DESIGNING FOR ATMOSPHERE

A LEVEL DESIGN APPROACH TO ARCHITECTURE

AXEL SÖRENSEN
ARCHITECTURE MASTER'S THESIS 2025
CHALMERS UNIVERSITY OF TECHNOLOGY

DESIGNING FOR ATMOSPHERE
– A Level Design Approach To Architecture

Axel Sörensen

Master's thesis 2025

Chalmers School of Architecture
Department of Architecture and Civil Engineering

Architecture and Urban Design, MPARC
Architectural Experimentation
Matter and Media

Examiner: Jonas Lundberg
Supervisor: Kengo Skorick

CHALMERS
UNIVERSITY OF TECHNOLOGY

CONTENTS

Abstract

The limits of the real world have long been a challenge to architecture, to rein in the creativity of the mind to the constraints of the world. What then, would architects design if rules and regulations were no longer a constraint, and even gravity was optional? As such it comes to no surprise that some architects have migrated into the virtual world of level design. As these architects leave designing in the real world behind, their new creations are no longer seen as architecture, they are for video games, even though they too are a deep exploration of form, space, and atmosphere, and arguably with a stronger emotional connection to its world than the connection real-world architecture has to its own. But like all creative works, the value of architecture comes from taking a dream or feeling and finding a way to realise it. To shape the world for the beholder to have the best possible experience. Just like level designers.

This thesis sought to nurture the connection between level design and architecture through design. To learn from the freedom of level design and capture its playful and fantastical essence and incorporate it into a project meant for the real world.

Through literature and case studies a set of level design principles were established. These were adapted to work in the real world to then be applied to as a mixed-use project in central Gothenburg.

The design-phase was divided into three key stages: Layout, establishing the goals and constraints, such as urban context and regulations; Block-out, focusing on spatial relationships, movement, and the exploration of the space; and Environment Art, refining the design to enhance materiality and detail, ensuring it connects to the surrounding city while maintaining its own identity. Throughout the phases, the design was analysed according to its atmosphere and realism through play-testing. Evaluating the effectiveness of the design compared to its realistic buildability and usage according to the dimensions of the spaces.

Through this methodology, the final design emerged as a public path along the mixed use building, forming intricate spaces with a focus on atmosphere.

Keywords: Architecture; Atmosphere; Ad hoc design; Method development; Level design; Adaptation; Play-test; Unreal Engine

STUDENT BACKGROUND

AXEL SÖRENSEN

MSC. ARCHITECTURE AND URBAN DESIGN 2022-2025
Chalmers School of Architecture
ARK123 - *Matter, Space, Structure 1*
ARK137 - Future Visions for healthcare, housing and work 2: Housing Inventions
ACE505 - Housing Inventions 2

ARK079 - Nordic Architecture
ARK650 - Sustainable development and the design professions

BSC. ARCHITECTURE 2019-2022
Chalmers School of Architecture

RELEVANT COURSES
Uppsala University 2019
5KV040 - Art History A: Art, Architecture and Visual Culture

Blekinge Institute of Technology 2021
ME1618 - Visual design and programming

Foreword

The motivation for this thesis is actually a very personal one, so before we start getting formal, I would just like to explain my feelings on the subject.

To me, architecture is fantastic, or at least the potential to be. Upon examining my surroundings I tend to find that this potential is so often squandered, especially in Swedish residential housing complexes. Not to mention the spaces in between the buildings. To me, the spaces in between are what make the city. The path you walk on your way home, to the store, and to your work. That thing that makes you look up, and really appreciate the buildings and surroundings that architects have spent years to design with all the constraints of the real world and its regulations.

I like video games. And not only the good ones. I admire the effort that goes into making something for the enjoyment of others. To create something that brings a bit of playfulness into an otherwise harsh reality. But what I admire most are their worlds. How they guide you through an unfamiliar space, and tell you its story along the way. How they engage you and encourage you to explore to solve their mysteries. This thesis is then an effort to take some of the freedom and playfulness of their designs, get inspired by them, and try to incorporate their essence in the real world.

If even a little bit of the quality of the virtual world seeps out into our reality as a result, this thesis is a success.

Thank you!

Kengo Skorick
Jonas Lundberg
Stuart Macdonald
Runa Ås

BACKGROUND

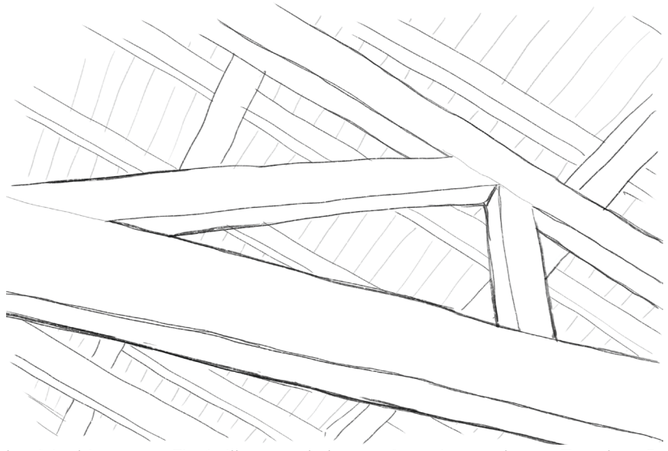
Introduction

The primary responsibility of architecture is shaping the environments that we inhabit. Throughout the ages this responsibility has taken many forms: Temples for the gods, and loggings for the people who built them, fortresses to protect the people, and palaces for their rulers. As society progresses, architecture progresses with it. And the more it progresses, the more efficient and accessible to the public it becomes. But this efficiency comes at a cost. Constructing an efficient building is much more complicated than just throwing up a decorated shed.

The shift in how the clientele works in architecture has also had a large impact on how the buildings are designed. Throughout the latter half of the 20th century, the corporate architecture has shifted from being tied to a city or place, to actively distancing itself from it, should favourable deals appear elsewhere and a move would be required. Leaving behind a paradoxical building that is iconic enough to stand out while simultaneously being general enough to fit any corporation. “In the same way that transnational elites consume cities’ amenities without committing to them, the selfabsorbed [sic], self-referential new corporate architectural objects make bold statements on the city’s skyline but are, at best, indifferent to the real city that hosts them.” (Kaika, 2011, p. 977)

Similarities can be seen in the housing market but for different reasons. Where regulations have raised housing quality to a point where it is no longer a major factor in choosing a home, leaving priority to location. Thus, creating an incentive for housing developers to construct buildings that are aesthetic, but still general enough as to not shun potential clients, because taking aesthetic risks are just that, a risk.

But progress is always a risk. The Eiffel Tower and Guggenheim New York were both highly controversial at their construction but now stand as masterpieces of their time. As trust in the vision of the architect has gradually been eroded, if it was ever there, the responsibility of the architect has shifted again. It is no longer just about designing quality environments, it is also about convincing the client to take a risk.



The Body of Architecture, Fig 1, Illustrated chapter from Atmospheres, Zumthor, P, 2006, Image by author.

Only Time Will Tell

Quality architecture is independent of epoch or style. When we as a society look back upon older architectural styles, we only see the marbles that were preserved. The 200-year-old buildings that are standing today will most likely remain standing for longer than the majority of what is being built today. Because we choose to preserve them, not only for their beauty, but because of how they shape the environments that we inhabit. The pursuit of good architecture is an iterative process. Architects do what they can with what they have, without ever really knowing the outcome. Did Palladio know we would still appreciate Villa Rotonda 500 years later? Did Vitruvius know architecture students would still quote his works over 2000 years in the future?

Quality architecture is independent of epoch or style, but they are aesthetics that are proven to work. But architecture is so much more than just aesthetics. It is something deeper. It is the atmosphere. How the spaces interact and connect with each other. It is the full experience of being within its space.

“Quality architecture to me is when a building manages to move me. What on earth is it that moves me? How can I get it into my own work? [...] One word for it is atmosphere.” (Zumthor P. 2006, p. 11)

The style or beauty of a space are not synonymous with the atmosphere of the space, but they are part of it.

The Magic of The Real, Fig 2, Simplified illustration of Atmospheres, Zumthor, P, 2006, Image by author.

Between Art and Architecture

Peter Zumthor insists that architectural quality is directly tied to the atmosphere. The intuition of the observer and their emotional perception is what determines its value. Likewise, Gernot Böhme defines atmosphere as a feeling of a space, primarily produced by sound and illumination, but also by shapes, pictures and signs. (Böhme, 2016)

In describing the process of his work, Zumthor divides atmosphere into 9 chapters that in different ways portrays his views on how architecture and atmosphere are connected. 9 ways of determining the quality of the architecture. But even here, they are subjective and vague. Without the emotional attachment of the scenes he so masterfully portrays, the criteria become undefined. Atmosphere, like all arts, are intrinsically linked to emotion. The emotions of the artist and their impression onto the observer.

"The mixture of architectural design and subjective impression that produce atmospheres are by no means symmetrical, nor does the atmosphere correspond directly to the built space." (Purdy, 2016, p. 145)

By omitting the subjective impressions of architecture, the judgement of its quality falls to its technical properties. Much like describing a painting by what colours were used and how the brush strokes were made, the discussion of the building falls to its materials and the capabilities of its rooms. Not on how they were combined to form a greater whole, because the value of the whole is in the impression it leaves.

Tension Between Interior and Exterior, *Fig 3, Illustrated chapter from Atmospheres, Zumthor, P, 2006, Image by author.*

The Sound of a Space, *Fig 4, Illustrated chapter from Atmospheres, Zumthor, P, 2006, Image by author.*

Atmosphere According to Zumthor	Short Summary
1. The Body of Architecture	The frame, surfaces and materials of a structure come together to form a whole, the anatomy of architecture.
2. Material Compatibility	Different materials accentuate each other. Creating a richness of different material qualities.
3. The Sound of a Space	The creak of a wooden floor, or the acoustic reverberations of a great hall. How the proportions and materials affect the sound of a space.
4. The Temperature of a Space	The combined interpretation of the temperature in the air, of the materials, as well as that of their colour.
5. Surrounding Objects	Objects within a space affect the space itself. The stories and emotional attachments behind these objects.
6. Between Composure and Seduction	Spatial qualities affect the pace of movement through the space. The difference between direction and gentle seduction.
7. Tension Between Interior and Exterior	The act of being enveloped by a structure. How this envelope obscures some aspects of the other side while framing others.
8. Levels of Intimacy	The scale in relation to the human form, intimacy and openness, public or private, close or far.
9. The Light on Things	How the light shines into a room, hitting different materials, creating shadows and reflections. Using light and dark.
Addition 1. Architecture as Surroundings	How the building becomes part of its surroundings, and part of peoples lives.
Addition 2. Coherence	When the building is shaped by use. How it comes into its own and finds itself.
Addition 3. The Beautiful Form	*"If the form doesn't move me, then I go back to the beginning and start again." (Zumthor, 2006, p. 71)*

Fig 5, Diagram of different chapters of atmosphere according to Peter Zumthor from Atmospheres, 2006, along with a summary written by the author of this thesis.

On Atmosphere

Atmosphere is a word with double meanings. There is the scientific term for atmosphere, of the gaseous envelope that surrounds our planet, and then there is the figurative term. This figurative term, that describes the character or mood of an environment is what will be discussed in this thesis. More specifically, the mood imparted upon an observer of that space. Atmosphere is also a combination of multiple sensory inputs, touch, hearing, sight and smell all have an effect on how the mood of a space is interpreted. This interpretation in further affected by the experiences and tastes of the person doing this interpretation. Upon entering a space, the process of evaluating an atmosphere happens quicker than the perception of its constituent parts, relating to it on an emotional level instead of on an intellectual one (Pallasmaa, 2014). As there are multiple ways of discussing this figurative form of atmosphere, Peter Zumthor's 9 chapters on what he determined to be the aspects atmosphere within architecture will be used as a base to build upon in this thesis.

These chapters are meant to describe ways that an architect can design a space that through its atmosphere imparts a positive mood onto its inhabitants. This atmosphere can take the form of a calming space that one wishes to remain within, or an awe inspiring environment that one wishes to explore further. Zumthor often alludes to how an atmosphere can be intellectually stimulating, as if the mere act of actively observing the atmosphere can have a positive impact on the interpretation of it. Whether this is a subjective interpretation of a man who as spent his entire life studying atmosphere, or a more universal quality of atmospheres as a whole is hard to determine. Of course, a well thought out design will be intellectually stimulating to other designers. But as the perception of an atmosphere is based on human instinct, this intellectual appreciation of an emotional experience could be a further tool for designing an atmosphere. If an active appreciation of an atmosphere has a positive impact of the perception of the atmosphere, this could be a further argument for greater diversity and experimentation within architecture.

Material Compatibility,

Fig 6, Illustrated chapter from Atmospheres, Zumthor, P, 2006, Image by author.

Level Design Is Like Architecture Without Toilets

"A level is a space where a game happens. [...] *Level design is the practice of planning and building spaces for video games...*

... usually first-person or third-person action shooters."

(Yang et al., n.d)

Demands set upon the field of architecture as it is today, gets harder and harder to fulfil while still creating interesting and expressive spaces. As such, taking the economic risk of experimenting in order to achieve a desirable atmosphere is getting harder to justify. Simultaneously, as established, describing an atmosphere to its full extent in an objective capacity is even harder. But an atmosphere can be produced in such a way that it evokes the same emotion in many people, as set design for plays and film would prove. Virtual Reality is often discussed as a tool for showing the atmosphere of architecture designs. How it feels to be in its space, and while that might be the most important step, explaining why it works in a more objective way is still important. So why not take it a step further and study the designs made for the virtual world that through the years have worked on perfecting the way of delivering an interesting and expressive experience that aligns with the most people. Why not study video games and their development? While many video games are hard to correlate to the real world, there are just as many with dynamic and playful worlds that tell a deep and enticing story. These are partly made possible due to the lower risk. In the virtual world of video games, the risks are lower and the space is infinite. Video games have no need for support beams, load bearing walls and toilets. Architects will always be restricted by reality, just the knowledge of what is possible and what is not can be restrictive. As this is not relevant for the video game level designers, it gives the them a freedom to fully explore the possibilities of the space they create.

As the stigma of video games remains to this day, this exploration of space has seemingly remained removed from architecture even though at their core, both architects and level designers seek to design spaces for the enjoyment of others. Some architects have seen this connection and chosen to work in both fields. But the stream of information mostly goes in the direction of level design. As such, the purpose of this thesis is to explore what makes some video game worlds so interesting, dynamic and expressive, and see what architecture can learn from it, to bring it into the magic of the real.

The Temperature of a Space, *Fig 7, Illustrated chapter from Atmospheres, Zumthor, P, 2006, Image by author.*

ACADEMIC FRAMEWORK

Purpose and Aim

This thesis seeks to further the discussion between the fields of architecture and level design by establishing a design approach inspired by level design that can work as an instrument for designing real world architecture that has a positive impact on the mood of the people inhabiting its environment.

As level design and architecture have different constraints related to the designing, and movement through each respective environment, an evaluation will be made of what effects used in level design to enhance the persevered atmosphere of the design can be translated into architecture. Formulating a set of principles that can aid the design in its endeavour to further emphasize the designed atmosphere.

The design principles established are applied to a three phased iterative design process. This process will finish with a detailed and dynamic environment taking the form of a public path along the roofs and facades of a mixed-use residential complex in central Gothenburg.

Research Questions

How can the values of joyful exploration and environmental storytelling, alongside the designed atmosphere in video game level design be translated and applied to architecture in its real-world setting and still achieve a similar result?

To what extent can these values be enhanced in architecture by following a design approach of level design?

Delimitations

This thesis is meant for the field of architecture. Hopefully it can be beneficial to other fields as well, but it will be assumed that the reader is unfamiliar with game development as a field. This is not a thesis on what game development is and what it entails, but the basic knowledge required to understand the theories will be provided.

The majority of the design will be made using the 3D computer graphics game engine Unreal Engine and the 3D modelling software Blender. Whilst learning how to use these tools in an optimised way was adamant for the design process, this thesis will no cover the process of learning these tools.

The perception of an atmosphere is a combination of multiple sensory inputs. Due to the limitation of how an environment is experienced through a real time rendering software such as Unreal Engine, a major focus will be on sight as a way of perceiving the designed spaces.

This thesis focuses on the design of a space meant for the real world, as such, many of the traditional ways of enhancing a building during visualization of the project will not be used. Instead the final project will be shown with limited changes from how it is perceived in the real time rendering software.

Relevance to Sustainable Development

This thesis aims to create an environment where its inhabitants can more deeply connect to their surroundings. Whether safe or dangerous, exciting or calming, inviting or excluding, our environments affect us in different ways. A greater understanding of these effects is beneficial in all scales of architecture. By providing a workable architectural design methodology that allows architects to prioritise different aspects of atmosphere this thesis hopes to increase the aesthetic and emotional diversity of architecture.

INTRODUCTION TO LEVEL DESIGN

Level design is the practice of planning and building spaces for video games.
As video games have become more advanced, there are numerous specialist roles involved: A concept artist draws a concept of the environment, which is then turned into a 3D environment by an environment artist, using textures made by a texture artist to give the blank 3D models materiality. (Rogers, 2014) Depending on the scale of the project there can of course exist more or fewer roles that work on the design of the level.

Similarly to how a city planner might draw a street, with nondescript boxes in place of buildings for the architects to add detail to, the level designer builds a level with nondescript boxes for the environment artists to add detail to.

A level designer makes the broader strokes and an environment artist adds the detail.

To complicate this matter further many game studios have forsaken the term level designer and instead prefer to call everyone environment artists. Or how some other studios calls everyone level designers.

For the purpose of clarity, level design will be used in its broadest sense, the designing of a level in its entirety. Environment art will be defined as the refinement of the level by adding more detail.

The following are an explanation of different terms for design principles within the field of level design and how they might be used in this project.

Play-Testing

> "*A play-test is when someone plays your level, and you watch whether your level works or not. Play-testing is a foundational skill and process in game design. You should do it.*"
>
> -Yang et al. (n.d)

This is the method where architecture can learn the most from game development as a whole. Play-testing is where either the developers themselves or recruited play-testers will explore the game or specific designs by playing the game to find bugs or flaws. It is also used to see if the designs achieve the desired result. Play-testing comes in many forms but is often used throughout the game development process. It is seen as a necessity for achieving a good final product (Shell, 2008).

To get an immediate response to whether a design has the intended effect is, as can be assumed, an immensely powerful tool and is in many ways understated in architecture. Many design methods of level design have been taken from architecture, it is only natural, architects have been doing this for far longer. But testing the designs by actually experiencing them and not trying to assume the effect? That is something game developers have been doing for far longer than architects. Architects have only recently started using virtual reality (VR) to explore their designs (Portman et al., 2015) and it is still in many ways not a standard practice. In 2015 one would have to search quite thoroughly to find a building where the architects meticulously and extensively explored their design from a human perspective before it was built. Conversely, one would have to search even more thoroughly to find a game in 2015 that was not play-tested. Level designers did not have to start from scratch in order to find out how to define a space. Similarly, architects do not have to start from scratch in order to find out how to play-test.

Game developers have a clear advantage to architects when it comes to play-testing in the respective fields. Game developers can play-test in the original medium for the experience. Architects can not construct a building in the real world to find out if the design is good or not and would instead need a substitute like VR. No matter how one would frame a play-test of architecture in VR the tester would not act the same way in a virtual space as in the real. This further distances the tester from the intended experience.

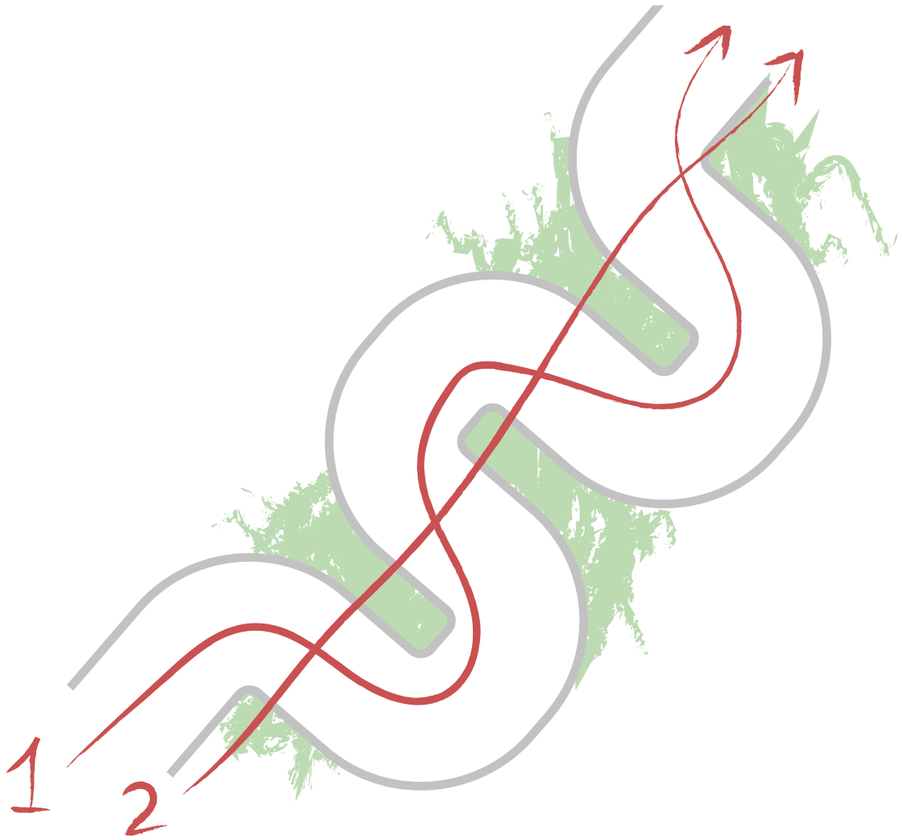


Fig 8, Diagram outlining different movements. Movement 1 follows the intended path while movement 2 disregards it.

For example: An architect might want to test the experience of going from point A to point B through a park as fast as possible. The design is made for a slow stroll of introspection so the road is a winding path framed by flower beds. [Fig. 8] Would the tester follow the winding path (1) or take the straight path (2) through the flower beds in order to arrive quicker at point B? A reasonable assumption would be that, given no other instructions it would take a lot less for the person to simply walk straight through the flower beds if the test was made in a virtual setting.

Due to the added complexity of VR, the simpler and more standard first person projection was used in this thesis. This somewhat limited the testing pool to people with at least minor experience with video games. Someone without any experience with video games can often have trouble moving around as the controls for this can be unintuitive.

The use of Unreal Engine 5 as a real time rendering software allowed for play-testing to be made easier. With the pre-built tools and assets included in each project, no coding was needed.

Fig 9, Concept art example, Image by author.

Concept Art

A piece of visual art that conveys an idea. While an important part of game development, concept art is also used in film, comic-books, and most other forms of visual media. It provides a tangible way for a team to focus their work with a unified vision. The concept sketches used in architecture often serve a similar purpose with a lower level of detail. In most cases a higher level of detail is reserved for the end of the process to be used for marketing purposes (Kaika, 2011).

Unlike the traditional sketch one might find in a sketchbook, the concept art is not primarily a searching tool but a tool for conveying an idea, a concept, to one self and colleagues. A concept artist is specialized to quickly be able to produce images that show colour, materiality, mood, and other qualities that are necessary for the design.

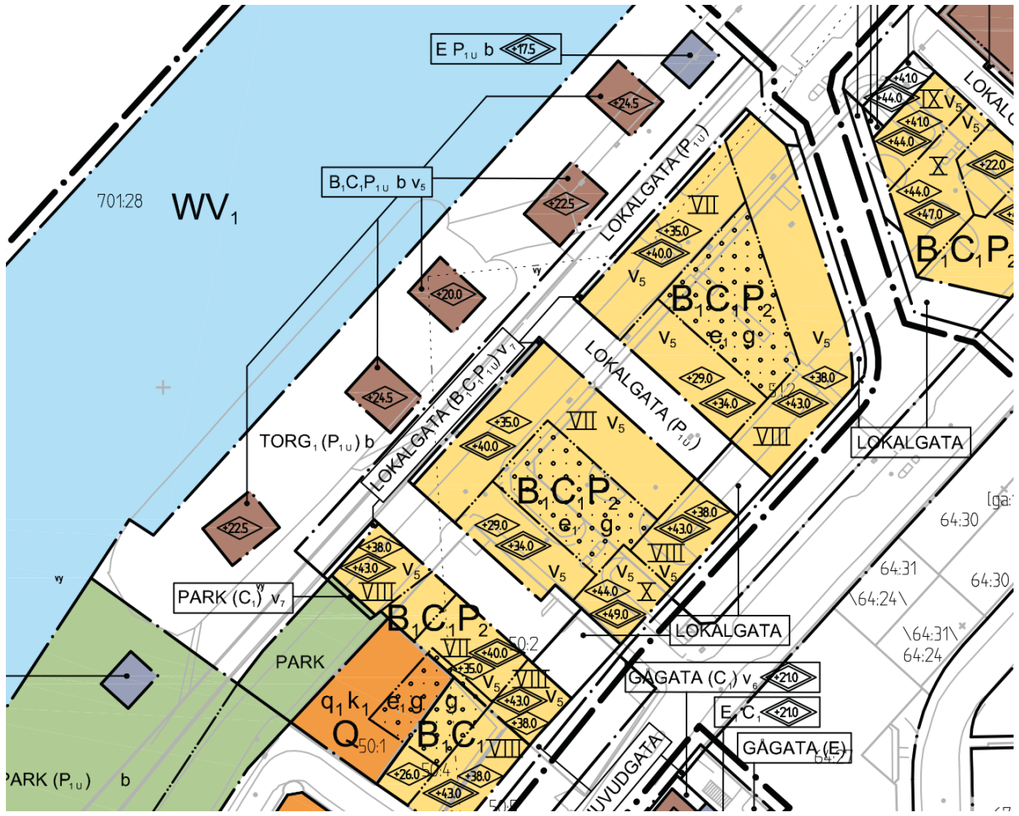


Fig 10, Detail Site Plan, Lööf, et. al, 2012.

Layout

A plan or diagram is often drawn up as a point of departure. The detail of this plan can vary greatly depending on the size of the project (Yang et al., n.d). But with how the virtual world is compressed and gravity is optional, Stuart Macdonald, architect and world art director for Remedy Entertainment's Control and more, mentioned how he tried to encourage the level designers to think more in sections and space and not only in plan (Macdonald, S. personal communication, march 5, 2025).

Remedy Entertainment placed a large emphasis on the node diagram in order to connect the important areas in a meaningful way.

Block-Out

Block-out, or massing, is a tool used to find the desired shapes of the whole environment. Using simple shapes to build the space, often directly in the game engine used to develop the game. The quick access to the play-test lets the developer seamlessly switch between designing and evaluating. What is most important in the block-out is movement and wayfinding. How does the player move through the space? Does this movement achieve the goal of the design?

In larger projects, this process might be reminiscent of the design process of a city planner.

Fig 11, Block-out example, Image by author.

Fig 12, Lighting example. Image by author.

Lighting and Atmospheric Fog

Lighting and atmospheric fog are two of the tools with the most impact for creating atmosphere. They are also the tools furthest removed from reality. In video games, a lot of effort is needed to optimise for the hardware used, which means real lighting cannot always be simulated, instead cheats have to suffice. These cheats also allows for lights without a light source and lighting to be tailor made for the perfect experience. Designing for light is a big part of architecture, but as the light can not be controlled to the same extent, this project will mainly use the default simulated daylight of Unreal Engine and focus on designing light and darkness through the obstruction or framing of this daylight.
Similarly, atmospheric fog is often exaggerated to simulate depth on a 2D-sceen as parallax and focus are of limited availability. Atmospheric fog also has a large impact on the perceived mood through the use of colours and its interaction with light.
Atmospheric fog is heavily utilized for architectural visualization, but as this thesis focuses on what techniques can be translated into a real world environment, this too will be kept to a minimum.

Environment Art

Environment artists refine the block-out into what the player sees. Designing the individual assets of the game.

In the development of video games a concerted effort goes into designing the environments of the world in which the game takes place. This world needs to convey the appropriate feelings and story to the –often distracted– audience. Environment artists focus on the art of telling this story through atmosphere. Many of the techniques used in this field come directly from architecture but by looking at it through the lens of an environment artist or level designer we can remove its more distracting aspects. Most often, a set of distinct assets are made to build up the scene, with specific changes made where needed. This allows the level to have a detailed appearance without the environment artist having to design every individual leaf on every tree.

Fig 13, Environment art example, Image by author.

CASE STUDIES

Case Study 1 - FROM Software: Dark Souls

FROM Software's Dark Souls series is a series of video games that have had such an impact on video game development that a specific genre of "Souls-likes" was created for games with similar characteristics to those which signify the series. They are brutal, combat oriented, challenging, but also empowering. In the game the player is an insignificant bystander who through chance or fate decides to take action. Battling demons, giants, dragons, and finally gods in order to save or destroy the bleak, insane, and dying world. The world itself represents this. The player climbs to the highest tower of a castle fallen into ruin or descends down to its deepest depths, always with something lurking behind every corner waiting to attack. The further the player progresses the more outlandish and creative the environments become.

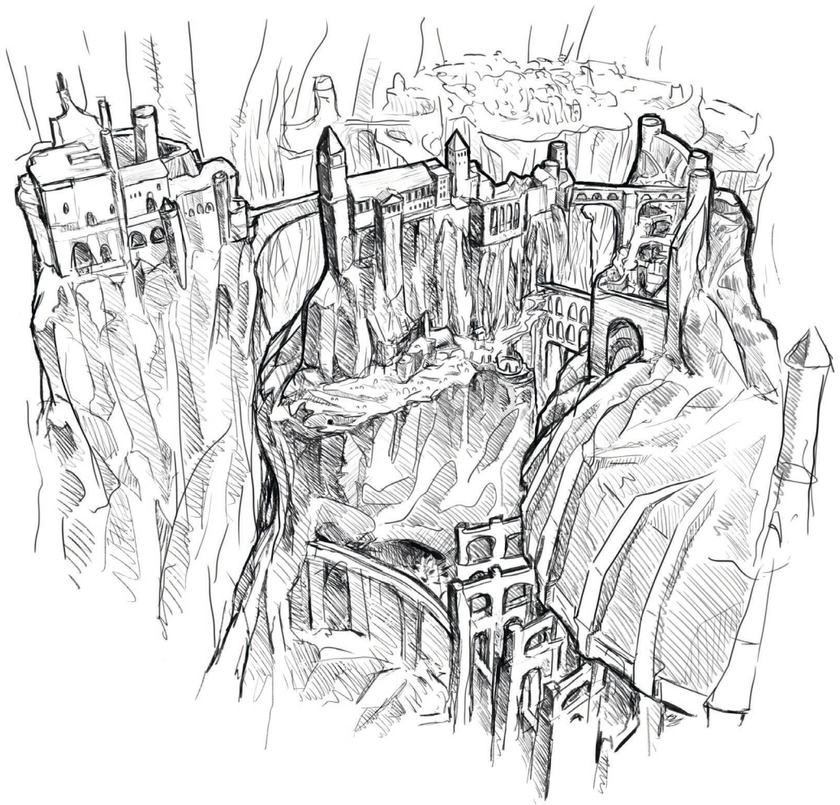


Fig 14, Drawing of the central areas in the world of Dark Souls, FROM Software, 2011, Image by author.

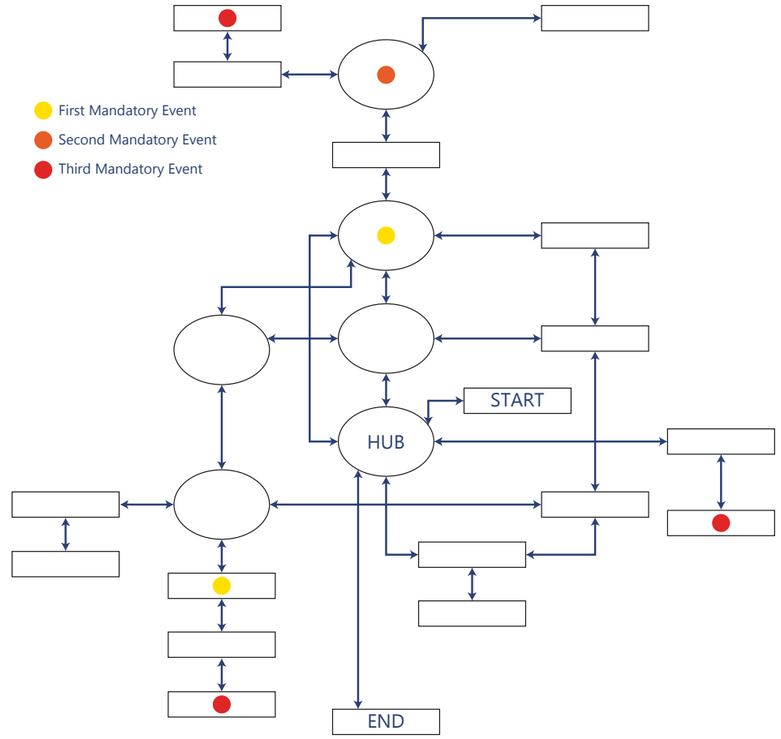


Fig 15, Simplified Map of Connections in the world of Dark Souls by FROM Software, 2011, Image by author.

The bleakness and imposing nature of the world is ever present but through all this the level design inspires hope. Dark souls may be bleak, but it is still a video game meant to be exciting and fun. Exploring a dying world might be interesting but seldom fun. It is the act of overcoming and claiming this world as your own that is the fun part, and even though the game never explicitly tells you how the world works, the world itself holds your hand and guides you in your exploration while you figure it out on your own. The game teaches the player how the world works through carefully designed spatial sequences while simultaneously giving the player a sense of freedom to explore.

The verticality of the world as seen in [Fig. 14] gives the player a general direction and a way to measure their progress. Upon reaching the central hub the player gets instructed to ring two bells, one at the top of the highest tower and one in the deepest depths. While traversing the winding paths of the world, the player then knows that if they're moving either upwards or downwards they're doing something right.

The sense of direction is further enhanced with landmarks seen between the areas, giving direction and teasing more to come.

Through careful application of these techniques, FROM Software created a masterpiece of a world that is just as novel to experience the second and third time as it is the first.

Fig 16, Drawing of the dominant clock tower from Dark Souls, FROM Software, 2011, Image by author.

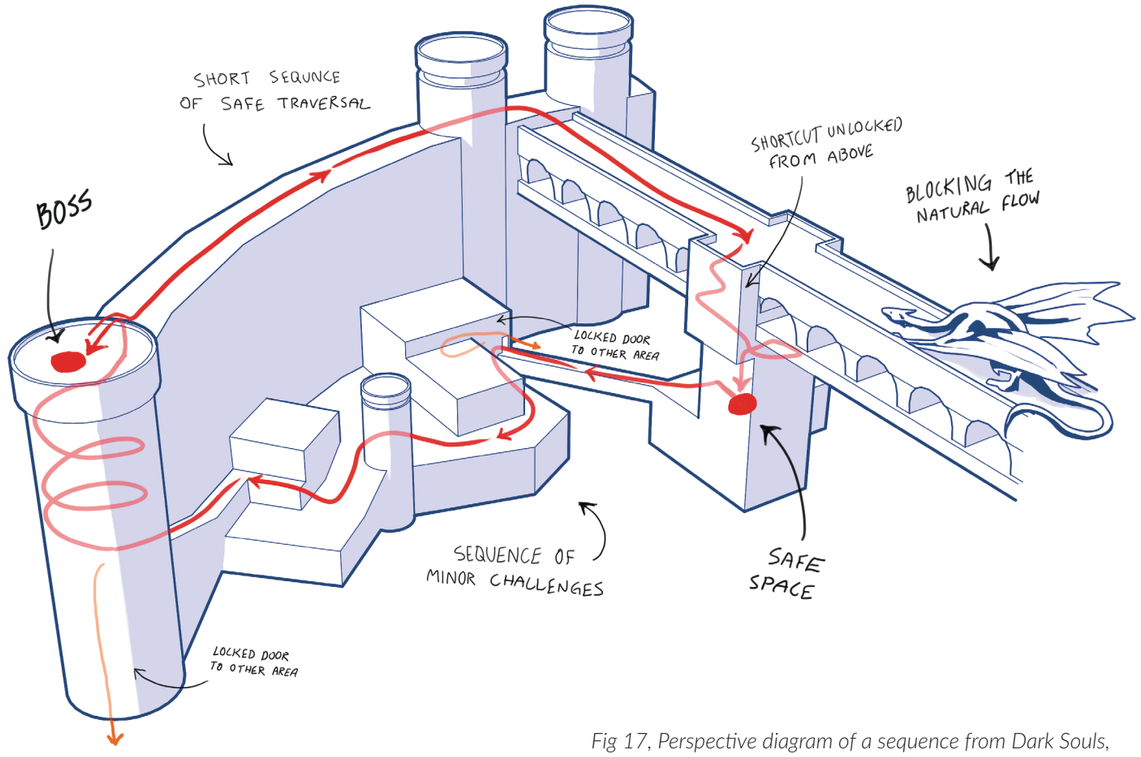


Fig 17, Perspective diagram of a sequence from Dark Souls, FROM Software, 2011, Image by author.

The world of Dark Souls is expansive and complex but it is broken down into smaller loops, the most common of which is a sequence of minor challenges; building up towards a culmination of a major challenge, often in the form of a boss fight; followed by a period of downtime and a safe space from which the next challenge can be tackled. In the case of [Fig. 17], an area early in the game, the safe space the player reaches is the same one they set out from in the beginning of the loop, reached through a ladder they have to kick down upon reaching the top. This has three effects: First of all the player doesn't have to run the entire loop again, but it also shows the player how the world is connected by giving them a familiar space to orient the world from. Thirdly, the passage teaches the player that the world is filled with shortcuts that keen observation of the environment can unveil. Also notable about this sequence is that due to the flow of the bridge, most players would miss this shortcut unless the dragon had forced them to find another way.

Design Rules and Elements

Layered Verticality

The biggest sense for verticality in the world is how the horizontal layers are connected through different vertical layers. Unlike the real world were a single horizontal layer connects the vertical layers. Streets connecting buildings etc.

Structured Connections

Multiple connections are good, but too many and the space loses structure. Mixing between few and many connections conserves the structure but keeps the feeling of openness.

Pacing

By shifting the pace throughout the sequence with fast paced areas with a lot of things happening shifting into slower paced areas of relaxation and recuperation, the player can keep exploring without getting exhausted by always being bombarded with new impressions.

"Hidden" Gems

The world of Dark Souls is populated with "hidden" areas. Meaning they're meant to feel hidden, but are also meant to be found by the player. Some are just hidden by breaking the sight lines, while others are only revealed by touching an illusory wall that melts into the environment.

Flow, and the Breaking of Flow

Showing the player where to go via the environment and giving them a direction is important. It keeps the player from wandering aimlessly and without purpose. But only giving directions does not facilitate exploration of the environment. By having a clear flow but breaking it forces the player explore and find their own way. But breaking the flow too hard will leave the player thinking its a dead end and they will turn back the way the came from.

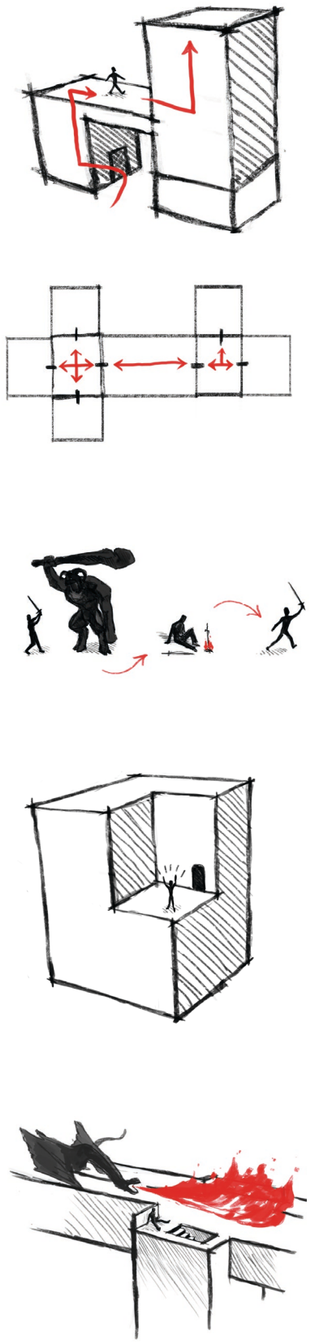
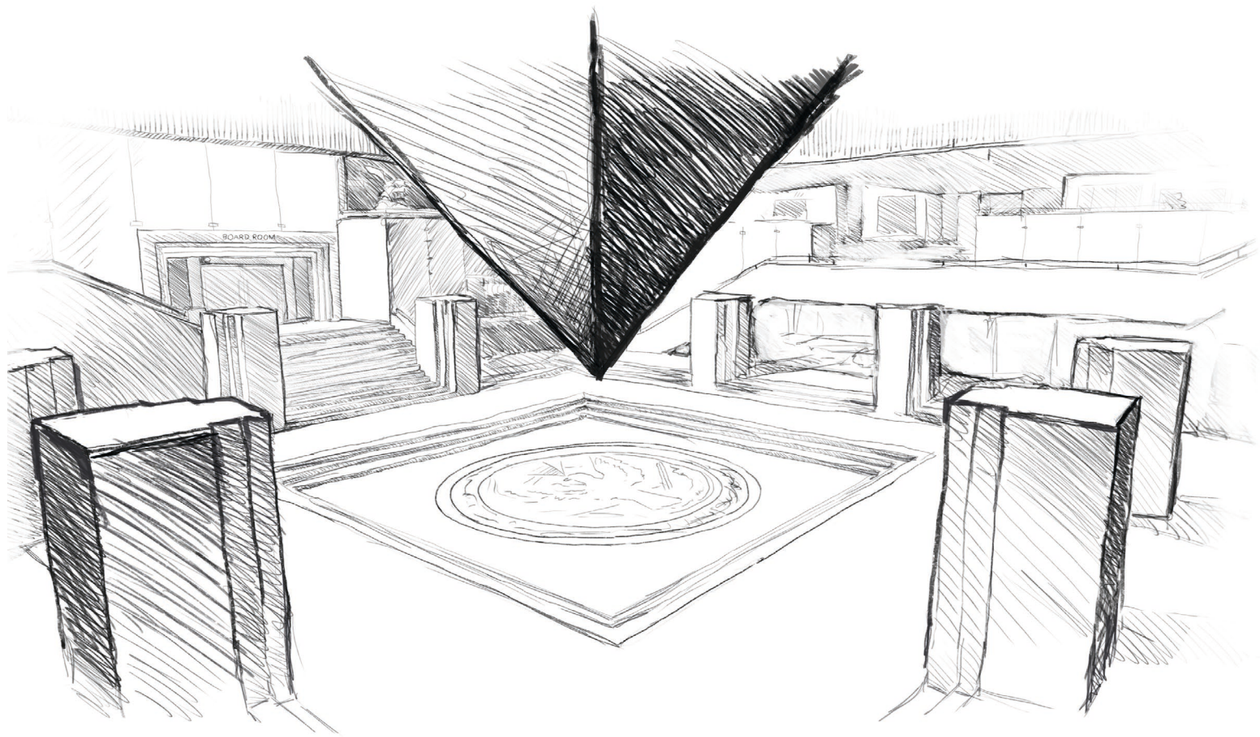


Fig 18, Illustrated Design rules and elements, Image by author.

Case Study 2 - Remedy Entertainment: Control

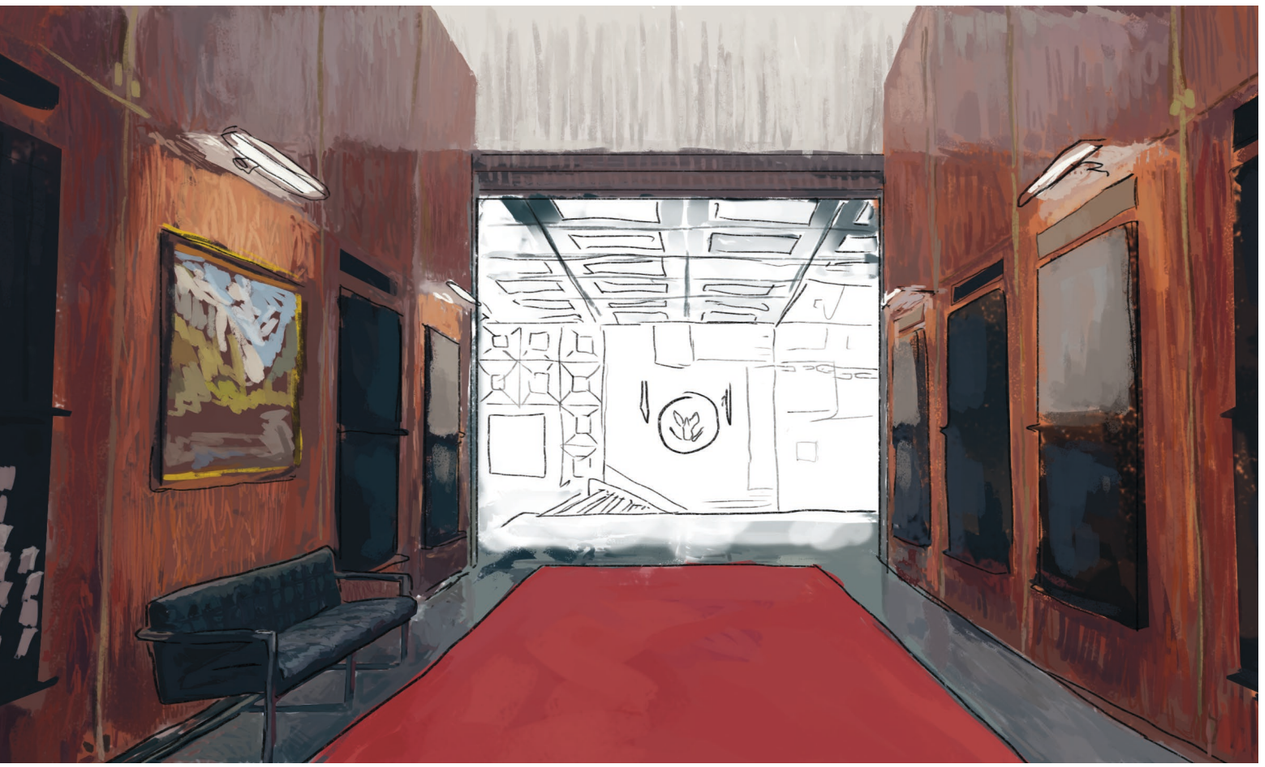
Control is a game about contrasts. It takes place inside a single building, an infinite and ever shifting building, but a single building nonetheless, called The Oldest House. It takes heavy inspiration from the "new-weird"-genre which in turn is a continuation of the eldritch horror of H.P. Lovecraft. In the game, the player quickly becomes the director of the Federal Bureau of Control (FBC), a secret U.S. government agency that focuses on controlling and studying different items and events that break the laws of reality. The Oldest House is the headquarters of the FBC, and though the house is not understood, they have carved out sections within its infinite bounds. These sections are in a clear brutalist style coupled with a mundane office aesthetic and act as a contrast to the reality-breaking beings and items that have occupied the spaces. This contrast between mundane and weird is what really captures this video game. For the player to really appreciate the weird, they must first have a baseline of the mundane for the weird to break.

Fig 19, Drawing of "The Executive Sector" from Control, Remedy Entertainment, 2019, Image by author.



This contrast between the mundane and the weird takes many forms. The order in the mundane and the chaos of the weird. The Oldest House and the FBC trying to claim it. The powerless and ostracised player character that then becomes the director of the organization that abused her. The concrete and steel often associated with stability and the human control over nature, being used to portray an ever changing building with a mind of its own, uncaring of the wills of the bureau. The building has no windows to the outside, yet still there are skylights in many rooms. The expansive rooms and the tight corridors that connect them. The contrasts goes on, down to the hard and rough concrete being contrasted with waxed wood and bright red fabrics.

Fig 20, Material study of Control, Remedy Entertainment, 2019, Image by author. Note resemblance to [Fig 6].



Architectural Jump Scares

Down in the depths of the oldest house lies “The Black Rock Quarry”, a quarry that gets eluded to throughout the game as a place where the FBC mines Black Rock, a stone that seems to constrain the supernatural. Upon entering the sector, the concrete walls slowly shift to the obsidian-like stone of Black Rock. When entering the main quarry the players gaze is drawn downward through a set of jumping puzzles. Then suddenly, upon looking forward again, the roof disappears and a starry night sky is revealed. The player is still inside the building, but there is a seemingly infinite space with stars and nebulae within it.

This tonal shift is seen in many spaces of The Oldest House. Within another of the sectors, the player is greeted by a pair of redwood trees growing within the interior of the brutalist architecture.

Fig 21, Artistic Recreation of “The Black Rock Quarry” from Control, Remedy Entertainment, 2019, Image by author. Note resemblance to [Fig 3].

METHOD

Research Process

The main focus of this thesis is on the experience of architecture. An experience is subjective and hard to quantify. As such this is a qualitative study where the designs will be evaluated through the use of play-testing by the author and peers by walking around in the virtual environment using Unreal Engine 5.

The design principles of level design gathered from literature- and case studies will be explored through an iterative design approach to gradually reach a dynamic and expressive design that achieves both the standards on atmosphere as well as having the possibility of being constructed in the real world.

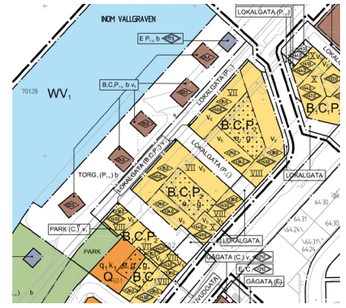
Design Process

The process of making the design is split into 3 distinct phases. Layout, Block-out, and Environment art, each with distinct goals. During these phases the design will be scrutinised through differing levels of realism and effect. Evaluating whether the effect of a specific space is reliant on aspects that cannot reasonably be built in the real world. The goal is not a perfect design, but to find a design approach that incorporates the a dynamic and expressive atmosphere into the design.

DESIGN

1 Layout

Establishing a framework to work from. Examining the context and constraints of the site, as well as its possibilities. The goal is to establish a clear idea of a design that fits both the site and the aim of the thesis.



2 Block-out

Focusing on spatial relationships and the exploration of the space by following the principles established from the case studies. Three levels, or maps, will be developed on the site established in the Layout-stage. The goal is to have a rough design that can then be further detailed in the environment art phase.

3 Environment art

Refining the Block-out designs to enhance materiality and atmosphere, ensuring it connects to the surrounding city while maintaining its own identity. This phase will continue until the project is finished.

ANALYSIS

Play-testing

Evaluating the effect of the design and how the design's dimensions and features affect its realism and practicality in a real-world setting.

The real time rendering aspect of Unreal Engine allows for an immediate response to whether a change works or not in establishing the desired atmosphere through play-testing.

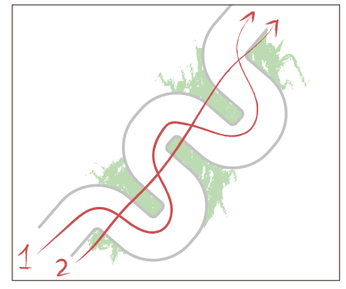


Fig 22, Diagram showing the phases of the design that will be used to produce the final project.

LAYOUT

Initial Goals of the Design

The project will act as a venue to showcase the methods established from the case studies. It will focus on atmosphere and the experience of a space but usability and realistic feasibility is still required.

To achieve this, the design of the project must fulfil the following criteria.

The design needs to fulfil the spatial design rules and elements established in the case studies.

Even though the methods in this thesis can be applied in any space, the design will focus on the public and semi public spaces and the exterior of the building.

The project needs to capitalize on existing potential whilst simultaneously creating a space of its own.

With a focus on the urban environment, the project also needs to fit inside the existing and planned road network within the city of Gothenburg.

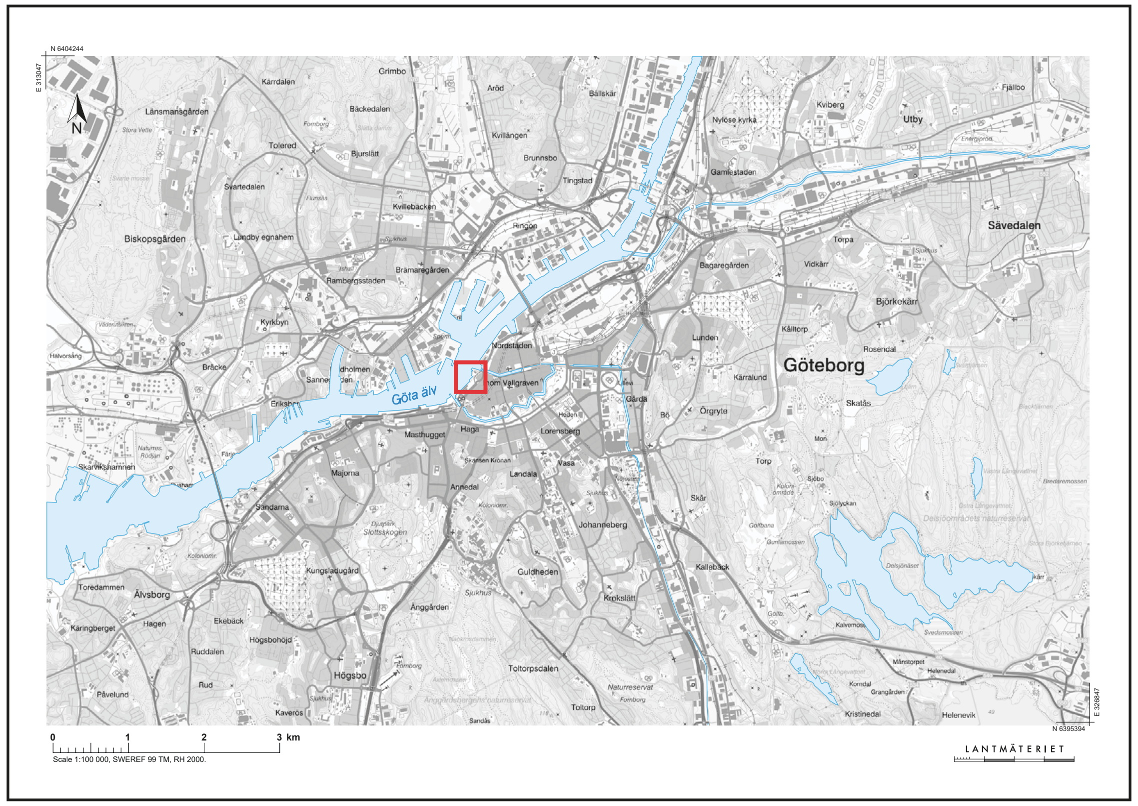


Fig 23, Map of Gothenburg, Scale 1:100 0000 (A4), Lantmäteriet, (2025), Image is edited for clarity.

Site Analysis

Skeppsbron in central Gothenburg was chosen as a site. It is a site that has been stuck in the limbo of bureaucracy for 15 years with multiple iterations of site restrictions, or detail plans.

The site in question was chosen as it is one of the last unexploited plots within the heart of Gothenburg. It has easy access to the entire city through the nearby travel centre of Stenpiren.

Skeppsbron is closely tied to the history of Gothenburg. With a number of culturally preserved buildings and the iconic Rosenlundsverket with its teal chimney of a 100 meters, adding to the silhouette of the city since 1954.

With the amount of unique buildings on the site, a greater degree of freedom in the design is possible.

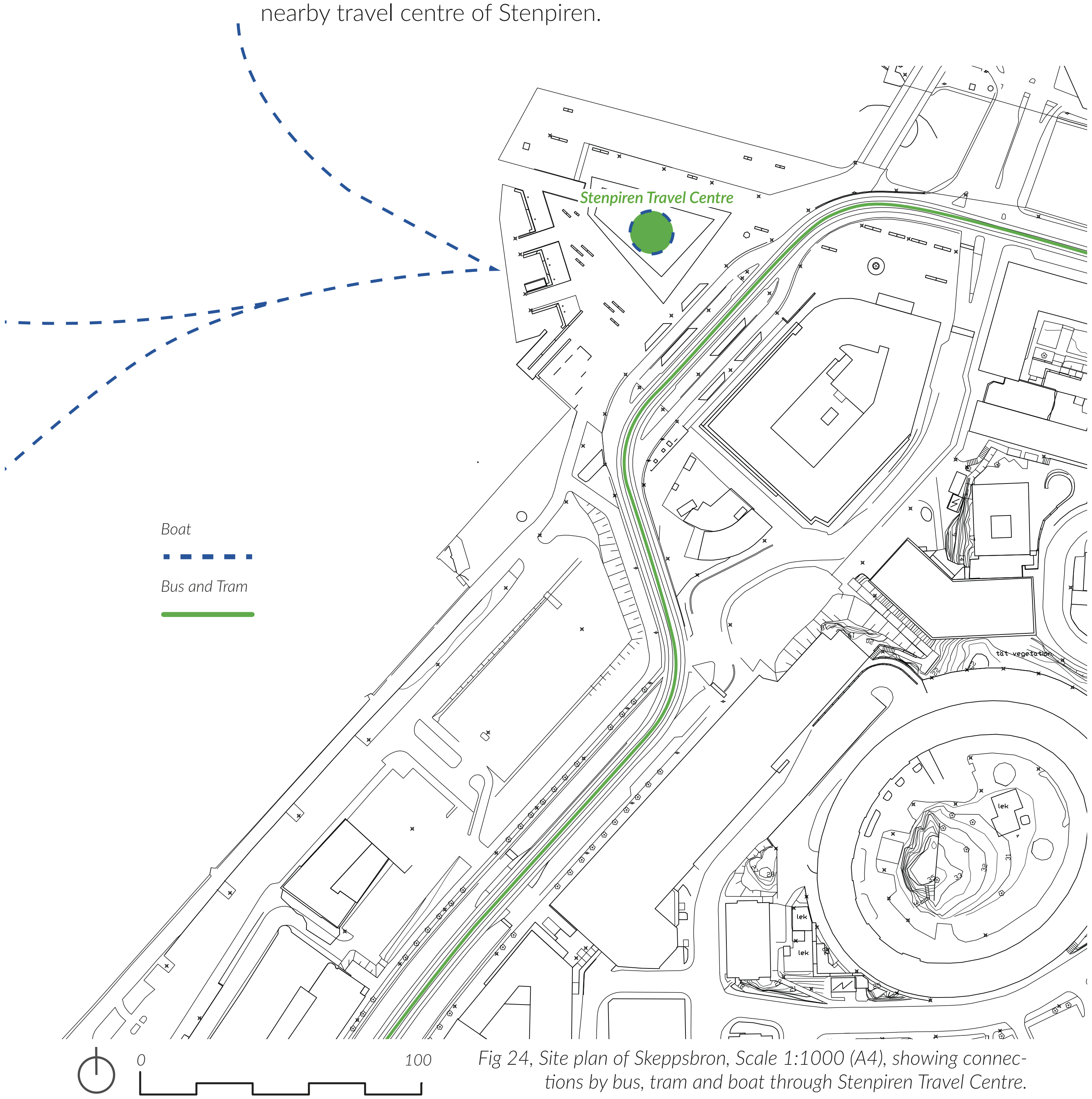


Fig 24, Site plan of Skeppsbron, Scale 1:1000 (A4), showing connections by bus, tram and boat through Stenpiren Travel Centre.

Changes in Detail Plan

While the restrictions of the detail plan will not be followed in their entirety it will be used as a plot restriction to ensure the project fits within the built and planned road network and that the housing program stays roughly the same.

Furthermore the detail plan makes a couple of changes to the existing site, most noteworthy of which is the widening of the quay. In the detail plan the quay gets extended roughly 35 meters into the river to further facilitate use and connection to the water.

This quay will not be designed in the project but the changes in the quay gives an opportunity to bring the water into the site.

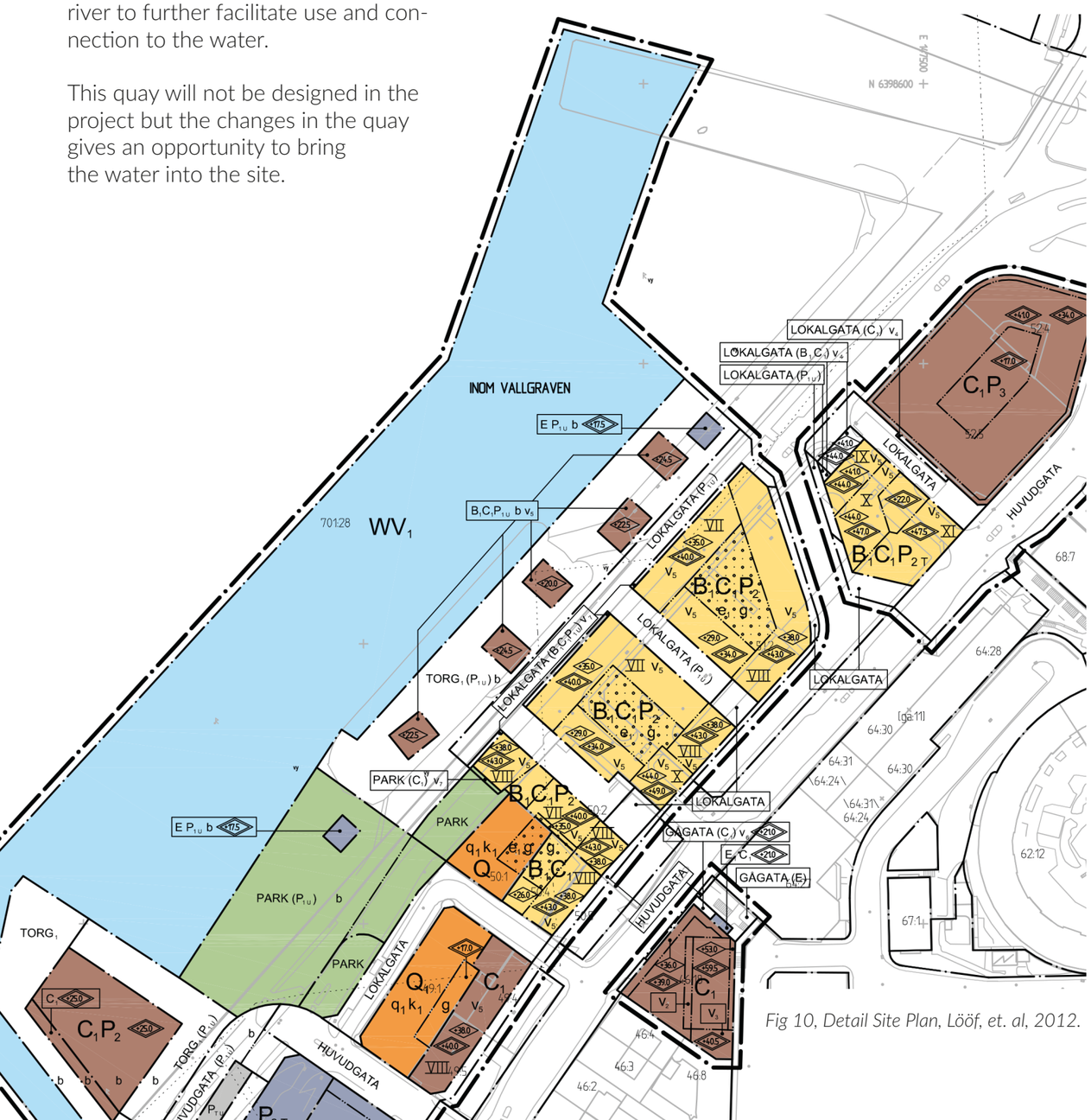


Fig 10, Detail Site Plan, Lööf, et. al, 2012.

Planned Project Area

The building composition and arrangement will be decided in the Block-out phase, but the general footprint and building height restrictions will be inspired by the detail plan. The program of housing on top of businesses meeting the street will also remain.

Also worthy of note is the reduction of the project area. This is due to the complexity of the project and it's time constraints.

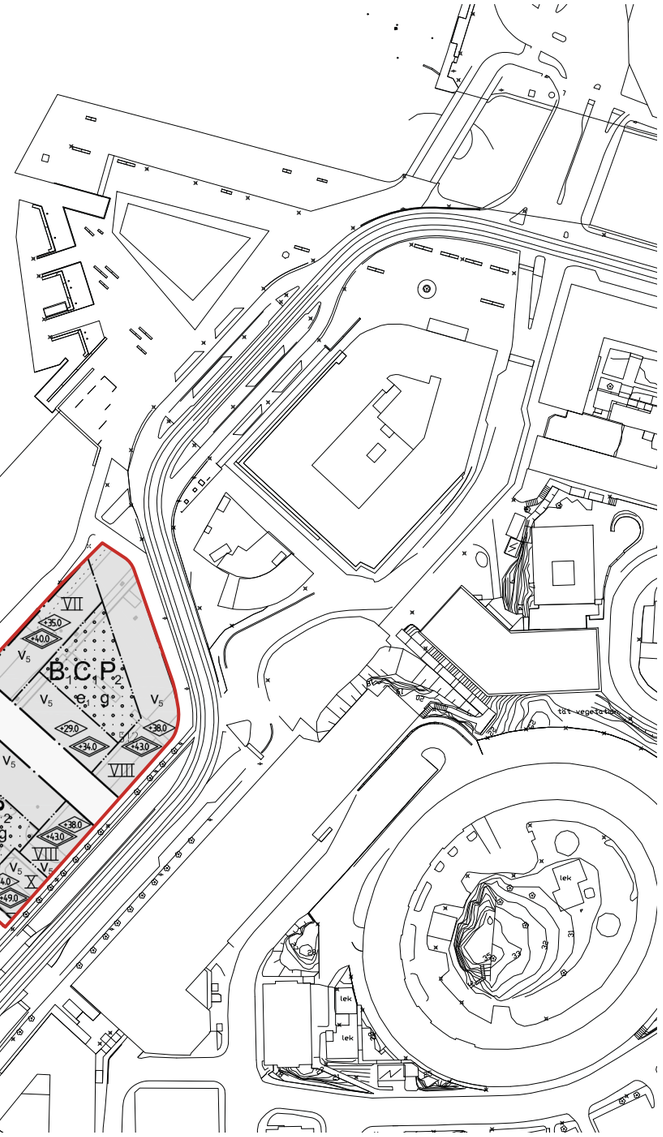


Fig 25, Site plan of Skeppsbron, Scale 1:2000 (A4), showing planned project area with buildings from the detail plan superimposed onto the site

Sketches for the Design

A set of sketches were made to explore the design. A multitude of unique buildings, forming a cohesive whole became the guiding goal. An inspiration from the wooden villas of the Gothenburg archipelago was combined with an approximation of its cliffs to achieve a design where a chaotic facade of concrete and stone could form the base for the wooden buildings to stand on. These wooden buildings would be similar in their design, but given the nature of the shifting base, their forms would change to give the impression of a town that grew naturally.

For the concrete base to feel like cliffs, an abstraction needed to be made. In the case study of Control (Remedy Entertainment, 2019), the concrete of The Oldest House appeared as cliffs. In an effort to replicate this effect, a simple 3D-model was built [Fig 28].

A facade sketch was made of the southern facade to explore how the wooden buildings would meet the concrete base. Alongside an exploration of different colours for said buildings. Even though most houses in the Gothenburg archipelago are painted white, an addition of colour to the city would help in giving it more life, as the personal opinion of the author is that a greyscale city only works if it is accompanied by trees and foliage, which in Sweden, is only for half of the year.

Fig 26, Collage of design ideas for the project. Image by author.

Fig 27, Facade Sketch, Elevation

Fig 28, Facade Sketch, Perspective

BLOCK-OUT

Map 1, Semi-Encased Terraces

A quick block-out-design was created to get a feeling of the space and its potential with a priority on verticality through the use of terraces. The level of detail in the design was explored further to get a better understanding of the relation between basic shapes and a more detailed environment.

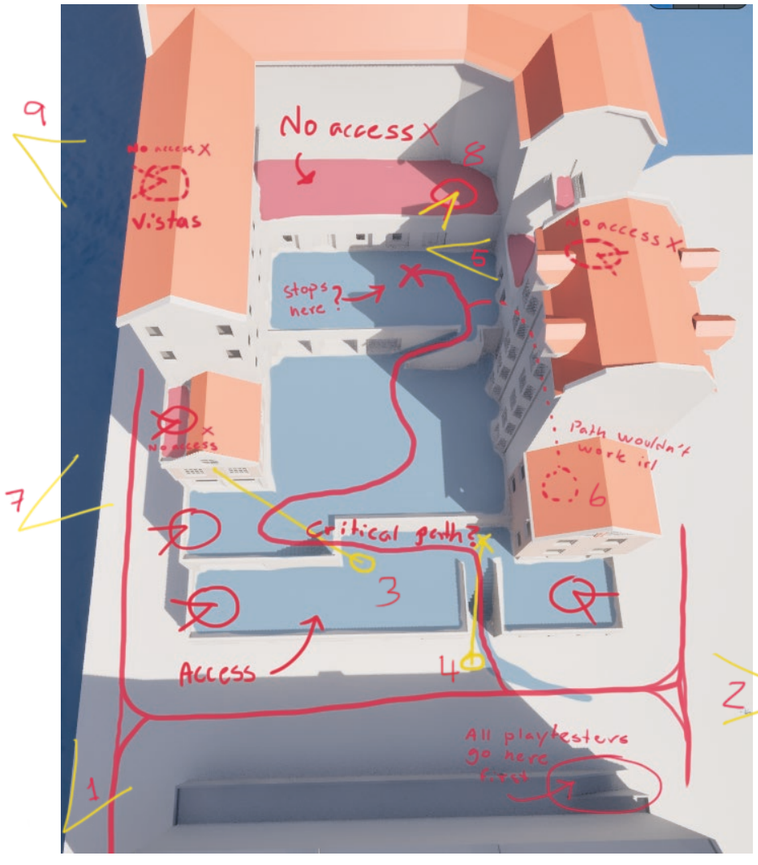
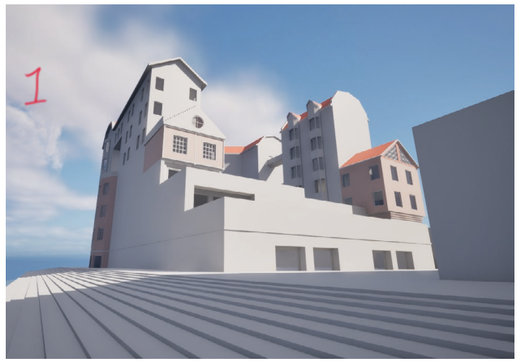
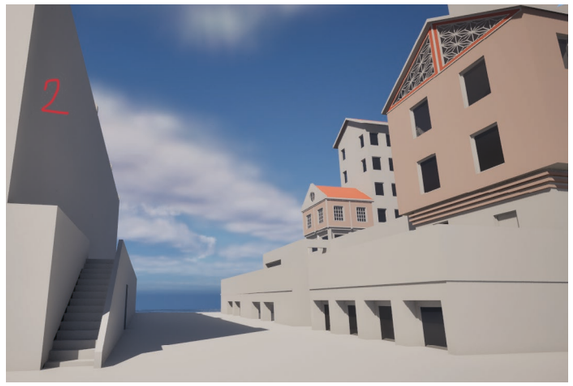


Fig 27, Annotated perspective of initial design, with perspective markers for [Fig 28]

Fig 28, Annotated perspectives,





The design was evaluated in relation to its flow, vertical and horizontal scale, physical and social barriers, as well as the usage of space. As these were determined to be some aspects that would work differently in a video game environment compared to the real world.

Flow
While there is only one path to enter the terraced space, there is no real incentive to enter the space. Every uninvolved play-tester prioritized the stairs to the unfinished building to the south. When asked why, the reason was to get a better view of the intended building. An issue appeared with the play-testers then getting stuck due to collisions generated by Unreal Engine 5 and trying to enter windowed spaces due to the windows being too transparent. The testers ended up needing verbal guidance of where to move.

Vertical Scale
The height of the buildings is reduced compared to the detail plan with a maximum of 7 floors instead of 8. The windows on the ground floor, intended to be roughly 2,5 meters tall, are lower than the player and thus removing the sense of an arcade and end up feeling more like basement windows.

Horizontal Scale
The floor plan is generated from the detail plan which would should make the horizontal scale roughly balanced. More detail is required to be able to make an assessment.

Barriers
There are no social barriers in this test and many physical ones. The spaces identified for optimal lighting and views are inaccessible. Windows are blocking the exploration of the unfinished interior. These could be labelled private spaces for the intended residents in a real life scenario, but the play-testing should allow for exploration of private areas.

Usage of Space
The design of the terraces create interior spaces with sub-par lighting conditions on the lower floors, these spaces could be used as parking garages but to take up so much valuable land to then convert it into parking garages would then need the effect the terraces create to be more enhanced. This is not achieved in this current iteration of the design, leaving the spaces to be unoptimized.

Map 2, Node Design

By using the elements and rules developed in the Dark Souls Case Study, a simplified design out of nodes and lines could be made. It quickly became clear the node design is dependent on what constitutes a node and the environments quickly became complicated, losing their structure and thus breaking one of the rules developed.

To simplify the spaces, parts of the abstract map of Dark Souls [Fig 15] was used. The nodes on the map were interpreted as being spaces of their own, similar to the spaces in the game world they represent. Creating a slightly more complicated node diagram in the process.

The node diagram in [Fig 29] was interpreted into a building complex with four distinct public areas. A central hub (red), a middle level of traversal (orange), an upper level (yellow), and a garden (purple).

The shape of the design was loosely based on the plot outlined in the detail plan of Skeppsbron. Blocks, roughly the size of an apartment were used to construct the shapes. These had a floor height of 3 meters and a depth of 8-14 meters. Interior stairwells and elevators would need to be added and the public paths designed would be an addition to these.

In the Dark Souls map that inspired the design, a profound realisation of how the game world works is when you enter an elevator on the upper level that takes you down to the hub. Since in the real world, an elevator is assumed to reach every floor of the building, this wouldn't have the same effect. Instead, a narrower but hidden path was created that, upon returning to the hub, would evoke a similar feeling of realisation.
Another aspect from the game that was incorporated was the feeling of walking not where you were supposed to when, in fact, you were. This takes the shape of a walkable roof with a slight tilt.

Motivation to explore isn't as simple as it is in video games; placing items that help you on your journey in hidden nooks, isn't an option. Instead, motivation to explore was drawn from the framing of views, both into the building and out from it. This effect would be more apt if there was anything outside the building to look at.

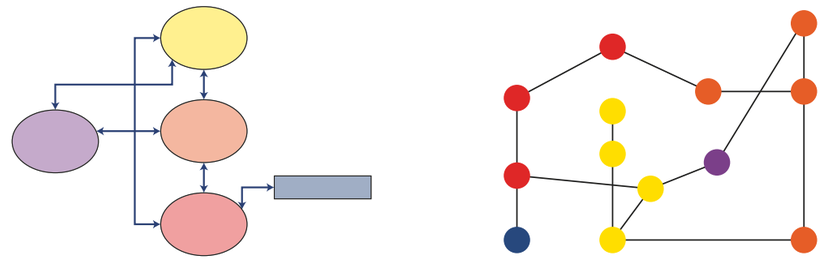


Fig 29, Simple node diagram extracted from [Fig 15]
Image by author.

Fig 30, Floor plans, no scale, Image by author.

Fig 31.1

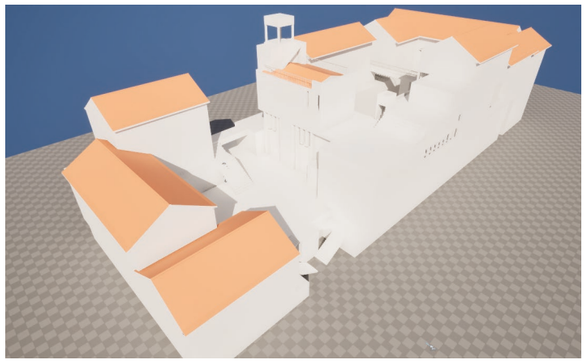


Fig 31.2

Fig 31.3

Fig 31.4

Fig 31, Perspectives of spaces designed in the block-out, Image by author.

The spiral shape of the design leaves the central building, here taking the form of a church but imagined as a library [Fig 31], always present, making it the most distinct building in the complex. As the spiral walk around this building continues, the spaces shift.

The main square is meant as a hub of stability. This connects to every other area, and while there are many nooks to explore, the space is easy to read and traverse, with a slightly hidden shortcut to the upper levels.

The courtyard, is meant to be a dark and mysterious garden filled with trees. The effect being amplified by the height of the buildings restricting the light from reaching the ground.

The paths instead have a dynamic movement with tight corners and height changes. Walking on the buildings and over bridges, always close to the darker courtyard but never touching.

The upper square is meant to be a new island of stability, where the open views reveal the building complex and one starts to understand how it all fits together, this is where the shortcut from the main square emerges, being much more apparent from this side, leaving a quicker path back to the exit.

From the upper square, the central building can be accessed. This monolith has two parts, a spacious interior akin to a grand hall, but also a stairwell accessible from the outside leading up to the final destination.

The roof of the central building is slightly slanted, to emphasize the feeling of actually walking on a roof, and not being where you're supposed to. This is in contrast to the clear lookout spot at the other side of said roof. Making it clear that the intention is to walk on the roof to get to the lookout spot, to see the city in all its splendour.

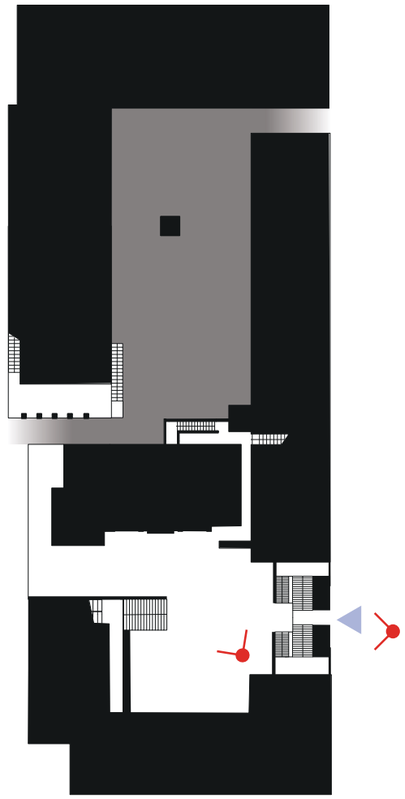


Fig 32, Negative space spatial diagram

Fig 32.1, Perspective of the main entrance, Image by author.

Fig 32.2, Perspective of the central square, Image by author.

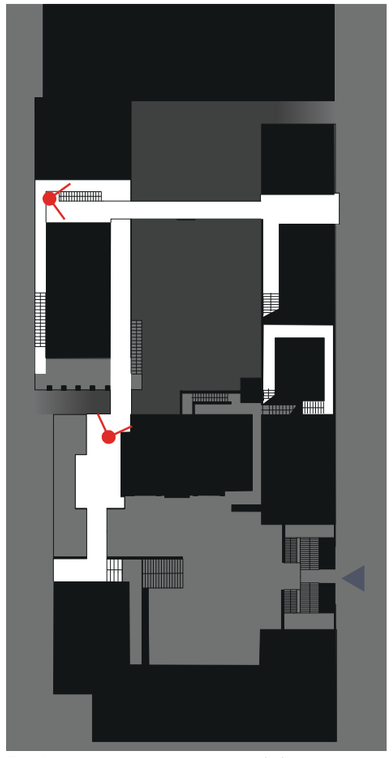


Fig 33, Negative space spatial diagram

Fig 33.1, Perspective of the path to the courtyard, Image by author.

Fig 33.2, Perspective of the bridge over the courtyard, Image by author.

Fig 34.1, Perspective of the path to the upper square, Image by author.

Fig 34.2, Perspective of the upper square, Image by author.

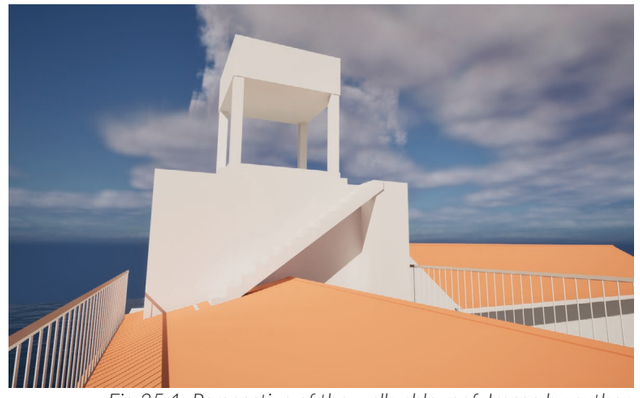


Fig 35.1, Perspective of the walk-able roof, Image by author.

Fig 35.2, Aerial perspective of the central building, Image by author.

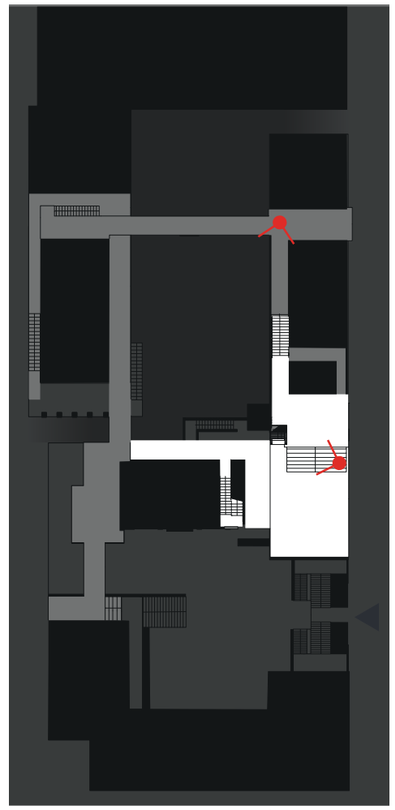


Fig 34, Negative space spatial diagram

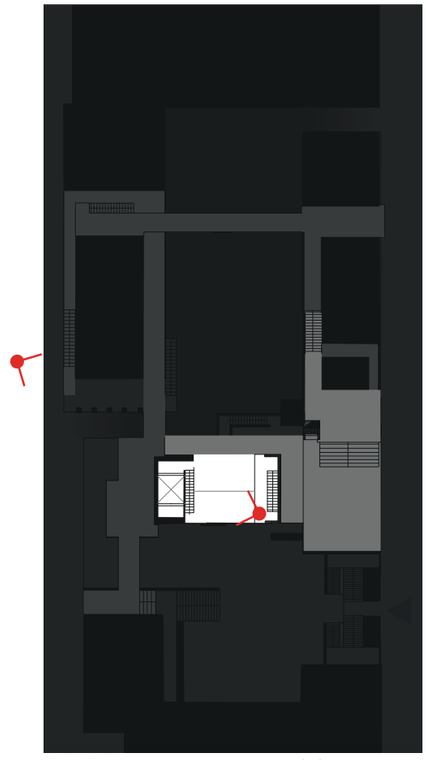


Fig 35, Negative space spatial diagram

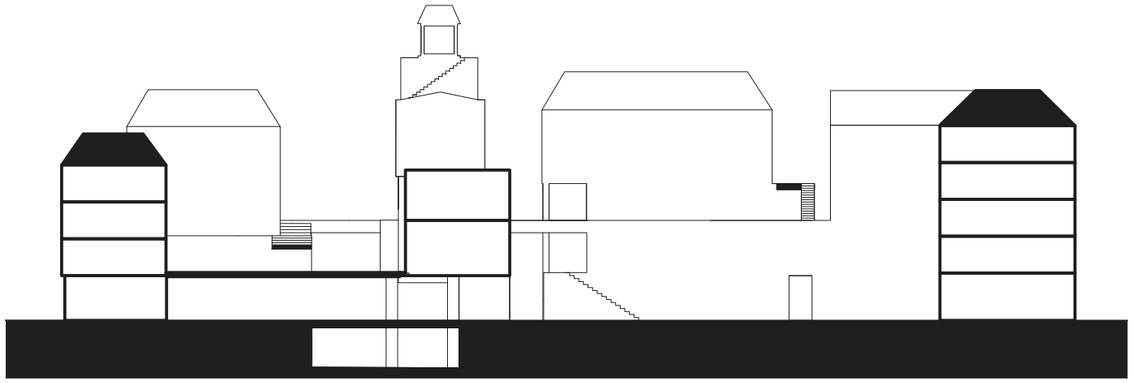
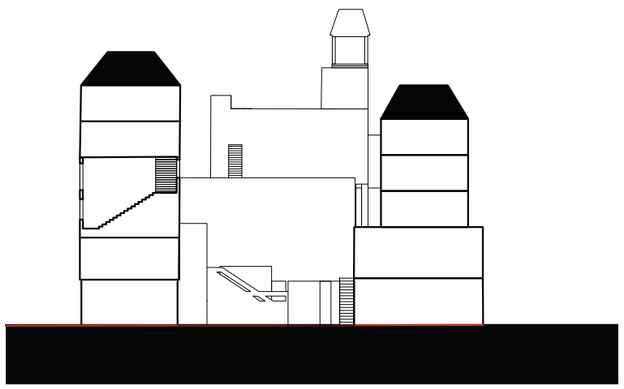


Fig 36, Section A-A, Scale 1:500 (A4)



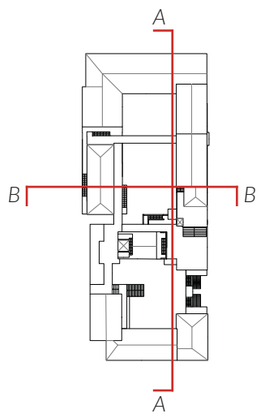


Fig 37, Section B-B, Scale 1:500 (A4)

Play-Testing

Walking around in the design reveals that the intended path is not as clear as it was assumed. Upon entering the main square the play-testers are drawn toward the imposing central building [Fig. 32.2], which was expected. But the exit of the short-cut between the upper square and the main square is too enticing [Fig. 31.3]. Play-testers saw the entrance and, expecting a quick detour chose this path instead of the bridge only to end up walking the path in reverse. The design is made with this in mind and it would not be a problem if the play-testers didn't immediately stumble upon a stairway down to the basement, which wasn't even supposed to be in the final design. Two out of the three play-testers ended up needing verbal instructions in order to find the spaces intended for the experience.

The short-cut will need to be revised or hidden more in the Environment Art-stage. Drawing the player up towards the bridge might have a similar effect but in the intended path. Or just removing the basement.

Map 3

With a general idea for the spatial sequence program established, Map 2 was compared to the site of Skeppsbron where it was apparent that the scale and footprint of the map was too small [Fig. 38 & 39]. The length and width of the buildings as well as the space between them was increased to encompass the larger footprint of the site. The new scale allowed for a greater building height which also aligned better with the established detail plan.

Due to the changed scale of the building complex, the spatial program needed to be adjusted. The upwards spiralling movement and overall look of Map 2 remained but stairs and bridges need to be moved or removed.

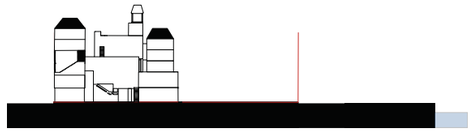


Fig 38, Section showing the size disparity, no scale.

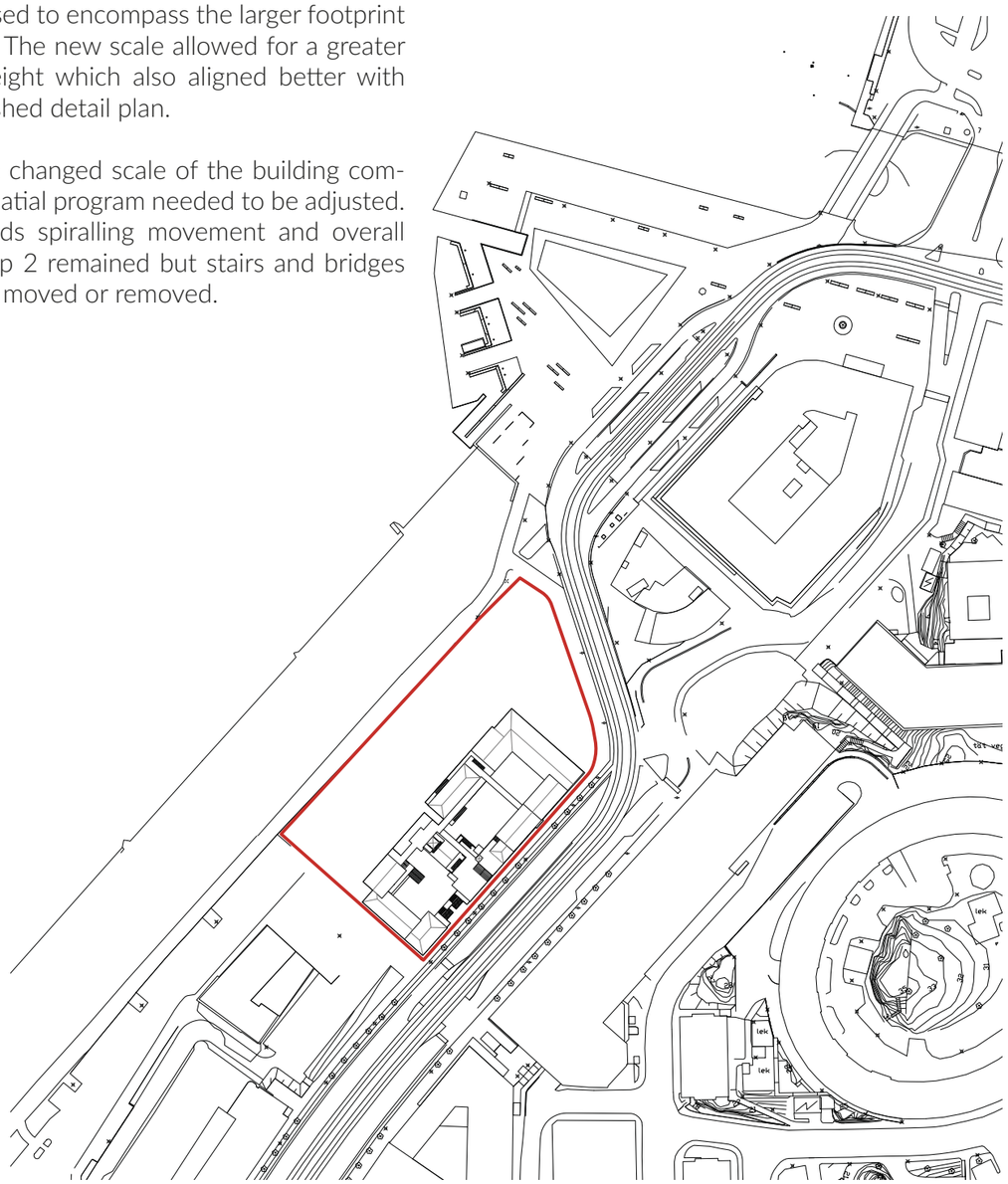


Fig 39, Site plan showing size difference between Map 2 and the project area, Scale 1:2000 (A4)

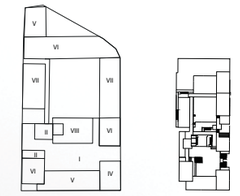


Fig 40.1, Diagram showing size difference, no scale.

Fig 40, Plan of Block-out, no scale.

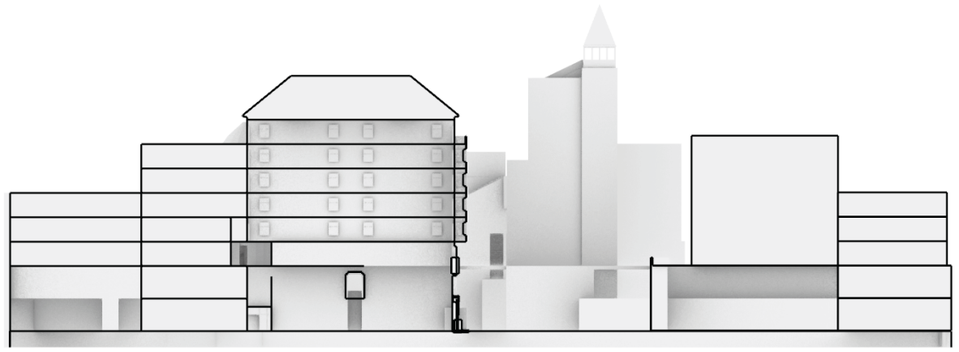


Fig 41, Section A-A of Block-out, no scale.

Fig 42, Section B-B of Block-out, no scale.

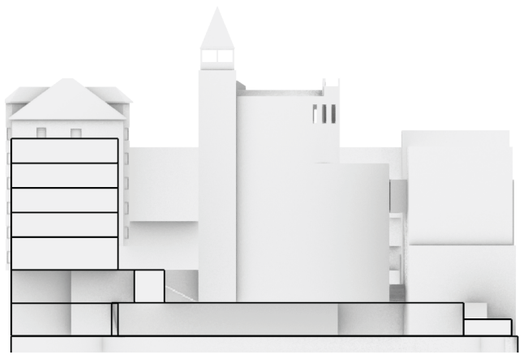


Fig 43, Section C-C of Block-out, no scale.

With the block-out adjusted to fit the footprint of the site, the environment art phase could be started. As seen in [Fig 44], the transition between the phases became gradual as the wooden panelling as well as the bay windows could have made a large enough change that they needed to be tested before the block-out could be considered finished. This adjustment to the larger shapes to better fit the details of the space continued throughout the environment art phase.

Fig 44, Facade elevation of Block-out, no scale.

ENVIRONMENT ART

Environment Art 1

Following the design of wooden buildings standing on top of a concrete base the Block-out was given greater detail and colour. The concrete, reminiscent of cliffs came with the issue of daylight access. In the end, the windows were thought of as caves within the cliffs shown in [Fig 48 & 49]

The textures of the wooden buildings were kept simple as a start, but as a result, the colours proved hard to manage. They were either too strong, evoking a polka dot feeling, or too weak. Instead they were left as is until the entire building complex was fully modelled as changing colour on the material was easy, but getting the right one without context was hard.

But as the buildings started to take form, the design didn't evoke the feeling of the envisioned town standing on top of cliffs. In an attempt to salvage the design more detail was added, a time consuming process that, although it created some aesthetically pleasing spaces, could not make up for the shortcomings of the overall design.

Fig 45, Perspective of the inner courtyard.

Fig 46, Perspective of the south eastern facade.

Fig 47, Perspective of the arcade facing inner courtyard.

Fig 48, Perspective of the square.

The boxlike protrusions of the concrete facade envisioned in the layout faced the same problem. In some areas they worked, managing to evoke the chaos of nature. In other areas, they ended up feeling like something made in Minecraft, and not in a good way.

The entrances to the complex also proved a problem. The main entrance became closed and hidden, without clear sight lines [Fig 50], while the side entrance leading to the inner courtyard was monumental, simple and clear, only leading to the wrong destination [Fig 51].

Fig 49, Perspective of the north western facade.

Fig 50, Perspective of the main entrance leading from the street to the square.

Fig 51, Perspective of a side entrance leading to the inner courtyard.

Environment Art 2: Facade Redesign

It became clear that a redesign was needed, and it needed to be more efficient. The concrete parts needed to evoke a sense of chaos without feeling cluttered and the wooden parts needed to have an ad hoc solution based design in order to capitalize on the chaos. All of this needed to be made in a way that every minute detail didn't have to be made every time.

All in all, two things were needed. A better design, and a lighter workload. The two easiest things to achieve, especially at the same time.

To achieve both goals a redesign of the major parts was needed. Two new drawings were made, not going off of the feelings that should be evoked but depicting the actual design.

Using the drawings, a set of building elements were made, that when put together could form larger buildings.

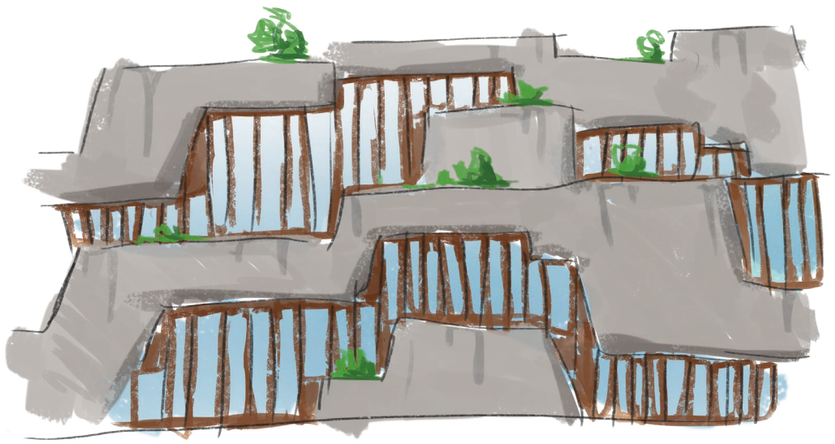


Fig 52, Drawing of a facade segment.

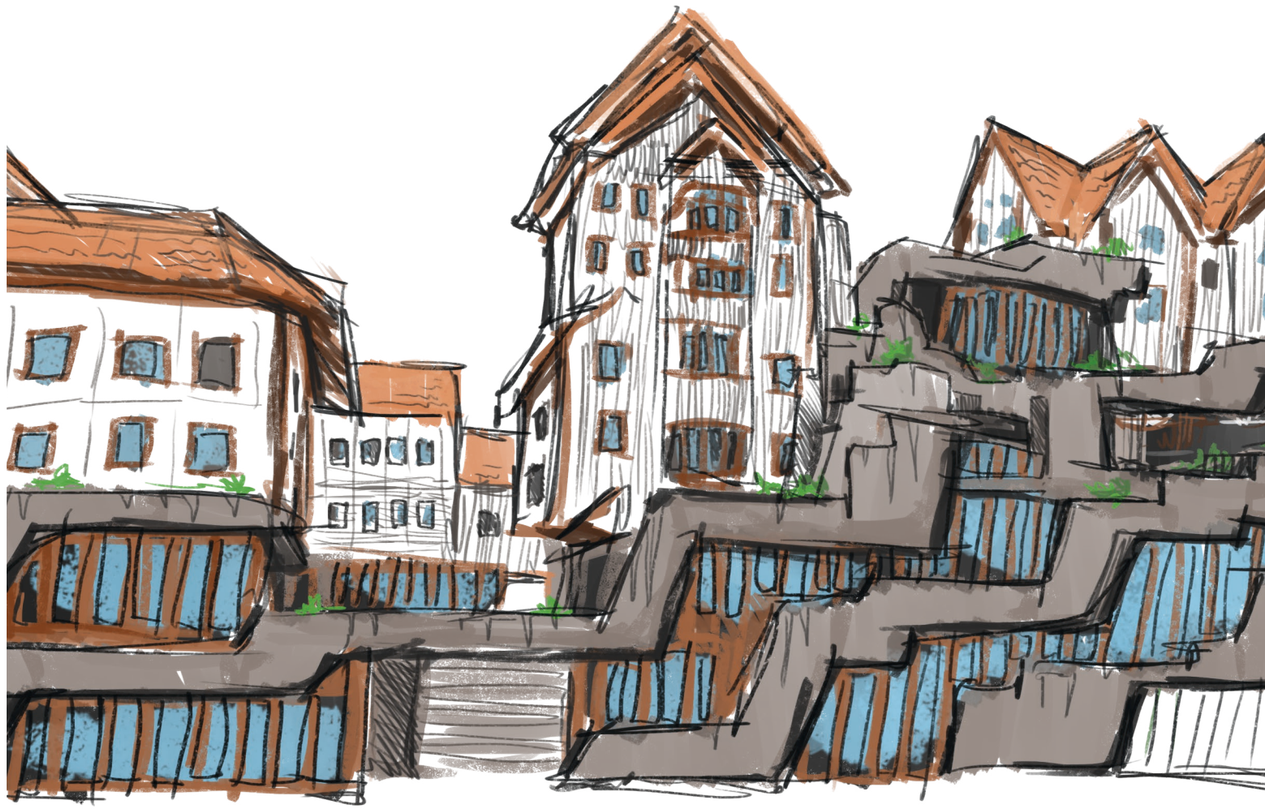


Fig 53, Perspective drawing of the south eastern facade. Wooden buildings standing on top of a concrete base.

Fig 54, Modular building blocks called assets, Assortment of walls for the wooden buildings.

Fig 55, Modular building blocks, Bay windows.

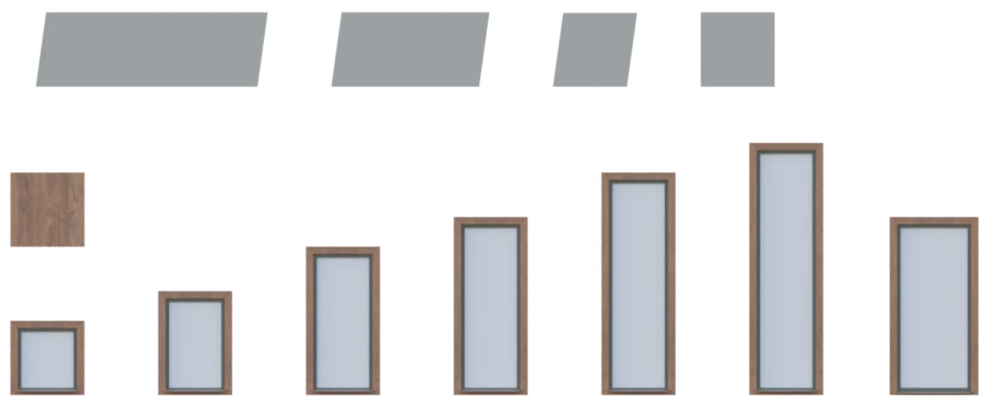


Fig 56, Modular building blocks, Widows and concrete blocks for the concrete base.

Fig 57, Concrete cliff base being built with building blocks.

Fig 58, Concrete cliff base with wooden buildings being added.

Fig 59, Interior courtyard out of building blocks and other specific purpose made elements.

The design idea of a chaotic “unbuilt” base which chaotic nature influences the buildings standing on top of it was further explored. This created three different themes within the complex. The “unbuilt” cliffs, a built concrete base inspired by Carlo Scarpa and the ad hoc wooden buildings.

The building elements allowed for the ad hoc design to have a form of cohesiveness through the apparent chaos of the base.

This process of sequentially adding more buildings was continued until the project’s completion. Where the elements did not suffice, new specific elements were made to fulfil that purpose.

FINAL DESIGN

Fig 60, Perspective showing the eastern staircase, overlooking the courtyard.

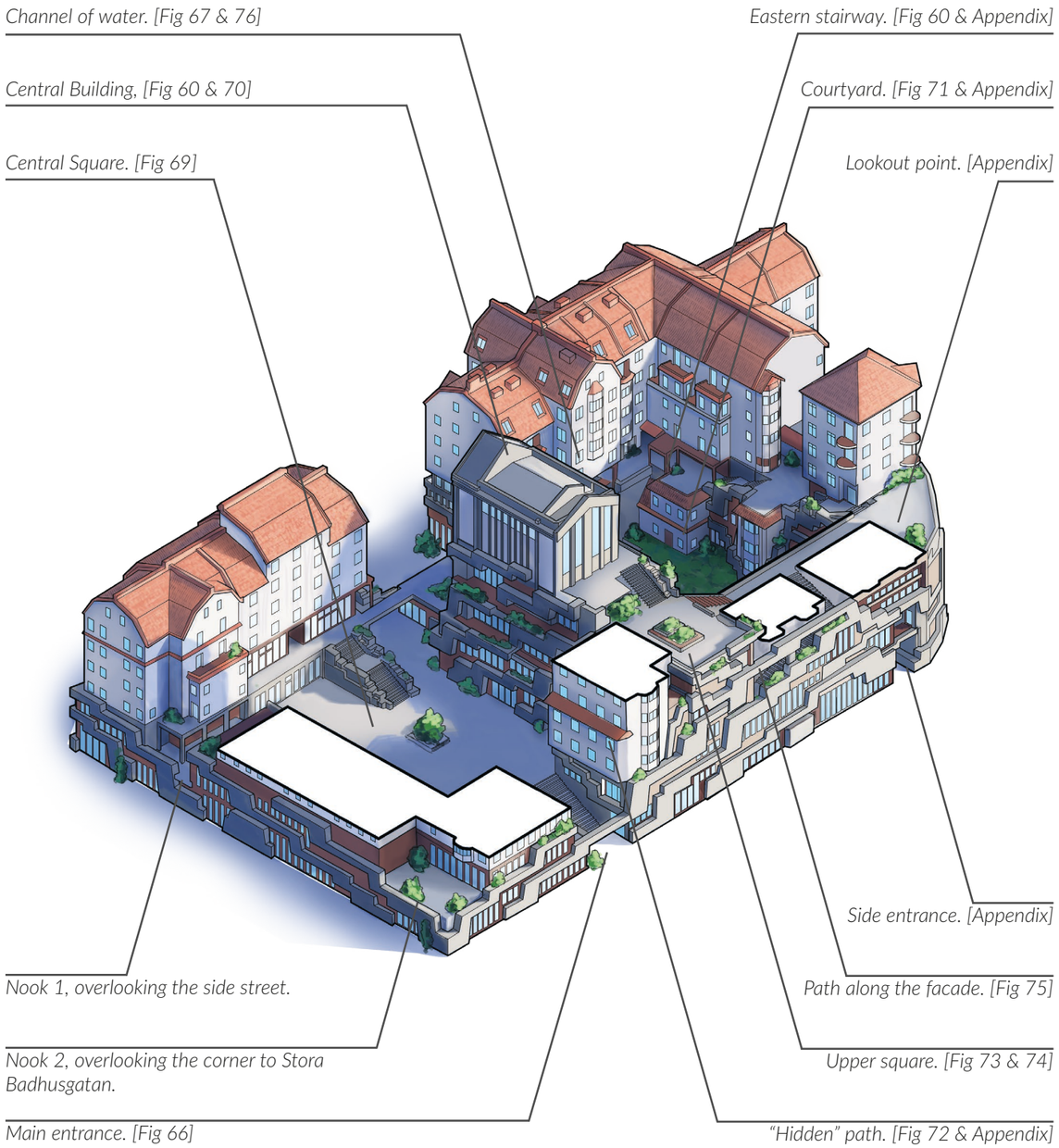


Fig 61, Isometric diagram showing different designed spaces of the project,

The project consists of many smaller spaces with different attributes. From large open squares to intimate nooks, the path to the top becomes a dynamic and shifting experience that encourages further exploration.

As in the block-out phase, the experience begins from Stora Badhusgatan and the first thing the subject meets is the main square, a space meant for restaurants, other commercial venues, and the main entrance to the central building that obscures the view of the other half of the complex. The observer is then guided up the dominant staircase and, being lead over two bridges, reaches the view of the courtyard. A slower path, interspersed with multiple landings, leads further up towards the upper square to finally reach the temple atop the cliffs.

Many of the changes to the larger context of the site in the detail plan done for Göteborgs Stad are kept. The only prominent change being the channel of water being brought in from the river through the building complex and into the courtyard.

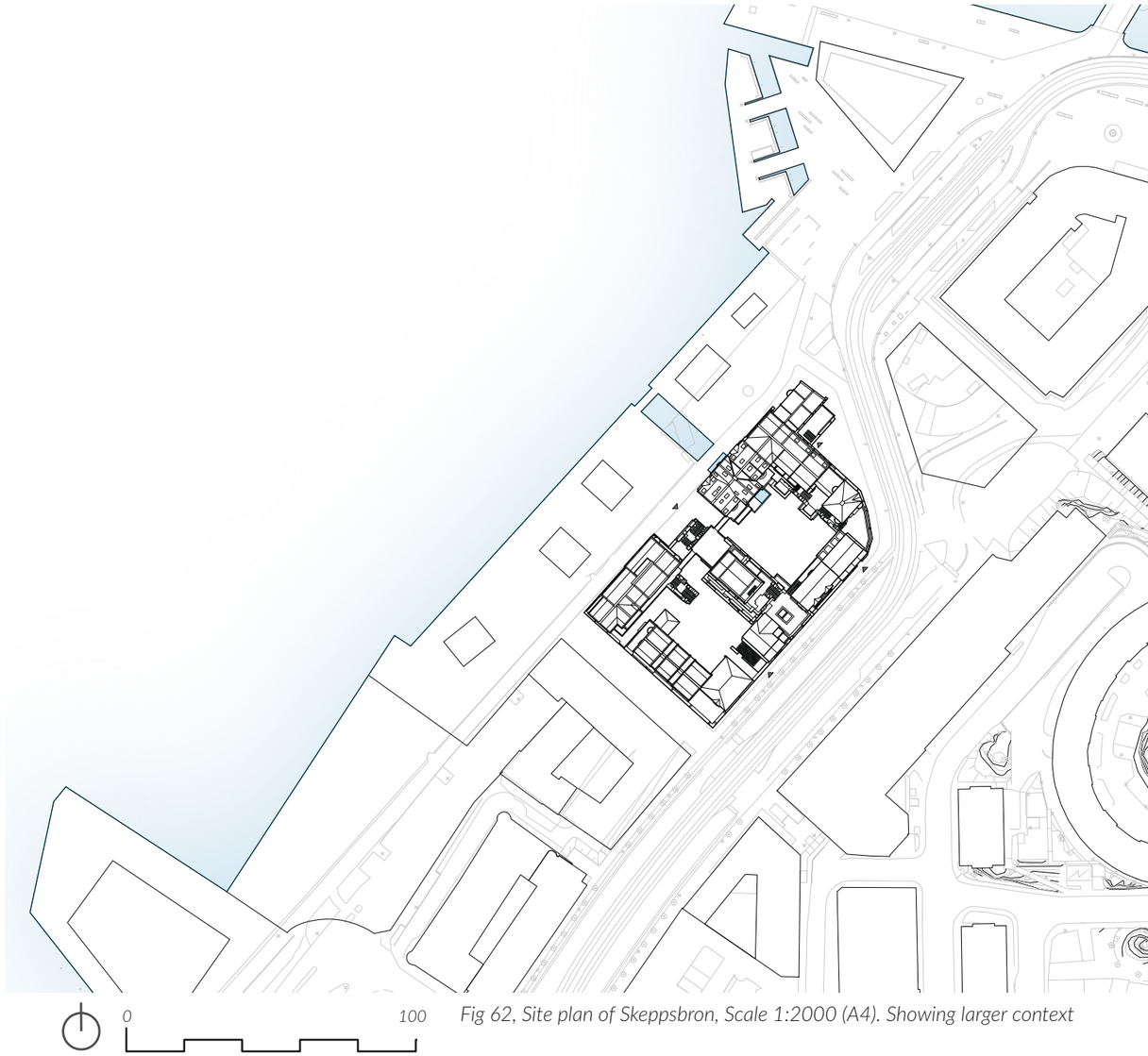


Fig 62, Site plan of Skeppsbron, Scale 1:2000 (A4). Showing larger context

The materials of the building complex guide the observer in what is public and what is private space. As the public spaces are predominantly made of stone, this allows the subject to more quickly determine where exploration and a closer look is encouraged. The facades of the buildings also correlate to this material distinction as the concrete base is primarily public and commercial and the wooden panelled buildings are housing. The combined floors of the commercial base and the housing gives the building complex an average of 7 floors, with most of the complex going up to 8 and the southern corner only having 4 floors to bring in more light to the main square. The design makes room for a grocery store on the ground floor, underneath the main square as this would be a needed addition to the area with the planned increase of housing. This is also where the street connection for elevator access to the central building would be situated.

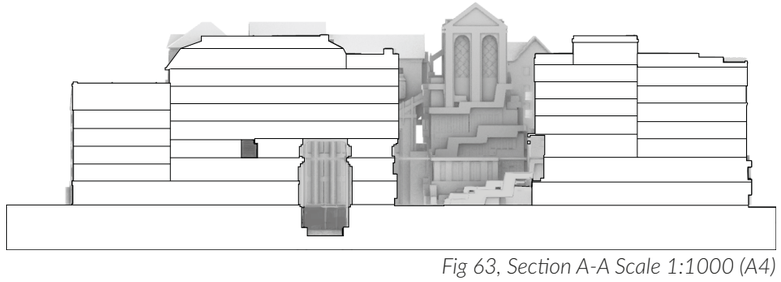
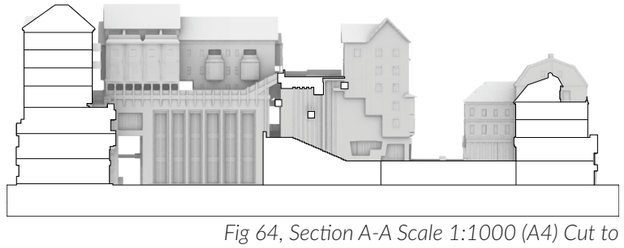


Fig 63, Section A-A Scale 1:1000 (A4)



0 100

Fig 64, Section A-A Scale 1:1000 (A4) Cut to show the entrance to the "hidden" path.

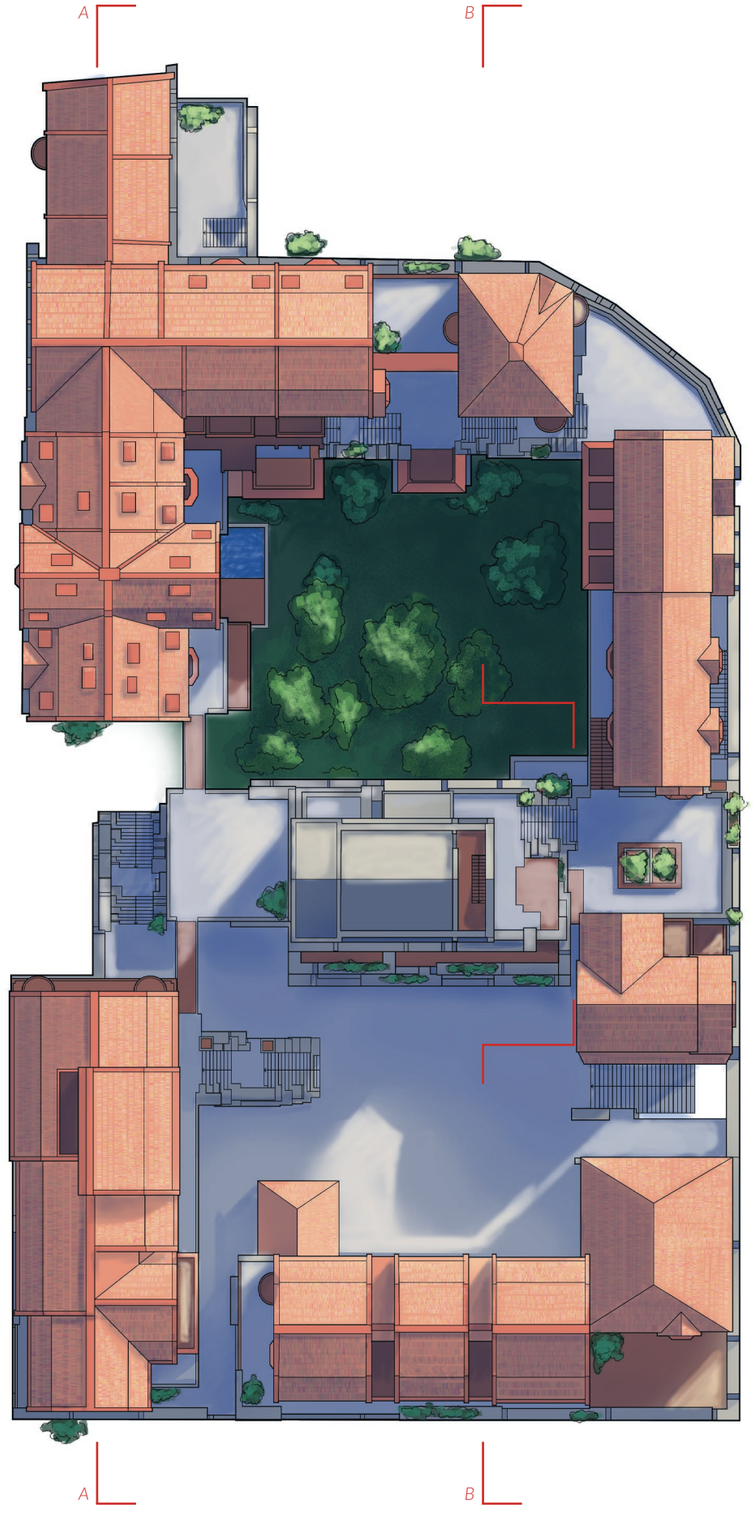


Fig 65, Illustrated plan, Scale 1:500 (A4)

0 25 50

Fig 66, Perspective showing the South eastern facade and Main entrance. Surrounding buildings removed for clarity.

Fig 67, Perspective showing North western facade, water channel, and side entrance from the quay.

Fig 68, Perspective showing the South western facade. Surrounding buildings removed for clarity.

Fig 69, Perspective showing the Main square

Fig 70, Perspective showing the Temple on the cliffs overlooking the Main square.

Fig 71, Perspective showing the first sight of the courtyard along the main path.

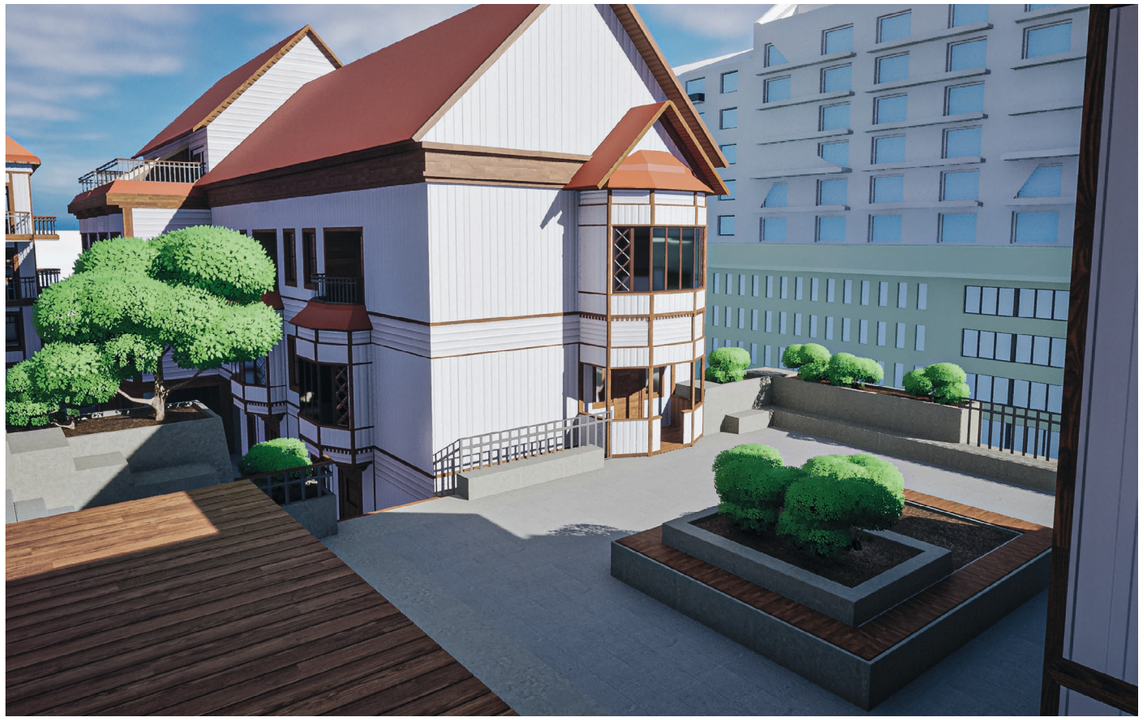


Fig 73, Perspective showing the upper square.

Fig 74, Perspective showing the connection between the upper square and the temple on the cliffs.

Fig 72, Perspective showing inside the “hidden” path.

Fig 75, Perspective showing the path along the facade.

Fig 76, Perspective showing the channel of water connecting the courtyard and the river.

DISCUSSION AND FURTHER STUDIES

This thesis is not meant to be a stand-alone project. It is meant to showcase the potential, broaden the conversation between the fields, and inspire others. As such, there are many potential avenues that in the opinion of the author should warrant further studies. The following are an assortment of topics that arose from the development of the design.

Final Design

For the application of the design into a real world project, further changes would have to be made. The design is made with the interiors in mind, as the buildings have ample room for apartments, offices, elevator shafts and the like. But as these were not drawn up, there would undoubtedly emerge a multitude of issues. One of the most likely issues that would change the design the most is the issue of where exactly to put the elevator shafts and fire escapes.

Even though it was never explicitly stated as a requirement for this thesis, the program of the design, a mixed use building with a commercial base with housing on top is similar to the proposed program for Göteborgs Stad in the detail plan [Fig 10]. The proposed program had a commercial ground floor with multiple stories of housing on top. In this design, the commercial base reaches upwards of 4 floors. This increase of commercial areas compared to the housing would need to be addressed in some way. Many of the floors in the concrete base have the possibility of being converted into housing, even though the windows would not be ideal for such a use case. In an ideal scenario, this disparity could be compensated for elsewhere as there are many other buildings planned in the area, many of which are only for commercial use. If parts of these buildings could be allocated for housing, the disparity within the proposed program and the design could be ratified.

This thesis focused heavily on material and spatial design. During the research process it was determined that natural light and fog are too hard for architects to control, even though they have an immense impact on the atmosphere of a space. A workaround for this would be to have multiple alternative weather types, allowing for a greater likeness to the real world. As important as this was deemed to be, the limited time frame did not allow for such explorations in this thesis.

Play-testing

Developing a way to properly “play-test” architecture would be immensely beneficial for the field. Showcasing by using VR-technology and the like is no longer a niche concept so continuing on this approach would be reasonable. What would be most interesting is finding a way to bypass or account for the different behaviour of the play-tester when in a virtual environment.

A prominent reason for play-testing not being used as much within architecture is because it does not fit into the early stages of the standard workflow of architecture. CAD-programs often don’t provide a way of experiencing the environments designed in real time. It is left for limited use in the rendering phase. For it to be available the entire process it should also be easy to access. Exporting from a 3D-CAD-software into a real time rendering software with capabilities for play-testing is not always a simple process. Developing a tool that could fit play-testing into the workflow of architecture via simple means and ease of access would then be beneficial for the entire field of architecture.

Some studios have gone the play-testing route without entering into the virtual world. By building up pieces of the project in cheap materials to get a feel of the project. This is of course one of the better alternatives to experience a space, but as this thesis hopefully has shown, quality architecture is more than just that. If the physical mock-up space would then be combined with augmented reality, both space, its traversal, and its atmosphere could be tested. But given how little priority these aspects of architecture are given due to economics, building both a real space and a virtual space might not be in the budget.

One important aspect this thesis has not mentioned is the difference in activities as well as exposure between architecture and video games. Few things have the same spark the nth time experiencing it. If that experience is then also coupled with boredom or monotony it would lose its spark even faster. This is not as big of an issue for video games, the games where the scenery matters most are often only experienced once or twice, and if a video game is boring, it has already failed in its primary purpose. But architecture is a part of life, and life can’t always be sunshine and rainbows, boredom is unavoidable, and so architecture has a different purpose to level design. That being said, some more playfulness in the architecture of our cities would most likely do them some good.

Pre-built Modules

An interesting use case for level design and architecture that appeared during the environment art phase is modular design. Unreal Engine, and most other real time rendering software for video game development are optimized for a form of modular design as the assets placed in their scenes are easy to edit and tweak. The software is also optimized to handle duplicated assets allowing for a higher level of detail where other image renderers might struggle.

As building with pre-built modules is being used more and more in the real world, the asset oriented design methodology of level design could aid with getting the most out of these modules.

Technical Issues and Tools

This brings us to the main issue of designing directly in a real time rendering software such as unreal engine as an architect. In general, every image rendering software uses triangulated meshes as a way of representing the 3D-shapes while CAD-programs often use Boundary representations (BREPs) and Non-Uniform Rational Basis Splines (NURBS). Conversion between these two forms of shape representations can often be problematic, especially when it comes to texture mapping. There are of course workarounds, but these can be problematic on their own and its often easier to just find a simpler alternative. When it comes to real time rendering on this scale, the models need to be better optimized for performance as it can be the difference between playing a video game and watching a slide show. This is the reason why the models in this project were made using meshes in Blender as it better fit the workflow by allowing for better mesh typology and texture mapping. The issue arose when it came to communicating the spaces to architects.

The values of the complex spaces were not adequately conveyed through perspectives alone and needed plans and isometric diagrams as well. But in order for this to work, the models needed to be converted into BREPs, or at worst, be drawn manually, which was the case in this thesis. A process like this takes time. Time that could be better spent elsewhere.

A program that seemingly solves this issue is Datasmith, allowing for a more seamless data transfer from a desired CAD-program into Unreal Engine. Sadly, this feature was discovered too late in the process for this thesis, but has the potential to be useful for architects wanting to use Unreal Engine as a visualization tool. Whether the Datasmith connection is capable of handling scenes of this size and complexity is yet to be tested. An important distinction is that this process does not work in the other direction.

The scale of the project limited the detail of the final design. There is only so much that standard computer hardware can do with limited optimization for performance. A greater level of detail would improve the experience as it would help in deepening the connection to the place. The biggest issue in this project were the trees and bushes. There are many highly detailed trees freely available online, but adding these trees to the project reduced the performance to such an extent as the map became unplayable. Without more active optimization, something I have not mastered, this remains out of reach.

There are multiple commercial assets and tools that could ease the design process, for a cost. A personal goal of this thesis was to explore how much could be done by one person with little experience in the limited time frame, without cost. With the addition of these tools, it is only natural that the process could be sped up, allowing for further exploration of the potential of this methodology.

Other

An important topic for this thesis that needs to be mentioned is how much the impression of the design is affected by the fact that it is made using a visual renderer. Can it be assumed that the impression would be the same for someone experiencing the design in the real world? A highly detailed tree is impressive in a real time rendering software, but in the real world it is just a tree.

I would greatly encourage a similar study to this thesis with greater focus on active collaboration with video game developers. As the majority of the knowledge within the field is in the experience of the people working in it.

CONCLUSION

Using level design techniques to design architecture that focuses on atmosphere, playfulness and joyful exploration is possible.

An asset oriented design methodology gives the opportunity to create dynamic and detailed designs quickly, which could similarly aid in the construction of the design, as more aspects of the building can be made off site.

An asset oriented design methodology comes with a set of drawbacks as most CAD-software is not optimized for this workflow. At larger scales this renders the models created incompatible with many traditional ways of visualizing architecture. As such, without a tool that can solve this issue, an asset oriented design methodology can be more trouble than it is worth.

Play-testing as a way of evaluating the design is beneficial in many ways. It can act as a way for the architect to better understand the design; it can act as a way to get direct feedback on aesthetics, atmosphere and wayfinding from an outside perspective; and as it is used now in the field, as a way of showcasing the design to stakeholders.

The similarities between architecture and level design are many. A greater degree of cross examination between the two fields is warranted as there are many ways the two fields can learn from each other.

REFERENCES

Literature

Block, B. (2020). The Visual Story: Creating the Visual Structure of Film, TV, and Digital Media (3rd ed.). Routledge. https://doi.org/10.4324/9781315794839

Böhme, G. (2016). The Aesthetics of Atmospheres. Routledge. https://doi.org/10.4324/9781315538181

Castillo, T., & Novak, J. (2008). Game development essentials: game level design. Delmar Learning.

Church, D. (n.d.). Formal Abstract Design Tools. Retrieved November 18, 2024, from https://www.gamedeveloper.com/design/formal-abstract-design-tools

DeGuzman, K. (2024, February 4). Concept Art in Film—Definition, Types & Iconic Examples. StudioBinder. https://www.studiobinder.com/blog/what-is-concept-art-definition/

Johnson, J. (2015, February 24). The impossible architecture of Castlevania: Symphony of the Night. Kill Screen - Previously. https://killscreen.com/previously/articles/impossible-architecture-castlevania-symphony-night/

Kaika M (2011) Autistic architecture: The fall of the icon and the rise of the serial object of architecture. Environment and Planning D: Society and Space 29(6): 968–992.

Montazeri, A. (2024, January 29). Level Design Process #01: Cube to Temple. Game Developer. https://www.gamedeveloper.com/design/-level-design-process-01-cube-to-temple

Novak, J. (2022). Game development essentials: an introduction. NOVY PUBLISHING.

Oxford University Press. (n.d.). Virtual reality, n. In Oxford English dictionary. Retrieved May 23, 2025, from https://doi.org/10.1093/OED/1042597194

Pallasmaa, J. (2014). Space, place and atmosphere. Emotion and peripherical perception in architectural experience. Lebenswelt. Aesthetics and philosophy of experience., (4).

Portman, M. E., Natapov, A., & Fisher-Gewirtzman, D. (2015). To go where no man has gone before: Virtual reality in architecture, landscape architecture and environmental planning. Computers, Environment and Urban Systems, 54, 376–384. https://doi.org/10.1016/j.compenvurbsys.2015.05.001

Rogers, S. (2014). Level Up! The Guide to Great Video Game Design. John Wiley & Sons.

Schell, J. (2008). The Art of Game Design: A book of lenses. CRC press.

Totten, C. W. (2019). Architectural Approach to Level Design. CRC Press.

Yang, R., & Yonder, A. (2024, March 26). The Level Design Book. The Level Design Book. https://book.leveldesignbook.com. Accessed: 2025, April 28.

Zumthor, P. (2006). Atmospheres: Architectural environments. surrounding objects. In Atmospheres. Birkhäuser.

Image References

Lantmäteriet, (2025). Min Karta, Lantmäteriet. https://minkarta.lantmateriet.se/

Lööf, B., Söderberg, F., (2012). Detaljplan för Skeppsbron m.m. inom stadsdelen Inom Vallgraven i Göteborg, Stadsbyggnadskontoret, Göteborgs Stad.

Video Game References

Kasurinen, M. (2019) Control (PC version) [Video Game] Remedy Entertainment.

Miyazaki, H. (2011) Dark Souls (PC version) [Video Game] FROM Software.

APPENDIX

Glossary

Atmosphere (figurative)
The mood or character of a space. Whenever Atmosphere is mentioned in this thesis without specification, this is the term used.

Atmosphere (scientific)
The gaseous envelope around a heavenly body.

Atmospheric Fog
The visual effect that the atmosphere (scientific) has on distant objects, often taking the form of a blue tint.

Level
The space where a game takes place. As this has multiple meanings, often pertaining to other aspects of video games, the often used alternative ***Map*** will also be used.

Level design
The act of designing a level or map.

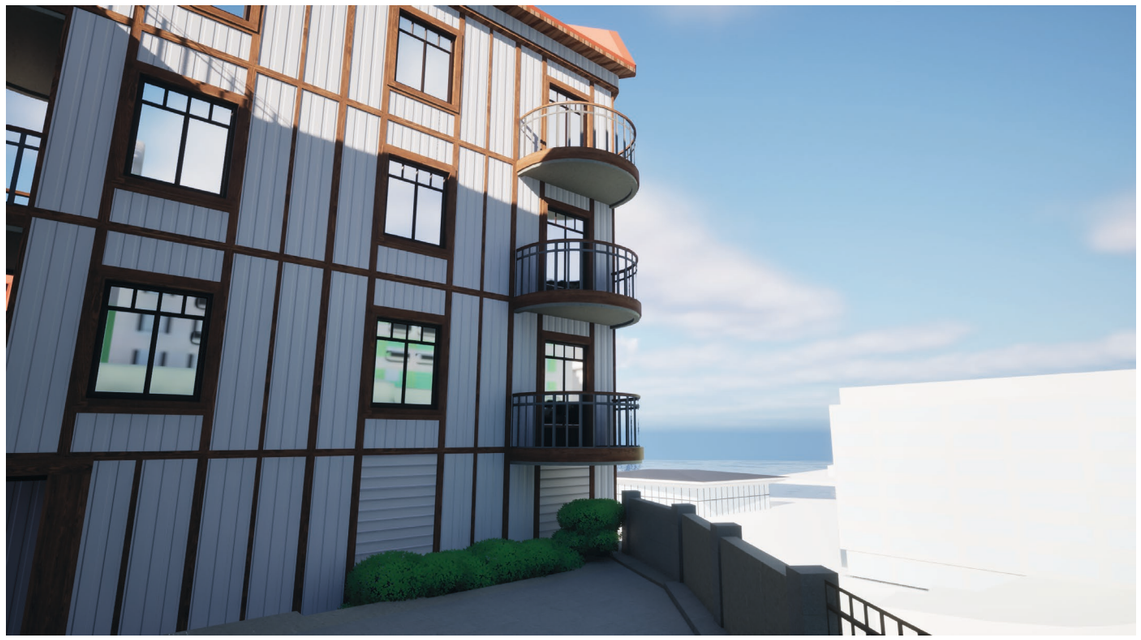
Play-testing
The act of playing an unfinished game in order to find flaws or possible improvements.

Virtual Reality
"A computer-generated simulation of a lifelike environment that can be interacted with in a seemingly real or physical way by a person, esp. by means of responsive hardware such as a visor with screen or gloves with sensors; such environments or the associated technology as a medium of activity or field of study; cyberspace. Abbreviated VR." (Oxford University Press, (n.d.)

Additional Images of the Final Design

Perspective showing the path along the inner facade.

Perspective showing the eastern lookout point.



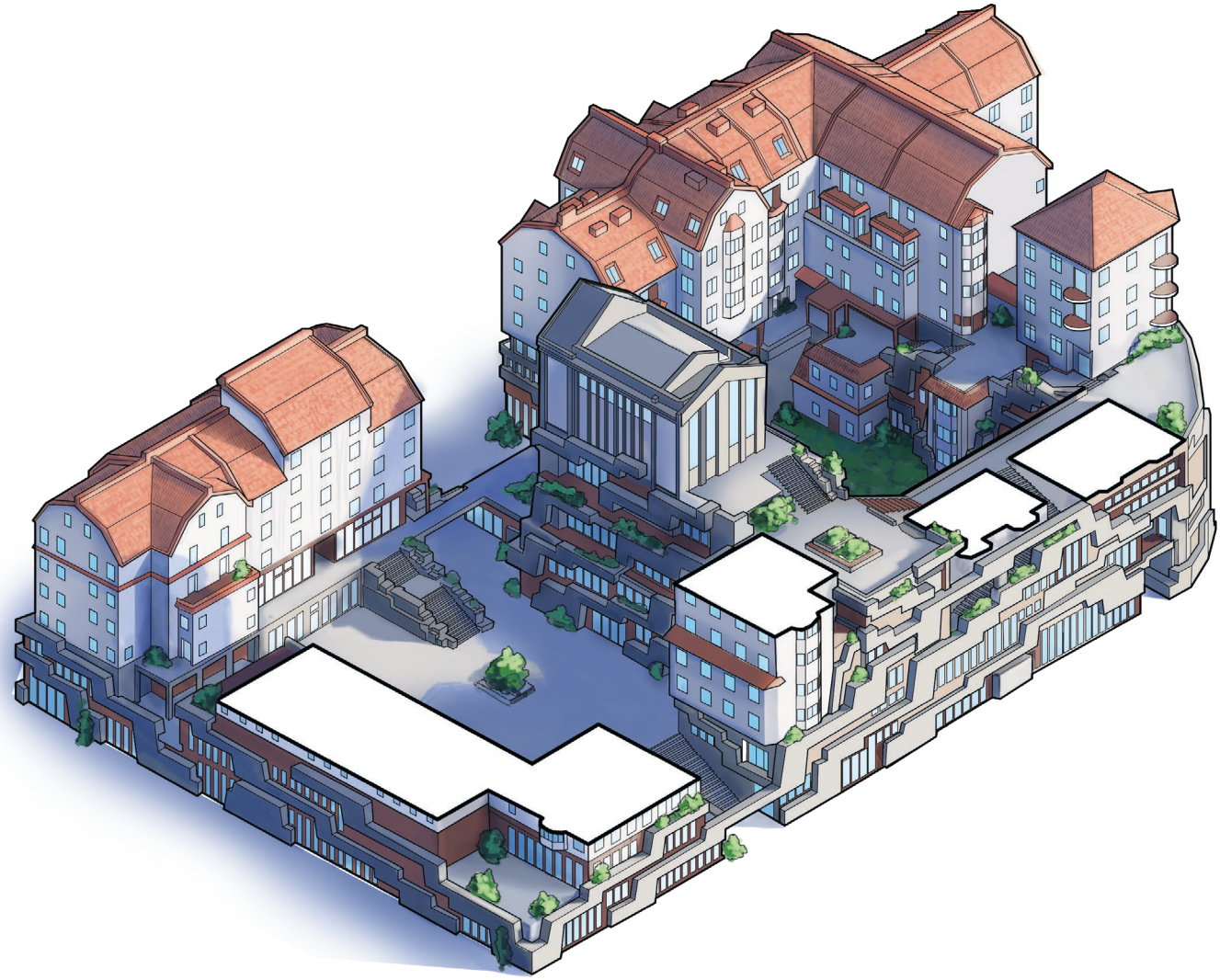
APPENDIX

Perspective showing the courtyard, seen from the “hidden” path.

Perspective showing the entrance to the “hidden” path.

Perspective showing the side entrance to the courtyard from within.

Perspective showing the view from the foot of the eastern stairway.



Title: Designing for Atmosphere

Author: Axel Sörensen

Theme: Architectural Experimentation

Supervisor: Kengo Skorick

Examiner: Jonas Lundberg

Chalmers University of Technology | Architecture and Urban Design