# ARCHITECTURE STUDENT CONTEST

## 18th INTERNATIONAL EDITION, LISBON 2023

STUDENT | ANGELA HANNA

PROFESSOR | ANTOINE YOUNAN

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GROW & IMPACT

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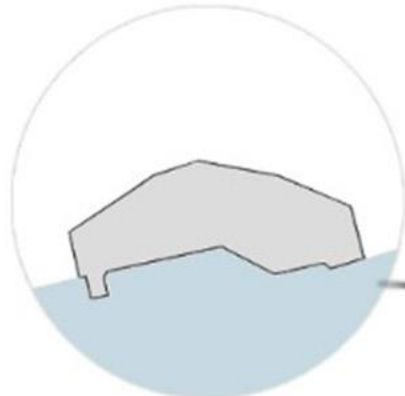
# SITE LAYERS

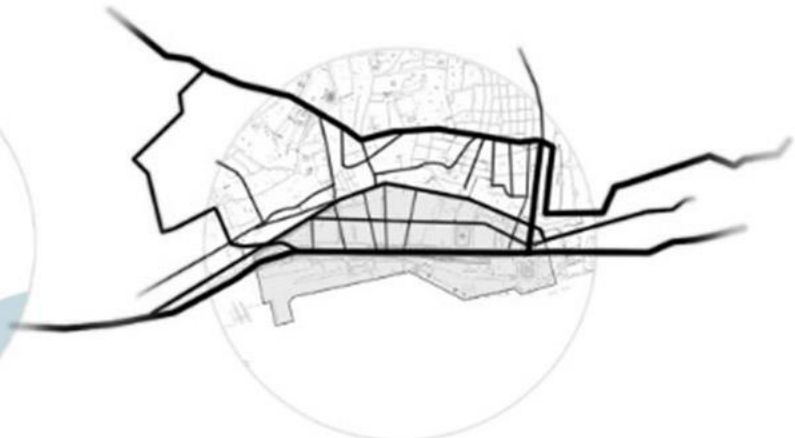
CITY

TOPOGRAPHY

BUILT



WATER



ROADS

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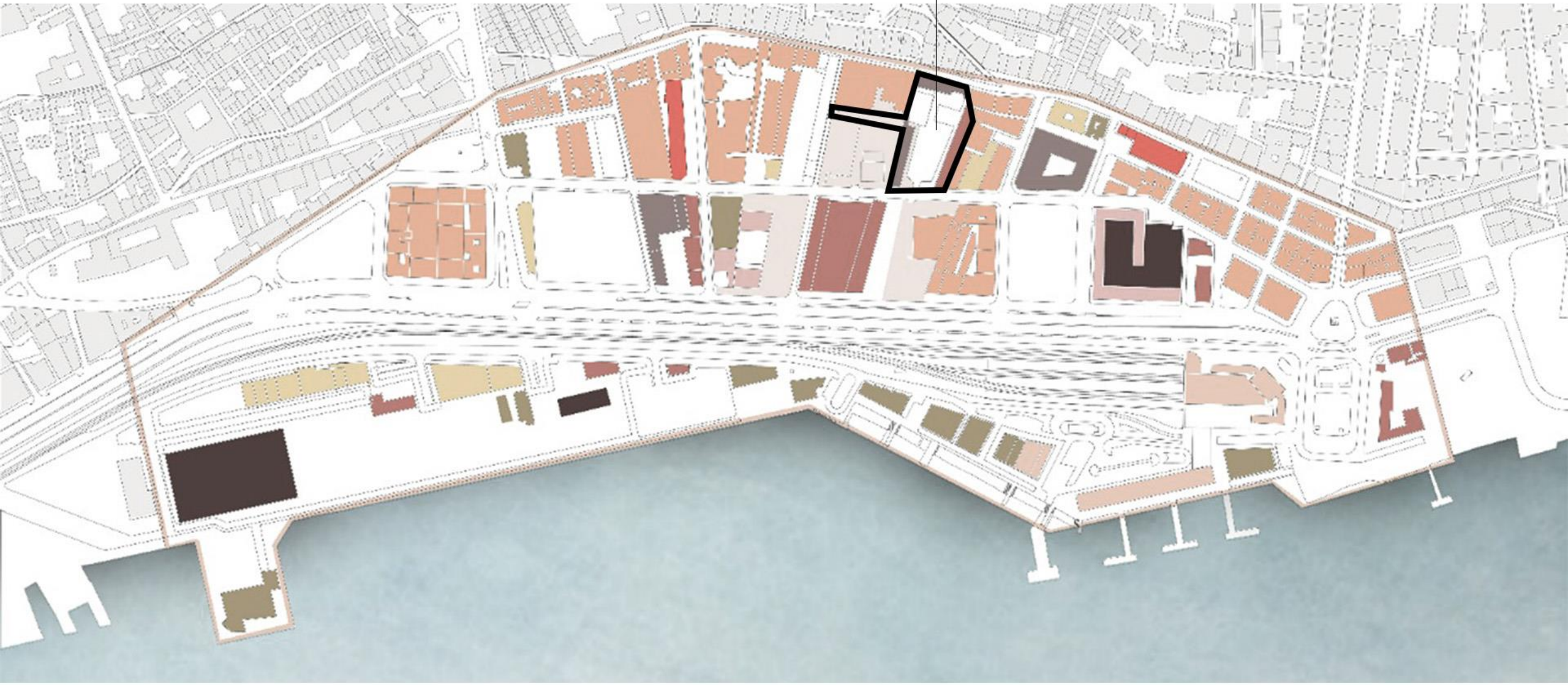
# SITE ZONING




MIXED-USE BUILDINGS
UNDER CONSTRUCTION
PUBLIC BUILDINGS
ENTERTAINMENT
WAREHOUSES
COMMERCE
EDUCATION CENTERS
RELIGIOUS BUILDINGS
RESIDENTIAL BUILDINGS

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# SITE CIRCULATION

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# A PROJECT THAT ...

01

REFLECTS

02

RESPECTS

03

REACTS

04

REMEMBERS

05

RECONNECTS

06

REPLENISHES

07

REVIVES

08

RECYCLES

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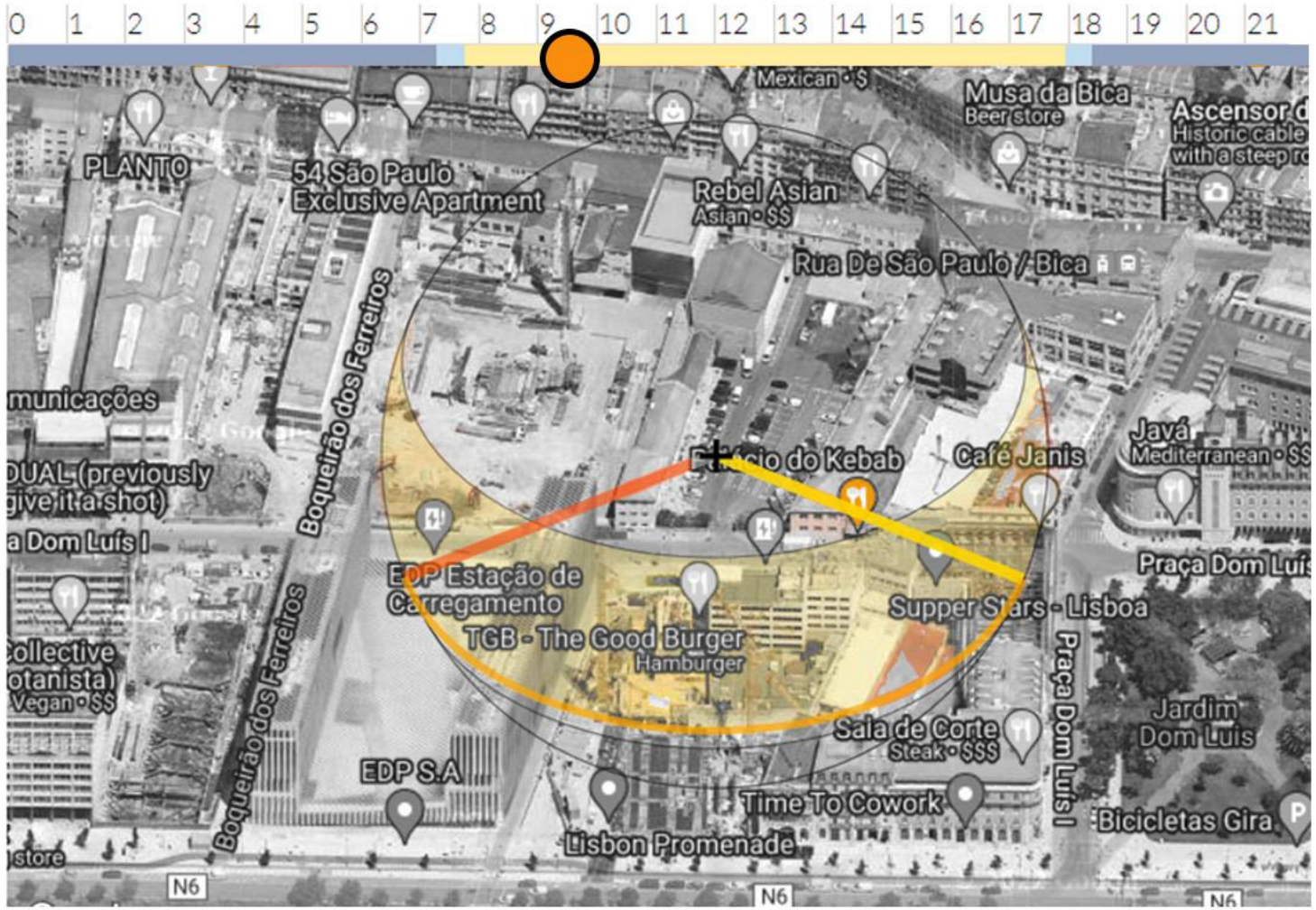
# SITE SOLAR STUDY




00:00–06:13 – Night
06:13–06:45 – Astronomical twilight
06:45–07:16 – Nautical twilight
07:16–07:45 – Civil twilight
07:16 – Dawn
07:45 – Sunrise
12:51 – Solar noon
17:57 – Sunset
18:25 – Dusk
17:57–18:25 – Civil twilight
18:25–18:57 – Nautical twilight
18:57–19:28 – Astronomical twilight
19:28–00:00 – Night

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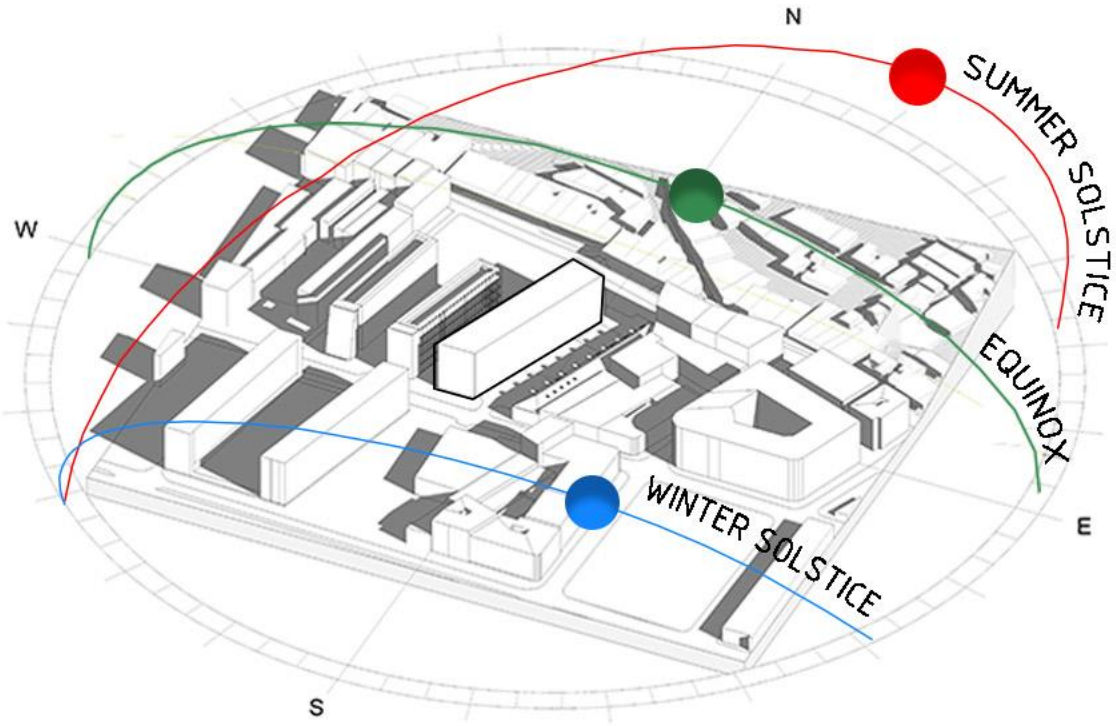
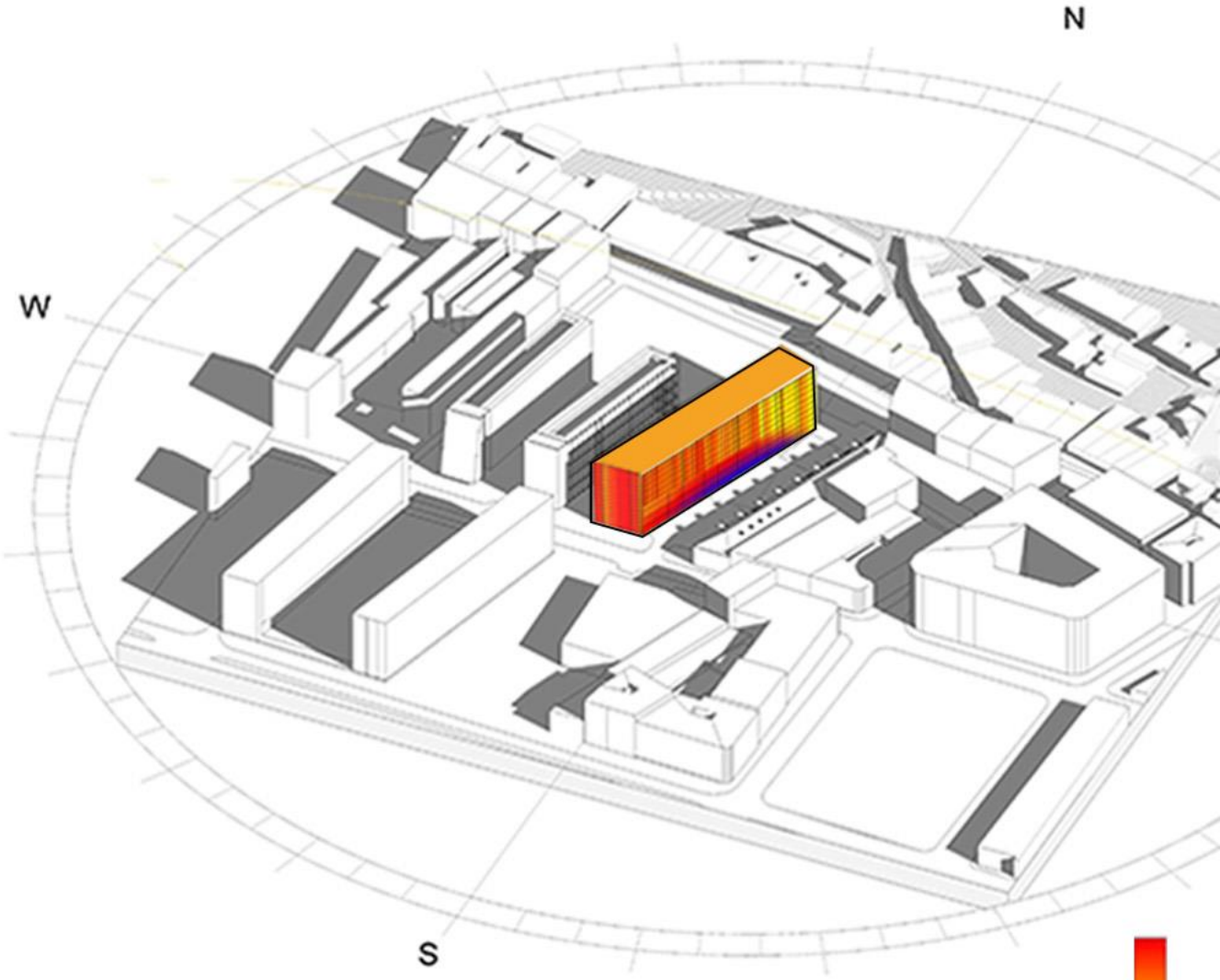
# SITE SOLAR STUDY




**JUNE 21** Sunrise: North-East | Sunset: North-West

**MARCH 20 - SEPTEMBER 22** Sunrise: East | Sunset: West

**DECEMBER 21** Sunrise: South-East | Sunset: South-West

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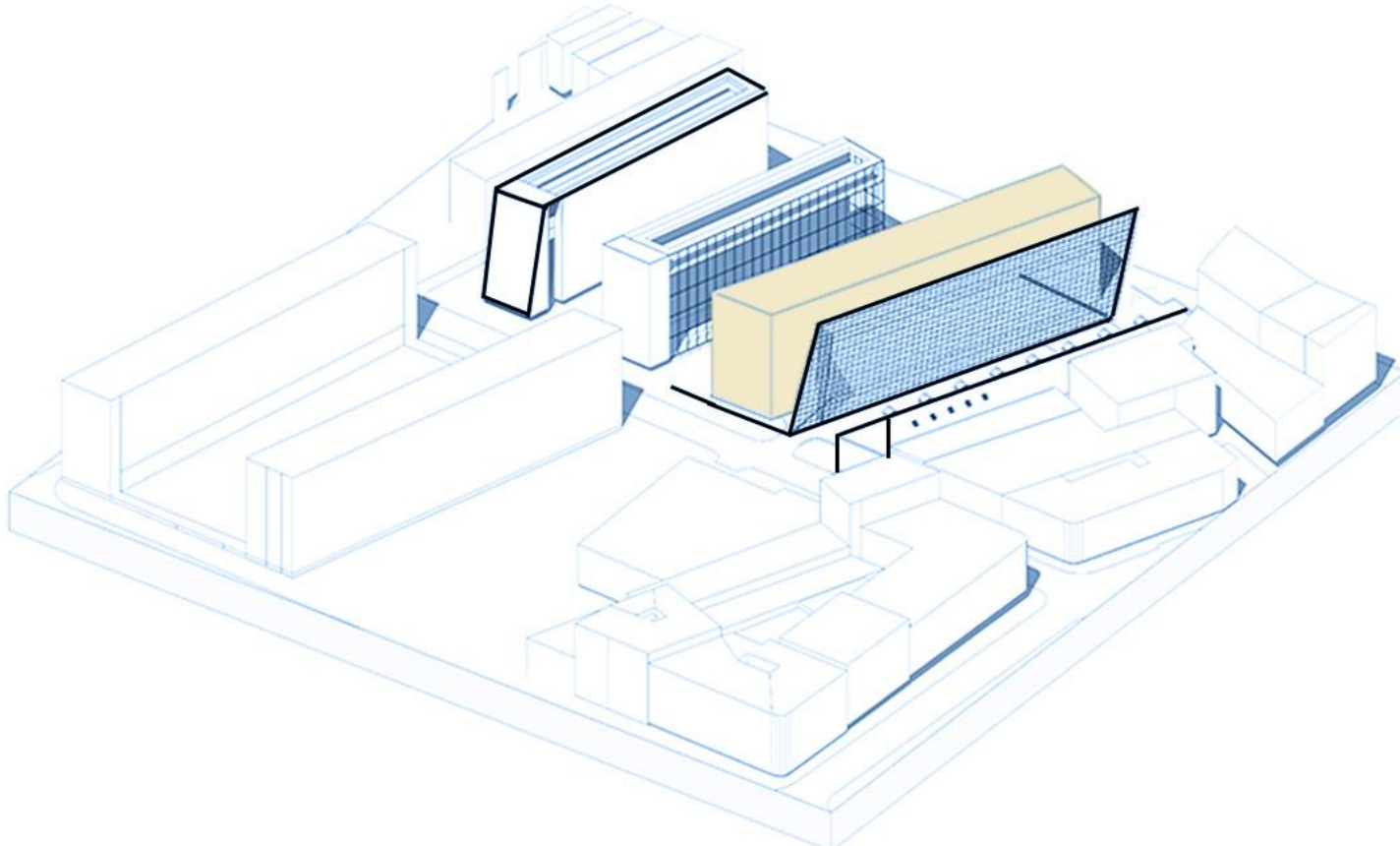
# CONCEPT

**REFLECTS**

The same way EDP II's front facade leans backward and Building A's roof is slanted, Building B's skin generates a movement unique, of its own, completing this distinctive

*Architecture in Motion*



MOTION

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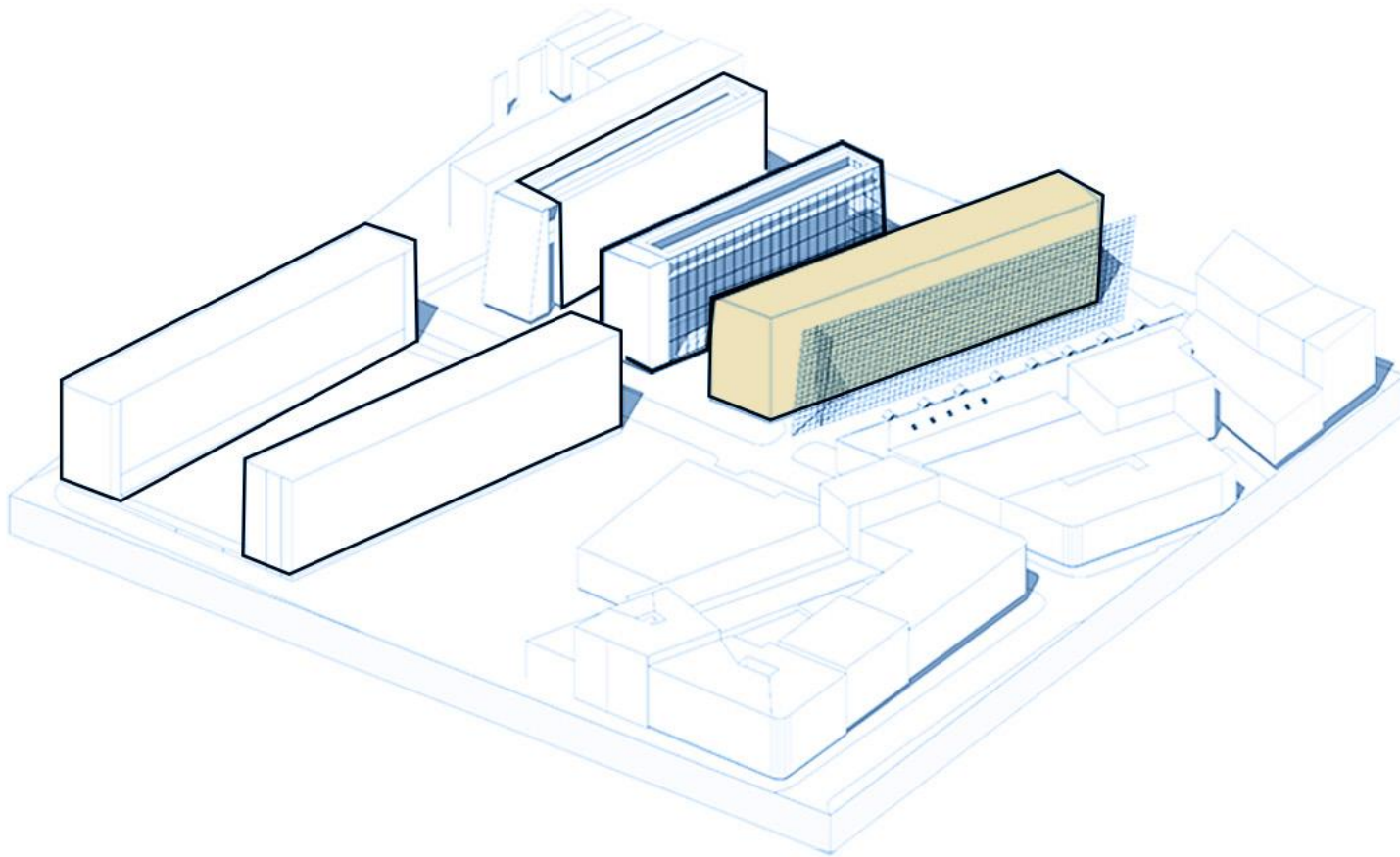
# CONCEPT

**REFLECTS**

Similarly, Building B adopts the extruded aspect of the surrounding buildings on site,
Therefore, the residential part of the project takes place in this volume caracterized by

*Stillness and Staticity*



STATIC

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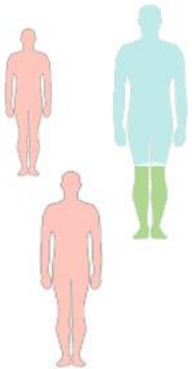
# CONCEPT

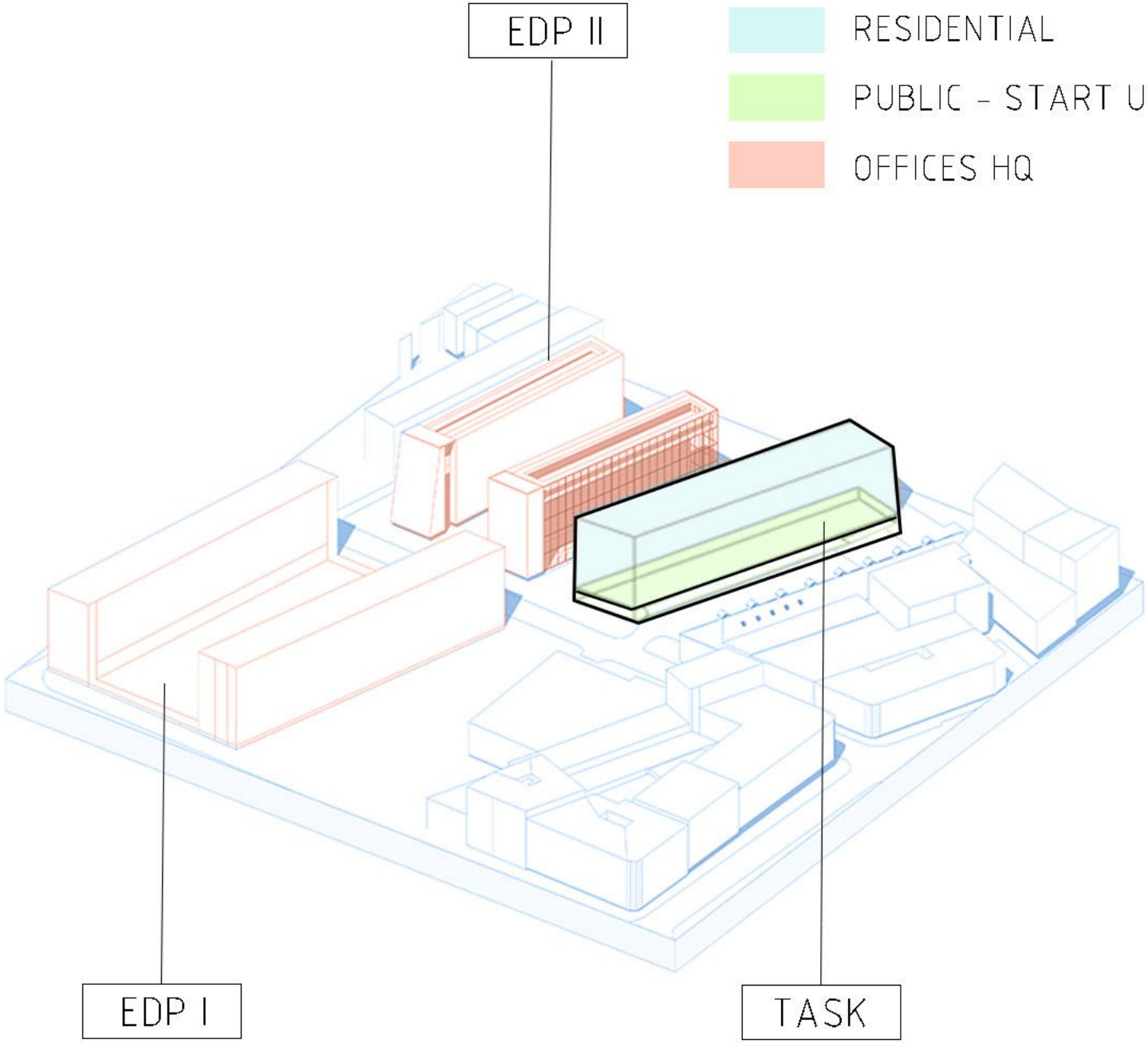
## REFLECTS



RESIDENTIAL

PUBLIC - START UP

OFFICES HQ



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# LISBON, PORTUGAL

**REFLECTS**

A skin that reminds of the Azulejo art ... Reflecting the city of Lisbon, its art and culture in a different way

Grande Panorama de Lisboa , Museu Nacional do Azulejo

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**REFLECTS**

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# CONCEPT

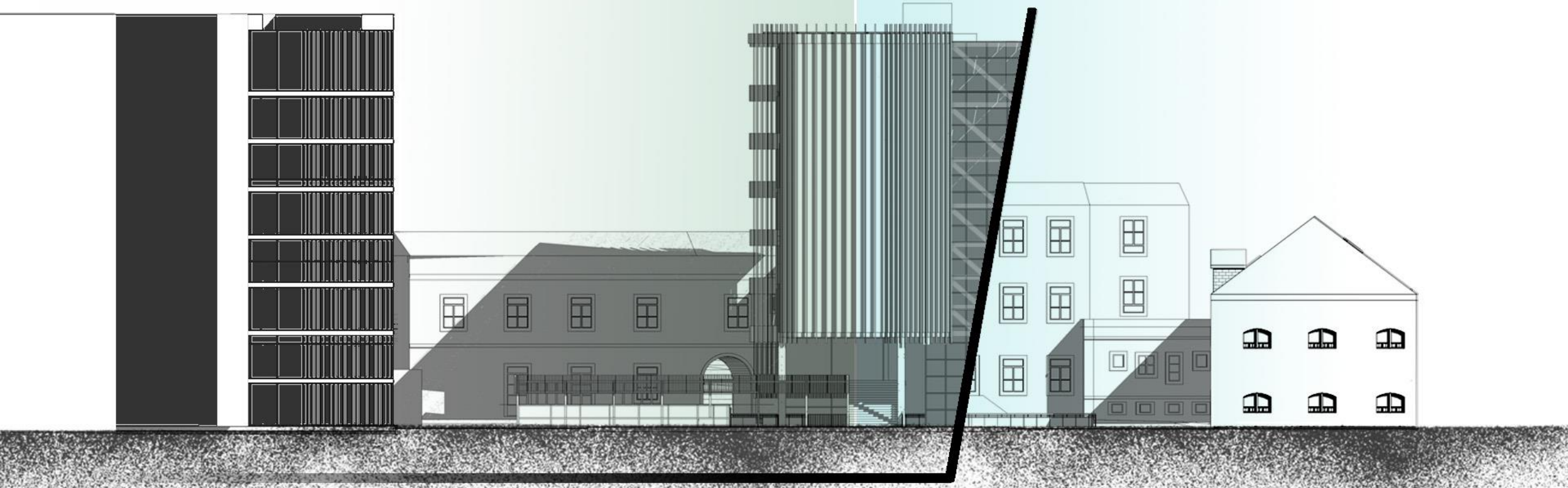
## REFLECTING

### THE FUTURE

EMBRACING SUSTAINABILITY

### THE PAST

HONORING HISTORY



SOUTH ELEVATION

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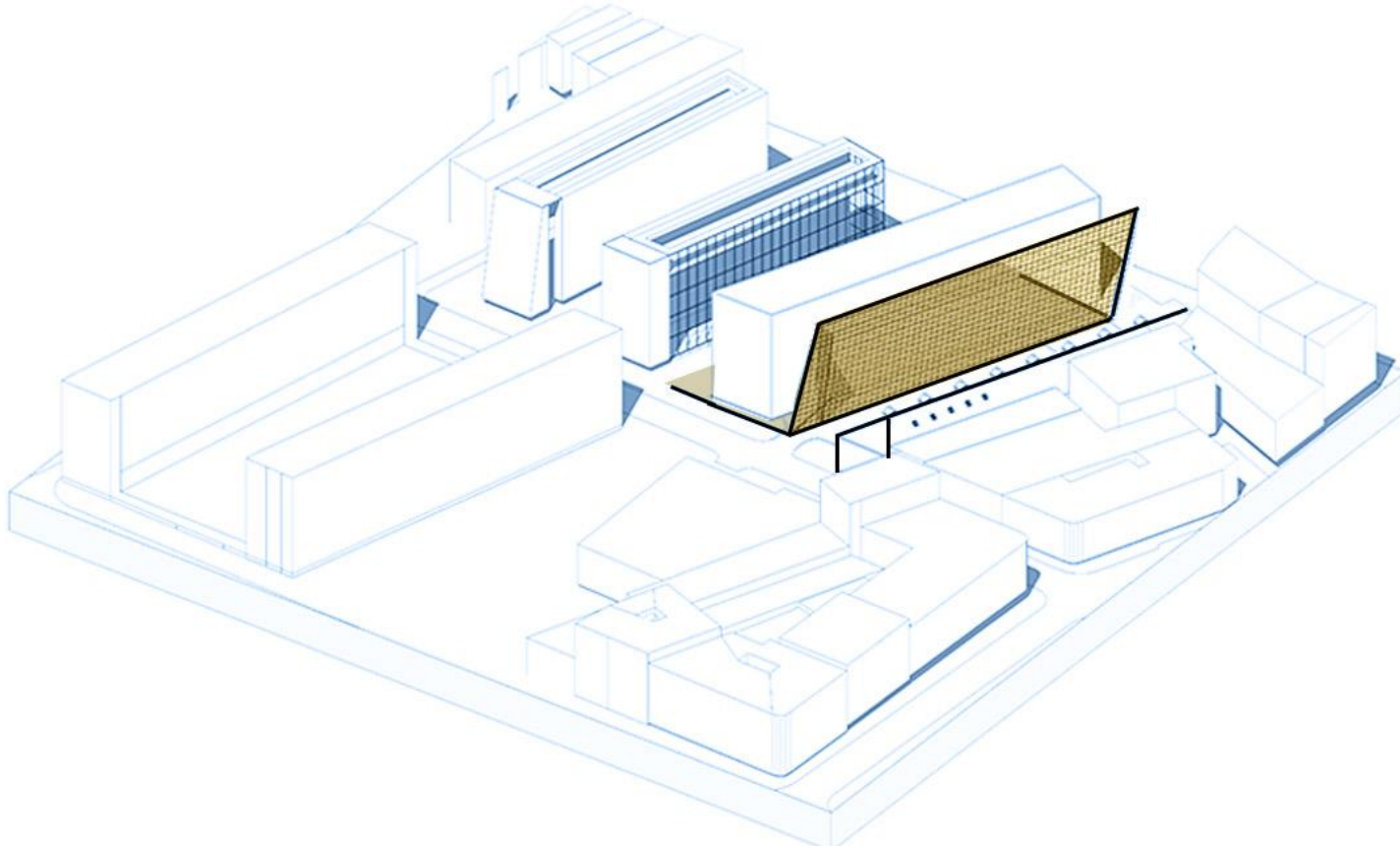
# CONCEPT

## RESPECTS

The bowing movement of the skin symbolizes the inclination of the new architecture to the older one, a gesture of

*Honor and Respect*



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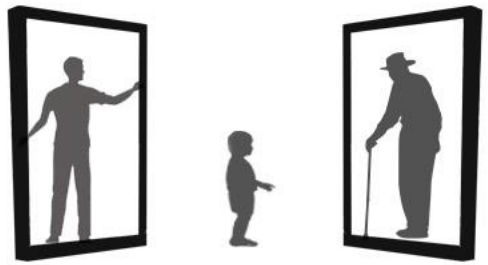
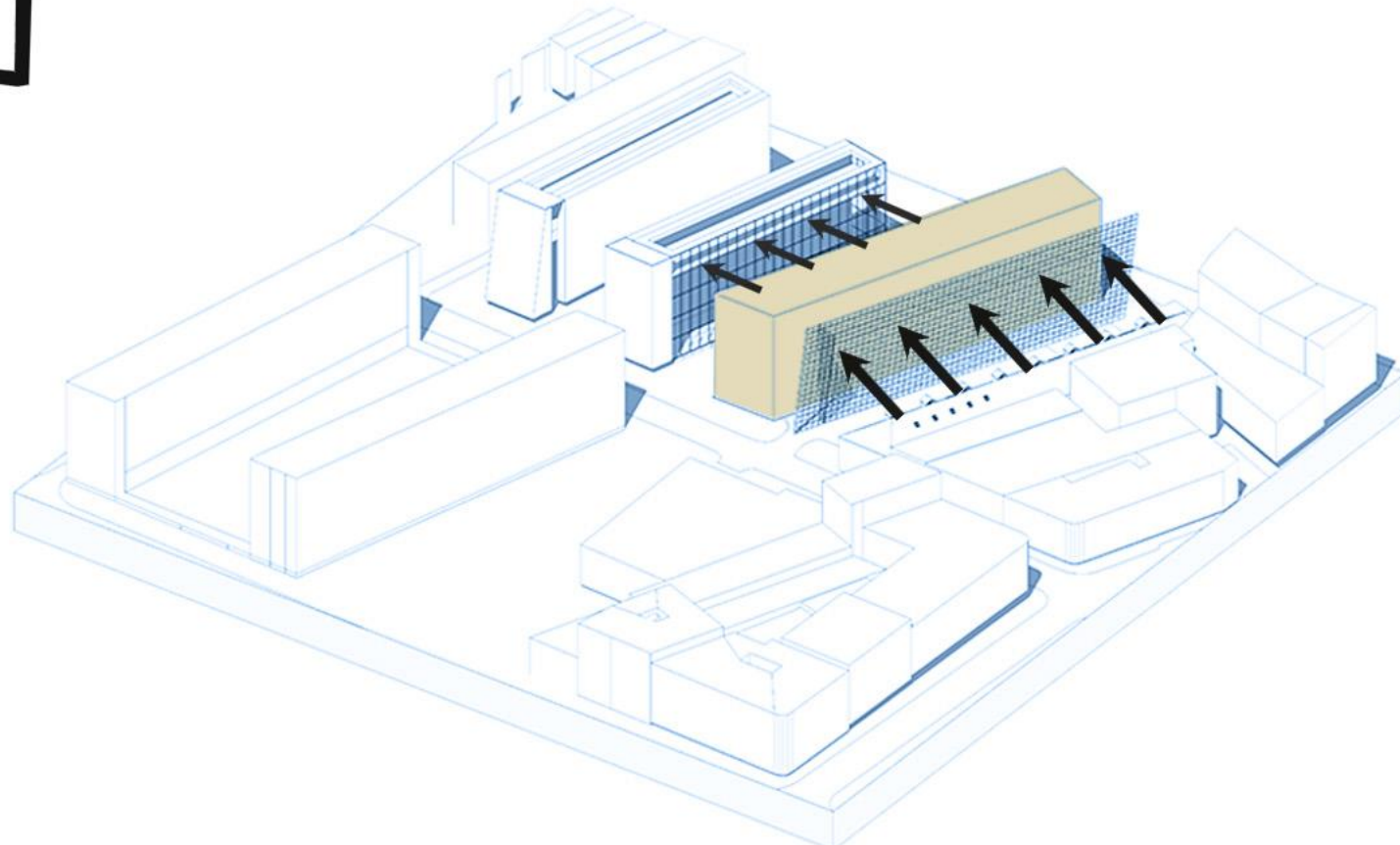
# CONCEPT

**REFLECTS** **RESPECTS**



Building A is reflected in Building B, as a refection of the past
Building B is reflected in EDP II's curtain wall facade, as a reflection of the future
The project respects both, old and new

*Moving Image*



REFLECTION

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**REFLECTS** **RESPECTS**

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**REFLECTS** **RESPECTS**

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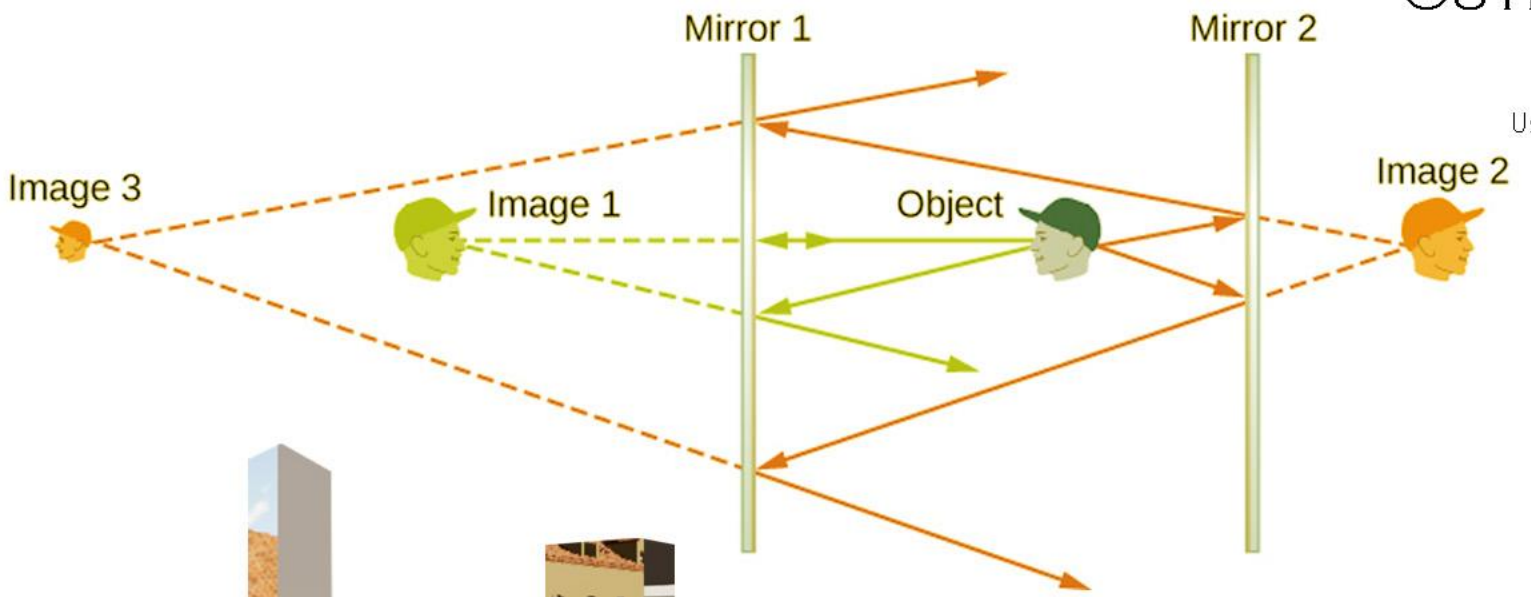
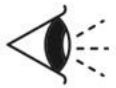
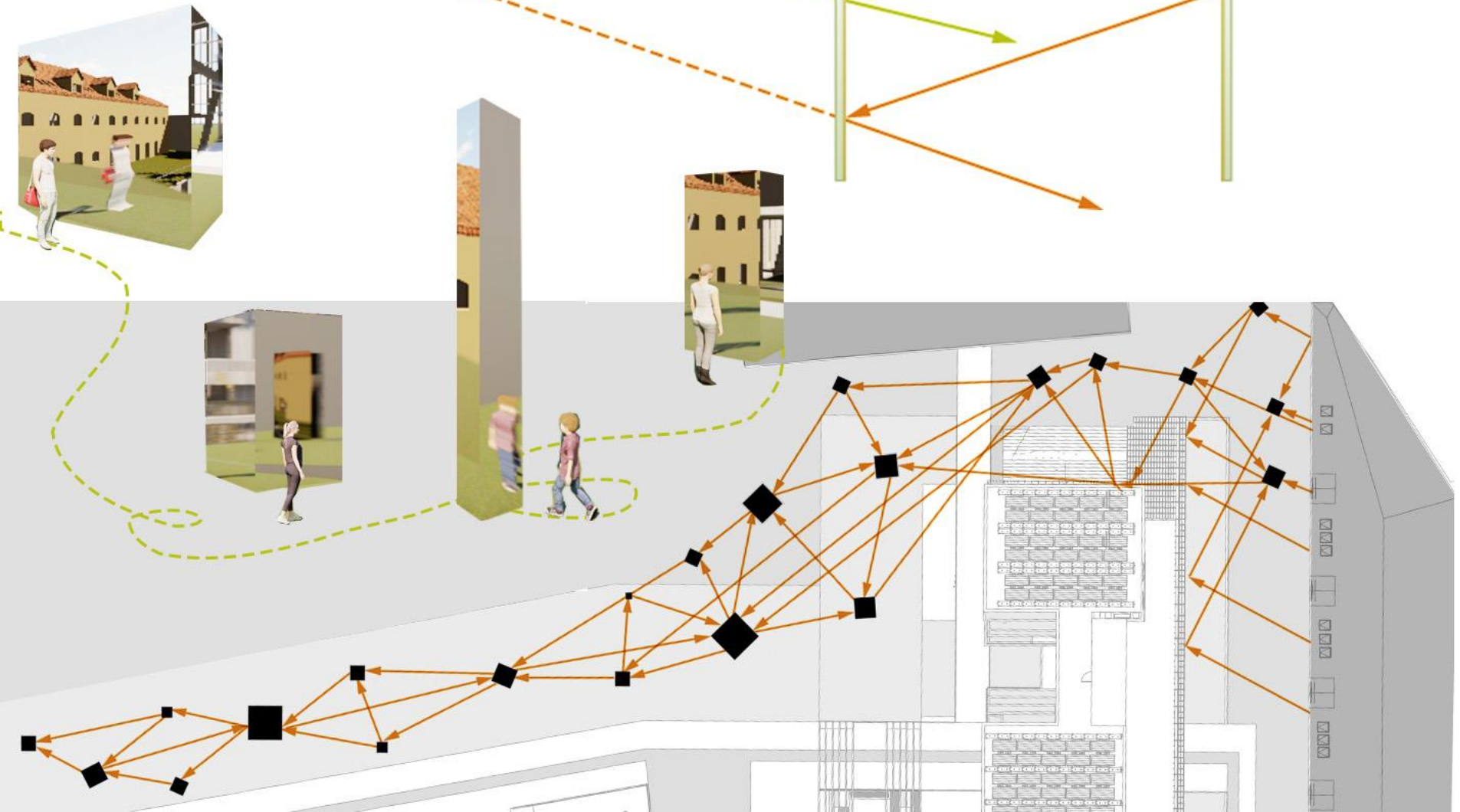
# OUTDOOR INSTALLATIONS

Taking the "**Moving Image**" to the next level.
Using the **image formation by plane mirror** principle

## REFLECTS





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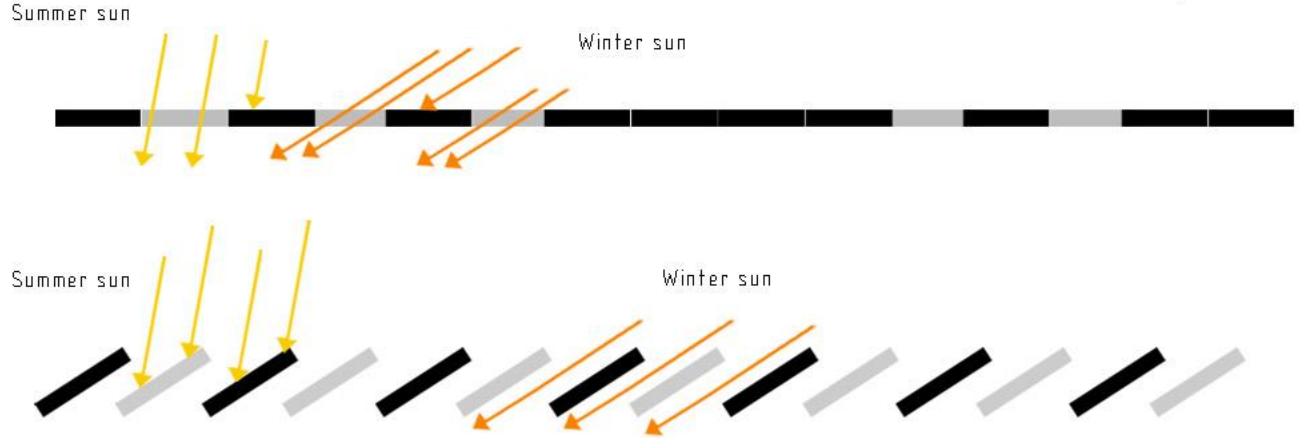
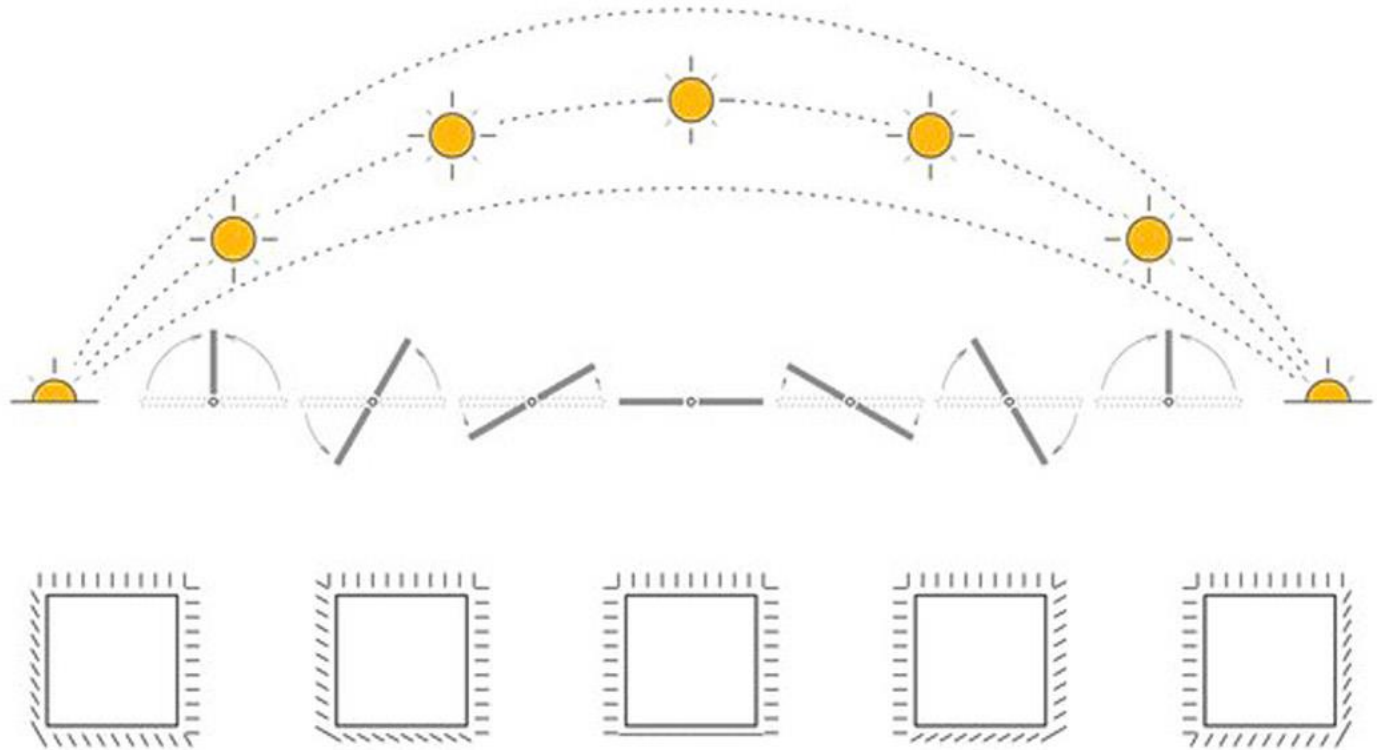
**REACTS**

# RESPONSIVE ARCHITECTURE




Responsive skin system; panels rotate around their axis at an angle to give **winter sun access** and **summer shade**



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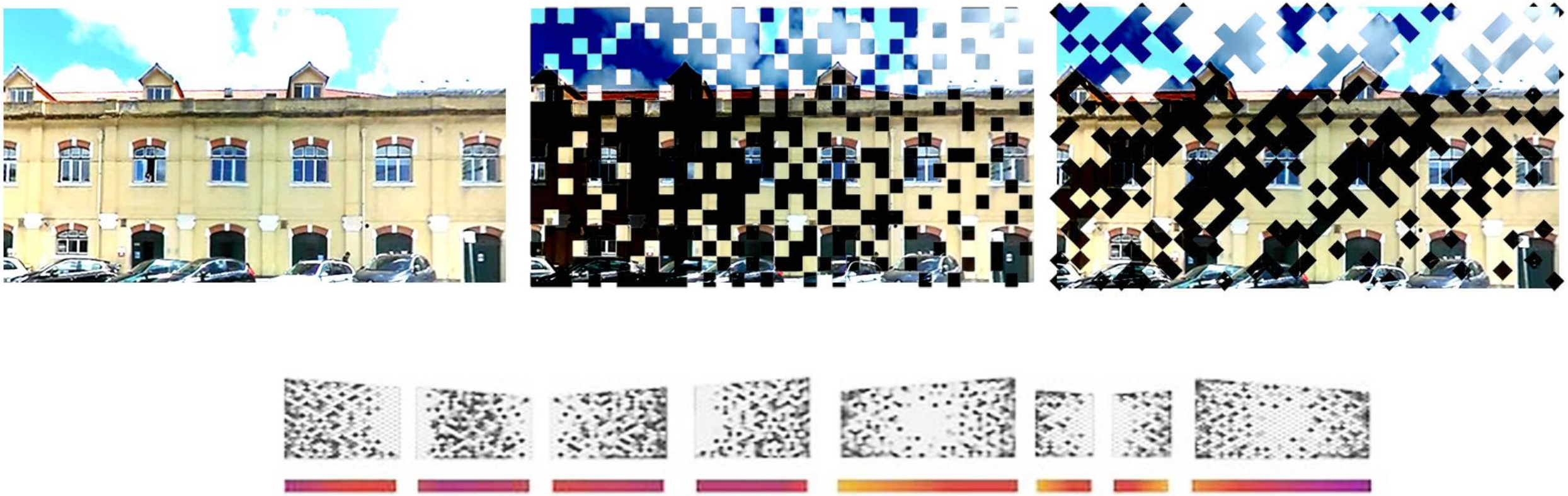
**REMEMBERS**

# MOTION AND MEMORY

The panels alter between **opaque** and **transparent**, and rotate, user and climate controlled, distorting the reflection of Building A from time to time, a reminder of the **Historical Lisbon Earthquake**, through the now shattered image



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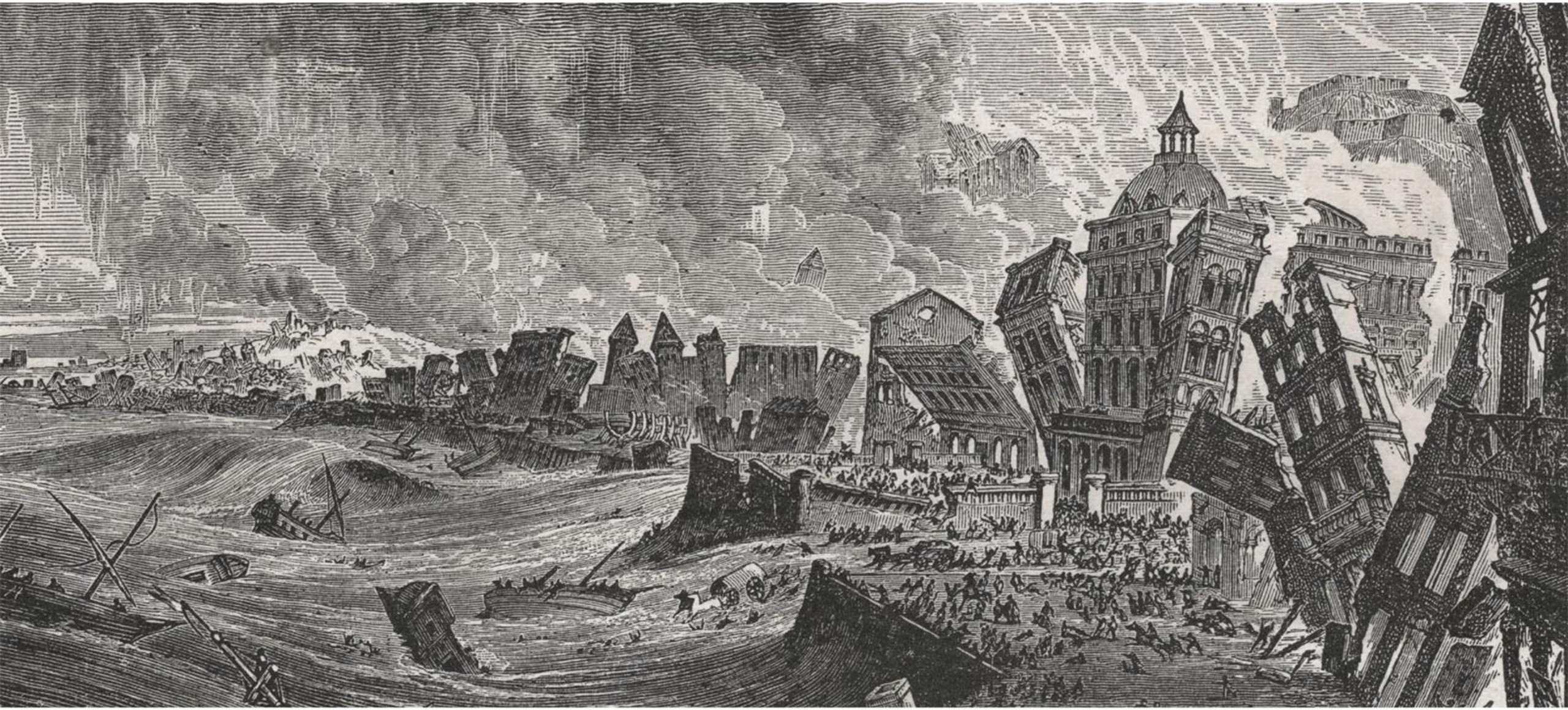
# MOTION AND MEMORY

**REMEMBERS**

The Lisbon Earthquake of 1755, that changed history



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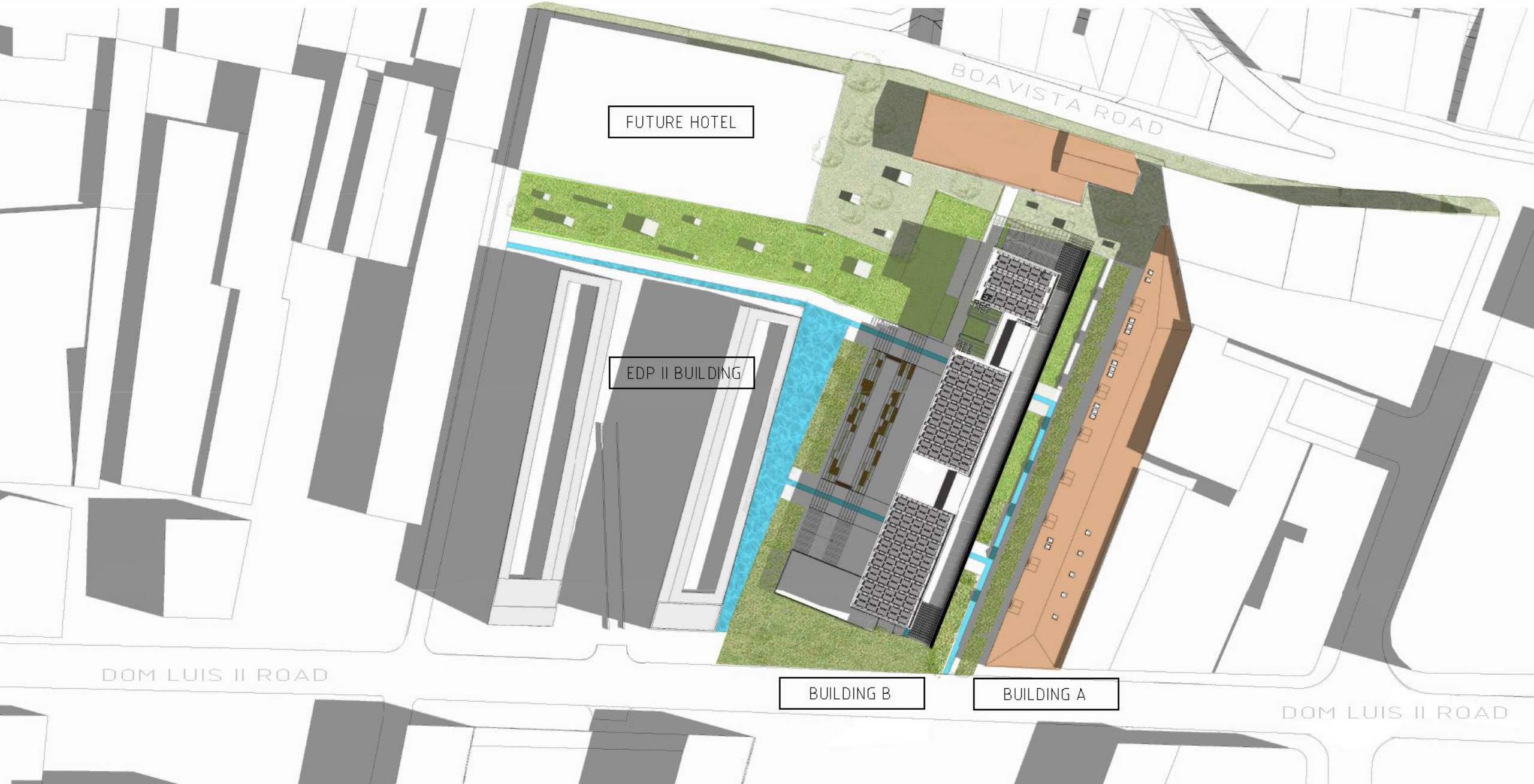
# MASTER PLAN

SCALE 1:500



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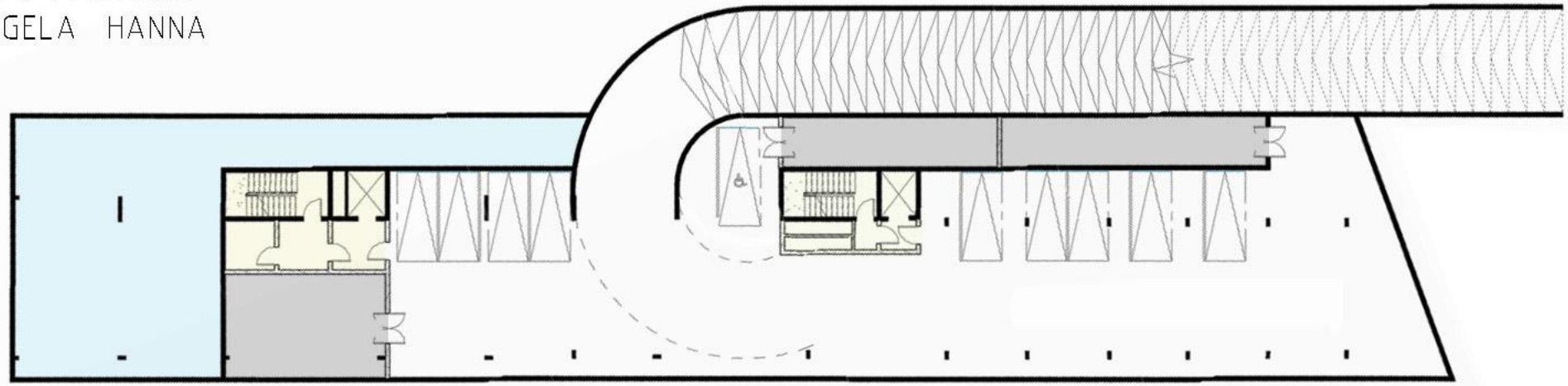
# FLOOR PLANS

SCALE 1:200



LVL -6.00 | UNDERGROUND PARKING

- Circulation core
- Water Tank
- Technical Rooms

LVL -3.00 | COMMERCIAL START-UP

- Circulation core
- Water plan
- Garden
- Public extension
- Commercial & start-up
- Access points

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## RECONNECTS

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## RECONNECTS

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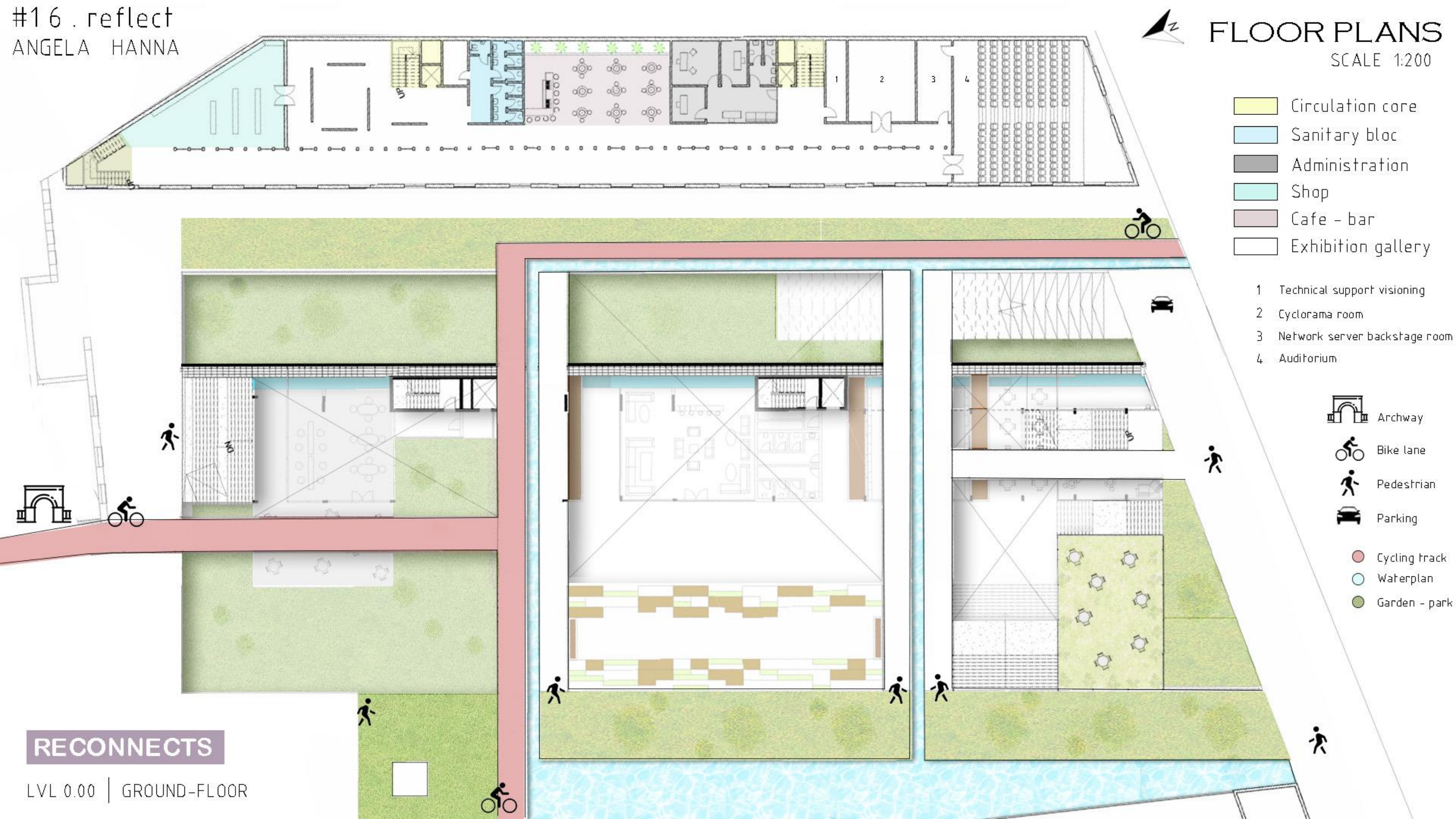
# FLOOR PLANS

SCALE 1:200




RECONNECTS

LVL 0.00 | GROUND-FLOOR

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## REPLENISHES

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## REFLECTS

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**REFLECTS**

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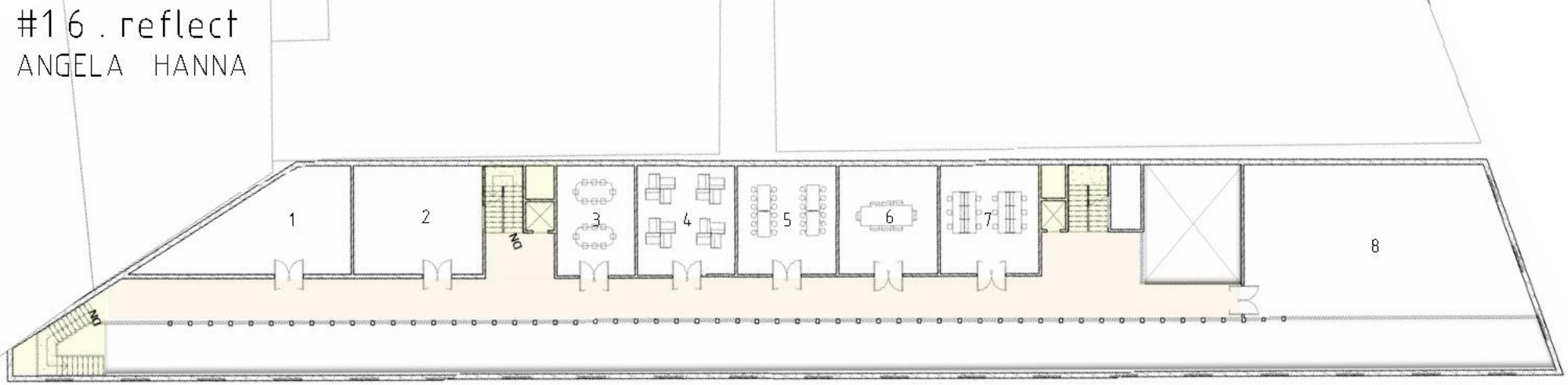
# FLOOR PLANS

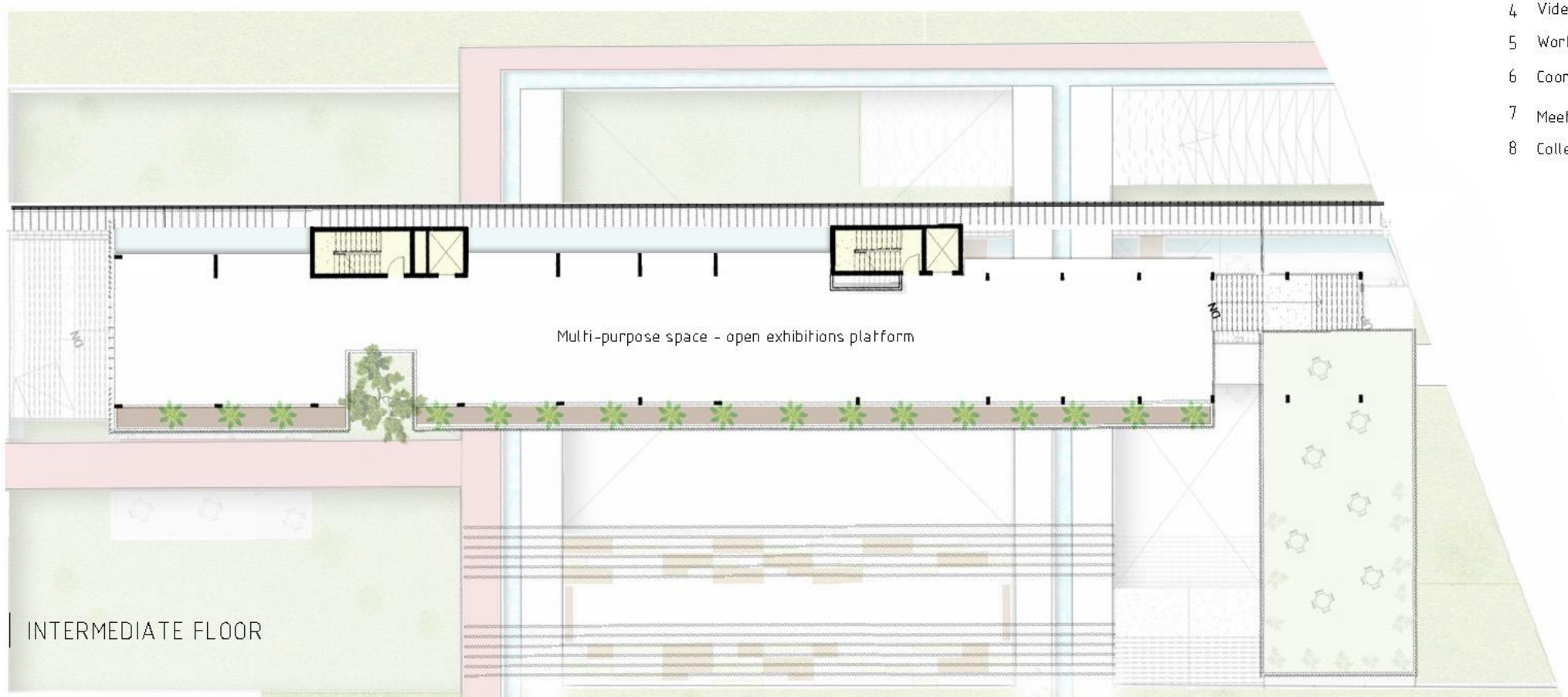
SCALE 1:200




Circulation core

Passage on void

1 Film and video description room
2 Deposit and archive room
3 Executive projet production room
4 Video digitalization room
5 Working rooms
6 Coordinator room and meeting
7 Meetings room
8 Collective visioning room




LVL 3.00 | INTERMEDIATE FLOOR

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# DIAGRAM

## REPLENISHES

Plants in pots

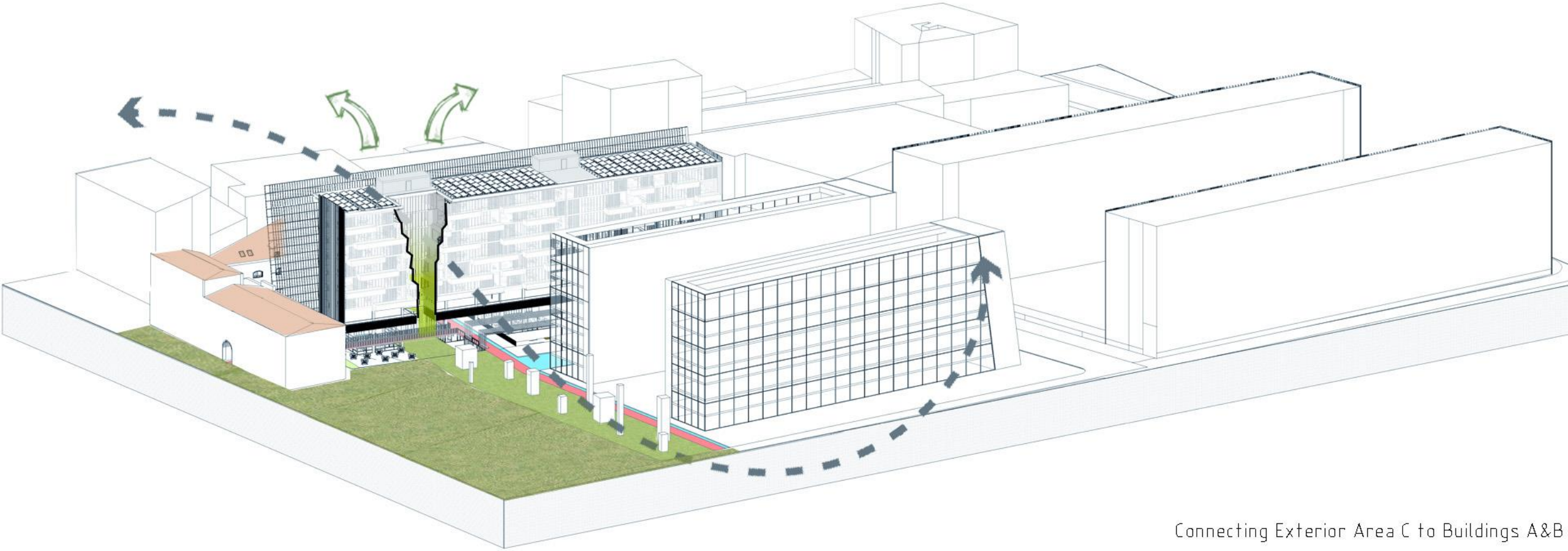
Cheminements doux

Informal meeting spaces

High grass

Main path

Terraces



Connecting Exterior Area C to Buildings A&B

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## REPLENISHES

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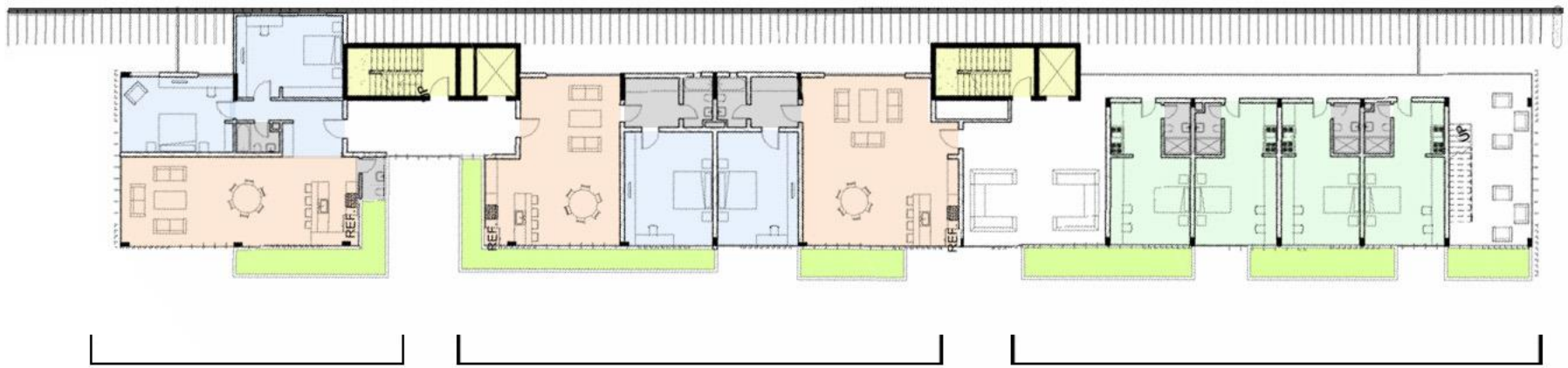
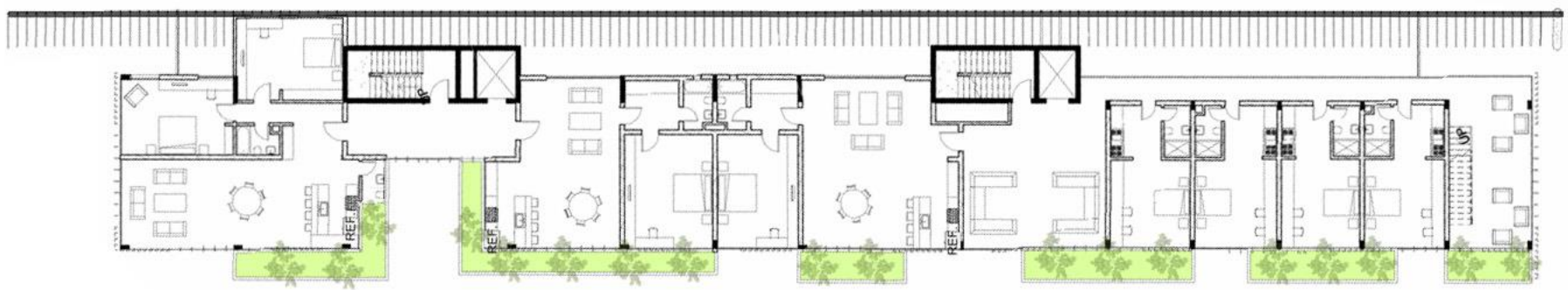
# FLOOR PLANS

SCALE 1:200




ZONING

- Circulation core
- Living area
- W.C
- Bedroom
- Single living unit
- Green slab
- Common area




LVL 6.00 | TYPICAL FLOOR

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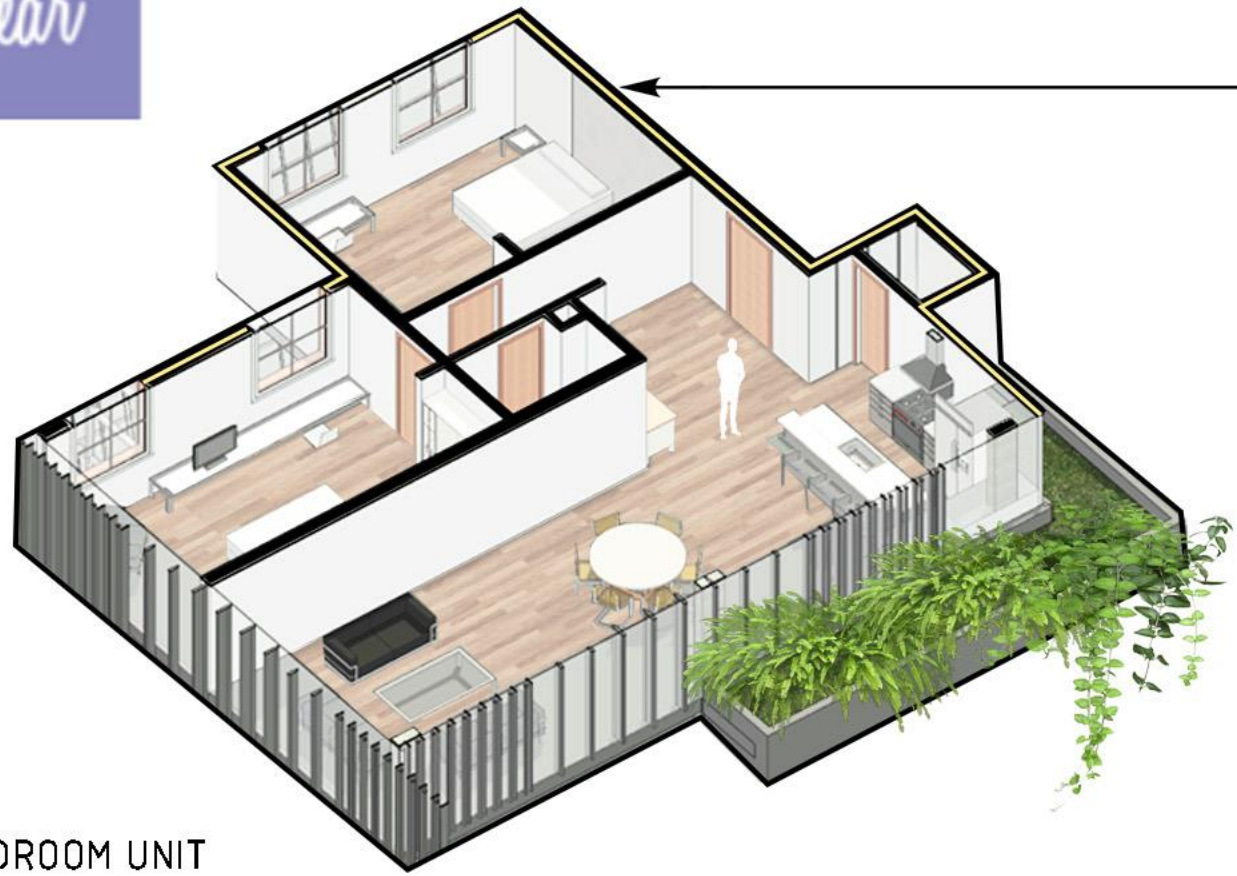
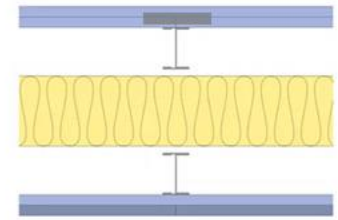
# ACOUSTIC COMFORT

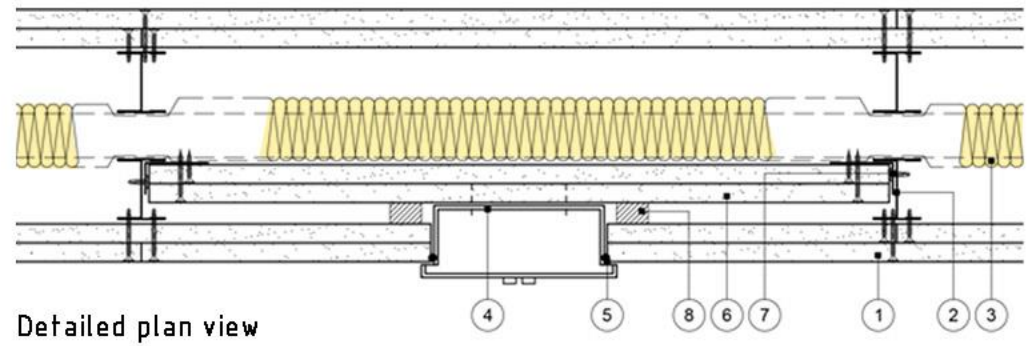
British Gypsum SAINT-GOBAIN | gyproc SAINT-GOBAIN | isover SAINT-GOBAIN



**GypWall Twin Frame Independent | A216013 MR1**

- Fire integrity / insulation (mins): **90**
- Sound insulation (airborne) Rw (dB): **70**
- Sound insulation (airborne) +Ctr (dB): **62**






Detailed plan view

## 2 BEDROOM UNIT

- Living Area
- Dining Area
- Open Kitchen & Bar
- Guest Bathroom
- 2 Master Bedrooms
- 1 Common Bathroom

1 **Gyproc** Plasterboard fixed with **British Gypsum** screws
2 **Gypframe** I studs
3 **Isover** insulation
4 Socket box
5 Socket box perimeter with **Gyproc** Sealant
6 Layers board
7 Nominal 150mm length of **Gypframe** GA4 Steel Angle
8 Fire resistant seal approved by building regulations

Hear

# ACOUSTIC COMFORT

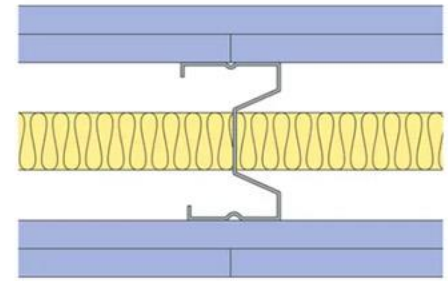
## 1 BEDROOM UNIT

- Living Area
- Dining Area
- Open Kitchen & Bar
- 1 Master Bedroom
- 1 Private Bathroom
- Walk-in Closet

**GypWall Single Frame | A206A198S**

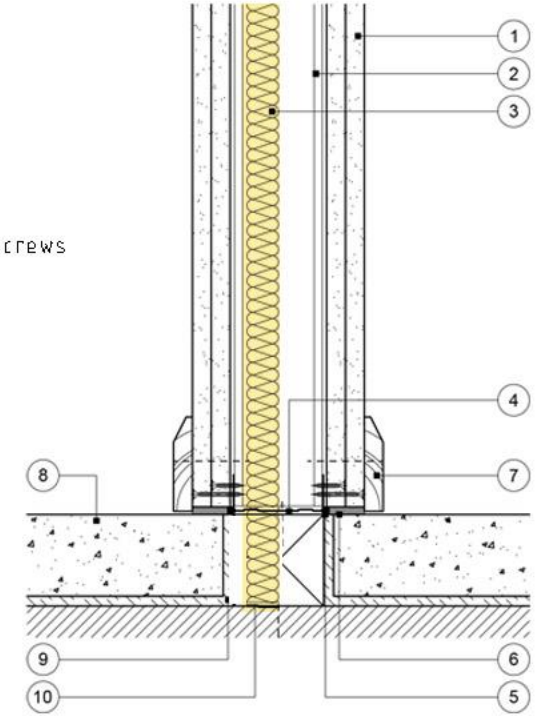
Fire integrity / insulation (mins): **60**

Sound insulation (airborne) Rw (dB): **59**



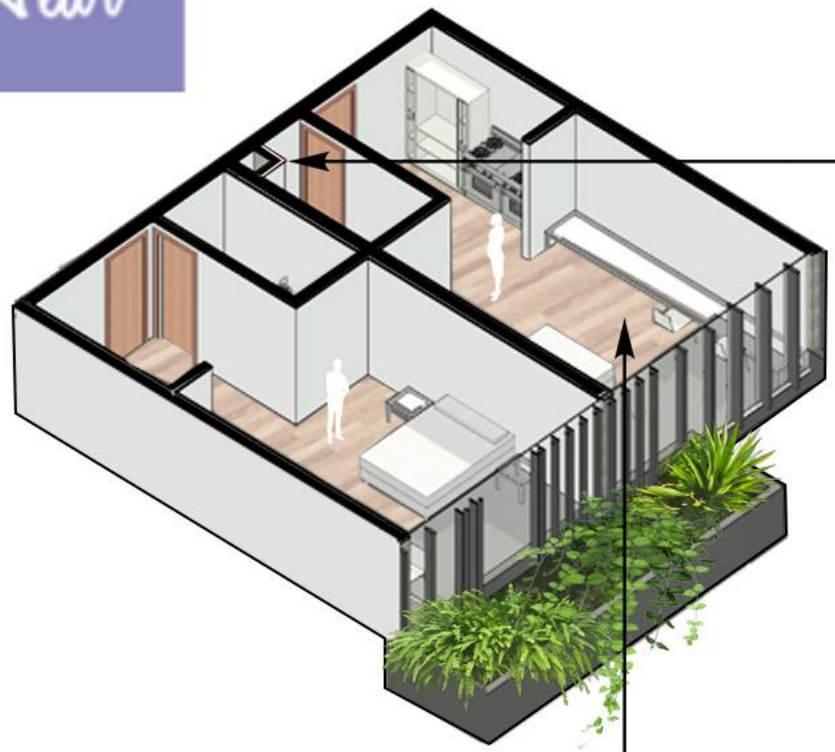
**Detailed section view**

1 **Gyproc** Plasterboard fixed with **British Gypsum** screws
2 **Gypframe** C studs
3 **Isover** insulation
4 **Gypframe** Channel fixed to timber sole
5 **Gyproc** Sealant for optimum sound insulation
6 **Gyproc** jointing material bulk fill
7 Skirting
8 Screed
9 Resilient layer
10 Channel width timber base plate



# ACOUSTIC COMFORT

Hear

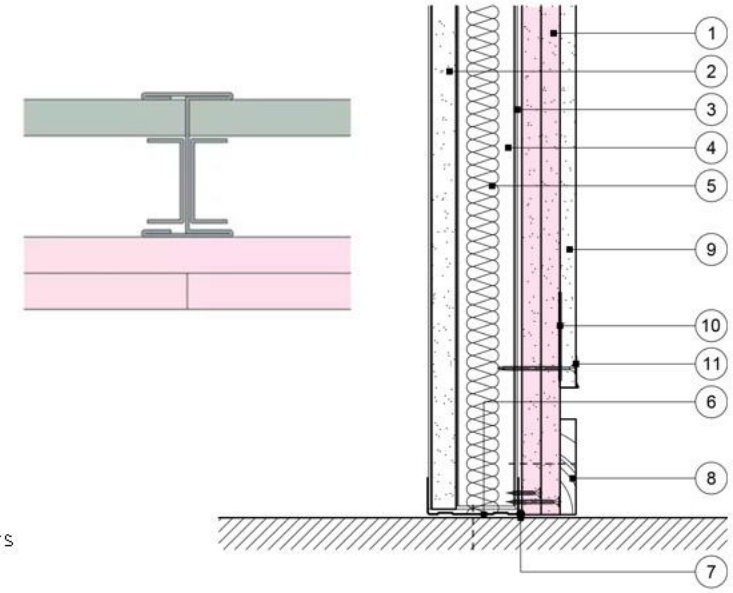


## GypWall Shaft | A306003 (B)

Fire integrity / insulation (mins): **90**

Sound insulation (airborne) Rw (dB): **42**

1 **Gyproc** FireLine fixed with **British Gypsum** screws
2 **Gyproc** CoreBoard
3 **Gypframe** I studs
4 **Gypframe** Retaining Channel
5 **Isover** insulation
6 **Gypframe** Channel
7 **Gyproc** Sealant for optimum sound insulation
8 Skirting
9 **Gyproc** WallBoard fixed with **British Gypsum** screws
10 **Gypframe** GFS1 fixing strap
11 Skirting trim



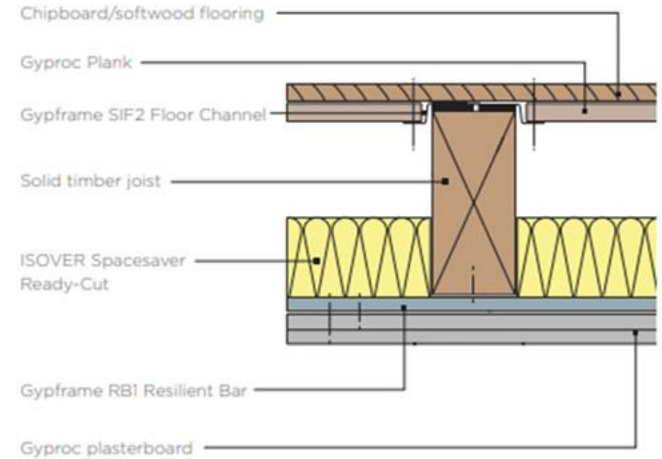

## GypFloor Silent | C204003

Fire integrity / insulation (mins): **60**

Sound insulation (airborne) Rw (dB): **63**

Sound insulation (airborne) Rw + Ctr (dB): **51**

Sound insulation (impact) Lnw (dB): **55**




## CO-LIVING SINGLE UNITS

- Kitchenette
- Bathroom
- Bedroom with study area

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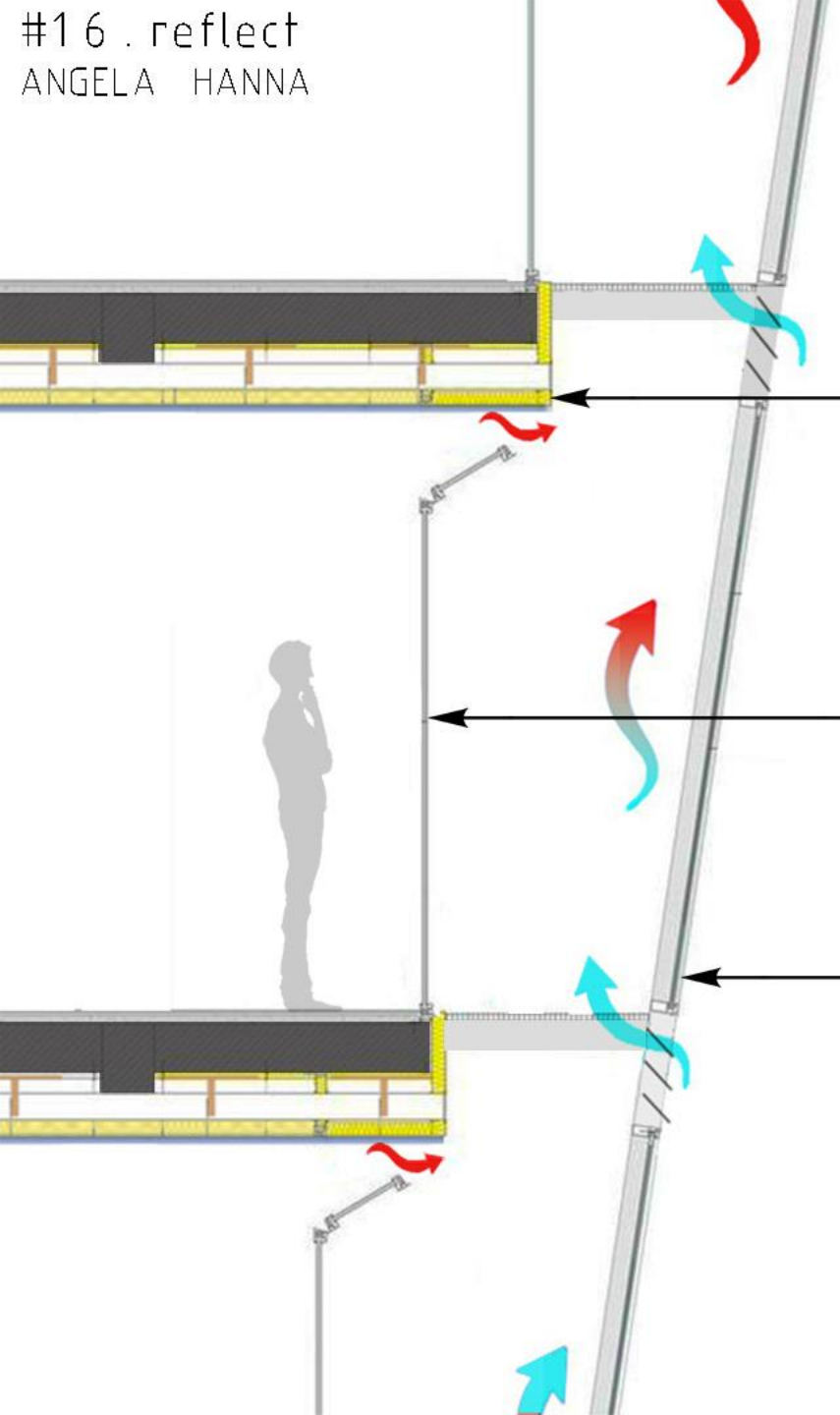
CONSTRUCTION DETAILS & MATERIALS

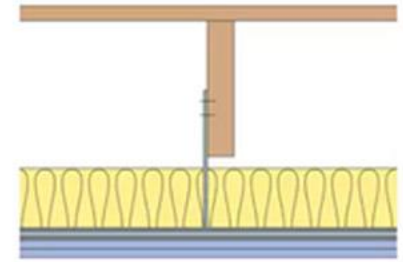
# SKIN AND GLASS



SAINT-GOBAIN | British Gypsum SAINT-GOBAIN | gyproc SAINT-GOBAIN | isover SAINT-GOBAIN

**GypCeiling Lining | C106020 (A)**

- Fire integrity / insulation (mins): **60**
- Sound insulation (airborne) Rw (dB): **54**
- Sound insulation (impact) Lnw (dB): **65**

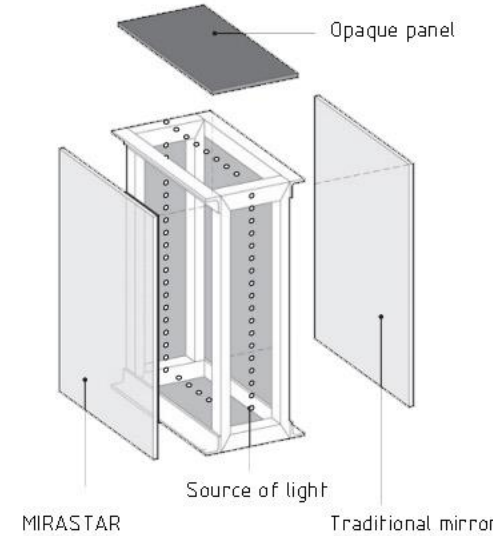


**ECLAZ® | Triple glazing**

- Ug = **0,5** W/(m2.K)
- Highest solar gain of the market (up to 60%)

**MIRASTAR® RANGE**

- Light transmission: **3%**
- Light reflection - glass side: **55%**
- Light reflection - coated side: **59%**




EPD VERIFIED — Sustainability | Design | Privacy

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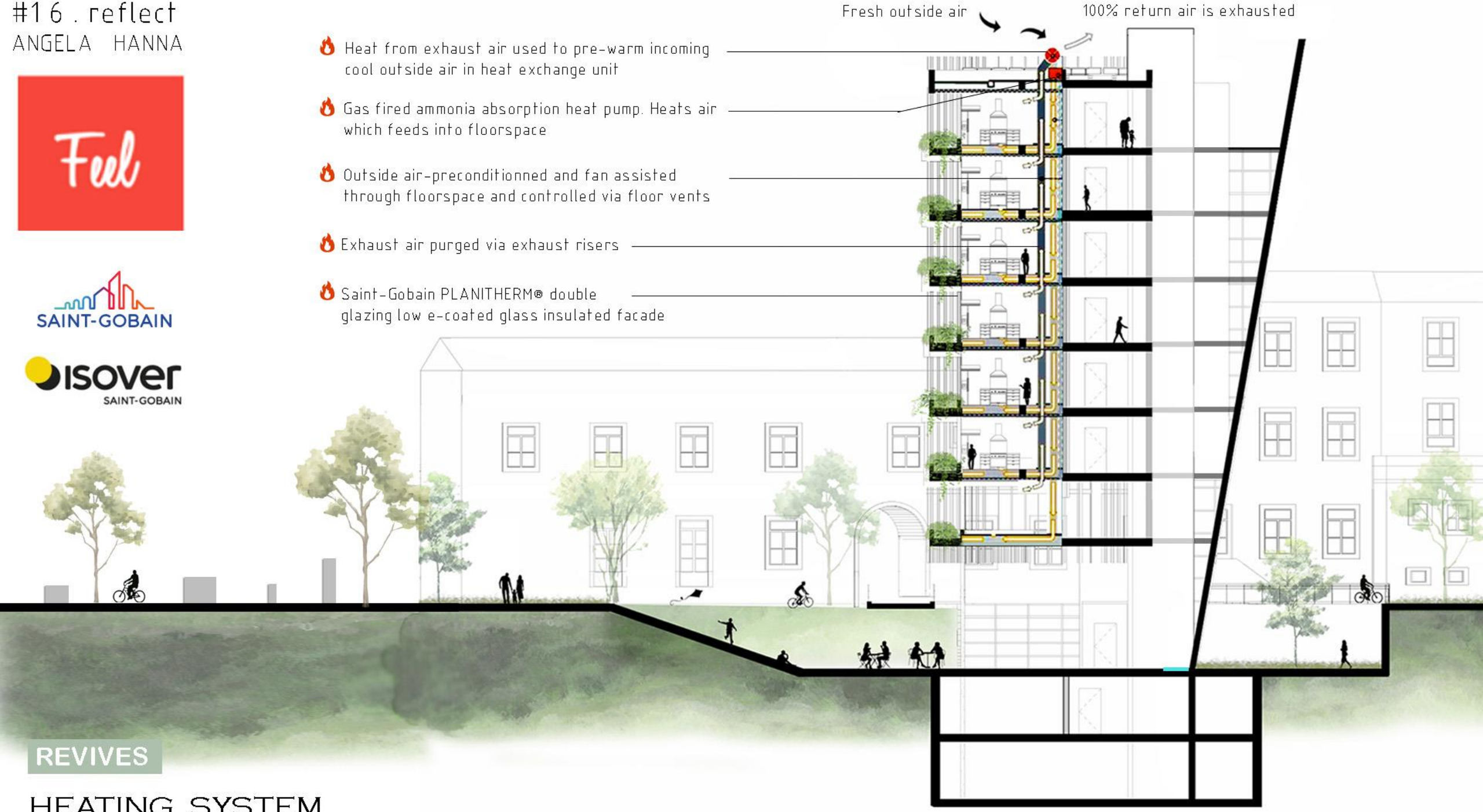
Feel

SAINT-GOBAIN

isover SAINT-GOBAIN

- Heat from exhaust air used to pre-warm incoming cool outside air in heat exchange unit
- Gas fired ammonia absorption heat pump. Heats air which feeds into floorspace
- Outside air-preconditionned and fan assisted through floorspace and controlled via floor vents
- Exhaust air purged via exhaust risers
- Saint-Gobain PLANITHERM® double glazing low e-coated glass insulated facade




REVIVES

# HEATING SYSTEM

#16 . reflect

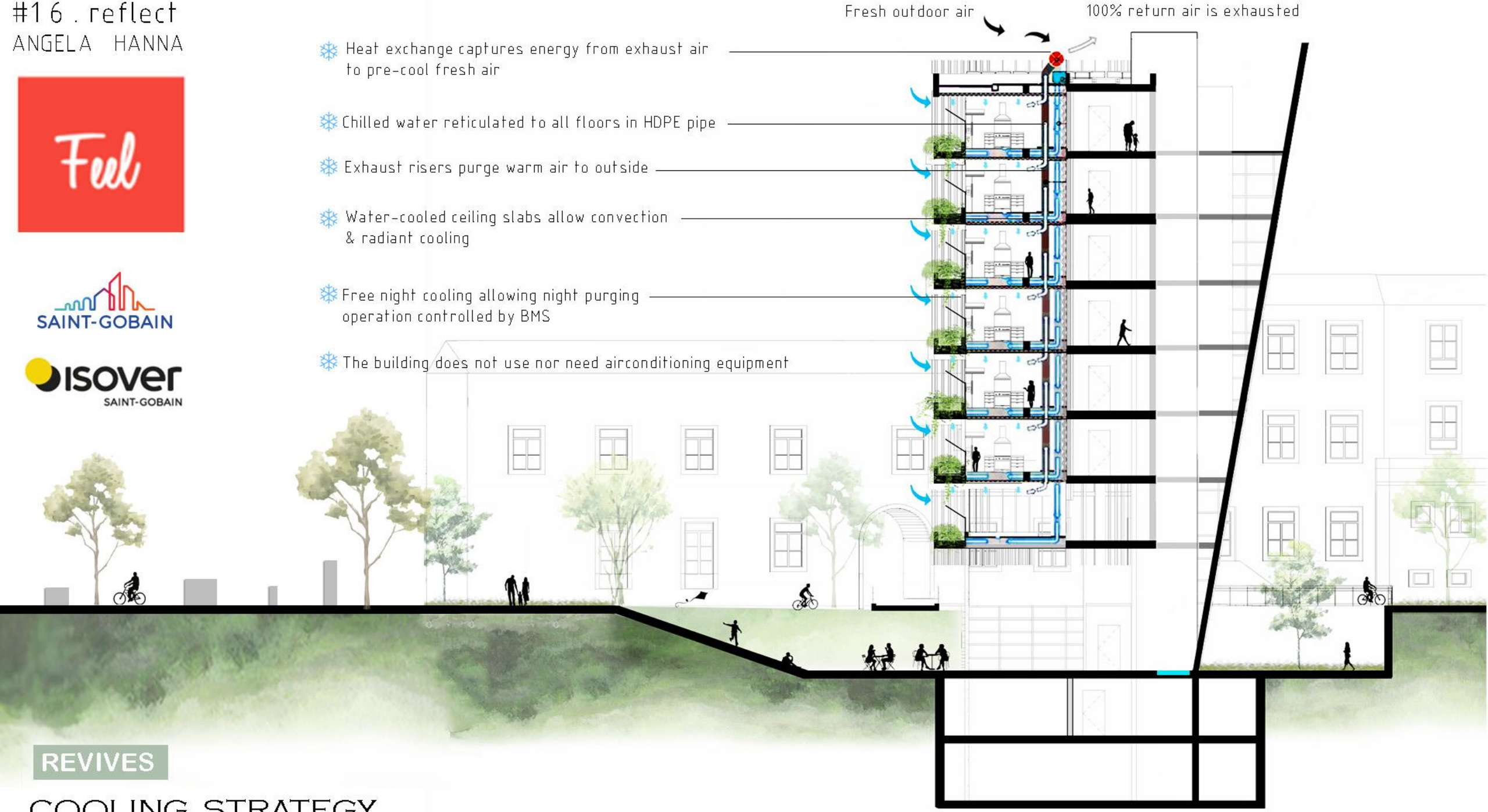
ANGELA HANNA

Feel

SAINT-GOBAIN

isover SAINT-GOBAIN

- Heat exchange captures energy from exhaust air to pre-cool fresh air
- Chilled water reticulated to all floors in HDPE pipe
- Exhaust risers purge warm air to outside
- Water-cooled ceiling slabs allow convection & radiant cooling
- Free night cooling allowing night purging operation controlled by BMS
- The building does not use nor need airconditioning equipment

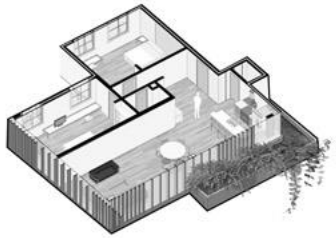


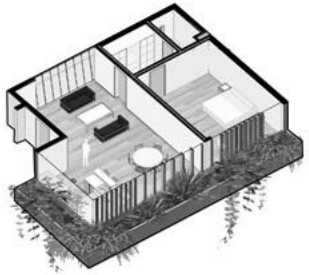

REVIVES

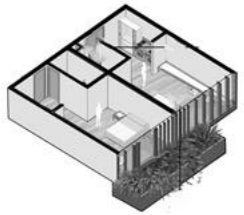
# COOLING STRATEGY

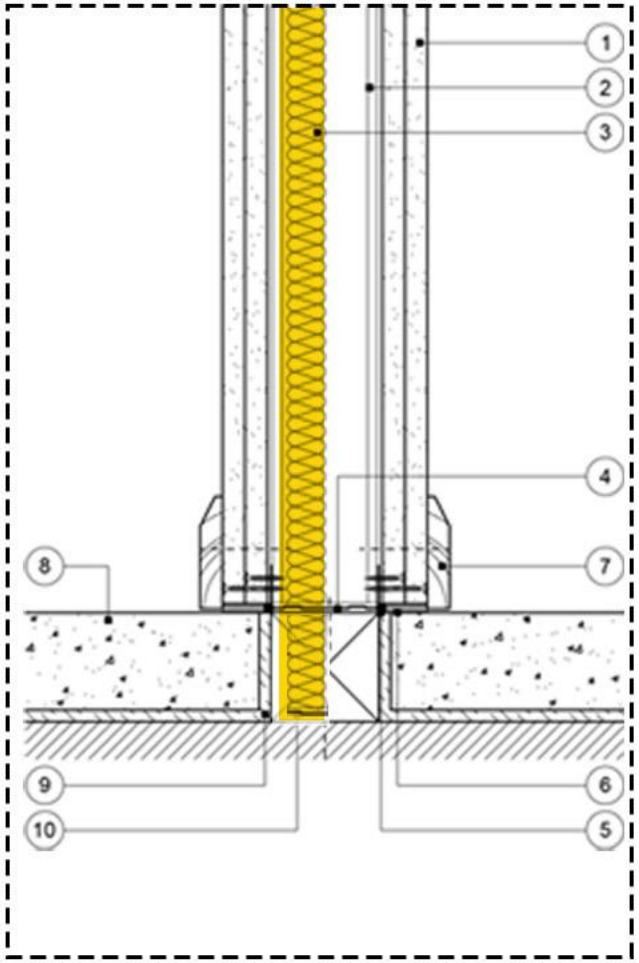
#16 . reflect
ANGELA HANNA

Feel

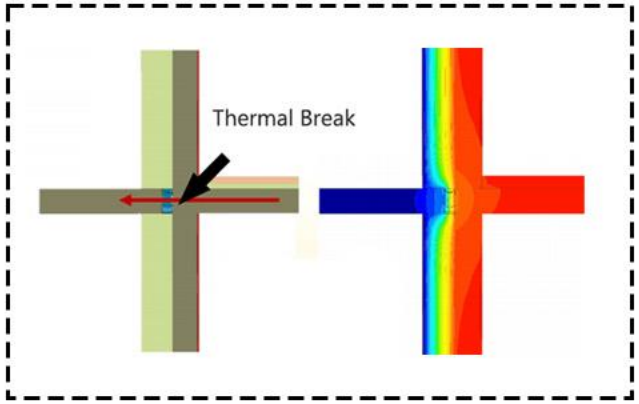


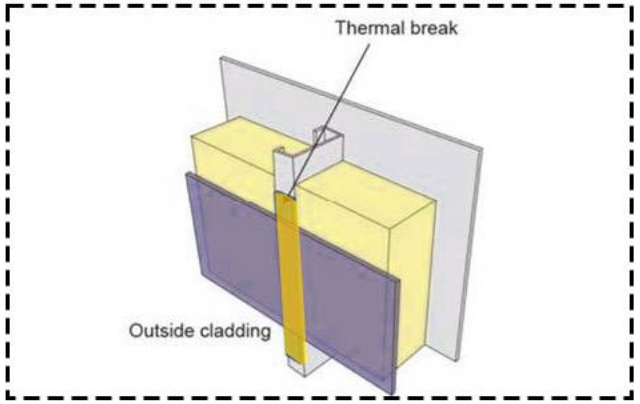


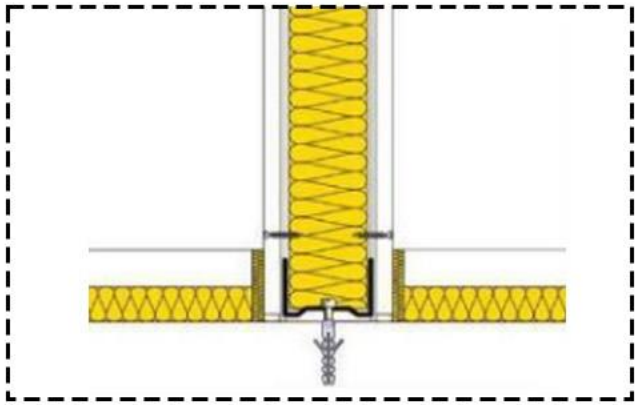


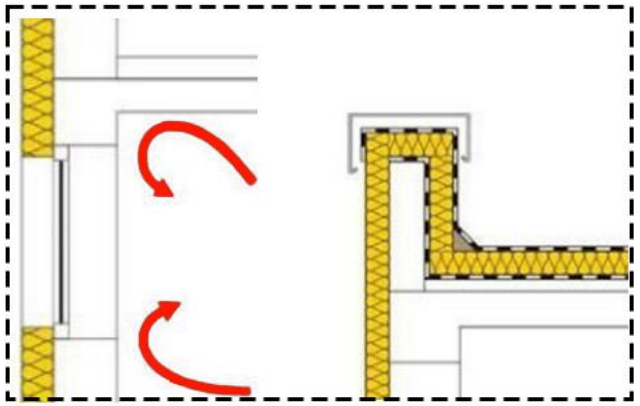



GypWall Single Frame | A206A198S





# AVOIDING THERMAL BRIDGES

#16 . reflect

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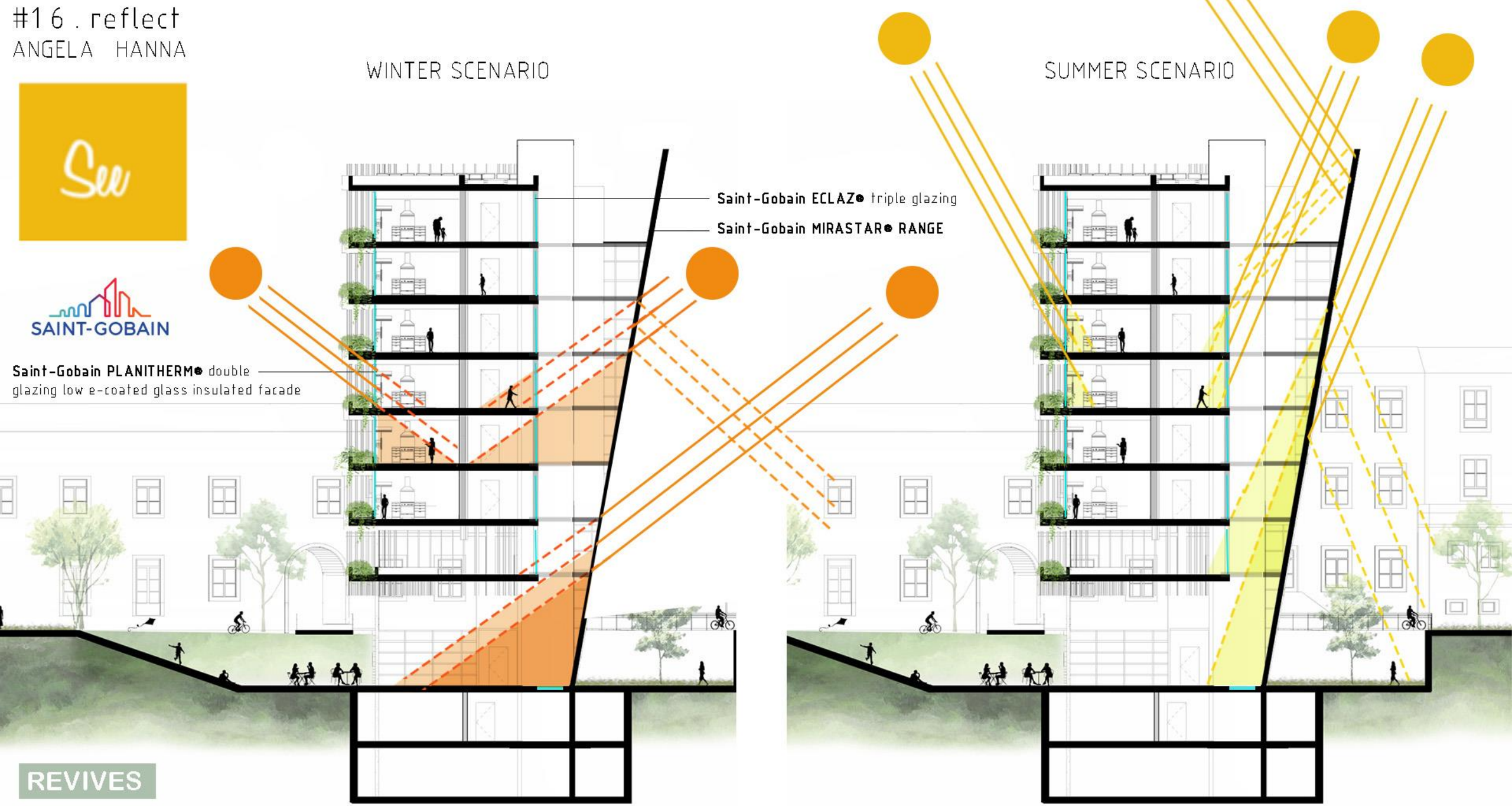
WINTER SCENARIO

SUMMER SCENARIO




REVIVES

# VISUAL COMFORT

#16 . reflect

ANGELA HANNA

Breathe

## Evapotranspiration

Evapotranspiration is a combination of **evaporation and transpiration** from a surface to the atmosphere. Excess moisture will be released to the atmosphere to **increase humidity and lower air temperature.** Hot air passes through the vegetation and is **cooled down** before entering the building.

**Evaporation**
Moisture in the soil evaporates as the ground surface warms up.

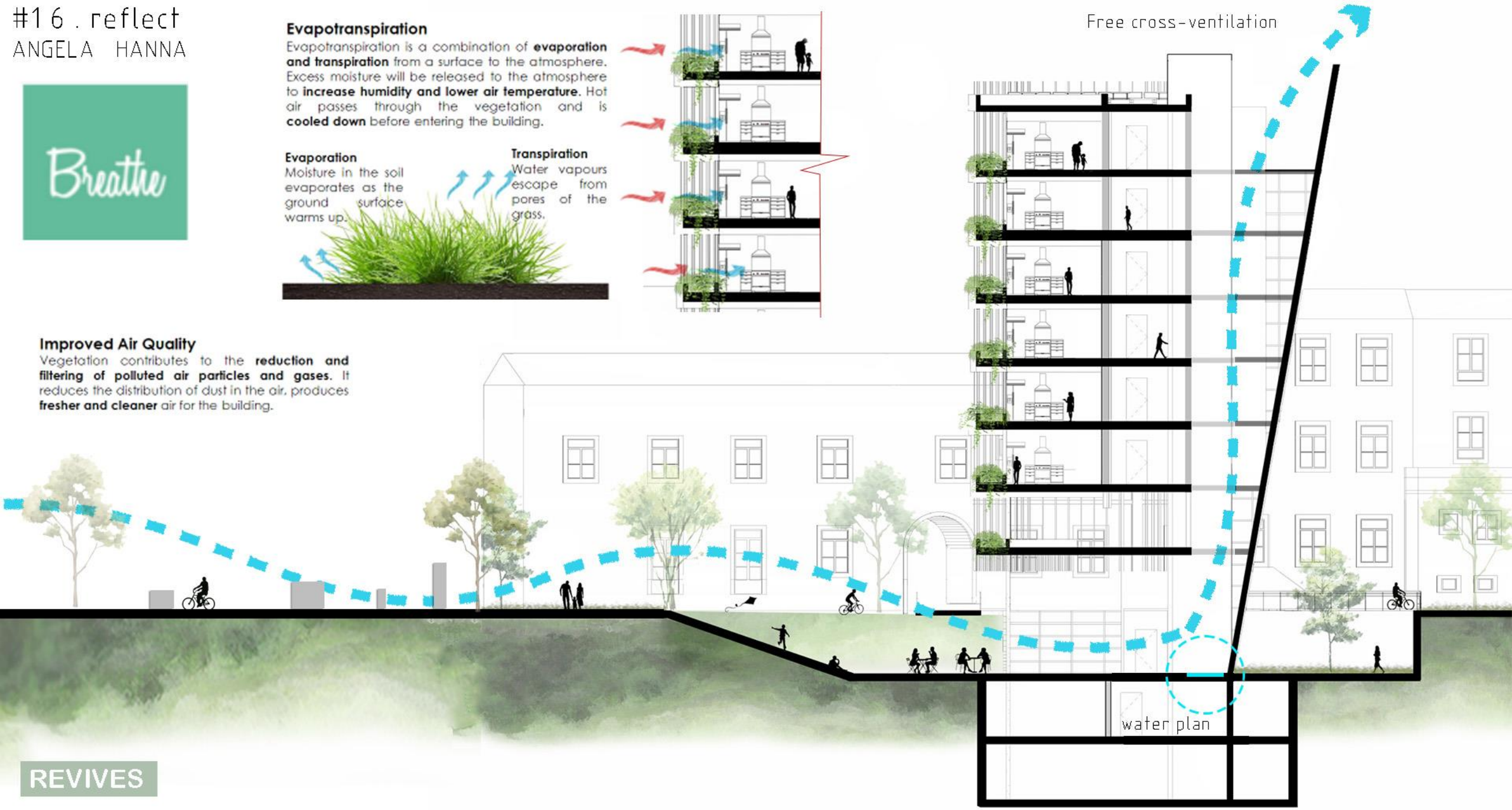
**Transpiration**
Water vapours escape from pores of the grass.





## Improved Air Quality

Vegetation contributes to the **reduction and filtering of polluted air particles and gases.** It reduces the distribution of dust in the air, produces **fresher and cleaner** air for the building.




REVIVES

# INDOOR AIR QUALITY COMFORT

#16 . reflect

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# STRATEGIC LANDSCAPE

Native plants of Lisbon are used in the project

**Water, Biodiversity & Local Value Creation**



Florist Kalanchoe



Jade Plant



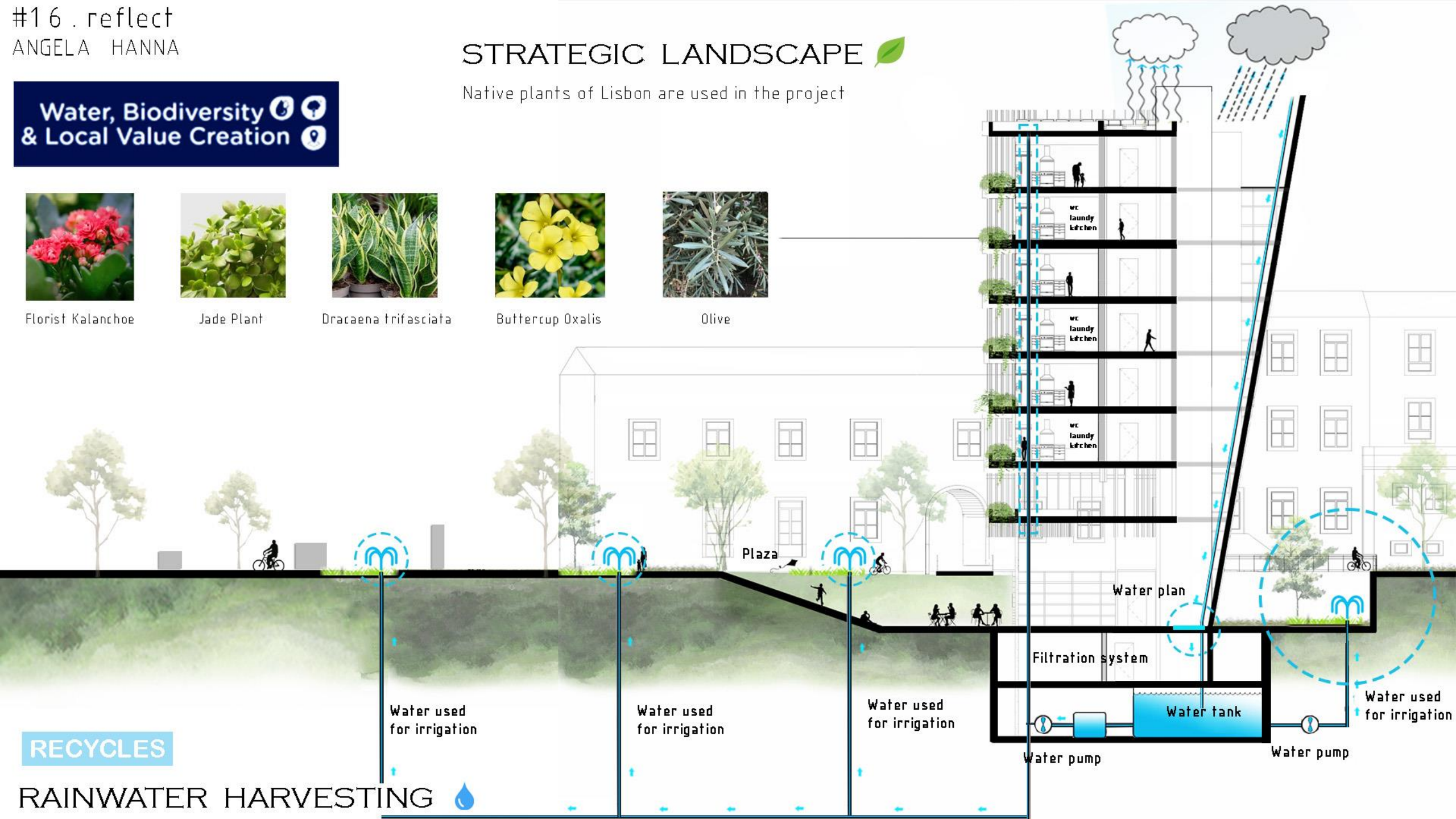
Dracaena trifasciata



Buttercup Oxalis



Olive




**RECYCLES**

## RAINWATER HARVESTING

#16 . reflect

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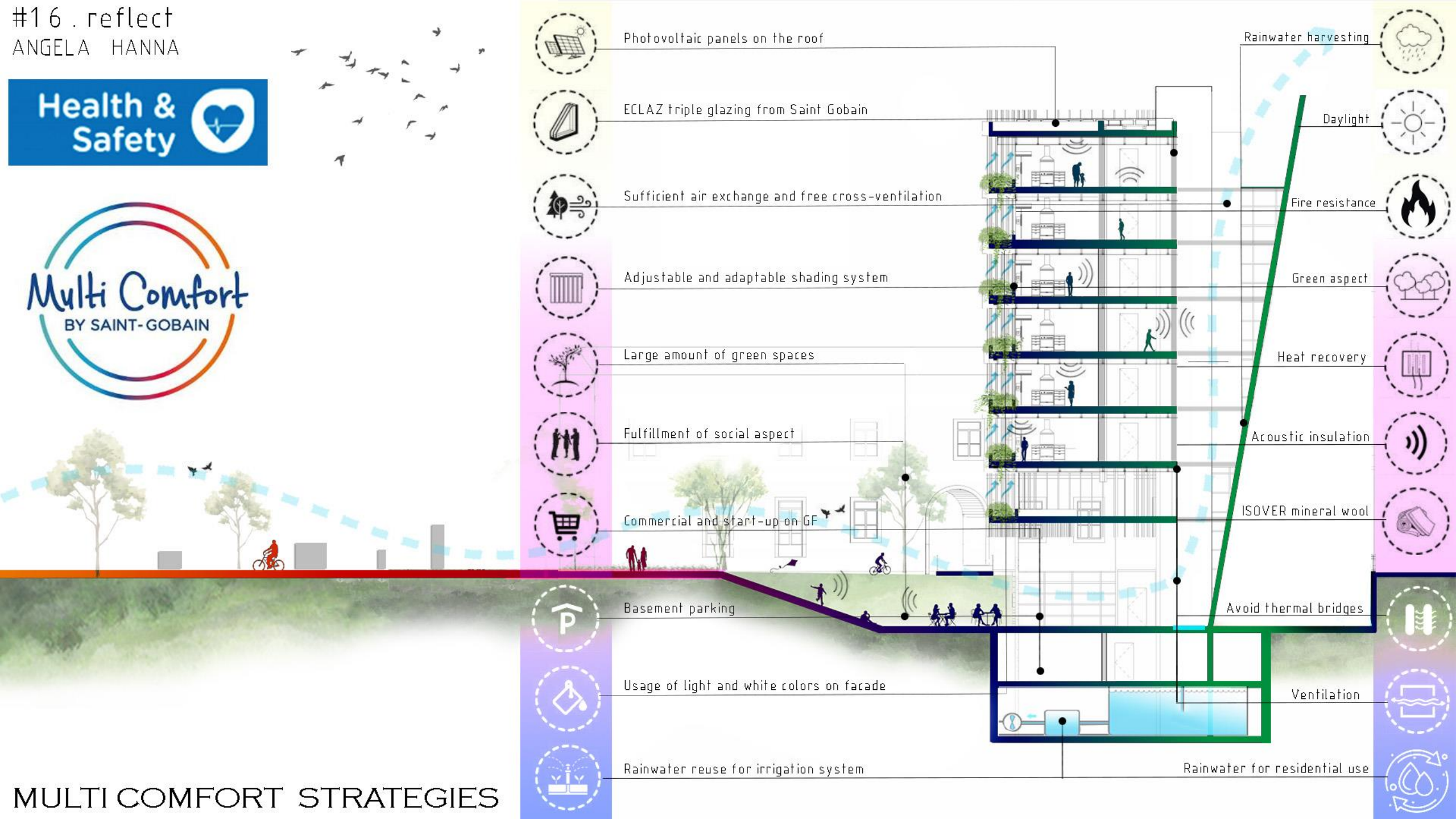
Health & Safety

Multi Comfort BY SAINT-GOBAIN




# MULTI COMFORT STRATEGIES

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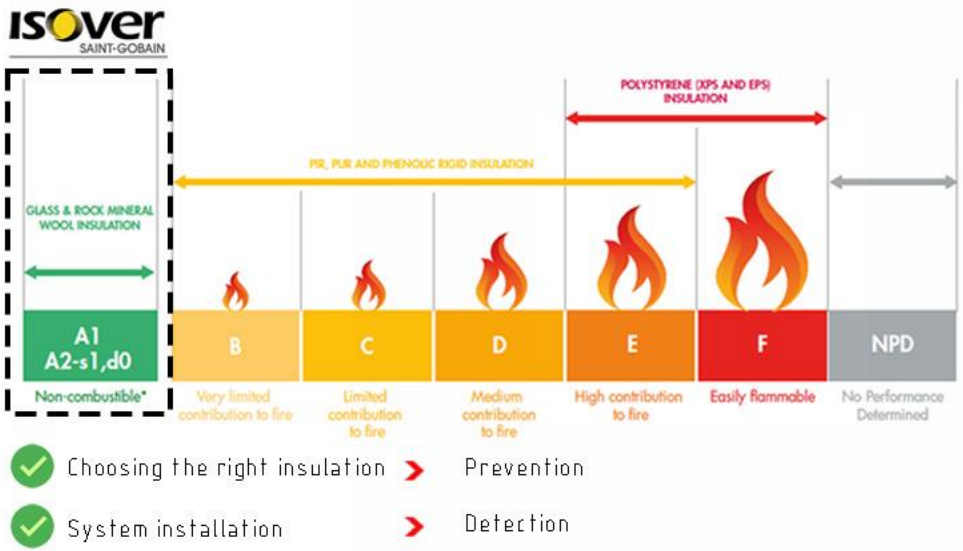
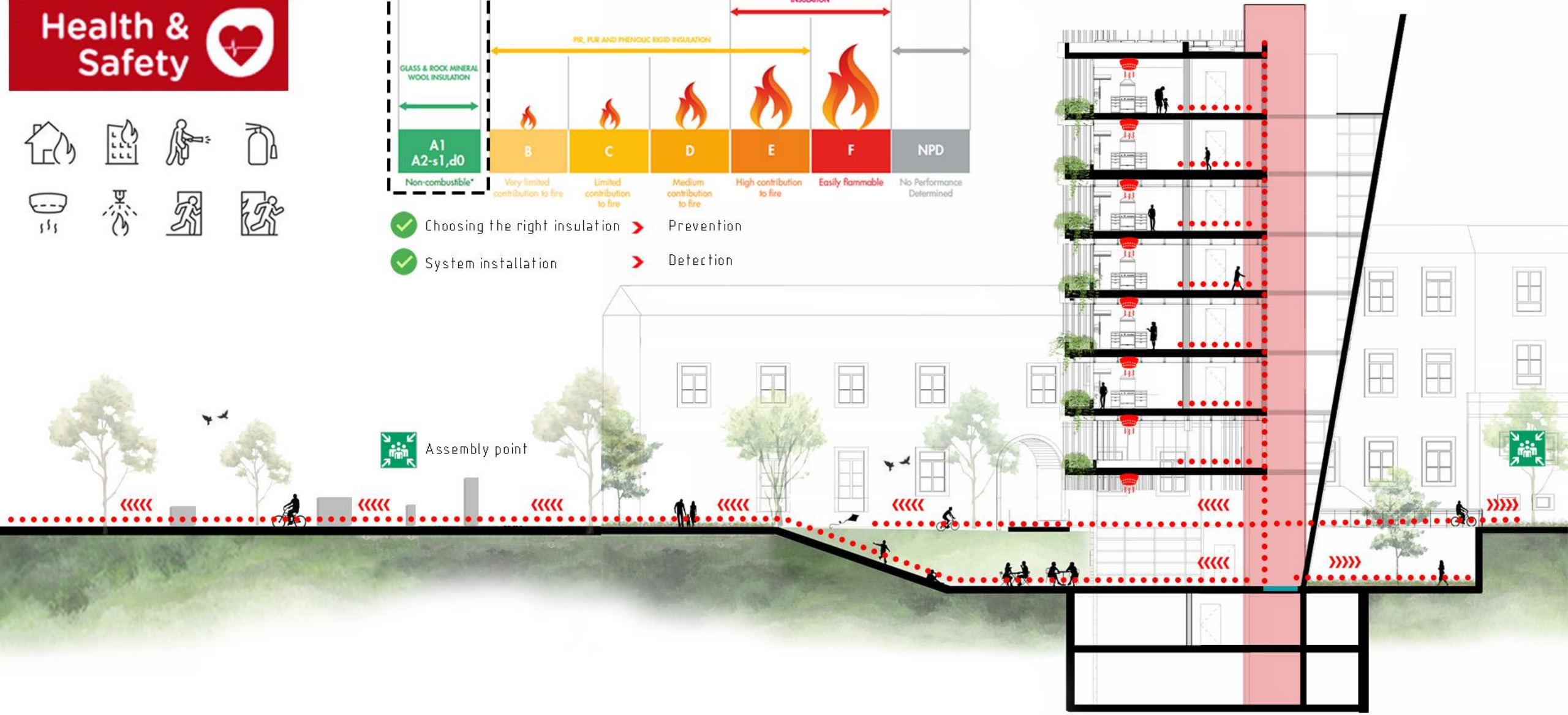
# Health & Safety






Choosing the right insulation > Prevention

System installation > Detection




# FIRE SAFETY STRATEGY

#16 . reflect

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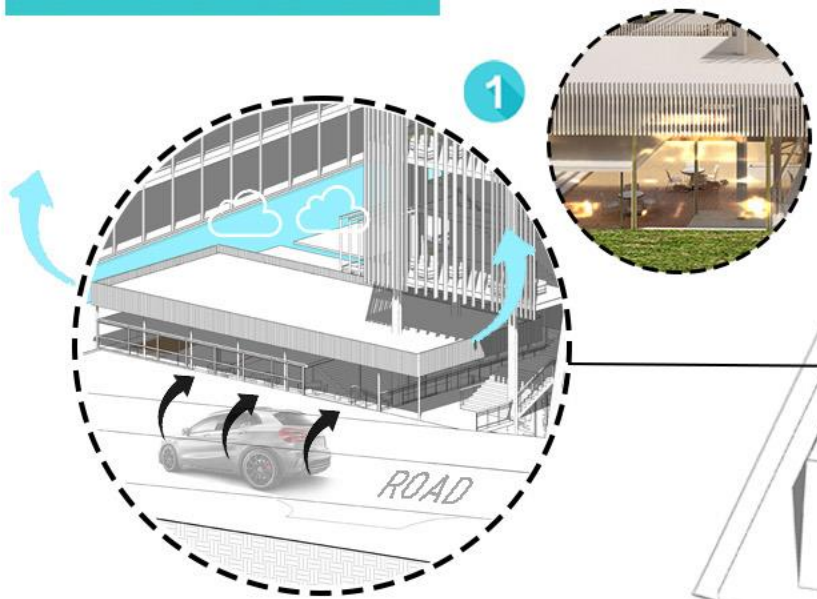
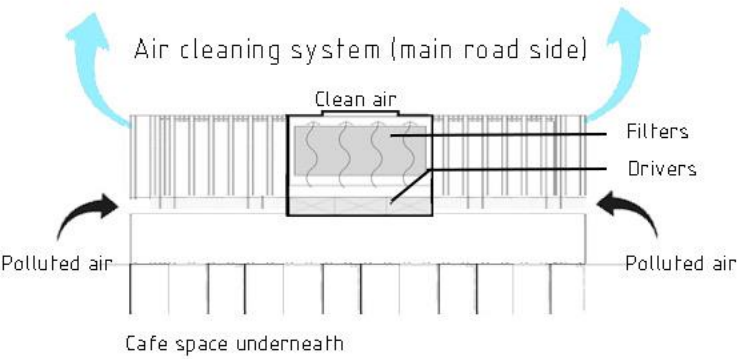
# DIFFERENT SYSTEMS

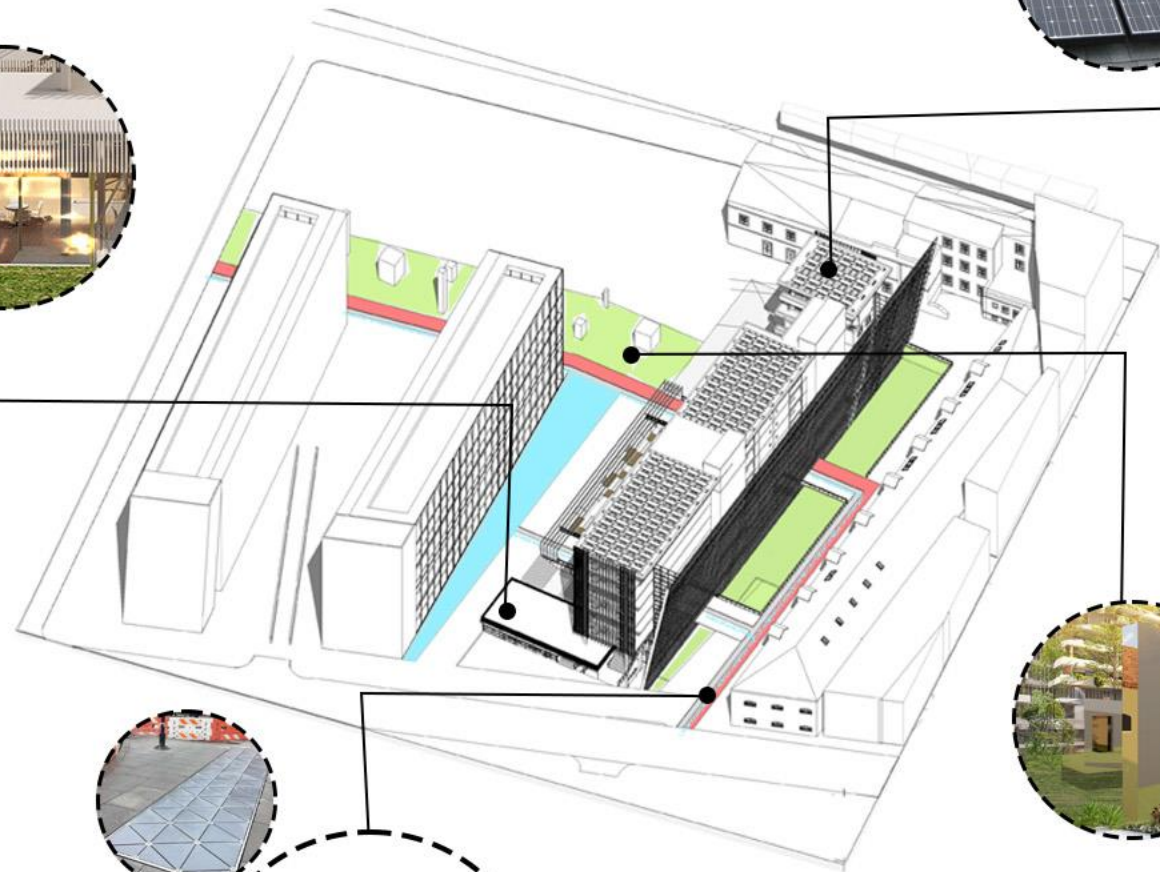
Energy & Carbon

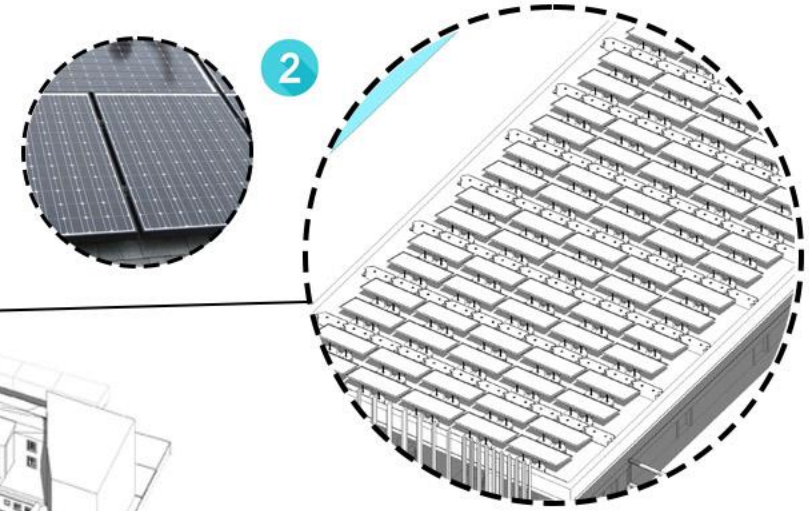
RECYCLES




## SMOG-FREE SYSTEM

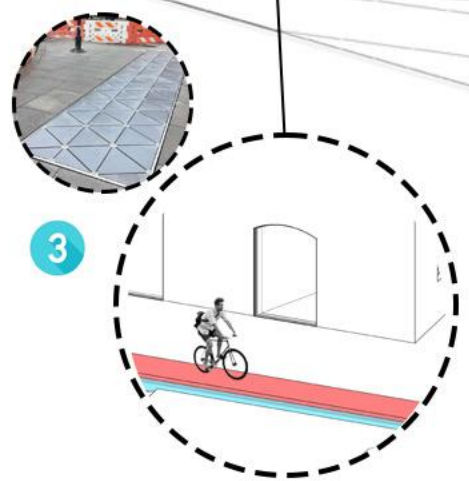





## PHOTOVOLTAIC PANELS

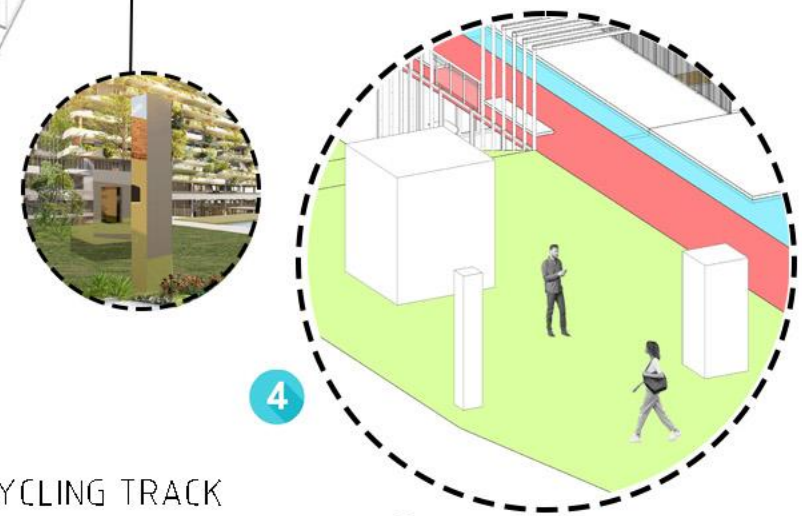
Electricity generation




## ENERGY-EFFICIENT CYCLING TRACK

Bike rack collect the kinetic energy generated by cyclists

Through electromagnetic induction by copper coils and magnets




## CSP SYSTEM

Use mirrors to reflect and concentrate sunlight onto a receiver

#16 . reflect

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# LIFE-CYCLE ASSESSMENT

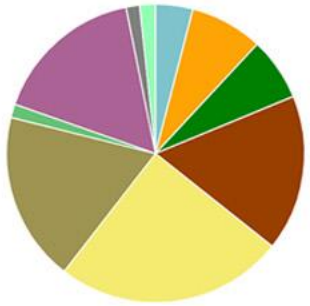
Energy & Carbon

RECYCLES

One Click LCA

### Global warming kg CO2e - Classifications

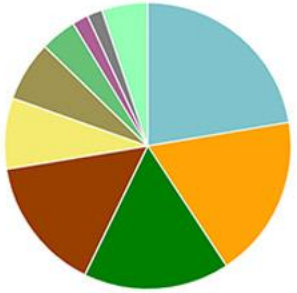
- 1.1 Foundations (substructure) - 4.1%
- 1.1.2 Basements - 7.9%
- 1.2.1 Frame (beams, columns and slabs) - 6.8%
- 1.2.3 External walls - 16.9%
- 1.3.1 Ground floor slab - 24.8%
- 1.3.3 Stairs and ramps - 18.4%
- 1.4.3 External paints, coatings and renders - 1.5%
- 2.3 Energy system - 16.5%
- 2.6.1 Lifts and escalators - 1.5%
- Other classifications - 1.7%



### Global warming kg CO2e - Resource types

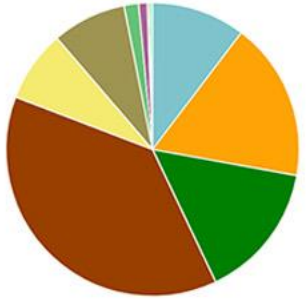
This is a drilldown chart. Click on the chart to view details

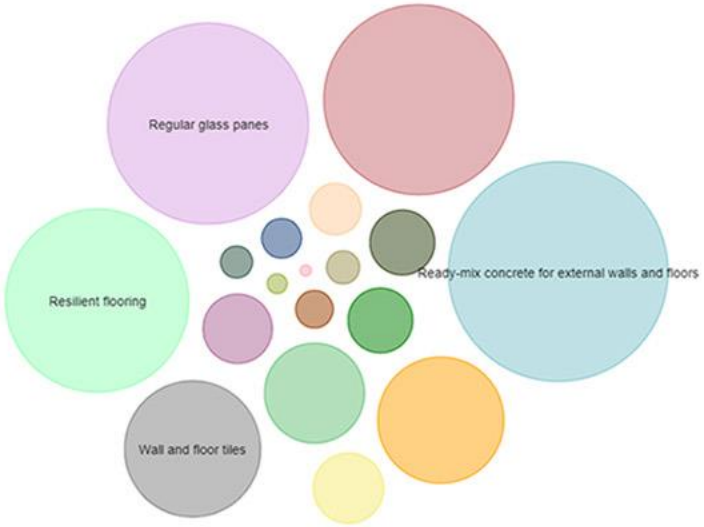
- Ready-mix concrete for external walls and floors - 22.4%
- Regular glass panes - 18.4%
- Energy production systems from renewable energy - 16.5%
- Resilient flooring - 15.2%
- Wall and floor tiles - 8.0%
- Ready-mix concrete for structures (beams, columns, piling) - 6.8%
- Ready-mix concrete for foundations and internal walls - 4.1%
- Glass facades and glazing - 1.8%
- Acoustic insulation panels - 1.7%
- Other resource types - 5.2%



### Mass kg - Classifications

- 1.1 Foundations (substructure) - 10.4%
- 1.1.2 Basements - 17.5%
- 1.2.1 Frame (beams, columns and slabs) - 15.1%
- 1.2.3 External walls - 37.9%
- 1.3.1 Ground floor slab - 7.9%
- 1.3.3 Stairs and ramps - 8.2%
- 1.4.3 External paints, coatings and renders - 1.6%
- 2.3 Energy system - 0.9%
- 2.6.1 Lifts and escalators - 0.2%
- Other classifications - 0.4%



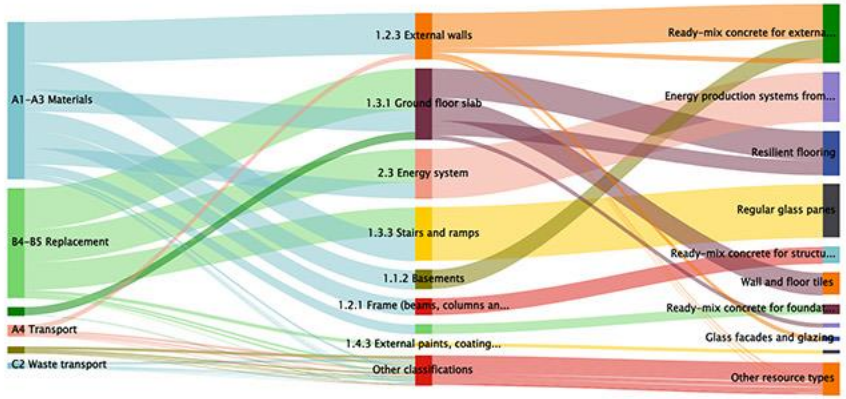



- Ready-mix concrete for external walls and floors
- Paints, coatings and lacquers
- Glass facades and glazing
- Ready-mix concrete for foundations and internal walls
- Wall and floor tiles
- Other metals
- Door and window parts
- Electrical appliances, home and office
- Elevators and escalators
- Ready-mix concrete for structures (beams, columns, piling)
- Aluminium frame windows
- Structural steel and steel profiles
- Acoustic insulation panels
- Resilient flooring
- Regular glass panes
- Wooden frame windows
- Sanitary ware
- Energy production systems from renewable energy

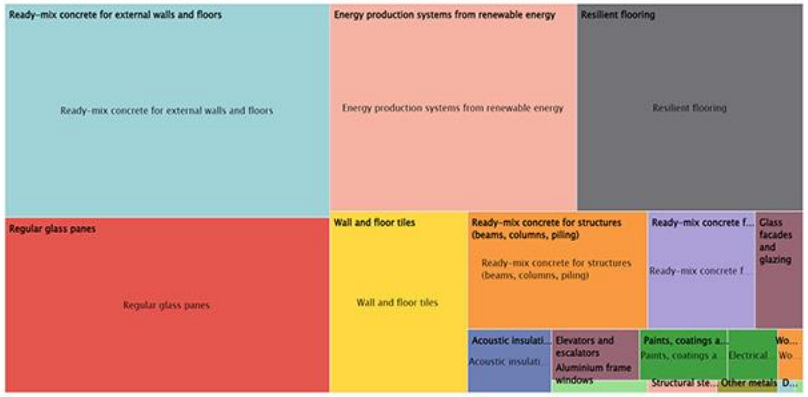
### Bubble chart, total life-cycle impact by resource type and subtype, Global warming

Hover your mouse over legends or the chart to highlight impacts. Bubble minimum and maximum sizes constrained for readability

### Sankey diagram, Global warming




### Resource type – subtype (over whole life-cycle)




| Cradle to grave (A1-A4, B4-B5, C1-C4) | kg $CO_2e/m^2$ |
|---|---|
| (< 230) A | |
| (230-340) B | |
| (340-450) C | |
| (450-560) D | |
| (560-670) E | |
| (670-780) F | 243 |
| (> 780) G | |

One Click LCA

#16 . reflect

ANGELA HANNA

BIM Energy

RECYCLES

# ENERGY EFFICIENCY

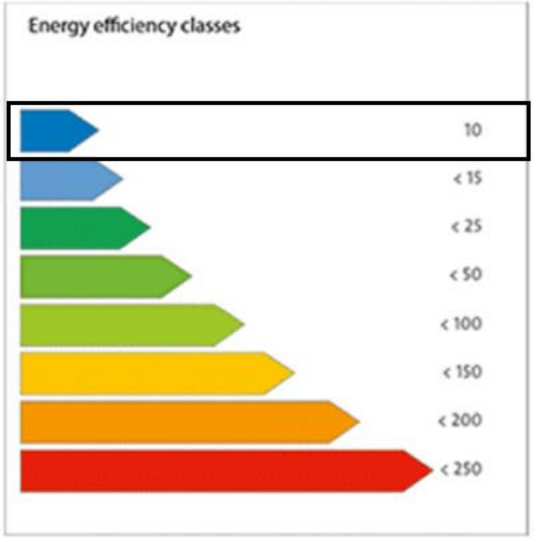
Energy simulation of the 2 bedroom flat

## Energy & Carbon

### CALCULATIONS

| Specific Heat Demand | |
|---|---|
| Bedroom 1 Heat Demand: | 1579 W - 5388 BTUs |
| Bedroom 2 Heat Demand: | 1863 W - 6357 BTUs |
| Bathroom 1 Heat Demand: | 533 W - 1819 BTUs |
| Bathroom 2 Heat Demand: | 514 W - 1754 BTUs |
| Living Area Heat Demand: | 5982 W - 20411 BTUs |
| Specific Heat Demand: | 10471 W - 35729 BTUs |

**Specific Heat Demand: 10,471kWh/(m2a)**

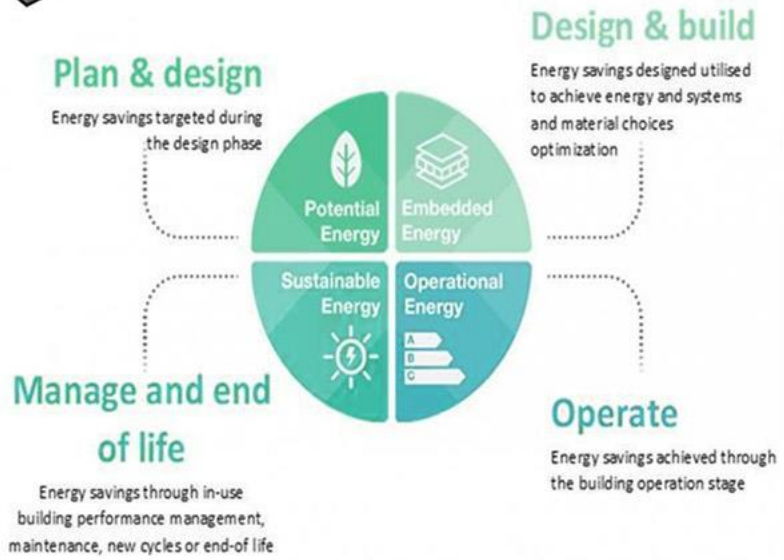

| | | |
|---|---|---|
| Supply Air Per Unit Area: | 0.5174 | CFM/Sq.ft |
| Area Per Cooling Capacity: | 1,019.9 | Sq.ft/Ton |
| Cooling Capacity Per Area: | 0.0010 | Tons/Sq.ft |
| Total Cooling Required With Outside Air: | 0.29 | Tons |

### PROJECT DATA

| | |
|---|---|
| Object: | 2 Bedroom Apartment |
| Climate zone: | Lisbon, Portugal |
| Construction: | New Building |
| Building type: | Residential |
| Design temperature: | 20 degrees |

### MEAN U-VALUES

| | |
|---|---|
| Annual energy demand for heating: | 10,471kWh/m2 |
| U value for roof | 0,10 W/m2K |
| U value for external wall | 0.12 W/m2K |
| U value for floors on the ground | 0.20 W/m2K |
| U value for windows | 0.50 W/m2K |
| Air tightness n50 | 0,5 1/h |




SAINT-GOBAIN

British Gypsum SAINT-GOBAIN

gyproc SAINT-GOBAIN

placo

isover SAINT-GOBAIN

Ecophon SAINT-GOBAIN

#16 . reflect

ANGELA HANNA

THANK YOU