HUMAN DEVICE*

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Politecnico di Torino
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ABSTRACT

This thesis attempts to observe the phenomenon of water management in China in relation to current urban transformations and the contemporary debate regarding climate change.
The objective of the research work is to explore the transformative possibilities of a Chinese city, Hehua Tang, through a methodology that attempts to combine two different approaches: on the one hand, the typological reading of the Chinese city as a design tool that in the study of the ancient city finds the basis for the redesign of the future city; on the other hand, the use of a complex and structured workflow related to BIM, which starting from the design of the land, a pivotal element for water management, reaches the modeling of architectural and plant objects, at different scales of detail.
Hehua Tang, thus, becomes an experimental field where the two methodologies are compared by laying the groundwork for a pilot project, which is articulated through the development of long-term design scenarios related to pivotal elements of a system, of which the park and plaza are the extremes.
A specific portion of the urban fabric is then selected to graft a design strategy that is based on the redesign of two pivotal elements, the historical fabric of the Chinese city in relation to the rethinking of macro-objects resulting from Nanjing's rapid and uncontrolled transformation.

INDEX

3 KEYWORDS (CHAPTER)

WATER

PROBLEM_The theme of water within the thesis acts as an experimental field in which to immerse all subsequent readings.
It was decided to analyze the issues related to the theme of water first from a global point of view, then specifically to the Chinese context.
Thus data emerged that make water a theme of fundamental importance within architectural design in China.
A silent object, it adapts to the spaces of human life by generating an invisible but essential substrate that can make the spaces it touches usable.
It thus constitutes an attempt to include the issue of water reclamation not only a technological issue, but transform it into spatial issues in relation to architecture.

HUMAN

SUBJECT_ At the center of the whole process, the human being represents and provides the dimensional parameters of the project.
Starting from the study of social issues, the inhabitant of Hehua Tang is constituted as the subject of the project within a vision of future recovery.
Through the typological study, the settlement criteria of Hehua Tang are deciphered, which will constitute the rules behind the rethinking of Hehua Tang.
A project is generated in which new spatial forms arise from the rigorous study of the rules that design space in relation to the social issues related to the form of the city.
The project is born and finds its final conformation within those settlement logics that have always constituted Hehua Tang's spatial matrix.

DEVICE

INSTRUMENT_ The thesis examines the design process not only as a tool behind the project, but as a complex and delineated workflow that constitutes and determines design outcomes.
The combination of multiple programs revolving around the BIM world is thus applied throughout the design process, generating a modern workflow.
Thus, a project is experienced in which the result is not only the final outcome but the achievement of multiple design steps realized with the application of devices in step with the technological era in which we live.


WATER


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DEVICE

INTRODUCTION

Architectural design is by its own nature multidisciplinary; behind a single design gesture there are multiple symbolic and spatial outcomes.
It is thus chosen to approach the thesis by trying to bring together this multidisciplinarity for the final architectural achievement, the rethinking of Hehua Tang.
HUMAN DEVICE , is thus, a project that attempts to observe the phenomenon of water management in China in relation to ongoing urban transformations.
Through the application of a methodology that attempts to combine two different approaches: on the one hand, the typological reading of the Chinese city as a design tool that in the study of the ancient city finds the basis for the redesign of the future city; on the other hand, the use of a complex and structured workflow related to BIM, which starting from the design of the land, a pivotal element for water management, reaches the modeling of architectural and plant objects.
Thus, a thesis is constituted in which different issues are confronted in different ways within the same architectural spaces, thus generating a project containing multiple perspectives of thought.
The title, therefore, seeks to highlight, on the one hand, architecture as a machine in the service of man and, on the other, the importance of the architect's operational tools and how they affect the design outcome, today increasingly linked to the digital world.
Therefore, it does not stand as a mere design exercise that has the only purpose of demonstrating the ability and skill to use the tools proper to the discipline of architecture, but rather wants to push towards a broader field of action, attempting to operate a simulation capable of progressively canceling the separation between the school and the outside world by reaching concrete results.
Three themes are thus generated within the thesis, three keywords that constitute both the index for reading the thesis and the three elements behind the final architectural result.
Water constitutes the problem to be solved, the experimental field of action in which to immerse the project, Human is the attempt to read and rewrite the spatial rules that have always characterized the urban fabric, and finally Device, which stands as a bet, the conviction that the tool, in this case BIM, is not secondary within the architectural project for the achievement of certain levels of design accuracy.
WATER_ as mentioned earlier constitutes itself as the problem, the field of action in which to measure the capabilities of architectural design.
It is the introductory chapter of the thesis, water that has always been a resource and wealth of the territories has now become a threat in China in a variety of aspects the investigation of each of them has been essential to design an architecture capable of dealing with them and be part of their resolution.
Floods, droughts, and pollution are the consequences of a changing climate and man forgetting his origins, nature is exploited and bent for economic interests, but then we are forced to pay the consequences as we learn to adapt to the new realities.
These new dynamics impact both on a large scale nationwide by changing policies and topography and on small neighborhoods forced to struggle for proper drinking water supply but also to be ready for violent floods and rains that are increasingly complicated to manage and prevent.
This thesis, starting from the study of all water-related dynamics, seeks to address and solve the issue of rainwater harvesting and management through the careful design of urban and natural surfaces.
HUMAN_ constitutes the tool for reading the human dimension, and how it transcends into architectural space.
The application of typological studies, typical of Italian architectural culture, allowed us to decipher the rules within a complex architectural system such as Hehua Tang.
The city is constituted as a neighborhood south of Nanjing, one of the last urban apparatuses in which it is still possible to read the typological matrix that has always dictated and generated Nanjing's spatial logics.
The relationship between man and city here generates a collectivity within an urban fabric in which private and public space are mixed, creating a complex fabric rich in human and commercial relations.
Hehua Tang can thus be read as an Urban Village, a gate community in which the city is transformed following the needs of the inhabitants, in which the architectural and spatial elements are constantly changing, a city that lives on itself by imploding rather than exploding outward.
The study of the existing therefore constituted the analogical tool capable of drawing the spatial and social rules that then formed the basis for the architectural redesign, seeking to generate a project that, even in its modernity, does not clash with the existing system of urban connections.

DEVICE_ The tool within this thesis does not stand as a static, ready-to-use object, but rather becomes an experimental field in which to try and test a cutting-edge digital process.
It is not only constituted as a tool for the achievement of an architectural result, but at the same time becomes an attempt to set up/design a workflow that, revolving around the world of BIM, can lead to the achievement of a high degree of detail.
The thesis therefore is based on the construction of a workflow that, throughout the process, generated different collaborative dynamics capable of managing and modeling design parts of different nature.
Underlying the entire digital process is the creation of a platform (Autodesk Construction Cloud) that allowed for the control and review of different design components modeled by two workstations in communication with each other.
Revit, Civil 3d, Infraworks become the useful tools for modeling different design parts and that, thanks to the collaborative process, are related later generating the new architectural image.
Thanks to the use of these techniques we were able to obtain a project in which the architectural elements, the new artificial plates, the new plant system and the terrain design have an accurate degree of detail and are related within a single final design file.

WATER

1.1 WATER VS URBAN SCAPE

Water has a profound relationship with urbanisation processes.
The beauty of the urban landscape where water is part of it is able to arouse and emphasise emotions.
The relationship between water and urban centres makes both more fascinating; artists of the past had already captured the beauty in this combination.
Water that enhances city places and the highest expressions of human civilisation through the combination of nature and artifice.
Water that, with its essence and physical force as sea, river, lake, canals, transforms, modifies the hydrography of territories and generates hydraulic engineering logics that influence the shape and growth of cities.
Water management in urban settlements has evolved through different processes in each era. In the past, water design was mainly linked to agricultural activities or the defence of territories.
Today, faced with new dynamics of urban and demographic development, water design has extended to more fields where water is used in different ways to meet new needs.
Cities have new needs, to favour economic and industrial processes, demographic development has taken land away from water to generate new urban land.
Water is also used for hygienic functions and recreational activities, as well as new receptive and commercial functions such as bathing, sports, and much more.
Often, however, these interventions have altered delicate ecological balances, compromising natural networks.
Water has been erased from the urban landscape of our times even though it is an indispensable element of life.
A complex system of pipes runs silently beneath our homes, the supply of drinking water arrives, via aqueducts, cisterns and distribution networks, as far as kitchen or bathroom taps and is hidden inside invisible pipes.
The hunger for space and infrastructure is always a good reason to cover a canal and allocate it to more "necessary" urban uses[1] such as roads, car parks and even actual buildings.
Growth has indiscriminately subtracted naturalness from the landscape and waterproofed it.
The unrestrained sealing of urban soil has had and is having major

1
Legambiente, Ecosistema urbano: rapporto sulle performance ambientali delle città 2019, Il Sole 24 Ore, Rome, 2020

repercussions on countless aspects of urban living, "Instead of paying attention to the role of greenery in urban environments, we have built machine-friendly cities," says agronomist Paolo Callioni of ANAB[2].
Today, water is connoted with a number of negative meanings. It is a danger when it overflows and overwhelms human lives and material goods, it can become a vehicle for disease, it carries bad smells and pollution.
The dominant culture has forgotten the value of water, the benefits it brings and the resource it represents.
The complex relationship between environment-city nature-artifice in water landscapes triggers a reflection on the problems related to the environmental safety of a place, becoming an opportunity for

2
ANAB (National Association of Bioecological Architecture) has been working on the topic of green roofs in cities for years. In June 2019 the conference 'GARDEN ROOFS: Green Revolution in Cities' was organised in Rome, in which important institutional figures took part

For centuries nature has been perceived as something inherently different from ourselves. Now the climate, the economy, politics and social conditions show us the consequences of this disconnected world view. How can architecture help develop a new, meaningful relationship with the world as a place where humanity recognizes that everything is part of a larger whole, that everything is connected?

The Danish Pavilion, Venice Architecture Biennale 2021

new strategies where water is the generator of new urban spaces.
Faced with today's climatic emergencies, a reflection on urban development arises spontaneously.
Architecture and spatial planning are forced to rethink their role and tools, "Green is slowly returning to the city"[3], there is once again a need to escape from concrete and chaos and return to parks where rivers and streams flow peacefully re-establishing those lost habitats.
It seems that green will necessarily have to become a central material in architectural projects, limiting soil sealing as much as possible.
New dynamics due to the climate crisis, accelerate the process of naturalisation of urban areas the new 'urban question' theorised by B.Secchi[4] linked to the environmental crisis and the consequences of global warming seems to lead, once again, to a change of perspective in the management of water resources, affecting the objectives of sustainable development for water-cities.
The impacts of climate change, land uses and changes in land cover, heavy urbanisation, and the economic and social crisis are just some of the phenomena triggering a newfound awareness of the issues related to this resource.
The new alternative scenarios aim to create a system in which urbanisation and landscape depend on each other for survival. Recycling water becomes one of the new goals, creating urban living scenarios combined with nature and water within everyone's reach.
The new projects require an original and innovative approach

3
Cardellini M., E le città si coprirono di campagna, Forum PA, 1st December 2014

4
Bernardo Secchi (Milan, June 1934 - Milan, September 2014) was an Italian urban planner, economist and academic, professor emeritus of Urban Planning at the Istituto Universitario di Architettura di Venezia (IUAV). Secchi B., A new urban question,"Territorio" n. 53, 2010, pp. 8-18

5
SUMMIT2021 "La cultura dell'acqua", Monterey ADV, Milan, 10-11 November 2021, The central theme dealt with the concept of 'sustainable water': how are projects, services and products for the maintenance of water systems changing in the era of environmental friendliness and climate change?

6
Ercolini M., Cultura dell'acqua e progettazione paesistica, Gangemi, Collana: Arti visive, architettura e urbanistica , February 2010, p.128

to the themes of the contemporary city and the centrality of the project in urban and territorial transformations.
The multi-scalarity of infrastructural, ecological and landscape networks will be the new key to interpreting projects that will pay much more attention to the forms of the changing territory, to the phenomena that characterise contemporary urban settlements.
This entails broadening the intrinsic meaning of the project, understood as a practice capable of modifying the city and its form, capable of addressing a multiplicity of problems and issues involving many different types of subjects with different needs.
In the face of the current urgency to modify and adapt the built environment to the new requirements due to climate change, it seems increasingly urgent to return to reflecting on the role that water spaces can play within the urban fabric.
Water masses should no longer be seen only in a strictly functional way, all the important aspects they can offer the city and its citizens should be considered.
A renewed sensitivity to the environment thus seems to be changing the critical relationship between water and settlements; there is a need to start again from urban water systems in order to rethink urban planning for the contemporary city.
A progressive formation of a "water culture"[5] is taking place where not only human needs but also environmental, social and cultural ones are considered.
Instead of planning the city as a two-dimensional extension of concrete mantle that waterproofs and distorts the soil, it is necessary to think of it in its vertical dimension, taking into consideration the ecological interchanges with the atmosphere, soil and subsoil.
A renewed culture is also evident in the reading of water landscapes as "ecological structures"[6], a useful figure for ensuring environmental sustainability capable of increasing biodiversity and favouring natural processes and ecosystems. The project for the conservation of water resources in the city is enriched by techniques and methodologies made available by the natural sciences and environmental engineering for the restoration of natural organisms in river and coastal areas and wetlands.
The hydraulic-environmental rebalancing of the urbanised territory becomes one of the main objectives of water design.
An articulated framework that, albeit briefly, hints at the intention to establish a different relationship between city and water in recent urban planning experiences.
Today, the design of water spaces also seems to trigger new perspectives for the specialisation of urban settlements: coastal cities, river boroughs, cities on canals are part of an imaginary that is useful in suggesting possible redevelopments of the contemporary city, precisely starting from this resource.
Dealing with water issues together with urban issues creates new

WATER

scenarios and design devices that qualitatively affect the land, they are projects capable of sustainably managing both water and urbanisation and redevelopment.

Waterplaza, cloudburst boulevard, rain garden are some of the devices that can be encountered in cities today and that make it clear in which direction we are going.

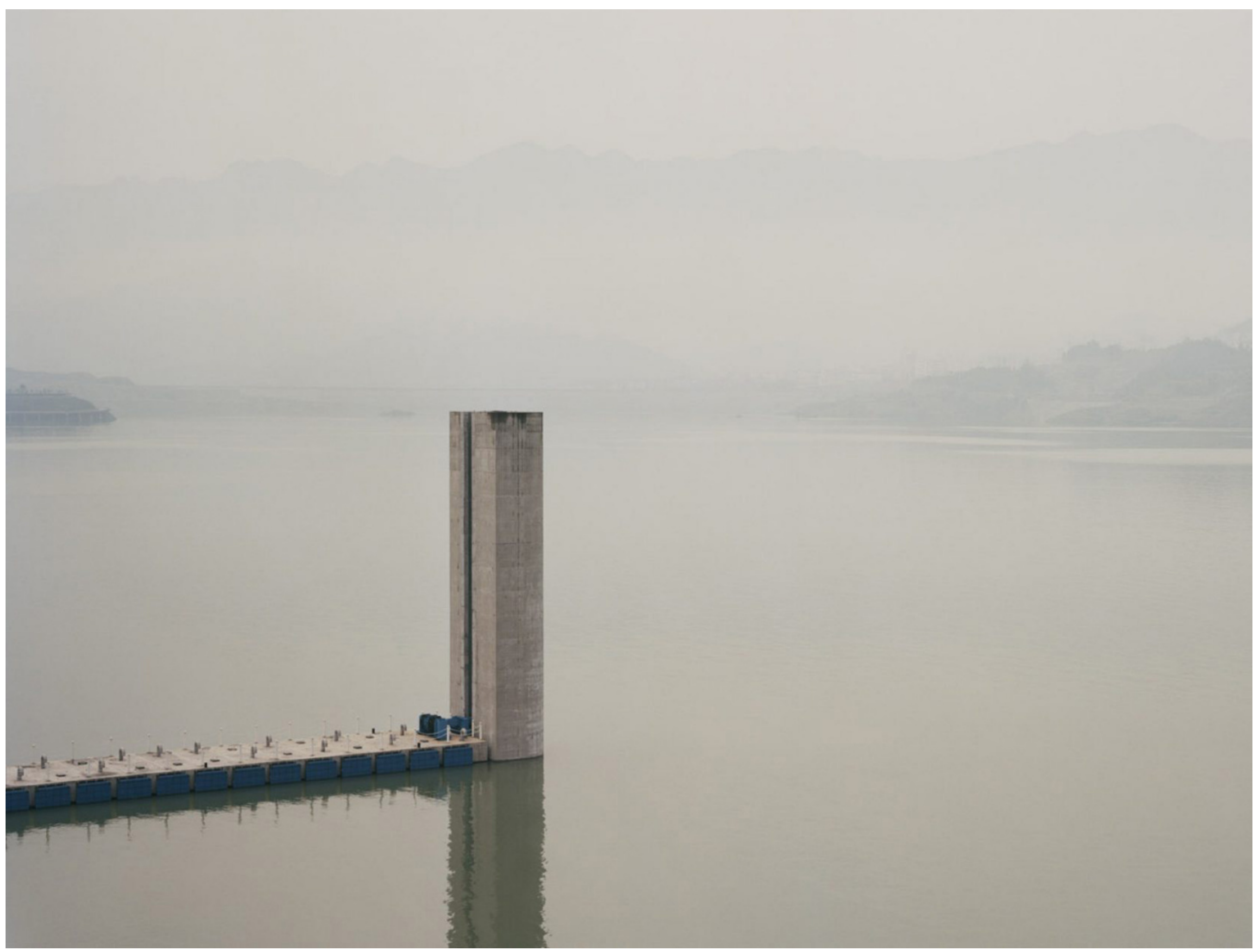
Hydrogeological and hydrological safety becomes part of the environmental issue that aims at a more relevant attention and sensitivity to the issue of water resource design.

New designs aim to be able to deal with uncertainties, due to unpredictable climate change, through land-water interaction and the simultaneous treatment of water systems and urban issues.

Old design approaches generated systems such as dams, retaining walls, tidal barriers, invasive projects that radically changed the nature of places.

Today, the reconfiguration of water spaces for the defence of "sensitive" contexts[7] becomes an opportunity that also triggers urban redevelopment, leading to new alliances between different disciplines and a renewed dialogue between different disciplinary points of view, between that of the engineer, the urban planner

7
Giovinazzi O., Progettare il paesaggio in contesti sensibili, Agribusiness Paesaggio & Ambiente, vol. XII, n. 3, 2009, pp. 215-224



and the architect.

The new projects aim to emphasise the presence of water without radically changing its essence, we have come to speak of a "water renaissance"[8], in the urban context, to explain that articulated process of redevelopment and revitalisation of waterfront areas.

Working on the waterfront, for example, has been a strategy adopted by many cities around the world.

These portions of land and city overlooking the water have grafted

8
Gashaw A., The Renaissance of Water, Harvard International Review, 8th January 2021

Soil provides a wide range of essential ecosystem functions (...). Soil sealing, i.e. its covering with impermeable materials such as concrete or asphalt, is one of the main causes of soil degradation in the European Union. Soil sealing increases the risk of flooding and water scarcity, contributes to global warming, threatens biological diversity ...

European Commission, Best Practice Guidelines for Limiting, Mitigating or Compensating, 2012

a series of new dynamics sometimes on the entire urban structure and induced large-scale mutations, far more extensive than the waterfront zone.

The intelligent and creative exploitation of water is the new key to creating new spaces both for facilities for collective use, administrative, cultural, leisure, etc., and for structures intended for residential use.

After the many mistakes of the past that degraded the presence of water, causing it to disappear, today we see these new strategies that, like waterfronts, tend to restore landscapes by trying as much as possible to recover naturalness where it has been erased.

Water resurfaces thanks to its intrinsic versatility, taking on new meanings.

Water Architecture deals with the saving, recovery, revitalisation and dynamisation of the resource thanks to a set of new theoretical and practical techniques.

Best practice guidelines for limiting, mitigating or compensating soil sealing are being followed in many cities around the world.[9]

Urban forestation interventions guarantee the return of nature, with the aim of recreating, in the midst of asphalt, concrete and icy artificiality, the natural environment, a place to live.

The visual and psychological pleasure that water and greenery provide contribute to the definition of a great variety of forms both in the urban environment, thanks to green roofs and roof gardens, and in the non-urban environment, thanks to parks and gardens.

New design strategies are also going further, it is no longer just a matter of bringing water to the surface and making the urban soil permeable with green areas, one of the new goals is to manage rain and flood water by changing it from a threat to a resource.

Cities are essentially made up of impermeable surfaces such as paved areas, roads, roofs and car parks.

The water in the impermeable urban environment cannot be fully captured causing the phenomenon of surface run-off, about 55%

9
European Commission, Luxembourg: Publications Office of the European Union, COMMISSION STAFF WORKING DOCUMENT Guidelines on good practice for limiting, mitigating and compensating soil sealing, Brussels, 15th May 2012

of the water.
At the cause are the surfaces of cities that have a deep and superficial infiltration capacity of only 15% compared to that of a soil, which is about 50%[10].
Rainwater harvesting wants to become a new device for the sustainability of water resources.
Current water networks solve a number of problems but have also produced some negative aspects, in fact although they take into account surface water such as lakes, rivers, seas, and ground water such as springs, wells and seepage wells, rainwater is mainly neglected or forgotten.
Rainwater has lost its historical value as a water source and is seen as a problem that seeks to be solved by rapid conveyance to sewers.
This approach is neither environmentally nor economically sustainable, encouraging the recovery of stormwater as a water source and using water more rationally is becoming a matter of urgency, due in part to the water shortage that is testing many areas.
The new approach favours local water collection and treatment rather than transporting large quantities of stormwater and wastewater.
Urban runoff could be organised in such a way as to favour natural drainage through the creation of community amenity elements, increasing the quality of the area in which it is implemented.

10 Di Gregorio R., La città e l'acqua, le good practices dal mondo, Esempi virtuosi di gestione della risorsa idrica, Edilportale news ambiente, 7th June 2019

WATER

WATER

1.2 WATER CHINA

What does water represent in China?
In traditional Chinese culture, water is considered a treasure and is expected to remain in harmony with humans.
Water flows through China from west to east by two great rivers placed one in the north and one in the south respectively, their water is blue and yellow, colors that determine their names. The more impetuous of the two, the Yellow River (Huang He) has always been characterized by flooding, especially in the central Great Plains.
China's longest river, the Yangtzejiang, also flows vigorously in the mountainous section and, after a dizzying descent from the peaks of the Tibetan Plateau, forms a large bend in the southwest of the country and then rises back to the Red Basin and carves three large gorges where the Chinese have tamed it by constructing a colossal hydraulic work, the Three Gorges Dam, once past the dam, the river's momentum is quelled and it flows into the East China Sea at Shanghai.
In the center of China, placed between these two vast rivers are many other lakes, rivers and streams, however, disharmony between water and urban life is looming, especially after more than three decades of rapid urbanization in China.
Water has been an integral part of China's culture, economy, growth and development to the extent that it constitutes China's history, civilization has been permeated by water, thought patterns and daily life have been influenced by this resource.
Practical affairs and politics have also been shaped by philosophical ideas based on this stream.
The allocation of water to support growth in all sectors has been a political action; in fact, the management of China's huge and problematic rivers has been the task of rulers from the earliest times.
Countless officials and political figures rose and fell based on the quality and effectiveness of their plan on hydrology, powerful floods and droughts were capable of bringing down dynasties so ambitious engineering drained the coffers of many of them.
In this culture, therefore, competence in water management was seen as an indicator of fitness to rule.
Poets and philosophers also debated what was the best way to

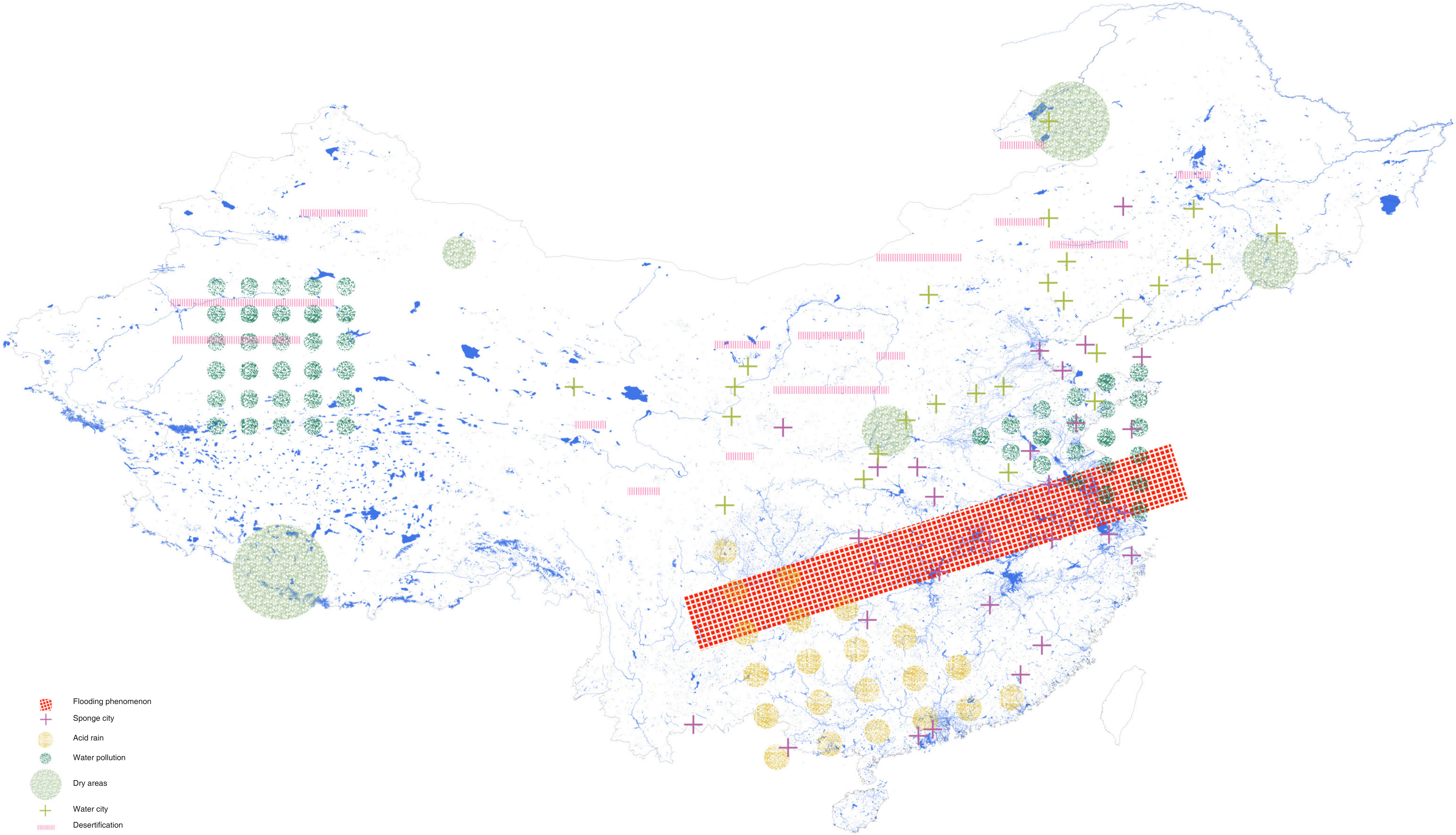
manage water: the Taoist tradition favored a low-impact theory, drawing off the excess with canals and letting the river flood widely, depositing rich silt on the floodplain.
Confucian officials, on the other hand, advocated more interventionist engineering, with higher and narrower dams.
For example, Mao Zedong, who believed that conquering nature was essential to building socialism, militarized Chinese society through a series of "wars" against nature, the disastrous consequences of which still loom over China's future.
In an irrigation campaign in the Yellow River between 1957 and 1959, the party increased the rate of extraction from the river while leading to a drastic reduction in crop yields.
Water struggles are not new in China or the world, but these struggles have unique historical and cultural contexts.
In the early 1960s, when the Red Flag Canal was built, water was abundant, the canal was a masterpiece of Chinese hydraulic engineering, begun during the Great Leap Forward and celebrated as an example of massive surface irrigation development, but after the 1980s, upstream withdrawals for irrigation and local industry dramatically increased competition for water downstream.
The history of village dispute was an early indicator of water stress in the North China Plain.
Post-Mao reforms increased both water consumption and pollution, and China's 30-year boom brought the North China Plain close to its limits.
Drastic solutions, such as large-scale inter-basin water transfers, have been invoked to maintain some semblance of ecological balance.
China's water challenges can only be fully understood from a historical perspective.
The cultural choices of the past and the physical realities of the North China Plain continue to shape the present and future by becoming a real water issue.
Water, even today, is still a very current issue in the country but in several different ways; many environmentalists call it China's main problem: not air pollution nor food pollution, but the problem of water scarcity and the fact that many rivers and streams are incredibly polluted.

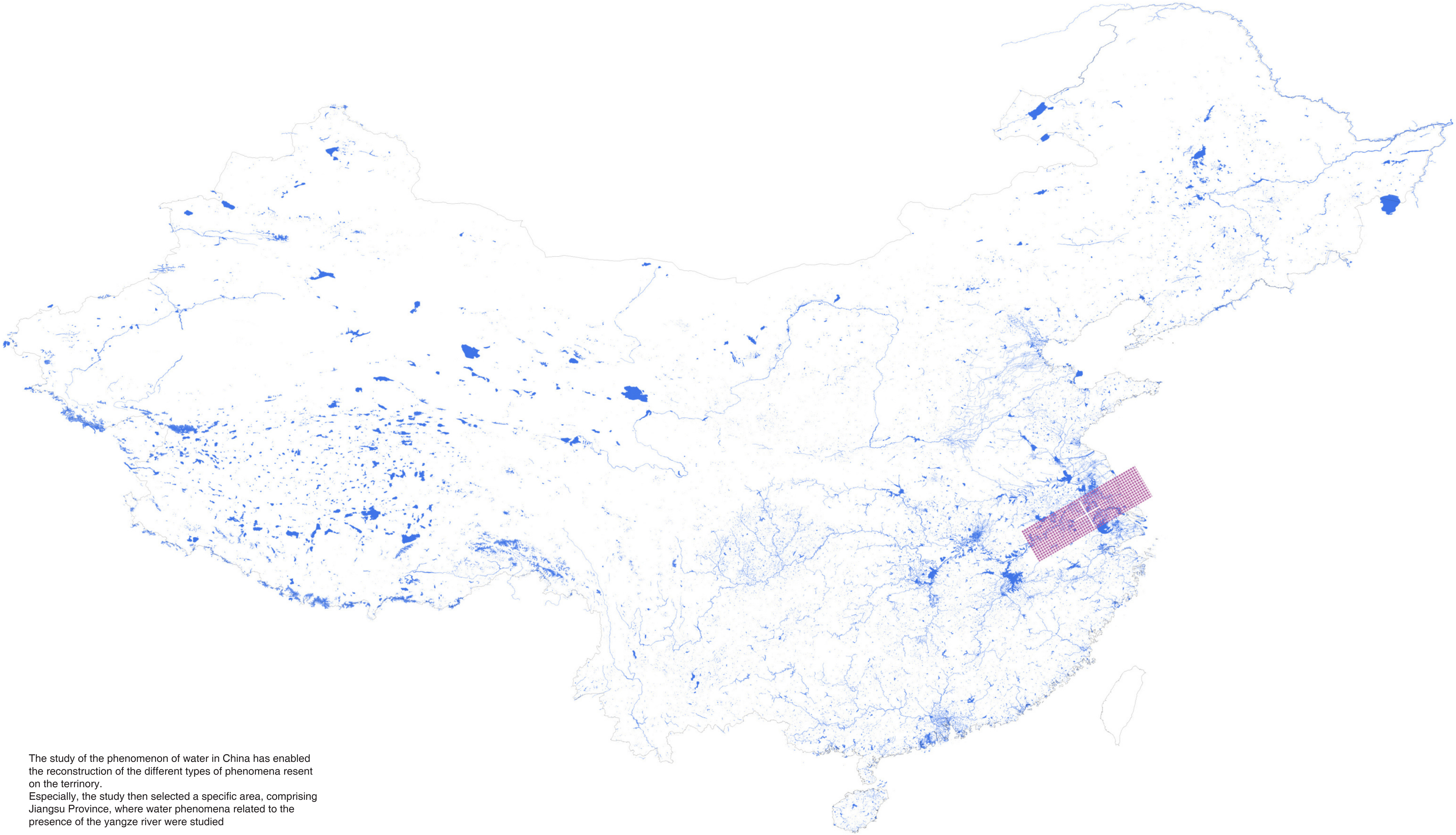
China's future, like its past, can be read in the fate of its water.

Philip Ball, The Realm of Water

1
Andrew Steer, President and CEO of the World Resources Institute, conference at UK Department of International Development (DFID) in London, 2011

Moreover, the situation is compounded if climate change is taken into account, which is causing more and more frequent flooding.
Andrew Steer[1], said that climate change has radically changed the situation of water resources and that rising sea levels have caused flooding.
At the same time, extreme weather conditions have led to many droughts, the emergence of water and its flow have also become unpredictable.
Global climate change affects people's lives through various channels, but it involves water, adaptation to water is a foundation.


Flooding phenomenon
Sponge city
Acid rain
Water pollution
Dry areas
Water city
Desertification



The study of the phenomenon of water in China has enabled the reconstruction of the different types of phenomena resent on the terrinory.
Especially, the study then selected a specific area, comprising Jiangsu Province, where water phenomena related to the presence of the yangze river were studied

1.2 WATER CHINA

POLLUTION

China's water pollution is the result of industrial wastewater, untreated domestic wastewater and non-point source pollution mainly from agriculture.
Wastewater discharges have steadily increased in recent years, and in 2007, the Ministry of Water Resources (MWR) reported[1] that they reached 75 billion tonnes, two-thirds of which came from industry and the rest from domestic wastewater.
Increased human activity threatens the quality of inland water in China, currently 43% of the seven major river basins, 50% of groundwater in cities and 77% of major lakes and reservoirs are unfit for human use[2].
Water-related pollution violations are reported daily, with 73.8% of groundwater in eight regions being polluted[3]. (GRAPH 1)
According to the Ministry of Environmental Protection, most of the water in the eight provinces and municipalities of Beijing, Liaoning, Jilin, Shanghai, Jiangsu, Hainan, Ningxia and Guangdong is no longer safe for humans and various ecosystems.
Despite the very high levels of toxic substances, the water is often still used.
In fact, 4.05 million hectares of land are irrigated with this water[4], so polluted crops mean bad harvests and unhealthy food.
According to the non-profit group China Water Risk[5], 190 million Chinese regularly drink polluted water, with much higher than average mortality rates associated with pollution.
(GRAPH 2)
Inadequate water quality exacerbates the water shortage in China, which is unevenly distributed across the country. Northern China often suffers from year-round water shortages, while southern China, despite sufficient quantities, experiences seasonal water shortages due to inadequate quality.
More than half of the population is affected by water scarcity, indicating an urgent need to improve the management of freshwater quantity and quality to cope with water shortages.
China is currently making significant efforts to reduce water pollution since 2001.

1 Ministry of Water Resource, P.R. China, 2007 statistic Bullettin on China Water Activities

2 China Water Risk, 2016 State of Environment Report Review, 14th June 2017

3 China Water Risk, Big picture online, Water Risk valutation :Water Risk Exposure - Interlinked water, climate, clustered & regulatory risks

4 Abigail R. Jahiel, The Organization of Environmental Protection in China, Published online by Cambridge University Press, 12th February 2009

5 China Water Risk report "No Water, No Growth - Does Asia have enough water to develop?", 2018

Large investments have been made in wastewater discharge standards and pollution control strategies to address the water pollution crisis and to promote environmental restoration. Especially since 2001 the beginning of the 10th National Five-Year Plan[6] there has been a growing environmental effort, mainly focused on the treatment of point source pollution and the provision of urban environmental infrastructure.

A key part of the strategy implemented is monitoring, as understanding how water quality responds to these forces can help guide future efforts to maintain water security and sustainability.

The most nationally representative investigations were carried out by analysing three typical water quality parameters[7] - chemical oxygen demand (COD; the permanganate index, an indicative measure of pollutant loading) and concentrations of total ammonium (NH_4) and Ammonium-Nitrogen (NH_4^+-N).

6
Gov.cn, The National People's Congress of the People's Republic of China, Report on the Outline of the Tenth Five-Year Plan for National Economic and Social Development (2001), 03rd March 2010

7
Ting M., Na Z., Yong N., Jiawei Y., China's improving inland surface water quality since 2003, Science Advances, Vol.6, n.1, 3rd January 2020

The COD concentrations observed in surface water resources typically range from 20 mg/L or less in unpolluted waters to greater than 200 mg/L in waters receiving effluents. Industrial wastewaters may have COD ranging from 100 mg/L to 60,000 mg/L

Chapman 1992

National-level variability in inland water quality from 2003 to 2017 and its responses to anthropogenic discharges were analysed, showing that water quality has improved significantly or remained at favourable levels across the country due to reduced discharges in industrial, rural and urban areas. However, increasing discharges from the agricultural sector threaten these results. (GRAPH 3)

Furthermore, the current state of water pollution is relatively severe in northern and north-eastern China.

The results suggest that water quality in China would further benefit from more flexible strategies for mitigation measures that respond to regional differences in the factors influencing water pollution levels in specific regions.

However, these investigations have usually focused on temporal changes in pollutant concentrations in specific local water bodies or regions and do not have a direct link to anthropogenic pollution sources. (GRAPH 4)

Therefore, they may not reflect the overall relationship between inland water quality and driving forces in the whole country.

Jiangsu is an important producer of chemicals, but most of the industrial parks are located in water-stressed or often flooded areas; industrial parks overlap with highly polluted, densely populated areas protected from drinking water (53 chemical industrial parks in the territory, densely distributed in northern Jiangsu and along the Yangtze River)[8].

Drinking water reserves are very environmentally sensitive and no factories are allowed within these areas.

However, some chemical parks are relatively close to such important sources of drinking water. (GRAPH 5)

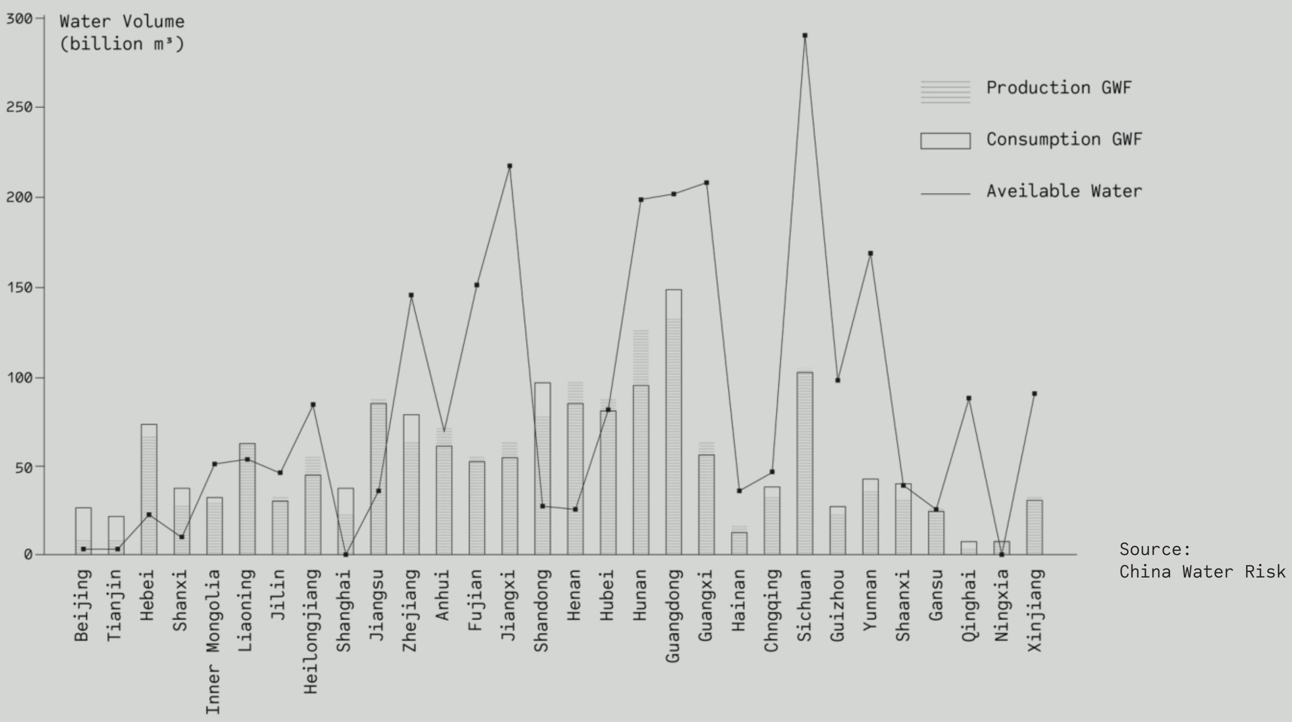
8
Yuanchao X., Jiangsu Chemical Park Explosion: Rectify Or Shutdown?, China Water Risk, 18th June 2019

NATIONAL GROUNDWATER QUALITY MAP

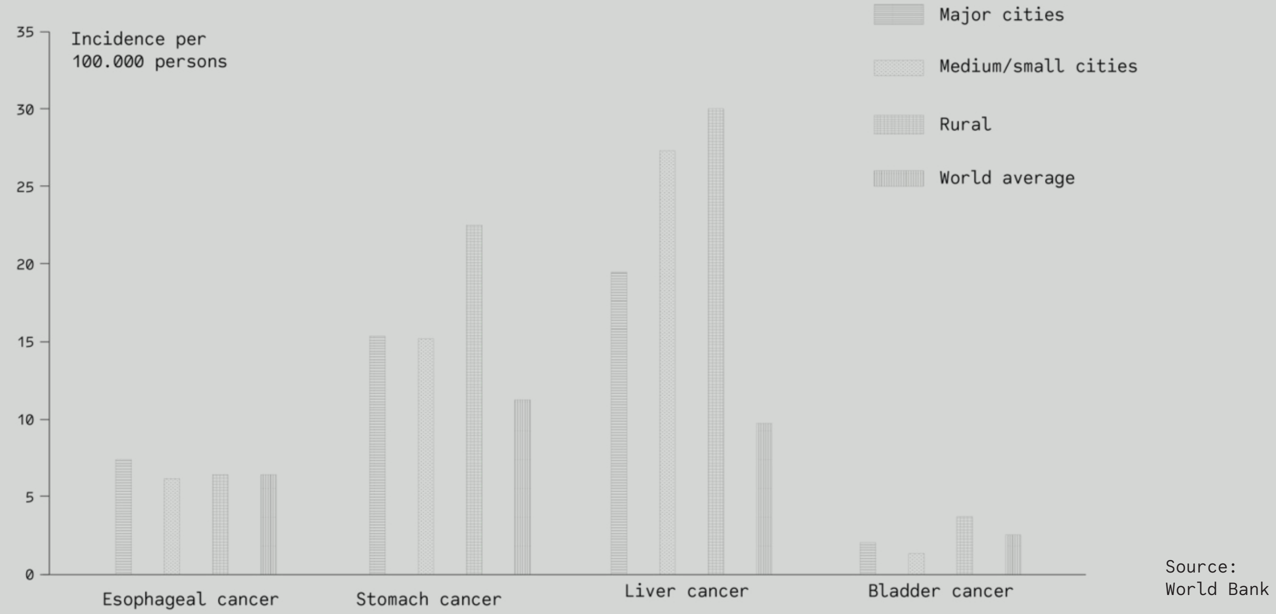
Reporting data on water pollution in China makes for interesting reading. The Yangze river area turns out to be one of the most polluted in China. In fact, it is no coincidence that there are cities along the river that are considered "cancer cities" where the index of disease due to pollution is very different.
So let us see how the phenomenon of sponge cities is generated within a heavily polluted area, generating an obligatory process that aims not only at water recovery but also its purification

Blue City Water Quality Index:
from 0.00 (Excellent) to 50.00 (Poor)

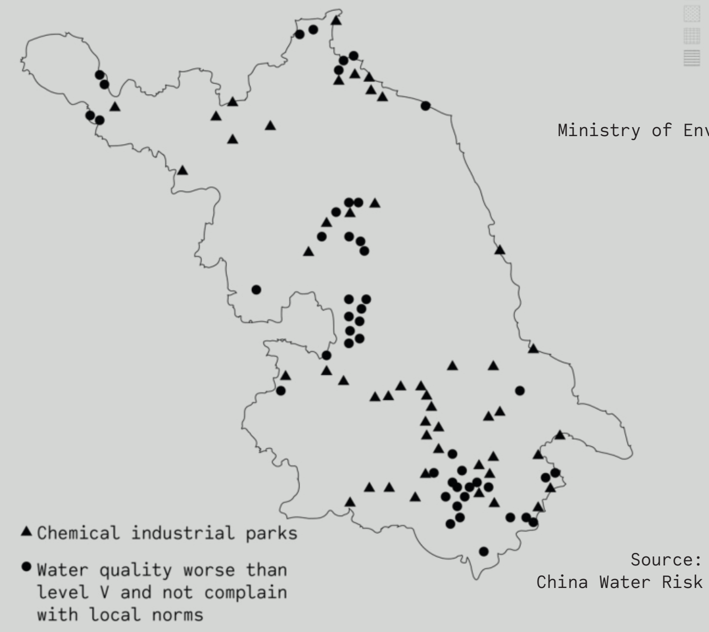
Groundwater production and consumption in Chinese states (Graph 1)



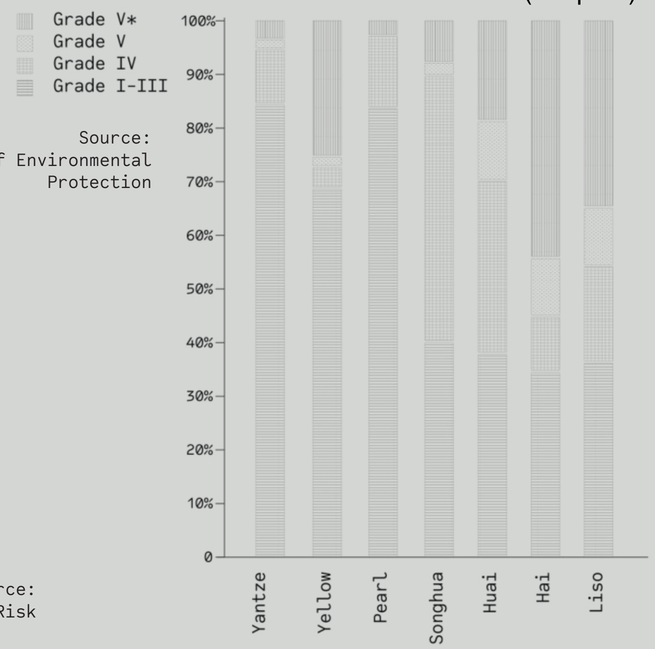
Mortality Rate for Cancer Associated with Water Pollution (1/100.000) in China, 2003 (world Avarage in 2000) (Graph 2)



Chemical Industrial Parks & Compliance map (Graph 5)



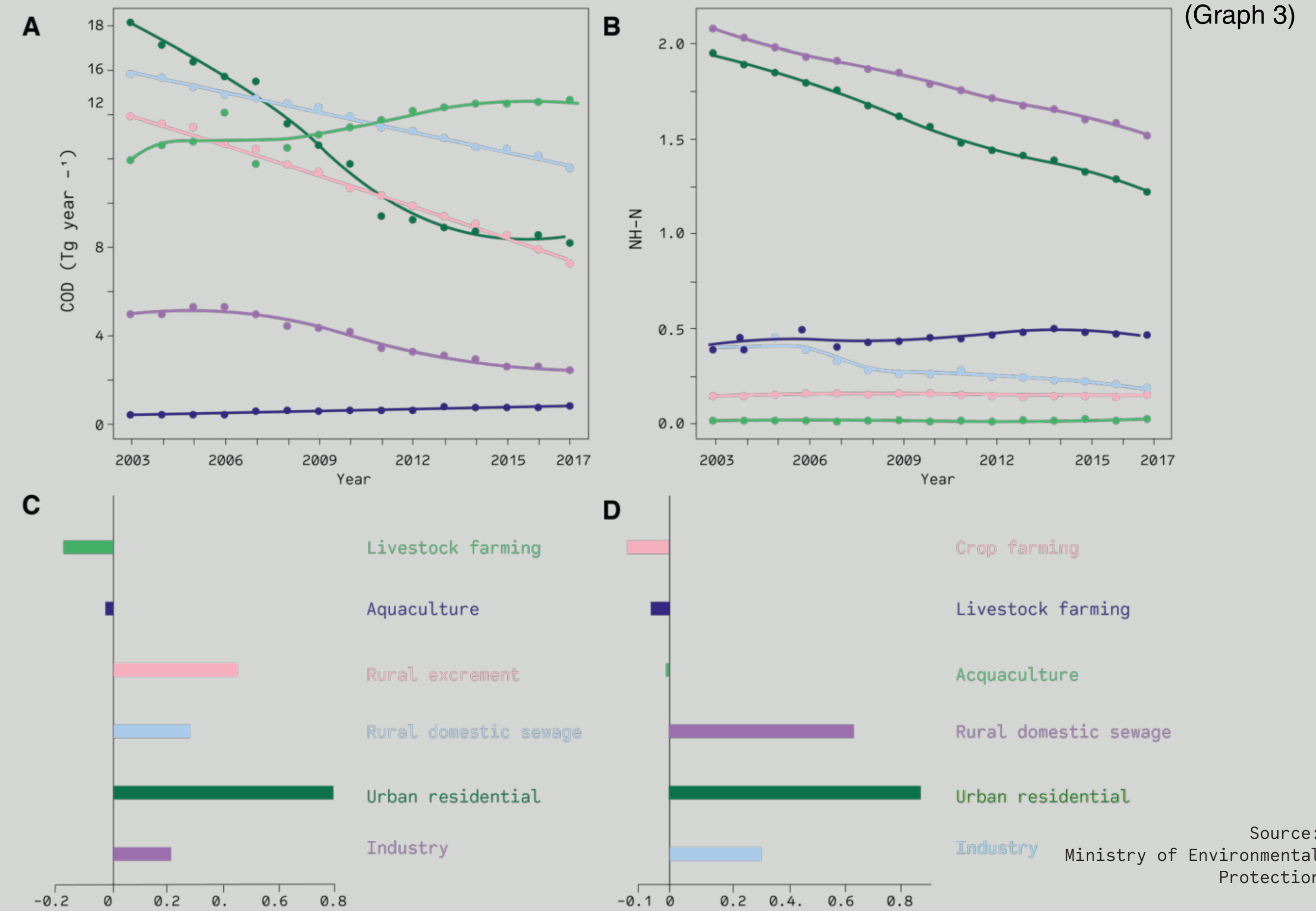
Water quality of China's river basins (Graph 4)



National-level trends in annual estimates of water quality measurements and inland surface water quality levels in China from 2003 to 2017

Nationwide dynamics of anthropogenic pollution discharges from different sectors and their relative impact on interannual variationsin COD and NH-N (A-B) concentrations observed in China's inland waters during 2003-2017, and their relative impacts for each sector (C and D)The positive values in (C) and (D) indicate a positive effect of the reduction of sectoral pollutant discharges on the decrease in observed concentrations.

(Graph 3)



WATER

WATER

SCARSITY

For thousands of years, civilisations along China's main rivers have fed on the glacial meltwater of the Qinghai-Tibetan Plateau, also known as the Third Pole.
Once a stable source of river flow, the ice mass is now less able to provide fresh snow and ice to the glacial melt as global warming has increased the temperature of the glacial region by 3-3.5 degrees Celsius over the past half-century[1].
A 2018 Greenpeace study[2] revealed that 82% of China's glaciers have retreated and more than a fifth of the ice cover has disappeared since the 1950s.
As a result, glacial runoff in the Yangtze alone has been reduced by 13.9% since the 1990s, reducing freshwater availability. (GRAPH 1)
Meanwhile, rising temperatures have also changed atmospheric circulation.
It has become more difficult for the humid summer monsoons to reach northern and inland areas, resulting in more unreliable rainfall patterns.
This abnormally dry climate has been experienced by Beijing in recent years: for 116 consecutive days between October 2017 and February 2018, no precipitation, including rain and snow, was recorded in the metropolis[3]. (GRAPH 2)
Climate change is thus diminishing accessible water resources in China, triggering a severe water shortage crisis within the national border, leading to a new range of environmental, social and geopolitical challenges.
Water is one of the most important resources for human survival and development.
As the second largest economy with a rapidly increasing demand for water, China has suffered from water scarcity and uneven spatio-temporal distribution.
The problem, in fact, is the distribution: 80% of the water is in the south.

To fight for every drop of water or die, that is the challenge facing China.

Minister of Water Resources,China, 2005

1 Smith M., Riseborough D., Climate and limits of permafrost: a zonal analysis, Permafrost and Periglacial Processes, 2002, pp.1-15

2 Greenpeace, Bilancio 18 di sostenibilità 2018, Rome, 2018

3 Ritter K., Water-Stressed Beijing Exhausts Its Options, Circle of blue, 14th March 2018

WATER

Eight northern provinces (in order, according to the CSY: Tianjin, Ningxia, Beijing, Shandong, Shanghai, Hebei, Henan, Shanxi) suffer from severe water scarcity; Ganxu, Shaanxi, Liaoning and Jiangsu also suffer from water scarcity, albeit to a lesser extent than the first eight provinces[4]. (GRAPH 3)
According to a report by the World Bank[5], water scarcity will have a very high impact especially in rural and northern China where people will have to look elsewhere for water, this phenomenon has already begun but 30 million environmental refugees are still expected to flee water stress. In the northeast, in Beijing, very little water is available: just 100 cubic metres per year per person, levels comparable to Saudi

Avoiding a true liquidity crisis, which could impact billions of lives and cost trillions of dollars, is one of our greatest challenges in the 21st century
CRW goal

Arabia, far below the scarcity threshold, internationally defined at around 1000 cubic metres per year per person.
China has about one fifth of the world's population but only 7 % of the world's water reserves.
At present, China uses far less water than any European country, about 400 cubic metres per person per year in total, 600 billion cubic metres per year[6], but usage levels are already unsustainable.
The Economist[7] claims that the 50,000 rivers with a significant flow in the 1950s have become about 23,000 and adds that 'as if that were not enough, China is polluting what little water it has left'.
On the banks of the Yellow River there are now four thousand petrochemical plants and, according to a 2007 government survey[8] , one third of the water is so polluted that it cannot even be used to irrigate fields.
The Ministry of Lands[9] says that more than half of the water in China's northern plain, on the edge of which Beijing is located, is unsuitable for industrial use and is not clean enough for human contact, not even for hygienic purposes.
Water is insufficient in the north and intense development is only putting more pressure on the demand for water, currently industry recycles too little water while agriculture wastes too much, current usage is unsustainable.
Countrywide, agriculture consumes 62% of water, power/ industry 22%, humans 14% and other use 2%[10]. (GRAPH 4)

4 Parton C., China's Looming Water Crisis, Chinadialogue, London, April 2018

5 World Bank Group, A New Era of Water Governance in China, 27th December 2018

6 The Economist, All dried up, 10th October 2013, p.2

7 The Economist, Desperate measures, 12th October 2013, p.4

8 China Daily, Pollution Makes Cancer the Top Killer, 21th May 2007

9 China Daily, Water Quality a Major Priority, 2nd July 2007

10 Gleick P., Cohen M., The World's Water 2008 – 2009: The Biennial Report on Freshwater Resources, ch.5, Island Press, 2009

WATER

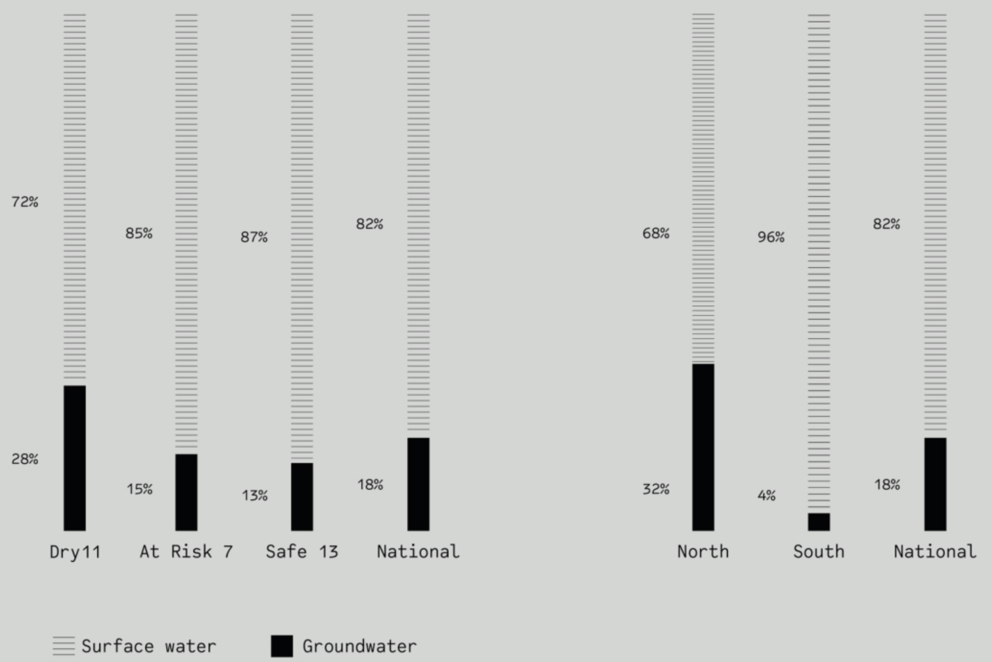
We are on a collision course with nature! Households, farmers, industries and ecosystems are increasingly competing for their daily water needs. Groundwater is being exploited faster than it can be replenished and is becoming increasingly polluted. By the middle of the next century, over 40% of the world population - 3.9 billion people - could be living in areas under severe water stress as climate change adds to the pressure from economic and population growth.

Angel Gurría, OECD Secretary-Genera

Surface & Groundwater

Surface water & Groundwater Supply Split

(Graph 1)

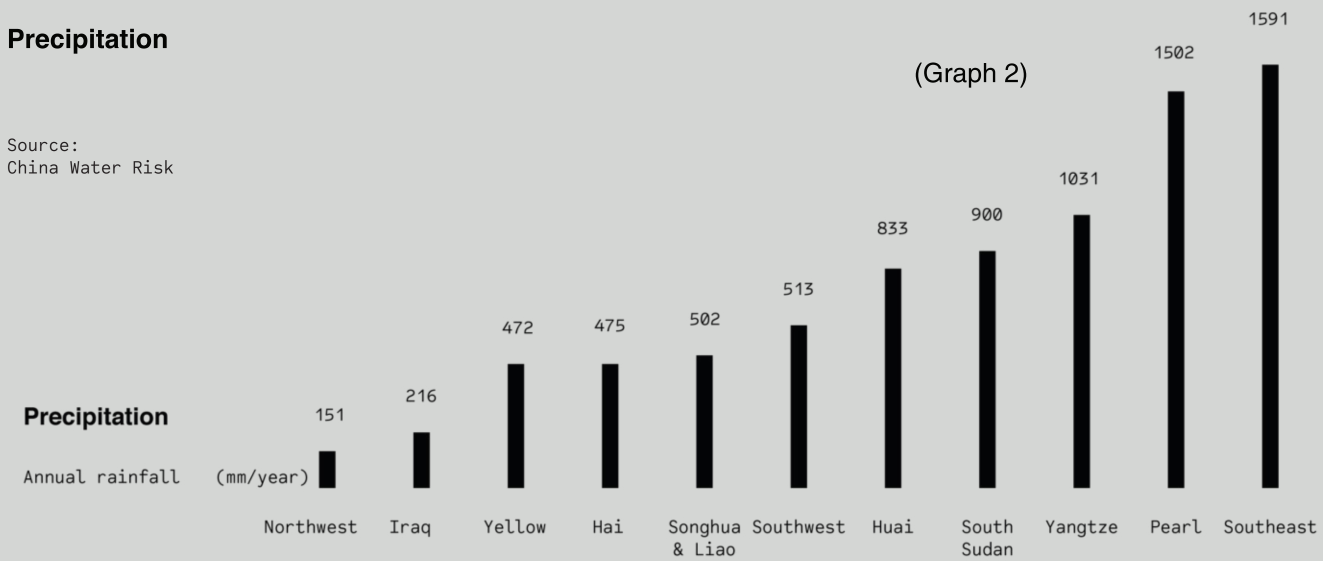


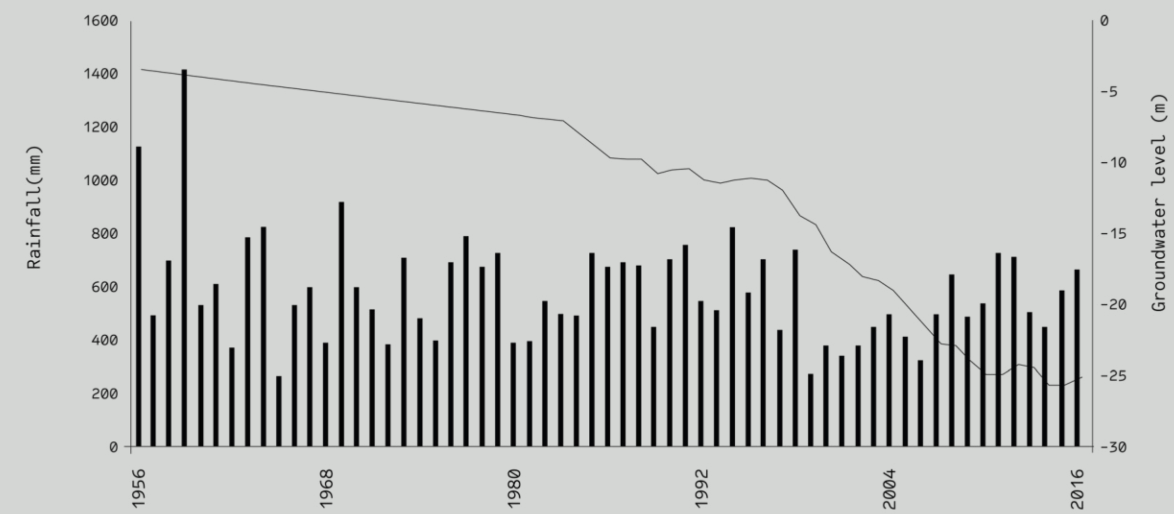
Source:
China Water Risk

Precipitation

(Graph 2)

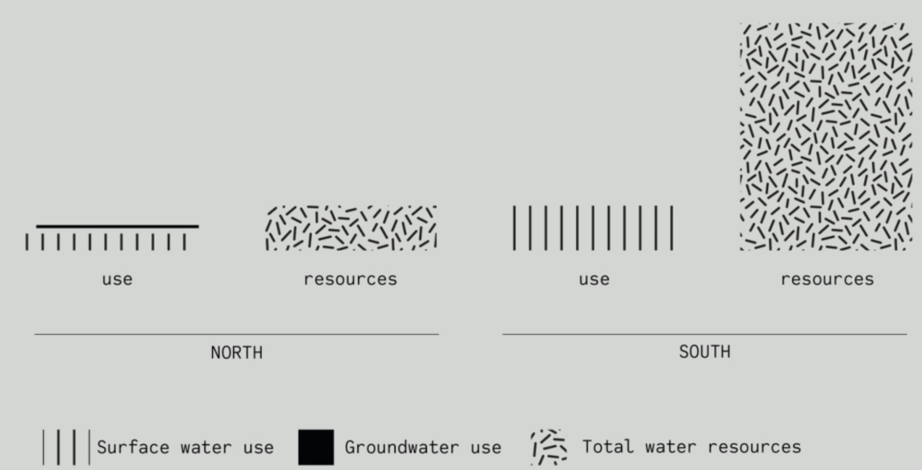
Source:
China Water Risk





2016 North-South Water Use vs Total Water Resources

(Graph 3)

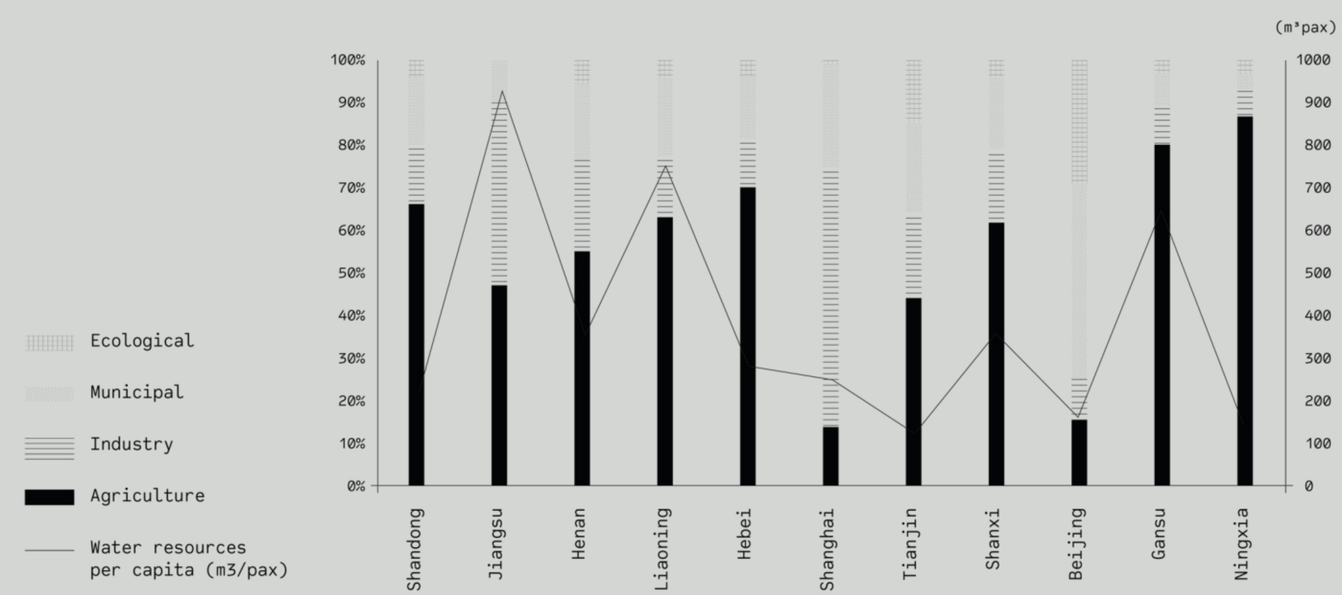


Source:
China Water Risk

Breakdown of Total Water Use & Water Resource per capita

Source:
China Water Risk

(Graph 4)



FLOODS

The term flood can represent different phenomena.
When water overflows the natural and/or artificial boundaries of a river or any body of water, this is called overflow, while when water accumulates on flat areas, this is inundation.
A flood event is an entirely natural process and part of the normal life cycle of a watercourse.
However, a flood can be very dangerous because it is a rapid and powerful flow capable of overwhelming and destroying whatever it encounters.
It can cause the death of people, or, it can sweep over cars, objects, buildings and cause damage inside them due to flooding and material carried and deposited.
Road infrastructure and communication networks, leading to the isolation of affected areas, are also subject to this danger.
Regardless of the type of flooding, possible causes include rainfall, flooding, human intervention, storm surges, tidal waves and tsunamis, as well as melting snow and glaciers.
The impact of climate change is playing a key role as it is significantly influencing the causes of flooding and has already begun to be felt around the world, but in the coming years Asia[1], an area where one third of the world's poorest people live, will be most affected.
If a concrete solution is not found in the coming years with effective measures to combat climate change on the Asian continent, all economic and scientific progress achieved by the constituent states will be drastically reduced.
In a study carried out by the Asian Development Bank (ADB)[2], it was shown that by the end of this century, the temperature in the Asian continent will increase by as much as 6 degrees Celsius.
Some countries such as Tajikistan, Afghanistan, Pakistan and parts of China will experience an even higher increase of around 8 degrees Celsius.
The number of hot days on the Asian continent will increase 10 times over the current figure, at the same time there will be an increase in the costs of flood losses to USD 52 billion per year[3].

1
Shukla N., Flooding Will Hit Asia the Hardest- Report, Earth.org, 8th July 2021

2
Minsoo L., Villaruel M., Raymond G., Effects of Temperature Shocks on Economic Growth and Welfare in Asia, ADB Economics Working Paper Series, no.501, Philippines, December 2016, pp. 1-3

3
Ivi, pp. 10-11

WATER

All this will lead to further increases in water levels, destructive storms, droughts, and the amount of flooding; if climate change is not addressed adequately, 50 per cent of agricultural land will disappear leading to climate change-related malnutrition resulting in the death of 26,000 children (under 5 years of age)[4].
The study "Satellite imaging reveals increased proportion of population exposed to floods"[5], published in Nature by a team of US and Canadian researchers, used satellite observations of floods, revealing that "The proportion of the population exposed to floods has increased by 24% globally since the turn of the century".
Most of the flood events in the database were caused by heavy rainfall, tropical storms, storm surges, melting snow or ice, and dam bursts are some of the other causes.
The results of the study published in Nature and funded by Google show that between 58 million and 86 million people moved to flooded regions observed between 2000 and 2015 as these regions are areas of high economic development,

4 Li B., Shang X., Cui Y., Blaxland M., Migration, urbanisation, climate change and children in China-issues from a child rights perspective Research Team in Chinese Social Policy Program lab SPRC, UNSW, Prepared for: UNICEF Beijing, July 2021

5 Tellman B., Sullivan J.A., Kuhn C.. Satellite imaging reveals increased proportion of population exposed to floods, Nature 596, 80–86, 4th August 2021

marking a 20 to 24 per cent increase in the percentage of the population exposed to flooding, between 2000 and 2018, worldwide, 2.23 million square kilometres were flooded for some time, affecting between 255 million and 290 million people, by 2030, climate and demographic changes will add 25 new countries to the 32 already subject to increasing flooding.
This research shows that nearly 90 per cent of flood events have occurred in South and South-East Asia, where they affect hundreds of millions of people and have already caused hundreds of deaths and billions of euros in damage.
Indeed, the state reports that over the past year, summer floods, which are nothing new in these regions of the People's Republic of China (PRC), are proving particularly severe, with more than 800 people killed across the country and 2.45 million forced to evacuate their homes.

I was really terrified at that time. When I saw the water rising above our heads outside the window, I was preparing myself to accept that I would never be able to get out.

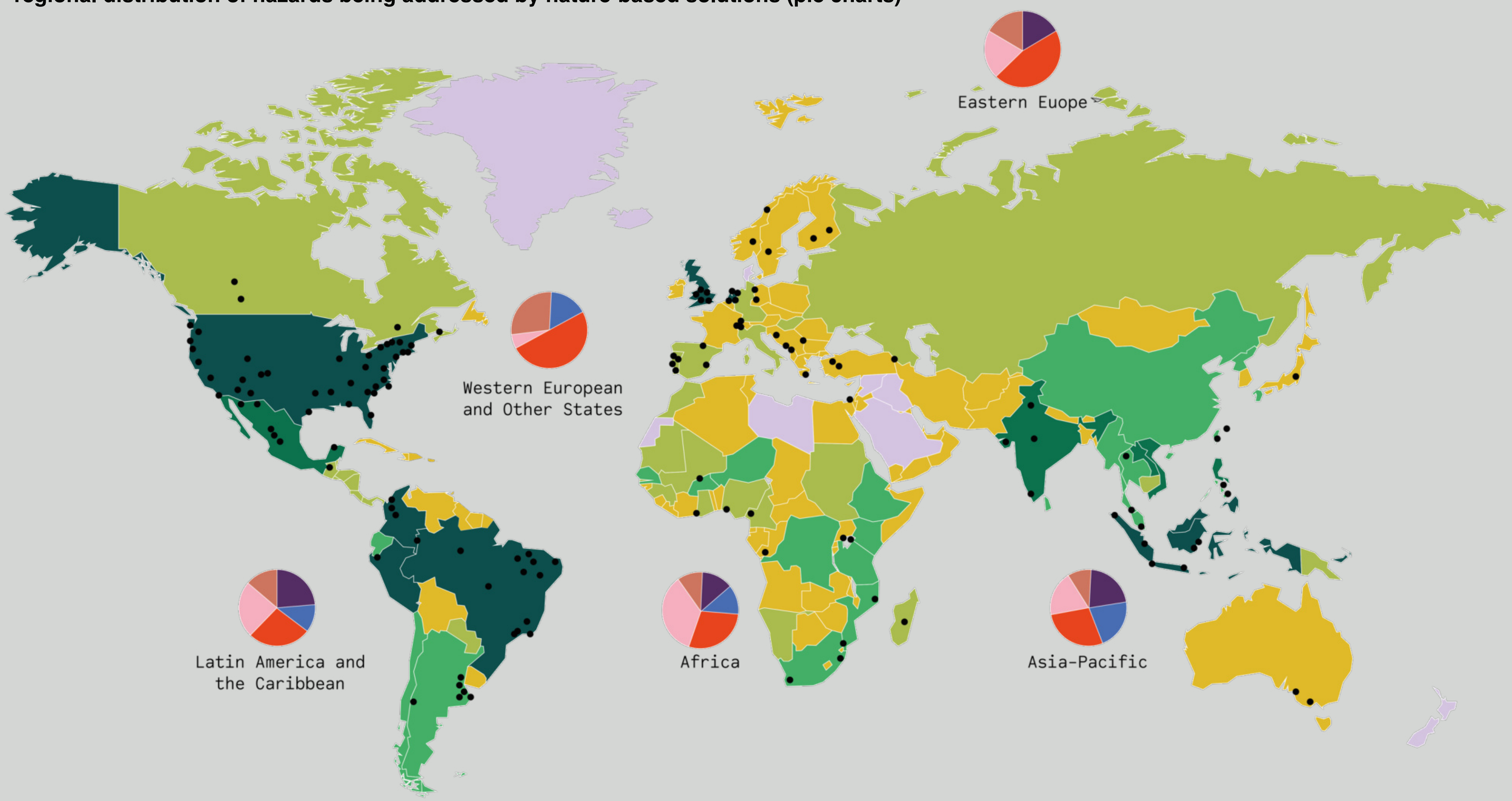
Testimony of Zhengzhou Metro flood survivors

WATER

However, floods in asia are being monitored in near real-time by ESA[6]'s Envisat Advanced Synthetic Aperture Radar(ASAR) sensor, which is capable of capturing images both day and night and in all weather conditions, these Envisat images are a means for authorities to identify the extent of floodwaters and coordinate mitigation efforts.

6 The European Space Agency (ESA) is Europe’s gateway to space. Its mission is to shape the development of Europe’s space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world.

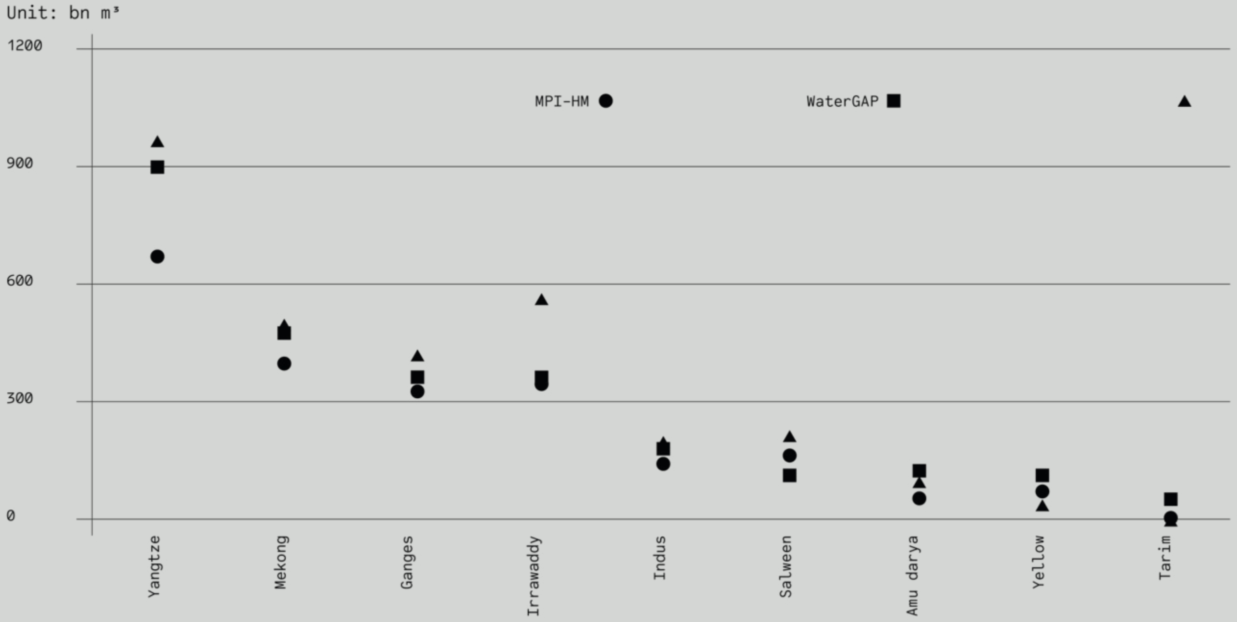
Global map of nature-based solution initiatives for adaptation, showing the number of investments per country, the geographic distribution of cities reporting on nature-based solution activities (dots), and the regional distribution of hazards being addressed by nature-based solutions (pie charts)



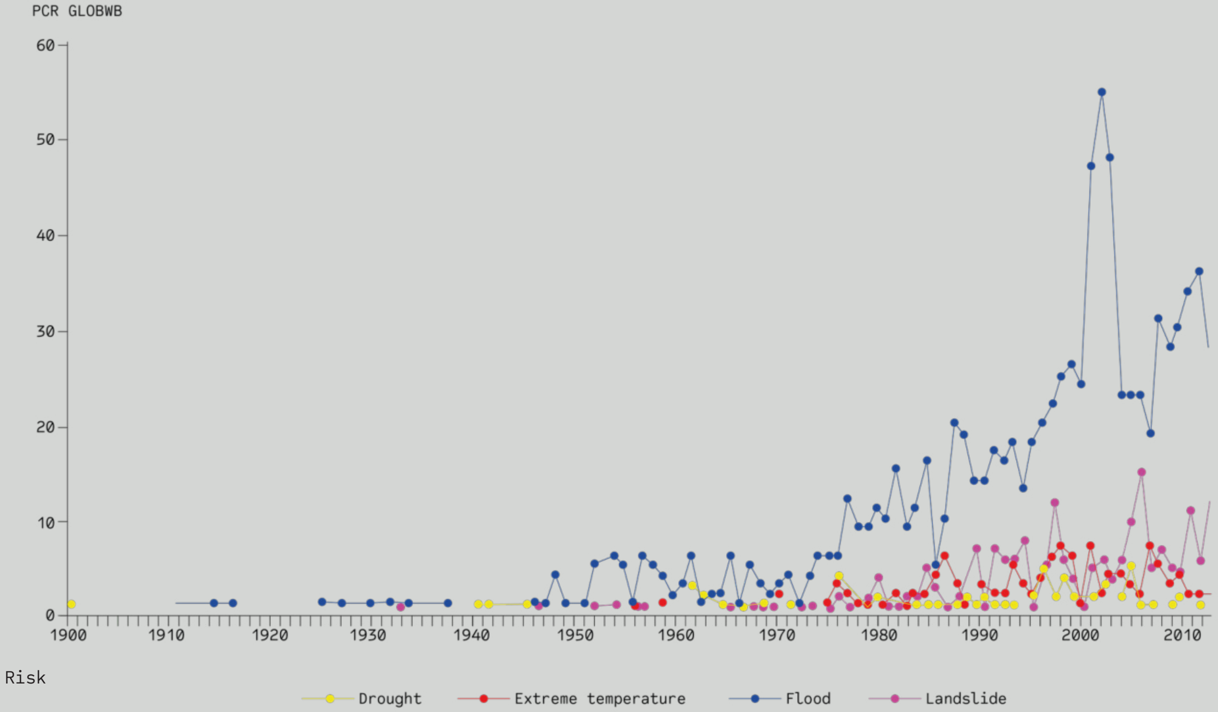
Source:
United Nations Environment Programme

Rivers: Annual Flow Estimation Based on 3 Models

Source:
China Water Risk

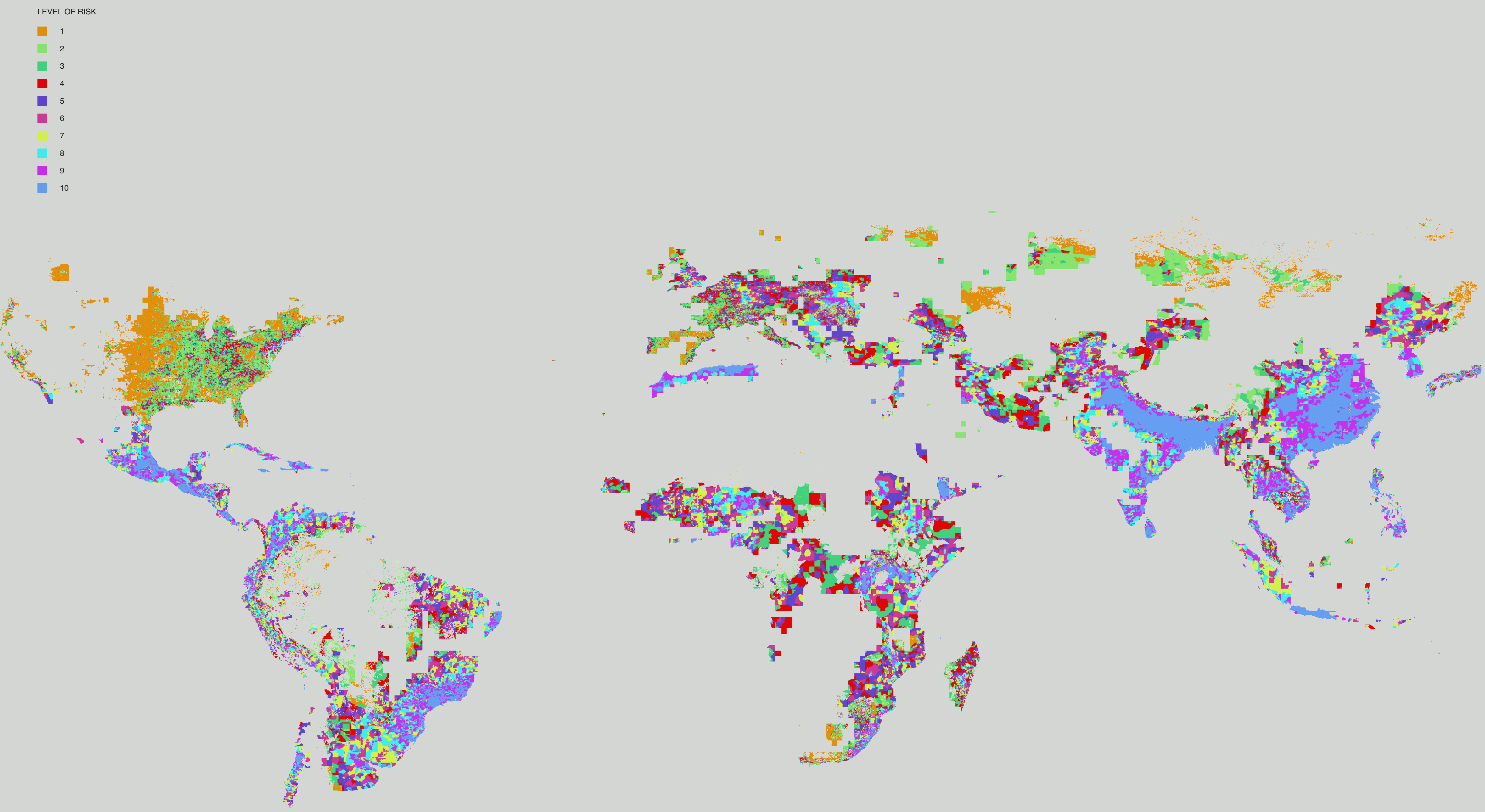


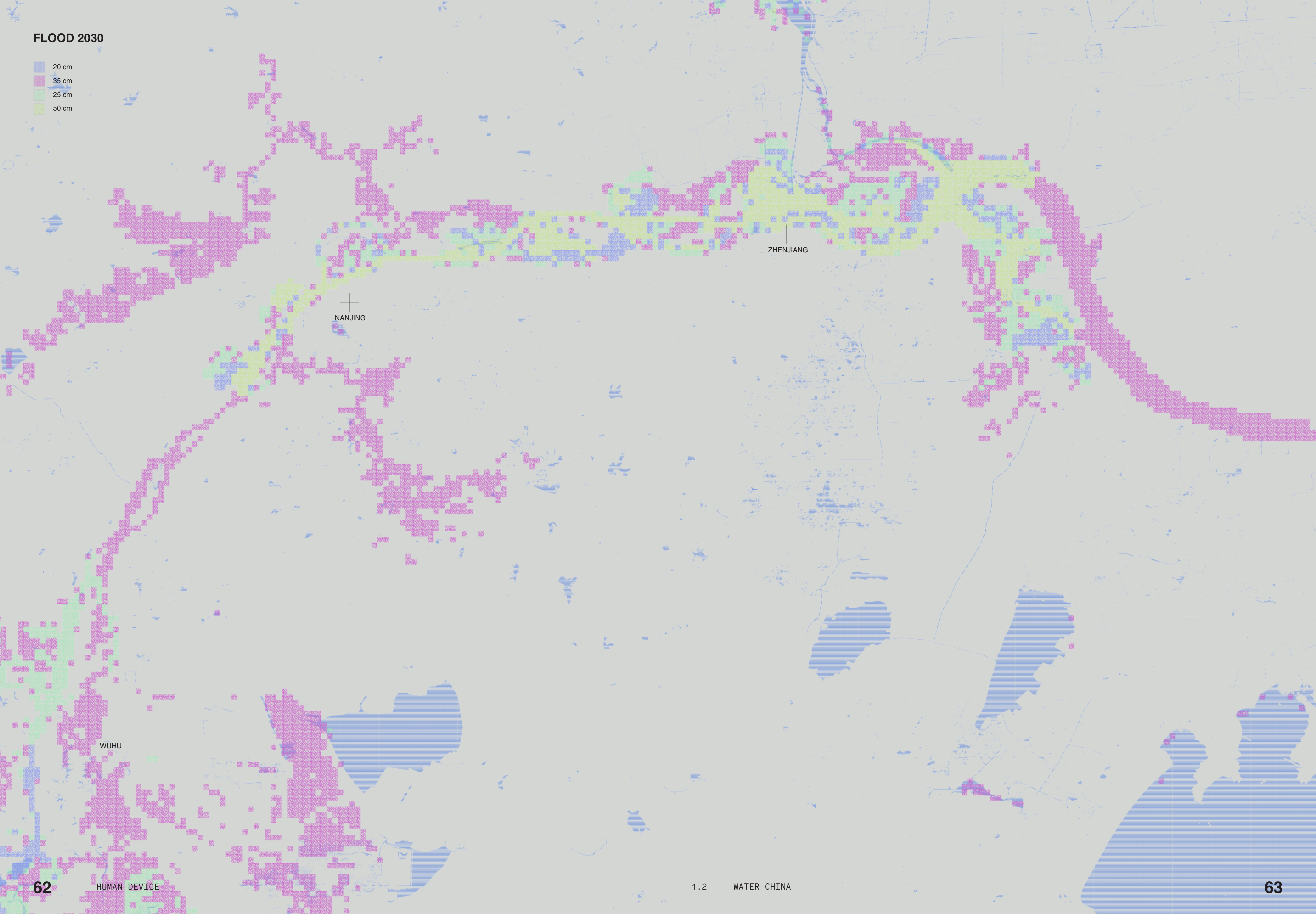
Occurrence of Natural I Disaster Wheather Event

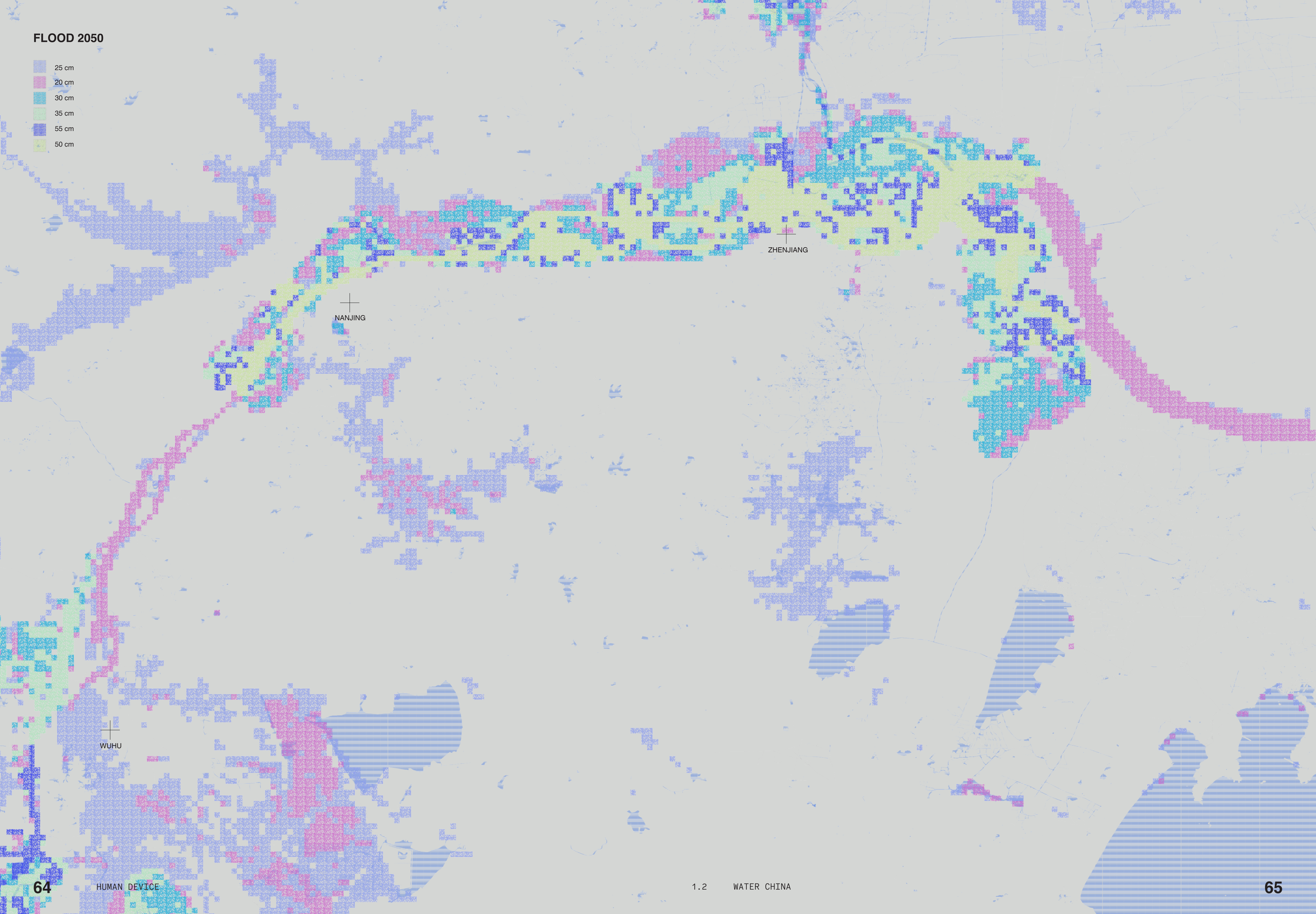


Source:
China Water Risk

GLOBAL FLOOD MORTALITY RISKS AND DISTRIBUTION




FLOOD 2030
20 cm
35 cm
25 cm
50 cm
NANJING
ZHENJIANG
WUHU


FLOOD 2050
25 cm
20 cm
30 cm
35 cm
55 cm
50 cm
NANJING
ZHENJIANG
WUHU

1.3 WATER CHINA TODAY

WATER

1
12th Five-Year Plan for National Economic and Social Development, 2011-2015

2
The Global Water Partnership China's vision is to promote the IWRM in China and facilitate the realization of the drinking water safety, flood control safety, food security and ecological security and the harmonious development of economy and society

3
Interview on Circular Economy with Anne te Velde counsellor infrastructure and environment at the embassy of the kingdom of the Netherlands and Lailai Li, an SEI Affiliated Researcher based in Beijing

4
The Economist, All dried up, 10th October 2013, p.1

China still has no viable answer to the water crisis that has plagued it for decades, Beijing has currently made reducing water consumption one of the key objectives of the government's 12th Five-Year Plan[1].
Meanwhile, water supply is threatened by increasing pollution and use for hydropower, and if business as usual continues, China could become the world's largest desert.
GWP[2] China expressed that the principle of integrated water resources is an eternal mission for the different sectors dealing with water-related strategies.
Water and cities would be one of the crucial development strategies for every municipality in the world.
During a seminar[3], chaired by Anne te Velde, Infrastructure and Environment Counsellor at the Dutch Embassy, and Lailai LI, Country Director of the China World Resources Institute, the concept of "climate adaptation" in current circumstances was emphasised.
It refers to the management of risks caused by climate change, such as floods, droughts, rising sea levels and hurricanes.
The Global Climate Adaptation Committee and 17 other countries are involved to focus on climate change adaptation.
The solution is to strengthen the adaptation mechanism and try to take global measures on related issues, importantly, China is involved and plays an important role in environmental and climate issues.
Currently, China is responding to its problems of water shortages and flash floods by implementing the engineering aspect, with new collection and transportation systems to meet water demand.
The allocation of water resources involves various aspects such as engineering, finance, technology and management.
The Economist[4] also argues that the remedies being pursued by the Chinese ruling class address the problem in the wrong way. "For decades the country has been ruled by engineers, many of them hydraulic engineers... they have responded to water problems by building engineering projects on a staggering scale", including the Three Gorges Dam on the Blue River, the Great Green Wall to stop the desert and restore the Yellow River, and the South-North Water Transfer Project (SNWTP).

This project envisages connecting the Blue River with the Yellow River through three thousand kilometres of canals, with the ultimate goal of transferring the abundant water from the south to the dry, industrial north of the country.
Of the three main canals, the first is expected to move billions of cubic metres of water (the water that has been moved so far was so polluted that one third of the costs went to purification).
The aim of the project is to move 45 billion cubic metres per year of water at a total cost of about 80 billion dollars: the Economist notes that 'it would be cheaper to desalinate an equivalent amount of seawater'[5].
The moment one decides to move a river, changing its natural course, or when one decides to build dams and embankments, one automatically encounters a new issue: environmental problems.
Natural landscapes are damaged, leading to the loss of biodiversity, all three SNWTP routes will change the natural hydrology on an unprecedented scale.
The Eastern Route raises the water levels of the four lakes it passes through.
A 2009 study[6] estimated that aquatic plants will decrease by up to 0.25 million tonnes in Dongping Lake surrounding the construction of the East Route; freshwater clams, whitebait and algae are among the species that will be affected.
This is not the first time that Chinese water programmes have led to the disappearance of local species.
Over the past decade, the construction of the Three Gorges Dam has permanently changed the landscape of the Yangtze. Similarly, the SNWTP project threatens to affect the climate and native plant and animal species in the areas it will pass through.
Research in 2016[7] warned of the potential for invasion of three southern aquatic plants, namely alligator grass, water hyacinth and water lettuce; alligator grass has already invaded Shandong Province in northern China.
The project could change the hydrology and microclimate in the region; a ten-year study[8] analysing the potential climate impacts of the Middle Route predicts that the sudden influx of water could alter local evaporation and precipitation rates, bringing frequent short and heavy rains to the area.
Diverting natural resources in one megaregion at the expense of another could also cause social conflict and consequently political instability.
Previously, water disputes in the Chinese province led to the 'block dam' incident in 2001.
Industries in the upstream province of Jiangsu have degraded the shared water of Zhejiang Province since the 1990s.
A decline in usable water has prompted Zhejiang residents to protest by sinking boats into the waterway to block polluted water, revealing the ineffective cooperation of provincial governments on resource management.
If there is public discontent due to the SNWTP, it will not only be provincial but regional, and could undermine the country's national governance.
Socially speaking, the project is forcing some 330,000 people[9] to relocate to enable the expansion of the Danjiangkou reservoir on the Middle Route.
Forced evictions occur with most infrastructure projects in China and are a constant source of mass protests.
However, China's SNWTP is a short-term solution, which prevents the government from correcting man-made problems and creates new challenges in the domestic and international community.
Experts suggest alternative solutions, such as proper utilisation of local water resources by increasing the price of water and improving water management bodies, reducing water consumption so as to make better use of limited resources can become a viable solution.
Water is too cheap in many cities and usually costs one-tenth as much as in Europe.
To alleviate pollution and drought problems, China is also pruning another, and quite different, type of investment. The project, no longer at the engineering level, deals with artificially seeding clouds so that it rains.

5 The Economist, Desperate measures, 12th october 2013, p.3

6 Chansheng He, Xiaoying He, Li Fu, China's South to North Water Transfer Project: Is it Needed?, Geography Compass 4(9), September 2010

7 Mallonée M. L., The South-North Water Transfer Project: a cost-benefit analysis, University of Pittsburgh, 2016

8 Yujun Ma, Xiao-Yan Li, Maxwell Wilson, Jianguo Wu, Water loss by evaporation from China's South-North Water Transfer Project, Ecological Engineering 95, October 2016

9 Chansheng He, Xiaoying He, Li Fu, China's South to North Water Transfer Project: Is it Needed?, Geography Compass 4(9), September 2010

WATER

Cloud seeding is a $168 million investment allocated by the National Development and Reform Commission[10].
The amount will be used for the purchase of new aircraft, the maintenance of some old ones, 900 missile launch systems and over 1,800 control systems[11].
According to the South China Morning Post[12] , this meteorological field programme will be used in the western belt of China, between Xinjiang and Inner Mongolia, that is, in the areas, most prone to drought and dry weather.
The National Meteorological Agency has drawn up the feasibility study[13] where it emerges that, with a three-year programme, there will be the possibility of seeing an increase in atmospheric precipitation over an area of 960,000 square kilometres, equivalent to about 10% of the country. Artificial rain induction in Qinghai Province increased rainfall levels to 55 billion cubic metres between 2006 and 2016, which is equivalent to 150% of the water contained in the Three Gorges Dam[14].
The process occurs by stimulating cloud clusters by dispersing chemicals such as silver iodide or dry ice into them.
However, the clouds must contain water at a temperature below 0°C for ice to form, which is generated by a freezing reaction of water vapour.
When the temperature is higher, liquid propane can also be used to produce crystals.
Recently, the use of hygroscopic materials such as salt is also being developed.
These substances are dispersed into the clouds by aircraft or directly from the ground by rockets.
The technique of artificial chemical insemination was discovered and studied in 1946 by Vincent Schaefer and Bernard Vonnegut.
Cloud seeding is not only used for droughts but also to mitigate smog and high, sultry temperatures.
The researchers claim that this practice does not pose any environmental problems, as they are sporadic and localised events and the substances used do not fall on the ground as they are not very dense.
To date, China has been the country that uses it most, but also Morocco, Australia, Russia, India, South-East Asia and the United States are employing this technique in at-risk areas.

It was very loud, like thunder, and it went on for a long, long time. Then the rain fell, it was quite heavy.

Citizen of Beijing to South China Morning Post

10 The National Development and Reform Commission (NDRC) is a ministerial-level department of the State Council. The NDRC implements the CPC Central Committee's policies and decisions on development and reform, and adheres to and strengthens the party's centralized and unified leadership over development and reform in the process of performing its duties

11 Josh Ye, China showers 1.15 billion yuan on rainmaking project for parched northwest in South China Morning Post, 24 January 2017, p.1

12 Ivi, p.2

13 National Meteorological Agency, Evaluation of hygroscopic cloud seeding in liquid-water clouds: a feasibility study, 2016

14 CIRES Boulder, Co, Literature Review and Scientific Synthesis on the Efficacy of Winter Orographic Cloud Seeding, January 2015

WATER

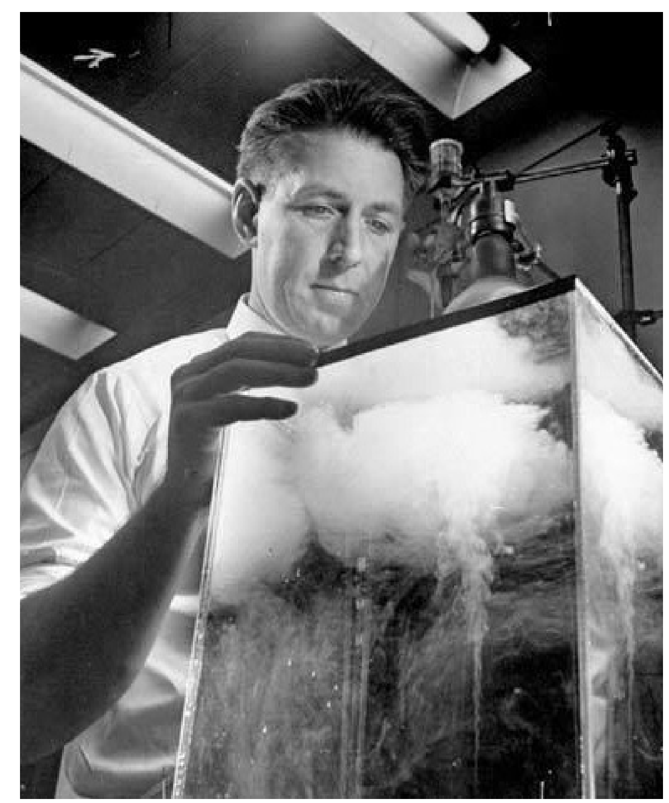
A new alternative, as opposed to the current engineering and artificial seeding of clouds, to deal with water shortages and flooding or climatic disasters, is moving across the country thanks to Professor Kongjian Yu, a Chinese ecological urban planner known as 'Sponge Cities Architect'.
Popular landscape architect from the People's Republic of China heads the landscape studio called Turenscape.

What we did was completely wrong, modern cities tend to use concrete waterways to channel flooding into lakes or seas.

Kongjian Yu

Yu believes that floods pose no danger if controlled.
The risk of flooding in urban centres due to unpredictable and extreme weather phenomena can become an opportunity for cities if they work with nature rather than against it.
In response to the climate crisis, urban researchers and innovators are putting the concept of 'sponge cities' into practice.
Sponge cities are urban ecosystems designed to take advantage of flooding, using urban design elements such as green roofs, open green spaces and interconnected waterways that can naturally retain and filter water, in fact the goal is to reuse 70 per cent of floodwater[15].
Absorbing and reusing floodwater not only helps cities avoid the severe consequences of urban flooding, but also brings many other benefits.
Sponge cities utilise green infrastructure to filter water in a natural way and then put it back into circulation for the benefit of residents.

15 Yu Kongjian, Sponge City: Theory and Practice, China Architecture & Building Press, 2016



A sponge city follows the philosophy of innovation: a city can solve water problems instead of creating them. In the long run, sponge cities will reduce carbon emissions and help combat climate change.

Kongjian Yu

The design principles of a sponge city are an appreciation of the ordinary, such as rural agricultural landscapes, and an approach to nature, even in its potentially destructive aspects, such as urban flooding.
Issues such as drought, water and soil pollution and habitat rehabilitation are also addressed using landscape techniques.

A new aesthetic is required to allow the operation and appreciation of ecological urbanism: the revolutionary aesthetics of Big Foot.

Kongjian Yu, The art of survival

Kongjian Yu advocates the need to deepen the connections and forms of the landscape, his projects transform the urban landscape using traditional designs and rural wisdom combined with the latest planning techniques and scientific knowledge, Yu defines his many convictions and projects as a Big Foot Revolution[16].
The big foot is the opposite of the small foot; healthy, natural feet were considered rustic and rural.
For centuries, bound feet were considered a status symbol, as well as a sign of feminine beauty and a hallmark of Chineseness in the Western mentality.
Girls' feet were squeezed repeatedly over the years to obtain more suitable sizes and shapes.
This painful fashion may have originated among upper-class court dancers in 10th-century China, gradually becoming popular among the elite during the Song dynasty.
With the Qing dynasty, foot binding reached most social classes and the abolition of binding became a banner for republicans and modernisers who would partly overcome this enduring tradition and create new meanings of citizenship.
The elites valued tying, the delicate, small and deformed feet, "devoid of functionality and smelly"[17], were considered beautiful at the expense of healthy ones.
Yu calls today's practices a return to the same aesthetic principles of small feet.
"Today in the city we tie natural feet with tiny fashionable heels and build a 500-year-old concrete flood control dam to surround the city and keep it away from water"[18].
Thus, urbanisation started with a highly privileged class that lost function in exchange for ornamental and superficial values, replacing "the messy, fertile and functional landscapes associated with healthy and productive people"[19].

16 Yu Kongjian, Letters to the Leaders of China: Kongjian Yu and the Future of the Chinese City, Terreform (ed.), 2018, p.58

17 Ibidem

18 Ivi, p.89

19 Ivi, p.93

WATER

The connections between China's natural and cultural elements are weakened by large and expensive infrastructure. China has used more concrete in three years than the United States used in the entire 20th century[20].
Significant investments are being made to create impressive and expansive landscapes in Chinese cities.
The landscape and image of contemporary China is changing towards European aesthetic principles, french-style gardens and spectacular buildings, such as the Shanghai Tower or the CGTN building in Beijing, stand alongside highways and dams as the image of a China in rapid modernisation and transition.
A country that is preparing to take the lead in the 21st century.
China is urbanising faster than the United States[21]: more than 20 million Chinese move to cities every year.
This significant social and infrastructural revolution is a trend of recent decades, in 1978, less than one fifth of China's population lived in cities; by 2020, this percentage has risen to 60 per cent.
In order to create beauty and make cities green, greenery has been taken away elsewhere, this decision has accelerated urban construction.
The crisis manifests the conflict between population pressure and the shortage of land resources, the new urbanisation must therefore take away and give equally without taking away and enough land.
Yu overturns classical planning strategies and methods by introducing "negative planning"[22] where he explains in 11 points that the ecology of the city matters first.
The growth of the city and its form are viewed under the lens of infrastructural ecology.
They consider landscape and not architecture as the fundamental unit of cities.
One of the new rules for design becomes saying what cannot be done rather than saying exactly what to do. Very important is the lanscape security pattern, as Geddes said "investigate first, plan later"[23].
Garden City Movement[24] is a programme, in the 21st century, to protect the environment, but the plan only envisages superficial initiatives, whereas there is a need to plan looking 50 to 100 years ahead.
Beijing planned a park for the 2008 Olympics, but they have done insufficient analysis by creating a greenbelt that is not well distributed and too narrow, and also lacks legal protection. This greenbelt was intended to prevent urban sprawl but due to the wrong design it caused this phenomenon to accelerate. Nowadays, many greenbelts adopt the style of parks and gardens, making it artificial and very expensive to create and maintain, as fountains, planters and exotic plants are used.
A forward-looking ecological infrastructure aims, in contrast to

20 Vaclav S., Making the Modern World: Materials and Dematerialization, John Wiley and Sons Ltd, 2013, p.34

21 Ivi, p.36

22 Yu Kongjian, Letters to the Leaders of China: Kongjian Yu and the Future of the Chinese City, Terreform (ed.), 2018, p.41

23 Geddes P., Cities in Evolution: An Introduction to the Town Planning Movement and to the Study of Civics, 1915

24 Tianyuan Dushi, The Garden City, Urban Planning and Visions of Moderniation in Early.Twentieth-Century China in Traditional Dwellings and Settlements Review, Vol. 31(1), International Association for the Study of Traditional Environments, pp. 39-54, 2019

current Chinese scenarios, to maintain the strength and continuity of existing landscape patterns and natural processes.
Each city has a key characteristic landscape element (river, mountain, lake), to strive to protect the diversity of city habitats becomes essential, much of what was there has already been destroyed.
The landscape is a living system, a mosaic of various habitats that shape its vitality.
Currently, there are areas that are not yet suitable for cultivation or living in, but this non-use of these areas could change over time so, before these areas are reclaimed, they must be secured and preserved.
Another current trend in China is not to maintain the natural configurations of rivers and coastlines, although this practice would bring many benefits.
The natural configuration with riparian zones and coarse vegetation does not please the eye of the observer, causing it to be lost in favour of redevelopment where nature and its needs are lost as the aim is only to create "pretty landscapes"[25].
Restoring and protecting water landscapes is another key design theme, Wetlands purify the environment and have many other benefits such as containing urbanisation.
Exploiting river banks and not creating concrete embankments also creates new habitats for species that have lost theirs with urbanisation, and these areas can also be exploited by citizens for environmentally sustainable mobility.
Greenways for pedestrians and cyclists, especially when integrated into the green system of schools, residential areas and commercial streets discourage car use.
Often in China, neighbourhoods are separated from the rest of the city by walls or large infrastructures and function as separate units, so they need to be integrated.
Parks must encourage the visitor to enter and experience them even before actually entering the park, urban greenery must be permeable and accessible to all types of public who must feel part of the space.
Parks used to be created in two ways, either aristocratic parks that were occasionally opened to the public, or some spaces in front of churches, but of no major importance.
Parks were places that attracted tourists almost as if they were theme parks designed with artificial details, pavilions, fountains, exotic species that made nature a mere spectacle without considering its needs.
There was a time in China when the Chinese themselves were forbidden to enter the parks because they were only for foreigners.
The ecological infrastructure applied on the generative principle of sponge cities is fast gaining ground in the new Chinese way of planning in 2014, the government announced a programme of

25
Yu Kongjian, Letters to the Leaders of China: Kongjian Yu and the Future of the Chinese City, Terreform (ed.), 2018, p.50 p.58

26
Faith C., Dimple T., Lei L., Sponge City Is Transforming Urban Flood Management, China Water Risk, 24 september 2021

27
Dingkun Yin, Ye Chen, Haifeng Jia, Qi Wang, Zhengxia Chen, Changqing Xu, Qian Li, Wenliang Wang, Ye Yang, Guangtao Fu, Albert S. Chen, Sponge city practice in China: A review of construction, assessment, operational and maintenance, Journal of Cleaner Production, Volume 280, Part 2, 20 january 2021

"sponge cities" (SCP)[26].
The People's Republic of China has established the concept of sponge cities, which will be used to address urban surface flooding and related urban water management issues such as urban runoff purification, peak runoff mitigation and water conservation.
There are currently 16 pilot sponge cities in China but the goal is to expand the number to 30 by 2030; sponge cities are also appearing outside China as urban sprawl is an increasingly common phenomenon around the world.
The United States, Russia and India are among the countries investing in sponge cities as a solution to urban climate change.
However, there are risks and challenges associated with these projects.
Compared to other stormwater management systems, the later start-up time of PSC is a disadvantage and this point may cause a lack of compatibility with existing urban stormwater management system models.
The inadequacy of the original grey infrastructure makes it complicated to achieve the full objective of preventing urban waterlogging.
Paved roads cover most of the land, making it difficult for stormwater runoff to flow into the land below.
Moreover, compared to more developed countries, the stormwater management systems in China are much less efficient.
Sponge cities theoretically reuse the collected water but, currently, most cities discharge stormwater along with polluted water to purify it.
Therefore, if cities want to utilise harvested water, they have to create additional waterways, involving the creation of new pipelines to channel rainwater directly into the system.
Residents and their perception of the project play a key role in the success or otherwise of the SGP.
Although surveys[27] show that the population is in favour, some aspects are not very clear, it is uncertain whether residents are willing to pay a surcharge on water.
There is also discontent due to large areas of occupied land that could disturb residents during construction.
The PSC is a newcomer among stormwater management systems worldwide.
There is still a huge gap between the goal and construction as a large amount of time and resources are required for construction due to a lack of practice and inadequate existing infrastructure. The CSP is effective in solving urban water problems; however, there are many challenges that need to be addressed to achieve the ultimate goal.

WATER

China can print money, but it cannot print water

CHINA'S LOOMING WATER CRISIS,
CHARLIE PARTON

THIS IS THE ONE PROBLEM WHERE CHINA'S FINANCIAL MUSCLE WILL NOT SAVE IT, NO MATTER HOW MUCH WATER IT REPLACES WITH IMPORTS: IT CAN PRINT MONEY, BUT IT CANNOT PRINT WATER. WATER IS AT THE HEART OF XI JINPING'S NEW CONTRADICTION: 'UNBALANCED AND INADEQUATE' DEVELOPMENT. THERE MAY STILL BE TIME AND WATER, BUT BOTH ARE RUNNING OUT.

HUMAN

2.1 HEHUA TANG

HUMAN

The current Chinese landscape highlights one of the most difficult challenges facing contemporary cities.
The change in China's economic structure has triggered processes that modify both social and spatial aspects, which sometimes generate conflicts in local realities.
Cities are growing rapidly, changing their spatial organisation and creating a modern image that reflects Western stereotypes, far removed from tradition.
Many historical cities currently suffer from a morphological and typological crisis due to mass production and the internationalisation of design.
The conflict between globalisation and local identities manifests itself especially in historical areas, which are often considered to be only a hindrance to modernisation, and this has already led to the destruction of much of the historical fabric.
In order to keep up with the times and prepare for the 21st century, Chinese metropolises have looked to the past of the West for inspiration.
The "beautiful city", or more correctly "cosmetic city", campaign now being seen all over China is inspired by the principle of the City Beatiful Movement, a civic design and development movement that the Western world, particularly the United States, pioneered more than 100 years ago[1].
Making cities beautiful is a two-sided weapon in fact unlike the first visual impact that amazes us, these interventions have many problems one of the main ones is the annihilation of citizens and their needs.
In China, to this day, this is happening again, majestic skyscrapers and infrastructures radically change the layout of cities with a large-scale impact, influencing various urban planning elements.
The creation of landscape avenues is an example of this, these large thoroughfares cut through entire neighbourhoods and create an obstacle that is difficult to overcome as a pedestrian, it also destroys the vernacular architecture of cities.
Squares, in Europe, become central parts of cities and China does not fail to build its own right away, but these squares are merely a showcase for the major powers in fact they tend to leave no room for the citizen to use them freely.

1
Yu Kongjian, Letters to the Leaders of China: Kongjian Yu and the Future of the Chinese City, Terreform (ed.), 2018, pp. 21-41

Filled with baroque references taken from the West, the squares are decorated with monuments, fountains and rich pavements.
New green areas were built in the city and were called parks, but they were gardens designed to please the eye and not the real needs of cities, trees and animals; in fact, exotic plants were often planted instead of native species.
Moreover, these green areas were well delimited by walls and fences that made it difficult for ordinary citizens to enjoy them.
During these redesigns, the real needs of the citizens, Chinese history and the climate of the area were not taken into account; again, the government creates for the rich and not for the people.
In order to be modern, China has decided to look outside its borders, with great appreciation for the western style, the outcome has been to create large, technologically advanced projects that, however, do not consider the conditions of the place and the soil.
They became landmark architectures of China, super modern buildings that however do not dialogue with history.
They tried to imitate the West but missed the meaning of the works they were copying, creating architecture that only had form and not spirit.
The affluent people in these new westernised cities tend to forget their origins and their relationship with nature.
In this historical moment of metamorphosis of metropolises, urban villages become the last shreds of cities still untouched by urbanisation, where hidden within a circle of walls and under what appears to be apparent chaos are the historical archetypes of a China that developed with precise typological rules dynasty after dynasty.
Urban villages represent the last examples of traditional settlements in today's urban fabric but at the same time have become neighbourhoods where decay and overcrowding are the main features.
Urban villages play an important role in providing affordable housing for urban migrants in Chinese cities.
They are considered an integration of the rural-urban dual system in China.
Chinese urbanisation has had great repercussions at the urban level, it is considered a direct consequence of growth and modernisation.
However, in order to control the flow of people entering the city, the Chinese government has adopted a particular policy, namely the allocation of hokou.
Representing a system of residence certification since 1958, it distinguishes each citizen according to their place of birth and the hokou of their parents, according to which they are entitled to certain social services, such as health, education and other similar services.
This instrument is used for social control, to prevent large migrations from rural to urban areas in order to ensure a continuous agricultural economy and at the same time prevent degradation and the spread of poverty in urban centres.
Those living in urban villages are mostly temporary migrants, citizens who constitute the so-called "floating population"[2], living in a temporary condition given by the household registration document, the hukou.
Despite the fact that the "National Urbanisation Plan of the New Type 2014-2020"[3] formalised the abolition of the hukou leibie (the residence permit), thus ending the impossibility for farmers to obtain non-agricultural rights, it must be kept in mind that in exchange for an urban hukou, a migrant farmer would lose any right to the use of land and with it, especially in urbanising areas, the large profits from land that will soon become valuable.
Moreover, the floating condition of villagers is their economic impossibility to become owners as their average monthly income is considerably lower than that of urban citizens.
Bringing a rural hukou into an urban environment therefore constitutes a prolonged condition of temporariness which, together with a general "dirty, chaotic and poor"[4] appearance, leads to a series of social outcomes that fuel a missing sense of belonging and undermine the construction of local identity.
Villages are not the destination for most of their inhabitants, who are aware that they will leave sooner or later.
The rapid development of villages has been carried out by the former residents themselves, no strict town planning or architectural regulations have been followed, and they have become a direct social product created not by the government or the housing market, but by the will of generations of people.
However, this need for new space for even more people has led to unhealthy living conditions.
Furthermore, although villages are well embedded in the urban environment, they are not necessarily connected to the urban

2
Zhang L, Strangers in the City: Reconfigurations of Space, Power, and Social Networks Within China's Floating Population; Stanford University Press, Stanford,USA, 2002

3
Issued in 2014 by the Central Committee of the Communist Party of China and the State Council

4
Liu, R.; Wong, T.; Liu, S. The peri-urban mosaic of Changping in metropolizing Beijing: Peasants' response and negotiation processes. Cities 2020, 107, 102932, p.3

Roads are narrow and congested; electricity, telecommunication routes and water and gas pipelines are disorganised; lighting, ventilation and drainage are insufficient and sanitation is poor.

Liu, 2020

fabric and access to services or transport in the city is easier from its borders, but the lack of internal infrastructure makes life more difficult within the village fabric, where schools or public facilities are often lacking.
Most of these problems stem from the high rate of building in villages, this prevalence of buildings leaves little space for outdoor green areas or public places and, as a result, fewer socialisation options are available within the village space.
In most cases, villages host different functions in the same space during the course of the day, e.g. a basketball court turns into a market, a playground, a car park or a storage area.
Urban village spaces are characterised by a strong sense of dynamism, flexibility and movement, and reflect the instincts of its inhabitants and their resilience in inhabiting space.
Of central importance to the study of urban villages is how the morphology of these informal settlements affects urban life.
The urban morphology of these areas is composed of various elements including urban density, accessibility, functional mix and urban interface.
These villages have become urban and until recently there has been no governmental interest in observing them, so the approach of reconstruction by demolition of new buildings has been adopted, producing spaces that are not accessible to evicted residents.
Hehua Tang, an important urban village in Nanjing, is one of the most authentic residential neighbourhoods in the city, where it is still possible to study the layering of architecture from different historical periods.
It is part of the "Nanjing Historic City Conservation Zone"[5], representing the anti-development and anti-urbanisation settlement par excellence.
Until recently, however, it was distant from the ideals of the contemporary, market-oriented Chinese city and for this reason was in danger of being replaced and homogenised with the already reconstructed context.
In the national historical context, Nanjing represents a very important city, having been the capital of China for years.
It is located in the south and more precisely serves as the capital of Jiangsu province and is crossed by the Yangtze River.
The city is full of history that can be read very well in the urban fabric, there are ancient walls that still dominate the urban scenery and the old city, representing both the old defensive system and a cultural identity planted of people.
Contemporary development has helped fragment and complexify the urban fabric of the city.
New social and urban contexts have developed in the area, mainly a difference can be seen between the north and south of the city.
The more industrial and commercial area has developed in the north while the south has remained a more vernacular place where

5
Nanjing Urban Planning Bureau, p.50 p.58

spontaneous residential neighbourhoods have sprung up to cope with the growing demand for housing, each area reflecting precise socio-economic conditions.
In turn, the "old south town" can be divided into five different areas with different socio-cultural dynamics[6].
In the southernmost part of Nanjing, hidden on one side by the shadow of the Ming era city wall and on the other by the large road infrastructure known as Zhongshan road, lies Hehua Tang.
The area is one of the most densely populated, in fact the density of the old city south is 34,000 people/km^2 while that of the old Nanjing old town is 28,000 people/km^2[7].
These numbers are much higher when compared to other Asian cities, Beiging old town itself has 23,000 people/km^2[8].
Due to its proximity to the river and the resource it represents, the first settlement developed into the most prosperous part of the city during the Ming and Qing dynasties.
Its role as an urban centrality slowly faded with the advent of the People's Republic of China in 1949, becoming a low-income residential district.
Sanitation problems, lack of infrastructure, illegal land use and precarious buildings are open issues, an economically unstable population lives within these walls.
New design and planning strategies led to the current situation, the 1958 "Old City Reconstruction Plan"[9] threatened the loss of vernacular characters and the historical identity of the place, an identity created by the layering and overlapping of architectural and non-architectural elements.
The 1982 plan "Law of People's Republic of China on Protection of Cultural Relics"[10] brought attention to these disappearing areas of historical importance, but in practice it was not enough to slow their decline.
In fact, the traditional urban layout of the area was transformed, large mansions or fake Chinese-style buildings replaced the true essence of Nanjing.
Demolitions have characterised much of the last period, in 2003, it was estimated that 90 per cent of the old city of Nanjing had been rebuilt[11].
Again, in 2006, five historical blocks and hundreds of courtyards were obliterated[12].
It was not until 2012 that the "Nanjing Historical City Conservation Plan"[13] was approved, where historical districts were identified and classified in order to protect and preserve them, the plan included 3 different categories "Historical Cultural Block", "Historical Feature Block" and "Normal Historical Block".
But the plan essentially did not work as it was supposed to.
The tendency to rebuild in style has further damaged the real historical fabric, which has had to bow to mere tourist and economic causes that have commercialised the urban areas,

6
Ibidem

7
Ibidem

8
Beiging Urban Planning Bureau

9
Chiu-Yuan Wang, Between Flexibility and Reliability: Changing Planning Culture in China, TU Delft, 1st March 2015, pp. 187-205

10
Adopted at the 25th Meeting of the Standing Committee of the Fifth National People's Congress and promulgated by Order No. 11 of the Standing Committee of the National People's Congress on, and effective as of November 19, 1982

11
Nanjing Urban Planning Bureau

12
Ibidem

13
Ibidem

turning them into "neo-old districts" where it has been decided to demolish and then rebuild a modern and tidy copy without taking into account the needs of the inhabitants.
At present, Hehua Tang is the block with the most historical and cultural value, but within it a punctual demolition-reconstruction process has already started, which follows neither rules nor typology, and is often done illegally.
The phenomenon of urban marginalisation, also due in part to the physical and social phenomena within the walls of the district, is becoming more and more accentuated due to the increasing degradation within it, the lack of spaces and services, and also its location in relation to its surroundings.
The context itself exalts its marginality, enclosed between the old city walls and the walls of the block itself, an area obscured by the tall buildings to the north and threatening its integrity, an area that to the east again faces a wall: Zhongshan road created in 1992, which is a few metres above the level of Hehua Tang and is the cause of the definitive separation into two parts of the fabric of the old town.
To the west of the district we find modern Chinese-style reconstructions, where the citizens, however, do not congregate; these further exacerbate the gap between the real heart of the district and the park, although it too is surrounded by high walls.
Hehua Tang does not correspond to the ideals of a contemporary, market- and tourism-oriented city and for this reason it is considered a piece of town that needs to be replaced.
At first glance, one cannot grasp the vernacular character of the area.
The dilapidated condition of the buildings is visible everywhere, structures distorted by countless alterations to make them larger in order to accommodate more people.
New floors and small rooms sprout up on top of old roofs, symbolising a desperate need for space, in Hehua Tang in fact, the avarage living space per person is below the Chinese standard of $20m^2$ per person[14].
Small parasitic constructions lean against the old walls: kitchens and bathrooms are the functions the residents needed to build, functions to be shared by several families.
These structures are built in a very haphazard manner, often with metal sheets; they are brought outside so as not to sacrifice

My father used to be an employee of Nanjing Enamel Factory. This building was assigned to the employees of the factory. I grew up here, but I don't live here now. I'm here to take care of my father. The second floor in front of the building used to be a staff dormitory. There is no toilet in it. If it is reconstructed, I hope they can have a toilet and supply gas.

Retired employee, Interview with the residents of Hehua Tang, Wang J., Zhang, B., Mei Y., 2021

14 Ibidem

HUMAN

the little living space inside, this filling of the courtyards results in a decrease of outdoor space and complicates the typological interpretation.
Hygienic conditions are diminished due to this unrestrained use of every free space and the very poor quality with which residents modify and extend their houses.
The current population is a mixture of residents who have lived in the district for generations, who have rented houses from the government, and rural migrants who have rented their houses or single rooms from the original owners.
This has led to a fragmentation of the buildings, where previously only one family resided now there are at least three households.

> **I live here for five generations. I used to go to Hehua Tang Primary School, which is Hehua Tang Kindergarten now. I don't want to move out. I want to repair the old house. The house used to be like a garden, but it became terrible after it was added. But living here is comfortable, neighbours can chat when they open the door, unlike the buildings now. Moreover, most of them are old residents and few of them move out.**
>
> **Grandpa, Nail Family, 50 Years' Residence, Interview with the residents of Hehua Tang, Wang J., Zhang, B., Mei Y., 2021**

HUMAN

15 Ibidem

16 Ibidem

Seventy per cent of the houses[15] are owned by the state, which rents them out at a very low cost that people can usually afford, but at the same time it is difficult for the government to maintain an adequate state of repair because of this derisory price.
The dense fabric of hehua tang is composed of 39% old buildings, 43% buildings from 1980 and the remaining 18% buildings from 2000 onwards, these only 39% are in good condition[16].
The population is dispersed horizontally in fact one mainly encounters buildings of one or two storeys but every now and then unusual buildings of up to six storeys sprout up, some of which were built for residential purposes while others have changed from factories to residences.
The area that presents itself as a mainly residential area, however, reveals a vibrant soul full of frenetic movement.
Bicycles and mopeds constantly cross its small streets where citizens flock to shop or hang out.
The streets have multiple meanings in Hehua Tang: they are spaces for meeting, socialising and playing, places where people carve out small places to plant vegetables, put a cupboard of things, park their vehicles.
The shopkeepers take the goods of their small, improvised shops outside to the street, the residents, likewise, not only exploit the street surface but also the urban voids they create between the dense buildings; if you look up, you can see a multitude of colourful clotheslines lying in the jungle of exposed cables.
The façades of the houses, which frame the streets, are weighed down by window grills, air conditioners, goods and foodstuffs hung out to dry and much more.
Only a few streets in the district are wide enough for cars to pass through, the rest is made up of a network of pedestrian and motorbike streets, these chaotic, narrow streets still represent an important historical heritage
The urban dynamic in which they evolve constantly changes with the period, which means that spatial, economic, social and other changes often occur together and interactively.
In spite of the area's dilapidated condition, it has been taking on an increasingly high commercial value in recent years.
Its historical prestige and its strategic location under the ancient walls and its proximity to a large green area is putting it in the spotlight, making it an ideal location for future investments.
This is a benefit on the one hand and a threat on the other.
Urban redevelopment (or regeneration) is a vital component of the urban development process simply because cities tend to age and become physically and functionally obsolete, and thus economically.
Hehua Tang is beginning to lose its unique historical and cultural characteristics due to physical ageing and the loss of intangible culture.

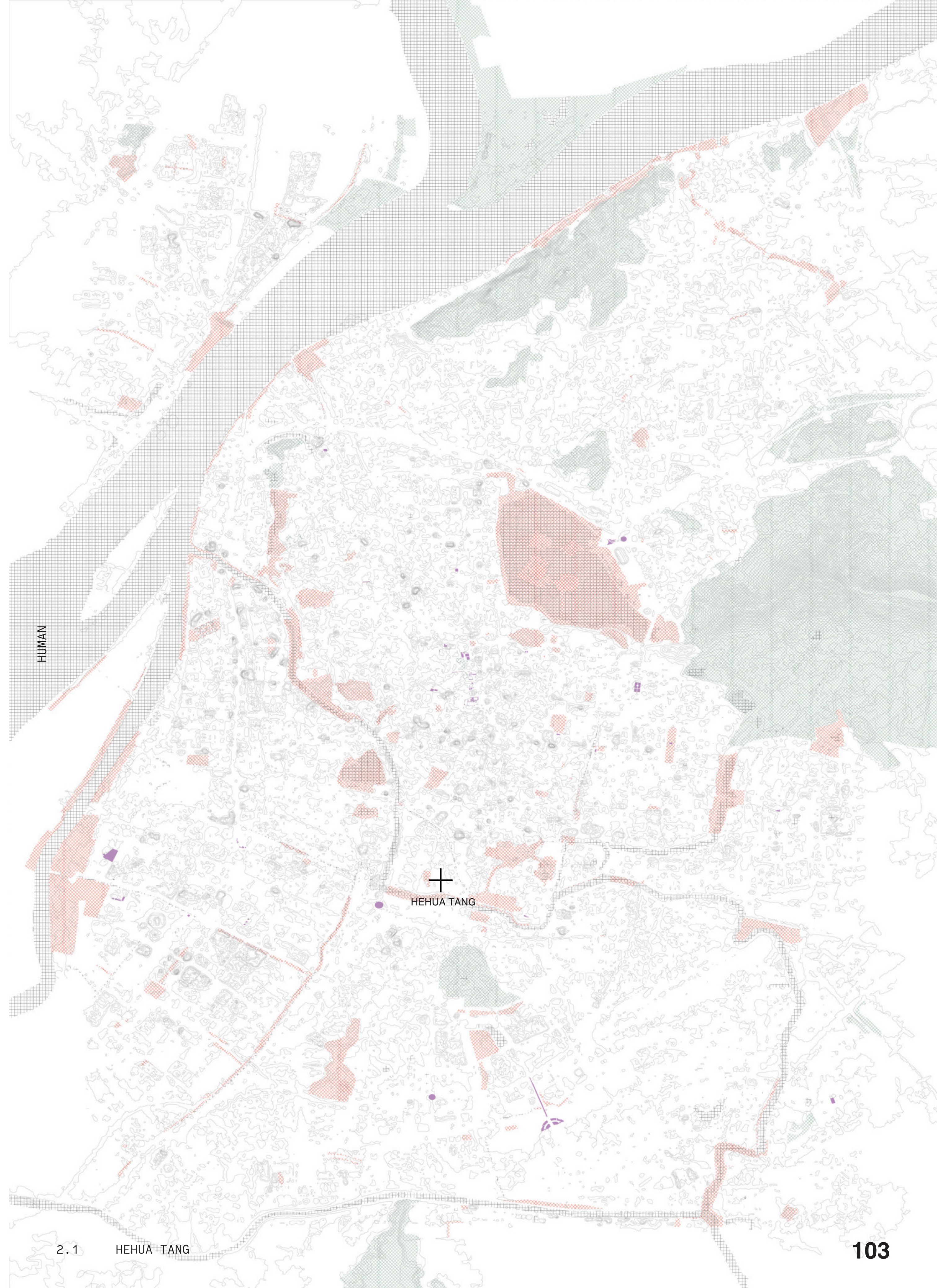
The risk, however, is that it will become a tourist and commercial place and lose its primary function as a residential area, somewhat like what happened in Laomendong, a similar district not far from Hehua Tang, where the percentage of residents after redevelopment dropped from 90% to 27%[17].
Despite its formal homogeneity, the urban fabric of Hehua Tang is the result of several layers.
Avoiding the construction of skyscrapers that represent the emblem of living in density, but re-proposing architecture where traditions and a more intimate dimension with the city are maintained is the current challenge.
Building typology and urban morphology are complementary elements and need to be studied and addressed together with Hehua Tang the courtyard house represents the cell of a complex but homogeneous city, in which the typology only takes on meaning when placed in its context.
The result is a system in which the two scales of typology and urban morphology cannot ignore each other.

17
Lei J., Morphological research of the historical urban boundary.The inner fringe belt of nanjing, Phd Thesis, Politecnico di Torino,2016

HUMAN

GREEN SYSTEM

The study of greenery shows the relationship between nature and the settlement system of Nanjing.
We can see how the Nanjing city walls represent a linear space in which the green system, starting from the north of Nanjing, develops, generating spaces of varying sizes.
Thus enters this study with Hehua Tang, which by being in relationship with the city walls comes into contact with the green system, a design element.

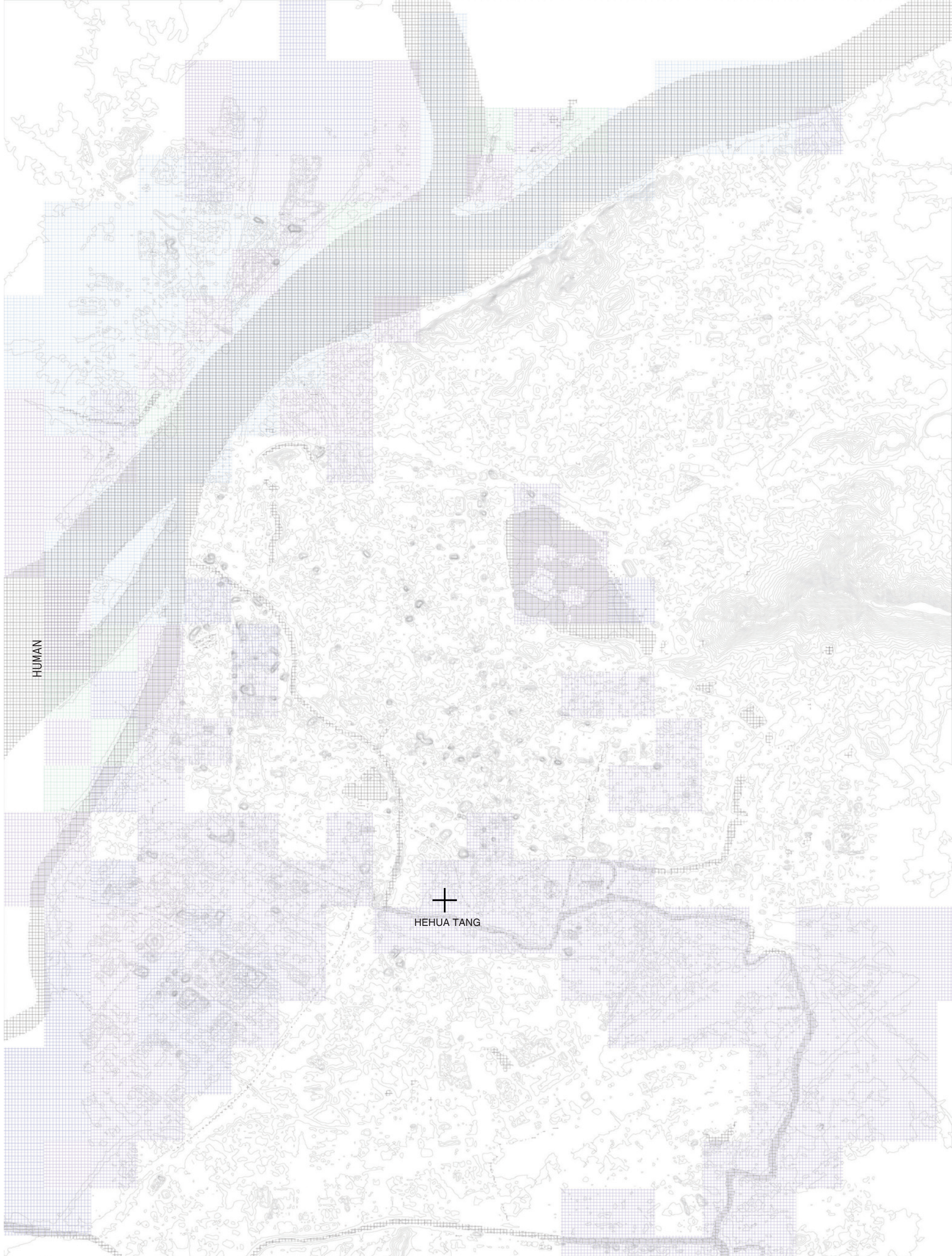


GREEN AREA
FOREST
RIVER
PARK

0 1 2 3 5 km

FLOODS SYSTEM

Although it has not been the main theme of water, the study of flooding shows how the degradation of rivers will lead to flooding phenomena in cities in 2050.
Looking at the map, we see how the entire Hehua Tang area will be subject to flooding phenomena.



2050 FIOOD FORECAST 35 CM

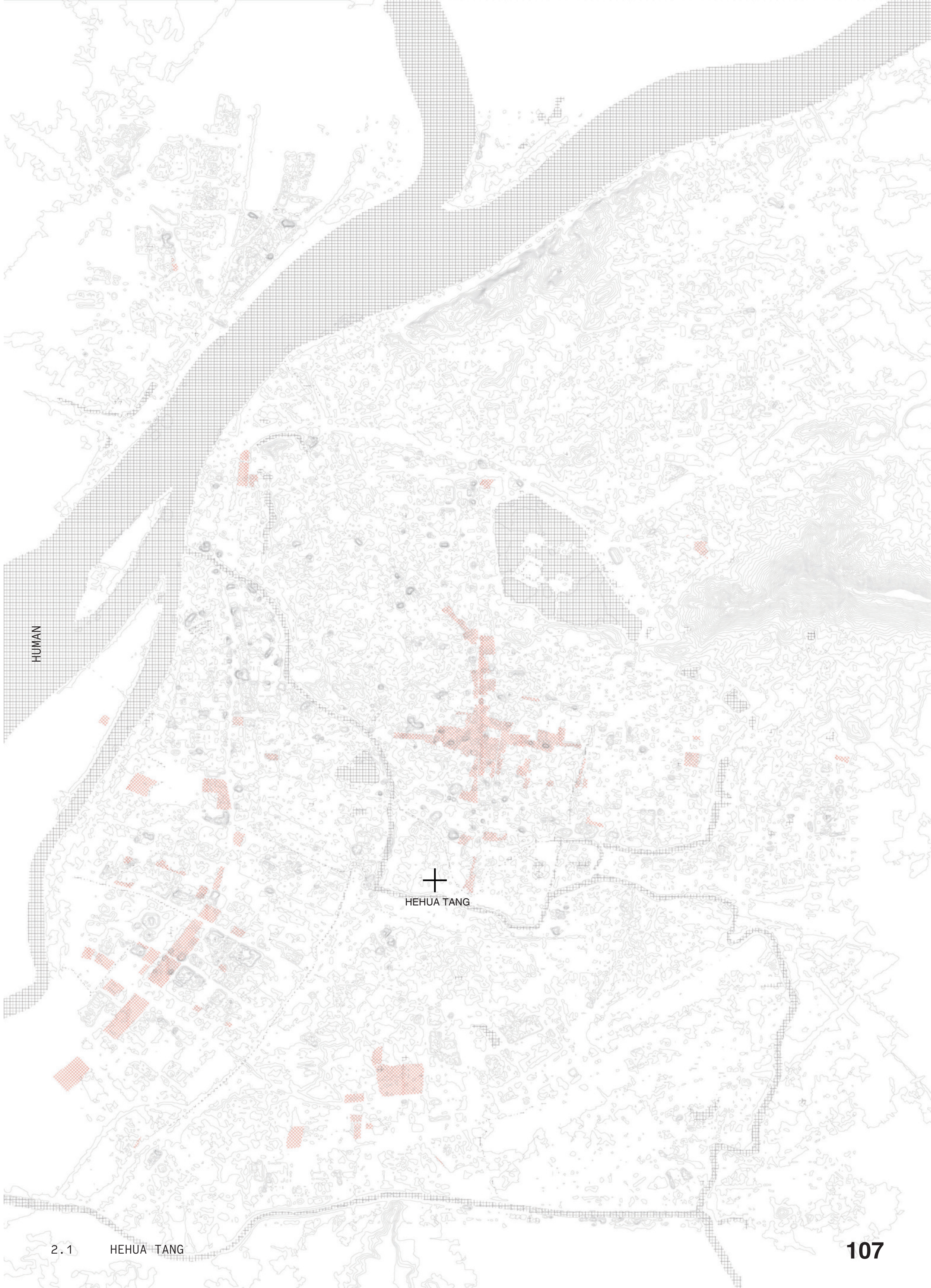
0 1 2 3 5 km

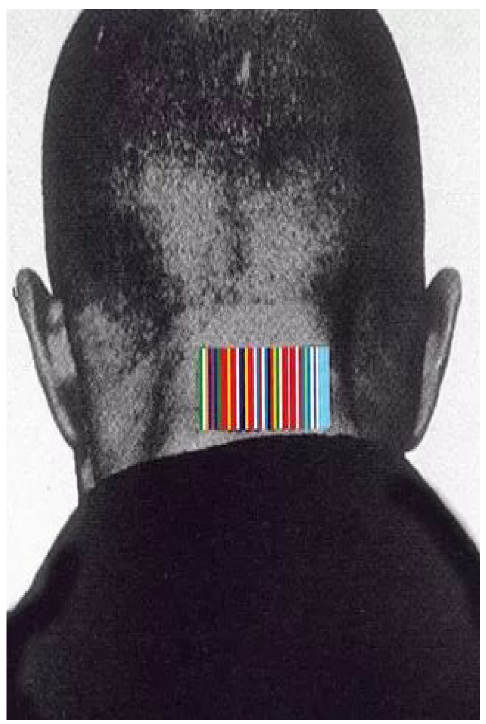
COMMERCIAL SYSTEM

Hehua Tang represents the history of Nanjing, the part of the city that has not undergone the major urban transformations compared to the city center.
The study of the commercial areas, however, shows how, being in axis with Zhongshan Road, Hehua tang comes into contact with it.
Thus the relationship between Hehua Tang and and its commercial system in connection with Nanjing becomes an element of study.

COMMERCIAL AREA

0 1 2 3 5 km





2.2 HYPERTYPOLOGY

HUMAN

In cities, buildings have evolved over time and with the cultural context, architectural activity is closely influenced by the demand of the reality of the moment.
Type, in this context, represents the basis of the identity of a place. From the notion of type in architecture, one can infer a way in which society transmits, through the mediating work of the architect, its cultural achievements that through a form leave a trace in history.
Spaces are created to accommodate human activities, so that in order to pursue a better quality of life, the physical environment needs constant change to meet evolving human needs.
However, many cities currently suffer from a typological crisis, with conflicts between the old and the new and the abandonment of local, social and cultural values.
This often leads to a loss of a sense of place due to mass production and the internationalisation of design, technologies and materials, resulting in universal architectural solutions and monotonous urban models.
In some cases, the past has been idealised as the only valid cultural identity and has triggered the search for and reinvention of a lost tradition.
Today, identity expressed through the use of traditional style is seen as a defence mechanism against the domination of globalisation identity.
We therefore wish to investigate the reciprocal relationship between cultural identity and how it affects the built environment, for as Baudrillard[1] argues, architecture is a storyteller, and its narrative provides the basis for understanding identity.
It follows that cultural identity is a process of meaning-making that consolidates past traditions with contemporary conditions and desires.

1 Baudrillard J., Mass Identity Architecture: Architectural Writings of Jean Baudrillard, Wiley-Academy, 2003

When it's necessary to create something new, to convince an invention of the future, then paradoxically only one thing is avalaible to the architect: the past.

Emanuel Christ and Christofer Gantenbein-Review n.II typology

Several identities can coexist at the same time, representing different groups in society.
Architecture and the built environment constitute some of the figures in a cultural space produced by individuals, groups and institutions to satisfy certain needs and requirements based on culturally accepted and desired common ideas.
Zavalloni uses the term hyper-identity to "characterise groups as the sum of all the representations produced about them"[2], he believes that the concept of hyper-identity allows us to see the changing nature of cultural identity.
The study of typology in the transformation processes of urban form can help mitigate the loss of sense of place, to the benefit of people's life satisfaction.
Considering the role of the physical environment in satisfying people's needs and aspirations and creating opportunities for human interaction, it is necessary to pay attention to the impact of different spatial relationships offered by different housing typologies over time.
The concept of typology proves to be a fundamental tool for understanding settlement principles and working on fabrics, on the relationships between architectures within a known and recognisable structure, describable and therefore progressively transformable, so that the impact of new design proposals can be assessed in advance.
The typological study is able to give us maps Maps are objects of study that come from the past but are indispensable for the future redesign of the urban lanscape
Type-morphology represents the union of two disciplines, architecture and town planning,
The study is carried out in parallel on the relationship between architecture and its distribution in urban space.
The type-morphological approach first appeared in France in 1982 in a short essay by Cestex and Panerai.
The Italian school developed this concept of typology thanks to Saverio Muratori (1910-1973) and G. Caniggia (1933-1987) during the late 1950s; "recognising urban structures is a condition to operate on cities" is the strategy adopted by architect Caniggia.
The study of traditional Chinese urban form is a more recent study compared to Europe, as China is currently seeing phenomena such as rapid urbanisation, population mobility, which developed in the 1950s in Italy and Europe.
Typological interpretation comes to the rescue of vernacular architecture, which is in danger of being wiped out to make way for skyscrapers or new buildings in mock Chinese style.
Caniggia and Muratori, for example, were the architects of the preservation of many historic buildings and neighbourhoods that were about to be demolished, as is now happening again in China.
In recent decades, most, if not all, Chinese cities have

2
Mahgoub Y., Hyper Identity: the case of Kuwaiti architecture, Archnet-IJAR, Volume 1 - Issue 1, March 2007 pp.70-85

experienced or are still experiencing urban sprawl and many traditional buildings have been replaced and hybrid areas created.
This process is so fast and complicated that it is not easy to analyse it; the contemporary urban landscape is the set of components that have appeared in the city that have played a certain role and transformed over time.

We cannot design a building without considering the city. We cannot talk about the city without keeping in mind its architecture and its buildings.

Aldo Rossi - The architecture of the city

The typological study as it has been done in the West cannot also be done in China, the strategies and methods used by human settlements to incrementally change a set of buildings and spaces change from one period to another, from one place to another, from one culture to another
One must therefore consider the specific conditions of Chinese cities, e.g. in the West the square is the public space par excellence while in China the streets are the protagonists.
In China, the historical features are not clear and visible as they have been changed and hidden by years and years of stratification, expansion, demolition and punctual reconstruction.
Behind every change, however, there are causes that can be political, social and economic, the latter being analysed by the 'Transitional Morphology' study set up in 2018 by Soth East University in Nanjing and the Polytechnic University of Turin.
The aim is to investigate these dynamics and return a graphical data represented by typological maps where the change of the city over time can be studied.
This approach becomes particularly difficult when studying a Chinese city as there are no complete maps to support the study one must therefore act by interpolating a series of documents, maps, photographs, narratives and the site survey.
For the investigation of Heua Tang, the Transitional Morphology team made use of two hard-to-find documents: the cadastral map from 1936 and aerial photographs from 1939.
Originally the fabric was quite different, in 1929 the fabric was homogeneous and compact consisting mainly of one- or two-storey courtyard houses.
As early as 1978, the progressive fragmentation can be seen, and in the 2017 map, the inclusion of anomalous 5/6-storey buildings in the fabric that did not follow the settlement criteria of Hehua tang is clear.
Cities are extremely complex objects to read morphologically.
The reading of the Chinese urban fabric can be carried out through 7 elements[3]: general plan, silhouettes, street networks, urban block, public spaces, public buildings and houses.
Thanks to the first element one can immediately begin to read the

3
Chen F., Thwaites K., Chinese Urban Design, The Typomorphological Approach, Ashgate, England, 2013, p. 65

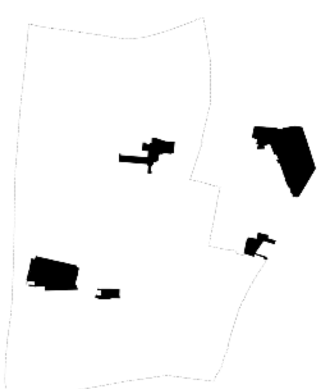
CONSTRUCTION SYSTEM

This map studies the full fabric of Hehua Tang, all the buildings that are part of it and their dense relationship to each other, this exercise makes the different types of fabric immediately clear, both historic architecture and new buildings cge modify and distort the original fabric are recognizable.

COURTYARD SYSTEM

Interior courtyards represent a typical element of Chinese houses, over time their form has complexified to house new constructions that have appeared within them. Their function is manifold from parking to laundry, place to plant greenery, kitchen and more.

VOID SYSTEM



The fabric of Hehua Tang is very dense in fact urban voids are very rare. The few that are encountered are parking areas or the areas between large multi-story buildings that compared to the historic fabric are built with more distance between them.

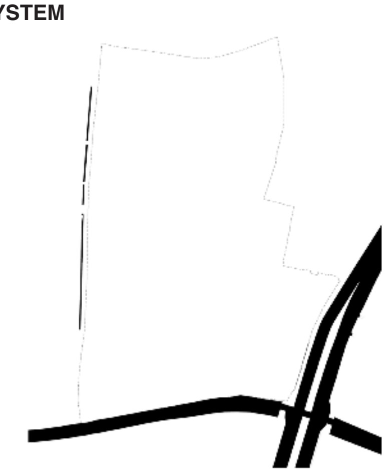
PROPERTY BOUNDARY SYSTEM

The systematization of property boundaries is a useful reading for understanding where to go to act in the future project, often these boundaries represent small roads or passages leading from the road to the various units

PARASITE SYSTEM

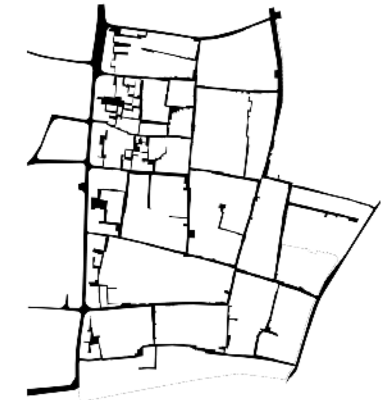
The needs of citizens have led over the years to the emergence of a series of small buildings leaning against the original. Often they are bathrooms or kitchens otherwise if larger in size they are real extensions of housing units.

WALL SYSTEM



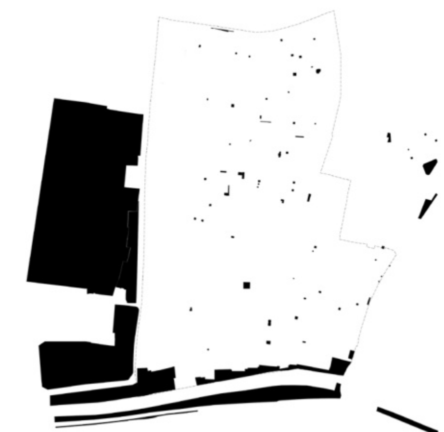
The walls that enclose Hehua Tang are different in extent. To the east the wall is represented by the road infrastructure 2 meters above the neighborhood elevation, to the south Hehua Tang is enclosed and hidden by the high historic walls. To the west we again face a wall, the one that encloses the park.

STREET SYSTEM



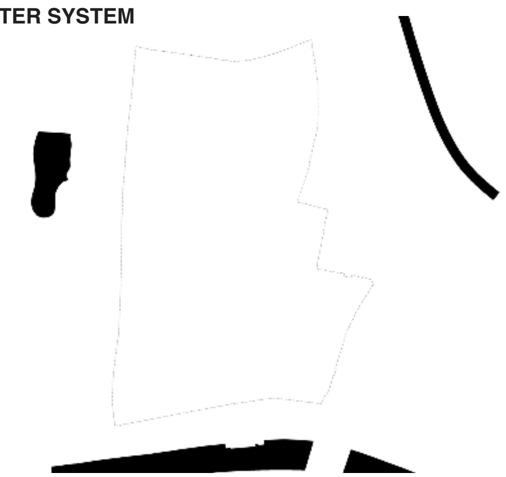
The roads in Hehua Tang are of various hierarchies. The main ones are few and are the only driveways, the others are secondary roads that can only be traveled on foot or by cycles and motorized vehicles, becoming more and more articulated until they enter the private courtyards of the housing blocks

GREEN SYSTEM



The system of greenery within the fabric of hehua tang is very sparse and represented by a few solitary trees in the various private courtyards or the fallow greenery under the walls. Outside, the district is surrounded by greenery with a large historic park and all the riverside greenery beyond the walls.

WATER SYSTEM



The water system is developed outside, near the area, to the south, in fact the river also flows to the north, albeit a much smaller one. Also in the heart of the park dominates a pond surrounded by rocks and bamboo.

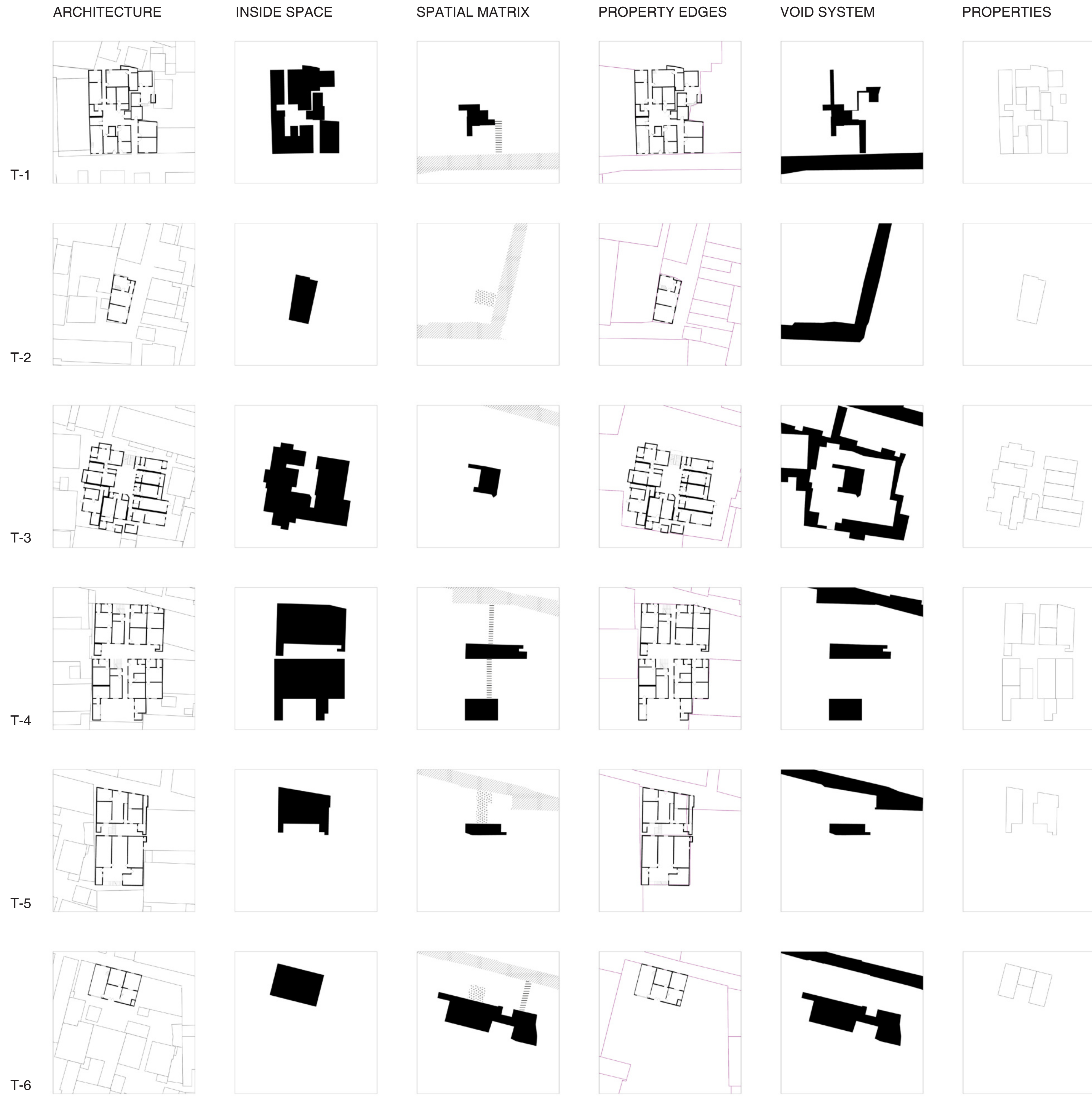
alignments the edges, the dimensions, the shapes and the density of the area, while thanks to the silhouette one can compare the sky-building relationship, this in Hehua Tang has changed a lot, albeit to a lesser degree than in its context, in just a few years tall and punctiform buildings have begun to appear, towering in the skyline of an area where mainly one or two storey buildings are found.
The streets are of a different nature, only a few of them are accessible by vehicles, the rest of the street fabric is composed of two other types of street hierarchies, the secondary one runs perpendicular to the first and these streets are either pedestrianised or passable by cycles and motorbikes.
The third type of road represents a more private type of distribution, in fact it is used to enter and lose oneself in the compact fabric of courtyards.
In addition to the important role of circulation and distribution, the streets take on a public space value as a place at the heart of the life of the neighbourhood's citizens.
The urban blocks are oriented mainly along the north-south axis and vary in size between 8 and 15 metres[4] in depth, while the width varies according to the courtyards.
The block is enclosed to the outside either by the buildings themselves or by walls enclosing the courtyards, and the dynamics within them are reminiscent of small-scale city phenomena.
Public space is accessible to all, unlike the plot, it is rare in Hehua Tang and where there is it tends to change function throughout the day, the street becoming the element that mainly embodies this role.
The state owns and maintains it, making it accessible to all, and usually residents tend to shape it to suit the functions they most need.
Public buildings in the district are in a clear minority compared to the private houses that represent the true essence of the residents.
The buildings in turn, although in their diversity, follow common rules and principles and can be told by elements such as cities, in this case we are going to decompose Chinese civil residential architecture mainly into 4 elements: structure, masonry, roof, courtyards
Typical in Chinese architecture is the use of the curtain wall that delimits the rooms, leaving the structural task to the extensively decorated wooden supports, generating individually legible architectural elements on the outside.
Walls do not have a structural function but perform the function of closing or partitioning the space.
The openings in the walls denote the introspective character of the architecture in fact the windows are almost never placed towards the street but face the courtyards and in those few that do not follow this rule, heavy grilles are applied.

4 Cosentino A., Cavaglion E. G., Colombo Z., Zhaowan W., Hehua Tang, lettura di un quartiere storico cinese, ripensare la relazione con la Zhongshan, Politecnico di Torino, 2017 p. 34-55

HUMAN

5 Ibidem

Contemporary western architectural practice involves surrounding buildings with open space, forming part of the property, in contrast traditional Chinese architecture is characterised by buildings or complexes of buildings that occupy the entire property, enclosing open spaces within them.
The inner courtyards are a strongly characteristic element, becoming the main place for cooking, washing and hanging laundry, growing vegetables and many other activities.
The entrance to these areas occurs differently from type to type, past the entrance one either arrives directly in the courtyard or one comes across narrow passages that cross the buildings and reach the courtyards linking them together, sometimes with strange paths between the original historical fabric and the parasitic architecture.
The typical curvature of Chinese roofs is still visible in a few houses, but very often in the area under consideration the inhabitants have destroyed part of the roofs in order to gain an extra storey.
Hehua Tang is a fabric in continuous transformation in which the ancient fabric is still preserved, a manifestation of a continuous evolving tradition; if we look closely we recognise a series of historical and non-repeating typologies in the fabric of the city.
The courtyard houses, also called Tianjing houses represent the true vernacular typology of Hehua Tang and Nanjing, they are composed of a sequence of buildings and their courtyard, the number of courtyards could change from 1 to 5 depending on the social status of the owner, usually Tianjing houses were composed of 3-5 structures and 2-4 courtyards[5].
At one time the courtyards of houses of this type had a hierarchy in that the one closest to the street was used for receiving guests, entering the system one encountered larger buildings which were those intended for the older generations of families, the last building was reserved for services and in the case of wealthy families was intended for servants.
These Tanjing houses were all built next to each other and only a narrow passage separated them.
The internal distribution between the various courtyard houses is via narrow corridors that can cut into a block centrally or lean to one side of it, there is also the case where there is no such corridor but one enters the various courtyards with direct access from the street.
The compact courtyard house, on the other hand, is based on a single courtyard that can take different forms.
The most common are the I, L, and U shaped ones.
The I-shaped ones are characterised by a rectangular courtyard surrounded on three sides by walls and on one by a rectangular building of the same length.
The L-shaped type has a rectangular courtyard enclosed by walls



TYPOLOGICAL MATRICES

The typological matrix reconstructs and places on the same plane the various spatial conformations that result as manipulations of the original typology.
For each spatial situation, a 6-step reading is made that allows observing more aspects more phenomenologies generated by a given spatial configuration.
T-1 Here the courtyard system is located within the dense fabric and relates to the main street via a secondary access system
T-2 Here the court system becomes enclosed and is directly connected with the main street system.
T-3 The architecture here is imposed as an object divorced from the dense context, generating a central courtyard system within the plot
T-4 The typology in question represents a recurring spatial arrangement in Hehua Tang. An entry point on the main street generates a series of courts threaded by a secondary street system
T-5 The courtyard is generated behind the building creating an internal crossing that allows entry to the rear
T-6 here a complex court system within the dense fabric is served by an enclosed passageway connected to the main street system

on only two sides but the buildings are perpendicular to each other, creating a shape reminiscent of the letter L.
The U shape, the most common in the area, presents a small courtyard enclosed between three buildings and with a wall on only one side, the latter side may in turn be occupied by a fourth construction.
Multi-storey buildings are residential blocks ranging from 4 to 6 storeys with stairwells or lifts inside.
They are completely out of scale with respect to the context despite often following its rules and alignments in plan.
Industrial buildings are atypical of their context with exaggerated shapes and dimensions.
They are now an obsolete and degraded character due to their abandonment.
The shops are small grocery shops, small restaurants, and trading establishments that take up space on the ground floor facing the street of existing buildings.
Seventy per cent of the perimeter of Hehua Tang is occupied by commercial activities[6].
The informal additions often turn into those small parasitic architectures that attach themselves to the historical building altering its original form, are dilapidated and built with poor materials and fill up the courtyards affecting the spatial matrix of the courtyards and streets even though there is a tendency to almost never invade this space considered a place of social interaction.

6
Ivi, p.65

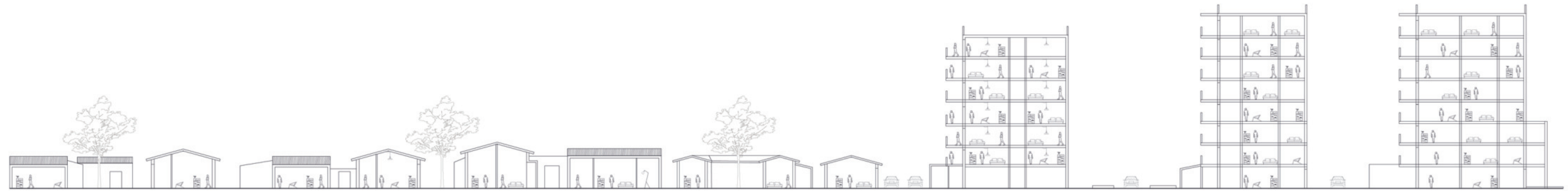
A theory that interprets the building landscape in relation to location, time and scale in order to inderstand the production and trasnsformation process of urban form and to guide quality design practice.

Chen, F. and Thwaites, K. Chinese urban design: the typomorphological approach

The subject of hyper-typology investigates not only aspects such as time, place and culture; it also studies a fourth dimension, which would be change and the tool to be applied.
A method of study and design to arrive at the final product considering all aspects.
According to the American Heritage Dictionary, hyper means "existence in more than three dimensions connected and arranged non-sequentially".
Similarly, according to the Treccani dictionary ìperî represents a prefix of words derived from Greek, with the generic meaning of "above, beyond".
It is especially frequent and productive in the learned language and in scientific terminologies, to denote (in adjectives and nouns) quality, quantity, conditions in a higher degree than normal.
Greg Lynn, in the 1990s, launched the cry to "bend architecture", during this period Lynn embarked on the software study of digital animation, redefining architectural production and the designer's relationship with the generative process.
Lynn's open approach was defined in 2000 by philosopher Brian Massumi as "in-folding", i.e. making the design process "not so much an external conduit for the artist's creativity" as "a conduit for the creativity of the design process"[7].
Lynn showed how the design process evolves decisively by integrating external constraints, converting them into internal growth factors, bending them to its self-generative activity.
Embracing the intrusion from outside creates a flexible process that exploits external constraints to vary its results, to creatively diverge.
Both in terms of internal arrangement and outward reactivity, the process involves more fundamentally a composition of relations than of forms or elements of form.
Extraneous constraints become positive opportunities for growth.
This is a welcoming approach to design, one that constitutively accepts what is outside its control, tending from the outset towards productive engagement.
The prototype is its own abstract reality that becomes architectural. The prototype is not an already architectural object of a certain type waiting passively on the screen to be realised in steel, it is already actively real and still in the making: it has the virtual reality of what one might call a hypertype[8].
We want to investigate the relationship of the contemporary architectural paradigm labelled as digital, parametric or morphogenetic with the living.
Tools and technologies play a considerable role in bringing the new potential to the surface, playing a profoundly significant role in driving innovation.
Just as Vitruvius' Ten Books on Architecture were painstakingly transcribed for his successors, the engines of the Renaissance benefited greatly from the inventors of printing.
Today, both digital and biological technologies offer potential for designers, who are directed towards many different aspects and dimensions of architectural practice.
The evolution, the hyper-typology, the pro-reality of the design entity make it necessary to talk about the design process that encounters its discipline as its exterior and is internalised as part of its continuous variation.
A project is thus constituted in which the typological study, an analogical element, generates the code of the new design process and highlights the external variations that are to be taken into consideration.
The typological tool is then inserted into the digital space with the BIM flow, becoming the basis for the new architectural overlay.

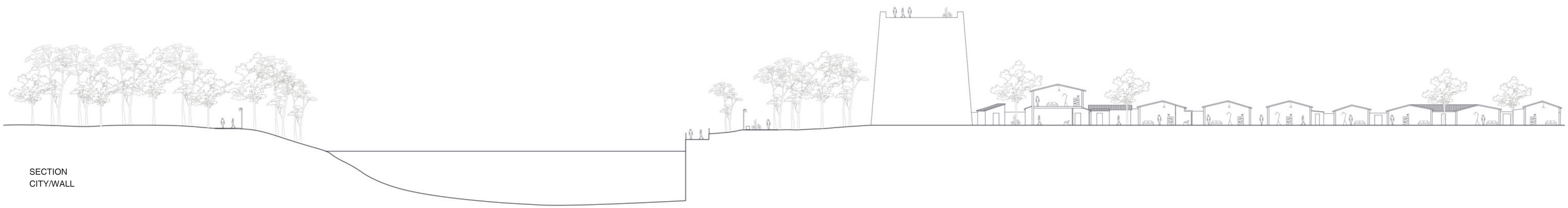
7
Massumi B., Becoming Architectural: Affirmative Critique, Creative Incompletion, The Innovation Imperative: Architectures of Vitality, January/ February 2013, pp. 50-55

8
Ibidem

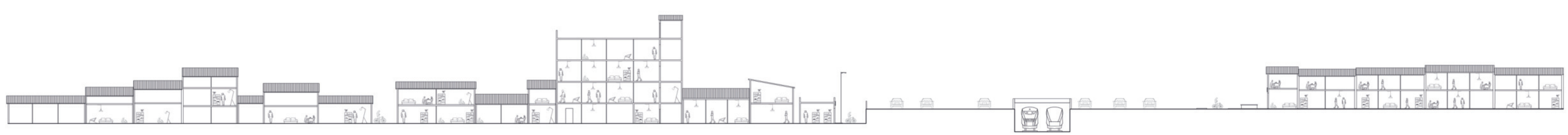


SECTION
CITY/NEW URBAN SETTLEMENT

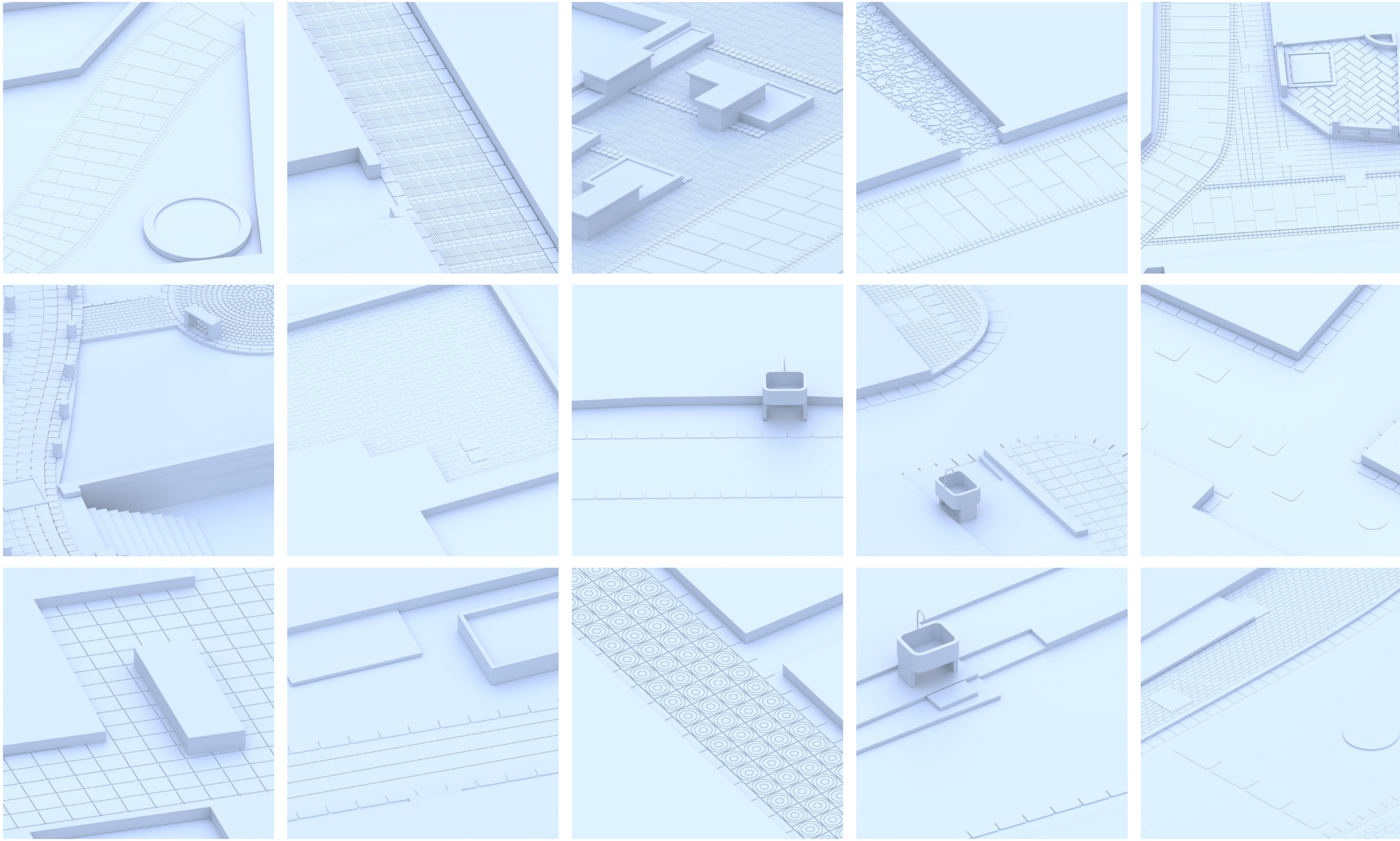
SECTION
CITY/PARK



SECTION
CITY/WALL



SECTION
CITY/ZHONGSHAN ROAD



The plate becomes in Hehua Tang the physical support of social space for the community, which will become one of the key themes within the project.
The redesign repurposes 15 pavement fragments that allow us to reconstruct the complexity of Hehua Tang's street system, which is constituted as a distributive and collective space at the same time.
We can see how the streets of Hehua Tang are composed of multiple patterns that draw spaces of varying nature and privacy.
The street shows a superposition of layers generated by human settlement in the space.

HUMAN

MADE IN HEHUA TANG

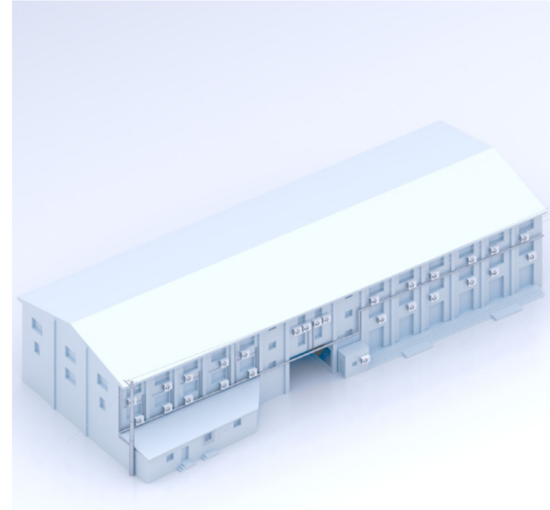
INSTRUCTIONS FOR USE

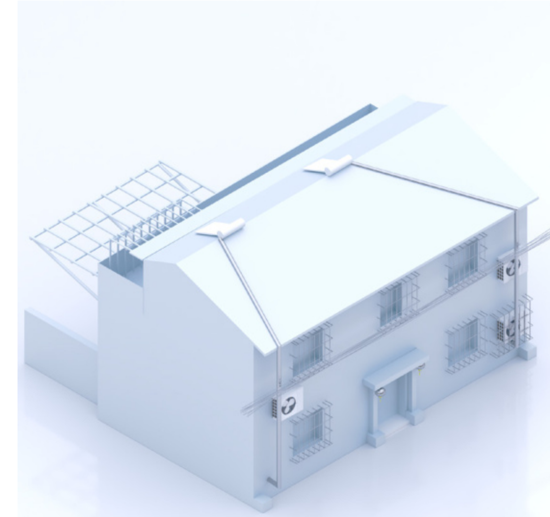
This collection represents the city of Hehua Tang, its true nature.
Within the fabric, buildings that represent spatial and functional peculiarities were selected, those buildings that represent the rule but also the element of inequality.
Thus 15 architectural samples are extracted and exhibited individually, creating a technical and typological sheet for each building.
A Tang Hehua is thus depicted in which architecture is an element in close contact with human life, which modifies it and temples its uses of space.
In an apparently "abandoned" city we see the conformation of unique architecture, spaces and functions that make the streets of Hehua Tang full of life.
The goal of the analysis is also to investigate the typology and its various spatial transformations, reconstructing what can be called the identity card of Hehua Tang.
Thus, a reading code is defined that allows the classification of buildings pandering to their spatial criteria:
A -The courtyard house
B- The compact courtyard house
C- multi-story buildings
D- stores
E- industrial buildings
F- single courtyard building passing through
G- agglomeration
The reading also brings to light informal additions understood as those small parasitic architectures that attach themselves to the historic building by altering its original form, often dilapidated and built with poor materials
With this reading of Hehua tang we are not trying to return a postcard of the neighborhood but rather researching the logic of the city's form and its development.
The intention is to learn from the existing without neglecting the device and how citizens use architecture.

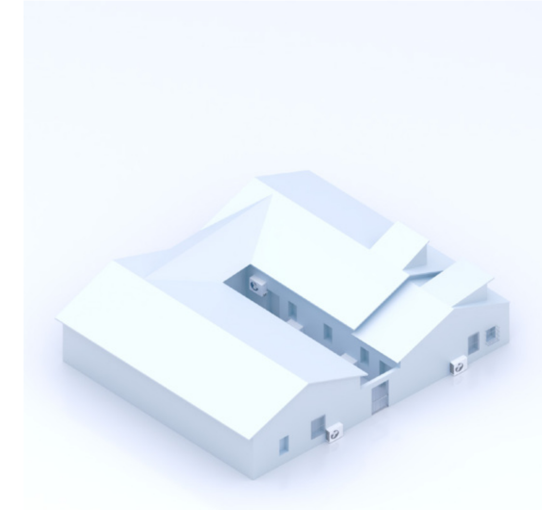
HUMAN

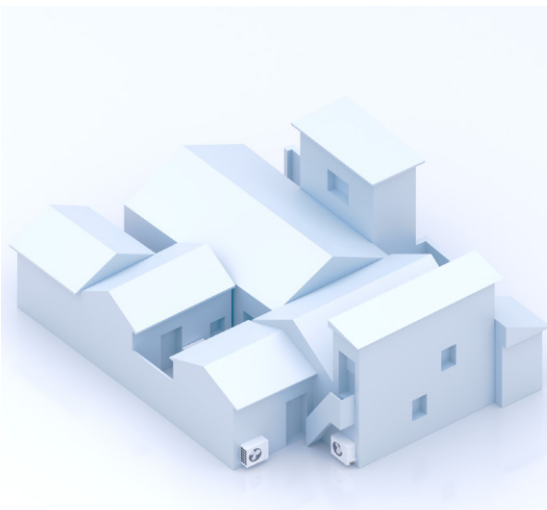

C.1


C.2

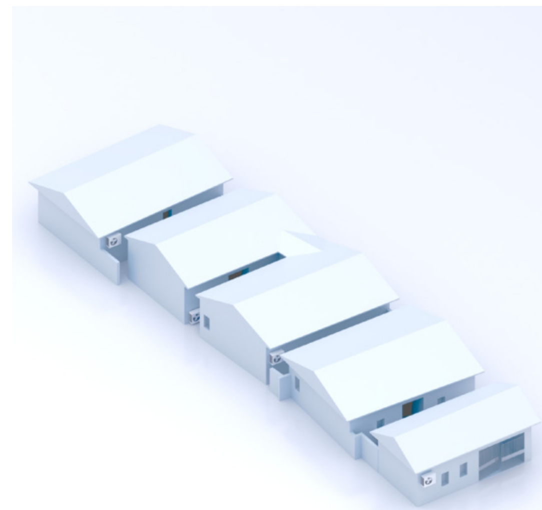

E.1


B.1

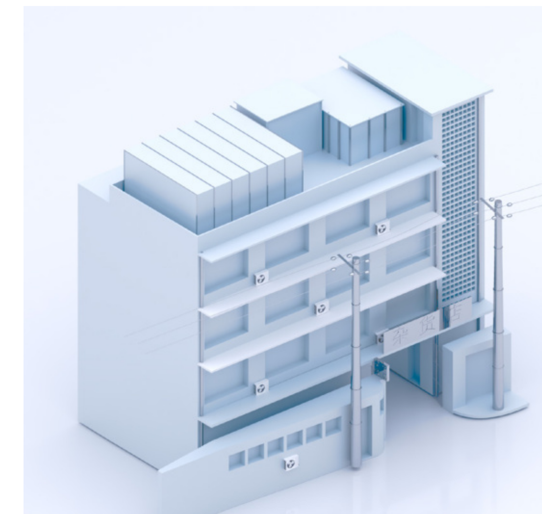

B.2

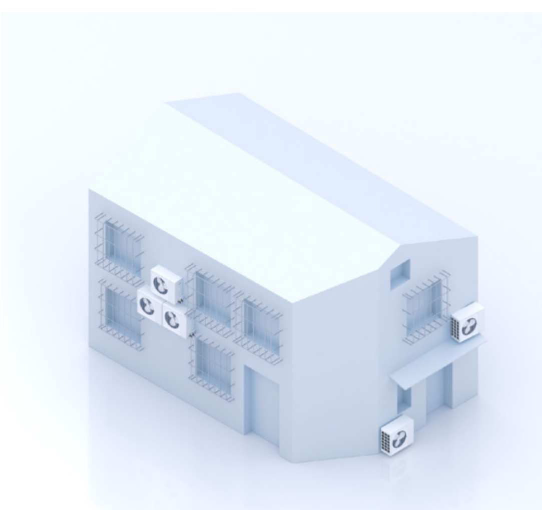

G.1

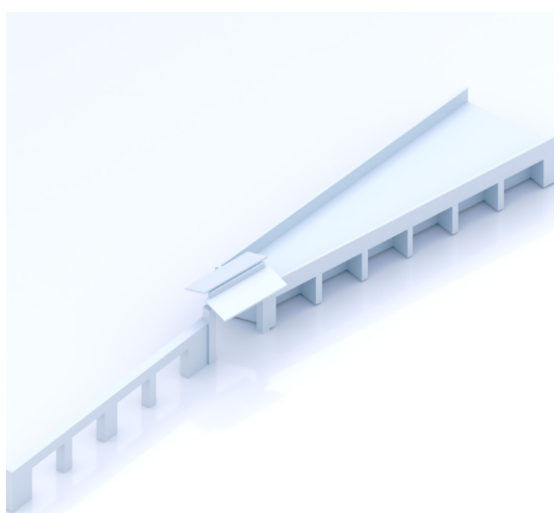

B.3

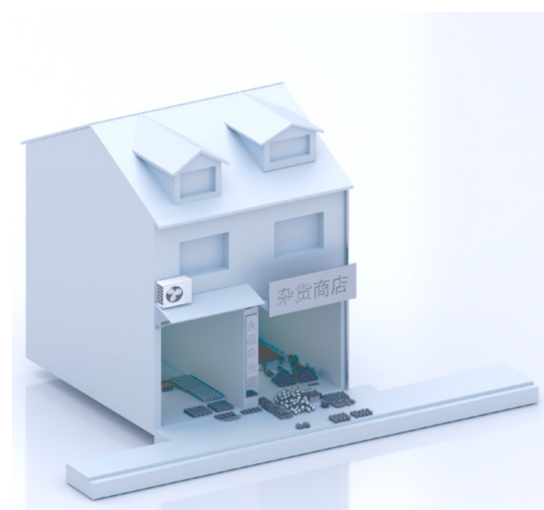

A.1

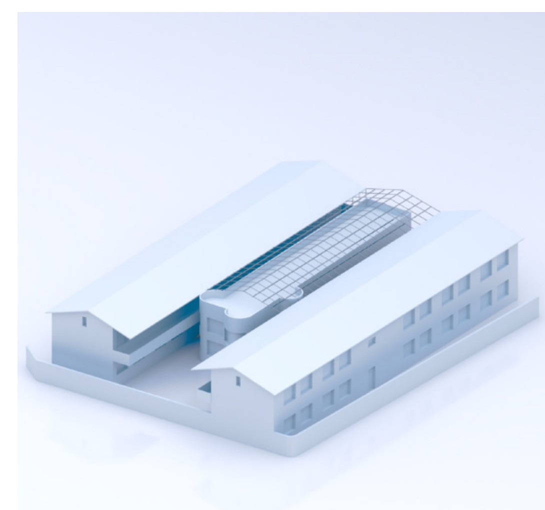

C.3

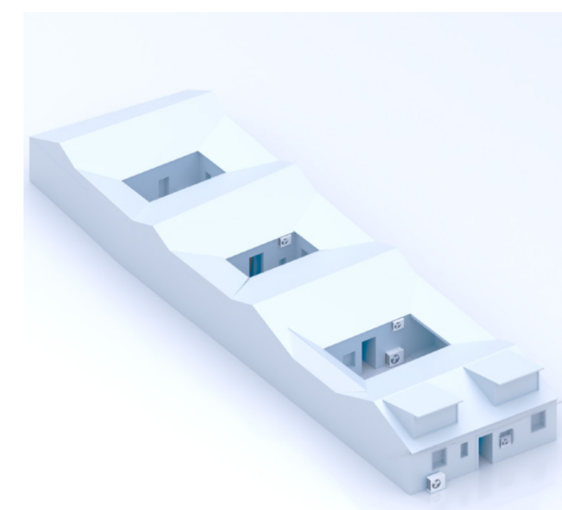

C.4


B.4

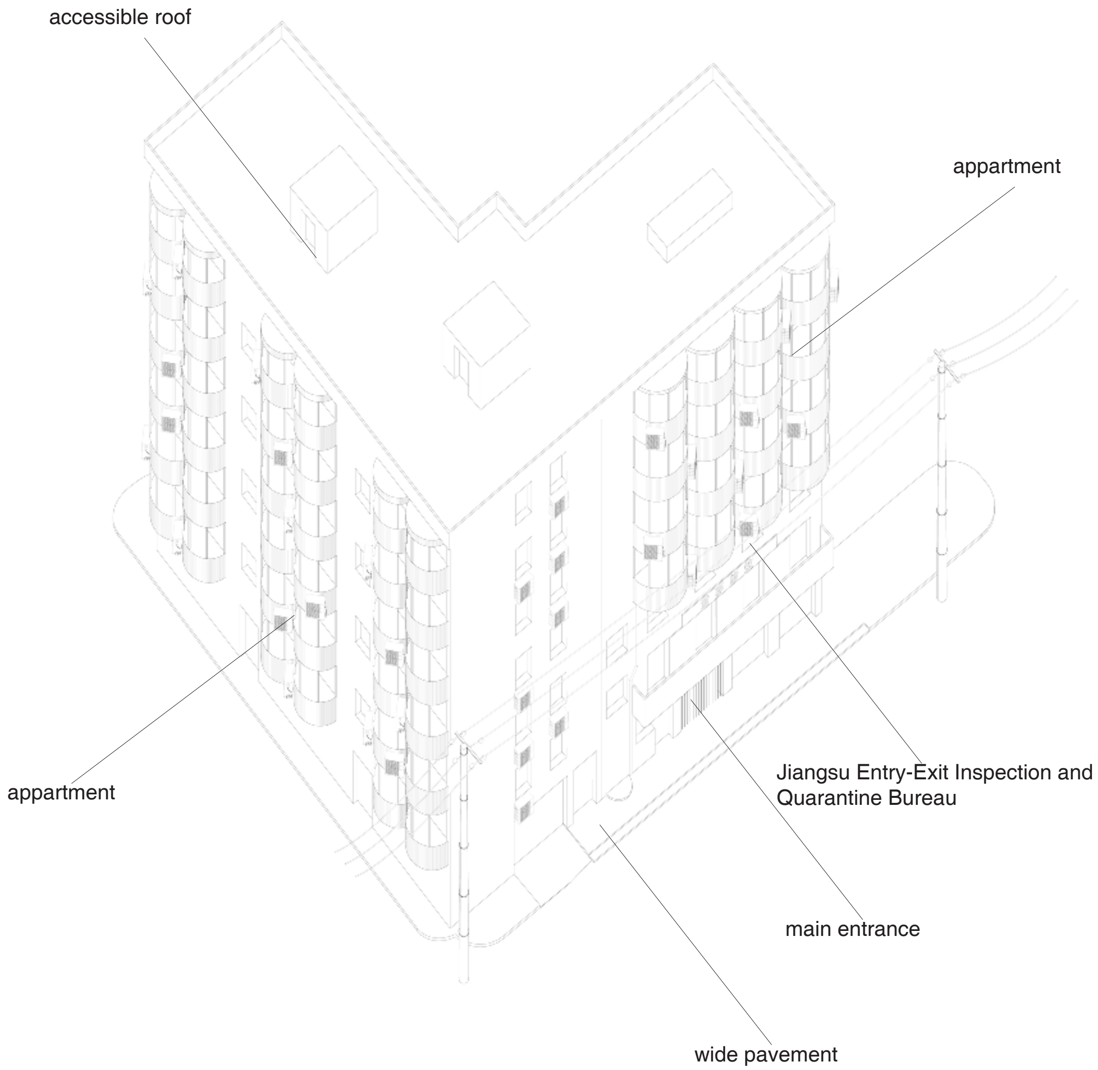

D.1

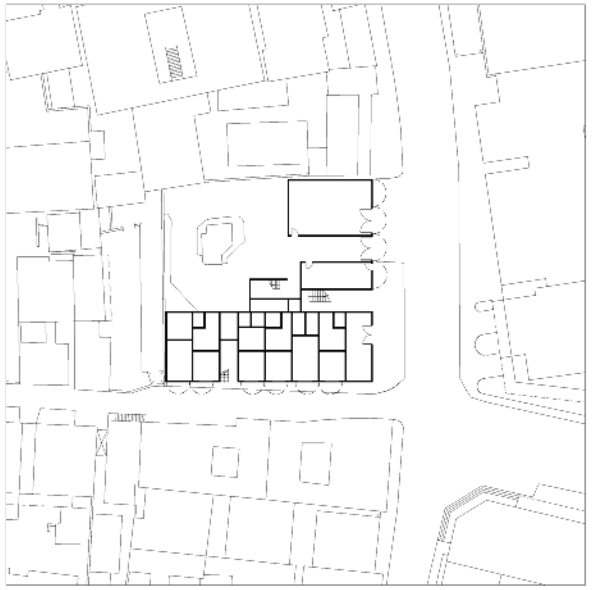

C.5


A.2


B.5

C.1



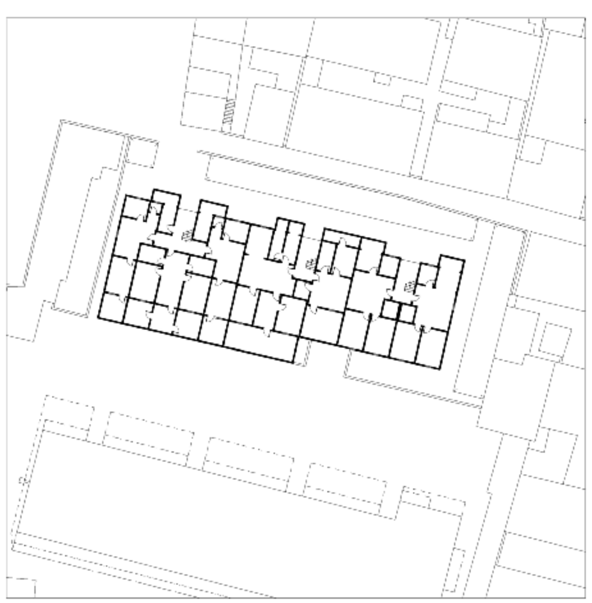


Multi-Storey Corner Building

Funcion: Housing, Office
Site: 39 Shuizaian
Concrete structure

7 floors,
1F (4 units in total) is a public enterprise, accounting for 14.3%
2 households are self-managed public housing, accounting for 7.1%
22 households are private houses, accounting for 78.6%
Large courtyard at the back

C.2

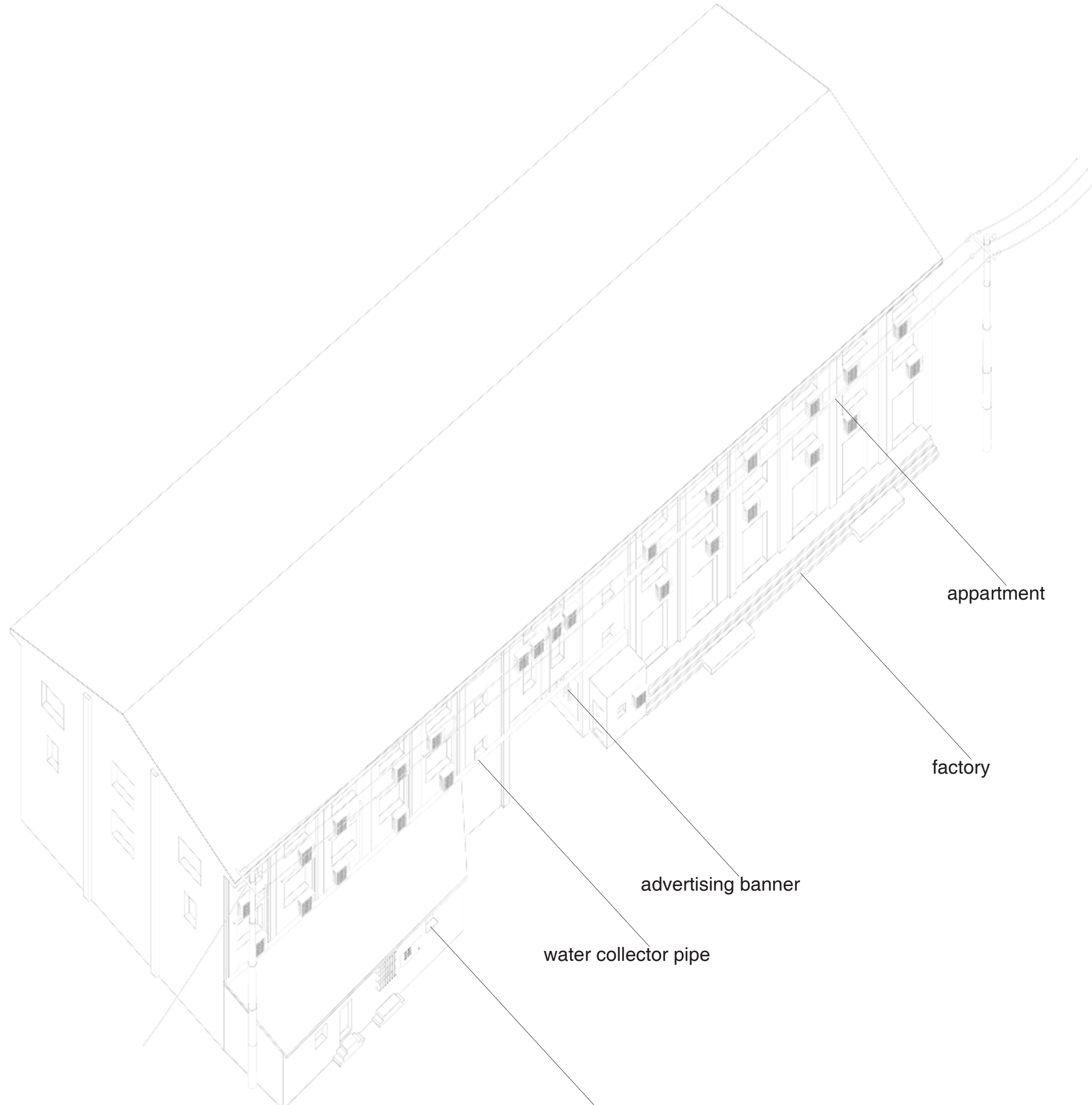


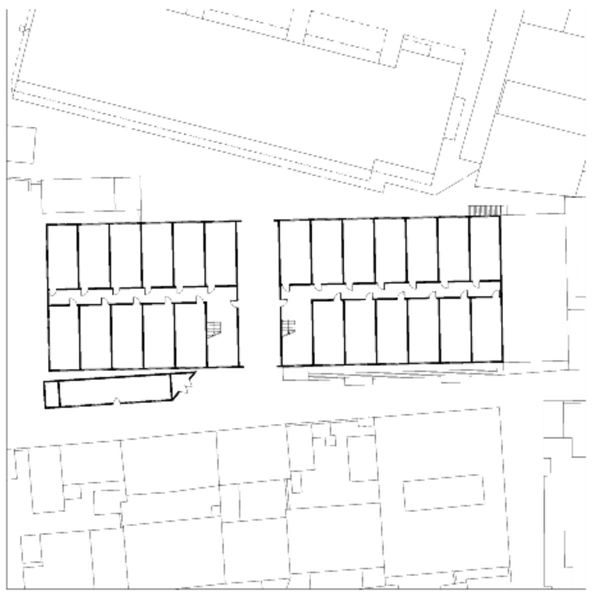
Multi-Storey Residential Building

Funcion: Housing,
Site: 24 Gao Gang Li
Concrete structure

7 floors,
7 units each storey
The building is located within a closed enclosure that follows the perimeter of the building.
The first floors have all their balconies crossed out.
The roof is used to position air conditioners and small photovoltaic.

E.1



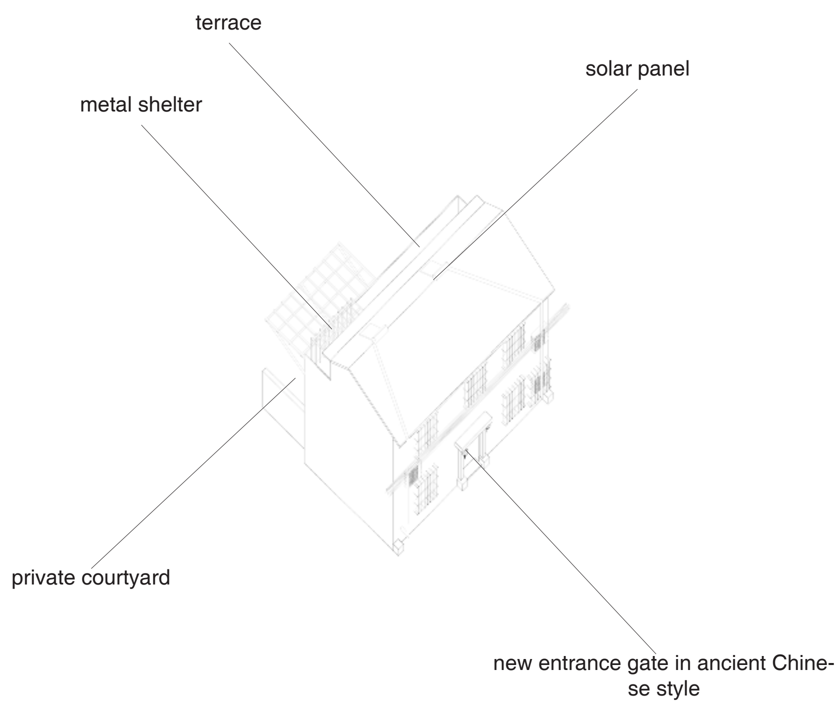


Nanjing Tea Factory

Funcion: Factory, Housing
Site: 26 Gao Gang Li
Concrete structure

3 floors
The building, given its origin, has a higher ground floor than the other floors.
The building has a long staircase towards the street.

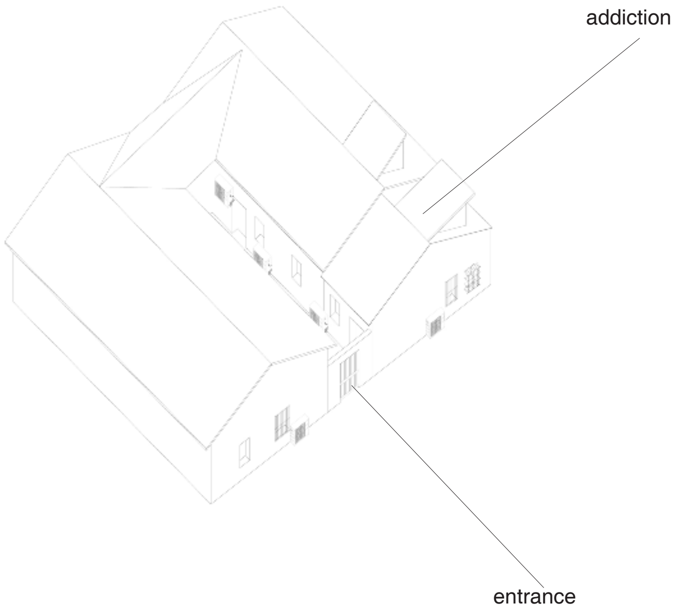
B.1



Residential Building

Funcion: Housing
Site: 33 Gao Gang Li
Brick concrete structure

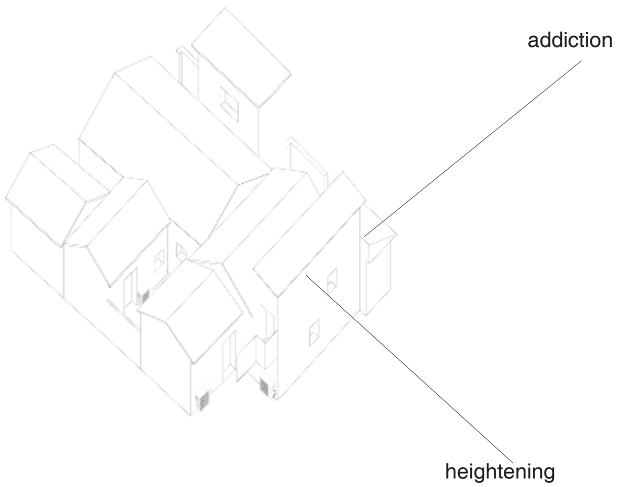
These types of buildings are Self built houses after the Republic of China, they follow the original texture but the materials are replaced with brick, cement mortar and other modern building materials.
These houses usually consist of one- or two-storey houses



Residential building C shape

Funcion: Housing
Site: 33 Chan Ka Pai Fong
Masonry structure

The central courtyard is used for washing and hanging clothes, planting a few small vegetables and for parking motorbikes and bicycles.
Residents enter in the courtyard through a main road before entering in the house separately.

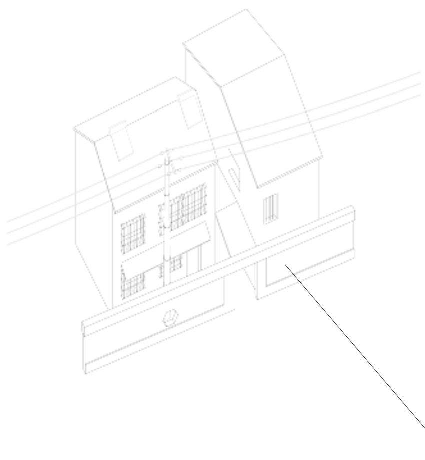


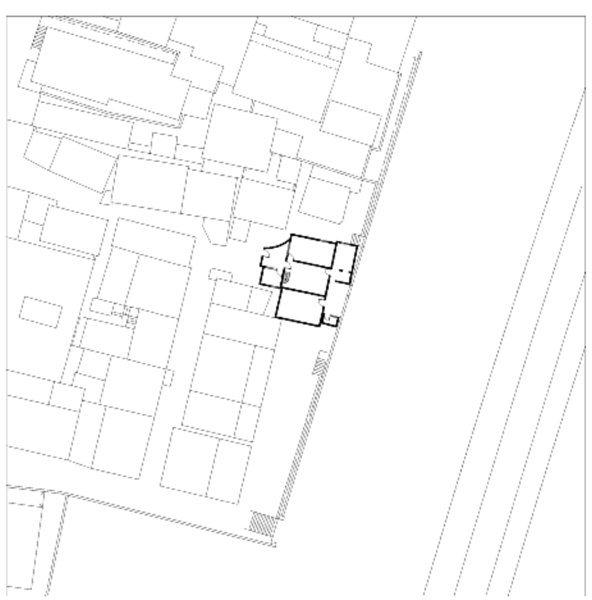
Residential Building

Funcion: Housing
Site: 56 Green Bamboo Garden
Brick concrete structure

The surrounding area has been subject to recent demolition. This type of building does not follow the original patterns of Hehua Tang, but are a series of buildings set against each other without an inner courtyard.

HUMAN



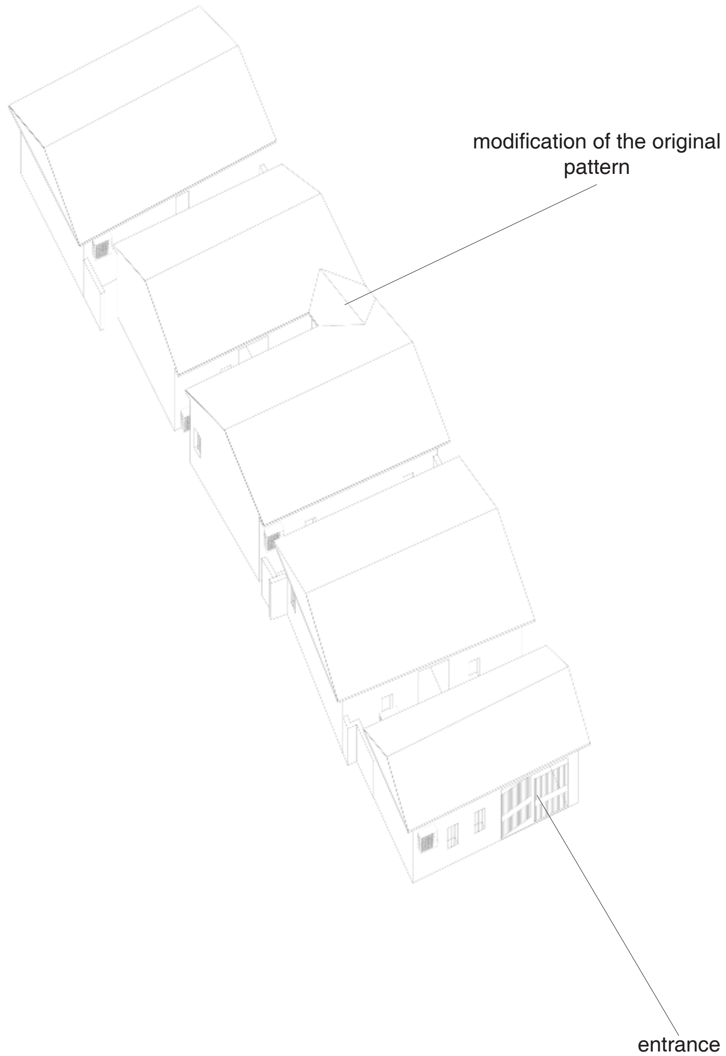


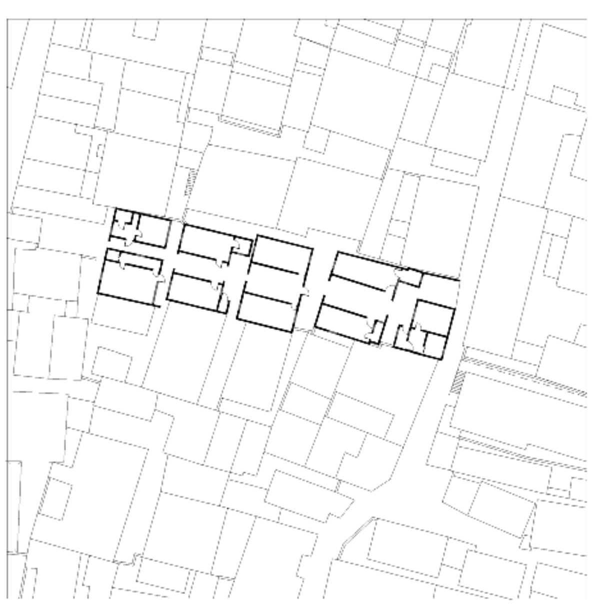
Residential Building

Funcion: Housing
Site: 14-5 Chen Ka Pai Fong
Masonry structure

The wall becomes an integral part of the dwellings.
The wall is used either as an integral part of the house or as a delimiter of a space such as the courtyard

A.1

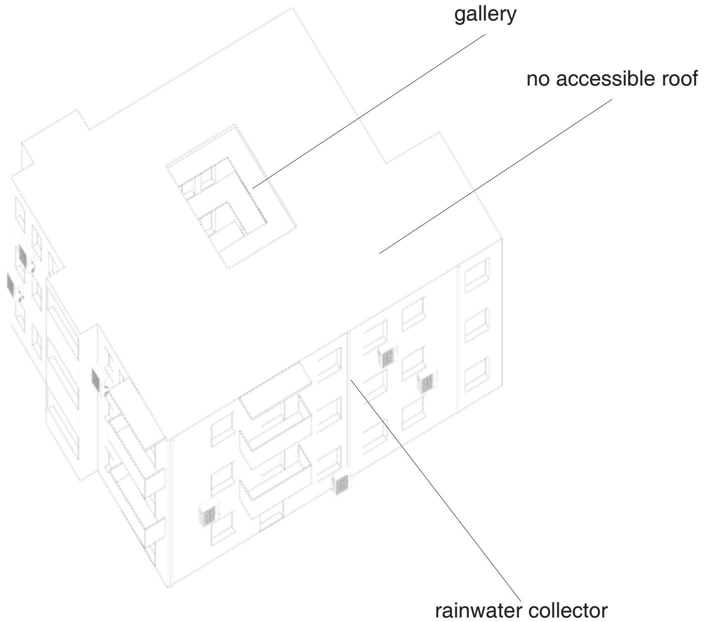




Tipical Residential Building

Funcion: Housing
Site: Fellow villagers
Masonry structure

The various courtyards are connected by exclusively pedestrian passages that cut through the houses, these are very narrow and are used by the residents as an extension of the house.
The entrance is not central and is very large.
The buildings are mostly untouched apart from one side of a closed courtyard.

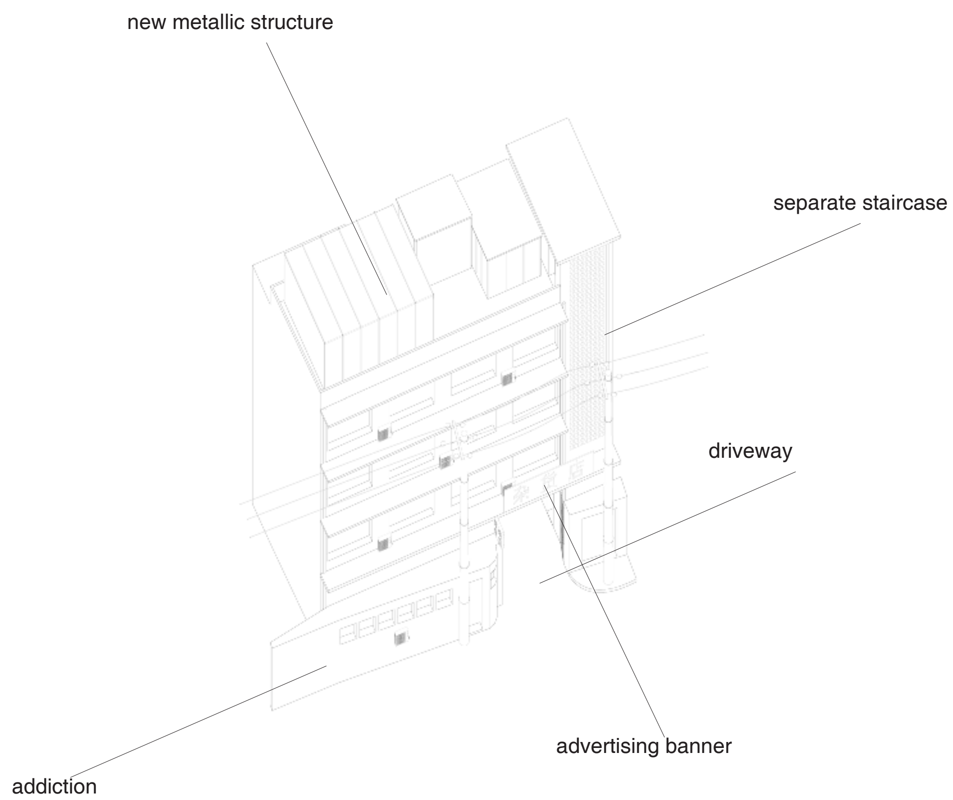


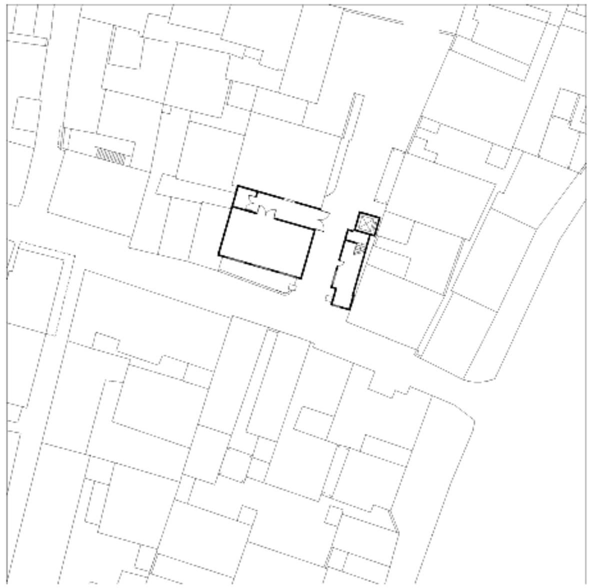
Tea Factory's Dormitories

Funcion: Housing
Site: 16 Gao Gang Li
Concrete structure

3 floors
9 housing units per floor
The central courtyard balcony distributes the entrances to the various dwellings.
The ground floor of the courtyard is used as a car park for scooters.

C.4



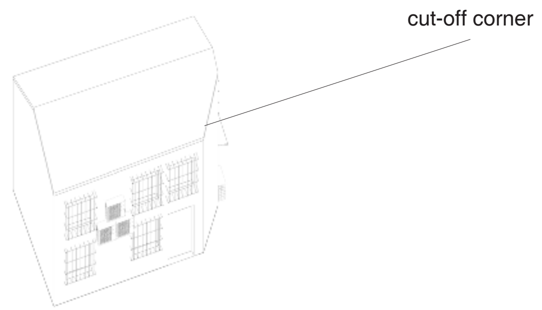


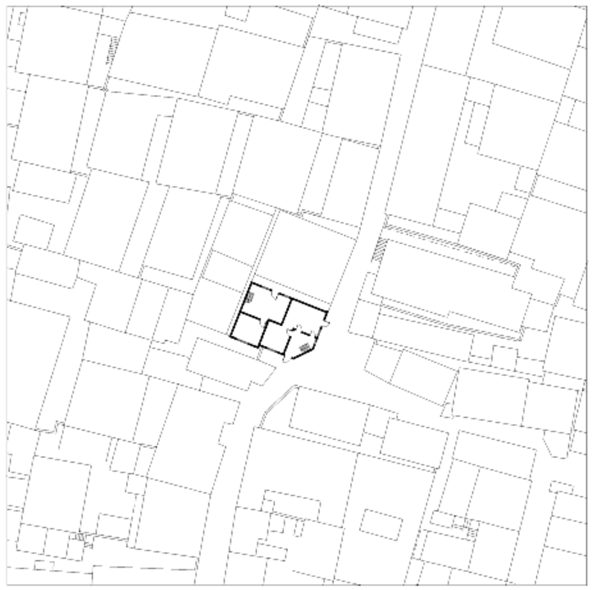
Residential Building

Funcion: Housing
Site: 92 Drinking Horse Lane
Concrete structure

The staircase is also visible from the outside thanks to the special decoration made by concrete bricks.
The solid roof has been exploited to create new spaces for residents.

B.4



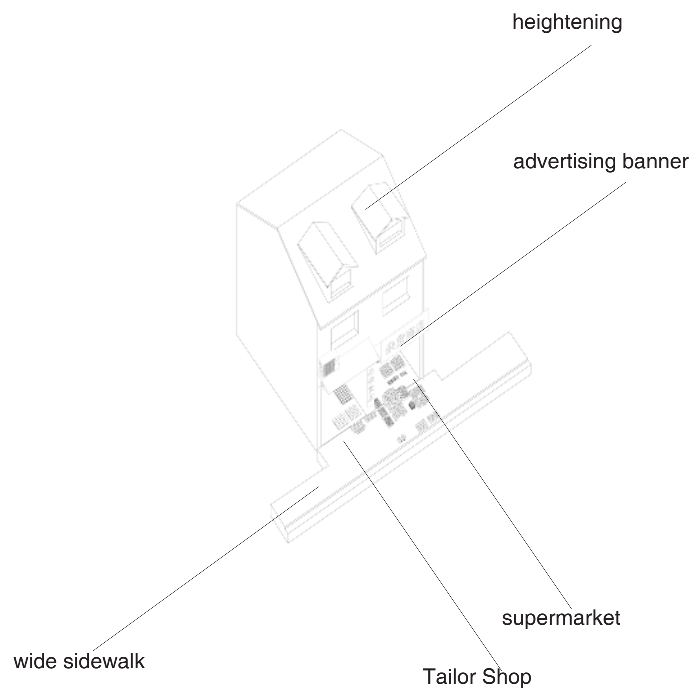


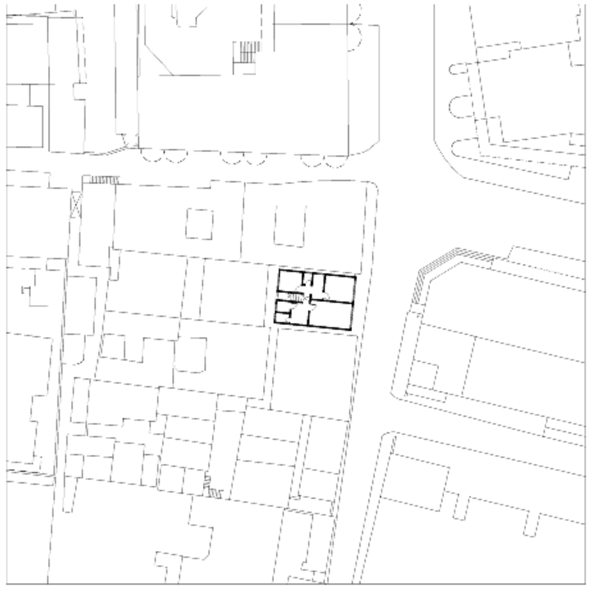
Shuangtang Housing Management Office

Funcion: Housing, office
Site:
Masonry structure

The particularity of this building is in its cut-off corner, probably due to the position of the building at an important junction in the street fabric.

D.1



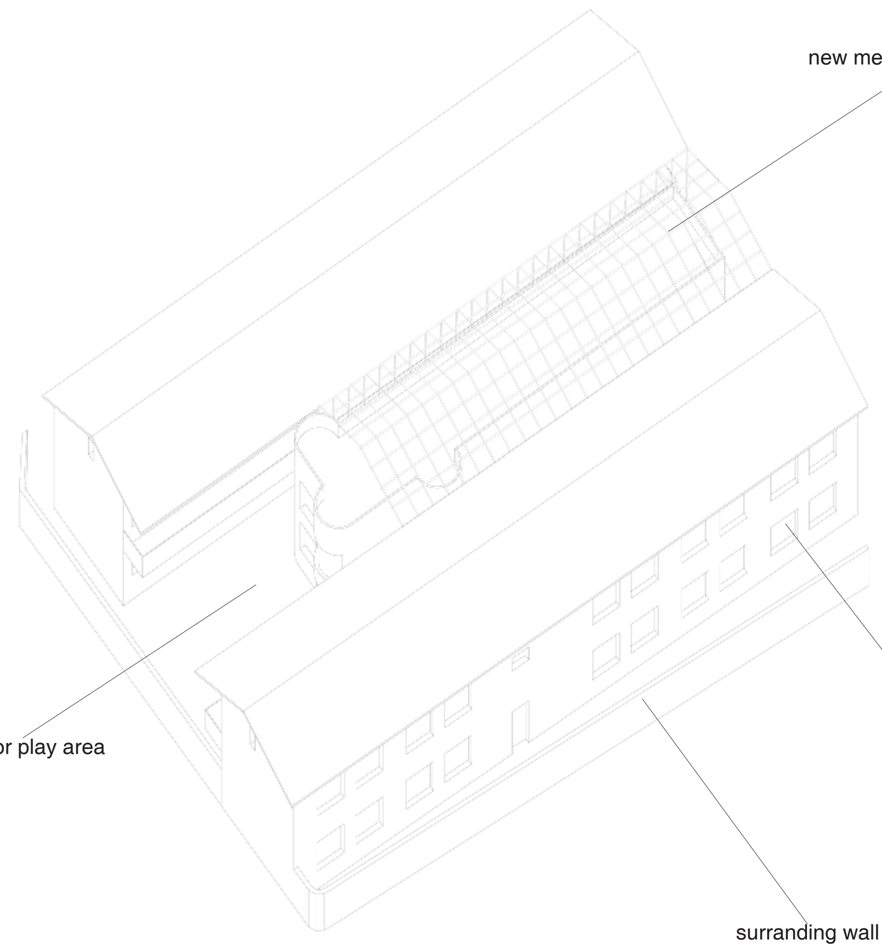


Shops

Funcion: Housing, Shops
Site: 43 Shuizaian
Masonry structure

The pavement is used as an extension of the shop itself. The shops are small and often connected to the house behind them.

C.5

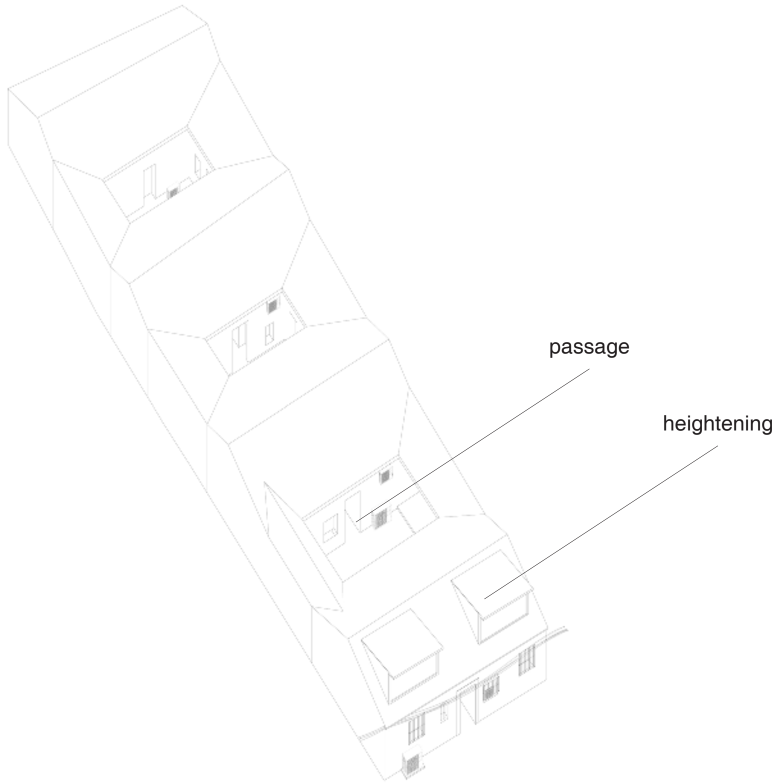


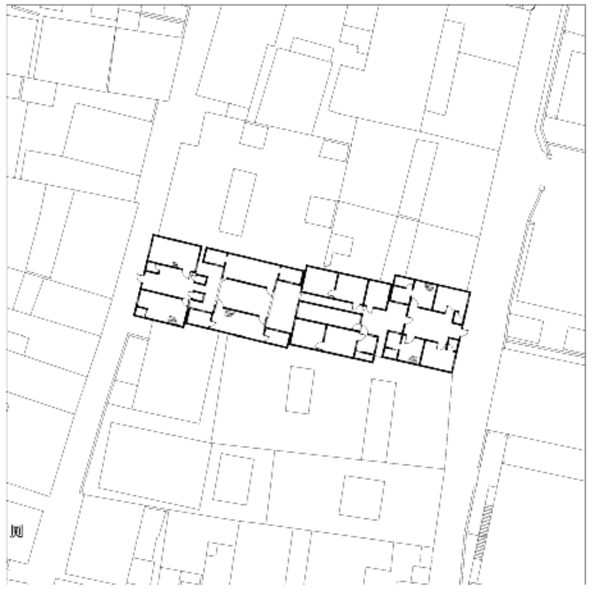
Kindergarten

Funcion: kindergarten
Site: Rouge Lane
Concrete structure

The building has recently been modernised with the addition of the central corp and the creation of the new outdoor play area.

A.2



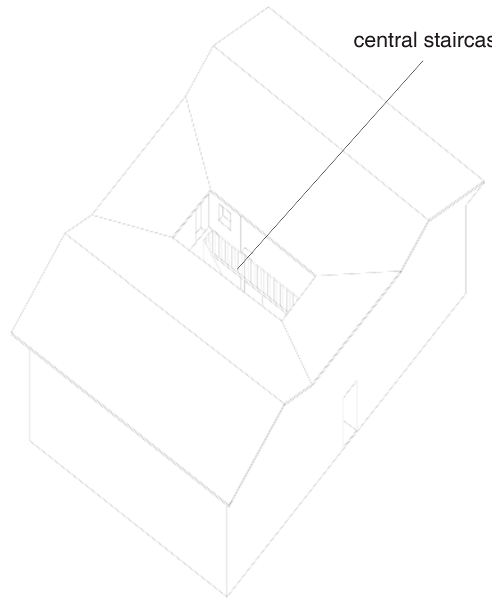


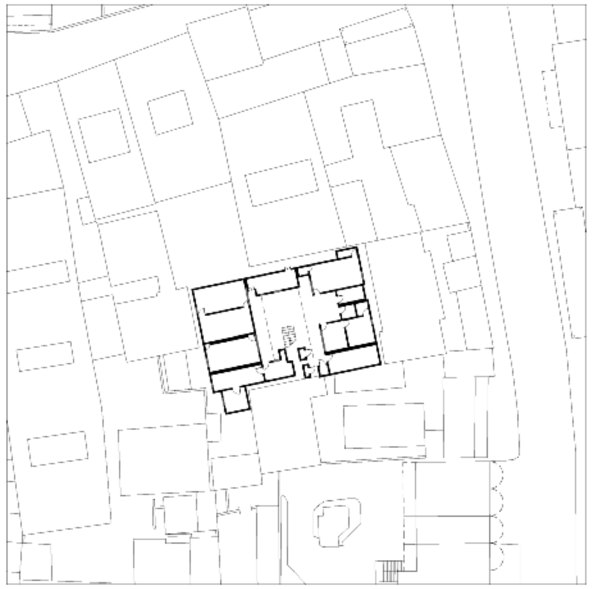
Tipical Residential Building

Funcion: Housing
Site: 11 Mopan Street
Brick-wood structure

The overall shape of this kind of courtyard can be distinguished, and the later added part is attached to the original building, occupying the original courtyard space
New additions on the roof are created by demolishing part of the existing building, they usually develop in height and are made to obtain a new floor.

B.5



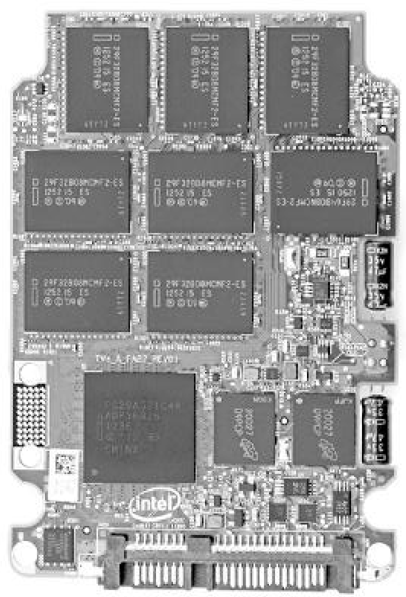


Residential Building

Funcion: Housing
Site:
Brick-wood structure

In this building, the staircase leading to the first floor is positioned in the middle of the courtyard and reaches a wooden gallery that distributes the various accesses to the dwellings.
This building, like many others in Hehua Tang, does not face outwards but only the courtyard.

2.3 CITY=HARDWARE



HUMAN

1
Reyner Banham, in “art of America”, 53, April 1965, p.70

The System of cables, the mechanical systems, the light system, the domestic equipment, show at all times the second skin of Hehua Tang , a technological superstructure that adapts to spaces and places by generating functioning elements and architecture.
This is the first impression when observing Hehua Tang, a machine for living, an overwritten system of information that collimates with each other.
To borrow the words of Reyner Banham: "When a house contains such a complex of pipes, flues, conduits, cables, lights, valves, sockets, ovens, sinks, garbage drains, hi-fi and heating systems, antennas, ducts, freezers-when it contains so many services that their framework would stand on its own, without any help from the building, why resort to a house to support them?"[1]
Starting from these words city=hardware is constituted as an attempt to investigate the superstructure of Hehua Tang, the technological system that dominates a city in which the use of architecture becomes highly functional.
This reading will establish the basis for the redesign of a part of the city, starting from here to define the formal aspect of the new architectural code in which the mechanical invasion of Hehua Tang offers the pretext for an architectural rethinking in which the technological aspect becomes the characterizing and aestheticizing element of the new urban scene.
In an urban context that seems anything but technological, one is immediately aware of the presence of a duality of meanings and uses of architecture and urban scenery within what seems to be a space without rules.
The walls are conceived not only as a division between inside and outside but become a vertical surface capable of supporting services for everyday life, the courtyard manifests itself is not only as an open space of a house but becomes a multifunctional element, the roofing element is pierced, cut, divided pandering to the best exposure for the sun's rays.
This creates a highly functional relationship between inhabitant and architecture, in which new forms are generated by the application and summation of technological elements that invade human space, generating new urban scenarios.
As Banham wrote: "Architecture, understood as an activity serving

human societies, can only be defined as that which provides suitable environments for human activities. (...) And however generously the term suitable is understood, it does not however necessarily imply the construction of buildings"[2] .
According to the author, architecture is not necessarily generated by a design/architectural act, but by the modification of space through the use of the technological element.
As Le Corbusier described the house as a machine for living and the airplane as a machine for fying[3]; as Reyner Banham identified in the technological tool of the curtain wall the overcoming of the load-bearing part[4]; as Peter Sloterdijk described the air-conditioning system as an explanation of air[5], the inhabitant of Hehua Tang identifies in his house a technological object capable of being encoded and recoded again and again according to external changes.
Thus, an architecture is delineated in which the technological component is at the parts of the architectural element, in which the facade of the houses of Hehua Tang cannot be represented without the addition of the equipment hanging from it, and the streets of Hehua Tang cannot be described without the pile of cables above them.
The city of Hehua Tang thus constitutes to us as a Hardware in which its spatial and architectural components become the elements of a larger system, in which architecture is a component of Hehua Tang, Hehua Tang is an element of Nanjing, and so on.
Streets like electrical circuits penetrate the hardware by relating the point elements of human life, houses are overlaid with a new mechanical skin rewriting the spatial codes of the city.
As in all machines at the base, however, there is a written code, a rule that generates and dictates the logic behind the spaces on the surface.
The typological study then manifests itself as a combination of rules, the summation of spatial behaviors that design the city, its system, its spaces, in which the typology dictates the spatial logics and the technological element overpowers the architecture to adapt it to man.

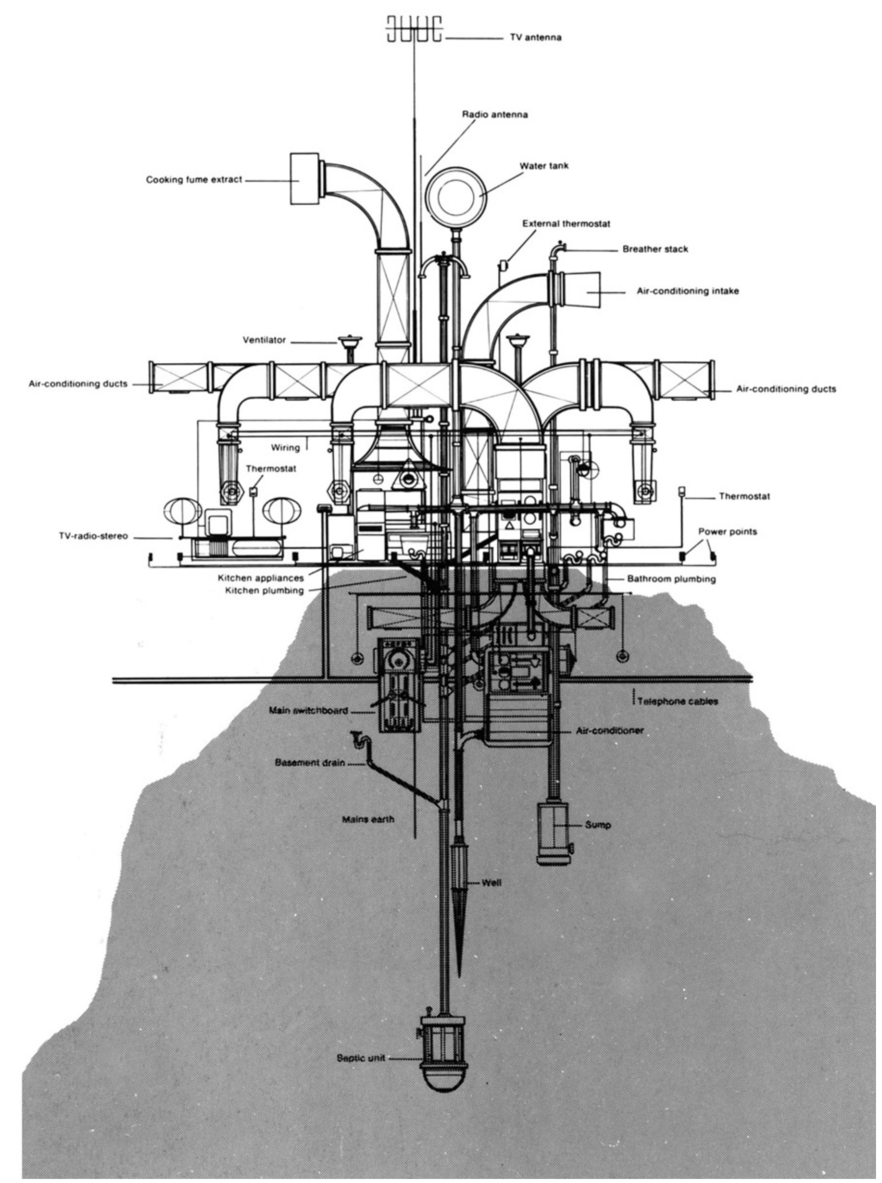
2
Ivi. p.78

3
Le Corbusier, Verso un Architettura, Milano, Longanesi, 1923, p.15

4
Reyner Banham, The architecture of the well-tempered Environment, London, Architectural Press, 1969, pp.154-159

5
Peter Sloterdijk, Schaume, Band III: Spharen. Plurale Spharologie, Frankufurt am main: Suhrkamp, 2004, pp.154-191

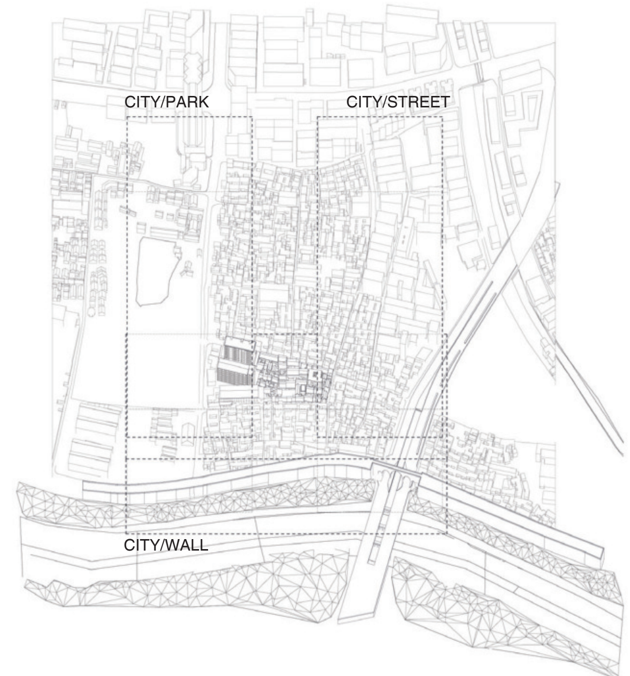
HUMAN



UN- GATED COMMUNITY

A_The goal is to break the communitysystem of Hehua Tang. Breaking the system to design and program the rethinking of the city in relation to identities of the edge

3 RELATIONSHIPS



B_Hehua Tang is a closed system that has no relationship with the outside, but its "boundaries" if open, have 3 different spatial and architectural relationschips with the corner

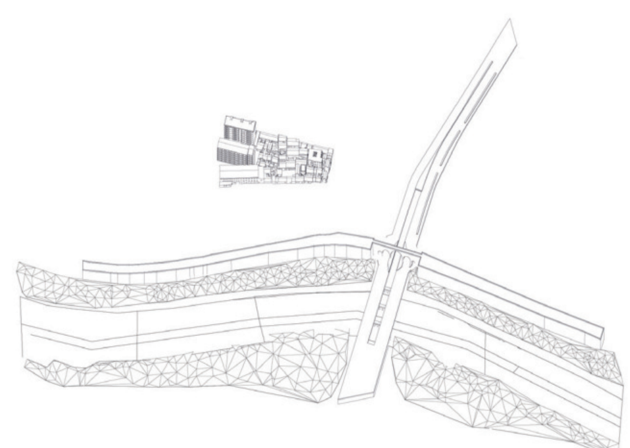
PLATES

C_The "plate" system in Hehua Tang is both distribution and collective space. The plates rappresent a central element within the rethinking of the city

EDGE BREAKING

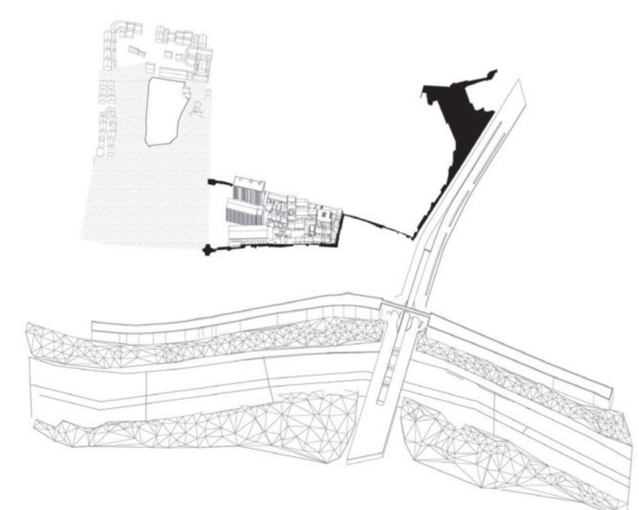
D_Edge breaking is a key theme for the future of Hehua Tang, breaking points represent crutial points where to set up infiltration within Hehua Tang

GEOMETRY



F_The geometric figure rapresents the rethinking of a passage of Hehua Tang and that is to the centre of the system analyzed previusly, field of test for the application of the sistem

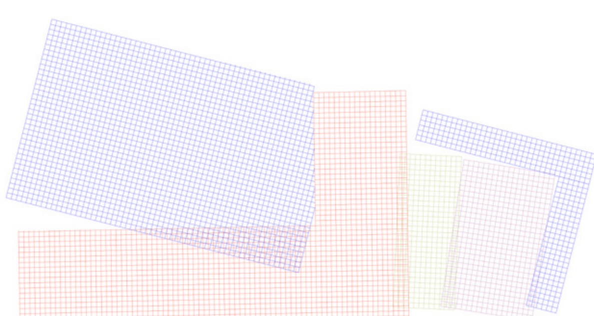
MASTERPLAN

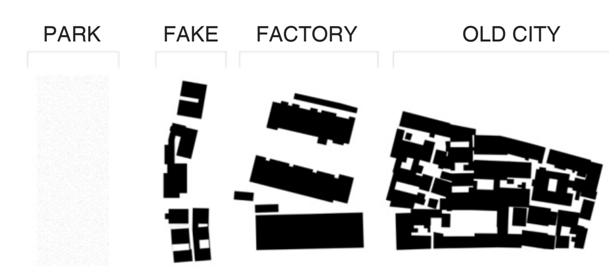


The masterplan rapresents the union of the various steps, identifies a project area within a design for Hehua Tang in the long term.
The goal is to set up a system that can be expanded over time, combining a dual aspect reading that goes from the typological aspect to that of water managment, laying the groundwork for a gradual recovery of the city.

ARCHITECTURAL PLOT

Thus outlined within the master plan is the study and rethinking of a specific portion of Hehua Tang.
The plot in question was selected to try to experiment with a rethinking that would coninvolve a portion of the city directly related with one of the issues between Hehua Tang and its edge.
This portion of the city turns out to be particular in that it has inherent multiple recurring morphological issues in Hehua Tang, the historical fabric, the hyper object, and the relationship between city core and conformation the extremes.
This creates the redesign of the architectural base in which all the architectural design issues carried out later will be tested.





AXES

The study of the axes showed the different types of alignments that the morphological fabric highlights.
Differentiated in various colors, we can see how the plot consists of 4 types of alignments that converge with each other generating different spatial forms

PROPIETY

Hehua Tang presents an interesting relationship between settlement construction and property.
From the reconstruction of the map, an attempt has been made to investigate how the Chinese court constitutes a pivotal element on which multiple types of property are leaning, sharing the central space.

BREAKDOWN

The plot explosion allows us to observe the generation of a system consisting of 4 parts in relation/conflict with each other.
In the heart of the city we observe the historical fabric of Hehua Tang, next we conform the 3 macro buildings that relate to the fake Hehua Tang, and finally the park.

PROJECT FORM

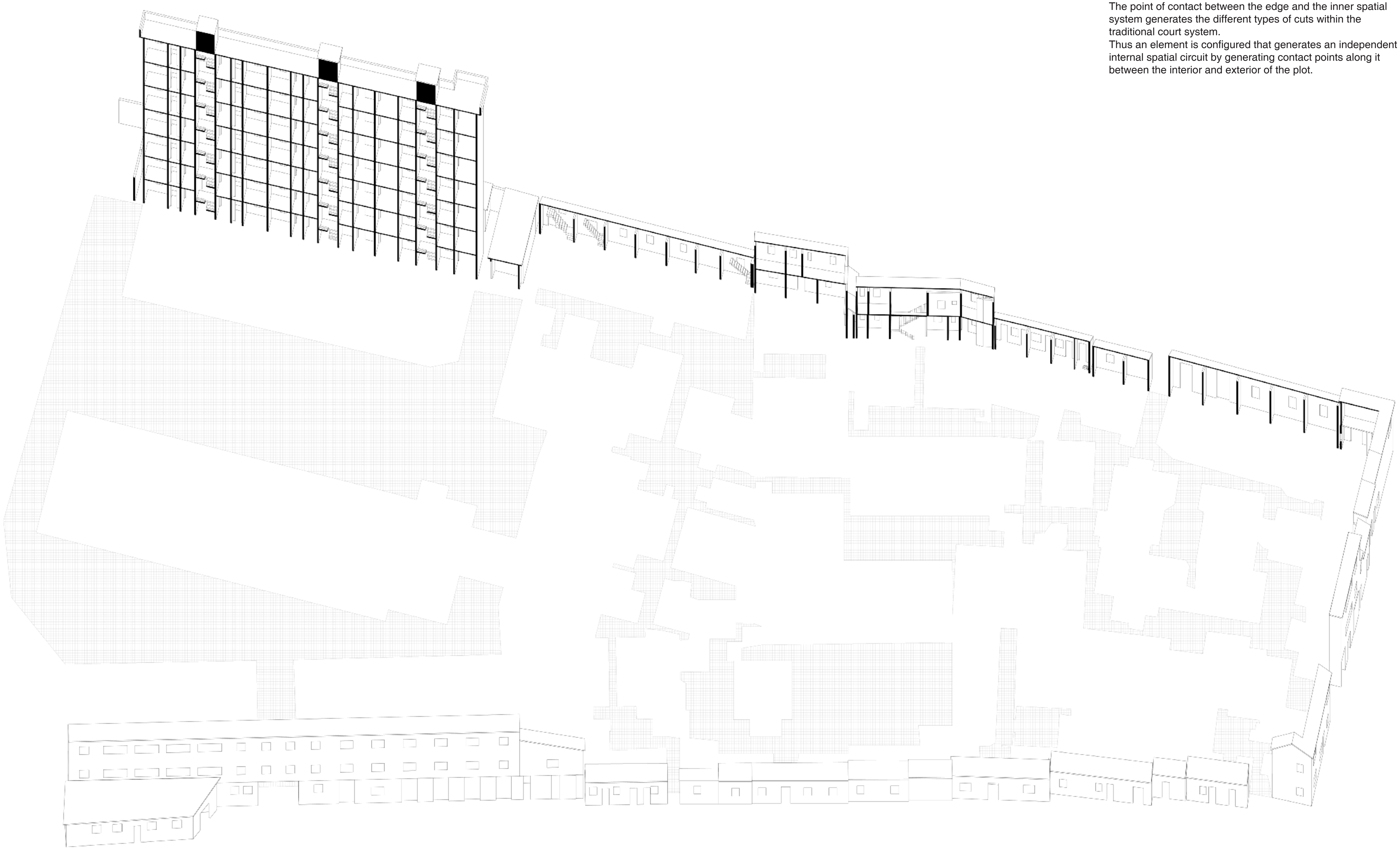
The new design forms are generated within a clearly delineated starting pattern.
By tracing the historic buildings constrained by Nanjing Municipality, a linear system naturally emerges that cuts the plot in two.
The project starts from this form to rethink an inline architecture in relation to both ends of the plot and the constrained historical context.
It was also decided to highlight the relationship between Hehua Tang's dense apparatus and its factories.
Thus, a project is outlined in which a portion of the city's historic fabric is taken up and placed in relation to one of the macro objects already present in Hehua Tang.
A system is thus created that starting from the heart of the city seeks to disrupt its gate community system by opening up to the park

VOID SYSTEM

The interpolation between the various plot alignments and the historical element of the Chinese court generates a complex and delineated spatial circuit.
The reworking shows how the set of courts, on which the vertical distribution system is also based, generates spatial systems that cut across the plot at several points, crossing the space transversely and longitudinally.
The spatial theme, both as open space and as a system of crossings, will be at the center of the architectural design, which will be conceived not in contrast but in relation to these forces.
The rethinking of a strip of the plot therefore will not affect the existing spatial circuit, but will conform to it.

EDGE SYSTEM

The edge is defined as the element that generates the plot. Delineated by the conformation of the main street system, the edge represents the gateway to what is defined as an independent spatial system, definable as a city within a city. The point of contact between the edge and the inner spatial system generates the different types of cuts within the traditional court system.
Thus an element is configured that generates an independent internal spatial circuit by generating contact points along it between the interior and exterior of the plot.



SPACE CIRCUIT

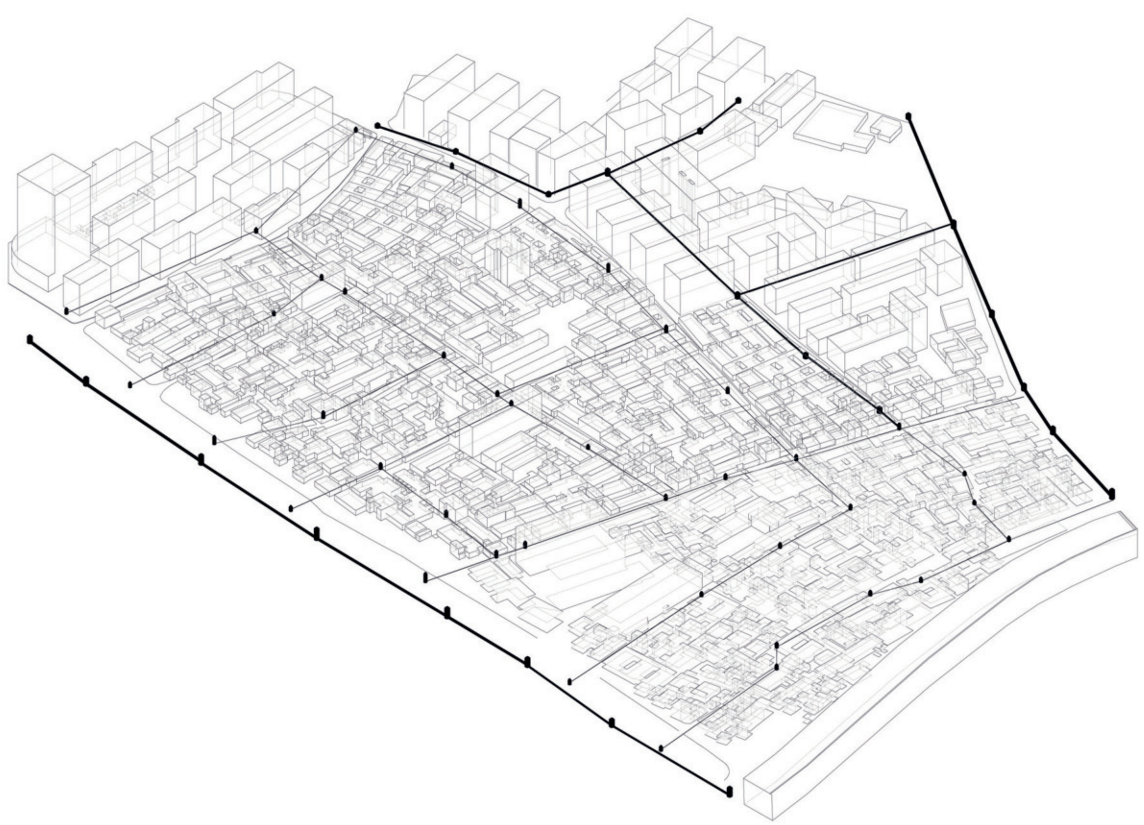
As a Hardware support, the conjunction of space form and function generates a redesign that shows the importance and correlation between the court system and the distribution apparatus.
Each punctual spatial element is closely related to the architectural system; the court generates the possibility of using the architecture within a dense system.
Thus a spatial circuit is delineated in which entrances and openings are related to the void system.

court access corridor
court area
window on courtyard
door on court
main plot access points
court access points

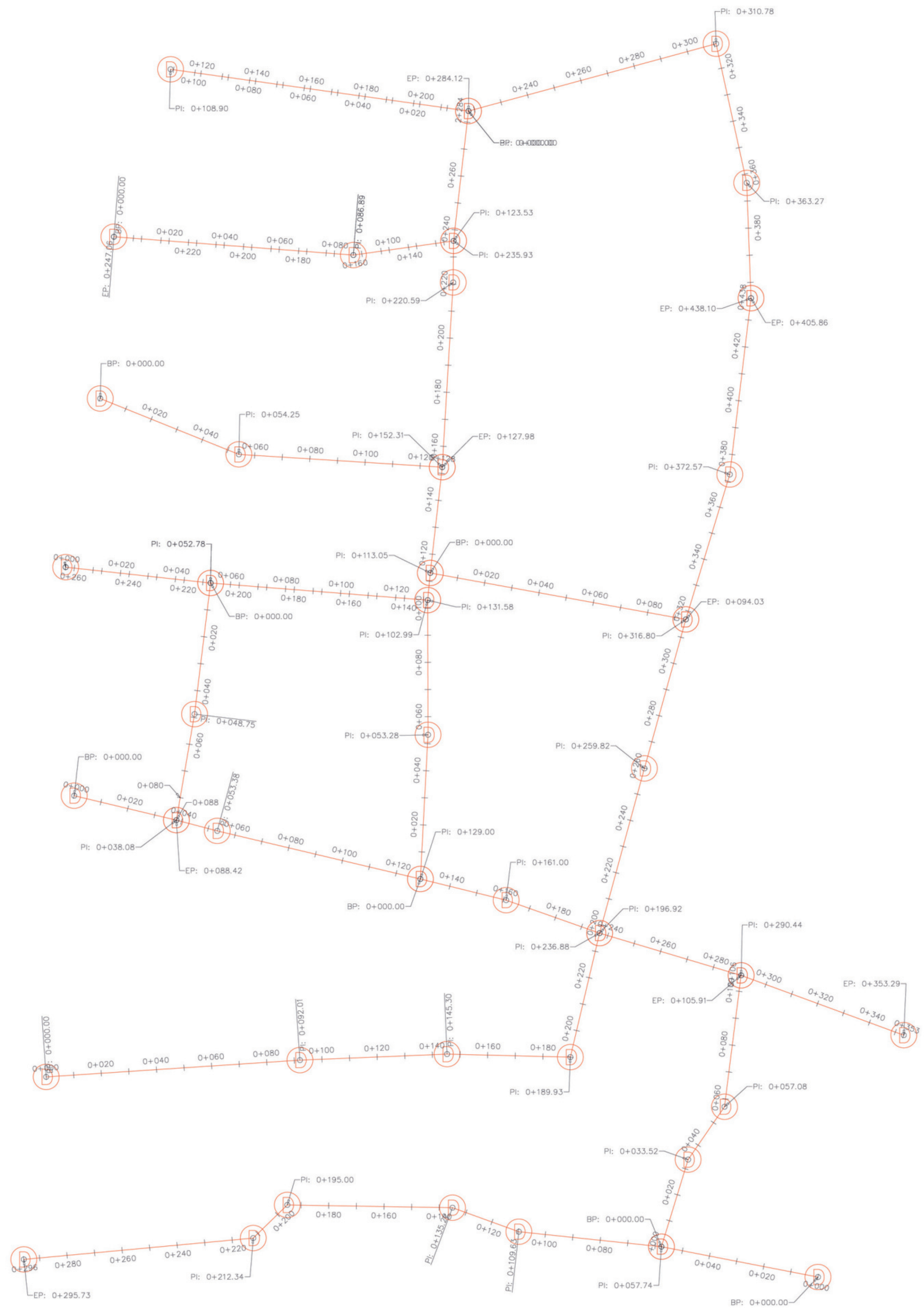
CO_N: Court space system
BI_N: Point of entry main road system and edge
CE_N: Point of contact between internal distribution system and court

EXISTING PIPELINES

In the definition of system, the study of the existing plant system is useful for the project.
A silent entity, the plant system generates a second layer that follows the spatial trends of the city above.
The study of the existing plant system, especially the water system, allowed us to reconstruct the situation of the existing infrastructure apparatus, so as to base the redesign of the streets.
Thanks to civil 3d it was possible to model the existing system and generate a map showing the route and elevation of each portion of the conduit



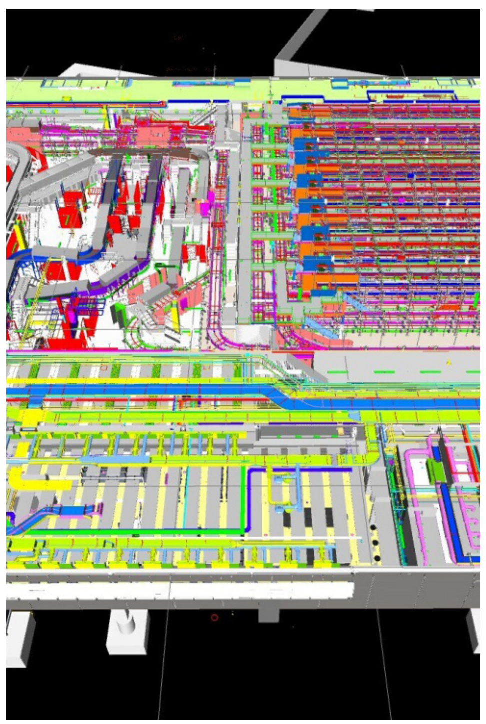
HUMAN



Architecture does not only have a history. It has a future. Change is taking place.

BRIAN MASSUMI,
BECOMING ARCHITECTURAL

DEVICE



DEVICE

3.1 THE ARCHITECTURE MACHINE

New time is a reality; it exists regardless of whether we accept or reject it. It is neither better nor worse than any other time; it is simply a fact and is in itself indifferent to values. What matters is not the what but solely only the how.

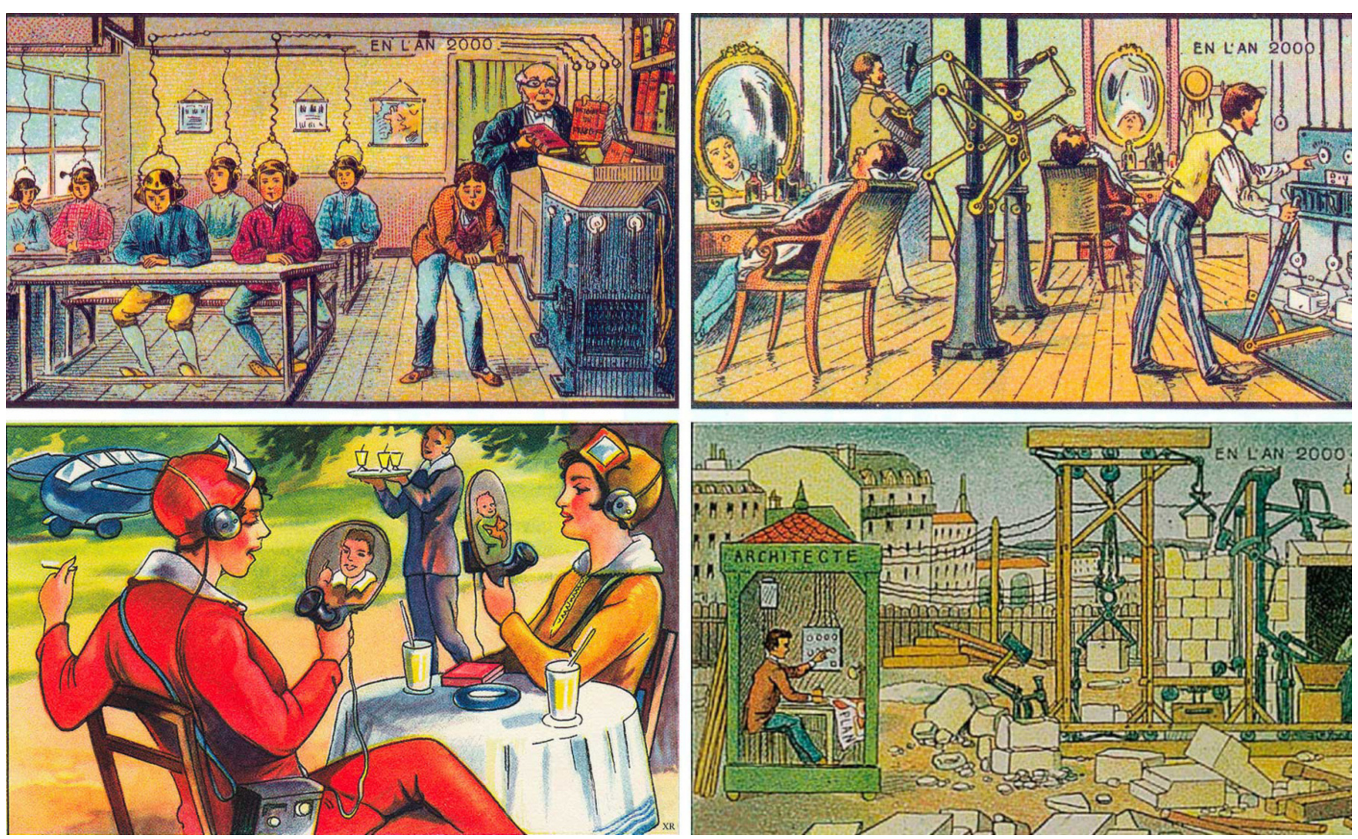
Ludwig Mies van der Rohe

The digital world has undergone a development in the past decade that cannot be compared to any evolutionary stage in human history.
Originating as a tool for solving certain application problems, the digital tool soon became a separate entity from the real, making the tool not only the means but also the end.
Going back to the words of Mies van der Rhoe written in 1930 we see how even in the world of architecture the process takes on the same importance as the end, the making of architecture can be as relevant as the architecture itself.
The factory of architecture has seen over the centuries the correlation between the evolution of its site, that is, the development of design and construction techniques, and the achievement of certain architectural results and forms.
Within the digital evolution in which we live, architecture, a complex and multidisciplinary object, is undergoing a technological rethinking which is radically rethinking the architecture-machine relationship, generating a process in which there is no longer linearity between end and means, digital artifice and built object.
Although on the surface the design flow may appear to be the same the advent of digital in the field of architecture has radically disrupted the relationship that is established between architect and architecture.
Thanks to the advent of modeling software something has fundamentally changed in the ambitions of architectural visualization, in the relationship between representation and reality.
Digital information has never been so closely coupled with the material logics and deployable flows of construction and operations through the life of a building.
It is within this context that the rapid development of digital technologies represent an enormous opportunity for the radical rethinking of our vision with respect to a new architectural perspective.
Thus, a dual vision of architecture composed of two different intellectual-disciplinary fields is increasingly consolidated, on one hand the rapidly changing world of software, on the other hand in more grounded architectural method.

As prof. Giacomo Ricci, "If we forget, in short, that we are divided between two different disciplines, we run a twofold risk: on the one hand, that of not abandoning all the limitations of the traditional procedures of architectural design-and, therefore, of not understanding anything about PA; on the other hand, since the computer is, in fact, the most complicated machine that has been built so far, that of getting lost in the meanderings of the difficulties and abstruse of Computer Science and forgetting that our ultimate goal still remains that of architectural analysis and design."[1]
Relating the phases of architectural design to the digital process, we can see the variation in their relationship as the design phase unfolds, analyzing the transition from initial formal suggestion to the insertion of geometry within the support system for computerized construction.
The design process involves the resolution of multiple problems that follow one another, revealing the true architectural form only once the work is completed.
As N.Negroponte states: "At the outset, the designer generally has a very confused view of his specific problem and therefore needs to find understanding and tolerance in the machine as he seeks consistency between criteria, form and method, between intention and purpose. The progression from the visceral to the rational can be expressed in successive tentative statements of detail and continuous revisions of the methods themselves."[2]

1
Ricci G., Frankwnstein rigenerato,Discussione sulle macchine intelligenti e il loro uso in architettura, archigrafica, 2006, p.13

2
Negroponte N.,The Architecture Machine, MIT, 1972; t.i. di Giancarlo De Carlo, il Saggiatore,Milano, 1974, p.33



Thus there is the constitution of the technological support as the tool that can respond to the uncertainties expressed by the architectural project and at the same time can anticipate the final result.
It materializes today more and more an architectural world in which the application of the different "tool" becomes more and more fundamental within the process, outlining also the final formal result.
In this regard, a study done by Sebastiano Fabbrini on the relationship between Aldo Rossi's projects and the advent of Fax in the architectural practice is interesting.
Following the opening of an office in New York by Aldo Rossi Fabbrini wants to investigate how: "Most of his later projects developed on the Milan-New York axis. The thread of connection was the fax machine, which allowed materials and ideas to be exchanged with unprecedented immediacy. This research paper explores how the fax machine influenced the production of architecture within this decentralized system, intersecting multiple key topoi in the architectural discourse of the time."[3]
The technological device in this case directly affected the transmissibility of architectural design, which through the use of the machine was decoded over and over again from one side of the hemisphere to the other.
According to Fabbrini, the difficulty behind this process was: "A constant concern during this transatlantic exchange was the scaling of faxed materials as evidence of a multitude of handwritten specifications on drawings. In a very literal sense, the challenge was to maintain control over the scale of objects that were repeatedly dematerialized and recreated in different places."[4]
Architecture has always reviewed the natural element as a tool on which to base principles that still underlie our design today.
Using the words of architect Achim Menges: "In living nature, the generation of form and its materialization are intrinsically and inseparably related."[5]
It is within this relationship that architecture can use the full potential of modern software in architectural design and construction.
Architecture can be traced back to a set of forces, numbers, and proportions that put together ensure the safety and usability of the work.
The machine gets inside this experimental field by putting these factors together and deciphering them, making them readable to the architect, showing a functional reworking of these data.
We observe, however, how the application of the principles behind machines have been part of architects since the early to mid-20th century, influencing their way of doing architecture.
Luigi Moretti, during the period when the electronic computer became a utility within the home stated that: "If function the

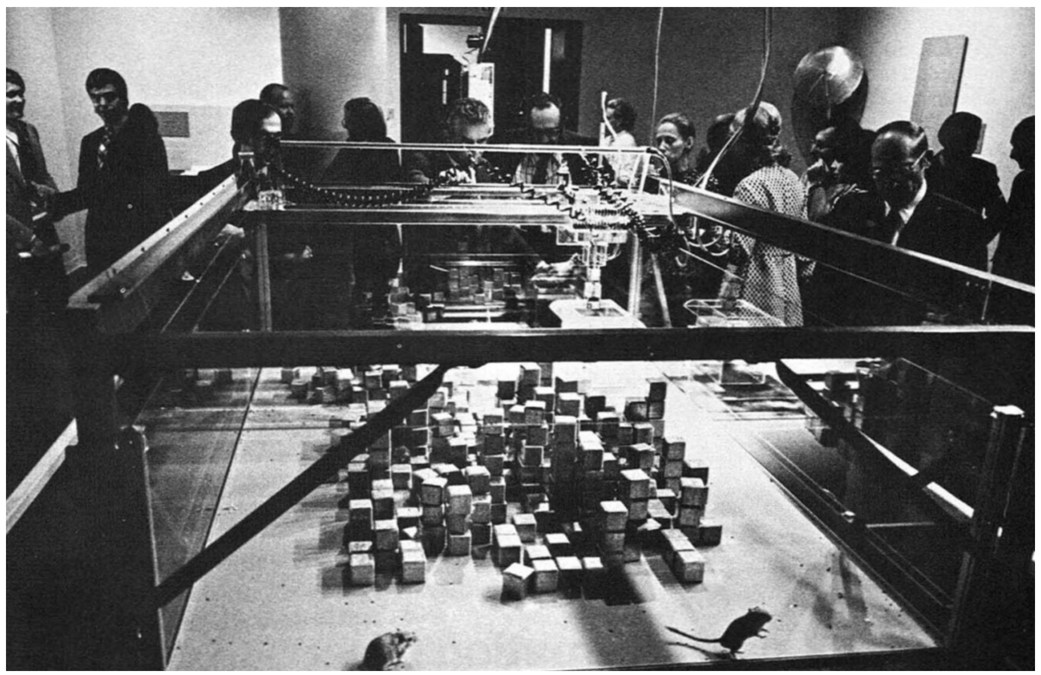
3
Fabbrini S., Faxing architecture, Art in Ardeth n.5, Innovation as it happenes, 2019, pp.96-116

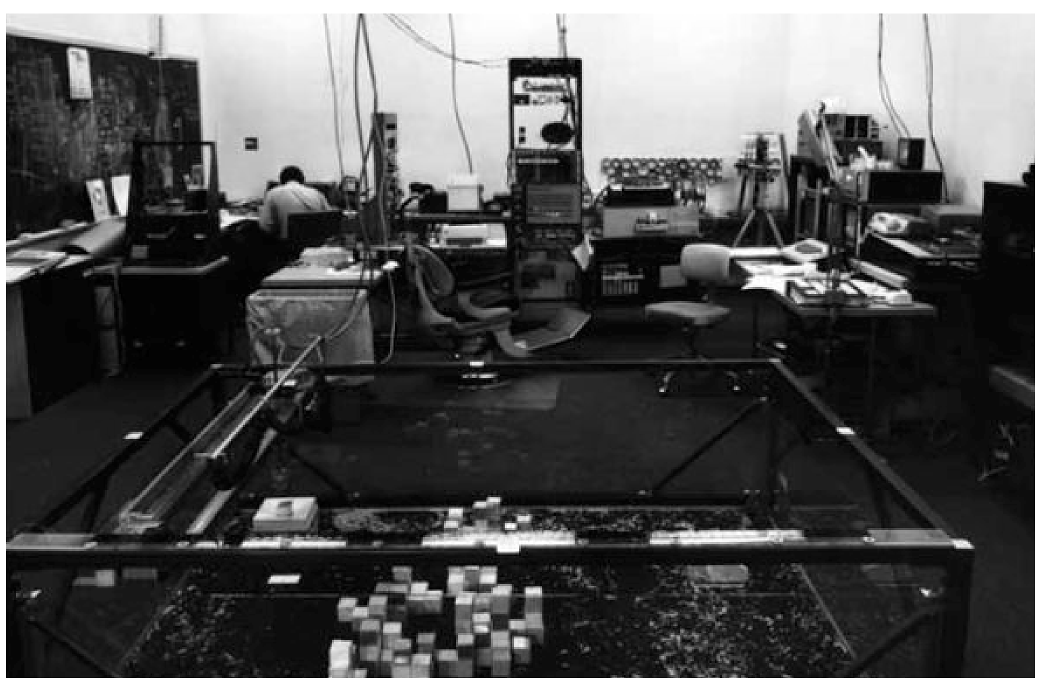
4
Ibidem

5
Menges A., Morfologia performativa in architettura, SAJ 5, 2012, pp.92-104

purpose of a building-can be described through a set of parameters, architects could design form using mathematical equations that relate to performative criteria."[6]
Within Moretti's statement, performative criteria refers to structural forces, spatial or geometric relationships, and environmental or experiential qualities such as light and airflow.
Thus we see already then the first conception of parametric architecture in which each to architectural element is associated with a parameter according to its performance, based on the 0 and 1 combinations of computer codes.

6
Gallo G., Pellitteri G.,Moretti L., Dalla Storia all'Architettura Parametrica, 2018





DEVICE

As mentioned earlier the basis of the digital tool is the ability to process data simultaneously managing to integrate, in the case by architectural design, the structural and spatial relationships that generate the building describing them in the form of a 3D model that anticipates the final forms of the architecture.
Over the centuries we notice how architects who were confronted with projects that were unconventional with respect to their time necessitated the development of innovative tools and working methods, this is for example the case of Antonio Gaudi with the project for the Sagrada Familia.
We see how there was rarely the use of conventional methods of representation, seeing in the generation of a three-dimensional physical model the tool to relate the parameters of the project, anticipating the architectural form before its actual realization.
It becomes increasingly evident how the conception of architecture as an expression of a historical era is always and strongly related to its tool, an object also related to the same time period that implicitly influences and determines the form and function of the architectural machine.
The beginning of the reversal of perspective between machine as a means for the architect and machine as a generator of architectural form occurs during the mid-twentieth century with the advent of cybernetics.
Cybernetics is based on the theory that: "All behavior, including that of humans and machines, is part of a system of feedback loops of inputs and outputs. In a given system, these inputs and outputs continuously merge together to extend the capability of the human or machine."[7]
In the design of the Fun Palace by British architect Cedric Price, the machine not only becomes a tool for implementation, but materializes by becoming a flexible architecture and programmable spaces that could change and adapt to different needs and activities.
The design drawings include suspended rooms and movable floors, walls, ceilings and walkways, as well as a temperature-sensitive control system to create different climates and disperse fog and hot air.
Another interesting case of front-flipping comes from architect Nicholas Negroponte and his URBAN 5 research group at MIT(Massachusetts Institute of Technology).
Their idea behind the research was to imagine the future dynamic between humans and machines as a dialogue in which the machine can initially learn from the human, generating forms autonomously and no longer supporting the architect's work.
One result of this research is the SEEK project.
The process was based on the relation between blocks, understood as architectures, and gerbils as replications of human behavior.

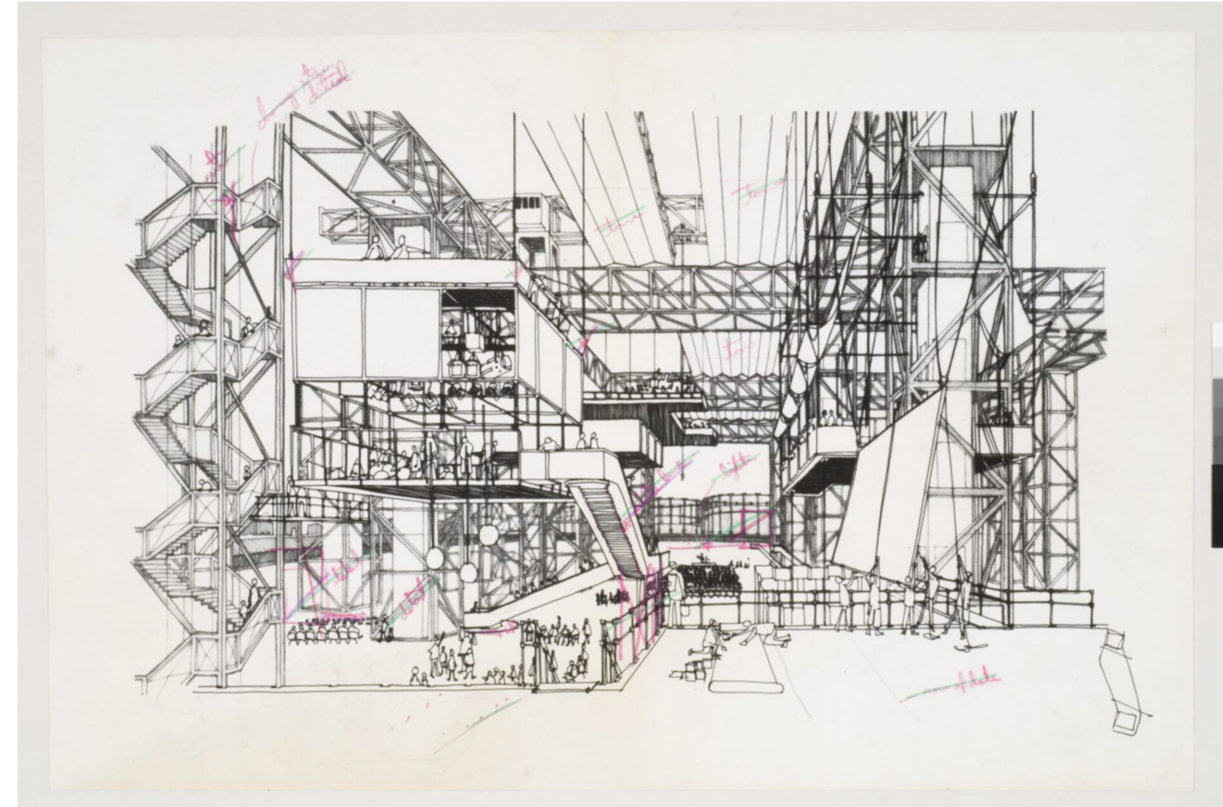
7
12th Five-Year Plan for National Economic and Social Development, 2011-2015

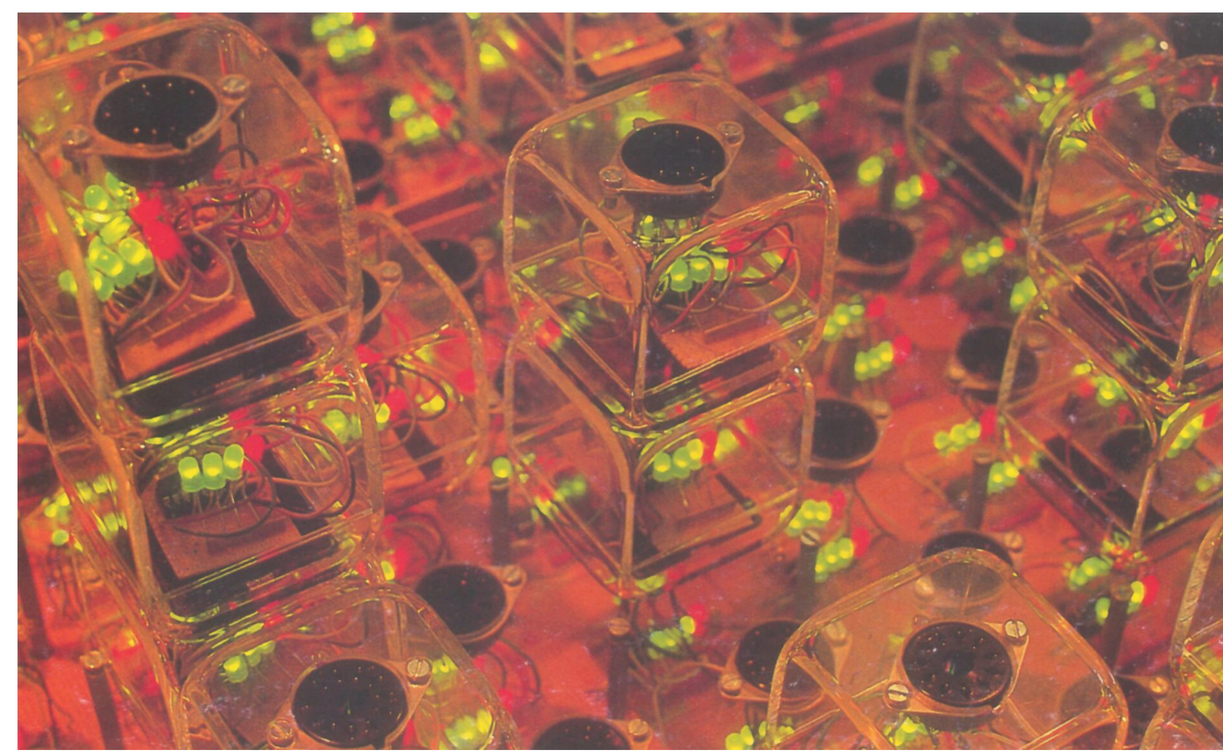
A robotic arm continuously changes the positions of the blocks and arranges them according to emergent behavioral patterns that mimicked gerbil behavior.
Negroponte said that through SEEK, architects could understand that the robotic machine could: "Be responsible for changing, unpredictable and context-dependent human needs", as well as require "Artificial intelligence that can cope with complex contingencies in a sophisticated way"[8].
In this way, the robotic machine could adapt, respond and generate spatial forms in which the architect is manager of the process controlled by the machine.
Within the same theoretical field Julia and John Frazer ,architects of the Architectural Association (AA) use generative and evolutionary algorithms as a new model for a design process .
"Cybernetics will enable a new form of designed artifact that interacts and evolves in harmony with natural forces, including those of society"[9], John Frazer reflects.
"All designed artifacts involve interaction with the user and the environment and can therefore be understood as cybernetic systems"[10].
It is from these experiments, both theoretical and practical, that by the early 1980s architecture was placed on the same level as the naval, aviation and automotive industries had been using CAD (computer-aided design) software to design complex forms for several decades.
The use of these tools by architectural firms such as Greg Lynn FORM, Foreign Office Architects (FOA), and NOX transformed the practice of architectural design: for the first time, architects were able to create 3D, complex, variable curves using a type of curve called a spline instead of just straight 2D lines along an X or Y axis.

8 Negroponte N., Emantica delle macchine dell'architettura", Foro architettonico, October 1970, p.40

9 Frazer J., Creative design and generative evolutionary paradigm, Creative Evolutionary Systems, 2002, pp.253-274

10 Ibidem





It is within this theoretical context that the thesis seeks to relate not only to the design theme but also to the contemporary tools that underlie the architectural process today.
The project is thus defined within a complex and structured process that sees the relationship of programs within the BIM (Building Information Modeling) process.
In recent years, BIM has emerged as an irreplaceable tool of the modal architecture, engineering and construction industry, proving to be able to ensure greater construction efficiencies, reduce errors, save labor and optimize the design process.
Now placed on the same plane as big data, robotics and virtual reality, BIM enables the creation of an architectural model capable of articulating in 7 dimensions, incorporating architectural design and management.
As Amelyn Ng states, "In addition to 3D modeling, it has gained a worldview of as many as seven dimensions: a 4D model simulates construction time; 5D estimates construction costs; 6D analyzes energy and sustainability outcomes; and 7D manages structures using a model of the building as built. While 7D applications are still far from achieving the ubiquity currently enjoyed by 3D BIM software, the "information turn" in architecture represents a new paradigm for cataloging the built environment as a single database of linked object data, from the scale of a wall element or door to (seemingly) the entire operational life of a building."[11]
Thus, we can see how the software that accompanies the architect today no longer serves only to generate an architectural visualization, but is able to compute visual and nonvisual information into a single space, enabling the management of all aspects.
Reyner Banham describes the High Tech impulse as "The latest way to bring advanced engineering within the discipline of architecture"[12] .
The BIM interface makes this union explicit by placing the three aspects: architecture, structure and plant on the same plane and in correlation with each other.
François Dallegret's canonical Anatomy of a Dwelling , which illustrated Banham's "Baroque set of domestic gadgets"[13], comes to mind.
BIM ducts depart from the High Tech environment of tubular exuberance.
Unlike Dallagret's ornamental compositions, today's labyrinthine HVAC layouts are militantly coordinated assemblies that demonstrate the ability to work as patterned objects.
Looking at a drawing of the 1975 Housing at East Hanningfield by James Gowan shows a painterly composition of pipes and trusses, hand-drawn and color-coded for presentation.
Even pre-CAD, the design seems strikingly similar to BIM: the solid building recedes, foregrounding a suspended architecture

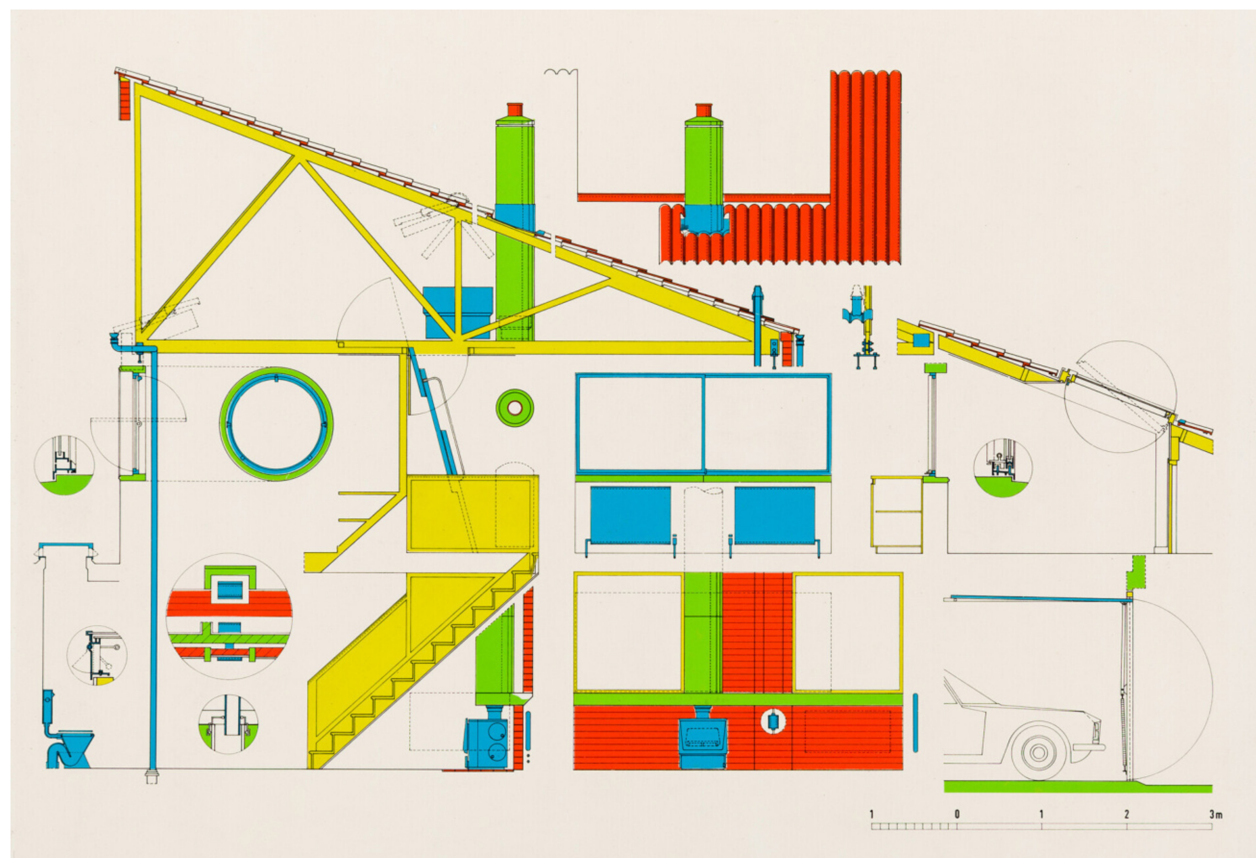
11
Frazer J., Creative design and generative evolutionary paradigm, Creative Evolutionary Systems, 2002, pp.253-274

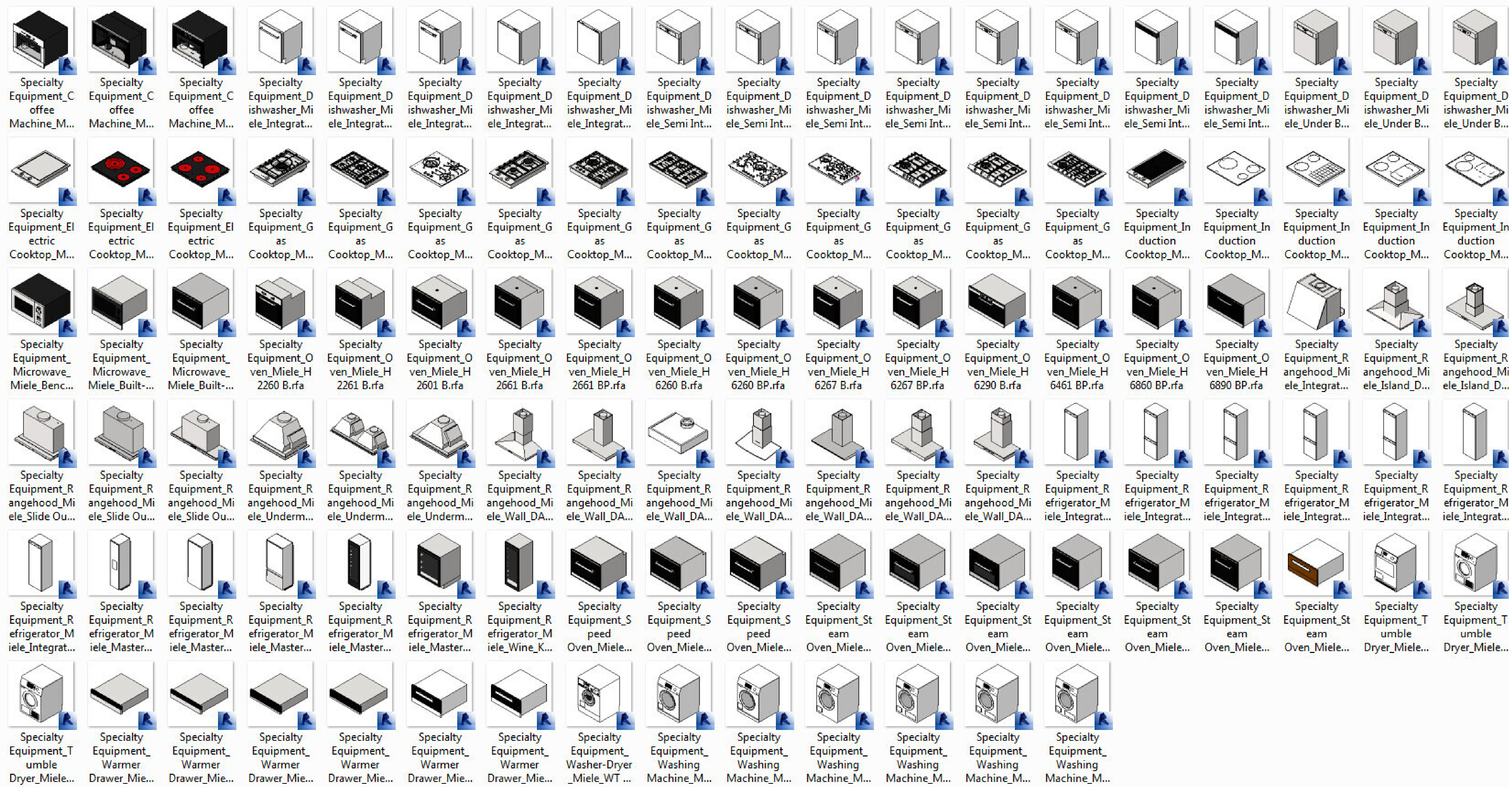
12
Gannon T., Banham R., The paradoxes of high technology ,Los Angeles: The Getty Research Center ,2017, p.244

13
Banham R., Home is not a house, Art in America 53, n. 2, April 1965, pp.70-79

14
12th Five-Year Plan for National Economic and Social Development, 2011-2015

of object-oriented services that unlike BIM however are inert, unaware of their function.
It is amazing to note that in the same year, Charles Eastman, proposed the generation of 3D elements that: "Could be cataloged and coordinated in precise alphanumeric (i.e., machine-readable) terms that, when assembled together in a relational model, would eliminate the repetitive work of updating 2D drawings and facilitate any kind of quantitative analysis."[14]
Thanks to this insight today the model is able to reliably read and redraw itself from a master model: moving a window or desk in the plan would cause the regeneration of other sections, elevations and perspective views as a result The model is now able to coordinate itself.
Thus, the basis of our thesis is a digital process that allowed us to create shared working files on which the various 3D models of the project were composed of intelligent elements, composed of editable parameters.

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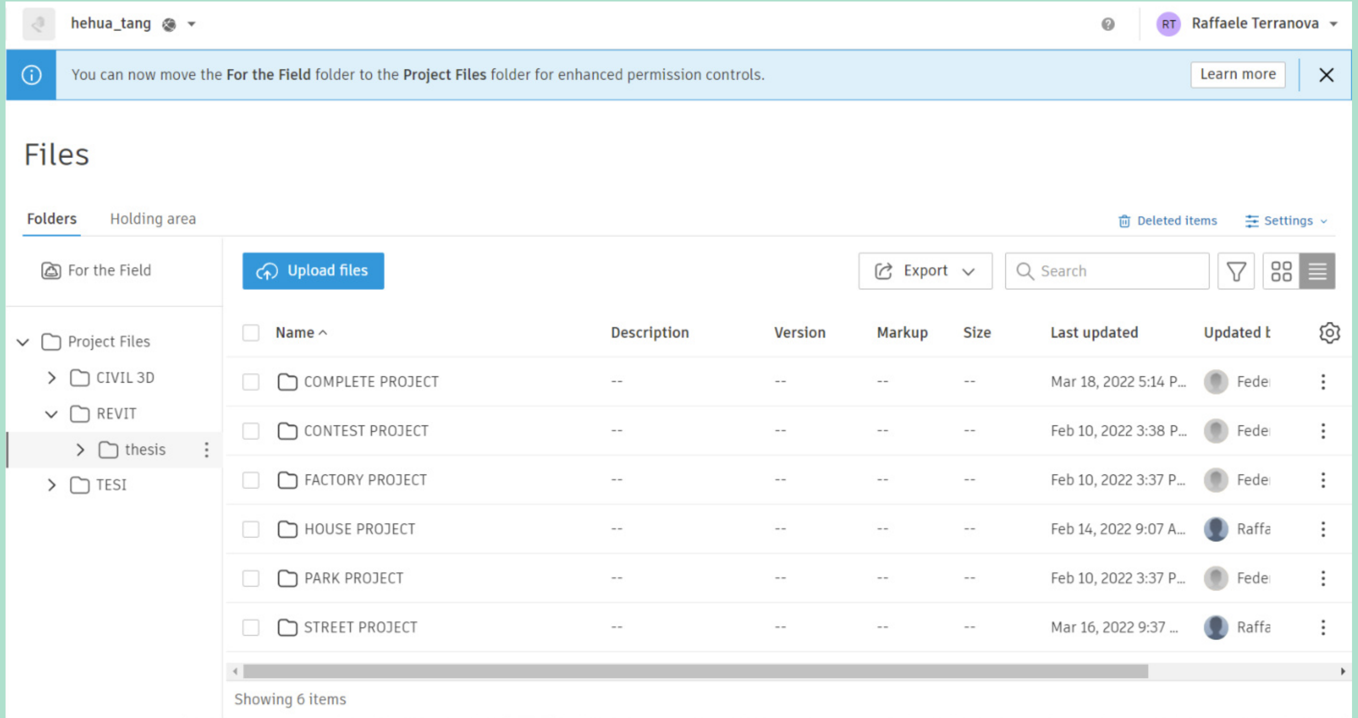
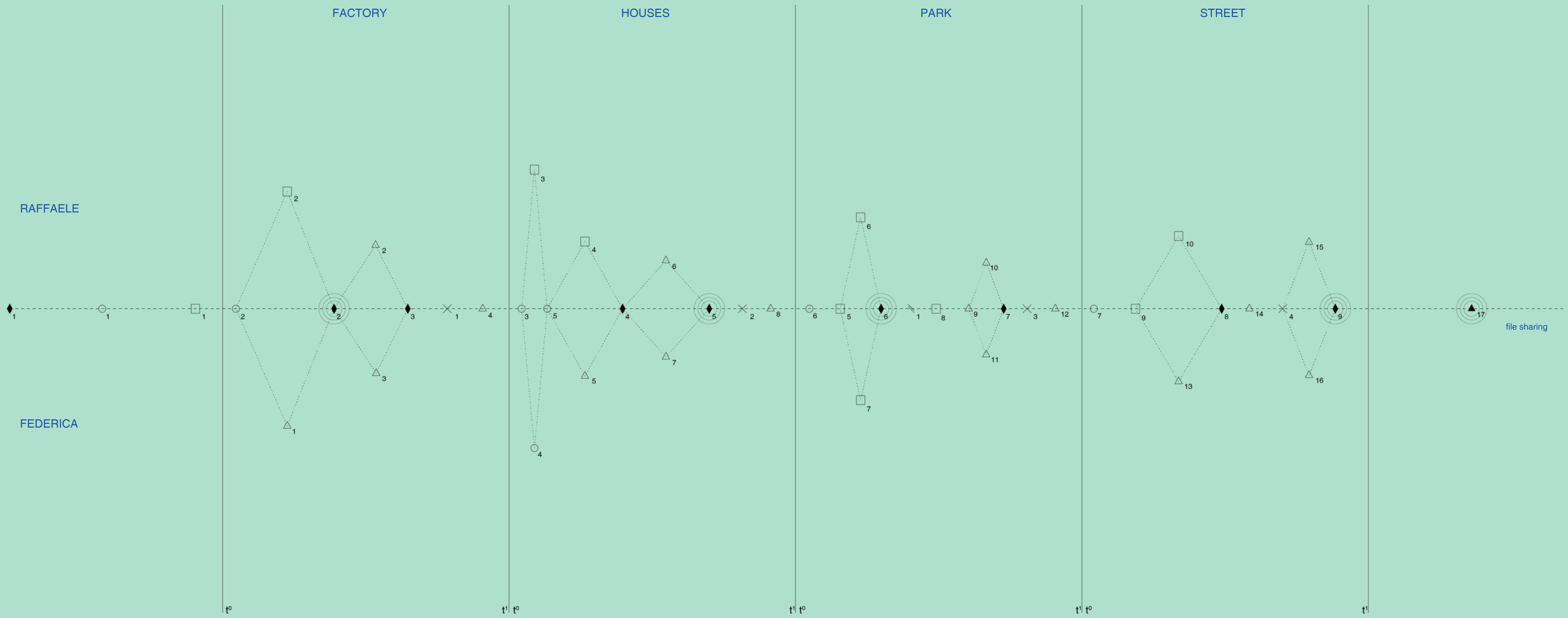
DIGITAL PROCESS

Within an era in which the tools of architecture are changing dramatically, the thesis tried to experiment with an outlined workflow capable of holding multiple fields of application together.
The goal of the thesis, therefore, was not only to achieve a specific design design, but to pursue it through experimentation with cutting-edge tools and working methods.
Architectural design today sees the union of several disciplinary fields and thus the need to be manipulated by several people with respect to different aspects.
Building on this awareness at the basis of the thesis work is the creation of a shared platform that allowed us continuous collaboration throughout the process.
The two authors of the thesis therefore also represent two possible users/professionals able to work simultaneously on the same project.
Therefore, ACC (Autodesk Construction Cloud), a platform from Autodesk that can generate a design cloud and later collaborate with various programs, was used.
The use of the server has mainly three purposes: the first is to generate a cloud in which files of different sizes can be saved having the possibility to share them with the various users, the second is based on the fact that the user has the possibility through the various drawing programs to enter inside the server and create an internal collaboration between cloud and project.
The third purpose, the main purpose behind our project, is the ability to create central working files between REVIT and ACC.
A central working file is defined as a file uploaded exclusively to the cloud in which various users can simultaneously access and make changes to various project components.
Through a series of "synchronization" operations, it is possible for each user to update changes and view them on their own device.
This generates a process in which you do not create various save files that you have to manually pass from one user to another, but you have one central file within the cloud in which continent all changes and updates.
This was the working method used within the thesis, whereby for each component of the project: PARK, ROAD, FACTORY, HOUSES, CONTEXT, a single central file was generated and inserted into the cloud.
After the modeling of all components was completed, a total file was created in which, through geolocation system, all the various files were grouped together reconstructing the project in its entirety.
As a matter of file size, the various components of the project were "linked" within the common file, so possible changes to various parts had to be made within the various central files and then refresh the link.
The creation of this work cloud also allowed us to work remotely with Prof. Peter Petschek, who was able to log into the cloud and, via an ACC preview view, review the various parts of the project by going into detail.
Within each central REVIT file, however, there is the collaboration of multiple programs that allowed us to model, on the most suitable program, the various components of the project.

DEVICE





♦$_1$ ACC platform creation
○$_1$ Finding CAD files new points
□$_1$ digital terrain model creation

○$_2$ new project plant study
□$_2$ square modeling
△$_1$ modeling architectural project
♦$_2$ merge revit architectural model and civil 3d square model
△$_2$ MEP modeling
△$_3$ structural modeling
♦$_3$ uploading to the cloud ACC
×$_1$ square stratigraphy creation
△$_4$ manholes insertion

○$_3$ new project plant study
□$_3$ study inclinations courts
○$_4$ volumetric study
○$_5$ project base creation
□$_4$ modeling plates of the courts
△$_5$ architectural modeling
♦$_4$ union plates civil 3d and architectural revit
△$_6$ union cpiatre civil 3d and architectural revit
△$_7$ MEP modeling
♦$_5$ structural modeling
×$_2$ courts stratigraphy creation
△$_8$ manholes insertion

○$_6$ new project plant study
□$_5$ extraction existing park land model
□$_6$ new terrain modeling
□$_7$ modeling artificial plates
♦$_6$ upload civil 3d file to ACC
⟍$_1$ park road modeling
□$_8$ merging roads with terrain model
△$_9$ revit file creation terrain+roads+artificial slabs
△$_{10}$ MEP modeling
△$_{11}$ architectural modeling
♦$_7$ union on central file
×$_3$ artificial plates stratigraphy creation
△$_{12}$ manholes insertion

○$_7$ new project plant study
□$_9$ path definition
□$_{10}$ road surface modeling
△$_{13}$ modeling element section T
♦$_8$ upload civil 3d and revit file to ACC
△$_{14}$ union surfaces and T element
×$_4$ road stratigraphy creation
△$_{15}$ MEP modeling
△$_{16}$ architectural modeling
♦$_9$ manholes insertion

▲$_{17}$ union of the 4 project files with the context

♦ Autodesk Construction Cloud
○ Autocad 2022
△ Revit 2022
□ Civil 3D 2022
× Infraworks
⟍ Dynamo x Revit

PARK

Starting with the park project, we see how the use of CIVIL 3D enabled the generation of the existing terrain base and then, through control of the feature lines, the modeling of the new design form.
Within CIVIL 3D it was possible to have maximum control of elevation points and thus be able to generate elevation differences and inclinations in every parameter is editable.
Within the park project, however, the collaboration between CIVIL 3D and INFRAWORKS was crucial for the design of the roads.
By entering the terrain design inside INFRAWORKS it is possible to generate the road section design and plot it in the new drawing.
In road design, an important factor during the design process is to consider carryovers or additions of soil to the sides that can ensure the correct slope of the road.
Thanks to INFRAWORKS, it was possible not only to generate the road layout but also to have full control over the elevation of the road relative to the existing terrain.
The next step was to collaboratively place the civil 3d file within the revit platform.
Through the "link topography" function revit is able to recognize the files containing the surfaces generated on civil 3d and inserted into the ACC cloud.
Subsequently, the entire architectural structure belonging to the park was modeled directly in revit by joining it to the terrain design.
Thus, a workflow is outlined in which the design arises from the combination of specific programs for specific design components, and in which all work files enter into connection with each other through the Autodesk Construction Cloud.

ROAD

Road design always arises within the digital logic expressed so far.
The use of Civil 3d allowed the creation of the road surface in which it was possible to control the two types of inclination of the road surface.
During the generation of the surfaces, the appropriate spaces were also created where the mechanized water collection system will later be inserted.
Also through the Revit feature, it was possible to insert the surfaces within a Revit work file, and later to put the surface in collaboration with the Revit manhole families.
The generation of the road stratigraphy was accomplished through the integrated use of DYNAMO, which allowed us, through the use of a special script, to automatically create the various stratigraphic packages configured as families within the Revit system.
The creation of the T-system under the road, on the other hand, originated as a manipulation of a family generated directly within the Revit platform and subsequently made to collaborate with the road design.
The same process was followed for the creation of the plaza.

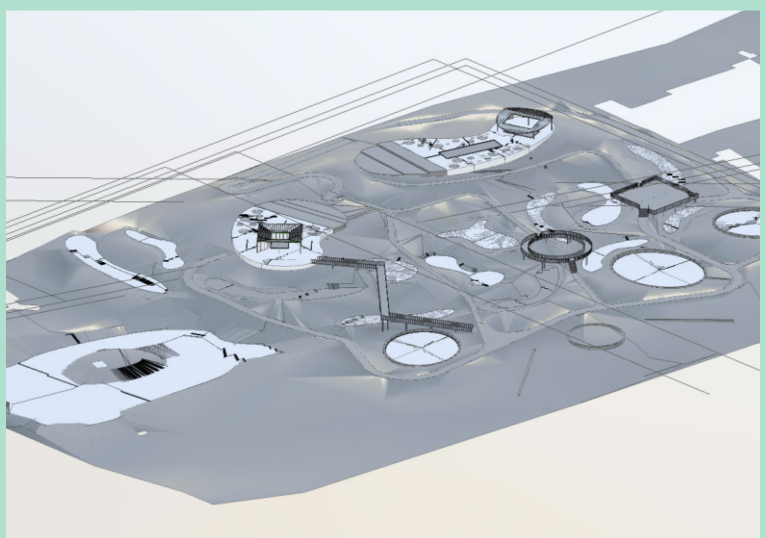
FACTORY

In the factory project, architectural modeling was carried out entirely in Revit thanks in part to the use of families that composed the new design.
After completing the architectural design, which took place within one central working model, the adjacent plaza born within Civil 3d modeling was inserted thanks to the control of feature lines.

HOUSES

The design of the houses involved the integrated use of Revit and Civil 3d, which allowed the redesign of the architectural and public space achieving a high level of detail.
The redesign of the courtyards is done on Civil 3d where modeled surfaces were created following the design of their slope, capable of conveying water to specific points.
Within the Revit world the whole architectural design was modeled which was later confronted with the plate of the public space.
Again, thanks to the use of DYNAMO, it was possible to generate the stratigraphy of the plates and then subsequently insert the plant system on Revit.
We thus note how collaboration among users and the use of different programs within a shared work cloud allowed the generation and modeling of multiple project components having different scopes and thus different workflows.

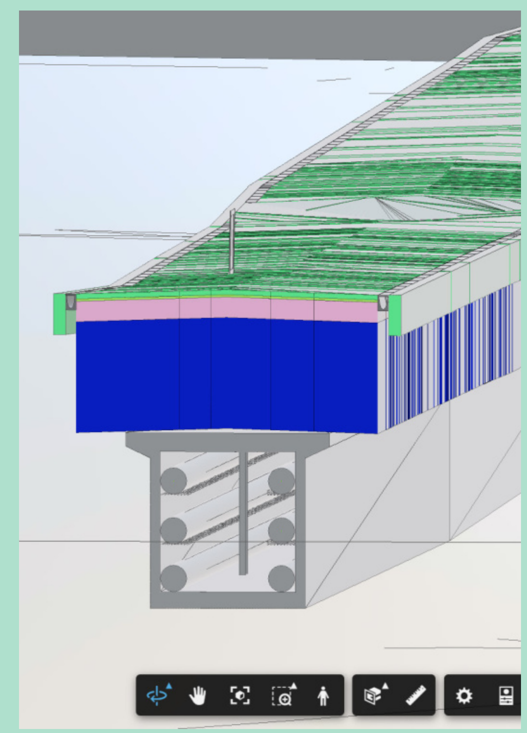
FACTORY PROJECT central.rvt



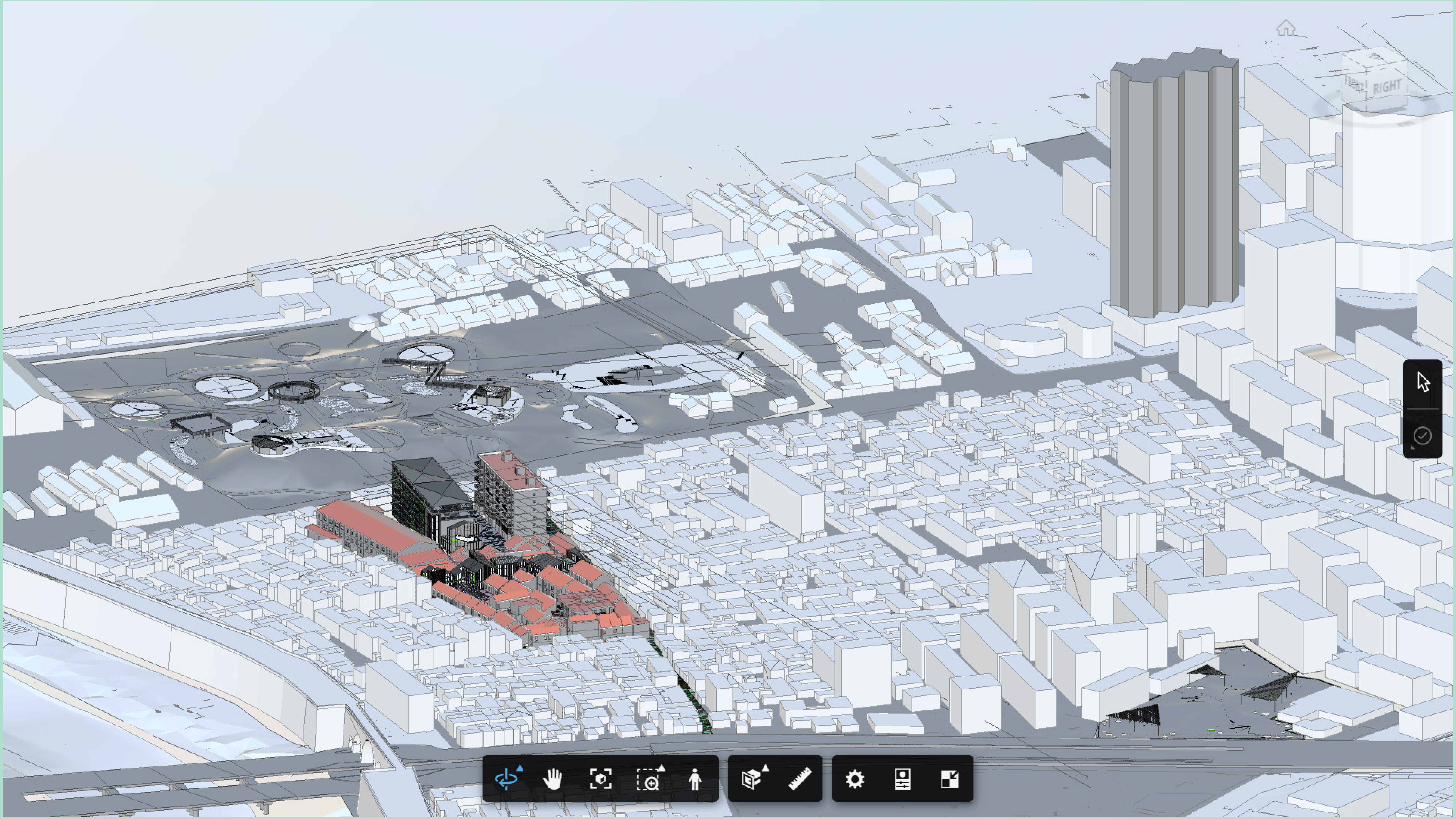
PARK PROJECT central.rvt

DEVICE

HOUSES PROJECT central.rvt



STREET PROJECT central.rvt



COMPLETE PROJECT central.rvt

ARTIFICIAL LANDSCAPE

This essay stems from the collaboration that arose between us and Prof. Peter Petschek during our double degree year in China, which allowed us to investigate the world of digitizing the terrain project.
Soil is a constant in every architectural or landscape project; every object that rests on the earth enters into relationship with the conformation of the ground beneath.
Despite its importance however, the difficulty in managing the terrain within various projects, especially architectural, tends to simplify and underestimate this element.
It is within the thesis that we have used a complex workflow capable of outlining a terrain project with the same detail as the architectural project.
Thus, a project is outlined in which the architectural component and the spatial component, in this case referring to the design of the inclination of the surfaces for water control, assume the same valence on the same plane thus generating a digital project in all aspects.
Terrain design is an essential element within any landscape project.
Although the slope of the terrain is not necessarily part of all landscape designs, every modification that the landscape architect makes undoubtedly involves a modification of the terrain, this also involves the creation of slopes.
Through the combination with the green system, terrain modeling becomes an essential element in every landscape project in more ways than one.
In the English Garden in Munich, terrain patterning draws spaces and visually imposes itself by directing the visitor's gaze, prompting the viewer to climb to the top of the hill to discover new sides of the park.
In the Italian Renaissance garden, space is generated through the definition of multiple levels through the generation of embankments and walls, generating a multi-level scenario that allows the view of its context.
The ground therefore is the basic element by nature, the element that generates the rules for everything above.
Added to light and water, soil is an essential element for plant

life, thus generating life for a system of greenery that serves for: plants to produce oxygen, plants for food generation, plants as soil protection, and plants that influence climate.
An interesting project in this regard is Ernst Cramer's "Poet's Garden" created at G9 in Zurich.
Here the design of the park represents a perfect combination of terrain modeling and the creation of an artificial platform.
The generation of these artificial pyramids induced the viewer inside what manifested as a green sculpture constantly changing with respect to different viewing angles.
Thus, a harmonious design generated solely by the manipulation of the terrain and consequently the creation of a new landscape comes into being.
Looking away from the design of the land as an element within the landscape project, we realize how the control of the land surface remains essential even in the design of man's "artificial" spaces.
The creation of road infrastructure, the generation of plazas, resting places, all cemented space necessarily sees at its base the design of its inclination, a silent and almost invisible project capable, however, of constantly making spaces usable.
As Prof. Hans Loidl says: "In the USA, grading is found in the curriculum of every accredited university. Students at bachelor level in European tertiary institutions mostly learn about grading as part of surveying classes. The importance of technical surveying knowledge and site mapping is indisputable. This forms the essential basis for all site grading, particularly since the arrival of digital terrain modeling and easy-to-use tacheometers with interfaces to CAD programs"[1] .
We then see how the advent of CAD has radically changed the relationship between planner and terrain, facilitating both its creation and management at the design stage.
The first research in the field of terrain digitization occurred in 1950 thanks to C.L Miller and R.A. Laflamme within the photogrammetry laboratory at M.I.T. (Massachusetts Institute of technology).
In 1980 mathematician and programmer Kevin Lynch developed AutoMap, based on AutoCad software.
This program was able to automatically generate interpolations of polylines based according to x,y,z axes, this can probably be considered the first software for digital terrain modeling.
The digital breakthrough behind the digitization of the terrain model comes with the invention of Feature Lines, which were also used within our project to modify the existing contour lines and consequently the terrain pattern.
As Prof. Petschek states: "Contour lines are lines that connect points of the same height above a reference surface. Their function is to map the relief of a landscape. The advantage of contour lines is that they deal in quantitative information about the terrain. Other terms for contour lines are isopleth, isoline, isogram, isarithm and isohypse. Lines beneath a zero horizon are known as depth contours or isobaths"[2] .

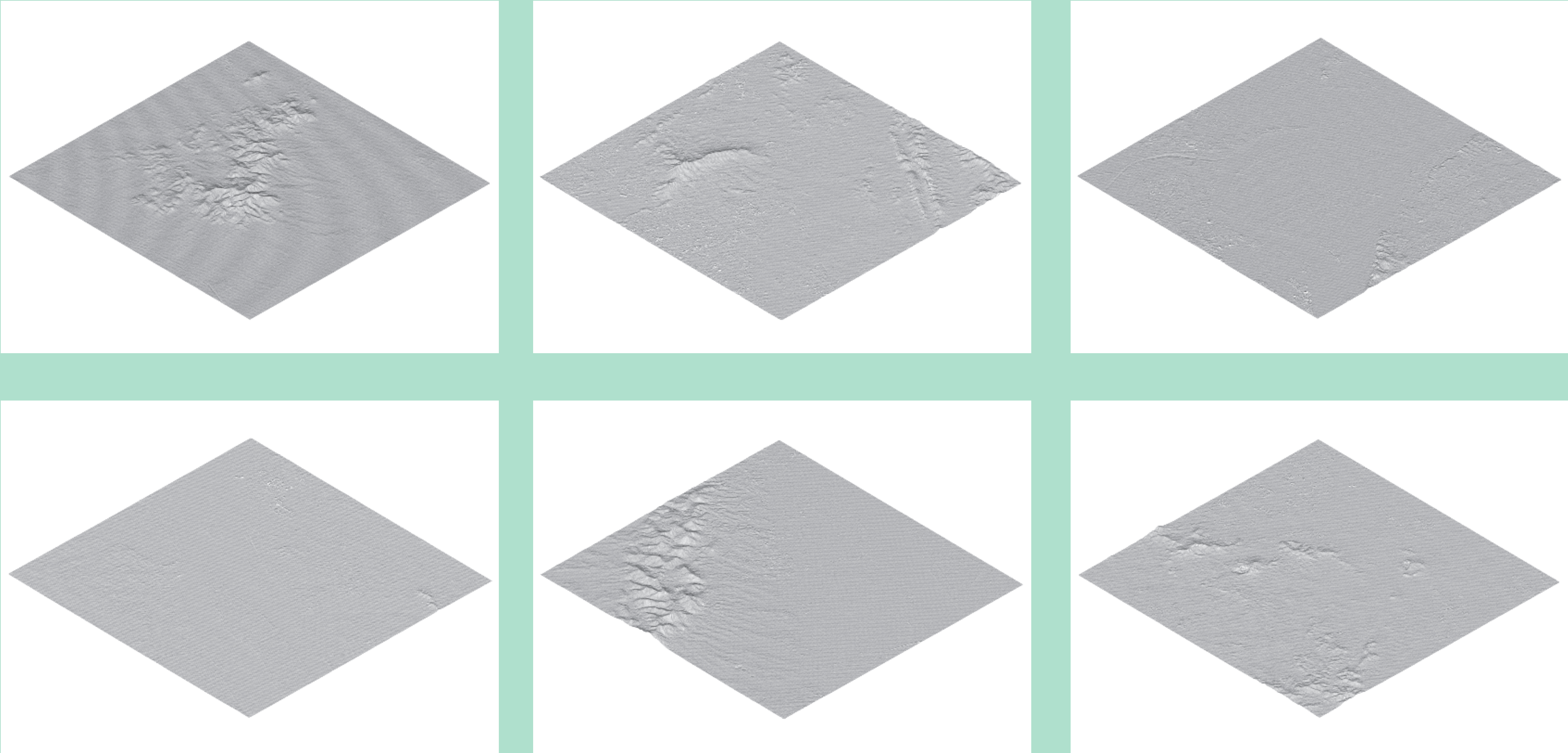
1 Petschek P., Grading for Landscape Architects and Architects, Birkhauser, Basel, 2008, p.15

2 Ivi p.19

So let us see how software development in this regard has enabled the digitization of traditional cartographic tools.
Feature lines represent the fundamental tool of what is now terrain design, capable of modeling and having control of every single new point in the new geometry.
They represent the basis of what, in 1997, would become the terrain modeling tool, CIVIL 3D.
Building on this, we thus outline the desire to investigate and experiment, within our thesis, with a workflow capable of generating a terrain model in which tilts are part of a controlled digital manipulation.
Within our project in particular, terrain modeling, later integrated with the inclusion of a plant system, was carried out by investigating the potential between surface slope and stormwater management.
The increasing imperviousness of the earth's soil combined with the growing climate emergency imposes strong rethinking on the management and design of both natural and man-made soil.
Prof. Petschek argues that: "During optimization, site grading is the deciding tool that enables the infiltration of stormwater on site. Even just by raising the levels of paths and hardscape areas, the spaces that lie between can become green areas for infiltrating and retaining rainwater. Rainwater that falls on roofs should be collected from the gutters and downspouts and not put into a concrete pipe connected to the sewer system, but conveyed in open drainage channel and allowed to flow into softly landscaped swales. Using swales and surface drain channel, the elevation of which are determined during site grading, a simple and networked infiltration system can be created"[3] .
These words are the basis for the design of the surfaces, structures modeled through a specific, state-of-the-art workflow that, thanks to the control of their inclination and the inclusion of a plant system, are able to generate rainwater recovery and redistribution.
Landscape design, as a discipline, has only recently begun to adopt BIM.
The delay is due to the fact that most BIM tools have not been designed for on-site work, such that many landscape companies continue to shy away from switching to these more advanced technologies.
This thesis therefore aims to disrupt this paradigm by integrating normal CAD programs within a more complex BIM workflow.
Thanks to the unfolding of the process within a BIM workflow, it was therefore possible to relate the various functionalities of the various programs in such a way as to be able to unite terrain generation with architectural generation.

3 Ivi p.105

DEVICE



The initial phase of digitizing the terrain required several trials to try to observe the degree of detail achievable.
Through the construction on QGIS of a new of points born from a DEM file, we tried to reconstruct portions of the Nanjing terrain to observe how the transformation of the file from DEM to new of points behaved in which we assigned Zs for each point.
As can be seen from the 6 samples, in the sections where the morphology becomes more severe the new of points was able to reconstruct the mountain ranges or draw the river hollow.
As mentioned earlier, the use of this technique was not possible within our project area because the elevations of elevation differences did not reach differences that could be calculated within the new of points

WORKFLOW

LEGEND

(process step number)

PROCESS STEP NAME

Frame taken at the time of the passage

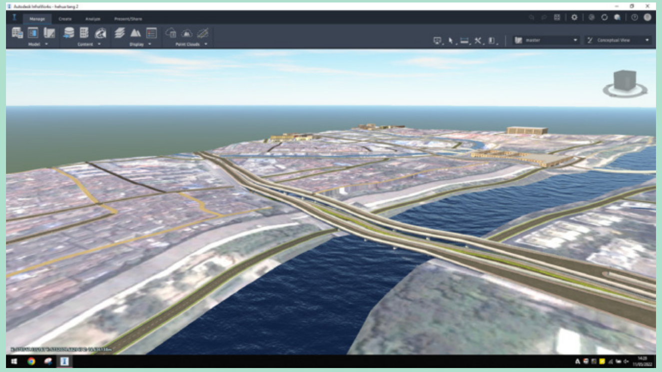
explanation of the passage shown in the image

program names used for this step

Notes regarding problems encountered during the course of the passage

Architecture today is created through digital flows whose purpose is to minimize the gap between model and realized object.
Here we aim to make explicit the digital process behind the design, Especially we want to highlight how the final result arises from the interpolation of multiple programs and disciplines put in relation to each other.
The application of this certain workflow proved difficult in China as it requires a large sum of information, so the final result arises from a sum of multiple attempts to achieve the best possible degree of data accuracy that can generate a realistic digital model.
The first goal was to try to generate a model of the existing terrain on which to then base all our design, architectural and otherwise.

(01)
FIRST ATTEMPT LAND GENERATION

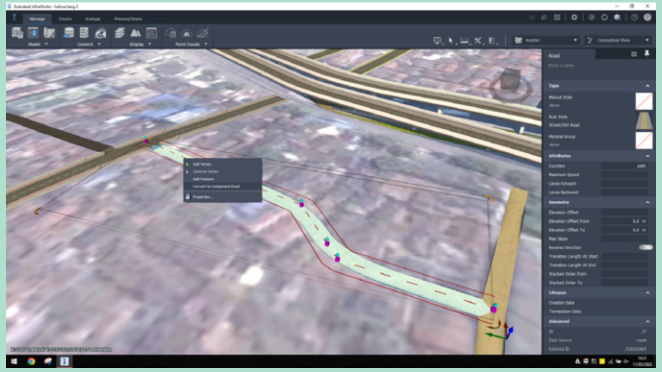


Program: INFRAWORK

in the absence of terrain-referenced data, the first attempt was to generate a possible digital model through MODEL BUILDER, a function within infraworks that can regenerate the existing terrain and roads of specific portions of the territory.

one problem encountered relates to the accuracy of the terrain, which is incorrect in some places. In addition, the structure of the bridge follows incorrect landforms, which have steeper slopes than normal

(02)
CONTROL ROADS GENERATED

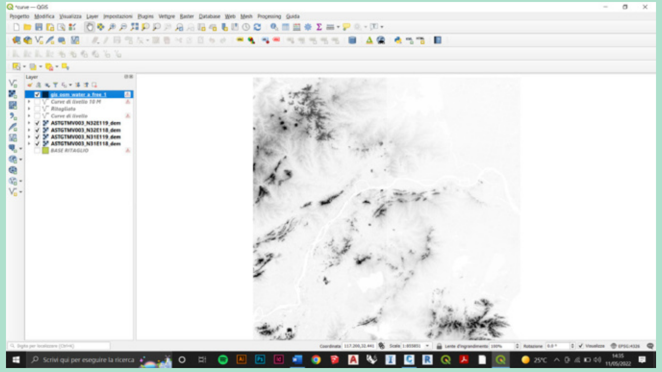


Program: INFRAWORK

an important check we performed was related to the usability of the roads, as we wanted to understand whether it was possiblèe to reuse them at a later time.
The roads generated matched only for the main axes and had approximate road sections.

The roads result illegible and unusable successively if you do not first make for each individual portion the command “ convert to component road”

(03)
SECOND ATTEMPT VIA DEM FILE

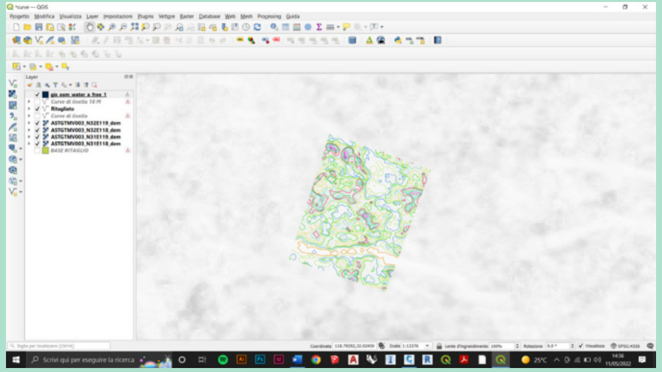


Program: QGIS

the second attempt arises from the summation of 4 DEM files to try to extract the contour lines of our project area. In order to have a more reliable result, we have accentuated the color contrast so that we have more correct and readable elevation differences

DEVICE

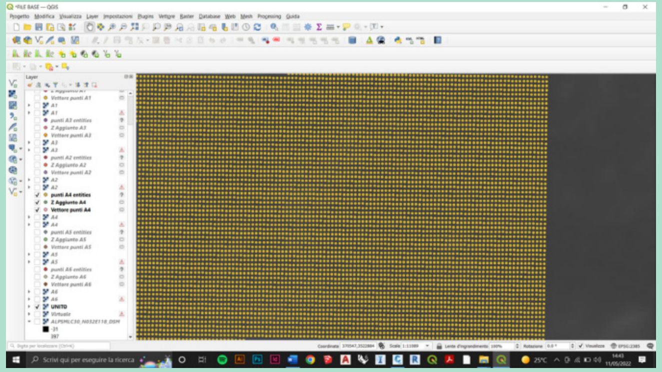
(04)
CONTOUR LINE GENERATION



Program: QGIS

file generates the curves correctly but with relative accuracy. Our project site has slight elevation differences that the source DEM file does not read because it has a different scale

(05)
POINT CLOUD GENERATION

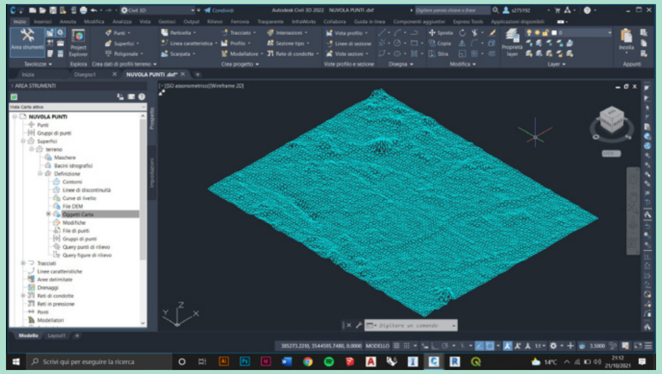


Program: QGIS

to achieve a more accurate result, we tried to generate a new of points, each point corresponds to a pixel in the DEM, and at that point, using a function in QGIS, we extracted the Z so that we have the terrain conformation

The operation is very complex for the PC, so only small portions of the territory have to be selected

(06)
POINT CLOUD IMPORT ON CIVIL 3D

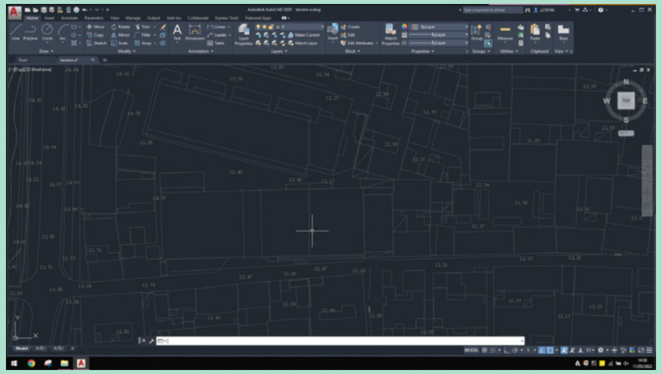


Program: CIVIL 3D

once the point file was generated we created the surface on civil 3d, managing to generate a more accurate terrain model than the previous ones in when we start to glimpse the riverbanks.
The file, however, turns out to be unreliable

A basic problem that makes the model unusable is that the basic DEM file also reads the height of the buildings, in fact you can see that in the civil 3d file there are bulges that are not part of the terrain but rather just the incorrect reading of the building heights.

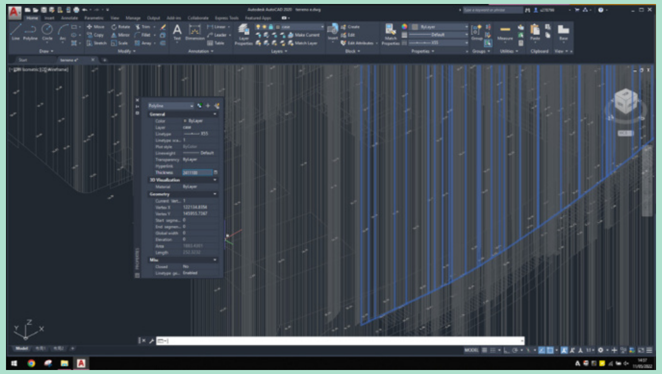
(07)
CAD FILE WITH ELEVATION POINTS



Program: AUTOCAD

once we obtained the cad file related to our project area we saw that within it were the elevation points with the highest degree of detail, the file formed the basis for the entire subsequent digital terrain generation process.

(08)
CAD FILE LINE THICKNESS

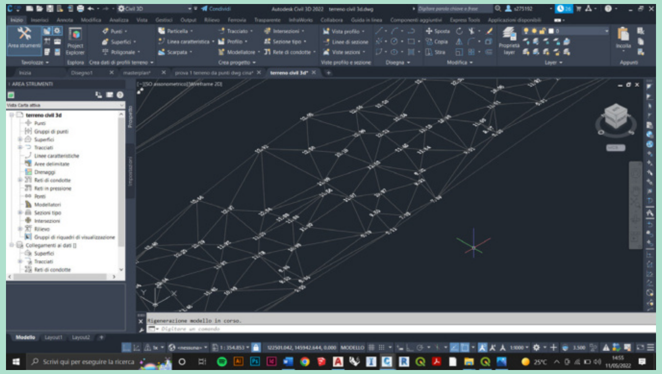


Program: AUTOCAD

the cad file if put in axonometry shows how the lines are all extruded at different levels and so at first it is unusable.
Actually this thing is due to the thickness of the lines, you only need to change the thickness to bring everything back to level

the different thickness of the lines is given by a series of information they contain, through a dynamo screept it would be possible to decode them but it is not relevant for our project

(09)
TERRAIN GENERATION BY ELEVATION TEXT

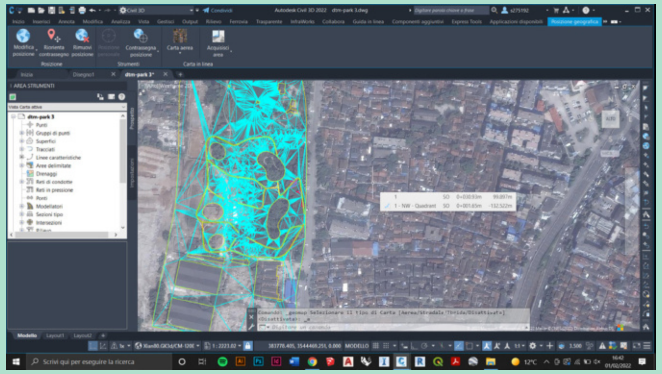


Program: CIVIL 3D

Once we imported the CAD file on civil 3d, we selected only the elevation elevations going to generate a triangulation that reproduces the existing terrain.
This time the terrain reports a high degree of detail managing to reconstruct the river margins and the existing park elevation difference.

The elevation points in the cad file are text elements, so the creation of the surface is done by joining text elements at different elevations.

(10)
GEOLOCATE THE TERRAIN



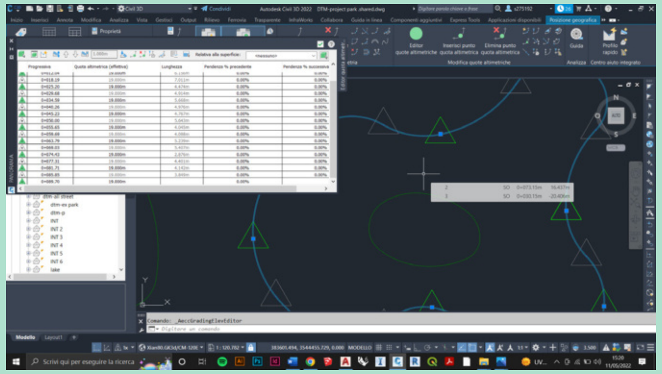
Program: CIVIL 3D

the second step after generating the terrain is to geolocate it.
Since the project area is in China, the reference system used was:

EPSG:2385-Xian 1980/3-degree Gauss-Kruger CM 120E

Let's see how the terrain reports correctly with respect to the geolocation set on CIVIL 3D

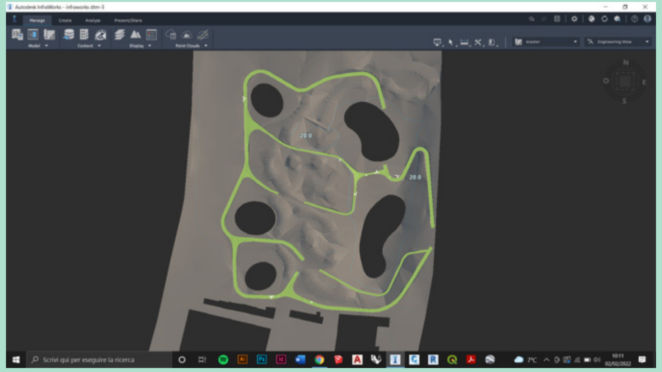
(11)
MODELING BY FEATURE LINES



Program: CIVIL 3D

Modeling of the terrain, and of the subsequent artificial plates, is done through the generation of feature lines that allow the control of level points that can then reshape the existing terrain with respect to the new elevation

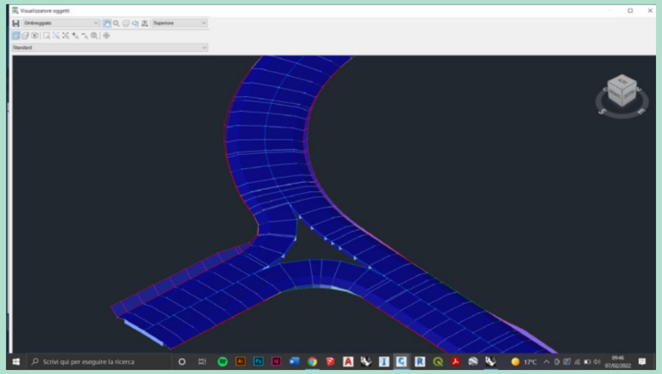
(12)
GENERATION PARK ROADS



Program: INFRAWORKS

Road generation is done on infrawork where the park project model is uploaded and then the roads are plotted.
Using infraworks, one can easily manage the road section and the degree of land fill or land grab to generate the new road

(13)
IMPORT PARK ROADS

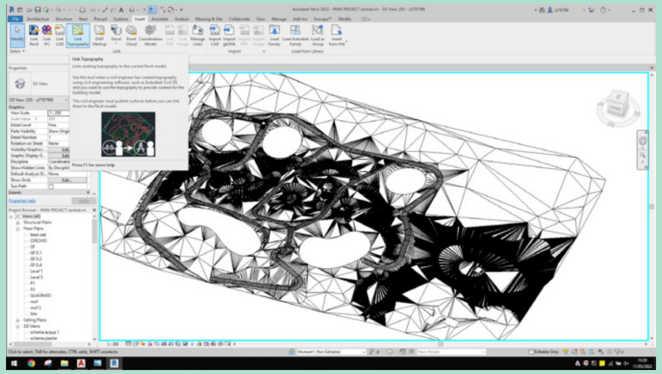


Program: CIVIL 3D

once the roads have been imported to civil 3d we can see how the model recreates the road section and laterally the land fill needed to create the layout.
The next step is to create the interpolation between the existing terrain and the new road axes to generate the final terrain model

Roads imported to CIVIL 3D do not read the intersections generated by INFRAWORKS, creating gaps.
For this reason, it is necessary to reconstruct the intersections at a later stage on SICIL 3D

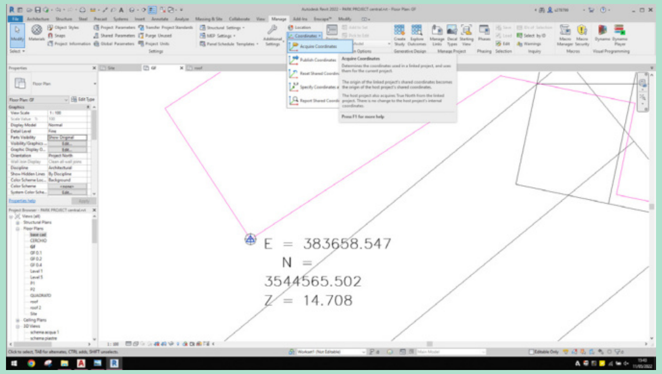
(14)
IMPORT TOPOGRAPHY IN REVIT



Program: REVIT

Underlying the whole revit process is the creation of a file sharing platform on ACC(autodesk construction cloud) where all the core files are generated.
Once the terrain file is uploaded to ACC, via the LINK TOPOGRAPHY command on REVITitis possible to have CIVIL 3D surfaces collaborate with REVIT

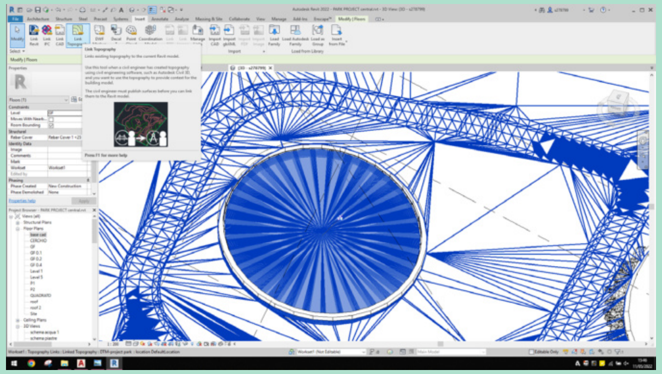
(15)
GEOREFERENTIAL IN MODEL ACCORDING TO XYZ AXES



Program: REVIT

via CIVIL 3D we selected a coordinate reference point that would represent the point to later merge all the different revit files.
Once the point was imported to REVIT via “acquire coordinates” we then subsequently moved the model to the reference point

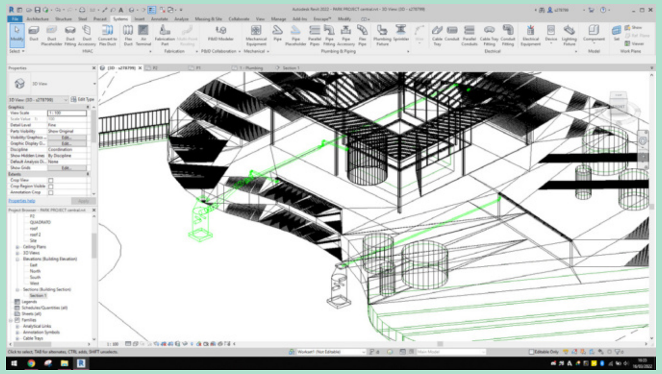
(16)
IMPORT PLATES PARK



Program: REVIT

the same process is carried out for the park’s hard plates, which, also generated on CIVIL 3D, are imported into the previously modeled park to accommodate the artificial plates

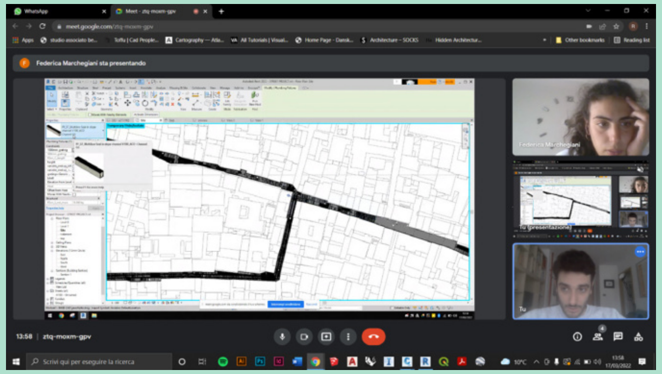
(17)
PLANT MANAGEMENT PROJECT



Program: REVIT

Through collaboration with the company ACO, we obtained the families of some manhole cover models that we subsequently incorporated into the project.
The plant model does not represent a final model, but a design hypothesis

(18)
ROAD PROJECT CREATION

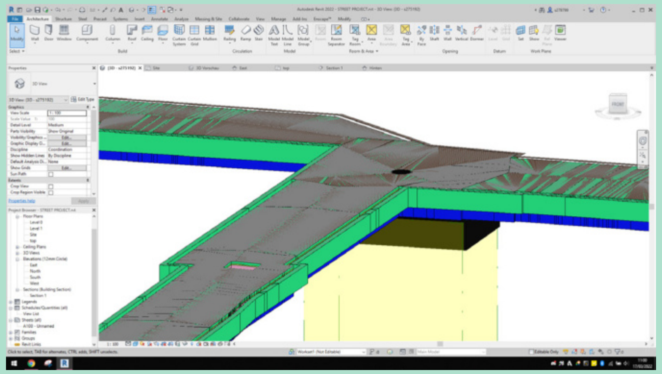


Program: REVIT

Another important step before architectural modeling was the generation of the streets.
The design is created on CIVIL 3D where the surfaces are modeled and the spaces are created, which will be filled later on REVIT by inserting the facilities.
The surfaces of the streets resume the shape of the existing layout, not touching any buildings

(19)

IMPORTING ROAD SURFACES TO REVIT

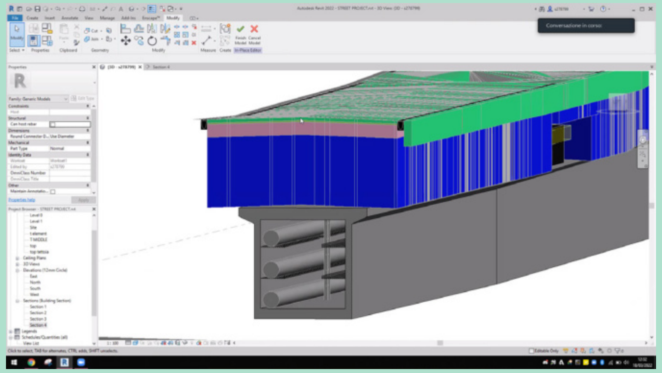


Program: REVIT

subsequent to importing the surfaces to REVIT, and geolocating them with respect to the rest by design, through a DYNAMO script it was possible to generate the stratigraphy by managing both material and thickness. The script was also needed to generate the side curbs that run along the entire road project

(20)

T SECTION GENERATION

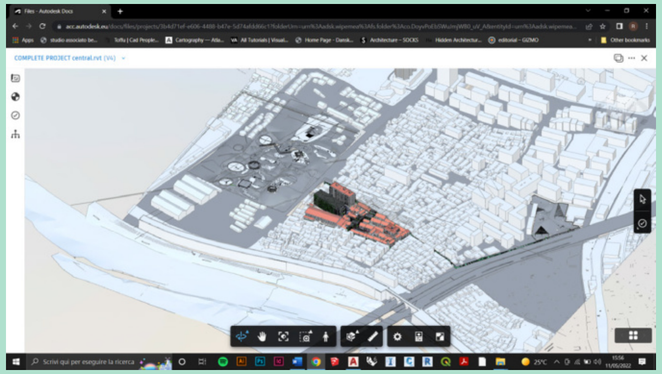


Program: REVIT

After generation of the stratigraphy, we inserted the families of the road water collection facilities.
The T element that lies below the road was generated directly on REVIT and placed below the road surface.
Obviously, the road surfaces generated on CIVIL 3D already had the holes prepared for tunnel access

(21)

FINAL FILE CREATION

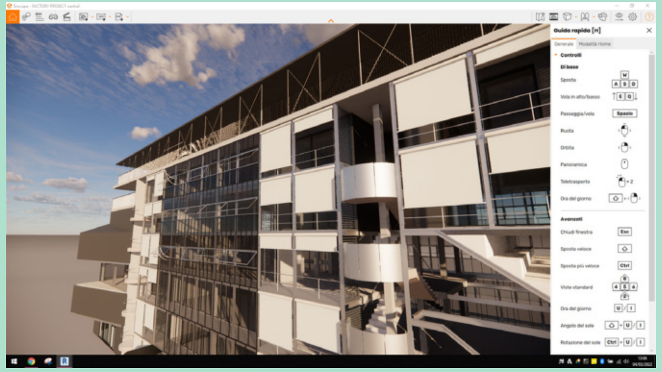


Program: AUTODESK CONSTRUCTION CLOUD

Once we had modeled all the components of the project, architectural and non-architectural, in individual central models, we merged all the components into a single file going on to generate on ACC a cloud model representing the total project

(22)

RENDER GENERATION



Program: ENSCAPE

The creation of the design images was done through ENSCAPE, a plug-in that allows strong compatibility with elements in REVIT

One problem encountered was related to the attribution of material to plates generated on CIVIL 3D and subsequently imported to REVIT, the program could not attribute this information

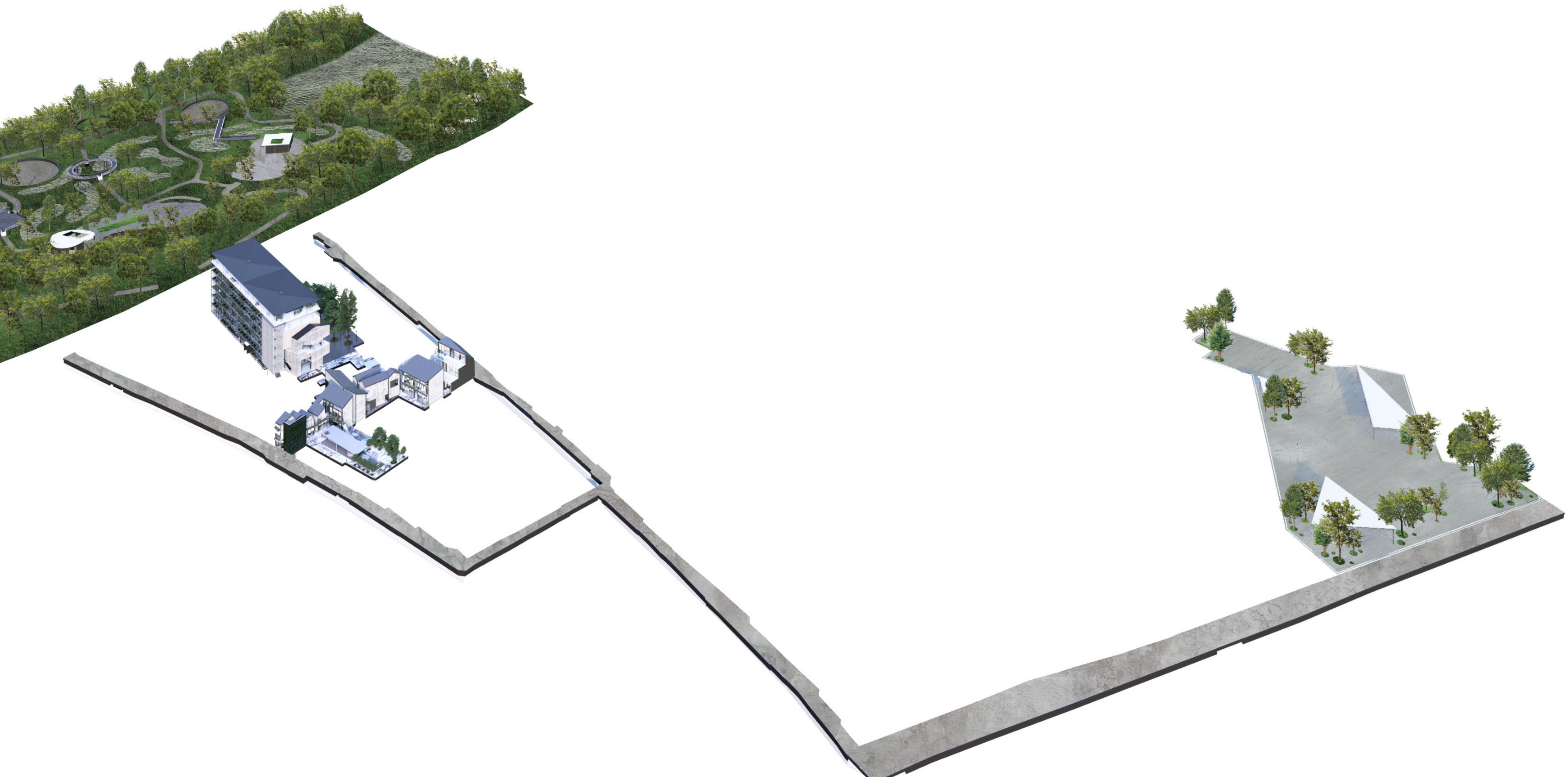
DEVICE

As can be seen, the project is based on a specific workflow focused on the collaboration of multiple programs.
Through the interpolation of CIVIL 3D and INFRAWORKS, it is possible to generate with extreme precision a digital terrain model on which the user has control of each individual elevation and slope.
In addition, even the design of the road, based mainly on the management of various slopes and the application of water collection facilities, was carried out thanks to this type of workflow that is difficult to reproduce through the use of REVIT alone.
Underlying the project is also the creation of a cloud(autodesk construction cloud) in which to generate central work files on which simultaneous work can be done, reducing modeling time.

PROJECT

MANIFESTO

HUMAN DEVICE was born from the union of two different fields of application: on the one hand, the typological study as a cognitive tool of the spatial rules that characterize the use of the city of Hehua Tang, and on the other hand, the awareness of the transformation taking place behind the world of design tools that increasingly aim at the technological sphere, selling in BIM technology a complex and structured workflow capable of generating detailed results.
Starting from these two tools, one theoretical the other technological, the city of Hehua Tang becomes an experimental field where to try to generate a project that, starting from the reinterpretation of society and its settlement rules, becomes a digital project capable of responding to further problems.
The aim was to test the technological process on the resolution of a specific issue, water management in China, and more specifically on the issue of water scarcity and reuse.
Thus we see forming from now on a project that always presents a duality in each of its parts, on the one hand the generation of a master plan that, starting from the reading of the problems of Hehua Tang, creates a spatial scenario that aims to increase the quality of life of the population, and on the other hand a silent project that using the same spaces aims at the collection and reuse of water within a city in which the water issue is of fundamental importance.
Based on these assumptions, the form of the master plan is generated that forms the basis of the city's regenerative process, centered on the idea of triggering a present-day process that lays the foundation for the revival of the fabric of Hehua Tang in multiple time phases.
The Hehua tang city presents itself as a gate community with respect to its urban context, generating different relationships on its four different edges.
We then observe how the master plan places its extremes outside the compact fabric, establishing a process that attempts to disrupt this system and aims to create a connection between the city's interior and exterior.
Cutting across the city from right to left, the plan connects Nanjing's two main axes, on the one hand the commercial system represented by Zhongshan Road that sees the reuse of an artificial impermeable plate, on the other side the appendage of a green system that runs along all the walls of Nanjing up to Hehua Tang.
The architectural regenerative process is focused on a specific portion of the city that becomes the experimental field for rethinking recurring themes in multiple parts of the fabric.
The factory represents the dimensional object mark that, being part of the rapid destruction of Hheua tang, contrasts with the architecture of the historic fabric.
It is within this contrast that the project seeks to rethink the relationship between the two elements from both architectural and spatial perspectives.
At the same time we observe how the same form of the masterplan forms the basis for the water collection system, with the purpose of fitting within Hehua Tang by generating future scenarios.
The two extremes of the masterplan, the plaza and the park, here become the head and tail of a system that sees a process of water collection, purification and redistribution within hehua tang.
Here the street reveals its multilayered nature, on the surface an attempt to reconstruct what represents the largest community space in Hehua Tang, and in depth the creation of a plant system that, by connecting the two extremes, creates the basis for the redistribution and collection of water.
HUMAN DEVICE thus constitutes itself as a "parasitic" project that, starting from the extremes, fits within Hehua tang generating a process that creates scenarios always containing two aspects, the social/spatial and the technological.

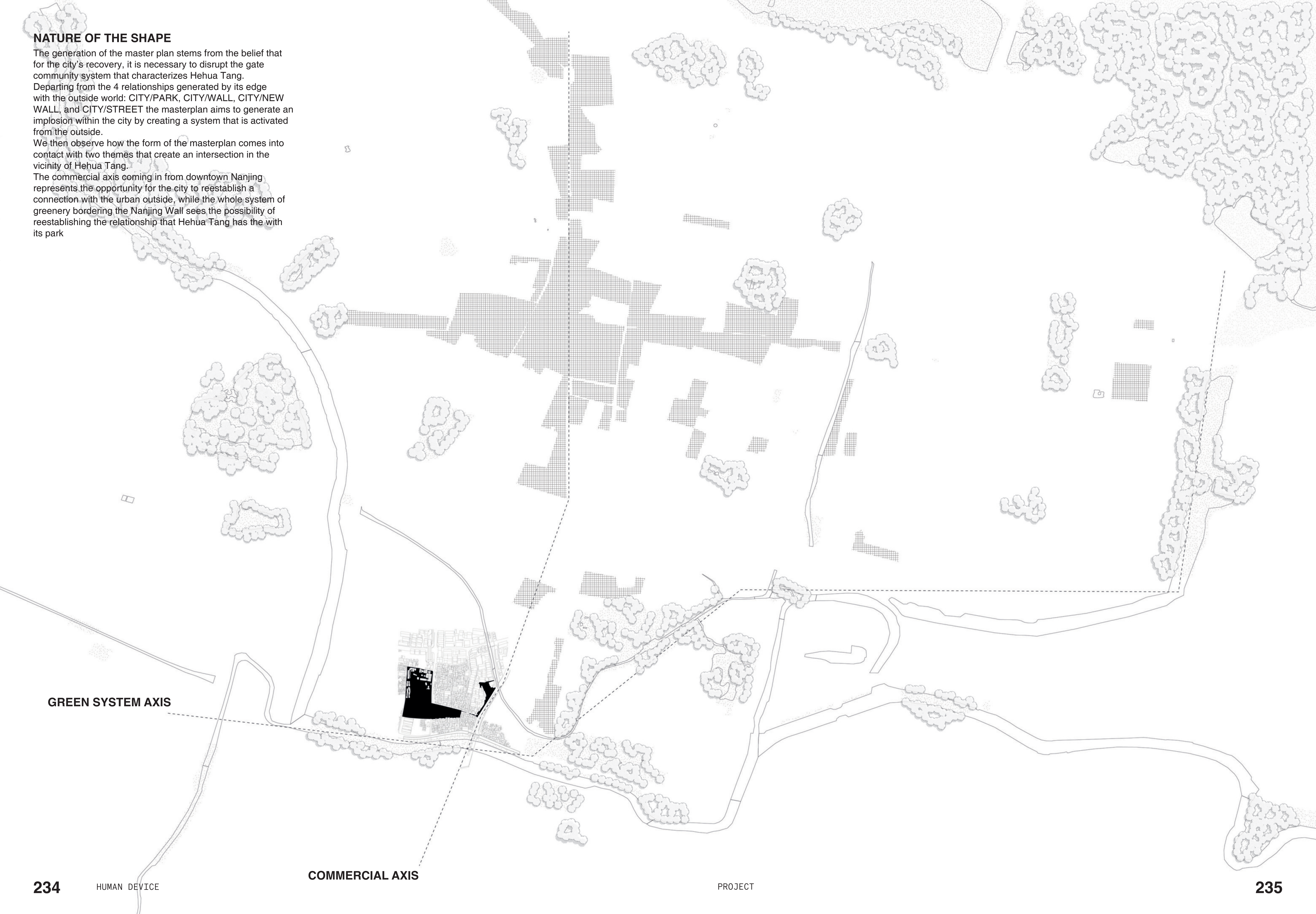


The project is made up of elements of different natures and entities that, by entering into relationship with each other in a single system, generate a process that can create a rethinking for the city of Hehua Tang in multiple aspects.

0
10
20
30
40
50 m

NATURE OF THE SHAPE

The generation of the master plan stems from the belief that for the city's recovery, it is necessary to disrupt the gate community system that characterizes Hehua Tang.
Departing from the 4 relationships generated by its edge with the outside world: CITY/PARK, CITY/WALL, CITY/NEW WALL, and CITY/STREET the masterplan aims to generate an implosion within the city by creating a system that is activated from the outside.
We then observe how the form of the masterplan comes into contact with two themes that create an intersection in the vicinity of Hehua Tang.
The commercial axis coming in from downtown Nanjing represents the opportunity for the city to reestablish a connection with the urban outside, while the whole system of greenery bordering the Nanjing Wall sees the possibility of reestablishing the relationship that Hehua Tang has the with its park



WATER MANAGEMENT MASTERPLAN

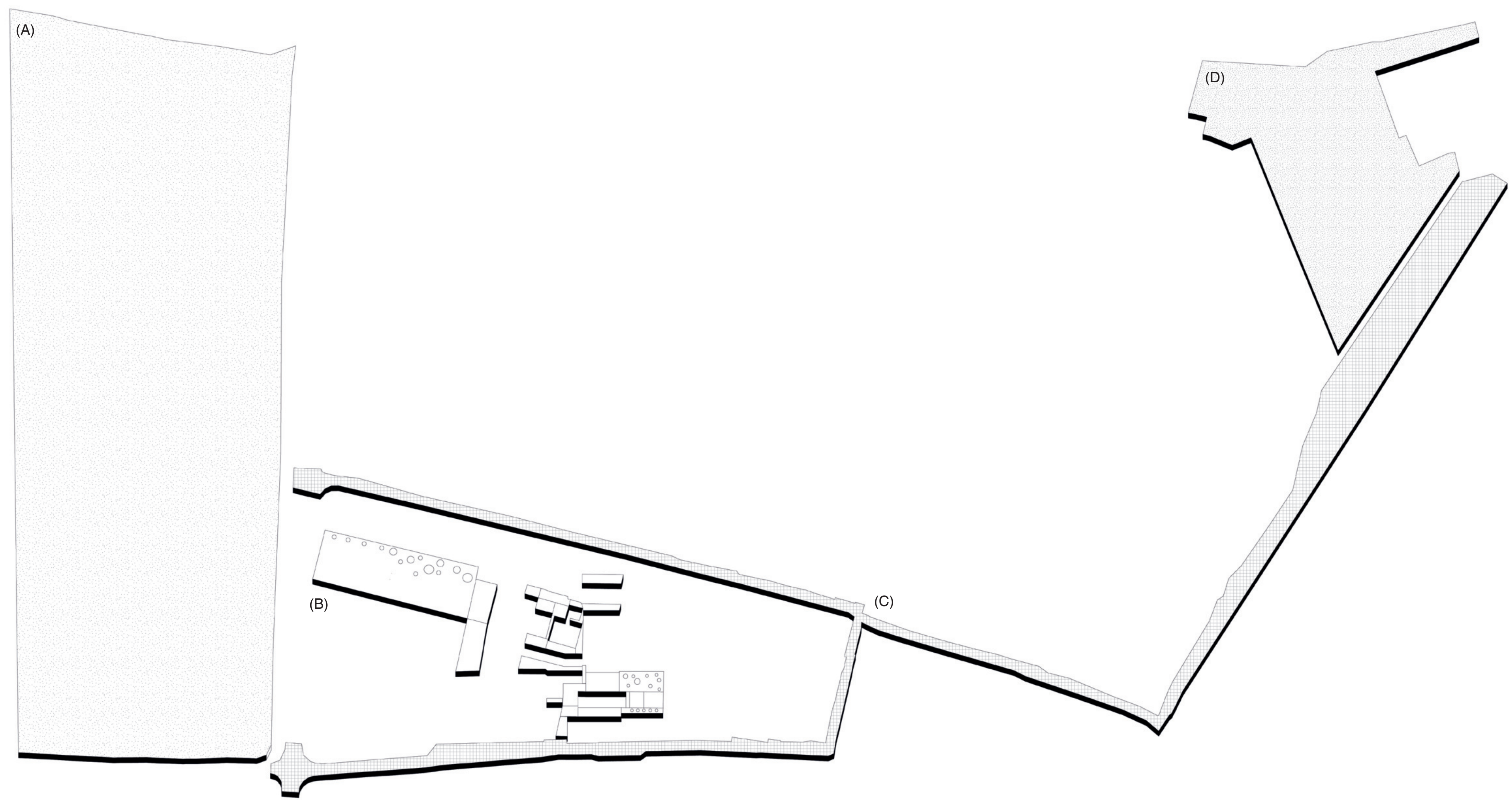
The issue of water system management in cities such as Hehua Tang is one of extreme importance and complexity, which, given the density of the urban fabric, makes solving the problem difficult. Within the process for water management, the master plan is schematized into plates considered for their potential to collect and not as a use of public space.
We then observe how the different plates of varying size and materiality enter into relationship with each other generating a system within a closed circuit, but one that is potentially capable of restoring, from a water point of view, the recovery of the entire urban fabric with which it comes into contact and not only with the part rethought within the project.
The water project therefore sees the combination of two tools, on the one hand slope management as a soil project, and on the other hand the application of specific devices for water collection and reuse.

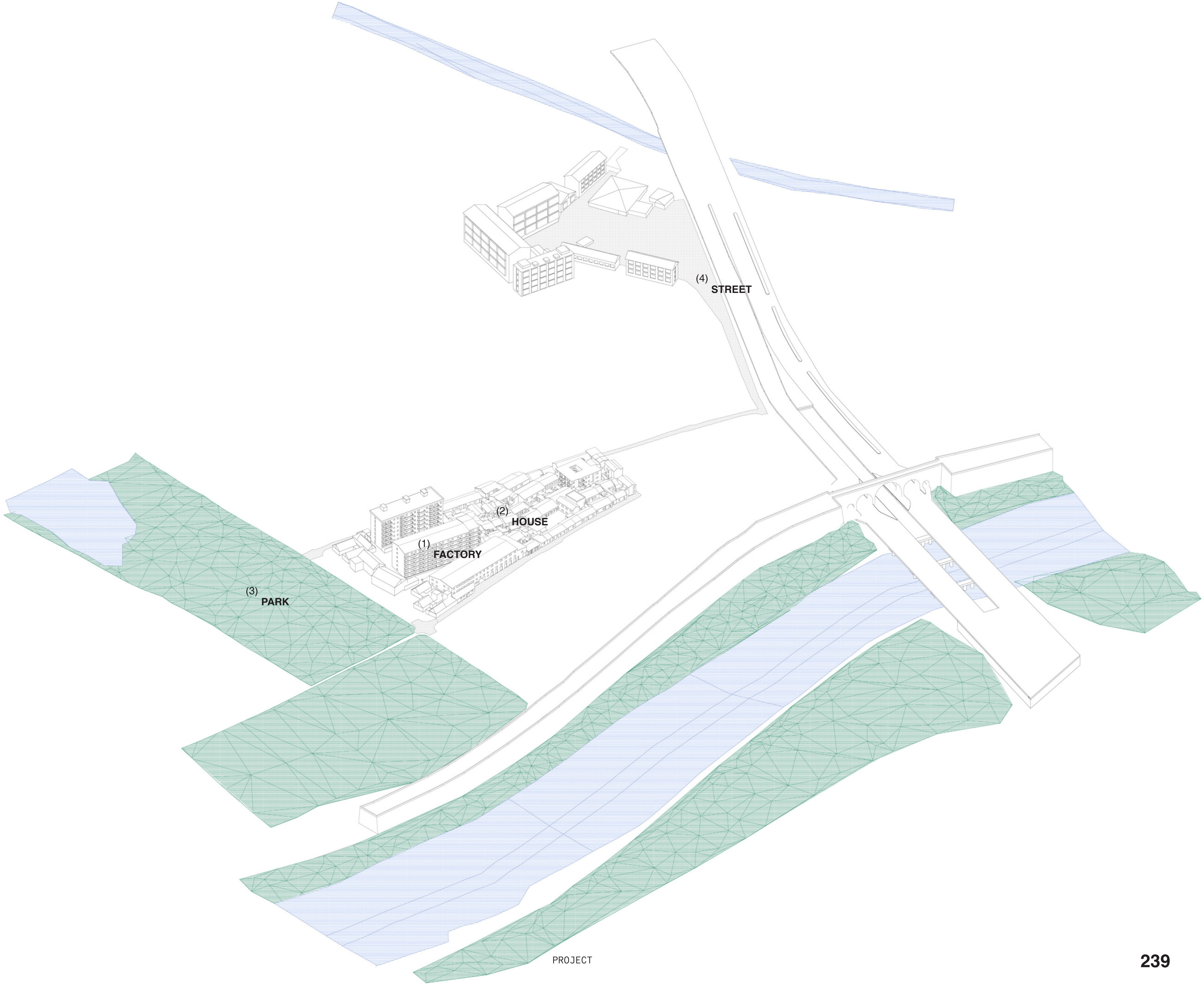
(A)
PARK: The park plate represents the tail end of the water system. Taking over an existing green area, it is rethought as the terminal part of the process that by having the city's water enter on one side, through a system of multi-level phyto-purification tanks, the water converges on the opposite high by reinserting itself within the urban water system with a higher quality than when it entered.
In this case, water management is done through the modeling of the land and artificial plates that can transform into water collection vessels.

(B)
COURT: The system of courts is designed as a consequential system of plates that individually converge each to its own center. In this case, slope control was combined with the application of a well-structured water system.
All the plates have a point collection system that feeds water into the general pipe system connected at the two ends of the project and consequently connected at two points with the road.
This also allows reuse of all water collected within the design of the courts, a primary element in Hehua Tang's rethinking.

(C)
STREET: The street design becomes the joining element of all the different types of plates, generating a circular flow that connects the head and tail of the system.
Starting from the plaza, the road penetrates the fabric of Hehua Tang by tracing some existing main axes, grafting a surface capable of channeling and collecting water by controlling the slope and inserting water management elements.
At the end, the road connects in two places with the park plate by having a dirty water intake pontoon and a clean water extraction point to put back into circulation.
Underneath the road, a section was designed that can contain the city's facilities and at the same time be inspectable through multiple accesses distributed on the surface.

(D)
PLAZA: The plaza represents a hyper object in total contrast to the dimensions of Hehua Tang.
In the water design, however, it represents the head of the system, a large permeable plate that becomes a collector of water that will feed back into the city.
Water is again collected through slope control and the insertion of water features.
The plaza exploits a pyramidal principle, having at the center the highest point all the water converges at the foot of the plaza where there is a linear system of manholes connected with the street structure.




(4)
STREET
(2)
HOUSE
(1)
FACTORY
(3)
PARK

FACTORY

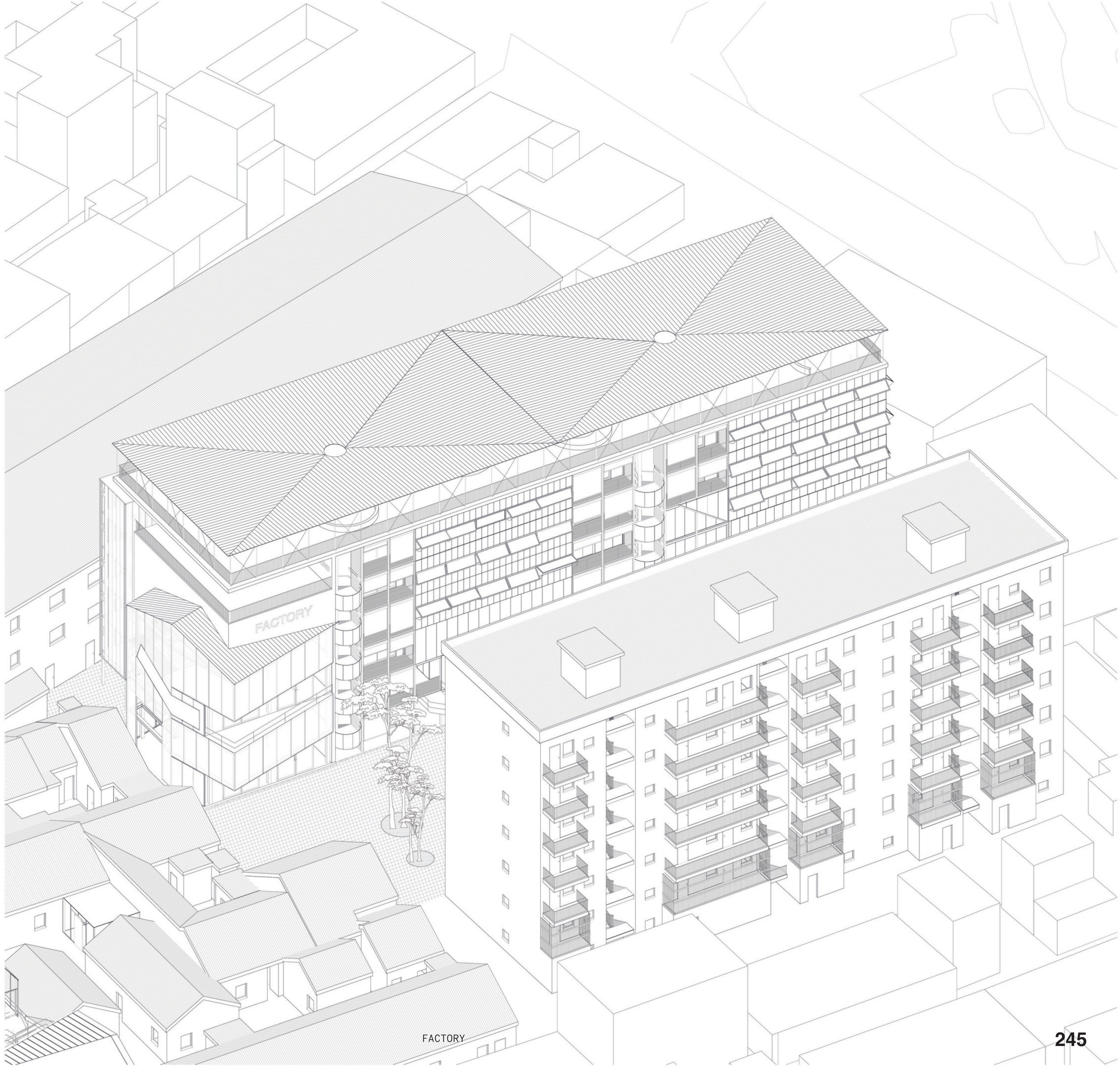
The factory is established within Hehua Tang as an avulsed object, totally at odds with the spatial logics that characterize the fabric, thus generating a disconnect at the urban level.
The project therefore aims to rethink this relationship, regenerate the spatial relationship while keeping the factory at the center of the project as a macro object within the dense fabric.
The plan thus becomes a tool for reinterpreting the urban layout, the basis for redefining the spatial circuits between the city and the factory.
The elevated, on the other hand, starting again from the original structure, aims to restore the existing volumetric relationship by generating a technological superstructure that aims to improve the spatial quality of the interior spaces.
A design strategy is thus defined that on the one hand aims to rethink the factory within the logic of Hehua Tang and on the other hand aims to accentuate this characteristic of the factory as a macro object by placing it as a centrality and a catalyst point for public functions and community spaces.

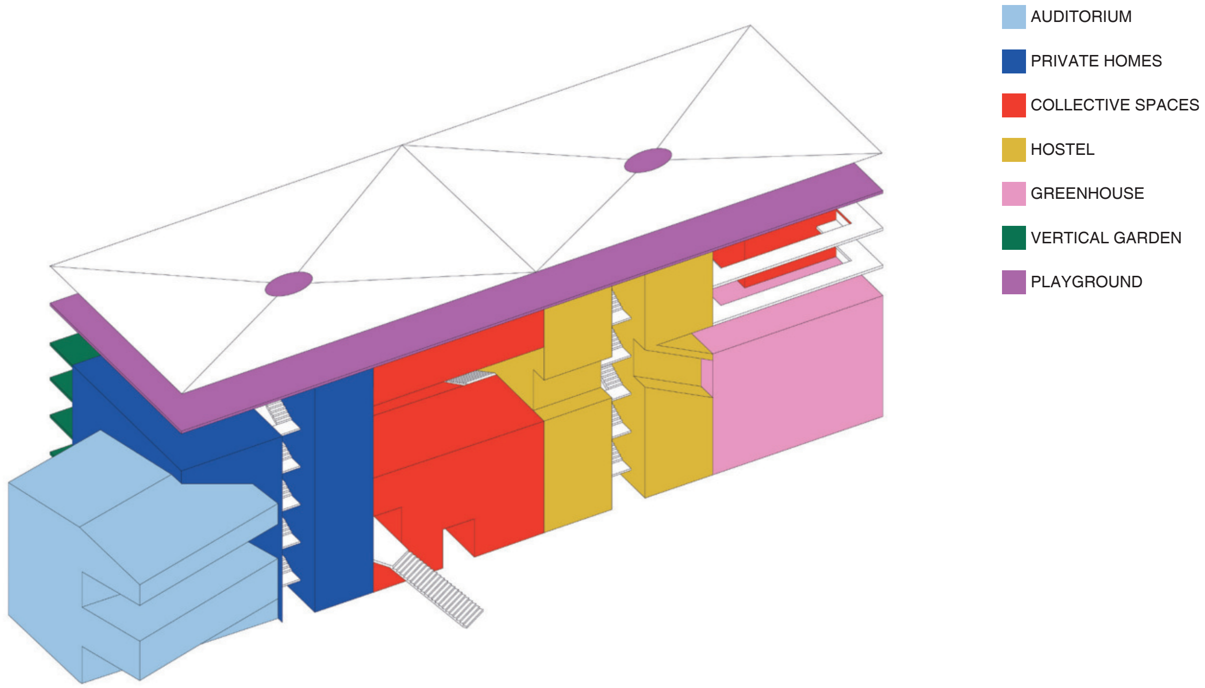
The design of the factory is that of an inclusive space, a place that aims to become a centrality not only within Hehua Tang, but also to be part of the design of Nanjing's future scenarios. Starting from a rethinking in typological terms, the project is shown as a technological device in which the elevation becomes a kind of membrane that adapts and transforms itself in accordance with use and external conditions.
Thus, a project is outlined that, having at its basis a critical reinterpretation of what are the uses and rules of space construction in Hehua Tang, wants to reinvent itself in a technological key by placing itself at the center of the city's future.

FACTORY

CONNECTIONS

Restoring the original volumetry, the project is characterized in its four sides generating different connections and themes with its context.
Toward NORTH, the main elevation relates to the new public space by differentiating private from public spaces in the façade, toward SOUTH the creation of a continuous and openable membrane as a function of the new vertical greenhouse for the community, toward EAST the theme of fragmentation and rotation of the façade that relates the factory to the urban layout of Hehua Tang, and toward WEST the creation of an urban greenhouse that marks continuity with the park.



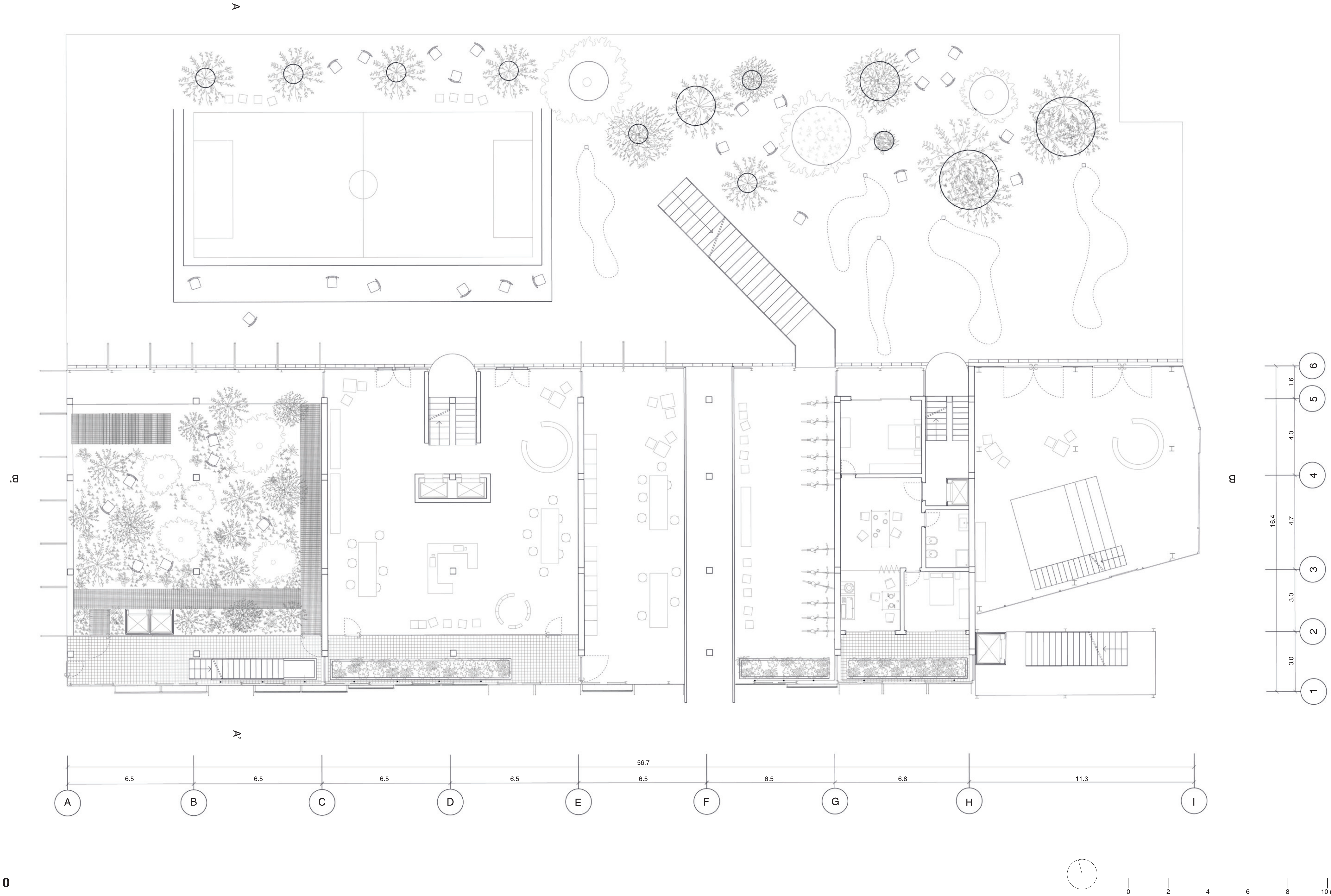


The public space of the factory enters into relationship with the public space generating a continuity between the interior and exterior.
The auditorium, developed on several levels, opens toward the square just as the distribution of the interior public spaces exits the body of the building creating the entrance into the center of the new public space.

MULTIFUNCTIONALITY

The pivotal point in transforming the factory into a key element within community spaces is its being multifunctional.
Starting from its original function, the goal was to create an object that could incorporate in the same place the private and public lives of the inhabitants of Hehua Tang, generating places that recall some ongoing social issues within the city.
Public space becomes a dominant element within the factory, developing at different different levels and with different types of functions.
We see spaces such as the VERTICAL GARDEN or the LAUNDRY that arise from the needs of the population due to the lack of spaces within Hehua tang, thus trying to reuse the Marco dimensional aspect of the factory to incorporate the absent spaces of the city.
There are also THE AUDITORIM, LIBRARIES, COWORKING spaces, designed to transform the factory into a catalyst point of public functions in the Nanjing scenario, thus turning the factory into a kind of propelling object for the revival of Hehua Tang.
Two types of private spaces are then delineated, THE HOUSES that feature multiple types of apartments that can respond to the different compositions of established households in Hehua Tang.
The HOSTEL, on the other hand, outlines a very pronounced and important social issue in the community, involving the whole group of students/young workers who are settling in Nanjing City for the first time and are being transported outside the city due to high living costs.

FACTORY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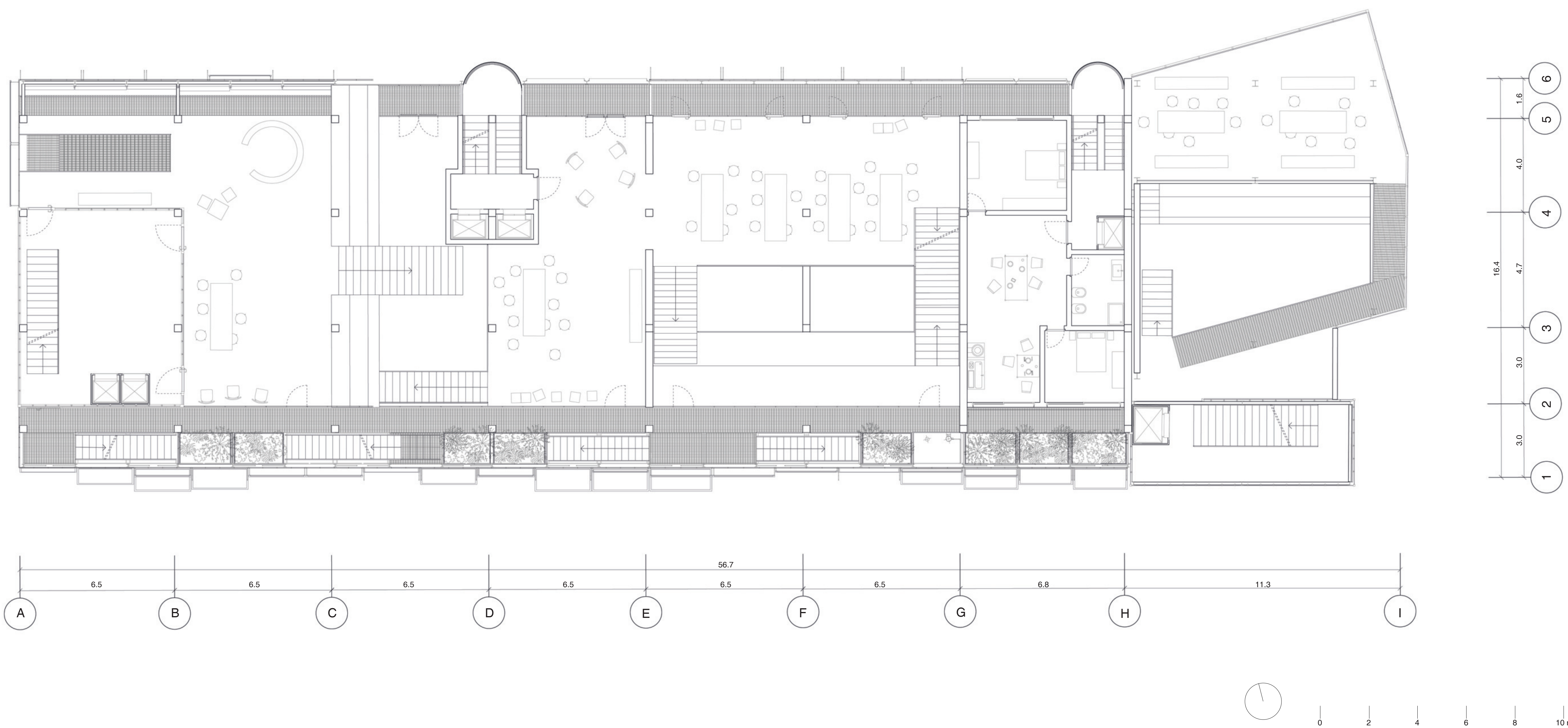
Level 0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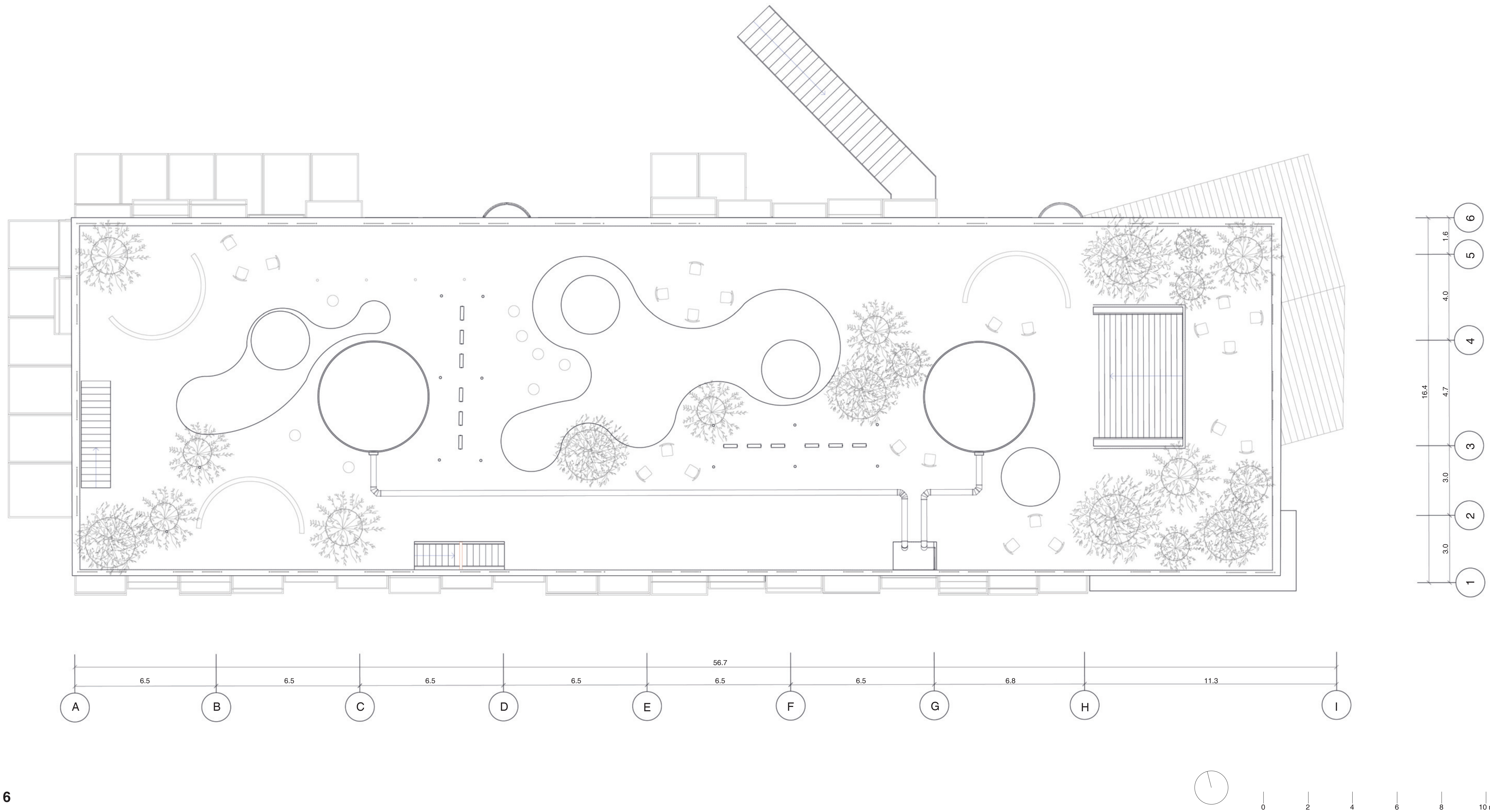
10 m

Level 3

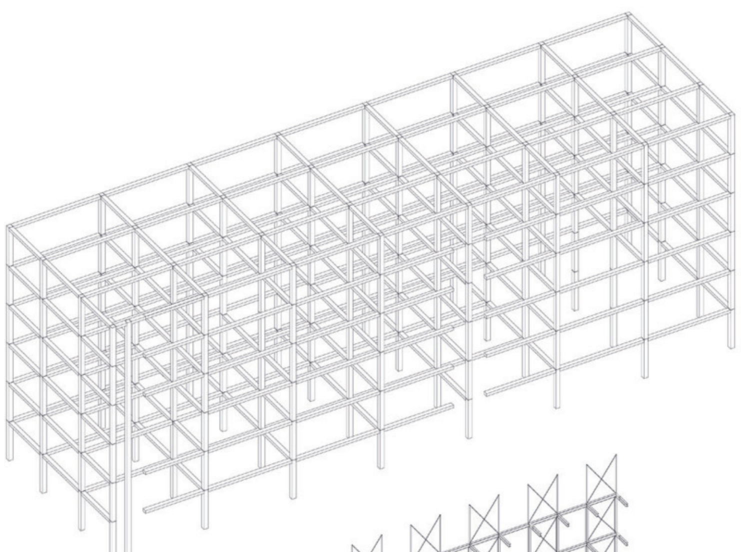


6
5
4
3
2
1
1.6
4.0
4.7
3.0
3.0
16.4
56.7
6.5
6.5
6.5
6.5
6.5
6.5
6.8
11.3
A
B
C
D
E
F
G
H
I
0
2
4
6
8
10 m

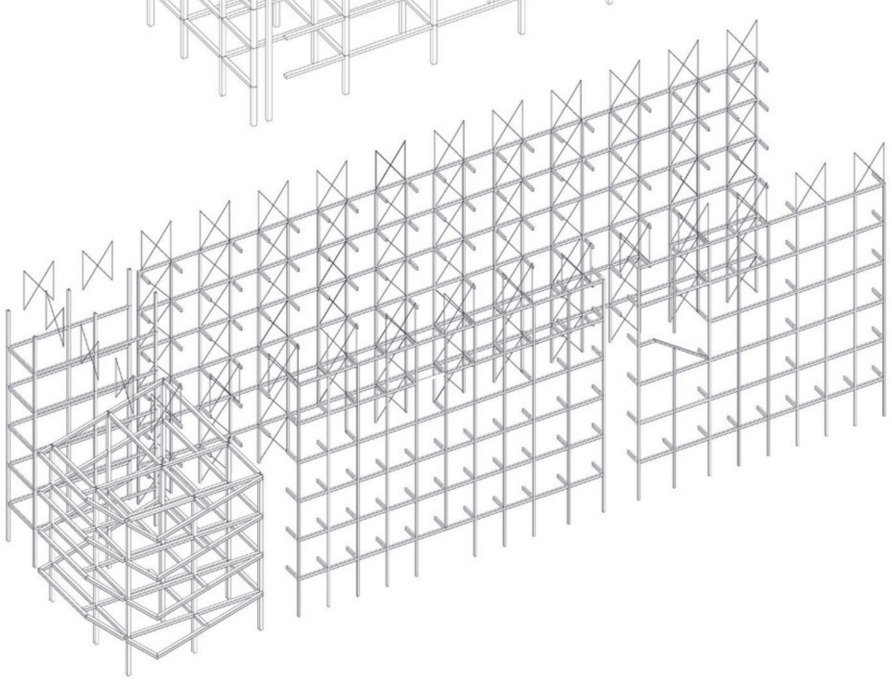
Level 6

STRUCTURE

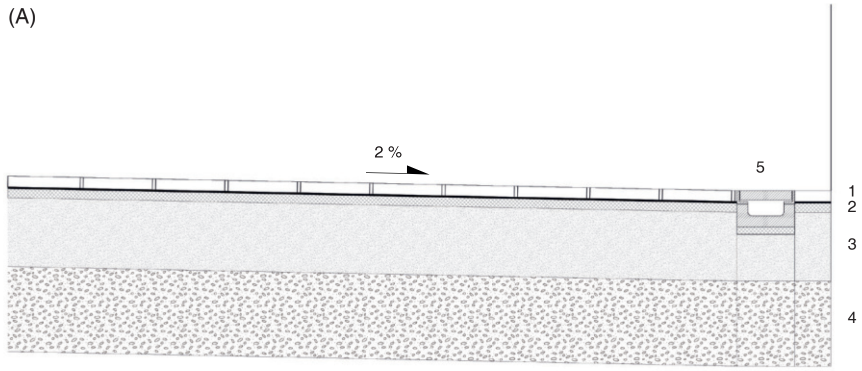
The original reinforced concrete structure is retained to reestablish the building's original massing.
The new design focuses on the application of a new structural steel frame that, surrounding the building, generates a kind of new skin attached to the existing structure.
Thanks to this technology, an open elevation is thus outlined where the structure becomes the defining element of the building's aesthetics and where each of its technological elements becomes a decorative and functional object.
In the image on the right we see how the use of different technologies, in this case curtains, make clear from the outside the internal distinction between public and private space, thus generating a "machine" at the service of man.
By designing on REVIT, it was possible to generate the structural connections of the new steel structure, thus creating a model of the actual factory.



EXISTING REINFORCED CONCRETE STRUCTURE



NEW EXTREME STEEL FRAME STRUCTURE

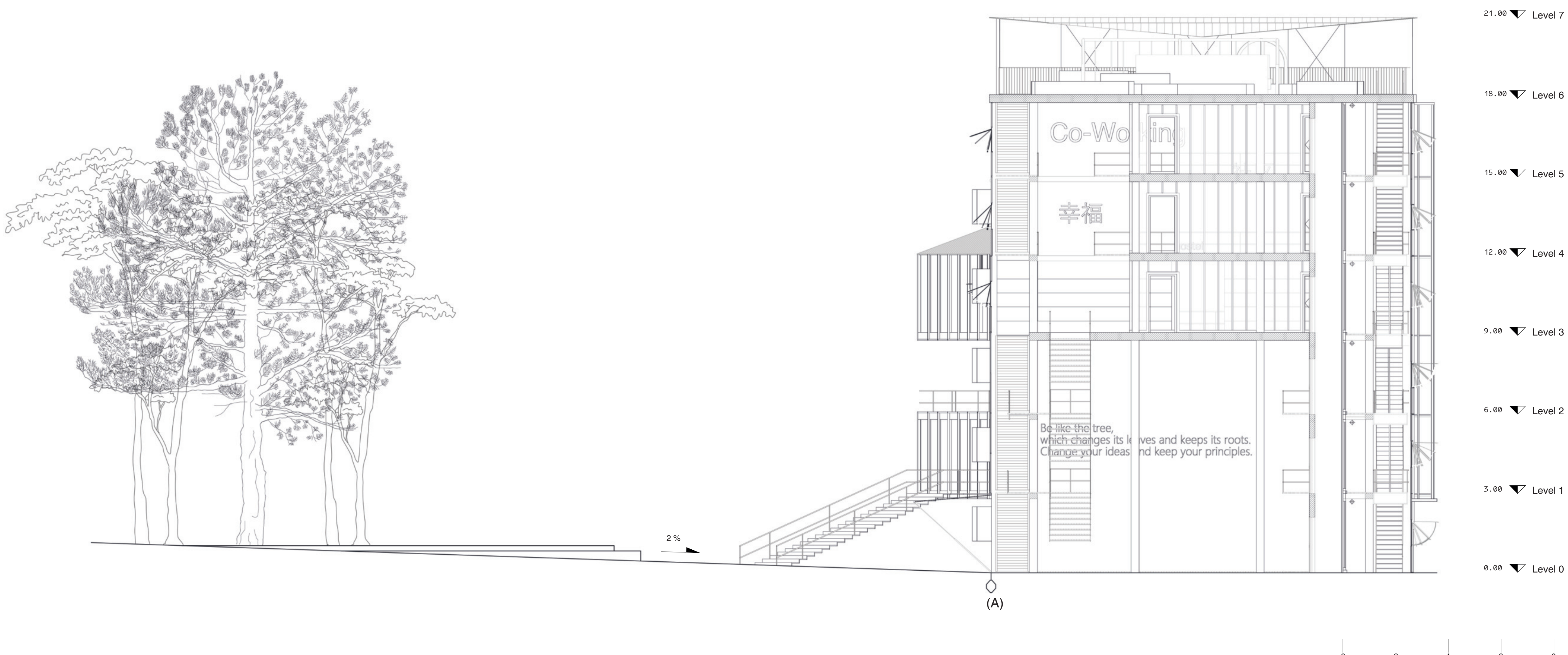


1	Natural Stone	6 cm
2	Bedding Layer	3 cm
3	Foundation Layer	25 cm
4	Fill Material	45 cm
5	ACO Flachrinne SD 100 , typ-FL 100 79035	

COURT

The design of the courtyard is the pivotal element that re-establishes the connection between the factory and the spatial circuit of Hehua Tang.
Starting from the original form, the design is based on the idea of creating an outdoor space in strong relationship with the factory, generating a flow of functions between the interior and exterior of the building.
Underlying the idea of the courtyard is the design of its inclination, an imperceptible element that presents a duality of meanings.
Starting from the relationship between the courtyard and the void system present in Hehua Tang, the design of the inclination aims to regenerate an intimacy between building and public space, yet relate it to the urban spatial network.
At the same time, the inclination becomes a technological tool to try to channel water to specific points by then reinserting it into the overall water system.
Thus we see how the courtyard element is reinterpreted from different points of view, the social one that attempts to connect this space back to the whole system, and the technological one that sees the courtyard as a permeable plate that can be shaped to collect water.

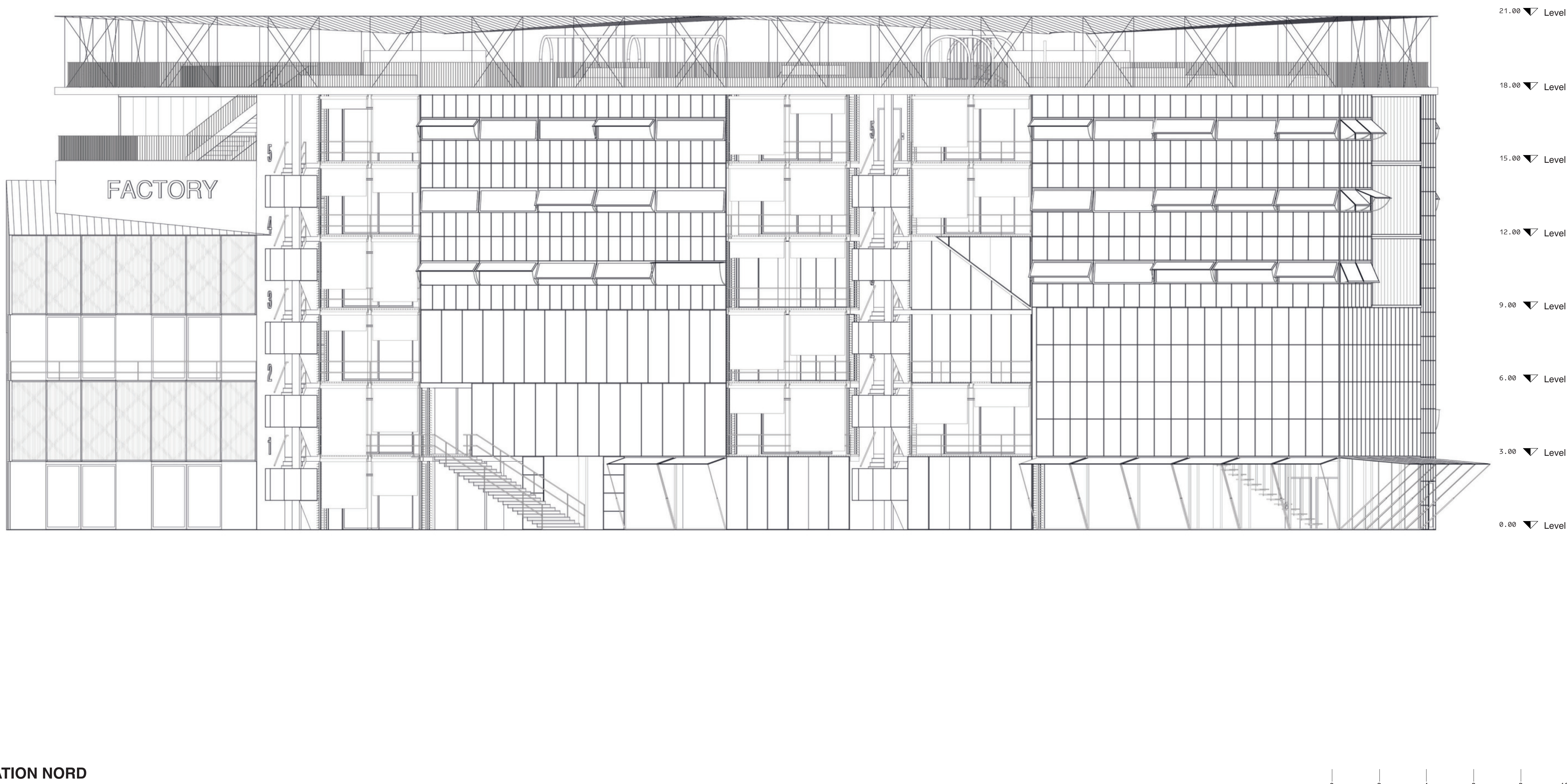
The slope design has a specific workflow behind it that, starting from CIVIL 3D, allows you to have on REVIT a plate of which you have control over every elevation point of the surface and every part of its stratigraphy.
The inclination of the plate, 2%, is also generated based on the type of manhole that will be inserted.
In this case, the plate is inclined along its entire length toward the factory that has an ACO linear manhole system at its base.



SECTION A A’

COLLECTIVE SPACE

Public space represents the focus within the design of factory spaces.
As seen earlier, the city of Hehua Tang presents a strong community that is able to shape spaces and generate common spaces that, due to the high density of the fabric , are often not sufficient.
It is for this reason that the factory imposes itself on the city no longer as a discordant element but, as an element that exploits the potential of its overdimensional aspect, becoming the center of Hehua Tang's social life.
Thus, a factory is outlined that presents different types of community spaces that, following plans, take on different functions.
Thus we see on the ground floor generate spaces more related to daily use such as laundry, bicycle parking and greenhouse, while on the upper floors various spaces for coworking, libraries and leisure are generated.

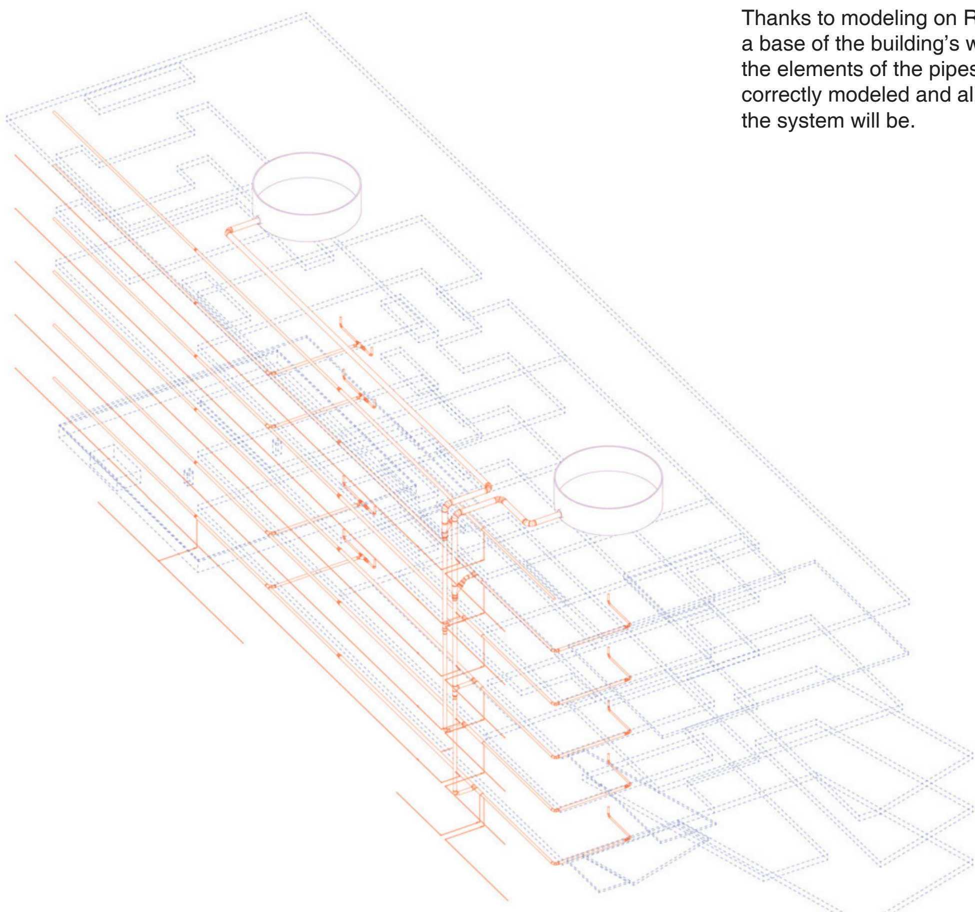


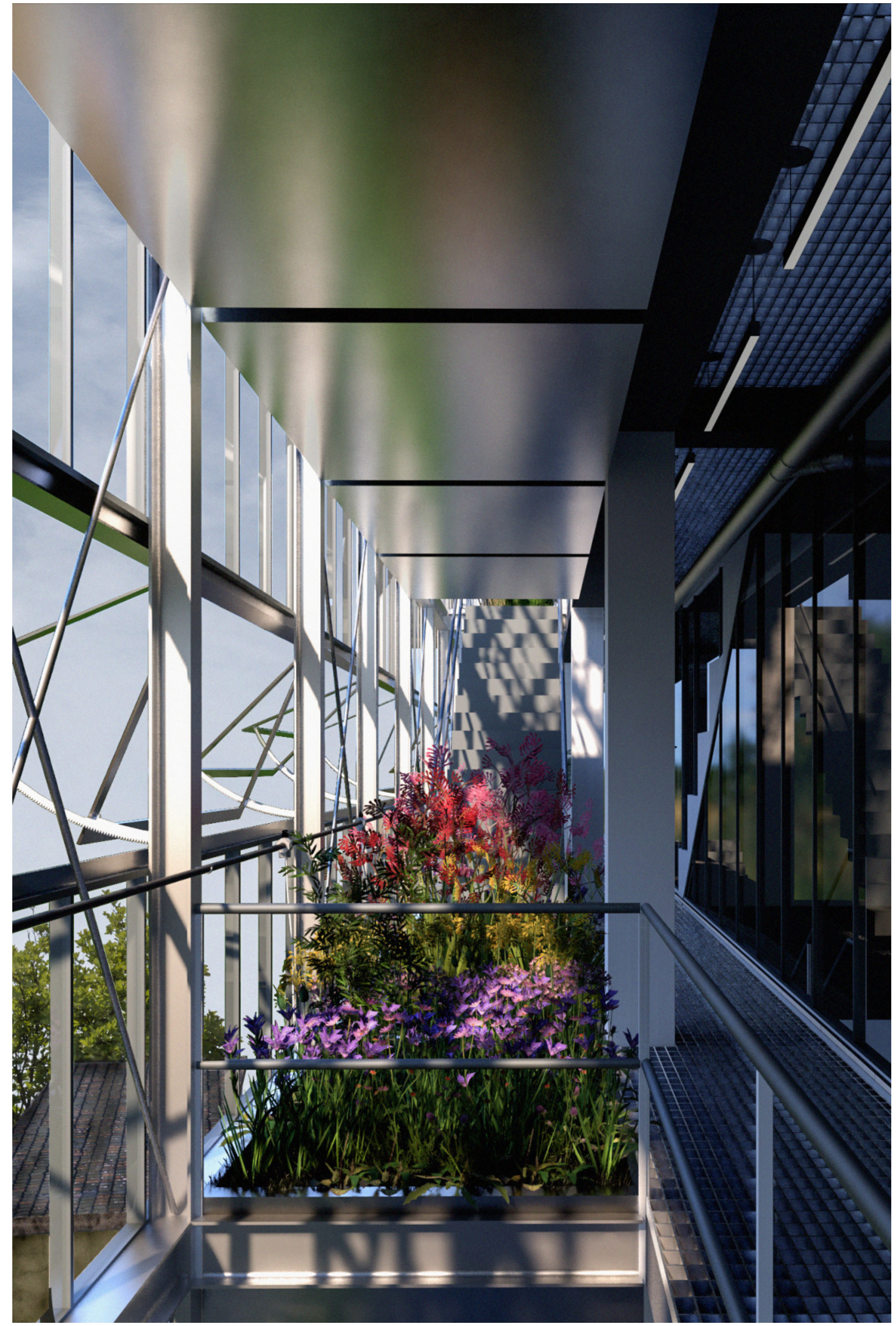
ELEVATION NORD

WATER

Water re-enters in pure architectural form within the factory, becoming a primary object within the form of the space.
The basic idea is to constitute a system that from the roof, thanks to the design of its inclination, conveys water to a system of tanks connected to a network of pipes that distributes lacqua throughout the building.
The south elevation, which contains the greenhouse, becomes the technical compartment of a system that not only feeds water into the building but also feeds the entire circuit of the greenhouses distributed over the building's seven foors.
This generates an architecture in which the plant element becomes a primary object, easily accessible by all users.

Thanks to modeling on REVIT, it was possible to generate a base of the building's water system in which, however, all the elements of the pipes and their respective couplings are correctly modeled and allow to return a detailed idea of what the system will be.

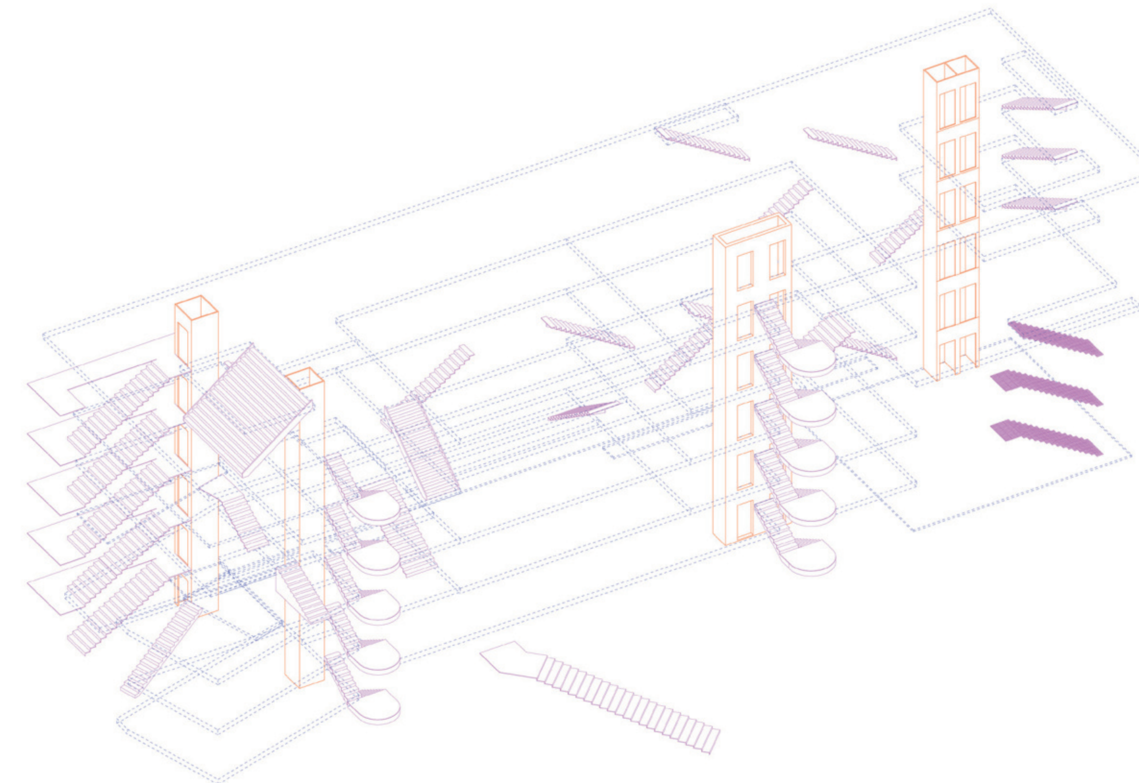


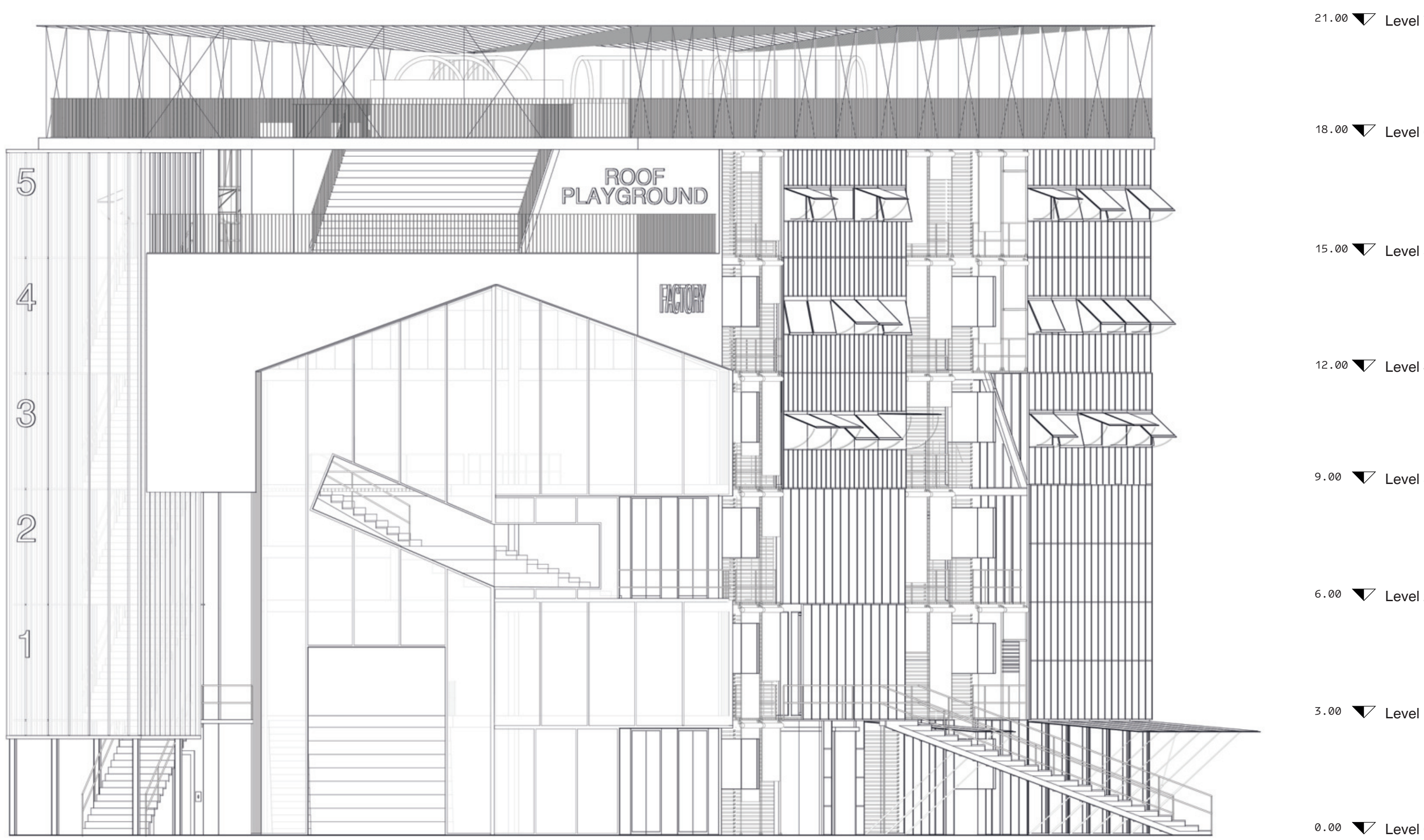


Starting from reading the needs of Hehua tang, the theme of cultivation turns out to be one of the most important ones. Thus taking advantage of the 7 floors of the factory, a vertical public space system is created in which, thanks to the purposeful shaping of the "tubs," every person in Hehua tang has the opportunity to use this space to cultivate.
The vertical vegetable garden is strongly related to the water system so that it constantly feeds all floors and tanks.

FACTORY/CITY

The design of the factory aims at maintaining its overdimensionality by redesigning it in such a way as to re-establish the link with the dense fabric of Hehua Tang, selling in the EAST elevation, which faces the city, the connecting element.
Through a set of rotations, dictated by Hehua Tang's layouts, the elevation undergoes a defragmentation generating two settling volumes, with respect to the body of the factory, which are marked with the use of polycarbonate.
These two architectures, one the auditorium and the other the staircase body generate an isolated architecture that comes in relation to both parts and forming a step between the height of the factory and that of the city.
Thus an architecture is delineated that, breaking the patterns with both parts, is established as a conjunctive element.





ELEVATION EST

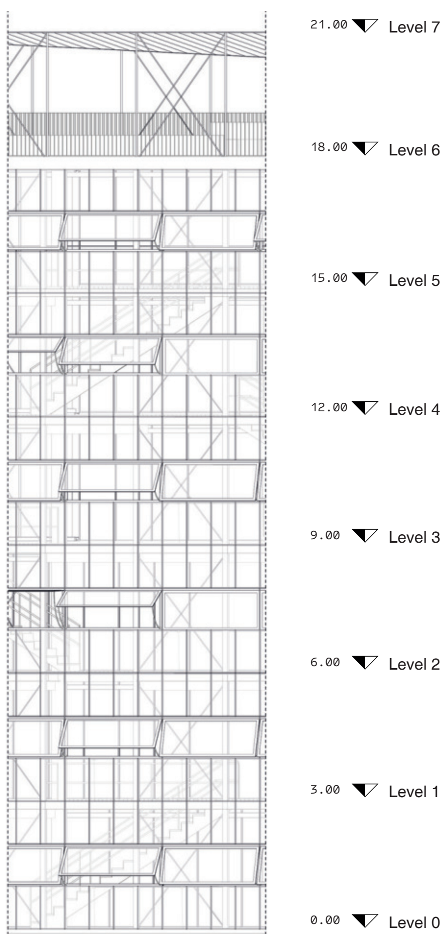
DISTRIBUTION

The design of the distribution stems from the idea of creating different paths for different spaces in the factory.
The idea for the distribution of the public space is to create a linear path that, starting from the outside of the factory, runs through it touching all its public spaces located in different areas until it reaches the roof.
Tied to this system are vertical distributions such as elevators and individual distributions for each part of the public space.
The two private parts, on the other hand, reuse the original distribution system which, made independent from the remaining part of the factory, becomes for the exclusive use of the owners.

0 2 4 6 8 10 m

GREENHOUSE

The greenhouse is the element that recalls the nearby park project inside the factory.
In relation to the other spaces, the greenhouse forms a green public space on several heights, characterizing the WEST facade of the factory.
At this point, the facade is designed as an opening membrane that, thanks to a system of piston windows is able to open its entire base and extend outward.
It represents a buffer space that stands between the outer space of the court and the inner space of the factory.



ELEVATION SUD

At this point the facade is understood as a vertical greenhouse, capable of capturing heat and conveying it along the seven floors of the greenhouse.
A system of opening windows allows the whole temperature to be managed according to the seasons and needs.
This system, unlike the NORTH elevation, is repeated along the entire elevation having different spaces inside, however.

FACTORY


21.00 Level 7
18.00 Level 6
15.00 Level 5
12.00 Level 4
9.00 Level 3
6.00 Level 2
3.00 Level 1
0.00 Level 0
0
2
4
6
8
10 m

SECTION B B’

GREENHOUSE DETAIL NORTH ELEVATION

01: New steel structure with beams IPE 120

02: Adjustable ogival sunshade systems with hollow aluminium tubular posts at the ends of the slats

03: Durable stainless steel grating, rods 25 x 5cm, depth 5cm

04: Steel beam-column joint by system Knee of frame with plate haunch and end plate

05: Gas piston for upward tilting window sash, stainless steel, length 3.95m

06: Outdoor Box Roller Shades with lithium-ion battery motor operating system, chain, crank and motor cover are in stainless steel materials

07: Railing with steel panels and 55 mm tubular handrail continuous inwards in Gerflor-Aluminium

08: Double-leaf emergency door in glass panels, aluminium uprights and plastic panic bar

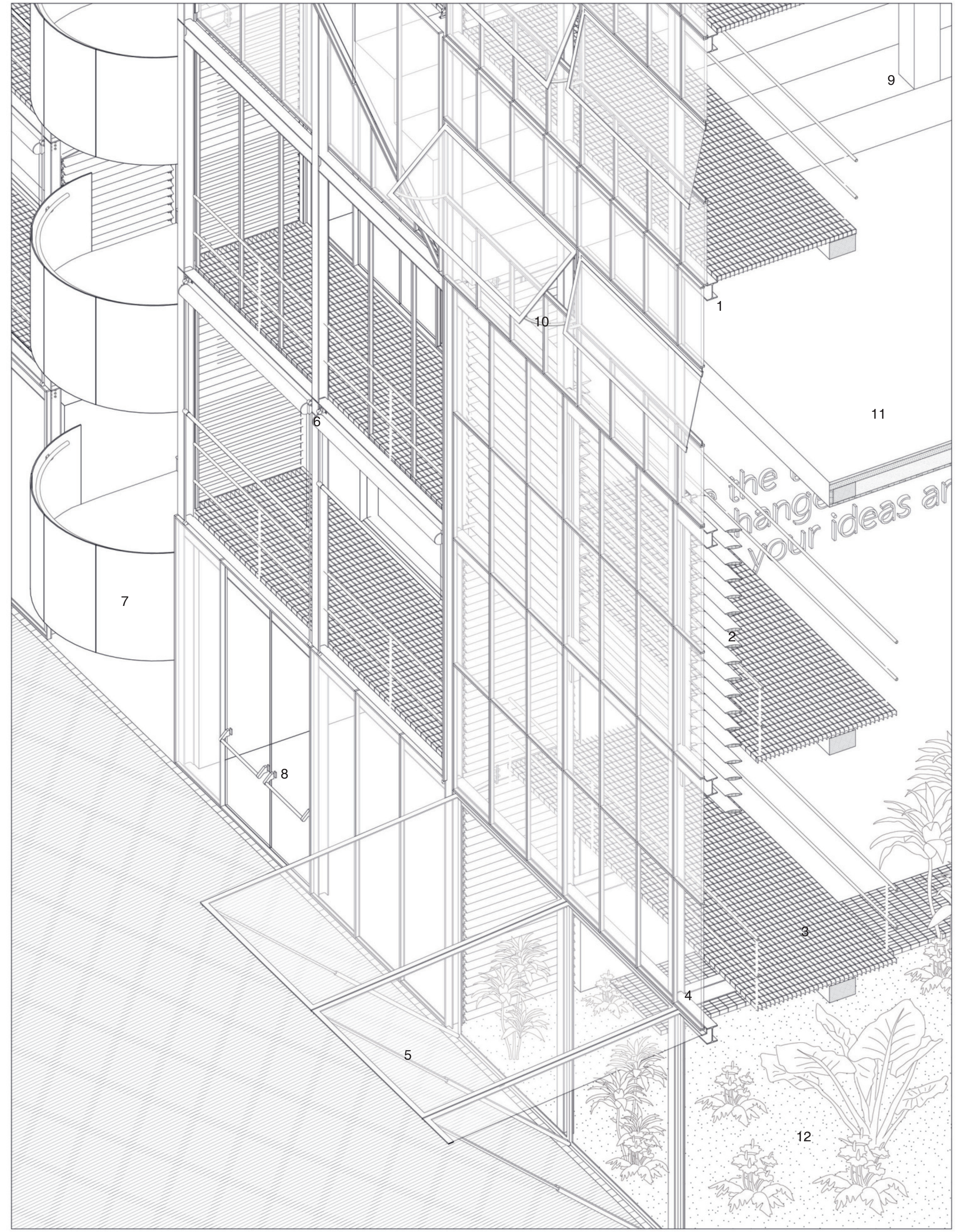
09: Pillar of the original reinforced concrete structure

10: Ventilation window for greenhouse titan peak and arch 90°, 95 x 300 cm

11: Public indoor social space for several activity

12: Public greenhouse 12 x 12m

20 40 60 80 100 cm



VERTICAL VEGETABLE GARDEN DETAIL

01: Assemble steel staircase, max. riser 17.5cm, max. tread 30cm, metal steps with 3cm thick tread and 1cm riser, 5cm thick metal centre support

02: Point irrigation system for each greenhouse tank with brass and aluminium water valve and PVC pipe, nominal pressure 50 bar, temperature range -20 to +120°C

03: Greenhouse aluminium tank 2.15 x 1.30m deep 45cm

04: Original concrete slab with new micro-cement floor

05: Durable stainless steel grating, rods 25 x 5cm, depth 5cm

06: Plastic street furniture

07: Sheet metal cover 2 cm

08: Ventilation window for greenhouse titan peak and arch 90°, 95 x 300 cm

09: Structural connection pillar-beam with moment and plate type

20 40 60 80 100 cm

WATER COLLECTION SYSTEM DETAIL

01: ACO pipe 1.4404 OD complex, stainless stell, 250mm

02: Rainwater collection tank from the roof, 1.50m high, 5m diameter, side structure thickness 5cm

03: New micro-cement floor slab, levelling slab, plant cavity and panel ceiling

04: C-shaped aluminium floor closing strip

05: Original concrete slab with new micro-cement floor, private house

06: Full port ball valves for autonomous management of the irrigation system in private flat pools

07: Original concrete slab with new micro-cement floor, corridor to the upper public floor

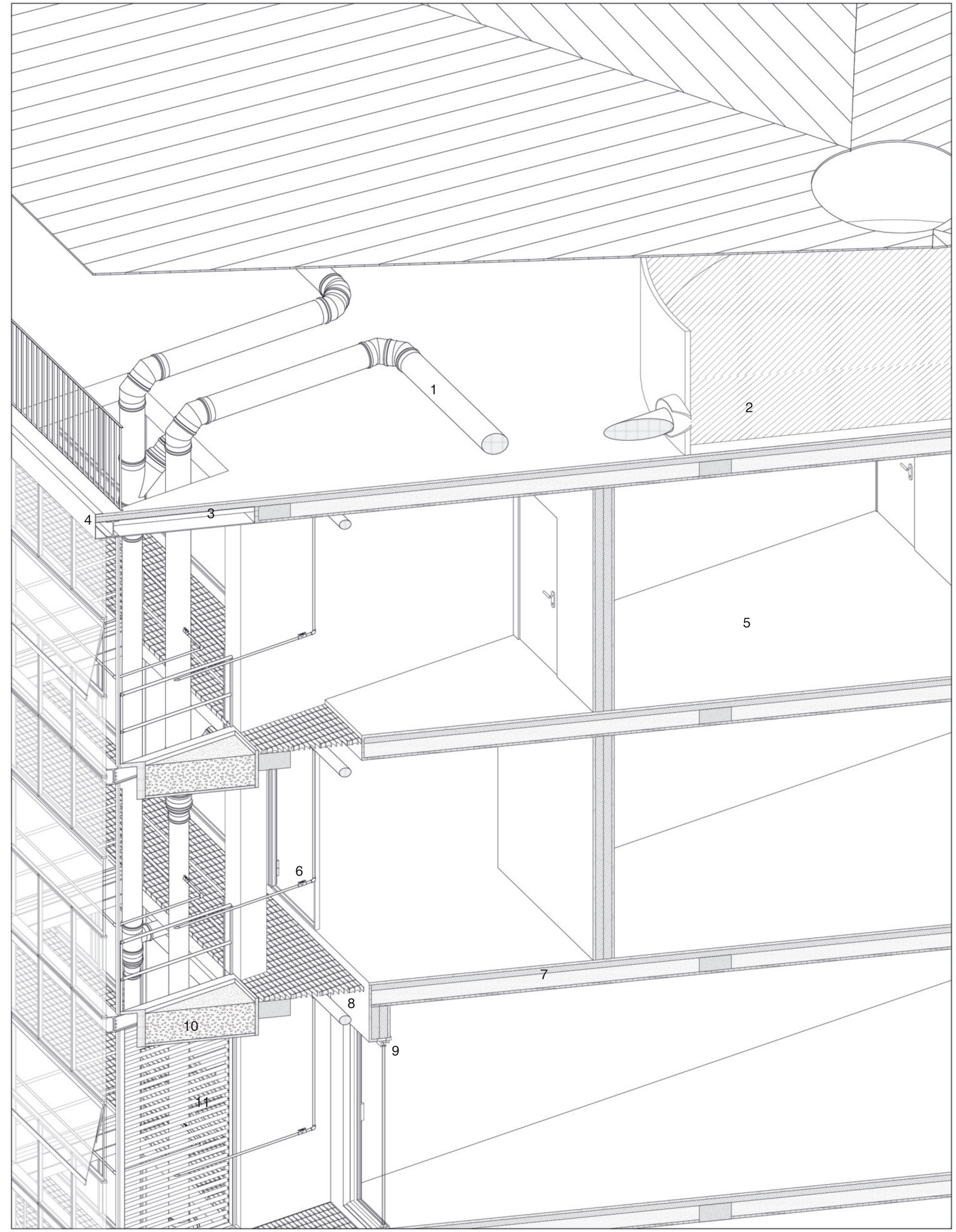
08: Outdoor Box Roller Shades with lithium-ion battery motor operating system, chain, crank and motor over are in stainless steel materials

09: Two-leaf sliding patio door with glass panels and steel mullions 3.80*2.30m

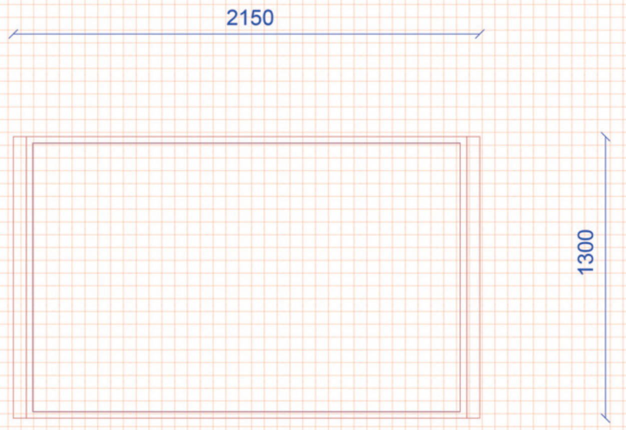
10: Greenhouse aluminium tank 2.15 x 1.30m deep 45cm

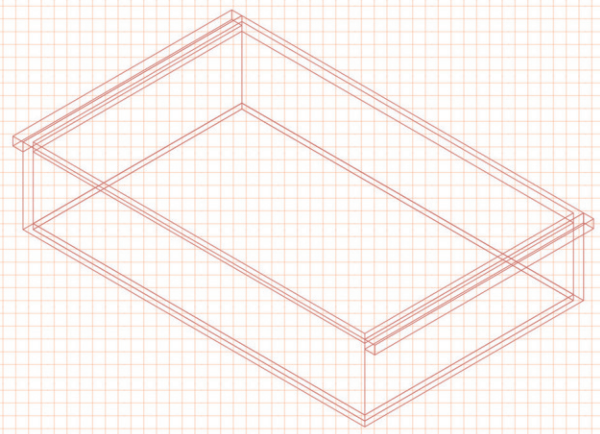
11: Adjustable ogival sunshade systems with hollow aluminium tubular posts at the ends of the slats

20 40 60 80 100 cm



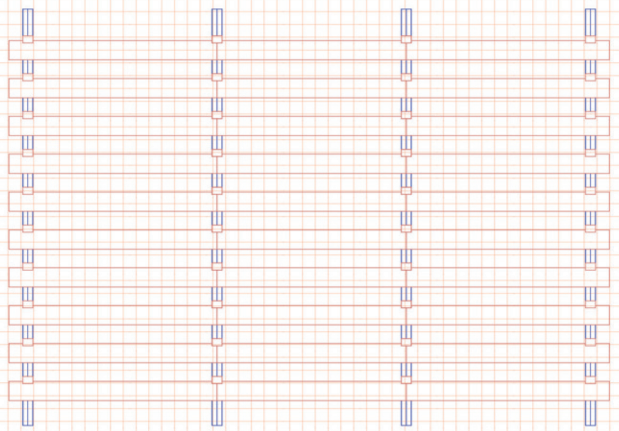
GREENHOUSE TANKS

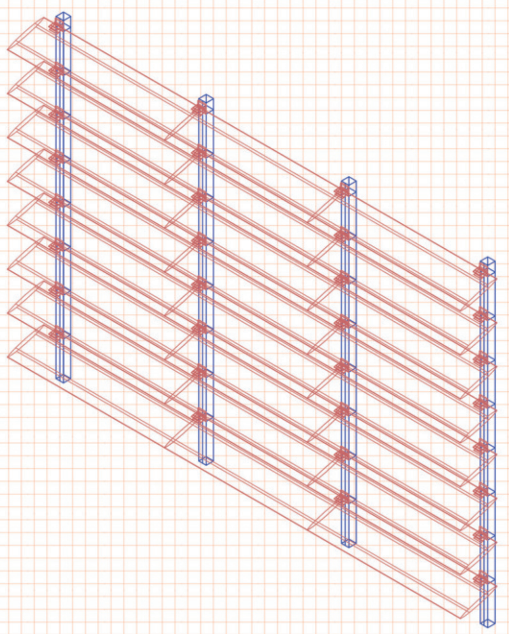




The tanks are designed following the structural pitch of the new facade. By generating a family on REVIT it was possible to control each of its dimensions thus being able to fit them within the greenhouse structure. This allows each person to have one or more tanks assigned in such a way that they have control over their own piece of land

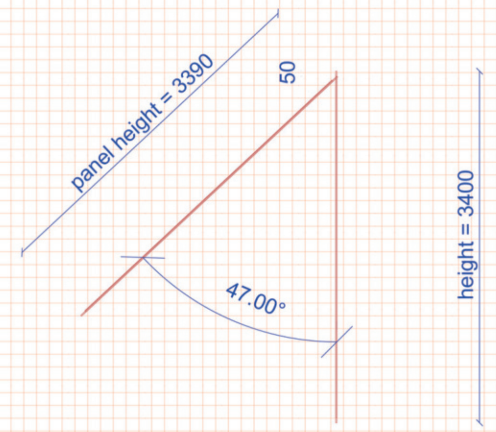
SUNSHADES

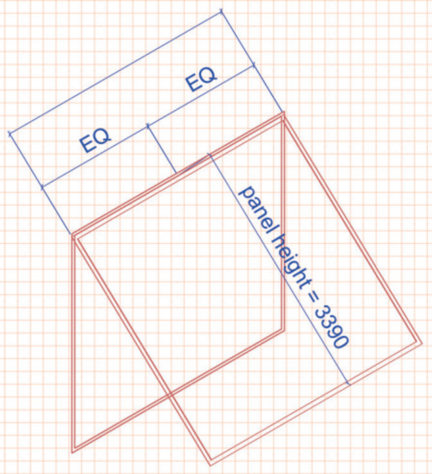




The sunshade system allows the control of light inside the greenhouse, able to transform the greenhouse into an element in which it is possible to transform the internal environmental conditions.
Thanks to its modeling on REVIT, it was possible to adapt them to the structural pitch of the new facade, thus being able to model the anchoring system

PLUNGER WINDOWS





The window element becomes essential within a design in which the façade is conceived as a membrane.
The modeling of the window generates a family in which the user is able to define the inclination of the glass.
Thanks to this system of generates, in the new elevation, a membrane that is able to adapt to different types of climate.

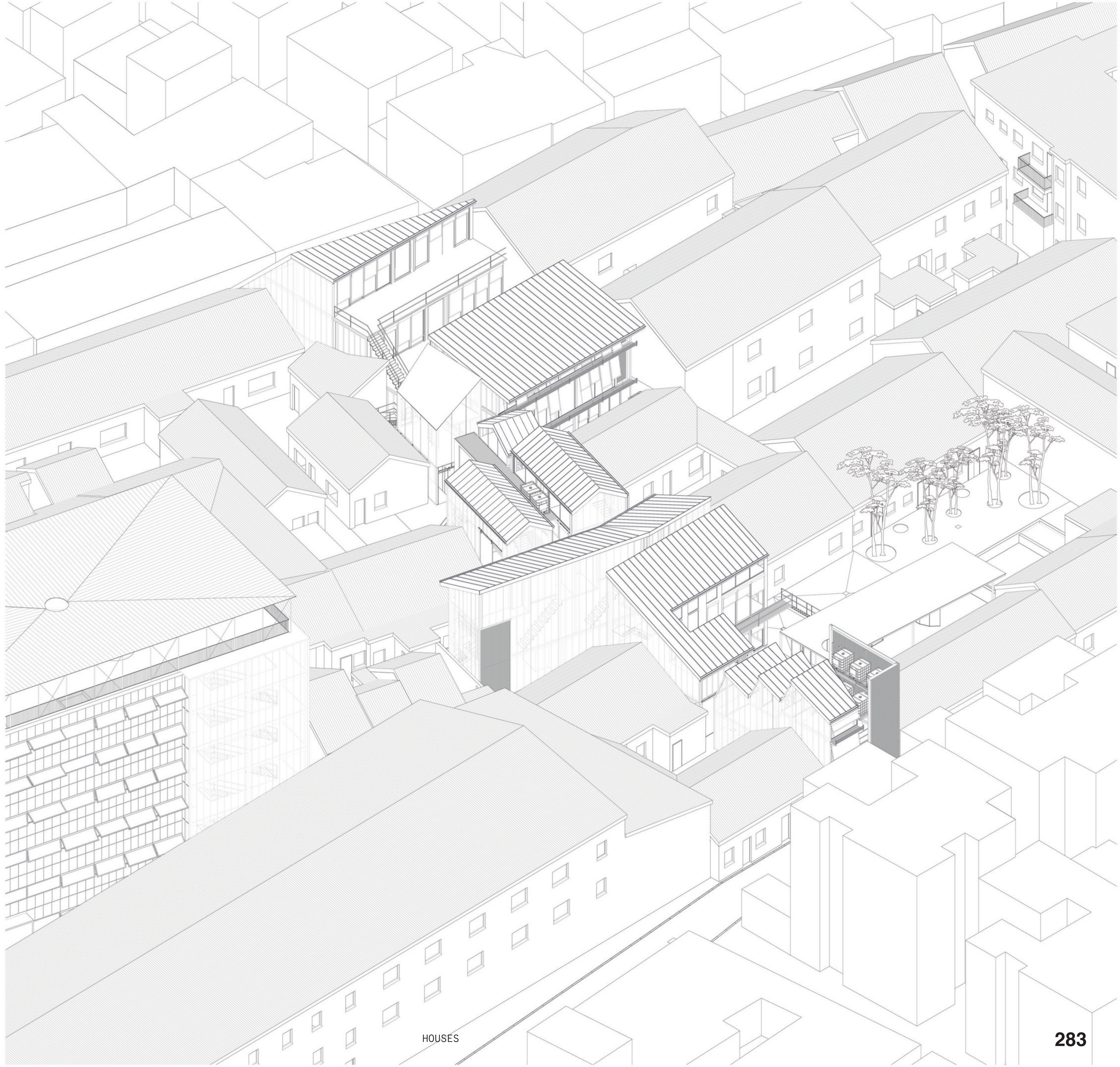
HOUSES

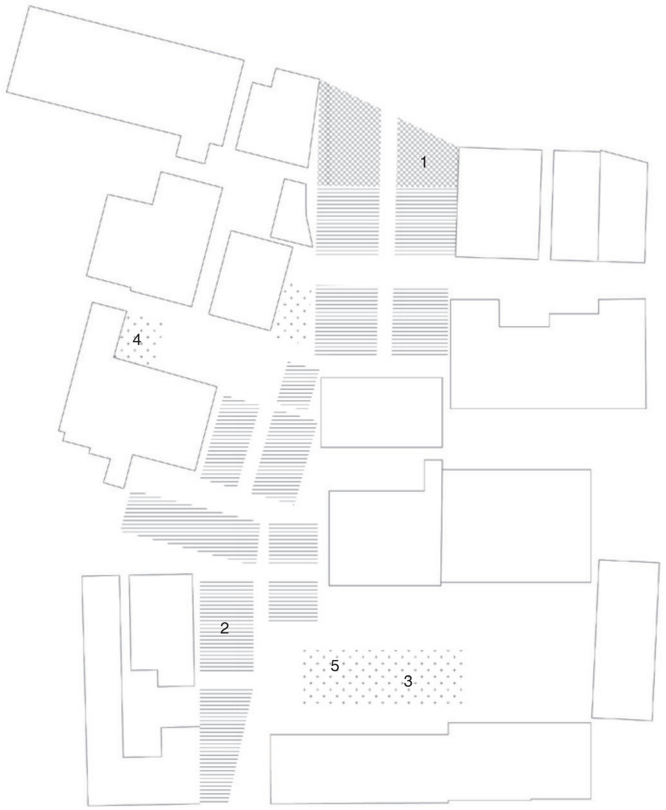
Starting from recognition of a plot within the fabric of Hehua Tang, the design of the houses wants to try to fit within the spatial circuit without breaking its mechanisms.
A linear project is constituted that starting at a point A and cutting the plot to a point B generates different spaces and configurations of the urban context with which it is confronted.
The architectural configuration arises from the reading of Hehua Tang's use of architecture as machine-architecture, an architecture in which the system of systems generates an external superstructure that dominates the use of space.
Thus, a technological architecture is configured in which, starting from the typological rereading in plan, the BIM process allowed each of its elements to be managed both as a singularity and as a whole.
Parallel to the spatial reading, a design of the water system is outlined, which, starting from the study of the relationship between the house and the courtyard, redesigns the elements not only from a spatial point of view but also from a technological point of view that can fit into the design of the water collection.
We thus see the courtyard element not only understood as a public space but as a permeable plate capable of collecting and recirculating water.
Connected to the public space system, the elements of the architecture are related to a plant system that aims to store water for reuse within the dwellings.

The design of the houses is shown as a technological project that, starting from typological reinterpretation, finds its spatial rules by entering into relationship with the context.
These architectures are thought of as machines, a summation of technological objects in the service of man, the combination of which delineates the architectural style.
Each element of this architecture is a re-proposition in a modern key of the studies done on the historic houses of Hehua Tang, thus generating a project that, although in stark contrast to the context, respects its logic by incorporating itself within it.

CONNECTIONS

Starting from the reading of the constrained historic buildings, the design of the houses seeks to rethink a strip of the plot starting from its edges until arriving in its center.
The plot constitutes spatial circuits that emerge touching the main streets of Hehua Tang only at certain points, and the edge constitutes the element of conjunction and separation between the plot and the city.
A project is thus constituted that seeks to depart from the present while regenerating the same spatial relationships, both near the edge and in the heart of the plot.
We notice how the project is a unique element that changes according to the conditions of the context, rotates, slips, collimates roofs with the existing, regenerates the spatial circuit without breaking it.
Arche in this case, the design of public space becomes an element of conjunction between past and present, an element that dictates the space and geometry of architecture.





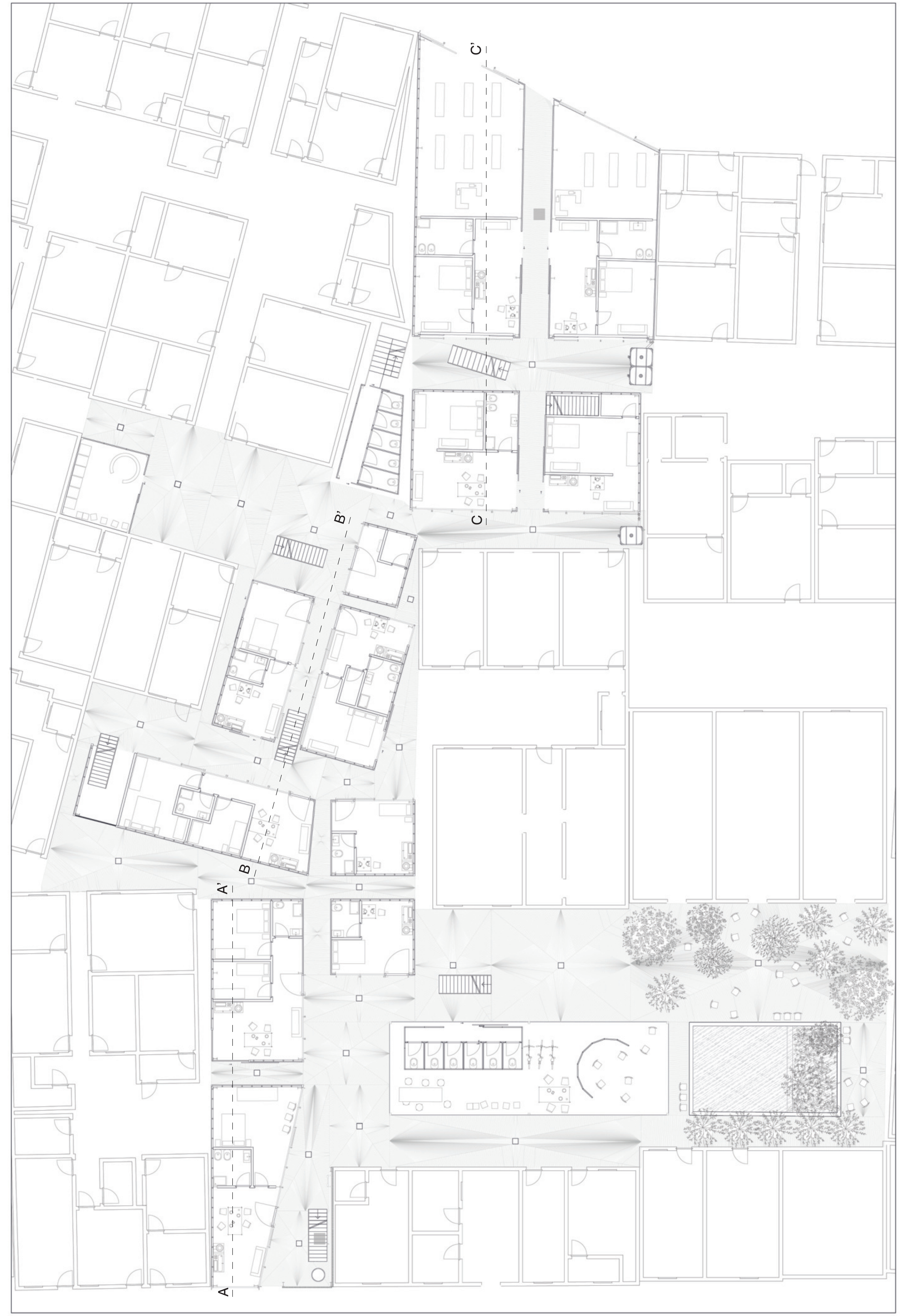
1 SHOP
2 PRIVATE HOME
3 PUBLIC SPACE
4 LAUNDRY
5 PUBLIC BATHROOMS

Restarting from the reading of the traditional Chinese house, the envelope of the new project is rethought by repurposing the same principles.
Thus we see the constitution of a main façade in which the element of the curtain generates the possibility, as with Chinese architecture, of maximum internal privacy.
The remaining part of the building is conceived entirely in polycarbonate with openings that feature sliding closures recreating the lateral septa of Hehua Tang's architectures

HOUSES

FUNCTIONS

The functions of the project restart from the reading established between the house and the courtyard in the historic fabric of Hehua Tang.
Starting from the reconstruction of private dwellings, the interior of the houses enters into relationship with the public functions included in the new courtyard project.
Laundry, public services and community space become elements that are grafted throughout the project, generating a series of points where private and public space meet.
The reconstruction of the edge of the plot, an element of facing the main street, is rethought in a commercial key by inserting stores for the sale of products on the ground floor of the building.
A dense fabric is thus constituted in which private functions come into contact with public functions stimulating in sense of community already present in Hehua Tang.



0 2 4 6 8 10 m

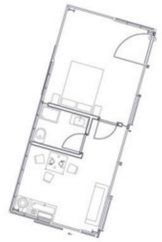
Level 0

The typological study is the tool behind the redesign of the new layout.
Starting from the reading of the different spatial relationships established between the courtyard and the house, the new design restarts and rereads the existing arrangements.
We thus see a plan system that rereads the vertical and horizontal axes and enters into total harmony with the historical context, recreating the spatial connections between the various court systems.
The courtyards in the vicinity of the new project have been rethought as micro public spaces within a dense fabric that folds in on itself, generating a block system.
The project is thus reconnected to the context not only through the new architectural spatial relationships, but also through the reinterpretation of new public spaces generated by the new design form.

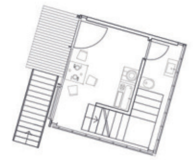
The new project also correlates with the context through an interplay of different volumetries.
Within these volumetries, the composition of different types of apartments comes from the reading of the different families of Hehua Tang.
Thanks to this reading, it was possible to generate different types of housing with different square footage.
The distribution system on the upper floors derives from the study of the Chinese court distribution system, which is also present in Hehua Tang.
The presence of the staircase in the court that generates a kind of gallery is rethought in the new design in the form of a new multifunctional technological element.
The new distribution becomes an element that, thanks to its shape, manages to generate distribution on the upper floors and at the same time become a support for the new plant system.

Level 1

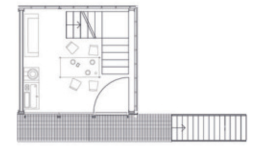
1 Person



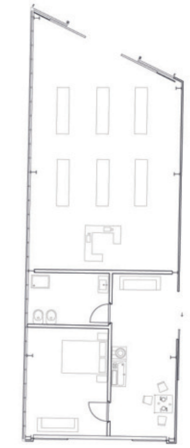
2 Persons



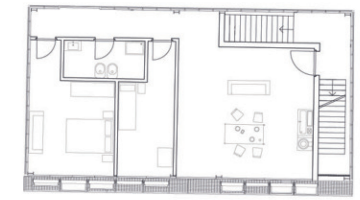
2 Persons
+ 1 floor



2 Persons
+ 1 floor



2 Persons
+ Shop

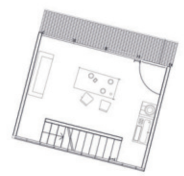


3 Persons

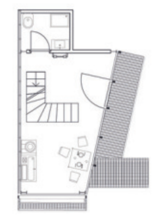
Public toilet

1 Person

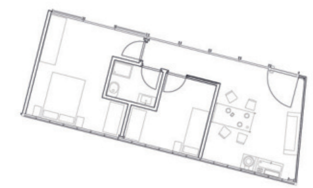
2 Persons



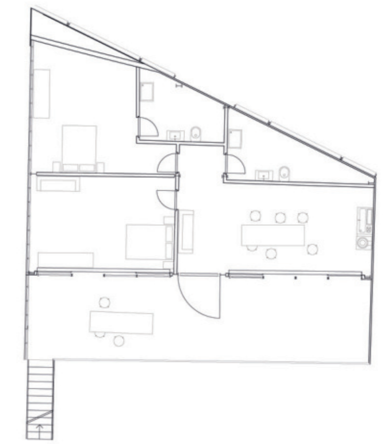
2 Persons
+ 1 floor



2 Persons
+ 1 floor

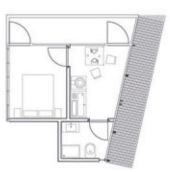


3 Persons

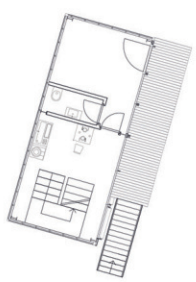


4 Persons

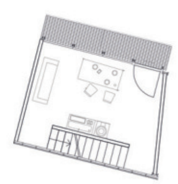
Public space
+ 1 floor



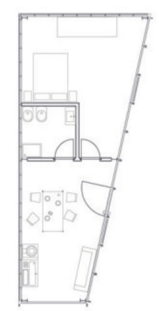
2 Persons



4 Persons
+ 1 floor

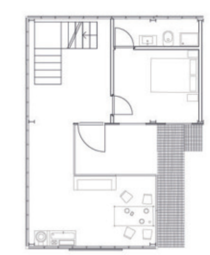


2 Persons
+ 1 floor

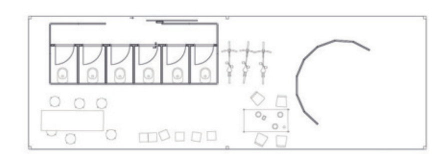


2 Persons

3 Persons

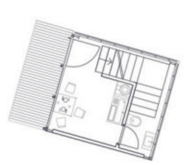


4 Persons
+ 1 floor

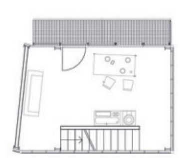


Public space
+ 1 toilet

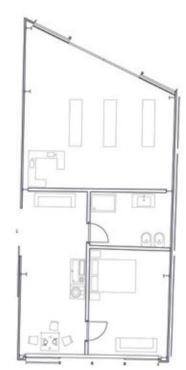
2 Persons



2 Persons
+ 1 floor

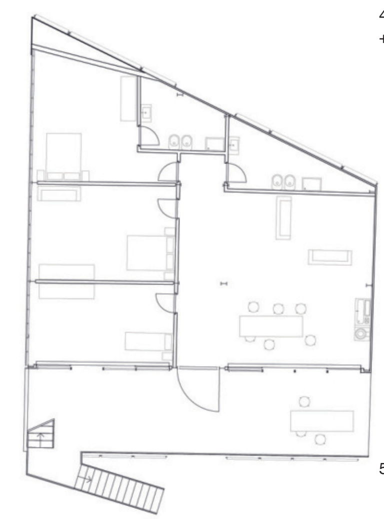


2 Persons
+ 1 floor

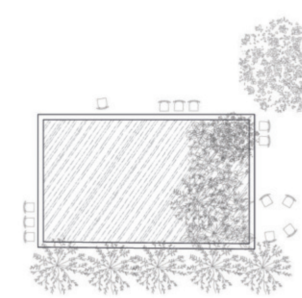


2 Persons
+ Shop

3 Persons



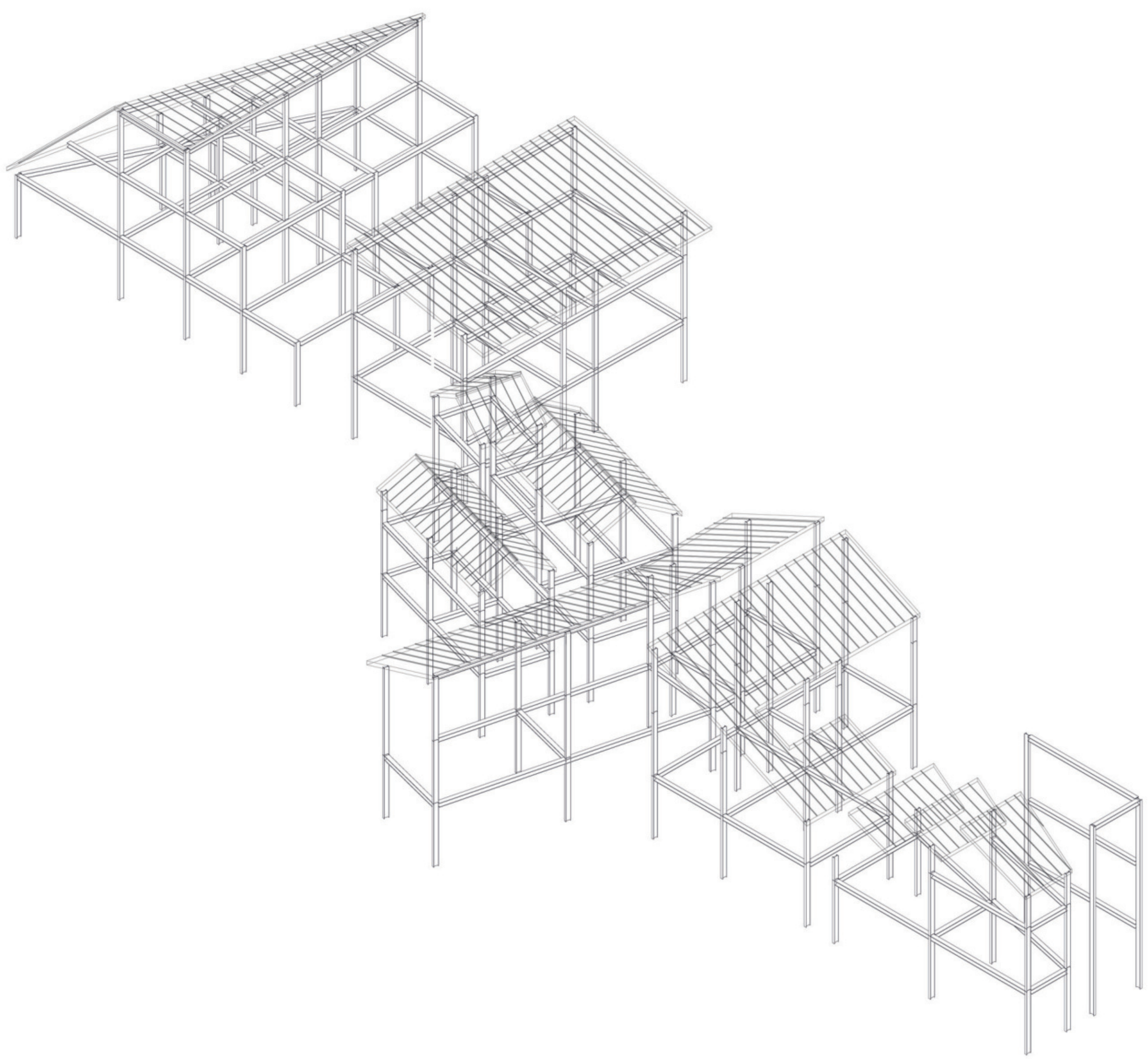
5 Persons

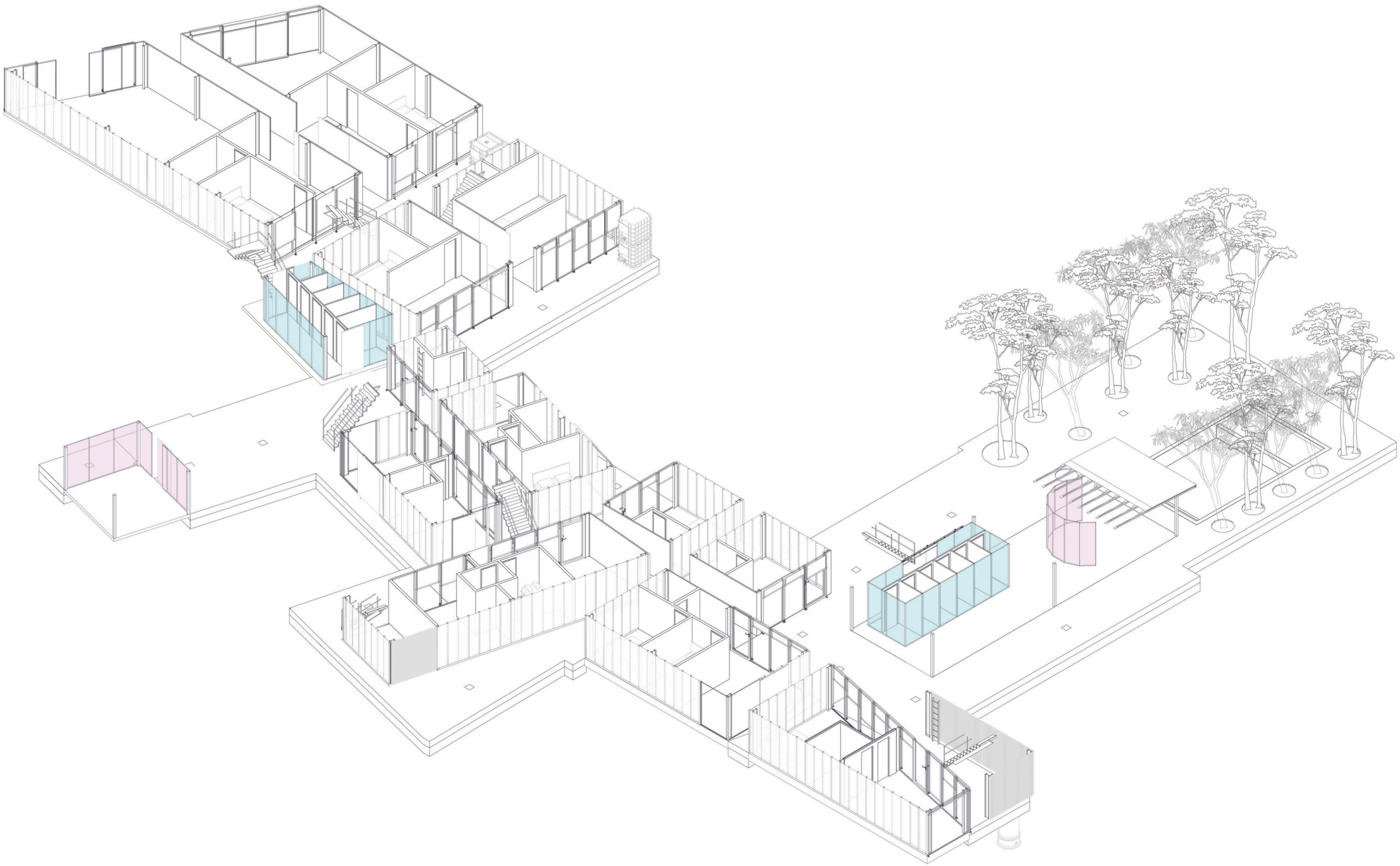


phytodepuration/plaza

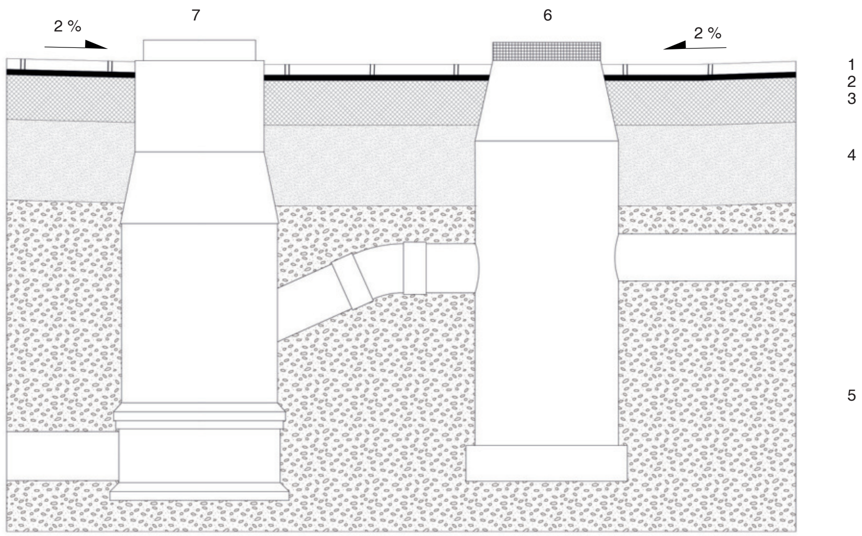
STRUCTURE

Constituting itself as a linear design among a dense fabric the structural choice is constituted as a light structure with little impact in space.
A structural steel skeleton is thus delineated, allowing for maximum space for the interior spaces.
As with historical Chinese architecture, the structural element becomes a key object in the architectural reading, generating independent elements that create space.





(A)



1 Natural Stone 6 cm
2 Bedding Layer 3 cm
3 Foundation Layer 25 cm
4 Fill Material 45 cm
5 earthy substrate 100 cm
6 Catch_basin Schacht 600x800_ Konus=650
7 ME-PE controlshaft NW 800_ACO NW800-DN100

Thanks to modeling within a BIM process, it was possible to insert existing digital elements, trying to achieve the highest possible degree of detail.
The combination with CIVIL 3D allows us to generate surfaces with controlled inclinations where later to insert the systems.
The detail represents the terminal part of the water collection system of the courts, in particular through the application of the catch basin it is possible to carry out an initial purification of the water before feeding it into the general system.

TO_N: ACO yard drain with LLD DN/OD 110 yard drain including mech grate 132890

P-N: number of the plate that makes up the court

CS_N: ACO ME-PE controlshaft NW 800_ACO NW800-DN100

CB_N: Catch_basin Schacht 600x800_Konus=650

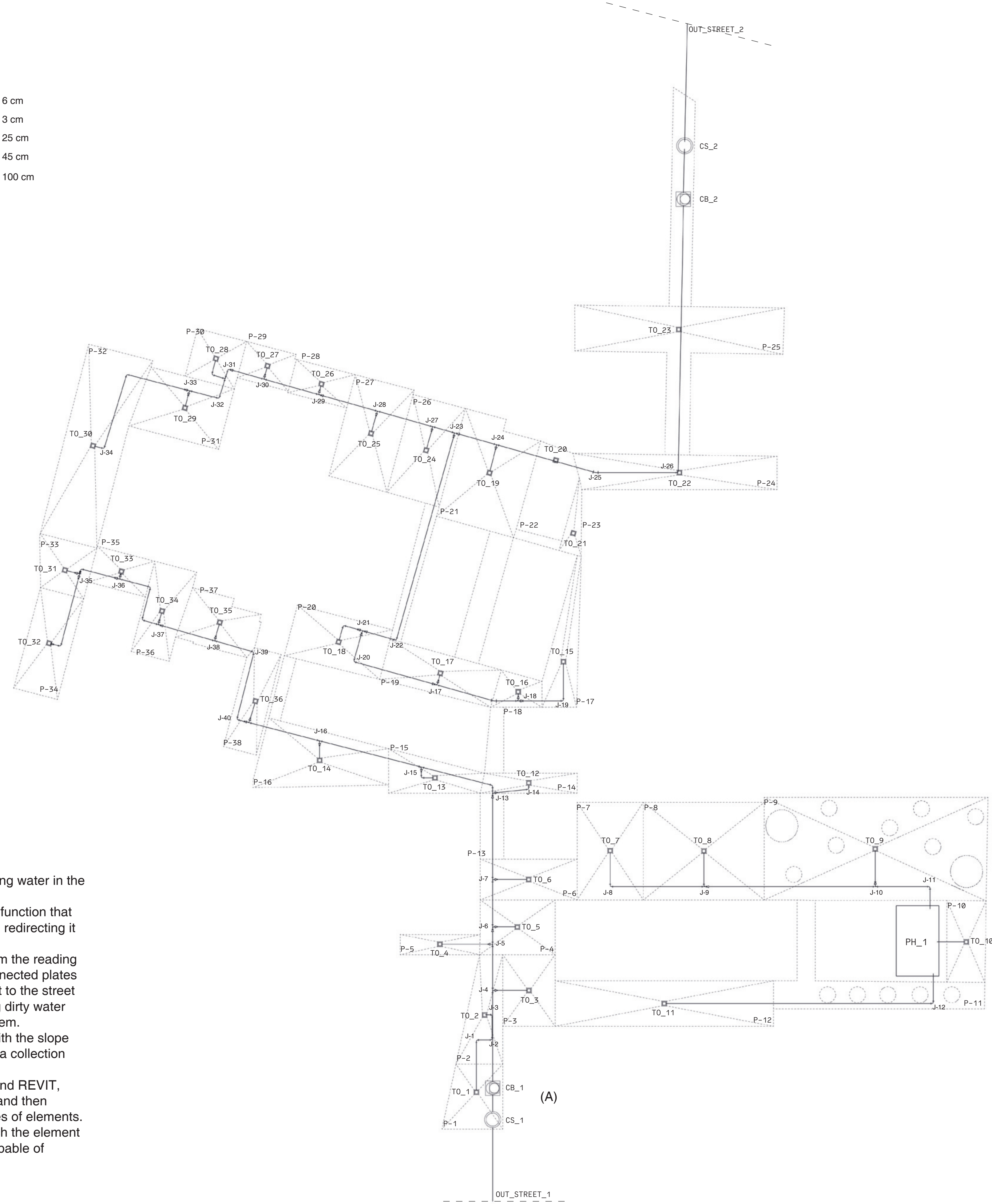
J_N: pipe system junction node

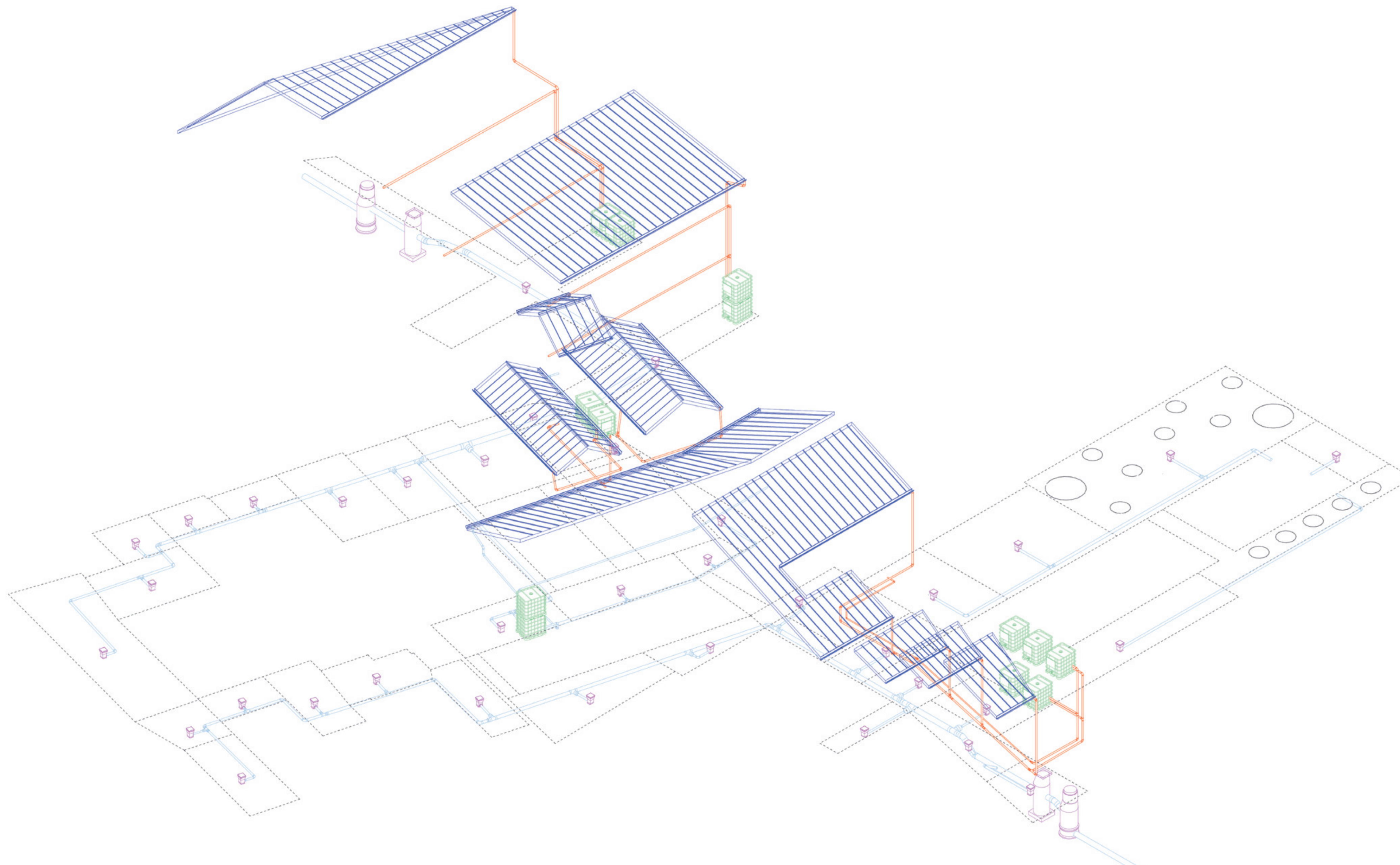
PH_N: phytodepuration tank via floating system

OUT_STREET_N System output terminals to the road

WATER MASTERLAN

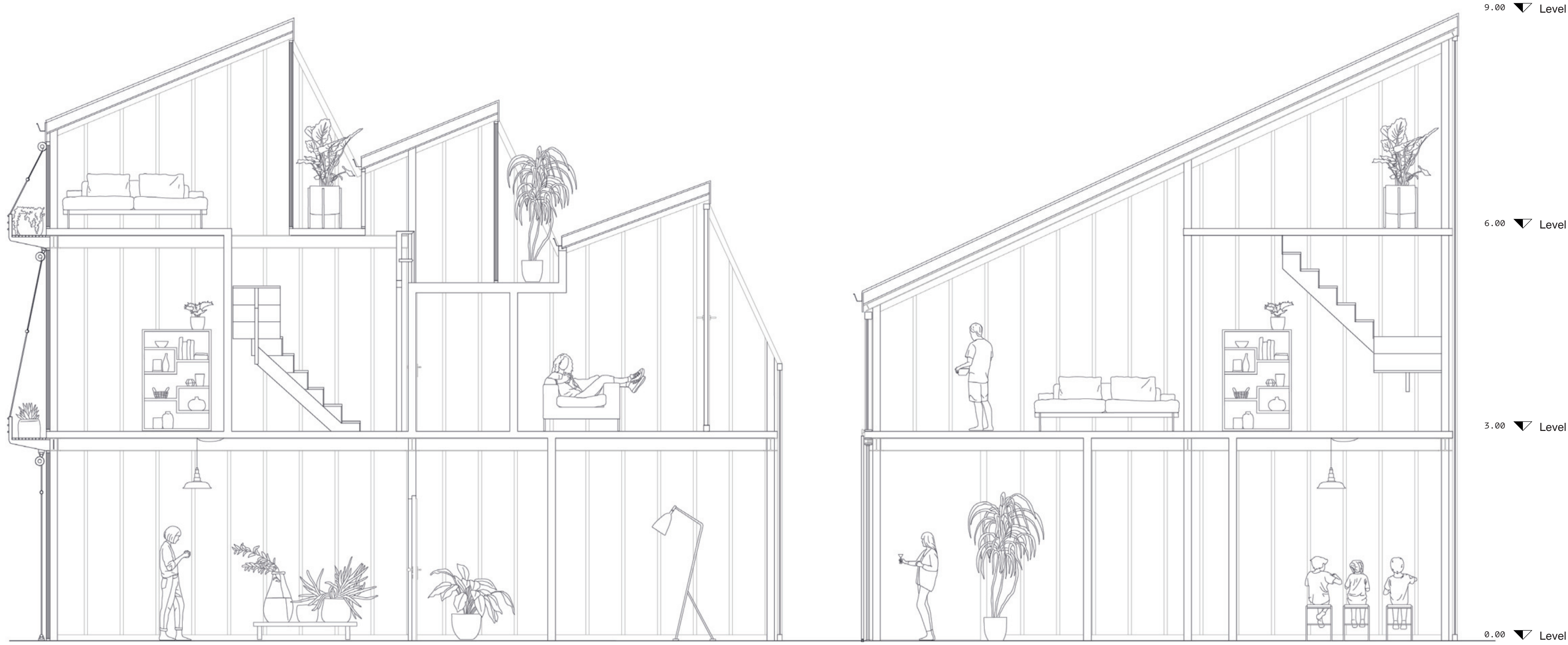
The plan shows the new pipe system for collecting water in the public space of the courtyard.
We then see how the space sees another silent function that constitutes the possibility of collecting water and redirecting it to the central system.
Thus, a system is constituted that, restarting from the reading of the courtyard, generates a system of interconnected plates that, thanks to a new planting system, reconnect to the street at two points, offering the possibility of collecting dirty water and reintroducing clean water back into the system.
The courtyard is constituted as a set of plates with the slope of 2% towards their center where for each plate a collection element was inserted .
Thanks to the collaboration between CIVIL 3D and REVIT, it was possible to model the slope of the plates and then reconstruct the new system composed of families of elements.
Thus, a double masterplan is constituted in which the element of the courts becomes a technological object capable of responding to specific functions.





Water collection is also developed three-dimensionally by transforming common architectural elements into technological objects serving a common system.
Thus, we see how public space and architecture also combine in this case, generating a system that aims for water recirculation within the plot on the one hand, and redistribution into the general system on the other.
This configures a system of pipes connected to rooftops that are not connected into the general system but feed water into tanks for internal reuse.
At the same time, another system of pipes connects the houses to the general system, allowing water to be recirculated.
The system of systems thus becomes an element that characterizes the architectural composition of the new houses' design.

The SOUTH facade represents the first entrance to the interior of the new system.
The intention was to recreate the relationship with the existing edge by designing a facade that creates an entrance to the internal system, not visible from the outside.
Here the plant system is hung on a grid that stands as an architectural element constituting an element within the space



SECTION A A' 0 1 2 3 4 m

The relationship between the units is generated through an interplay of different volumes.
The roof becomes the connecting element between the different blocks and sews up the relationship with the historical context

WATER/TYPOLOGY

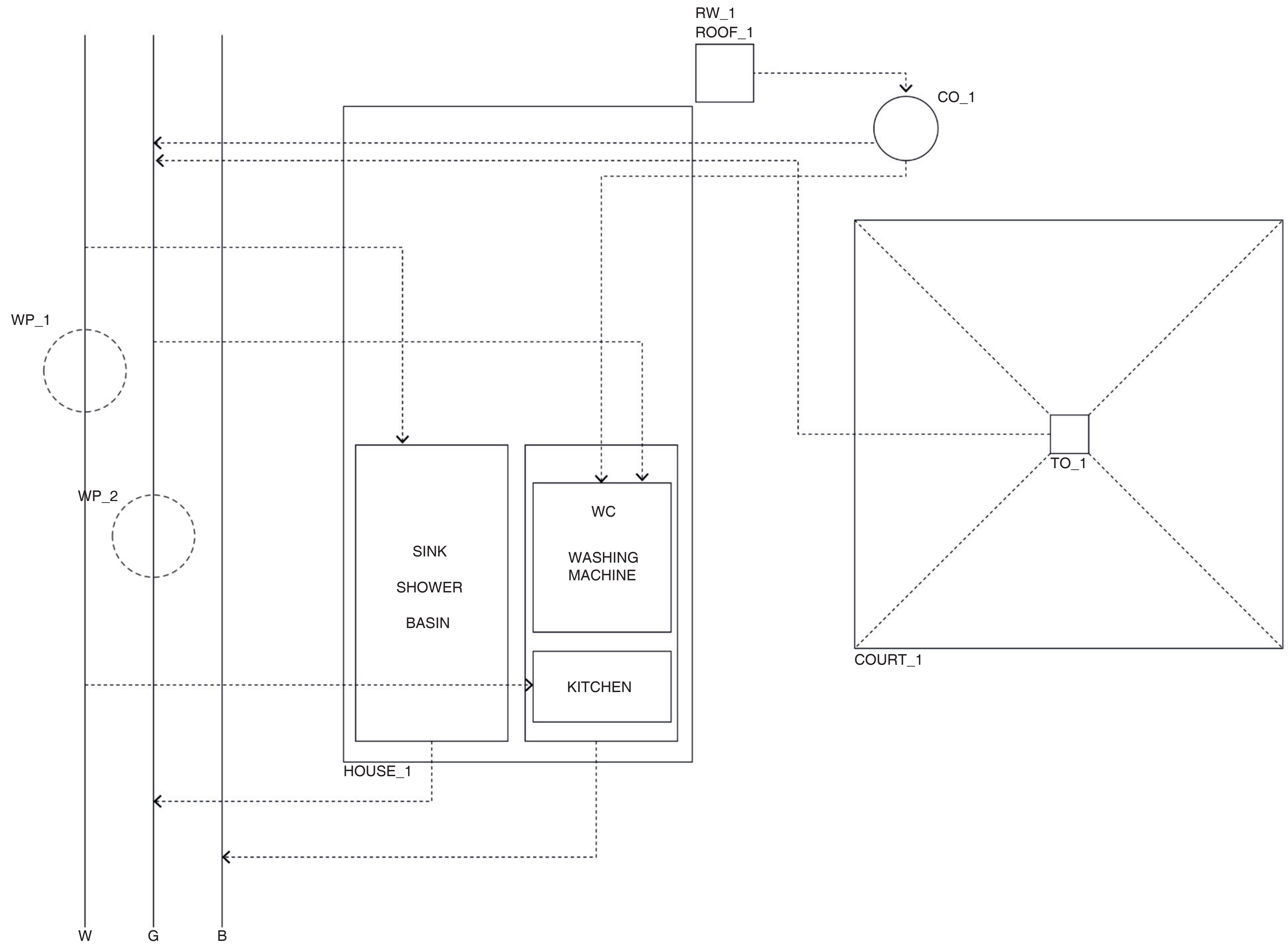
Starting from the historical relationship, house-courtyard, the relationship is rethought in the form of a technological matrix that investigates the potential that this relationship can generate in the form of water reclamation.
We then see how the courtyard becomes an external plate capable of both retrieving water to redirect it within the dwelling to be used for a given type of service and to put it back into the central system.
The matrix sets the stage for a technological rethinking that is based on spatial potential, and is thought of as writing a code base that can be used in the parts of the city not rethought by the project.

WP_WATER POINT: It represents the outcropping point of the underground water city system. It relates the public space of the street with the water, a relationship already existing in the city of hehua tang.

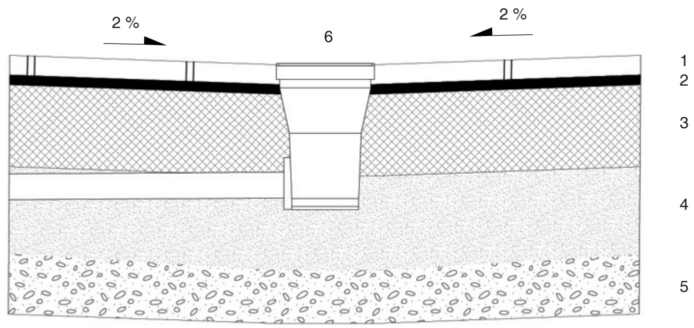
RW_RAIN WATER: the roof becomes a functional element that gives the possibility to turn into a surface of water collection to be put back into circulation inside the micro system house-court.

CO_CONTAINER : besides purification another objective is to have a system of water tanks for off seasons, each unit is connected to the central system but also has personal storage areas.

TO_TOMBIN : Water collection is also activated through the application of suitable mechanical systems. Thus, the insertion of the manhole into the court system is designed



(B)

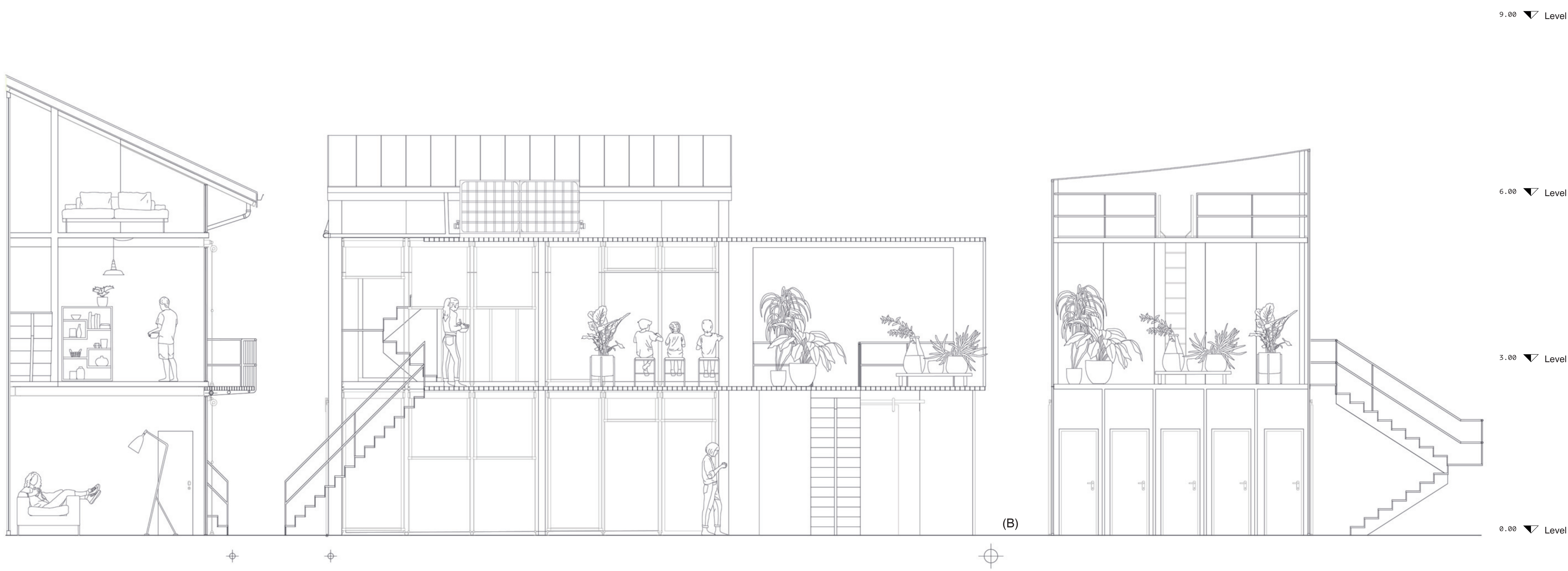


1	Natural Stone	6 cm
2	Bedding Layer	3 cm
3	Foundation Layer	25 cm
4	Fill Material	45 cm
5	earthy substrate	100 cm
6	ACO yard drain with LLD DN/OD 110 yard drain including mech grate 132890	

With a 2 percent slope toward the center, each court is constituted as a plate with a barycenter where there is a water collection element.
This constitutes a point system connected to an underground structure capable of recovering water from meteorological precipitation

SECTION B B'

The distribution on the upper floors stems from the reinterpretation of the distribution system in the traditional Chinese courtyard, settling in the project as a key element of distribution and union of multiple housing units.



IN THE MIDDLE

The design of the houses enters the dense fabric of the plot, shapes itself within it, generating forms in harmony with the context.
A linear project is formed in the midst of listed historic buildings that dictate the implicit rules of the relationship between new and old.
On the one hand, the composition of an avowedly modern project that, with its light materials, shows itself to be avowedly modern, and on the other hand, a project that arises from its relationship with the old and draws its rules from the old, becoming not a project in contrast but one that accompanies the logic of the city.

In houses, too, the private-public relationship intersects between the distribution system and the courtyard system.
In this case the staircase body goes outward generating in the courtyard a combination of functions.
We also observe how the distributive body becomes an architectural element in the design of space

SECTION C C'

Constituting itself as a project within dense space the relationship between volumes is essential to generate a space suitable for human needs.
The relationship between volumes is also thought of in relation to building as much open space as possible.
The building that forms the northern entrance to the project generates inwardly a stepped profile capable of allowing as much light as possible to enter.

FACADE DETAIL

01: Water tank in white HDPE high-density polyethylene, depth 1.20m, height 1.16m,width 1.00m, volume 1.0m3, 1000l fluid capacity

02: PVC pipe diameter 80mm, pipe for redistribution of water collected in water tanks inside houses

03: Fixed triple-glazed panel and steel mullion

04: Outdoor Box Roller Shades with lithium-ion battery motor operating system, chain, crank and motor over are in stainless steel materials, inclined at 20°

05: PVC pipe, diameter 80mm, pipe for roof rainwater collection and transport to water tanks

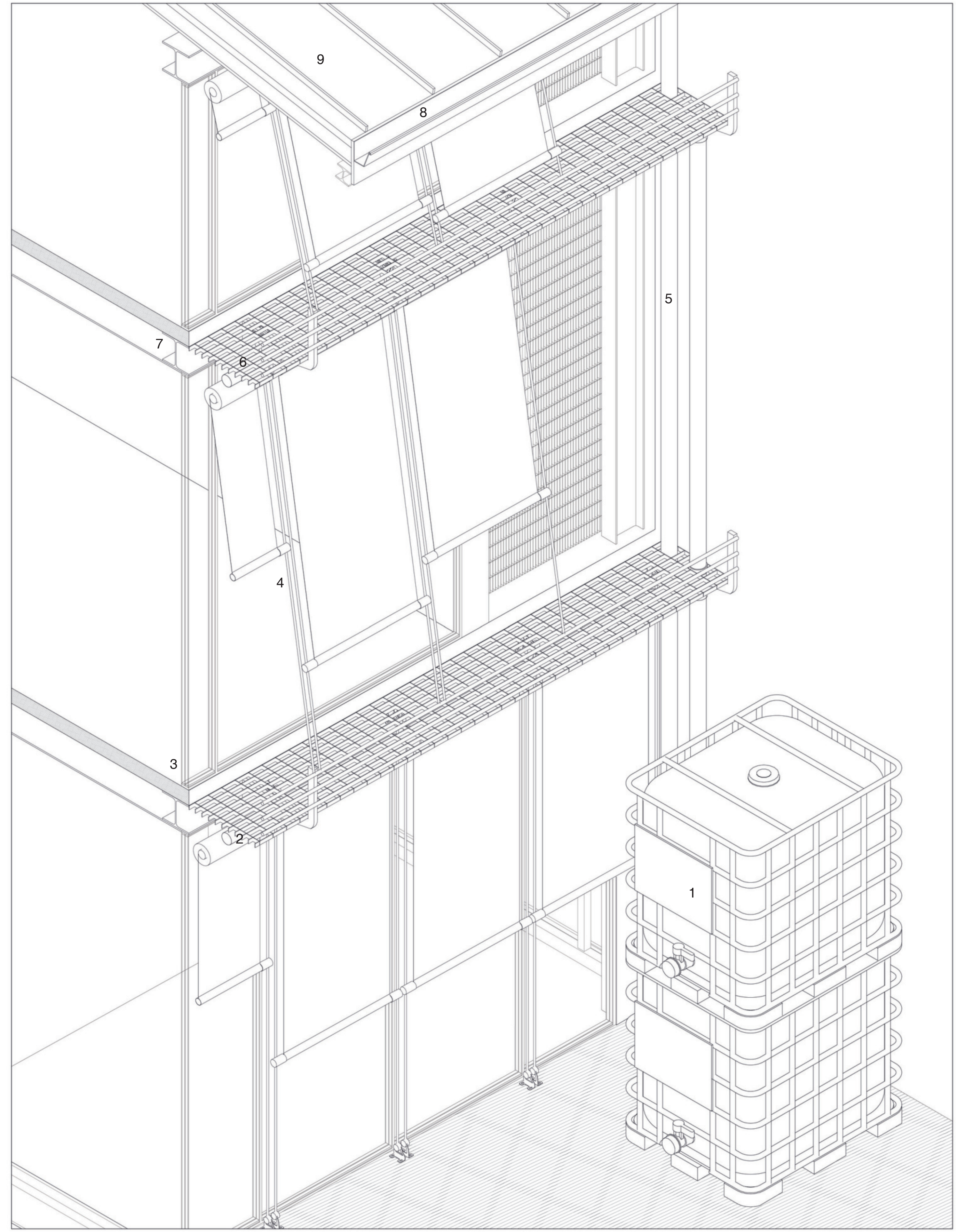
06: Heavy-duty, stainless steel grating 55cm deep, rods 25 x 5cm, depth 5cm with small guardrail consisting of three aluminium tubes

07: New steel point structure with HE200A

08: Gutter Profile, Bevel 5" x 5"F, steel

09: Sheet metal cover 2 cm

20 40 60 80 100 cm



ENCLOSURE DETAIL

01: Exterior slidind steel door, single panel, with rail above and below

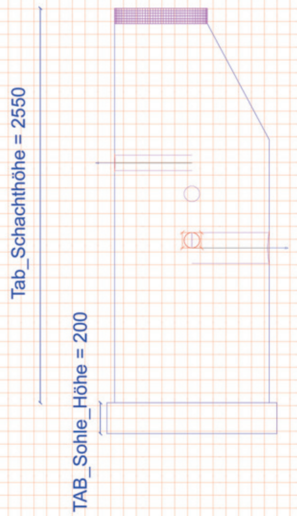
02: Polycarbonate for facade system, metallice ice colored

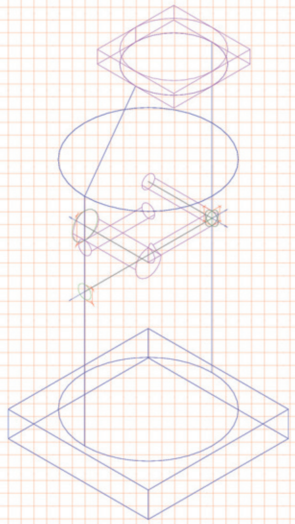
03: Steel and concrete floor with micro-cement finish

04: Gutter Profile, Bevel 5" x 5"F, steel

05: New steel point structure with HE200A

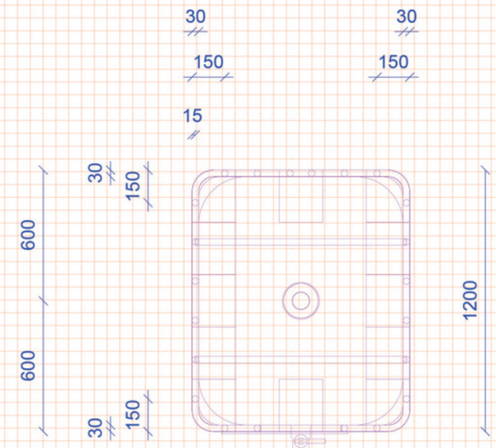
CATCH BASIN

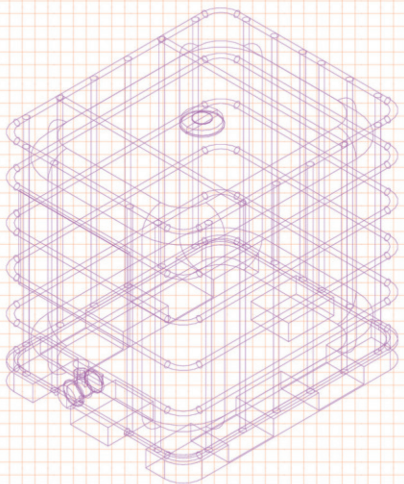




Catch_basin Schacht 600x800_Konus=650

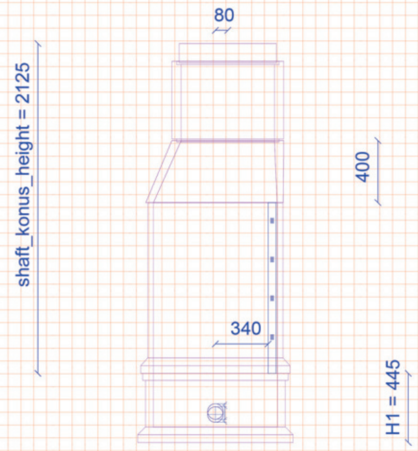
WATER TANK

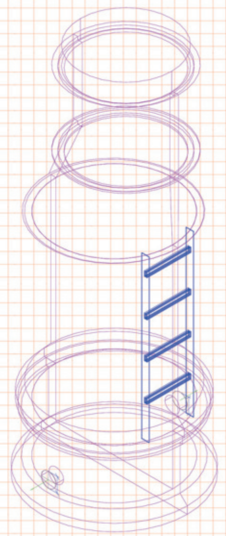




The water tank is established in the architectural design as a fundamental element, a technological object that is part of the architectural and spatial design.
It is a temporary container connected to the roof system that is capable of retaining water to reuse it inside homes for certain functions

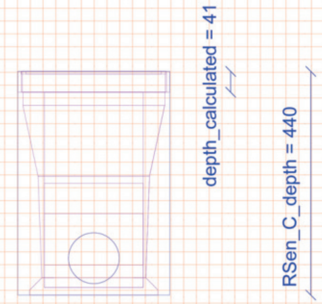
CONTROLSHAFT

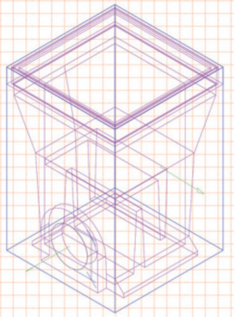




ME-PE controlshaft NW 800_ACO NW800-DN100

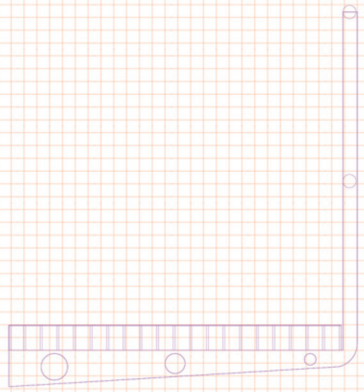
MANHOLE

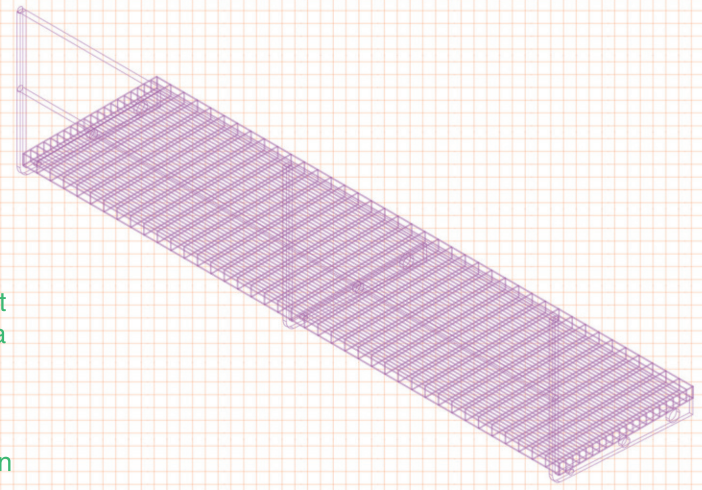




ACO yard drain with LLD DN/OD 110 yard drain including mech grate 132890

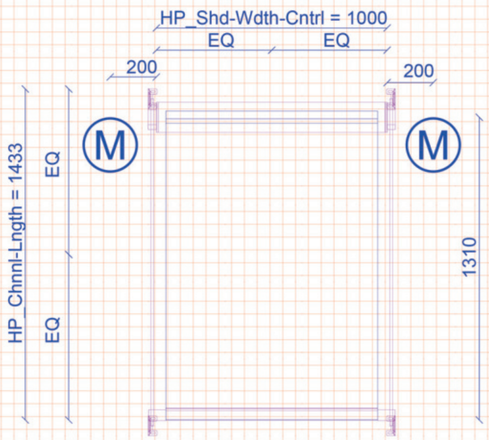
BALCONY

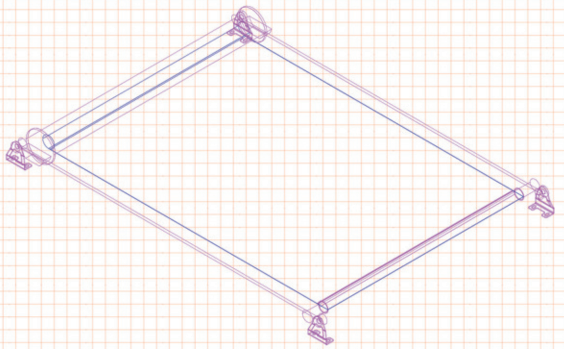




The design of the walkway is a technological object modeled as a family on REVIT and designed with a dual function.
On the surface the distribution takes place while underneath, thanks to the special profile of the walkway there are supports for the systems that run along the facade of the houses.

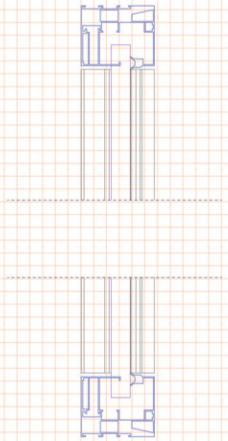
ROLLER BLIND

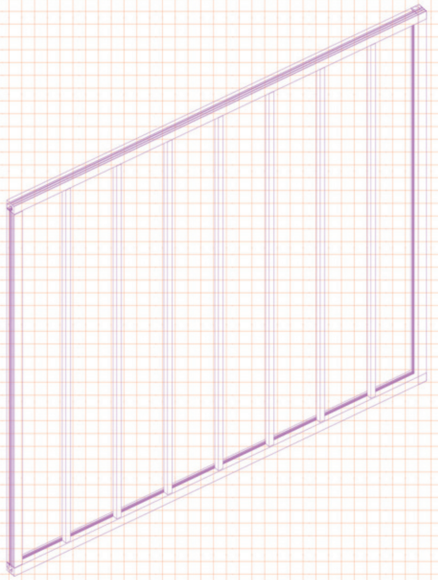




the curtain system is configured as an object characterizing the facades of houses.
Following the structural step, the curtains, through a system of cables, are configured along the entire facade generating movement and creating the possibility of creating privacy inside the houses

DANPAL POLYCARBONATE





polycarbonate generates the exterior surface of the houses.
Thanks to its modeling in REVIT, it was possible to control the different structural steps of the façade by being able to adapt the family according to the different shapes of the façade and its holes.

PARK

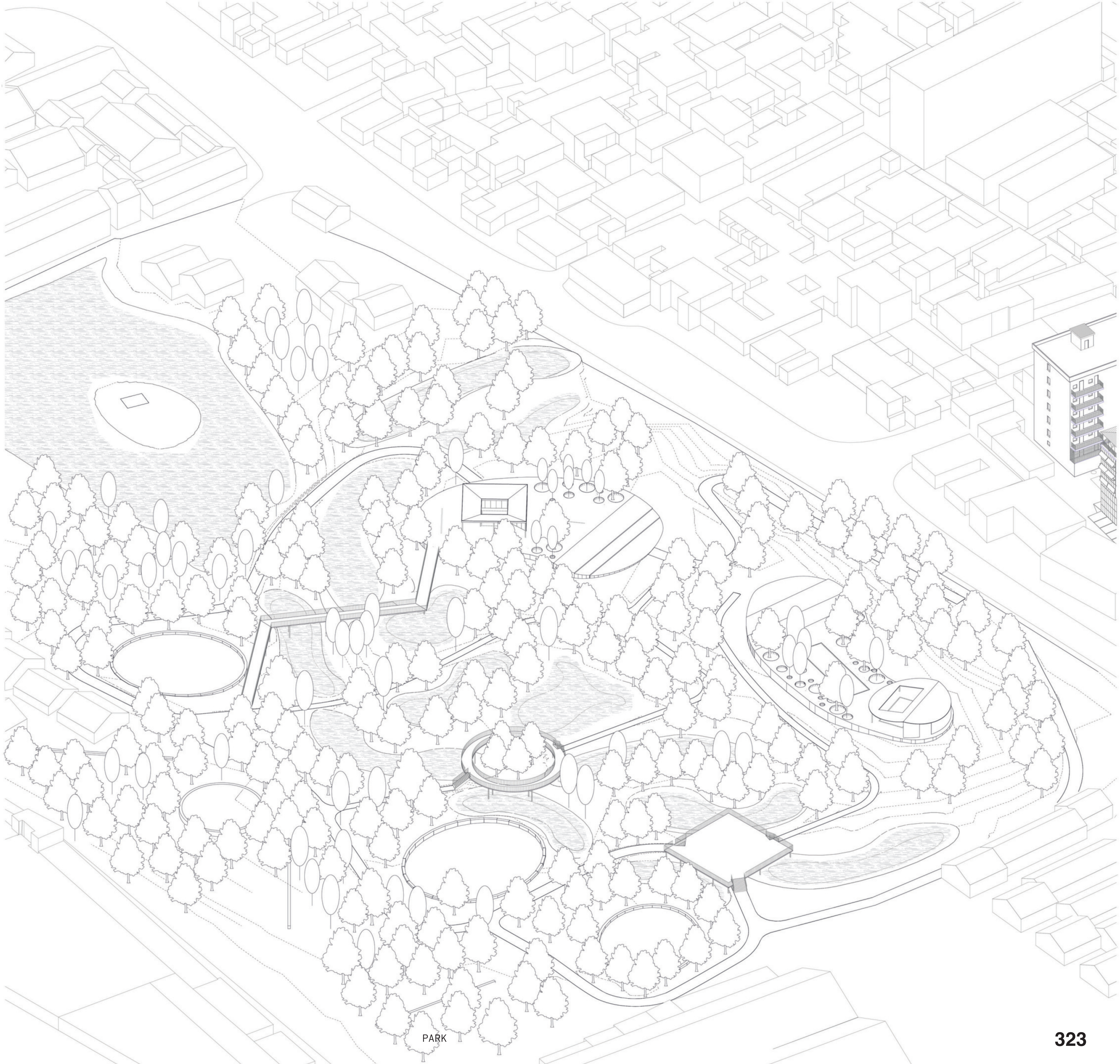
Park design is the moment when digital process and urban space creation find their highest expression.
Starting from the existing geometry, the park is configured as a ground movement project that generates different forms and scenarios.
The idea behind it is to make the park a technological infrastructure that, having at its base the study of the composition of traditional Chinese, becomes an ambivalent object that vertebrae between its human use and water infrastructure.
Starting from the original lay of the land, the design of the park is divided into areas that take on a different landscape and functional conformation.
Within the water master plan, the park represents the tail end of a process that, thanks to its two different connections to the street system, is able to store dirty water from the city and feed it back clean.
This is made possible by a system of phytoremediation tanks that, being at different elevations, create a communicating system that purifies the water.
Underlying the entire project is a strong digital component that allowed for the reconstruction of the existing terrain subsequently then modeled using CIVIL 3D, and file sharing on REVIT for the inclusion of the architectural plates in the park.

the design of the park is thought of as an essential green infrastructure for the city of Hehua Tang.
The design of an infrastructure within the park allows the user to use it in different ways, thus generating spaces in which the green component and predominant, others in which the infrastructure allows another type of relationship between user and park.
Starting again from the Chinese garden, the aim was to reinterpret its rules, its elements and re-propose them in a contemporary garden.

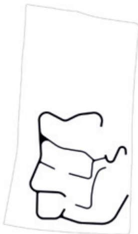
PARK

CONNECTIONS

Underlying the project is the desire to rebuild the link between the city of Hehua Tang and its park, which is currently disrupted by the construction of a wall that makes the park accessible only in places.
The idea was to remove the wall and reshape the land near the road, creating a park that faces the city.
The street system is a key element in rebuilding the link between the city and the park.
In the vicinity of Hehua Tang two distinct paths wind their way into the park and through all its points.
The reconstruction of the city-park relationship was not done by distorting the original conformation of the land; in fact, the elevation of the terrain was maintained, which allows for the generation of different viewpoints to indulge the user's position.
The park therefore rejoins the city not by configuring itself as a flat plate but rather by rethinking its relationship through the reshaping of its terrain



STREETS



The new road design is generated by following landforming of the existing terrain, thanks to the use of Infraworks

WATER

The new design of the pools generates a shape that runs through the entire park, creating different spaces

ARTIFICIAL PLATES

Artificial plates provide spots for activities in the park and at the same time places that can convey water

PARK OBJECTS

Objects in the park allow you to get inside nature by observing the system and the water system

EXISTING HOUSES

The existing houses provided a starting point for the redesign of the park as they are historic architectures in symbiosis with the green

LAKE

The lake represents the symbolic element of the Chinese garden, becoming in the new project a central element in the design of the water

the design of the park can be read in 4 macro areas.
We identify the first area in the right part of the park, the part that stitches the city to the park. Here the original conformation of the land, a natural buffer with the city, has been maintained, and two public squares have been inserted within the park's vegetation.
In the centrave part there is the most technological area of the park where, a series of phyto-purification tanks positioned at different elevation levels rotate around the park thus generating a design of the land that becomes both technological tool and landscape.
In this part we also find to break up the design of the artificial platforms within the play of the ponds.
The left part of the park represents the most naturalistic area, where the dense vegetation is confronted with the three artificial plazas that generate public space and catch basin in the same place.
The three new elements confront the historic part of the park above where the presence of the lake and traditional Chinese architecture come into harmony with the new design.

DAY 1/SUNSHINE

during the day, the park functions mixed between the artificial plates and the natural terrain, generating a combination of different activities. By not raining, the phytoremediation tanks revealed their design, thus generating new scenery and spaces in the park.
Thanks to the maintenance of the existing vegetation, the park, although in connection with the city, creates a kind of isolated oasis where the community can find its own spaces.
The low vegetation surrounding the pools generates micro habitats where nature can take hold by having a different space from that of humans.

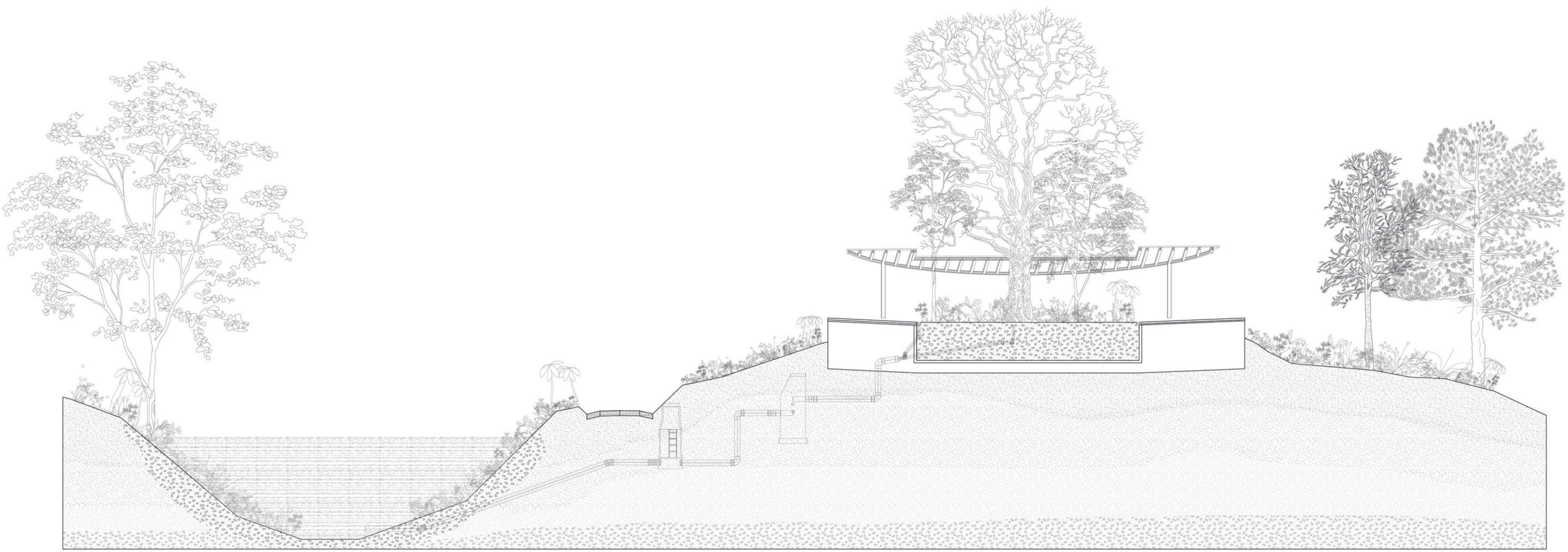
PARK

PARK

DAY 2/TEMPORAL

during a storm, the park reveals its nature as a technological object.
Phytoremediation tanks fill up transforming the landscape and at the same time cleaning up rainwater.
Thanks to the infrastructural system, the park remains a human-accessible element, yet transforming its spaces and relationships.
It is now possible to read its natural origin, the shaping of the land that underneath in turf dictates the spaces and visual logic.
The system of pools, placed at different elevations, manage to self-balance the water supply within them, thus generating natural water runoff.

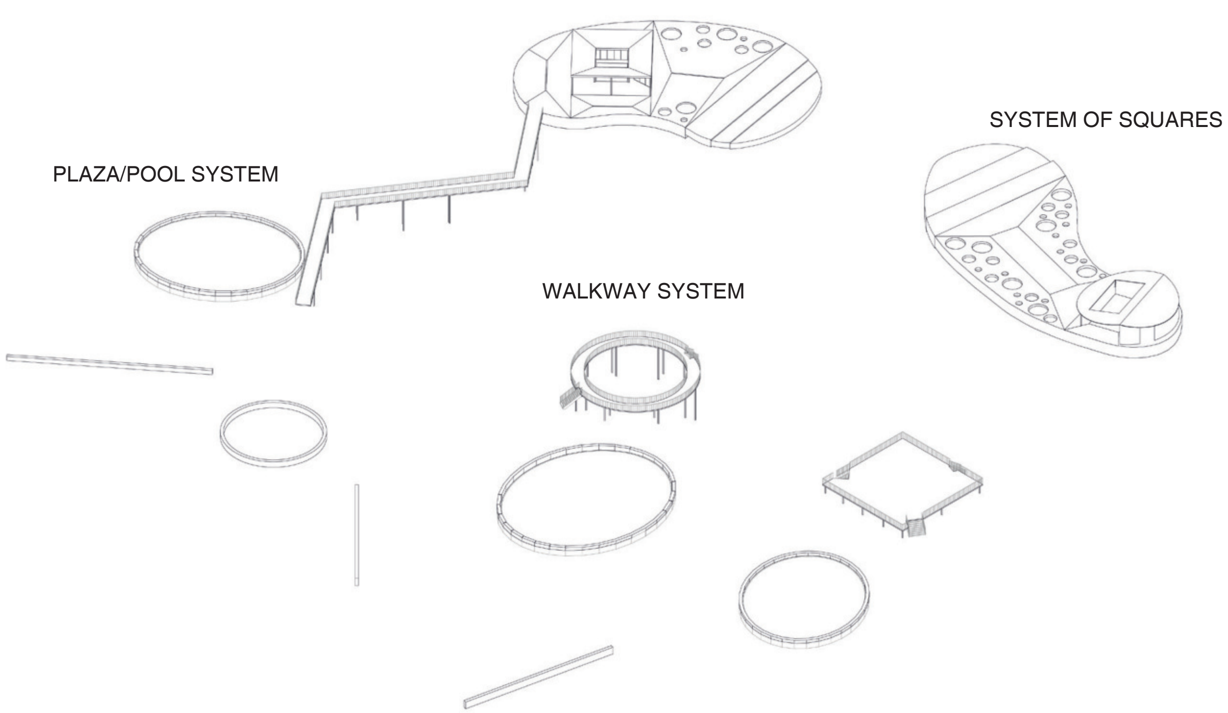
SECTION A A’



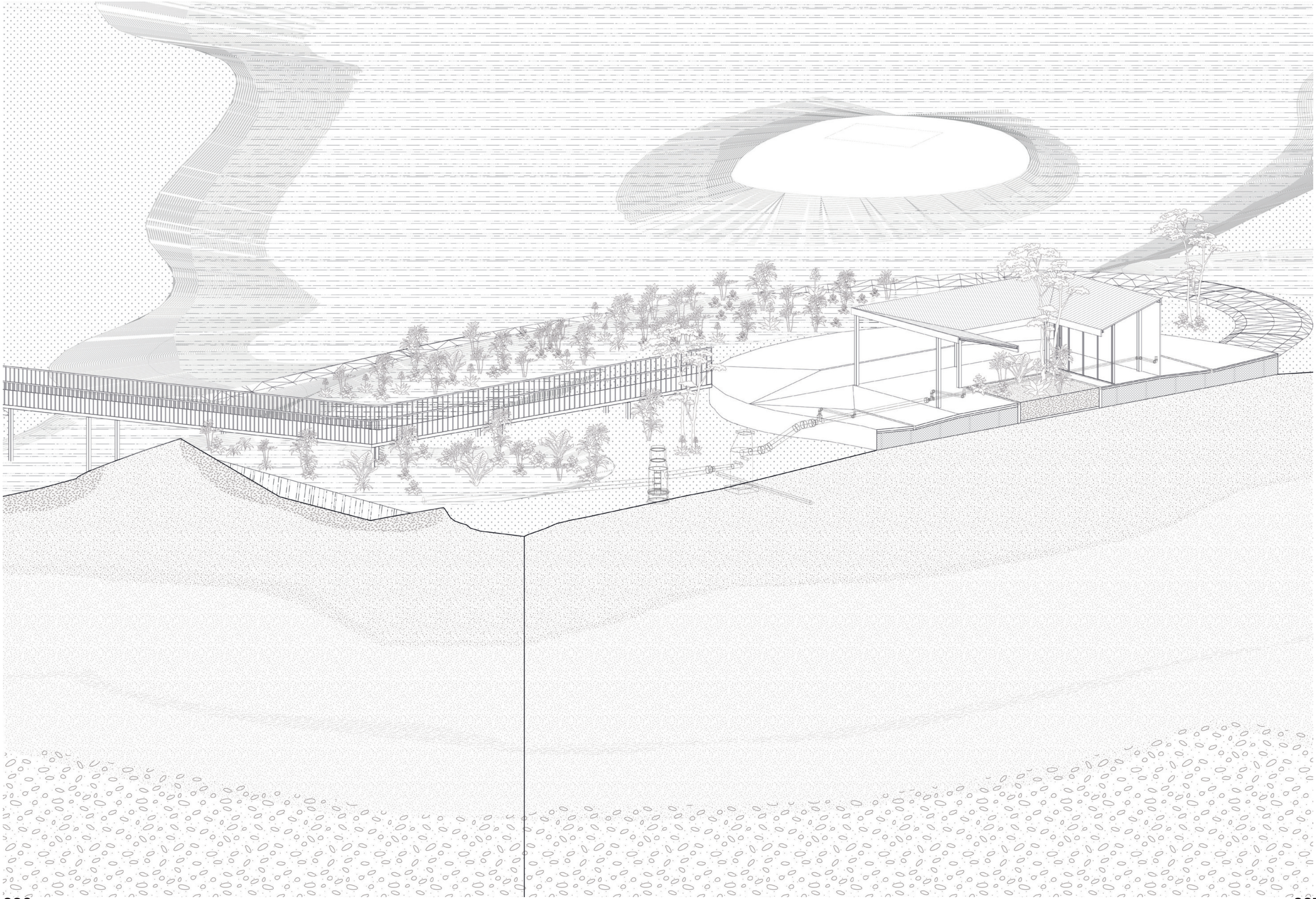
SECTION B B'

ARTIFICIAL LANDSCAPE

The design of the park is also composed of its artificial component, which allows the user a different approach to the park.
The artificial design enters the relationship with the logic of the park by also constituting itself in three distinct parts.
In other the two squares are the architectural element within the park and constitute the first point of arrival from the city.
In the middle of the pools three elevated plates allow the viewer to observe the phytoremediation system from above and have a different perception of the terrain.
In the terminal part of the park the three squares become a dual object, without water a space connected to nature in which, however, it is possible to perform various functions, during a thunderstorm they become three artificial basins capable of collecting water and feeding it back into the main system.



The artificial plaza/pool was shaped in relation to the surrounding terrain.
Thus we see how that although it is an artificial element it enters into relationship with the green, immersing itself within it.
Thanks to the design of its slope and planting system, it is able to collect and redirect water, becoming an object in constant function.
Artificial architectures, as in this case the walkway, allow the user to enjoy the park even when the phytoremediation tanks are in their full function



WATER MASTERLAN

As a silent project, the water master plan represents the second face of the park, its technological component.
If on the surface the movement of the land generates different scenarios for the viewer, at the same time it constitutes a technological tool that works to clean up the city's waters.
Through the use of CIVIL 3D, it was possible to generate a design that starts from the original conformation of the land in which to then immerse the new design forms.
The design of the waters through slope control can only be carried out accurately through a complex workflow that, through the use of CIVIL 3D, is able to calculate the land fills or additions generated by the new forms on the existing ones.
Based on this, the design of the inclinations is carried out not only on the natural surface but that on the artificial plates.
The plazas have a system of inclines that can collect water and feed it back into the system of pools.
Similarly, the plazas work, which, thanks to a central elevation point, collect water along their perimeter.
In the middle of the artificial system are articulated the phytoremediation tanks that positioned in the shape of a half circle and at different elevations allow water to enter from above and reinsert it back into the city from below, generating a looped system.

TO_N: ACO Flachrinne SD 100 , typ-FL 100 79035

SQ_N: Number square/tub for water collection

PO_N: phytodepuration pound number

CS_N: ACO ME-PE controlshaft NW 800_ACO NW800-DN100

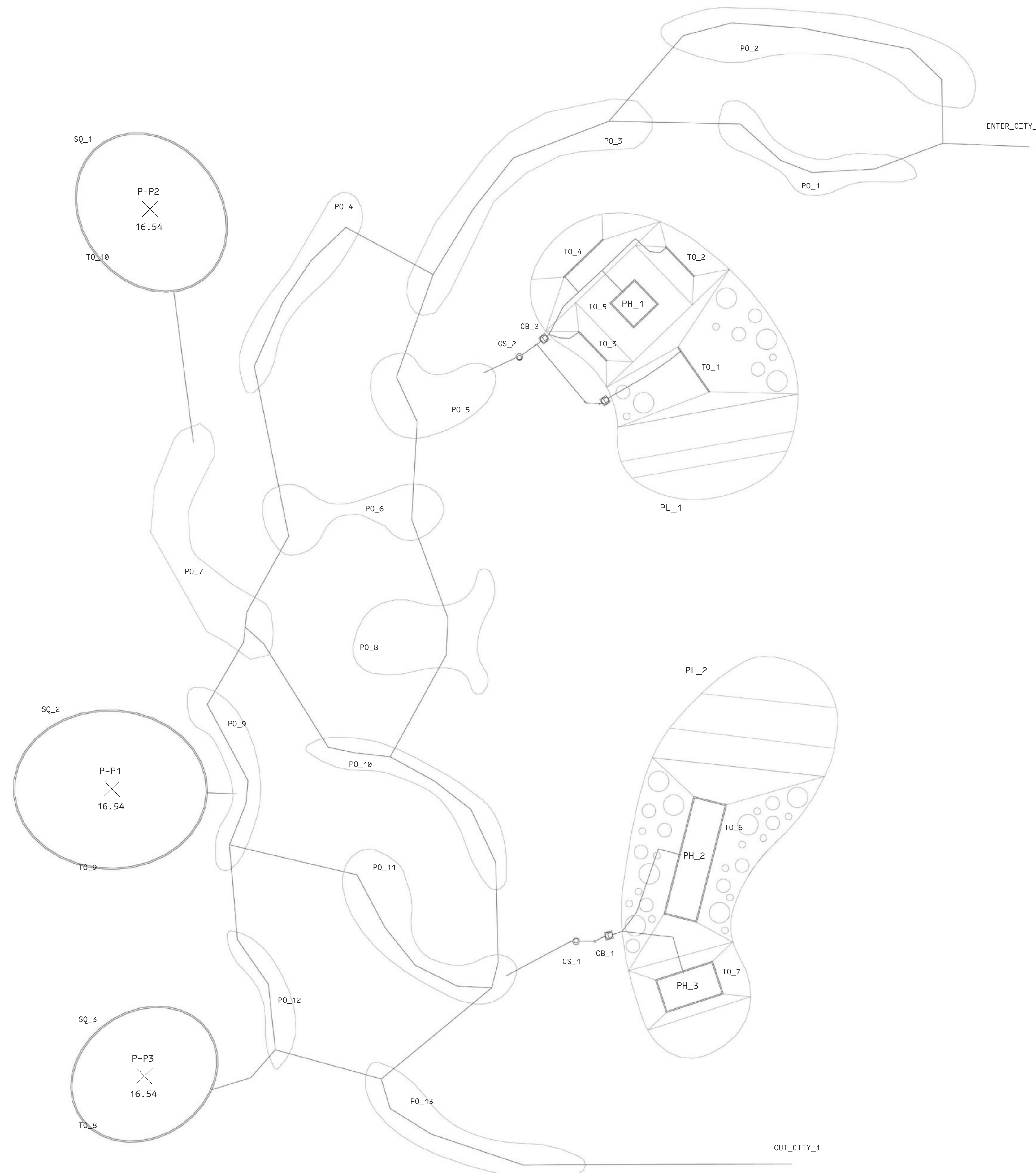
CB_N: Catch_basin Schacht 600x800_Konus=650

PH_N: Phytodepuration tank via floating system

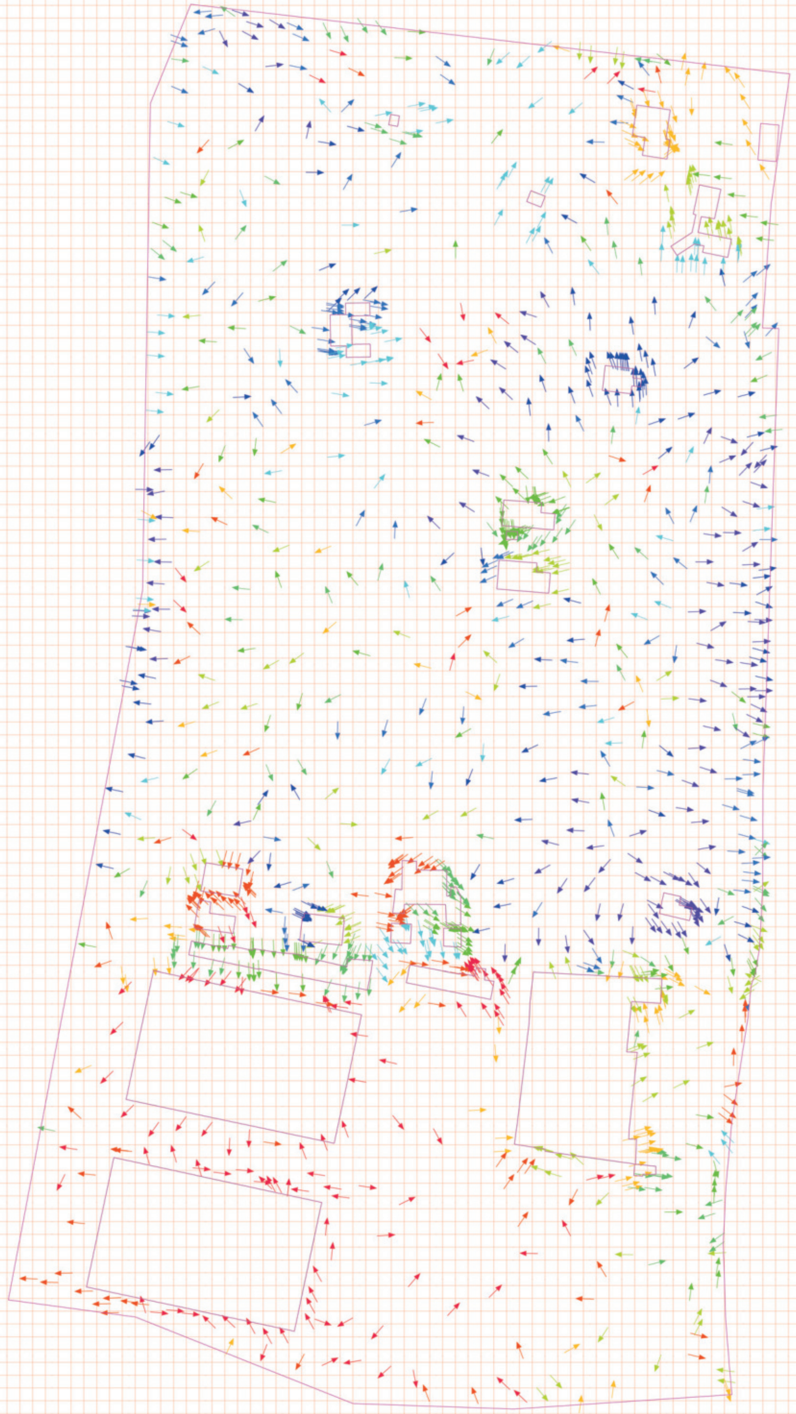
P-PN: Characteristic point elevation of the modeled surface

OUT_CITY_N: Water inlet from the main system

ENTER_CITY_N: Water input to the main system

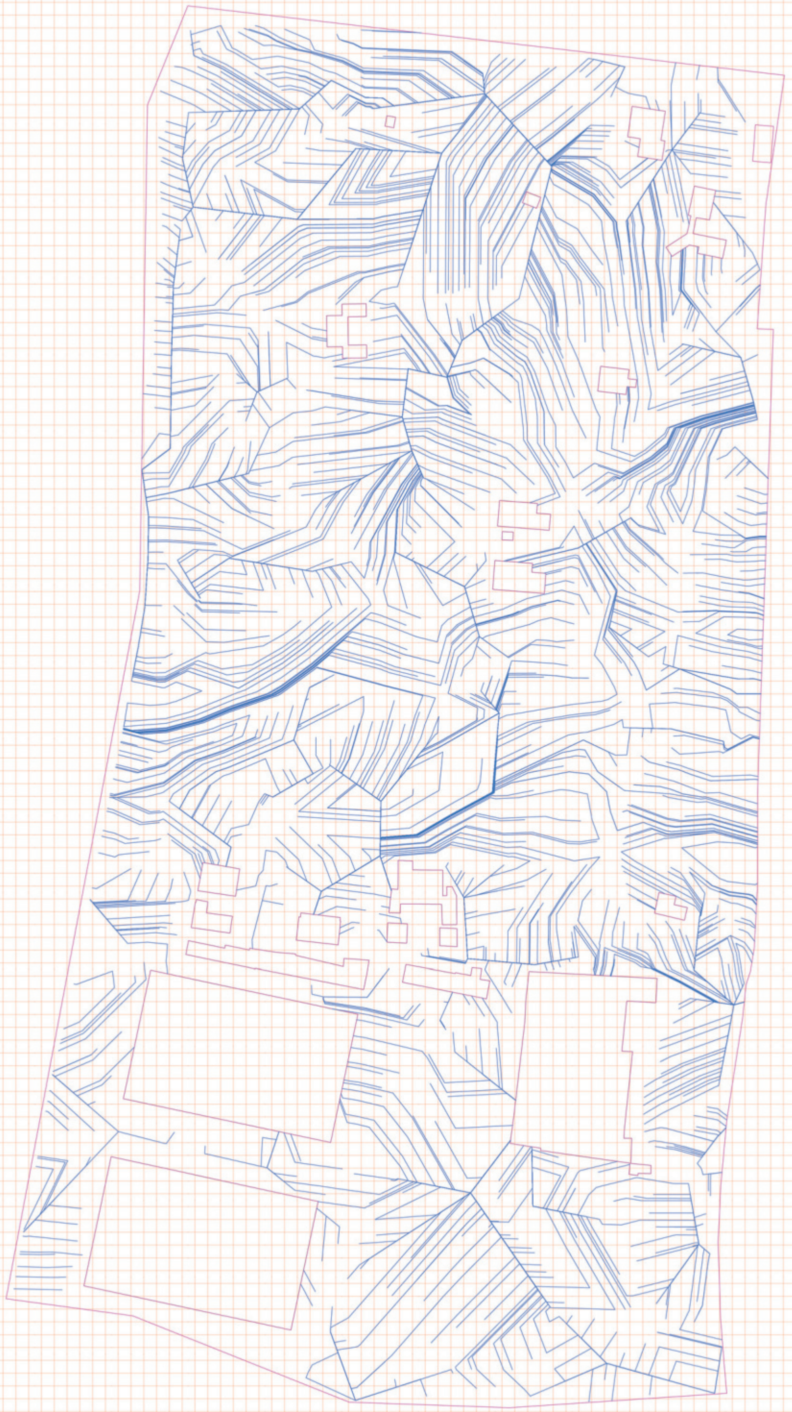


LAND SLOPES



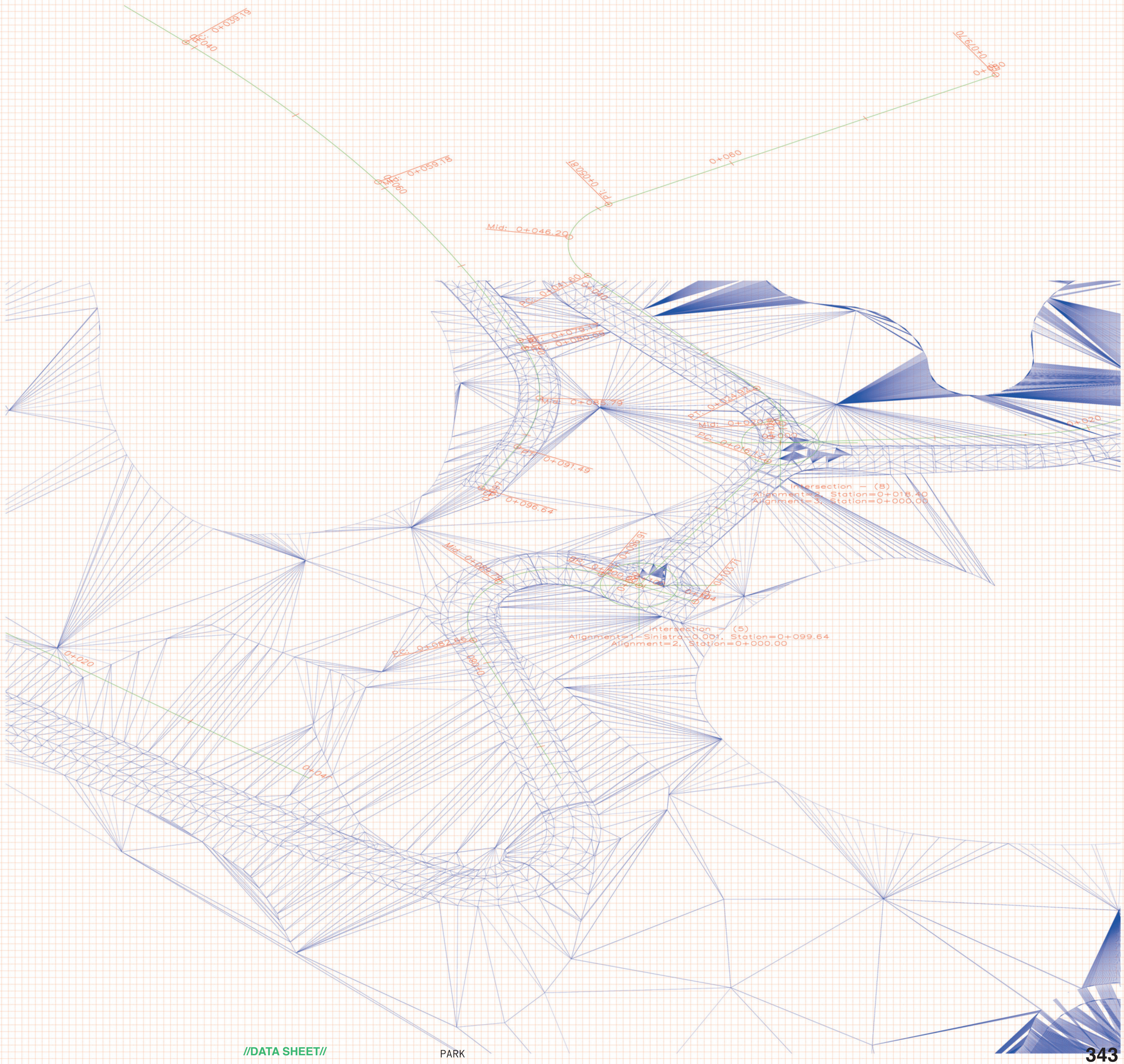
Reconstruction of the existing model allowed for analysis to read its features.
Through the use of CIVIL 3D, it was possible to reconstruct the reading of the terrain slopes schematized by arrows of different colors.
The color represents the slope percentage, while the direction of the arrow represents the direction of the slope of the terrain.
The reading is taken after subtracting the outline of existing buildings from the surface, thus achieving a greater degree of detail

DROP OF WATER



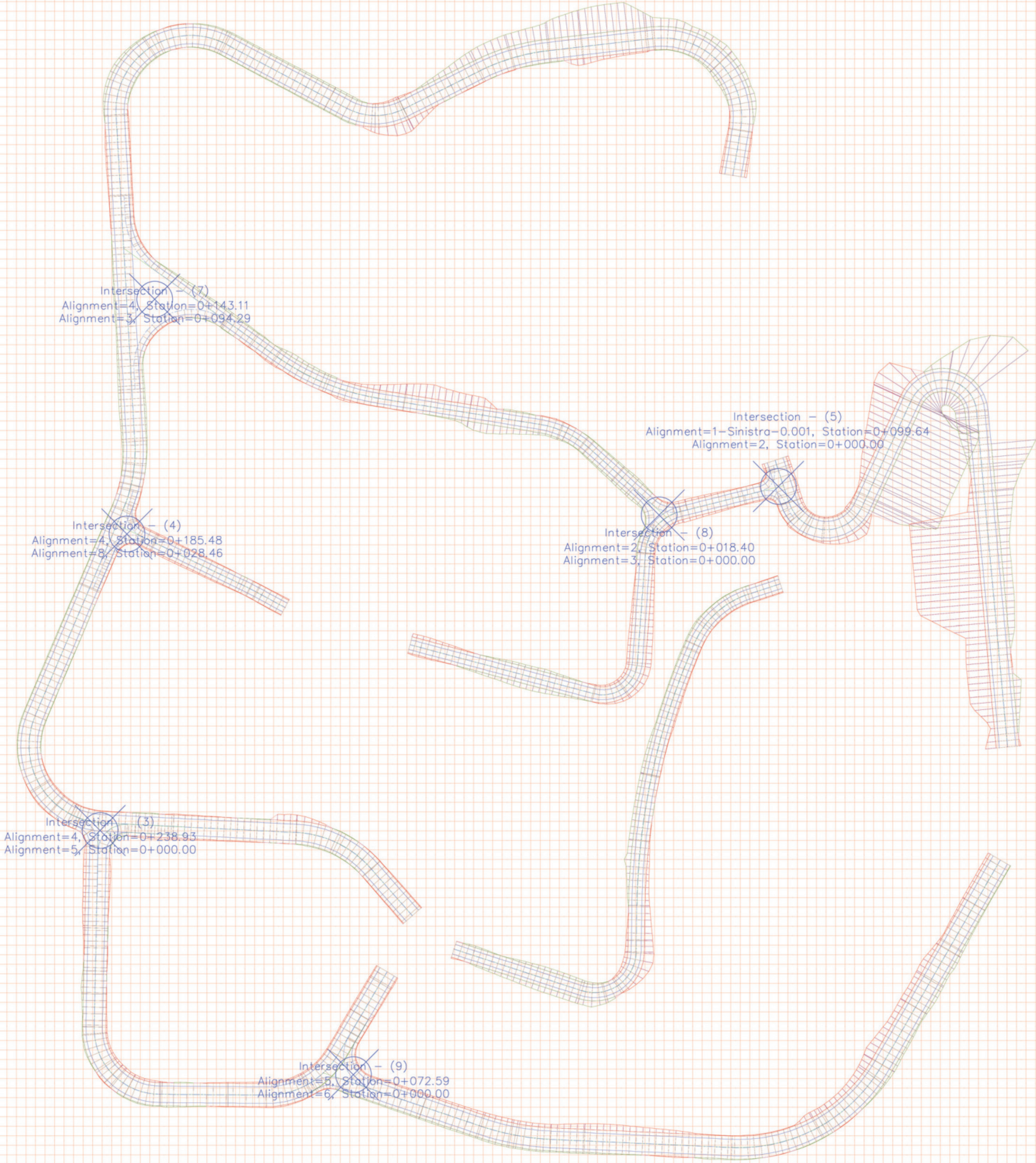
CIVIL 3D is able, starting from the existing model to reconstruct thanks to the analysis of inclinations, the possible paths of the water droplet.
Thanks to this analysis, it was possible to start making an initial design of what will later be the phytoremediation tanks.
This makes it possible not to distort the existing conformation of the terrain and to position the tanks in the best possible spot.

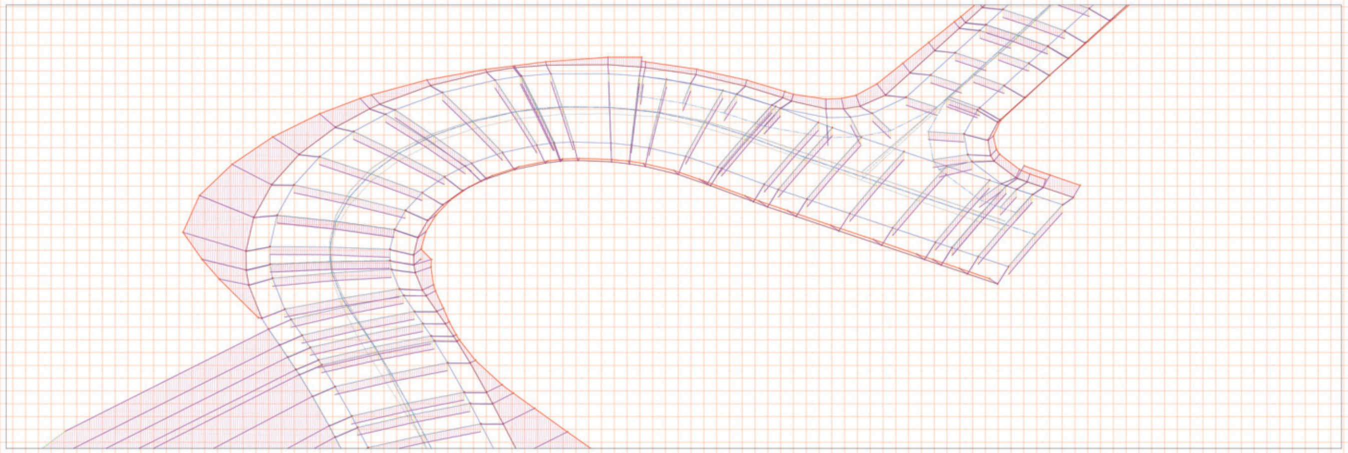
DIGITAL MODELING

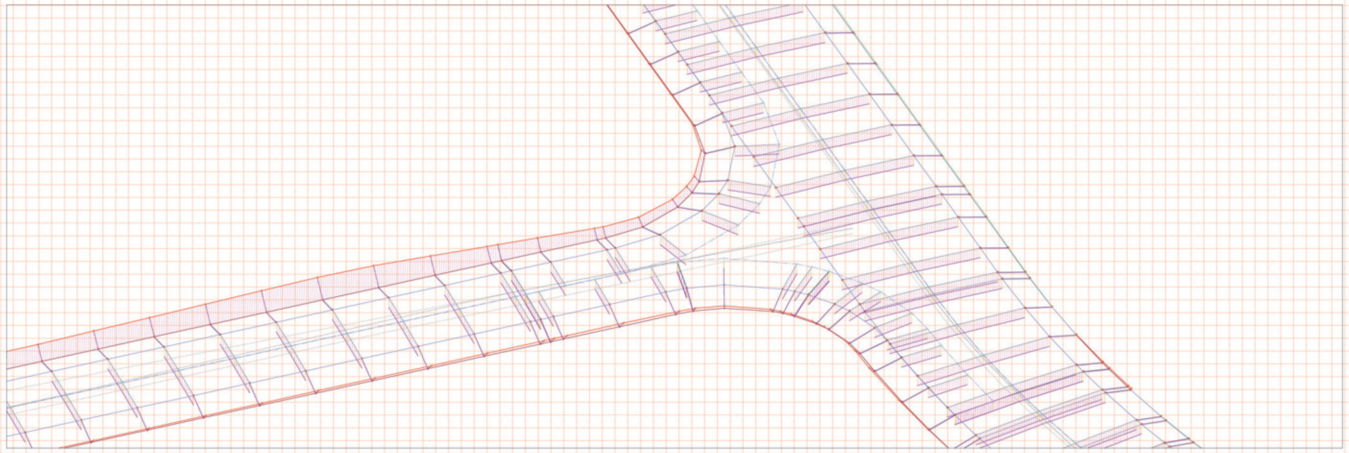


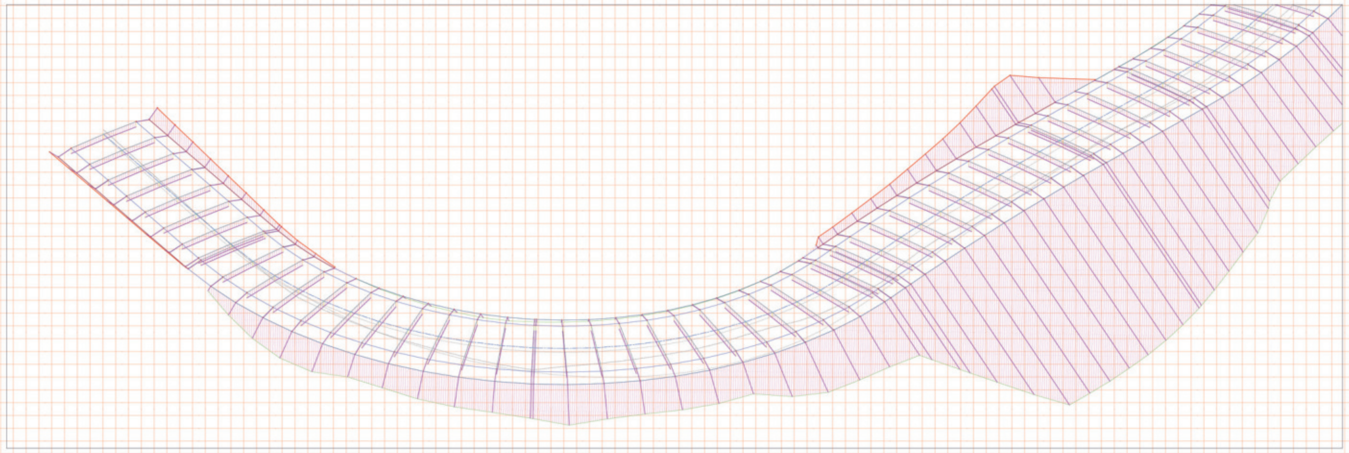
The infrastructural design, especially the road design, required the application of a complex workflow in which multiple programs were combined.
By entering the terrain model from CIVIL 3D to INFRAWORKS one is able to design the road system having full control of the new road section.
Using INFRAWORKS you are able to generate the desired road section and plot the new route on the terrain.
By controlling the slope of the road, the program automatically generates the carryover or subtraction of soil needed to construct the new road layout.
The merging of the layout with the terrain takes place on CIVIL 3D where the merging of the roads to the terrain is automatically generated and consequently the new terrain conformation along the roads.
By generating the surfaces then it is possible to separate the new road surface from the terrain surface

STREETS



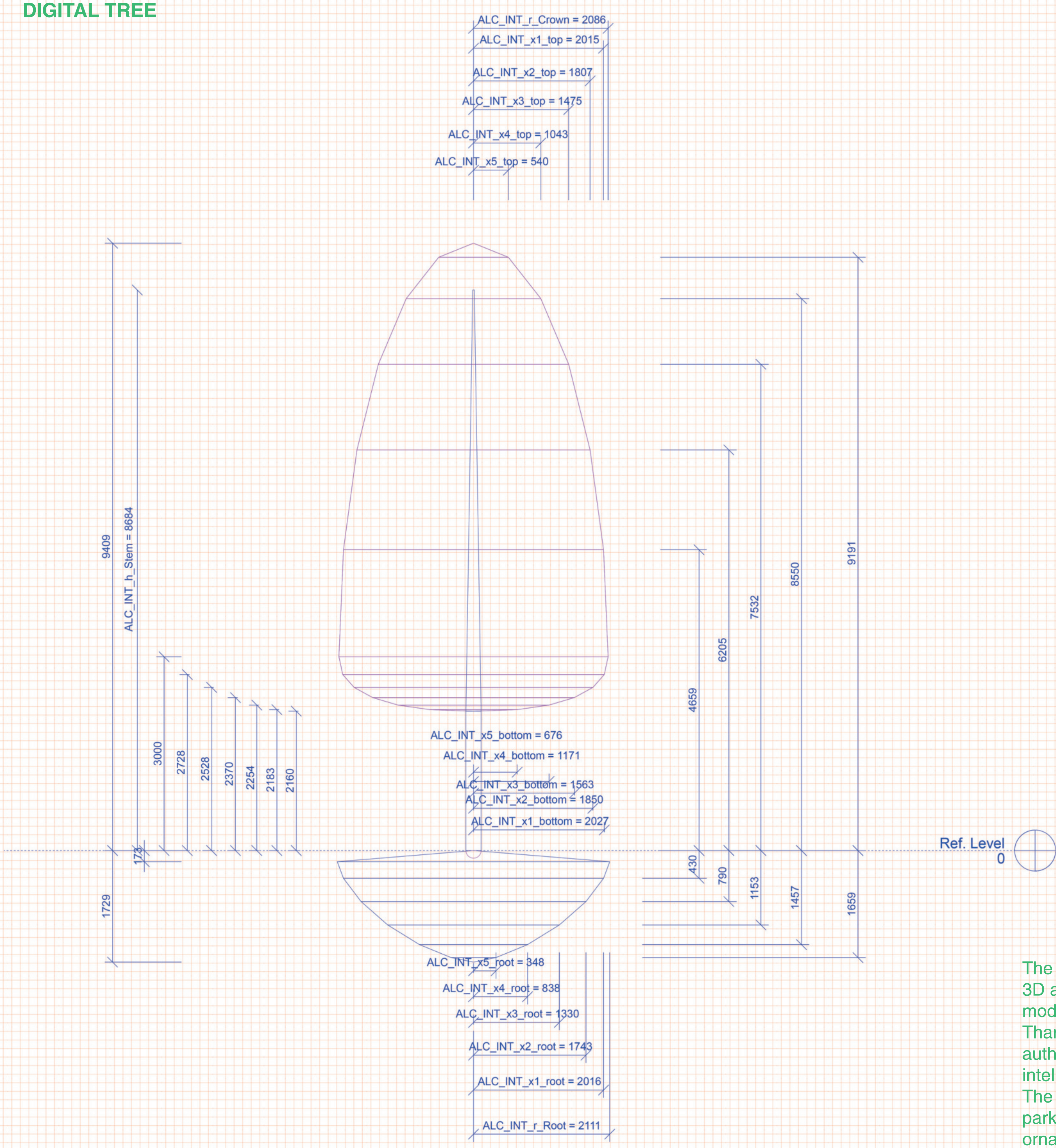


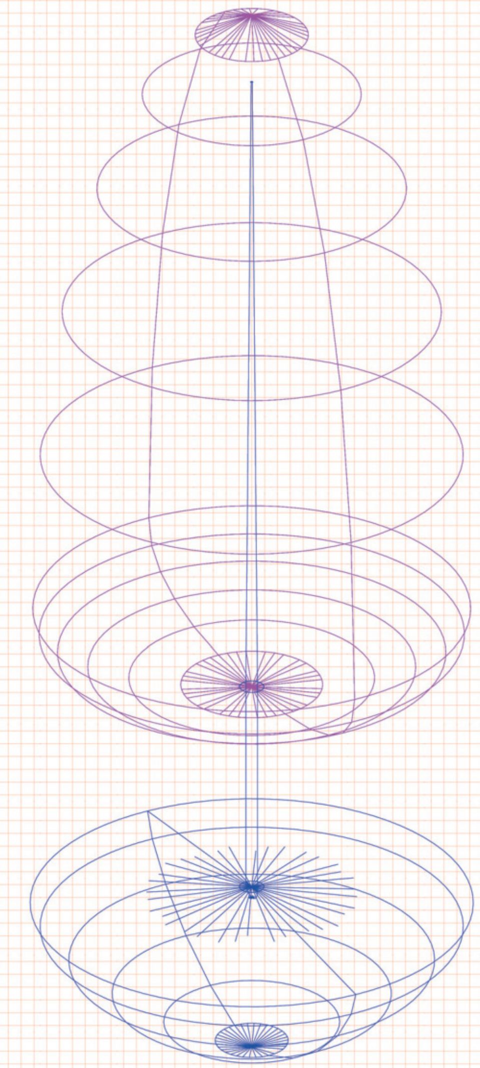




the design of the road then takes the form of a digitally modeled technological element.
In the images above we can see the total design and some sections of the new road.
The drawings represented the abstraction of the road from the terrain, and thus it is possible to notice the additions of terrain on the sides of the road that will later join the existing terrain.
Also notice how the road is composed by the repetition of its section previously modeled on INFRAWORKS

DIGITAL TREE





The digitization of the park through the use of CIVIL 3D and INFRAWORKS refers not only to the terrain model, but also to its natural elements.
Thanks to the collaboration with Prof. Andreas Luka, author of the families, it was possible to include an intelligent tree family in the park model.
The use of this family makes it possible to have a park model in which the green element is not only ornamental but becomes a technological object capable of establishing specific parameters, root depth and crown height.
Thus, more and more experimentation is being made with the use of the digital world behind the architectural design of greenery, a design in which nature and the terrain become digital elements useful for design and their control in later stages.
Prof. Andreas' family also can relate to the Escape plug-in, being able to link the digital tree to a renderable model.

STREET

The design of the street has a double face, above the attempt to reconstruct what is the major social and business relations space of Hehua Tang, below the construction of a silent project that along its entire course becomes the main water redistribution facility.
The street surface becomes the connecting element of these two worlds, a rough surface to accommodate the hectic life of Hehua Tang but at the same time a technological surface where the control of inclinations allows the total collection of water that touches the street.
Below the social life, an innovative plant system is able to store water by redirecting it within an engineering design that runs along the street.
The relationship between the two worlds is interrupted at certain points where the space below the road becomes accessible through entry via trapdoors located along the surface.
The road thus becomes a virus capable of regenerating the urban fabric with which it comes into contact, regenerating urban space and creating an opportunity for water collection and use.

DUALITY

The street is not meant to propose an illusory imagery in which the surface becomes a hyper-designed space; rather, it is meant to be configured as a functional space in which human activity takes hold.
Starting from this point, a street is designed and represented as a platform without specific functions, a platform ready to be settled by the life of Hehua Tang.
At the same time, however, a silent project takes shape that although in appearance is bare of functions actually works silently by controlling and managing the inflow of water into the city.
Thus a project is formed that finds in the design of its section the solution key to the water problem.
On the surface in the road surface that through water control is able to convey water to its edges to direct it to specific points where, thanks to the application of a system (ACO STROMBRIXX) the water is channeled below the road.
Parallel to the surface, the design of a plant cavity allows the management of distribution systems, thus transforming the street into a regenerative system of the city

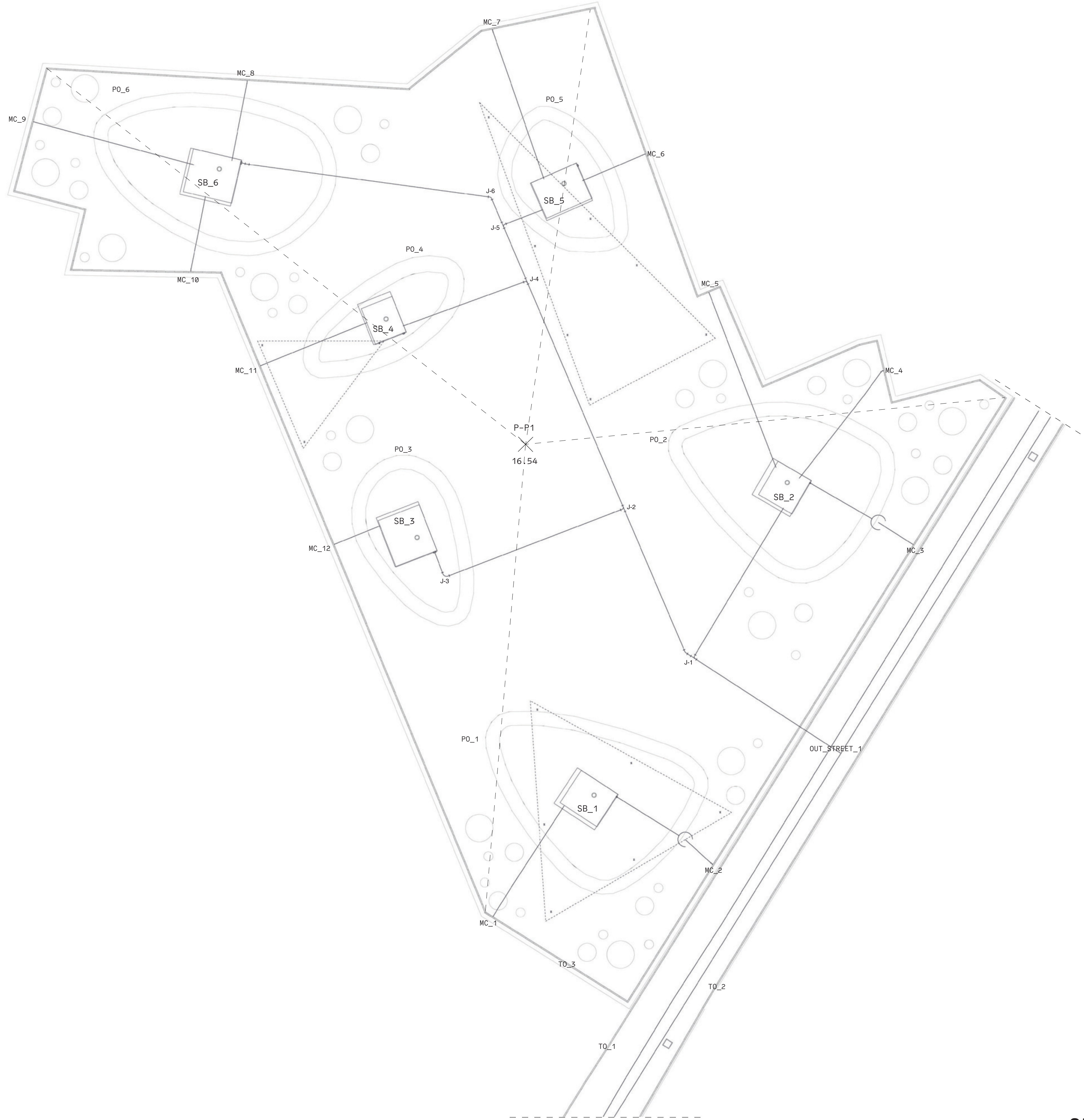
STREET

MASTERPLAN

the road master plan is the tool that enables the rupture of the gate community within Hehua Tang , and at the same time generates a looped system between the square, the head of the system, and the park, the terminal part.
Starting from the reinterpretation of the urban void outside Hehua Tang as an impermeable plate capable of transforming itself into a water basin, the road takes up the existing paths regenerating them and crossing the city to the park.
This generates a system that embraces the design plot and allows the experimentation of a system involving architecture and public space.
The square then thanks to the road is configured as a new urban space in the city of Hehua tang, which does not close in on itself but takes advantage of the difference in the urban fabric that surrounds it.

SQUARE/BASIN

Figuring itself as an overdimensional space in relation to the city, the new square design is configured both as a new centrality of Hehua Tang and as the head of the water system. The plaza is conceived as a large water basin that, thanks to a system of ground inclination manages to channel all rainwater to certain points.
Thanks to modeling using CIVIL 3D, the plaza plate has an elevation point in its barycenter raised above the rest, thus outlining a pyramidal effect that finds along its perimeter the system for collecting water thanks to a system of linear manholes.
Distributed in the space of the square, puddles are created to delimit parts of the urban space intended for different collective activities.
At the same time, these puddles present a system of ACO STORMBRIXX that, like the street, retains water.
The whole water plant circuit is rejoined to the underground system of the street, thus constituting the plaza as the head of the system that starts outside Hehua Tang and penetrates it reaching to the park.



TO_N: ACO Flachrinne SD 100 , typ-FL 100 79035

MC_N: Meeting point between stormbrixx system and linear manholes

PO_N: number puddle public space

SB_N: ACO Stormbrixx SD

P-PN: Characteristic point elevation of the modeled surface

OUT_STREET_N: Water inlet from the main system

WATER COLLECTION POINT ROAD DETAIL

01: ACO yard drain, with LLD DN/OD, 110 yard drain

02: Asphalt 6 cm

03: Bedding Layer 3 cm

04: Foundation Layer 25 cm

05: Fill Material 45 cm

06: Concrete curb 45 x 10

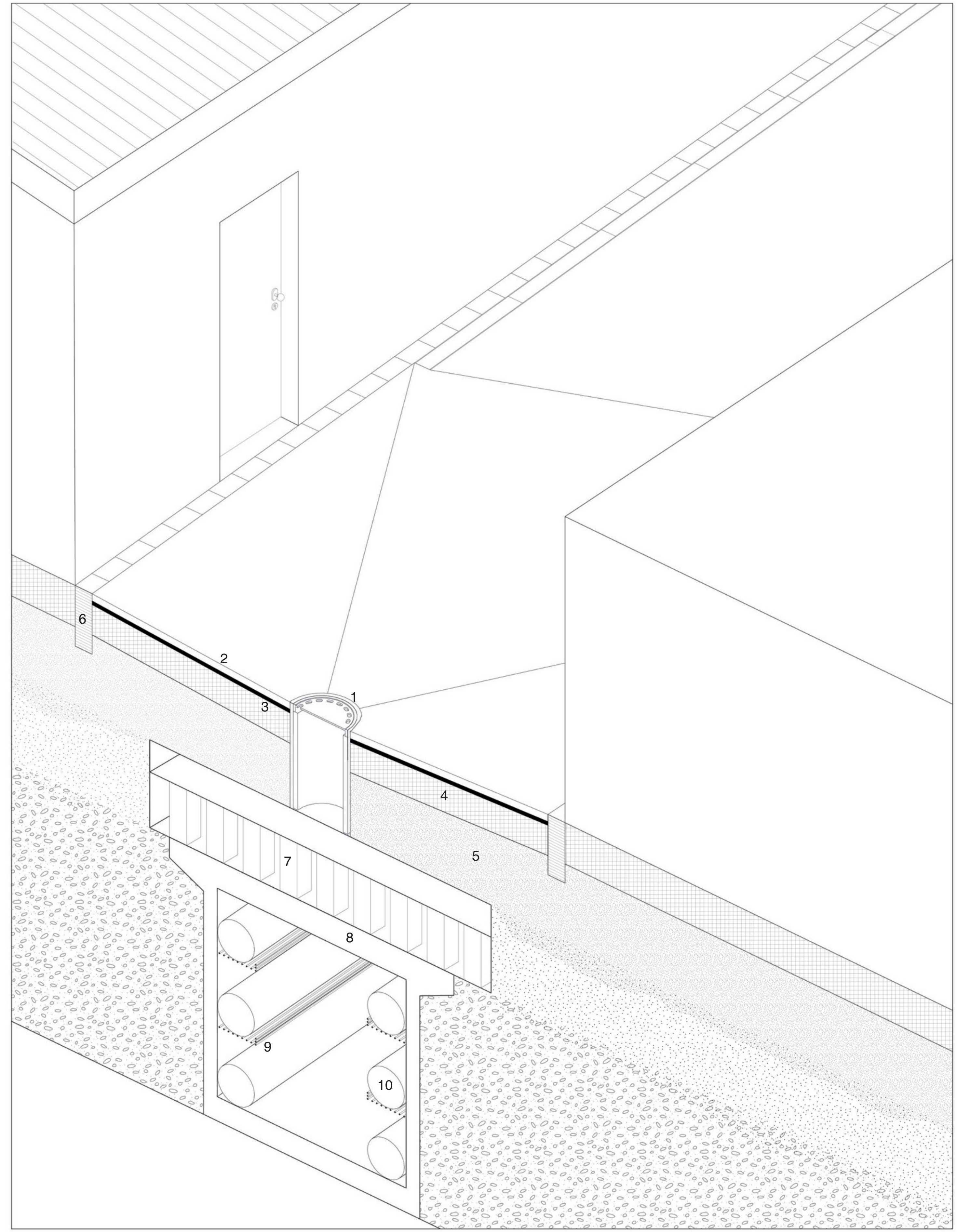
07: ACO Stormbrixx SD 91.4cm

08: Reinforced concrete T structure

09: Support for pipes hanging from the sides

10: Pipes for waste and black water collection and clean water distribution

20 40 60 80 100 cm



DETAIL ROAD POINT OF DESCENT

01: Iron hatch for pipe inspection

02: Concrete curb 45 x 10

03: ACO Slope channel for multiline seal in v100, Steel, Galvanised and polymer concrete

04: Asphalt 6 cm

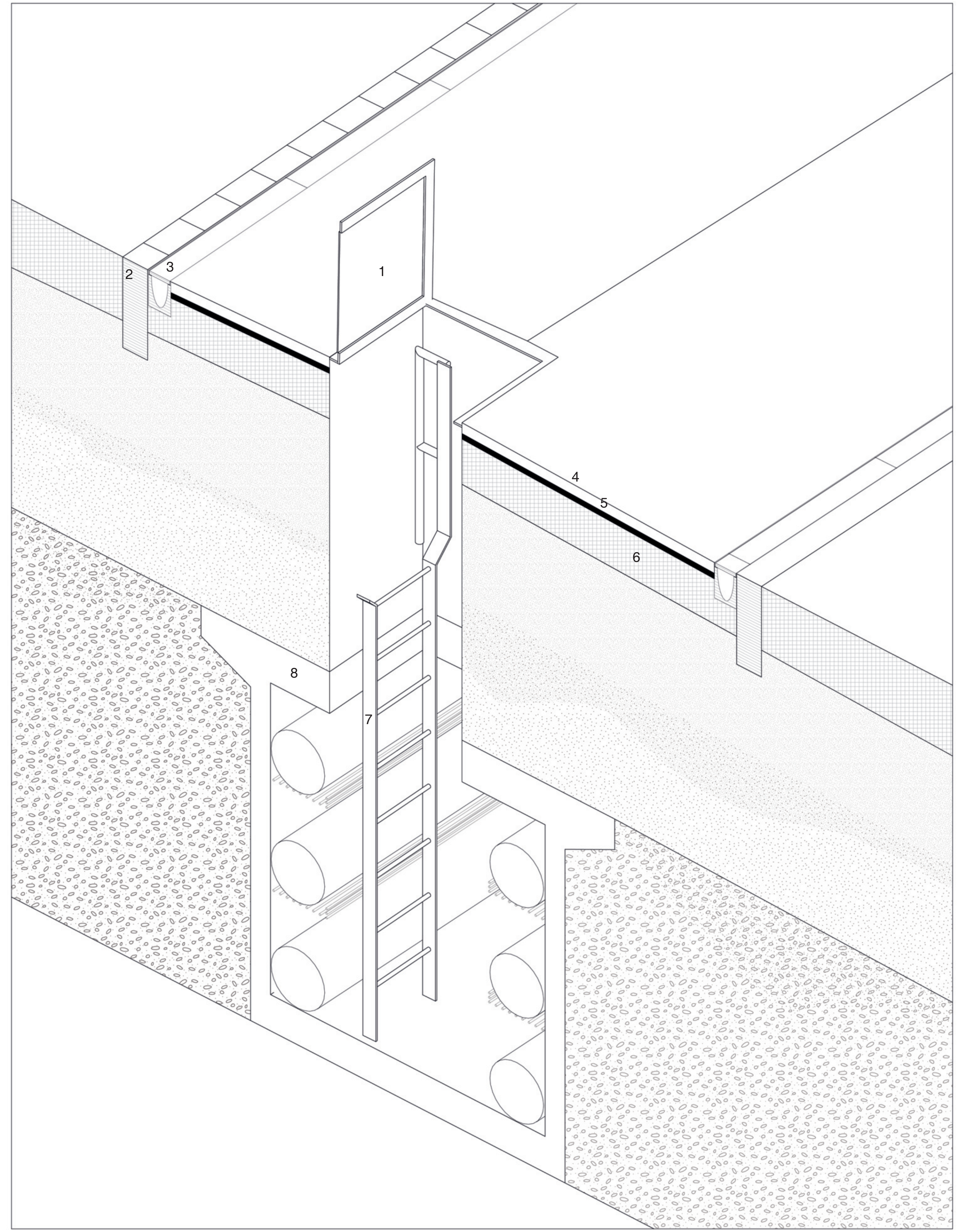
05: Bedding Layer 3 cm

06: Foundation Layer 25 cm

07: Stainless steel ladder for pipeline inspection

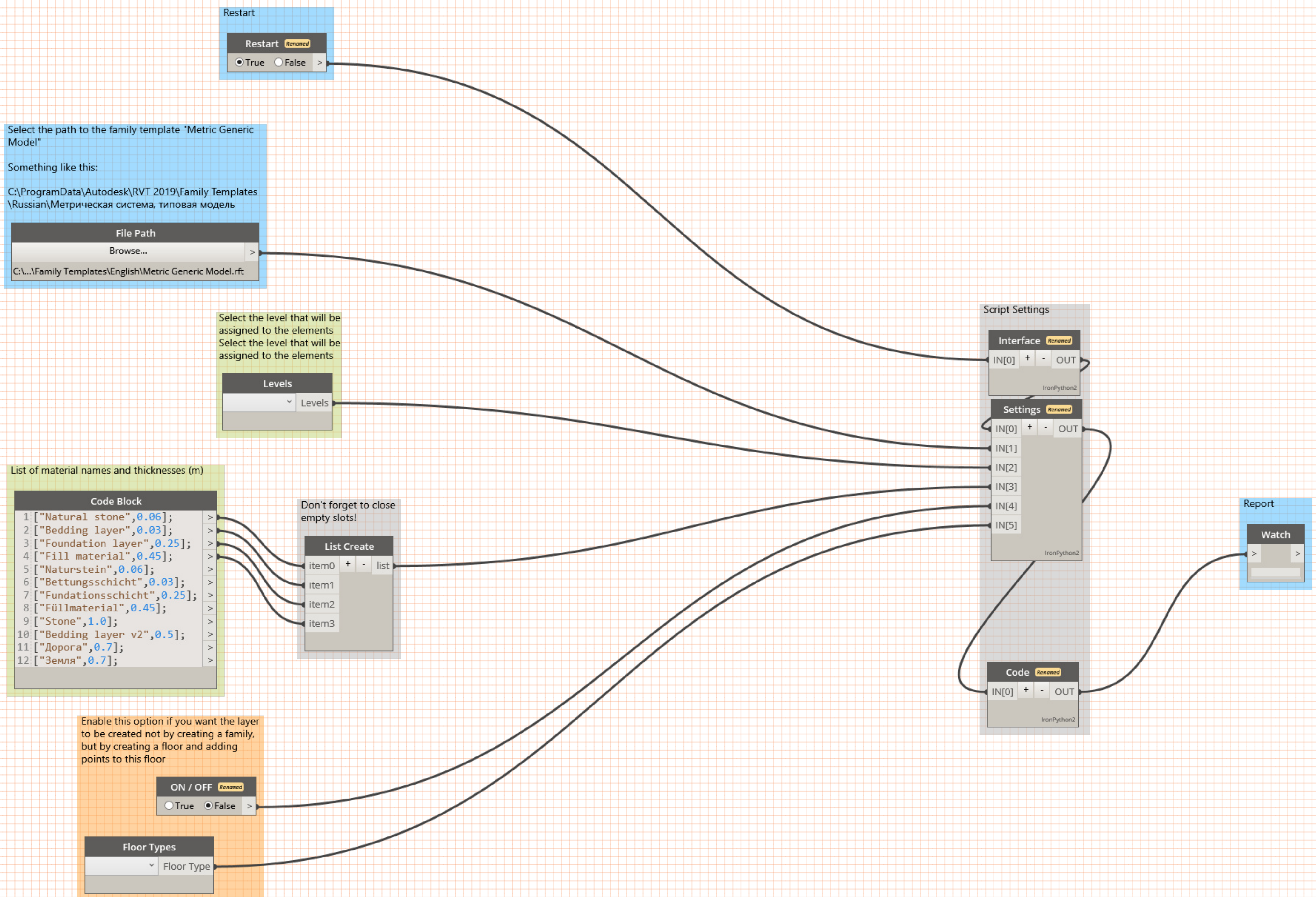
08: Reinforced concrete T structure

20 40 60 80 100 cm

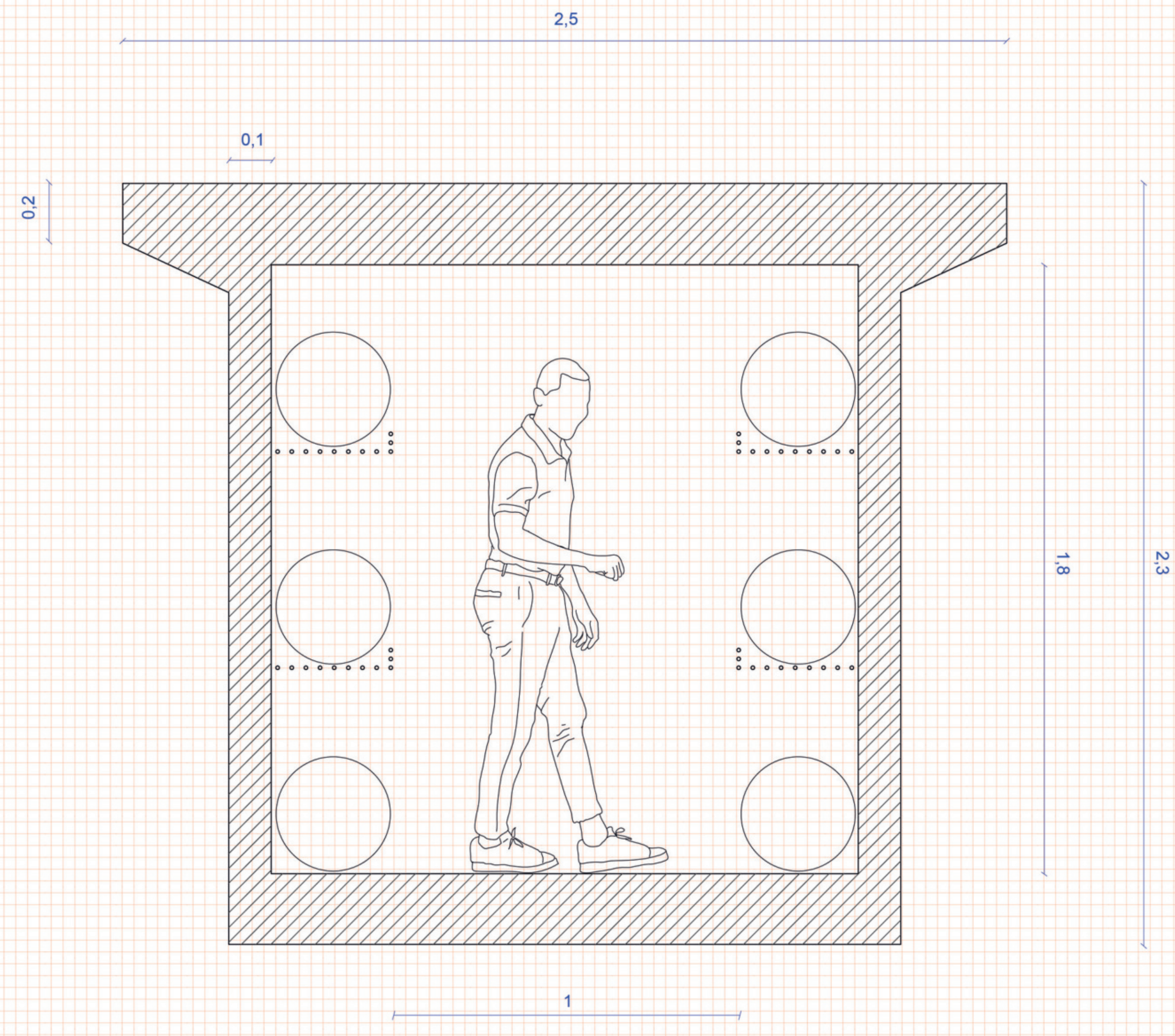


DYNAMO PROCESS

Through collaboration with Prof. Peter Petschek and developer Vsevolod Chugreev, it was possible to employ a sophisticated script from DYNAMO that allowed us to generate the stratigraphy of the road. Starting from the import of the surface, generated on CIVIL 3D, on REVIT it is possible through the script to automatically generate families composed of the different layers of the terrain.
The script allows us to control the thickness and nomenclature of the layer, which can subsequently be modified at the material level.
This process allowed us to greatly lighten modeling operations as it was very difficult to work with the stratigraphy generated on CIVIL 3D and imported to REVIT.
The process was used also to generate the thickness of the side curbs



PLANT CAVITY



The density of Hehua Tang presents not only a problem for the generation of collective spaces, but also the difficulty in the construction and generation of water management facilities.
To address this issue, the project takes advantage of the opportunities that the street creates, as the widest space in the city, by constructing an underground system that due to its conformation allows the installation and accessibility of facilities.
This configures a T-section that, thanks to the possibility of entry through a system of trapdoors placed in the street, allows for the insertion of a new infrastructure system that is invisible and does not disrupt the existing fabric of Hehua Tang.

"How Will we live together?"

BIENNALE VENEZIA 2021

THIS ARTICULATED AND COMPLEX NARRATIVE ONCE AGAIN RECODES THE TOOLS AND GOALS OF ARCHITECTURE, WHICH, CONDITIONED BY AN INHERENT BINARY NATURE: TECHNICAL AND HUMANISTIC, FINDS ITSELF IN THE DIFFICULT POSITION OF DESCRIBING ITS AUTONOMY AND, PERHAPS, ITS DISCIPLINARY IDENTITY.
THIS QUESTION IS AS MUCH SOCIAL AND POLITICAL AS IT IS SPATIAL.
RAPIDLY CHANGING SOCIAL NORMS, INCREASING POLITICAL POLARIZATION, CLIMATE CHANGE, AND MAJOR GLOBAL INEQUALITIES MAKE US ASK THIS QUESTION MORE URGENTLY AND ON DIFFERENT PLANES THAN IN THE PAST.
ARCHITECTURE HAS AMONG ITS GOALS, THAT OF WANTING TO EMPOWER WITH RESPECT TO THE RISKS AND CHALLENGES THAT HUMANITY WILL FACE IN THE COMING YEARS.
IN OTHER WORDS, THE FUTURE WE ARE ABOUT TO DESIGN, DRIVEN BY SCIENTIFIC RESEARCH AND BASED ON AN ALMOST UNCONDITIONAL TECHNOLOGICAL POSITIVISM IS ALREADY HERE, AND HAS ALREADY BEGUN TO MANIFEST ITSELF THROUGH NEW WAYS OF RELATING INDIVIDUALS TO THE ENVIRONMENT IN WHICH THEY LIVE.
AN ATTEMPT IS MADE TO DRAW ATTENTION TO A FEW MACRO THEMATIC CATEGORIES THAT ALL HAVE TO DO WITH THE SURVIVAL OF OUR ECOSYSTEM: THE ENVIRONMENT, SOCIAL INCLUSION, HABITAT, CONFLICT, AND HEALTH.

CONCLUSION

Upstream of this whole process, let us review the various steps and obstacles we encountered.
This thesis required a lot of effort and dedication for us to learn from both type and new cutting-edge devices.
Our goal then has been to know and learn through the form, which carries shared meanings and values, and to create a new design that inherently represents the values of Hehua Tang and China itself but at the same time considers all the study on water issues in China that we have carefully researched.
With this thesis we sought to understand the logic of the city's form and its development and then return a design that took into consideration both the reinterpretation of the typology and the needs of the citizens.
The intention was to learn from the existing without leaving out any part of it so the reading goes beyond that of the architecture and its elements but also includes the objects applied to it.
After the study of typology, which was a tool we had already learned to use during our university years, we came across a new world for us, that of digital.
The interpolation of programs challenged us from new points of view, from the very beginning we encountered the first obstacles for data retrieval and its reworking, in fact before arriving at the digital terrain that served as the basis for the whole project, we did several tests on a variety of programs such as qgis, Infrawork, Civil 3D.
The collaboration between civil 3D and revit, in spite of our first uncertainties due to errors we did not know how to solve, then simplified the whole process, speeding up the information and the realization of the digital model also obtaining a much more reliable and accurate result.
The digital world was a new terrain of challenges that allowed us to be in control of every element throughout the process, thanks to the cloud we were able to work even at times when we were far away staying in constant contact.
The architectural result embodies the thinking and creativity of two people, often with different ideas but always open to dialogue and ready to put their ideas back into play, thanks to this continuous debate we arrived at the architectural choices we see today making them even richer and more articulate.
The fabric of Hehua Tang has been touched at key points, the factory that has always been an anomaly is being renewed in both architecture and function to provide an answer to the demand for housing and to fill the shortage of
common spaces, making itself a new magnet both for the neighborhood and for the city itself.
The houses in turn creep into the dense fabric respecting its spaces, dimensions and characteristics but renewing themselves in technology and materials, the architecture bending to the needs of residents with new devices for their comfort.
The new spaces increase the quality of life of future residents and not only that, in fact during the design it was also intended to take into account the people who are not going to live in the new architecture, creating for them facilities used as public bathrooms, laundries, and covered gathering places.
The courtyards are a typical element of the architecture of the neighborhood so the whole project is characterized by small courtyards, all connected to each other, in addition to playing a social role they also
act as large water collectors thanks to the study on the slopes, the new system of pipes reintroduce the water collected in the system that flows hidden in the large Tshaped element hidden under the streets. The streets thanks to the new design have the possibility to take on a double value both technically for water collection and transportation and socially as transit spaces and social meeting spaces.
The largest public space that was intended to be returned to the citizens in an accessible and usable year-round way is the park; the new park stands on the slopes of the existing historic park.
The walls that surrounded it were removed making the park accessible from every point, the design resulted in a park that changes with the climate, in fact the pounds designed with civil 3d are able to collect and phytodepurate rainwater and then return it to the city.
After studying the history of parks in
China, we wanted to include two pavilions for public activities within it and use bridges, walkways and platforms as well as other elements characteristic of Chinese parks.
We feel satisfied with both the process and the result of this thesis, which was for us not only a concluding project of our university course but a time to learn even more new things that again reminded us of the countless facets and beauties of architecture.

A Marco Trisciuoglio,
per la capacità di saperci guidare senza tante parole, per la sua disponibilità.
Per aver sempre creduto in questa tesi.

A Peter Petschek,
per la sua capacità di farti innamorare delle cose, per averci fatto scoprire nuovi mondi.

A Bao Li,
per averci dato in questo anno un po' di Cina, per essere stata sempre disponibile

A Raffaele va il mio più sentito ringraziamento per questa tesi, se siamo qua oggi con questo risultato è sicuramente grazie a te.
La tua dedizione e il tuo amore verso l'architettura ti hanno portato sin qui e ti porteranno anche molto più lontano.
Lavorare con te è stata una sfida continua per stare al passo con la tua bravura e la tua dedizione.
Sei stato per me sia compagno di avventure sia professore insegnandomi cose che non avevo appreso sin ora.

Ci sono persone poi, sebbene non starò a nominarle, le quali vorrei ringraziare per quanto riguarda quest'ultimo anno.
A loro va il mio ringraziamento per avermi ricordato che la vita non e fatta solo di doveri, che a volte bisogna perdersi per capire bene dove si vuole arrivare e che la curiosità è essenziale per vivere nuove avventure ed imparare cose che nessuno ti insegnerà altrove.

Federica

Quelli che ti dicono cosa non sei in grado di fare e poi sono i primi che non sanno fare nulla

Quelli che come la mia famiglia c'è sempre stata, silenziosamente senza diregermi ma semplicemente essendoci

Quelli che come Alessandra a cui devo semplicemente tutto, il presente ma soprattutto il futuro

Quelli che mi hanno detto no Quelli che ma sei sicuro Quelli che forse non fa per te

Quelli che forse sogni troppo

Quelli che non ci sono più ma che mi guardano dall'alto, sempre accanto a me

Quelli che come la Sicilia, madre lontana

Quelli che come Federica potrebbero cambiare il mondo ma hanno solo bisogno di una spinta

Quelli che come Franco Battiato mi accompagnano durante la vita

e specialmente Quelli che non hanno mai creduto in me

Raffaele

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