



FINAL PRESENTATION
ANJÈS SWART
4437543

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BIOPHILIC DESIGN

LOCATION

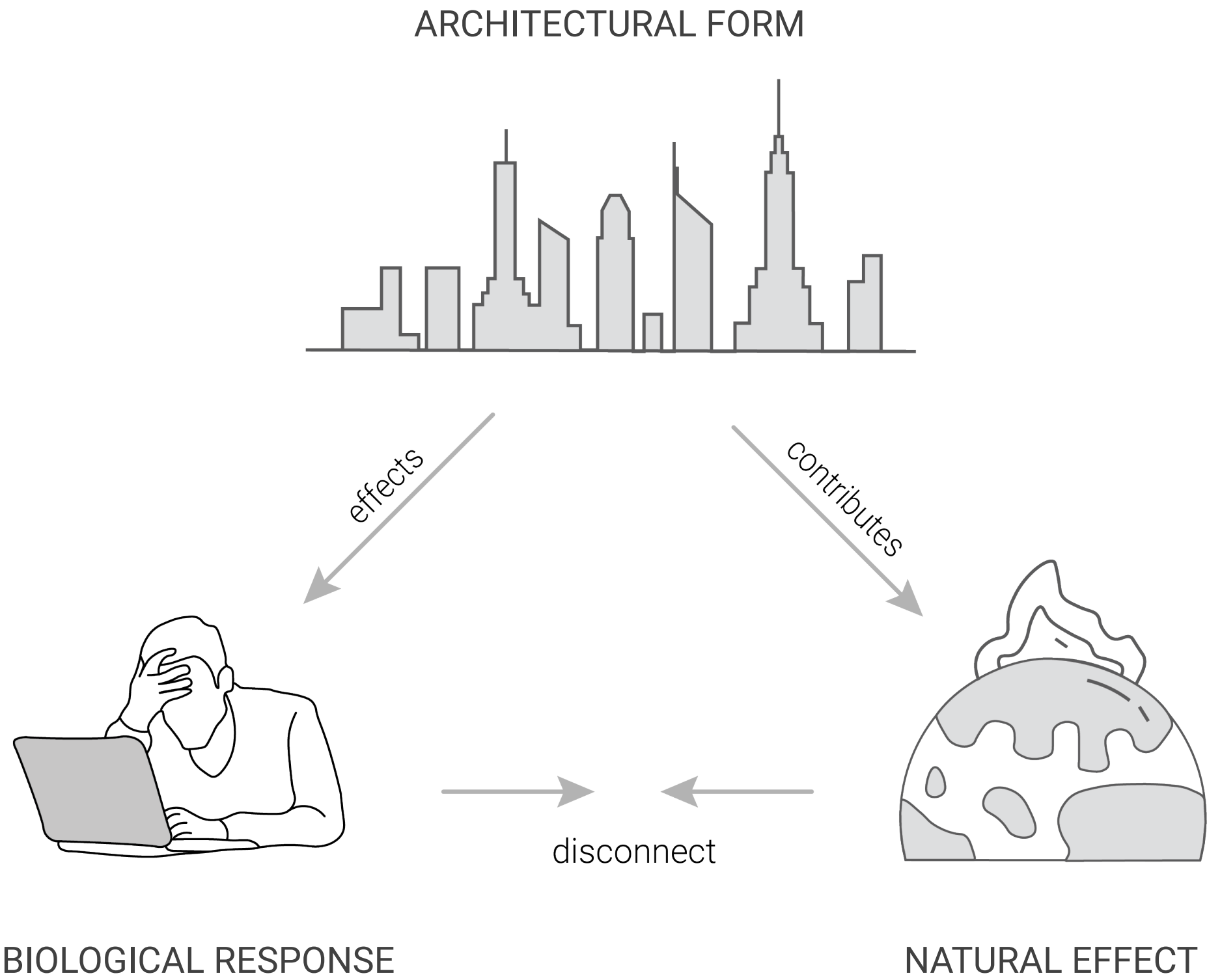
INSPIRATION

02 BIOPHILIC DESIGN - ANJÈS SWART



BIOPHILIC DESIGN

SOCIAL RELEVANCE



By 2050, 66% of the developed world will be urbanized.

Europeans and North-Americans spent an average of 90% indoors.

The World Health Organization calls stress the health epidemic of the 21st century.

Cities contribute to the emission of greenhouse gases.

Global temperatures are rising, in addition cities experience heat island effect.

NEED TO CHANGE OUR APPROACH

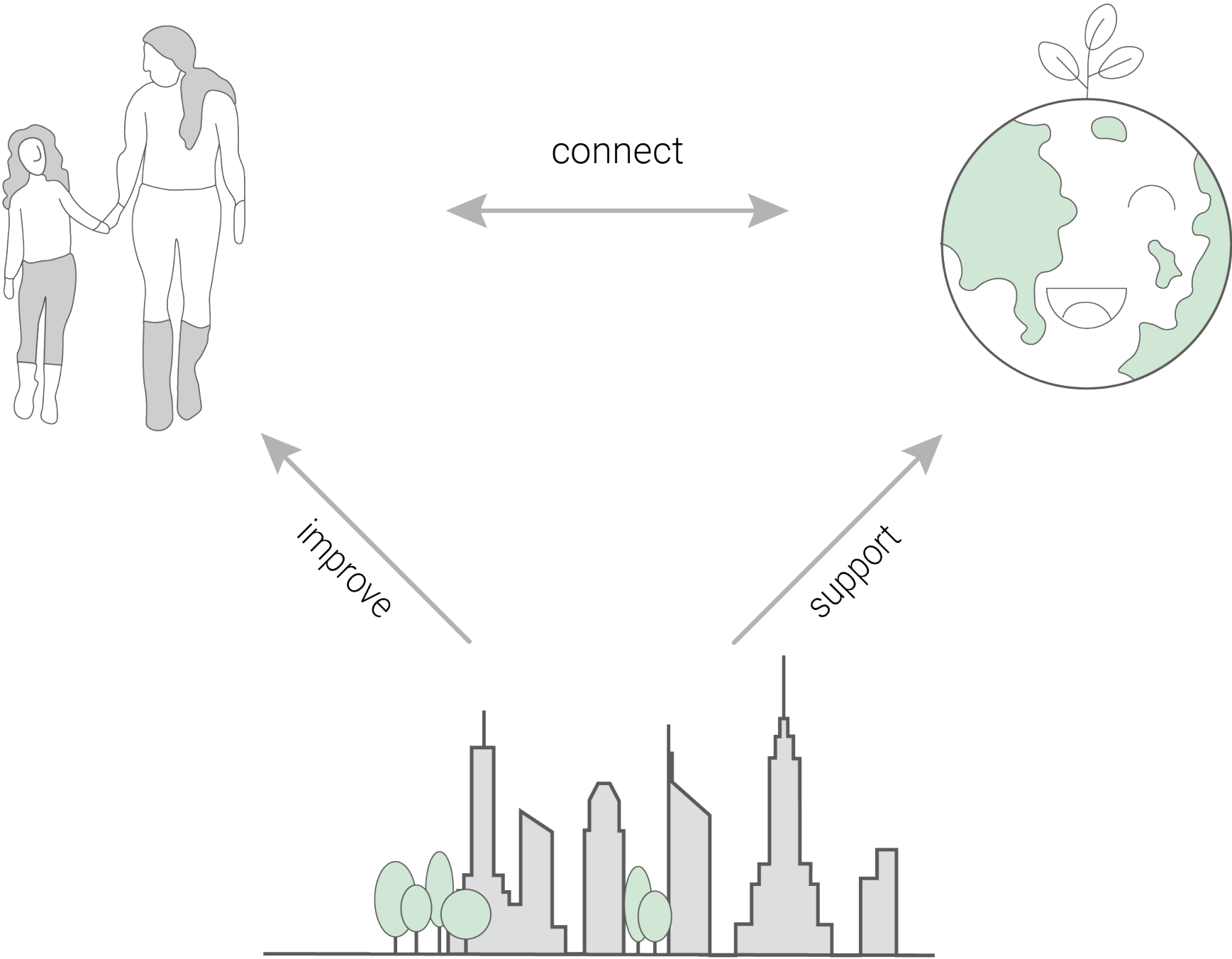
BIOPHILIC DESIGN

“Biophilic design is the deliberate attempt to translate an understanding of the inherent human affinity to affiliate with natural systems and processes—known as biophilia—into the design of the built environment.”

-Stephen Kellert

BIOLOGICAL RESPONSE

NATURAL EFFECT



ARCHITECTURAL FORM

RESEARCH

CATEGORIES AND PATTERNS OF BIOPHILIC DESIGN

NATURE IN THE SPACE



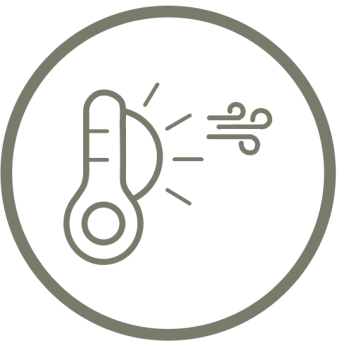
1. VISUAL
CONNECTION WITH
NATURE



2. NON-VISUAL
CONNECTION WITH
NATURE



3. NON-RHYTHMIC
SENSORY STIMULI



4. THERMAL
& AIRFLOW
VARIABILITY



5. PRESENCE OF
WATER

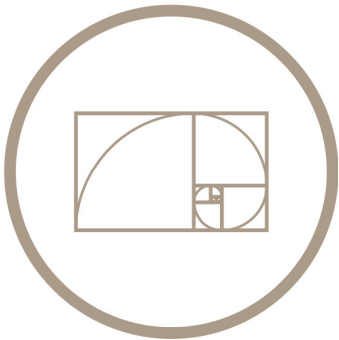


6. DYNAMIC &
DIFFUSE LIGHT



7. CONNECTION
WITH NATURAL
SYSTEMS

NATURAL ANALOGUES



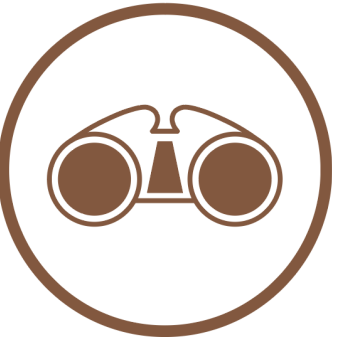
8. BIOMORPHIC
FORMS &
PATTERNS



9. MATERIAL
CONNECTION WITH
NATURE



10. COMPLEXITY &
ORDER



11. PROSPECT



12. REFUGE



13. MYSTERY &
ENTICEMENT



14. RISK & PERIL



15. AWE

NATURE OF THE SPACE

RESEARCH QUESTION

What is the architectural expression of biophilic design, and what strategy should be used to correctly implement Biophilic design?

PATTERN CARDS

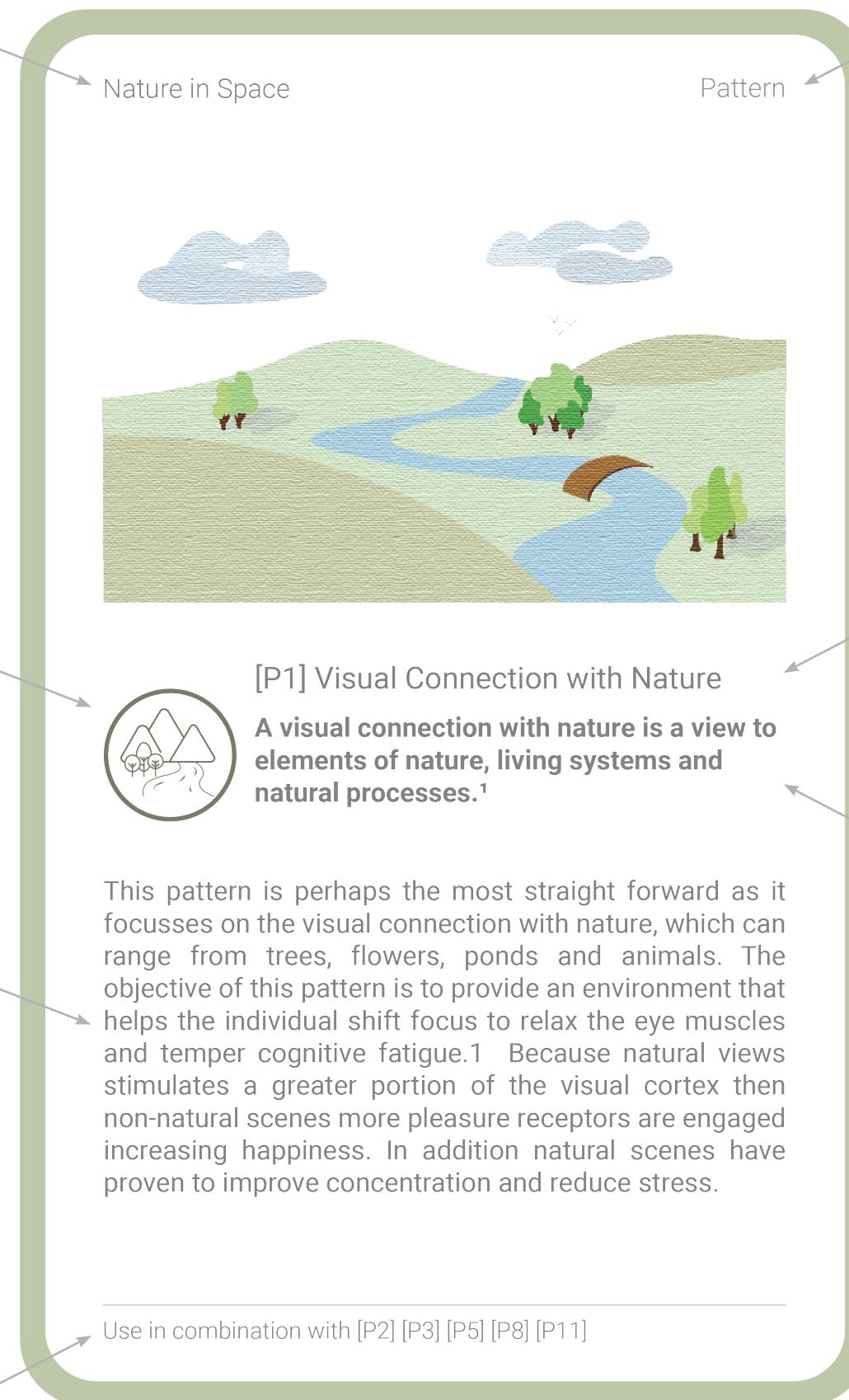
Biophilic Sub-Category

Card Type

Identification Icon

Summary explaining
the physical and
psychological effects
on human

Common Pattern
Combinations



Pattern Titel

Pattern Meaning

Nature in Space

Pattern

General Application

Application Strategies

This pattern specifically focusses on the sense of sight, however the pattern becomes more effective when combined with pattern two, the non-visual connection with nature, where nature also stimulates the other senses.

Biodiversity – The impact is increased, not necessarily with a greater area but with a higher number of biodiversity.

Time – The impact is the greatest after at least 5-20 min of exposure.

View – Design in a way that upholds the desired view lines, and prevent obstructions that prevent visual access in a sitting position.

Local – In order to increase placeness it is important to create a natural environment that is representative of the area you are building in.

Parallax – The changing of the view due to the motion of the observer.

Ideal – The ideal scene encompasses looking down upon a trees creating shade, flowering plants, human habitation, water and non-threatening animals.

Examples in Architecture: fountain, pond, green wall, sculpted gardens, artwork of natural scenes.

Examples

CASE STUDY CARDS

Case Study

Case Study Titel

Case Study Data

Summary of the building

Visible Patterns

Windhover

Windhover Contemplative Center



Architect:
Aidlin Darling Design

Year:
2014

Site:
Stanford, CA, United States

Type:
Public Gallery

Area:
372m²

The Windhover Contemplative center is designed to promote personal renewal and well-being, and serves as a spiritual retreat for the students, faculty and staff of Stanford University. The designer wanted to create a space where art, landscape, and architecture come together. The art gallery connects with its location, a natural oak grove, through large windows, that blur the lines between the interior and exterior. Making nature part of the art that can be experienced in the gallery.

Pressent Biophilic Patterns: P1, P2, P3, P4, P5, P6, P7, P8, P9, P11, P12, P13

Case Study



The spaces are designed in such a way that they take the visitor out of the exterior environmental conditions and main flow of daily life. This is mainly done with the material selection and routing that direct the visitor further into the space, strengthening the concept of contemplative refuge.

Card Type

Architectural Inspiration

CASE STUDY CARDS

Images with visible patterns



Visible Patterns: P6, P7 P9, P12,



Visible Patterns: P1, P2, P4, P5, P9, P12,



Visible Patterns: P1, P2, P9, P12,



Visible Patterns: P1, P6, P7 P9

P1 Visual Connection with Nature

Nested in a natural oak grove the building offers plenty of opportunities for far views into the grove. The addition of a reflection pool [P5] and courtyard create moments that break up the interior spaces, obscuring the line between inside and outside. The still water of the reflection pool reflects the surrounding oak grove, further emphasizes its presence which allows for a moment of peace and reflection.

P6 Dynamic & Diffuse light

The art is lit by individual skylights to wash them in light, putting emphasis on them and creating a moment of reflection. Louvers on the east façade mimic the non-rhythmic layering of tree trunks [P8], that due to the eastern orientation cast dynamic shadows, that change in accordance to the path of the sun [P7], on the dark oak wood flooring. Due the abundance of glass there is no need for artificial lighting during the day, only at night are the lights turned on, creating a light box which acts as a beacon [P11].

P9 Material Connection with Nature

The materials are carefully chosen to increase the experience of nature and refuge. Almost all materials represent the local ecology, and come from natural

sources that are minimally processed. Rammed earth walls form a solid mass, creating a sense of safety [12]. The elegant striations, created by the various layers of earth [P8], root the building into the site. The representation of stained oak on both the floor and the ceiling creates a grotto effect [P12]. The stained oak is seen again in the furniture, connecting it to the rest of the building. Earthtones dominate the color palate, representing the local environment, creating a calming atmosphere.

P12 Refuge

Most of the decisions made in the other patterns are in support of the pattern of refuge, as this pattern embodies the main function of the building. The building is entered through a narrow path between the exterior rammed earth wall and a row of ginkgo trees. The change from gravel, to concrete, to wood amplifies the change from the exterior noise to the quiet on the interior [P2] pulling the visitor in. The spaces themselves are designed in such a way that they provide cover from behind and above, while still preventing the feeling of being trapped by providing multiple means of egress, allowing the visitor to feel safe. The variety of spaces allows the visitor to find their own way.

Summary of how the patterns are applied and how they relate to each other

TOOL CARDS

Card Type

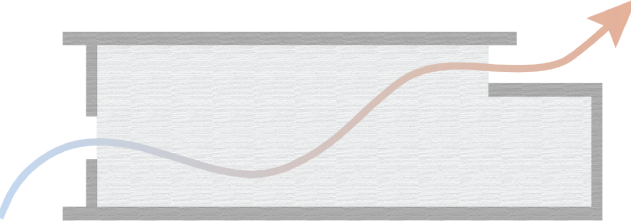
Pattern Relation

Architectural
Expression

Summary and
Effect on People

Thermal & Airflow
Variability

Tool



Cross-Ventilation

This creates a breeze through the building and lets the occupant experience the movement of nature. This increases comfort and improves peoples concentration.

How To Apply

1. Maximum performance is achieved when the inlet and outlet are placed diagonal in both plan and section.

2. Reduces the need for mechanical ventilation and with that the energy demand of the building.

3. $W_{max} = 5H$, which means that the total length between the openings should not be greater then 5 times the height of the room.

4. The effects are even further increased when the occupant is given manual control over the rate.

LOCATION

THE CITY OF LOS ANGELES



LOCATION

HISTORY OF THE LA RIVER



1898 and before

It is believed that the river has existed for over 1000 of years in some shape or form, being a resource for indigenous people.

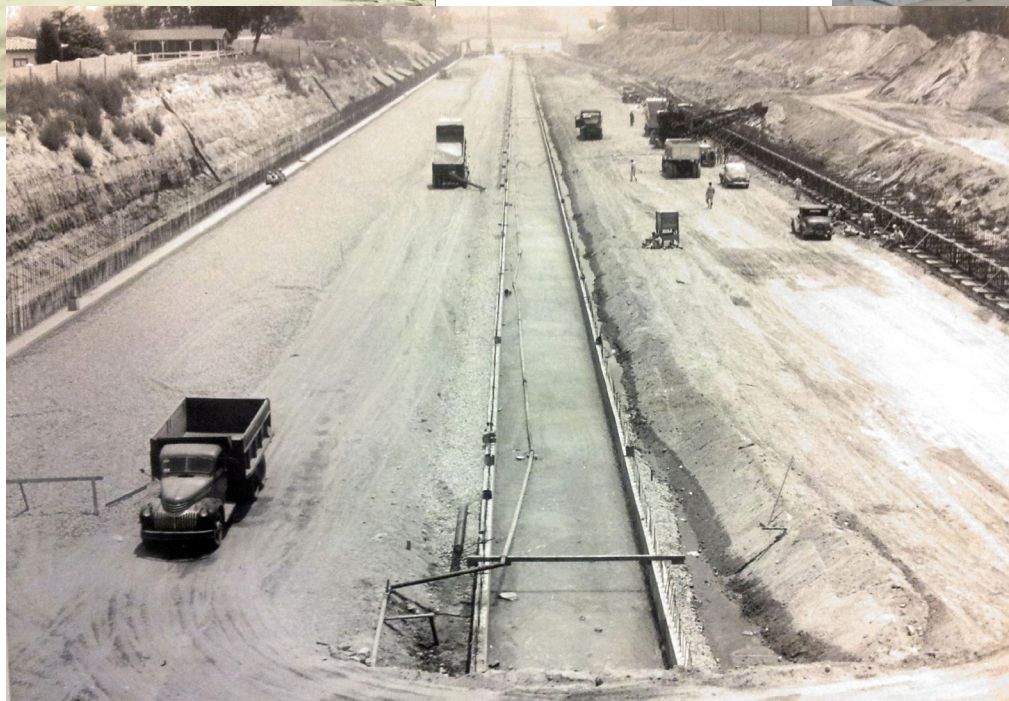


1924

Due to growing population river dams became occupied, damming in the river.

1938

An estimated 17 floods between 1815 - 1938 called for the river to be tamed.



1938

In 1938 the concrete channelization of the river began, with the plan being completed in 1960.



2014

River banks are industrialized and the people relation to the river is distant.



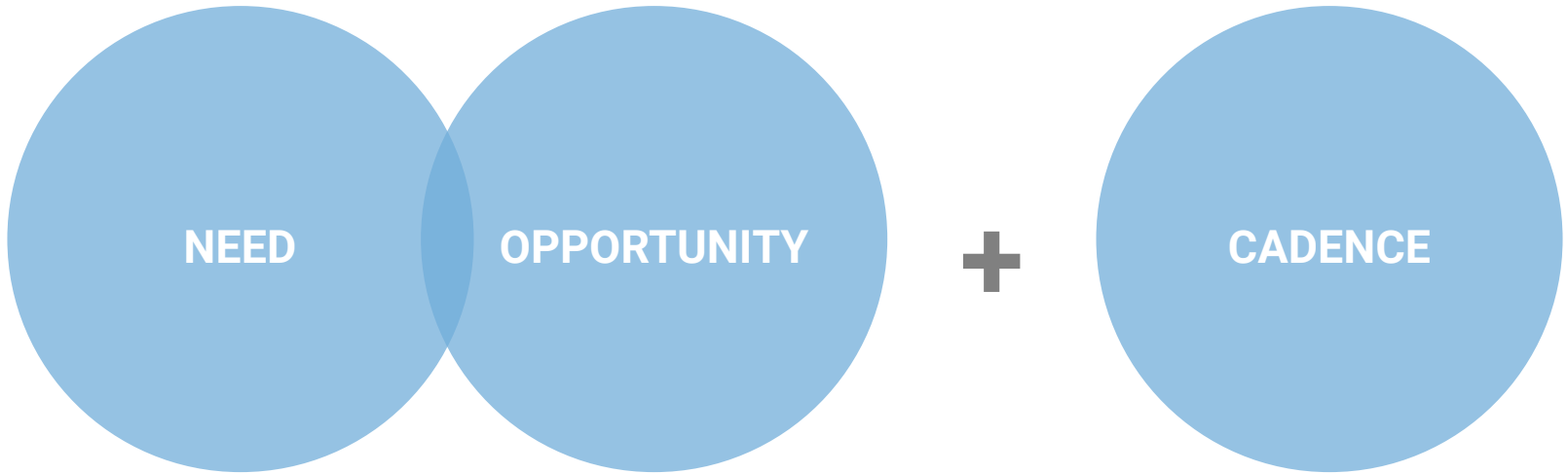
FUTURE

The River Revitalization Plan aims to create a closer relation between people and the river, by reintroducing nature.

LA RIVER REVITALIZATION PLAN

“It is an integral part of daily life in LA County—a place to enjoy the outdoors and to get across town, a place to appreciate the serene and to bring all people together, a place to celebrate a thriving urban habitat and understand infrastructure, a place to learn from the past and to shape the future.”

- LA river master plan



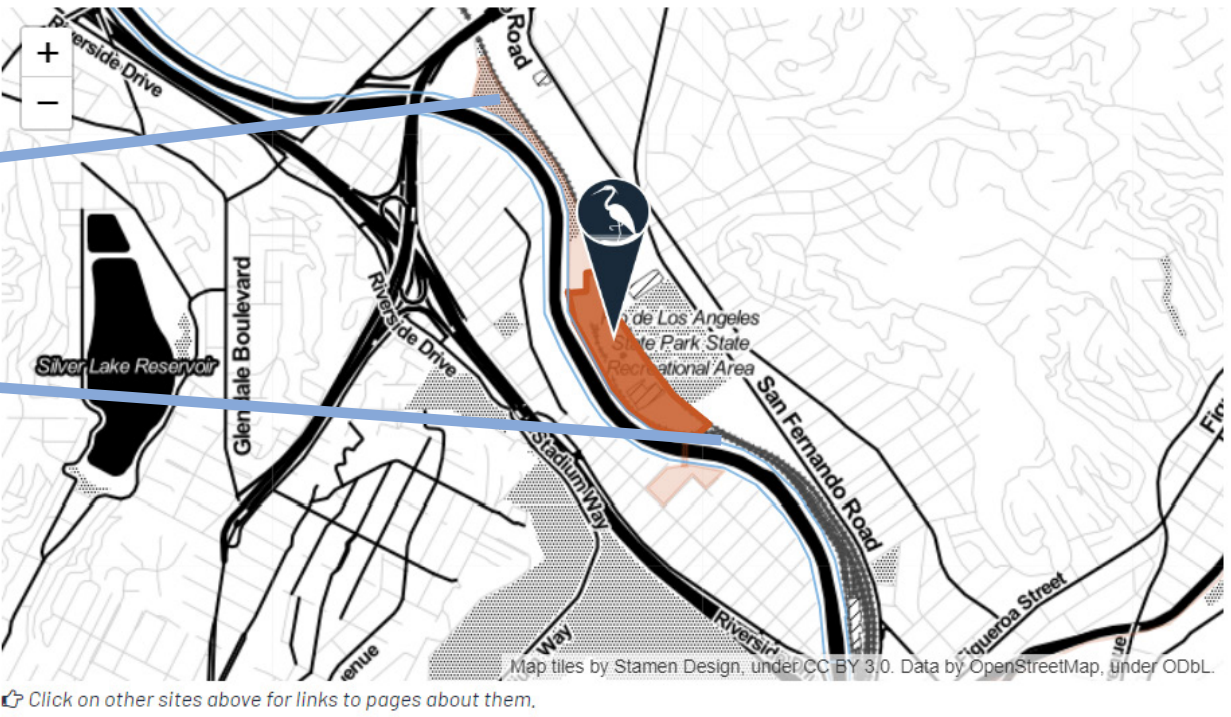
LOCATION

LA RIVER REVITALIZATION PLAN



[Back to: Narrows](#)

G2 Taylor Yard



About

Size
41.6 acres

Location
City of Los Angeles
— Glassell Park

Also Appears in

[> ARBOR Study](#)

25.6
River Mile

Needs

	general need	moderate need	high need	very high need
Flood Risk Reduction				
Parks and Trails				
Ecosystems				
River Access				
Arts and Culture				
Housing Affordability				
Engagement and Education				
Water Supply				
Water Quality				

LOCATION

G2 TAYLOR YARD

G2 Taylor Yard is a former railyard from Union Pacific.

Acquired by the City of LA to transform into green space, walking trails, wetlands, wildlife habitat, to provide river access, and public recreation, all in the middle of Los Angeles.

Close proximity to downtown LA and has the possibility to connect to the METRO system.

It transforms an industrialized site to green space and public functions.

Potential of becoming a destination.



LOCATION

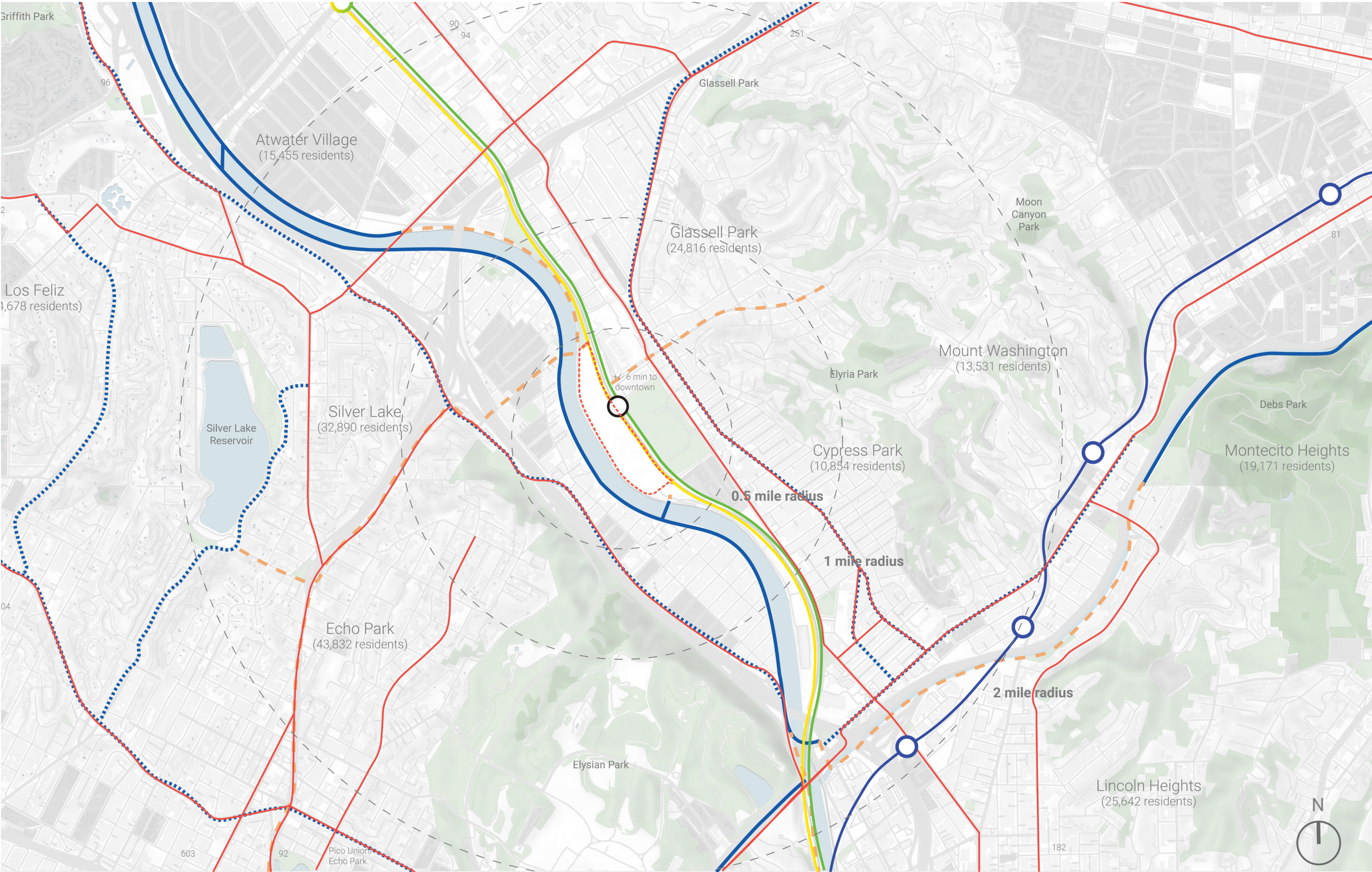
CURRENT PLANS



LOCATION

PUBLIC TRANSPORT / BIKE

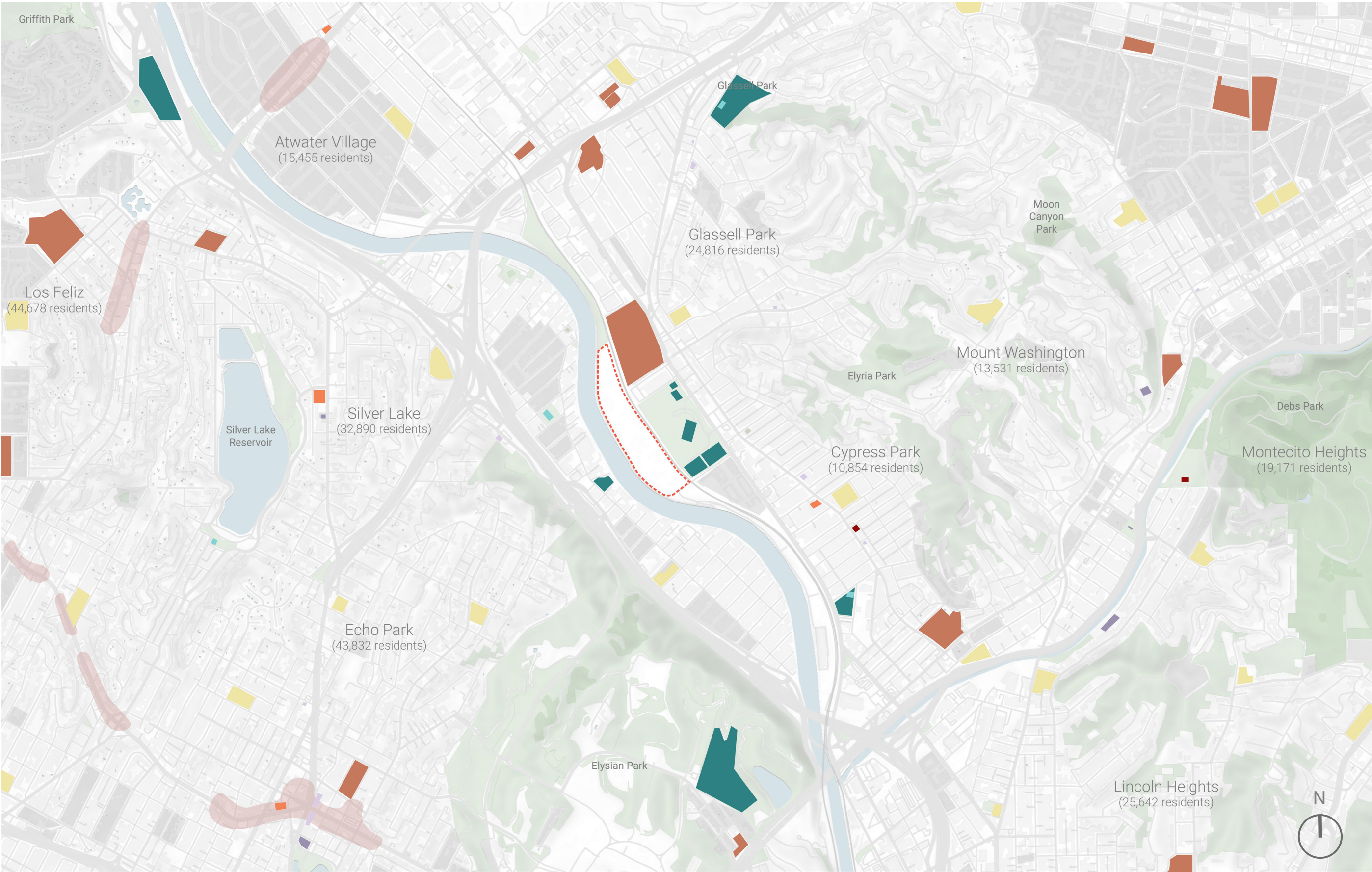
- Location
- Isolated bike path
- Bike path on road
- Proposed bike path
- Ventura County Line
- Metrolink Antelope Valley Line
- Metro A Line
- Bus Lines
- Existing Metro Station
- Proposed Metro Station



LOCATION

PUBLIC FACILITIES

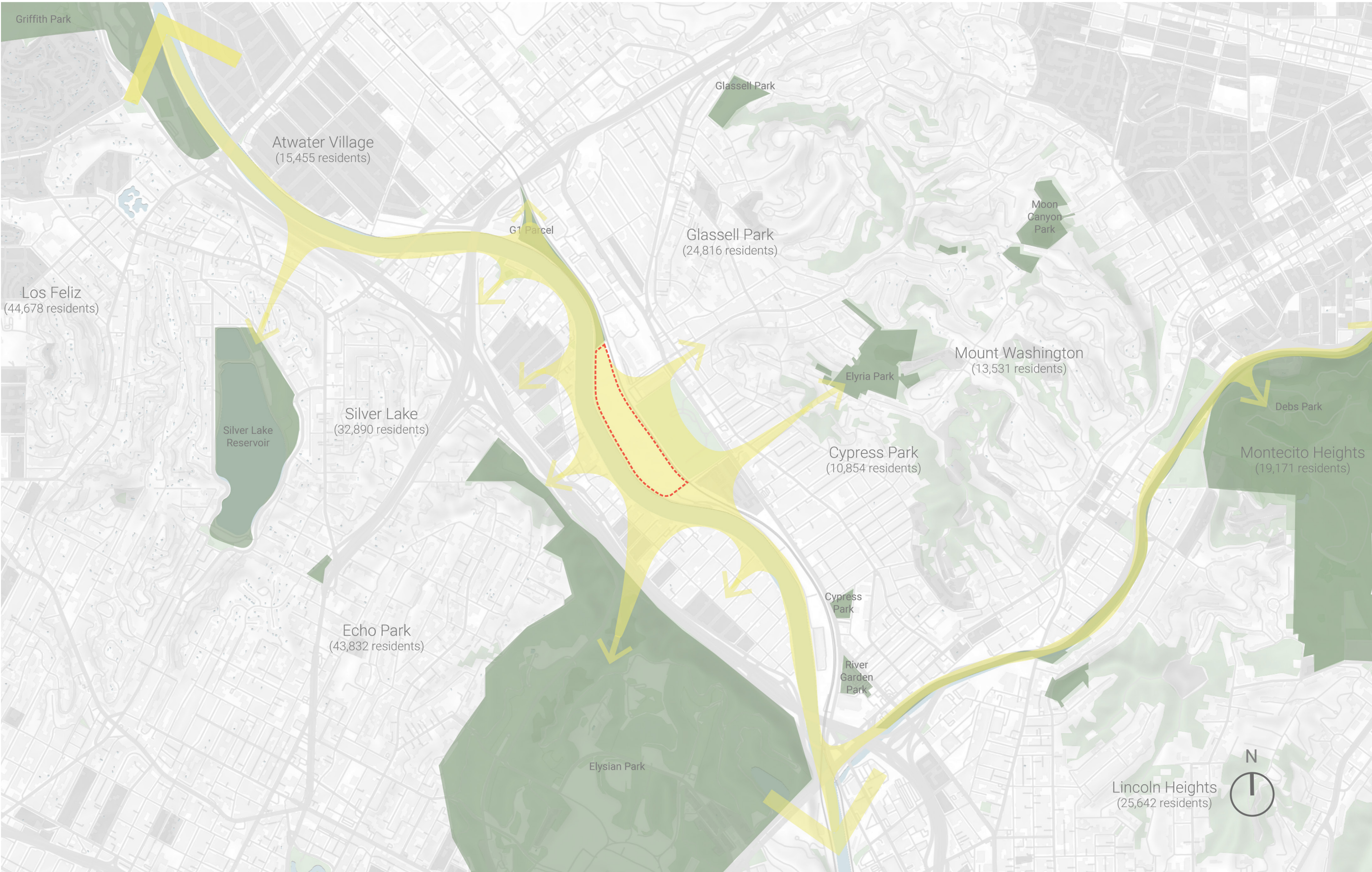
- Location
- Library
- High School
- Elementary School
- Community Center
- Recreation Center
- Sports Center
- Art Studio
- Art Gallery
- Museum
- Business District



LOCATION

GREEN NETWORK

- Location
- Green Spaces
- Proposed Green Network



LOCATION

PROGRAM

THE PROGRAM AND BIOPHILIC DESIGN



EDUCATION



COMMUNITY



NATURE



ARTS & CULTURE

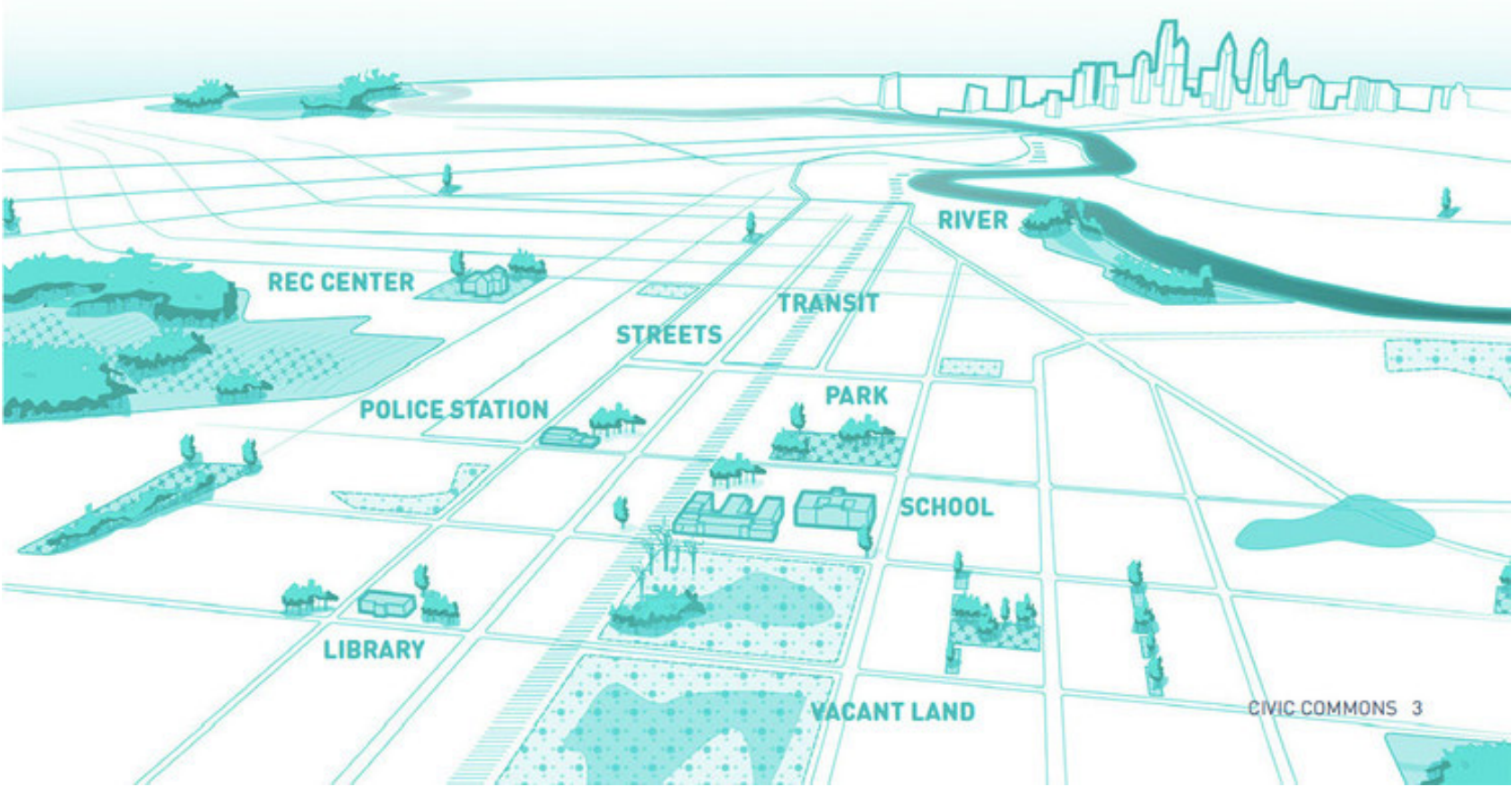
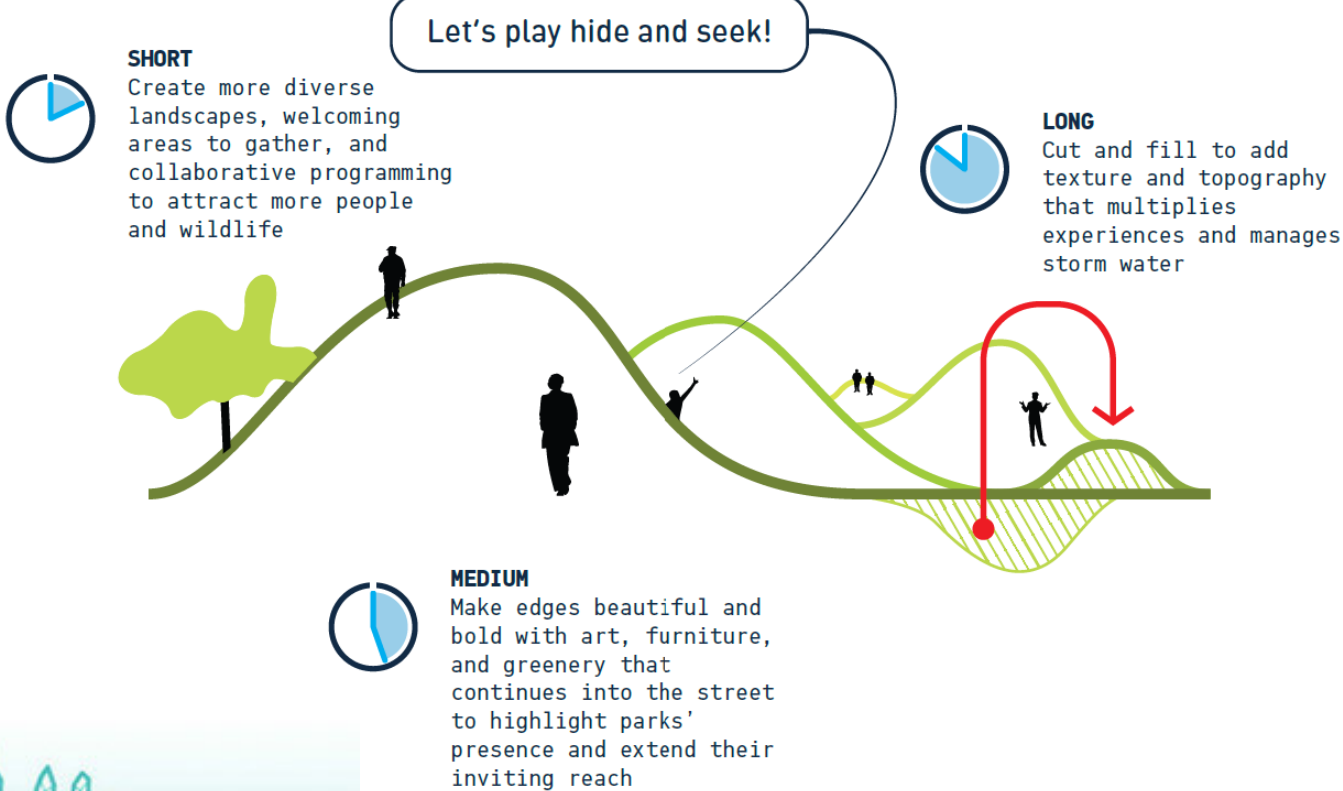
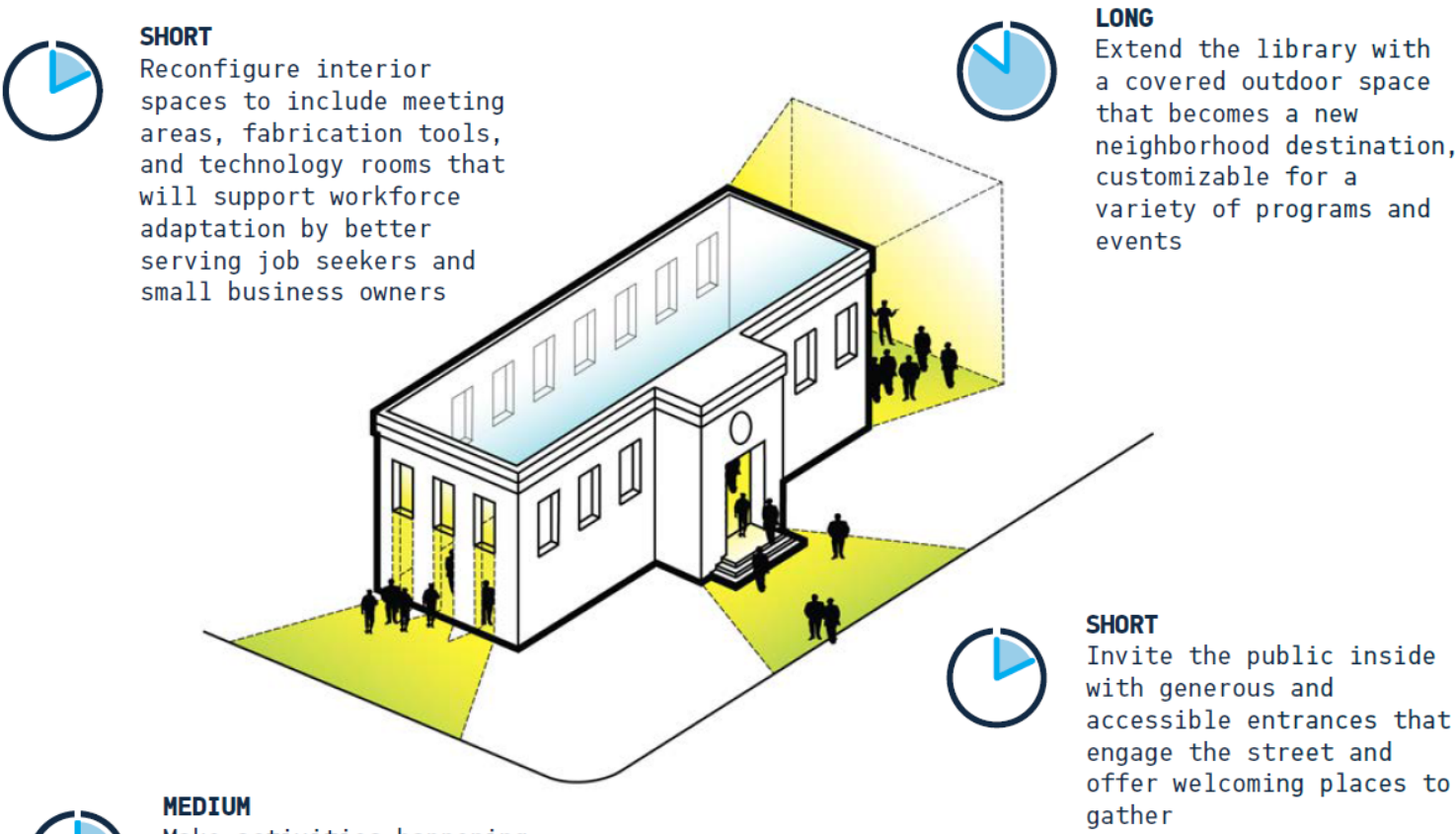
CIVIC COMMONS

Civic Engagement, Socioeconomic Mixing, Environmental Sustainability, Value Creation

Park
Functioning parks can make people healthier, happier, and more productive.

Library
The library system persists as a key means of access to an abundance of resources and public programming that improves people’s lives.

Arts & Culture
The arts can help explore our civic life, how we live together, and how we aspire to live together.



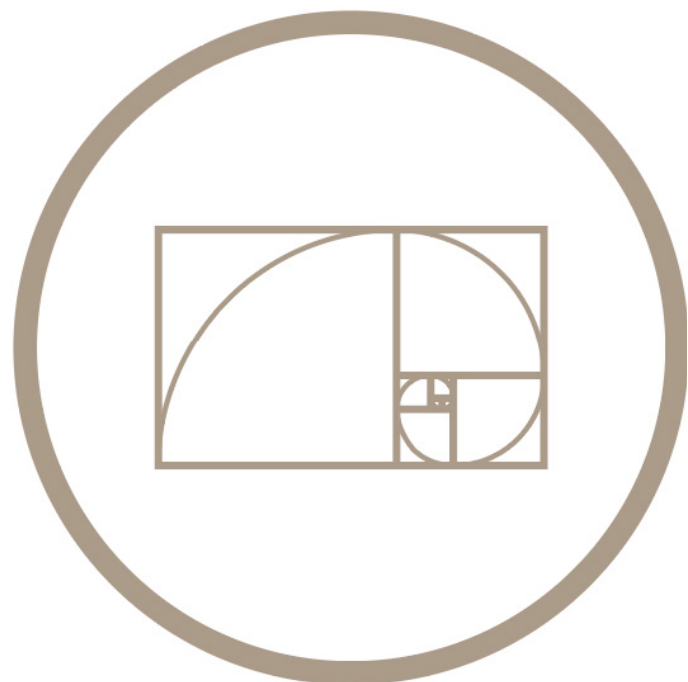
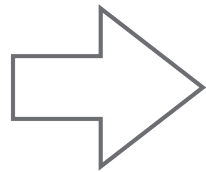
PROGRAM

DESIGN INSPIRATION

INSPIRATION FOR SHAPE

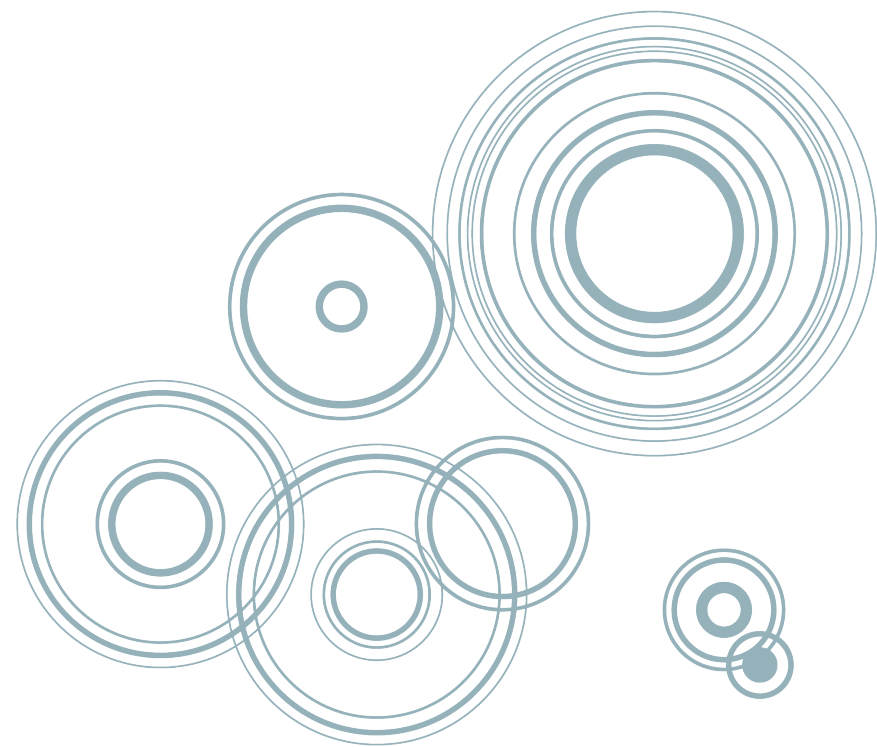


1. VISUAL
CONNECTION WITH
NATURE



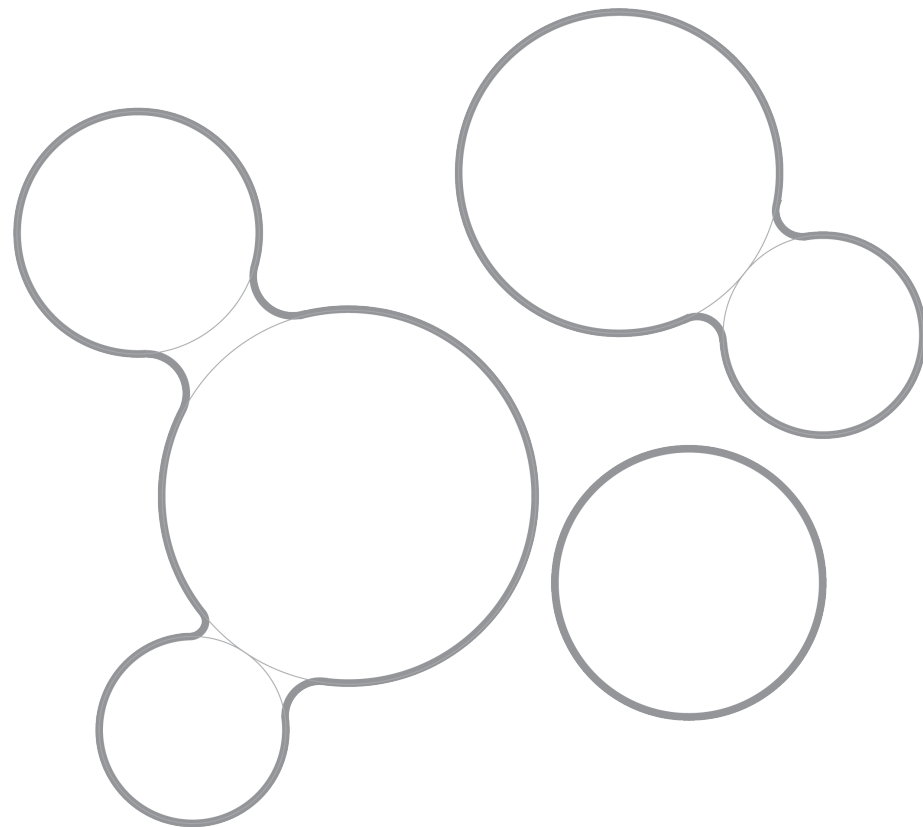
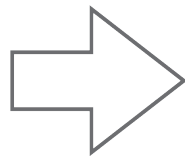
8. BIOMORPHIC
FORMS & PATTERNS

INSPIRATION FOR SHAPE



WATER RIPPLES

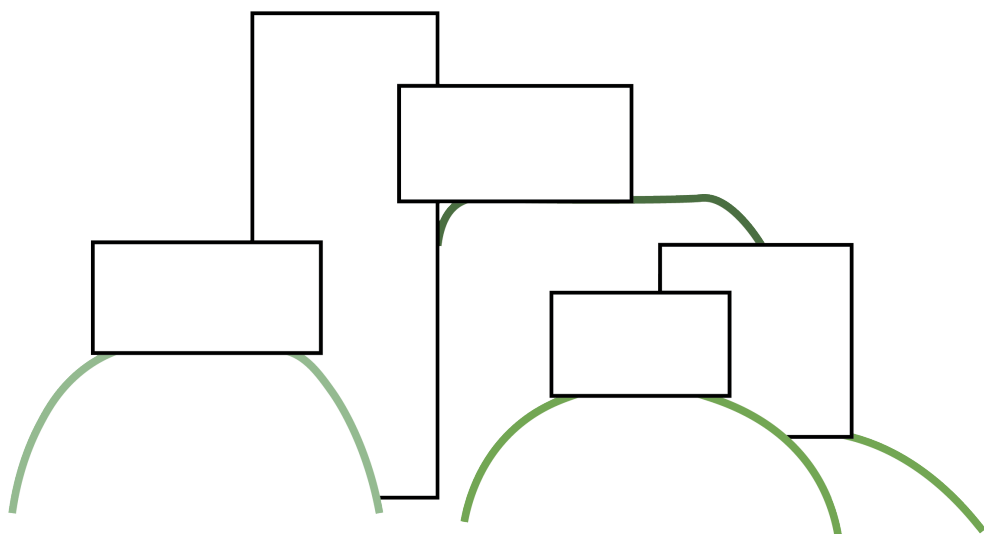
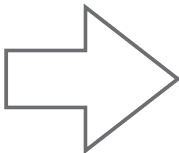
When an object enters the water ripple effect is created. It starts with a small ring that becomes bigger and bigger. The size and weight of the object determines the size of the ripple. When multiple objects enter the water around the same time, multiple ripples are created that will merge.



MERGED SHAPES

The shape of the building is inspired by the rings that are created in the water. Some of the rings are merged together, others exist by themselves. The circular shape represents P8 Biomorphic Forms and Patterns.

INSPIRATION FOR SHAPE



HILLS

VARIOUS HEIGHTS

The site is surrounded by hills, most notably are the hills of Elysian Park, Griffith Park and Mt. Washington. Additionally it responds to current design for part of the site, that consists of mounds and valleys.

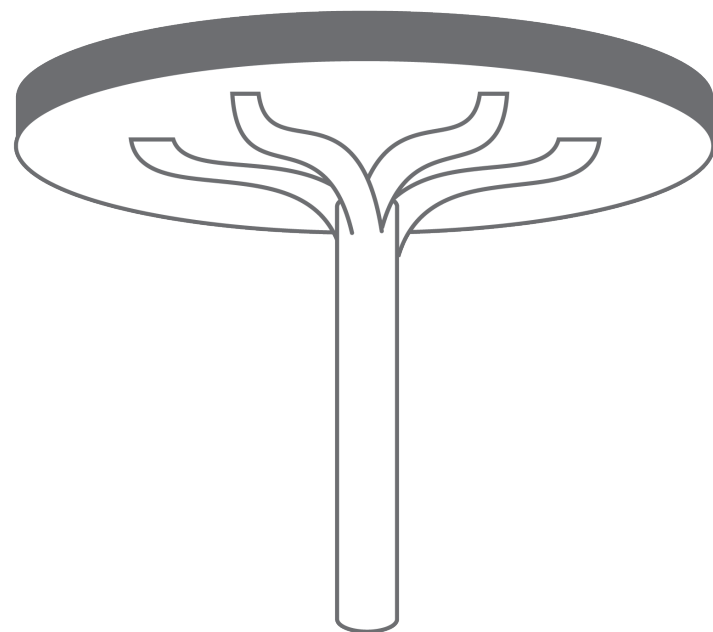
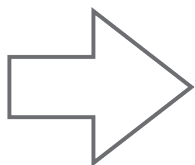
Various hills and mounds will be added to the location to continue the flow of the location. The building will be integrated into the hills, creating various plateaus for the volumes to rest on. This creates a dynamic building that responds to natural forms. The hills and valleys also represent the patterns P10 Prospect and P11 Refuge.

INSPIRATION FOR SHAPE



TREES

While the site currently lies bare, the surrounding hills are covered in trees. Also in the surrounding parks and along the streets plenty of trees can be found. The green adds color to the location, and the wood can be used as a building material.



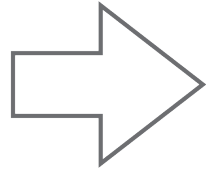
STRUCTURAL TREE
TRUNK WITH BRANCHES

Trees represent a canopy like structure that is represented by having the structure originate from a central point in the building, after which the beams branch out.

INSPIRATION FOR MATERIAL



1. VISUAL
CONNECTION WITH
NATURE



9. MATERIAL
CONNECTION WITH
NATURE

INSPIRATION FOR MATERIAL



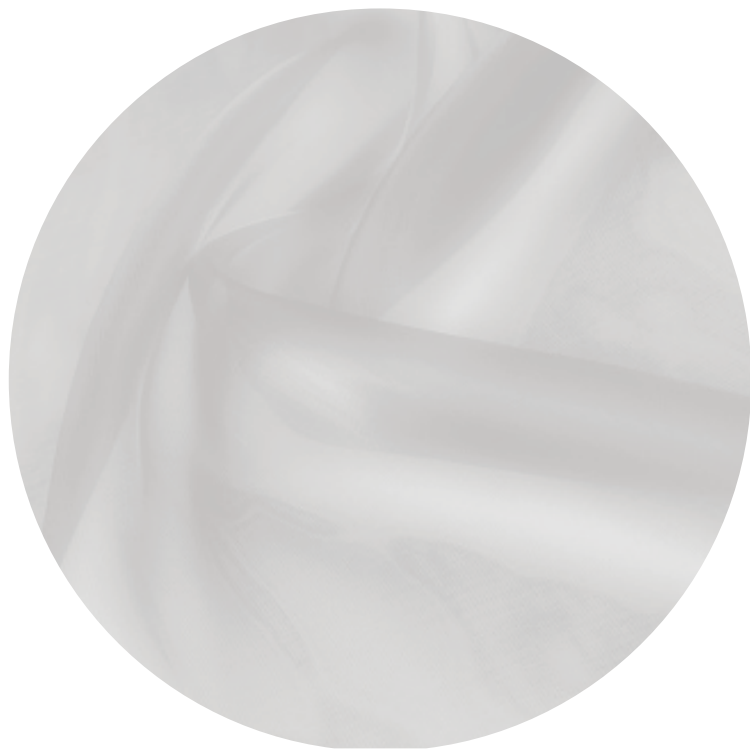
WOOD (DOUGLAS FIR)

The use of wood will mainly be represented in the structure of the building, in CLT or Glulam. The choose is made for douglas fir as this can be used for structural purposes and is one of the most common wood spieces in California.



RAMMED EARTH

Rammed Earth will be used for closed walls adding texture. This material will also be closely connected to areas of the building that are underground, or touch the earth. This material will not be structural.

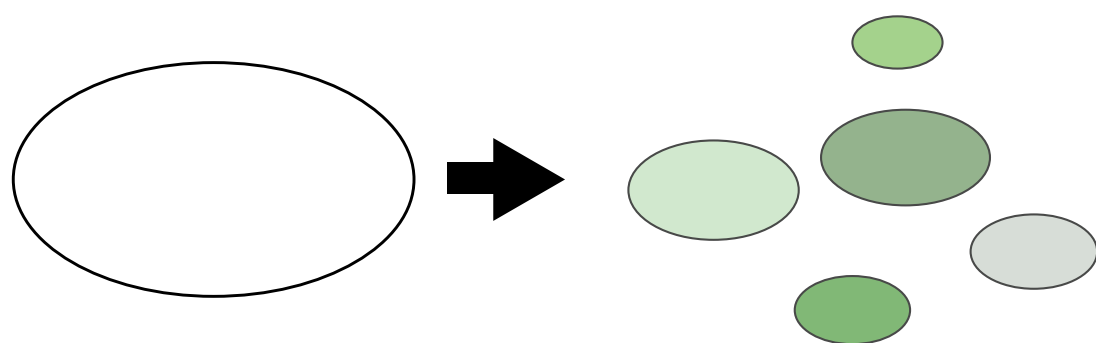


FABRIC

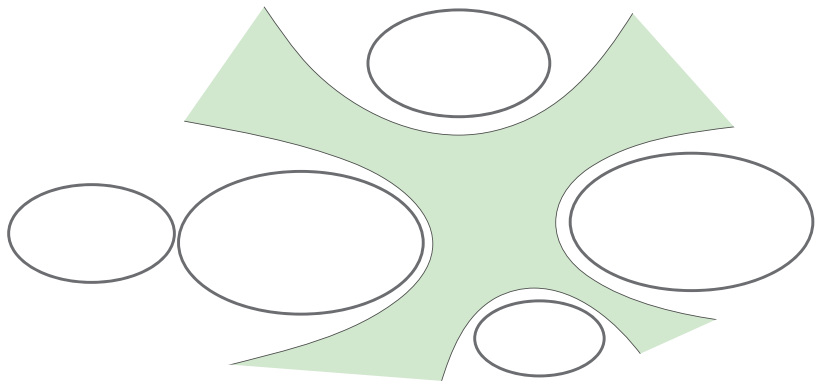
Fabric will be used for soft boundaries, the fabric can also have various degrees of transparency. The fabric moves by the air, when is touched, creating a wavy appearance that represents the water.

DESIGN

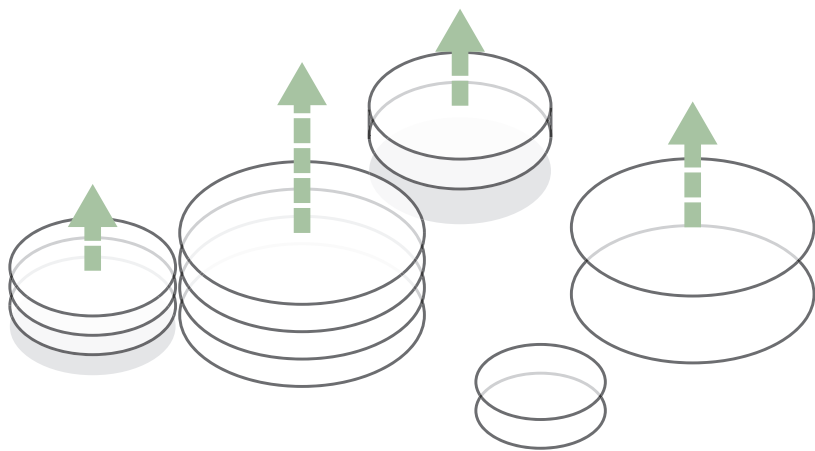
CONCEPT DIAGRAM



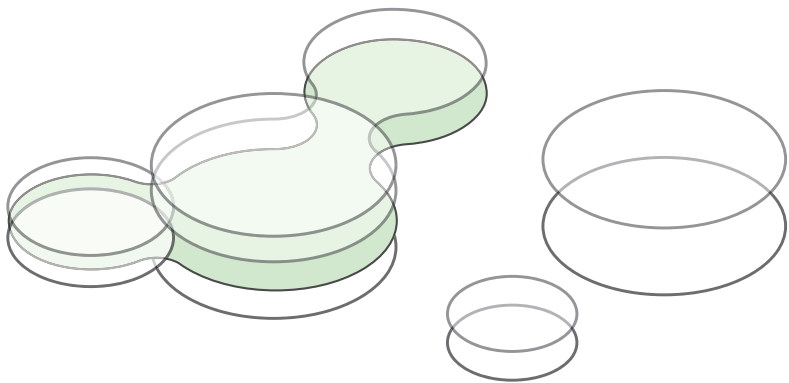
SPLIT VOLUME



ORIENTATE



EXTRUDE



MERGE

SECTION THROUGH LANDSCAPE



PLAN

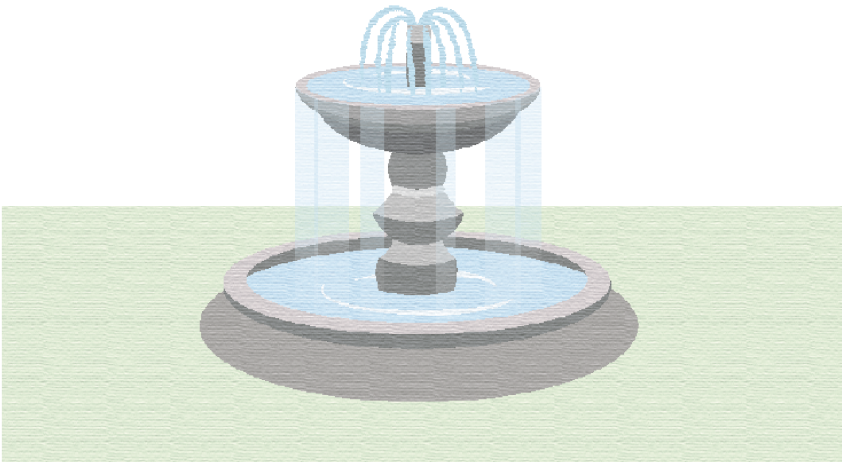



DESIGN

P5 WATER

Nature in Space

Pattern





[P5] Presence of Water

Presence of water is a condition that enhances the experience of a place through the seeing, hearing of touching of water.

The incorporation of water lends itself extremely well for a multisensory experience, where the user can not only see, but also hear and touch the water. The effects of water in urban environments can create a similar impact to that of a natural environment without the presence of water, showing its profound effect. Research has shown that people prefer views that include clean bodies of water, as this creates an environment that reduces stress, and lowers the heart rate and blood pressure. Experiencing the visual stimuli of water also improves concentration and memory.

Use in combination with [P1] [P2] [P7] [P11] [P14]

Presence of Water

Tool



Reflective Pool

A reflective pool offers a body of water that stands almost still, that is due to its character, often used as a place of reflection. The main feature is that it offers a reflection of its surrounding, enhancing its (natural) effect.

Presence of Water

Tool



Rain Garden

A rain garden only holds water after rainfall, and is therefore most of the time dry. Yet it holds a lot of value not only for nature but also for people, as it makes them aware of the natural processes that occur.

SECTION A'' - A''



SECTION D'' - D''

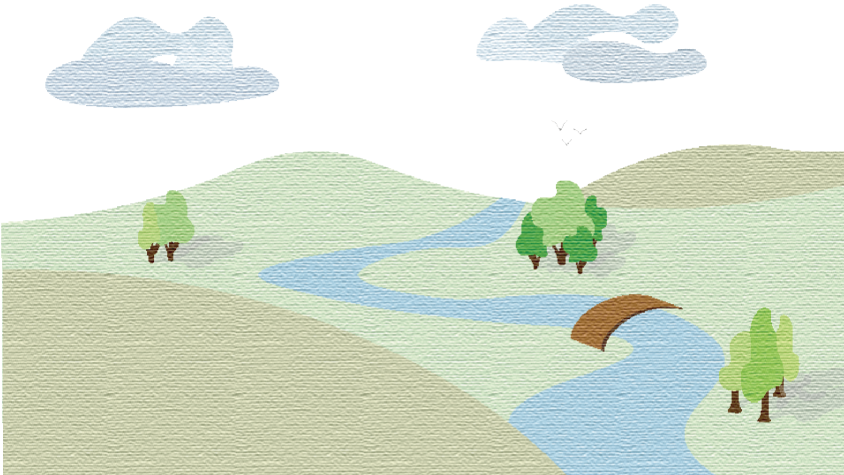



DESIGN

P1, P2 VISUAL AND NON-VISUAL CONNECTION WITH NATURE

Nature in Space

Pattern





[P1] Visual Connection with Nature


A visual connection with nature is a view to elements of nature, living systems and natural processes.¹


This pattern is perhaps the most straight forward, as it focuses on the visual connection with nature, which can range from trees, flowers, ponds and animals. The objective of this pattern is to provide an environment that helps the individual shift focus, to relax the eye muscles and temper cognitive fatigue.² Because natural scenes stimulate a greater portion of the visual cortex then non-natural scenes, more pleasure receptors are engaged, which increases happiness. In addition, natural scenes have proven to improve concentration and reduce stress.

Use in combination with [P2] [P3] [P5] [P8] [P11]

Nature in Space

Pattern





[P2] Non-Visual Connection with Nature

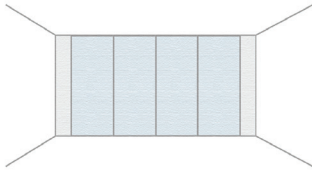
Non-Visual connection with nature is the auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.¹

In addition to the visual sense there are four other senses that are seldom specifically stimulated, yet an environment that engages an individual with sound, scent, touch and potentially taste creates a complex and changeable environment, which feels familiar and comfortable. Natural sounds have been proven to reduce cognitive fatigue and accelerate recovery. Sent stimulates the olfactory system which can trigger powerful memories that can calm and energize people. Based on other research it is believed that touching elements in nature like water and raw materials can calm people and reduce fatigue.

Use in combination with [P2] [P3] [P4] [P5] [P9]

Visual Connection with Nature

Tool



Floor-to-Ceiling Window

Due the lack of boundary, these windows offer an unobstructed view to the outside. It blurs the lines between the exterior and the interior, enlarging the space and increasing the connection to the outdoors.

Visual Connection with Nature

Tool

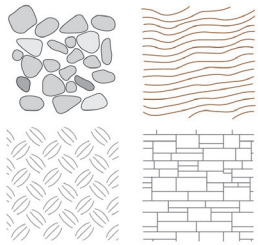


Green Roof

Green roofs can offer a welcome break in an otherwise gray environment. It increases biodiversity and creates an habitat for animals. Besides this, a green roof has many other ecological and economical benefits.

Non-Visual Connection with Nature

Tool




Textures

Texture plays an important role within architecture, and not only on surfaces that can be touched. As one already has a perception on how something feels, even by just looking at the surface. Different textures can evoke different emotions.

Non-Rhythmic sensory stimuli

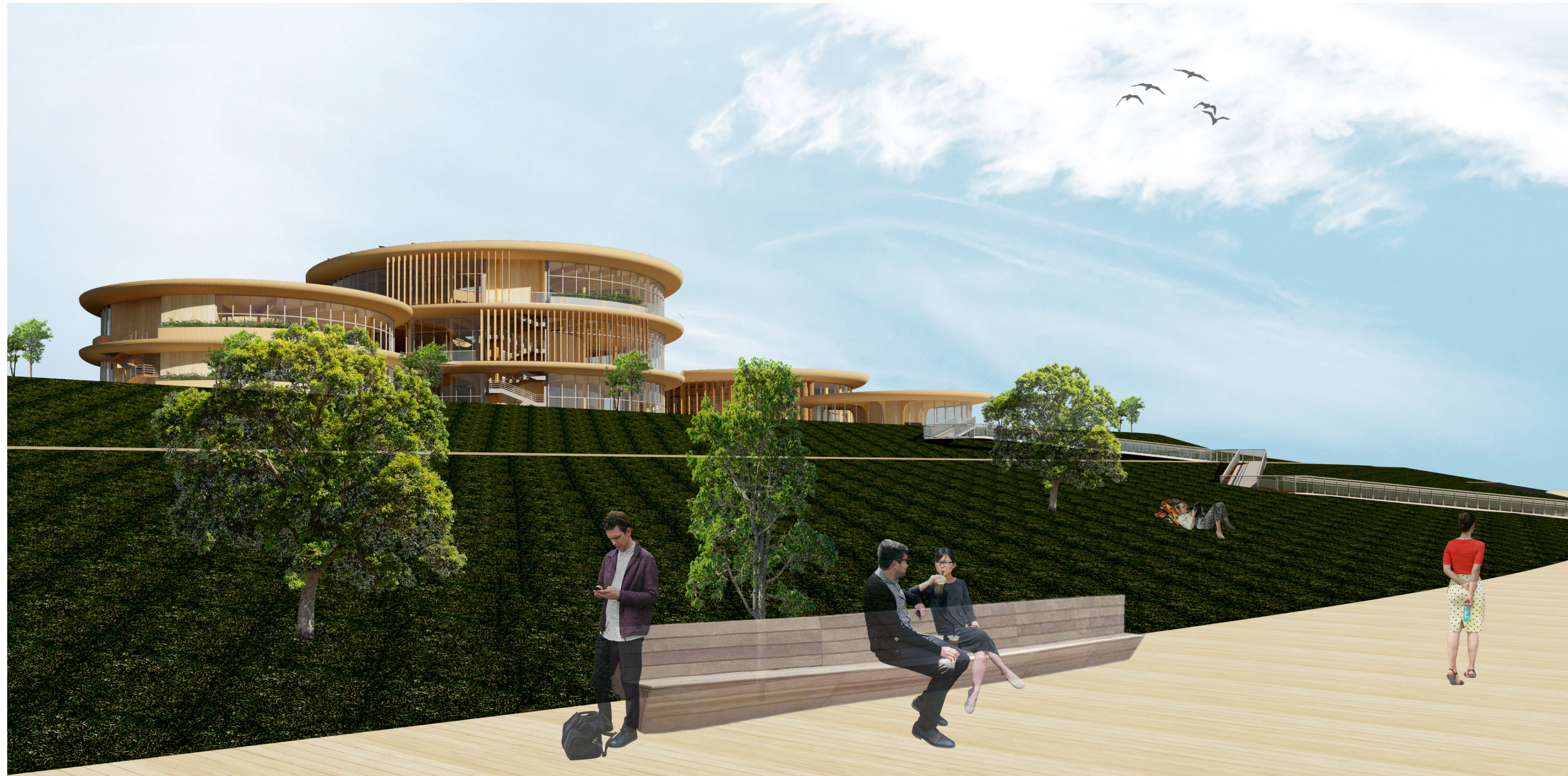
Tool



Bees and butterflies

The presence of bees and butterflies doesn't only speak to the biodiversity of the site. It also engages the observer, as the non-rhythmic movements of the animals attract attention and can prevent boredom.

SIGHT FROM WATER



DESIGN

SIGHT FROM BOULEVARD



DESIGN

APPROACH FROM NORTH



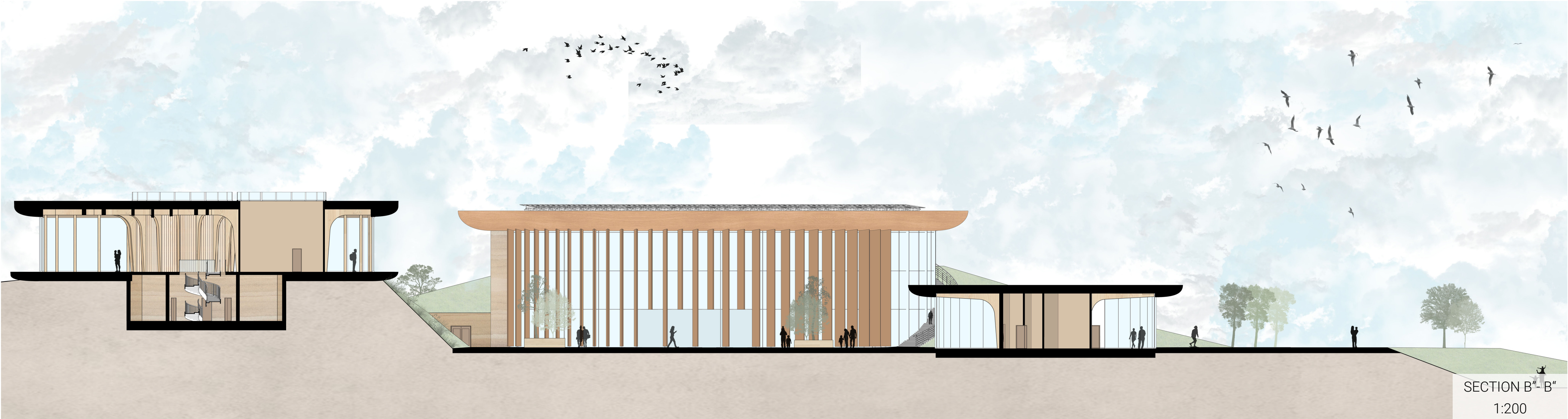
DESIGN

APPROACHING CENTRAL SQUARE



DESIGN

SECTION B'' - B''



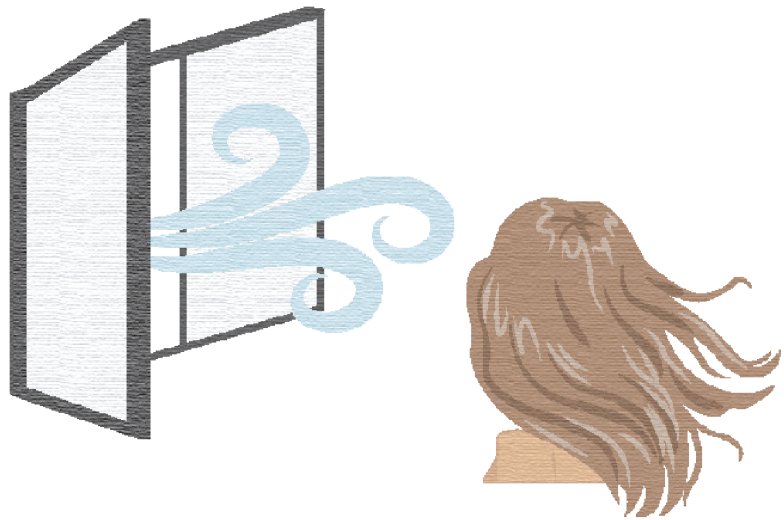
SECTION C'' - C''




P4 THERMAL AND AIRFLOW VARIABILITY

Nature in Space

Pattern





[P4] Thermal & Airflow variability

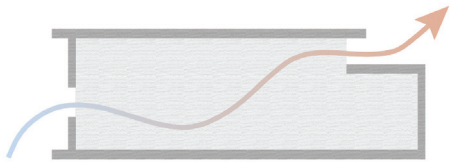
Thermal & Airflow variability can be characterized as subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperature that mimic natural environment.¹

This pattern promotes the experience of the sensory elements of airflow and thermal variability. The benefits of this are further increased when people are given control over these conditions. This stems from the research into the positive effects of natural ventilation, alliesthesia*, and the impact of nature in motion on concentration. As opposed to how modern mechanical systems work, people desire moderate levels of sensory variability in light, sound and temperature in order to avoid boredom. Therefore, light breezes and changes in thermal conditions increases comfort and improve both peoples well-being and productivity.

Use in combination with [P6] [P7] - sometimes [P3] [P5] [P13]

Thermal & Airflow Variability

Tool

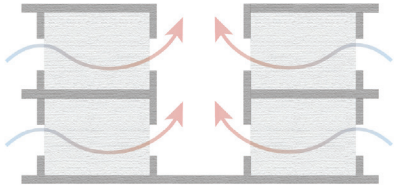


Cross-Ventilation

This creates a breeze through the building and lets the occupant experience the movement of nature. The air increases comfort and improves peoples concentration.

Thermal & Airflow Variability

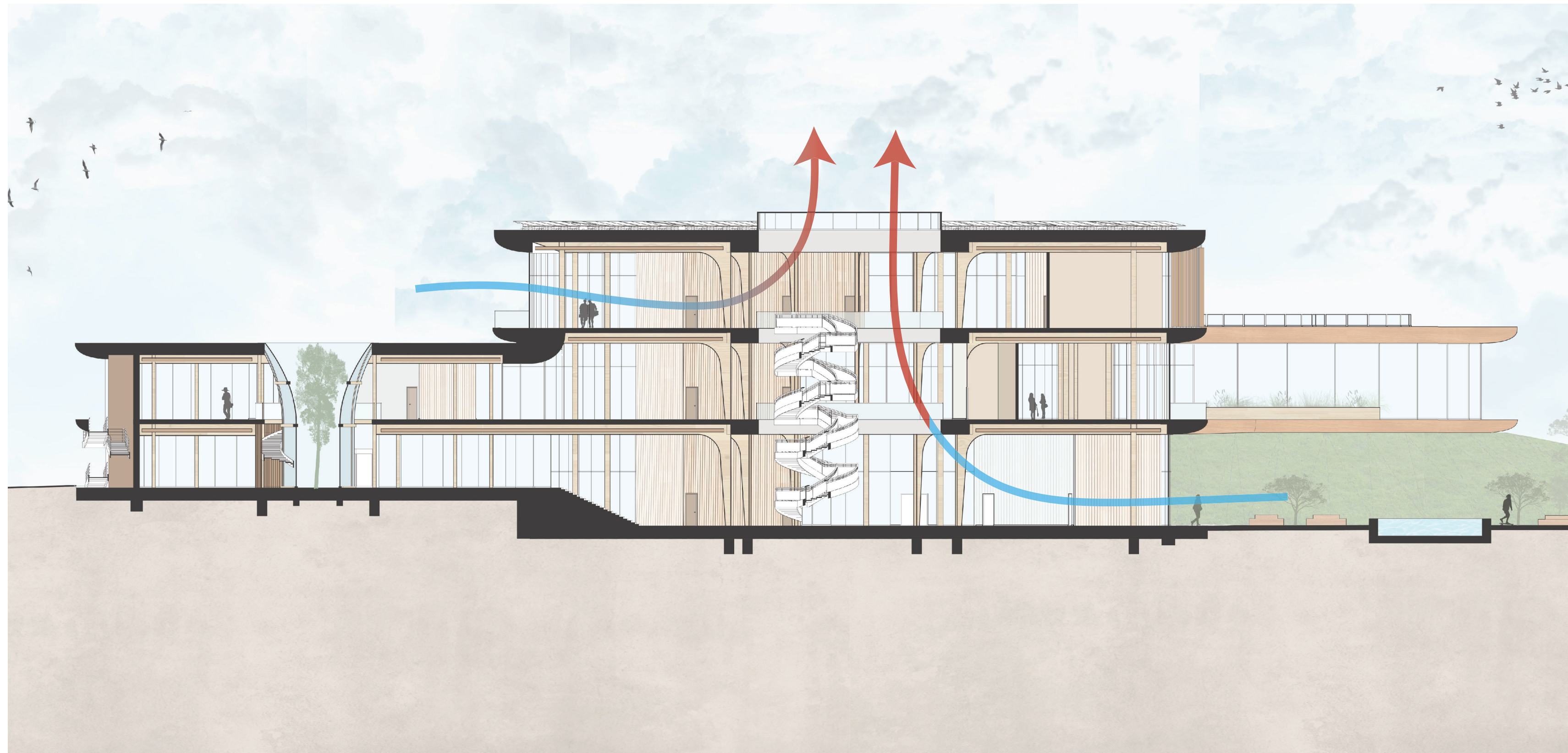
Tool



Courtyard / Atria

The addition of a courtyard doesn't only provide a green space. It also adds the possibility of natural ventilation, as it creates an airflow trough the surrounding rooms. It can both supply cool air or subtract hot air depending on the design.

CENTRAL ATRIUM



DESIGN

P6 DYNAMIC AND DIFFUSE LIGHT

Nature in Space

Pattern

[P6] Dynamic & Diffuse Light

Dynamic & diffuse light leverages varying intensities of light and shadow that change over time to create conditions that occur in nature.

This pattern promotes the experience of the changes that occur in natural light, as it is rarely uniform. The tone of the light changes throughout the day from yellow, to blue, to red, which has an effect on the humans circadian system, the system that promotes a healthy sleep pattern and improves the mood. Light also changes in intensity, due to the passing of clouds, or the interaction with other natural elements, like trees that create shade, showing its dynamic nature. In well daylighted spaces, productivity is higher, and the mood and overall well-being is improved.

Use in combination with [P1] [P3] [P4] [P14]

-

[P5] [P7] [P8]

Visual Connection with Nature

Tool

Floor-to-Ceiling Window

Due the lack of boundary, these windows offer an unobstructed view to the outside. It blurs the lines between the exterior and the interior, enlarging the space and increasing the connection to the outdoors.

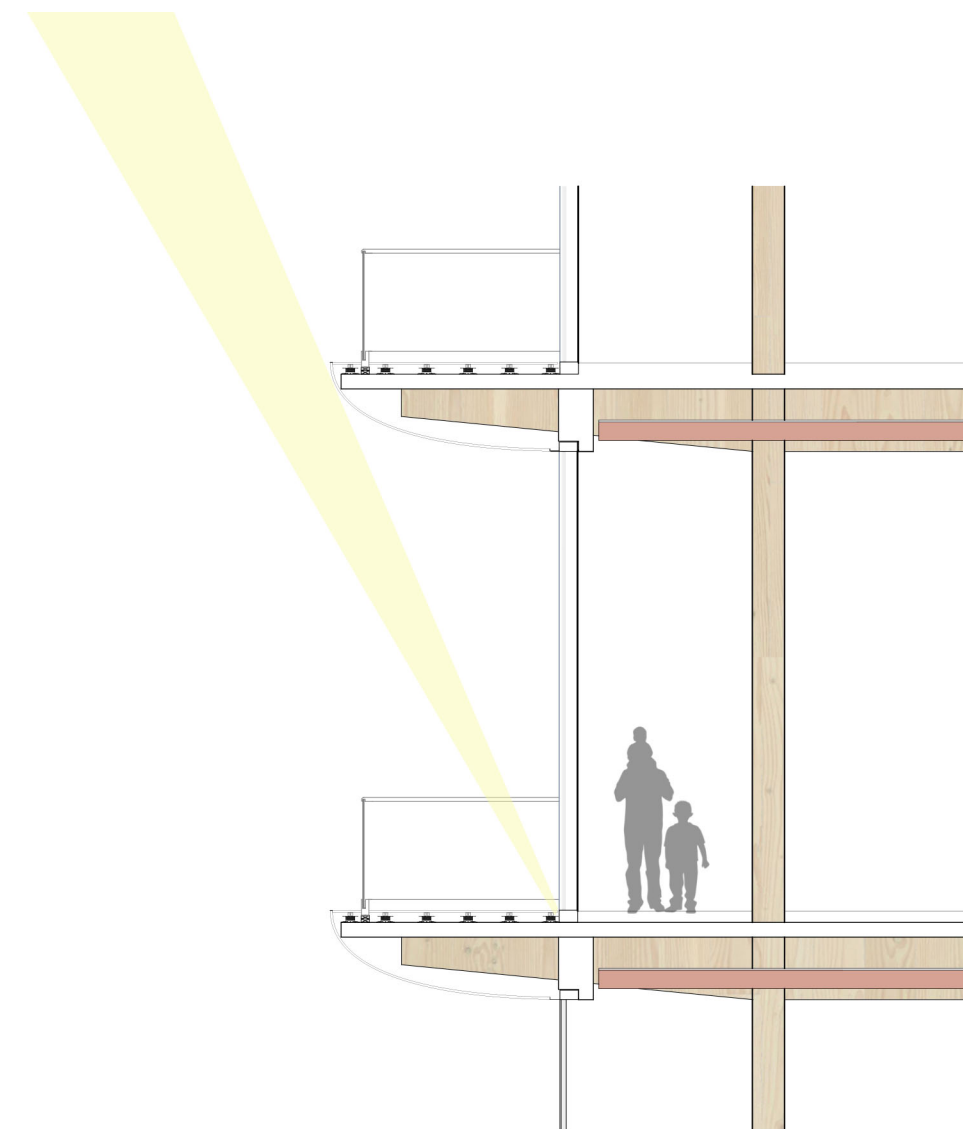
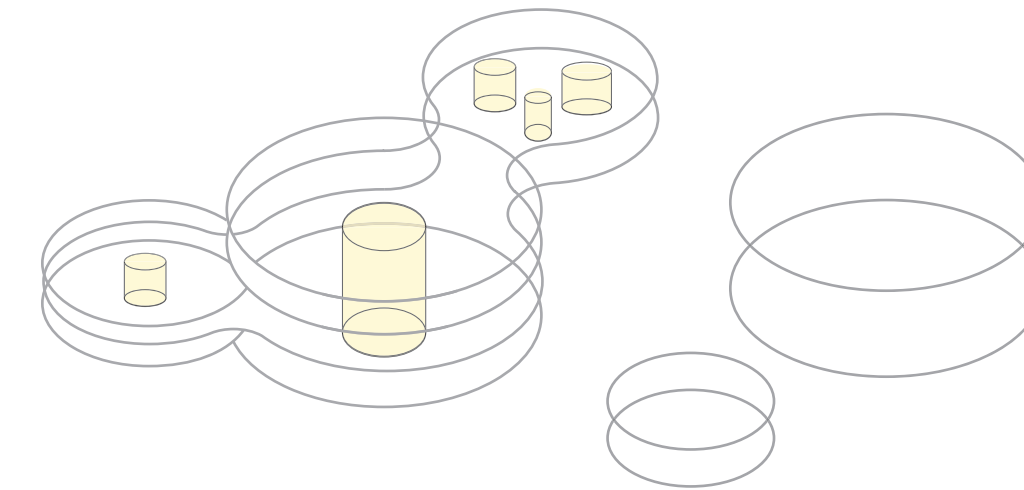
Dynamic & Diffuse light

Tool

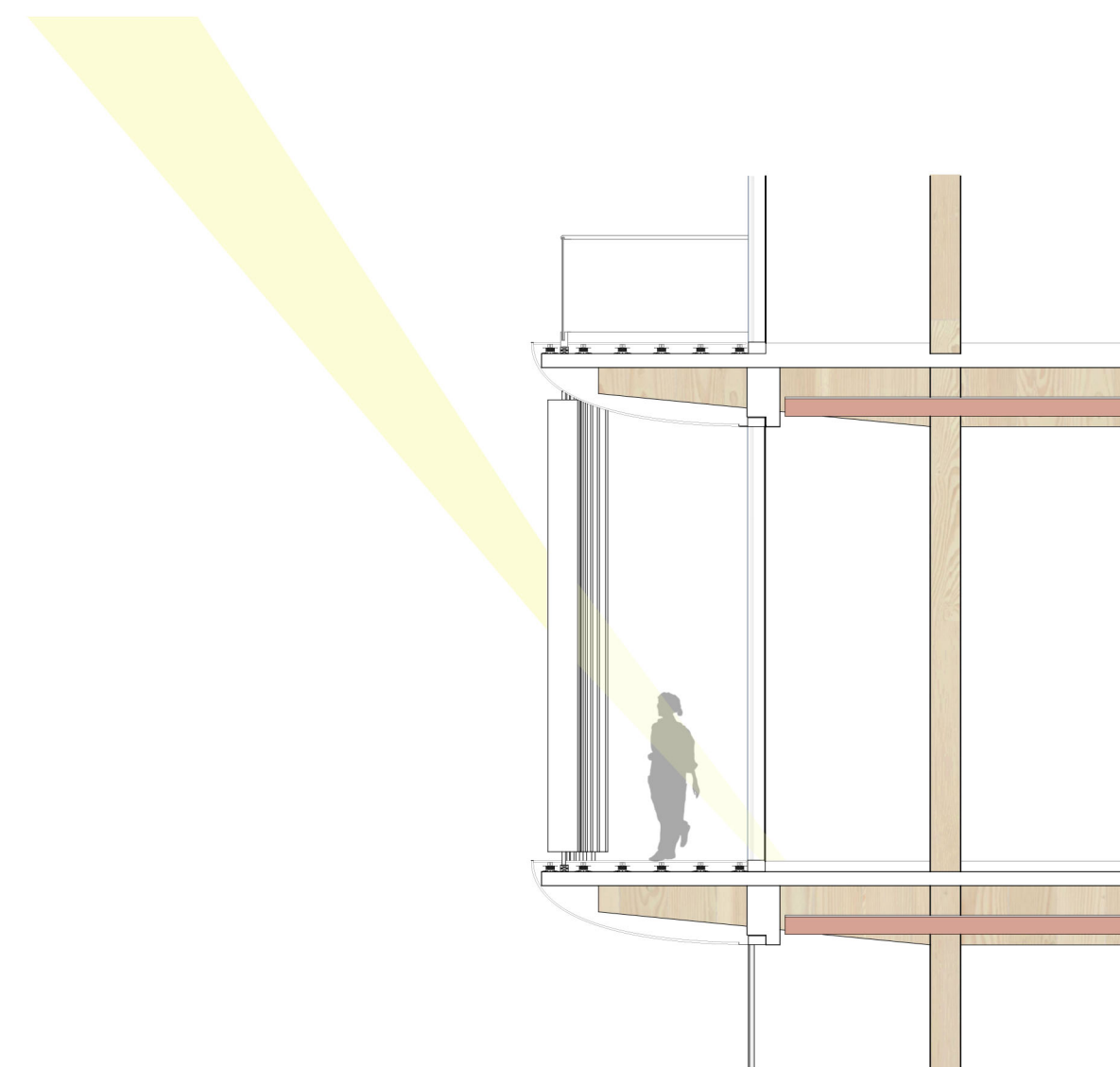
Skylight

A skylight can bring natural light into a room where that would otherwise be impossible. They can also be used as an architectural statement, to for example, give emphasis to an art piece on the wall, or as moment of reflection in a light well.

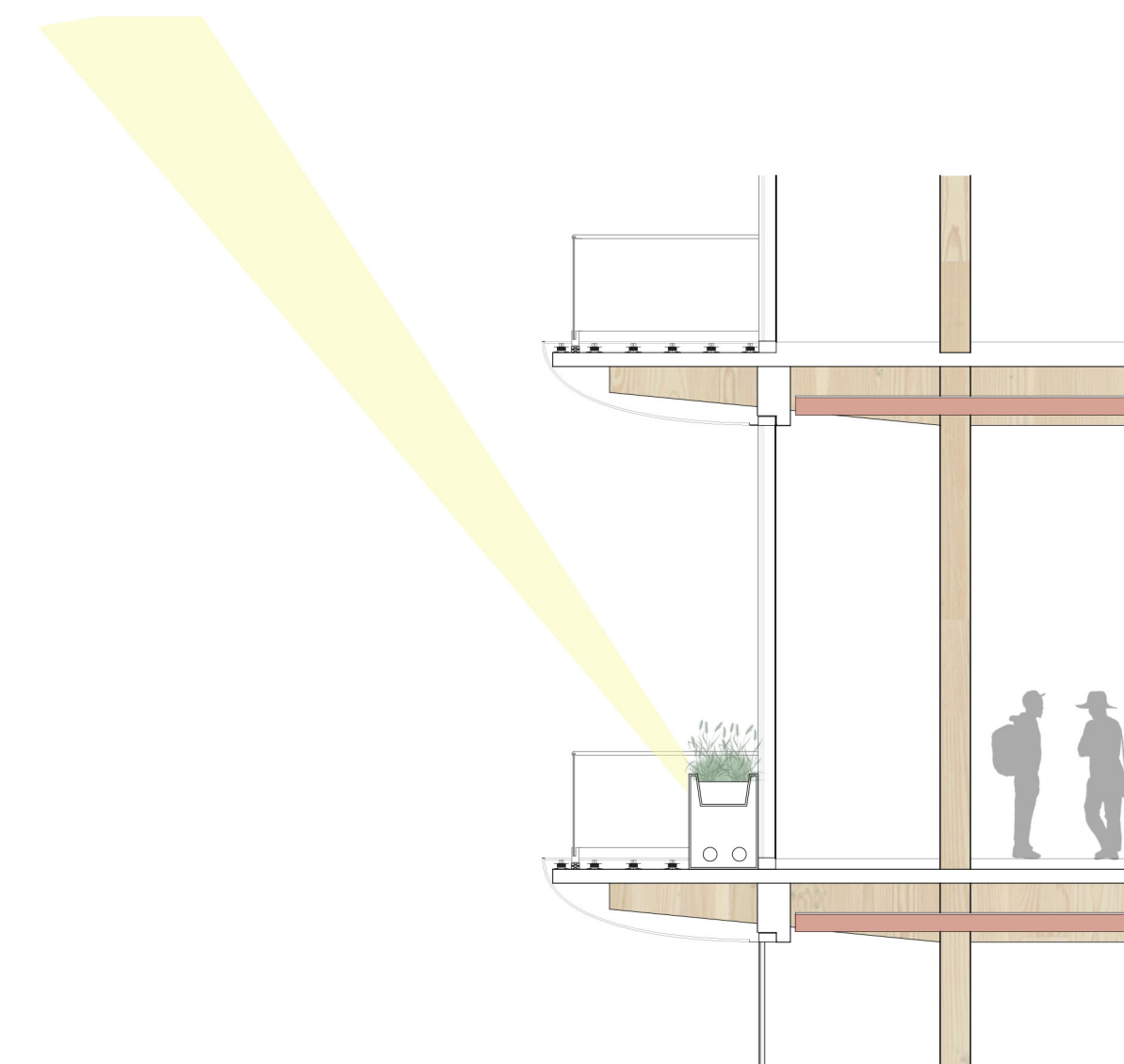
SUN SHADING AND LIGHT WELLS



SOUTH



EAST / WEST



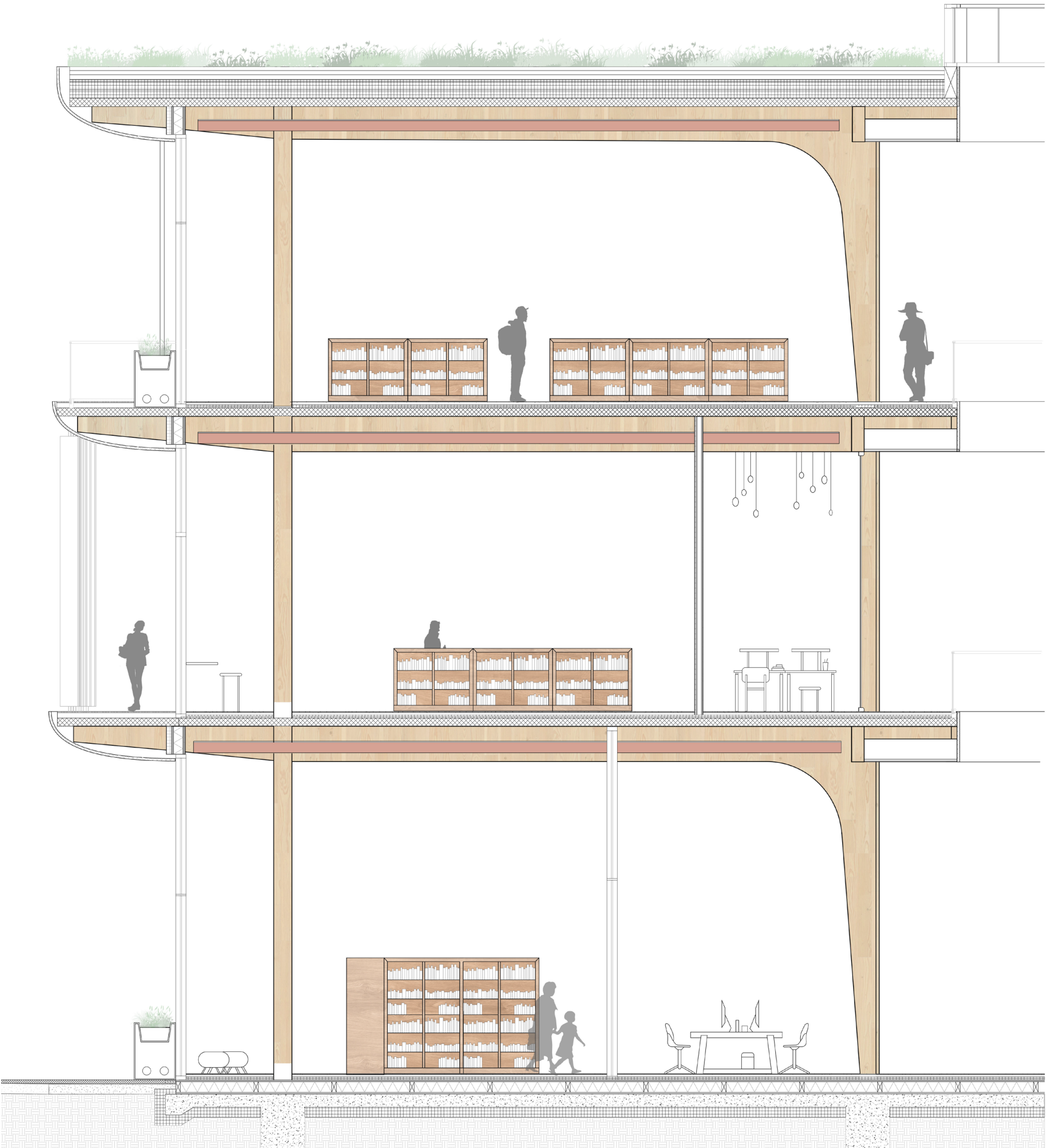
EAST / WEST

DESIGN

FACADE AND SECTION DETAIL



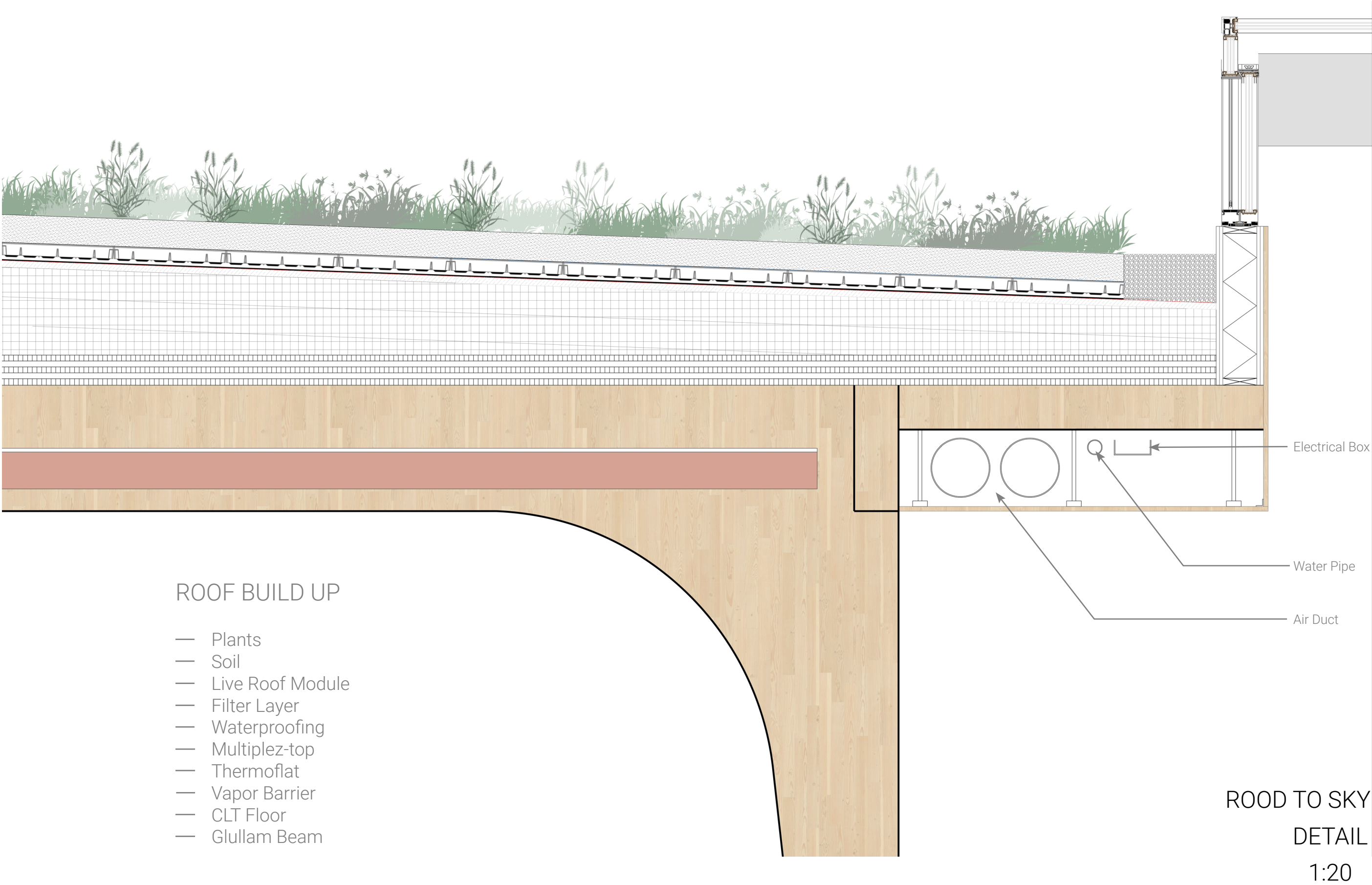
FACADE VIEW
1:40



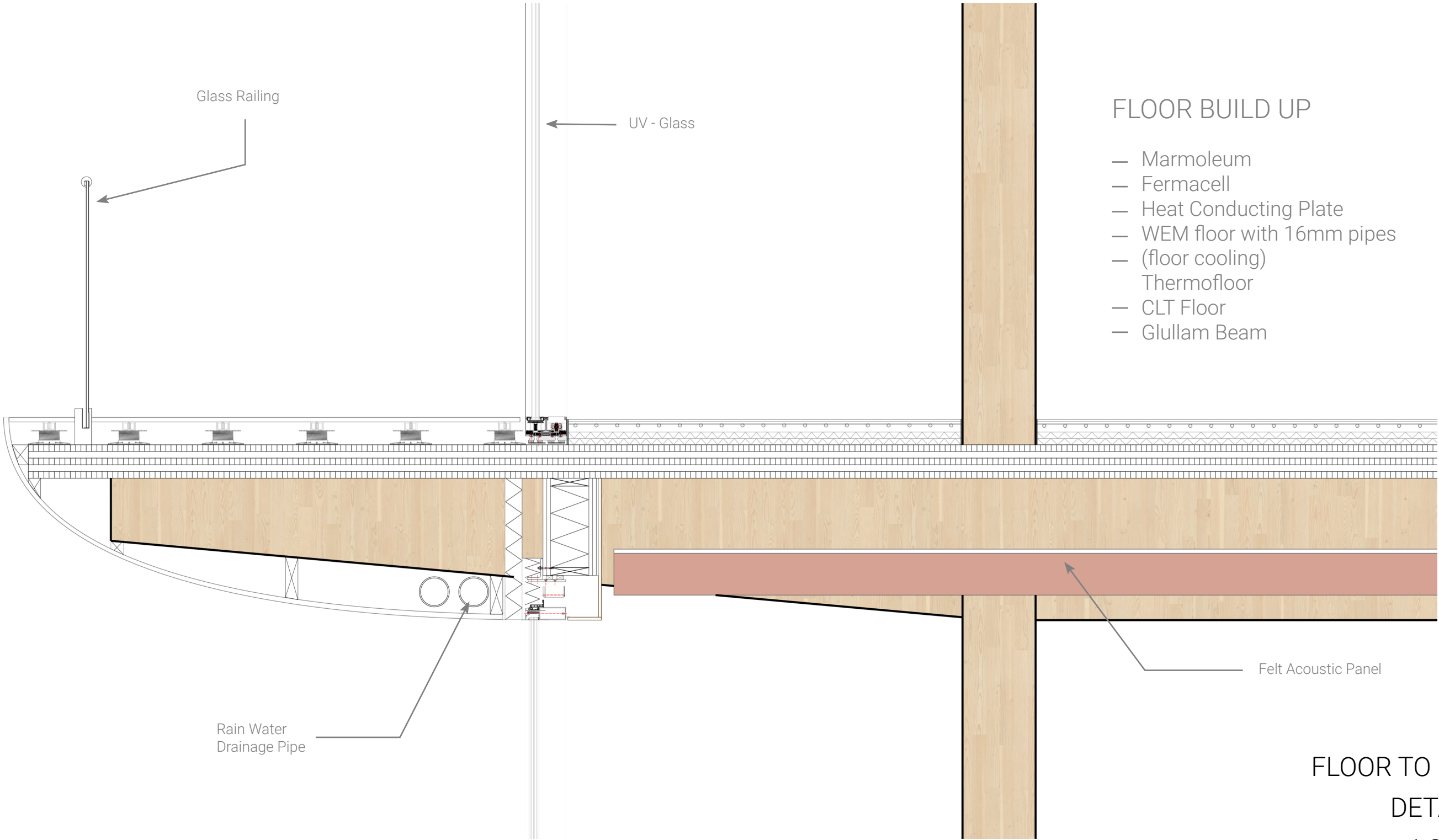
SECTION E'- E'
1:40

DESIGN

ROOF – SKYLIGHT DETAIL

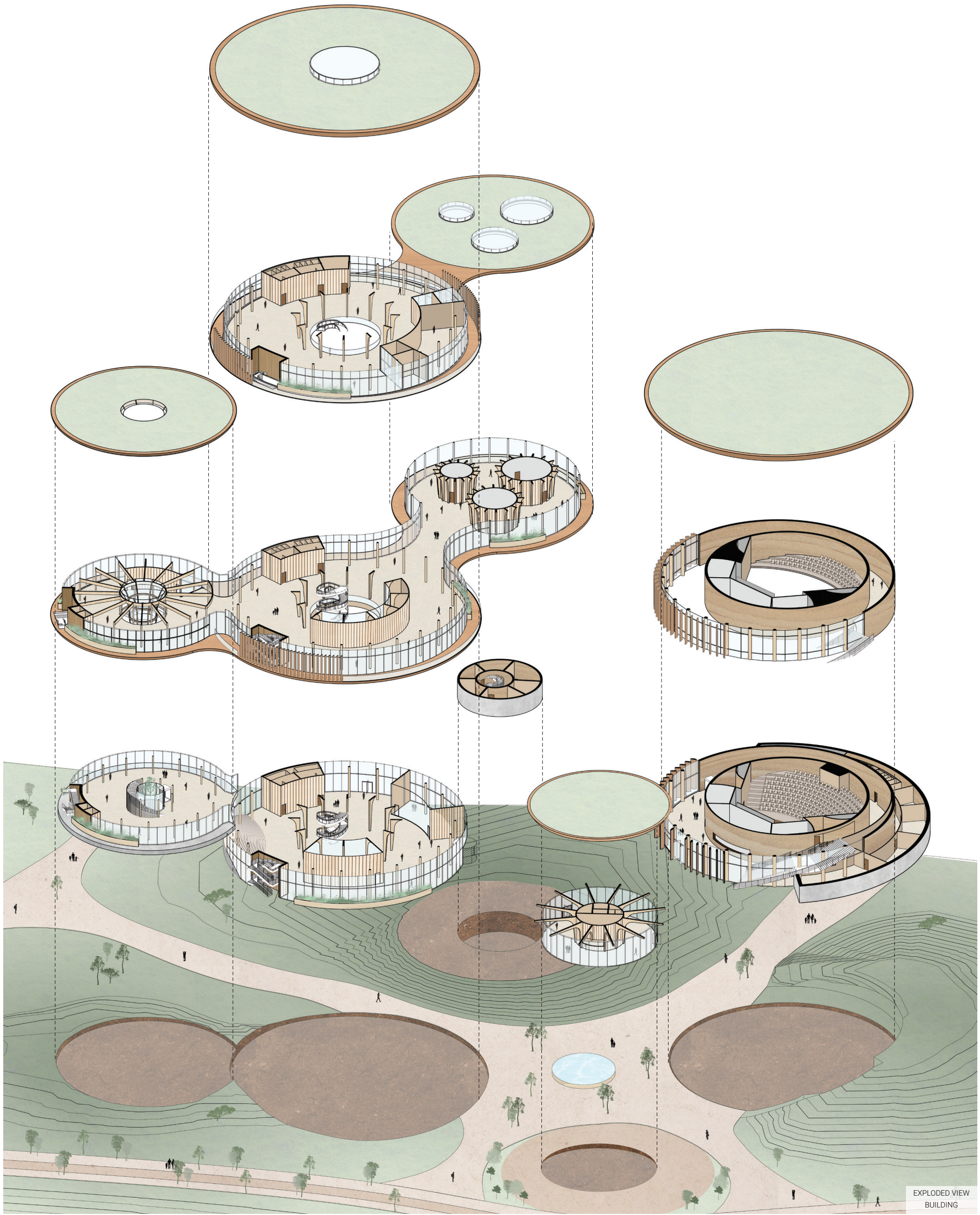


FLOOR – BALCONY DETAIL



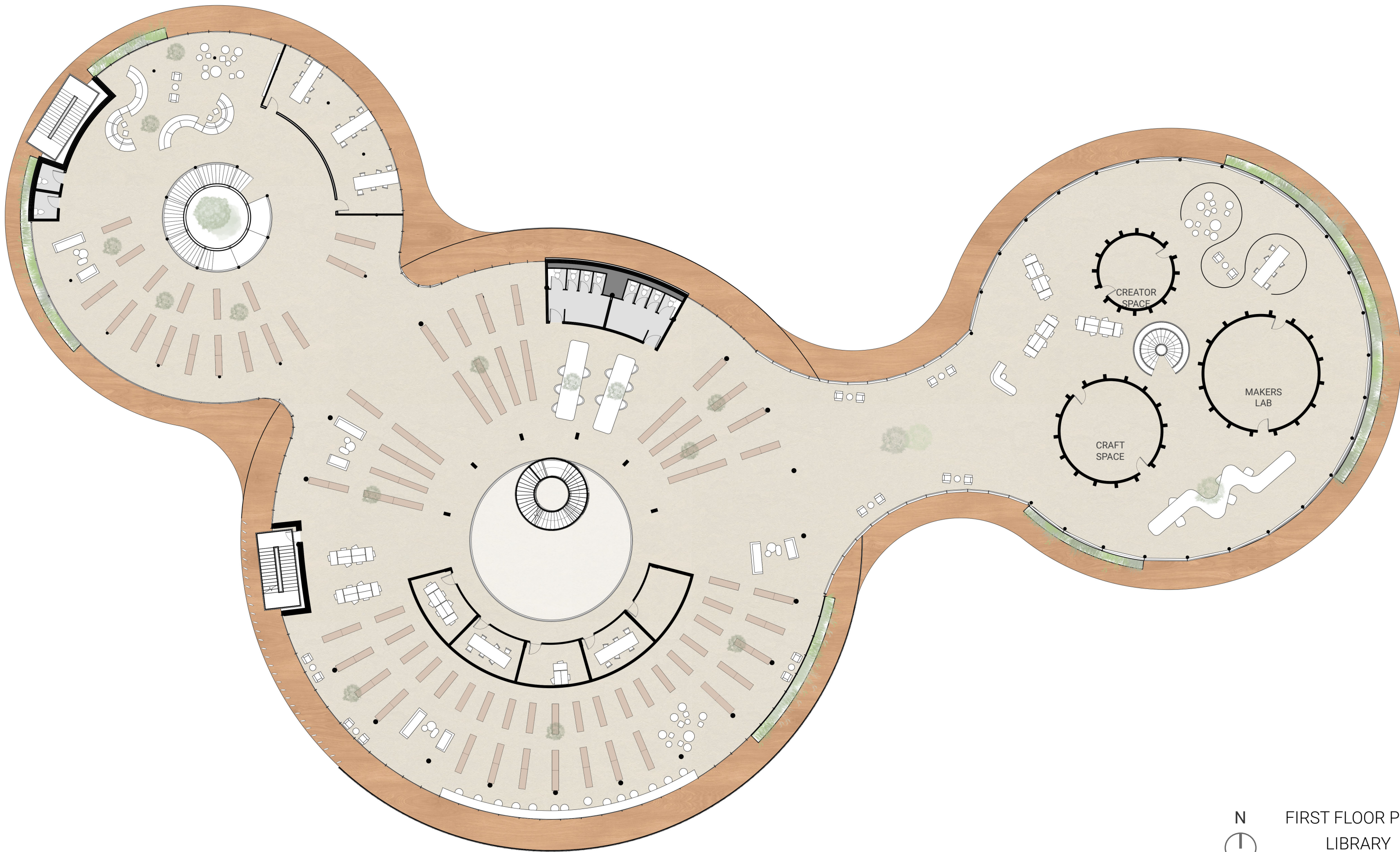
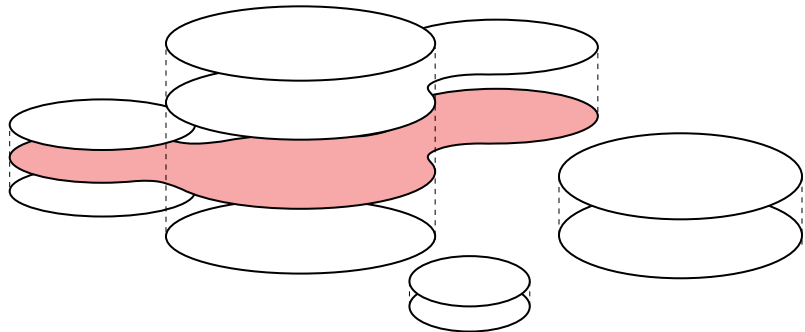
FLOOR TO BALCONY
DETAIL
1:20

EXPLODED VIEW



DESIGN

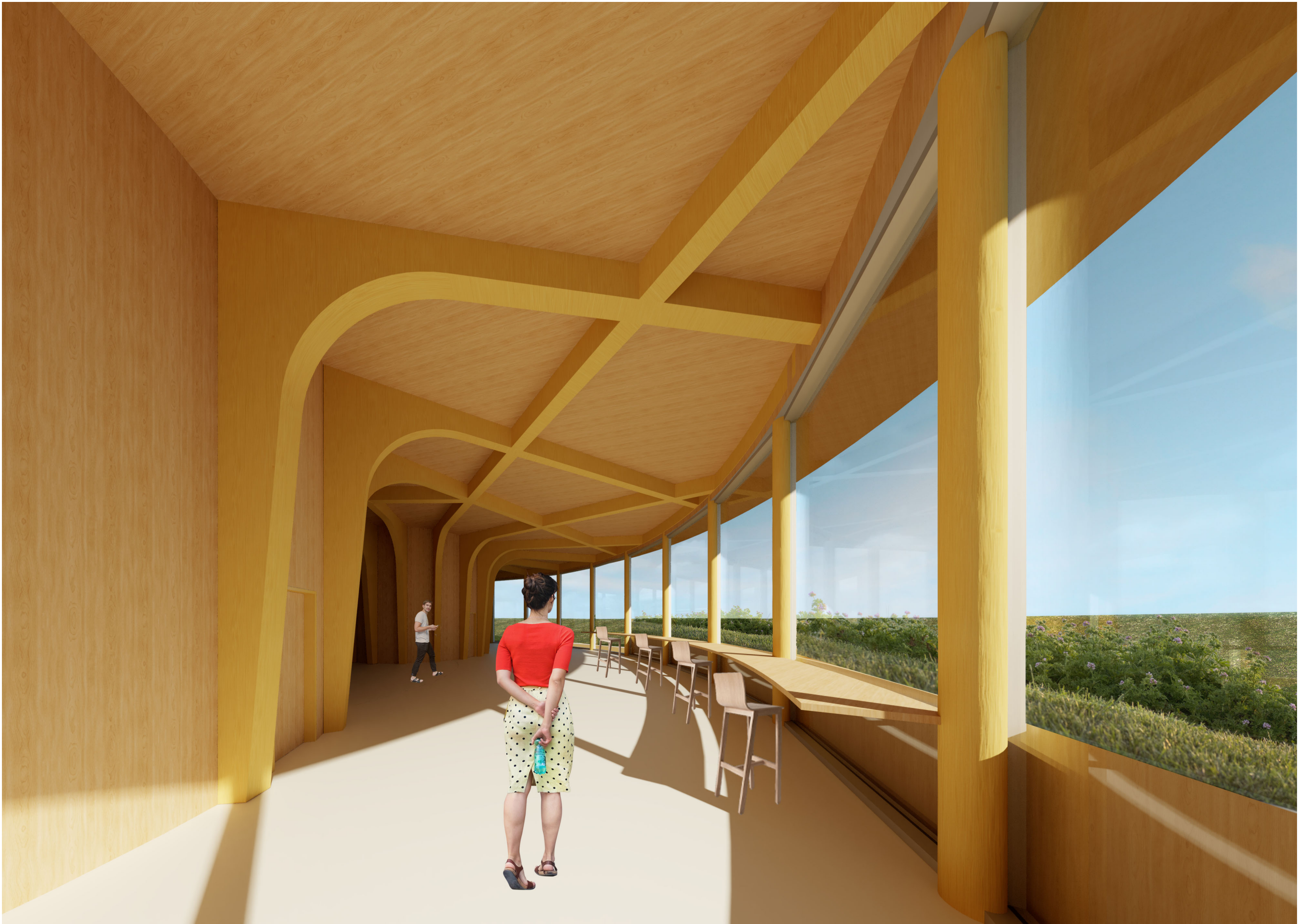
LIBRARY FIRST FLOOR PLAN



DESIGN

N
FIRST FLOOR PLAN
LIBRARY
1:200

MAKERS SPACE



DESIGN



1. VISUAL
CONNECTION WITH
NATURE



3. NON-RHYTHMIC
SENSORY STIMULI



8. BIOMORPHIC
FORMS &
PATTERNS



9. MATERIAL
CONNECTION WITH
NATURE



10. COMPLEXITY &
ORDER



11. PROSPECT

CENTRAL ATRIUM



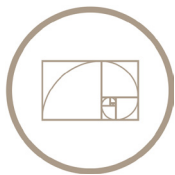
DESIGN



4. THERMAL & AIRFLOW VARIABILITY



6. DYNAMIC & DIFFUSE LIGHT



8. BIOMORPHIC FORMS & PATTERNS



15. AWE

STAIR CHILDREN'S LIBRARY



DESIGN



6. DYNAMIC & DIFFUSE LIGHT



1. VISUAL CONNECTION WITH NATURE

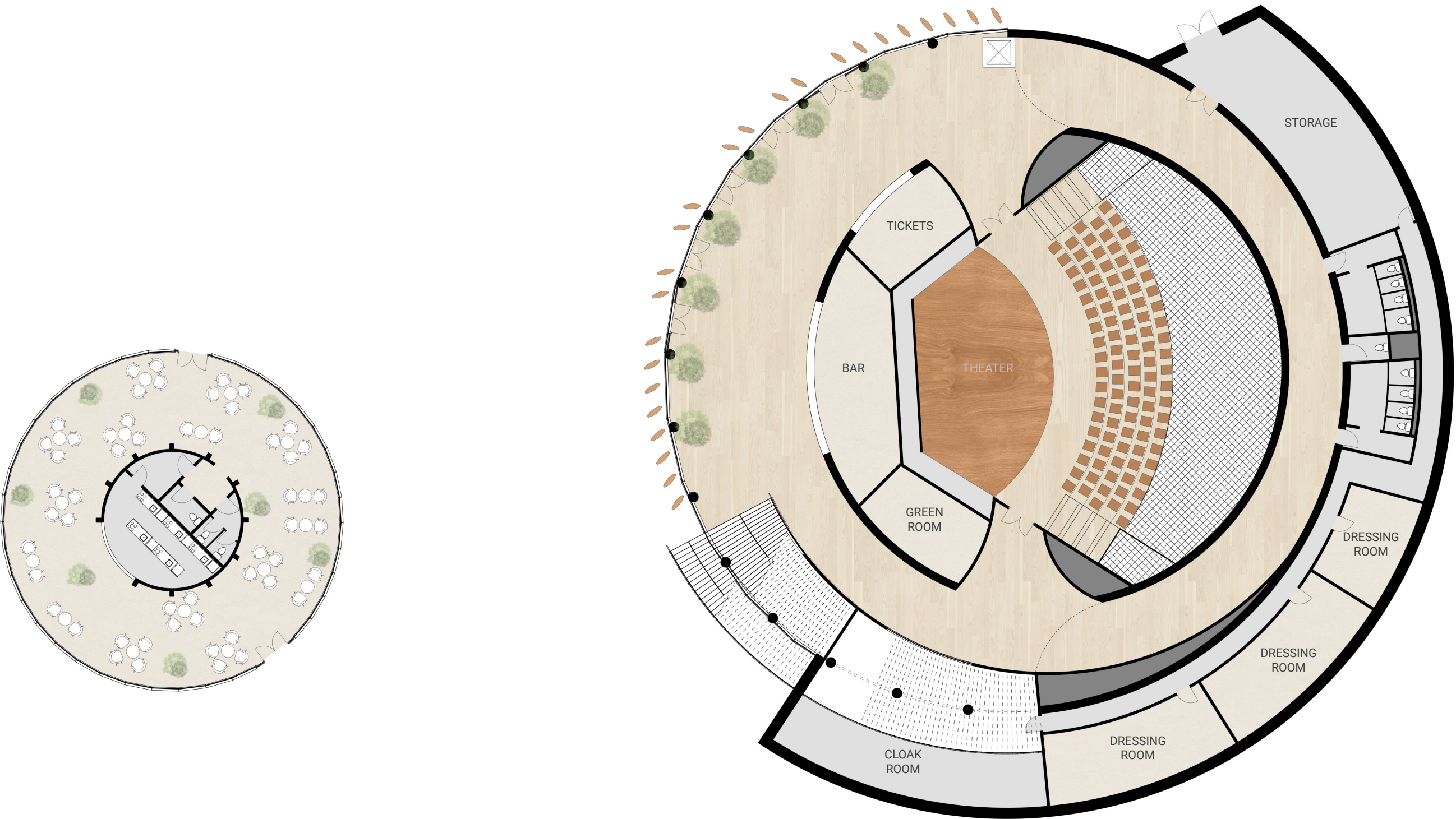
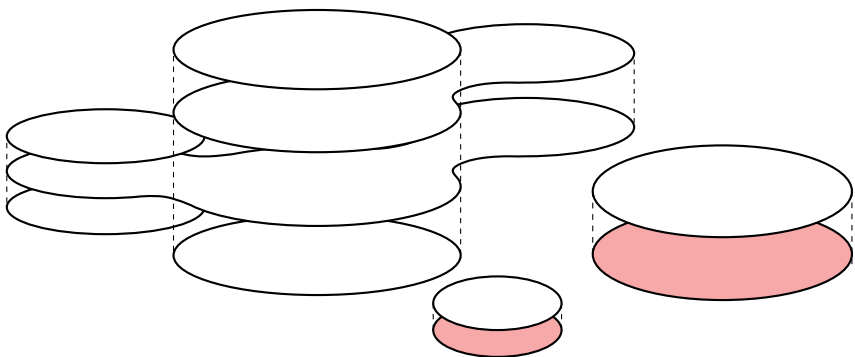


7. CONNECTION WITH NATURAL SYSTEMS



11. PROSPECT

THEATER GROUND FLOOR PLAN



LEVEL 0

DESIGN

N
GROUND FLOOR PLAN
THEATER
1:250

THEATER FOYER



DESIGN



6. DYNAMIC & DIFFUSE LIGHT



9. MATERIAL CONNECTION WITH NATURE



11. PROSPECT



15. AWE

THANK YOU

ARE THERE ANY QUESTIONS?



BUILDING DESIGN