Ariona Doko

Architectural Portofolio

Adaptive Architecture for a Changing Climate

Exploring adaptive reuse, climate-responsive design, and regenerative spatial strategies.

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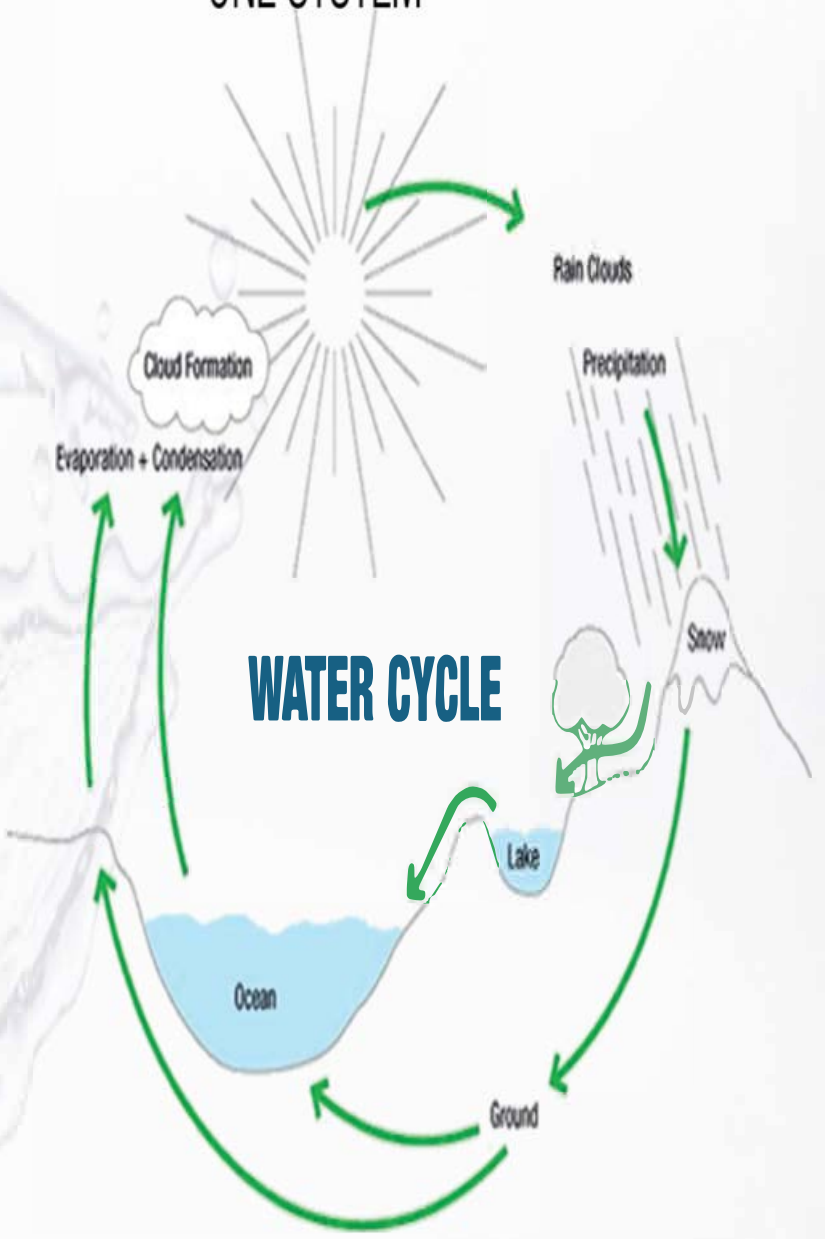
The Climate and Water Centre

ONE IDEA

WATER
AS A MEDIUM

ONE SYSTEM



Ice

Liquid

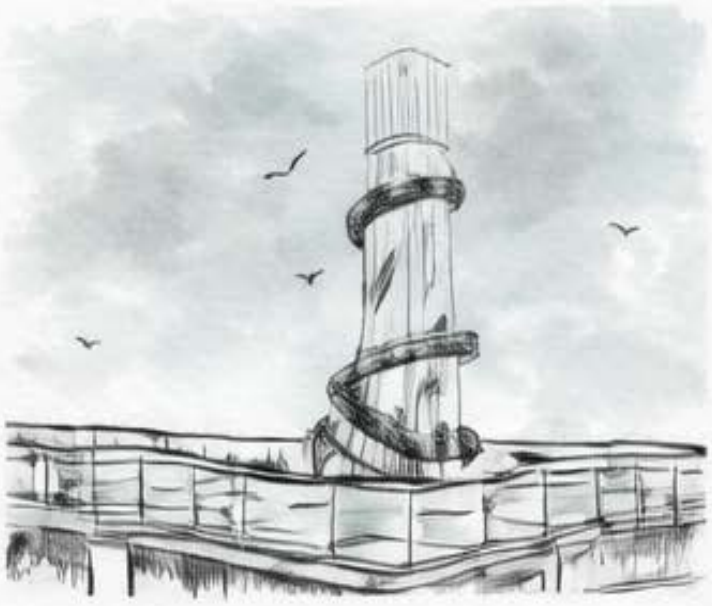
The Climate and Water Centre uses
water in all its states
to create a sensory journey
where climate is understood
throught body

Vapour

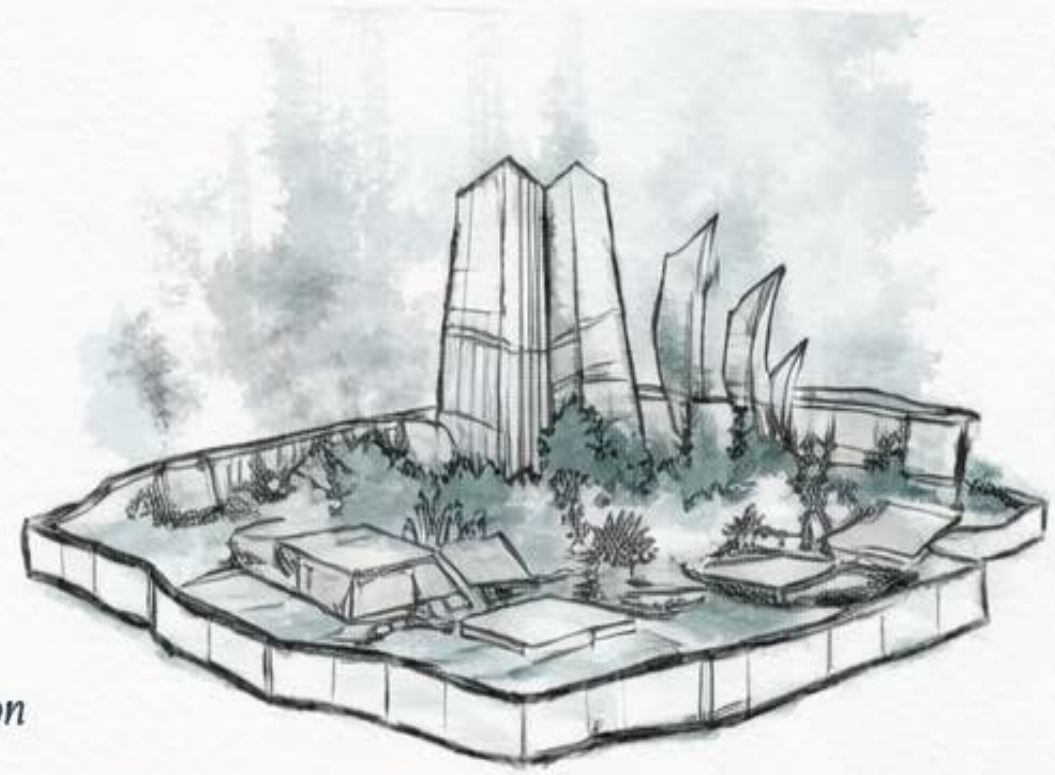
The Nordhavn Climate and Water Centre reimagines Copenhagen's Harbour as a living system for climate awarness. Rooted in the city's adaption strategy, the project uses water as a medium, ice, liquid, and vapour, to translate scientific processes into sensory experience. Visitors ascend throught three spatial stages: Perception, Condesation, and Percipitation, mirroring the natural water cycle. Each level emboides a transformation o state, turning scientific processes into immersive architecture. Functioning as a rain collector, fog generator, and filtration system, the centre merges environmental performance with education. Positioned within Nordhavn's sustainable urban framework, it strengthens the district's identy as a place shaped by water and environmental innovation.

ONE SPATIAL LOGIC VERTICAL

Hydrological Journey — Climate-Responsive Architecture



Atmosphere - *Vertical circulation and light diffusion*

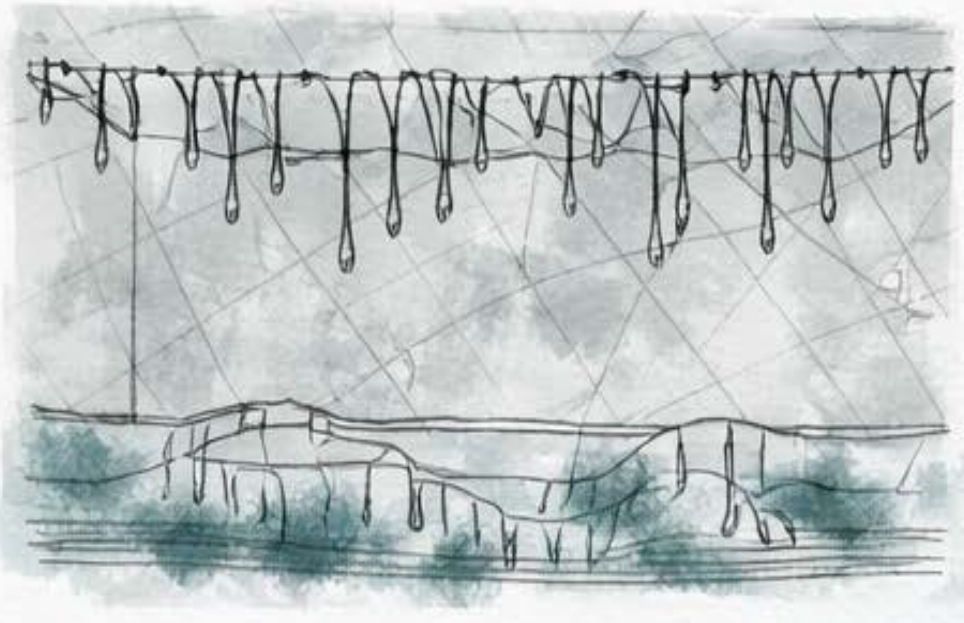


Evaporation - *Thermal exchange and material porosity*

Flow - *Spatial continuity and movement*

Precipitation — *Human experience and rhythm*

Precipitation - *Human experience and rhythm*



Condensation - *Cooling and collection systems*

SITE ANALYSIS - SWOT

NORDHAVAN, COPENHAGEN, DENMARK

Smart Solutions/Materiality

Materiality around site

Materiality

Site location

Views

Strengths

- Direct waterfront access enables water-based wellness activities
- Existing roads and buildings support adaptive reuse
- Nordhavn's urban renwal aligns with sustainable development goals
- Surrounding water buffers climate and enhances seasonal comfort

S

W

Weaknesses

- Concrete edges and industrial massing limit sensory engagement
- Public realm is fragmented and lacks pedestrian flow
- Strong harbor winds challenge outdoor comfort
- Some zones remain monofunctional, reducing vibrancy

O

T

Opportunities

- Warehouses and piers offer potential for creative reuse
- Space for community-led wellness programming and and seasonal events
- Muted tones and textures support calming palettte integration
- Water and vegetation can be woven into therapeutic, climate -responsive design

Threats

- Rising sea levels pose long term risks to waterfront edges
- Gentrification may exclude local communities
- Industrial noise and traffic distrupt wellness goals
- Heritage and zoning regulations may constrain design freedom

NORDHAVN / CLIMATE CHANGE / SITE PRESSURES

“WHAT’S HAPPENING TO NORDHAVN”

Climate Impact Statistics (Denmark & Copenhagen)

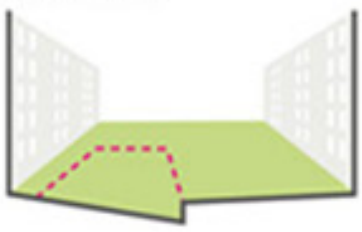
Sea Level Rise (Copenhagen)
Projected +29–55 cm by 2150 under very low emissions .
Projected +99–123 cm by 2150 under very high emissions.
A historical 100 year storm flood could become a 1–5 year event by 2100.

Temperature & Rainfall (Copenhagen)

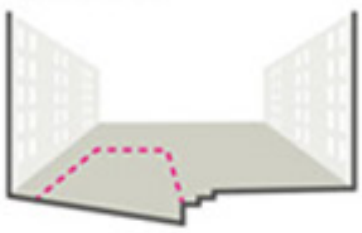
Average annual temperature range: 0.1°C (Feb) to 21.7°C (July).
Highest recorded temperature: 33.8°C (August).
Average monthly rainfall peaks at 66.9 mm (August).

CLOUDBURST TOOLBOX 01-04

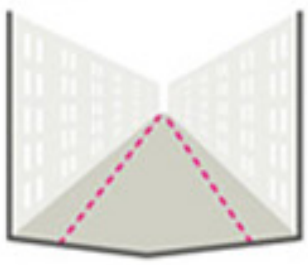
01 Park
Hans Tavsens



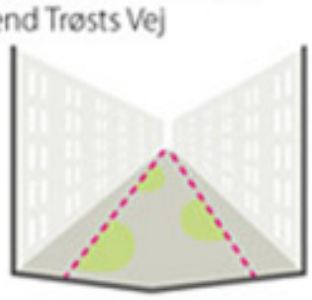
02 Plaza
Blågårds Plads



03 Street
Korsgade

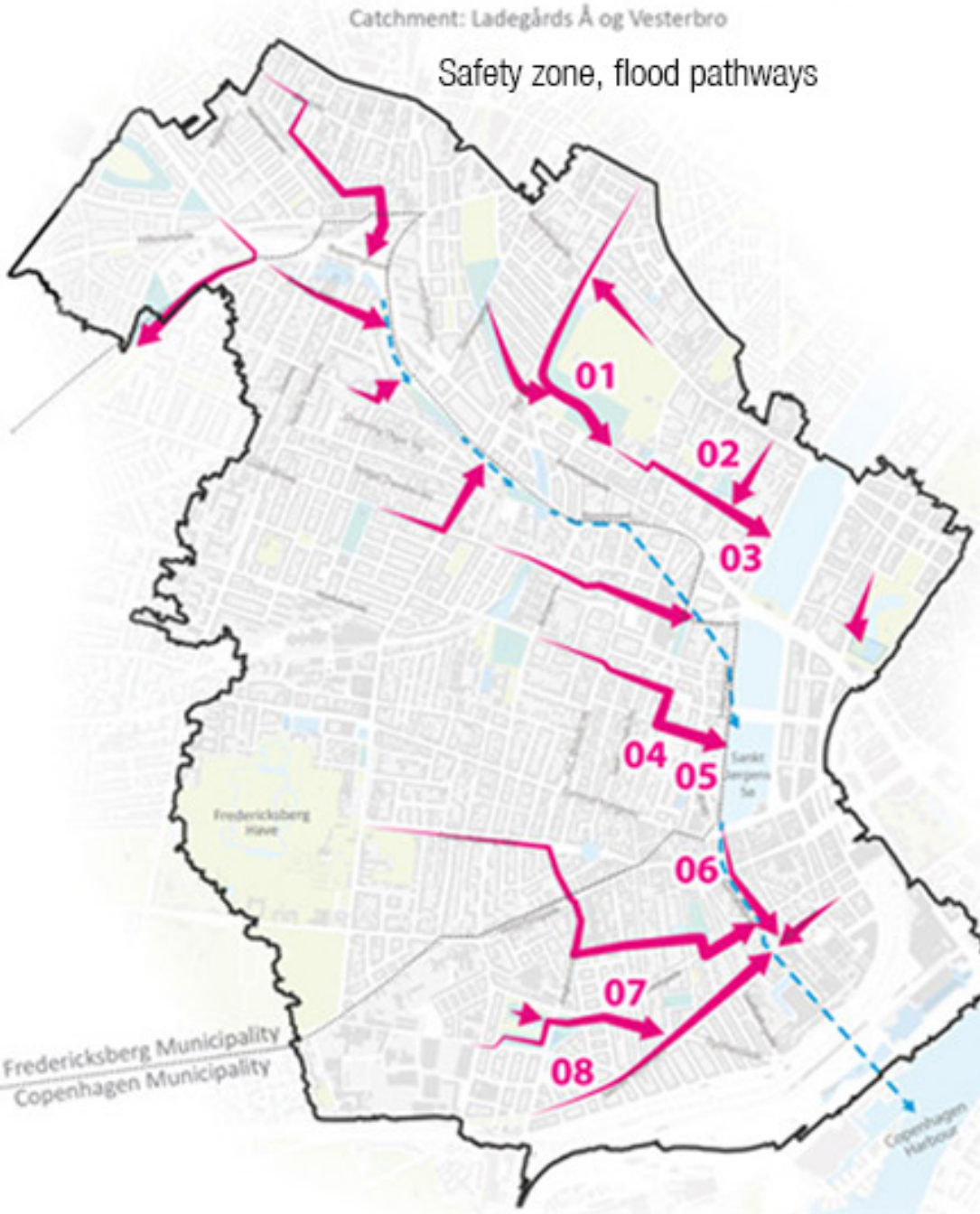


04 Green Street
Svend Trøsts Vej



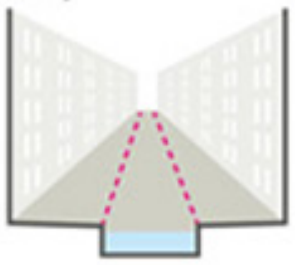
COPENHAGEN
Strategic Urban Flood Plan

Catchment: Ladegårds Å og Vesterbro

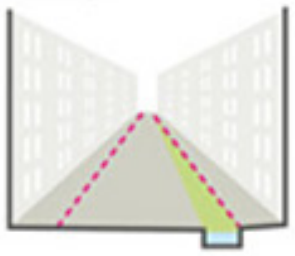


CLOUDBURST TOOLBOX 05-08

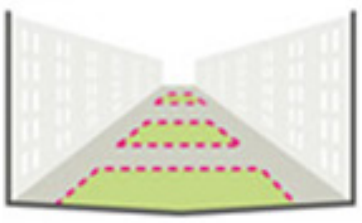
05 Urban Canal
Vodrofsvej



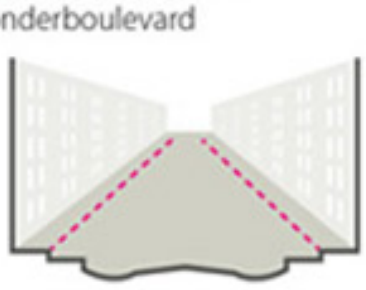
06 Urban Creek
Gasværksvej



07 Retention Boulevard
Istegade



08 Boulevard
Sønderboulevard



Emissions & Carbon Footprint

Copenhagen emits 5,847,855 tonnes of CO_2 per year.
CO_2 emissions per capita: 10.1 tonnes per person.
CO_2 intensity: 61,109 tonnes per km² (very high due to dense urban area).

DESIGN DEVELOPMENT - THE CLIMATE & WATER CENTRE

ONE SPATIAL LOGIC VERTICAL - HYDROLOGICAL JOURNEY

ATMOSPHERE	AIR DECK/WIND STRUCTURE
EVAPORATION	WARM STONE TERRACE
VAPOUR	MIST ROOM
FLOW	REFLECTIVE BASIN FLOW HALL
PRECIPITATION	RAIN ROOM
CONDESATION	COLD ROOM

ONE EXPERIENTIAL NARRATIVE - CLIMATE FELT THROUGHT THE BODY

PROGRAM DIAGRAM - Each floor as a climatic layer in the hydrological cycle

GROUND FLOOR - WATER CYCLE STAGE: CONDESATION & PRECIPITATION

RAIN - MIST - COLLECTION- WET ATMOSPHERE- BEGINING OF THE CYCLE

RAIN ROOM, FOG COURTYARD, SHALLOW REFLECTIVE BASIN, WARM MIST ROOM EXHIBITION WALL, CHAINGING ROOMS, ENTERANCE /FOYER.

FIRST FLOOR - CONDESATION & FLOW

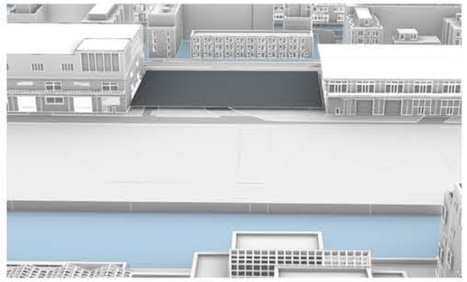
COOLING AND MOVEMENT - STAGE OF THE CYCLE

COLD ROOM/COLD PODS (Condesation), THERMAL BATH (Liquid), SALT STEAM ROOM (Vapour), WATER RESONANCE ROOM (Flow), COLD PLUNGE (Contrast) BALCONY OVERLOOKING THE FOG GARDEN

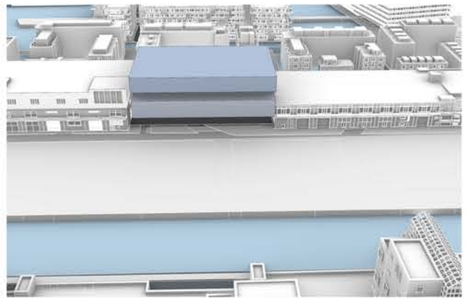
SECOND FLOOR - EVAPORATION & ATMOSPHERE

HEAT - RISING AIR - SKY - WIND - STAGE OF THE CYCLE

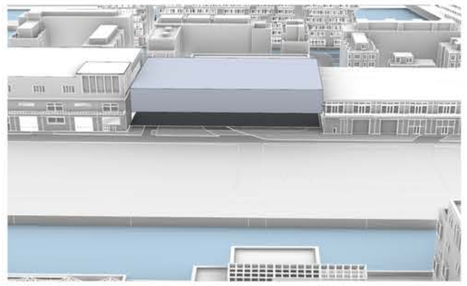
WARM STONES TERRACE, EVAPORATIVE COOLING GARDEN, SEASONAL AIR DECK, WIND STRUCTURE, RAIN HARVESTING, CLIMATE LAB, LIGHT SHADOW ROOM, WORKSHOP, RESTING LOFT



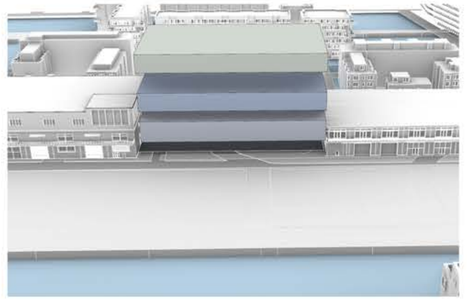
Base Form- Establishes the building footprint along the Nordhavn shorline.



Material Climate Logic -Applies materials (transparent, refletive, solid) to xpres vapor, heat and water movement.



Layered volumes- introduces stacked volumes that represent the three climate zones:atmosphere, evaporation, and flow.



Environmental Shaping - Openning, terrraces, and voids are carved to respond to sea wind, daylight, and ciculation.

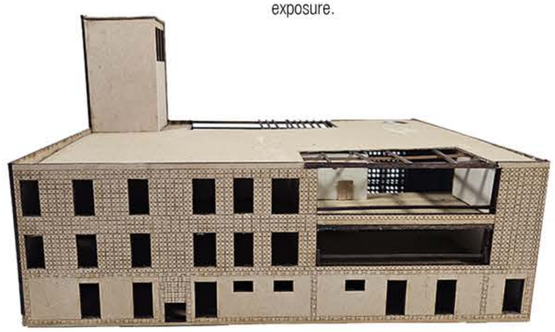
Material - Driven Massing Analysis

Base Massing- Simple block form testing overall scale and position on the Nordhavn sea edge.

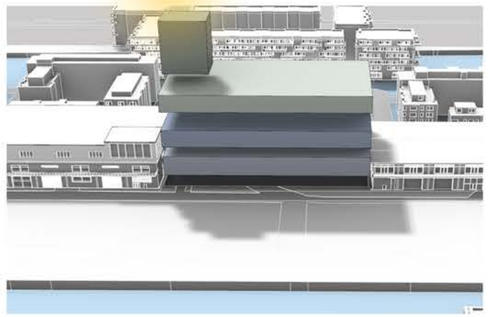
Material Porosity Test- Wire mesh and transparent film explore airflow, light, and vapour qualities within the mass.

Context Placement- The model is placed in the site to study orentation, sea-facing edges, and envoronmental exposure.

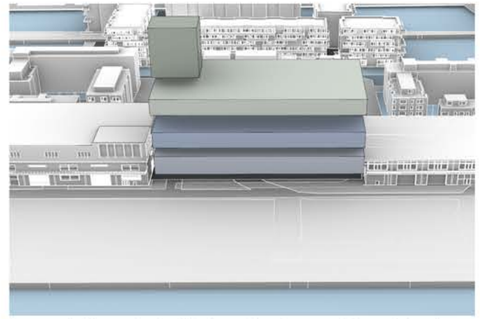
Material Integration- Coloured and textured blocks combine to express thermal zones and climate behaviors in one coherent form.



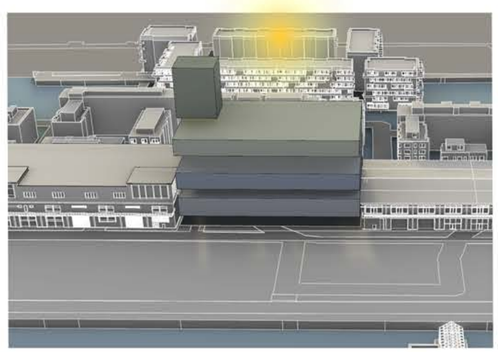
Final physical model 1:200 scale



Summer equinox- High-angle sun creates strong reflections from the sea; upper terraces heat up, activating the evaporation zone.



Integrated Climate Cycle- All climate layer interact, light, wind, and water movement form a continuous environmental system.

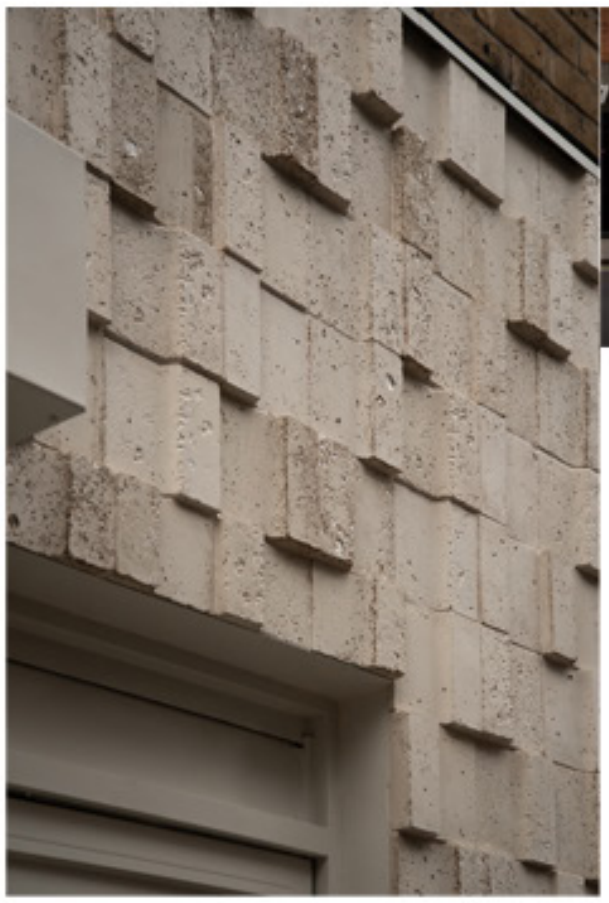


Winter Equinox- Low-angle sun and cooler tones empasize condesation, shadow, and sheltered interior spaces.

Final Model- The fully resolved building sits on the Nordhavn sea edge, with all climate zones, materials, and environmental respones integrated into one coherent architectural form.

INSPIRATIONAL PRECEDENTS

Sustainable facade materials

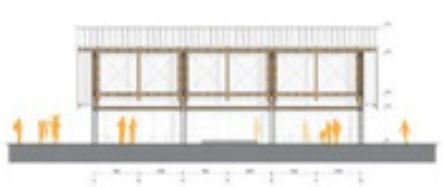


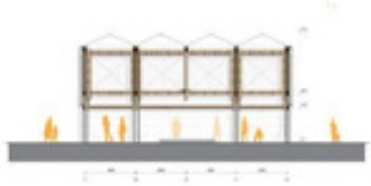
Oyster Shell Façade

Luxury retail store UJNG plays host to an array of contemporary independent fashion designers, and now has a 3D exterior made from Oyster[concrete]. The material is the brainchild of Matter Forms, a studio led by Mooka Srisurayotin, who researched and experimented with oyster shells over a 2 year period before launching the surface in 2023.

People's Pavilion from bureau SLA
Location: Eindhoven, Holland

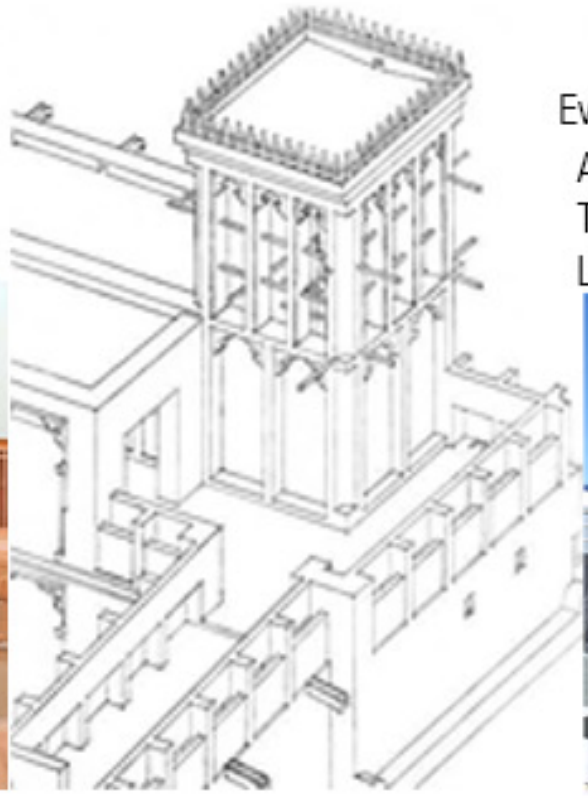
The People's Pavillion demonstrates a fully circular construction system, built entirely from borrowed, reusable components.Its facde and structure show how community-sourced mateials can create a temporary, low impact architecture with strong spatial identity.





Wind Tower natural ventilation

Badgir Windcatcher:
A Traditional Iranian Architecture Feature
An architectural innovation to capture cool air in a desert environment.



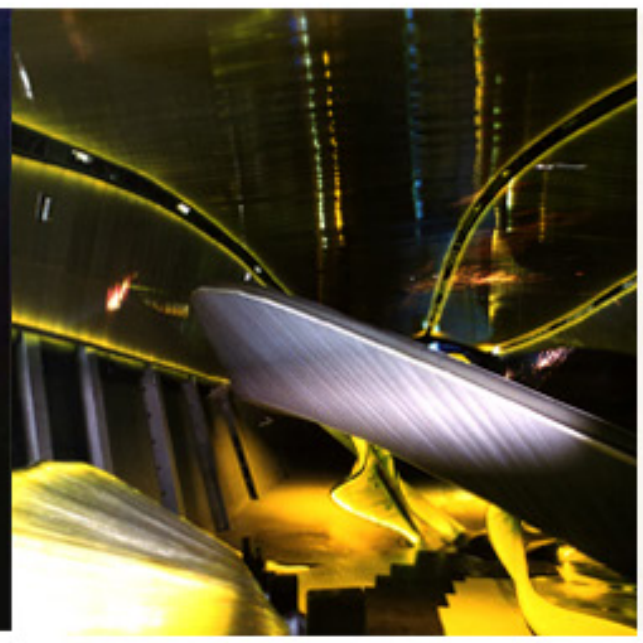
Evaporative Cooling Towers in Modern Architecture
Animal Campus Dog Adoption Park
Tate Snyder Kimsey Architects
Las Vegas, Nevada, United States

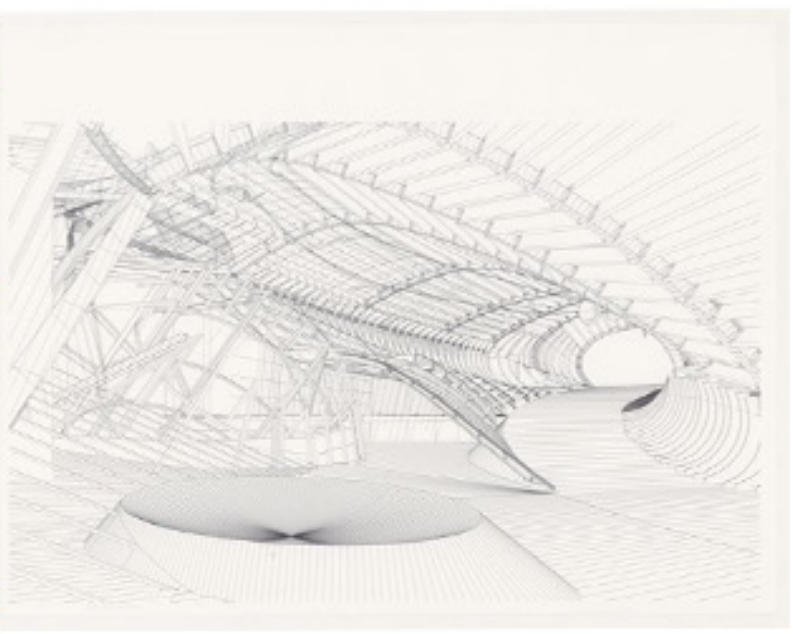
INSPIRATIONAL PRECEDENTS

Lea Bridge Library by Studio Weave
Salvaged timber

Lee Bridge Library uses warm timber, soft daylight and sculptured interior forms to create calm, community - focused space that inspires spatial atmosphere

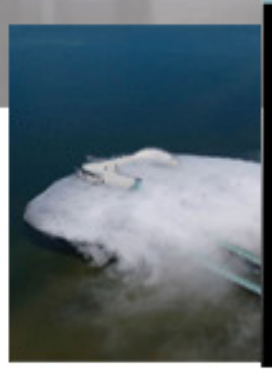
Water Pavilion — Lars Spuybroek / NOX (1997)

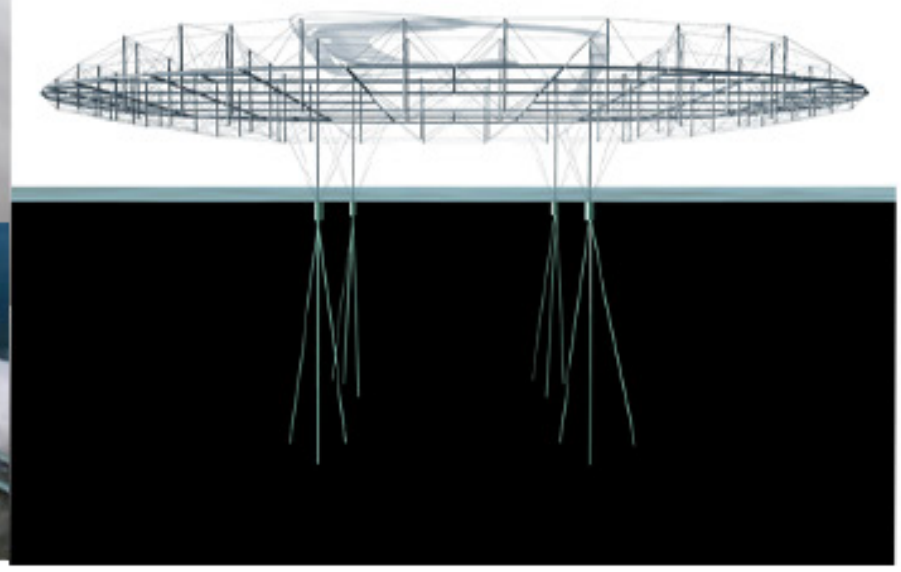




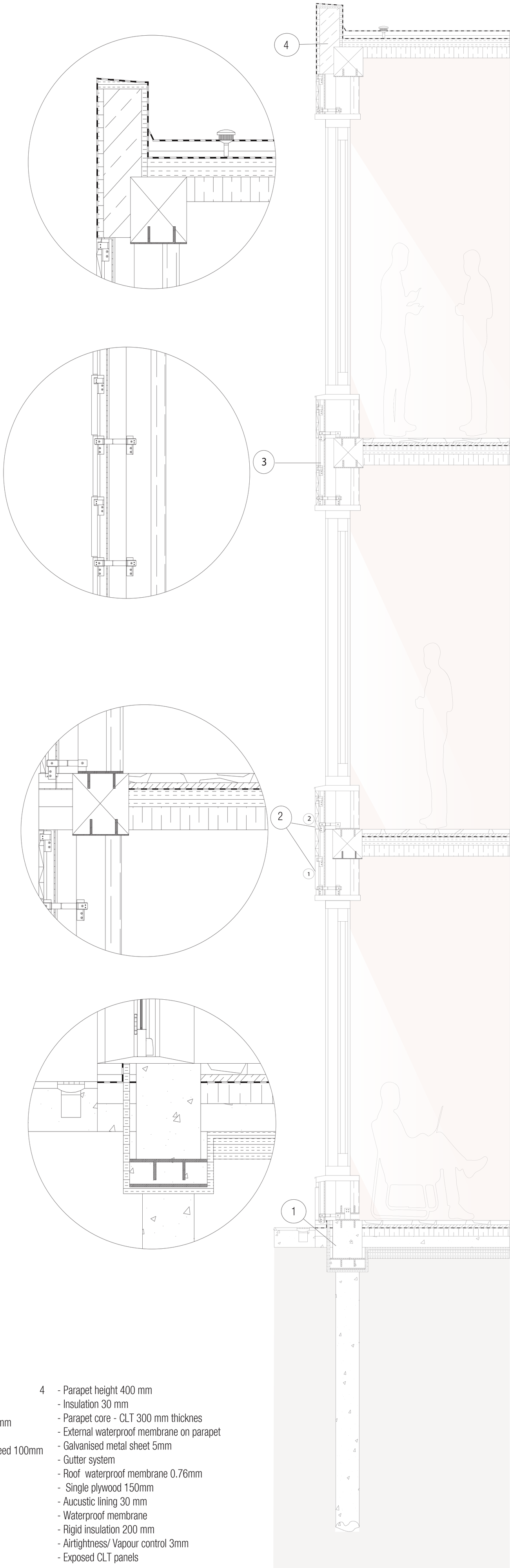
Lars Spuybroek's Water Pavillion create immerse, sensor-driven environments where light, sound and movement respond to visitors. Its interactive, fluid spatial sequences inspire atmospheric rooms for the Climate Centre that translate water behaviour into experience.

The Blur Building generates an immersive fog environment using pumped lake water, dissolving architecture into atmosphere. Its shifting, sensory field inspires interactive climate-centre rooms where humidity, visibility and movement become the primary spatial experience.





The Climate and Water Centre ariel view



Bay Study

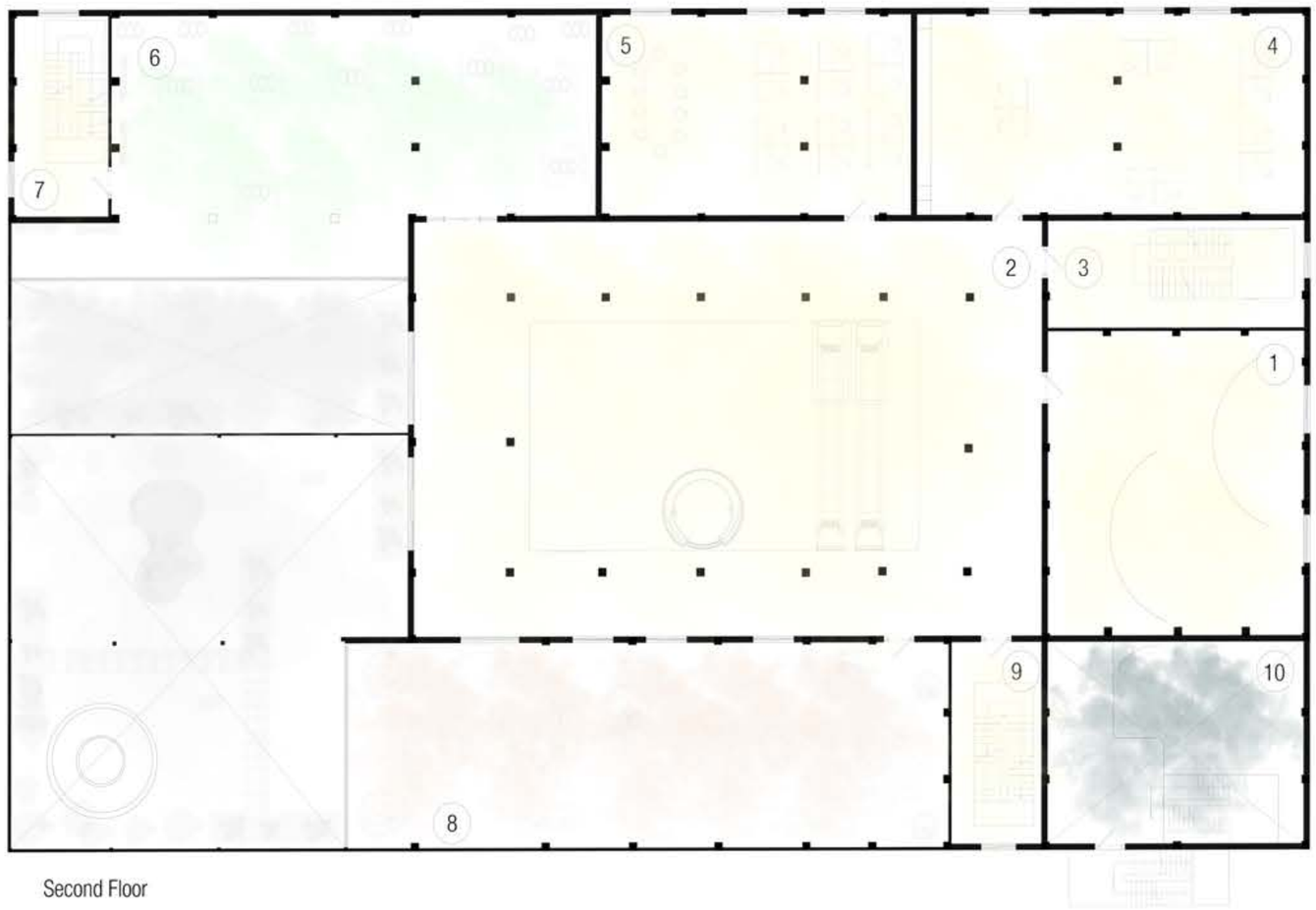
1:50 Bay Section- Climate Water Centre front enterance facade

1 - Pile concrete foundations
- Pile cap
- Metal plate connector
- Rigid insulation 200 mm
- Insulation surrounding foundation 30mm
- Concrete slab 200mm
- Thermal insulation 200mm
- Waterproof membrane 0.76mm
- Aucustic lining 30mm
- Crushed Oyster concrete screed 100mm
- Guttering system

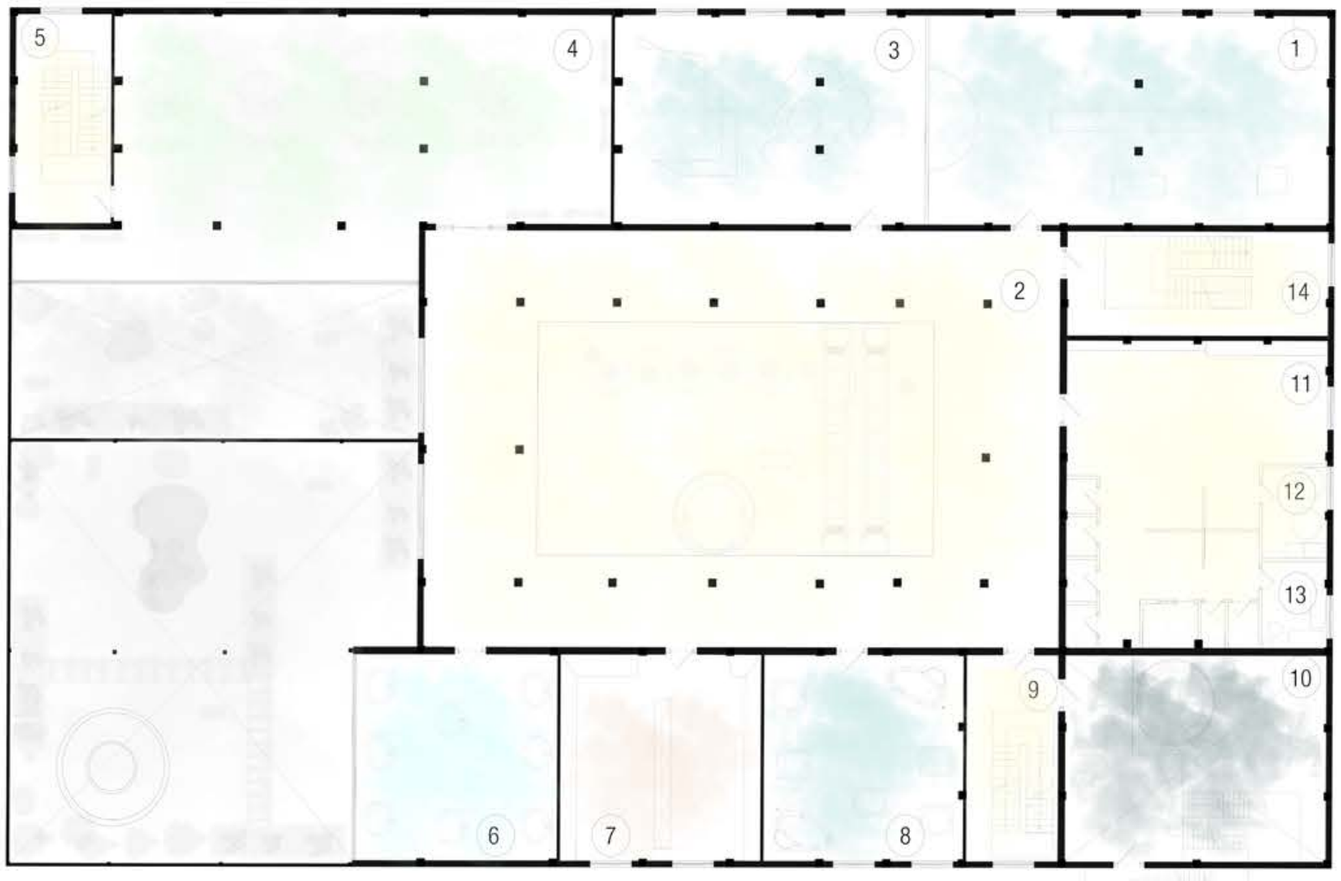
2 - Oyster shell(crete) cladding pannels 60 mm
- Ventilated cavity 25mm, clear air gap with insect mesh at base top
- Aluminium support frame 80mm
- Aluminium support brackets
- Breathable membrane 0.8mm
- Sheathing board 18mm
- Insulation 180mm
- CLT Panels 160mm

3 - CLT floor panels 160 mm
- Thermal insulation 200 mm
- Waterproof membrane 0.76mm
- Aucustic mat 10mm
- Crushed oyster concrete screed 100mm

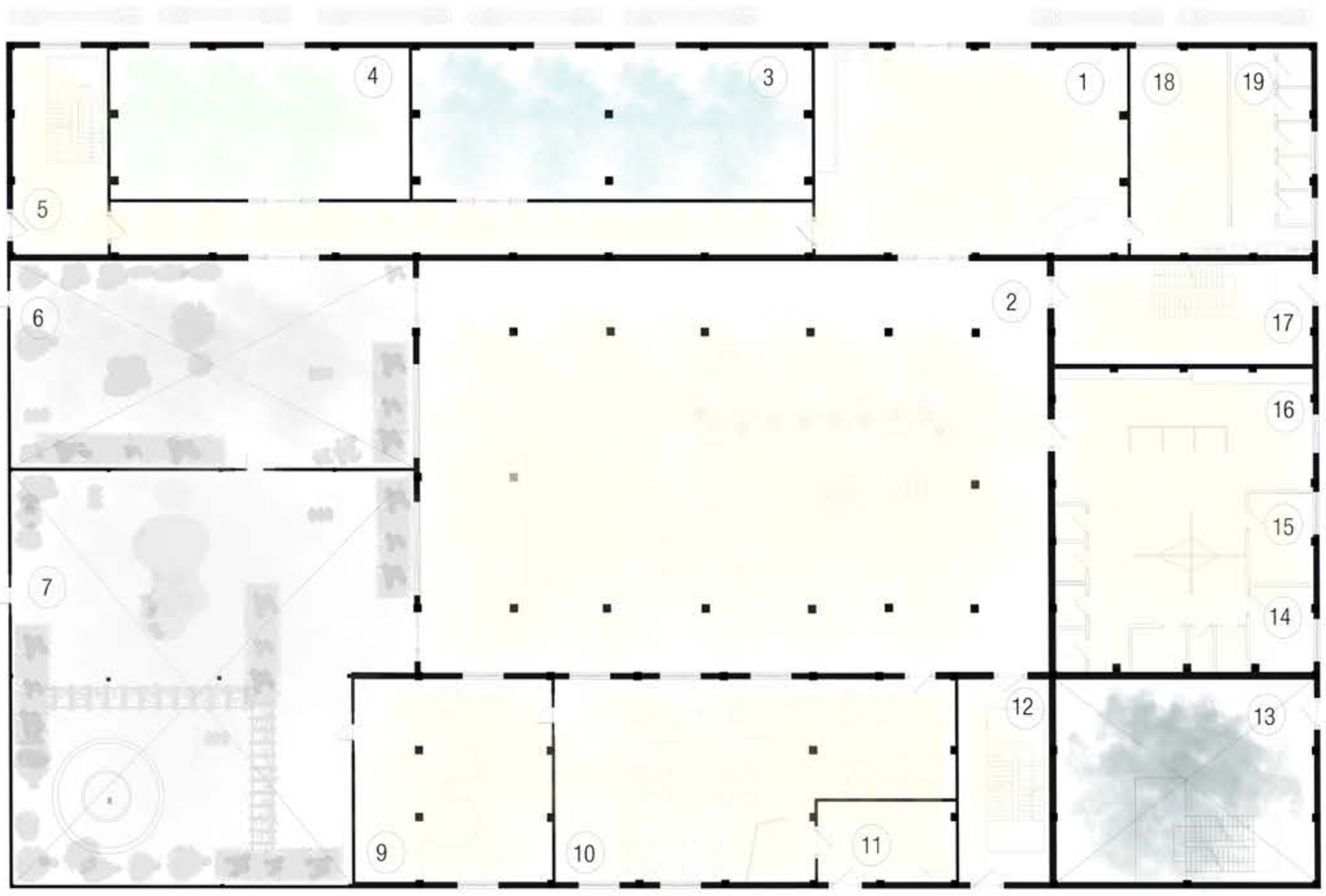
4 - Parapet height 400 mm
- Insulation 30 mm
- Parapet core - CLT 300 mm thicknes
- External waterproof membrane on parapet
- Galvanised metal sheet 5mm
- Gutter system
- Roof waterproof membrane 0.76mm
- Single plywood 150mm
- Aucustic lining 30 mm
- Waterproof membrane
- Rigid insulation 200 mm
- Airtightness/ Vapour control 3mm
- Exposed CLT panels



Second Floor



First Floor



Ground Floor

Floor Plan Legend

The Climate Water Centre - Floor Plans

1- Ground Floor

1- Main Enterance/Reception
2- Foyer /Exhibition Space
3- Rain Room
4- Material Behaviour Gallery
5- Fire Escape /3
6- Foggy Garden
7- Enclosed Garden
8- Harvesting Rain Water System Plant
9- Children Indoor Play Zone
10- Caffe/Restaurant
11- Restaurant /Kitchen
12- Fire Escape /1
13- Wind Tower
14- Maintenance Room
15- Maintennce Room
16- Dressing/Wc
17- Fire Escape /2
18- Staff Room
19-Staff Chainging Room/Wc

2- First Floor

1- Water Resonance Room
2- Foyer
3- Mist Room/ Natural Moss
4- Balcony
5- Fire Escape /1
6- Cold Pods
7- Steam/ Salt Room
8- Thermal Bath
9- Fire Escape /2
10- Wind Tower
11- Chainging Rooms/Wc
12- Maintenance Room
13- Maintenance Room
14- Fire Escape /3

3- Second Floor

1- Shadow Room
2- Foyer
3- Fire Escape/1
4- Climate Lab
5- Seminar Room
6- Seasonal Decking
7- Fire Escape /2
8- Hot Stone Decking Area
9- Fire Escape /3
10- Wind Tower

Temperature Gradient Palette

Zone Type	Colour Tile	Feeling Evoked
Hot		High Heat
Warm		Mild Warmth
Neutral		Comfortable/Stable
Cool		Slightly Cool
Cold		Low Temperature
Extreme Weather		Storm-Level Cold
Humidity		Air Feels Charged
All Weather		Feeling the season

SCALE BAR 1:200

0 5 10 20 30 40

The Climate Water Centre - Nordhavn, Copenhagen, Denmark

Temperature Gradient Palette

Zone Type	Colour Tile	Feeling Evoked
Hot		High Heat
Warm		Mild Warmth
Neutral		Comfortable/Stable
Cool		Slightly Cool
Cold		Low Temperature
Extreme Weather		Storm-Level Cold
Humidity		Air Feels Charged
All Weather		Feeling the season

Cross Section

Transversal Section

SCALE BAR 1:200

0 5 10 20 30 40

The Climate Water Centre - Nordhavn, Copenhagen, Denmark

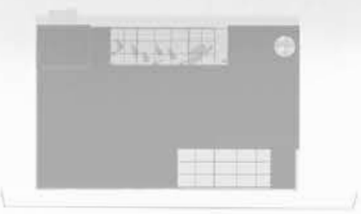
Transversal Section

SCALE BAR 1:50

Temperature Gradient Palette

Zone Type	Colour Tile	Feeling Evoked	Space No
Hot		High Heat	6
Warm		Mild Warmth	8
Neutral		Comfortable/Stable	9,4,3,2
Cool		Slightly Cool	7
Cold		Low Temperature	5
Extreme Weather		Storm-Level Cold	10
Humidity		Air Feels Charged	1

Front Elevation



Back Elevation

SCALE BAR 1:200

0 5 10 20 30 40

STRUCTURAL-MATERIAL STRATEGY
EMBOIDED CARBON CALCULATION

Materiality Index

LVL Timber (Laminated Veneer Lumbar)

Role: Columns, beams, floor plates, cores where possible.
-Benefits: Carbon storing, fast assembly, warm interior atmosphere.
-Nordhavn relevance: Matches the district's shift toward timber high rise and low carbon construction.
Life Cycle:
-Source: FSC certified Nordic forests.
-Use: Prefabricated, demountable structural elements.
-End of Life: Reuse as structural components; downcycle into insulation or biofuel.

Stainess Steel

- Role: Tidal energy components,facde frame, rainwater harvesting hardware, exposed fixings.
- Benefits: Corrosion resistant, fully recyclable, long service life.
- Nordhavn relevance: Designed for marine air, salt, and moisture

Life Cycle:
- Source: High recycled content steel.
- Use: Modular components for easy replacement.
- End of Life: 100% recyclable without quality loss.

Low - Carbon Concrete (Foundations)

-Role: Ground contact, tidal interfaces, structural anchoring.
-Benefits: Reduced cement content, recycled aggregates, long lifespan.
-Nordhavn relevance: Necessary for coastal stability while minimising carbon.
Life Cycle:
Source: Local concrete plants using recycled aggregates.
-Use: Minimal volume, only where timber cannot perform.
-End of Life: Crushed and reused as aggregate.

ETFE Roof / Garden Cover

- Role: Lightweight cover for evaporative cooling garden
- Benefits: High light transmission, low weight, minimal embodied carbon.
- Nordhavn relevance: Allows year round climate experiences with minimal structure.

Life Cycle:
- Source: Manufactured in thin, efficient membranes.
- Use: Inflated cushions or single layer sheets.
- End of Life: Fully recyclable into new ETFE membranes.

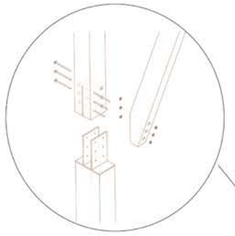
Crushed Oyster Shells

- Role: Permeable courtyard surfaces, terrazzo finishes, water related installations.
- Benefits: Reuses local seafood waste, reduces aggregate extraction, supports drainage.
- Nordhavn relevance: Direct link to harbour ecology and circular economy.

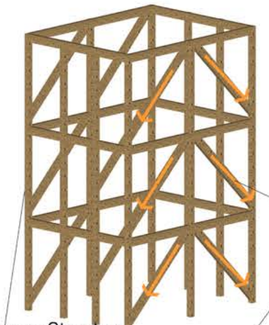
Life Cycle:
- Source: Local seafood industry waste streams.
- Use: Mixed into screeds, terrazzo, or permeable paving.
- End of Life: Crushed and reused as aggregate again.

Wood Fibre Insulation

-Role: Thermal and acoustic insulation for walls, roofs, and floors in timber based structures.
-Benefits: Renewable, vapour open, and carbon sequestering; improves summer heat resistance and indoor comfort.
-Nordhavn relevance: Supports low carbon, regenerative design and aligns with circular material strategies.
Life Cycle:
-Source: Waste wood chips and sawdust from local timber production.
-Use: Installed as rigid boards or loose fill within wall and roof build ups.
-End of Life: Recycled or composted as biodegradable material; can be reused in new insulation panels.

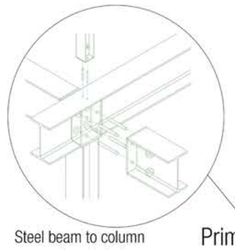


The details shows how two structural memebers connect like beam to column joint.

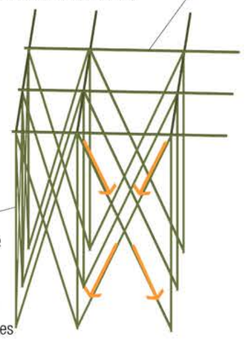


Primary Structure

Timber column beam frame defines the main grid and carries vertical loads.

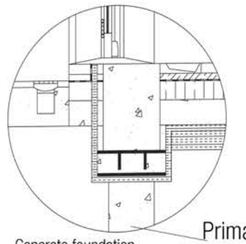


Steel beam to column connection, bolted plate joint providing lateral stability.

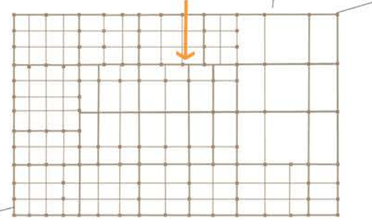


Primary Structure

Steel bracing system in the garden space provides lateral stability and expresses wind forces architecturally.

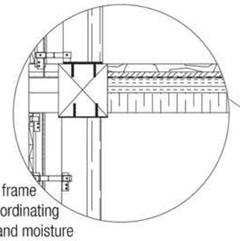


Concrete foundation detail, load transfer and thermal continuity.

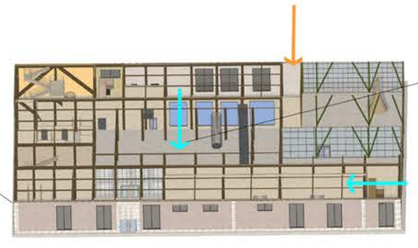


Primary Structure

Concrete foundation + piles anchor the building and distribute loads into the ground.



Detail shows how the steel frame meets the wall and floor,coordinating load transfer with thermal and moisture control.



Load Path - Vertical Loads

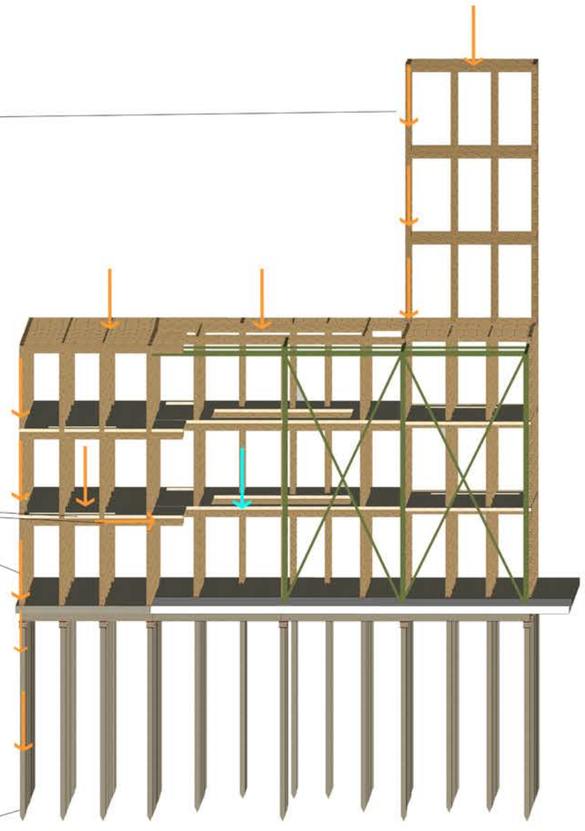
Continue through columns into the pile caps and deep foundation piles embedded in Nordhavn reclaimed soil.

Load Path -Lateral loads (wind)

Are resisted by diagonal steel bracing and the concrete core, channelled down to the pile foundations.

Load Path -Floor loads

Move from CLT panels, secondary beams, primary beams,columns.



Load Path-Roof loads

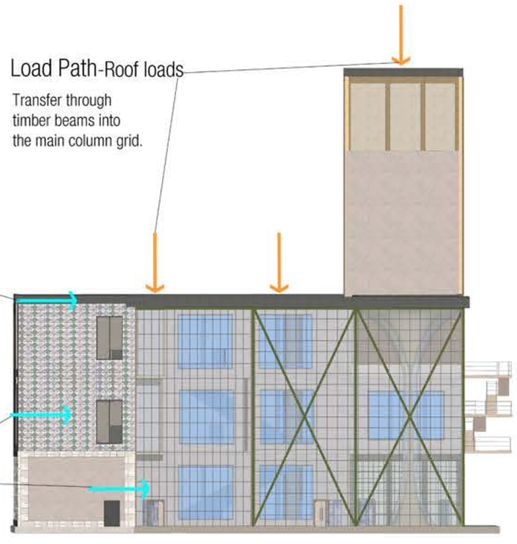
Transfer through timber beams into the main column grid.

Secondary Structure

Roof trusses support the upper level and integrate water collection geometry.

CLT floor panels span between beams, forming rigid diaphragms.

Façade sub frame connects to the main grid, supporting glazing and shading elements.



STRUCTURAL EMBODIED CARBON EN15978 (A1–A5)
Climate Water Centre

Building Area
Footprint: 40 × 63 m
Total floor area: 7,560 m²

Material Volumes
Concrete (slab + piles): 1,453 m³
CLT (slabs + walls + tower): 2,908 m³

Carbon Factors
Concrete: 495 kgCO e/m³
CLT: 205 kgCO e/m³

Embodied Carbon Results
Concrete: 719,000 kgCO e
CLT: 596,000 kgCO e
Total: 1,315,000 kgCO e
Intensity: 174 kgCO e/m²

Benchmark Comparison
Full concrete baseline: 285 kgCO e/m²
RIBA 2030 target: 625 kgCO e/m²

Full Concrete Structure (Baseline)
- All CLT replaced with concrete
- Total EC: 2,159,000 kgCO e
- Embodied carbon intensity: 285 kgCO e/m²

Structure Legend

Primary Structure
Secondary Structure

ACCESS STRATEGY

CLIMATE AND WATER CENTRE NORDHAVN,COPENHAGEN,DENMARK

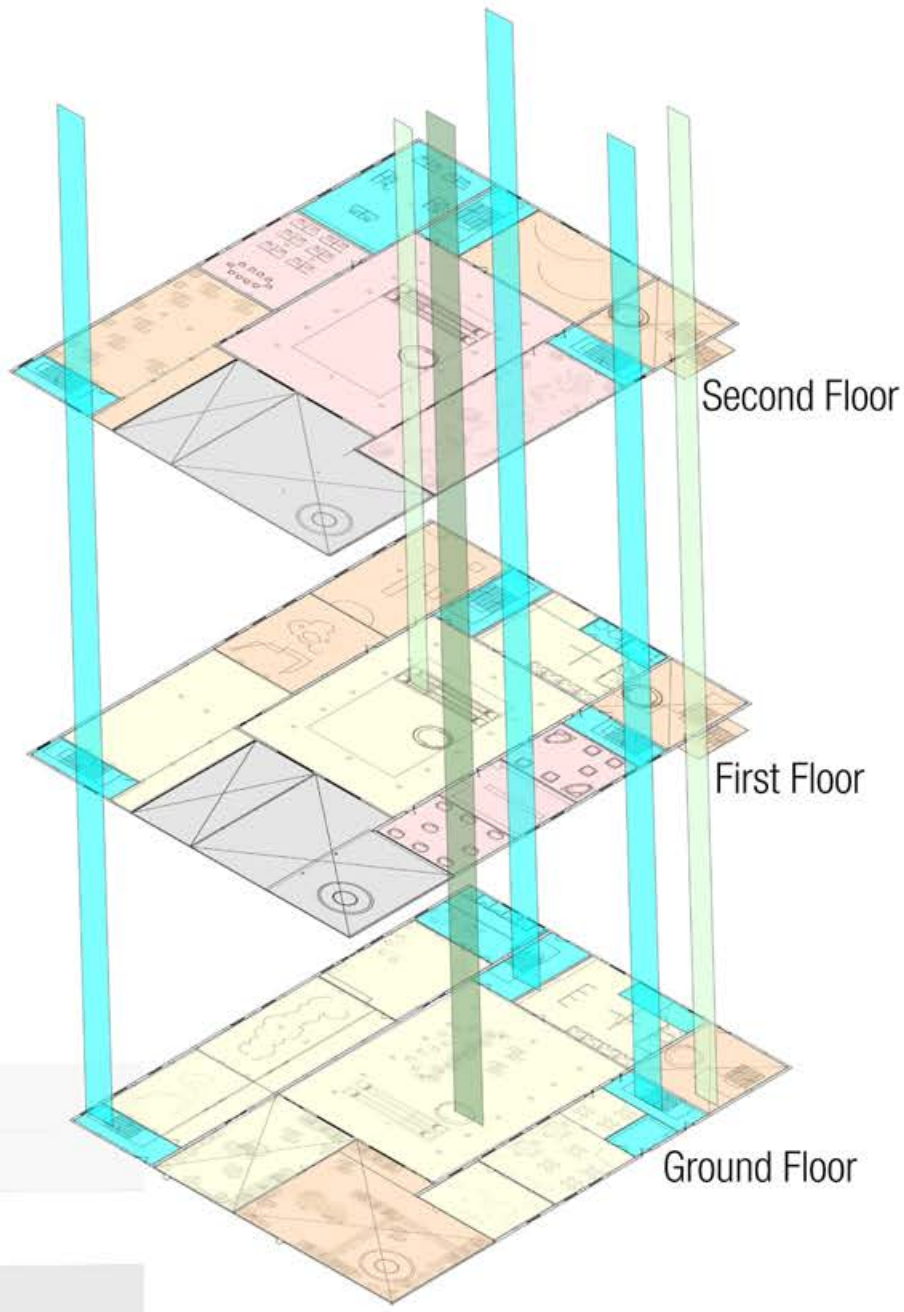
Fire Escape Routes

Second Floor

First Floor

Ground Floor

Building Access Strategy



Fire Escape Strategy Legend

- Escape routes
- Prtotected stairs cores
- Refugee point
- Sprinkles (conceled wet pipe)
- Sprinkles (corrisionresistant wet heads)
- Sprinkles (corrisionresistan wet heads)
- Sprinkles (wet pipe+ hood suppression)
- Sprinkles (standard wet pipe)
- Sprinkles (dry pipe heads)
- Heat detectors
- Optical smoke detectors
- Smoke/gas detector
- ETFE roof vents
- Mechanical extractor
- Alarm Sound sysem
- Red escape follow sign
- Manual call point

The Climate Water Centre - Floor Plans

1- Ground Floor

1- Main Enterance/Reception
2- Foyer /Exhibition Space
3- Rain Room
4- Material Behaviour Gallery
5- Fire Escape /3
6- Foggy Garden
7- Enclosed Garden
8- Harvesting Rain Water System Plant
9- Children Indoor Play Zone
10- Caffe/Restaurant
11- Restaurant /Kitchen
12- Fire Escape /1
13- Wind Tower
14- Maintenance Room
15- Maintennce Room
16- Dressing/Wc
17- Fire Escape /2
18- Staff Room
19-Staff Chainging Room/Wc

2- First Floor

1- Water Resonance Room
2- Foyer
3- Mist Room/ Natural Moss
4- Balcony
5- Fire Escape /1
6- Cold Pods
7- Steam/ Salt Room
8- Thermal Bath
9- Fire Escape /2
10- Wind Tower
11- Chainging Rooms/Wc
12- Maintenance Room
13- Maintenance Room
14- Fire Escape /3
15- Harvesting Rain Water System Plant

3- Second Floor

1- Shadow Room
2- Foyer
3- Fire Escape/1
4- Climate Lab
5- Seminar Room
6- Seasonal Decking
7- Fire Escape /2
8- Hot Stone Decking Area
9- Fire Escape /3
10- Wind Tower

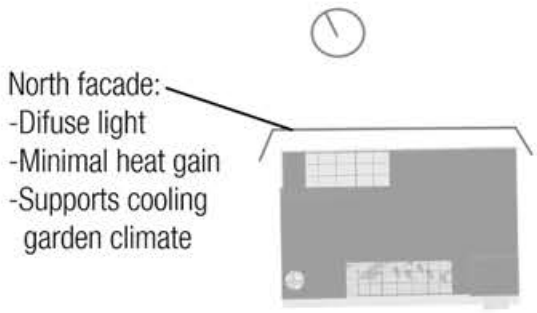
Building Access Strategy Legend

- Public space
- Semi public
- Private
- Semi Private/Public
- Overlooking garden space
- Public ascent
- Staff Access
- Accessible lift

Fire Strategy

The building's fire strategy ensures safe evacuation and full compliance with Approved Document B. Three protected stair cores provide the main means of escape, each enclosed in 60 minute fire rated construction. Escape routes are clearly defined, with travel distances kept within limits and supported by illuminated signage. Automatic fire detection covers all areas, with smoke detectors in circulation spaces and heat detection in plant rooms. Sprinklers operate throughout to control fire growth and maintain safe conditions. Refuge points at each stair landing support inclusive evacuation, while smoke ventilation at stair tops helps maintain clear escape paths.

ENVIRONMENTAL STRATEGY



Enclosed garden

Biodiversity pocket

Microclimate buffer
Air quality improvment
Evaporative cooling

Winter Equinox

Summer Equinox

Wind cachers structure
40m above the ground.
High wind velocity, cleaner air.

Harvesting
the rain water

Opening facing wind
Wind

Hotter air rises up
and ventilates out

Filter system

Harevsting water
system

Cool water circulation

Air is pulled down

Sea water
intake

Heat transfer
system

Water
pump

Water
pump

Water cistern

Water flowing in qanat

Water collected
filtered,going back
in the water network

Air regulated
transferd inside the building

Air current cooled by convection and evaporation

Harbour-side façade stepping with the coastline to open views and anchor the building to the water.

Climate-shaped urban passage where mixed materials soften wind and winter light.

Atrium as the light and climate core, blending natural and artificial illumination to express the hydrological cycle's vertical connection.

Ground-floor forum as a social condenser, blending natural and artificial light with greenery to create a warm, communal atmosphere.

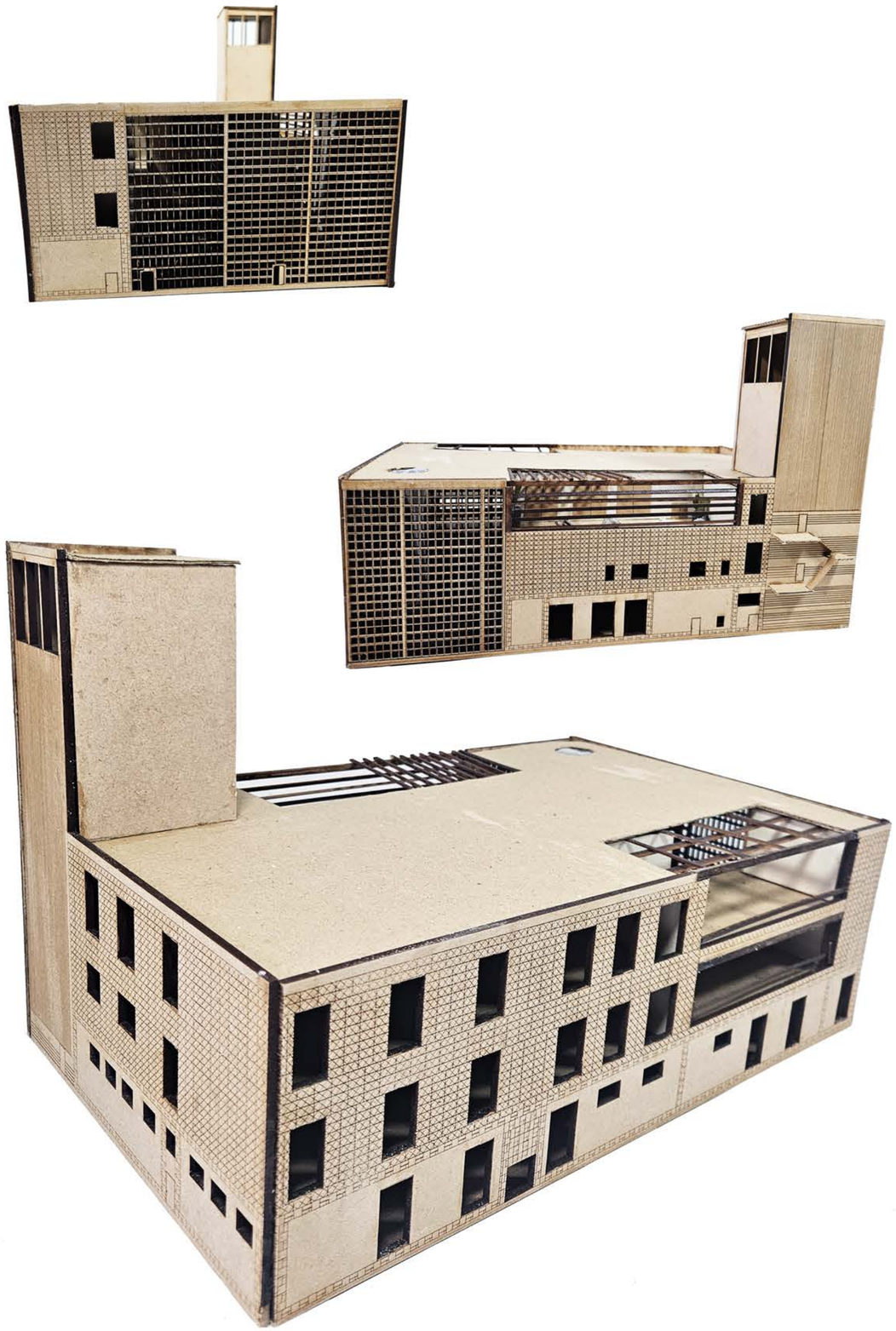
Warm water room as a climatic chamber, where heat, humidity, and vegetation interact to embody the hydrological cycle's restorative phase

Microclimate garden where fog, plants, and airflow interact to make the hydrological cycle tangible

Hot stone area as the evaporation stage, where radiant heat and textured surfaces evoke the transformation of water into vapor, completing the hydrological cycle's ascent.

Exploring volumetric relationships and skyline impact.
Transparent material used to study light permeability and spatial hierarchy.

Testing program distribution, public vs. private zones.
Evaluating how massing interacts with site boundaries and circulation.



Physical model 1:200 scale, massing study
shows how the stepped tower and porous facade work together to shape light, airflow and enviornmental performance

The materiality Room showcase how real,, climate- exposed materials come together, revealing their behaviour under light, humidity, nd long-term enviornmental change Daylight filters through openings,casting soft shadows on oyster- concrete flooring and mossed walls. The views highlight how natural light animates texture, revealing material ageing and the room's evolving atmospheric depth.
Model 1:50 scale.