LANDSCAPE DRIVEN DESIGN

An investigation of a new building typology
that seeks to preserve natural landscape
qualities in urban contexts

A Master's Thesis in Architecture
By Ellen Wikdahl

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Civil Engineering

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CHALMERS
UNIVERSITY OF TECHNOLOGY

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Chalmers School of Architecture
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ABSTRACT

The larger cities in Sweden are growing and densification is considered a sustainable method for societal development that counteracts urban sprawl and thereby exploitation of landscapes and agricultural land outside the cities. But there are a lot of challenges with densification such as loss of green spaces.

In today's building industry, natural urban green spaces with little or no interference from infrastructures and buildings are exploited with little concern to the site. Natural landscape features and characteristics, such as biodiversity, terrain and topography, vegetation, spatial patterns and elements, human recreation, and visual qualities, vanishes in the process of urban densification.

To ensure a sustainable green infrastructure it's important where new buildings are developed. Already exploited areas, such as parking lots, are to prefer oven virgin land. But sometimes green spaces are the only areas available. The aim of this master's thesis is to explore an alternative and more sustainable building typology and design approach for urban densification of green spaces that seeks to preserve natural landscape qualities.

The thesis will result in a design proposal of a residential complex at an unexploited site in Lunden, Gothenburg. Emphasis will lie in research by design where different landscape analysis methods will be used and explored as design tools in an iterative design process. Case studies will be used for obtaining more knowledge of how landscape characteristics can be approached in a design process with focus on spatiality, visual effects, terrain form, and vegetation. Research about building foundations with minimal impact on the ground will be used when exploring spaces generated in the interface between building and ground.

TABLE OF CONTENT

READING INSTRUCTIONS

The first chapter introduces the emergence of the master's thesis and its relevance for the architectural profession. It also illustrates the geographical relevance of the site for the design proposal in relation to the master's thesis discourse. The master's thesis aim and questions are presented together with delimitations that further explains what subjects the thesis is dealing with. The chapter ends with explaining the research methods used in the thesis.

The second chapter introduces relevant theoretical background for the master's thesis and put them in context with the master's thesis design proposal.

In the third chapter, reference projects are analyzed in order to gain knowledge of different design approaches that deal with natural and unexploited landscapes.

The fourth chapter presents the site. It starts with explaining how the site was chosen and cartography over the site. Landscape analyzes are made that will guide the design process that is introduced in the sixth chapter.

In chapter five, volume studies that are made on the site for the design proposal are introduced. The chapter ends with presenting design strategies for the design proposal that derived from the volume studies.

In chapter six, focus lies on the design proposal and its design process. The chapter contains illustrations and descriptions of how the landscape analyzes and the design strategies from the volume studies have been implemented in the design proposal and its iterative design process.

The seventh chapter contains reflections of the master's thesis work. What conclusions can be made in relation to the master's thesis questions and aim? What issues raised from the master's thesis work are relevant for future discussions and research?

INTRODUCTION

STUDENT BACKGROUND

MASTER'S PROGRAM

Design for Sustainable Development, 2018, 2020-2021

BACHELOR'S PROGRAM

Architecture and Engineering, 2015-2018

STUDIOS

Planning and Design for a Sustainable Development in a Local Context, 2018

Sustainable Architectural Design, 2020

Architecture and Urban Space Design, 2020

INTERNSHIP

Werner Arkitekter, 2019

THESIS BACKGROUND & DISCOURSE

The climate issue has become an increasingly important concern in planning contexts. When it comes to urbanization and its consequences, the general perception has so far been dominated by the idea that more dense cities and cities with a multi-core city structure are better for the climate. These city structures provide good preconditions for increased public transport and thereby lower carbon emissions due to a reduced car dependency. (Naturvårdsverket, 2015)

Urbanization and densification of Swedish cities have though led to a fragmentation and reduction of urban greenery over the last decades. Despite the importance of greenery for a good and environmentally sustainable city life, it's often downgraded in the densification process of buildings and infrastructure in urban contexts. Along with the decrement of greenery in the cities, ecosystems are weakened as well and thereby also the ecosystem services they provide. Ecosystem services can be defined as direct and indirect contributions from ecosystems to human well-being and are divided into three groups: 1) providing, for example bio energy and drinking water; 2) regulating, like pollination, climate regulation and air and water purification; and 3) cultural such as well-being, recreation, inspiration and aesthetically value. (Andersson-Sköld et al 2018)

The concept of ecosystem services is a relatively new term and was wider established in society when the UN-initiated report Millenium Environmental Assessment was launched in 2001. (Naturvårdsverket, 2017). Cultural ecosystem services are though difficult to assess and value due to their intangible nature and several methodological concerns. Landscape aesthetics and spiritual experience etc. are often assessed based on interviews, questionnaires and tools like landscape metrics among others. (Burkhard et al, 2014)

Research shows that spending time in natural environments have major positive impact on both the physical and the psychological health. A lot of green spaces in the neighborhood seems to increase the motivation for physical activity for people living there, but it's not enough to have green spaces in the surrounding neighborhood. Science shows that people should have direct proximity to green spaces since many people don't have the habit or possibility to use them. Therefore, according to Maria Löhmus Sundström, researcher at the institute for environmental medicine at Karolinska Institutet , it's important for city planners to densify green areas as well, not only buildings. (Sternudd, 2021)

Concern about landscapes, urban greenery etc. within planning and land management are seen internationally in studies and publications. Methods and guides about how to assess and value cultural ecosystem services and landscape sensitivity have the aim of informing municipal and regional planning management about:
- valuating how a changed land use of an area will affect the contribution and value of ecosystem services there (Andersson-Sköld et al, 2018)
- strategic thinking concerning the location of new development, such as housing, renewable energy, transport infrastructure, and recreational infrastructure etc. (Natural England, 2019)

But how can this knowledge be used and translated into architectural design? Jensen and Skodvind Architects, a Norwegian architectural office, writes following in their website:

"Today's concern for sustainability in architecture focuses almost excludingly on reduced energy consumption in production and operation. We think that conservation of topography is another aspect of sustainability which deserves attention. Standard building procedure requires the general destruction of the site to accommodate foundations and infrastructure before building can commence. Conserving the site is a way to respect the fact that nature precedes and succeeds man. Also, dutiful observation of existing topography produces a reading where the geometry of the intervention highlights the irregularities of the natural site, thus explaining both itself and its context with more power. A sustainable connection is established between structure and site."
(Jensen & Skodvin Architects, n.d.)

A connection and interplay between nature, urban landscapes and architectural design could be considered a powerful tool in generating a sustainable housing stock. Steven R. Kellert, professor of social ecology at the Yale School of Forestry and Environmental Studies, wrote following:

"Buildings and landscapes that people do not associate with a positive experience of nature will almost always be discarded overtime, because they are not perceived as aesthetically appealing or connected to people's emotional and intellectual well-being. What is more sustainable - a technologically complex, low environmental impact building isolated from the natural world and abandoned once its high technology systems are no longer novel, or constructions that people revere and recycle generation after generation because they affirm an enduring and inherent affinity for the natural environment?"
(Kellert, 2005, p. 124)

In this master's thesis, I want to investigate if urban densification can be more sustainable by integrating existing urban green spaces in building densification by looking at a new building typology in the urban context of Gothenburg.

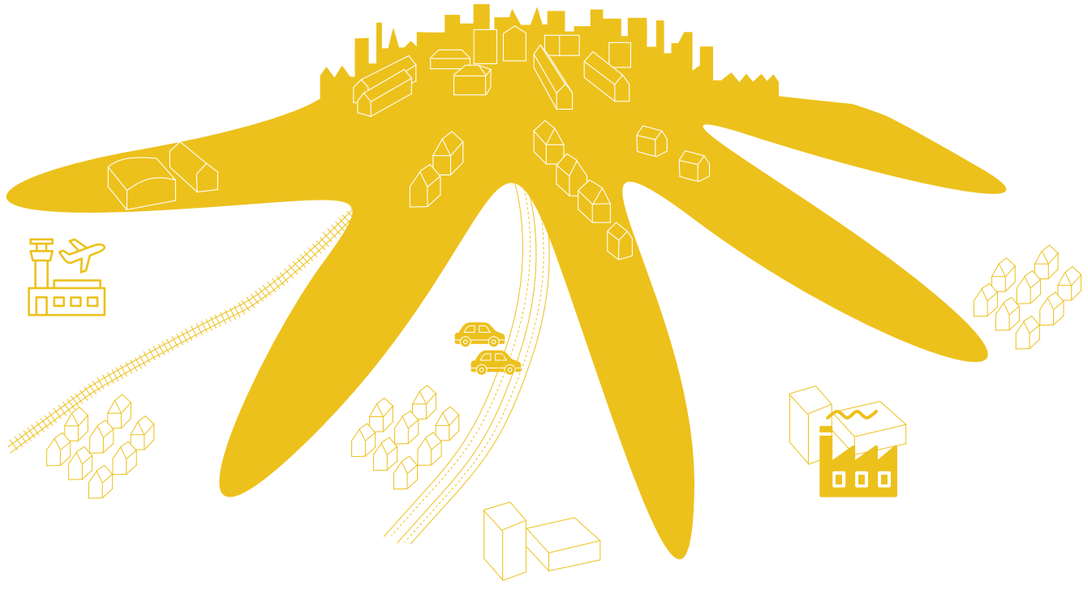


Figure 1. Illustration of urban sprawl

THESIS CONTEXT

The east part of Gothenburg has quite mountainous ground conditions which is visible in the terrain shading map above. Along with these prerequisites comes large height differences to deal with in the built environment. When walking around in these parts of Gothenburg, it becomes clear that more or less every house, large apartments buildings and villas, have done irreparable damages on the landscape due to the choice of foundation, which predominantly consists of concrete slab on ground.

The typical way of exploiting green spaces here is to blast away huge parts of million years old rocks and excavation of important topsoil and vegetation. The photos on the next page exemplifies this in newly built residences in Lunden, eastern Gothenburg.

The site for this master's thesis design proposal is situated in the eastern parts of Gothenburg on a mountainous site in order to investigate a new building typology that generates a more sustainable urban densification where landscapes aren't damaged.

LANDSCAPE DAMAGES

Photos of the damages made on the rocks. The blasting has generated irreparable damages to the landscape.

The highlighted area illustrates how much of the landscape that has been damages when building these apartment houses.

PURPOSE AND AIM

The aim of this master's thesis is to explore an alternative building typology and design approach for urban densification by looking at how new residential areas can be implemented in unexploited urban green spaces without removing landscape characteristics and features, such as:

- terrain and topography
- vegetation
- spatial patterns and elements,
- pedestrian mobility and recreation
- visual qualities.

The thesis results in a design proposal of a residential complex at an unexploited natural site in the urban context of Lunden, Gothenburg. The degree of densification in the design proposal was developed during the design process.

Hopefully, this research can contribute to preservation of urban natural environments, green spaces and landscapes in the increasingly denser cities which would be beneficial for human well-being and preservation of natural landscapes.

RESEARCH QUESTIONS

How can landscape characteristics and qualities work as a point of departure in the design process of a densification project in an urban context with the aim of preserving, or even enhancing, cultural ecosystem services?

How can the interface between building and ground be designed to reduce the impact on site and preserve or even enhance pedestrian mobility and experience?

DELIMITATIONS

This thesis will not necessarily generate new knowledge in terms of construction techniques of building foundations. Existing and used construction techniques were investigated and used in the design proposal.

In order to be free and exploratory in the design process of the design proposal, I chose to not follow the Swedish regulations for accessibility concerning closeness to parking etc, but rather have them as a reference and focus on pedestrian mobility and accessibility.

Is about	*Is not about*
"Every day" nature connection	Nature "stay cation"
Residences	Public buildings
Exterior	Interior (floor plans etc.)
Low impact on site	Low environmental design
Relatively dense building complexes	Sparsely built, for example just one villa
Unexploited sites	Exploited sites
Landscape characteristics	Environmental psychology
Cultural ecosystem services	Providing and regulating ecosystem services
Preservation of relatively untouched landscapes	Constructed landscapes

METHOD & PROCESS

This master's thesis is based upon previous work and knowledge of building in unexploited sites and landscape analyzes. From here, exploratory investigations were conducted where case studies and an iterative design process were emphasized.

Following research methods were used:

Research FOR design
Searching for information about:
- constructions with low impact on site
- landscape analysis methods

Research ON design
Case study analysis
- Develop knowledge and inspiration of different design approaches that deal with natural landscapes

Case studies were chosen to represent a wide range of design projects that interact with landscapes. Some of the case studies are examples of how the landscape is completely changed and maybe destroyed by the proposal. Other case studies exemplifies how the landscape has been integrated and gently approached in the design process.

Research BY design

With these investigations as a base, the thesis questions were further explored with an iterative design process of a residential complex in Lunden, Gothenburg. The research by design part consists of two phases. In the first one, volumes studies are conducted with the aim of developing a reference bank of how the site for the design proposal is affected by different building volume approaches. Emphasis lies in the larger scale.

- How will the design proposal affect the surrounding neighborhood and the landscape picture?
- What overall pedestrian movement on site is created by the building volumes?
- What building density do the different building volumes generate?

In the second phase of the research by design part, a design proposal is developed with an iterative design process. The focus is more zoomed in and only one part if the site is developed, see figure 2. Emphasis lies in:

- Pedestrian experience
- Spatiality
- Materiality and construction
- Landscape character on site
- Interface between building and ground

Volume studies

Design proposal

Figure 2

THEORY

The theoretical part of this master's thesis is divided into two sections:

- investigation of different landscape analysis methods
- investigation of constructions of building foundations with minimal impact on the ground.

LANDSCAPE ANALYSIS

"Landscape is about the relationship between people and place. It provides the setting for our day-to-day lives. The term does not mean just special or designated landscapes and it does not only apply to the countryside. Landscape can mean a small patch of urban wasteland as much as a mountain range, and an urban park as much as an expanse of lowland plain. It results from the way that different components of our environment – both natural (the influences of geology, soils, climate, flora and fauna) and cultural (the historical and current impact of land use, settlement, enclosure and other human interventions) – interact together and are perceived by us. People's perceptions turn land into the concept of landscape."
(Landscape Institute et al, 2013)

As can be understood from the text above, landscape analyzes concerns many different dimensions. Accordingly with the aim and research questions of this master's thesis, the landscape analyzes investigated in following chapters will concern the dimensions spatial patterns, elements and features, and human recreation.

Landscape analyzes can be conducted through a wide range of methods. The landscape for this master's thesis design proposal will be analyzed through:
- landscape character assessment (LCA)
- spatial analysis and
- landscape and visual impact assessment (LVIA).
The sense of place, a more intangible matter, will also be emphasized.

These landscape analysis methods are defined and used differently internationally. For exempel, spatial and visual analyzes are a part of the Danish LCA model. (Stahlschmidt et al, 2017, p. 94) LCA, LVIA and spatial analyzes don't have any strict boundaries between each other and are strongly connected but can in some extension be explained separately, which will be done in this theoretical background. It's though important to look at these methods as a whole and use them accordingly.

The landscape analyzes described in following text are to a large extent relying on personal assessment and interpretation which is quite understandable since visual effects, landscape character and spatiality are perceived different from person to person.

But if the analysis process is legible, have logical arguments and motivation of interpretations and a professional observer, they can be considered powerful tools.

Landscape analyzes in this master's thesis will be used for analyzing the existing site for the design proposal and will also be used as a tool in the iterative design process. The stages of landscape analyzing within the design proposal will be conducted at different scales and have various purposes. For each phase in the design process, an assessment of proper analysis methods for the specific case will be made. The following landscape analysis methods will, in other words, not be necessary or useful to use in every stage.

LANDSCAPE CHARACTER ASSESSMENT, LCA

Christine Tudor (Natural England, 2019) writes in her report *An approach to landscape sensitivity assessment: To inform spatial planning and land management* that landscape character assessment can be described as followed:

"The process of identifying and describing variation in the character of the landscape and using this information to assist in managing change in the landscape. It seeks to identify and explain the unique combination of elements and features that make landscapes distinctive. The process results in the production of a Landscape Character Assessment."

The LCA involves a step by step process of describing and characterizing the landscape's attributes, elements, features and patterns and valuing the qualities and functions the landscape provide to people. (Stahlschmidt et al, 2017, p. 18) LCA is a kind of regionalization which involves an analytical classification of landscape into areas with a significant degree of homogeneity in attributes, patterns and overall character. (Stahlschmidt et al, 2017, p. 99) This classification is done by dividing the landscape into smaller areas on, for instance, a map, a section, or a photo with regard to their characteristic (key) elements and visual appearance, based on their particular combination of (Stahlschmidt et al, 2017, p. 103-104):

- terrain form
- water
- vegetation
- pattern of built structures
- special spatial and visual aspects.

Homogeneity isn't the same as a low degree of complexity. A homogeneous area can have a high degree of detailed variations but act together as one distinctive character. (Stahlschmidt et al, 2017, p. 103-104)

When conducting a classification into homogeneous areas, the first step is to choose relevant classification criteria and level of detail which depends on the purpose of the analysis. (Stahlschmidt et al, 2017, p. 104) In the case of this master's thesis spatiality, vegetation and topography could be relevant classification criteria.

SPATIAL ANALYSIS

In the landscape analysis of the site for this master's thesis design proposal, emphasis will lay on spatial analysis which Stahlschmidt et al (2017, p. 79) describe as followed:

"A spatial analysis is a study of the spatial relationships of a landscape. It deals with the relative location and significance of different patterns, elements, and features in the landscape, and how we experience the landscape through our senses and through movement and physical engagement. The question addressed in a spatial analysis is "What is the architecture of the landscape, what is its spatial structure and what is its spatial expression?"

Spatial analysis is in close relation to visual analysis. In a spatial analysis, the visual appearance of the landscape from a viewpoint will describe visual characteristics such as shapes, colors, textures, etc, which are also a part of a spatial analysis. But unlike a visual analysis, the spatial analysis isn't restricted to two dimensions and always includes the 3D space. (Stahlschmidt et al, 2017, p. 79)

In the following text, different kinds of spatial analysis will be investigated. They all have in common that several spatial dimensions are included. Such spatial analyzes are more beneficial on landscapes that have some complexity. If the landscape to be analyzed is very homogeneous or in a very small scale, such as a part of a backyard, extensive spatial analyzes can be unnecessary. A more adequate approach in these situations could just be one photo or a text description. (Stahlschmidt et al, 2017, p. 84-85)

SERIAL VISION ANALYSIS

Serial vision analysis investigates the spatiality of a place by looking at photos or drawings of views along a route. These images can together provide an impression of a sequential experience that can be used for analyzing movements in a city or landscape. The nodes from which the views are taken are not chosen with a determined distance, but rather how they highlight changes and rhythms in the spatiality. (Stahlschmidt et al, 2017, p. 89)

Figure 3. Regionalisation of ground photo

Figure 4. Figure ground analysis

FIGURE GROUND

Figure-ground analysis looks at a plan in several layers. It intends to highlight different elements that contributes to the spatiality. A common element in an urban figure-ground analysis is buildings meanwhile tree trunks, dense vegetation and tree canopies are common in a green space figure-ground analysis. (Stahlschmidt et al, 2017, p. 88-89) In the case of the site for this master's thesis design proposal, terrain and trees could be relevant elements.

LANDSCAPE AND VISUAL IMPACT ASSESSMENT (LVIA)

The purpose of an LVIA is to analyze visual effects of a proposed development. In order to this, a visual and landscape baseline of the existing landscape must be made first. (Landscape et al, 2013, p. 32)

MAPPING VISIBILITY

The first step in the LVIA is to map the zone of visual influence, that is areas from where the proposal may be seen from. This can be done both manually by field work and digitally with i 3D-model. In a digital approach, elevation data is used to calculate inter-visibility between the proposal and its surroundings. It's though important to not only use digital tools since the digital model can differ from the reality. (Landscape et al, 2013, p. 101)

CHOOSING VIEW POINTS

In some parts of the zone of visual influence, there will be few or no people to experience the effects of the proposal. After mapping the zone of visual influence, the next step is to find viewpoints where people will experience the effects of the proposal. This could be people living in the area or people engaged in recreational activities such as strolling or sports. It's important when choosing views to cover locations that may be more associated with the site for the proposal regarding experience and enjoyment of the landscape. The views can be both fixed and sequential along a rout and should cover both near and distant views, but not so distant that the effects of the proposal will be meaningless. (Landscape et al, 2013, p. 110)

BUILDING ON MOUNTAIN

The ground on the site for this master's thesis design proposal is mostly bare rock. In some places it has a thin cover of vegetation and tree roots. There are three foundation principles for building on mountain: slab on ground, crawl space, and stilts. The different methods result in various degrees of damage on the mountain bed. (Petterson, 2013, p. 52)

Building with slab on ground is the most damaging method since a lot of dynamiting is required. A brick crawl space can be constructed directly on the mountain bed without any dynamiting. Depending on the inclination of the ground, the reinforcement of the walls must be embedded in the mountain bed. (Petterson, 2013, p. 54-56)

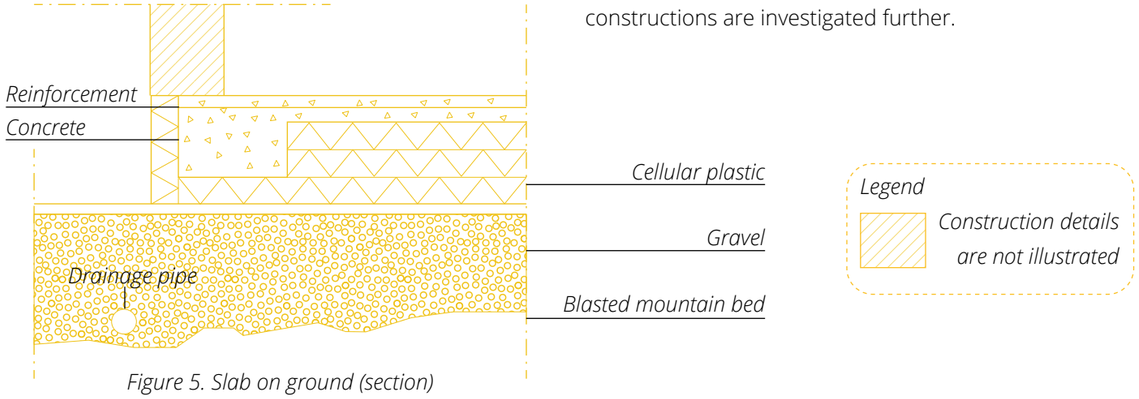


Figure 5. Slab on ground (section)

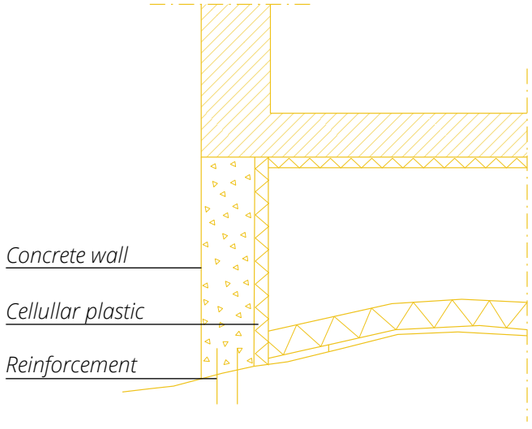


Figure 6. Crawl space (section)

When building on stilts, the floor is raised above the ground on stilts than stands on concrete plinths that are casted directly on the mountain bed. The stilts could be made in wood, steel or concrete. To anchor the plinths into the rock, reinforcement are placed into pre-drilled holes. There must be at least two rebars, but in many cases there has to be three rebars in order to absorb rotational forces. Crawl space and stilts can easily be considered as the gentlest building approaches since they result in the smallest damage on the mountain bed. (Petterson, 2013, p. 58)

The difference between crawl space and stilts is that the last methods result in a space between building foundation and ground that generates both architectural challenges and opportunities. This space could easily be dark and unfriendly, but if treated right, it could be considered an extra space that can contribute to the built environment. In this master's thesis, stilt constructions are investigated further.

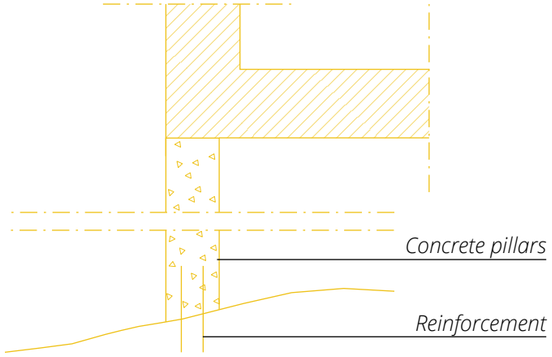


Figure 7. Stilts (section)

STILT CONSTRUCTIONS

In a stilt construction, the floor rests on load carrying beams that in turn is supported by stilts standing on concrete plinths, see figure 8. It's also common that the beams rest directly on concrete plinths. Just as the stilts, the beams ca be made in wood, concrete or steel. (*Öppen plintgrund*, Svenskt Trä, 2003) In this master's thesis, glulam timber will be used since it's the best alternative climate wise and has a warm and organic materiality which steel and concrete don't have.

There are several connection details to be considered when working with stilt constructions in glulam timber, like the pillar foot and the pillar top.

PILLAR TOP

There are mainly two approaches in how the pillar top can be connected with the beam. Either the beam rests lightly on the pillar, or the beam is recessed in the pillar, generating a more brutalist expression (figure 9). In both cases, steel plates or screws are needed to connect the beam and pillar. This steel element could be more or less visible. In the case where the beam rests on the pillar, they can be connected via visible steel plates on the outside, recessed plates where the steel can't almost be seen or universal screws that are screwed in obliquely in the beam and pillar. In the last solution, the steel cannot be seen at all. (Svenskt Trä, 2016, p. 57)

PILLAR FOOT

There are several ways of connecting a wooden pillar with a concrete plinth. With just a moisture protection in between, the pillar can rest directly on the concrete plinth, connected by different kinds of steel plates, see figure 10. The pillar appears rooted in the ground. Another solution is a steel pole shoe that generates a distance from the concrete plinth to the wooden column, see figure 11. It's almost looks like the pillar is hovering over the ground. (Svenskt Trä, 2016, p. 55)

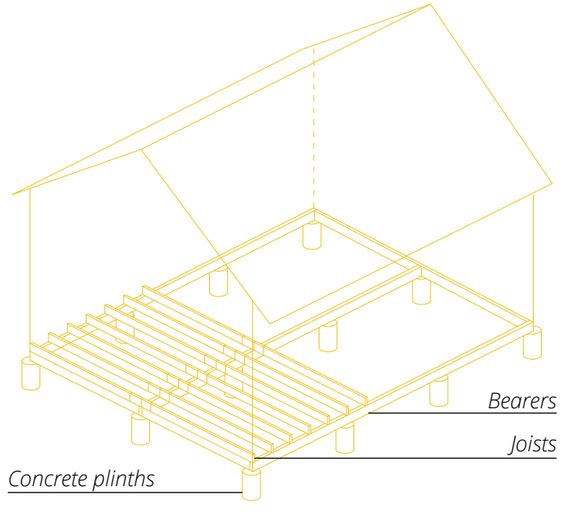


Figure 8. Plinth foundation on bearers

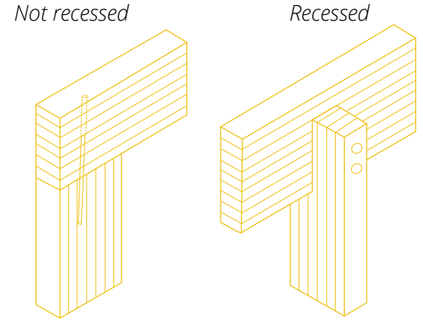


Figure 9. Connection pillar/beam

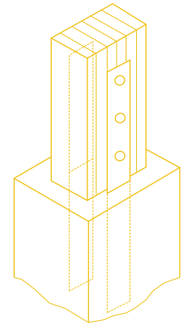


Figure 10. Clamped attachment of pillar foot

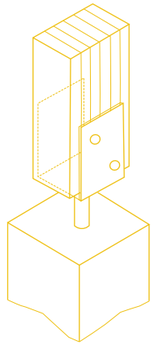


Figure 11. Pole shoe

STABILIZING SYSTEMS

The stilts by themselves aren't stable unless the stilts are very short. They need to be stabilized in order to absorb wind loads both along and perpendicular to the building. The construction must also be able to handle torque. The stilts can be stabilized either via solid wooden lamellas, wooden skews or steel crossbars. It's important to have stabilizing elements in two directions and an extra one to handle the torque. (*Stabiliserande system*, Svenskt Trä, 2003) These different kinds of stabilizing elements generate quite different architectural expressions.

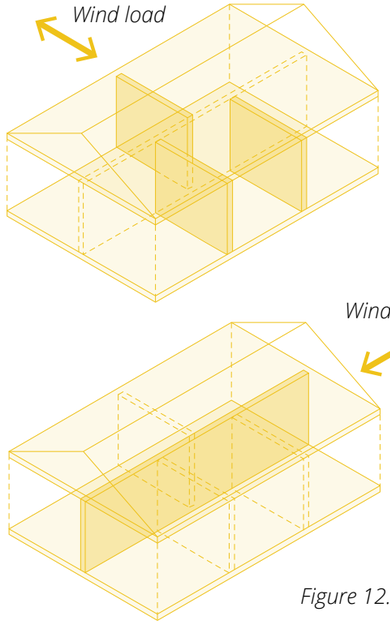


Figure 12. Wind load

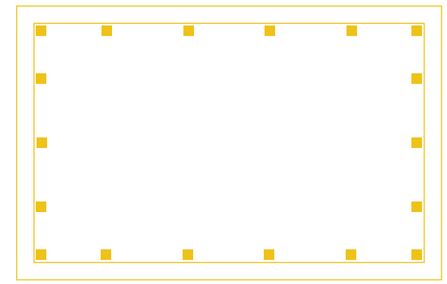
Image 1. Stabalizing skews

Room defining, stabalizing lamells

PILLAR BUILDINGS

The pillars supporting the foundation of the building can stop before the floor or continue in the facade. If the pillars continue in the facade, they can be placed both outside, inside or in the facade which of course generates very different architectural expressions. If the pillars are placed outside the facade, they should preferably be made of a durable timber since they are exposed for weather. (Wood, 2000, p. 78)

Figure 13. Floorplan, pillars inside facade



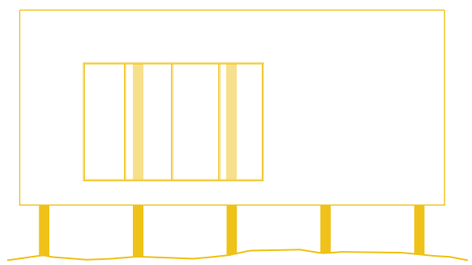
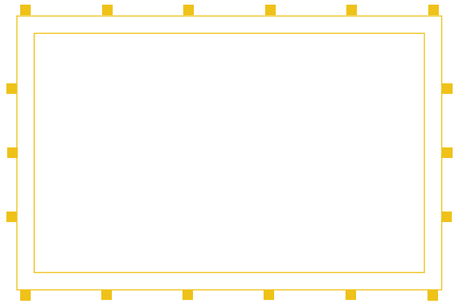


Figure 14. Facade, pillars inside facade

Figure 15. Floorplan, pillars outside facade



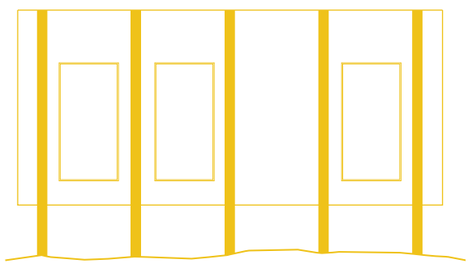


Figure 16. Facade, pillars outside facade

CASE STUDIES

The case studies were chosen to represent a wide range of design projects that interact with natural landscapes. Some of the case studies are examples of how the landscape is completely changed and maybe destroyed by the proposal. Other case studies exemplifies how the landscape has been integrated and gently approached in the design process.

CHINA ACADEMY OF ARTS' FOLK ART MUSEUM

BUILDING FOUNDATION

Terrain - Hilly
Construction type - Concrete slab and pillars

The section shows that it's most likely that a lot of vegetation and soil have been excavated in the construction in order to fit the concrete slabs and the long poles.

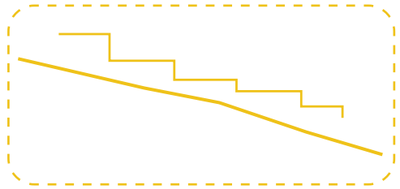


Figure 17. The building is divided into several rigid volumes that follows the slope of the terrain stepwise.

- Building that follows the ups and downs of the hill.
- Planning is based on geometric division in the units of parallelogram to deal with the intricate topography. Each unit has a small individual roof, so the outlook became like a village that evokes a view of extending tiled roofs.

- Fractals
- Landscape features that define building form. The building shape isn't made of one continuous form but are made of different fractals that follows the slope of the landscape.
- Shapes resisting straight angles (shapes deriving from the structure of parallelogram)
- Relatively low and widespread building that isn't experienced as invasive on the landscape due to variation that the fractals generate.
- The building is perceived as having a information richness. Due to the organized ways that the fractals are structured within the logic of parallelograms, the building has a complexity without being chaotic.

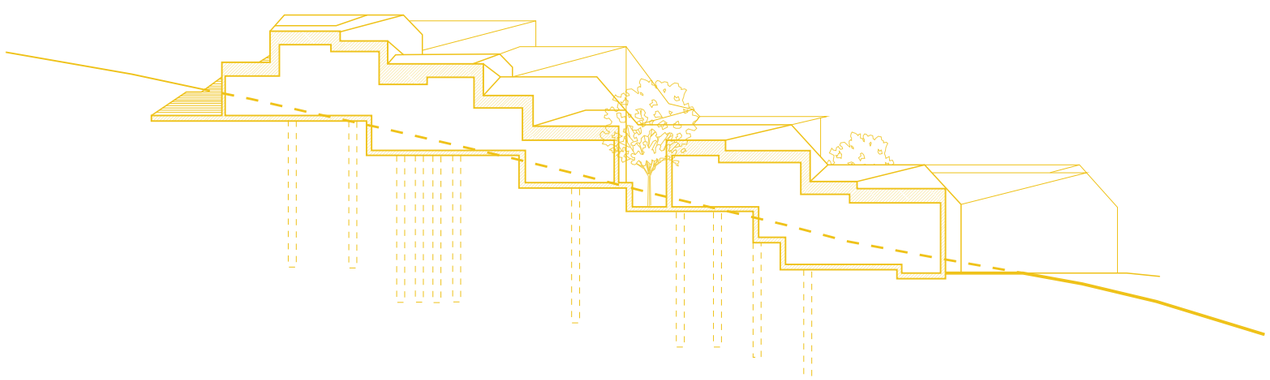


Image 2. Section

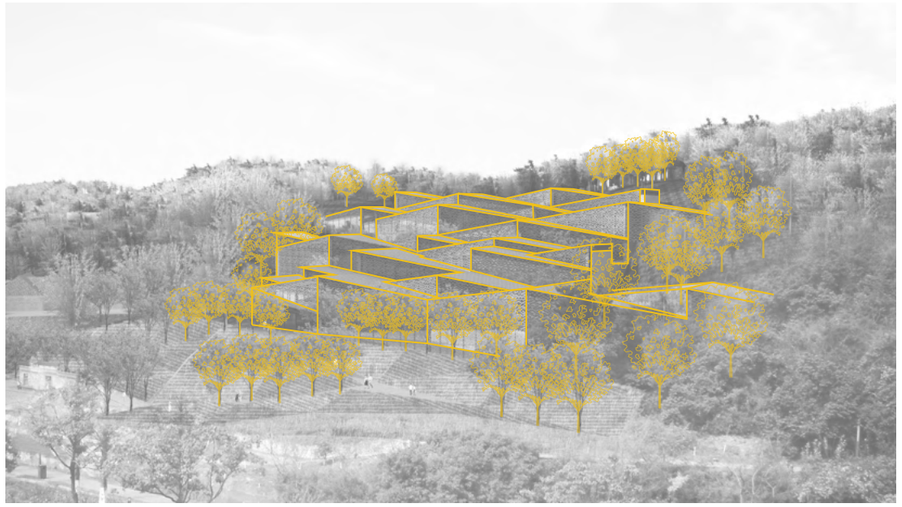
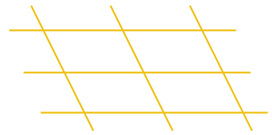


Image 3

The structure follows the terrain by the logic of parallelograms.



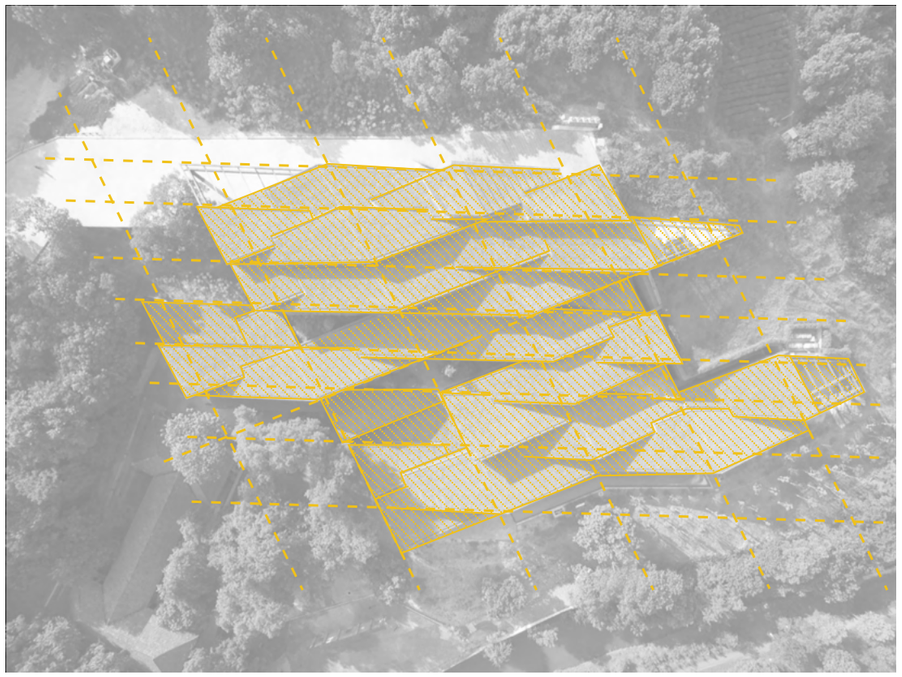


Image 4

MUSEUM QUARTER ON THE VIRGL MOUNTAIN

BUILDING FOUNDATION

Terrain - Mountainous
Construction type - Probably concrete slabs

- The building blends into the surrounding topography and extends the mountain terrain.
- Public building
- Large scale structure mainly consisting of three prominent building volumes.
- The height of the structure is perceived as relatively low due to the elongated shape.

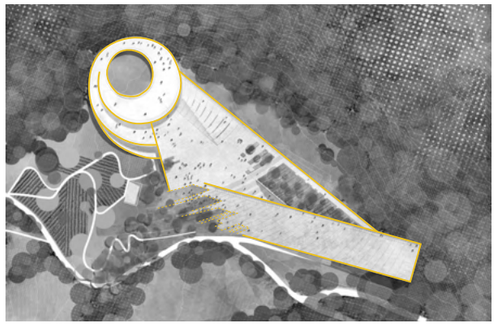


Image 5

The slope of the mountain inspires the design of the museum. The rounded mountain ridge in the left part of the diagram is strengthened by an organically shaped building volume. To the right, the terrain is sloping in a relatively straight curve which is amplified by a more rigid building form. The contrast between the two prominent building volumes defines the variations in the landscape.

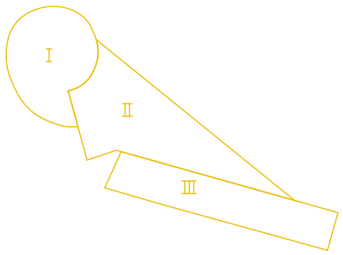


Figure 18. Three defined building volumes
Plan

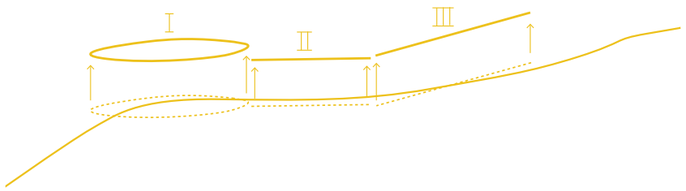


Figure 19. Building volumes follow terrain
Section

The third building volume follows the height of the tree tops, creating a harmonious expression where the building doesn't compete with the vegetation.

Image 6

It's not only the surrounding landscape that influences the design. The rounded building volume contributes to the horizon of the mountain landscape.

Figure 20.

Image 7

The outdoor area inclines down towards the surrounding ground, creating a smooth transition.

The building blends into the surrounding ground. Concrete meets grass, seemingly without any friction

JUVET LANDSCAPE HOTEL

BUILDING FOUNDATION

Terrain - Bedrock covered in vegetation
Construction type - Steel rods

This case study could be considered the most straightforward way of designing structures with minimal intervention on landscape. The hotel is split into several separate hotel rooms distributed throughout the terrain as small individual houses.

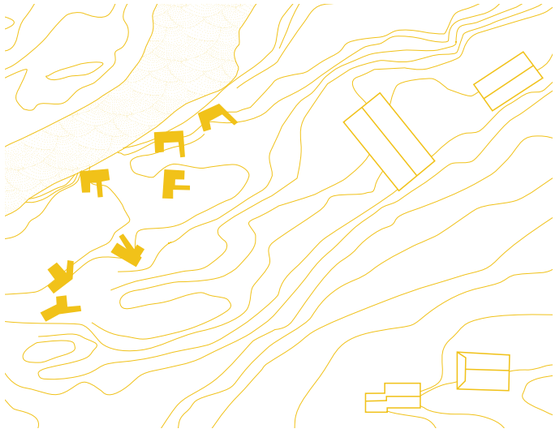


Image 8. Site plan

Image 9

All rooms have slightly differing designs as a result of local topographies and vegetation. Due to their non compact forms and small scale, the shape factor is quite bad which results in high energy demands for heating.

All hotel rooms have views over the nature with little or no sight of the other rooms. The buildings blend into the nature, making them almost invisible.

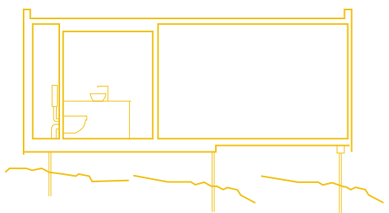


Image 10. Section

The buildings stand on thin steel rods, giving the impression that they are hovering over the vegetation. The spaces generated in the interface between building and ground don't appear dark, desolated and unused. Maybe because they are far below eye-height and quite small due to the small width of the volumes.

The small volumes fit carefully into the terrain among small rocks and trees rather then amplifying characteristic terrain forms.

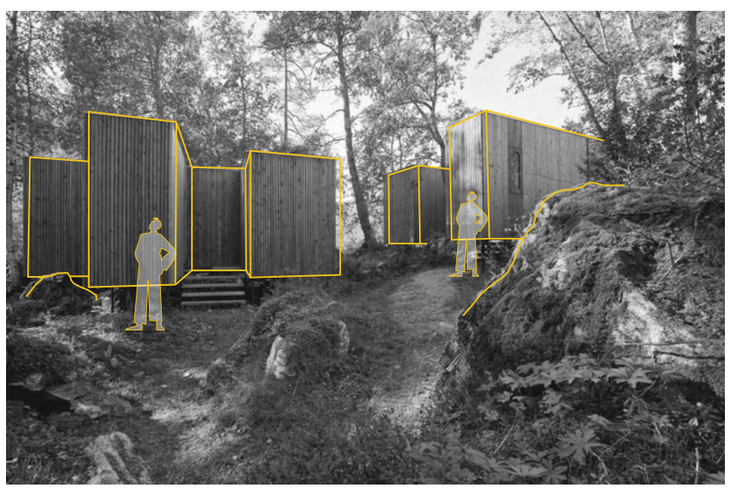


Image 11

HALSSMYCKET

Image 12

The housing project Halssmycket is situated on a site with much nature character. In order to reduce the impact on the biotope, the buildings are placed on pillars. Spaces generated in the interface between ground and building foundation are perceived as shady and unwelcoming and it's unclear how these spaces are to be used. Are you supposed to walk there or not?

The highlighted space in image 13 isn't high enough for people to walk there but still so high that the dark space is rather visible.

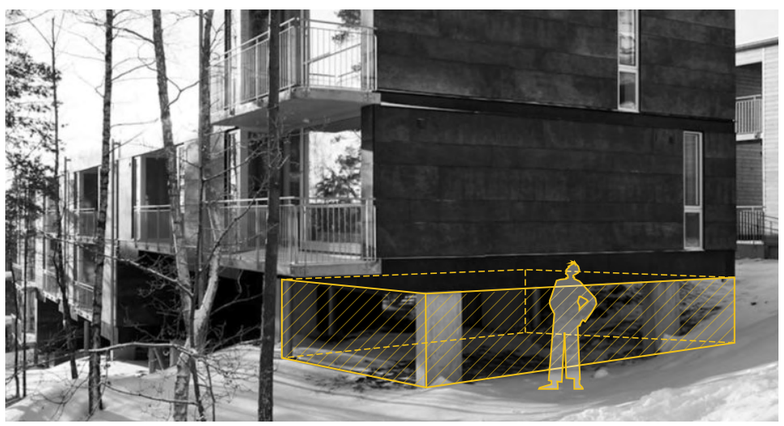


Image 13

THE SITE

CHOOSING SITE

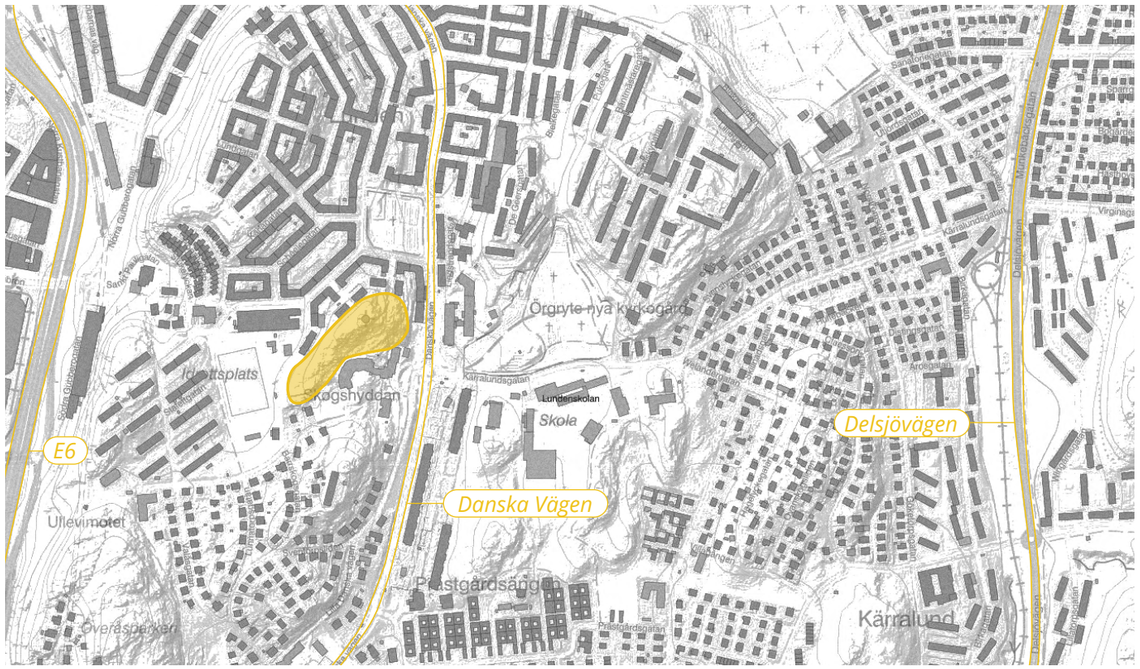
The site for the design proposal was chosen upon several criteria:

- Urban context in Gothenburg
- A too a large extent unexploited natural area
- Low recreational and pedestrian use

Green spaces that already have a good recreational use shouldn't be exploited, but green spaces with tough terrain could be made accessible by a built structure.

The site for the design proposal didn't require an extraordinary nature and character. The "every-day nature" and how such areas can be developed in urban contexts were in focus. Places without extraordinary and magnificent features still have qualities and values from being a place of greenery in an urban context.

Lunden is a larger area in eastern Gothenburg with multiple areas that meet these demands. After investigation of several areas, a green space at the site of the water tower was chosen.



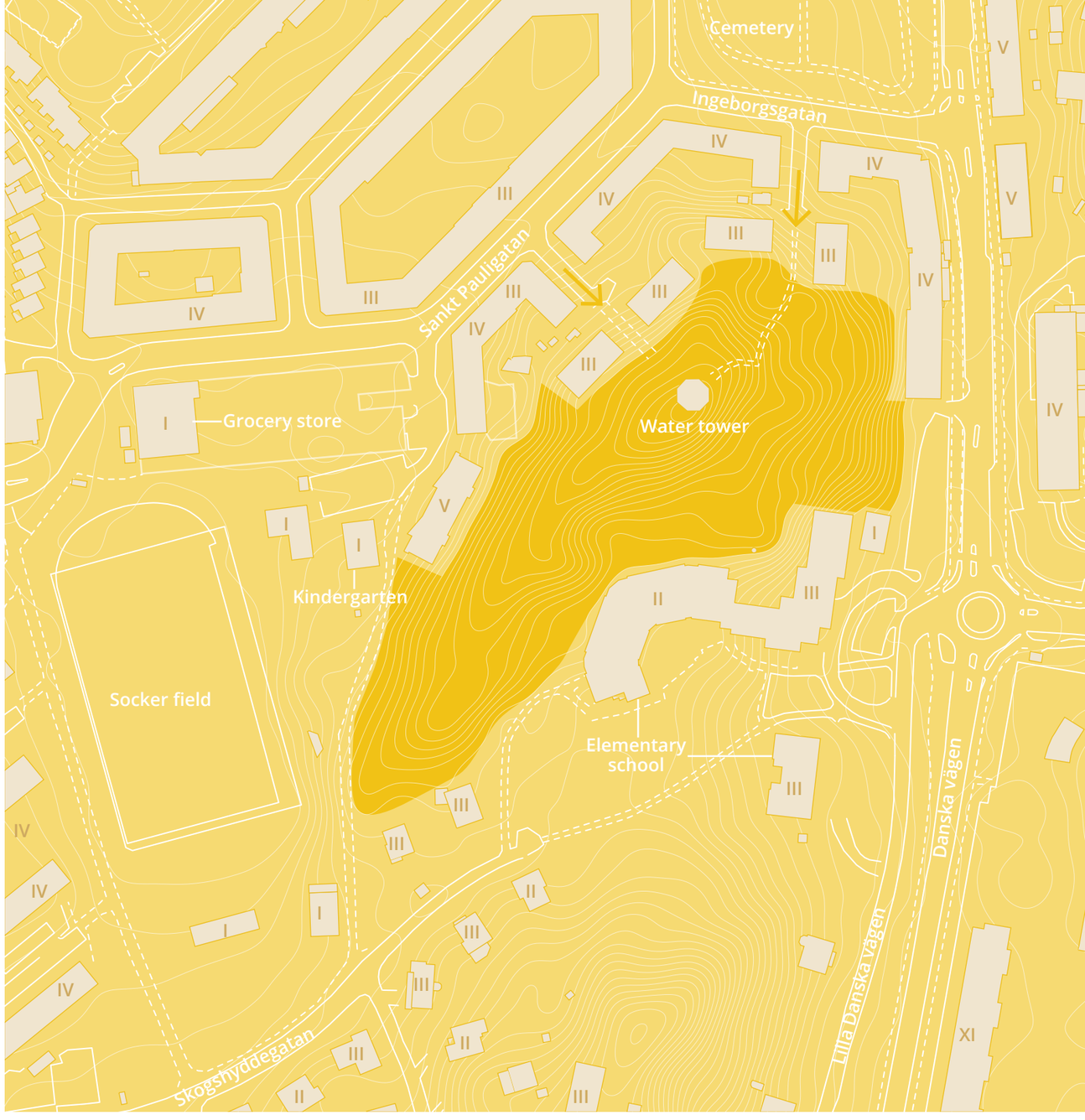
THE SITE

The site is rocky and have a terrain with large height differences. Some places on the site have long views over Gothenburg. Due to the tough terrain and poor pedestrian mobility, the area isn't used for recreation in form of recreation paths etc. The only paths on the site are the two stairs that leads up to the water tower. Maybe the pedestrian mobility and the attractiveness of the area can be improved by a built structure and thereby encourage physical activity and time spent in nature.

Photos of the site





SURROUNDING NEIGHBORHOOD

The building typology in the nearby area is variating. Lamella houses are situated in west, next to the soccer field. In the south west, modernist villas are spread out. Along the east side of Danska vägen, which is relatively trafficked, there are high million program buildings with facades in Danish sea stone. A mix of landshövdingehus and mid-20th century brick buildings are organized like a "kvartersstad" north of the site.

LEGEND

x Storey building

Walking paths

Roads

Existing entrances to the site

LANDSCAPE SECTIONS

Landscape character analysis and mapping of the site

Section A-A
Scale 1:500

Characteristic mountain ridge

Existing walking path

Wide and mountainous hillside towards Danska Vägen

Section B-B
Scale 1:500

Tree-rich hillside sloping
towards the football field

The mountain ridge has a clear curvature

- Few trees
- Bare rock

Existing walking path

School yard

Football field

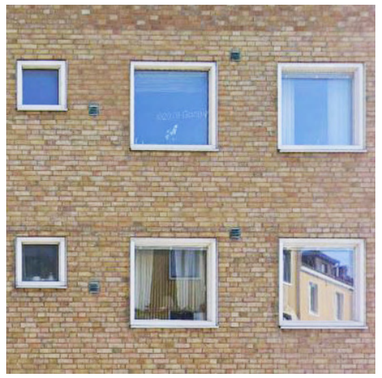
Lilla Danska Vägen

Danska Vägen

MATERIAL

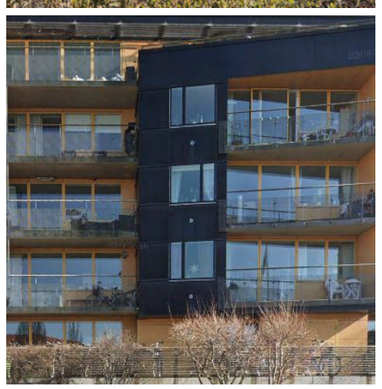
The photos below show a material palette of buildings in the nearby neighborhood. Consistent themes are:

- Square windows
- Robust rectangular building volumes
- Facade materials in brick and plaster







LCA

A landscape character assessment of the site is done through a regionalization (see page 12-13 in the theoretical background) of a 2D map with focus on terrain form and vegetation. By the map you can tell that there are lots of areas with steep terrain on the site.

The only flat areas are on the mountain ridge and in an area east of the ridge. Most parts of the site is covered by trees excluding the mountain ridge that is more bare and open.

LEGEND

Steep terrain

Relatively flat terrain

More tree dense areas

VIEW BASELINE

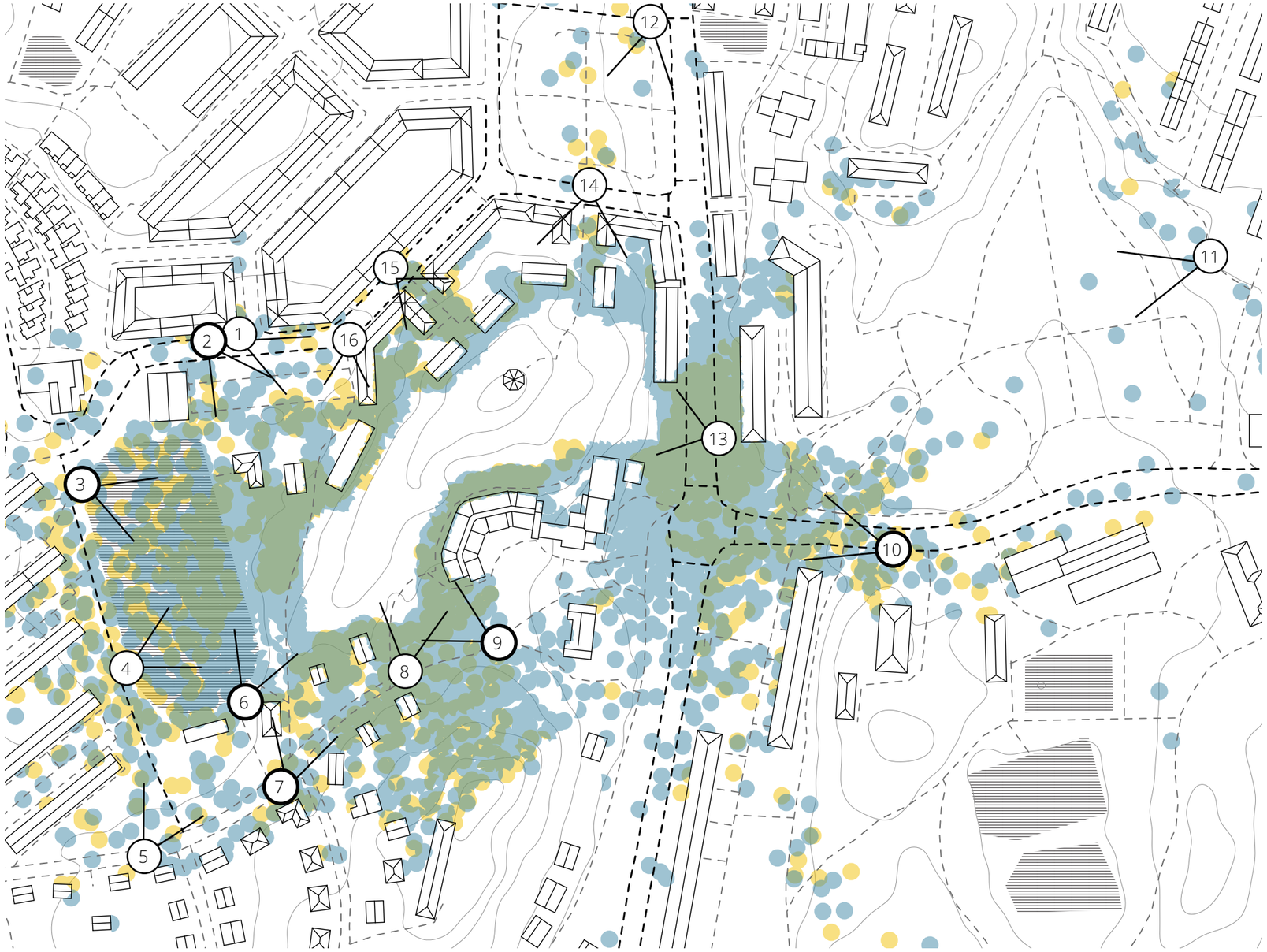
VISIBILITY ANALYSIS

The purpose of the visibility analysis is to find viewpoints outside the site for the design proposal with characterizing views over the site, see p. 14 in the theoretical background. The selected views together with characterizing landscape sections will be used to analyze the volume studies in a human scale. The visibility analysis is made in two steps, digital and manual visibility analysis.

DIGITAL VISIBILITY ANALYSIS

The digital visibility analysis is made in Grasshopper with a script that through rays maps areas in the surrounding where the site is theoretically visible from. More elaborated digital visibility analyzes can be found in appendix A.

- Nodes with views over the site topography
- Nodes with views over treetops on the site
- Nodes with views over treetops and topography of the site
- Walking paths with high flows of people
- Walking paths with smaller flows of people
- Areas used for sports and leisure
- XX Nodes for manual visibility analysis
- XX Final viewpoints from the manual visibility analysis from which the volumes studies are investigated through.



MANUAL VISIBILITY ANALYSIS

The digital visibility analysis maps where the site is theoretically seen from. In the manual visibility analysis, viewpoints with views of the site were investigated with field studies in order to examine the visibility of the site under “real” conditions such as trees etc. The field studies also generated another dimension of the characters of the views that can’t be achieved in a digital visibility analysis.

15 nodes were further investigated with field studies (photos) and they were chosen with the following criteria:

- Views towards the site, preferably views of both topography and treetops.
- High flows of people.
- Different distances to the site.
- In different environments (trafficked city street, calm recreation path, etc)

The photos from the viewpoints 1 to 15 are illustrated in appendix B. In some photos, the site wasn’t visible at all due to trees, like photo 11. In other cases, the site was only glimpsed between buildings and that visible part didn’t have any meaningful connection with the landscape for the design proposal.

From the collection of the 15 photos, 6 viewpoints with associated views were selected according to criteria described in page 15. These 6 final views are illustrated in the following spread.

WORKING FLOW

Digital visibility analysis

Theoretical visibility of the site

Manual visibility analysis

Field studies - photos from points chosen in the digital visibility analysis

Views for analyzing volume studies

Final viewpoints

LCA OF PHOTOS

A landscape character assessment of the selected views from the visibility analysis is done through regionalizations of the ground photos, see page 12-13 in the theoretical background.

Verticality, vegetation, spatial patterns and built structures are important parameters in this analysis.

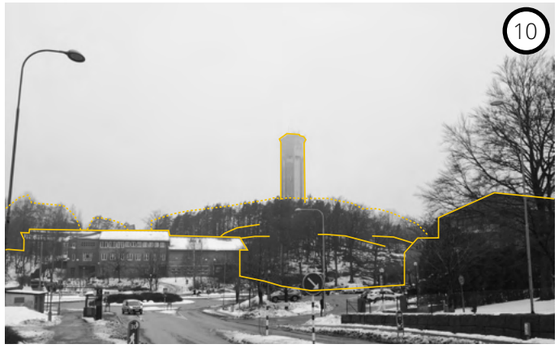
Distance view of the south parts of the site.

View of the soccer field. Both the mountain ridge, trees and surrounding buildings contributes to the landscape picture.

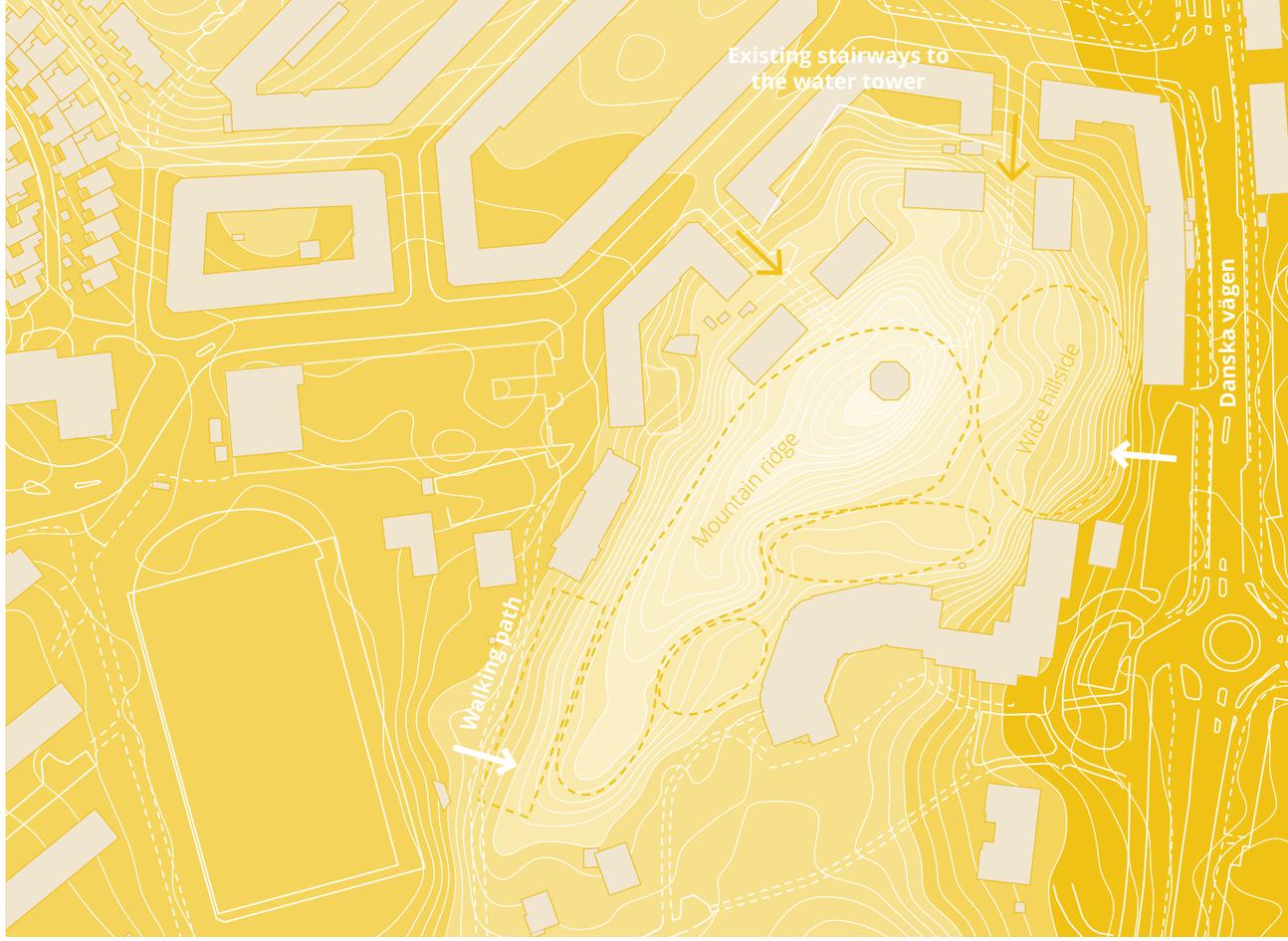
View from the sports track around the soccer field. The verticality of the trees is strong.

View of the entrance to the path that goes past the western parts of the site.

View from the schoolyard looking over the "foot" of the mountain ridge. The landscape is framed by surrounding buildings.



Long distance view over the eastern parts of the site. The tree rich hillside starting from the water tower and ending by Danska Vägen is prominent.



MOVEMENT ON THE SITE

The Swedish regulations for accessibility regarding proximity to parking and disabled parking will not be followed in this master's thesis since the landscape would take too much damage of such heavy infrastructure as car roads. Instead, focus lies in having an accessible pedestrian flow on the site where all people can move, even if they sit in a wheelchair. This means that the main path on the site will consist of footbridges and not stairs. The footbridges should preferably don't have an inclination above 8,3 % in order to be accessible for people with reduced mobility. (Boverket, 2019)

The only walking paths today on the site are the stairways leading to the water tower. In order to make the site a part of the urban fabric, it should be two available entrances to the area places so as much as possible of the landscape will be experienced when passing through. The walking path west of the site and Danska Vägen east of the site are natural entrances. The east hillside, towards Danska Vägen, is quite steep but accessibility could be solved with a long ramp or an outdoor elevator that could be incorporated in the design of the built environment.

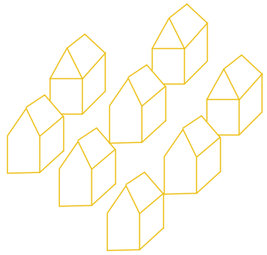
As already mentioned, the site has large height differences which has to be considered when designing for pedestrian mobility. The site could roughly be divided into the quite homogeneous inclining and wide hillside on the east part and the mountain ridge on west side. If buildings are placed on both these areas, it's important investigate how there areas are connected.

LEGEND

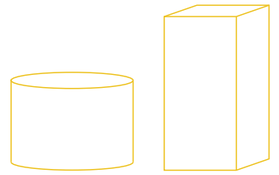
- Existing entrances to the site
- Proposed new entrances
- Areas on different height on the site

VOLUME STUDIES

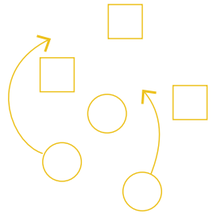
The purpose of the volume studies was to investigate a range of design approaches that deals with the landscape and its character in different ways. Case studies and landscape analyzes have acted as a starting point in this design process. The volume studies variate in scale, building density, design language, movement on the site, etc. Some of the volume studies are iterations of a previous one, developing features that appeared interesting.



Building density
& placement



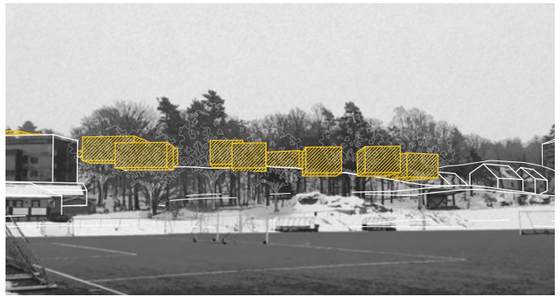
Building shape and height

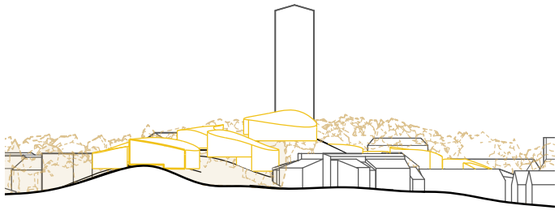


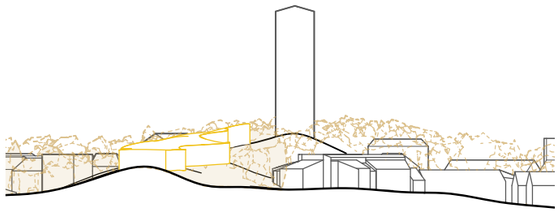
Movement on site

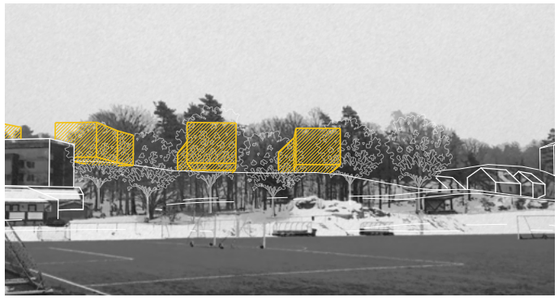
VOLUME STUDIES

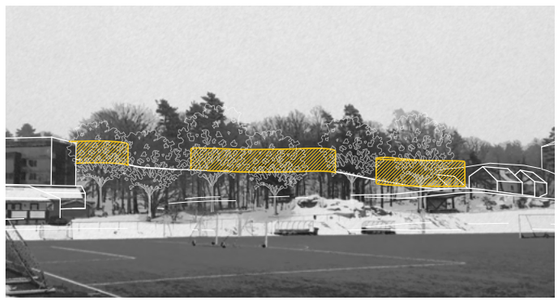
Several volume studies were made with the aim of generating design strategies concerning the larger scale of the design proposal and its effects on the landscape picture. Some illustrations from the volume studies are showcased below. All the volume studies with associated illustrations and analyzes can be found in Appendix E.

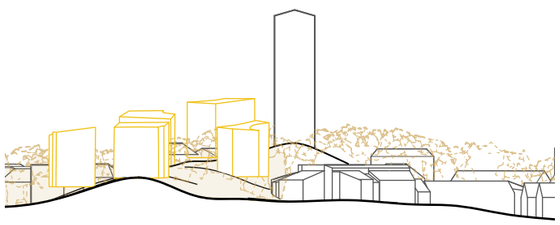








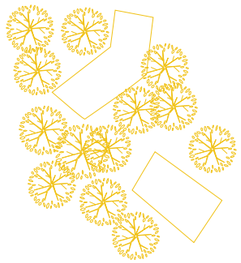




DESIGN STRATEGIES FROM VOLUME STUDIES

Verticality

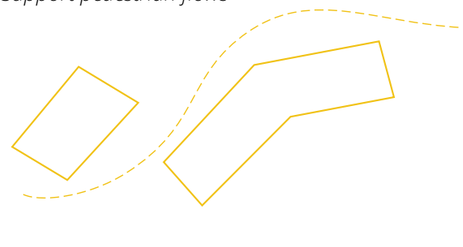
Amplify the verticality of the trees and the rhythm of the mountain ridge by placing building volumes transverse to the mountain ridge.



Preserve vegetation

Place buildings and paths to a reasonable extent as far as possible in areas with less vegetation in order to preserve vegetation.

Support pedestrian flows



Contrasts

Highlight the contrasts in the landscape with building volumes.

Pedestrian movement along the mountain ridge

Few and compact building volumes

Amplify landscape characteristics and pedestrian movement with few and compact building volumes.

Amplify landscape shapes

THE DESIGN PROPOSAL

DESIGN NARRATIVE

What if cities can be densified and at the same time keep green spaces that have major significance for the biological diversity and human well-being? The purpose of this design proposal is to investigate a new building typology that preserves million years old mountain, thriving vegetation and human recreation. What architectural opportunities and challenges are faced when the landscape is considered as the main design influence and stakeholder and is not blasted away?

In this design proposal, residential buildings are the focus. How can the landscape on the site be made available, inviting and enjoyable for both people visiting the landscape in recreational purposes and the residents living there?

ZOOMING IN

When investigating different volumes on the site, it appeared like different design approaches suited the eastern part of the site with the large slope leaning towards Danska Vägen and the mountain ridge in the western part of the site. In the design proposal, the mountain ridge is explored and developed for a proposal of residential buildings. Even though the east part of the site isn't developed with residences, the overall pedestrian mobility and flows on the site has been taken into consideration, making the landscape contribute with a recreational and accessible natural green space in the urban fabric.

Volume studies

Design proposal

SPATIAL ANALYSIS

The site for the design proposal was analyzed with maps and site visits. Both serial vision analysis and figure ground analysis were made, see Appendix C and D. The result of the spatial analyzes is visible in the map above. Different spaces, A to N, that emerged in the spatial analysis are described in the page to the right.

LEGEND

- Areas with trees
- Highlighted levels in the topography
- Distinctive rock faces
- Enclosed spatiality (rocks, buildings, etc.)
- Semi-enclosed spatiality (trees)
- Open spatiality (long views)
- Important long views

A

Characterizing rock face.
Bare rocks mixed with grass.
Scattered trees.
Views towards west and east.
The rock face together with the trees create a feeling of enclosement.

B

Footpath with a clear spatiality due to surrounding trees and hillside. It has a feeling of enclosement in the middle part and open ups in the ends. The footpath entrance in north is frame by buildings on both sides.

C

Coherent hillside.
Bare rocks mixed with grass.
Trees.
Views towards the “entrances” of the site.
Surrounding trees and the mountain ridge to the east create an enclose spatiality.

D

An elongated space with a clear direction along the mountain ridge. Some trees can be found in the south part of the area. A mountain height to the east encloses the space on one side. There are no visible rocks, only grass.

E

Elevated space
Long views to east
Shorter views to west due to trees
Few trees
Openness

F

The space is experienced as a small valley. It’s like a transitional space that guides the pedestrian from space D to H.

G

This space is similar to D, but with more visible rocks and a more open spatiality.

H

A larger area enclosed by the school to the east and the mountain ridge to the left and opens up towards the schoolyard in south east. Trees are scattered over the space and visible rocks are mixed with grass patches. A high rock face characterizes the space. The area is situated on a lower level and have no connection with the west part of the site.

I

A smooth hillside without any trees that leans down towards a residential building in west. It is experienced as almost disconnected from the rest of the site.

J

When entering this space, it’s almost like walking into another place.
It has a feeling of a lagoon with surrounding trees in south, west and north. The space opens up towards east and offers long views of distant houses and forests. The middle part of this space is lower than the rest, making water gather here on rainy days. When it’s cold outside, ice make this water collection look like a little lake.

K

A round space surrounded by higher rocks and the school to the east. Trees are scattered of the place. Since the terrain is relatively low here, the space has a feeling of enclosement and no longer views.

L

An elevated plateau with long views over Gothenburg to the east. Distinctive visible rocks characterizes this space. Treetops on the eastern slope of the mountain ridge encloses the space.

M

A homogeneous grass surface with no trees and long views over Gothenburg. It’s situated close to surrounding houses and has less nature character than the rest of the site.

N

The highest part of the site with long views over Gothenburg. Bare rocks and the absence of trees characterize the terrain. From here the distinct and long rocky mountain ridge is visible.

THE DESIGN PROPOSAL

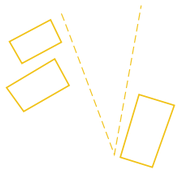
All the buildings in the design proposal have a visible wooden construction that generates a light expression even though the building volumes are quite compact. Since there are few and compact volumes instead of many small ones, larger tree rich nature areas are left available between the buildings than can be enjoyed both by residents in the area and pedestrians visiting.

The site is accessible for pedestrians via ramps that generates a nature experience along the mountain ridge. The building volumes are placed transverse to the mountain ridge in the south part of the site, strengthening the verticality and the rhythm of the mountain ridge. Since gables instead of long facades meet the promenade along the ridge, nature is constantly present, mixed with the build structure.

SITE PLAN

Scale 1:1000

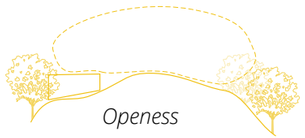
Several design strategies were developed from the spatial analysis in page 45.



Keep important views

Public spaces of different character

Enclosement



Openess

Enhance the existing landscape spatiality with the design proposal

LEGEND

- Mountain ridge curvature
- Public spaces
- Long views
- Openess

PUBLIC SPACES

1	Sequential rooms
2	Entrance area
3	The pillar forest
4	The nature classroom
5	The Lagoon

VOLUMES AND FACADES STRENGTHENING
LANDSCAPE CHARACTERISTICS

This view from the soccer field overlooks the west part of the design proposal. The entrance area opens up, welcoming people to take the promenade along the mountain ridge. The height of the buildings aligns with the treetops, making the built structure harmonize with the nature instead of competing with it.

ENTERING THE SITE

Pedestrian path along the mountain ridge

The Pillar Forest

Section, scale 1:200

LETTING IN THE SUN

The building volumes follows the shape of the hillside. The buildings are highest in east and lowest in west, letting in sun from west into the site.

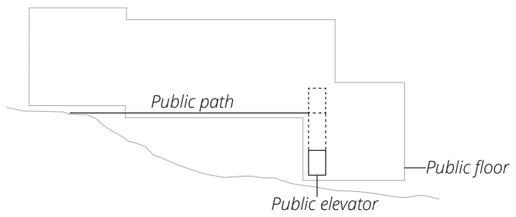
THE PILLAR FOREST

The public space called The Pillar Forest has a wooden staging that gives the opportunity to have small performances or Christmas markets under roof.

ACCESSIBILITY

The largest height difference to deal with in the pedestrian accessibility is the one between the mountain ridge and the path going through The Pillar Forest. In order to avoid a large and invasive ramp on the hillside in the entrance area, accessibility is managed via the building that bridges over The Pillar Forest.

There is a public floor next to The Pillar Forest that can be used for workshops or similar. A public elevator bridges the height difference between The Pillar Forest and the mountain ridge in this space. From the elevator, a public path along the facade enters the mountain ridge.



THE PILLAR FOREST

There is a small horizontal distance between the glulam pillars and the wooden deck, generating the expression that the pillars are rooted in the ground, just as trees. It also creates a distance from the water runoff from the wooden deck and the glulam pillars.

REFERENCE PROJECTS

Spaces generated in the interface between building and ground in stilt constructions are usually neglected in design projects. They often become dark and unusable. In this master's thesis, I have explored if they can turn from being a disadvantage into generating an additional usable space in the built environment. I have looked at following reference projects when exploring these spaces further.

Image 14. Using wooden boards to lightly define room boundaries. Even though the space is outdoors, it offers a clear space to sit and some weather protection. The layout of the wooden boards generates varied views och openness.

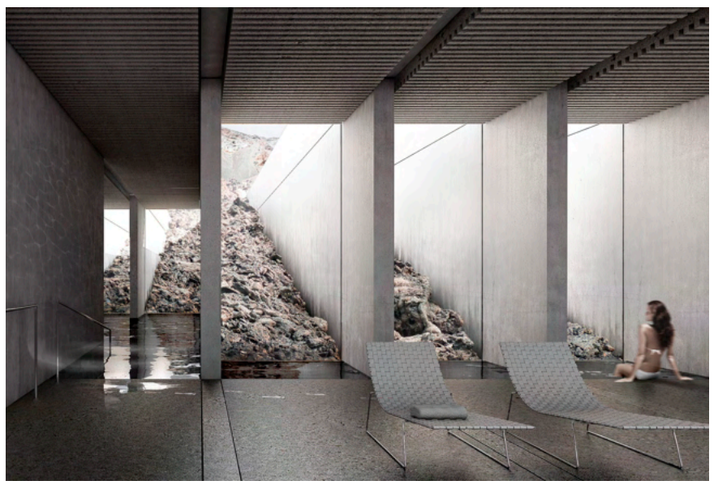


Image 15 . The sun lights up the concrete lamellas that are places in the interface between inside and outside. The concrete elements meet the gravel on the ground, generating interesting contrasts.

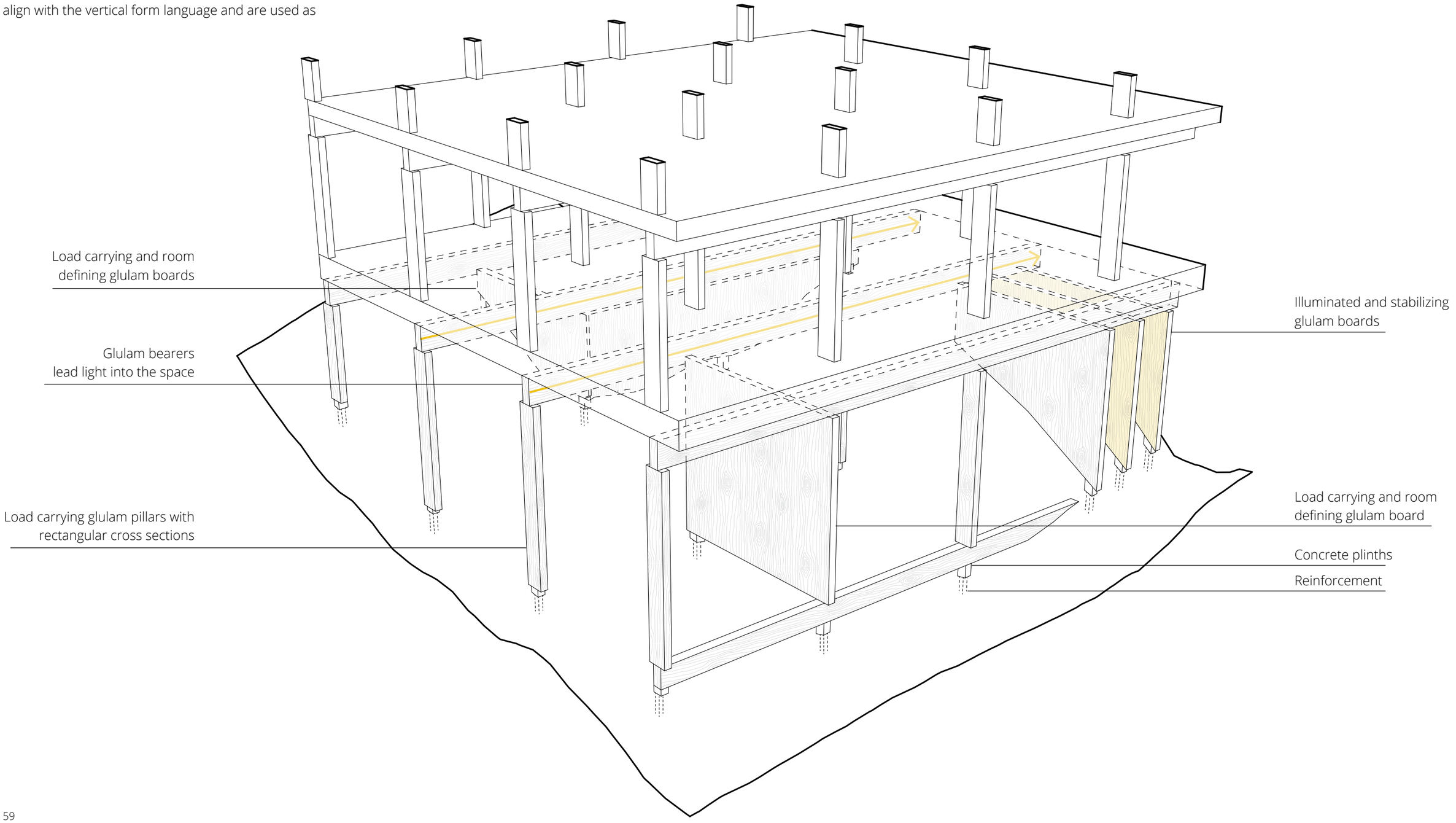
Image 16. The riverbed is part of the exhibition and the architectural expression in the museum.

Image 17. Bus station in Umeå, designed by Wingårdhs. The illuminated over-dimensioned glulam elements lights up the otherwise dark and cold environment.

WOODEN CONSTRUCTION

The master's thesis design proposal has a visible construction, showcasing the glulam elements. A stilt construction needs to have a diagonal support to take up wind forces from the sides. In the design proposal, glulam wooden boards are used instead of diagonal wooden skews or steel crossbars. The glulam boards align with the vertical form language and are used as room defining elements in the spaces generated in the interface between building and ground.

The cross sections of the glulam bearers and pillars are perpendicular to each other, generating a light feeling in the construction that continues in the entire facade.



SEQUENTIAL ROOMS

This view overlooks the public space called “Sequential Rooms”, situated in the interface between building and ground. To the right, close standing wooden boards light up the otherwise dark space. To the left, the spatiality opens, offering seating places in two different semi-open rooms. The three different spaces are experienced as sequential rooms with different character as walking by. The horizontal beams together with the vertical pillars create a square form language that harmonizes with the existing buildings in the surroundings.

WOOD MEETS ROCK

This drawing illustrates a horizontal section through the Sequential Rooms. To make the otherwise quite deep spatiality under the building lighter and more welcoming, wooden boards are placed as room defining elements together with the rocky terrain. The space to the north is elongated and its spatiality connects to the stair that leads up to the mountain ridge.

WOODEN LANDSCAPE

This view overlooks the public space called "The Nature Classroom". The pedestrian movement on the site is integrated in the wooden space, making it more public and welcoming. Similar to the Sequential rooms, illuminated wooden boards are used to make a contrast to the dark rocks. This space could be used as a nature classroom, both for children in the school next to this space, but also by the public.

THE NATURE CLASSROOM

The gap between the rock wall and the building makes the rock wall in The Nature Classroom light up by the sun in the afternoon. The space under the west part of the building isn't high enough for a human to stand there, but high enough to feel dark and unpleasant if it isn't dealt with. Illuminated wooden boards are placed to make this space more shallow and lighter.

FRAMING THE ROCK WALL

The rock wall is illuminated by the sun in the afternoon and the wooden construction frames the rock, making it look like a painting. The stabilizing wooden boards rest lightly on concrete plinths.

The light feeling in the wooden construction continues in the floors above. Glazed sections in the top of every floor let the viewer experience how the glulam bearers continue through the entire building.

THE LAGOON

Section

PUBLIC SPACE IN NATURE

This space is a more nature characterized public space than the entrance area. The enclosed spatiality from west is strengthened by a building volume that integrates the pedestrian path in the structure. The first floor is public and can be used for workshops or home offices for residents. The curvature of the mountain ridge is amplified with the round building volume east of the ridge.

CONCLUSIONS & REFLECTIONS

This master's thesis focused mainly on investigating two different subjects. How can nature characteristics and qualities be preserved in an urban densification project of an unexploited natural site? And, How can the interface between building and ground be designed to reduce the impact on site and preserve or even enhance pedestrian mobility and experience? In this chapter i discuss what observations and findings I made and how this field of research could be taken further in the future.

I investigated if the characteristics and qualities of a natural site could work as a point of departure in the design process. I believe that the thorough landscape analyzes helped me a lot in the design process. They gave me a deeper understanding of the site and graphical tools to describe the spatiality and characteristics. It was useful to combine landscape analyzes that I made through cartography and by visiting the site. Together they created a larger picture that was hard to grasp with only one landscape analysis approach.

Without the case studies, the thorough landscape analyzes and the volume studies, the design proposal would probably had turned out quite differently. When I first approached the subject of this master's thesis is seemed like the most straight forward way was to investigate how the buildings could blend into the landscape. This design approach can work well in small projects, but when it comes to larger complexes it's quite contradictory. A densification project will inevitably be rather visible. Instead, I wanted to investigate how landscape characteristics and spatiality could be enhanced by the built structure, to explore if the nature and the built environment together could create a landscape that amplifies qualities and characteristics of the unexploited, natural site.

The landscape analyzes and other investigations I made were of course the result of me and my experiences. If another person would have done these investigations, the result would probably have been different. I think it's important for architects to use adequate landscape analyzes to guide the design process in urban densification projects in order to develop a more sustainable housing stock. I believe that this master's thesis indicates that nature characteristics and pedestrian experience can be preserved.

Regarding the second object of this master's thesis I chose to work with stilt constructions since they make the least impact on the landscape compared to other foundation constructions. The different spaces generated in the interface between building and ground in the design proposal had different prerequisites. Some of the spaces had larger dimensions and could be used for seating places or as a nature classroom. Other spaces weren't that large but still needed to be considered in the design in order to not appear dark and threatening.

I believe that using wood as a construction material was a good choice in order to make a warm contrast against the rough bare rocks in the spaces between building and ground. It was important to look at the configuration of the wooden construction and its connection details, such as how the pillars meet the ground and the glulam bearers, when exploring different architectural expressions. By having the rectangular cross sections of the glulam pillar and bearers orthogonal towards each other, the expression got lighter and made the spaces more welcoming. Another important factor was to look at daylight and how the structure could be designed to bring in daylight into the otherwise dark spaces.

In most design projects, it seems like the design is made top to bottom. A lot of work is put in the facades meanwhile the foundation is just there, mostly as a concrete slab on ground. I investigated if the facades could be designed the other way around. How could the architectural expression in the spaces generated in the interface between building and ground could continue in the facades above?

In the design proposal, all the spaces generated in the interface between building and ground were public and integrated in the pedestrian path on the site. There were no courtyards for the residents since the intention was to open up the landscape for both residents and visitors. If I would have had more time, I would have liked to investigate this further. How would it work to have all these spaces public? And what kind of events and social activities could these spaces be used for?

I decided early in the master's thesis process that I wanted to investigate how the design proposal could be developed without having any car roads. I focused on the pedestrian mobility and accessibility. Maybe it wont be necessary to have car roads every where with future technology and solutions? Maybe the accessibility of fire brigades, waste management, etc, could be solved in another way that doesn't exploit the landscape as much? Maybe some inspiration could be taken from the islands in the archipelago of Gothenburg where cars mostly aren't allowed.

This master's thesis could be considered as one small step in exploring how urban densification could be made with a more sustainable building typology. I believe the subjects is important and relevant for architects to explore further.

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Image 2
Kengo Kuma Architects (2016, February 18). *China Academy of Arts' Folk Art Museum* [Drawing]. Retrieved May 24, 2021, from https://www.archdaily.com/782230/china-academy-of-arts-folk-art-museum-kengo-kuma-and-associates?ad_medium=office_landing&ad_name=article

Image 3
Source of underlay: Kano, E. (2016, February 18). *China Academy of Arts' Folk Art Museum* [Illustration]. Retrieved May 24, 2021, from https://www.archdaily.com/782230/china-academy-of-arts-folk-art-museum-kengo-kuma-and-associates?ad_medium=office_landing&ad_name=article

Image 4
Source of underlay: Kano, E. (2016, February 18). *China Academy of Arts' Folk Art Museum* [Photograph]

Image 5
Source of underlay: Snöhetta. (n.d.). P*roposal for a New Museum Quarter on top of the Virgl Mountain* [Illustration]. Retrieved Mars 5, 2021, from https://snohetta.com/projects/426-proposal-for-a-new-museum-quarter-on-top-of-the-virgl-mountain

Image 6.
Source of underlay: Snöhetta. (n.d.). Proposal for a New Museum Quarter on top of the Virgl Mountain [Illustration]. Retrieved Mars 5, 2021, from https://snohetta.com/projects/426-proposal-for-a-new-museum-quarter-on-top-of-the-virgl-mountain

Image 7
Source of underlay: Snöhetta. (n.d.). Proposal for a New Museum Quarter on top of the Virgl Mountain [Illustration]. Retrieved Mars 5, 2021, from https://snohetta.com/projects/426-proposal-for-a-new-museum-quarter-on-top-of-the-virgl-mountain

Image 8
Source of underlay: Jensen and Skodvin. (n.d.). Juvet Landscape Hotel [Drawing]. Retrieved February 28, 2021. from https://jsa.no/Juvet-landscape-hotel-first-phase

Image 9
Source of underlay: Jensen and Skodvin. (n.d.). Juvet Landscape Hotel [Photograph]. Retrieved February 28, 2021. from https://jsa.no/Juvet-landscape-hotel-first-phase

Image 10. Section
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Image 11
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Image 12
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Image 13
Source of underlay: Vandkunsten Architects. (n.d.). Forest town with minimal footprint [Photograph]. Retrieved April 2, 2021, from https://vandkunsten.com/en/projects/halssmycket

Image 14
[Photograph of wooden construction, no title]. n.d. Retrieved May 25, 2021, from https://i.pinimg.com/564x/1b/c5/6a/1bc56aaa09a41aaf6c37bfa27a4b6da1.jpg

Image 15
Cortesia de Equipo Finalista. (2015, May 12). *no title* [Photograph]. ArchDaily. Retrieved May 25, 2021, from https://www.plataformaarquitectura.cl/cl/766693/xlii-propuesta-finalista-en-concurso-de-ideas-para-el-nuevo-balneario-de-la-fuente-santa-espana

Image 16
Louisiana Museum of Modern Art. (2014, August 22). [Illustration]. ArchDaily. Retrieved May 25, 2021, from https://www.archdaily.com/540338/olafur-eliasson-creates-an-indoor-riverbed-at-danish-museum/53f7441bc07a80388e00071a-olafur-eliasson-creates-an-indoor-riverbed-at-danish-museum-photo

Image 17
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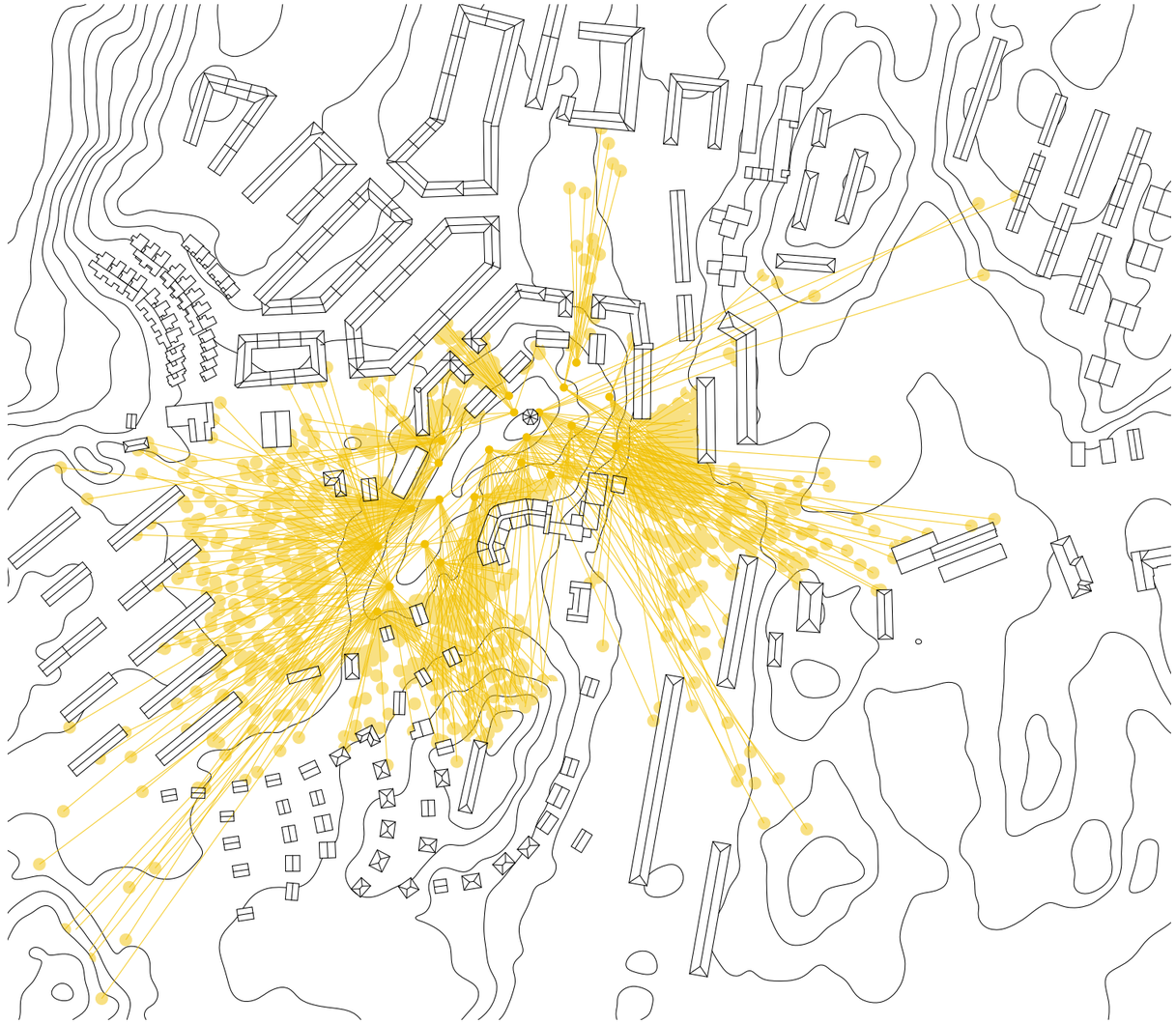
Appendix A

**DIGITAL VISIBILITY ANALYSIS -
TOPOGRAPHY**

Nodes with views over the site topography

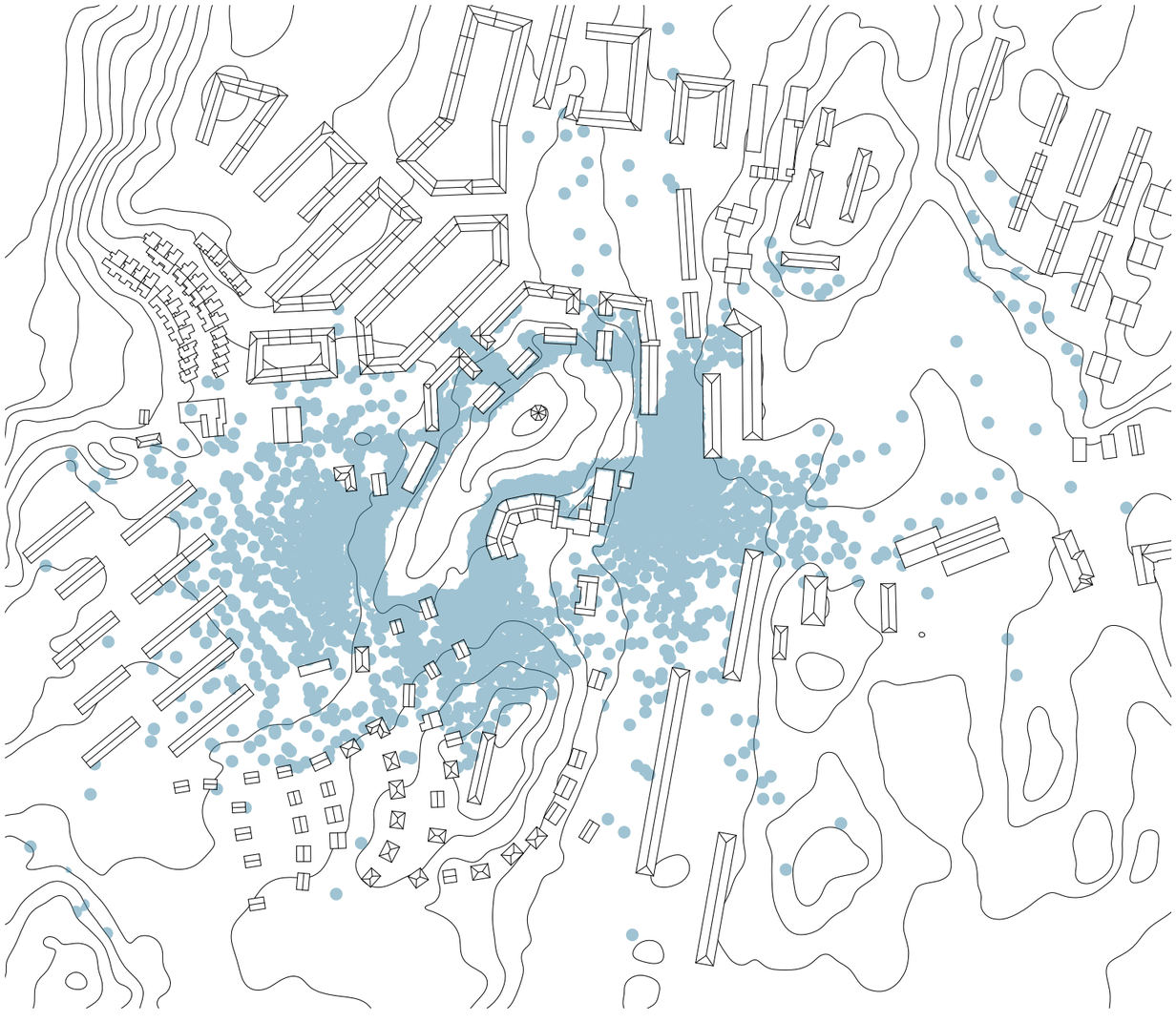
The visibility analysis is made on a digital terrain model without vegetation.



The view lines visualizes which parts of the site are visible to nodes outside the site.

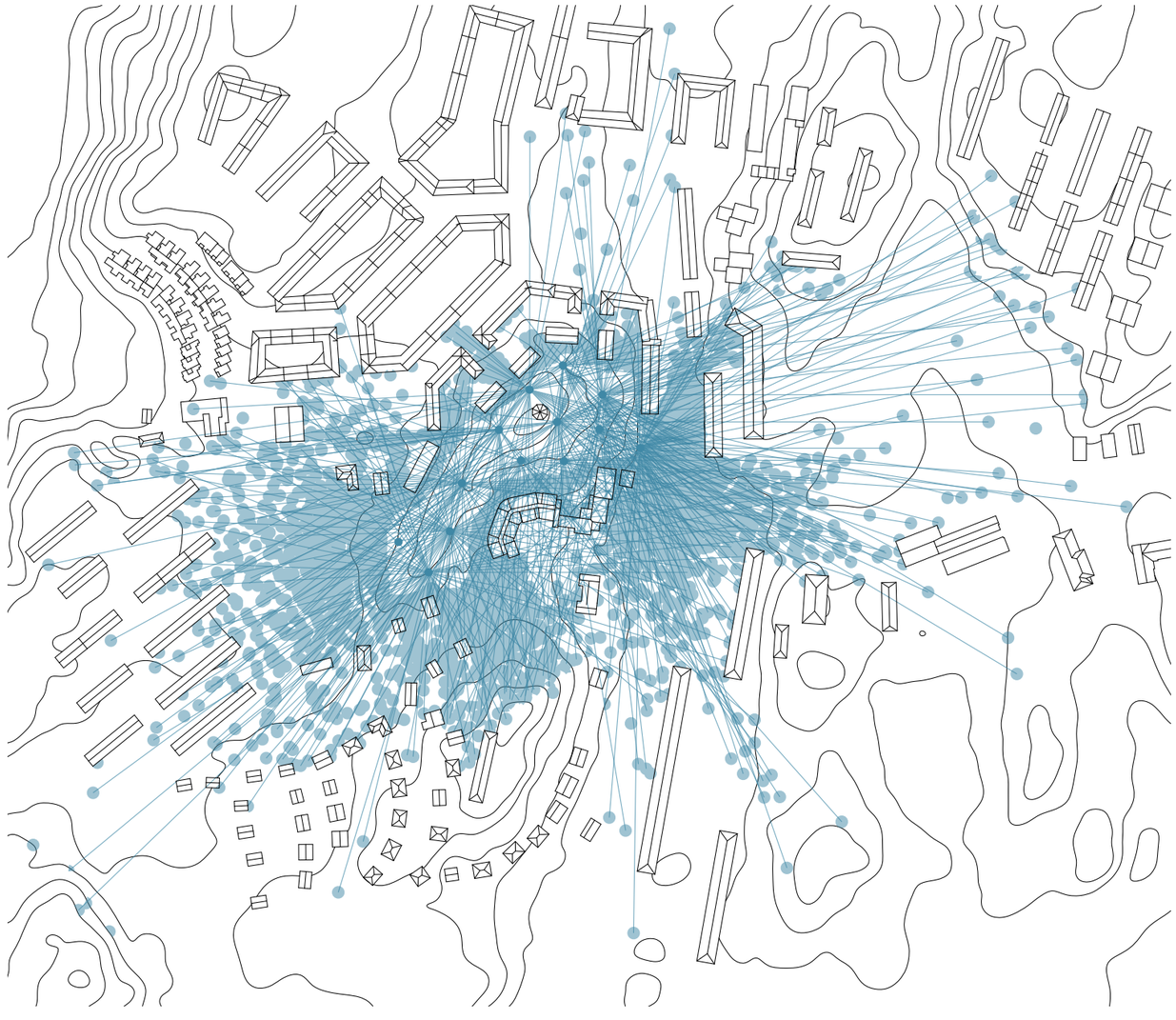
Appendix A

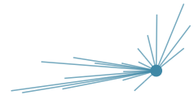
**DIGITAL VISIBILITY ANALYSIS -
TREETOPS**



Nodes with views over treetops on the site

The visability analysis is made on a digital terrain model without vegetation.





The view lines visualizes which parts of the site are visible to nodes outside the site.

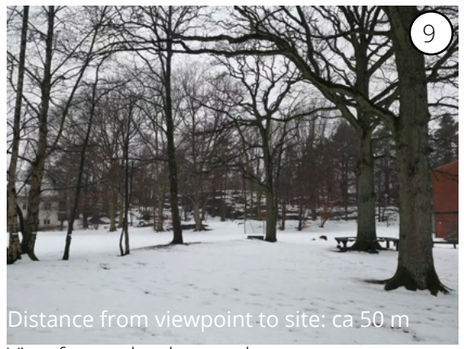
All the views from the visibility analysis.

Only a small glimpse of the site is seen between the two buildings.

Trees obscures the site in some extension, but if they were to be removed, the site would be very visible.

View from Skogshyddegatan.

View from the running trail around the soccer field.



View from school ground.

View from Kärralundsgatan.

View from Danska Vägen.

Entrance to path that leads up to the water tower.

Appendix B

Large parts of the site are visible here.

Large parts of the site are visible here.

Entrance to walking path in the boarder of the site.

View from school ground.

The site can’t be seen because of trees.

View from the crossing of Fritjofstigen and Danska Vägen.

A small glimpse of the site with no particular landscape characteristics.

Only some trees on the site are visible.

Appendix C

FIGURE GROUND ANALYSIS

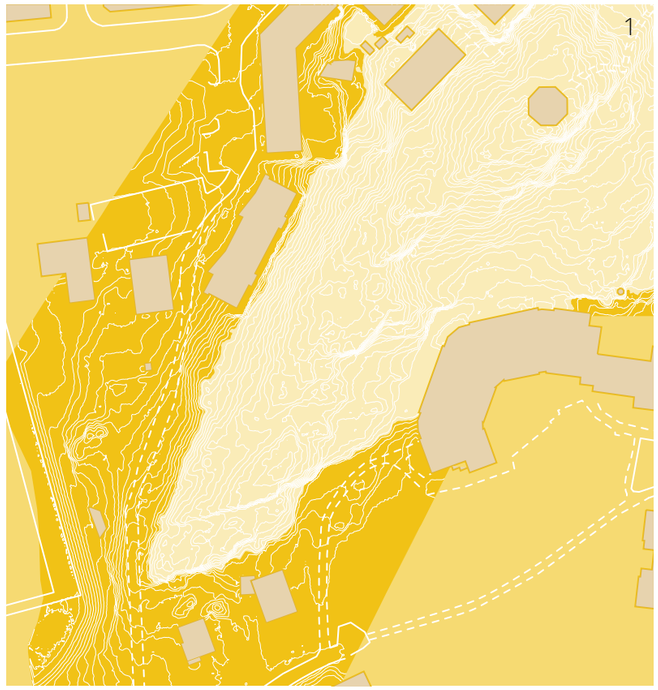
Image 1 to 5 illustrates horizontal sections of the site at different levels. The clipping level for image 1 is the lowest and the one for image 5 is the highest, just under the foot of the water tower.

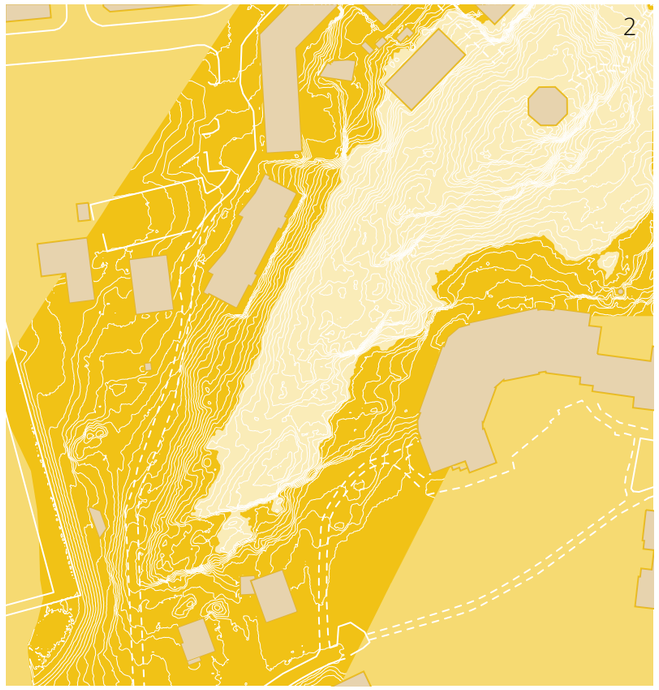
In image 6, all the horizontal sections in image 1 to 5 are combined with cartography over vegetation on the site. Together they make an underlay for investigating the spatiality on the site made by terrain form and vegetation.

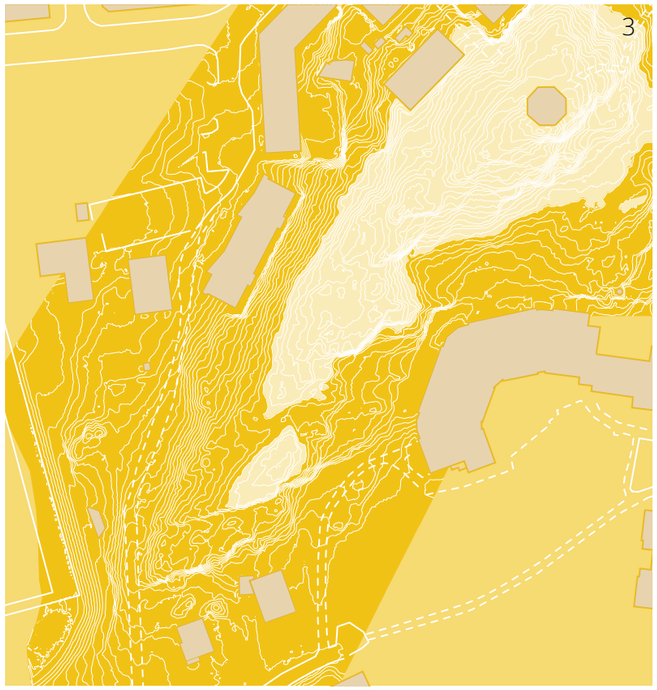
LEGEND

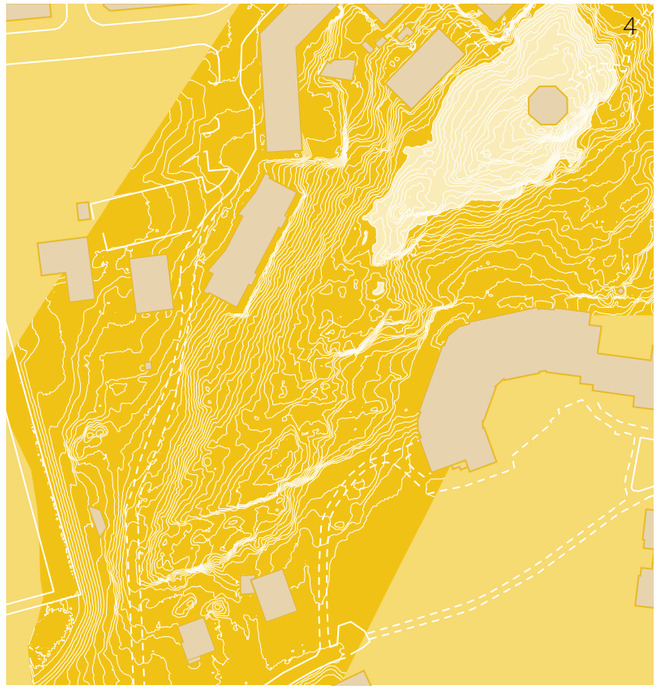
Areas with trees

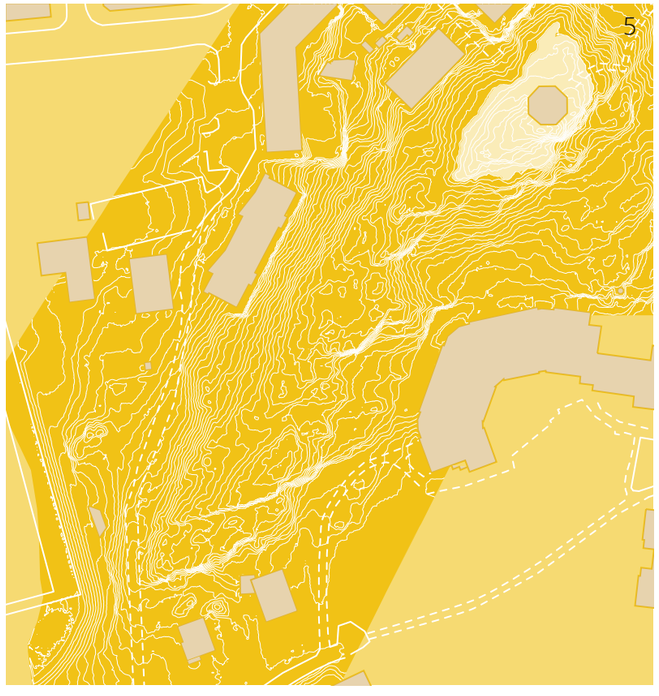
Highlighted levels in the topography

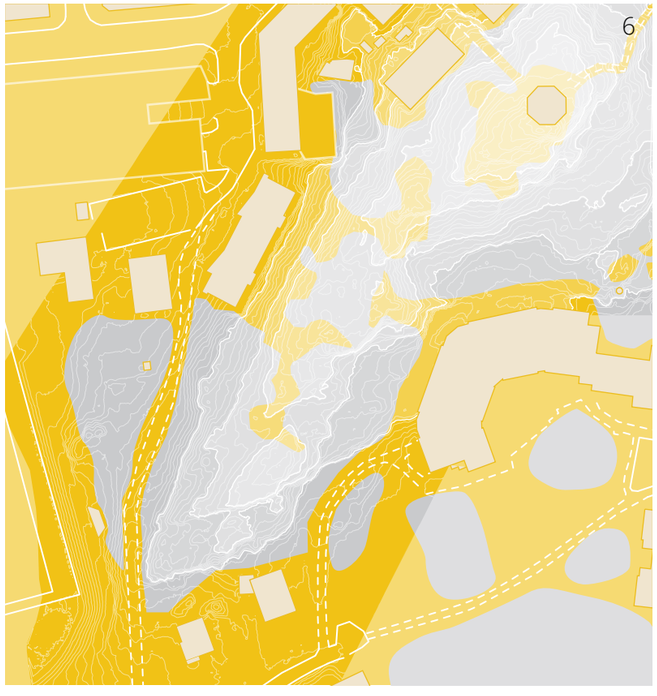












Appendix D

SERIAL VISION ANALYSIS 1

A serial vision analysis (see page 13 in the theoretical background) was made along the mountain ridge, starting from the water and ending in the south part of the site.

Appendix D

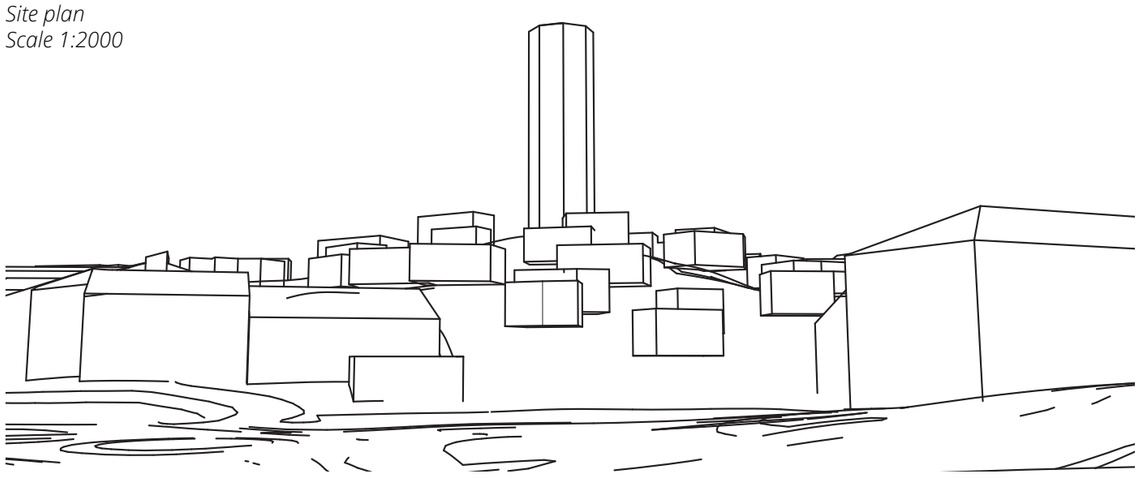
SERIAL VISION ANALYSIS 2

A serial vision analysis (see page 13 in the theoretical background) was made along the mountain ridge, starting from the south part of the site and ending by the water tower.

VOLUME STUDY 1

Many smaller volumes are placed in the slopes, leaving the mountain ridge relatively intact. The small volumes are more energy consuming than larger volumes due to the bad shape factor.

Site plan
Scale 1:2000

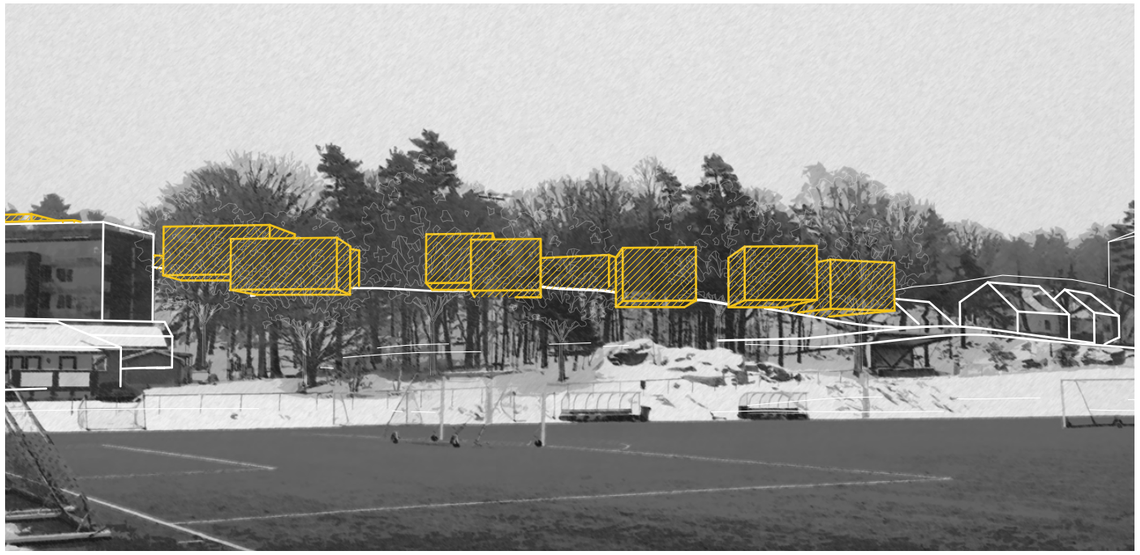


View point 10

The distribution of the small volumes on the slope towards Danska Vägen defines the widespread hillside. The smaller building volumes differs a lot from surrounding buildings when is comes to scale. This do somewhat strengthen the widespread slope towards Danska Vägen.

Section B-B
Scale 1:1000

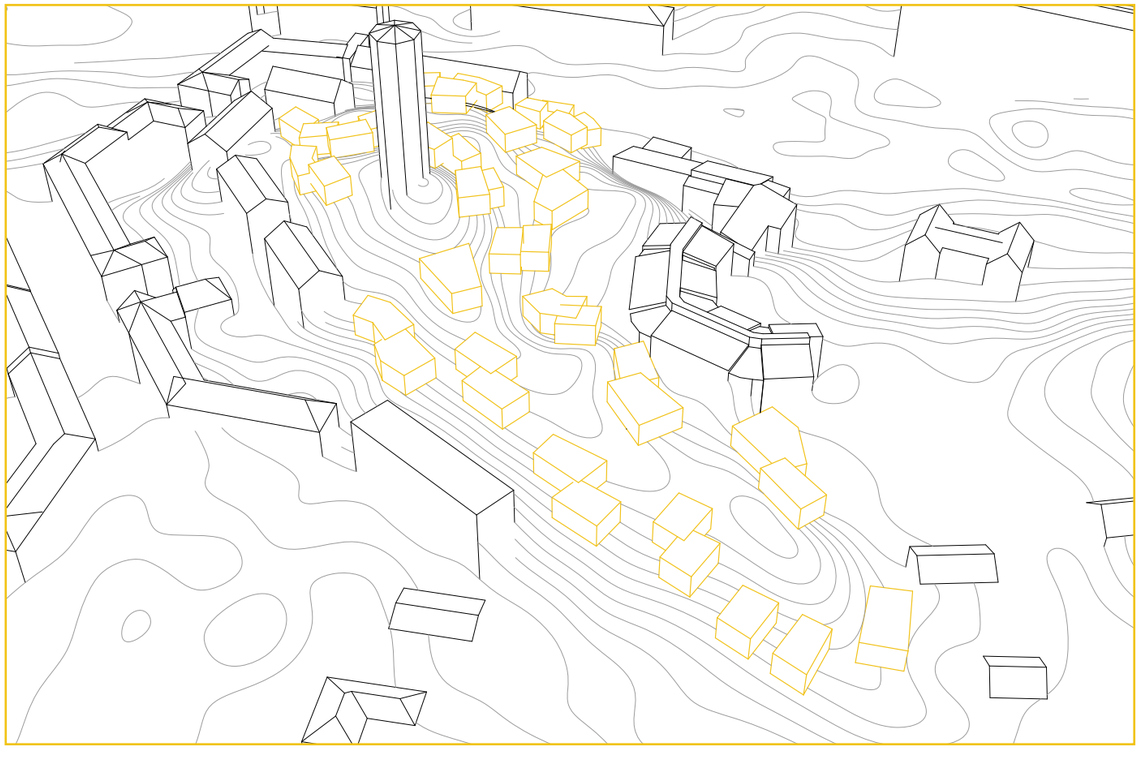
The impression is quite messy and the landscape is somewhat lost in the blur of the buildings.



View point 3

From here the volumes seems to be more connected and the impression is less messy. The volumes create a cohesive pattern that follows the mountain ridge. To the left, the volumes are thinner and strengthens the verticality of the trees. A lighter expression is generated by the gap in the middle where no trees are obscured by buildings. This vertical in between space also contributes to the verticality. The building volumes are lower than the treetops.

Bird's perspective



Site plan
Scale 1:2000

VOLUME STUDY 2

Three examples of elongated volumes follows the mountain ridge in different ways.

PLACEMENT

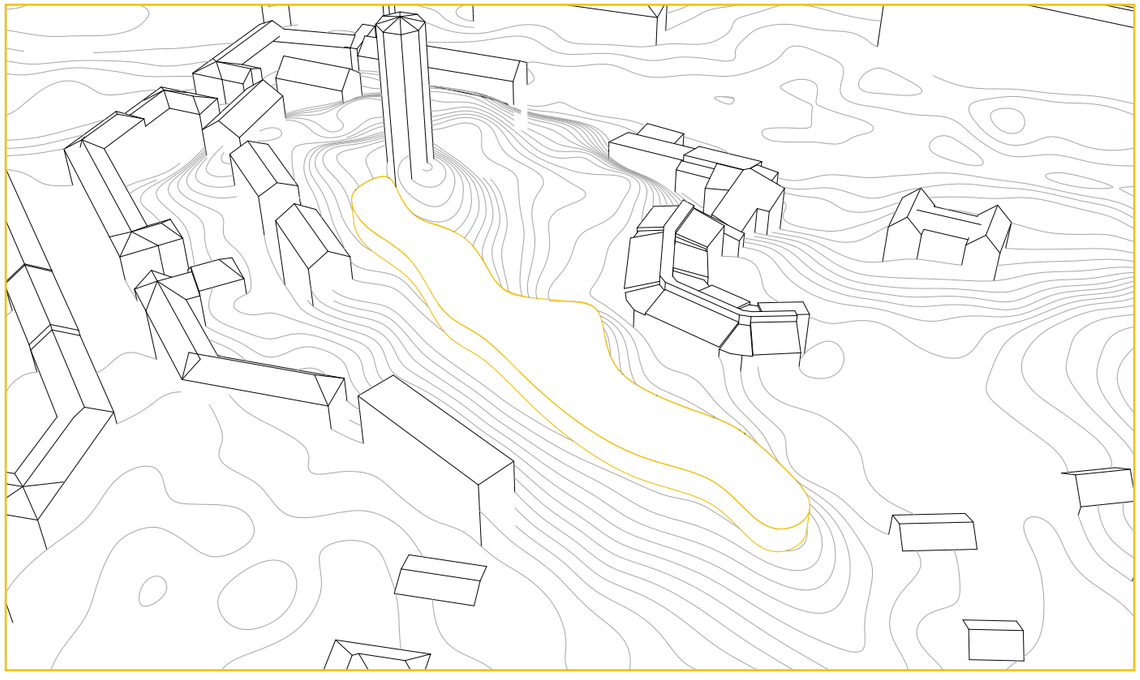
This placement reduces tree felling since there are fewer trees on the mountain ridge. It also deduces the relatively flat and walkable surfaces than the mountain ridge consists of.

I
The volume sweeps over the terrain in a straight line. The with of the volume remains almost the same.

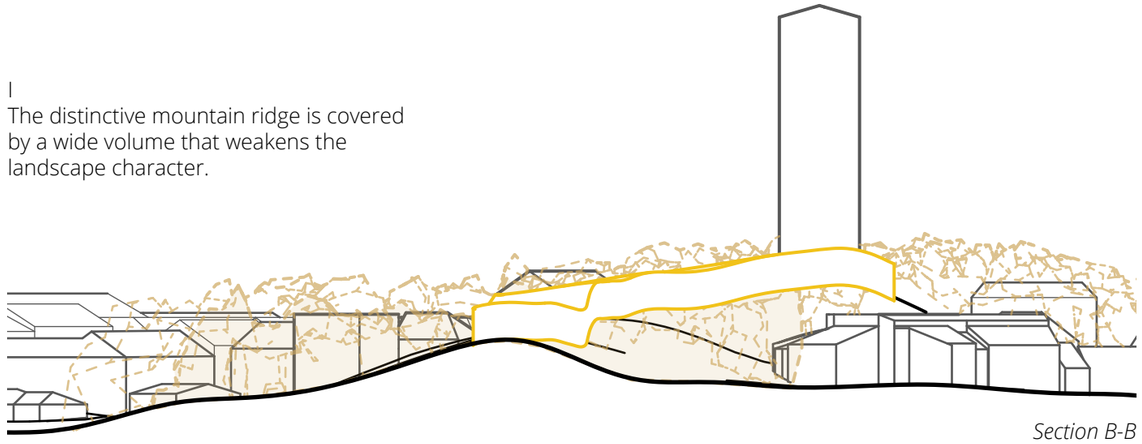
II
The volume accentuates the fluctuating with of the mountain ridge and ends south of the water tower.

III
Just like the previous one, this volume also has a variating with. But instead of ending south of the water tower, it continues north west of it.

Bird's perspective

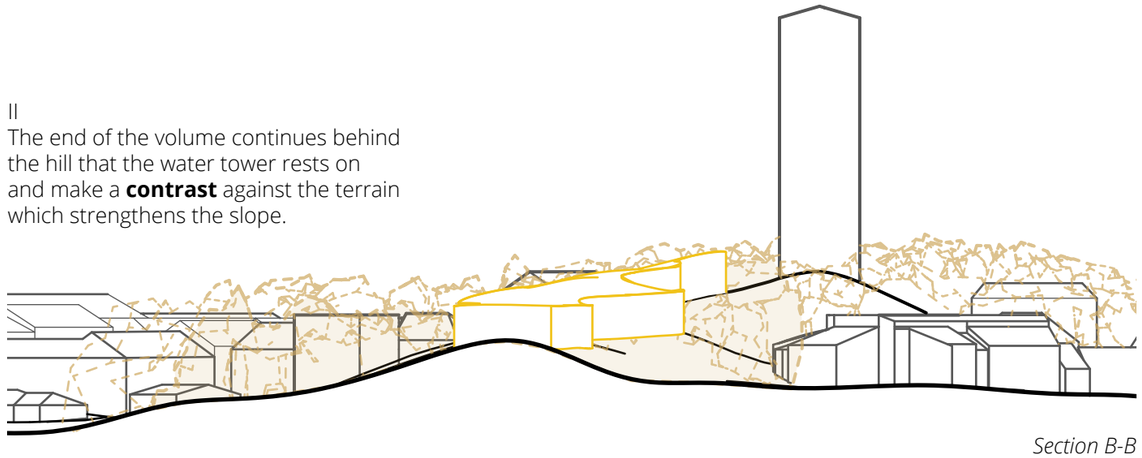


I
The distinctive mountain ridge is covered by a wide volume that weakens the landscape character.



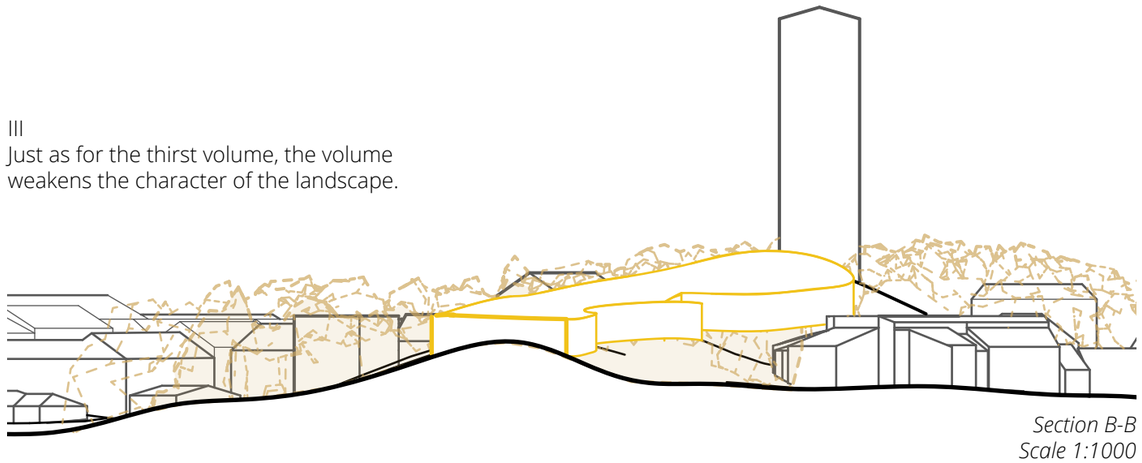
Section B-B
Scale 1:1000

II
The end of the volume continues behind the hill that the water tower rests on and make a **contrast** against the terrain which strengthens the slope.



Section B-B
Scale 1:1000

III
Just as for the thirst volume, the volume weakens the character of the landscape.

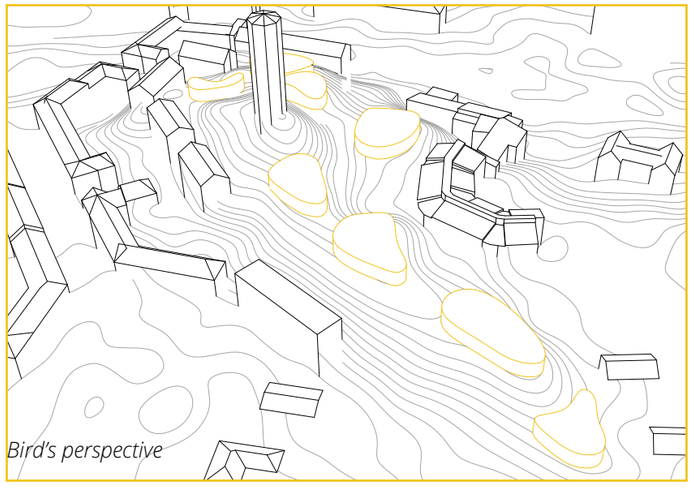


Section B-B
Scale 1:1000

VOLUME STUDY 3

Smaller volumes are placed in line to amplify the mountain ridge. Even though there are several volumes instead of one, the expression is quite similar to the last iteration due to the placement of the volumes.

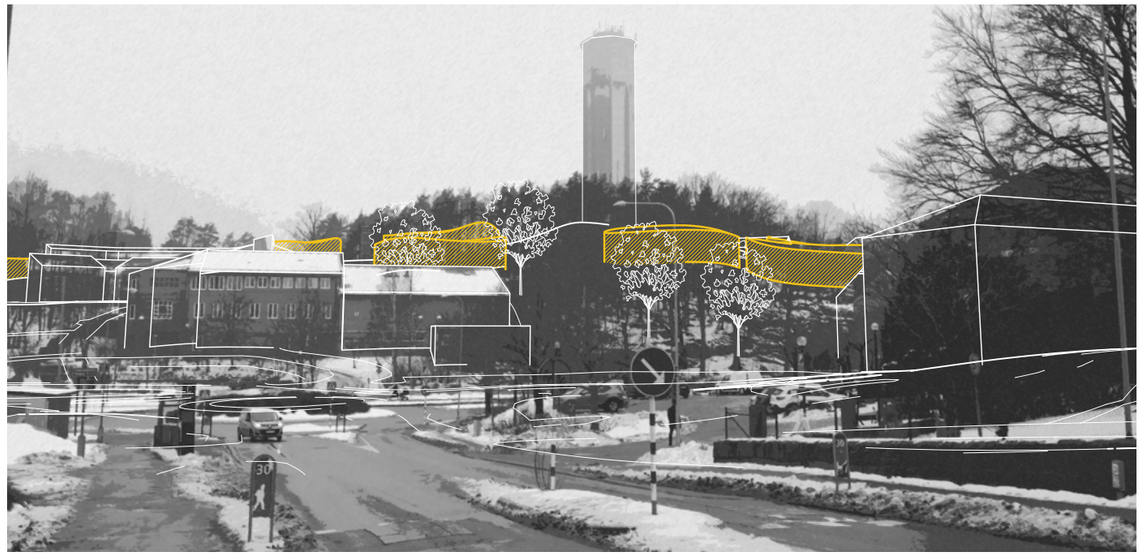
Site plan
Scale 1:2000



Bird's perspective

View point 3

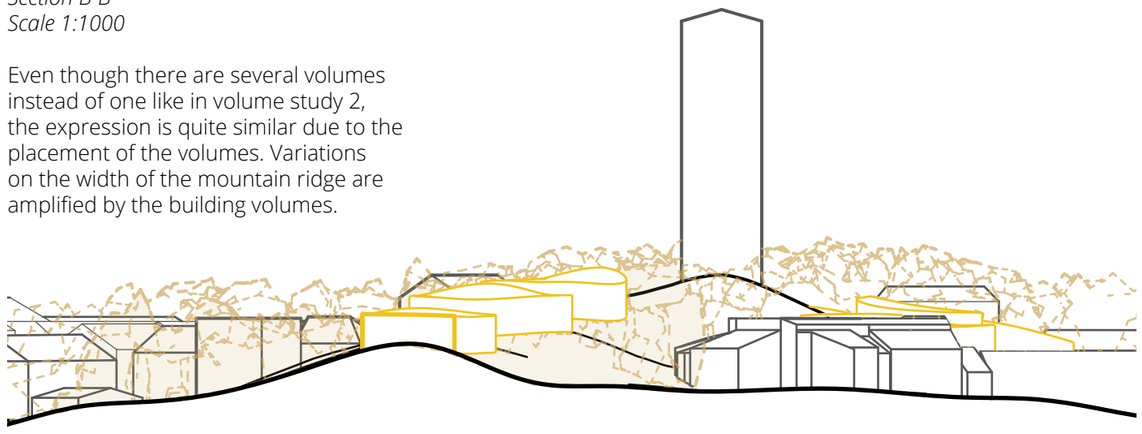
From this view, the trees and the mountain ridge are characteristic for the landscape of the site. The evenly distributed volumes follows the ridge and it's horizontality and create a homogeneous expression. The vertical spatiality of the trees is so



View point 10

Section B-B
Scale 1:1000

Even though there are several volumes instead of one like in volume study 2, the expression is quite similar due to the placement of the volumes. Variations on the width of the mountain ridge are amplified by the building volumes.



View point 7

The building volumes can be glimpsed from this entrance to the area and invite people into the site. The building doesn't take over the view and leaves the treetops speaking for them selves.

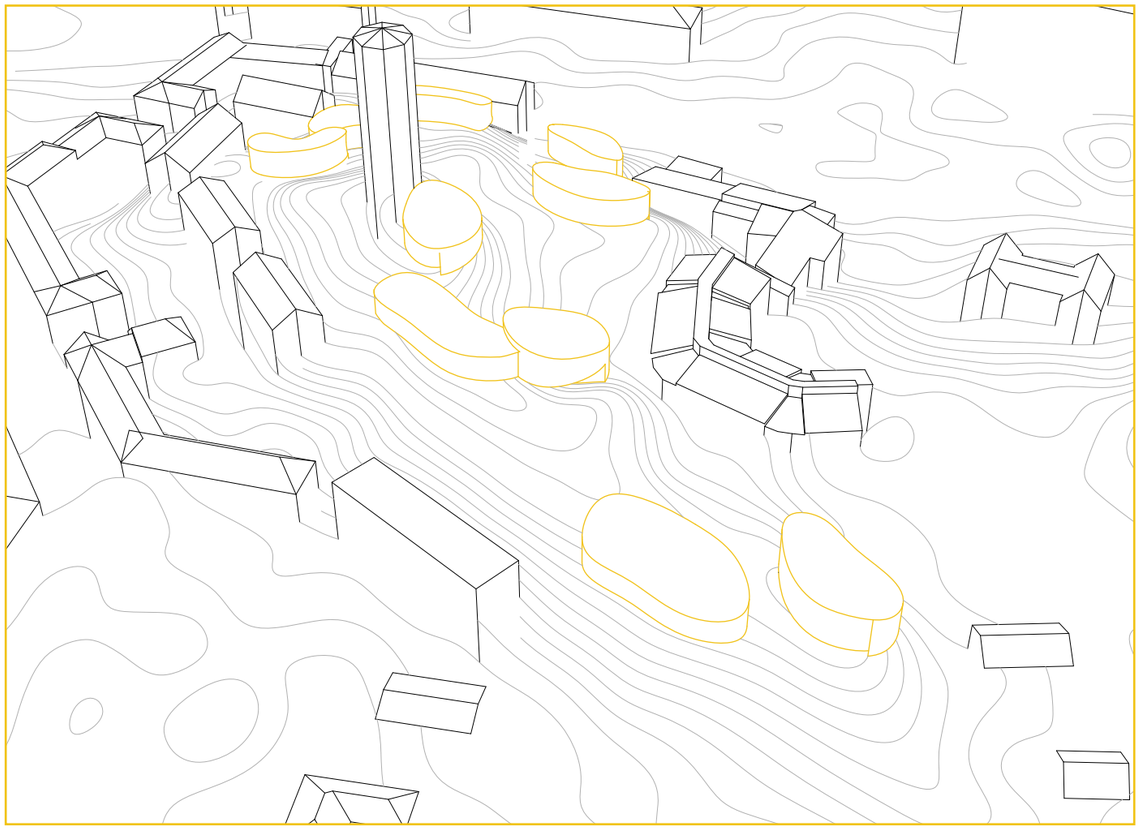
VOLUME STUDY 4

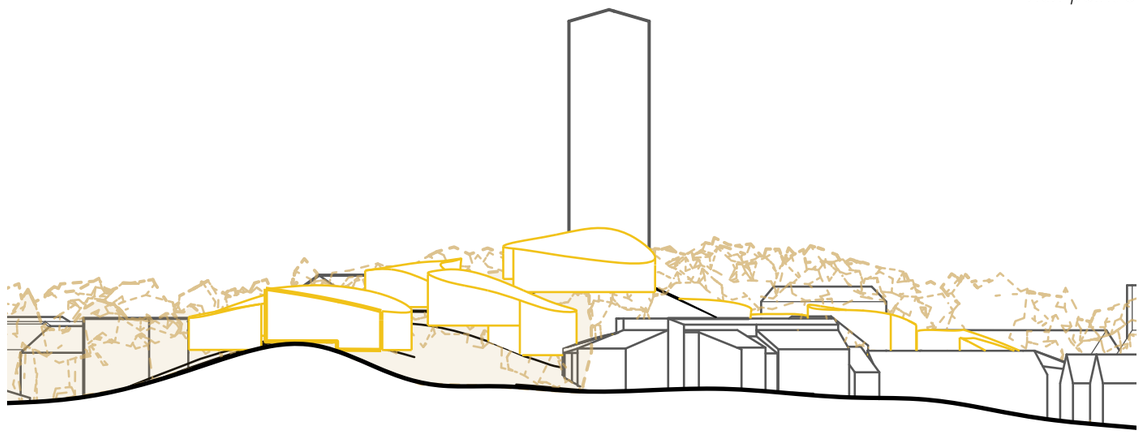
The volumes are placed in clusters both on the mountain ridge and the surrounding slopes. Larger areas of the mountain ridge are left available for pedestrians. A round volume is placed in a curvature, amplifying the curve and making a contrast to the surrounding slopes.

Site plan
Scale 1:2000

View point 6

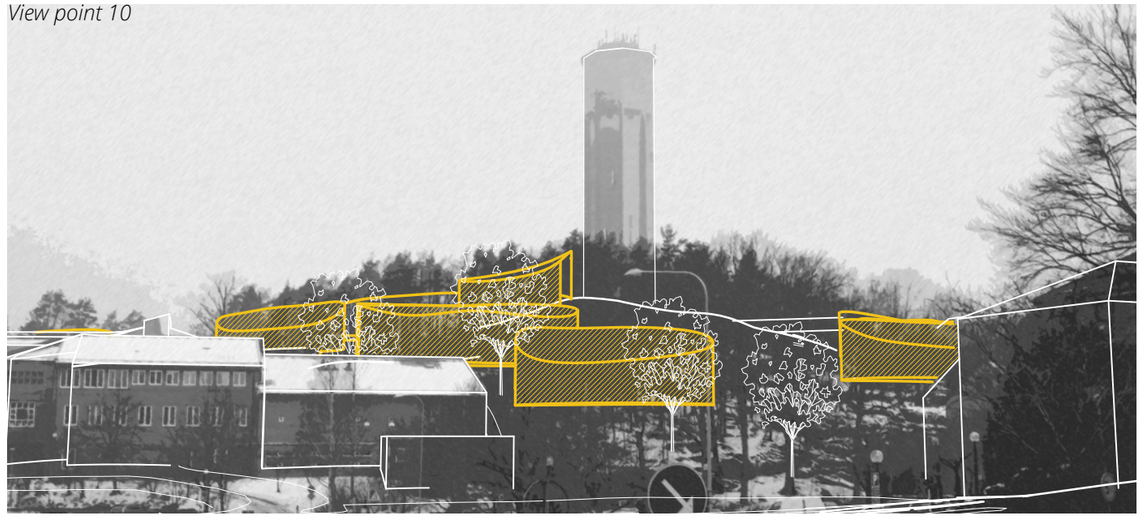
Birds perspective





Section B-B
Scale 1:1000

View point 10

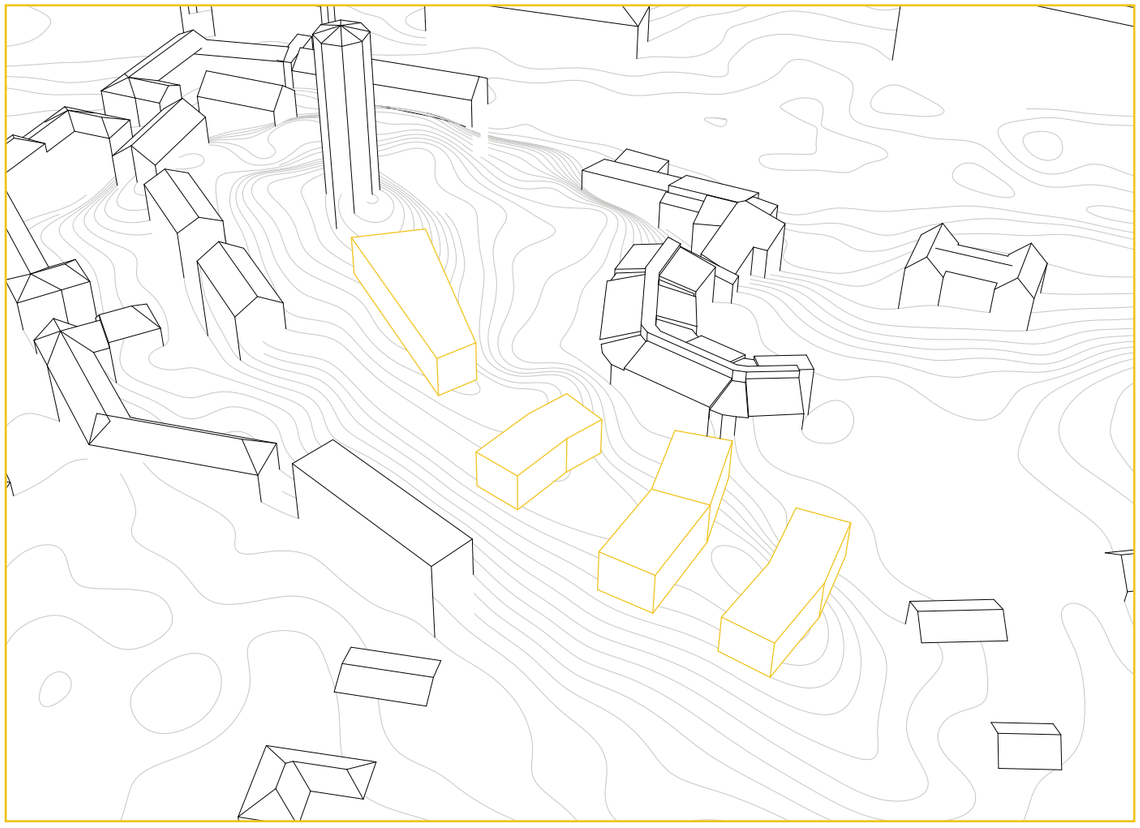


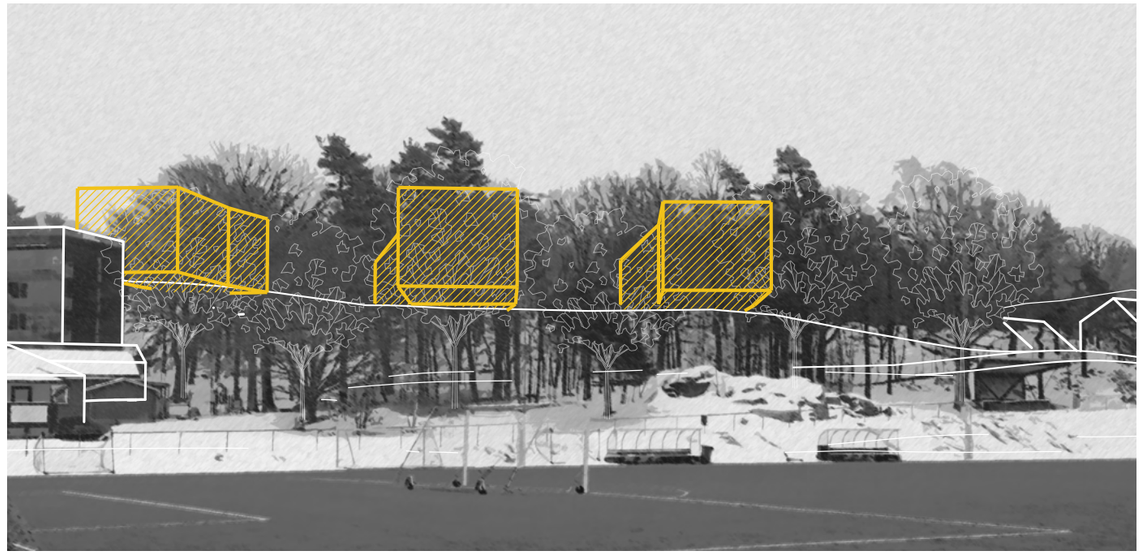
VOLUME STUDY 5

Rigid, elongated volumes are placed across the mountain ridge.

Site plan
Scale 1:2000

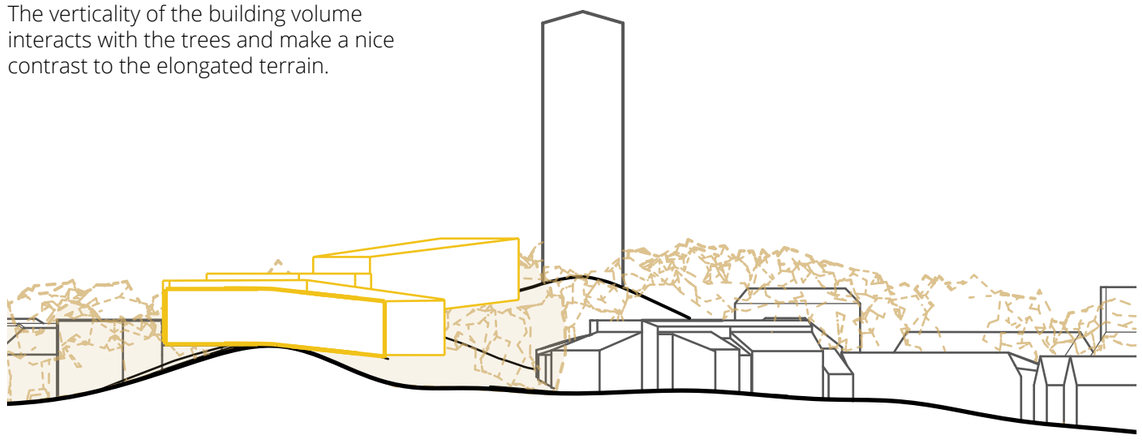
Birds perspective





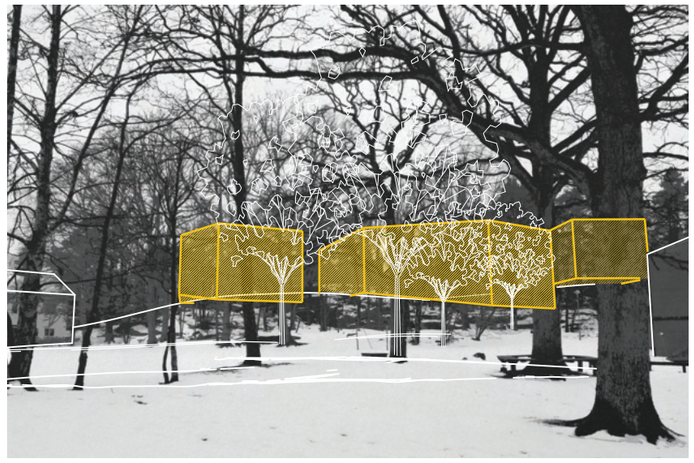
View point 3

The verticality of the building volume interacts with the trees and make a nice contrast to the elongated terrain.



Section B-B
Scale 1:1000

View point 9

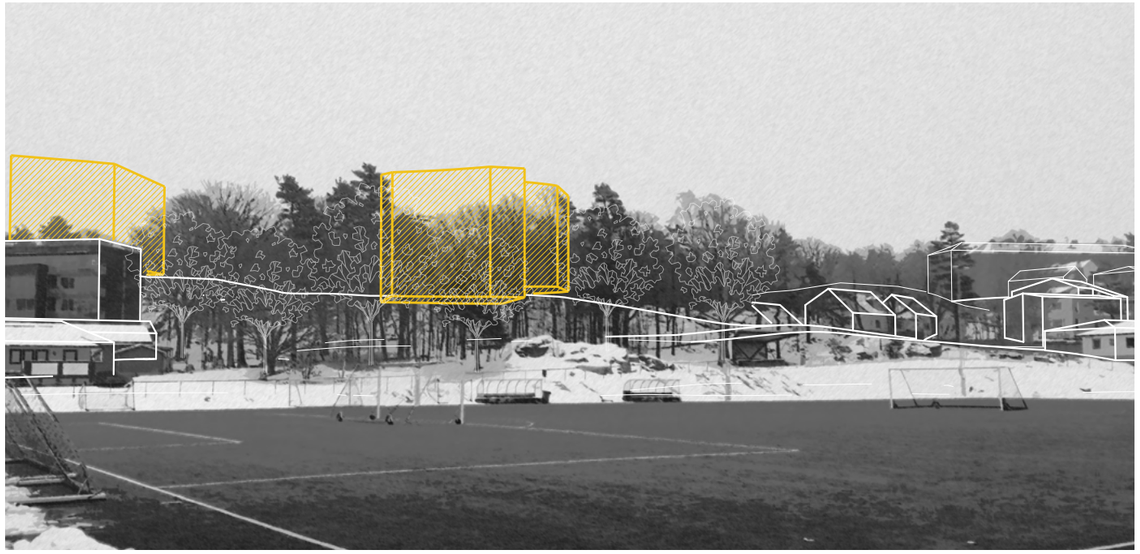


The building volume stretches over the mountain ridge at the same time as it follows the contour lines. It's almost like the building with its clear direction makes a conceptual bridge between the western and eastern part of the site, which is otherwise quite separated due to the mountain ridge.

VOLUME STUDY 6

High and compact building volumes placed both at steep and flat areas.

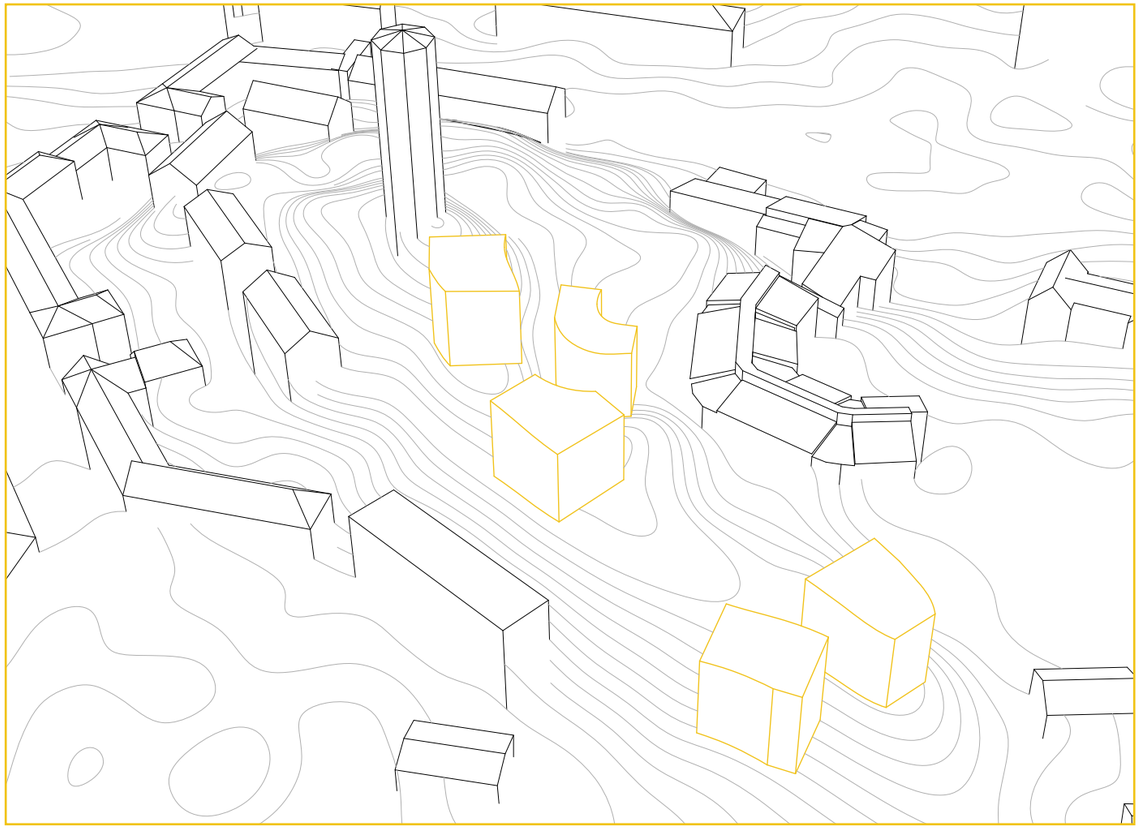
Site plan
Scale 1:2000

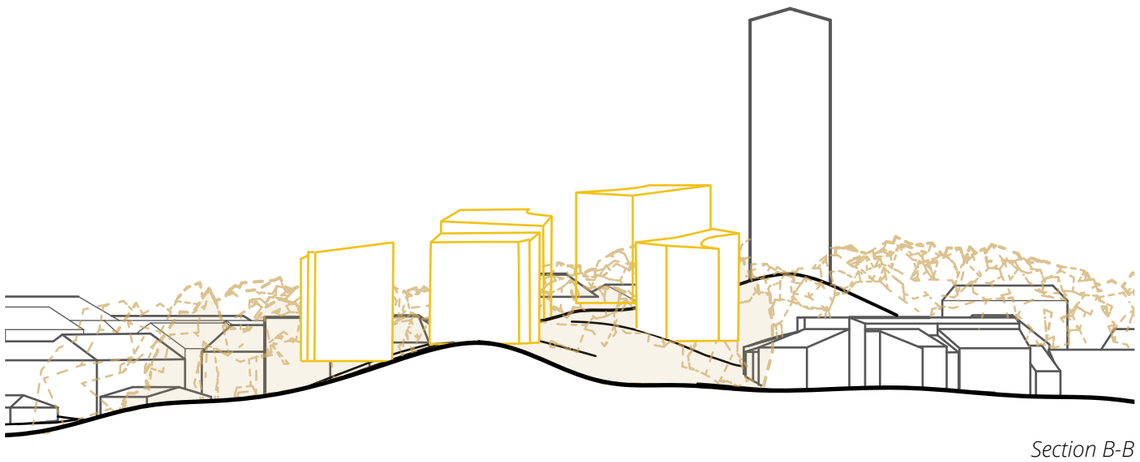


There's a lack of pattern and rhythm in how the building volumes are distributed. They don't interact with each other and make the landscape appears divided. The verticality and the lightness of the trees are lost when the building volumes rises above the treetops.

View point 3

Birds perspective





Section B-B
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