

**A FESTIVE AMC**





(Source: <https://gotaki.com/es/lugar/the-academic-medical-center>)

## ***Project: Renovation of AMC***

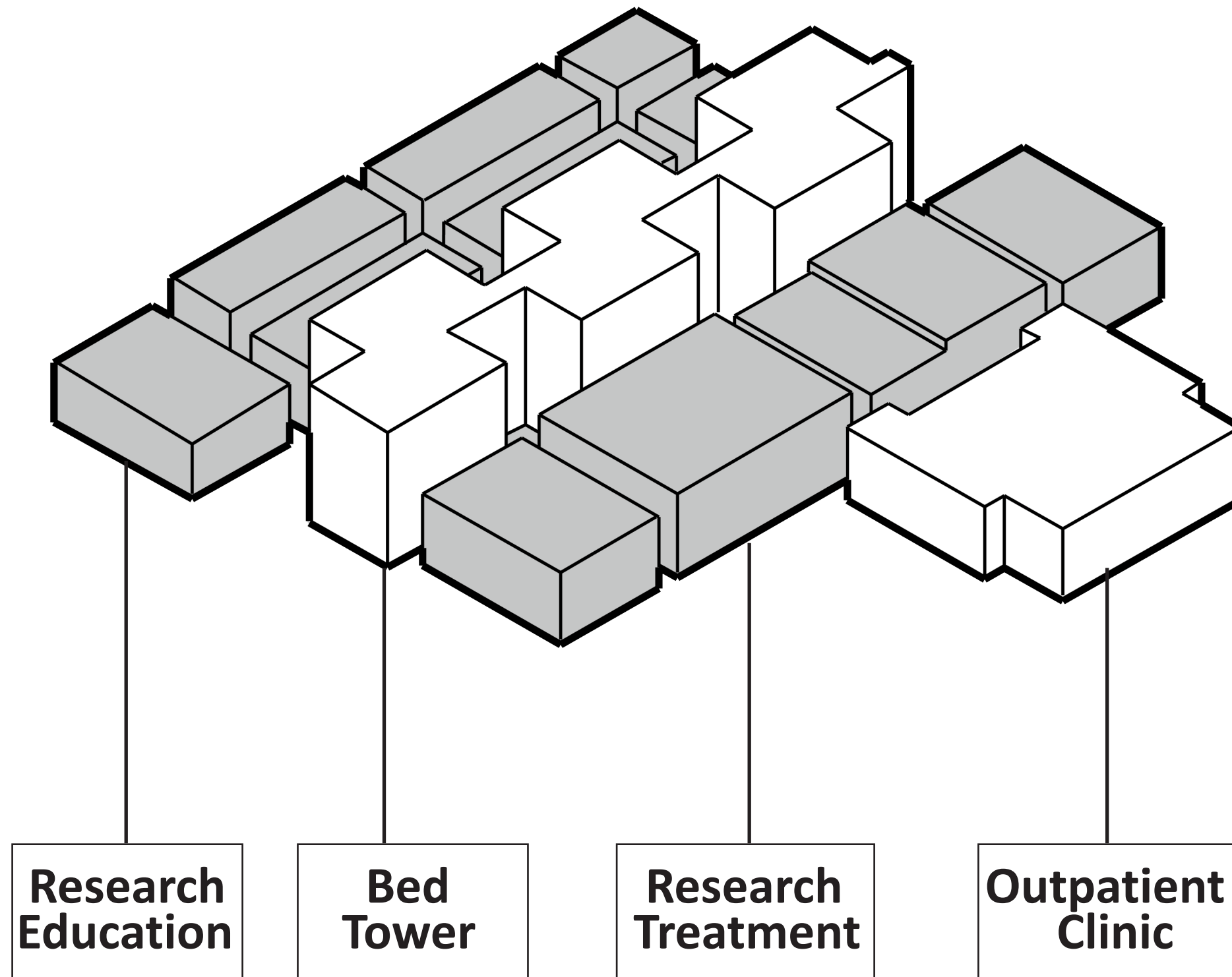
Kedi Zhou

Main tutor: Anne

Research tutor: Marcel



# ***AMC - 1983***







***What would the AMC be in 50 years?***





## ***Nursing Center***

Future Identity



***Two urgent factors***

***that are challenging the current hospitals***



# ***1. AI / Big data***

- remote diagnose*
- information network*
- new business model*



(Source: <https://gotaki.com/es/lugar/the-academic-medical-center>)

***small & acute hospital***

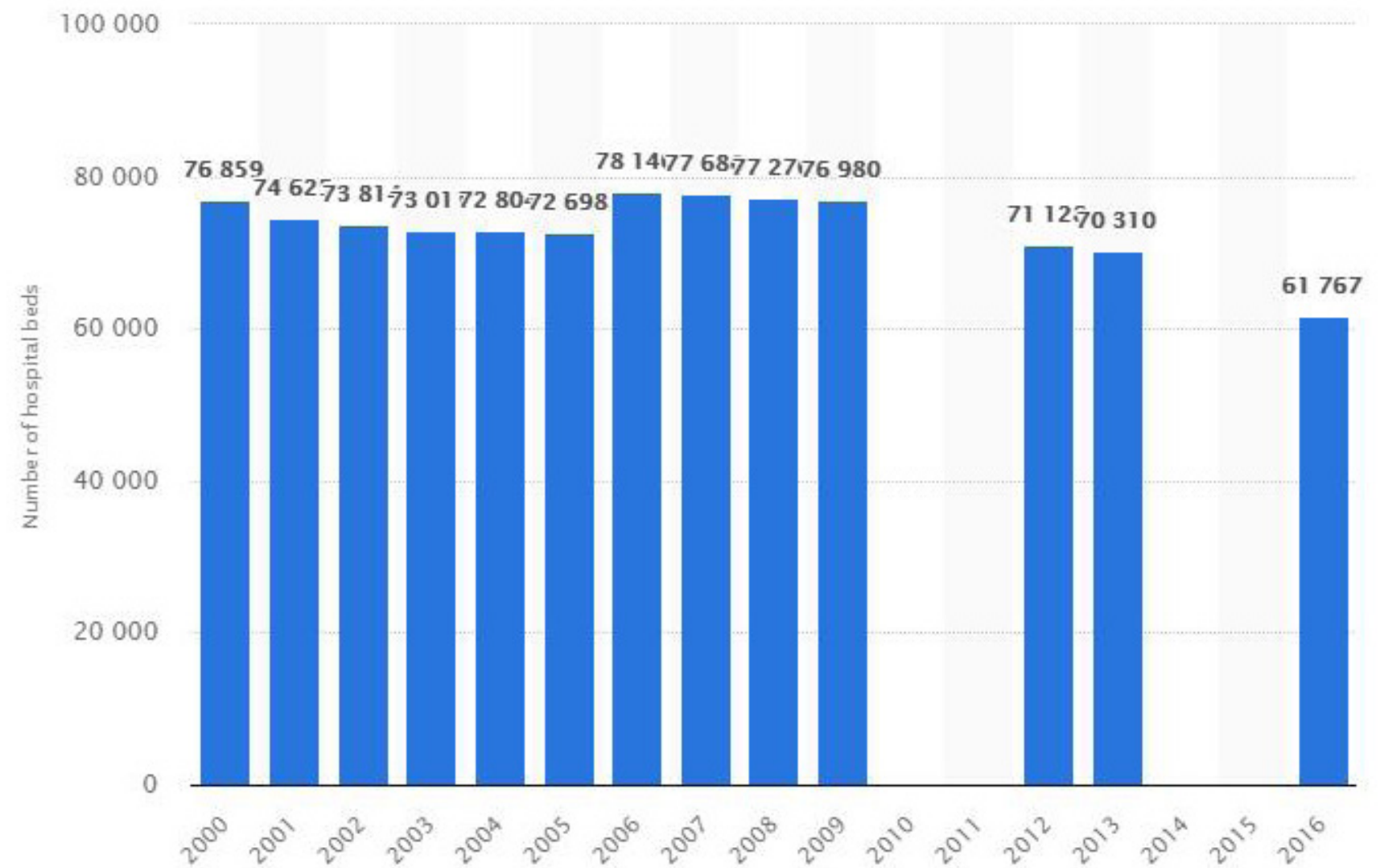


*result 1:*

## ***Spatial surplus***

*- outpatient clinics*

*- bed wards*

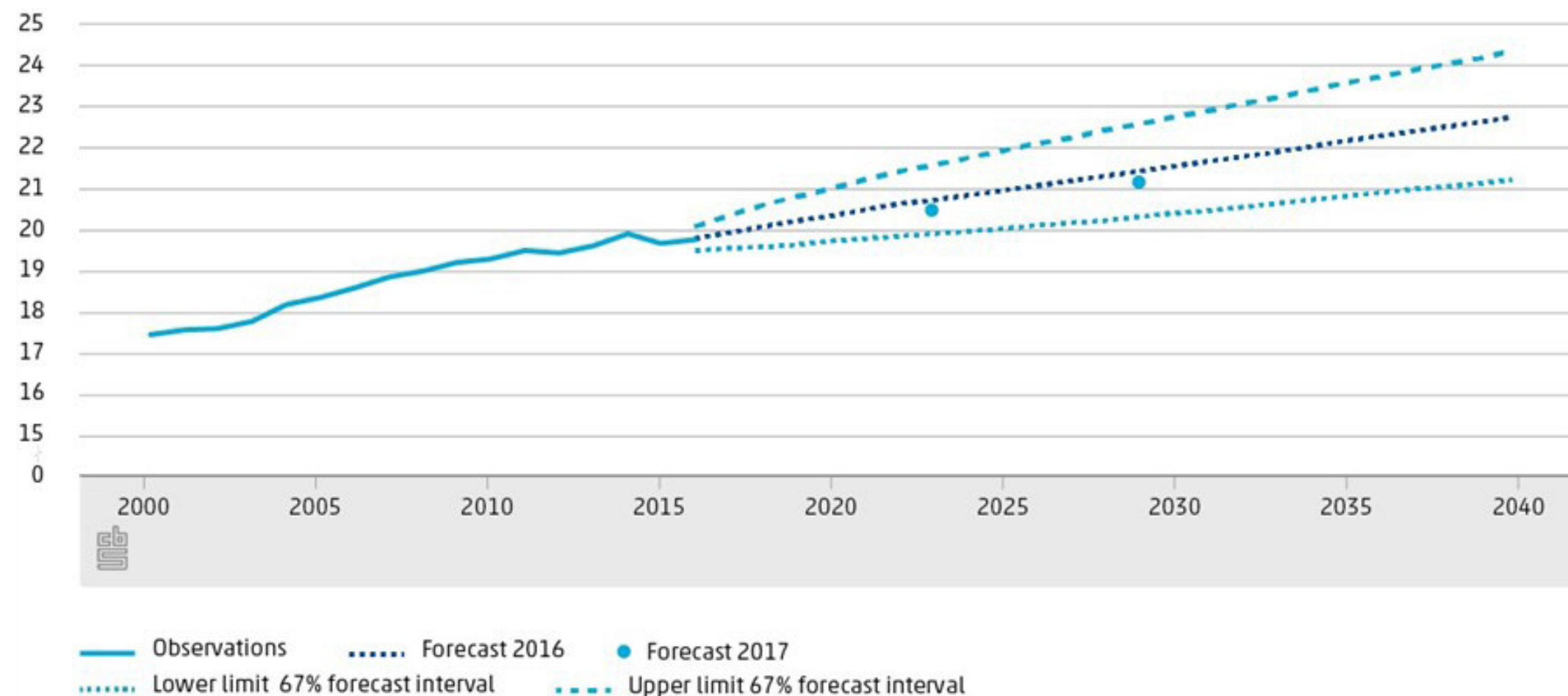


**Number of hospital beds in the Netherlands from 2000 to 2016\***

source: <https://www.statista.com/statistics/557310/hospital-beds-in-the-netherlands/>



## 2. Prolonged life expectancy



Life expectancy at age 65, observations and forecasts in Netherlands

source: Statistics Netherlands CBS, 2017

- *growing aged population*

3 million (2015) - **4.2 million** (2030)



*result 2:*

## ***Shortage of nursing institution***



- *long-term care population rising*  
will reach over **350,000** in 2050, NL



***Shortage***

*Nursing*



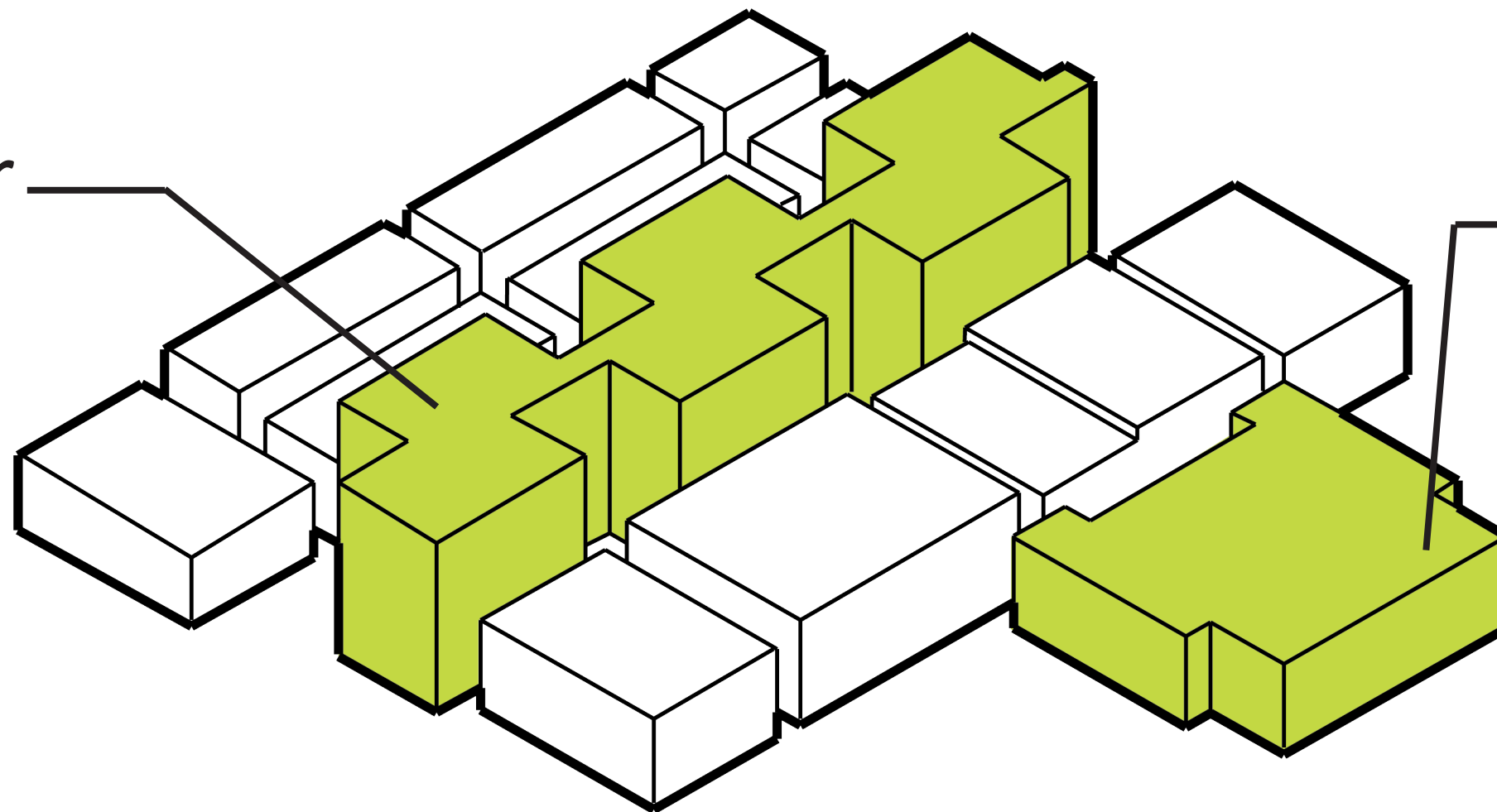
***Fill in***

***Surplus***

*hospital space*

*Bed Tower*

*Outpatient  
clinic*



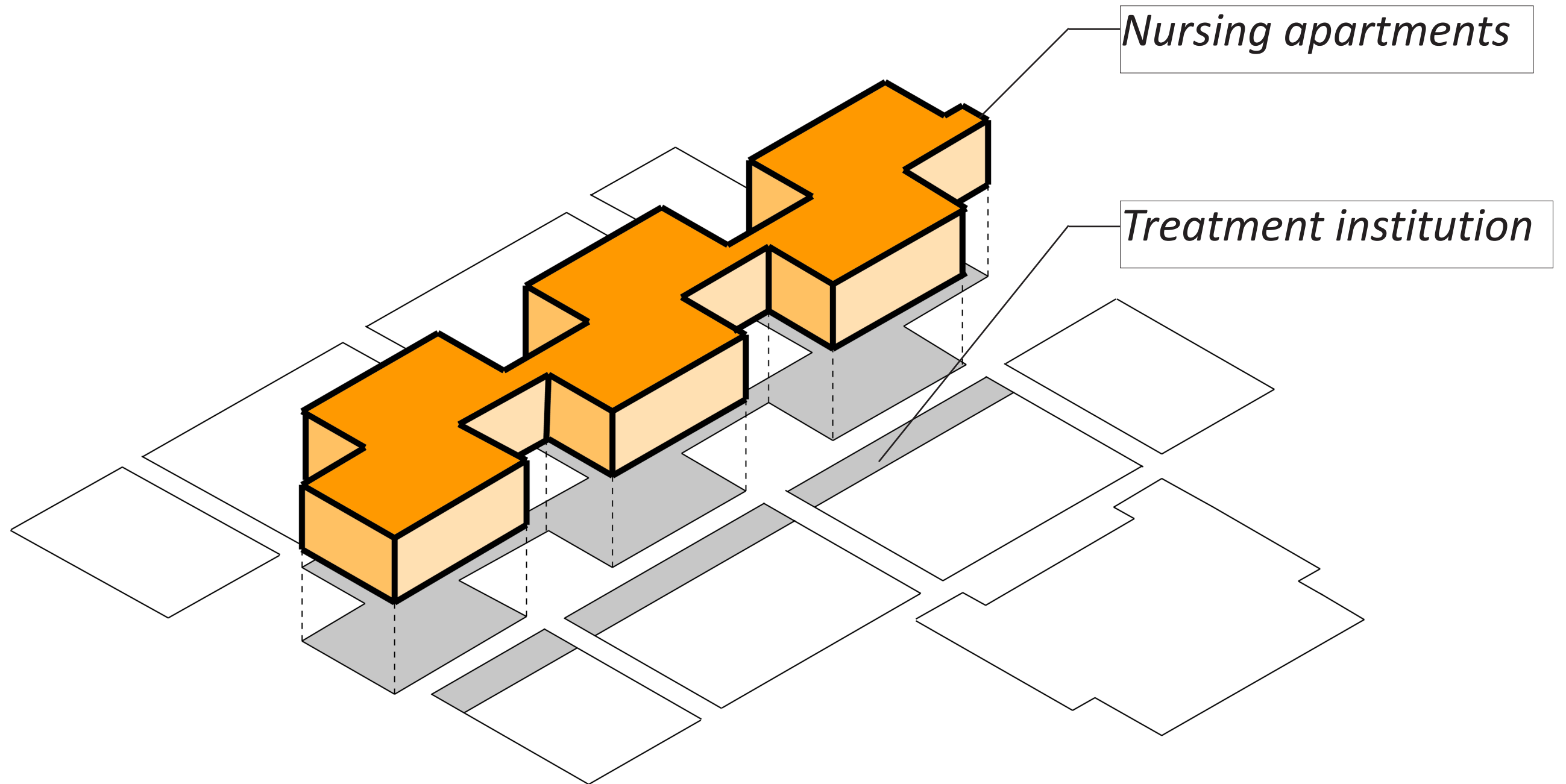
*AMC*



***A transformation plan***

***3 phases***

# ***Phase 1***

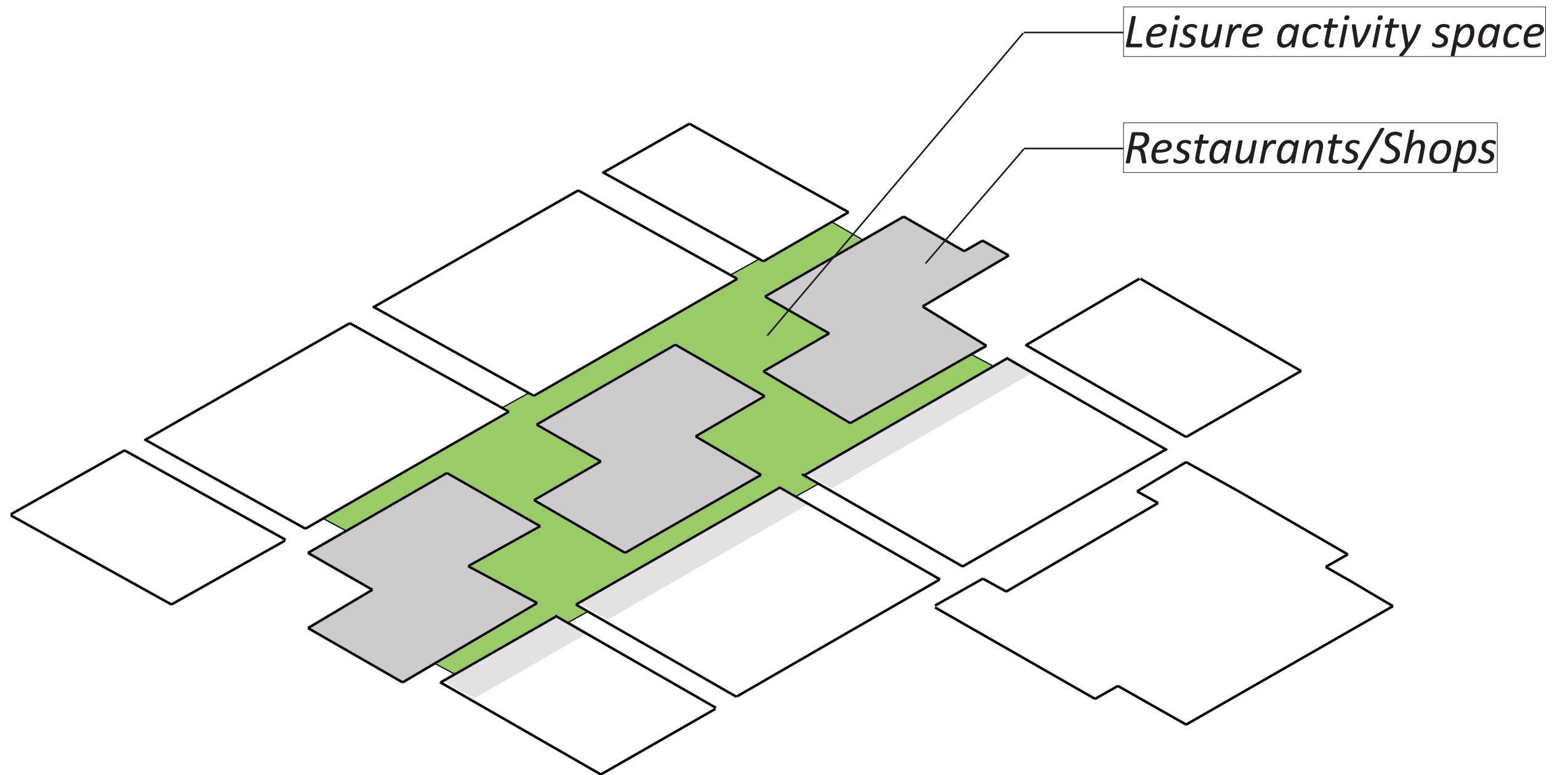


*F6-F8 Bed wards - Nursing apartments*

*50% Shopping street - Treatment institution*



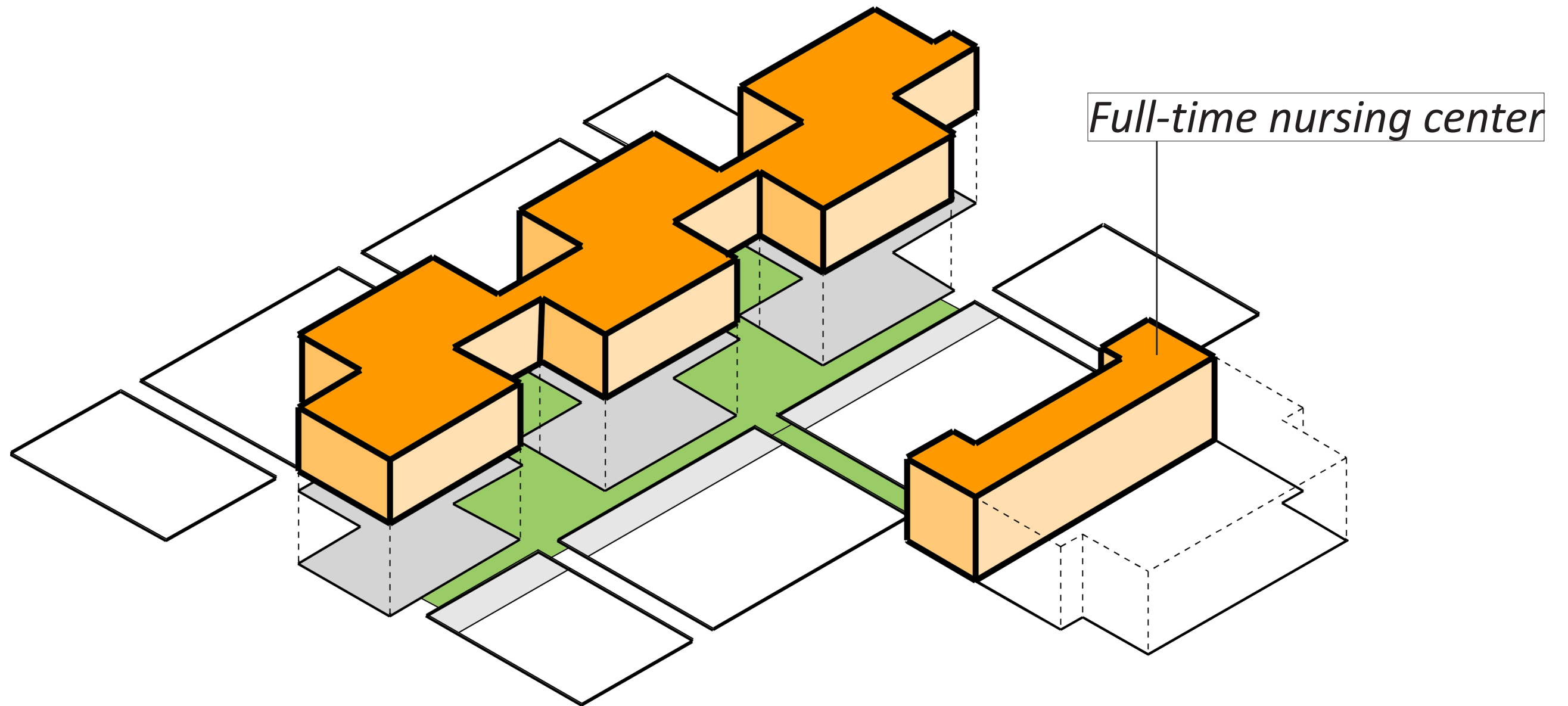
## ***Phase 2***



*Original public squares - Leisure activity space*

basic public infrastructure / bridge

## ***Phase 3***

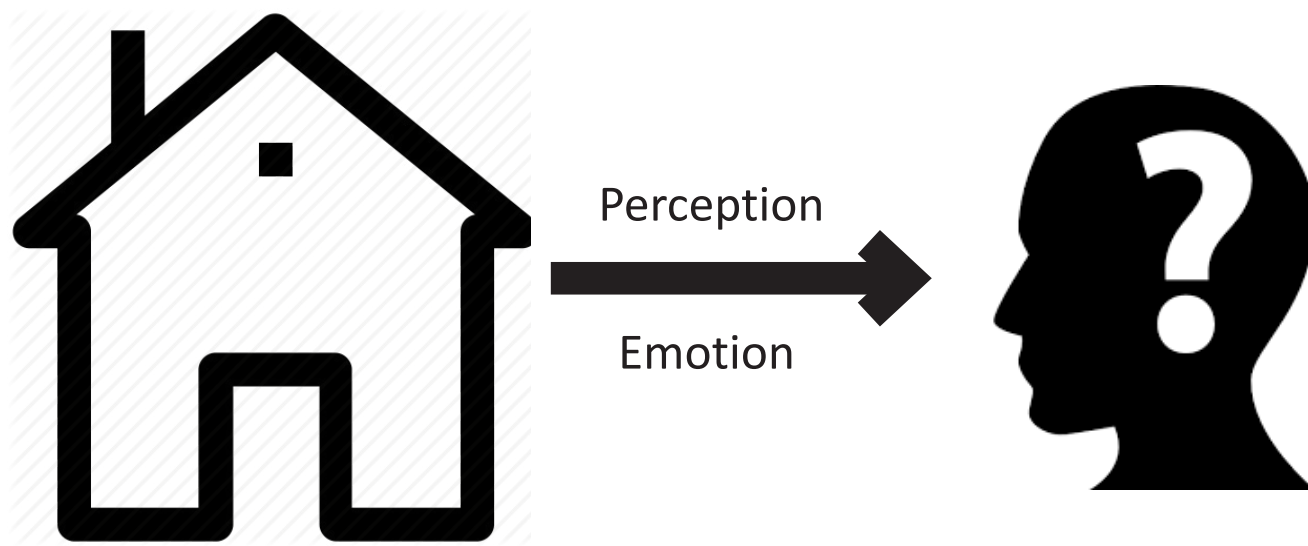


*50% Outpatient clinic - Full-time nursing center*

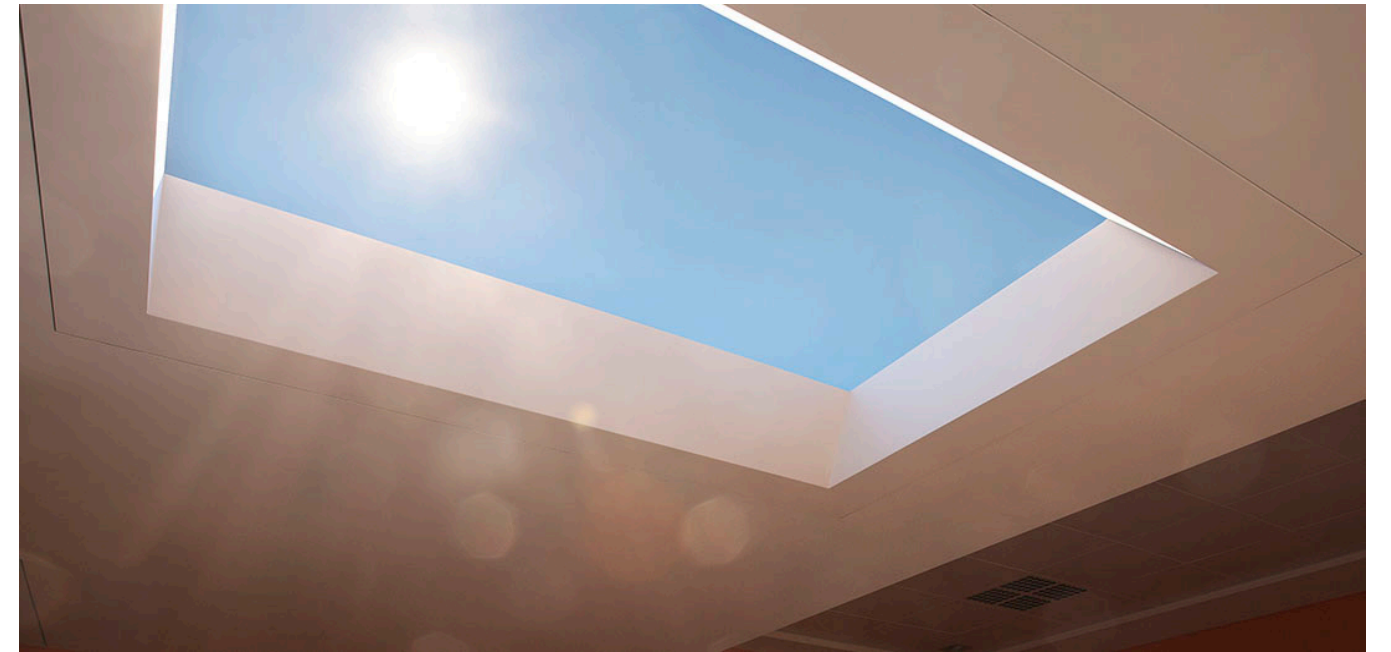




*Problem: Relocation & Adaptation*



*Positive perception & human emotions*



***Skylight***

Cognitive Map

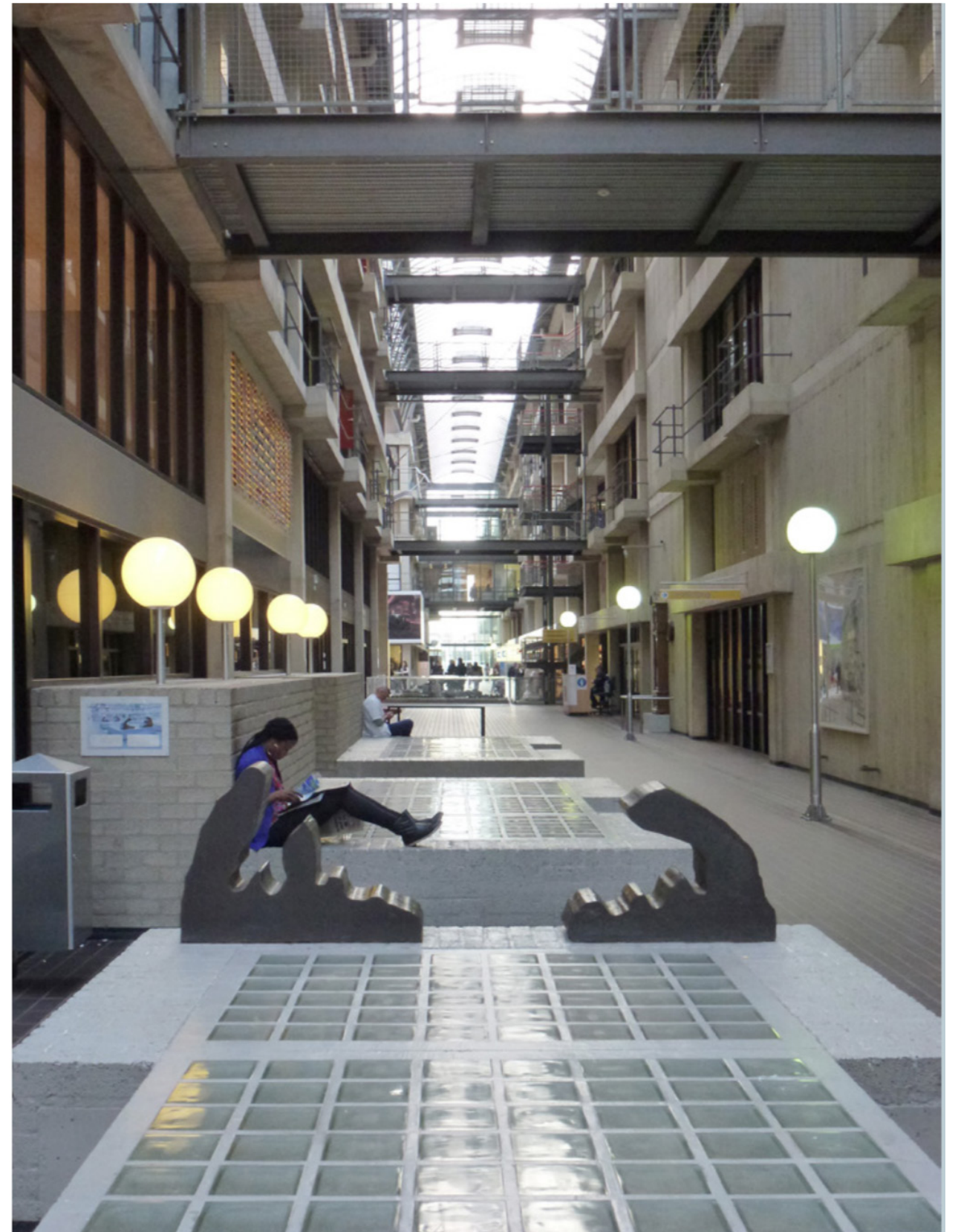


## ***Problem: Relocation & Adaptation***



***Leisure activities***





*Public spaces in AMC*



direct



diffused

bright



dim

central



peripheral

warm



cold

***Four lighting modes***

Light	Positive influence	Negative influence	Implementation
Bright	attention; excited; efficiency; intensify positive emotions	stress and anxiety when over-lighting	atrium; exhibition hall; reading room
Dim	calmness; steady; security	depression risk when prolonged	meditating room; lounge



Bright: Nadir Afonso Contemporary Art Museum

(source left : <https://www.architonic.com/en/project/alvaro-siza-vieira-nadir-afonso-foundation/5103884>)



Dim: Church of Light

(source right: source: <https://www.archdaily.com/101260/ad-classics-church-of-the-light-tadao-ando>)



Light	Positive influence	Negative influence	Implementation
Direct	visual clarity; pleasant; sense of nature	intense dirctional light causes stress	most public spaces providing relaxing and natural environment
Diffused	attention; efficiency	stress; disoriented; spacialness	library; working space



Direct: Seattle Public Library

(source left : source: <https://www.archdaily.com/11651/seattle-central-library-oma-lmn>)



Diffused: Bagsvaerd Church

(source right: source: <http://pikde.com/media/96686723221678623>)



Light	Positive influence	Negative influence	Implementation
Central	attention; sense of intensity; efficiency	stress and anxiety when intensified	working space; stage
Perimeter	relaxing; hospitality	lack of sense of space; disoriented	lounge; chatting space; private booth



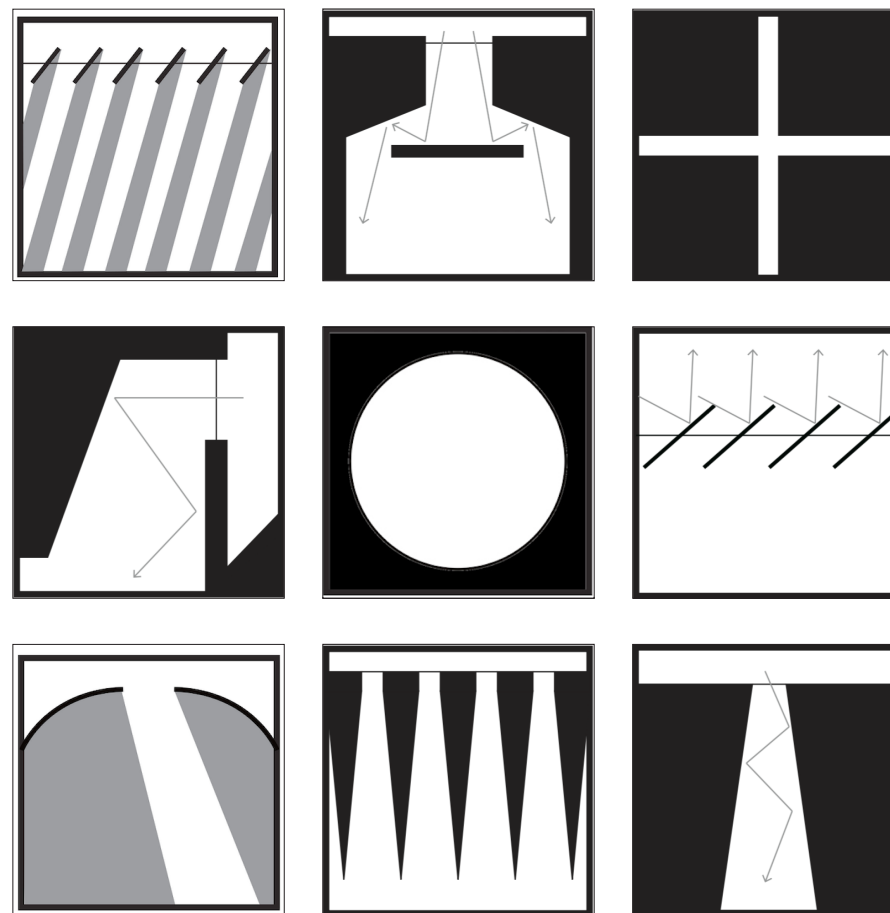
Central: Warehouse Office

(source left:<https://archello.com/story/41581/attachments/photos-videos/1>)



Perimeter: Rothko Chapel

(source right: <https://www.atlasobscura.com/places/rothko-chapel>)



## ***Case Studies***

*How to shape different ambient skylight through architectural methods?*



## ***Direct Light 1:***



***Method:***  
***Single Bright Spot***



source: <https://www.shutterstock.com/zh/image-photo/inside-pantheon-rome-italy-28-june-634914992?studio=1>

***Case Study 1:***  
***Pantheon, Rome***

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*

## ***Direct Light 2:***



***Method:***  
*Textured Shades*



***Case Study 2:***  
*Seattle Public Library, U.S.*

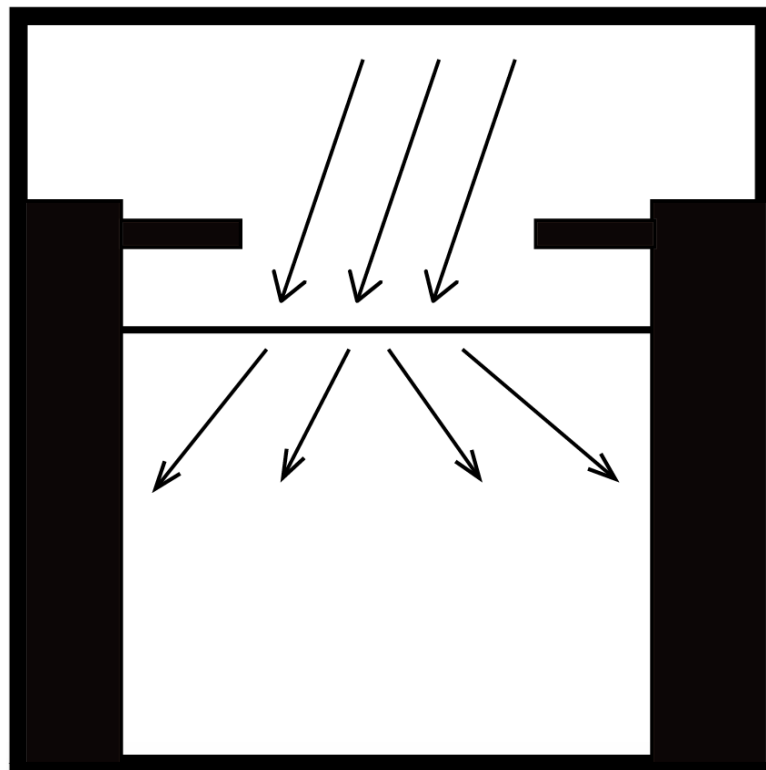
source: <https://www.archdaily.com/11651/seattle-central-library-oma-lmn>

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*



## ***Diffused Light - Filtration***



### ***Method:***

*Filtered with Panels*



source: <https://www.architonic.com/en/project/alvaro-siza-vieira-nadir-afonso-foundation/5103884>

### ***Case Study 3:***

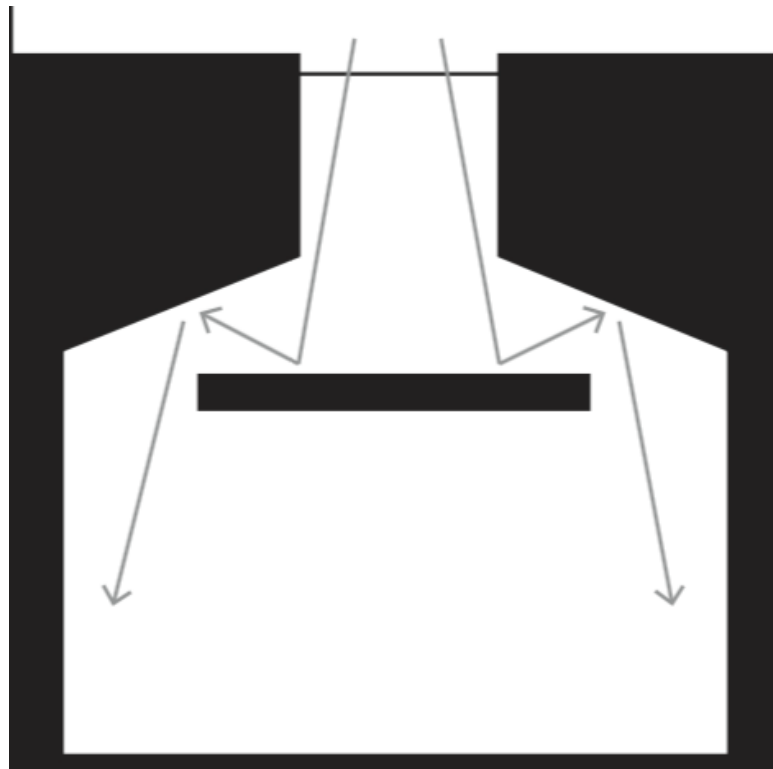
*Nadir Afonso Contemporary Art Museum*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*



## ***Diffused Light - Reflection Top-down Lighting 1***



***Method:***  
*Additional Panel*



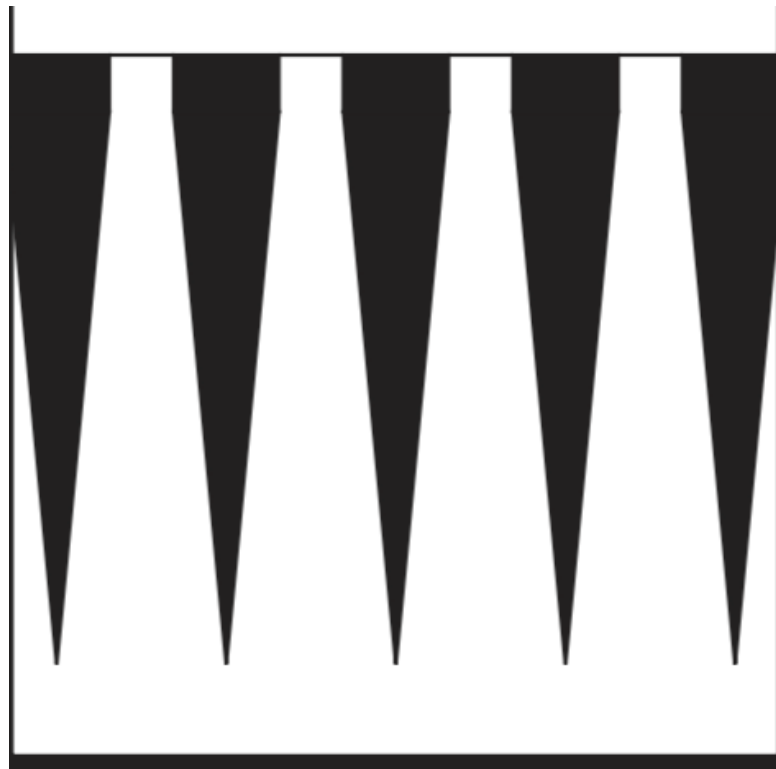
source: <https://www.kimbellart.org/>

***Case Study 4:***  
*Kimbell Art Museum, U.S.*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*

## ***Diffused Light - Reflection Top-down Lighting 2***



***Method:***  
*Vertical Void Reflection*



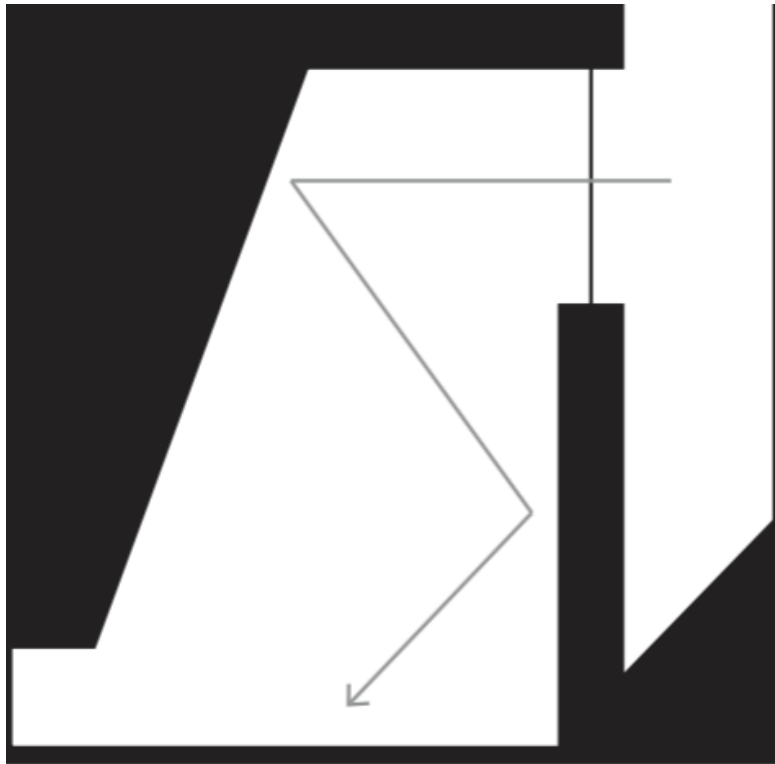
***Case Study 5:***  
*Herz Jesu Church, Munich*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*

source: <https://www.architectural-review.com/essays/reviews/peter-zumthor-the-swiss-shaman/8667039.article>

## ***Diffused Light - Reflection Side Lighting***



***Method:***  
*Side Void Reflection*



source: <http://pikde.com/media/96686723221678623>

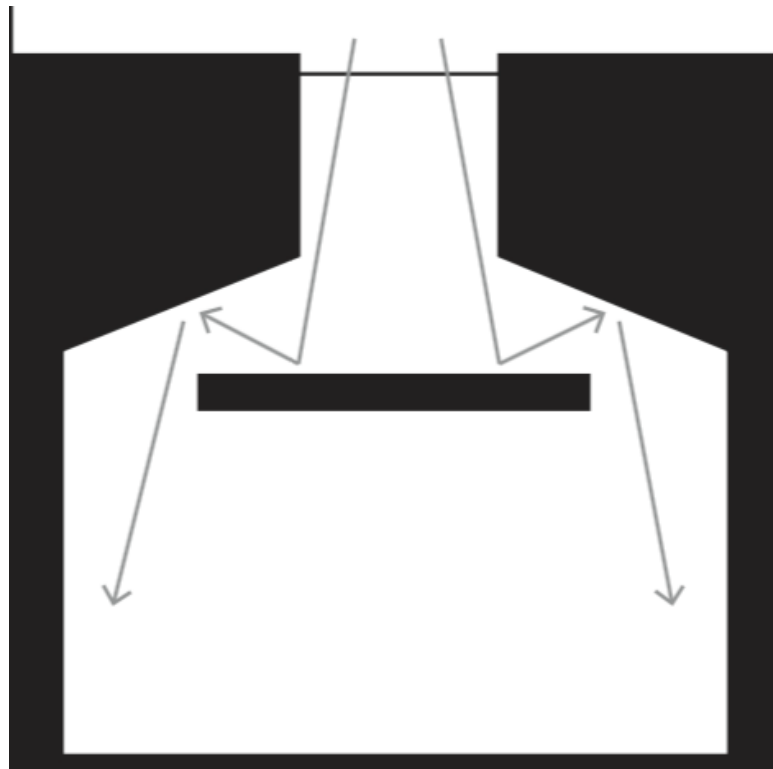
***Case Study 6:***  
*Bagsvaerd Church, Denmark*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*



## ***Peripheral Light:***



***Method:***  
*Peripheral Reflection*



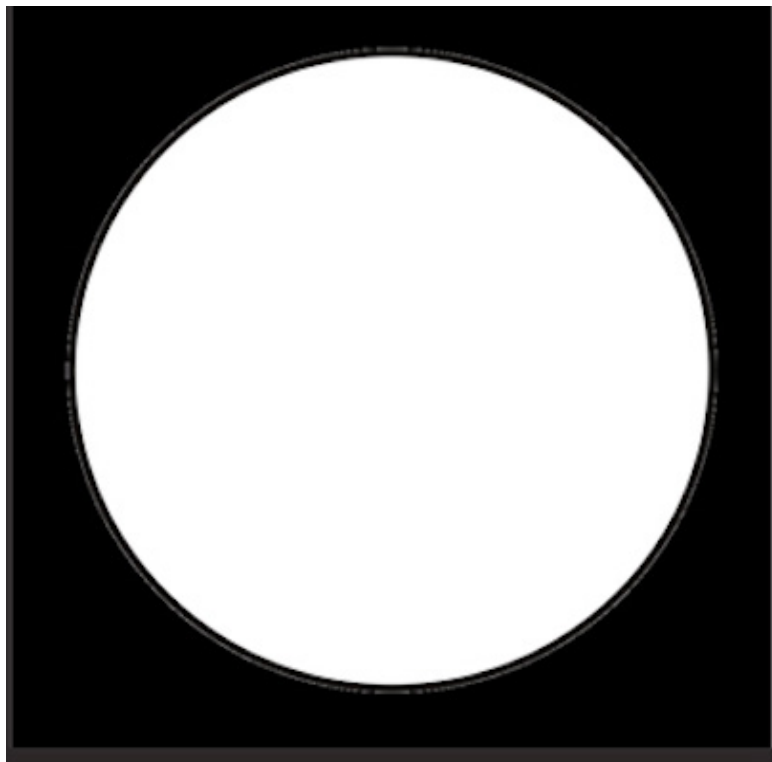
source: <https://www.atlasobscura.com/places/rothko-chapel>

***Case Study 7:***  
*Rothko Chapel, U.S.*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*

***Bright Light:***



***Method:***  
***Big Opening***



source: <https://www.are.na/hanna-thayer/architecture-odlgcxprey>

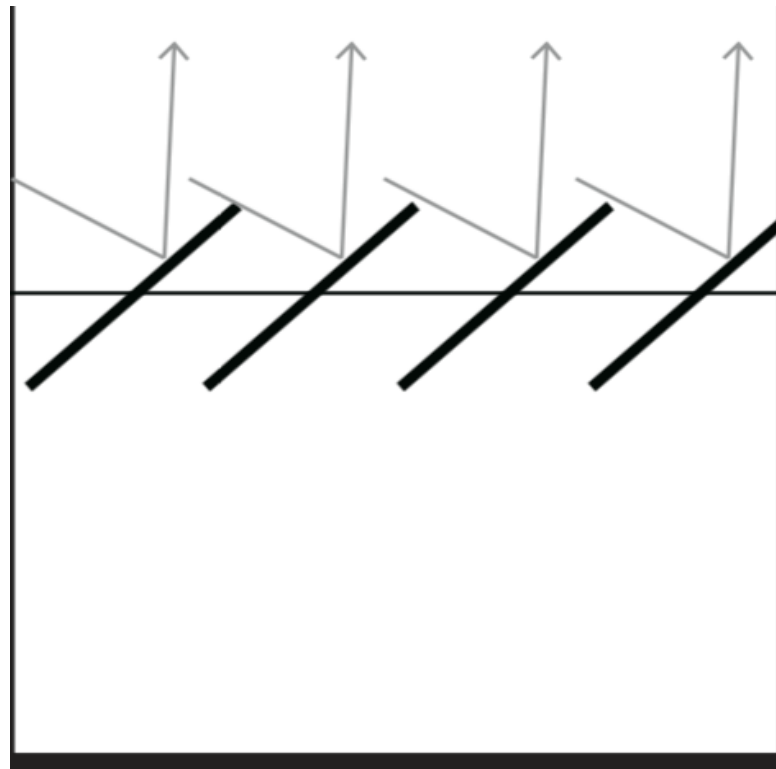
***Case Study 8:***  
***Teshima Art Museum, Japan***

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*



### ***Dim Light 1:***



***Method:***  
***Rebound***



source: <https://tshaonline.org/handbook/online/articles/klm06>

***Case Study 9:***  
***Menil Collection Museum***

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*

## ***Dim Light 2:***



***Method:***  
*Small Opening*



source: <https://www.archdaily.com/101260/ad-classics-church-of-the-light-tadao-ando>

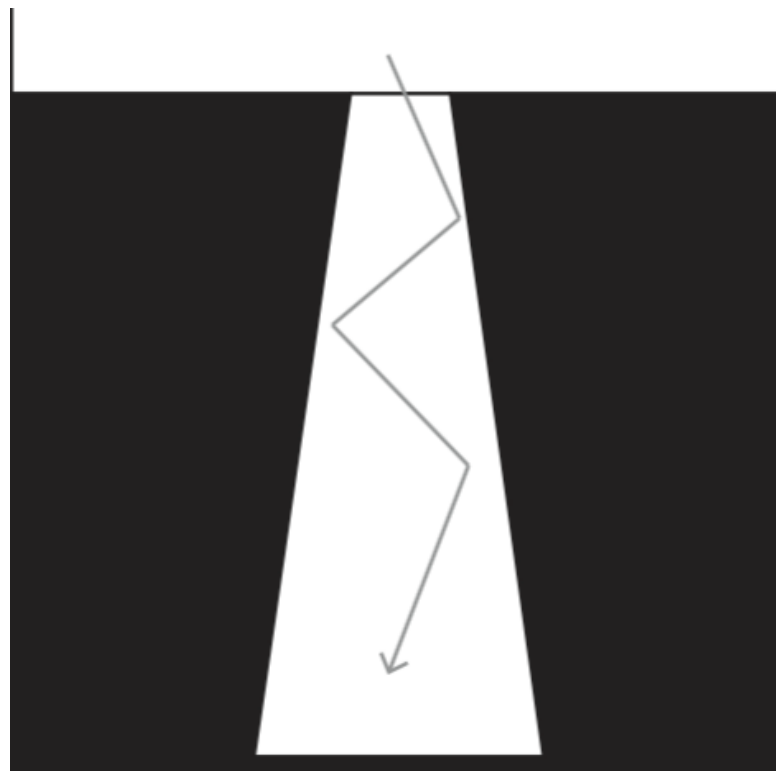
***Case Study 10:***  
*Church of Light, Japan*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*



### ***Dim Light 3:***



### ***Method:***

*Deep Void / Single Small Opening*



source: <https://ryanpanos.tumblr.com/post/51055501233/bruder-klaus-kapelle-chapel-by-peter-zumthor>

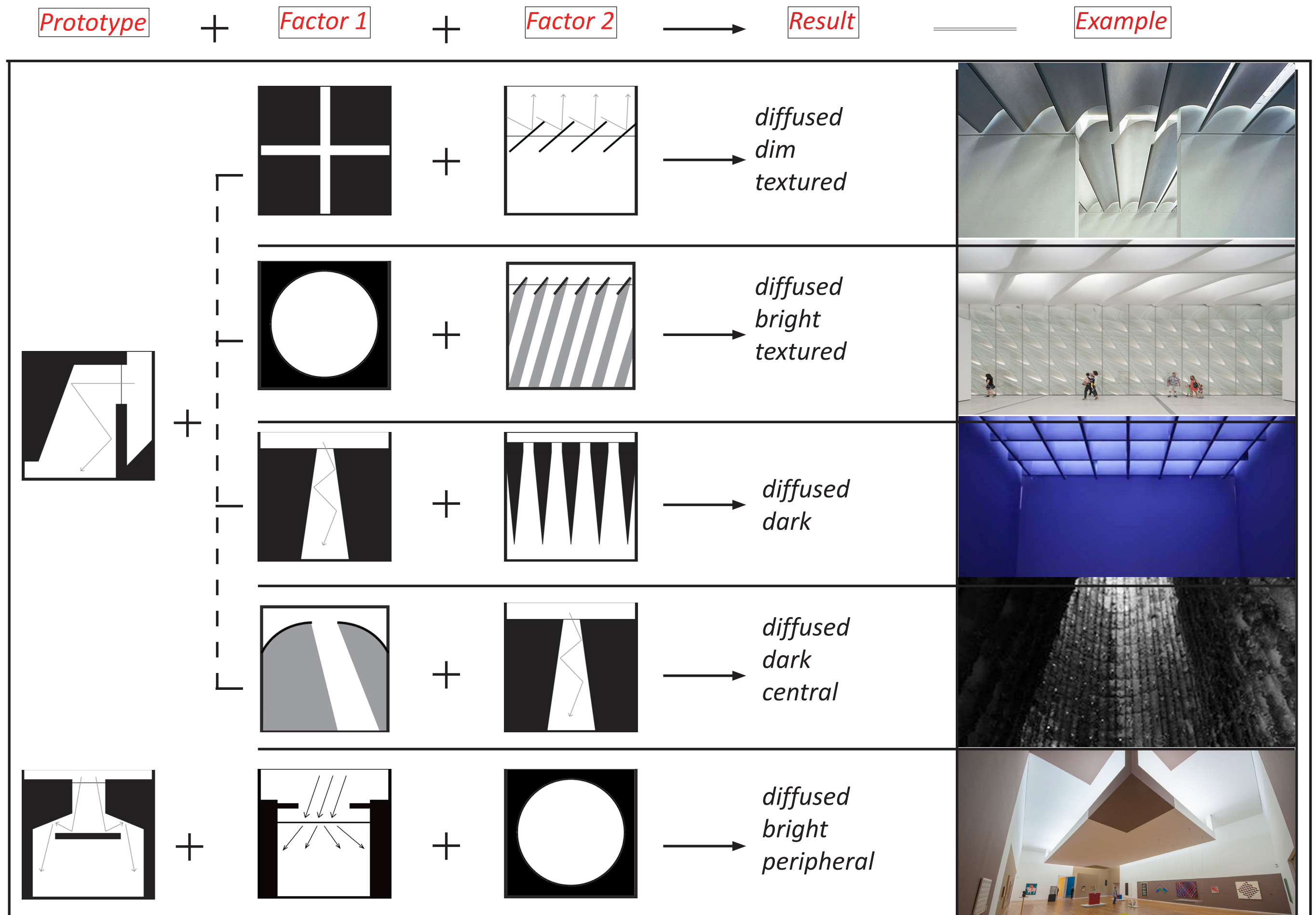
### ***Case Study 11:***

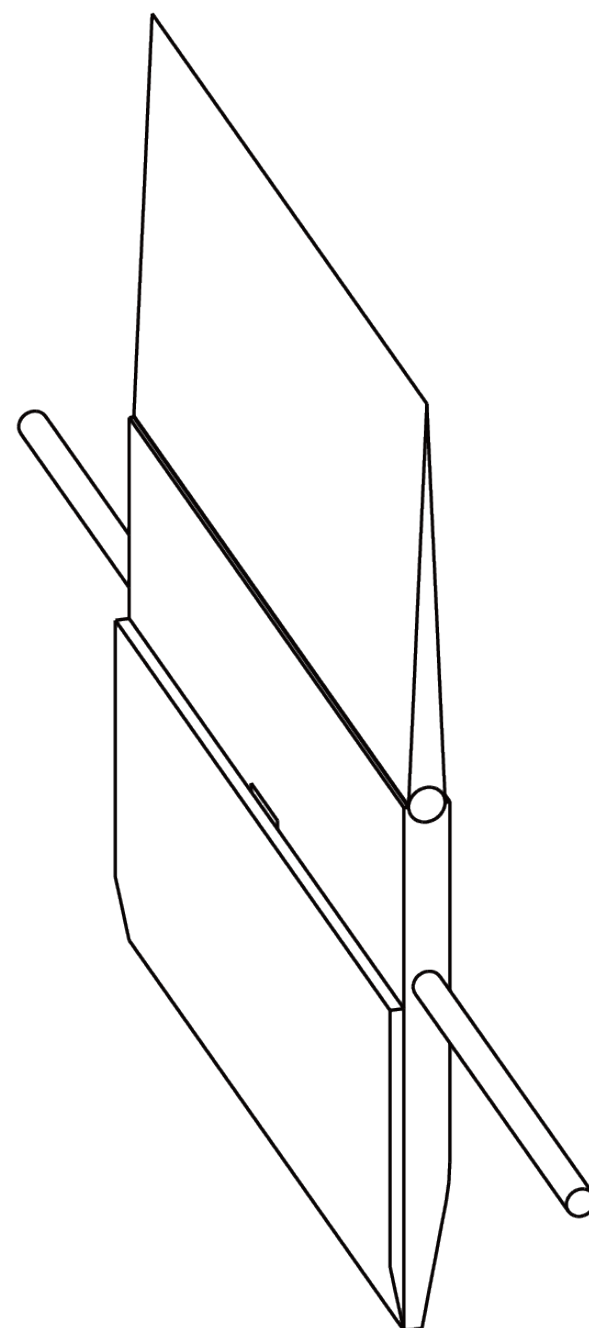
*Bruder Klaus Chapel, DE*

***Ambient Light:*** *Natural / Change through time / Directional / Bright*

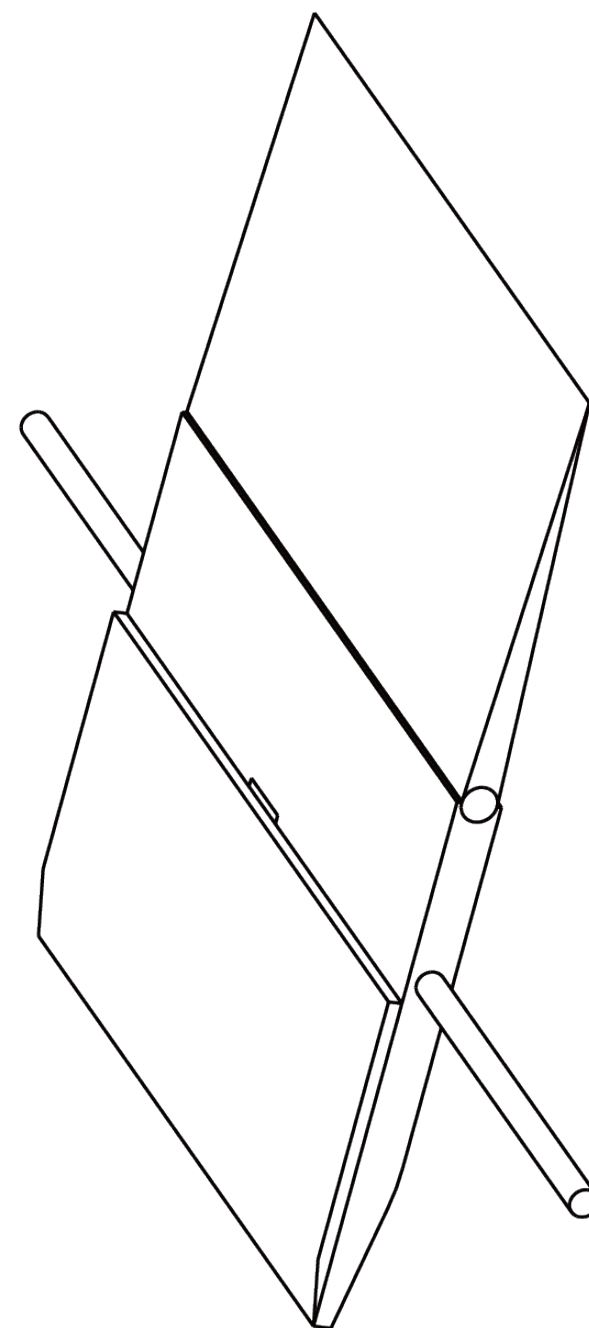
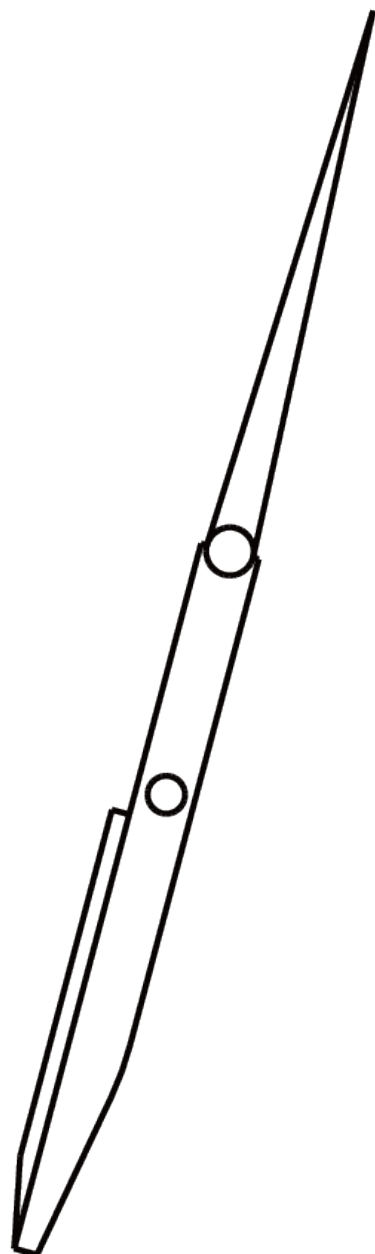
***Emotional Response:*** *Sense of universe or nature / Circadian Rhythm*

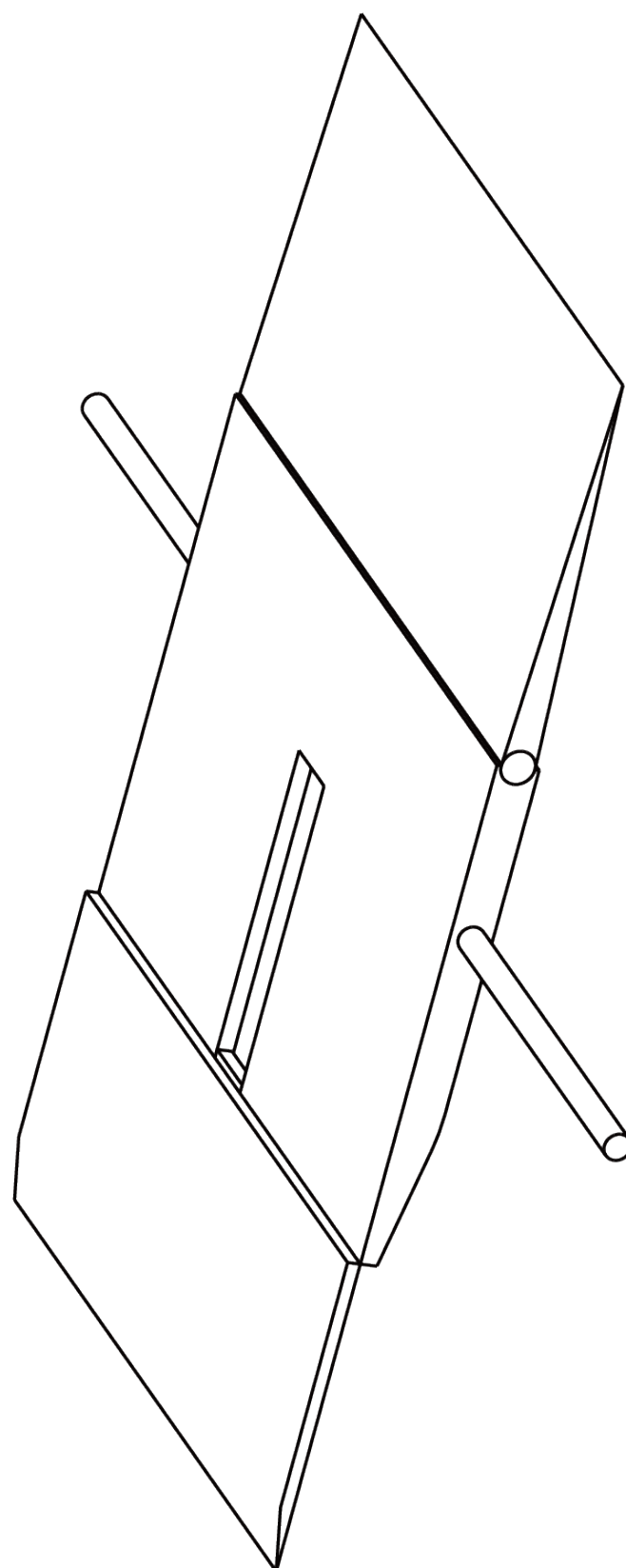
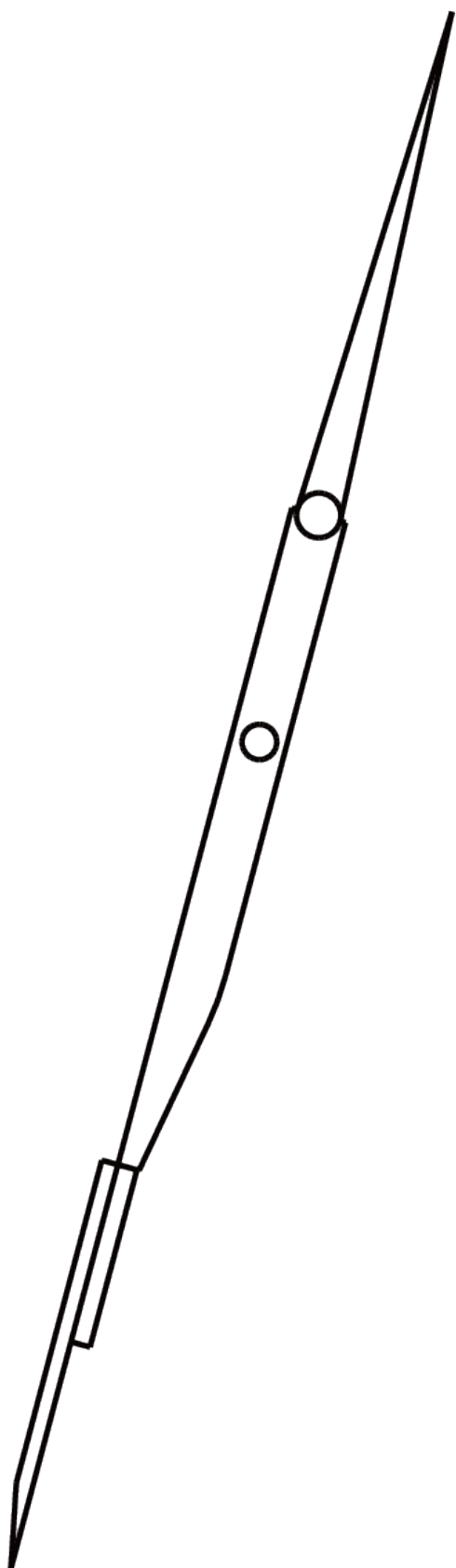
# The Cooperation of Different Factors

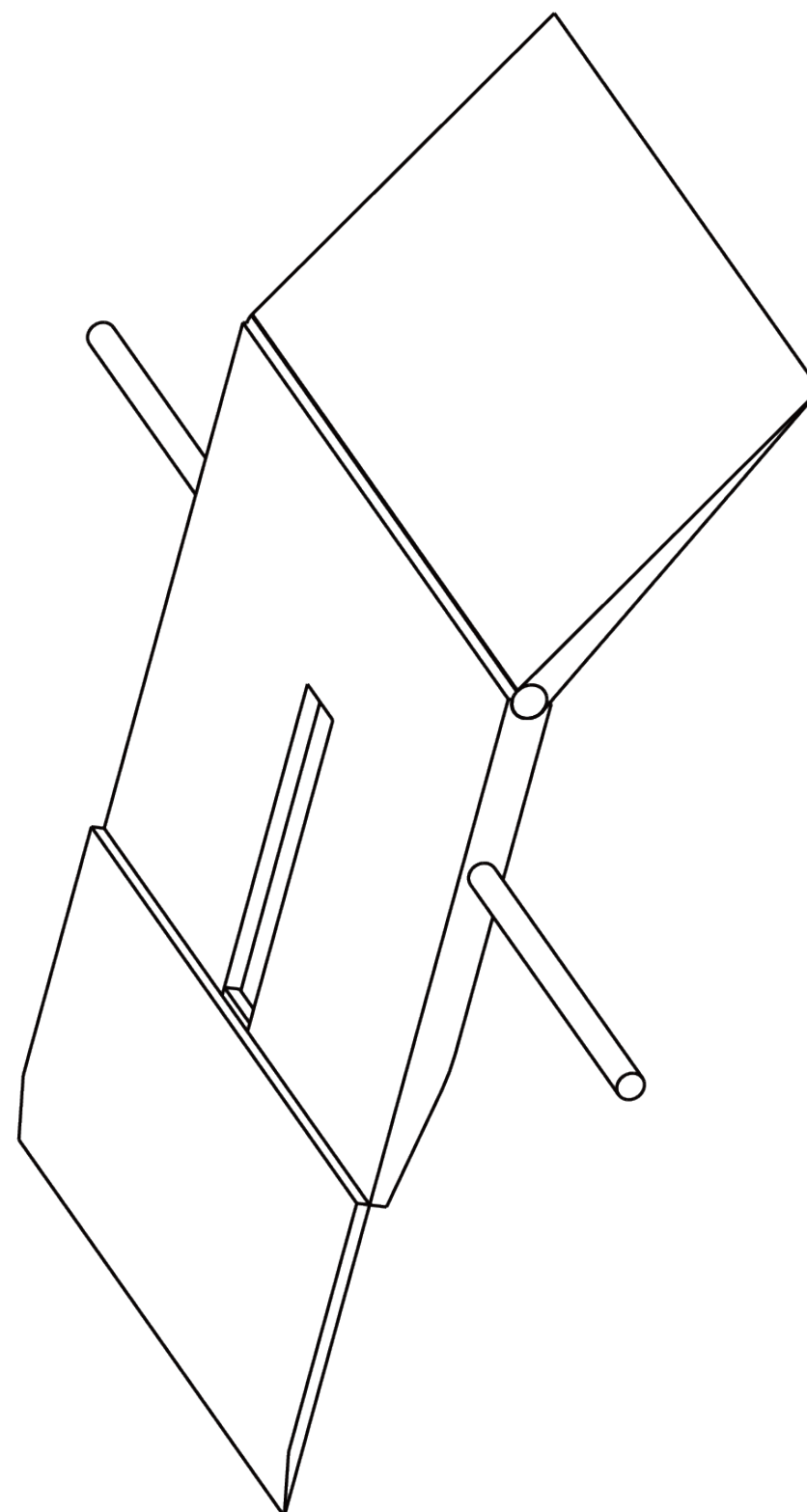
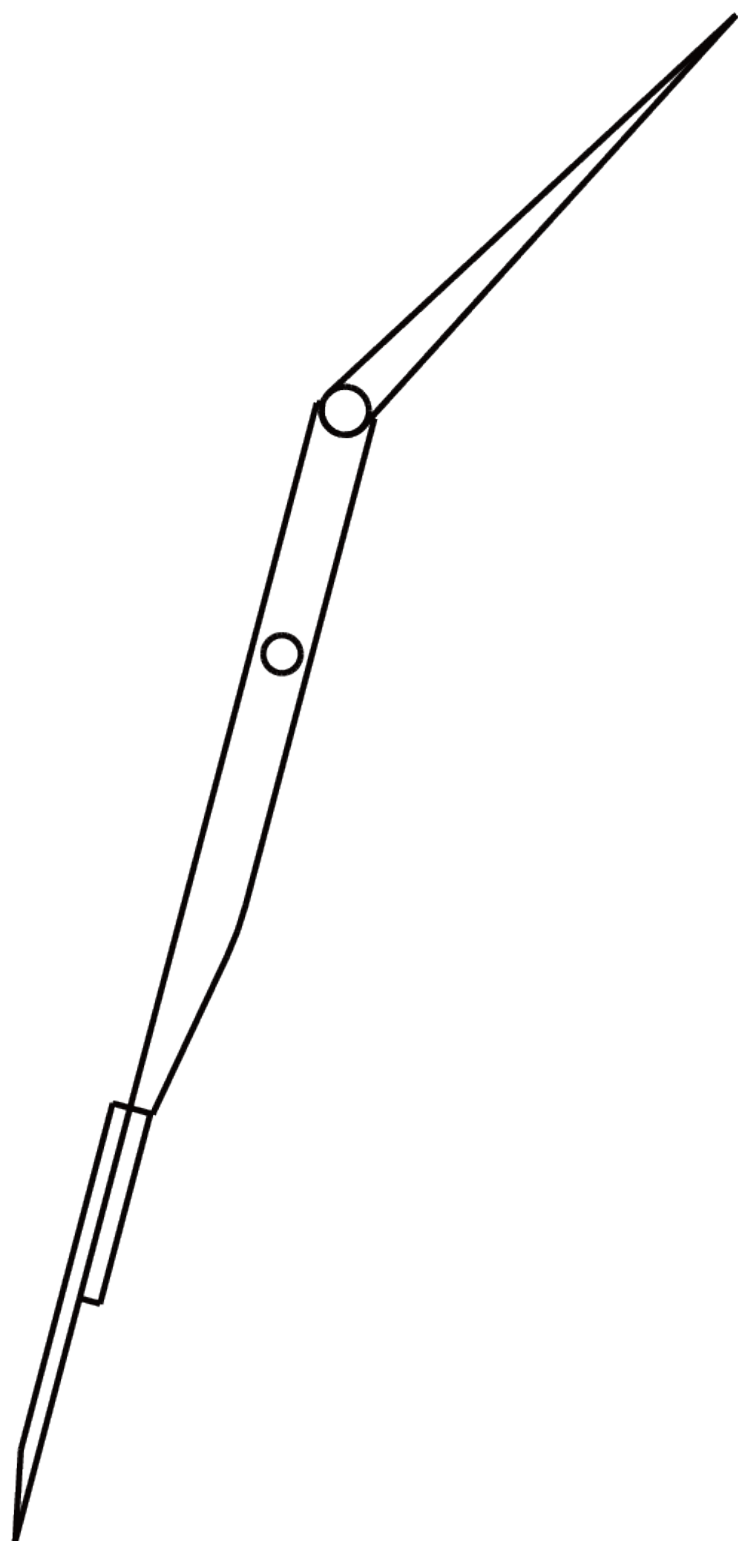




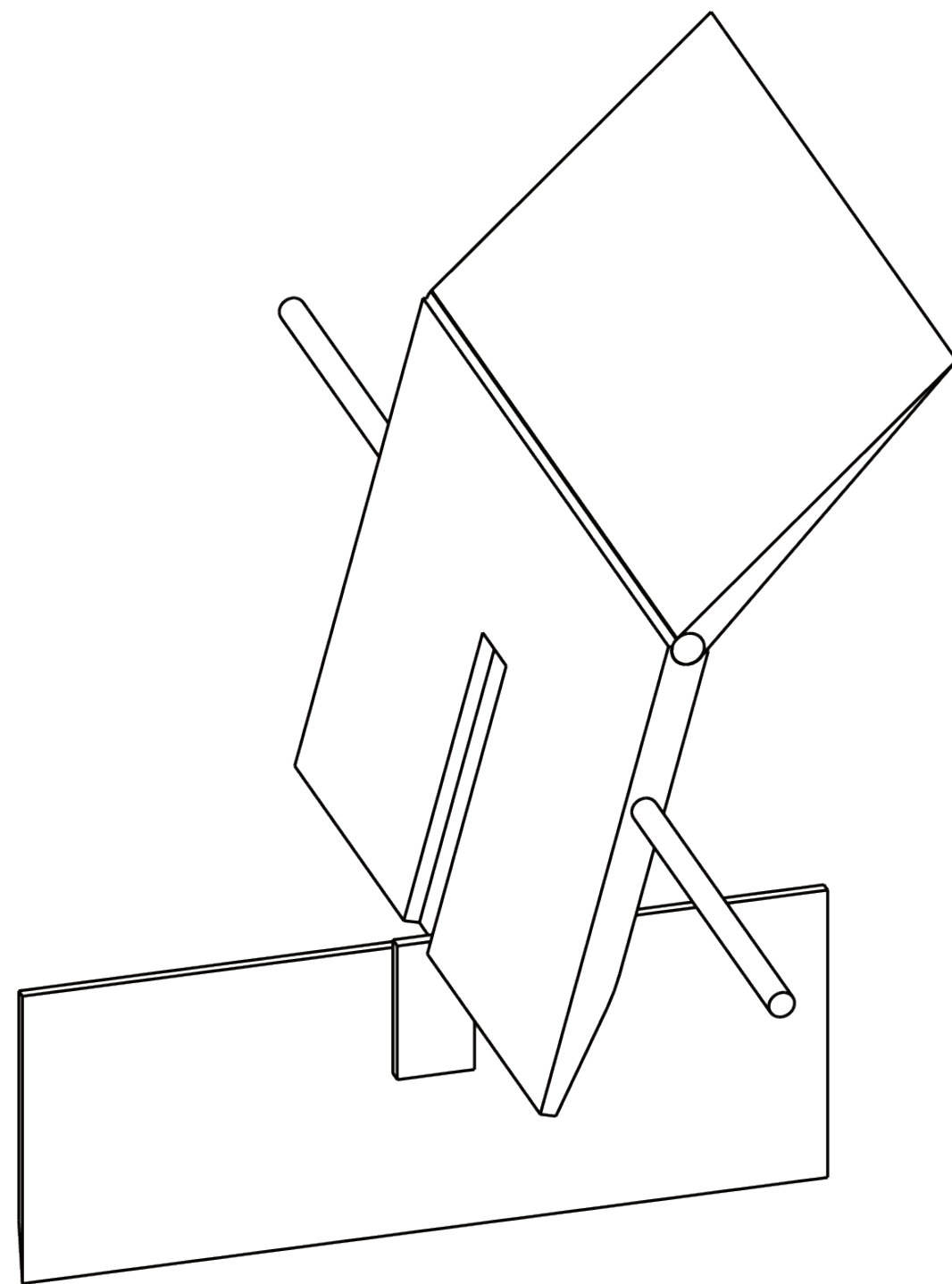
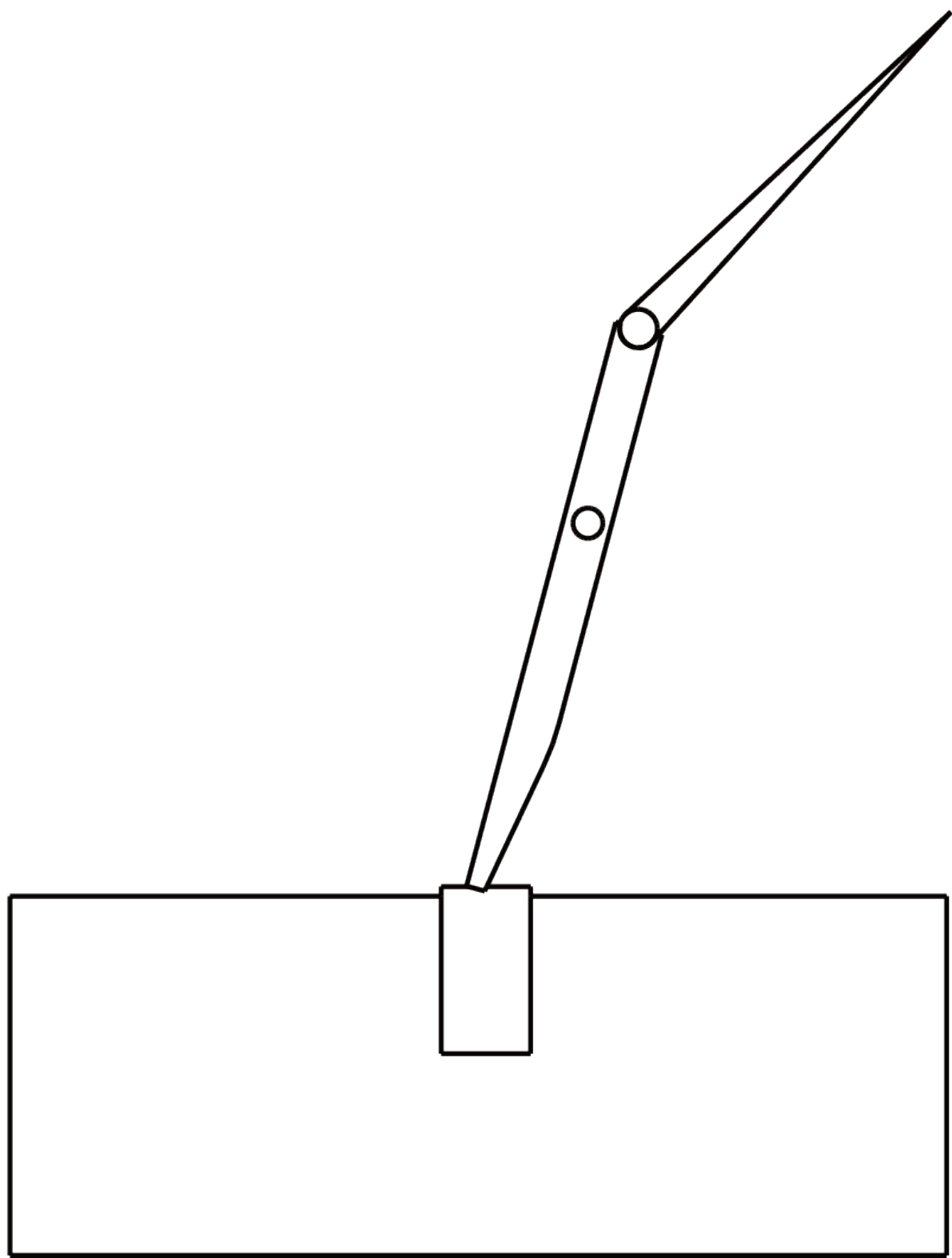


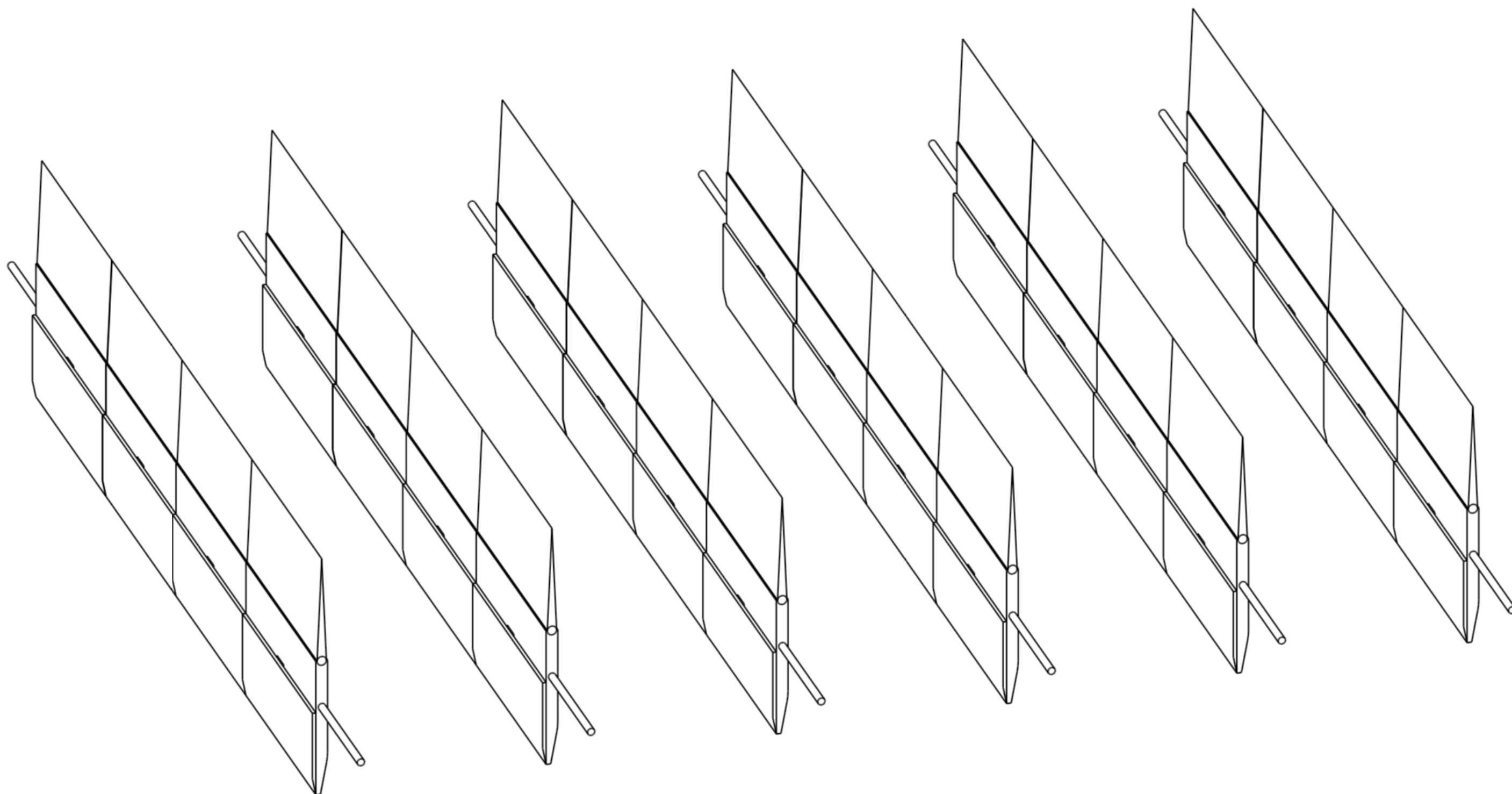


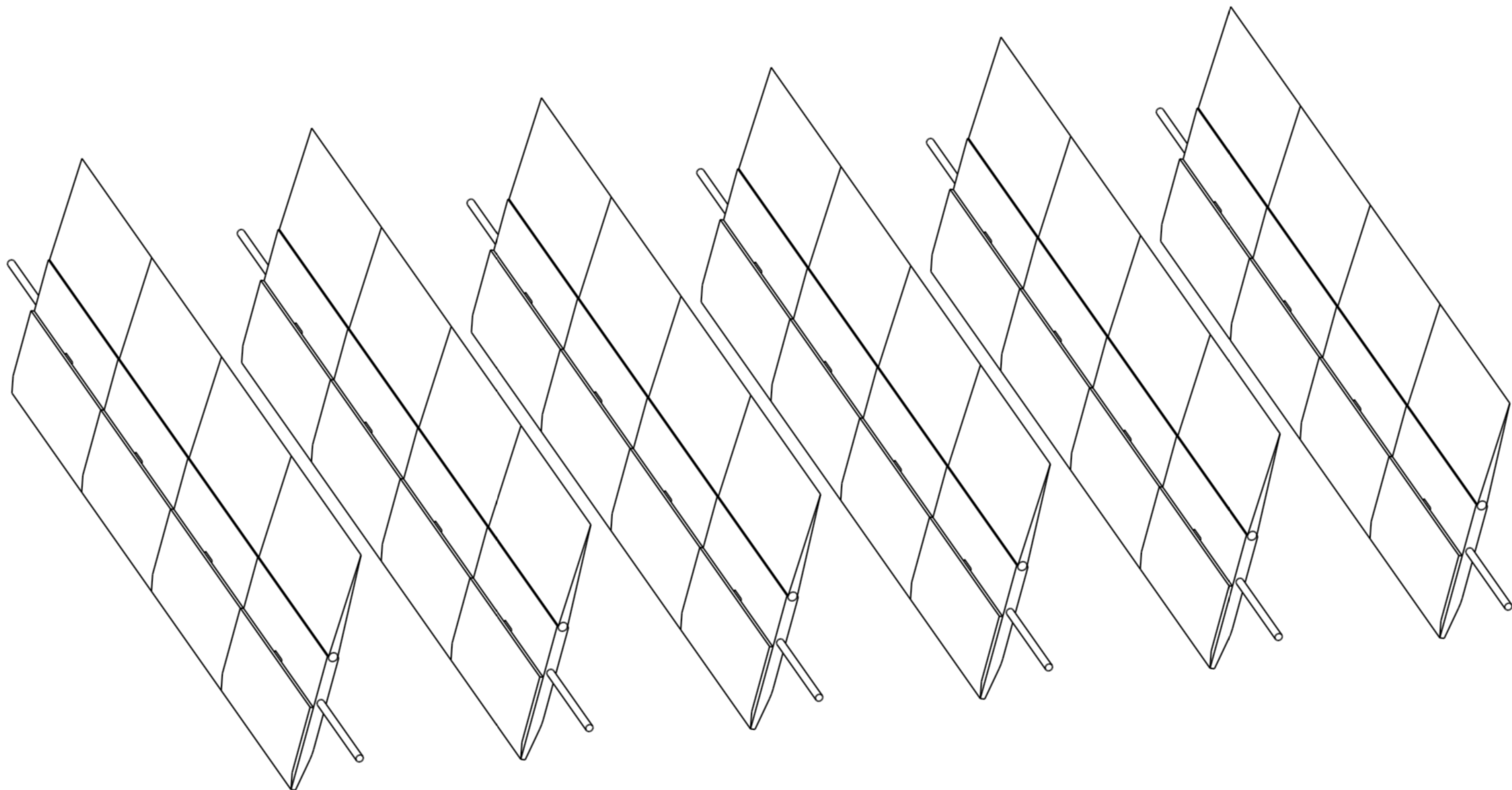




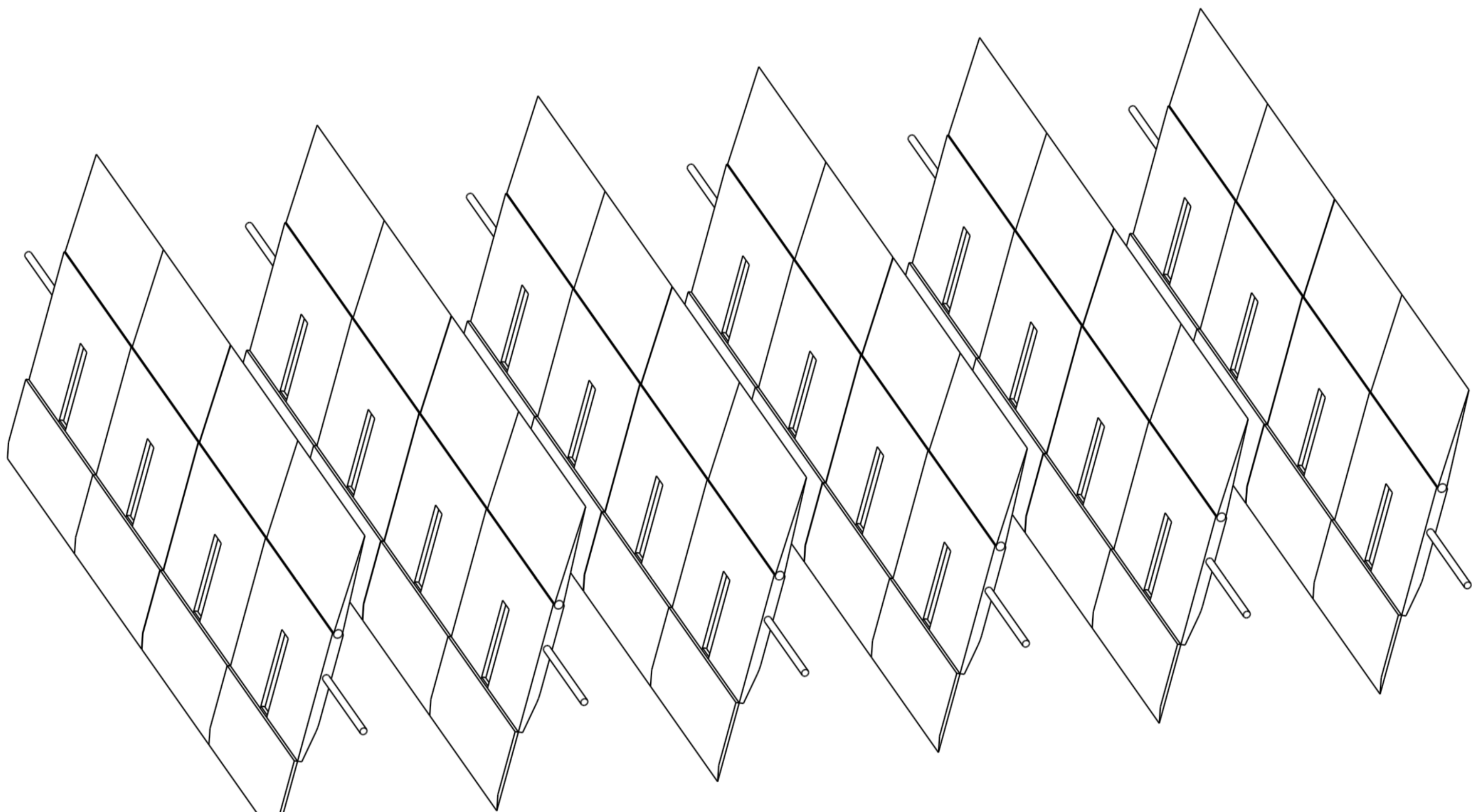


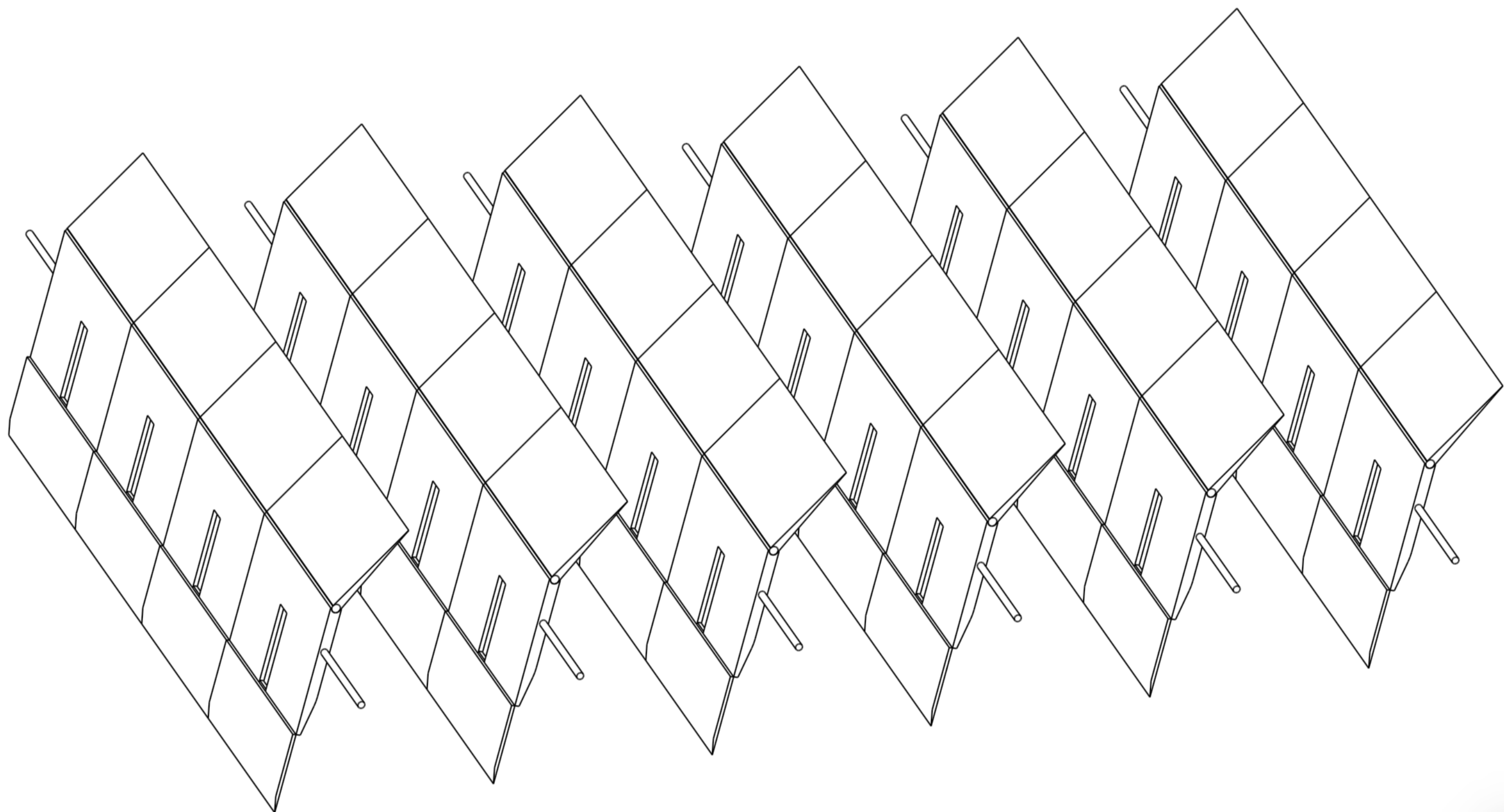


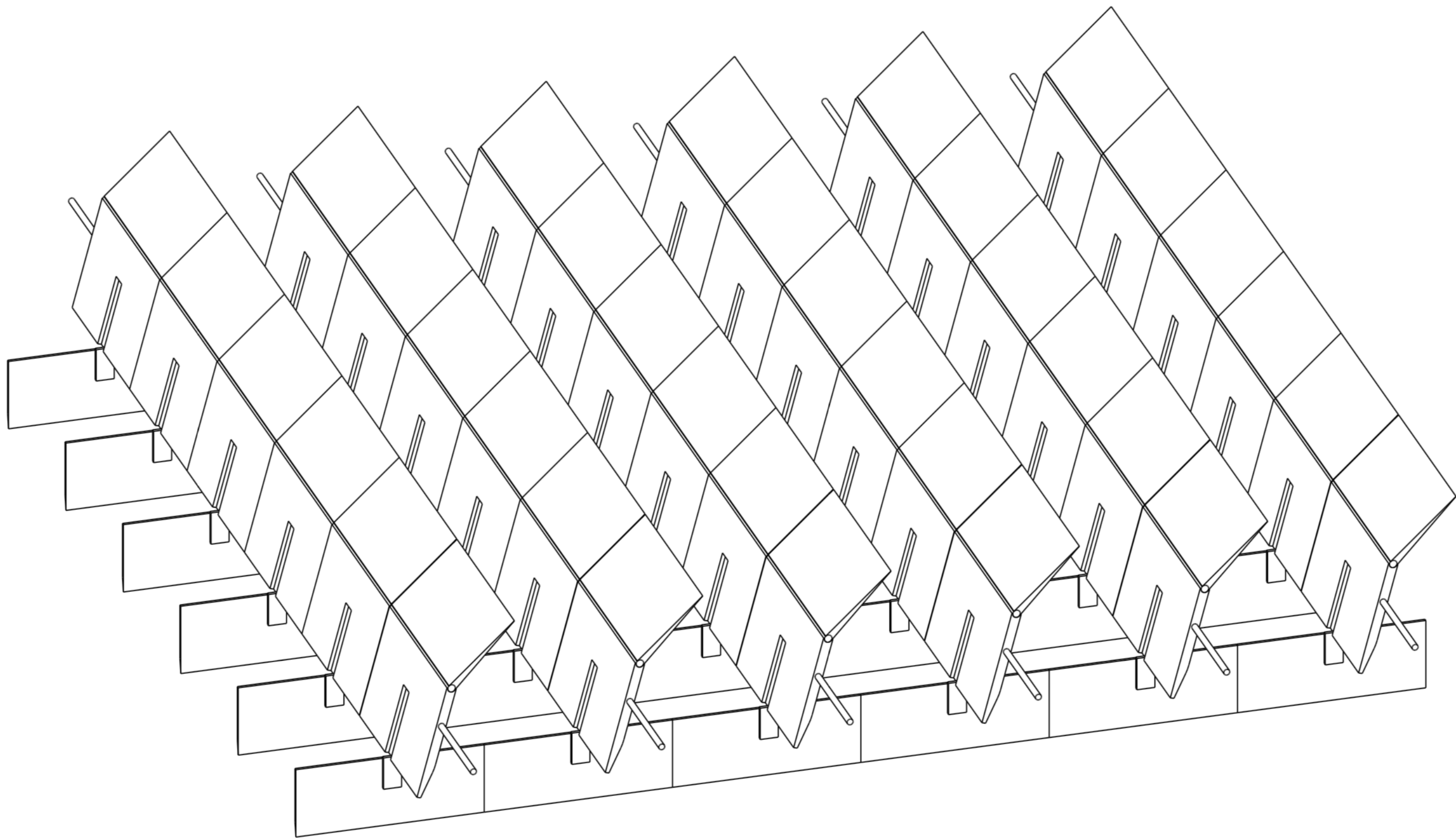




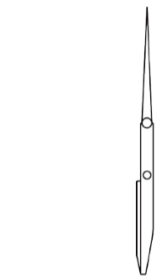
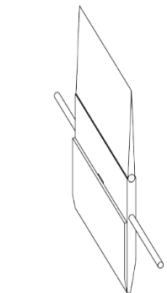
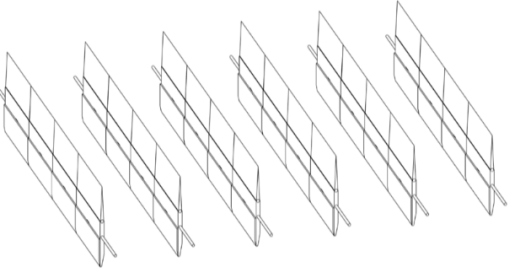
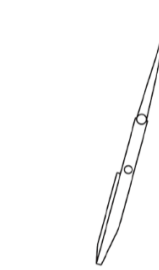
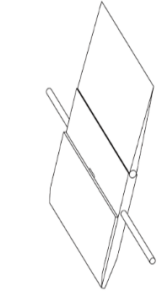
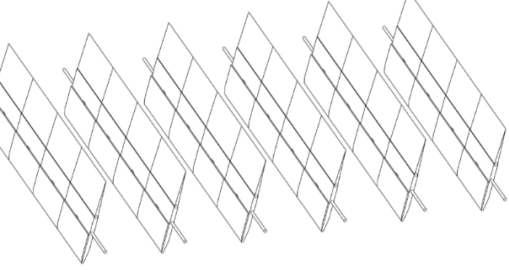
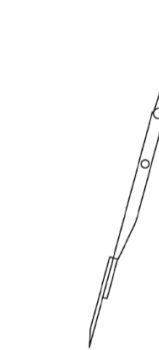
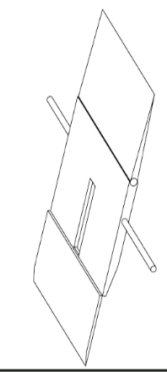
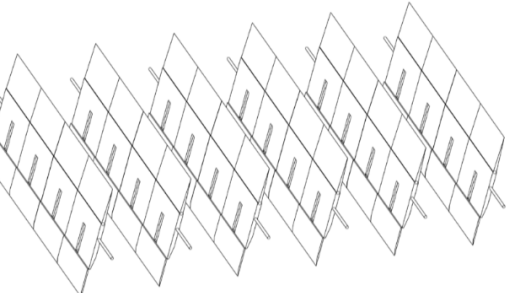
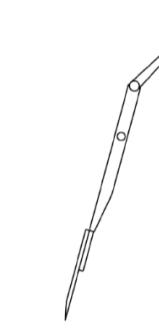
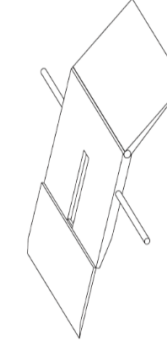
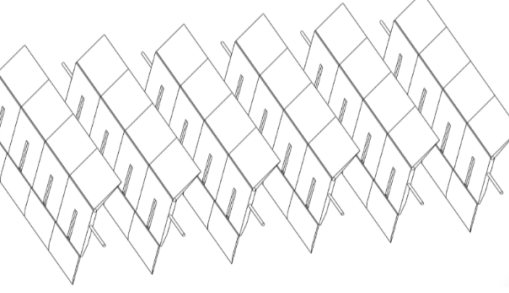
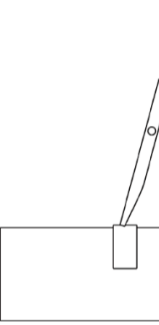

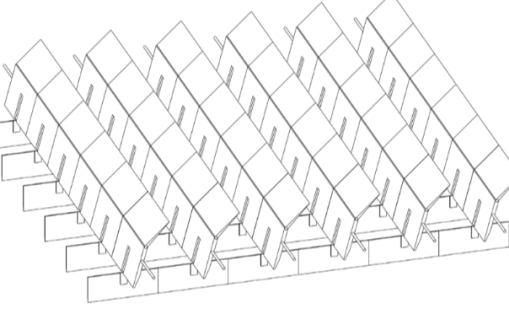




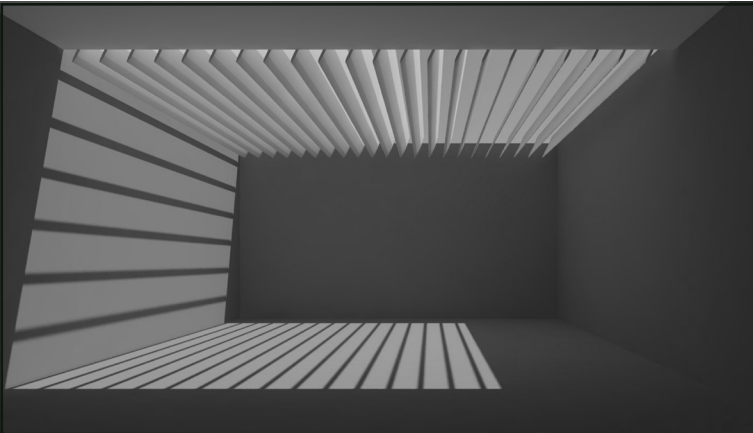
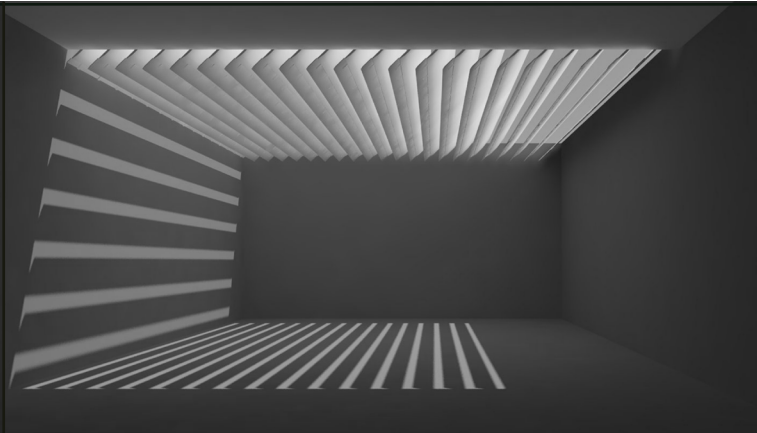
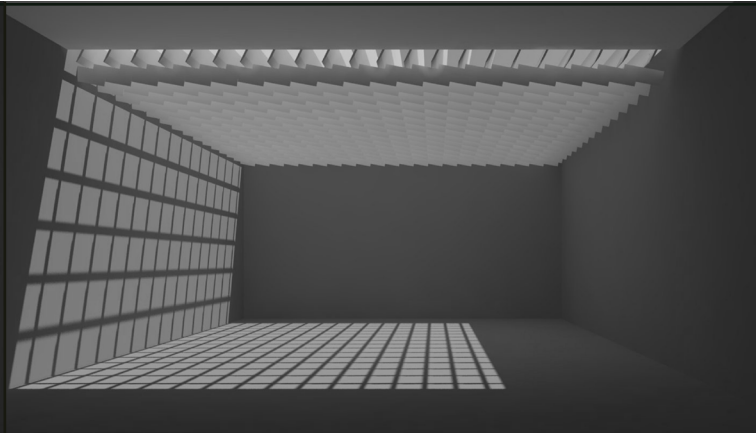
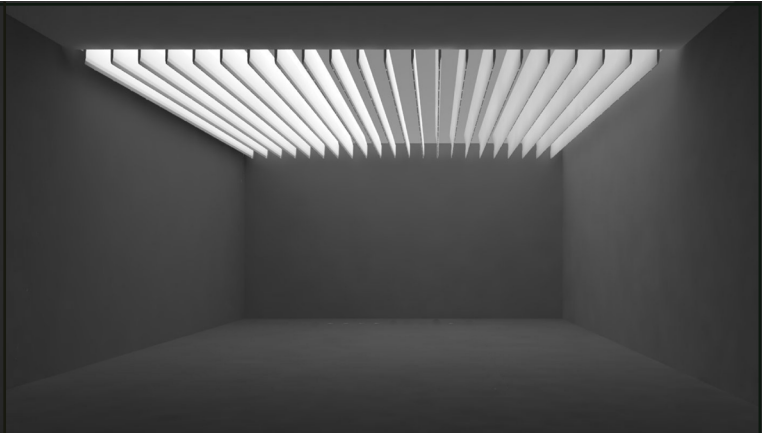
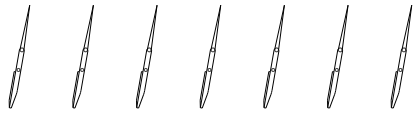

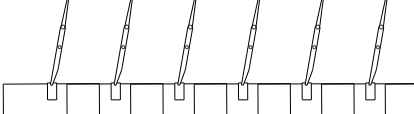
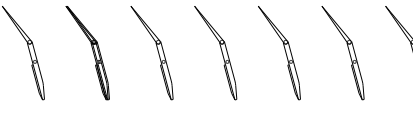
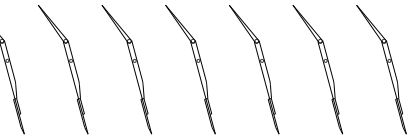
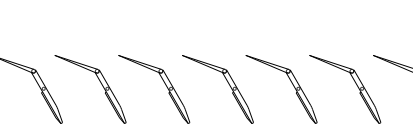
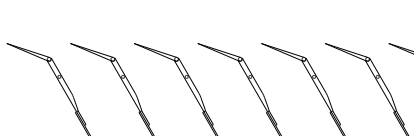
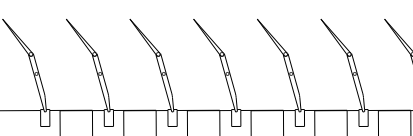






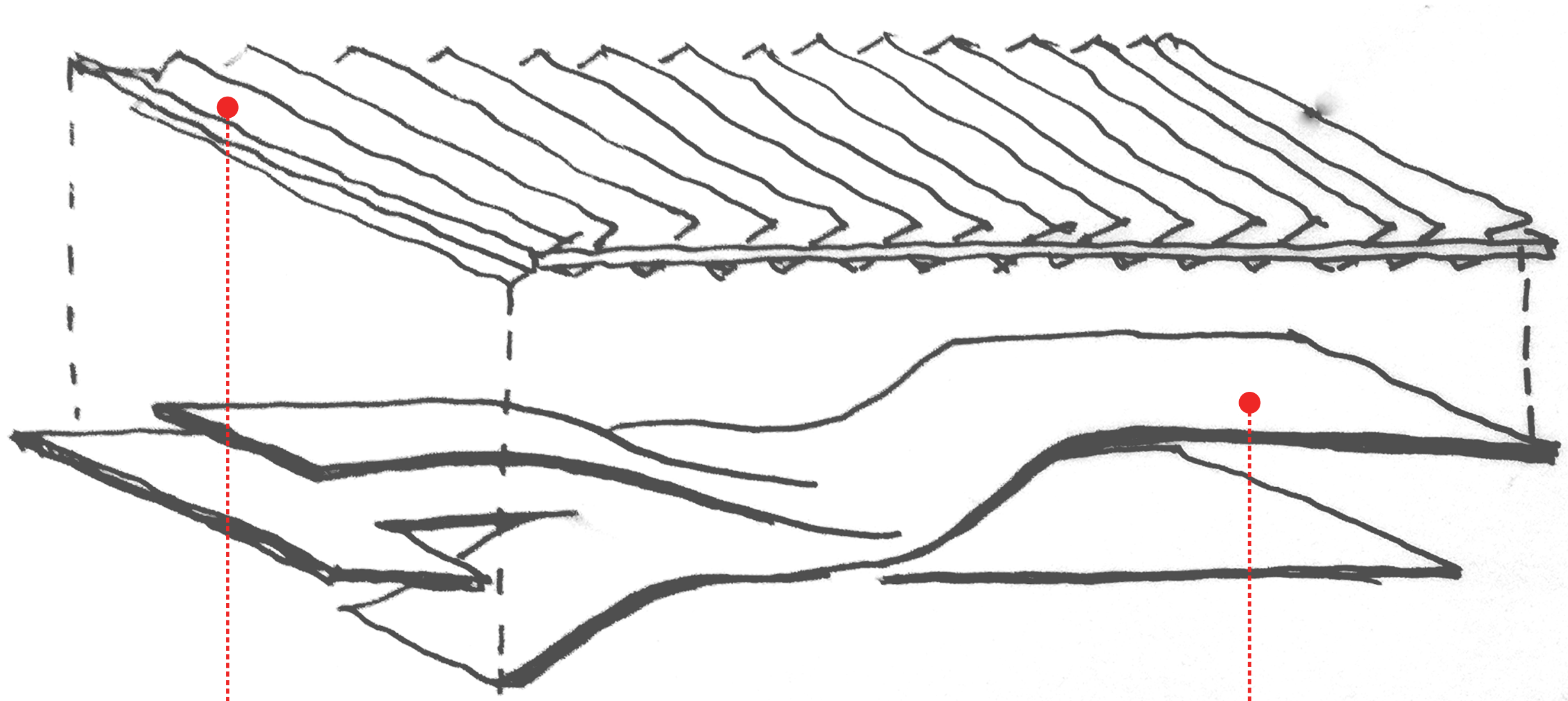
Form	Front view	Perspective view	Perspective view
<div>1</div> <div>Vertical</div> <div>Rotating</div> <div>↓</div>			
<div>2</div> <div>Slant</div> <div>Extending the back panel</div> <div>↓</div>			
<div>3</div> <div>Extended</div> <div>Rotating the top shield</div> <div>↓</div>			
<div>4</div> <div>Covered</div> <div>Turning the back panel sideways</div> <div>↓</div>			
<div>5</div> <div>Textured</div>			

Software: Vray for SketchUp 2016

			
 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>	 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>	 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>	 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>
Skylight Test 01 Ambient Light: Bright / Direct	Skylight Test 02 Ambient Light: Dim / Direct	Skylight Test 03 Ambient Light: Bright / Direct / Textured	Skylight Test 04 Ambient Light: Bright / Diffused
 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>	 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>	 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>	 <div>09:00 am 18/07/2019 UTC+02:00 Amsterdam, NL</div>
Skylight Test 05 Ambient Light: Dim / Diffused (deep void )	Skylight Test 06 Ambient Light:Dim / Diffused(small opening)	Skylight Test 07 Ambient Light: Dim / Diffused (deep void + small opening)	Skylight Test 08 Ambient Light: Bright / Diffused / Textured

*Synthetic Skylight Roof SystemTesting*

# ***Design Strategy***



## ***Multi-lighting roof***

*Creating different lights at one time*  
*Providing exclusive lights for each space*

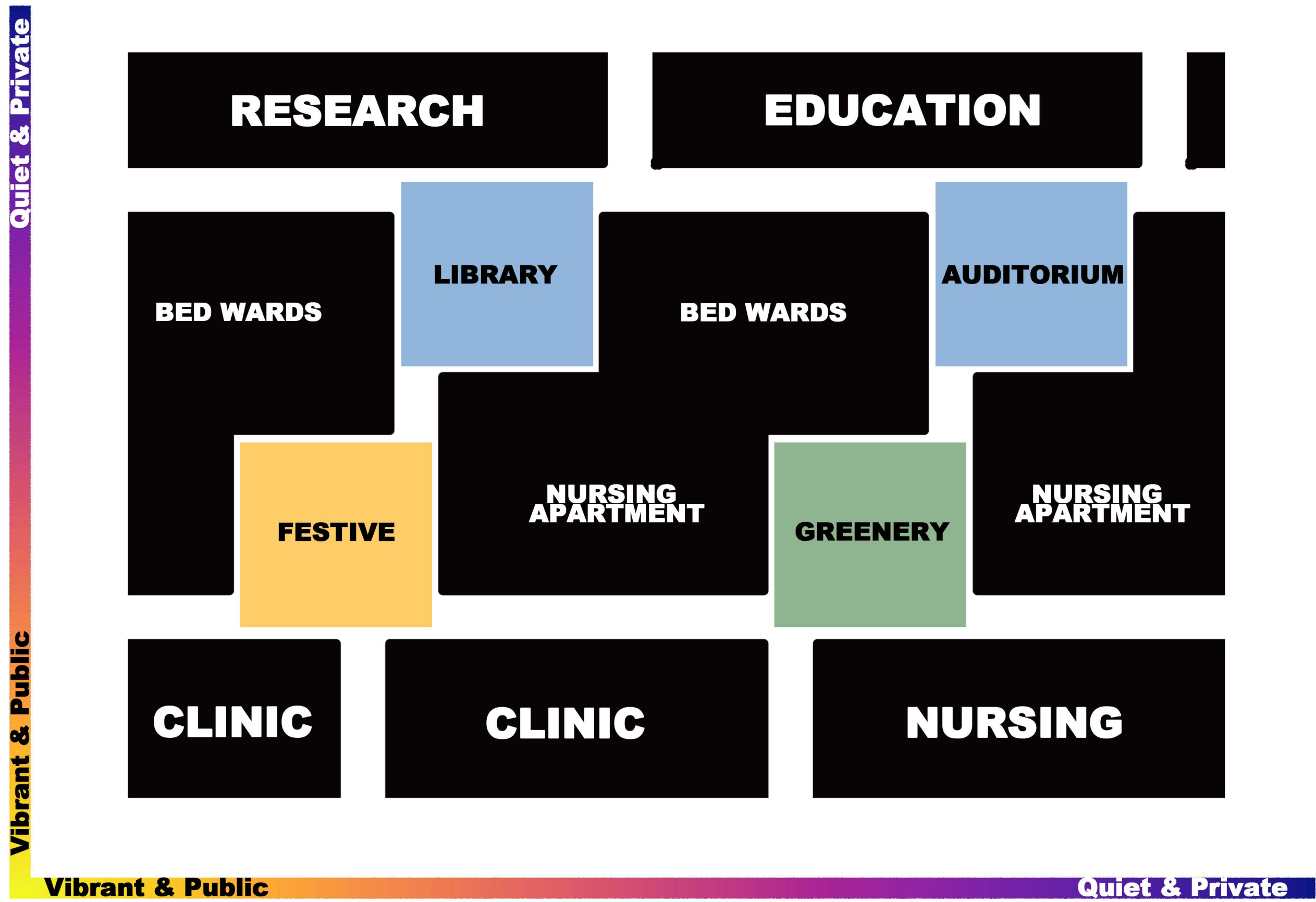
*multi-lighting therapy*

## ***Super surface***

*reorganizing space*  
*Proper height & exclusive lighting*

*immersive experience*





**THE IDENTITY OF THE FOUR PUBLIC SQUARES**

## FOR WHOM ?



Doctors/Researchers



Patients



Visitors



Kids

A Melting Pot of Feelings

Happiness Relaxation Sadness Stress Fear Anxiety

## **WHAT DO THEY NEED ?**

The Festive Square

A Space absorbing all the sadness and stress and produce joy and color.

**1. SOCIAL HUB**

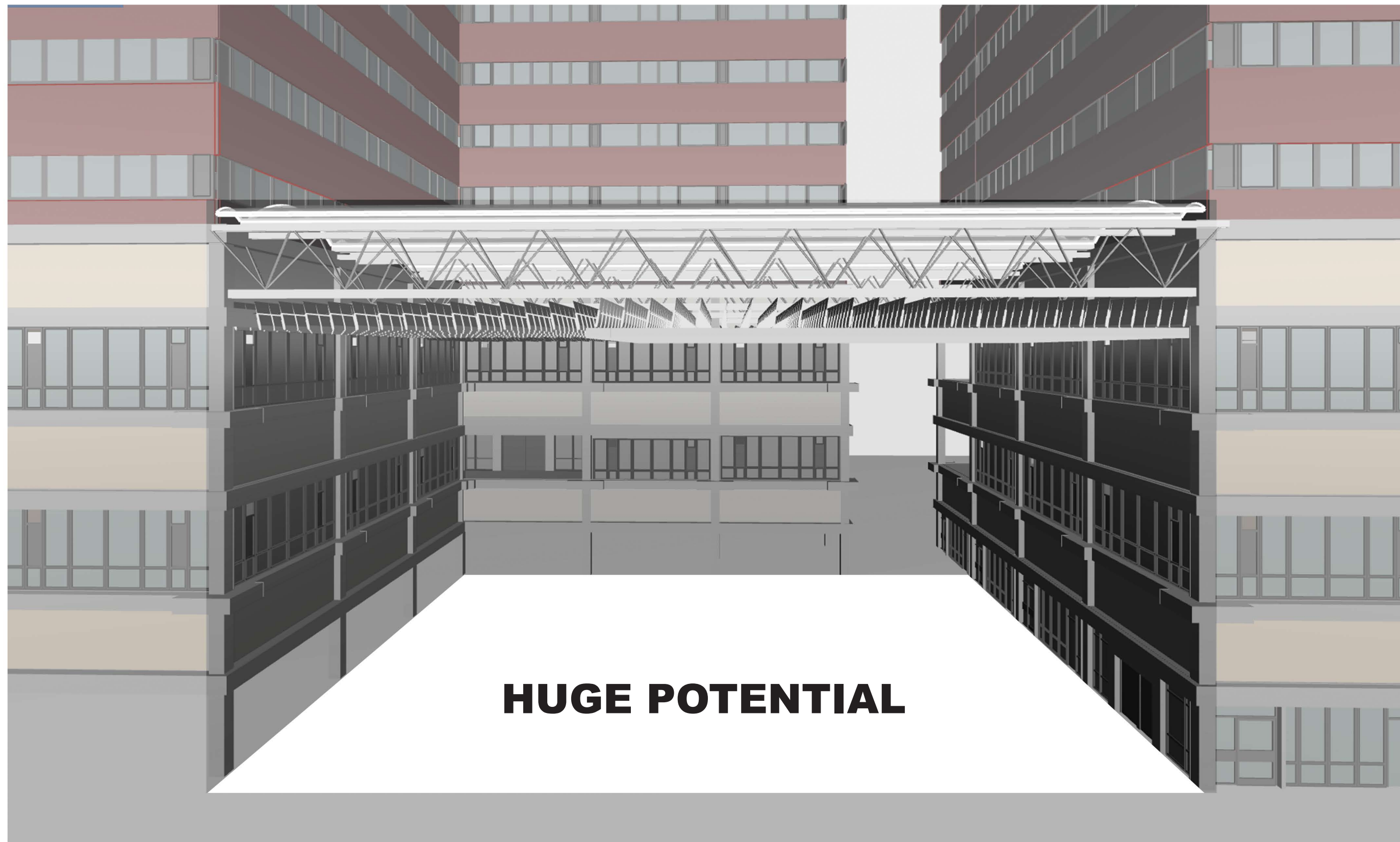
**2. CAFE**

**3. LOUNGE**

**4. PLAYGROUND**

**5. CALMING SPACE**





**HUGE POTENTIAL**

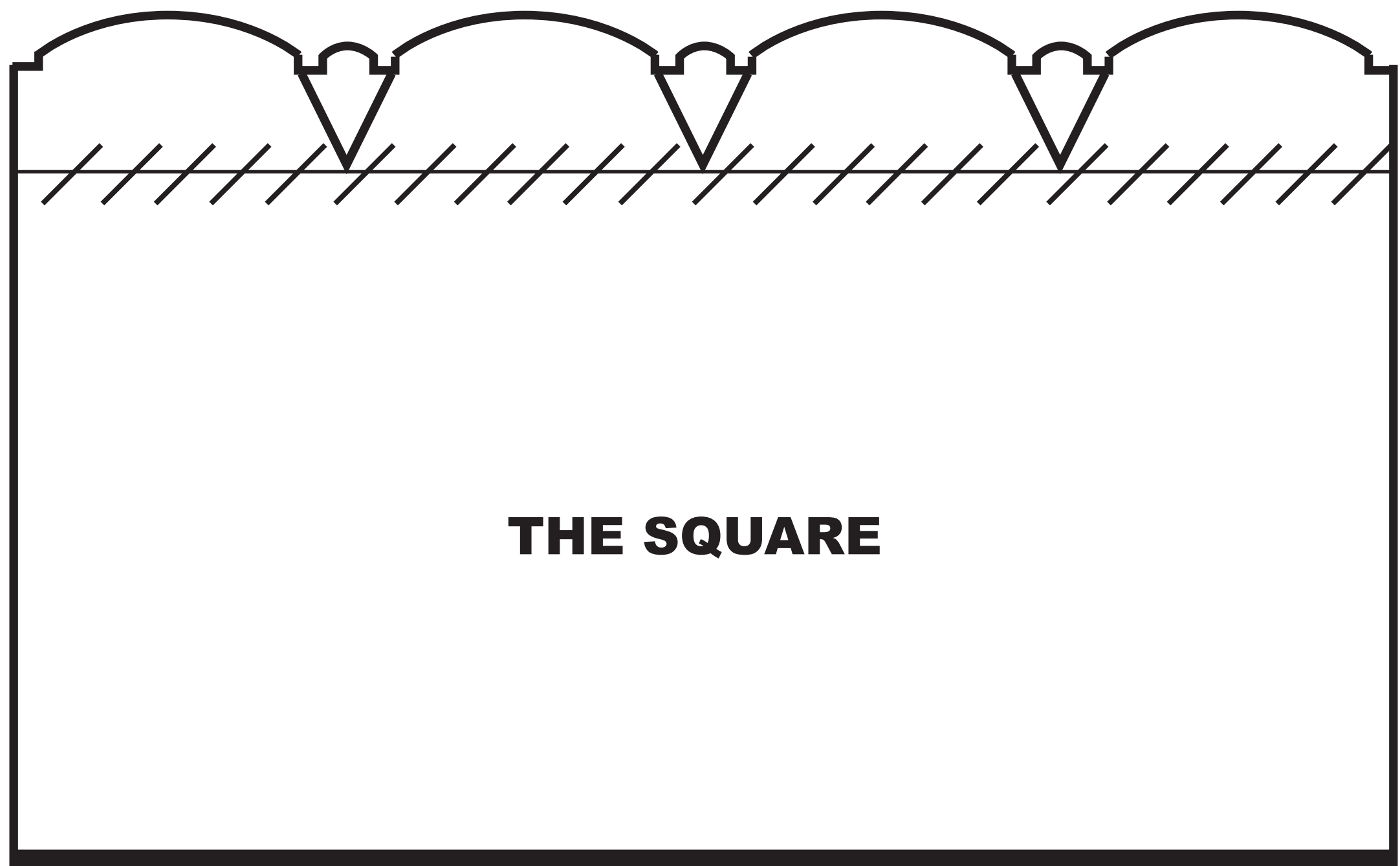
**FUNCTION ----- ATMOSPHERE**

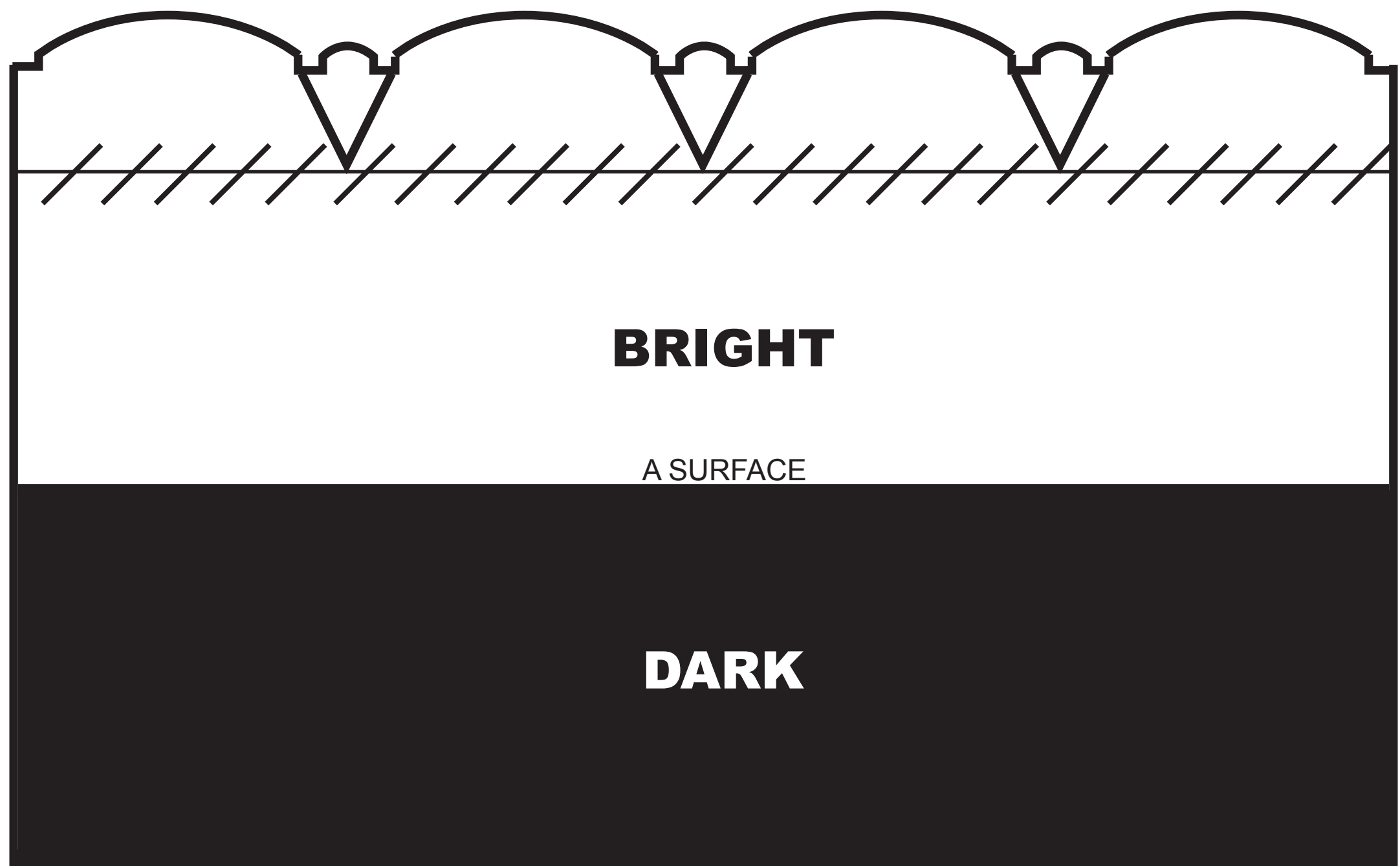
LIGHT      SPACE      COLOR

ATMOSPHERE ELEMENT 1:

**LIGHT**







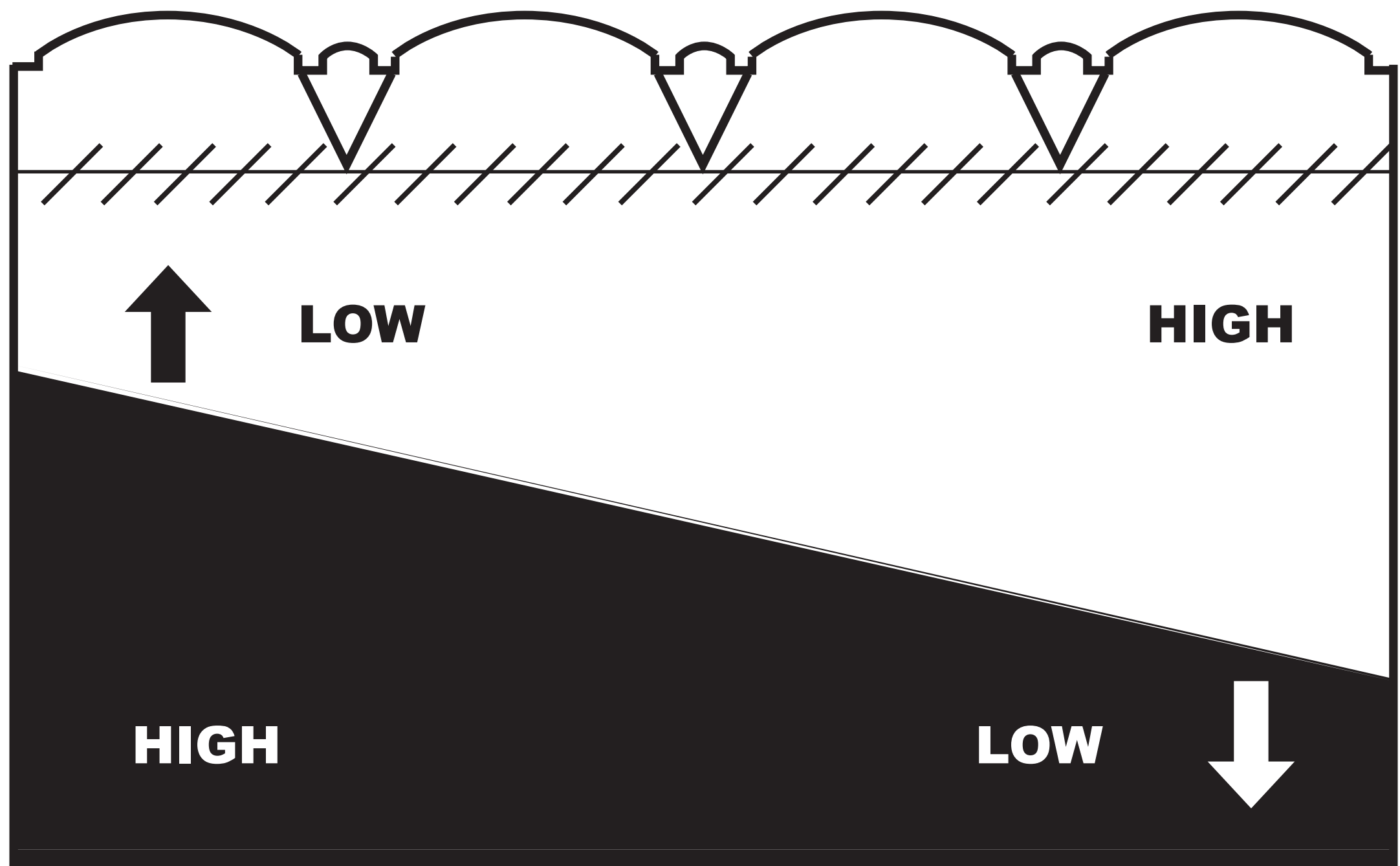
Bright -----Dark

Public -----Private

ATMOSPHERE ELEMENT 2:

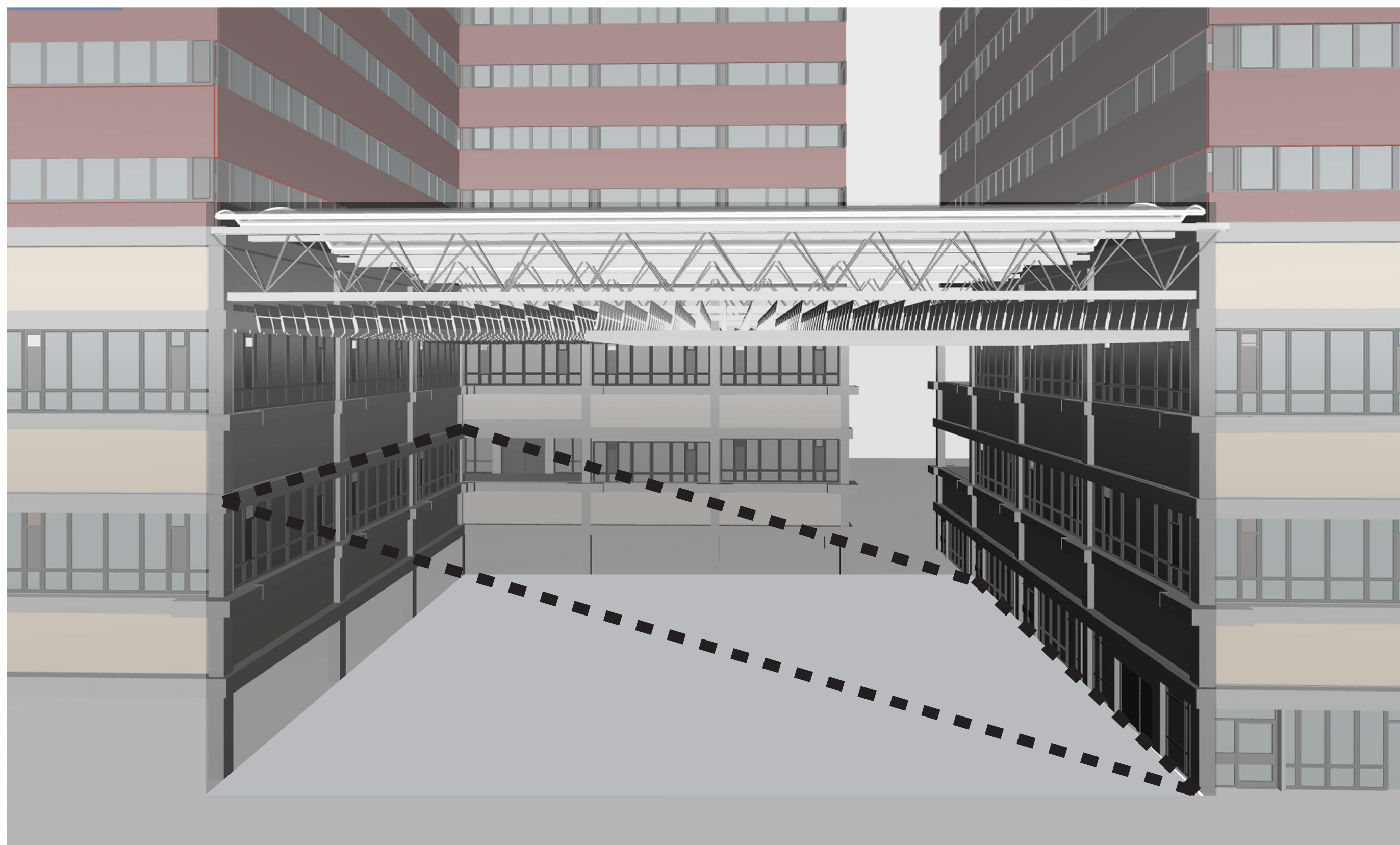
**SPACE**

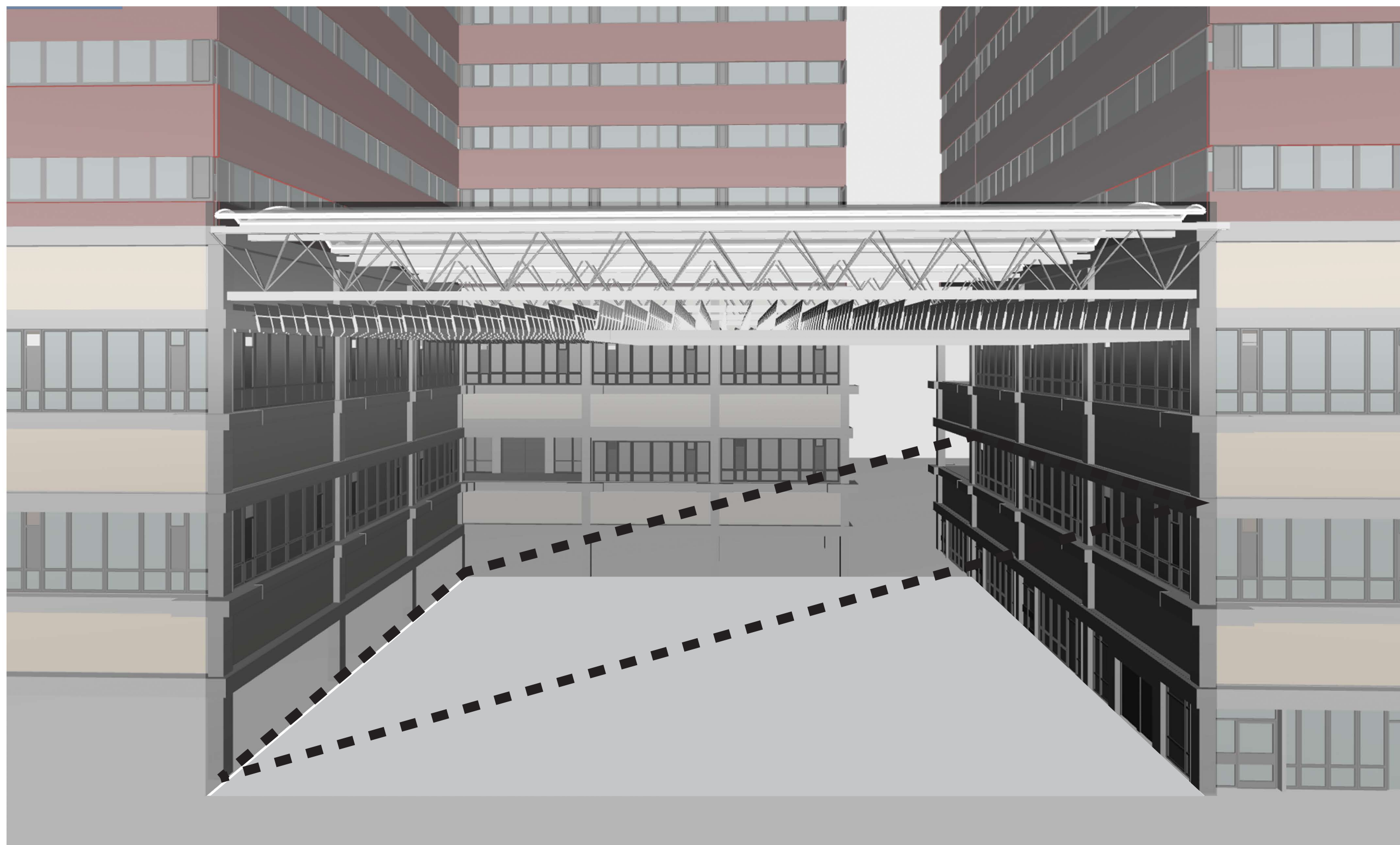


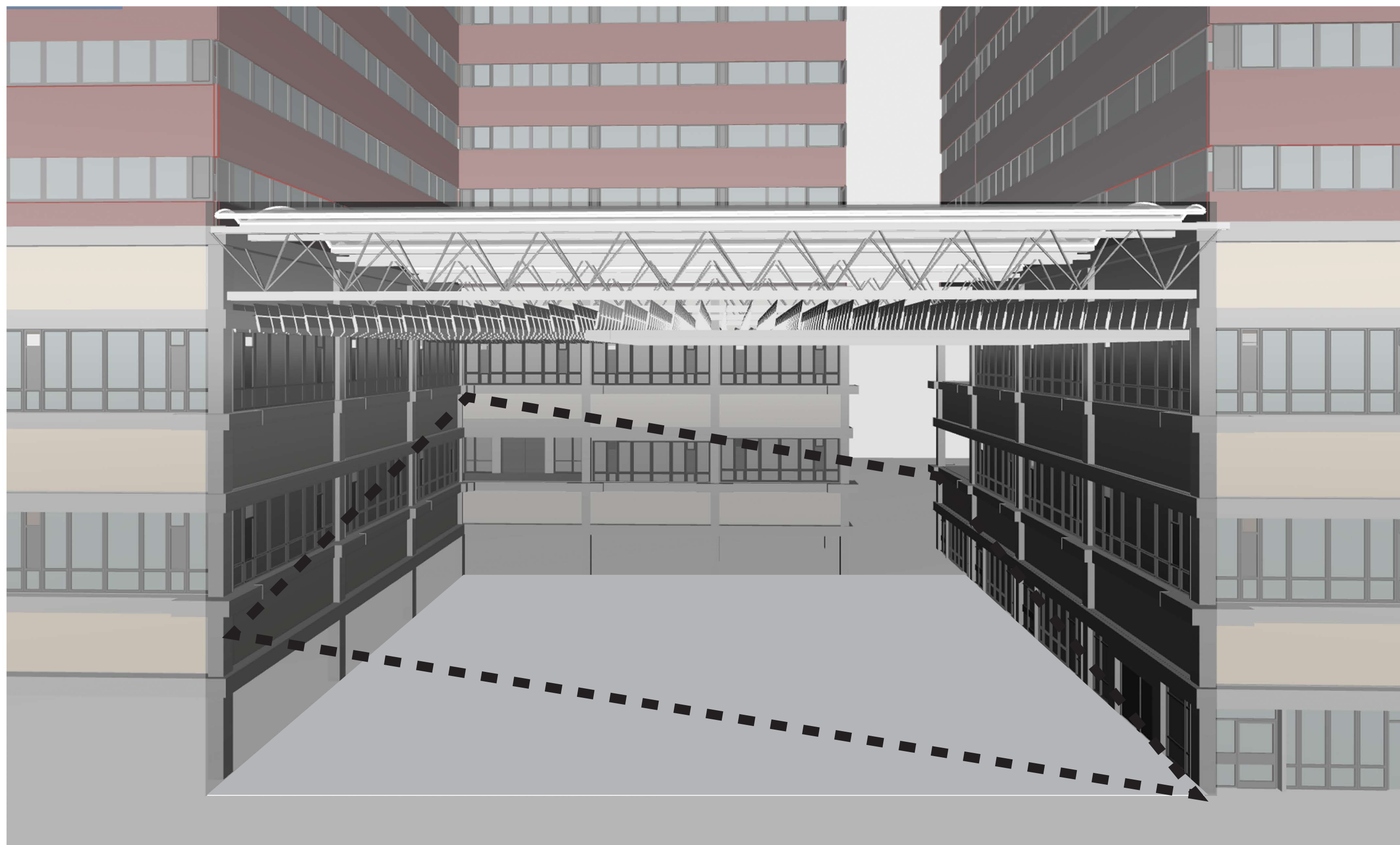


High/Big ----- Low/Small

Public ----- Private









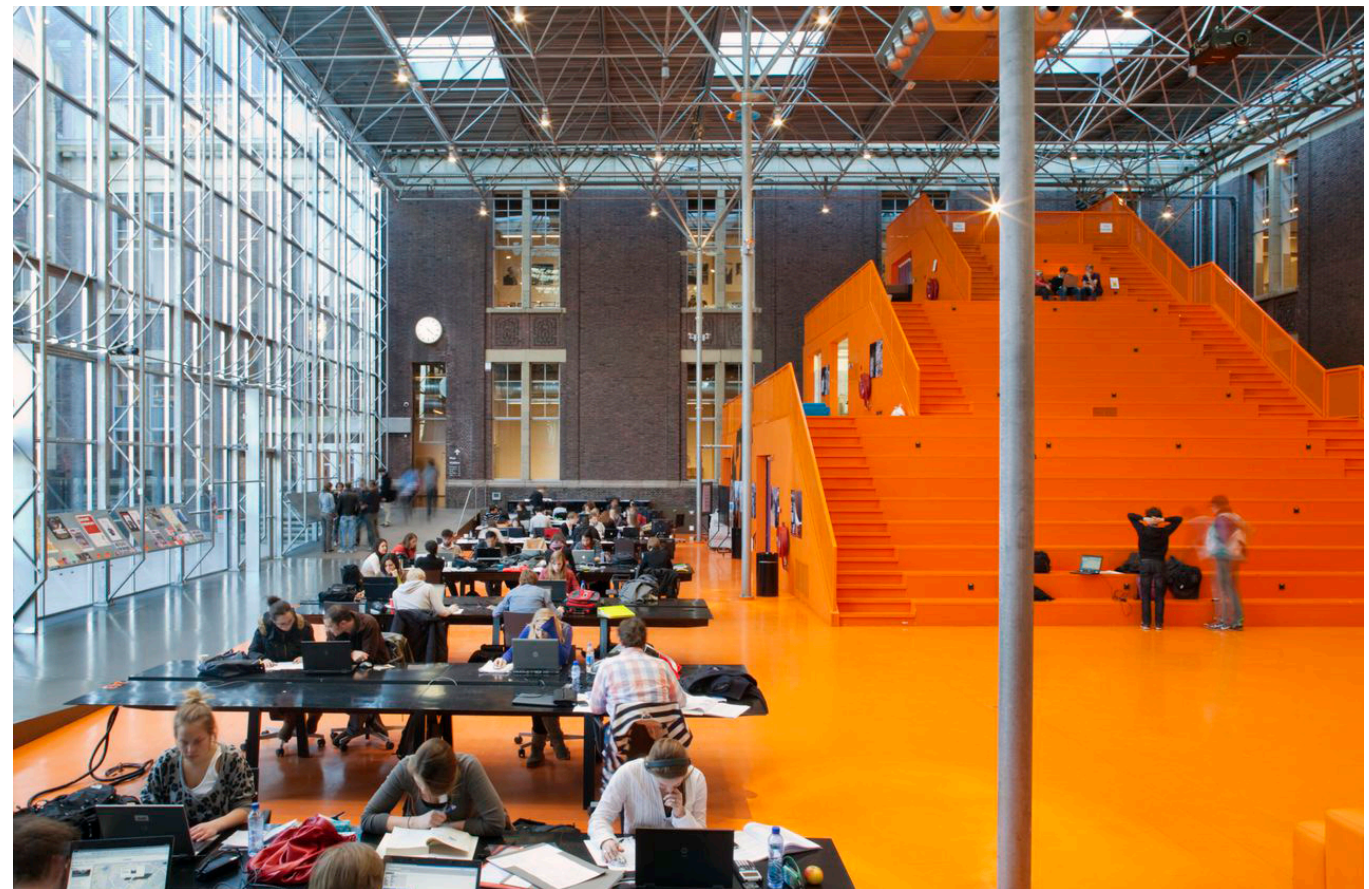
ATMOSPHERE ELEMEN 3:

**COLOR**

# THE COLOR SHAPING

FOR SURFACE:

Using colored floor  
to influence the  
atmosphere for  
each piece of area



# THE COLOR SHAPING

FOR SPACE UNDER THE SURFACE

## Colored Sheer Fabric



Surrounding and enclosing the **space with color**

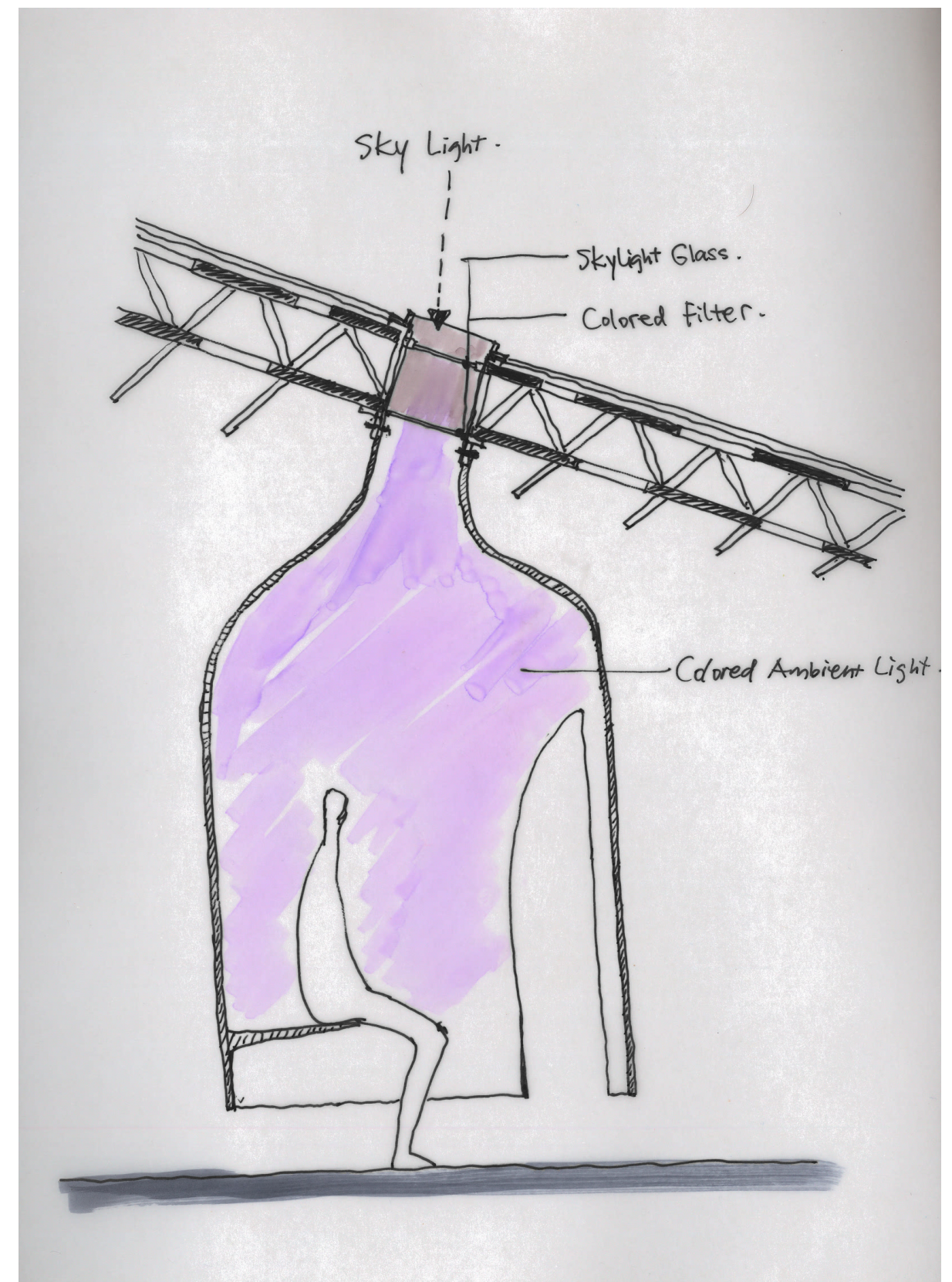




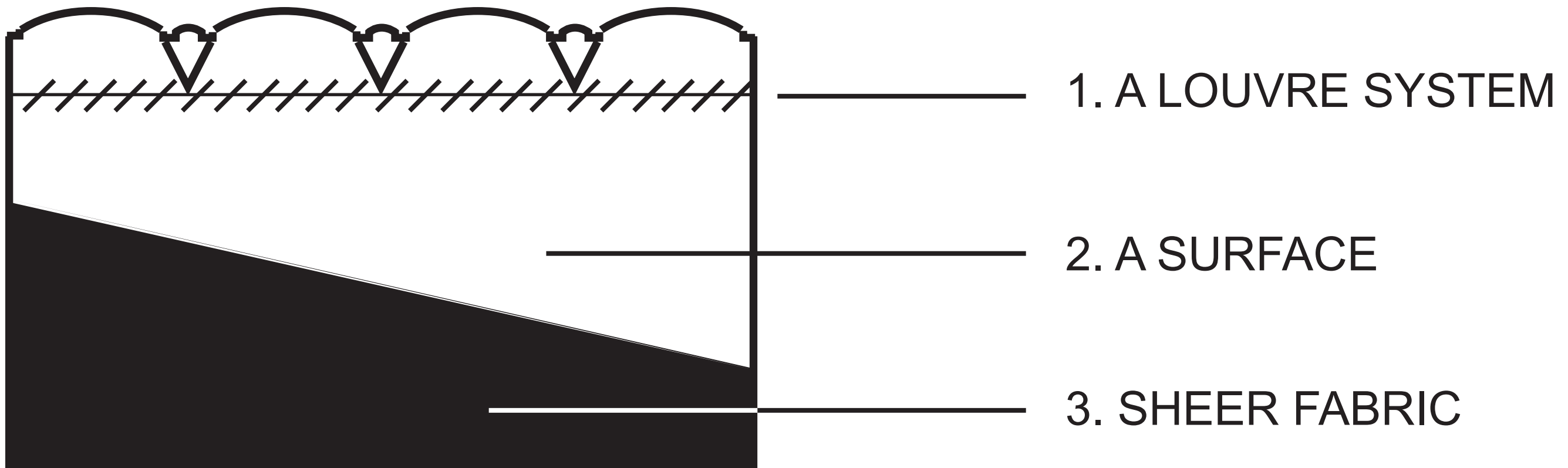
Sheer fabric skylight lampshade influence the **brightness** under the surface



By changing the size of the lampshades to create different atmosphere

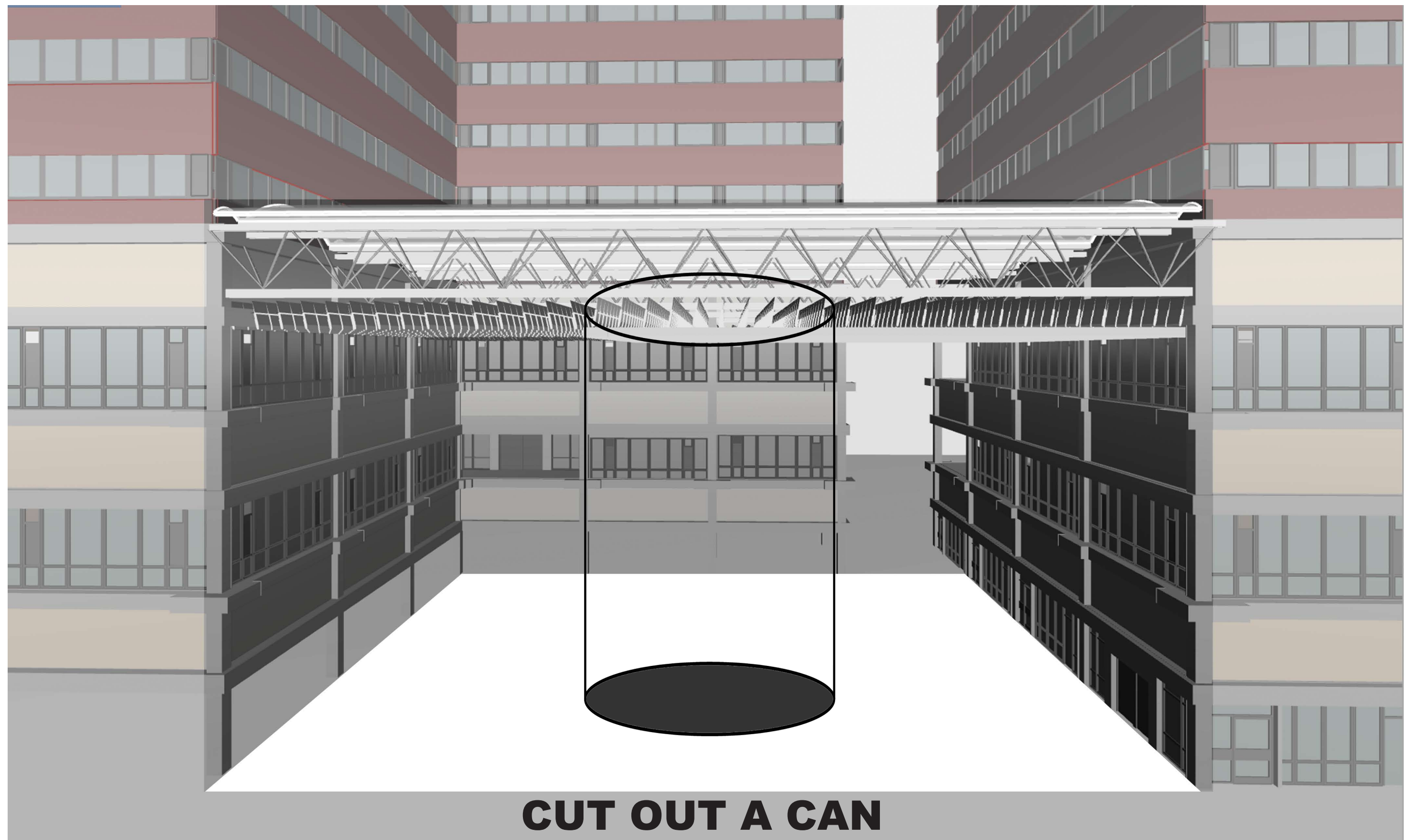


## VOCABULARY



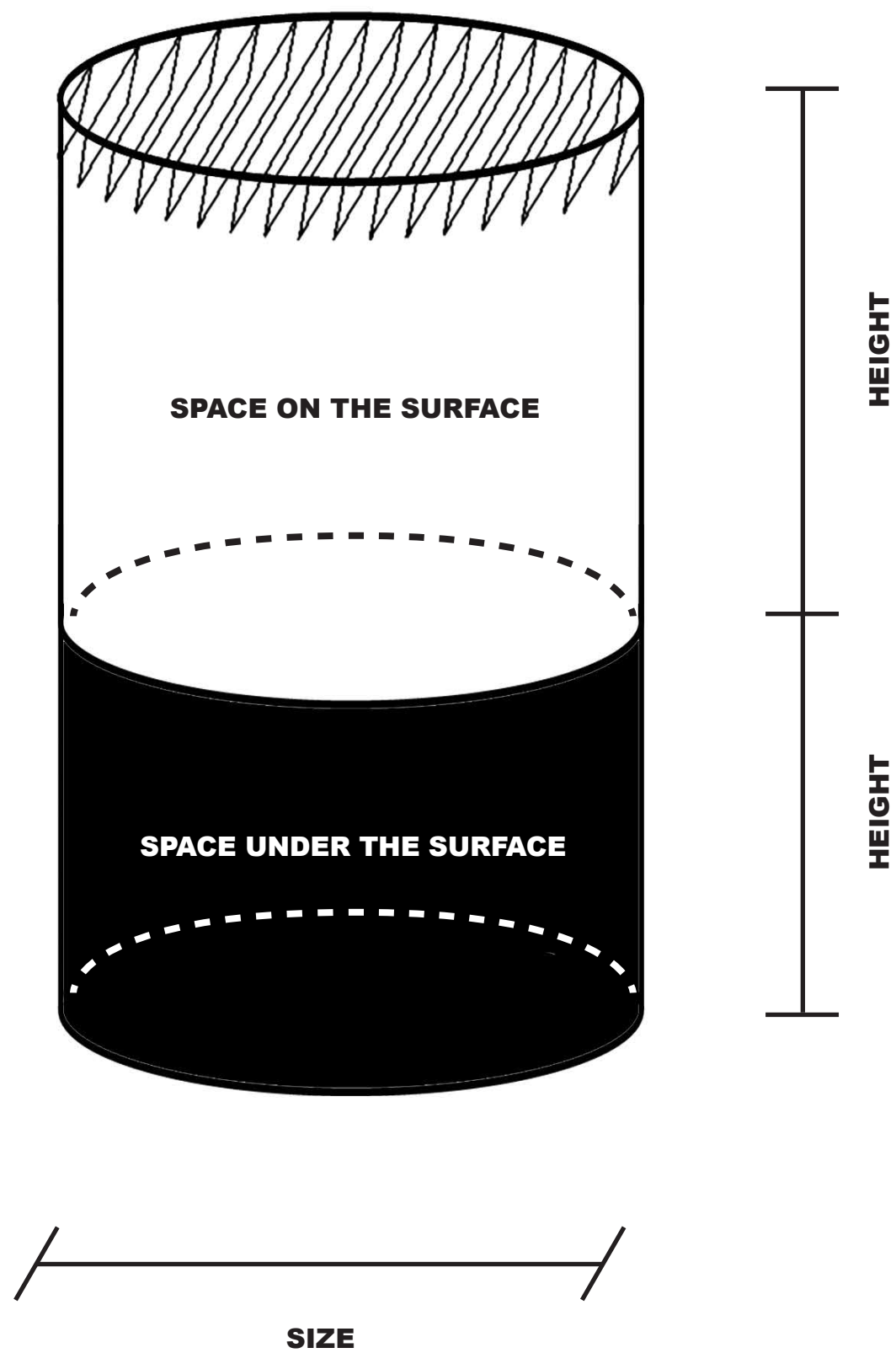
**HOW TO ORGANIZE THE VOCABULARY TO PRODUCE SPECIFIC ATMOSPHERE FOR CERTAIN FUNCTIONS?**





**ATMOSPHERE STUDY**





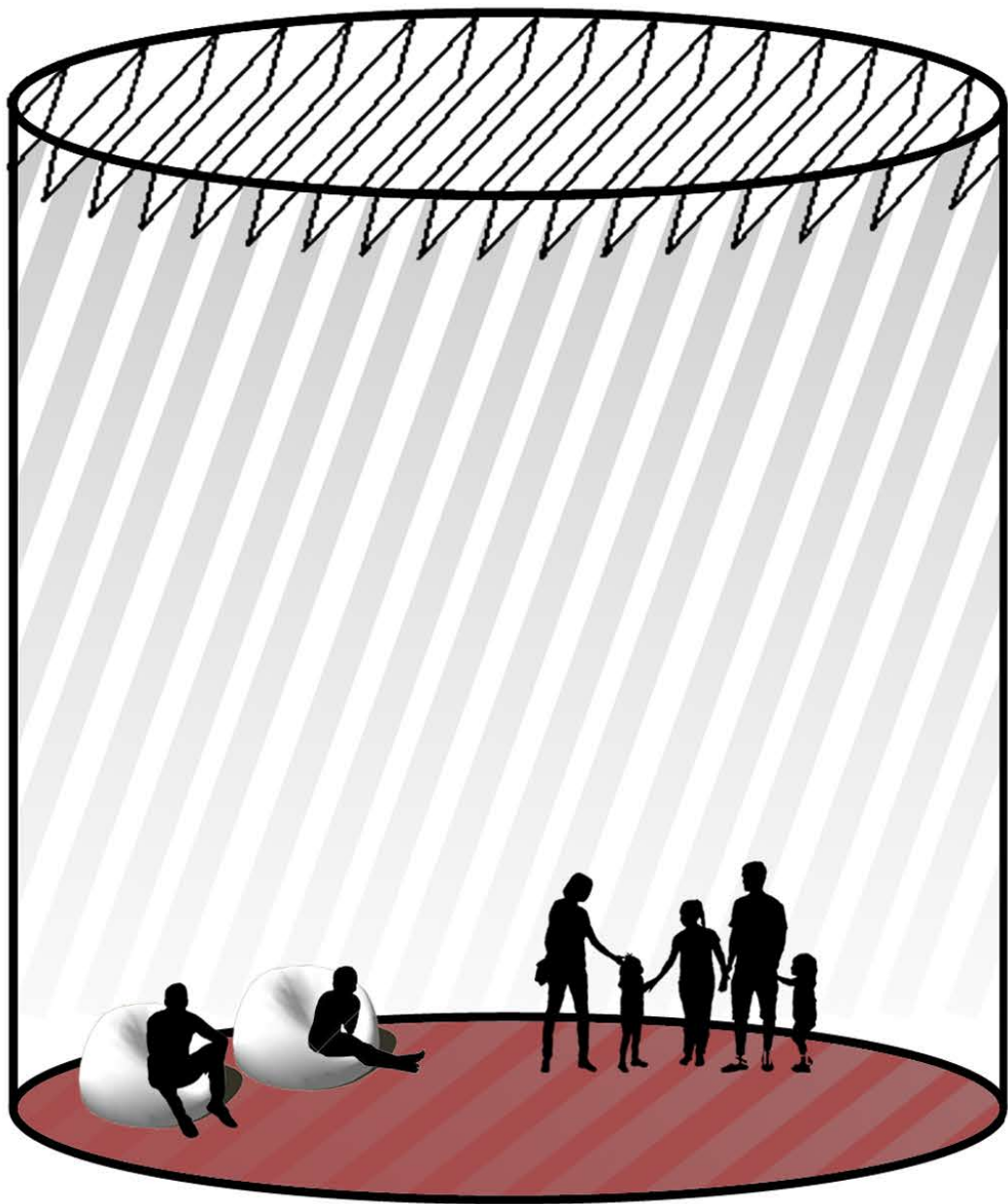
## ATMOSPHERE ELEMENT



## VOCABULARY

1. The louver system
2. The Surface
3. Sheer fabric curtains and lampshades

FUNCTION 1 : SOCIAL HUB



City Square



Underground Hub



FUNCTION 2 : CAFE



Terrace

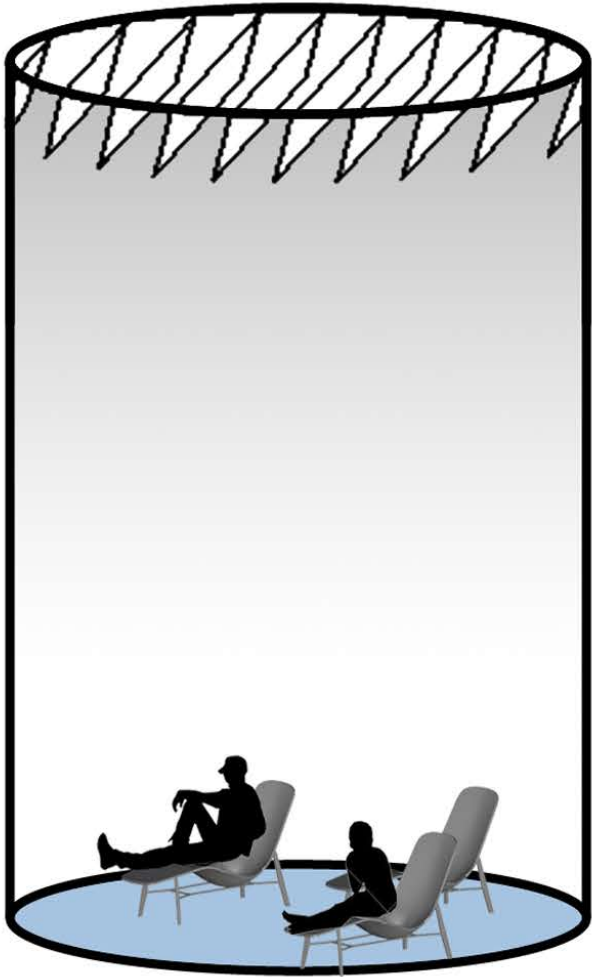


Intimate Bar Space





FUNCTION 3 : LOUNGE



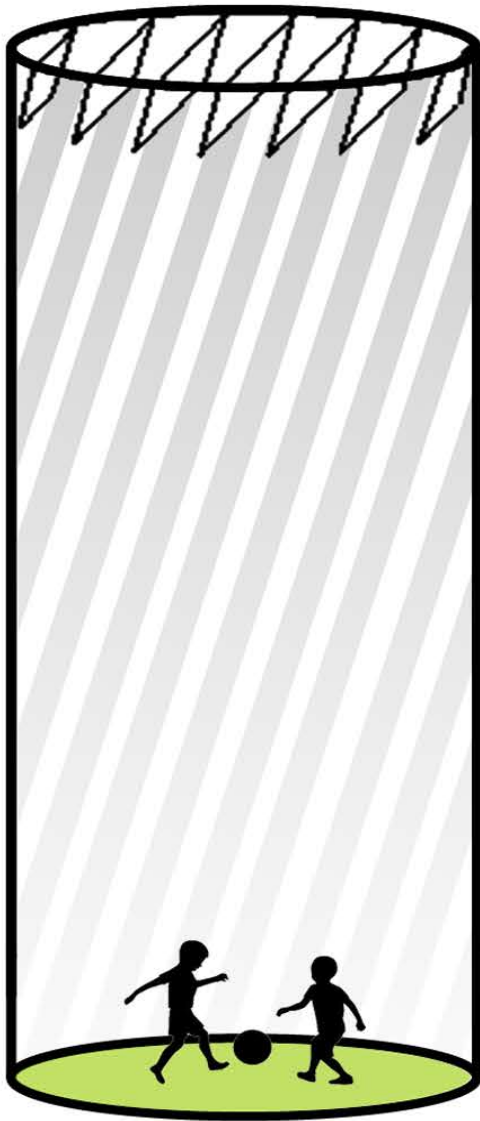
Light Bath



Bedroom Talk



FUNCTION 4 : PLAYGROUND



Nature



Colorful Cave



FUNCTION 5 : PRIVATE SPACE



Calming Space

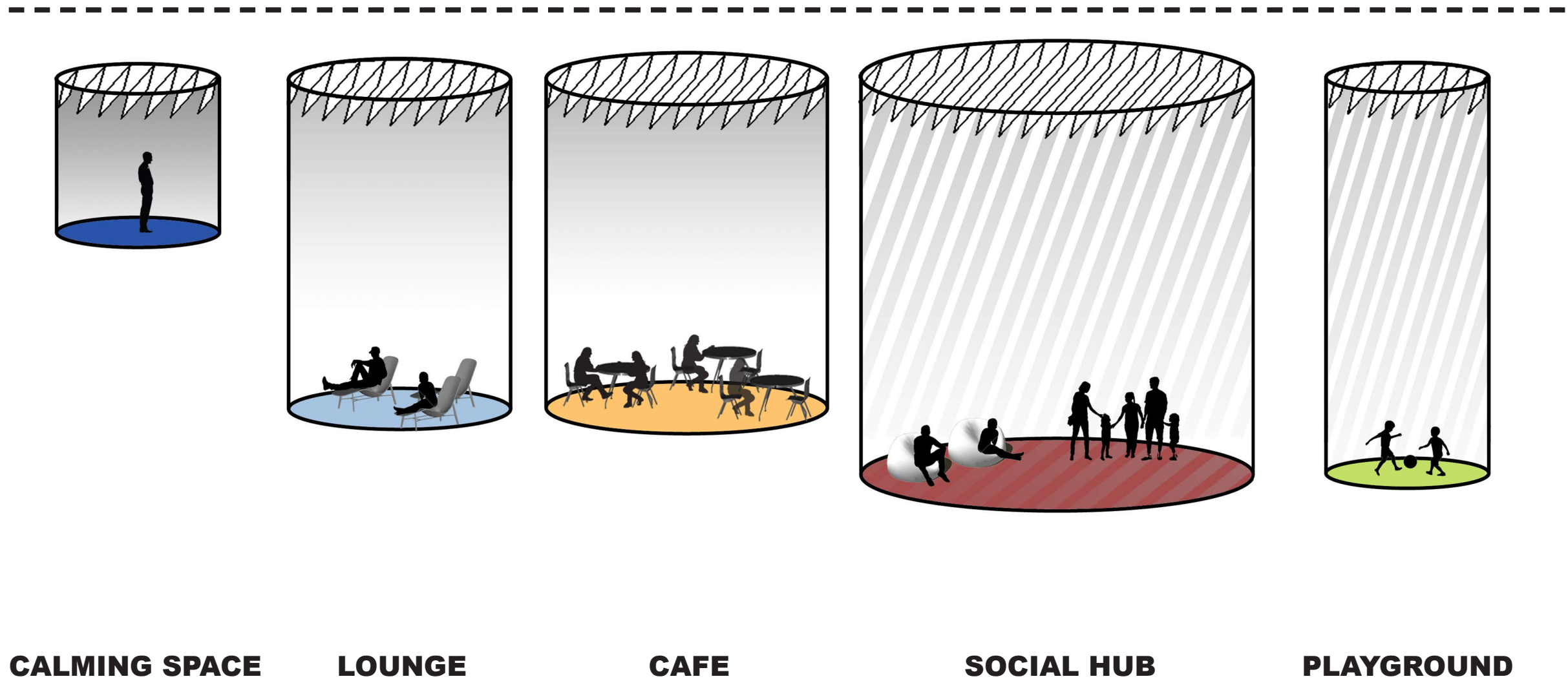


Private Booth

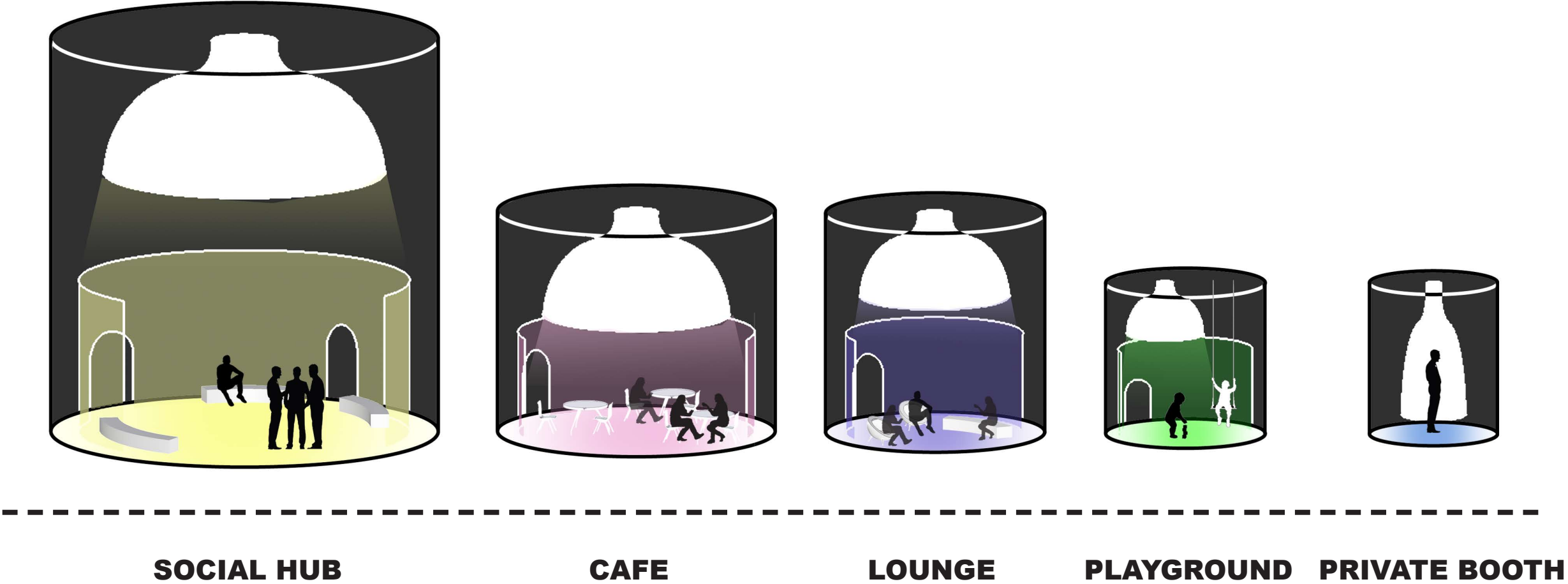




## Spaces on Top of the Surface



**Spaces Under the Surface**



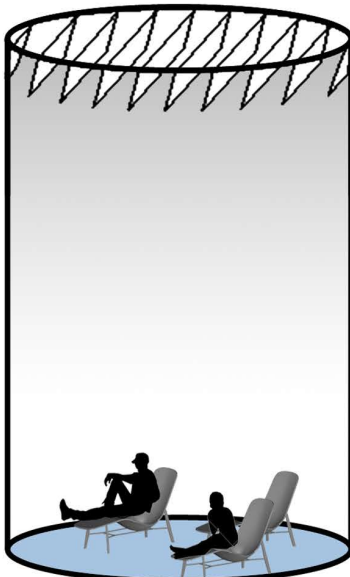
**CALMING SPACE**



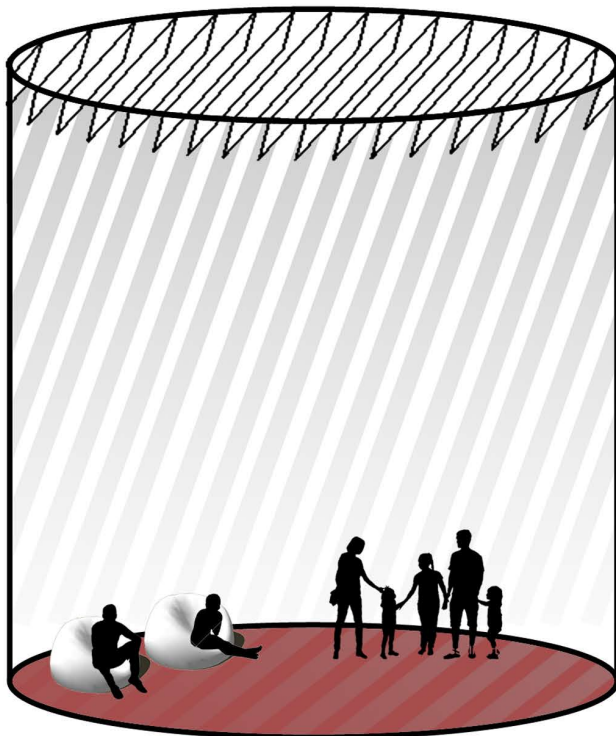
**CAFE**



**LOUNGE**



**SOCIAL HUB**



**PLAYGROUND**



+

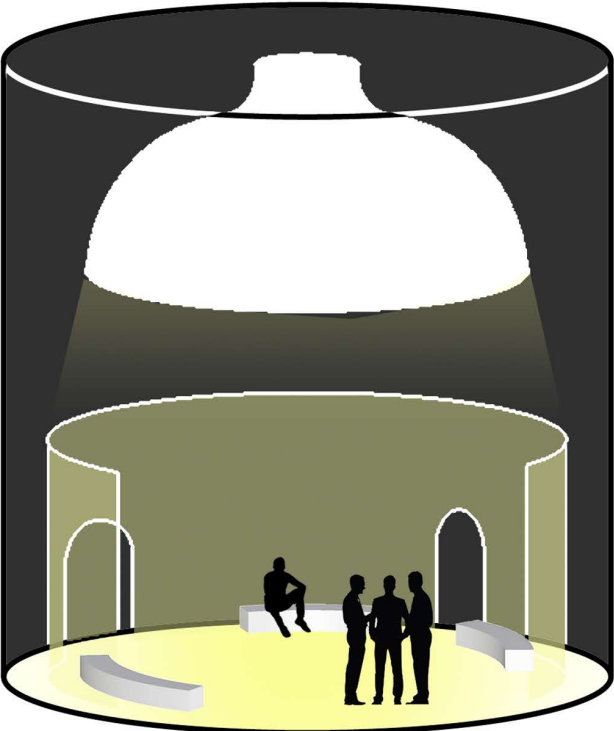
+

+

+

INSERT

INSERT



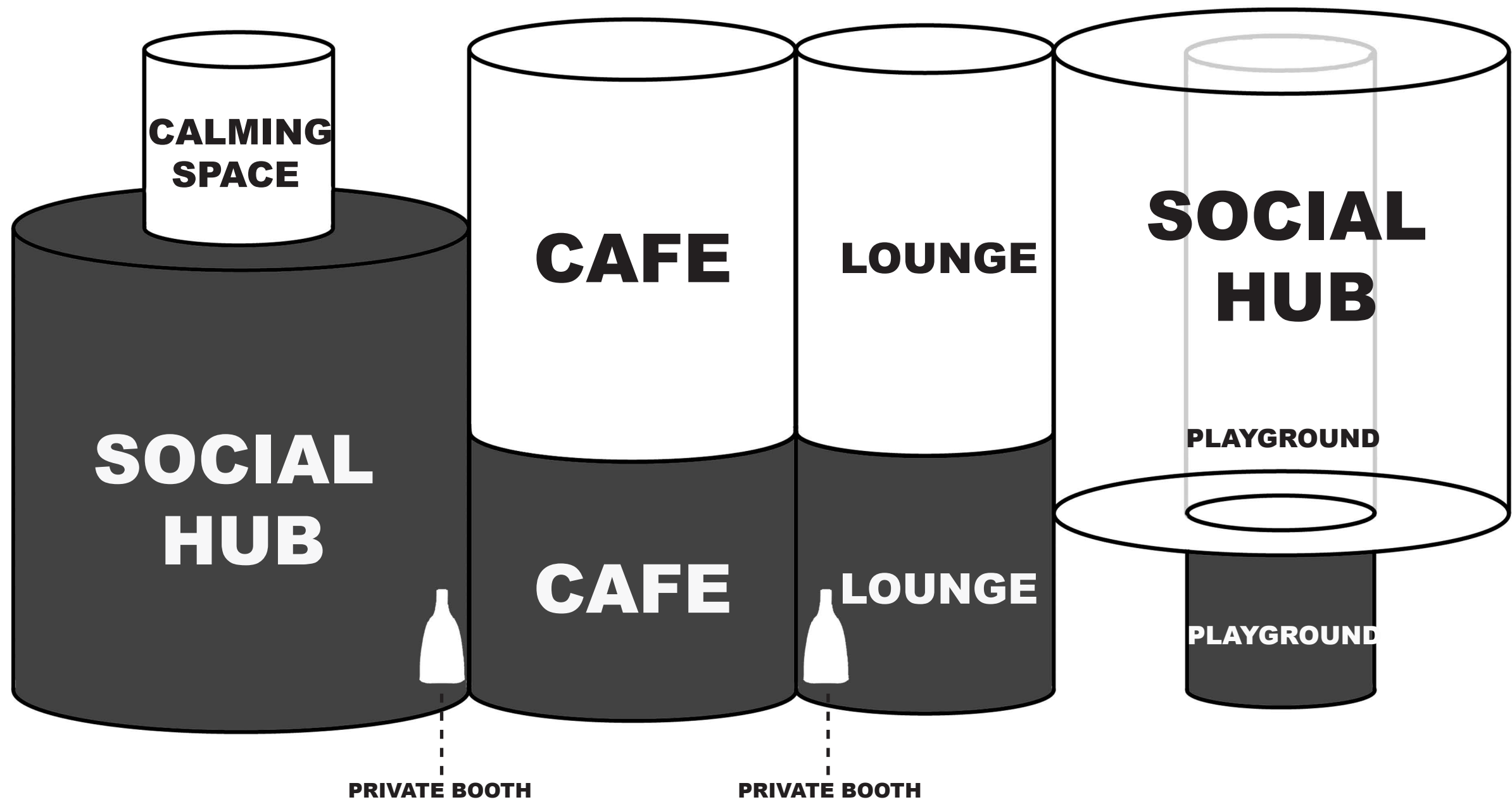
**SOCIAL HUB**

**CAFE**

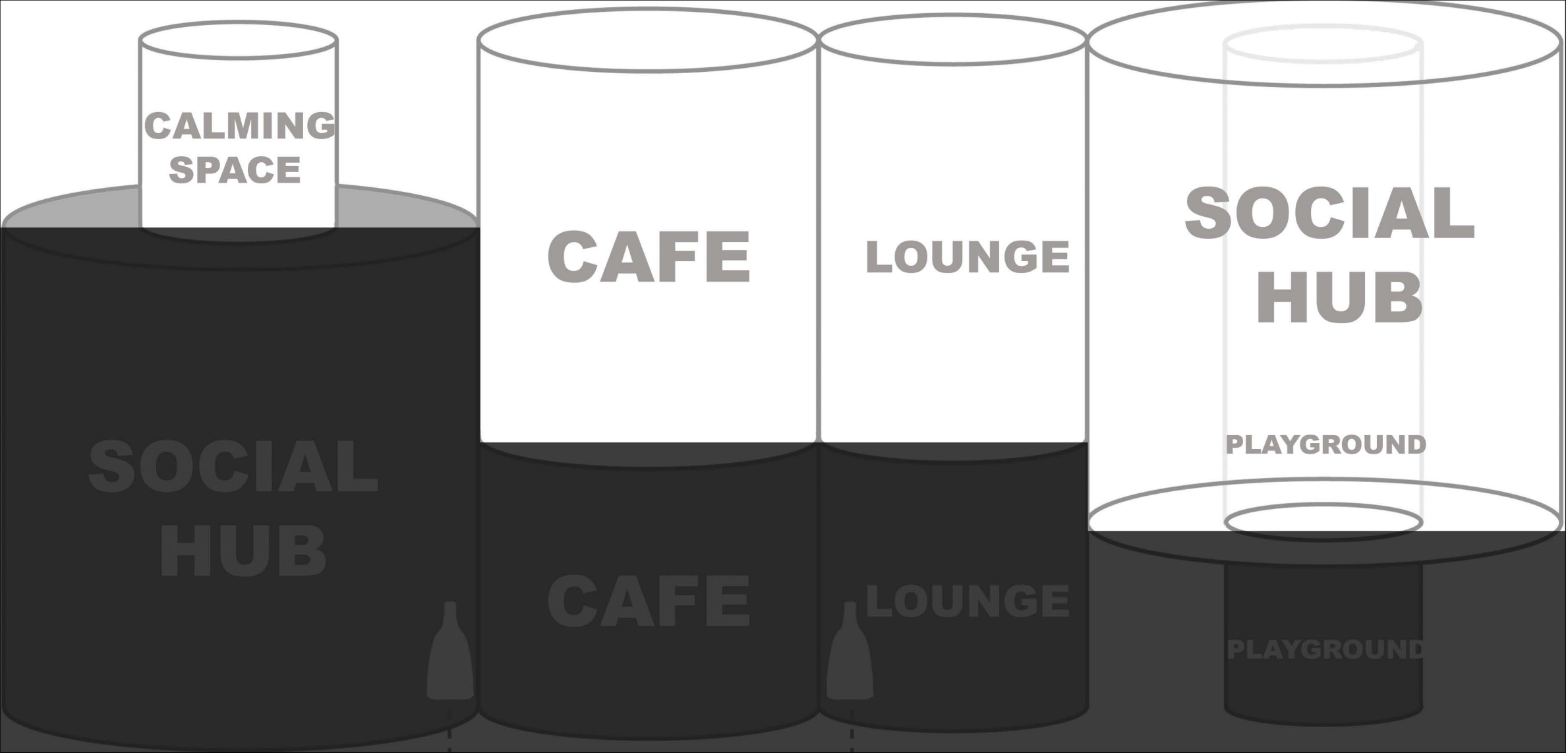
**LOUNGE**

**PLAYGROUND**

**PRIVATE BOOTH**

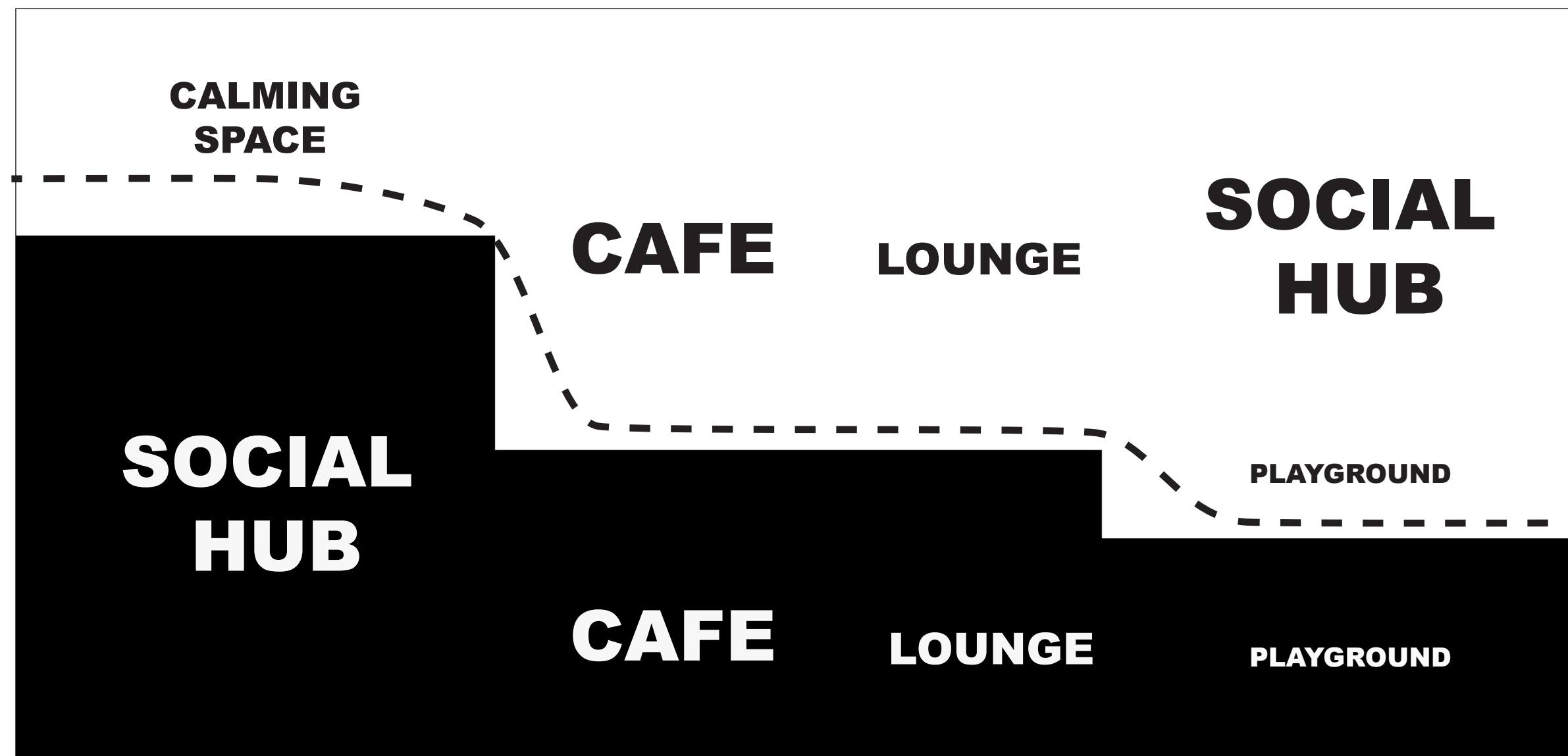


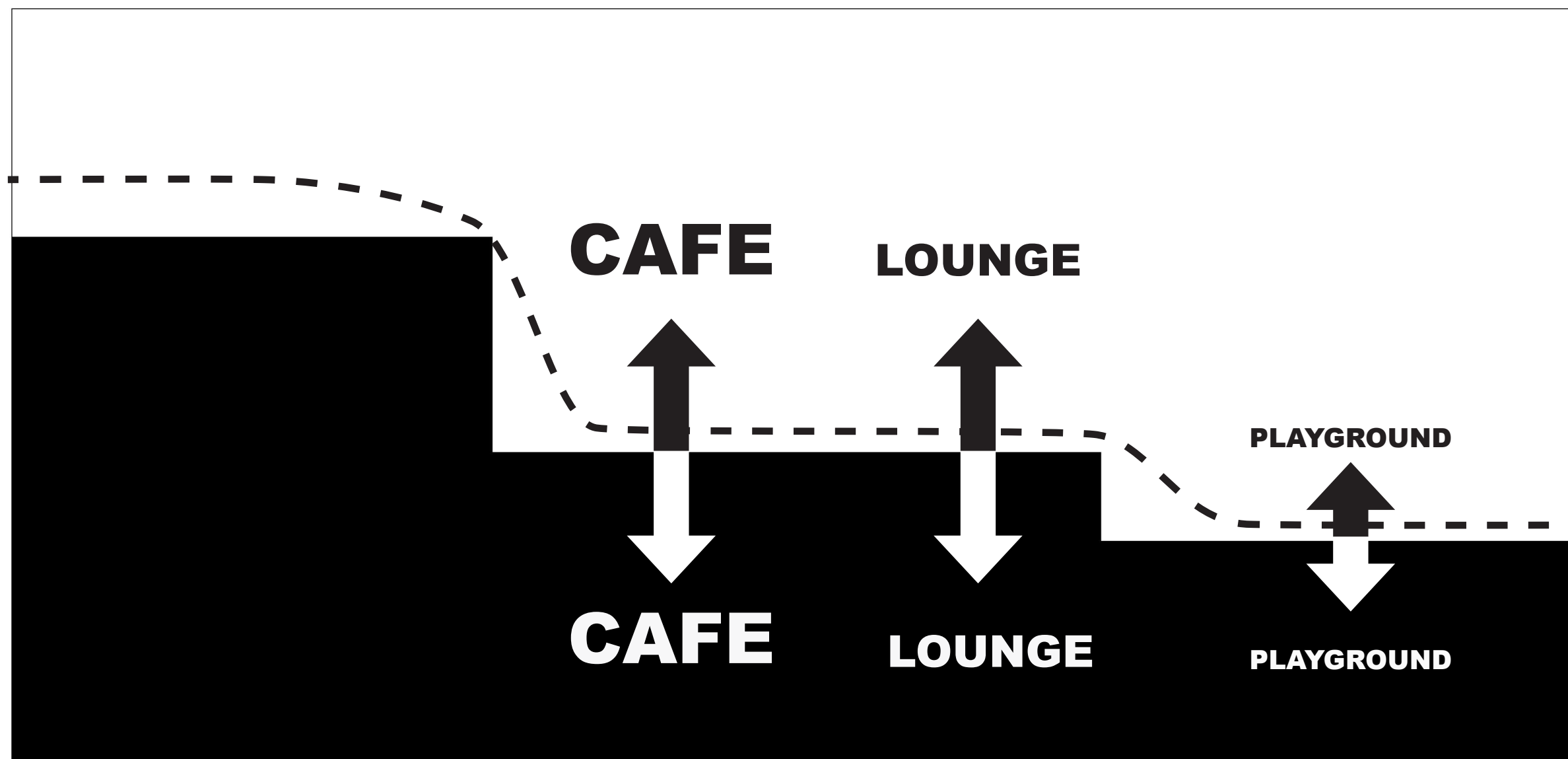


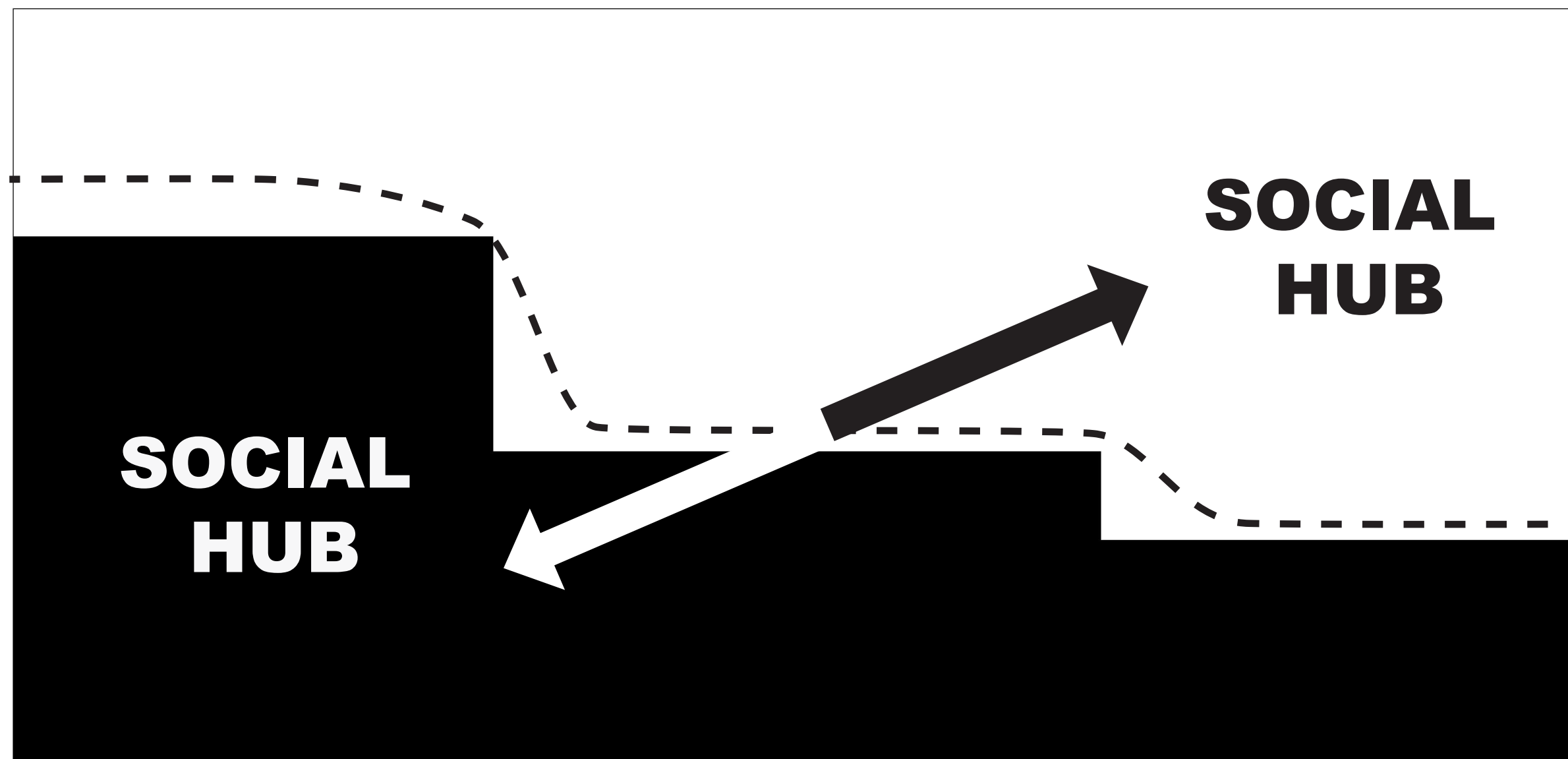


PRIVATE BOOTH

PRIVATE BOOTH





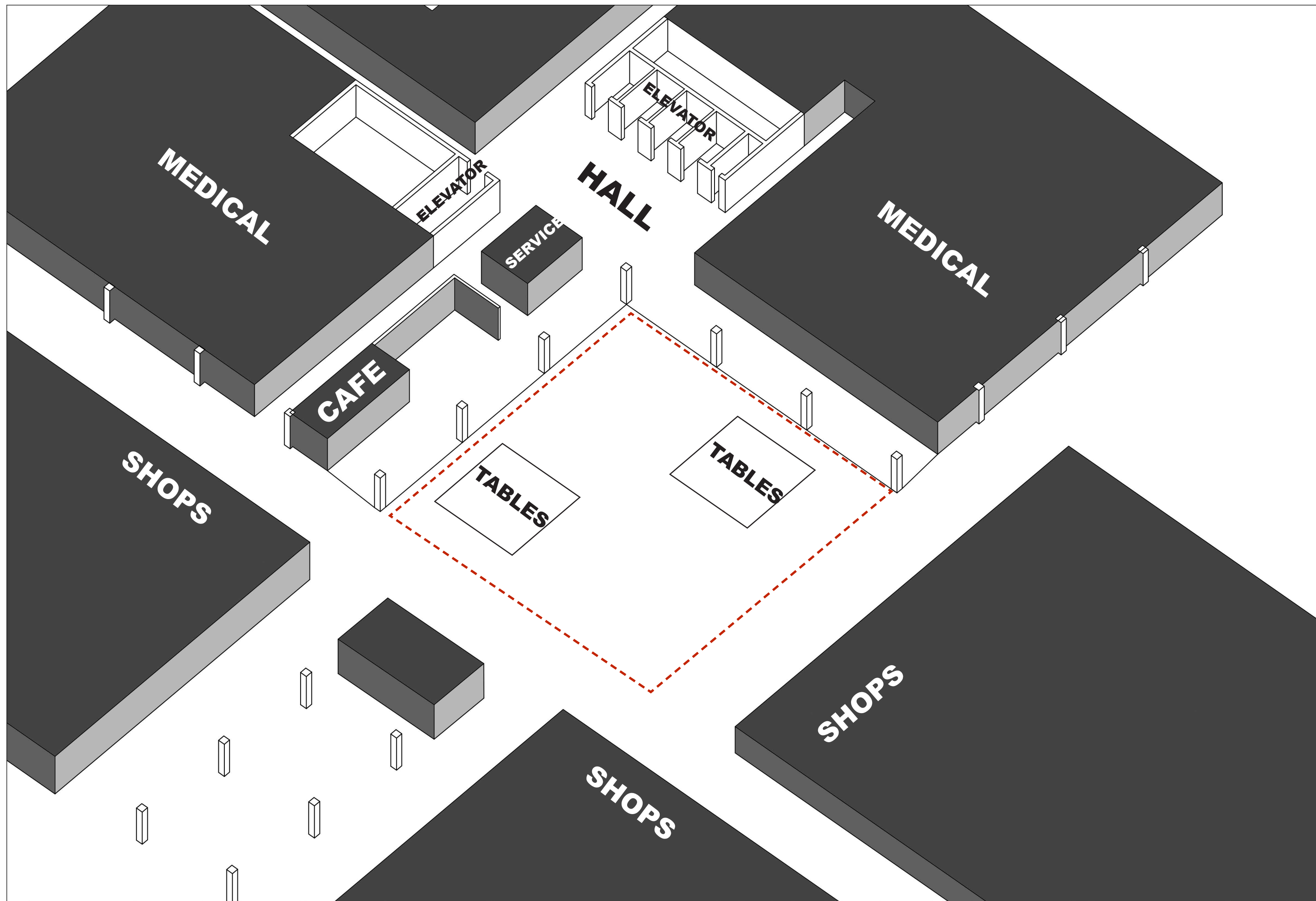


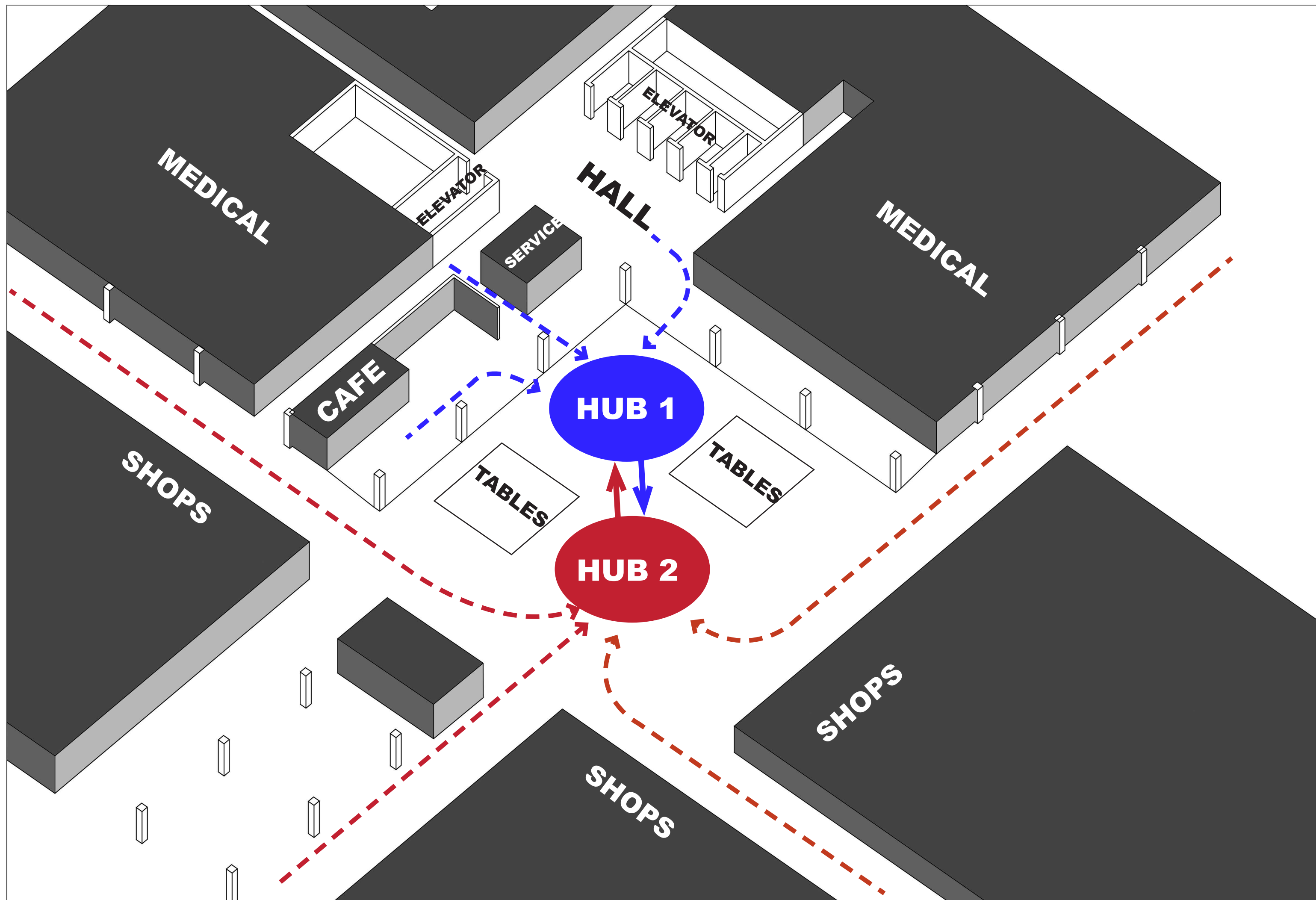


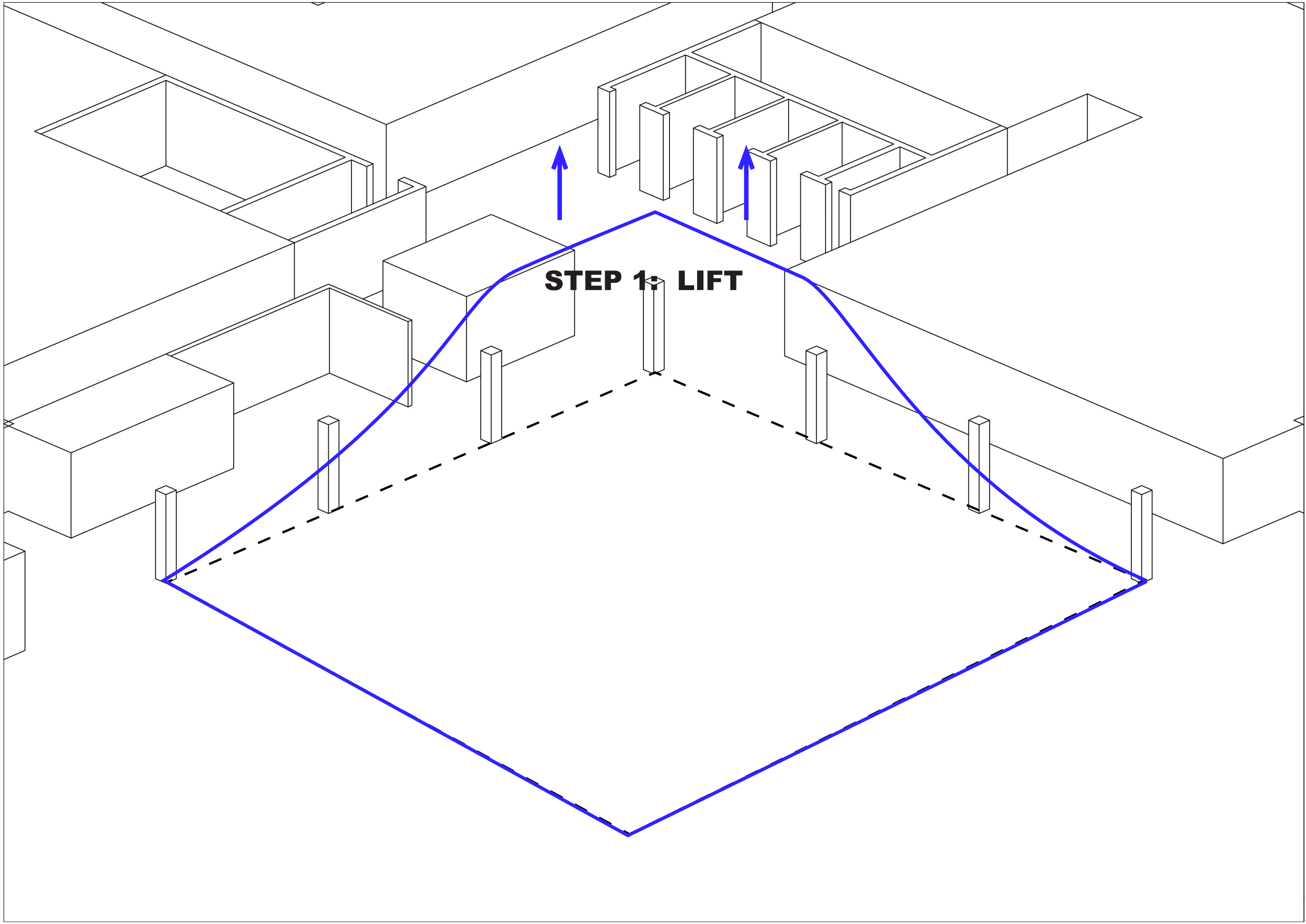


# Voorwoord



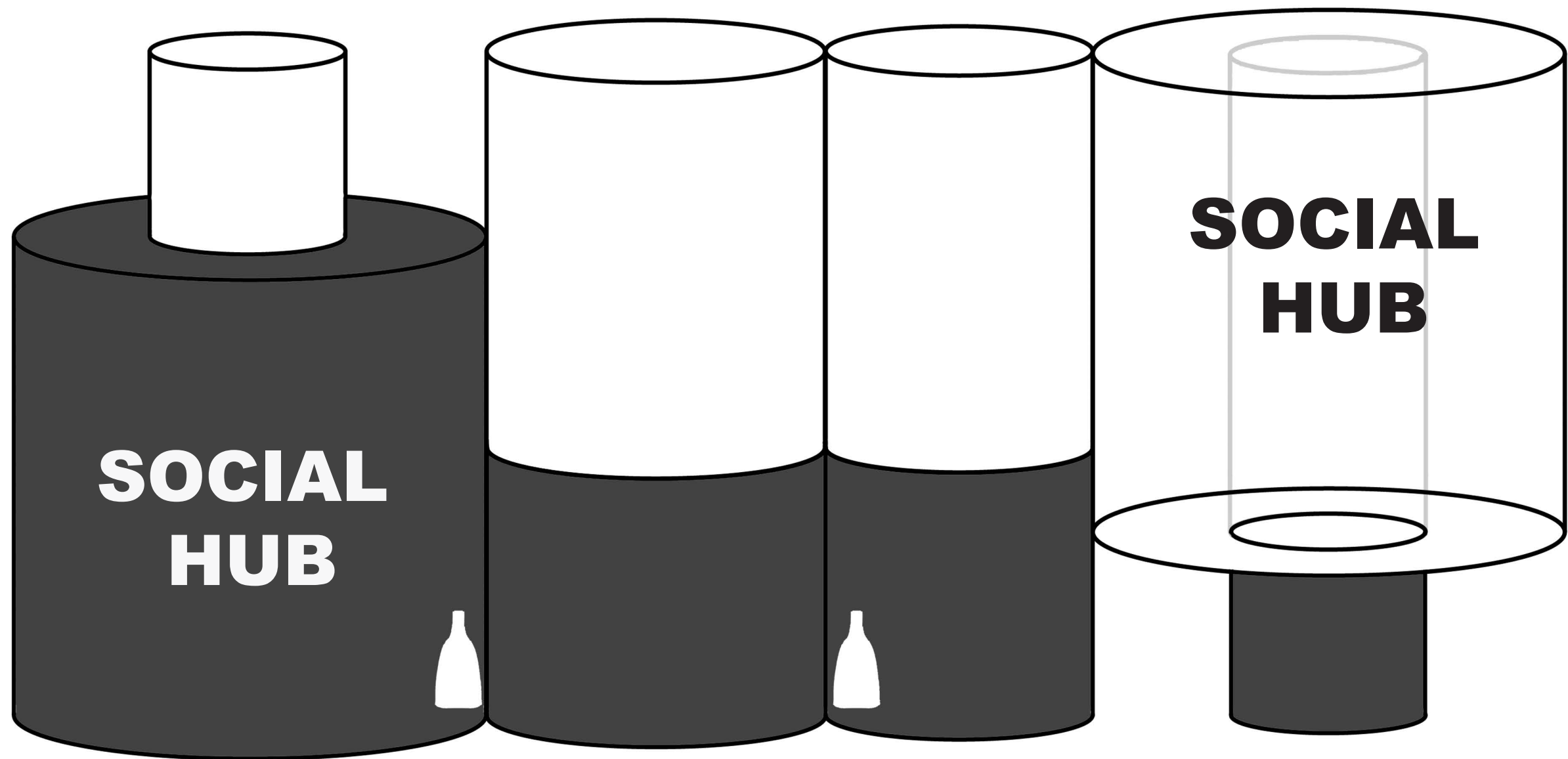


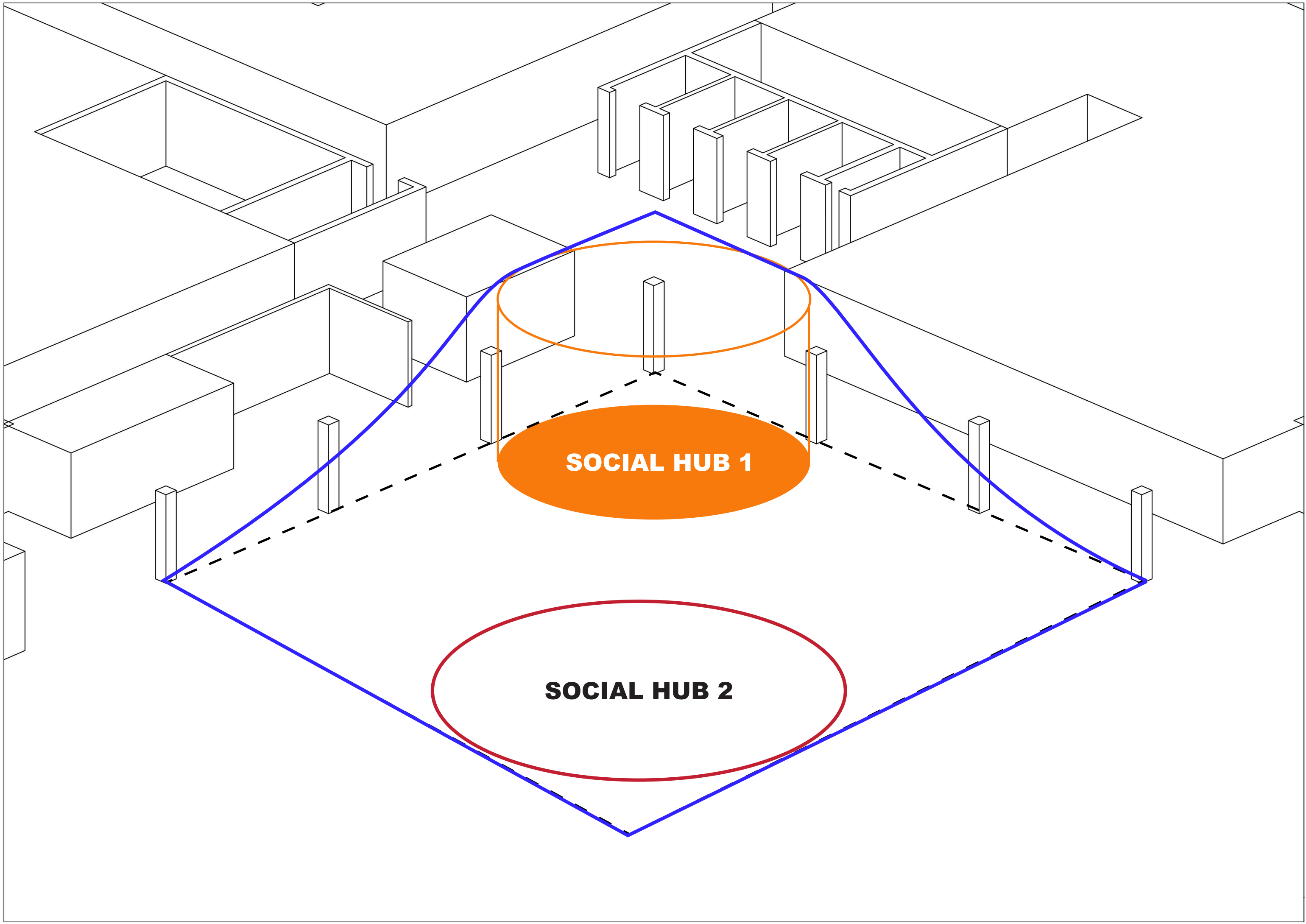




**STEP 1: LIFT**

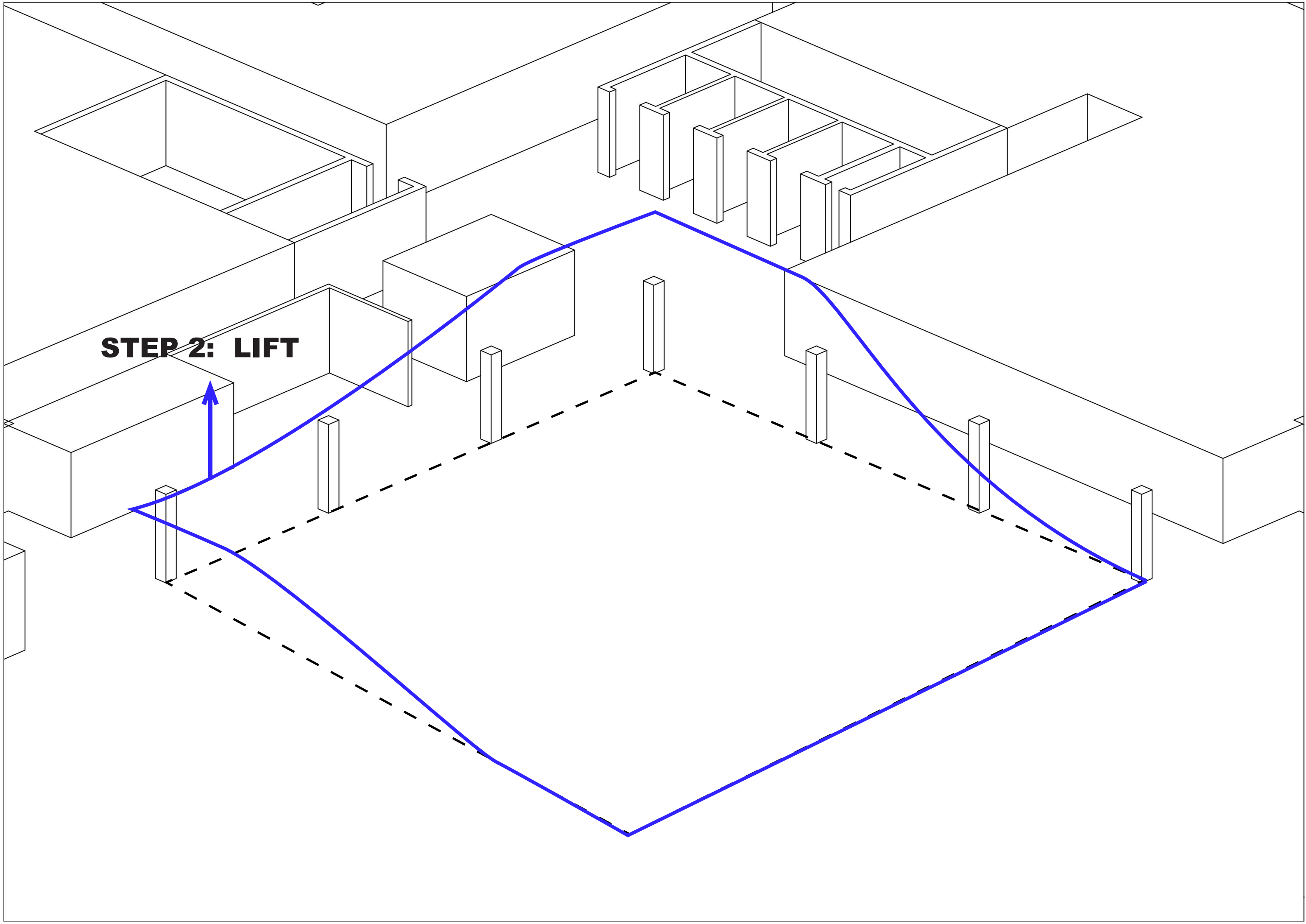




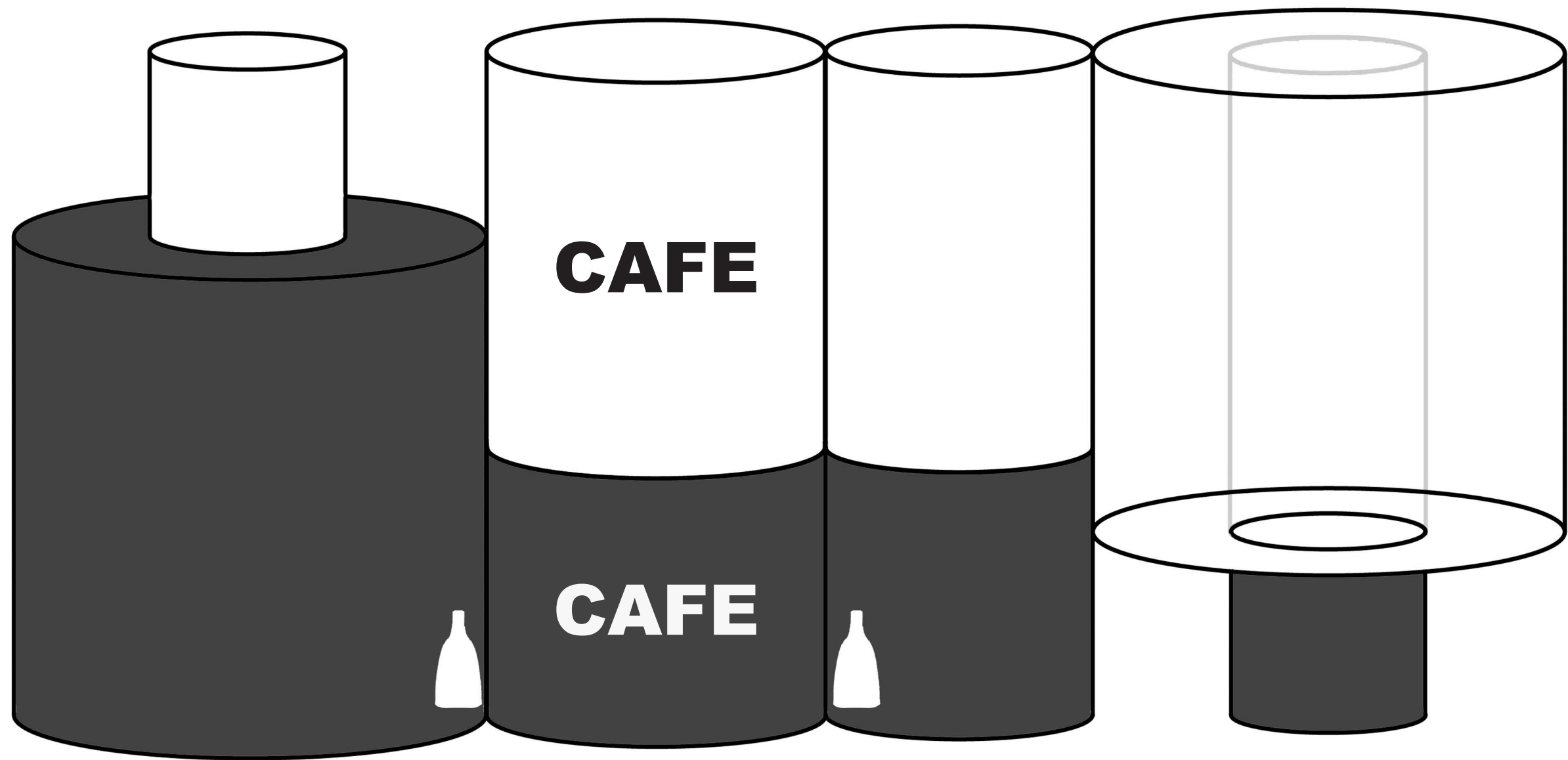


**SOCIAL HUB 1**

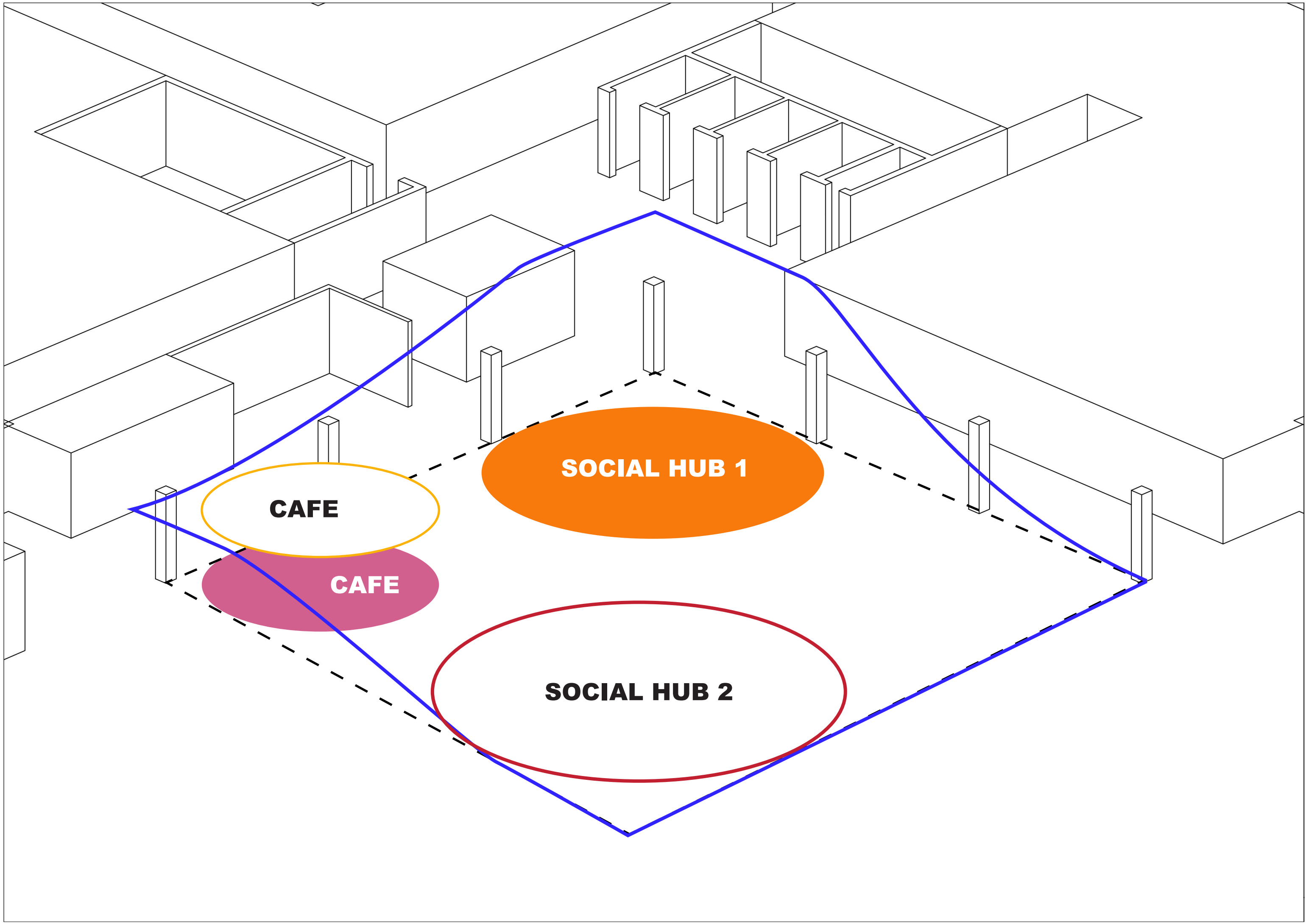
**SOCIAL HUB 2**

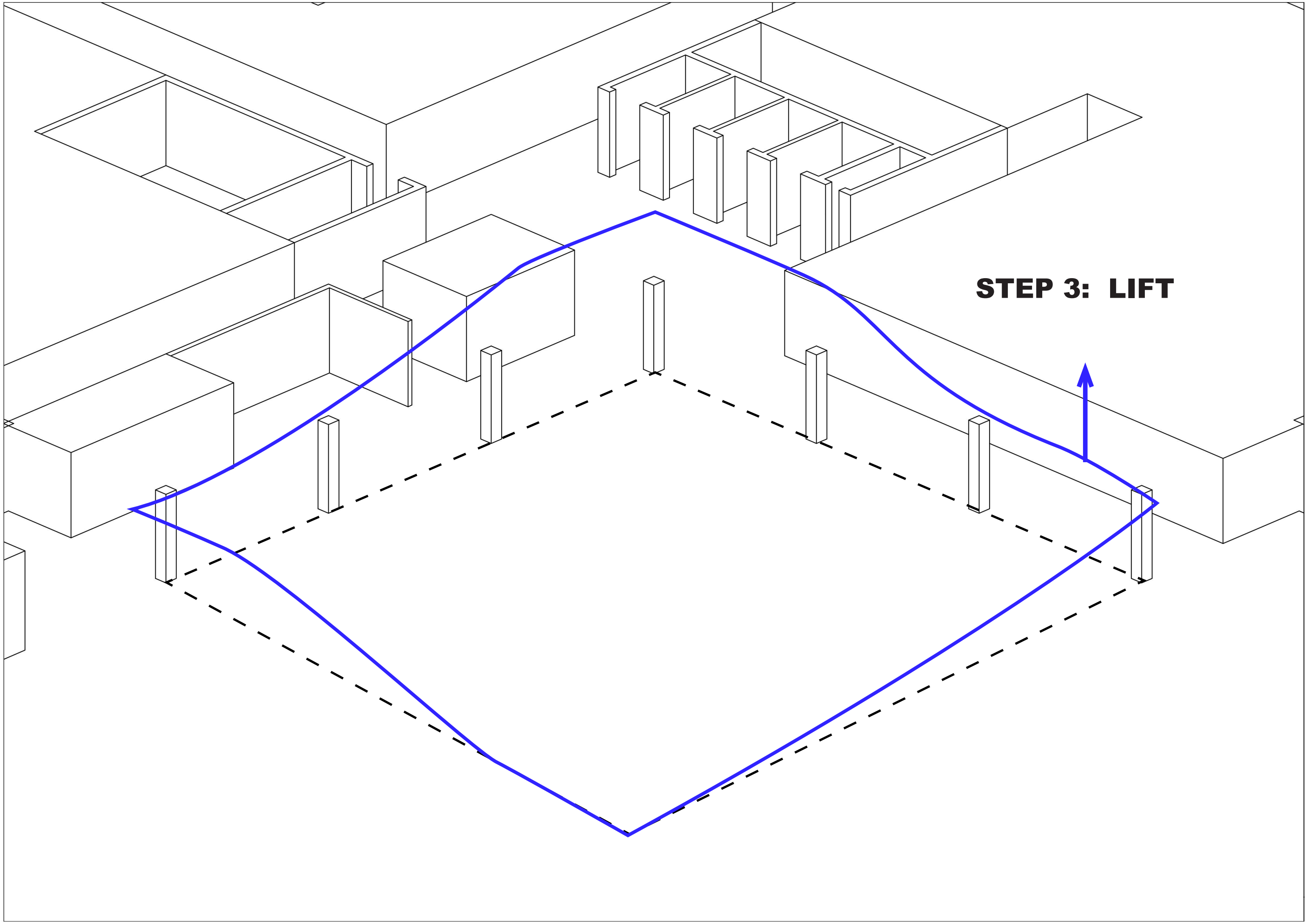


**STEP 2: LIFT**

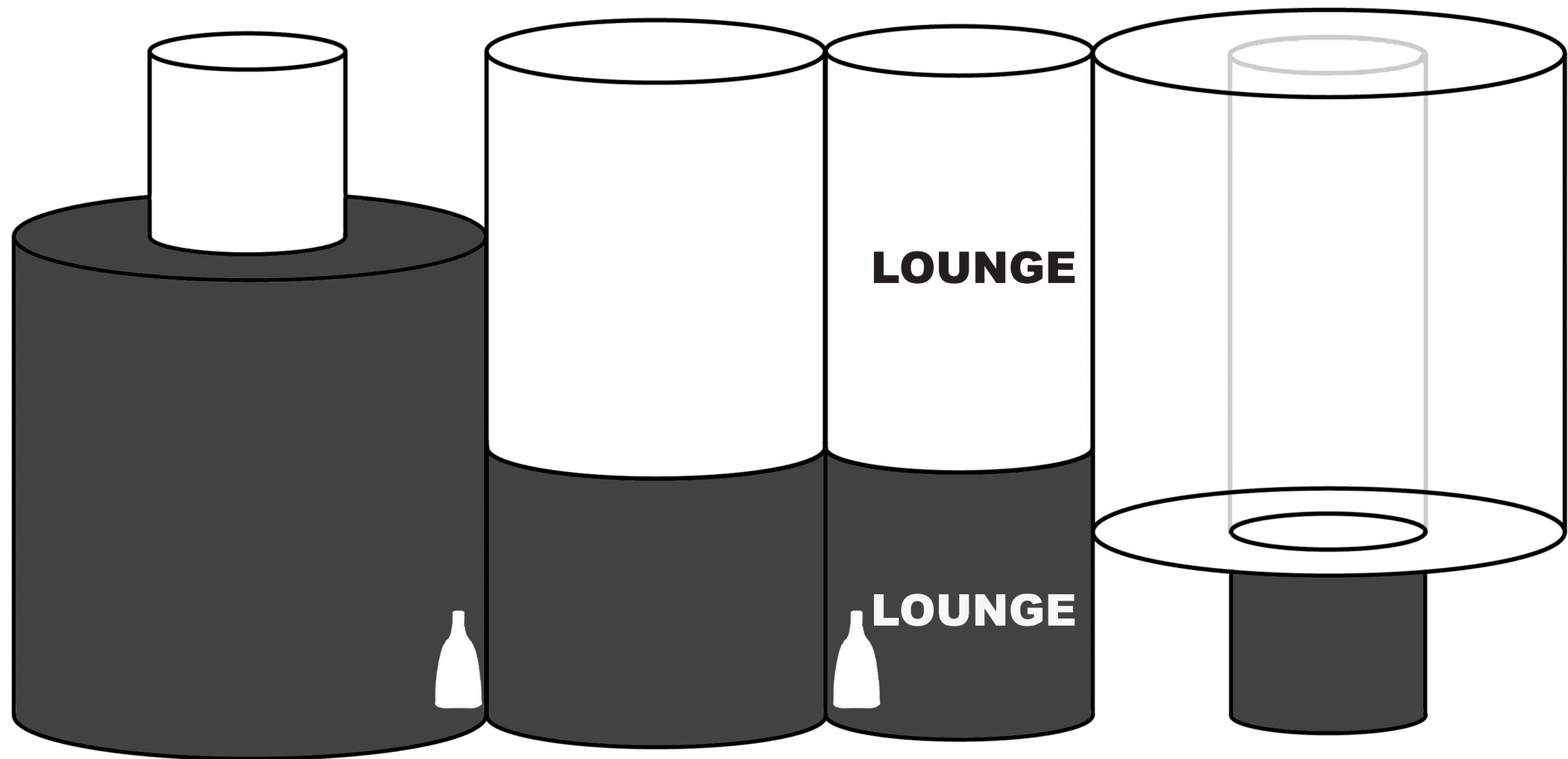


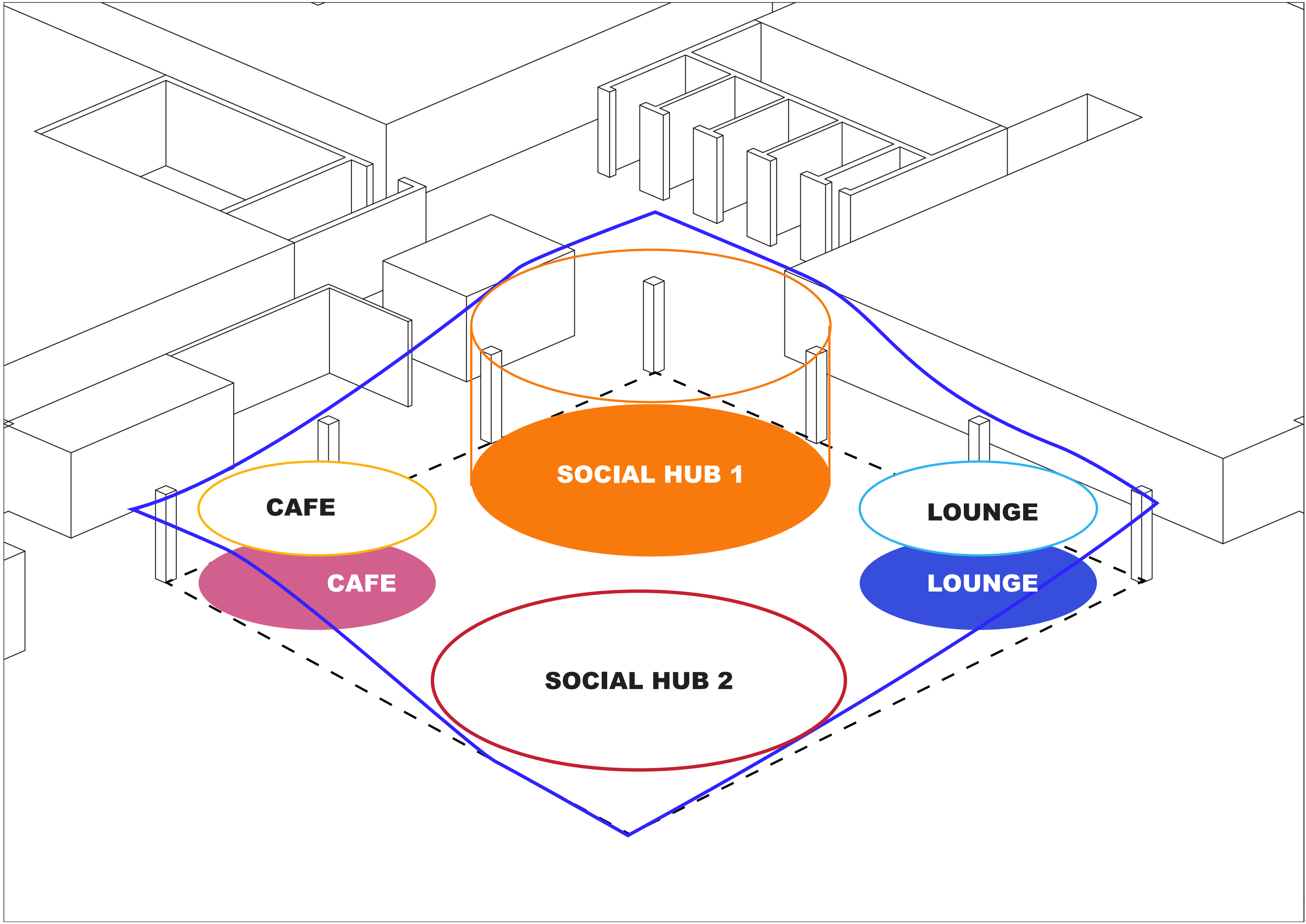






**STEP 3: LIFT**





**CAFE**

**CAFE**

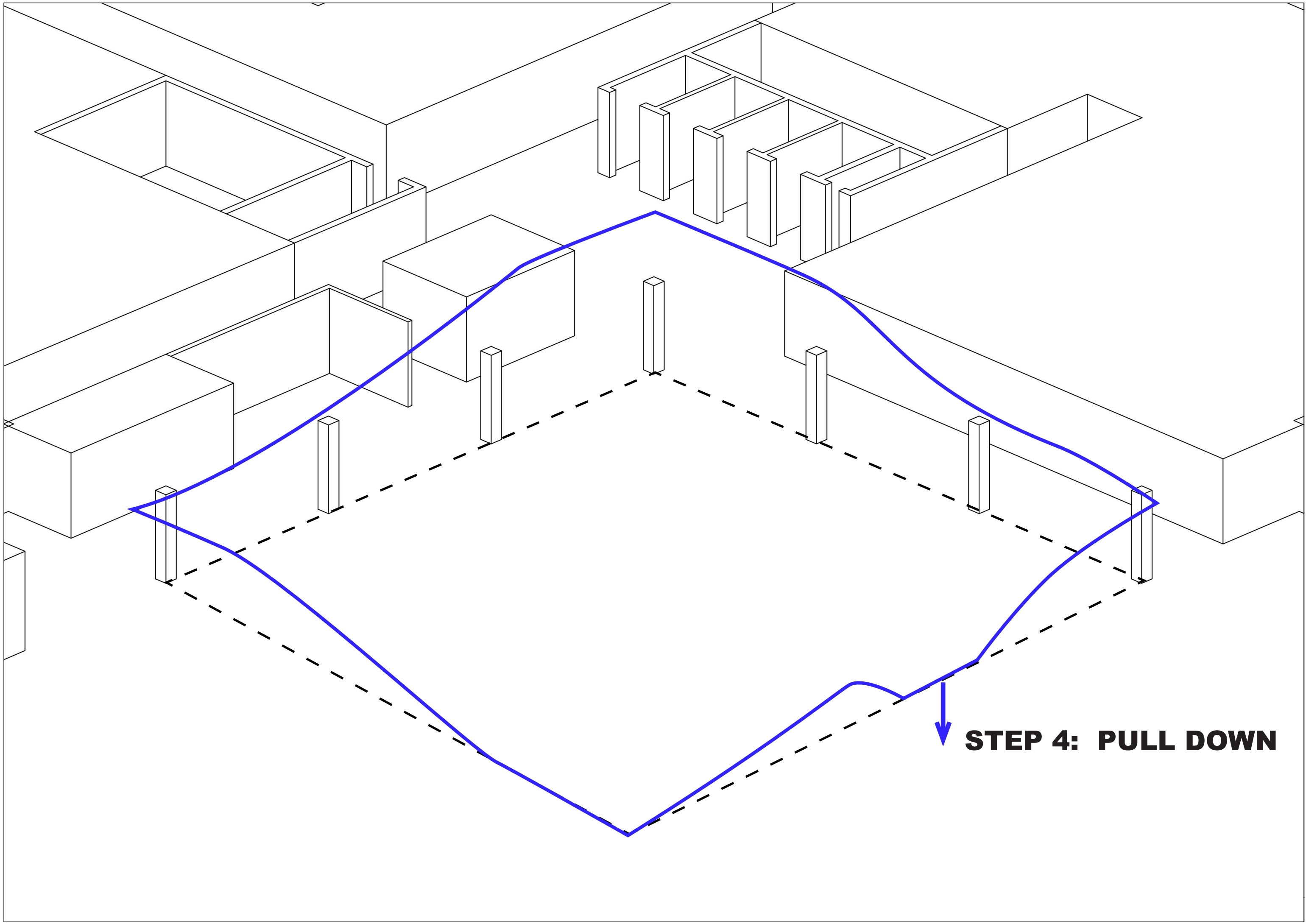
**SOCIAL HUB 1**

**SOCIAL HUB 2**

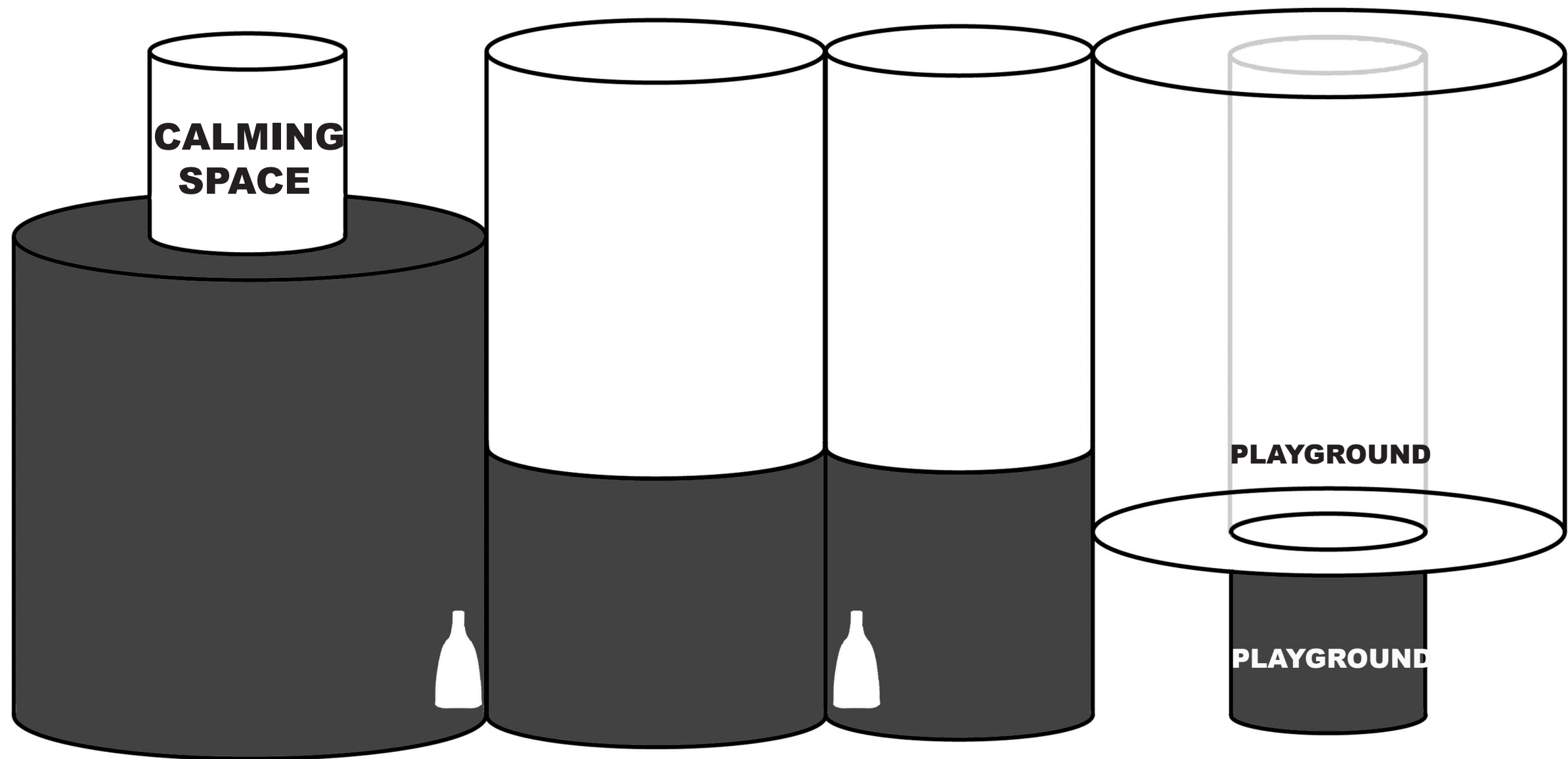
**LOUNGE**

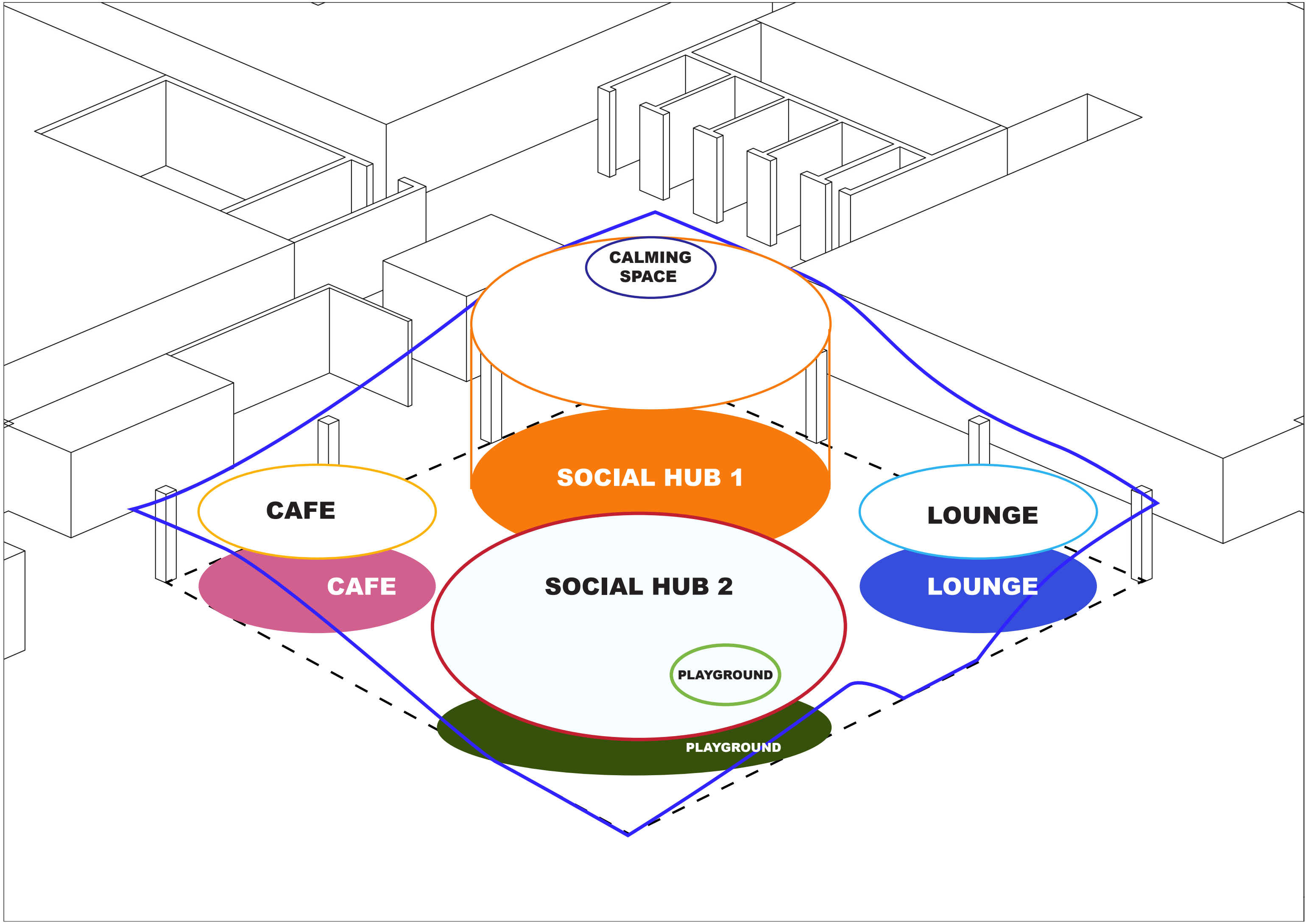
**LOUNGE**

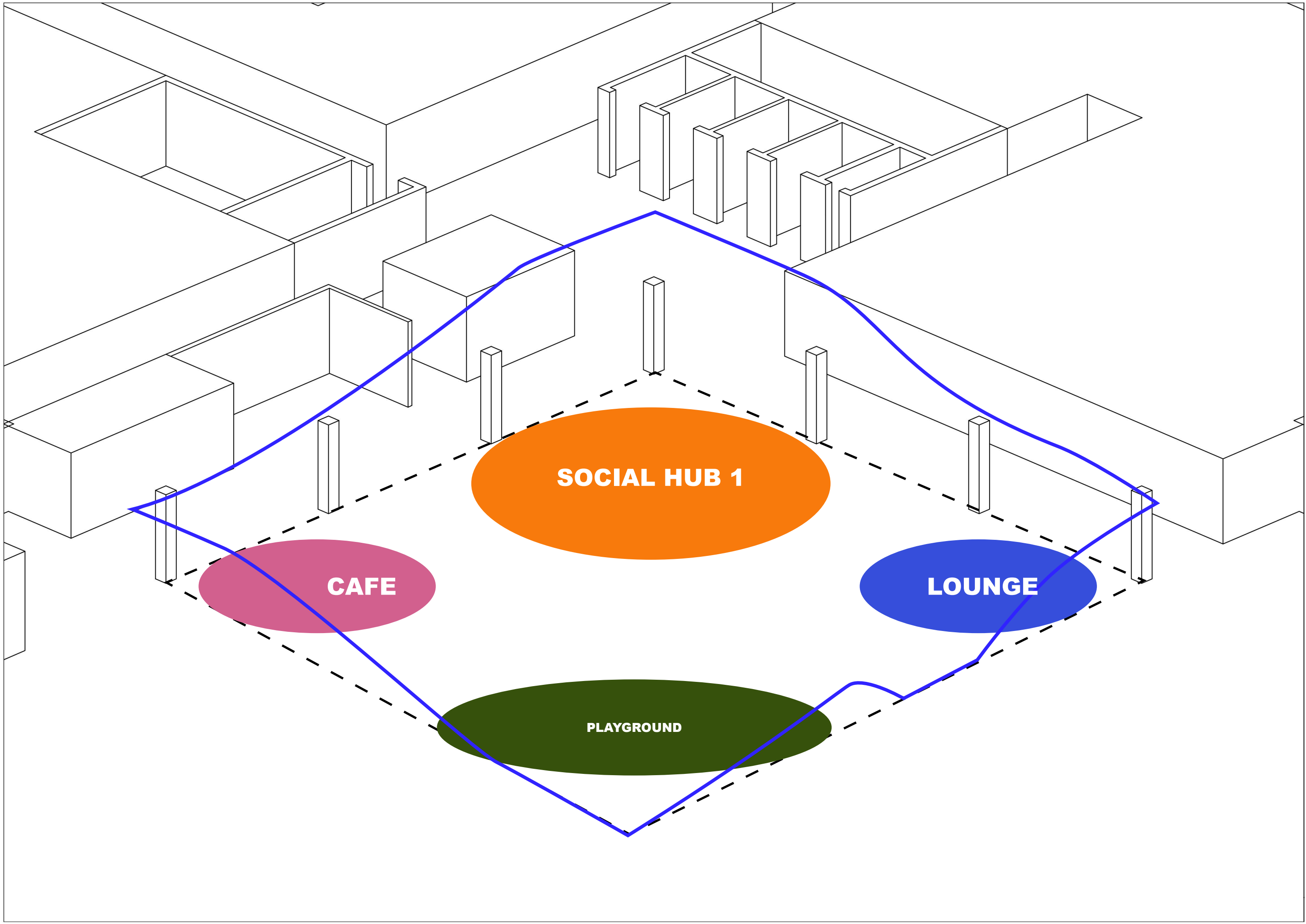




**STEP 4: PULL DOWN**







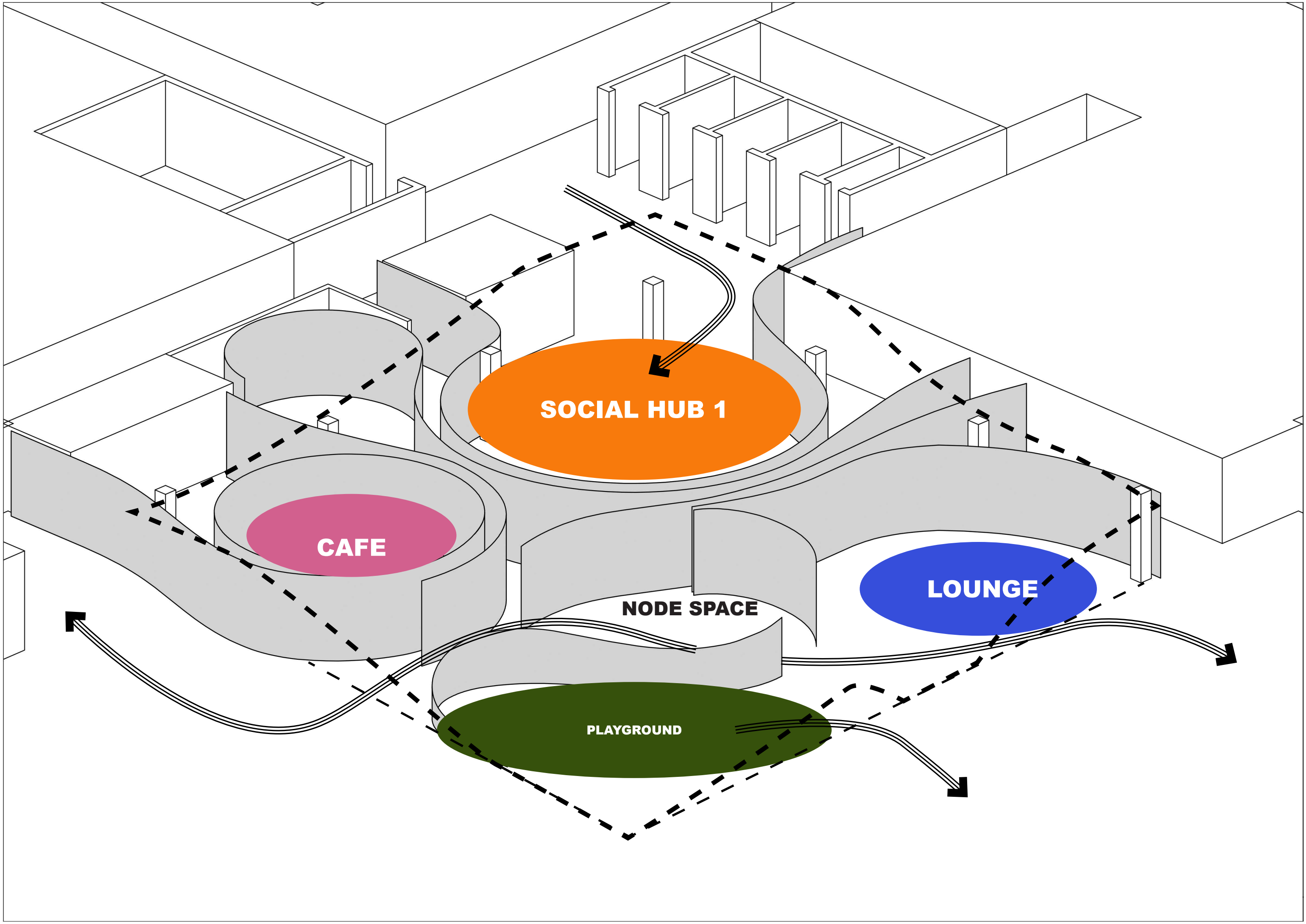
**SOCIAL HUB 1**

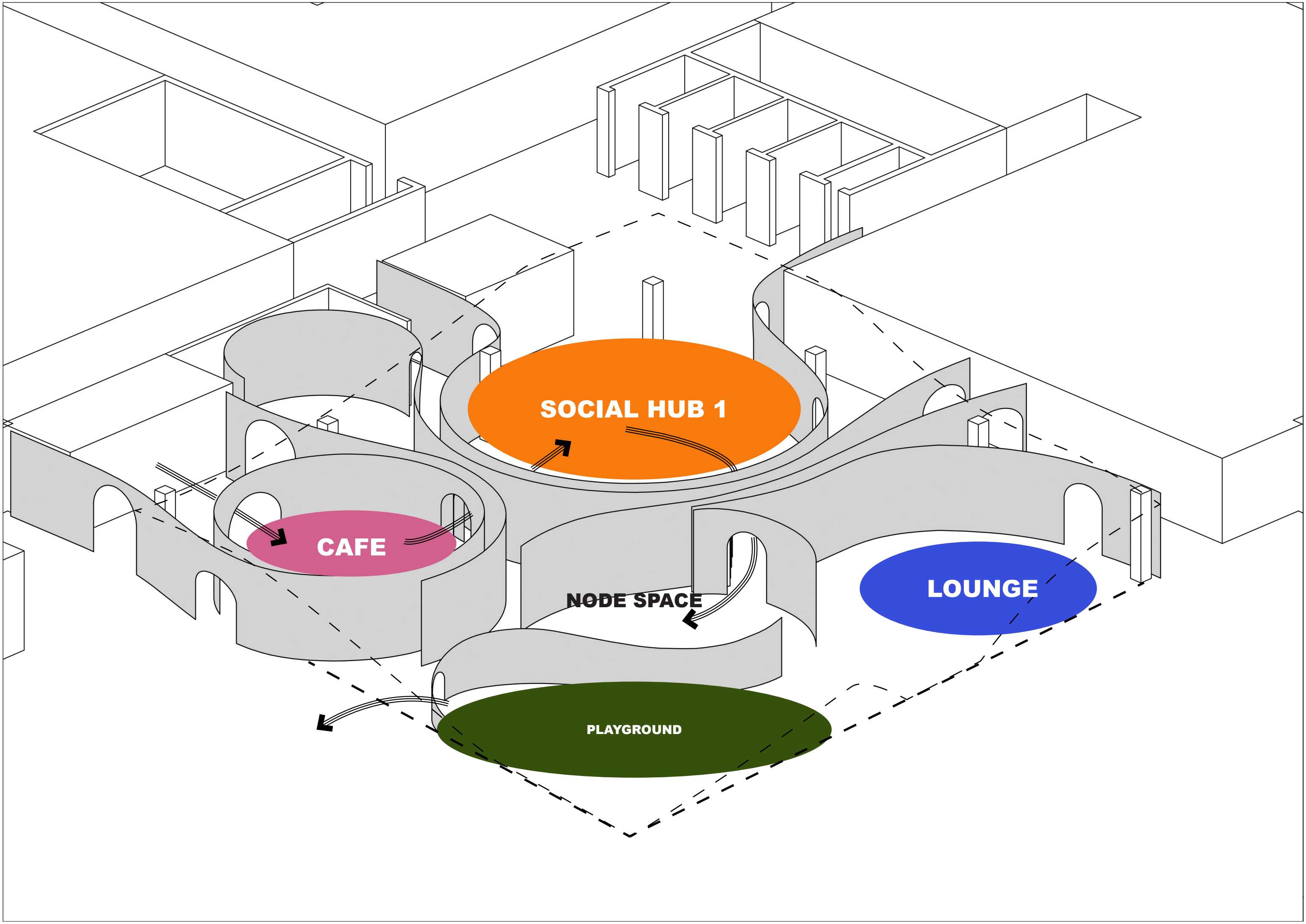
**CAFE**

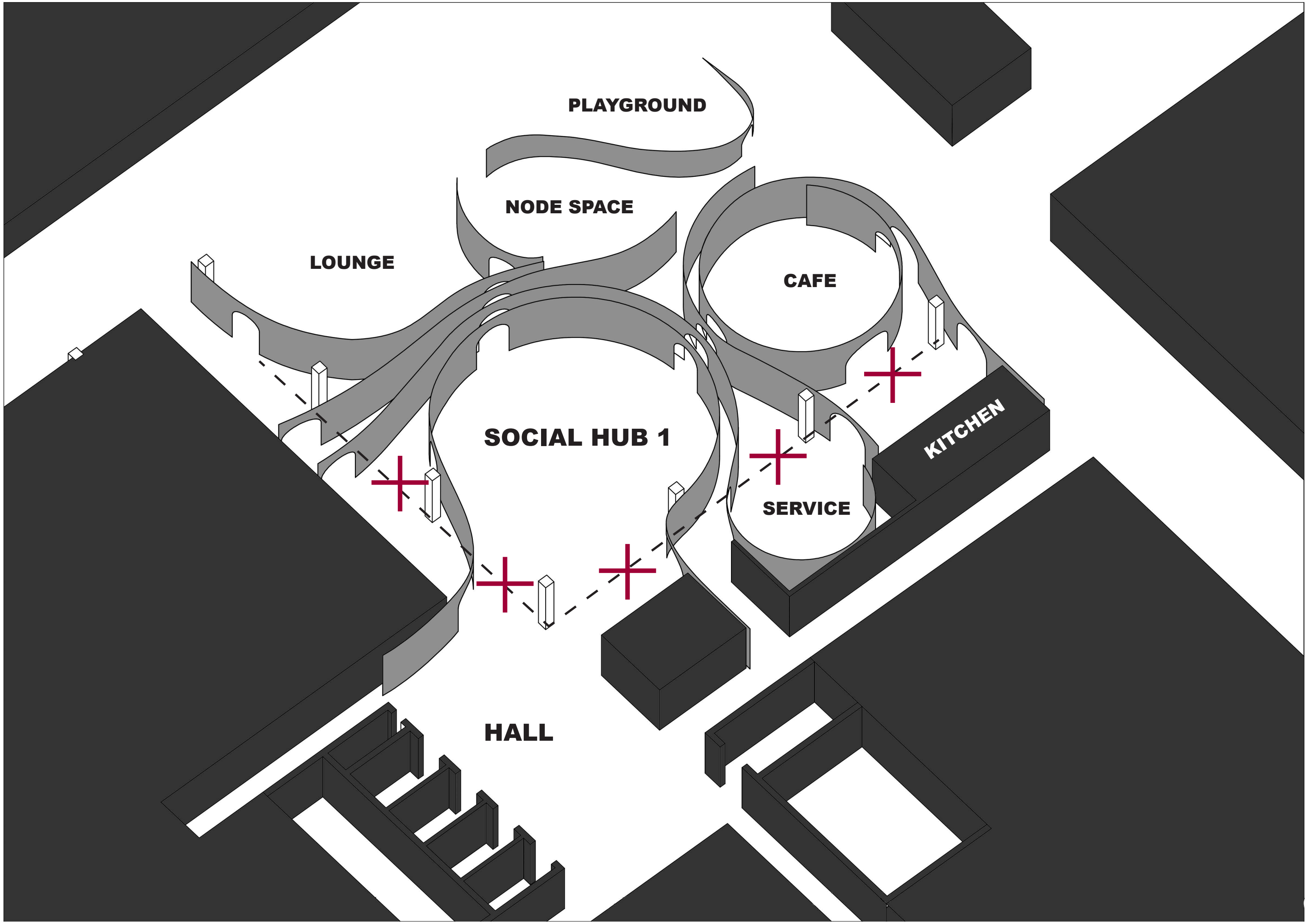
**LOUNGE**

**PLAYGROUND**









**PLAYGROUND**

**NODE SPACE**

**LOUNGE**

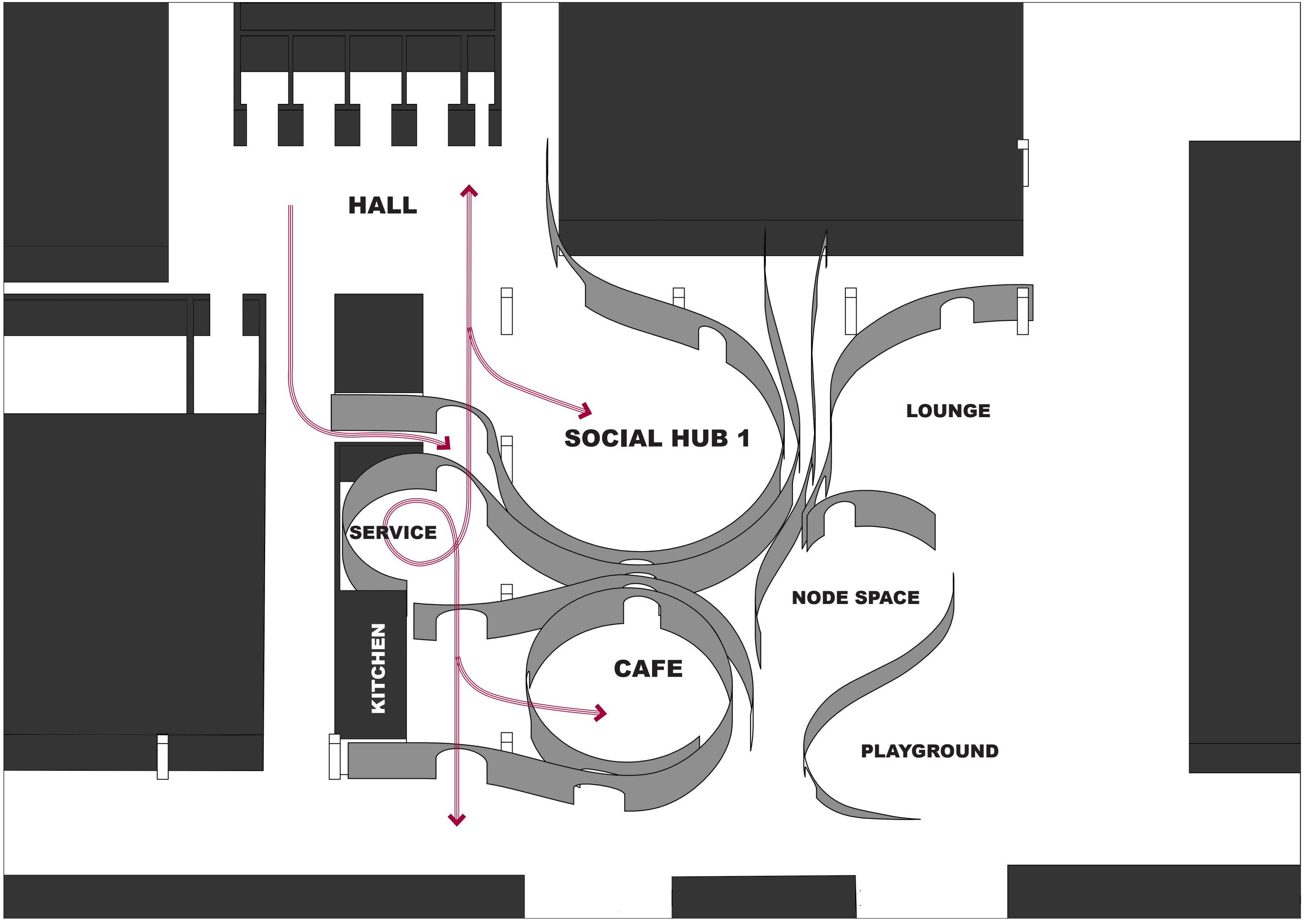
**CAFE**

**SOCIAL HUB 1**

**KITCHEN**

**SERVICE**

**HALL**



**HALL**

**SOCIAL HUB 1**

**LOUNGE**

**SERVICE**

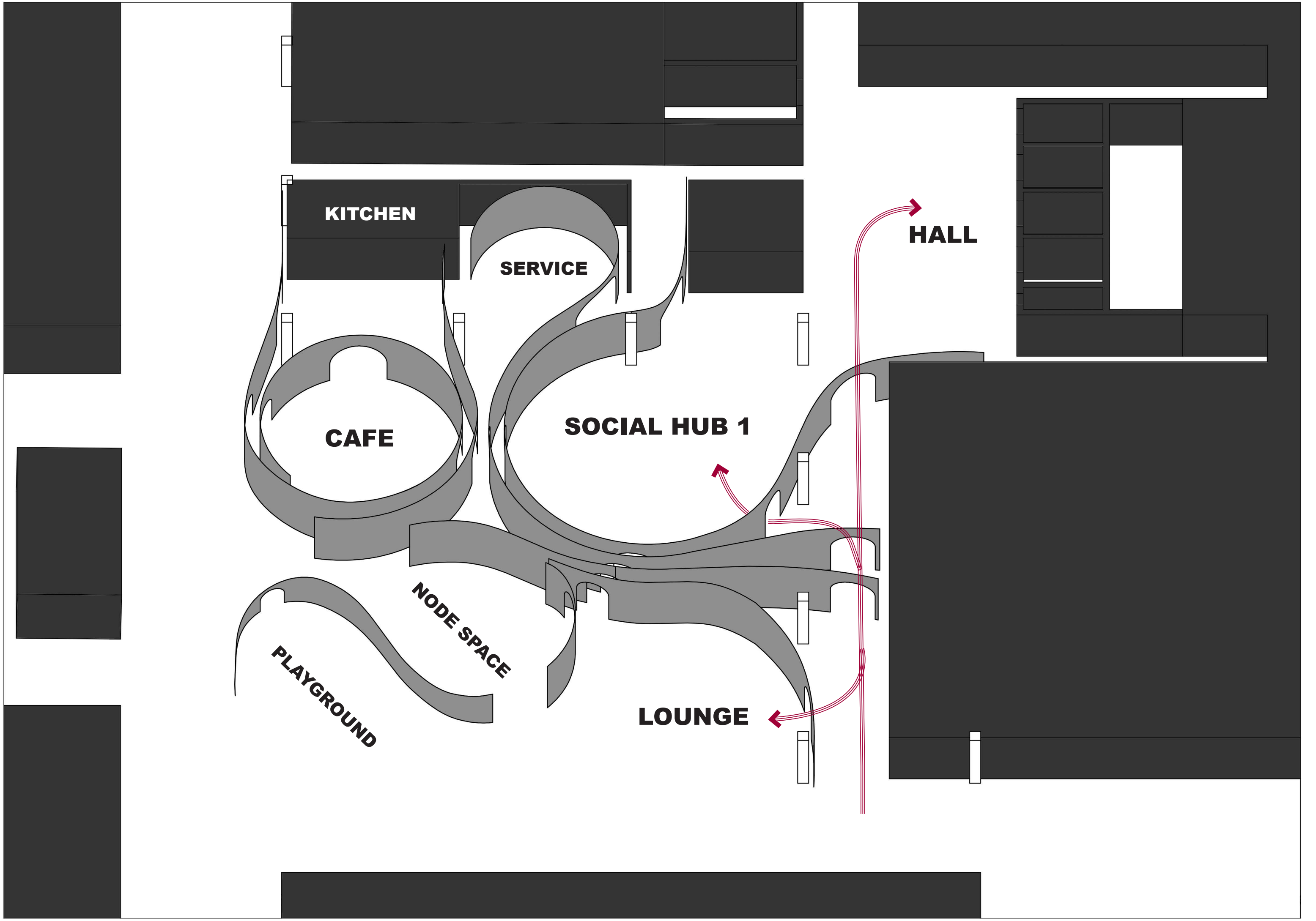
**KITCHEN**

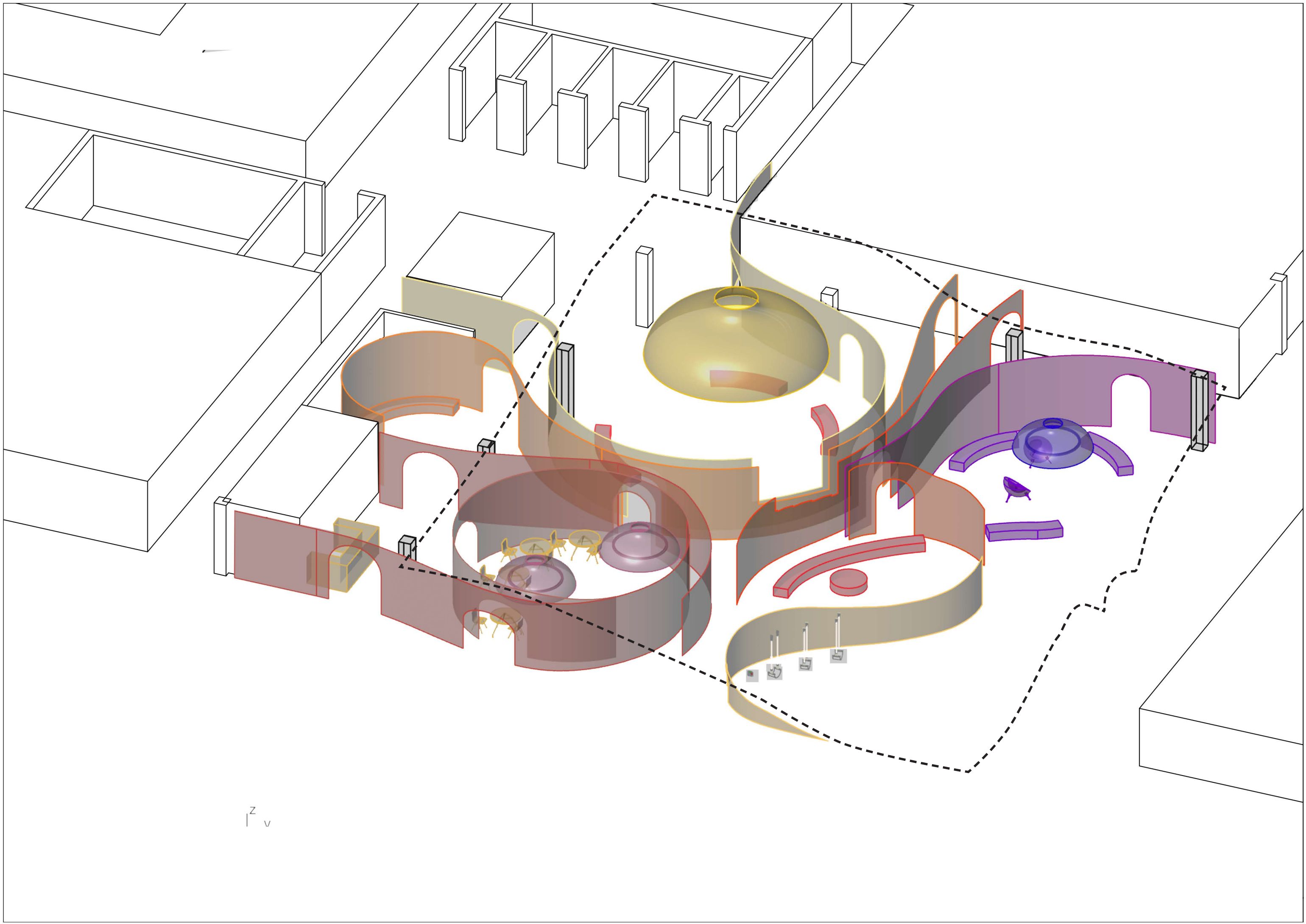
**CAFE**

**NODE SPACE**

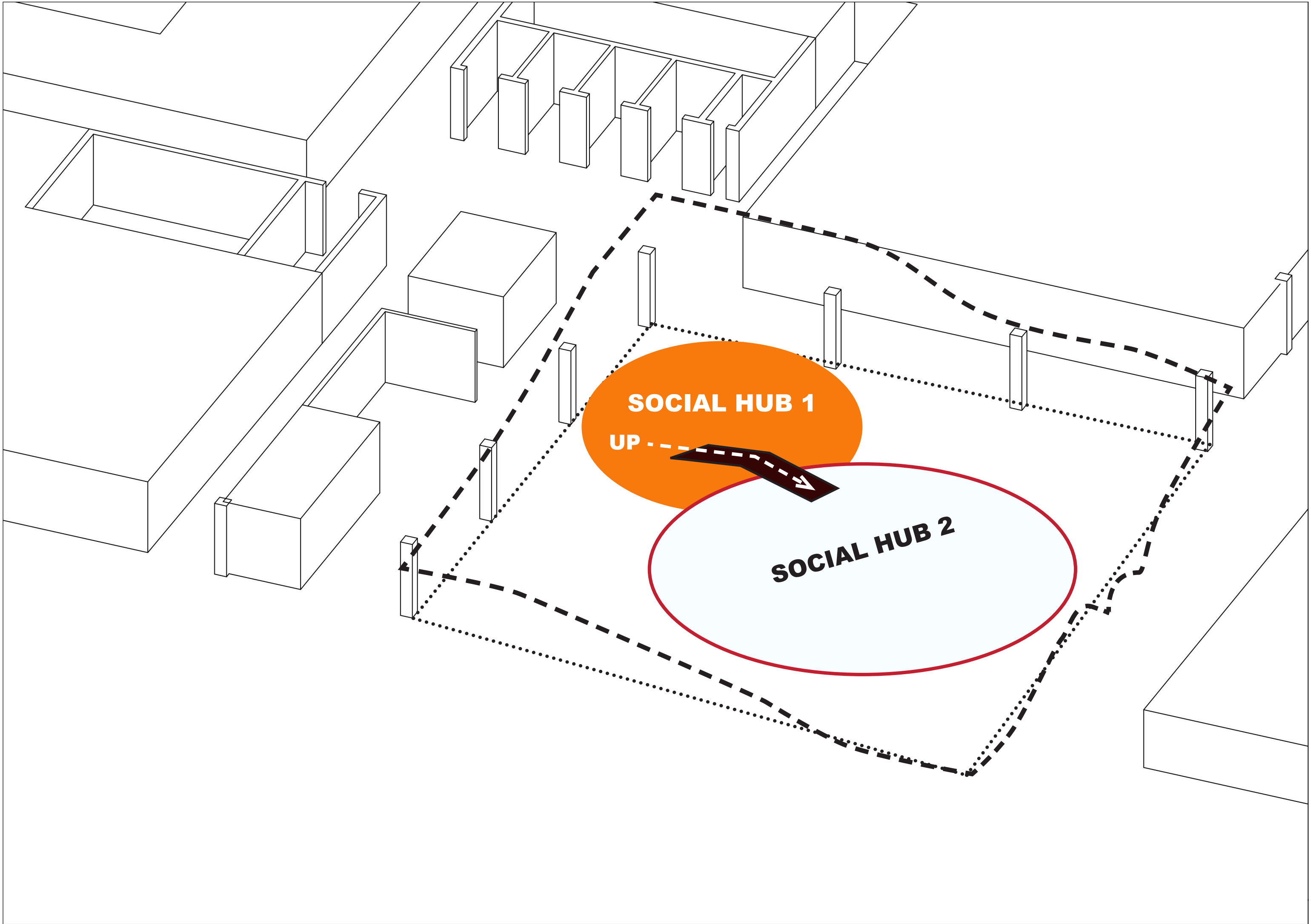
**PLAYGROUND**

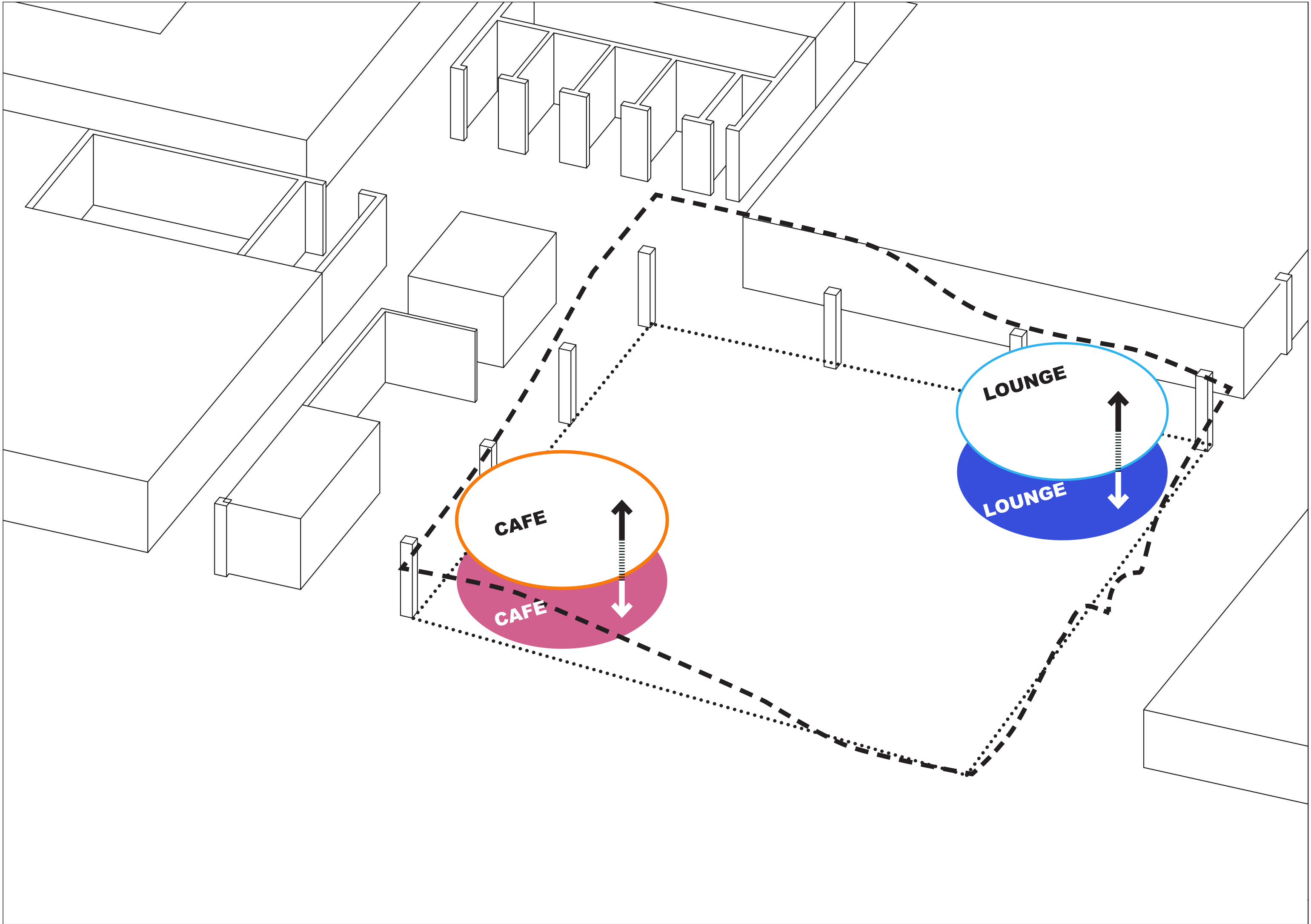




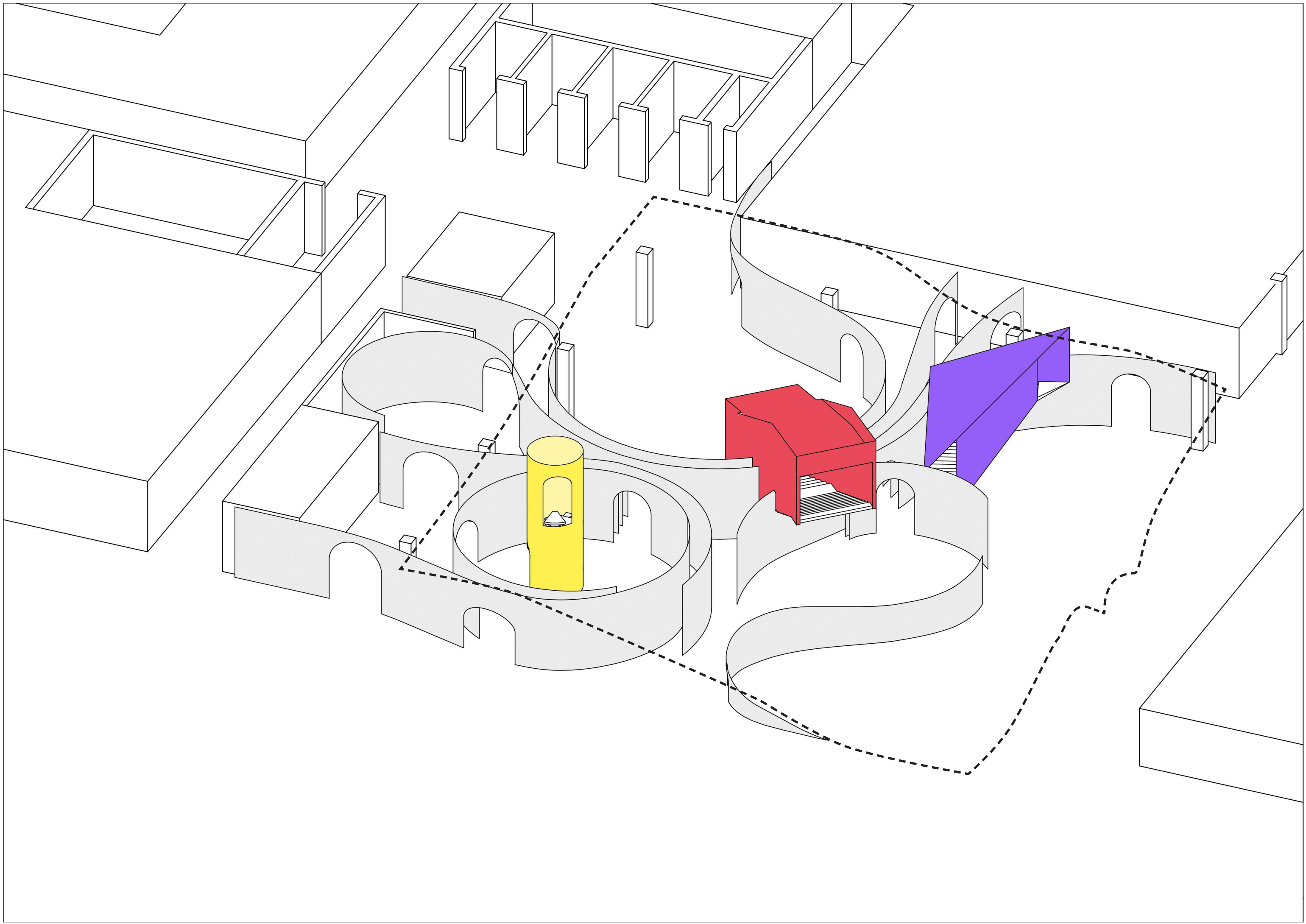


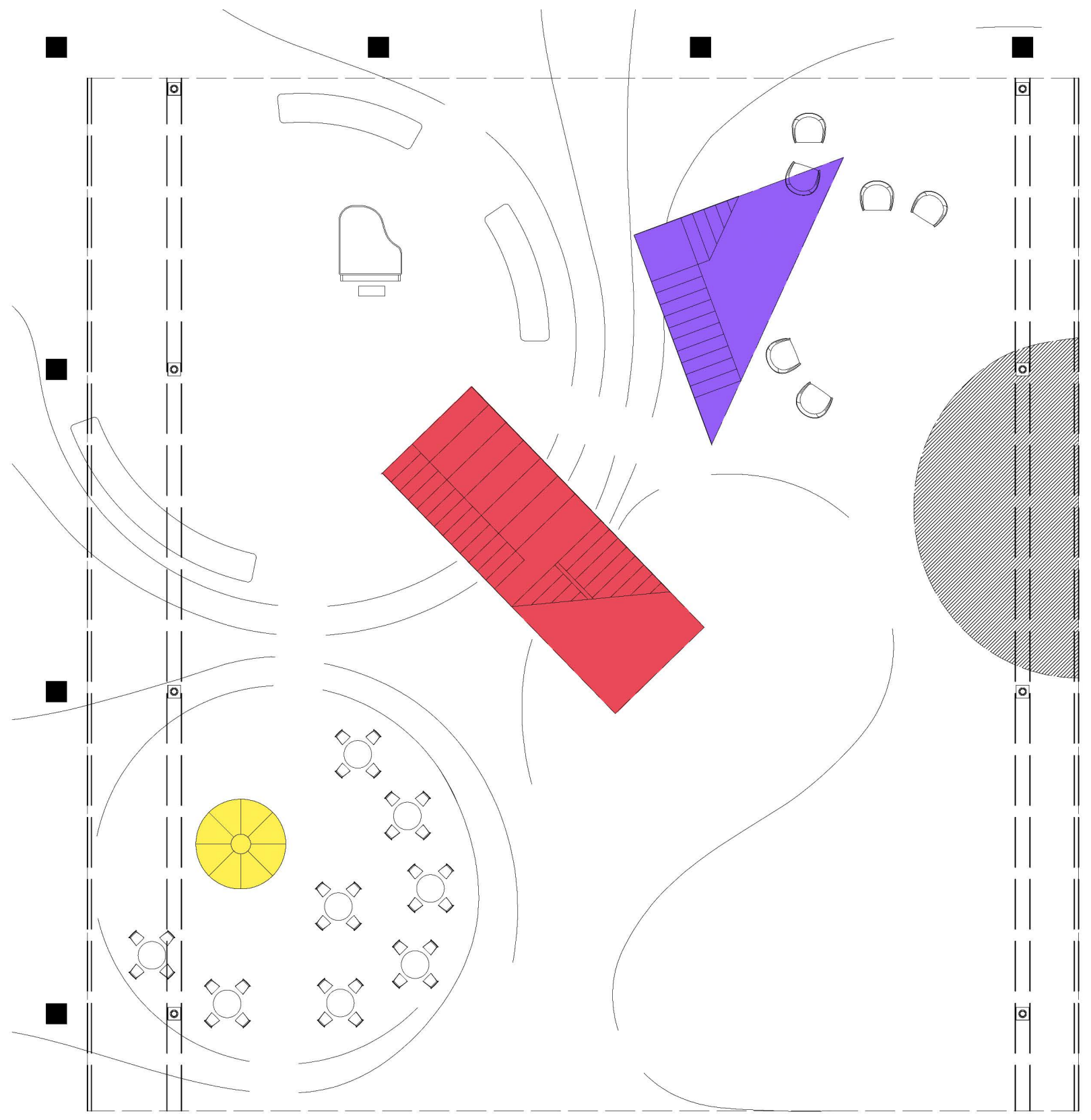
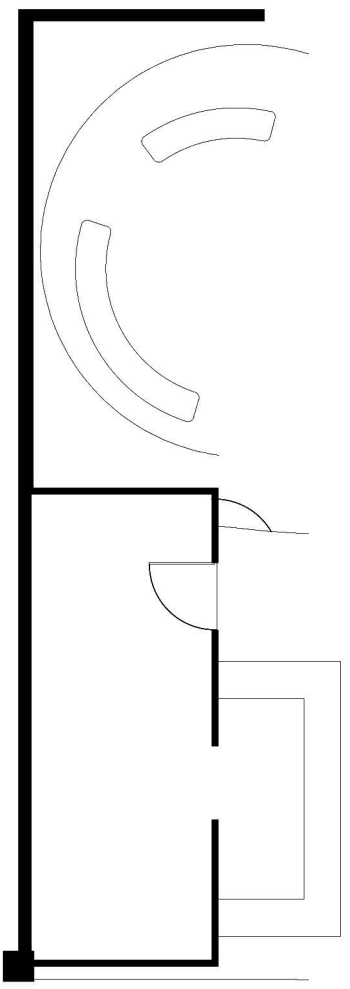
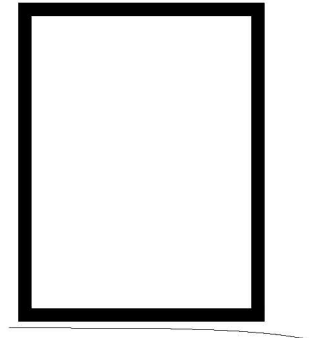
$z_v$

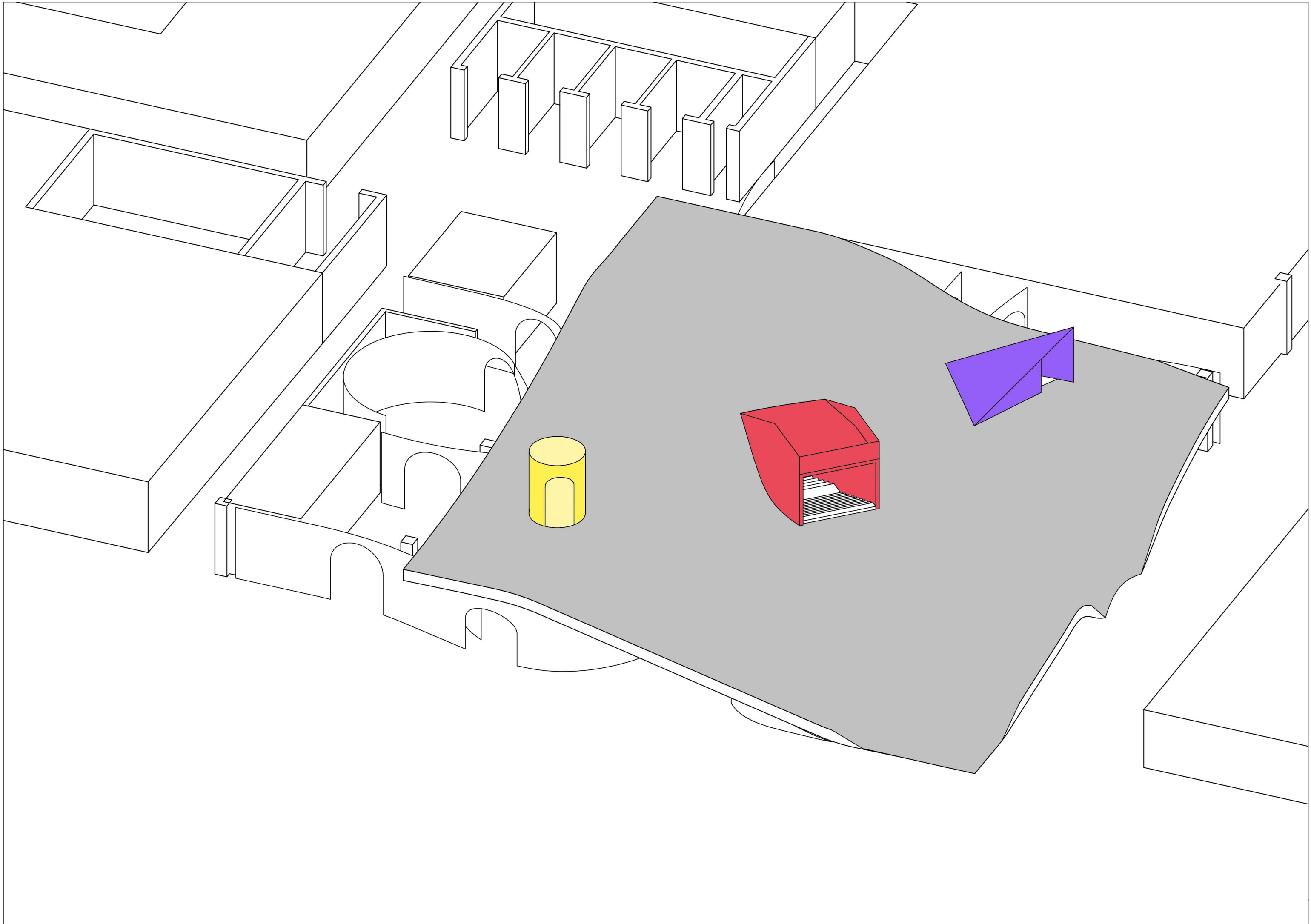




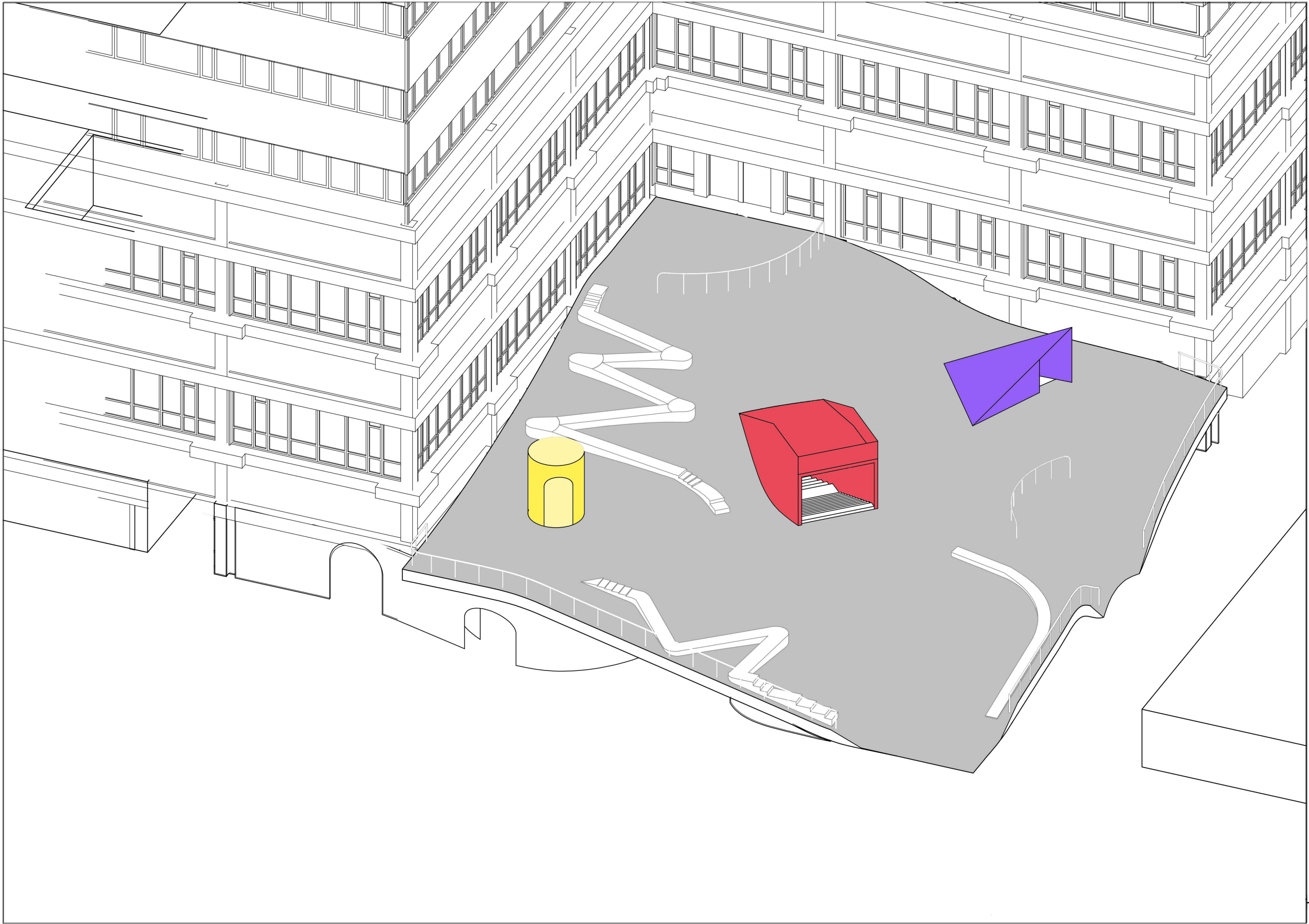




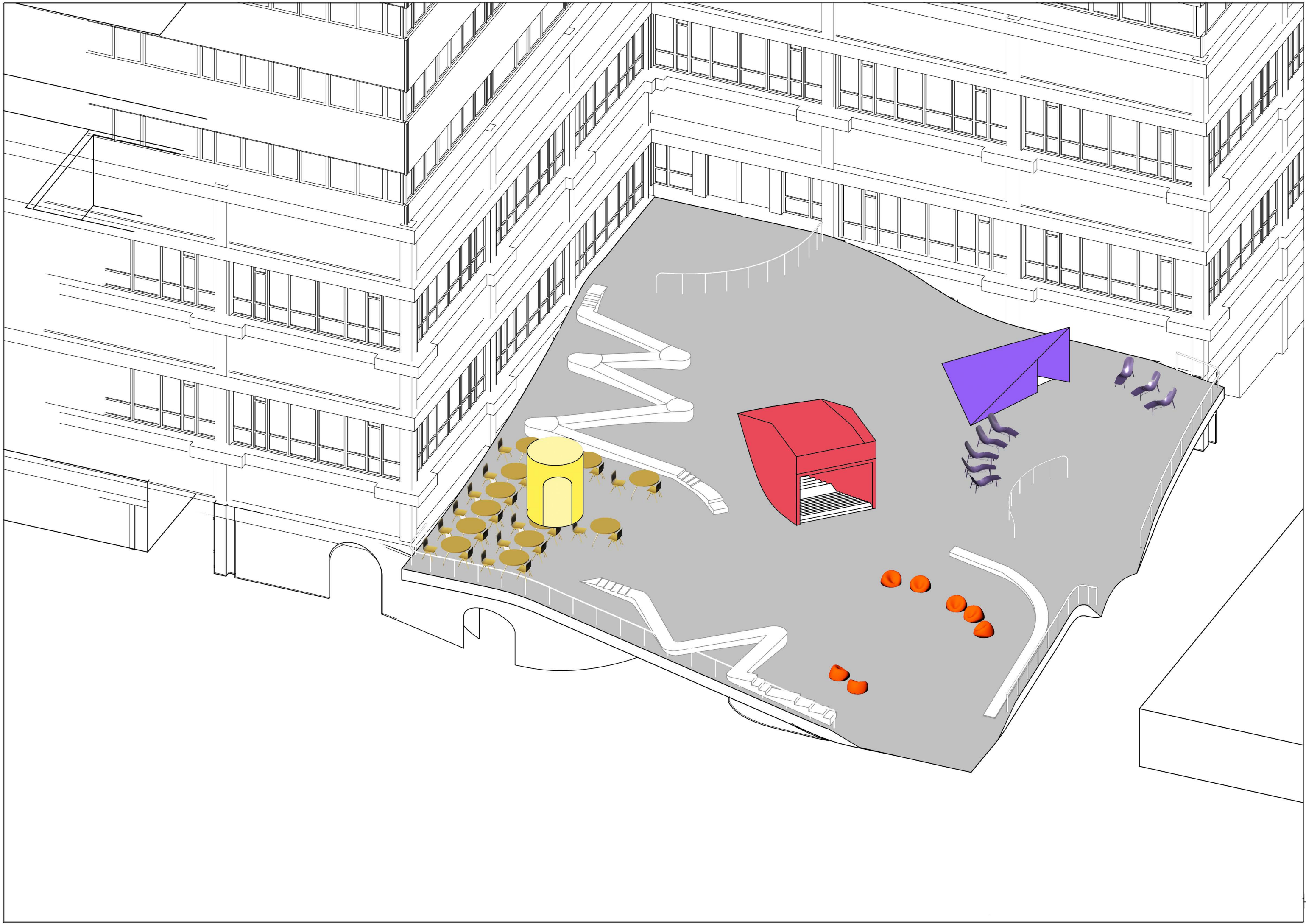




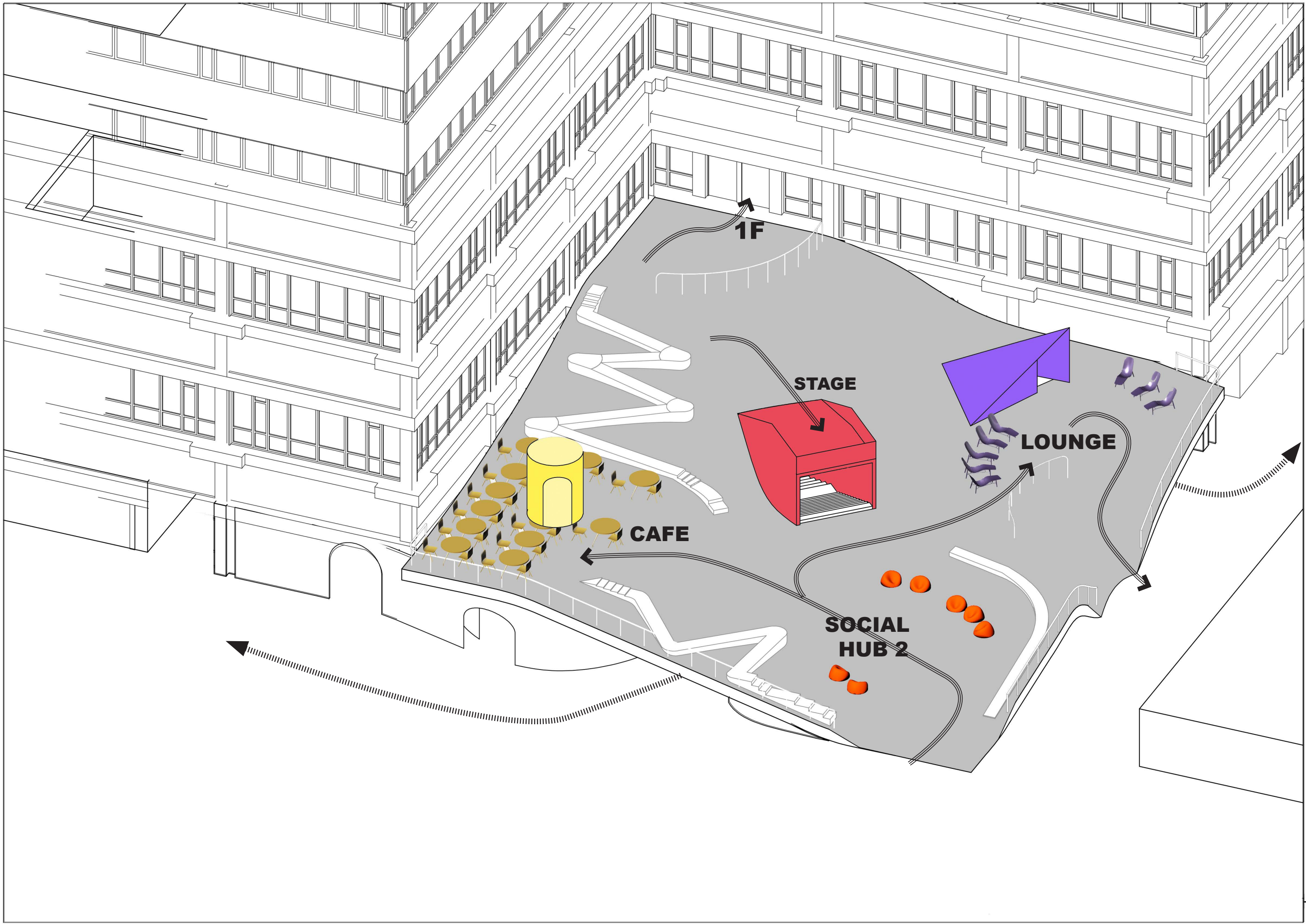






















STRUCTURAL REFERENCE

## **"The Sequential Roof" at ETH Zurich**

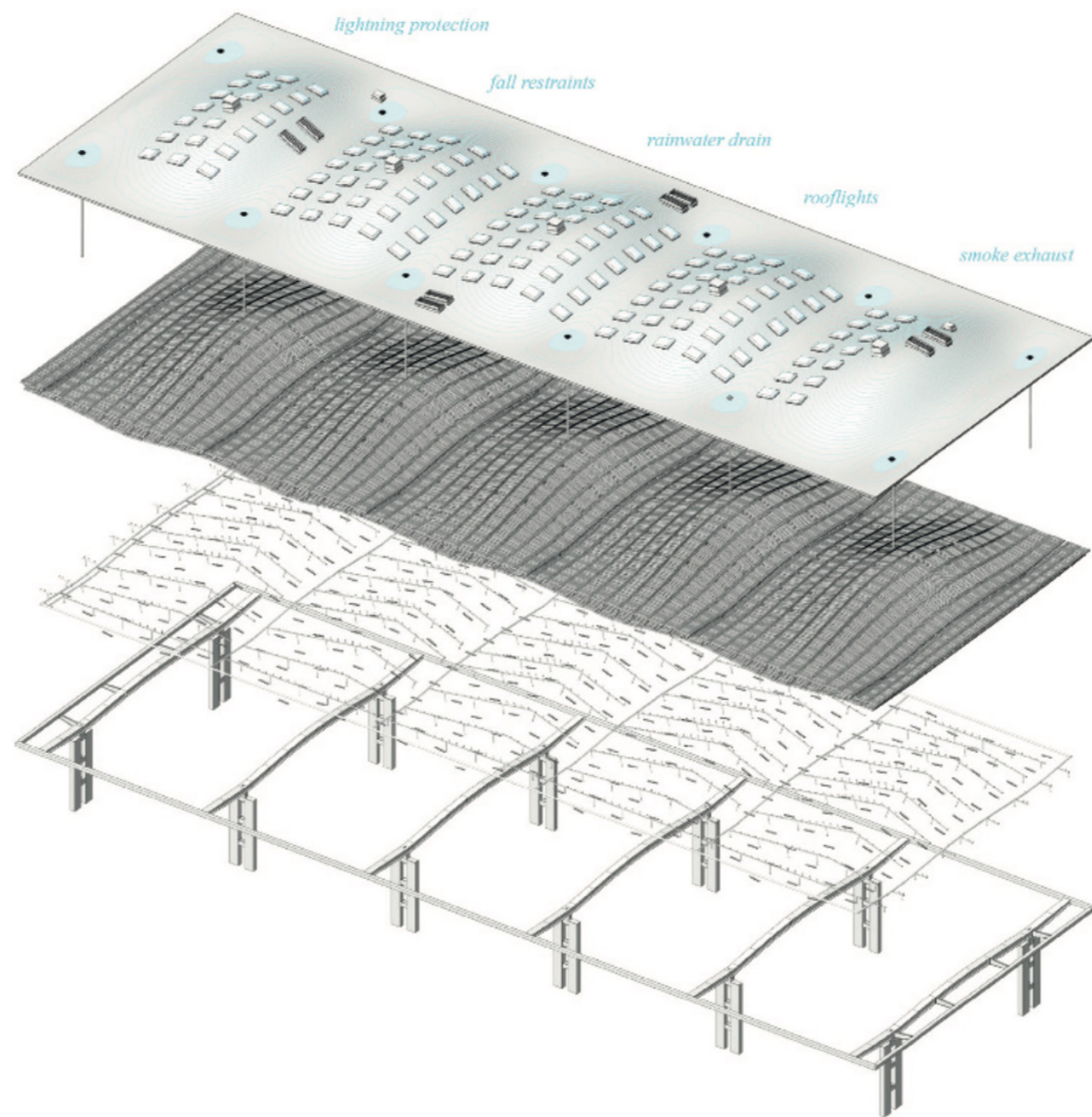






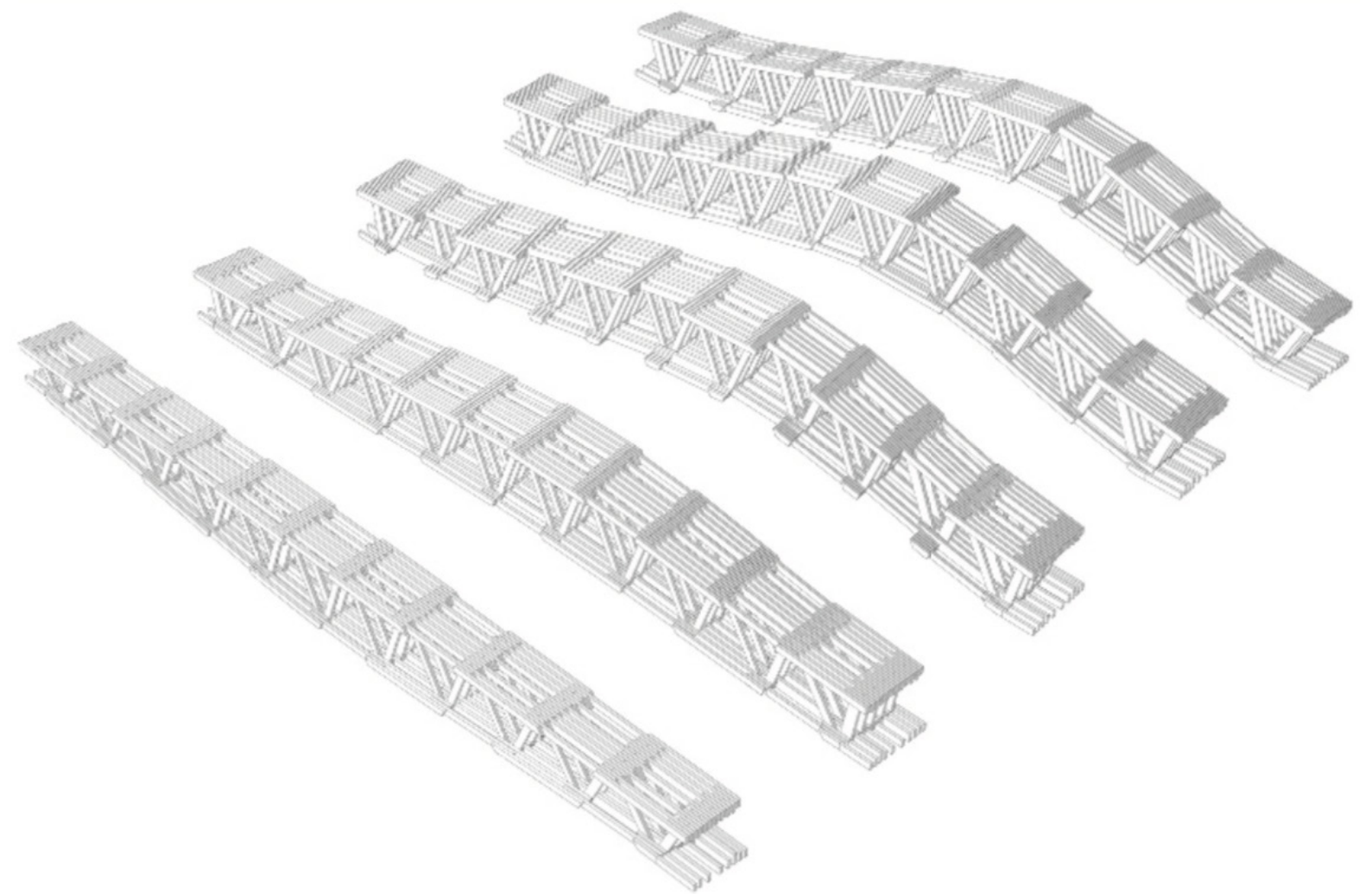
The roof was constructed by load-bearing timber structure consisting of nearly 50,000 members, robotically assembled layer-by-layer into trusses, connecting to each other very tightly by fixing nails.





## The overview of the roof build-up

Roofing layers, skylights, sprinklers, lighting and other systems are tightly integrated into the roof structure



## Assembling piece by piece

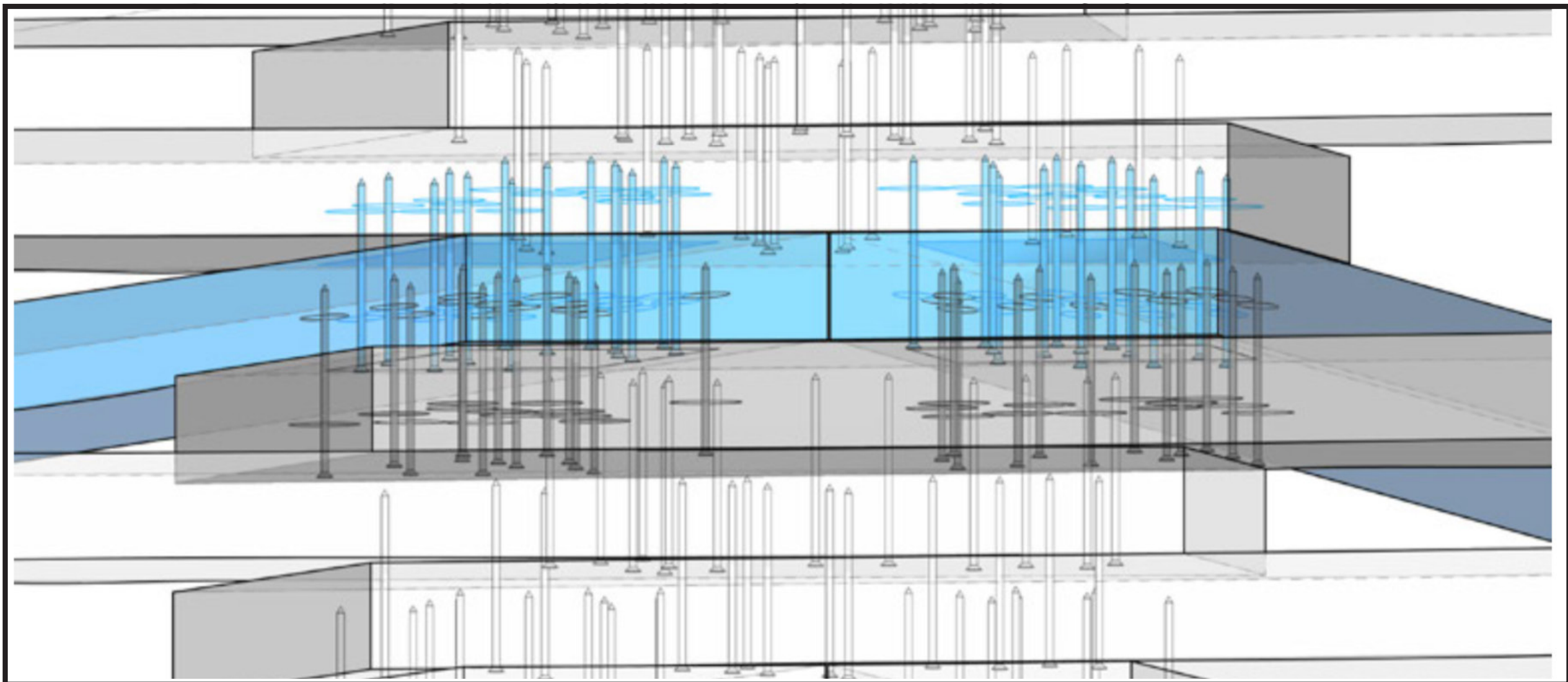
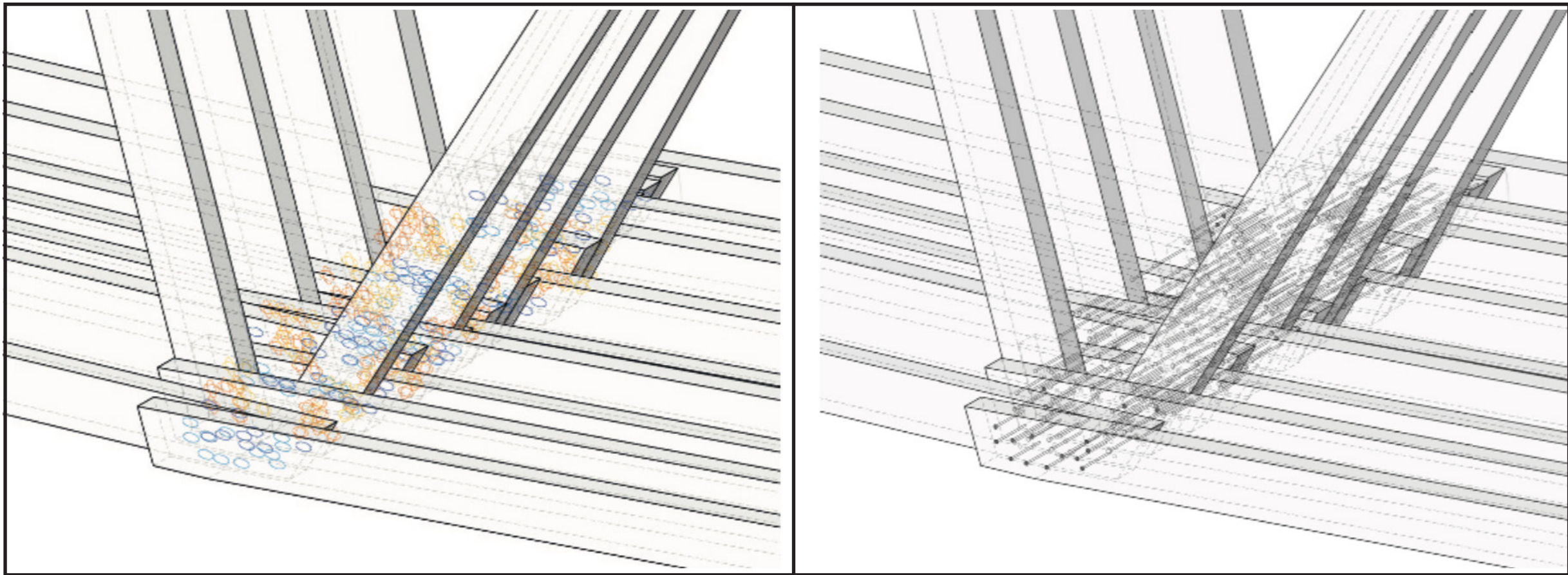




Automated fabrication and assembly using a 6-axis gantry robot

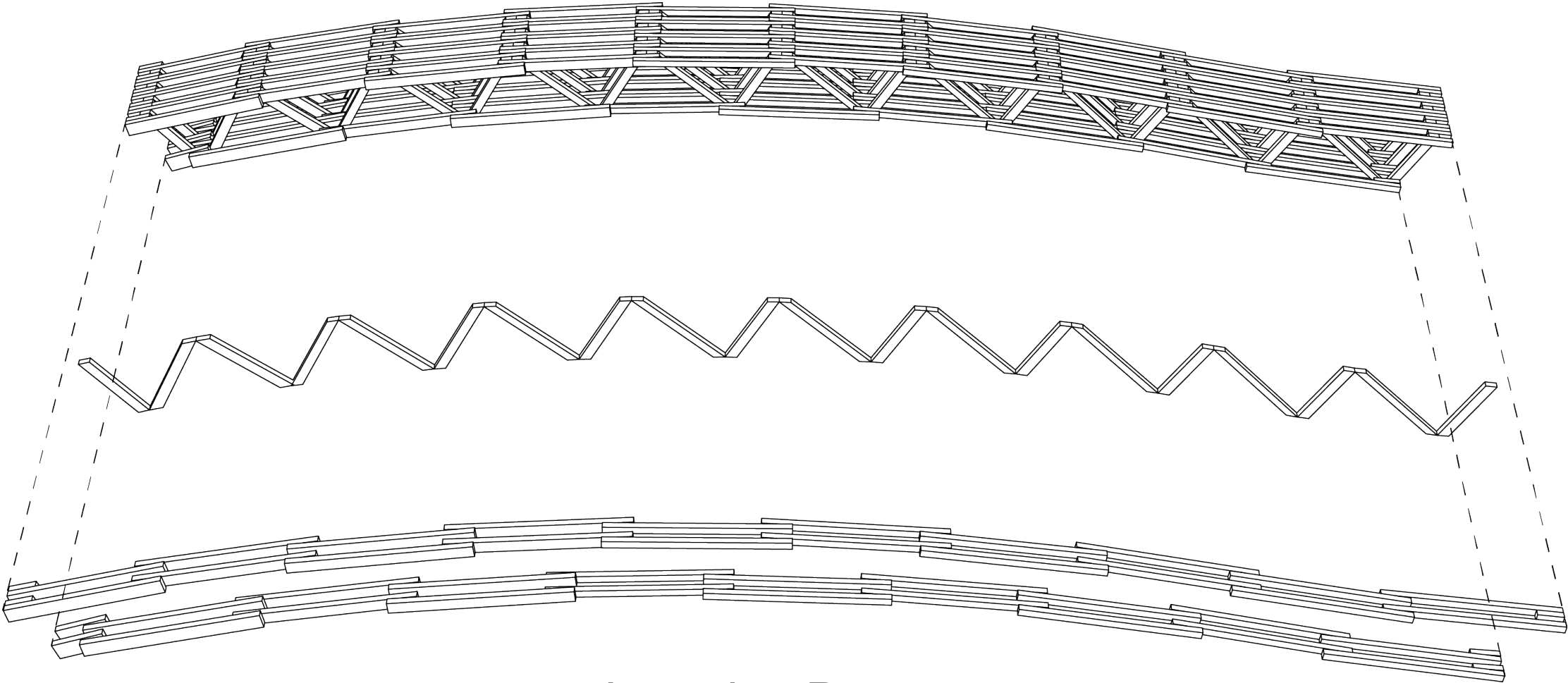




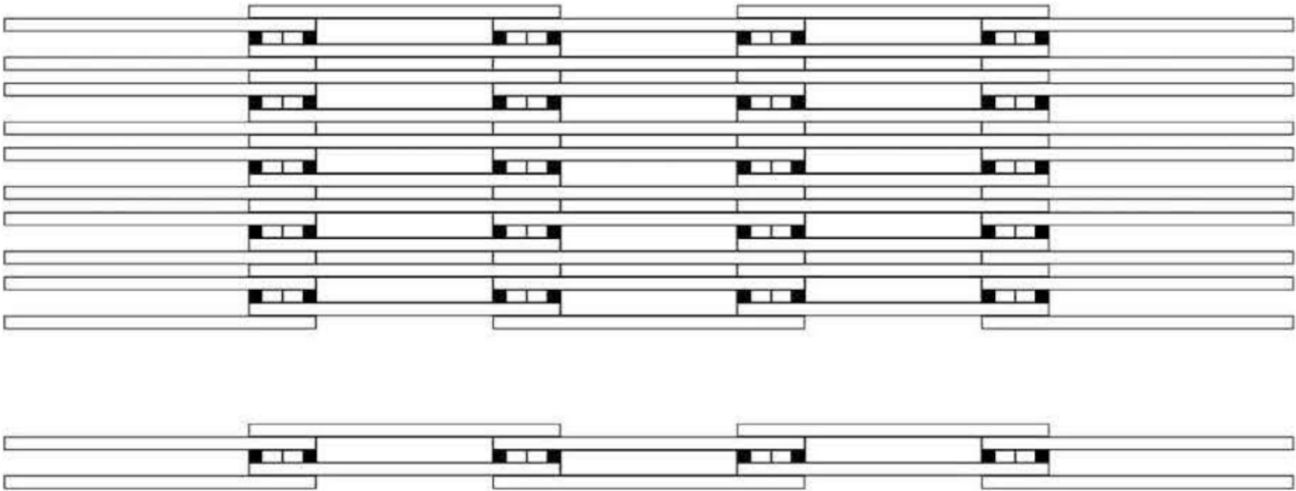


Fixing the slats by using the fix-nails

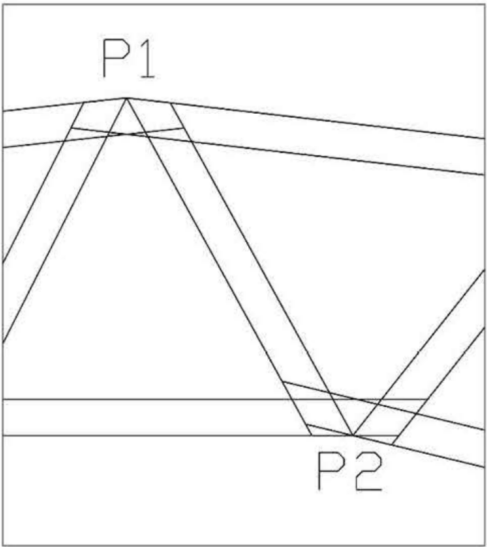
# Reference to my design



Layering Pattern



The Plan View

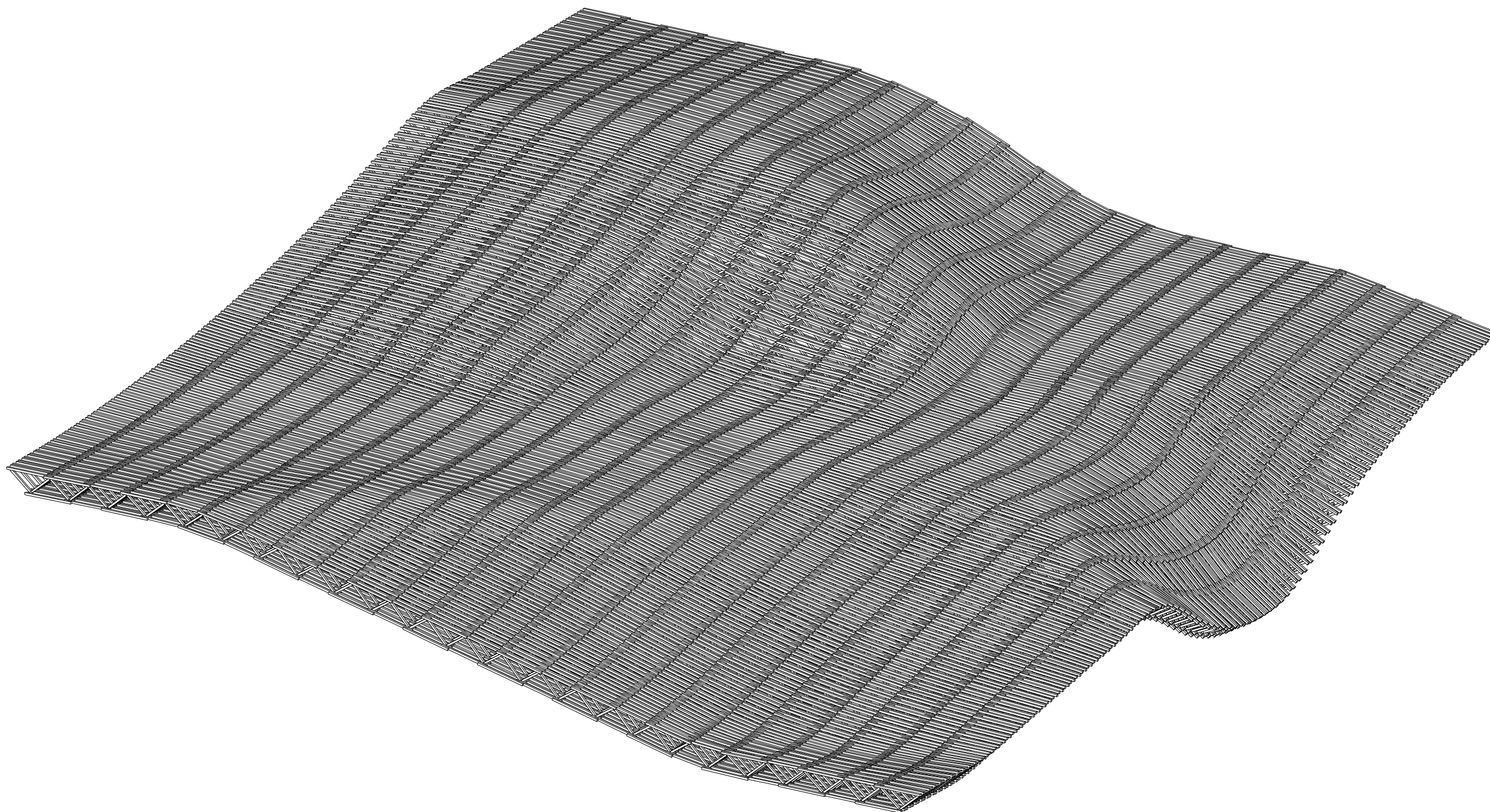


The 50mm slats are from 1m to 1.2m. Between every three chord elements there is a layer of web elements. All timber slats are cut at their unique angles in order to shape a smooth rooftop and ceiling.



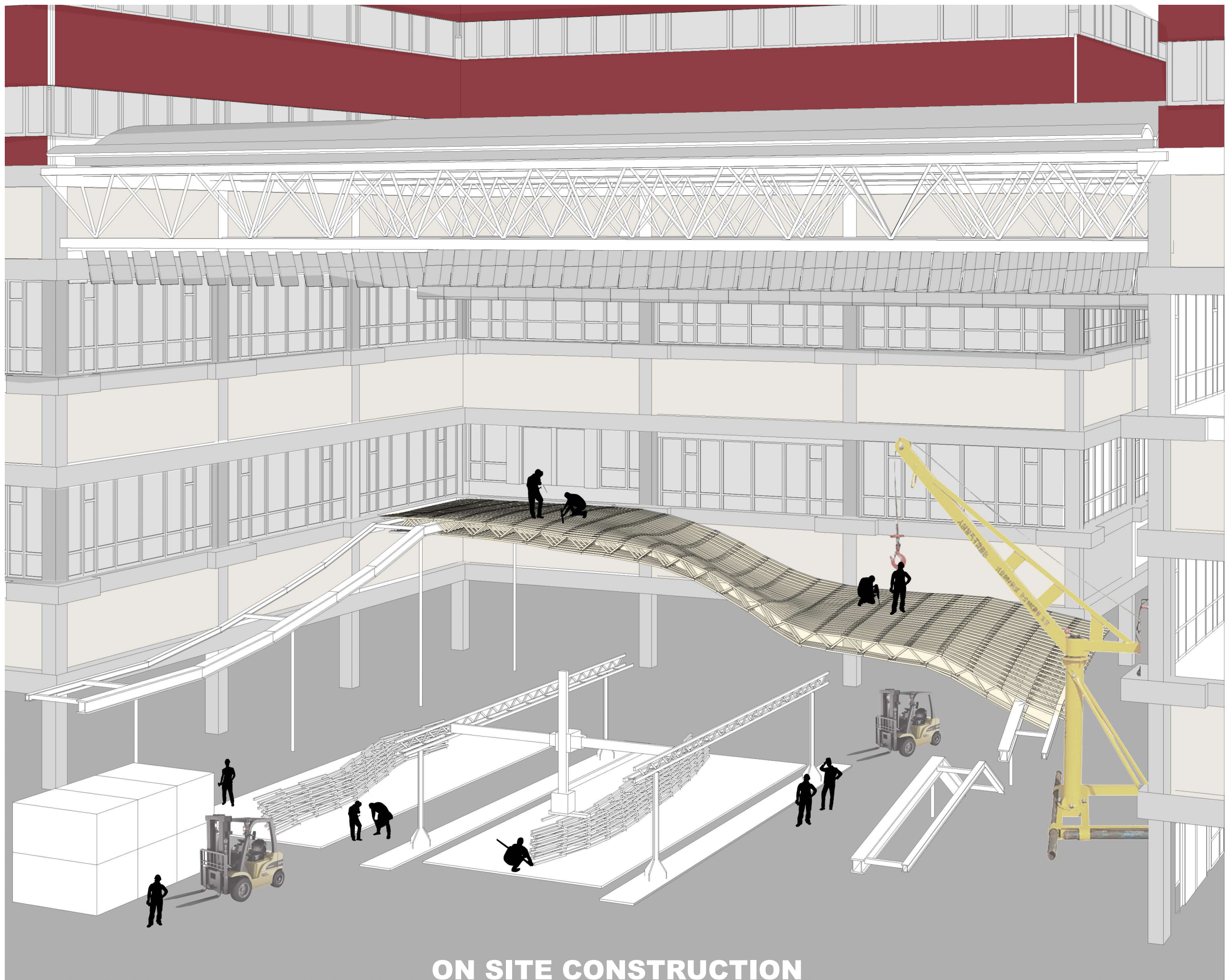






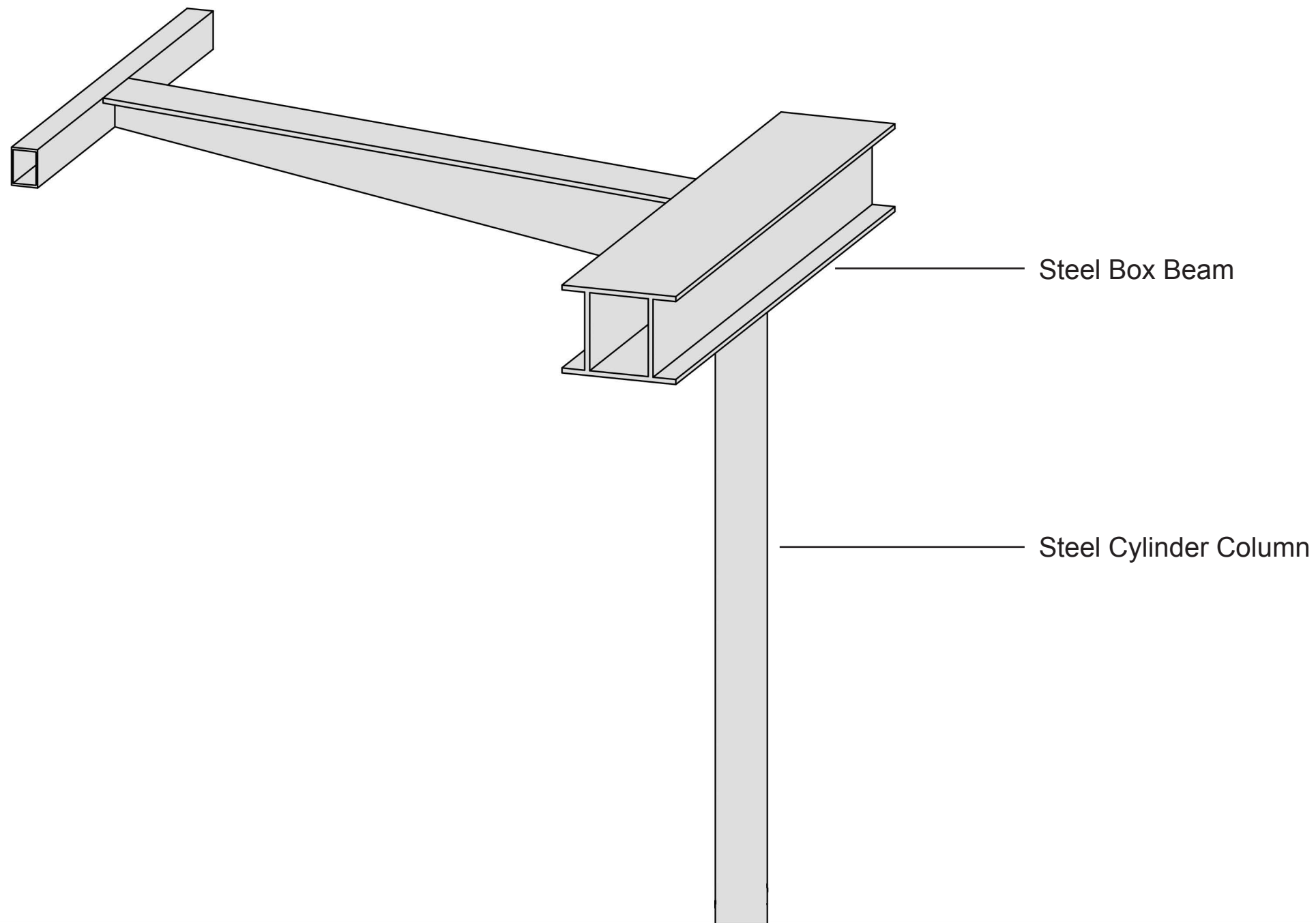
**The surface structure**

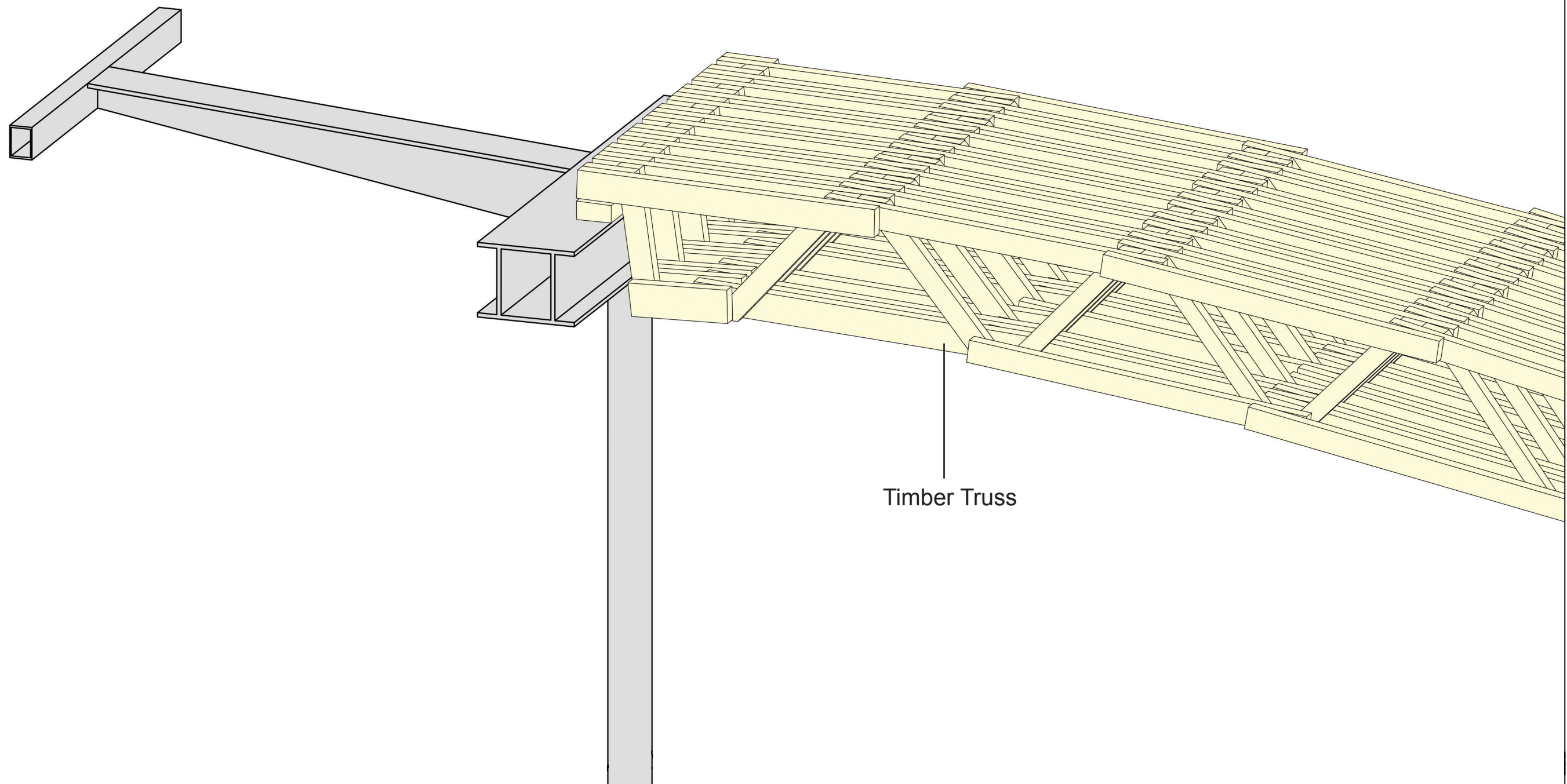


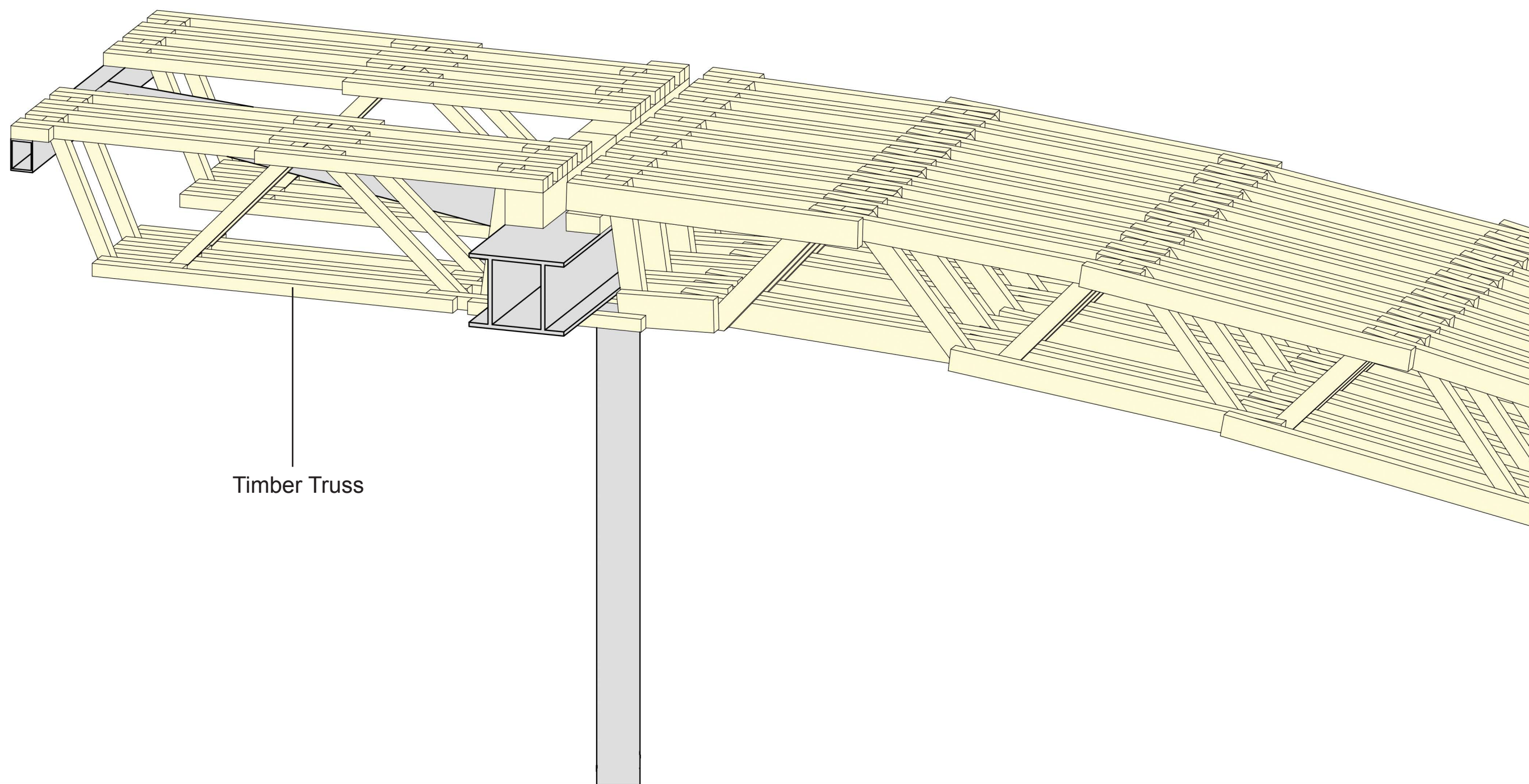


**ON SITE CONSTRUCTION**

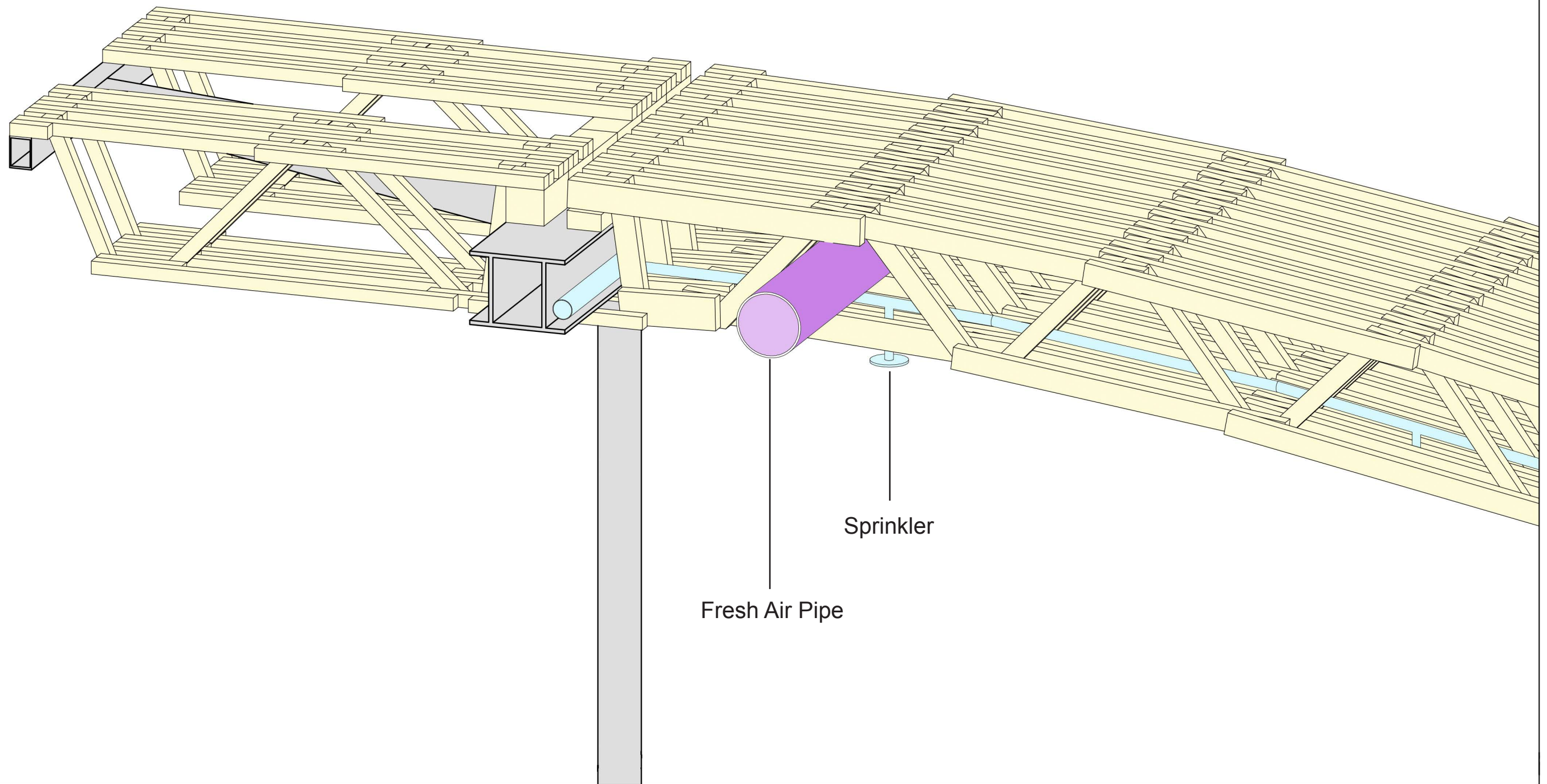














carprt 8mm

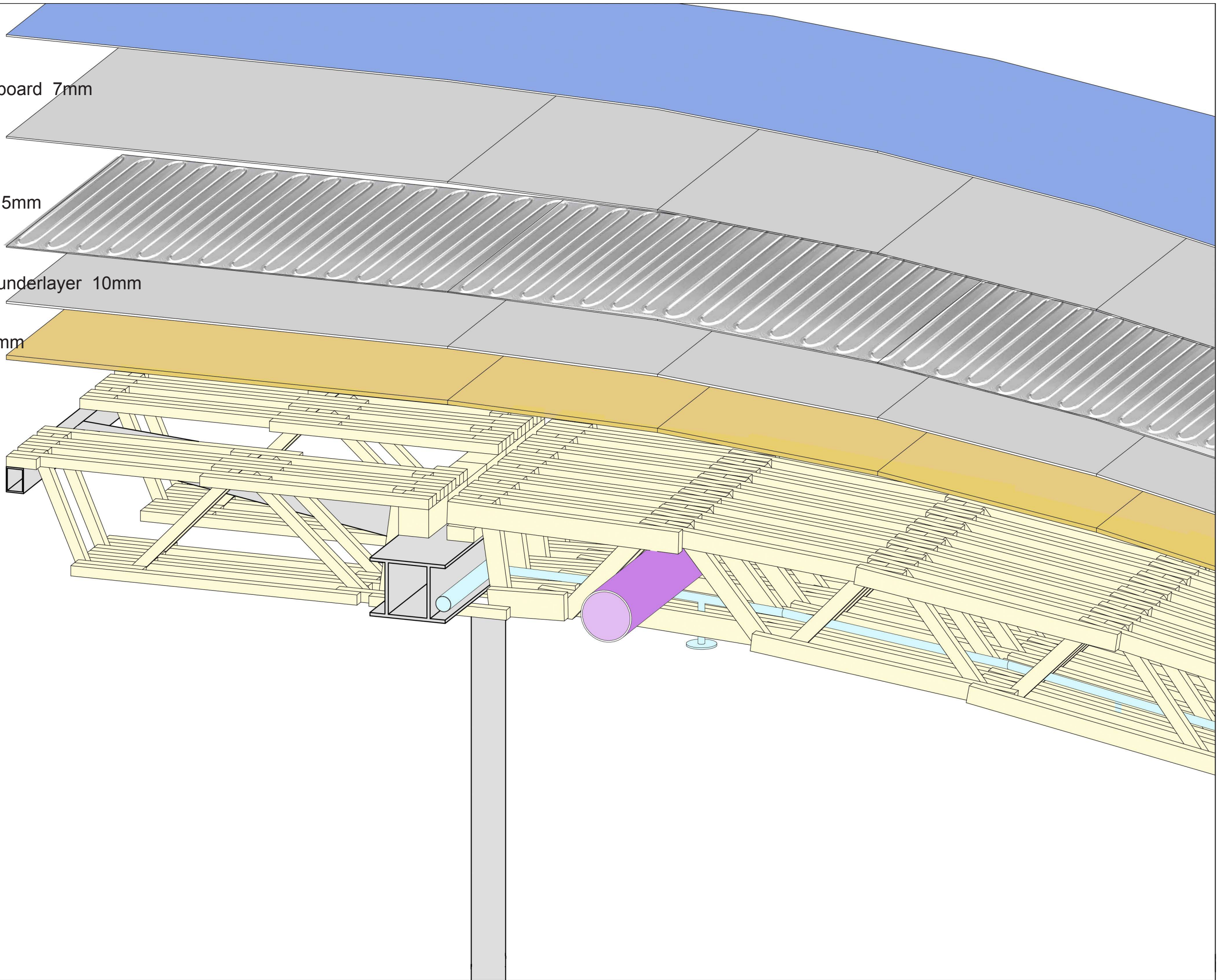
dual overlay base board 7mm

foil heater system 5mm

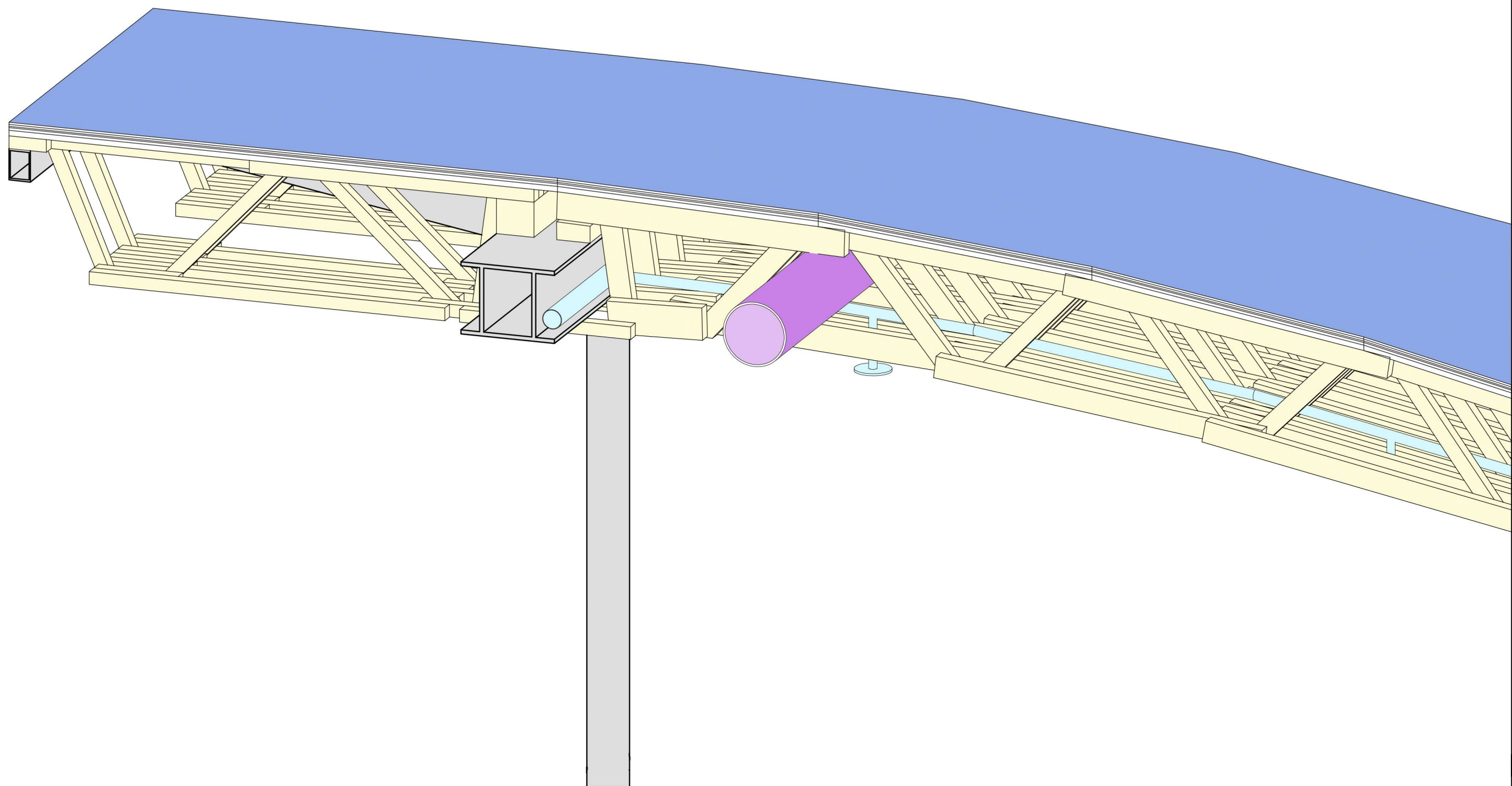
warmup insulated underlayer 10mm

wooden board 20mm

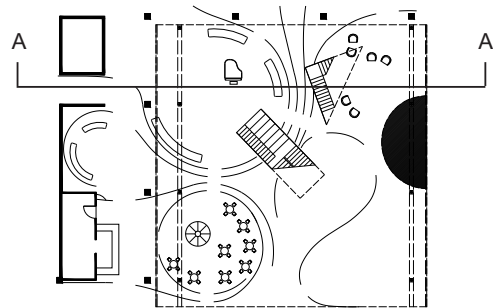
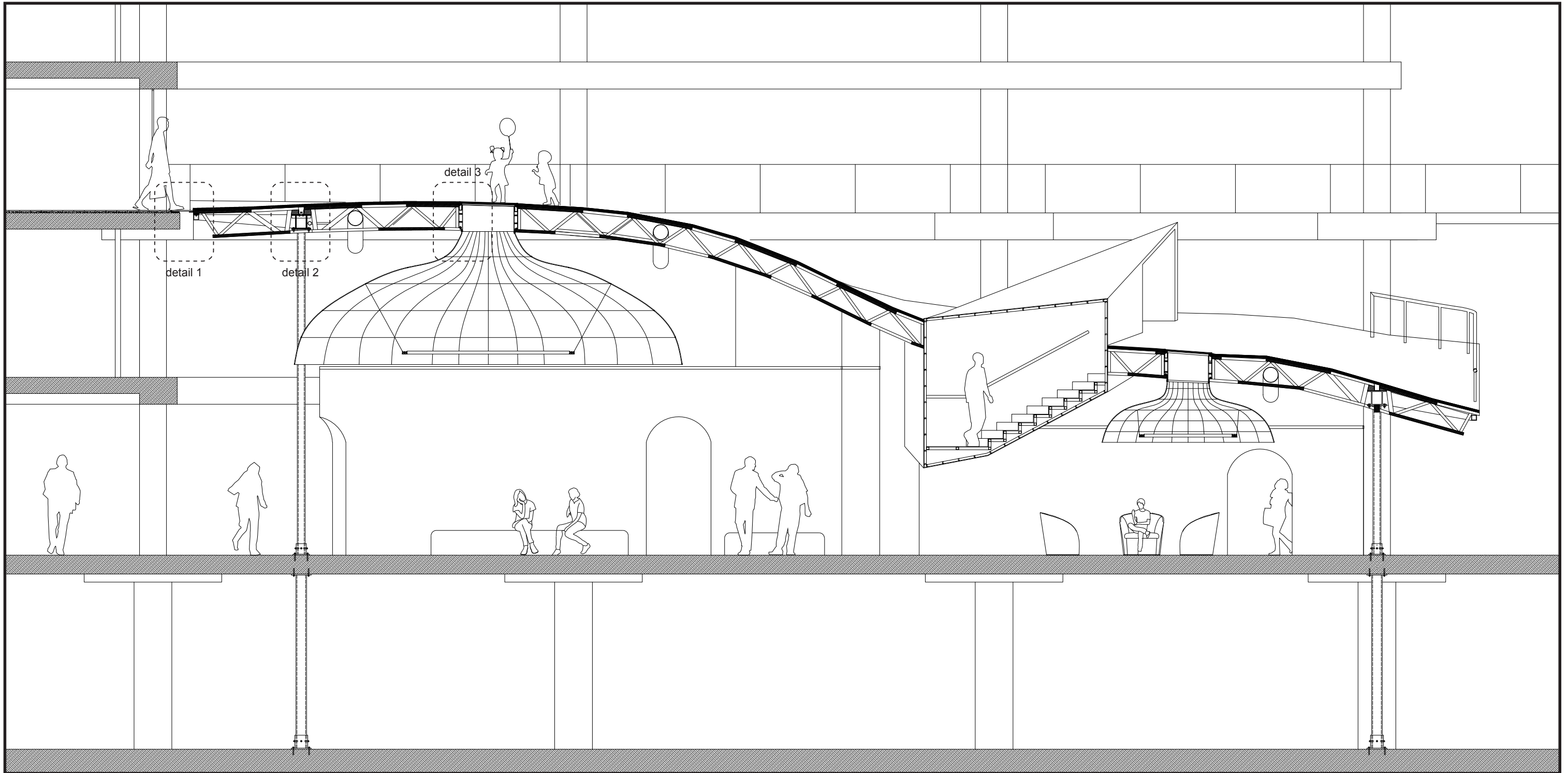
timber truss



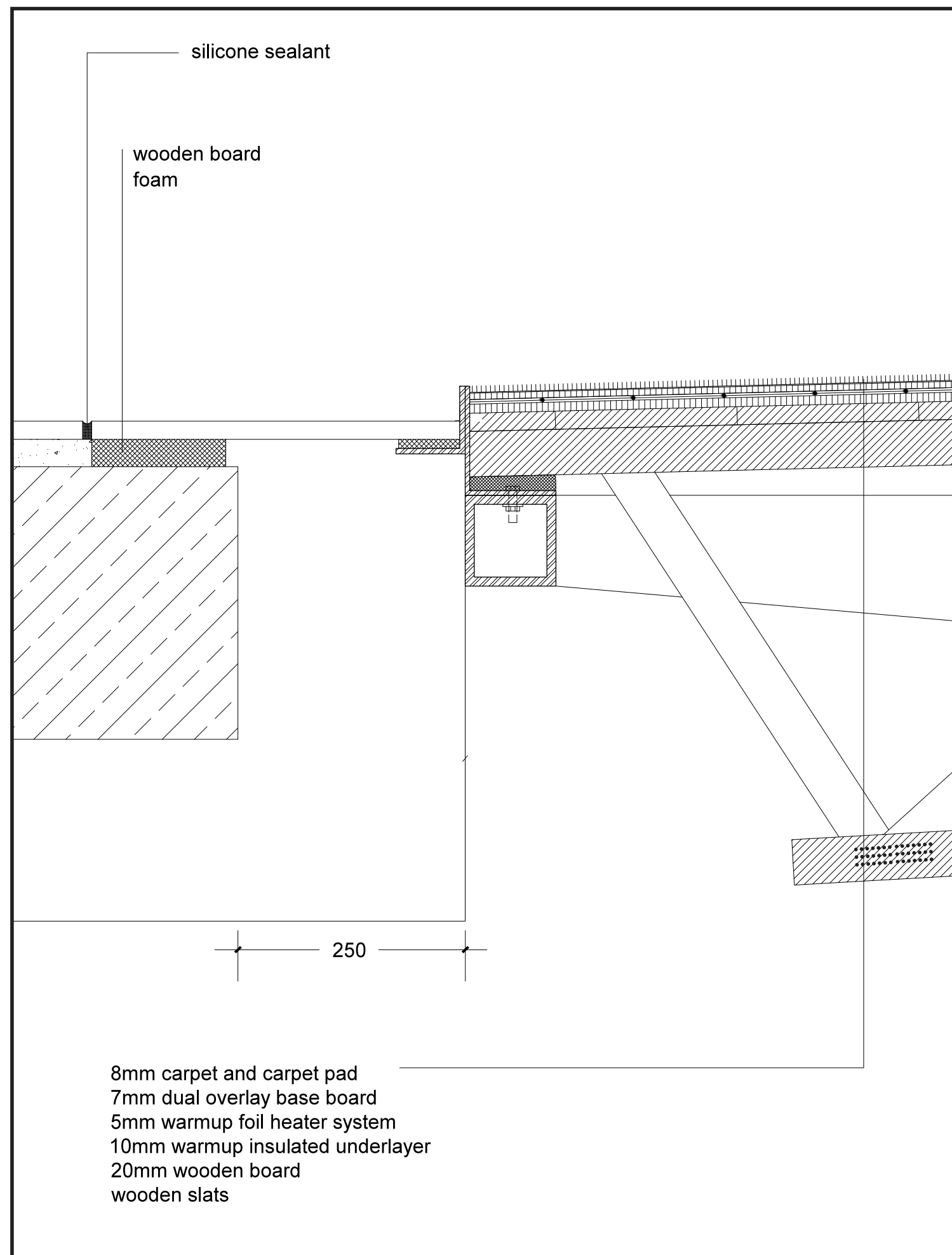






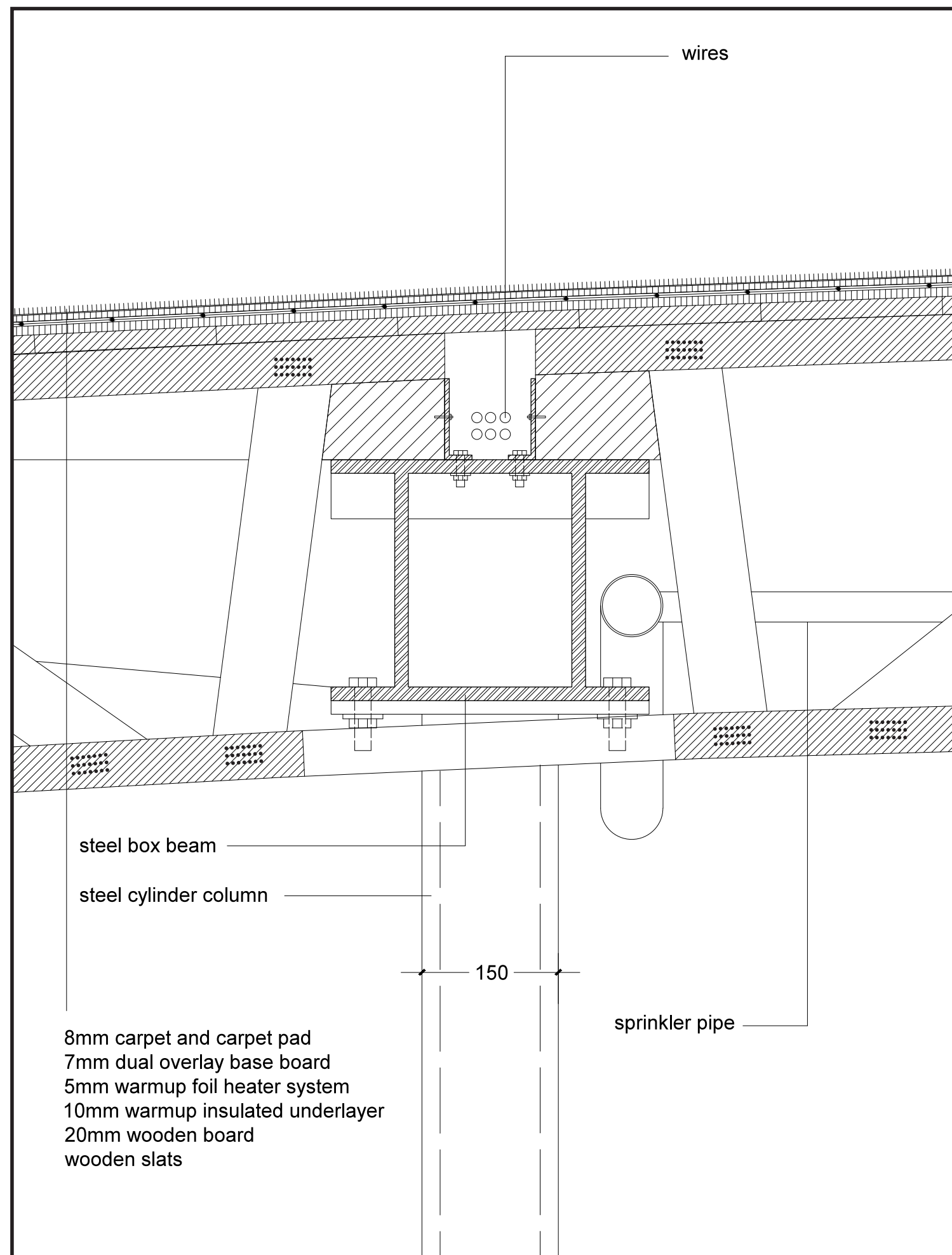


Section A-A 1:50



Detail 1

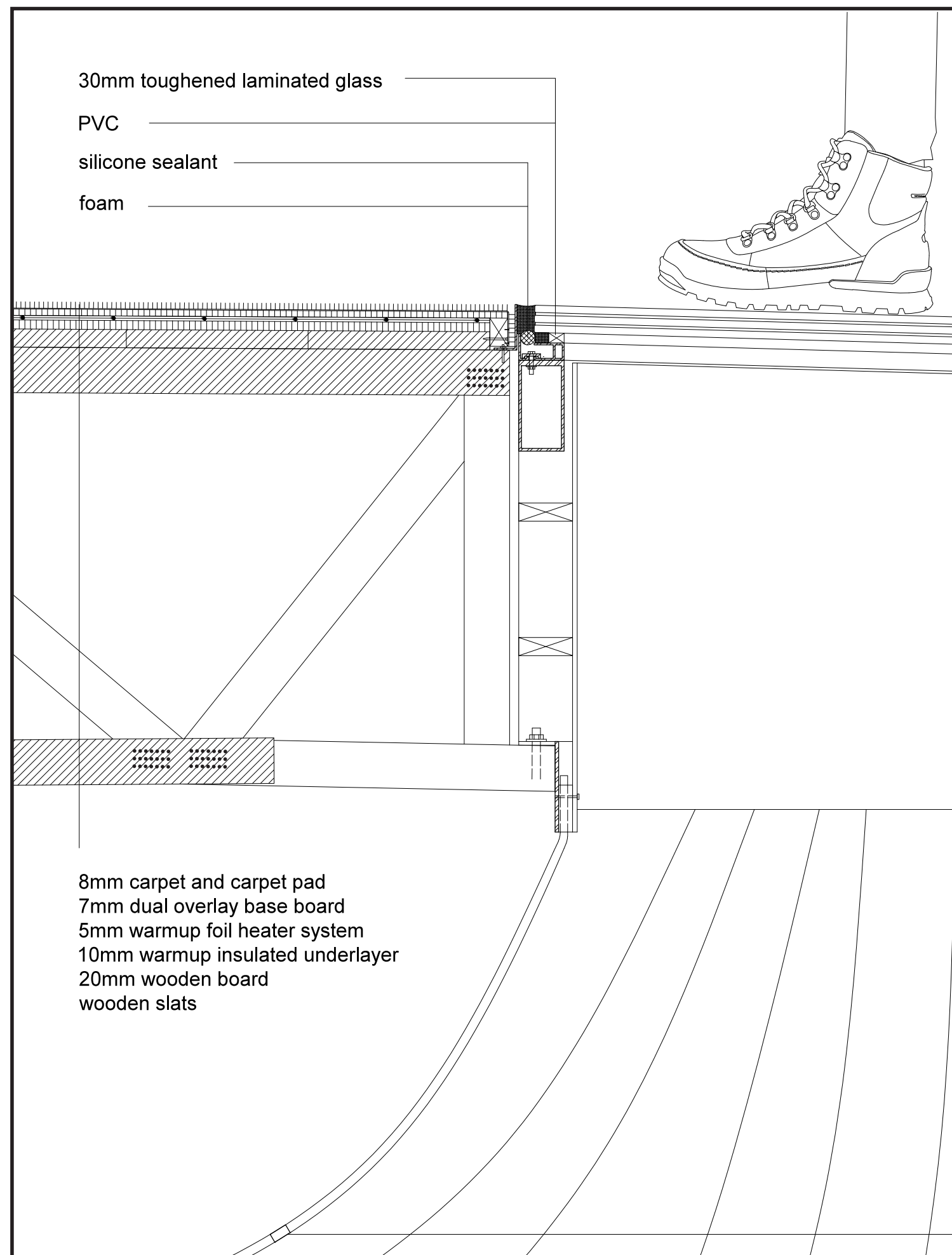
1:5



Detail 2

1:5





Detail 3

1:5

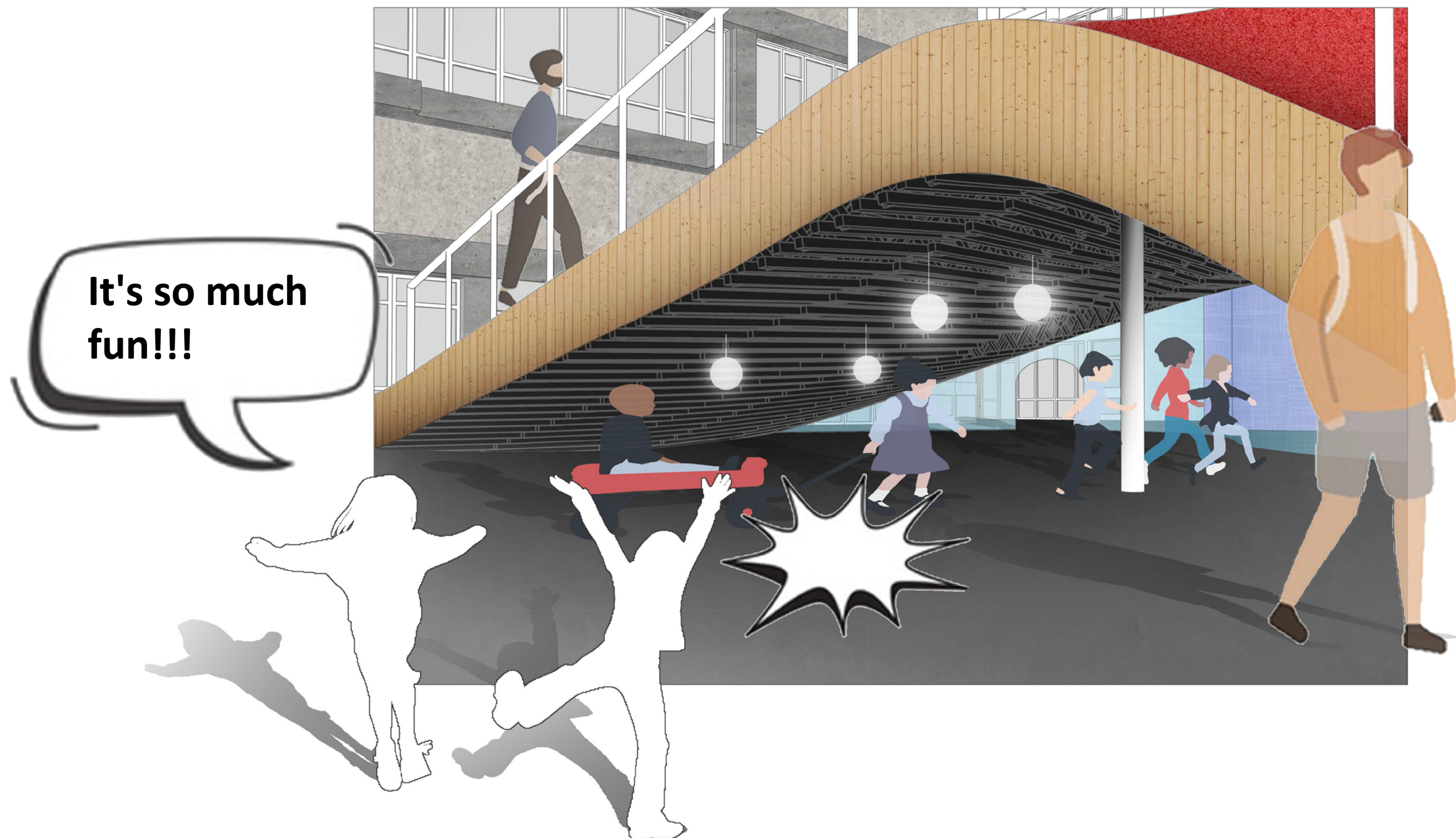




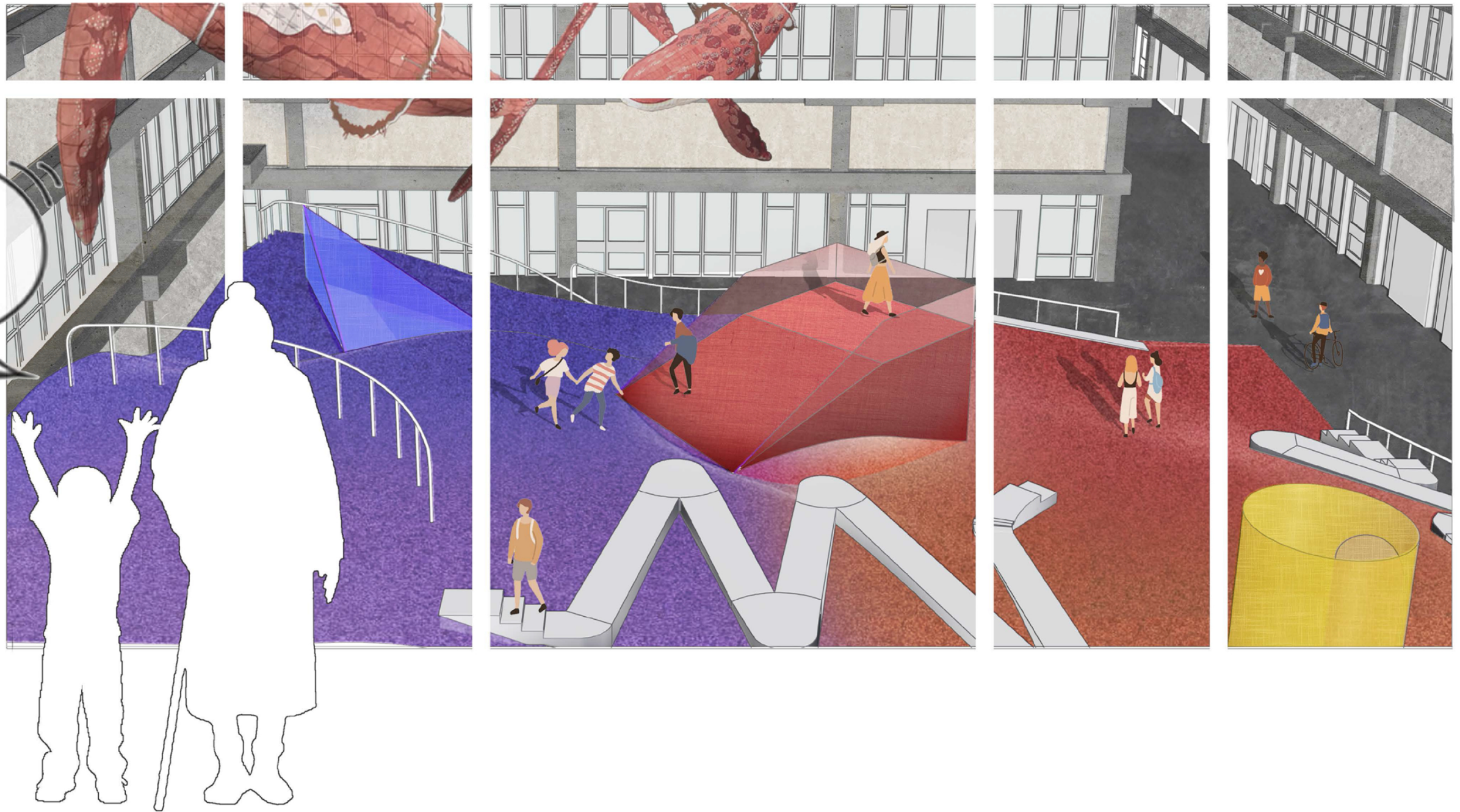
**Mom, look  
at that flying  
carpet !**



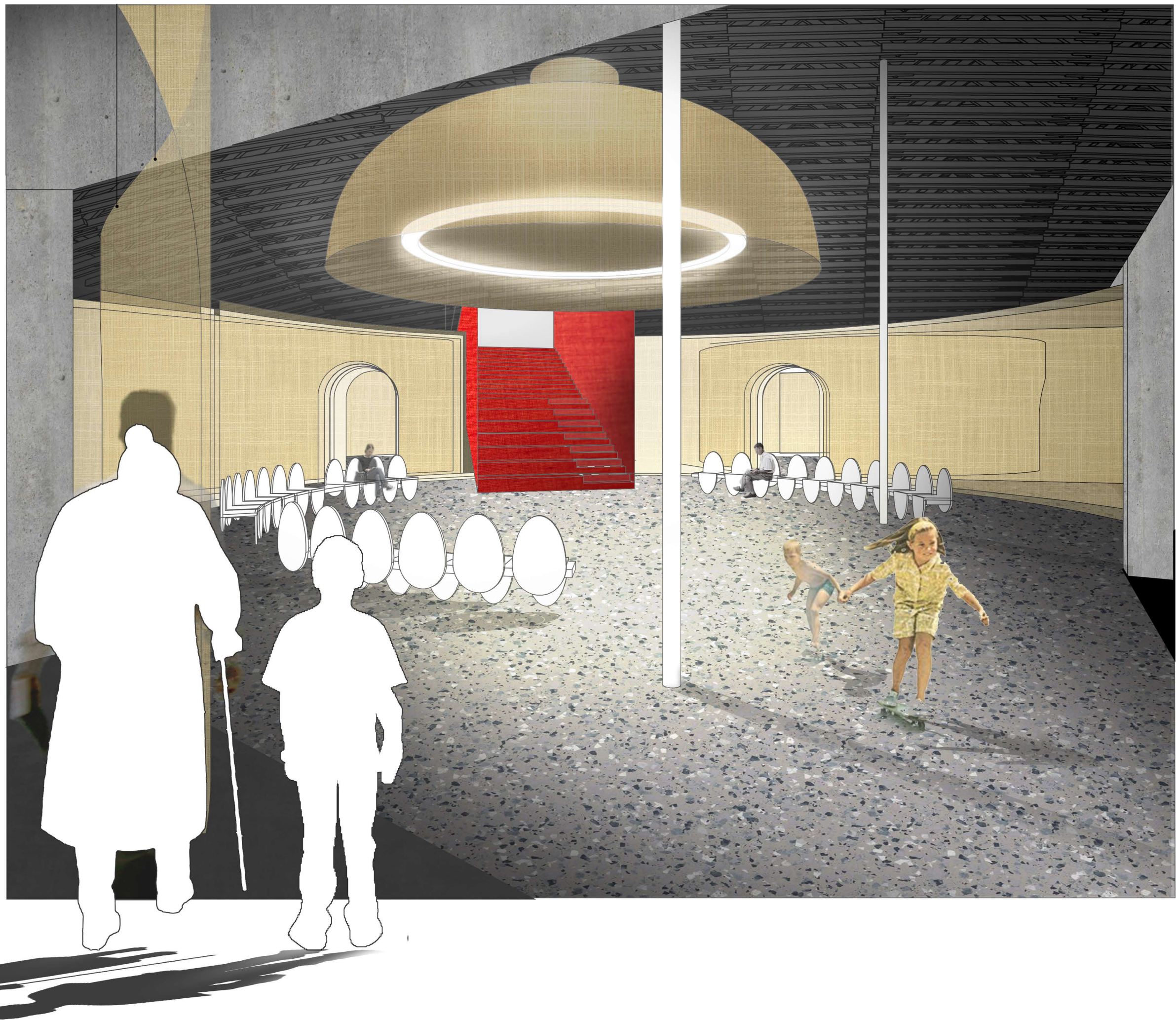










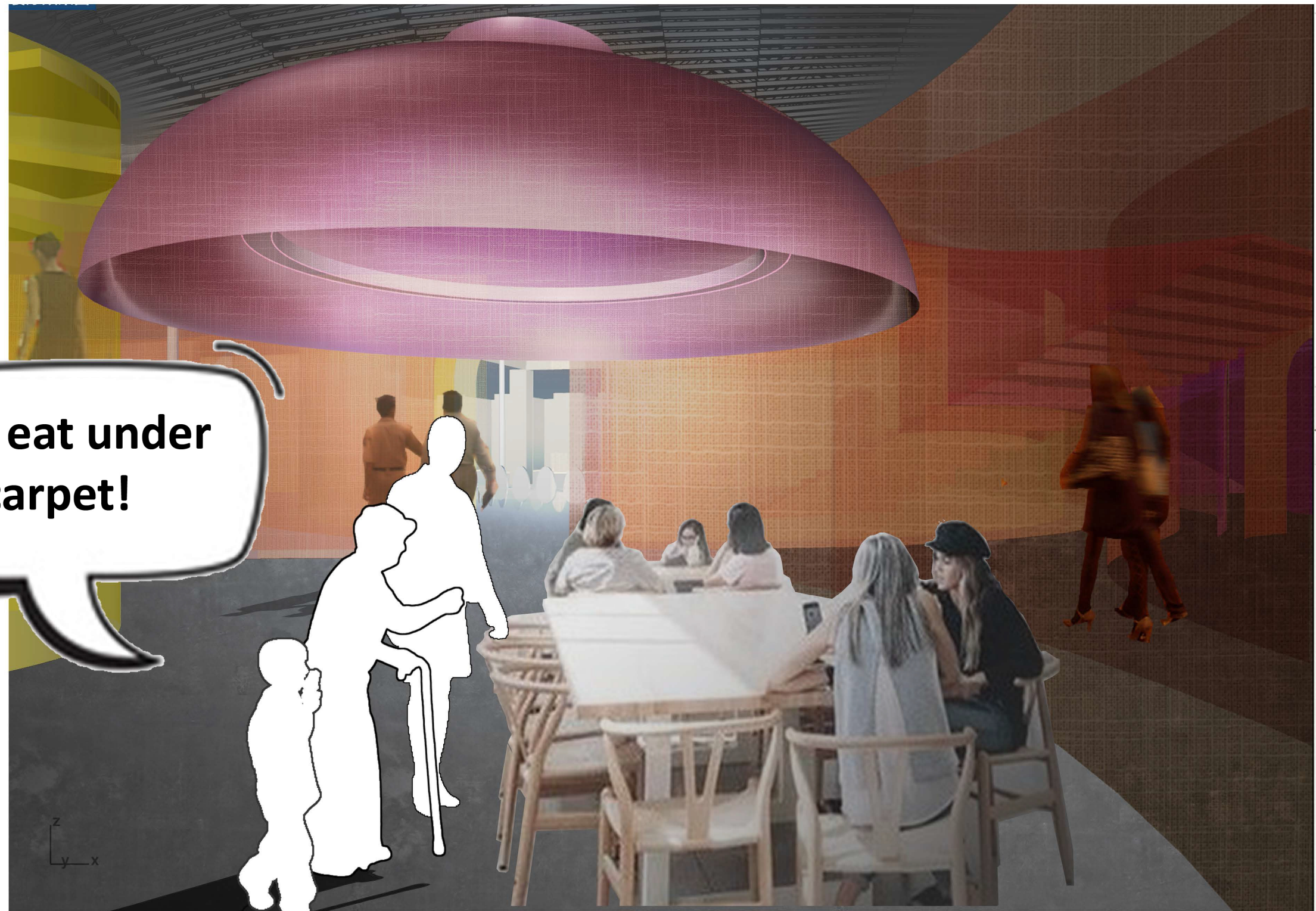


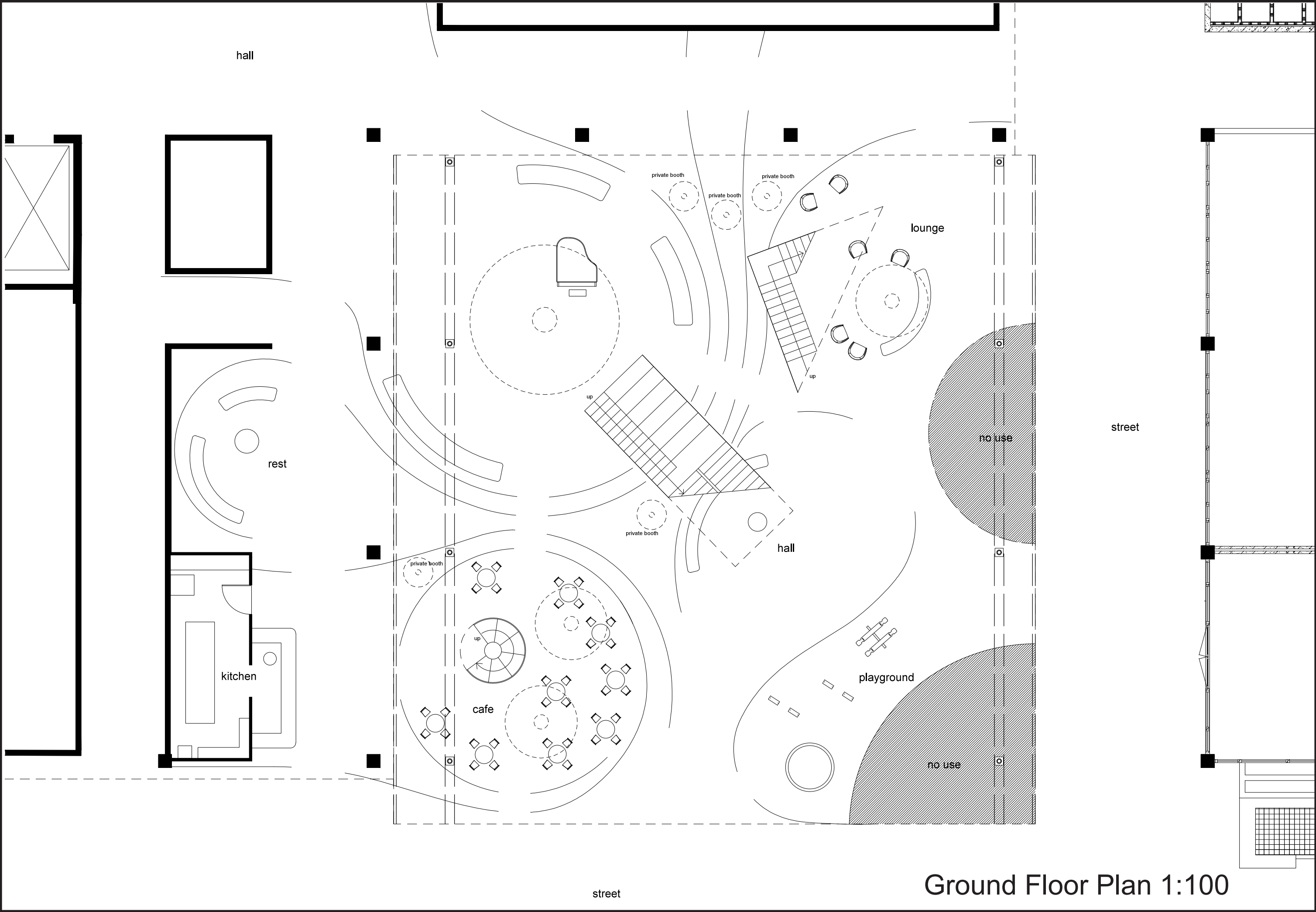






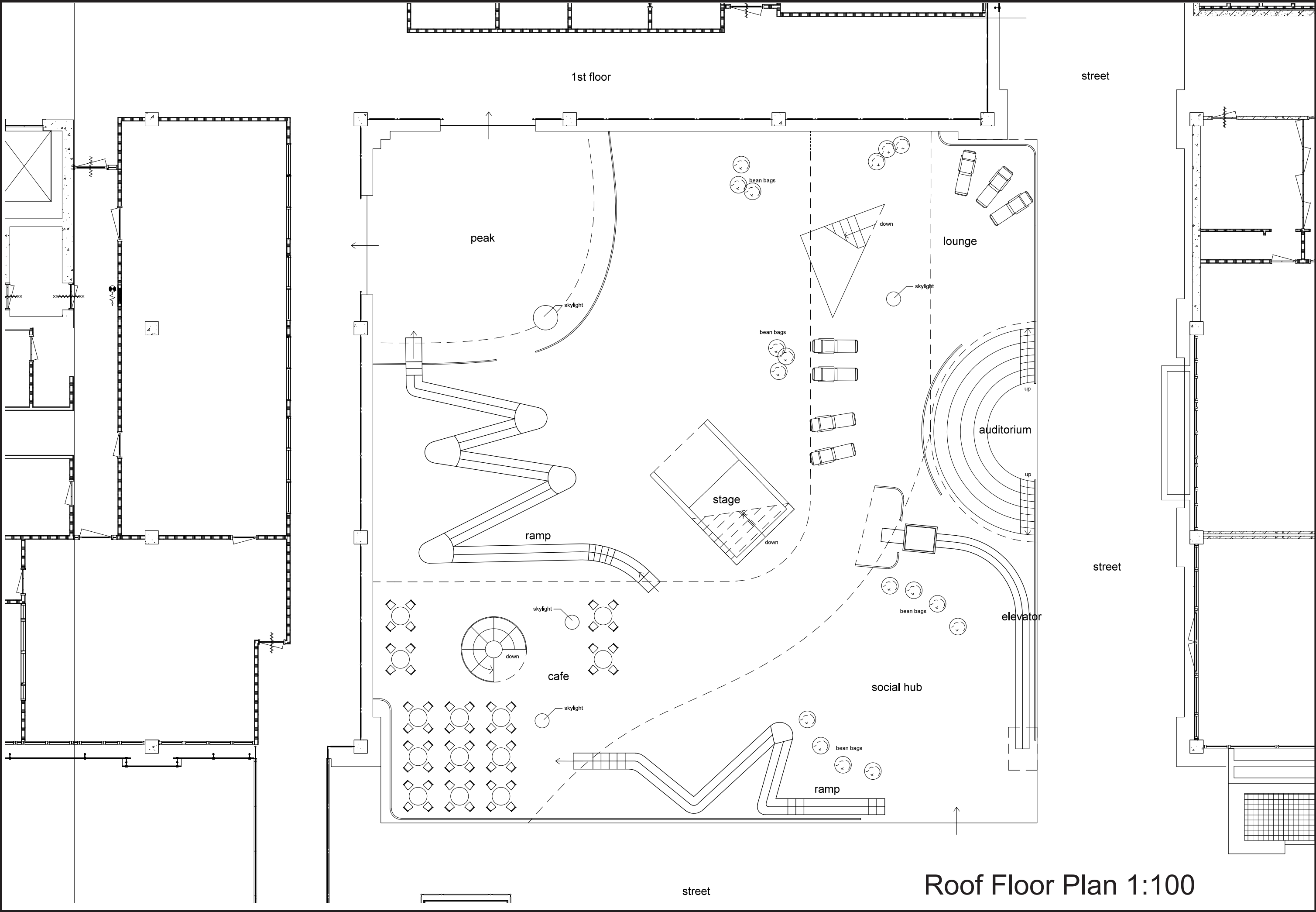
**Let's eat under  
the carpet!**



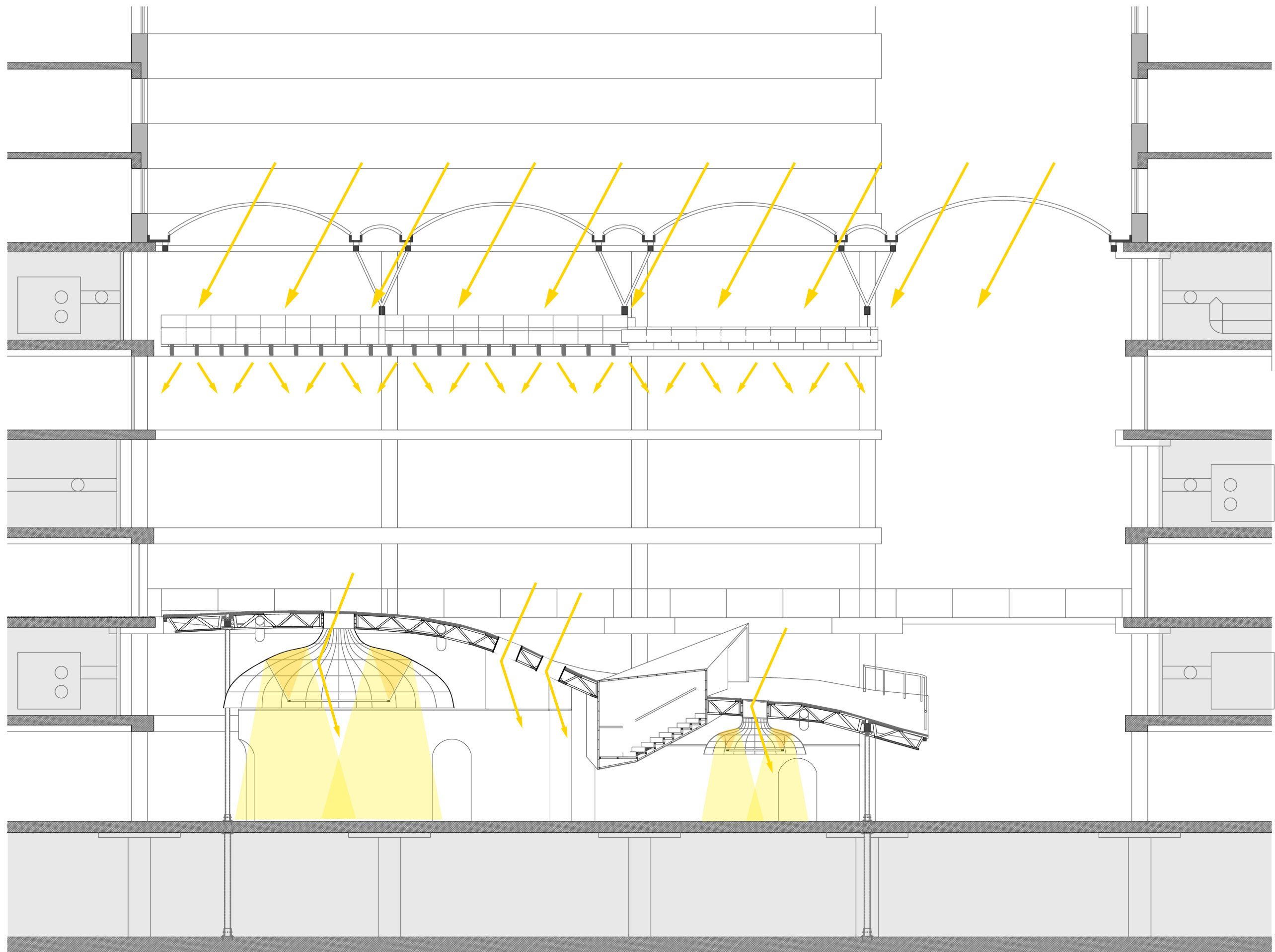


Ground Floor Plan 1:100



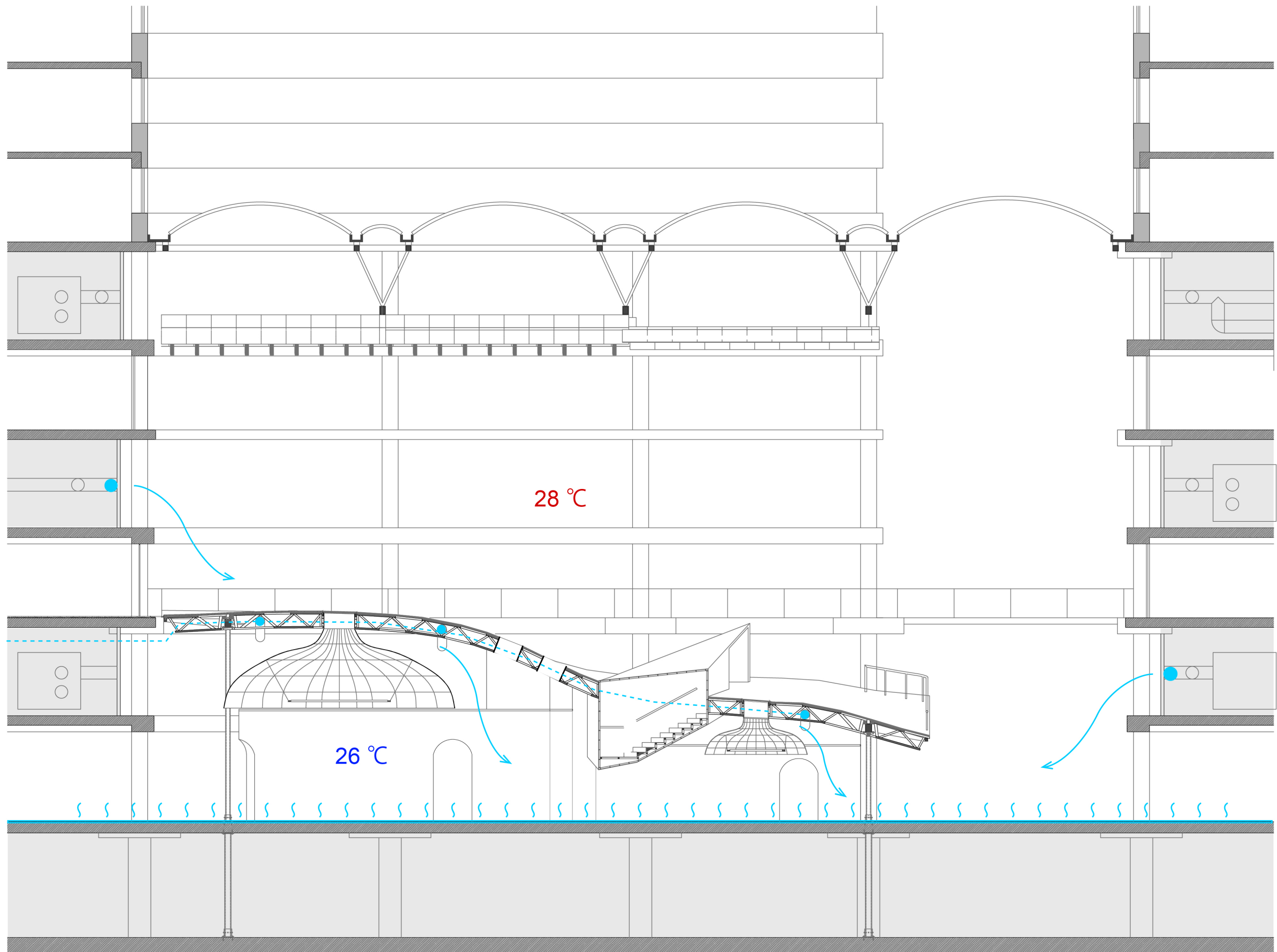



Roof Floor Plan 1:100



- ← Natural light
- Artificial light

## Climate: lighting

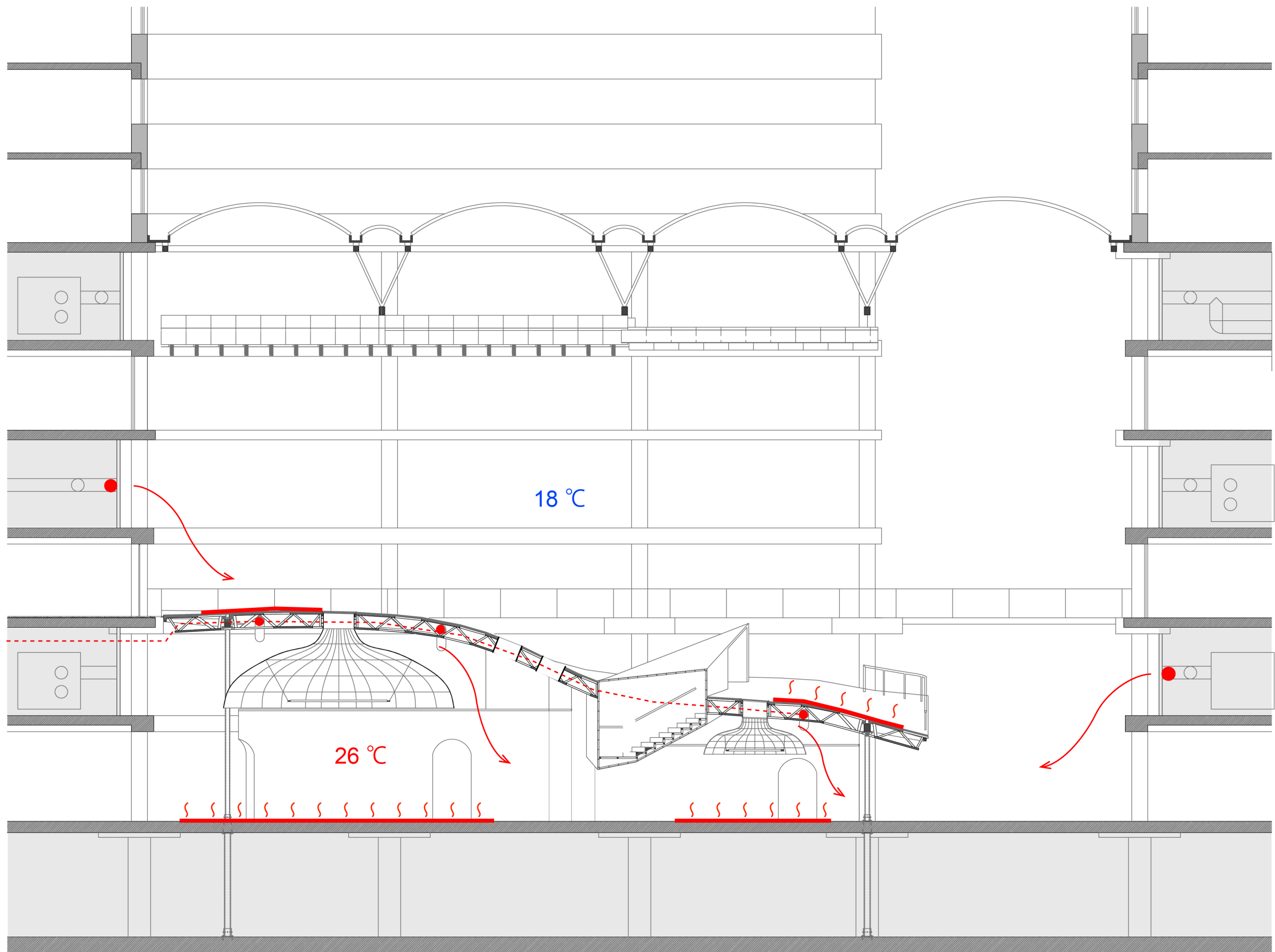


 thermal mass banlance tempreture

 AC system cooling

**Climate: cooling**

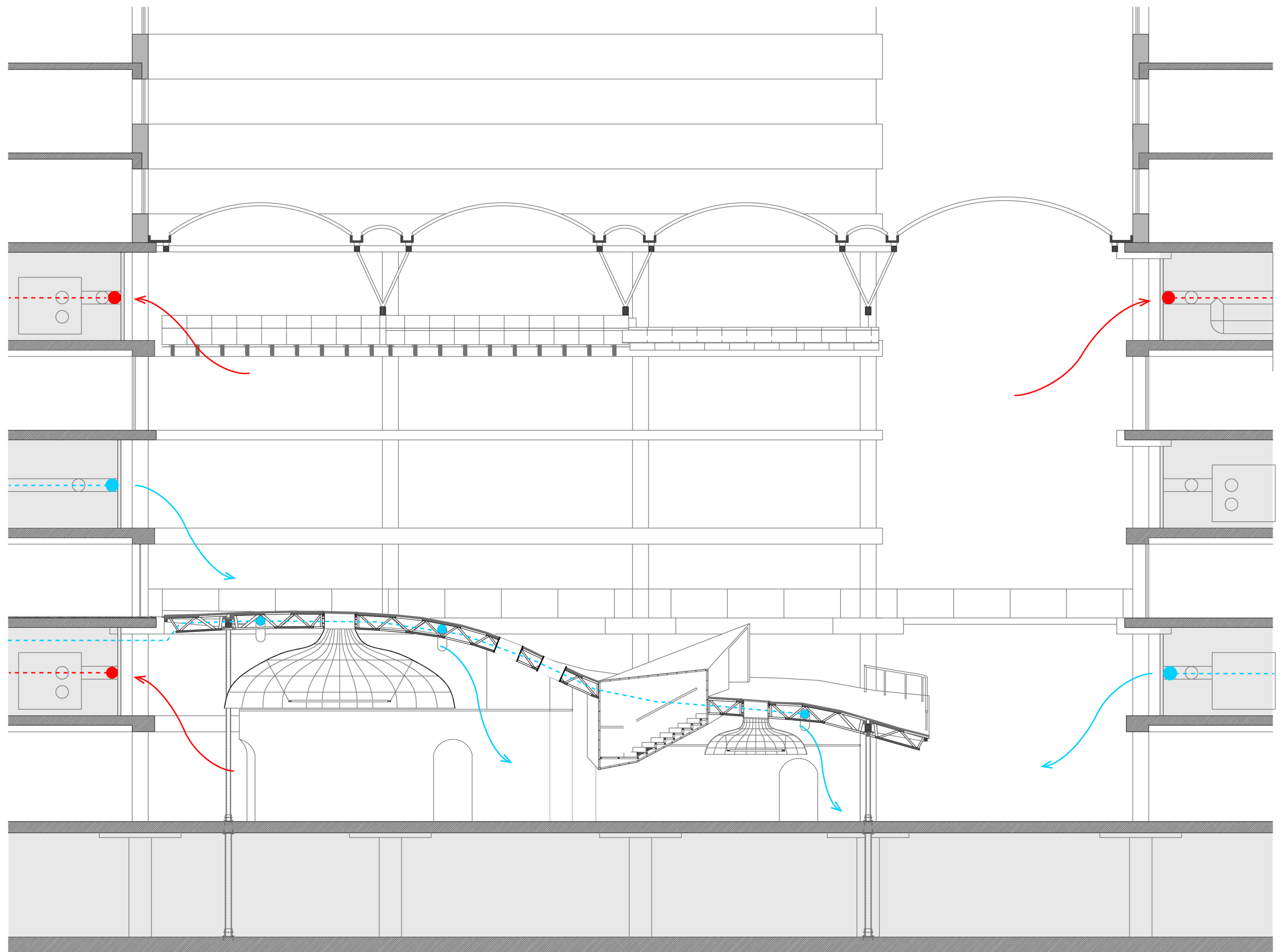




 electric heating mat

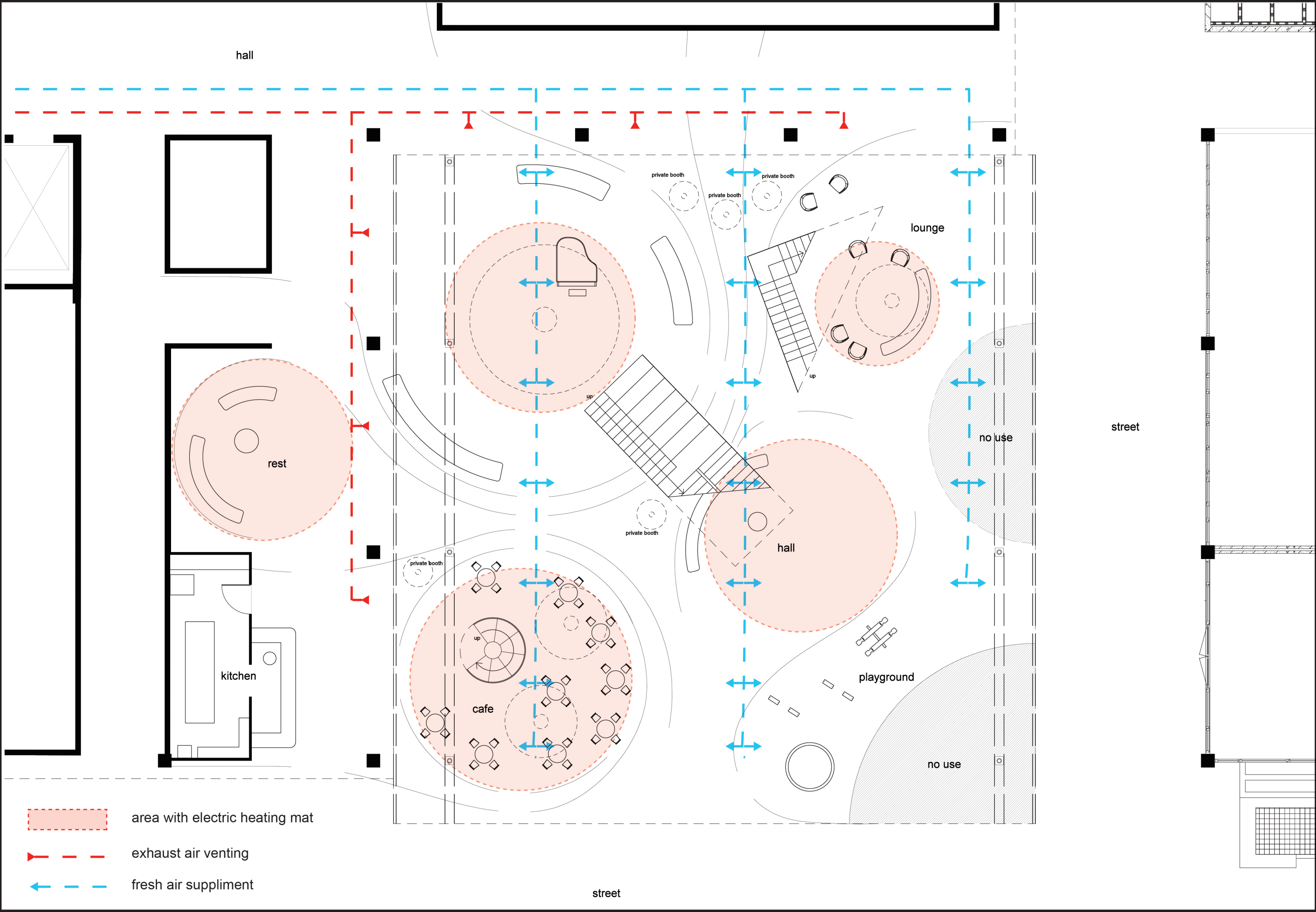
 AC system heating

**Climate: heating**

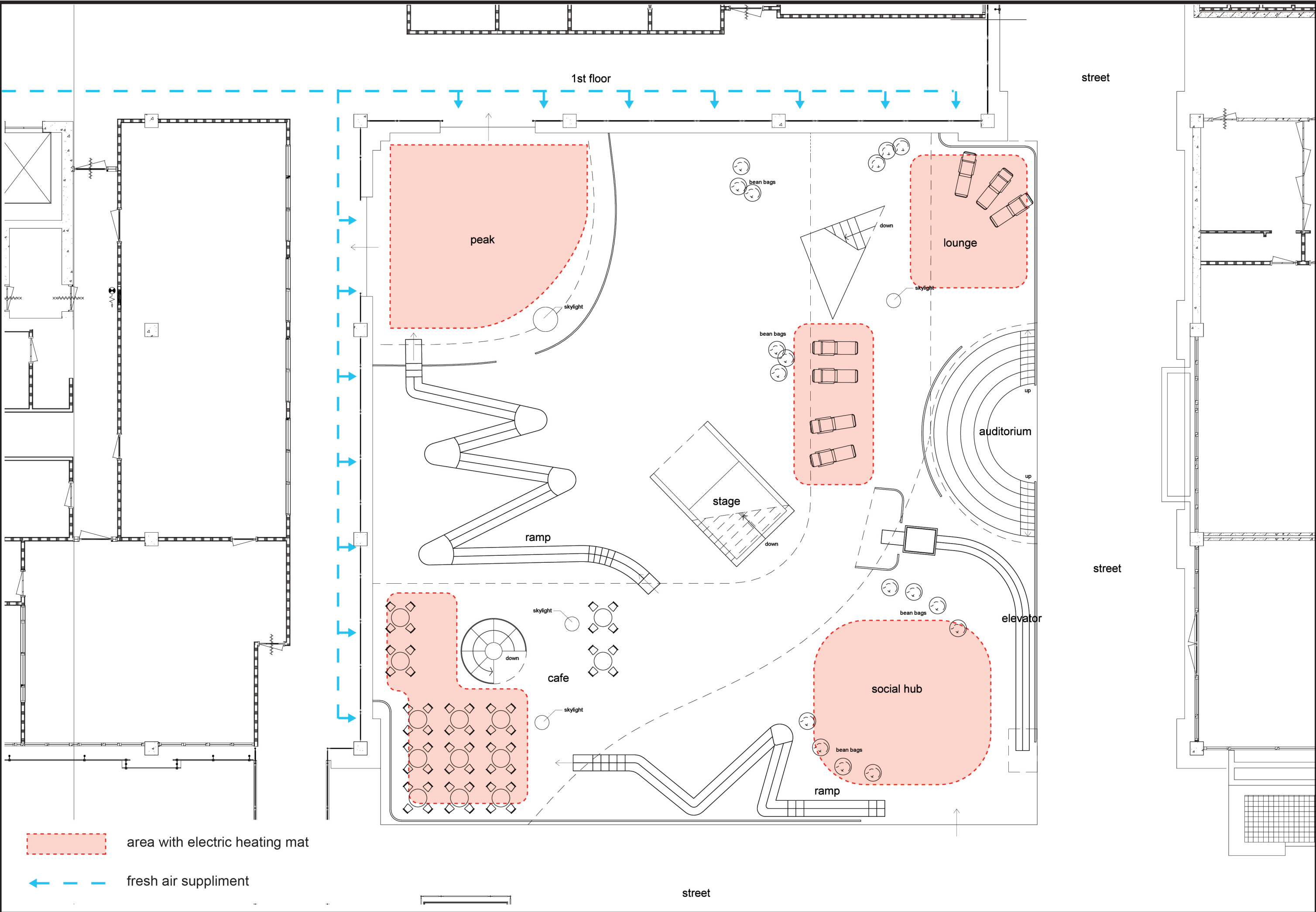


- ← exhaust air venting
- ← fresh air suppliment
- ..... ventilation ducts behind section
- machanical area

**Climate: ventilation**



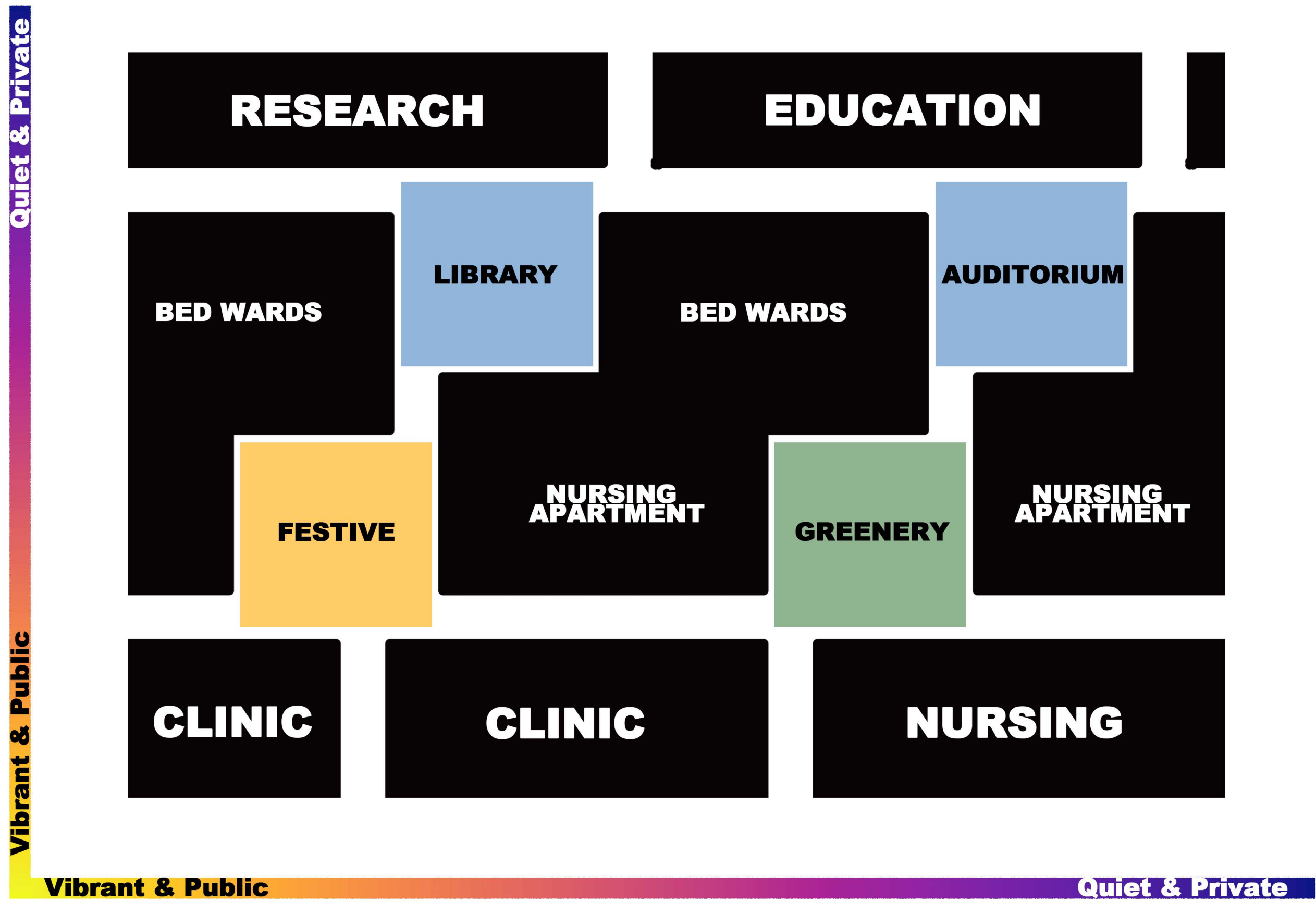




area with electric heating mat



fresh air supplement



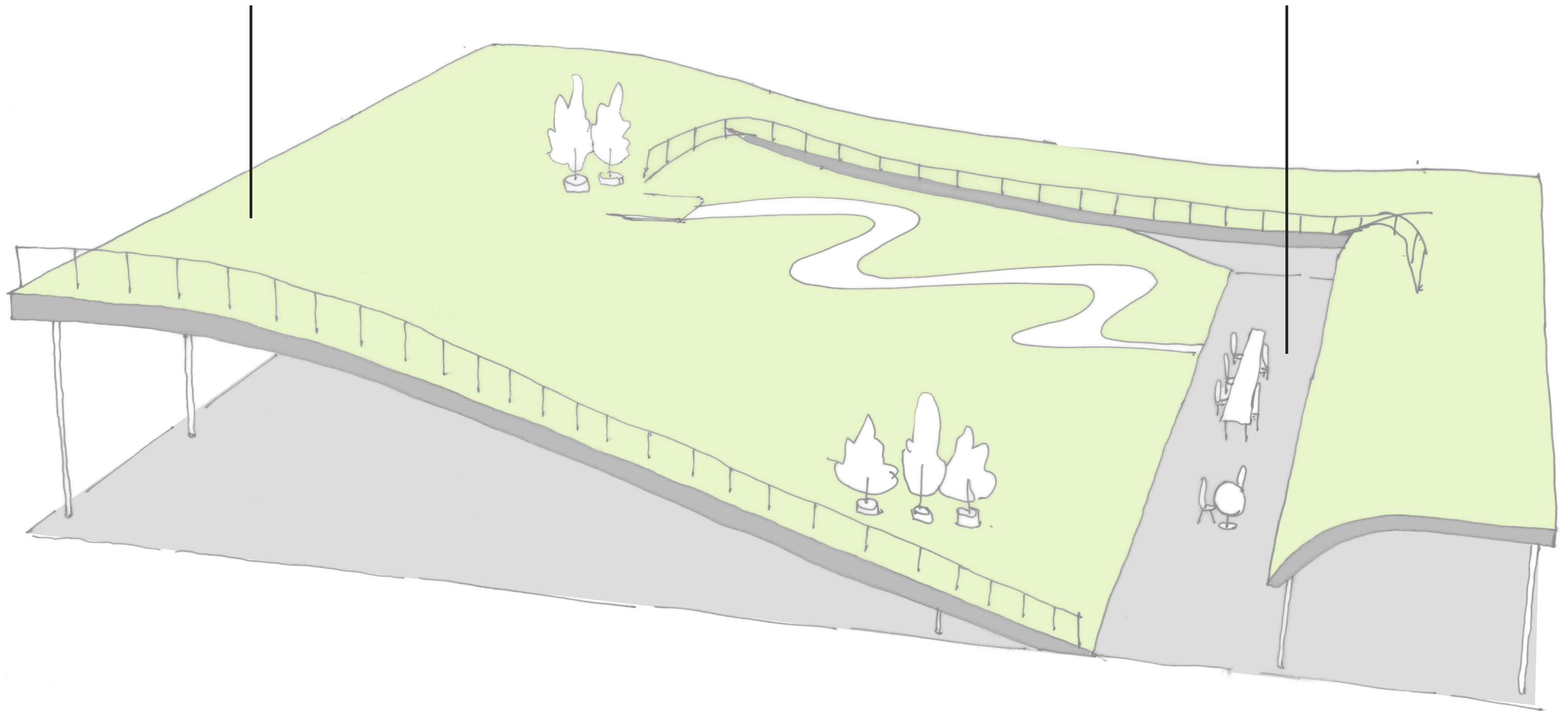
**THE IDENTITY OF THE FOUR PUBLIC SQUARES**

# The Greenery Square

Peaceful and Quiet

**Green Roof Surface**

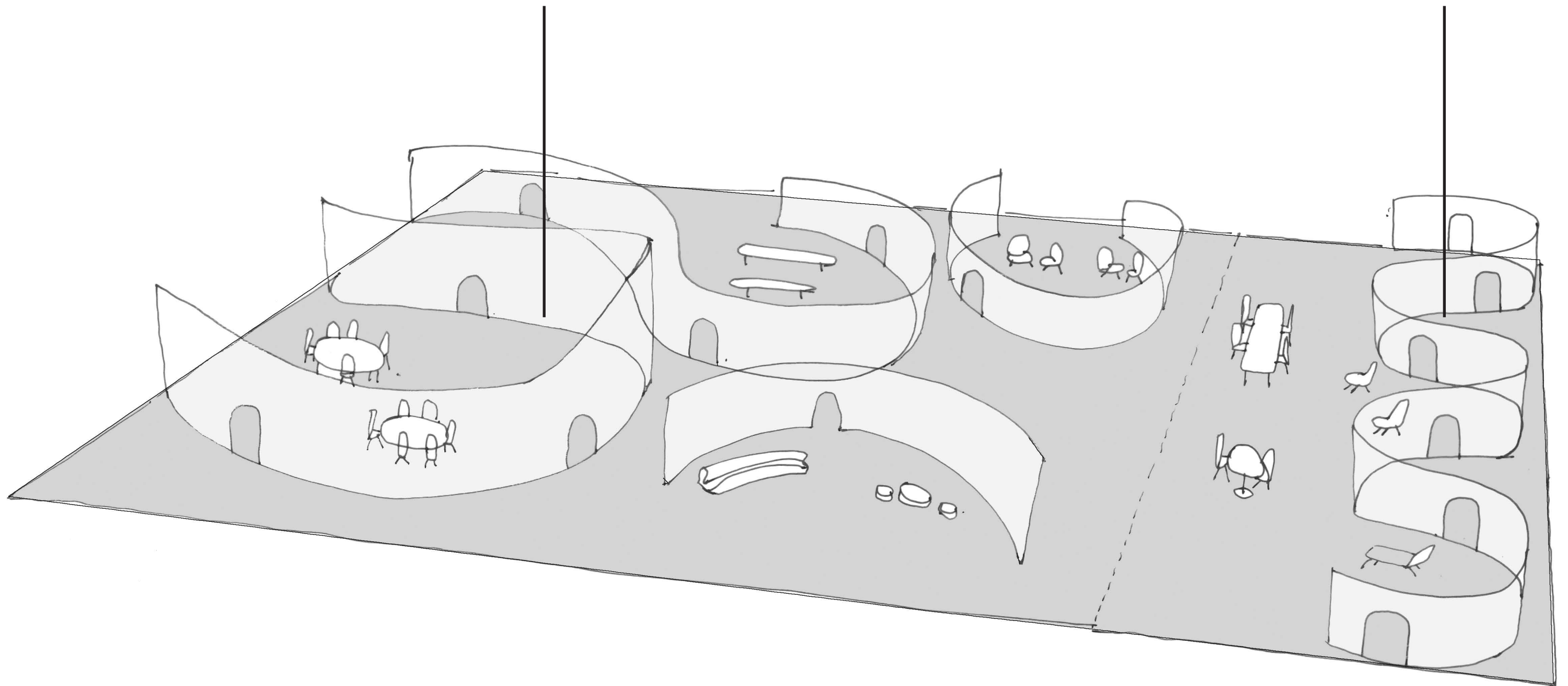
**Inner Courtyard**

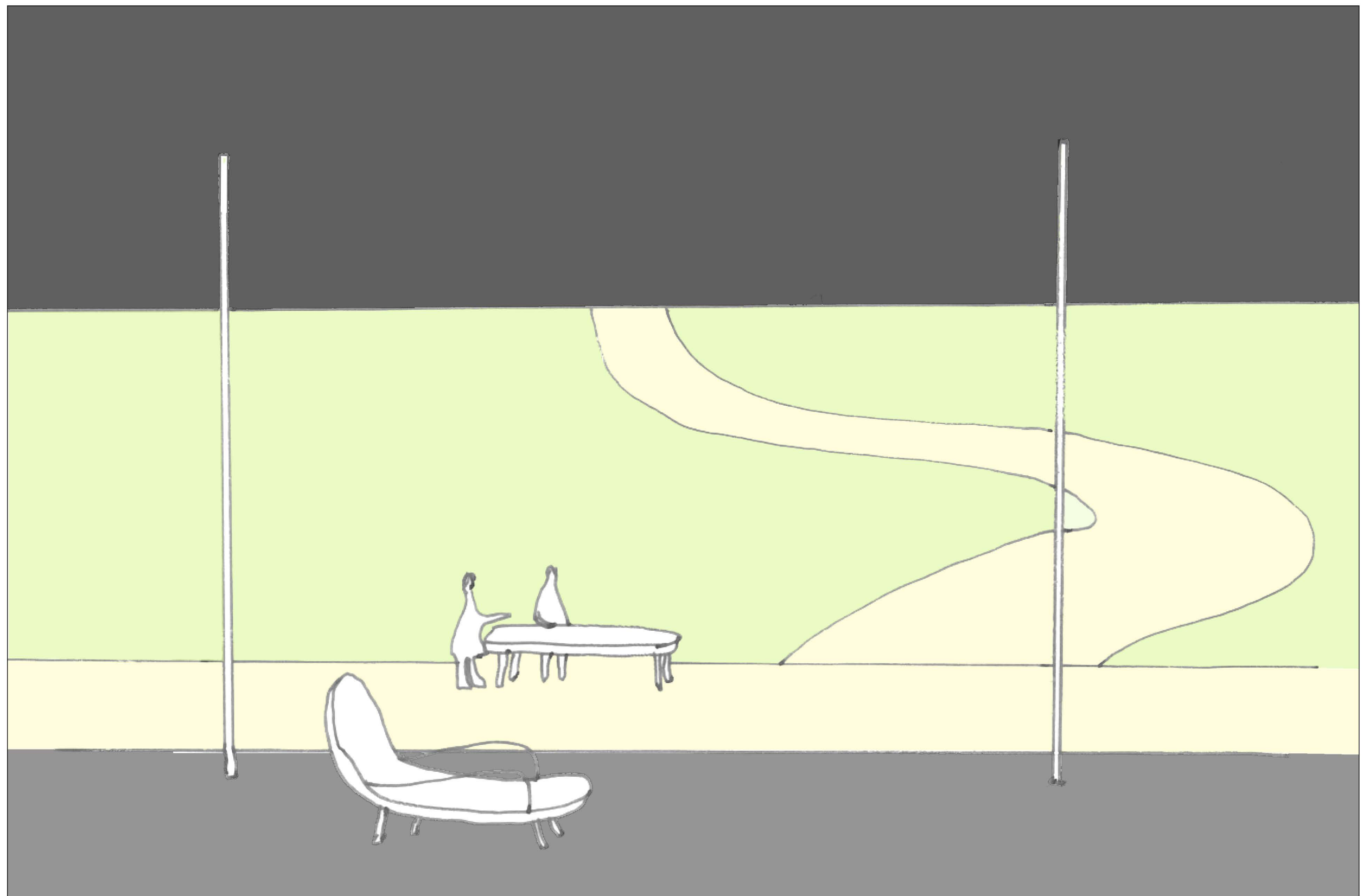




**Social Activities**

**Small Lounge Space**





**Under the eave**