

# The Emmasingel Construct:

An Open Framework

**Graduation Report**

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**Name of the Project\_**

The Emmasingel Construct: An Open Framework

**Course Name\_**

Architectural Engineering Grad. Studio

**Course Code\_**

AR4AE020

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# Abstract

This project investigates how architecture can operate as an open and adaptable framework within dense, high value urban environments increasingly dominated by fixed models. Taking Emmasingelkwadrant in Eindhoven as a test site, the project proposed a permanent structural system combined with a reconfigurable elements logic that allows spaces, programs and occupation to evolve over time. Through scenario-based testing, modular systems and spatial prototyping, the research explores how architecture can support changing cultural, educational, and residential uses without requiring complete redevelopment. The project argues for a shift from architecture as a finished object toward architecture as an evolving framework capable of accommodating long term change.

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# 1. Introduction

Across contemporary European cities, inner-city densification has become a dominant response to housing shortages, economic growth and sustainability targets. While increased density is often framed as a solution to urban sprawl and environmental impact, it has simultaneously produced highly optimized, mono-functional developments in which architectural and social complexity are reduced in favor of efficiency, control and financial predictability. As a result, many central urban areas, despite their density, risk becoming socially homogeneous and programmatically static, generating urban environments that are active only at specific times and function as “dead zones” outside narrowly defined use cycles. This condition exposes a growing mismatch between the long lifespan of architectural structures and the rapidly changing social, cultural, and economic realities they are meant to support (Chee Peng Chin, 2025).

In response to this condition, architectural discourse has increasingly questioned the notion of buildings as finished objects with fixed programs, advocating instead for models that embrace adaptability, interpretability and long-term transformation. Within this debate, structuralist approaches propose architecture as a framework or ordering system capable of balancing collective coherence with individual appropriation (Hertzberger, 2015)(Centre, 2021). In a city such as Eindhoven, characterized by a strong technological, educational and design driven identity, these questions become particularly relevant, as central urban development must negotiate not only density and land value, but also cultural production, learning environments and inclusive public life.

## 1.1 Urban Complexity at Emmasingelkwadrant

While Eindhoven's urban development strategy aims to revitalize central areas and accommodate a growing population, the transformation of the Emmasingelkwadrant exemplifies a recurring issue in contemporary urban planning: the predominance of monofunctional, housing-focused development in prime central locations. According to the municipal Ontwikkelvisie Emmasingelkwadrant, the area is being redeveloped primarily as a residential district, with plans for over 600+ new homes alongside limited public spaces and infrastructural enhancements. While this vision is framed positively as a way to create a 'hotspot' for living, it reflects a narrow approach to urban functionality. (Eindhoven, n.d.)

This focus on housing, especially in such a central location, creates several challenges. First, the area risks becoming exclusively residential, limiting opportunities for mixed-use urban life, such as offices, cultural spaces and services. Public feedback and legal critiques submitted during planning processes highlight that the redevelopment largely prioritizes the volume and height of homes over the integration of diverse urban functions. (Het ontwerp van het bestemmingsplan II Emmasingelkwadrant, 2021)

Second, the centrality of Emmasingelkwadrant means that such housing is financially inaccessible for a large segment of residents. News reports covering municipal debates reveal that the combination of central location and high-demand residential planning is driving up property values, making these homes some of the most expensive in Eindhoven. This creates tension between urban revitalization goals and social accessibility, as new developments cater primarily to higher-income residents or investors, rather than fostering a socially diverse urban environment. (Theeuwen, 2023)

Finally, political and economic pressures further amplify this problem. Reports indicate that external influences, such as demands from major employers and industrial stakeholders, may shape housing priorities in the area, reinforcing the focus on residential development over multifunctional urban planning. Combined, these factors illustrate that the Emmasingelkwadrant redevelopment, while framed as progressive urban densification, makes it as a bad case of spatial inequality, limits urban diversity and risks creating a monocultural city core dominated by high-end housing.

## 1.2 Problem Statement



Emmasingelkwadrant, despite being the most central and strategically connected area of Eindhoven, is currently evolving through a hyper exclusive, private led redevelopment logic that prioritizes high end housing density over cultural, educational and public value. Driven by rising land values and fixed planning models, the area is being shaped as a collection of internally optimized, monofunctional fragments rather than as a cohesive urban framework that serves the city as a whole.

This approach produces a finished, static architecture that forecloses adaptability, social mix and long term urban learning. Instead of leveraging its proximity to Eindhoven Central station, TU Eindhoven campus, Philips stadion and the Strijp S area, the site risks being isolated bubble of expensive housing. Creating an “Urban Dead Zone” in the dense centre.

The architectural challenge is not simply to add another mixed use block to the land parcels, but to redefine the role of central urban architecture of Eindhoven. From fixed finished buildings/ objects to open ended systems. Shifting focus from profit driven enclosure to social and educational infrastructure and from monofunctional planning to programmatic instability over time.

## 1.3 Objective

The objective of this project is to develop an urban architectural framework for Emmasingelkwadrant that enables continuous change, social diversity and programmatic openness over time. The project needs to be a design with long lasting structural system that can host short termreplacable units, enable spaces that can be easily subdivided, temporarily occupied, programmatically unstable, prioritise social/ cultural infrastructure over a final building form.

Architecture and urban planning operating closer to plug in urban infrastructure than to traditional masterplanning. Non fixed experimental architecture, architectures relationship to learning, culture and collective use.

### 1.3.1 Keywords

#### //Design

Easily Subdivided

Temporarily Occupied

Programatically Unstable

Social Infrastructure over Aesthetic Value

Buildings as Service, not Objects

#### //Engineering

IKEA + Minecraft + Urbanism

Self Planning

Structure lasts decades

Units last years or months

Machines constantly replacing parts

### 1.3.2 Relevance

This project contributes to architectural practice by proposing an alternative to housing-led, profit-driven development in dense urban centers, framing architecture as an open system capable of adapting over time. Societally, the project supports more inclusive and active city centers by spatially enabling cultural, educational and shared programs within highly valued urban areas.

## 1.4 Scope & Limitations

This project investigates the Emmasingelkwadrant in Eindhoven as a test site for an open, incomplete architectural framework that can counter dead zones, fragmented parcels and socially homogeneous housing in dense inner-city areas. The scope is limited to architectural and spatial strategies, focusing on building order, adaptability and mixed-use capacity rather than fixed programs or finished forms. The project aims to develop a unifying system that supports cultural, educational and residential (future phase) uses over time, informed by Eindhoven's culture of experimentation and making.

The project does not address policy, real estate economics or long-term user behavior in a quantitative way. Testing is conducted through design iterations and scenario-based evaluation rather than real occupancy data. By intentionally avoiding a finalized architectural object, the project accepts incompleteness as a limitation and positions it as a core design principle.

## 1.5 Research Questions

### Main Question

- How can an open ended architectural framework, based on a structural grid and a kit of parts system, enable long term spatial adaptability, programmatic diversity and higher urban density in high value, housing driven urban contexts, as explored through the case of the Emmasingelkwadrant in Eindhoven?

### Sub Questions

(Structure and System)

- How can a permanent structural grid and kit of parts system define a clear architectural order while allowing flexible assembly, disassembly and reconfiguration of spaces over time?

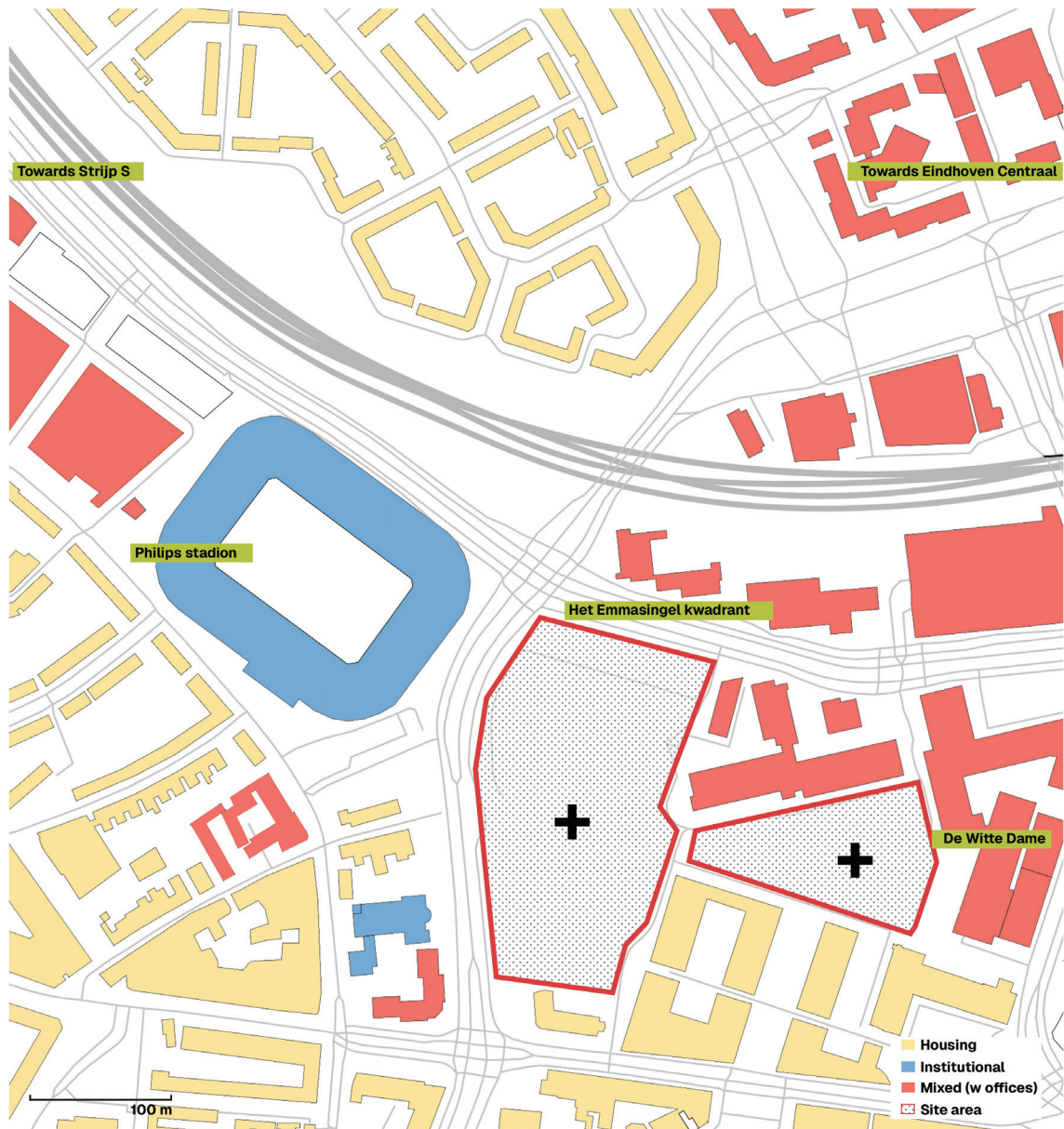
(Programmatic)

- How can the framework accommodate shifting cultural, educational and residential uses without relying on fixed programmatic layouts?

(Time and Obsolescence)

- How can processes of change, replacement and partial obsolescence be integrated into the design through reversible systems and adaptable components rather than complete redevelopment?

## 2. About the Site



Located between Eindhoven's historic centre and the former Philips industrial campus, the Emmasingelkwadrant sits at the intersection of memory and reinvention. It offers an opportunity to translate industrial narratives into new forms of public use, cultural production and social infrastructure.

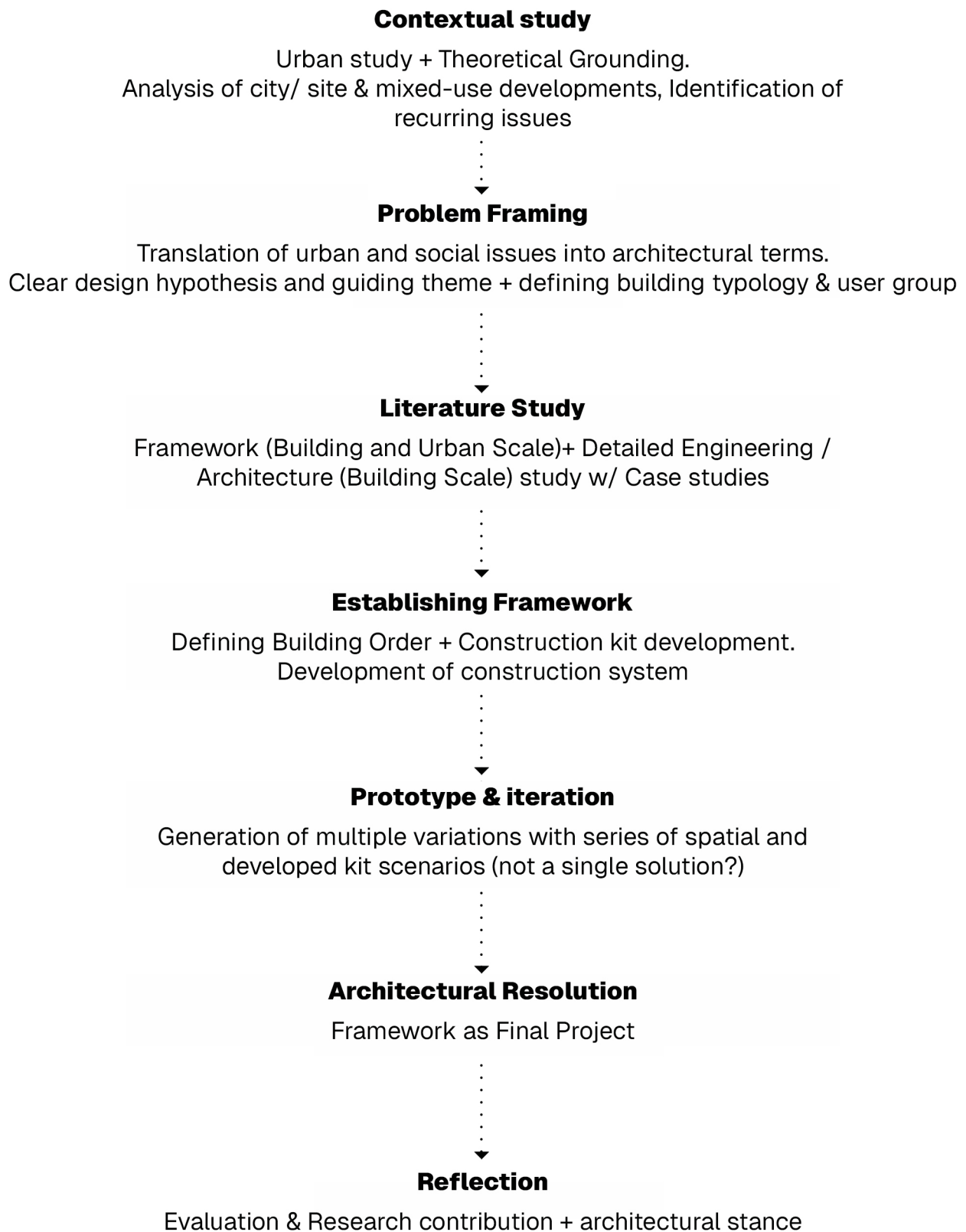
Recent demolitions have created large, open parcels that allow design at urban scale without navigating restrictive pre-existing programmes. Current municipal proposals anticipate around 625 housing units in three phases on the former Philips HCZ/ Het Karkas site, revealing development pressure.

### **3. Methodology**

This graduation project follows a design-driven research approach, where architectural design operates as the primary tool to explore and test spatial, structural and programmatic possibilities. Rather than aiming for a fixed solution, the project understands architecture as an open-ended system capable of adapting over time. The methodology is therefore focused on investigating how a consistent architectural framework can accommodate change, negotiation and multiple forms of occupation within a dense urban context.

The outcome of this methodology is not a singular finalized design, but a coherent architectural system supported by a set of spatial and tectonic principles. These demonstrate how an open and incomplete framework can accommodate long-term change, support diverse uses and remain relevant within evolving urban conditions. The final proposal therefore acts as a manifestation of this system, rather than a fixed endpoint.

## 3.1 Method Flowchart

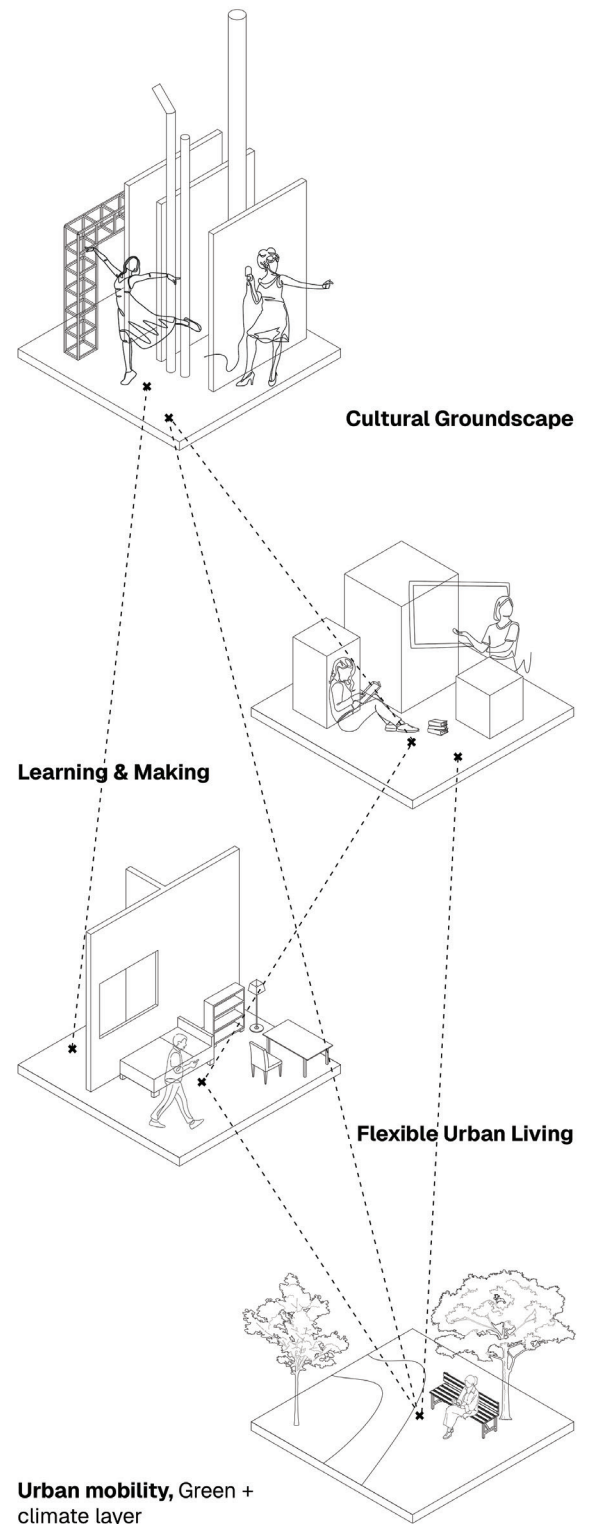


## 3.2 The Programme & Users

A hybrid system with temporary cultural, educational spaces, flexible working, maker spaces, general public infrastructure with housing (future phase) as one component rather than the dominant driver.

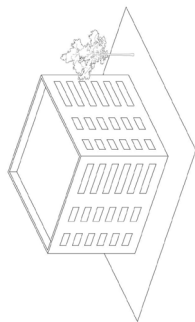
Typological intentions include:

- **Adaptability** through modular floors, flexible rooms, and convertible public spaces
- **Coexistence of public and semi-public functions**, allowing cultural production, learning, and everyday living to overlap
- **Housing variety**, including student units, short-stay studios, young professional units, and possibly intergenerational or special-care apartments (concept)
- **Anchoring the precinct** with a civic node that encourages collaboration between residents, visitors, students, and cultural practitioners

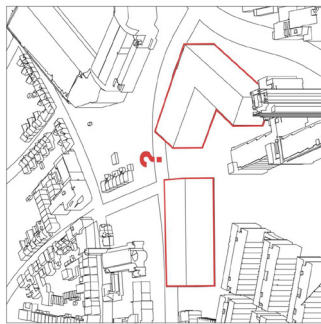


# 3.3 Guiding Themes

## Concerns



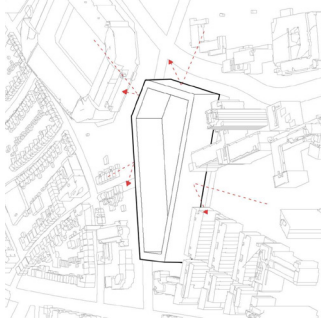
Finished Architecture



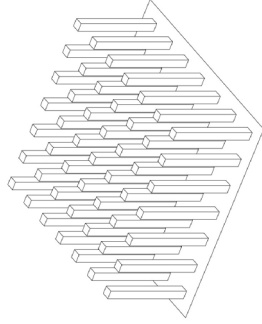
High End housing dominance



Fragmented Parcels

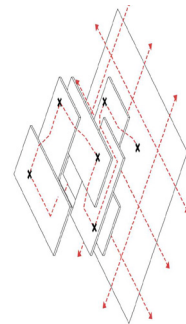


Dead Zones

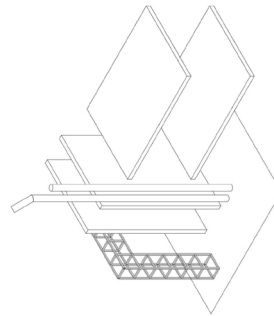


Social Homogeneity

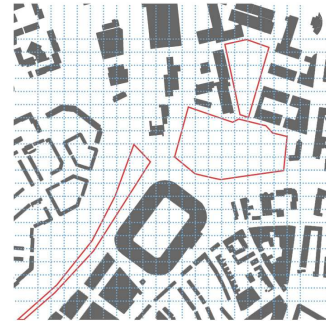
## Guiding Theme



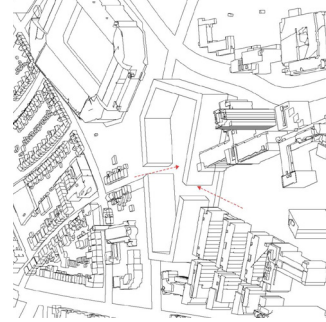
Design incompleteness



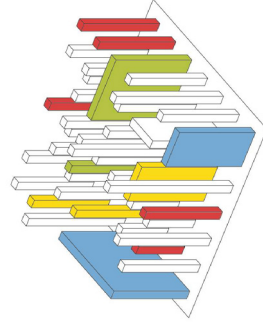
Framework over object



Unifying systems



Continuous occupation



Programmatic instability

## 4. Theoretical Framework

Overall, the theoretical research is structured into three main parts.

### 1. Framework (Building and Urban Scale)

This part focuses on developing a conceptual framework at both the building and urban scales. It draws primarily from literature and precedent studies, many of which are speculative or conceptual in nature. These visionary “blueprint” projects help establish the foundational logic of the framework and strengthen the theoretical argument, effectively functioning as a rulebook that guides the overall system.

### 2. Detailed Engineering / Architecture (Building Scale)

The second part examines the framework at a more detailed, technical level. It focuses on architectural and engineering aspects such as modularity, adaptability, and building-level systems. This research is grounded in indepth case studies that address specific programs and contexts, with particular attention to the engineering challenges encountered in real projects. The aim is to understand technical constraints, possibilities, and methods of implementation.

For both parts, the research currently draws from the following case studies:

- Interaction Centre
- Ville Spatiale
- Archigram City London
- Potteries Thinkbelt
- Fun Palace
- Habitat 67
- Nakagin Capsule Tower, Tokyo
- Culture house Eemhuis, Amersfoort
- SESC Pompeia, Sao Paulo
- Centre Pompidou, Paris
- NEXT21 Housing, Osaka
- Frac Nord-Pas De Calais, Dunkerque

### 3. Design Language and Aesthetics

The final layer focuses on design language and aesthetic expression. This will be informed by a broad range of works by architects such as Wes Jones, Bryan Cantley, and Neil Denari, among others

## **4.1 Literature findings**

### **/Generic, Specific and Polyvalent**

Generic, specific and polyvalent describe different ways of relating a building's permanent structure to changing uses. Generic space is neutral and unnamed, focusing only on the basic framework while leaving use open. It provides a common base that can support many interpretations and remains stable even when functions change, as seen in large industrial buildings that are easily reused. However, generic space is passive and does not actively guide how people use it.

*Source: (Hertzberger, 2015)*

### **/Theoretical Models**

Yona Friedman, in *On Theoretical Models*, says that mathematics cannot properly describe the real world because it focuses on results rather than processes. He explains that math works as a system of abbreviations for repeated actions, but it fails to capture the unique details of how things happen over time. In a process, the order of steps matters more than the final outcome, even if the result looks the same.

*(Friedman, 2007) (Yiannoudes, 2013)*

### **/Role of “Open Building” in achieving spatial adaptability**

Open Building is based on creating a general superstructure that allows spaces to be rearranged easily over time. The main goal is long-term adaptability of housing to respond to changing social needs, even after the building is completed. This approach separates the permanent collective structure, called the base building or support, from the infill, which includes individual dwelling units.

*Source: (Holtbernd) (Hertzberger, 2015)*

## **/Building Order**

Building order is the consistent way a building is structured to give it a clear identity and logical flow, created through self-chosen rules by the designer. Hertzberger describes it as the building's "architectural DNA," giving it a stable character that stays recognizable even as its function or user interpretation changes.

*Source: (Centre, 2021) (Hertzberger, 2015)*

## **/Construction Kit parts**

Structuralist philosophy emphasizes Construction Kits and Work in Progress as ways to make architecture logical, adaptable and open to change. Construction Kits are like toys with internal rules that guide how parts fit together, similar to 19th-century Anchor stone sets or architectural styles like Classicism and Modernism, where elements have fixed tasks.

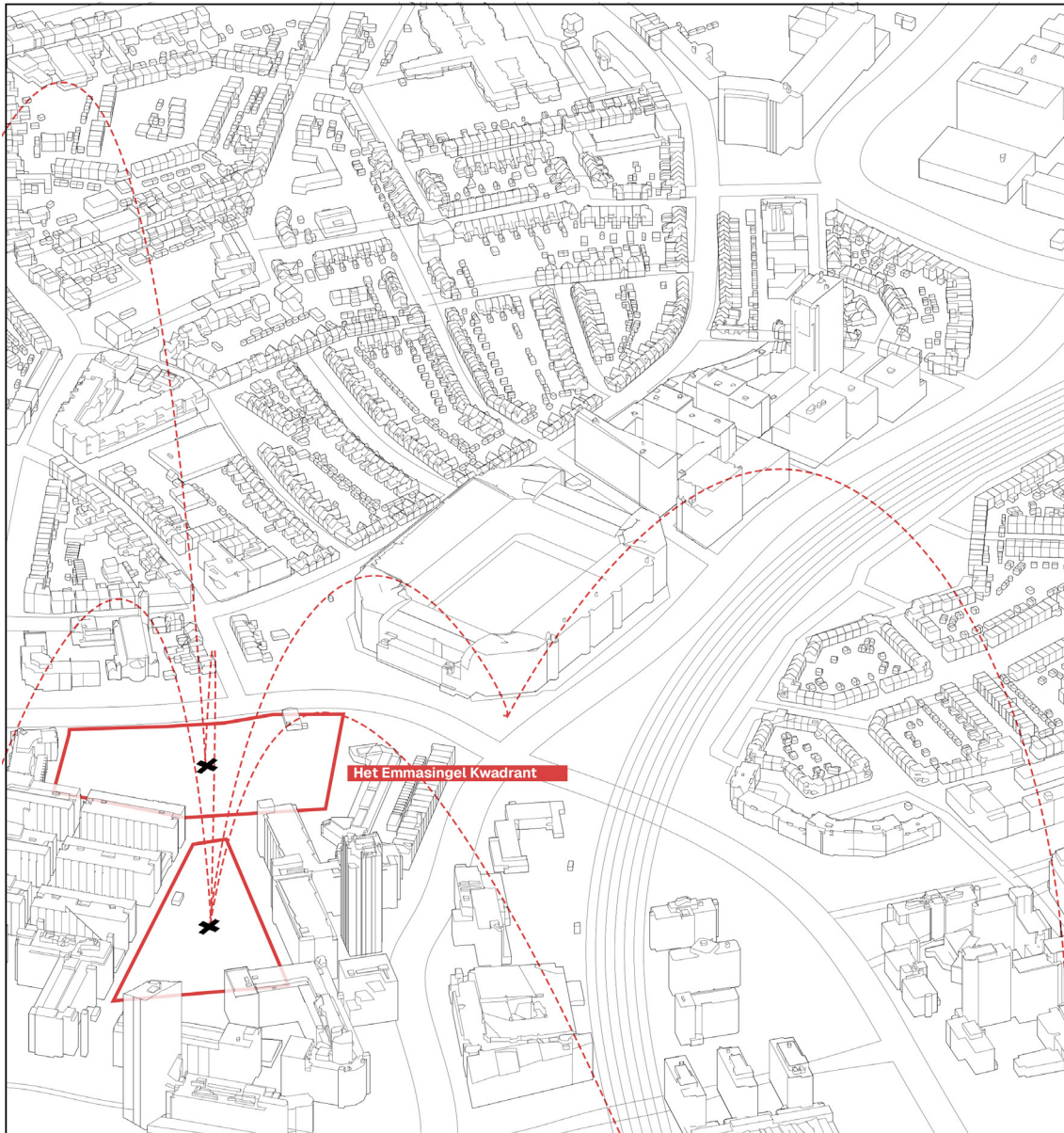
*Source: (Herdt, 2017) (Federico L. del Blanco García, 2024)*

## **/Rules of play to facilitate architectural freedom**

In architectural structuralism, rules are not meant to limit freedom but to make freedom possible. Freedom comes from choosing within a given set of rules, similar to how a game like chess works. These rules create a framework that people can explore and use in different ways. Open structures use simple rules that allow individual expression, like a grid-based city plan where the overall system stays fixed but individual parts change.

*Source: (Federico L. del Blanco García, 2024) (Herdt, 2017)*

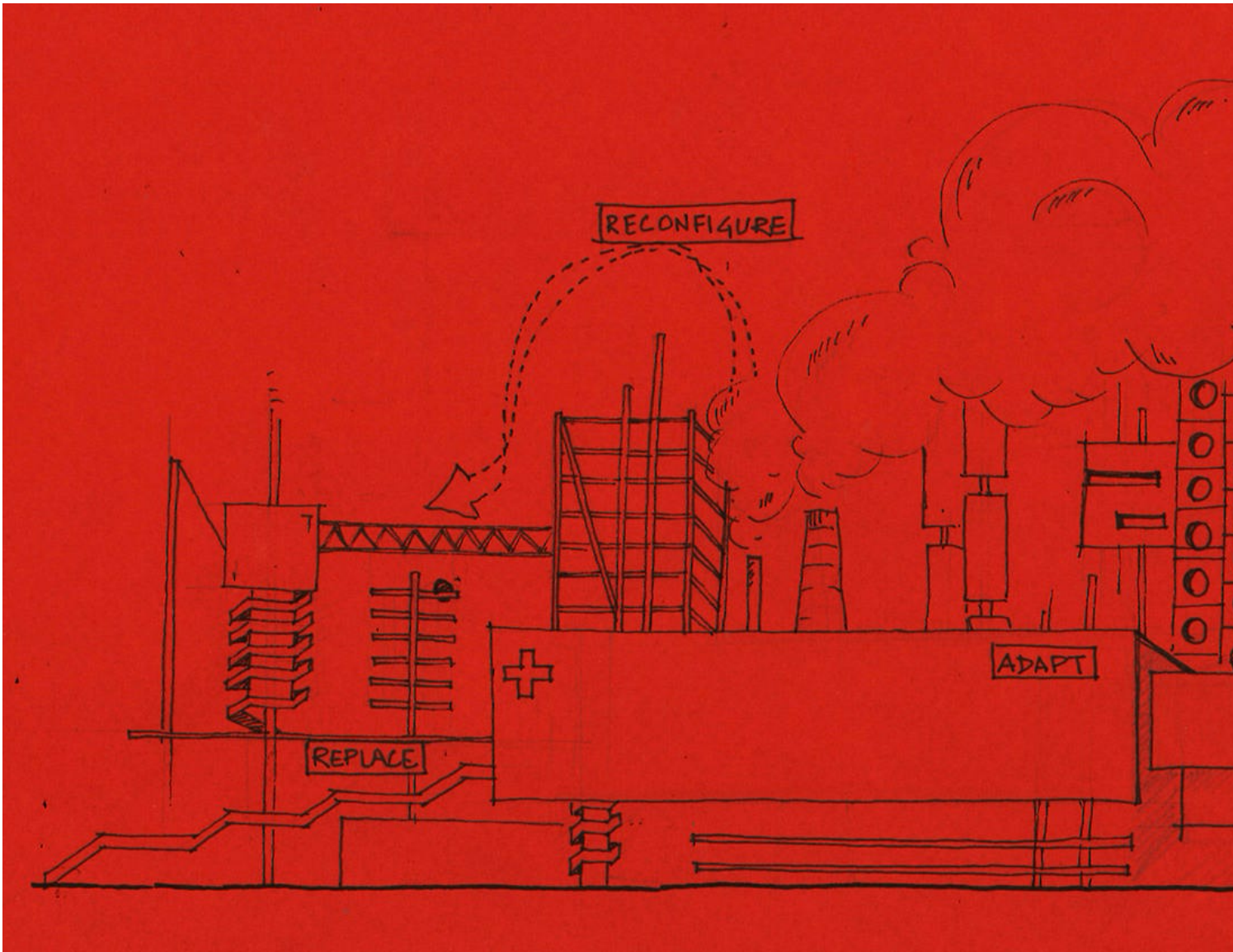
## 4.2 Vision



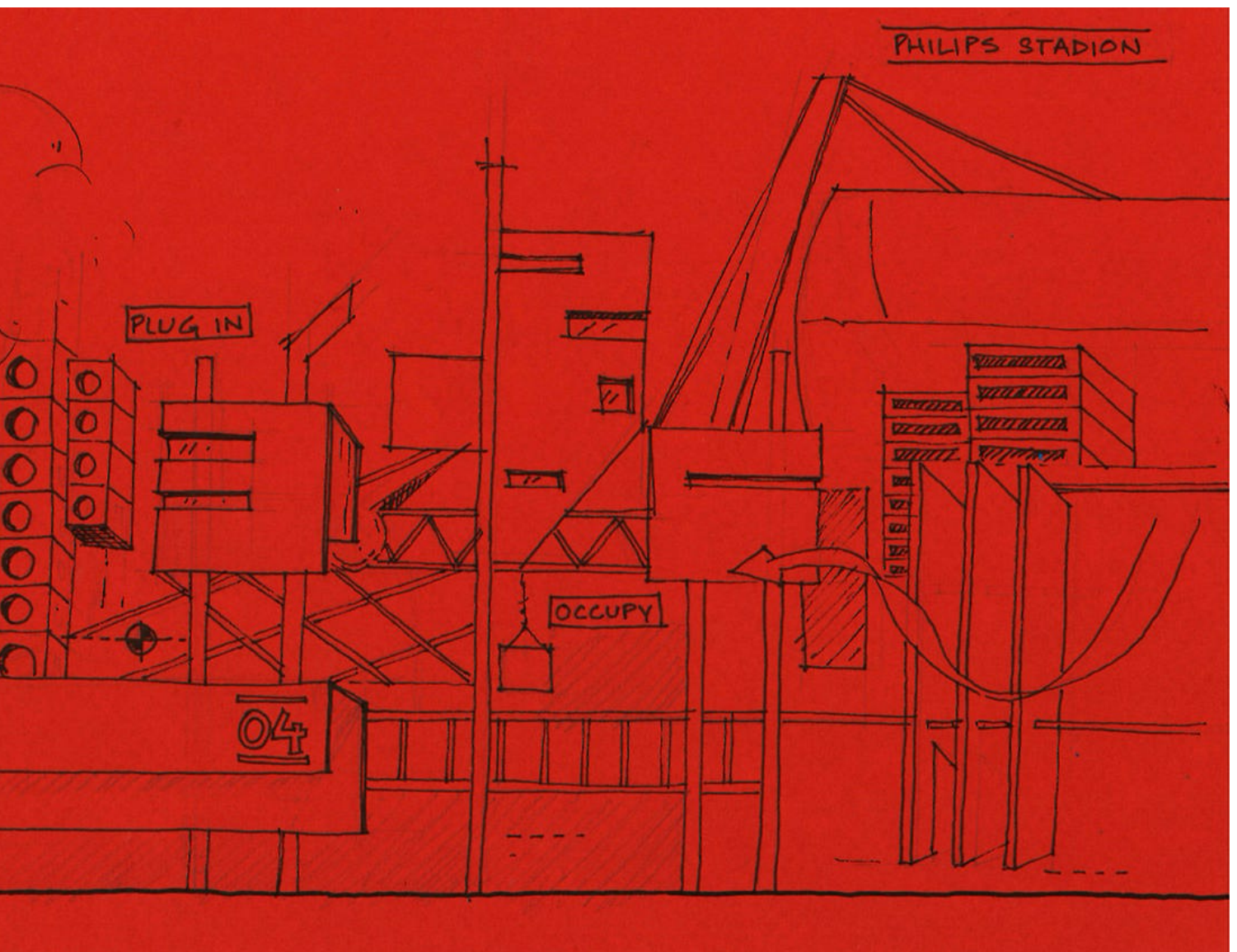
The vision of this project is to propose an alternative to the Eindhoven Mega Proposal, which aims to transform large parts of the city centre over the coming decades primarily through housing-led development. Within this vision, the Emmasingelkwadrant is largely proposed as a zone for high-end housing. In response, the project questions whether such a central significant urban area should be reduced to an exclusive residential enclave catering only to a limited demographic and income group.

Instead, the project argues for using the potential of the Emmasingelkwadrant to support a broader and more diverse public, including creatives, students, young professionals, makers, educators and local communities. Rather than creating isolated residential blocks, the proposal envisions an open architectural framework that acts as a stage for public life, cultural production, learning and collective occupation.

## 4.3 Design Vision



The abstract sketch is a composite exploration composed of both realised and unrealised architectural projects that share a common thematic focus. By assembling these references, the drawing investigates how a collection of architectural fragments can collectively form a spatial system capable of adapting to different typologies and user needs.

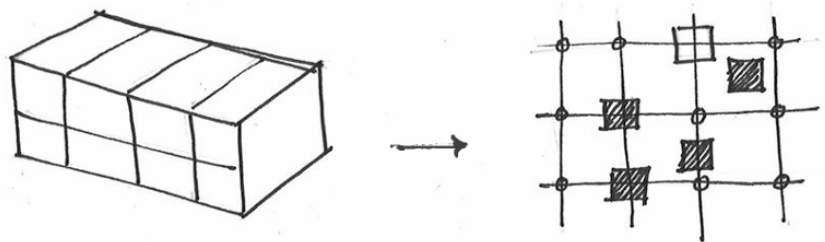


The dystopian-leaning sketch draws conceptual influence from Cedric Price, Peter Cook and Yona Friedman, particularly their ideas around cybernetics, open frameworks and responsive systems. These ideas are further complemented by the architectural language and aesthetic sensibilities found in the work of Wes Jones, Bryan Cantley and Neil Denari.

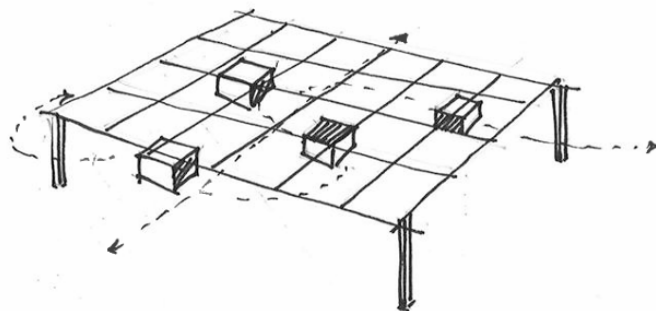
## 5. Case Study Findings

The selected case studies collectively reframe architecture as a dynamic system rather than a fixed object. Fun Palace and Potteries Thinkbelt introduced cybernetic, kit-of-parts logic where use is continuously negotiated rather than predetermined. Yona Friedman's Spatial City proposed separating permanent structural infrastructure from a user-defined spatial layer, while Plug-In City and Nakagin Capsule Tower demonstrated the technical possibility of distinguishing long-life structure from short-life inhabitable units. Habitat 67 showed how modular construction can achieve density without sacrificing spatial quality, and the Inter-Action Centre grounded these ideas at a community scale through lightweight, user-appropriated architecture. Together, these precedents establish three core principles that underpin this project: architecture as framework rather than finished object, adaptability through the separation of permanent and temporal systems, and time as a fundamental design parameter.

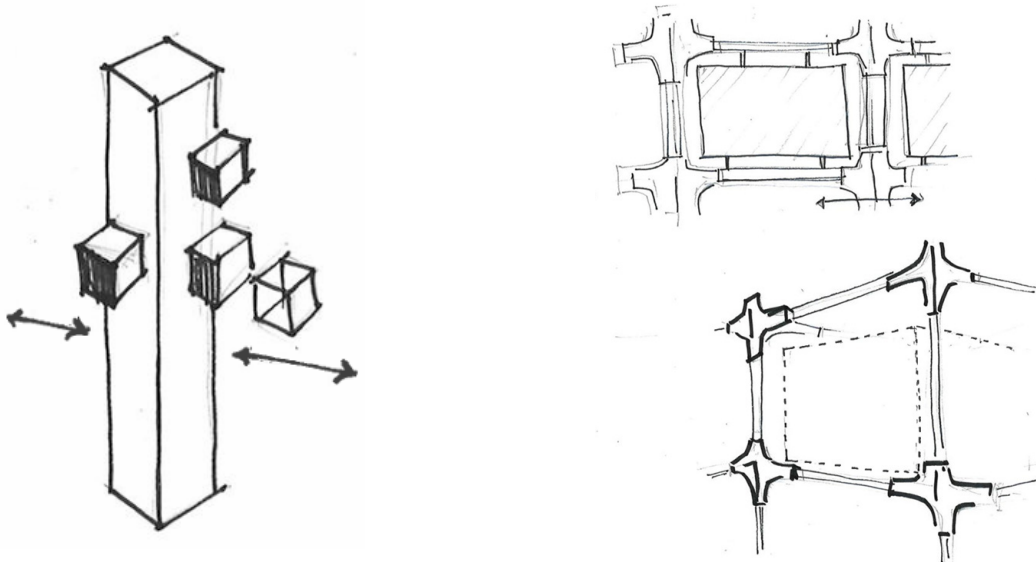
### **/Fun Palace & Potteries Thinkbelt:** Indeterminacy and Architecture as System (Centre, 2021)



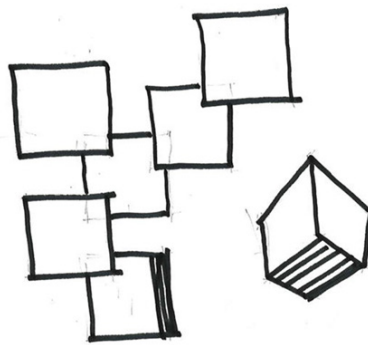
### **/Spatial City:** Structural Framework and User Agency (Friedman, 2007)



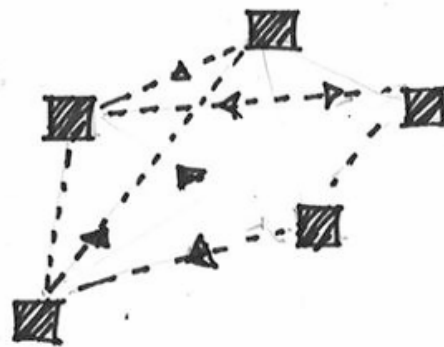
**/Plug-In City, EXPO 70 & Nakagin Capsule Tower: Modularity and Temporal Systems**



**/Habitat 67 & Expo 70: Density, Modularity, and Spatial Quality**

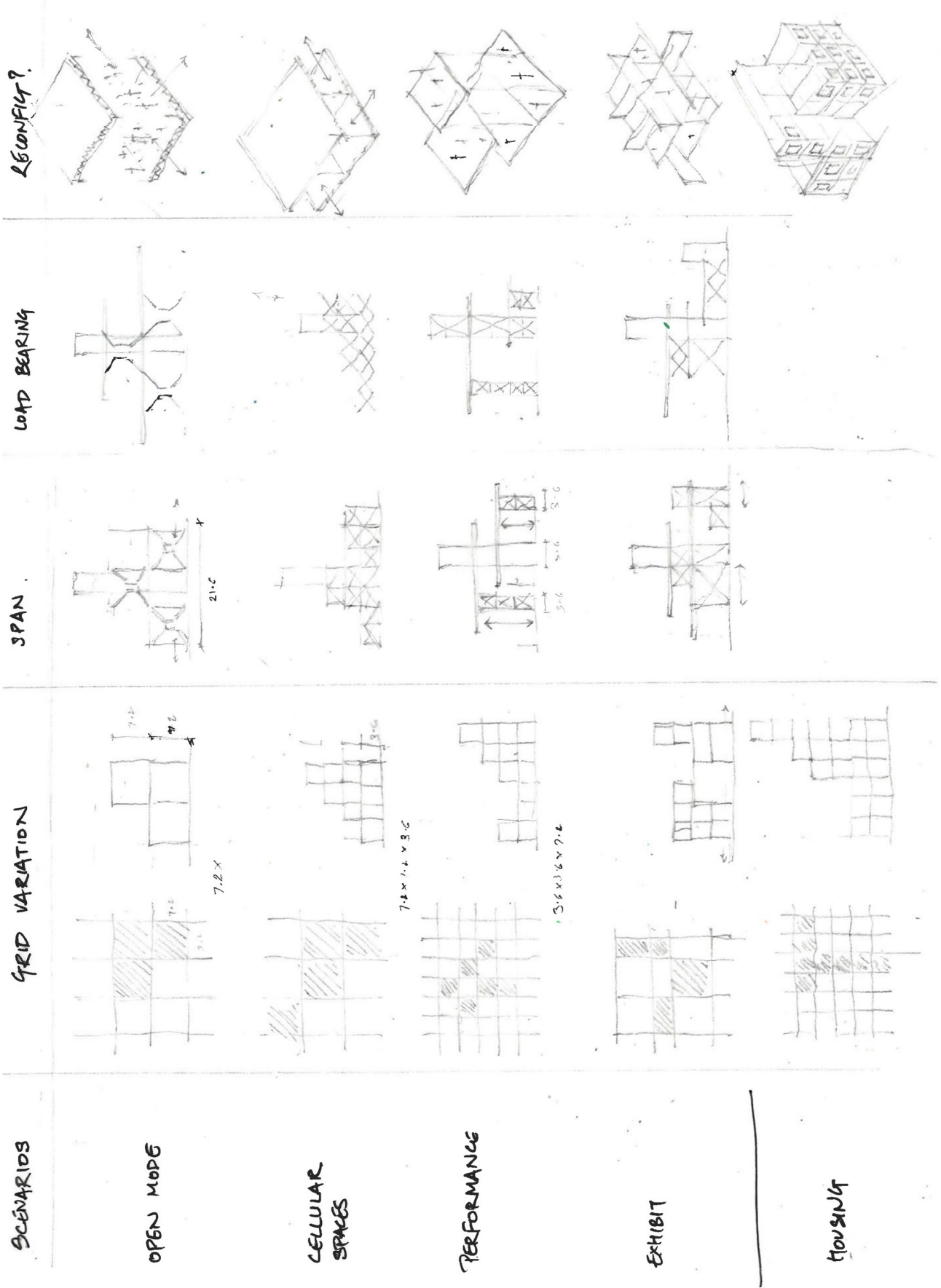


**/Interaction Centre: Adaptability at the Human Scale**  
(Herdt, 2017)



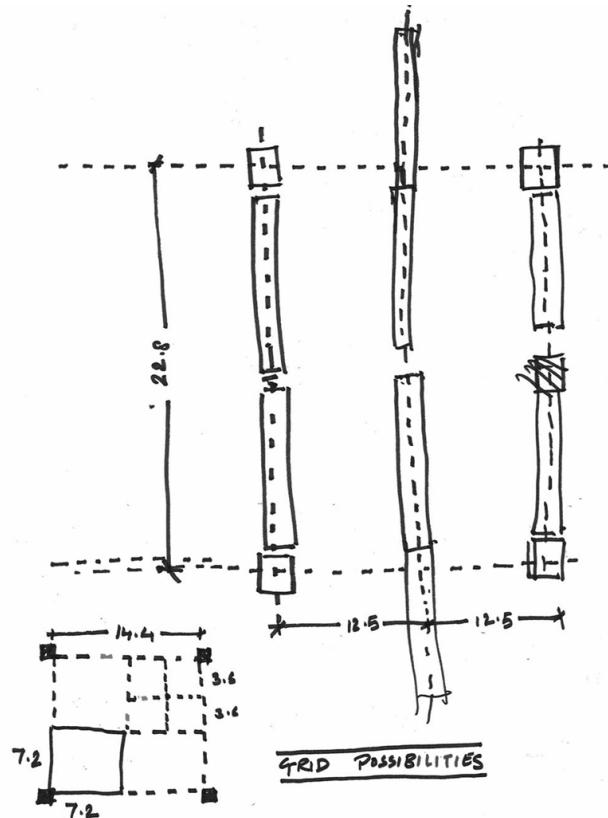
# 6. Research By Design

## 6.1 Explorations



## 6.2 Matrix- Grid Comparison

Variations in grid dimensions and structural logic were examined to establish a base framework capable of accommodating change. This framework was then tested through different module assemblies and spatial scenarios, ranging from open and collective conditions to more controlled and cellular arrangements.

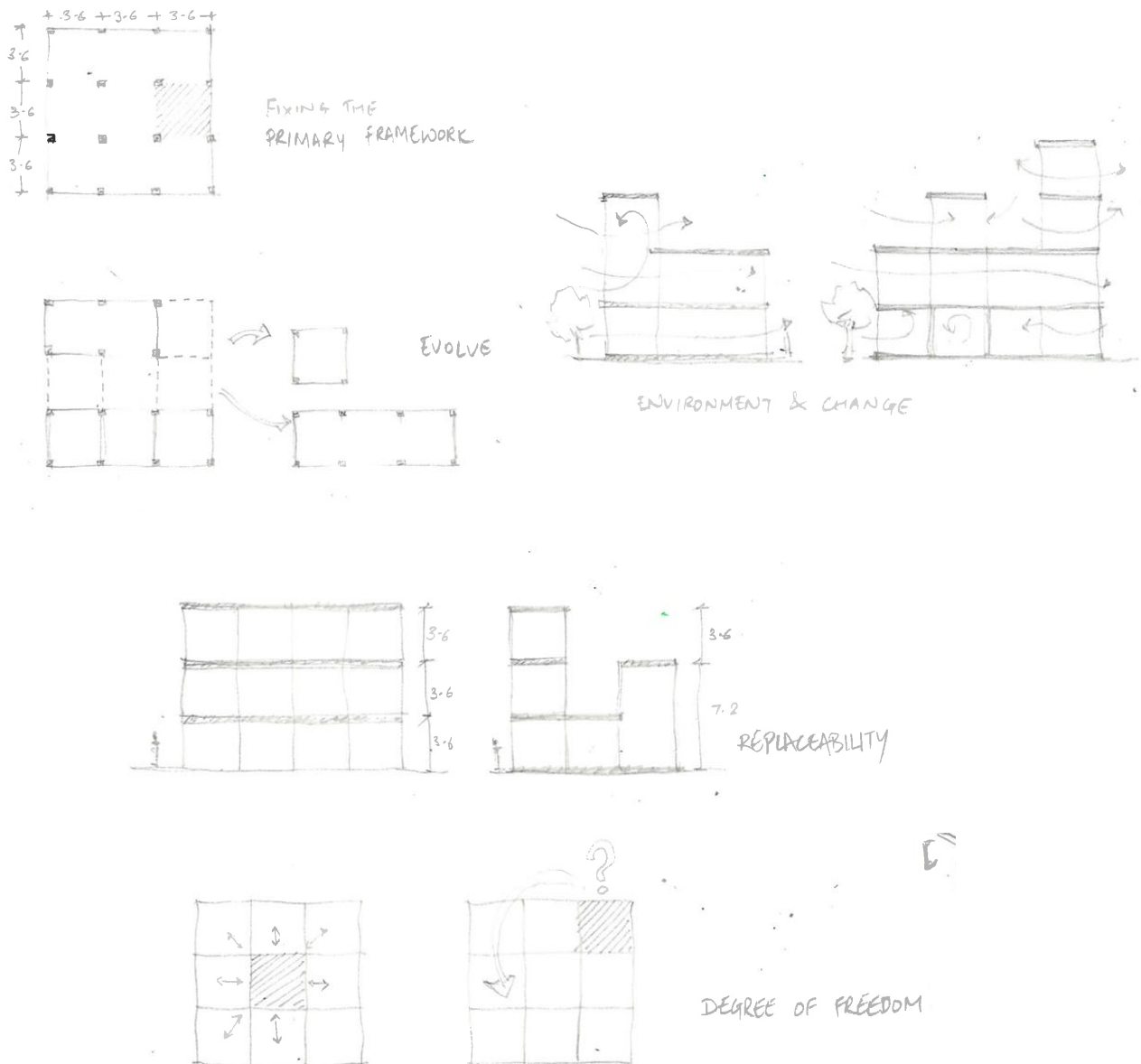


## 6.3 Inferences

The design exploration resulted in the selection of a  $3.6 \times 6.6$  m primary grid, as it demonstrated the highest capacity to accommodate both subdivision and aggregation without losing spatial clarity. The dimension allows smaller units to function independently while also enabling multiple modules to combine into larger spans, making it suitable across cultural, educational and performative programs. In vertical distribution, a flexible height system based on 3.6 m increments (3.6 m, 7.2 m,+) was adopted, allowing for vertical variation through double-height spaces, partial slab removals, and insertions. This sectional flexibility proved essential in supporting different spatial intensities, from open collective environments to more controlled and enclosed conditions.

Across scenario testing, the framework consistently showed a strong capacity for reconfiguration, where the same structural system could support multiple spatial arrangements without requiring fundamental changes to the primary structure. The distinction between permanent elements (structure and cores) and temporary components (modules, partitions, facade systems) further reinforced the system's adaptability over time. As a result, the chosen grid and structural logic operate not as a fixed solution, but as a stable yet open framework, capable of accommodating programmatic shifts, varying spatial needs, and incremental transformation.

## 6.4 Design Explorations- What Stays & What Changes



The exploration distinguishes between elements that remain stable over time and those that are intentionally open to change. The primary structural grid (3.6 x 3.6 m), vertical cores and main load-bearing system are treated as permanent, establishing a consistent spatial and structural framework.

## 6.5 Criterias & Qualities for evaluation

The exploration was evaluated through a set of criteria addressing construction logic, spatial hierarchy, performance, and long-term adaptability. The framework establishes a coherent spatial order and supports a range of atmospheric conditions without requiring constant structural modification.

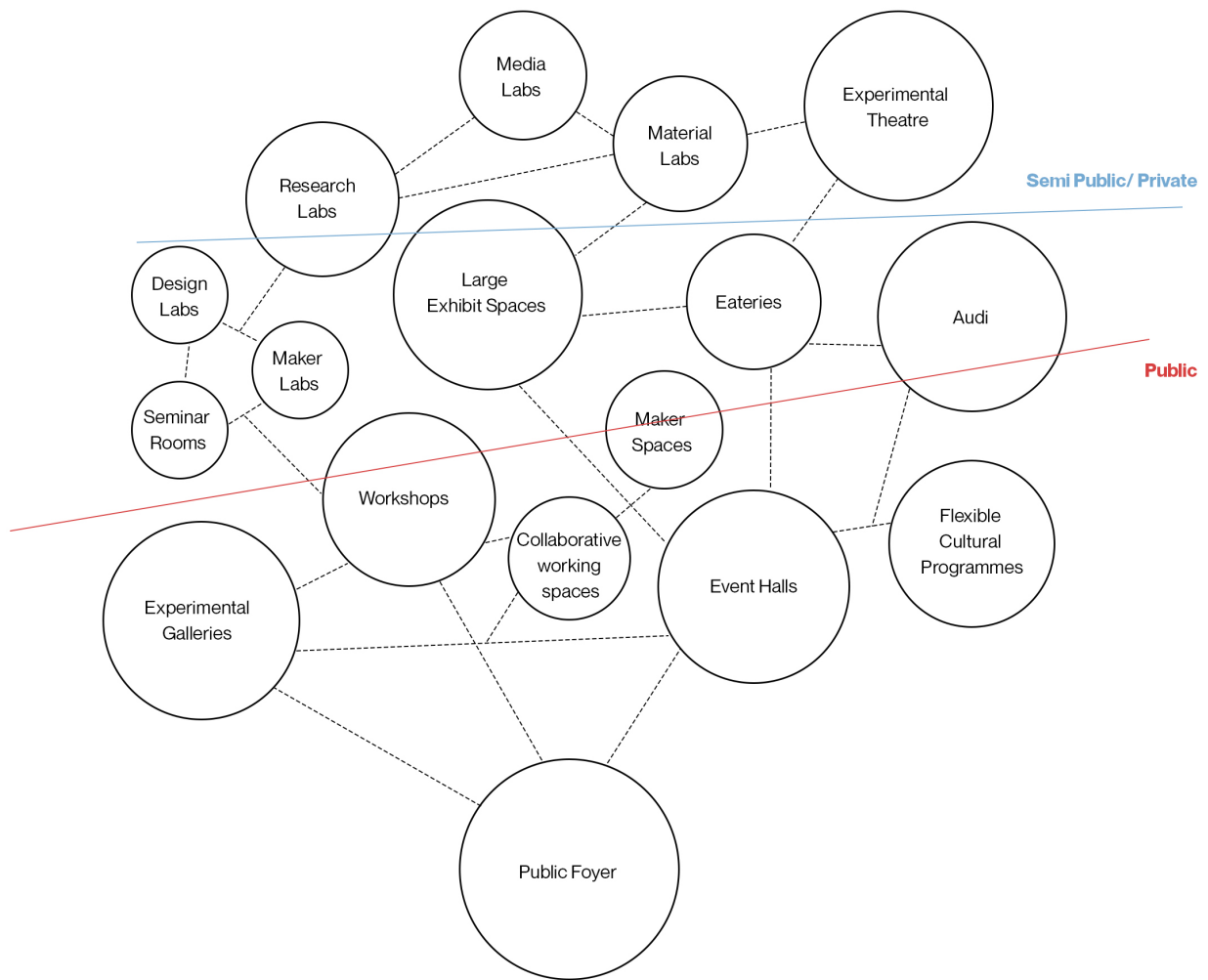
- How to build?
- Hierarchy
- What kind of atmosphere does it produce?
- Spatial order
- How does it perform?
- Time based adaptability
- Accessibility of modification
- Degree of program replaceability
- Structural redundancy

## 7. Area Programming

The two primary land parcels are assigned distinct typological functions based on their size, position and suitability within the urban context. The larger parcel accommodates the cultural and educational program, while the second parcel is designated for housing for the second phase of the project. This distribution responds to both spatial capacity and urban relevance. Following general buildable area guidelines in Eindhoven, each typology is further developed with specific area allocations.

Area Specifics		
<b>Land Parcel I</b> 32,000 Sqm approx.	<b>Modern dense cultural projects</b> 40%-70%	
<b>Possible Built Ground Cover</b> 17,000-22,000 Sqm	<b>Open Spaces</b> 10,000 Sqm	
Cultural + Edu	Land Parcel I	32,000 Sqm
<b>Public</b> <b>60%</b> large exhibition halls public foyer event halls maker spaces Eateries urban plaza connections	<b>Semi-Public</b> <b>25%</b> workshops maker labs experimental galleries seminar rooms design labs collaborative working spaces small auditoriums research labs flexible cultural programs terraces gardens open framework spaces	<b>Semi-Public/ Private</b> <b>15%</b> educational studios experimental theater media labs material labs advanced spaces? Offices
Area Specifics		
<b>Land Parcel II</b> 9,700 Sqm approx.	<b>Modern dense Housing projects</b> 50%-60%	
<b>Possible Built Ground Cover</b> 5,800 Sqm	<b>Open Spaces</b> 3,900- 4,700 Sqm	
Housing	Land Parcel II	9,700 Sqm
Student Dorms	40%	
Studios	30%	
Shared	10%	
Common/Amenities	10%	
Services	10%	

# 7.1 Spatial Order

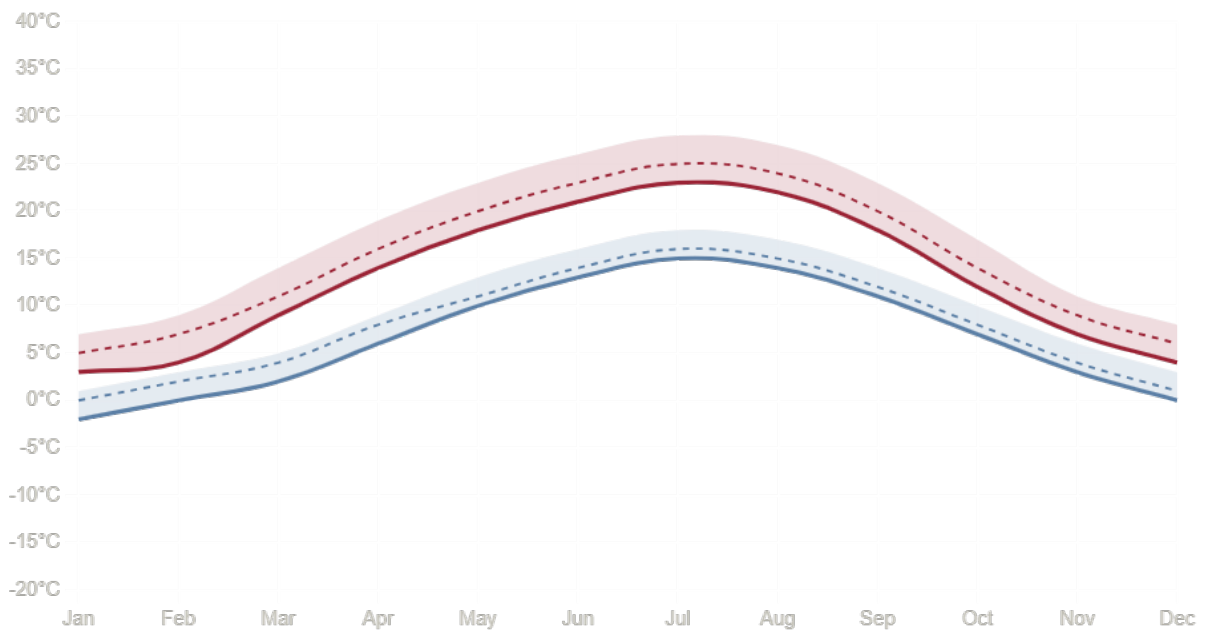


# 8. Climate Study

## /Climate Study for Site Analysis

### 8.1 Temperature profile

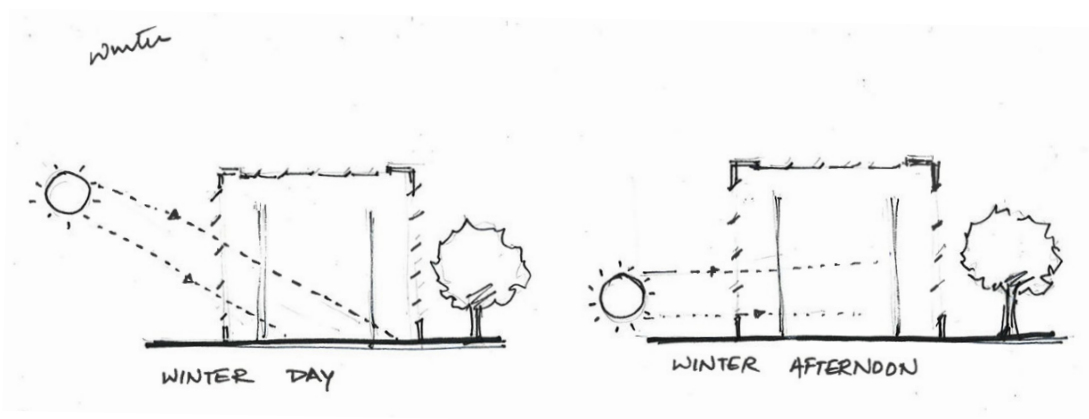
Eindhoven has an Oceanic climate also known as a temperate maritime climate. It has mild summers and cool winters but has long heating season.



## 8.1.1 Strategies

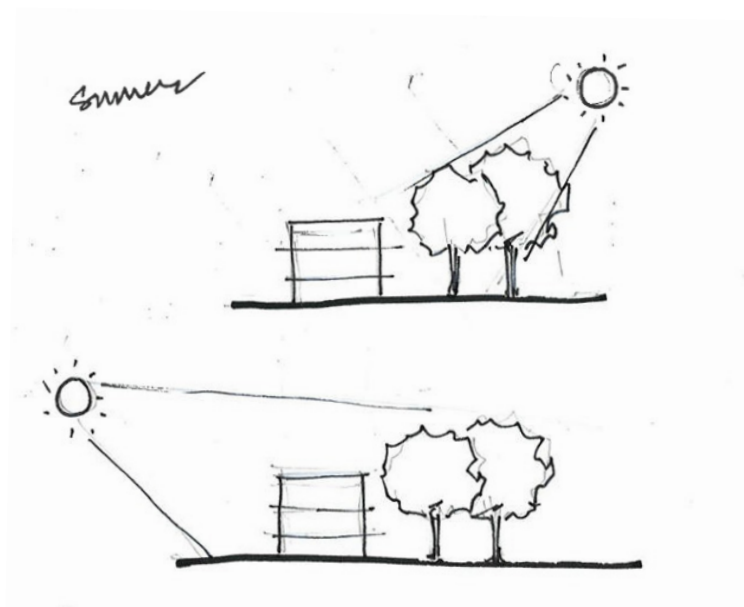
### /Winter

- Maximize Solar Gain: Orient key spaces south-facing, Allow deep sunlight penetration into interiors. Prioritize indoor activity spaces. Protect from Wind Exposure: Shield public spaces from cold winds.

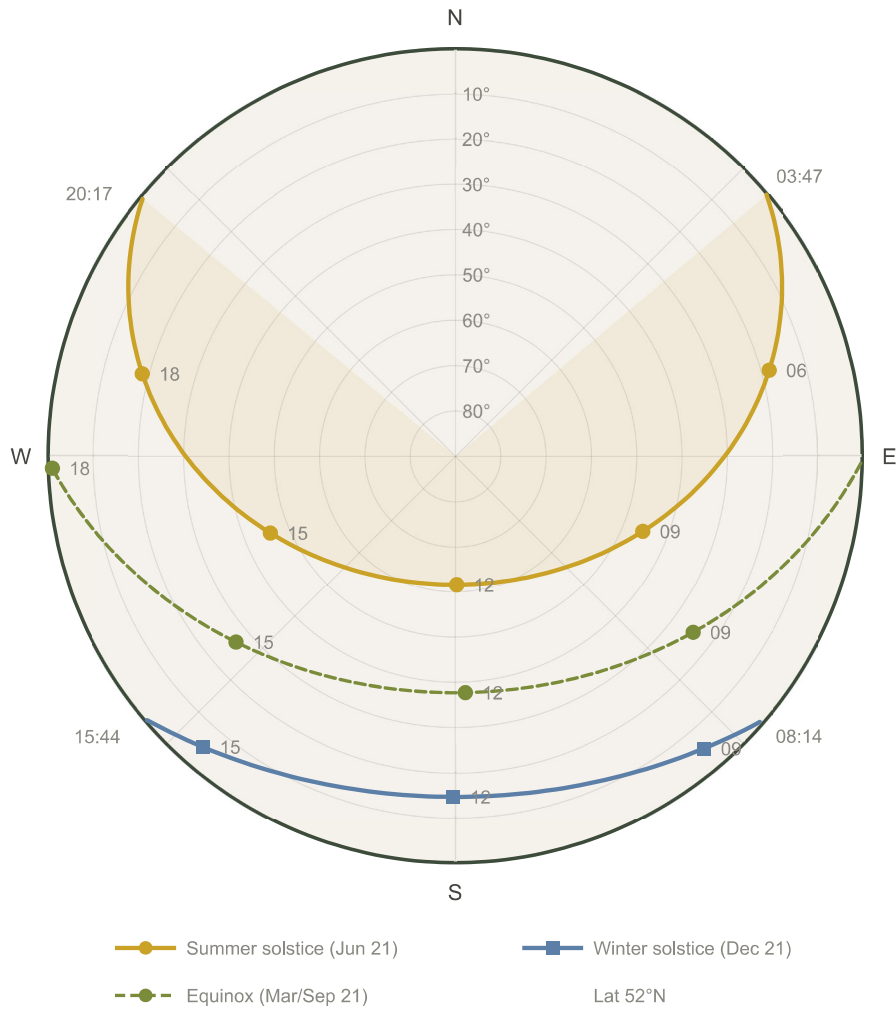


### /Summer

- Enable Cross Ventilation: Design for airflow through spaces. Expand into outdoor and semi-outdoor areas. Allow spaces to spill out and adapt. Design for social interaction and occupation outside.



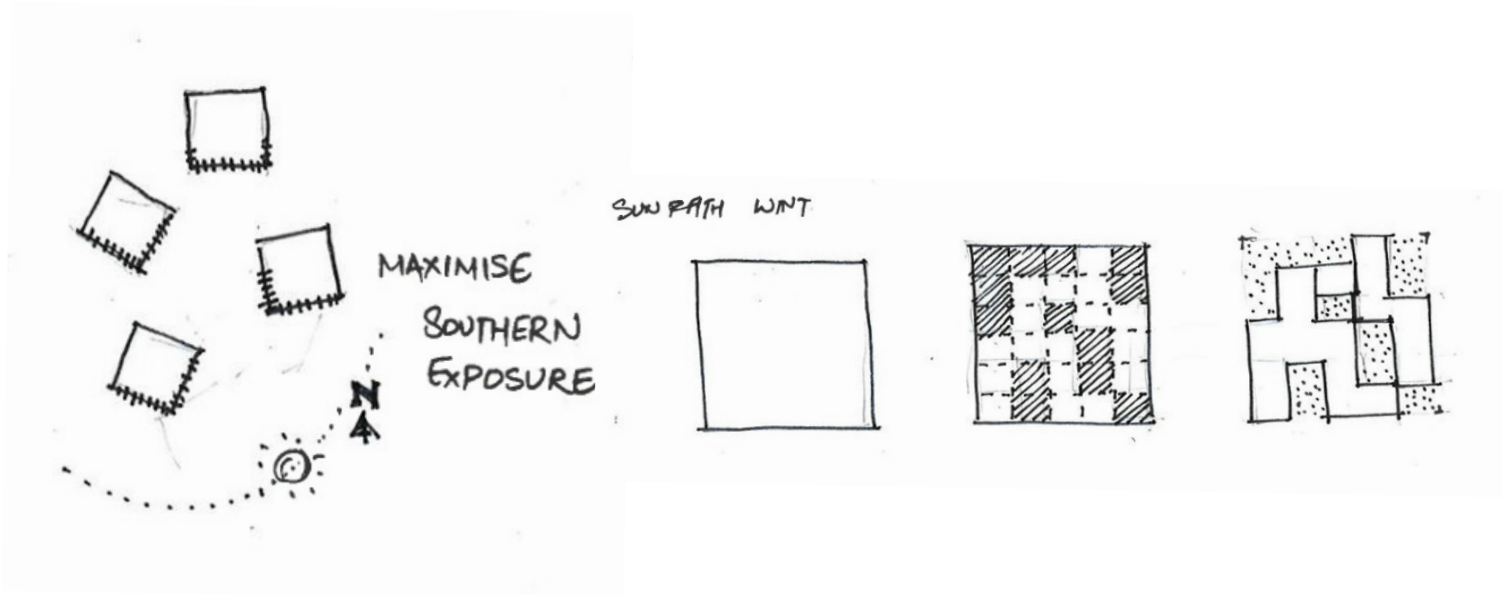
## 8.2 Sun Path



### 8.2.1 Strategies

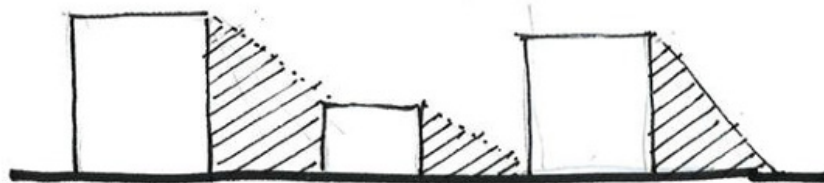
#### /Winter

- Maximize southern exposure along Emmasingel edges: Orienting the primary inhabited spaces towards the south and southwest edges of the block to capture low-angle winter sun to ensures that the most frequently used spaces receive direct sunlight during limited daylight hours. Using voids as solar collectors. Locating service spaces, circulation, and storage along the colder north edges.

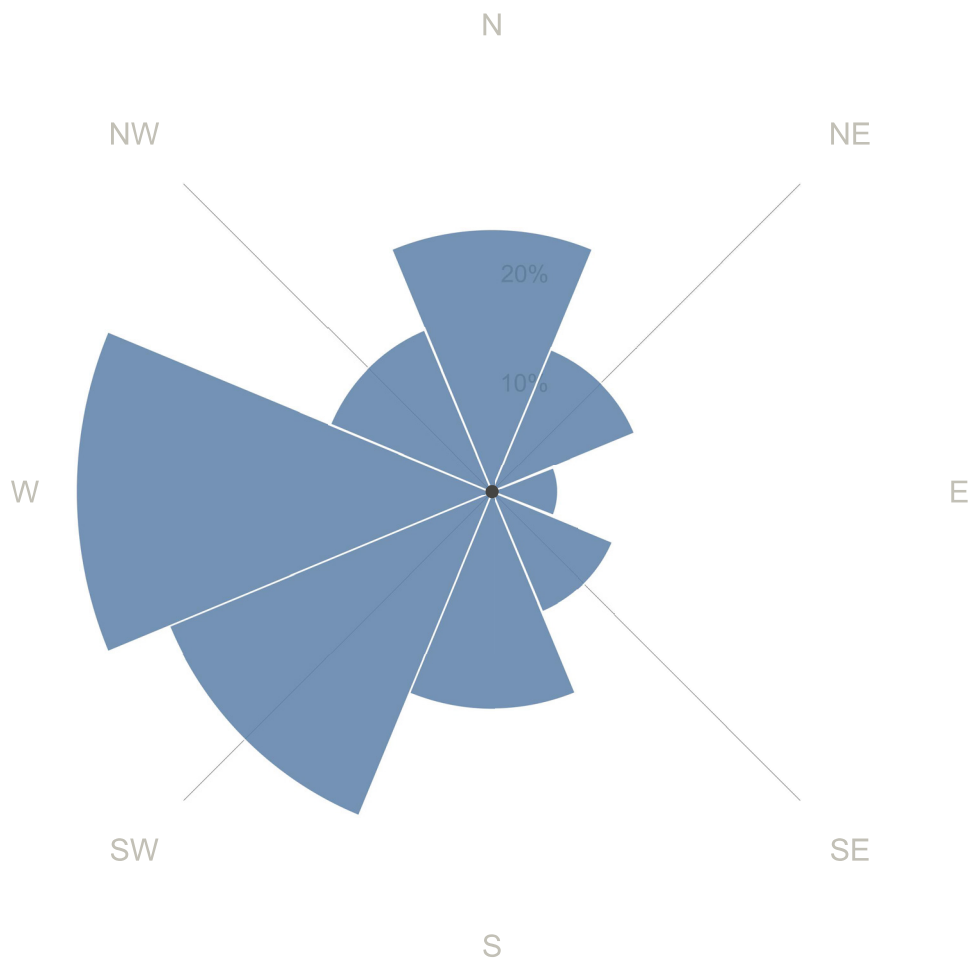


## /Summer

- Shading of south facades: Incorporating horizontal shading devices such as overhangs and balconies on south-facing facades. Activating semi-open spaces: Extending program into shaded transitional spaces such as arcades, galleries, and terraces. This allows occupation to shift outward during warmer periods.



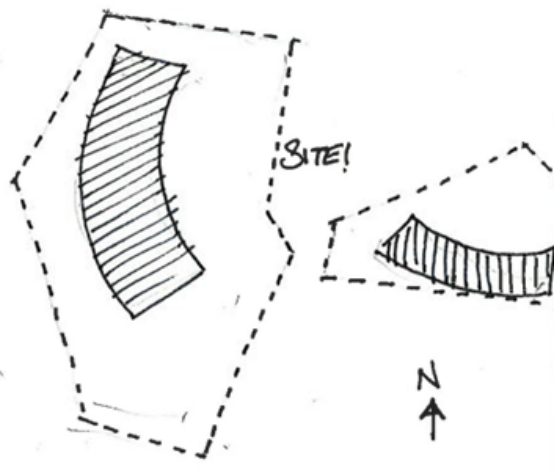
## 8.3 Wind



### 8.3.1 Strategies

#### /Winter

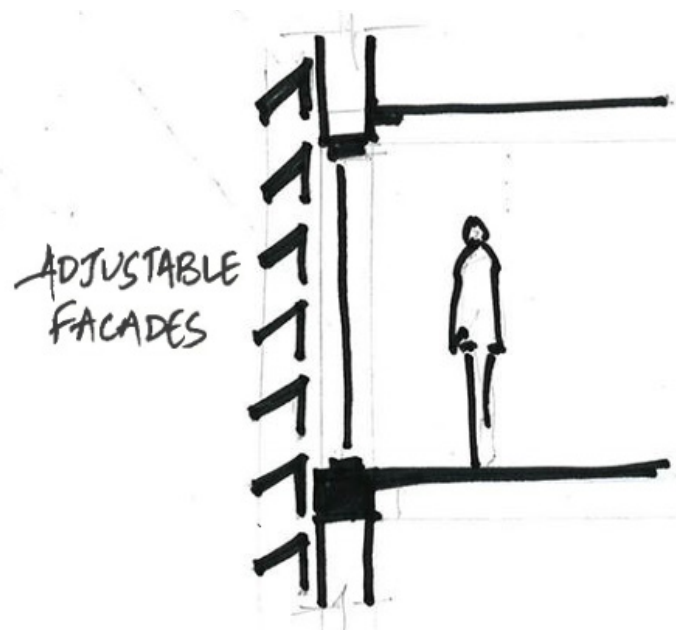
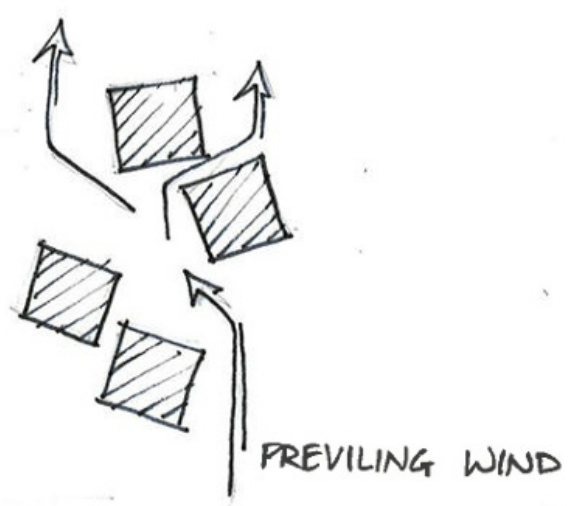
- Orienting primary inhabited spaces toward the south and southwest edges of the block to maximize exposure to low-angle winter sunlight, ensuring the most frequently used spaces receive direct sunlight during limited daylight hours. Minimal exposed facades on the windward (northwest) side to reduce heat loss and shield from prevailing cold winds.



ORIENTING INHABITED SPACES  
TOWARDS SOUTHWEST EDGES  
TO MAXIMIZE EXPOSURE  
TO WINTER SUNLIGHT

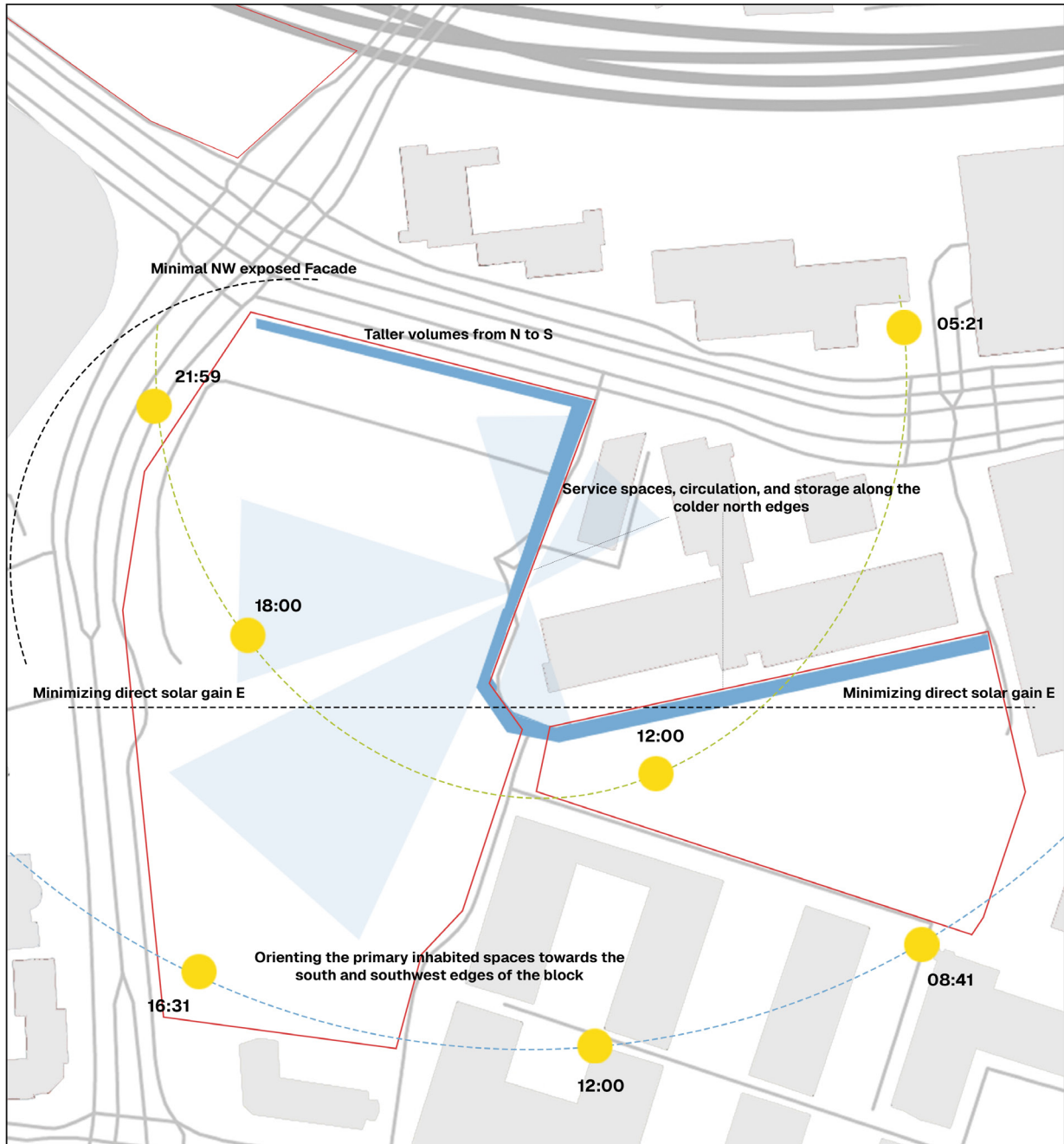
**/Summer**

- Aligning openings and internal voids with prevailing southwest winds to enable cross-ventilation. Courtyards must function as ventilation chimneys to extract heat. Adjustable shading devices on south-facing facades.



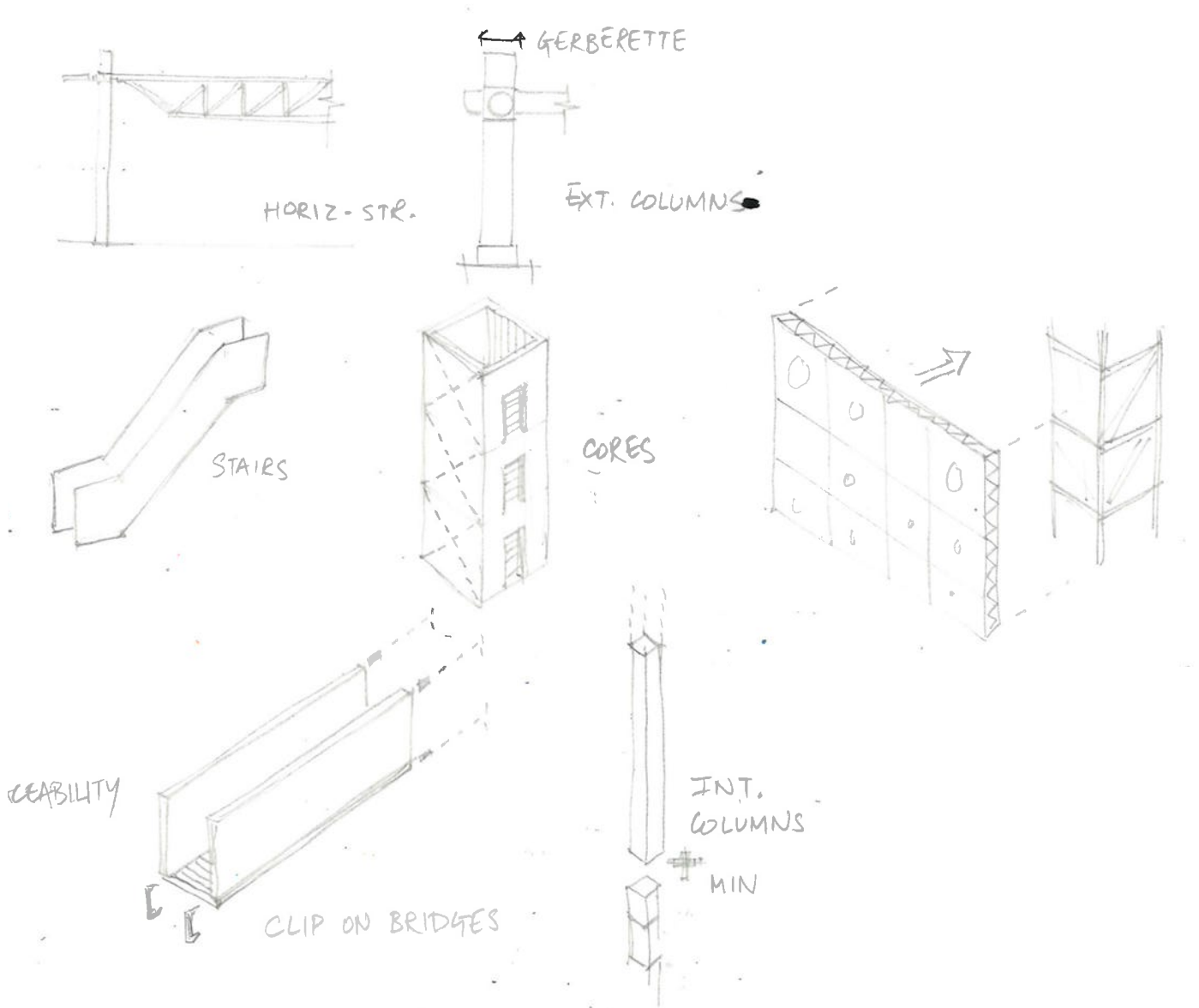
# 8.4 Inference

## /Site Analysis Inferences



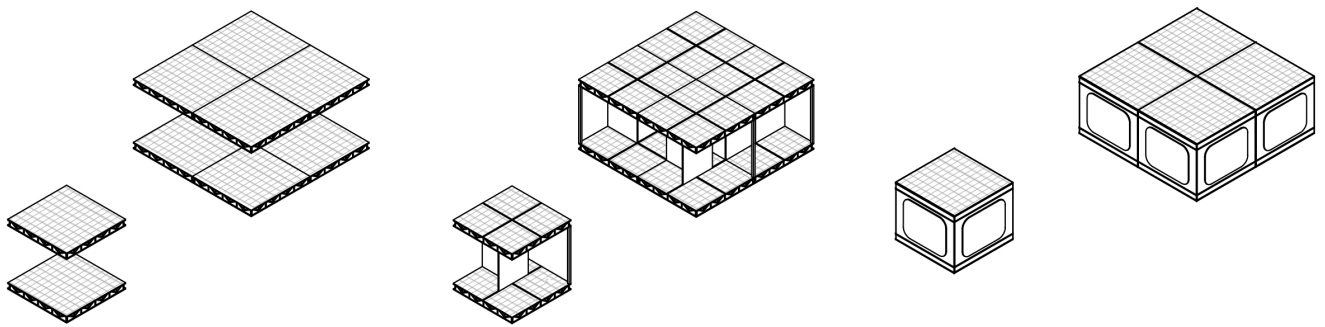
# 9. Kit of Parts

## /Initial idea of Kit of Parts



The kit of parts is the most crucial aspect of this proposed framework. Each component is designed to fit within the grid and facilitate reconfiguration within the system. The kit of parts in this project includes modules, floors and ceilings designed as cassette systems to integrate electrical and plumbing services, as well as allow for additional reinforcement if required, stairs, facade modules, cores, structural support elements.

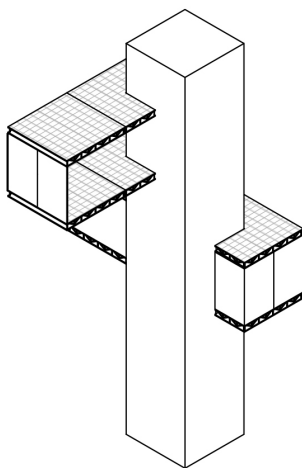
# 9.1 Module in-fills



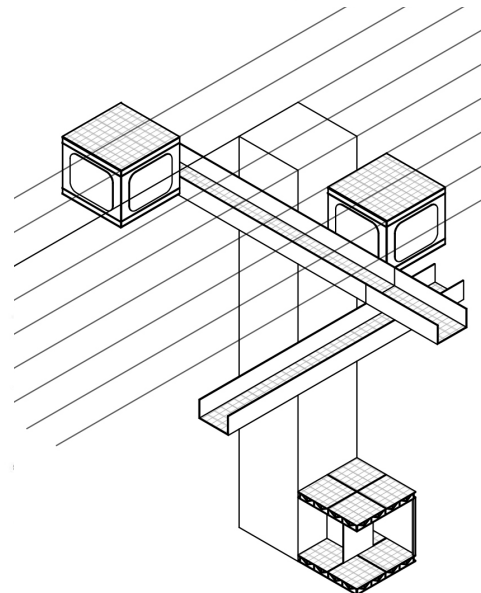
- MODULE I
- Free flexibility
  - Exhibit, workshops, ...

- MODULE II
- Rail grid system within module
  - Free removal channels.

- MODULE III
- Technical upgrade capacity
  - Not structurally stable

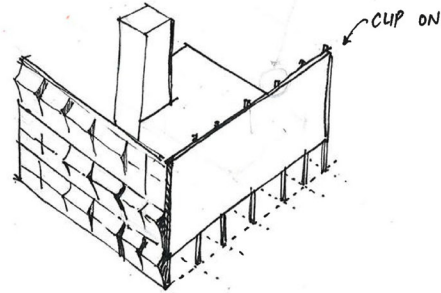
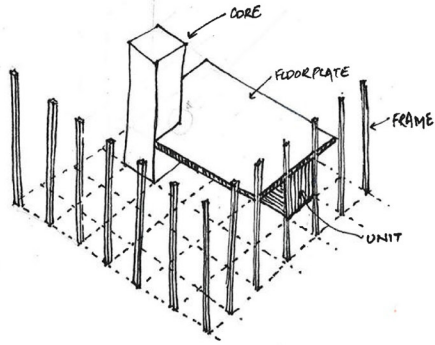


- MODULE III
- Height adjustment
  - partial slab removal

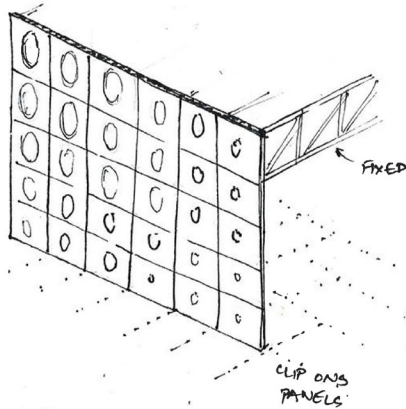


**/Tests:** Different types of modules were designed, each with a distinct capacity for reconfiguration. While all follow the same underlying logic, each type adapts differently based on functional requirements. One module allows reconfiguration on all sides, another enables internal subdivision both vertically and horizontally. A lab specific module is designed as a compact, fully integrated unit.

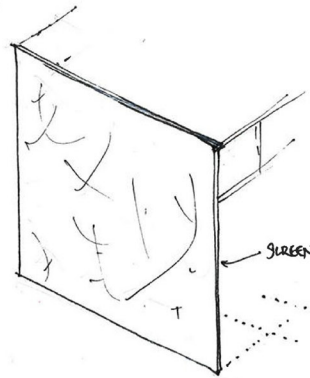
## 9.2 The Facade Idea



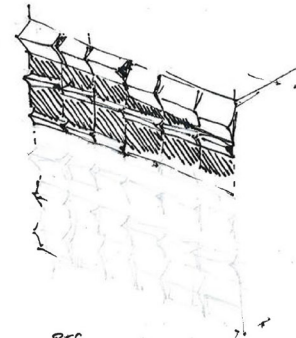
PROJECTIONS



REF.  
INSTITUTE DE MONDE ARAB  
RESPONSIVE DIAPHRAGM SYSTEM



REF.  
MEDIAS PRADO  
INTERACTIVE PUBLIC EDGE



REF.  
KEIFER TECHNIC SHOWROOM  
DYNAMIC FACADE PANELS.

**/Tests:** As this project is primarily a study of possibilities, the next step is to further investigate how the building can remain relevant under changing scenarios, contexts and environmental conditions over time. For the graduation project, it is assumed that each side of the building is exposed to different climatic conditions and therefore requires distinct environmental responses.

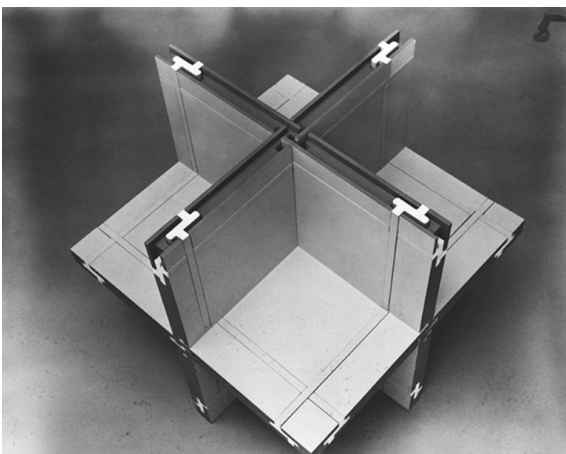
## 9.3 Kit of Parts from Case Studies

Each of these chosen case study have some interesting structural elements used for a certain kind of a purpose. The idea was to take inspiration or just take those kit of parts as it is. These brought together have an ability to create a very strong core of the project and at the same time gives a strong possibility to reconfigure the spaces within the framework.



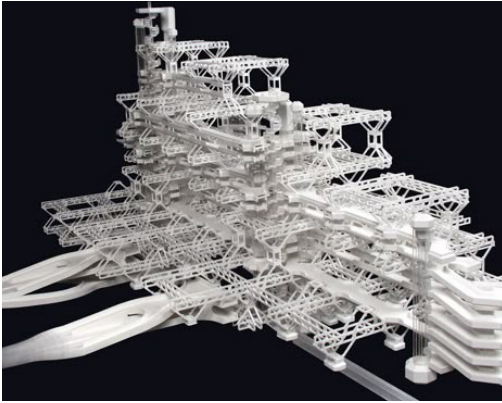
### Wall system

I.M.Pei's Javits convention centre



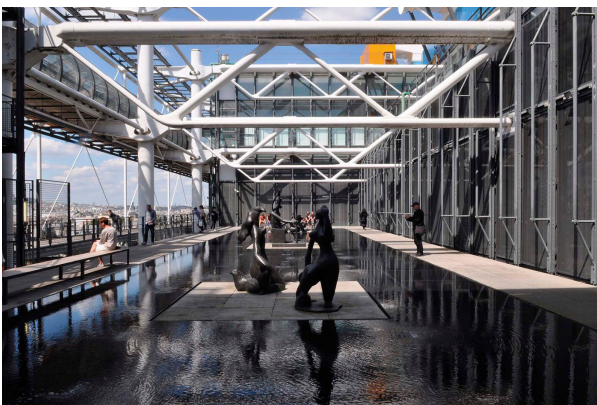
### Module Connection

3d joint system by Konrad Waschmann



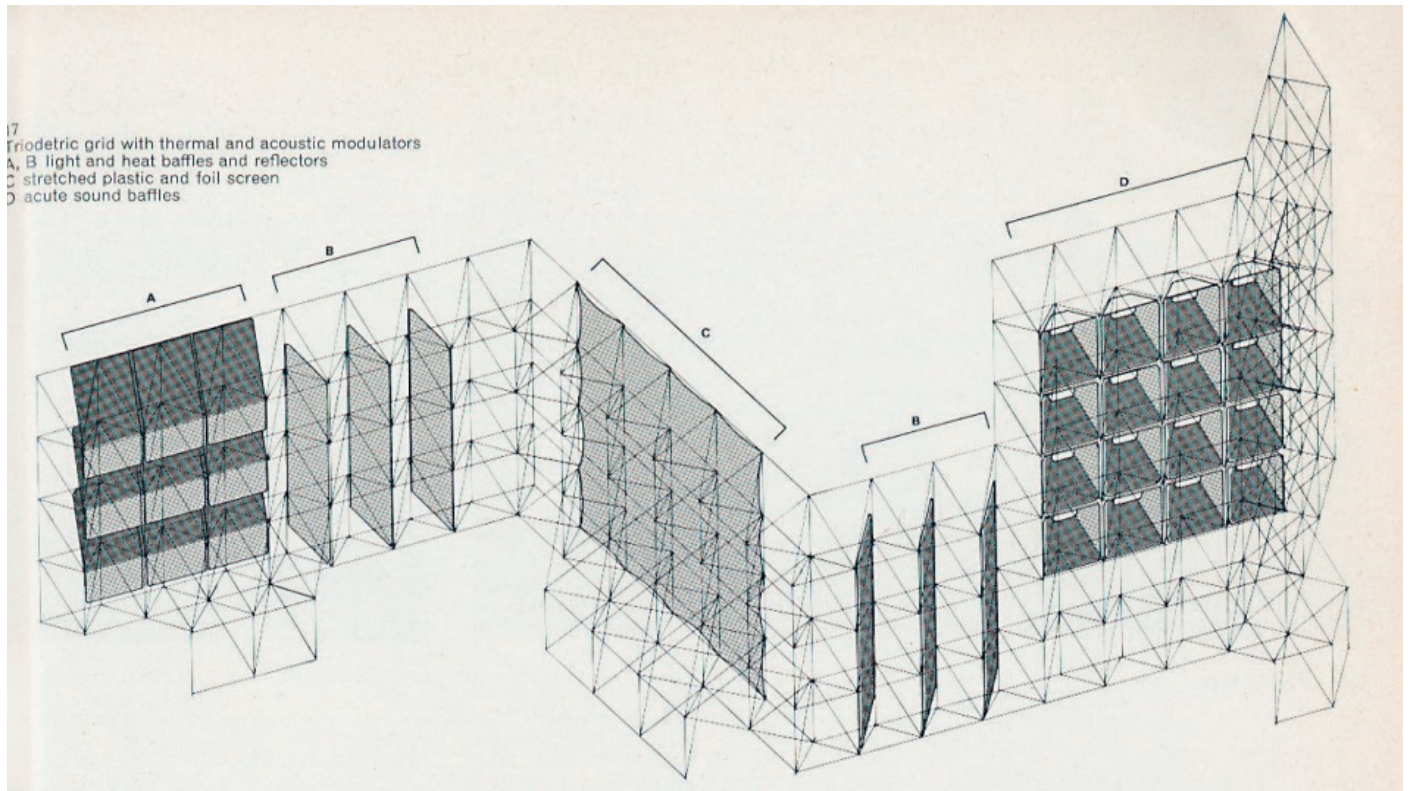
## Exoskeleton Bracing

Stadt Ragnitz by Eilfried Huth & Gunther Domenig



## Main Truss

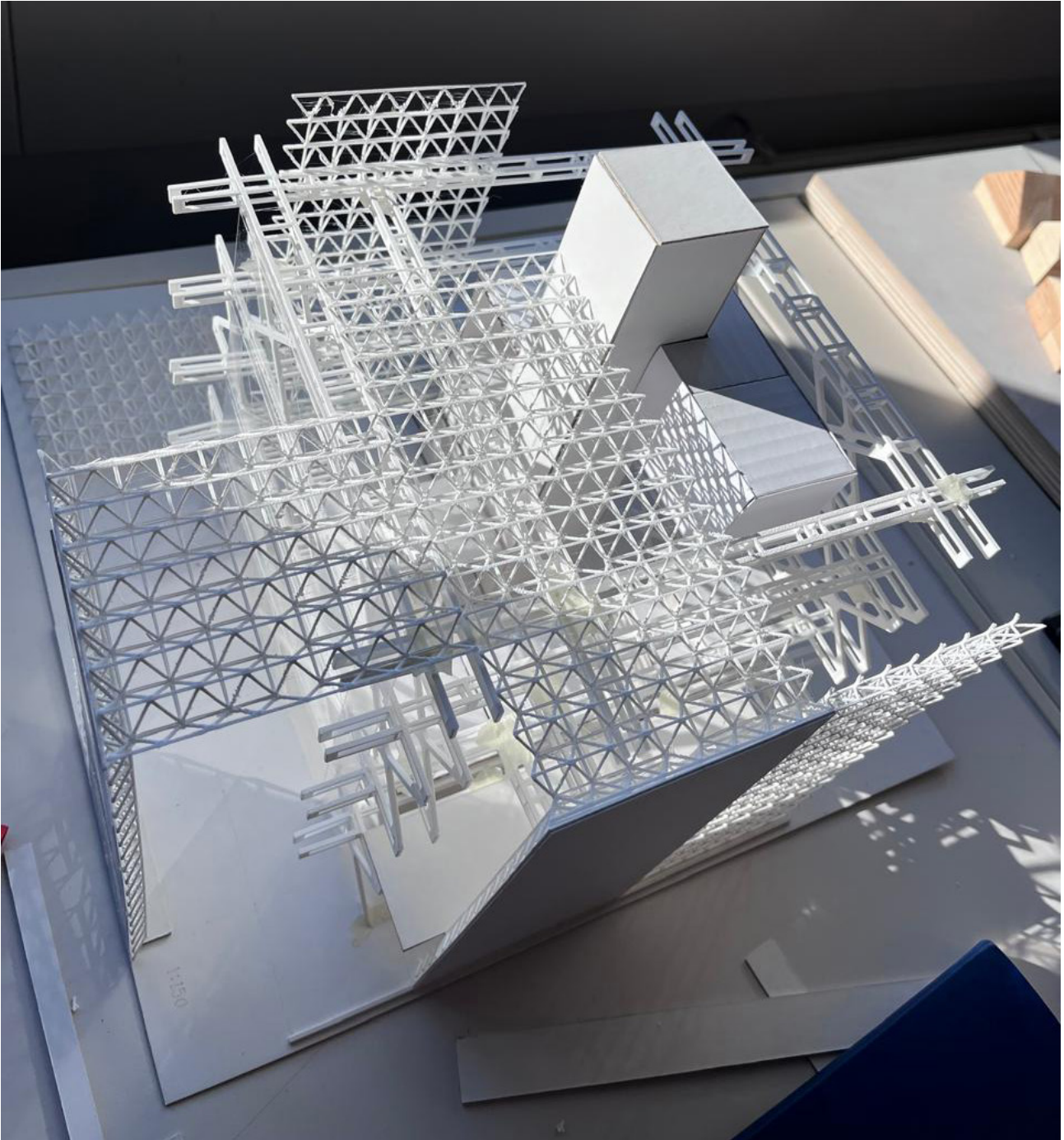
The Centre Pompidou by Richard Rogers & Renzo Piano



## Facade Clip on system

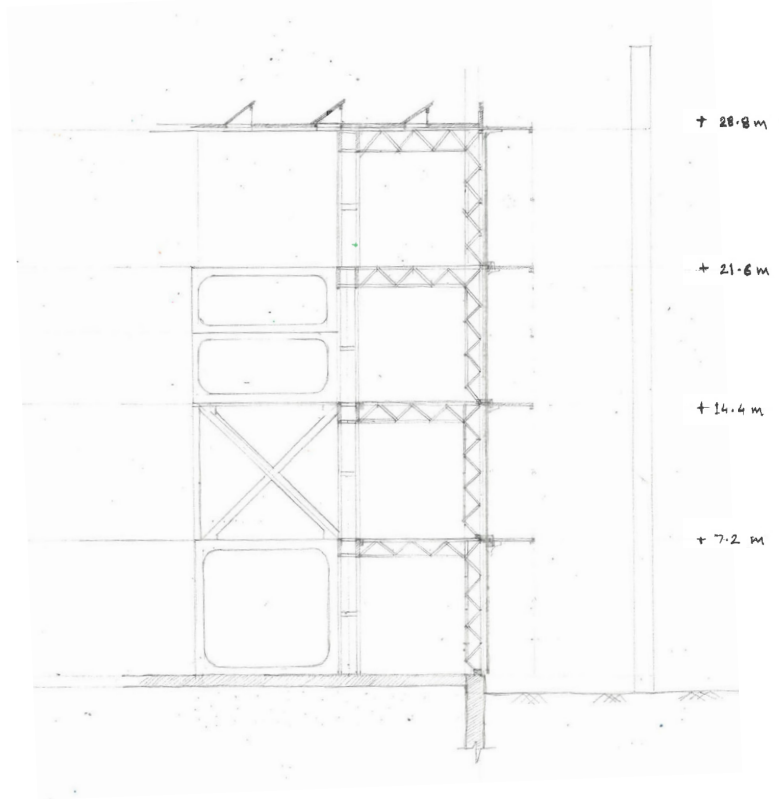
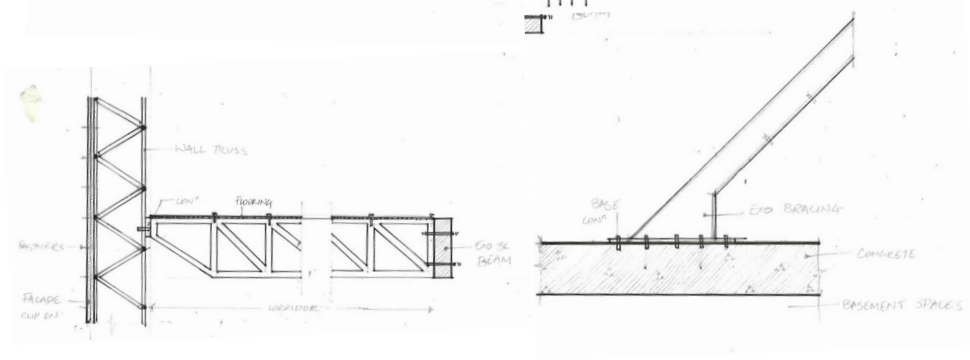
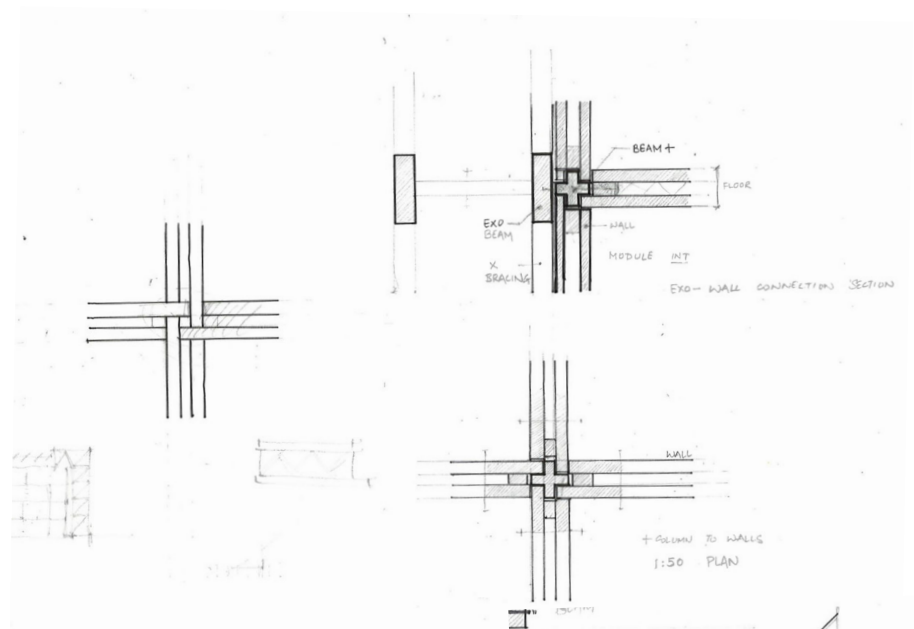
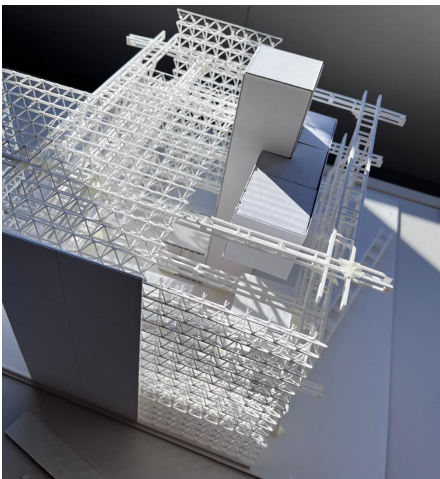
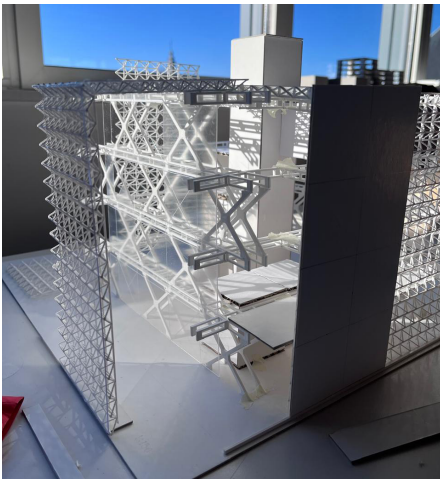
Cedric Price's adaptable prototype concept

## 9.4 Kit of parts assembly



### / Prototyping Phase

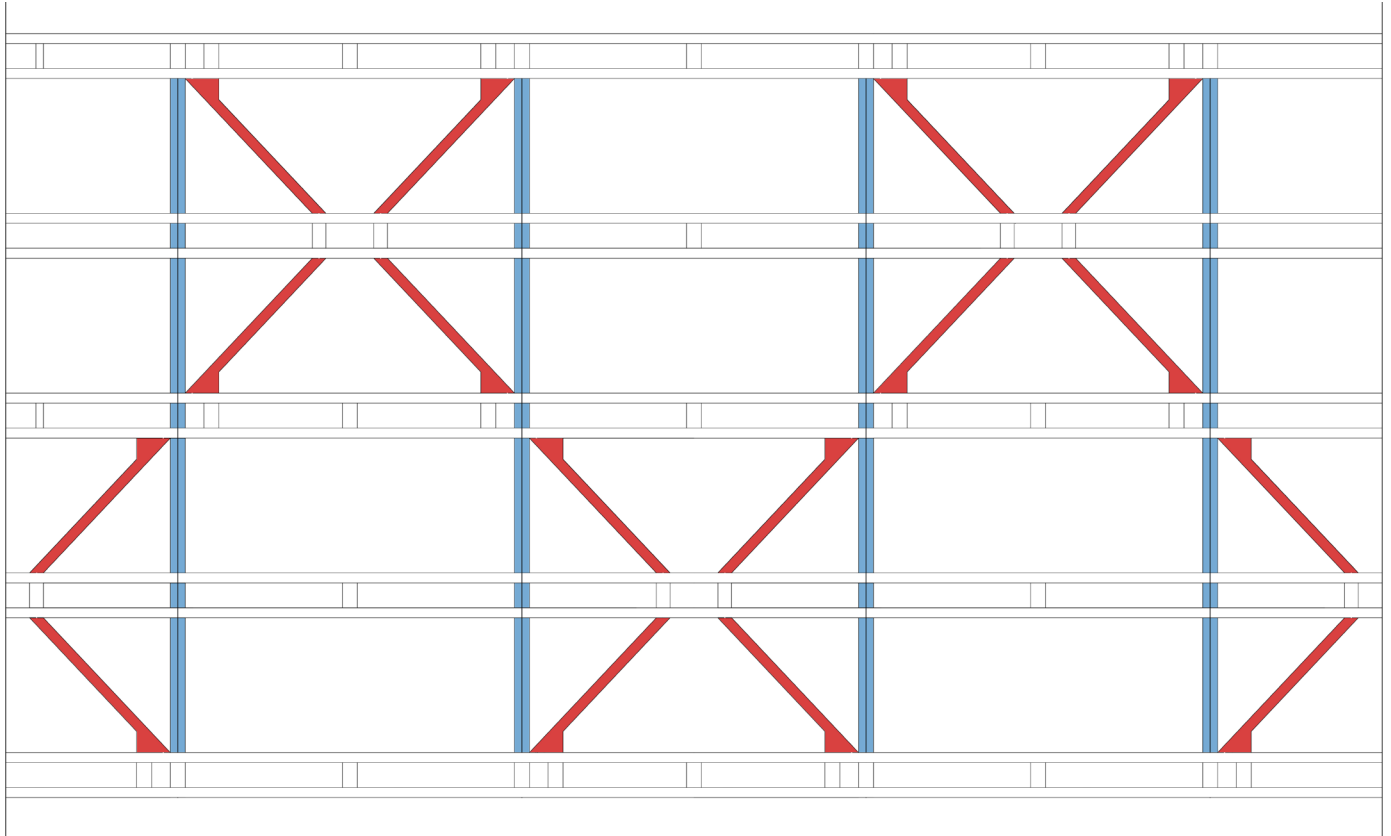
As a preliminary study to test the overall feasibility of the structural system, each component of the kit of parts is assembled through a clear logic of structural stability while simultaneously allowing flexibility in the spatial configurations generated within the framework.



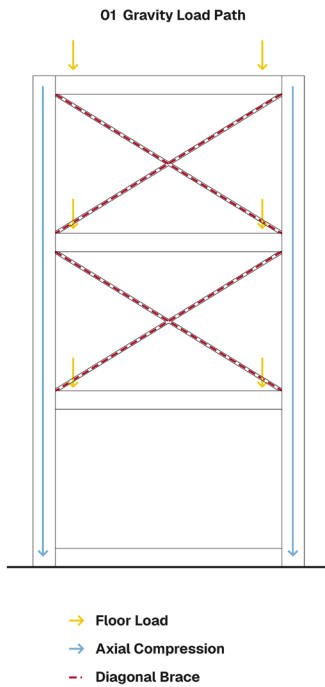
The system includes a primary exoskeleton composed of large, deep beams and bracing elements, which act as the main vertical support and replace conventional columns. This external structure is connected through horizontal cassette slabs, which also create opportunities for use as free-flowing circulation corridors. With a clip-on facade system is applied to the exterior.

# 10. Design

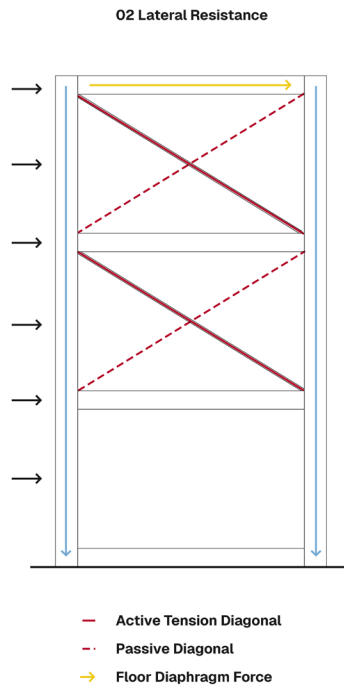
## 10.1 The ExoSkeleton



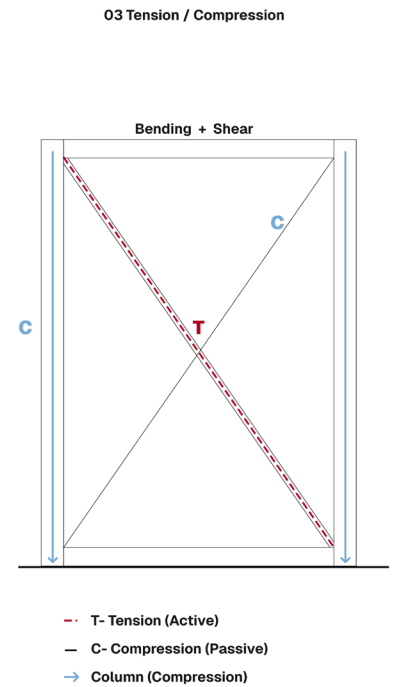
The idea to consolidate all load-bearing into a perimeter exoskeleton is both a structural and a spatial argument. By placing vertical columns, horizontal beams, and diagonal braces entirely on the outer envelope, the interior is freed from any structural obligation allowing it to be subdivided, opened, or left empty without touching the frame. This perimeter strategy also maximises the lever arm against lateral forces, allowing clear interior spans. The consequence is a building whose interior has no predetermined layout, and no reason to have one.



Floor loads travel via beams into columns. Columns carry it to foundation.



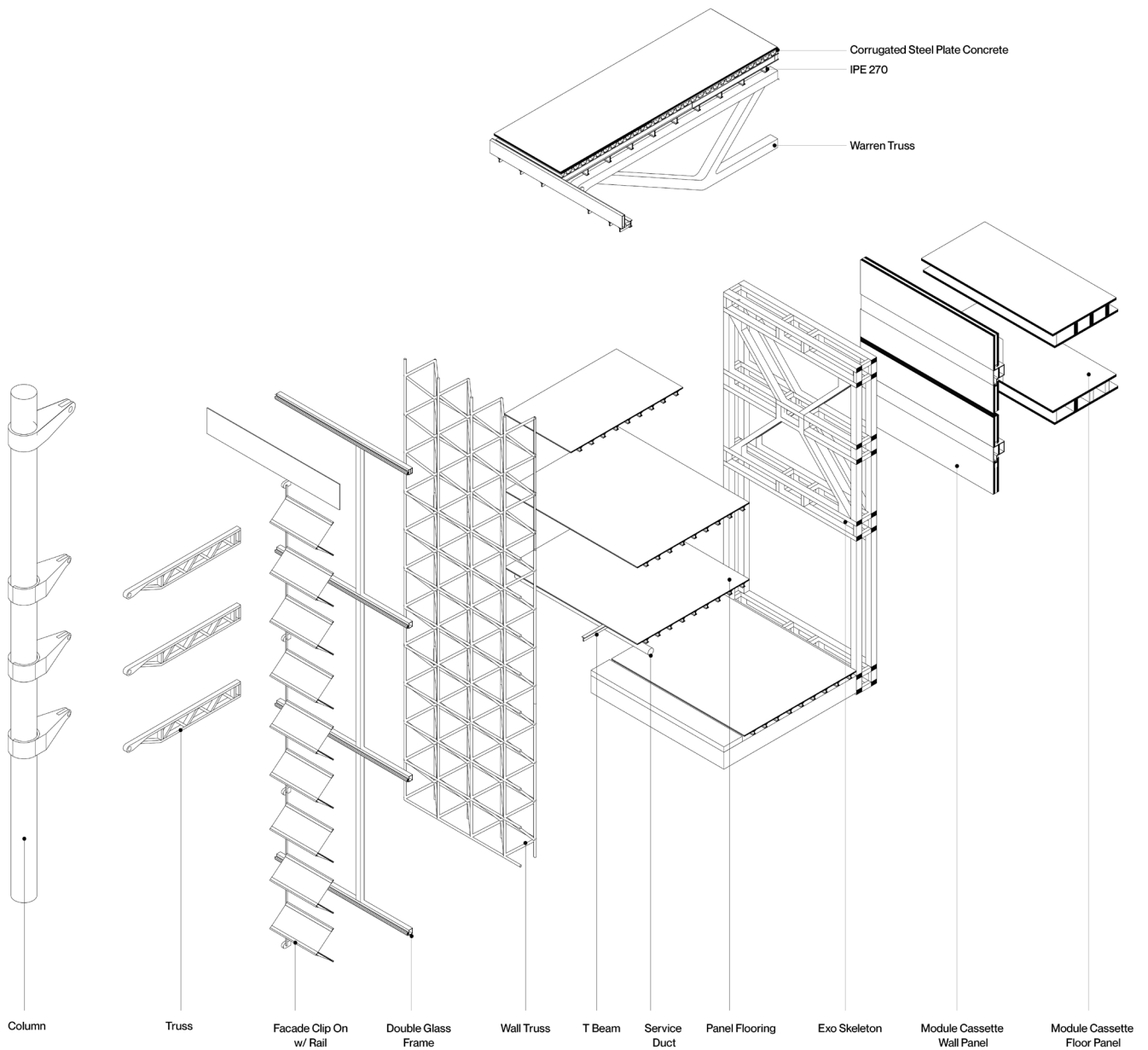
Wind load enters via floor diaphragm. Only one diagonal brace activates in tension. Roles reverse when load reverses.



One diagonal carries tension only. The other is passive. The other is passive. This allows slender, efficient section sizes.

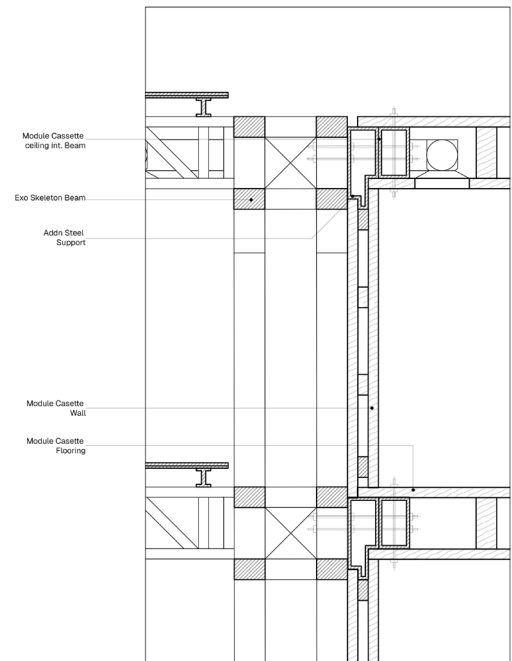
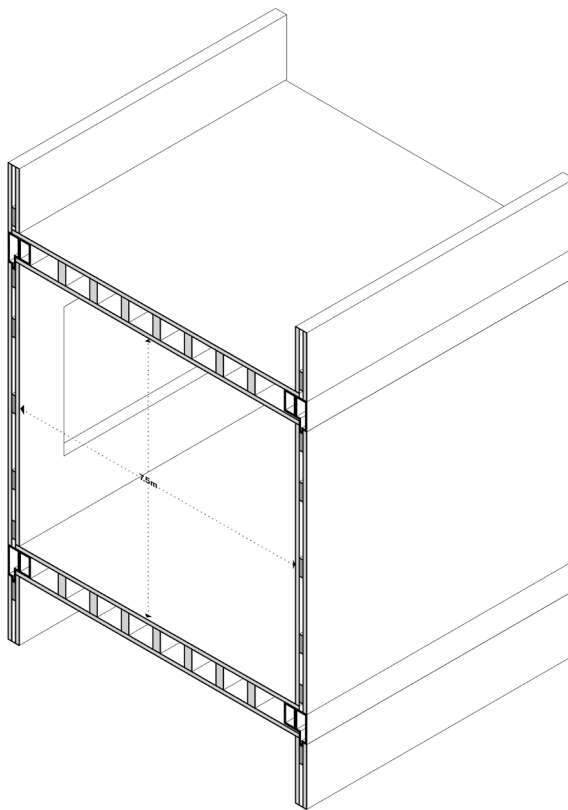
Each element carries a specific load condition. The vertical columns absorb compressive forces from the floors above and channel gravity to the foundations. The horizontal beams collect floor loads through bending and shear, while acting as chord elements that distribute lateral forces across each floor plate. The diagonal cross-braces resist wind and lateral loads through tension, only one diagonal engages at a time, switching roles as the load direction reverses. This tension-only logic allows the braces to remain slender, contributing to both material efficiency and the visual lightness of the frame. Structurally, the result is a redundant system with multiple parallel load paths. Spatially, it is a clear interior uninterrupted by the logic of how the building stands.

## 10.2 Structure Elements



Each of these individual elements has a distinct role within the overall system. Rather than operating independently, they are designed to support one another structurally and spatially, forming a coherent framework. Together, they generate spatial conditions both within the modules and in the spaces between them, allowing the system to produce adaptable environments inside and around the structural order.

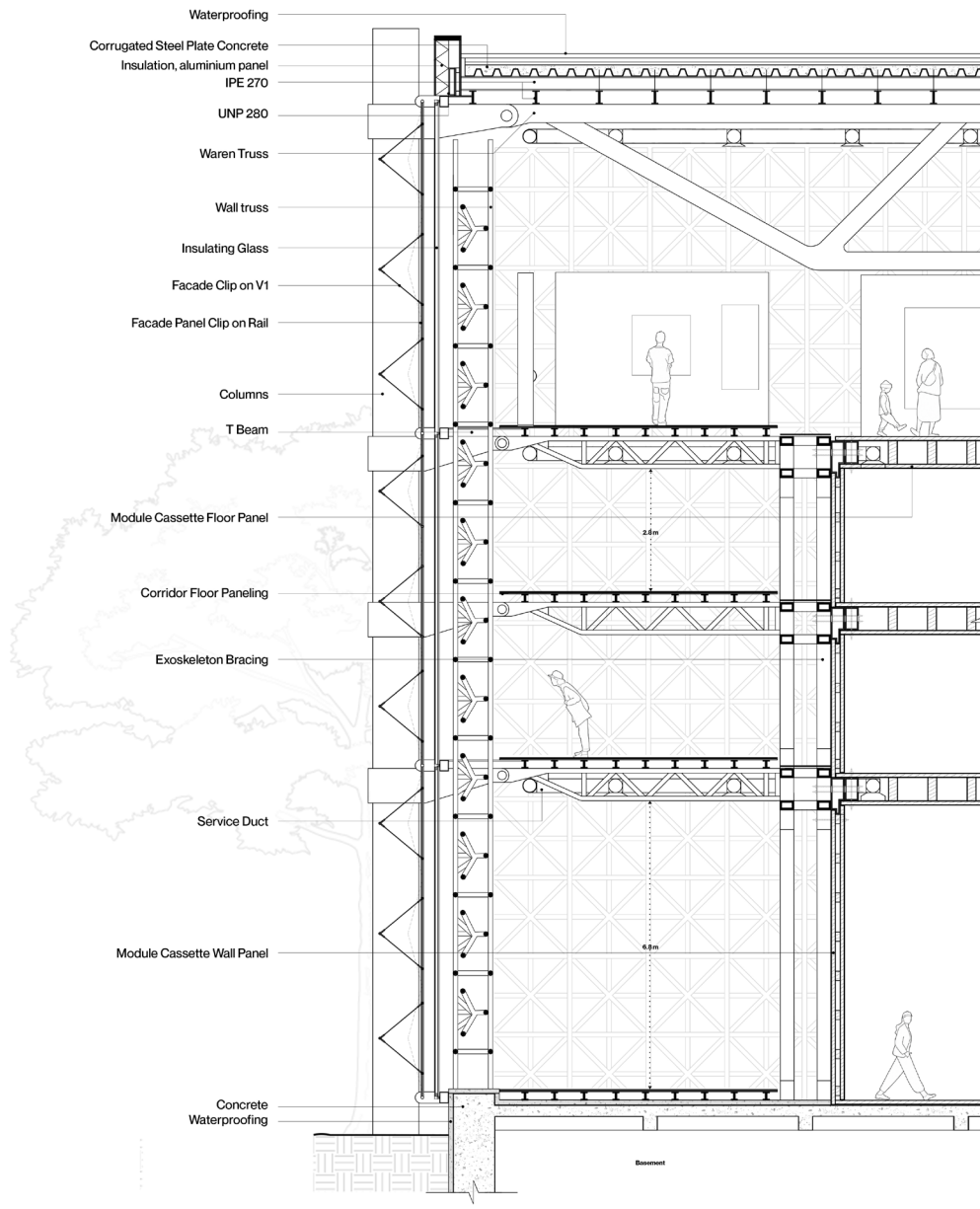
## 10.3 The Module



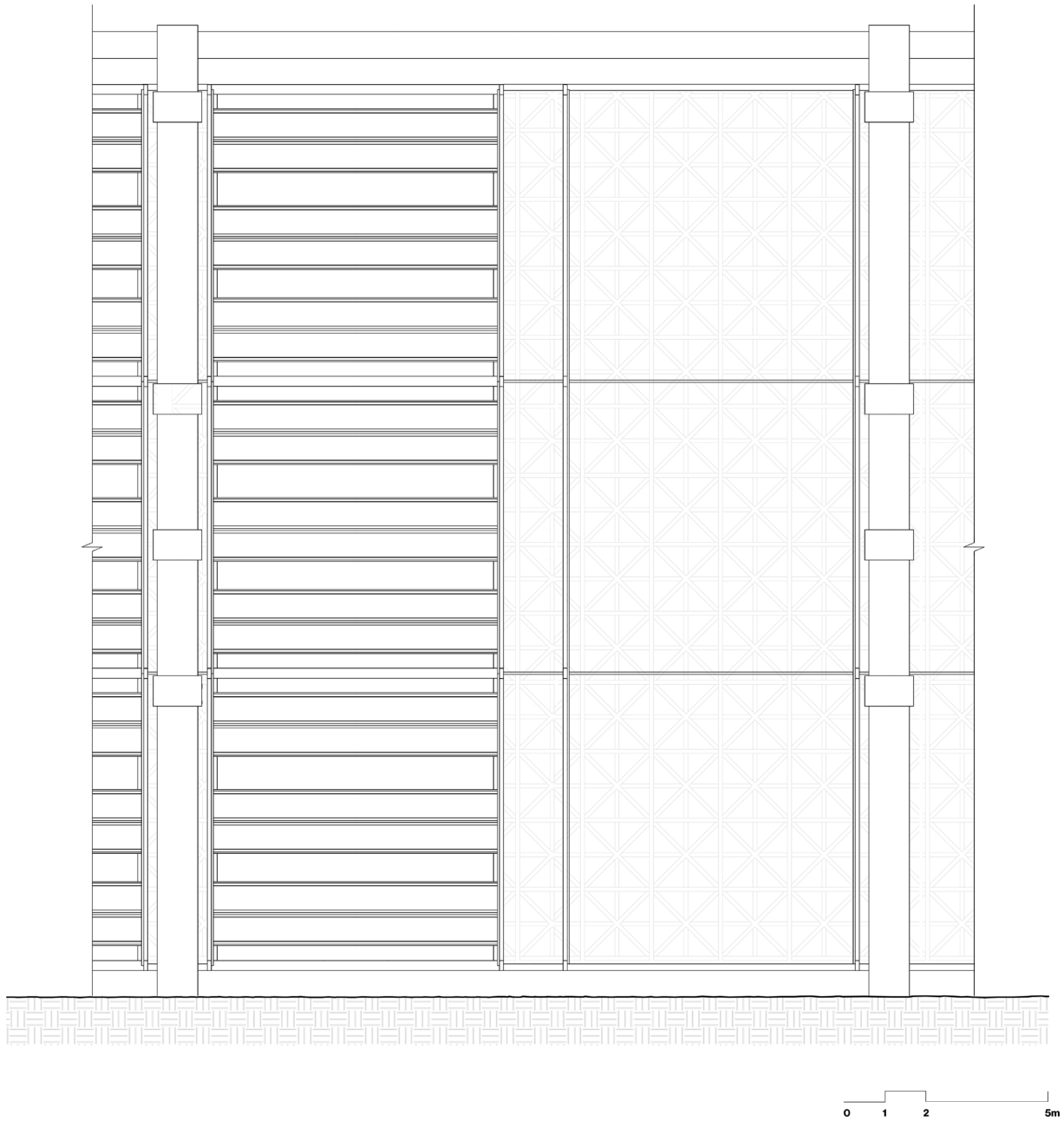
The design of the module elements is inspired by a simplified 3D connection joint system developed by Konrad Wachsmann. The core principle of this joinery lies in its ability to interlock components on multiple sides, enabling stable and flexible spatial connections.

This principle is adapted and reinterpreted for the module system, where the same logic is applied along the edges of each component with specific modifications to suit the architectural framework.

# 10.4 Structure Fragment

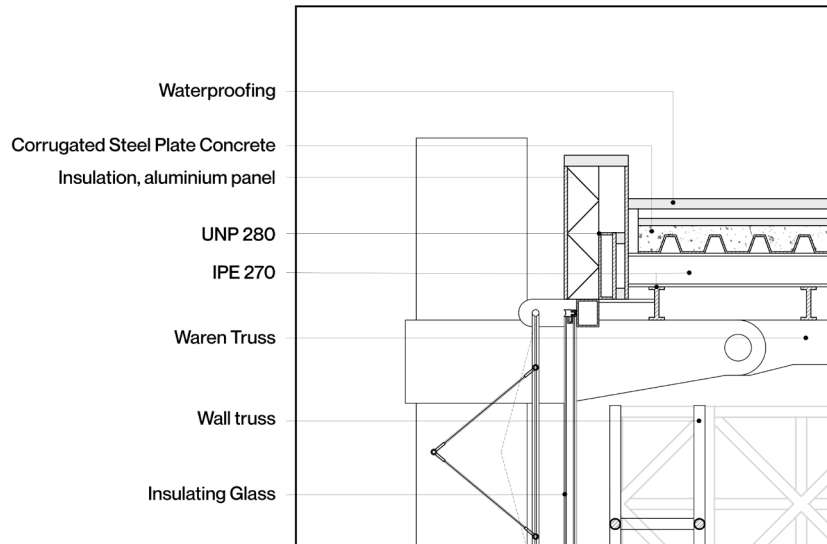


The assembly of the kit of parts is one of the most important aspects of the project concept. It defines the spatial conditions generated within the framework and also determines the potential for future modifications within its defined limits. In doing so, it maintains structural integrity and functional performance while allowing for controlled adaptability and change over time.

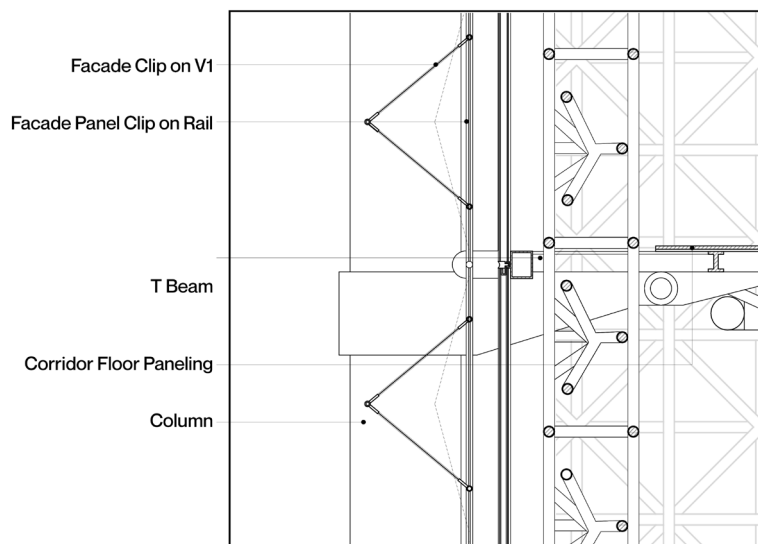


The system also allows users to reconfigure the facade at an external level, responding to climatic conditions, functional requirements and aesthetic preferences. This enables the facade to evolve over time, ensuring both environmental responsiveness and spatial variation within the same structural framework.

# 10.5 Structure fragment details

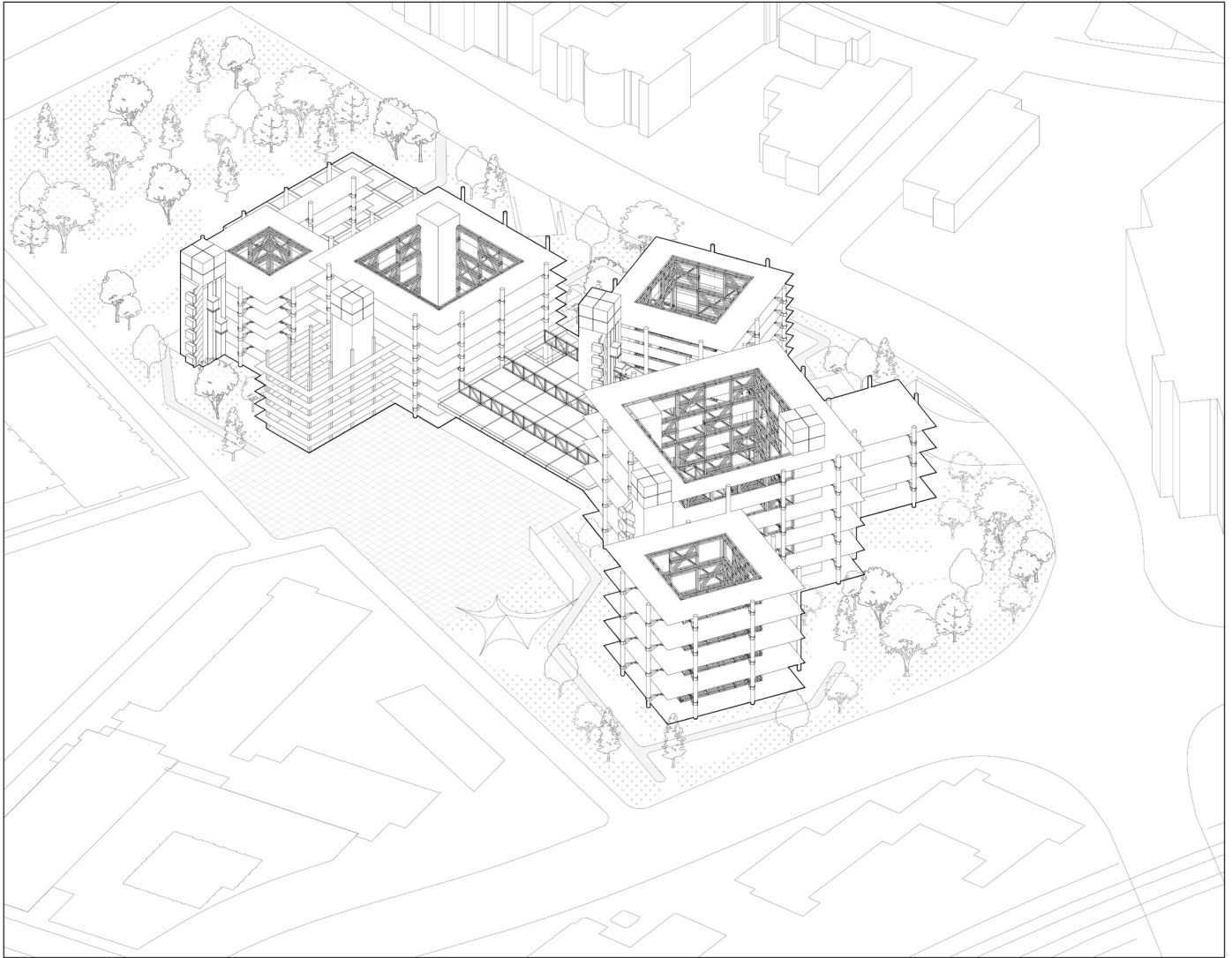


A detail of connection of the massive external columns with the internal main truss holding the roof of the building block.



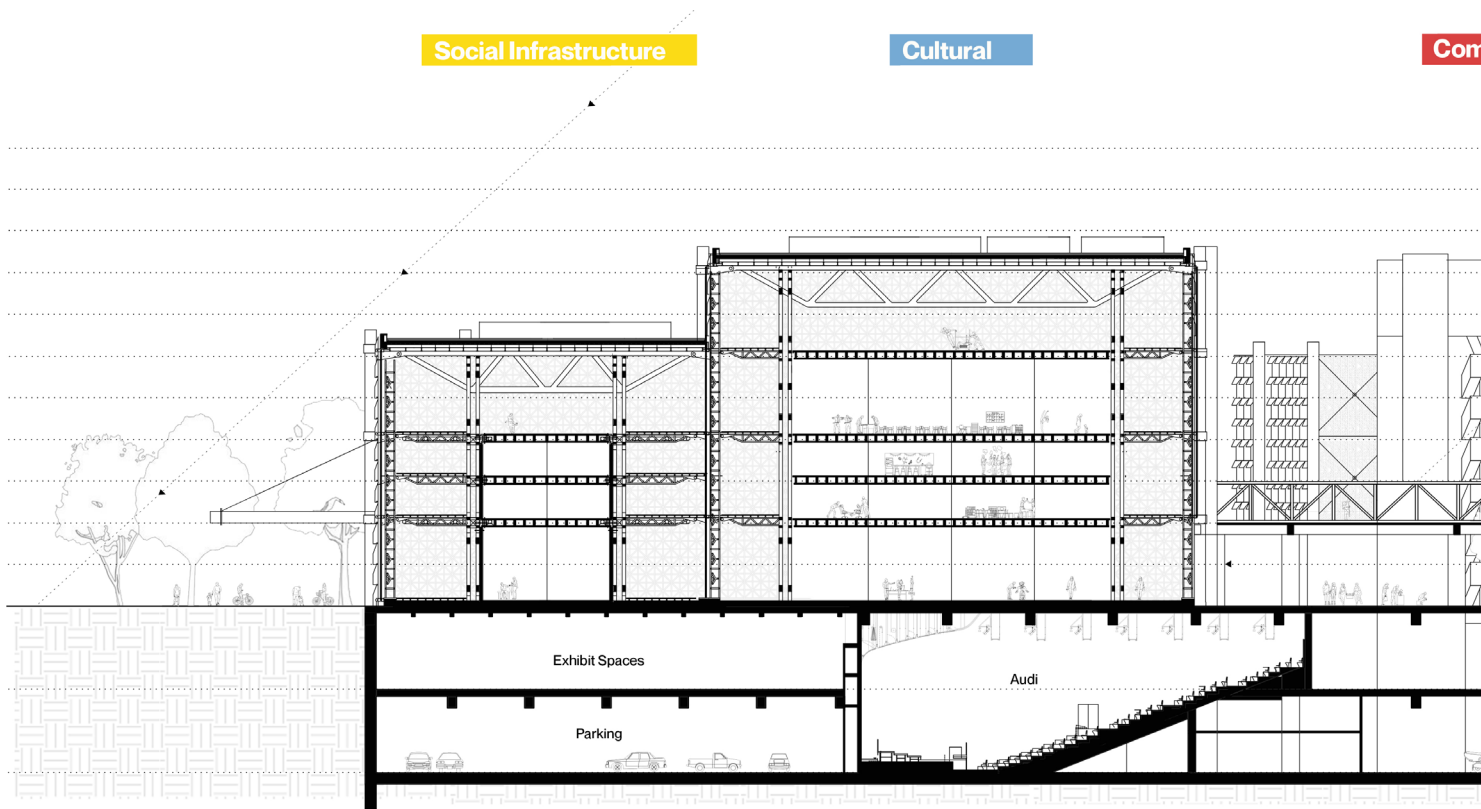
A detail of the connection of the steel column with the internal corridor with the external facade layers showing the frames, truss and facade clipons

## 10.6 Structural Framework

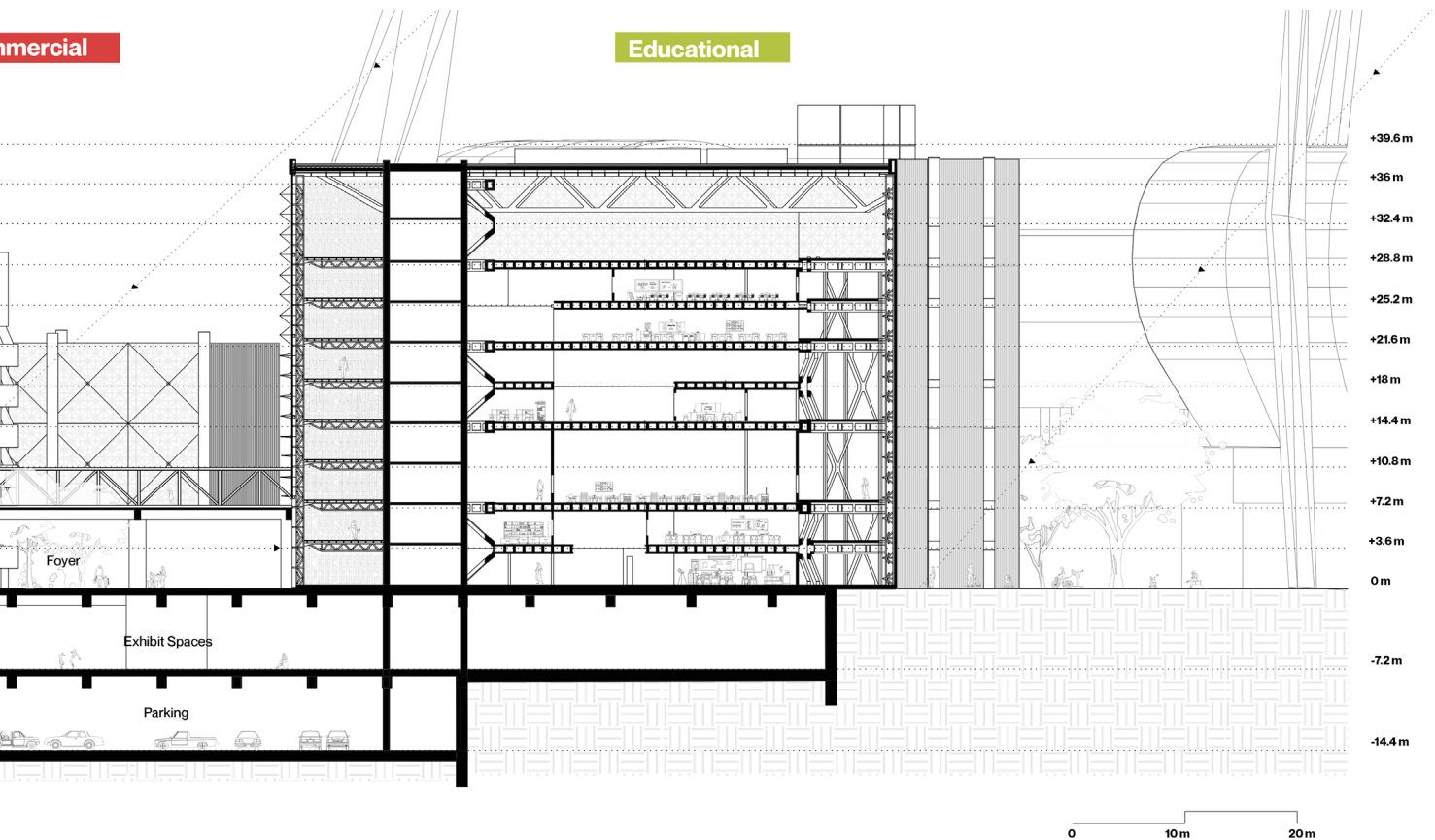


The graphic above illustrates the overall structural framework as a mass on the site. It represents only the primary structural system, without any internal spatial infill or programmatic definition. This diagram highlights the framework in its most open condition, emphasizing its capacity to act as a neutral structural base.

# 10.7 Section



The section illustrates the spatial logic of the project, showing how different spaces are arranged and how each structural element performs, interacts, and supports the others. The building is divided into multiple masses, reflecting the intention to break it down into smaller, manageable units.

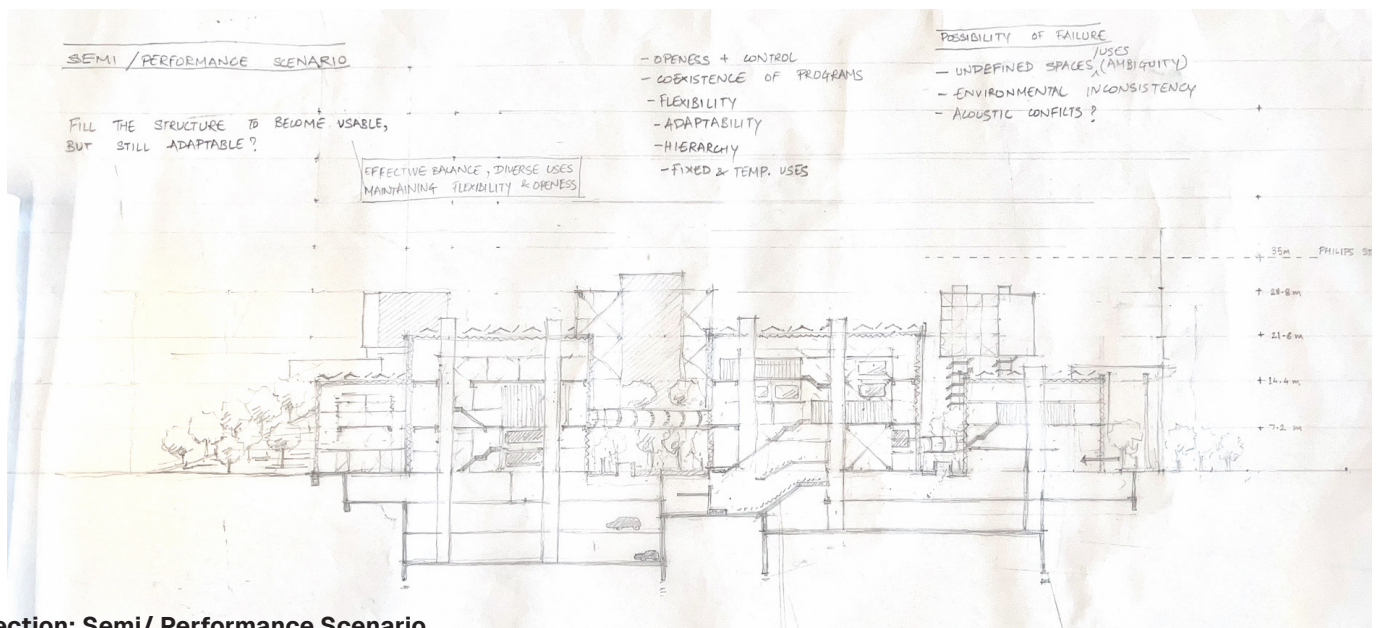


This approach directly addresses obsolescence- smaller divisions allow functions to be assigned more flexibly and each block can operate independently within the overall framework. As a result, if one or two blocks become non-functional, they do not significantly affect the others, preventing the entire system from becoming obsolete.

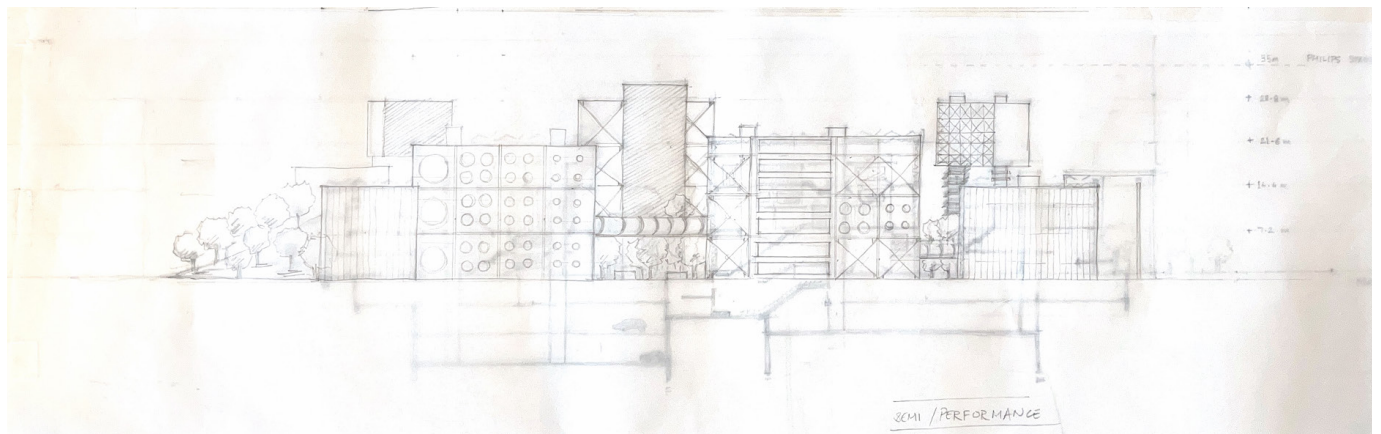
# 10.8 Scenarios

The scenarios are depicted in section, highlighting the transformation of internal spaces within the fixed limits of the structural framework. A constant condition across all cases is the primary framework itself, which remains unchanged, while the internal modules adapt according to the needs and requirements of different users.

For the purpose of this study, three main scenarios were developed: Dense, Semi/performance, Open scenario case. These were selected specifically to test both the limits and the potential of spatial reconfiguration within the system.



Section: Semi/ Performance Scenario



Elevation: Semi/ Performance Scenario

DENSE SCENARIO

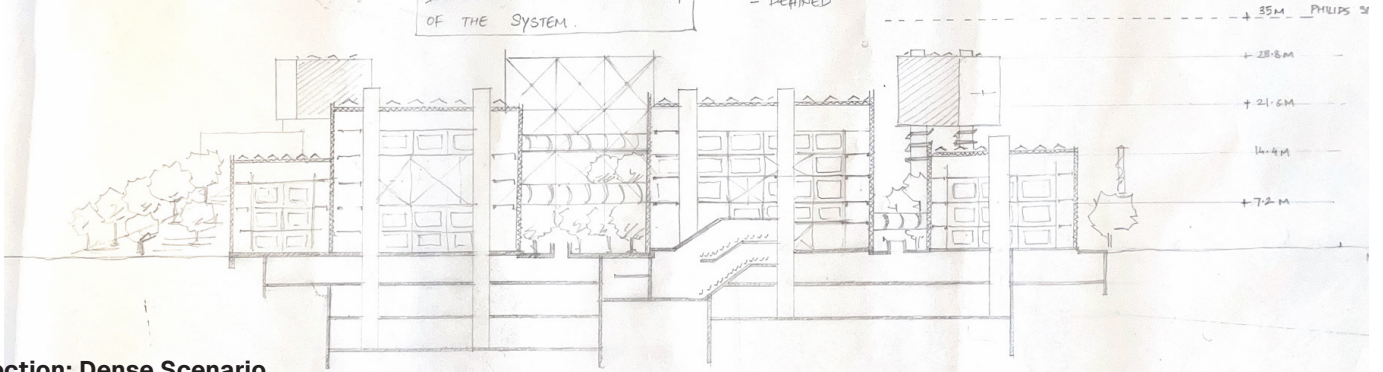
WHEN SYSTEM IS FULLY OCCUPIED?

DEMONSTRATION OF MAX. CAPACITY OF THE SYSTEM.

- MAX. CAPACITY
- PROGRAMMATIC EFFICIENCY
- HIGH DENSITY OCCUPATION
- STRUCTURAL LIMITS
- CLEAR FUNCTIONAL ORGANIZATION
- DEFINED

POSSIBLE FAILURE

- LOSS OF FLEXIBILITY
- REDUCED SPATIAL QUALITY
- BECOMING BASIC?



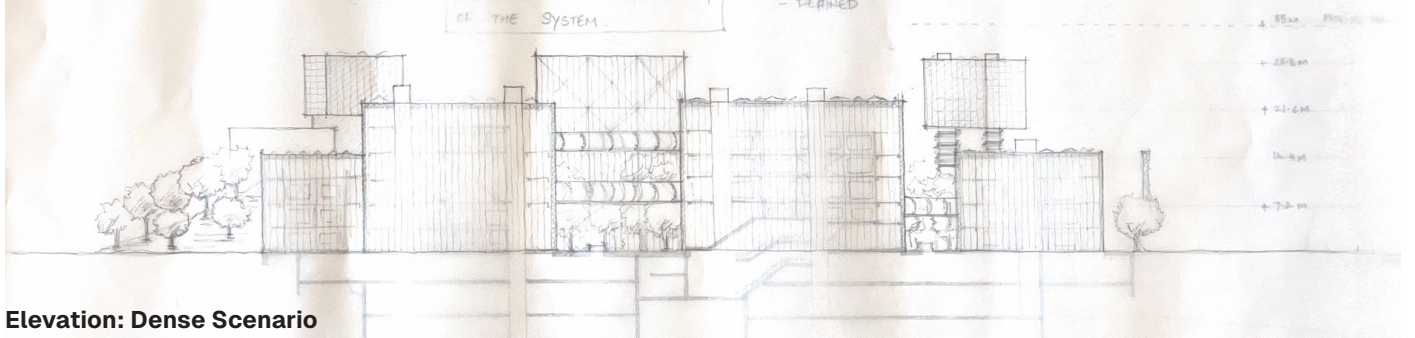
Section: Dense Scenario

WHEN SYSTEM IS FULLY OCCUPIED?

DEMONSTRATION OF MAX. CAPACITY OF THE SYSTEM.

- PROGRAMMATIC EFFICIENCY
- HIGH DENSITY OCCUPATION
- STRUCTURAL LIMITS
- CLEAR FUNCTIONAL ORGANIZATION
- DEFINED

- REDUCED SPATIAL QUALITY
- BECOMING BASIC?



Elevation: Dense Scenario

OPEN SCENARIO

INDEPENDENT OF PROGRAM.

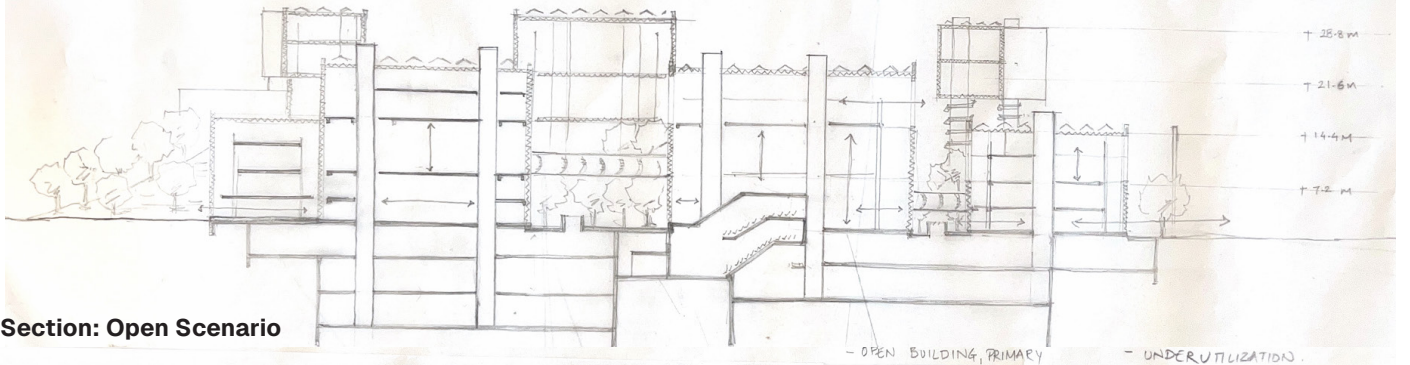
CAN FUNCTION WITHOUT PREDEFINED USE?

OPEN

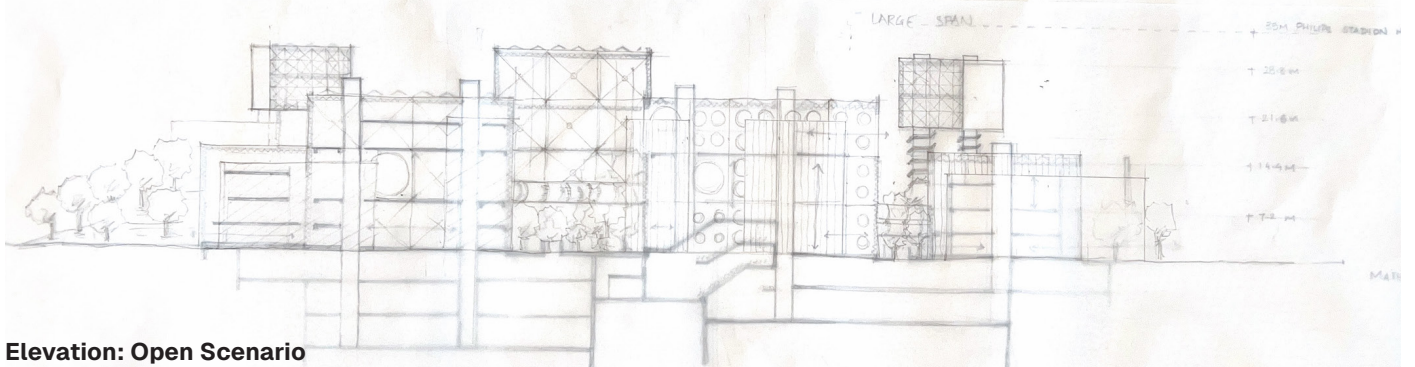
- PERMEABILITY
- CIRCULATION ↔
- OPEN BUILDING, PRIMARY
- LARGE SPAN

POSSIBILITY OF FAILURE

- NON-SPACIAL DEF.
- DIFF. ENVIRONMENTAL
- UNDERUTILIZATION.

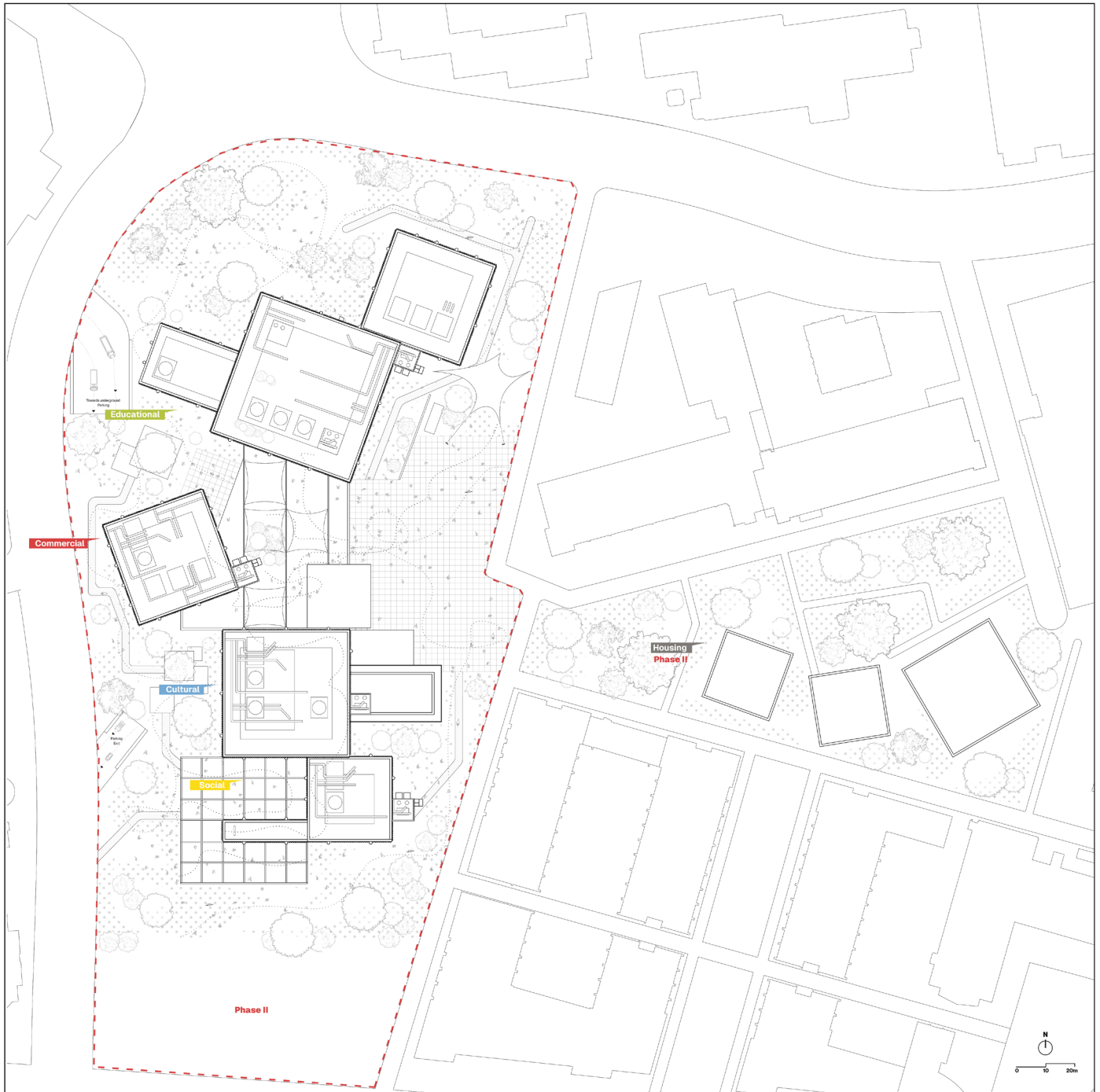


Section: Open Scenario



Elevation: Open Scenario

# 10.9 Plan



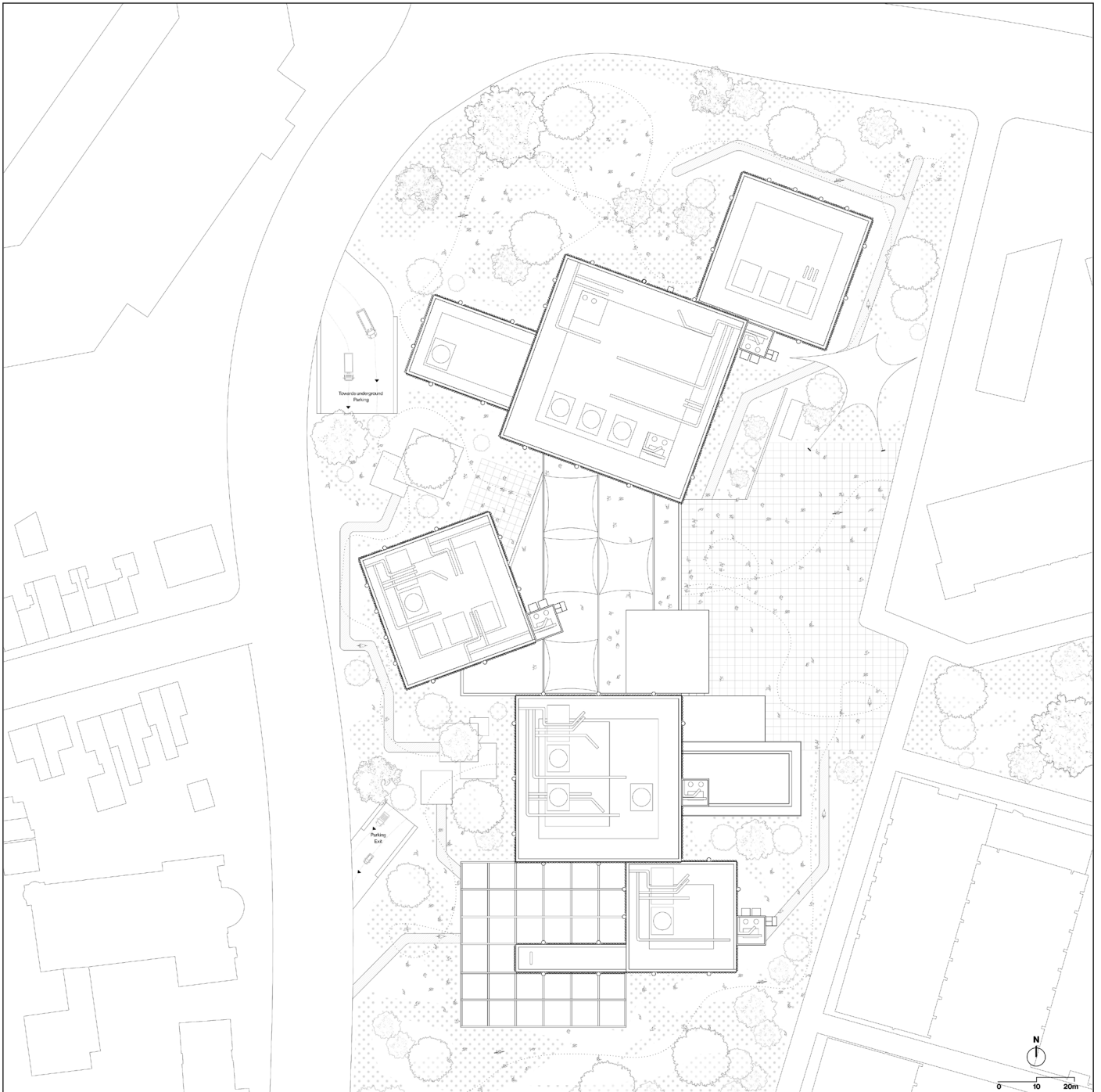
Site Plan: Emmasingelkwadrant

## 10.9.1 Proposal

This plan explores the distribution of massing across the selected site as an initial test of how the structural framework can be positioned within the site conditions on the two land parcels, with the housing in future phase II. The placement of these framework blocks is informed by climatic analysis, allowing orientation strategies that maximise environmental benefits such as sunlight access, wind response and shading conditions.

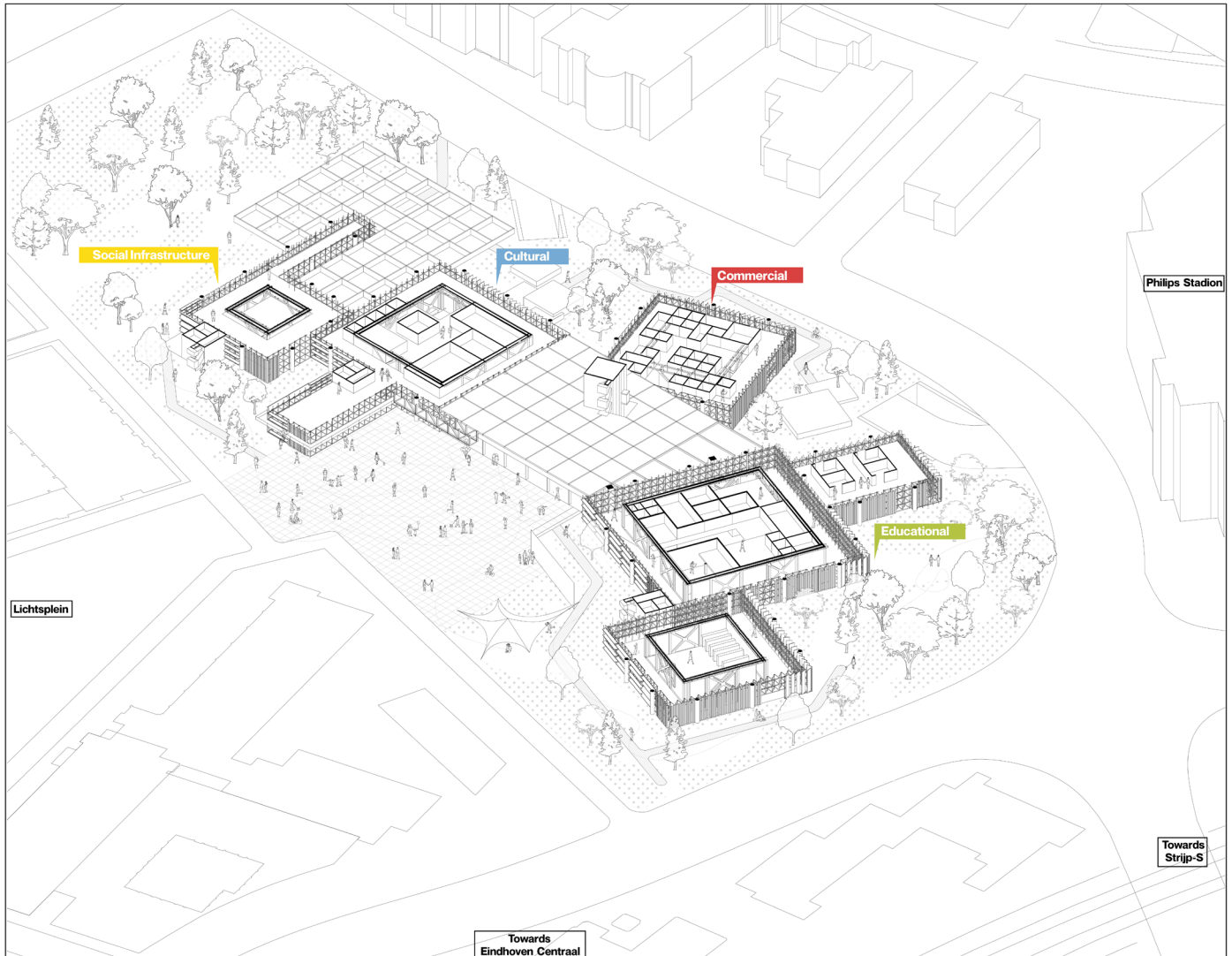
At the same time, the study ensures that the proposed massing is not isolated from its surroundings but instead integrates with the existing urban context. Through this approach, the framework is tested both as a spatial system and as an urban instrument, capable of adapting to environmental forces while maintaining a coherent relationship with the surrounding fabric.

## 10.9.2 Plan



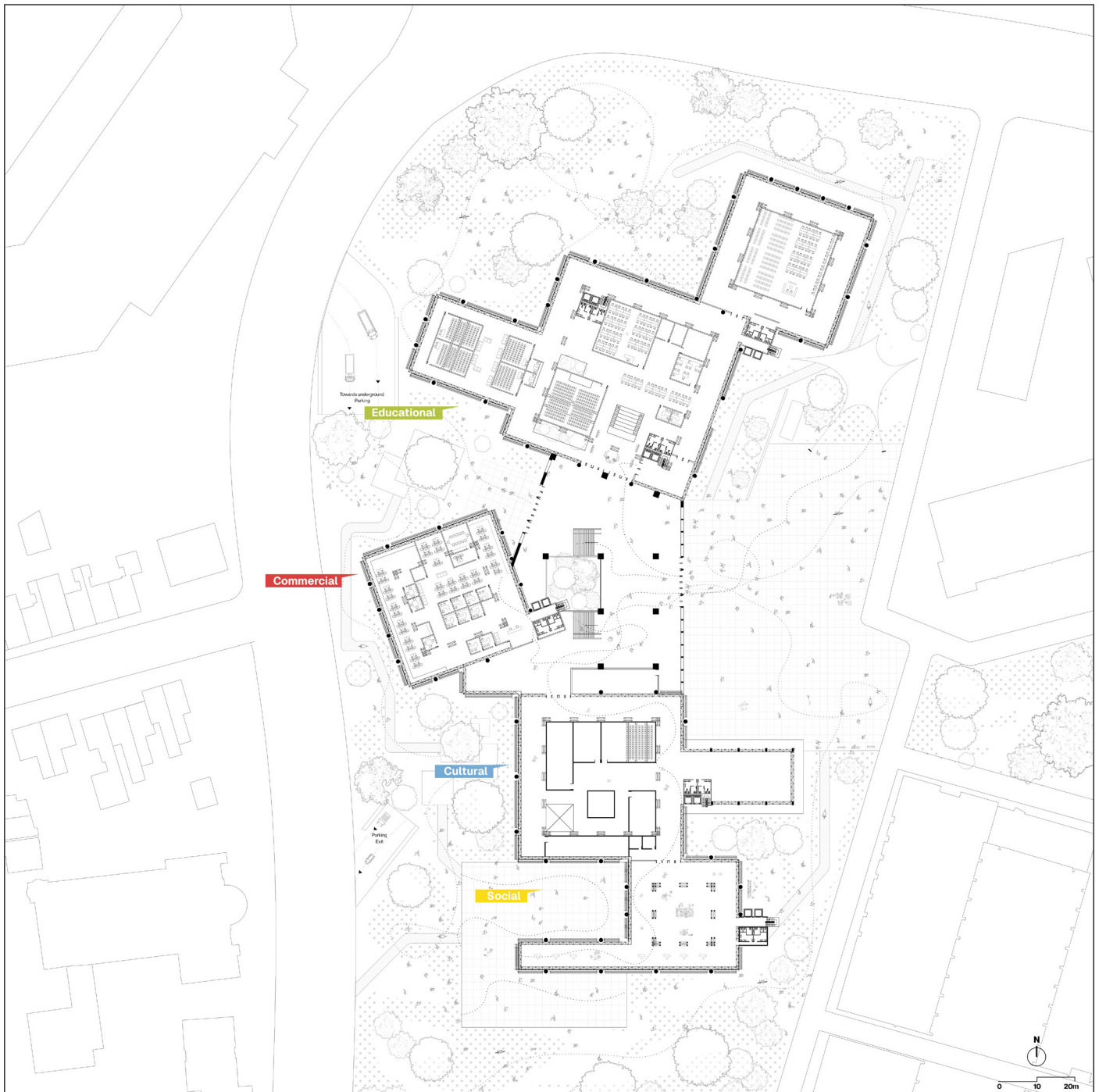
The plan reflects the orientation of the building masses, which is determined by insights derived from the climatic analysis. Each block is connected across multiple floors through external bridges, ensuring continuity, accessibility and spatial integration across the framework. Between and around the blocks, transitional spaces are introduced as semi-covered, covered and green corridors, enhancing both spatial quality and environmental performance. These zones act as climatic buffers while also supporting informal occupation and movement. Furthermore, the landscape design is informed by the same climatic considerations, with the intention of creating softer, more permeable spaces between and around the blocks.

## 10.9.3 Functions



For the purpose of the graduation project, this concept is explored through a mixed-use configuration of building blocks, incorporating educational, cultural and commercial functions. The project operates as an exhibition of potential uses within the framework, demonstrating how different programs can exist independently while also coexisting and interacting within the same structural system.

## 10.9.4 Floor Plan

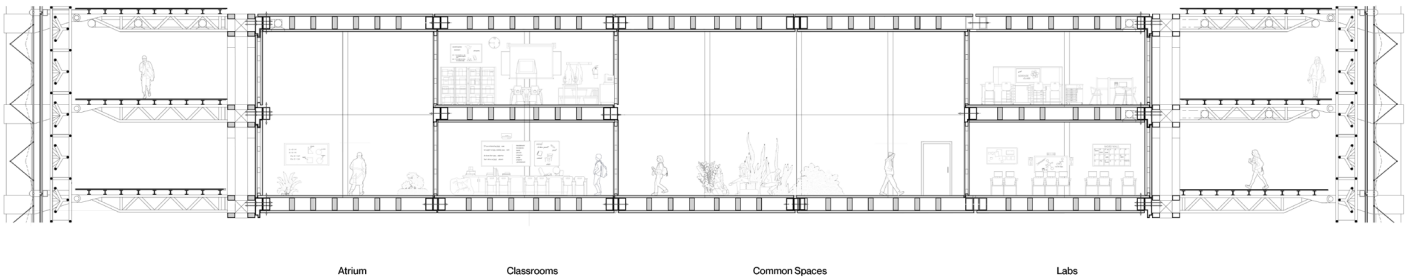


Plan G+1

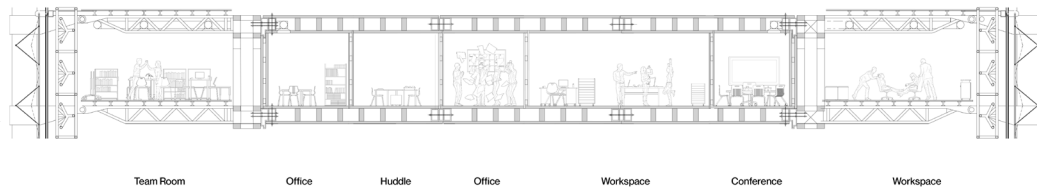
The plan reflects the orientation of the building masses, which is informed by insights derived from the climatic analysis. with the intention to demonstrate how reconfiguration occurs within each framework block, allowing different spatial organisations to emerge while maintaining a consistent underlying engineering logic.

Each mass can be read as a variation of the same structural system, where changes in module sizes and internal configurations generate different spatial conditions. At the same time, the framework maintains a continuous relationship with the surrounding landscape, enabling informal activities to take place around and between the blocks. This creates a fluid transition between interior and exterior spaces, reinforcing the permeability of the overall system.

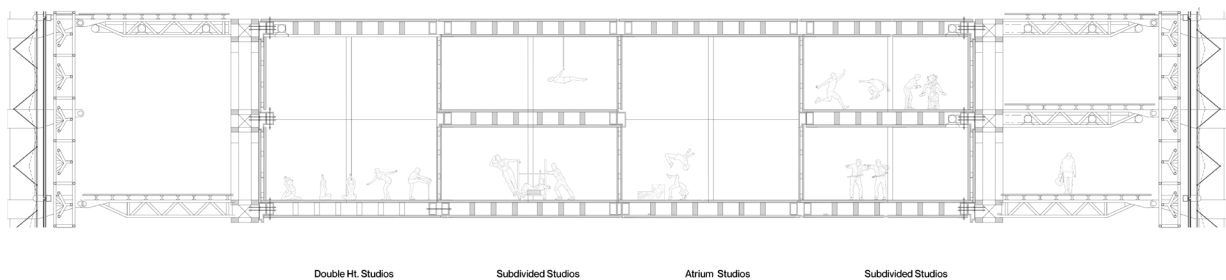
# 10.10 Scenarios (Zoomed)



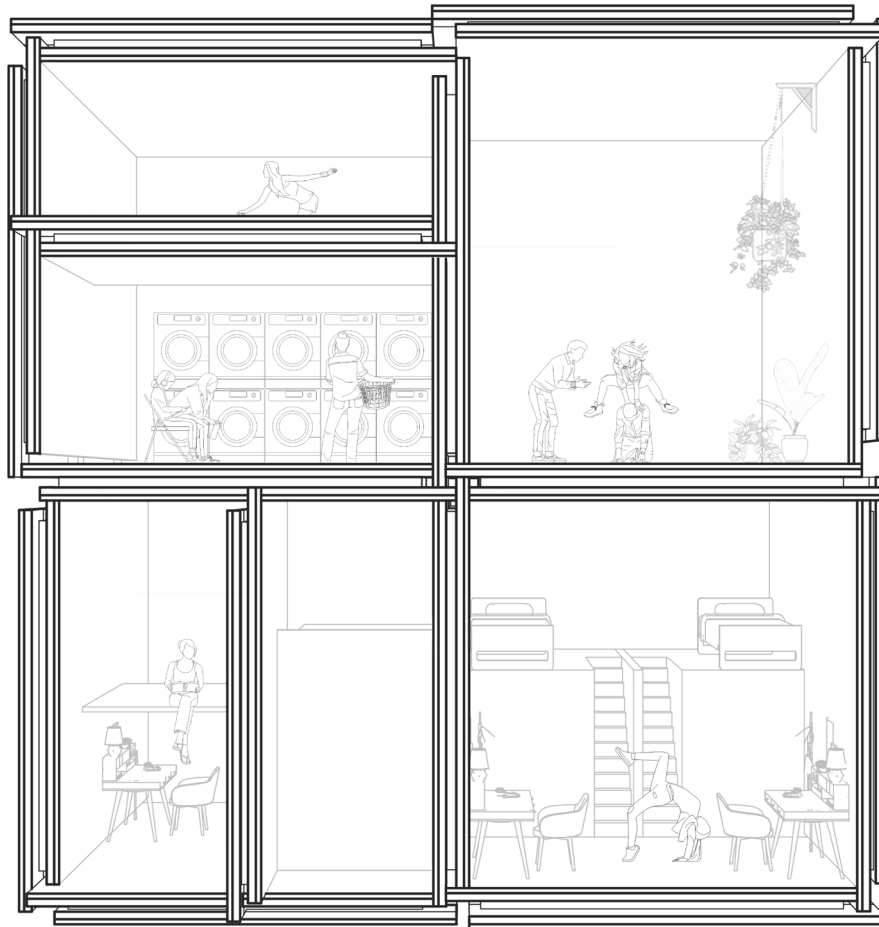
**/Educational:** Within this configuration, certain modules retain the full 7.2 m height to accommodate shared and collective spaces, while other areas are organised at a 3.6 m height to support more specific functions such as classrooms, laboratories and meeting spaces.



**/Commercial:** Compared to the other cases, this configuration demonstrates the capacity of the system to be subdivided into smaller spatial units, accommodating functions such as offices, huddle spaces and meeting rooms. The spatial organisation predominantly operates at the 3.6 m module height, enabling a more compact and efficient distribution of workspaces within the structural framework.



**/Cultural:** In this scenario, selected areas are organised with a 7.2 m height to accommodate double-height studios and shared gathering spaces, while other zones operate at a 3.6 m height to support more focused functions. This configuration allows the framework to be adapted into studios, workshops, and common meeting spaces.

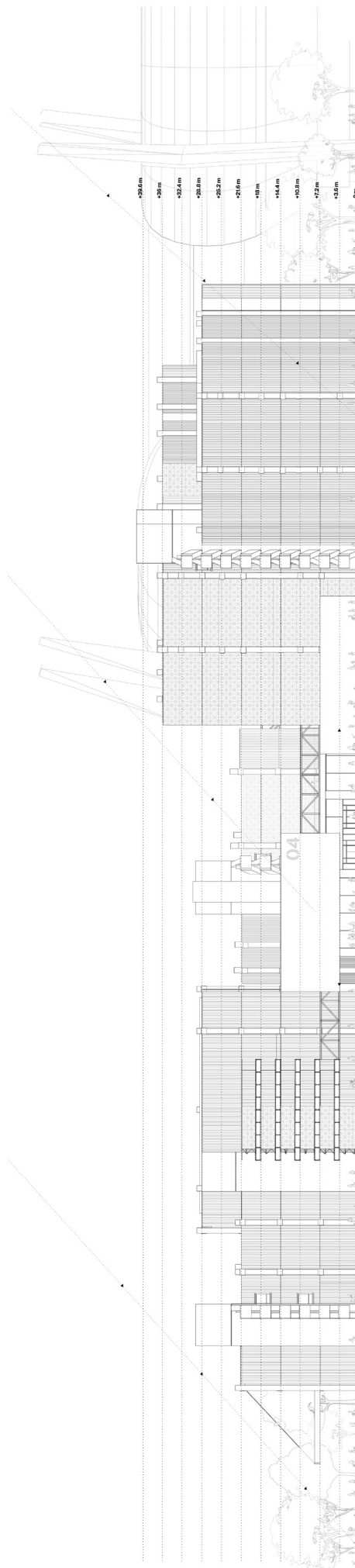


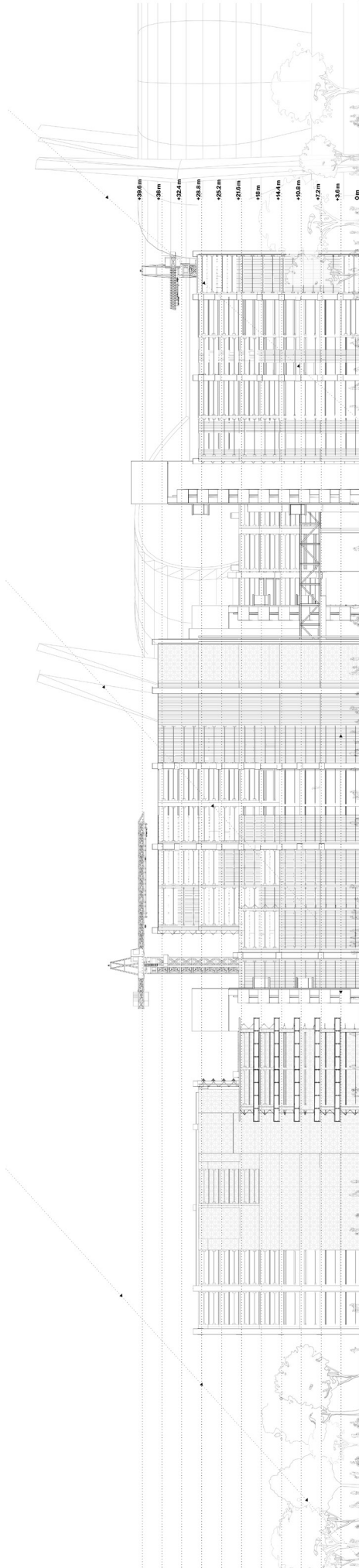
**/Housing:** The graphic above shows the housing module. Although this module has not been developed in detail within the scope of the graduation project, it is presented as a conceptual extension to demonstrate that the same framework logic can also accommodate residential functions.

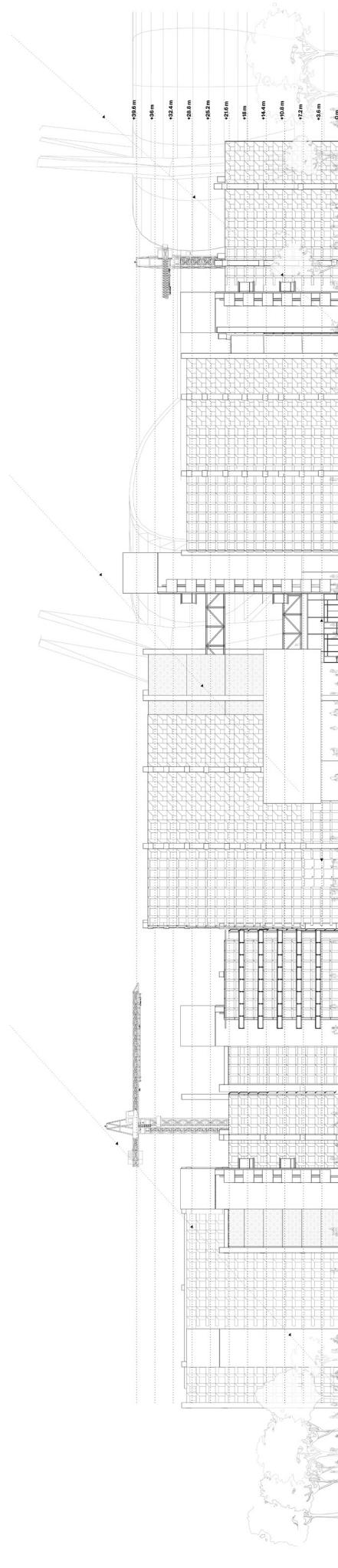
## 10.11 Architectural Imagery

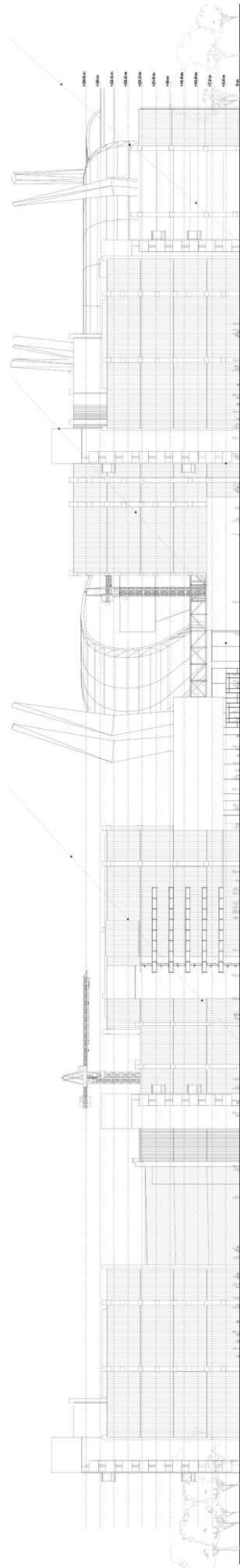


**Architectural Imagery\_ Expression**

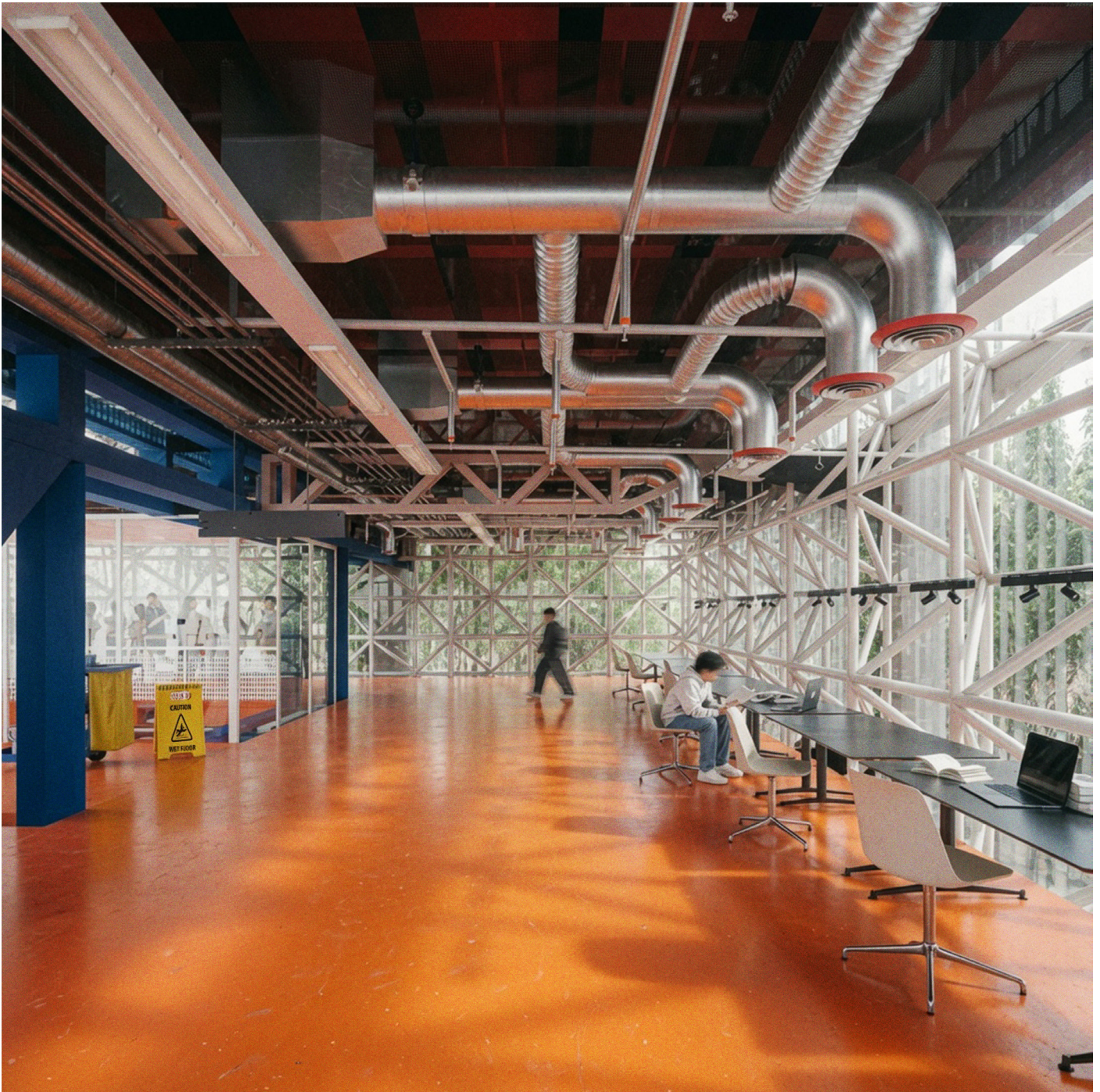












**Architectural Imagery\_ Interior**

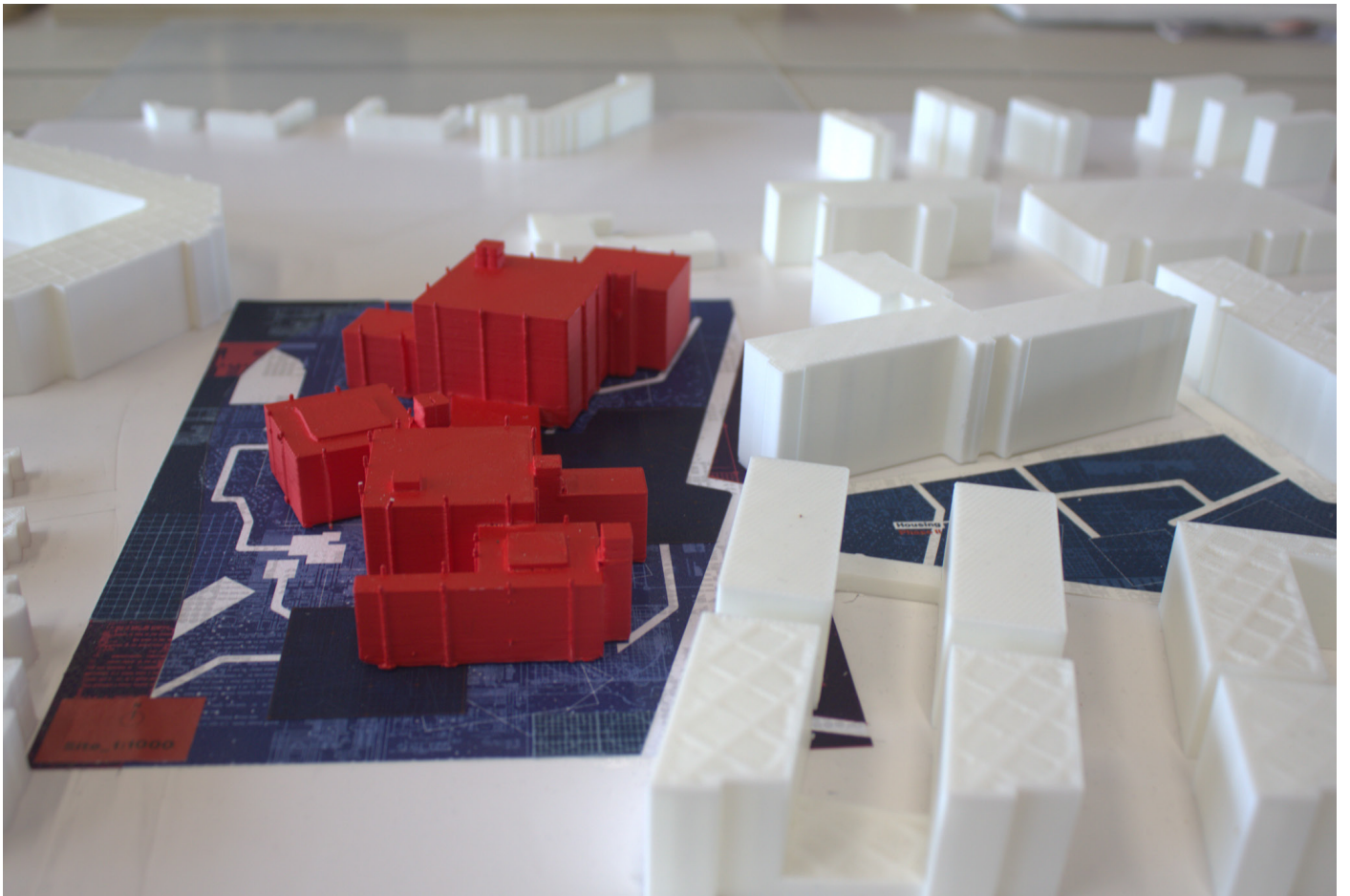


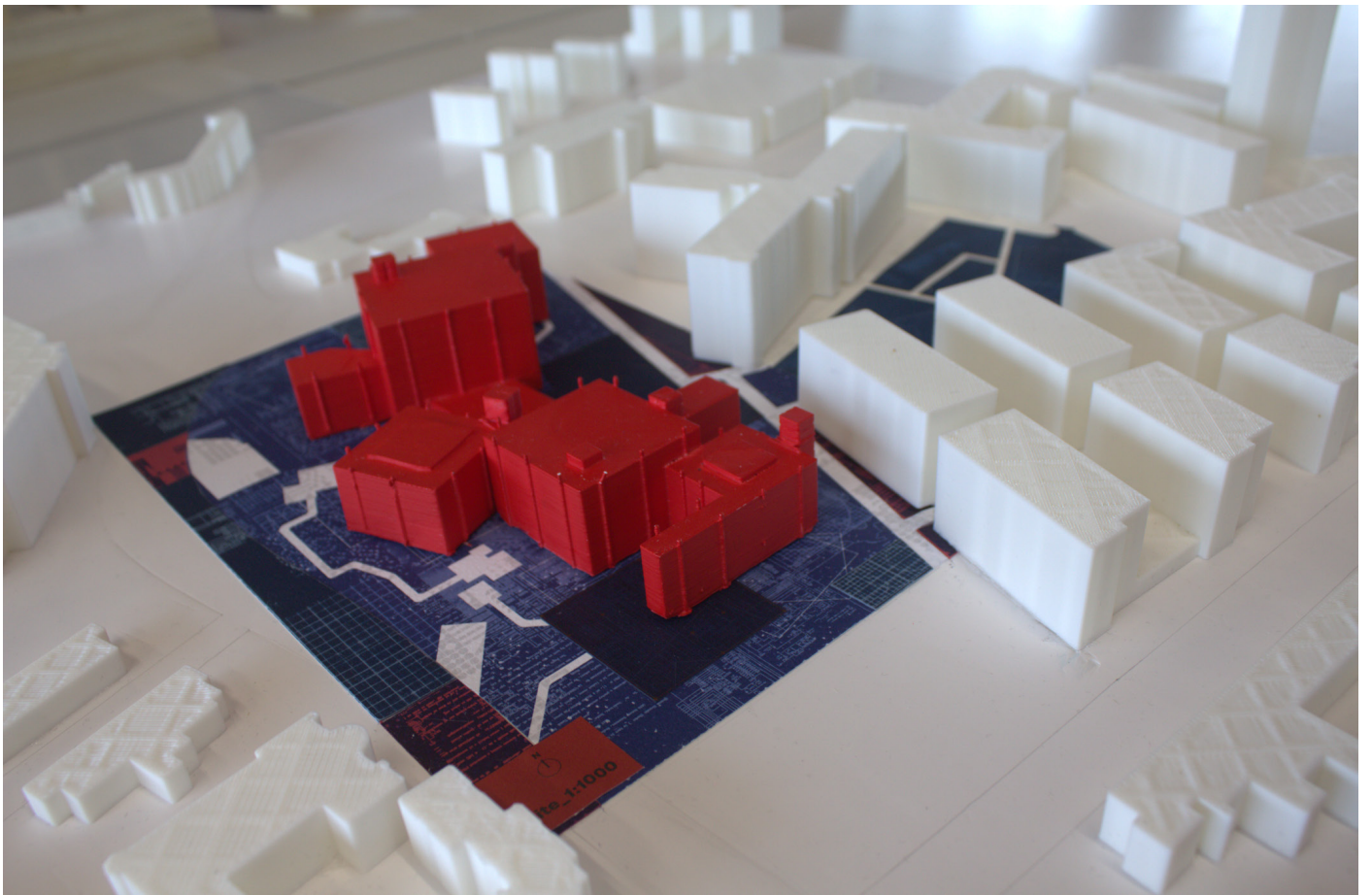
**Architectural Imagery\_ Interior**

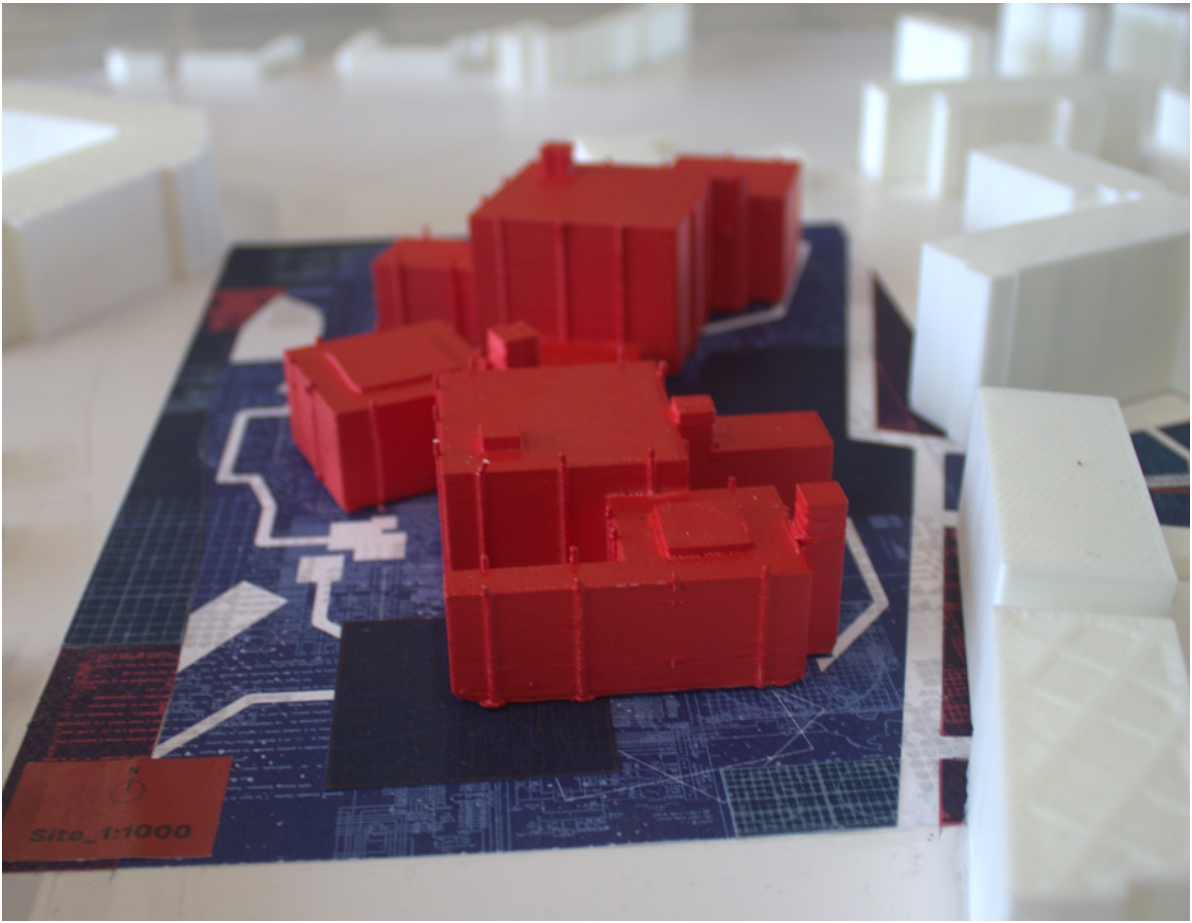
## 10.12 Models

//Site

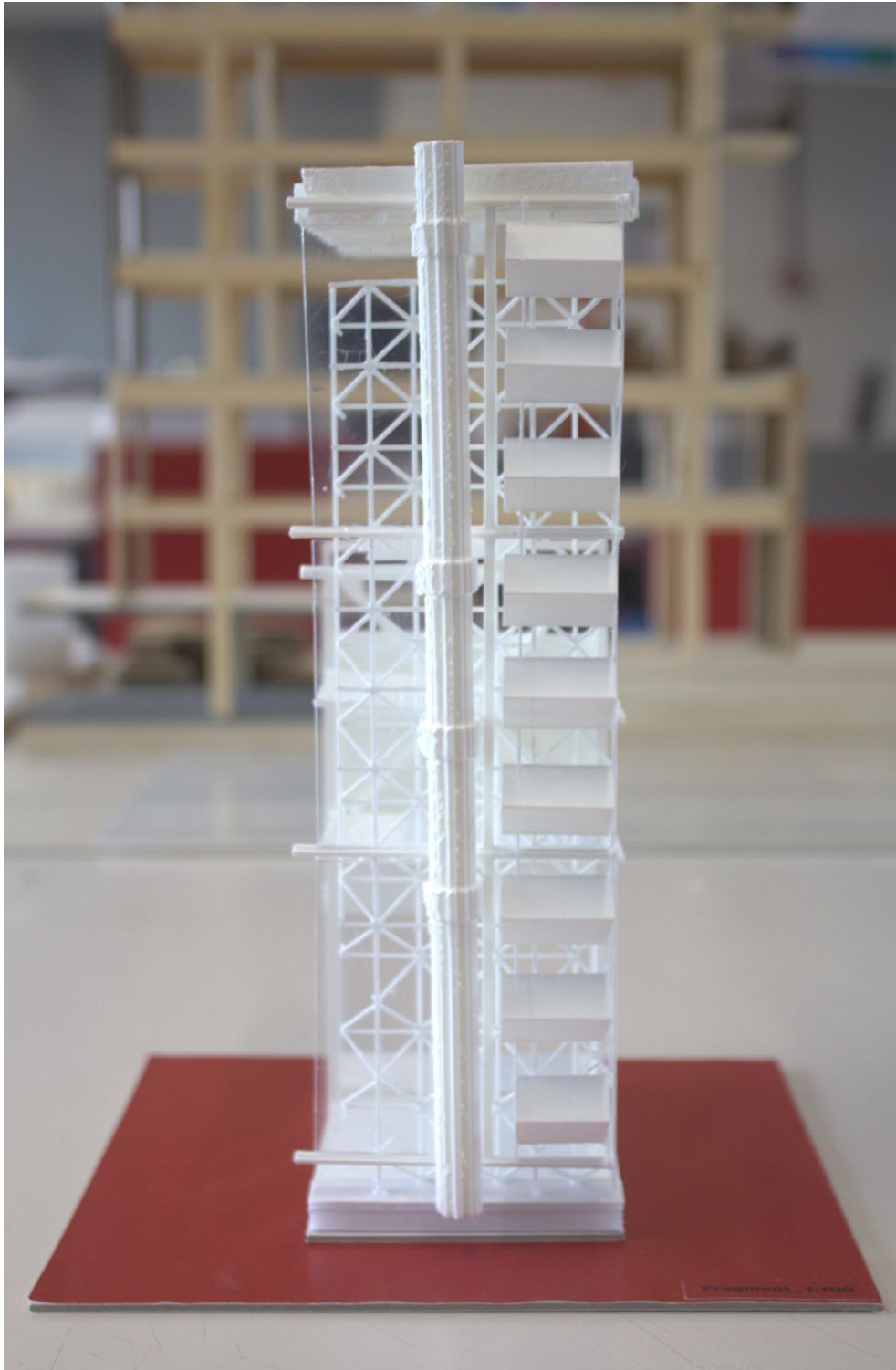






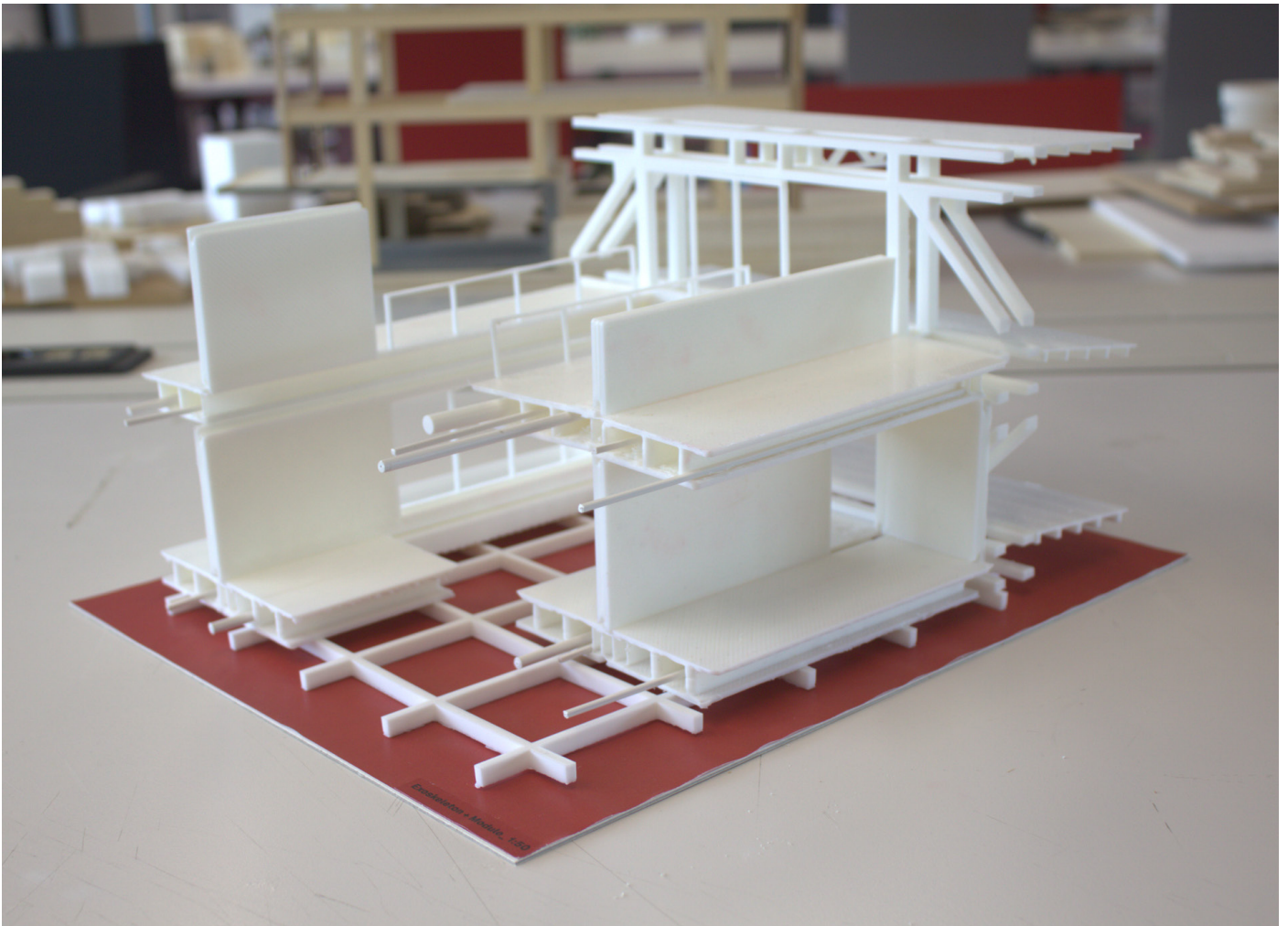


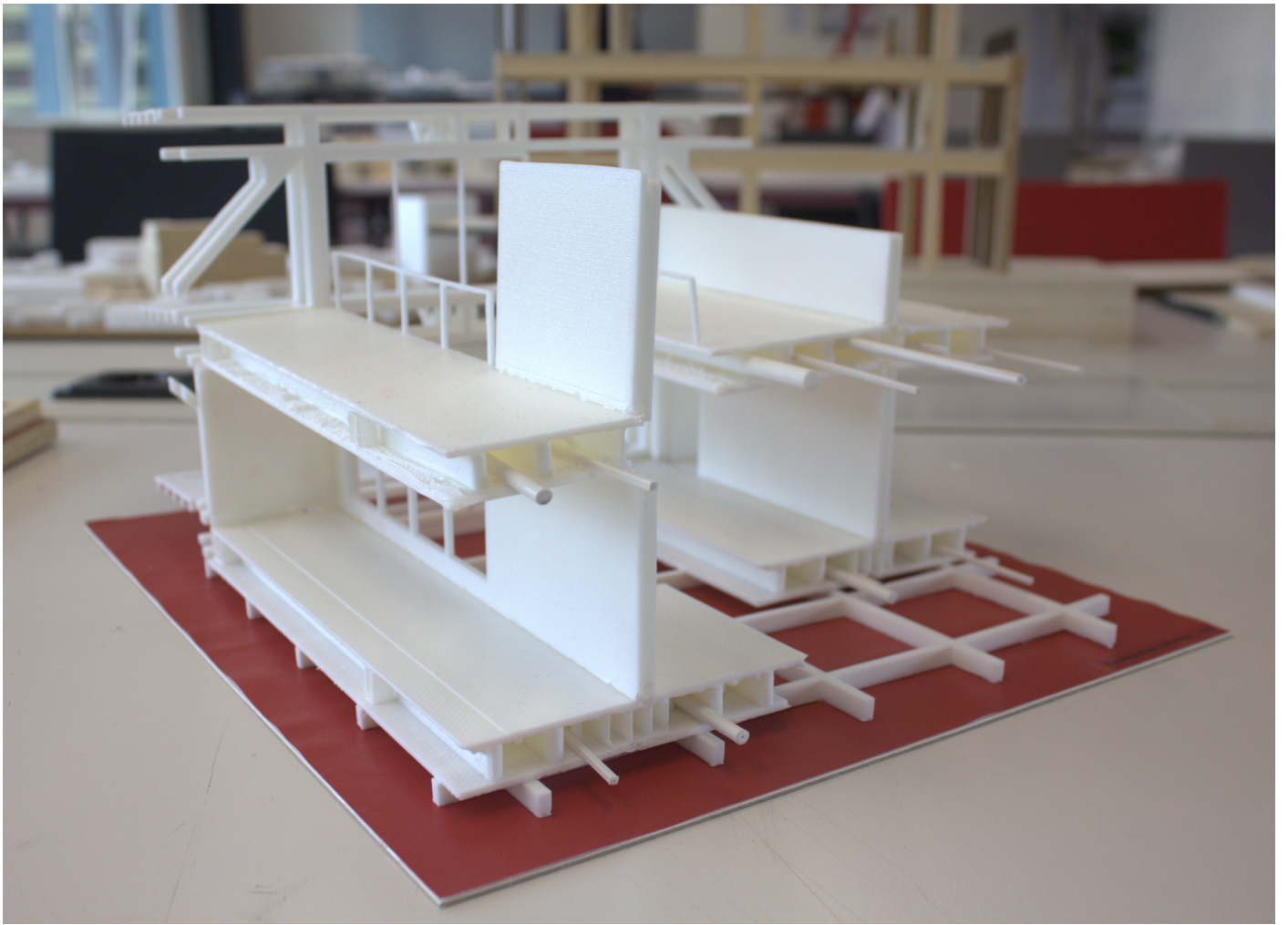
## //Kit of Parts Assembly





## //Exoskeleton + Infills





# The Emmasingel Construct:

An Open Framework



Eindhoven, Emmasingelkwadrant

**An Unfinished Building.**

This project investigates how architecture can operate as an open and adaptable framework within dense, high value urban environments increasingly dominated by fixed models. Taking Emmasingelkwadrant in Eindhoven as a test site, the project proposed a permanent structural system combined with a reconfigurable elements logic that allows spaces, programs and occupation to evolve over time. Through scenario-based testing, modular systems and spatial prototyping, the research explores how architecture can support changing cultural, educational and residential uses **without requiring complete redevelopment**. The project argues for a shift from architecture as a finished object toward architecture as an evolving framework capable of accommodating long term change.



Architectural Imagery, 2018



The Emmasingel Construct, Site Plan

**./Vision.**

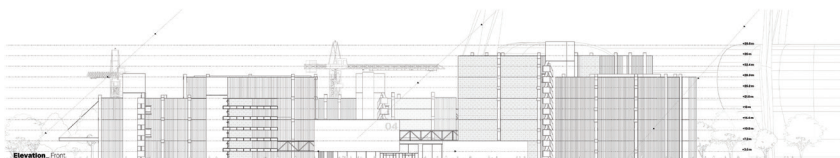
The vision of this project is to propose an alternative to the Eindhoven Mega Proposal, which aims to transform large parts of the city centre over the coming decades primarily through housing-led development. Within this vision, the Emmasingelkwadrant is largely proposed as a zone for high-end housing. In response, the project questions whether such a central significant urban area should be reduced to an exclusive residential enclave catering only to a limited demographic and income group. Instead, the project argues for using the potential of the Emmasingelkwadrant to support a broader and more diverse public, including creatives, students, young professionals, makers, educators and local communities. Located between Eindhoven's historic centre and the former Philips industrial campus, the Emmasingelkwadrant sits at the intersection of memory and reinvention. It offers an opportunity to translate industrial narratives into new forms of public use, cultural production and social infrastructure.



Architectural Imagery, Description



Architectural Imagery, Context

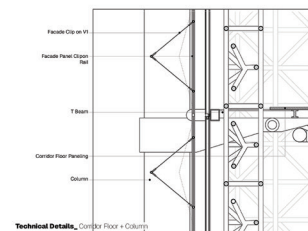
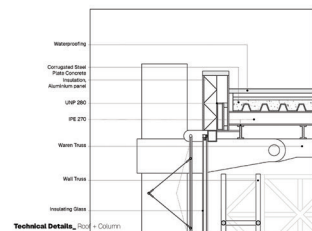
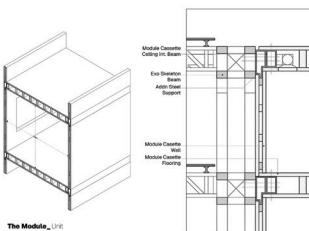
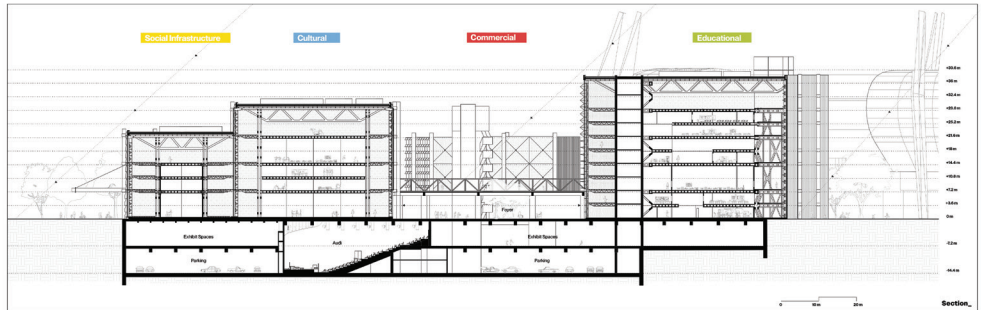
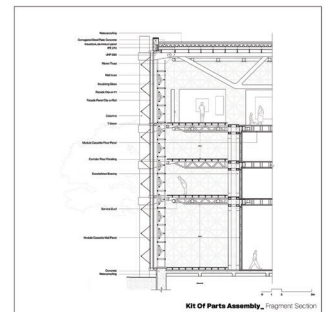
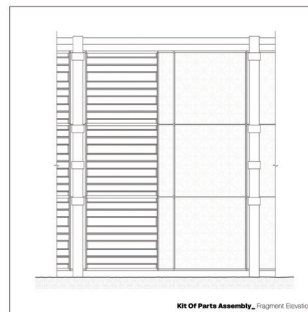
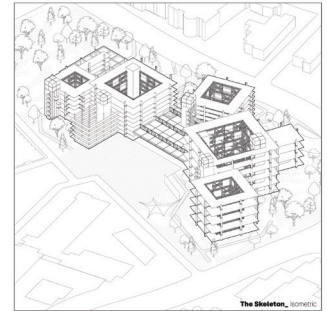
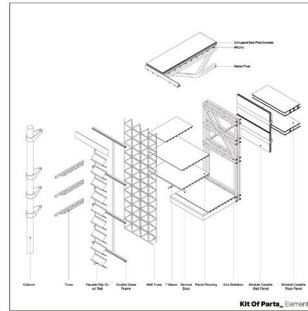
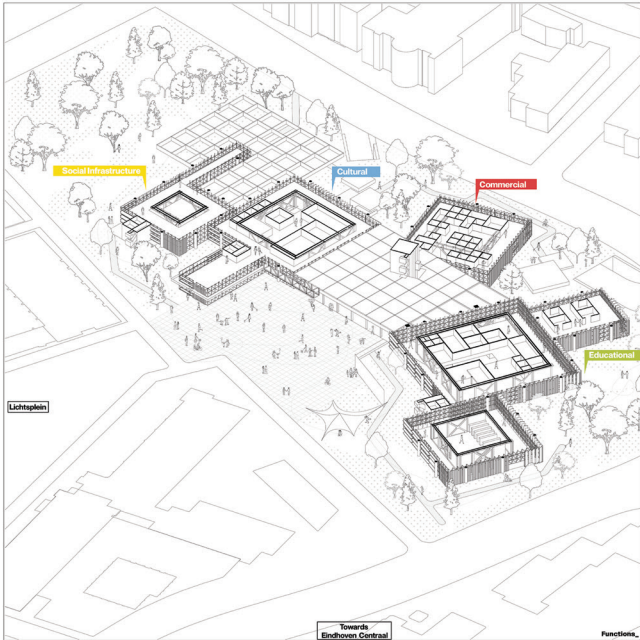
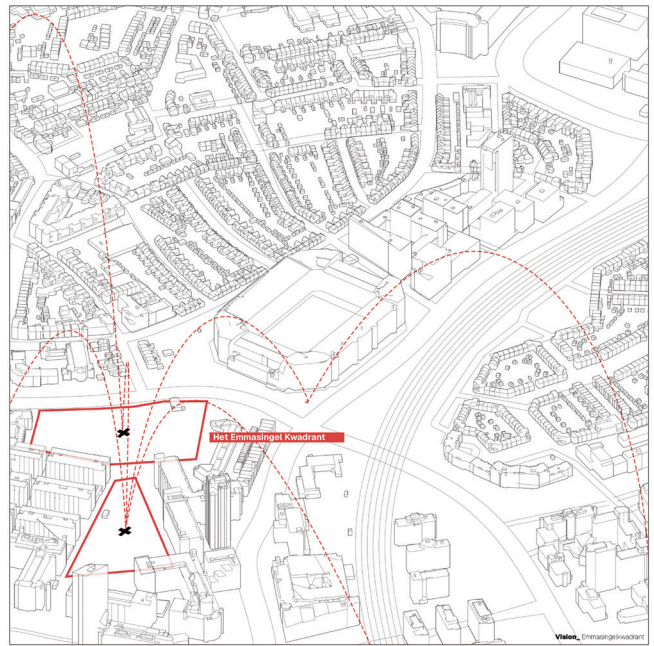
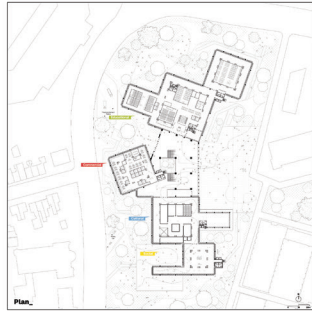


Elevation, Urban

# The Emmasingel Construct:

Drawings

An Open Framework



//About\_

The project uses Emmasingelkwadrant as a test site for an open, adaptable architectural framework that counters mono functional housing and dead zones, focusing on building order, mixed-use capacity and spatial strategies rather than fixed programs. It does not address policy, economics or real occupancy, embracing incompleteness as a deliberate design principle tested through iterations and scenarios. The project positions architecture as a plug-in urban infrastructure prioritizing social and cultural value over fixed form.

Course Name\_ AR4AE020  
 Architectural Engineering Grad. Studio

Student Name\_ Pranav Jadhav  
 6239641

Supervisors\_ Anne Snijders  
 Pieter Stoufjesdijk

# 11. Conclusion

The project explored how architecture in high value urban, high end urban contexts can move beyond fixed development models by operating as an open and adaptable framework. Through the development of a structural system combined with the possibility of reconfiguration inside and also on the exterior level, the project demonstrates how architecture can support long term spatial and programmatic change without requiring complete redevelopment. Rather than designing a finished object, the proposal approaches architecture as an evolving system capable of accommodating the possibilities of changing cultural, educational, commercial, etc. uses over time. The design reflects the architectural ambition of creating a legible structural order while simultaneously allowing flexibility, reversibility and multiple forms of occupation within it. Technically, the project studies and investigates how modular assembly systems, adaptable and layered construction strategies, can enable change to occur in a physically realistic manner instead of remaining purely conceptual.

The project “The Emmasingel Construct: An Open Framework” concludes that long term adaptability can be achieved through the separation of permanent and temporal systems, By establishing a fixed structural framework and combining it with reconfigurable infill modules, façade systems, the proposal allows different forms of occupation and transformation to occur over time within the same architectural order. Through varied scenario based testing, spatial studies and structural prototyping, the project demonstrated that adaptability is quite effective when openness and occupation can co exist rather than in extreme conditions of complete irrelevance or complete saturation. The study therefore argues that architecture should not be conceived as a static and finalized product, but as an open ended framework capable of continuous evolution.

## 11.1 Implications and Recommendations

The project highlights the growing relevance of open ended flexible architecture within contemporary urban development. As cities increasingly prioritize efficiency and fixed models, the ability for buildings to evolve over time becomes increasingly important socially, economically and environmentally. The proposal suggests an alternative idea in which architecture acts as a long term infrastructure capable of supporting changing users, uses and spatial requirements without demolition or large scale replacement. The study also indicates the importance of integrating adaptability at multiple levels, including structure, internal modules, services, façade layers, etc. Future research could investigate material systems, circular construction methods and adaptability in greater depth to support long term reconfiguration and shared occupation within urban frameworks.

## 11.2 Reflection

Throughout the process, the project evolved from initially conceptual exploration of flexibility toward a more technically grounded investigation into physically constructable adaptability. Initial stages focused heavily on theoretical references and building principles, while later stages concentrated on developing structural systems, details and configurations. The use of scenarios based sections and elevations, prototyping, models, rule based spatial studies proved valuable in evaluating how the framework performs under different conditions of occupation.

One of the key reflections from the process was the realization that flexibility alone does not automatically produce meaningful architecture, adaptability requires certain structural logic, environmental considerations and carefully designed spaces. While the project establishes a strong conceptual and spatial framework, certain aspects such as detailed material exploration and improving the architectural qualities within the framework remain open for further development.

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# 13. Appendices

## /Project Phasing

Nov

### Scope

#### Contextual Analysis

City and site analysis to identify recurring issues in mixed-use development

Dec

#### Issue Identification & Problem Definition

Translating urban and social issues into a clear architectural concept, defining the design hypothesis, typology, and user group.

Jan

#### Theoretical Positioning

Urban–building scale framework with detailed architectural and engineering study, supported by case studies.

**A1**

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Feb

### Research by Design/ Design Studies

#### Design Framework Development

Defining building order and developing the construction kit and system.

Mar

#### Prototyping & Iterative Exploration

Generating multiple spatial and construction-kit & testing scenarios rather than a single fixed solution.

Apr

**A2**

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### Contextual Design

May

#### Architectural Synthesis

Framework presented as the final project.

Jun

**A3**

---

### Final

#### Reflection & Evaluation

Assessment of research contribution and articulation of an architectural stance.

**A4**

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# VI. DATA MANAGEMENT CHECKLIST

## Instruction

This checklist is relevant for all graduation projects of the Master AUBS. The form is intended to highlight common aspects of graduation projects that require particular attention with regard to planning the research and data management. Relevant information and supplementary sources regarding each question are provided below each question.

With this checklist, the faculty wants to avoid that students unexpectedly find themselves in complex and stressful situations, in which ethical or privacy matters and/or other laws and regulations become an issue. In projects involving humans, certain types of data processing increase the risks to the human participants: planning such projects requires additional evaluations and advice from university staff before ethical approval can be received and the project can begin. In the case of a graduation project, obtaining additional advice or permits may delay the project with an extra education period or semester. To avoid this, it is recommended that students set up a graduation project with a low level of risk. Therefore, all students have to check their risk, by completing this checklist before their A1.

The first section of the checklist (A) should be completed by all students, together with their supervisor, during the planning of the graduation project, before the A1. It does not need to be submitted to anyone for review or approval. Please consider questions 1 to 3 carefully in relation to the intended graduation project, and answer with 'yes' or 'no'.

The second section of the checklist (B) should only be completed if the graduation project involves working with data from human participants. In that case, the student and their supervisor must apply for and receive ethical approval from the [Human Research Ethics Committee](#) (HREC) before the project can begin (see the paragraph 'Explanation and follow-up' after the questions). The student can submit the application to the HREC, but the supervisor is responsible for making sure that the project is compliant with relevant privacy regulations and ethical policies.

<b>Section A. General considerations</b>	yes	no
<p>1. Is the graduation project conducted as part of an internship (at a company), or as part of a research project at TU Delft?</p> <p>If a student's graduation project is conducted at a company or as part of a research project at the university, questions of data ownership and intellectual property rights need to be addressed in a written <a href="#">graduation or internship agreement</a> before the project begins. Student and supervisor should consult the <a href="#">Intellectual Property Rights of Students webpage</a>. Additional information can also be found in the <a href="#">Extended Personal Research Data Workflow</a>. If applicable, complete the <a href="#">Confidentiality Agreement</a>.</p>		✓
<p>2. Does the project involve conducting (part of) the research outside the Netherlands?</p> <p>Students who intend to travel abroad (even to other EU countries) for study, exchange, research, internship, or graduation project purposes need to follow the <a href="#">Travel Safety Protocol</a>. This includes attending a mandatory Travel Safety Training Session: see the <a href="#">Disclaimer</a>.</p>		✓
<p>3. Will the research involve processing data from humans, such as running a survey, conducting interviews or workshops, collecting data through social media or internet forums, or re-using existing datasets about humans provided by a third party? (If 'yes', see follow-up questions 4 to 13 in Checklist B.)</p> <p>Students who work with data from human participants must complete the next section and apply for and receive ethical approval from the <a href="#">Human Research Ethics Committee</a> (HREC) before conducting the research.</p>		✓

<b>Section B. Extended risk factors</b> (only if question 3 has been answered with 'yes'.)	yes	no
<p>4. Will the project involve participants who may be considered vulnerable, such as the elderly, refugees or asylum seekers, ethnic minorities, patients, or people with disabilities?</p> <p>Participants who may suffer very adverse consequences (for instance, due to discrimination) if their personal data became publicly available can be considered vulnerable.</p>		✓
<p>5. Will the project involve participants who cannot themselves give informed consent for taking part in the project, but for whom consent must be obtained from a legal guardian?</p> <p>Participants who cannot give <a href="#">informed consent</a> can include, for instance, children or participants with intellectual disabilities, mental disorders, or dementia. Such participants are also considered vulnerable in the context of the <a href="#">General Data Protection Regulation</a> (GDPR).</p>		✓
<p>6. Will the project involve processing any of the special categories of personal data below?</p> <ul style="list-style-type: none"> <li>- Race</li> <li>- Ethnicity</li> <li>- Criminal offence data</li> <li>- Political opinion</li> <li>- Union membership</li> <li>- Religious or philosophical beliefs</li> <li>- Sex life and/or sexual orientation</li> <li>- Health data (including measurements such as heart rate)</li> <li>- Biometric or genetic data (including fingerprints, iris scanning, facial recognition)</li> </ul> <p>The <a href="#">General Data Protection Regulation</a> (GDPR) defines a stricter rules for processing <a href="#">special categories of personal data</a>. If it is necessary to process these data in a project, it is it is important to provide additional safeguards.</p>		✓
<p>7. Will the project involve processing personal data that could be considered sensitive, such as the ones listed below?</p> <ul style="list-style-type: none"> <li>- Information about a person's income, debts, or other payments</li> <li>- Information about a person's (un-)employment status</li> <li>- Information about a person's performance at school or work</li> <li>- Information about relationship problems or (gambling) addiction</li> <li>- Information about poverty, domestic violence, or youth welfare/social work involvement</li> </ul> <p>Some types of personal data are considered <a href="#">sensitive</a>, because they can have a high impact on the privacy of the data subject if other persons gain access to these data. Sensitive personal data should only be processed if necessary: in such cases, additional safeguards need to be put in place.</p>		✓
<p>8. Will the project involve processing video-recordings, or photographs of participants?</p> <p>TU Delft considers photographic and video-materials of research participants to be <a href="#">sensitive personal data</a>. If such data need to be processed, additional safeguards must be put in place.</p>		✓

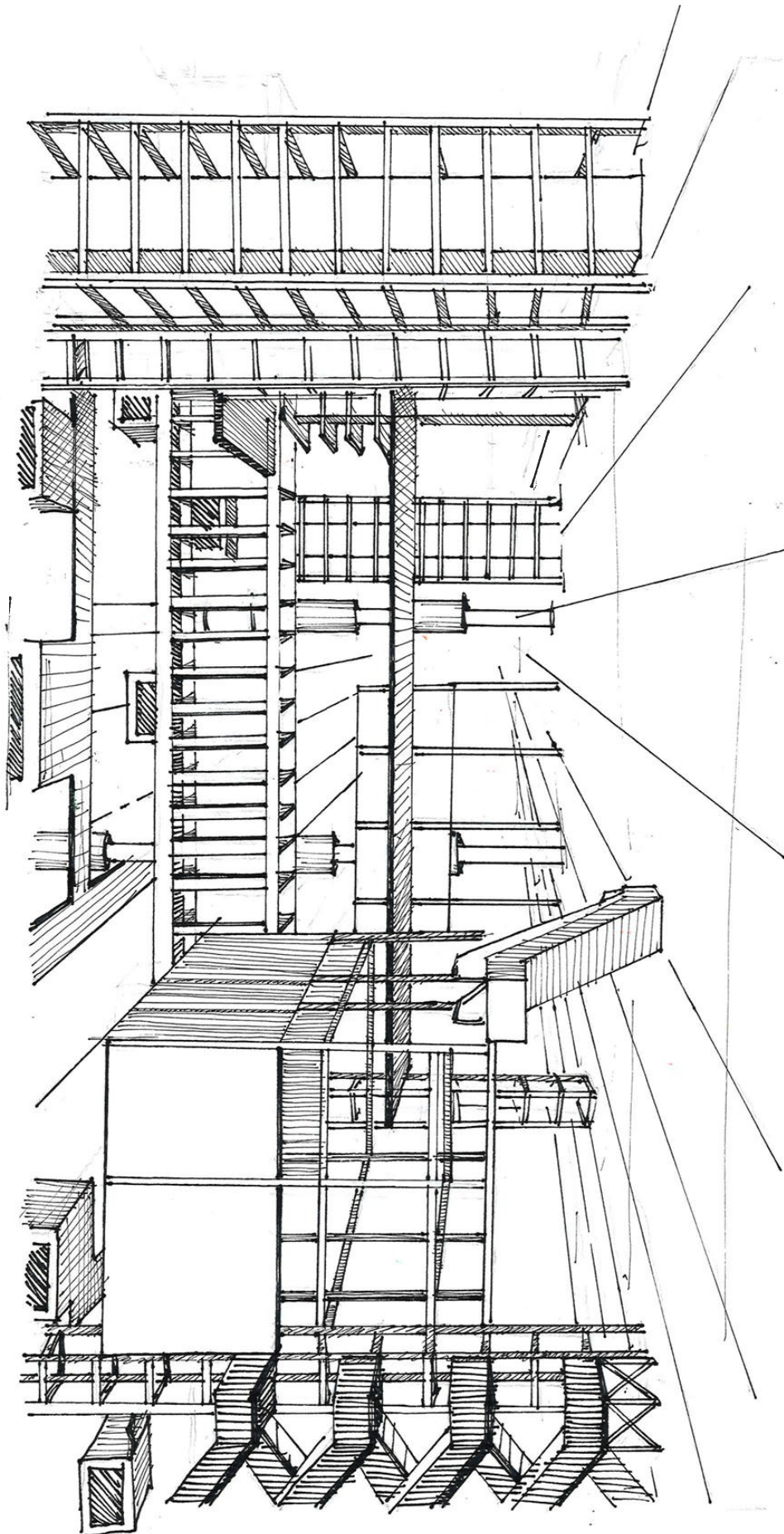
<b>Section B. Extended risk factors</b> (only if question 3 has been answered with 'yes'.)	yes	no
<p>9. Will the project involve sharing or transferring personal data between multiple partners or collaborating organisations involved, such as between TU Delft and an internship company?</p> <p>According to privacy law, sharing personal data between organisations requires a <a href="#">privacy agreement</a> to be in place: setting this up takes time, and requires support from additional university staff. Furthermore, personal data sharing can potentially expose research participants to different types of risks: these risks must be considered in the ethical application.</p>		✓
<p>10. Will the project involve deception, or covert observation of participants?</p> <p>In some types of research, obtaining <a href="#">informed consent</a> for processing participants' personal data is not an option: for instance, if the research involves deception, or the research is covert (conducted without participants knowing about it). In such situations, the steps to mitigate risks to participants are important, and an alternative <a href="#">legal basis</a> for processing the participant's data needs to be established with the help of additional support staff.</p>		✓
<p>11. Will the project involve working with social media data?</p> <p>Social media data are personal data, but since it is usually not possible to ask for <a href="#">informed consent</a> for processing social media data, another <a href="#">legal basis</a> for processing the participant's data needs to be established. Processing of social media data also involves legal considerations related to terms of use of data from third-party platforms: therefore, research with social media data requires expert support on privacy, ethics, and legal matters.</p>		✓
<p>12. Will the project involve using learning algorithms or other AI to analyse, combine, or otherwise process data from participants?</p> <p>The use of AI in research involves many considerations in terms of data protection, ethics, security, and intellectual property: for more information, see TU Delft's <a href="#">Instructions for use of Generative AI</a>.</p>		✓
<p>13. Will the project involve participants who are based in a country or countries outside of the EU?</p> <p>Students affiliated with TU Delft must comply with Dutch and EU regulations of personal data processing (<a href="#">GDPR</a>). Furthermore, the student and their supervisor must make sure that the research complies with <a href="#">local (privacy) legislations</a> of any foreign destinations. Additional support from an external (local) expert may be required.</p>		✓

### Explanation and follow-up

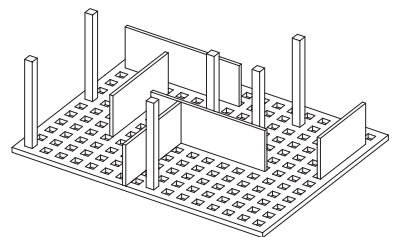
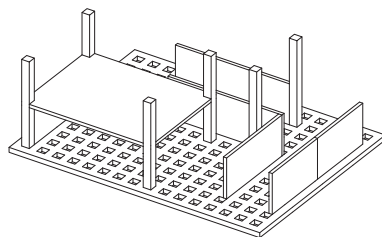
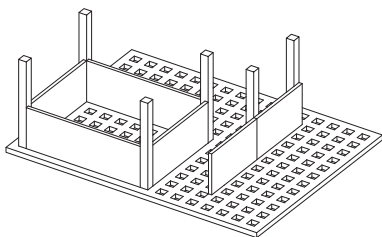
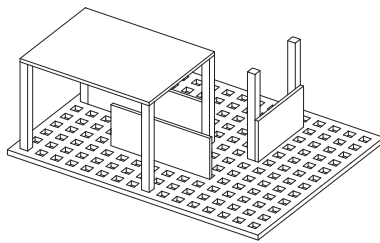
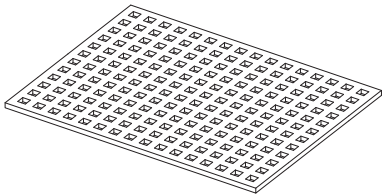
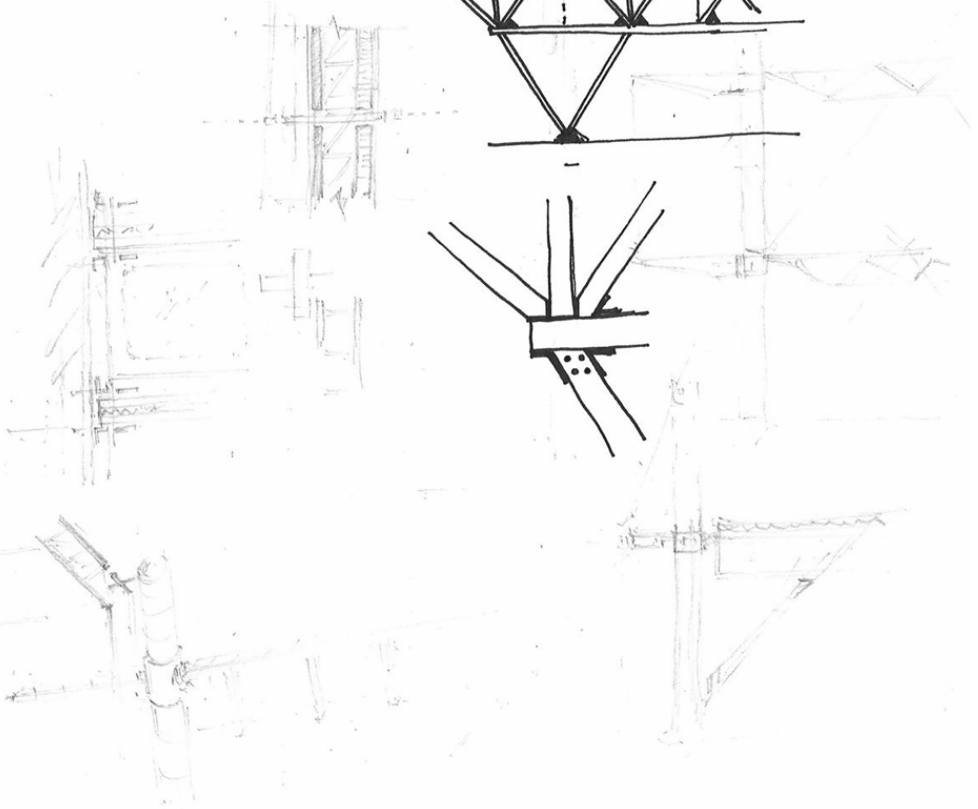
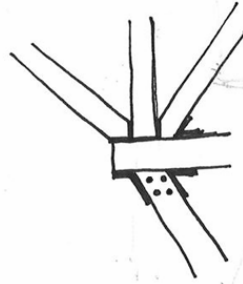
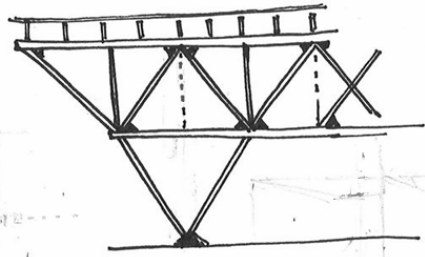
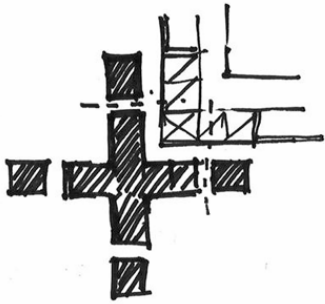
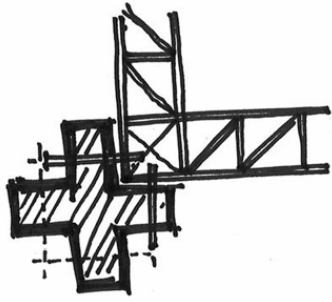
If you have answered 'no' to all questions 4 to 13, your project is likely to be considered low or minimal-risk: see the paragraph 'Projects with minimal or low-risk' on the next page.

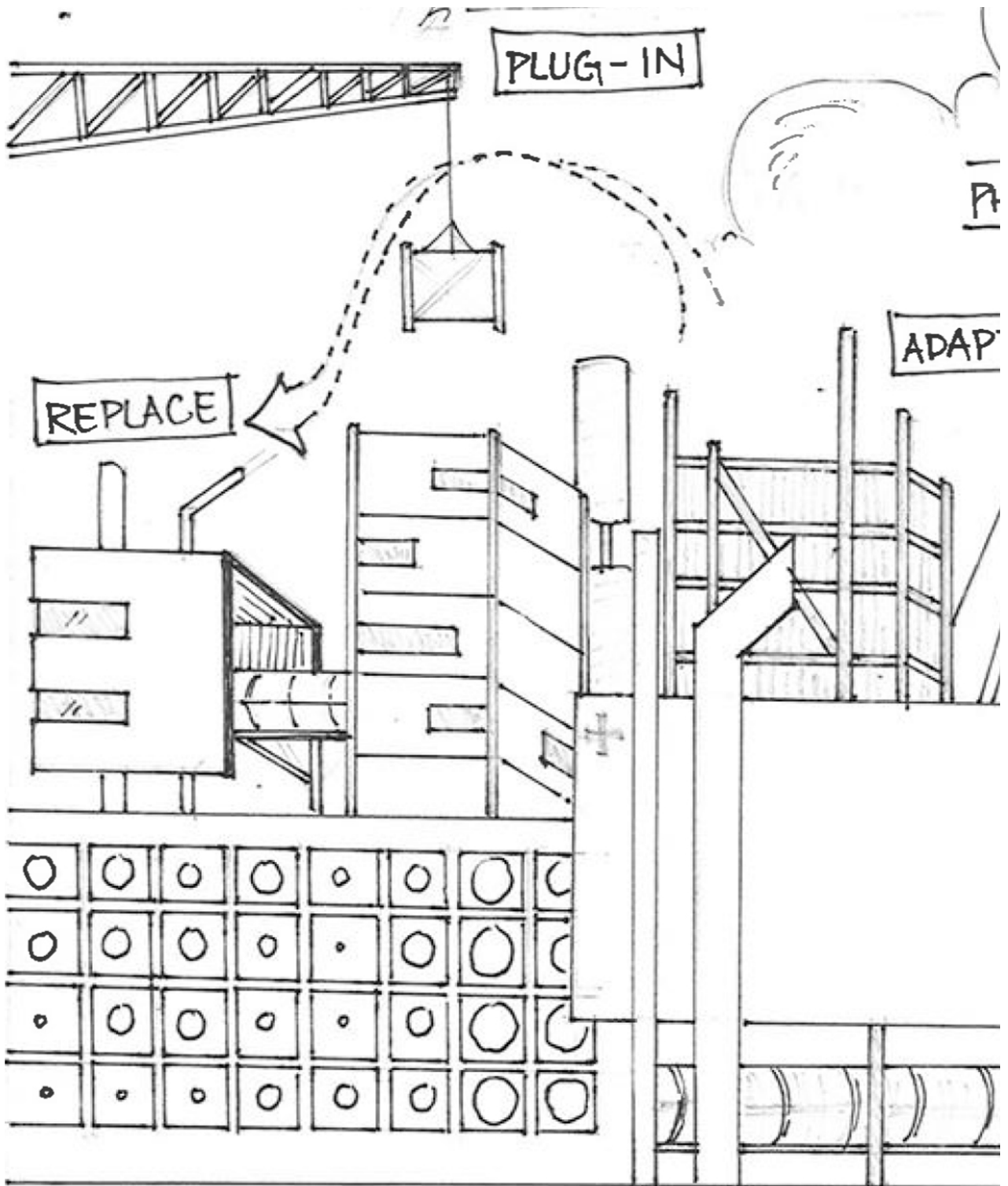
If you have answered 'yes' to one or more of the questions 4 to 13, your research likely involves extended or high risks to participants, according to the [General Data Protection Regulation](#) (GDPR) and TU Delft's privacy and ethical policies: for information regarding such projects, see the paragraph 'Projects with extended or high-risk' on the next pages.

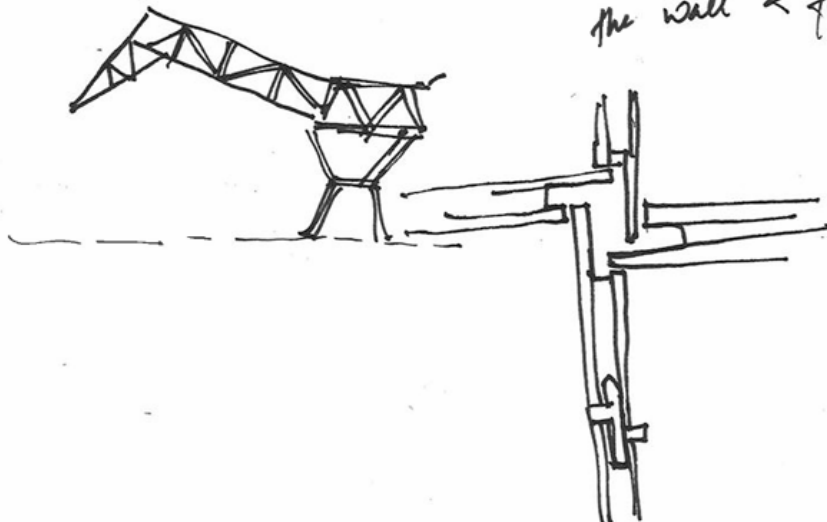
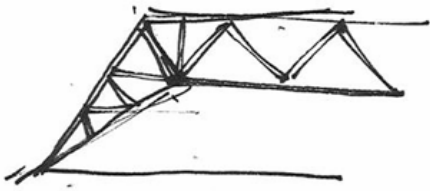
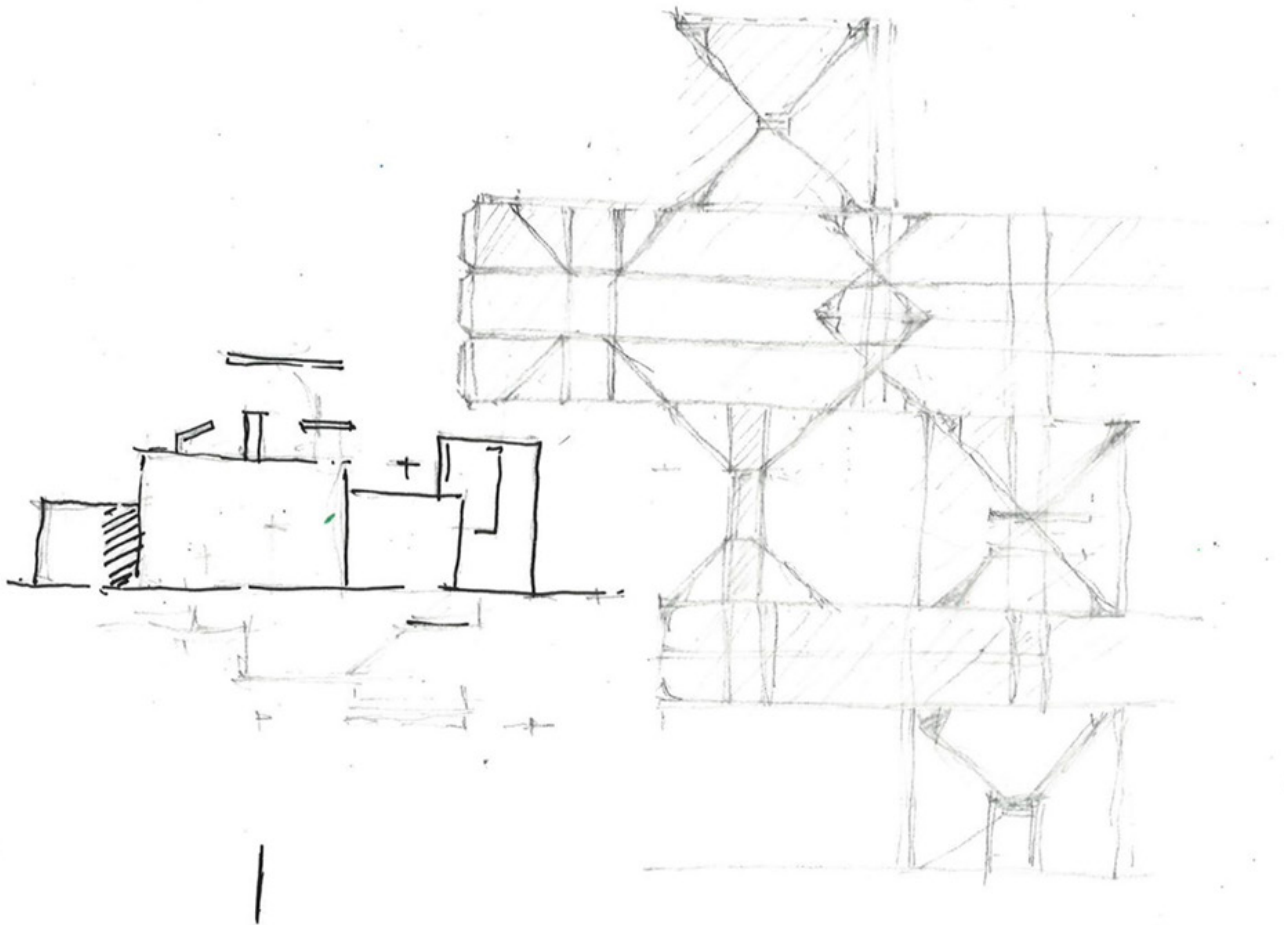
# /References



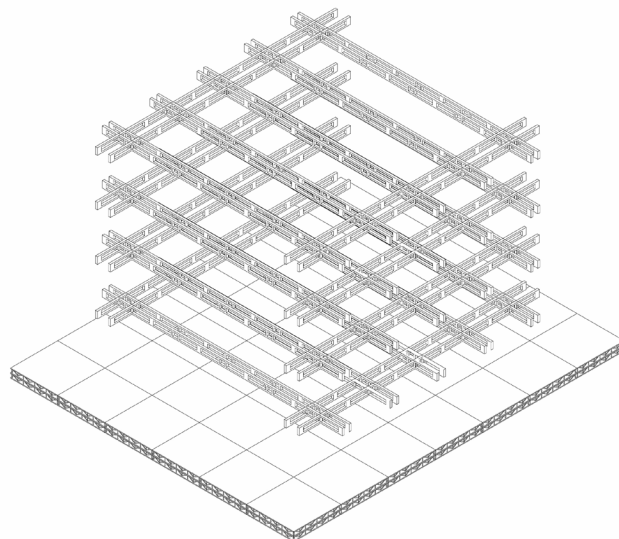
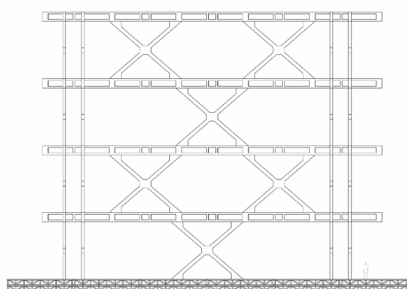
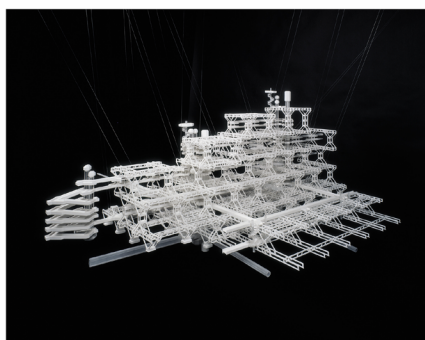
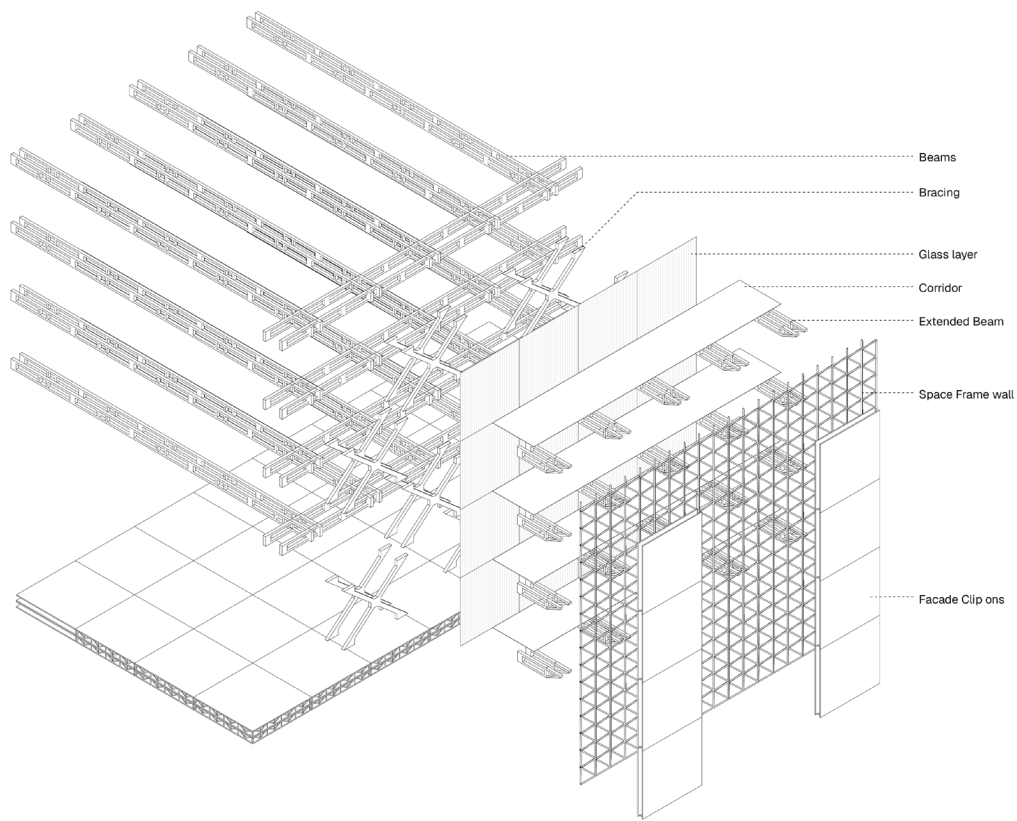
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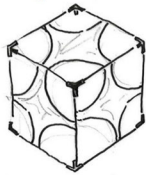




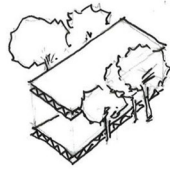
- wall section fine for paper
- Roof. large span Kuraat Wachsman
- 3 Dimensional joint as part of the wall & floor system. - Kuraat



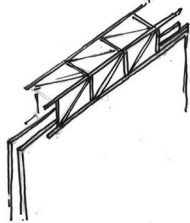
CLIMATE ENCLOSURE



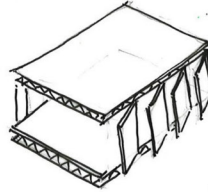
TENSIONED MEMBRANE



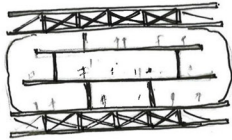
SOFT ENCLOSURE



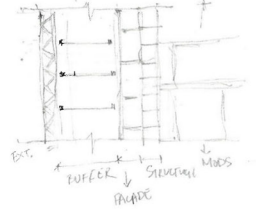
SLIDING PANEL



LOUVRED SIDES



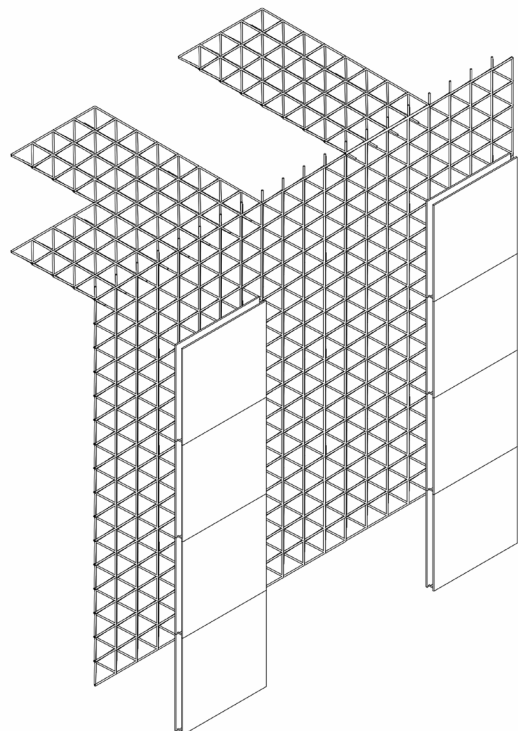
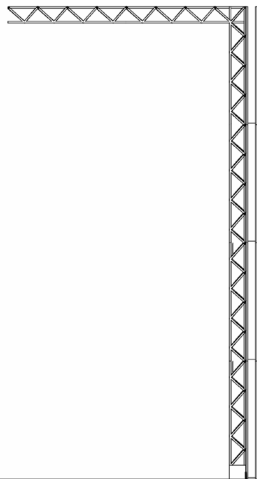
INFLATABLE INSERT

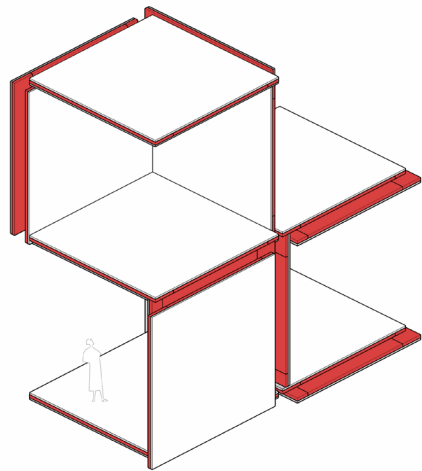
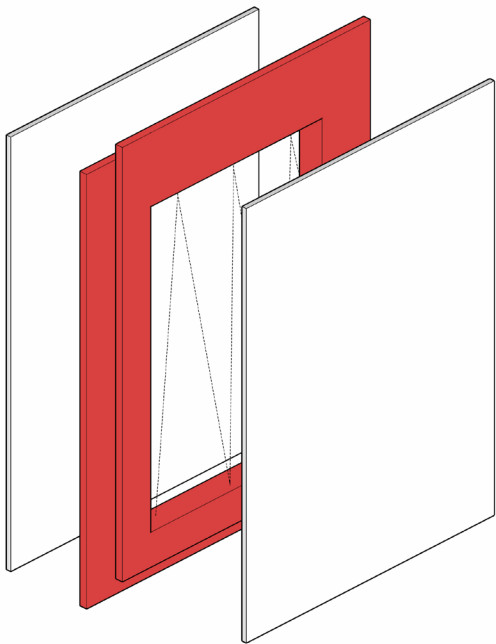
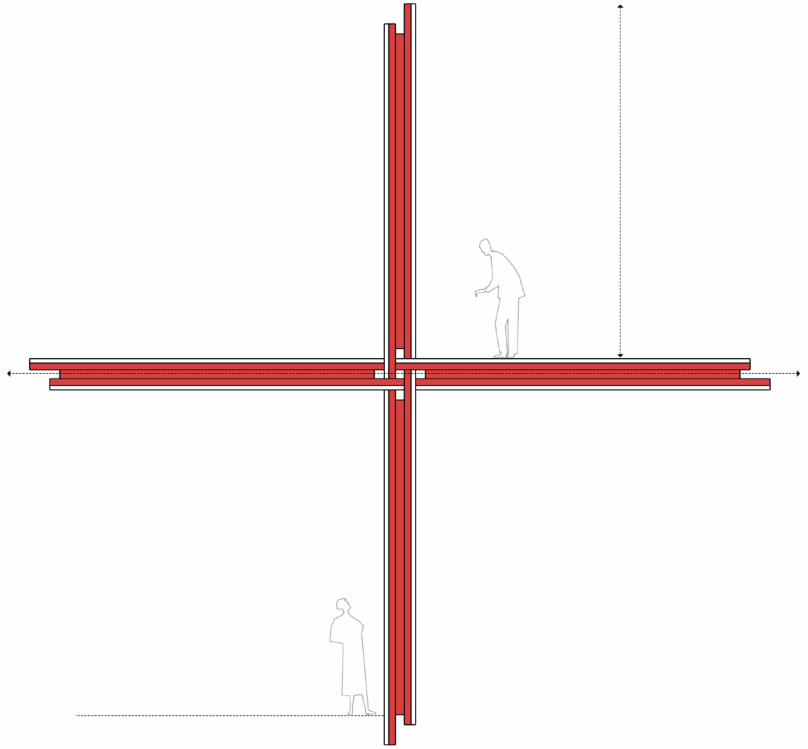
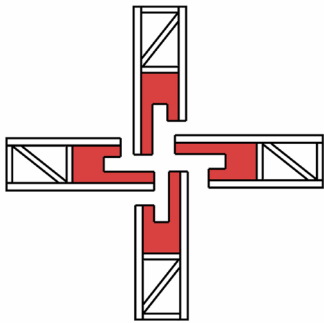
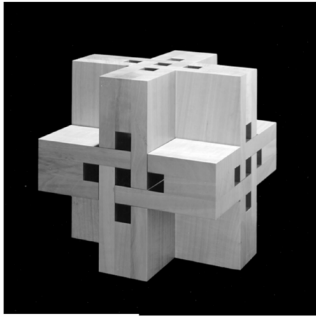


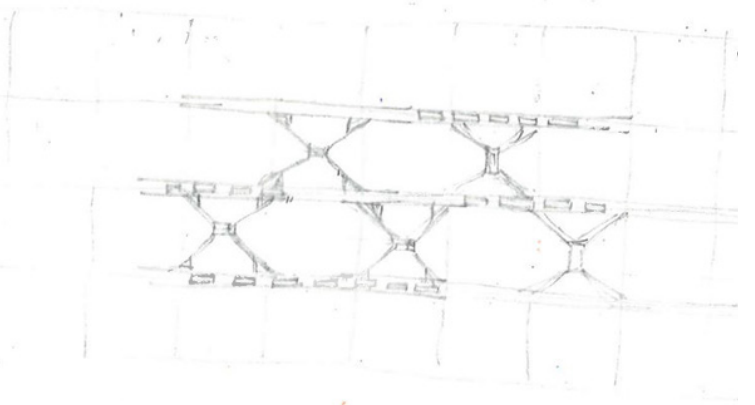
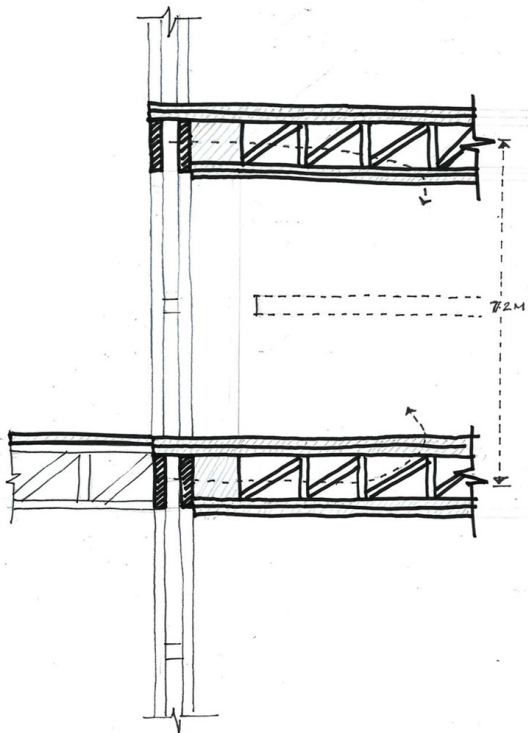
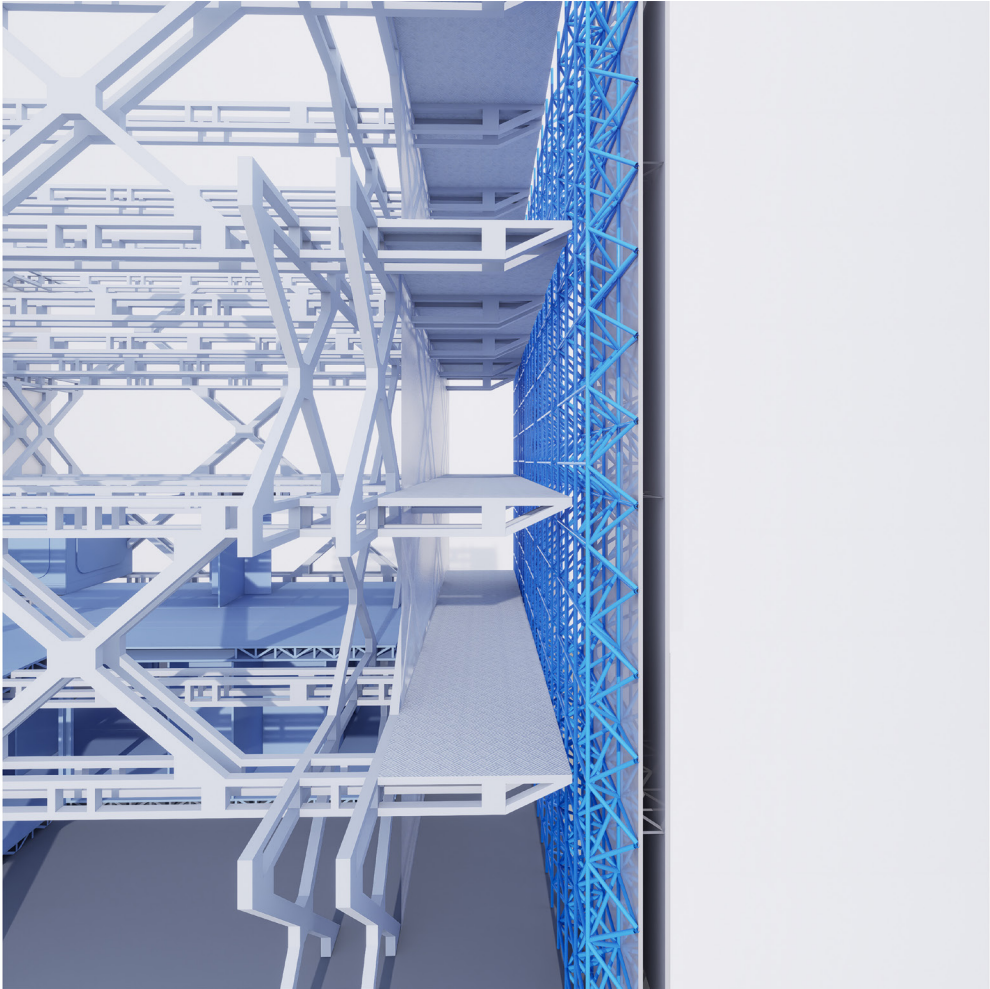
ROOF & SEVERAL MASTS MADE

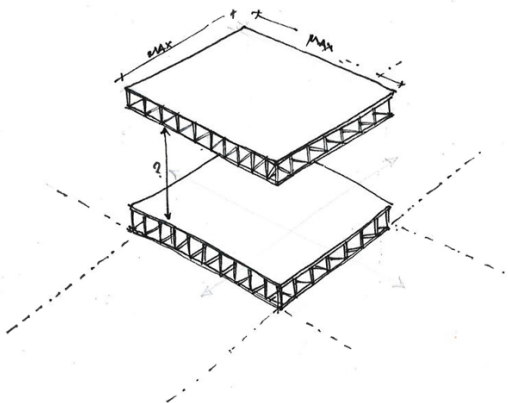
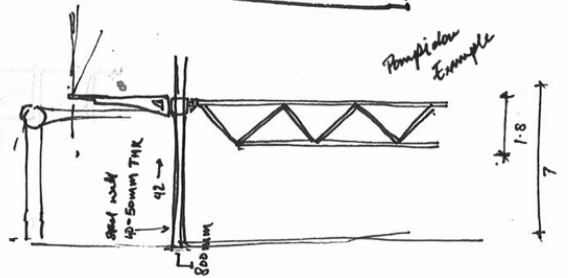
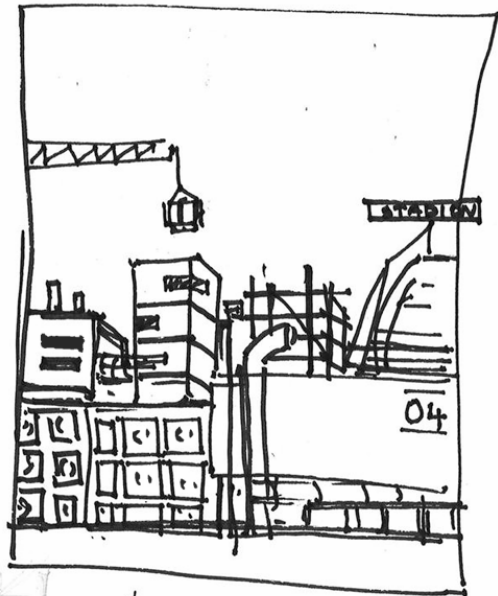
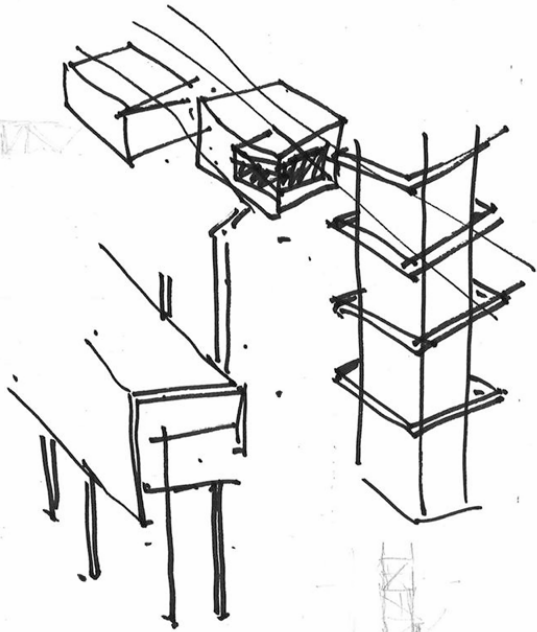


- Project criteria → metrics
- Project goals
- Dimensions
- Housing layout
- Spat layout
- Elements
- Foot for functional
- criteria assignment

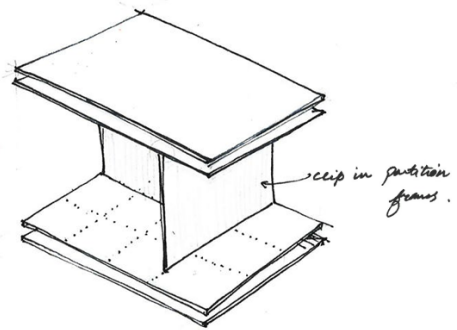








MODULE I -  
 - Free flexibility  
 - Exhibit, workshops, ...

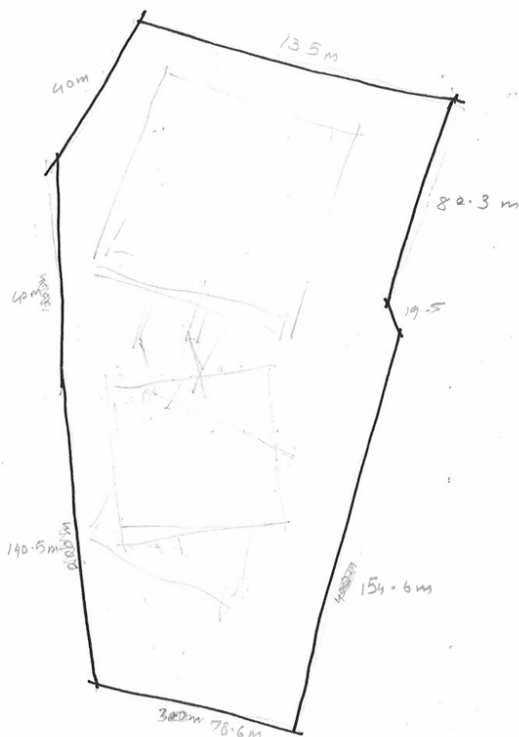
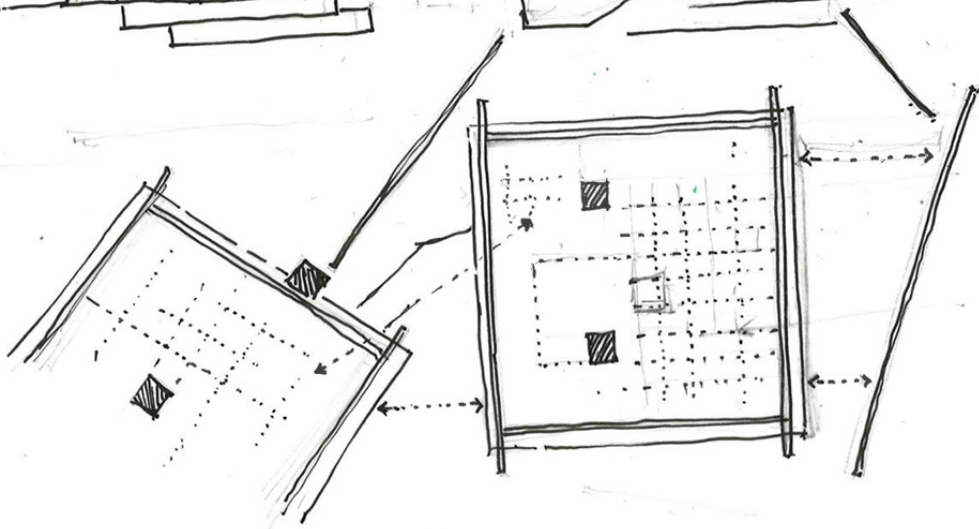
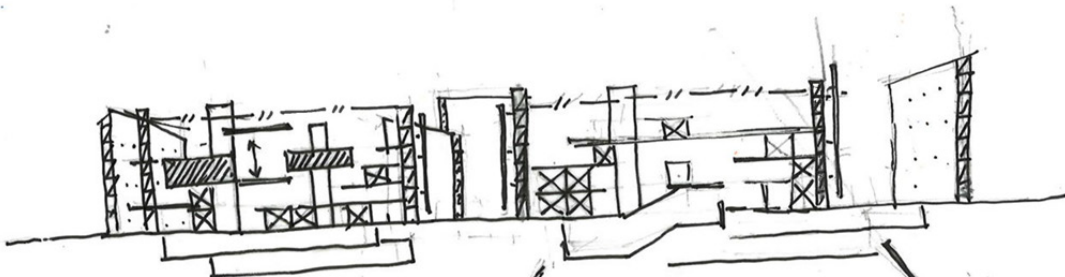


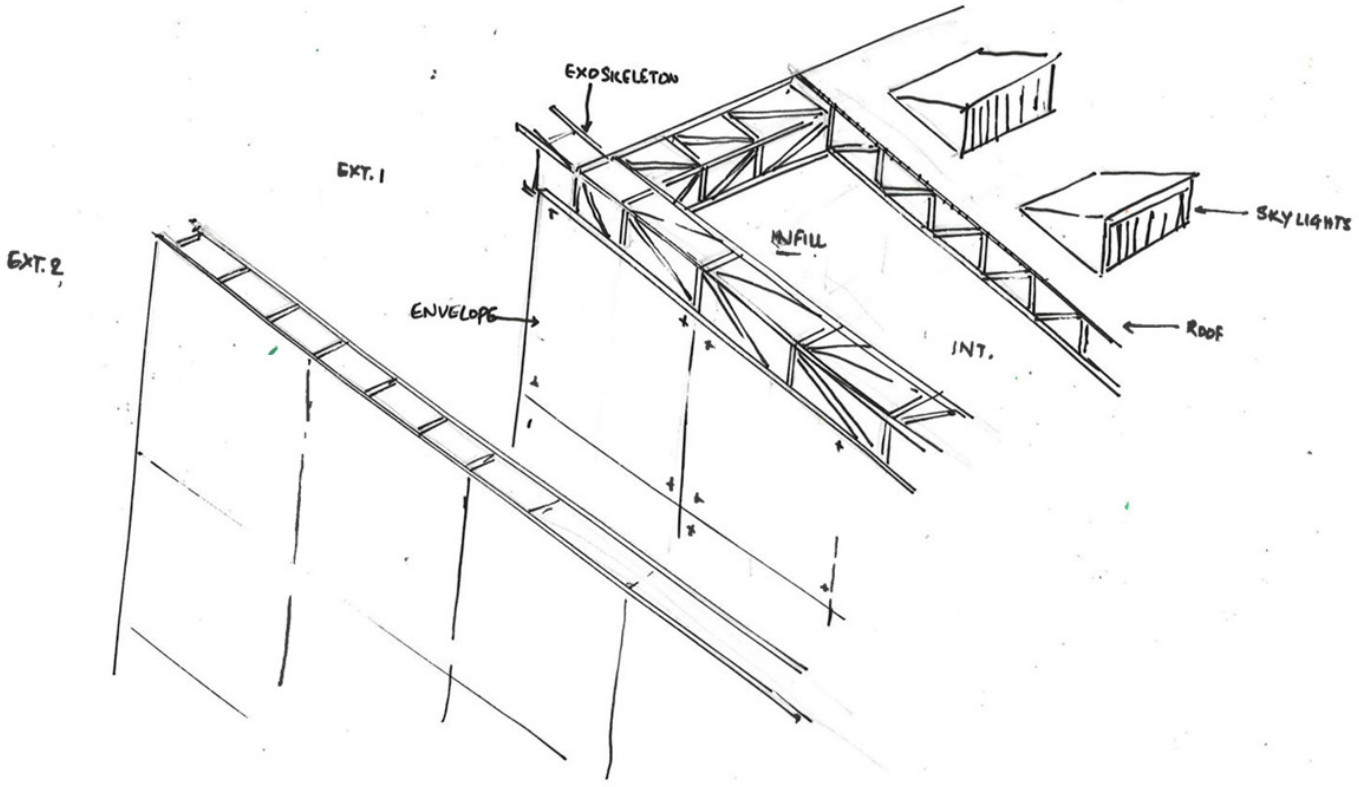
MODULE II  
 - Rail grid system within module  
 - Floor recessed channels.

Building plan view

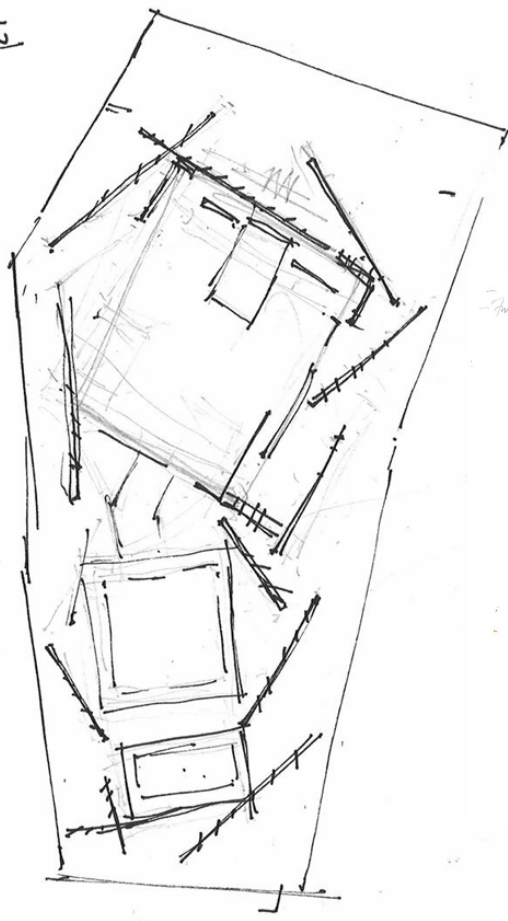
(see angle glass) W

E (Morning light)



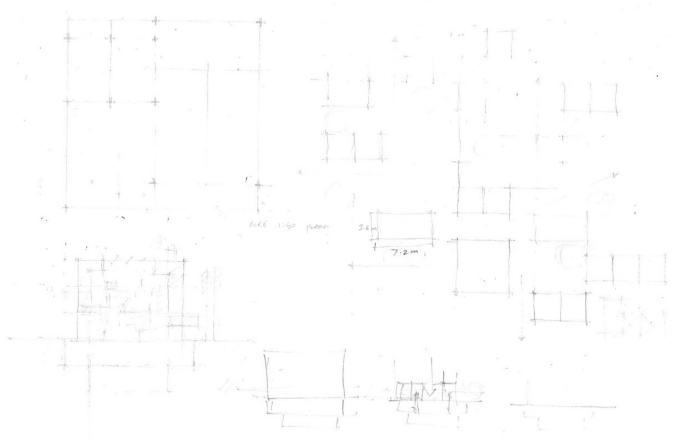


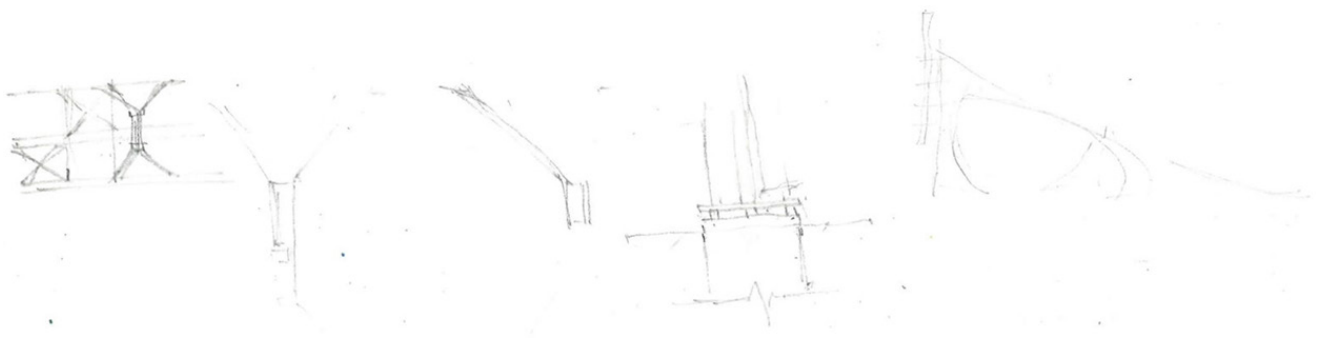
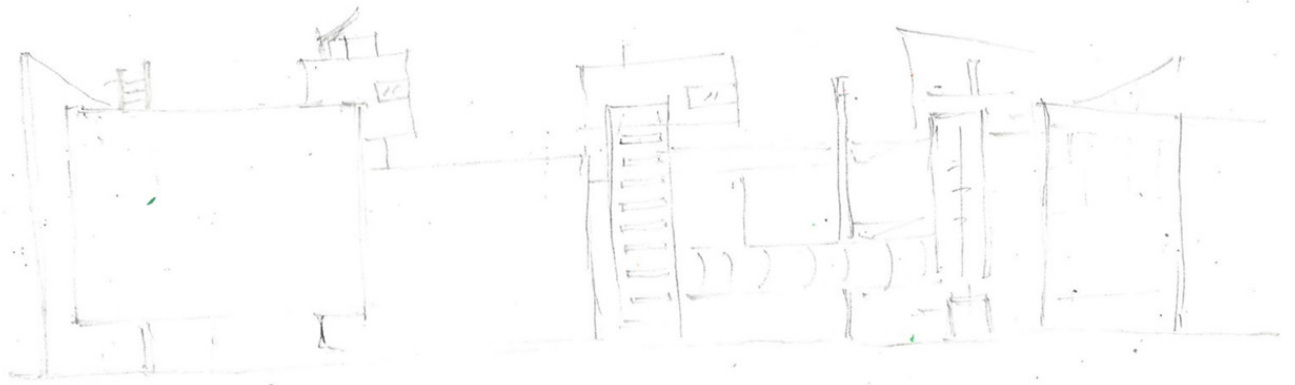
STADIUM



TOWER EXPO 70  
OSAKA.

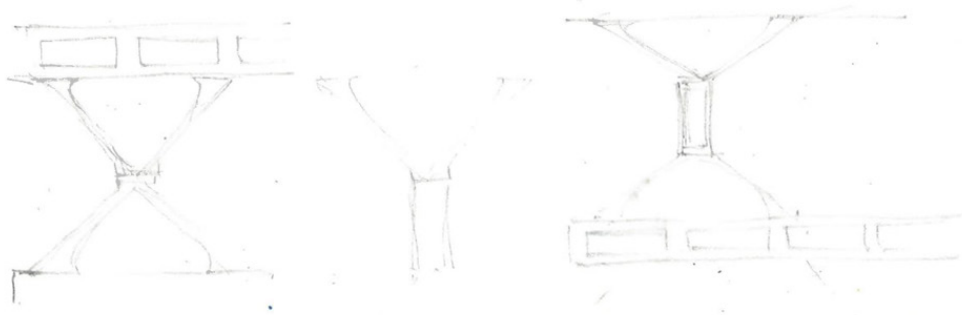
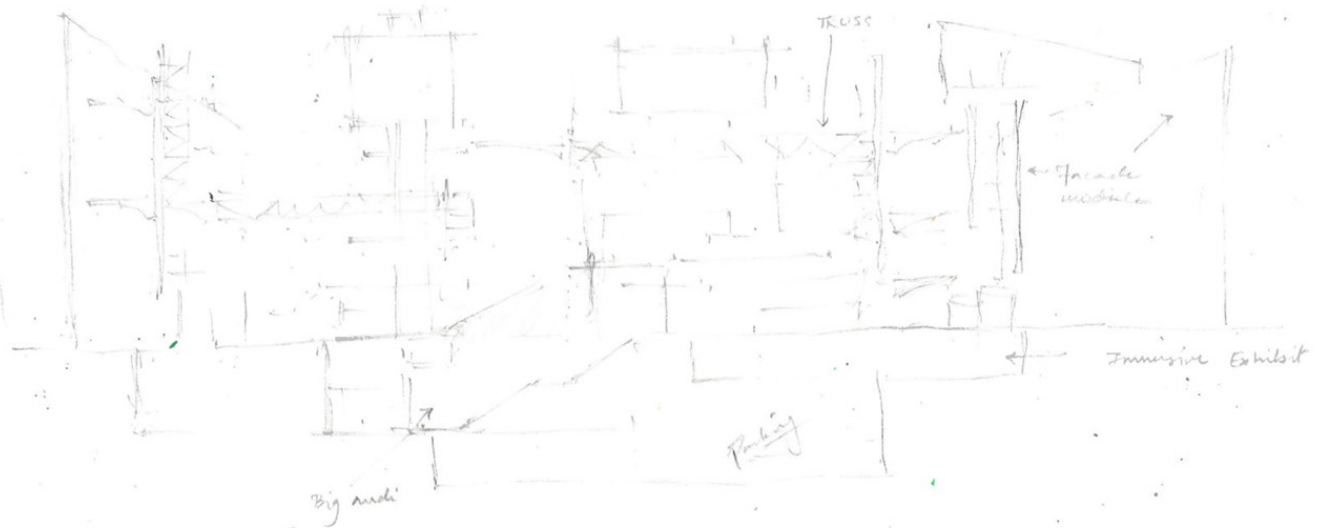
USAKI 01/17/70  
Familiar layout roof





Primary truss

Evolving Area



How permanent structure connects to replaceable units.

Proof of system viability

Not — what variations can happen?

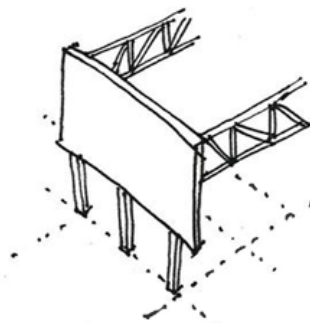
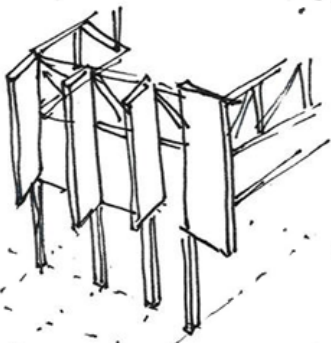
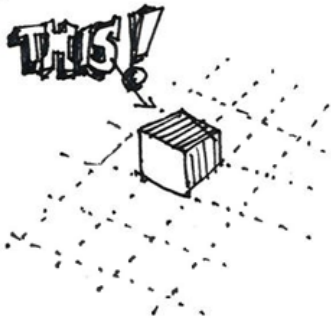
Permanent framework + replaceable occupation.

Optimise the kit of parts

Add elements without structural compromise.

1. Facade variations — based on the direction.  
Also its connections.

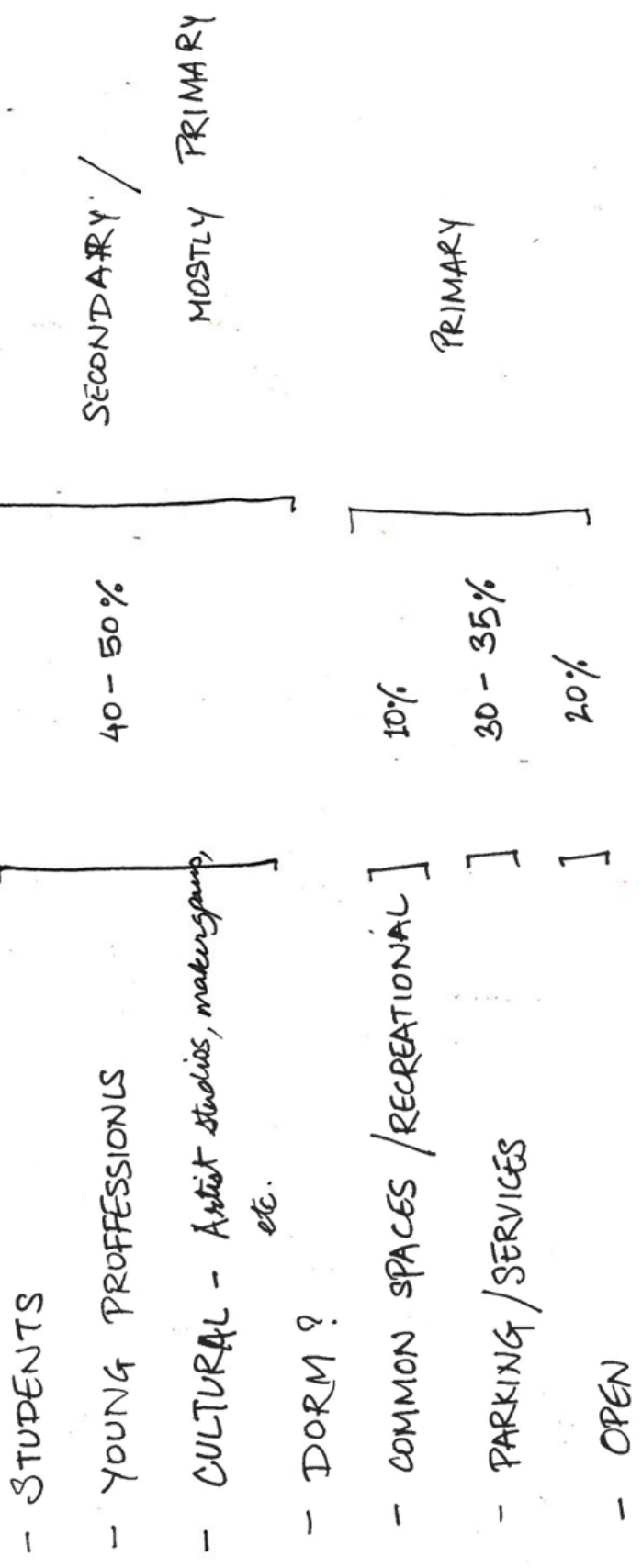
2. A unit module. within a specified grid.  
— Its capacity to Reconfigure.



Stable skeleton (Framework) + Movable interior (the unit) + Negotiable exterior (The facade)

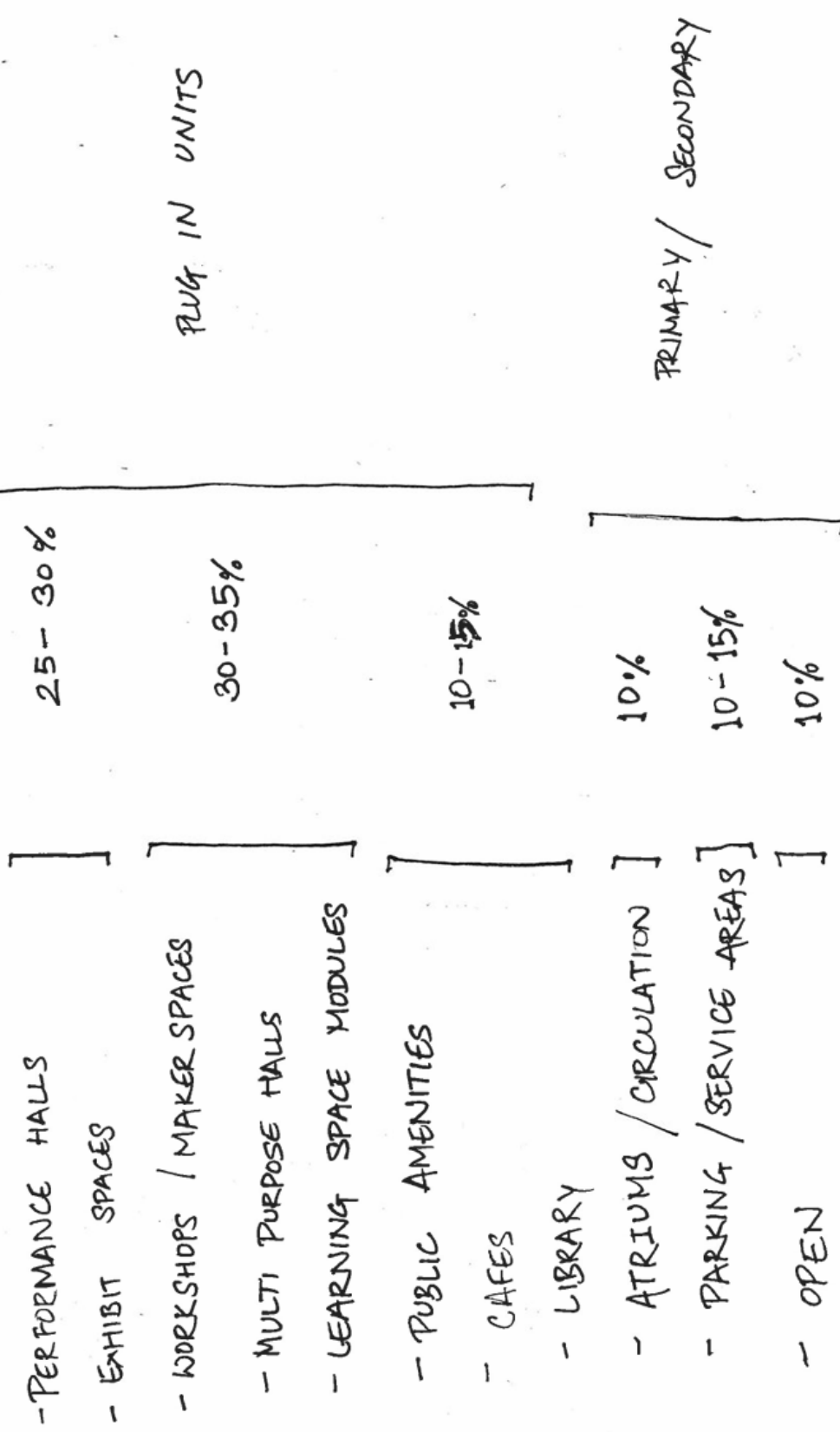
PARCEL II" - 11,600 Sq. M.

RESIDENTIAL + SUPPORT



# PARCEL I - 36,300 m<sup>2</sup>

## CULTURAL + EDUCATIONAL



2.2

SCENARIOS

- CULTURAL HEAVY
- LEARNING HEAVY
- RESIDENTIAL HEAVY
- MIXED + PARTIAL VACANCY
- 2070

COMMON THING

- SAME STRUCTURE
- DIFFERENT INFILL
- SAME RULES



OUTPUTS TO TEST  
/COMPARE?

THE CAPACITY OF CHANGE



SYSTEM BEHAVIOURS

- CEI
- Variety of Elements
- Diff in movements
- Spans
- loads
- Spines
- location
- location
- location

## CRITERIAS

- HOW TO BUILD?
- HOW DOES IT PERFORM?
- HIERARCHY ?
- SPATIAL ORDER / SEQUENCE PERHAPS
- WHAT KIND OF ATMOSPHERE DOES IT PRODUCE?

MUST BE

- MEASURABLE
- TESTABLE ?

## TECH

- CLEAR STRUCTURAL GRID
- INDEPENDENT SERVICE SPINE
- MODULAR ATTACHMENT LOGIC
- SCENARIOS OF PROGRAM CHANGE
- SIMPLE, FAST, ACCESSIBLE CONNECTIONS.

GROUNDING IN MEASURABLE LOGIC

- PROGRAM SCENARIOS
  - STRUCTURAL REUSE
- ↓  
HOW MUCH THO?

2.1

PRIMARY STRUCTURE  
(LONG LIFE)

FIXED RULES

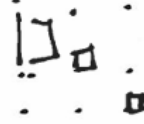
- STRUCTURAL GRID
- MAX. SPAN
- FLOOR PLATES
- KIT OF PARTS

- AD
- CATE
- KIT
- POST

SECONDARY SYSTEMS  
(MED. LIFE)

MAY SHIFT, BUT WITHIN LIMITS

- CORES
- HORIZ. CIRCULATION
- SERVICE ZONES
- ACCESS



PLUG IN UNITS  
(SHORT LIFE)

HIGHLY VARIABLE

- UNIT DEPTH, HEIGHT, WIDTH
- ATTACHMENT POINTS
- SUBDIVISION LOGIC

- Technical manuals
- cat. of elements

FOLIES

GRID OF 120 M INTERVALS

SYSTEM OF POINTS THAT POSSES THE STATUS OF 'OBJECTS' THAT  
ACTIVATE SPACE & EMPHASIZE 'OCCURRING EVENTS'.

[THE SCIENCE MUSEUM & THE GRANDE HALLE]

WIDTH OF 50M . 5, 10, 25 OR 40 . GUIDE FOR EFFICIENT CHANGE  
& REPLACEMENT WITHOUT DISRUPTING THE WHOLE SITE.

COORDINATE AXES (COVERED GALLERIES)

RANDOM CURVÉ (CINÉMATIIC PROMENADE)

ANTI CONTEXTUAL

PARC DE LA VILLETTE

CULTURE HOUSE EEMHUIS, AMERSFOORT.

(CULTURAL + EDUCATIONAL) — 15,000 m<sup>2</sup>.

FUNCTIONS

- ART SCHOOL (MUSIC/VISUAL/DANCE)
- LIBRARY
- EXHIBITION SPACES
- HERITAGE CENTRE

CENTRE POMPIDOU, PARIS

8,000 m<sup>2</sup>

- WIDE CLEAR SPANS
- INTERNAL FREEDOM
- SERVICE OUTSIDE
- PROGRAM INDEPENDENT OF STRUCTURE
- VISIBLE & PERMANENT INFRA.

SESC POMPEIA, SÃO PAULO

- PUBLIC MEGA SPACE WITHIN FRAMEWORK

- PROGRAM FLEXIBILITY BUT STRUCTURALLY GROUNDED.

- INFRA AS A LIVING ROOM.
- LARGE SPAN INTERIORS
- RAW AESTHETIC?

NEXT21 HOUSING, OSAKA

- FIXED FRAMEWORK (CONCRETE)

- CUSTOMISABLE INFILLS
- ~~PER~~ CONFIGURABLE UNITS

- FLOOR PLATES INDEPENDENT OF PRIMARY FRAME

### NAKAGIN CAPSULE TOWER - TOKYO

- 140 CAPSULES 1,000 m<sup>2</sup>
- PERMANENT CORE
- REPLACEABLE CAPSULES
- ↑ - MECHANICAL OVER-COMPLEXITY
- ↳ - CAPSULES NEVER REPLACED

### FRAC NORD-PAS DE CALAIS, DUNKERQUE

10,000 m<sup>2</sup>

- INDUSTRIAL AESTHETIC
- FREE INTERIOR OCCUPATION
- ART + PUBLIC
- GENEROUS SPATIAL CAPACITY
- INDUSTRIAL MEGA FRAME AS A STRUCTURE

## SPATIAL / AESTHETIC

- MINIMUM VOID %
- DECKS / PLATES SPAN
- VISIBLE RHYTHM
- LEGIBLE SPACES
- CIRCULATION EMBEDDED.

FUNCTION  
OBJECT

BUILDING

## TRANSFORMATIONAL (TIME + CAPACITY)

- FLUCTUATIONS
- CONVERTABILITY OF SPACES.
- PRESERVED SPACES ACROSS SCENARIOS
- ~~THE~~ SYSTEM COLLAPSE?

SCENARIOS TESTING

If one program changes / disappears  
will ~~it~~ the structure still function?

3. RESEARCH QUESTIONS AS MEASURABLE CRITERIA.

HOW CAN ARCHITECTURE BE OPEN, INCLUSIVE, ADAPTABLE.....??

BUT  
HOW MUCH? HOW FAR? UNDER WHAT RULES?

- 
- HOW MANY PROGRAM CHANGES WITHOUT STRUCTURAL MODIFICATIONS?
  - WHAT SPAN / GRID? → MAX. SUBDIVISION?
  - WHAT %age OF THE BUILDING CAN BE REPLACED WITHOUT SHUTTING EVERYTHING?

CRITERIAS FOR EVALUATION.

- Time based adaptability
- Accessibility of modification
- Degree of program replaceability
- Structural redundancy

## PUBLIC-NESS GRADIENT

SHIFT IN -

- TRANSPARENCY

- DEPTH

- MANAGING MOVEMENT

- OCCUPATION POSSIBILITY

SOUTH (SOLAR GAIN) + (overheating)

NORTH (Diffuse light)

WEST (low angle glare)

EAST (Morning light + Privacy).

Test Parameters

Daylight Depth

Overheating

Acoustic Insulation

visual permeability

Sliding screen, shading cassette, Double skins, kinetic plugs.

## UNIT MODULES (CULTURAL + EDUCATIONAL)

- Distributed micro-Occupation

↳ Partitions attach/detach easily.

Acoustics?

Circulation

Service Support (ide secondary).

Maximum fragmentation capacity

- Collective Occupation

↳ All the modules merge into one perform space.

or uniform distribution.

→ large clear spans possible?

partitions fully retractable

crowd density

Maximum spatial unity capacity.

- Vertical Mutation

↳ Does load transfer allow selective subtraction?

Mezzanine floors.

institut du Monde Arabe - Responsive displacement system

Kiefer Technik Showroom - Dynamic facade panels

Mechatex Prado - interactive / Public edge.

Case Studies

FUN PALACE

- ULTIMATE ADAPTABLE ARCHITECTURE
- CONSTANTLY RECONFIGURABLE SYSTEM

LIMIT TO CONCEPTUAL /  
INSP STUDY

NO REAL EVIDENCE  
OF A SUCCESSFUL SYSTEM

FAILS

- NO FEASIBILITY
- EXTREMELY FLEXIBLE — LACK OF ARCHITECTURAL CONTROL
- UNCLEAR SPATIAL HIERARCHY

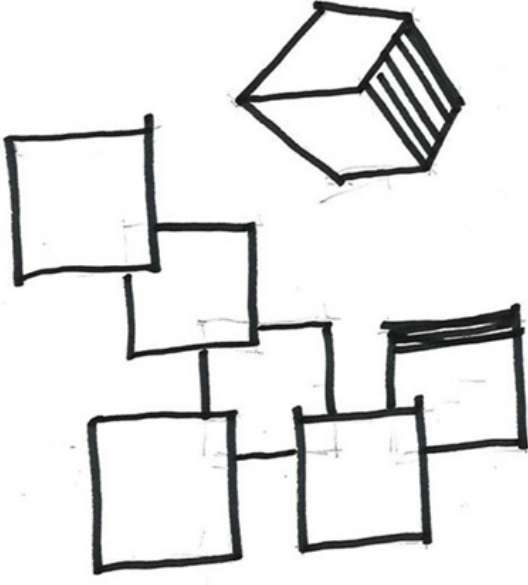
TOTAL FLEXIBILITY RISKS BECOMING UNMANAGEABLE / UNBUILDABLE

## HABITAT 67

- MODULAR, ADAPTABLE HOUSING
- AGGREGATION OF UNITS

### FAILS

- EXTREMELY EXPENSIVE
- COMPLEX CONSTRUCTION
- MODULES NOT ACTUALLY RECONFIGURABLE AFTER CONSTRUCTION
- SYSTEM BECOMES FIXED



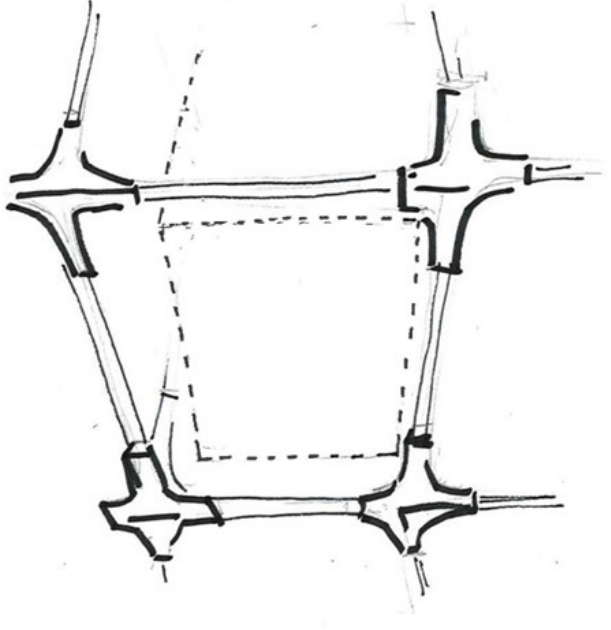
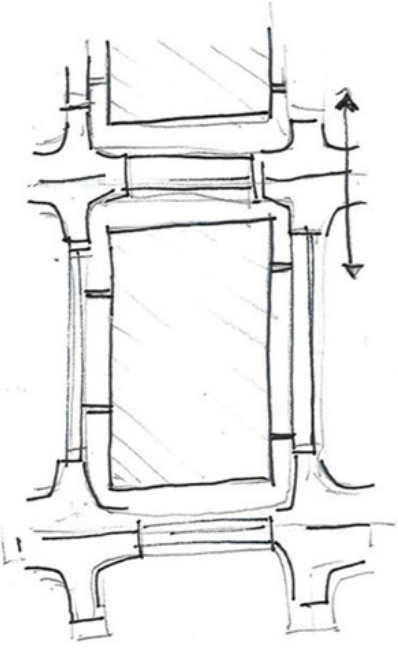
- Modularity does not equal adaptability unless change is physically possible after construction.

FAILURE

YAMANOTE HOUSING - METABOLIST OSAKA EXPO 70'

- COMPACT ADAPTABLE UNITS
- DENSE MODULAR LIVING

- FAILS
- TOO SMALL UNITS →
  - POOR LIVING QUALITY
  - LACK OF SHARED / IN BETWEEN SPACES
  - INDIVIDUAL UNITS SEEMED ISOLATED!



# CENTRAL BEHEER

- OPEN BUILDING LOGIC
- MODULAR OFFICE CLUSTERS



## FAILS

- DIFFICULT TO ADAPT NEW PROGRAM.
- NO OTHER FUNCTION THAN OFFICE USE
- SYSTEM IS BOUNDED BY SPECIFIC USE PATTERN.



ABANDONED

STRUCTURE IS PERFECT!

PROGRAMMATICALLY RIGID

