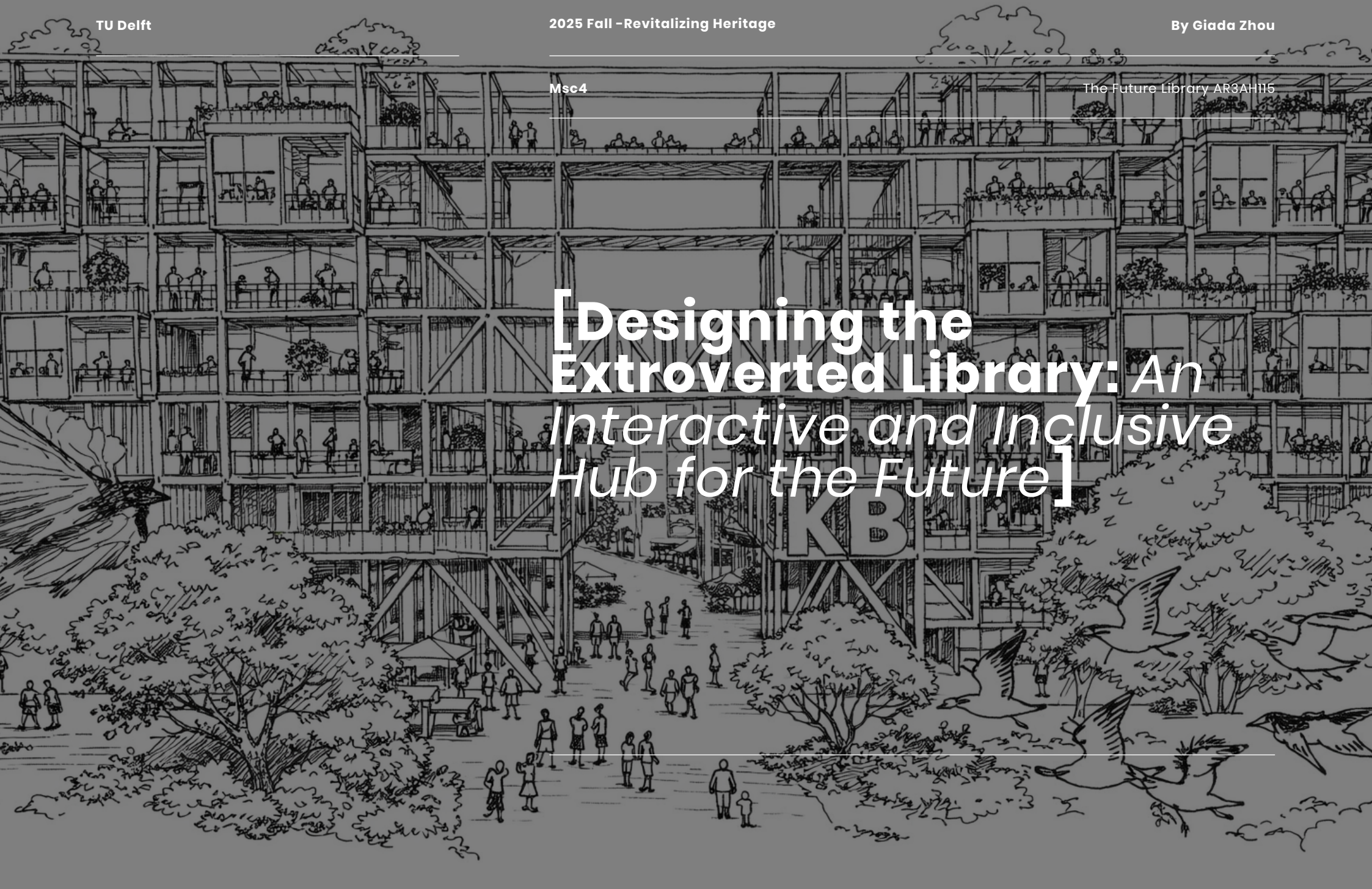
TU Delft

2025 Fall -Revitalizing Heritage

By Giada Zhou

Msc4

The Future Library AR3AH115

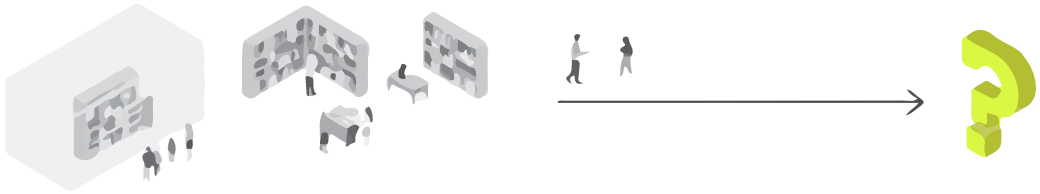


[Designing the Extroverted Library: *An Interactive and Inclusive Hub for the Future*]

Designing the Extroverted Library: An Interactive and Inclusive Hub for the Future

*"Many libraries are dealing with a **drop in patronage** in a world that is **becoming more digital**." (Sharma et al., 2024)*

With the rise of online resources, libraries **risk becoming static spaces**, lacking the **adaptability** needed for future technological and social shifts. Conventional library layouts often do not support interactive or dynamic user experiences, limiting their potential as **vibrant community hubs**.



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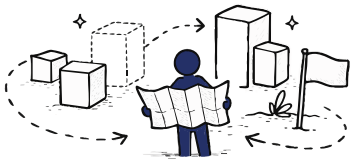
Context, existing building, heritage values and current problems.

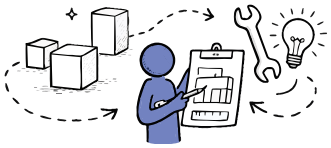
Phase 2 – Research for the Future KB

Technology scan, user interviews, DepthMapX tests and design guidelines.



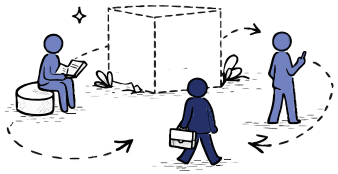
Phase 3 – Heritage Strategy & Big Moves

What is kept and removed, CO2 and material impact, KB Plaza.



Phase 4 – Spatial & Technical Concept

Urban climate, new entrance and access, extroverted timber façade, green–blue, water systems and robotic shelving.



Phase 5 – Lived Building & User Journeys

Daily use by different users, spatial typologies, atmospheres and accessibility.

Phase 6 – Reflection & Future Relevance

Role of heritage, SDGs and R-strategies, limitations and outlook beyond P5.

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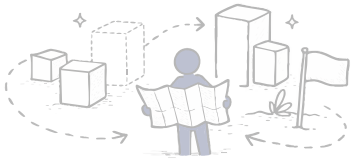

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300 BCE – Library of Alexandria -> *Center of Learning*
A hub for scholars to collect, translate, and advance global knowledge.

15th Century – Printing Press (Gutenberg) -> *Democratization of Knowledge*
Books became more

20th Century – Institutional & Academic Libraries -> *Knowledge Infrastructure*
University and research libraries became essential for scientific and technological progress.

Now

21st Century – The Internet & AI Era -> *From Storage to Interaction*
Libraries evolve into social, interactive, and adaptive learning spaces, integrating AI and digital tools.

2600 BCE – Ancient Libraries ->*Knowledge as Power*
Libraries stored administrative records, religious texts, and laws for rulers and priests.

8th-14th Century – Islamic Golden Age -> *Libraries as Innovation Hubs*
Preserved and expanded knowledge in science, medicine, and philosophy.

17th-19th Century – Enlightenment & Public Libraries -> *Libraries for the People*
Public and national libraries promoted education, civic engagement, and intellectual freedom.

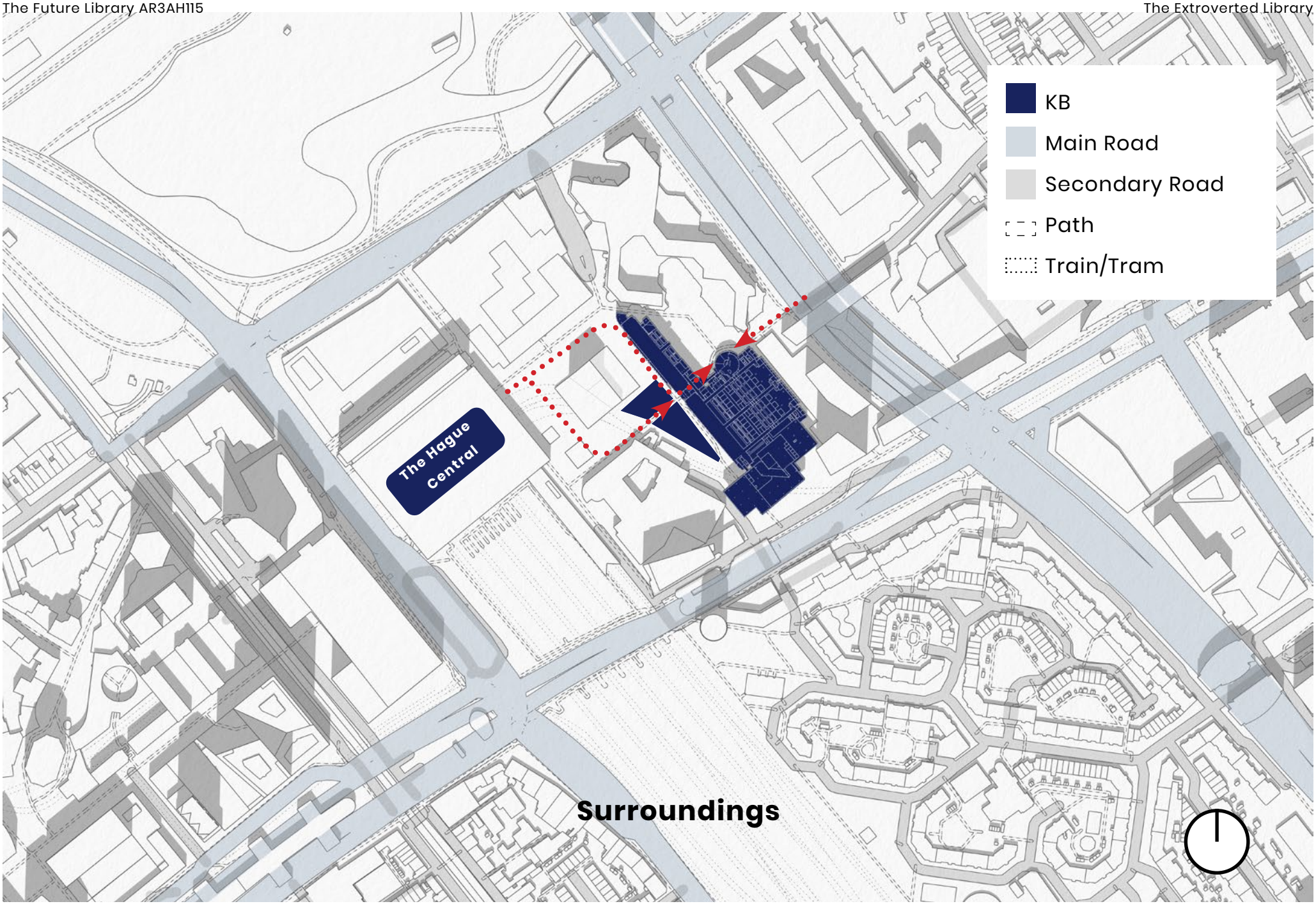
Late 20th Century – Digital Revolution Begins -> *Information Explosion*
Libraries expanded into digital collections, online databases, and multimedia resources.

Ancient -> Modern -> Digital

What is the Extroverted Architecture?

"Extroverted architecture is characterized by its **centrifugal, outward-looking nature**, where 'open spaces [are] extroverted, **centrifugal**" (Xhambazi, 2015, p. 12)

Extroverted architecture refers to design strategies that promote **openness, interaction, and engagement** with the surrounding environment and users.

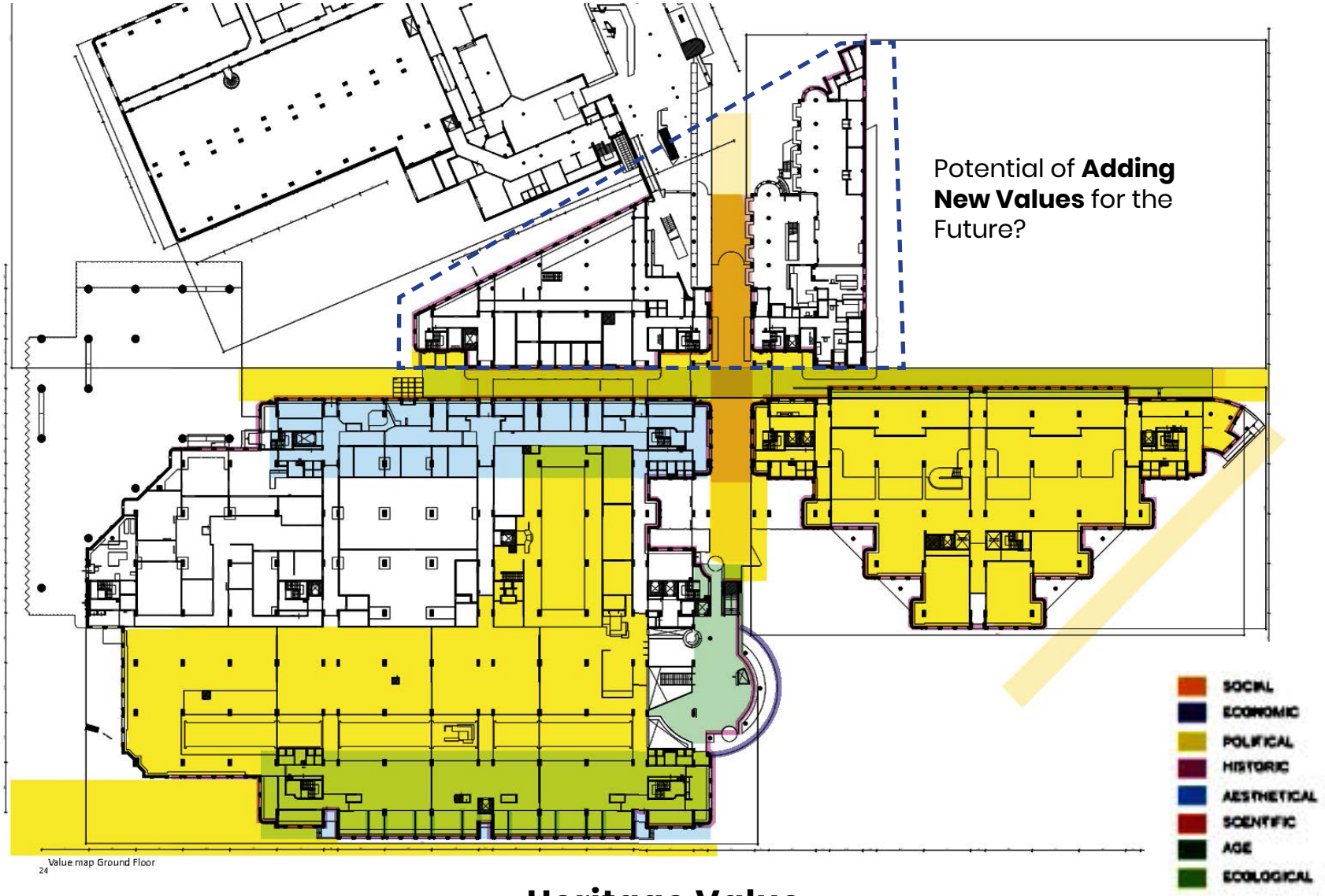


Surroundings


The building consists of 4 massive blocks, difficult to spot on the user level and perspective
B
D
A
C

Context

Value map Ground Floor, Made by the Heritage Group, "Reshaping KB" p.22-23



Heritage Value

Figure 1, KB Entrance

The current entrance is hidden and difficult to locate

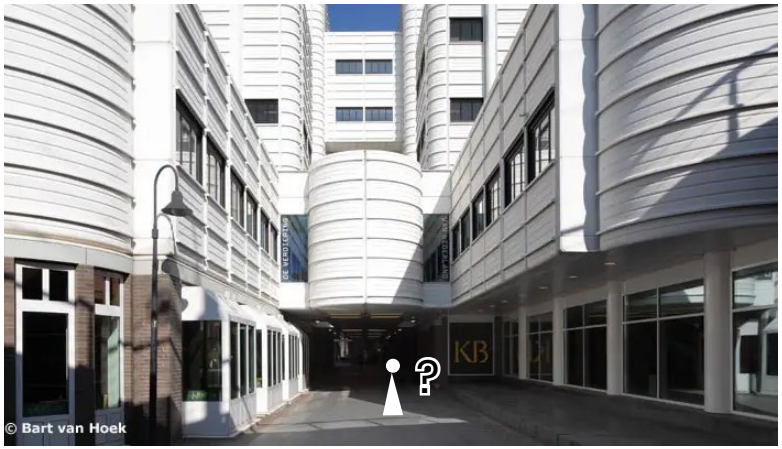


Figure 2, Ground Floor Passage

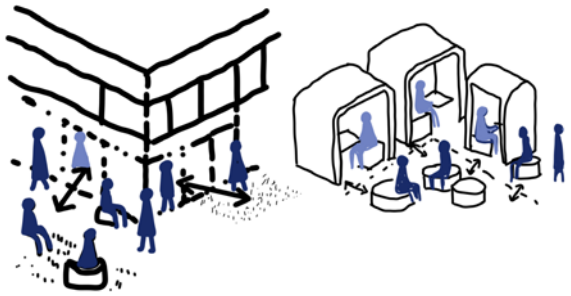
The character of the building is mainly introverted/ enclosed and very linear

Current Problems

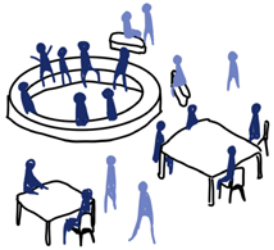
Current KB		Future KB
Concrete bar structure	⇢	**Concrete frame** kept as core
Deep archive plate	⇢	Archive plate reused / **upgraded**
Introverted Character	⇢	**Reading hall preserved** as quiet heart
Closed south façade	⇢	**New extroverted façade** wrapped around core
Office wings	⇢	**Open Plaza**
Hidden / internal main entrance	⇢	**New main entrance**, clearly legible
Corridors as neutral transit	⇢	**Corridors become social / tech spines**
Technology mostly invisible	⇢	**Visible tech** (book-exchange, digital walls)
Limited relation to climate & green	⇢	**Green, water and microclimate layers**
Heritage read mainly as 1980s object	⇢	**Heritage understood as structure + material bank + public institution role**

Design Goal: The Extroverted Library

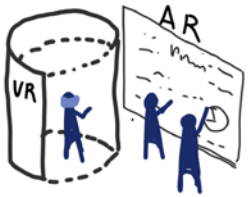
Public/Private Blending areas



Community Centric Hubs



Interactive and Experential Spaces



Exterior/Interior Connection

Interactive & Engaging Circulation

Biophilic Spaces

Extroverted Design Strategies:
promote **openness, interaction, and engagement**

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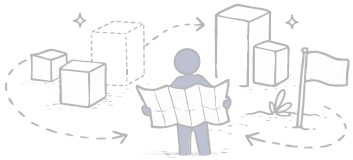

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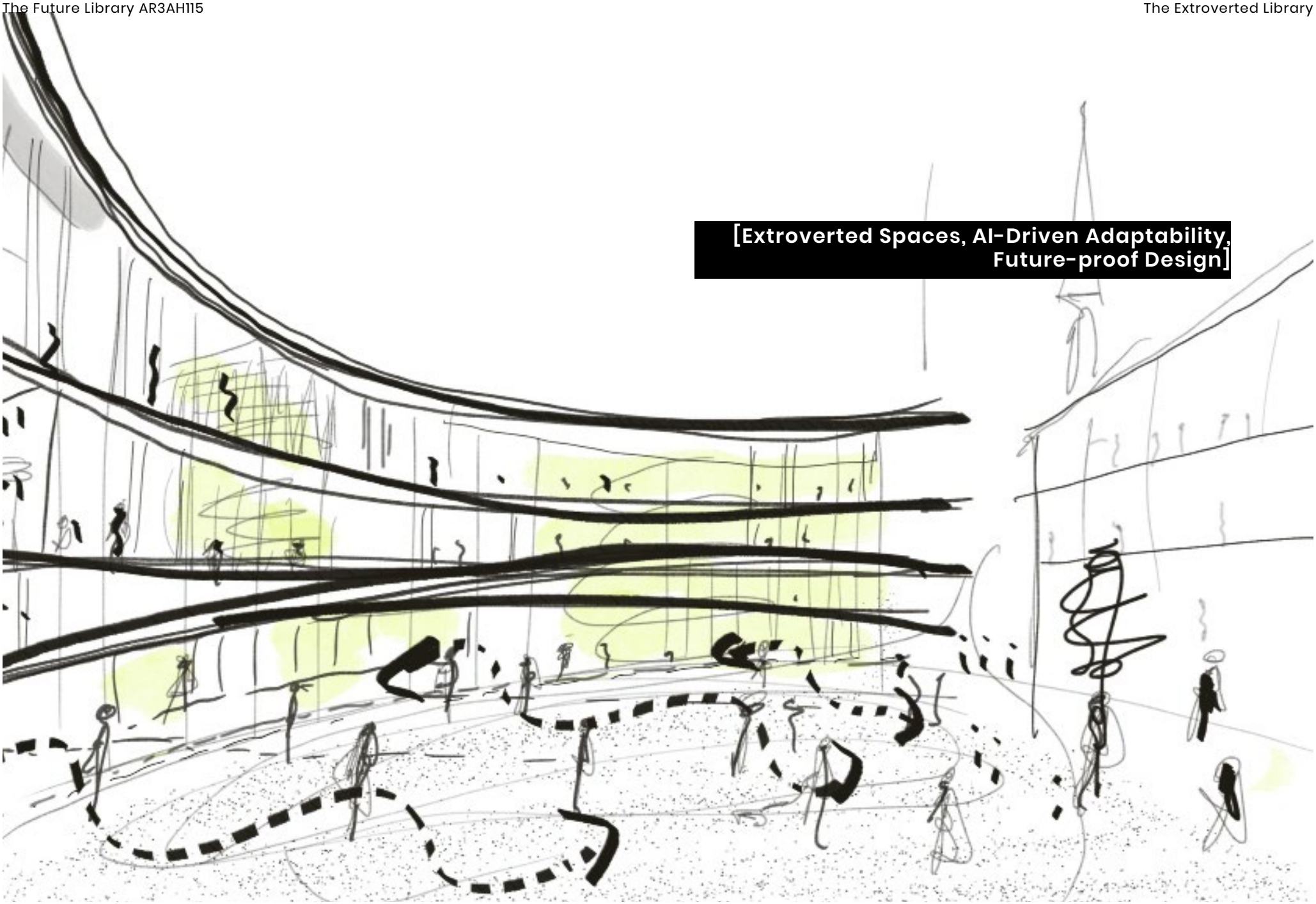
[Extroverted Spaces, AI-Driven Adaptability,
Future-proof Design]

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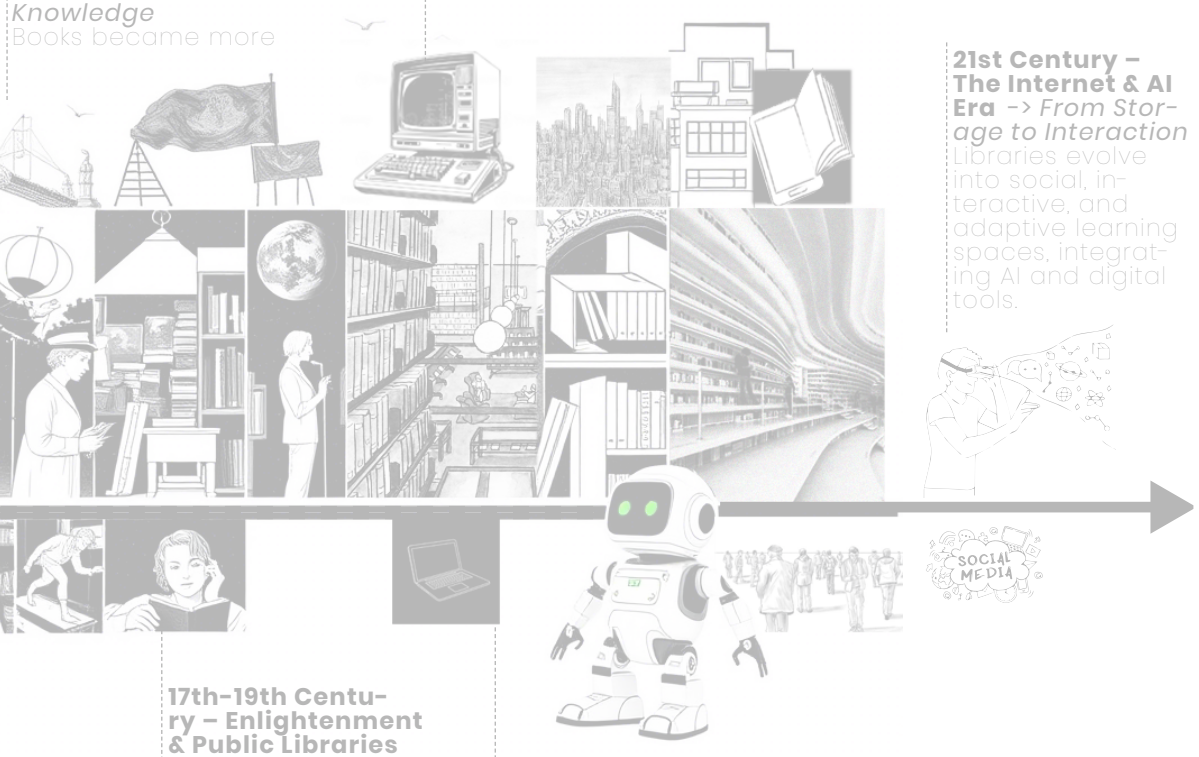

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Modern -> Digital

What will be next?
Building for future scenarios

Research & findings

RESEARCH QUESTIONS

Main question

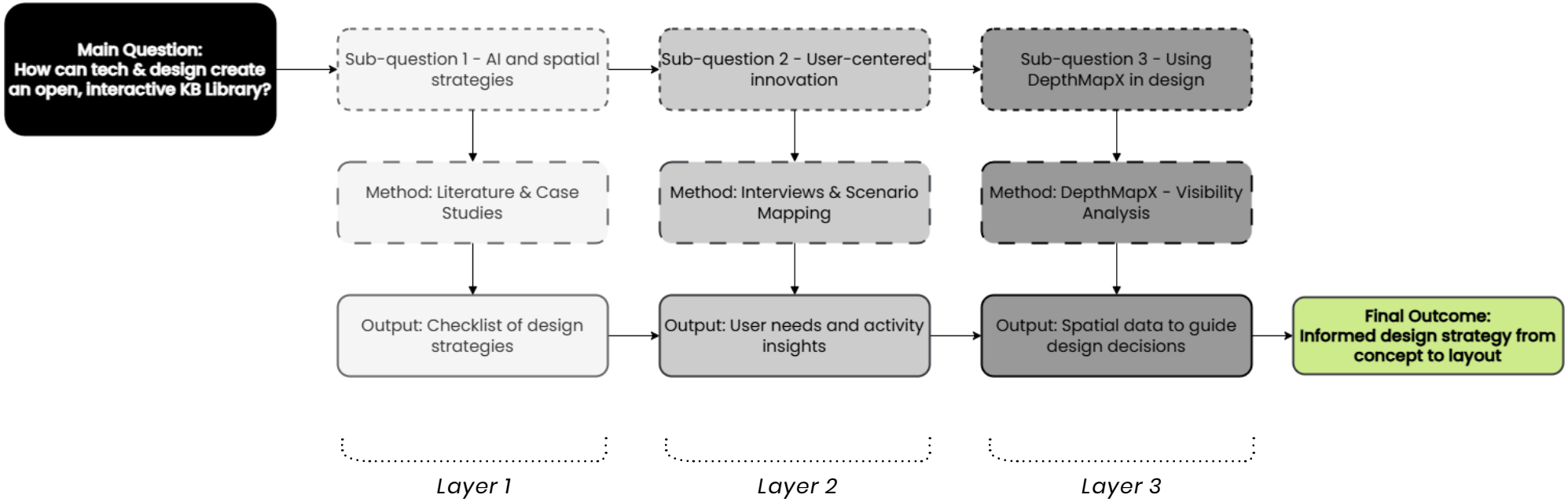
What role can technology and design for adaptivity play in shaping the KB Library as a space that promotes openness, interaction, and engagement, using predictive spatial analysis (DepthMapX) to inform adaptability in its design?

Secondary Questions

*What **AI-driven technologies and spatial strategies can enhance user interaction** and support library functions?*

*What are **user expectations and preferences** regarding AI integration and spatial adaptability in the future KB Library?*

*How can the impact of the new library interventions be **informed through a data-driven decision-making tool** (DepthMapX)?*



METHODOLOGY+OBJECTIVES

Layered Method

The future library check-list

Technology	Spatial Change	Design Impact	Estimated Space Use
AI-driven Cataloguing	Reduced space for physical catalogues	Digital kiosks replace large reference desks; open lobby flow	**<1–2%** (info desks only)
Robotic Shelving Systems (RFID/ASRS)	Compact vertical storage, fewer open stacks	Robotic corridors behind walls; public stacks reduced	**10–15%** (back-of-house)
AI Chatbots / Virtual Assistants	Less human-manned service points	Self-check terminals, help kiosks, mobile chat zones	**<1%** (dispersed stations)
IoT Sensors	Smart zoning and usage feedback	Dynamic furniture layout, responsive lighting, occupancy tracking	**<1% physical**, pervasive digitally
RFID Technology	Faster inventory and user interaction	Sleek self-checkout areas; secure yet open stacks	**2–3%** (within collection areas)
Automated Storage & Retrieval Systems	High-density, hidden storage	Archive functions relocated to compact areas, freeing up public space	**Up to 10–20%** (if integrated)
Spatial Design Network Analysis (VGA)	Optimized layout planning	Informs zoning and planning; no physical footprint	**0% (methodology tool)**
AR/VR Learning Spaces	Immersive, tech-based zones	Dark rooms, adjustable partitions, AR booths	**3–5%** (can be modular)
3D Scanning / Digital Twin	Real-time digital monitoring	Flexible planning and predictive maintenance; back-end integration	**<1% physical** (software-driven)
Spatial AI for Navigation	Personalized wayfinding	Interactive displays, smart signage, voice-guided access	**<1–2%**, integrated at circulation

Participant Demographics

Age group: All respondents are **between 18–30**

Backgrounds: **Architecture, Finance, Design, Computer Science, International Relations**

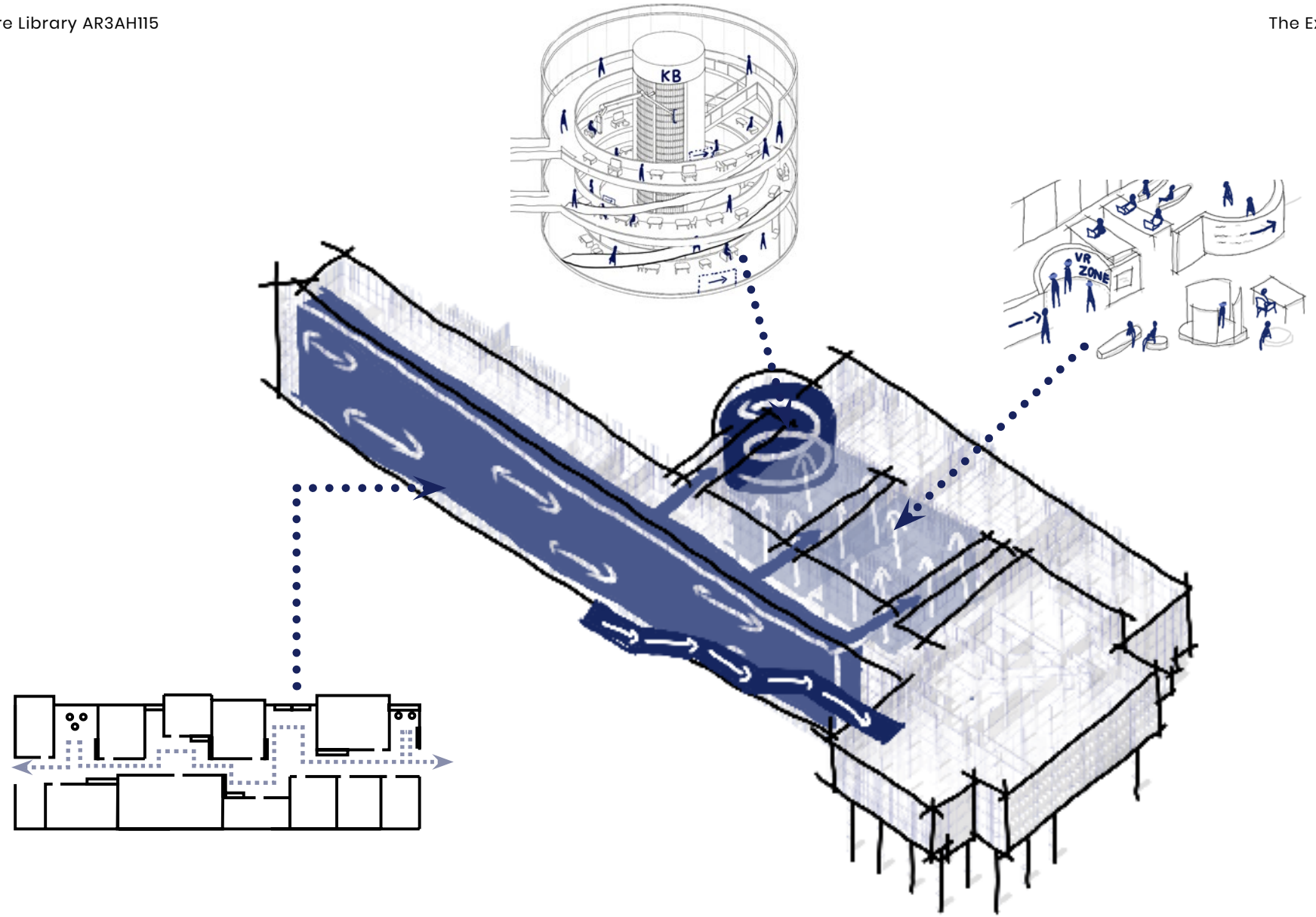
Usage Frequency: Mixed (Some regular users, others occasional or non-users)

Technology	User Response Summary
AI-Assisted Search / Smart Lookup	Strong interest across all interviews: faster, more relevant access to archives and books
AR Archives / Visual Browsing	High appeal for making content exploration more intuitive and engaging
Self-Service Tools	Generally positive attitude; helps speed up routine tasks (e.g. check-in/out, navigation)
Chatbots / Virtual Assistants	Mentioned less explicitly, but desire for intelligent assistance is noted
Concerns	One user flagged potential AI bias and accuracy concerns

RESEARCH FINDINGS

Spatial Preferences

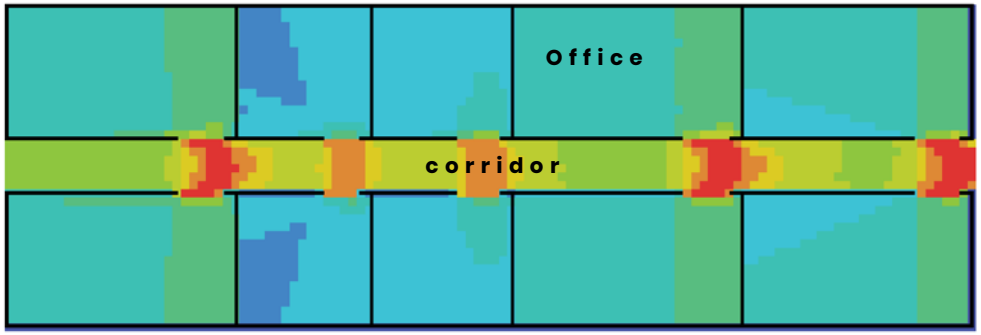
Space Type	Mention Frequency	Notes
Quiet Study / Reading Areas	⭐⭐⭐⭐⭐⭐ (6/7)	Highly valued. Preference for silent zones, privacy corners, and good acoustics
Co-Working & Group Zones	⭐⭐⭐⭐⭐ (5/7)	Desirable for students and young professionals. Sound separation is crucial
Makerspaces / FabLabs	⭐⭐⭐⭐ (4/7)	Strong interest, especially from architecture and design students
Café / Social Lounge	⭐⭐⭐⭐⭐ (5/7)	Seen as attractive, helps libraries serve as “third places”
Outdoor / Green Areas	⭐⭐⭐ (3/7)	Considered a bonus, supports well-being and informal use
Children’s Zone	⭐⭐⭐ (3/7)	Mentioned mostly by those who value multi-generational inclusion
Modular / Flexible Workspaces	⭐⭐⭐⭐⭐ (5/7)	Desire for convertible areas: silent zones, group rooms, semi-private pods
Exhibition / Cultural Events	⭐⭐⭐ (3/7)	Support for hybrid library programming—talks, exhibitions, etc.



DESIGN TRANSLATION
Location

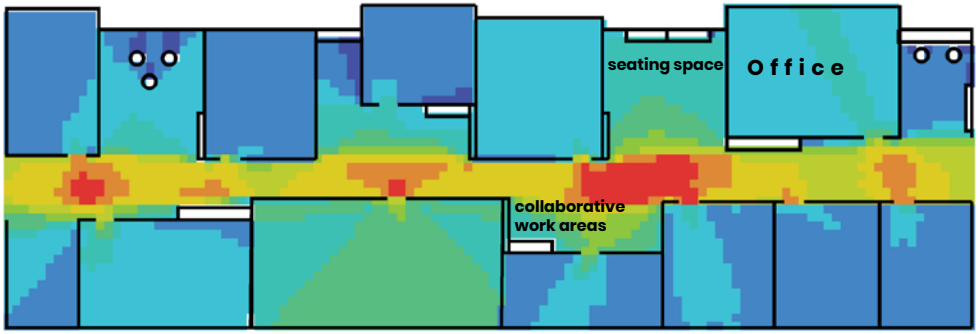
-Corridors acted as linear, highly visible passageways.

-Strong directionality (clear axis), but limited spatial interaction.



BEFORE

GOAL: not just a passage, but a destination



AFTER

-Visibility becomes more spread/dynamic.

-Corridors support activity with facade-facing openings and fun zones.

-Acts as a connective, socially active spine of the library.partial walls, or larger portals.

RESEARCH FINDINGS
VGA Test 1- Corridor Design

From Q1–Q3 to Design Guidelines

G1 – Corridors as social spines
Research showed desire for encounter and clear visibility.
->***Turn main corridors into continuous visibility spines with seating, AI touchpoints and framed views.***

G2 – Layered privacy
Interviews and VGA revealed conflict between exposure and focus.
->***Place quiet carrels in low-visibility perimeters, keep pods and collaboration near, but not on, the spine.***

G3 – Tech as legible infrastructure
Technology scan and heritage stance call for visible but bounded innovation.
-> ***Keep ASRS and digital tools visible from public areas, while logistics routes stay off the main path.***

G4 – Green at spill-over zones
Comfort issues cluster where flows and noise are highest.
-> ***Insert green pockets and planters at ramps, nodes and balconies to soften hotspots and cool micro-climate.***

G5 – Wayfinding through space, not signage
Users experience the KB as confusing and opaque.
->***Use sightlines, thresholds, level changes and a few interactive markers so the building itself guides orientation.***

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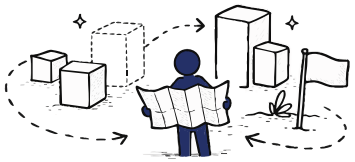

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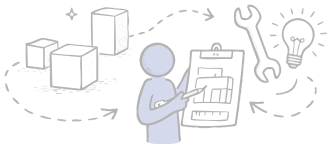

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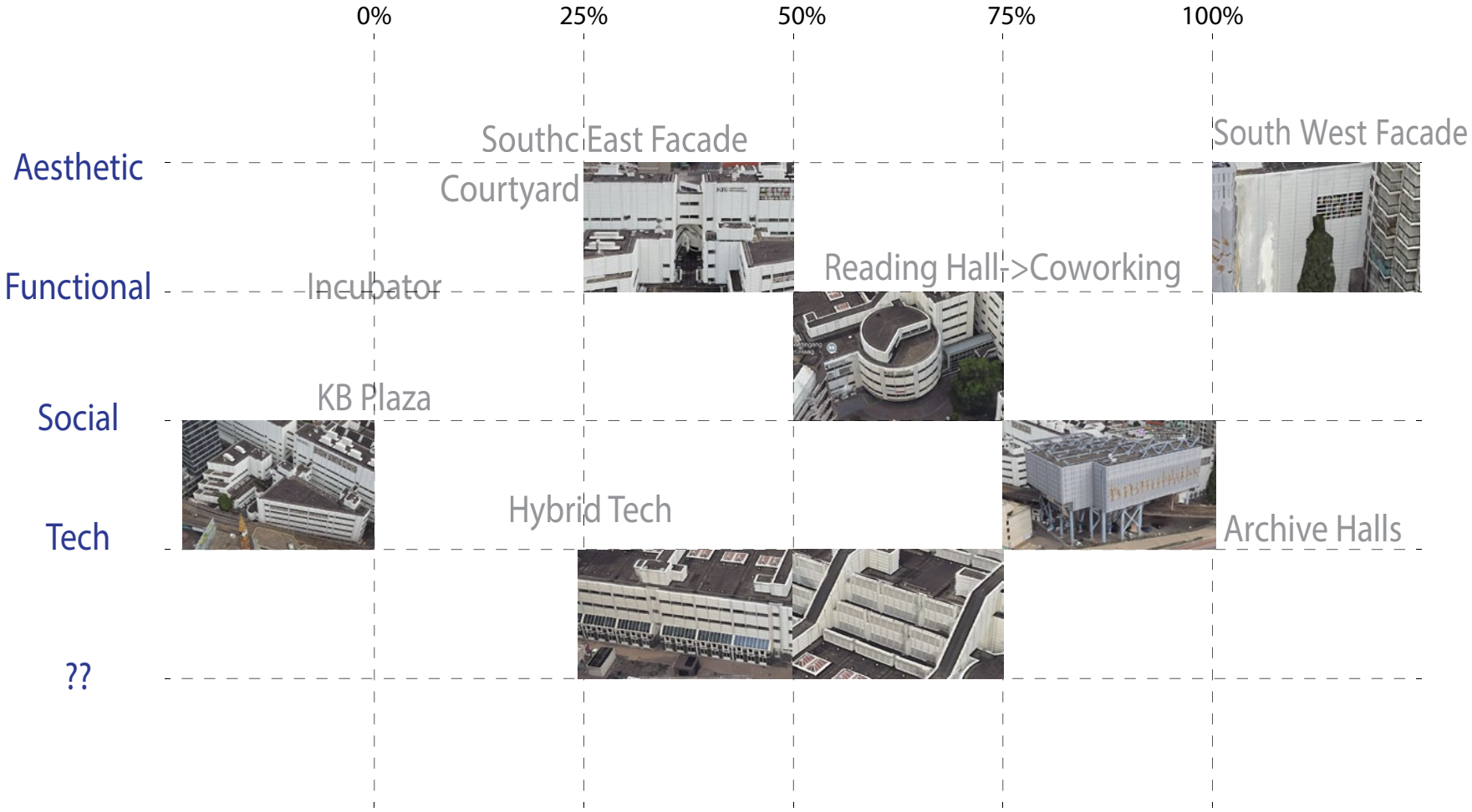
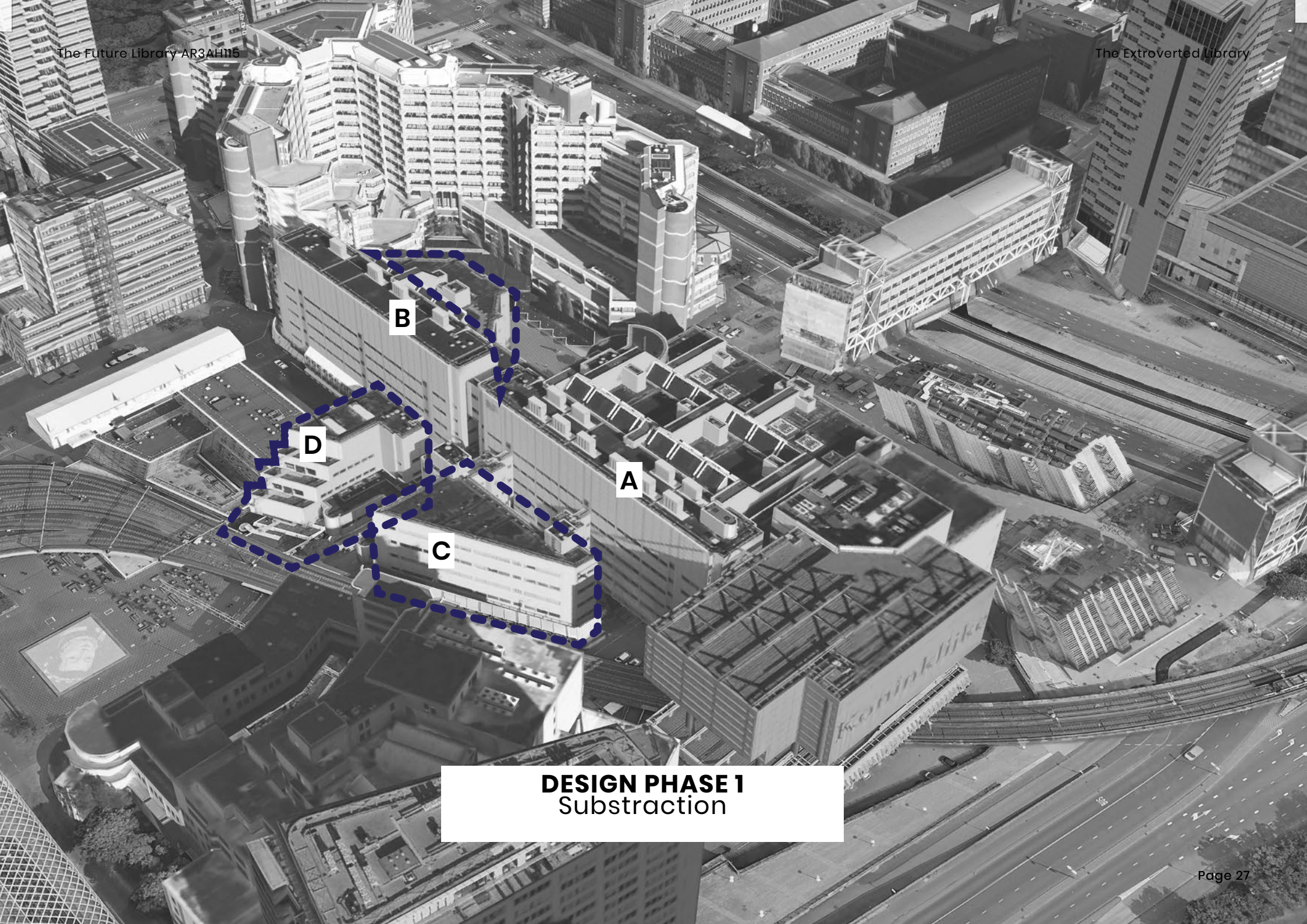
HERITAGE RETENTION %





DESIGN PHASE 1
Substraction

MASS OF DEMOLISHED MATERIALS

Concrete ≈ 5,400 t (~96%)

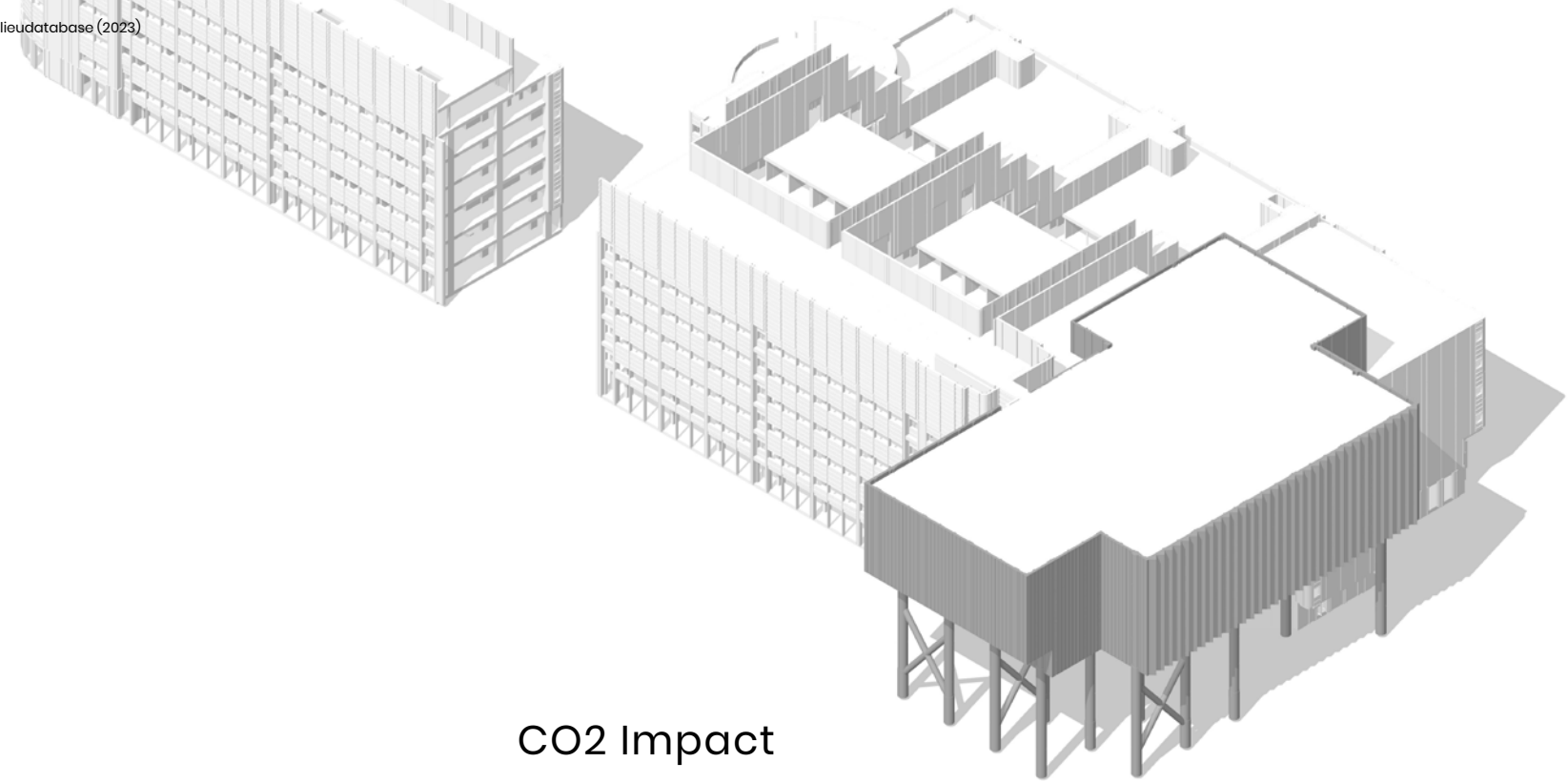
Brick ≈ 200 t (~3.6%)

Aluminium ≈ 9 t (~0.2%)

EMBODIED CO_2 – DEMOLISHED CONCRETE

Concrete (7,515 m² × 98 kg CO_2/m²) ≈ 736 t CO_2e

Numbers and Values retrieved from Nationale Milieudatabase (2023)



CO2 Impact

POTENTIAL REUSE OF DEMOLISHED MATERIALS (ON-SITE / DIRECT)

Concrete [redacted] ≈ 25–30% reused:

- RCA in geotextile bags under new modular floors
- Limited sub-base for KB Plaza / new paths
- A few cut blocks for benches / small retaining edges

(Remaining concrete sent to external recycling / downcycling.)

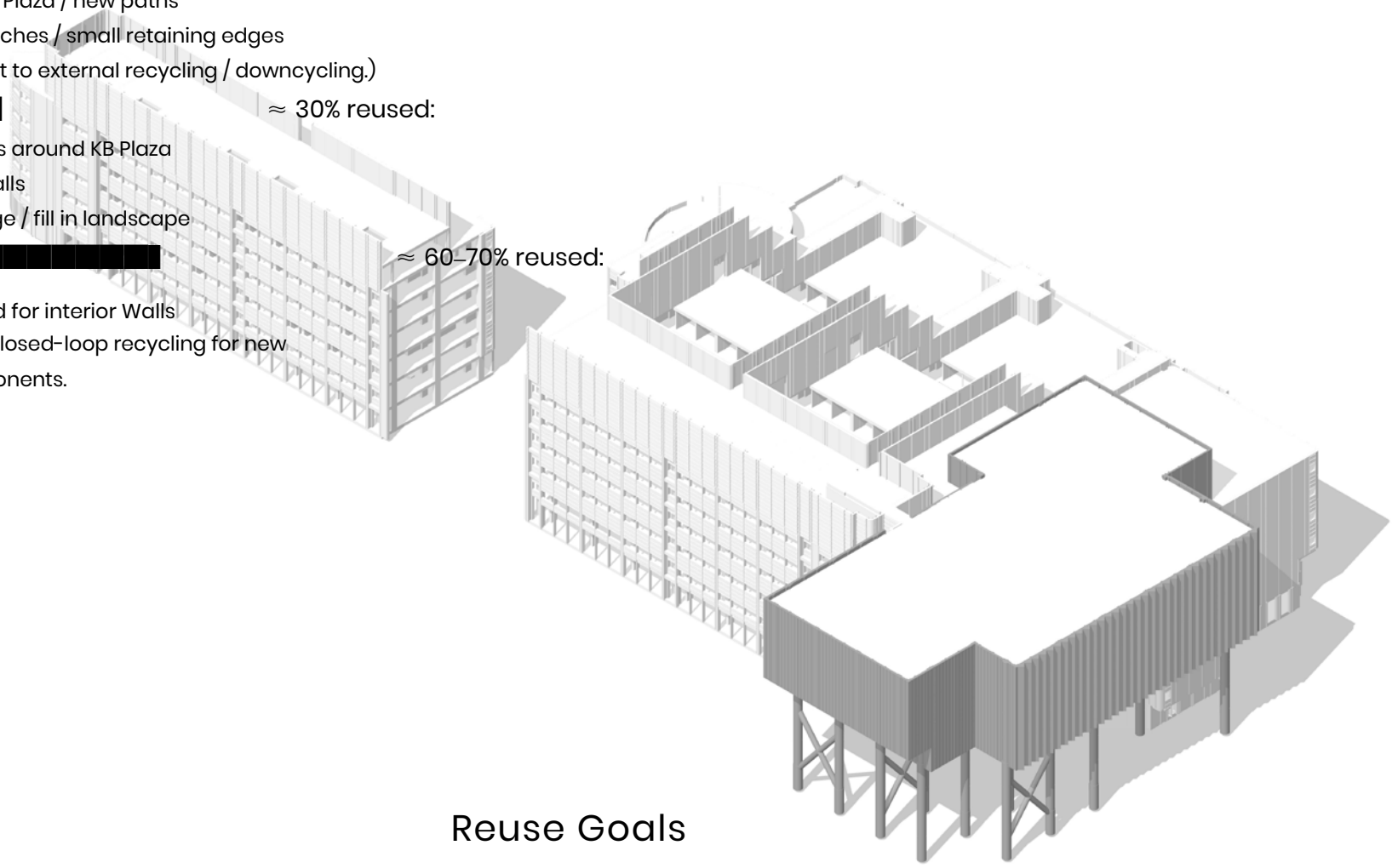
Brick [redacted] ≈ 30% reused:

- Paving strips and plinths around KB Plaza
- Low garden / planter walls
- Some rubble as drainage / fill in landscape

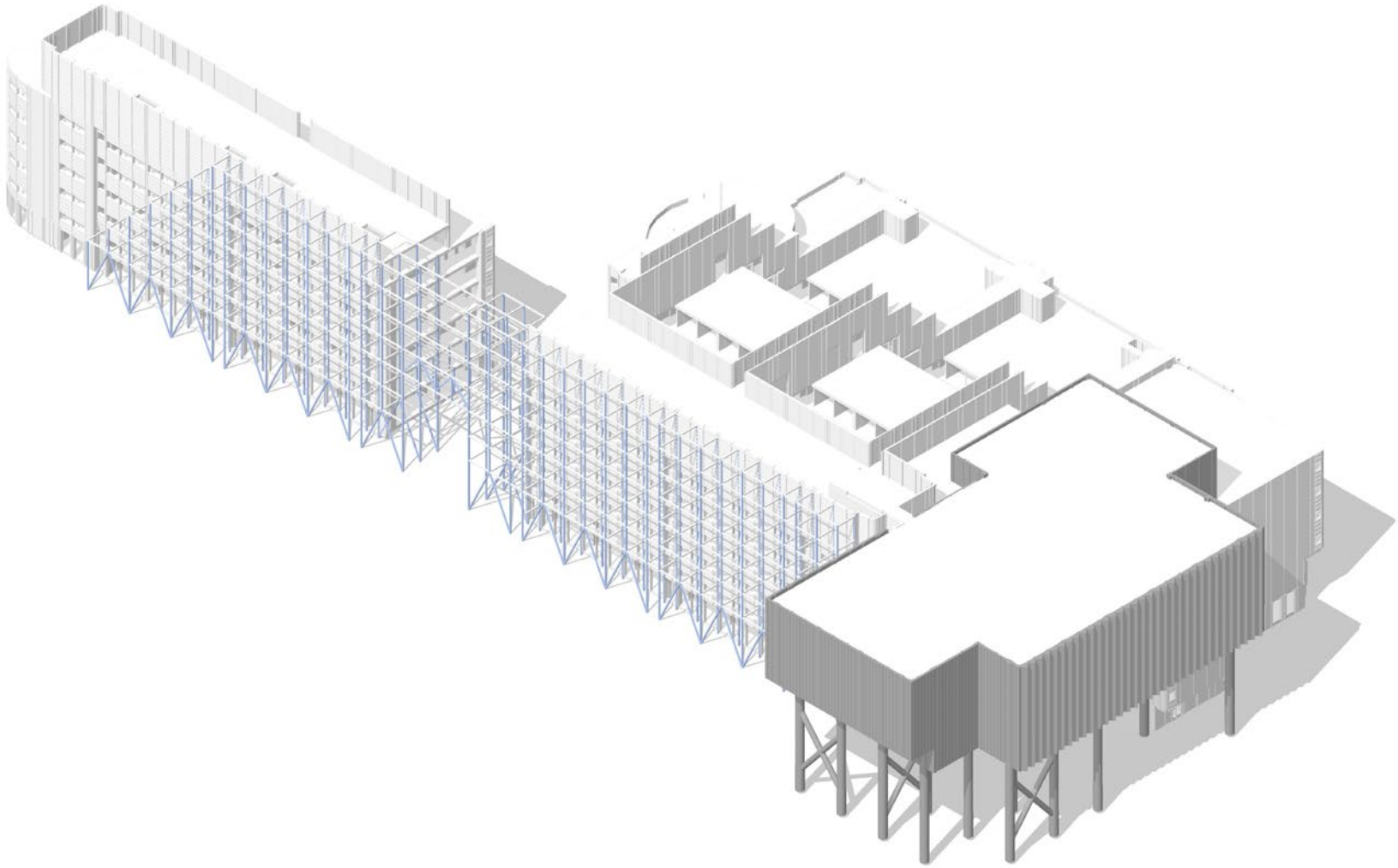
Aluminium [redacted] ≈ 60–70% reused:

-Facade Panels Reutilized for interior Walls

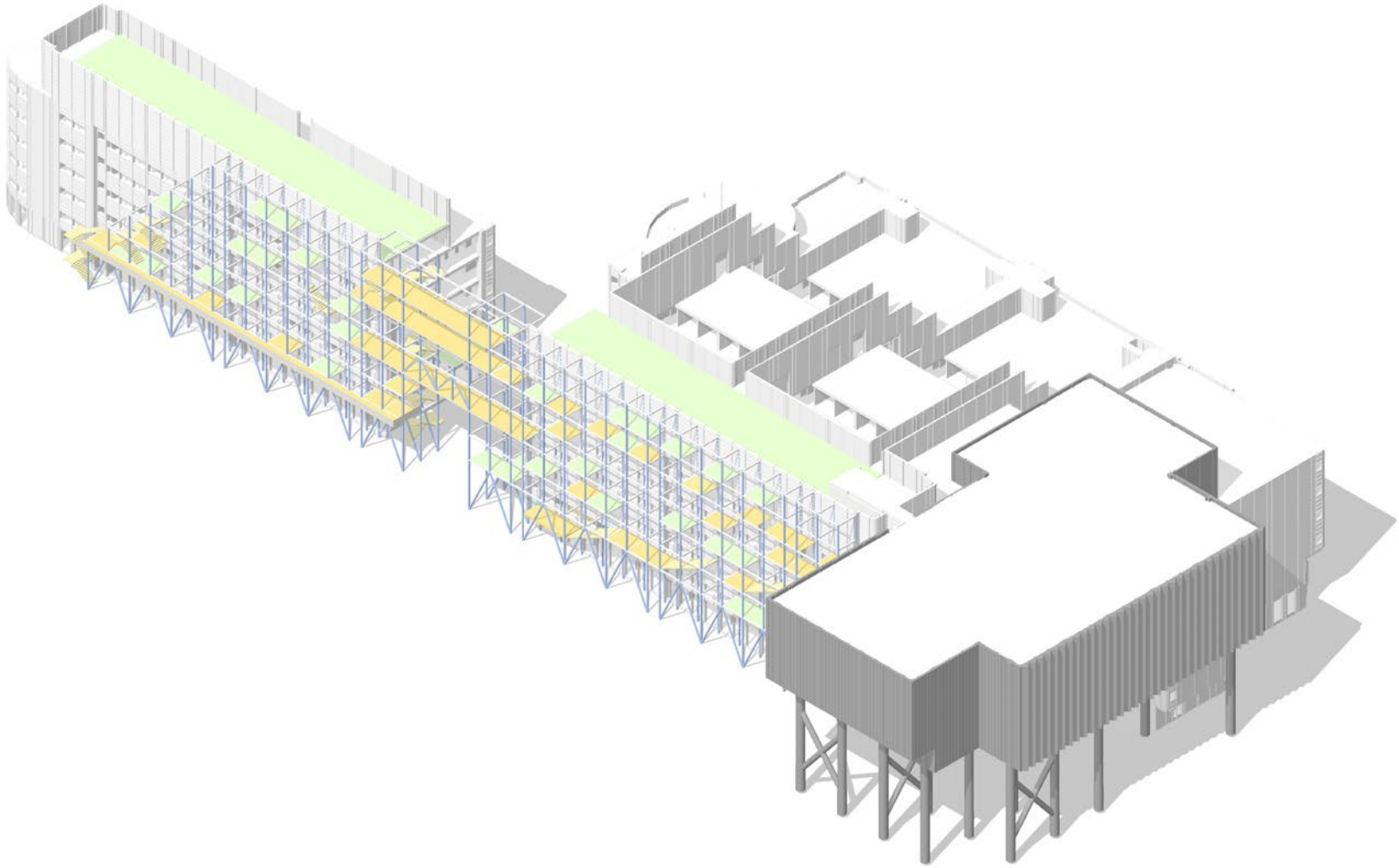
- Surplus panels sent to closed-loop recycling for new façade / shading components.



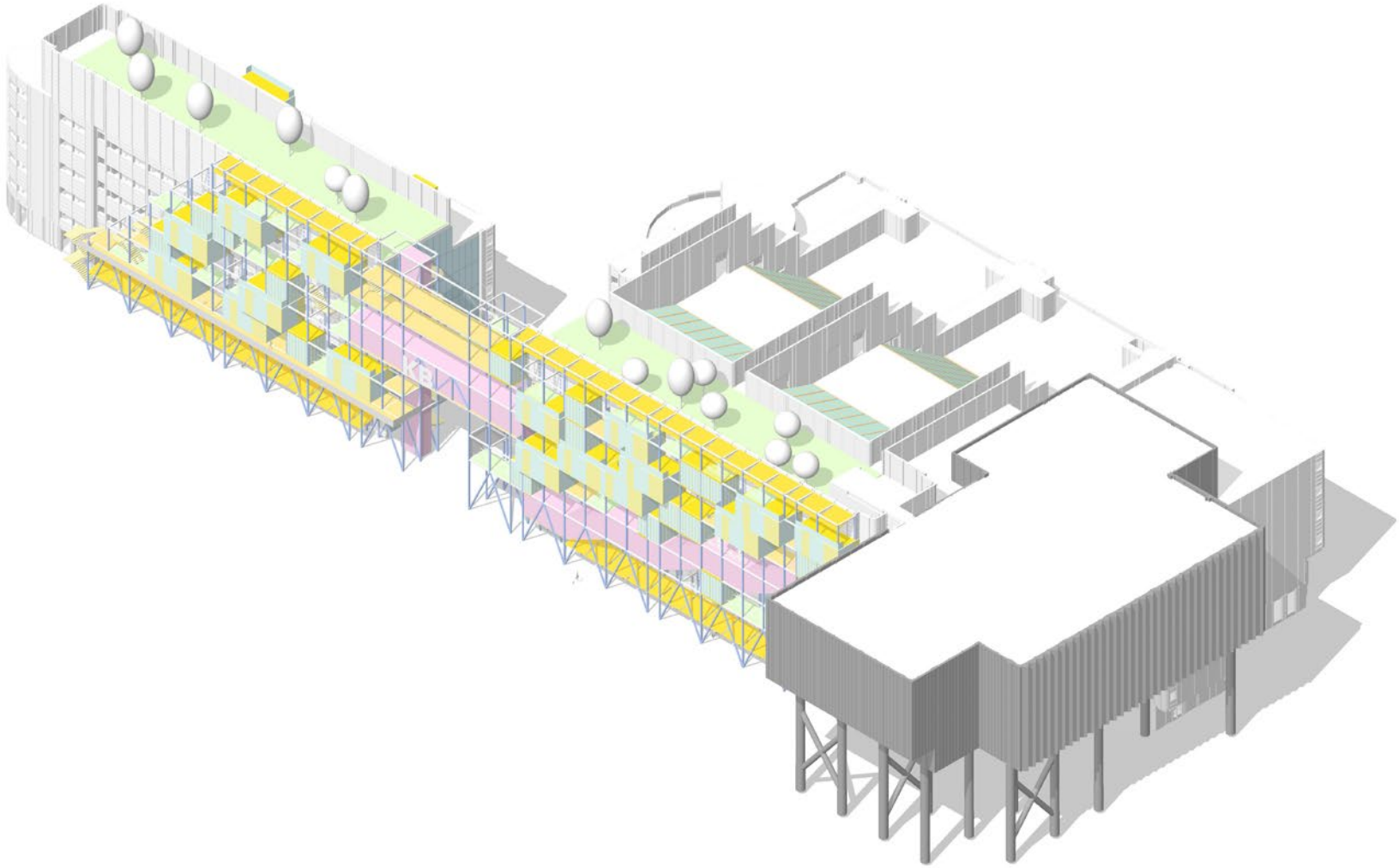
Reuse Goals



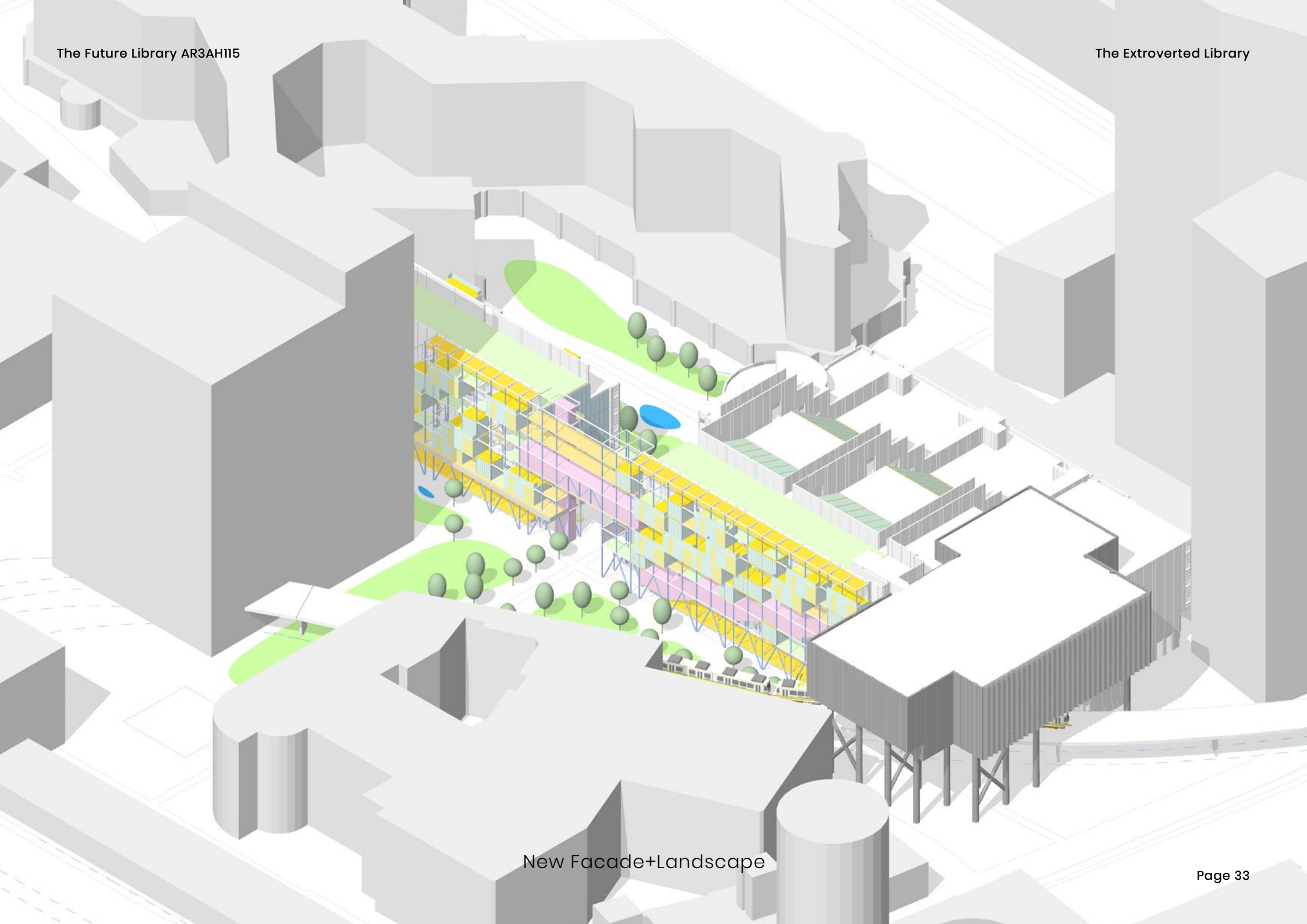
Structure



Access Points



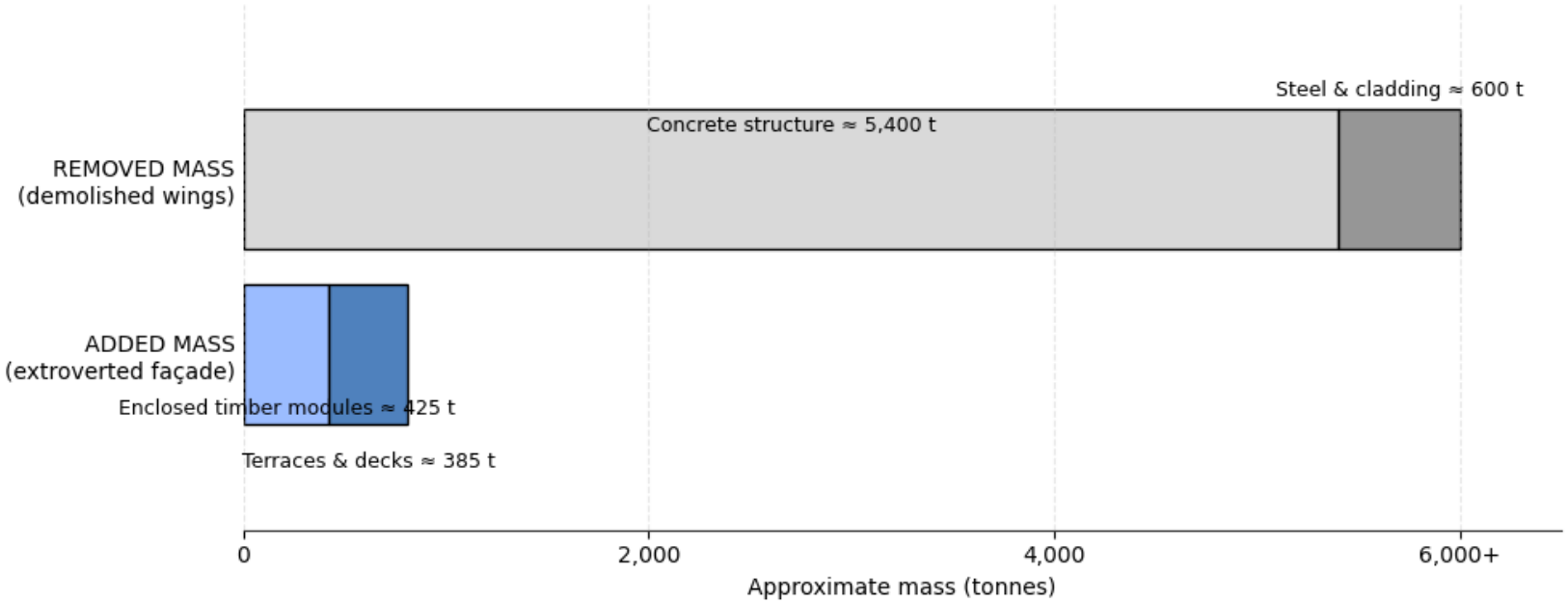
Indoor/Outdoor &Staircase



New Facade+Landscape


Before


After


REMOVED MASS
(demolished wings)
Concrete structure ≈ 5,400 t
Steel & cladding ≈ 600 t
ADDED MASS
(extroverted façade)
Enclosed timber modules ≈ 425 t
Terraces & decks ≈ 385 t
0
2,000
4,000
6,000+
Approximate mass (tonnes)

CONS

LOSS OF EXISTING FABRIC
– parts of the original KB volume and façade are removed.

EMBODIED CARBON OF DEMOLITION
– breaking down concrete and steel costs energy and emits CO2.

LOSS OF HERITAGE CHARACTER
– fear that the new extension will overwrite the 1980s identity.

CONSTRUCTION IMPACT
– noise, dust and disruption to neighbours and KB operations.

MORE SURFACE AREA TO MAINTAIN
– new façades, terraces and green systems could increase maintenance needs.

RISK OF FUTURE OBSOLESCENCE
– what if the new extension no longer fits future library uses?

PROS

TARGETED REMOVAL OF LOWER VALUE WINGS
– Only blocks with low heritage and spatial usage are demolished; the main concrete bar, archive plate and reading hall are kept as the heritage core. This allows the building to add new values in the Urban level.

MATERIAL BANK APPROACH
– Demolished concrete becomes RCA infill bags under new floors; metal panels are reused as a heritage layer in the new façade, converting part of the demolition mass into reused components.

HERITAGE MADE MORE LEGIBLE
– The extroverted timber grid follows the existing structural rhythm; the preserved bar now stands in a clear KB Plaza, so the original building is seen better than when it was buried behind office wings.

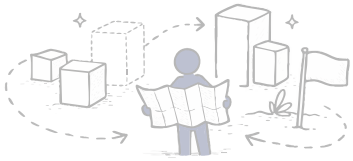
SHORTER, CLEANER CONSTRUCTION VS FULL RETROFIT
– Removing complete wings allows phased work outside the archive core, limiting deep interventions in sensitive storage areas and concentrating disturbance in a controlled zone.

LIGHTWEIGHT, ACCESSIBLE ENVELOPE
– The new layer is mostly outdoor / semi-outdoor space in timber, adding far less mass than removed concrete and hosting green façades and terraces that improve microclimate and user comfort.

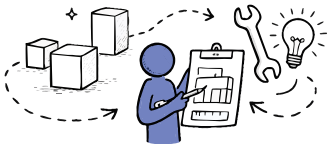
REVERSIBLE AND ADAPTABLE EXTENSION
– Modular timber boxes, bolted brackets and dry connections make the extroverted façade demountable; future programs (new media, new study modes) can reconfigure or replace modules without touching the preserved core.

Phase 1 – KB Today: Introverted Heritage
Context, existing building, heritage values and current problems.

Phase 2 – Research for the Future KB
Technology scan, user interviews, DepthMapX tests and design guidelines.



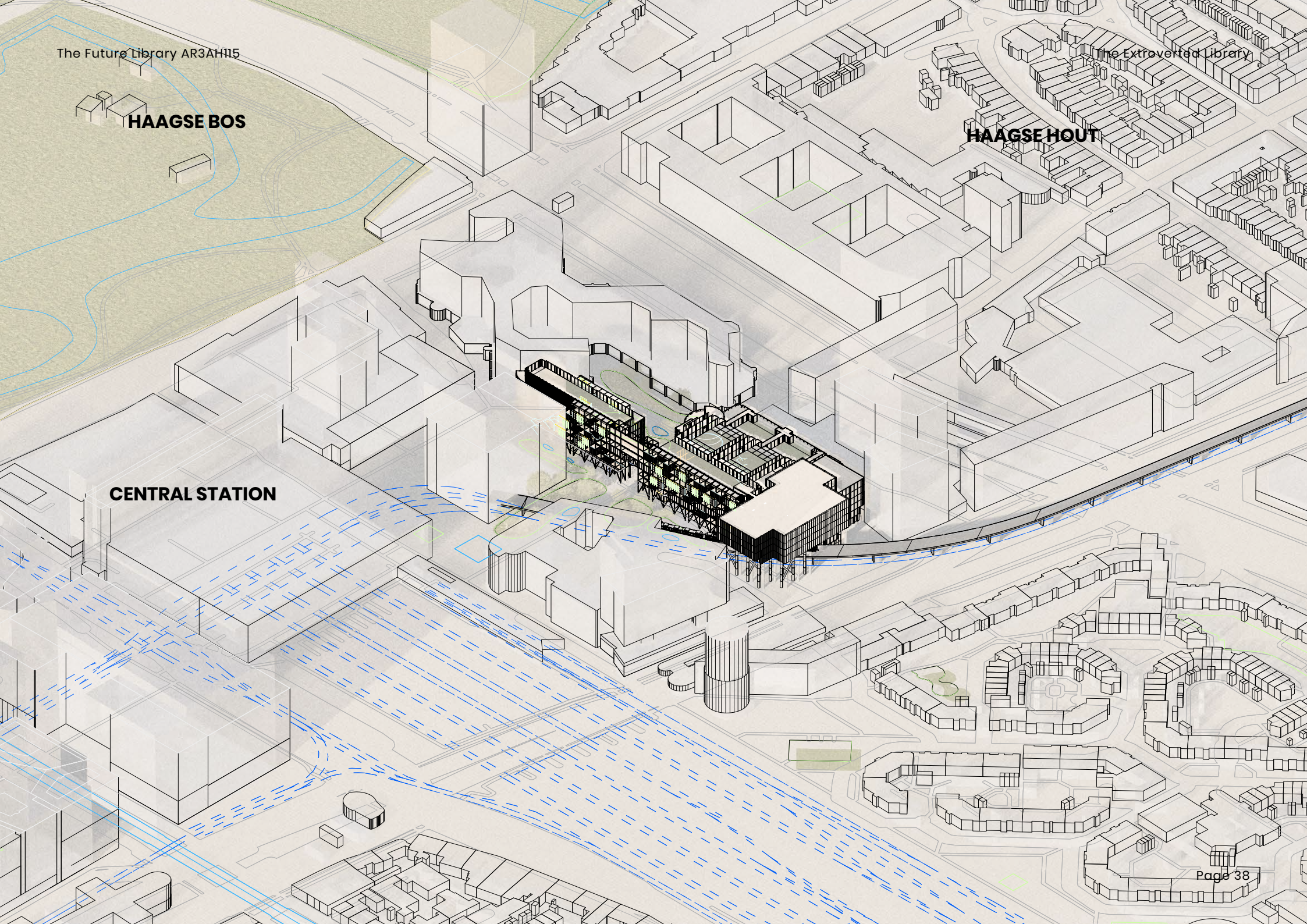
Phase 3 – Heritage Strategy & Big Moves
What is kept and removed, CO2 and material impact, KB Plaza, robotic shelving.



Phase 4 – Spatial & Technical Concept
Urban climate, new entrance and access, extroverted timber façade, green–blue and water systems.

Phase 5 – Lived Building & User Journeys
Daily use by different users, spatial typologies, atmospheres and accessibility.

Phase 6 – Reflection & Future Relevance
Role of heritage, SDGs and R-strategies, limitations and outlook beyond P5.


HAAGSE BOS
HAAGSE HOUT
CENTRAL STATION

Climate Scheme

1. Urban wind

- Prevailing coastal wind is funneled along railway + high-rise corridor -> harsh, windy station area.
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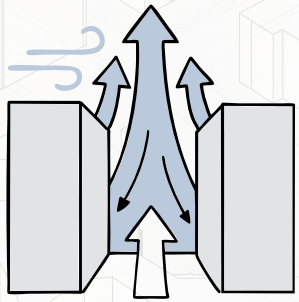

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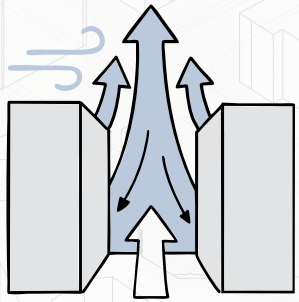

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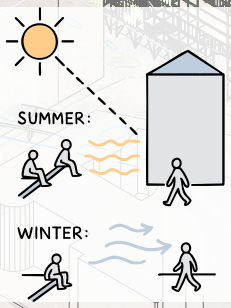

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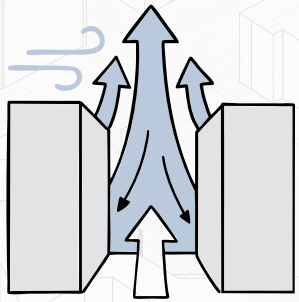

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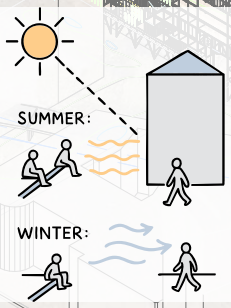

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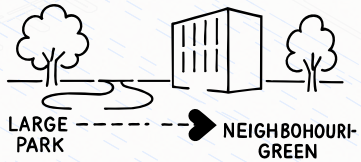
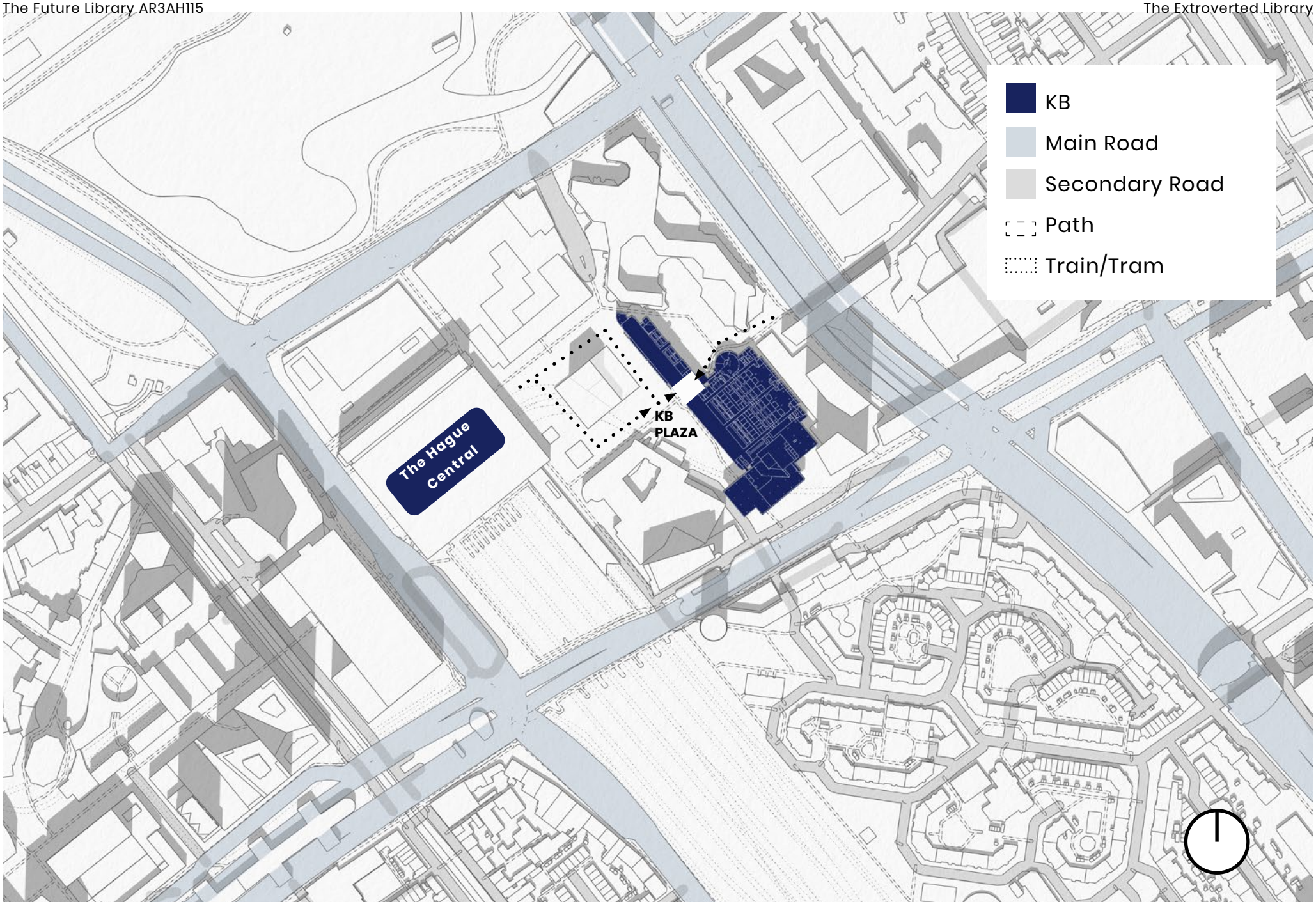
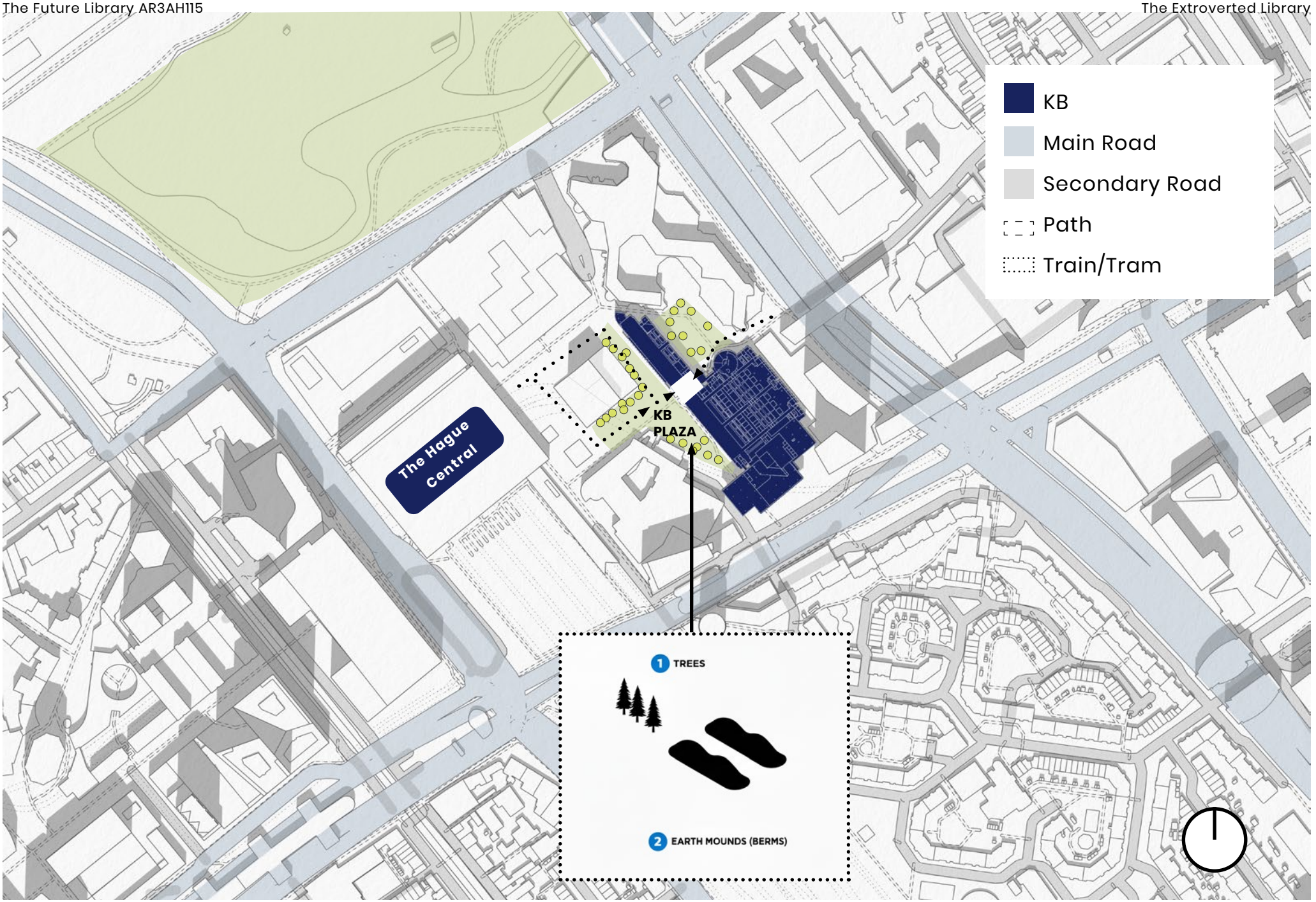



KB
Main Road
Secondary Road
Path
Train/Tram
KB
PLAZA
The Hague
Central


KB
Main Road
Secondary Road
Path
Train/Tram
The Hague Central
KB PLAZA
1 TREES
2 EARTH MOUNDS (BERMS)

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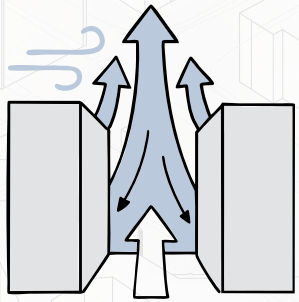

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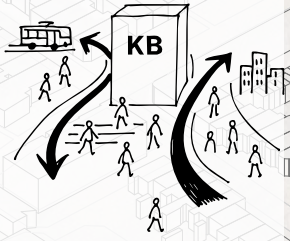

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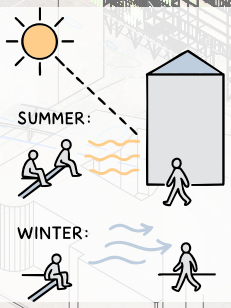

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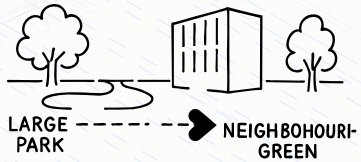
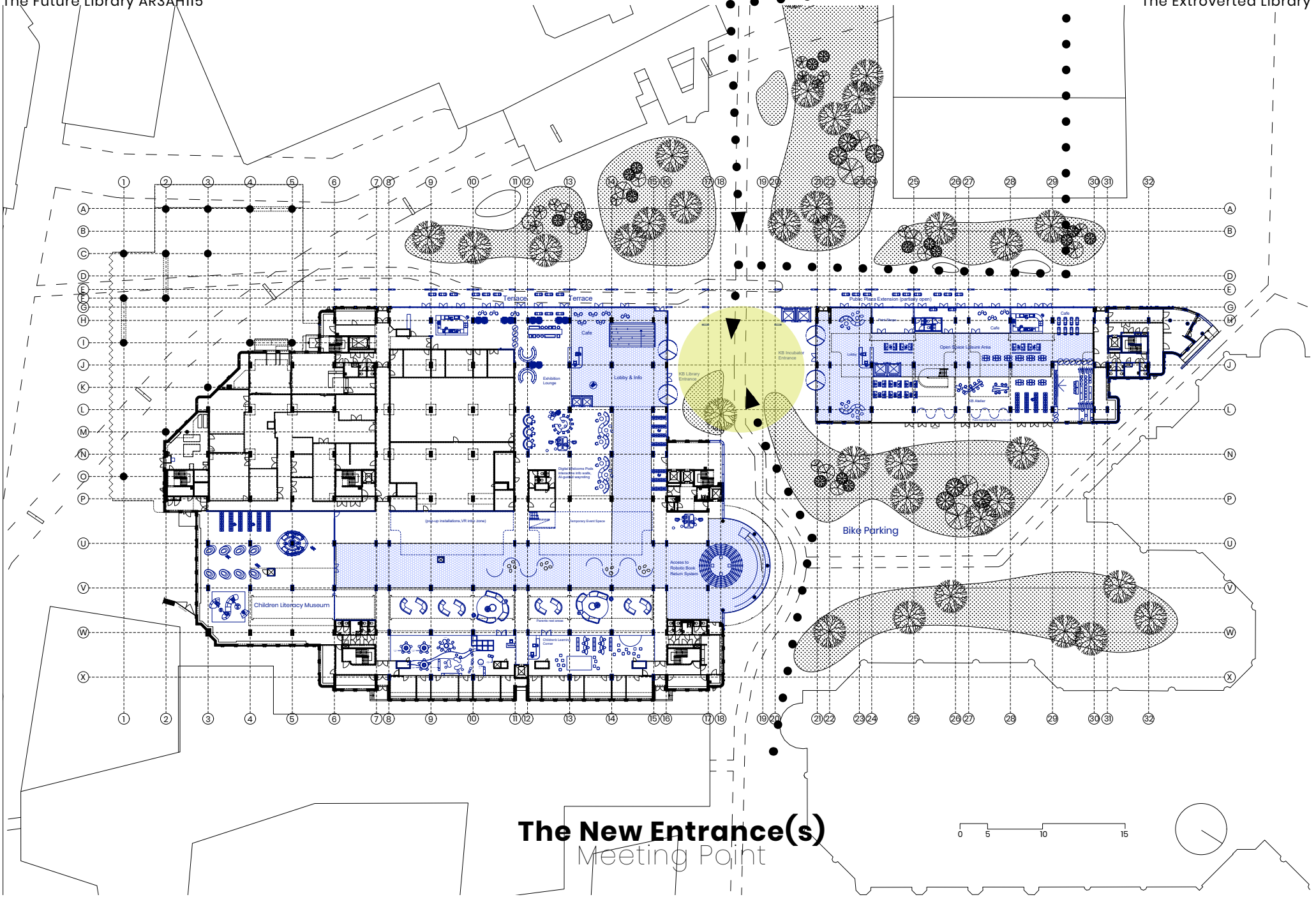
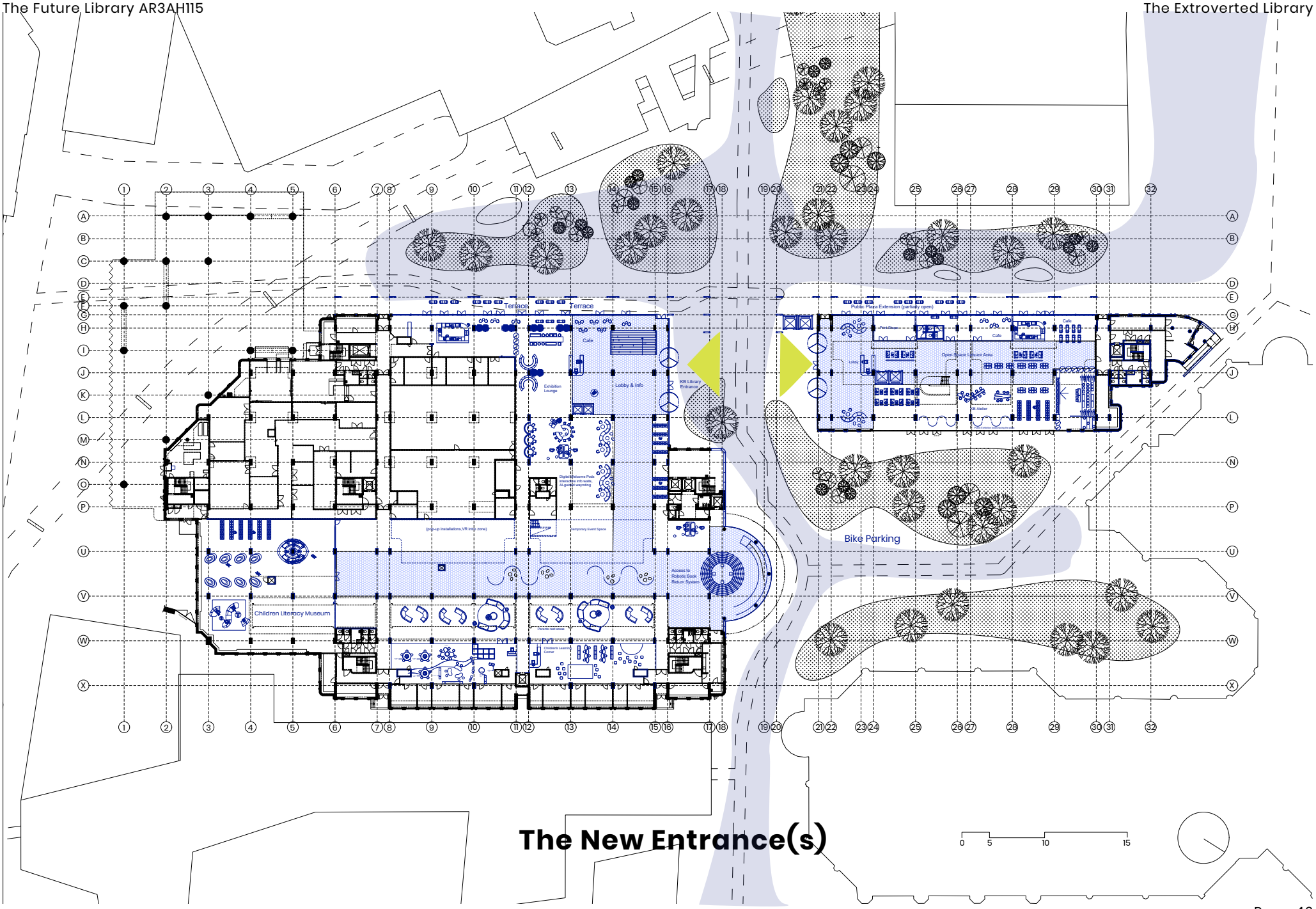




The New Entrance(s)

Meeting Point



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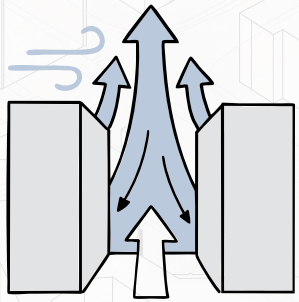

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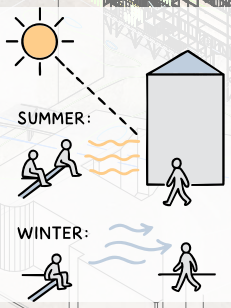

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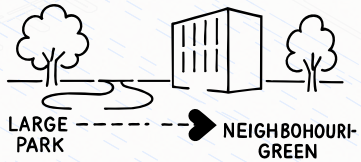

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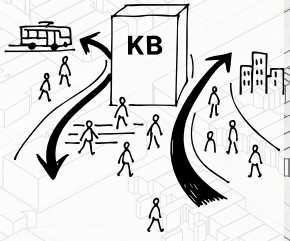
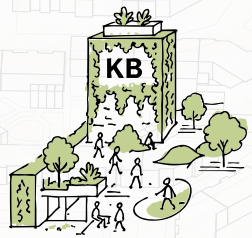


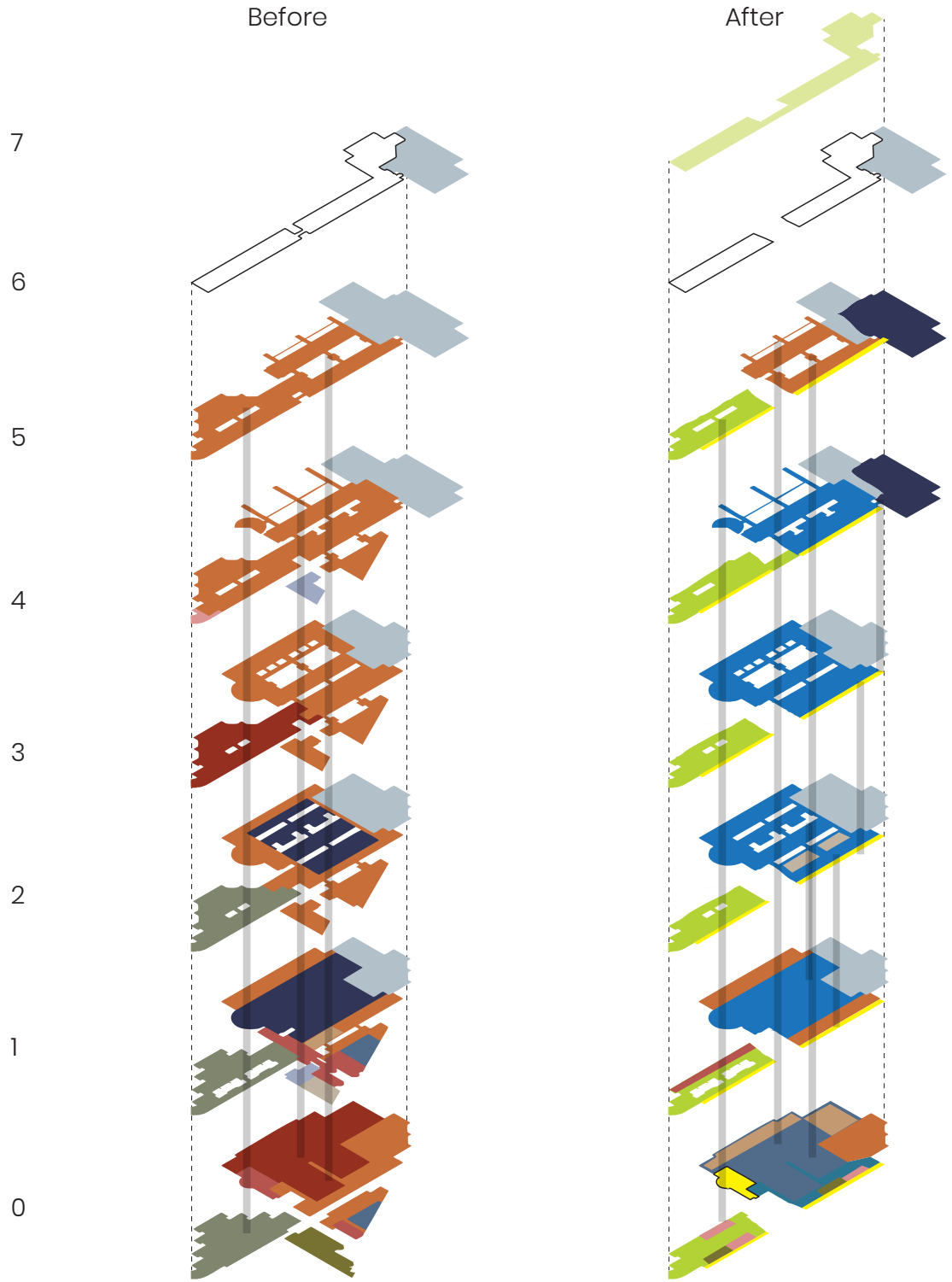
5. KB interventions – adding quality

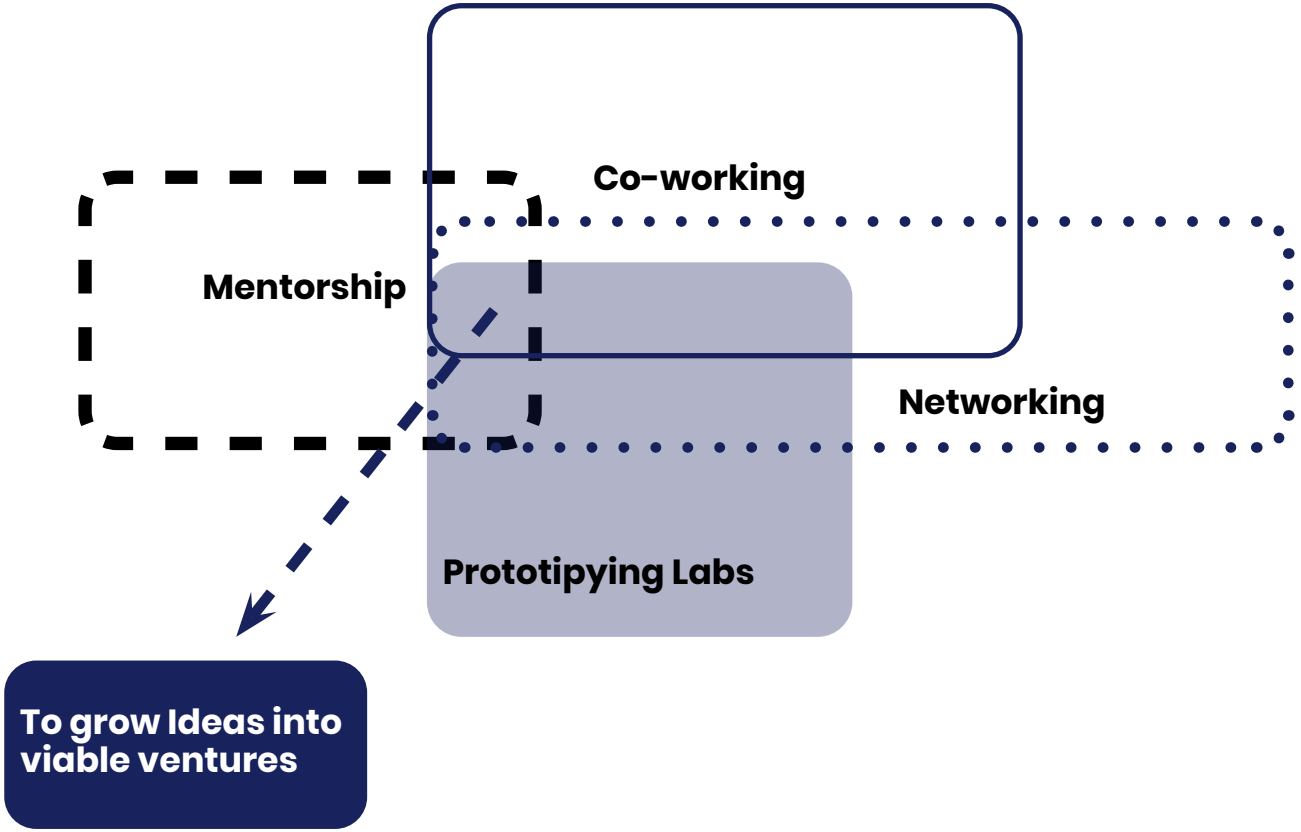
- KB Plaza carved on leeward side -> sheltered microclimate pocket, sun in winter with small earth mounds to block wind, shade in summer.
- Extroverted façade act as wind buffer and active edge along main flows.
- **Green façades, planters and roof gardens turn KB into a biodiversity stepping stone** in the urban network.
- Rainwater-collecting façade + roofs plug building into local water cycle, cooling and irrigating the park.
- Ground floor opened and connected to routes -> library becomes **everyday shortcut, meeting space and climate refuge**.



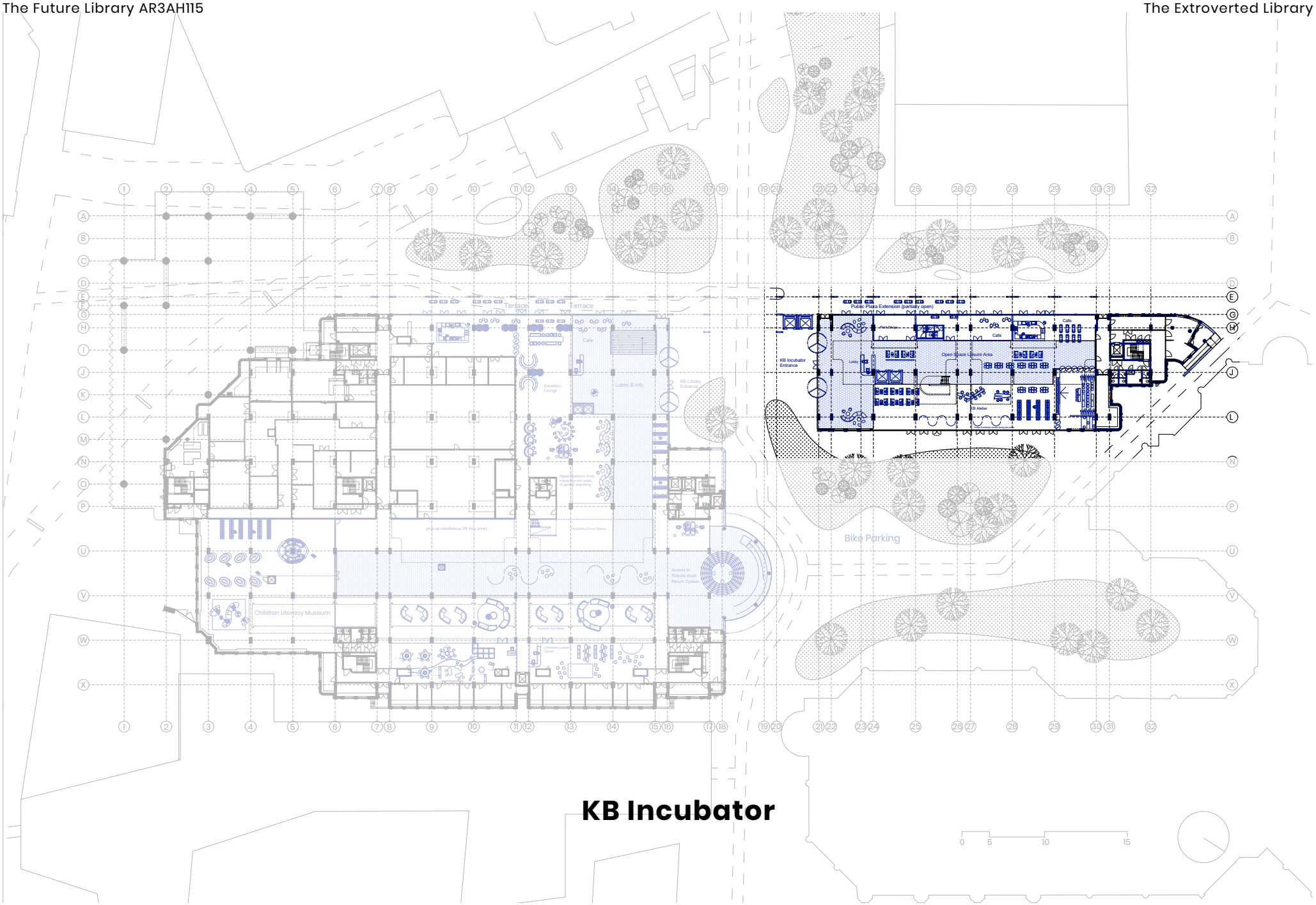
The biodiversity stepping stone in the urban network

Areas Mapping





THE KB INCUBATOR
What?



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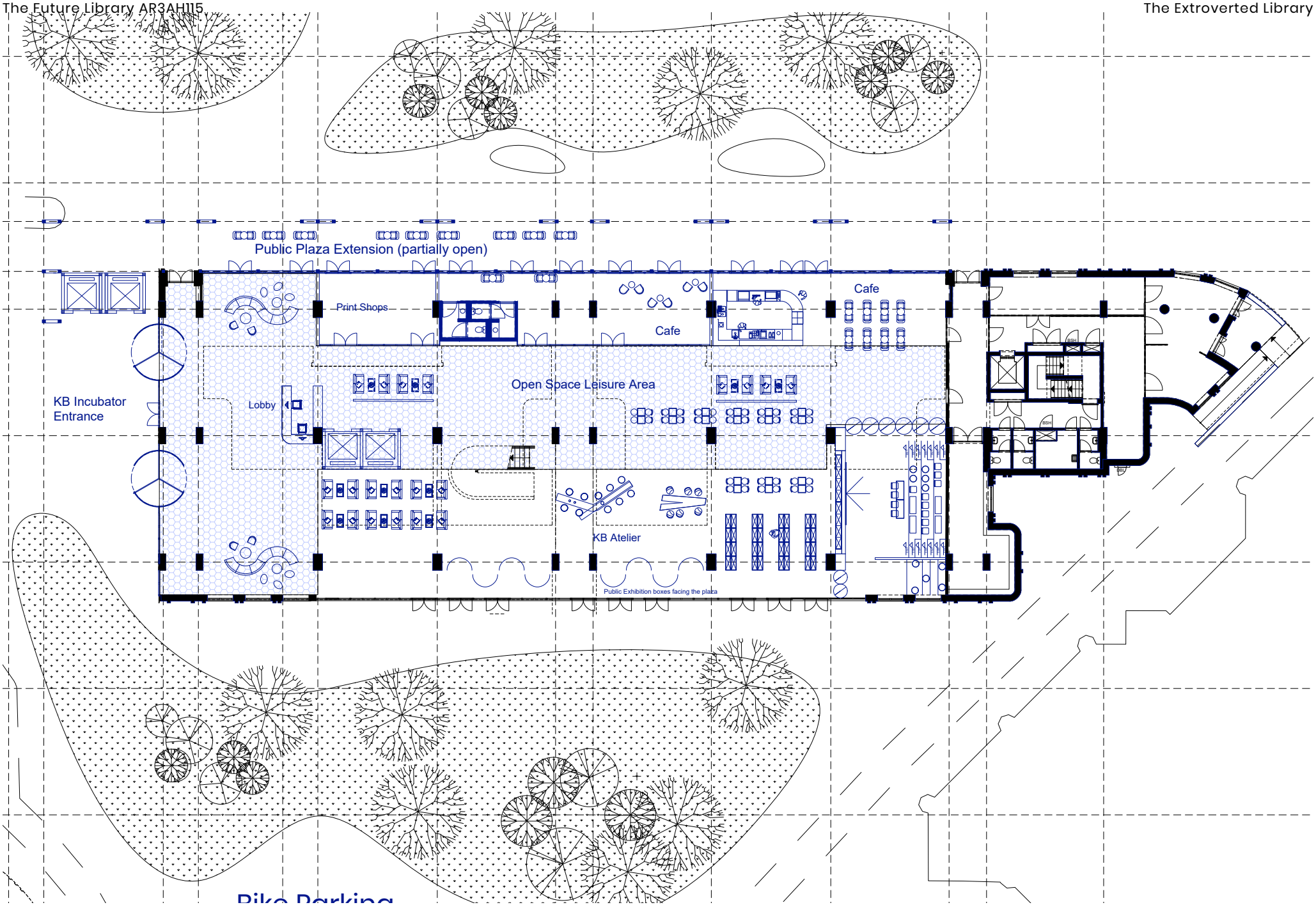
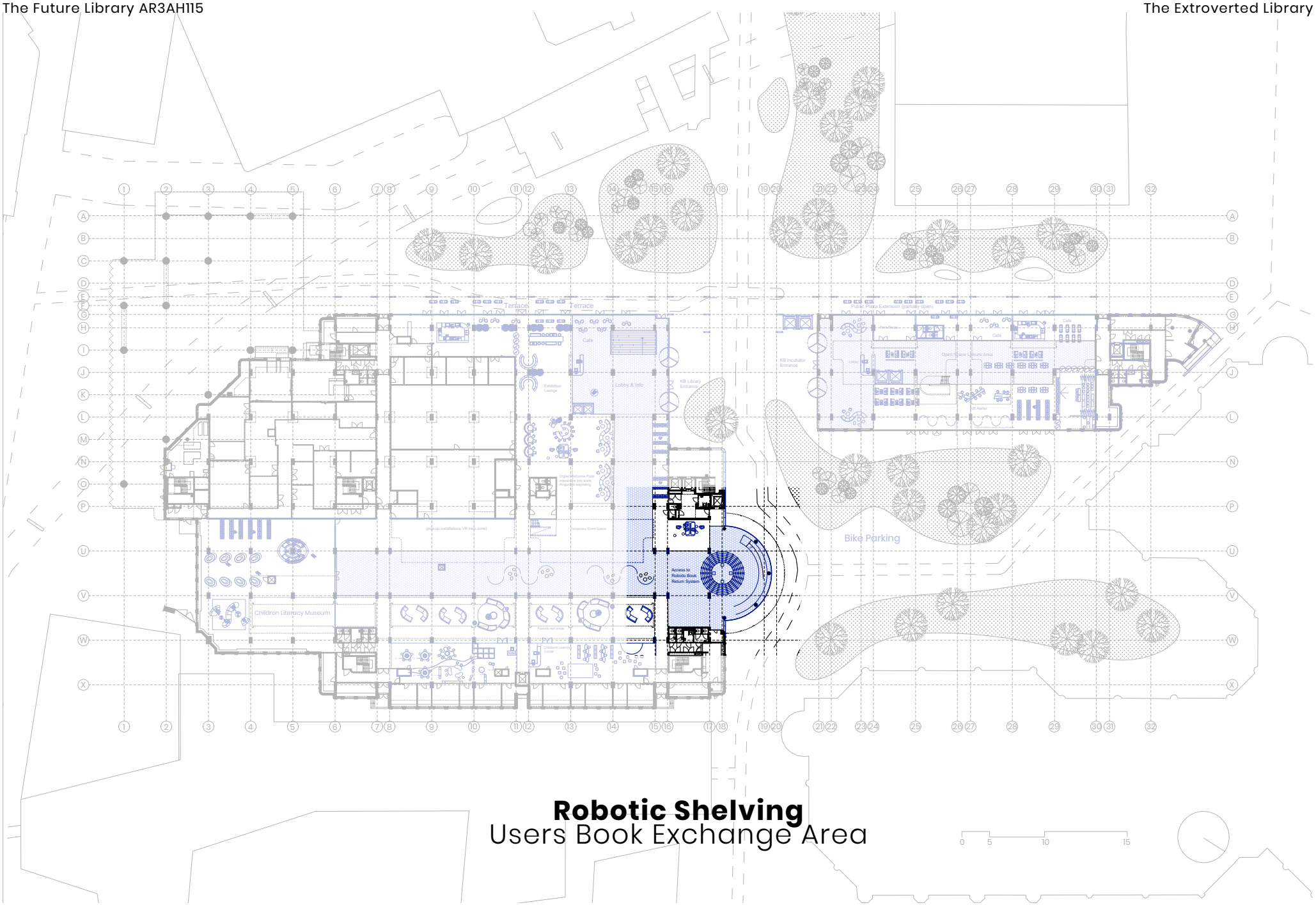

Public Plaza Extension (partially open)
Print Shops
Cafe
Cafe
KB Incubator
Entrance
Lobby
Open Space Leisure Area
KB Atelier
Public Exhibition boxes facing the plaza
Bike Parking

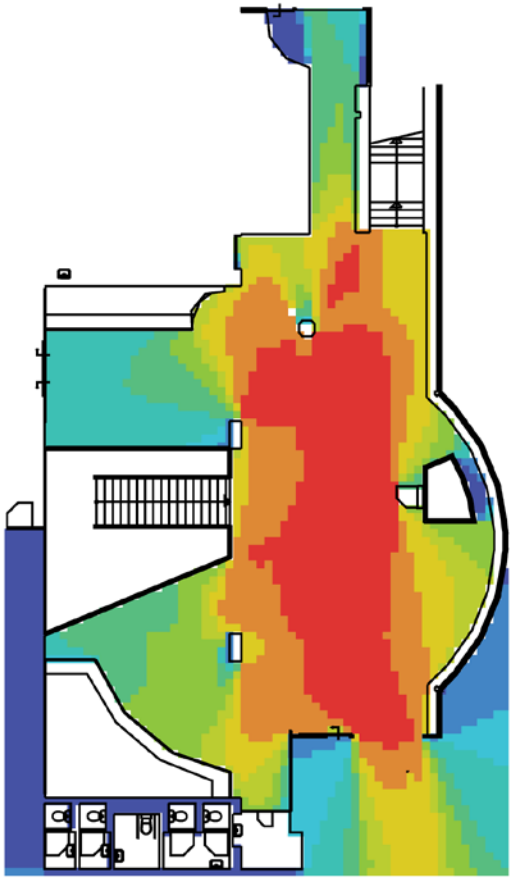


Robotic Shelving

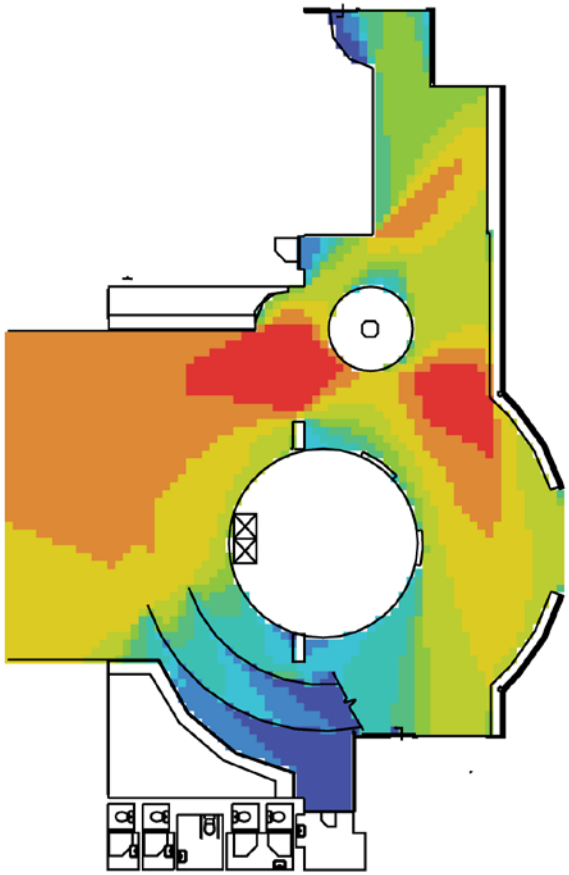
Users Book Exchange Area

-Direct route to stairs with **high visibility in a single central band**.

-Functioned more like a transit zone, **lacking spatial engagement**.



BEFORE



AFTER

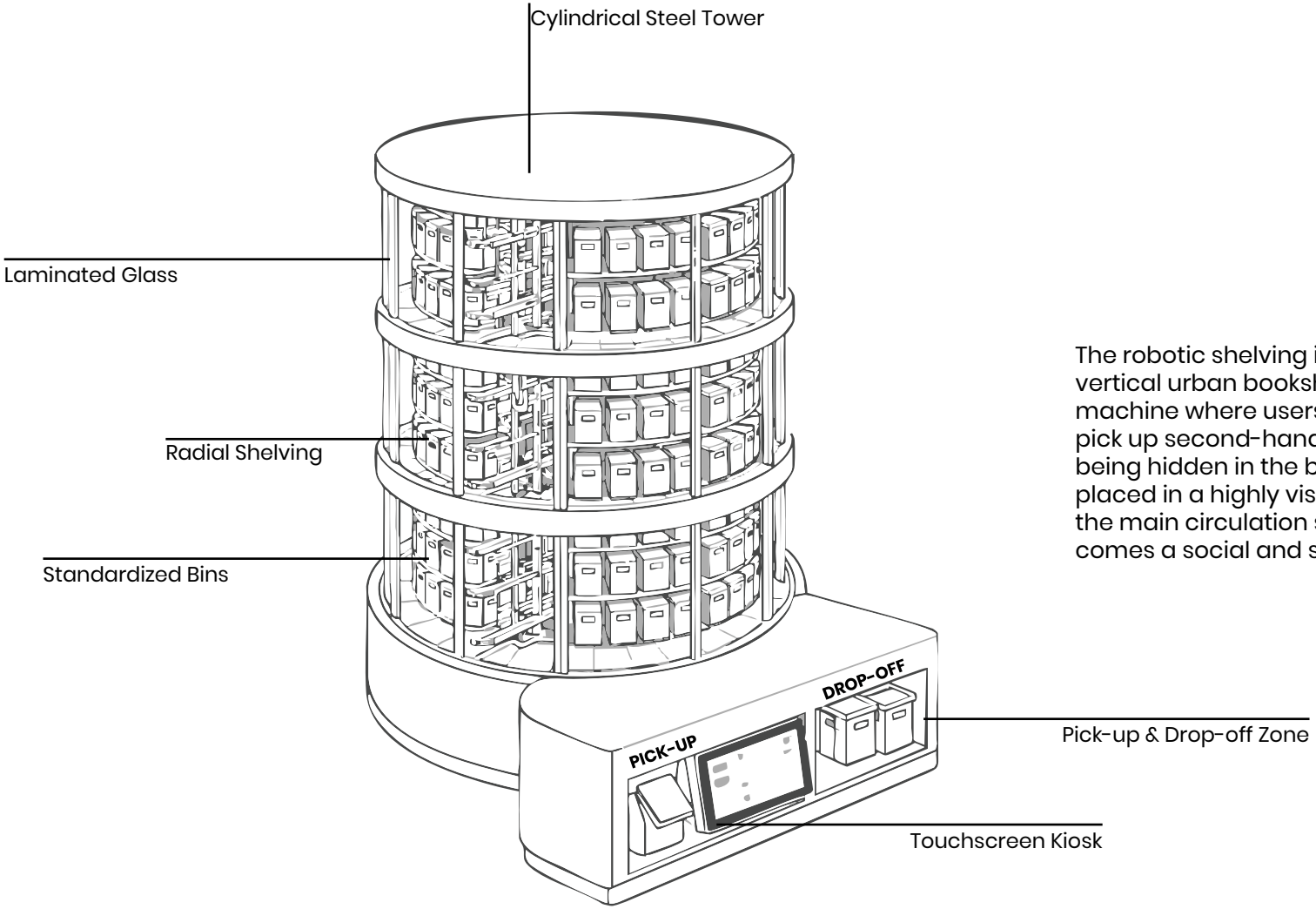
-Entrance repositioned to **de-emphasize** the stair axis.

-Introduction of **ramp and interactive library shelving** diversifies circulation.

-Visibility is more **dispersed, creating potential for lingering and engagement**.

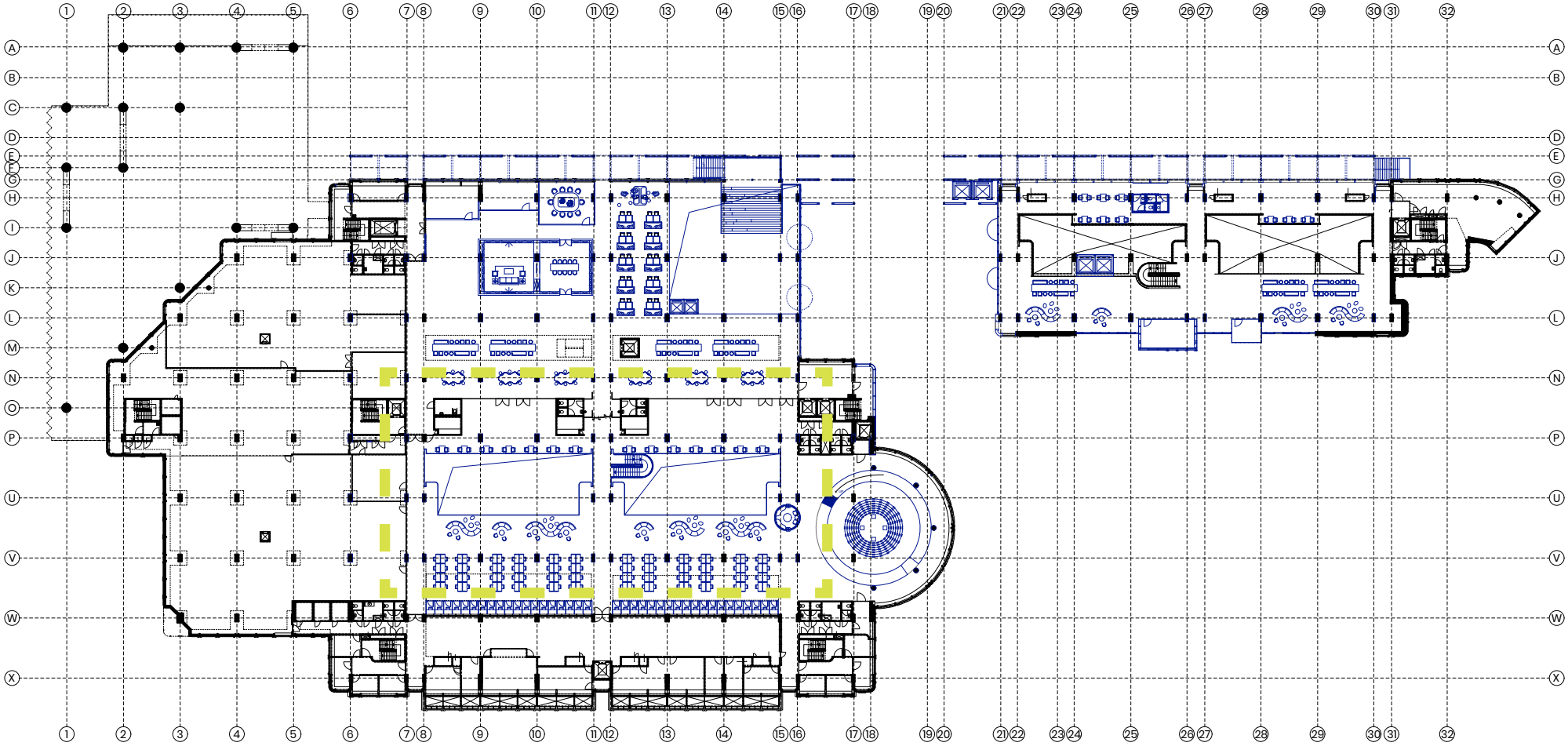
High visibility — Low visibility

RESEARCH & Design
VGA Test 2-Cirulation Ramp

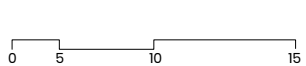


The robotic shelving is conceived as a vertical urban bookshelf: a compact machine where users can drop off and pick up second-hand books. Instead of being hidden in the back of house, it is placed in a highly visible position along the main circulation spine, so it becomes a social and spatial attractor.

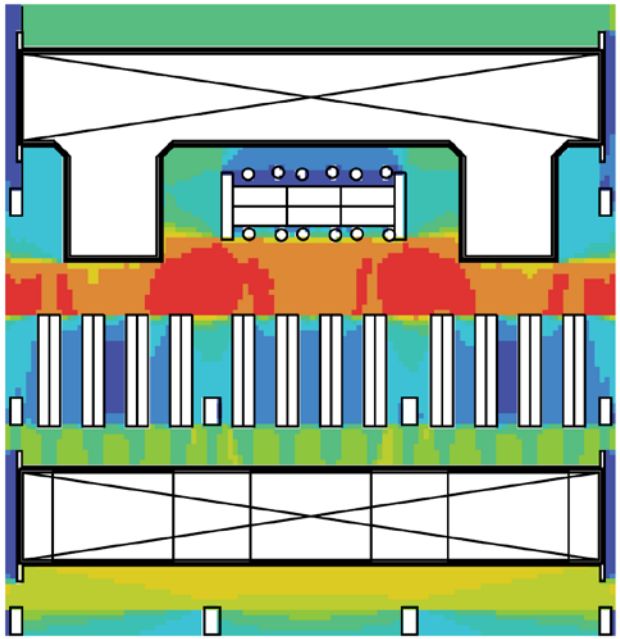
Robotic Shelving
Users Book Exchange Area



Co-Working Areas

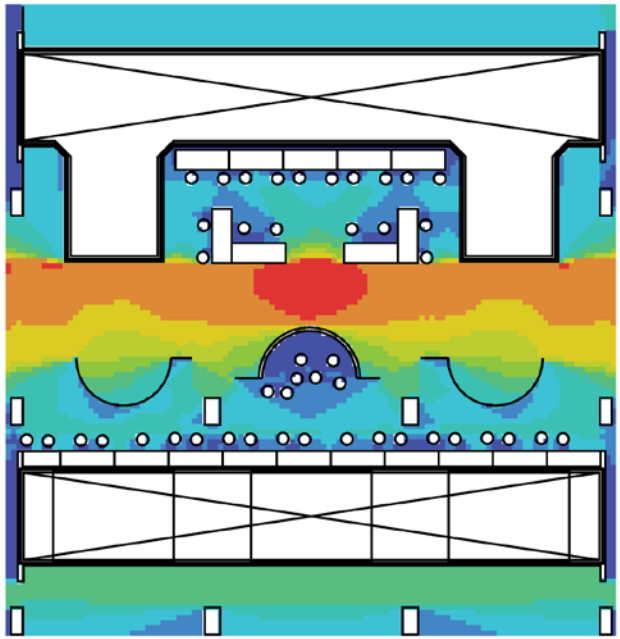


-Strong central axis with two red visibility hotspots.
-**Rigid, linear layout** encourages silent reading and focused behavior.
-Visual control is **centralized**.



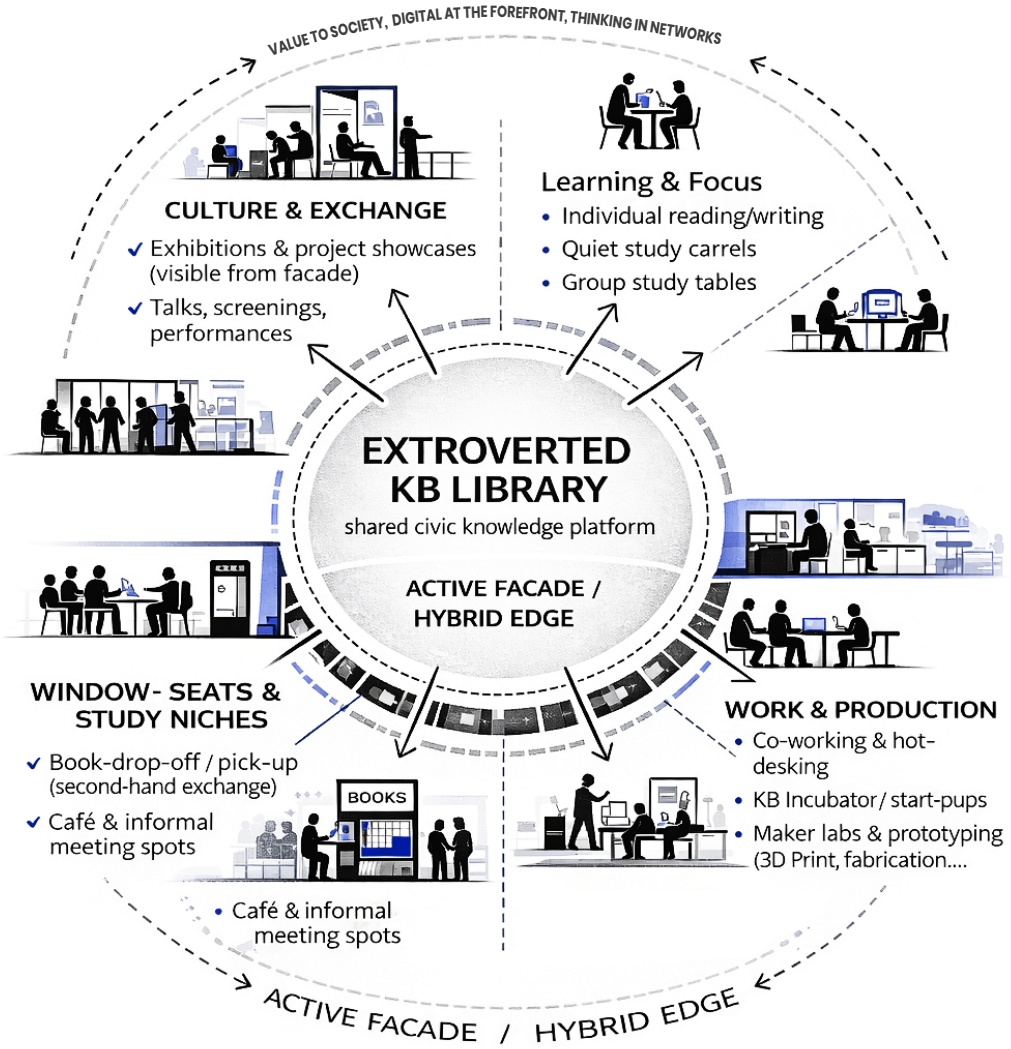
BEFORE

-Visibility is more dispersed and dynamic.
-New curved VR/resting pods soften the layout.
-A central node remains, but directionality fades..
-Corridors and pod placement create **multiple interaction points**.

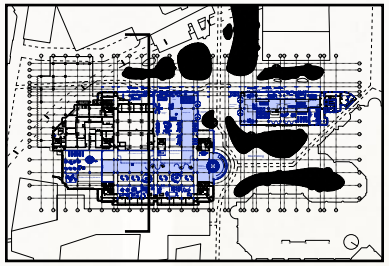


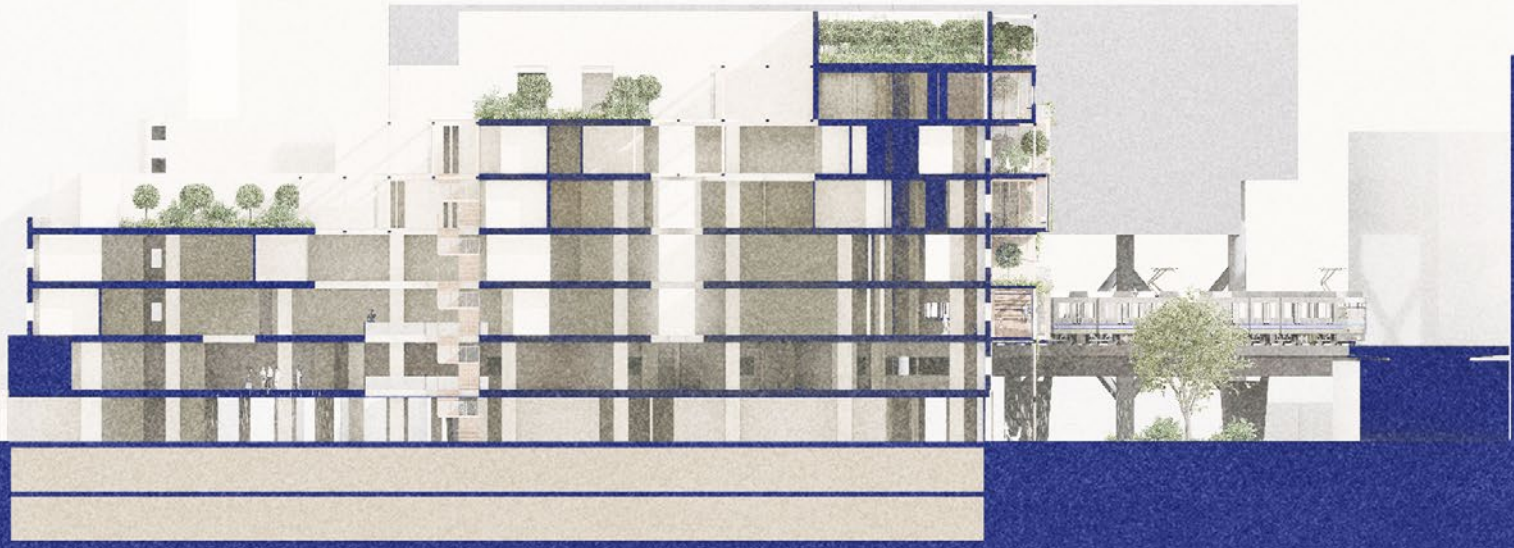
AFTER

RESEARCH & Design
VGA Test 3- Reading Hall->Co-working Hall

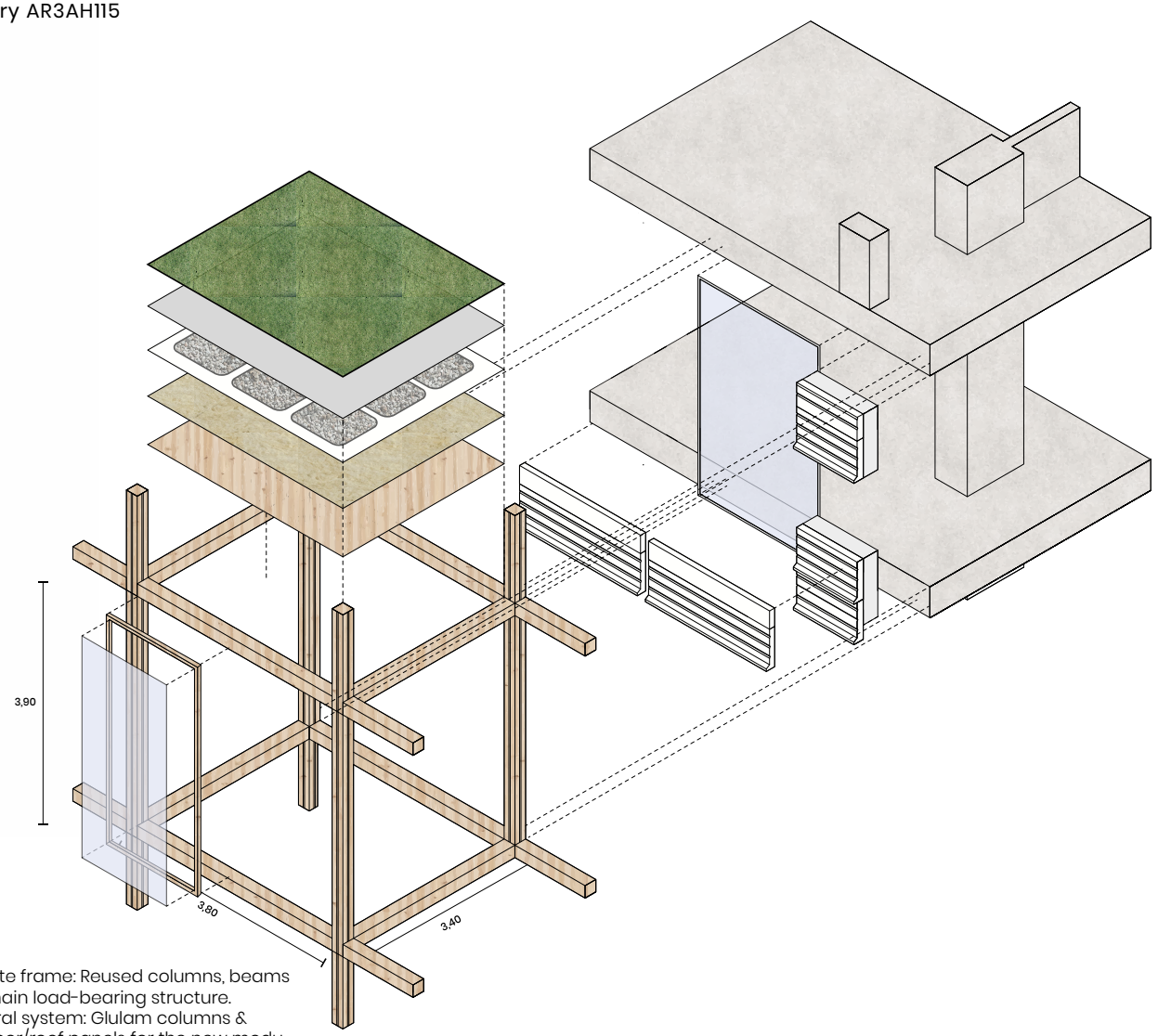


The KB of the Future





The Extroverted Facade



CLT floor / roof panels

Original Concrete Structure

Metal Panels

Mineral wool insulation

Recycled Concrete Aggregate

Waterproofing + root barrier

Vegetation

Vacuum glazing units

1. Primary structure

- Existing concrete frame: Reused columns, beams and slabs as main load-bearing structure.
- Timber structural system: Glulam columns & beams + CLT floor/roof panels for the new modular façade boxes.

2. Envelope & thermal layer

- Timber stud wall cassette: Light, demountable timber back-wall behind the façade.
- Bio-based / recyclable insulation: Wood-fibre or mineral wool in wall cavities and floor cassettes.
- RCA insulation layer: Recycled concrete aggregate in geotextile bags under modular floors (reused demolition material).
- Membranes: Breather membrane (outside) + vapour control / airtight layer (inside).

3. Openings & façade skin

- Timber window frames with vacuum glass: Renewable frames + high-performance glazing.
- Timber cladding: New rain screen in boards or panels.
- Reused metal KB panels: Selected original cassettes re-mounted as a heritage layer in upper zones.
- Sills & flashings: Aluminium / zinc sheet to drain water.

4. Shading & environmental control

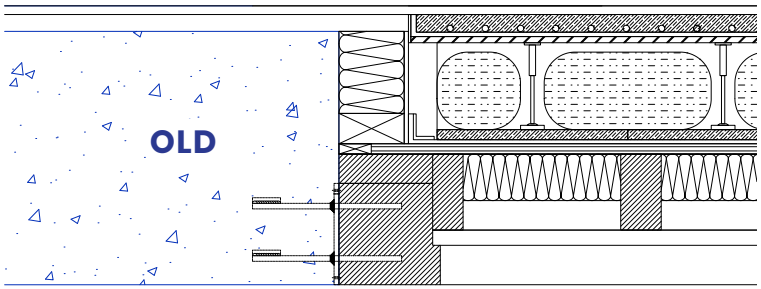
- Timber shading grids / fins: Fixed or adjustable outer layer to control sun.
- Exterior roll shading devices: Slim boxes, fabric curtains and side rails for additional solar control.

5. Green & water system

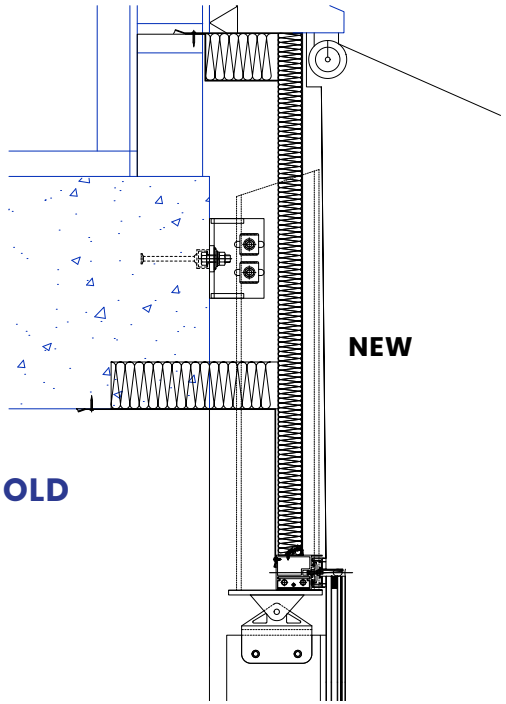
- Facade planters: Timber/steel boxes with waterproofing + root barrier.
- Lightweight substrate & drainage: Engineered soil + gravel/RCA drainage layer.
- Vegetation: Mixed sedums, perennials, grasses and small shrubs/trees adapted to The Hague's climate.
- Rainwater downpipes / collection: Integrated channels linking roof and façade to storage and irrigation.

6. Connections & reversibility

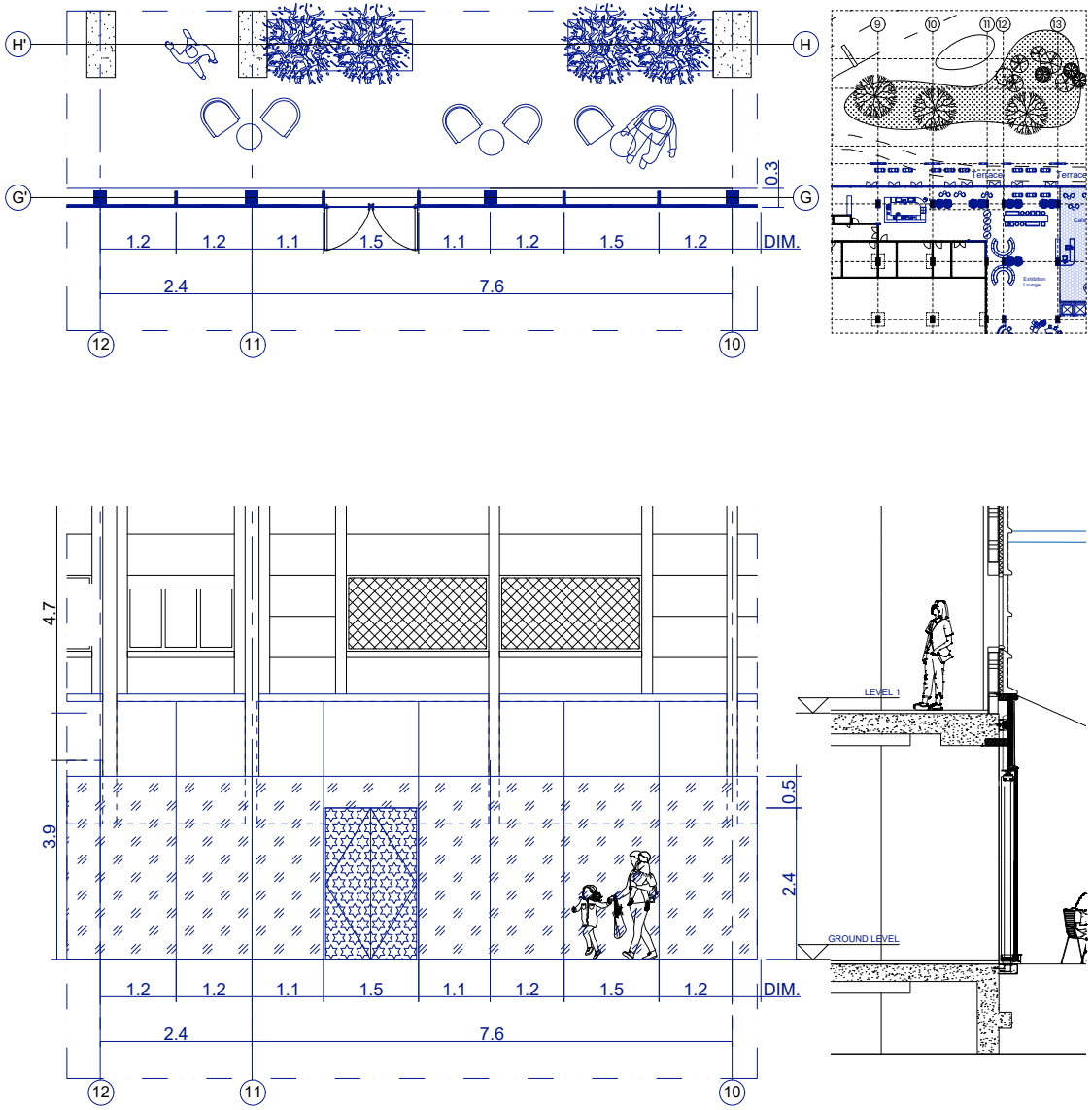
- Demountable steel brackets & plates: Bolted connections between timber modules and existing concrete.
- Screws / bolts for timber joints: Dry, reversible fixings enabling future disassembly.



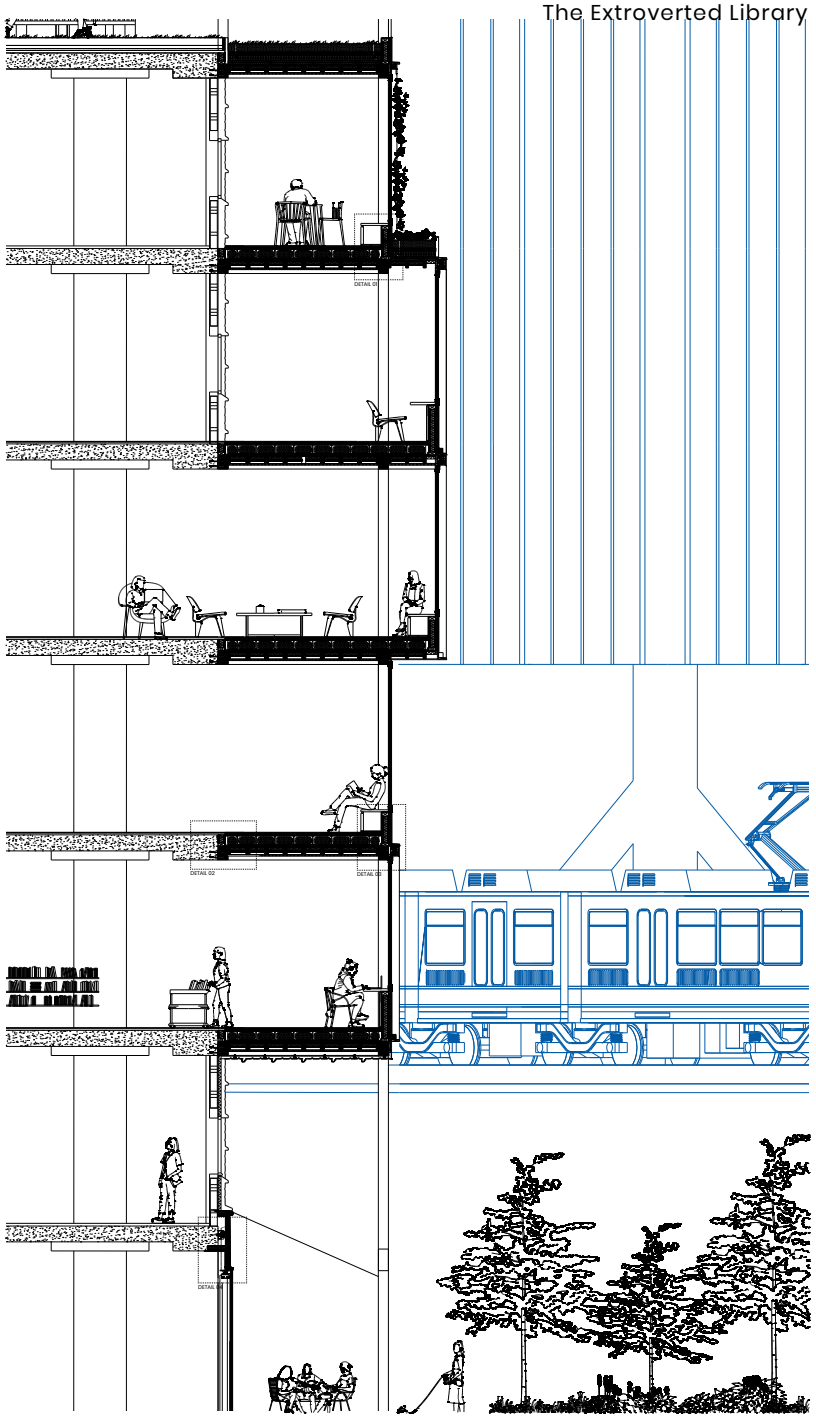
OLD STRUCTURE+NEW STRUCTURE CONNECTION



OLD STRUCTURE+GROUNDFLOOR CONNECTION



Groundfloor Exterior/Interior Connection

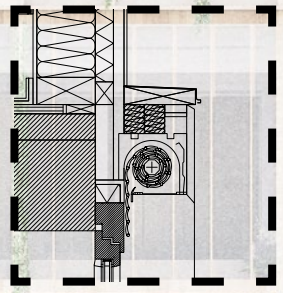


Floor 2-5 Strategy

SUMMER SUN
Movable Plant Grids for

WINTER SUN
Grid put aside to welcome as much sunlight as possible

Mechanical Shading devices
On the Extruded Rooms



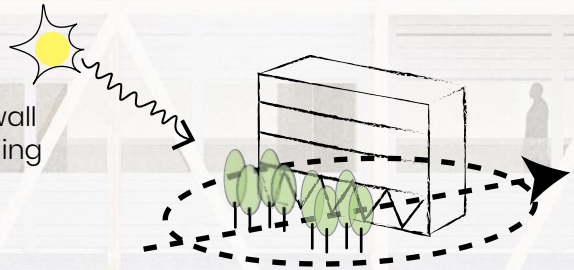
OPENINGS AND ACCESS
Shading and cooling side access on the sides of the extruded rooms

EXTRUSION
Some boxes are extruded differently to create shade

Floor 0-1 Strategy

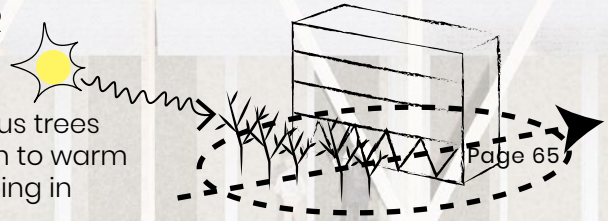
SUMMER SUN

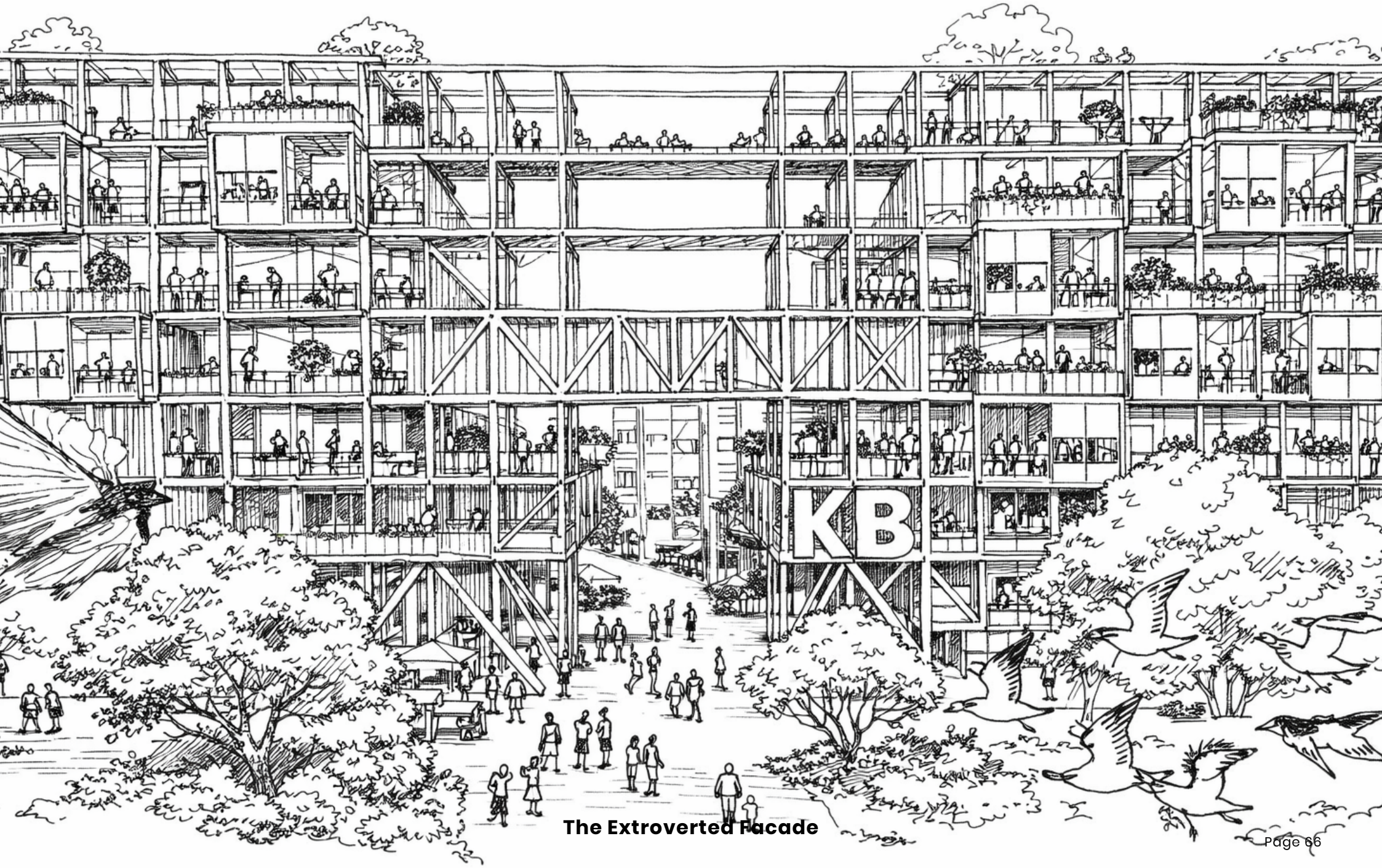
Shade on wall lowers cooling load



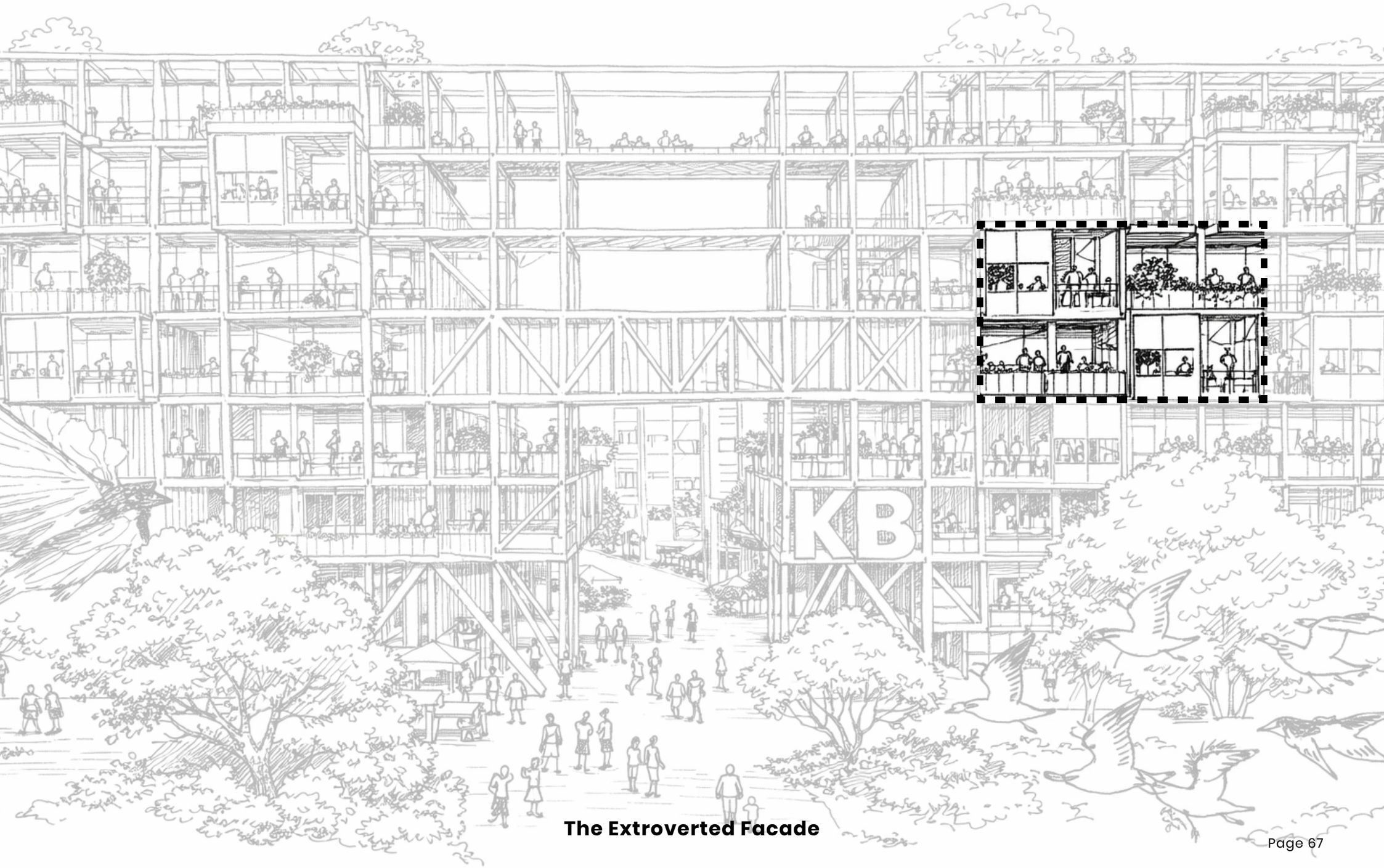
WINTER SUN

Deciduous trees allow sun to warm the building in



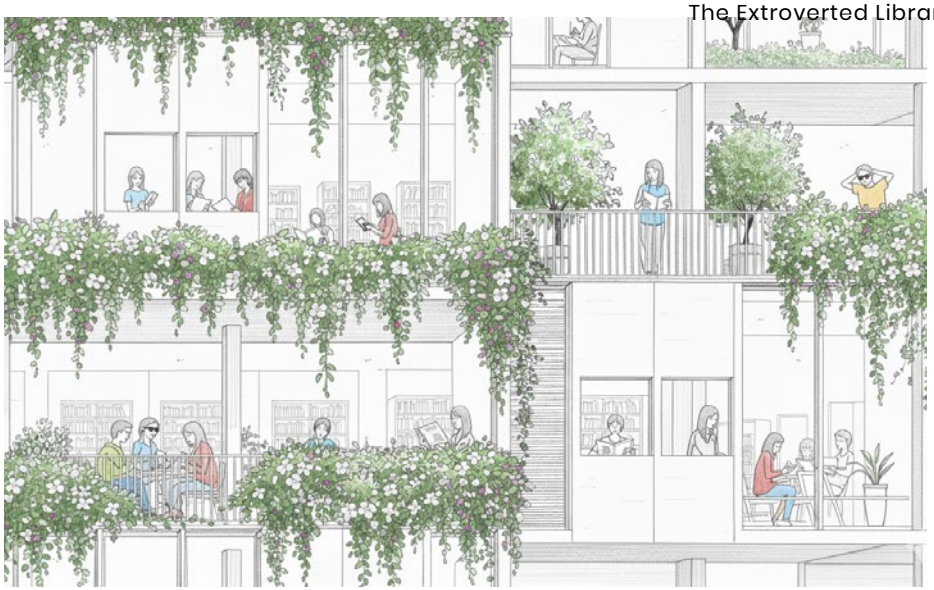


The Extroverted Facade



The Extroverted Facade

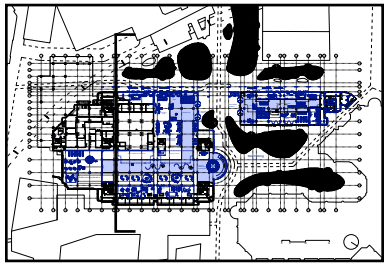
Spring



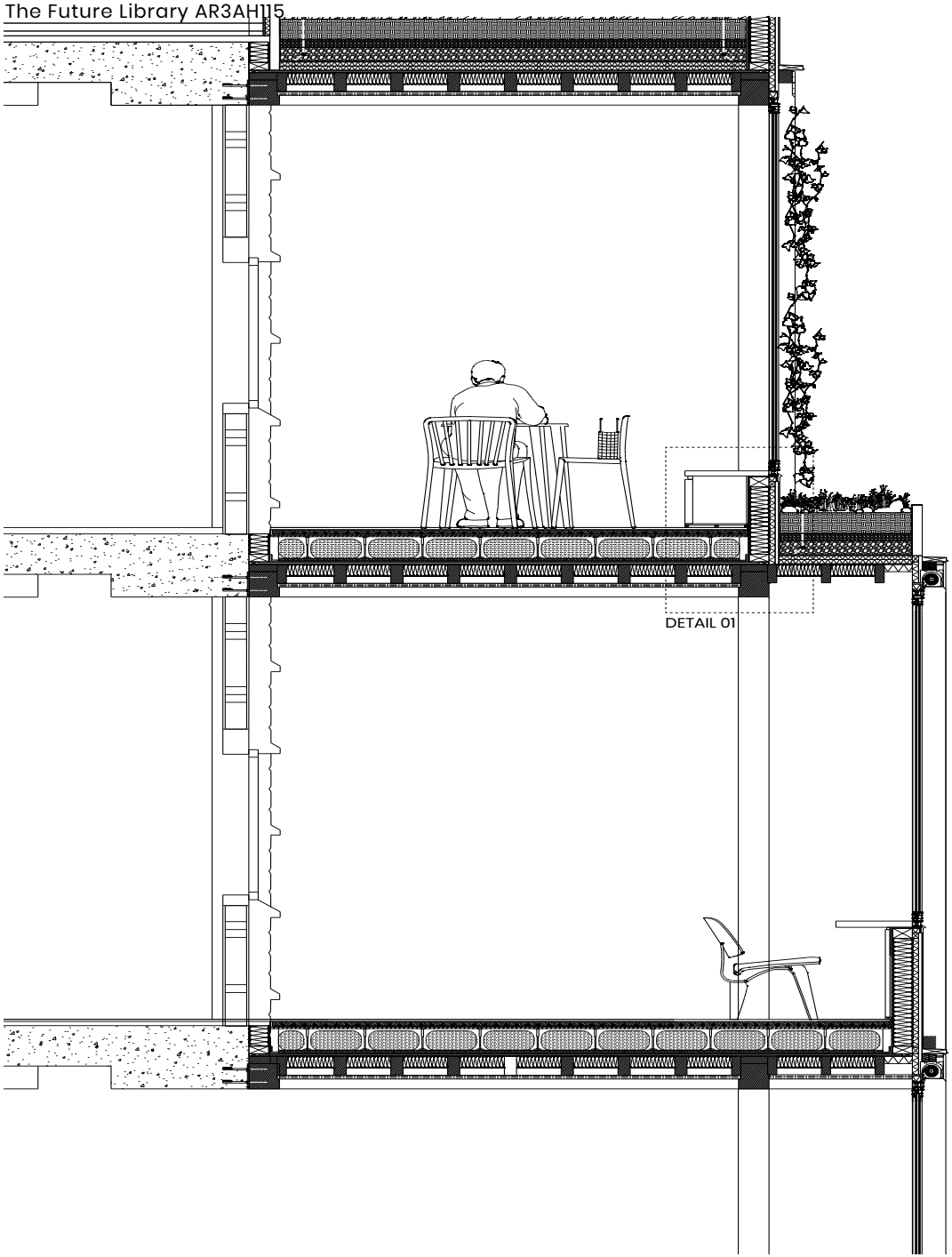
Summer

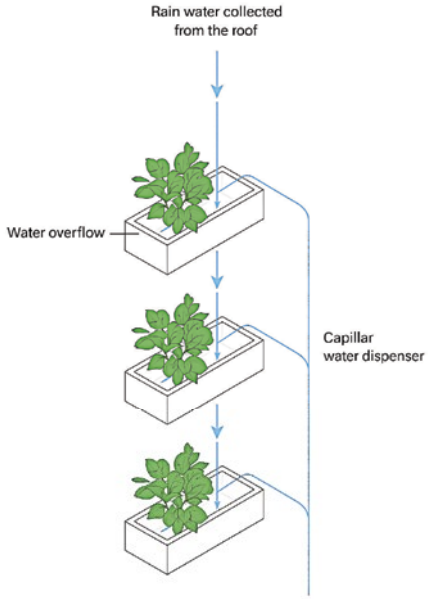
Fall

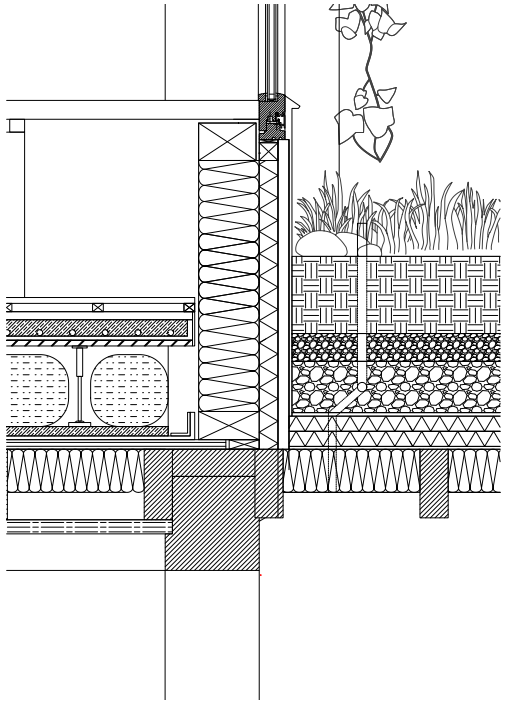
Winter



ROOF+FACADE WATER STRATEGY


DETAIL 01


Rain water collected
from the roof
Water overflow
Capillar
water dispenser



The KB Green Booklet

Plant palette for facade & roof

1. Groundcovers & succulents (≈ 6–10 cm depth)

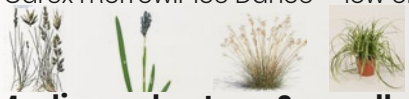
- Sedum album – white stonecrop
- Sedum acre – yellow stonecrop
- Sedum spurium (e.g. 'Dragon's Blood') – low mat-forming sedum
- Sedum kamtschaticum – slightly taller sedum, yellow/orange flowers
- Sempervivum spp. – houseleeks
- Thymus serpyllum / T. vulgaris – creeping / common thyme
- Dianthus deltoides – maiden pink

2. Low perennials & herbs (≈ 10–20 cm depth)

- Origanum vulgare – wild marjoram
- Achillea millefolium – yarrow
- Campanula poscharskyana / C. portenschlagiana – trailing bellflower
- Allium schoenoprasum – chives
- Lavandula angustifolia – lavender (sunny, dry spots)
- Geranium macrorrhizum – aromatic geranium, semi-evergreen groundcover
- Heuchera spp. – coral bells, colourful foliage
- Nepeta × faassenii – catmint
- Stachys byzantina – lamb's ear

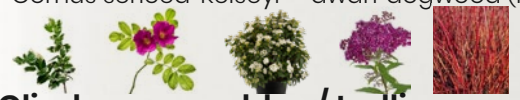
3. Grasses & grassy perennials (≈ 10–20 cm depth)

- Festuca ovina – sheep's fescue
- Sesleria caerulea – blue moor grass
- Deschampsia cespitosa – tufted hair grass (slightly wetter spots)
- Carex morrowii 'Ice Dance' – low ornamental sedge



4. Medium planters & small shrubs (≈ 20–30 cm depth)

- Euonymus fortunei – evergreen, trailing / low shrub
- Rosa rugosa (kept low by pruning) – tough, coastal rose
- Viburnum davidii – low evergreen viburnum
- Spiraea japonica – compact flowering shrub
- Cornus sericea 'Kelseyi' – dwarf dogwood (low, coloured stems)



5. Climbers on cables / trellises

(roots in ≥ 30 cm soil, facade itself needs almost no depth)

- Hedera helix / H. hibernica – ivy (evergreen backbone)
- Parthenocissus tricuspidata / P. quinquefolia – Boston / Virginia creeper (deciduous)
- Lonicera periclymenum – honeysuckle (fragrant)
- Clematis viticella – light flowering clematis

6. Very small trees / tree-like shrubs (kept ≈ 1.5–2 m max, ≥ 40–60 cm depth)

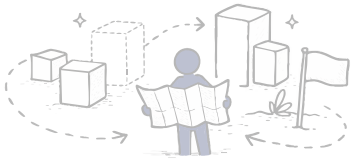
(Use sparingly in more sheltered, deeper balcony or roof planters.)

- Salix purpurea 'Nana' – dwarf willow, rounded form (≈ 1–1.5 m)
- Cornus mas 'Nana' – dwarf Cornelian cherry (≈ 1.5–2 m)
- Amelanchier alnifolia 'Obelisk' (or similar compact cultivars, pruned) – narrow juneberry, kept ≈ 2 m
- Acer palmatum (dwarf cultivars) – Japanese maple, compact forms kept ≈ 1.5–2 m with pruning
- Ribes sanguineum (compact cultivars) – flowering currant, shrub trained as small multi-stem "tree" ≈ 1.5–2 m

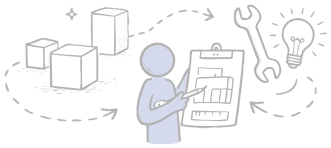
-Thuring, C. & Dunnett, N. (2015). The biodiversity of temperate extensive green roofs: a review of research and practice. Urban Forestry & Urban Greening.
-City of Hamburg (n.d.). Manual Green Walls.

Phase 1 – KB Today: Introverted Heritage
Context, existing building, heritage values and current problems.

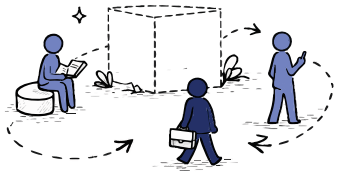
Phase 2 – Research for the Future KB
Technology scan, user interviews, DepthMapX tests and design guidelines.



Phase 3 – Heritage Strategy & Big Moves
What is kept and removed, CO2 and material impact, KB Plaza.



Phase 4 – Spatial & Technical Concept
Urban climate, new entrance and access, extroverted timber façade, green–blue, water systems and robotic shelving.



Phase 5 – Lived Building & User Journeys
Daily use by different users, spatial typologies, atmospheres and accessibility.

Phase 6 – Reflection & Future Relevance
Role of heritage, SDGs and R-strategies, limitations and outlook beyond P5.

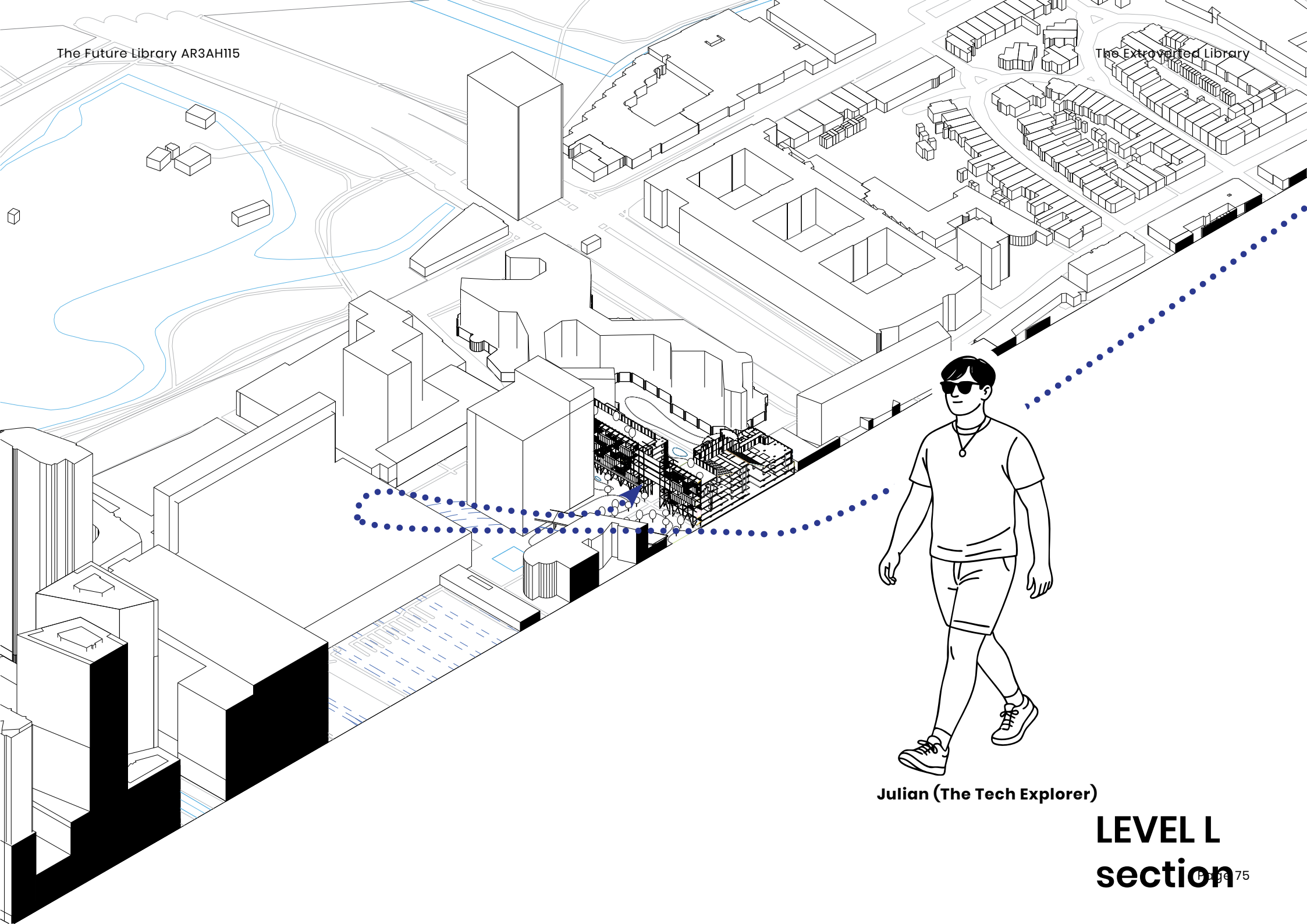
Julian (The Tech Explorer):

- 27, Digital Nomad, data-oriented
- uses AI search, AR previews
- loves clear wayfinding
- wants flexible co-working tools and quick access to digital collections

Angela (The Creative Maker):

- 21, Product Designer
- values making, mentoring, tangible workshops
- seeks hybrid zones to present, learn, and collaborate
- curious about how the building performs

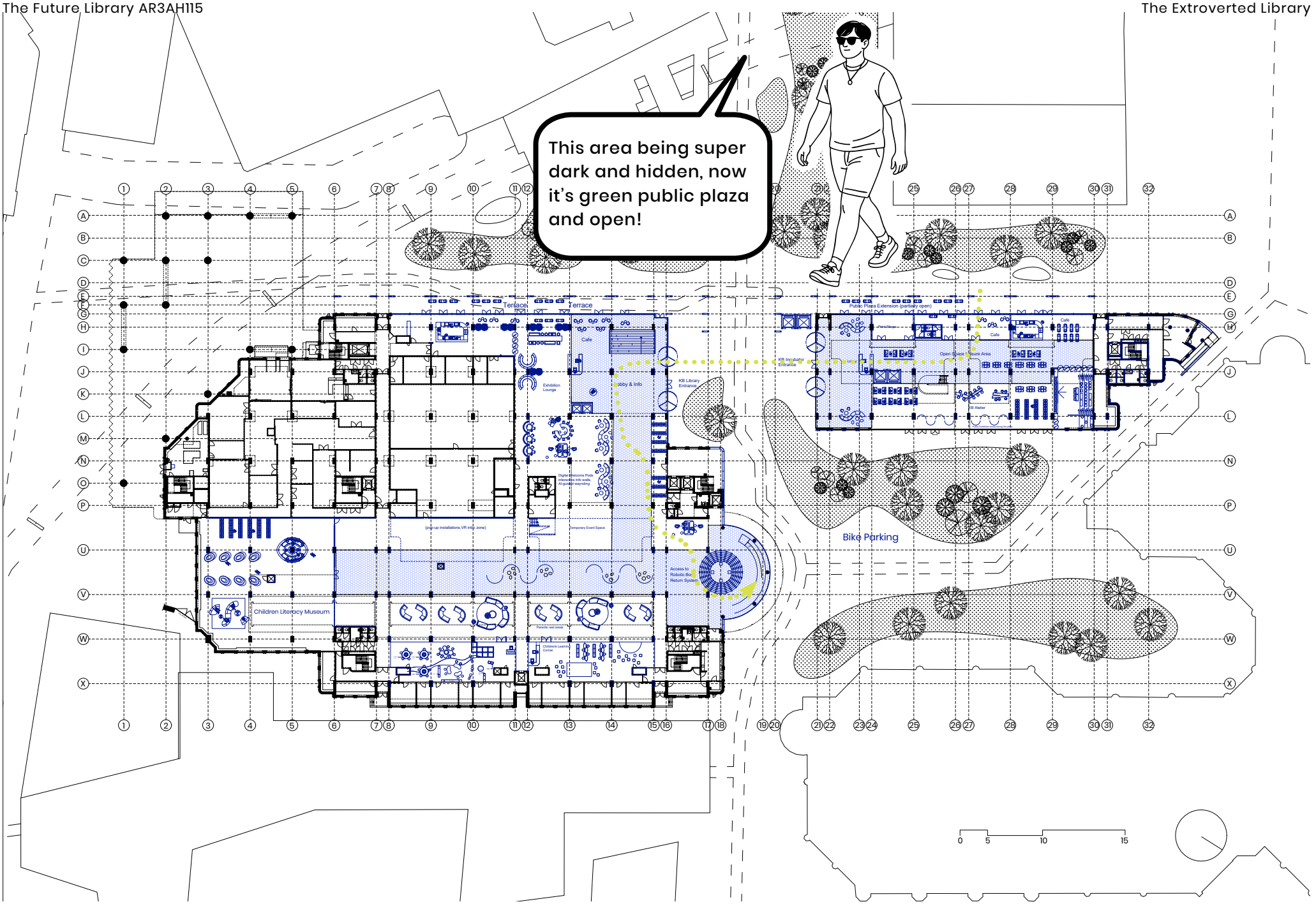
A KB JOURNEY THROUGH USER EXPERIENCE

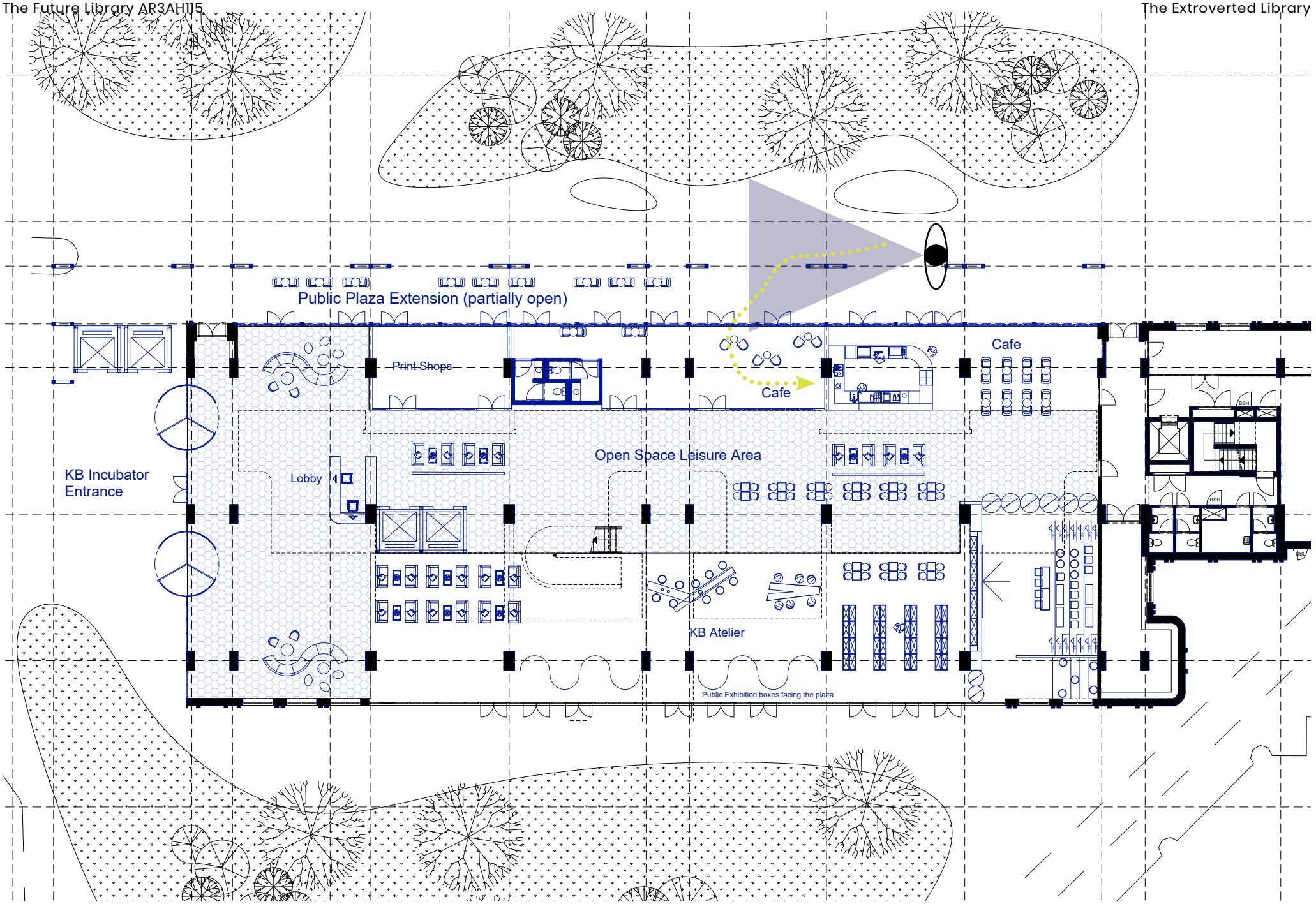


Julian (The Tech Explorer)

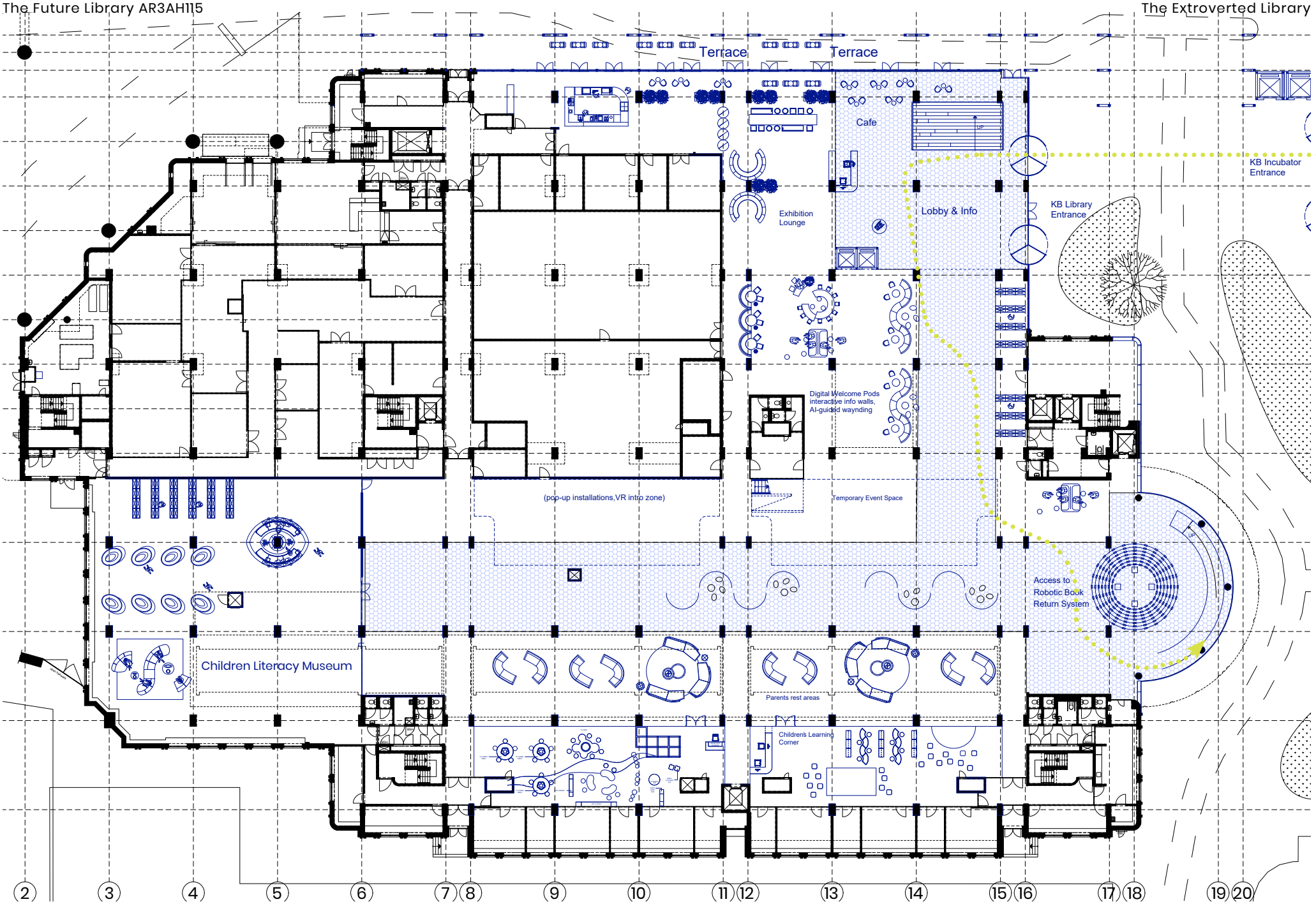
LEVEL L section

The Extroverted Facade


This area being super dark and hidden, now it's green public plaza and open!
Terrace
Terrace
Public Plaza Extension (partially open)
Cafe
Cafe
Exhibition Lounge
Lobby & Info
KB Library Entrance
KR Incubator Entrance
Open Space
Music Area
KR Atelier
Digital Welcome Pods, interactive info walls, AI-guided wayfinding
(pop-up installations, VR info zone)
Temporary Event Space
Access to: Robotic Book Return System
Children Literacy Museum
Children's Learning Corner
Bike Parking
0
5
10
15


Public Plaza Extension (partially open)
Print Shops
Cafe
Cafe
KB Incubator Entrance
Lobby
Open Space Leisure Area
KB Atelier
Public Exhibition boxes facing the plaza

Groundfloor Exterior/Interior Connection


Terrace
Terrace
Cafe
KB Incubator Entrance
KB Library Entrance
Exhibition Lounge
Lobby & Info
Digital Welcome Pods interactive info walls, AI-guided waynding
(pop-up installations,VR intro zone)
Temporary Event Space
Access to Robotic Book Return System
Children Literacy Museum
Parents rest areas
Children's Learning Corner
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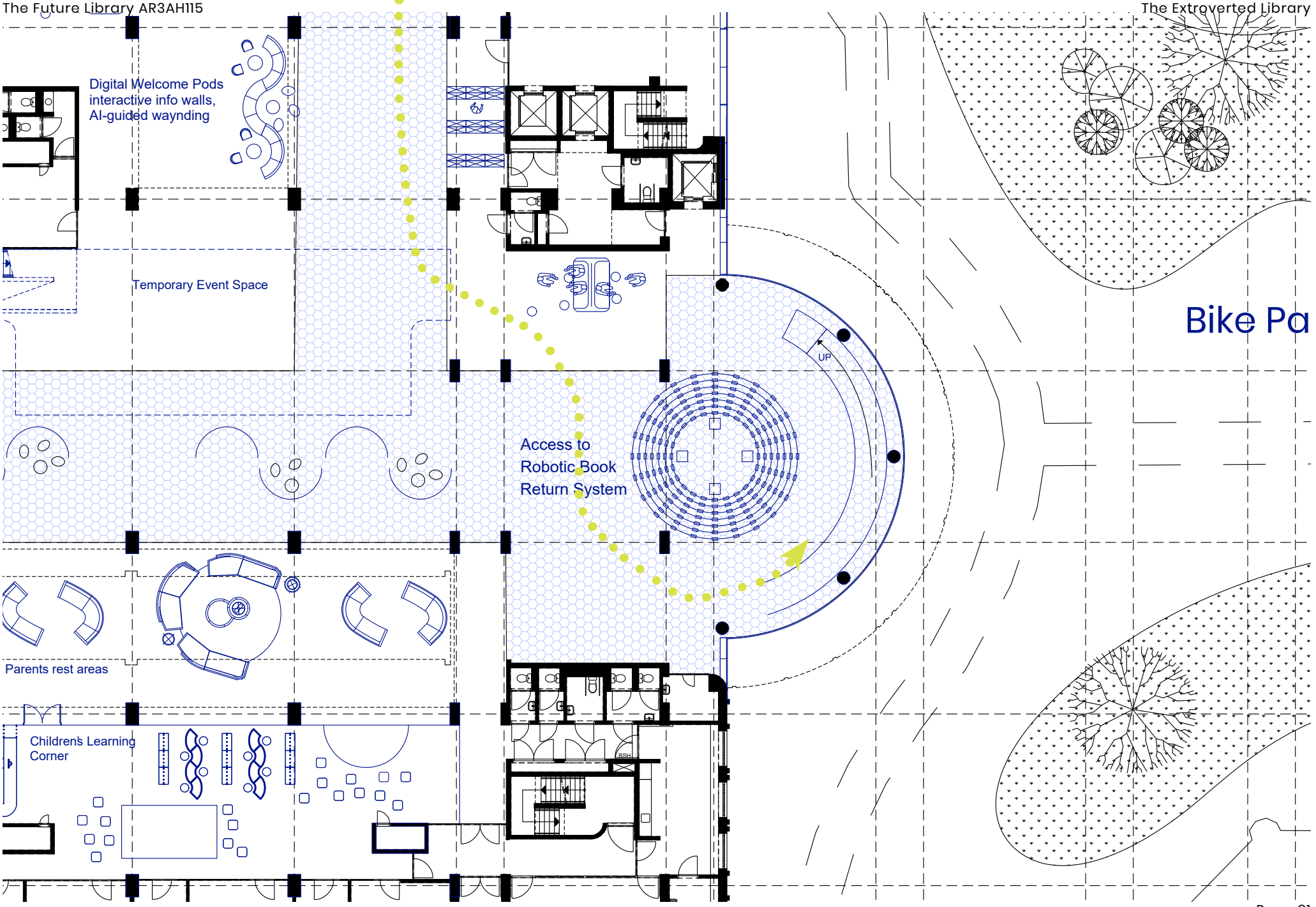
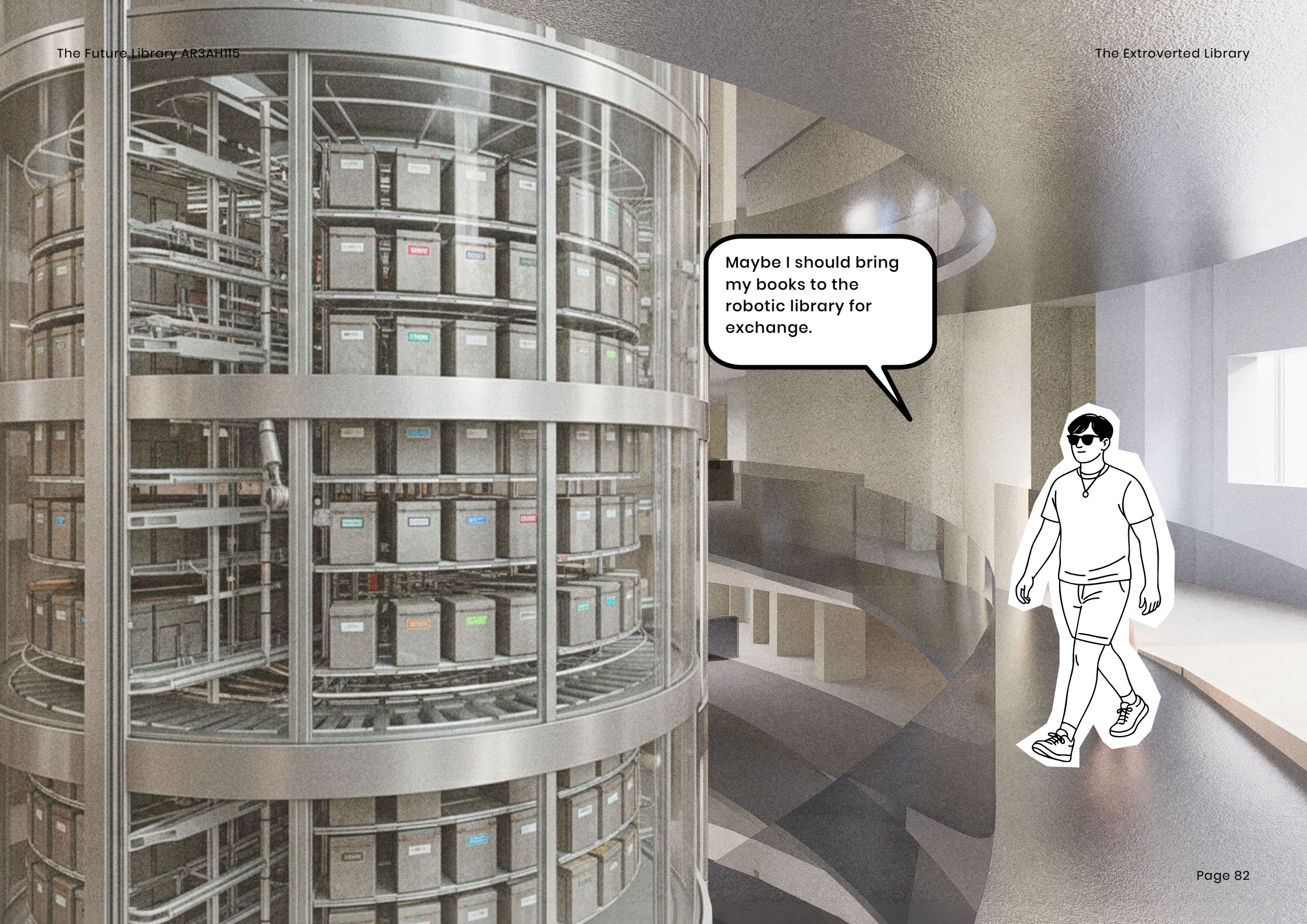
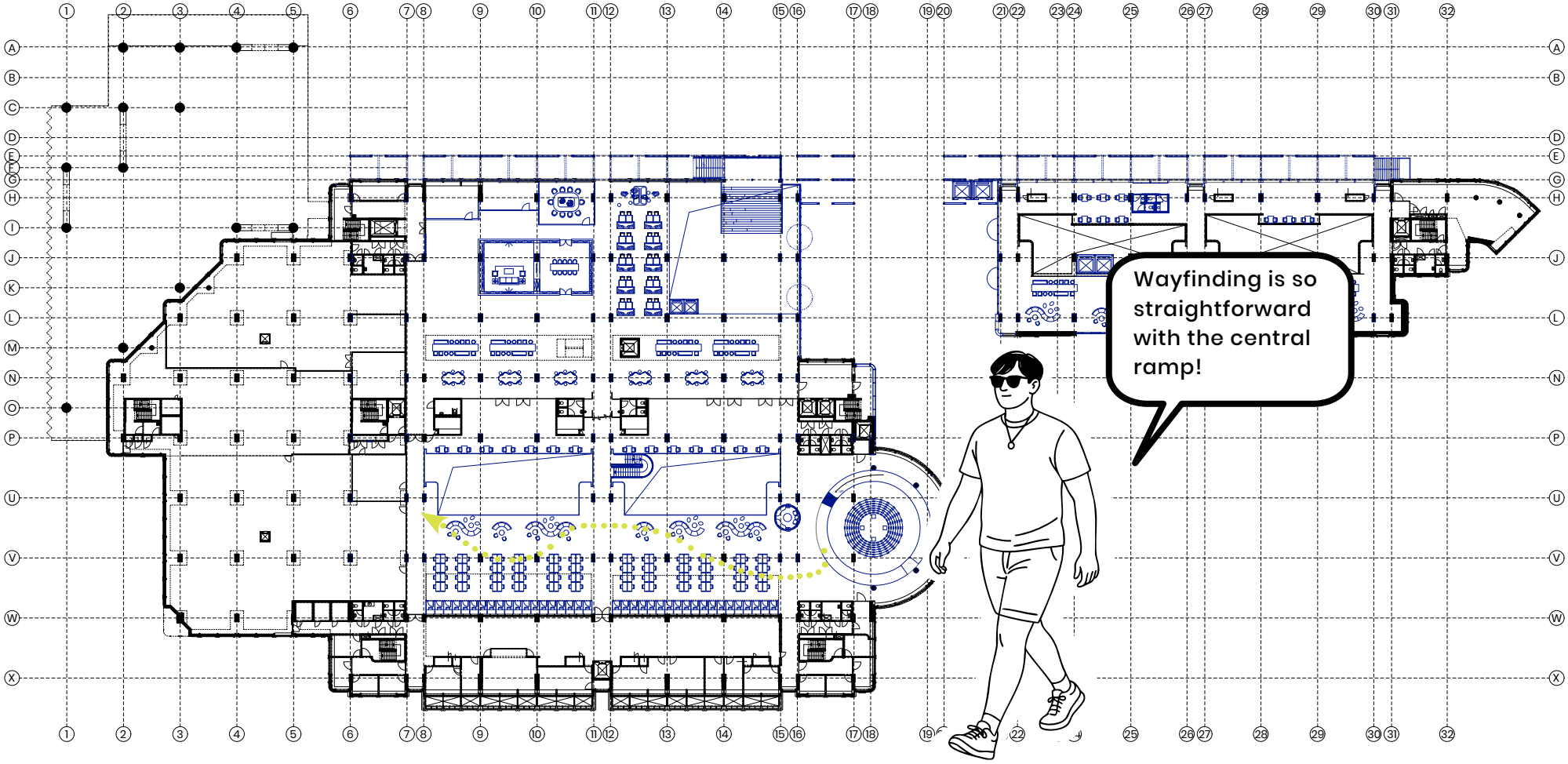
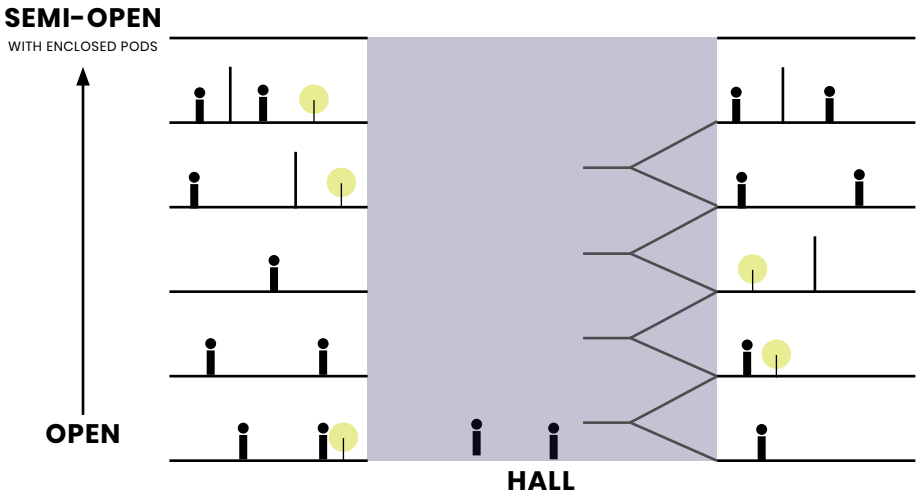
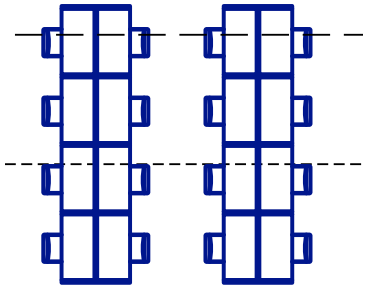

Digital Welcome Pods
interactive info walls,
AI-guided waynding
Temporary Event Space
Access to
Robotic Book
Return System
UP
Parents rest areas
Childrens Learning
Corner
Bike Pa


Maybe I should bring my books to the robotic library for exchange.

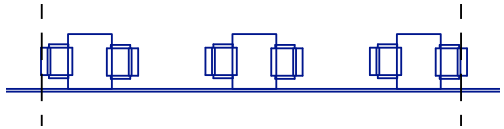

Wayfinding is so straightforward with the central ramp!


It's nice to have a good balance of enclosed/open zones to work!

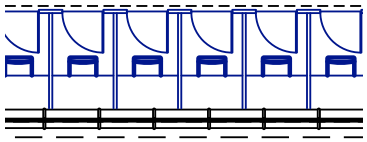

SEMI-OPEN
WITH ENCLOSED PODS
OPEN
HALL



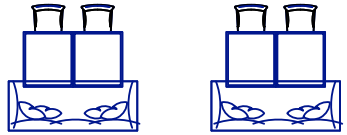
SHARED



DUO

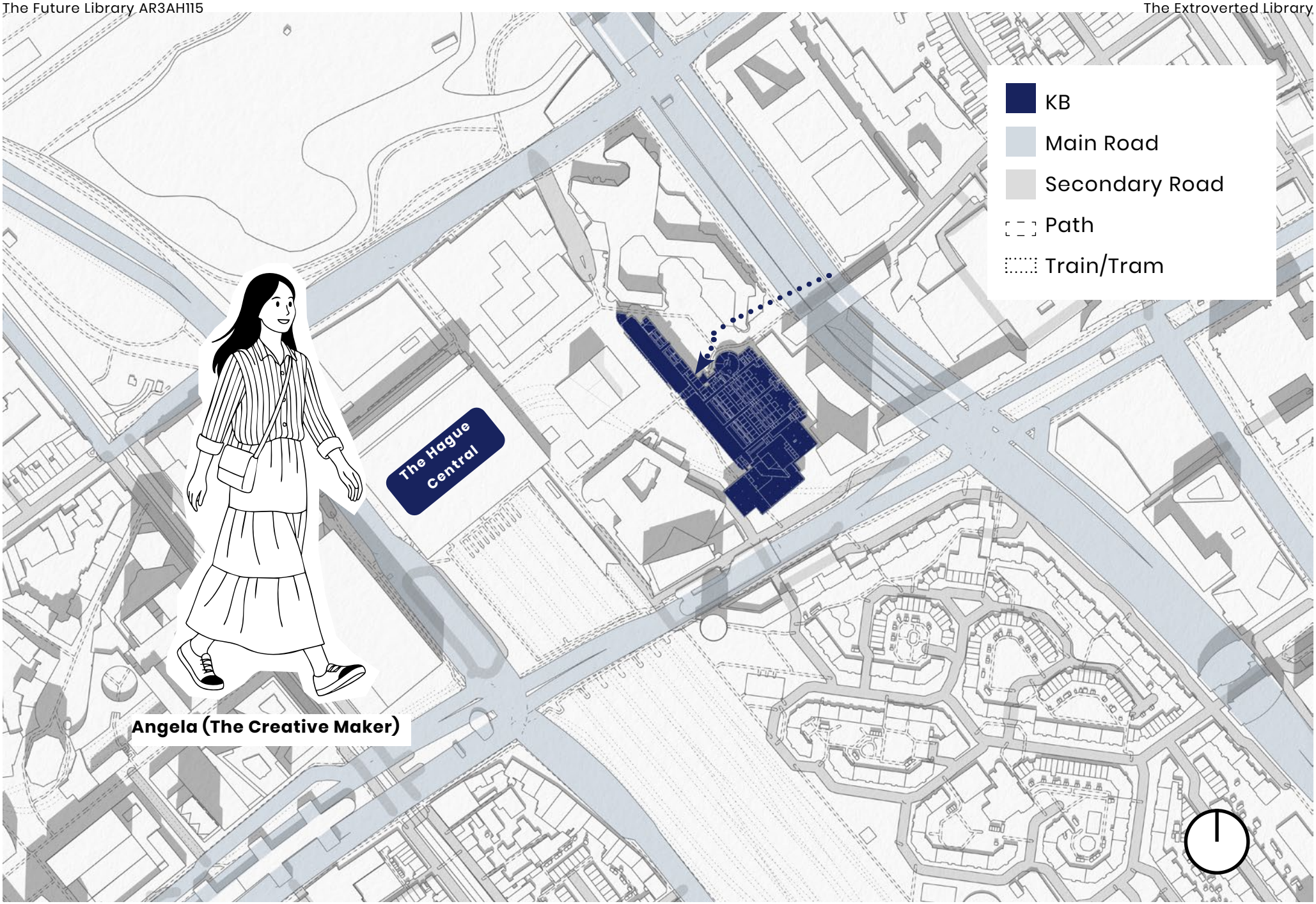


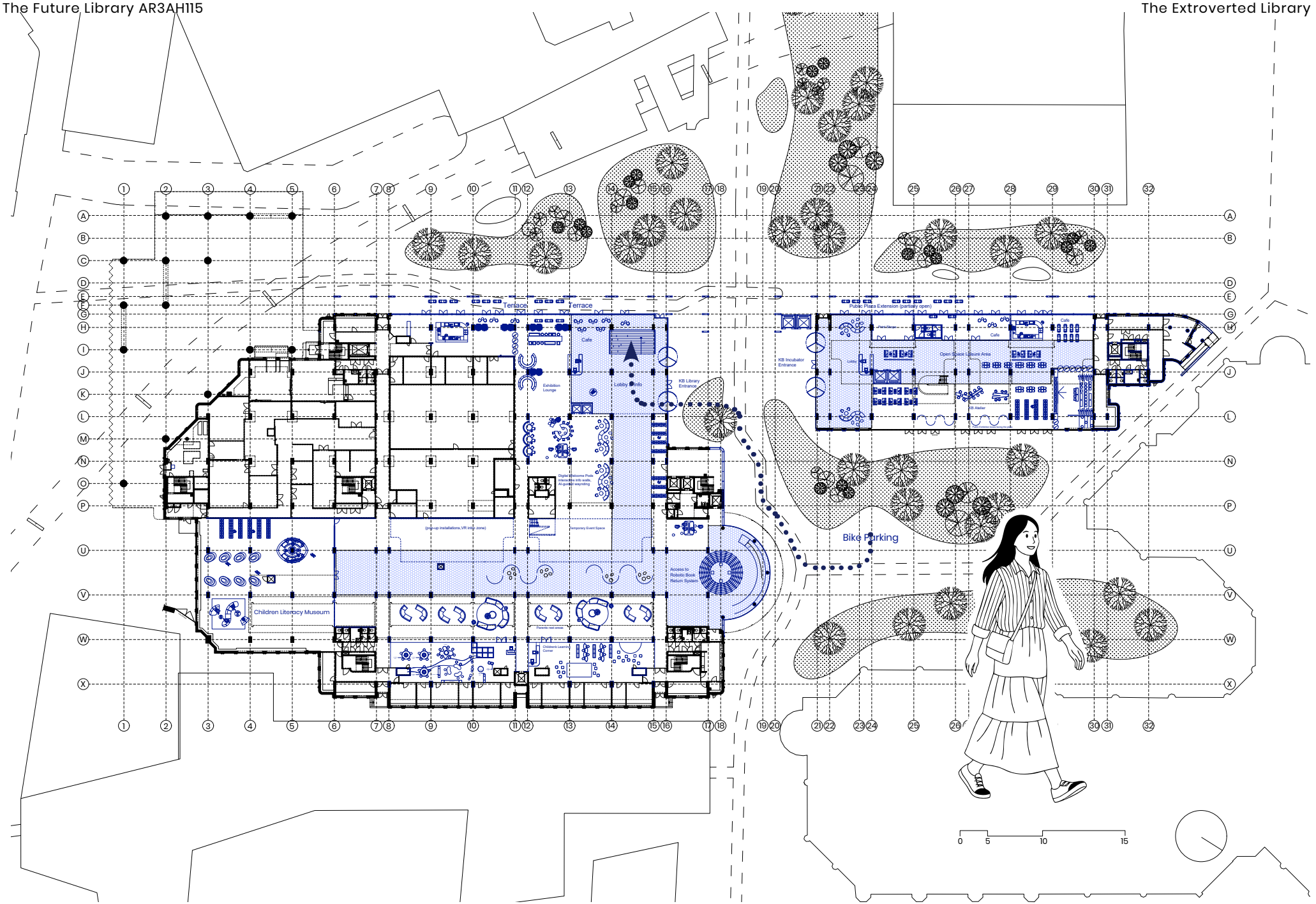
SINGLE



COUCH+SEATS

SELECTION OF DIFFERENT WORKING AREAS


KB
Main Road
Secondary Road
Path
Train/Tram
The Hague Central
Angela (The Creative Maker)


Terrace
Terrace
Cafe
Exhibition Lounge
Lobby Info
KB Library Entrance
Digital Welcome Pods interactive info walls, AI-guided wayfinding
(pop-up installations, VR intro zone)
Temporary Event Space
Access to Robotic Book Return System
Children Literacy Museum
Children's Learning Corner
Public Plaza Extension (partially open)
Cafe
Cafe
KB Incubator Entrance
Lobby
Open Space Leisure Area
KB Atelier
Bike Parking
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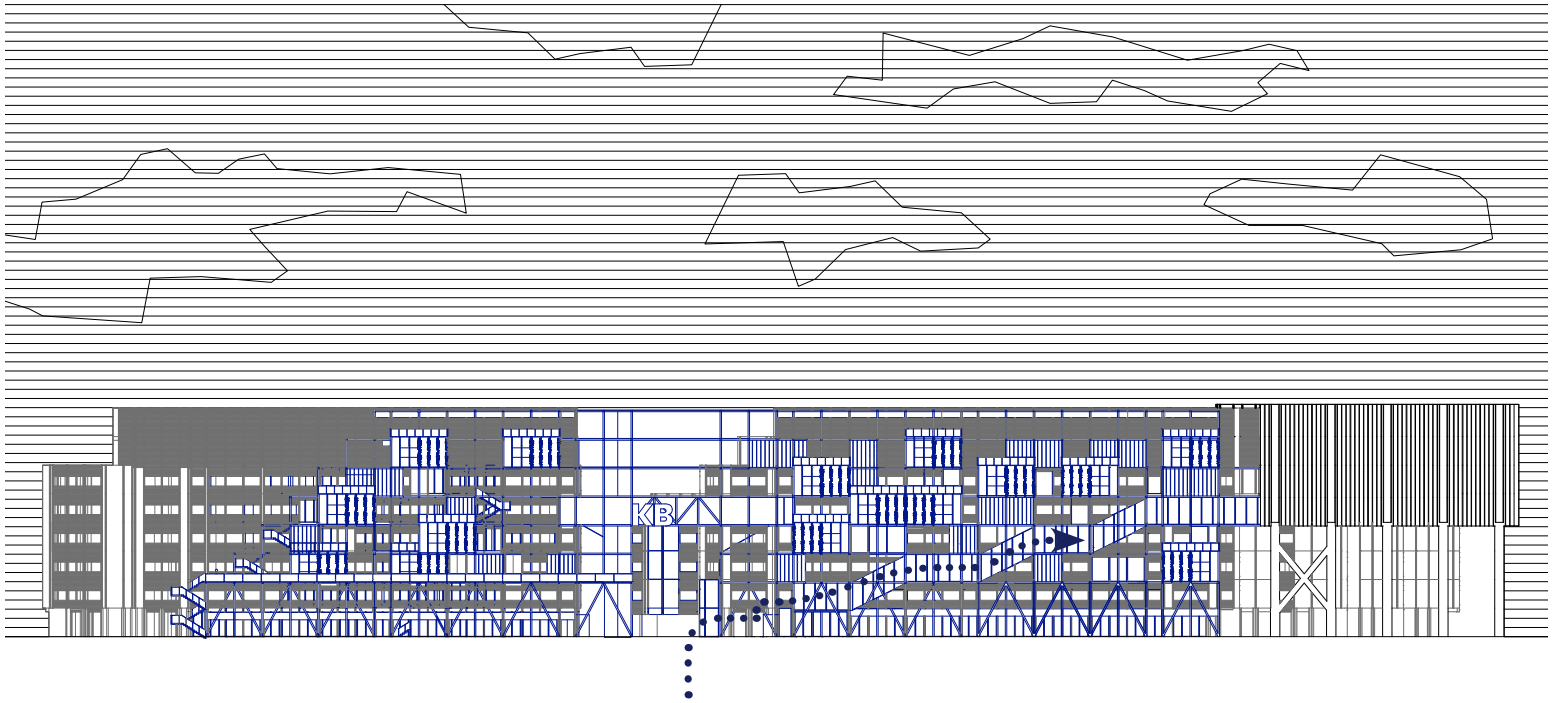
Main Entrance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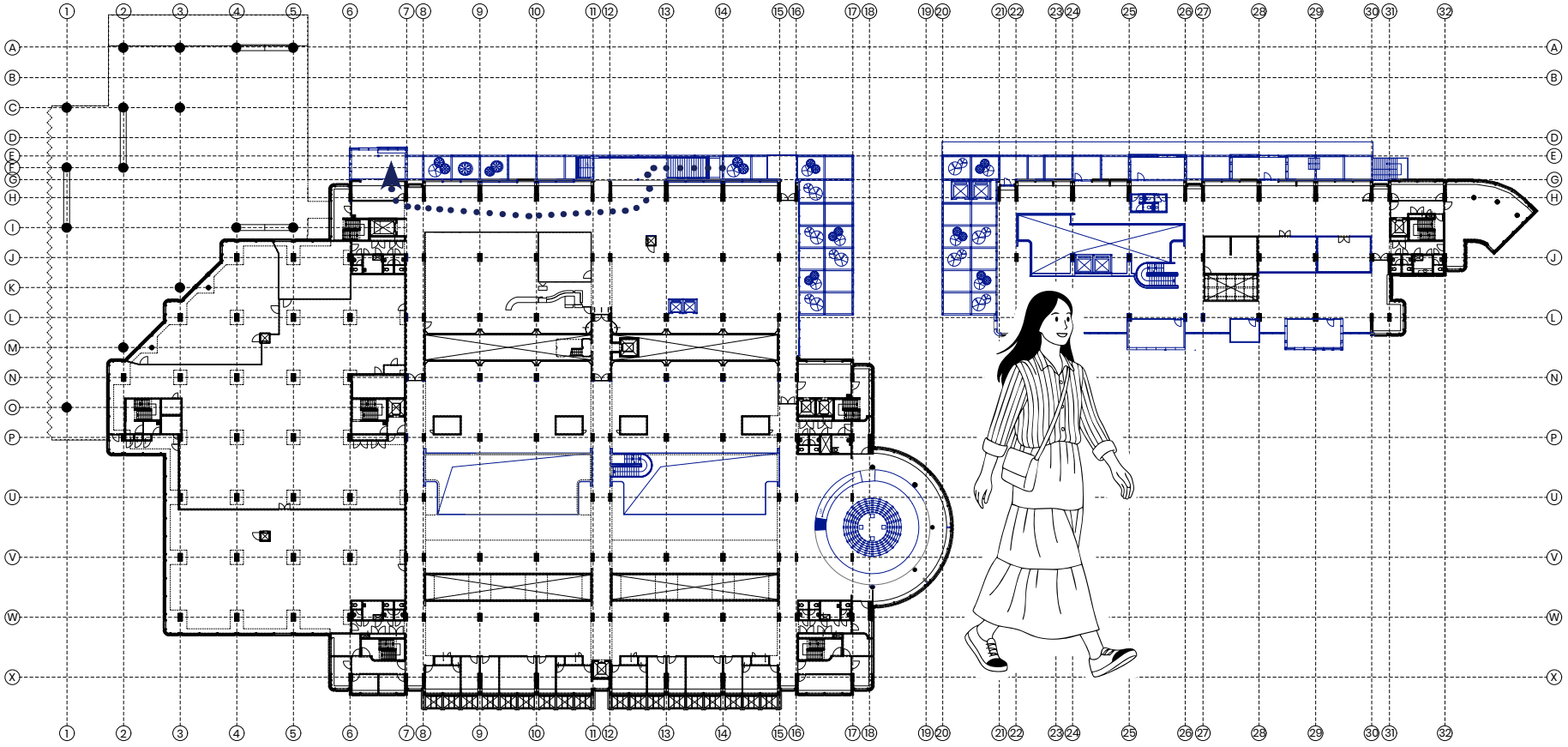
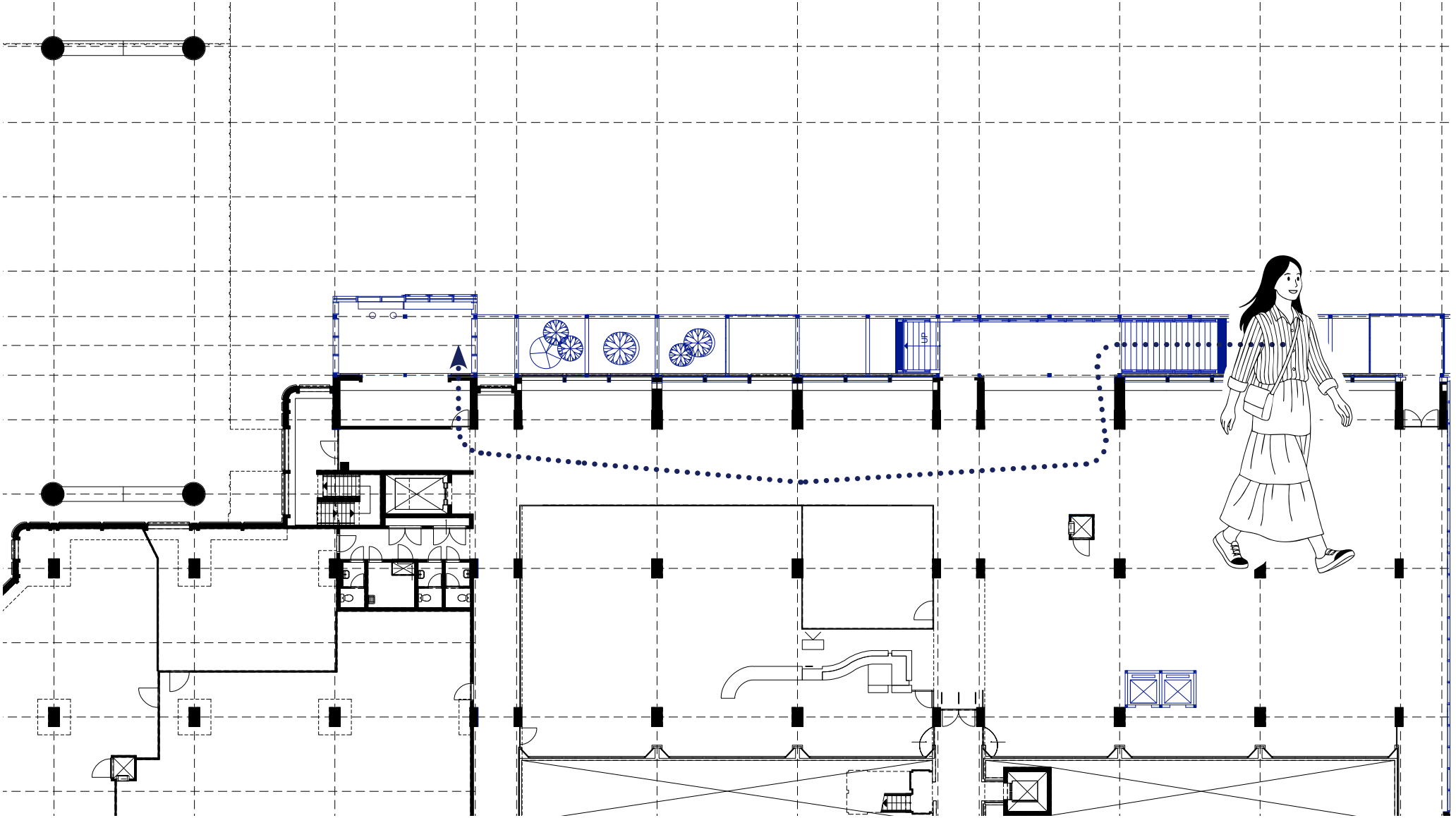
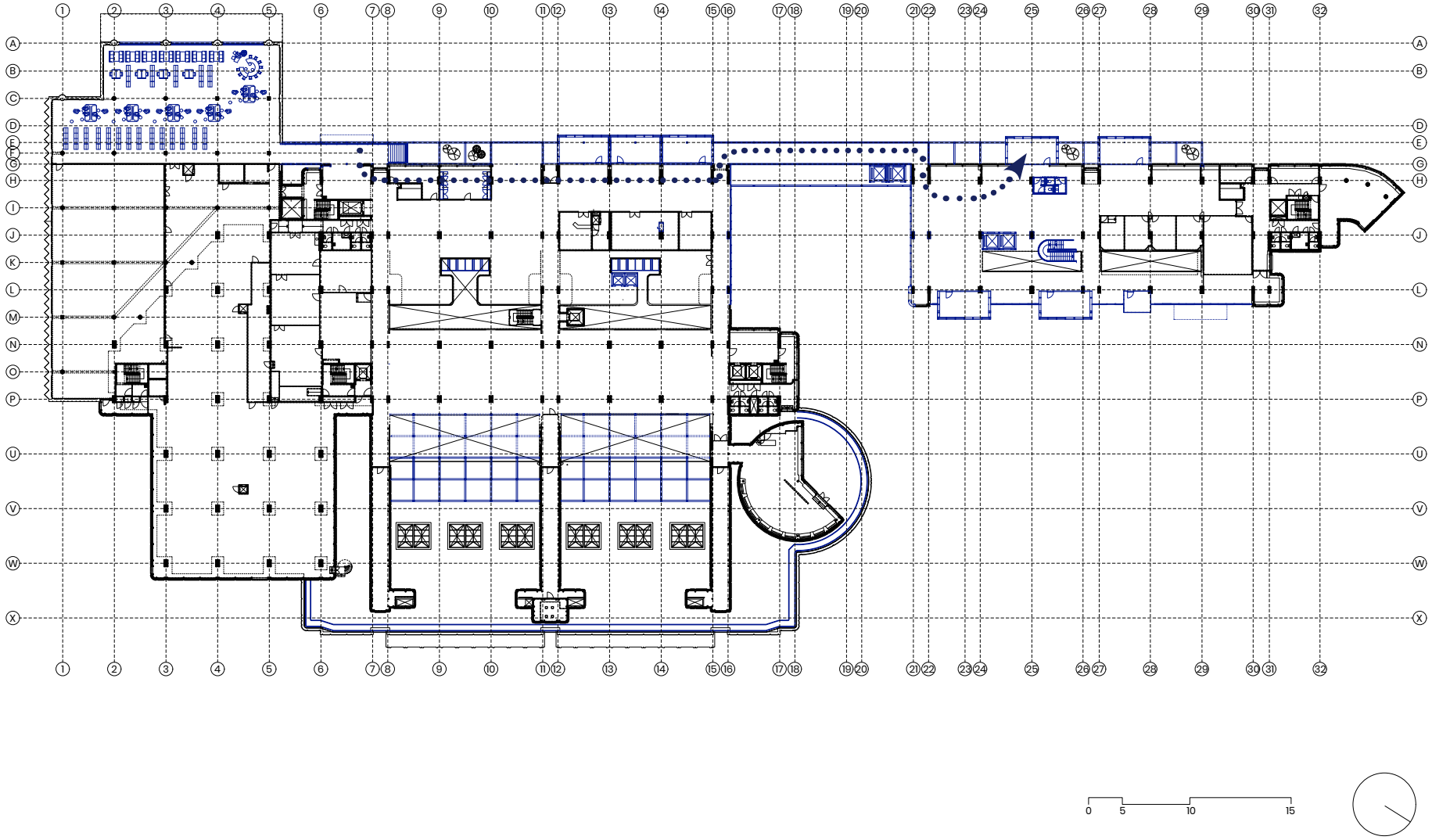


0 5 10 15

FLOOR 2




Oh! I'ts time to go to my 3D printing class at the **KB Incubator**
BEEP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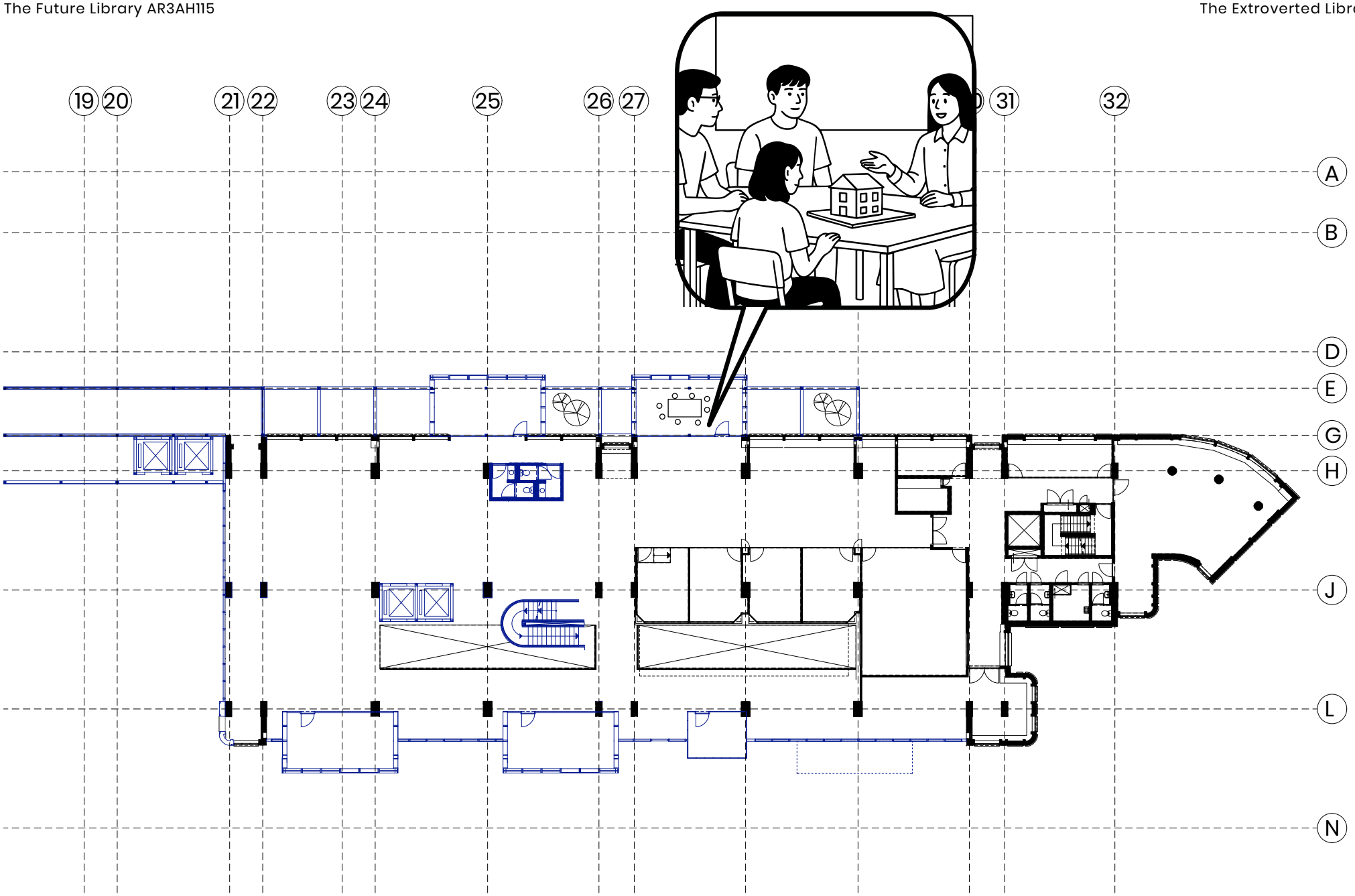
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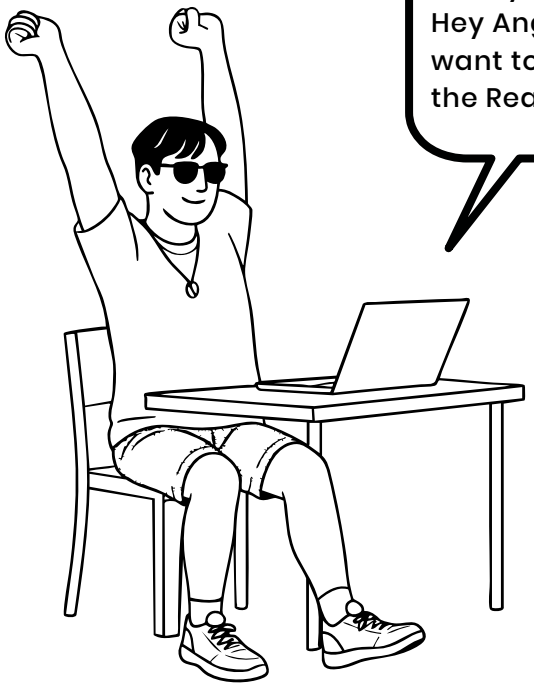
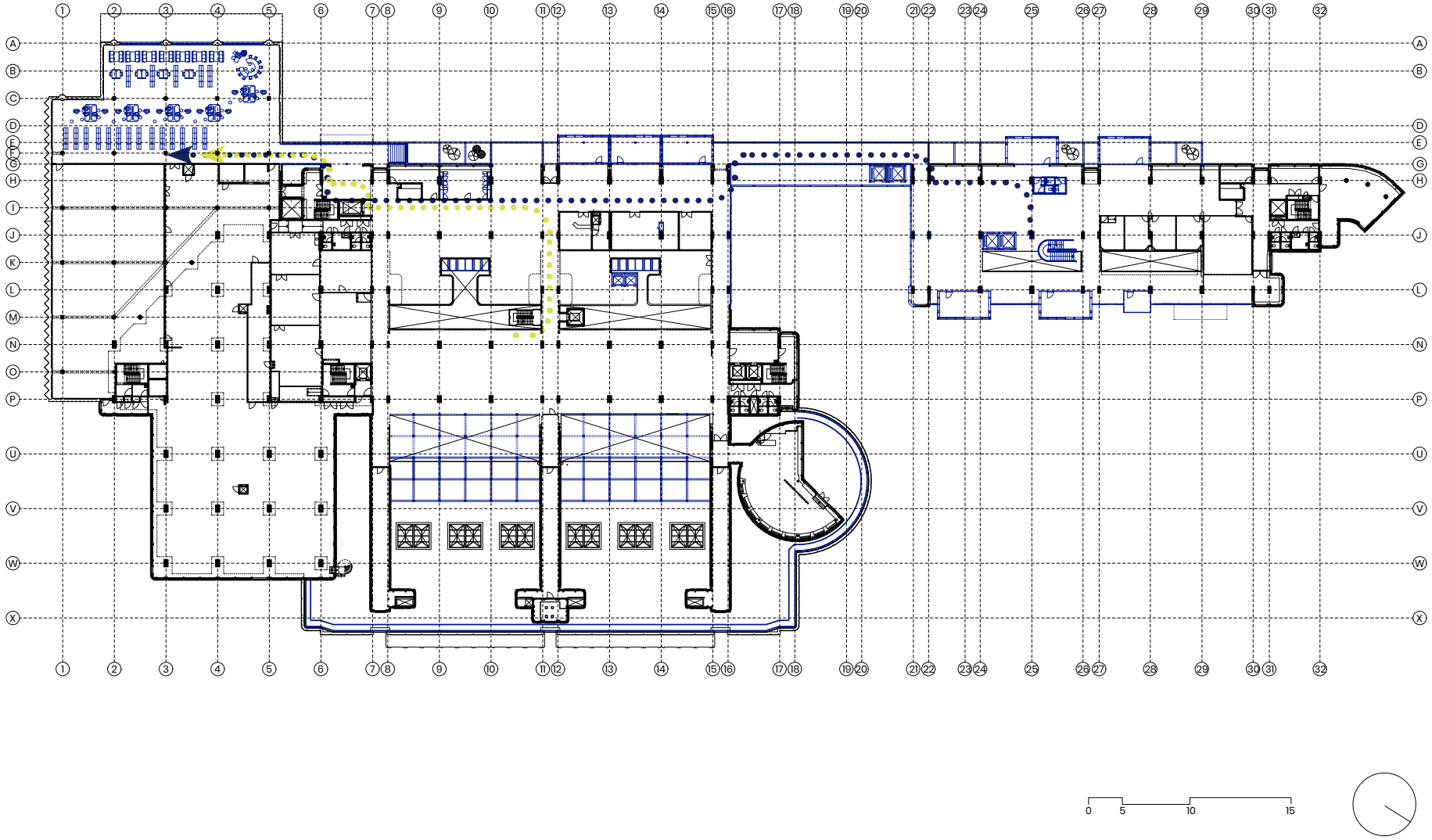
Julian (The Tech Explorer)

Finally done with work! Hey Angela! Do you want to go check out the Reading Hall?



Angela (The Creative Maker)

Yes, just done with class. See you there! I got recommended a very fun book by my AI assitant!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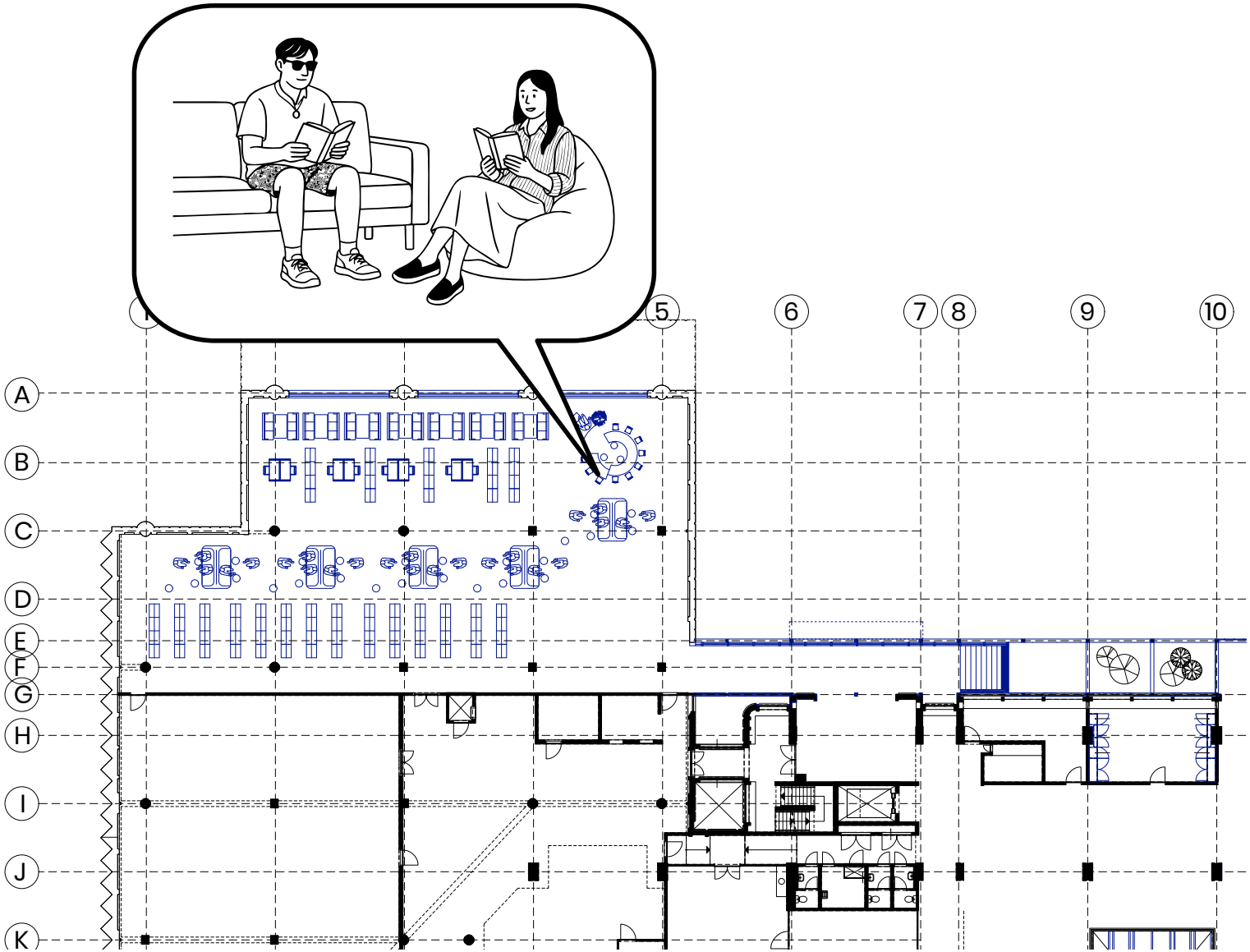
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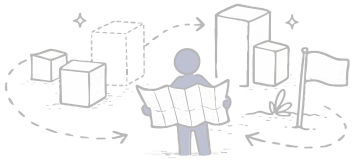
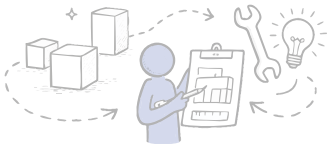
Context, existing building, heritage values and current problems.

Phase 2 – Research for the Future KB
Technology scan, user interviews, DepthMapX tests and design guidelines.



Phase 3 – Heritage Strategy & Big Moves
What is kept and removed, CO2 and material impact, KB Plaza.



Phase 4 – Spatial & Technical Concept
Urban climate, new entrance and access, extroverted timber façade, green–blue, water systems and robotic shelving.

Phase 5 – Lived Building & User Journeys
Daily use by different users, spatial typologies, atmospheres and accessibility.

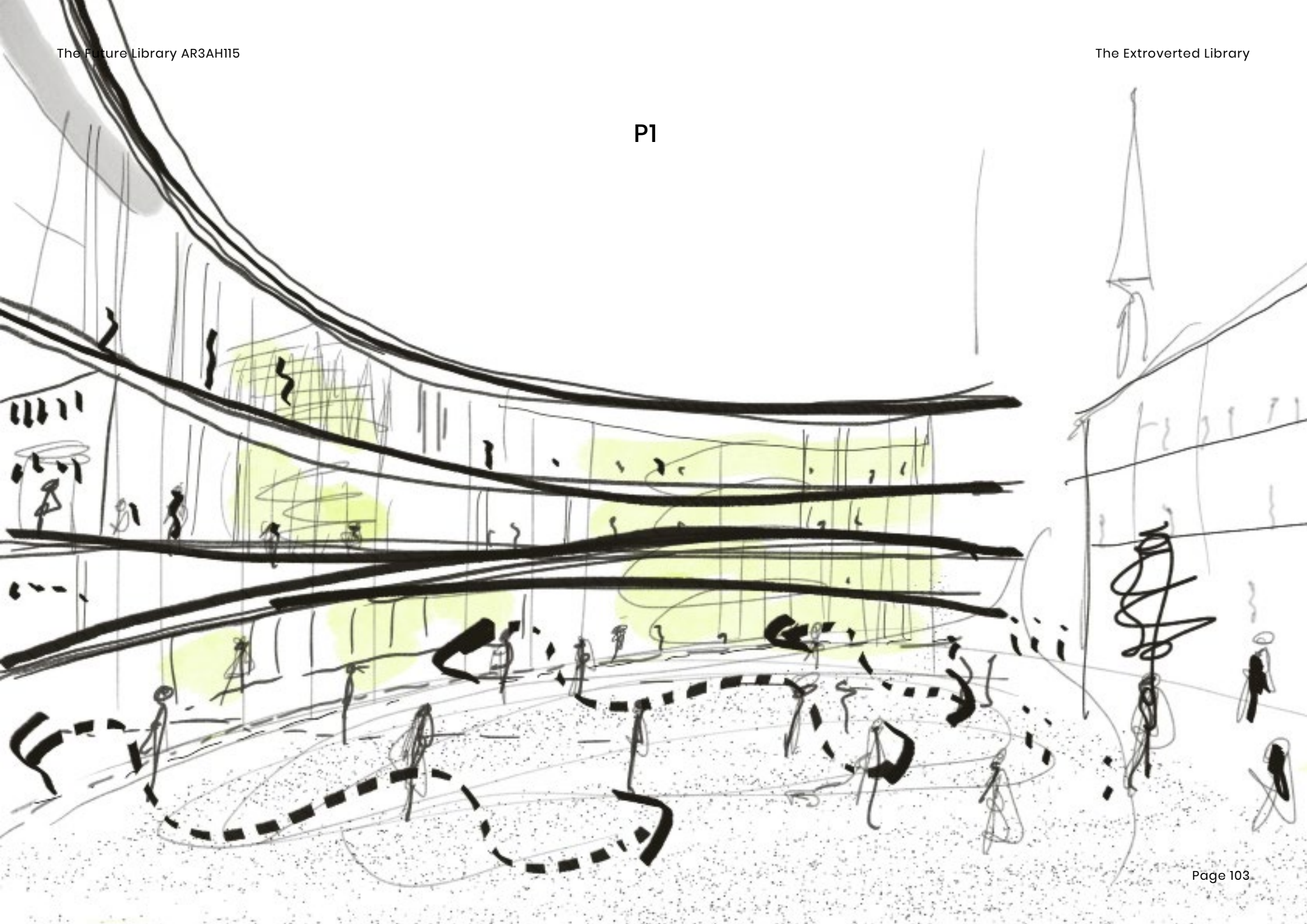
Phase 6 – Reflection & Future Relevance
Role of heritage, SDGs and R-strategies, limitations and outlook beyond P5.

Design from P1 to P4

P1 – Framing the extroverted library

In P1 the project started as a conceptual question: **how can the KB shift from an introverted archive to an extroverted public interface?** I mapped user journeys, first interview insights and the meaning of “extroverted architecture”, and sketched an open, transparent façade as an ambition, but without a concrete spatial or technical strategy yet.

P1



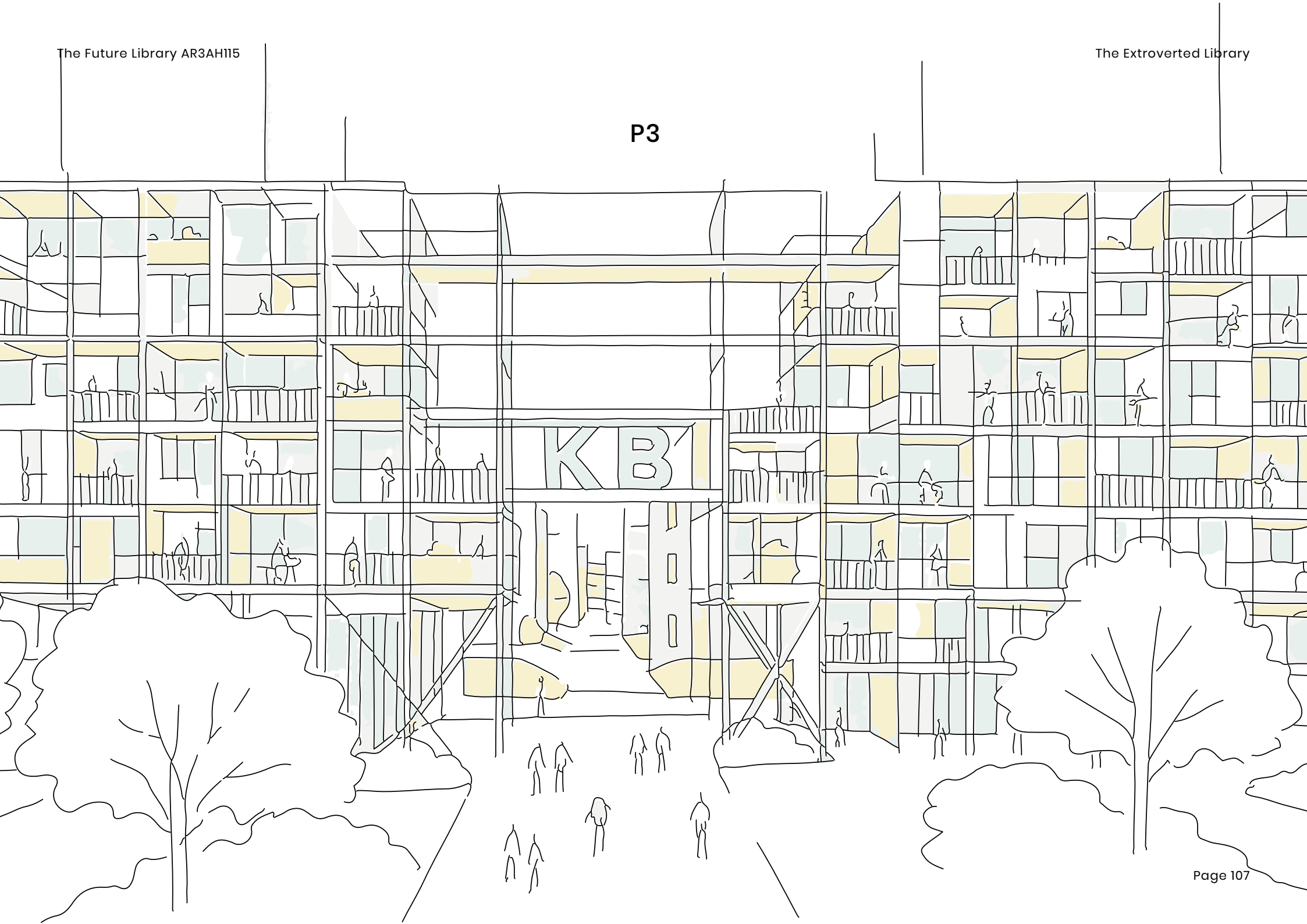
P2 – Opening the ground and creating KB Plaza
In P2 the idea became urban: removing the low-value wings to carve out KB Plaza and moving the entrance towards the station. The first extruded boxes appeared on the façade, testing how the library could spill out with balconies, terraces and **visible activities**. Extroversion was now translated into a **clear access strategy, sightlines and public routes through the building**.

P2

P3 – Modular structure, facade system and climate

In P3 the project moved from concept to building technology. I developed the modular timber grid and extruded boxes as a **reversible layer around the existing concrete frame**, integrating insulation, green planters, rainwater collection and different comfort zones. DepthMapX analyses and interviews informed where to place quiet cores, active edges and hybrid spaces along the façade.

P3

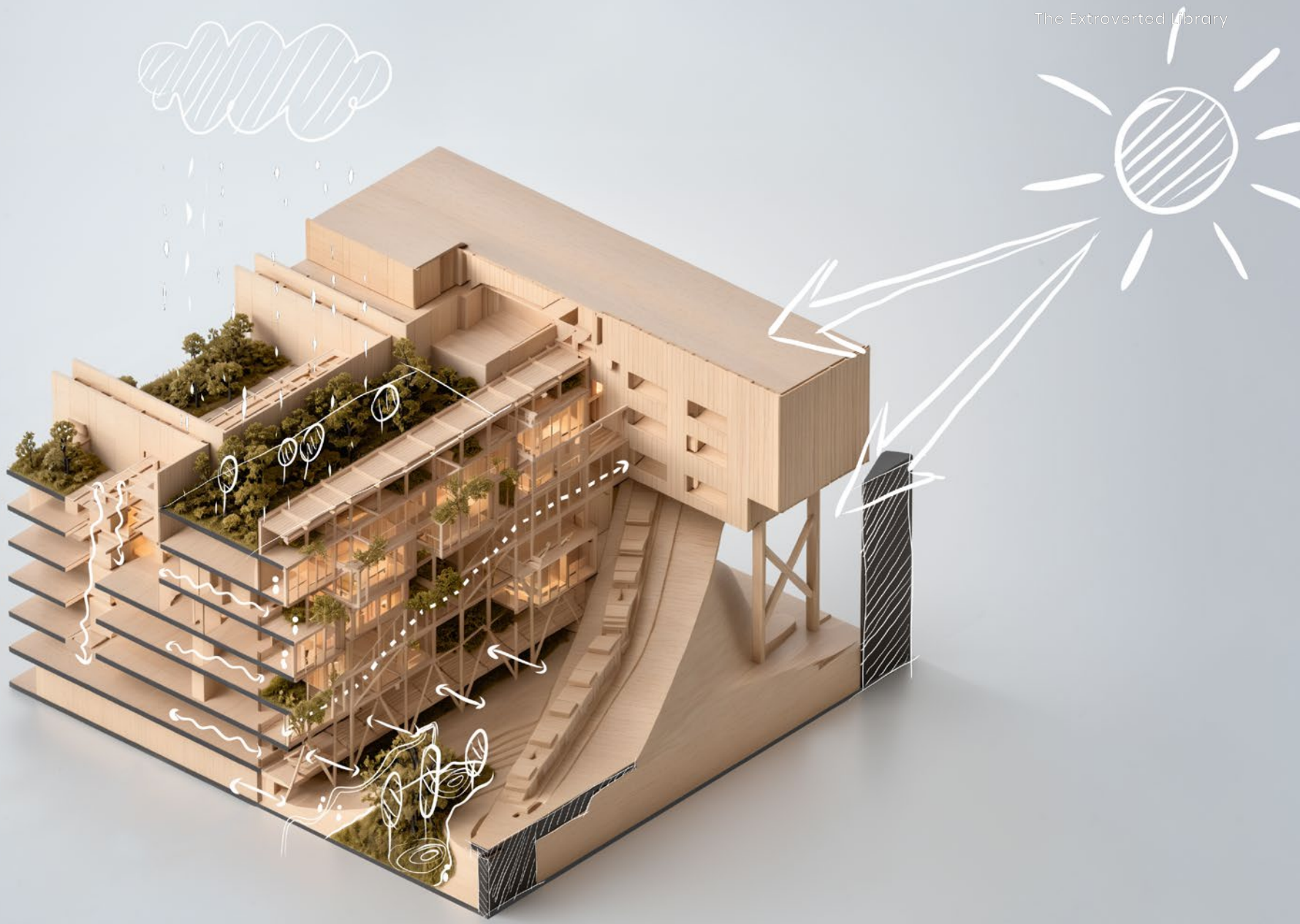


P4/5 – Integrated extroverted KB

In P4/5 the design is consolidated as a coherent system: the heritage bar is kept as structural and programmatic core, while the new timber façade, KB Plaza and ramps connect the library to city, park and tram-line. The interior is organised around a visible tech-spine with AI search points and the robotic book-exchange, a new reading hall, children's area, incubator and maker spaces. **Together they show the KB as a future-ready, extroverted civic library where architecture, technology and climate strategies work as one.**

P4

P5



Key SDGs in the Project

SDG 15 – Life on Land

- Green façades, roof gardens and re-shaped park create a biodiversity "stepping stone" between larger green areas.

SDG 6 – Clean Water & Sanitation

- Rainwater-collecting façade and roofs; storage + reuse for irrigation of planters and park, reducing potable water demand.

SDG 13 – Climate Action

- Climate-responsive façade (shading, ventilation, green buffer) moderates wind and overheating.
- Increased tree cover and planted terraces improve microclimate and reduce heat-island effects.

SDG 11 – Sustainable Cities & Communities

- Transformation of existing KB instead of replacement; KB Plaza as a new public room in a dense mobility node.
- Heritage structure largely retained; new modular additions keep the library active and visible in the urban network.

SDG 4 – Quality Education

- KB as open civic learning infrastructure (study plazas, incubator floors, hybrid physical–digital collections)
- Extroverted façade shows learning activities to the city; AI tools support access to knowledge.

SDG 12 – Responsible Consumption & Production

- Reuse of existing concrete frame and foundations; selective demolition of low-value wings only.
- Demolished concrete/brick used as RCA and landscape material; modular timber façade designed for disassembly.

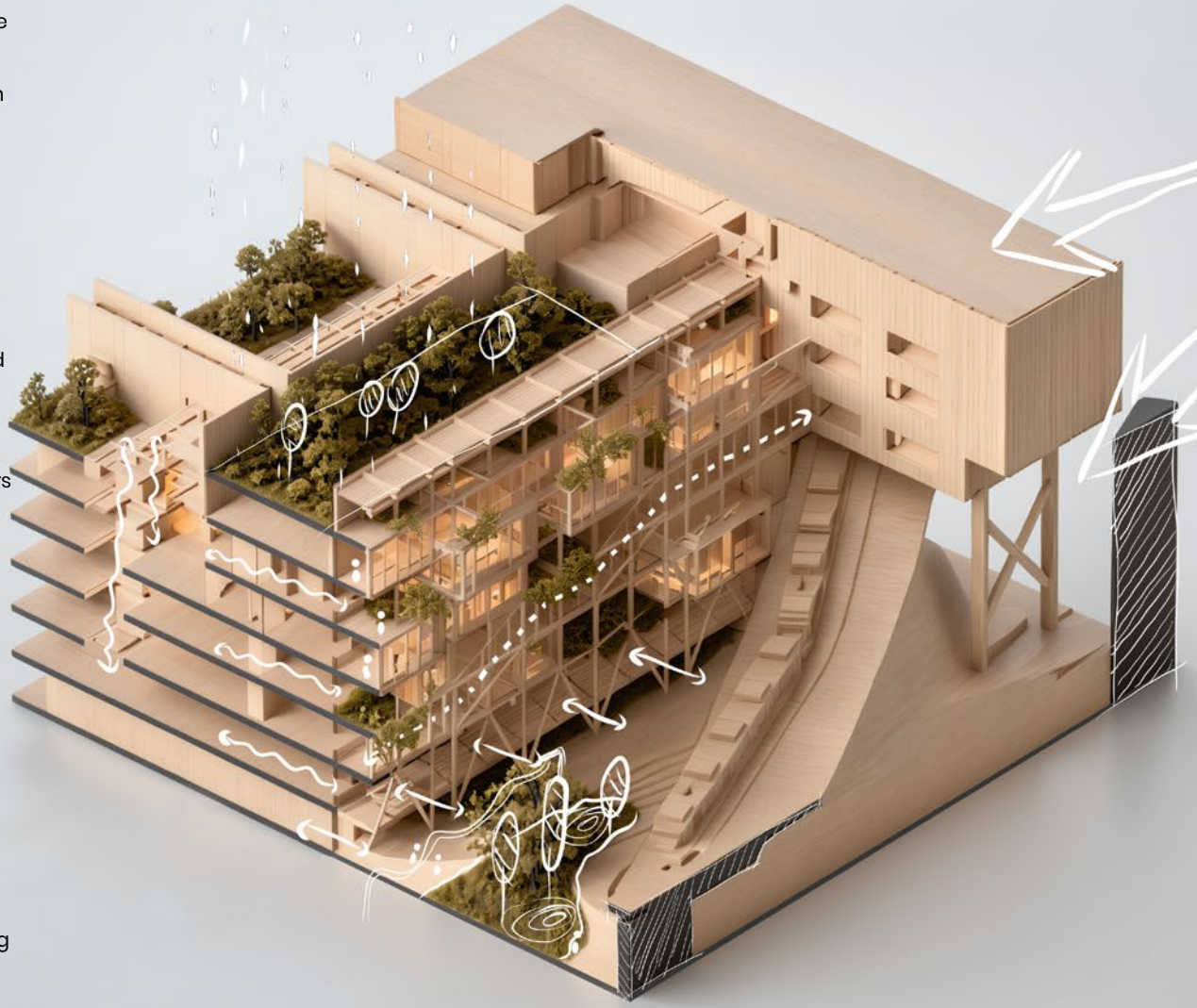
The **R** Strategies

REFUSE
- Avoid a brand-new standalone library elsewhere in the city; work with the existing KB complex and its embedded carbon instead of “starting over.”
- Limit new materials to where they create real spatial or climatic value (no decorative add-ons).

RETHINK
- Rethink the national library as shared civic infrastructure: hybrid study + production + exhibition, open to commuters and citizens, not just researchers.
- Intensify use of the existing structure through extroverted circulation, the Hybrid Tech Ramp and “thickened” corridors that host AI touchpoints and workspaces.

REUSE
- Retain and use the existing concrete skeleton and floor slabs as main structure.
- Reuse selected metal façade cassettes on upper levels as a heritage layer.

REFURBISH
- Clean and upgrade existing panels, cores and interior finishes instead of replacing everything.
- Improve performance (insulation, airtightness) while keeping the structural fabric.



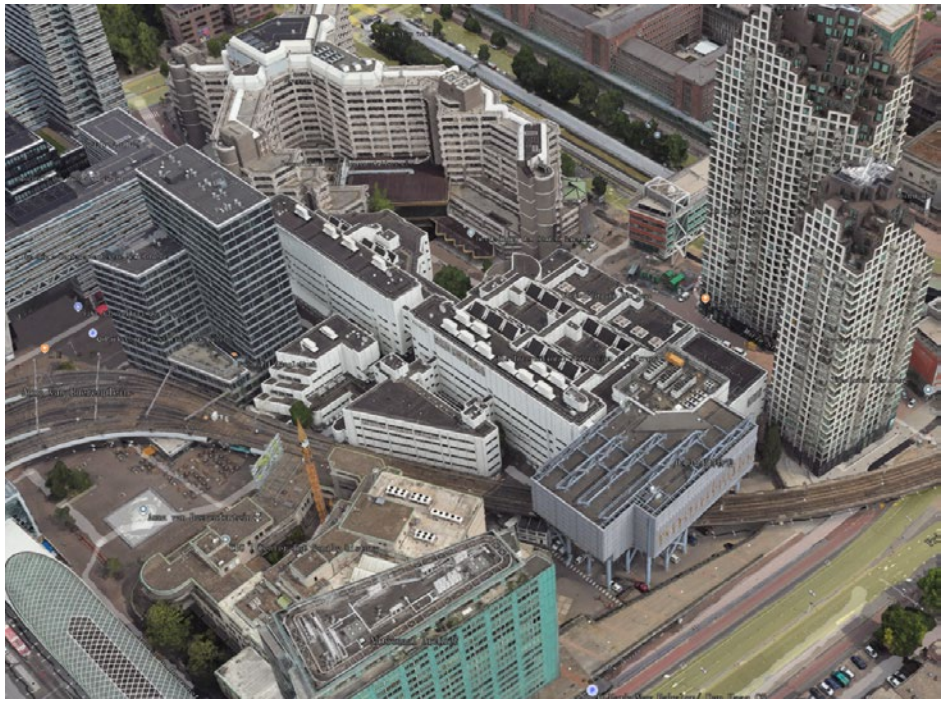
REPURPOSE
- Demolished concrete cut or crushed and repurposed as site furniture, plinths, RCA bags under modular floors and sub-base for paths.
- Bricks reused in new paving bands and low garden walls around KB Plaza.

RECYCLE
- Remaining concrete, brick and aluminium sent to certified recyclers; aluminium re-enters façade/shading components.

REDUCE
- New volume built mainly in timber; lighter modular structure reduces new material demand.
- Compact, layered program: more use per m² (AI-supported sharing of spaces and resources).

REPAIR
- Local repair and strengthening of the existing structure where needed instead of wholesale replacement.
- Repair and upgrading of internal finishes, stairs and handrails so they can continue to serve new programs.

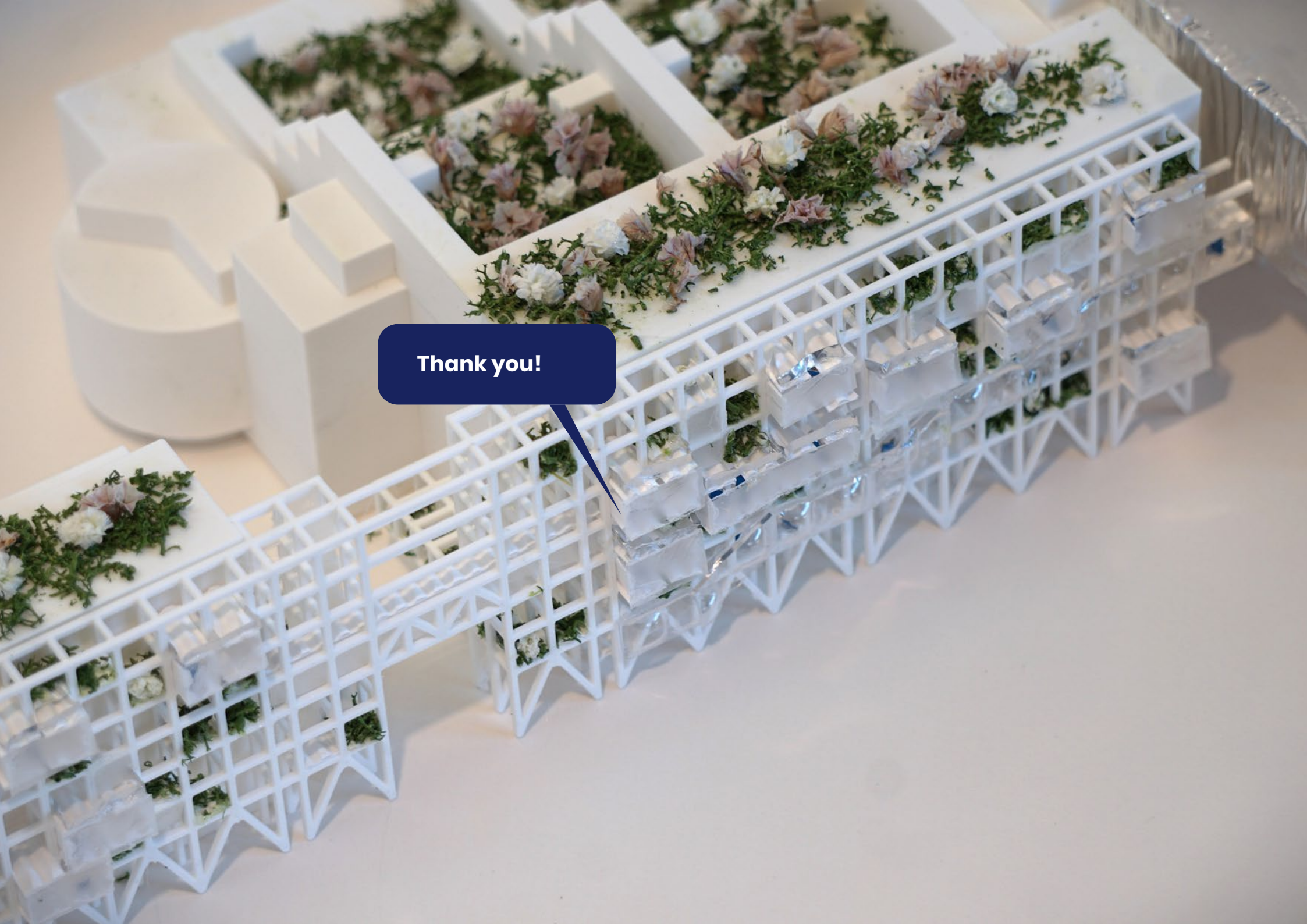
BEFORE



The KB's core mandate — **stewardship of collections**, **legal deposit**, **research services**, and **conservation** — remains spatially protected, while **the new plaza, co-working, incubator, and extroverted façade act as connective tissue** that amplifies **access, participation, and production.** In this arrangement, heritage and innovation work together.

AFTER

The **original KB anchors authority and memory**, and the new program widens its public, updates its tools, and keeps the institution future-relevant.


Thank you!