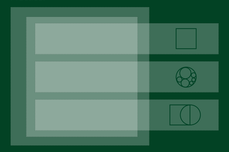
Framework Handbook for Architects and Real Estate Investors

Pushing Beyond Conventional Investment Processes, Enabling Greater Value Co-Creation in the Urban Residential Investment Practice.



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AR4CFA010 Cross Domain City of the Future
Graduation Studio (2025/26 Q2)
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The Handbook is the ultimate tool for both practices to evolve typological supply. This exhibition presents the architectural design outcome when applying the integrated framework in Zurich, Switzerland.

A detailed elaboration can be found in the printed handbook.

The Problem Addressed by the Design

The residential housing market indicates a growing housing shortage in the urban fabric of European cities, accompanied by changing household compositions and living needs. The analysed typological supply does not reflect this shift, widening the supply-demand mismatch. Investors and Architects continue to supply traditional typological patterns; this is not a single-practice problem, but rather a knowledge gap between two interdependent practices. The Handbook defines an integrated framework to help close this gap and co-create greater value for Investors, Architects, Residents, and society in general.

Demand -> Supply

The key method of the architectural design is to understand what the targeted segment demands, reinterpret it, and design accordingly. New typological supply, to reduce market mismatch, must address the specific needs of location- and segment-specific demand.

1. Proportional Space Distribution Between Functions

The key functions within residential typologies are:

- **Sleeping**
- **Hygiene**
- **Recreation/ Cooking**
- **Storage**

The household-demanded space distribution has shifted, as identified in the household questionnaire survey yconducted in Zurich, Switzerland. Thus, the design pays close attention to addressing these evolved demands, with spatial quality as the primary design tool.

2. Distinguishing Serving Space and Space to Be Served

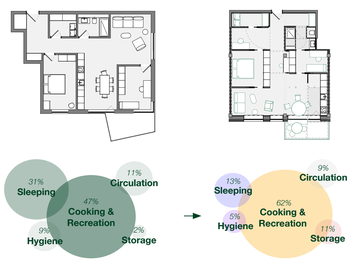
The Key Definitions:

- **Function:** The space required for the functional elements themselves.
- **Serving Space:** The space required for the function to be used accordingly.
- **Space to be Served:** The space that needs to be served by the resident and does not fulfil a specific function.

The current typological supply in Zurich demonstrates that spatial adequacy is not prioritised, as shown in the example below. The design carefully analyses and develops spatial quality adequate to residents' needs. Urban fabric densification must occur in an adequate manner at every scale.

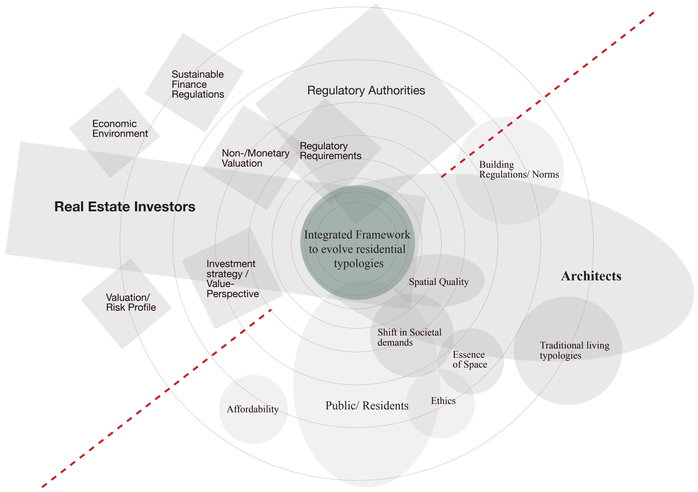
3. The Evolved Typology for the Targeted Segment

The following design presents the evolved typology and its context in detail. It demonstrates how the architect can design a typology for the Zurich context that challenges financial assum- ptions and pushes conventions. The iterative process, research by design, is crucial for developing designs that meet demand, create spatial quality, and build investor conviction to invest in not-yet-monetary value.



Example Typology Supplied in Zurich

Evolved Typology for Zurich



Potential Urban Placement Urban Placement - Scale 1:1.000

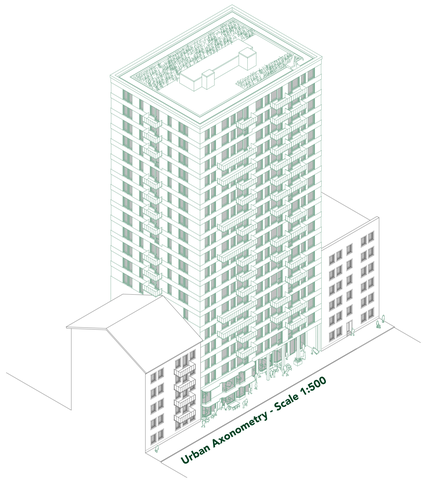
Urban Fabric Map - Scale 1:15.000

Targeted Segment

The targeted segment comprises one-to-two adult households, whether single adults or couples. The typology accommodates up to four individuals, though a single bathroom is provided, designed with multi-use in mind. This segment was identified through market research and the precise analysis of the typological supply-demand mismatch. Household composition data reveals that the largest growth over the past decade has occurred in one- and two-person households. Yet the current typological supply continues to be designed for two adults with one or two children. This creates a direct competitive conflict: families, typically with lower purchasing power, are forced to compete with one-to-two adult households, typically with higher purchasing power, for the same typological supply.

The result is the systematic displacement of families toward the urban periphery, driven by typological misalignment rather than absolute shortage.

This design directly addresses that mismatch by developing an evolved typology for the one-to-two adult household, calibrated to their spatial demands while remaining adaptable to shifting household compositions. The typology accommodates change up to a defined threshold: once a child born within the household grows to require an independent room, the typology may no longer be suitable, at which point the household can transition to a conventional apartment, freeing the unit for incoming one-to-two adult households.



Urban Axonometry - Scale 1:500

Urban Embedding

The city is broadly segmented into four urban fabric typologies. The most suitable potential for this design lies within the perimeter block fabric, characterised by five-to-ten-storey mixed-use buildings at medium density. The proposed placement illustrates an example approach an investor could adopt when targeting a redevelopment as an investment strategy in Zurich.

Zurich's built environment is characterised by a traditional typological palette, limited high-rise development, with perimeter blocks dominating the areas immediately surrounding the historic centre. The proposed placement challenges the conventional redevelopment height of five to ten storeys by introducing an eighteen-storey punctual densification, opening a productive discussion about the potential of vertical intensification within established urban districts.

1 - Old Town
<5 floors
mixed use
high density

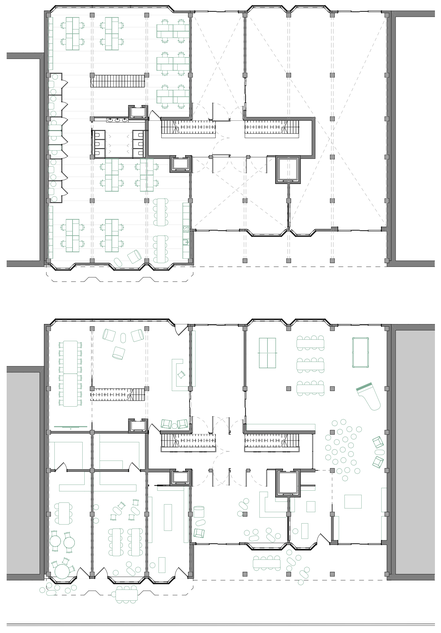
2 - Perimeter Blocks
<10 floors
mixed use
medium density

3 - Garden Districts
<4 floors
residential use
low density

4 - Con. Densification
>10 floors
mixed use
very high density

Current Data of Zurich's Building Stock

Floors	*% of buidling stock*
0-5 floors	72,1%
6-10 floors	27,2%
11-20 floors	0,6%
21- floors	0,1%

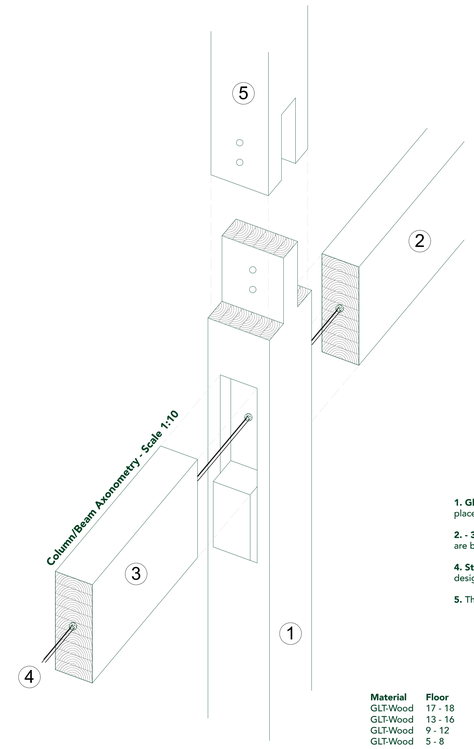


Ground Floor Plan including Mezzanine Level - Scale 1:200

Construction Method

The construction system has been developed along two parallel objectives: sustainability and scalability, and the honest use of materials according to their structural capabilities. The primary structural system is a prefabricated glued-laminated timber (GLT) construction, using beams, columns, and floor panels. Column dimensions are reduced at higher levels of the building, reflecting the actual structural loads and avoiding the waste of material resources.

The beam-column joint was a central design challenge. Various timber joint configurations were explored, each encountering the same constraint: the material resources required to achieve all structural demands within a single connection. The adopted solution draws on ETH Zurich-inspired steel-tendon construction, a hybrid approach that reduces material consumption by exploiting timber's compressive capacity and steel's tensile capacity within a single, efficient joint.



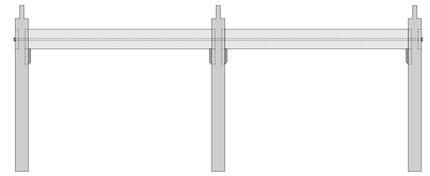
1. Glue Laminated Timber Column placed ontop of the previous floor

2. - 3. Glue Laminated Timber Beams are being incerted between the columns

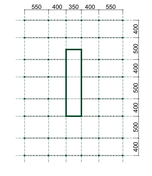
4. Steel Tendons are feed trhough the designated path, to bring tension alive.

5. The Next Floor can be build up

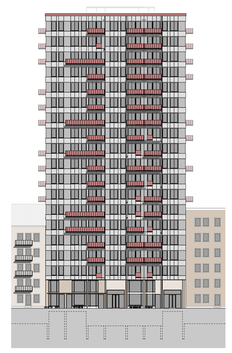
Material	Floor	Column	GLT-Beam
GLT-Wood	17 - 18	260 × 260 mm	180 x 450 mm
GLT-Wood	13 - 16	280 × 280 mm	180 x 450 mm
GLT-Wood	9 - 12	300 × 300 mm	180 x 450 mm
GLT-Wood	5 - 8	320 × 320 mm	180 x 450 mm
Concret	3 - 4	350 x 350 mm	180 x 450 mm
Concret	1 - 2	400 x 400 mm	180 x 450 mm
Concret	GF	450 x 450 mm	180 x 450 mm



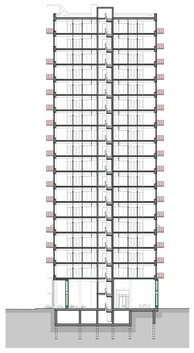
Construction System Diagram - Scale 1:50



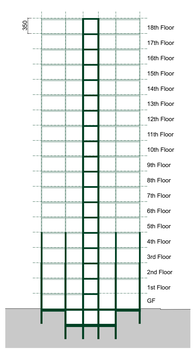
Construction Grid - Scale 1:500



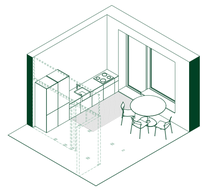
Urban Facade - Scale 1:500



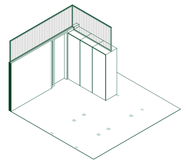
Section - Scale 1:500



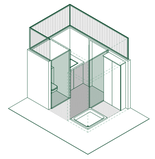
Construction Diagram - Scale 1:500



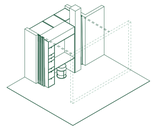
Evolved Kitchen Concept - Scale 1:100



Evolved Sleeping Concept - Scale 1:100



Evolved Hygiene Concept - Scale 1:100



Evolved Storage Concept - Scale 1:100

1. **Core Wall**
010mm - Plaster
200mm - Reinforced Concrete
060mm - Mineral Wool
012mm - Gypsum board (fire-rated)
012mm - Gypsum board (fire-rated)
010mm - Plaster

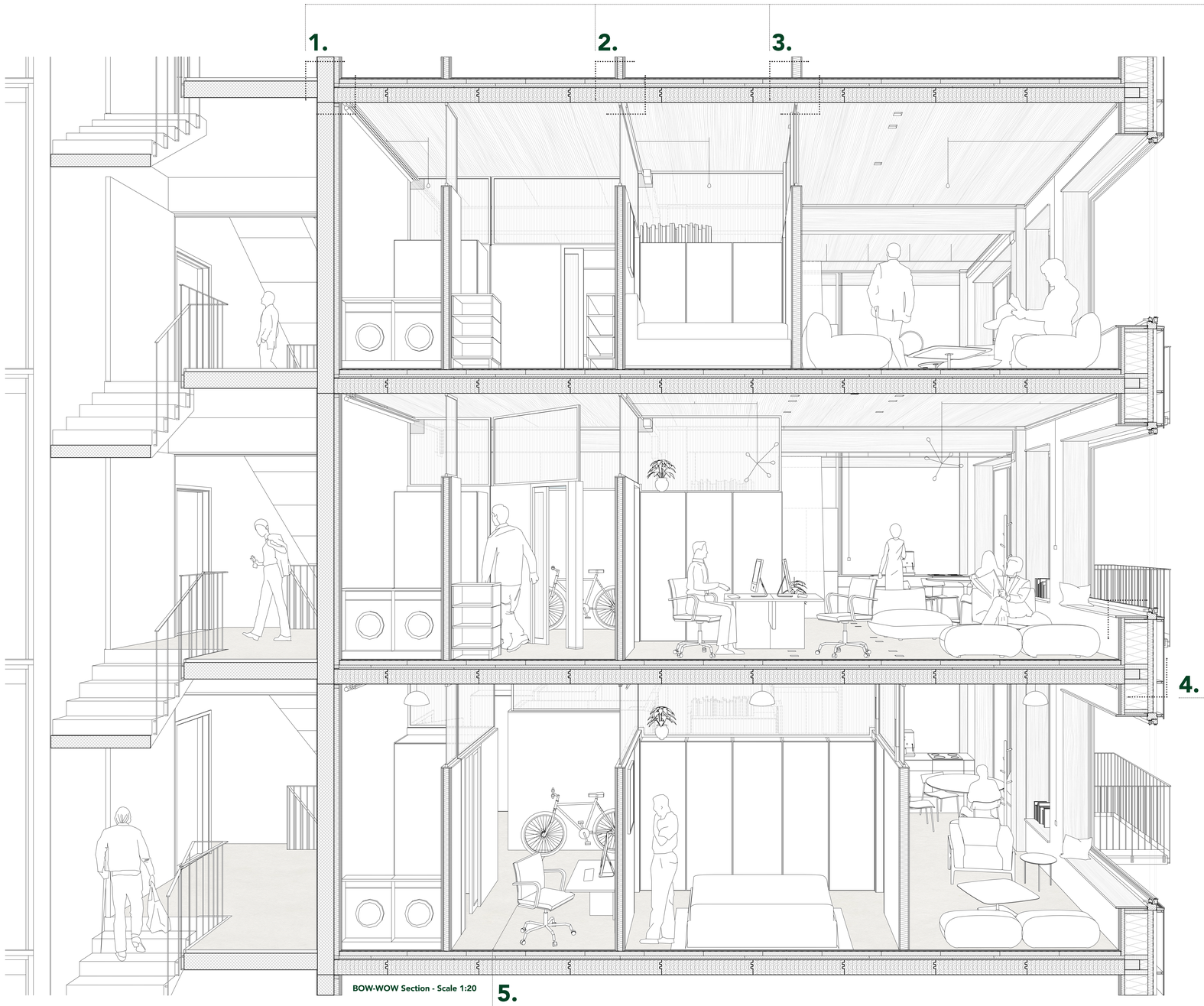
2. **Interior Wall**
010mm - Plaster
012mm - Gypsum board
075mm - Steel studs + infill
012mm - Gypsum board
010mm - Plaster

3. **Adaptable Wall**
010mm - Timber board
100mm - Timber Frame + infill
010mm - Timber/ Polycarbonate board

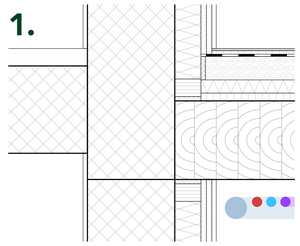
4. **Outer Wall (Facade)**
010mm - Plaster
012mm - Gypsum board
012mm - 3-Layer Timber board
280mm - Timberframe/ Insulation
060mm - Wooden Fiberboard
005mm - Foil - waterproof/ diffusion-open
040mm - Vertical Battening
080mm - Horizontal Metal underconstruction
010mm - Polycarbonate Elemente

5. **Apartment Wall**
010mm - Plaster
012mm - Gypsum board
012mm - Gypsum board
060mm - a Frame + infill
020mm - Air gap
060mm - Timber Frame + infill
012mm - Gypsum board
012mm - Gypsum board
010mm - Plaster

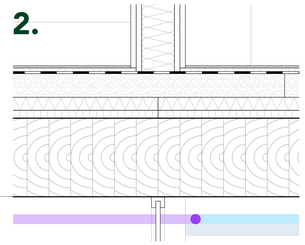
Floor
005mm - Recycled Vinyl
015mm - Timber boards
005mm - Foil underlayer
050mm - Dry screed panel with heating, Timber joists
030mm - Sound insulation
020mm - OSB board
180mm - Glue Laminated Timber Floor (120+60mm)
450mm - Glue Laminated Timber Beam (450x180mm)



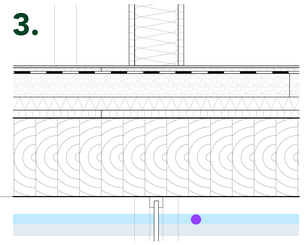
BOW-WOW Section - Scale 1:20



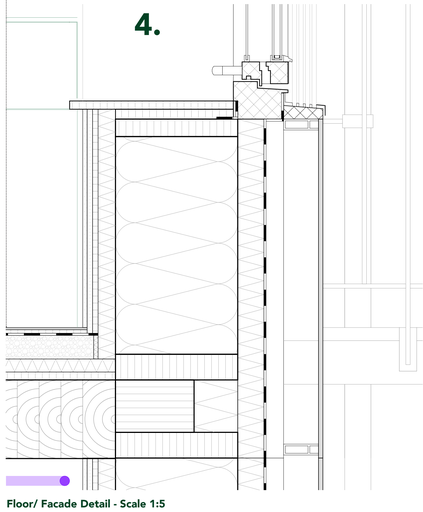
Core/ Floor Detail - Scale 1:5



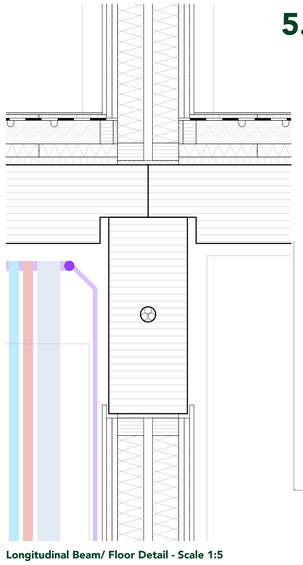
Interior Wall/ Floor Detail - Scale 1:5



Adaptable Wall/ Floor Detail - Scale 1:5



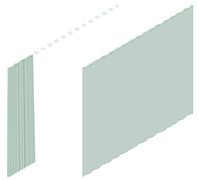
Floor/ Facade Detail - Scale 1:5



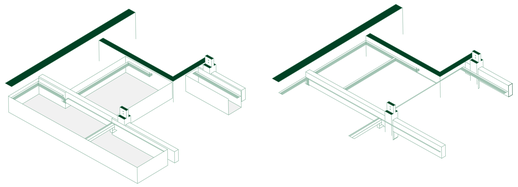
Longitudinal Beam/ Floor Detail - Scale 1:5

Capacity to Adapt - The Configuration

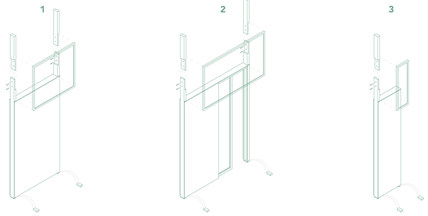
Curtain



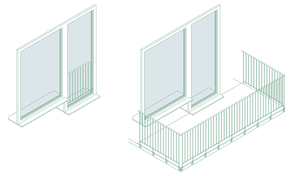
Second Ceiling



Prefabricated Panel



Balcony

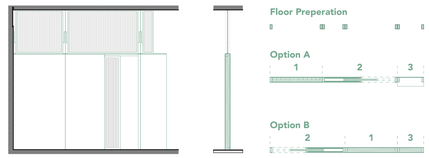


The Configuration

The design is conceived as an IKEA Configurator model. The baseline product is spatially sufficient and contains all essential elements. Depending on the individual occupant's way of living, the wall, ceiling, and balcony can be configured accordingly, with the wall serving as the primary configurative element. Various use configurations are illustrated below, demonstrating the full capacity to adapt.

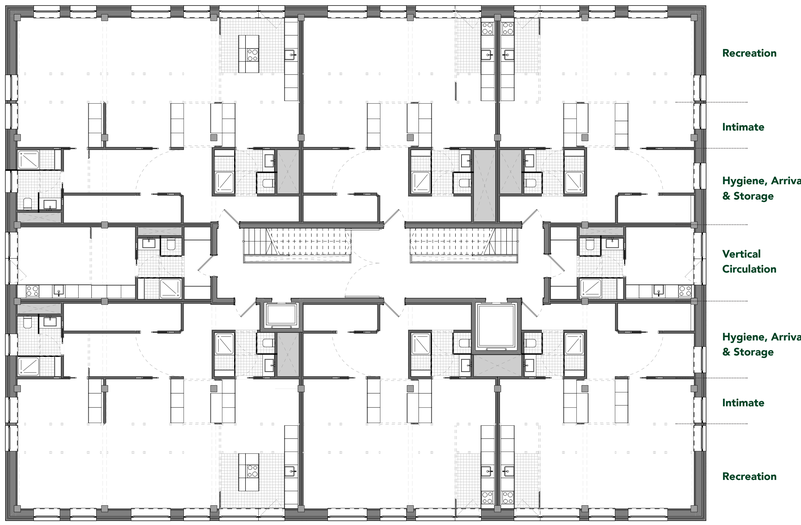
Curtain: The cautious use of curtains wihtin the typological design has enabled the flexibility of space, more sepcifically the multilayered use of space.
Ceiling: The typology features an exposed GLT panel ceiling with visible systems. Should a future resident prefer an enclosed ceiling, the design is prepared to accommodate an additional ceiling layer within the corridor and bathroom, directly adjacent to the vertical shaft, creating an entirely different spatial atmosphere.

Balcony: The typology is designed with two configurations: a French balcony or a full external balcony. Given current household demand for outdoor space, the full balcony is the preferred configuration. However, should future demand shift, the typology is prepared for the French balcony option, with provision for the later attachment of a lightweight metal balcony via the window-cleaning crane mounted on the building's roof.

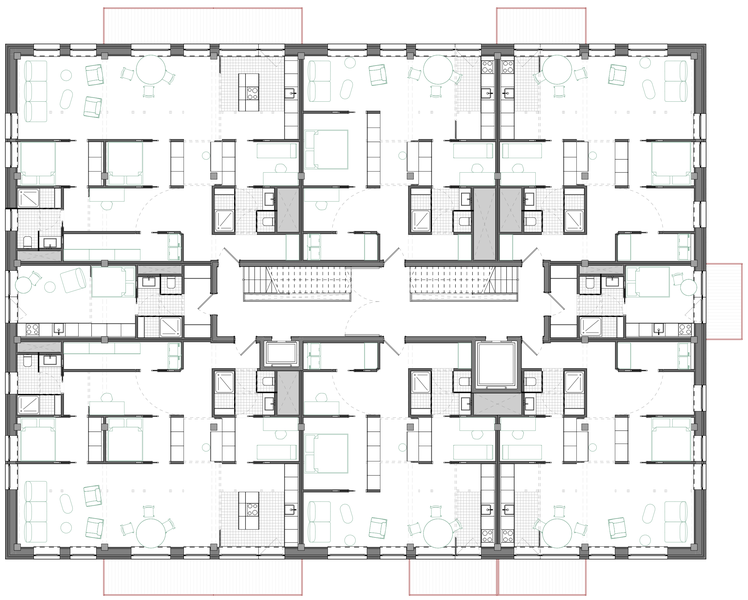


Adaptable Wall Configuration - Scale 1:50

The Wall: The wall is the most critical element enabling the capacity to adapt, and thus the long-term stability of the typology for its target segment. The finished floor incorporates timber interlocks that can be removed to receive three wall panels. The panels are prefabricated, stored in the basement when not in use, and transported to the unit via the elevator. Assembly can be completed by the building's caretaker within a few hours, without specialist equipment or skills. The panels consist of three primary components: the panel itself, the overhead element, and the polycarbonate frame. This element is the operational heart of the typology unlocking its full potential for the resident and providing the investor with a demonstrable future-proofing mechanism.



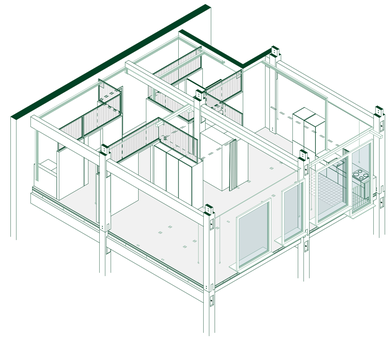
Floor Plan Baseline Configuration with Systematic Zoning - Scale 1:100



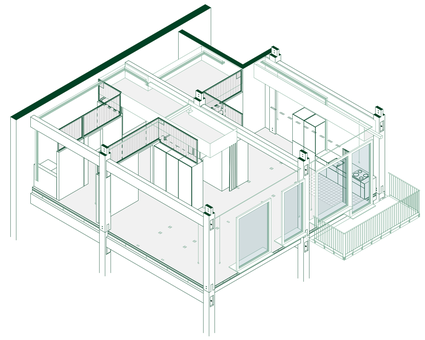
Floor Plan with Additional Configuration - Scale 1:100

Framed View throught the Typology

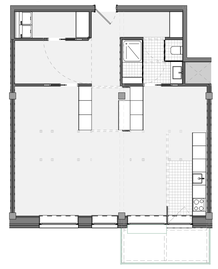
Sequence of Capacity to Adapt

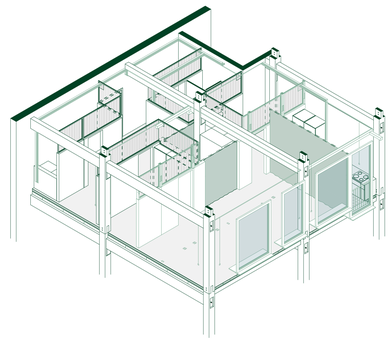


Baseline
Configuration - Scale 1:100

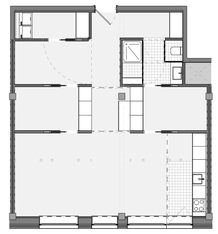


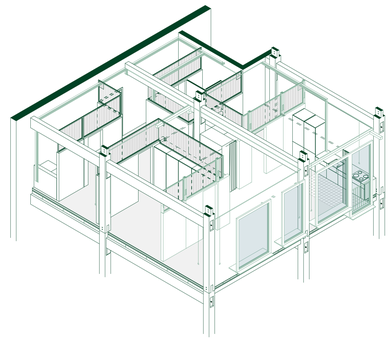
Option A - Second Ceiling
Configuration - Scale 1:100



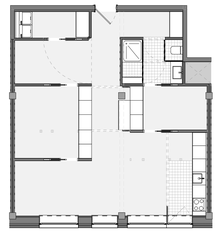


Option B - Closed Curtains
Configuration - Scale 1:100

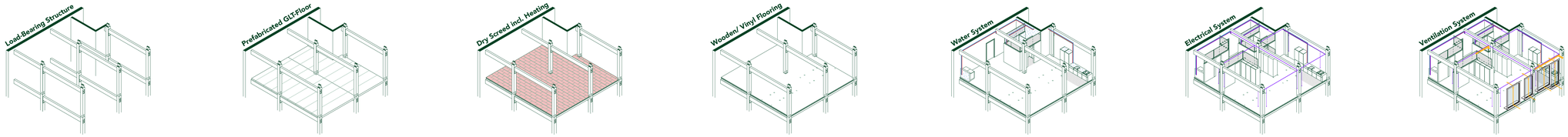




Option C - Large Bedroom
Configuration - Scale 1:100

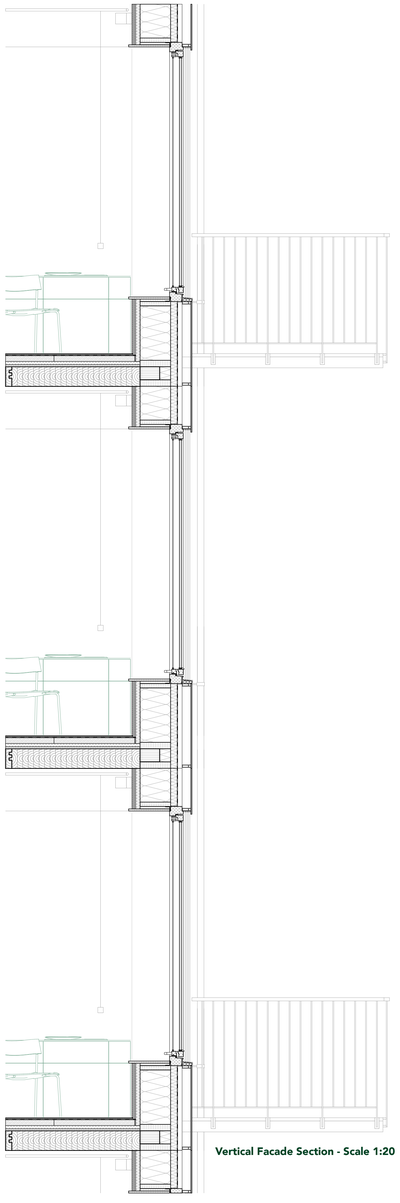


Systematic Build-up



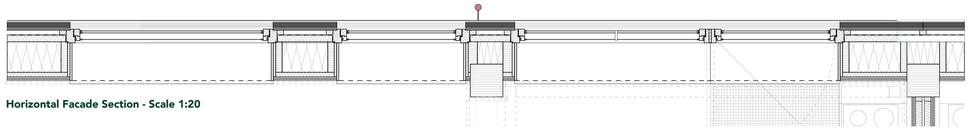
Scale 1:200

Facade Elevation - Scale 1:20



Vertical Facade Section - Scale 1:20

Longitudinal Section - Scale 1:20

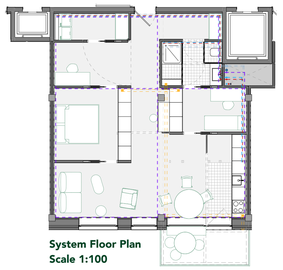


Horizontal Facade Section - Scale 1:20

Systems

The building systems have been designed to be sustainable, resource-efficient, and responsive to the actual demands of the typology, carrying not only functional but also spatial quality. All systems are designed for ease of maintenance, as all construction materials are dry-assembled, significantly reducing on-site build time and simplifying future interventions. The placement of water, electrical, and ventilation systems has been carefully considered to enable adaptability by design, without introducing unnecessary flexibility that would consume resources if left unused by the resident. Full visual documentation of the system build-up is provided in the appendix.

Heating: A low-temperature floor heating system is introduced. Heating pipes are embedded within dry-screed panels, separated by timber elements that simultaneously provide a stable connection for the internal wall structure.
Water: A clearly organised pipe system accommodates grey water for the washing machine, kitchen, and bathroom; a dedicated toilet pipe; and hot and cold water supply to all required connection points.
Electricity: A clear and accessible distribution system, designed to be adapted and extended where required. Given the high dependency of this system on individual occupancy patterns, the capacity to adapt is deliberately legible.
Ventilation: Windows are equipped with integrated natural ventilation systems built into the frame. Mechanical ventilation supplements this, extracting air from the sleeping area, bathroom, and kitchen.
Windows: The windows function not only as ventilation and light elements, but as inhabitable spatial elements in their own right. Their placement and design have been carefully considered to make them part of the building's system and to serve as multifunctional facade components, providing opportunities for recreation and occupation within the window depth itself.



System Floor Plan
Scale 1:100

Facade

The facade is the threshold between the intimate interior and the public exterior. The design proposes a carefully assembled facade using polycarbonate as its primary material. Polycarbonate was selected for its translucent qualities, filtering light differently at different times of day and generating unique facade patterns that respond to the way the resident inhabits the space. An integrated sliding system enables the material to function as a shading device, giving the resident agency over their own representation of the urban environment.

Polycarbonate Facade at Night

The Main Contribution

The primary contribution of this thesis is the knowledge production, through the Handbook, establishing a framework for transforming non-monetary value into monetary value over the long term. This is achieved through the integrated framework defined in the Handbook, with Research by Design as the central iterative process tool, enabling the testing of assumptions and the facilitation of suitable innovation. The framework further defines an evolved investment perspective and a repositioned role for the Architect within the residential investment process. For Investors, the framework enables the valuation of non-monetary qualities and supports long-term asset stability through innovative, supply-demand-aligned typologies. For Architects, it positions spatial expertise as a value driver within the investment process, expanding influence beyond the design brief. For urban residents, the framework contributes to housing supply that aligns with actual shifted household demand, improving affordability and spatial adequacy. For Regulatory Authorities, the iterative process offers a mechanism to inform and challenge decision-making on building regulations and zoning, grounded in tested design-investment outcomes.