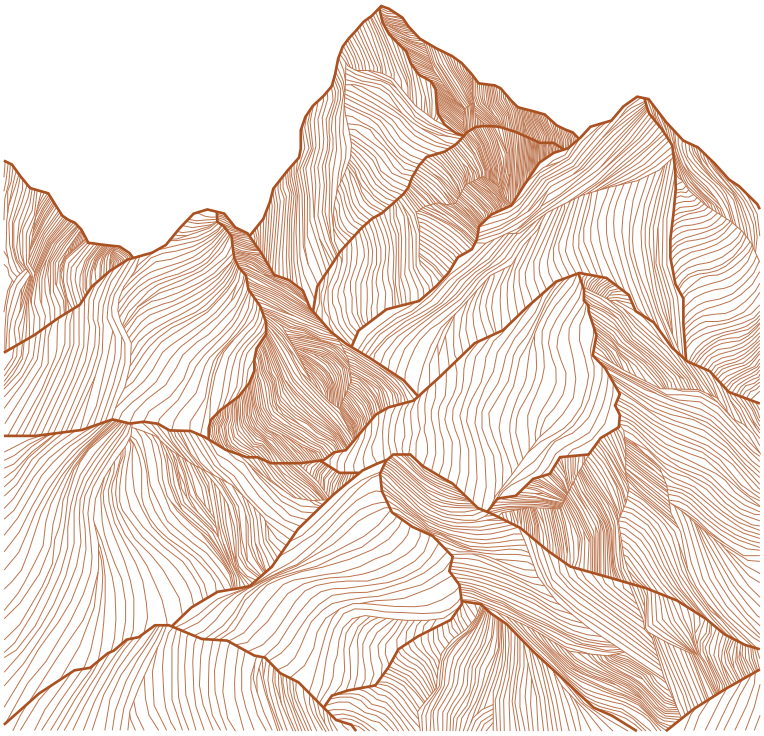
dwellings in lishui mountains



新居住区

麗水市

zhejiang, china: a housing prototype

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Politecnico di Torino

POLITECNICO DI TORINO
Master of Science in Architecture Construction City
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zhejiang, china: a housing prototype

supervisor: sampieri angelo
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candidate: guedes trotta angelina

Thank you!
To my advisors at PoliTo, for your vast expertise and support.
To all my professors and leaders, for teaching me to persist.
To the university staff, for working endlessly to guide us.
To my friends and colleagues, for walking alongside me.
To my family, for giving me a piece of the world.

abstract

This dissertation is the final product of a collective work done by students and professors at the Politecnico di Torino. The research group was created with the aim of making analyzes and proposals for the new urban plan of Lishui, China – after participating with the South China University of Technology in the contest whose theme was 'Future ShanShui City: International Urban Design Competition – Dwellings in Lishui Mountains'.

Subsequently to a brief moment of group work, each student went deeper into a specific question from Lishui new urban plan - which resulted in this thesis, focused on the housing issue of the elevated part. During the contest, the city masterplan was divided in three major areas: agricultural valley, dwelling on the mountains and ecological reserve. In order to promote reflections on the second topic, efforts were made to ascertain, diagram and exemplify what this new dwelling could be.

Therefore the idea is to explore a prototype "Dwellings in the Mountains", represented by the new residential settlements of Lishui – placed like a ring at the foot of the mountains. These typologies interpret the traditional urban block with a central gap space, lifted above the infrastructures and connected to the topography. It was intended to analyze how this block organizes the distribution of housing and services, along with local and metropolitan mobility. This vertical mixed building seeks to promote communication, reduce energy consumption and enrich places.

Besides studying this proposed system – which integrates mountains, housing and urban infrastructure –, some case studies were also analyzed, both in theory and practice, complementing the research. In addition to these, the first part comprises a succinct study of urban conditions in China, contextualizing Lishui and explaining the premises of the competition held in 2020, which gave life to such studies. Following this path – theory, examples and propositions – the dissertation was built up and hereby presents the features and challenges of a new Lishui.

key words

dwellings, urban block, Lishui, housing prototype, urban China

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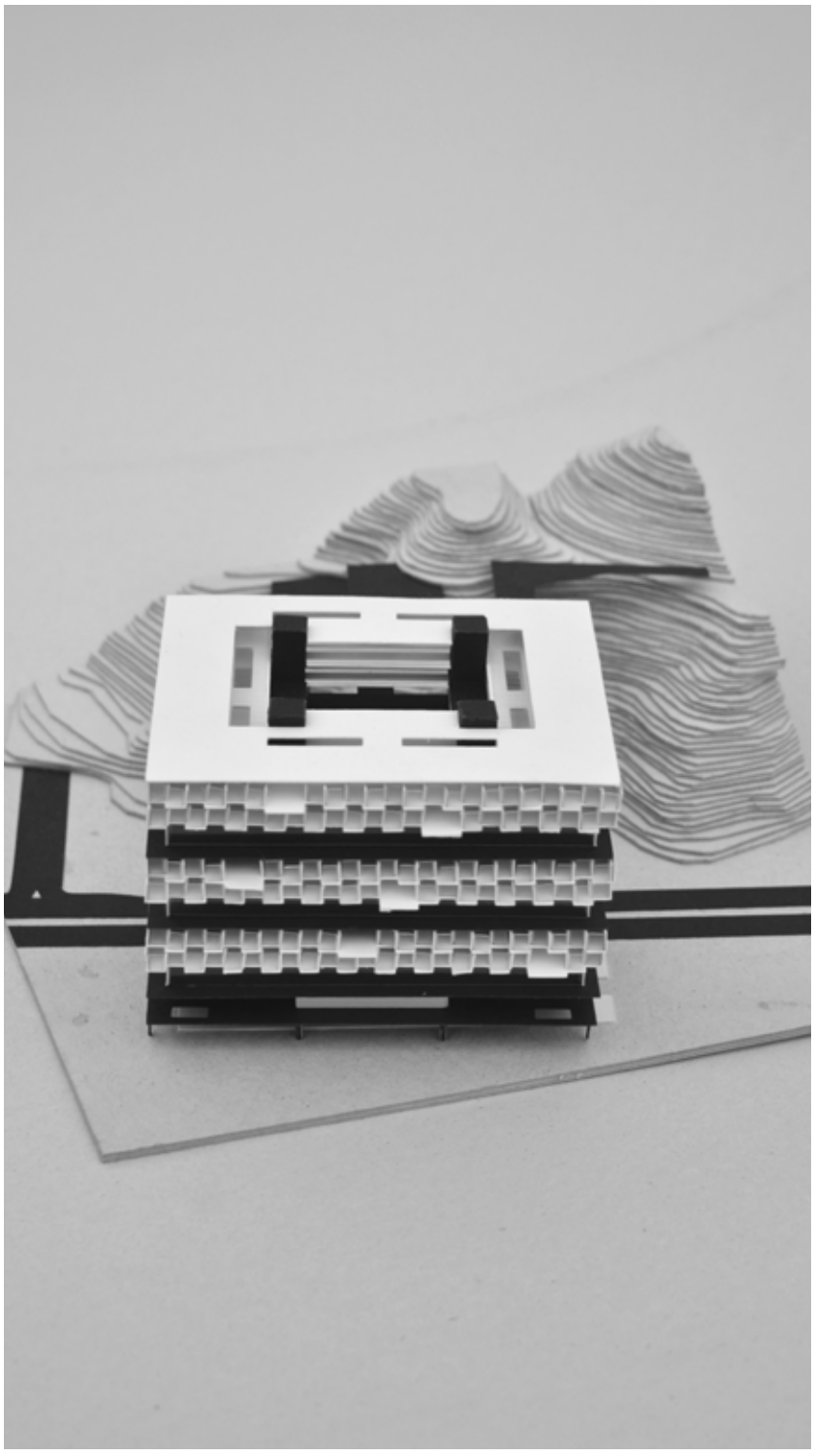


This City is permanent; there is no reason that the buildings should ever be replaced. The eerie calm of their exteriors is ensured through the Great Lobotomy. But inside, where the Vertical Schism accommodates all possible change, life is in a continuous state of frenzy.
(Rem Koolhaas 1978, 177)

01
intro

1.1 introduction

The city of Lishui is situated in the southwest of Zhejiang province, 120 kilometers from the east coast of China and 450 km from Shanghai, largest city in the country. Its name refers to 'beautiful waters', being the city occupied by the Ou River (Oujiang) and surrounded by a mountain range. Characterized by this intense relation to nature – and enjoying beautiful landscapes – the city also contains traditional village clusters, marked as tourist spots conducive to observing and experiencing ancient customs and traditions. Lishui is even known for hosting an artistic community called Lishui Barbizon, that allows artists to preserve this village life through open air sketching and practices. These experiments of cultural city making, endorsed by a celebration of Lishui natural landscapes, are tuned to the national campaign to promote cultural cities and their regeneration in China.

The city's occupation dates from 4000 years ago, when a few tribes lived in the area which was then called 'Chuzhou'. Over most recent decades, Lishui municipality has seen a growing development in sectors of industry (bamboo, textile, pharmaceuticals and electronic machinery) and agriculture (edible fungi, dried and fresh fruit, tea, sericulture, herb medicine and vegetable). Its population today goes around 2,6 million people – whilst efforts had been made to promote Lishui City as "home to health-preserving and longevity with its picturesque sceneries" (In Zhejiang, 2019).

Inserted in a widespread context where cities become a country's economic growth instrument (Gaubatz and Wu 2012, 273), Lishui is only one of many Chinese cities that since the beginning of 21st century had undergone redesign and new urban plans. Besides these actions, new cities are built each year, while the "The Belt and Road" initiative helps to promote connectivity and rebalance the gap between different regions in China. The cultural exchange and integration that are possible due to "The Belt and Road" reinforce the studies of urban premises and characteristics in China, giving rise to many other fields of investigation.

In this way, the city has been one of the national stages to explore the concept of *ShanShui* cities, an idealized Chinese worldview that encompasses a lifestyle balancing tradition and modernity, as well as nature and artificiality (in other words, integration of

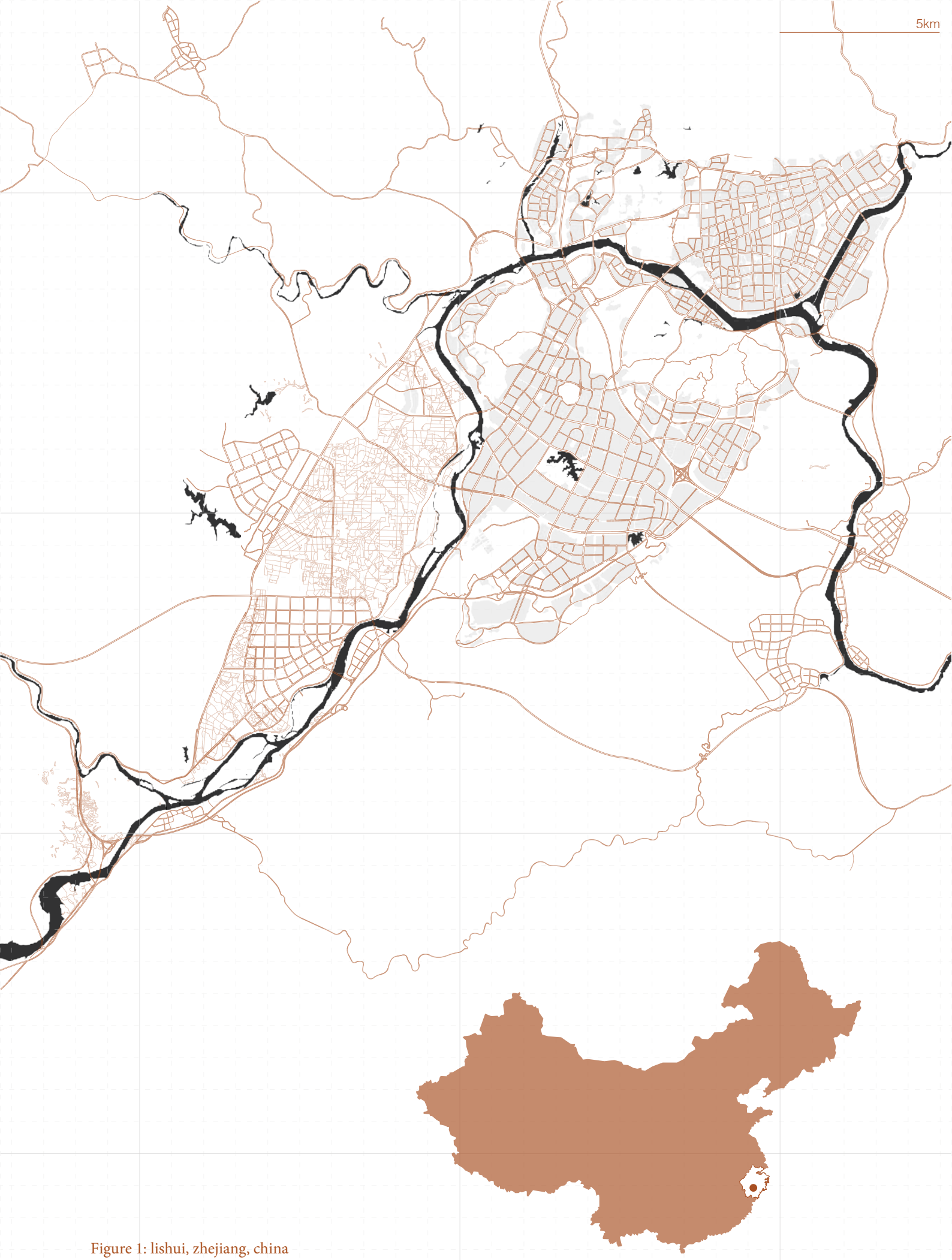


Figure 1: lishui, zhejiang, china

man and nature). Combining the exclusive natural panorama, the millennial relationship with the territory and sustainable urban planning strategies, Lishui has a great potential to build a status as a 'traditional Chinese *ShanShui* city'. In that sense, waterfront urban life, a sheer countryside and the mountain scenario would compose a unique landscape.

With this background, in 2019 the People's Government of Lishui City started working on the 'Future *ShanShui* City: International Urban Design Competition – Dwellings in Lishui Mountains'. The competition was launched the following year, establishing as a goal a masterplan urban design for Lishui, as well as detailed urban design applied to core areas. The proposals should implement spatial guidelines exploring new patterns of future *ShanShui* cities, without compromising the environmental integrity of the mountains and historical villages.

As one of the competitors, the group formed by Politecnico di Torino + South China University of Technology won the third prize, presenting the 'Prosperous Lishui'. The overall result was a new metropolitan area that moved its core from the old city to a large central agriculture park conceived as a huge, highly specialized and technological platform for production, research and leisure. The general plan consists of three main zones – the valley, the residential settlements and the ecological system – adapting to the existing city and its infrastructure.

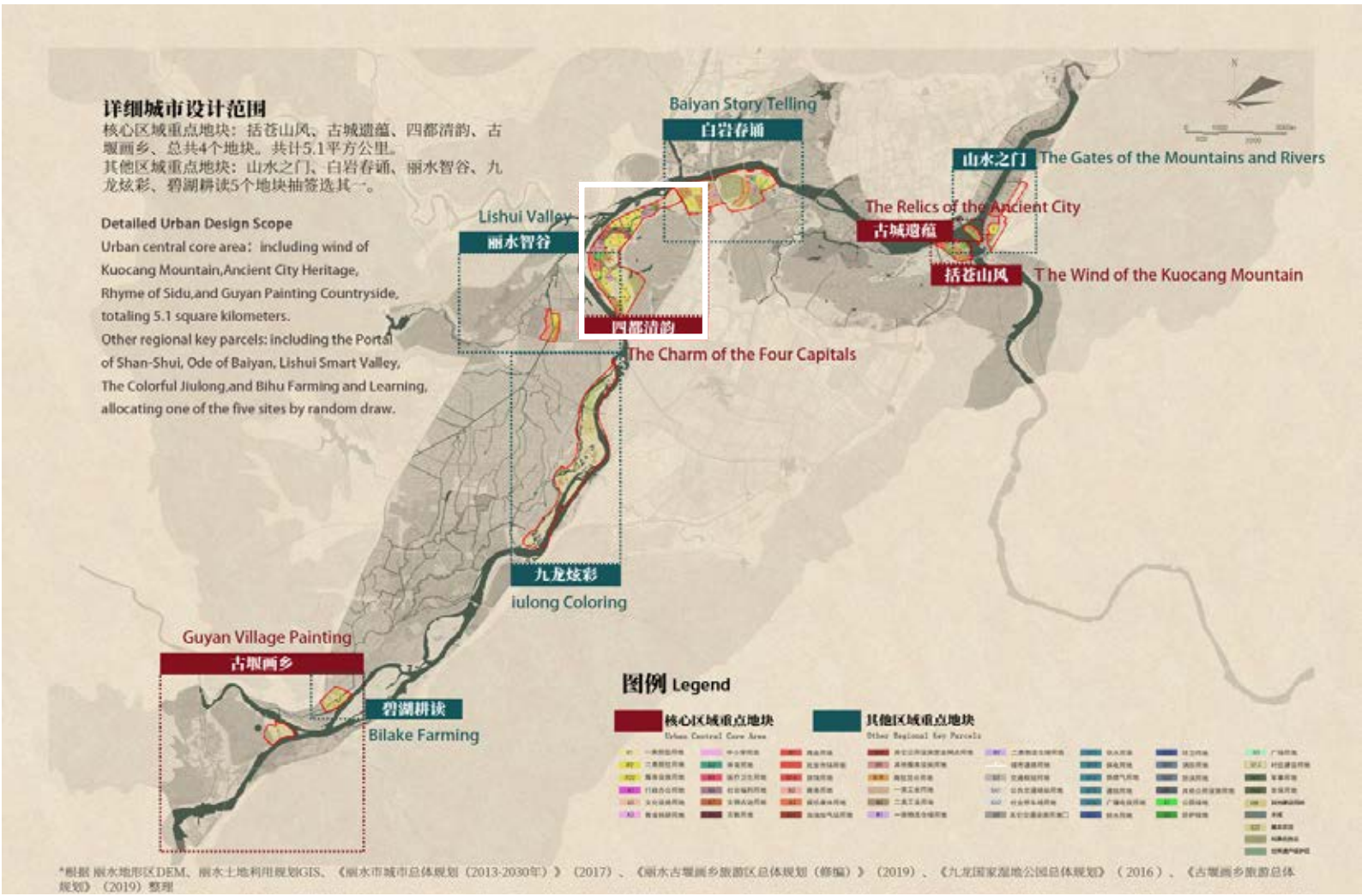
Urbanization thus smoothly permeates the countryside and mountains, generating a mosaic with a network of rural and urban spaces, constituted by built area, mobility system and open spaces. As an important part of this mosaic, the settlements climbing the mountains aim at moving the urban density from the (agricultural) valley to the foothills, preserving this central plain and the ecological corridor of the Ou River. This is a strategy derived from principles of the European valleys, but also inspired by the history of linear urbanization. As cited in the Competition Booklet (2020, 15), "the counterpoint between great geometrical forms and the complex organic shapes of the geomorphology has often been a matter for radical experimentations in architecture". And it's in this strand of housing, contextualized by such specific conditions, that the thesis will deepen.

Figure 2: Silk Road Belt and Maritime Silk Road
Source: https://www.silkroadbriefing.com/the-belt-and-road-initiative.html

Figure 3: Yunhe Rice Terrace by Xu Li Photo, Courtesy of Lu Zhengyuan
Source: https://www.globaltimes.cn/content/1149555.shtml

Figure 4: Lishui aerial view, 2021
Source: Chaojin Ruan, Chenfei Liu, Ming Zhao

Figure 5: Lishui aerial view, 2021
Source: Chaojin Ruan, Chenfei Liu, Ming Zhao



*根据 丽水地形区DEM、丽水土地利用规划GIS、《丽水市城市总体规划（2013-2030年）》（2017）、《丽水古堰画乡旅游区总体规划（修编）》（2019）、《九龙国家湿地公园总体规划》（2016）、《古堰画乡旅游总体规划》（2019）整理

1.2 competition

The proposal submitted to the international competition was named 'Prosperous Lishui', a masterplan seeking to explore the city as the ideal site to practice the relation between nature and artificial uses – as well as conservation and innovation. Working on new possibilities for this urban model, the proposal aspired to emphasize the *ShanShui* City concept by maintaining the existing heritage and environmental principles. The research group visualized the system for this proposition as an intricate network, where urban areas, agricultural land, and natural reserves should coexist. Ideas like "urbanized countryside" and "linear city" were discussed to help conceive the texture for Lishui mosaic, resulting in the mentioned division of three major areas: agricultural valley, dwelling on the mountains and ecological reserve.

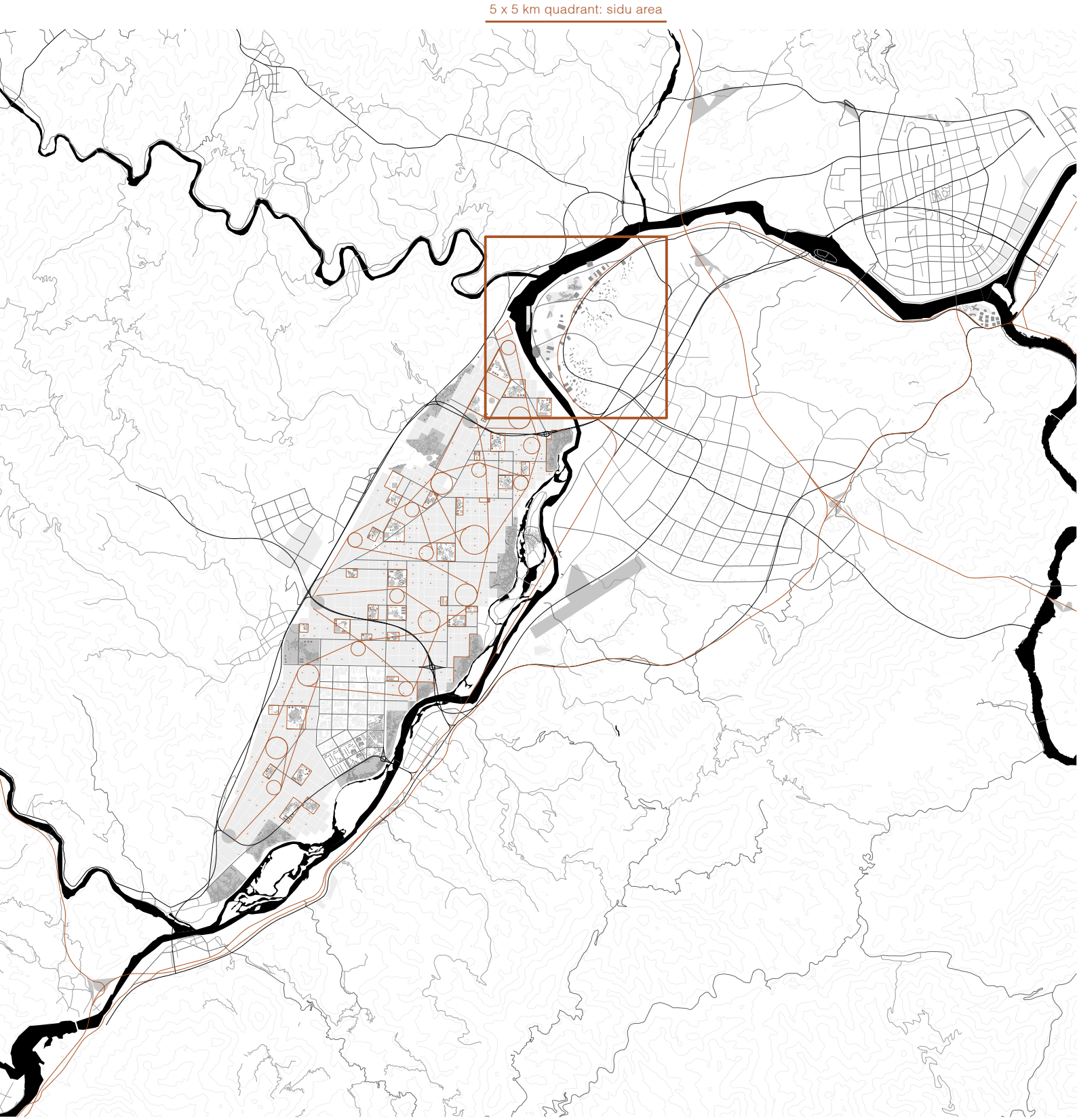
As stated before, the second area (urbanization of the mountains) was here examined and reimagined in detail – but keeping the argument of creating stunning views on the surroundings whilst respecting the need of preserving the landscape's traditional image. As in the competition, this idea of dwelling on the mountains is applied to the area called Sidu Qingyun (identified on the left map by the red label 'The Charm of The Four Capitals').

The new residential typologies of Lishui are placed like a ring around the large agricultural valley, along the metropolitan area and its mobility infrastructures. The buildings at the foot of the mountains thus benefit from the view and the proximity to the neighboring topography. They were initially thought of as systems of blocks able to adapt to the natural slope of the hills, distributing its activities along many levels. The typical block works as a transverse connection between the plain along the river and the nature of the mountains, consisting of a longitudinal organization of the infrastructure.

"The combination and the superposition of many functions (public and private transportation, public services, open spaces, private housing etc.) in a single object gives the opportunity of creating complex cross sections, where the intersection between the different spaces offer almost unlimited possibilities of experimentation." (Competition Booklet 2020, 15).

Figure 6: Lishui Detailed Urban Design Scope
Source: International Urban Design Competition Technical Brief

Figure 7: Prosperous Lishui, aerial view
Source: Competition Booklet, 2020



Figures 8 and 9: Plans for the New Prosperous Lishui
Source figure 9: Competition Booklet, 2020

main goals:

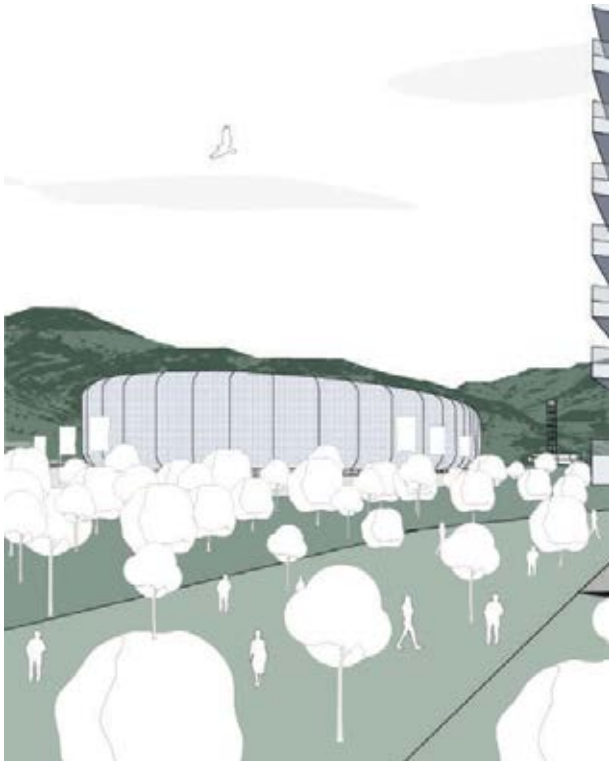
public facilities within the park

connection to the valley

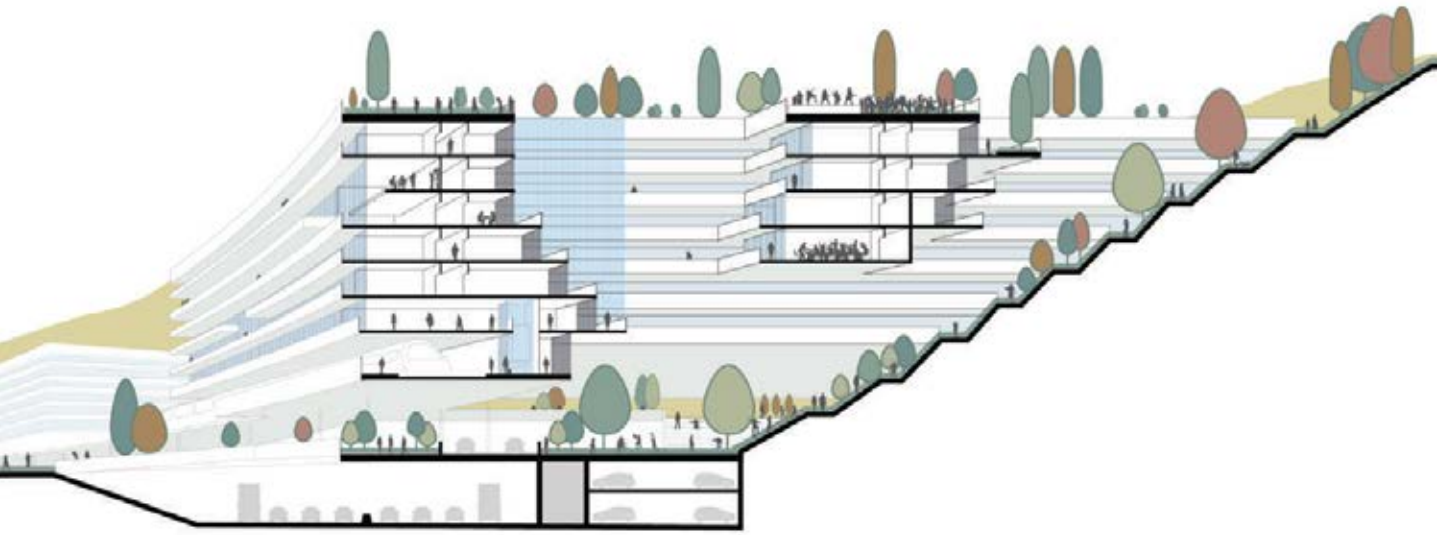
subway

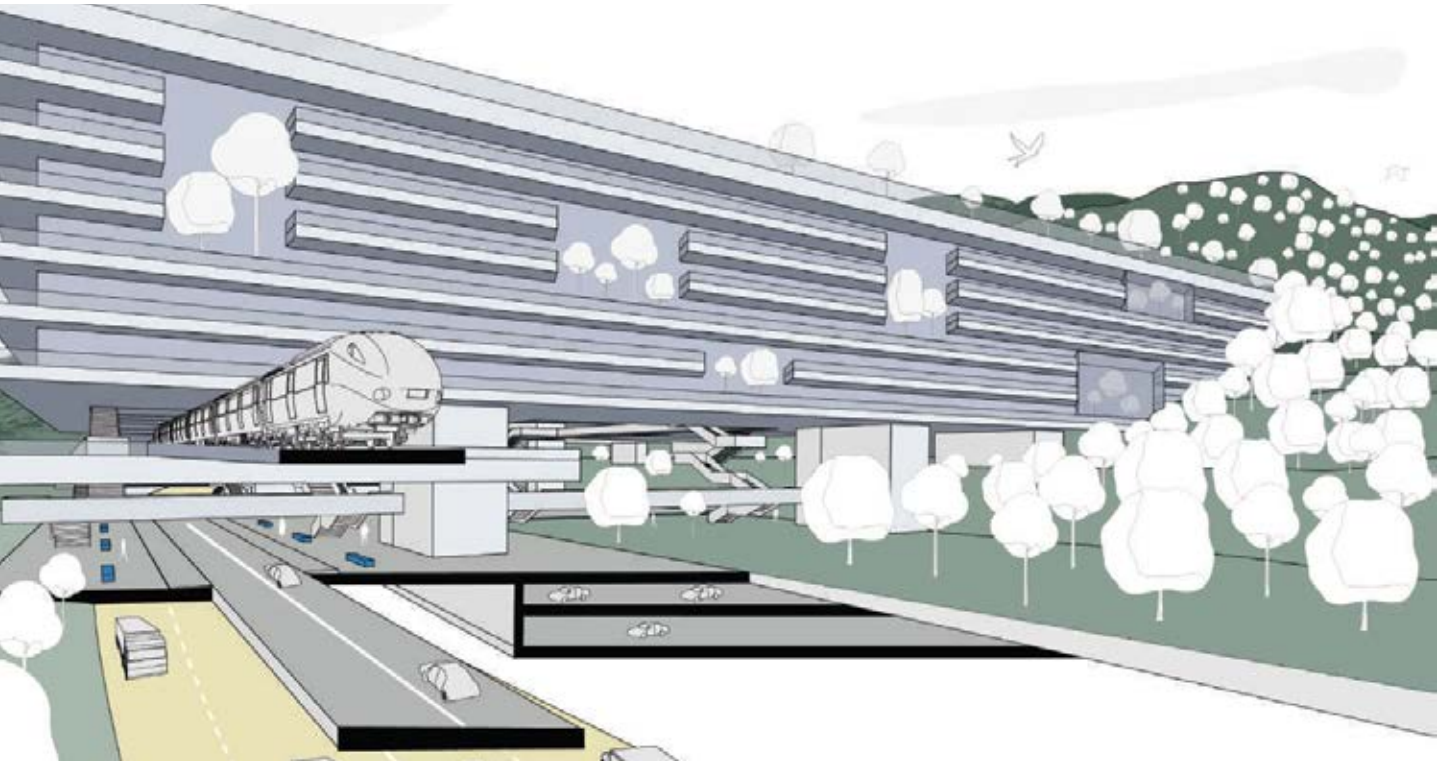
high speed infrastructure

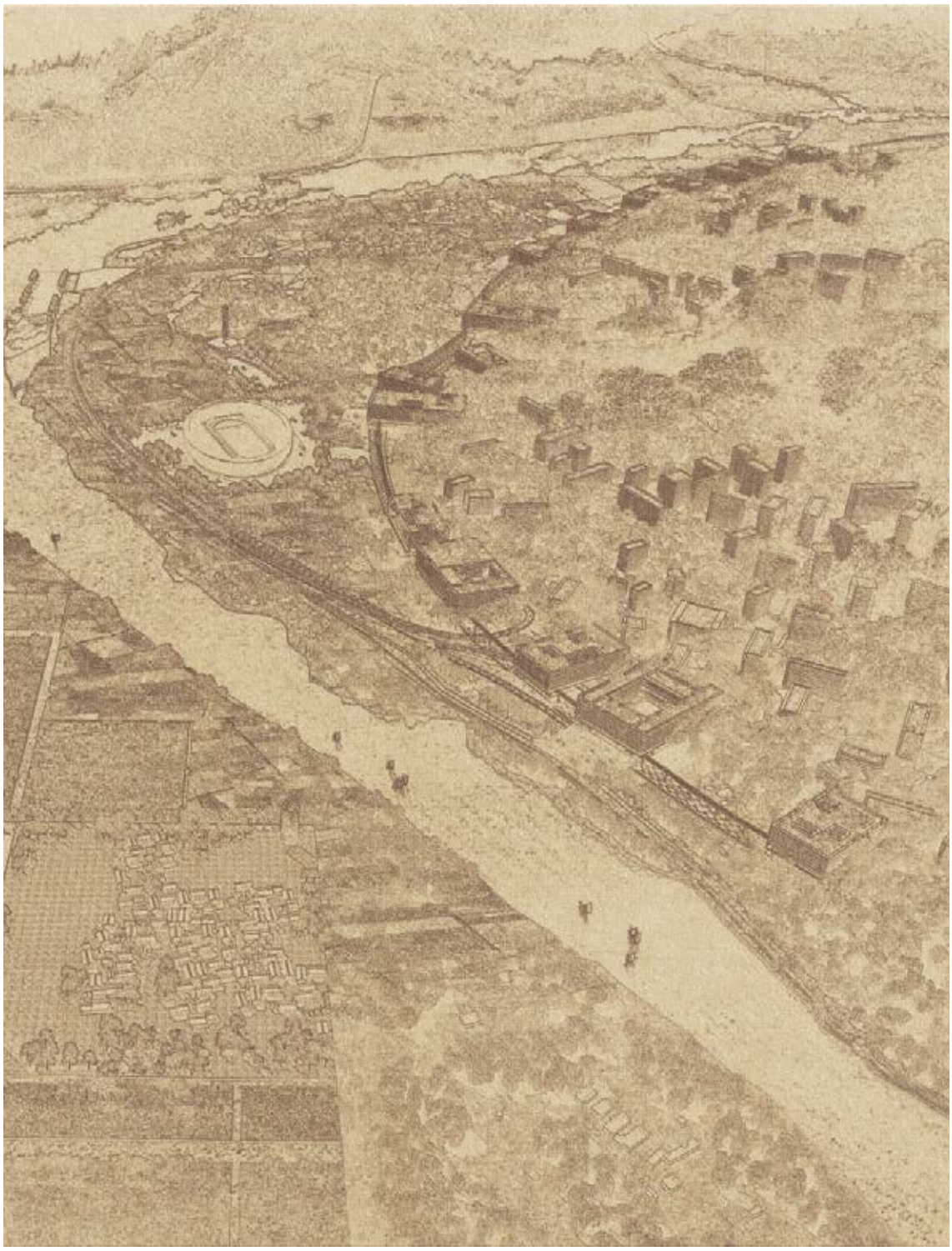
accessible green roof



Figures 10 and 11: Propositions for Rhyme of Sidu area, typical urban block
Source: Competition Booklet, 2020







1.3 methodology

After studying the masterplan done in the 'Prosperous Lishui' proposal, and having chosen the 'Sidu Qingyun' area to develop (a 5x5 km quadrant), the intention is to gather material for analysis of this area – composed of maps, drawings, schemes and pictures. To complete the investigation part, a study will be presented on some issues relevant to urban China and its history, supported by the reading of three books specialized on the subject. The objective is to insert in the project features of China's cities and the way of living experienced by Chinese people. After that, the first design guidelines and decisions will be launched, still in the urban scale, thus inducing the micro area to be advanced on next steps. These guidelines will orient and create relations between the many objects and the whole area.

Entering on an architectural scale, the fourth topic "prototype" will be devoted to conceive, project and detail one of the objects defined on the masterplan – along with its immediate context. The aim will be to explore its relation to the river, the mountains, the mobility infrastructure and the existing villages; besides delineating the activities within the object, and how they are separated and connected. Plans, sections and axonometric views will assist the elaboration of this working system, making possible the visualization of how all functions and spaces will intersect and interact. This will consist of the main core of the thesis.

To complement that, some case studies of vertical complexes, mixed buildings and mountain housing will be explained, to illustrate and reinforce the potential of this new prototype. Projects in similar contexts can establish a coherent relationship with the main study, while projects inserted in diverse conditions can broaden the range of possibilities brought by this type of housing. Posteriorly, assembling the materials and survey done, a conclusion text will finalize the thesis, opening new possibilities of further debates and interpretations.

Figure 12: Areal view of Rhyme of Sidu area
Source: Competition Booklet, 2020

02
context

2.1 urban China

> Chinese cities have undergone tremendous transformation spurred on by the state-oriented economic reform since the late 1970s [...] Not only are material living conditions and urban environments substantially improved, but individuals' everyday practices and experiences are also continuously shaped and changed by new ideas, consumption culture and lifestyles, among others. (Jingfu Chen 2018, 165).

As stated before, once China entered the post Mao era (and especially after 1979), chinese cities have been through huge transformations stimulated by the state-oriented economic reform that took place. Gradually the maoist desire to be modern turned into a desire to be international, which restructured the urban development direction. During Mao era, the growth of industrial centers (away from the cost) was encouraged, to the detriment of large cities – and particularly in the Cultural Revolution (from 1966 to 1976), urban development stagnated (Junfang Xie 2018).

This new dominant discourse of modernity and development also caused a shift in people's mentality. According to Yangzi Sima and Peter Pugsley (2010, 287), this "decidedly post-socialist mentality of individual expression, achievement and pleasure has taken over from the arguably 'collective interest' mentality that marked the older, Mao generation". A new way of life spread throughout chinese imaginaries: the urban life. This idea was instilled into national ethos, while the massive migration of rural inhabitants to the city culminated in the majority change: in 2019, about 848 million people lived in urban regions in China (World Bank 2021).

Concomitantly with this vast array of modifications in China, scholars like Brenner and Schmid (2015) introduced their theses on an "urbanization of the world", a planet-scale phenomenon that dialogues to some aspects of Chinese changing society. One pertinent issue is the spread of consumer culture in China, happening since the 1980s, which portrays the country's economic prosperity and its emergence as a world superpower.

Along with this, some cities experienced urban events, such as gentrification and commodification, widely observed abroad. The

prosperity enabled the overall reinforcement of infrastructure systems in China, notably the mobility system, which allowed a reduction (although not yet elimination) of the gap between the urban powers of the east coast, and the cities of central and western territories.

Urbanization in China has many fronts. According to Bonino, Governa, Repellino, and Sampiere (2019), the decision to build hundreds of new cities from scratch was made by the Chinese Government in the early 21st century. Initiatives like The Belt and Road promote connectivity in local, regional and international scales; and entire cities are rethought and redesigned in order to harbor the new Chinese ideals and wishes.

Cities became the country's economic growth engine, but they also can express Chinese values and proposals for new healthy ways of living. Diverging from twentieth-century new cities in the West, the Chinese new towns "[..] are instead new settlements that gradually occupy all available land, transform property rights, shatter administrative boundaries, modify the country's economic structure as well as the status and lifestyles of the people" (Bonino, Governa, Repellino, and Sampiere 2019, 14-15).

It is in this context that the purpose to replan Lishui arises, guiding the city through the possibilities that technology brings – while reinforcing the balance aimed at its population. The city is already classified as a space with stunning natural views and an intense relationship with ancient traditions, thus composing the ideal stage for a new master plan based on *ShanShui* principles.

Figure 13: Lishui aerial view, 2021
Source: Chaojin Ruan, Chenfei Liu, Ming Zhao

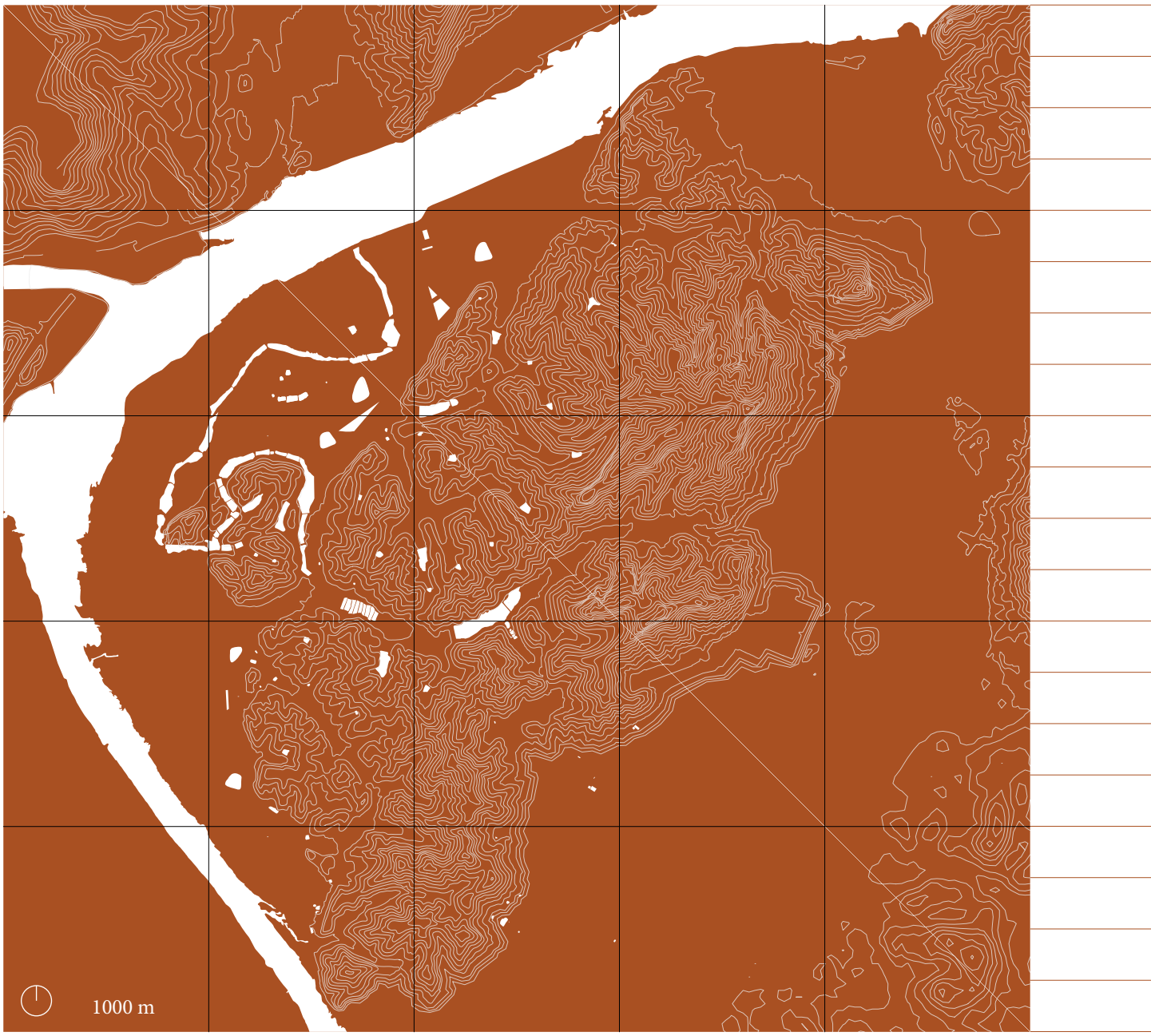
2.2 Sidu, Lishui

To live in between. In between old and new, mountains and water, art and technology. Sidu area presents itself as a promising site to experiment the very concept of *ShanShui* city, for its scenic landscapes capable of integrating such a varied range of elements. Located on a key spot close to both the new agricultural park, ancient villages, the river and the topography, the area will house a sequence of "objects" with architectural and urban functions and relations.

These objects will personify the *ShanShui* ideal as well as a vertical and linear city notion, interacting with each other and inducing paths towards the hills. As described before, these objects or blocks will establish this integration on different levels, enabling direct connections to the mountains and to the mobility infrastructure while concentrating a diversity of functions and spaces. Together with a natural park that alternates with built platforms by the river, the blocks will grant this area a selection of activities and possibilities for living.

Before detailing them, a series of maps and diagrams intend to analyze the main characteristics of Sidu area. A quadrant of 5 by 5 kilometers was fixed as the masterplan base, including a part of the already settled subdistrict of *Shuige* (east to the mountains). By depicting the current state of its roads and constructions, the topographic profiles, the relation between water and densities and even its evolution in time, it gets clearer how and where the objects should lay.

Figure 14: Sidu, Lishui aerial view
Source: www.lishui.gov.cn/art/2016/9/3/art_1229439344_57269322.html

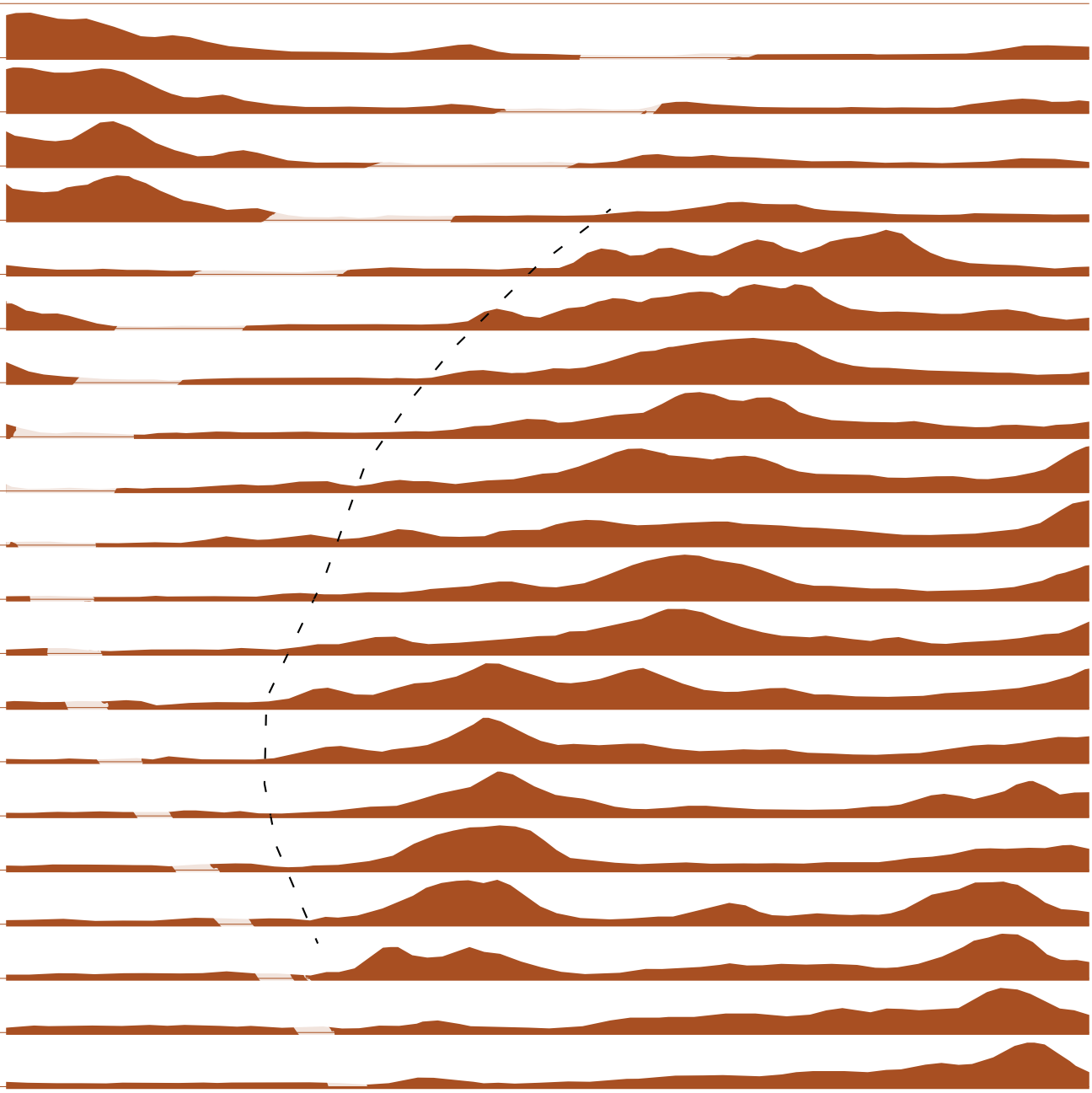


topography

The topography varies from an altitude of 50m above sea level (by the river) to one of 200m (by the highest peaks). This intense variation is exposed on the sections, where one can visualize the relation created between the foothills and the river plan.
The project will follow a line deducted from the waterfront and the mountains edge, distributing its objects in a way to optimize outlooks. Taking advantage of this natural obstacle and inner routes formed by it, some blocks will extend their influence beyond the line, in smaller and less dense clusters.

section

In the section, it is clear how the presence of the hills (and its anatomy) influences the landscape as a whole and how this new block intends to intercross different scales.



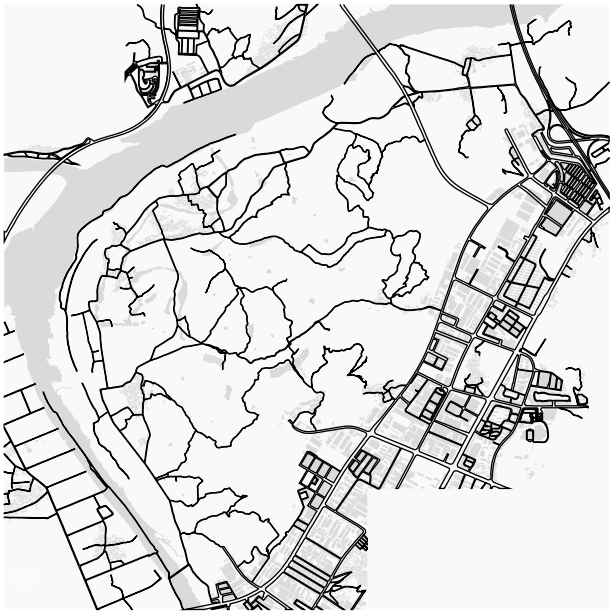
edge of the valley

water

topo section

5000 m

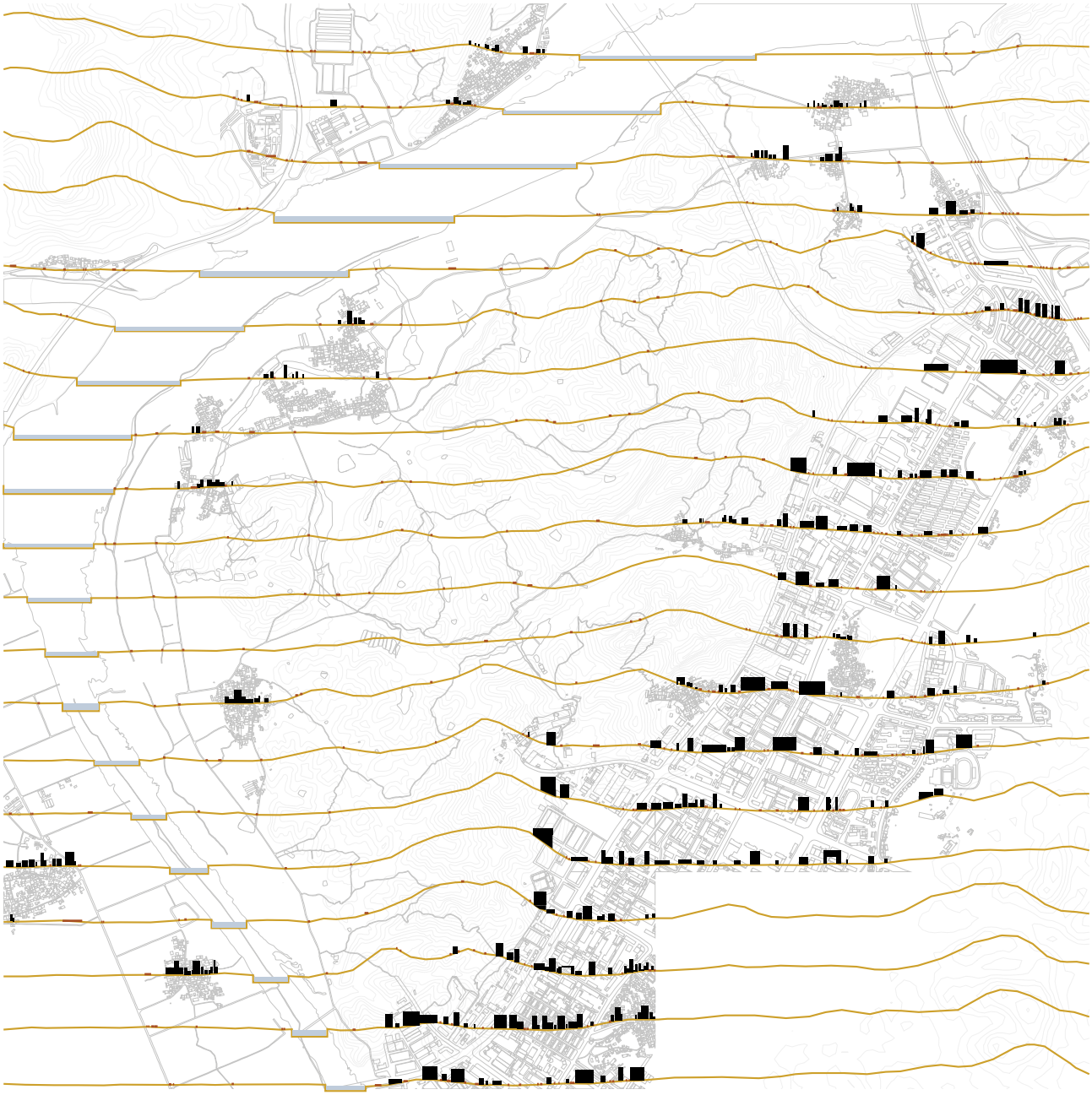
water and built area



mobility system

open spaces

5000 m



environmental preexistences

As shown in the left maps, some urban features must be taken into account for the new proposal. Firstly, it is possible to perceive a conformation near to 'gridded' streets present in the existing district, a conformation that leaves some loose ends to be connected across the mountains and that connects already to the west side of Ou river. There is also a more organic network of local roads, which explores the topography and gives access to some of the villages. This minor network will be absorbed by the new project, with the aim of keeping the existing relations but also preserving the mountains.

Regarding the buildings, only a few of them cross the topographic barrier, most of which are located instead close to the waterfront – where they will interact with the proposed multifunctional platforms (accommodating public facilities). Those in the subdistrict will remain.

1985

2020

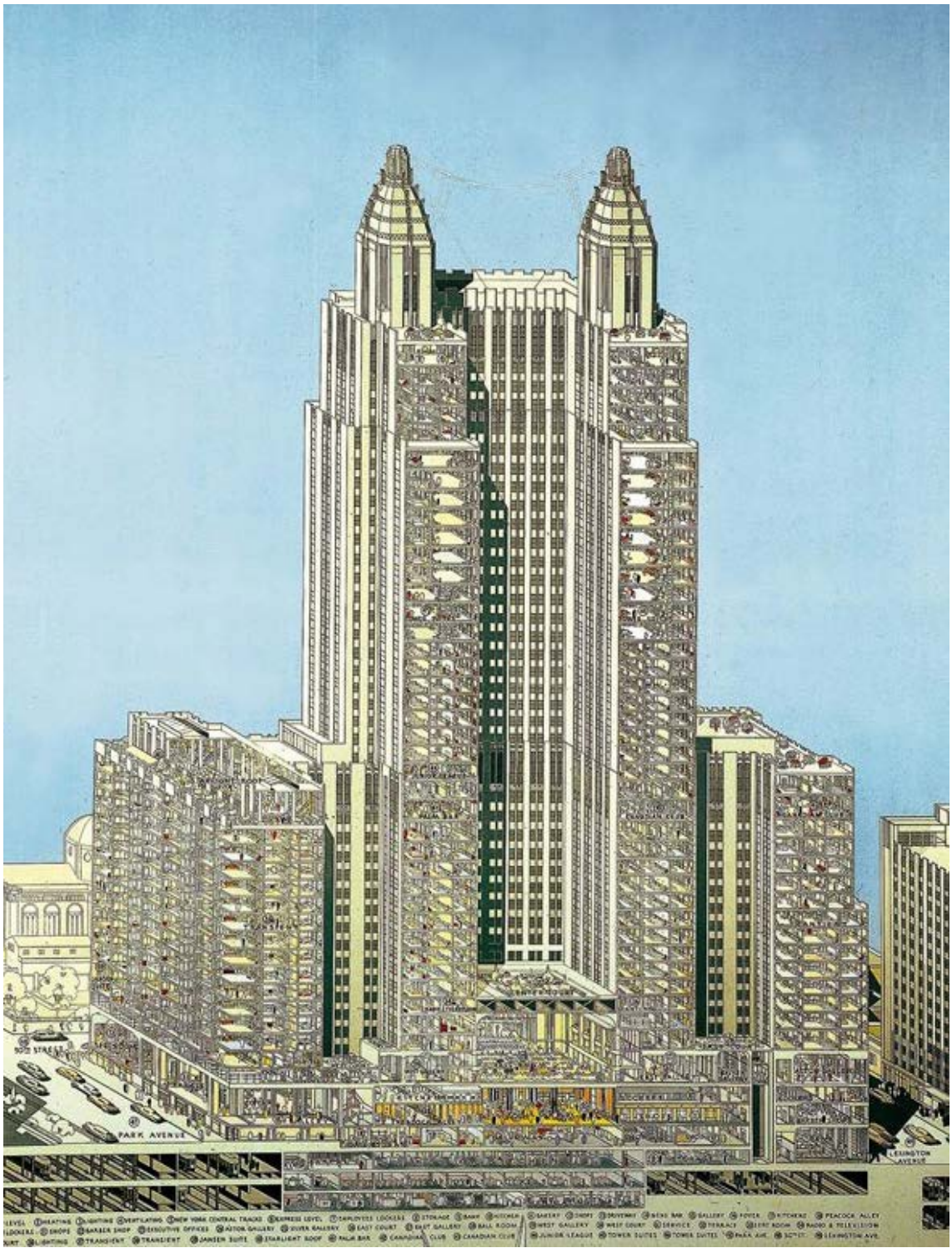
time frame

The two images on the previous page show two extremely different moments of Lishui and urban China. After 1976, with the end of what historians call Maoist China and the start of the post Mao era, the country went through profound changes in social, economic and urban aspects – what resulted in the largest mass migration seen in the world (Harvey 2005, 127).
With such changes, the years between 1985 and 2020 "had witnessed the rapid reconfiguration of socio-economic structures and the formation of new urban spatialities" (Jingfu Chen 2018, 165). This is clearly pictured on the maps, which demonstrate how the city of Lishui was occupied and widely transformed in this period.

local frame

Considering the 5 kilometers quadrant, two other cities were used (in the same scale) to better understand the dimensions visible in the area. The three localities reveal distinct relations of water, streets, buildings and nature, in important fractions of their urban scenarios. Besides Lishui, one can see Manhattan, New York (with its orthographic mesh); and Brasilia, a modern city relatively young (with a particular urban plan).




PARK AVENUE
LEXINGTON AVENUE

2.3 dwelling in blocks

How to (re)interpret the traditional urban block?

As Jonathan and Chloe S. Tarbatt assert in their book "The Urban Block", the block is described by the Urban Design Compendium as "the land area defined by the grid of streets" (Tarbatt and Tarbatt 2020, 34); and their potential physical configurations fit on a list of five types: the perimeter block, the row block, the ribbon block, the courtyard block and the point block. The point block (or tower block) was a much explored typology during the 20th century modern movements, when high-density freestanding point blocks configured a new approach to urban form.

In many cities, this type was reserved for civic buildings in outstanding positions – but modernism introduced it to residential and commercial buildings. Higher density, according to the two authors, helps to "promote walkable neighbourhoods and healthier lifestyles, makes local services more viable, supports better public transport, promotes diversity and social contact, makes more efficient use of land and resources and reduces development pressure elsewhere" (Tarbatt and Tarbatt 2020, 80).

In this project the point block is explored as a mix typology that harbors not only dwellings (its main focus) but also commercial and office facilities, mobility systems and open leisure areas. These functions are "stacked" in a large building, planned to articulate issues of location, permeability and flow.

Figure 15: Axonometric section through new Waldorf-Astoria Hotel
Source: Delirious New York, book by Rem Koolhaas

As explained before, the idea of spreading urbanization across the valley, following the concept of equilibrium (*ShanShui* city), is achieved in the Sidu area of Lishui through the urban point block. This typology will be explored in the panorama of a Chinese city, but it aims to be a universal prototype of urban complex (or megastructure) – replicable and applicable in different contexts around the world. The high-density point block, as elucidated previously, comprises modern ideals of compact and vertical cities – stacking functions and spaces and in this case creating connections on the urban level.

While populations around the globe increase, and issues of land and ecology become even more arduous, some people believe vertical cities hold the key to solving overpopulation. The massive skyscrapers containing houses, hospitals, stores and schools would reduce contact to the ground and therefore help preserve natural resources. Densification is a notion examined also by those who consider linear urbanization a solution, among them Peter Eisenman and Michael Graves, who developed the "Linear City" project in the 1960s. It consists of two strips housing urban spaces and a mobility infrastructure that would cross the west coast of the United States.

In an effort to financially enable social housing, or to provide affordable ways for people to live in the centers, many "vertical living" projects have been developed by architects and planners – the Vertical Village by Ole Scheeren being one among many examples. As the world's population turns urban and demands for land (in the cities) grow, it is a part of those professions to conceive possibilities of (re)occupying spaces in the most rational and functional way. To densify means for many a solution.

Lastly, it is convenient to mention once more the thesis of an "urbanization of the world" by some urban scholars – based on Henri Lefebvre's concept of a society deriving from complete urbanization. Although many critiques still permeate these thoughts, the idea of the urban fabric covering extensive areas of the planet is no longer an absurd, but a problematic reality from which to develop answers.

Figure 16: Rino Levi proposal for Brasilia
Source: https://www.archdaily.com.br/br/01-149102/brasilia-por-rino-levi

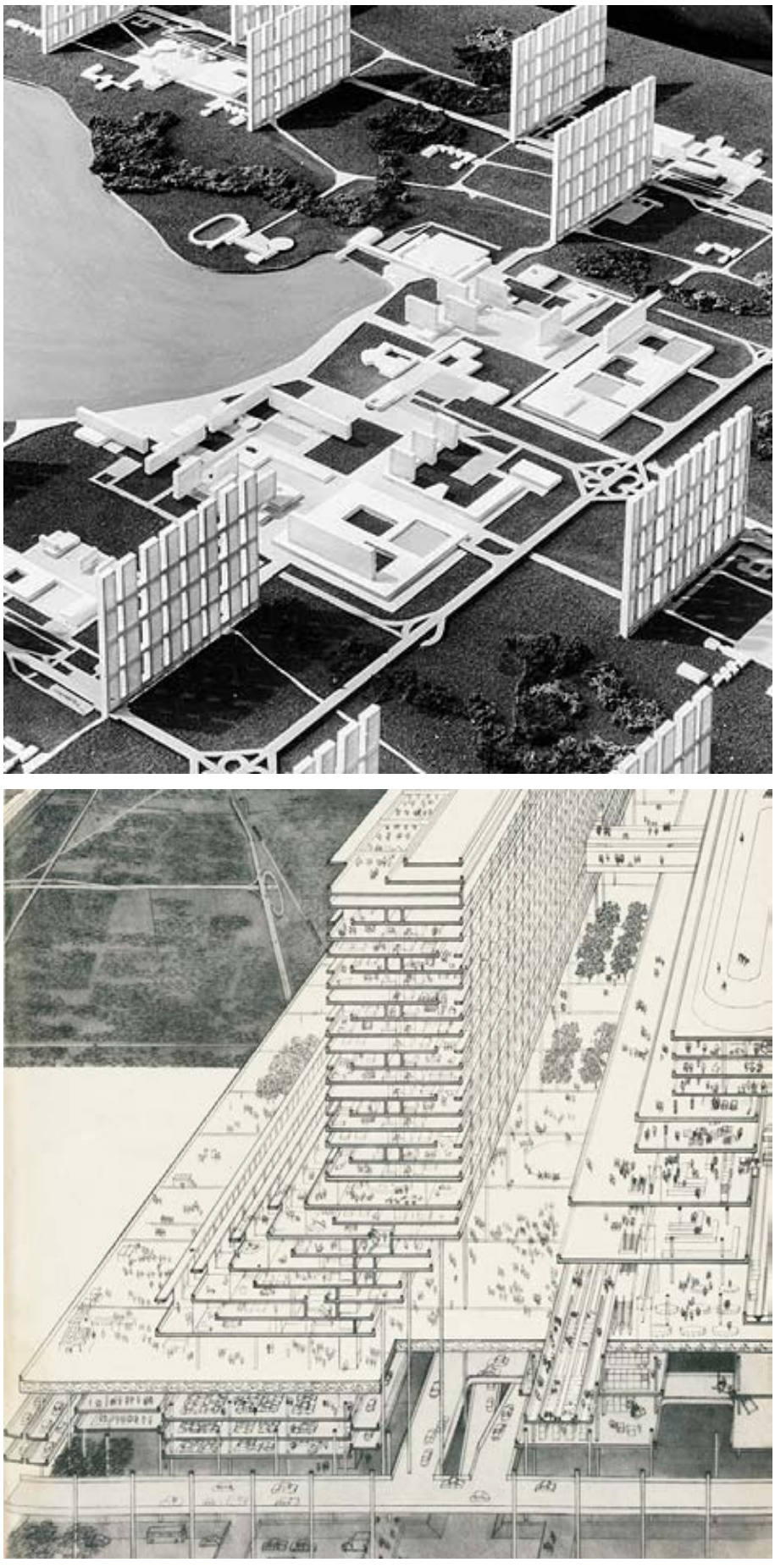
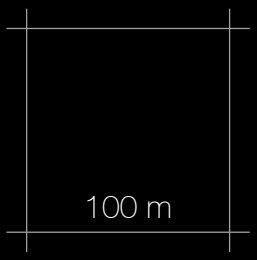


Figure 17: Linear City by Peter Eisenman and Michael Graves
Source: http://hiddenarchitecture.net/linear-city/

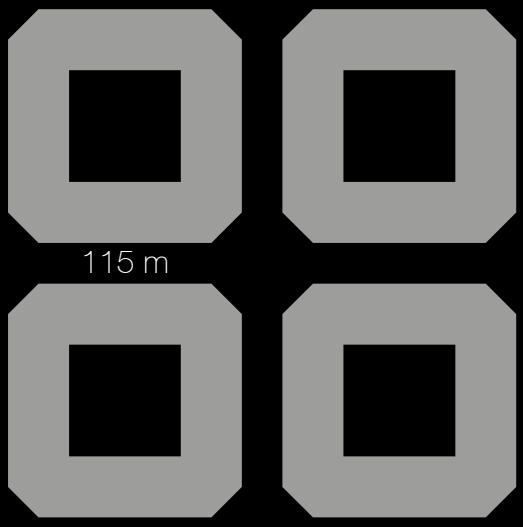
Jane Jacobs
maximum standard

[1961 book]



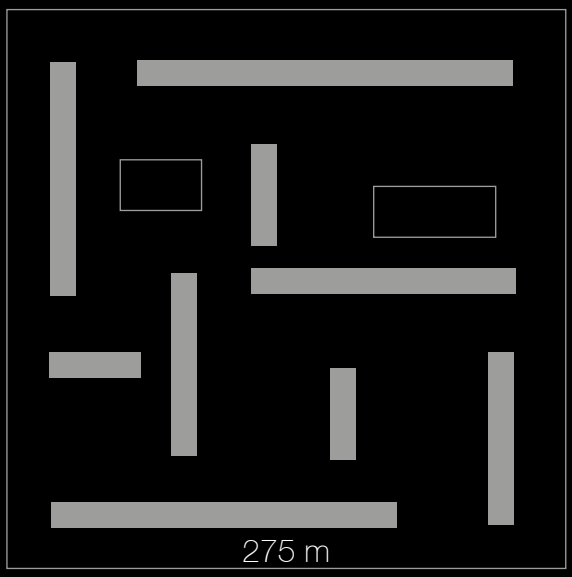
Barcelona blocks

Cerdà Plan [1859]
700 residents per block
Height: 20 meters - 6 floors



Brasilia superquadra

Lucio Costa Plan [1956]
4 000 residents per unit
Height: 20 meters - 6 floors



Unite d' Habitation (Marseille)

140 m

Le Corbusier [1952]
1 600 residents
Height: 56 meters - 18 floors

Precedents: Ville Radieuse and Plan Voisin

RCA Building (Rockefeller Center)

160 m

Raymond Hood, NY, 1933
Centerpiece of RC complex
Height: 260 meters - 66 floors

Rino Levi Superblock

400 m

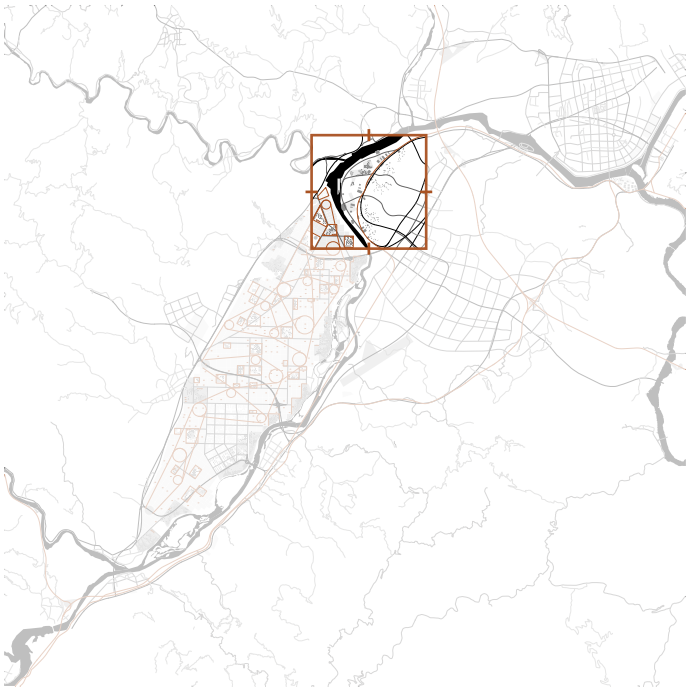
Brasilia Competition [1956]
16 000 residents per block
Height: 300 meters - 4x20 floors

Fourier's Phalanstère

Utopian community [1820]
1 620 residents
Unknown area

strategy to apply this typology:

place along the edge of mountains a sequence
of molotic objects with a central gap

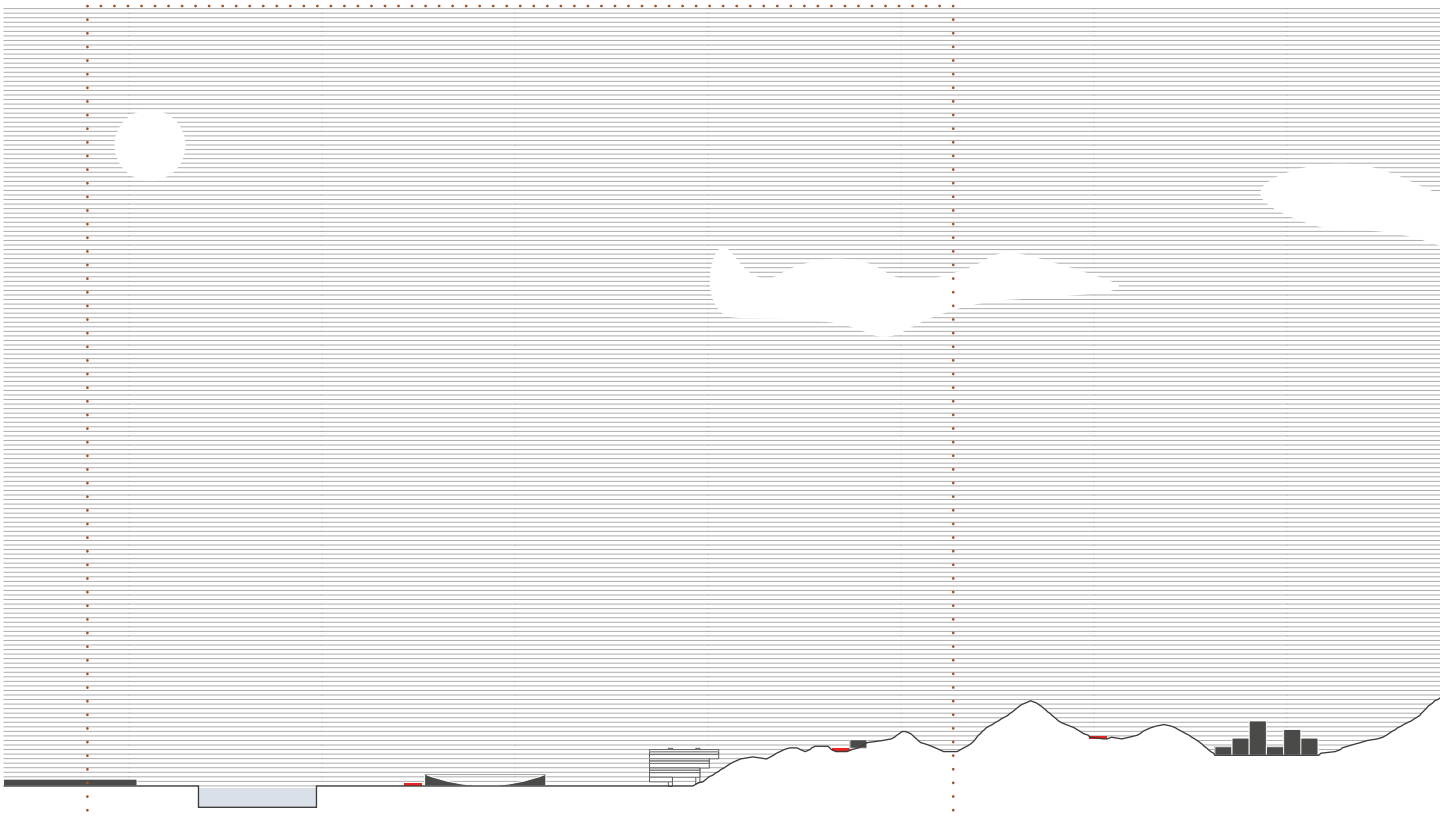


macro section

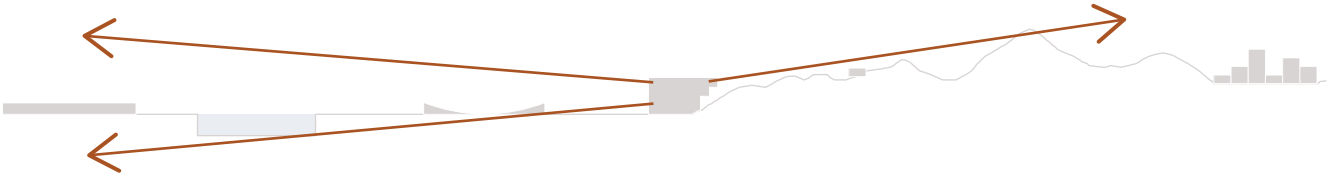
zoom area and main block

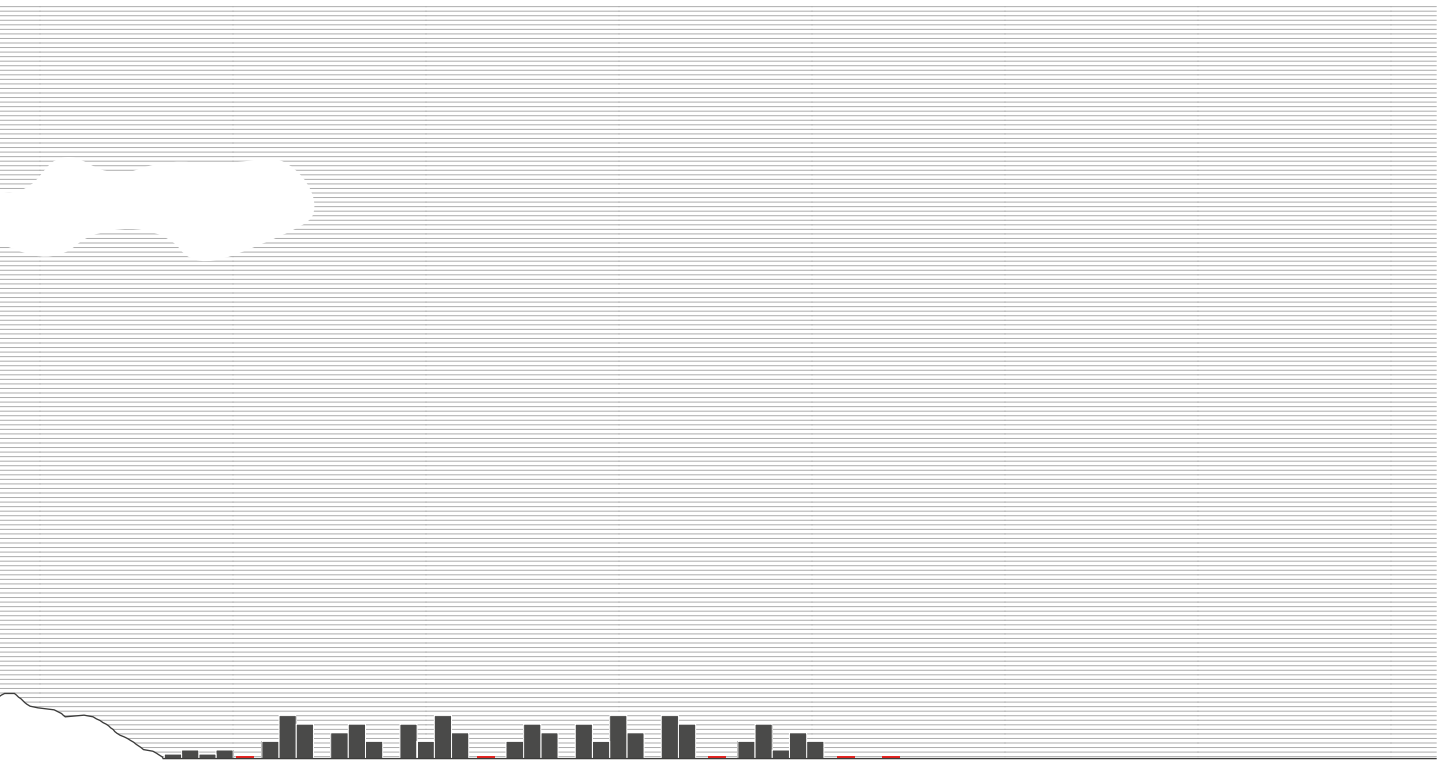

0
1km

macro section



relation between the valley, the river, roads, public spaces,
the mountains, existing buildings and the urban block

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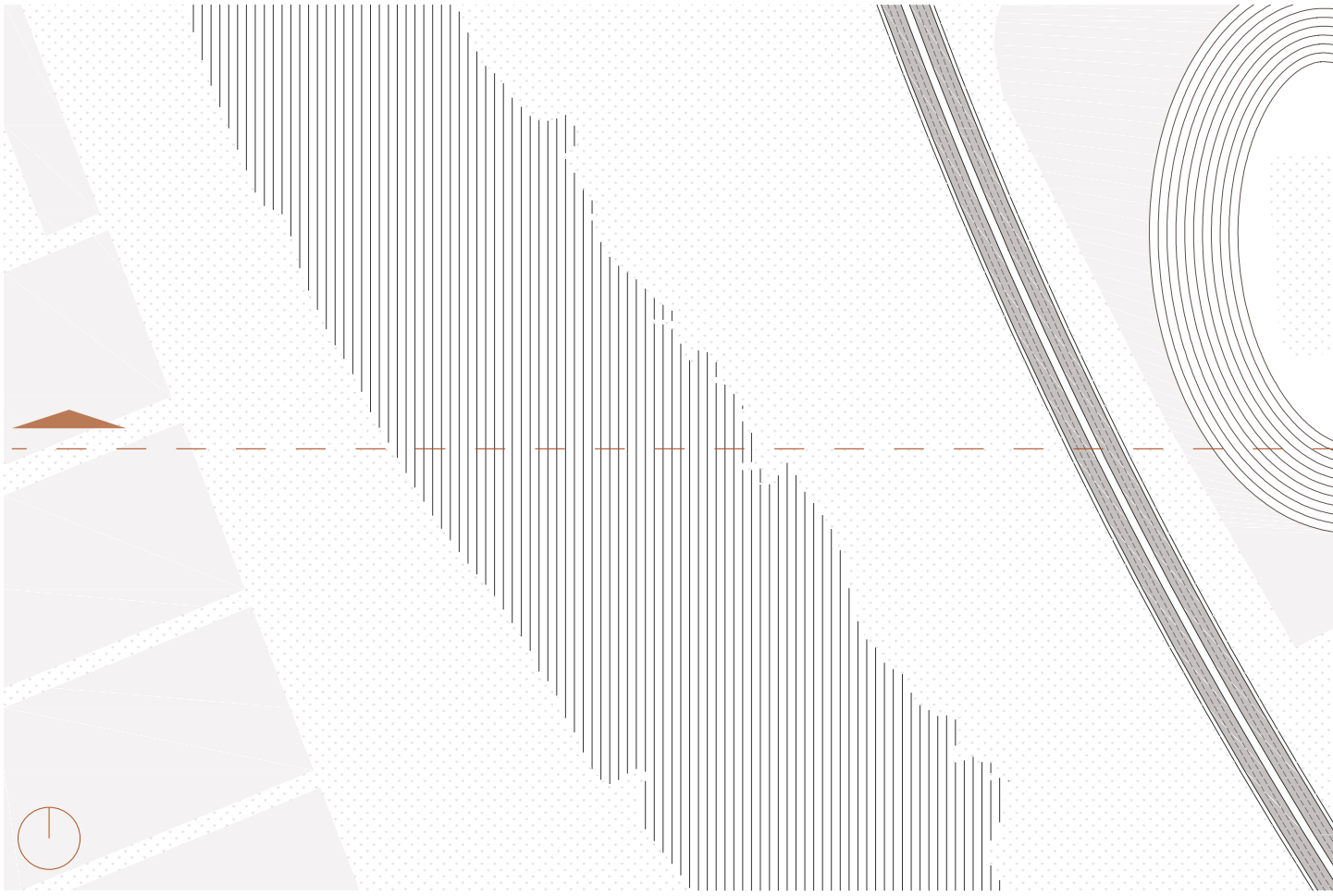
zoom area



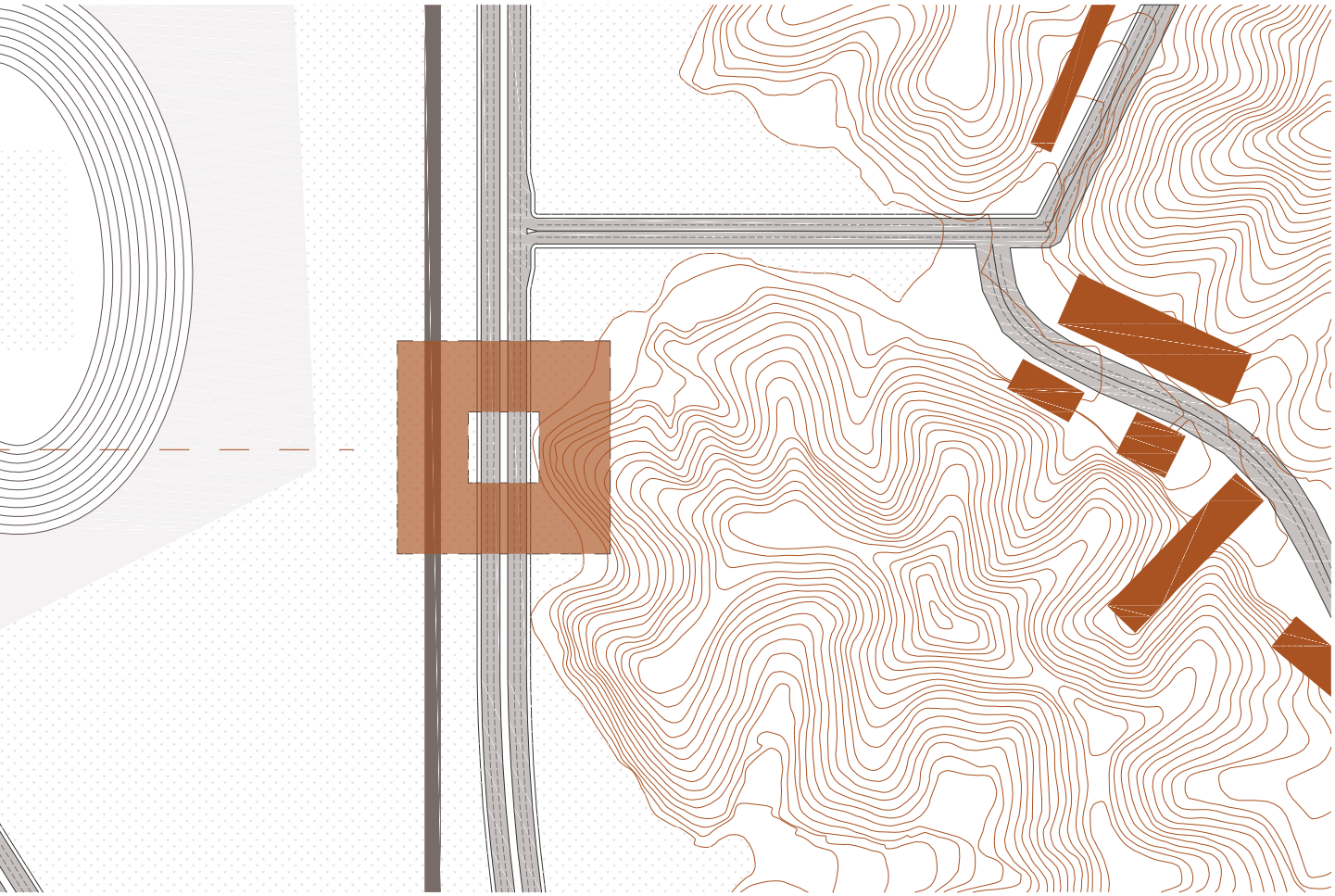
agriculture valley

ou river

primary road

pub facil

1 500 m



lic
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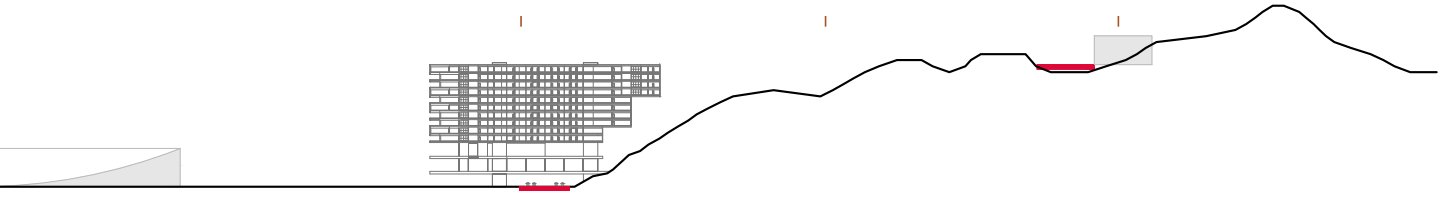
urban block

foot of the
mountains

housing



03

case study

To complement the study of mixed-use building, urban blocks and landscape inhabit, three projects in different locations and timeframes will be presented in this topic:

I. The Renovation of Tianbao Cave District (China 2020)

II. WoZoCo (The Netherlands 1997)

III. Pedregulho Housing Complex (Brazil 1947)

3.1 case study I

The Renovation of Tianbao Cave District of Erlang Town
Jiakun Architects, 2020
Luzhou China, area of 8 478 sqm

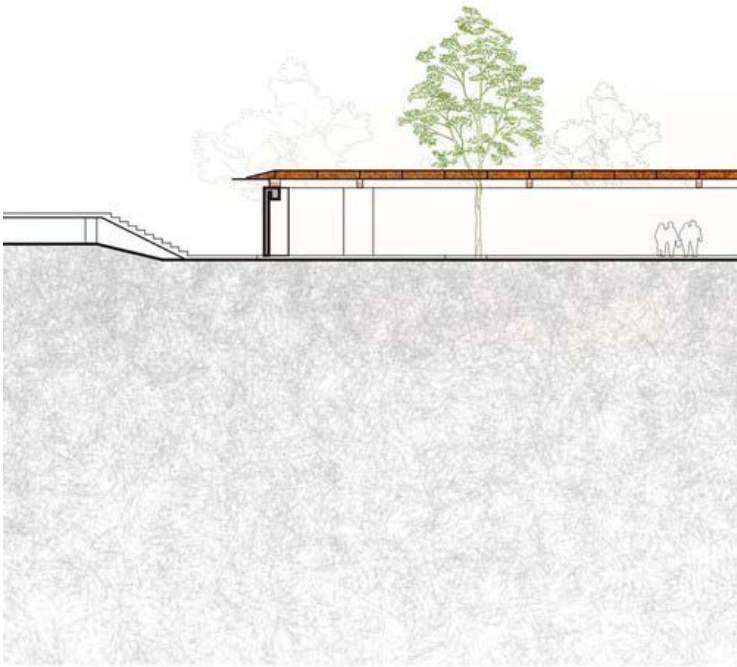
The project is located in Erlang Torn, in Luzhou City – next to Chishui RIver. The River houses Tianbao Cave, Dibao Cave, and Renhe Cave, which are the largest natural liquor-storage caves in the world. The idea was to extract the classic concept of "pavilion" from the Chinese architecture, utilizing contemporary technique to express classical and traditional connotations. The intervention is intertwined in two characteristics: **sediment and floating**, being integrated into the mountain and landscape.

To organize all the spatial-function nodes, the project uses the strategy of **literary narration** – which creates a continuous scenario. All the elements are carefully organized to enrich the experience - according to location, height difference and modality of site. The new architecture replaces obsolete constructions and connects in circle the buildings scattered among the topography.

The entrance pergola is a long green tunnel composed of bamboo and steel, while the heliophilous trigonometry changes as hours goes by, swaying the shadow. In the reception lounge, a long horizontal window allows visitors to overlook the **natural beauty**. There is also a Poetic Liquor Yard, containing famous quotes on Chinese liquors. Going on to the Tree Yard, one can enter a low space with a suspended roof – where a projection on the surrounding walls presents the liquor-making scene.

The path also leads to the Exhibition Hall of Lang, where mirrors give the sensation of infinite reflections, and the Blending Experience Area. Standing in the sky and surrounded by water is the Liquor Tasting Pavilion. And then visitors can walk through a cascade of stairs **enjoying various sceneries**. Going into the woods one finds the Plank Walkway and Lounge Bridge – from where the slope elevator connects to the Cliff Restaurant and Renhe Cave.

Figures 18 and 19: Photos by Arch Exist, Wang Kai (Brandston), Han Xiao
Source: archdaily.com/949413/culture-the-renovation-of-tianbao-cave-district



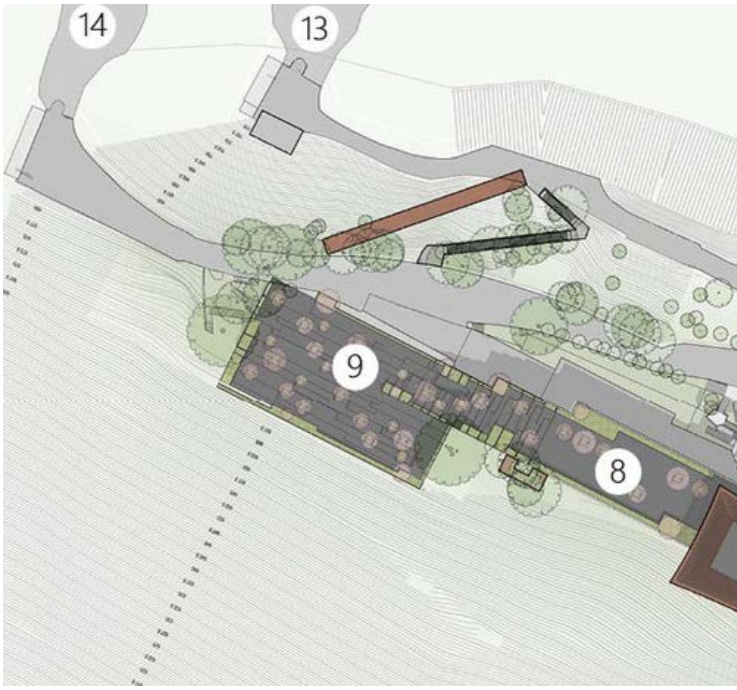
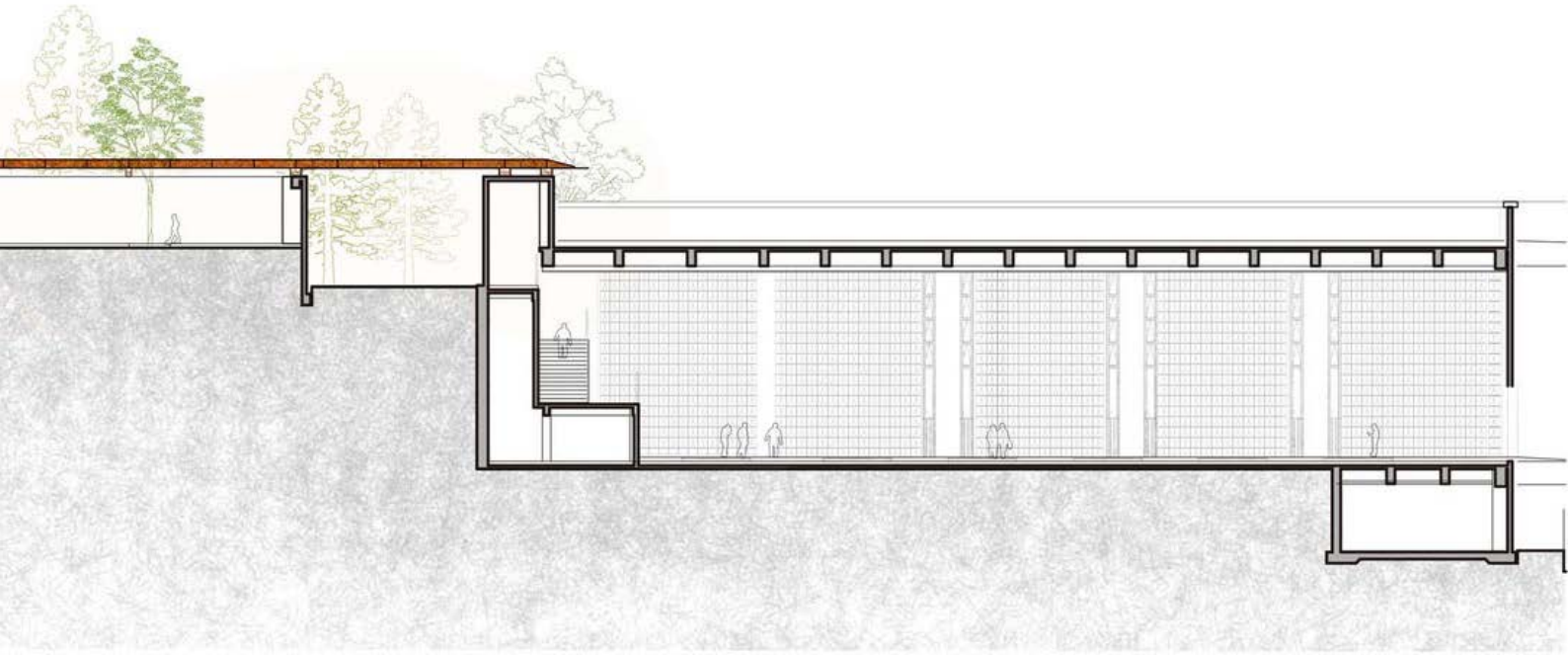
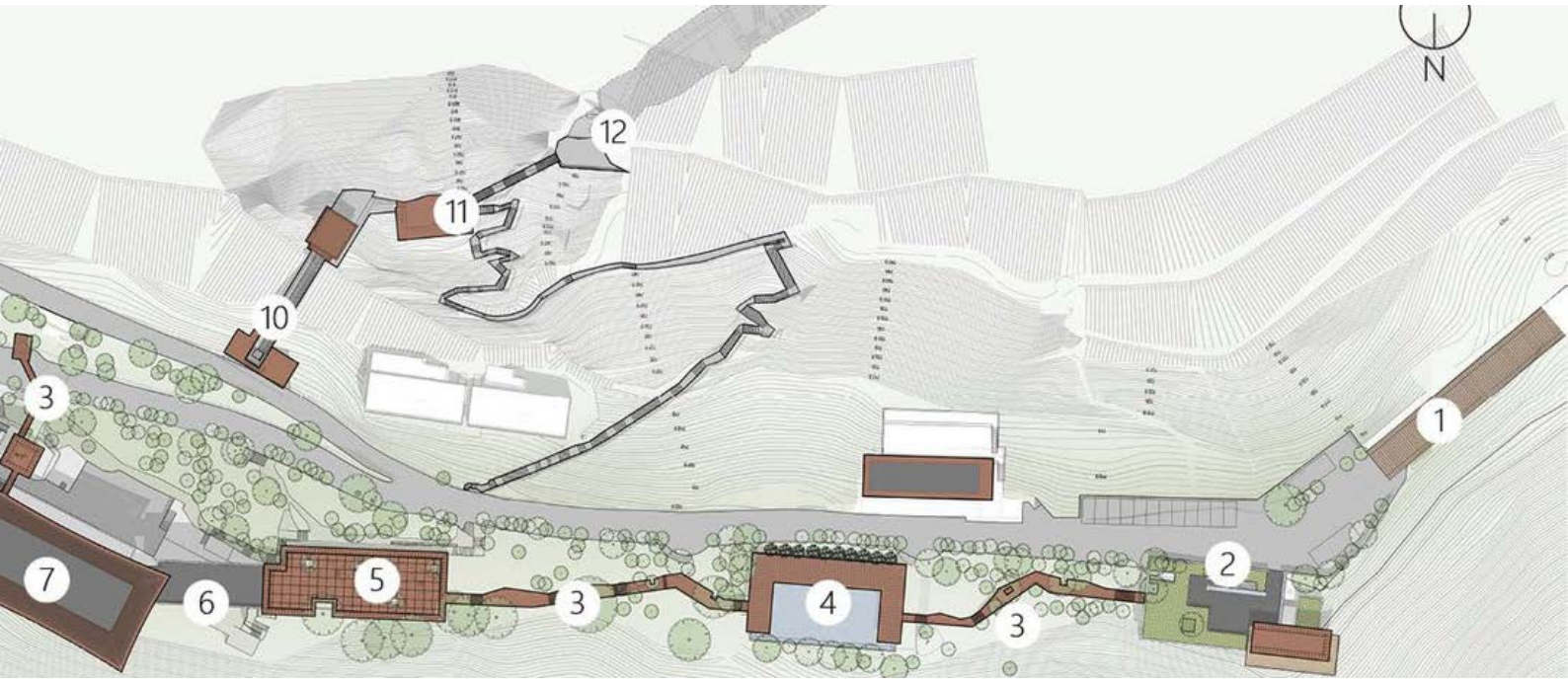


Figure 20: Rendering
Figure 21: The tree yard & exhibition hall of lang section
Figure 22: Master plan
Source: archdaily.com/949413/

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12
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3.2 case study II

WoZoCo

MVRDV, 1997

Amsterdam Netherlands, area of 7 500 sqm

WoZoCo project was born from the challenge of accommodating 100 residential units for the elderly population, making use of a gallery-type circulation. Protecting the open green spaces of The Western Garden Cities of Amsterdam was essential, so the housing corporation in charge hired the studio after a first meeting where MVRDV presented a surprising solution.

It consisted of additional 13 units being **glued** to the outer side of a main volume - as the other 87 units were accommodated on the main block following daylight urban regulations and minimum dimensions. In a context of increasing densification and a need of maintaining the existing generous public space, there was a search for concepts of "light, air and space" to be present in each gesture of the project.

MVRDV therefore planned a north facade with 13 **cantilevered units**, structurally opting for trusses and load bearing walls. Both public space and daylight exposure would not suffer reductions with this strategy – which however generated additional costs that can explain the highly **economic layout** of units. With alternate window positions, different sizes of balconies and different materials and colors, each apartment unit gained an individual character.

Besides, working with some other smart and cheap design solutions granted the studio to present in the end the lowest building cost in the city. This growing density and consequently search for housing seen in the Netherlands have constantly made good opportunities for Dutch studios and architects to innovate in technology and to propose creative solutions in the fields of architecture and design.

Figure 23: Picture by MVRDV
Source: https://www.mvrdv.nl/projects/170/wozoco

Figure 24: Picture by MVRDV
Source: https://www.mvrdv.nl/projects/170/wozoco

Figure 25: Picture by MVRDV
Source: https://www.mvrdv.nl/projects/170/wozoco

3.3 case study III

The Pedregulho Housing Complex
Affonso Eduardo Reidy, 1947
Rio de Janeiro Brazil, 260 linear meters

The Pedregulho complex was a part of the city plan - when Rio was the capital – in response to **growing housing problems**, so it would contain 522 units plus community services. The responsible engineer, Carmen Portinho, brought from England concepts about urban reconstruction in postwar. She and the architect A. E. Reidy were partners and were considered the "intellectual pillar" of the Department of Popular Housing. They idealized the housing project along with many other complexes.

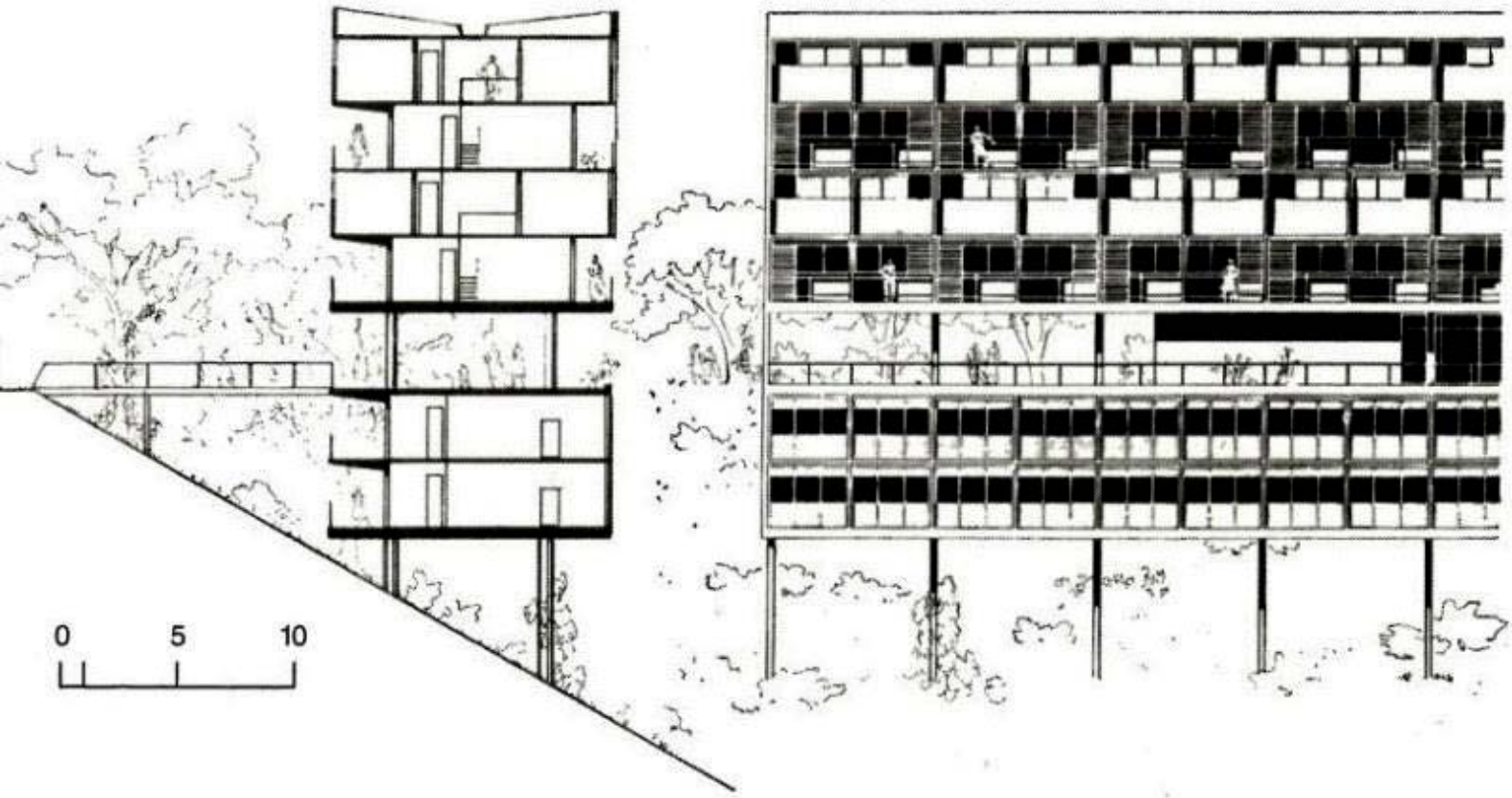
By the time it was inaugurated, Pedregulho's **plasticity** impressed the architectural community, giving importance to the work of Reidy. It entered the list of numerous admired works of the Modern Architecture in Brazil. The formal repertoire of this movement is recognized in the building by elements like pilotis, the free plan, cobogos and the brise-soleil. They gave Pedregulho a character of **uniqueness**. The building has a long relation to the urban vitality of Rio de Janeiro, its residents and its outlooks.

During its first occupancies, Portinho and Reidy tried to implement some habits from European costumes, like the communal laundry – which caused friction with the residents. Over the years, the complex succumbed to inappropriate functions and lost its initial utopic vision. The hospital and laundries closed, the garden by Burle Marx was forgotten and residents assumed part of the maintenance. People living there also did their own interventions and internal changes, having appropriated the buildings.

But since 2005, **restoration** works have been carried out, following a renewed interest in the memory of modern architecture. Even a similar cobogo was found to be manufactured and then replace the damaged original pieces. Expectations were high for the residents, the government and the many admirers of this singular work.

Figure 26: Photo by John Hartman
Source: https://hiddenarchitecture.net/pedregulho-housing-developmen/

Figure 27: Photo by John Hartman
Figure 28: Section and Facade
Figure 29: Master Plan
Source: https://hiddenarchitecture.net/pedregulho-housing-developmen/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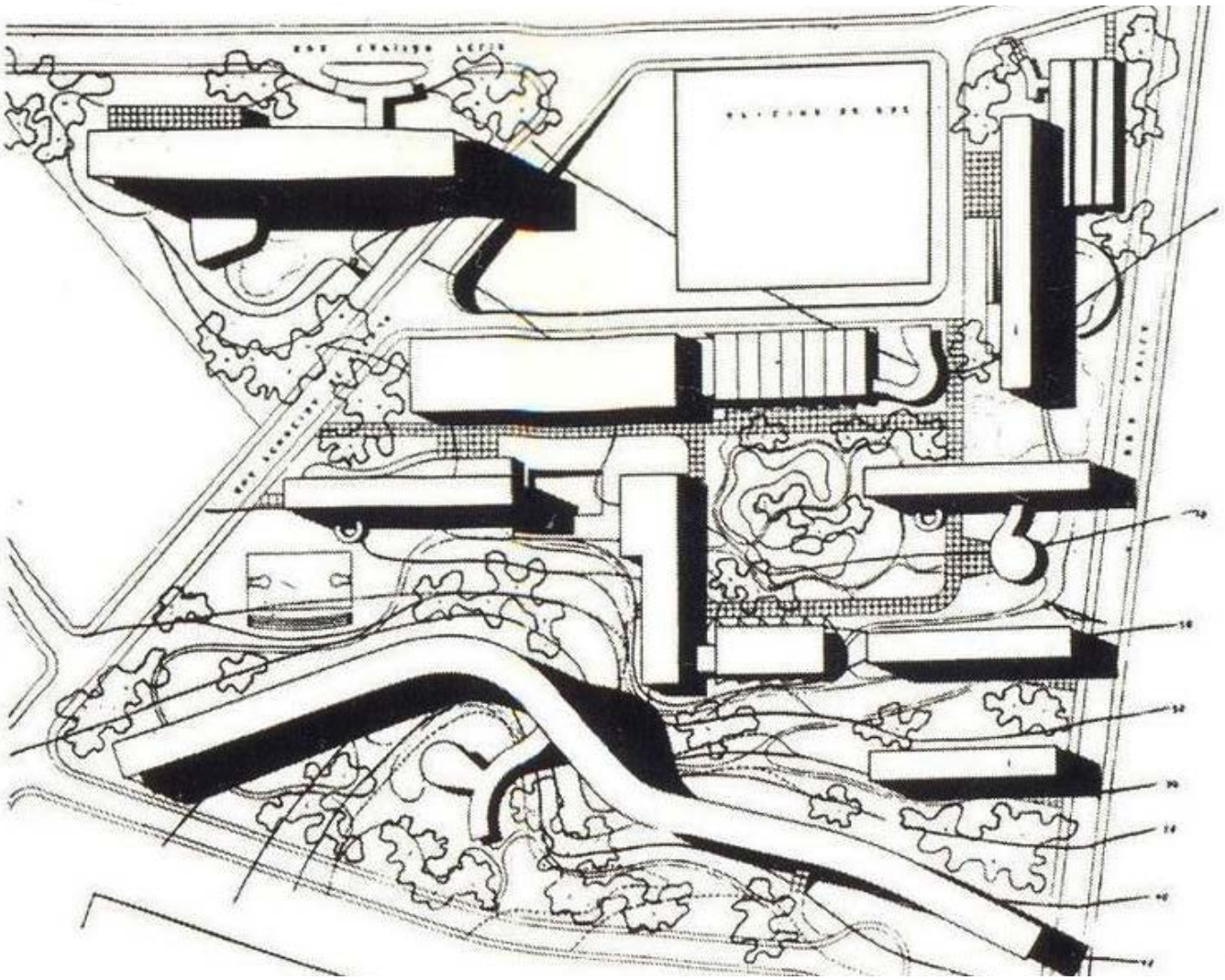
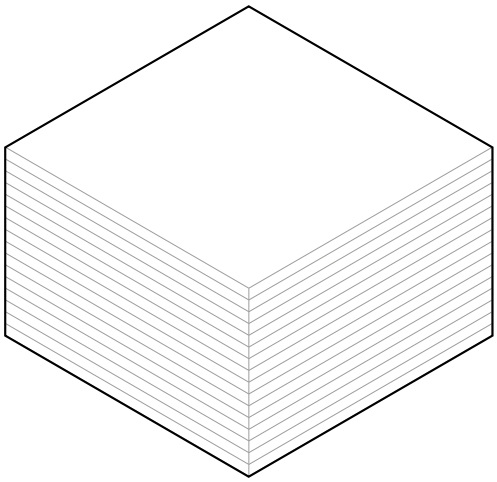


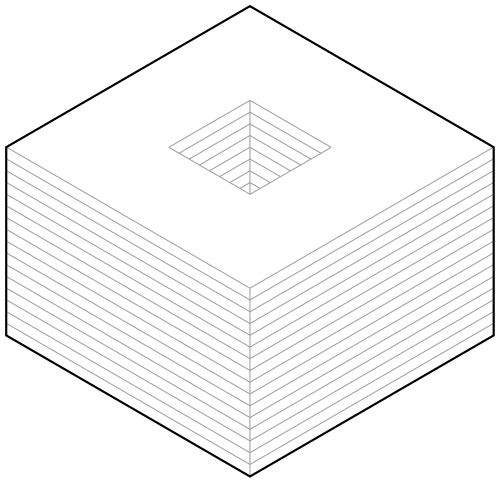
04
prototype

4.1 defining

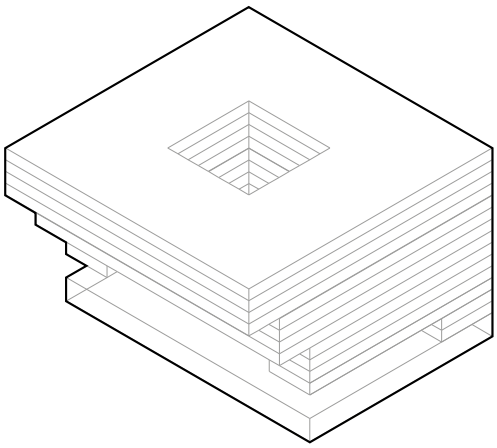
volumetry



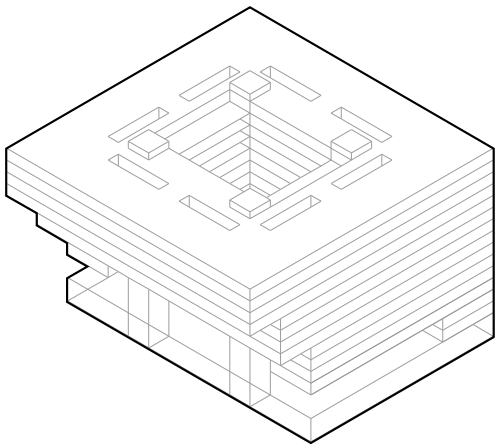
1 urban block: box



2 central gap

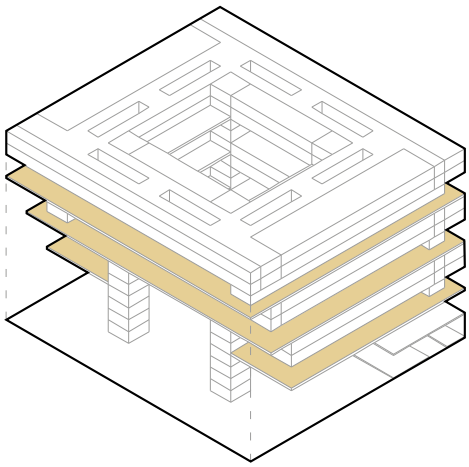


3 topography subtraction

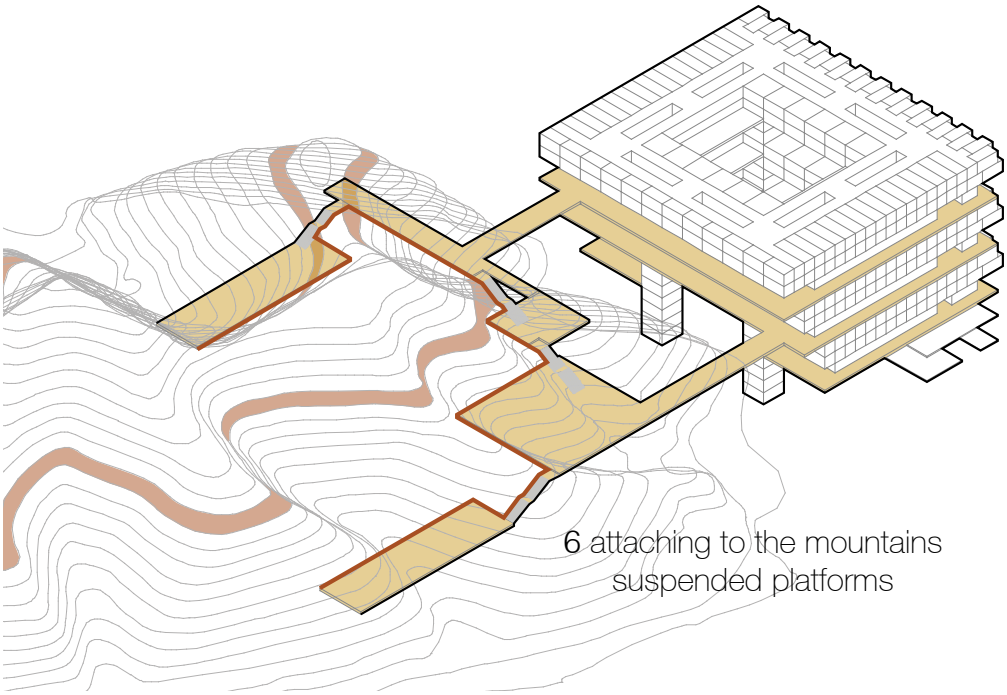


4 openings and core structure

volumetry



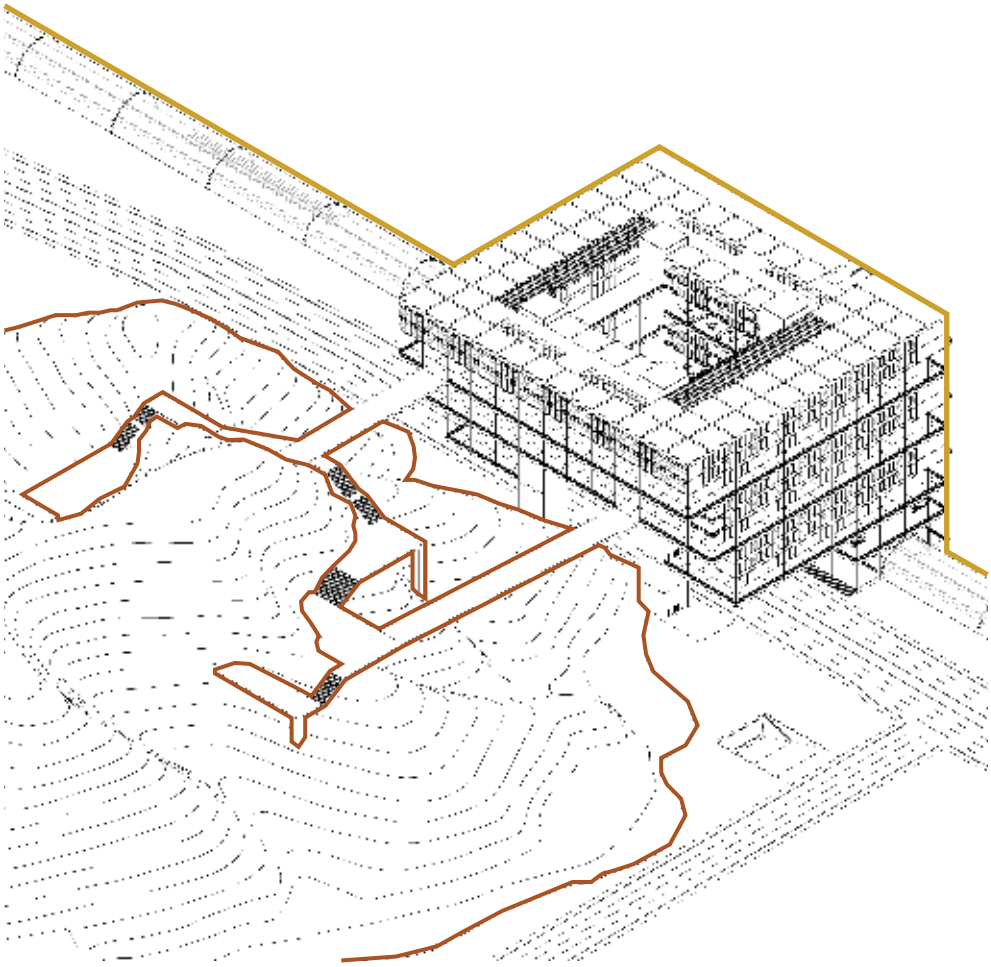
5 public x private areas



6 attaching to the mountains
suspended platforms

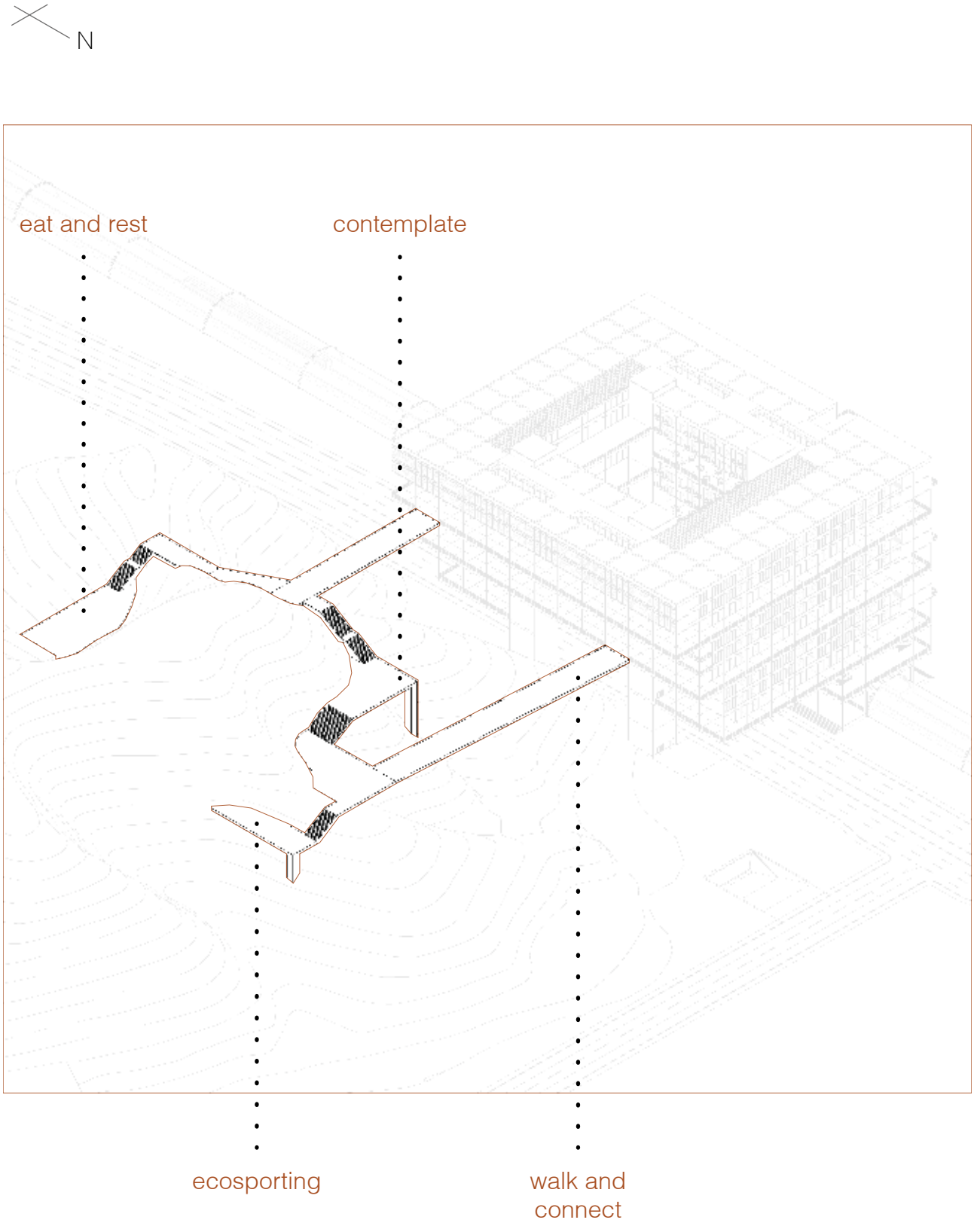
two different moments:

I. west facade, facing the river
hard and rectilinear

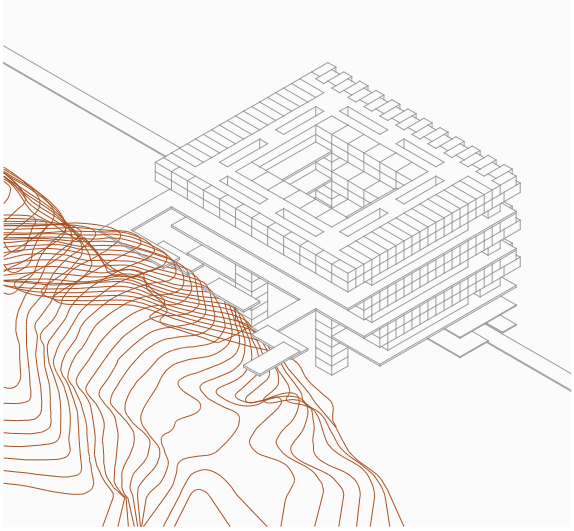


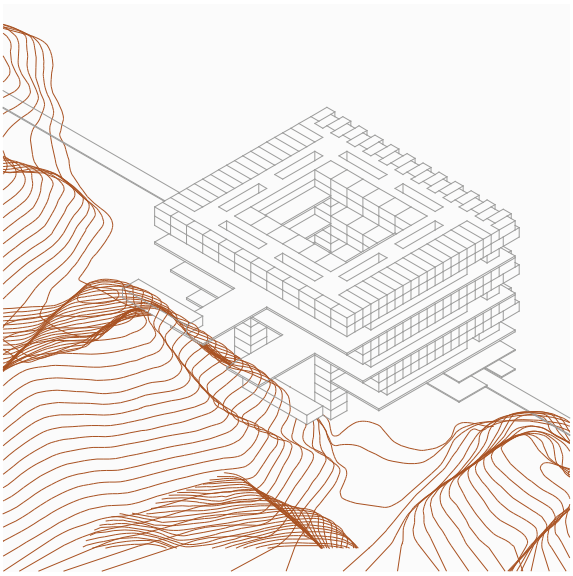
II. east facade facing topography
soft and adapting

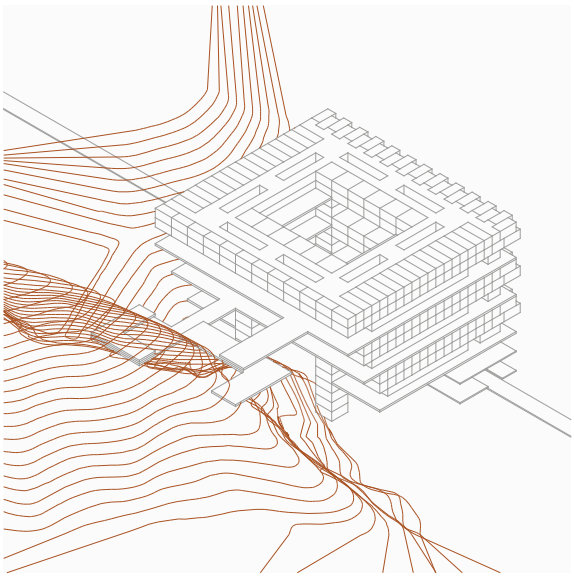
using the suspended plazas



diverse contexts, the same block







sectorization - axonometric

apt type A - 50 sqm
out west facade
22 units / floor (total 132)

apt type B - 75 sqm
out north facade / out south facade
30 units / floor (total 180)

apt type C - 100 sqm
in west facade / in east facade
8 units / floor (total 40)

common areas and commerce
varied areas

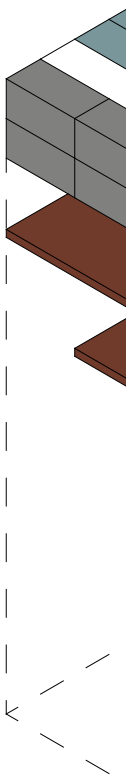
public floors
varied areas

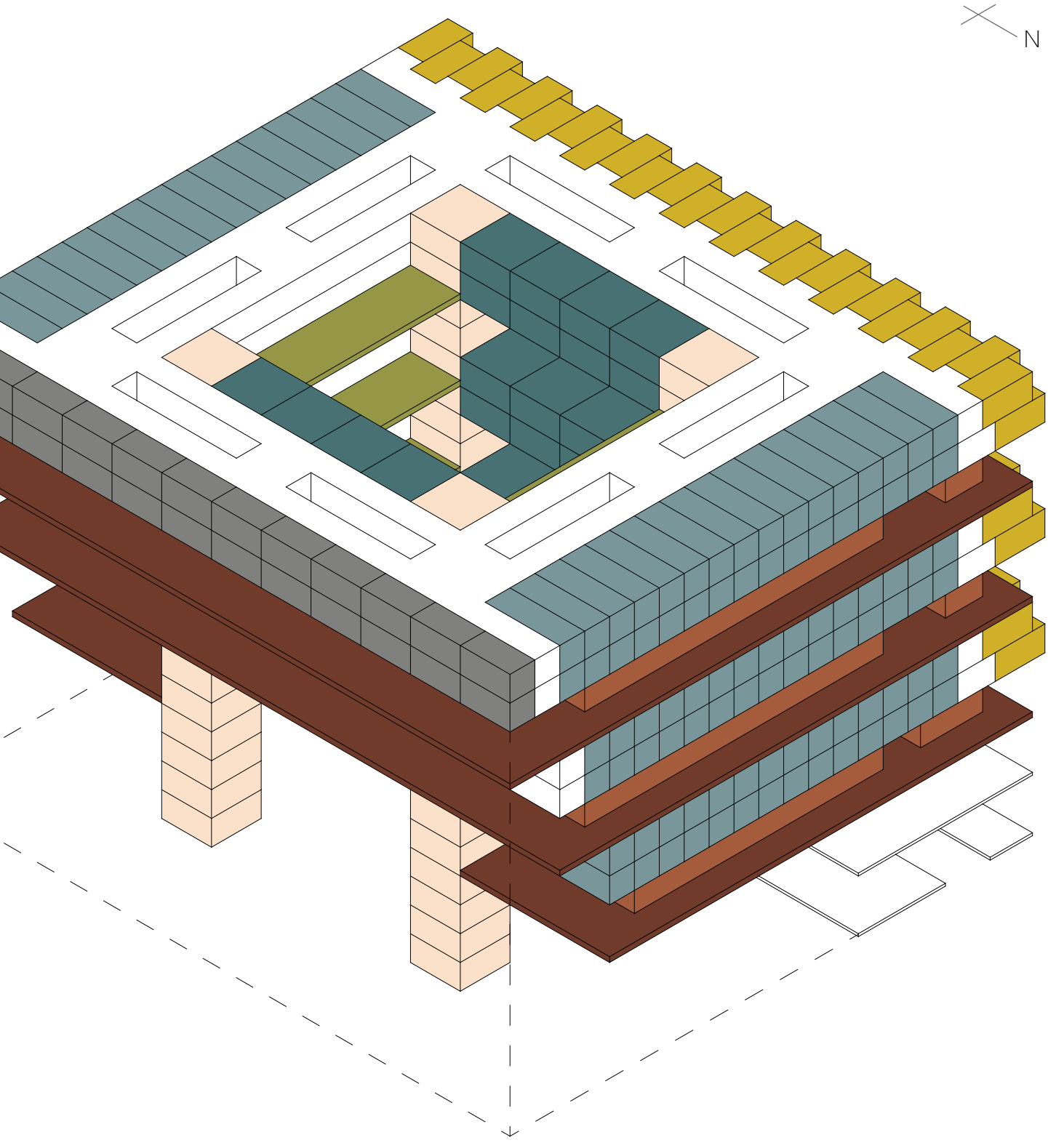
“vertical gardens”
in north facade / in south facade

temporary housing
out east facade
12 units / floor (total 24)

vertical circulation
rigid core

horizontal circulation
mobility and transport

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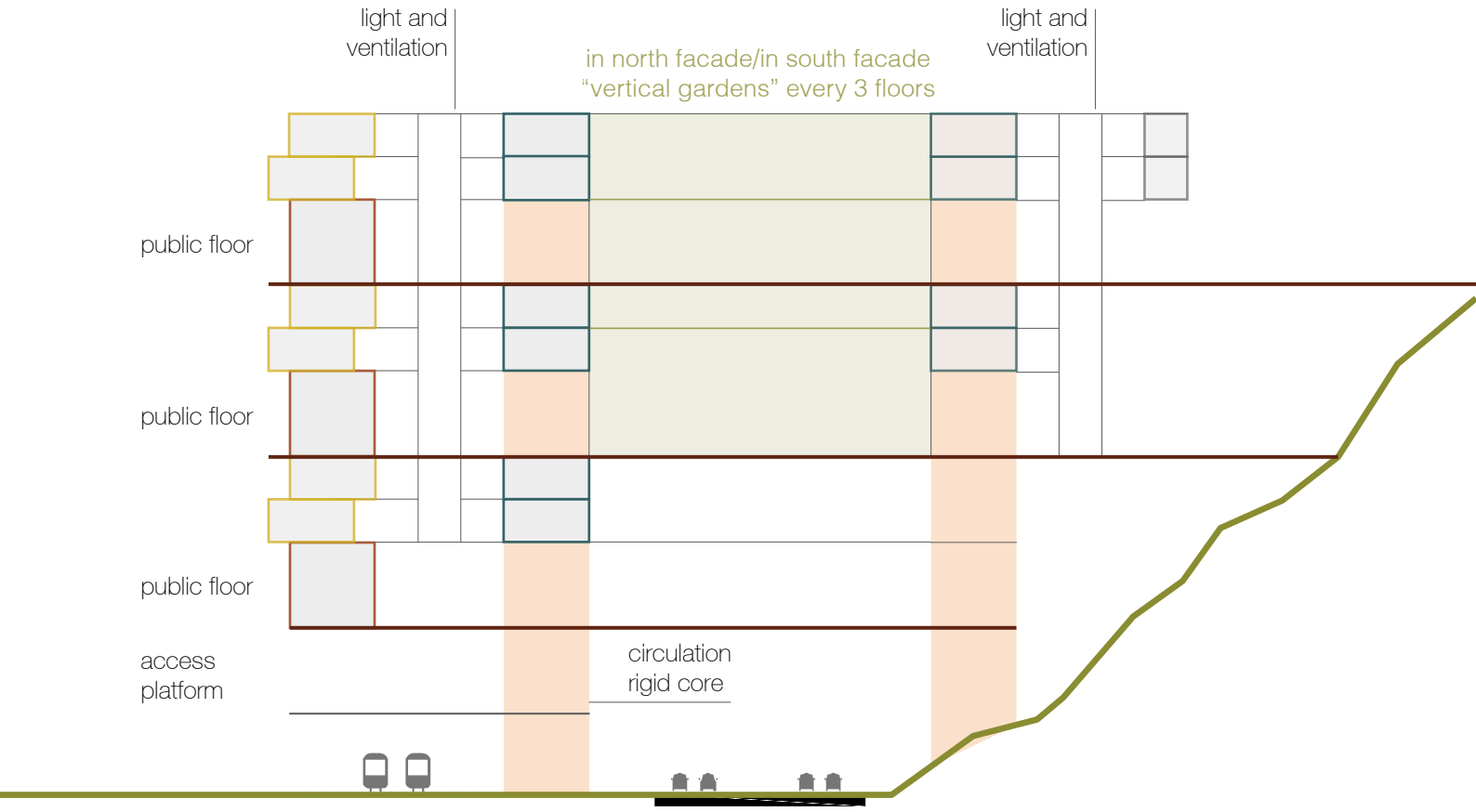
sectorization - scheme section

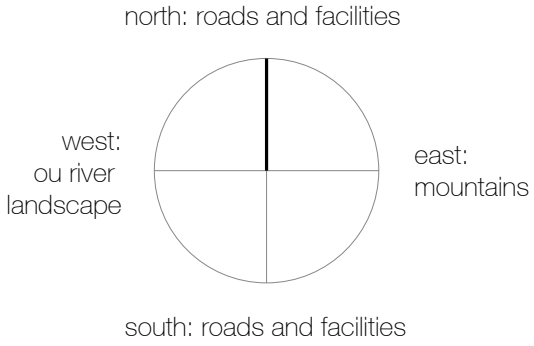
- apt type A - 50 sqm
- apt type B - 75 sqm
- apt type C - 100 sqm
- common areas and commerce
- gardens
- temporary housing
- vertical circulation
- horizontal circulation

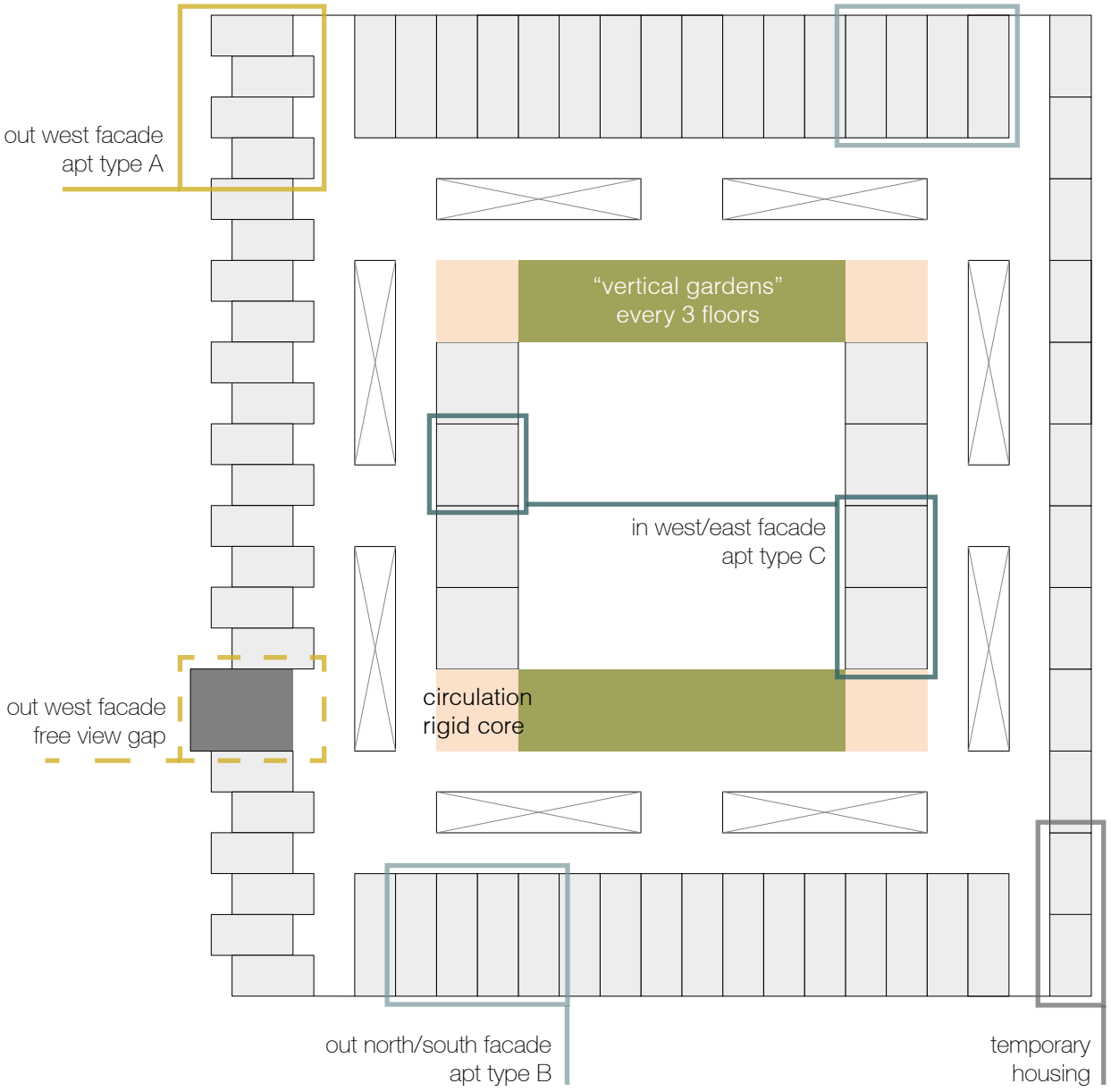


public floors

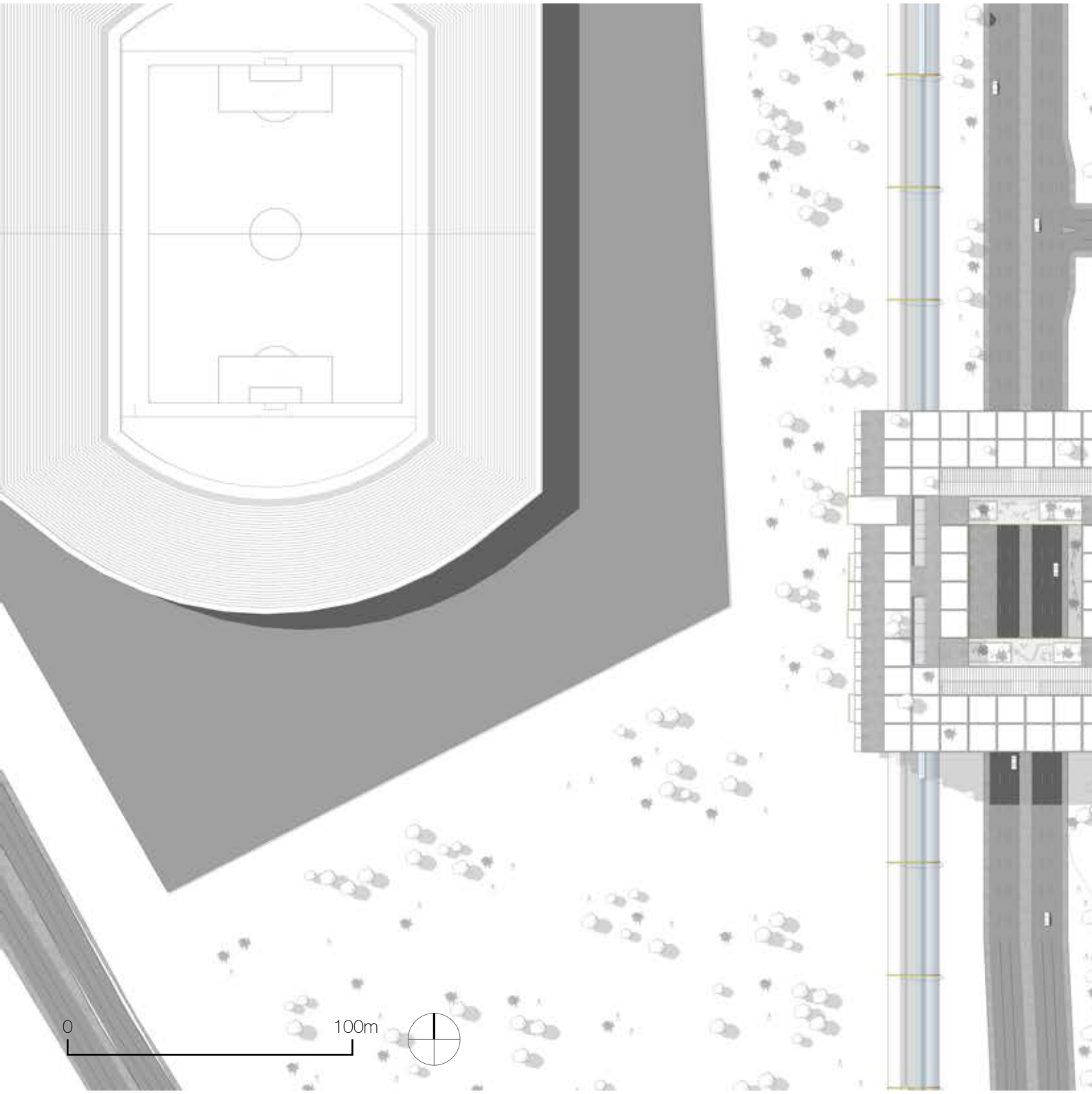
0 5 15 25m

sectorization - housing floor plan



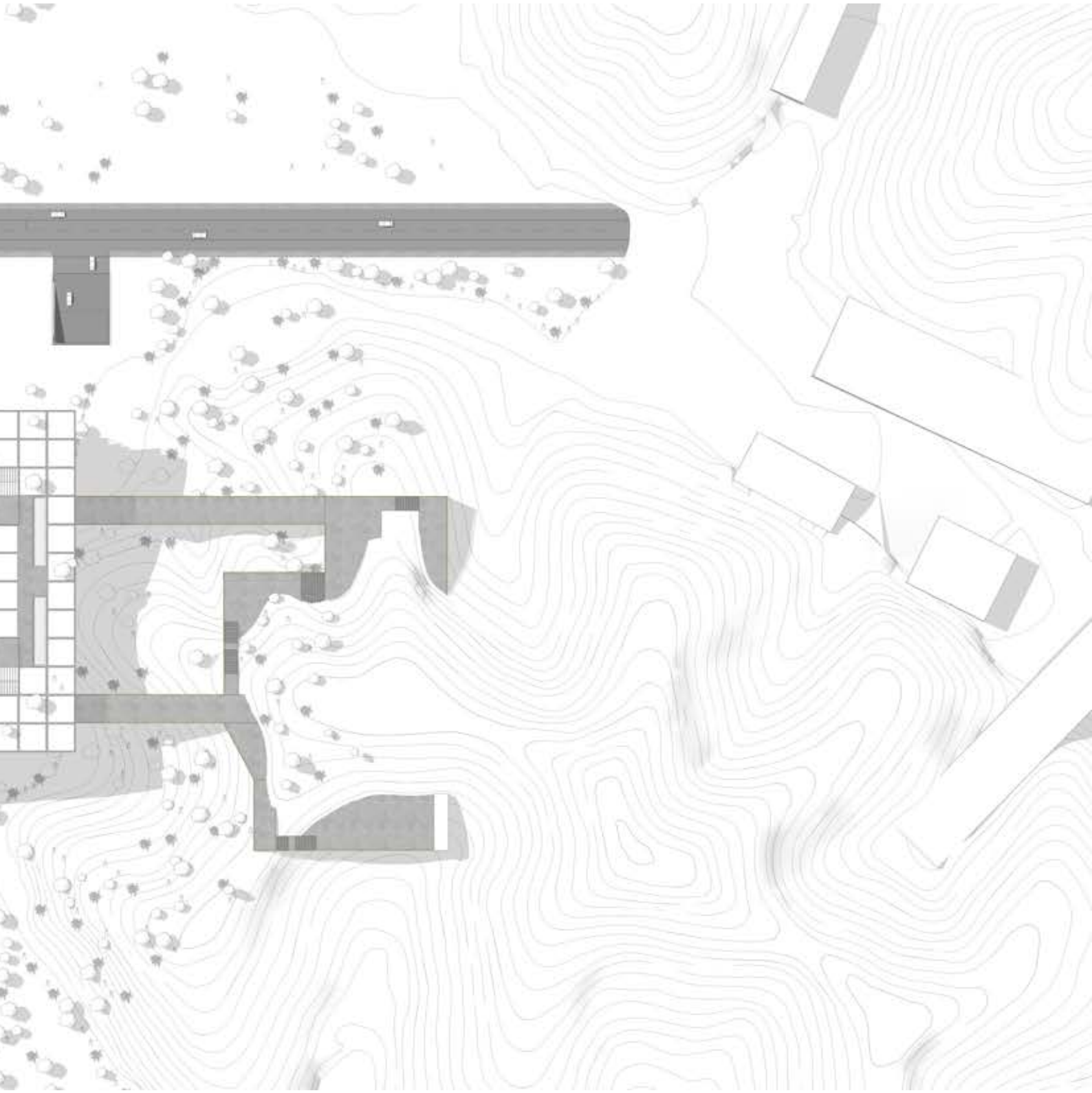


aerial view



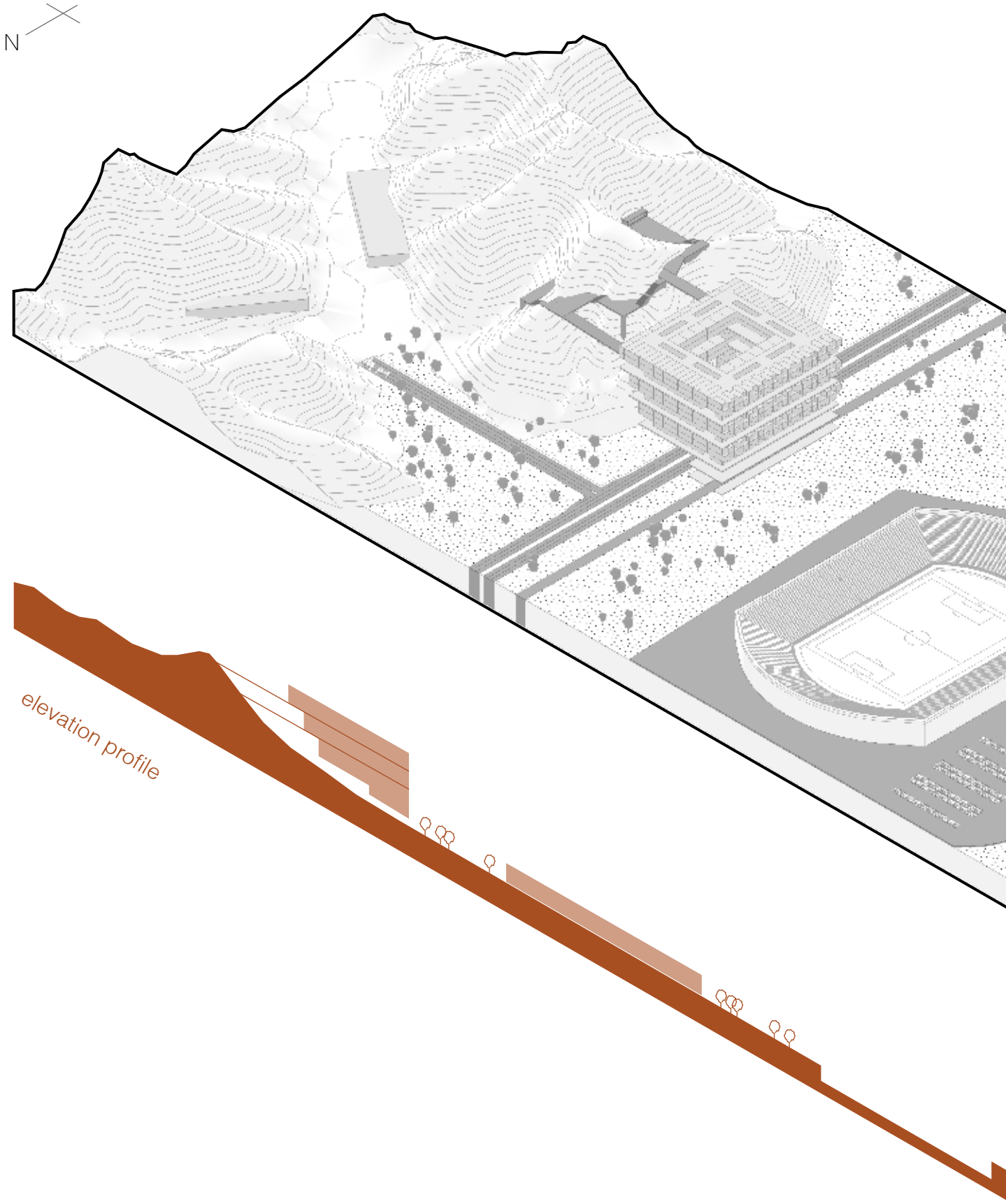
urban block

dwe



suspended plaza

elling in lishui mountains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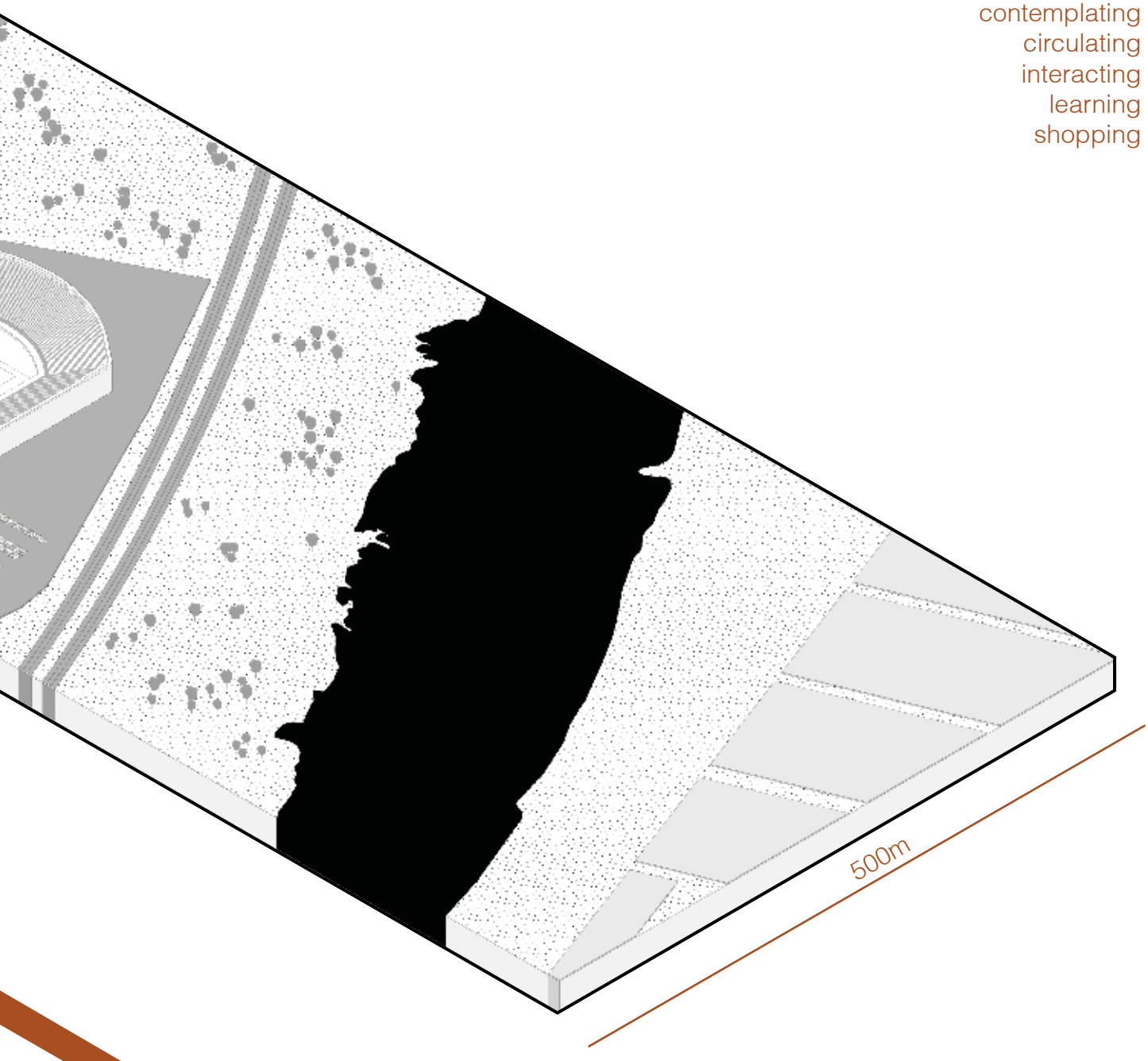
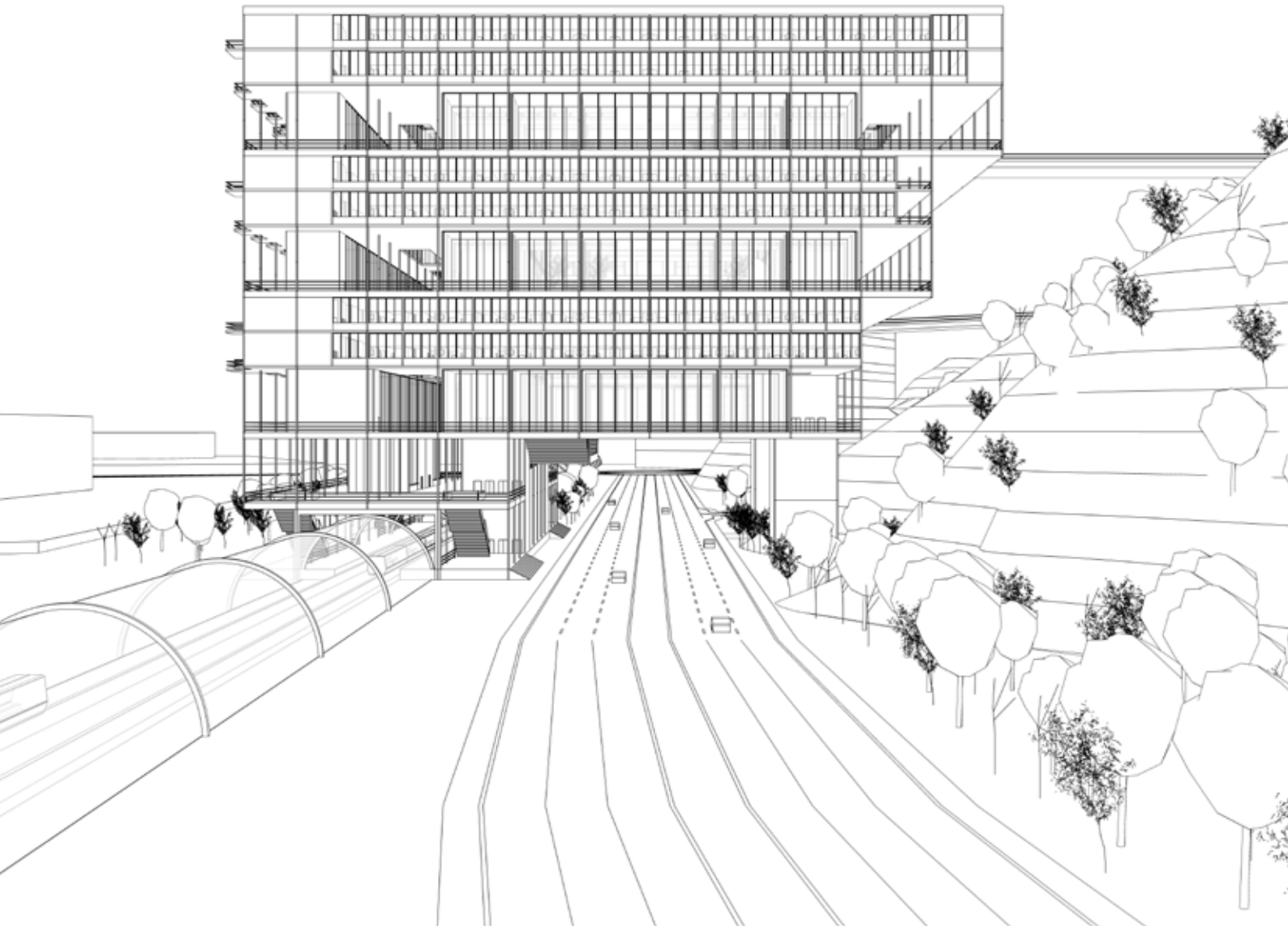
elevation profile

guidelines:

create spaces for living
working
hosting
playing
contemplating
circulating
interacting
learning
shopping





4.2 resolving

plans:

top view floor
housing floor 6
housing floor 5
public floor 3
housing floor 4
housing floor 3
public floor 2
housing floor 2
housing floor 1
public floor 1
access platform
ground floor

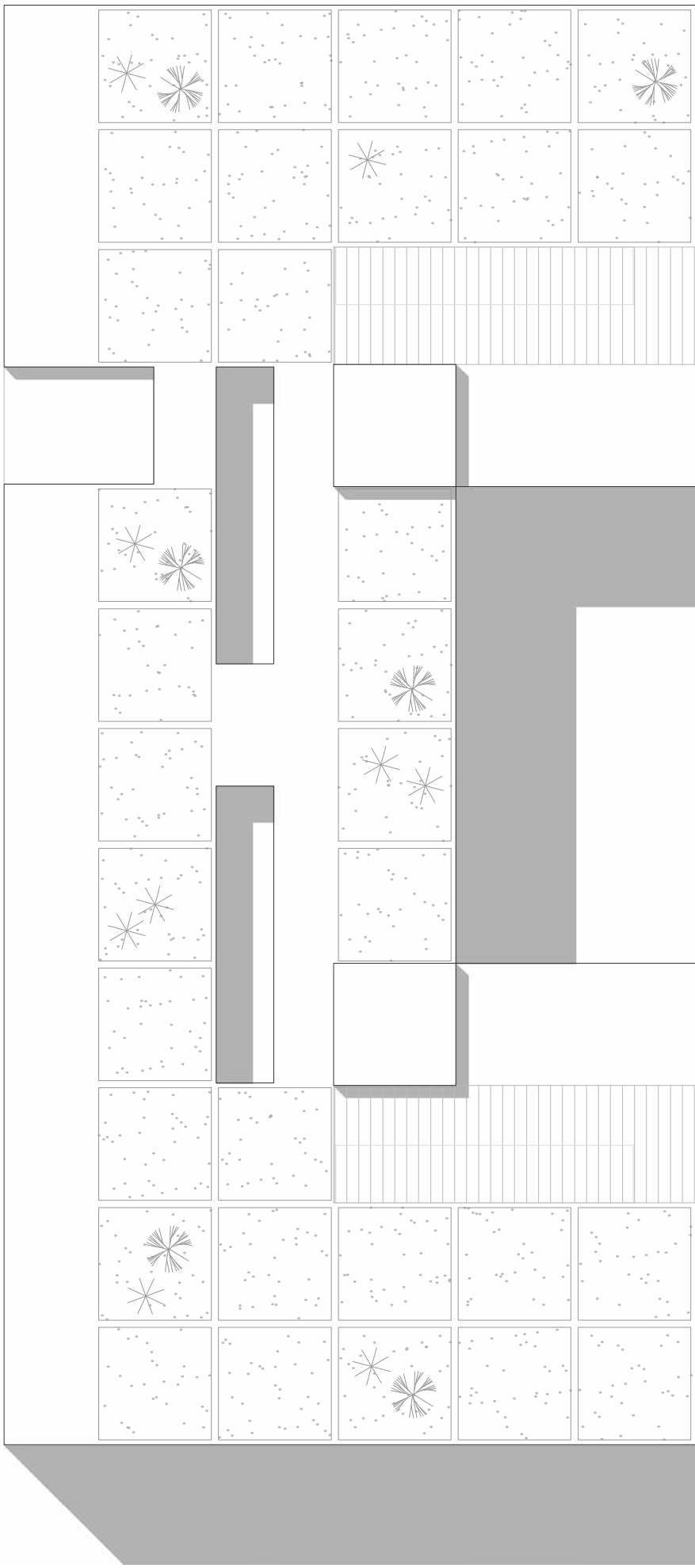
sections:

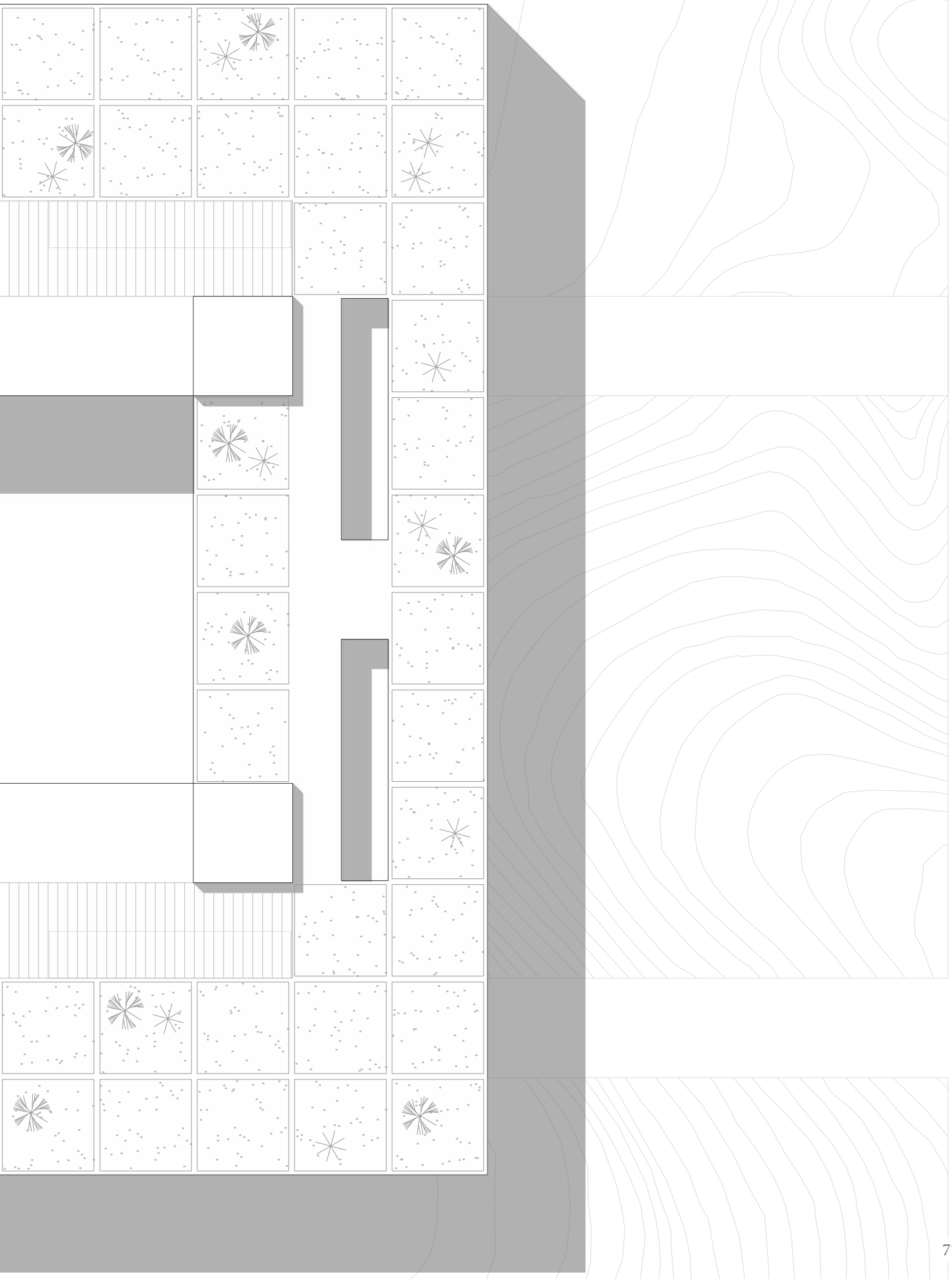
cross section A
cross section B

interiors:

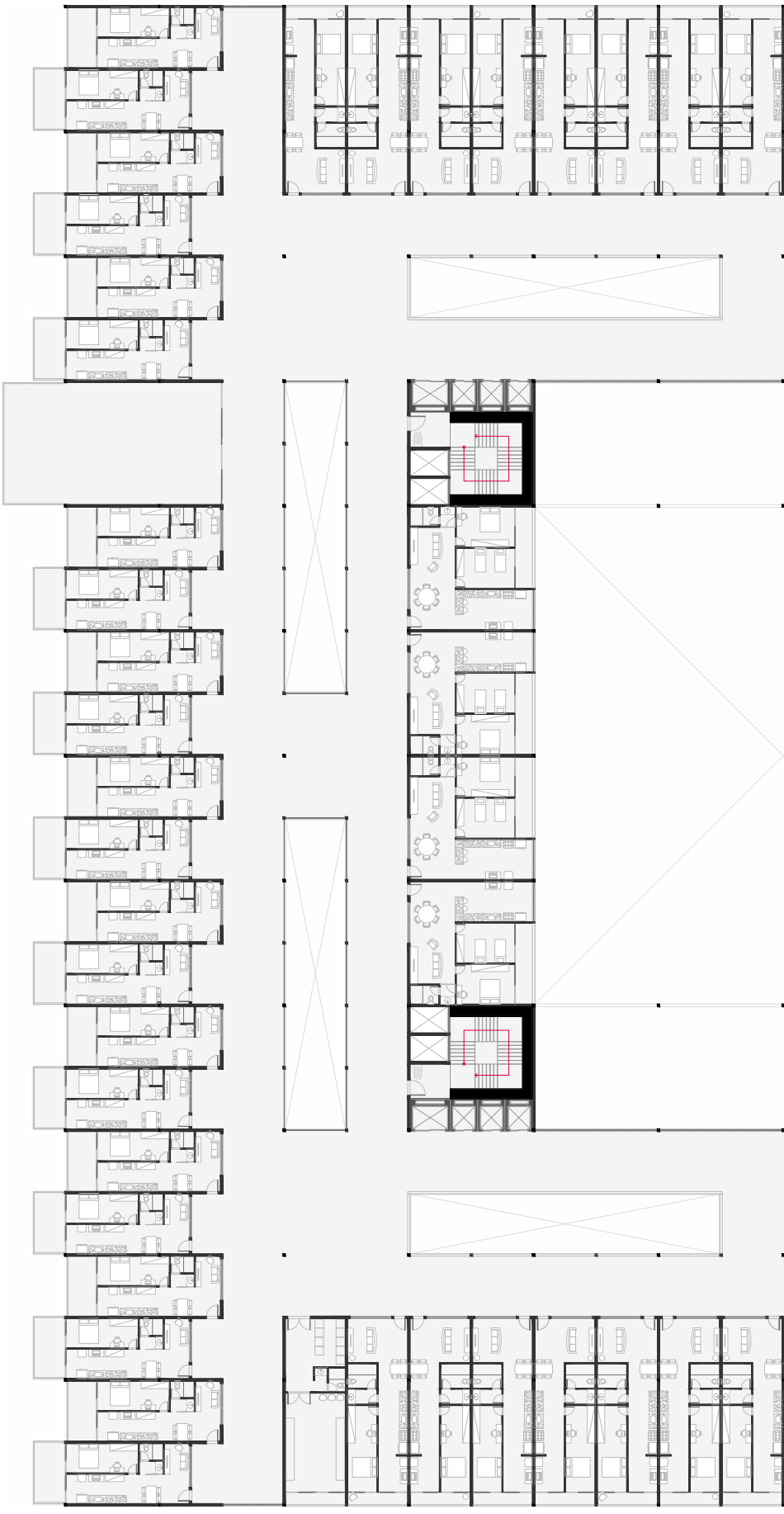
apartment type A
apartment type B
apartment type C
public floor

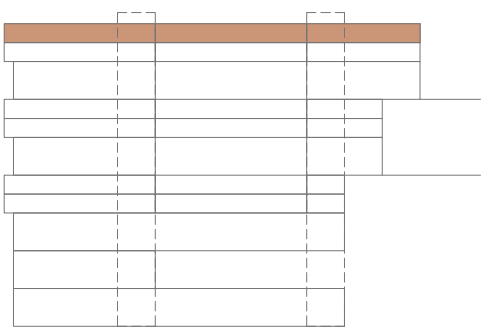
top view floor



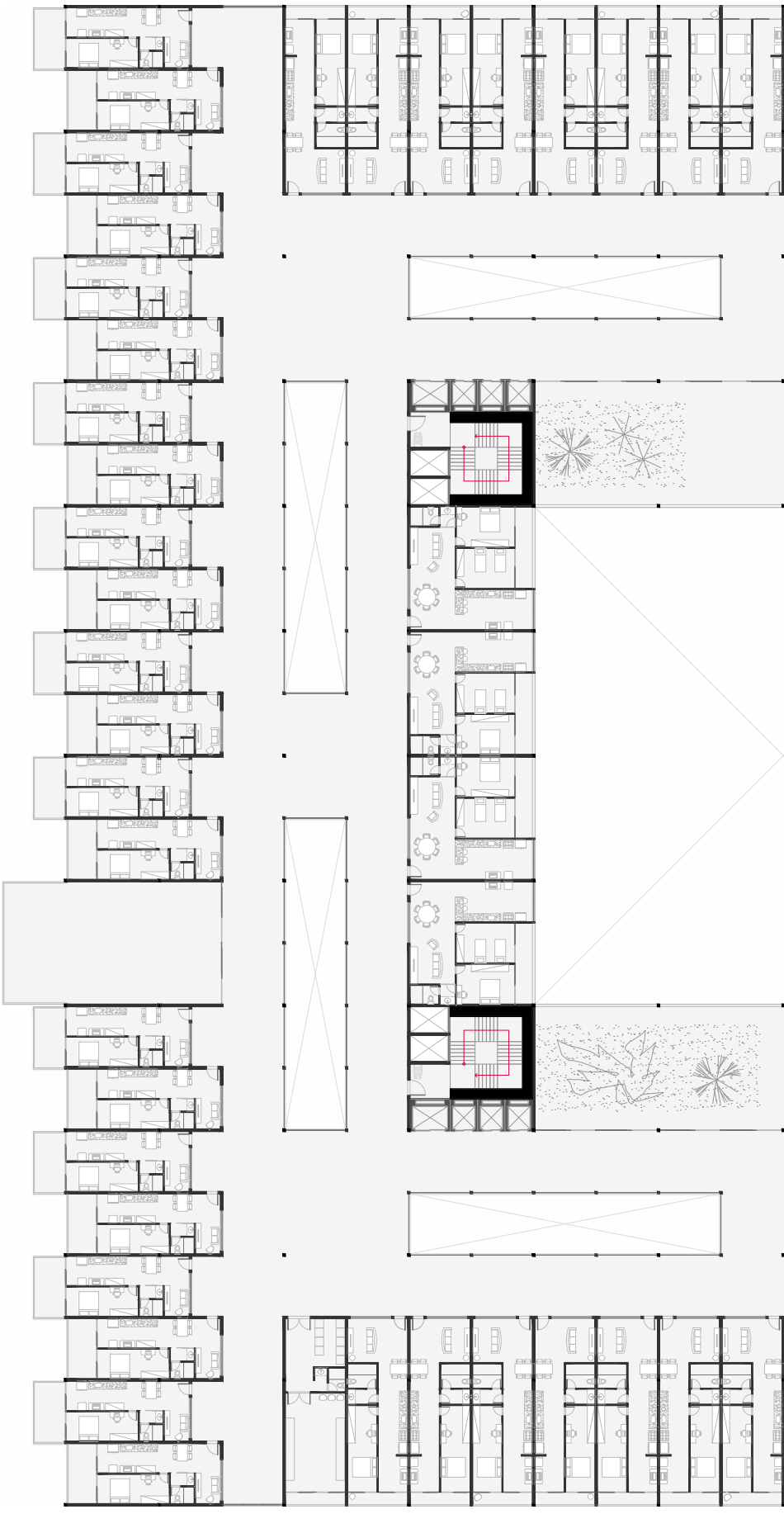


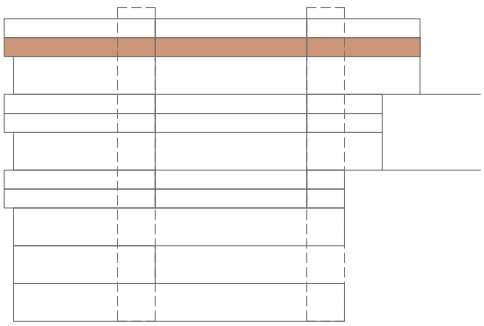
housing floor 6



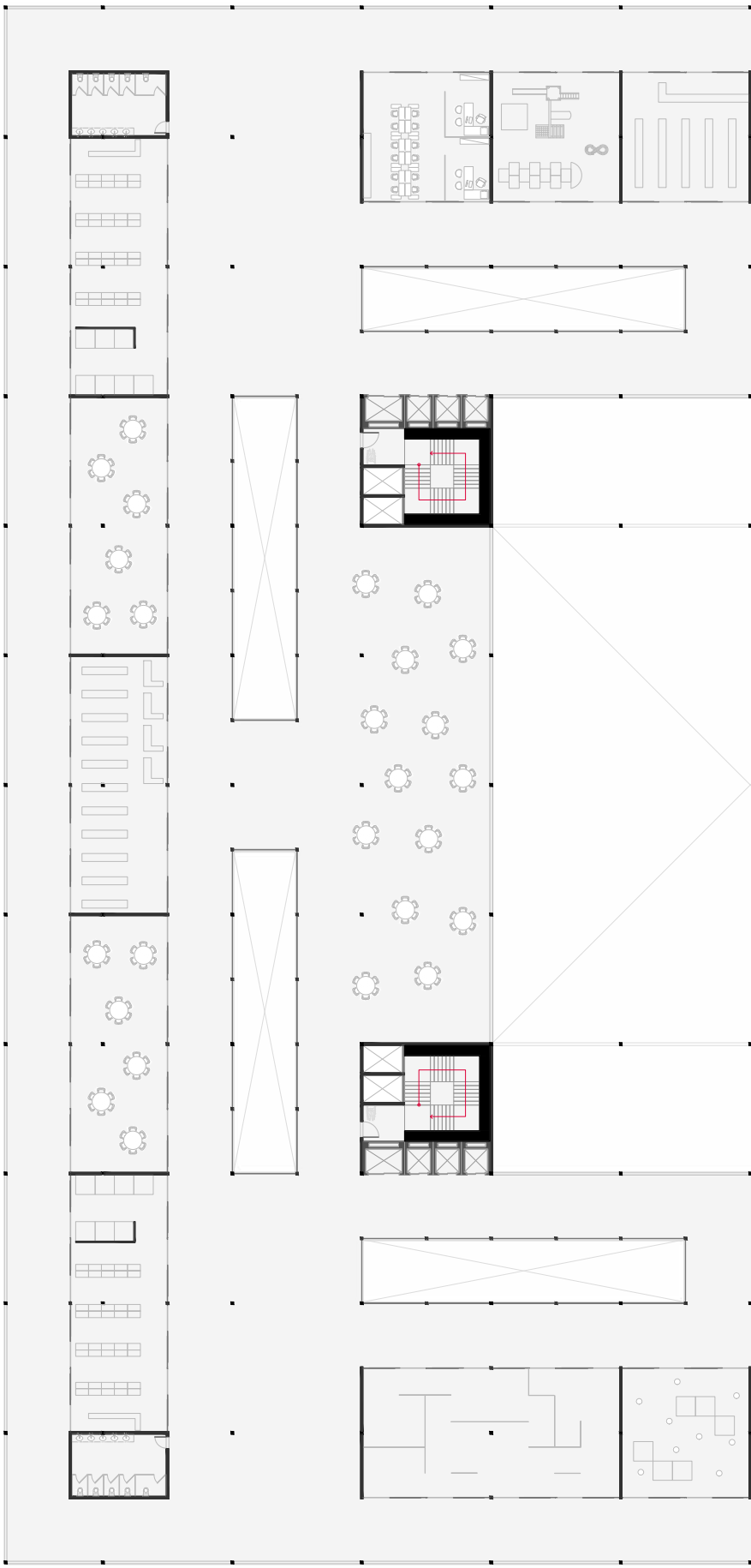


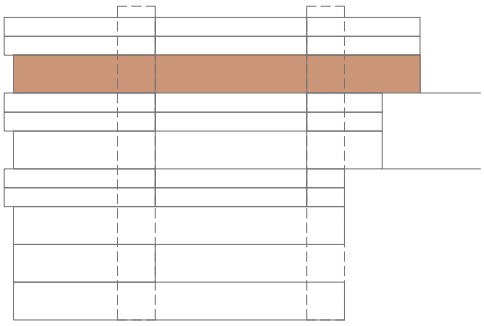
housing floor 5

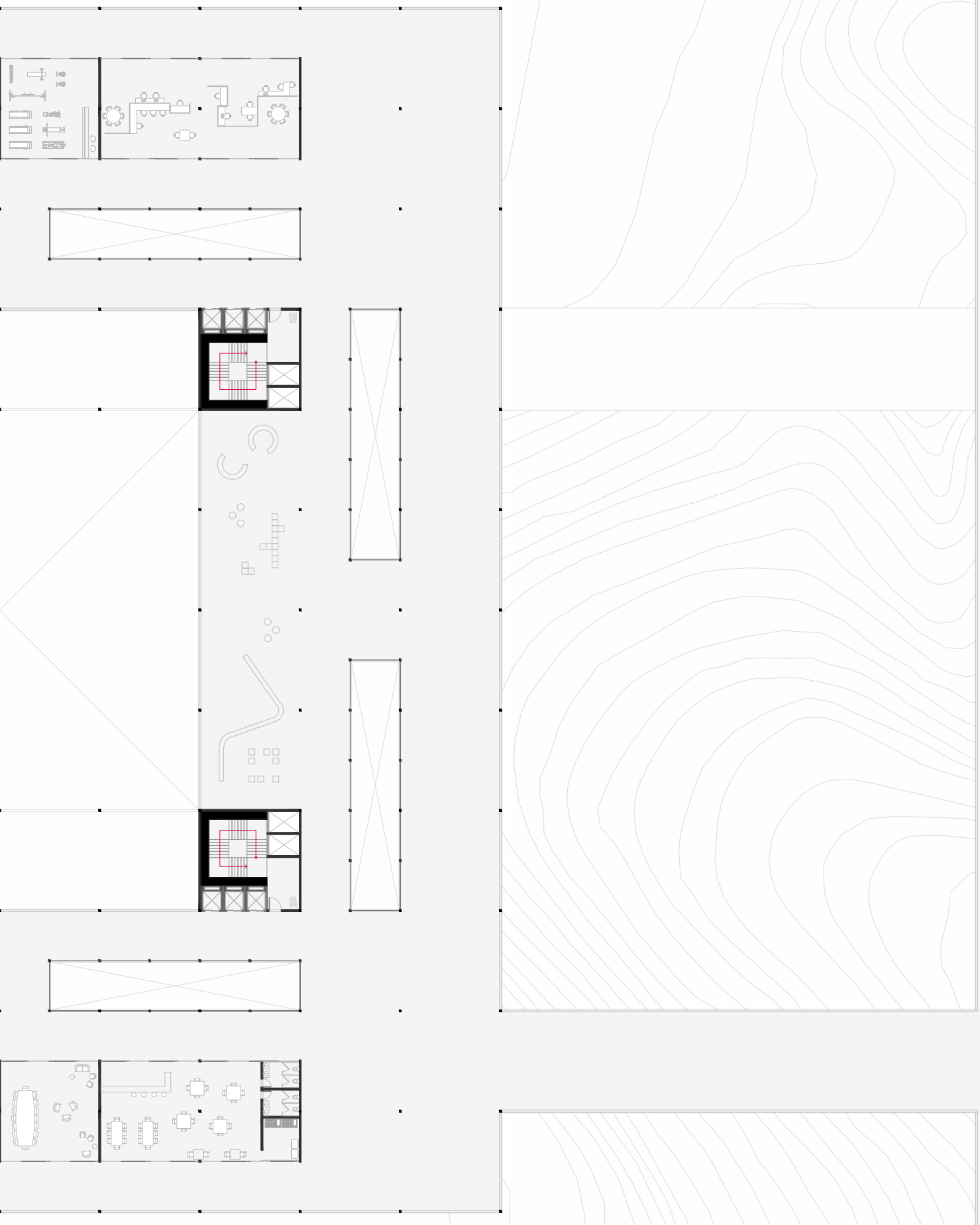




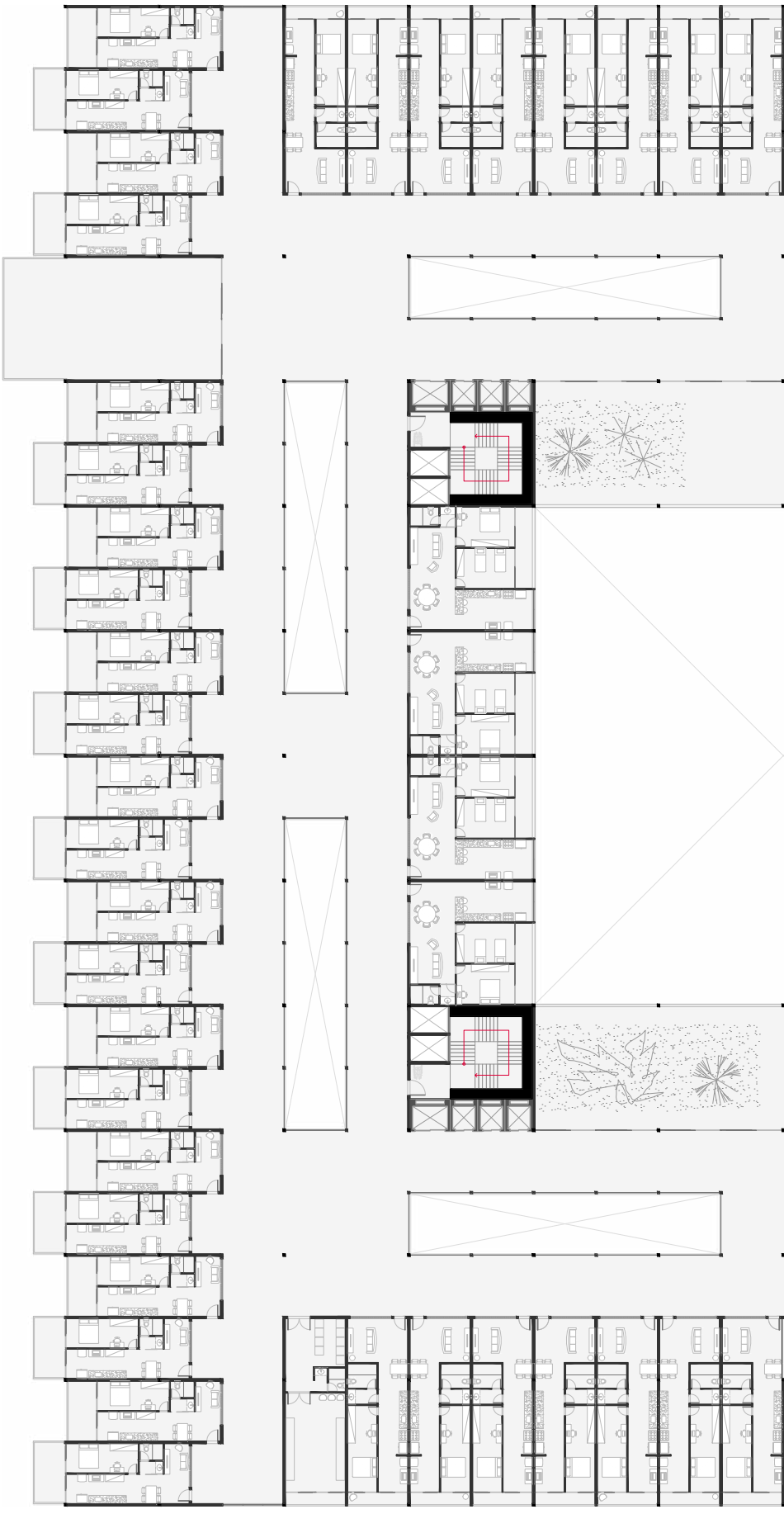
public floor 3

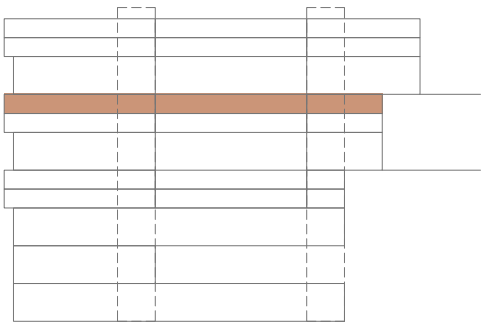


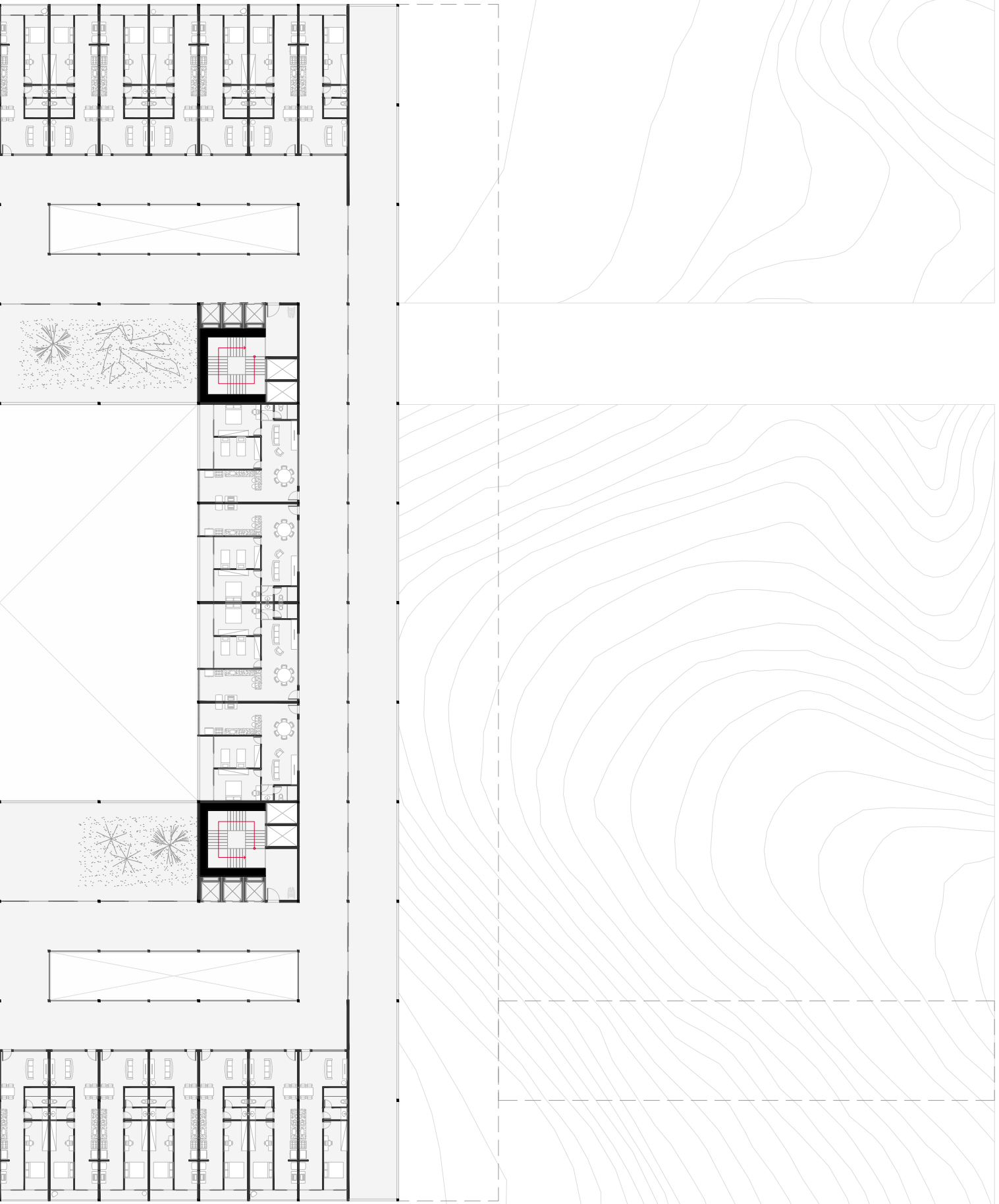




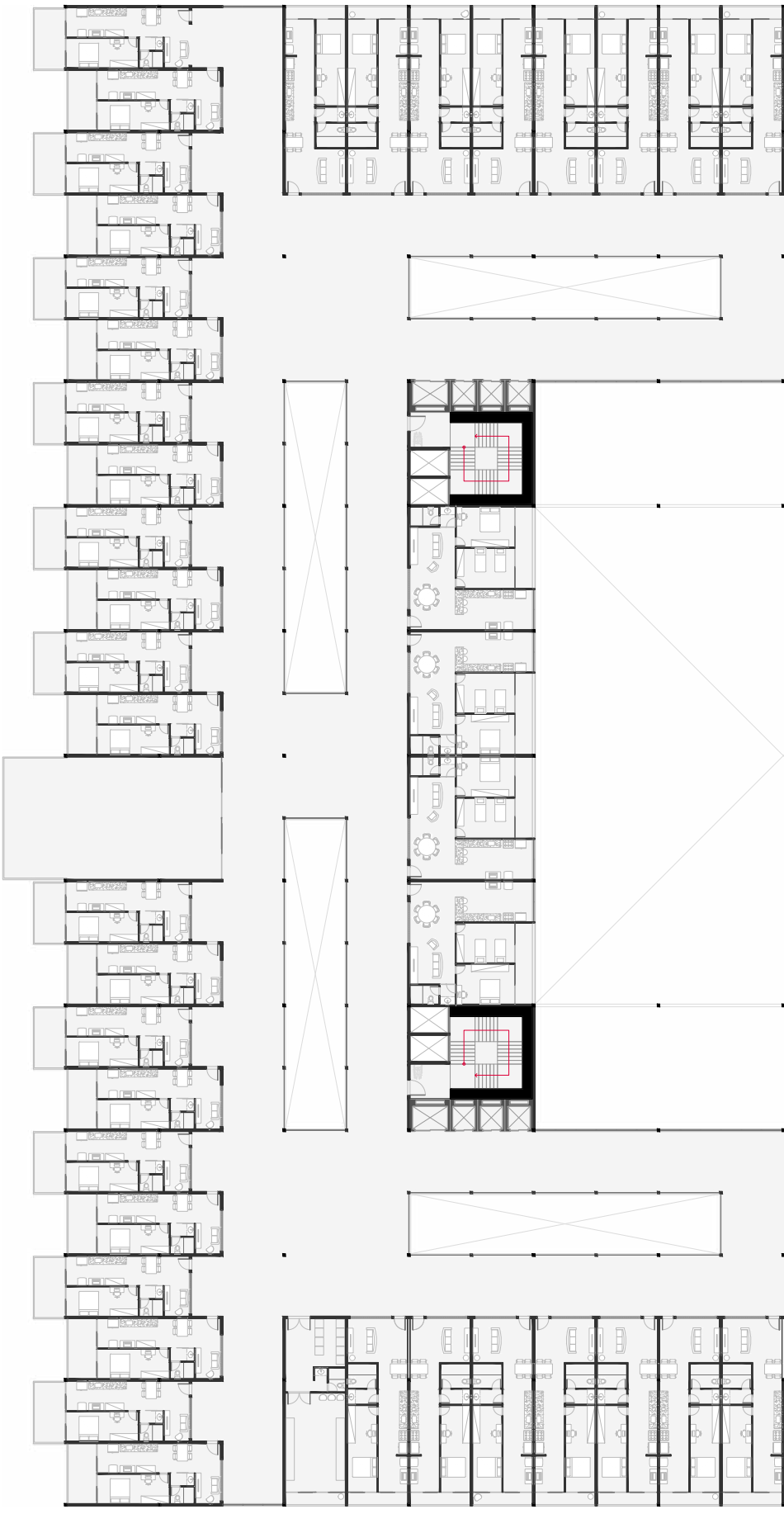
housing floor 4

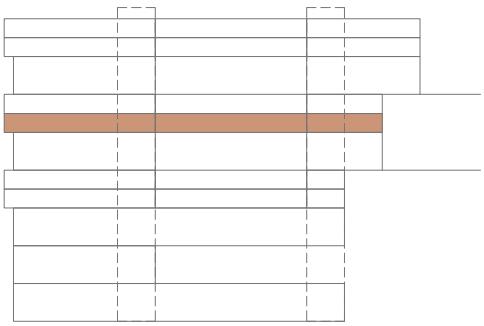


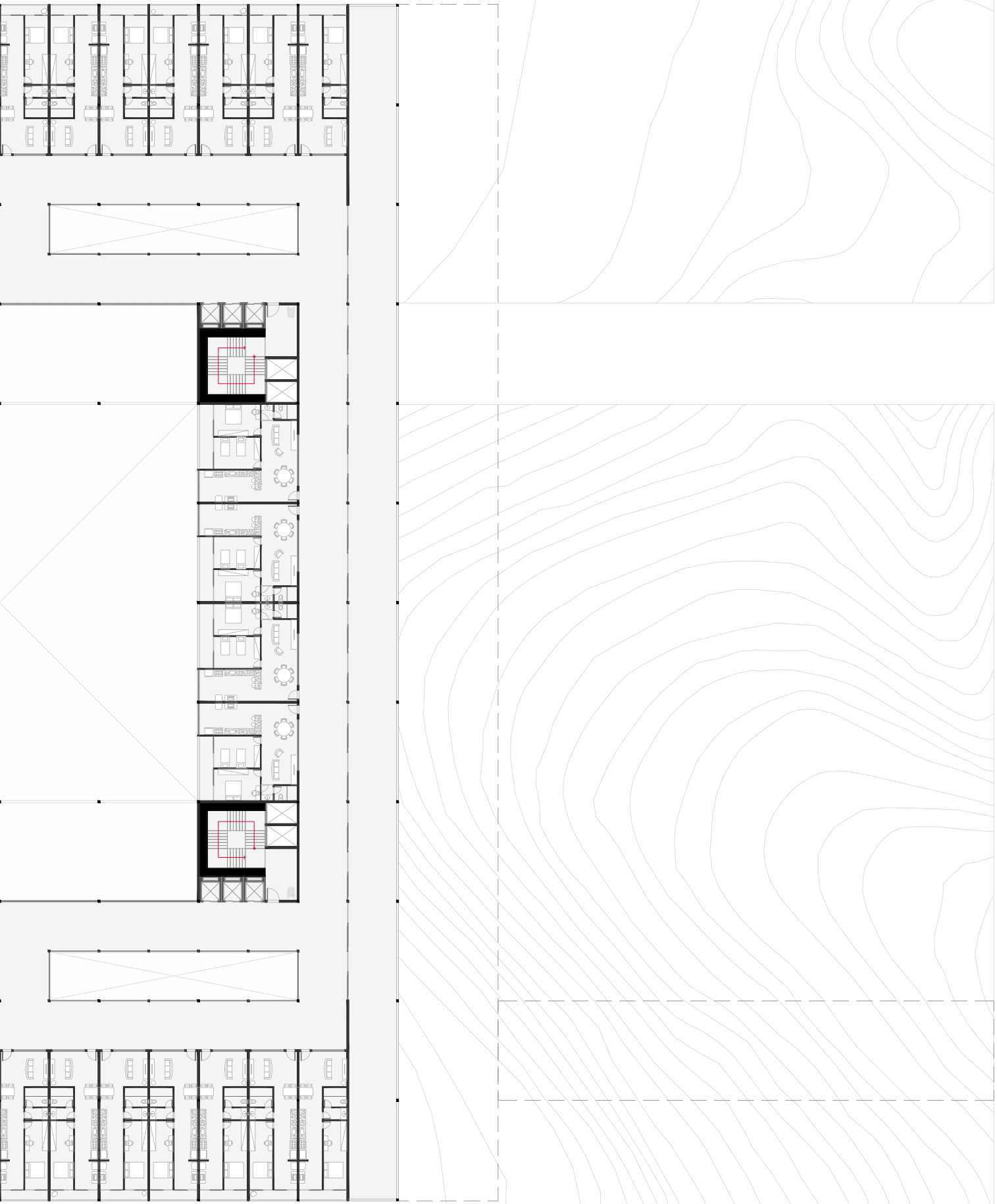




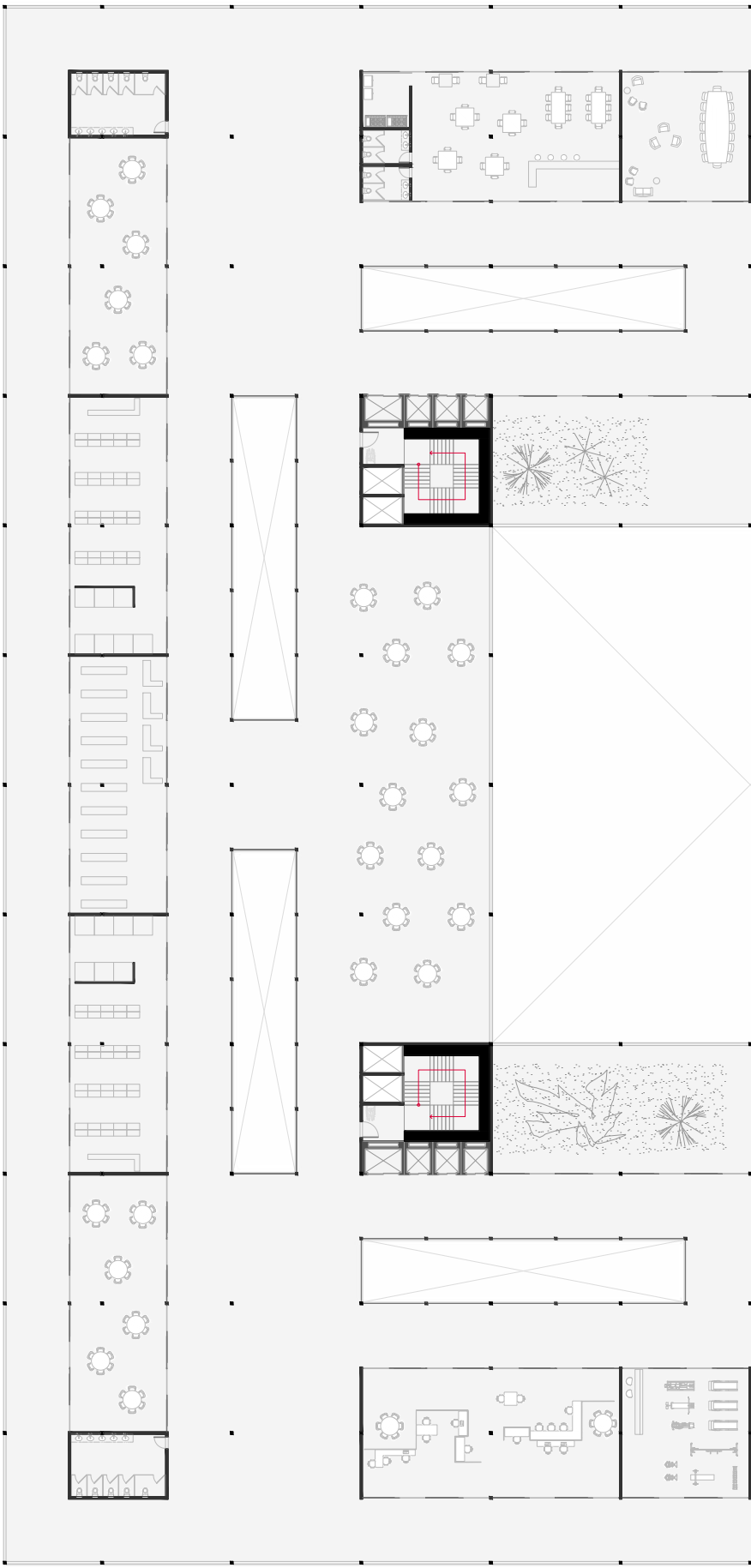
housing floor 3

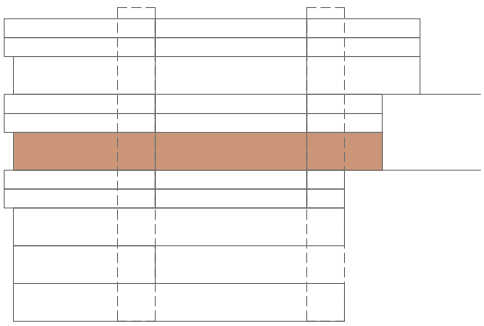


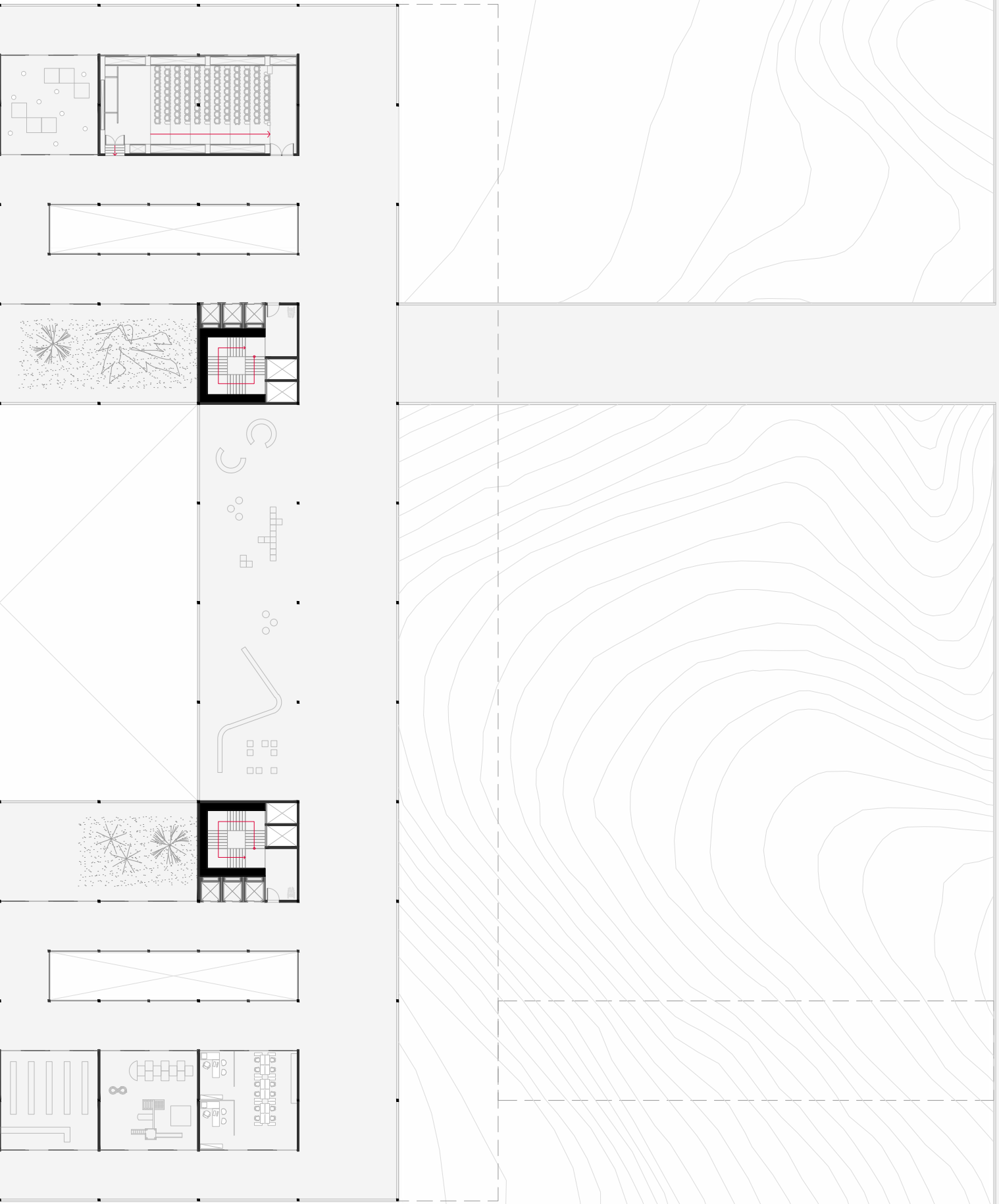




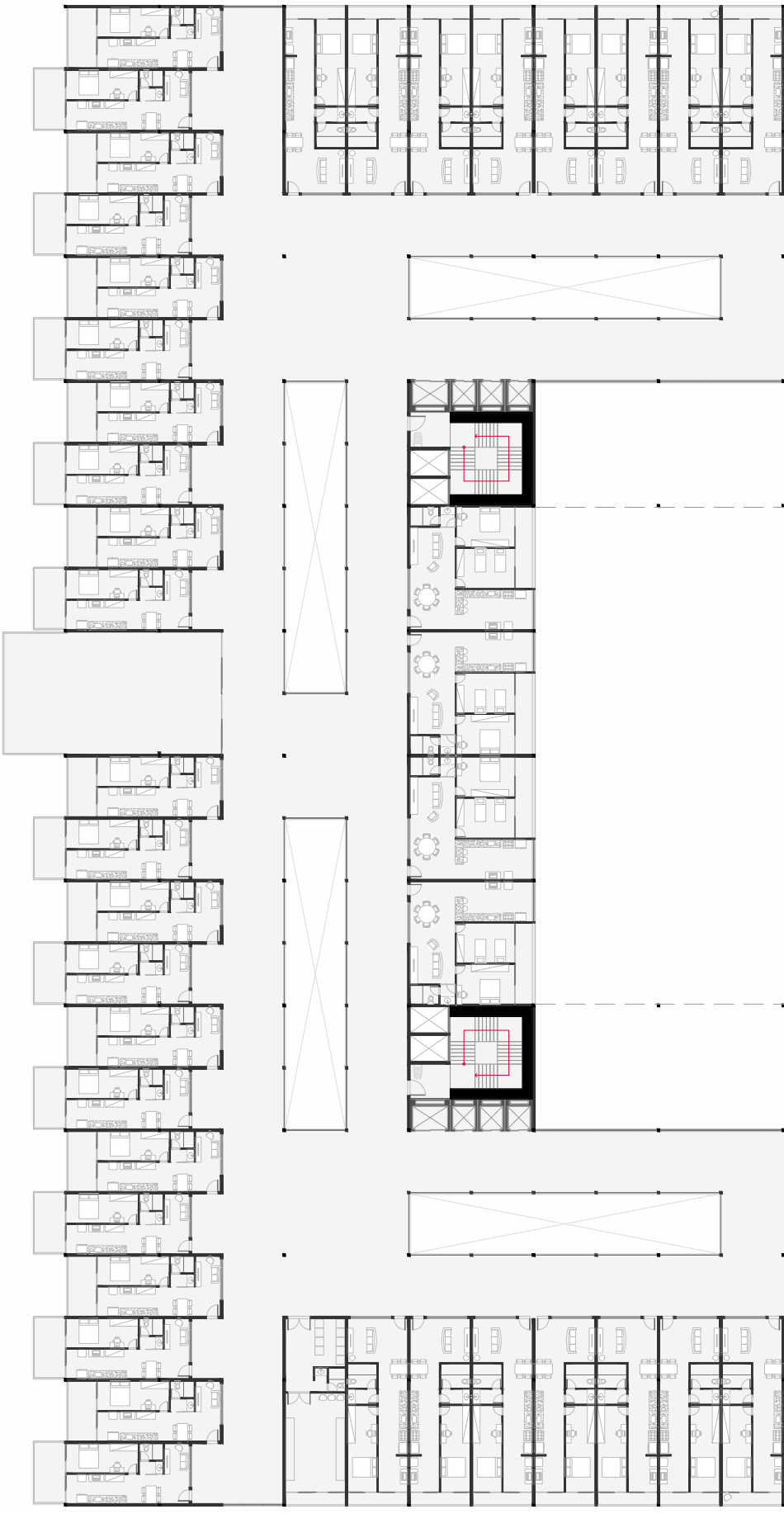
public floor 2

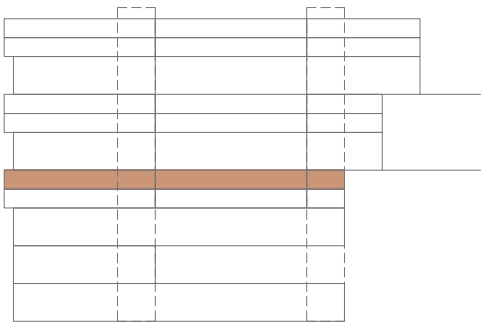




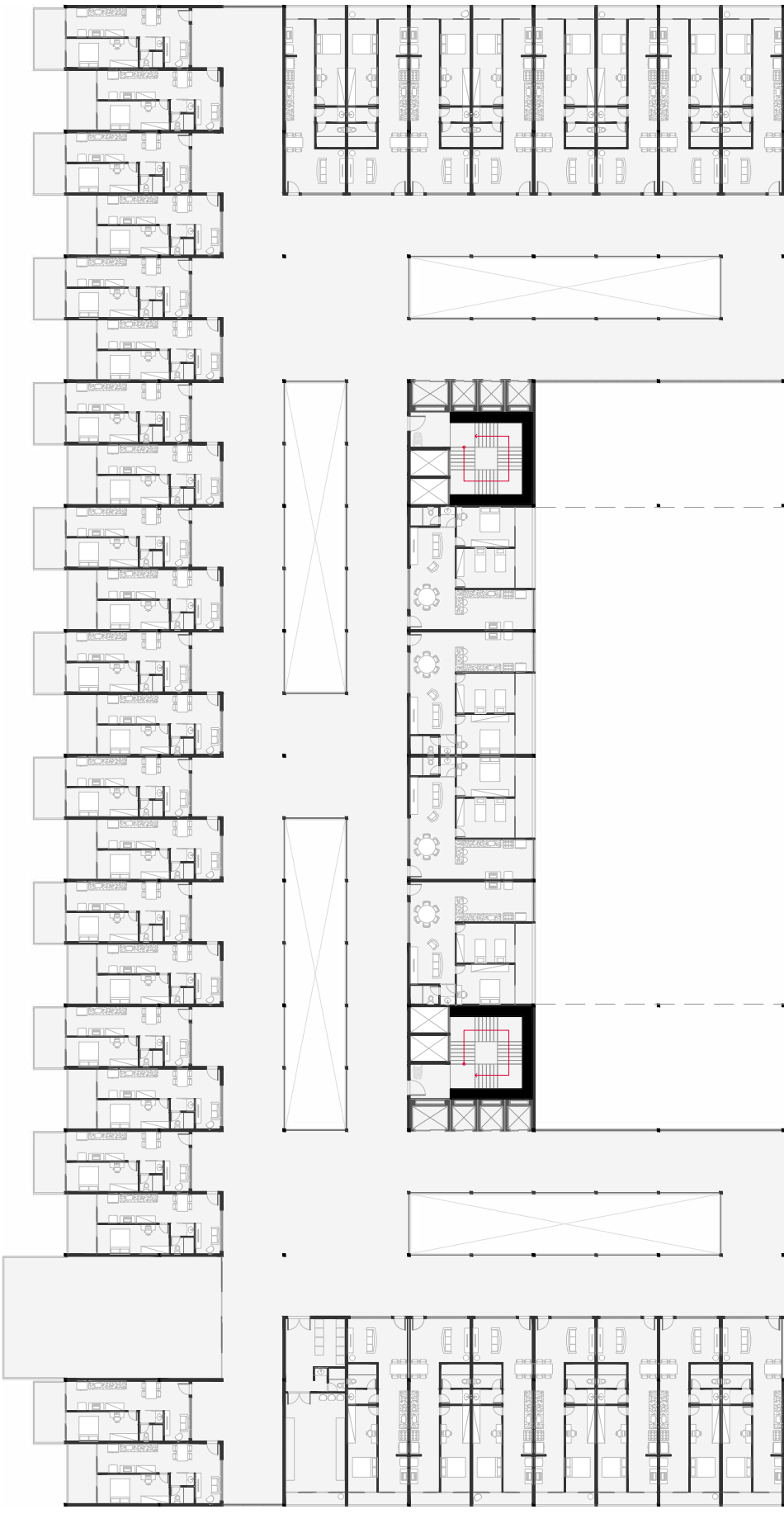


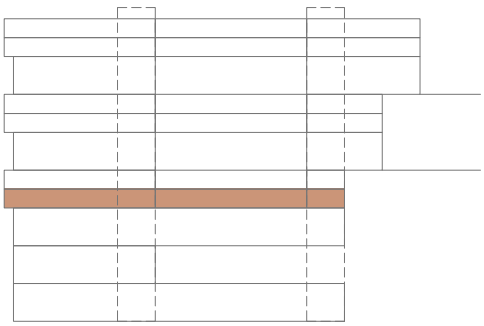
housing floor 2



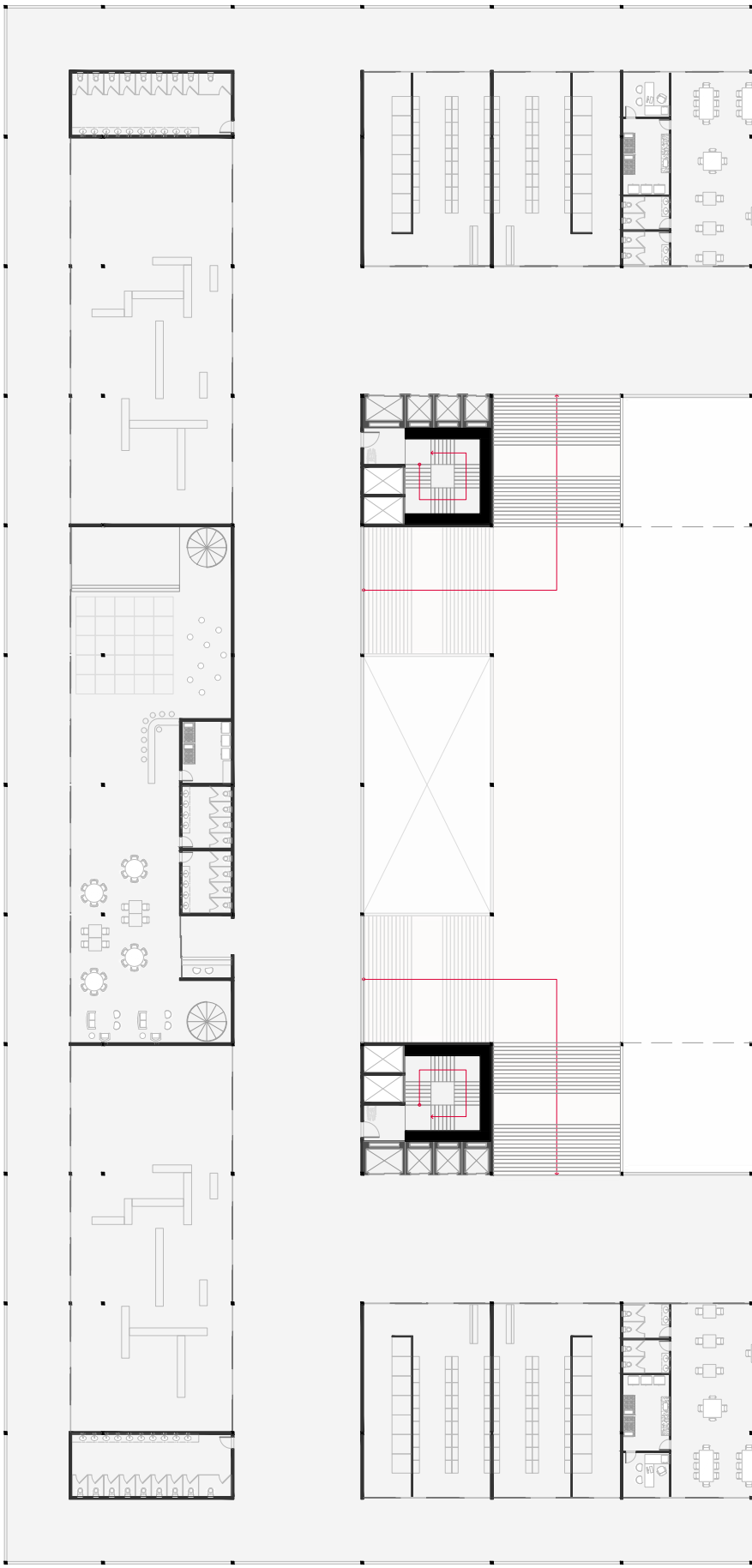


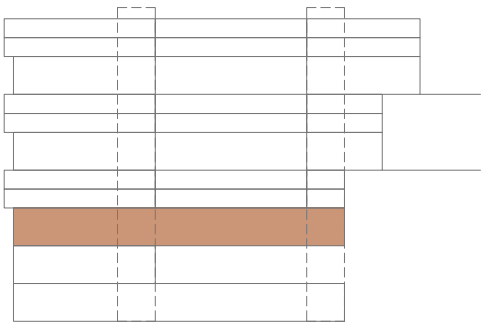
housing floor 1

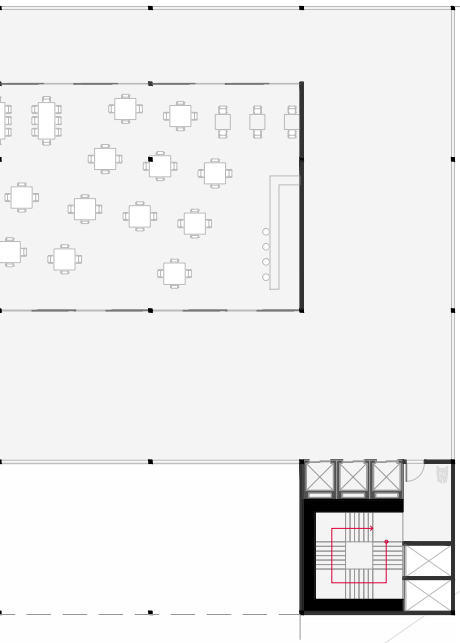


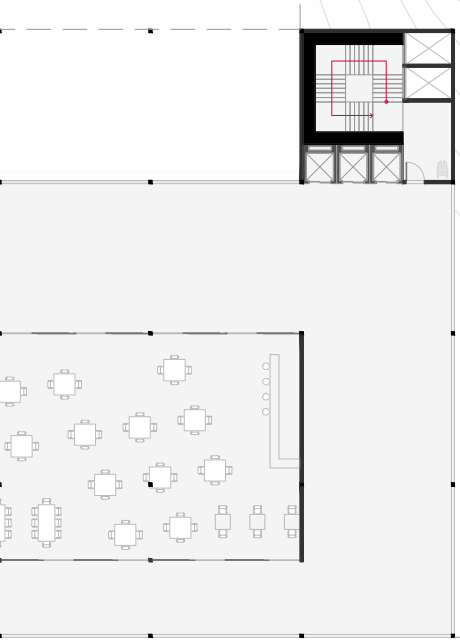


public floor 1

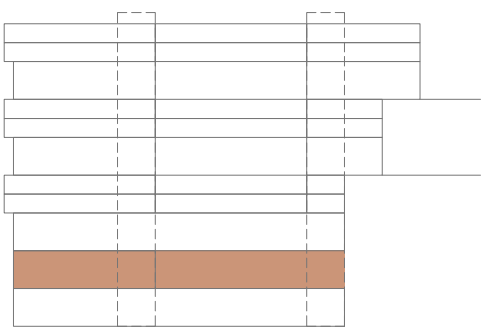


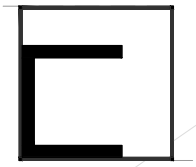


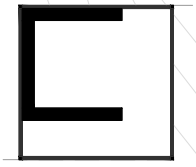




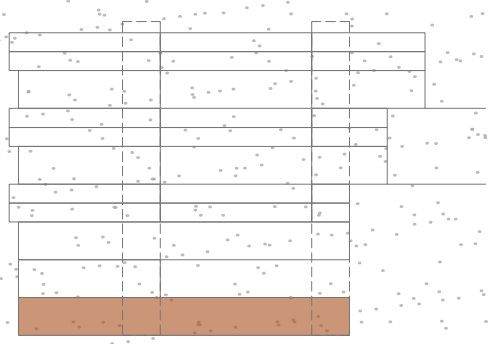
platform



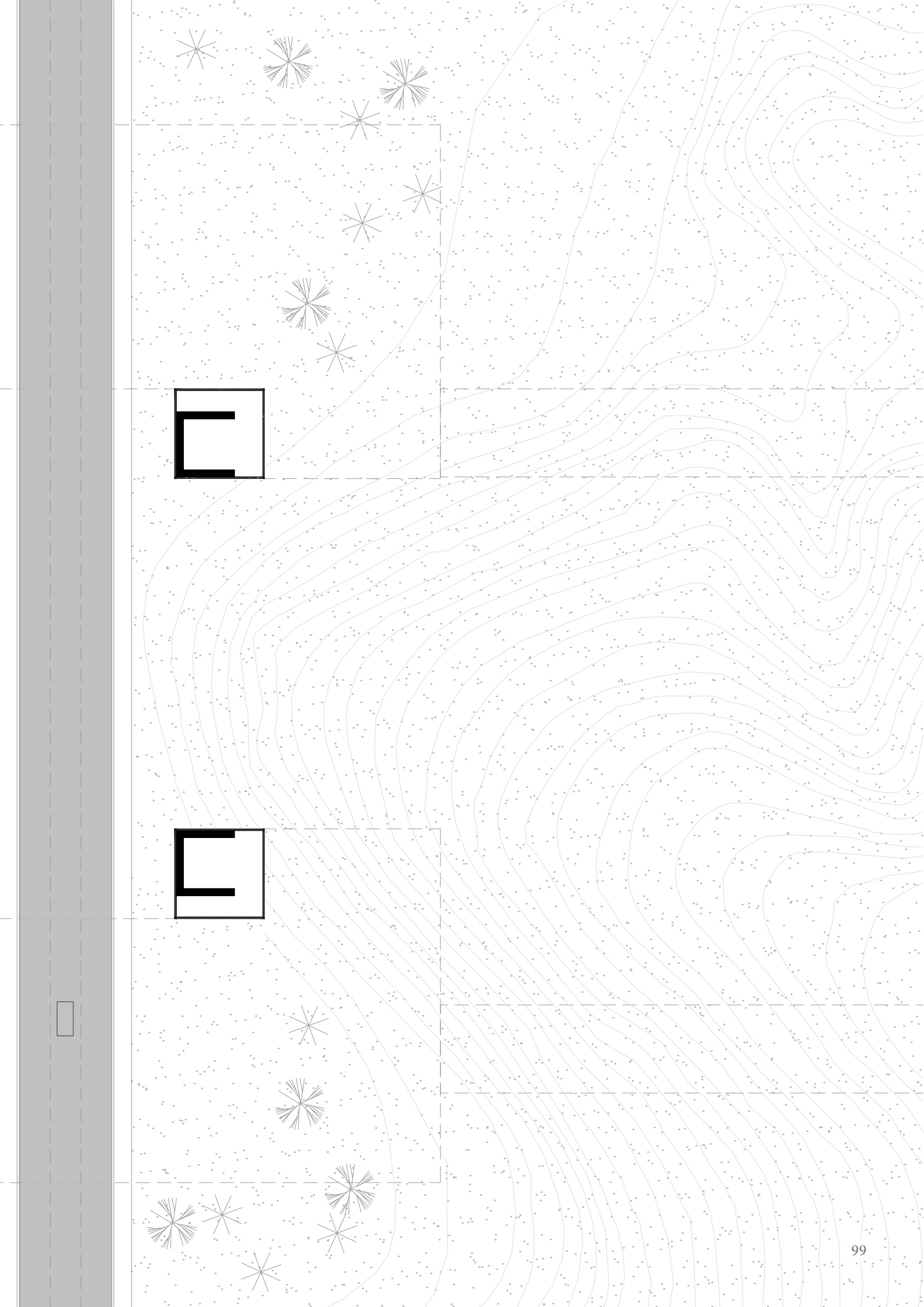




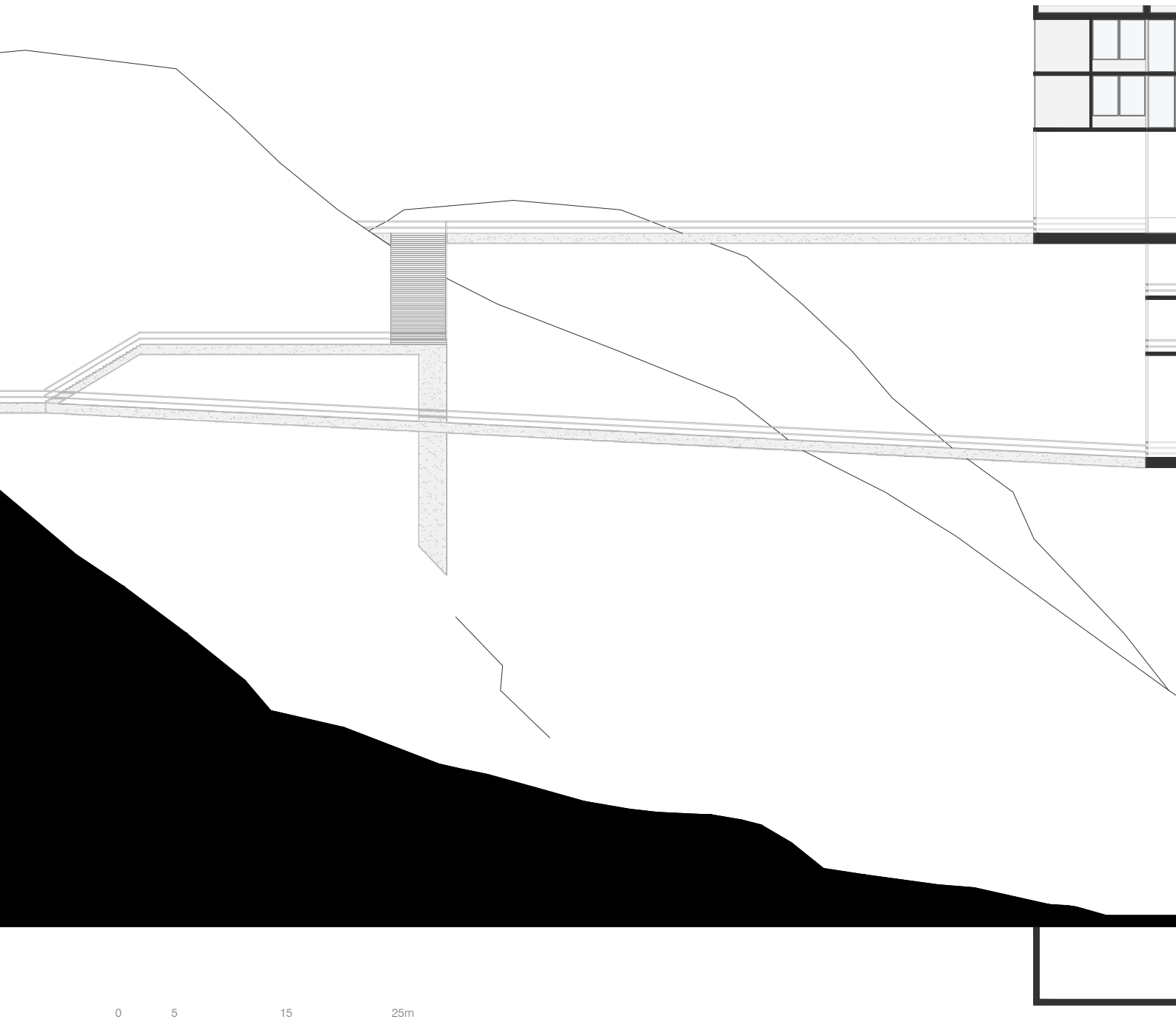
ground floor

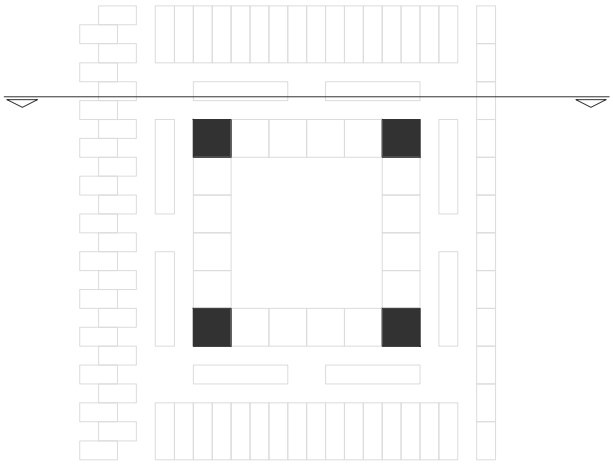


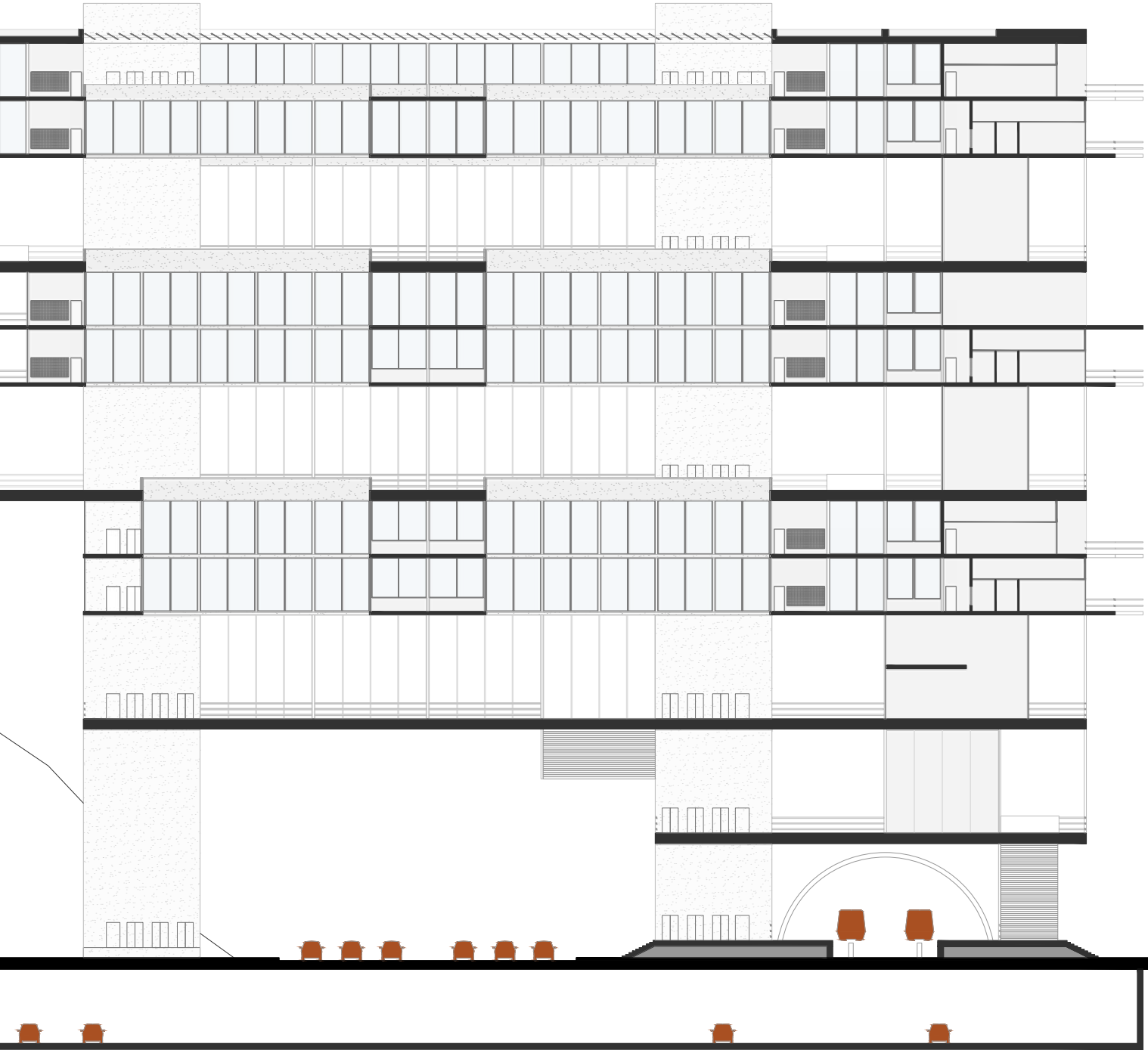
0 5 15 25m



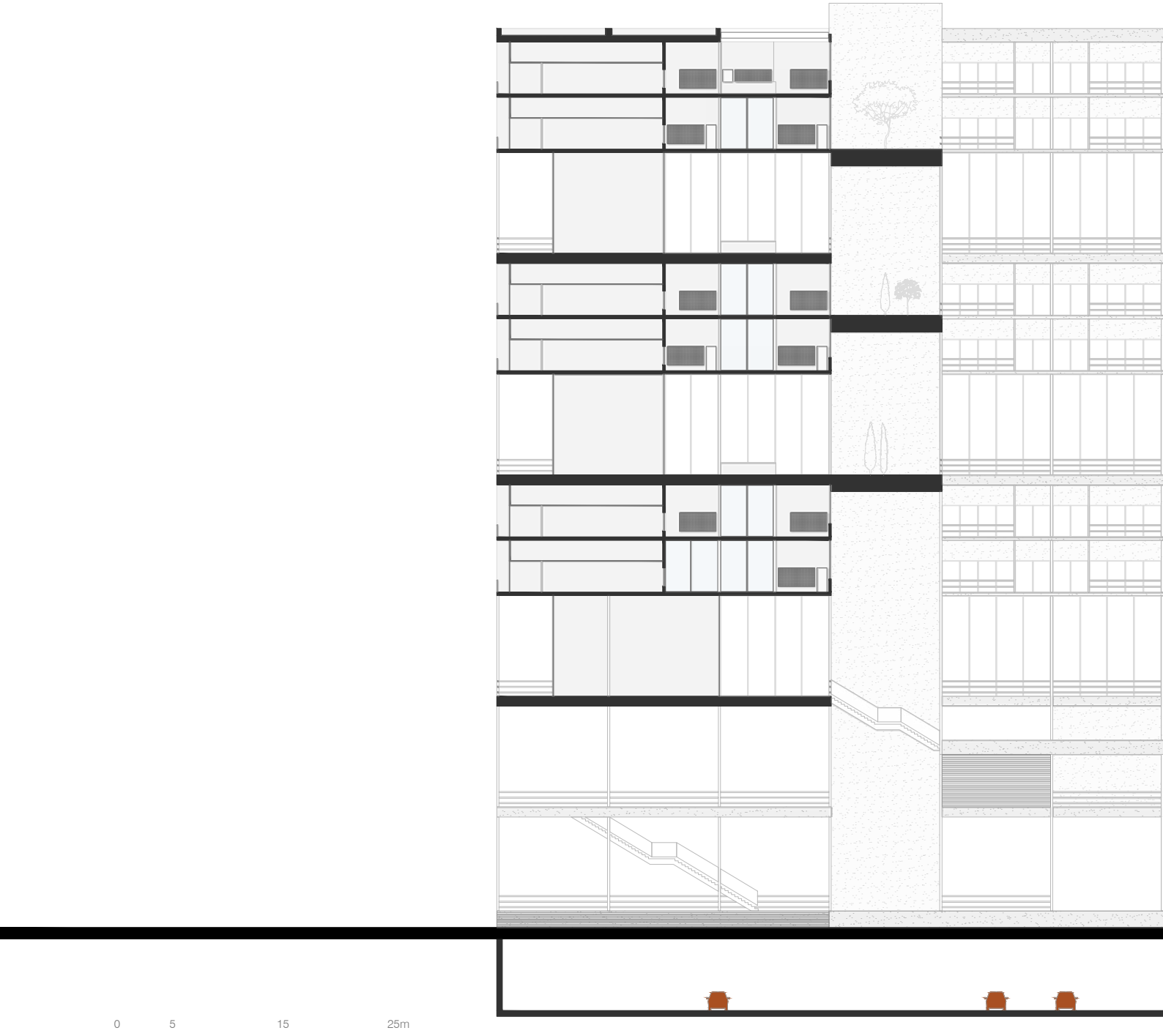
cross section a







cross section b



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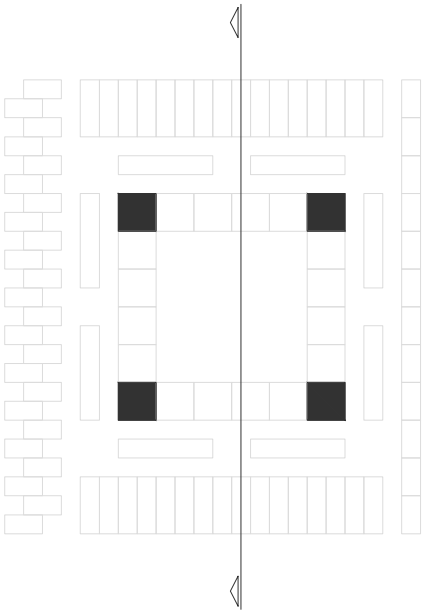
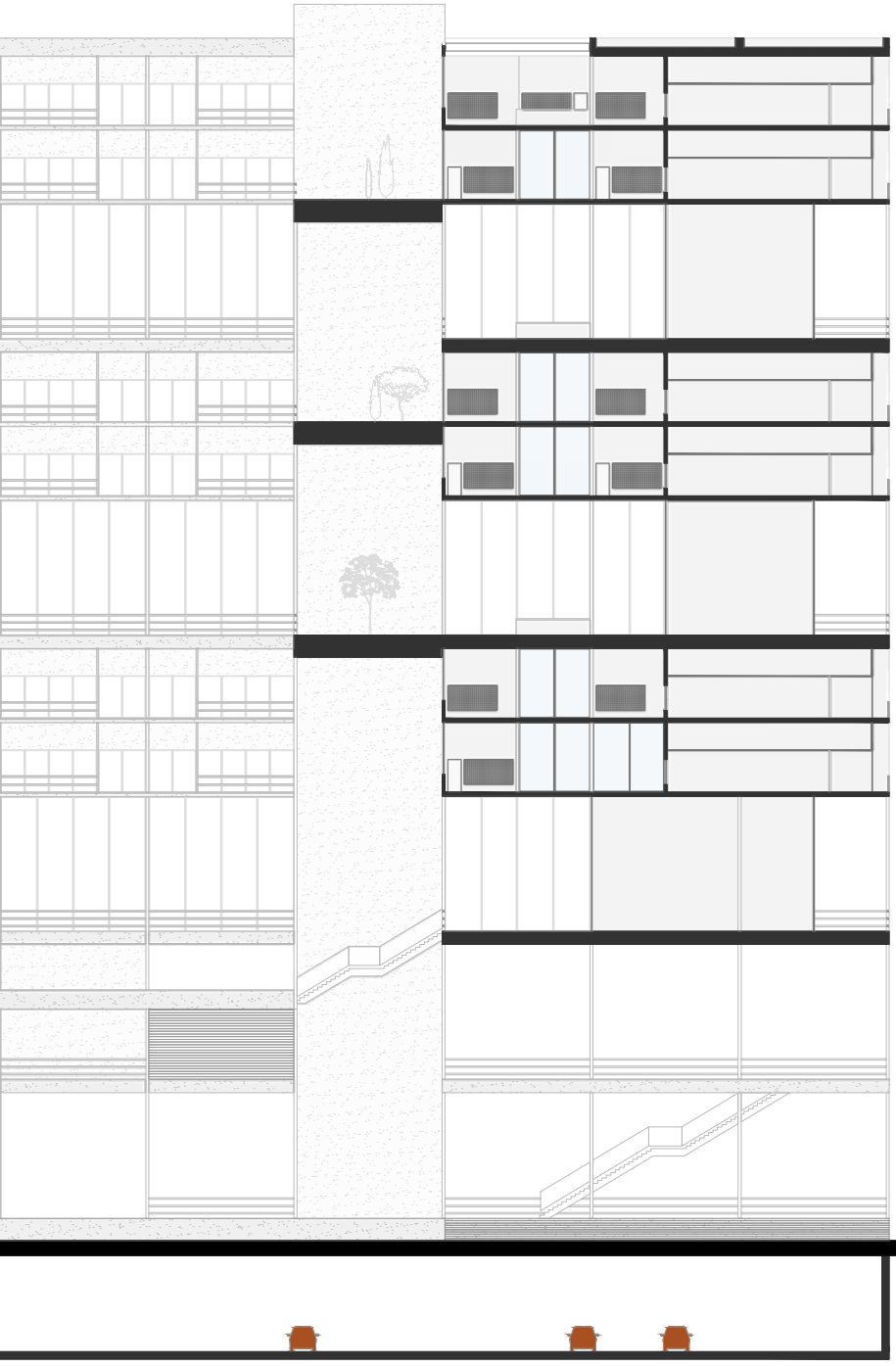
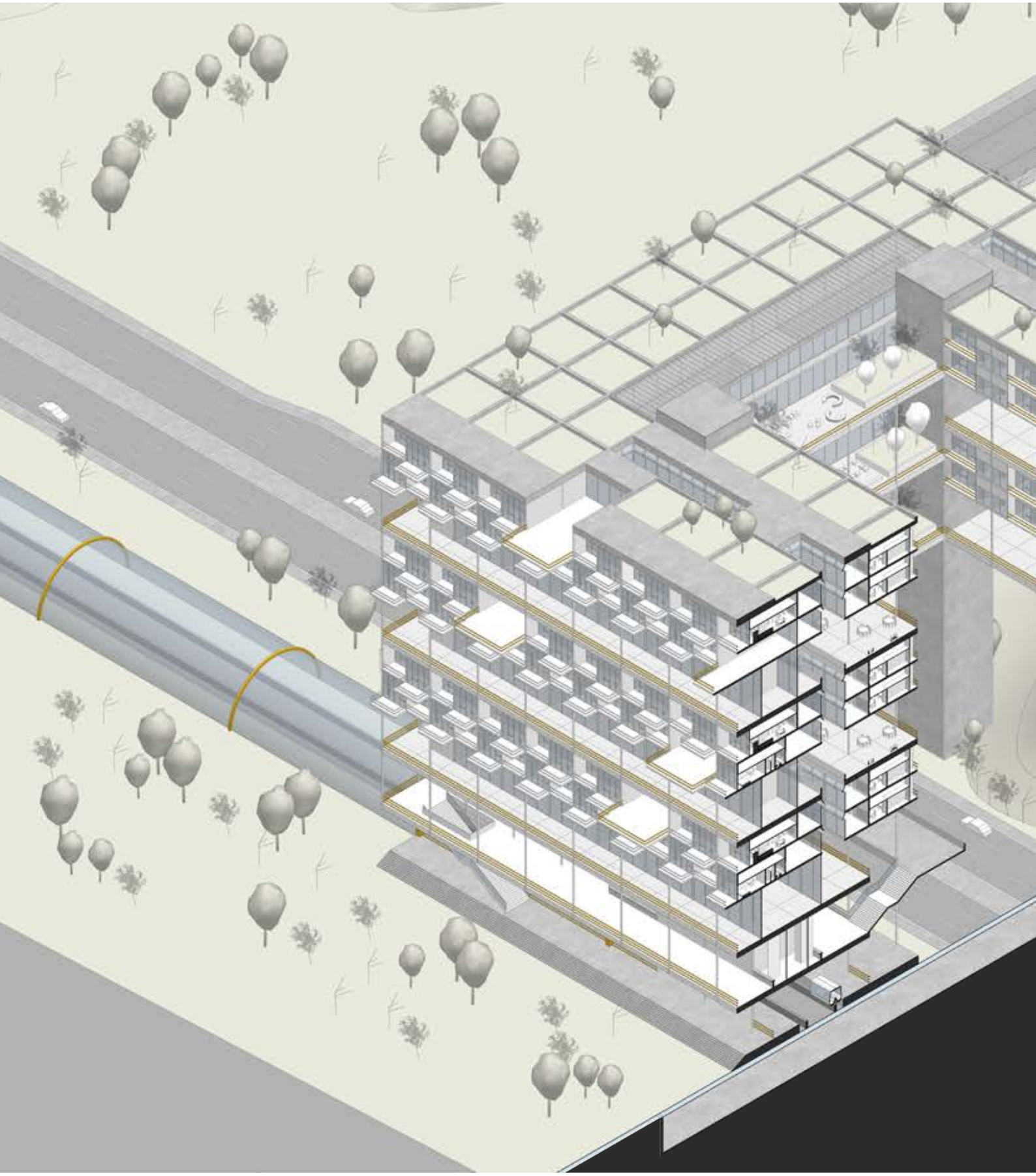
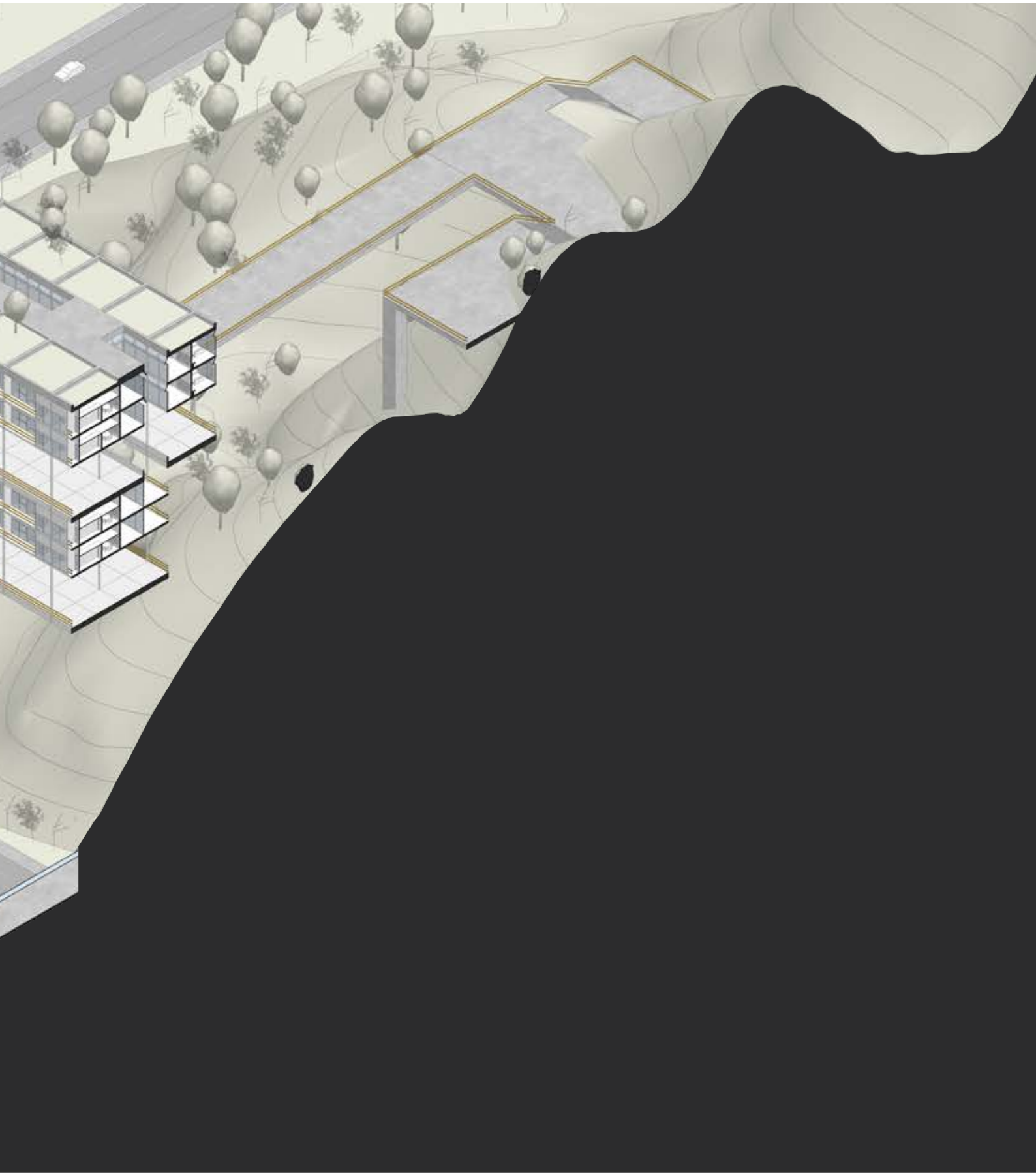




axonometric section





apartment type A - isometric
(5x10m)

apartment type B - isometric
(5x15m)

apartment type C - isometric
(10x10m)

public floor - isometric

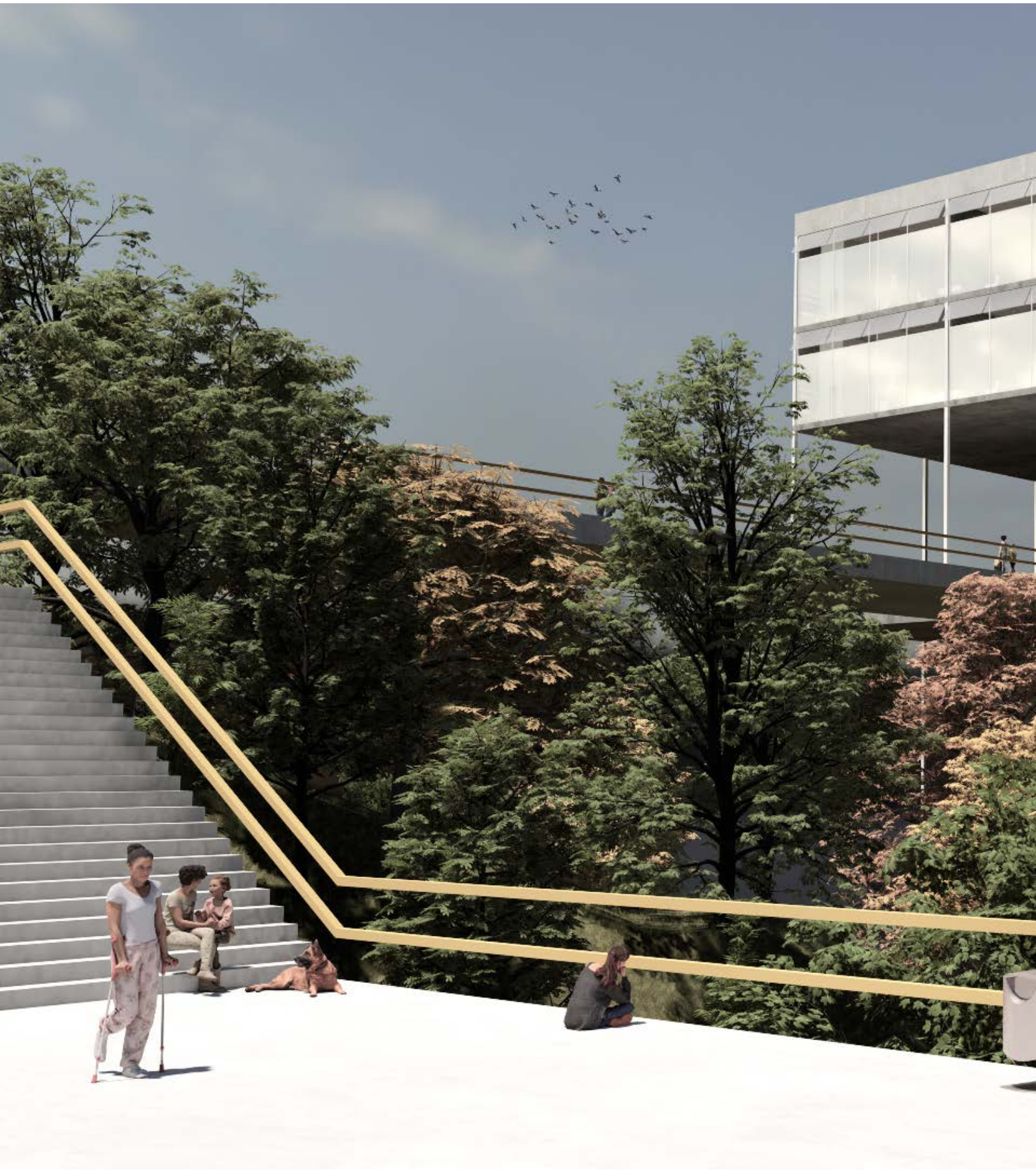
View from the temporary apartment to the east mountains

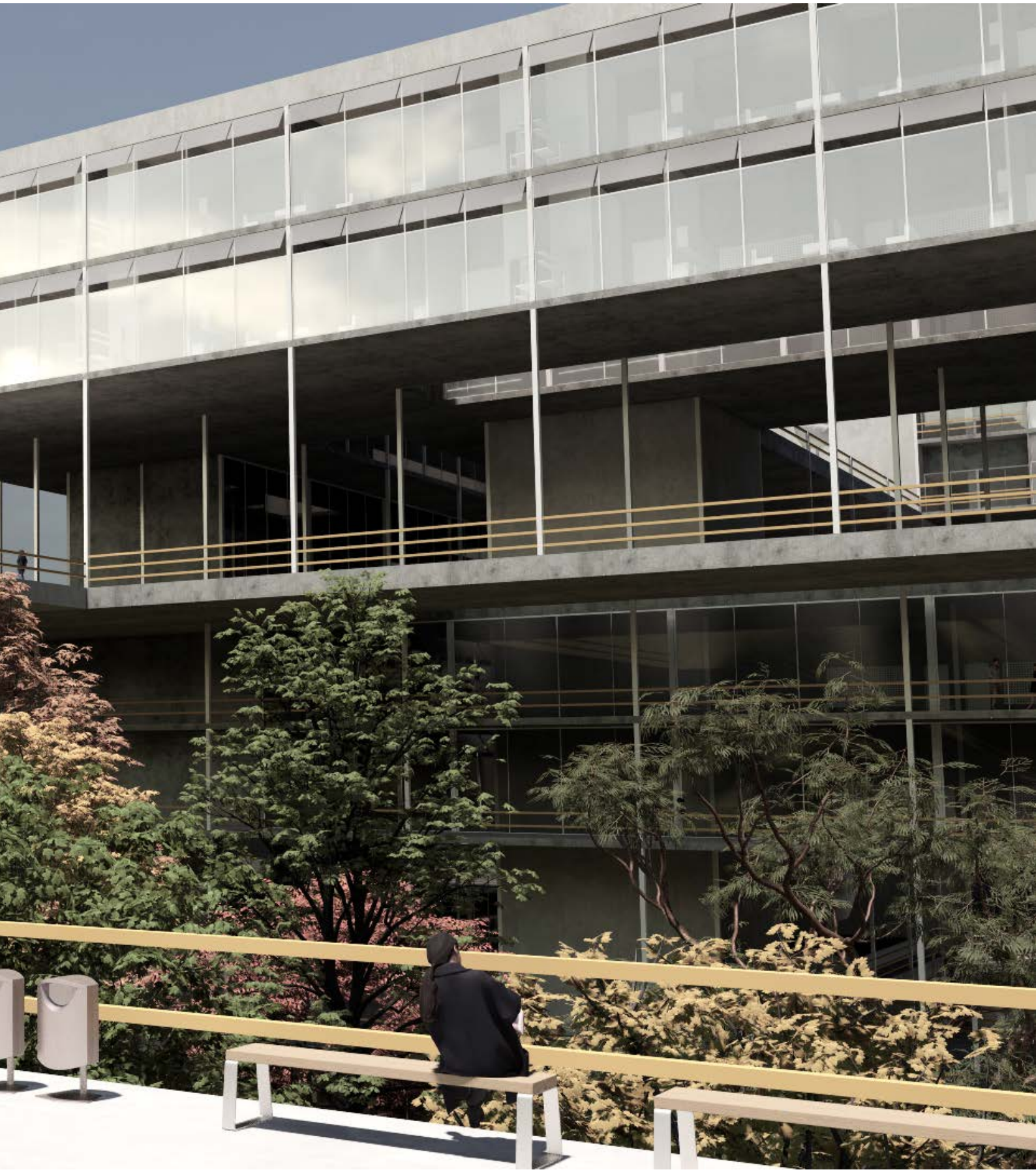

SAMSUNG

View from the apartment type A to the west river

View from the vertical garden to the inner gap

View from the top floor corridor



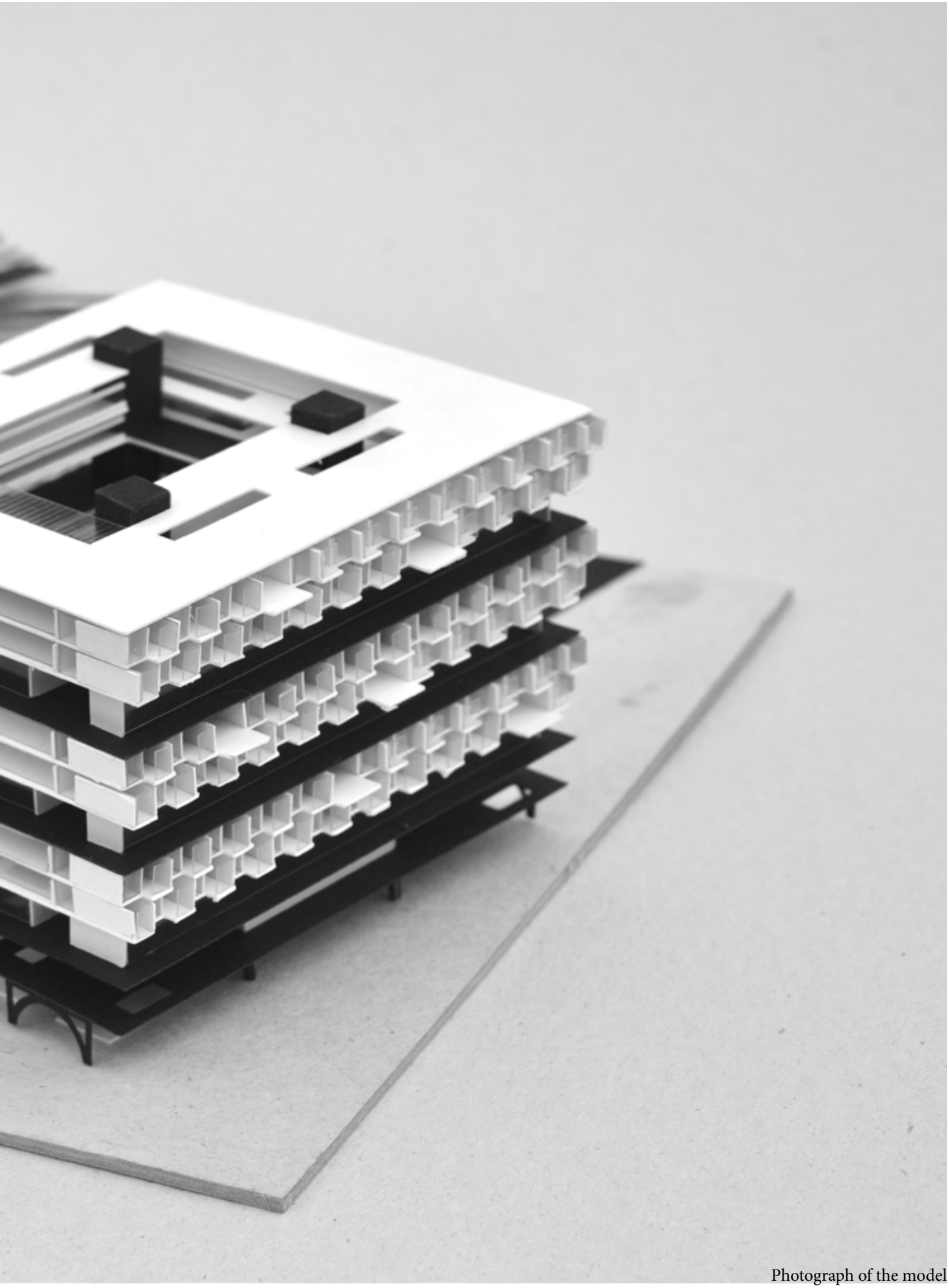


View from the contemplating platform

View from the mountain bridge

View to the exterior north facade

View to the exterior west/south facades



Photograph of the model

05
conclusion

The project presented as a result of this research is only a sample of how architecture and urbanism can react to the existing conditions and terrain. How they can dialogue with water, streets, nature and people. And how they can help (or not) to connect these and to create relations to be explored. A prototype for an urban block within the Lishui context.

The Chinese cities and culture present a very rich panorama to experiment new constructions and ideas, especially due to the growing and expanding characteristics observed in the country lately. Given the rules defined in the competition that originated this study and project, it was a challenge to investigate and design a new architecture to assume the dwellings in the mountains of Lishui City. And here the urban block aimed at supporting an approach that could be assertive and sensitive at the same time.

Planning a mixed building also fostered the discussion about new and old ways of living, and how they can rest upon such a unique landscape. Finally, the ideals inserted in the *ShanShui* city were present in the entire design process, which attempted to make the most of its surroundings, to learn the best from its references and to offer outstanding views and an alternative way of perceiving the scenery of Lishui.

06
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A. Y. 2021/2022

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