

THE BERGWEG WATER STATION

P5 PRESENTATION

Annebregje Snijders

Pieter Stoutjesdijk

Paddy Tomesen

Robert Nottrot

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04 RESEARCH IMPLEMENTATION 44

05 SECOND LIFE 85

I. EXPLORATION

I. EXPLORATION: UNUSED POTENTIAL





I. EXPLORATION: REPURPOSE



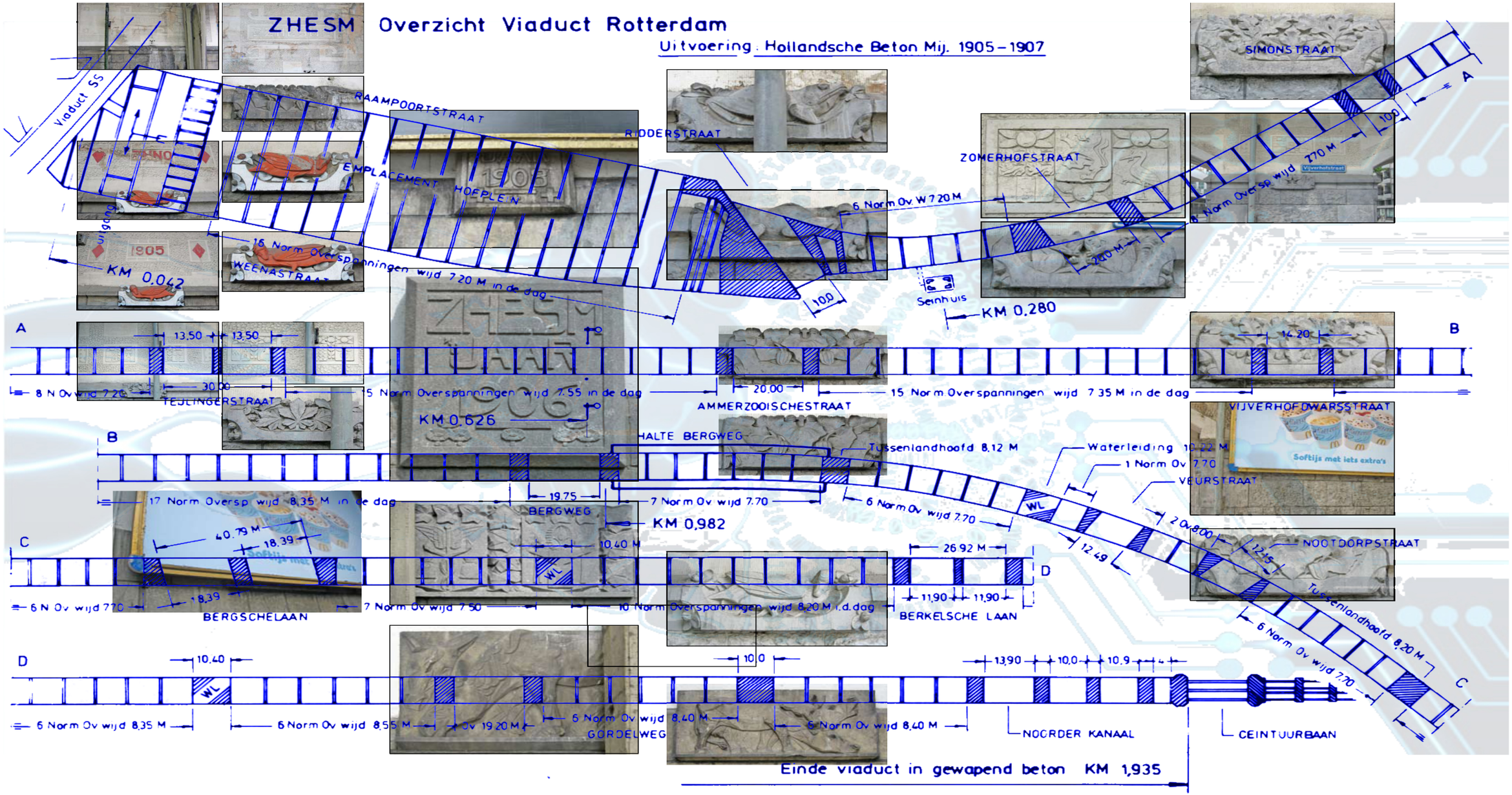


I. EXPLORATION: HOFBOGEN IDENTITY





I. EXPLORATION: HOFBOGEN IDENTITY



I. EXPLORATION: HOFBOGEN IDENTITY



Source: Karampir

I. EXPLORATION: HOFBOGEN HISTORY

1908



INAUGURATION

1915



DEVELOPMENT

1940



WW2

1956



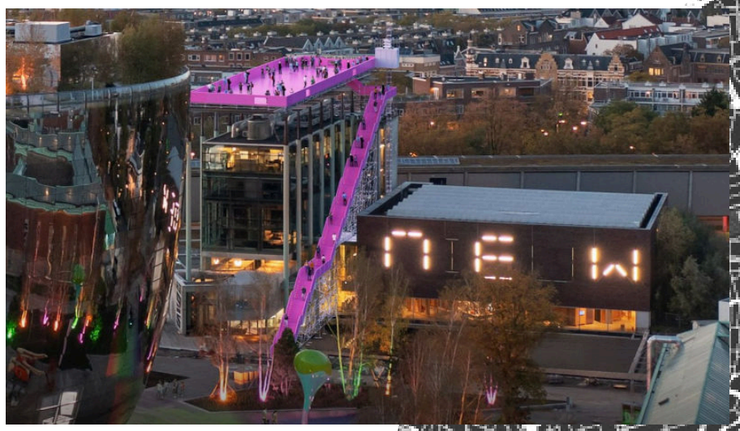
BERGWEG STATION

2010

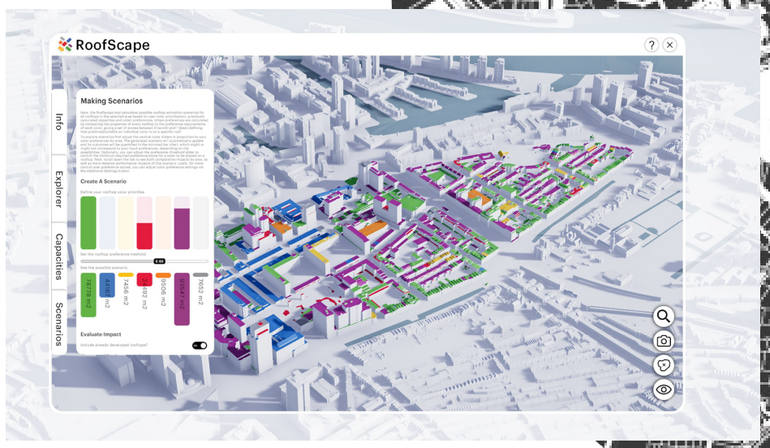


PERMANENT CLOSING

I. EXPLORATION: INITIATIVES FOR CHANGE







I. EXPLORATION: UNUSED SPACE IN THE CITY

FUTURE PLANS



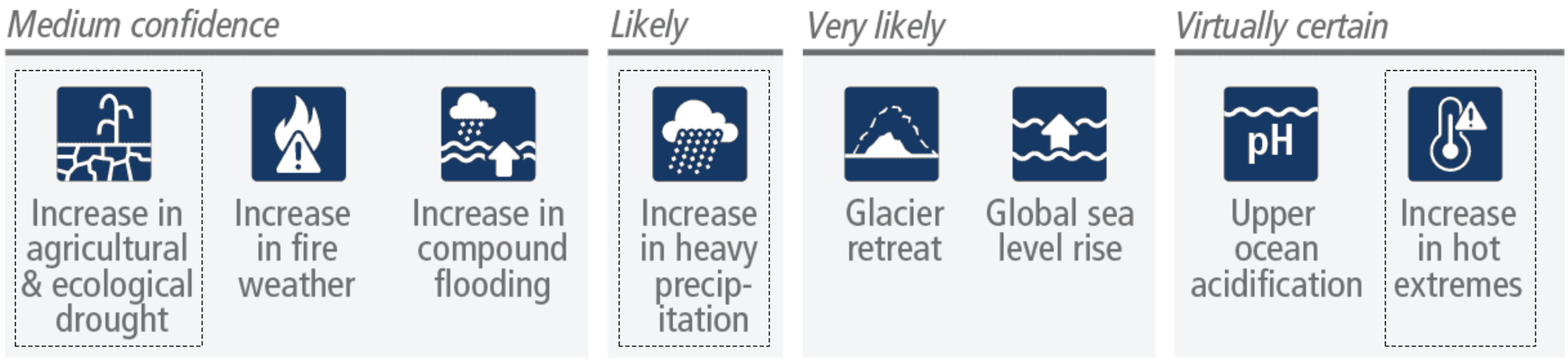




I. EXPLORATION: CLIMATE CONDITIONS

FUTURE SCENARIOS

ICCP REPORT



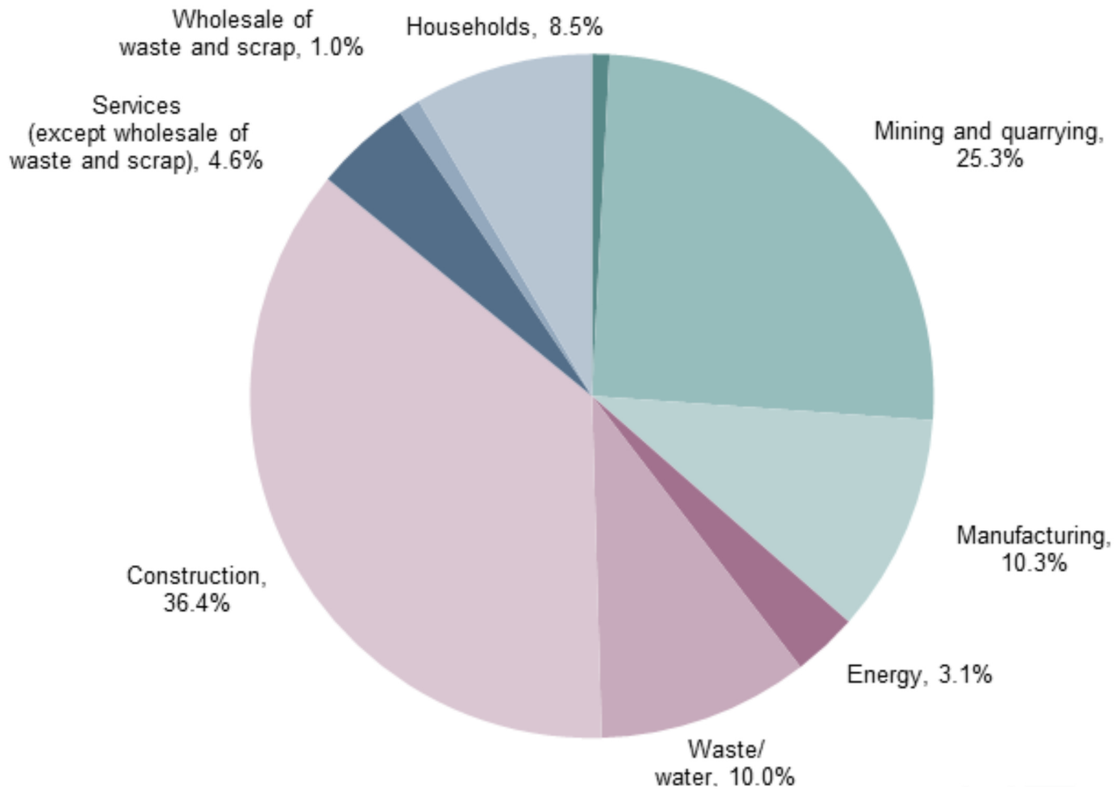
CLIMATE OF ROTTERDAM

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	3.9 °C (39) °F	4 °C (39.2) °F	6.3 °C (43.4) °F	9.8 °C (49.7) °F	13.4 °C (56.1) °F	16.2 °C (61.2) °F	18.3 °C (64.9) °F	17.9 °C (64.3) °F	15.5 °C (59.8) °F	11.8 °C (53.2) °F	7.7 °C (45.8) °F	4.7 °C (40.4) °F
Min. Temperature °C (°F)	1.8 °C (35.2) °F	1.4 °C (34.5) °F	3 °C (37.5) °F	5.7 °C (42.3) °F	9.4 °C (48.9) °F	12.2 °C (53.9) °F	14.5 °C (58.1) °F	14.3 °C (57.8) °F	12.3 °C (54.1) °F	9.1 °C (48.3) °F	5.5 °C (41.8) °F	2.7 °C (36.8) °F
Max. Temperature °C (°F)	6.1 °C (42.9) °F	6.8 °C (44.2) °F	9.8 °C (49.7) °F	13.9 °C (57) °F	17.2 °C (63) °F	20 °C (67.9) °F	21.9 °C (71.4) °F	21.5 °C (70.7) °F	18.8 °C (65.9) °F	14.7 °C (58.5) °F	10 °C (50) °F	6.7 °C (44) °F
Precipitation / Rainfall	68	56	57	54	66	70	84	83	77	72	73	75

I. EXPLORATION: CONSTRUCTION WASTE

GLOBAL PROBLEM STATEMENT

"The construction sector is causing extreme amounts of waste due to the ***excessive use*** *of resources."*







I. EXPLORATION: POTENTIAL
CURRENT SITUATION

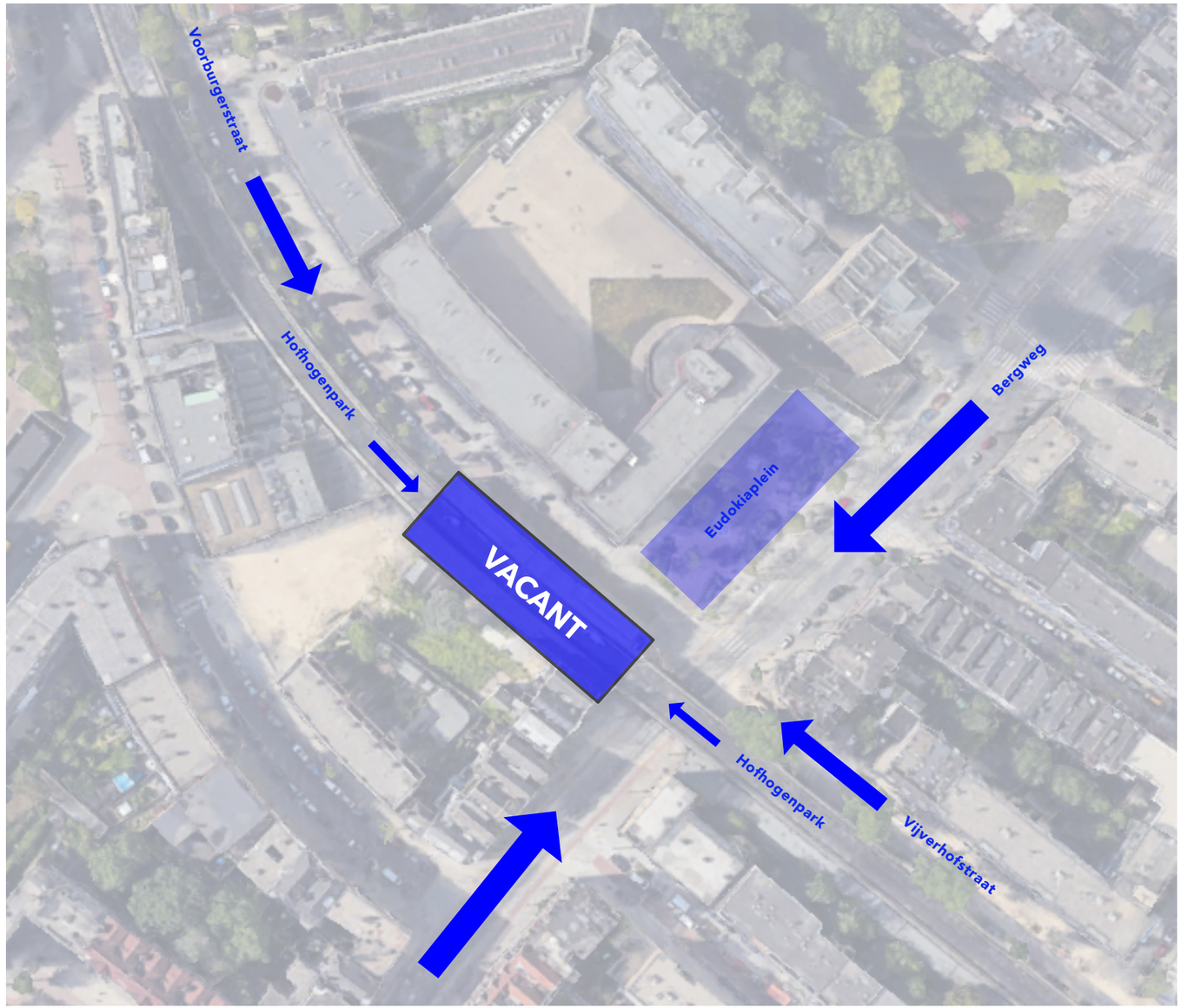
POTENTIAL OF THE PLOT

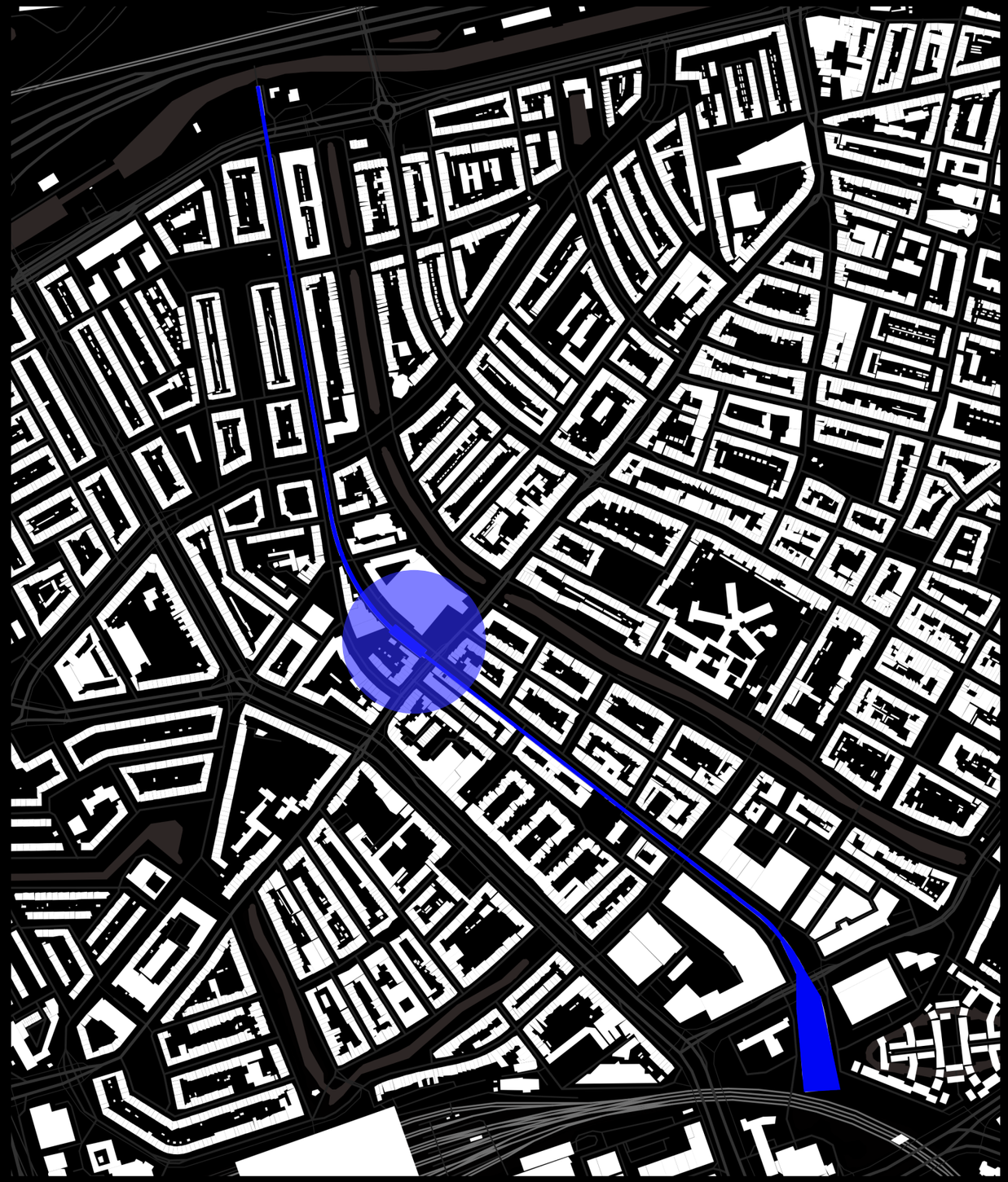
1.500m² vacant roof space

High demand for workspace

Synergy with Hofbogen park

Vacant building in gentrified area

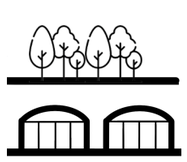




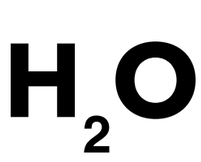
CONCEPTS
BERGWEG STATION



II. CONCEPTS



CONNECTIVITY



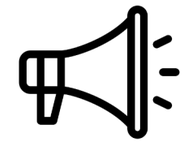
CLIMATE
ADAPTIVENESS



PERMANENT&
TEMPORARY

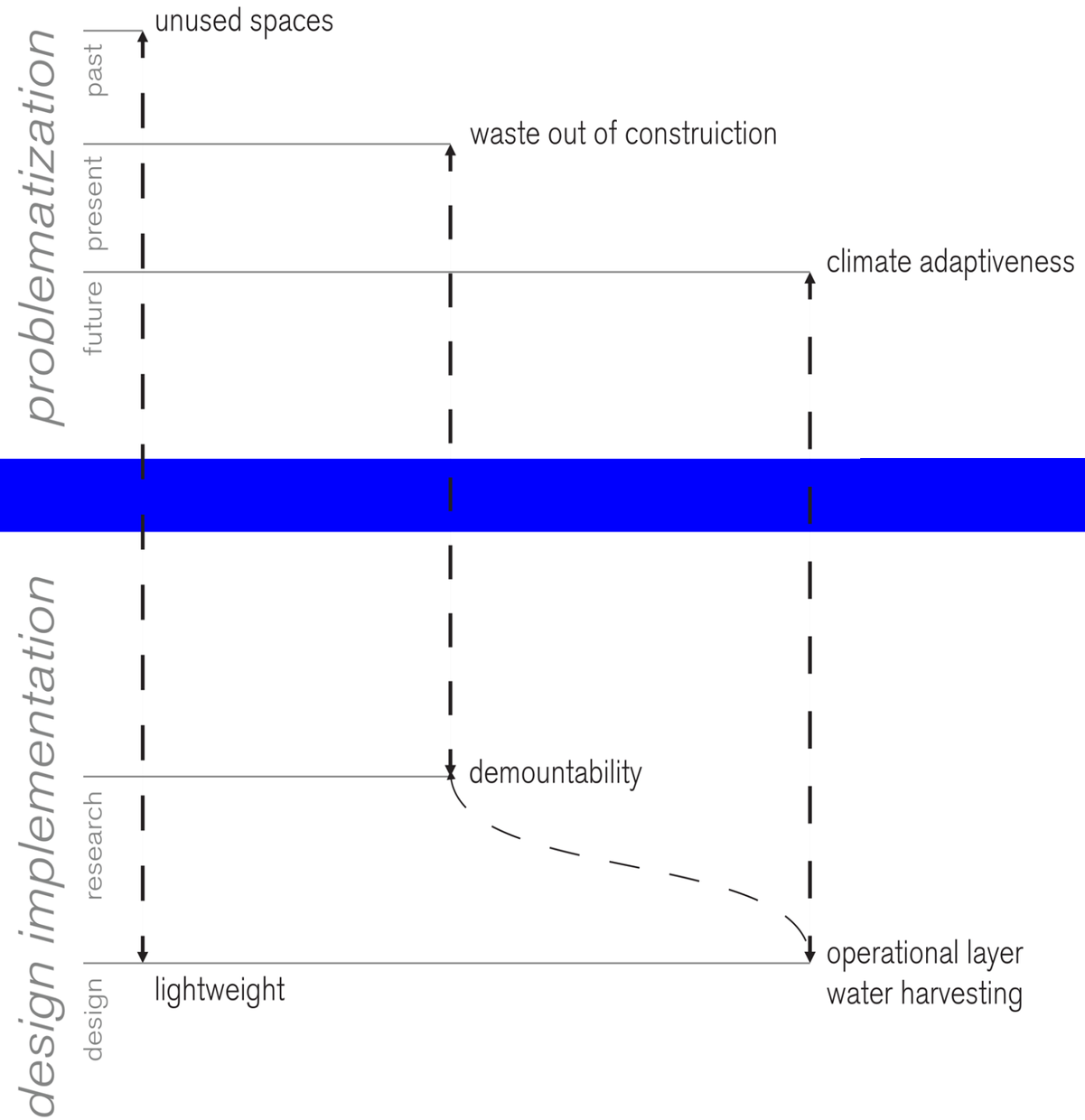


REPURPOSE

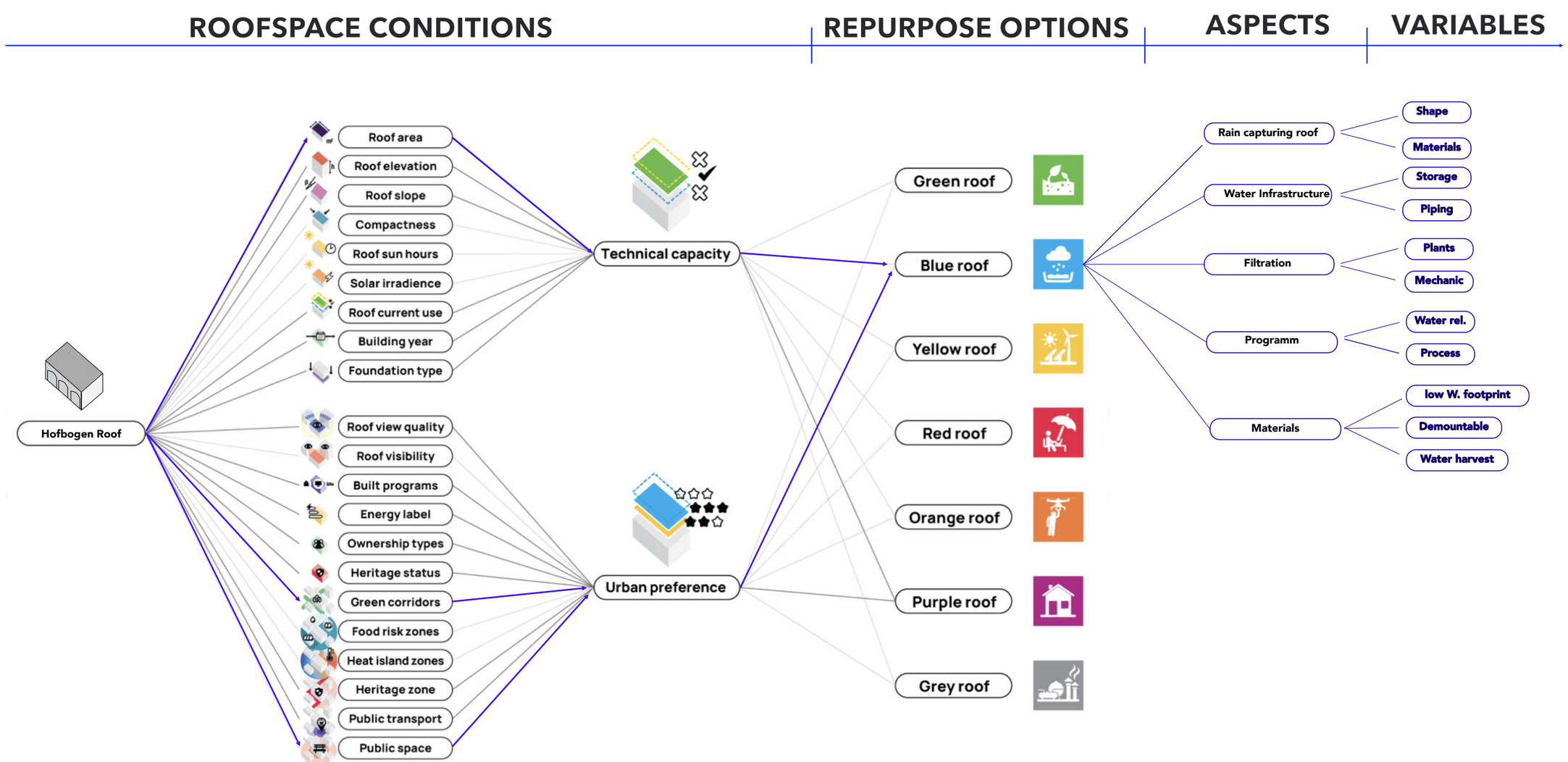


TANGIBILITY

II. CONCEPTS: METHODOLOGY FRAMEWORK

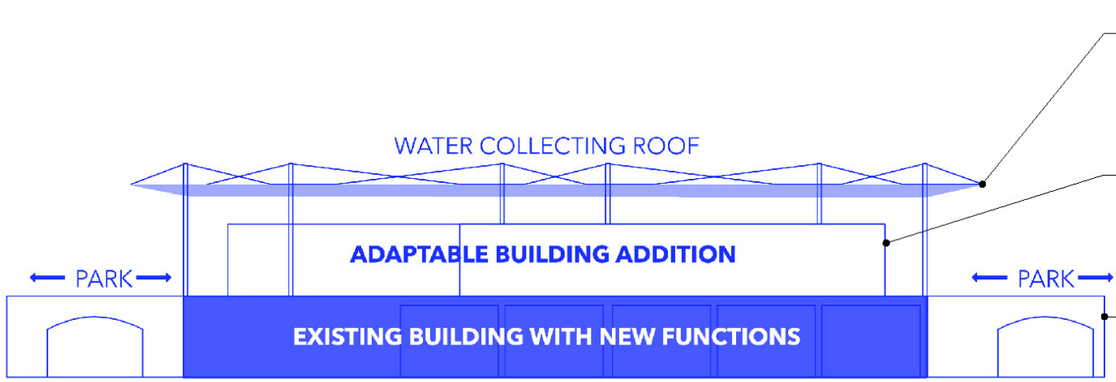


II. CONCEPTS: REPURPOSE



Source: Gemeente Rotterdam

II. CONCEPT: REPURPOSE STRATEGY

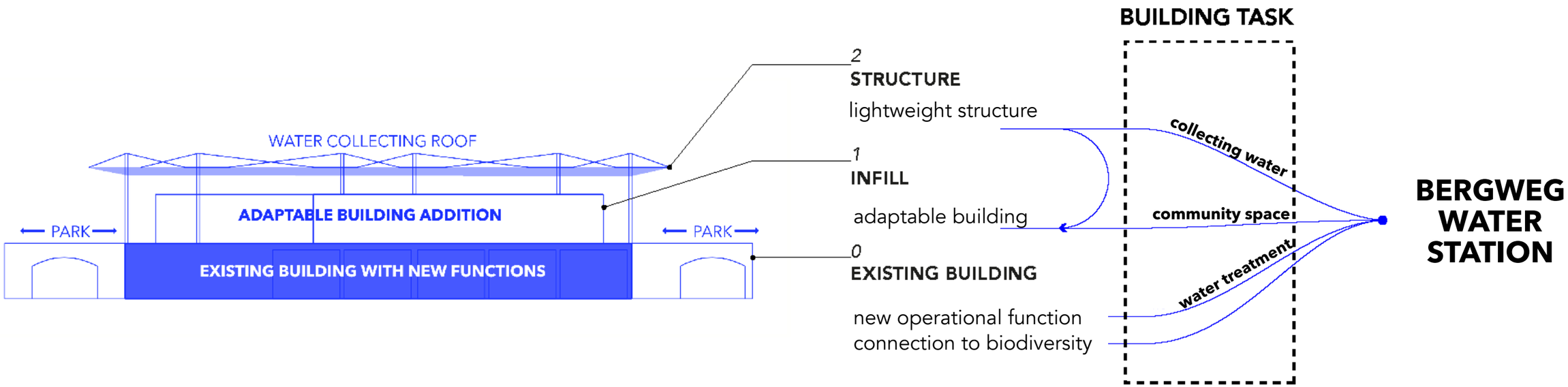


2
STRUCTURE
lightweight structure

1
INFILL
adaptable building

0
EXISTING BUILDING
new operational function
connection to biodiversity

II. CONCEPT: REPURPOSE STRATEGY



III. DESIGN IMPLEMENTATION

III. DESIGN IMPLEMENTATION: CONTEXT













THE BERGWEG WATER STATION_P5_040723

MAX LIESER_5626293

III. DESIGN IMPLEMENTATION: EXISTING BUILDING





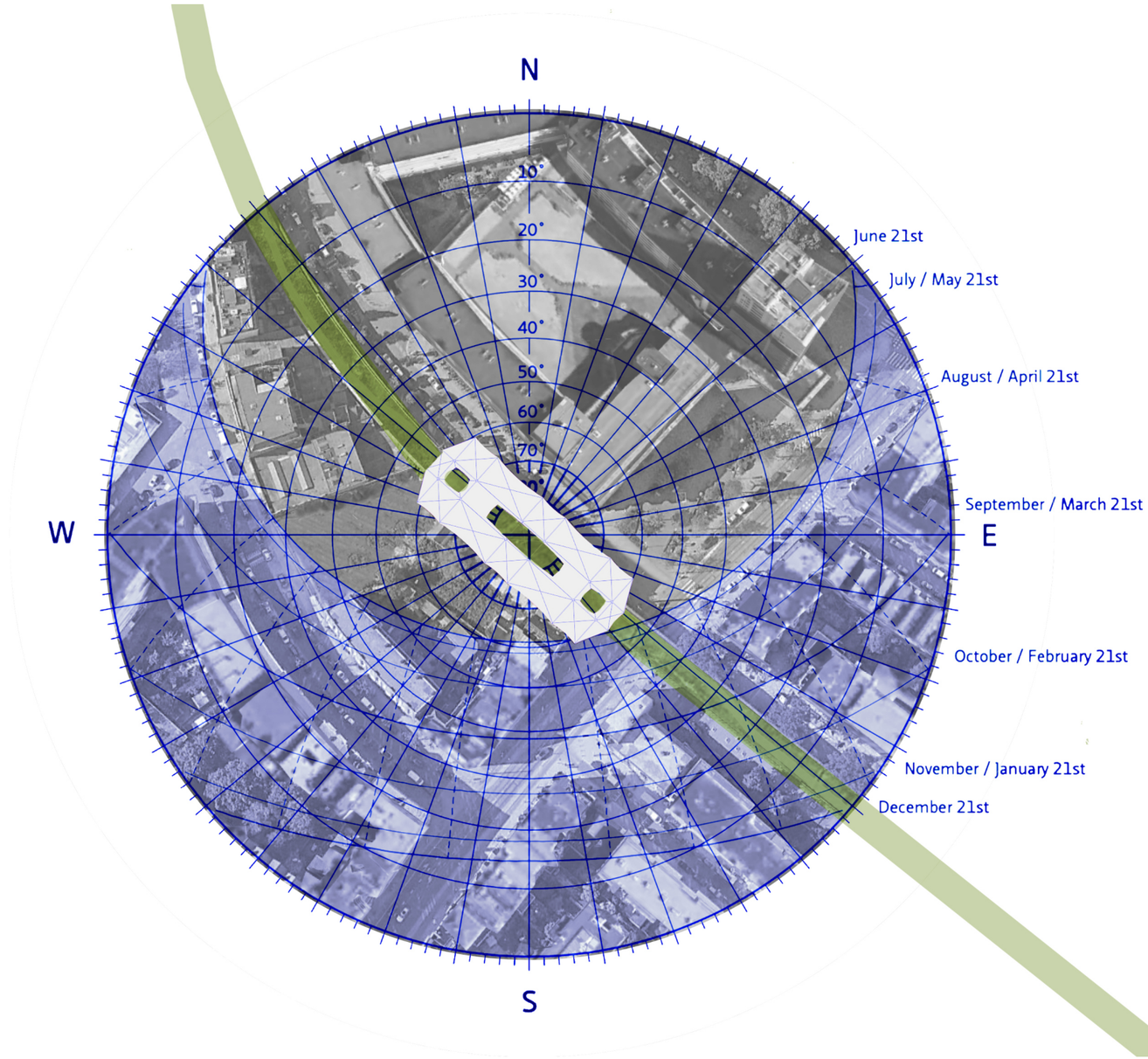
III. DESIGN IMPLEMENTATION: EXISTING BUILDING



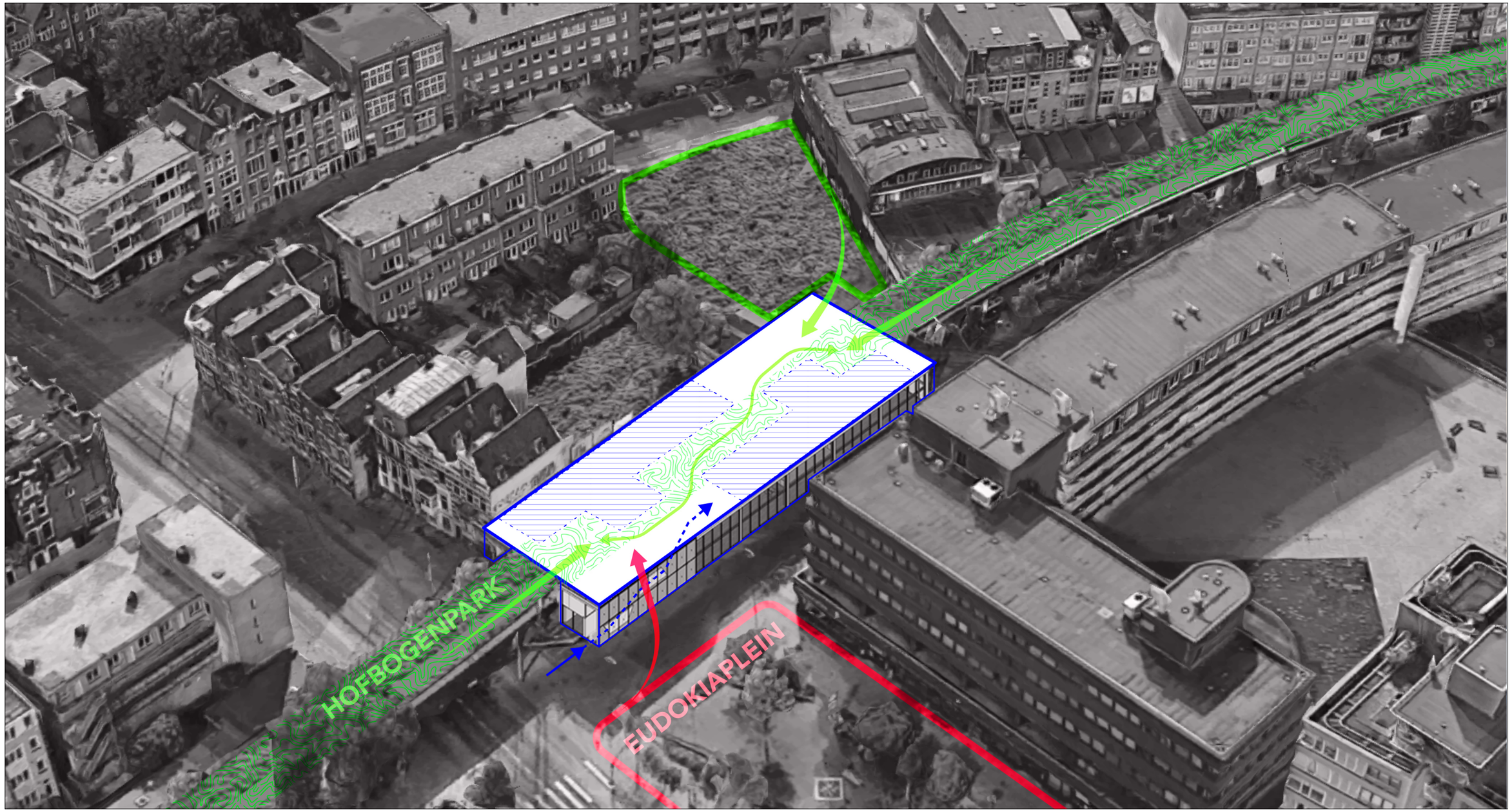




III. DESIGN IMPLEMENTATION: ORIENTATION



III. DESIGN IMPLEMENTATION: CONTEXT



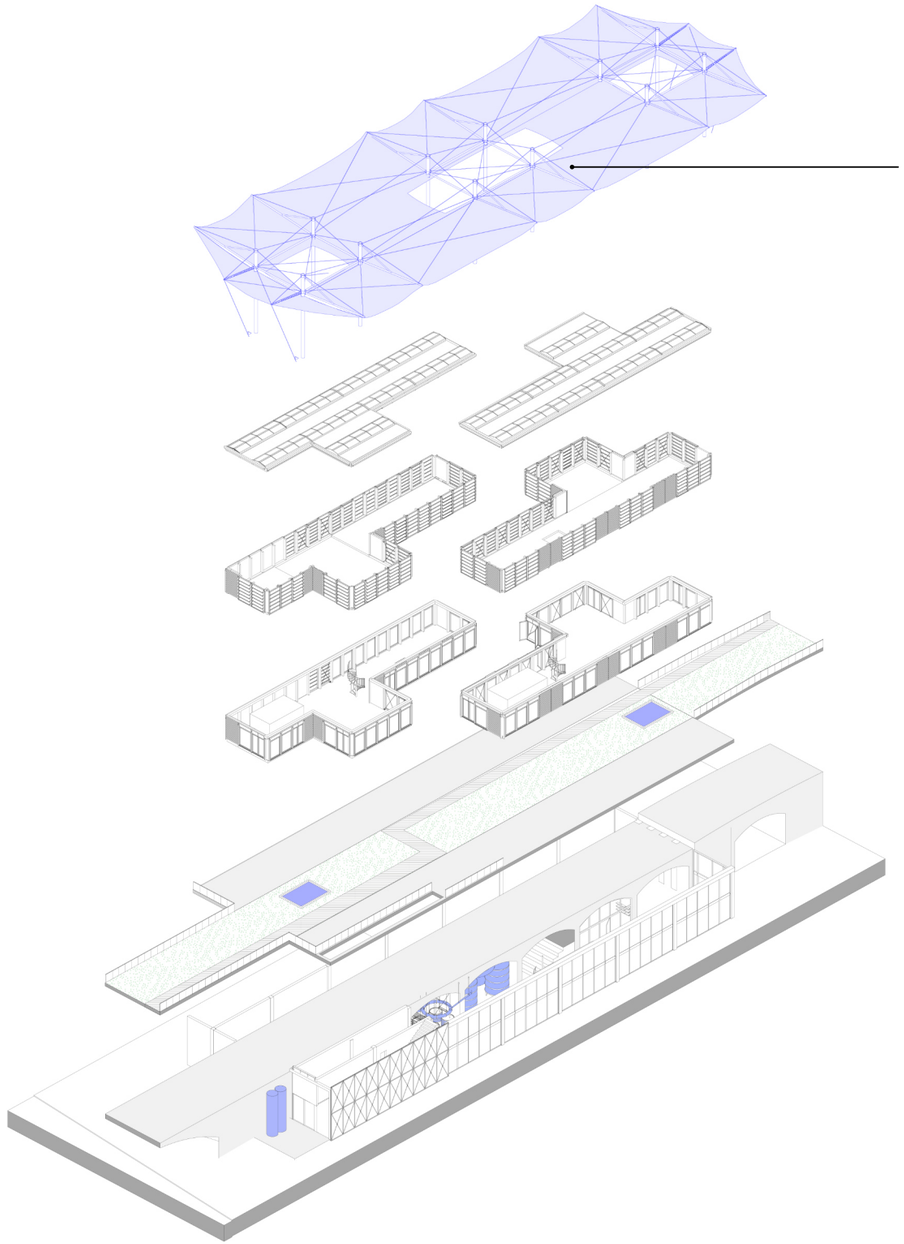
III. DESIGN IMPLEMENTATION: CONTEXT





VIJVERHOFSTRAT

III. DESIGN IMPLEMENTATION



LIGHTWEIGHT CONSTRUCTION + MEMBRANE

- OVERVIEW
- OPERATING PRINCIPLE

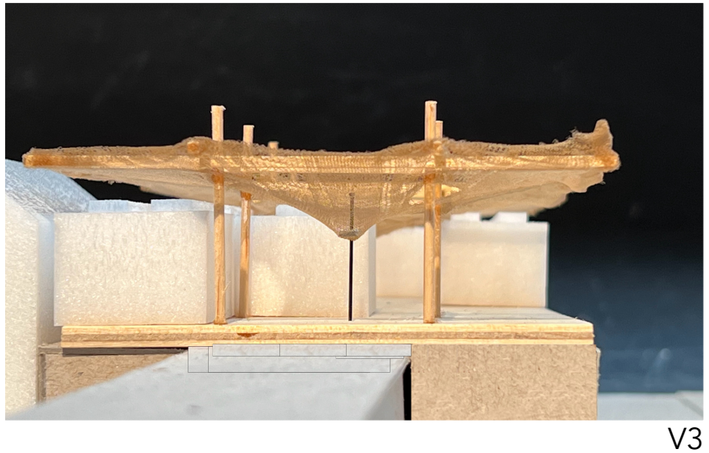
III. DESIGN IMPLEMENTATION



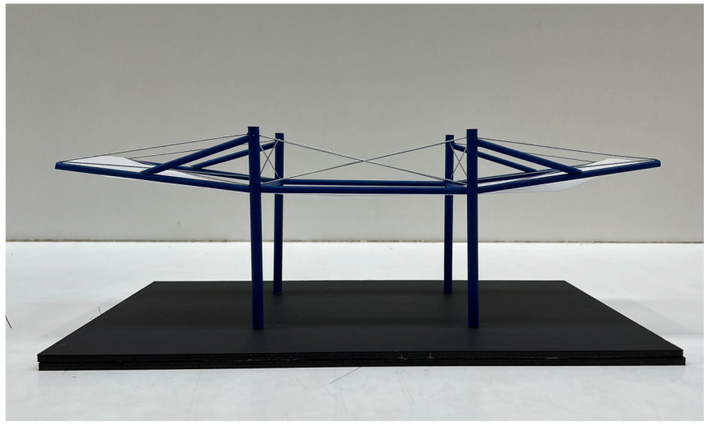
V1



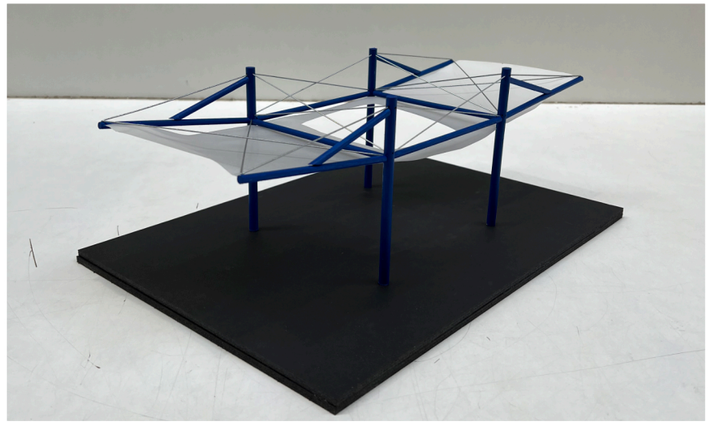
V2



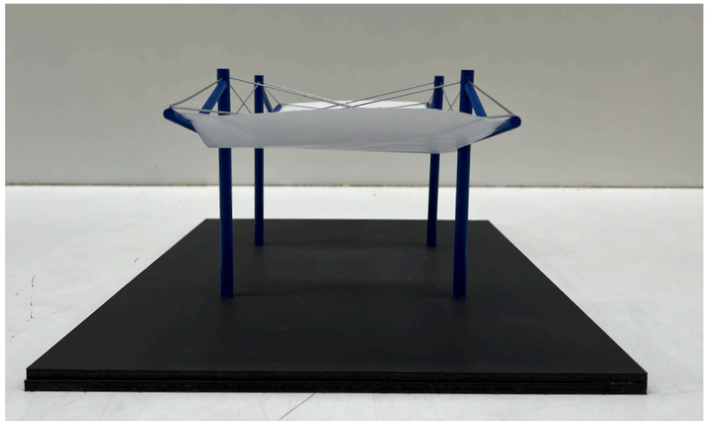
V3



V3



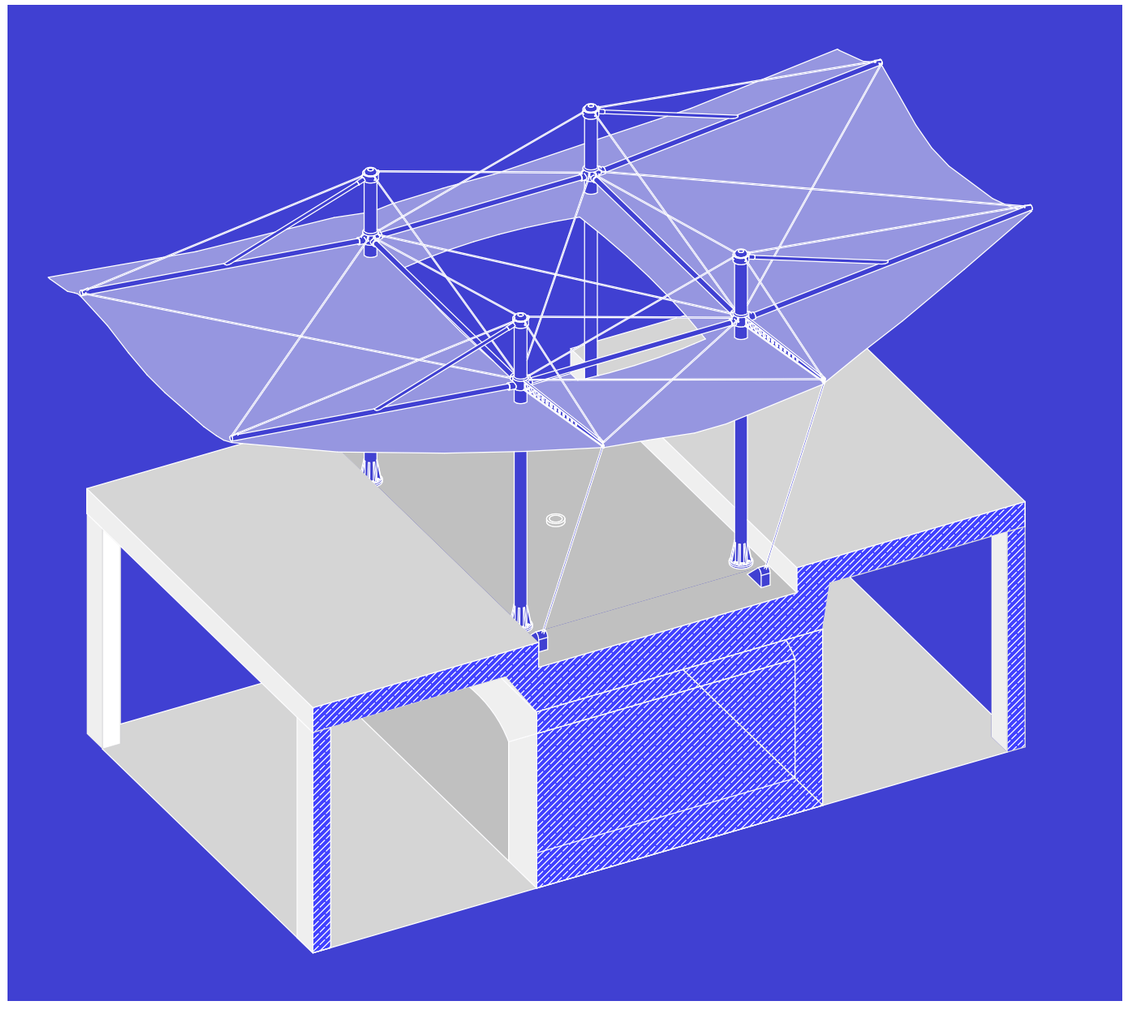
V3



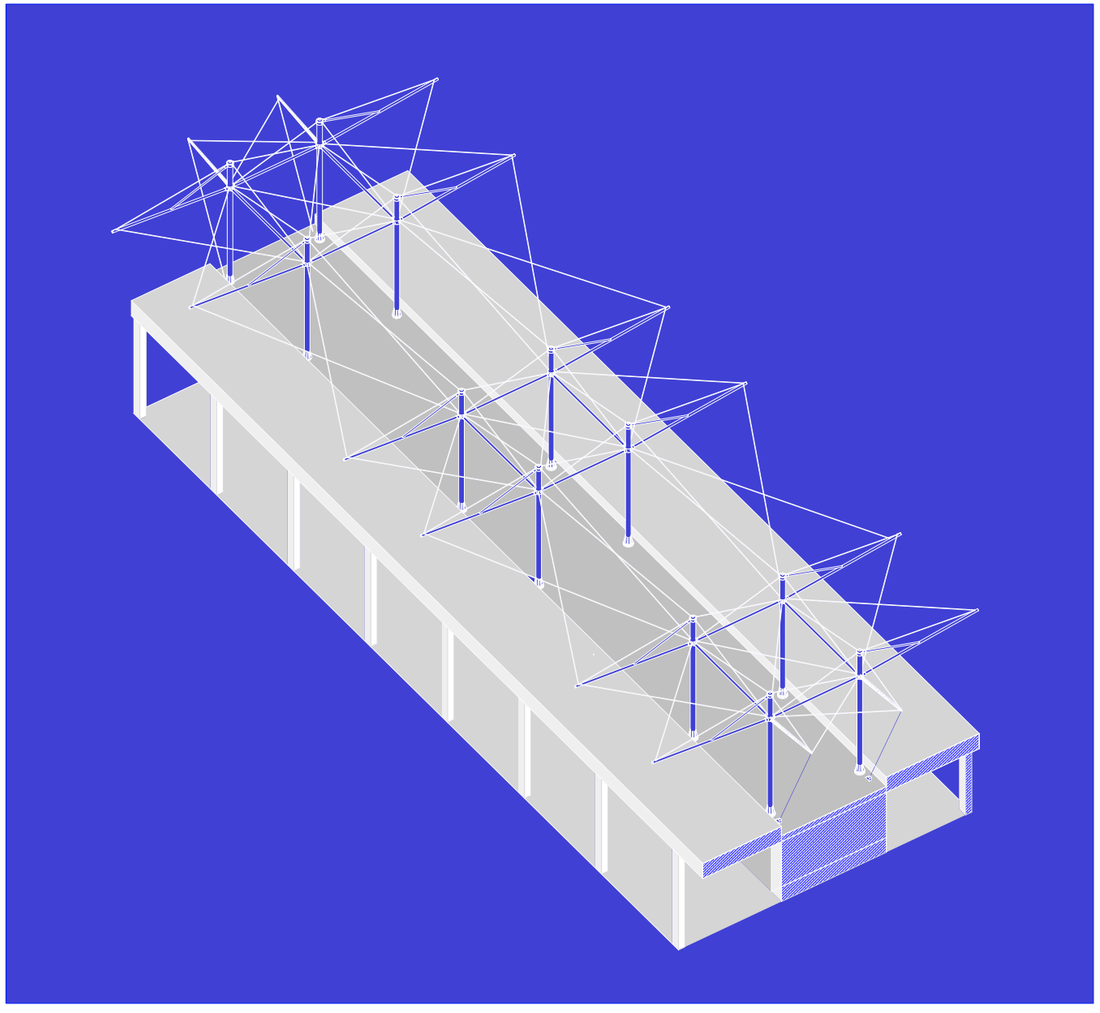
V3

III. DESIGN IMPLEMENTATION

WATER COLLECTING STRUCTURE



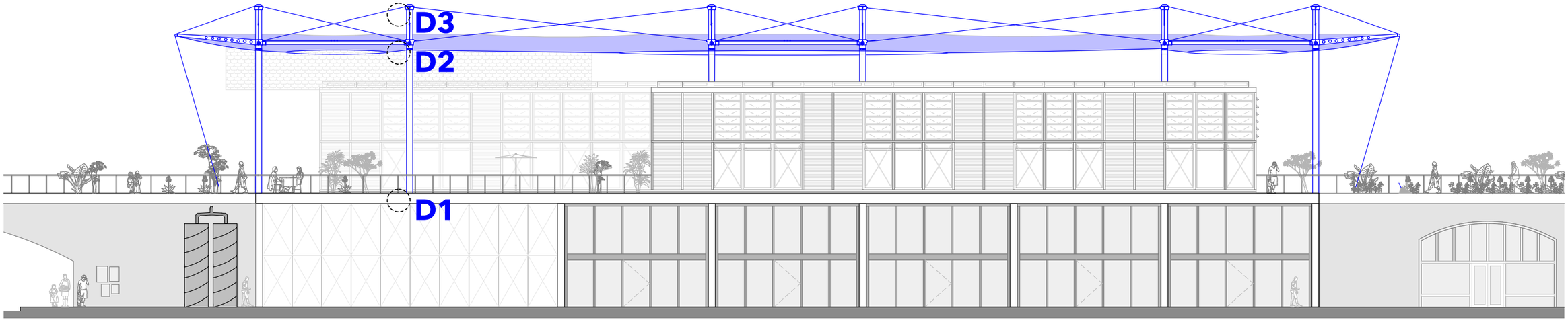
STRUCTURE SEGMENT

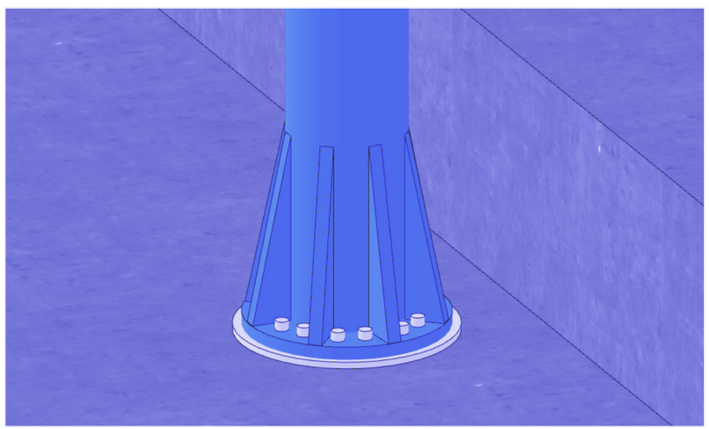


OPERATING PRINCIPLE

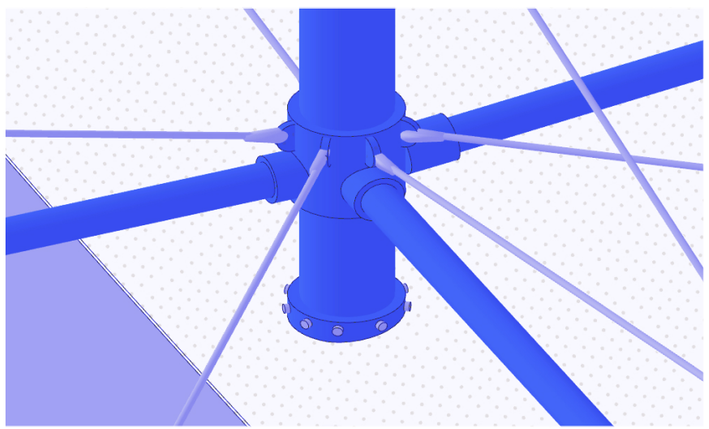
III. DESIGN IMPLEMENTATION

VIEW 1:200

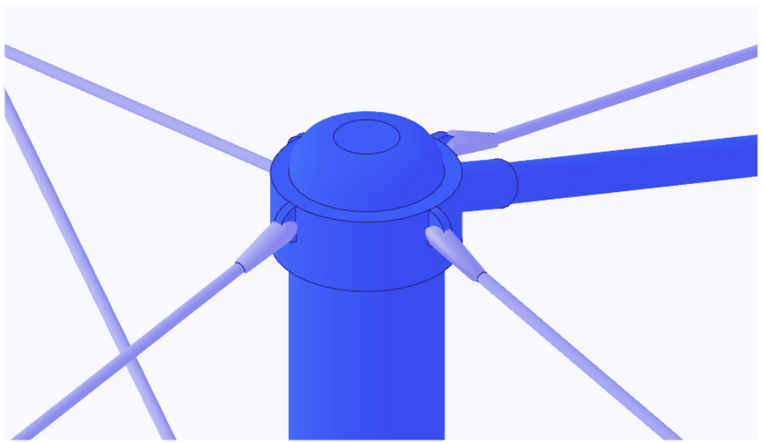




GROUND CONNECTION (D1)



MIDDLE KNOT (D2)

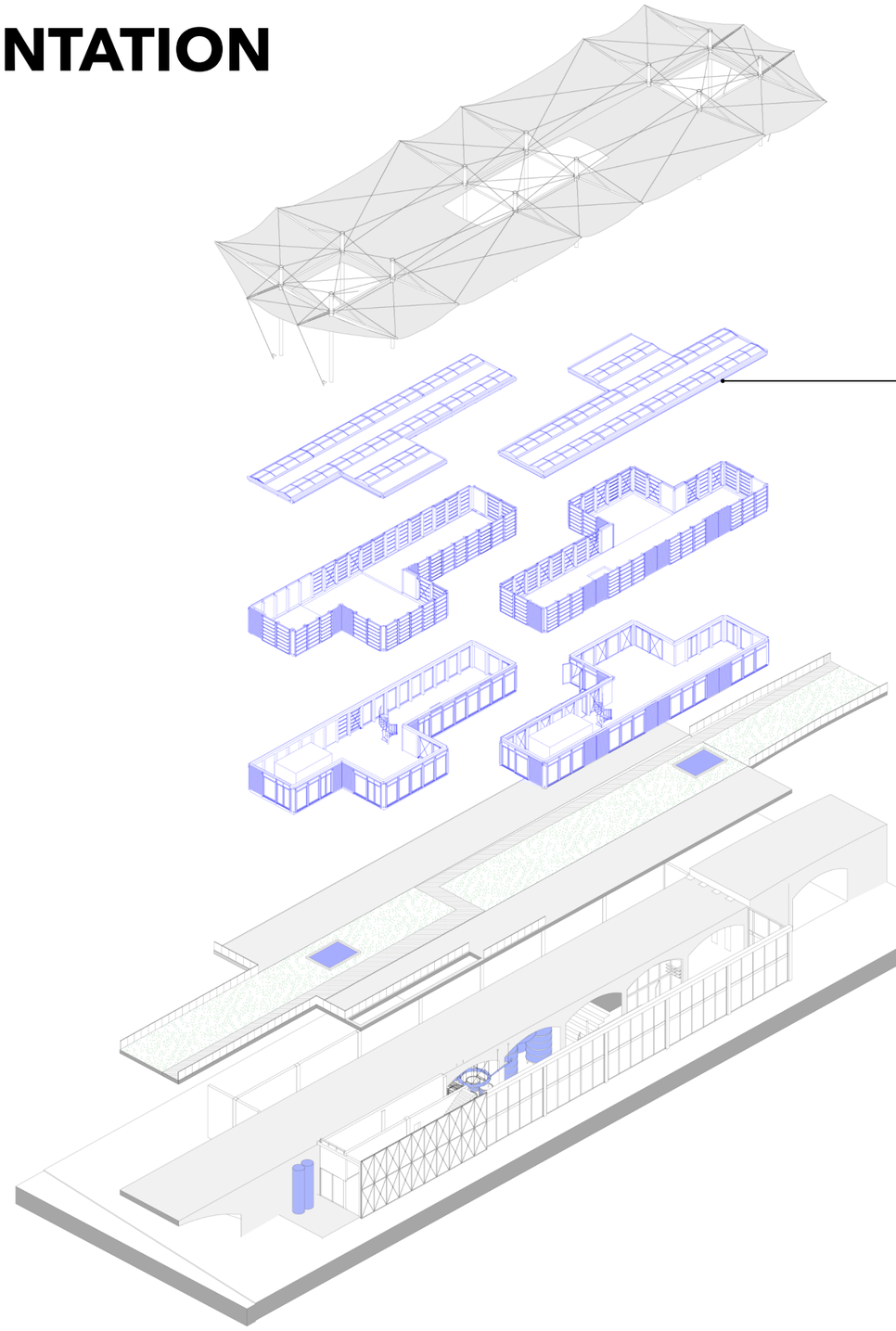


TOP KNOT (D3)



EUDOKIAPLEIN VIEW

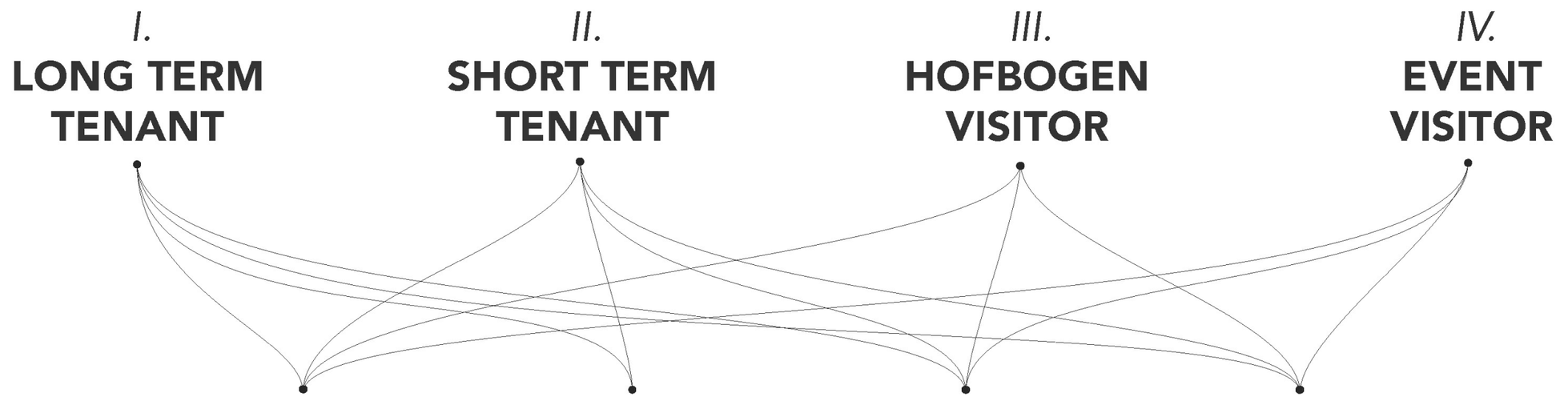
III. DESIGN IMPLEMENTATION



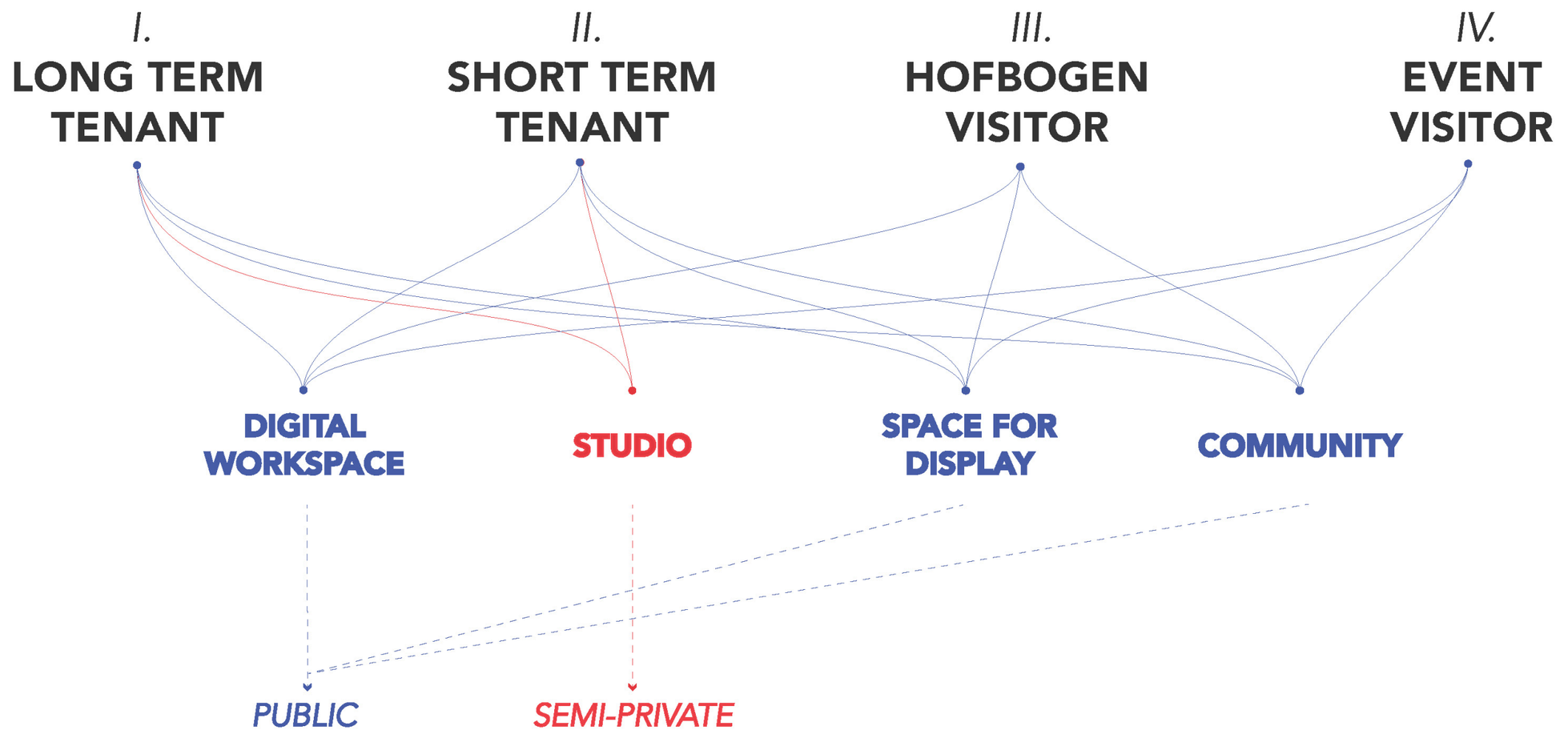
BUILDING ADDITION

- USERS
- ROUTES
- PROGRAMME
- CLIMATE

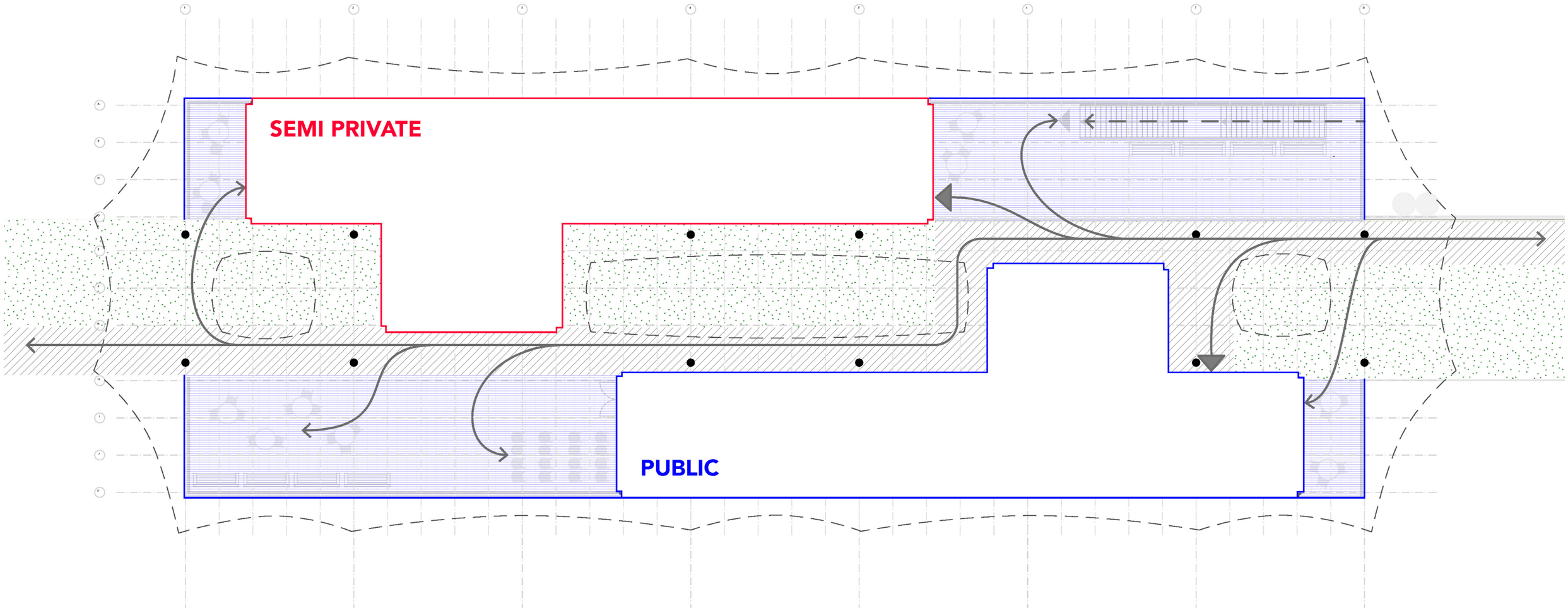
III. DESIGN IMPLEMENTATION: BUILDING USERS



III. DESIGN IMPLEMENTATION: BUILDING USERS



III. DESIGN IMPLEMENTATION: PLATFORM ROUTES





III. DESIGN IMPLEMENTATION: PLATFORM PROGRAMME

1. Public café 100sqm

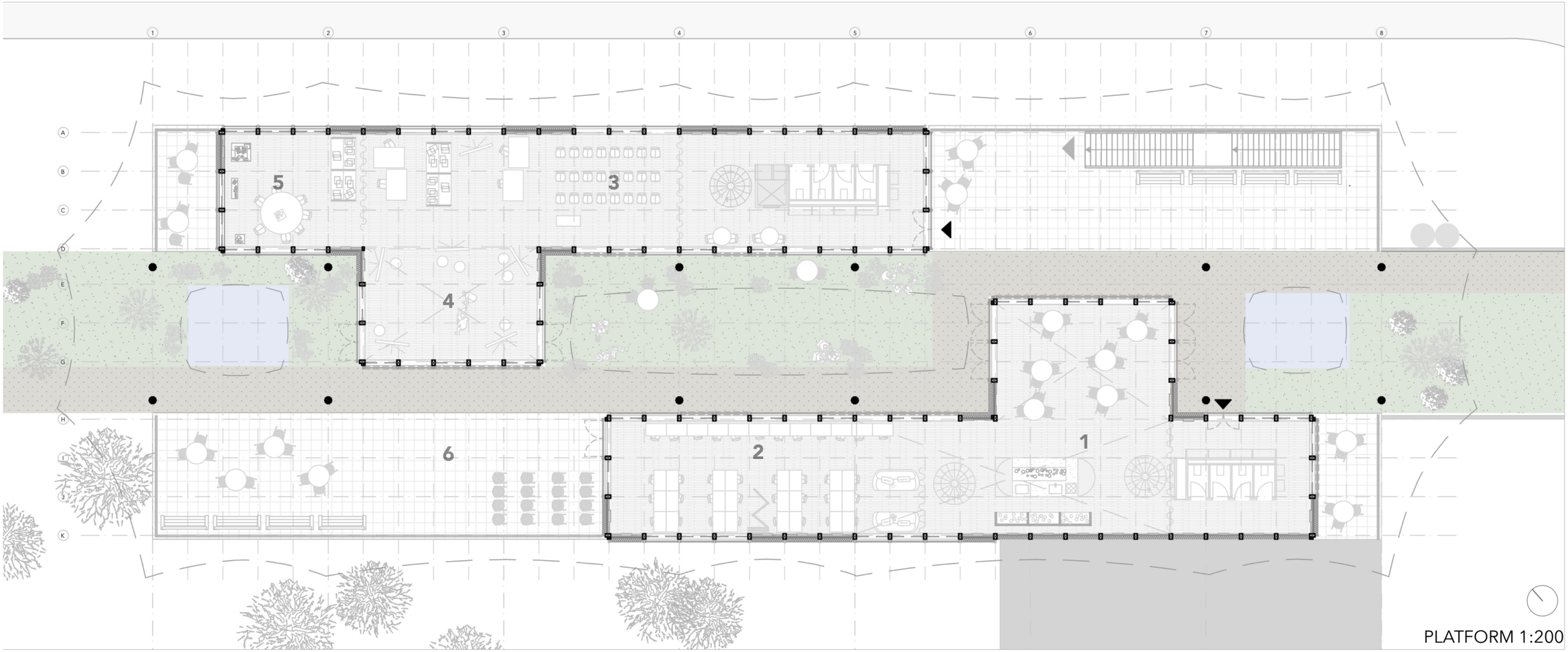
2. Public workspaces 220 sqm

3. Presentation Space

4. Workshop room 100 sqm

5. Meeting Room

6. Public Space 670 sqm

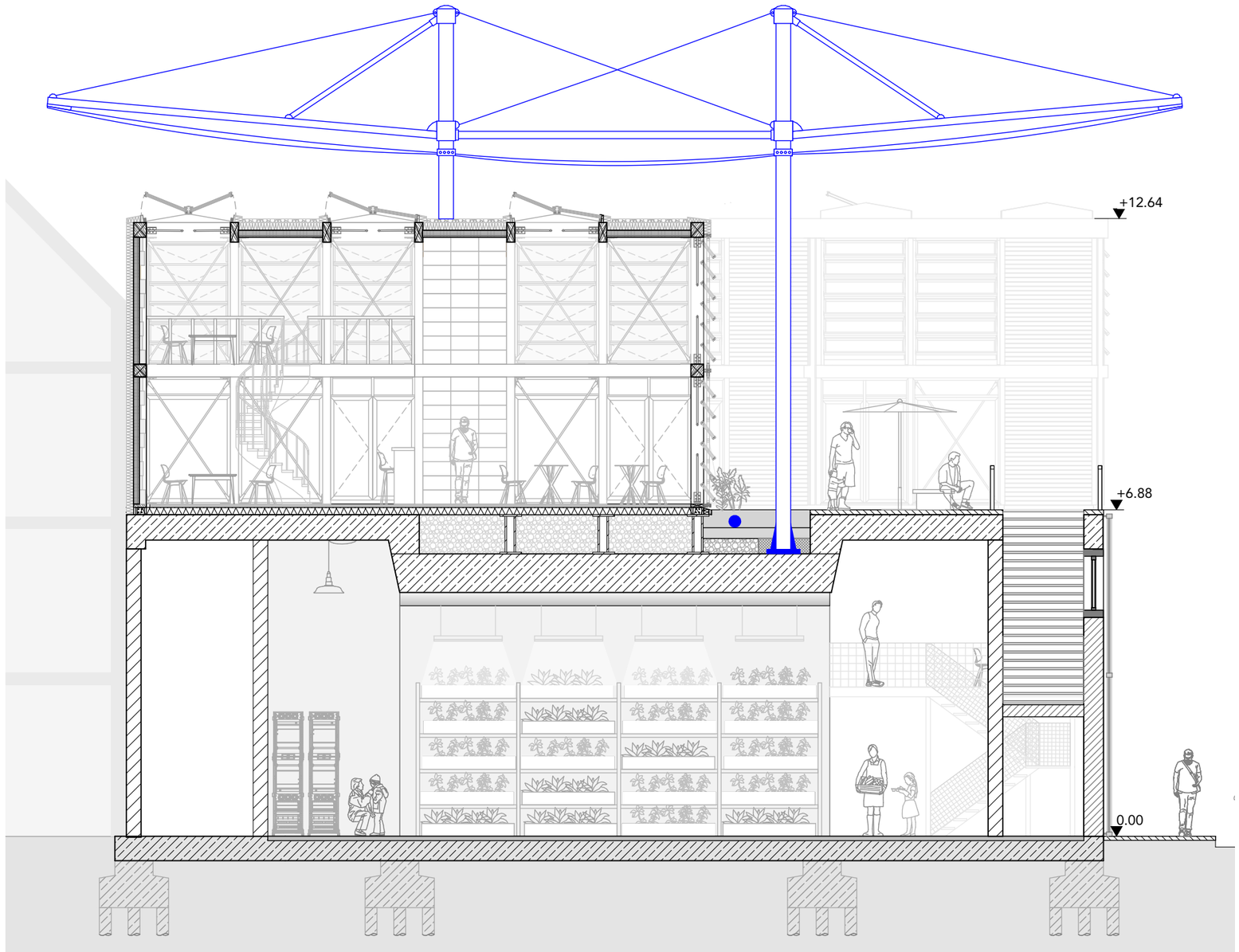


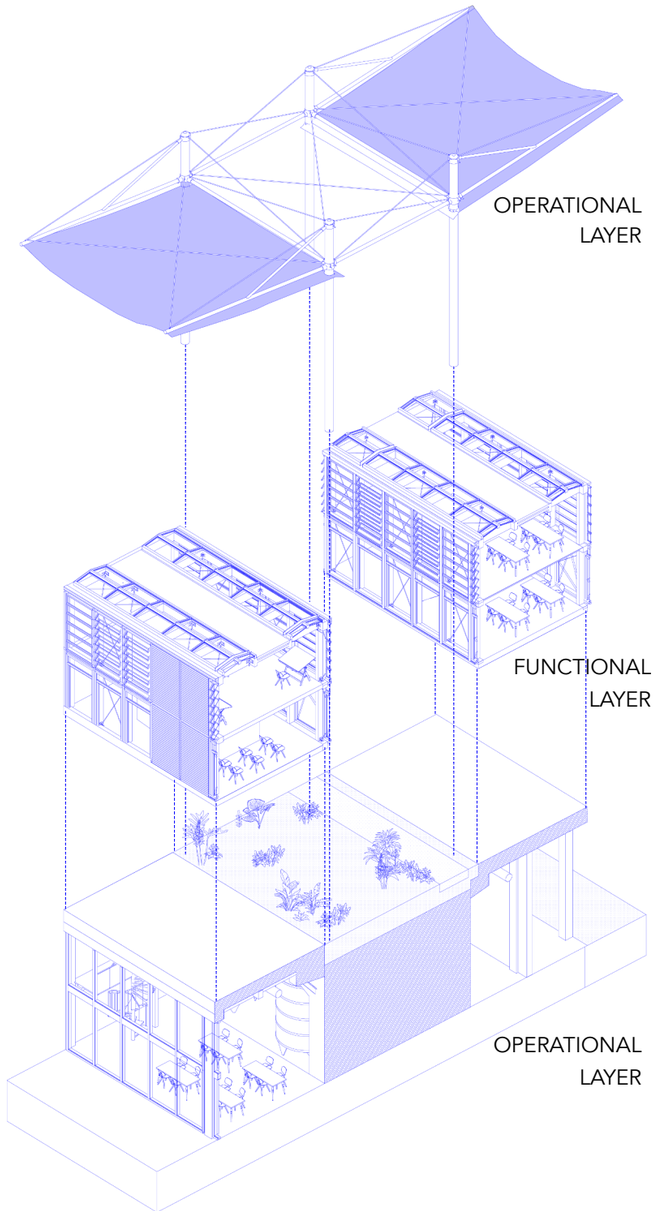
PLATFORM 1:200

III. DESIGN IMPLEMENTATION

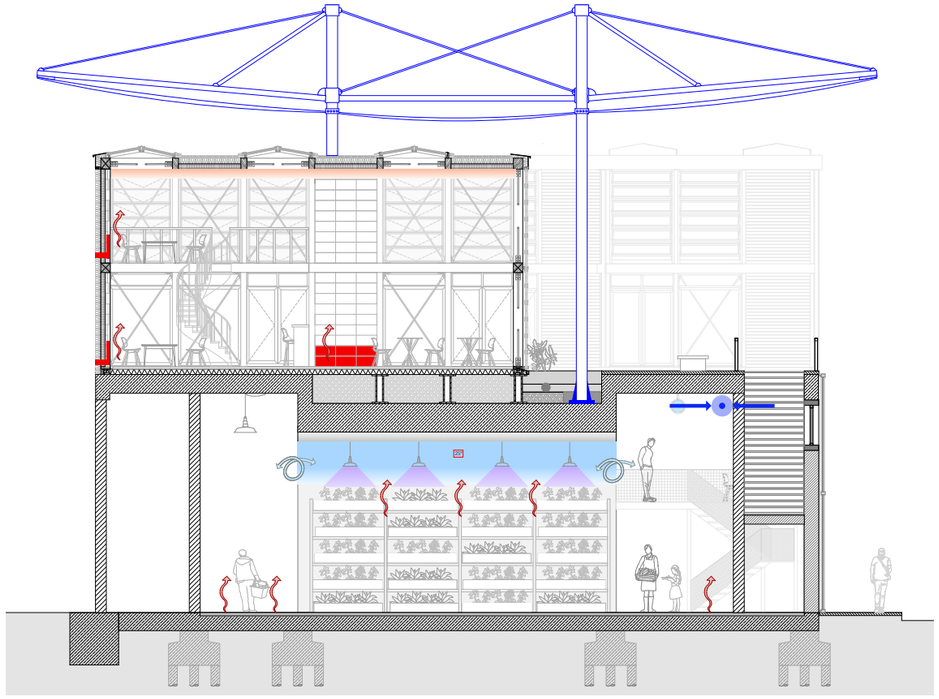
NORTH-WEST SECTION

1:100



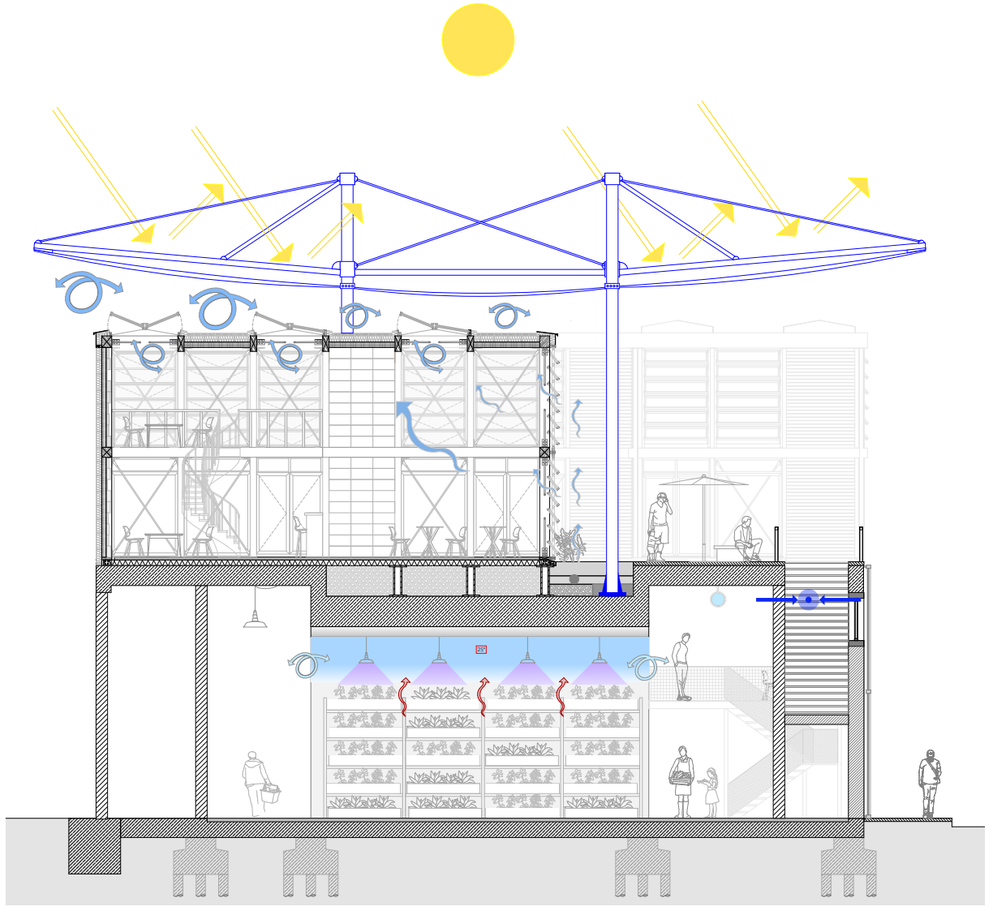


III. DESIGN IMPLEMENTATION: CLIMATE



WINTER

- 90 users per building
- 500 sqm => need 20.000 Watt heating
- 5 Climarad H1C-S (6632 Watt heat output each device)
- Corkwalls for natural humidity control
- Moisture recovery from plant station



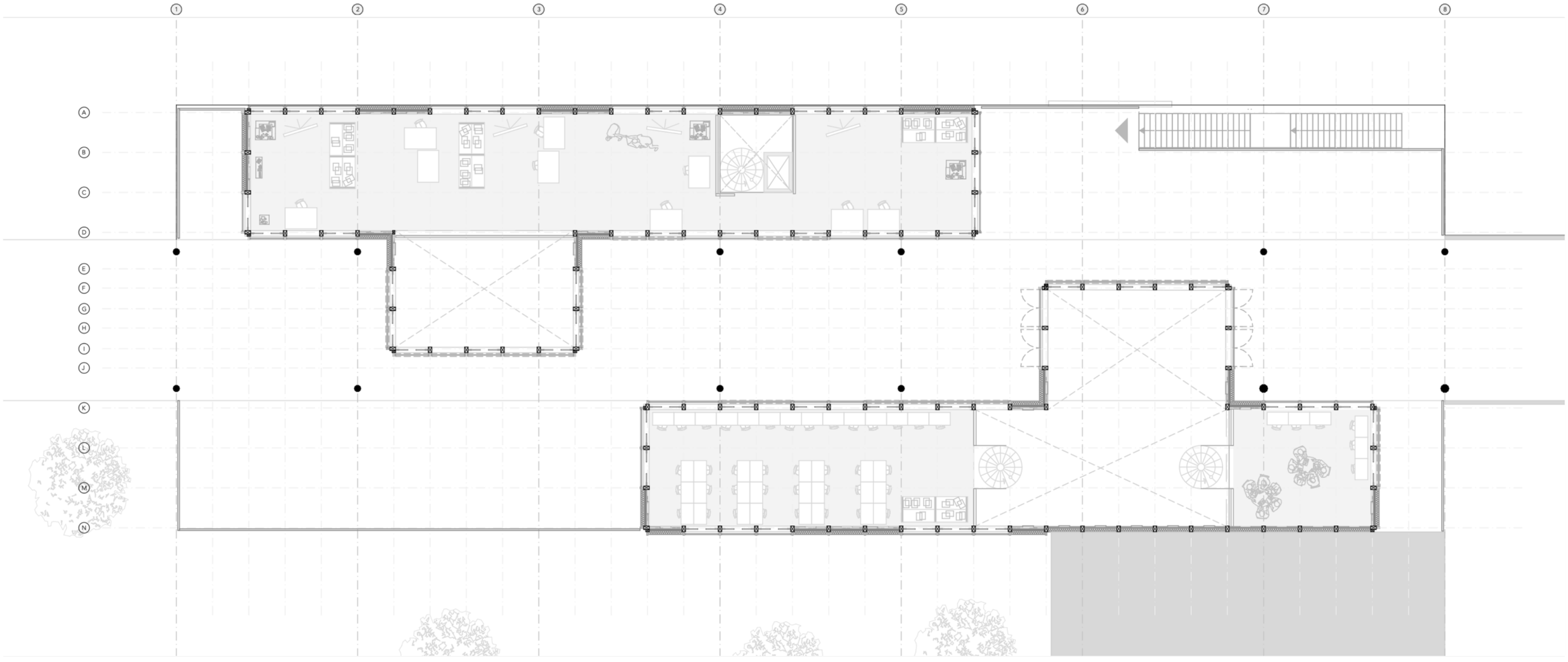
SUMMER

- 90 users per building
- Natural ventilation
- 5 Climarad H1C-S (6632 Watt heat output each device)
- Corkwalls for natural humidity control
- Moisture recovery from plant station

CAFE

III. DESIGN IMPLEMENTATION:

1. FLOOR
1:200

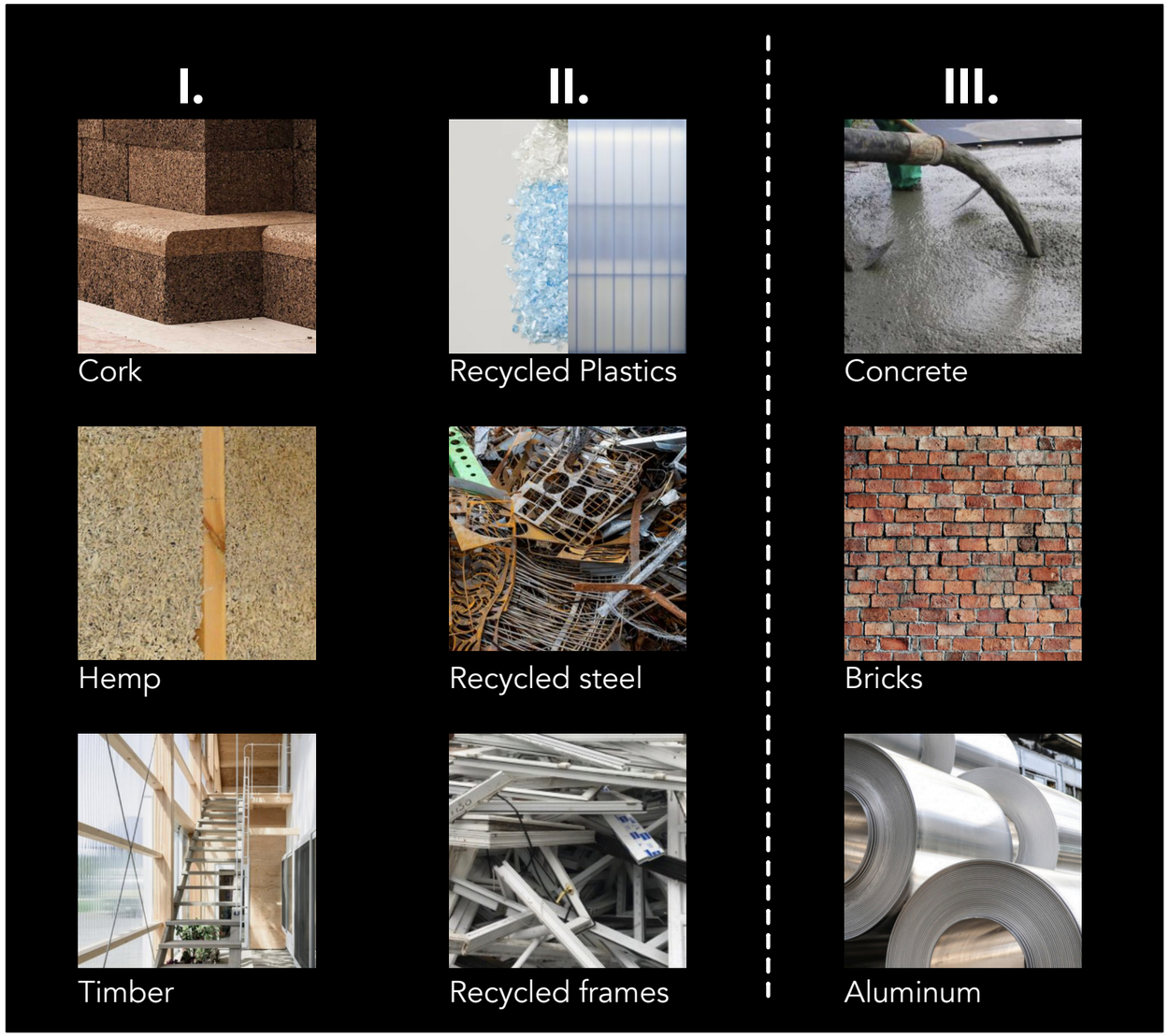




III. DESIGN IMPLEMENTATION: MATERIALS

WATER FOOTPRINT:

The water footprint of a material refers to the total volume of freshwater consumed, directly and indirectly, throughout its entire **life cycle, including production, use, and disposal.**



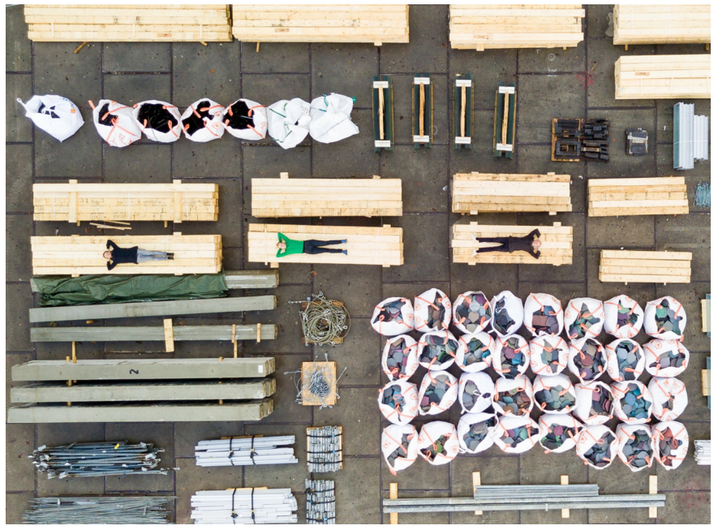
III. DESIGN IMPLEMENTATION

RESEARCH AND APPLICATIONS

III. THEMATIC RESEARCH PAPER: WASTE & DEMOUNTABILITY



Jean Prouvé, 1944



Overtreders, 2017

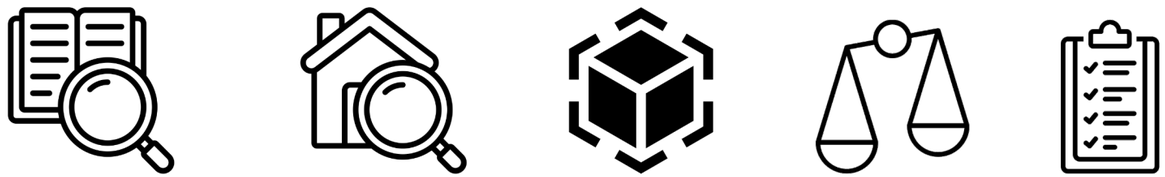


Overtreders Vision 2050

III. THEMATIC RESEARCH PAPER: DEMOUNTABILITY

RESEARCH **OBJECTIVE:**

Finding possibilities to build an adjustable an changeable space plan to maximise the use of the building by reacting to the demands of the users without generating waste.



Literature + market research + remodeling + comparing = guidelines



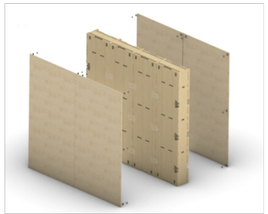
CHANGE CAUSES **WASTE**

III. THEMATIC RESEARCH PAPER: DEMOUNTABILITY

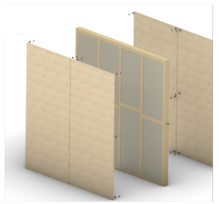
CASE STUDY



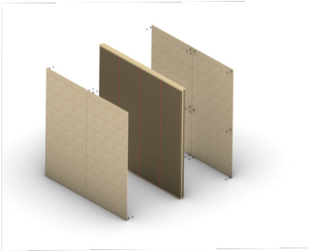
I. CNC-milled



II. CNC-milled

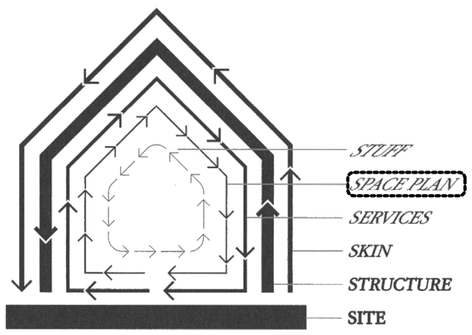


III **not** CNC-milled

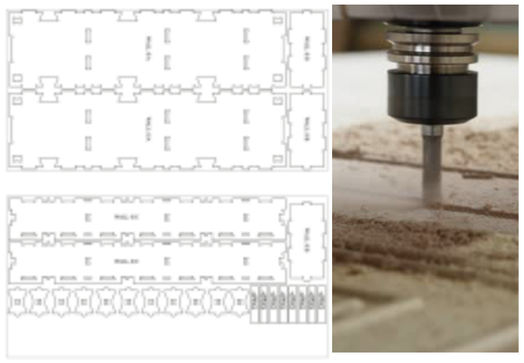


IV **not** CNC-milled

DESIGN FOR **DISASSEMBLY**



POTENTIAL OF **CNC-MILLING**



EASE OF ASSEMBLY **CRITERIA**

Criteria		Rating Score	%
1. Connection Type		36,00	21,11 %
2. Number of Component Types		32,33	18,96 %
3. Total number of Components		26,75	15,68 %
4. Connector Integration		16,29	9,55 %
5. Number of fasteners		12,95	7,59 %
6. Fragility		12,70	7,45 %
7. Workspace Accessibility		11,48	6,73 %
8. Tool Complexety		8,51	4,99 %
9. Labor intensiveness		8,18	4,79 %
10. Required Operator Qualifications		5,37	3,15 %

III. THEMATIC RESEARCH PAPER

RESEARCH **CONCLUSIONS**

POSITIVE CORRELATIONS

HIGH PRECISION

COMPLEXITY & TIME

No.	Guideline	Material Recycling	Component Remonufaccture	Component Reuse	Building Relocation	Ease of Assembly	Reference
1.	Use recycled and recyclable materials	●	●	•	•	•	Combined Philip Crowther& Nicolas Cialimbori Guidelines
2.	Minimise the number of different types of material	●	●	•	•	•	
3.	Avoid toxic and hazardous materials	●	●	•	•	•	
4.	Provide identification of material types	●	●	•	•	•	
5.	Use an open building system not a closed one	•	•	•	●	•	
6.	Use modular design	•	•	•	●	•	
7.	Separate the structure from the cladding for parallel disassembly	•	•	•	●	•	
8.	Provide a means of handling and locating	•	•	●	●	•	
9.	Design joints and components to withstand repeated use	•	•	●	●	●	
10.	Allow for parallel disassembly	●	●	●	●	•	
11.	Provide identification of component type	●	●	●	●	•	
12.	Use a standard structural grid for set outs	•	•	•	●	•	
13.	Use lightweight materials and components	●	●	●	●	●	
14.	Identify points of disassembly	•	•	●	●	●	
15.	Provide spare parts and on site storage for them and parts	•	•	•	●	•	
16.	Retain all information of the building components	•	•	•	●	•	
17.	Minimise the number of different types of components	•	•	●	●	●	Combined Evaluation & Philip Crowther Guidelines
18.	Use mechanical not chemical connections	•	●	●	●	●	
19.	Design to use common tools,avoid specialist plant	•	•	●	●	●	
20.	Provide access to all parts and connection points	•	•	●	●	●	
21.	Make components sized to suit the means of handling	•	•	●	●	●	
22.	Use a minimum number of connectors	•	•	●	●	●	
23.	Use a minimum number of different types of connectors	•	•	●	●	●	
24.	Integrate connections into the Elements	•	•	●	•	●	
25.	Use Elements that withstand the Assembly and the disassembly	•	•	●	•	●	
26.	Minimise the total number of componentes	•	●	•	●	●	

Not normally relevant • Relevant ● Highly Relevant ●

III. THEMATIC RESEARCH PAPER

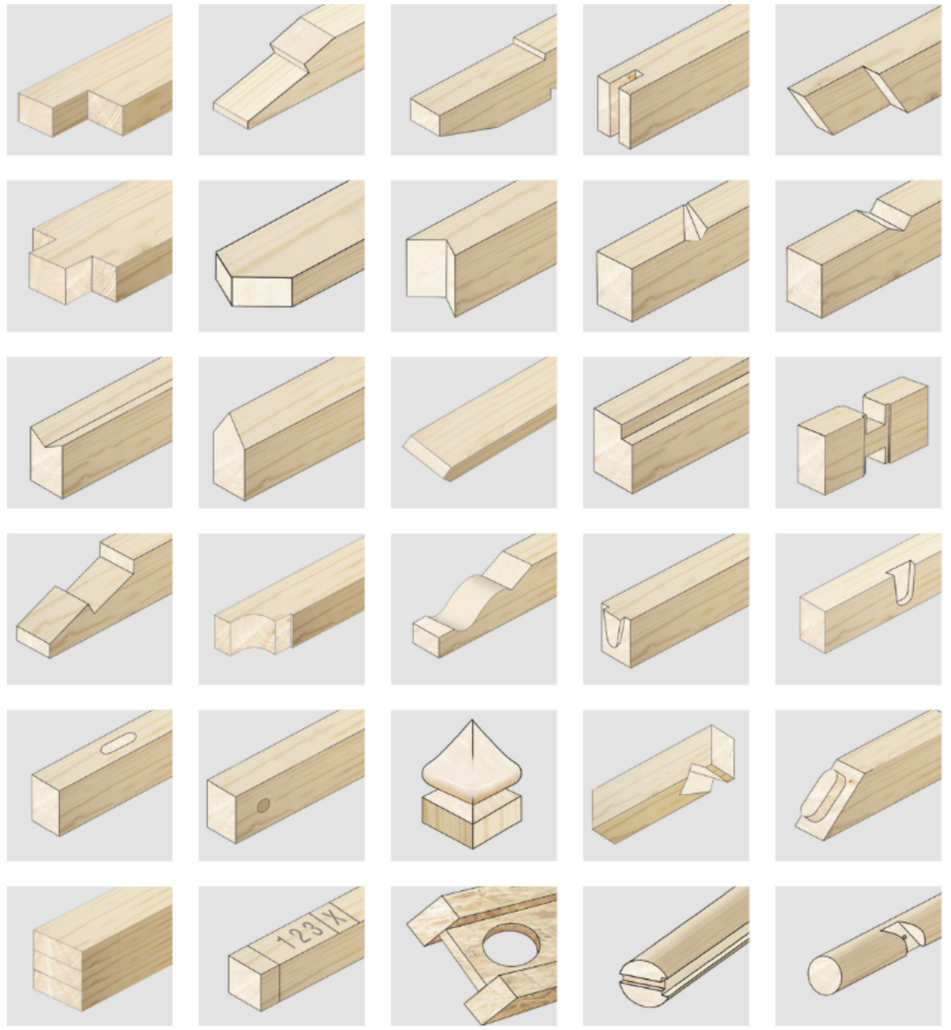
DIGITAL FABRICATION

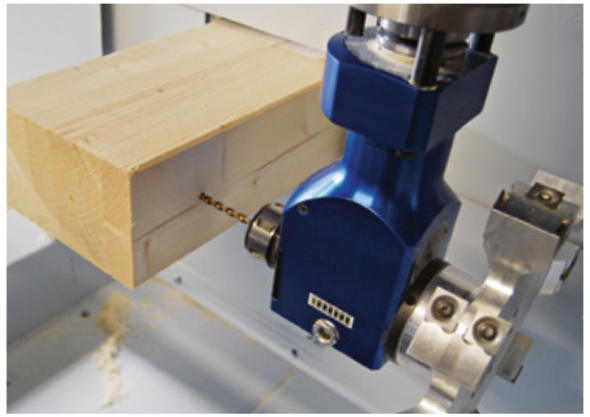


Five-axis trimming

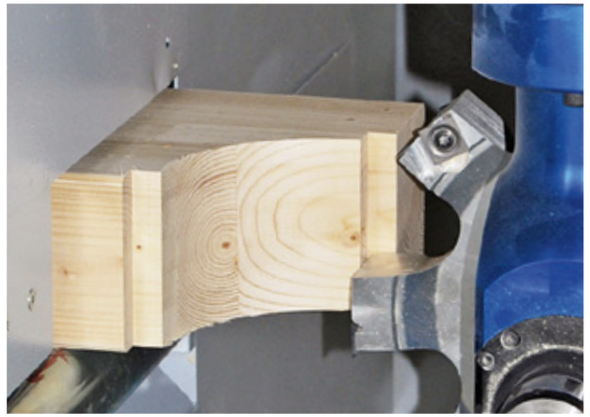


12-slot tool changer





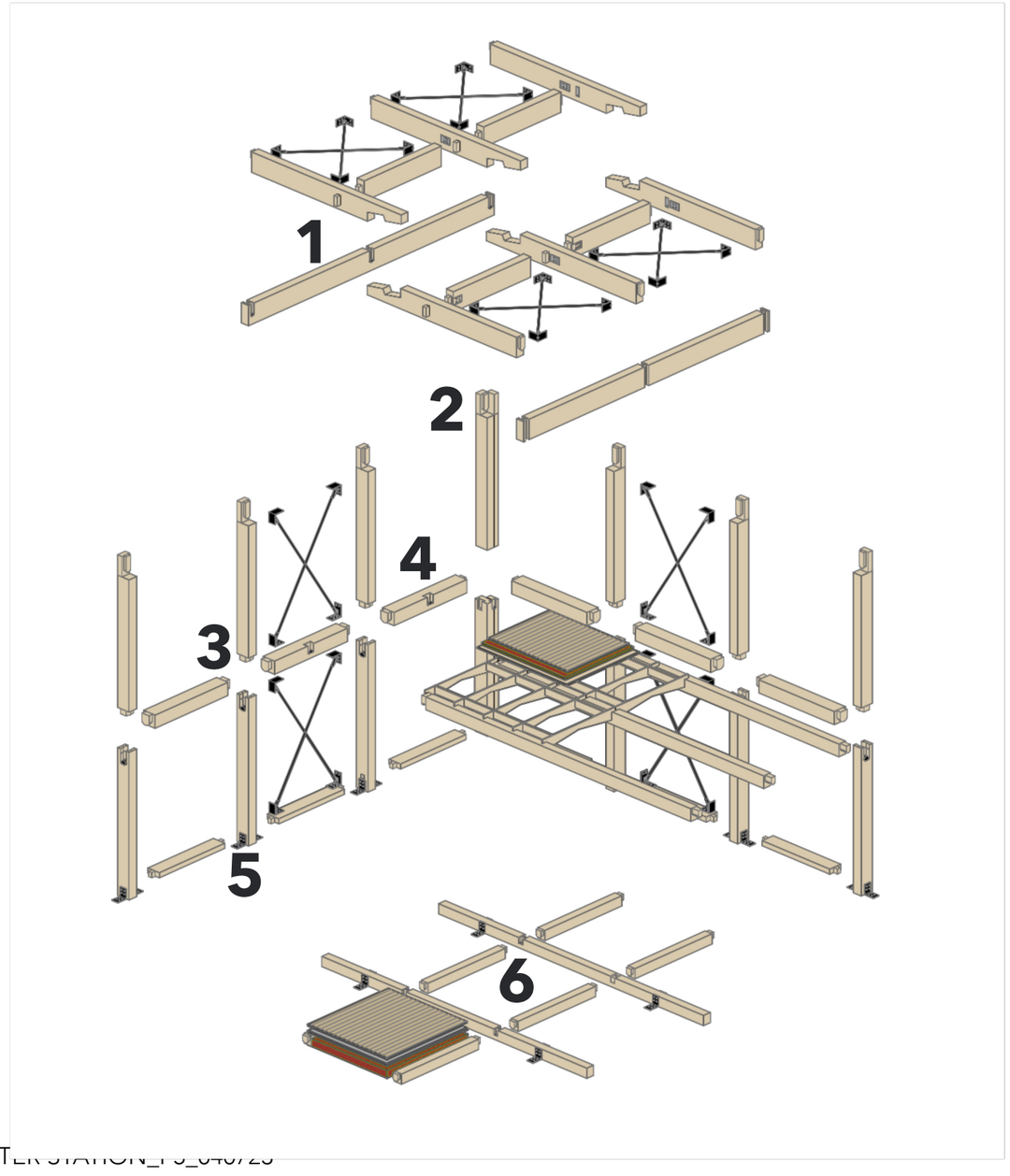
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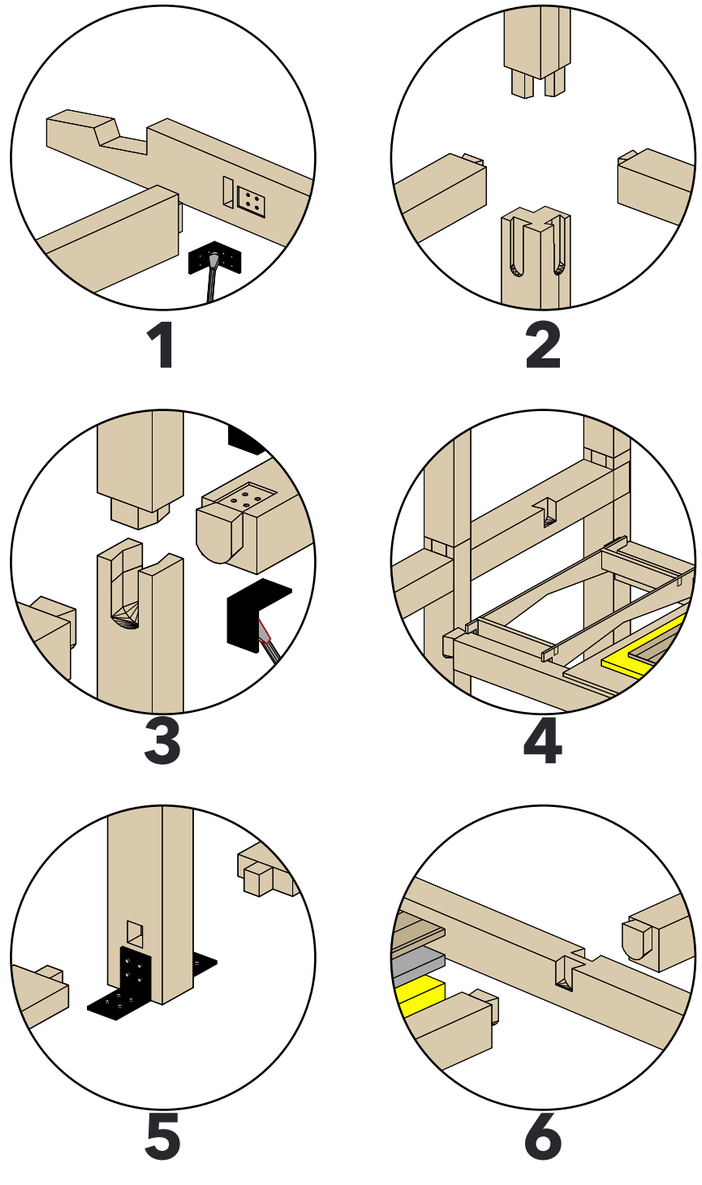


Rafter head processing

III. RESEARCH IMPLEMENTATION

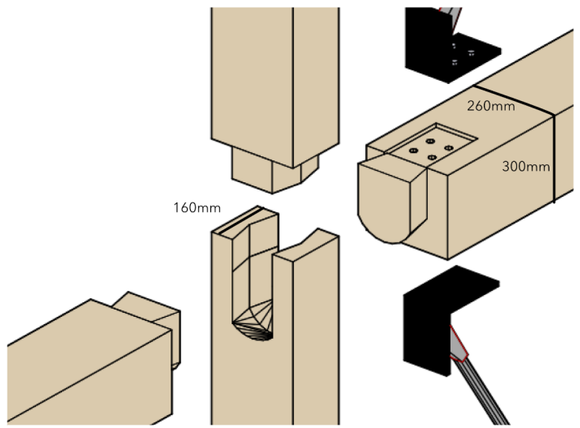
KIT OF PARTS



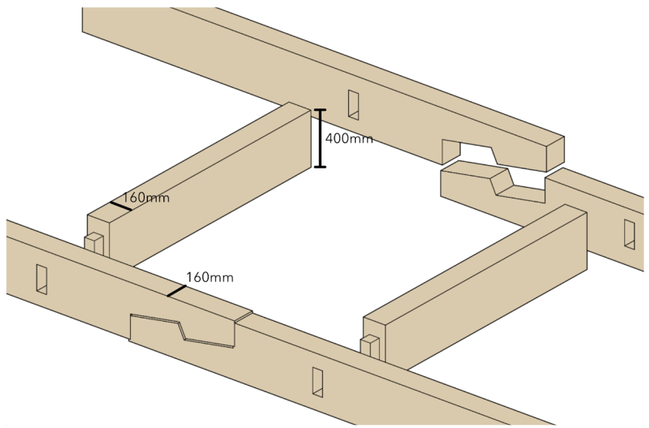


III. RESEARCH IMPLEMENTATION

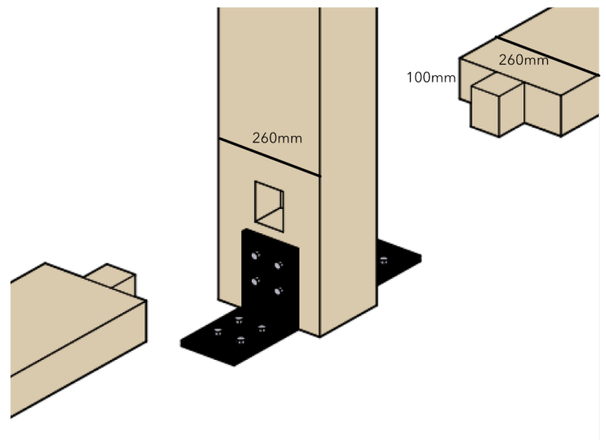
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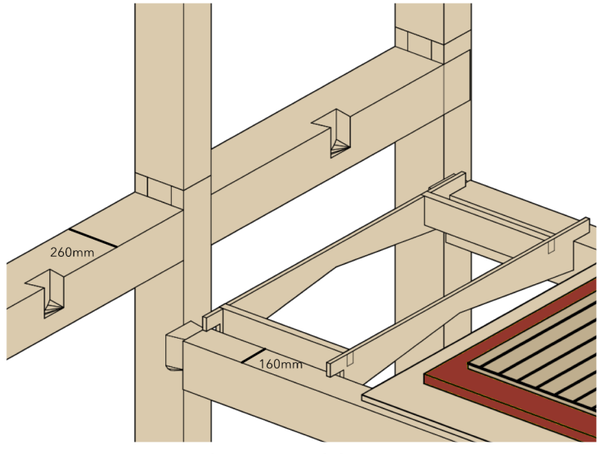
Post-beam connection of stucture



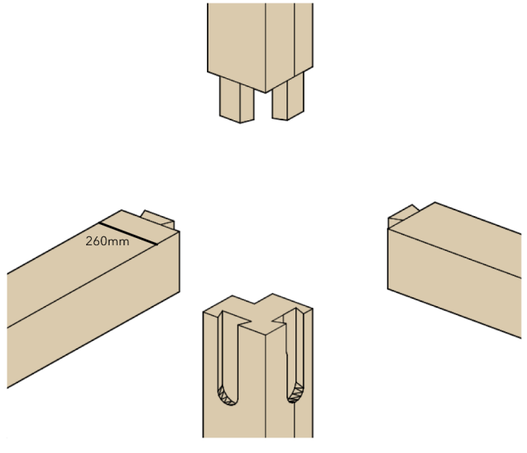
Celing beam connection
Mortise and Tenon + Scarf Joint



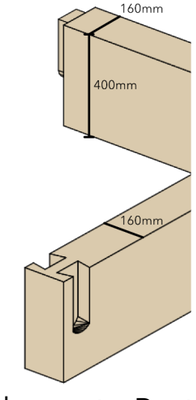
Post connection to ground
Mortise and Tenon



Interior celing and beam connection
Dovetail



Beam + Post corner connection

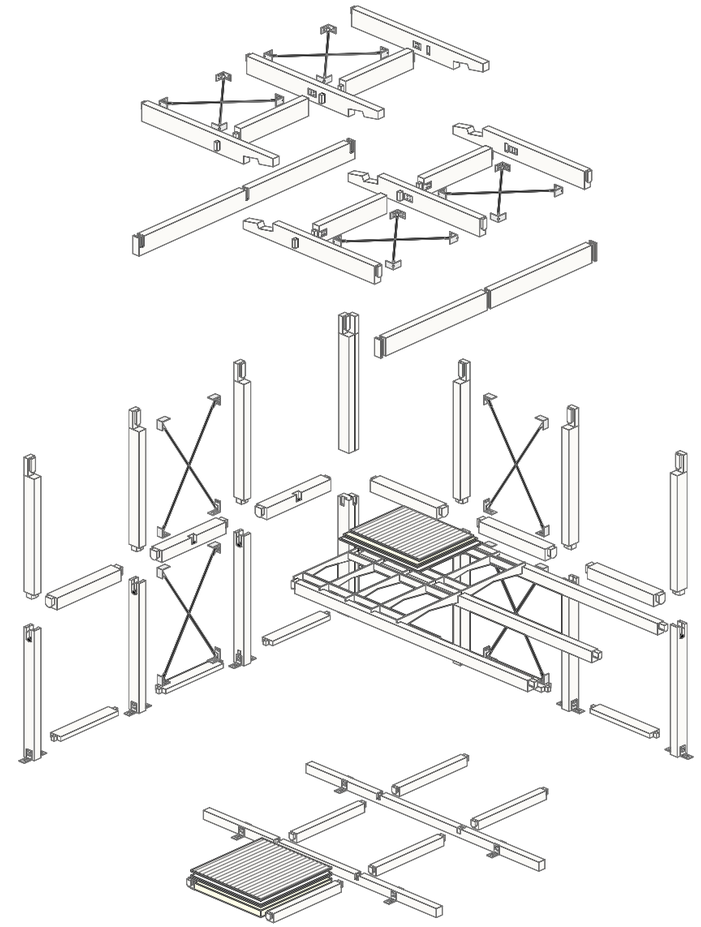


Celing beam to Post connection

III. RESEARCH IMPLEMENTATION

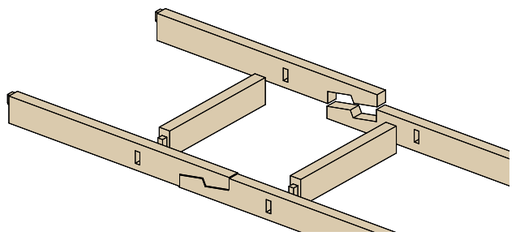
KIT OF PARTS

Criteria	Describtion	Rating Score	%
1. Connection Type	6	36,00	21,11 %
2. Number of Component Types	19	32,33	18,96 %
3. Total number of Components	-	26,75	15,68 %
4. Connector Integration	Wood Connections	16,29	9,55 %
5. Number of fasteners	Metal Bracing	12,95	7,59 %
6. Fragility	Connectors	12,70	7,45 %
7. Workspace Accessibility	Skeleton	11,48	6,73 %
8. Tool Complexety	Low	8,51	4,99 %
9. Labor intensiveness	75-85 Kg	8,18	4,79 %
10. Required Operator Qualifications	Low	5,37	3,15 %



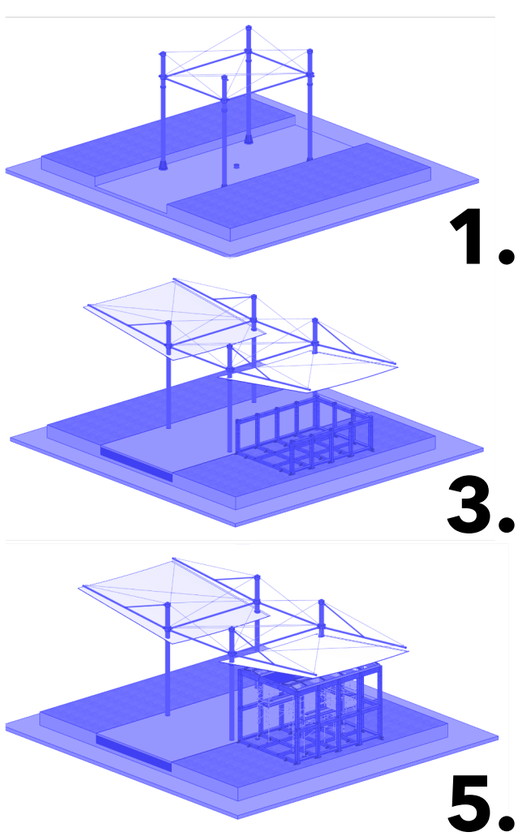
450 kilograms per cubic meter Spruce wood(kg/m³).
Wood beam dimensions: 350cm x 40m x 16cm
Weight = 0.192 m³ x 450 kg/m³ = **86.4 kg**
One person carrying weight 25-30kg

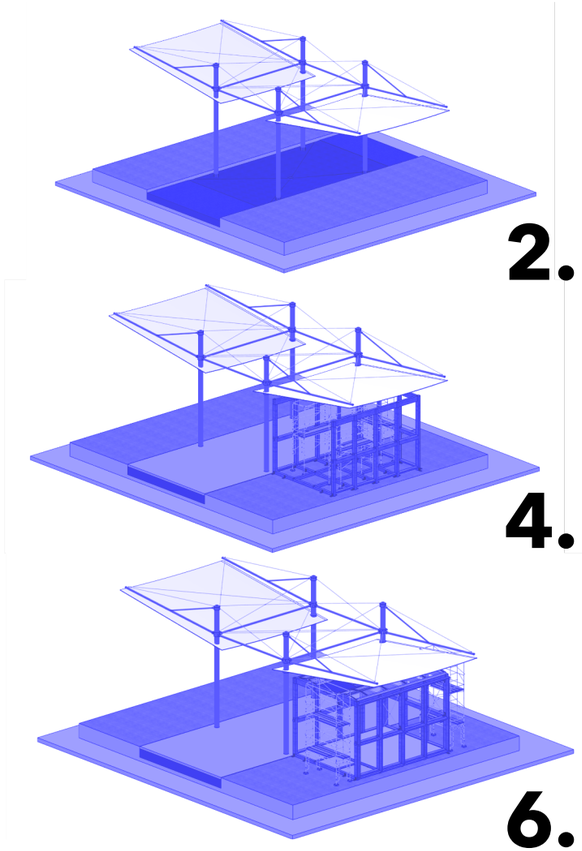
=> Beam can be carried by 3 people + scaffold

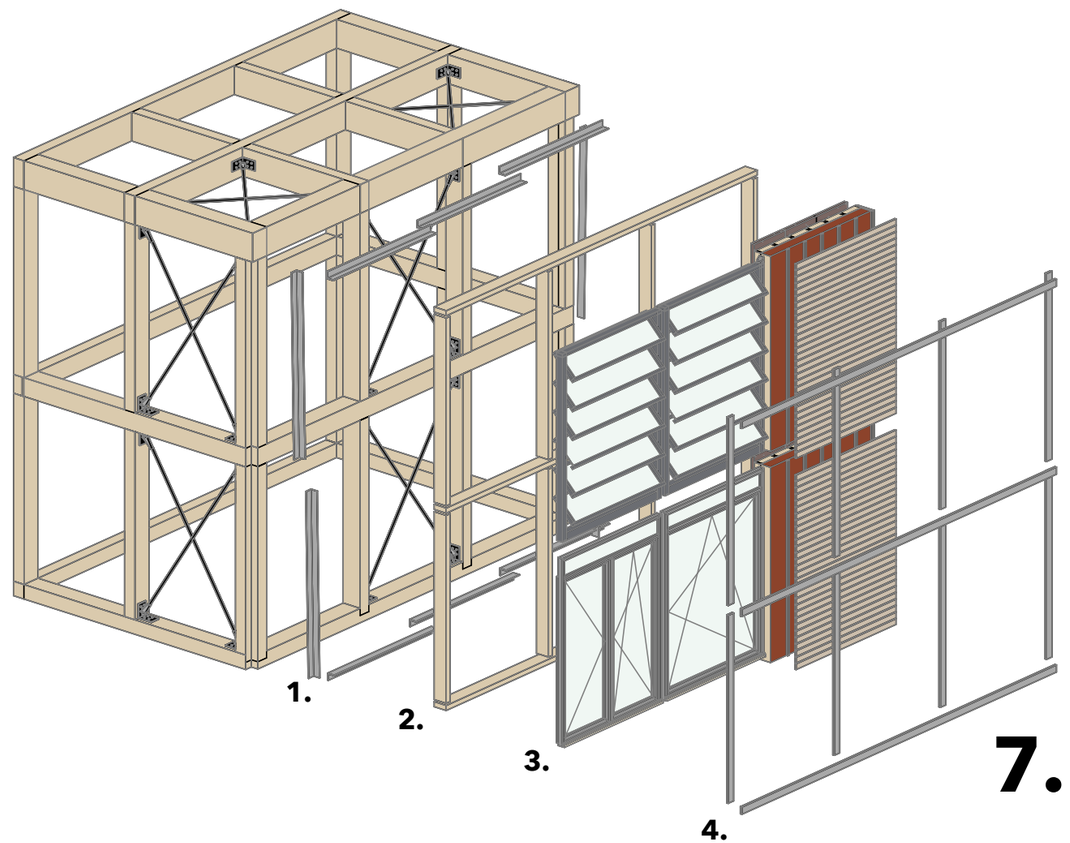


III. RESEARCH IMPLEMENTATION

BUILDING PROCESS



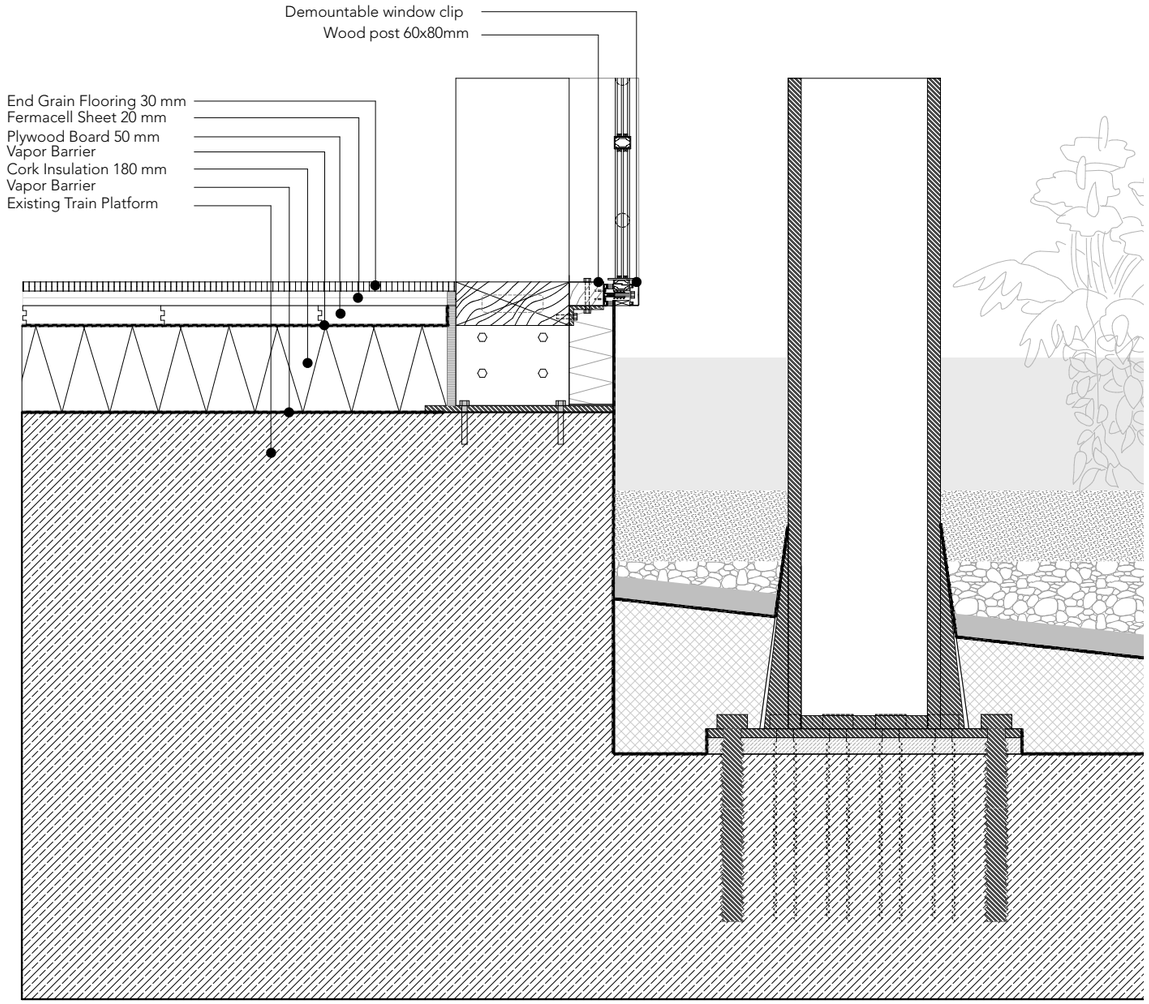


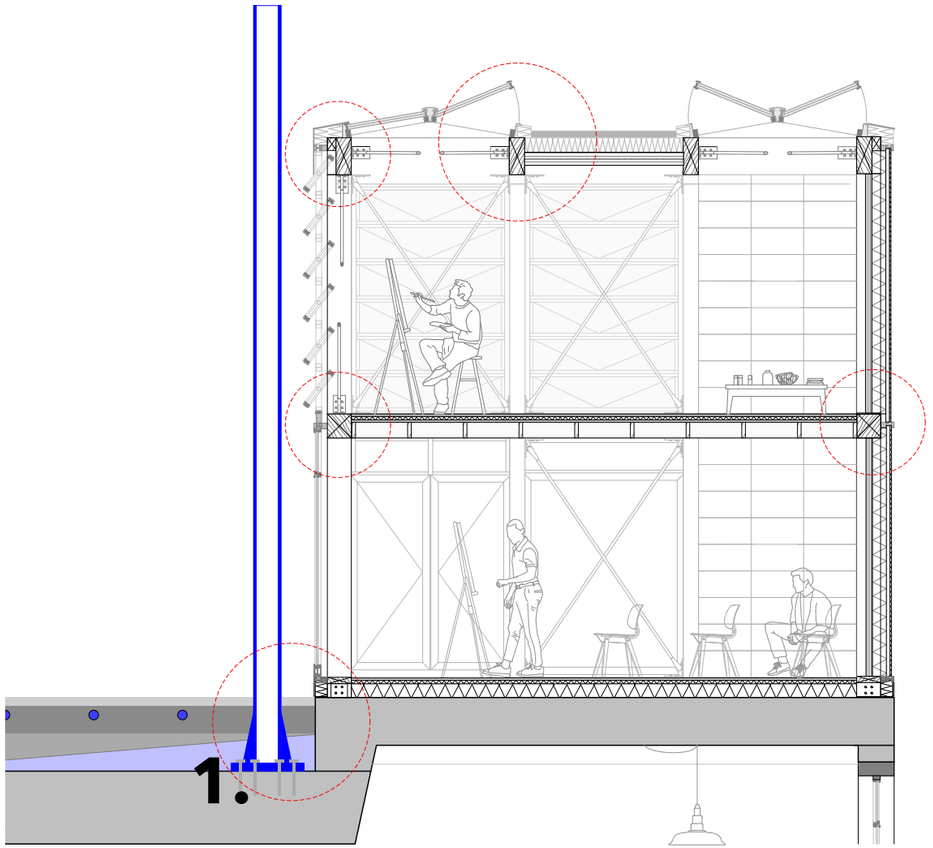


III. RESEARCH IMPLEMENTATION

FLOOR DETAIL
1:5

1.

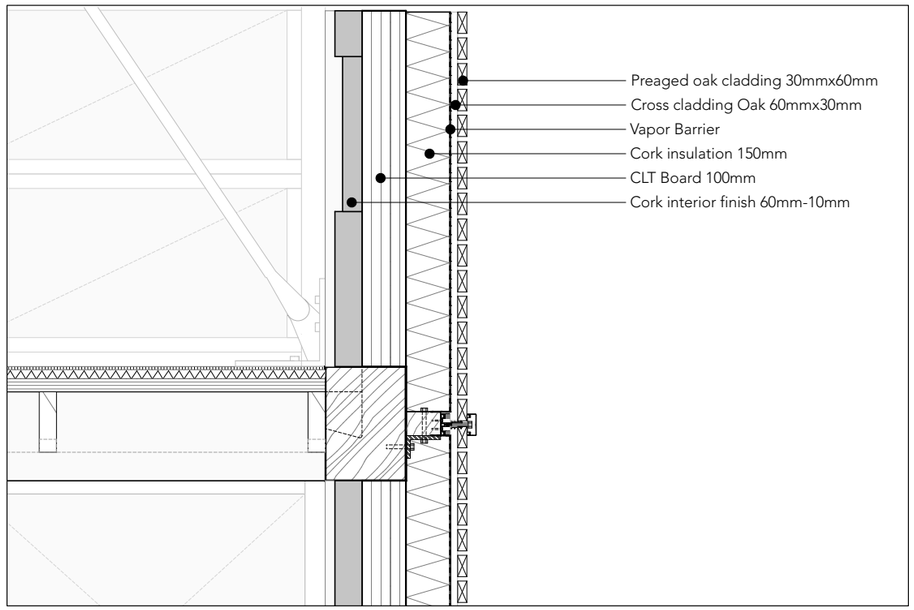




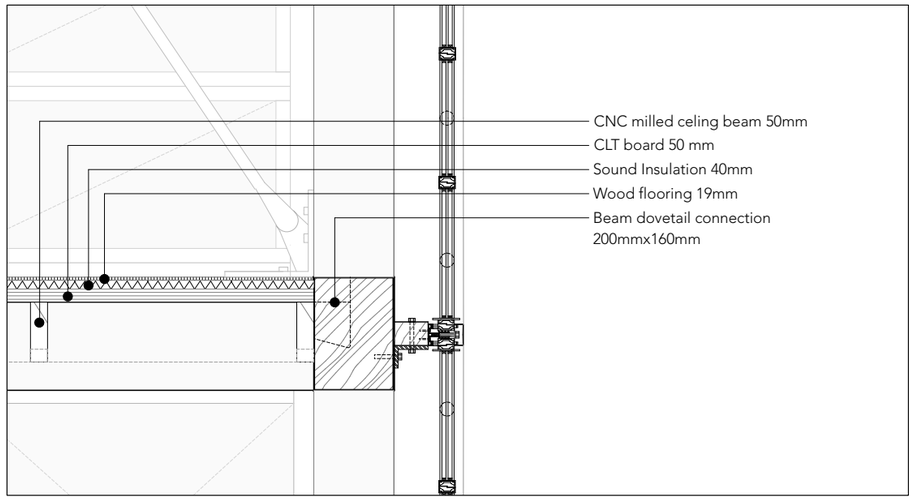
III. RESEARCH IMPLEMENTATION

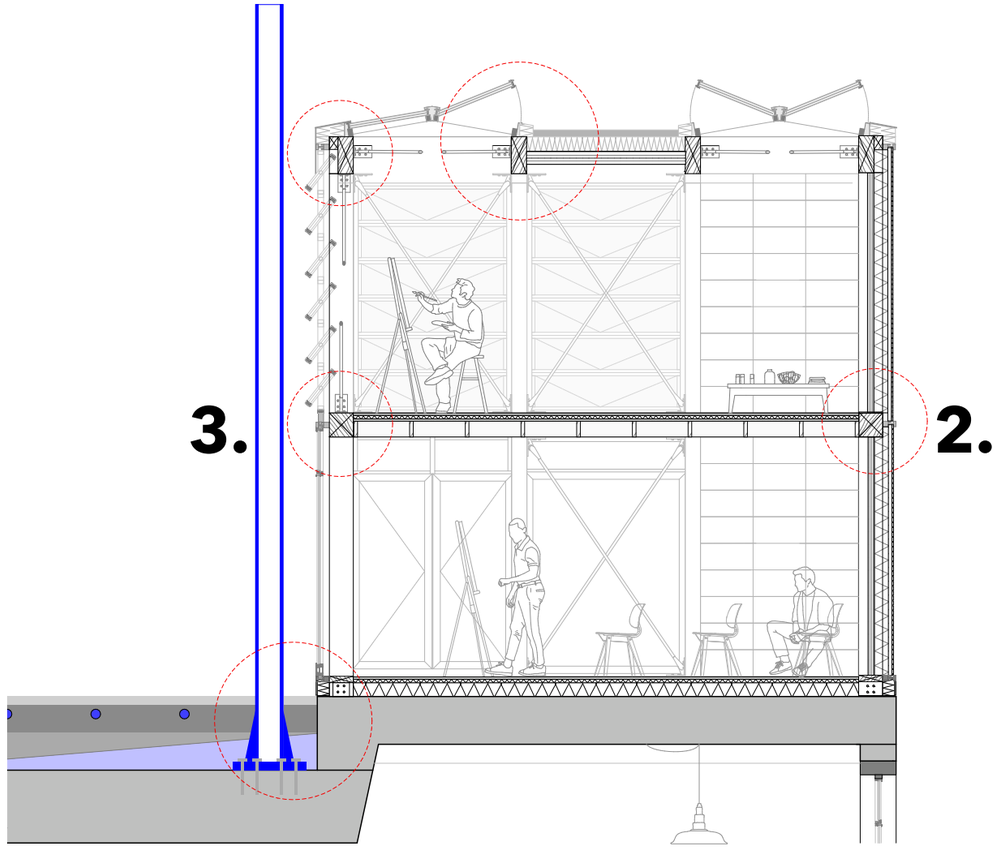
FLOOR DETAIL
1:5

2.



3.

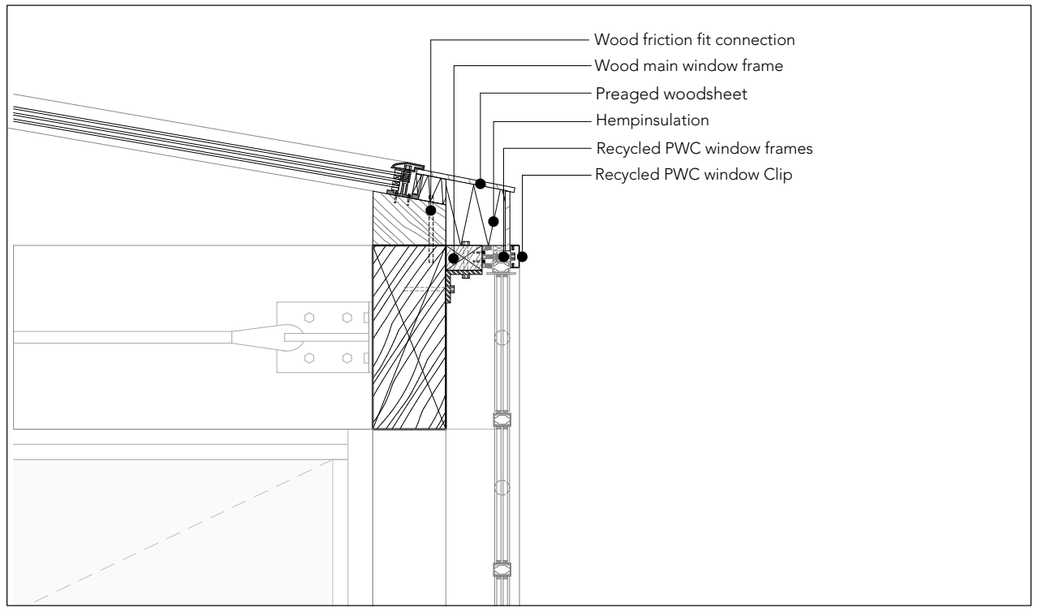




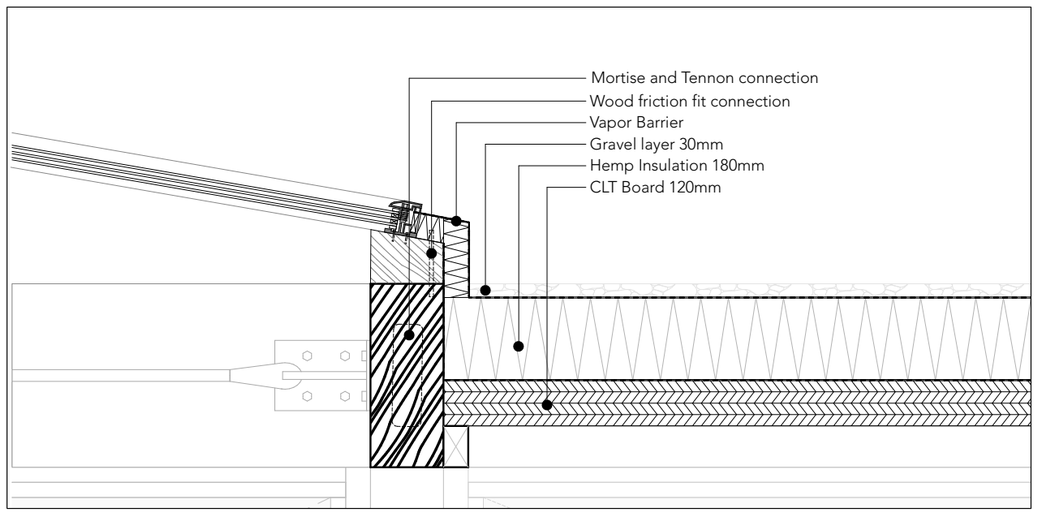
III. RESEARCH IMPLEMENTATION

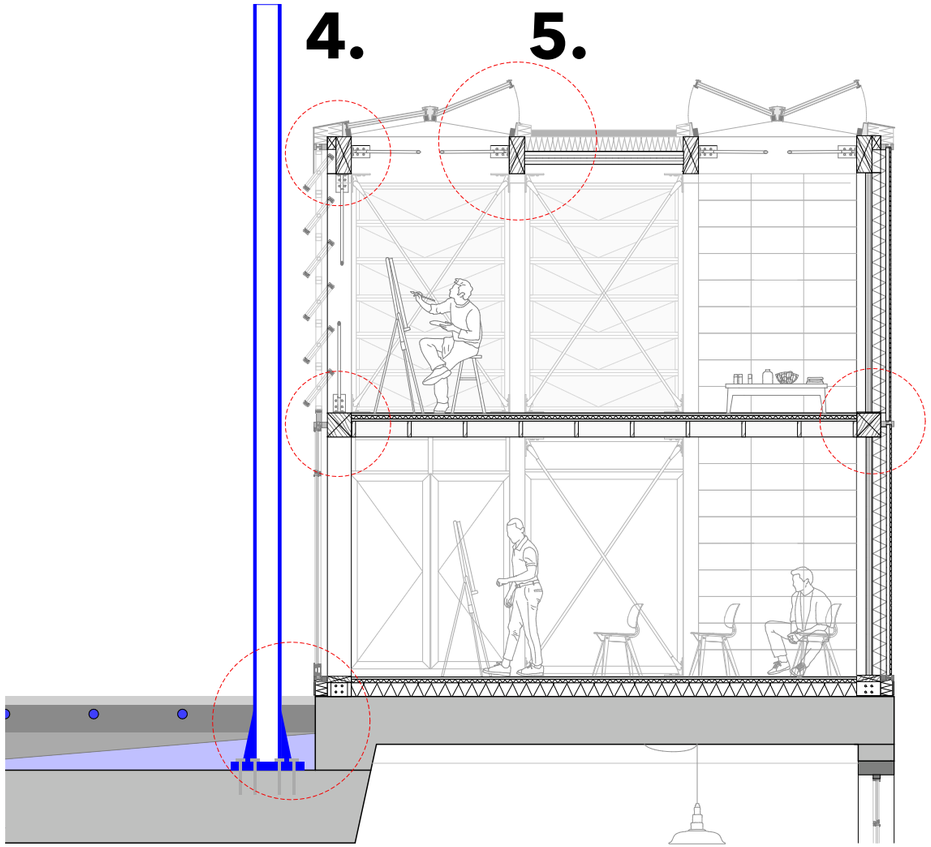
FLOOR DETAIL
1:5

5.



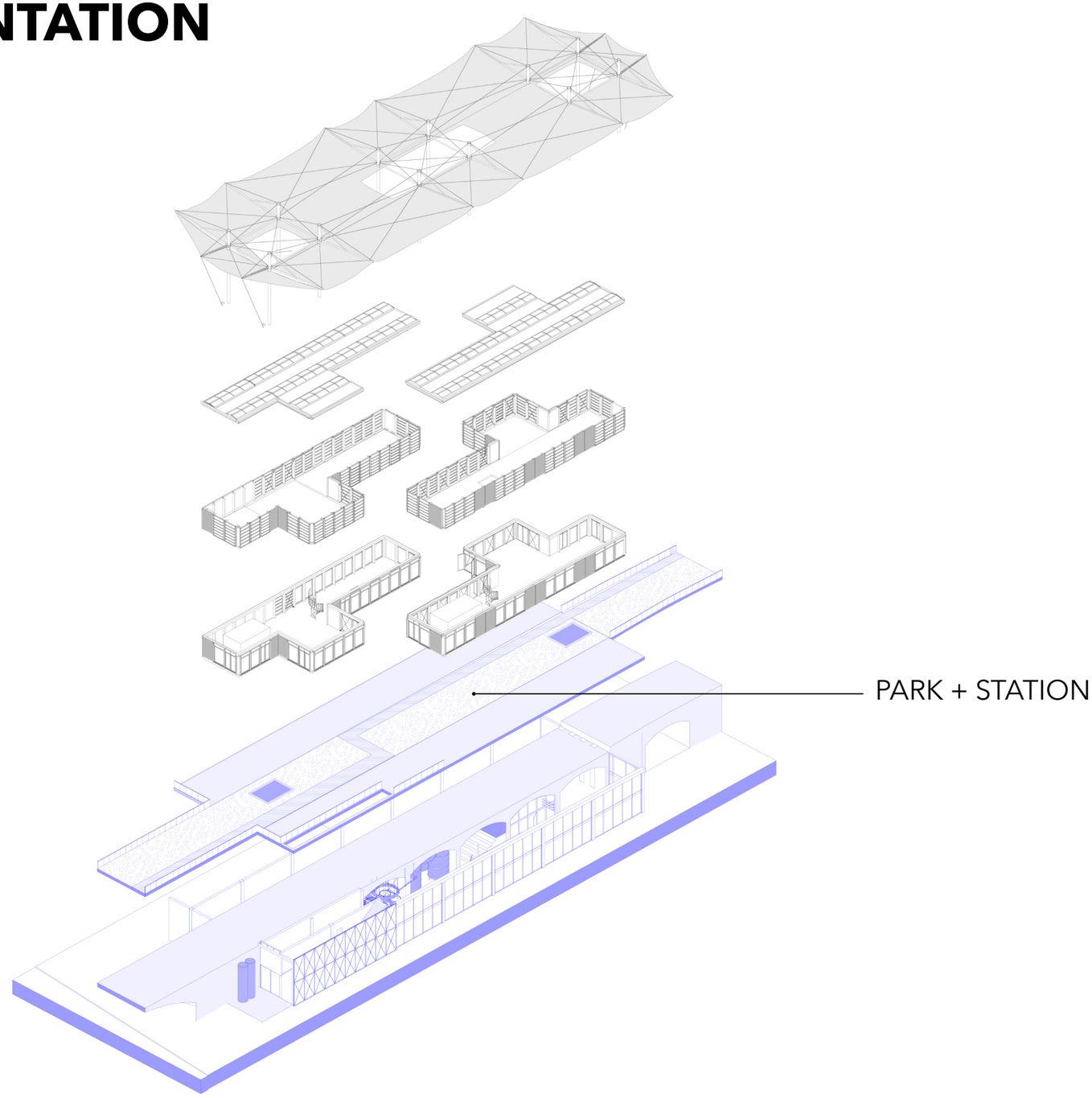
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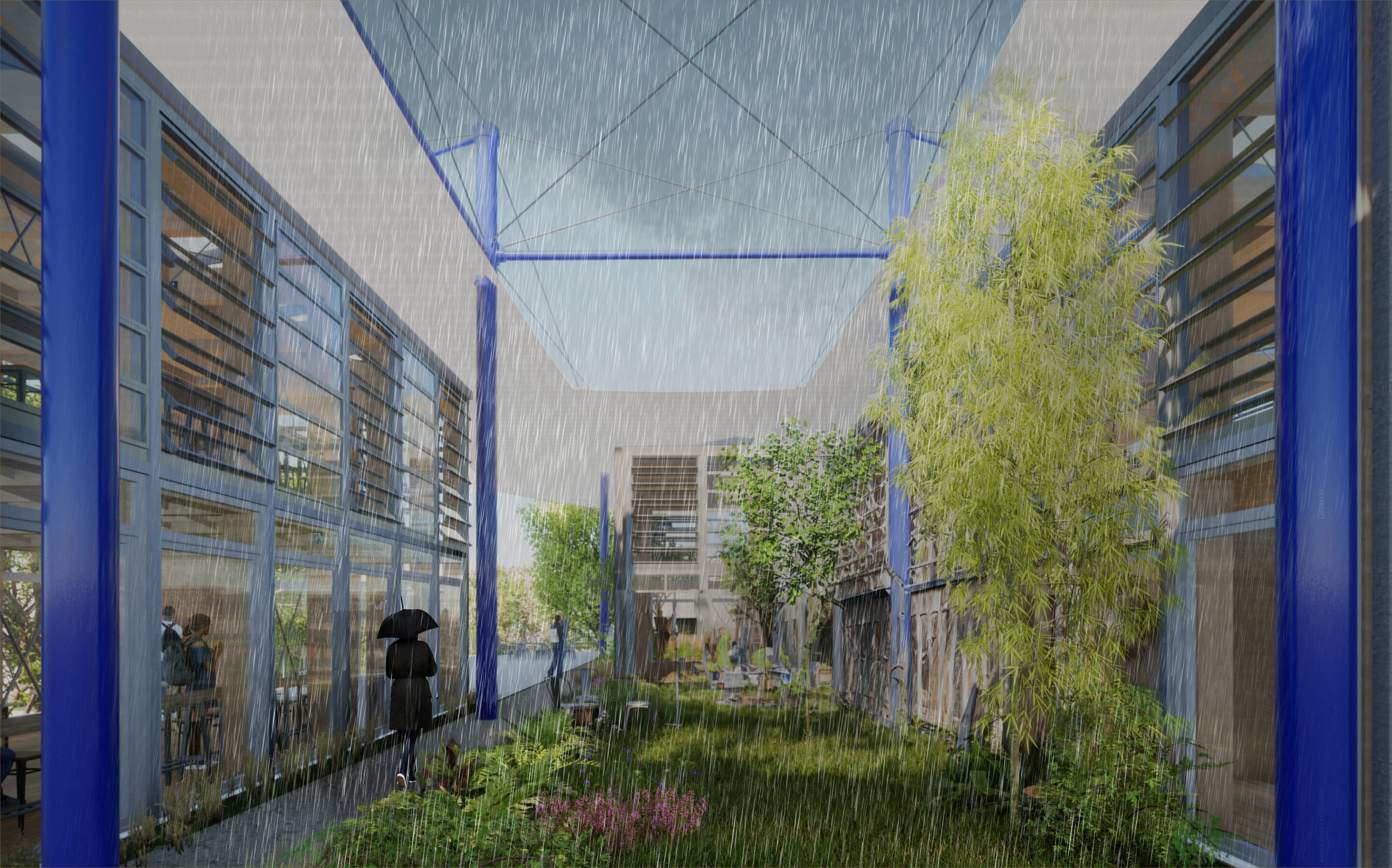


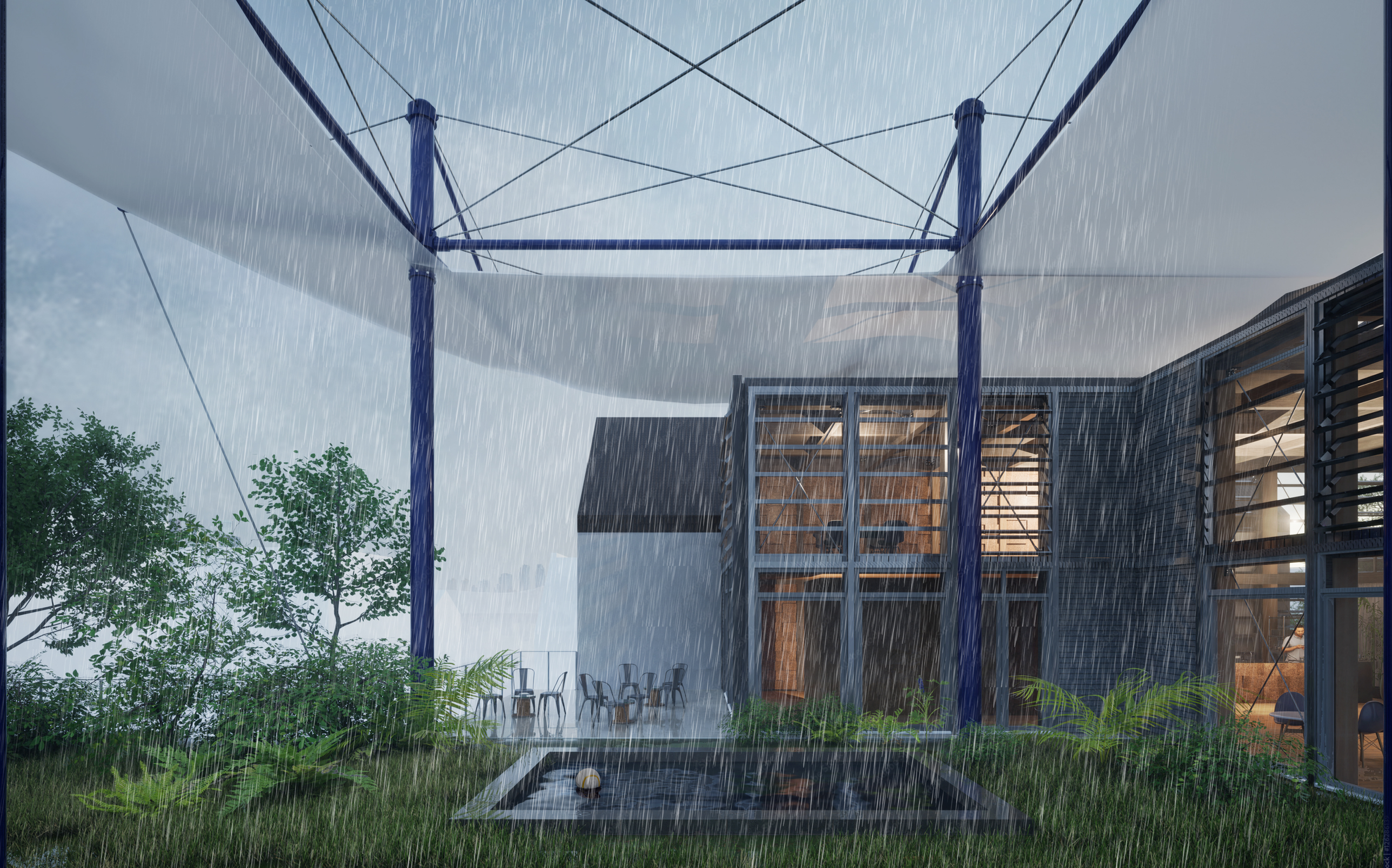




III. DESIGN IMPLEMENTATION



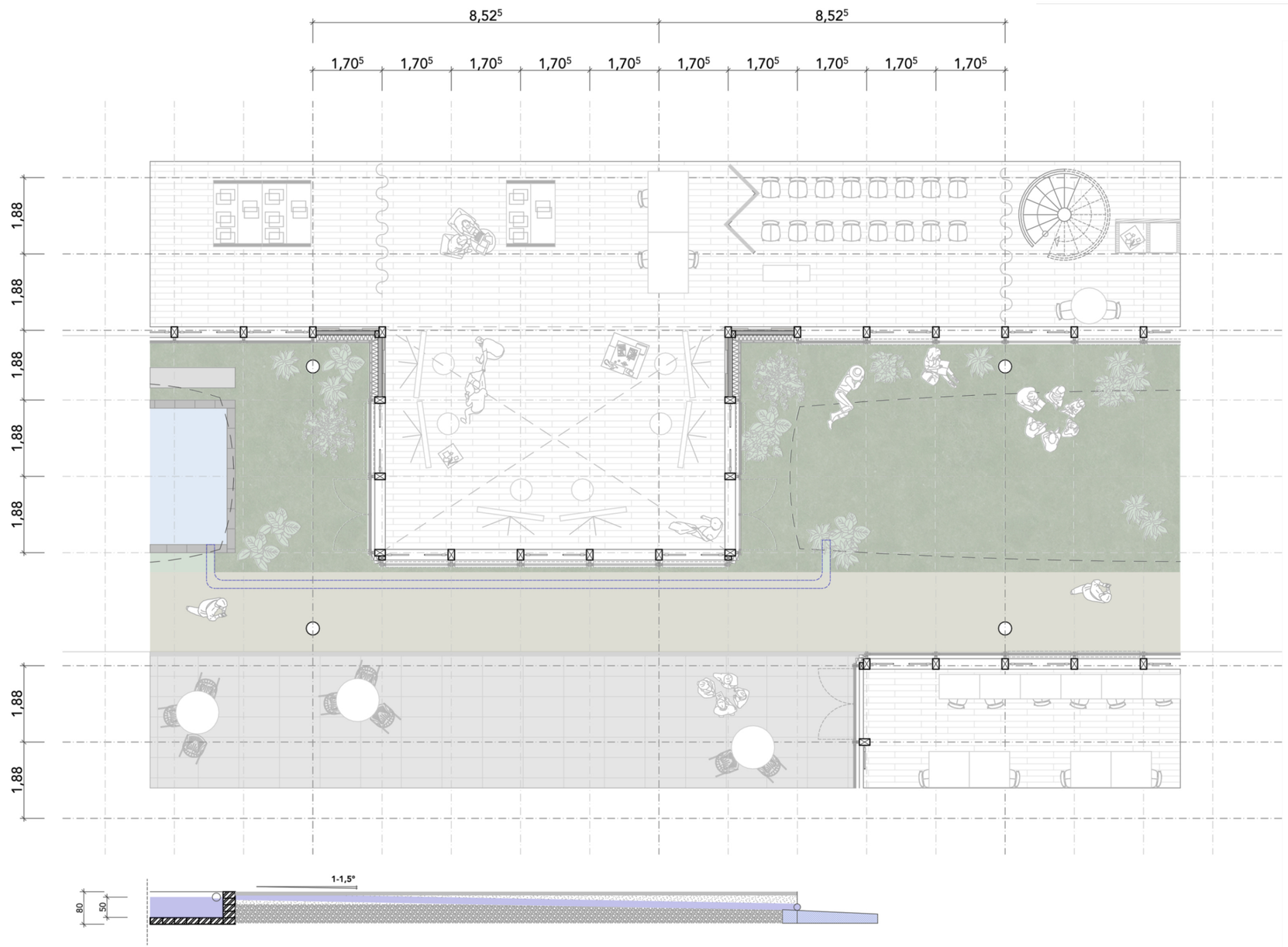




III. DESIGN IMPLEMENTATION

PLATFORM FLOORPLAN

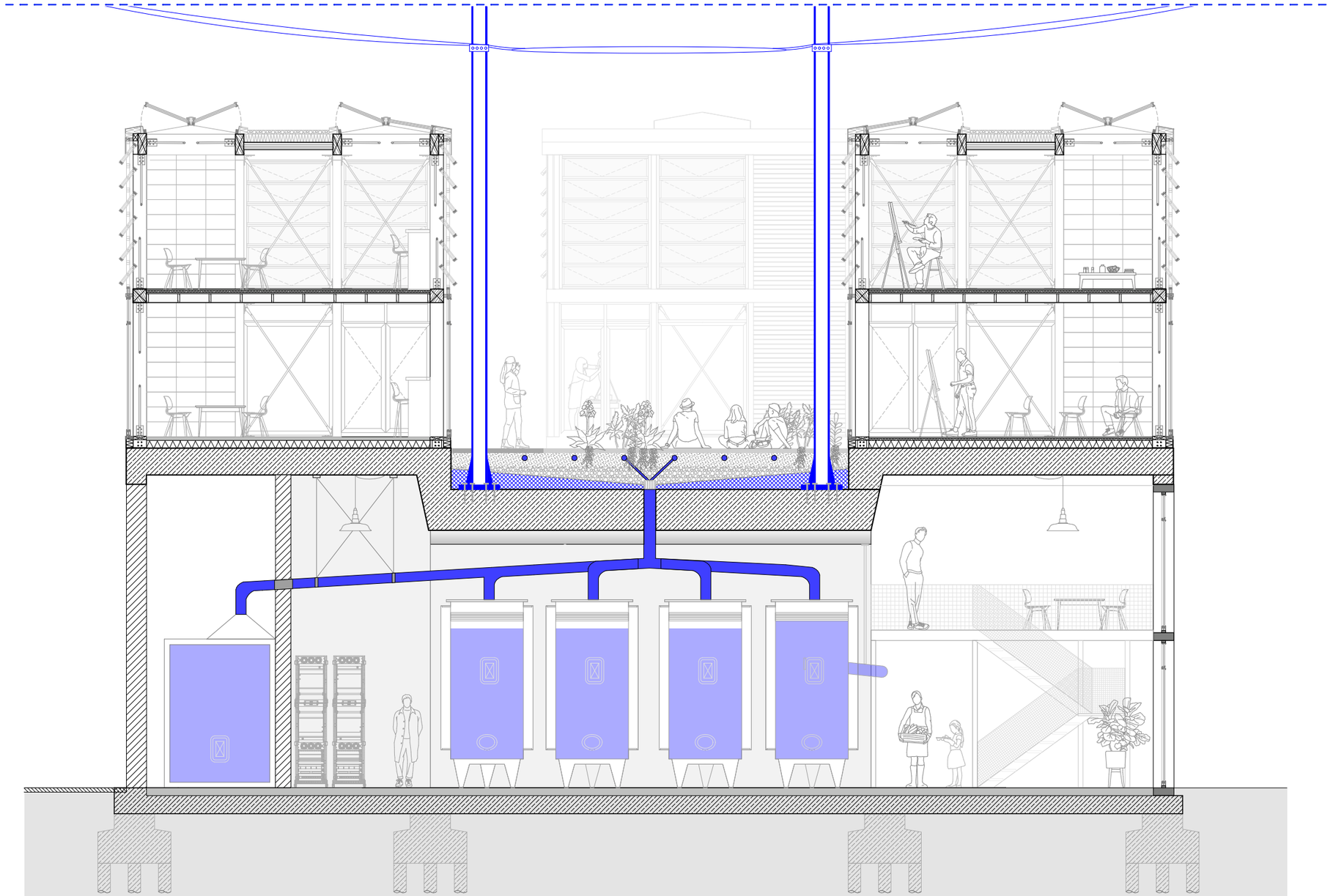
1:50



III. DESIGN IMPLEMENTATION

NORTH - EAST SECTION

1:50



DATA *IS THE NEW OIL*

THE ECONOMIST

WATER *IS THE NEW OIL*

THE GUARDIAN

III. DESIGN IMPLEMENTATION

EXISTING TRAIN STATION



1956-2015



2015

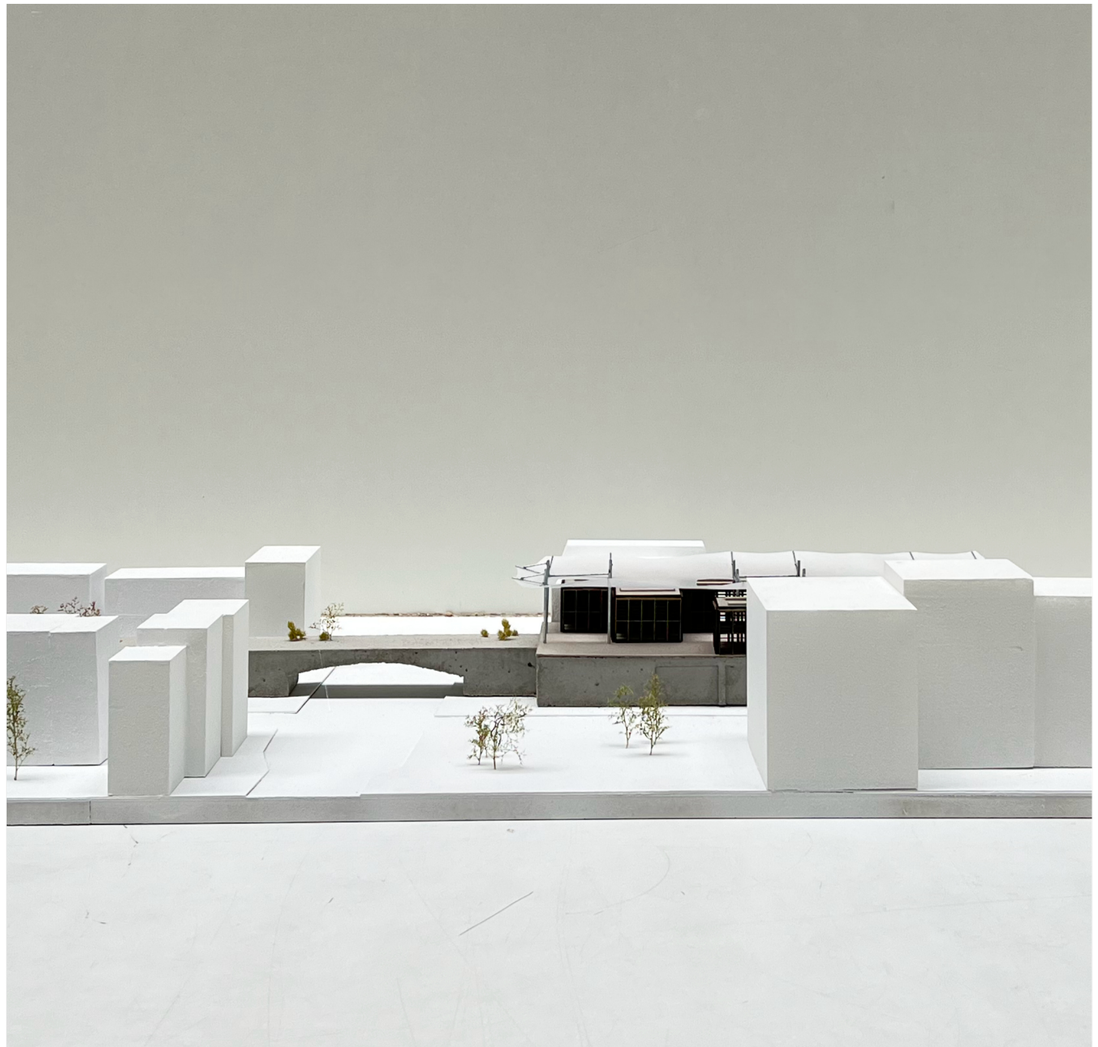


2015-

III. DESIGN IMPLEMENTATION

EXISTING TRAIN STATION





III. DESIGN IMPLEMENTATION

EXISTING TRAIN STATION

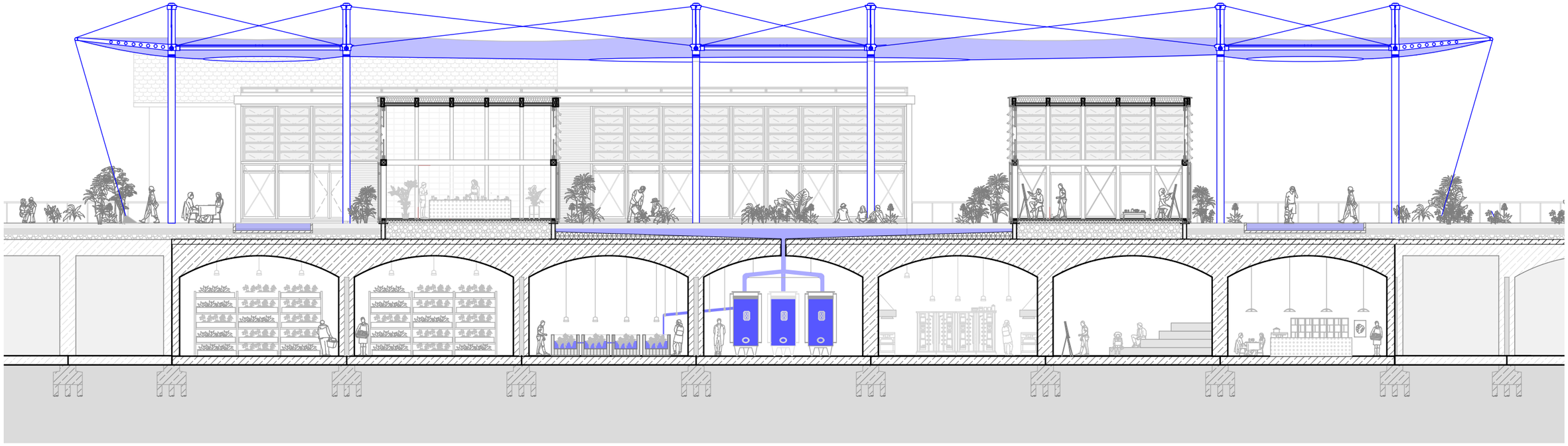




III. DESIGN IMPLEMENTATION: FUNCTIONS OVERVIEW

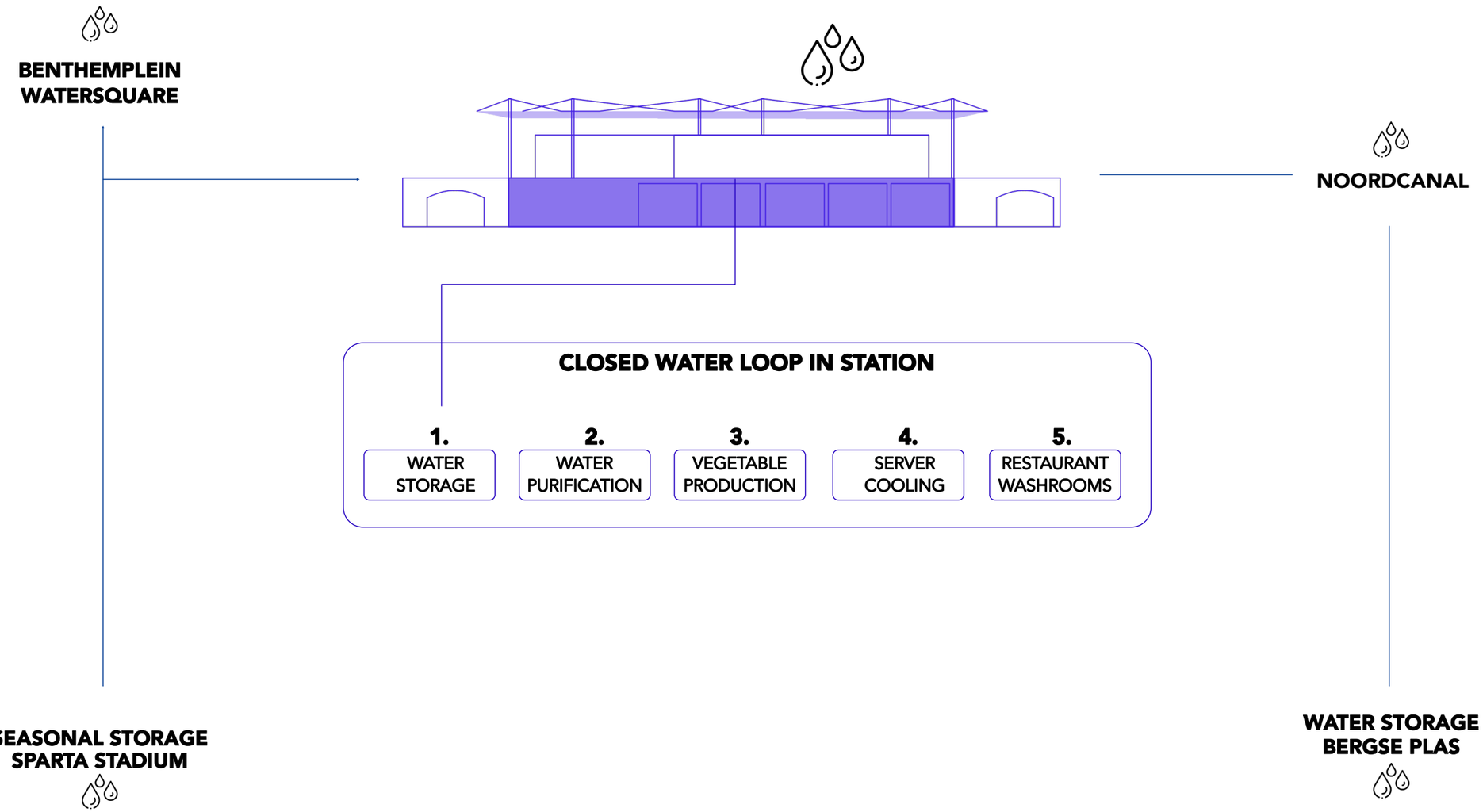
NORTH-WEST SECTION

1:200



III. DESIGN IMPLEMENTATION

URBAN WATER STRATEGY



III. DESIGN IMPLEMENTATION

LOCAL WATER STRATEGY

Rain Water Calculation

Water Station Harvest Roof: 1051m2
Average rain water per year in m: 0,835m/m2
1051m2 x 0,835m rainwater per year = 877m3 / 877.0000 liters
877m3 / 365 = 2.400 liters per day

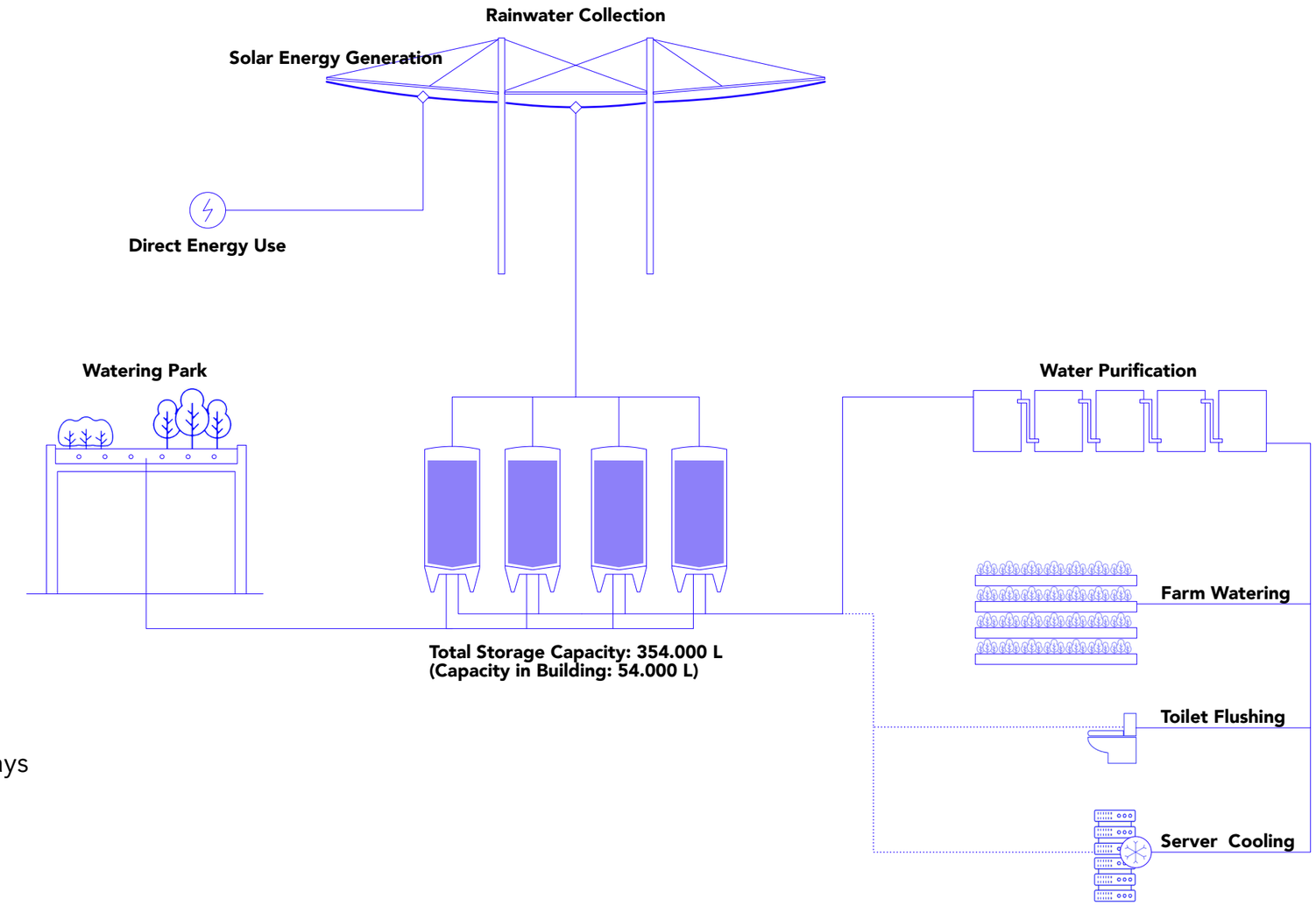
Park Requirements

Park needs 2,7 liters/m2 per day in growing season
Park Around the water station: 445m2
2,7 liters/m2 per day x 445m Park = 1201 liters per day

Roof can save double what the park needs per day!

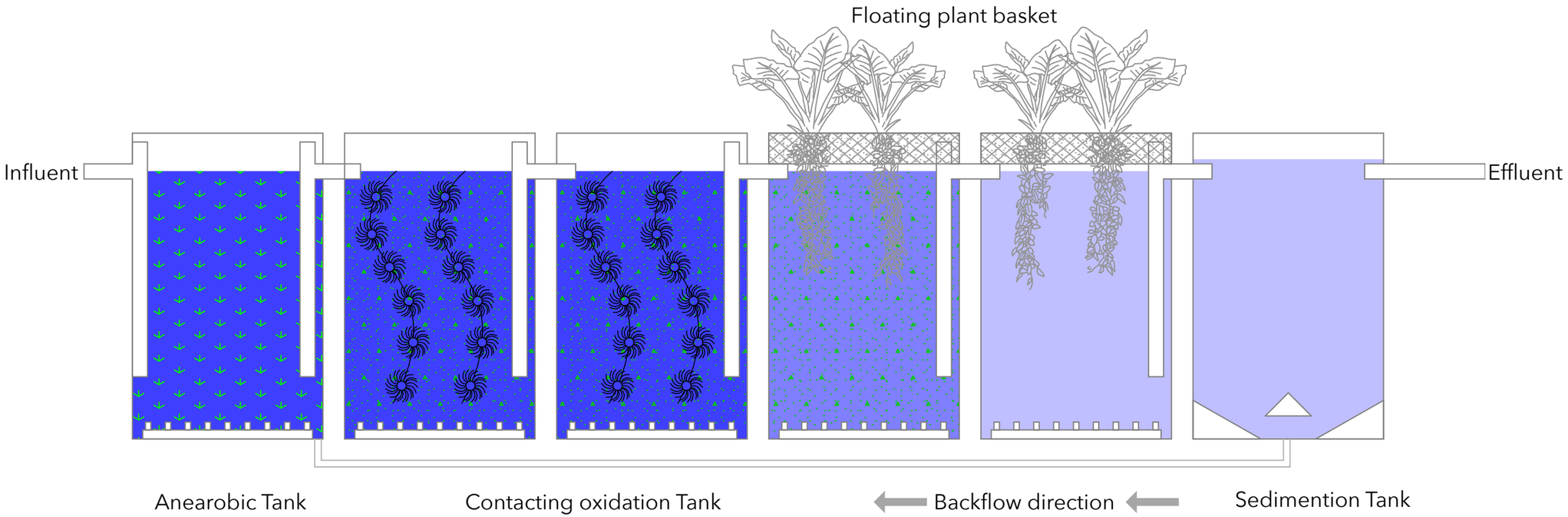
Storage & Buffer for Drought

Subsequent average rain days to fill tanks in the building: 23 days
Days to water the park (455m2) in times of drought: 45 days



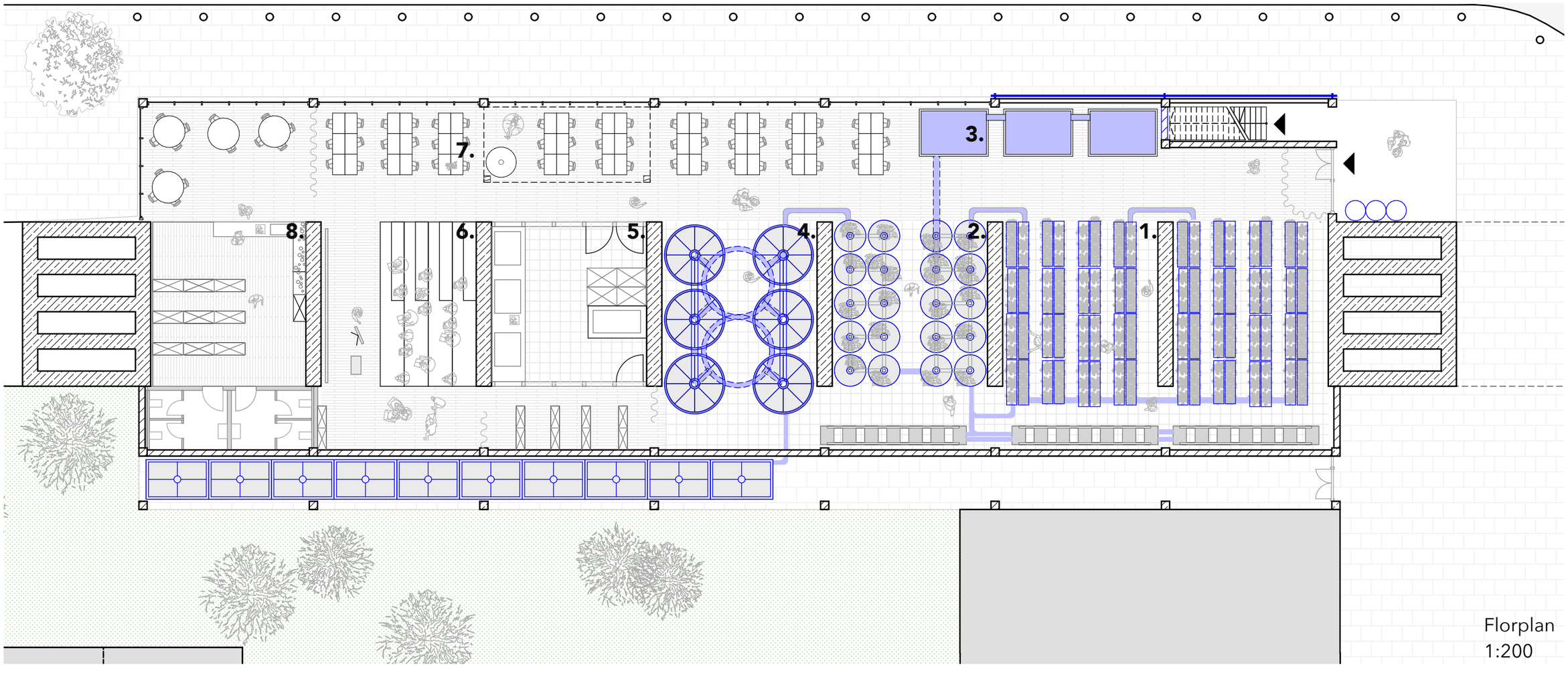
III. DESIGN IMPLEMENTATION

LOCAL WATER STRATEGY



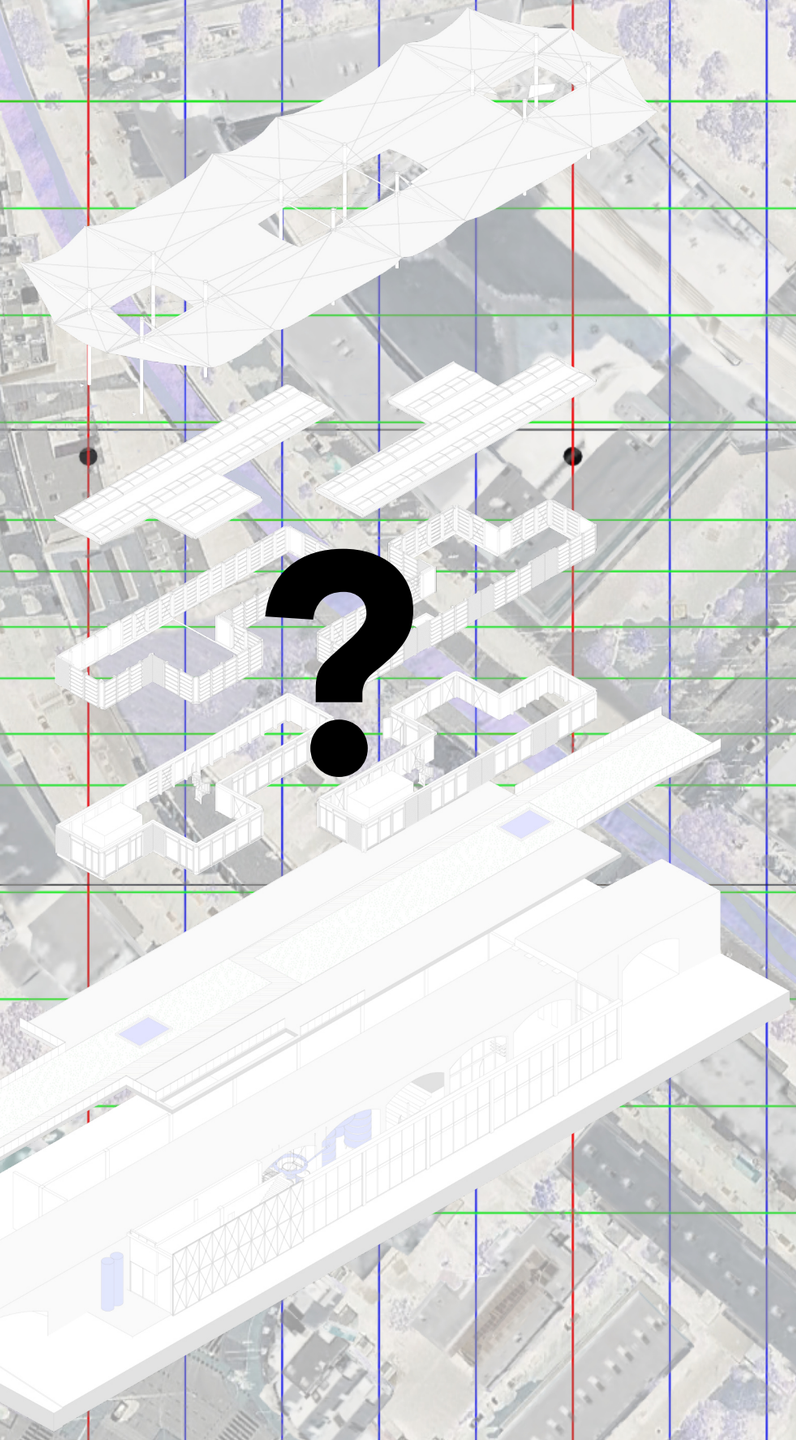
III. DESIGN IMPLEMENTATION: STATION PROGRAMME

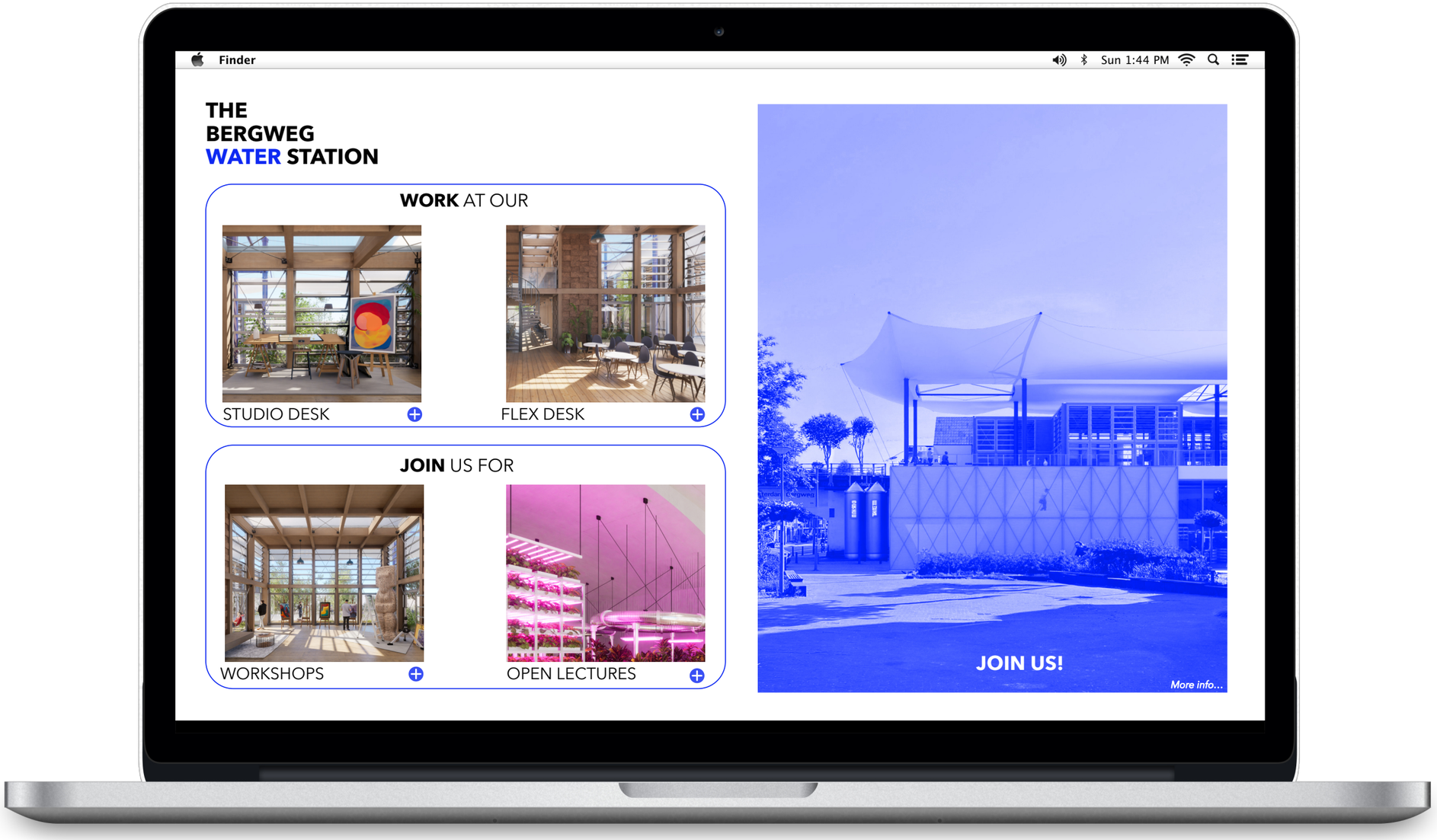
1. Vegetables production	***180sqm***	2. Living machine	***70sqm***
3. Aquaponic	***45sqm***	4. Interior water tanks	***54.000l***
5. Open Lab	***70sqm***	6. Lecture room	***70sqm***
7. Workshop Space	***100sqm***	8. Vegan Bar	***130sqm***



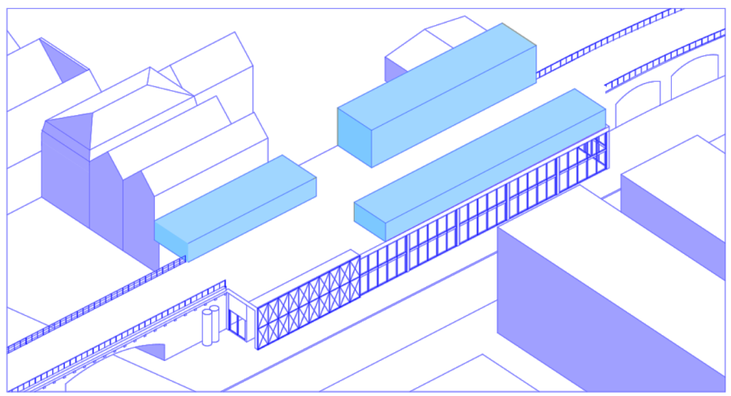
Florplan
1:200



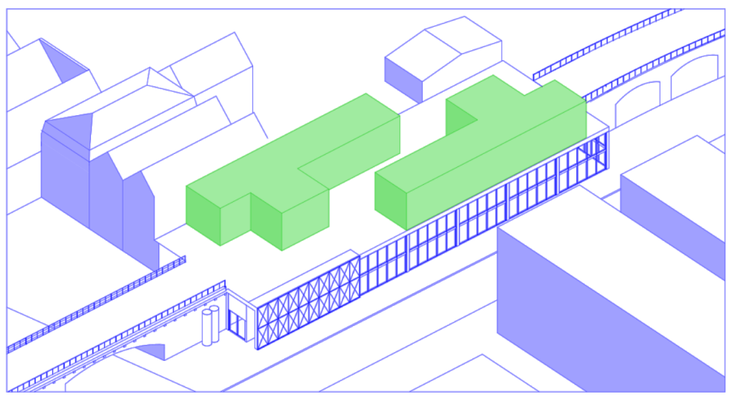



Finder
Sun 1:44 PM
THE
BERGWEG
WATER STATION
WORK AT OUR
STUDIO DESK
FLEX DESK
JOIN US FOR
WORKSHOPS
OPEN LECTURES
JOIN US!
More info...

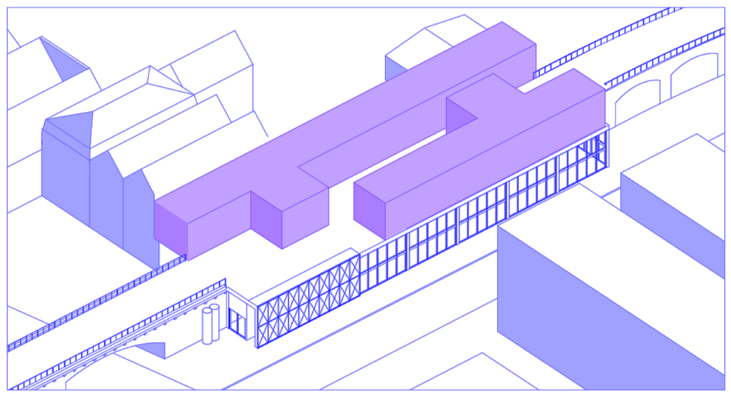
III. DESIGN IMPLEMENTATION : CONFIGURATIONS



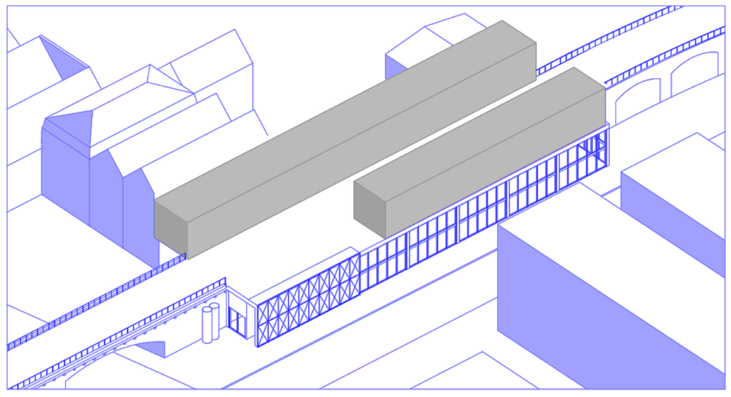
MIX (50 USERS)



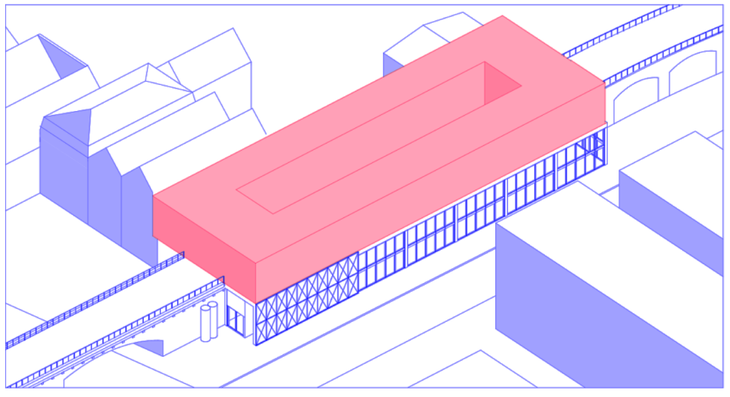
GARDEN LAYOUT (120 USERS)



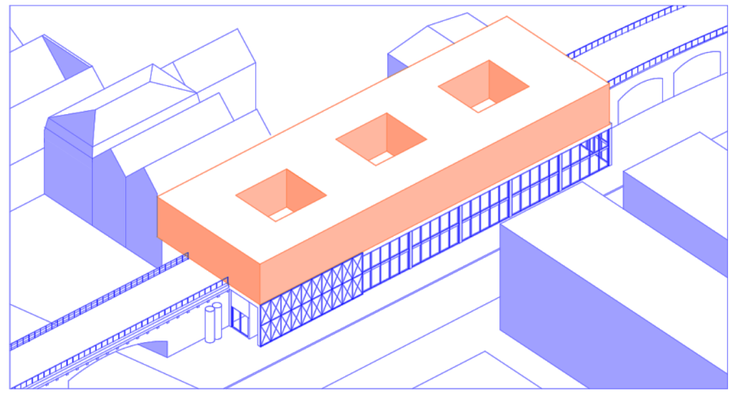
GARDEN LAYOUT EXT. (140 USERS)



CORRIDOR (90 USERS)



ENCLOSED (150 USERS)



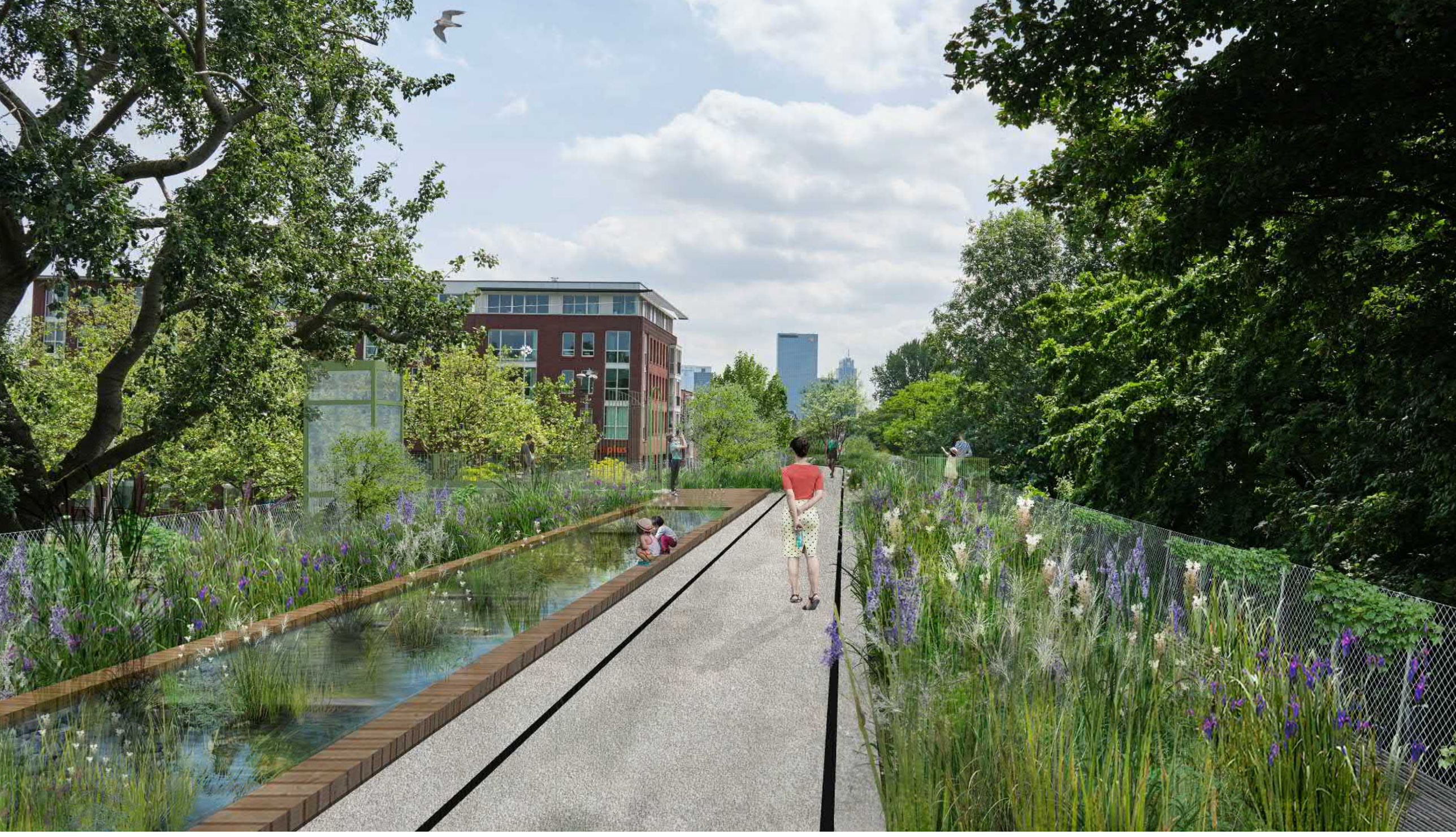
FULL PLOT (220 USERS)

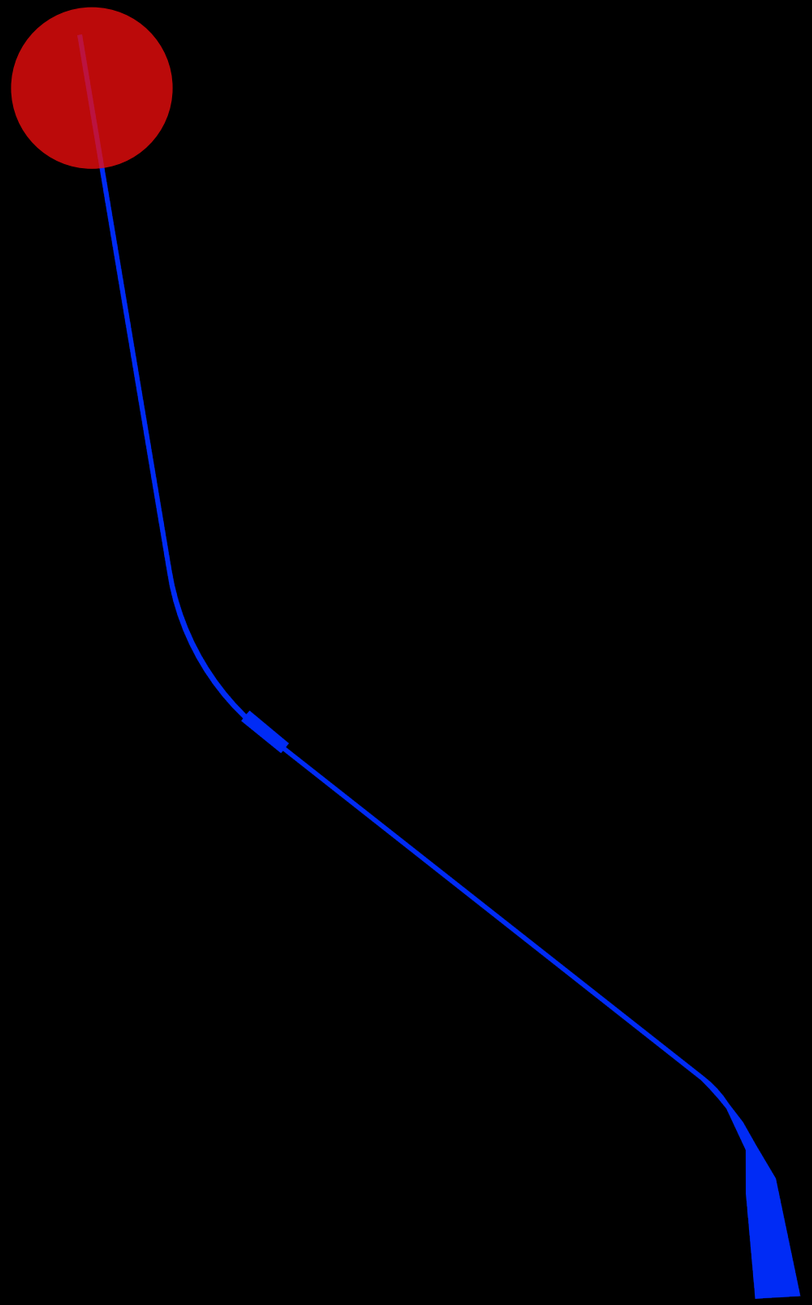
GLOBAL MATERIAL FLOWS





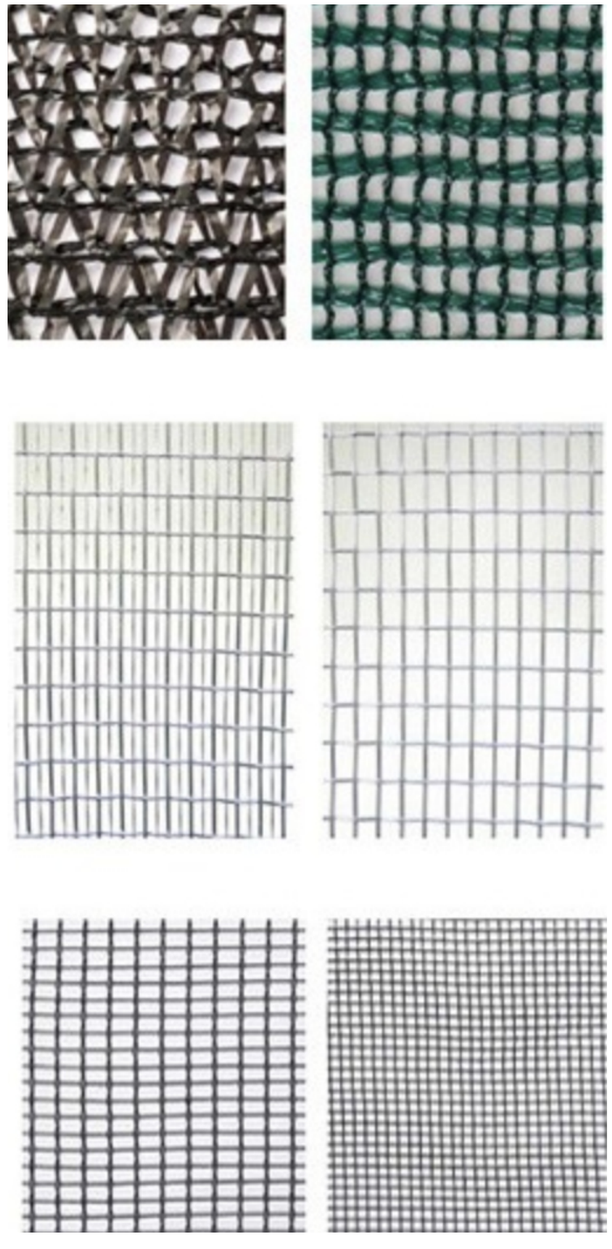






SECTION NOORDCANAL

IV. NOORDCANAL PAVILION / SECOND LIFE



THE BERGWEG WATER STATION_P5_040723





MAX LIESER_5626293

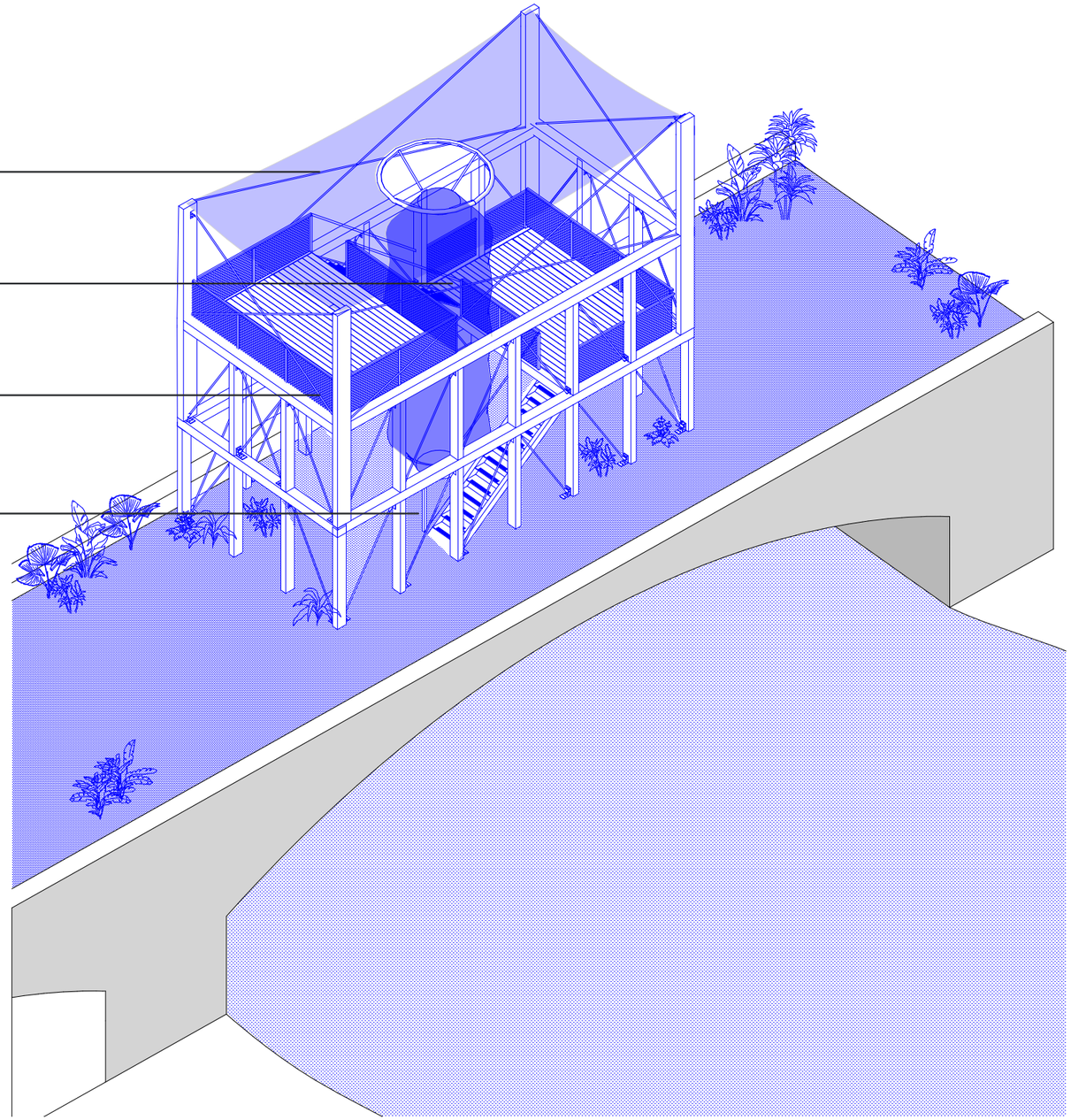
IV. NOORDCANAL PAVILION / SECOND LIFE

RAIN MEMBRAN

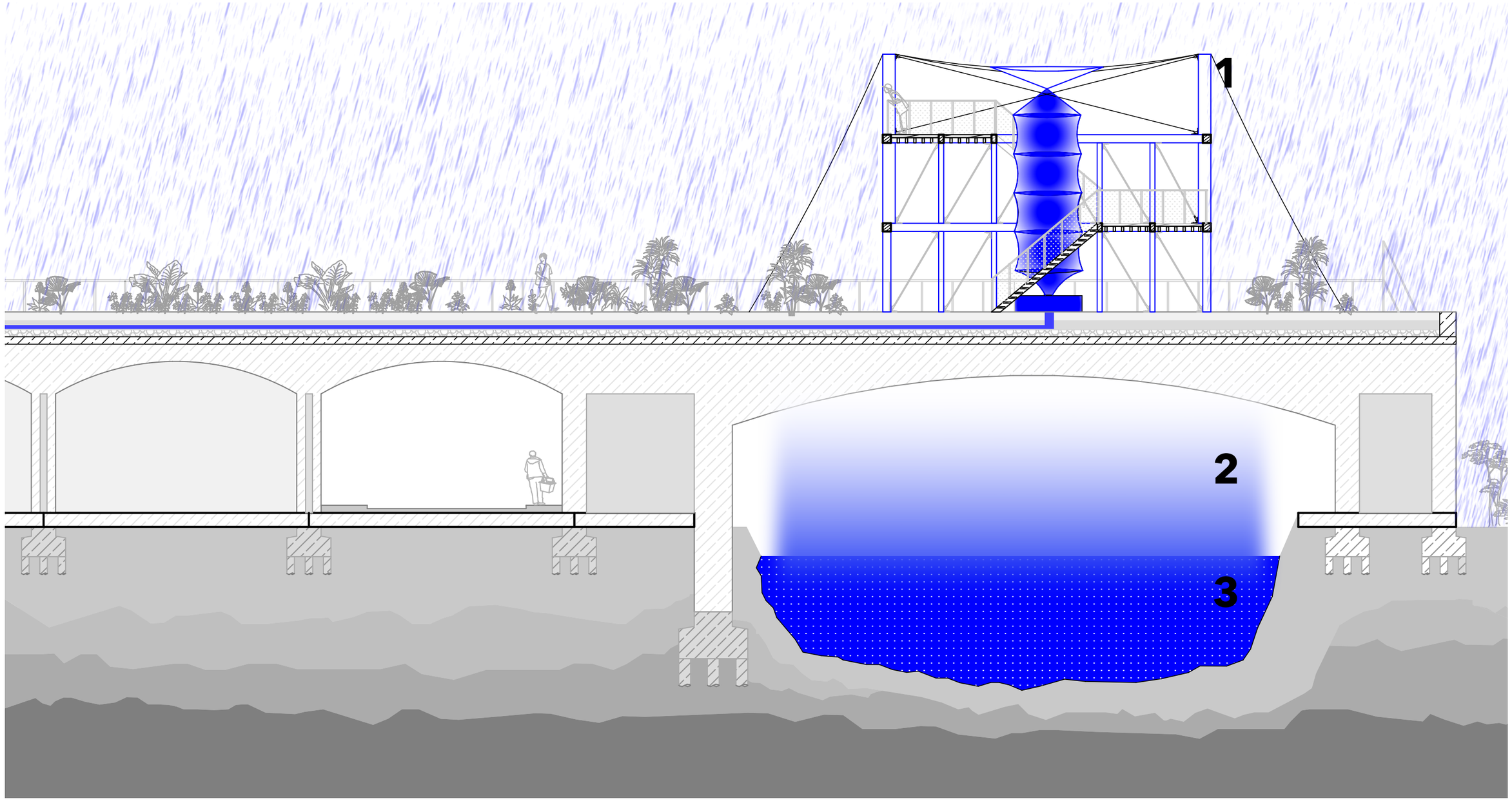
FOG HUNTING FABRIC

OBSERVATION DECK

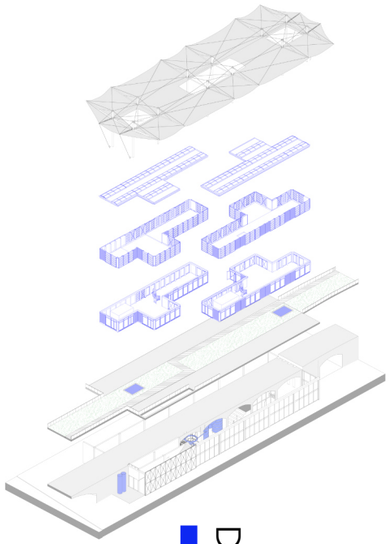
WATER DISTRIBUTION



IV. NOORDCANAL PAVILION / SECOND LIFE

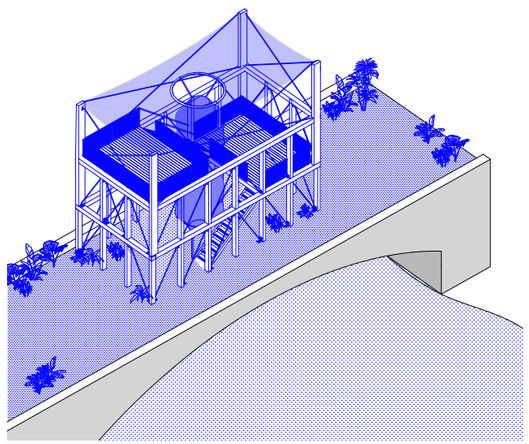


IV. NOORDCANAL PAVILION / SECOND LIFE

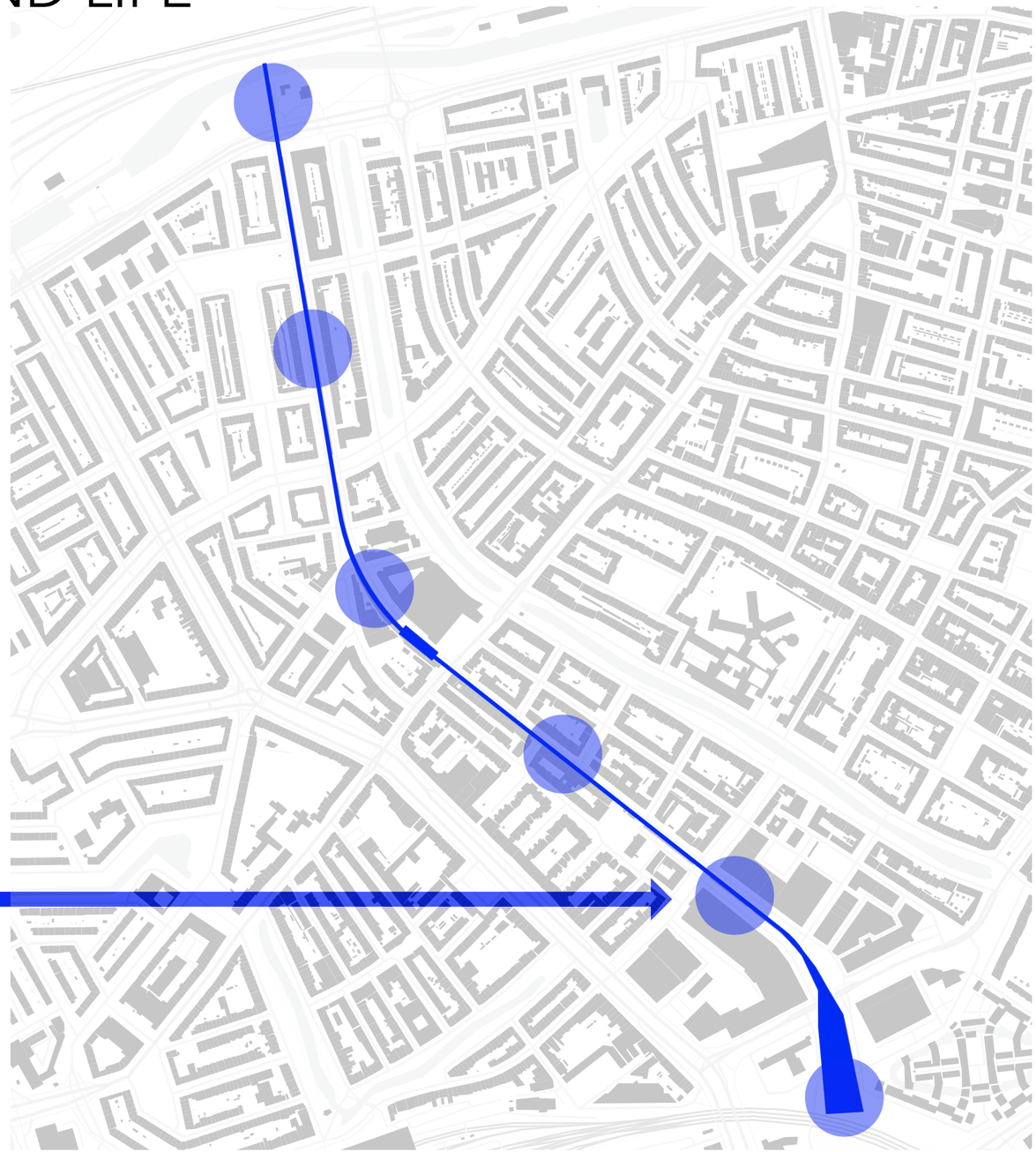


DISASSEMBLY

6x



REUSE



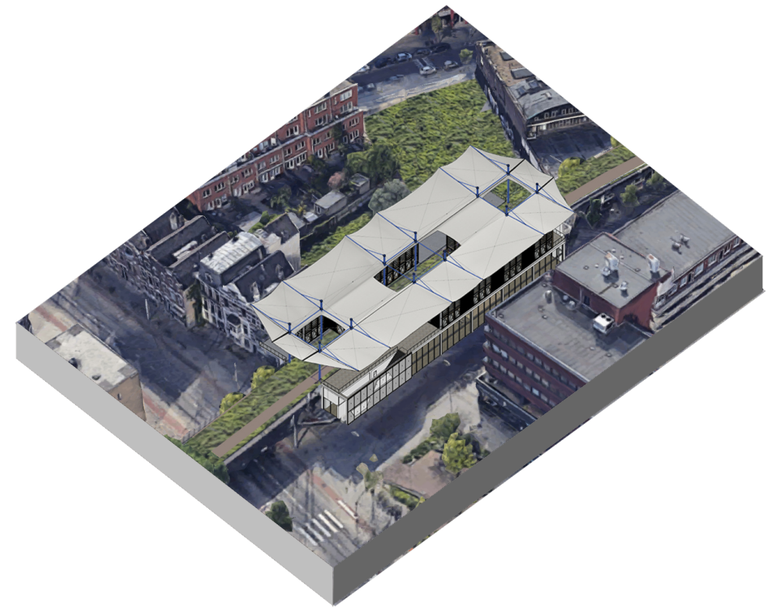
IV. NOORDCANAL PAVILION
SECOND LIFE



REPURPOSING THE BERWEG ROOFSPACE

IDENTIFY EMPTY ROOFSPACE

1.300sqm



REPURPOSING THE BERWEG ROOFSPACE

IDENTIFY ROOFSPACE POTENTIAL

500 sqm

Nature & Relaxation

125 Persons

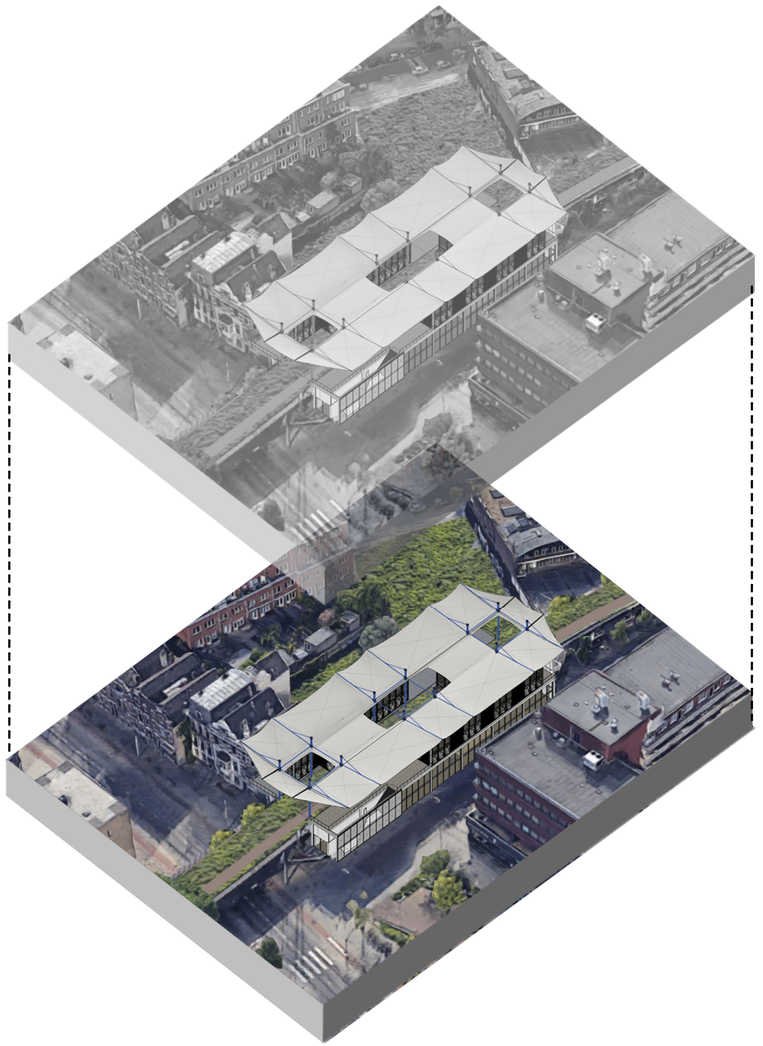
Workspaces

220 sqm

Art Display

IDENTIFY EMPTY ROOFSPACE

1.300sqm



REPURPOSING THE BERWEG ROOFSPACE

DIDACTIC AND TANGIBLE

54.000 l
Water Collection

1100 sqm
Solar Energy

1500 l/day
Water Purification

400 sqm
Vegetable Production

IDENTIFY ROOFSPACE POTENTIAL

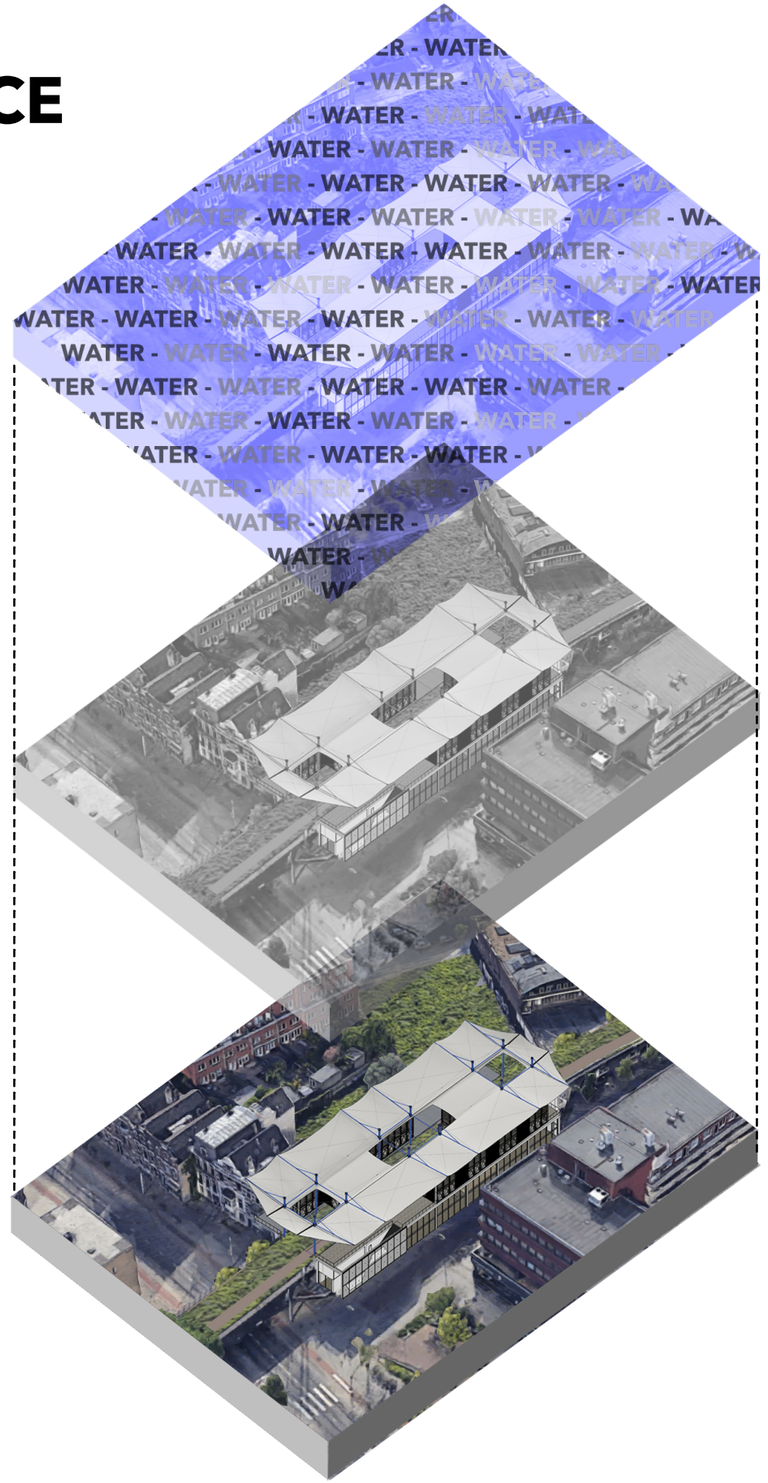
500 sqm
Nature & Relaxation

125 Persons
Workspaces

220 sqm
Art Display

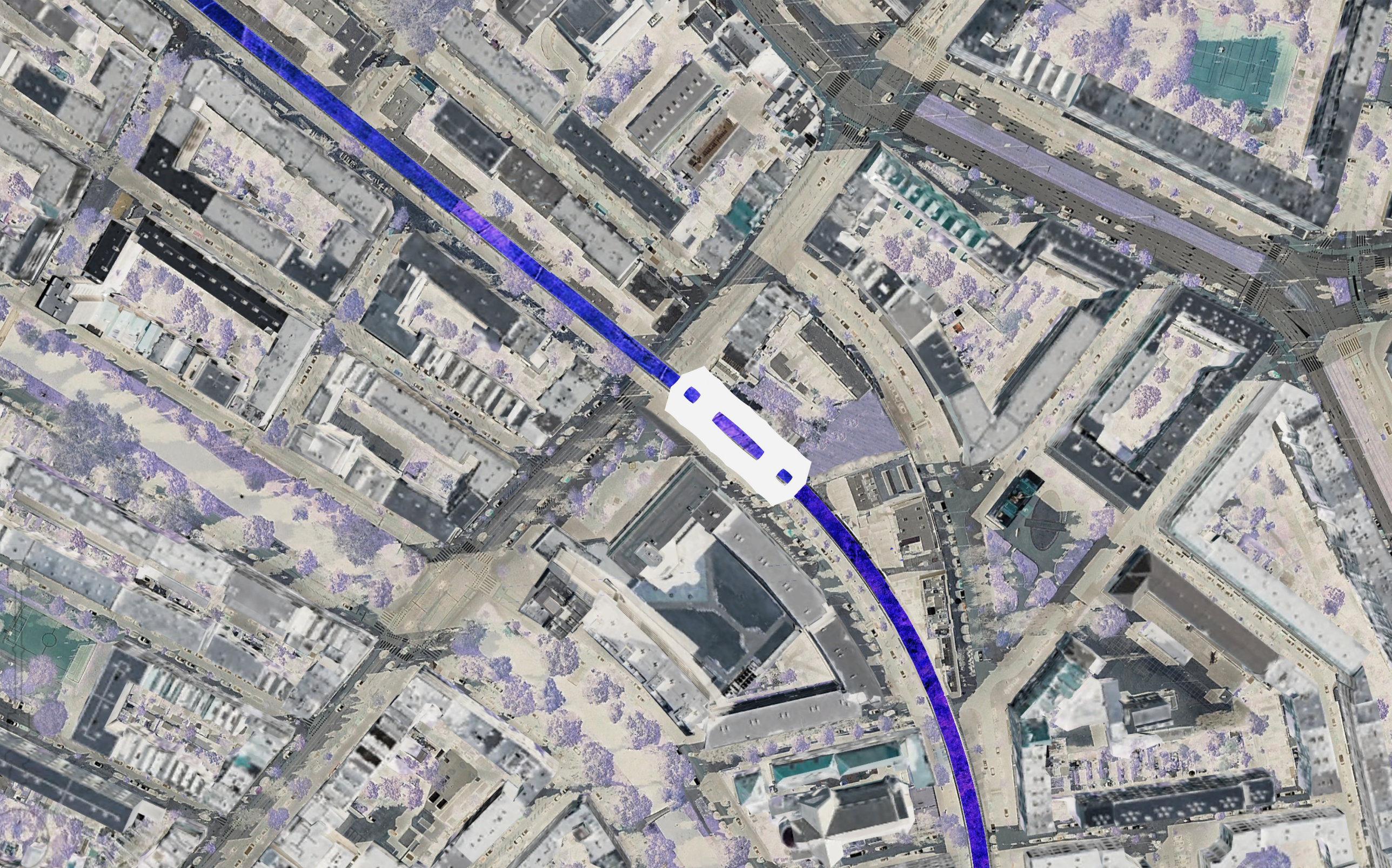
IDENTIFY EMPTY ROOFSPACE

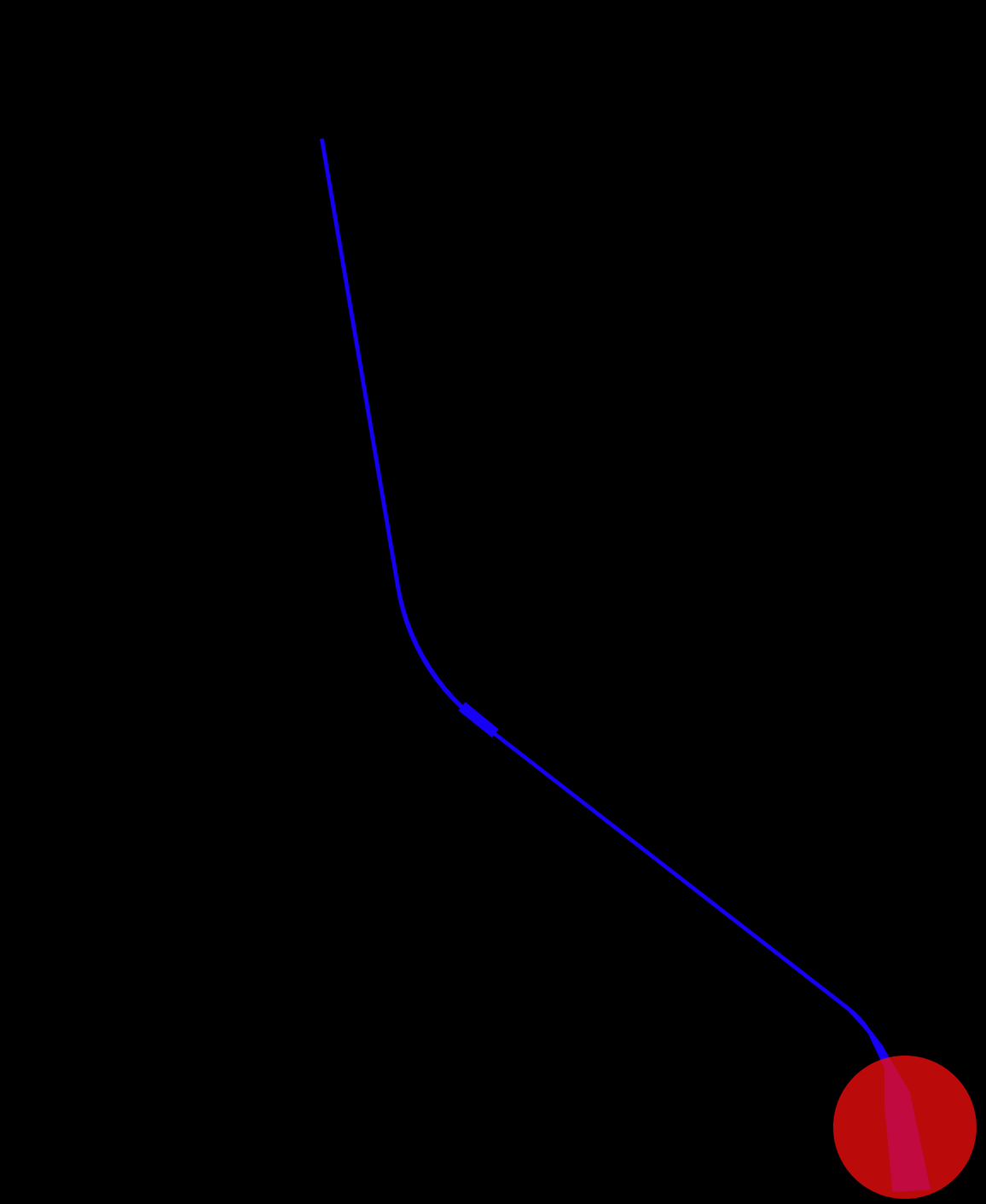
1.300sqm





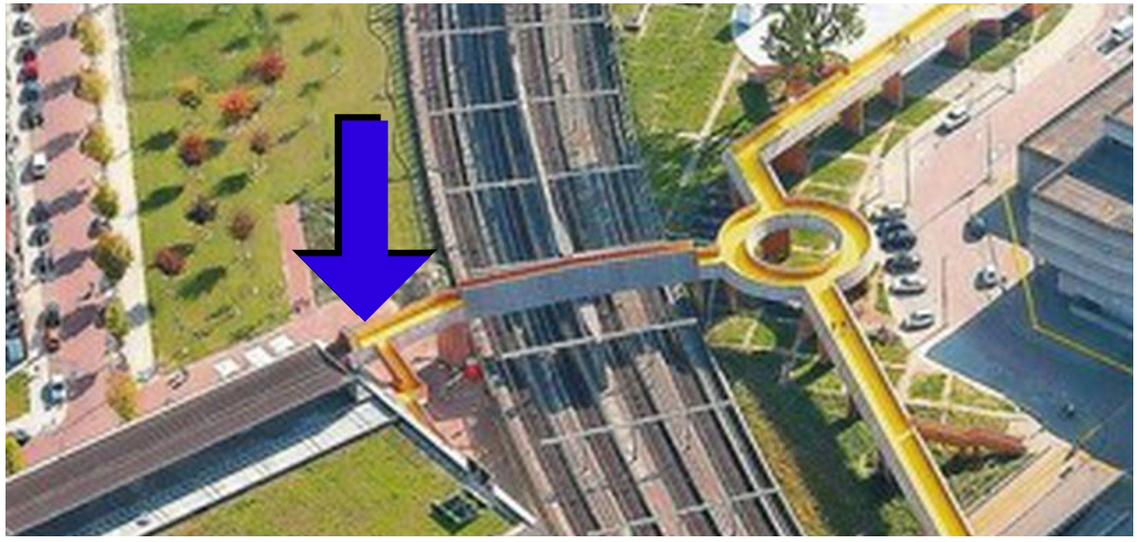
Thank you!





SECTION LUCHTSINGEL

SECTION LUCHTSINGEL







SECTION HOFBOGENPARK



Waterperron Gordelweg