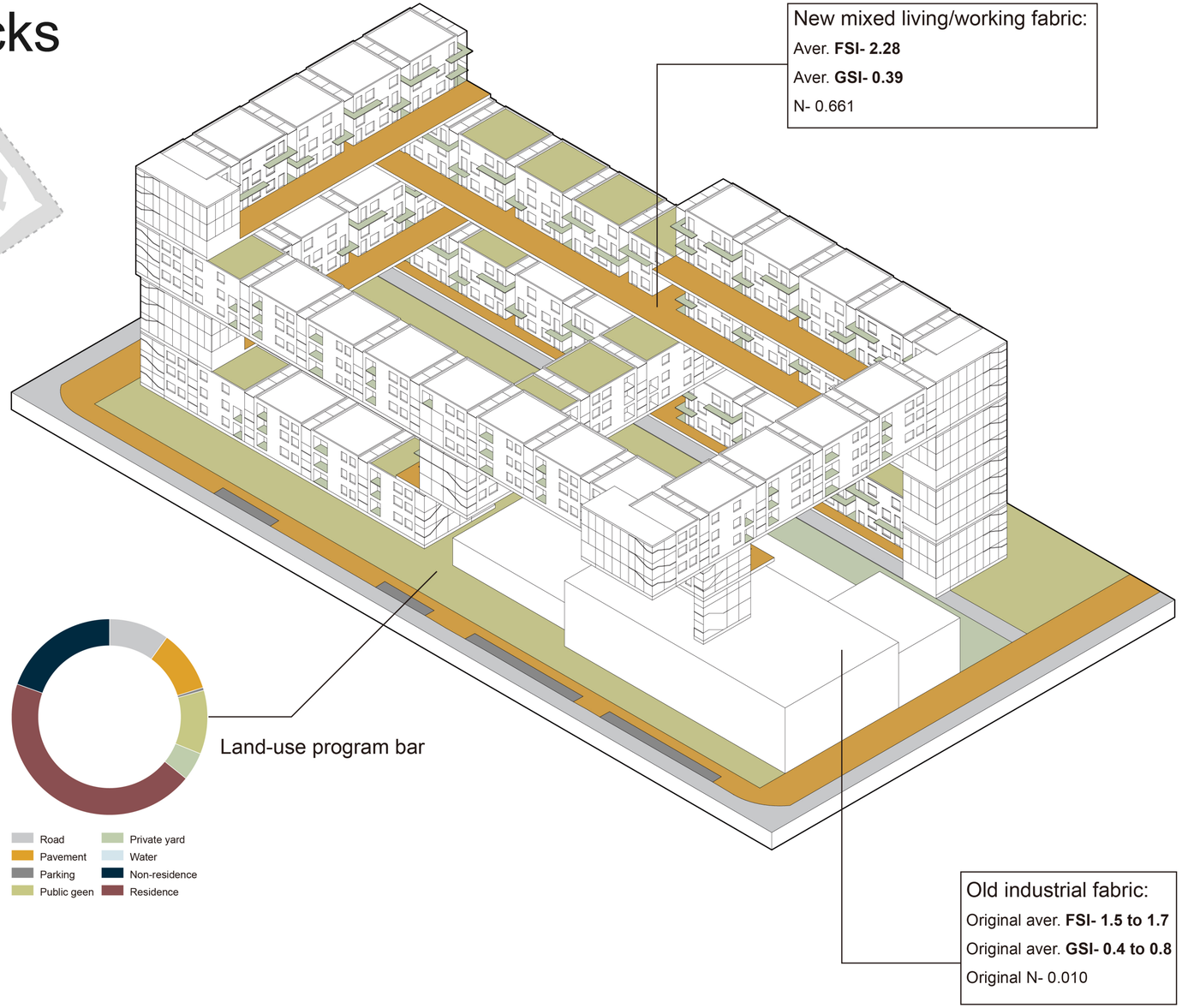
VII. Prototypes Design of Future Blocks

Sloterdijk I:

Mixed Urban Block

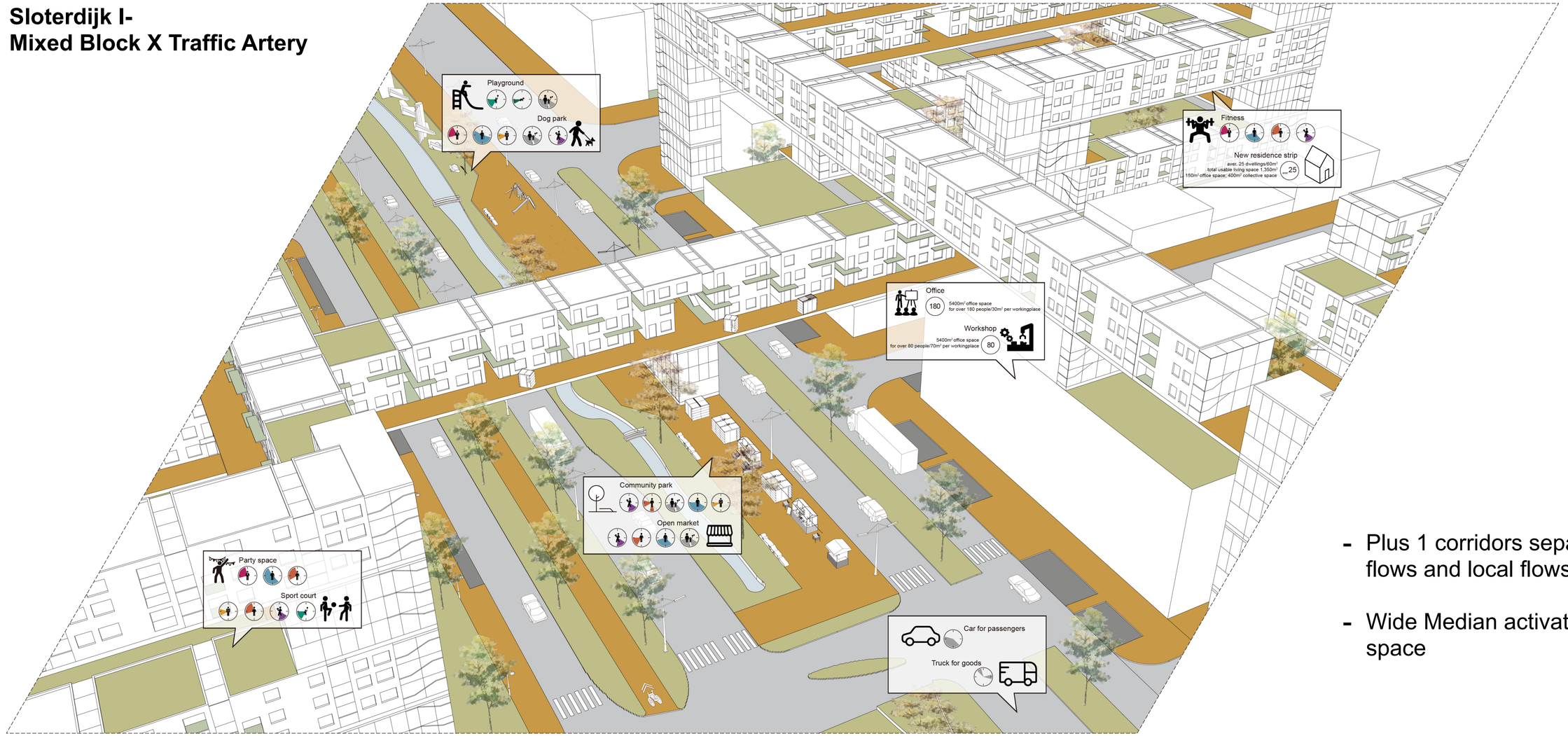
- Mixed of living & working & amenities
- Urban facade vs. Community residential interior





VII. Prototypes of Blocks on Contexts

Sloterdijk I-
Mixed Block X Traffic Artery



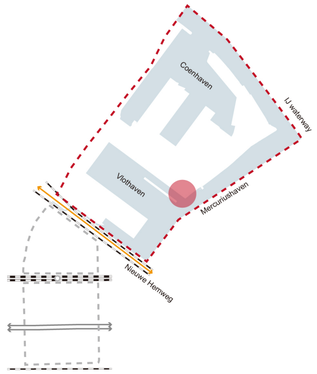
- Plus 1 corridors separates cross flows and local flows
- Wide Median activated as public space

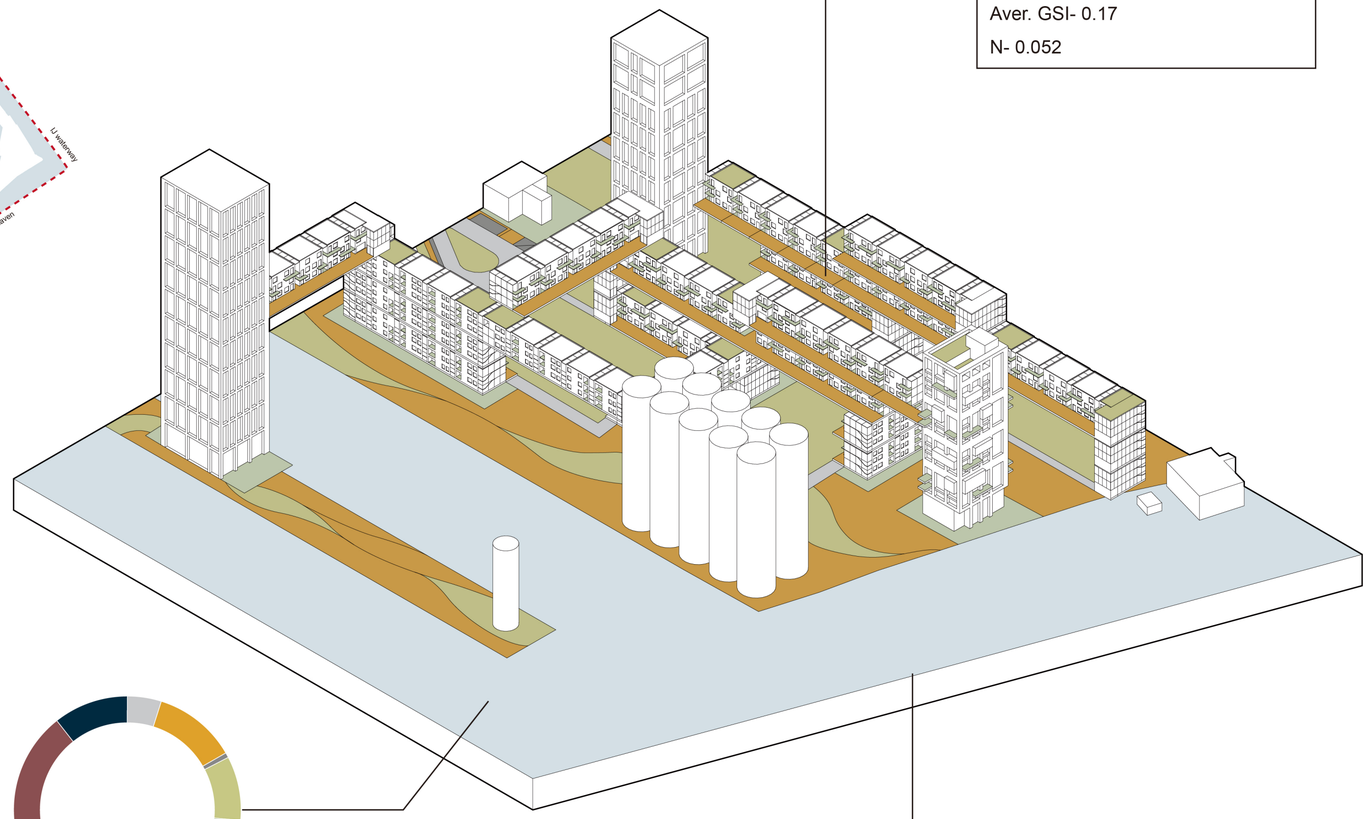
VII. Prototypes Design of Future Blocks

Coen&Vlothaven:

Public Waterfront Block

- Waterfront for community & for city
- Make use of water and dockland





New waterfront fabric:
Aver. FSI- 2.01
Aver. GSI- 0.17
N- 0.052

Land-use program bar

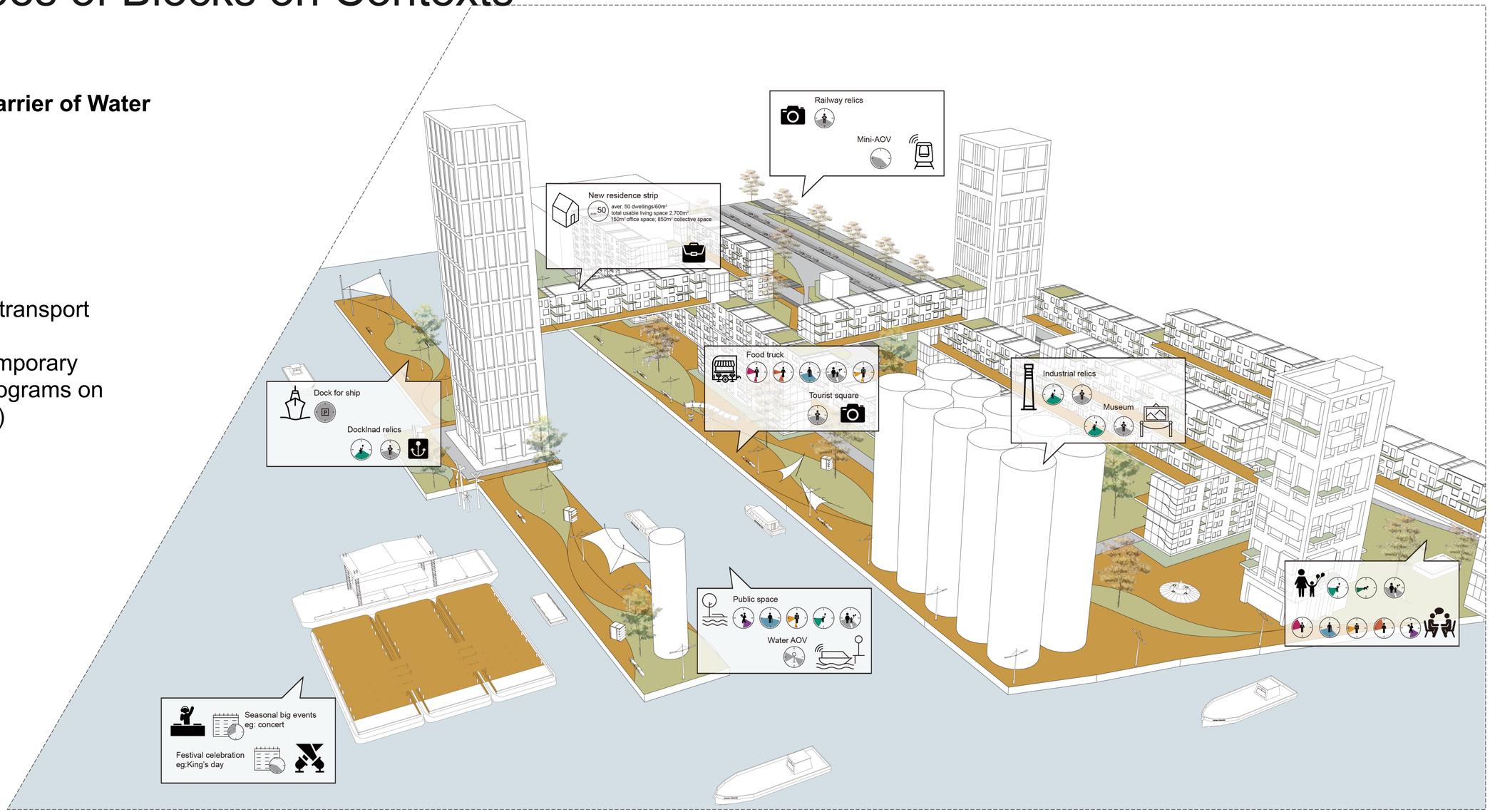
Road
Pavement
Parking
Public geen
Private yard
Water
Non-residence
Residence

Old port fabric:
Original aver. FSI- 1.7
Original aver. GSI- 0.2 to 0.4
Original N- 0.006

VII. Prototypes of Blocks on Contexts

Coen & Vlothaven-
Public Waterfront X Barrier of Water

- Waterways for water transport
- Water surfaces as temporary ‘stages’ for mobile programs on water (eg: big events)

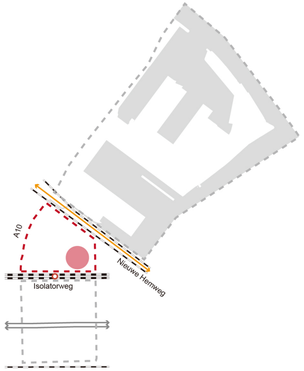


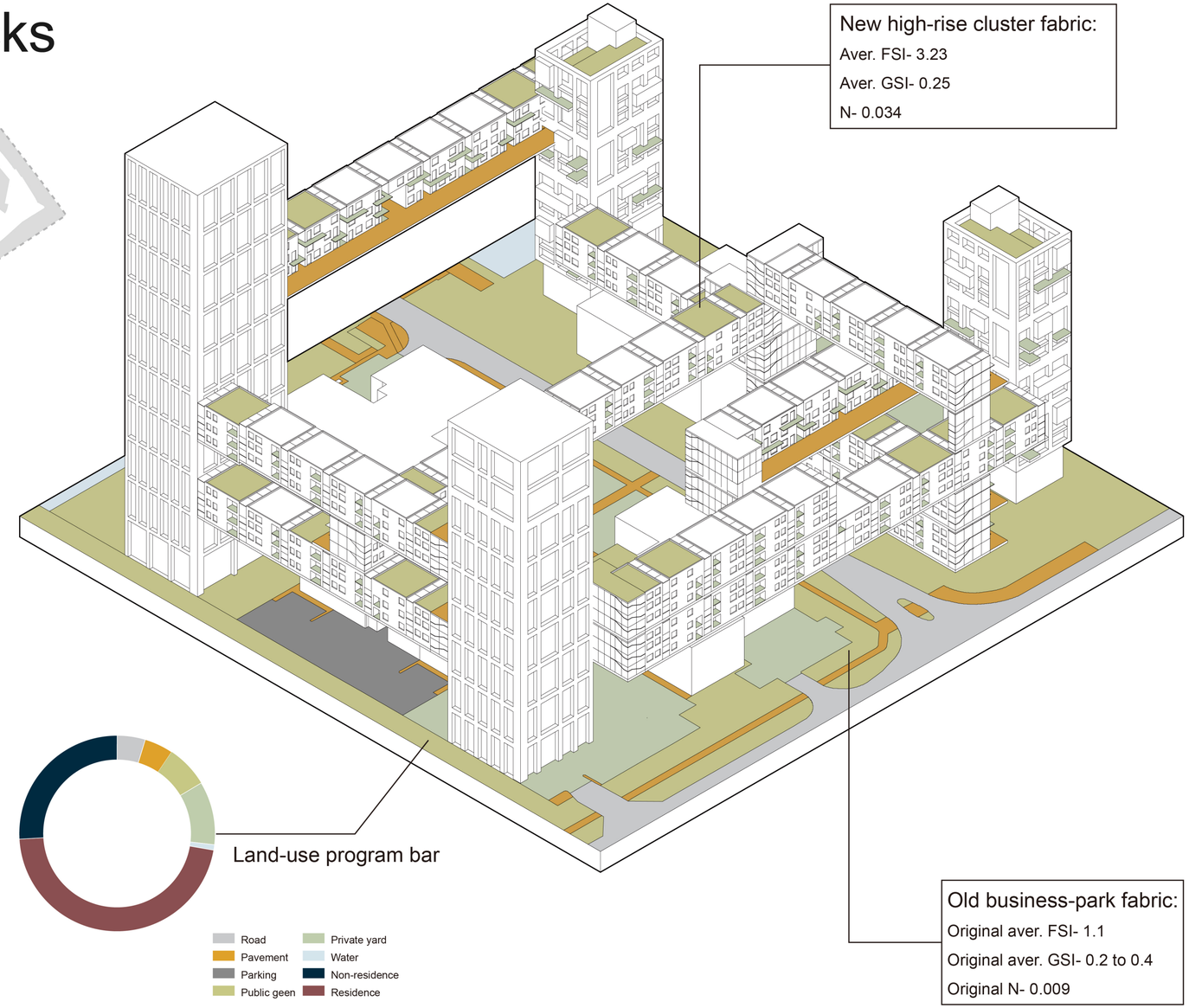
VII. Prototypes Design of Future Blocks

Alpha Triangle:

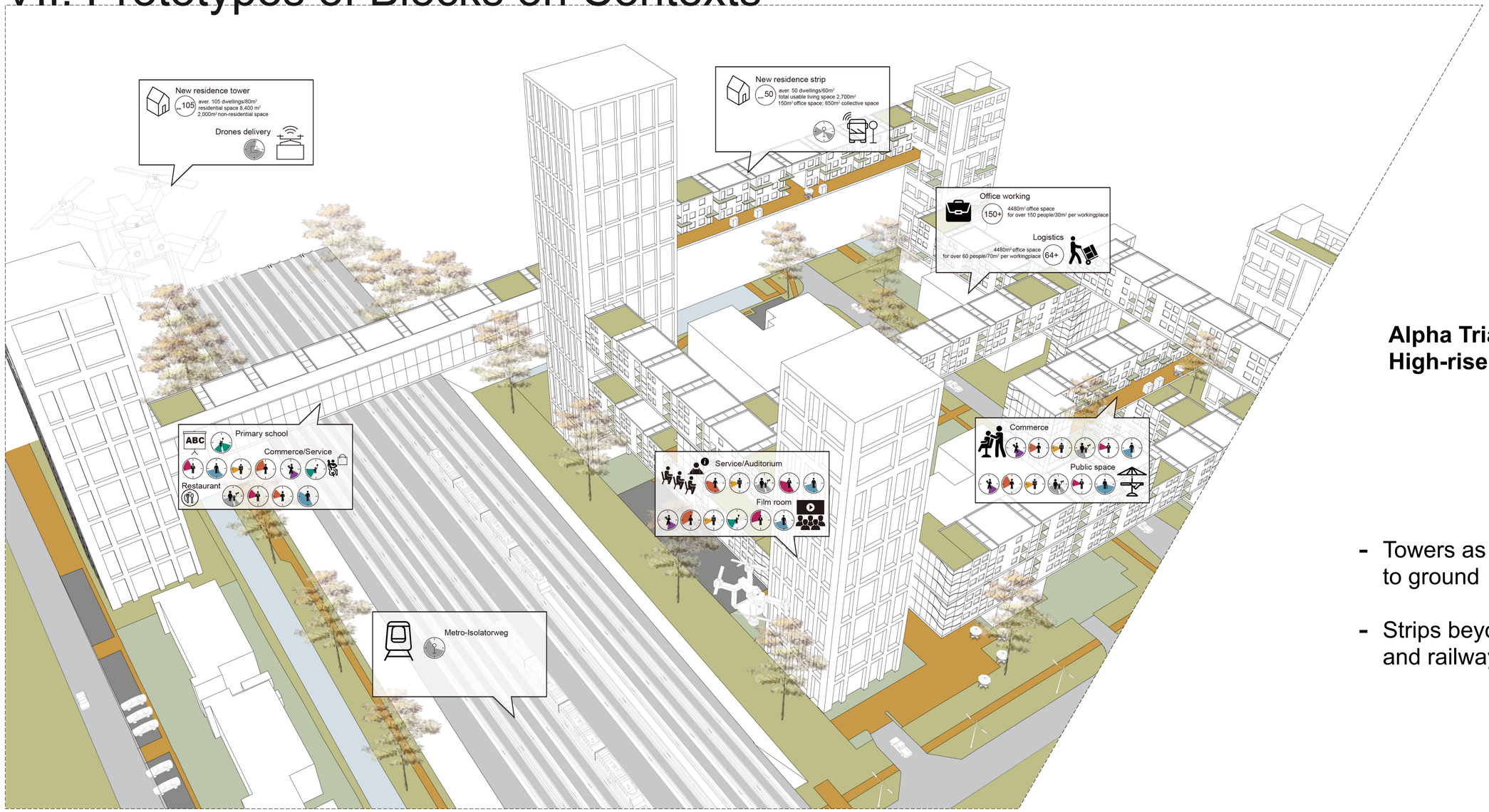
High-rise Floating Block

- Built beyond original office business park
- Towers as roots & strips as braches floating above





VII. Prototypes of Blocks on Contexts



Alpha Triangle-
High-rise floating block X Rails

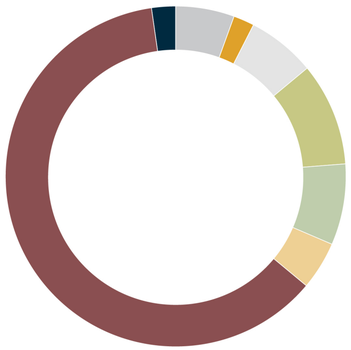
- Towers as pilling for connection to ground
- Strips beyond original offices and railways

Conclusion & Reflection

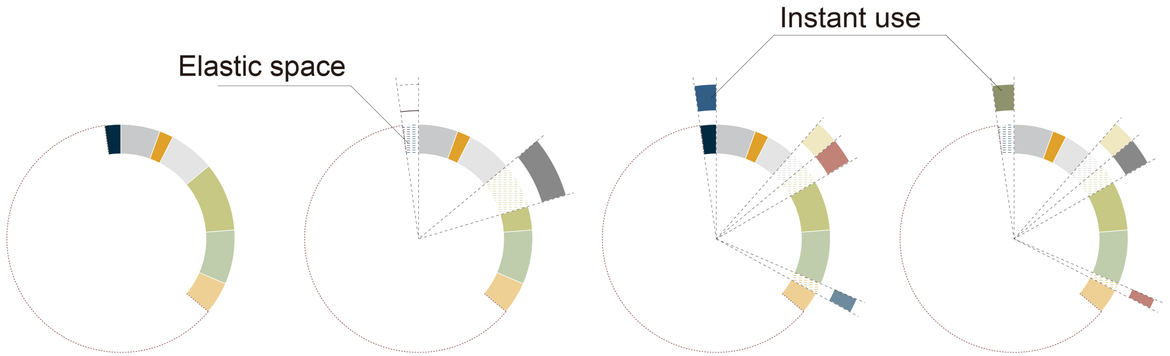
Features of Future Blocks

- Vertical network/Multilevel public network
- **Flexible mobile programs**

Elastic space



Program bar
/All surfaces



Non-residential designed surfaces

Before 7am

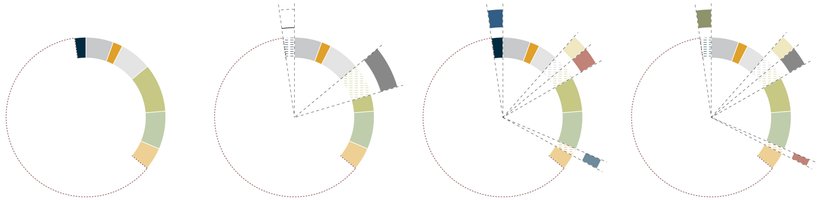
9am - 5pm

After 7pm

Road
Pavement
Public geen
Private yard
Non-residence
Residence
Residence
Retail
Education
Sport
Public facilities
Religion
Restaurant
Office
Parking
Garage
Care

Reflection/Further Research

Elastic space



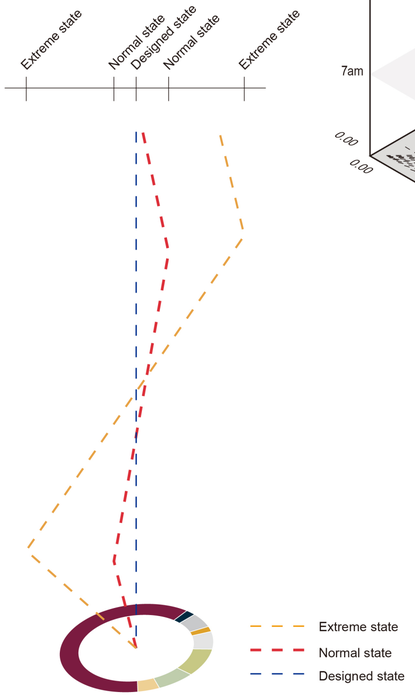
Non-residential designed surfaces | Before 7am | 9am - 5pm | After 7pm

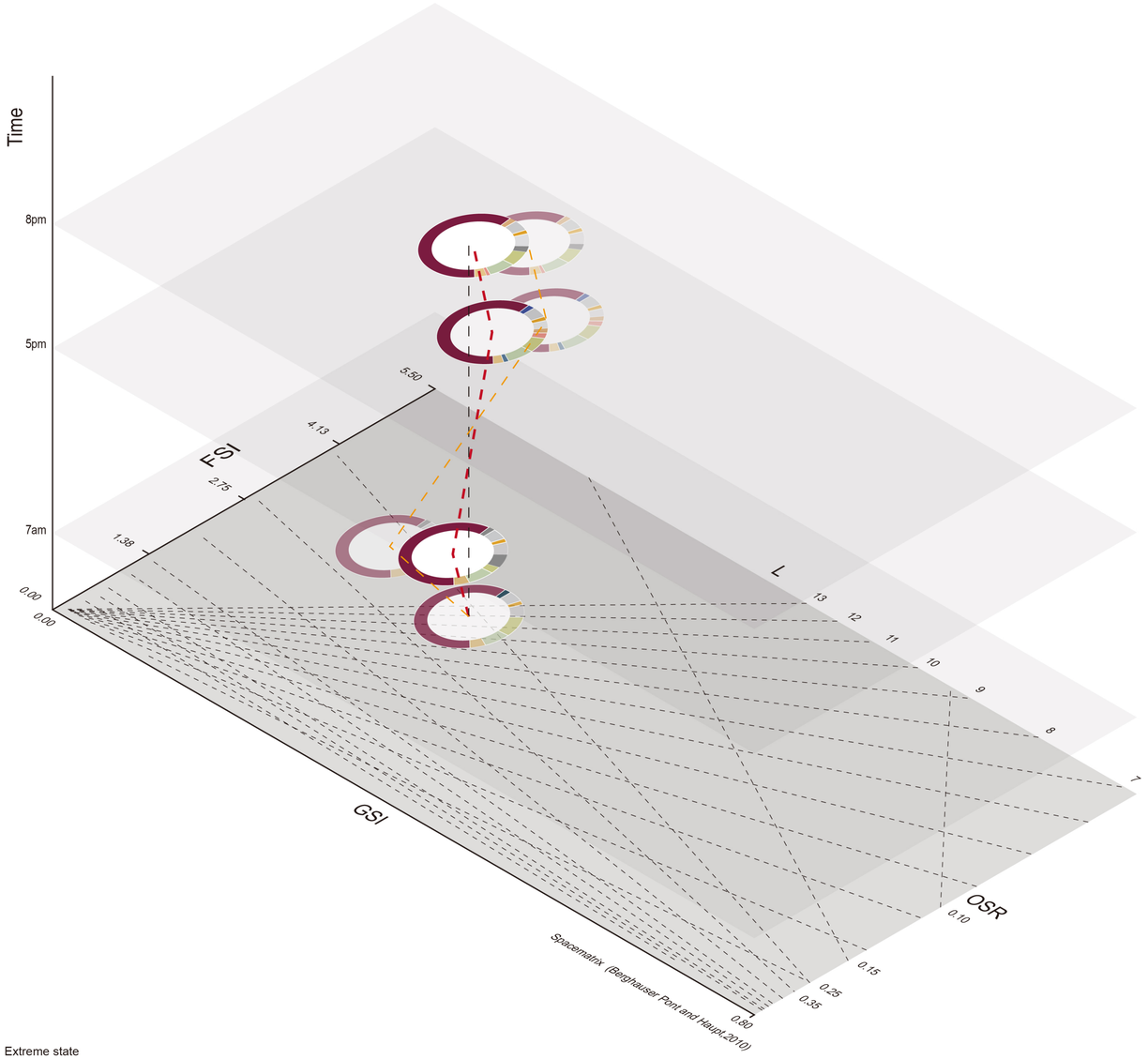
Range of density

0. Designed layout & Initial state of density

1. Common change & Normal state of density

2. Occasionally change & Extreme stat of densitye





謝謝!

Dank Je!

Thank You!