

The image is a full-page architectural rendering of a modern park or urban space. A large, bold, red curved canopy dominates the upper left and top of the frame. Below it, a wide, light-colored concrete walkway curves through the space, supported by several thick, red cylindrical columns. Two people are standing on a raised section of the walkway, looking out over the landscape. The background features green trees and a clear sky. The overall design is minimalist and sculptural.

TO PERCEIVE THE CITY

EXPLORING THE NOTION OF NEGATIVE SPACES
AS A NODE FOR LOW-SPEED URBAN PERCEPTION

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MASTER THESIS
URBAN CHALLENGES



CHALMERS
UNIVERSITY OF TECHNOLOGY

Master's Thesis in Architecture

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"We have our own ways of sensing space
and of moving through space.
We have our own ways of making meanings
of space."

—Bryan Lawson

ABSTRACT

The starting point of this master thesis is to explore how negative space in cities affects people's perception and experience of urban space, and affects people's way of movement and social interaction through design.

Negative space, in the field of architecture, generally refers to the space left behind which exists widely in urban spaces. In this master's thesis, my research object is selected as viaduct space.

The high-speed transportation system occupies an important position and space in Gothenburg. It is undeniable that the rapid development of infrastructure to facilitate cars and trains has divided the city into small chunks and created obstacles to mobility at a human scale. In addition, Gothenburg has very good river resources, but some of the river banks are not well used to create public value. For example, where railway tracks and Bridges cross rivers, the continuity of walking along the river is interrupted. The dark, noisy and cluttered space under the bridge brings a strong sense of insecurity and depression to pedestrians, which are invisible psychological effects. In many cases, slow pedestrians and bicycles are on the ground level of the city, and people need to look up to get a sense of the city, while cars and trains can read the urban space at high speeds. What if the continuous space of the viaduct is used to create pedestrian space occupying the upper part of the city?

At present, some infrastructures are facing the situation of abandonment around the world, but there are still new viaducts being built. Therefore, besides of considering the coexistence of the viaduct and the existing environment, how can we consider the coexistence of future planning? How do we consider new construction to achieve its own future flexibility?

The viaduct is connected to the surrounding environment in various and complex ways, which brings both challenges and opportunities to the improvement of urban space. This thesis discusses how to connect the infrastructure with the surrounding urban assets to provide high-quality experience value for the urban low-speed traffic groups, so as to create a dialogue between people, space and movements.

Keywords : Viaduct, Negative space, Perception, Public space



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READING INSTRUCTIONS

Chapter 1 starts with the background of this Master's Thesis by introducing the point of departure, and explains the main subjects, research question, delimitation, and its relevance to sustainability and profession. In addition, methodology is also presented in this part.

Chapter 2 sorted out the theoretical studies related to Environmental Psychology, Spatial Perception, Viaduct, and other elements, providing theoretical support for subsequent research, and finally summarized with a relationship map.

Chapter 3 explains the background of the site on a large scale with the analysis of urban elements and some visions from local people.

Chapter 4 sets several research typologies of viaduct based on theoretical foundation and the analysis of the site, analysing the challenges faced by each typology and corresponding solutions extracted from case references. This part finally summarizes in the form of Toolbox.

Chapter 5 shows the mapping of three main challenges. With the help of

overlapping the three mappings, there is a overall territory mapping which helps to find the final site for the next step.

Chapter 6 is an example of the application of the Toolboxes. With the analysis of target groups, the outcome is a Viaduct Theme Park that fulfills different needs of groups and creates various routes for people to explore. The proposal also showcases the knowledge that gained in the previous chapters.

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01

INTRODUCTION

The idea of this thesis initially comes from the thoughts about the spiritual infrastructure in cities. It aims to discuss the interaction between architecture, infrastructure, movement, social communication, and human psychological factors.

I read some works of literature about space and psychology in the process of turning the starting point into thesis ideas, and "The Language of Space", written by Bryan Lawson, gave me much inspiration. In his book, he discusses the mechanism of people's perception of architecture and the city and the influence of psychological factors.

Through reading, I was also experiencing and perceiving the city of Gothenburg from the perspective of a "tourist", bringing some arguments in the book with me. As the thesis progressed, Gothenburg entered wintertime. Living in a high-latitude city for the first time, I got excited about the early arrival of darkness at first. However, gradually I found that the lengthening of darkness had brought more and more obstacles to travelling. Some areas free to walk on summer nights become dark and scary when winter comes, making many spaces unattractive, especially the pedestrian areas under the viaducts. Under the shadow of darkness, all the everyday events become unknown and frightening, such as buildings that cannot be seen clearly, a group of people

walking in the distance whose expression and purpose are indistinguishable, etc. Then I realized that not the physical barriers but the psychological aspects stopped my movement.

As an industrial city and transportation hub, with the viaducts well developed here, Gothenburg is facing the problem of psychological boundaries in many spaces. Even so, viaducts usually stand near many valuable urban assets, such as rivers, green spaces, etc. The viaduct itself also has the advantages of stability and coherence, which is excellent potential. Therefore, I would like to continue this topic to explore how combining the viaduct and surrounding situations can create an excellent perceptual environment for people to transfer the negative space into the positive.

PURPOSE

The purpose of this master's thesis is to find a planning approach to achieve a good coexistence of infrastructure with the surrounding environment and future planning, to create a comfort zone for pedestrians and cyclists, reduce the negative psychological impact, and promote the establishment of a slow urban travel system. By analyzing the problems and challenges that infrastructure brings to the surrounding environment, rethinking their potential for transformation, and combining reasonable and attractive public activity spaces, we have the chance to change the infrastructure into a bond, a new urban axis, instead of a divider.

Based on the theory of space production, Movement of pedestrians and space perception, this thesis investigates an integrated urban public space design proposal to create space attraction to promote the occurrence of public activities and social interaction.

RESEARCH QUESTION

Can the viaduct become the node and axis for people to perceive and experience the city, and to promote urban circulation and social interaction?

DISCOURSE

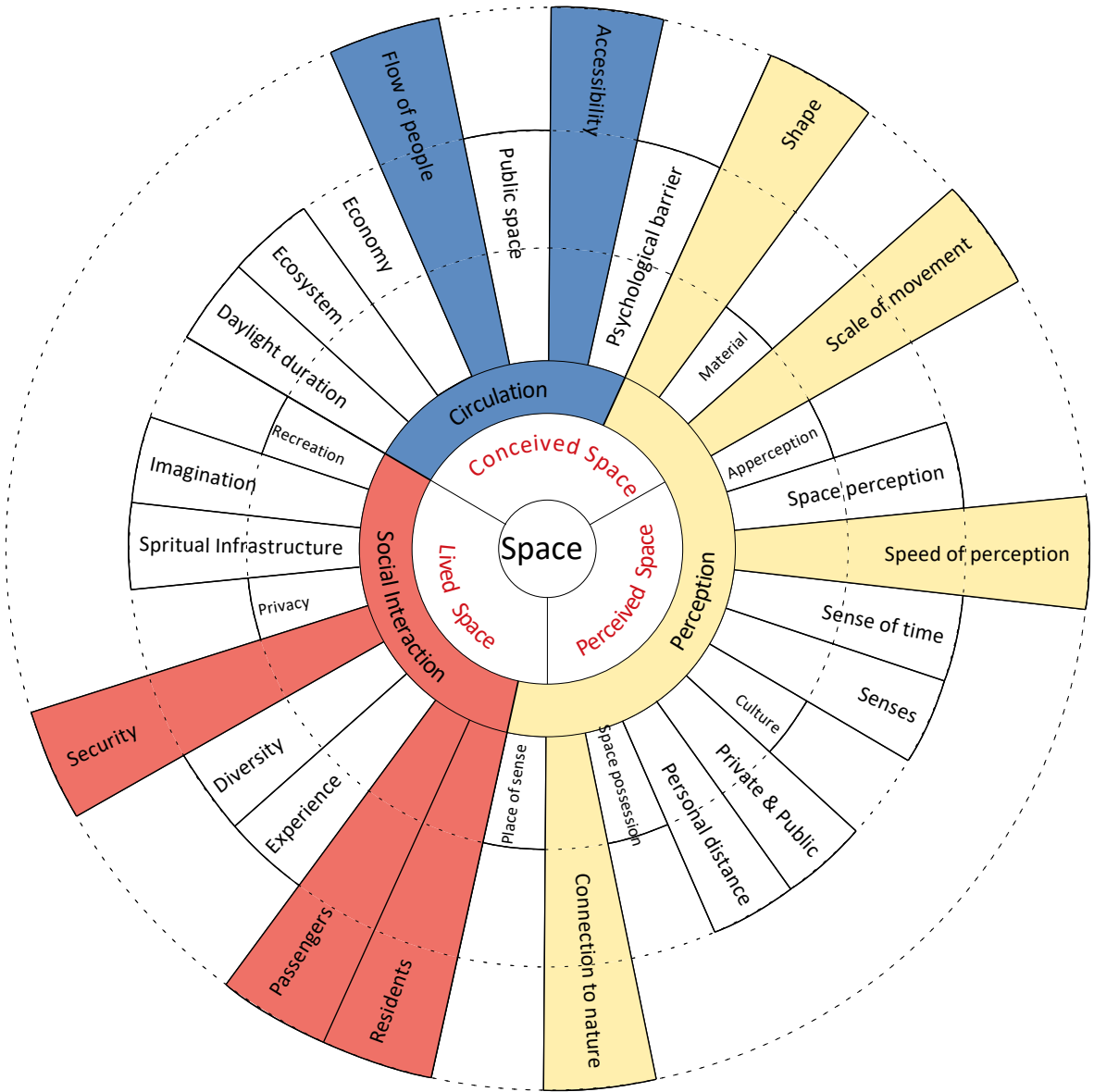
The thesis focuses on "Urban Circulation", "Space Perception", and "Social Interaction".

The first topic is about the circulation of people. As mentioned earlier in this thesis, infrastructure forms a boundary for people's mobility, both physical and psychological. Then, the forms and causes of these boundaries are analyzed and classified in the paper, and corresponding solutions.

The second topic is spatial perception under the influence of environmental psychology, which is mainly reflected in human feeling, space, environment, circulation and psychological factors.

The third topic is the thought about social interaction and space use. As people have their own understanding and sense of belonging to space, they also have different understandings and ways of using space. Therefore, this part focuses on how to consider the flexibility and diversity of space production to promote people's interaction.

DELIMITATIONS



“Production of space is linked to three-part dialectic of perceived, conceived and lived.”

——Henri Lefebvre

RELEVANCE

Relevance to profession

Modern urban fabrics are primarily based on the flow of priority vehicles, bringing ease of transport. However, in the subsequent development of the city, the negative space under the viaduct has brought many obstacles to the edge of the city. However, architects and planners can turn things around by seeing the positive in these negative spaces.

Our cognition of the city is based on the feeling and perception of the environmental space, which means that the meaning of urban space is not only two-dimensional or three-dimensional. Using the knowledge of environmental psychology to design public space to

change the negative feelings of negative space is an essential factor in urban planning and space design.

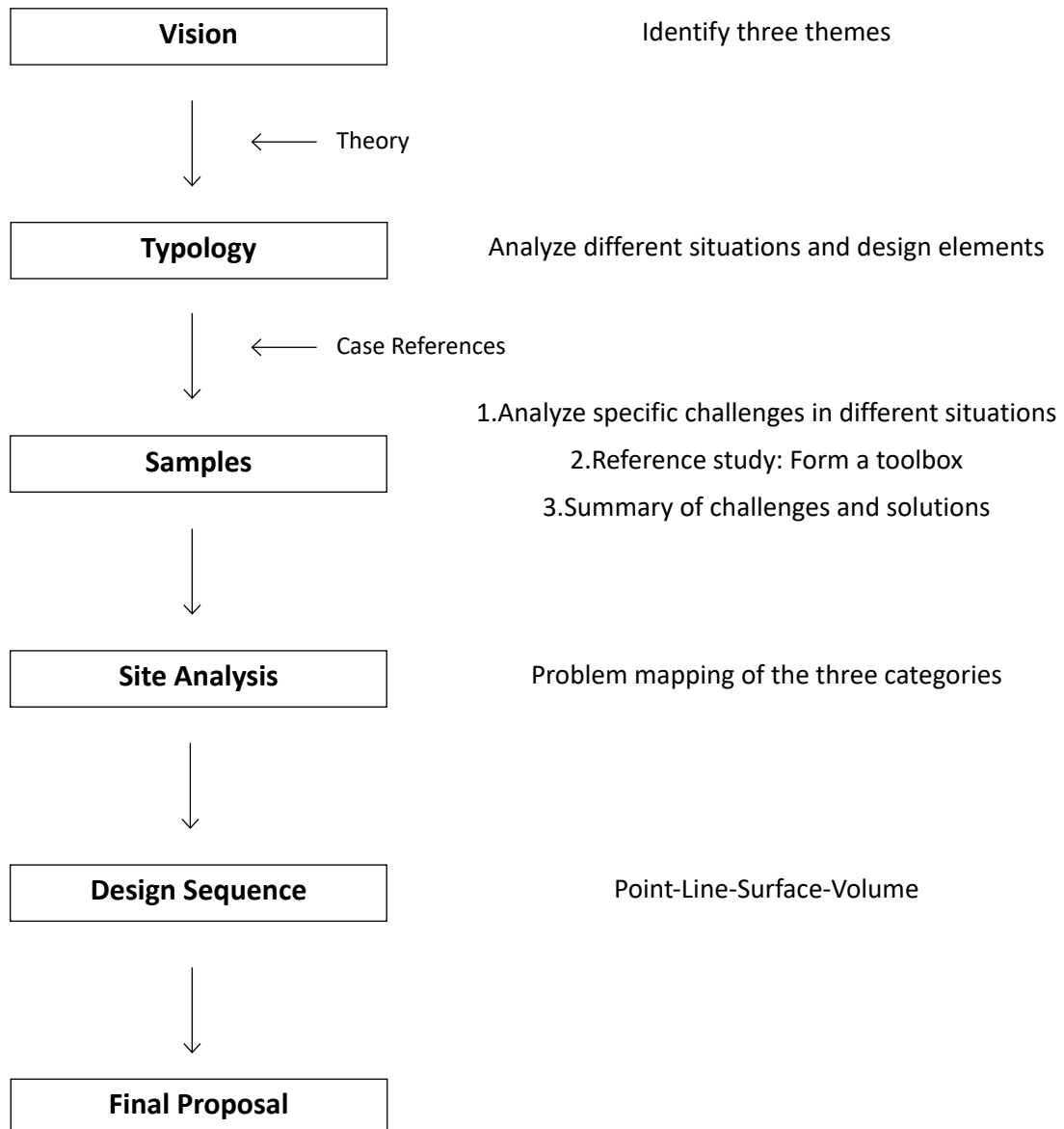
This master thesis wants to inspire architects to consider the use and experience of space under the influence of users' psychological factors rather than simple physical elements when creating the architectural environment.

Relevance to sustainability

The sustainability aspects of this paper will focus on climate, environmental resources and social impacts.

The role of infrastructure in a city cannot be ignored. This paper discusses how to add more quality to infrastructure and promote the vitality of the urban fringe and the physical and mental health of community citizens. In addition, this paper also aims to promote the development of walking and cycling in the city while promoting a slow perceptual urban system while reducing the use of cars to protect the environment.

In Northern European cities, daylight in winter is highly prized, while shadows, rainy weather and cold winds are correspondingly negative factors. By analyzing and studying the natural conditions in the urban environment, reducing the negative impact of these environments can promote the proportion of people staying outdoors in winter. Making full use of natural resources to create a comfortable sensory experience can increase the attraction of urban space.

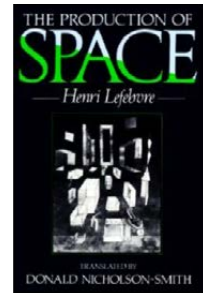


02

DESIGN ELEMENTS
&
THEORY FOUNDATION

The Production of Space

Henri Lefebvre
Logic of Space Production



Environmental Psychology

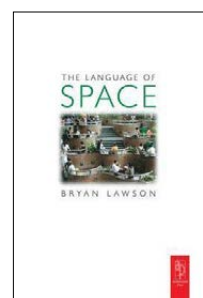
Psychology of Perception
Space Perception
The social psychology

Movement & Perception

Henri Lefebvre
Logic of Space Production

The Language of Space

Bryan Lawson
Space Perception



THEORY

PRODUCTION OF SPACE

The transformation of urban space is a type- of space creation. Movement, perception and social interaction seem to be very independent and unrelated. However, I got inspired by the theory of space production in **Henri Lefebvre's** book "**The Production of Space**".

He claimed that "The fields we are concerned with are the physical-nature, The Cosmos; secondly, the mental, including logical and formal abstractions; and, thirdly, the social. From the phenomenological perspective, the Production of space is linked to the three-part dialectic of

- Conceived
- perceived
- lived"

-Conceived spaces are spaces supported by the agency in its plans and programmes.

-Perceived space means that we, as users of space, experience, remember and understand space with our sensory systems.

-Lived space refers to the space we create through appropriation and how we use the space to meet our needs.

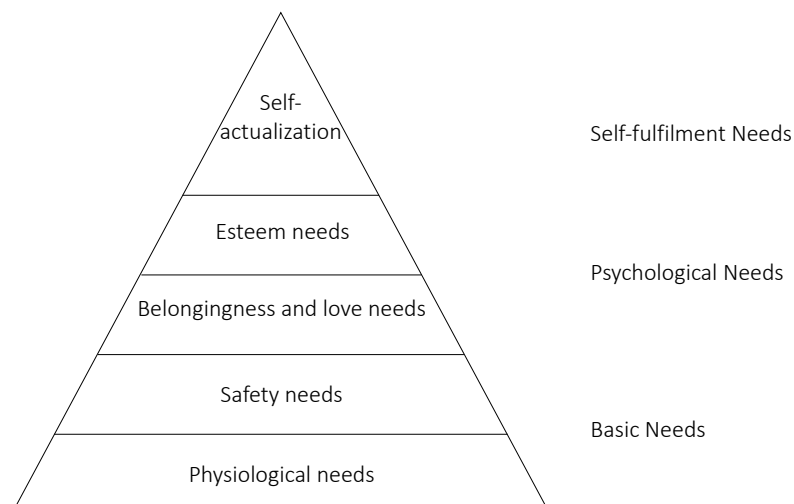
This classification of space is the transition from passive to the active control of space by the public. The same is true of the three subjects in my dialogue. The control and decision-making of the conceived space are often only in the hands of power and architects, and people are passively accepted and involved. In urban space, urban structure, infrastructure and

accessibility are set in advance by urban planning, and people's movement is restricted.

Furthermore, for spatial perception, like the concept of mental infrastructure, perception is abstract, it happens in people's brains, and everyone has different perceptions and understandings of space. It is a process of active understanding and experience, although it is affected by the space of conception. Due to the different perceptions of space, people's understanding and use of space are different, so there is a diversity of behaviour. In my opinion, such diversity is an essential factor in forming social interaction.

Human Needs

Abraham Maslow developed a hierarchy of needs theory, including five levels. The most critical needs are surviving physiological needs, for instance, air, food, rest, water, sex, etc. (Maslow). As the individual progresses up the pyramid, needs become more psychological and social. When basic needs are not met, people may have physical diseases, and when higher needs are not met, people may have negative emotions, such as sadness and anxiety.



Negative Space

In the field of architecture and urban space, humans' basic needs for space include fresh air, sufficient light, basic living facilities, etc. Higher needs are feeling comfortable, mental relaxation and healing. When the needs are not met, people will also have negative emotions, and such space is defined as negative space in this thesis.

at the same time, it also brings many adverse spiritual effects to people walking in the city because of its structural characteristics. The following part will combine the knowledge of environmental psychology to analyze how the negative space around the viaduct affects people's circulation, perception, and behaviours to influence social interaction.

Viaduct, a transportation facility to promote urban development, helps the city and people to realize the basic needs of transportation and passage. However,

THEORY

ENVIRONMENTAL PSYCHOLOGY

In order to explore the impact of the environment on emotion and psychology, the first thing to study is the human senses. The existence of the senses is the first layer of media for people to receive information from the outside world. Each of the five senses represents a way of receiving information. Environmental psychology has a great deal of research on architecture, urban space and psychology. However, little attention has been paid to the impact of transportation systems on human perception, even though these hard infrastructures bring intense negative experiences to cities.(Kathleen, 2006). This part will mainly explore the sensory feelings brought by the viaduct space from four aspects of vision, hearing, smell and touch, and the possible corresponding emotional influences of these feelings.

Vision | Light

Light affects our vision and daily life and our perception and judgment of our environment. *"Studies have demonstrated the importance of adequate lighting in physiological health and human perceptions."* In our cognition, darkness and fear are often linked together because we are used to feeling the world with our eyes, blocked vision cuts off our ability to judge the environment to some extent, and our safety feels threatened.

Due to its structural characteristics, the viaduct blocks particular light during the day and blocks light and ground reflection at night. Studies have shown that one of the reasons for the high incidence of

urban crime in the space under urban bridges is that there is not enough good lighting design.

Vision | Open View

Like the effect of light, a wider field of vision allows us to see our surroundings more fully and detect and react to changes in our environment. The viaduct does not just block light; and it blocks our view. On the one hand, they interrupt the observation of the entire street space and imagine that the distant landscape separated by a bridge or Bridges is uncomfortable in most cases. In addition, they also cut off the ability to anticipate danger. Even familiar streets we pass daily can feel insecure at night when there is no light, let alone unfamiliar surroundings.

The analysis and consideration of the line of sight will be essential when using the space under and around the viaduct. First of all, create eye-catching markers to make the walking process have a certain sense of purpose to reduce the negative judgment of the environment. In addition, the use of expensive footbridges and other ways to raise the point of view to provide a different perspective and a more comprehensive view.

Vision | Color

"Psychological research shows that people have the strongest visual perception of colour. Bright warm colours can make people happy and positively guide people's psychological behaviour; Dark, cool colours can make people depressed and negatively guide their psychological behaviour."(Chen, 2021)

The heavy and comprehensive volume of the viaduct has dimmed the space below, and the grey material and ground add to this negative feeling. When people pass such a space, they tend to speed up their pace, pass through it quickly, and even bypass it sometimes, which undoubtedly exacerbates the negative feeling of space.

"Bright warm colours should be used as the main colours under the viaduct, such as yellow, red, pink, etc. Yellow makes a person feel sweet and gentle, and red can make a person happy radical; pink can make a person comfortable and comfortable. Whether people pass by or stay in the space under the bridge, their mood will be affected by the warm colour environment to become happy, positive and peaceful, which helps relieve the

depressed mood."(Chen, 2021)

The space around the viaduct is a place where people and vehicles are travelling, and the space with a large number of people flow is a place with great potential for cultural transmission and rise. Suppose colour elements can be used to inject cultural colours and urban regional characteristics into this traffic space to spread information or history. In that case, it is a potential way to improve regional identification and increase residents' sense of belonging.

THEORY

ENVIRONMENTAL PSYCHOLOGY

Hearing | Sound and Noise

"Sound is received by the human ear and may be judged to be pleasant or unpleasant. Noise is generally a judgment by the listener of unpleasant sensations and deemed unwanted and disturbing." (Dobie, 2004)

Noise has been shown to negatively affect physical and mental health. *"Unwanted, uncontrollable and unpredictable sounds can be annoying and disturbing, resulting in physiological stress responses, such as a rise in blood pressure, excessive levels of certain hormones, change in heart rhythm, and a slowing down of digestion. Sustained noise-induced stress can result in negative responses of immune, circulatory, cardiovascular, or gastrointestinal systems." (Dobie, 2004)*

In all kinds of noise, viaduct traffic noise to the surrounding environment is apparent harm. Many ways can be found to solve the viaduct noise in the relevant precedent studies. For example, planting different green plants on the underside of the viaduct and the columns provides vertical greening for the underside of the viaduct while absorbing environmental noise and weakening the sense of oppression brought by the volume.

Studies have shown that visual elements can alter how people perceive sounds. *"The location and visibility of outdoor vegetation will affect the noise reduction effect perceived by people at home. In the case of no vegetation at all, residents are 34% likely to be bothered by noise, while residents with obvious vegetation vision*

are 8% likely to be bothered by noise." (Tyrväinen, 2013)

"There is an important relationship between green space and noise perception. The perception of green space outside a building can affect people's annoyance to noise, while indoor plants (for example, in a living room) have been shown to be insufficient to affect people's perception of noise. That is to say, when people can observe outdoor vegetation, it will directly change their perception of sound comfort. Acoustic comfort may contribute more to the overall impression than visual factors, especially when road traffic noise levels are high." (Tyrväinen, 2013)

However, this method is highly dependent on the region and climate, and in some high latitudes with long and cold winters, it is not easy to find suitable plants. Therefore, it may be more universal to consider physical isolation combined with interior space or semi-open space with isolation function when designing improvement.

How do we perceive space?

First, it receives all kinds of information in the space employing seeing, hearing and touching through perception and senses. This is a relatively passive information exchange and physiological feeling. The received information passes through the brain, and the emotions and emotions generated change into the process of perceiving space. This linkage of emotional change with memory, experience and personal understanding is cognition, which is subjective and active action.

The psychologist Sir Frederick Butler argued that much sensory activity is recalling memories. *"Perception is far from just feeling, and it is an active process by which we perceive the world around us. Perception is a comprehensive experience of all human faculties."* Even in the same place, different people's perceptions are different, which depends on everyone's personality, experience, memory, mood, etc. *"We see what We want to see!"* (Frederick)

Kevin Lynch believes that environmental imagery *"is the joint product of direct*

feeling and memory of past experience" and establishes an interactive relationship with the environment. "The overall atmosphere of the environment, some parts and details, as long as they coincide with the "vision of expectation", will quickly establish a sense of identity." (Kevin Lynch)

Based on this theory, can we use the viaduct as an urban element as a node connecting memory to the current environment? The spatial layout and architectural form between cities may differ significantly, which also belongs to each city's uniqueness and cultural background. However, as a kind of transportation infrastructure, the viaduct has remarkable similarities in material, form and structural characteristics. It has elements that can arouse emotional resonance and overlap "vision of expectation". Taking Gothenburg as an example, can the improved space under the viaduct transfer the positive emotional power to people's perception and memory to gradually form a positive cycle and change the negative perception of the viaduct space?

THEORY

PERCEPTION & COGNITION

"Humans have three important space needs: Stimulation, security and identity."

"A good city should make space identifiable, but also make space feel domain, place and security."

Perception mechanism

"The perceptual elements of space include distance, size, scale, foreground, background, symmetry, color, number, meaning, before and after, etc. These elements are the basis of our perceptual system." In addition, speed is an important factor in perception. *"Reading the city or buildings in the speed of walking and cars are different."* The elements that directly stimulate our senses, such as material and scale, can not be felt in a car. This is one reason why walking or cycling is advocated in this thesis.

Take the effect of spatial organization on perception, which predictability can explain. When people are faced with a redundancy layout, they will predict the unknown space to some extent in the perception process. When the form always conforms to the prediction, the freshness will be weakened, and the sense of security will be increased.— I know what is going to happen.

On the contrary, when space is organized in various forms, it is difficult for us to predict the space accurately we will experience next. In this case, freshness and excitement will increase, but the sense of security will decrease.

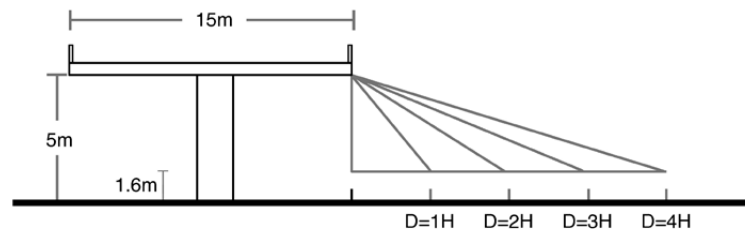
Spatial Characteristics of Viaduct

When the negative impact of the viaduct is mentioned, it is inevitable to refer to the fragmentation of the urban space brought by the viaduct. Tall, elongated Spaces bring physical and psychological boundaries to the urban environment. However, such structural features themselves have a particular quality potential. First, it has integrity and predictability in structure. The regular column structure divides the space under the bridge evenly. When walking along the bridge, the recurring elements provide a predictable sense of security to a certain extent.

On the other hand, such characteristics also provide convenience for transforming the space. There is an opportunity to set different themes within the small domains divided by the master sub-structure according to the surrounding environmental assets. In this way, when walking along the viaduct, pedestrians can anticipate the structure ahead to enhance their sense of security and continuously experience unexpected spatial attributes in different thematic Spaces.

The viaduct has a variety of forms and scales, so the perception of viaduct space is different. The closure of scale and space can be used as a criterion for judging. The closure of the space can be explained by the relationship between the height of the viaduct and the close spacing of the buildings. One method is Yoshinobu Ashuhara's urban spatial scale Comparison method (D/H).

D is the distance from the viaduct, and H is the height of the viaduct.



Some researchers have explored the visual relationship and spatial perception between D/H and observer.

Ratio	The vertical Angle of view	Observe effect	Space feeling
$D/H < 1$	$45^\circ - 90^\circ$	Observation viaduct is easy to produce perspective deformation	There is a strong sense of proximity and pressure
$D/H = 1$	45°	Observation viaduct is easy to produce perspective deformation	There is a sense of proximity and pressure
$D/H = 2$	27°	Observe the main body of the viaduct	With space closed ability, no sense of pressure
$D/H = 3$	18°	Observe the viaduct population	The spatial relationship is weakened and there is no sense of oppression
$D/H = 4$	14°	Observing linear contour	No general spatial interaction is formed
$D/H = 5$	11°	Observe the relationship between the viaduct and the surrounding city	
$D/H > 5$	$0 - 11^\circ$	The viaduct is secondary	

Moreover, the conclusion is: "According to the analysis of the visual characteristics of people, the distance between pedestrians and viaduct and the ratio of the height of the beam bottom of the viaduct is 2-3, so people will feel comfortable and can also meet the basic requirements of the lateral building for sunlight, ventilation, daylighting and so on." The data here provides a particular reference for the spatial reconstruction of the viaduct.

THEORY

URBAN CIRCULATION & PERCEPTION

Artificial Barriers:

Railways, Viaducts, Major roads

Natural Separating elements:

Water bodies's banks, park's boundaries

For people's walking, there are various guides and boundaries in the city, which bring different feelings and corresponding choices. In their paper, Gabriele Filomena, Ed Manley and Judith A. Verstegen divide barriers in cities into artificial barriers and natural barriers. They found that artificial barriers are the real barriers that create obstacles, both physical and psychological, by mimicking the path choices of people. However, natural separation elements, such as water and green space, are related to people's positive feelings, which will promote the possibility of walking, and also increase the probability of surrounding residents walking and the attractiveness of the area. (Filomena, 2020)

This is not surprising, since many studies related to environmental psychology have shown that natural landscapes can reduce physical stress responses. Therefore, the accessibility and connectivity of natural public Spaces are important to provide a place for a variety of behaviors to occur. Pleasant views and landscapes may induce people to take longer routes. When people enter these Spaces slowly, they increase the likelihood of activity crossing. Urban sociologist Richard Sonnette once

said, "One of the important roles of public Spaces is to bring some social function, to bring people together that they would not otherwise meet."

• **Smooth Ground Plane with clear focus**

The smooth path reduces the difficulty of passage and reduces psychological resistance to some extent. A clear focus can add a layer of distance perception and destination traction to the walking process, creating a sense of depth near and far.

• **Privacy in public space**

Deliberately add soft boundaries to a large space, such as transparent partitions, such as trees, or invisible boundaries suggested by the ground, such as appropriate height differences or pavement textures, with the transparency of vision to achieve the change of psychological feeling.

• **Blurred boundaries**

In addition to increasing privacy, blurred boundaries make people more accessible in relation to material and spatial forms as well as boundary forms. In an ideal state, people are drawn to natural public Spaces and effortlessly participate in public activities.

"Architecture is judged by visible eyes, moving heads and walking legs. Architecture is not a synchronic phenomenon, but a continuous one, made like music by pictures superimposed on each other in time and space." -- Le Corbusier

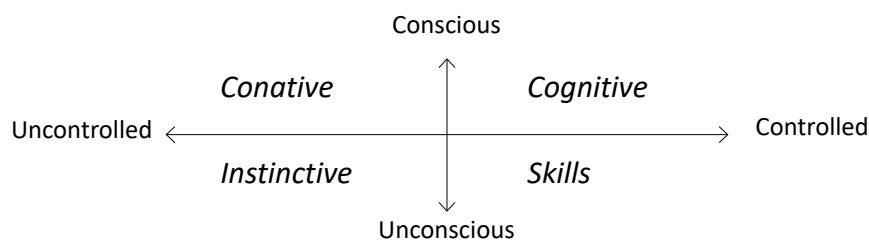
According to Charles Montgomery and his Happy City Experiment, happiness in a city is directly connected to the amount of sociability in that city. The more socially connected a city is, the healthier and more successful a city is.

Perception is crucial in understanding the relationship between conceived space and lived space. In his book *The Language of Space*, Bryan Lawson has many exciting ideas and insights about the perceptual mechanisms of space and the

relationship between human behaviour and architecture. *"Our relationship with architecture and how architecture mediates our relationship with each other."* (Lawson, 2001). He sees house and home as two different concepts, and The first seems to be a purely architectural concept, while The second includes overtones of humanity. The relationship between these two ideas are physically and humanity of space.

To understand social interaction and the relationship between people and the built environment, we first need to understand people's behaviours and perceived needs and some communication that is not easily perceived. Secondly, the scale of space and human interaction.

Human behavior Categorize



"At its most basic, we have our own ways of sensing space and of moving through space. At the more sophisticated level, We have our own ways of making meanings of space." (Lawson, 2001)

THEORY

SPACE PERCEPTION & SOCIAL INTERACTION

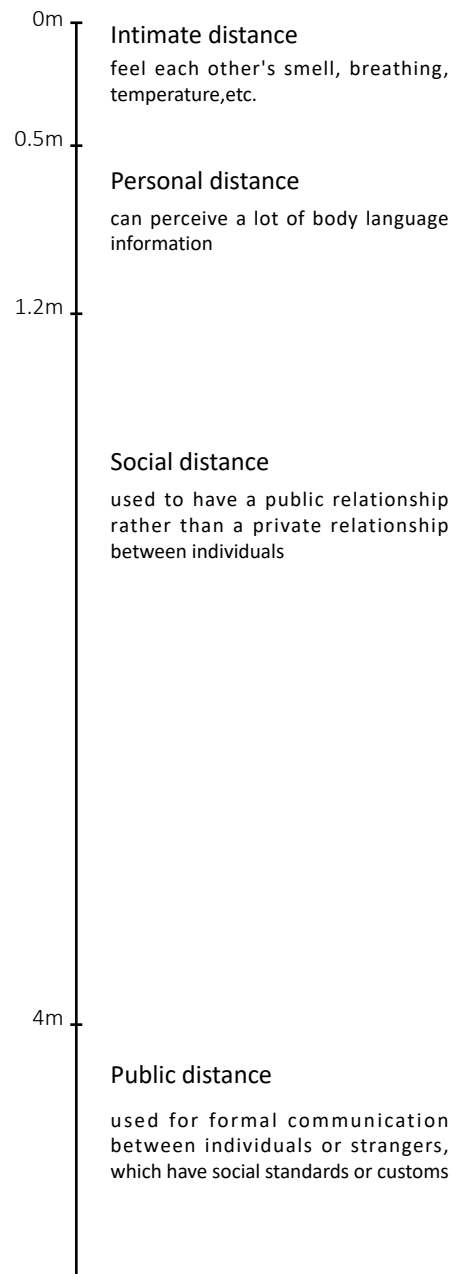
Time and Distance

Social Distance: Intimate - personal - Social - the public

Positive interactions are based on respect and comfort. Social distancing makes people more comfortable participating in public Spaces and less likely to disturb others. Sometimes, seeing someone doing something is already a potential communication. *"Not all behaviour in space involves communication, But much of our behaviour in space involves communication somehow or other."*

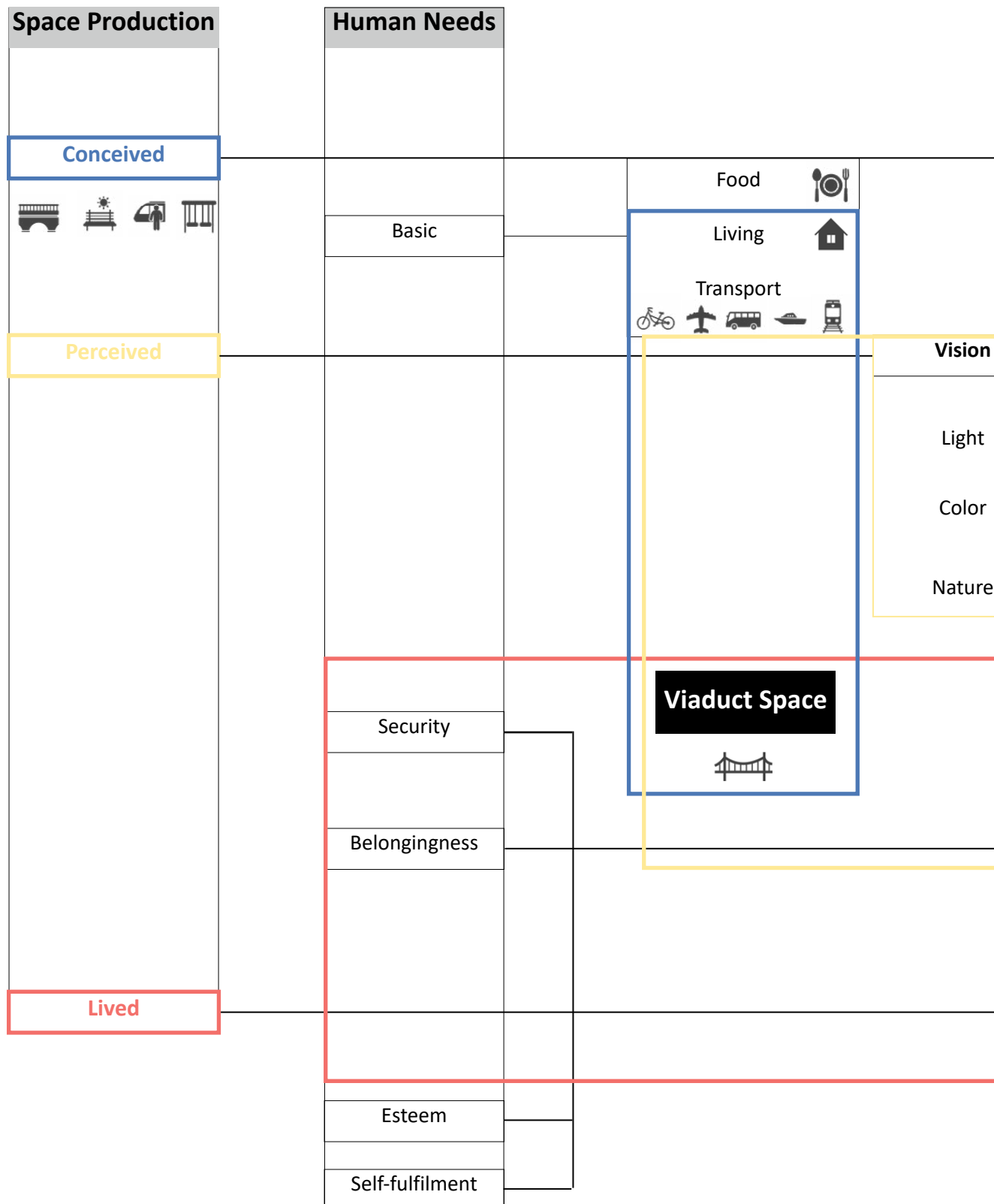
Time is also significant for space.

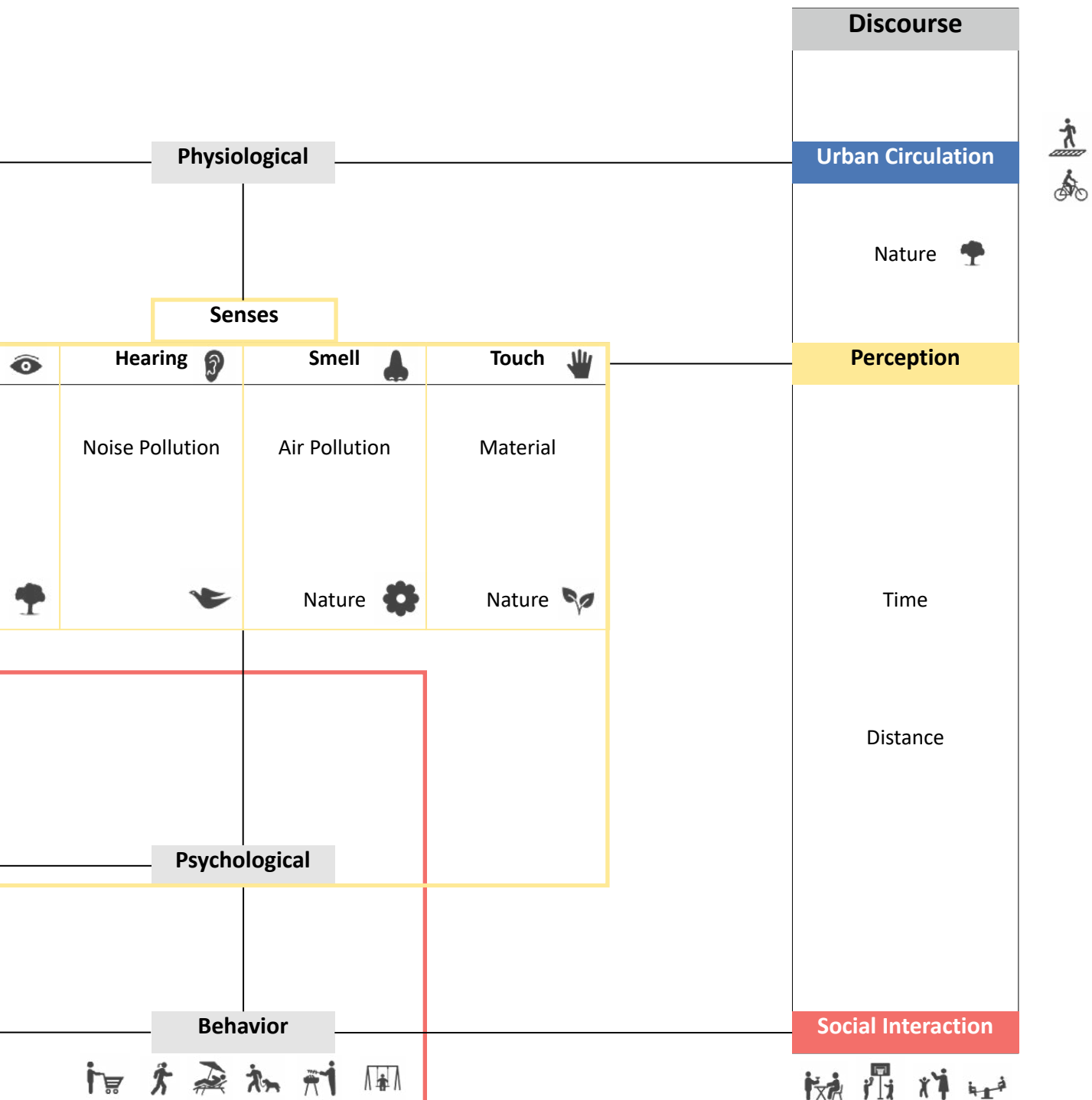
The possession of public space is time-sensitive, users will change with the pass of time, and accordingly, the way of use will also change. For example, during the day and night, the user may face a transition from being a commuter to a stroller. In both cases, the amount of space occupied, the speed of movement, and the occurrence of activities are different. Alternatively, younger people may socialize in the late afternoon, while older people and children are more likely to enjoy the afternoon playground and sun.



Manifestos

1. Architects and urban planners cannot just be satisfied with the physical infrastructure of cities, and it is time to focus on the spiritual infrastructure of cities.
2. Cities should stop being dominated by cars and switch to lower speeds.
3. Spiritual needs are no longer only met through soft culture; physical space should also transmit spiritual power.
4. Viaduct can be used as a new urban connection space.
5. Architects should focus on the coexistence of old and new facilities shortly while envisioning the future city.
6. A perfect urban space should bring people together but keep them apart.
7. Pedestrians have the right to occupy high Spaces in cities. It is time to look at the world differently.





03

CONTEXT



HARD INFRASTRUCTURES IN OTHER CITIES



*Stratford
London, UK*



*Birkenhead
Wirral, UK*



*Paris Rive Gauche
Paris, France*



*Britz
Berlin, Germany*



*Prosperidad
Madrid, Spain*



*Metropolitan City of Milan
Milan, Italy*



*Faber
Frankfurt, Germany*



*Gottlieb-Dunkel-Straße
Berlin, Germany*



*Estrella
Madrid, Spain*

HARD INFRASTRUCTURES IN OTHER CITIES



*Silvastintie 2
Vantaa, Finland*



*Seppämestartintie
Helsinki, Finland*



*Conway
Chepstow, UK*



*Saint-Germain-lès-Corbeil
Paris, France*



*Horcajo
Madrid, Spain*



*Brooklawn
Dublin, Ireland*



*Adolfsberg
Helsingborg, Sweden*



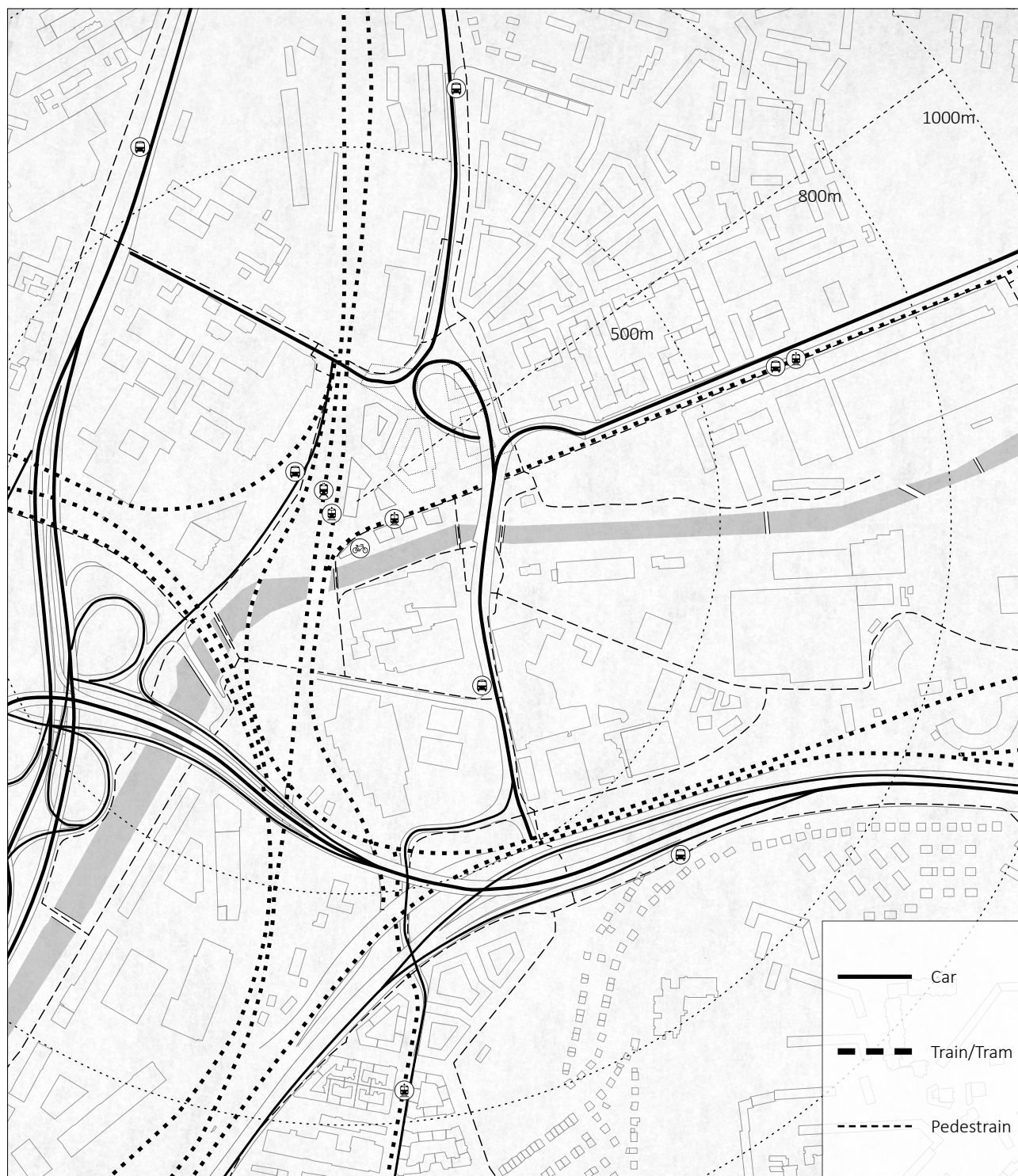
*Griesheim
Frankfurt, Germany*



*Vestskoven
Denmark*

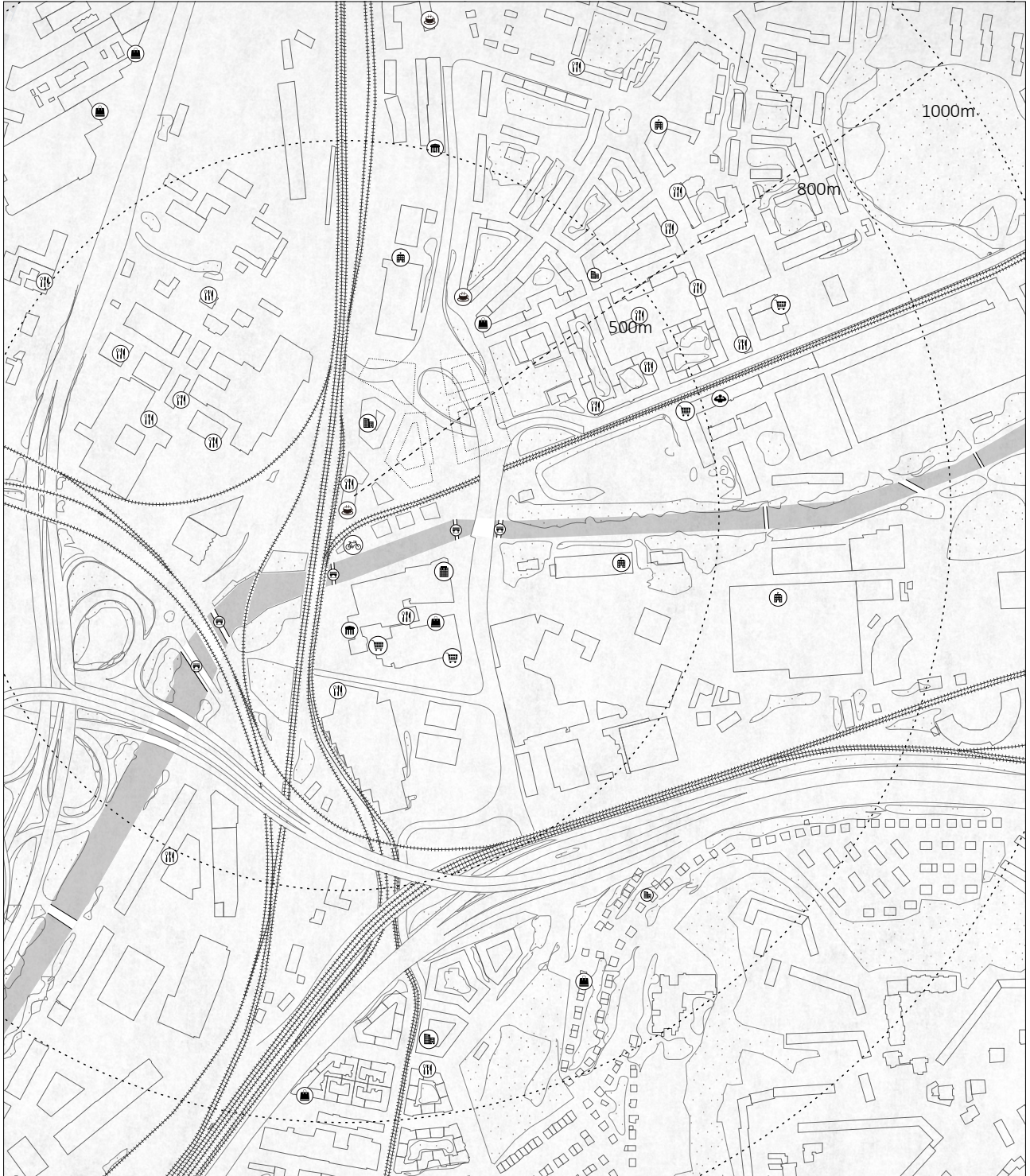
CONTEXT

TRANSPORTATION



CONTEXT

FACILITIES



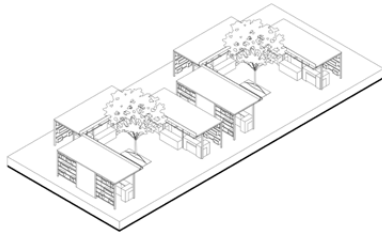


"If you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places."

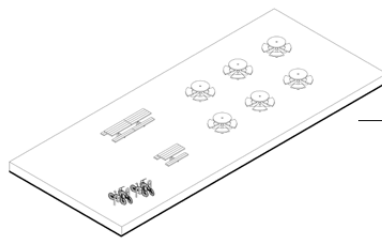
– Fred Kent

CONTEXT

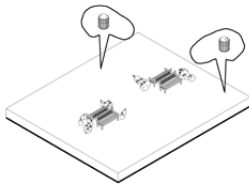
NEEDS & VISION



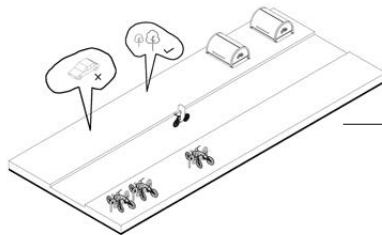
Nicer, more modern shops
Nice cafes/lunch spots



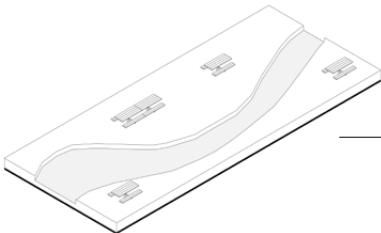
Outdoor seating for a meal



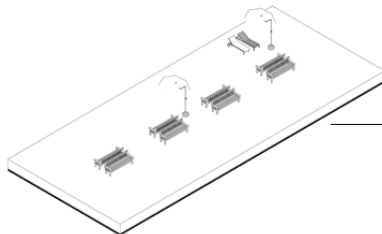
cleaner streets



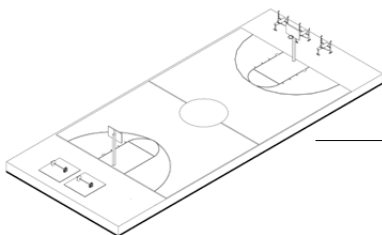
Reducing car traffic
The trees
Reduce parking



See more water
Walk at lunch



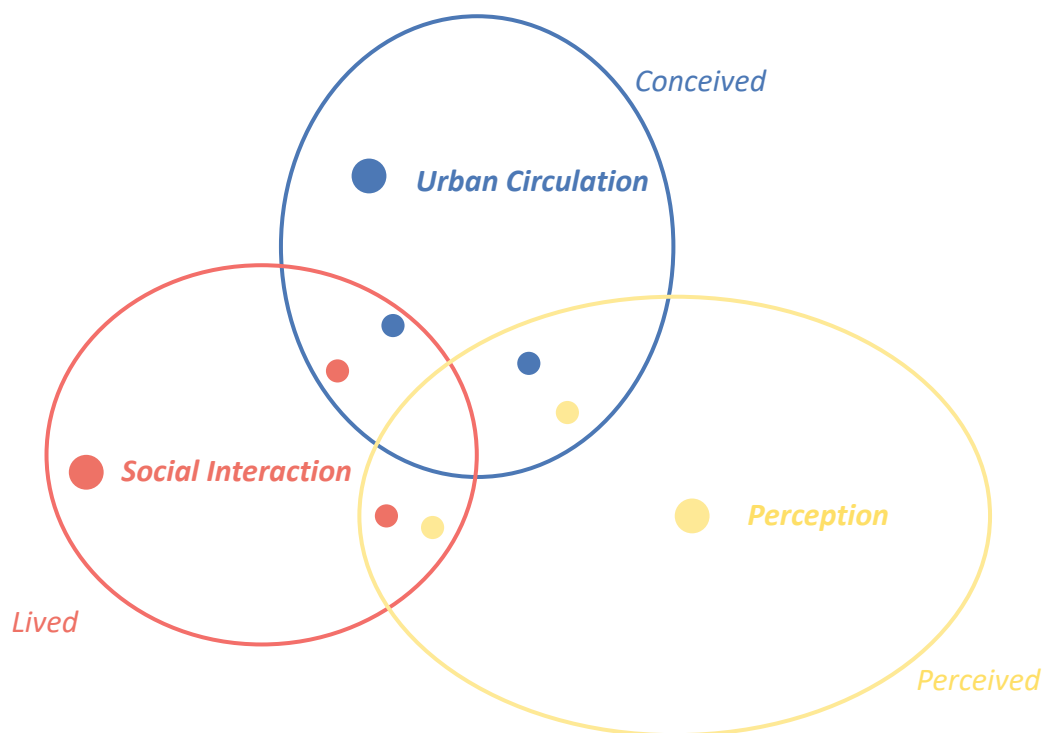
Outdoor seating for a break



Outdoor gym
Sports

04

EXPERIMENTATIONS
&
TOOLBOX



The experimentation follows the discourses of urban circulation, perception, and social interaction. Each strategy is color-coded to correspond the three categories.

SAMPLE 1



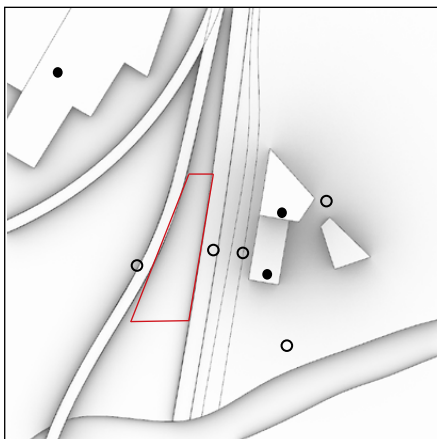
With river and greenery

Elements

Railway bridge: last for a long time, too low for people to pass, noise pollution

Topography: height difference, River bank

SAMPLE 2



With several levels

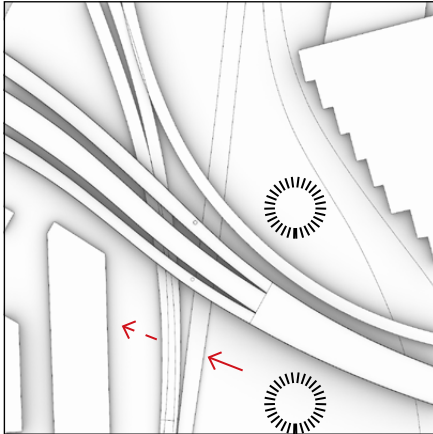
Elements

Railway viaduct: last for a long time, noise pollution, height for one layer

Topography: height difference

Building: office, commerce, industry

SAMPLE 3



With river and greenery

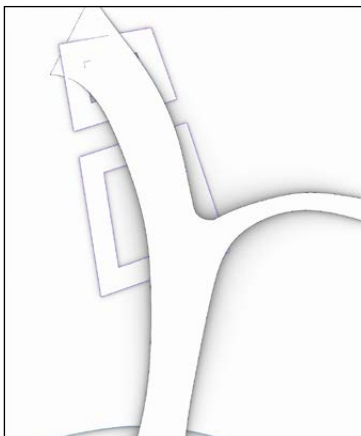
Elements

Railway viaduct: last for a long time, noise pollution, height for one layer

Topography: height difference

Building: office, commerce, industry

SAMPLE 4



With several levels

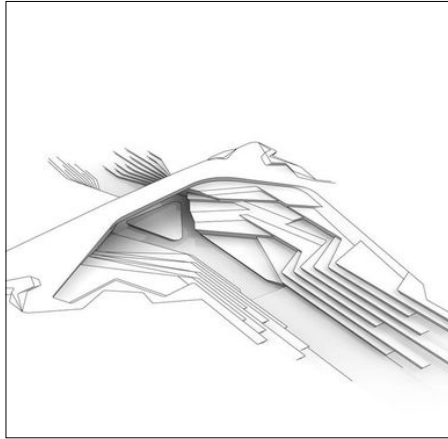
Elements

Viaduct: Will be demolished in the early future, wide and short, close to river

Building: New residential buildings will be built here

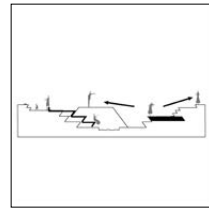
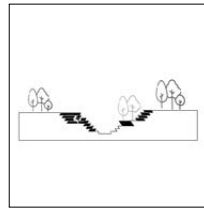
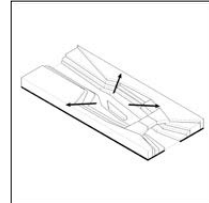
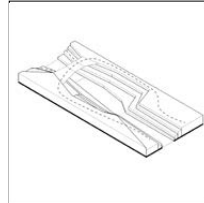
SAMPLE 1

CASE REFERENCES



Promenada

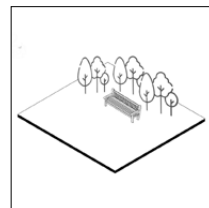
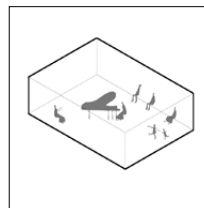
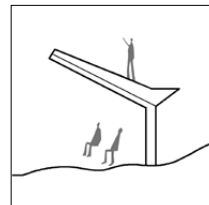
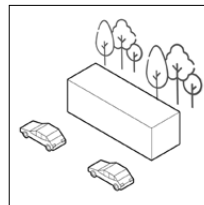
The Velenje “Promenada” is an important city space and a vital city thoroughfare. The slightly twisting narrower path carefully slows down the users

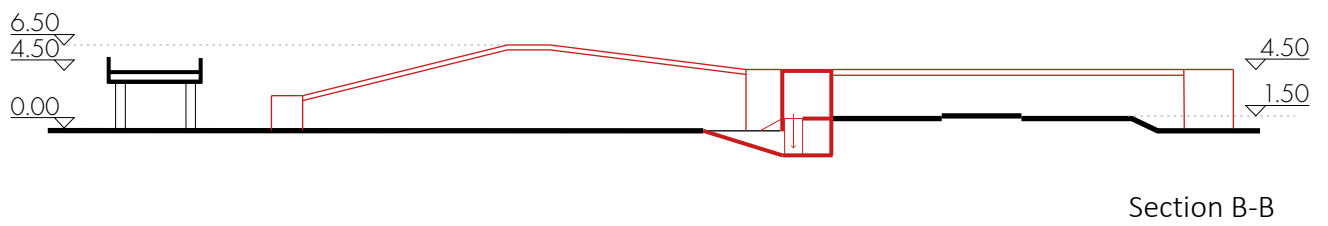
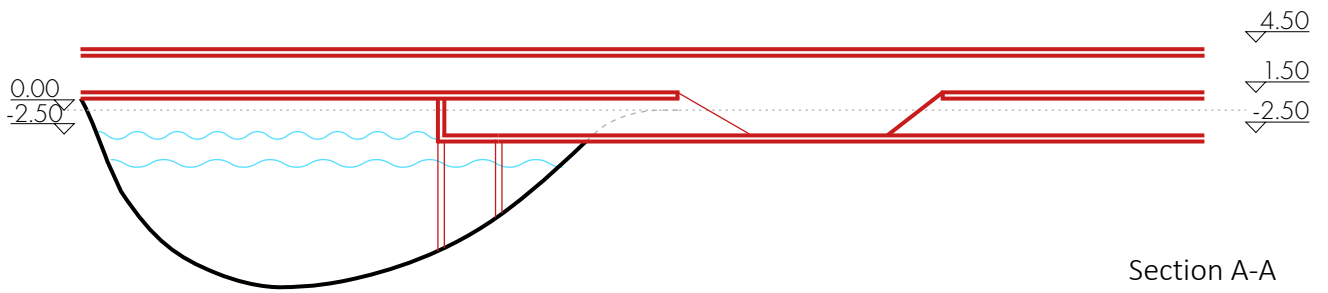
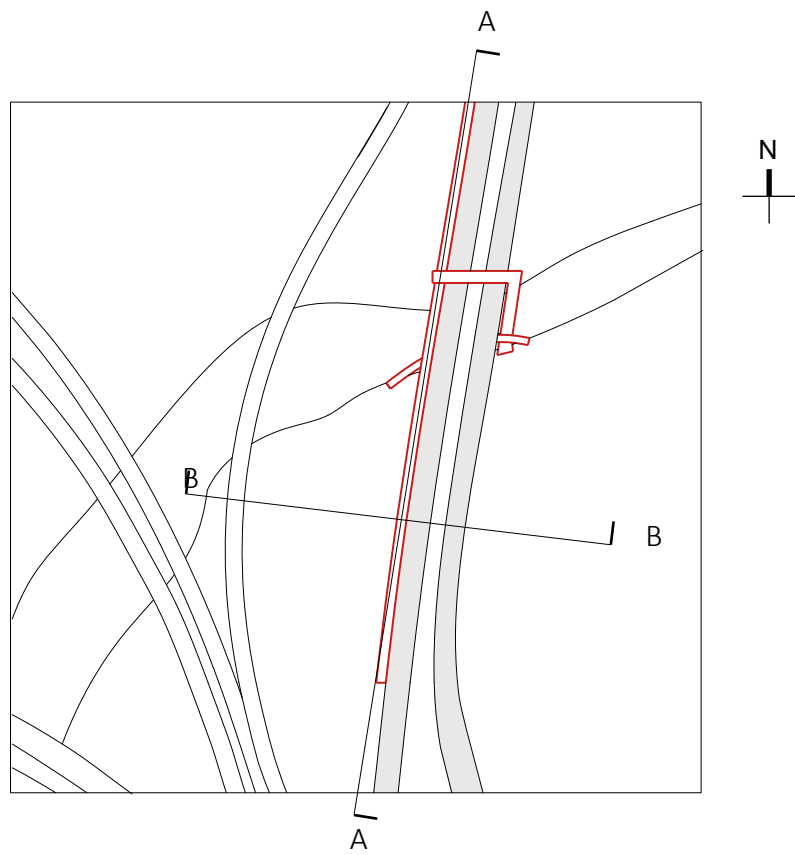


Place Screen

Paweł Dadok

A proposal to solve the problem of acoustic screens erected in cities. It can not only serve as sound insulation, but also become a space for residents to use.





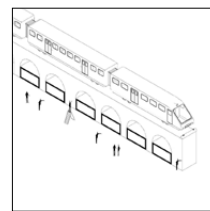
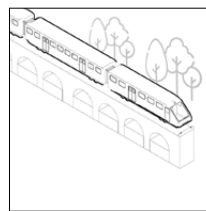
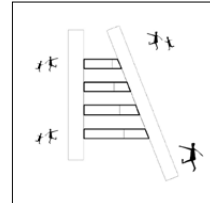
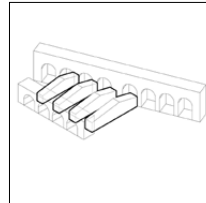
SAMPLE 2

CASE REFERENCES



Im Viadukt

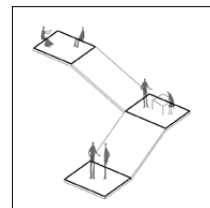
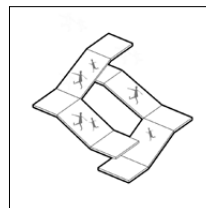
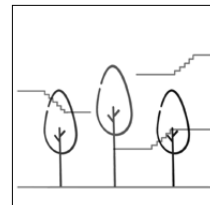
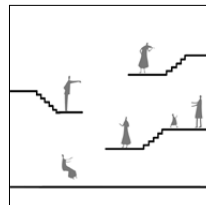
Under the arches of the railway viaduct, which was built in the 19th century, is a unique mix of diverse shops, hip cafés, cultural & social institutions and concert venues.

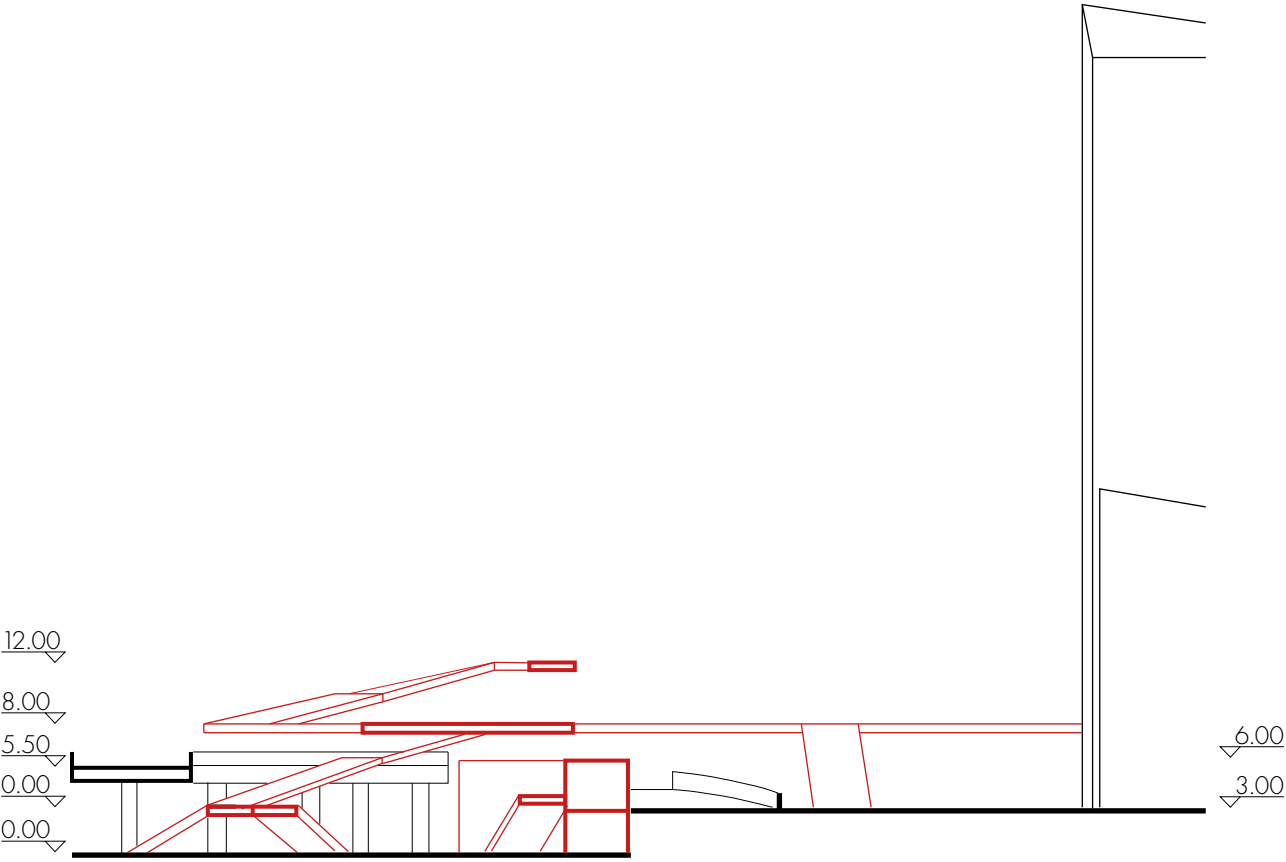
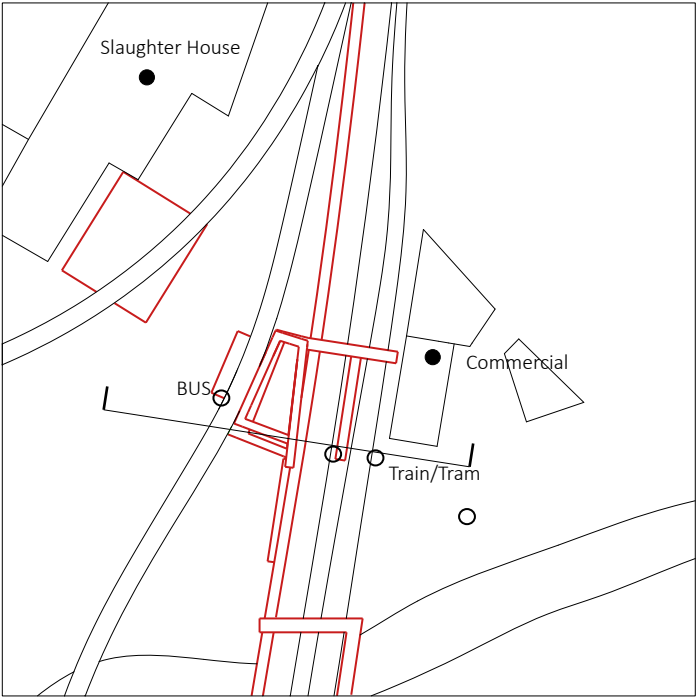


Open Air Taiwan Cafe

Sou Fujimoto

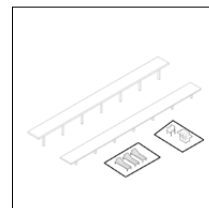
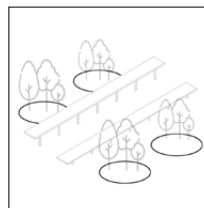
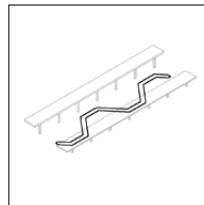
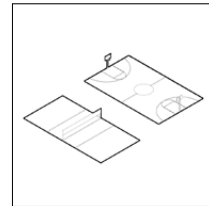
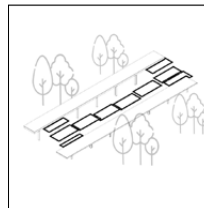
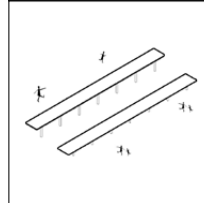
The design aims at forming a new urban environment by employing these passageways which are normally considered a place of transition, and turning them into areas in which to linger.





SAMPLE 3

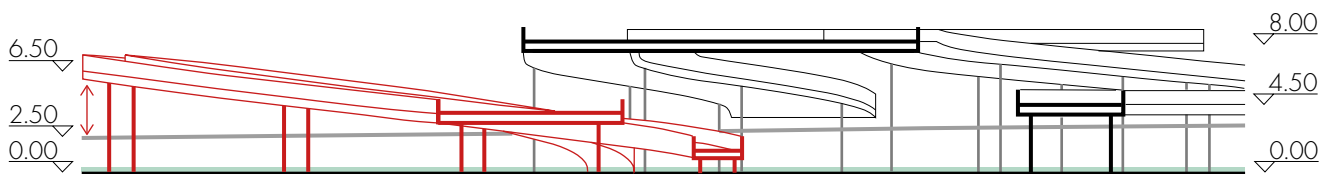
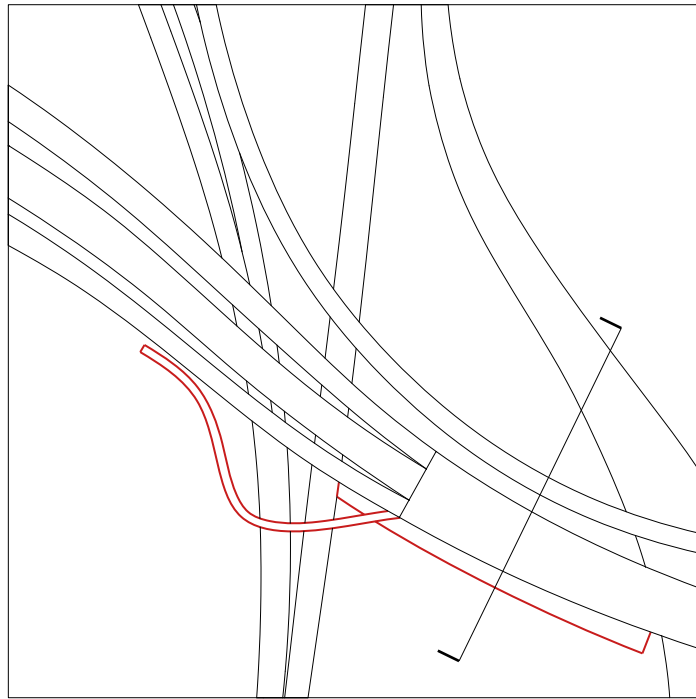
CASE REFERENCES



Caulfield to Dandenong Level Crossing Removal

ASPECT Studios

By elevating the line and stations, this project presented an opportunity to transform an extensive tract of land within Melbourne's metropolitan zone into a new linear park.



SAMPLE 4

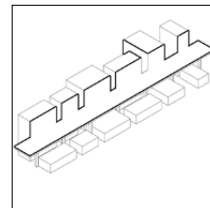
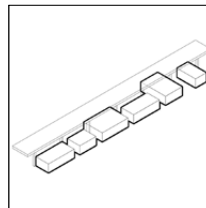
CASE REFERENCES



The SOHO Commons

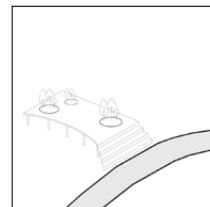
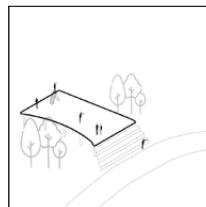
Raphael Arthur

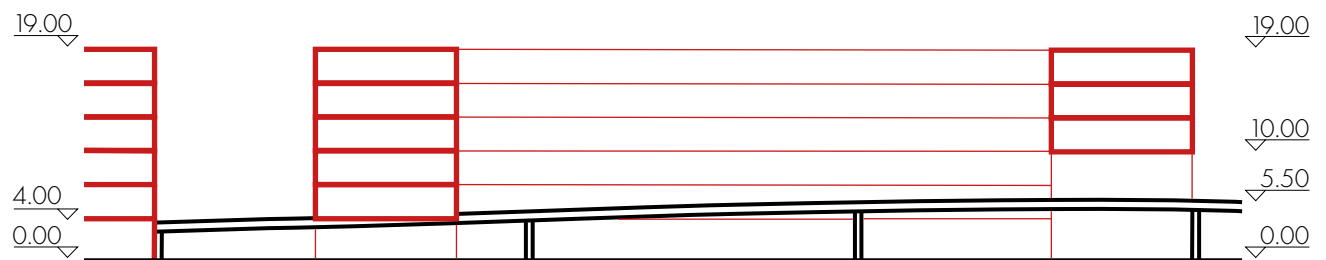
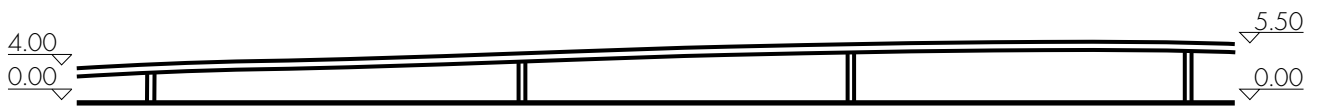
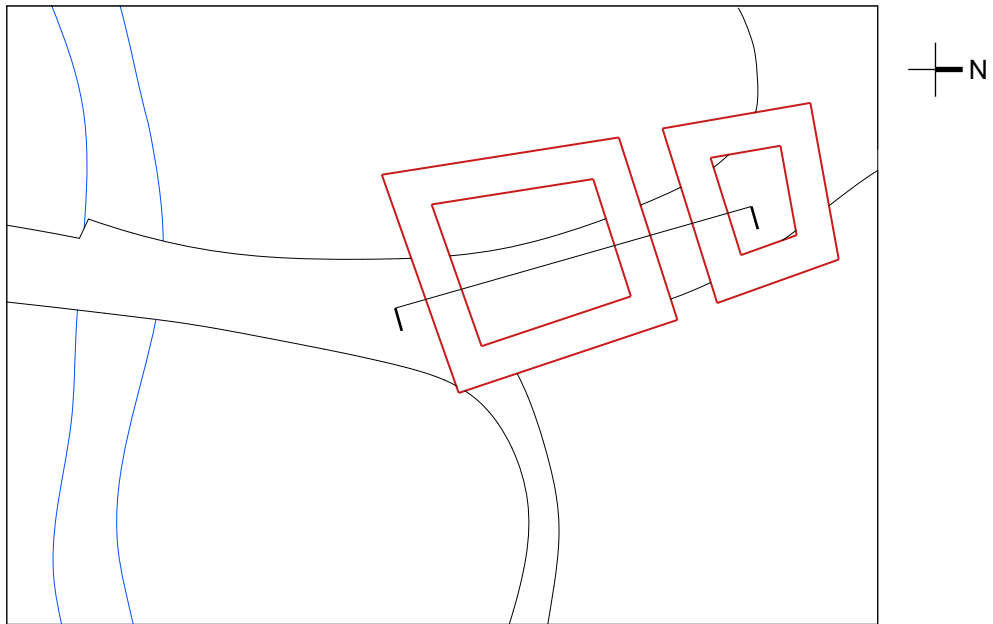
By pedestrianising part of Oxford St and inserting a civic spine with raised platforms, new high value retail space can be created



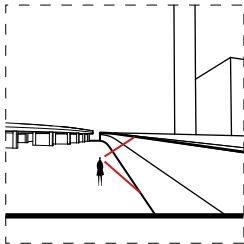
An American Landscape

A public plaza spans a major highway and rail line to make a new waterfront park on the Connecticut River accessible to pedestrians from downtown.

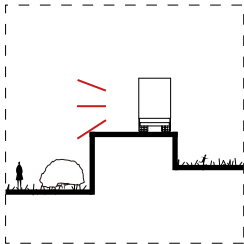




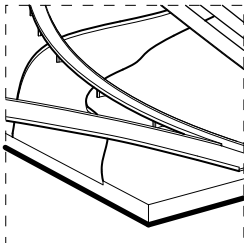
Discomfort and unpleasant perception



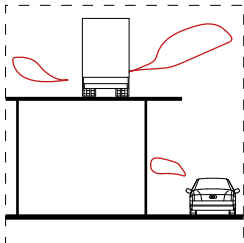
Visual obstacles



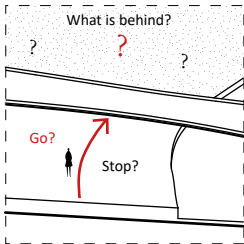
Noise pollution



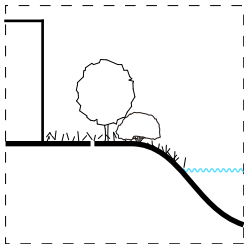
Lack of lighting in the dark



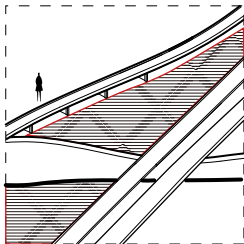
Air pollution



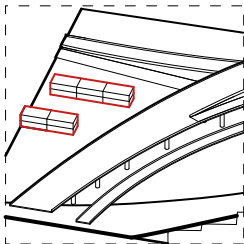
Sense of insecurity



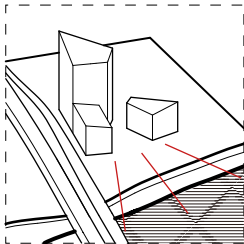
Inaccessible water and greenery



Dirt, construction garbage



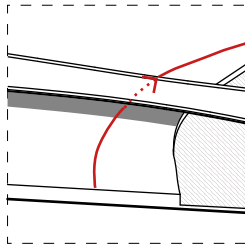
Temporary building



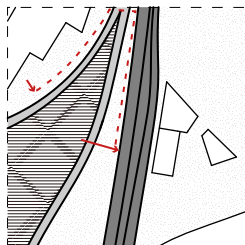
Visually unattractive

CONCLUSION | CHALLENGES

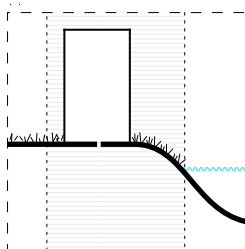
Lack of access and connections



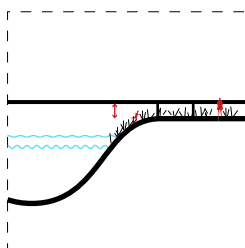
Low quality of footpaths and bike paths



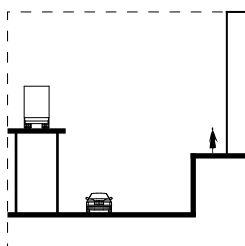
Fragmentation of space



Connection with buildings

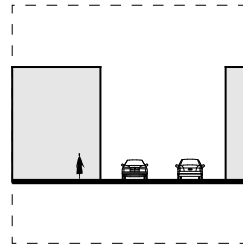


Lack of accessibility

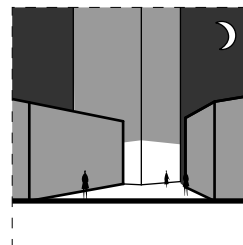


Terrain hight difference

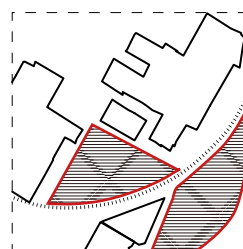
Lack of communication



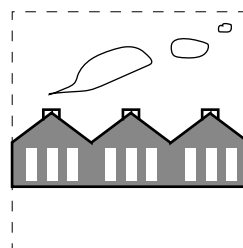
Lack of outdoor activities



Lack of activities in the evening

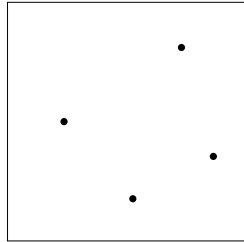


Lack of outdoor business



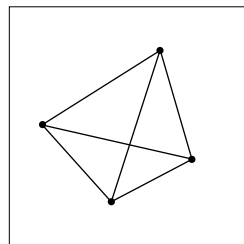
Lost cultural identity

Design Sequence



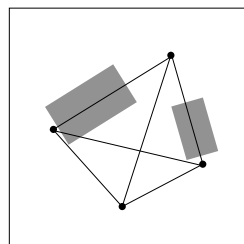
POINTS

POINTS represent potential destinations within the site, such as stations, riverbanks, restaurants, public facilities, etc.



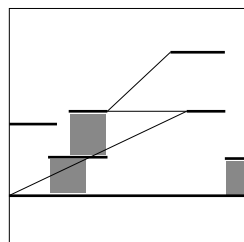
LINE

LINE represent connections between destinations, implies the movement of people.



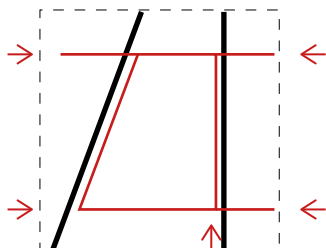
SURFACE

SURFACE represent extension from lines, which implies the stay of people.

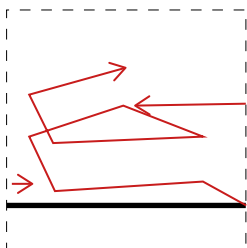


VOLUME

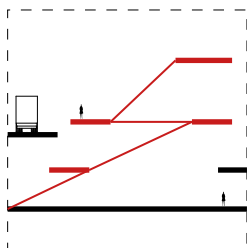
VOLUME represent possible indoor activities around the site, which supports communications.



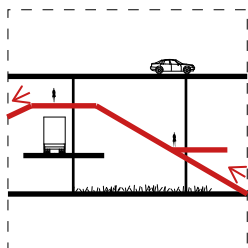
Multipul directions



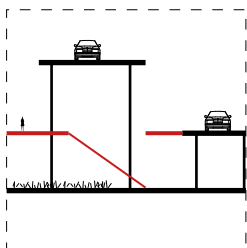
A movement connecting different levels



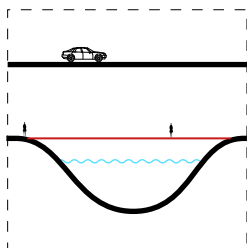
Multipul platforms to rise the pedestrian



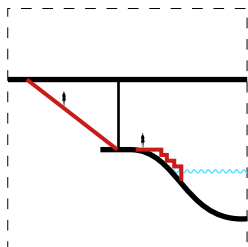
Adjust the height to coexist with the railway



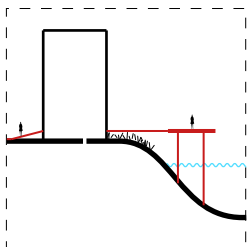
Add new layers and connect to ground



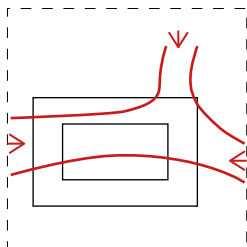
Bridge under the infrastructure



Stairs connecting to water



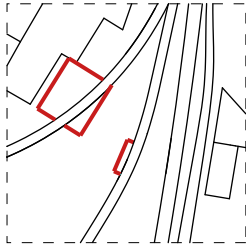
Add path on the river



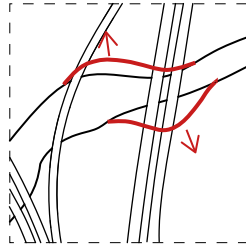
the viaduct work as a new ground



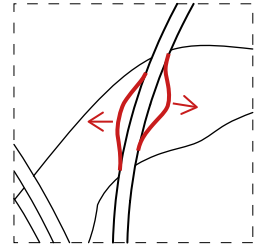
TOOLBOX | SURFACE



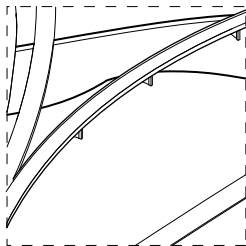
Sitting space outside the shops



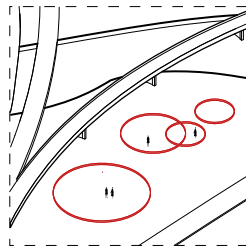
Expand riparian leisure space



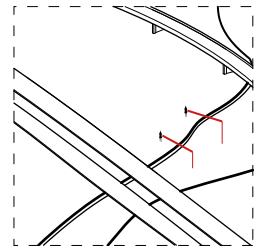
Expand the bridge to the river



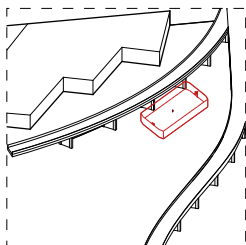
Sitting space on the riverbank



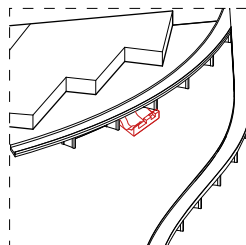
Meeting circles



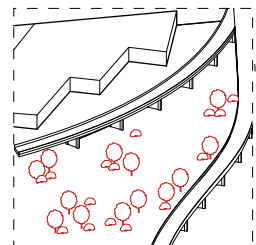
Fishing along the river



Sports | Basketball

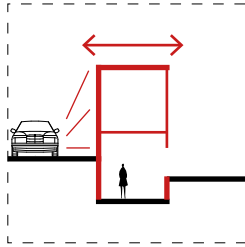


Sports | Skatepark

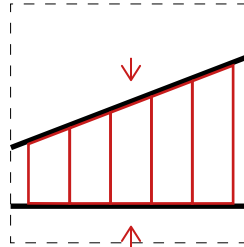


Natural greenery

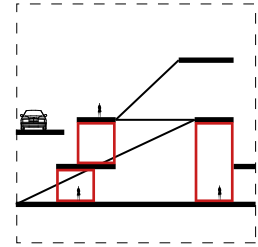




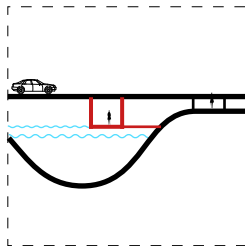
A wall with public functions



Add retail boxes



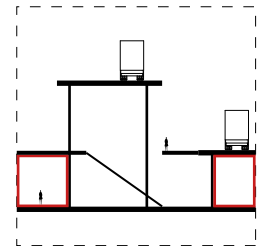
Cafe boxes below the surface



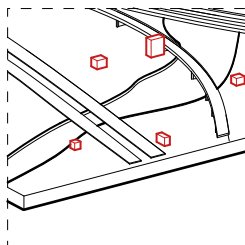
Bridge on/in the river



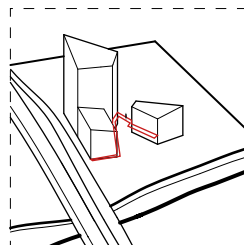
New buildings above



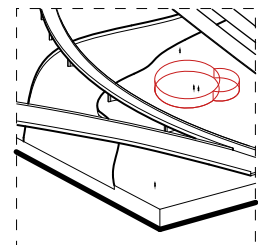
Meeting boxes below the infrastructure



Meeting boxes on the riverbank



Extension in between the buildings

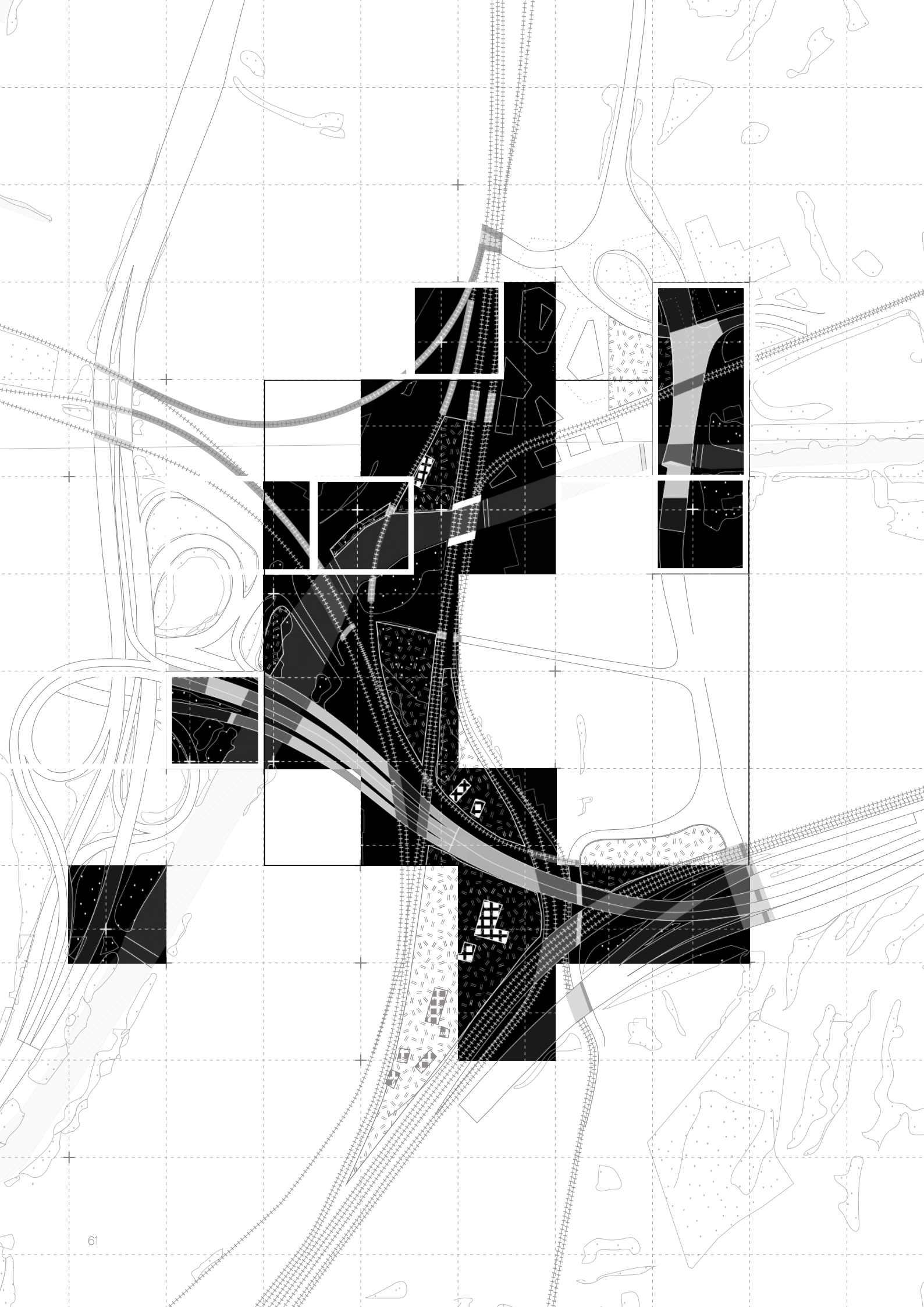


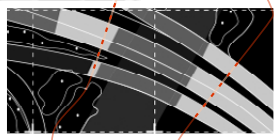
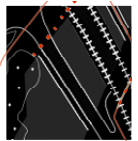
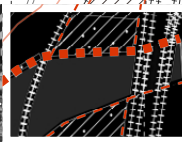
Curved volumes




05


CHALLENGE MAPPING
&
SITE SELECTION









Railway



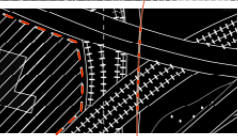
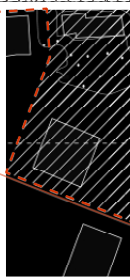
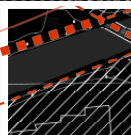
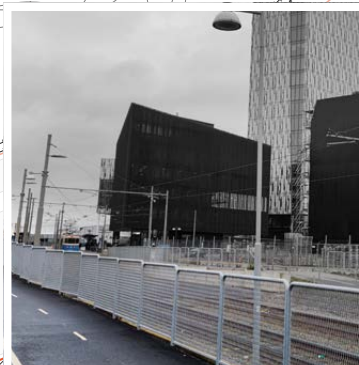
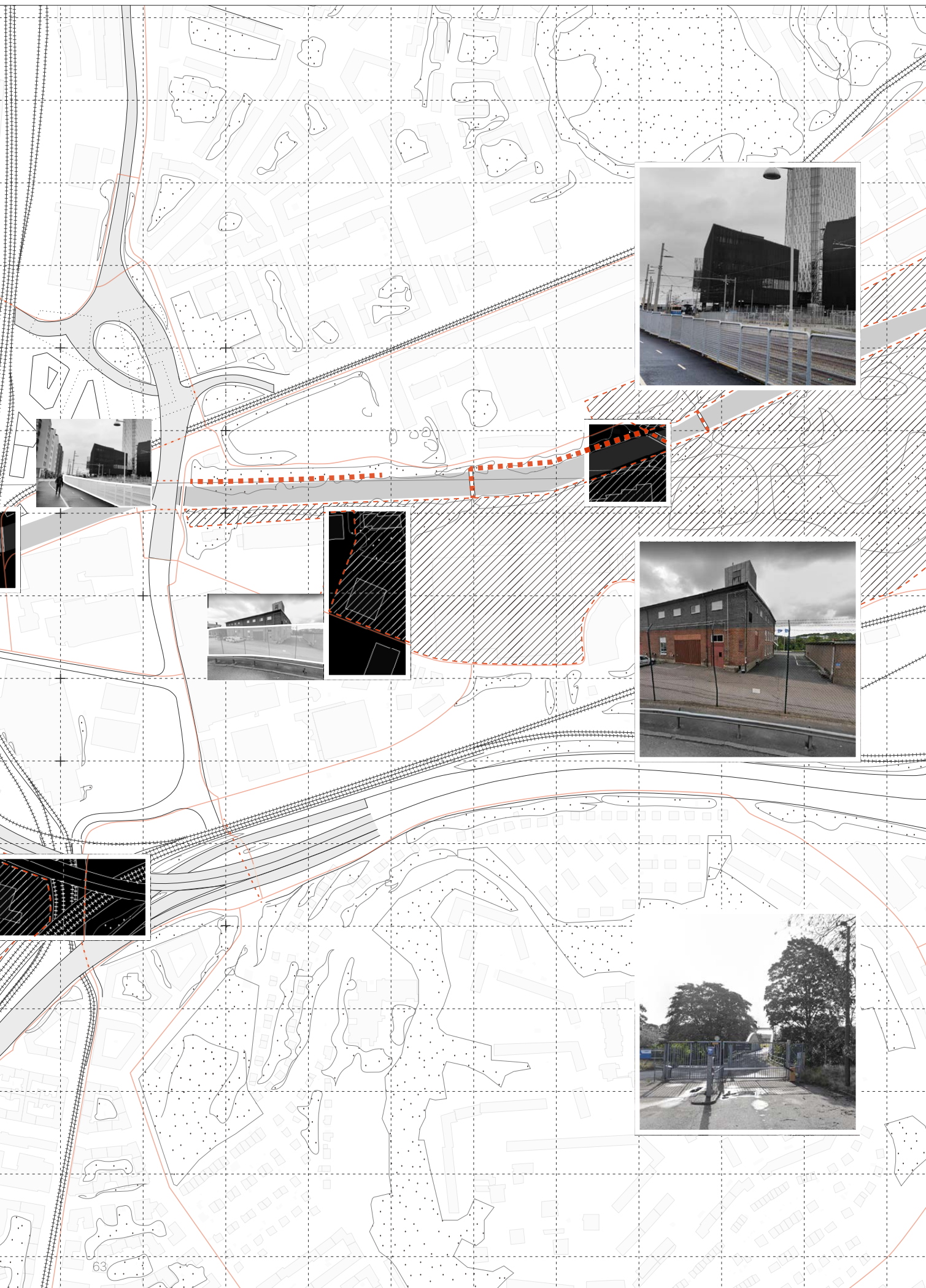
Inaccessibility

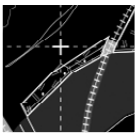



Pedestrians




Inaccessibility









Railway




Barrier




Space under



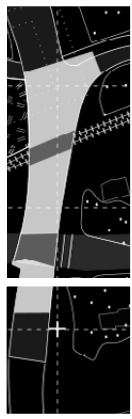
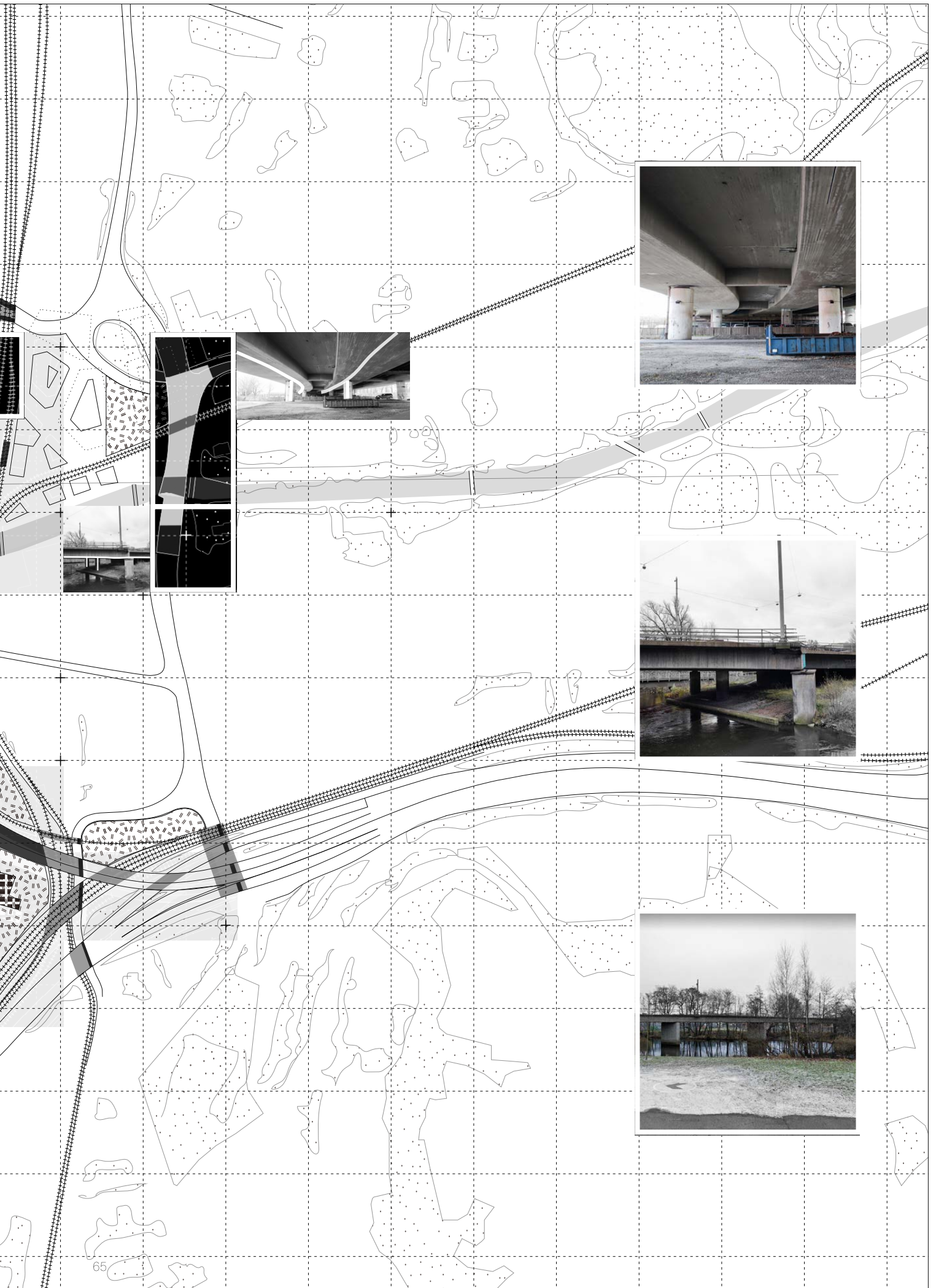
Temporary Container

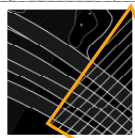
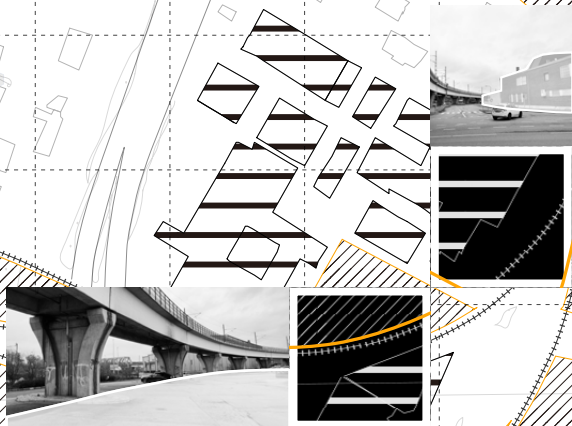







Viaduct

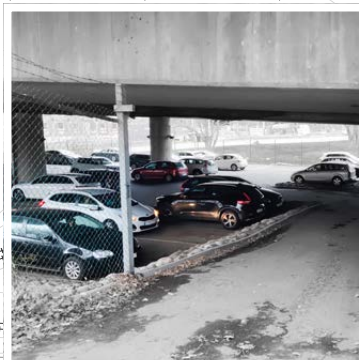
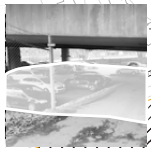
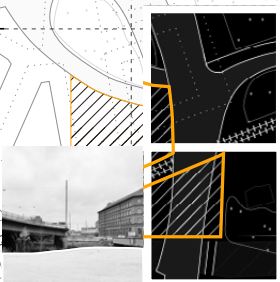
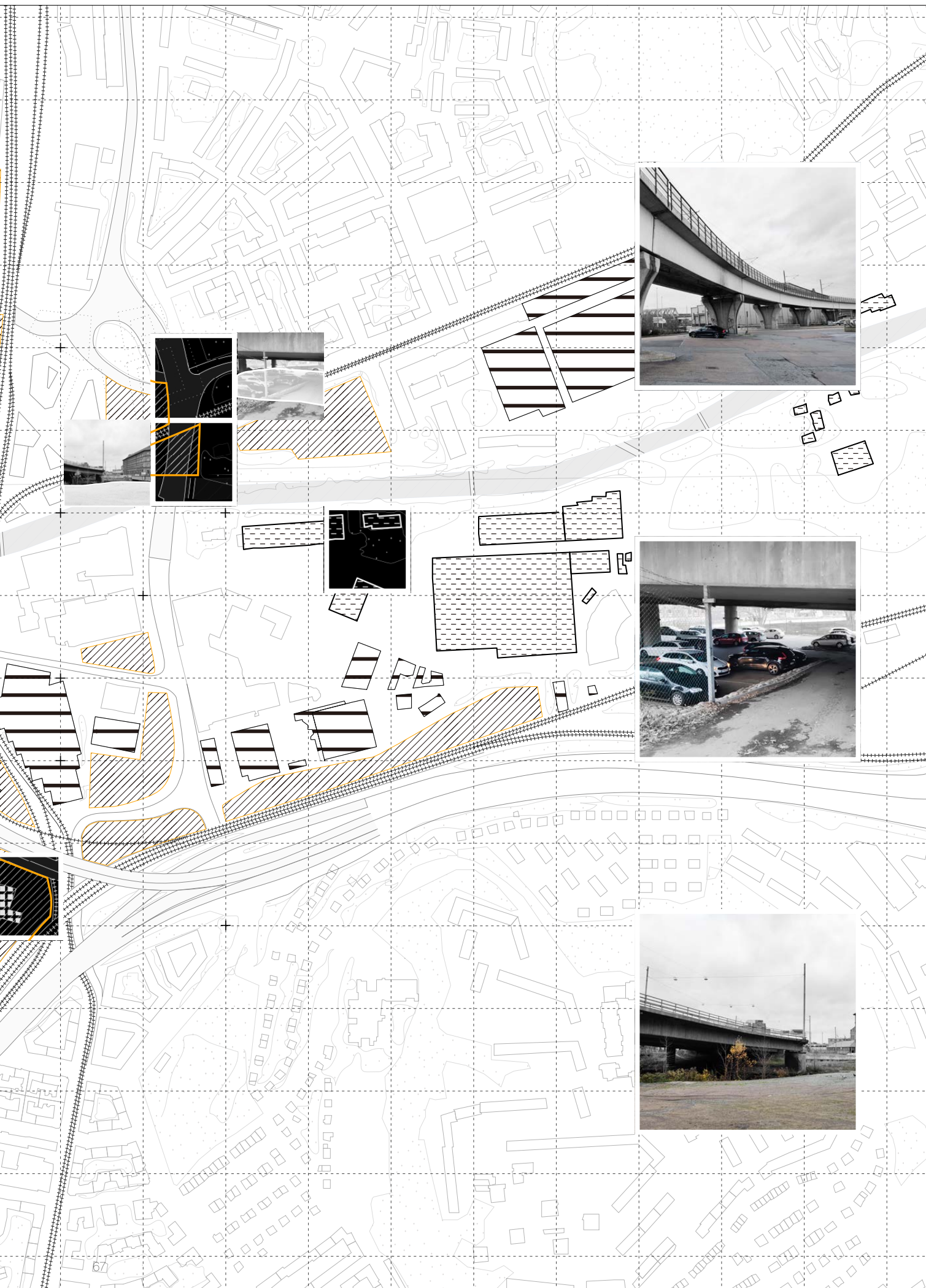


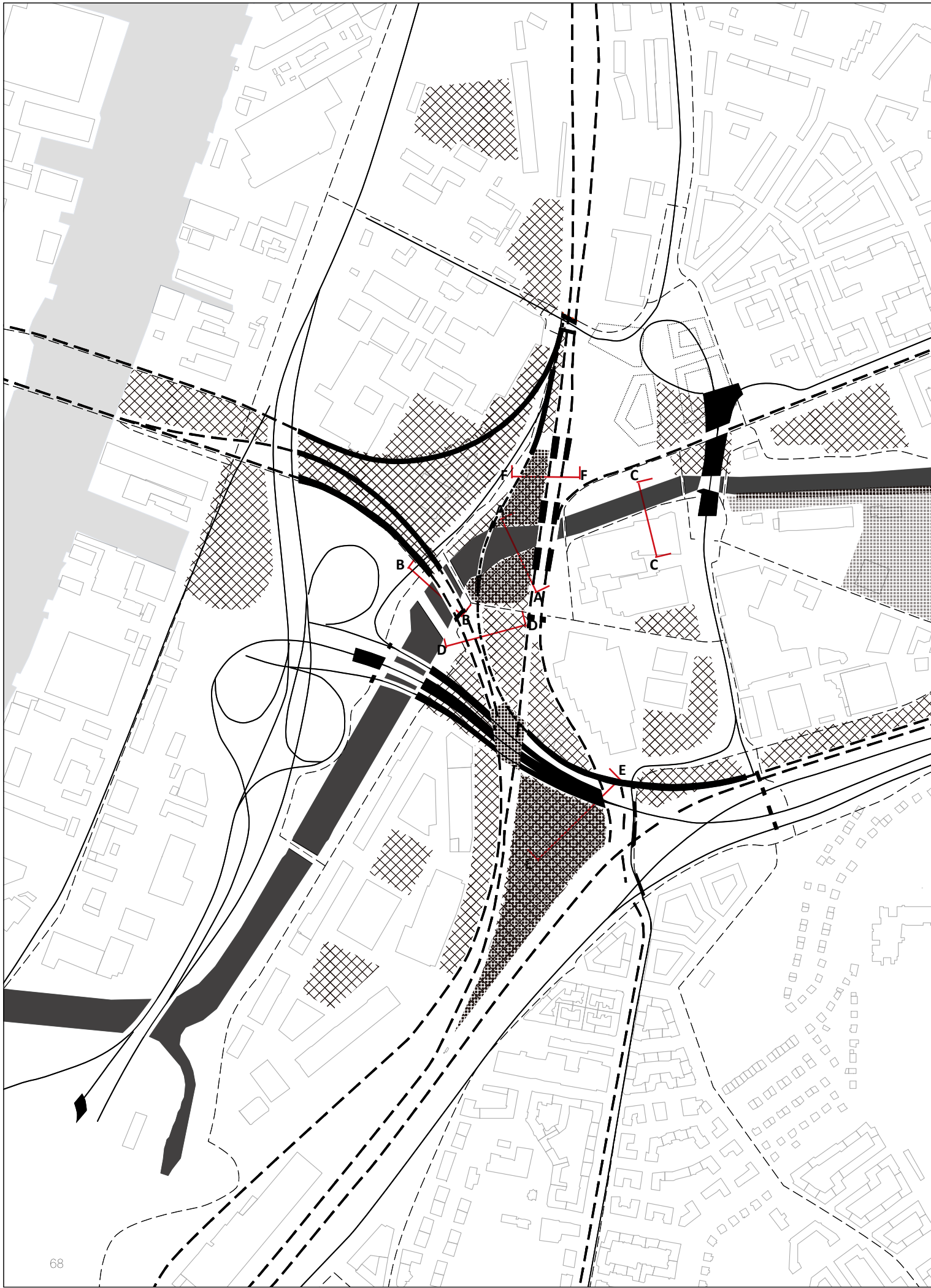
Dirty Soil

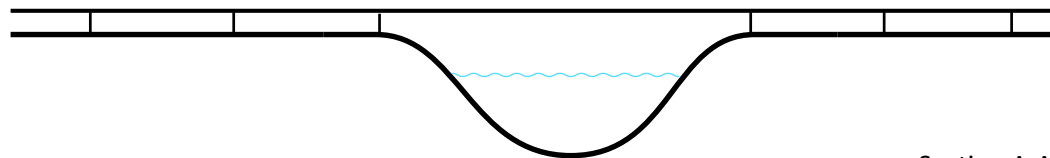
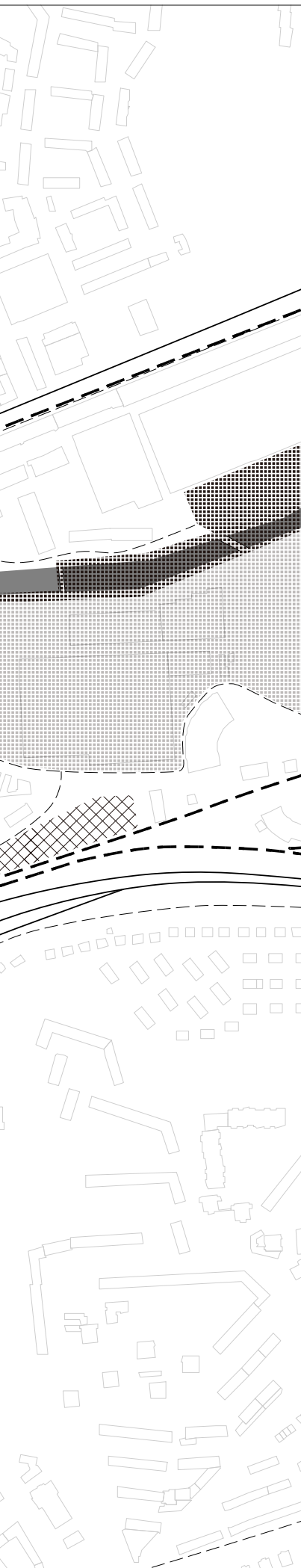




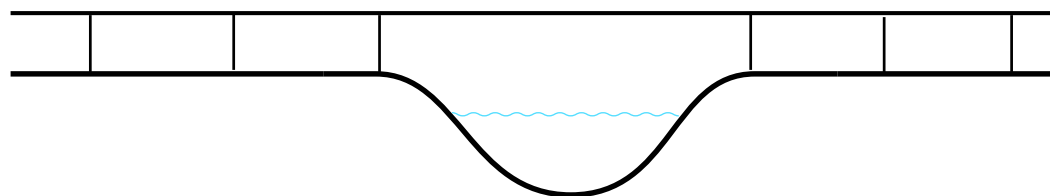
	Railway
	Temperary Container
	Private Building
	Industrial Building
	Open Space



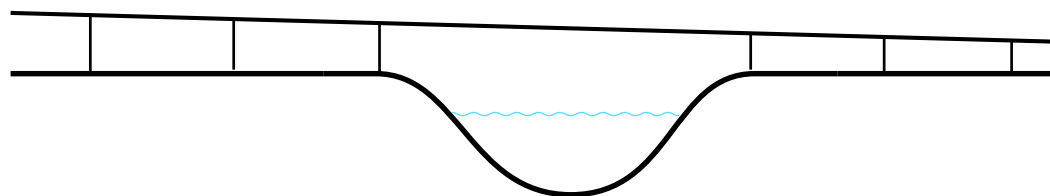




Section A-A



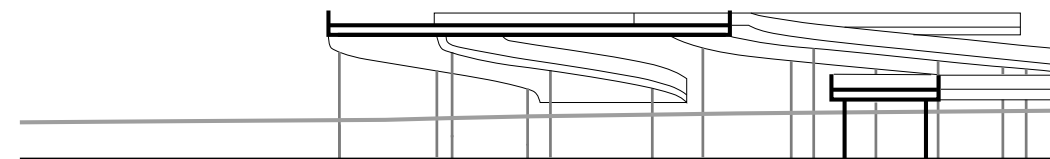
Section B-B



Section C-C



Section D-D



Section E-E



Section F-F

06

DESIGN APPLICATION



DESIGN PROCESS

TARGET GROUPS

Commuters

Go for work & After work

Bike Parking,
Bus/Tram/Train Station,
Cafe,
Walking

Need accessibility

Speed: Fast

Residents

Living Around

Shopping, Eating outside, Picnic, Fishing, Boating,
Exhibitions, Activities, Sports, go for a walk, jogging...

Relax in the area

Speed: Fast&Slow

Tourists

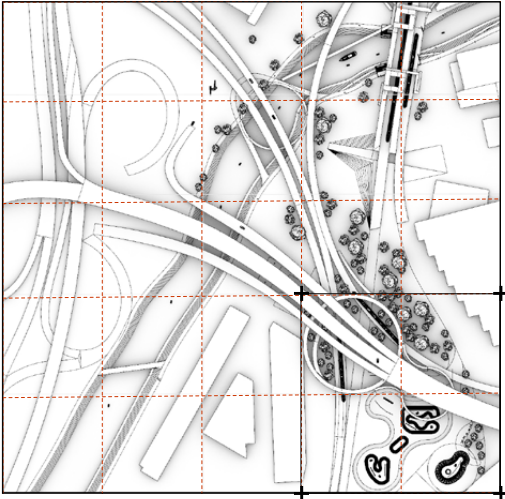
Go for a specific site

Theme Park, Special Shops, Cultural Activities, Exhibitions,
Theme Market, fishing, boating

Trams, Bus, Bike, Train, Car, Walking...

DESIGN PROCESS

SCALES



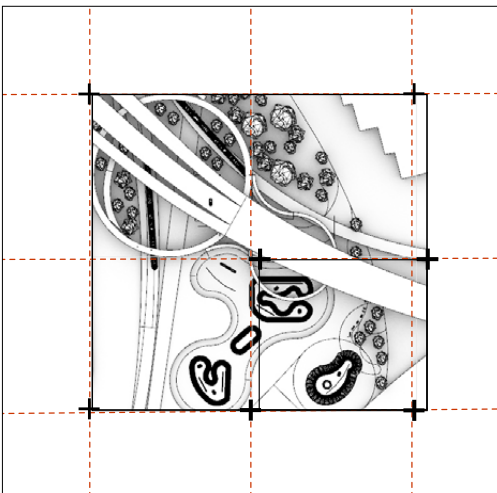
Nature

river, ponds, lakes, greenery

Walking Paths

path for strolling, jogging, skating, biking

Biodiversity



Public Art

a period, short stay : Exhibitions...

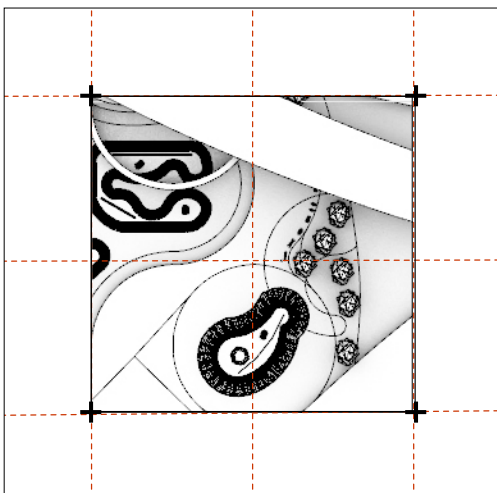
Cultural Events

at certain times, long stay: concert, lecture, games...

Playground Equipment

Skateboard, football, basketball, table tennis, rock climbing...

Plaza



Facilities

bike racks, benches&tables, sculpture, fishing, sitting, cafe, boating...

Activities

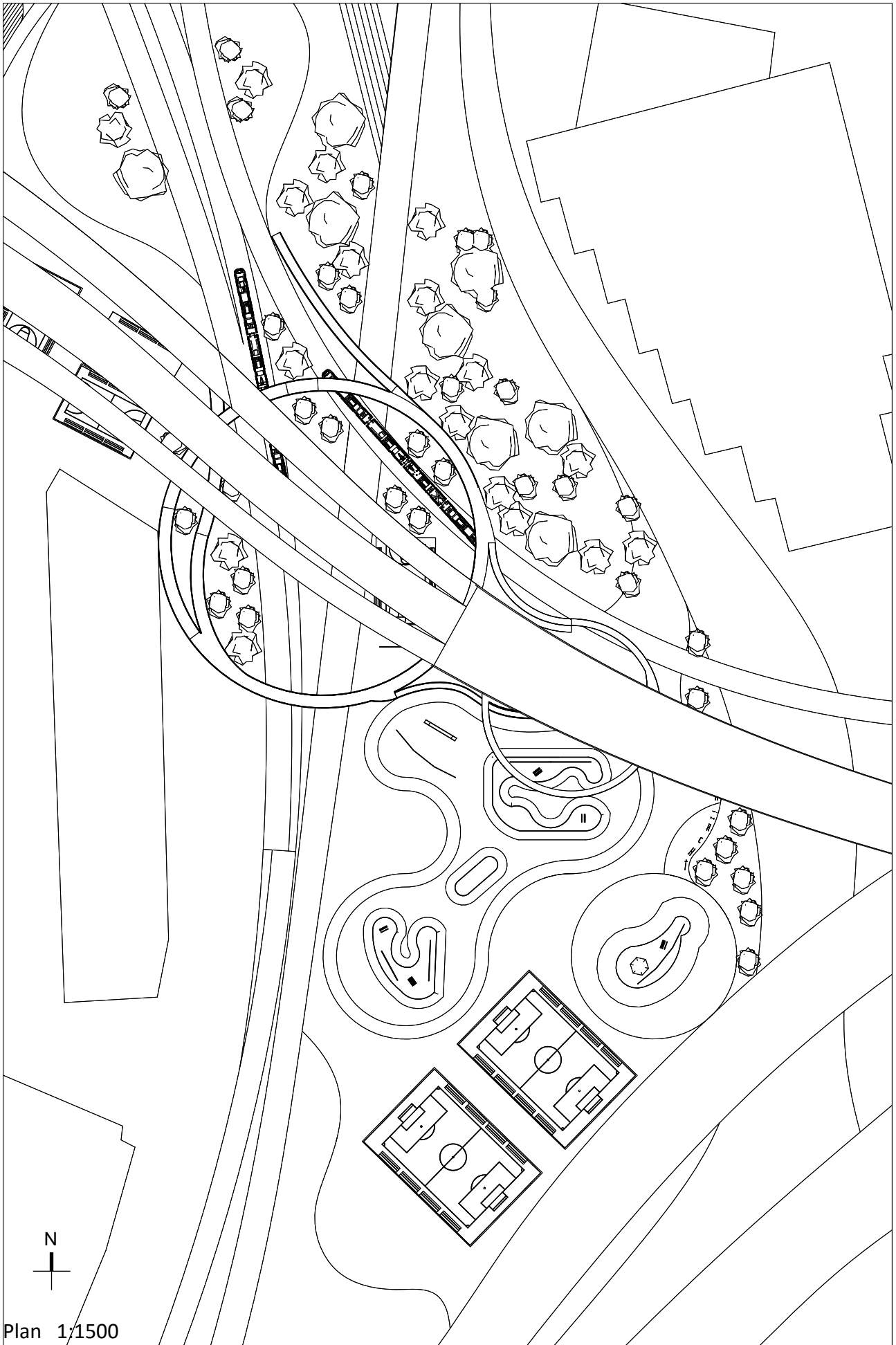
Social activities, meeting, shopping, relaxing, swing, maze...

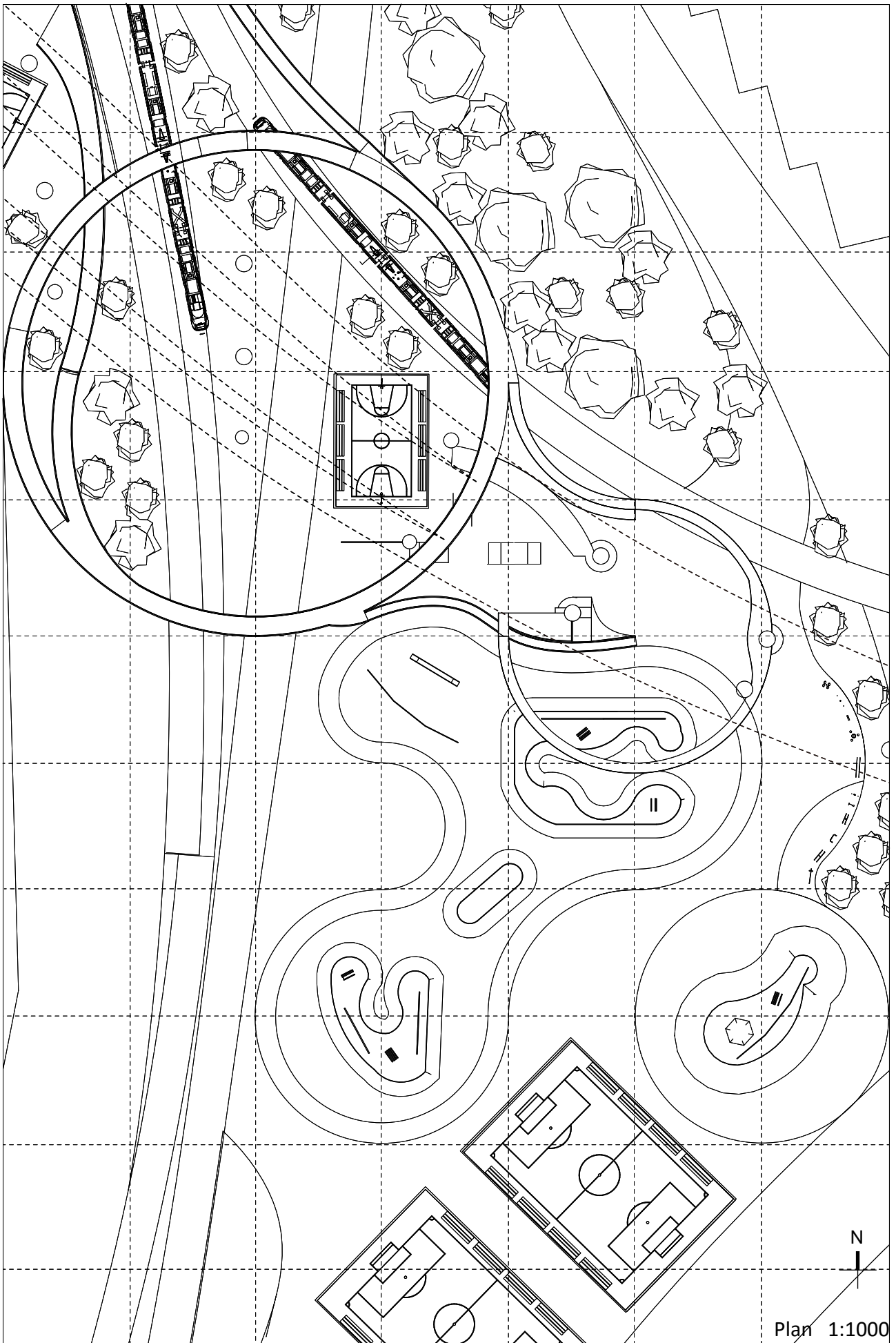


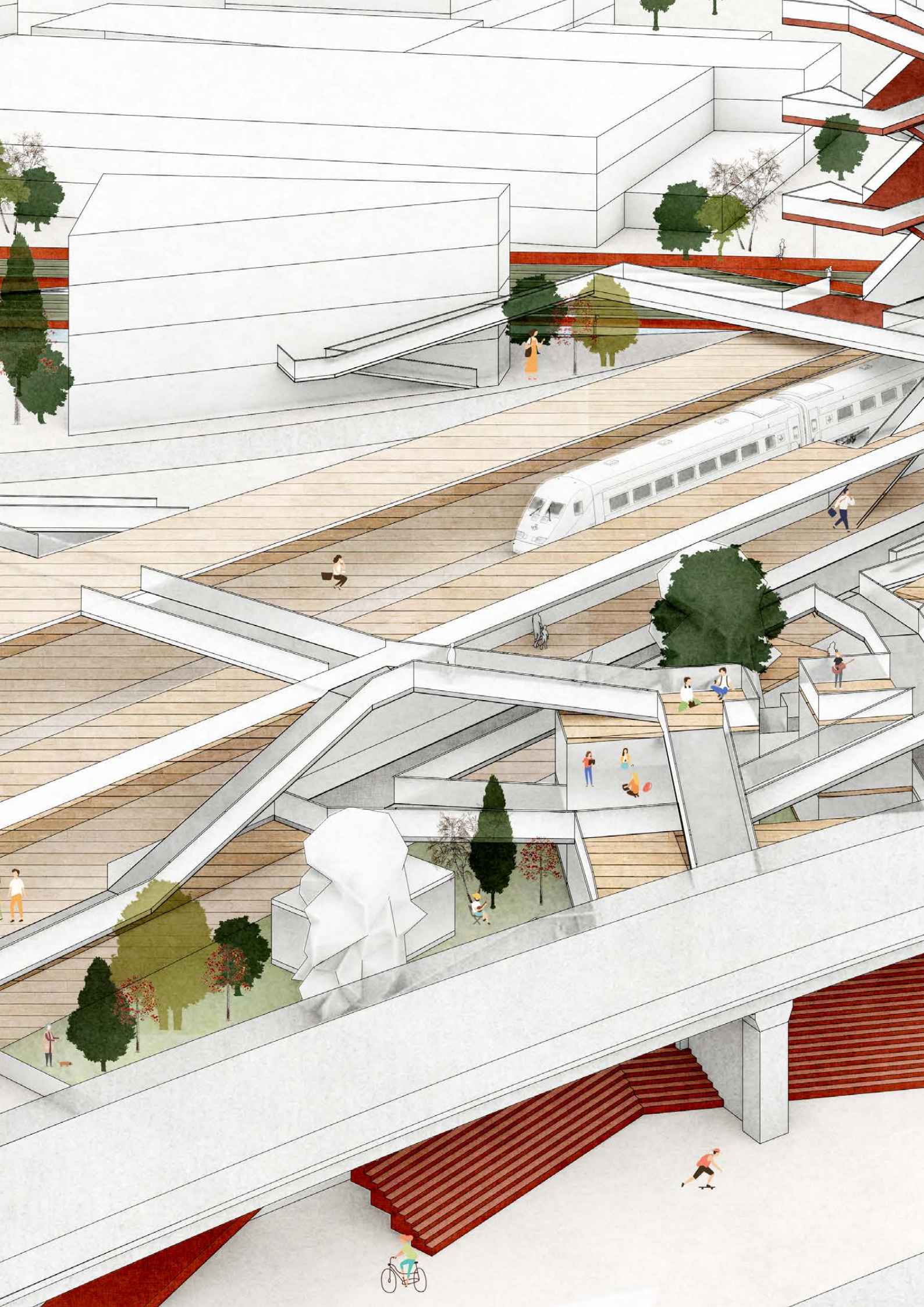




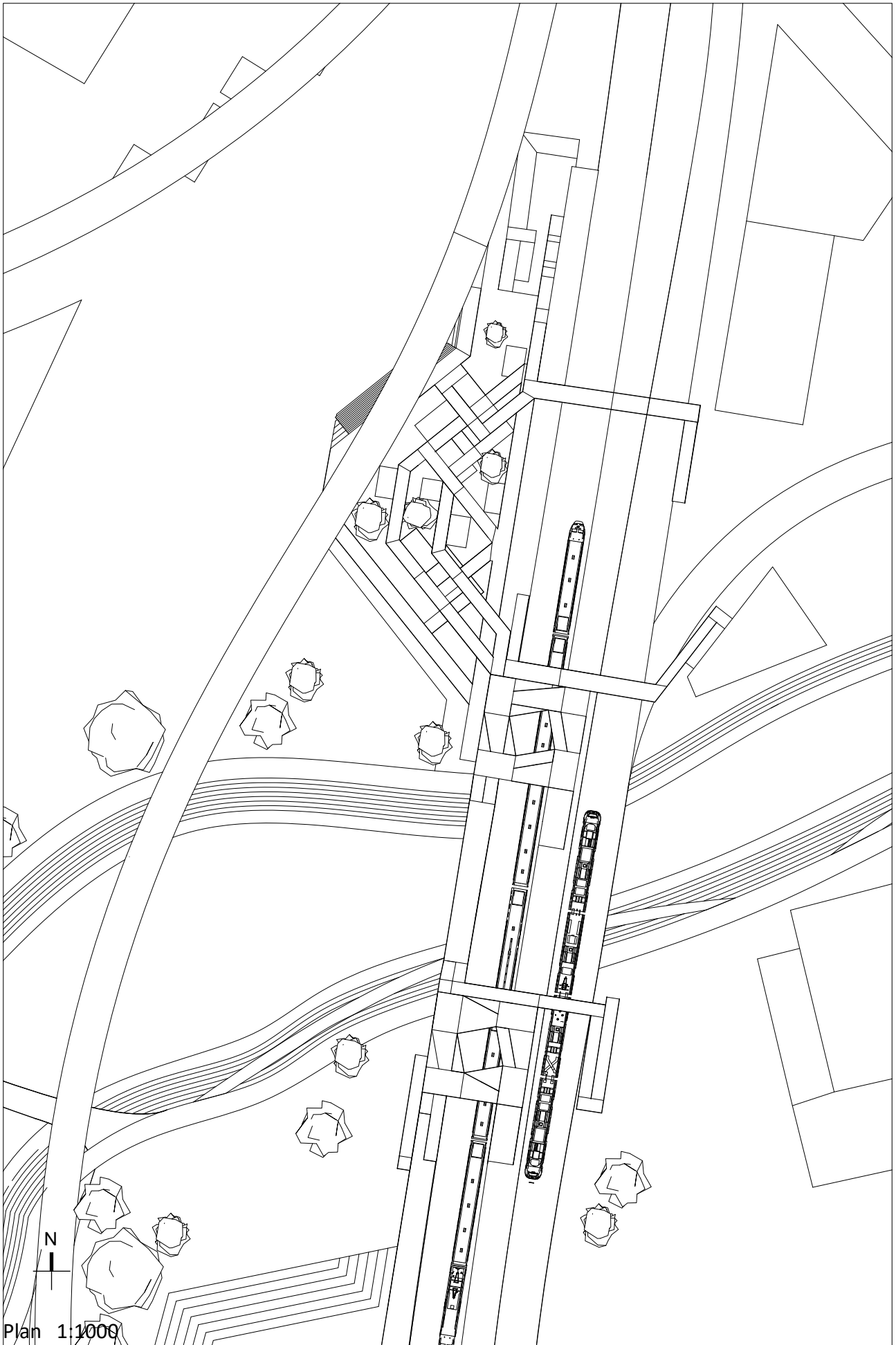


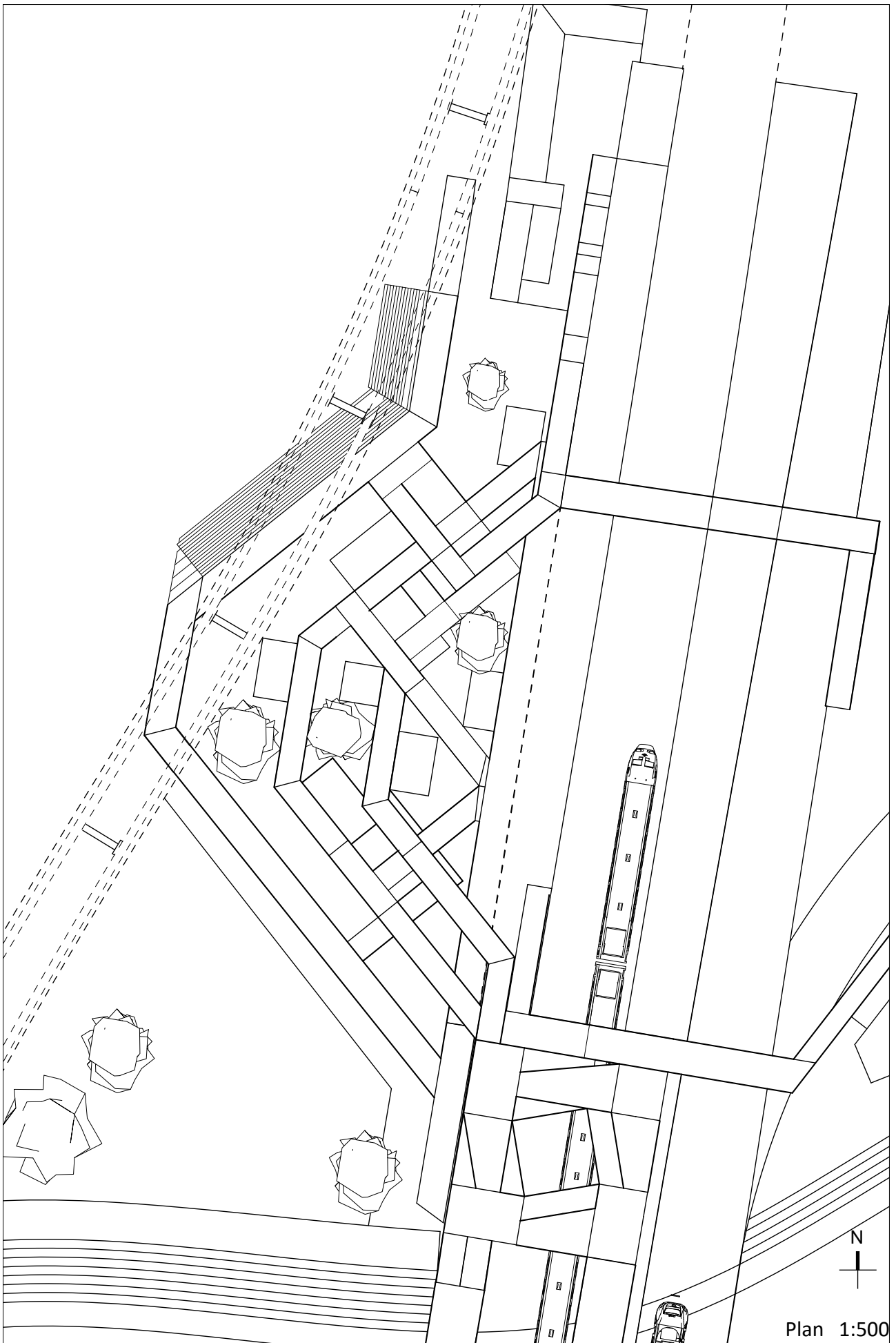




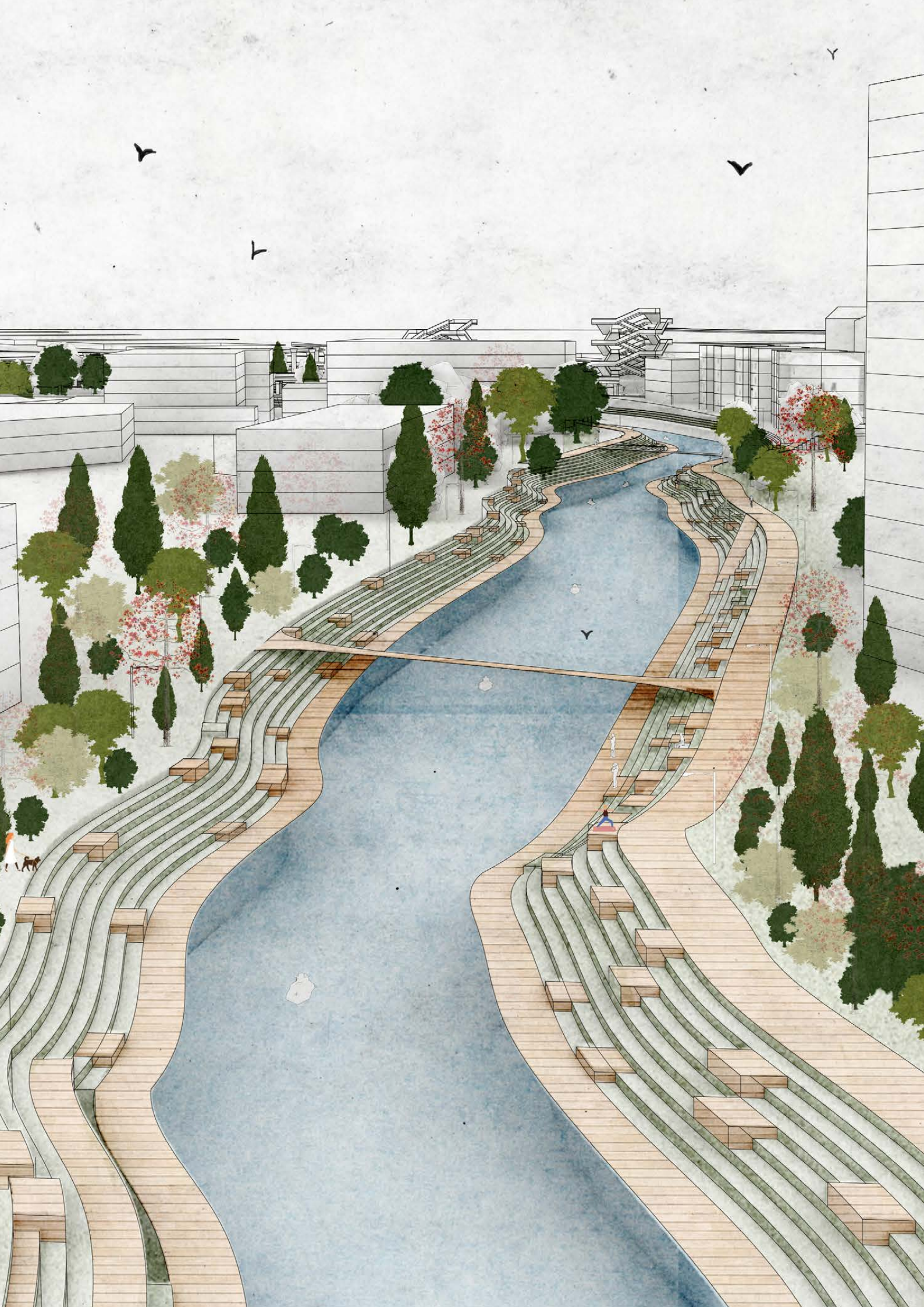


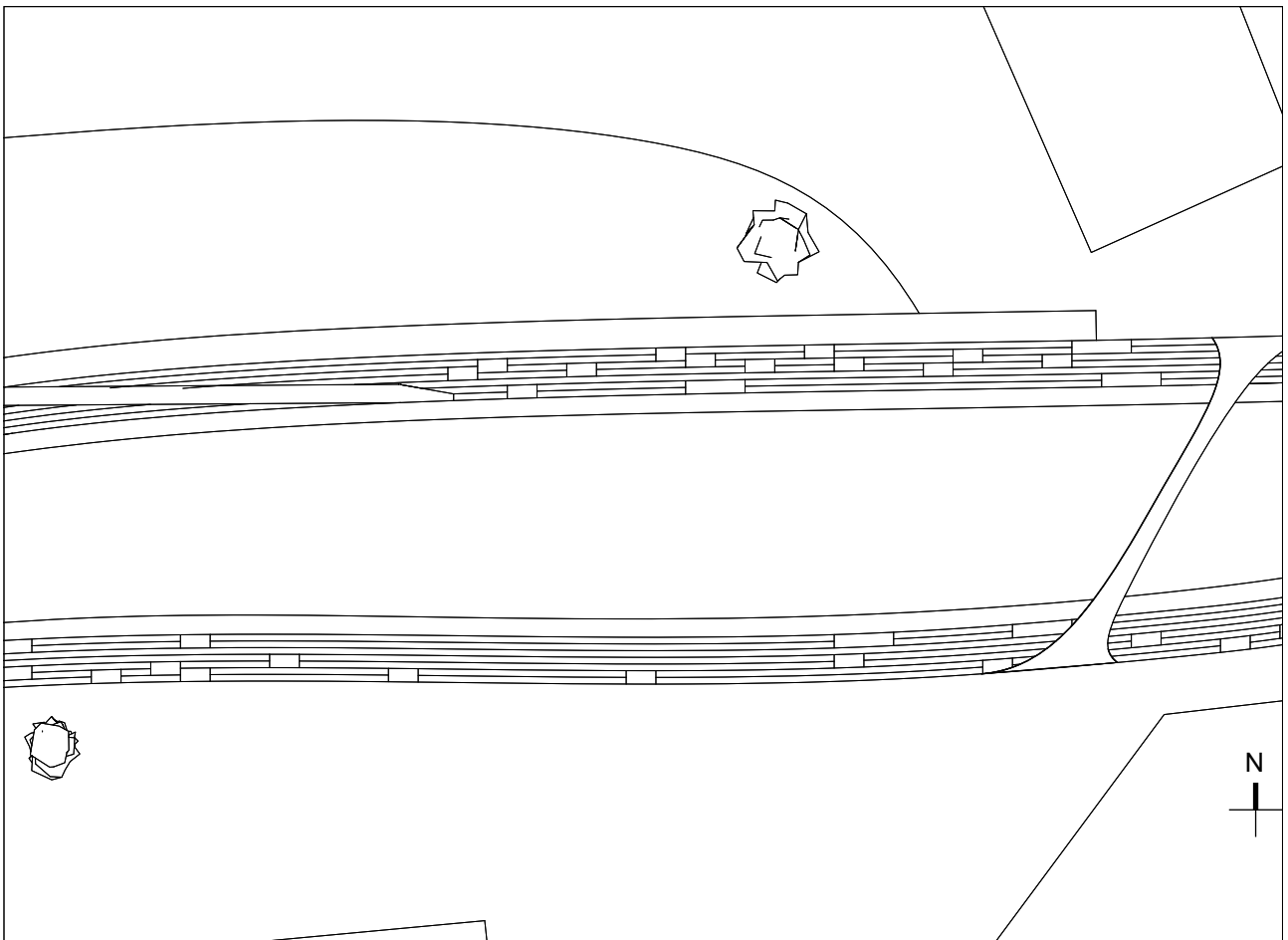
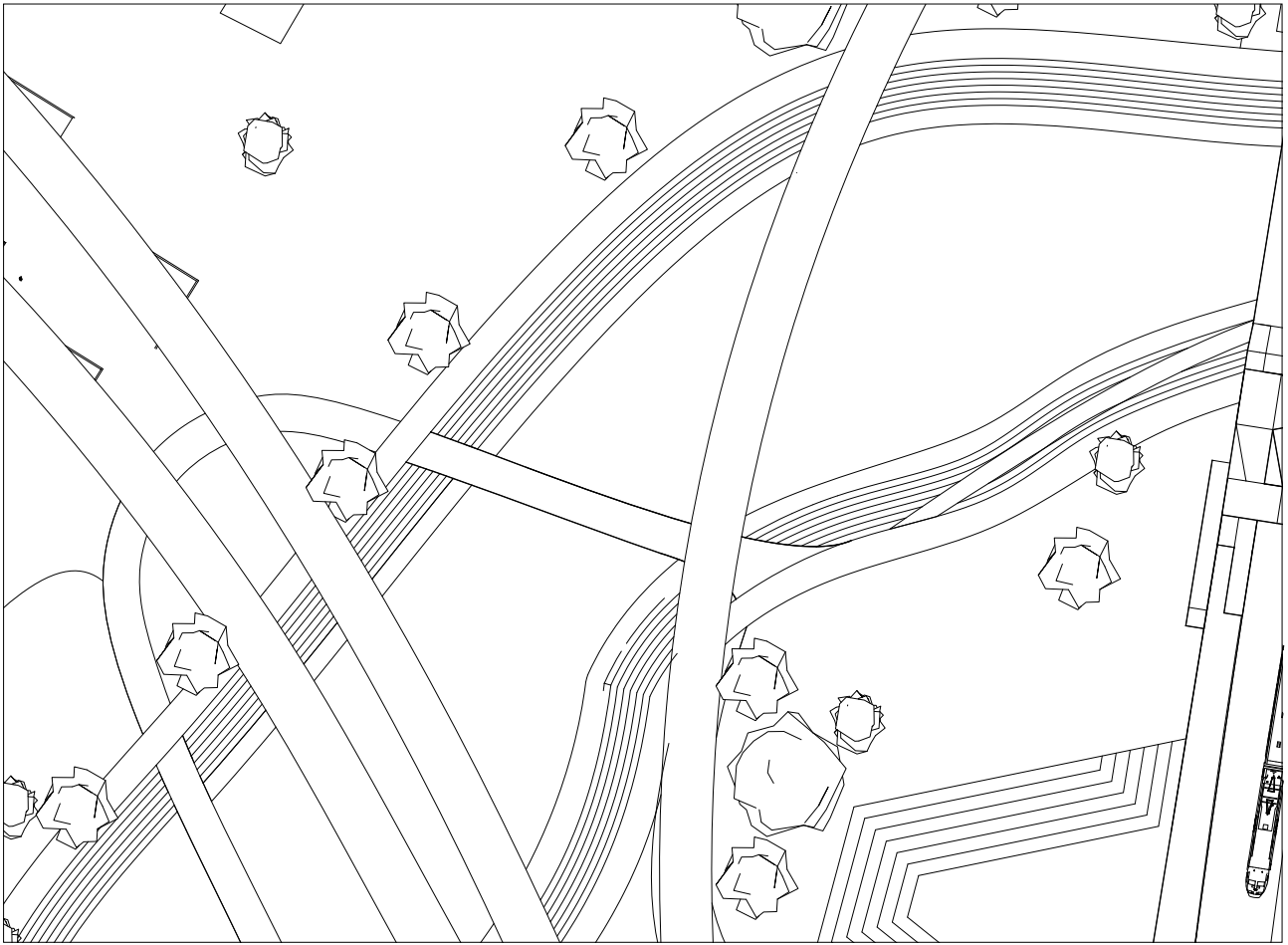


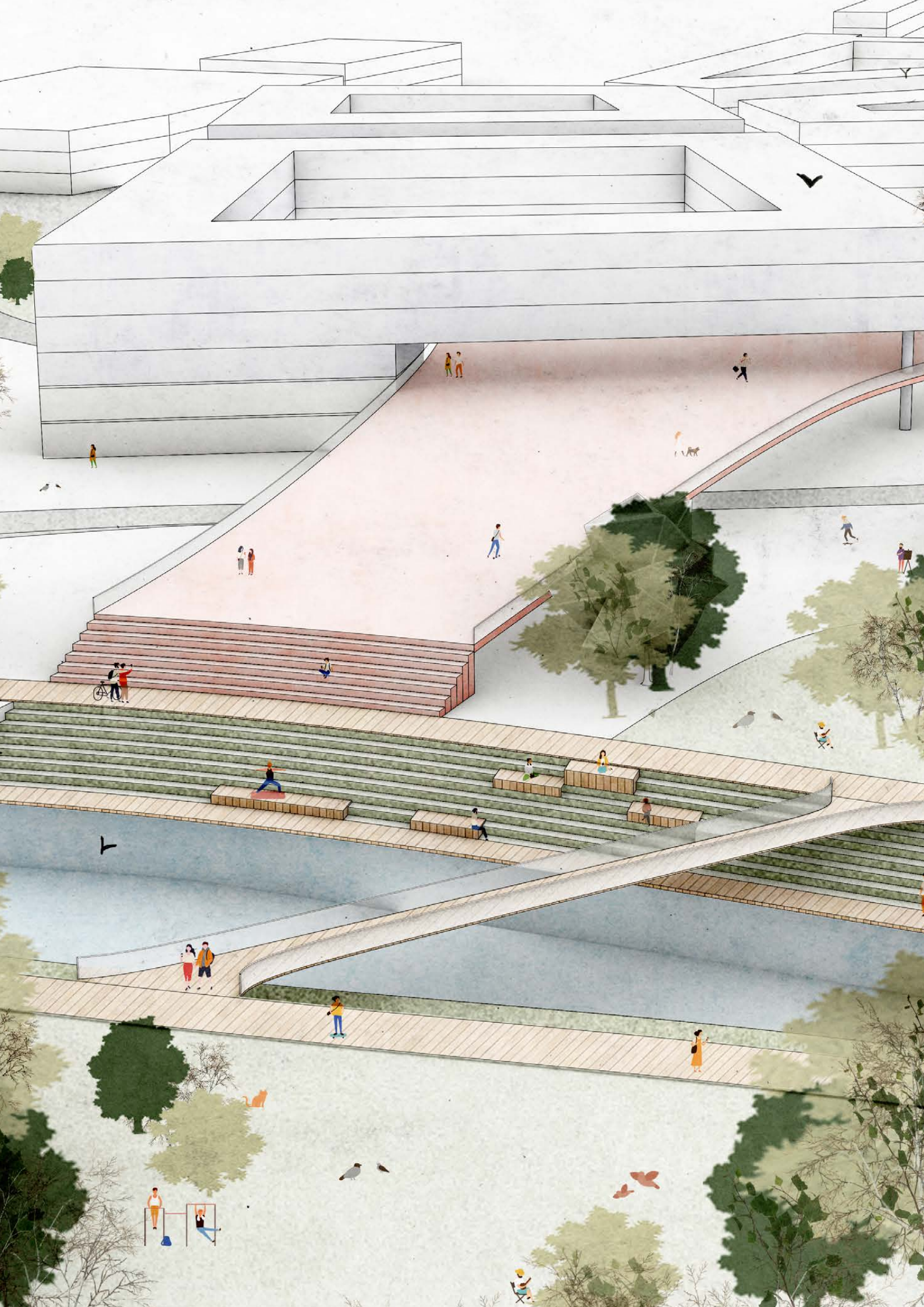


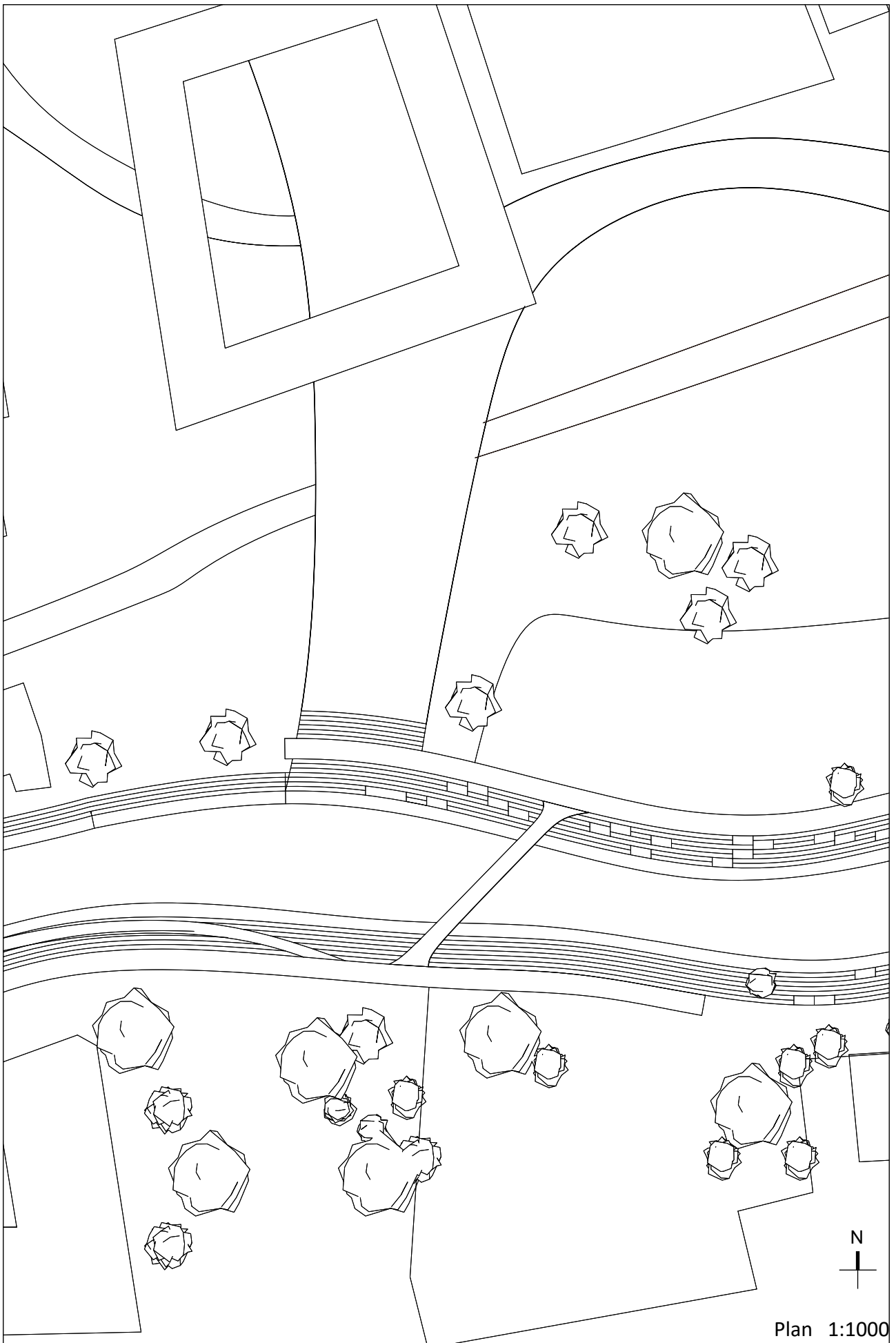


Plan 1:500

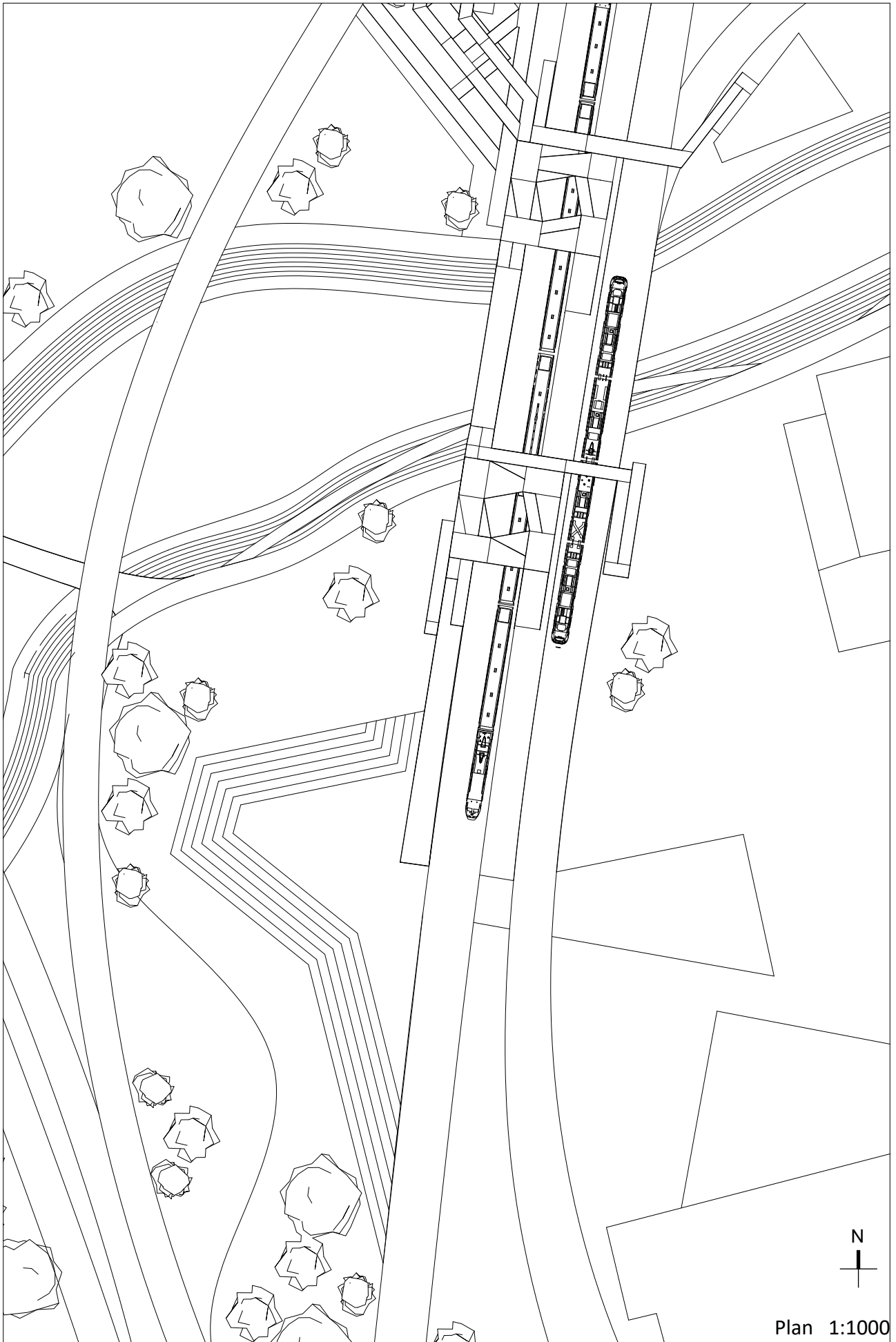




















REFLECTION & DISCUSSION

When I started writing my master's thesis, I planned to discuss some topics about psychology and negative Spaces in cities. As a very sensitive person to the surrounding environment, my mood and psychological changes are often affected by the external environment. Therefore, I often think about whether the design of urban space really pays attention to the spiritual needs of users rather than just meeting the basic needs of daily life through design. Therefore, I want to explore how people perceive the environment in urban space and how urban public space affects people's emotional and psychological changes.

However, when I went into this topic, I found that the scope of "urban negative space" and "psychology" was too broad, and many related concepts in psychology were abstract to the field of architecture. So it was challenging to correspond the terms and images between the two fields one by one. Therefore, an essential step is defining and breaking down the more prominent topic and finding more specific research subjects. Based on my personal experience, I finally chose the viaduct as the primary research object of this paper. With the help of the research field of environmental psychology, I explored how the viaduct, an architectural element, affects people's spatial perception, movement and social behaviour in urban space.

Psychology and environmental psychology have been involved in many aspects of architecture. For example, there are many studies on improving the spatial experience of wards, workplaces and other places through the knowledge of psychology, or planning and layout of natural Spaces in cities through the knowledge of environmental psychology. However, there is not much research on experience and perception related to large-scale transportation infrastructure in cities. However, even so, there are still many successful viaduct space transformations and reuse of excellent cases to provide us with valuable experience.

The site selected for this paper is located in Gamledstaden, a critical transportation hub of Gothenburg leading to the north, which is also why I decided to study the viaduct space. When I passed there for the first time, I had a strong negative feeling about the viaduct. In the subsequent site investigation and research, I found new problems every time. Various factors led to the fact that I never stayed there for a long time. However, even with all of its urban problems, it has surrounded by valuable river resources and various building assets that have a lot of potentials.

Due to the staggered distribution of multiple viaducts and railways, there are various problems at the site. It is a great challenge to select specific application sites and focus attention. However, with the advancement of research and design, the structure of the paper has become more evident. Based on theoretical research, various elements and potential analysis problems are gradually determined. Later, with the help of relevant case studies, complementary schemes to solve various problems were proposed, and Toolbox was formed, which can be used in similar sites. Finally, the paper uses the application of Toolbox on the site to give a solution and respond to the research question.

This thesis also has many shortcomings. First of all, due to the numerous and chaotic contents involved in the research, many relevant theoretical studies have not reached a very in-depth level. Many data are obtained from relevant precedent studies without verification and comparative analysis. Secondly, in the final part design, I want to reflect a complete perception experience, so the site selection range is extensive. Furthermore, different areas, combined with the surrounding environment, are involved in the function of different subjects; this led to no chance for further design, such as dimensions, material, and colour application-specific enough. There is also no more complete Toolbox for corresponding.

This project made me more deeply aware that the environment is a complex whole, and so are human beings. The contact between human beings and the environment and the contact between human beings under the action of the environment is complicated and can not be summarized and solved by a simple formula. Therefore, as architects and urban planners, I think how to learn to touch and add soft spiritual infrastructure into daily life is what we should pay attention to in future social development to achieve a higher level of sustainable development of mental health.

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GLOSSARY

Perception

Perception is the sensory experience of the world. It involves both recognizing environmental stimuli and actions in response to these stimuli.

Cognition

Cognition refers to "the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses".

Apperception

1: Introspective self-consciousness.

2: Mental perception: the process of understanding something perceived in terms of previous experience.

Sense of place

Sense of place refers to the emotive bonds and attachments people develop or experience in particular locations and environments, at scales ranging from the home to the nation.

Environmental Psychological

An interdisciplinary field that focuses on the transactions between individuals and their surroundings.

