

**/META/:**

ELICITING INTROSPECTIVE STATES  
THROUGH VIRTUAL REALITY  
- AN ARCHITECTURAL EXPLORATION  
OF EXTERNALLY INDUCED PHENOMENA

A. ALDOWSARY      CTH  
G. NORDAHL      KTH

A CHALMERS AND KTH COLLABORATION

# Eliciting Introspective States Through Virtual Reality — An Architectural Exploration of Externally Induced Phenomena

THANKS TO

Naima Callenberg

Peter Christensson

Karin Matz

Fredrik Stenberg

Daniel Norell

Claes Sörstedt

Maria Thereza Perez

Hanna Duvander

Edith Önell

META:

Eliciting Introspective States Through Virtual Reality  
— An Architectural Exploration of Externally Induced Phenomena

Adam Aldowsary & Gustav Nordahl

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Chalmers University of Technology

Department of Architecture and Civil Engineering

Supervisor: Peter Christensson

Examiner: Daniel Norell

KTH Royal Institute of Technology

Department of Architecture

Supervisors: Fredrik Stenberg & Karin Matz

Examiner: Claes Sörstedt

A collaboration between  
Chalmers and KTH



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY



ABOUT THE AUTHORS

ADAM ALDOWSARY  
CHALMERS, GOTHENBURG

Adam has an interest in architectural psychology and an expansive curiosity about architecture's ability to inspire and influence human behaviour, which initiated the exploratory research that led the way in defining the narrative of the master thesis.

With prior knowledge in creating visual identities and conceptualizing ideas, Adam was responsible for defining the project's comprehensive theoretical framework and its visual and conceptual identity.



GUSTAV NORDAHL  
KTH, STOCKHOLM

Gustav aims to find new ways of approaching the creative process. A deep interest in technology and software, within and outside of the architectural field, was a key factor in establishing the method of the project.

He has great experience with 3D modelling and the exploration of virtual and augmented reality, which is what contributed to an experimental and playful tone throughout the project. Gustav therefore had the responsibility to oversee the method and the use of digital tools including 3D modelling and visualization.



ARCHITECTURAL BACKGROUND

MSc, Architecture and Urban Design Chalmers University of Technology	2020 – 2022
Architect Intern MAF Arkitektkontor, Umeå	2019 – 2020
BA, Architecture and Fine Arts Umeå School of Architecture	2016 – 2019

ARCHITECTURAL BACKGROUND

MSc, Architecture KTH Royal Institute of Technology	2020 – 2022
Architect Intern BIG, Copenhagen	2019 – 2020
BA, Architecture and Fine Arts Umeå School of Architecture	2016 – 2019



LIST OF CONCEPTS

META	A concept of referring to itself or to the context of its genre. Also the title of the project.
VIRTUAL REALITY	A digital reality that is generated through 3D data imagery, and is often conveyed as an immersive visual experience utilizing some kind of technological equipment as means of interaction.
SPATIAL DOMAINS	Sub-categorization of architecture into concepts concerning spatiality on different levels of consciousness.
PSYCHOLOGICAL PHENOMENA	Psychological phenomena describe sentiments that might occur due to various spatial sequences, ranging from positive to negative.
MANTA	The title of the VR-experience, inspired by the shape and context of the structure.
AF, ID, IC, EXP <sup>A</sup> , EXP <sup>B</sup> , EXP <sup>C</sup> , EXCP <sup>D</sup> , ER	Abbreviations of virtual reality experiences. Amplification Foyer (AF), Immersive Descent (ID), Introspection Chamber (IC), Experience A (EXP <sup>A</sup> ), Experience B (EXP <sup>B</sup> ), Experience C (EXP <sup>C</sup> ), Experience D (EXP <sup>D</sup> ) and Exit Ritual (ER).
VO, SQ, MT, DR, EC, SO, LI, CP, SY	Abbreviations of spatial domains. Void (VO), Sequence (SQ), Materiality (MT), Disruption (DR), Enclosure (EC), Sound (SO), Light (LI), Complexity (CP) and Symbolism (SY).
DEREALISATION	The process of becoming alienated with one's context and reaching a state where objects and the direct environment feels unreal.

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## ABSTRACT

Architecture is a field inherently connected to art. The artist can create pieces that purposefully challenge our emotional states. Often, the architect is merely responsible for supplying the canvas. These emotional challenges, often conveyed by art, can frequently be left as secondary in architecture.

In big cities society is constantly changing at a high pace. According to the Swedish Social Insurance Agency (2020), the population stresses more and more, which leads to mental illness through exhaustion. That, in turn, leads to long-term sick-leaves and unemployment. We have little time for self reflection and introspection and during the remaining hours of our days the media steer us in directions of their own. Our minds are crowded with ideas and needs that are not inherently ours that further increase toxic societal norms.

The relation between our bodies, our minds and our direct environments has a great impact on our mental well-being. Architecture and spatial design have the ability to inspire and influence human behaviour. So, the spaces in which we spend most of our time could help us become mentally stronger and reduce stress levels.

In order to explore how to create these kinds of built environments, Virtual Reality (VR) can be used as a tool to test spatial experiences that would emulate real life situations and trigger real emotional reactions. After surveying the field of VR research and performing VR experiments, a virtual space was designed. This VR experience was to act as a summary of the exploratory stage of the project, acting as a precursor to the architecture set in the real world.

The reality-based project is located on site in central Stockholm, in connection to areas where stress levels are recorded to be among the highest. In this building, visitors could pause for a short time, being surrounded by an architecture that triggers positive and beneficial emotional responses, ultimately contributing to a more socially sustainable city.

## THESIS QUESTIONS

### INTROSPECTION

How can architecture and spatial design act as externally induced conditions to elicit an introspective state with the user?

### EMOTION

How can architecture be implemented in a specific public space to interfere with a societal culture of stress and social pressure?

### VIRTUAL REALITY

How can Virtual Reality act as an exploratory architectural tool for examining spatialities to determine specific emotional responses?

What are the advantages of virtual reality as a tool for the architectural profession?

## CREATIVE PROCESS

### PHASE A: EXPLORATORY RESEARCH

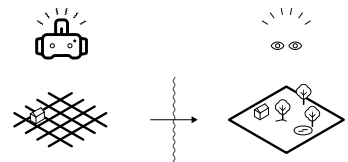
Research about architectural and spatial implications of specific psychological phenomena and conduction of spatial experiments in virtual reality.

### PHASE B: VIRTUAL REALITY EXPERIENCE

Design development of virtual reality environments based upon research findings and previous definitions.

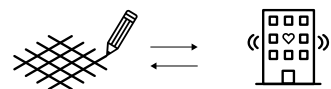
### PHASE C: ARCHITECTURAL REALISATION

Realise outcome of Phase A+B into physical building at specified site.



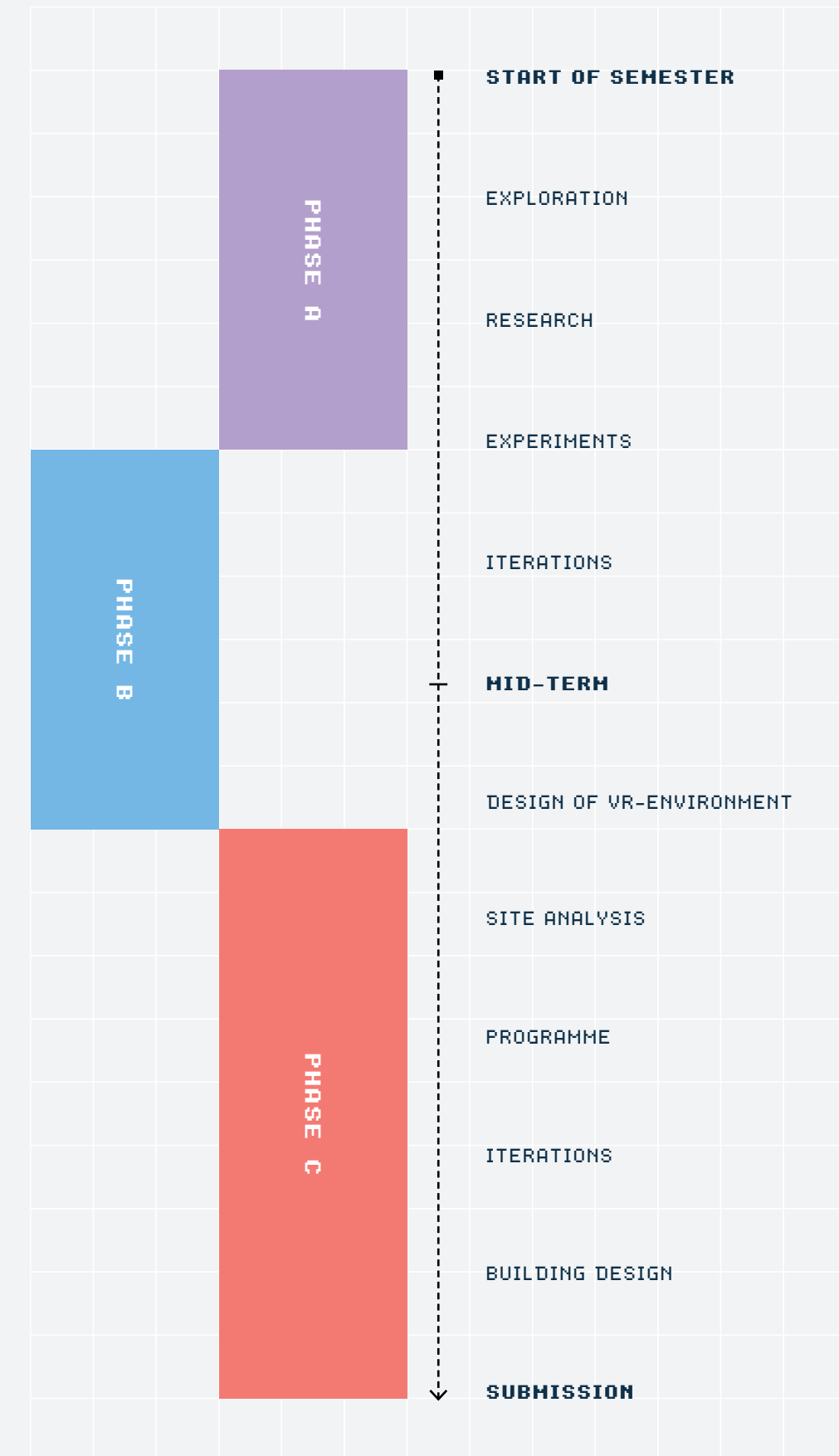
#### REALITY FILTER

The design will go through a process of realisation, where virtual reality elements become grounded to reality and the architecture comes to life in a traditional sense.



#### EMOTIONAL VALUE

As architects, we should be conscious in how we design our digital futures. As architects, we should therefore try to incorporate a higher emotional value into our design.

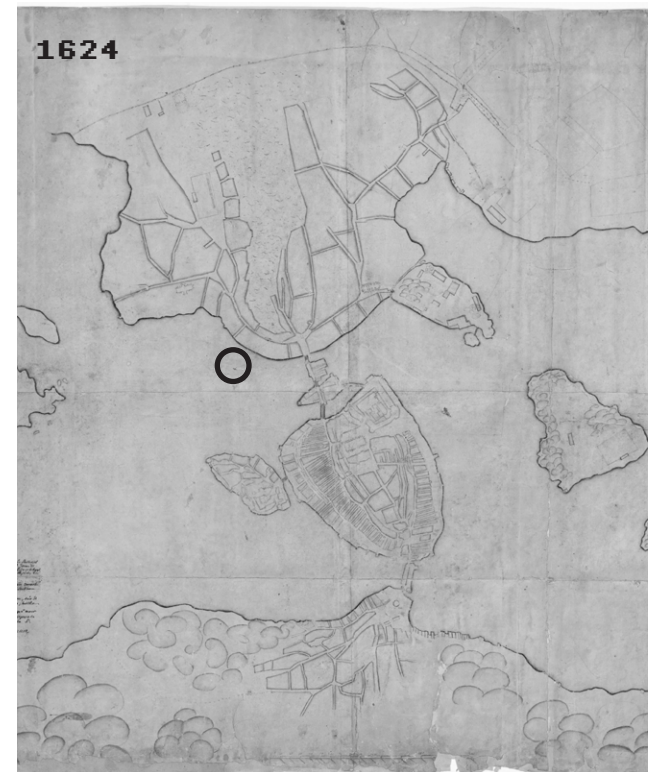




## HISTORY OF SITE

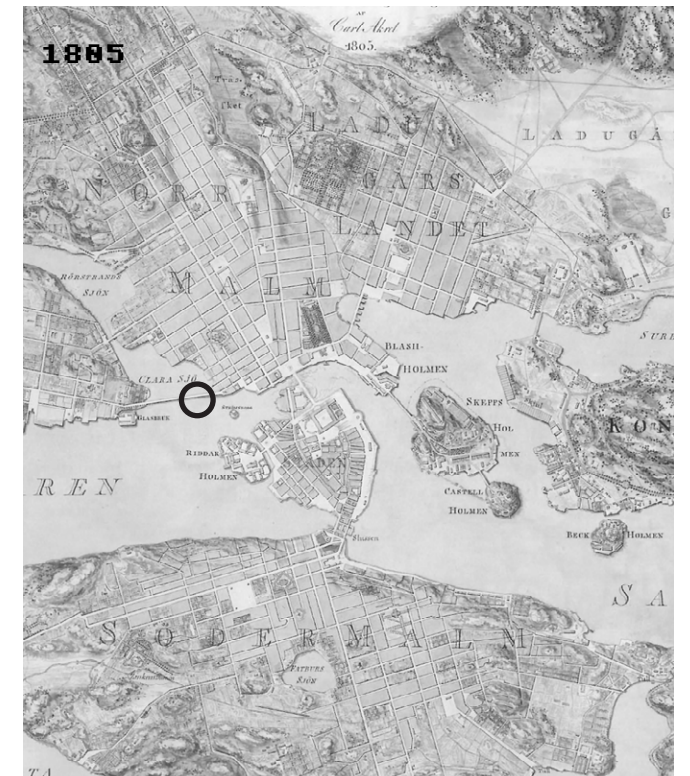
1624

The first map ever made of Stockholm. It focuses on the older and more central part of the city we know today. Interestingly, the space between Norrmalm and Kungsholmen appears quite large and no connection between the two land masses has yet been made. Where our site is today is merely an extension of Mälaren.



1805

By 1805, the city had grown a lot, as most parts of Södermalm and Kungsholmen had been established. On our site, we find a description of Clara Sjö, as a pedestrian bridge that crosses from Tegelbacken to the location where Stadhuset stands today.



1899

In 1874, the central train station was established as apparent by this map from 1899. The surrounding area has been cleared to make way for a train yard and a big landmass was constructed to create where Klara Mälarstrand is today. Järnvägsbron, which in the future would go along Centralbron, has also been established.



## SITE

## URBANIZATION

Sweden is made up of 70 % forest. Whereas more than 87 % of the population lives in cities (fig. 1). There is a supported theory that young people growing up in the countryside with close proximity to nature, have less problems with stress growing up.

## STRESS LEVELS

As Stockholm is the most populous city in Sweden and a business centre for most industries, stress levels are among the highest in the country (fig. 2). Not only within the central city but also municipalities within the county are also affected by the high pace of the city, as most are commuting to town for work.

## OUR SITE

We propose that the most optimal site for our project is in an area that is dense in stress. The two proposed sites are located at the edge of the Central Business District (CBD) and has the added benefit of being close to water, something that studies have found is a source of tranquillity for many.

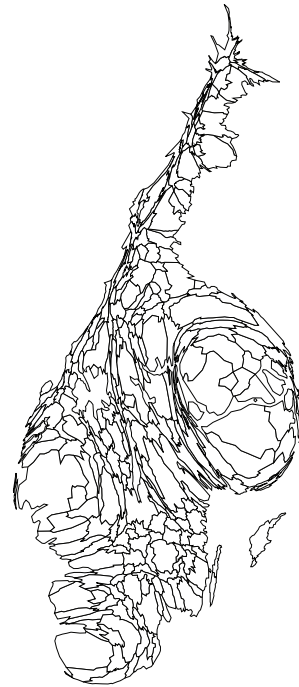


Figure 1. Distribution of people in Sweden 2008.  
Source: Statistiska Centralbyrån

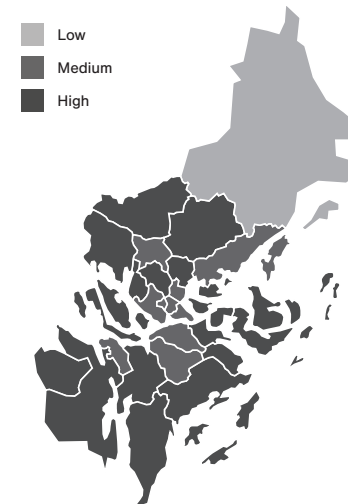
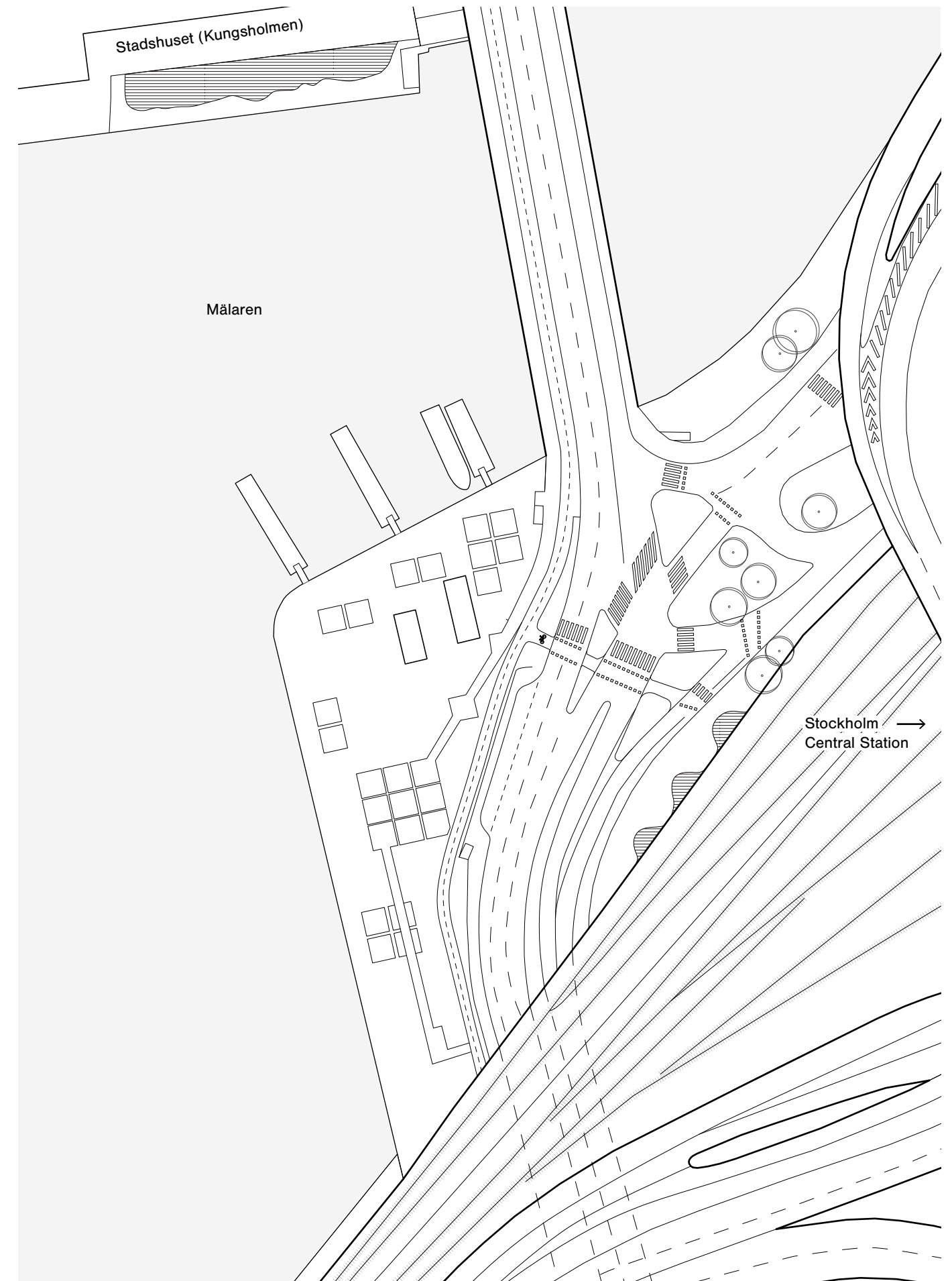


Figure 2. Level of stress in Stockholm. Source: Folkhälsomyndigheten



> PHASE A

> EXPLORATORY RESEARCH

/ BACKGROUND & METHOD



SPATIAL DOMAINS & DELIMITATIONS

We initiated our project by conducting a workshop to kick-start the exploratory research phase. The vision was to explore one keyword per day, regarding an architectural or spatial domain, with the intention to create sketches, find relevant references, write texts, create experimental models and conduct spatial VR tests as well as reviewing existing experiments and studies.

The keywords consist of eight spatial domains and two “meta” domains that encompass the others in one way or another. This approach allowed us to create a framework and departure points for our explorations. In this way, also creating a delimitation for our project to focus on keywords that we define as relevant, interesting and exciting to look further into.

The selection is mainly based upon our understanding of what typologies within architecture and spatiality that impact human spatial perception and behaviour. These are deliberately chosen to establish a broad spectrum of domains, ranging in scale, complexity and tangibility. Some domains are recognized within the field of contemplative architecture (eg void and light) and others act within a more implicit realm dealing with sub-conscious and attentional aspects (eg disruption and displacement).

The spatial domains are a part of what defines the project’s delimitations. Through using merely ten chosen subcategories we could, in a systematic way, approach the subject of introspective and contemplative architecture. With Meta, we also chose to work with an overview perspective and therefore not delve too deep into specific architectural phenomena. As the project mainly explores varied architectural sequences in various contexts, this practice made sense.

This perspective also carries on into Phase C, the architectural realization, where we chose to focus on the major subjective experiences and spatial concepts, as opposed to focusing, for example, on construction details. The intention with the design of the building was to interfere with an issue in a specific site, although we believe that when taking a site into consideration, a similar concept could be applied to any urban context.

In regards to the method, we limited ourselves to a specific experimental tool, the virtual reality headset. A tool which came to influence the outcome of the project greatly. Other digital methods such as photogrammetry and augmented reality were looked into. Delimiting the project to working with virtual reality allowed us to more distinctly investigate what implications the tool could have for the future of architecture.

Another limiting aspect came from the fact that the project was done entirely remotely, which meant that no physical models were built in order to allow for both authors to interact with the material together.

VOID	VO
SEQUENCE	SQ
MATERIALITY	MT
DISRUPTION	DR
ENCLOSURE	EC
SOUND	SO
DISPLACEMENT	DP
LIGHT	LI
COMPLEXITY (H)	CP
SYMBOLISM (H)	SY

RESEARCH & EXPERIMENTS

Researching the emotional implications within each spatial domain and testing various specific architectural and spatial concepts demonstrates a wide set of applicable psychological phenomena. The understanding of these phenomena is embodied through emotional, sensory and bodily reactions.

Subjective interpretations of various phenomena and concepts of the introspective state are thus defined, which then are to act as a theoretical and conceptual base for further design development.

- 1 Void

2 Disruption

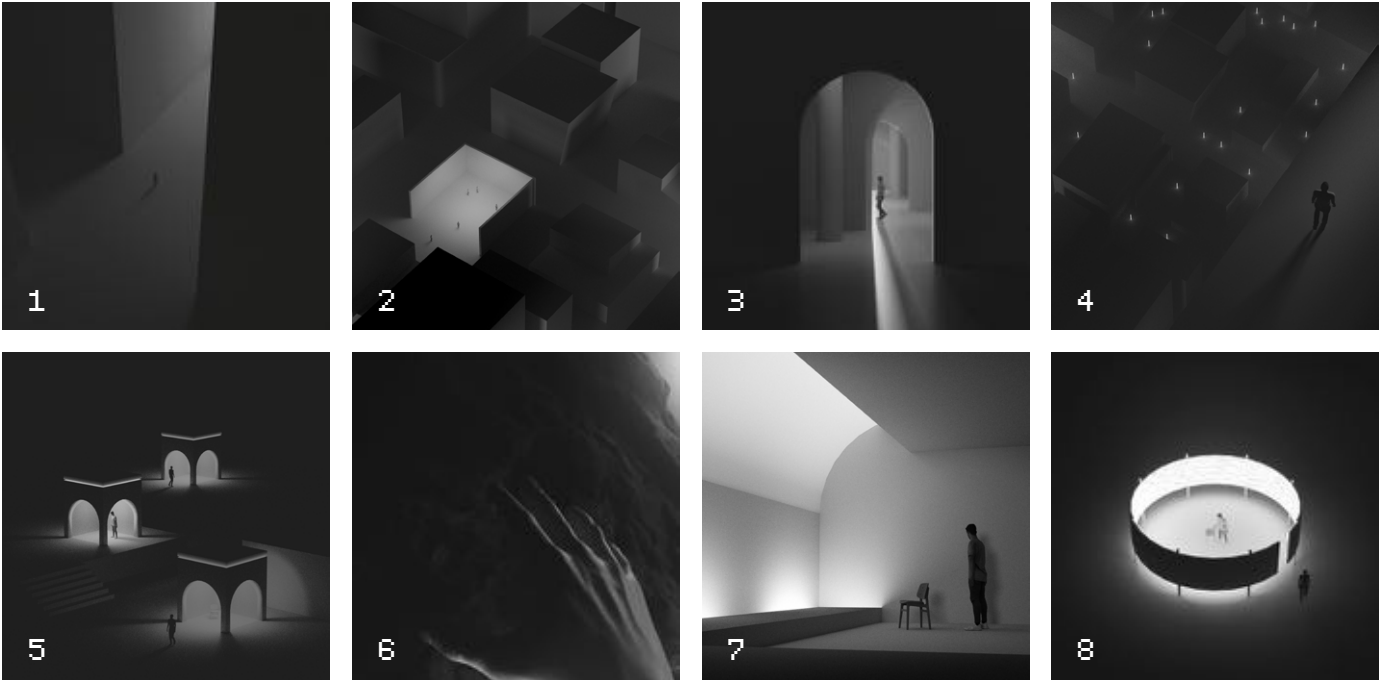
3 Sequence

4 Displacement
- 5 Enclosure

6 Tactility

7 Sound

8 Light



	VOID	SEQUENCE	MATERIALITY	DISRUPTION	ENCLOSURE	SOUND	DISPLACEMENT	LIGHT	COMPLEXITY	SYMBOLISM
COMFORT										
ALLEVIATION										
CONFIDENCE										
AMPLIFICATION										
ANTICIPATION										
AWE										
CONSCIOUSNESS										
INSECURITY										
MANIPULATION										
AGITATION										
DEREALISATION										
EXISTENTIALISM										
FEAR										

In order to extract conclusions from our workshop regarding the different spatial domains, we chose to map out the findings within our research with specific psychological phenomena. This narrative allows us to get an overview of our findings and enables a brief understanding of which human emotional implications various architectural elements might have.

## SPATIAL DOMAIN RELATIONS

VO - SQ	Void amplified by sequential structure
VO - SQ	Void enhanced by order of spatial sequence (eg low to high ceiling)
VO - EC	Scale of void affects perception of enclosure feelings
VO - SO	Void enhancement of sound
VO - DP	Void as a physical displacement enhancer (eg from loud traffic node)
SQ - DR	Deviation of sequence evokes disruption
SQ - LI	Sequence amplified by light (eg sequence of window light inlet)
TM - EC	Over-dimension of digital texture material evokes enclosure
TM - DP	Recognition of materiality acts as mental displacement
TM - SO	Different materiality to manipulate sound
TM - LI	Colors and materiality reflections
TM - DR	Direction manipulation of texture acts upon direction
TM - DR	“Uncanny Valley” phenomena of image texture evoking disruption
DR - LI	Absence of light as a disruption in a bright environment
DR - SO	Enhance direction of path disrupting movement flow
DR - SO	Deviating sound as an audial disruption
DR - DP	Flow disruption by environment displacement in public structure
EC - LI	Small bright spots of reflected lights create feelings of enclosure
EC - SO	Volumetric geometry affects acoustic perception
SO - DP	Sound as an immersive tool to create displacement phenomena
LI - VO	Absence of light enhanced by void

		SQ	TM	DR	EC	SO	DP	LI
VO	→	2	0	0	1	1	1	1
SQ	→		0	1	0	0	0	1
TM	→			2	1	1	1	1
DR	→				0	2	1	1
EC	→					1	0	1
SO	→						1	0
DP	→							0

CONTINUE READ:

> APPENDIX 1 (ONE)

/ EXPLORATORY RESEARCH



> APPENDIX 1 (ONE)

> PHASE A

/ EXPLORATORY RESEARCH

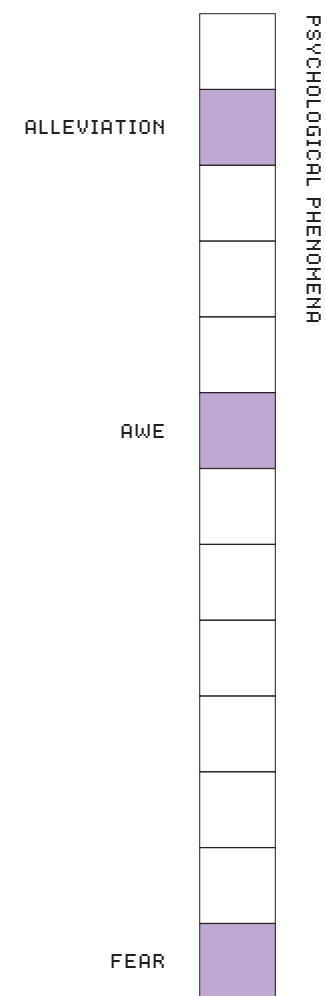
## VOID

A void refers to a volume containing no, or a few, external man made objects. The volume requires a quite large magnitude in relation to the human scale in order to be referred to as a void, especially in the vertical axis perpendicular to the ground.

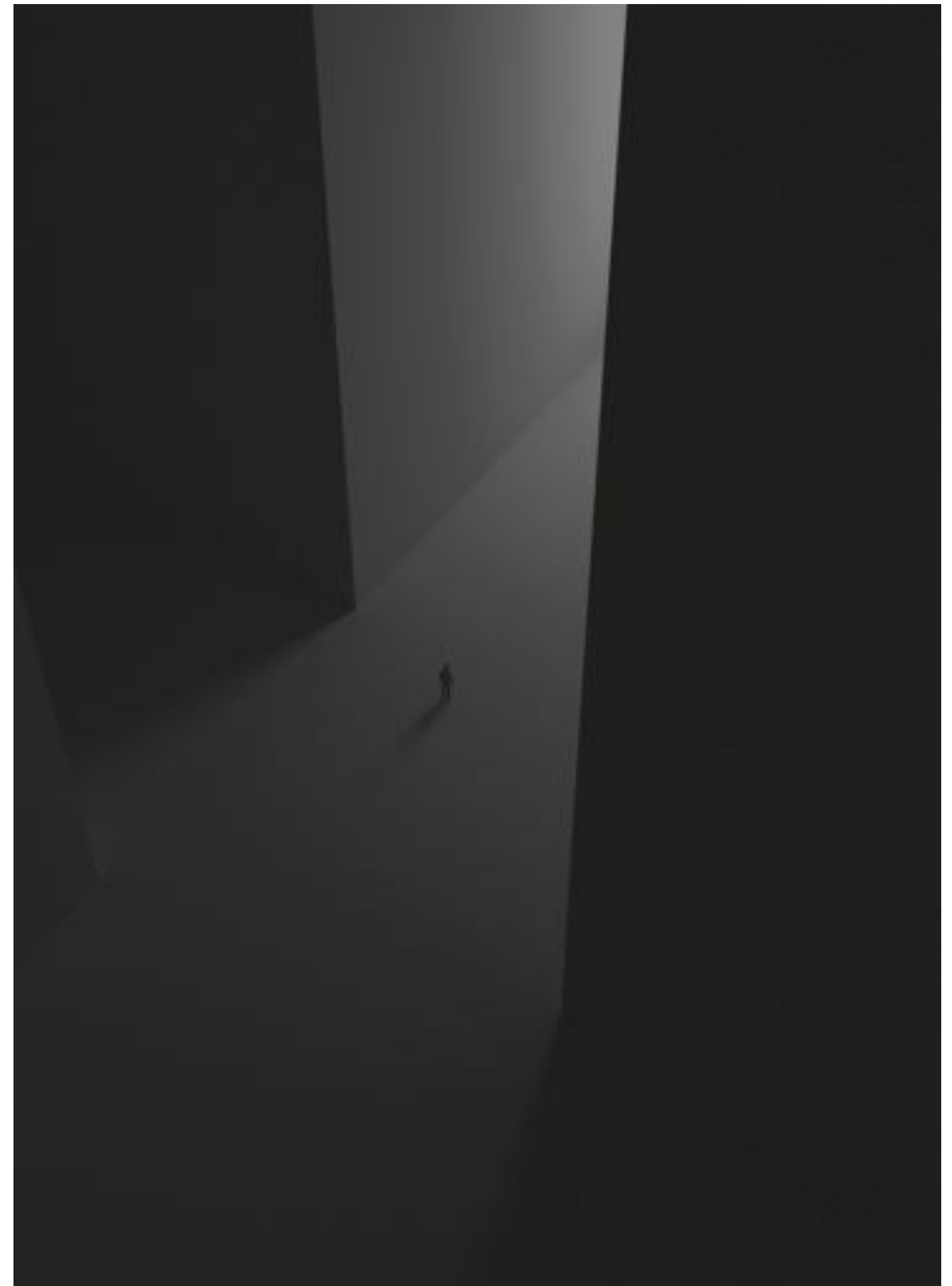
The level of spaciousness of an enclosed room affects our perception of our bodies in relation to the magnitude of the space. A voluminous and extensive spatiality tends to generate conspicuous feelings towards the building or room itself, and may evoke a more humble experience between the visitor and the room. This phenomenon is often recognizable in architectural typologies such as churches, concert halls, stadiums and other sizable spatialities where the void aspect is obvious (Bermudez et al, 2017).

Our approach towards void as an architectural phenomenon differs depends on its dimensional direction, but it also strongly depended on whether the void is experienced in an interior setting or outside of an enclosed building. The vertical void tends to be perceived as more powerful within an enclosed building as an interior phenomena, regardless of its direction perpendicular to earth - being a void above you as you're looking up or below your feet looking down.

Within the notion of vertical voids, another psychological aspect is also touched upon. As an evolutionary remnant, humans perceive high altitudes as life threatening because of the risk of injury or death if falling from above high ground. Hence, perceiving vertical voids with a negative direction (below us) often triggers our amygdala into sending signals of danger which makes us feel fear (Liu et al, 2020).



VO





REFERENCES



References of futuristic movie environments (Image: Bladerunner 2049) often enhanced by vertical voids.

RESEARCH STUDIES

A. Aron et al. *Some Evidence for Heightened Sexual Attraction Under Conditions of High Anxiety*. 1974.

J. Bermudez et al. *Externally-induced meditative states: an exploratory fMRI study of architects' responses to contemplative architecture*. 2017.

J. Liu et al. *Encoding Fear of Heights by Basolateral Amygdala Neurons*. 2020.



Over dimensioned openings.  
1 The Multiplicity of Sacrality

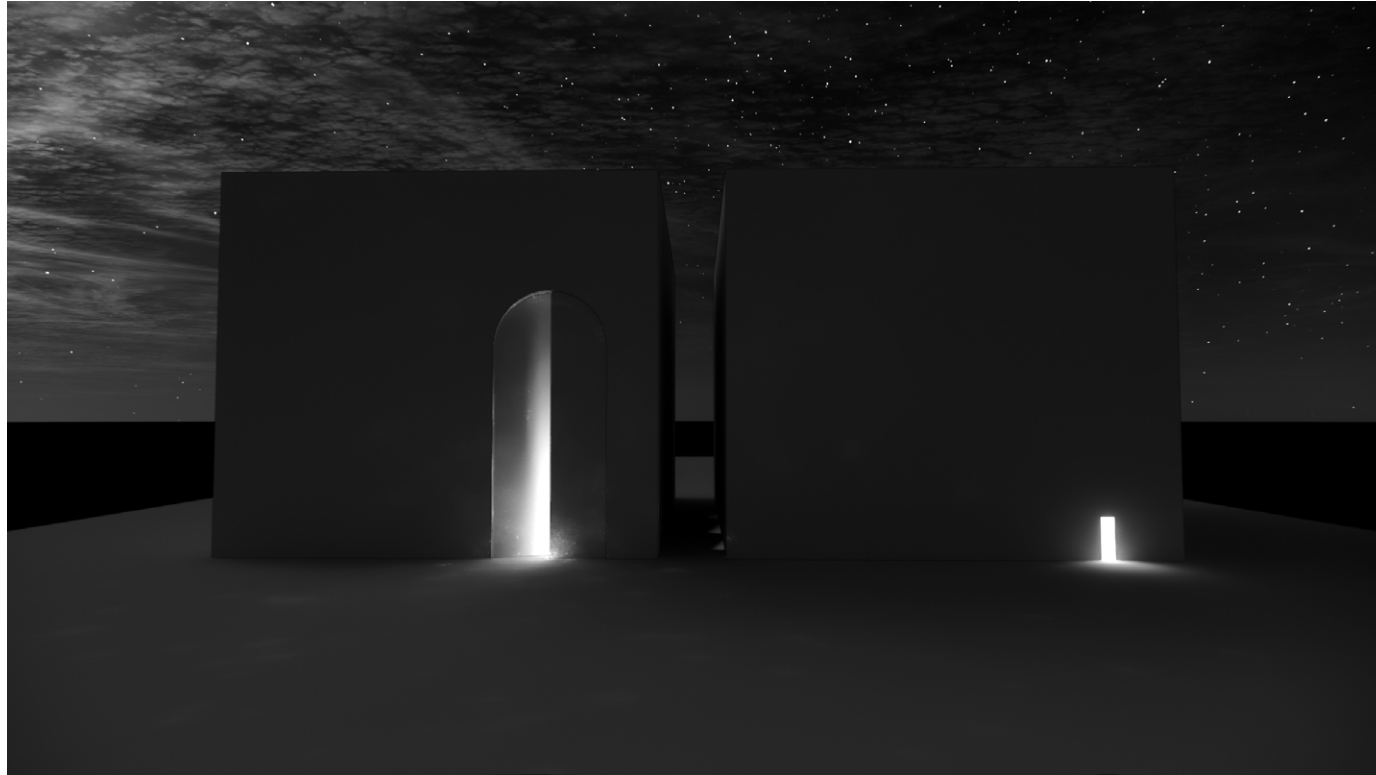
Voids within churches and other religious buildings are often associated with a sacral feeling and atmosphere.  
2 Cathédrale e Marie  
5 Saint Moritz

Vertical elements can enhance the feeling of void.  
3 Grundtvig's Church

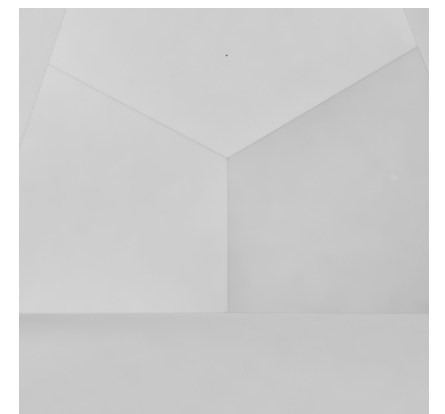
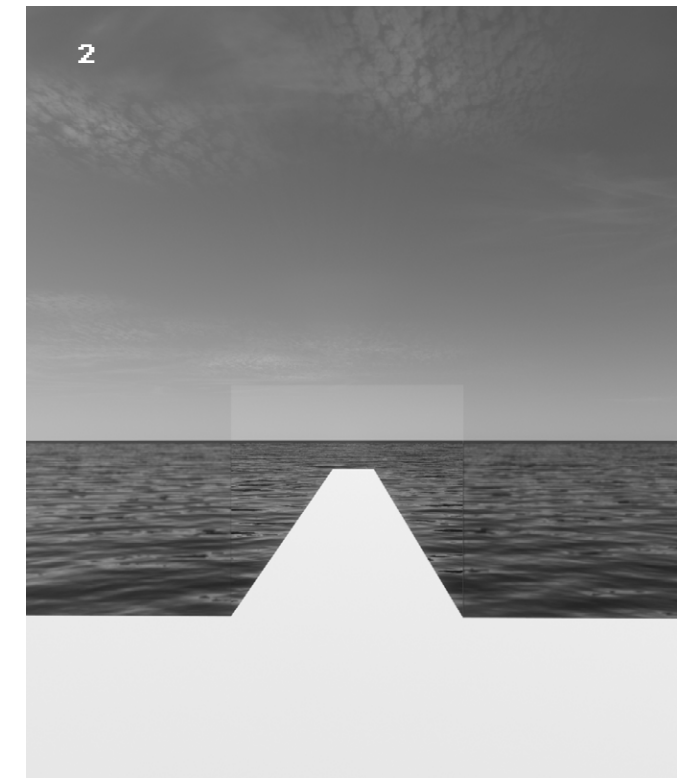
Void can act as an immersive tool to create focal points.  
4 Musée cantonal des Beaux-Arts Lausanne



## EXPLORATIONS



Entrance experience as defined by the scale of the opening.



- 1 Vertical void eliciting a physical response in the amygdala.
- 2 Large horizontal void is often seen in connection to open water, which in itself can give a comforting response.
- 3 Void in relation to scale. The hole has a diameter of 2 meters, however the room size increases exponentially.

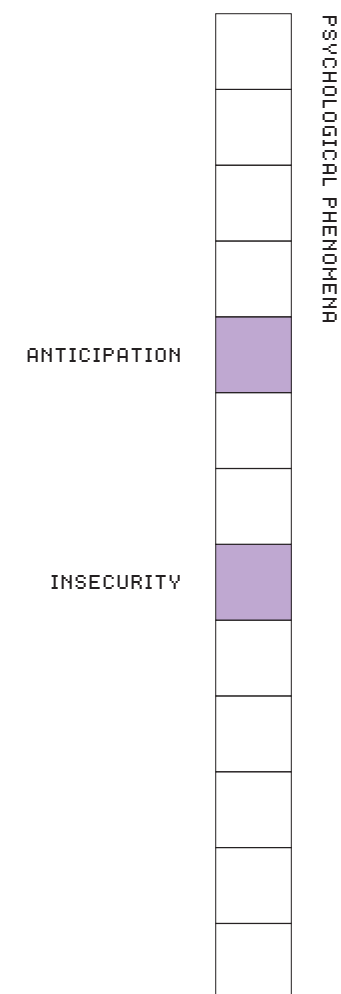
VO

## SEQUENCE

The notion of sequence touches upon several architectural and spatial aspects, and contains a wide variety of approaches. Sequential aspects act within different scales; in public structures on volumetric sequences of buildings, but also within interior scales in hierarchy, chronology and structure of interior structures.

Sequences in architecture can be used to create varied experiences, exploring the inhabitants inherent need for order, the adherence to expectations and the breaking of these expectations. One of the most generic spatial sequences in a metropolitan environment can be found in the homes of most apartment dwellers. The spatial sequence of entering a building, using the stairwell to enter our homes, a foyer, a kitchen, a living room and a bedroom in an order of increasing privacy. Social sequences are inherent in our societies and can be identified anywhere.

Geometric sequences have been investigated since ancient times and most of them define our facades to this day. Even the use of a plan grid could be seen as an application of sequence in architecture.



SQ





## REFERENCES



Facade of alternating sequences of arches. Image: Arches Boulogne

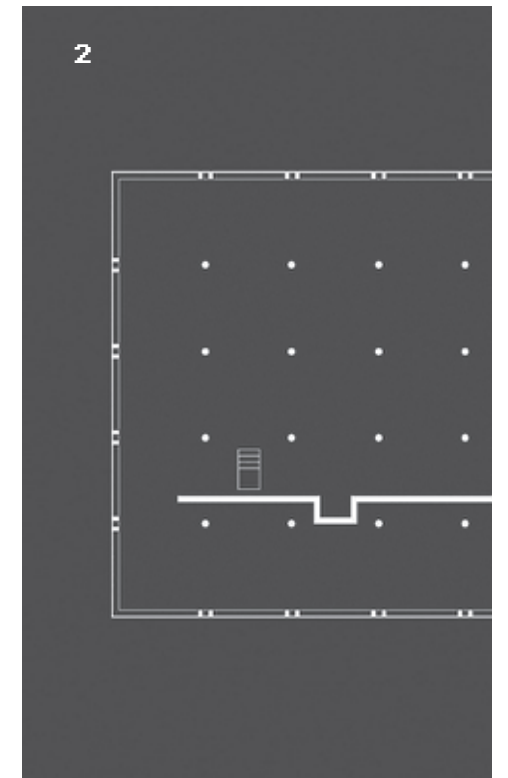
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N. Salingaros. *Symmetry Gives Meaning to Architecture*. 2020.

R. Baillargeon. *Representing the Existence and the Location of Hidden Objects: Object Permanence in 6- and 8-month-old infants*. 1986.

SO



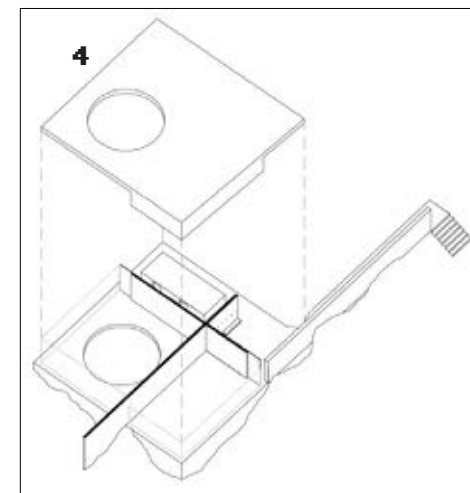
Interior repetitive structural elements as a directional sequence.  
1 The Chamber Church

Logical sequences of structures create a sense of structure.  
2 Stardust

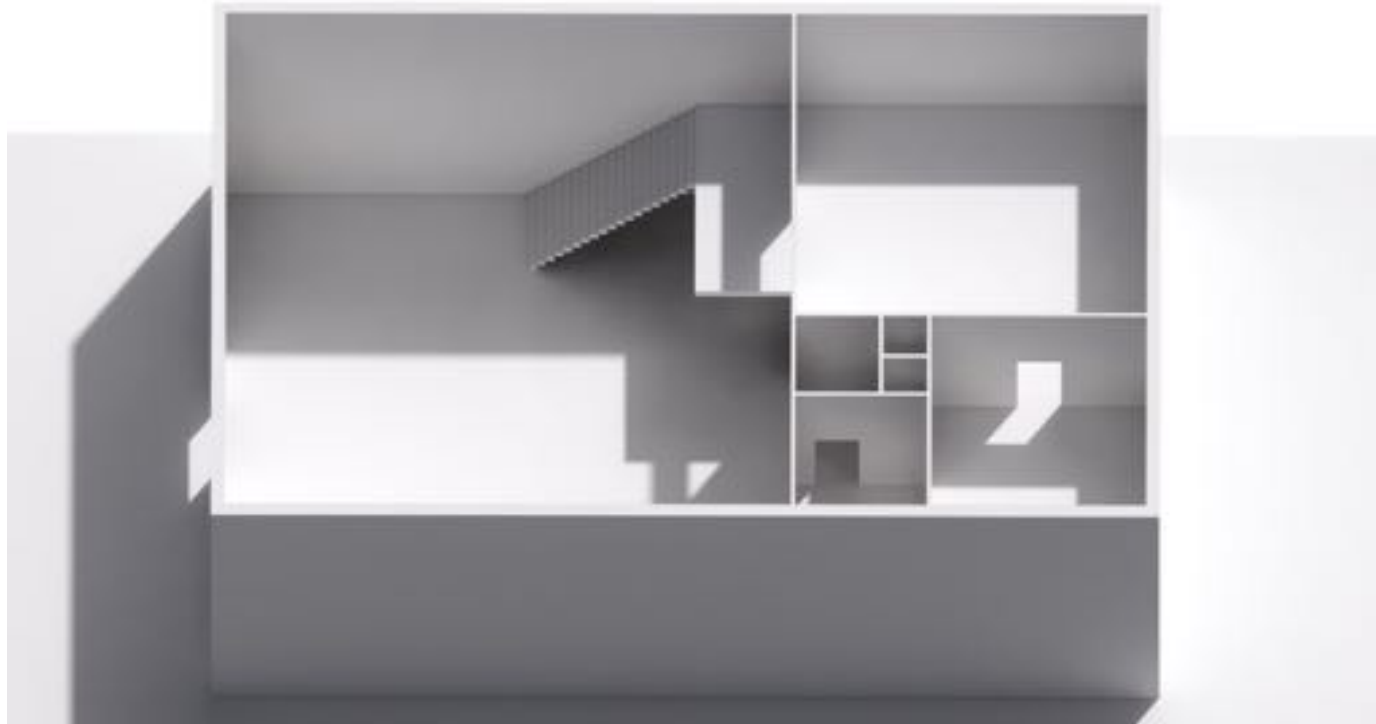
Exterior repetitive sequence as a base for architectural elements.  
3 Musée cantonal des Beaux-Arts Lausanne

Entrance as a sequence toward larger spatiality creates tension.  
4 Introspection

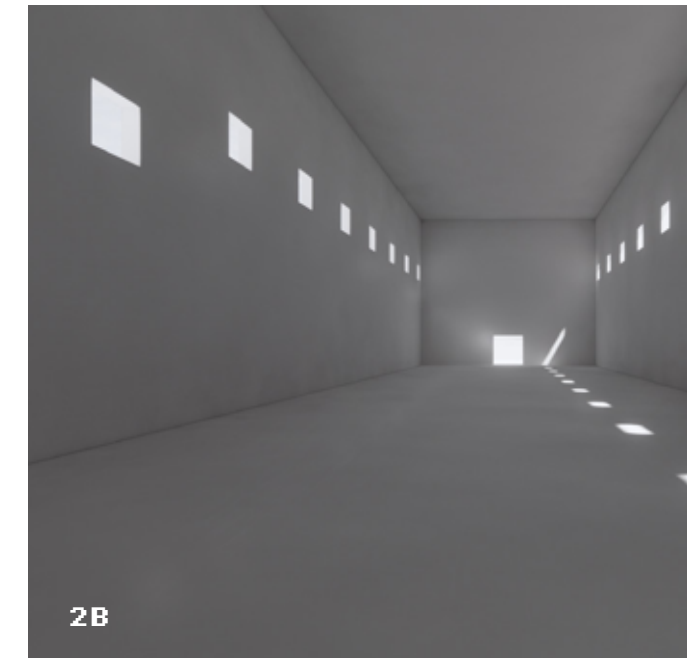
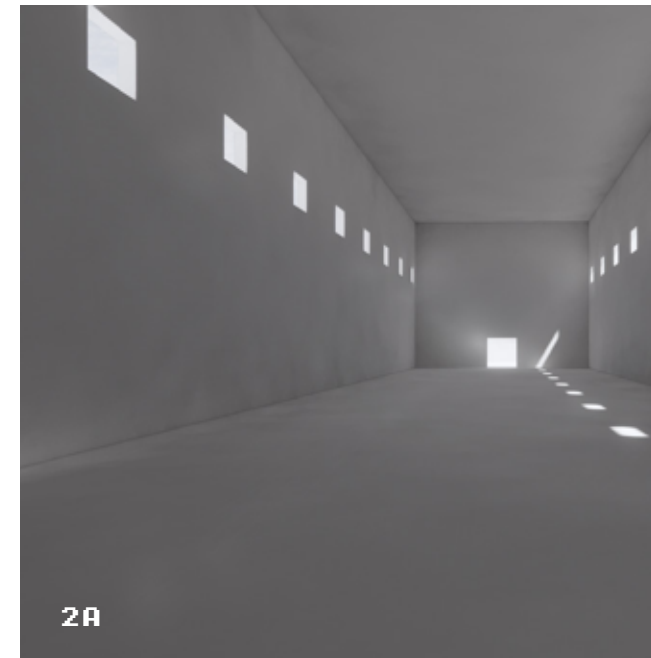
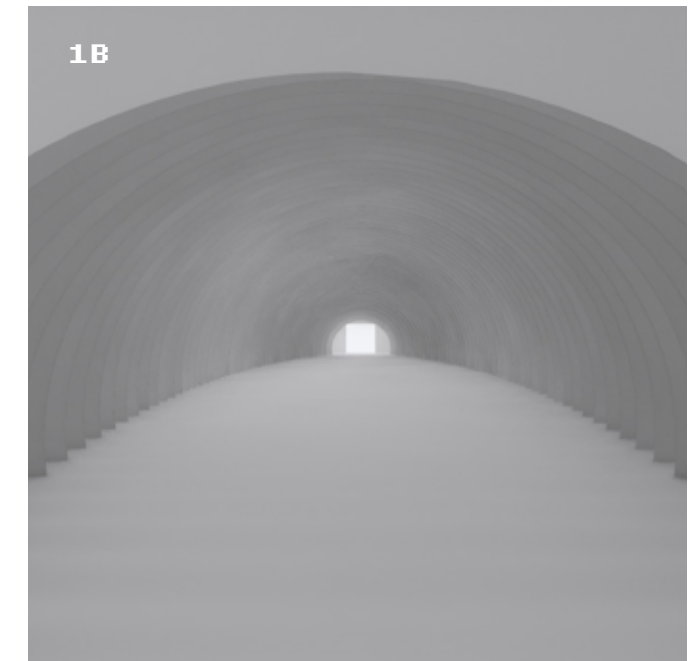
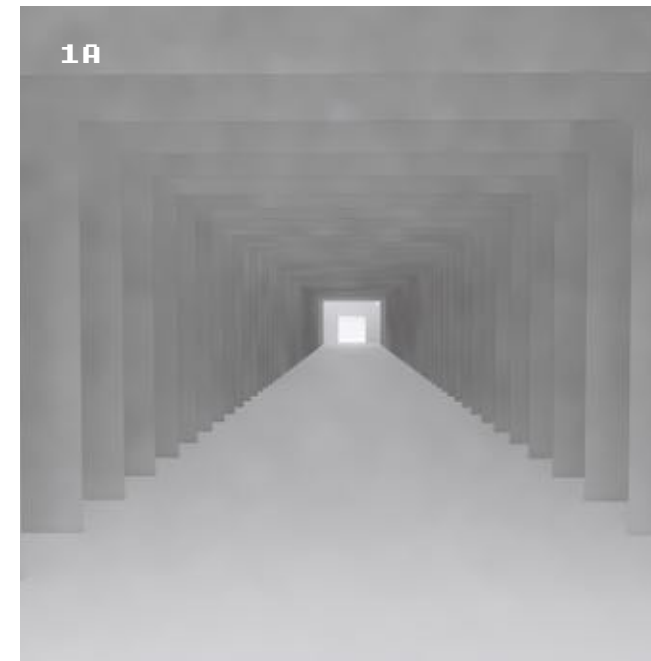
Exterior window sequence.  
5 Tanzhaus Zürich



## EXPLORATIONS



The Fibonacci Sequence in a plan drawing creates an eerie sense of claustrophobia as rooms decrease in size.



- 1 Interior sequential elements create a sense of depth and have a satisfying nature.
- 2 A disruption in a sequence might elicit a feeling of unbalance and irritation.

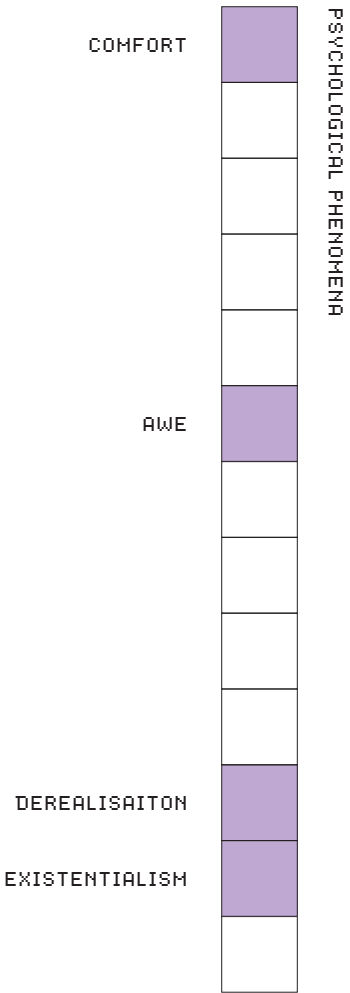
SQ

MATERIALITY

Interior environments play a critical role in our health. Materials and textures affect our perception of spatialities, and hence our well-being.

Wooden materials are well studied in relation to human physiological responses. Zhang et al (2017) concluded studies that showed fewer signs of stress and fatigue as well as benefits to the autonomic nervous system in a wooden room compared to a non-wooden room. Physiological parameters such as blood pressure, ECG and near distance vision were also improved in the wooden environment.

I. Bower et al (2019) states that the neurological and physiological activity elicited by design characteristics and spatiality can occur in the subconscious perception without conscious awareness, which argues against relying completely on participants' self-evaluations.



MT





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Different types of stone materiality. Image: Himalesque

## RESEARCH STUDIES

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D. Fell. *Wood in the human environment: Restorative properties of wood in the built indoor environment*. 2010.

X. Zhang et al. *Human physiological responses to wooden indoor environment*. 2017.

MT



Illusion of soft materiality.  
1 Birdie Cup Coffee

Wood as an interior material to relate to  
environmental context.  
2 Aspvik

Frosted glass creating illusion of frozen cube.  
3 Ice Cubes Cultural Tourist Centre

Mirror materiality to reflect surrounding  
environment.  
4 Tree Hotel

Chain ceiling installation creating raindrop effect.  
5 Casa Batlló



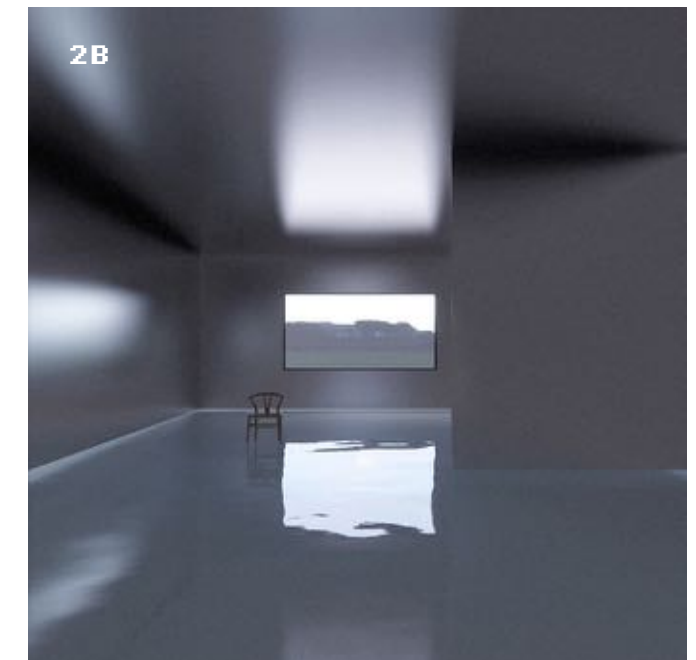
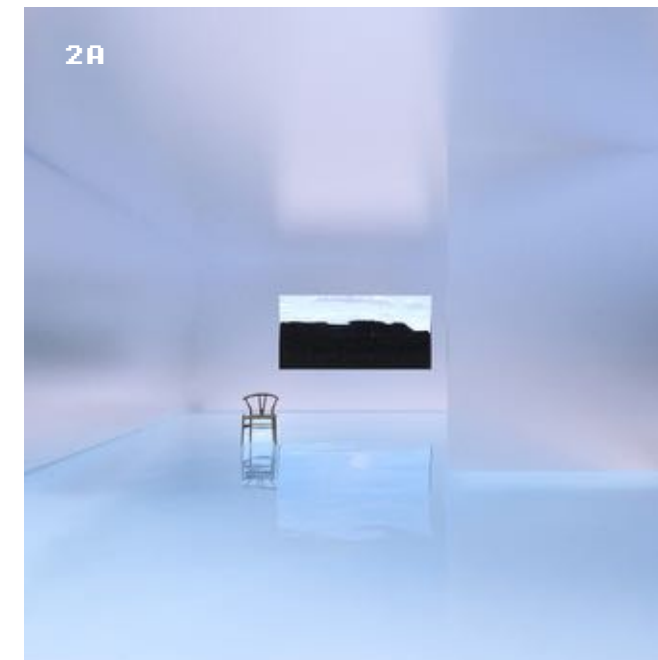
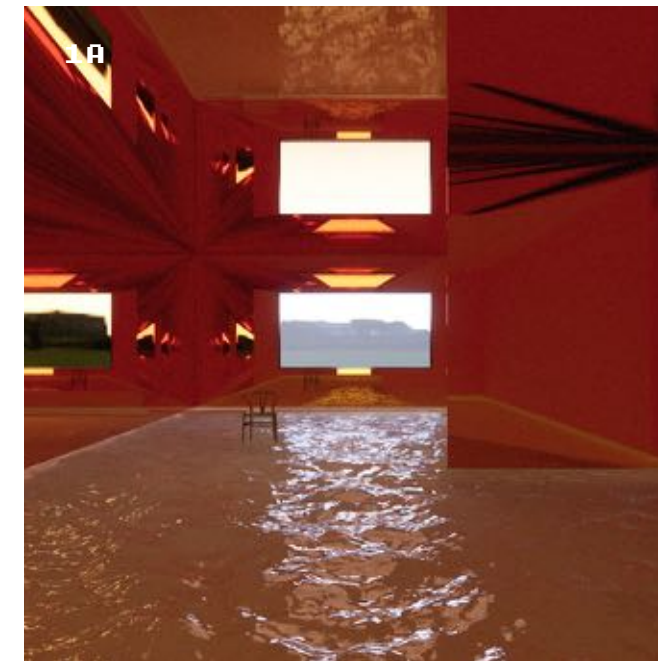


## EXPLORATIONS



Our spatial perception changes drastically from simply manipulating the wooden image texture size. The room with enhanced texture (B) appears more enclosed despite having the same dimensions.

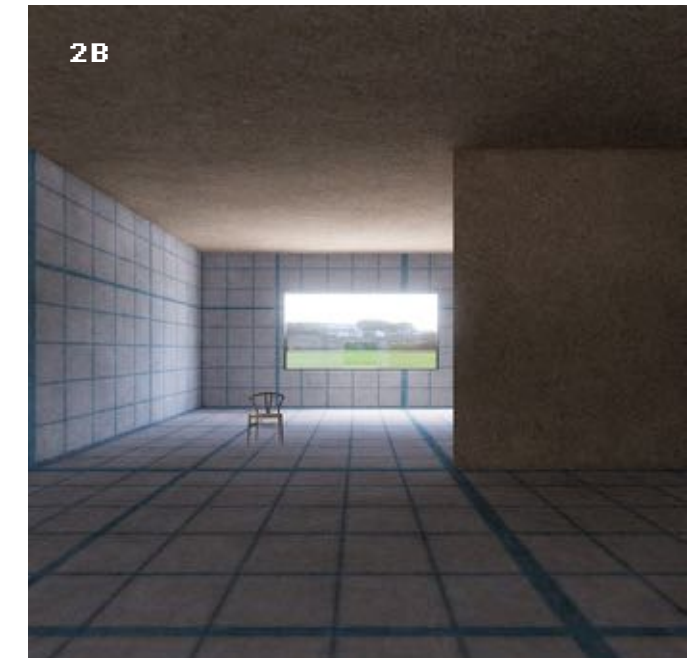
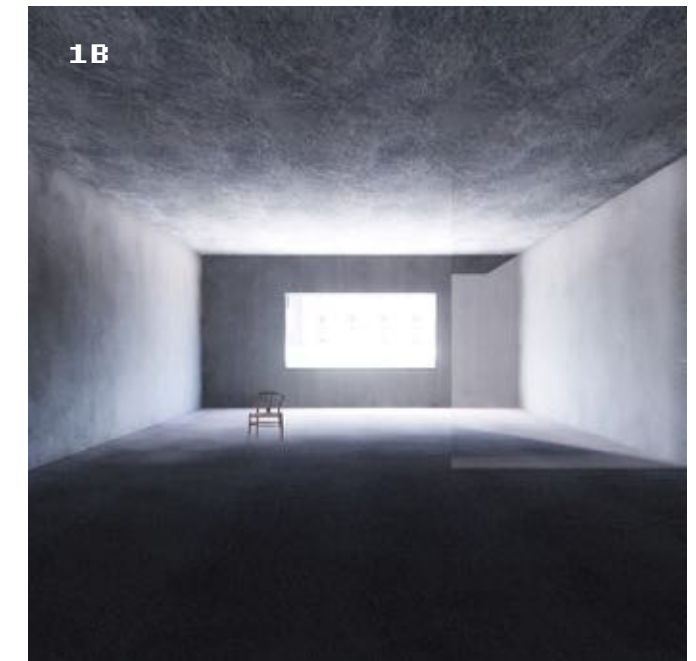
MT



- 1 Glitch rooms let us experience unreal material states which cannot be produced outside of VR.
- 2 The serenity of calm water and soft reflections elicit a positive and calm response.

## EXPLORATIONS

- 1 Wooden surfaces (1A) give a warm feeling of comfort and familiarity, whereas the stone surfaces (1B) feel, in contrast, much cooler and inhospitable.
- 2 A fluffy pink floor mat and fabric laced all around the room (2A) provides a soft atmosphere, however, some of the connection is lost through the absence of tactility. The cardboard model (2B) room has a less convincing minimising effect while maintaining reference elements such as the window view and the chair.



MT

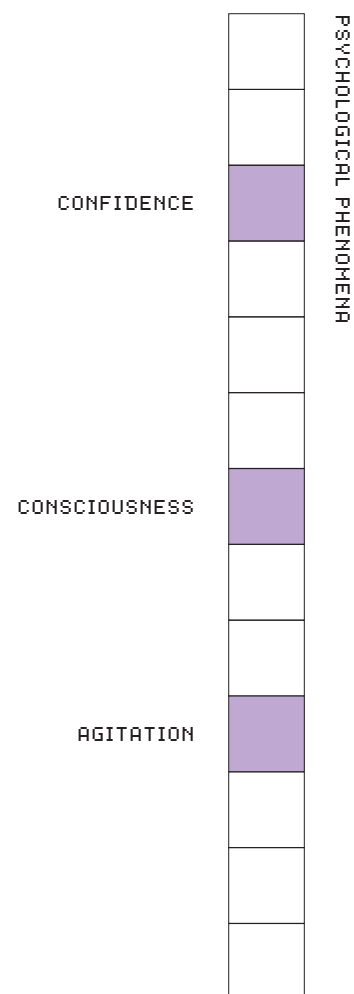


## DISRUPTION

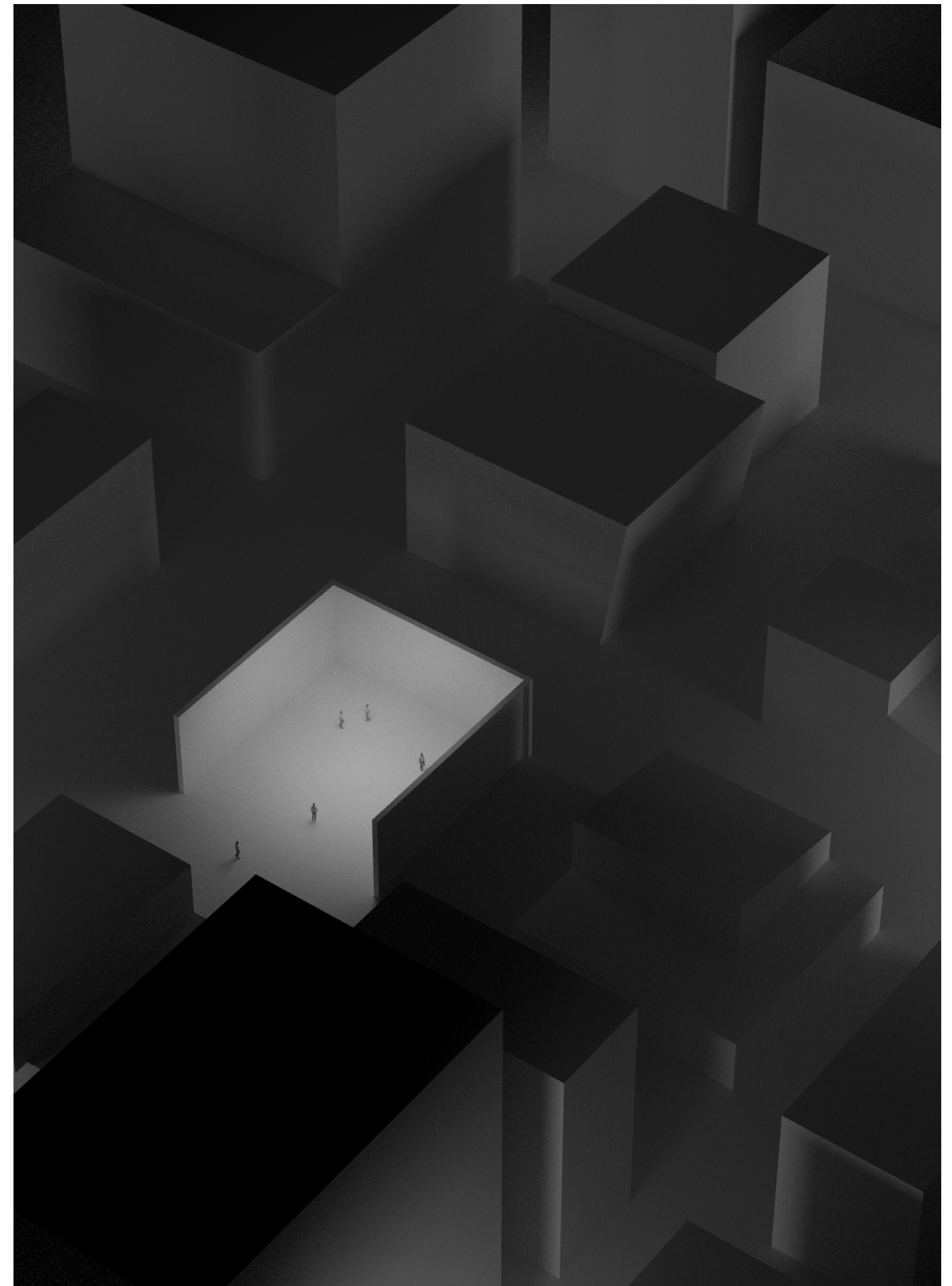
Disruption as a spatial architectural concept can be seen as an unwanted element in a design. The Chinese Feng Shui is a traditional concept where practitioners would form the inhabited environments in order for energy forces to harmonise in users. When working with the notion of flow in architecture, architects try to define spaces based on seamless movement in a building or public space. Disruption is the force that counteracts these practices. With both Feng Shui and flow, spaces and their design work with the user to create optimal movement for individuals. An element of disruption should make the user stop and think, alternatively make them aware or conscious of their physical presence in a space.

Jelic et al (2017) states that architectural spaces can act directly on attention and conscious awareness through body schema, by disrupting the habitual engagement with space.

Some architects try to use the notion of disruption in specific spots to activate the senses of their users. The unintentional creation of disruption is apparent in everyday society as e.g. electrical scooters blocking sidewalks or whenever the escalator in the subway is under maintenance. The disruption of movement can create feelings of frustration but also increased feelings of physical labour (Buday et al, 2006).



DR





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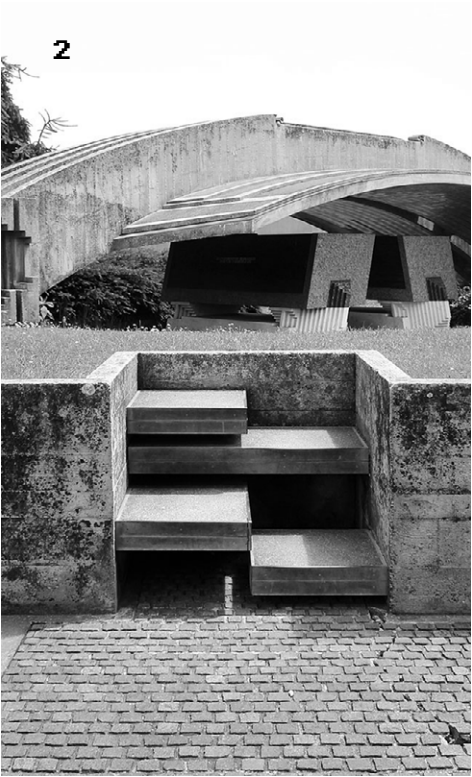
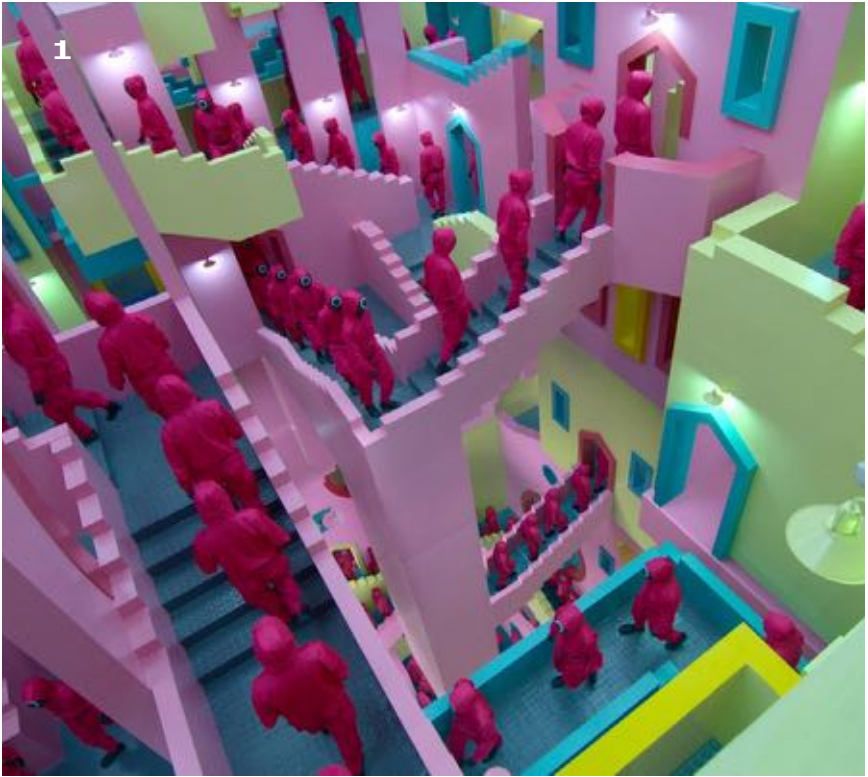


Disruption of public structure using over dimensioned walls. Image: 19-S Memorial

RESEARCH STUDIES

A. Jelic et al. *The Enactive Approach to Architectural Experience: A Neurophysiological Perspective on Embodiment, Motivation, and Affordances*. 2016.

K. Buday et al. *The effect of trial number on the emergence of the ‘broken escalator’ locomotor aftereffect*. 2006.



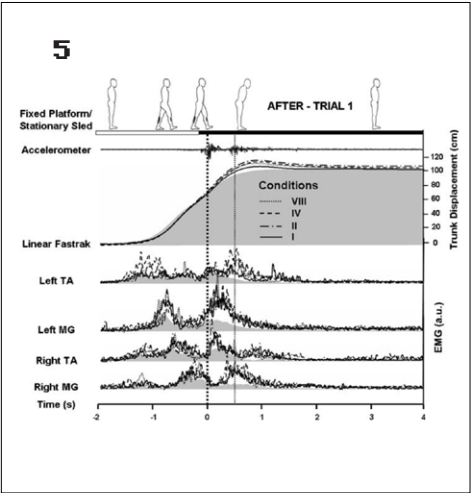
Exaggerated set of stairs create confusion.  
1 Set of Squid Game

Disruptive stair activating the attentional switch.  
2 Carlo Scarpa Stair

Pile of electric scooters creates physical disruption of sidewalk.  
3 TT Nyhetsbyrå

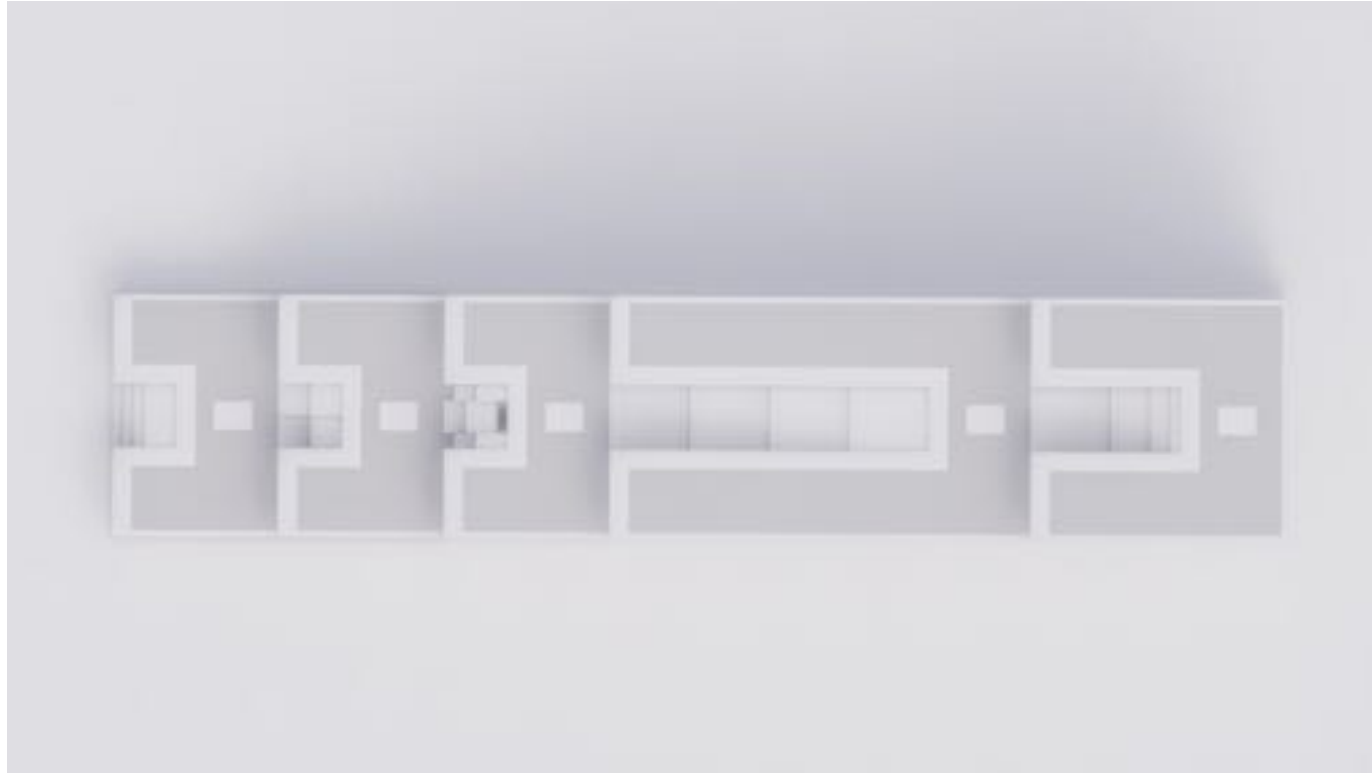
Locked doors in VR encourages exploration.  
4 Dark Souls

Study on broken escalator effect.  
5 The effect of trial number on the emergence of the ‘broken escalator’ locomotor aftereffect  
K. Buday et al. 2006





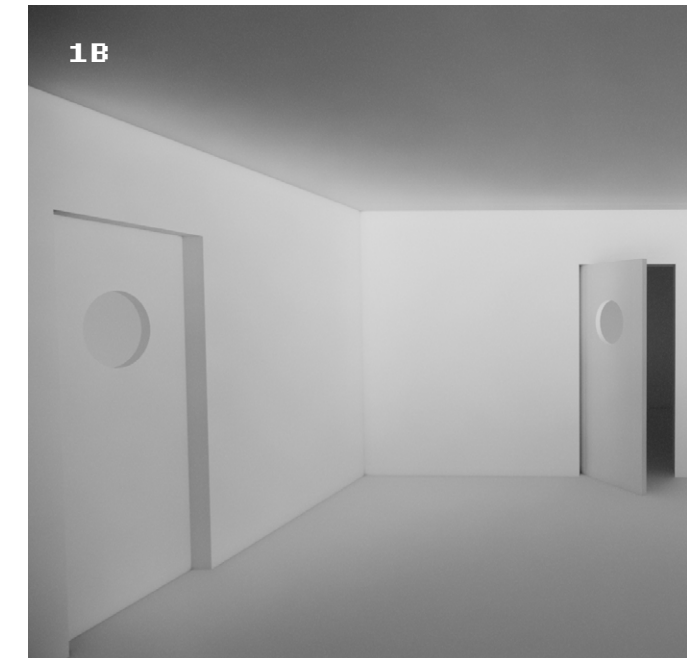
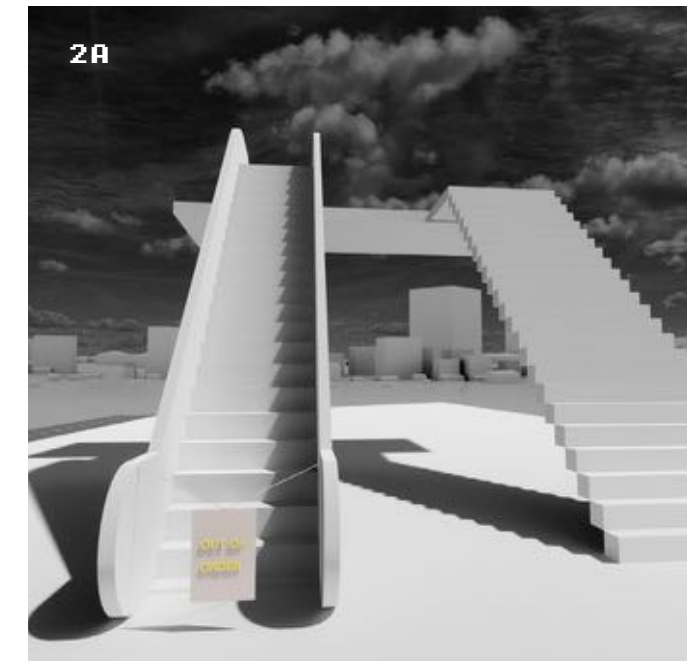
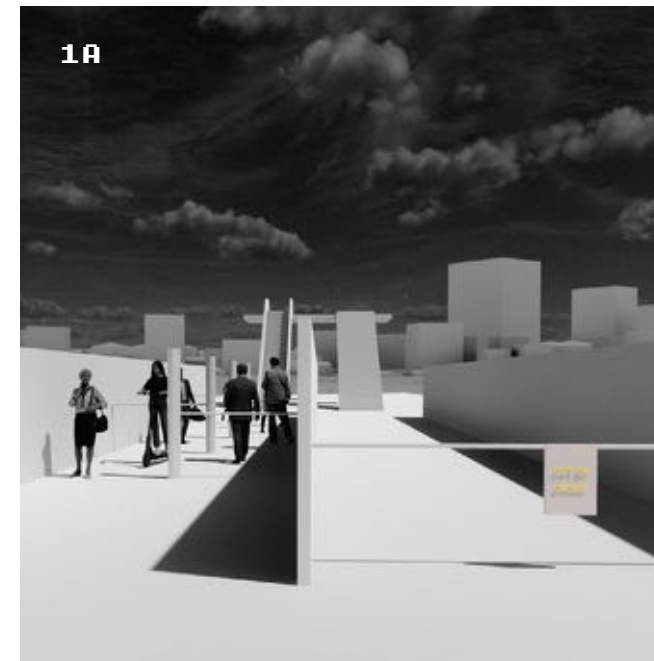
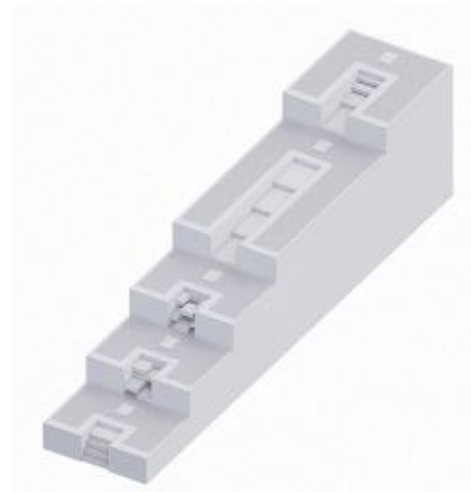
## EXPLORATIONS



Carlo Scarpa's stair (Reference no. 2) at the Brion Cemetery exemplifies the notion of disruption in architecture.

The peculiar stair requires the visitor to recalculate the body's position and appropriate action. This brief instance is just enough to activate the attentional switch and to allow the visitor to consciously experience both the architectural settings and oneself as an experiencing and bodily subject.

We explored developing different stairs in the same realm as Scarpa's and asked ourselves if we could replicate the design principle and maintain the user's physical consciousness.



- 1 Exemplifying both explicit (A) and implicit (B) directions strongly influences pathing.

DR

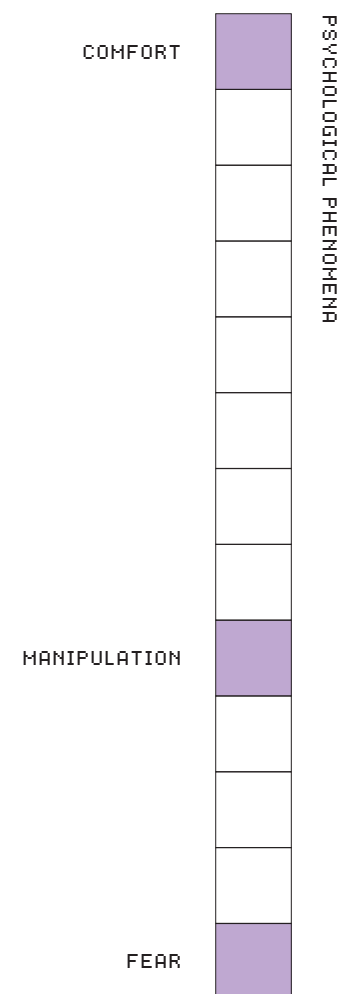
## ENCLOSURE

The feelings we experience in interior spaces are often defined by scale and materiality as the floors, roofs and walls in most cases resemble two parallel planes with a straight line drawn in between. Due to functionality, affordability and flexibility this room design is the standard type of enclosure in homes across the world. However when investigating how different enclosures in VR affect humans, there is a study that argues that this way of living might not be optimal for our mental well-being.

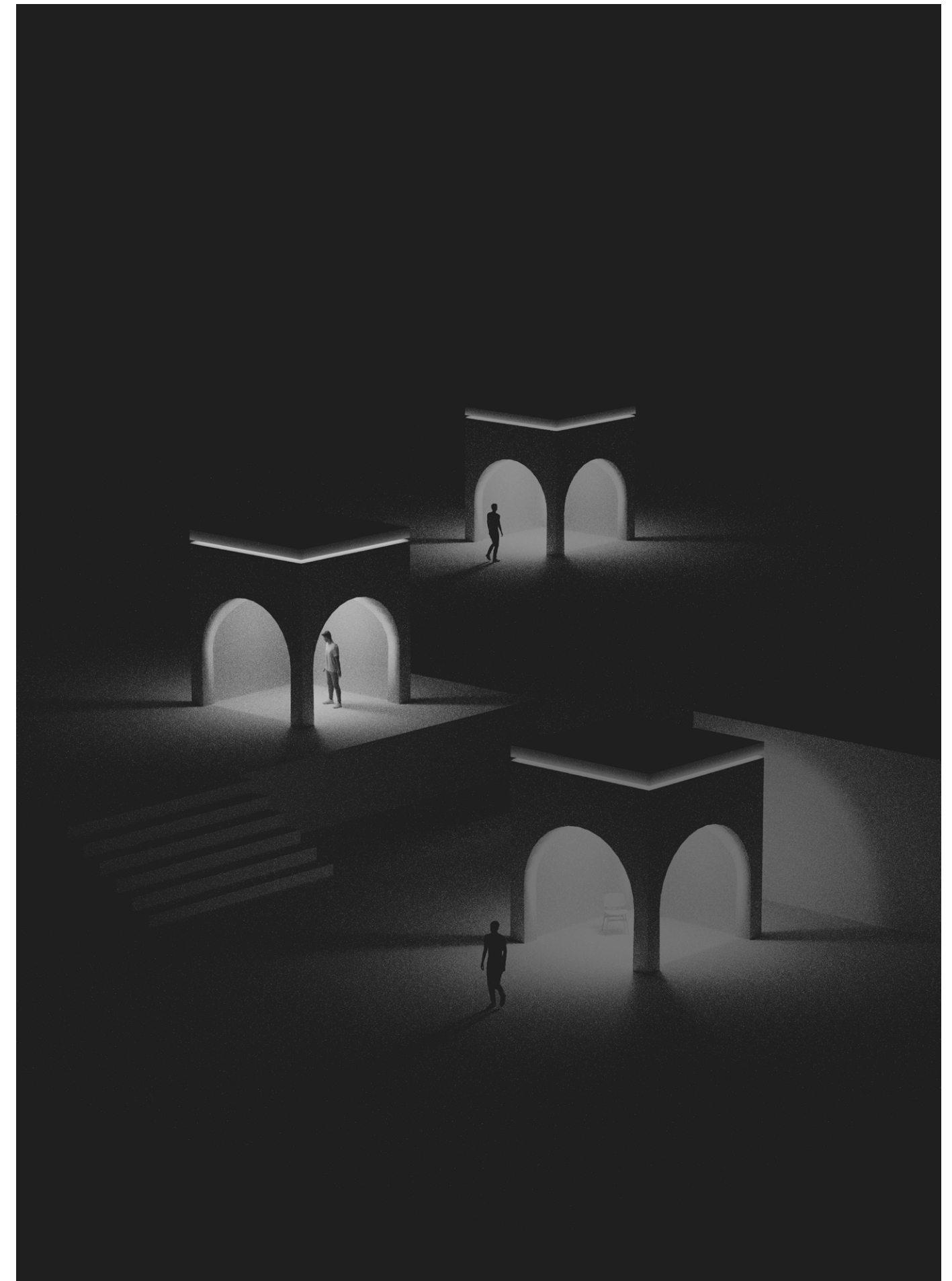
Shemesh et al (2021) examines how spatial manipulations of architectural spaces in virtual reality generate emotional reactions. The research assumes that humans are emotionally affected by the space they perceive and investigates it using virtual reality as a method. Results show a range of emotional responses to geometrical criteria between scale, proportion, curvature and protrusion.

Dias et al (2014) describes objective findings of arousal responses related to positive and negative emotions in users within different virtual reality spaces.

The shapes of the rooms we inhabit are unconsciously affecting our mental states. This could imply that researching form will lead to architects better understanding how to design certain spatial experiences for certain activities or emotional responses.



EC



## REFERENCES



Enclosed spaces to evoke introspective states. Image: An Occupation of Loss

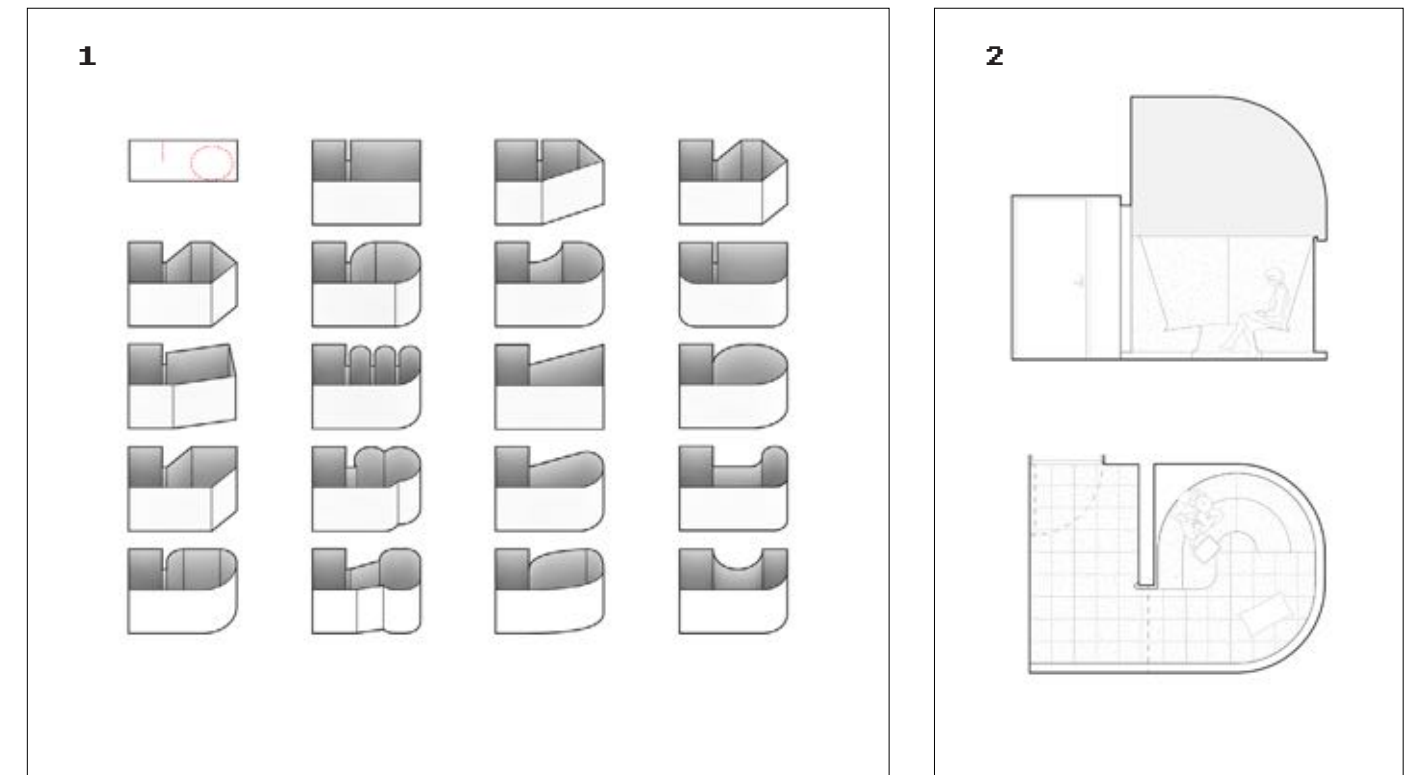
## RESEARCH STUDIES

A. Shemesh et al. *A neurocognitive study of the emotional impact of geometrical criteria of architectural space*. 2021.

O. Vartanian et al. *Impact of contour on aesthetic judgments and approach-avoidance decisions in architecture*. 2013.

O. Vartanian et al. *Architectural design and the brain: Effects of ceiling height and perceived enclosure on beauty judgments and approach-avoidance decisions*. 2015.

EC



Iterations of enclosed spaces as workplace escapes.

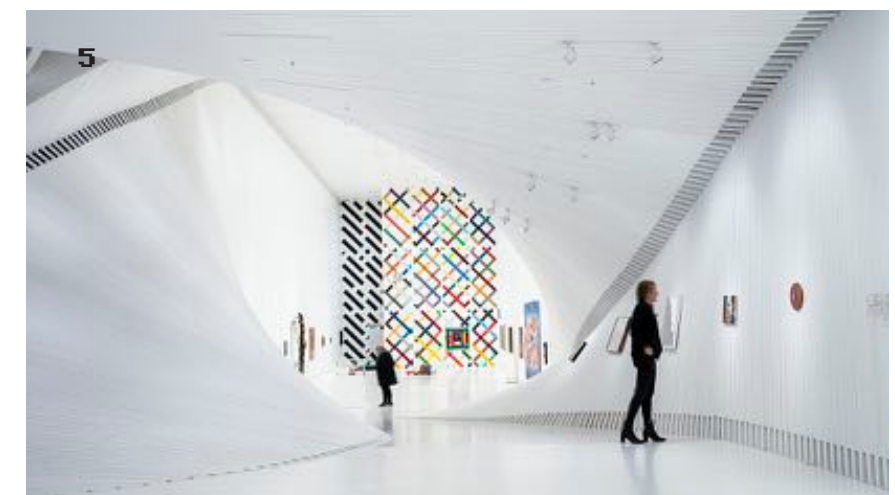
1 Immersive Spaces

Workplace escape.  
2 Immersive Spaces

Sequence of enclosure in spatiality.  
3 Room of Silence

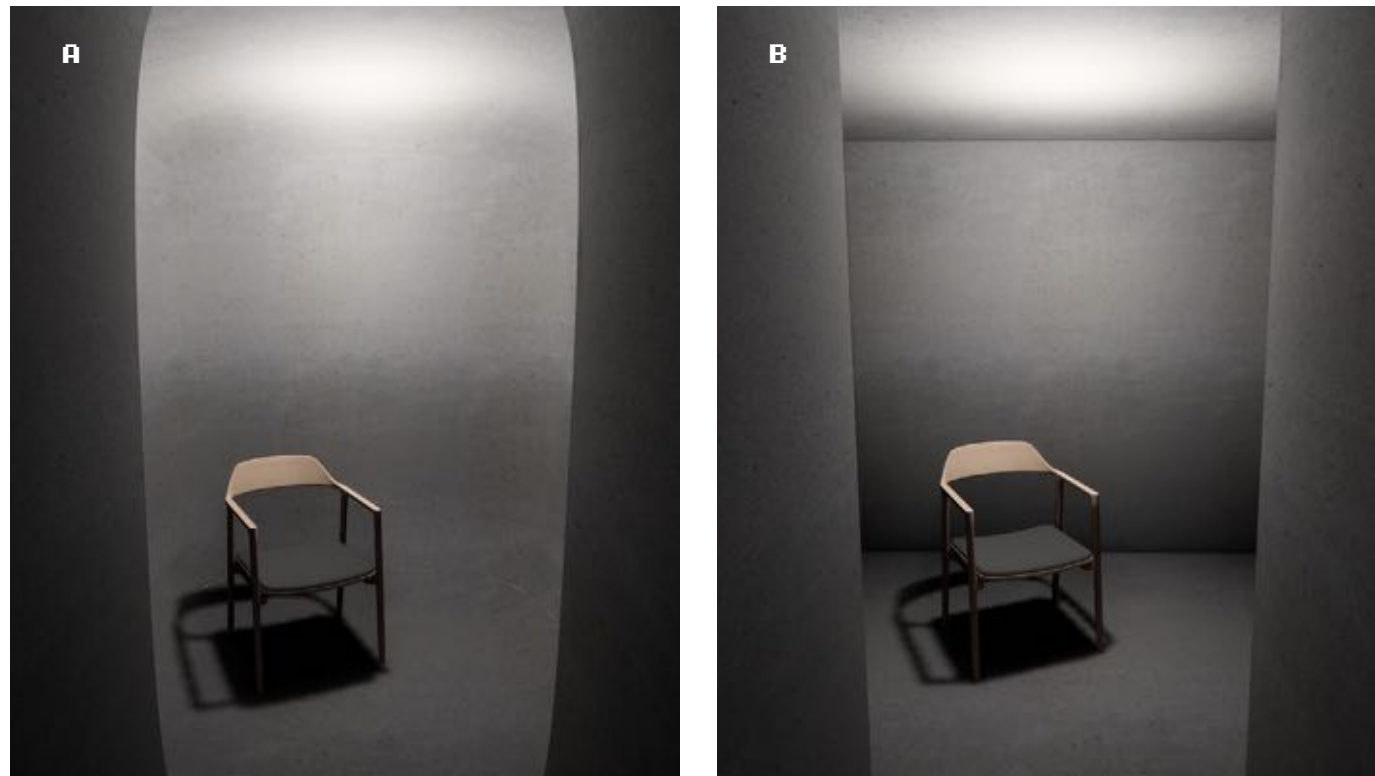
Undulating expression of enclosure.  
4 Kinderarch

Variation of interior geometry.  
5 Kistefors Museum





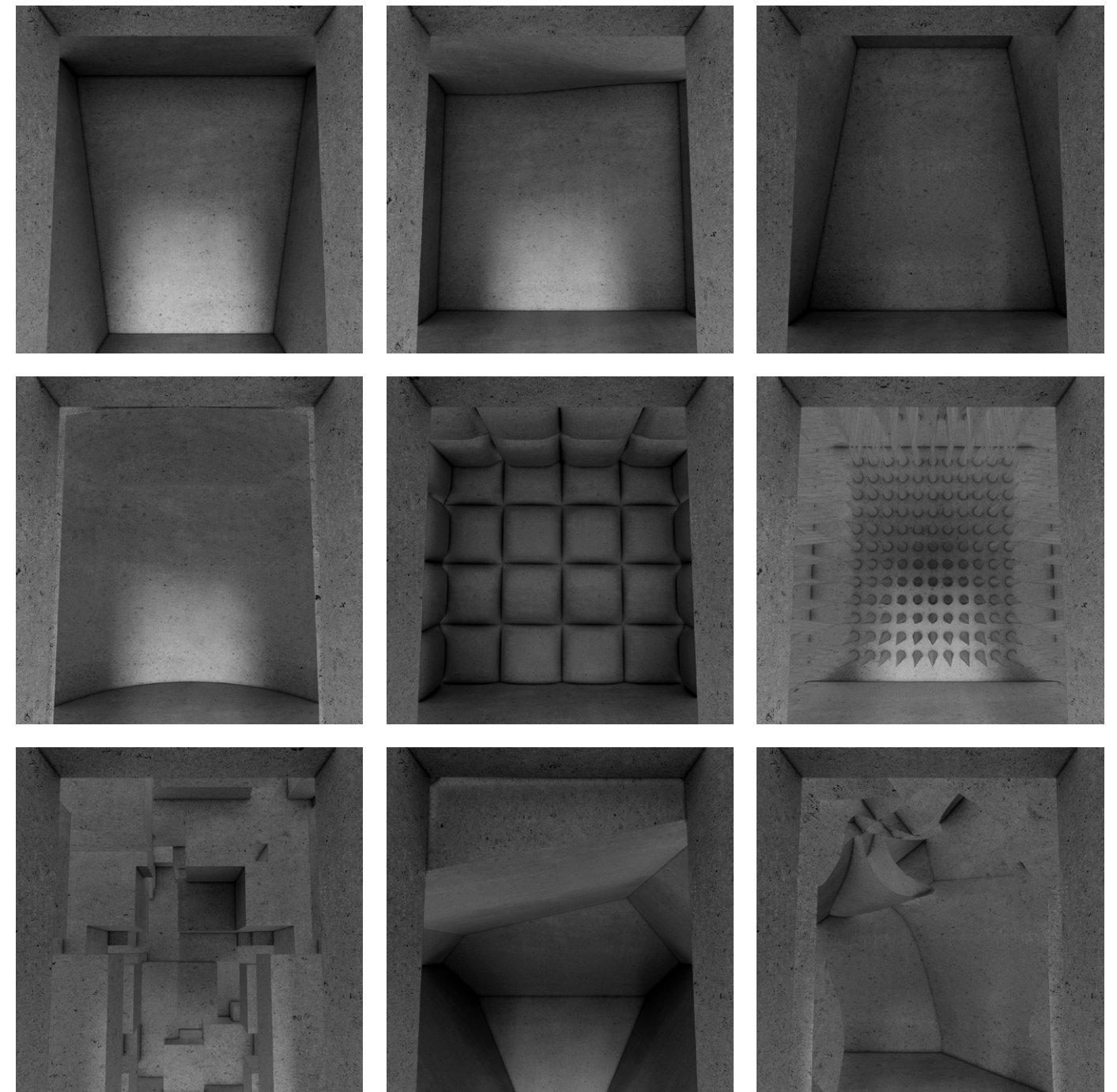
## EXPLORATIONS



There is scientific evidence for preferences of beauty of curvilinear (A) spaces before rectilinear (B).

In a 3 by 3 metre cube we manipulated the interiors in order to create different spatial experiences (right page).

Some of the volume experiments yielded anticipated results, however, others such as the cubic room (down left), which has the anticipated effect of being hostile, was cosier and more inviting than the others. The irregular nature of the room gave place for exploration and the imagination to envision how one would inhabit the space, raising questions of where to sit or where to store food.



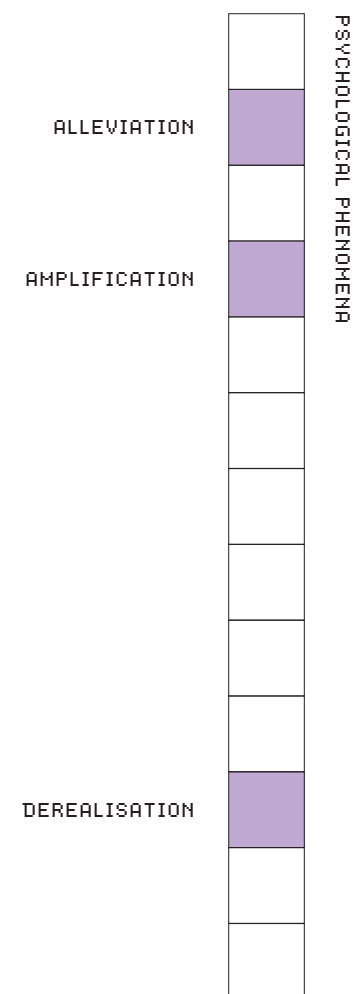
EC



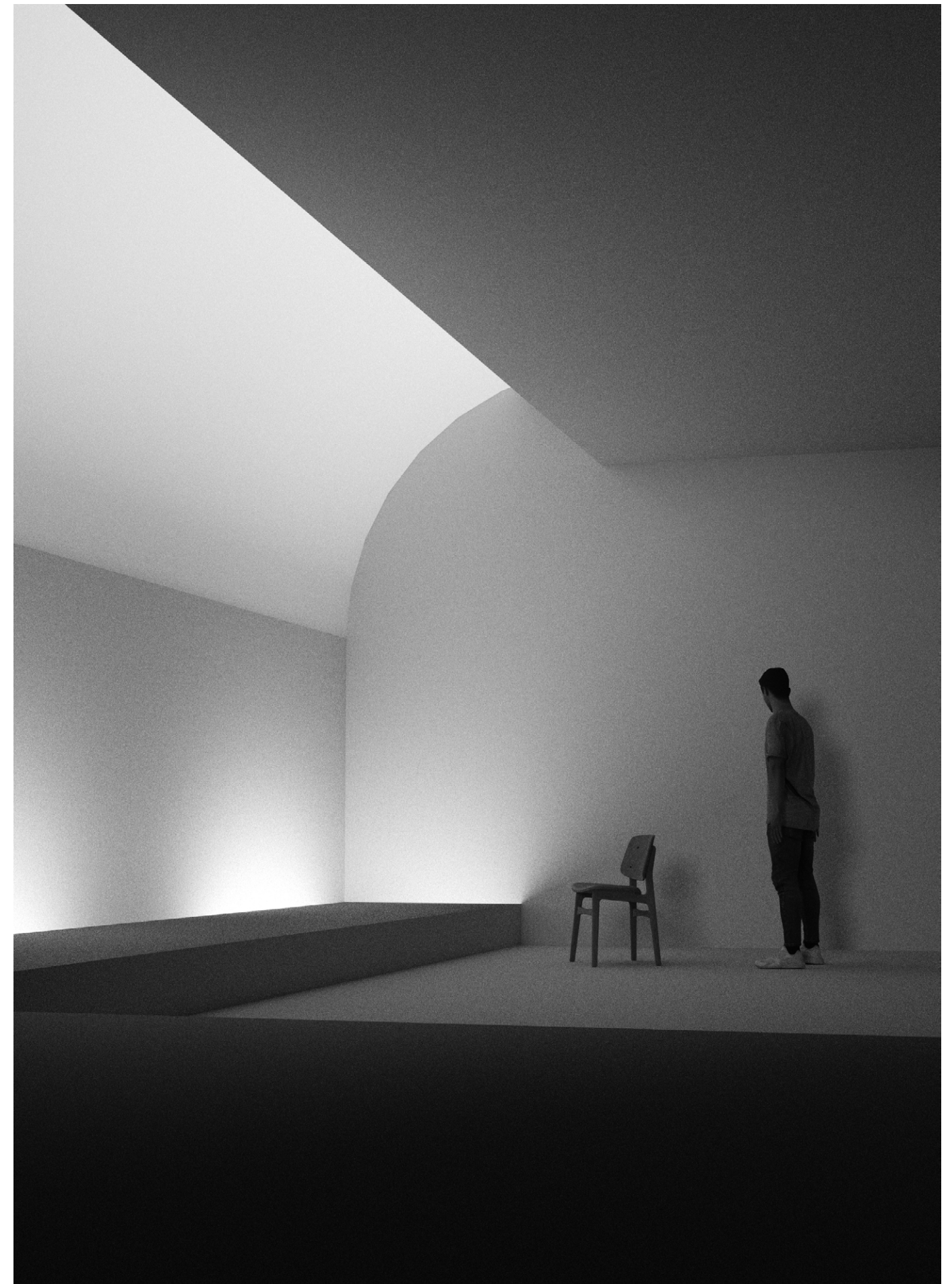
## SOUND

Sound can be split up in two parts in regard to architectural investigation. Firstly, the sound that is added in a space (external sounds) will affect how it is perceived. Secondly, the sound that a space creates when being interacted with (reverberation) has a strong effect on our perception of architecture. These two aspects work together to create familiar environments that we recognize. In a church we expect to hear certain noises, e.g. a choir, a sermon from a priest, an organ. However, these sounds without the context of the reverberating church hall will be perceived out of place and inaccurate.

When interacting with architecture the sounds are incorporated into materiality and the scale of our spaces, and the sounds defined by the programmatic use of a building. However in virtual reality, sounds do not inherently integrate. They are all added externally and need to be programmed in the right context in order to create a coherent and logical spatial experience.



SO





## REFERENCES



Acoustics of performance hall. Image: Harbin Opera House

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J. Andersson et al. *Stress Recovery during Exposure to Nature Sound and Environmental Noise*. 2010.

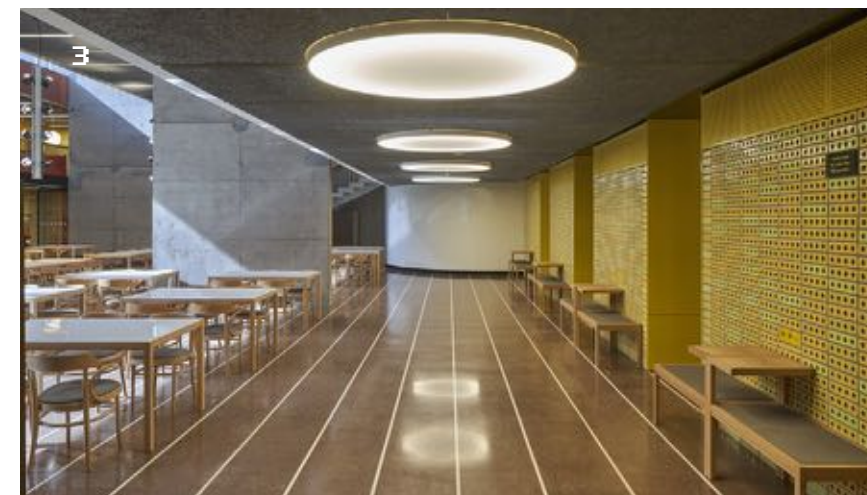
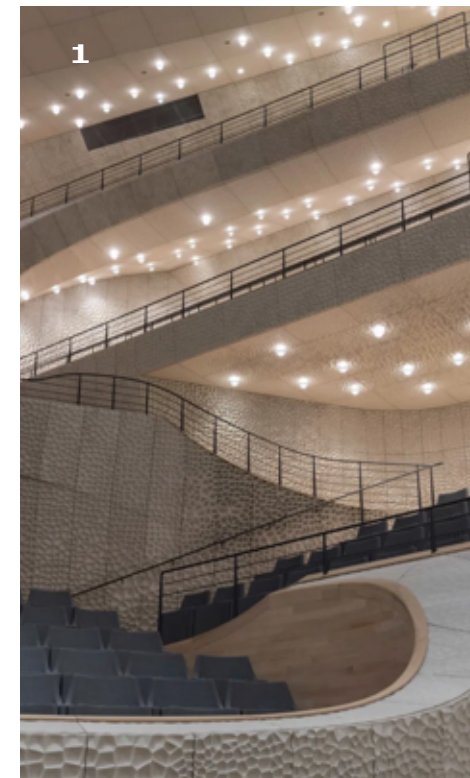
D. Baumann. *Acoustics in Sacred Buildings*. 2008.

Y. Ooishi et al. *Presence of Three-Dimensional Sound Field Facilitates Listeners' Mood, Felt Emotion, and Respiration Rate When Listening to Music*. 2021.

D. Västfjäll. *The Subjective Sense of Presence, Emotion Recognition, and Experienced Emotions in Auditory Virtual Environments*. 2003.

M. Zentner et al. *Emotions Evoked by the Sound of Music: Characterization, Classification, and Measurement*. 2008.

SO



Acoustic wall texture.  
1 Elbphilharmonie

Undulating wall expression.  
2 Harbin Opera House

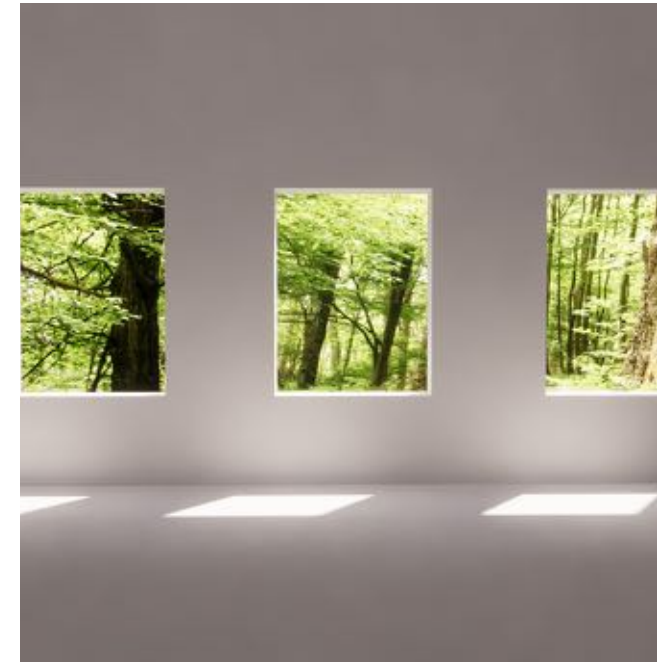
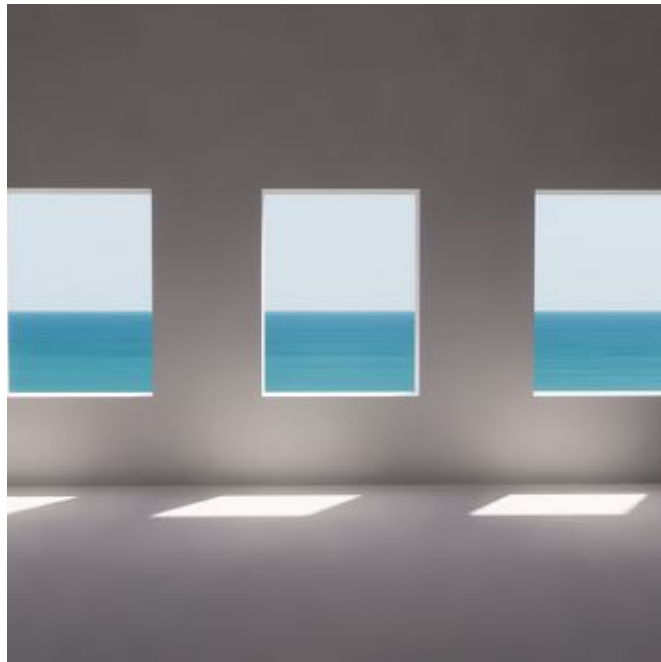
Materiality as sound proofing.  
3 Carolina Rediviva

Public sound installation.  
4 Sonic Bloom

Materiality with reverb effect.  
5 Chapel of Sound







Experimenting with sound. Comparing perception of environment while actively listening to appropriate or non appropriate sound.

We discovered that walking around in the room using additional acoustic effects, such as the sound of footsteps in an empty hall, would further confirm immersive emotions.

SO

DISPLACEMENT

Displacement acts upon both explicit and implicit levels. In an explicit sense, displacement is referred to actual physical displacement in relation to an object being a way of creating distance.

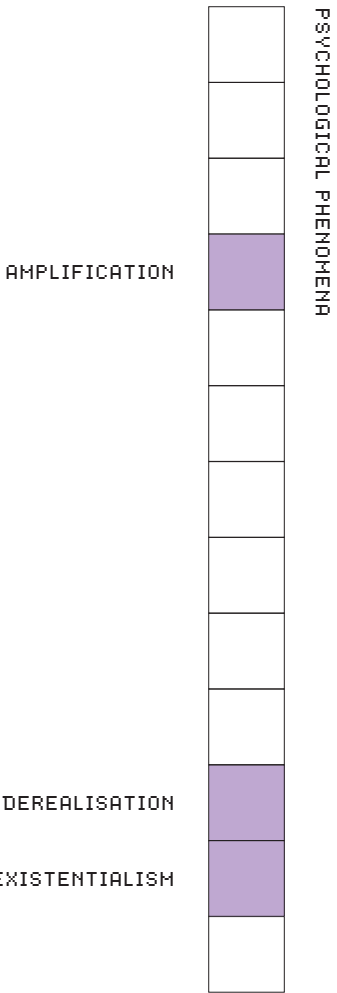
In our thesis, we focus on the implicit psychological approach toward the notion of displacement, in the sense of projecting real world beneficial objects and environments into architecture and spatialities through virtual reality.

Freud (1916) defined the concept of displacement as a means of dream-distortion, involving a shift of emphasis from important to unimportant elements, or the replacement of something by a mere illusion.

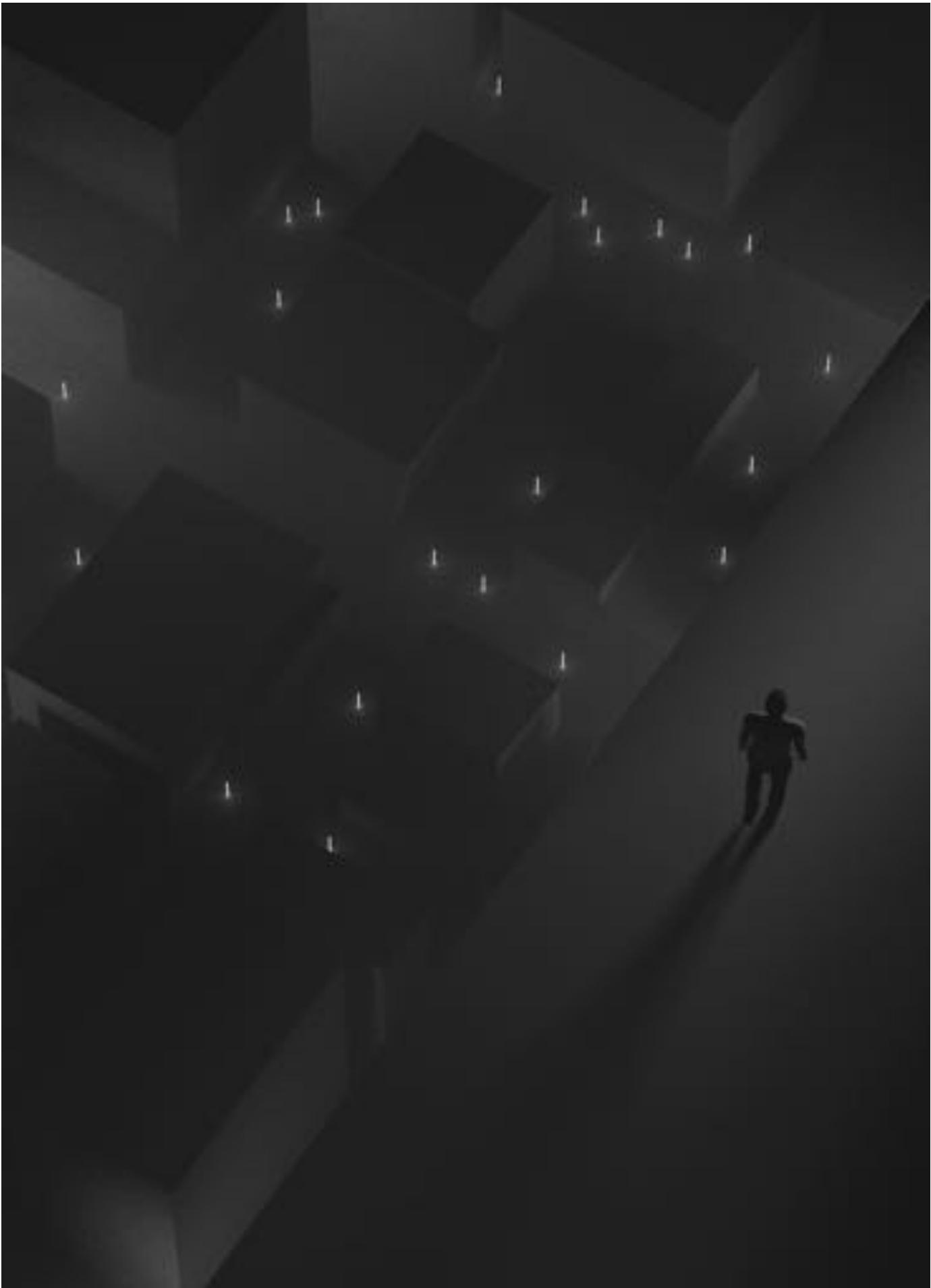
We define displacement in relation to its psychological aspects projected onto architecture in the sense that emotions connected to objects or perceived in oneself are projected, or displaced, onto other architectural objects, structures or spatialities.

In a more practical approach, the displacement phenomenon establishes the idea that we could project what is already defined as externally induced conditions for introspective states in the real world, and with unrestrained tools of virtual reality, enhance those aspects within the virtual world.

In this implementation, we found an interesting dissonance occurring in that how we perceive our real world and its physical laws and the virtual reality (designed within the domain of displacement) we found ourselves in do not correlate. It generates a feeling of being “displaced” to another spatial dimension whereas the laws prevailing in your physical body’s world cease to exist within the virtual environment, and act upon the psychological phenomena of derealization.



DP





## REFERENCES



Projected nature environment in interior setting. Image: Sumsei Terarium

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DP



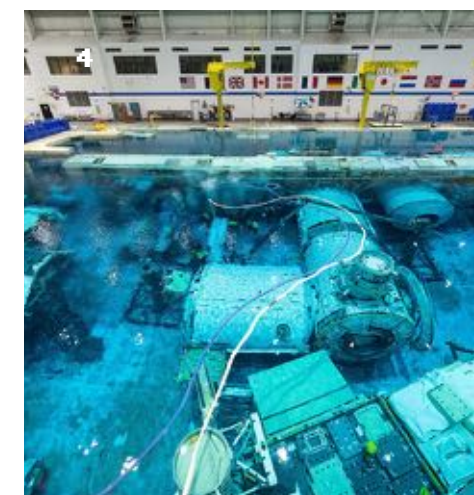
Cave-like atmosphere.  
1 Sumsei Terarium

Expressive light installation.  
2 Team Lab

Mist climate in interior setting.  
3 Sumsei Terarium

Simulation of space gravity.  
4 NASA Neutral Buoyancy Lab

Cultural appropriation of Swedish house in Japan.  
5 Little Sweden





## EXPLORATION



Studies on nature's health benefits on our psychological well-being are overwhelming. There is a scientific consensus that even short-term exposure to natural settings have positive outcomes for health and well-being (White et al, 2018).

By using VR, the effect of the real nature environment can be produced artificially. Browning et al (2020) concluded a study illustrating that six minutes of nature exposure in mobile VR headsets produced similar effects as six minutes of outdoor nature exposure.

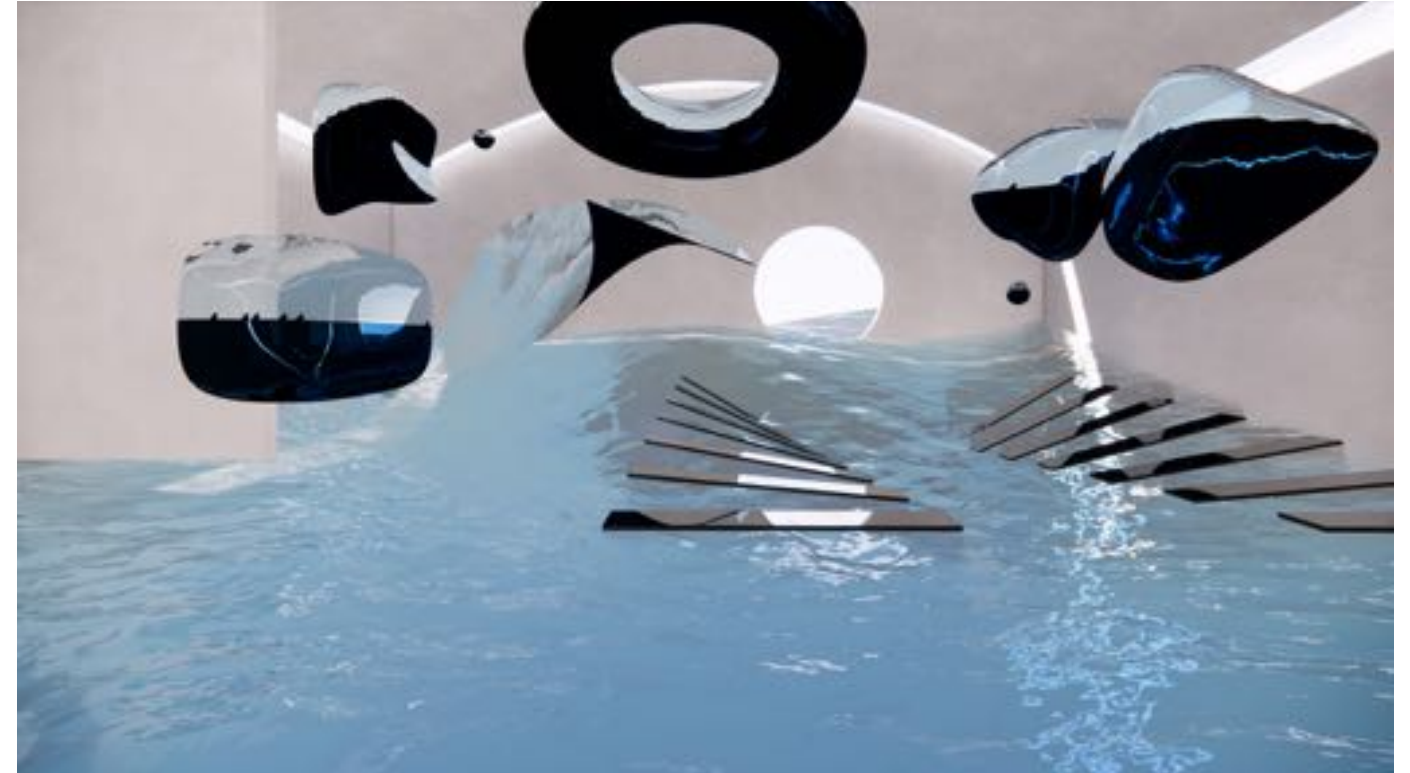


A generic room was modelled with simple elements such as an interior wall, benches and a visual motive. In order to test different levels of displacement the same room was utilised. In the first state, it is merely a blank one with relatively anonymous materials.

In the second state, nature is introduced as a means for displacement. The goal was to create an indoor VR environment that represents nature and lets the user experience a similar response as in "real" nature.

DP

## EXPLORATION



In the third state, a method of establishing surrealism is tried. Water spews in from the opening, while benches turn and big molecules of matter float in the air. This might encourage the user to accept a new set of laws of reality in the VR simulation.

DP

## LIGHT

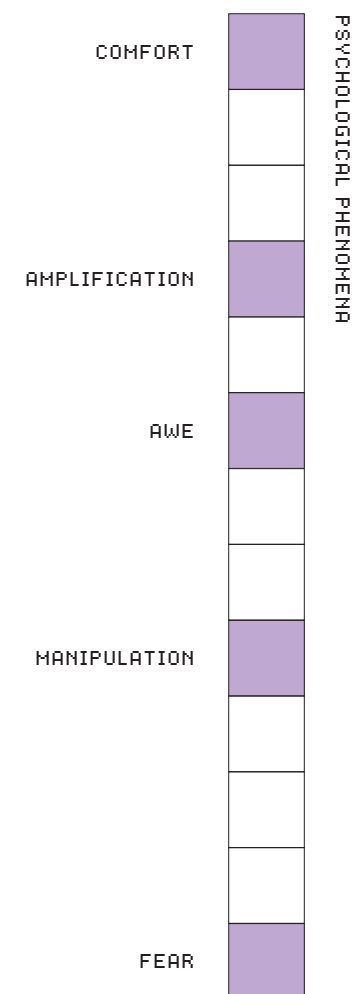
Daylight is to be considered a powerful tool of a natural resource capable of shaping a building and its interior settings. It's a highly evident element in achieving pleasant spatial settings.

Light determines much of an interior's atmosphere and spatial feeling and creates an atmosphere of contemplation and composure. This is for example evident in many sacred architectural typologies designed for worship and introspection (Kreuz, 2008).

When used correctly, light - and the absence of light - can accentuate, direct attention and highlight specific parts of a spatiality. Furthermore, daylight is considered as a generator of positive effects related to physiological and psychological well-being and, therefore, a crucial factor supporting health. Studies have also identified daylight as an indispensable source of aesthetic experiences (Cold et al, 1998).

Light's non-visual effects can be described as short-term effects, directly influencing for example our mood, alertness and performance, and as long-term effects on our health and well-being (Anter et al, 2017).

A study conducted by Moscoso Paredes (2016) described a correlation between perceived aesthetic attributes and window size. The study conducted by Flynn also showed the preference of peripheral lighting rather than overhead lighting. Low intensity light tends to convey a more relaxing atmosphere. The feeling of relaxation also precedes warm, white light and non-uniform peripheral lighting. Varying contrasts and peripheral emphasis in illuminance are thus factors which reinforce the perceived feeling of pleasantness (Flynn, 1977 cited by Wörnström Lindth, 2012).



LI





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Organic inlet of diffuse sunlight. Image: Várzea Church

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C. Moscoso Paredes. Daylighting and Architectural Quality. 2016.

P. Wardono et al. Sensory Effect of Daylight on Contemplative Perception of Space. 2013.

LI



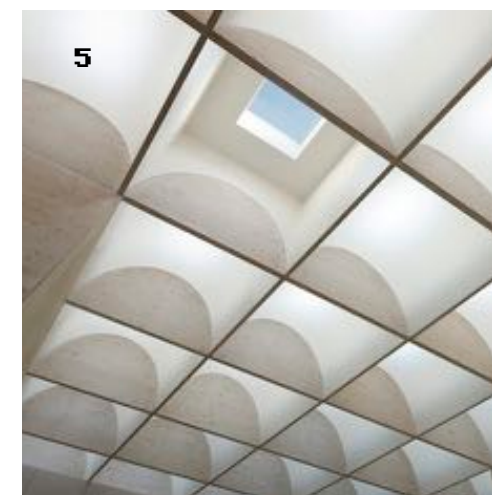
Real HDRI creating correct light atmosphere.  
1 Mandalorian Set

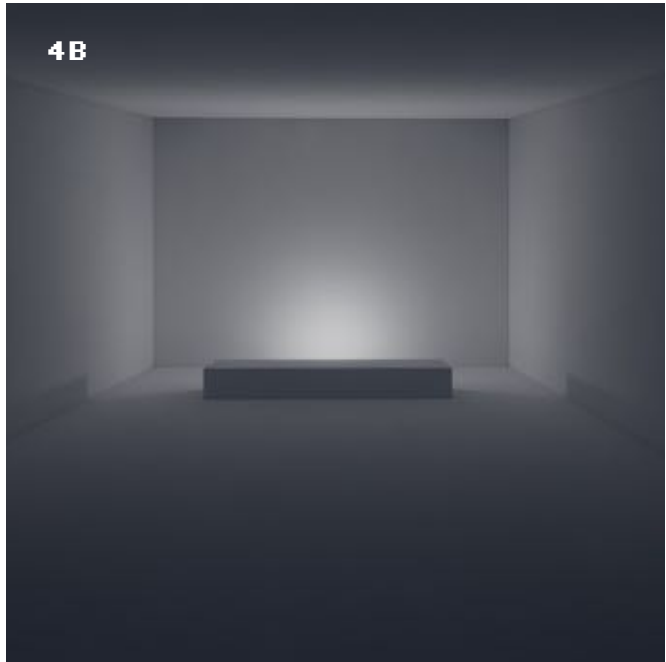
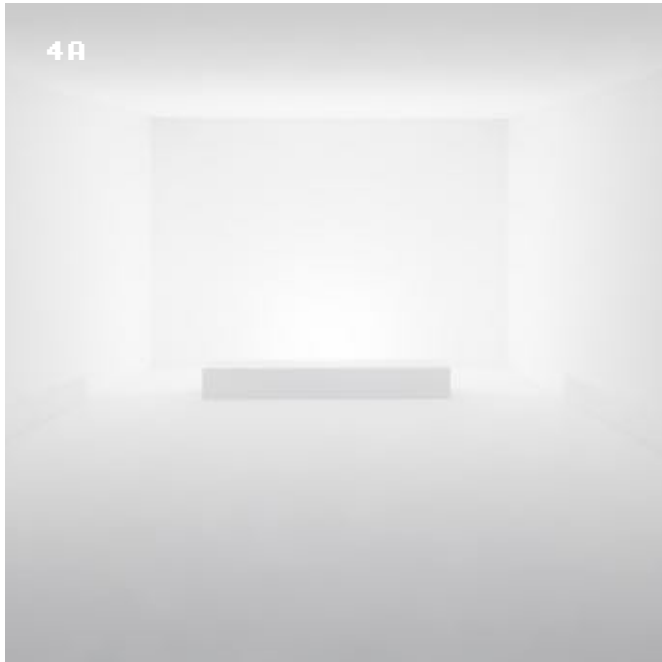
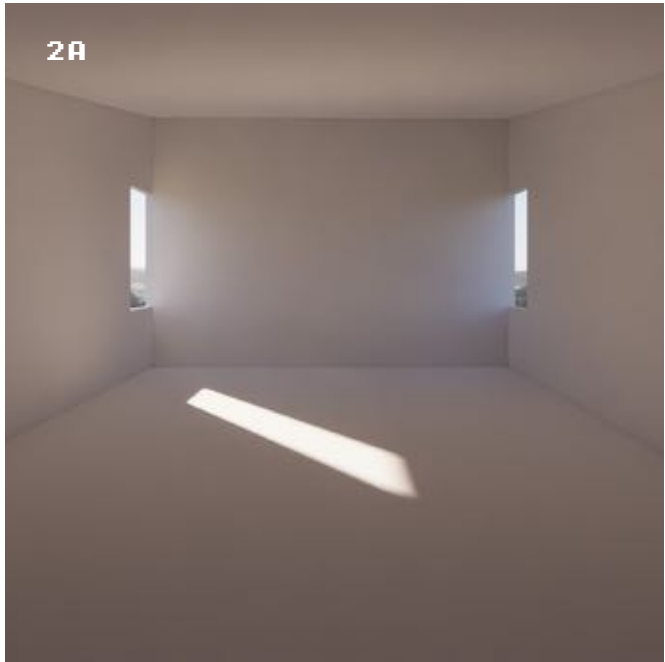
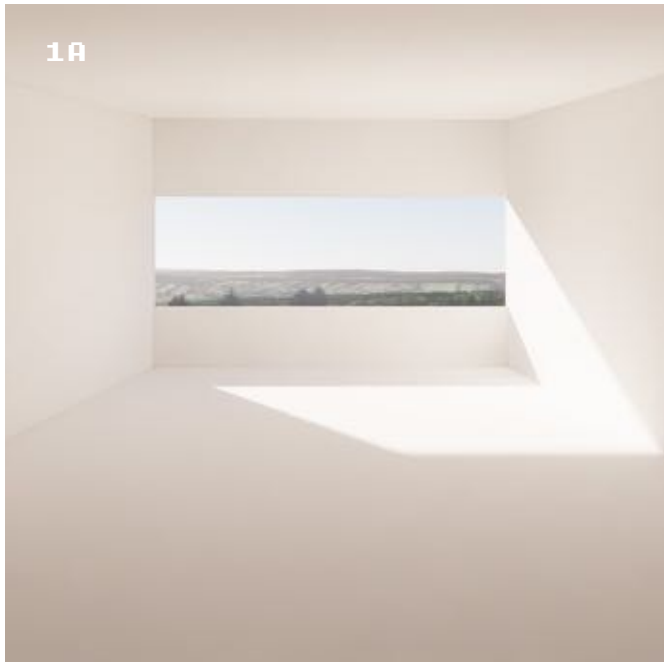
Color atmosphere based upon sky color.  
2 See Color, James Tyrell

Immersive light installation in dark setting.  
3 Spy Data

Shadow pattern.  
4 Los Limoneros

Ambient sky light inlet.  
5 Daylight House





- 1 Comparing light from a horizontal (A) and vertical (B) inlet.
- 2 Light coming from visible (A) and invisible (B) sources.

- 3 Simulating direct sunlight (A) and diffuse skylight (B) in a space.
- 4 Different levels of intensity of an artificial light source might evoke different moods.

LI

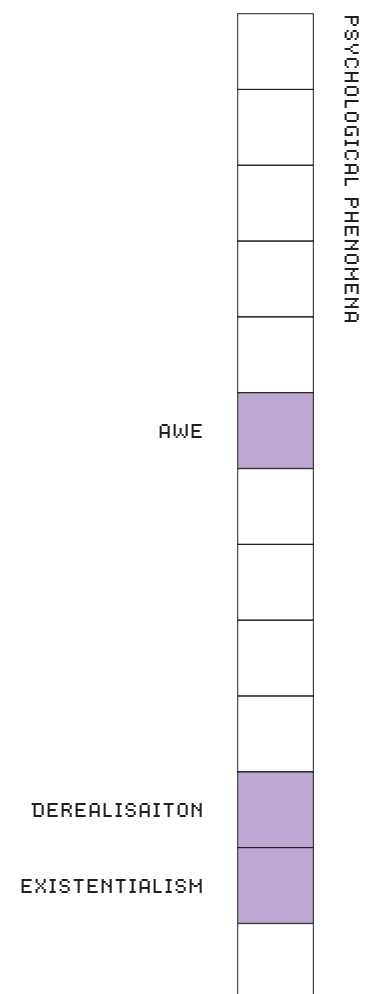


## COMPLEXITY [META]

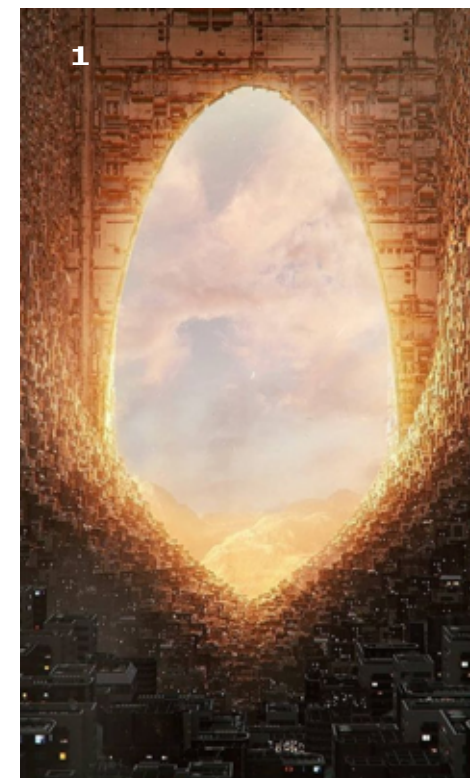
The word complexity often refers to a level of something else. It's a reference to how much of something there is or how intricately it is ordered.

As a spatial domain, it can be used as a meta expression and develop the eight prior domains, as complexity exists, at some level, everywhere. In architecture, a sense of complexity can be achieved through structures too difficult to understand at a glance and this can be applied at any scale.

Sometimes, the overwhelming nature of something complex can create feelings of perplexity and derealization in humans, but also negative emotions such as anxiety and fear. Complexity in architecture can be developed through extensive research and knowledge carried out through thoughtful applications in spaces and exteriors. Other ways of creating complexity in design can be to explore parametric design and create tools that bring out patterns inconceivable by humans, although easily generated by computers.



CP



Small object textures projected onto large surface creating “Greeblies phenomena” enhancing sense of scale.

1+2 Annibale Siconolfi Art

Complexity in facade structure.  
3 Aluminium House

High level of complexity in organic geometry.  
4 Heydar Aliyev Center

Complex tectonic interior structures.  
5 Cloud Pergola





## EXPLORATIONS



High level of complexity in architectural language. Image: Centre Pompidou



We made four different iterations of the same space using a Grasshopper script with set variables. The extrusion of the shapes defines the space and gives a sense of complexity and randomness.

Discussing this concept, we drew connections to nature and its seemingly random state, however, still bound by parameters and variables such as the laws of physics.

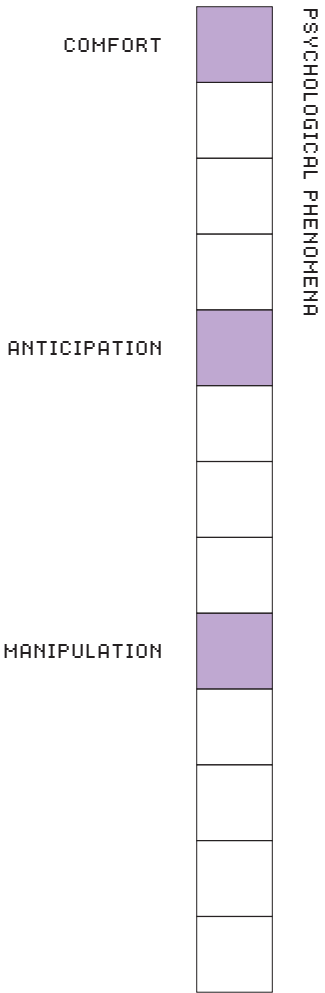
CP



SYMBOLISH [META]

The second meta domain is the domain of symbolism. With symbolism we identify the inherent values that history and culture have on architecture. Our history and culture is what shapes the future of architecture but it is also what makes it make sense. If there was no preconception of what, e.g., a bank looks like, individuals might find themselves struggling to navigate modern society.

Symbolism could therefore be seen as an invisible force that acts as a filter on all the things we experience, implicitly and explicitly.



SY



Piloti symbolizing power in a cultural historical context.  
1 NY Stock Exchange

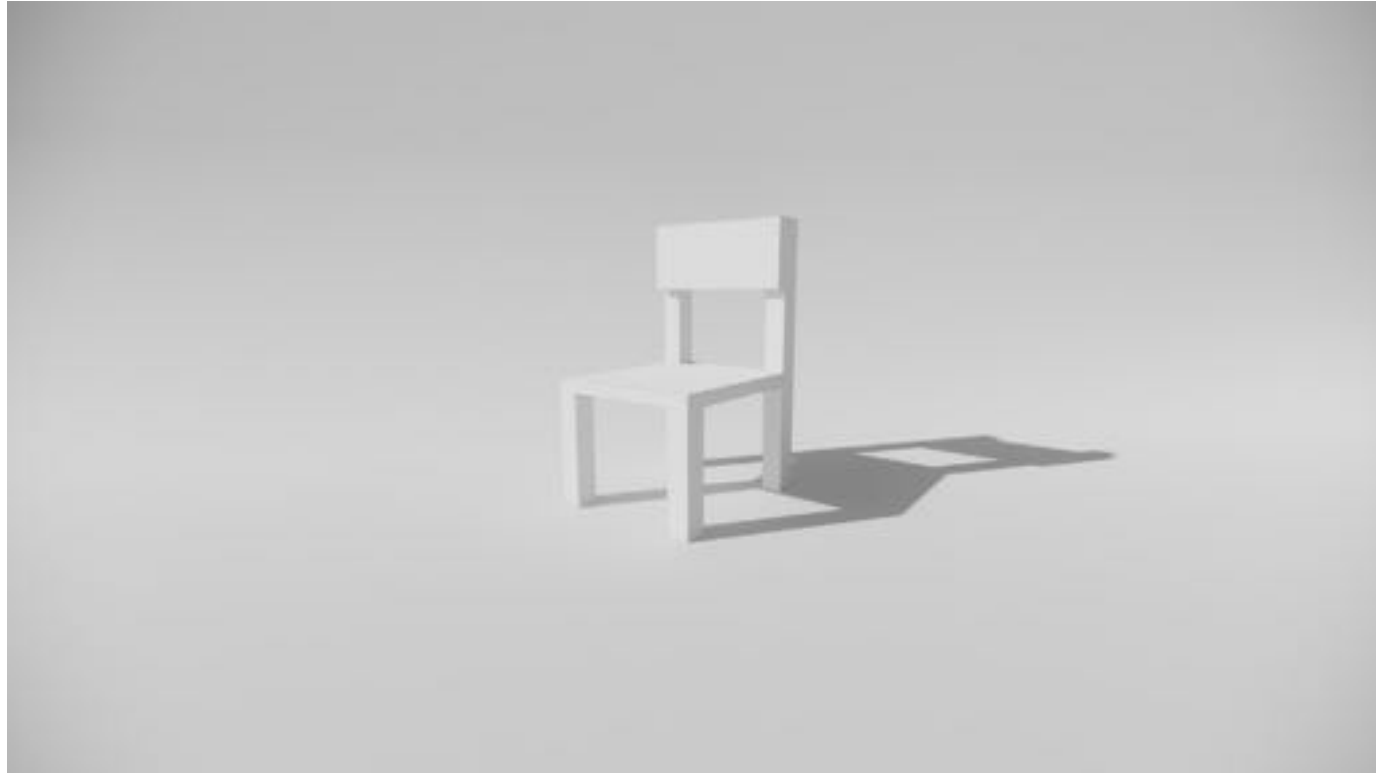
Characteristic high-end product store displaying company logo.  
2 NY Apple Store

Light inlet strengthens symbolic values.  
3 Church of Light

Color as an identification symbol.  
4 Russian IKEA store



## EXPLORATIONS



The metaphysics of a chair. Even the most basic chair with minimal context is clearly identifiable as a chair. This is due to the fact that the volumes constructed in this order represent “chairness”.

This can indicate that we all have preconceptions about what a chair or any other known object is or should look like. This concept, we believe, also carries over to architecture.



The same volume using different symbolic elements can give us an idea about what a building represents. The decorated shed is a way for designers to give the user an idea about the building without having to create an architectural design that represents the program.

SY



> PHASE B

> VIRTUAL REALITY EXPERIENCE

/ BACKGROUND & METHOD



## INTRODUCING VIRTUAL REALITY

Virtual reality and its role in architecture is frequently debated today. As the digital tools of the architect have developed over the past decades, the use of the 3D-model is almost always a part of the contemporary practitioners' tool box. From this, the world of architecture visualisation derived. Renders, and eventually live rendering tools, gave the architect a way to experience the models in real time. VR in combination with real time rendering can be utilised to give architects and customers an immersive way of entering the virtual work. Architects have then started to see different possibilities in working with VR, not only as a way of giving virtual house tours.

The London based practice Space Popular uses VR as a tool of showcasing art installations, but also challenging spatial norms and concepts. They explore how people interact with information and virtual models, however, the environments themselves are somewhat lacking in terms of atmospheric values.

In order for XR Architect, Artist and Creator Samuel Arsenault-Brassard to create the Museum of Other Realities, a museum for virtual art, he wanted to define what atmospheric values were crucial in different spaces and how to convey it through space, light and sound.

Yara Feghali is a faculty of UCLA A.U.D and she creates immersive and interactive experiences that work with different visual themes to address different social and urban issues through VR. Working with VR as a means for changing the perception of an issue in a real life scenario.

As VR becomes more popular with giant tech companies such as Meta and Amazon, new digital worlds might become part of our daily lives. As such, there are clear challenges for architects when creating virtual environments. Perhaps the first VR environments are going to be social media platforms, filled with ads and new forms of societal pressure. One might argue that VR as such should not be seen as a means of creating an alternative digital reality, but instead an explorative playground for testing things that question and challenge our own reality.

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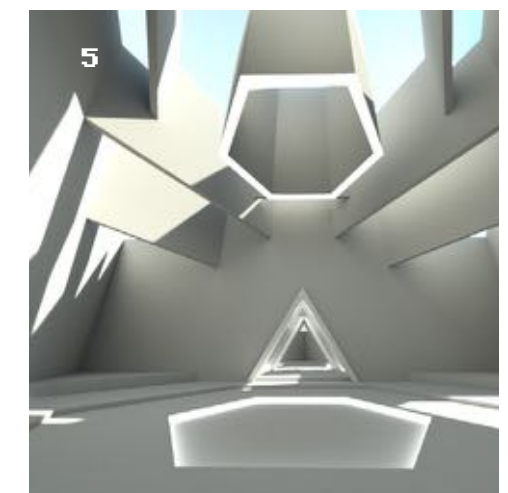
Virtual revival of Californian desert Herbarium.  
1 Yara Feghali, Virtual Herbaria

Burning Man virtual installation.  
2 Mamou-Mani

Overlapping virtual rooms creating hybrid spaces.  
3 Space Popular

Immersive virtual environment of seabed.  
4 Yara Feghali, Virtual Herbaria

Museum of other realities.  
5 Samuel Arsenault-Brassard

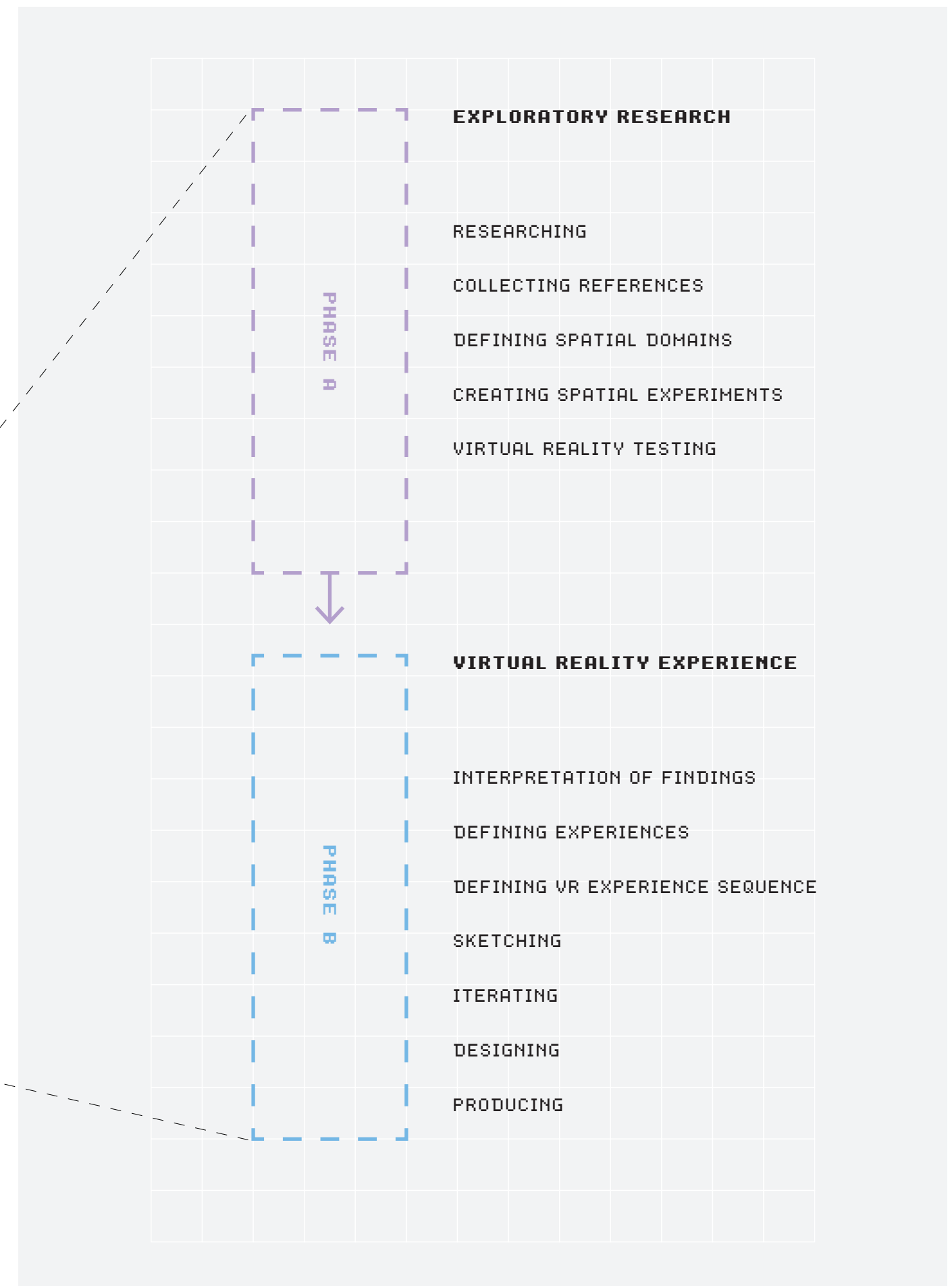
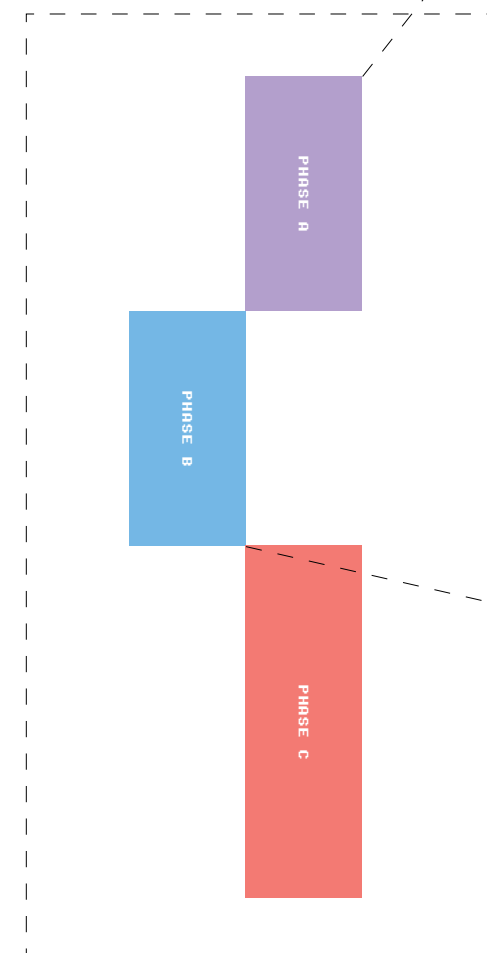


## INITIATING PHASE B

With the knowledge created from past phases, there was an attempt to create a virtual reality experience based on the findings.

As a starting point, defining sets of psychological phenomena that relate to each other would create sequential experiences. The sequences were to act as a base for further architectural development. The psychological phenomena came to dictate the overall narrative the architectural experience would have – also on a smaller scale, defining the micro narratives of our sub experiences.

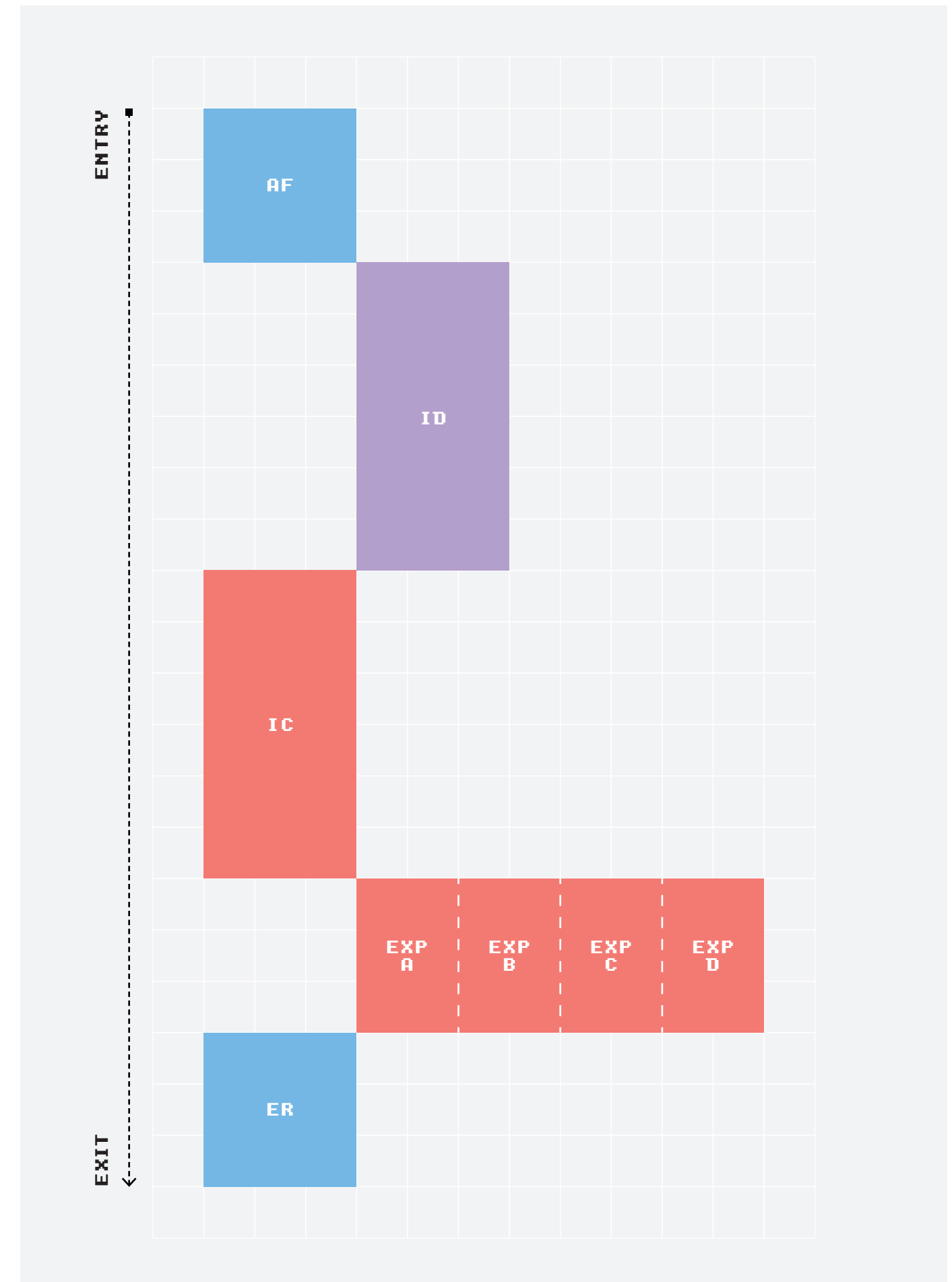
Through sketching, discussing and iterating, the narratives eventually solidified and started to develop as physical concepts through 3D modelling and drawing.





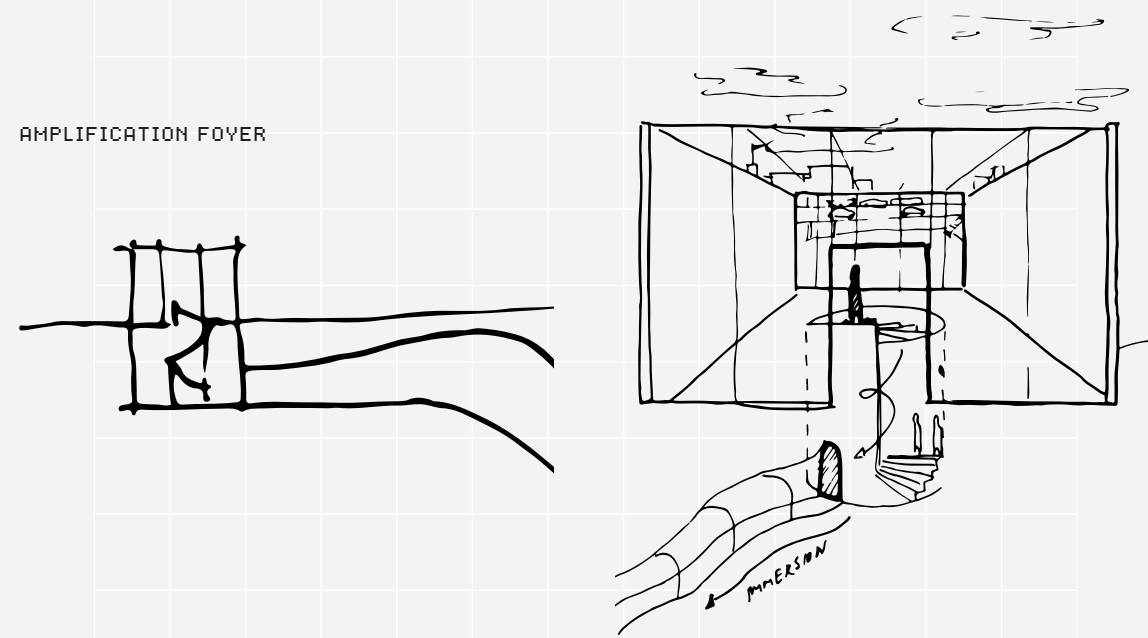
## VR EXPERIENCE SEQUENCE

AMPLIFICATION FOYER (AF)	The first point of contact in the VR experience, acting as a priming agent of amplifying the contextual environment to create a strong counter-reaction.
IMMERSIVE DESCENT (ID)	An organic tunnel that elevates levels of immersion and builds up expectations as the user descends vertically.
INTROSPECTION CHAMBER (IC)	A main hall that stands on its own as an introspective experience, also acting as a node for the other experiences.
VERTICAL (DIS) PLEASURE (EXP A)	An experience creating a heightened sense of pleasure through a feeling of intense vertigo.
SCALES (EXP B)	Exploring materiality in various scales to create derealization and give a larger sense of perspective to the user.
SOLITUDE (EXP C)	A soft and curious experience where the human scale is present and allows for a calm introspective moment through its space.
MULTIROOM (EXP D)	An interactive sequence of infinite rooms that reward the users for relying on their intuition.
EXIT RITUAL (ER)	A tunnel that paves the way for reflection and re-introduction to the fast paced society.

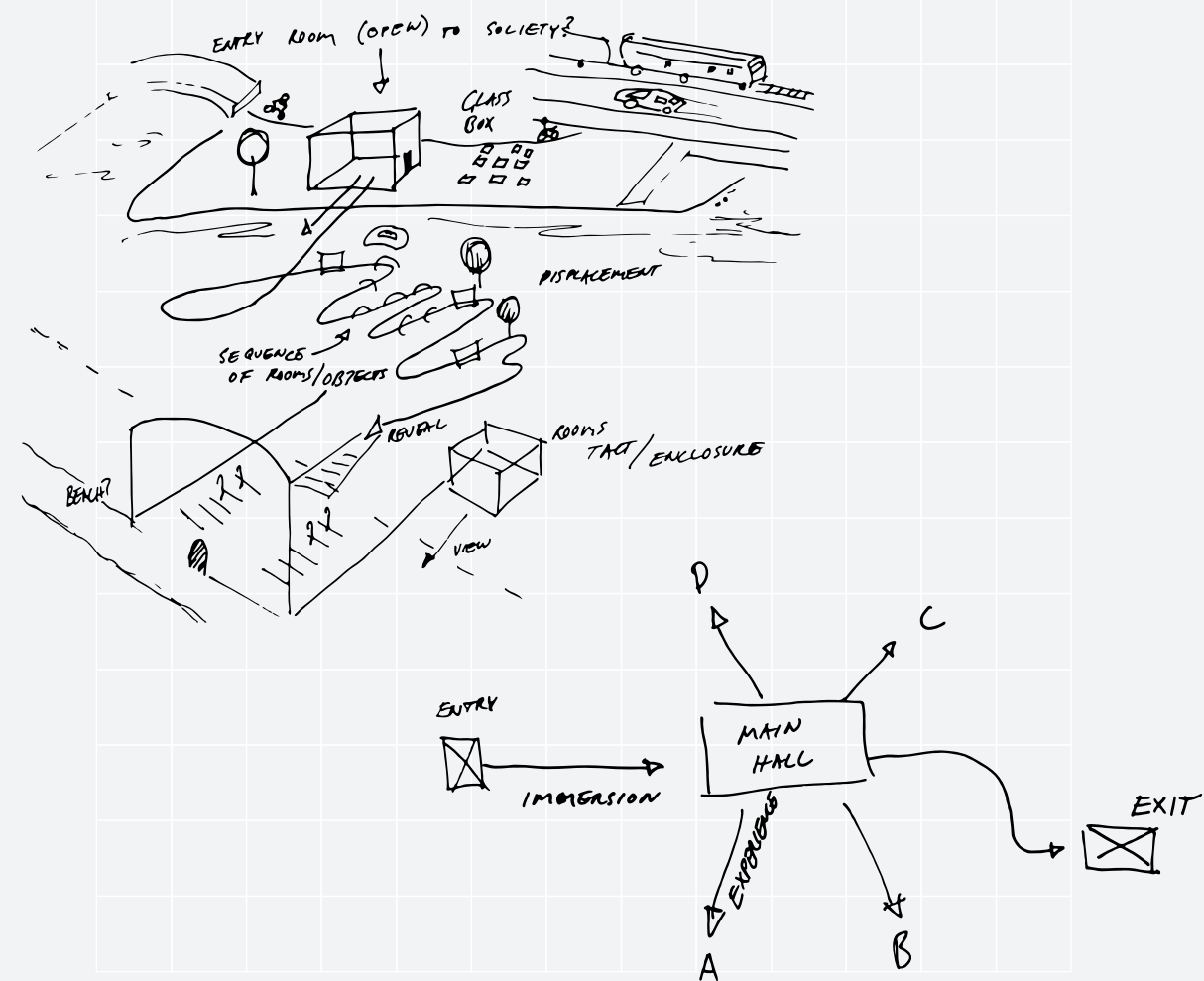


## INITIAL SKETCHES

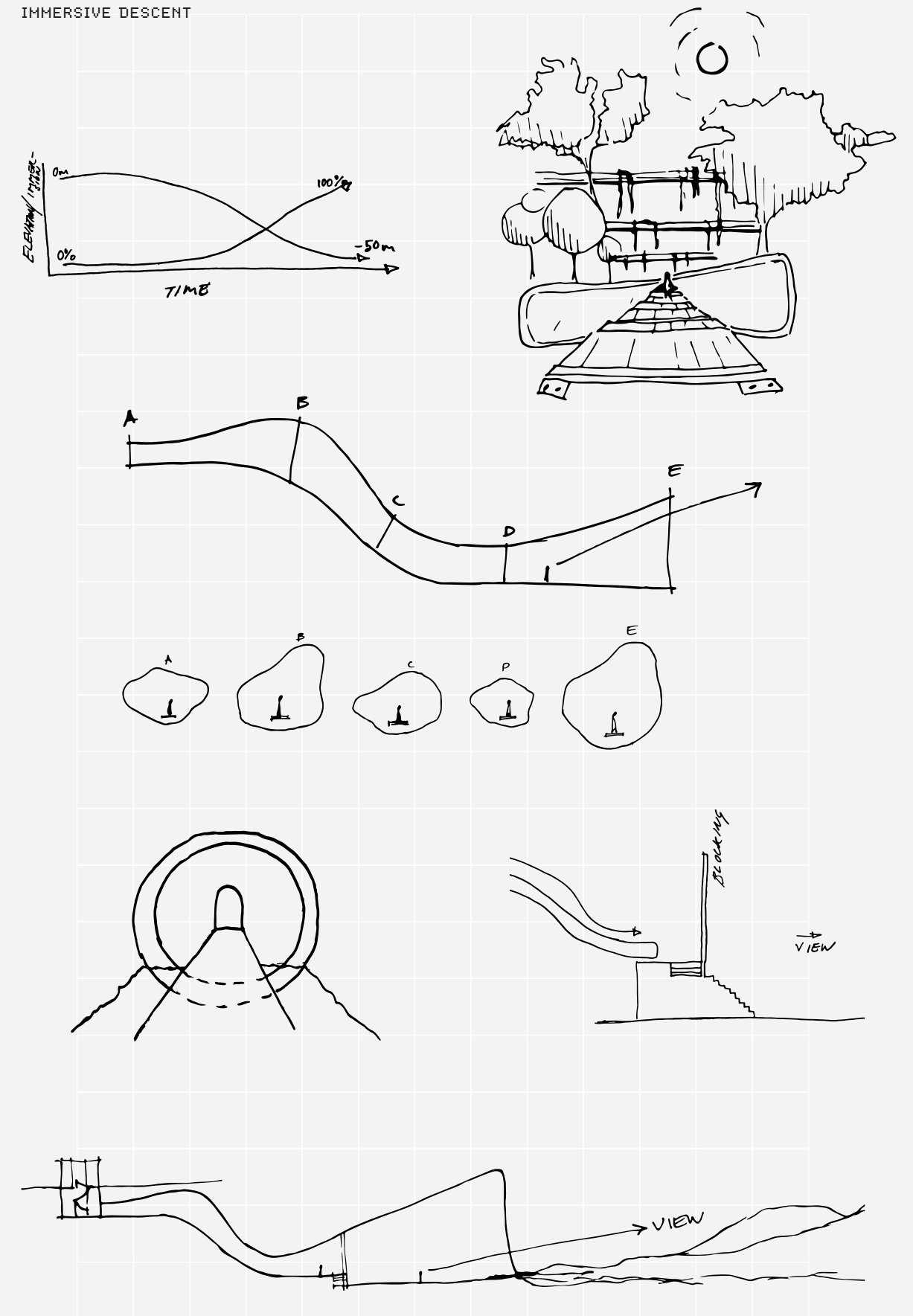
## AMPLIFICATION FOYER



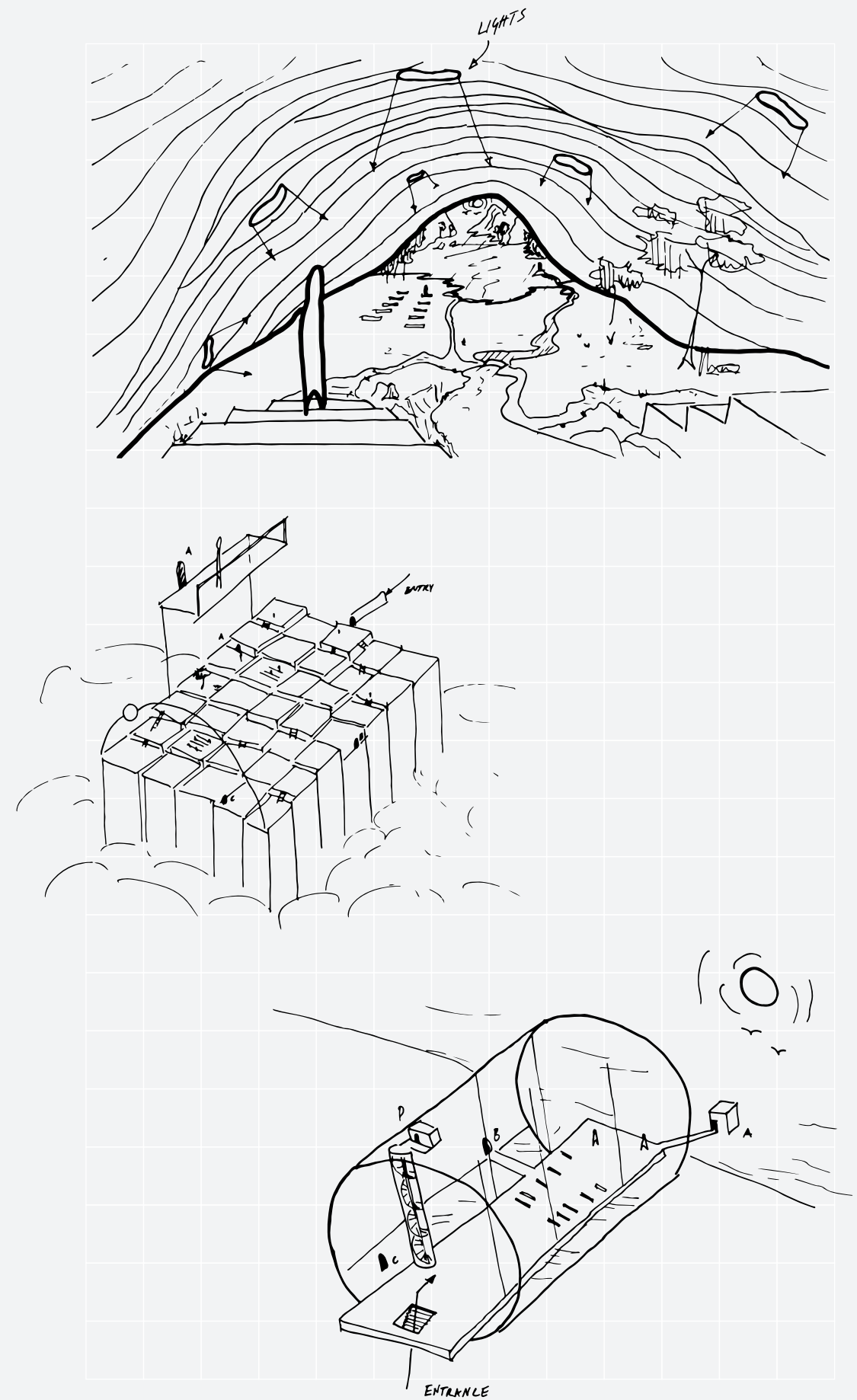
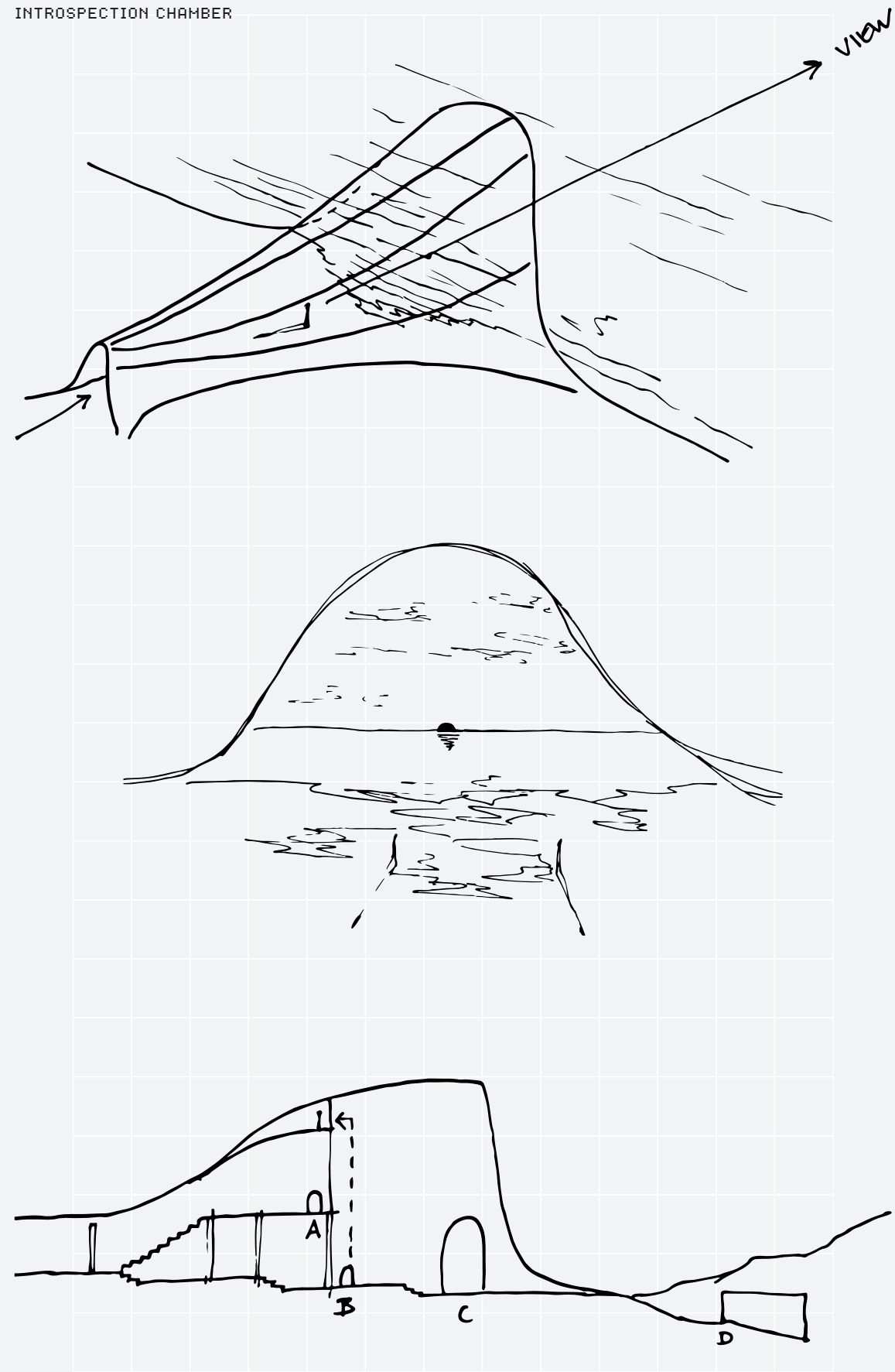
## VR EXPERIENCE SEQUENCE



## IMMERSIVE DESCENT

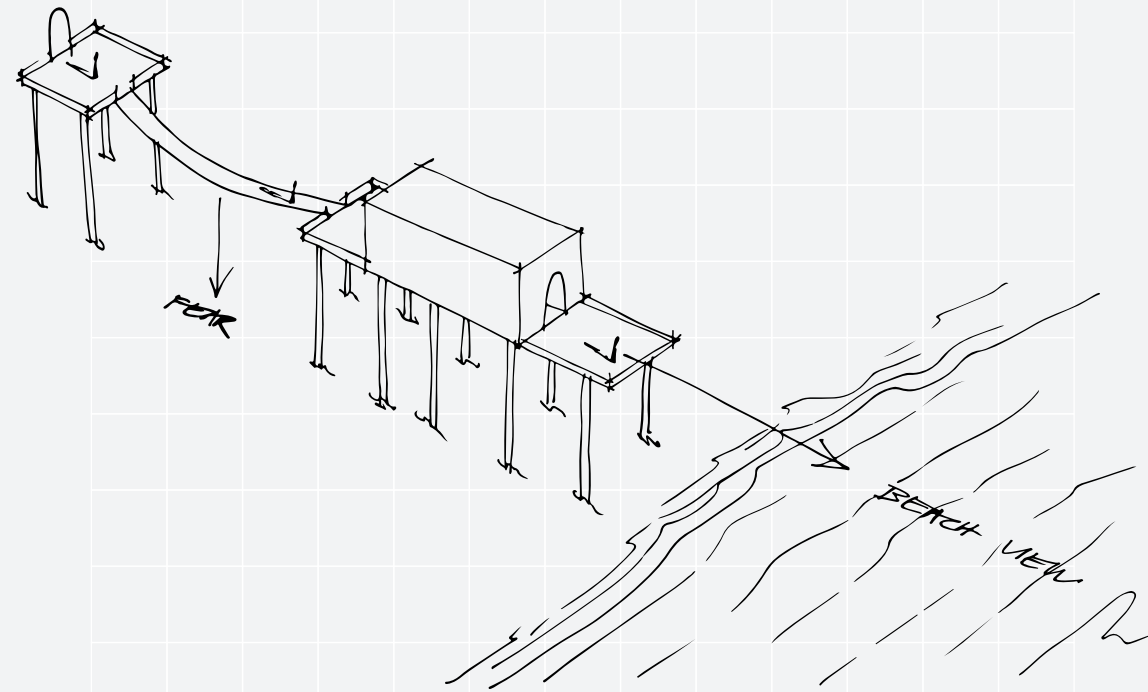


## INTROSPECTION CHAMBER

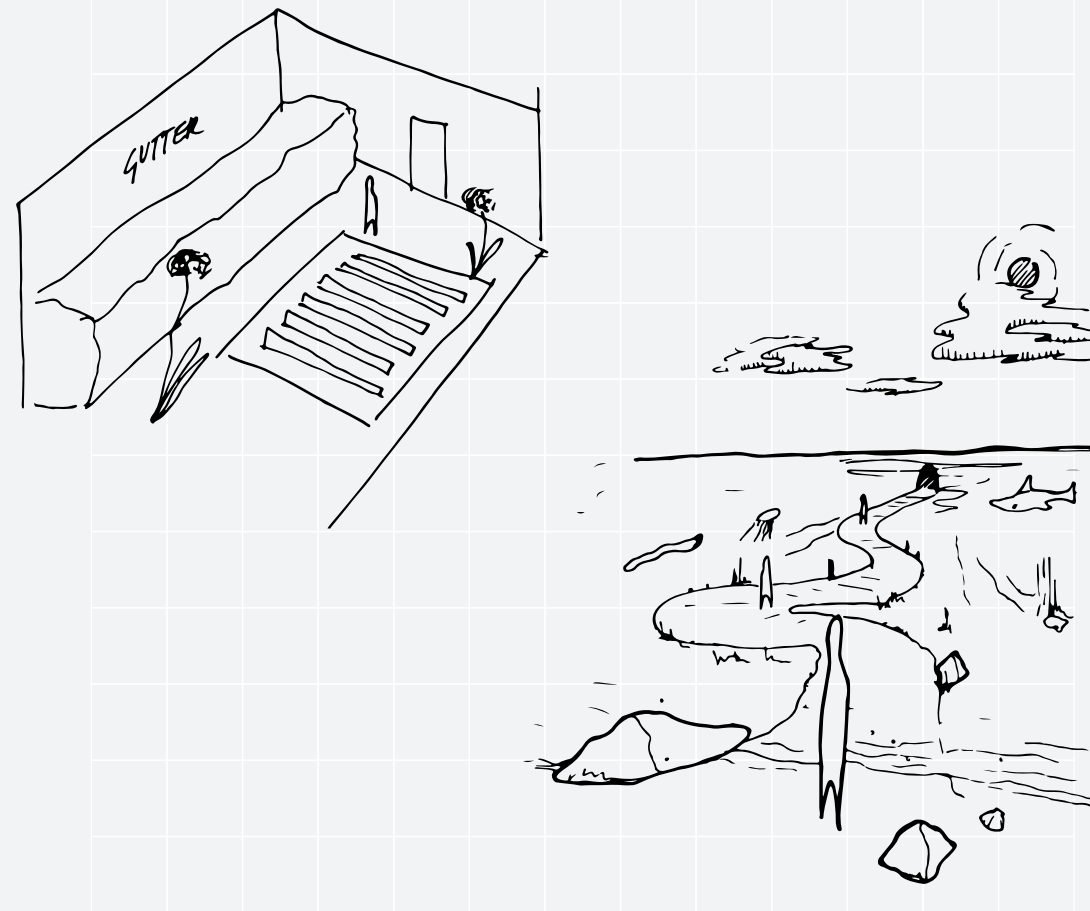




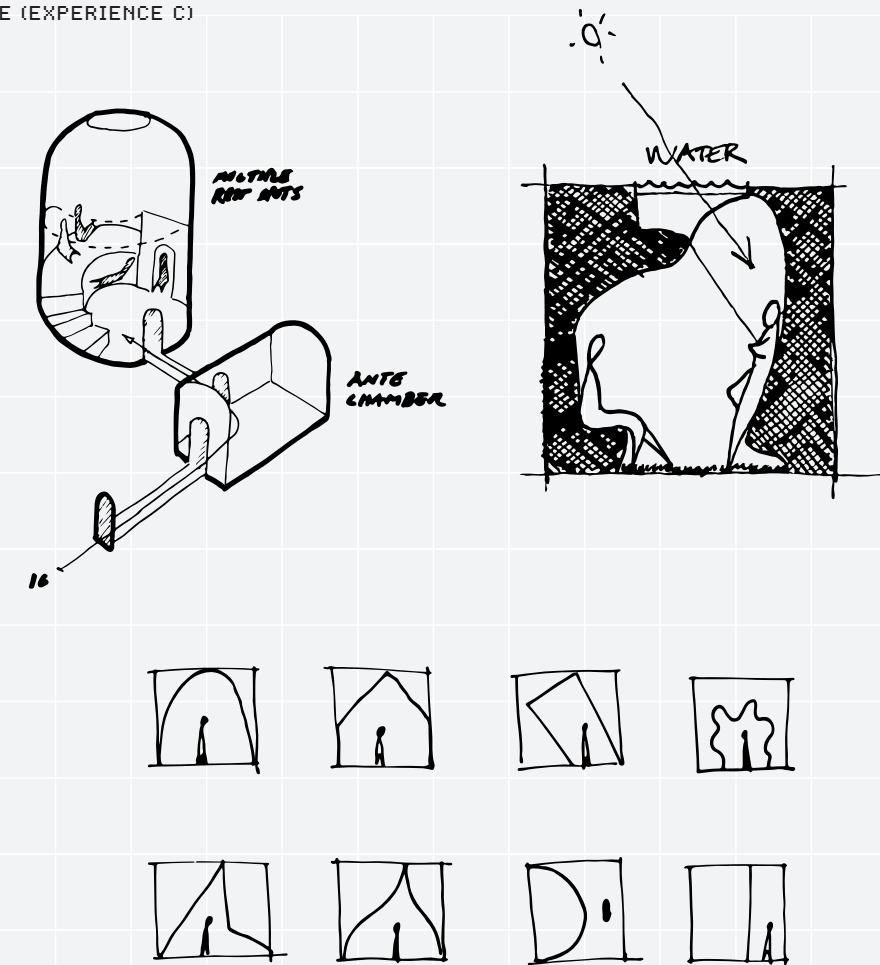
## VERTICAL (DIS)PLEASURE (EXPERIENCE A)



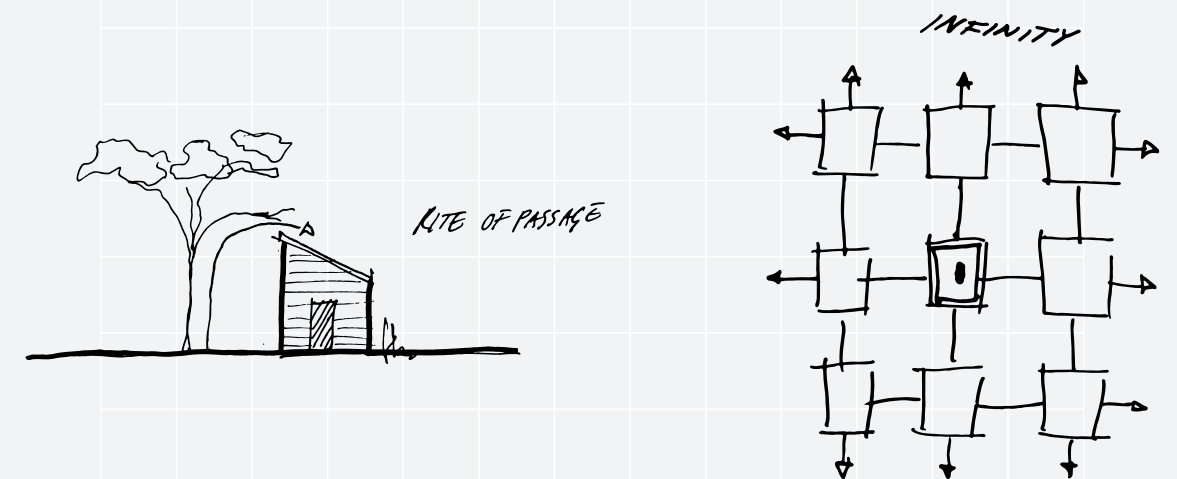
## SCALES (EXPERIENCE B)



## SOLITUDE (EXPERIENCE C)



## MULTIROOM (EXPERIENCE D)



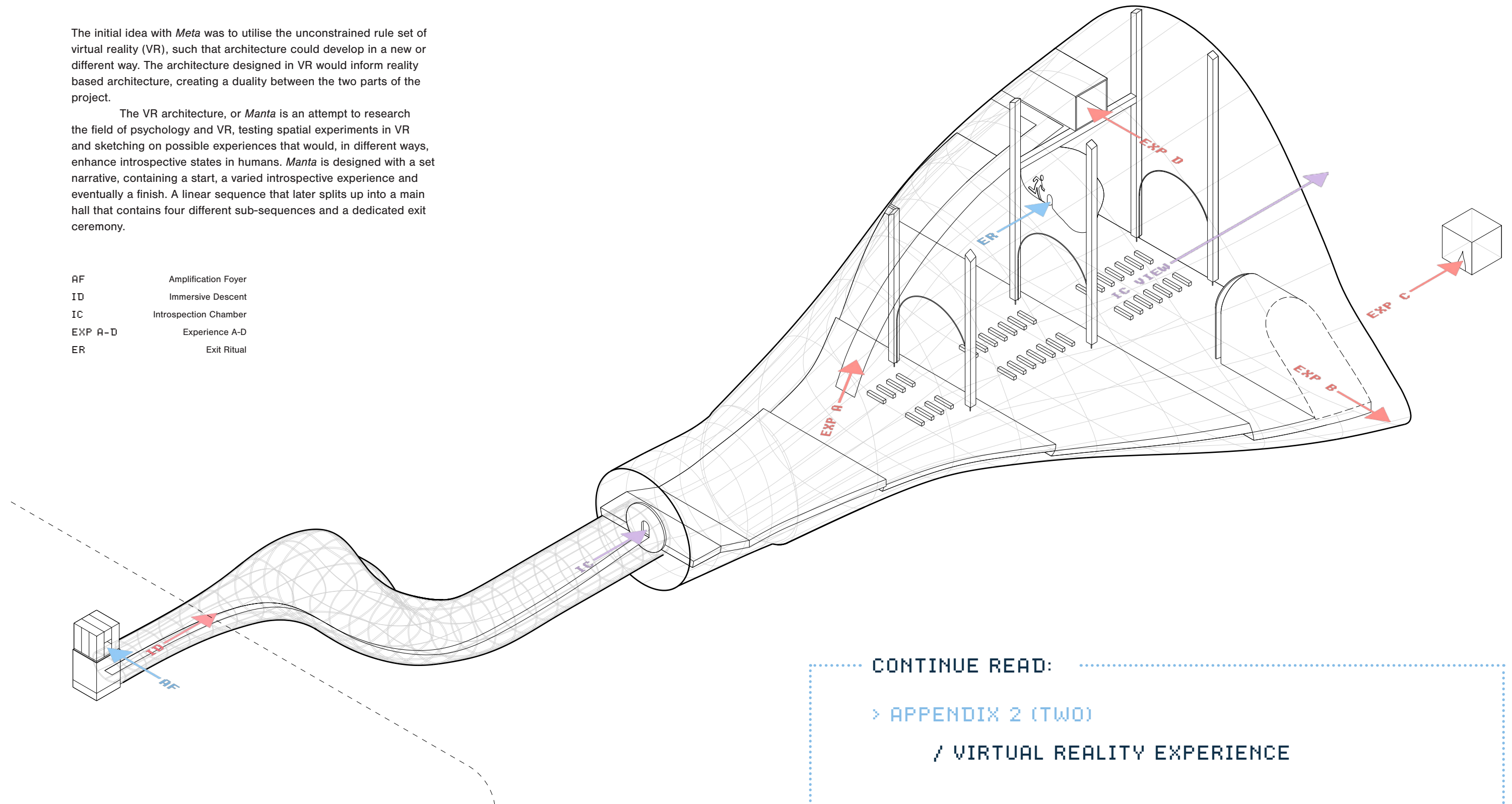
## MANTA

### VR EXPERIENCE

The initial idea with *Meta* was to utilise the unconstrained rule set of virtual reality (VR), such that architecture could develop in a new or different way. The architecture designed in VR would inform reality based architecture, creating a duality between the two parts of the project.

The VR architecture, or *Manta* is an attempt to research the field of psychology and VR, testing spatial experiments in VR and sketching on possible experiences that would, in different ways, enhance introspective states in humans. *Manta* is designed with a set narrative, containing a start, a varied introspective experience and eventually a finish. A linear sequence that later splits up into a main hall that contains four different sub-sequences and a dedicated exit ceremony.

AF	Amplification Foyer
ID	Immersive Descent
IC	Introspection Chamber
EXP A-D	Experience A-D
ER	Exit Ritual



CONTINUE READ:

> APPENDIX 2 (TWO)

/ VIRTUAL REALITY EXPERIENCE

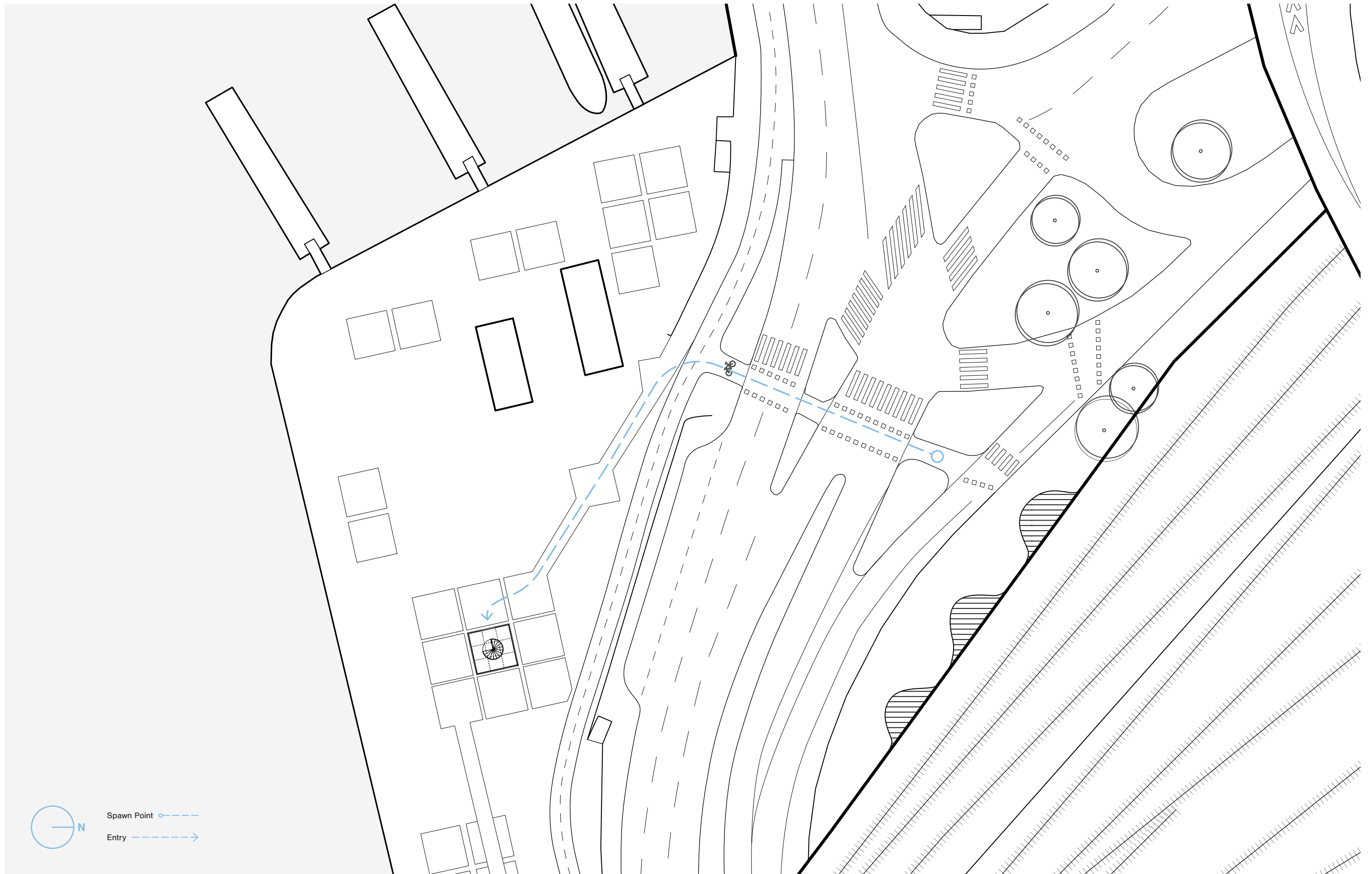


> APPENDIX 2 (TWO)

> PHASE B

/ VIRTUAL REALITY EXPERIENCE





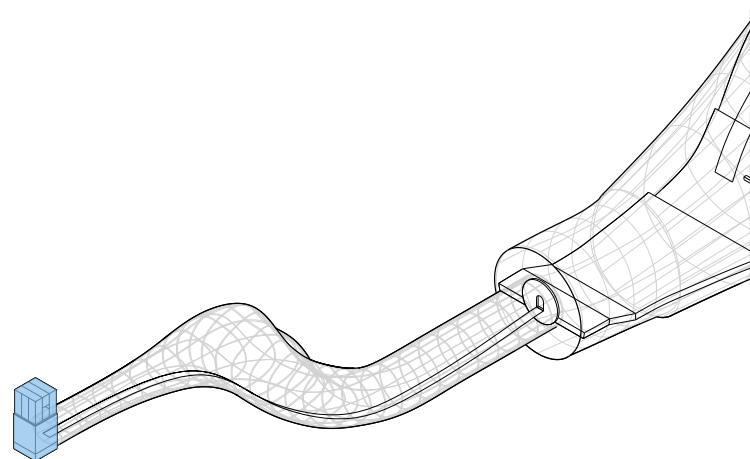
Spawn Point   
Entry 

## AMPLIFICATION FOYER

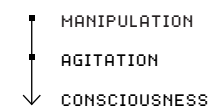
As one enters the program, one will spawn in a digital version of Klara Mälärstrand, Stockholm. In the midst of a traffic junction, the user is led towards a glass box standing in the centre of the proposed site.

The *Amplification Foyer* is the first piece of VR architecture unfamiliar to the user. Walking down a spiral staircase the sounds of nearby cars, trains and pedestrians are enhanced to amplify the user's contextual connection, in order to create a stronger contrast to the next part of the entry sequence.

LOCATION

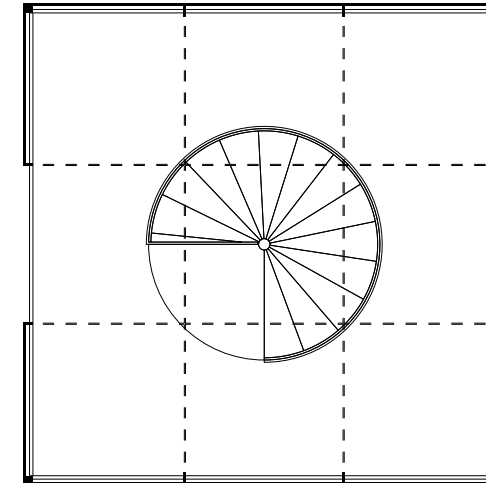


SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

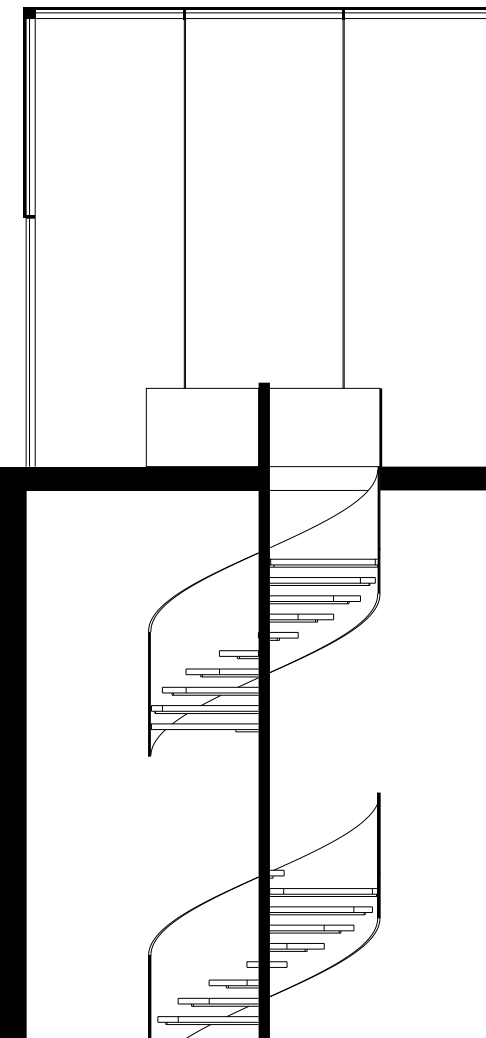


AF

## PLAN



## SECTION



SCALE 1:50







## IMMERSIVE DESCENT

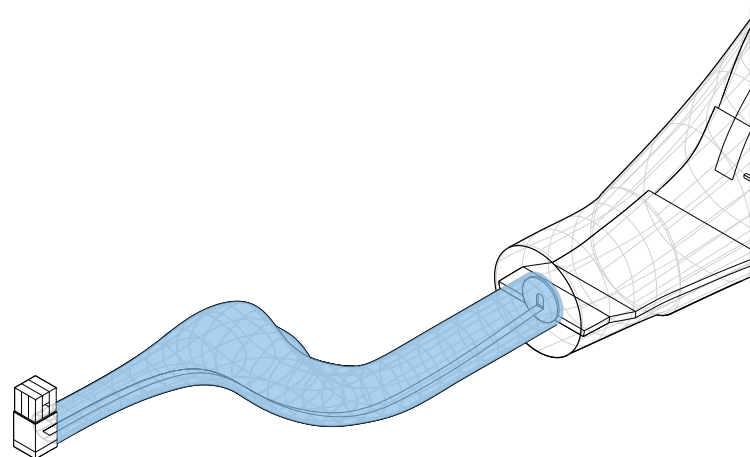
Heading down, below the surface of the simulated reality, the noise fades out and is replaced by the sound of running water.

In the *Immersive Descent*, the user is introduced to a tunnel with a walking platform. The water flowing below one's avatar leads the visitor in the same direction of the stream. Following the path, one is slowly introduced to natural elements such as rocks, bushes, plants and trees. There is a gradual increase in the density of the foliage as one descends down the path. This would act as a starting point in priming the visitor to later spaces while exploring concepts of derealization as the environment starts to get slightly out of hand. The path culminates in a halo of light at the end of the tunnel, pulling the user into the next room.

SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

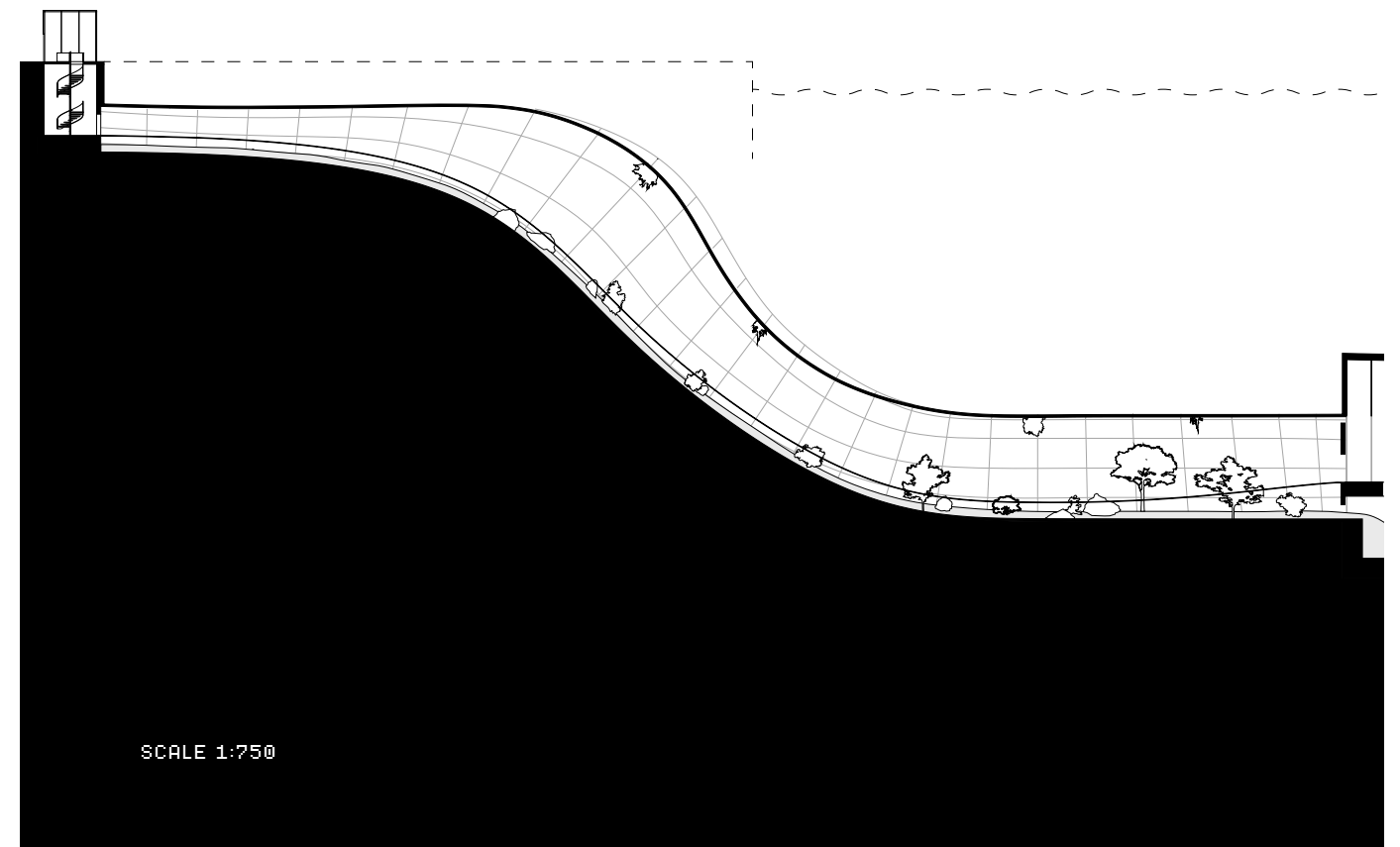
■ ANTICIPATION  
■ DEREALIZATION  
■ AMPLIFICATION  
↓ AWE

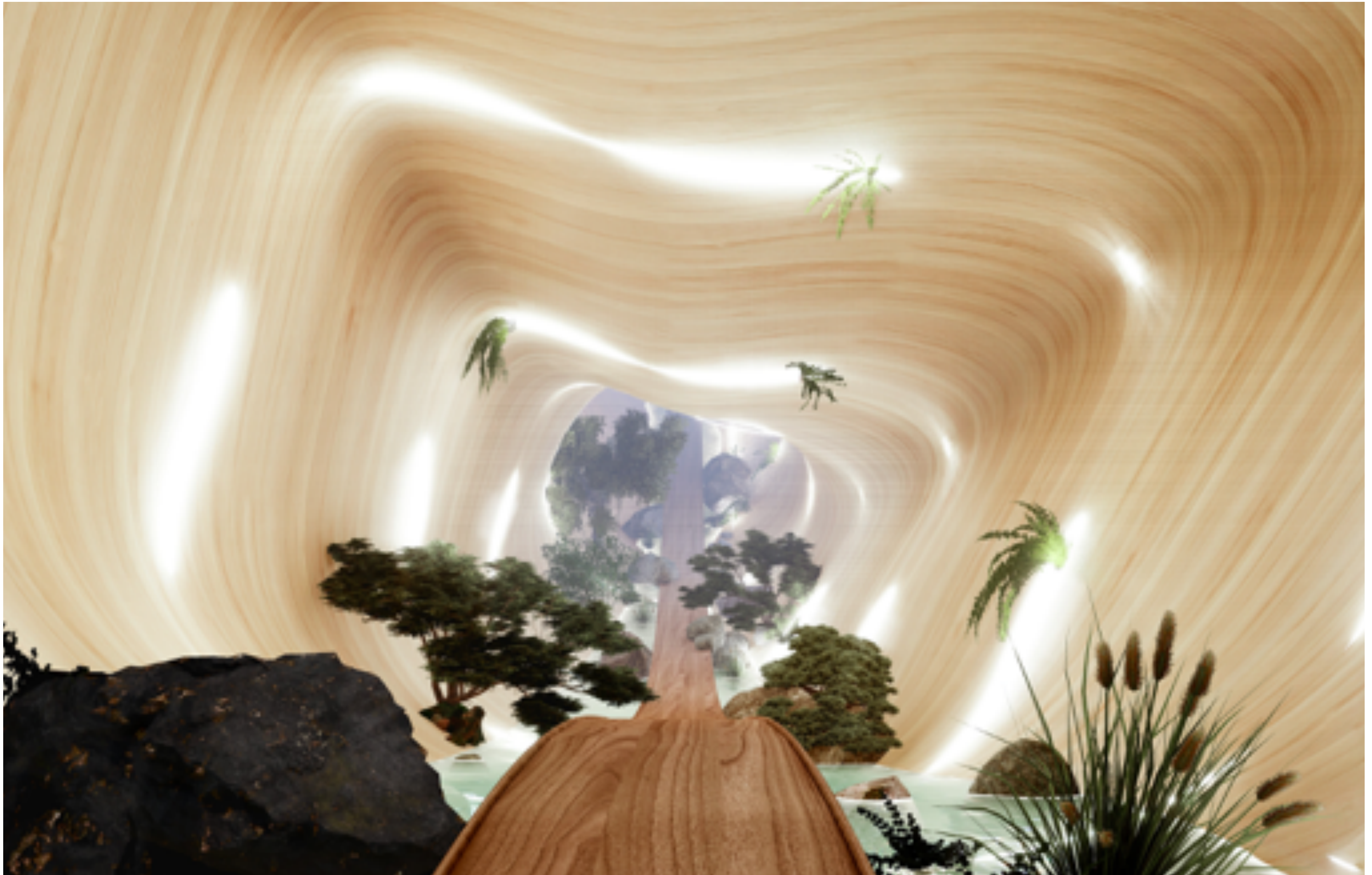
LOCATION



10

SECTION





## INTROSPECTION CHAMBER

The *Introspection Chamber* is the main hall in *Manta* and acts as a node for the subsequent experiences. The chamber is, however, mainly meant to serve a purpose of its own, as it is designed to be a space for reflection and introspection through this extensive hall giving a humbling experience to the user (Bermudez et al, 2017).

The space has a curvilinear semi transparent envelope, enclosing the user and growing out towards a viewpoint centred in the room. Tall wooden pillars and a row of benches are meant to connect the user to notions and symbols of sacrality, as the luminous arches further frame the view and references classical architectural shapes. A wide natural horizon is meant to dominate the scene as feelings of harmony and a bed of warm light washes over the user.

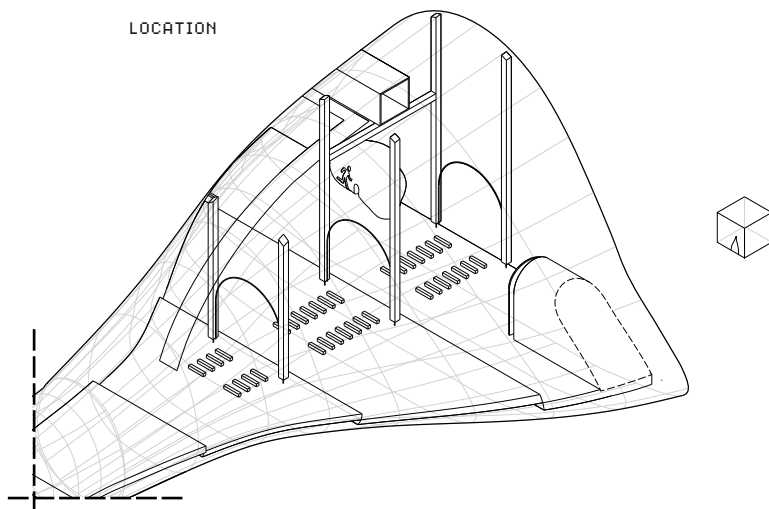
The water and the introduction of natural elements are reintroduced in the chamber and aim to create a connection with nature together with the virtual architecture. The natural landscape outside of *Manta* stretches far and beyond what the eye can see, but can be explored all the same.

Acting as a node, the space includes different entry points to the later in-depth experiences — all catered to the specific sequences that follow.

SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

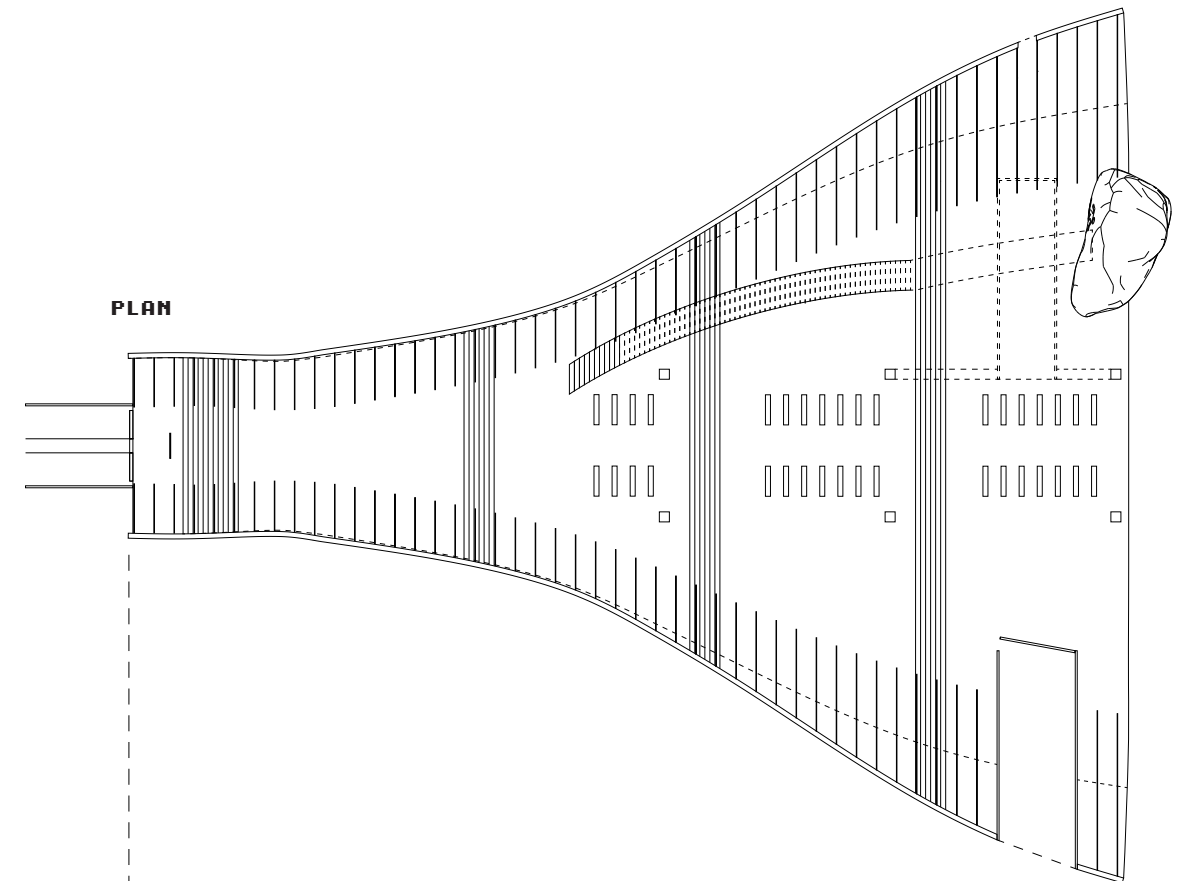
- ANTICIPATION
- AMPLIFICATION
- AWE
- ↓ ALLEVIATION

LOCATION



IC

PLAN



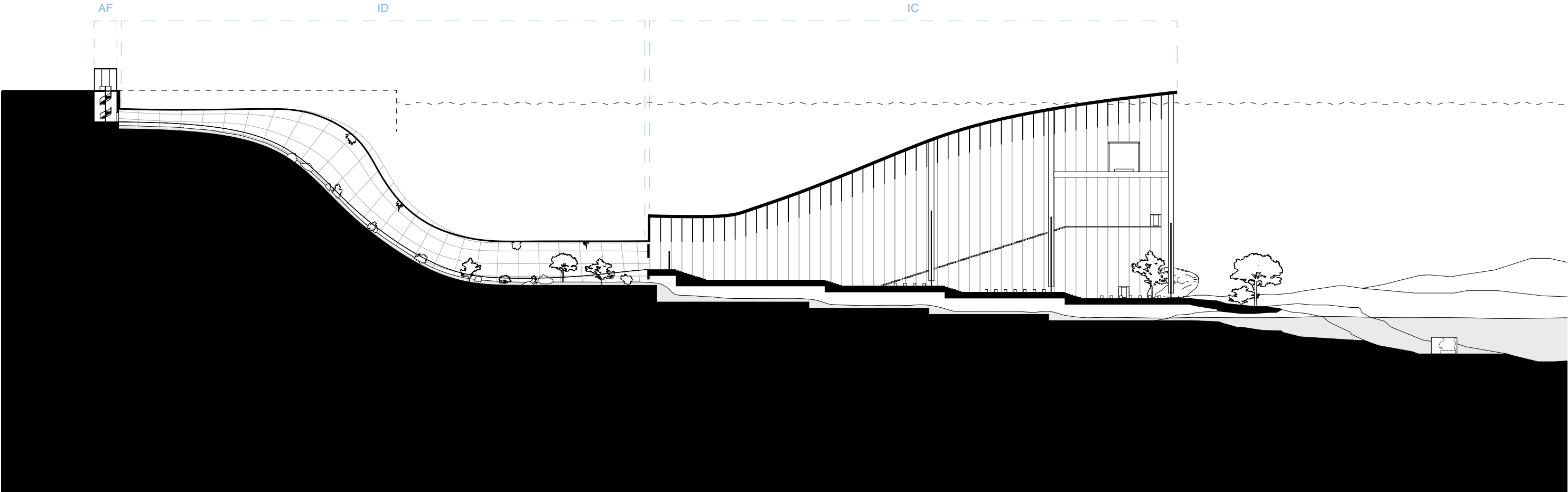
SECTION



SCALE 1:750

IC

SECTION







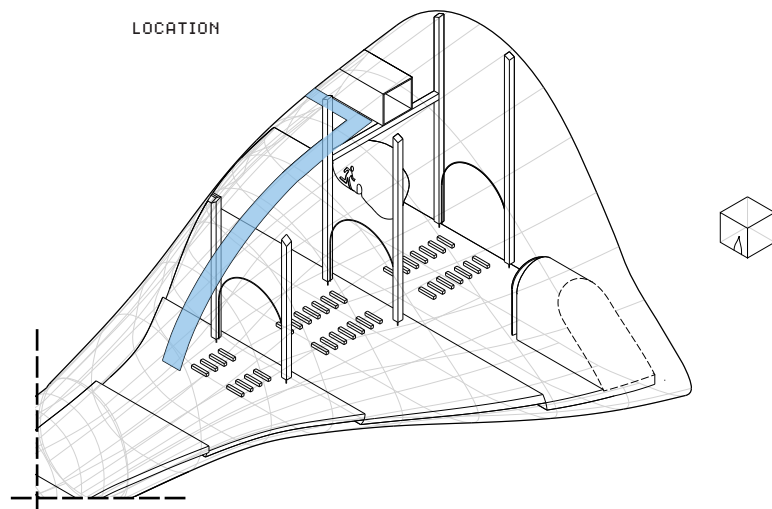
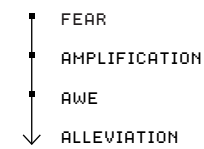
## VERTICAL (DIS)PLEASURE (EXPERIENCE A)

Leaving the main hall to explore the first of the many offshoots, one might find the entry to experience A to leave quite the mark. The entry to the experience called *Vertical (Dis)pleasure* is a staircase enhancing the geometry of the space as well as priming the visitor to some sort of elevated state.

The portal leading to the experience sends the user to a platform high above a canyon. A thin path bridges over to a room on a big wall. The path is eerily thin and according to our testing it was found that in VR, users display a high level of stress even with virtual vertigo.

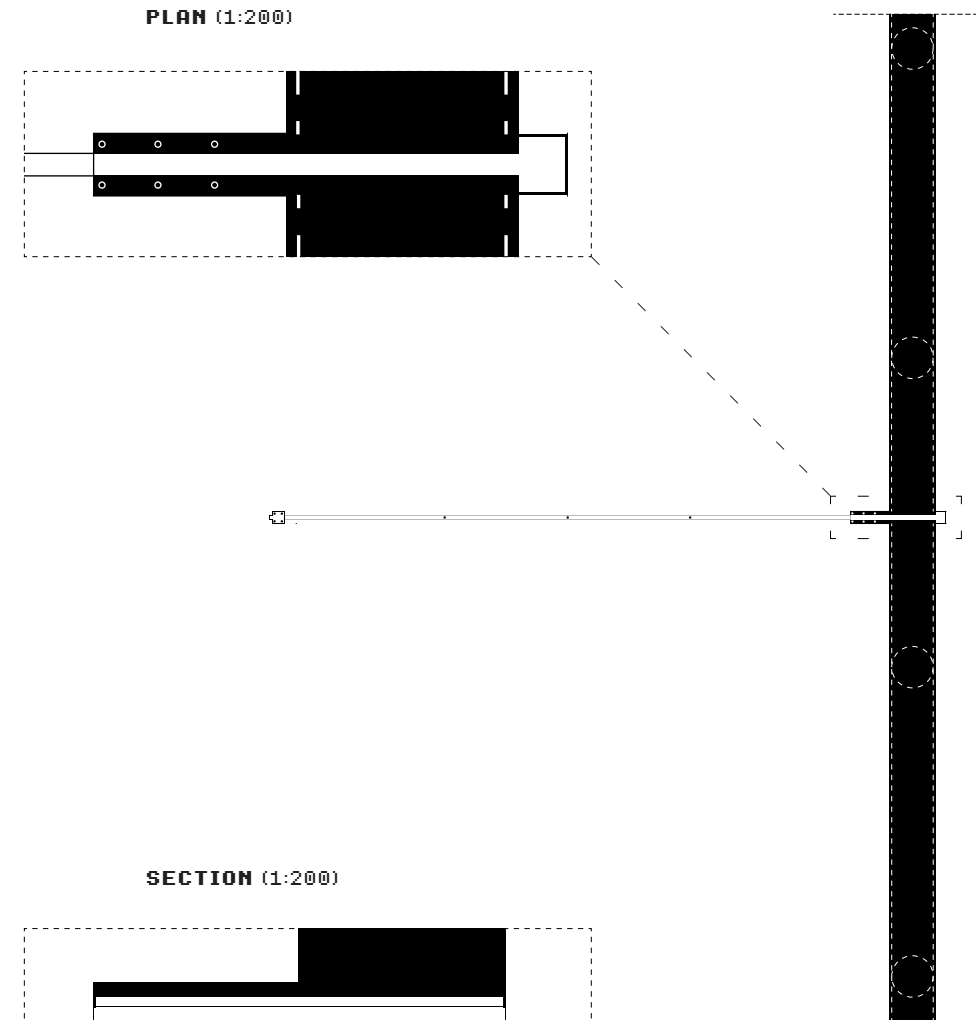
Another study has shown that once humans are exposed to a fear, e.g. vertigo, feelings of pleasure can be increased (Liu et al, 2020). Hidden behind the big wall, one can hint at a strong light and the presence of a large body of water. This beautiful, yet hidden, view will hopefully create a strong reaction in the visitor as they reach this vantage point.

LOCATION

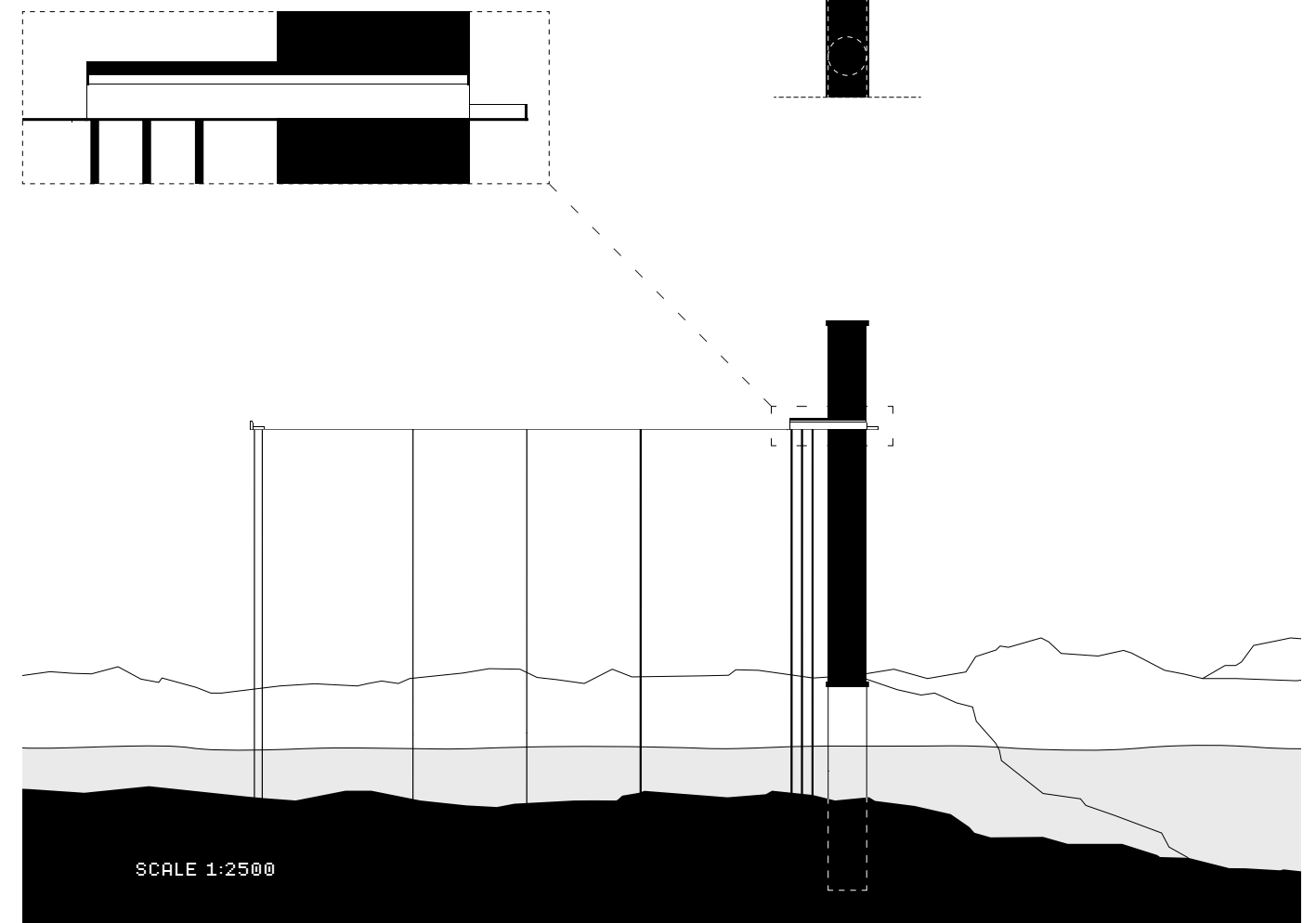
SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

EXA

PLAN (1:200)



SECTION (1:200)









## SCALES (EXPERIENCE B)

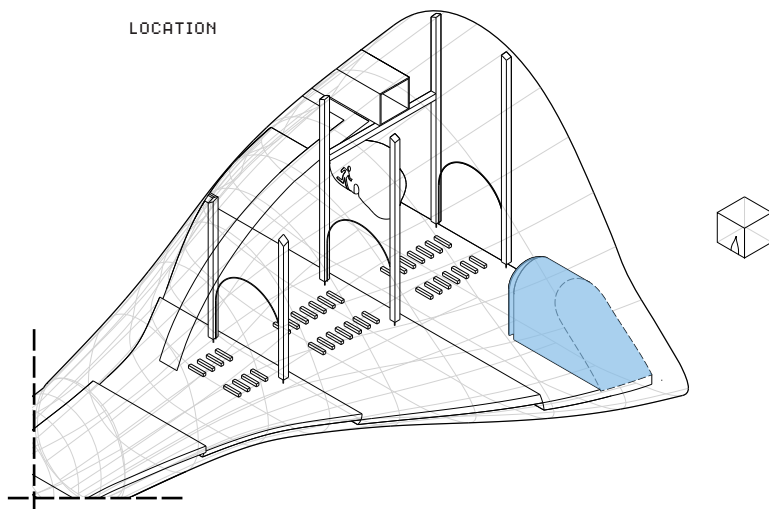
Located on the far right of the *Introspection Chamber* stands a tall door. The over-dimensioned aperture is just barely open enough to allow the user in. *Scales* (Experience B) starts here, as one might feel quite small in relation to an opening seemingly built for giants.

The following rooms explore how VR can exploit textures to create feelings of derealisation or shrinkage in different scales. Room 1 is a reference room where materials seem to behave at a normal scale, whereas in room 2 the surfaces on the floors and walls have doubled in size. This could enhance the user's sense of their relative scale in this context. Further in the third room, the materials are finally 10 times the initial size. In this scale, the small cracks in a wooden plank look as if they are gaping holes. Room 4 uses the same scale as room 3 although, through implementing relatable everyday objects in the space, one might sense the effects of derealization\* (I. Bower et al, 2019).

Finally the experience takes the user to a platform, surrounded by nothing but outer space, looking down at the earth from above. Here a shift between emotions of feeling small get replaced by an overwhelming idea that we are all small, concluding the experience.

\*Derealisation is a mental state where you feel detached from your surroundings.

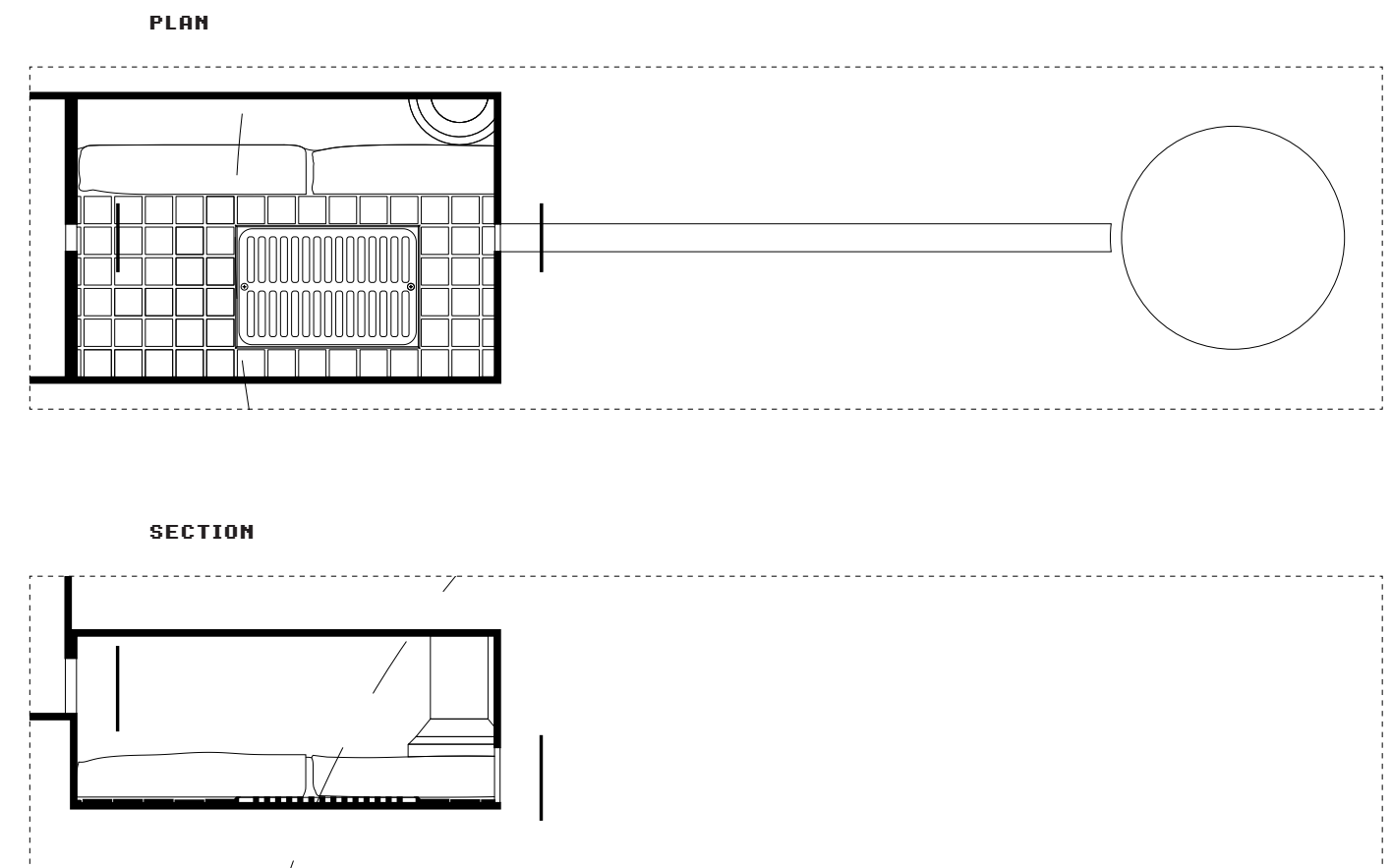
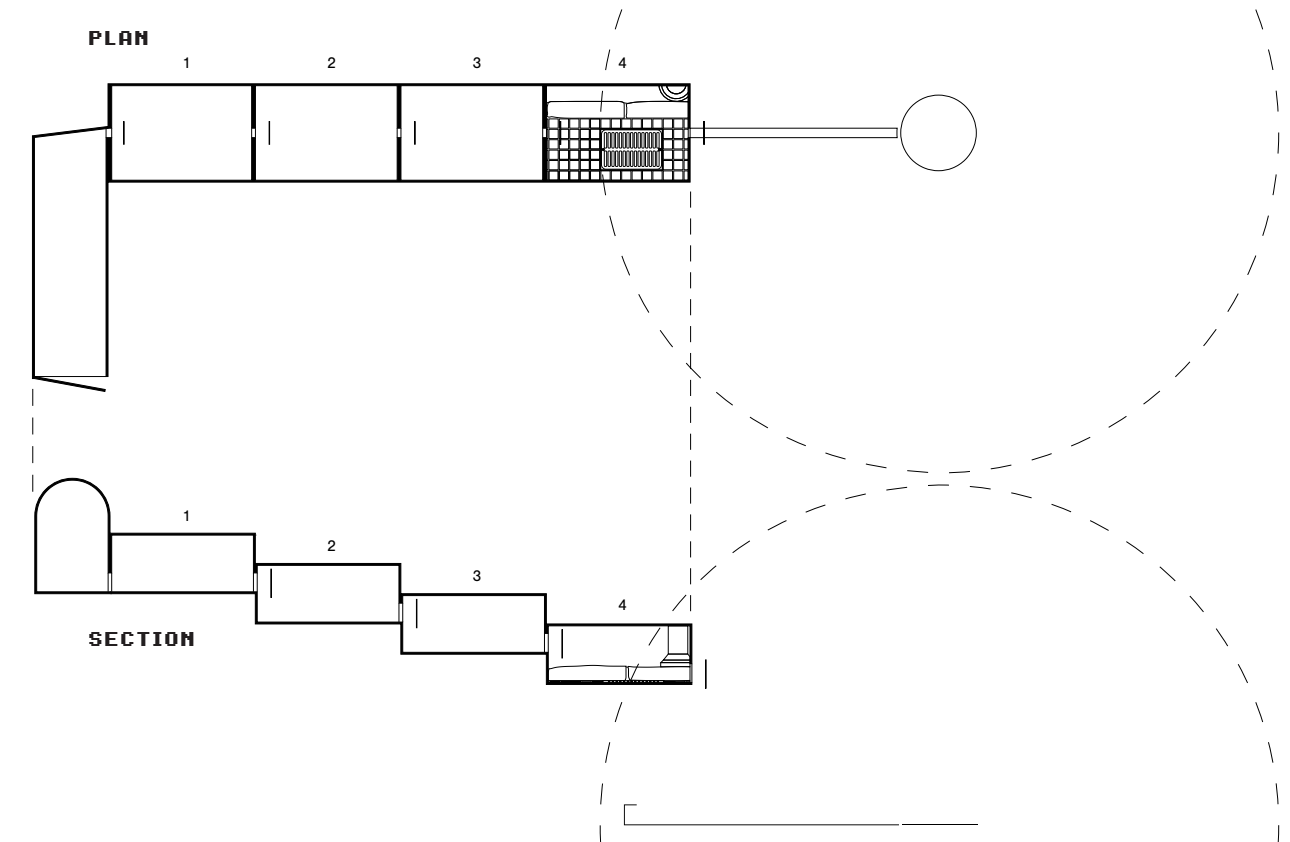
LOCATION

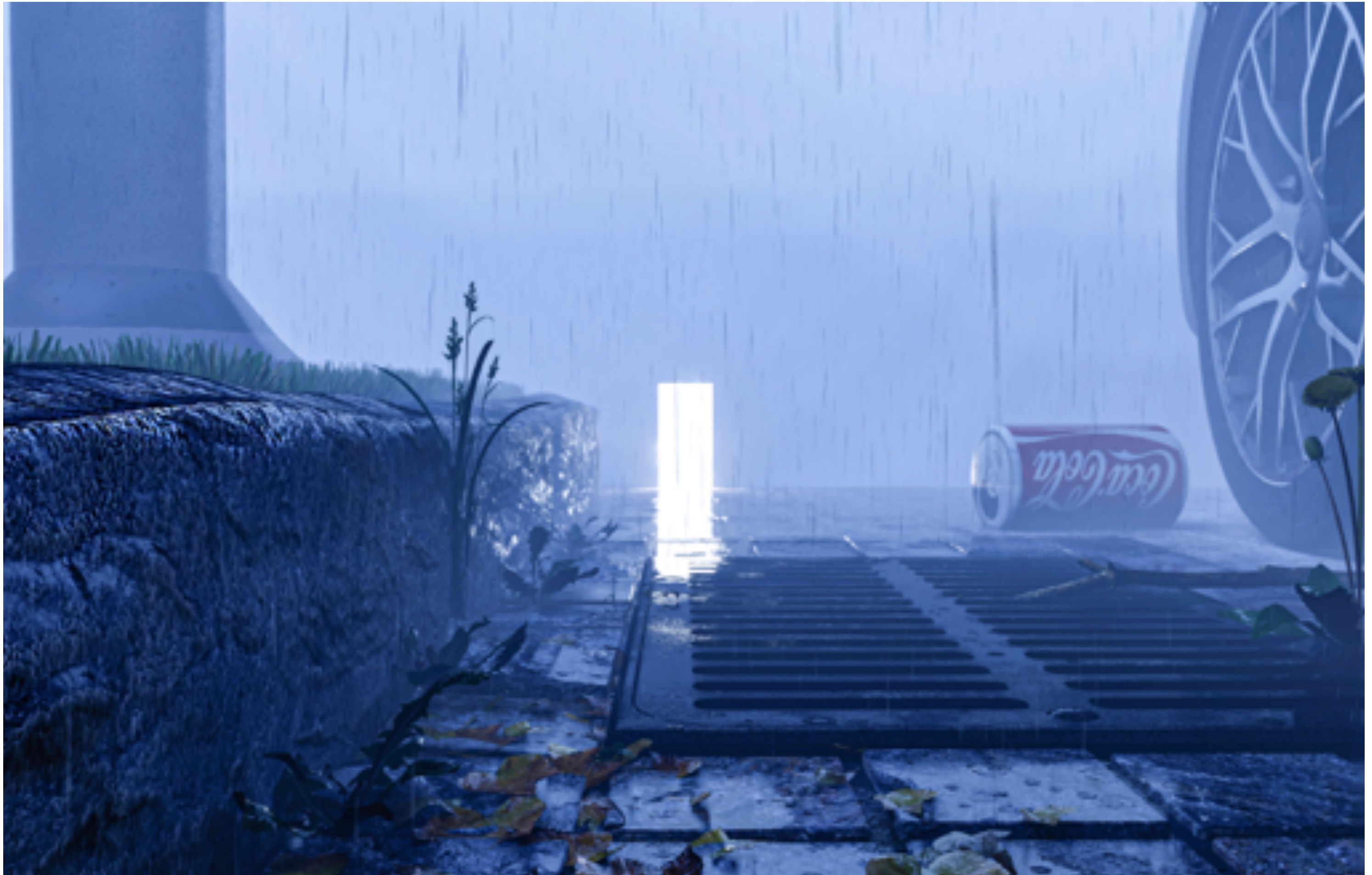


SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

- COMFORT
- MANIPULATION
- DEREALIZATION
- ↓
- EXISTENTIALISM

EX<sup>B</sup>





## SOLITUDE (EXPERIENCE C)

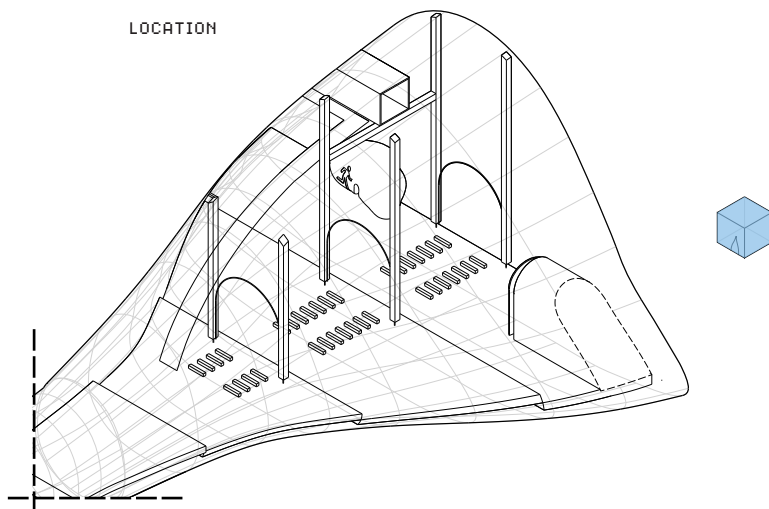
As the visitor approaches the body of water in the main chamber. A faint light, under the surface in the bottom of the trench, might reveal itself. In this virtual reality, water does not make the user wet, nor does it drown the user and so this might allow for aquatic exploration to take place. Once submerged, a short walk down to *Solitude* (Experience C) is all that remains.

Entering the space, one is met with a short corridor and what looks like soft walls. A small staircase opens up to a condensed room. The warm materials should give a feeling of hospitality and the curvilinear form of the room is designed to be gentle and easy to the eyes (Shemesh et al, 2021). Above, is an opening toward the water encasing the structure. Light penetrates the surface and creates quiet patterns on the walls and floor of the room. For some users, *Solitude* might be an ideal environment for introspection.

SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

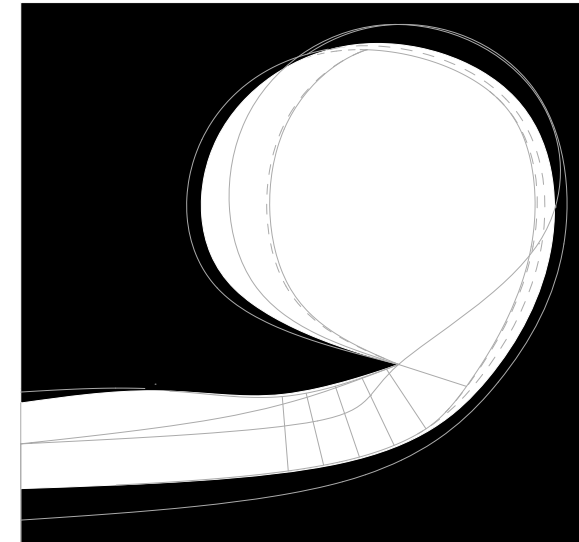
↑ INSECURITY  
↑ ANTICIPATION  
↑ COMFORT  
↓ CONSCIOUSNESS

LOCATION

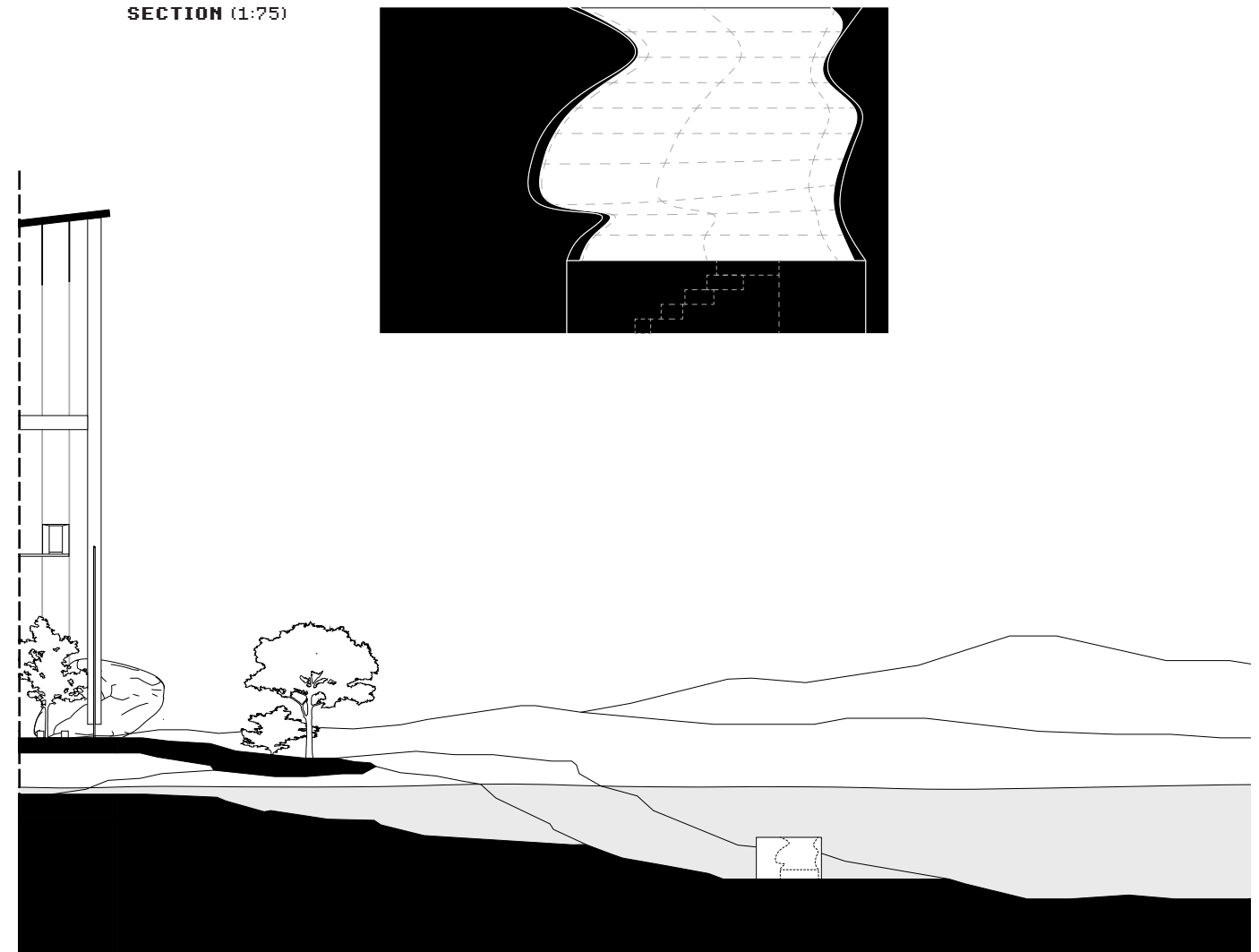


EXC

PLAN (1:75)



SECTION (1:75)







## MULTIROOM (EXPERIENCE D)

In a room, high in the *Introspection Chamber*, sits an inaccessible space for most new users. The room looks out over the remaining hall and gives the inhabitants an overview of the space. However, to access the room the user must pass through the *Multiroom* (Experience D).

The idea behind *Multiroom* is to, through virtual reality, create an infinite sequence of rooms and doors, a prospect of which is unlikely as a realistic concept. If the user makes the right choices and enters the correct differentiated doorways, they are allowed to the outlook room.

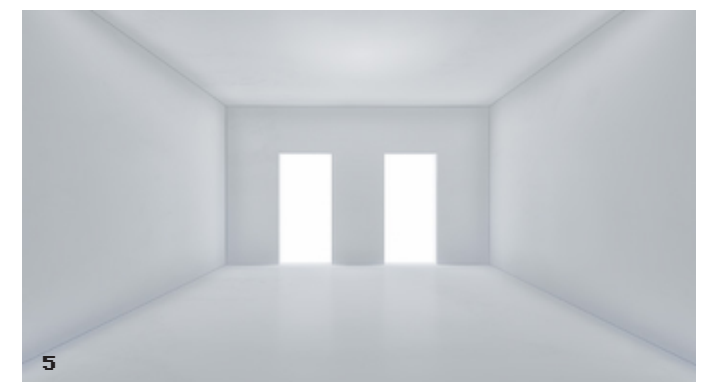
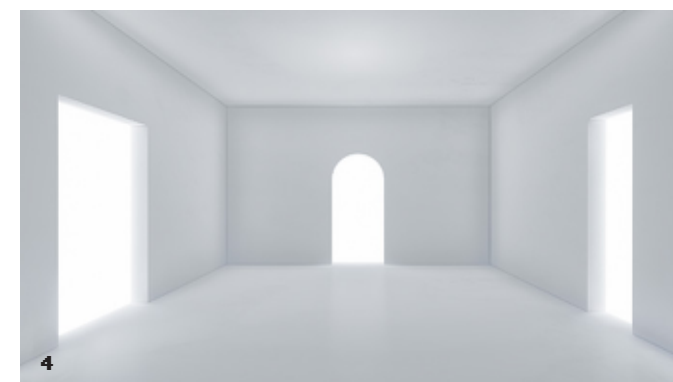
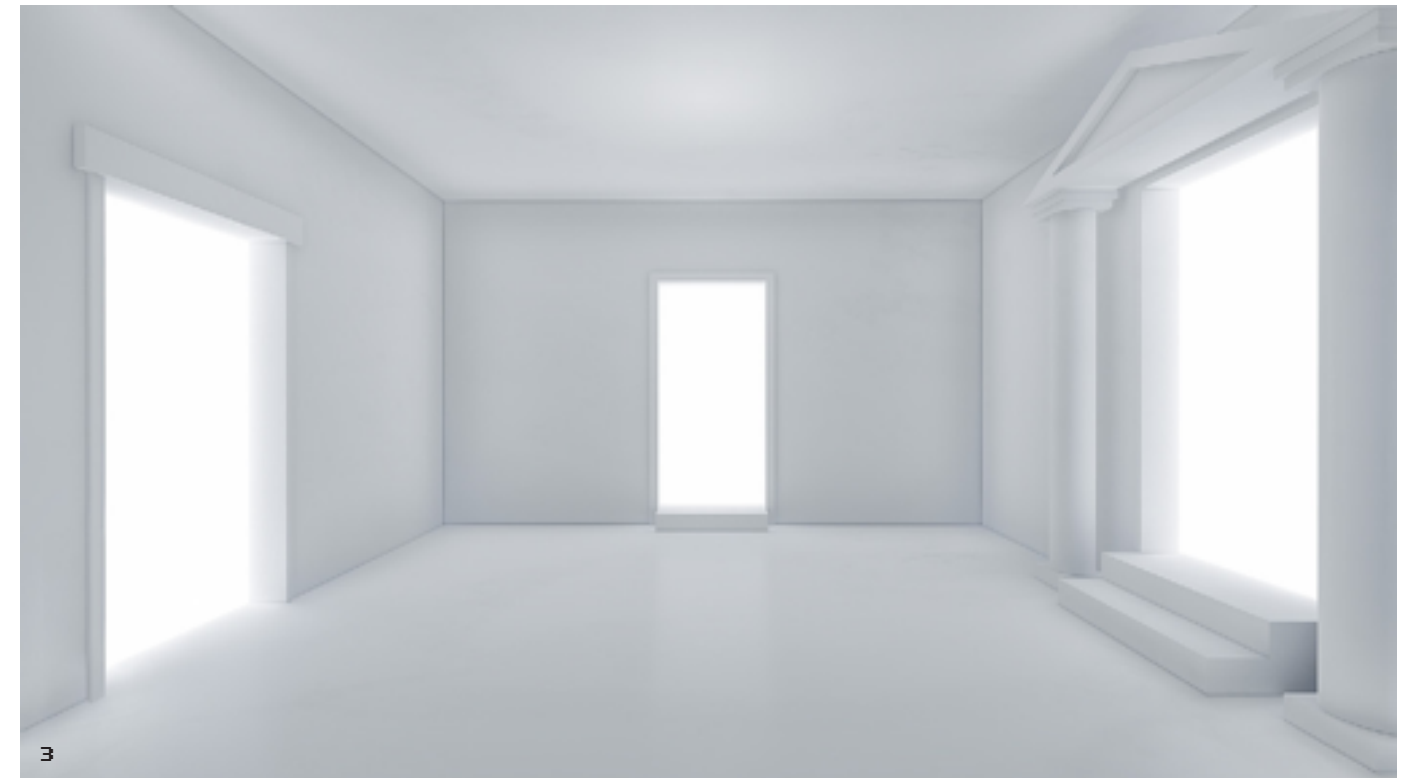
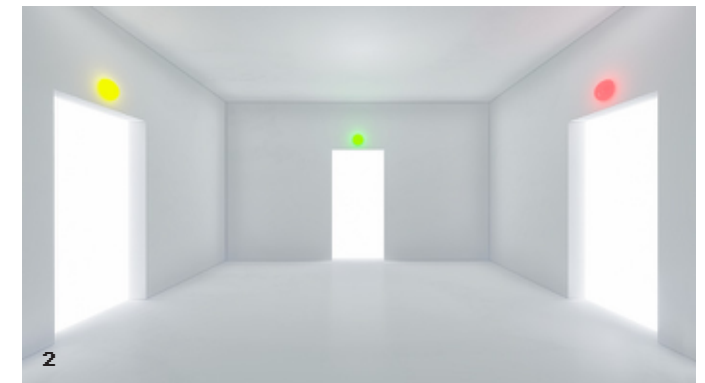
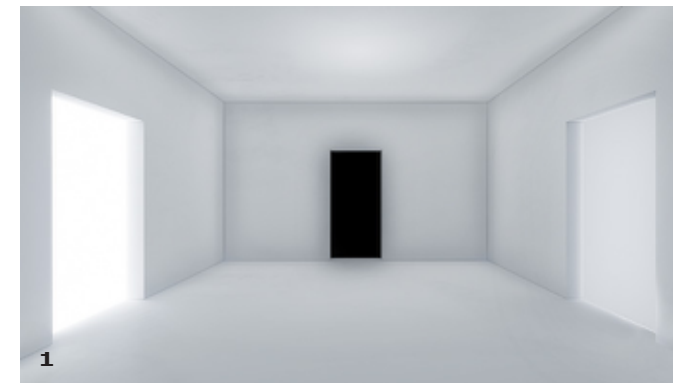
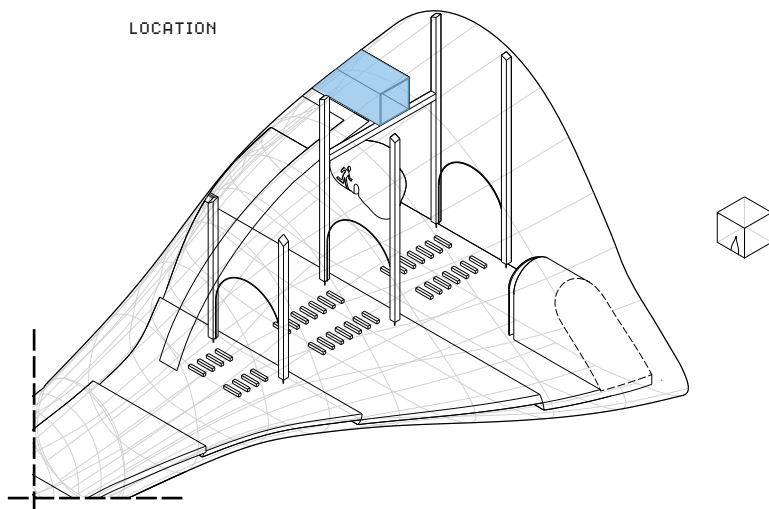
What is right and wrong in this experience is defined by a preconceived notion that there is a correct answer. The correct answer always corresponds to what one might initially think is the correct answer, according to societal influences. As an example: Green means go. Or even: Darkness is scary.

If the user successfully realises to go with these kinds of choices, they will end up in the final room in a sequence of five. The user gets to choose between two identical doorways. The user is oblivious to the fact that both doors lead to the correct answer and is instead put in a position of guessing. Finally, getting this choice “right” will lead to a hopefully heightened feeling of confidence in cracking the sequence as well as being lucky, while being rewarded with a room that was previously out of bounds.

SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

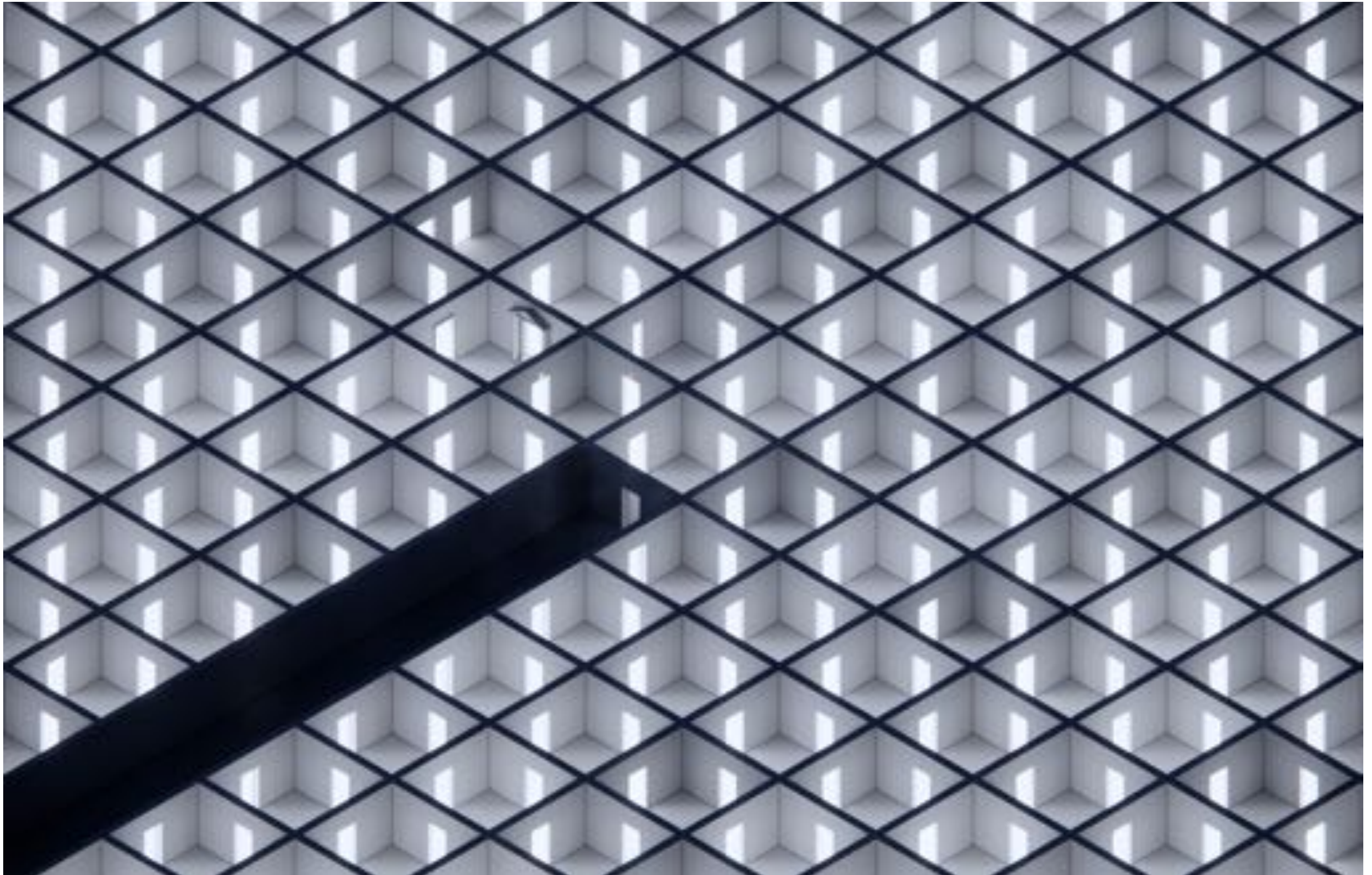
↑ INSECURITY  
↓ AMPLIFICATION  
↓ CONFIDENCE

LOCATION



EXD







ER

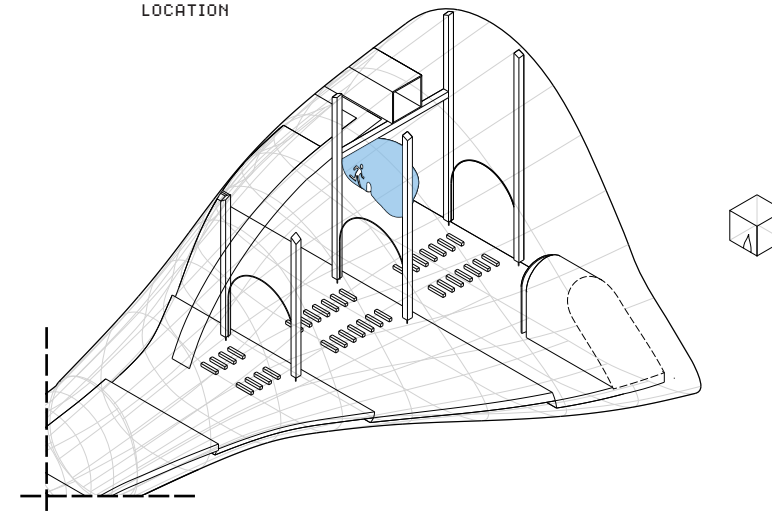
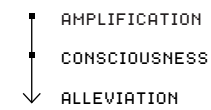
## EXIT RITUAL

As the visitor feels satisfied with the VR experience, an option is always to remove the headset and return to reality. However, to complete the narrative there is a rock in the main hall with a symbol that insinuates an exit portal. This leads to an *Exit Ritual*.

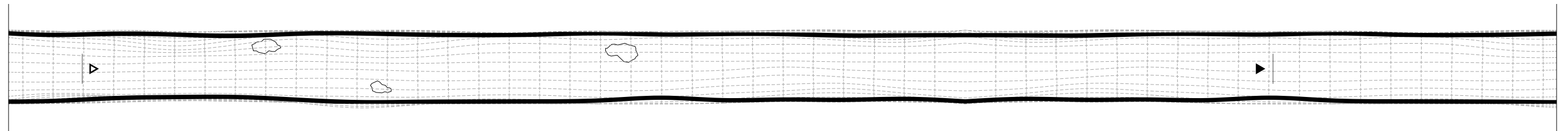
In order for the visitor to leave not feeling overwhelmed, there is the option of passing through this exit. In this tunnel, one is wading through a silent creek, surrounded by cave-like stone. It is lit by lanterns leading the way toward the exit portal that shines in the distance.

During this walk, the visitor might reflect on the experiences and acclimatise in order to gradually re-enter reality. After reaching the end portal, one is sent back to the *Amplification Foyer*, although this time in a silent state. As one walks out on an empty Klara Mälarstrand, one is finally prompted to remove the headset.

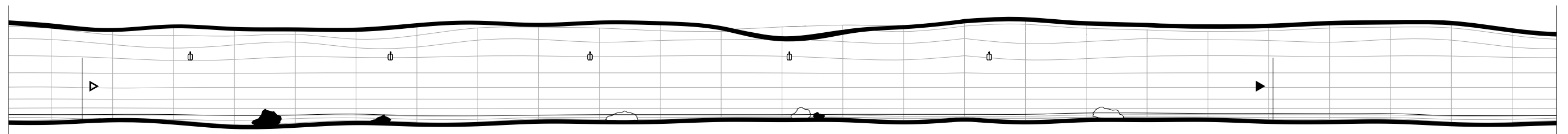
LOCATION

SEQUENCE OF  
PSYCHOLOGICAL  
PHENOMENA

## PLAN



## SECTION









> PHASE C

> ARCHITECTURAL REALISATION

/ DESIGN PROCESS

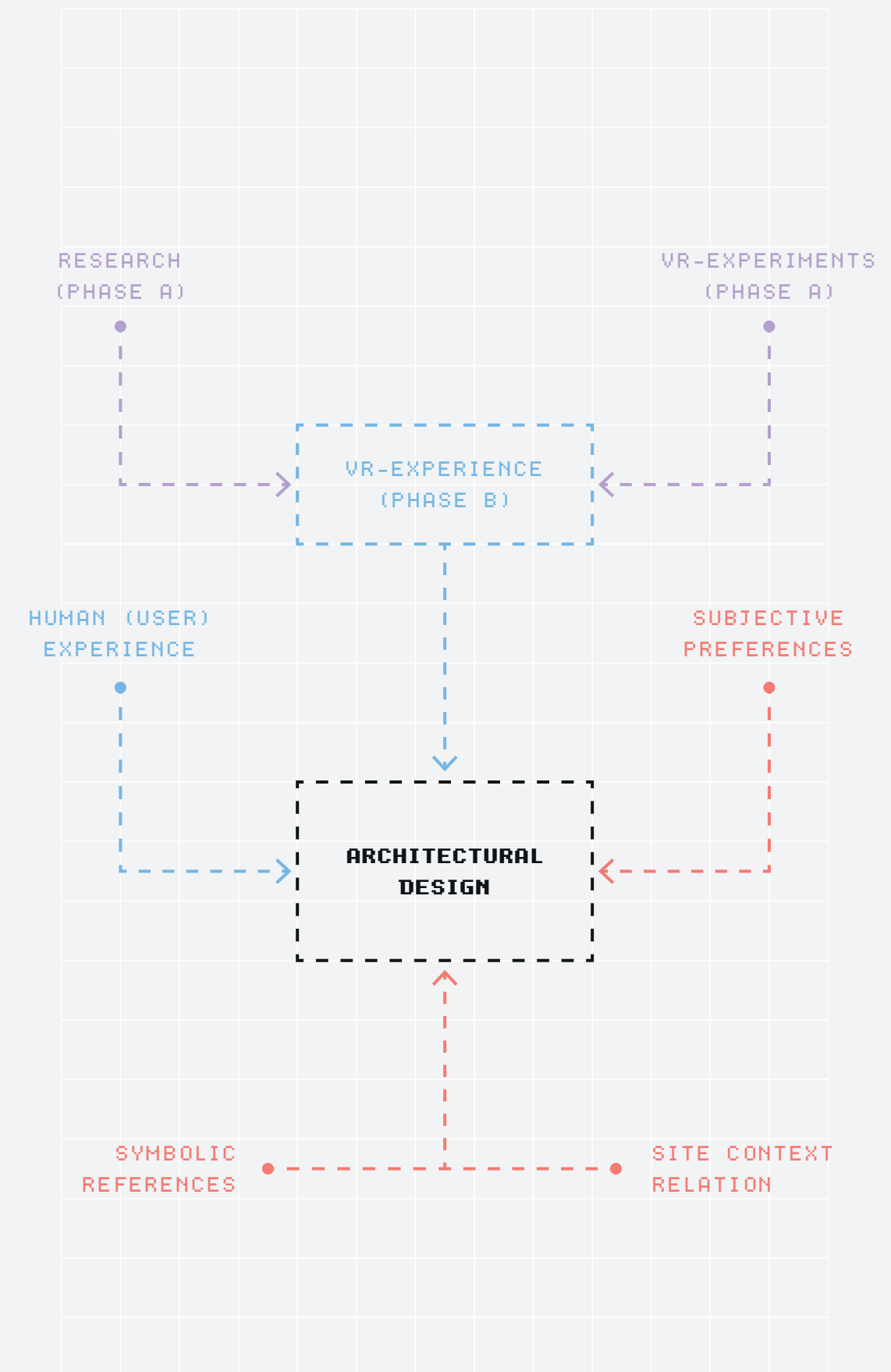
## INITIATING PHASE C

Having concluded the virtual reality environment, we are to advance into the next phase, letting the VR experience act as a precursor for the transition to practical architecture. The objective of phase C is to realise the outcome into a physical building at the chosen site in Stockholm.

This realisation process is where our design knowledge and architectural skills are further utilised and encouraged, entailing an amplified subjective approach towards the artistic expression.

In order to retain a scientific and pragmatic attitude, we applied a predetermined working method to base our design decisions upon. This conditions for a holistic design approach, where the theoretical framework defined during the research phase covering psychological research, our conducted VR experiments (Phase A) and their spatial interpretations illustrated in the VR experience (Phase B) are present.

Symbolic and contextual references to historical preconceptions and design characteristics of the site surroundings are also defined as a part of the design approach.

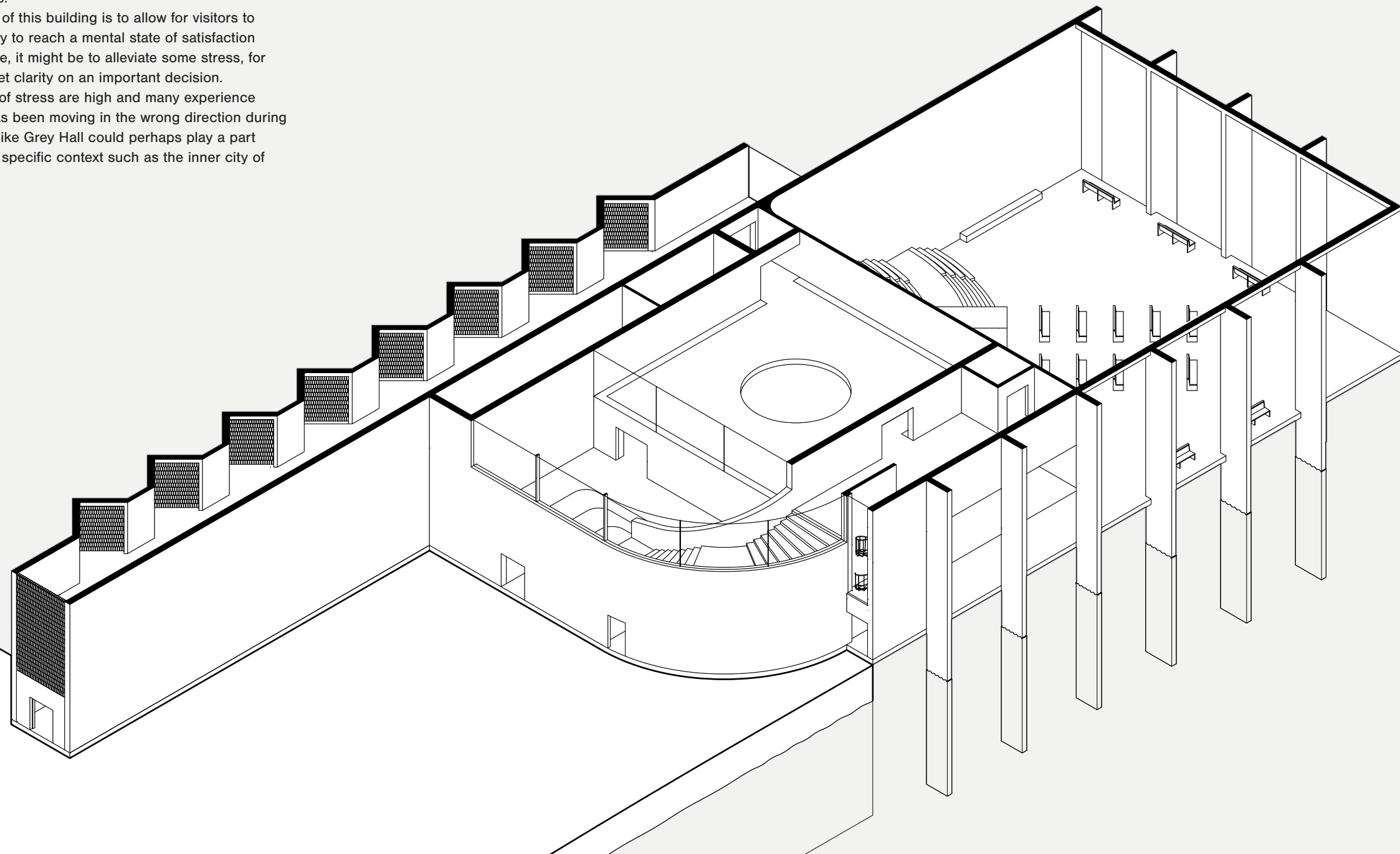


## GREY HALL (GRA HALLEN)

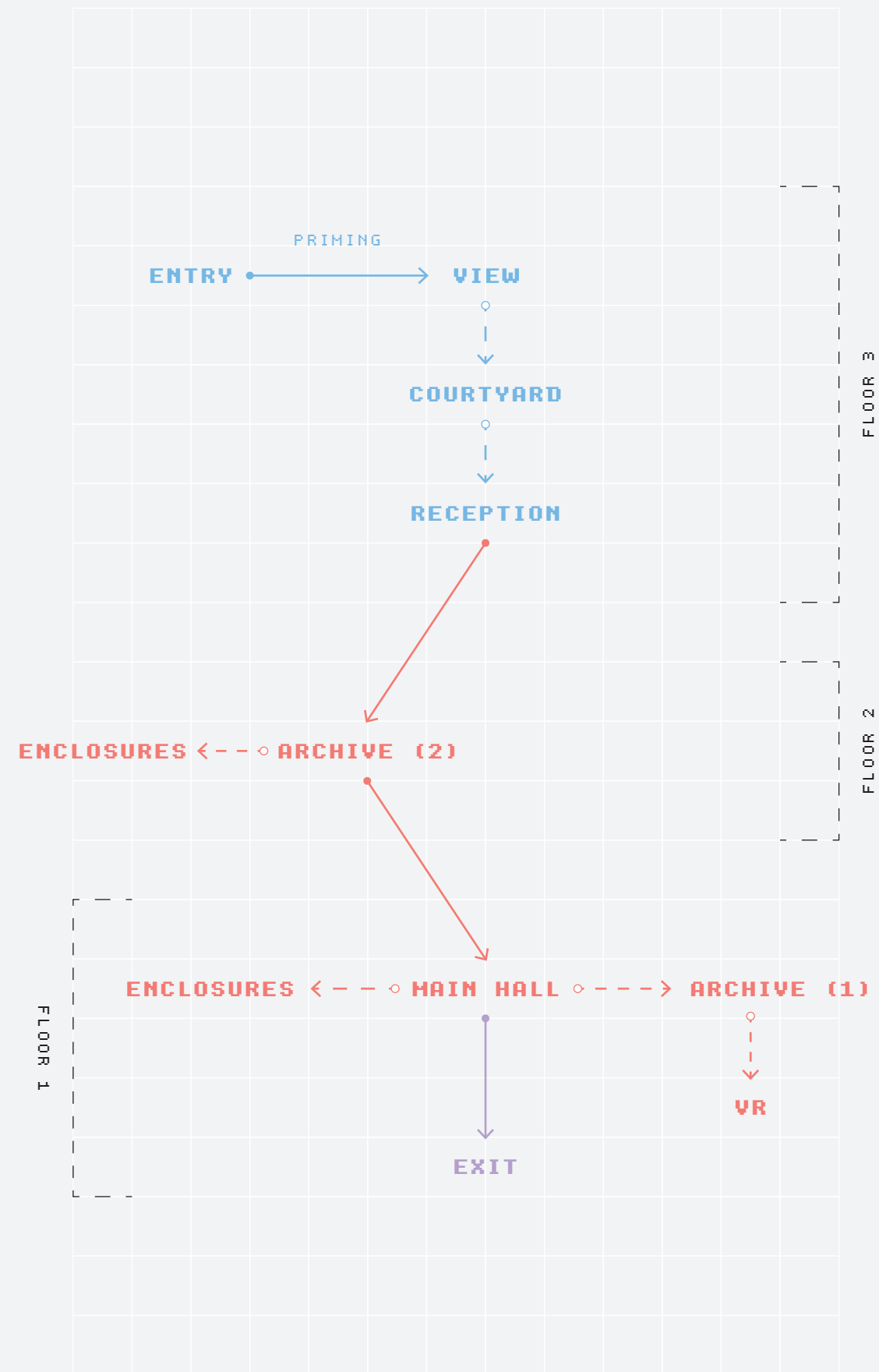
The building is called *Grey Hall*. The name is not merely a description of its aesthetic expression. Grey is a colour with connotations of indifference. A reference to everything that exists between the black and the white. The way our minds and emotions are not so clearly defined is represented with this name. *Grey Hall* does not fit into existing building typologies.

The primary goal of this building is to allow for visitors to pause during a time and try to reach a mental state of satisfaction before they leave. For some, it might be to alleviate some stress, for others, just a moment to get clarity on an important decision.

In society, levels of stress are high and many experience exhaustion, a trend that has been moving in the wrong direction during the past years. A building like Grey Hall could perhaps play a part in changing this trend in a specific context such as the inner city of Stockholm.







## A SEQUENTIAL SPATIAL EXPERIENCE

The building is designed as a fluid sequential experience that has an entry, priming sections, a climax and an exit. In the building, there are large common rooms and small private enclosures, all with a specific function adapted to the needs of different individuals.



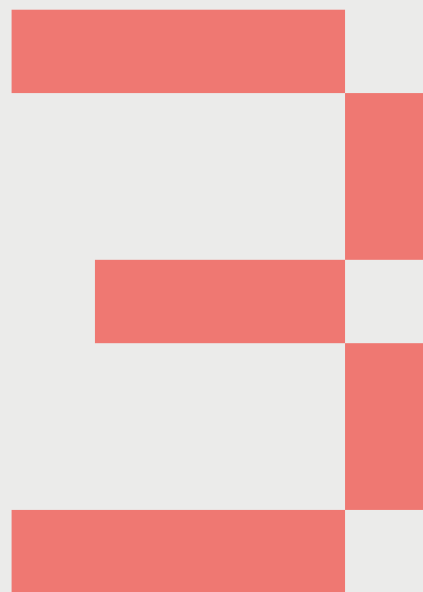
The courtyard (image 1) acts as a part of the mental priming sequence of the entrance path and is designed based upon preconceptions of Japanese Zen gardens intending to imitate the essence of nature.

The idea with the Main Hall (image 2) involves creating and framing extensive visual atmospheres with lower levels of distracting objects in order to allow the visitor to focus on personal reflection.

CONTINUE READ:

> APPENDIX 3 (THREE)

/ ARCHITECTURAL REALISATION



> APPENDIX 3 (THREE)

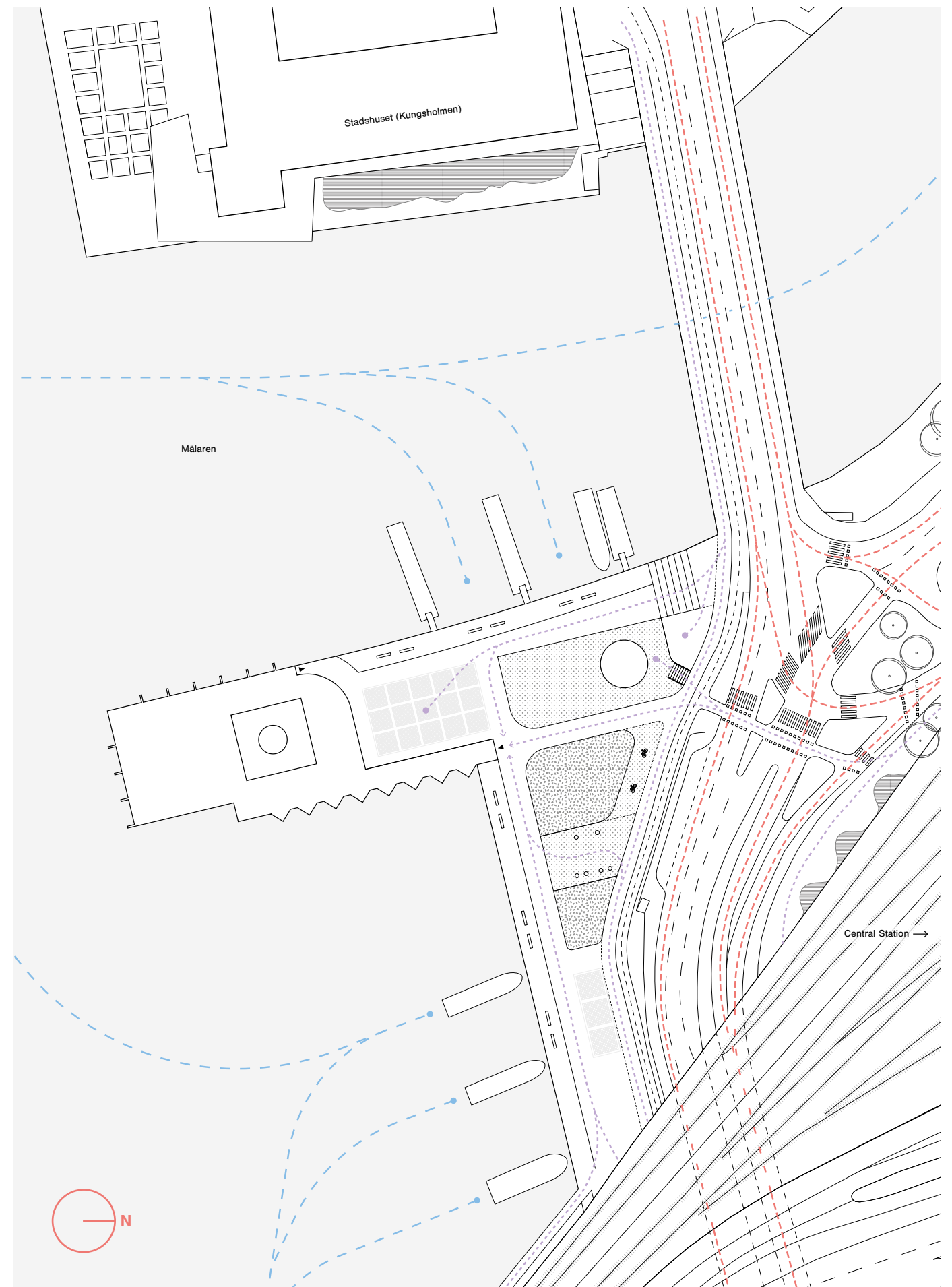
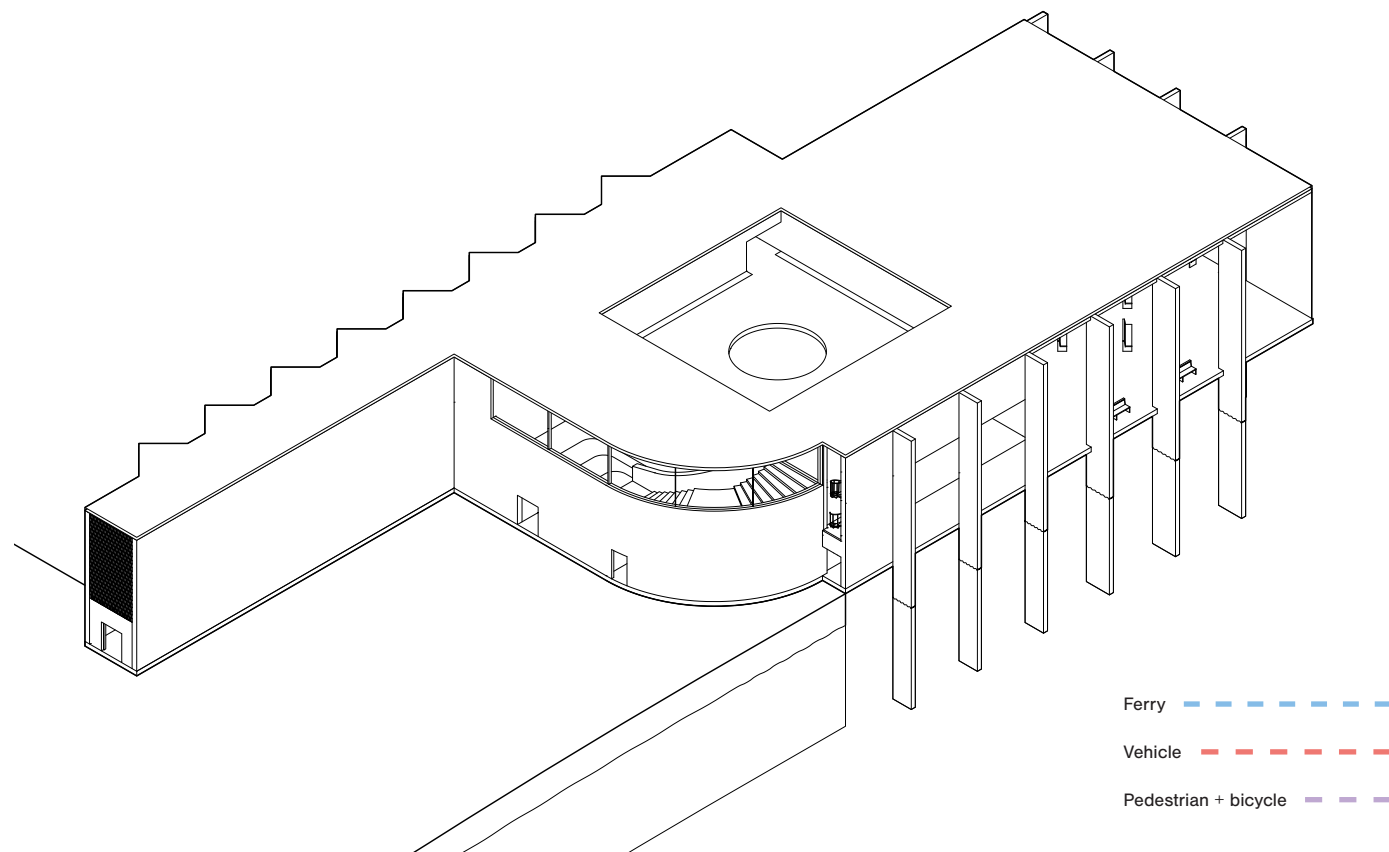
> PHASE C

/ ARCHITECTURAL REALISATION

## SITE IMPLEMENTATION

The building is located in a quite sensitive central location. The current program of the site is heavily oriented toward commercial boat traffic and some pedestrian visitors, albeit mostly tourists. The building tries not to interfere with existing conditions and instead wants to add value to the existing activities while remodelling the hardscape and buildings to match the extension of the plaza. In order to add value to the existing programs, more space for boat docking is provided to compensate for the space the building occupies and a new café/ticket shop is planned. Also creating a more secluded garbage area for the boat traffic was a priority.

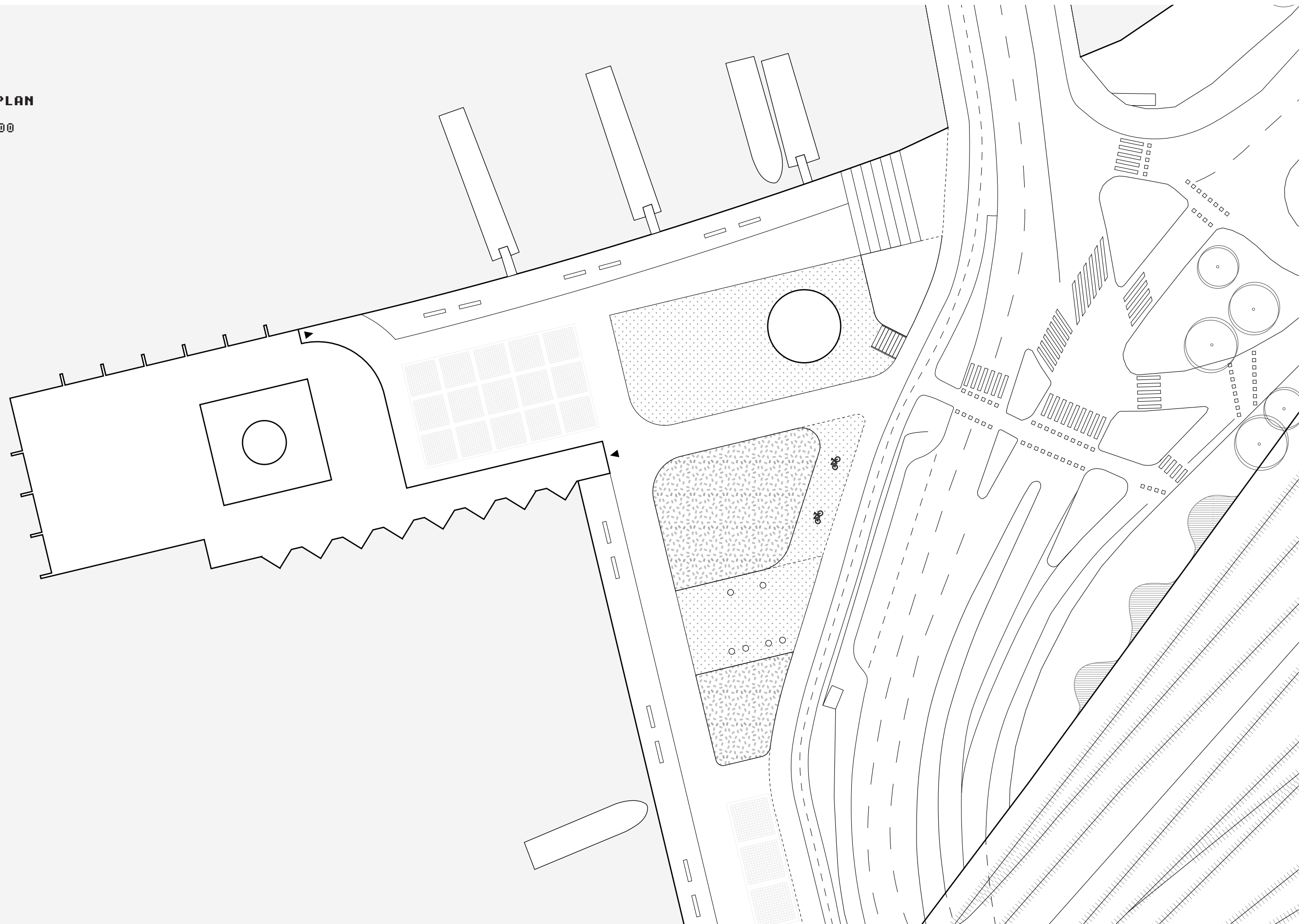
When remodelling the site, focus was put on creating stronger pedestrian and cyclist flows to both the site and the building, this through bicycle parking spots and wider flow sensitive walkways. The walkways connect to a central plaza located in between the entry and exit of the building. On this spot, visitors can freely move the furniture around as they please, perhaps waiting for a boat departure or having a moment in the sun after a visit to the building.





## MASTER PLAN

SCALE 1:500

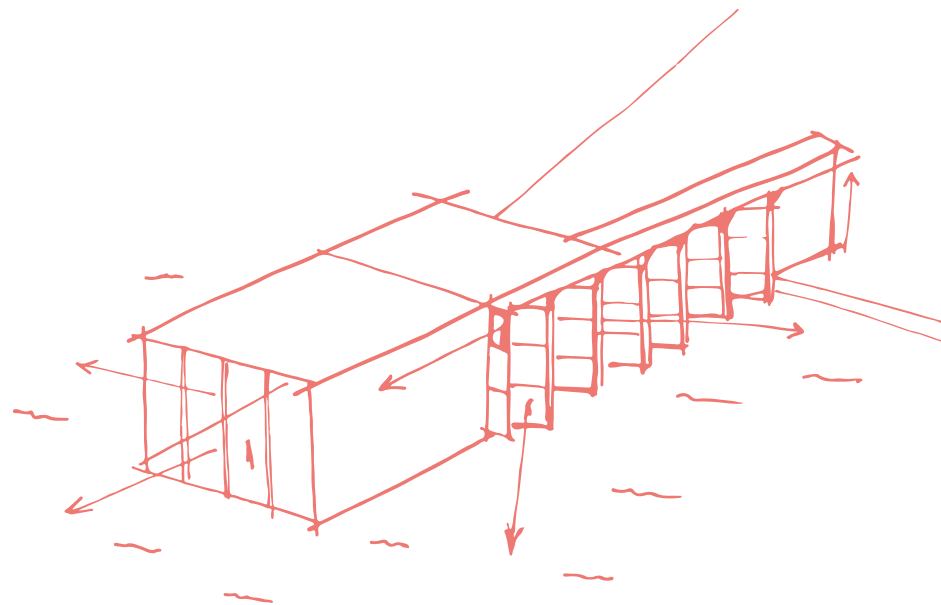


## ENTRANCE PATH

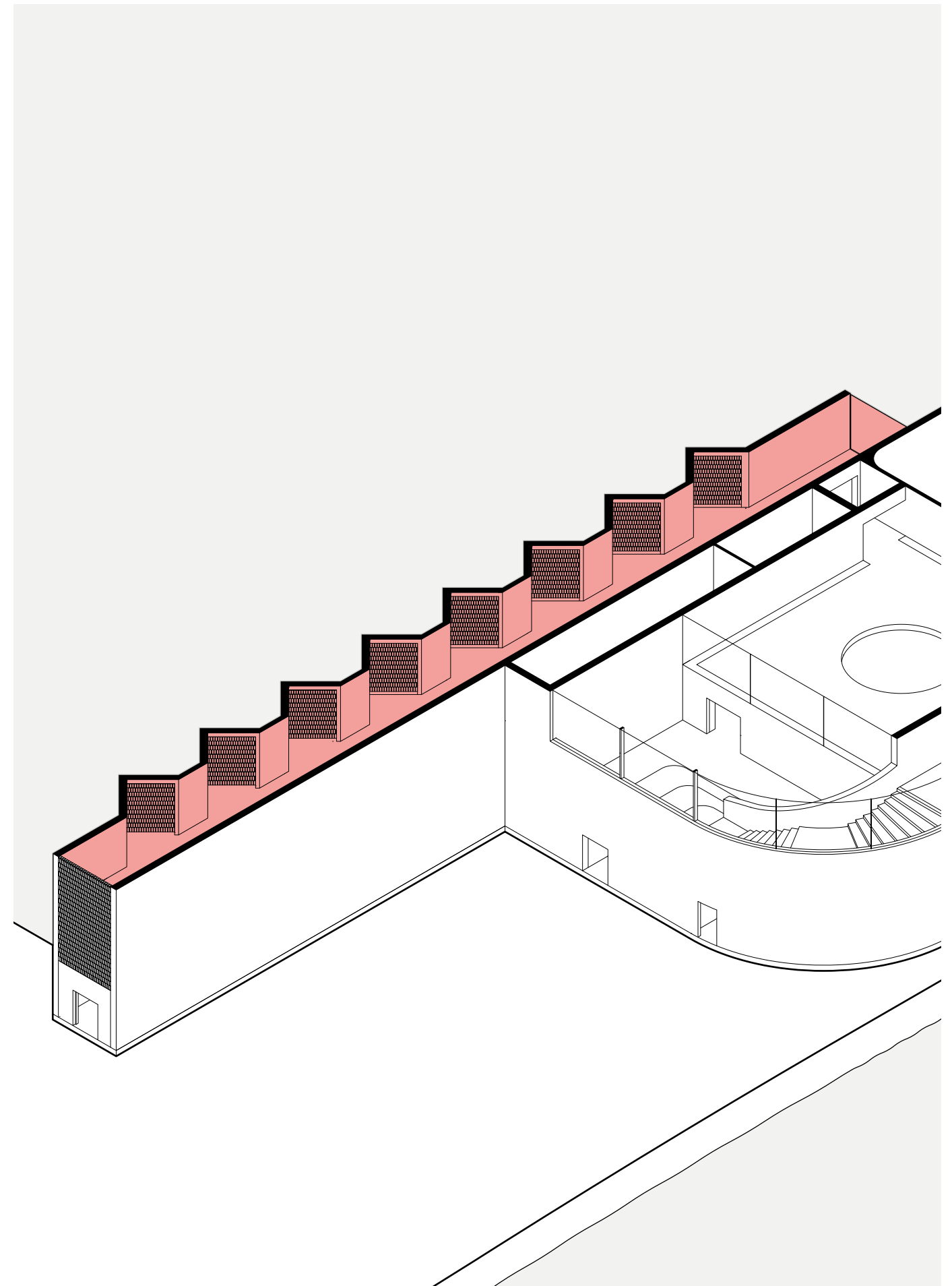
A perforated brick elevator is the first point of contact for the visitor. The elevator is bound to the third floor, which is the highest level of the building. This means that from now on, the visitor will only travel downwards, minimising physical stress in the sequence.

The visitor is then meant to walk through a long dark passageway with a bright window at the end. Along the brick tunnel, are perforations in the brick, meaning light tries to fight its way in.

This part of the building sequence is related to the priming sequences of the VR-experience [Immersive Descent, Vertical (Dis) pleasure]. The walk is supposed to set the mood and allow for a moment to prepare oneself for some kind of introspective experience. At the end of the tunnel, one is greeted with a view, giving a hint of what is to come later in the sequence.



Sketch. Defining different view points along the spatial sequence in relation to the intended emotional state of the user.





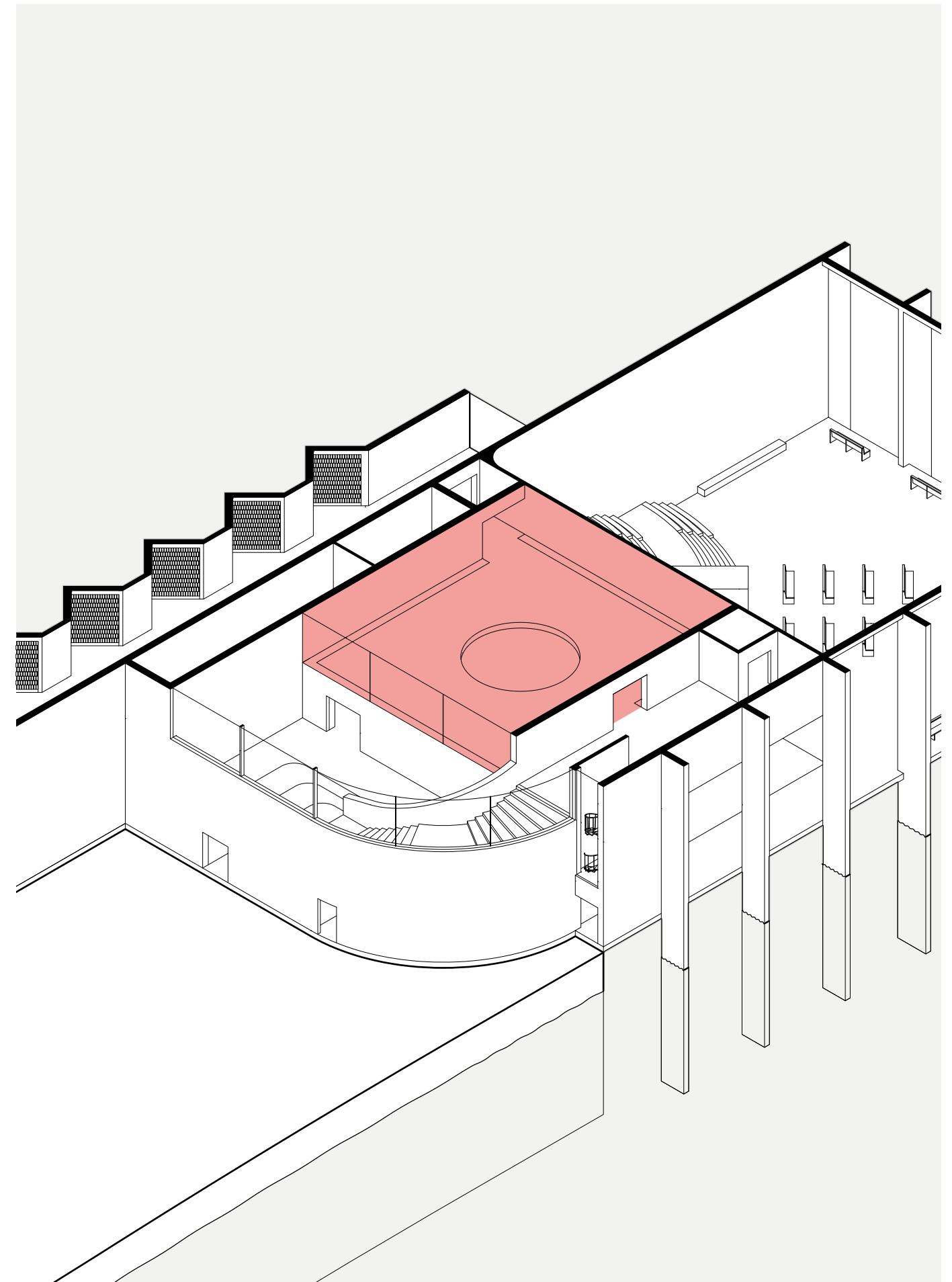


## THE COURTYARD

After the walk through the entrance path, the visitor is led to a square shaped outdoor courtyard invading the building's volumetric geometry. The courtyard acts to continue the mental priming sequence of the entrance path and is designed based upon preconceptions of Japanese Zen gardens intending to imitate the essence of nature. Zen gardens are commonly found in Buddhist temples and monasteries and are designed to serve as an aid for meditation (Nitschke, 1991).

The courtyard is surrounded by brick walls, except from the north facade, which is completely covered with glass panels, offering the visitor a view over the public space with a backdrop of the urban structure. Centred in the courtyard, a circular roof window allows for a visual connection to the Archive, giving the visitor a hint of what awaits inside the building.

Reaching the courtyard, the visitor is met by, a previously not seen brick expression, as opposed to the previously experienced light grey brick of the exterior facade and interior materiality of the entrance path. The dark brown brick walls act as a symbolic reference to the surrounding visual environment as the tower of Stadshuset is distinguished in the peripheral view toward the sky, as well as introducing the visitor to the coming interior material expression.

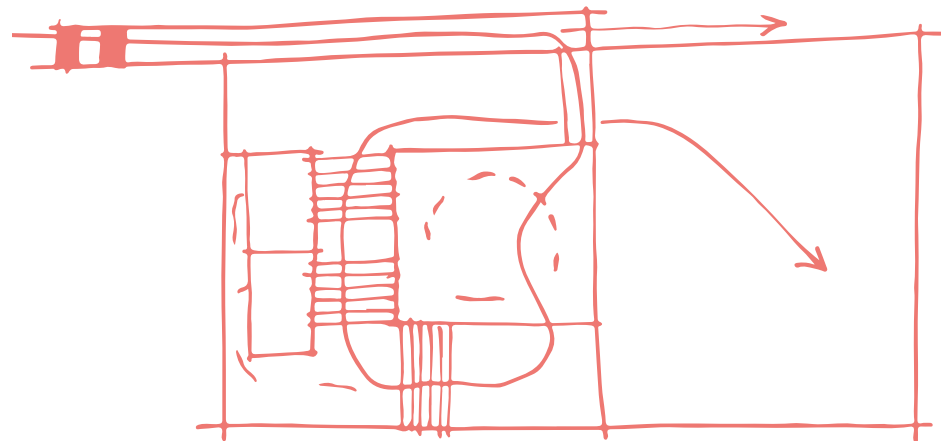




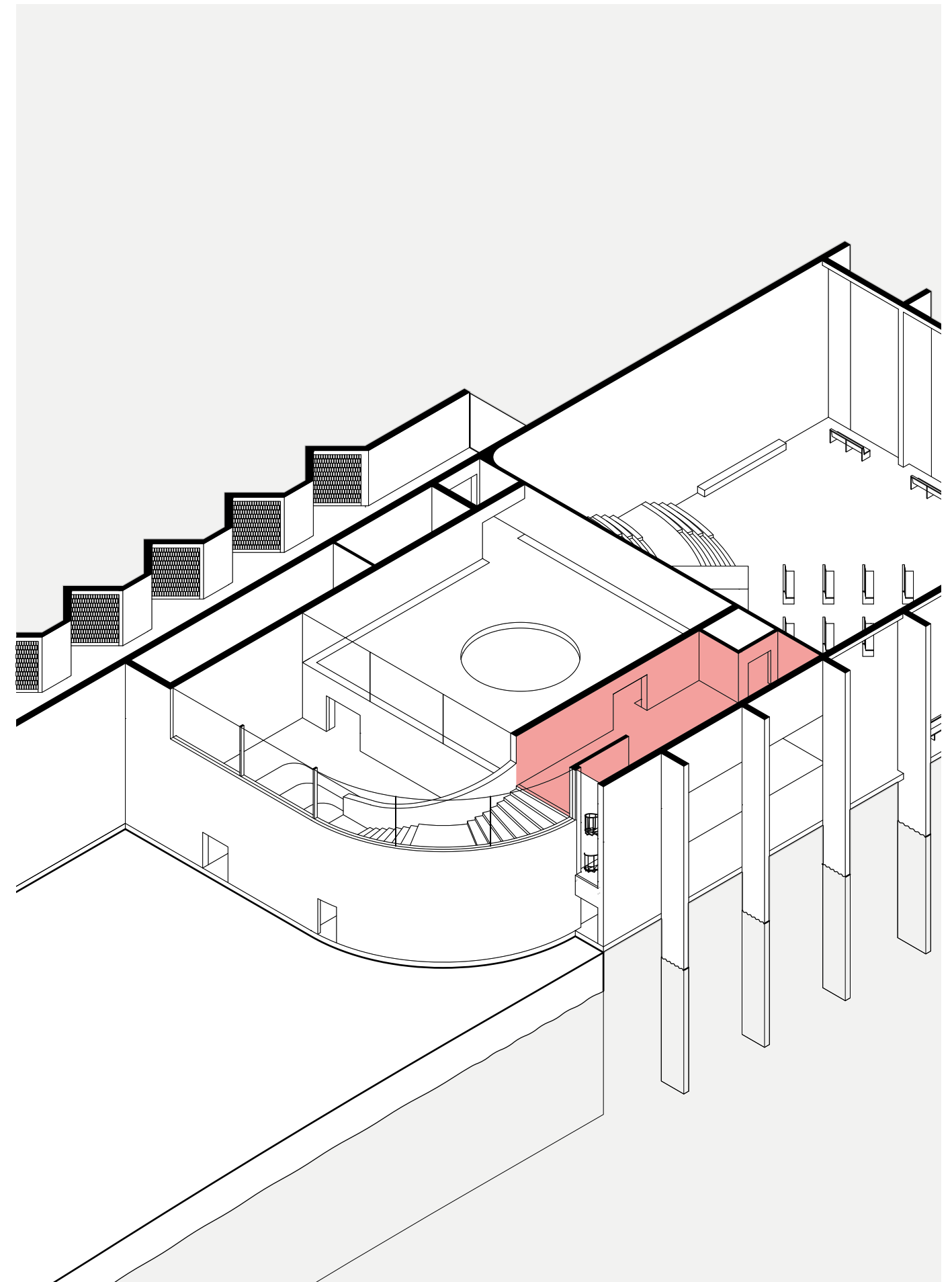
## RECEPTION

At the reception, one will be greeted by an individual working at the centre. This person's purpose is to set the mood for the experience, to help individual visitors to subconsciously align themselves with the social atmosphere of the building, which should be open, but calm.

In the reception, three movement options are present. The main visitor stair, an elevator and a stair restricted to employees. The main flow follows the big visitor stair as it follows the direction of the reception itself. The stair has certain proportions to disrupt the visitor movement habits and create more aware walking patterns. As this happens, the view slowly disappears from sight to introduce an upcoming, more enclosed space.



Sketch. Iterating upon the programmatic sequence and the interior movement flow.

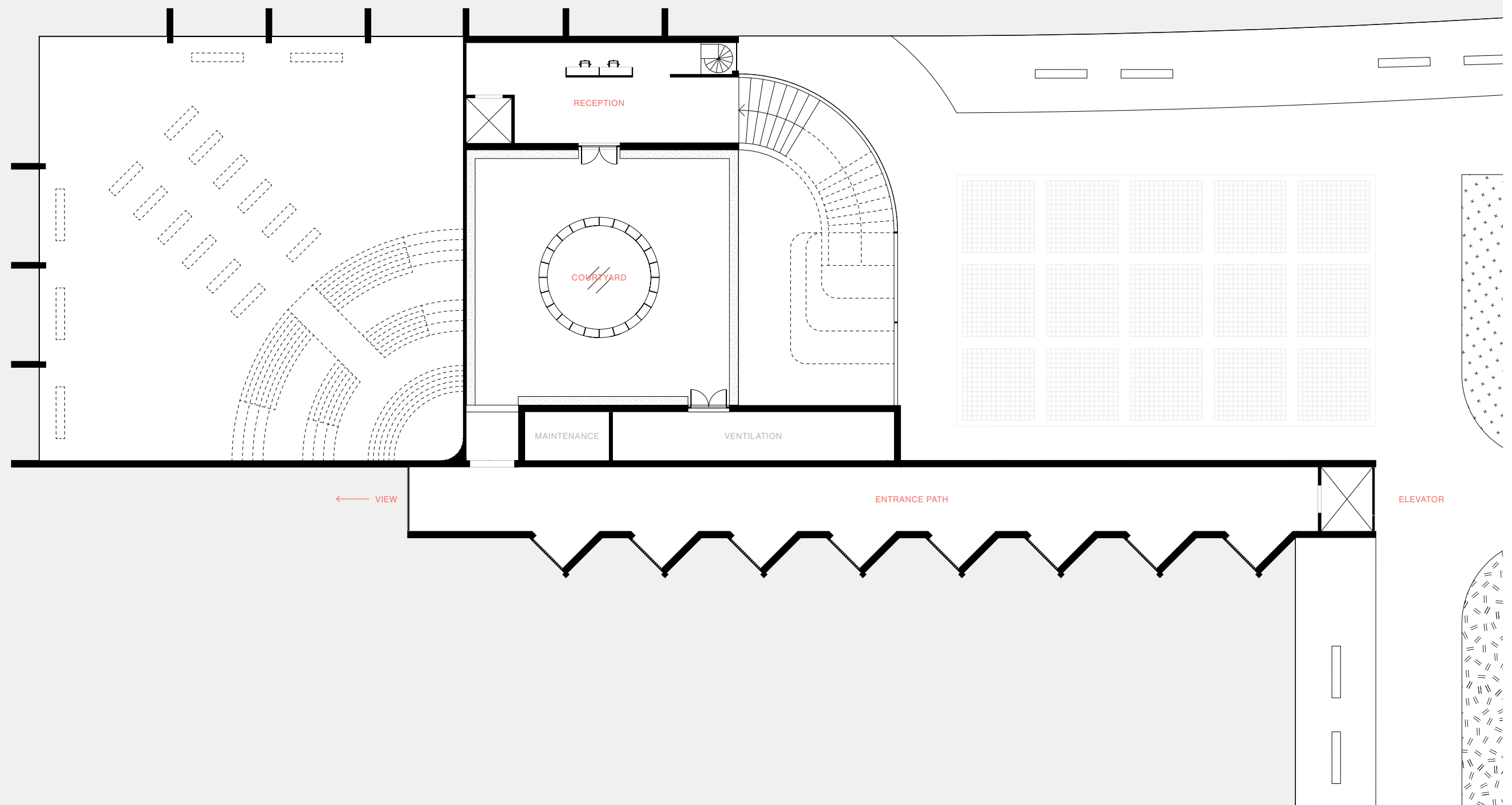






**PLAN (LEVEL 3)**

SCALE 1:250



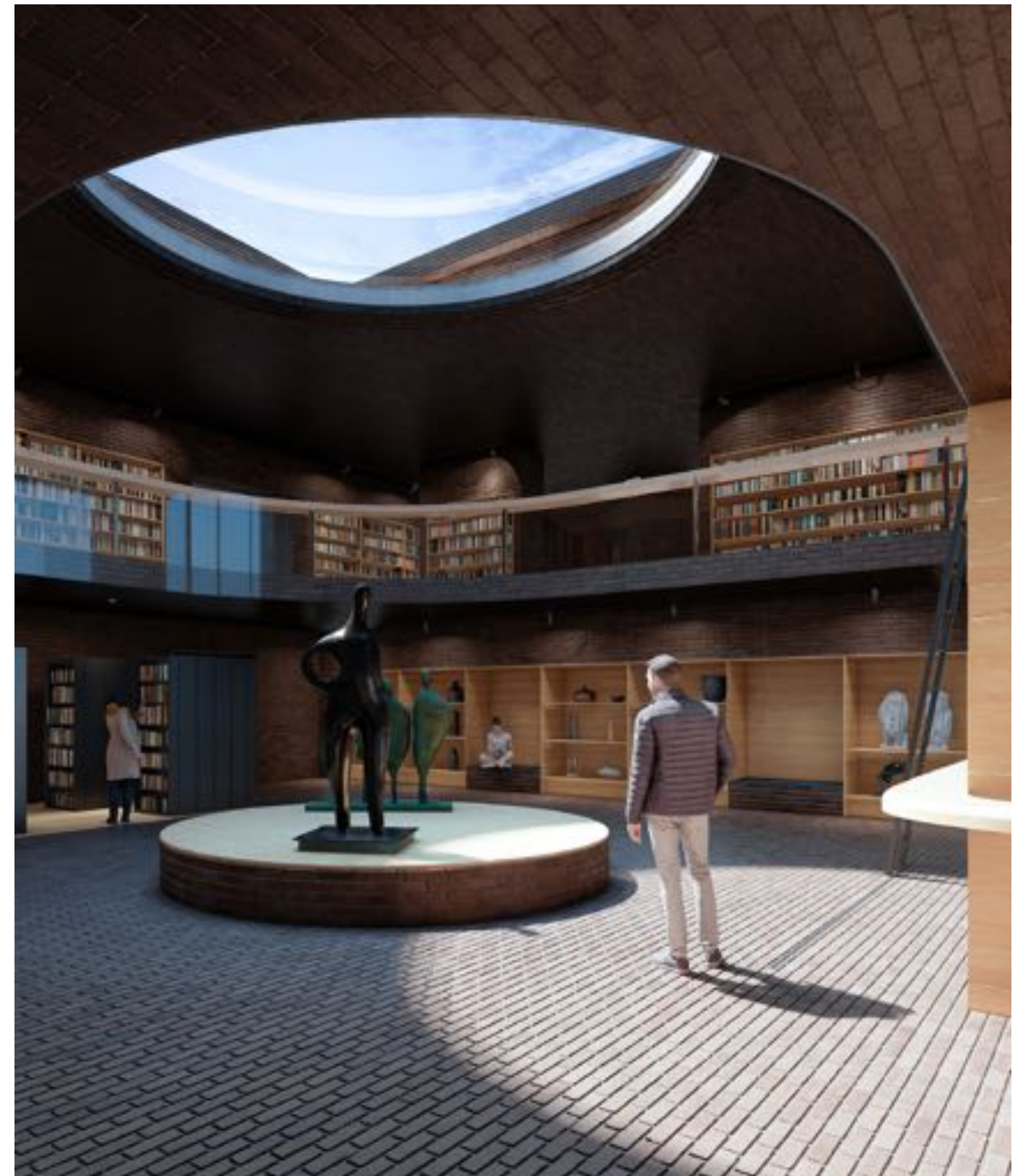
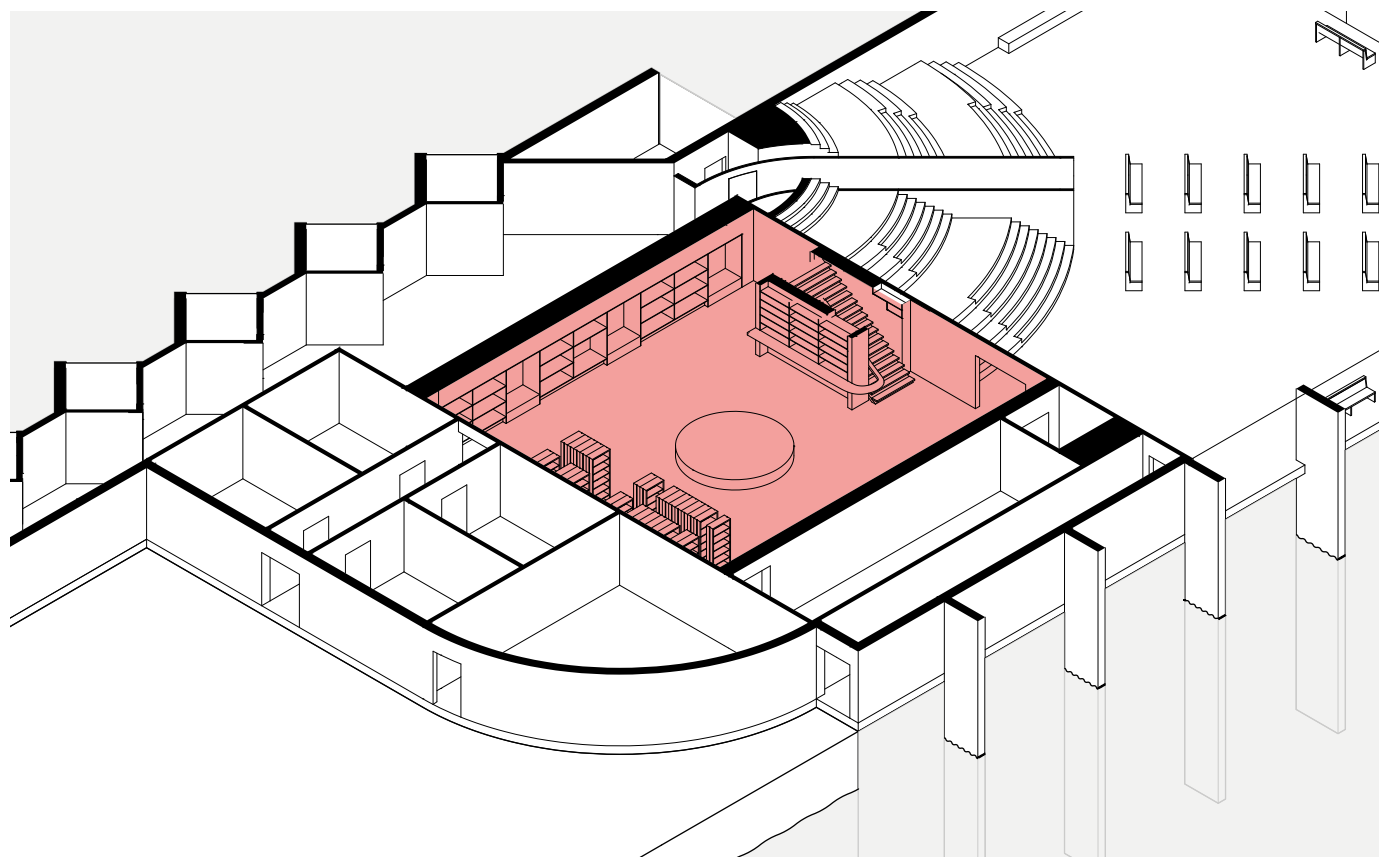


## ARCHIVE

In the building, there are two main concepts to achieve introspection and stress relief. The *Archive* acts as the defining space for one of these concepts, which is an idea of “alleviation through disconnection”. The archive is filled with books and objects available for the visitor to explore. For some visitors, leaving one’s personal headspace and entering the headspace of authors, artists or simply other people might create distressing feelings, as one would immerse oneself in an entirely different context.

The *Archive* has restricted access to exterior views and light, while maintaining a homogenous materiality in order to create more focus on the objects and their content. However, the Archive was also designed to be a corridor that visually leads the visitor further in the sequence, if one would choose to focus on a different type of introspection.

Personal intimate enclosures exist in conjunction with the Archive and they have a similar theme as the main space. A somewhat hidden stair also connects the two floors of the archive behind the great bookcase.

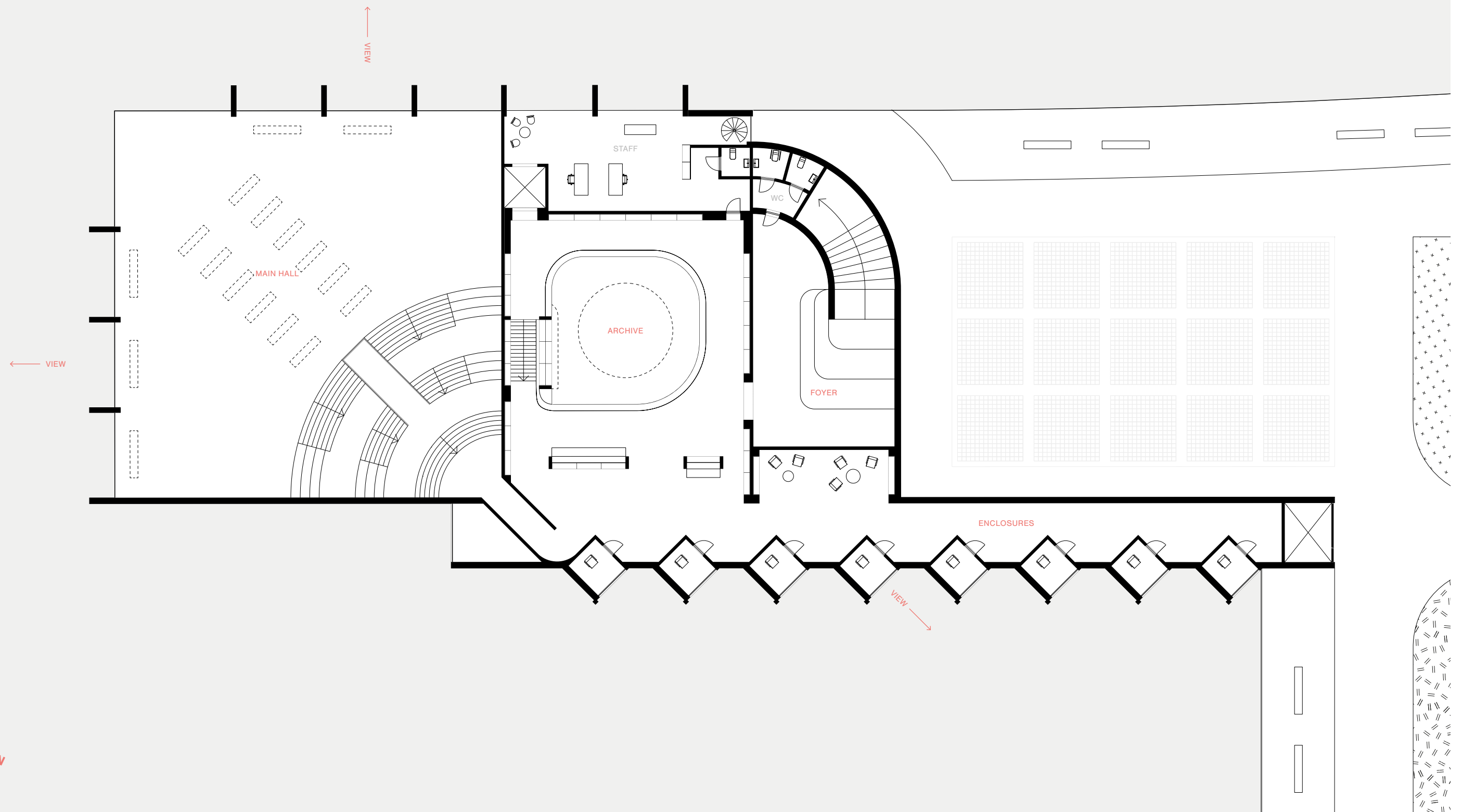






PLAN (LEVEL 2)

SCALE 1:250



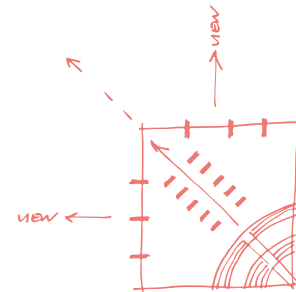
## MAIN HALL

The other introspection concept is the idea of “space for reflection”. This idea involves creating and framing extensive visual atmospheres with lower levels of distracting objects, in order to allow the visitor to focus on personal reflection. The *Main Hall* acts as the defining space for this concept.

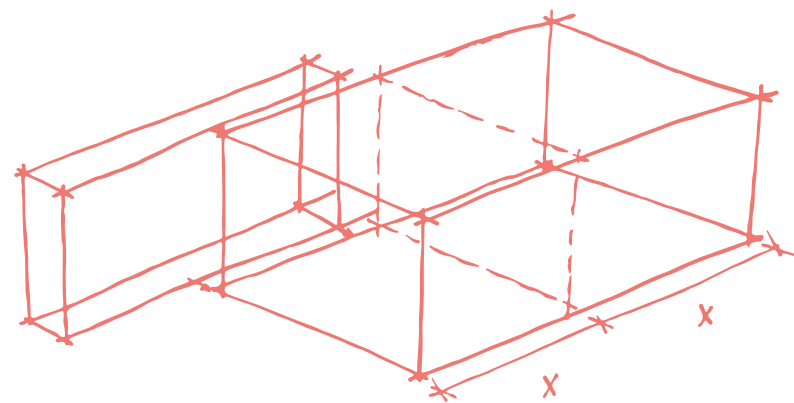
The room gets its name from having the highest level of importance in terms of the spatial hierarchy in the building. It also acts as the climax of the flow sequence. The room has the visitor entering at a 45 degree angle in relation to the main views of the space, which would allow the visitor to freely move around in the hall with a less clear path. The views are focused west, a sight that reaches far over Riddarfjärden, and south, which allows for heaps of light to wash in over the day.

Inspired by the *Introspection Chamber* in the VR experience, symbolic, church-like bench structures and vertical elements have influenced the space. The materiality is brighter than previous environments since the space is more externally focused.

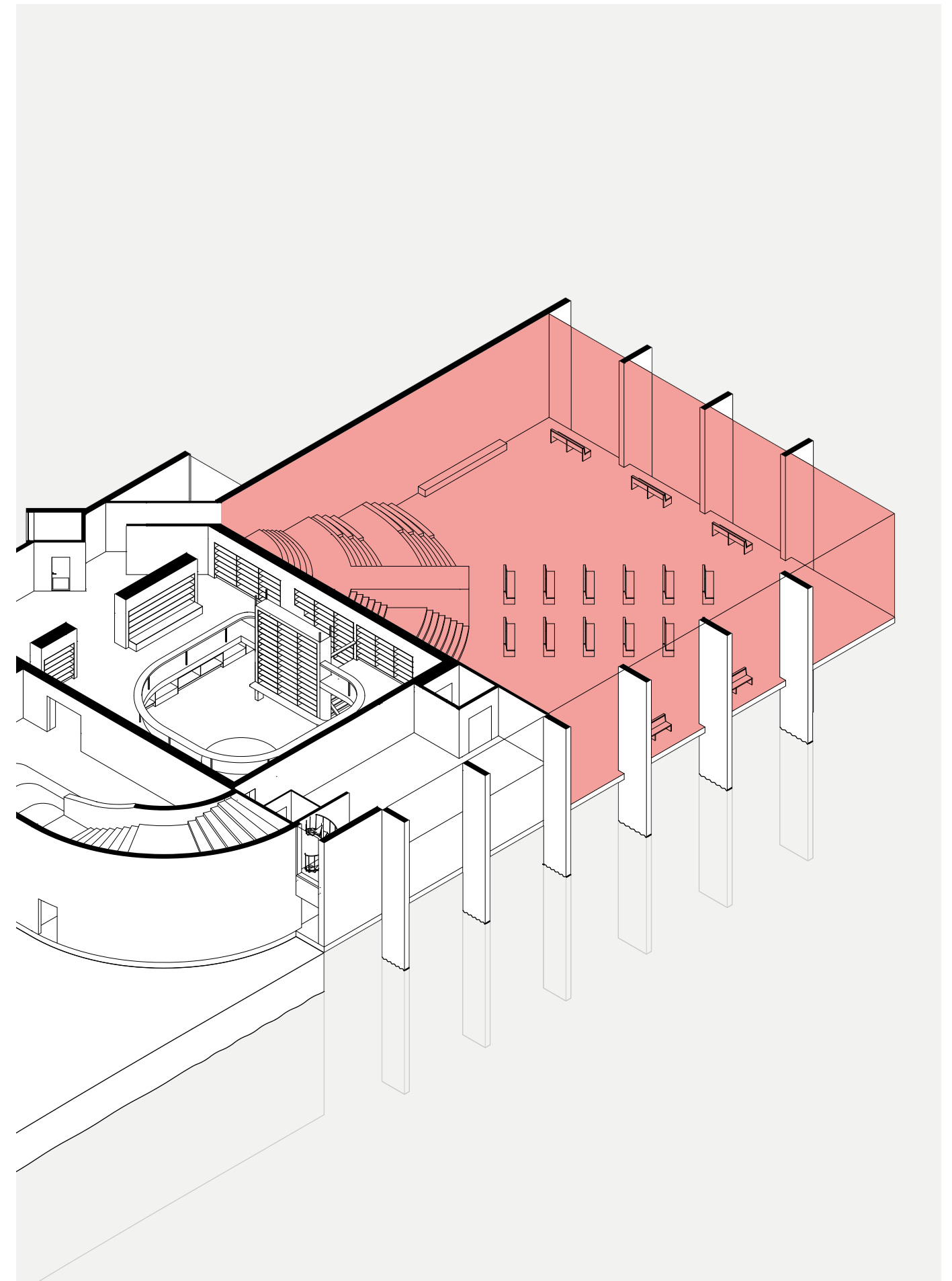
The stair taking visitors down into the hall includes seating as well as a tunnel leading to individual enclosures with a similar theme to the *Main Hall*. In the spatial sequence the *Main Hall* is only followed by the exit. The exit path as with *Manta*, allows the visitor to shortly reflect and readjust to entering society once more.



In the Main Hall the visitor enters at a 45 degree angle in relation to the room. This enforces the panoramic experience of the views present.



Sketch. The volumetric geometry of the building derives from dividing the main body into two equally large geometries. The greatly sized Main Hall gives the spatiality a strong hierarchical position in the experience.







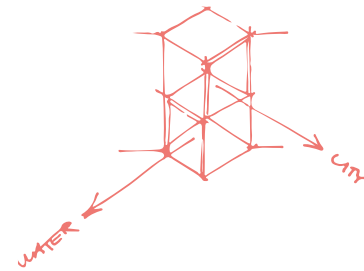


## ENCLOSURES

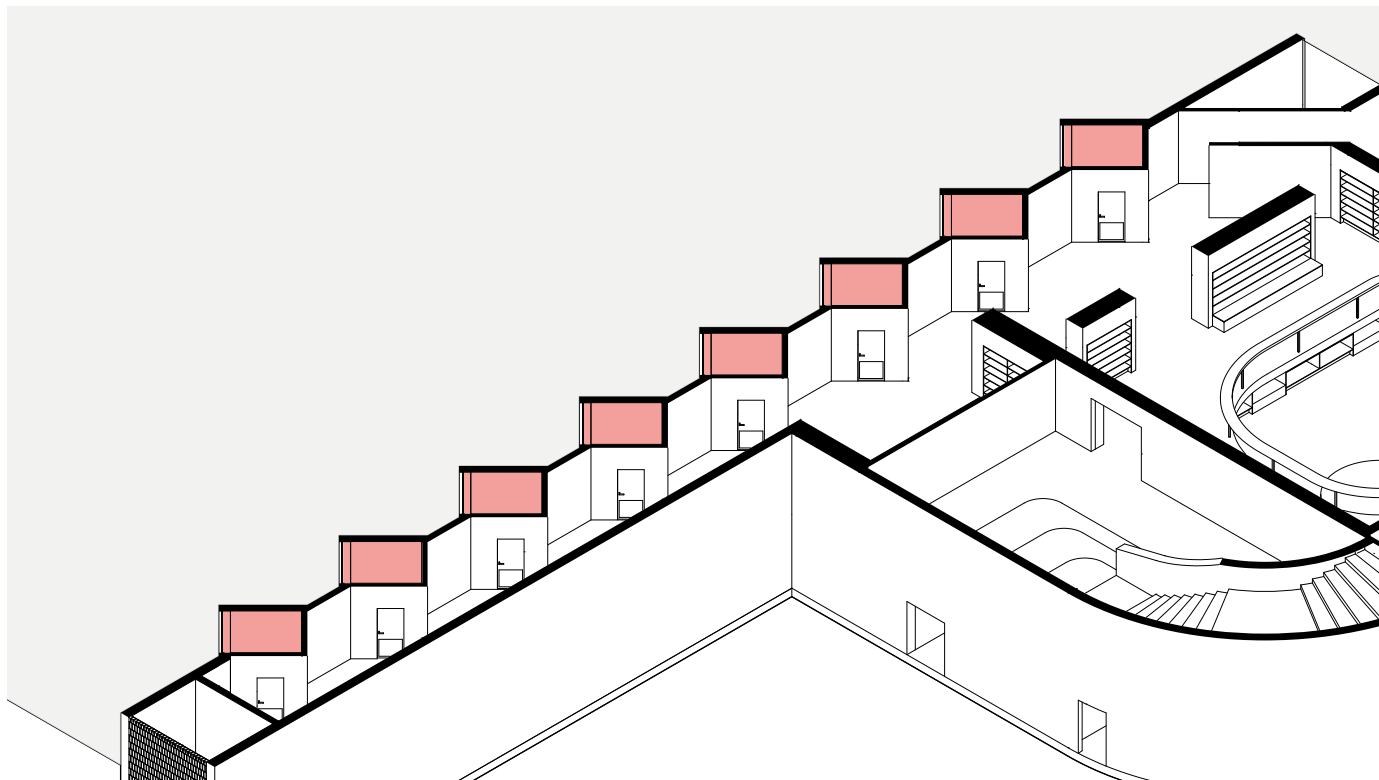
The *Enclosures* include all the rooms created for individual use. These rooms exist as counterparts to bigger common rooms such as the *Archive* and the *Main Hall*. On the second floor, the *Enclosures* focus on “alleviation through disconnection” and so this could be a space for reading as well as for people watching, as the rooms deliberately face the city. People watching might allow the visitor to further escape the personal headspace and enter the perspective of others.

On the first floor the *Enclosures* have views facing the water, using the concept “space for reflection”. On both floors, warm wood interiors and an ergonomic chair tries to make the individual experiences more comforting. A low window placed on the doors of the rooms make sure that other visitors know that a room is occupied without disturbing the experience.

The final type of *Enclosure* are four rooms connected to the lower floor of the *Archive*. These rooms have no exterior openings and are designed for virtual reality. Similarly, a comfortable chair exists as the only object in the rooms, except for the VR headset that hangs on the wall. After booting up the program, one is free to decide which kind of visual and auditory environment is desired, then proceed to enjoy the virtual space of one’s liking.

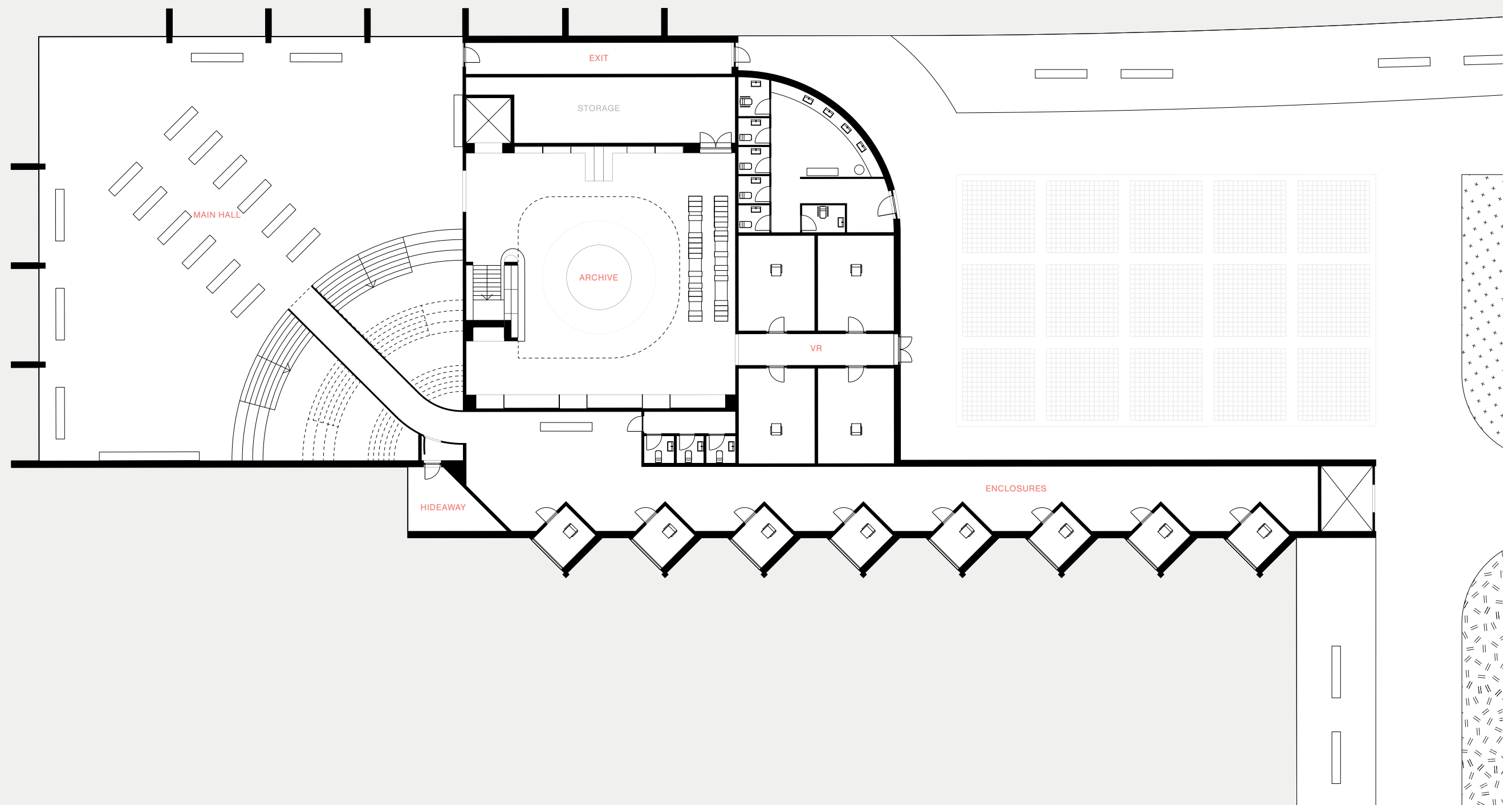


The window openings of the Enclosures are facing two different directions depending on the floor. The upper floor focuses on the busy city, whereas the lower focuses on the open water.



**PLAN (LEVEL 1)**

SCALE 1:250

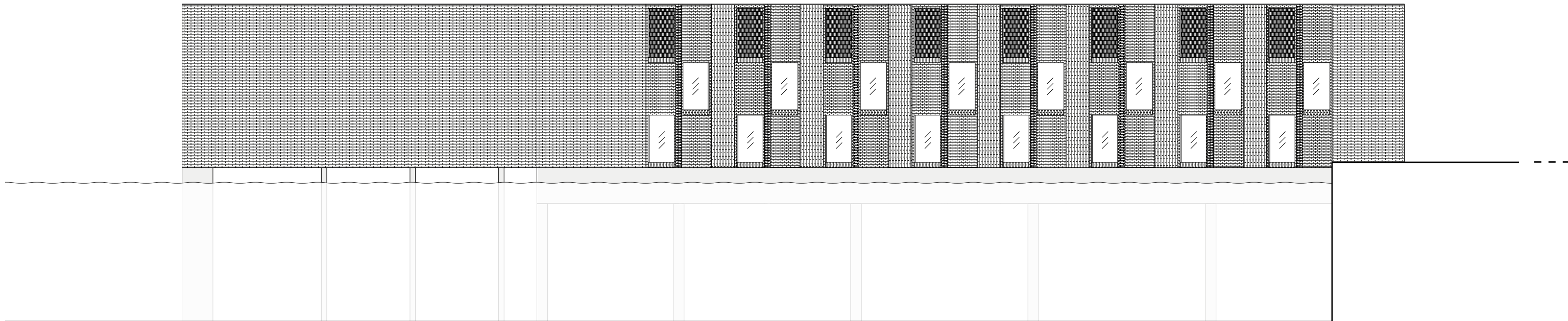
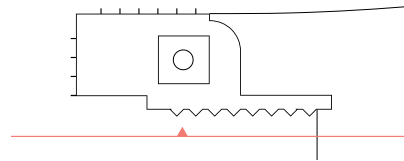






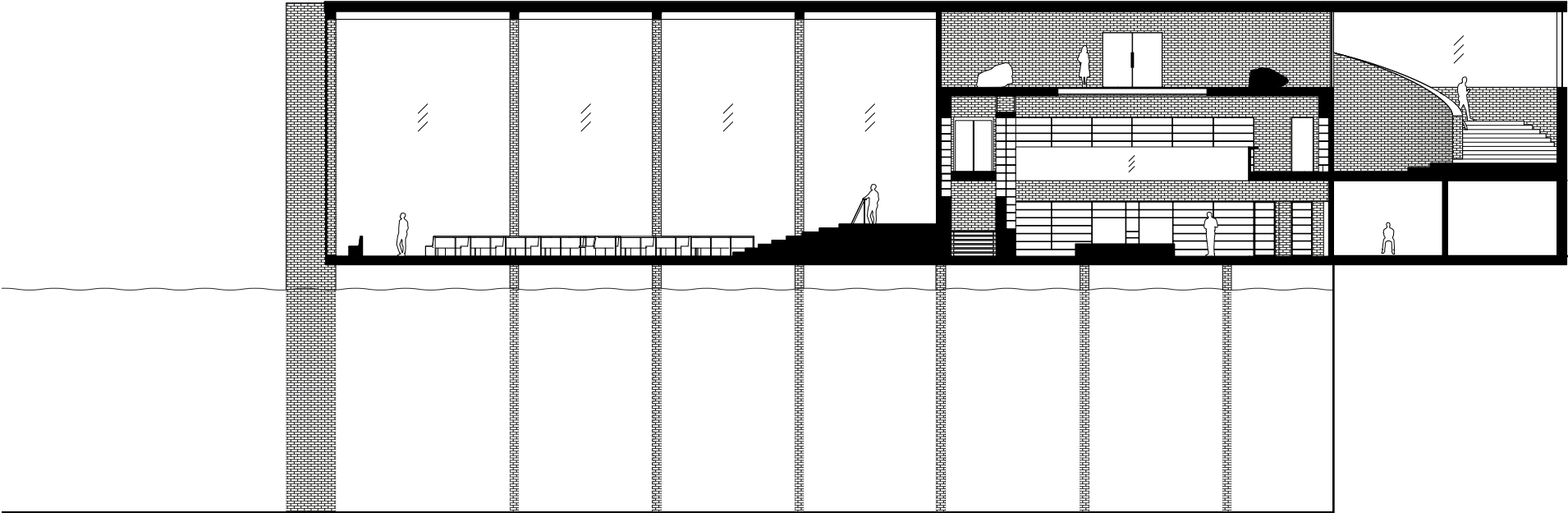
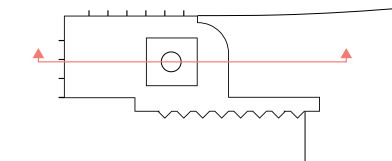
## ELEVATION (EAST)

SCALE 1:250



SECTION (EAST)

SCALE 1:250

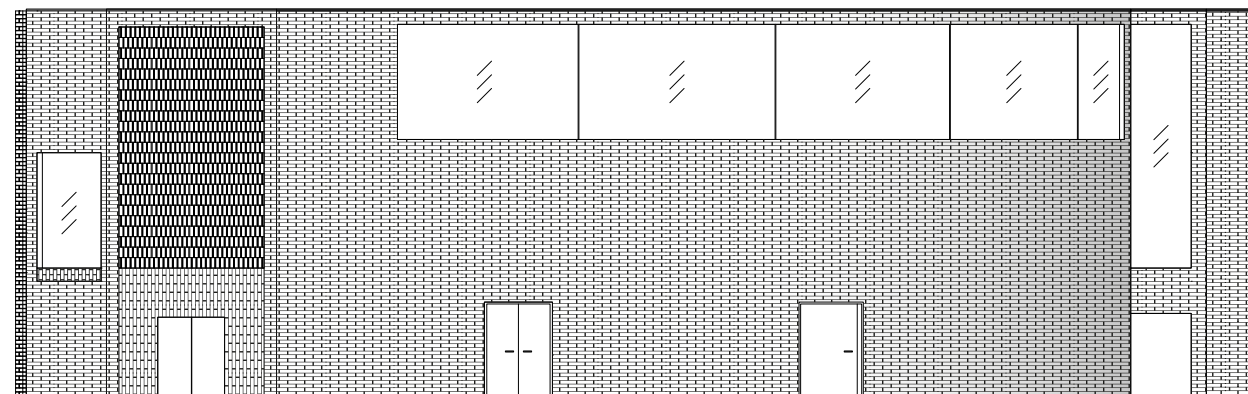
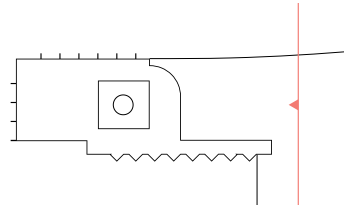






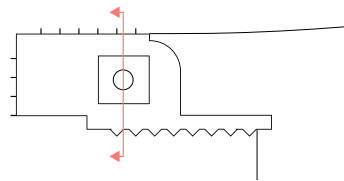
**ELEVATION (NORTH)**

SCALE 1:250



**SECTION (NORTH)**

SCALE 1:200

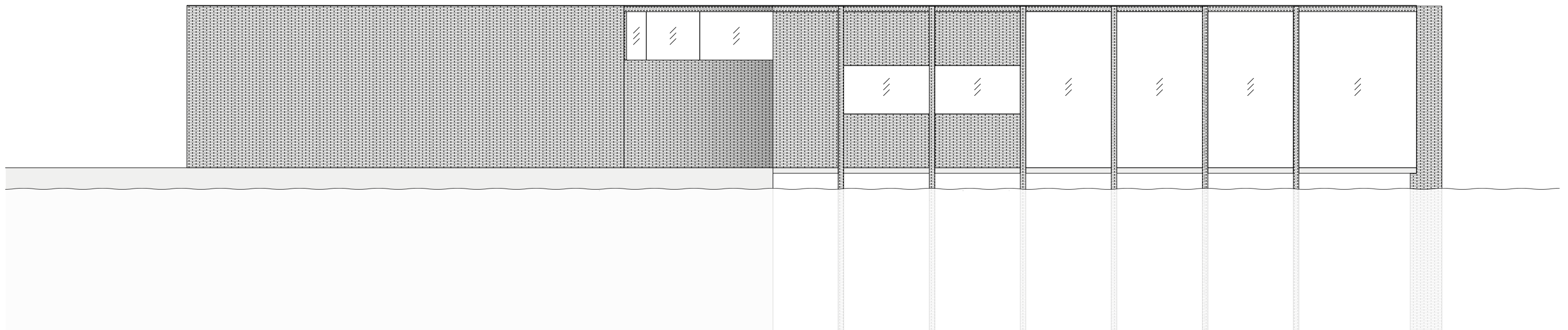
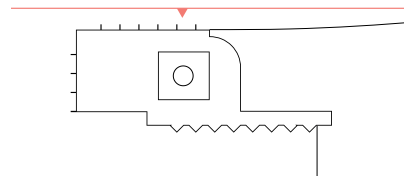






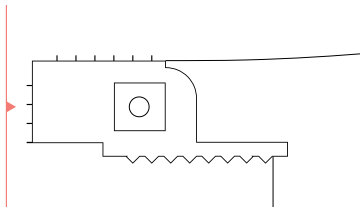
## ELEVATION (WEST)

SCALE 1:250

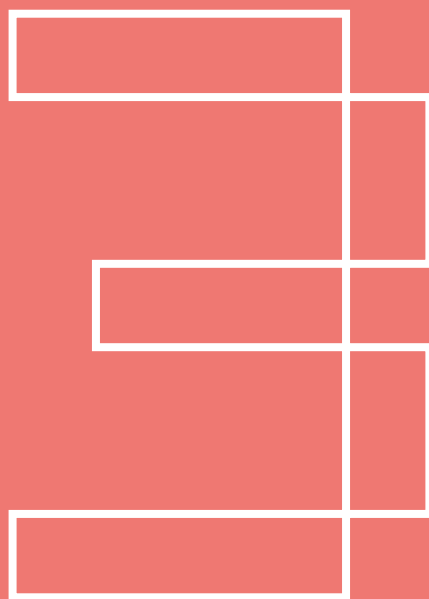


ELEVATION (SOUTH)

SCALE 1:200







> SUMMARY

> REFLECTION

/ PROCESS & DISCUSSION

## SITE INVESTIGATION

### INTERVENING PLAZA (A)

An on-land intervention located on the platform by Klara Mälarstrand that now makes up a small, quite empty, plaza.

This proposed site creates the strongest connection to the existing site and its atmosphere, but creates a challenge in order to intervene on the site without losing its current qualities. It allows for easy logistics for transportation to and from the building. This location also creates possibilities for future development of the site and its surrounding public space.

However, in order to preserve the main qualities of the site's waterfront, it becomes quite difficult to fit our programme without vertical structures, which in turn restricts the view from the plaza out toward the water and Stadshuset.

### CONNECTING ROAD BRIDGE (C)

A long entry sequence above the lake accessible from the road bridge leading the visitor into a disconnected building located on the water next to Stadshuset's plot.

This solution allows for a complete retention of the site's qualities and creates a stronger connection to Kungsholmen, as well as creating a visual axis toward the city centre.

Even though the building is completely free standing on the water, making deliberate design decisions, the proposal may feel like an addition to Stadshuset and strengthen the visual identity of its surrounding.

### EXTENDING RIVER FRONT (B)

Extending the west part of the existing waterfront creates a stronger connection to Kungsholmen, while retaining and amplifying the plaza's current park qualities.

By creating more land to contain our programme, as well as a new public space, the site can remain intact with some minor modifications to fit the master plan. The connection to water allows for a greater possibility to construct intimate spatialities with views over the lake. The entry sequence can be situated in connection to the road bridge, while the visitors exit the experience to the plaza.

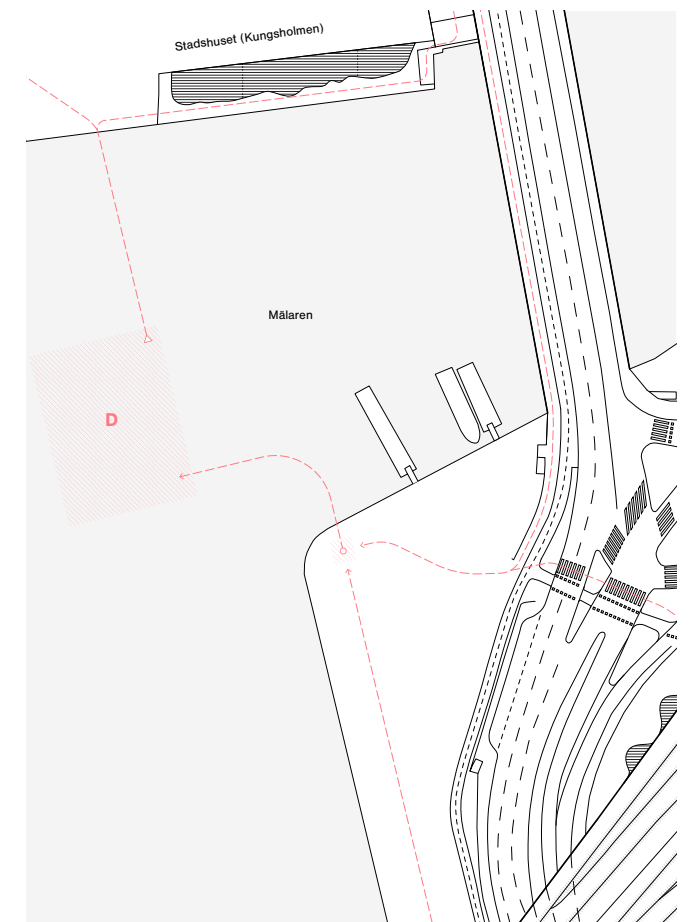
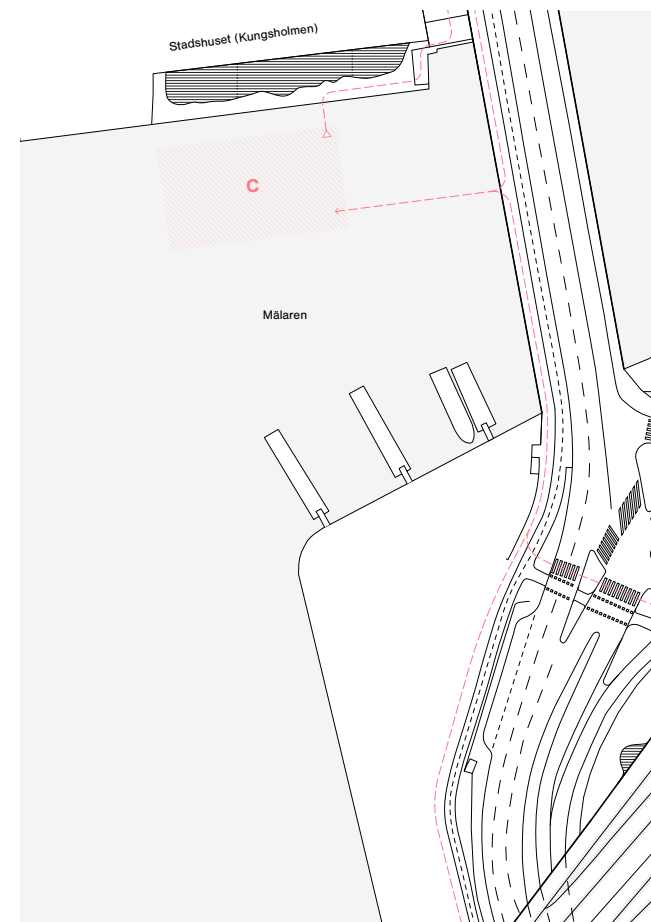
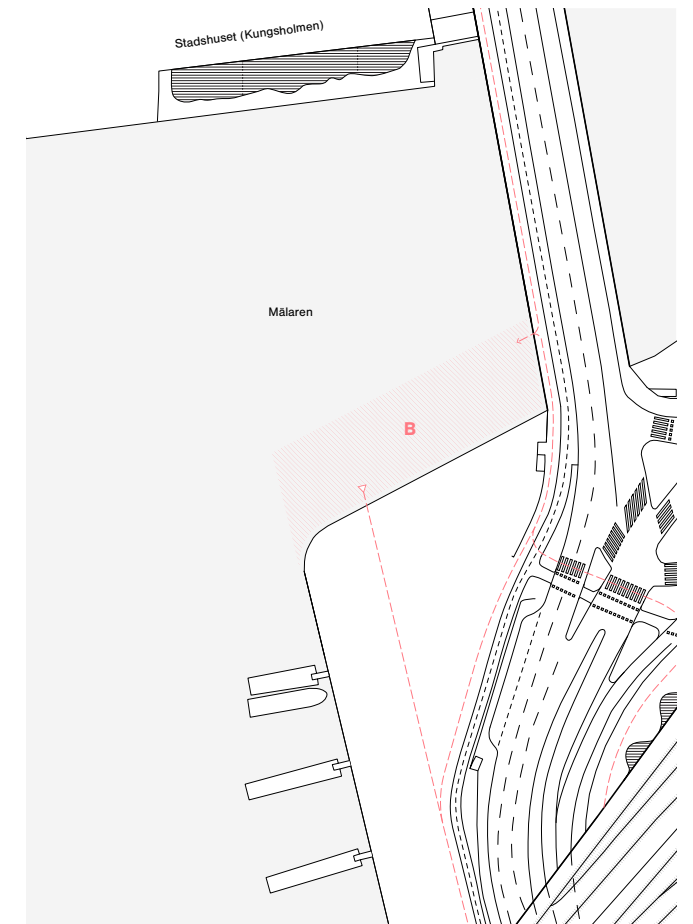
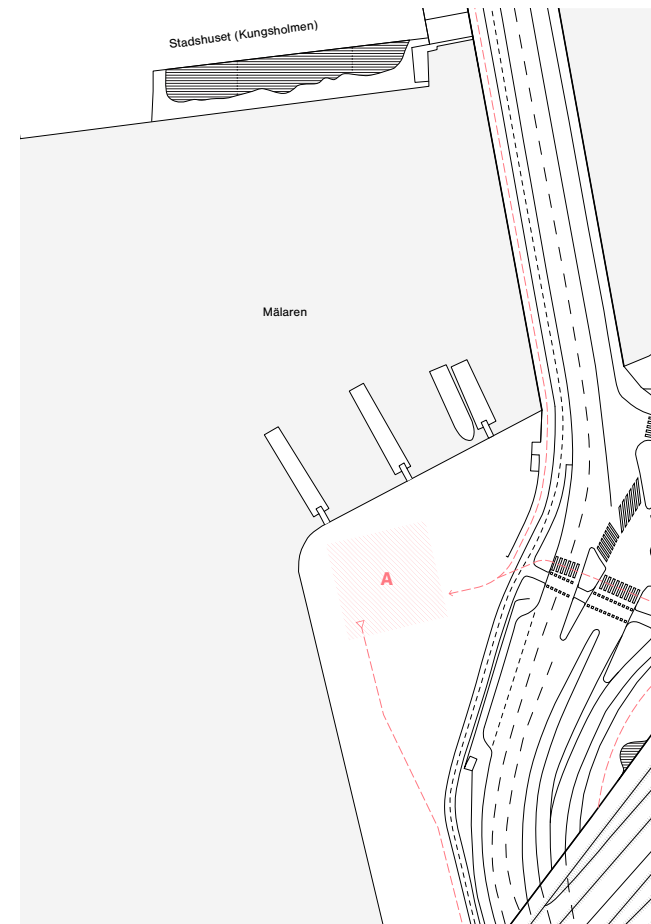
This location creates a need for a relocation of the current boat harbour node and may restrict the view towards Stadshuset.

### BRIDGE OVER WATER (D)

A free-standing building located on the lake in proximity of the site, accessible through an elevated bridge from Klara Mälarstrand.

This location allows for the strongest views toward the water and enables several programme solutions. It follows the historical approach of building on water, referring to the old bath house situated on the lake.

In addition to logistical issues, this location also restricts the current flow of boats through the existing harbour. Being placed out on the river the building may feel like a landmark that may occupy the visual and aesthetic vibe of the area.





## BUILDING PREMISES

- + Entry sequence should depart from (or close to) an area of high intensity (e.g. traffic road, communication flow, pedestrian flow)
- + Entry sequence should, in itself, be an experience and prime the visitor to further experiences within the building
- + Building should not restrict to much the views toward the water and Stadshuset
- + Building should not have the aesthetic and visual vibe of a landmark - but relate to existing surroundings
- + Building should not interfere with existing pedestrian and traffic flow
- + Master plan should add (or retain) public space of the existing site
- + Programme of the building should be of a deliberate experience sequence and, if possible, contain a separate exit situation
- + Proposal should, to the extent possible, retain existing boat terminal and not interfere with accessibility of in and outflow of boats
- + Proposal should be designed with intentions of easy logistics to transport objects to and from the building
- + Building should - except for spaces for experiences - contain room(s) for personell, reception, utilities, maintenance, storage and enough space for spacious communication between spatialities

## PROGRAMME IDEAS

As Phase B was concluded, we had to figure out how to translate *Manta* into a building that could embrace the ideas of both our research and our experiments. We looked into different secular typologies such as memorials, libraries and museums, etc. but in the end, we came to the conclusion that no existing typology fits the objectives that the VR experience represented.

+ MEMORIAL

+ MUSEUM

+ CHURCH

+ LIBRARY

+ ARCHIVE

+ CREMATORIUM

Instead, we started to define which of the spatial qualities we have developed that we found especially intriguing to explore within a realistic context. This list of spatialities became the basis of our new typology and would come to define the flow of the building.

+ ENTRY SITUATION

+ PRIMING SEQUENCE

+ MAIN HALL

+ VIEW ENHANCEMENT

+ DISCONNECTION &  
DEREALISATION ROOM

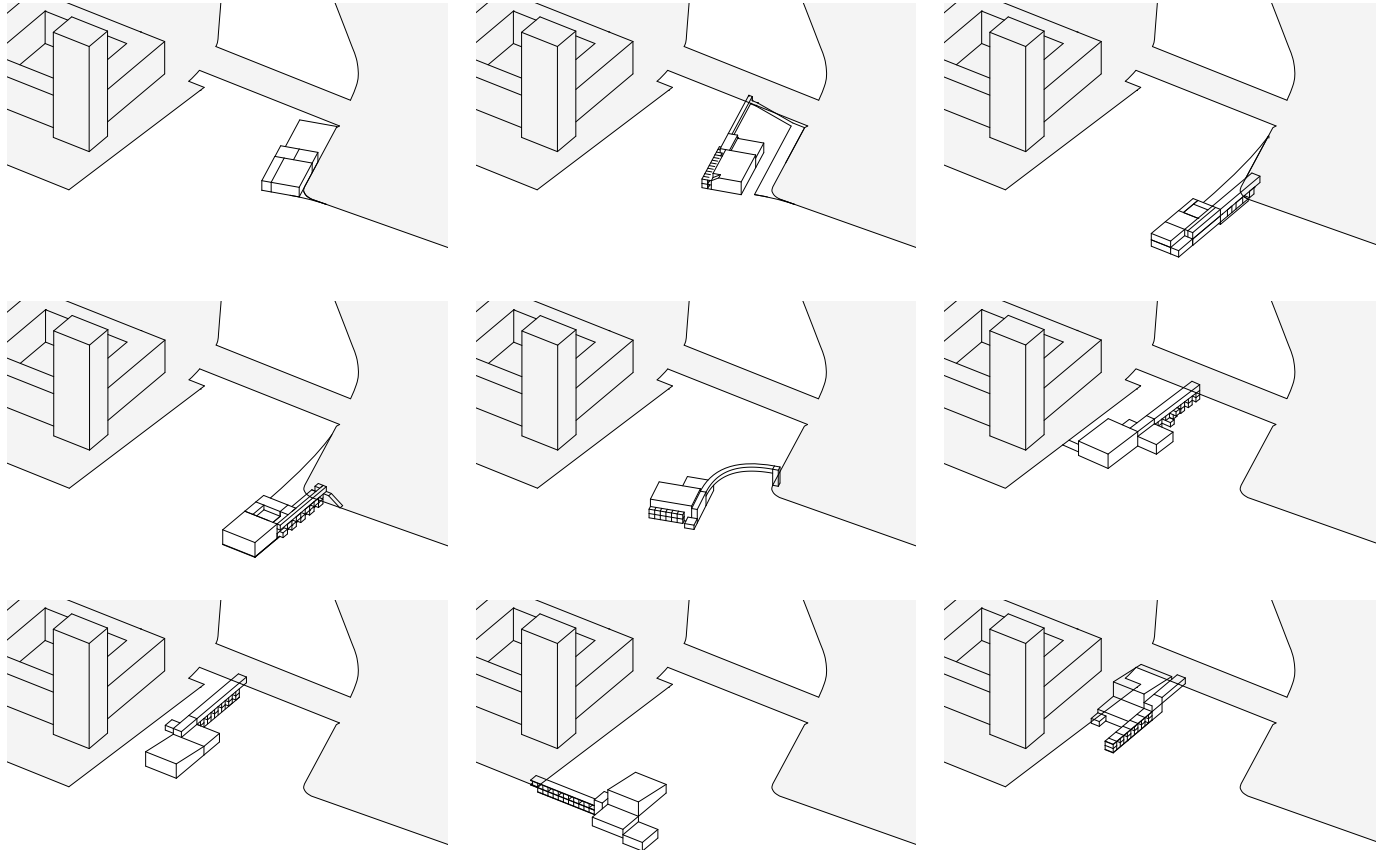
+ FOCUSED  
INTROSPECTION ROOM

+ INTROSPECTIVE  
DISPLACEMENT ROOM

+ CURIOSITY &  
EXPLORATION ROOM

+ FINAL REFLECTION

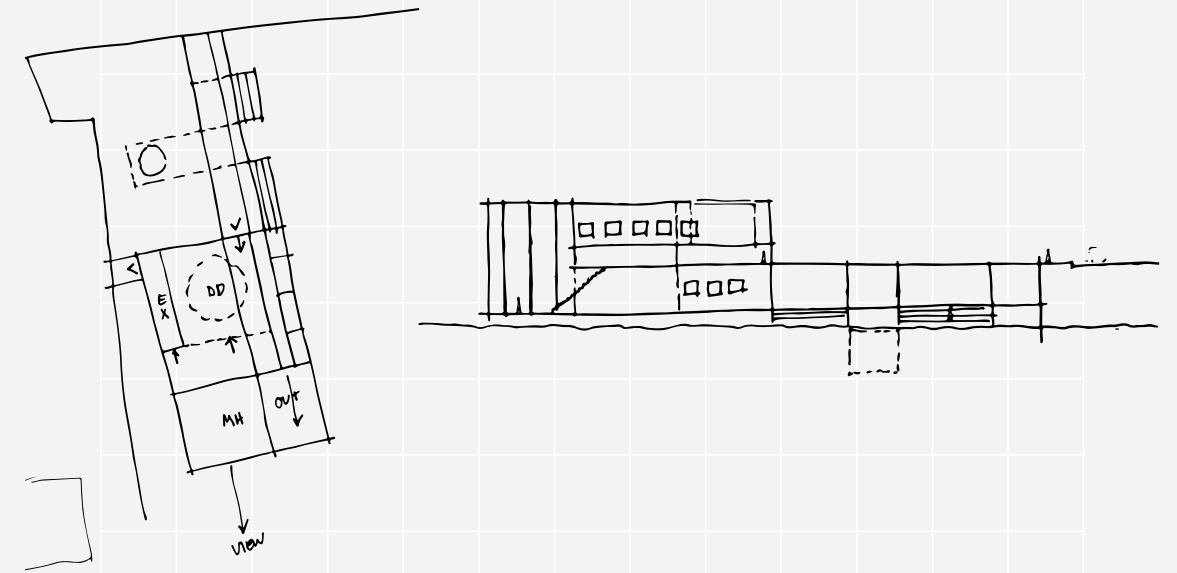
## BUILDING VOLUMETRIC LAYOUT



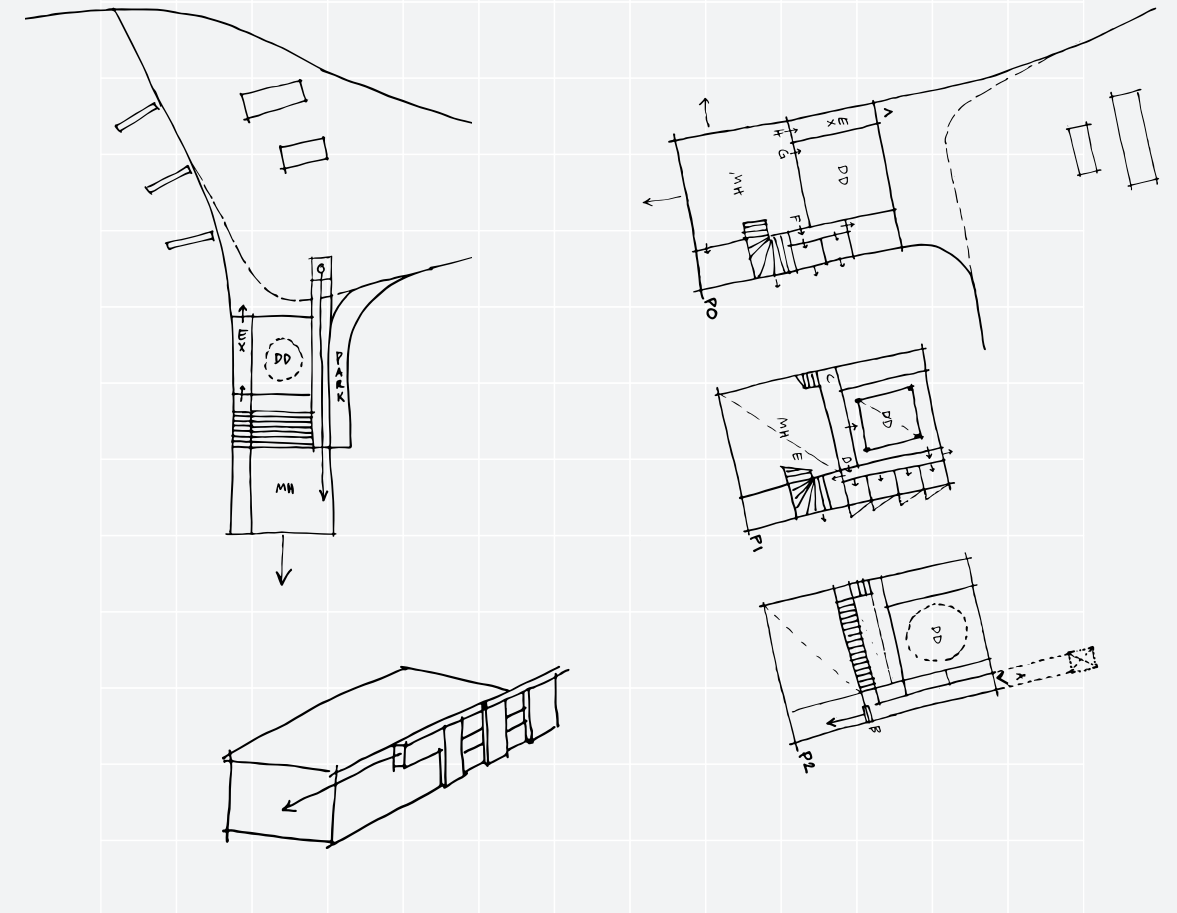
Different site-specific conditions created various iterations in terms of the volumetric layout of the building. Common factors in most of the trials were the way that a circulation “arm” connected the main volume of the building to the context, as well as the presence of many identical smaller rooms, a big hall and a smaller undefined hall which later became the *Archive*.

At this point in the process, the hierarchy of the spaces was already established. The position on the site, and above all the sequence in which these volumes interacted with each other, was what ultimately became the deciding factor in choosing which path to take.

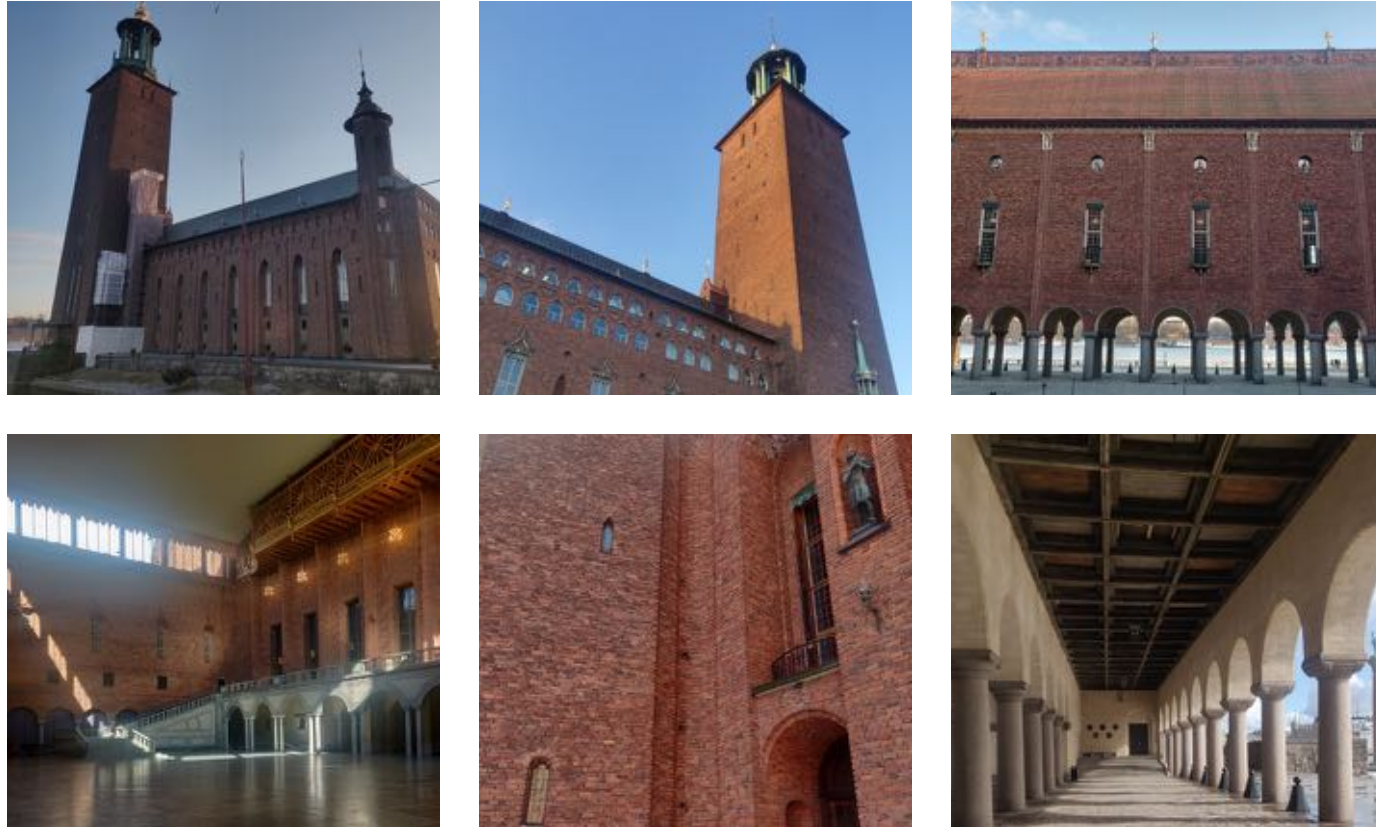
## CONNECTION TO TOWN HALL PLOT



## EXTENSION OF WATERFRONT

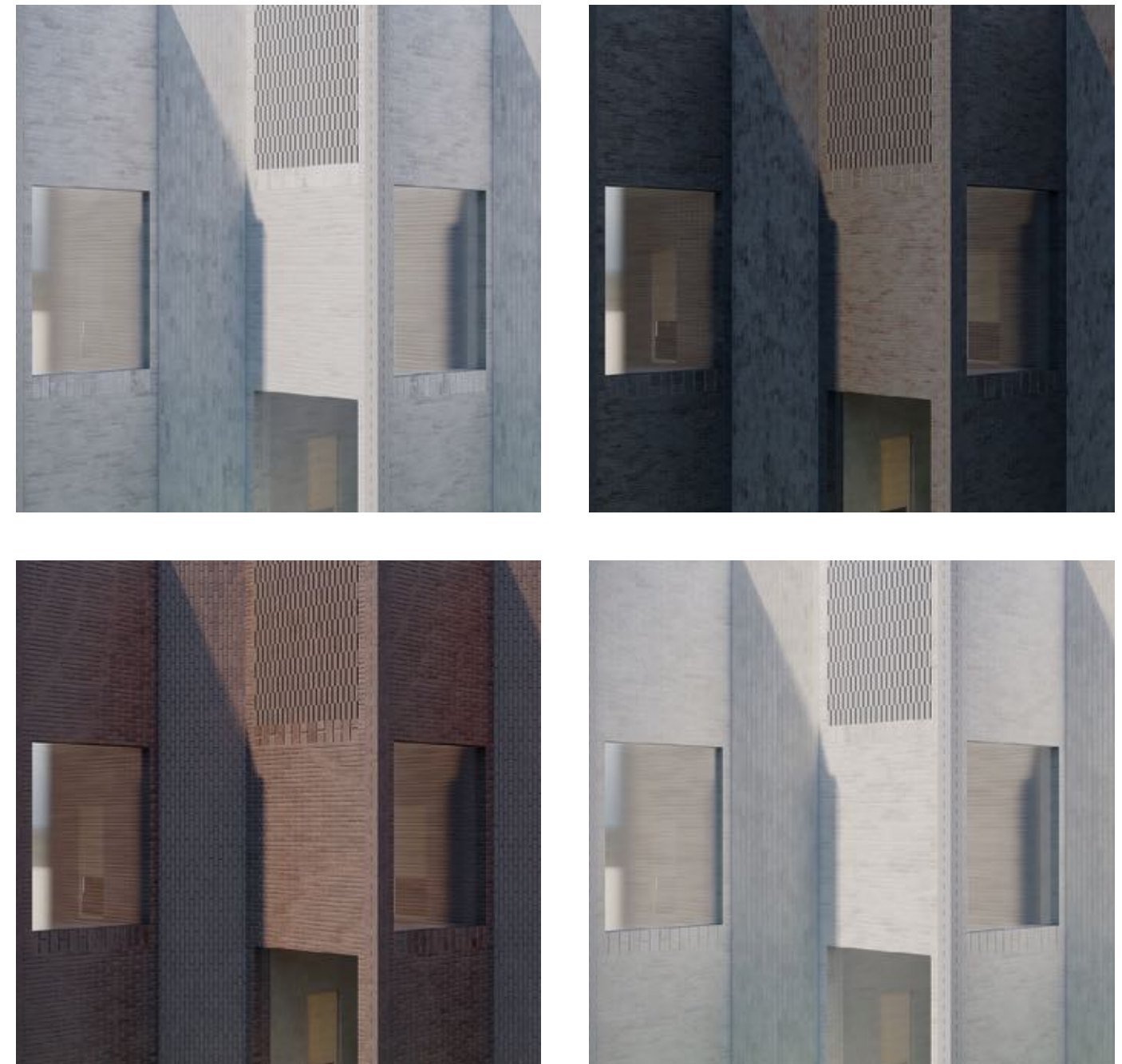


## EXTERIOR MATERIALITY



As a point of departure, we conducted a study trip to Stadshuset, the most prominent neighbouring building and also a source of inspiration for the project.

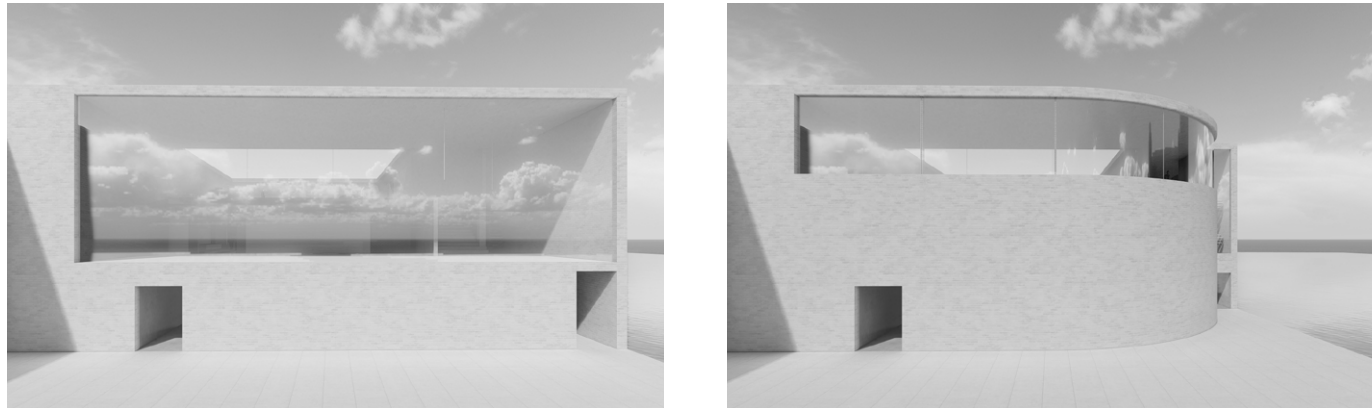
Stadshuset has a very dominant presence on the site and, as such, rather than trying to compete with a very important and historic building, we decided to design some kind of a complementary piece that stands on its own, but shares exterior cues with the city hall. Both the interior and exterior materiality concepts derive from Stadshuset, with a few trying to mimic some playful design aspects that Ragnar Östlund have worked with, such as hidden rooms and overly designed specific details.



On the eastern facade, we tried several iterations of brick in order to get both the colour and the pattern right. In the end, a bright, but slightly warm tone in the brick, came to dress the entire exterior facade. The colour is meant to seem light and inviting, whereas the brick on the interior refers to the shades found in Stadshuset and is meant to be more introspective and closed.

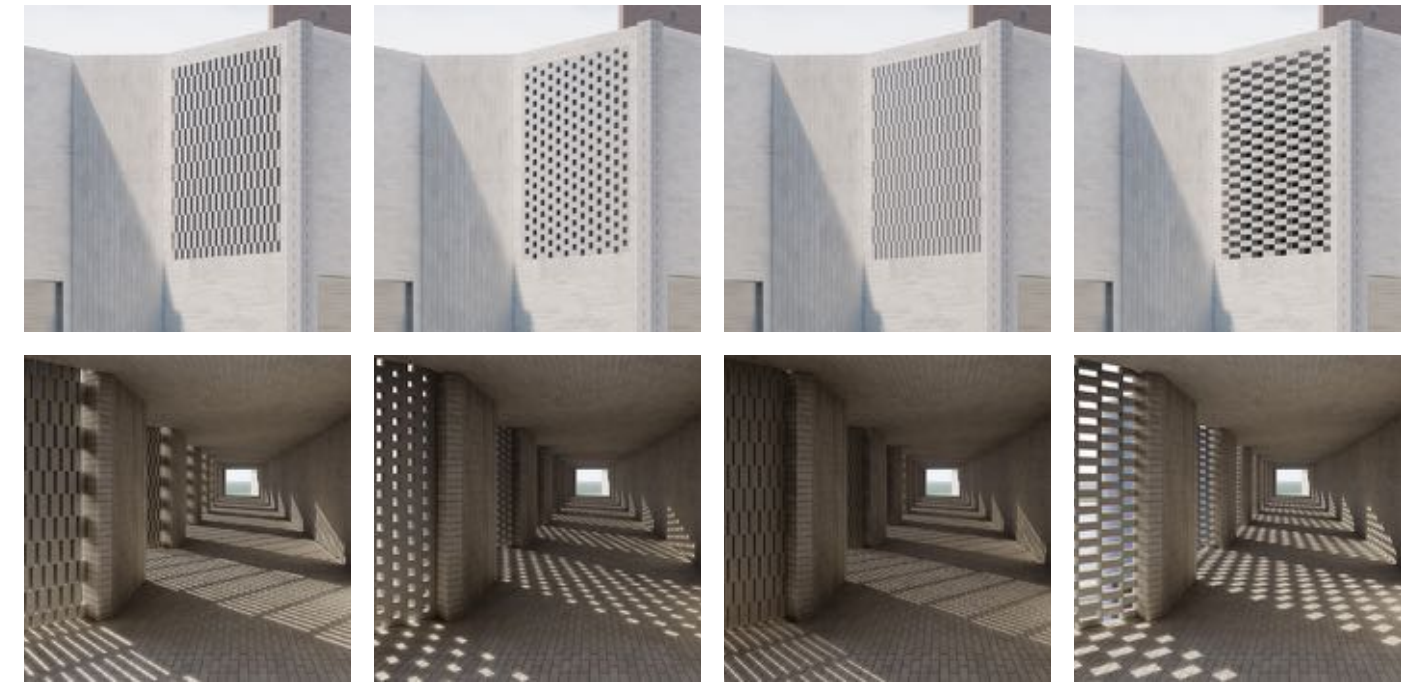
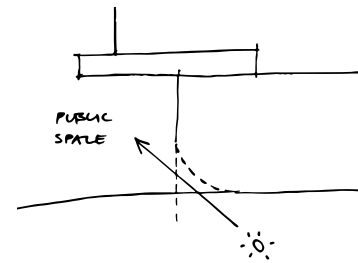


## EXTERIOR DETAILS



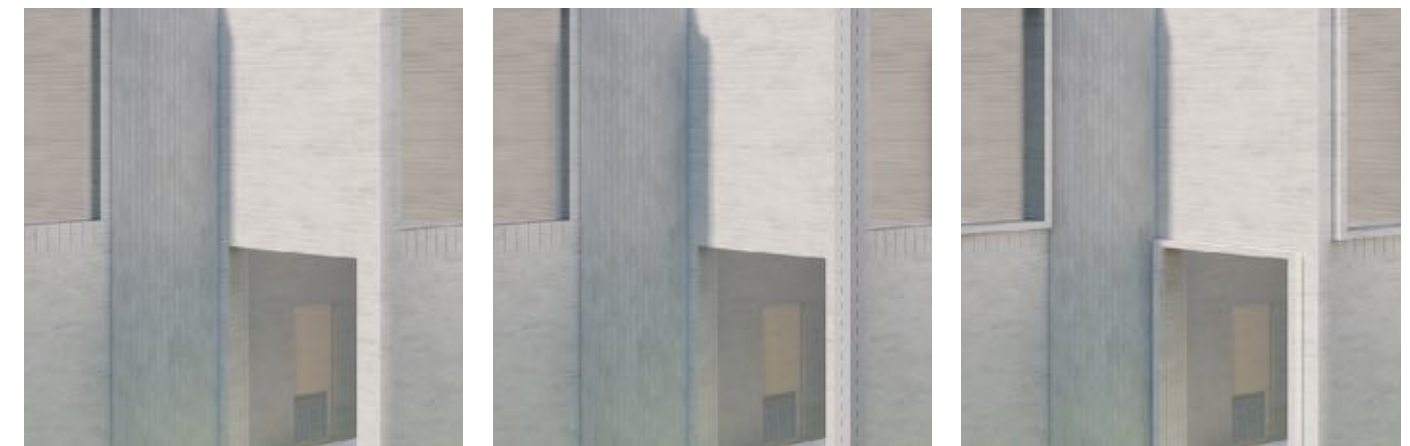
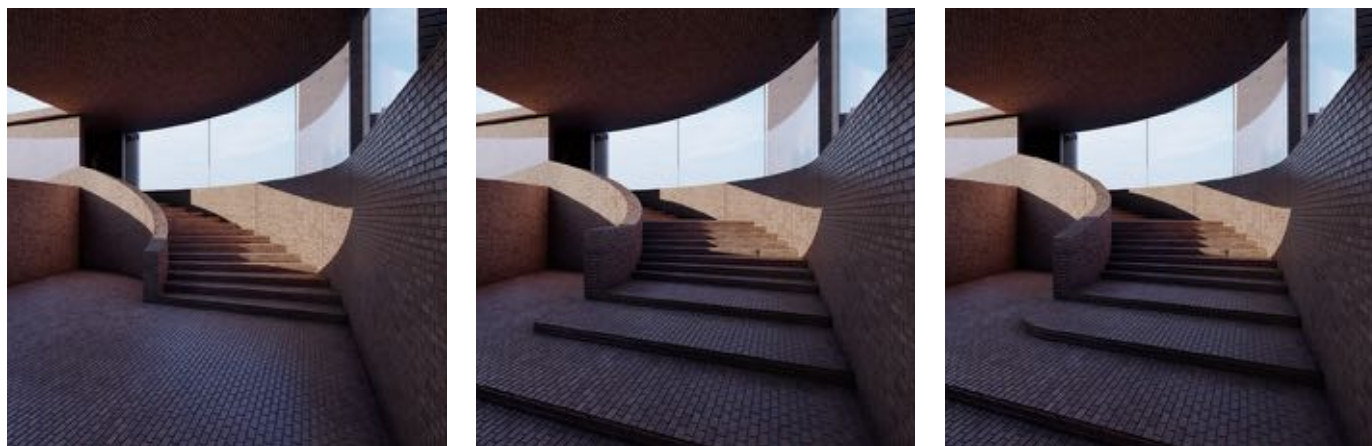
A volumetric system defines the interior spaces of the building. One arm and two equally sized squares. However, in an effort to open up the plaza to better views and more light, one of the corners of the square was adjusted. This, we thought, also worked as an interior strategy, as the now curved main stair leading down to the *Archive* became more dynamic and might disrupt the movements of a visitor.

To further establish this effect, several iterations of the same staircase were made in order to ensure some kind of an unnatural effect as the visitor makes their way down and makes them more aware of their physical state in the space.



We tried to configure the interior atmosphere of the entry passageway to feel dark, but allow for slivers of light to penetrate and reach the visitor. Different perforations were tried while maintaining an identical brick size in order to create more realistic options. In the end, we leaned towards the thinnest option as the smallest amount of light was let through and gave a slightly less prominent exterior expression.

The pattern of the east facade went through many passes before ending up at a result where we felt that the verticality was expressed and was visually connected to the facade of the city hall. With different directions in the brick sections, we aim at creating a look that feels more alive and plays with the openings of the facade.



## EXTERIOR EXPRESSION

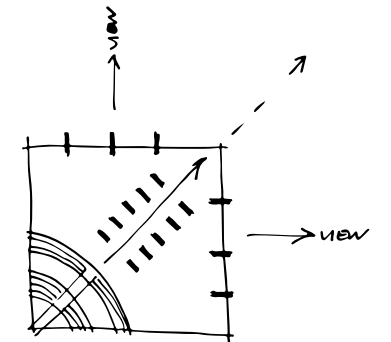


Pillars that stretch down to the riverbed are what holds the *Main Hall* in place and creates a sense of levitation as seen from the outside. These structural elements were in the end designed to follow a grid system created for the entire building. This meant that we could extend the concept to the next section, stretching past the *Main Hall* and connecting the facade to create a homogeneous expression.

## INTERIOR STRUCTURE

The large corner stair in the Main Hall was a quite early concept as we figured that it could become a strong part in the introduction sequence of a grand space. However the same corner also required a path that would lead to the Enclosures.

Finally we developed a stair that is large enough to be experienced as a prominent part of the space and including some seating allowed it to feel like it is not removing function. A tunnel leads through the stair that connects to the Enclosures and creates a viewing platform above.





## DISCUSSION

The wider discourse of this project lies in the societal disconnection to emotions. An inward looking, self-reflective approach to our individual emotional life gets overshadowed by an everyday life crowded by consumption of information, entertainment and other external impressions.

By enlightening ourselves within the subject of the relation between our body, our mind and our direct environment through collecting and analysing research studies, we have gained an understanding of the incredibly strong - although somewhat neglected - connection between our mental well-being and our surroundings. Architecture has the capability to inspire and influence human behaviour. It is one of the most influential human produced artefacts, even when not consciously processed.

With an architectural approach toward this societal issue we have explored how we, as designers of our built environment, can create spatial conditions that favours a more social and emotionally-connected society.

There is consensus in the research around that architectural and spatial phenomena affect human emotional states. Growing empirical evidence indicates that well-designed environments raise mindfulness, restore cognitive fatigue, improve well-being, maintain health and facilitate healing.

The societal understanding upon architecture's effects seems to be substandard compared to other areas around what affects our mental well-being. Nature exemplifies a typology where that connection seems to be easier to understand, where our positive connotations influence our society's general attitude.

How we, as architects, can influence the societal perception of how our immediate environment affects our mental well-being is, above all, to work to establish an awareness and understanding of the issue within our industry.

When trying to determine what role virtual reality will have for the architectural profession a few things are clear. The VR world is quickly expanding, the future spaces of the virtual world should thus be conscious about their user's minds and emotions. Architects might play an important role in establishing what high and low value VR architecture looks like.

The architecture of the physical world might benefit from using the VR tools. Creating irrational parallel versions of real life projects by developing ideas and concepts that are simply over the top and unrealistic could nuance design decisions. Also, simply experiencing iterations using the VR headsets to efficiently gauge the emotional and atmospheric values of proposed spaces. Quantitative and qualitative studies using VR can help us narrow down how people will act and feel in our designs.

As architects, we should be conscious about how we design our buildings; we should try to incorporate higher emotional value into our design. As designers of our immediate environment, we should address human cognitive ability at different levels ensuring to elicit appropriate emotions and provide positive experiences.

Emotions are what dictates how we perceive our world - and more importantly, our place in it.





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META:  
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— An Architectural Exploration of Externally Induced Phenomena

Adam Aldowsary & Gustav Nordahl

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Chalmers University of Technology  
Department of Architecture and Civil Engineering  
Supervisor: Peter Christensson  
Examiner: Daniel Norell

KTH Royal Institute of Technology  
Department of Architecture  
Supervisors: Fredrik Stenberg & Karin Matz  
Examiner: Claes Sörstedt

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