

CASE-STUDY
SCHIECENTRALE-4B
Marilene de Wit

H A N D _ M A D E

Architecture
for
craftsmanship



BUILDING INFORMATION

Building: SCHIECENTRALE 4B

Location: Schiehavenkade, Rotterdam

Architect: Mei Architects and Planners

Client: Ontwikkelingsbedrijf, Proper Stok, PWS

Year: 2008

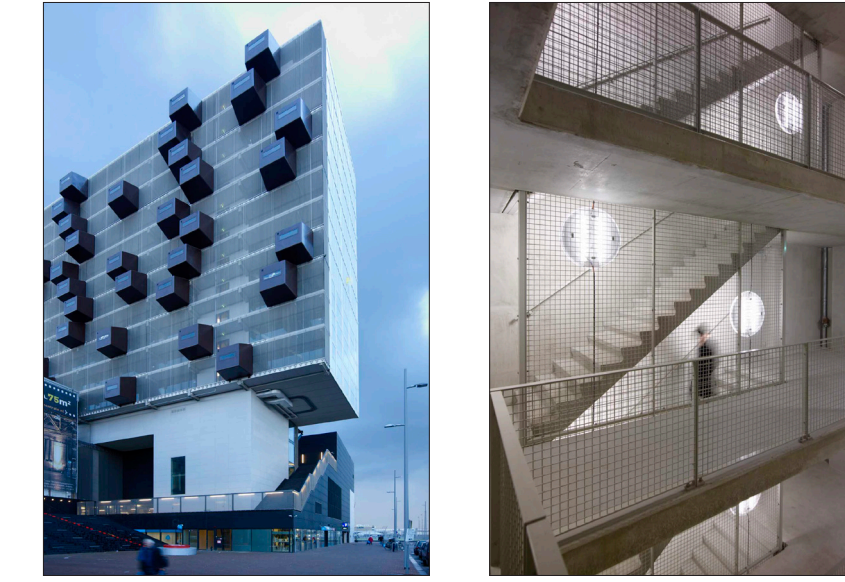
Program: Total floorspace 55.000m². 7000m² office space, 156 live-work apartments, 20 quay homes of 3.5 stories, day-care, supermarket, sports hall, parking garage, multi-functional deck and solar terrace.

The Schiecentrale is a mixed-use building complex, used for living, working, shopping, parking and recreating. Parts of it are older, and the Schiecentrale 4B building has been the latest addition to the ensemble. As a whole, the concept is a business and creative breeding ground. The concept for the whole area was for the Schiecentrale to become the creative center of Rotterdam.

The building consists of a combination of dwelling units, working units and live-work units. The first four floor are a parking garage and also holds a supermarket, gym, playground and daycare center. On the waterfront side, there are full-height dwellings of 3.5 stories with an own entrance on the waterside. The roof is this is designed as a courtyard for recreating. Then on top of this are two towers, of which the first floors are for rent-able working units. The top floors in the two towers consist of live-work units.

The buildings tries to identify itself with the scale and identity of the harbor, as is clear for the concepts drawn by Mei Architects. It is a high building of 130 meters long and 50 meters wide, towering above the older buildings that used to be a powerplant.¹

1. Mei Architects and planners. Retrieved from <http://mei-arch.eu/projecten-archie/schiecentrale-4b/>, visited on 12-12-2017



8.2.2 Photographs of the Schiecentrale 4B complex

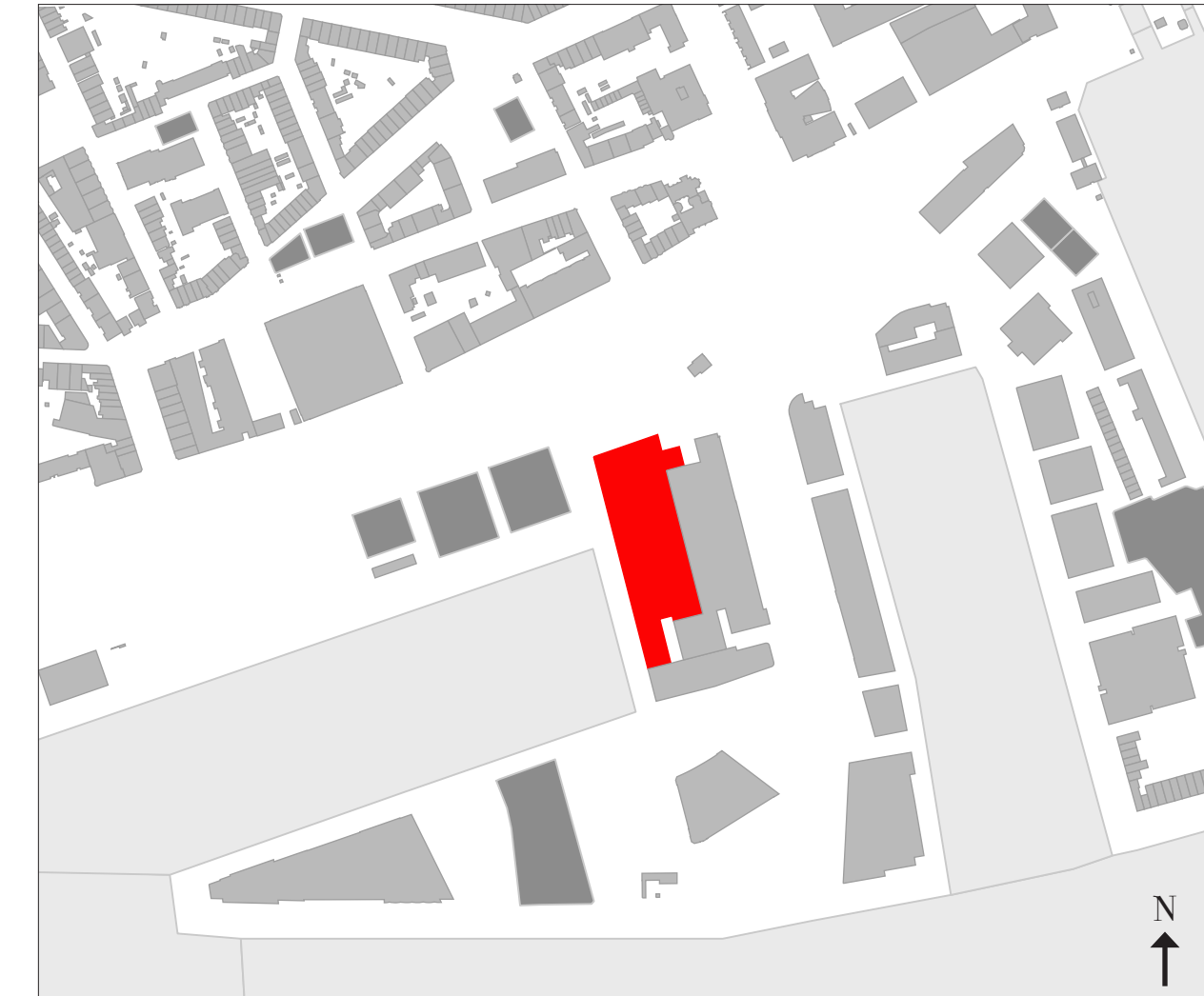
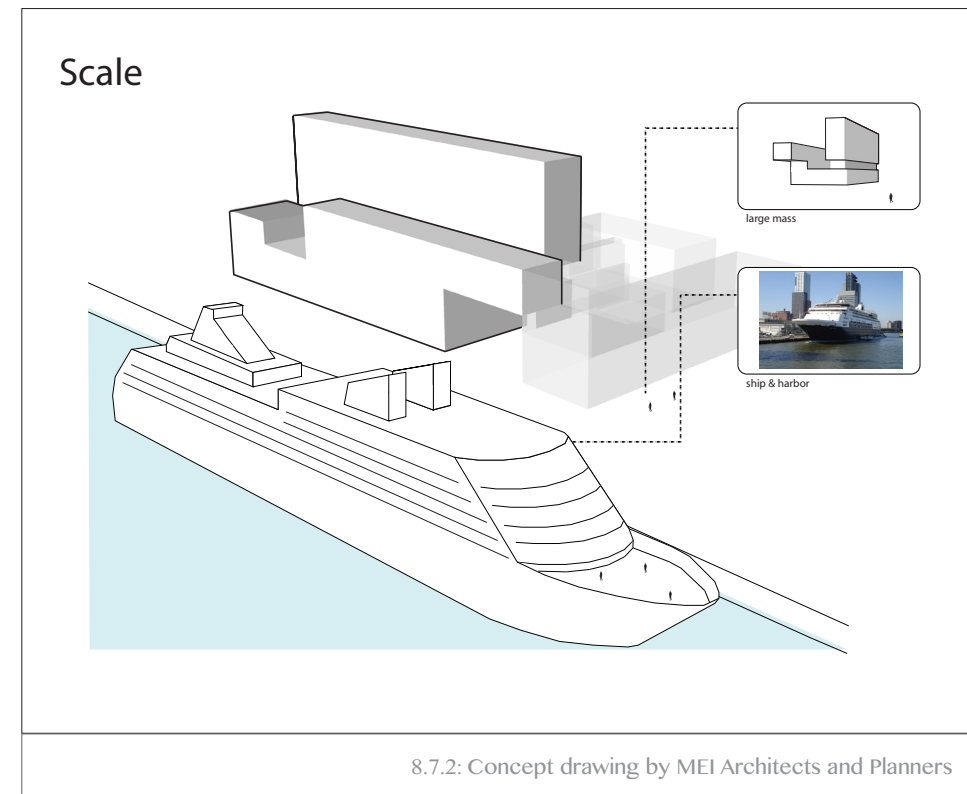
BUILDING SITE

The Schiehaven 4B complex is the last fase of a bigger structure that is called the Schiehaven. It consists of the re-development of the old powerplant.

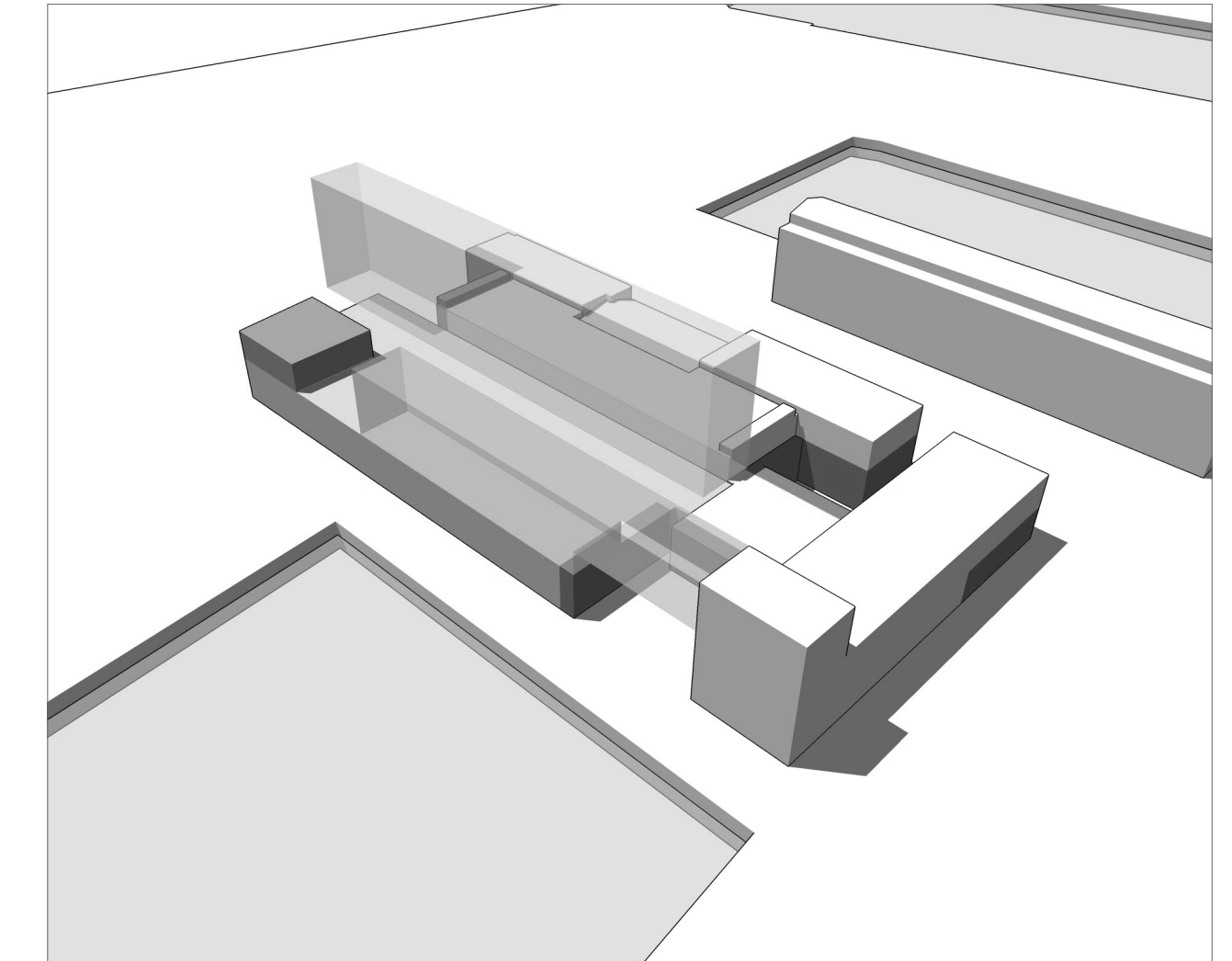
The entire complex is meant to function as a creative center in the city of Rotterdam.

This building is freely positioned at the head of the water on the Schiehavenkade in Rotterdam. It uses its orientation to the water as one of the qualities for the dwellings and workspaces.

The building concept is to connect to the identity and history of the harbor.



8.5.1 Site plan of the Schiecentrale 4B building
Scale 1:5000



8.3.2 3D model, in perspective view, of the whole Schiehaven complex including the other building phases.

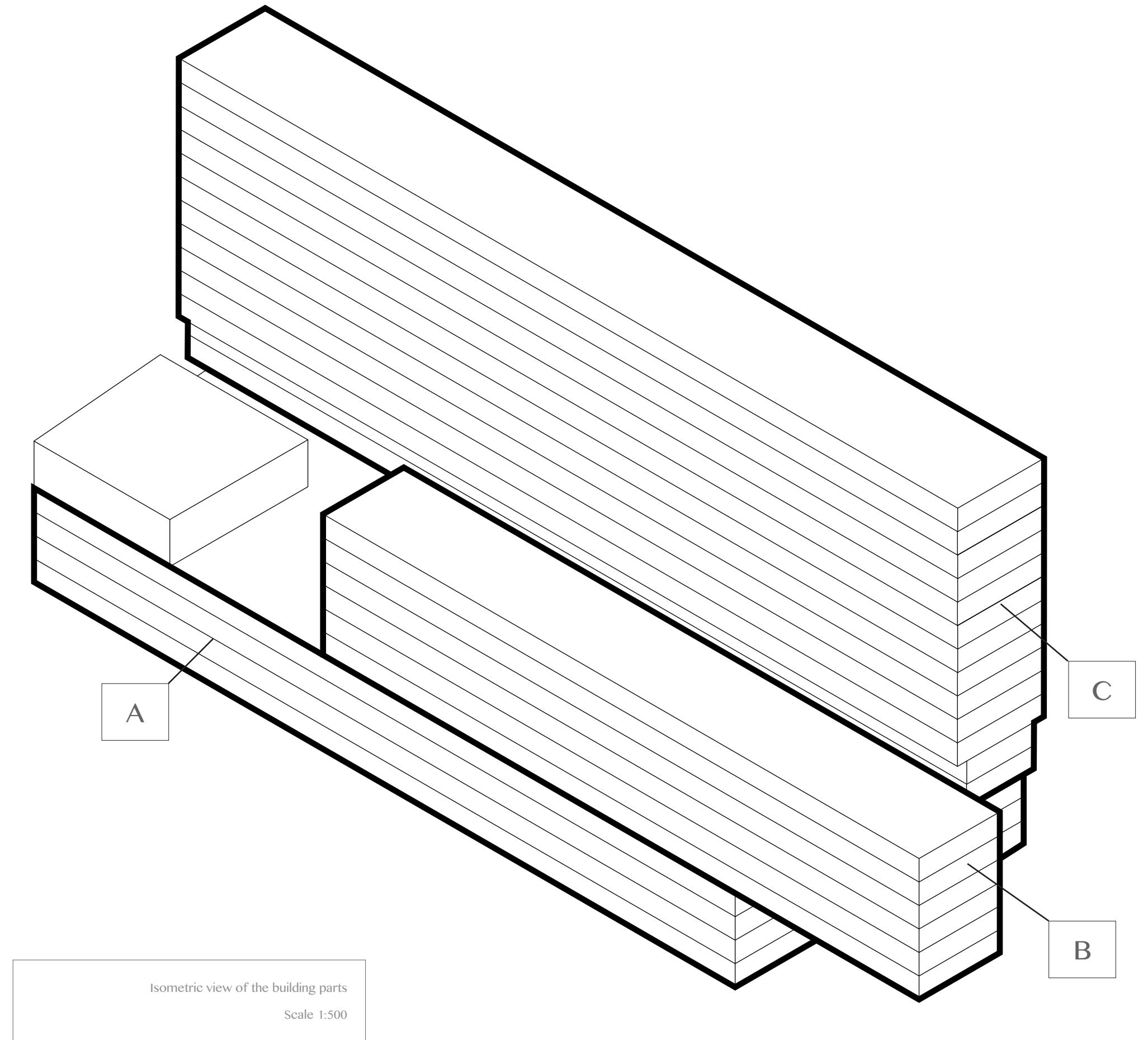
BUILDING PARTS

The building consists of three main building parts. The lower floors that span the entire plot and are mainly parking garage, but also host some other program such as the supermarket.

The waterfront is used for waterfront dwellings of three stories high.

The other two parts are two separate towers, both holding a mix of work-units and live-work units. This is explained in the section following this page.

For the construction analysis, I have worked out the bigger tower, which is depicted as building part B in this scheme.



BUILDING PROGRAM

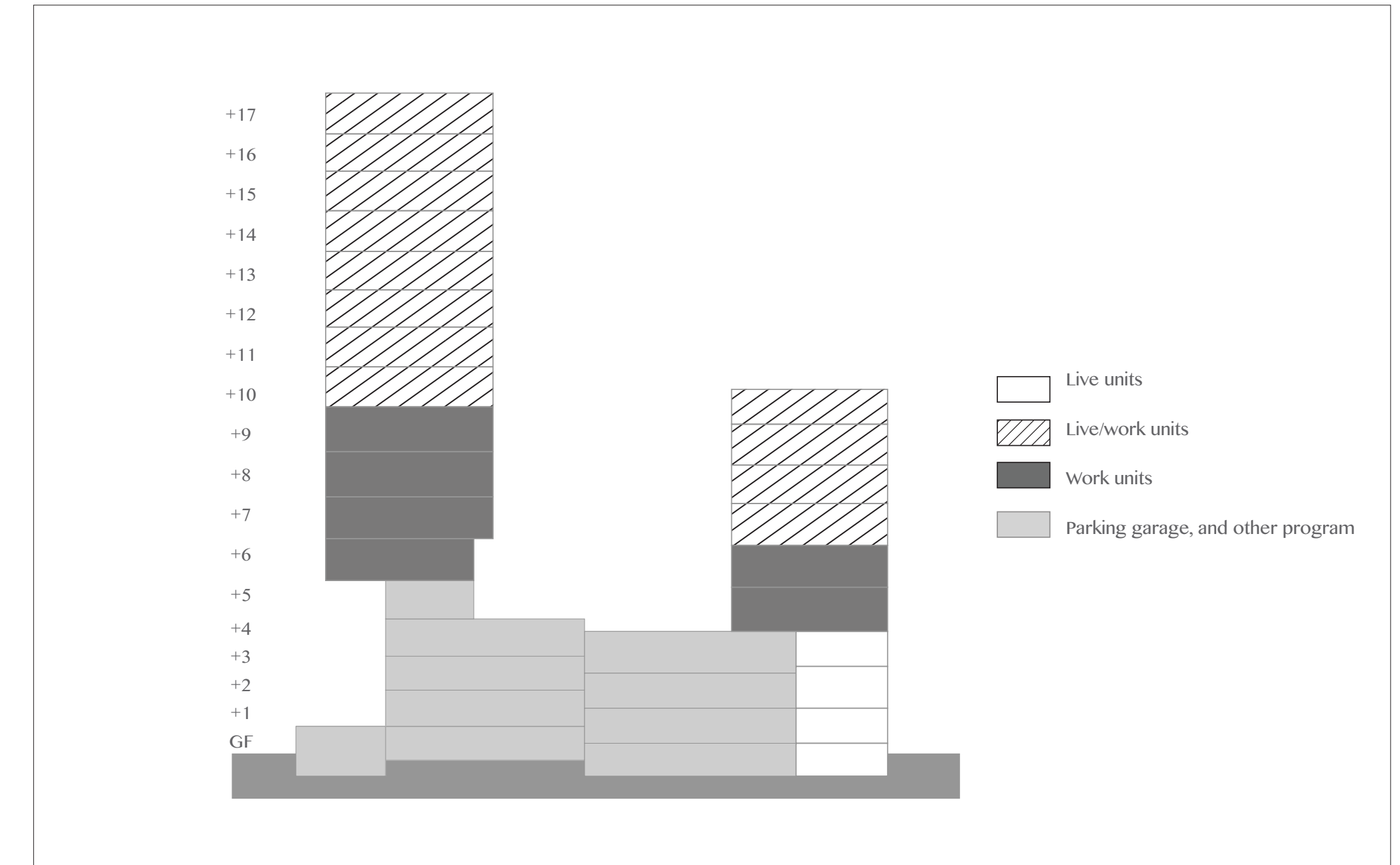
The Schiecentrale 4B has a large program.

- 156 live-work apartment dwellings
- 7000 m2 office
- 1700 m2 supermarket
- 3500 m2 Health care center
- 600 m2 gym / conference room / event space
- Parking garage for 400 cars
- 20 quay homes
- Day-care
- Multi-functional deck
- Solar terrace

The layout of the Schiecentrale in essence is quite clear. On the ground floors there are 4 layers of parking, with waterfront apartments on the waterfront facade.

Above that two towers, with public space in between on the roof of the lower building mass. The first 2 or 4 layers are used for work units, the units above that are live-work units type lofts.

In the Schiecentrale complex, the working units are office-type spaces that you can use or rent.



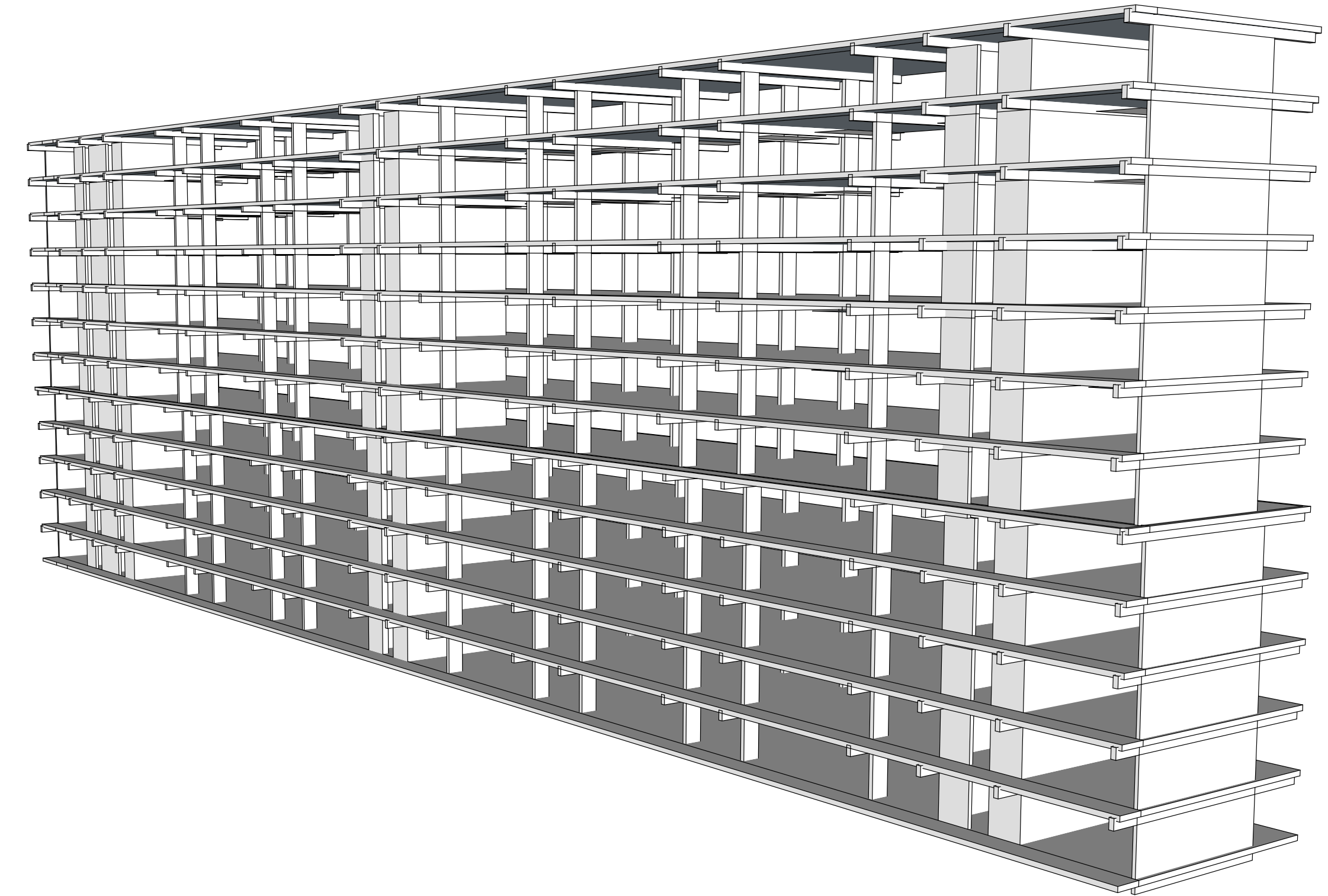
Typological reduction section, showing primary program of the different floors

LOAD-BEARING CONSTRUCTION ELEMENTS

The load-bearing construction is made out of a concrete skeleton frame, with the addition of two load-bearing walls on the sides of the tower.

Also there are three concrete cores in the high tower, holding the elevator shafts, staircases and technical spaces, that provide additional strength and stability to the structure.

The lower tower has two of these cores, since it is smaller in length.



Reduced perspective view of the large tower only, showing the load-bearing construction elements; the beams, columns, floors, walls on the endings and staircase/elevator shafts.

LOAD-BEARING CONSTRUCTION

There are multiple options when designing flexible buildings, depending on the criteria for the project a choice should be made. In this case, the construction is designed as a skeleton frame, with non-supporting facades and walls.

The architects' documentation states this is because of the

- Current economic situation
- Sound nuisance reduction during construction
- Speed of realization of the project ¹

There was a discrepancy between the documents received from Mei Architects in the description of the skeleton frame; one claimed it was constructed from steel and the other claimed it was constructed from concrete.

I visited the website of the constructor, which showed pictures of the building in the construction phase and concluded the construction is made of concrete columns, beams and floors.

"De hoofdraagconstructie bestaat uit betonnen kolommen, liggers en vloeren. Hiermee zijn volledig vrij indeelbare verdiepingen gecreëerd waarmee voldaan is aan de doelstelling van de opdrachtgevers om een flexibel gebouw te realiseren waarin verschillende programmaonderdelen inwisselbaar zijn."²

Story height is 3,4m. The height from floor to beam is 2.9. Because most of the beams are integrated in the non-load-bearing walls, the net height of the units is larger.

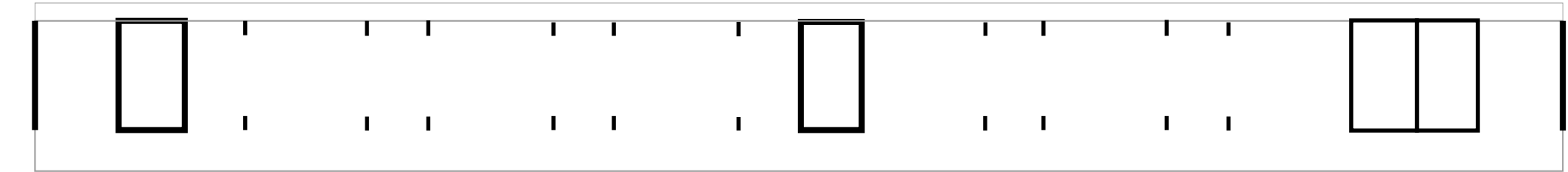
Height of the beams is 600mm. Columns are 290 x 1150mm

1. Archive of Mei Architects and planners, regarding the Schiecentrale 4B complex. Archive accessed on 4-1-2018.

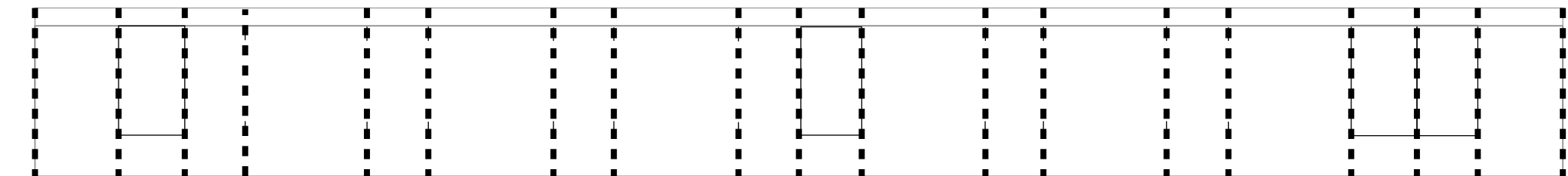
2. PBT Delft. Retrieved from <https://www.pietersbouwtechniek.nl/welkom/projecten/2014-10-0840/>, visited on 26-1-2018.

LOAD-BEARING CONSTRUCTION: CONCRETE SKELETON FRAME WITH ADDED CORES AND LOAD-BEARING FACADE ON BUILDING ENDS.

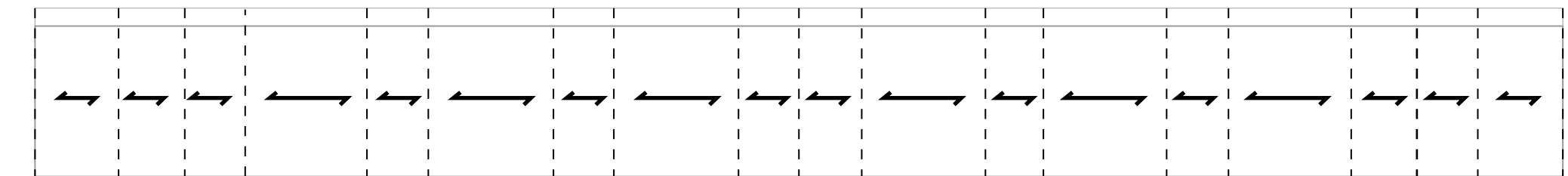
Load-bearing columns, cores and walls



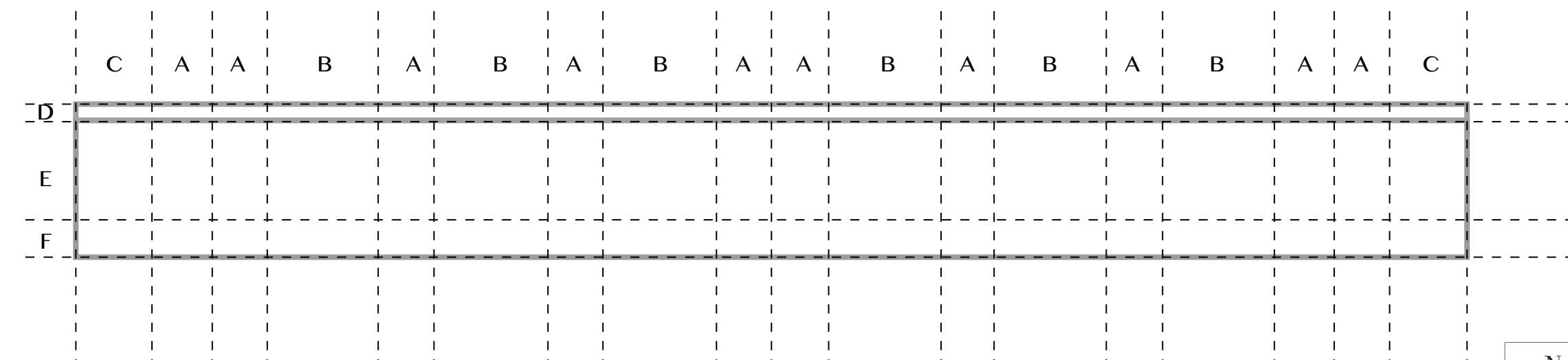
Load-bearing beams



Direction of floor span



Construction grid
 A = 5.4 m
 B = 2 * 5.4 m = 10.8 m
 C = 5.4m + (1/3)*5.4m = 7.2m
 D = 1.75m
 E = 9.15m
 F = 3.7m



N
 Scale: 1 : 500

LOAD-BEARING CONSTRUCTION: MEASUREMENTS AND COMBINED VIEW

The beams are carried by the concrete columns. They cantilever on both sides.

Dimensions of the construction:

Floor to floor height: 3.4m

Concrete beams 600 x 300 mm

Concrete columns: 300 x 1150 mm

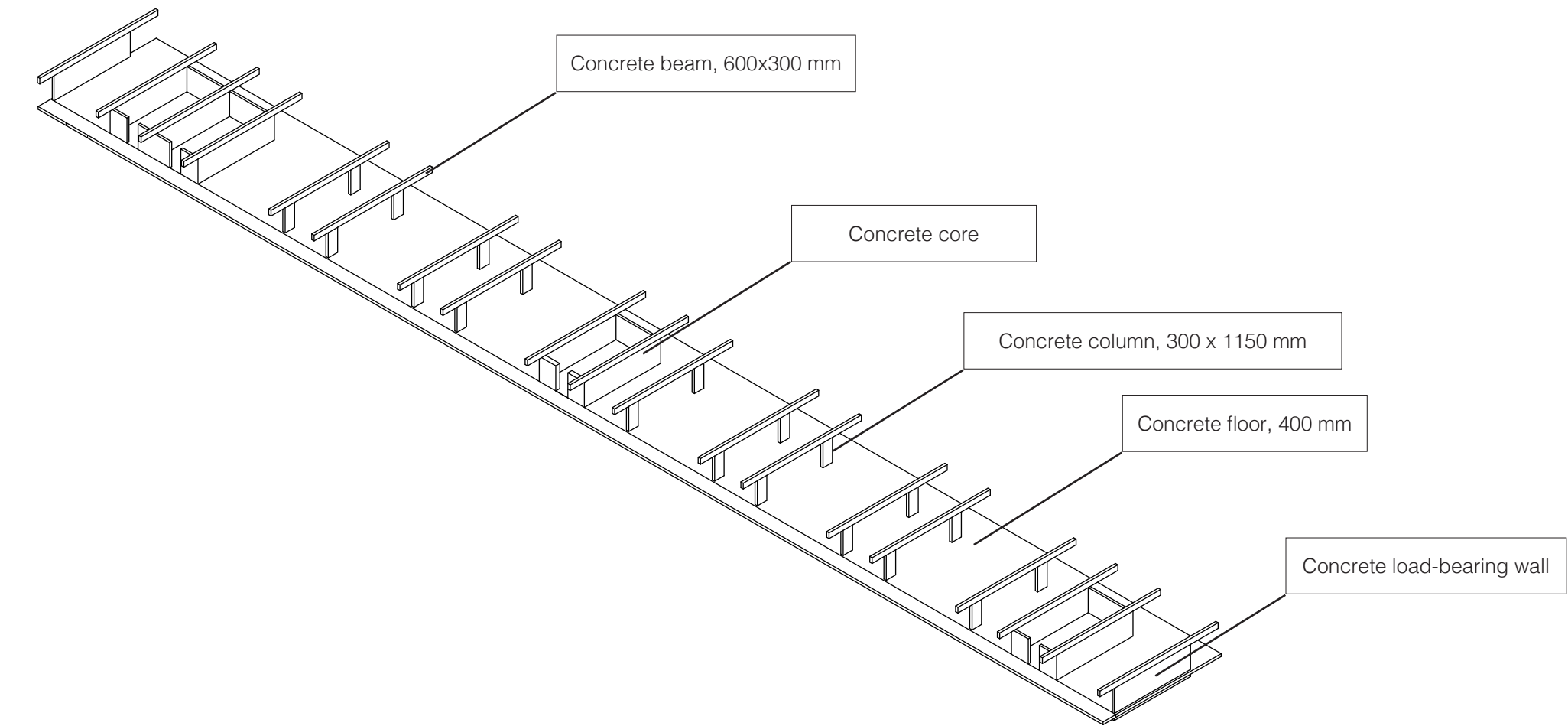
Floor: 400 mm

The floor partly descends in between the beams. The beams have an added smaller beam attached to them on both sides, providing extra strength for carrying the floor.

On the buildings ends there is a partly concrete closed facade, to provide strength and stability.

Extra strength and stability comes from the three cores that hold the staircases, elevators and shafts. They are rectangular shaped with an opening for accessing the core.

The core that is bigger is actually made from two cores, making it twice the size. This is because it has two elevators instead of one, and holds a big central shaft for pipes. The added staircase core is then slightly large for its function, but it was the architects decision to not deviate from the grid dimensions.



Isometric view of the load-bearing construction elements, showing one floor of building part C.

Scale 1:500

CIRCULATION AND ACCESS

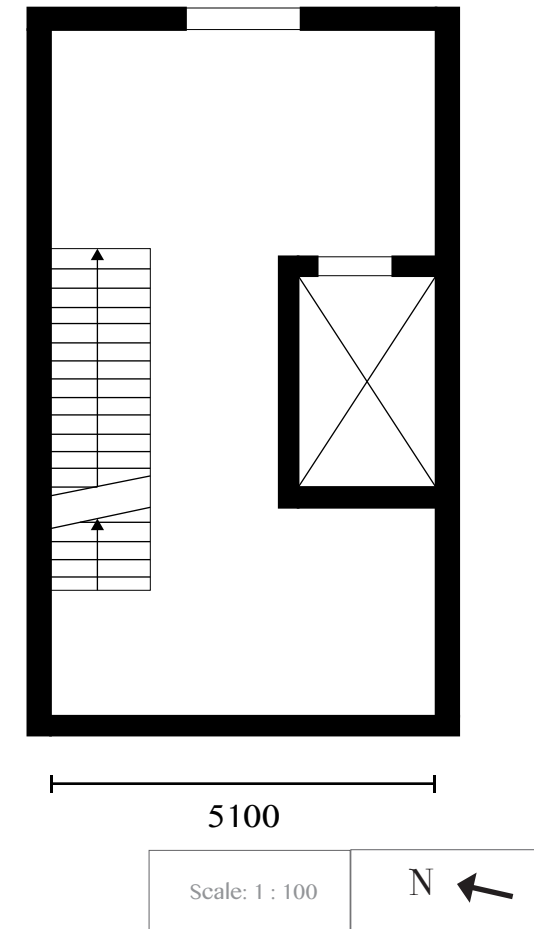
The building makes use of a gallery type circulation system. The galleries span the entire length of the tower on the south-east facades, on one side. This is the only entrance point for the dwellings. The gallery gives access to the dwellings units, as well as the storage units hanging on the facade and the vertical shafts.

Vertical circulation is achieved by putting the stairs in the three (Tower A) or two (Tower B) shafts. One of the cores in tower A has two elevators, making it a total of four.

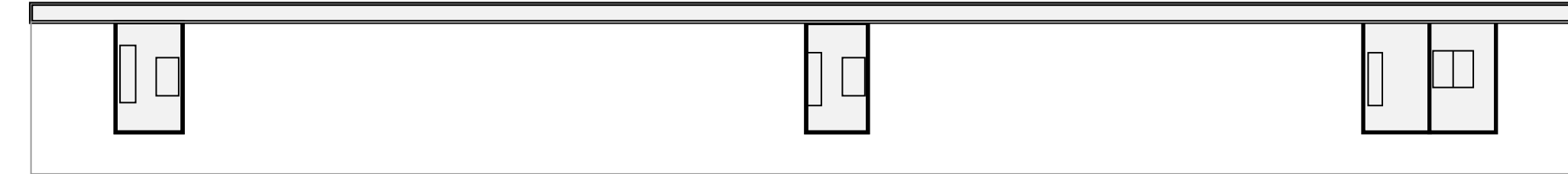
Staircases are designed as totally straight, so they would fit net to the elevator in the 5.1 net width of the core element.

There are 14 dwellings per floor, with 8 residential floors. This means there are three staircases and four elevators for 112 dwellings.

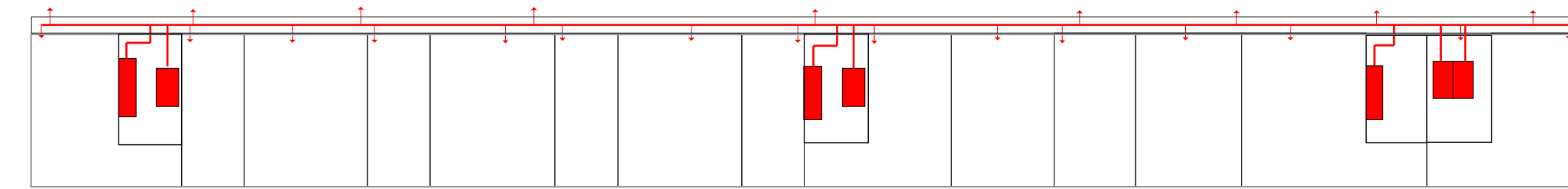
Also, they provide access to the lower floors (five floors with offices, and four floors with parking and other building program).



MAIN CIRCULATION ELEMENTS



DWELLING ACCESS



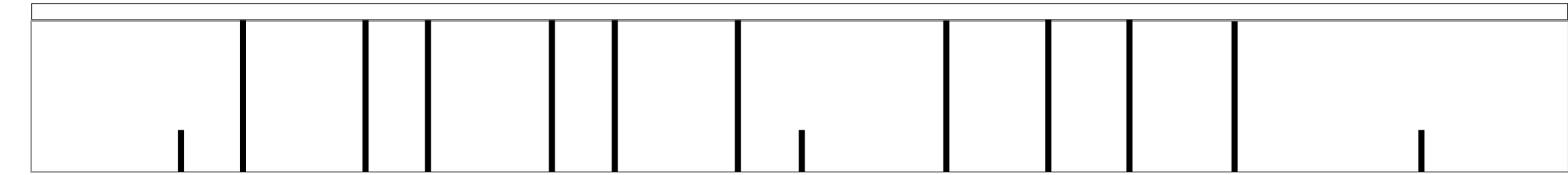
NON-LOAD-BEARING WALLS

Most of the non-load-bearing walls are placed inside the construction grid, resulting in the columns and beams being integrated in the walls between the dwellings.

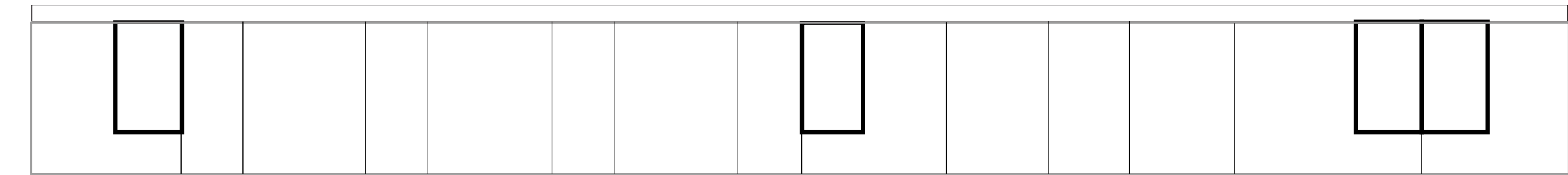
There are some exceptions, as is shown on the drawings on the right.

It results in more variation of dwelling sizes, but also causes the columns to stand in the floorspace of the apartment.

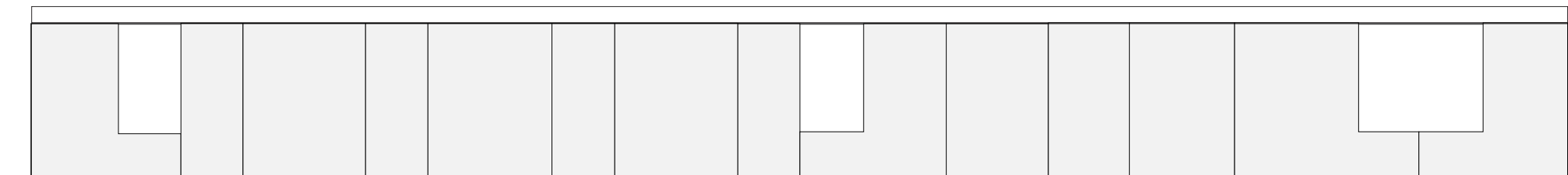
NON-LOAD-BEARING WALLS



NON-LOAD-BEARING WALLS IN RELATION TO THE LOAD-BEARING CONSTRUCTION



RESULTING DWELLINGS



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Scale: 1 : 500

FUNCTIONAL CORE

Every live-work dwelling unit has a functional core, holding the kitchen, bathroom, toilet, wardrobe, storage/washing space, fuse box and vertical shafts for the pipes.

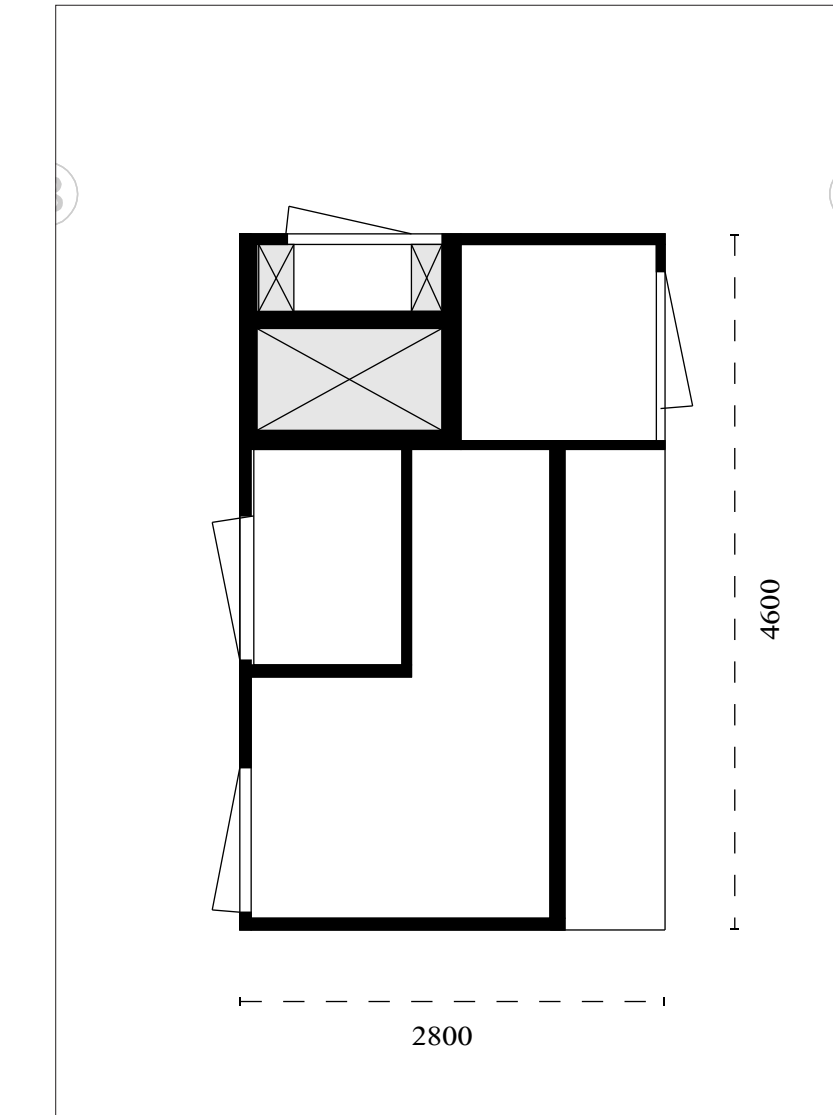
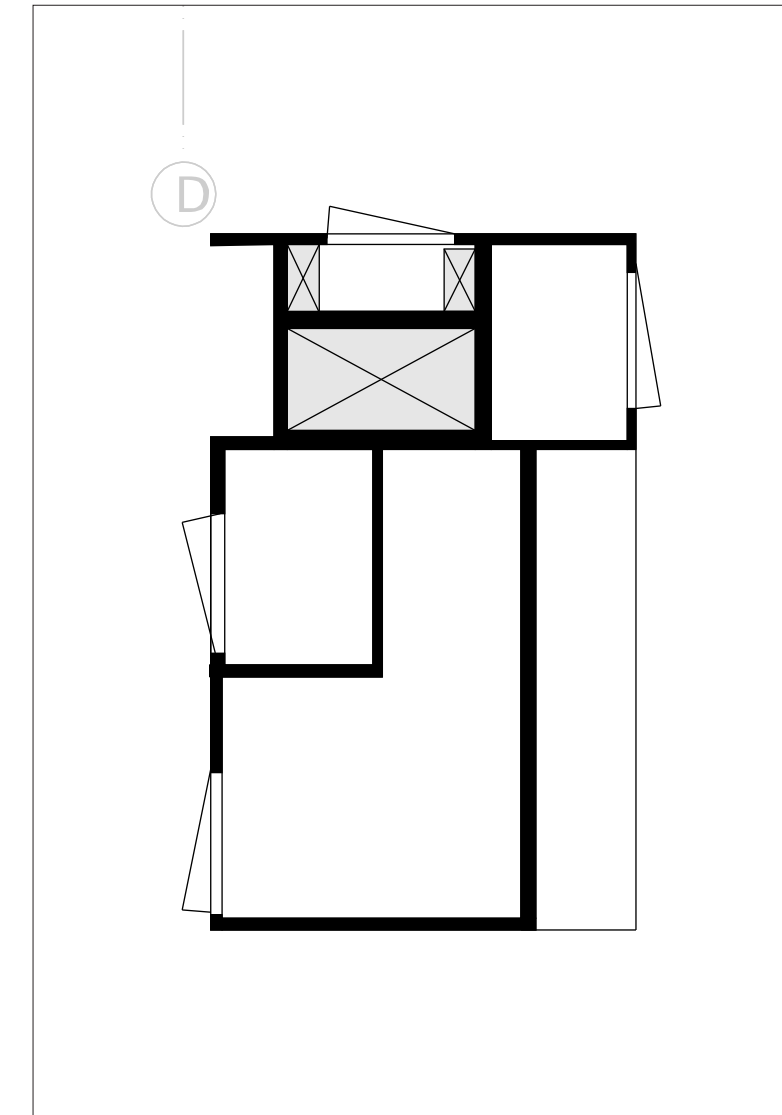
There are slight variations, shown on the right.

These two variations are also reversed in some of the units, which is shown in the 1:500 overview.

The pipes for the water, ventilation, floor heating, plumbing, and electricity are all going down through the shafts in this core. The technical installations are all done per dwelling and then going down, instead of going down through a main shaft. In the opinion of Mei Architects, this enables the interchangeability of the dwellings.

The fixed nature of the core limits the flexibility in the way that the dwellings cannot become more narrow than the width of the core and the needed space for the circulation. This circulation is on two sides of the core because of the fact there are entrances to spaces on both sides. The hallways are dimensioned at 1,15 meters wide. This results in a minimum dwelling width of 5,1 meters and a square meter surface of 65 m².

It limits then the distribution of the non-load-bearing walls. I will go into this deeper in a following section of the analysis.

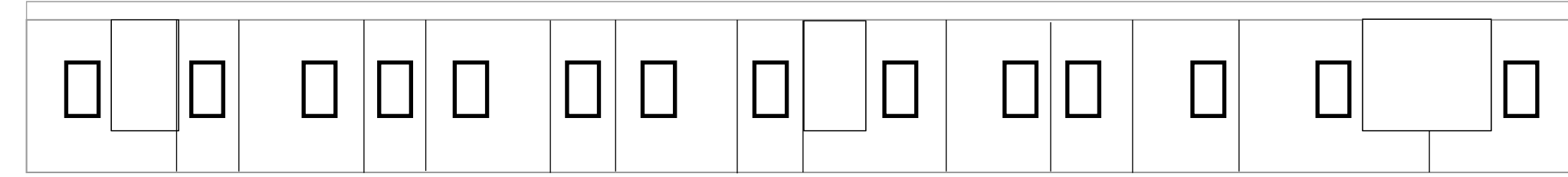


DISTRIBUTION OF FUNCTIONAL CORES

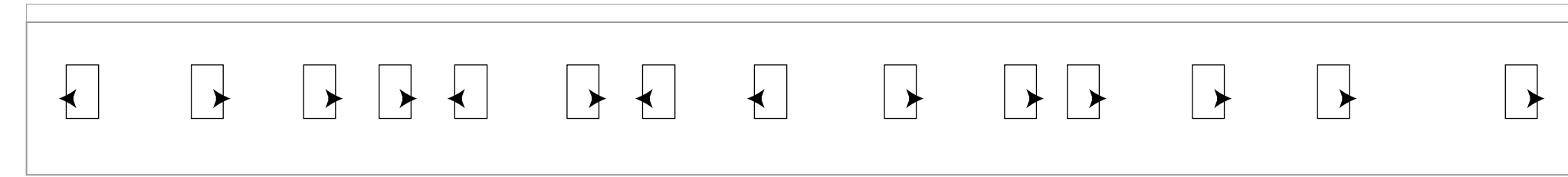
The functional cores are distributed in between the constructional grid.

They are fixed elements that do limit the flexibility of the layout of the apartments, as well as the flexibility of moving the walls to make the sizes bigger and smaller, This is shown in the drawing that follow later in the analysis.

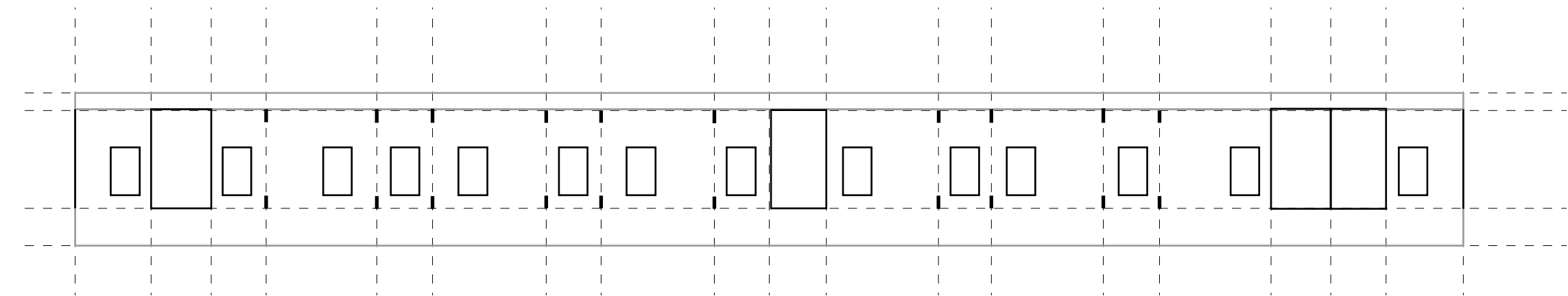
FUNCTIONAL CORE POSITIONS



FUNCTIONAL CORE, SIDE OF THE KITCHEN



FUNCTIONAL CORES IN RELATION TO THE CONSTRUCTION



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Scale: 1 : 500

FUNCTIONAL CORES IN RELATION TO THE DWELLING UNITS

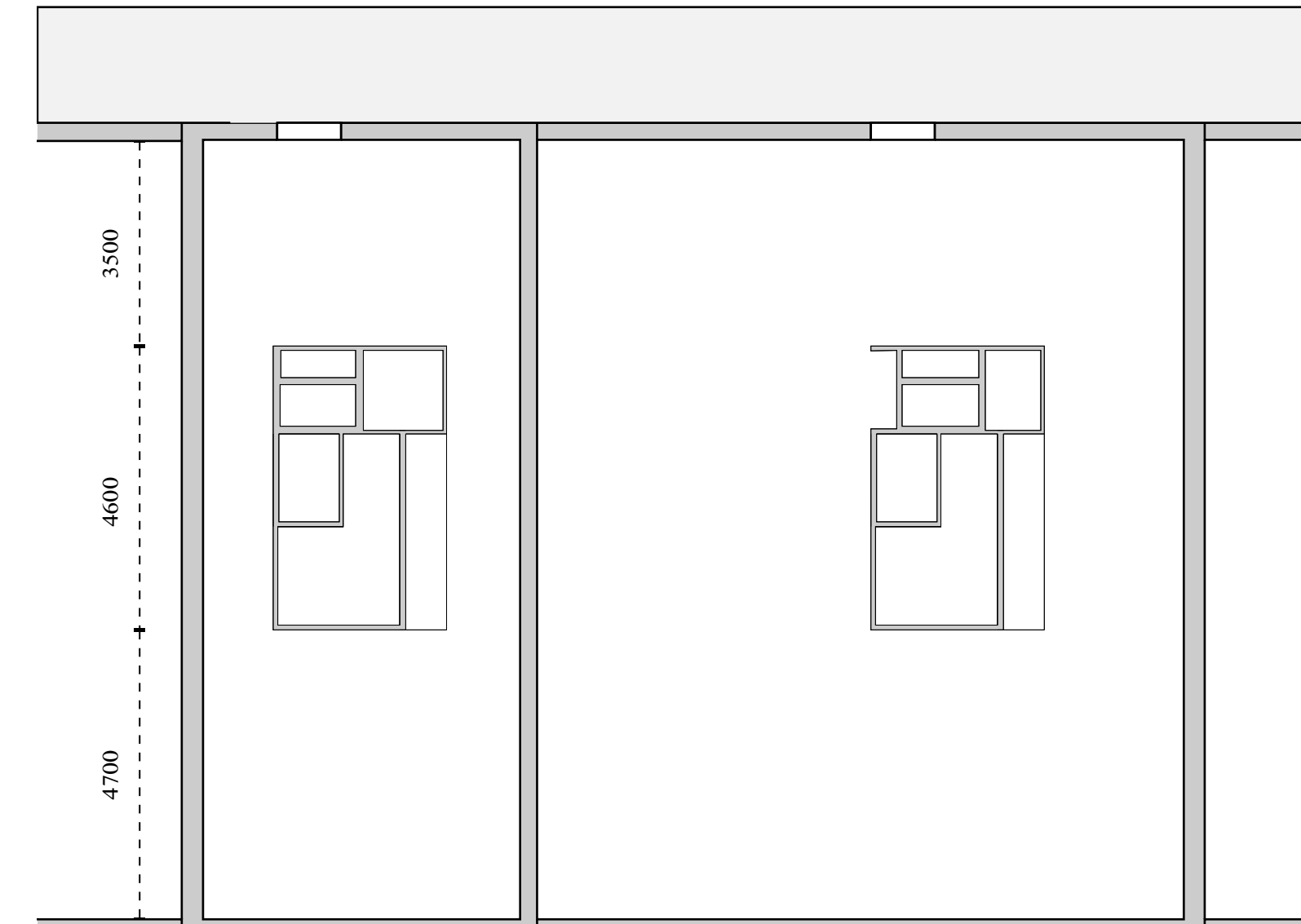
As a strategy, all these cores have been placed in the middle of the dwellings.

It leaves fixed spaces of 3,5m and 4,7m in the length of the dwelling from facade to facade. The spaces span a variable width, that is free to use as workspace, living space or working space.

In the bigger units the space can be a living space, depending on the placement of the core in relation to the non-load-bearing wall. The walls can be constructed accordingly to the taste of the owner. It's not clear how common in this building to rebuild the layout every time it is sold, but it is possible.

In the smaller units it limits the free space to this 3.5 and 4.7 meters, because the whole middle section is either functional core or circulation space.

There are some examples of dwellings layouts to be found on Funda.



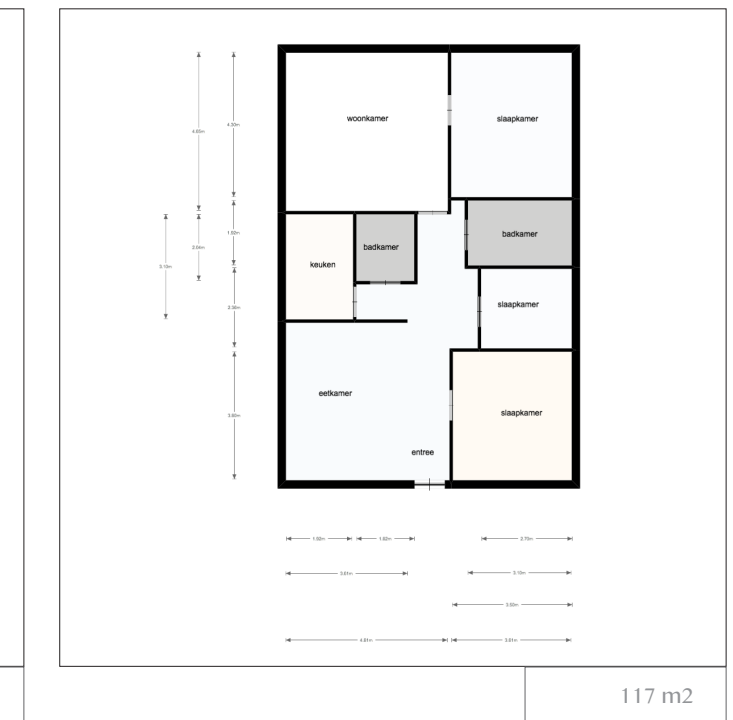
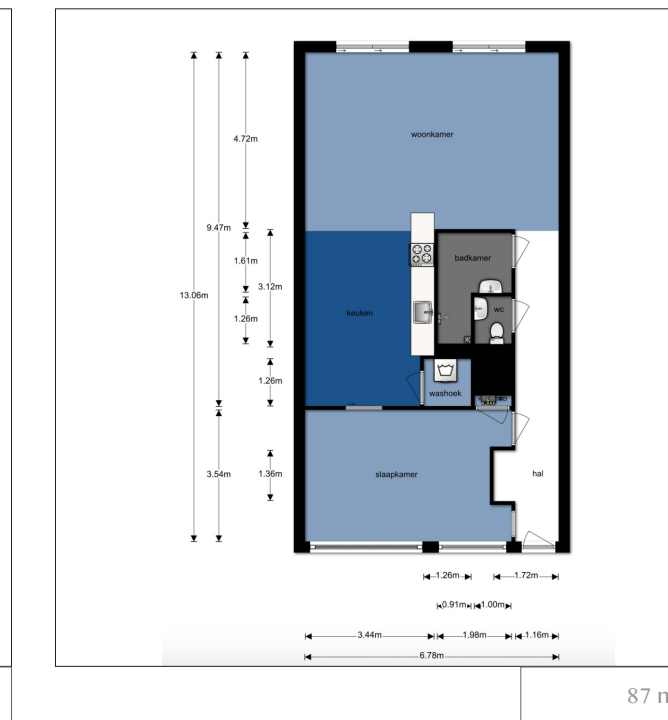
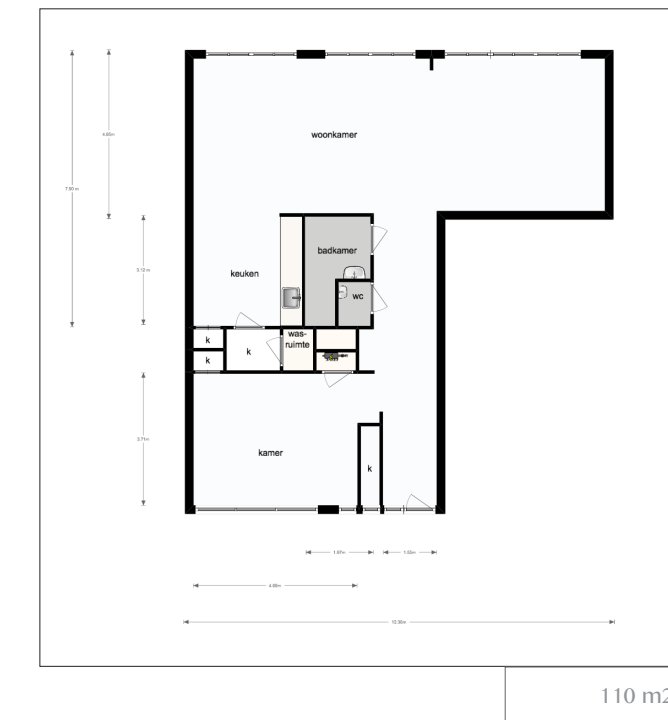
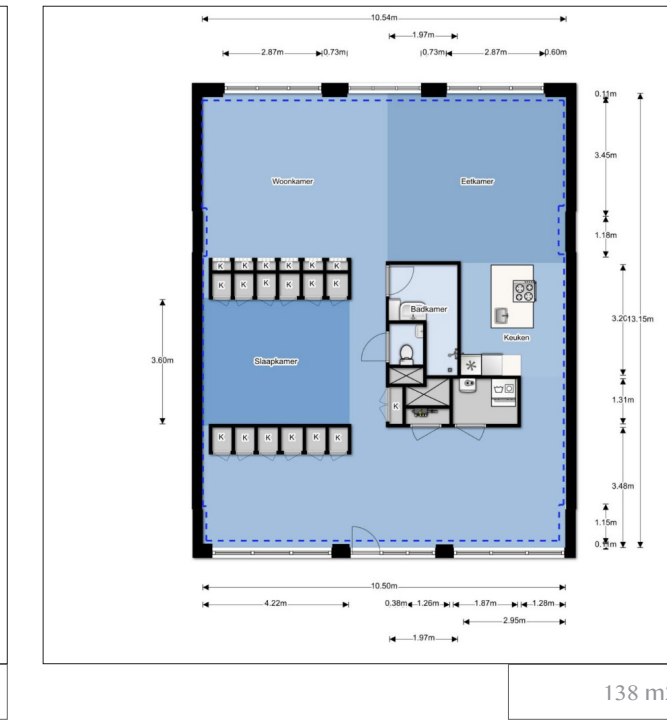
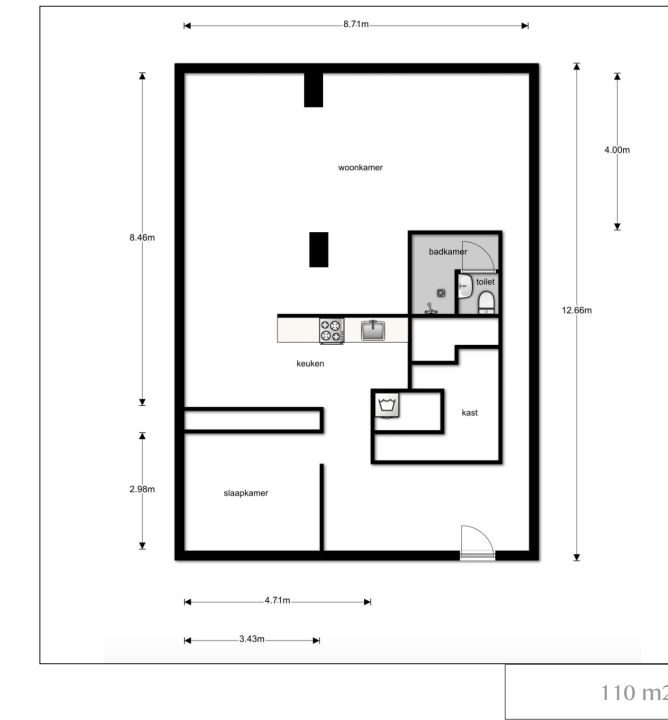
DWELLING LAYOUT

For actual dwelling layout possibilities, I gathered some information from Funda.

What is interesting, is that none of the floor plans show actual space designated for working. Also, none of the descriptions list the dwellings as being live-work units.

In some cases the owner made alterations to the functional core. Most common is another placement of the kitchen. Also, the layout of the toilet and bathroom, making it rectangular instead of L-shaped. In one case, a second bathroom was added, and the rest of the core removed all together.

Most layouts are straightforward, with a living space attached to the kitchen, and on or two bedrooms in the front and/or back. The one that is more creative is one of the bigger ones. It has a third bedroom in the middle section. It would not normally get daylight but one of the walls is made completely out of glass. It has obvious privacy issues but apparently the owner didn't care about this.



BUILDING FLEXIBILITY: APARTMENT SIZE

The walls have the option of being moved in the width.
If there were no cores, this would have much greater flexibility.

But the way the walls can be placed is greatly influenced by the width of the core and the needed circulation space around them.

In the left side of the building, the walls can be re-located but will fall out of the construction grid, leaving beams in the middle of the apartment, which then also influences the layout possibilities of the floor plan.

In the right side of the buildings, the architects have chosen to do it the other way around. In the current situation, the walls are placed outside of the grid, with the option of moving them to fall in the grid.

The reason for this decision remains unclear, but one possible answer is that they opted to create more diversity in dwelling sizes in the current situation.

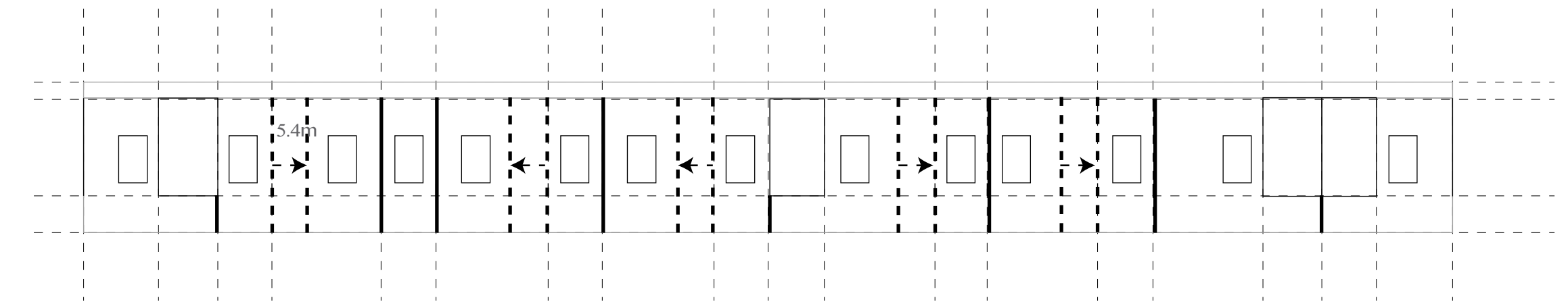
The movement drawn here is always 5.4m, which is the standard measurement of one grid-space. This means the dimensions of core, construction and non-load-bearing walls have been very precisely outlined to fall within this measurement, as well as the intended flexibility options.

On big side-note on the moving of the walls is that you would have to deal with the owner, since they are mostly private ownership dwellings. In that case, both parties of the affected dwellings should agree that this is a good solution.

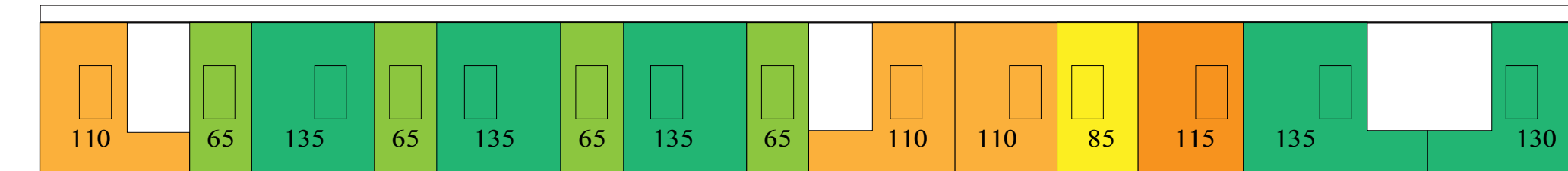
If don't imagine that it would actually happen.

It is more probable that it would happen during a big building renovation, where current situation would ask for other dwelling sizes and lay-outs. In this case it would be relatively easy and cheap to do. But still then, the options are limited due to the functional core.

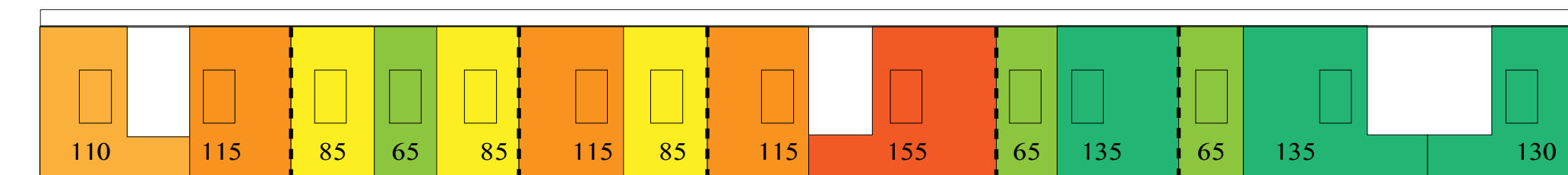
FLEXIBILITY OF THE NON-LOAD-BEARING WALLS



CURRENT PLACEMENT OF THE NON-LOAD-BEARING WALLS AND THE RESULTING DWELLINGS SIZES



POSSIBLE FUTURE PLACEMENT OF THE NON-LOAD-BEARING WALLS AND THE RESULTING DWELLINGS SIZES

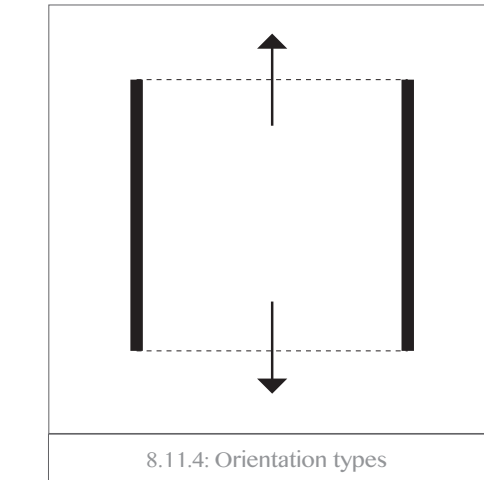
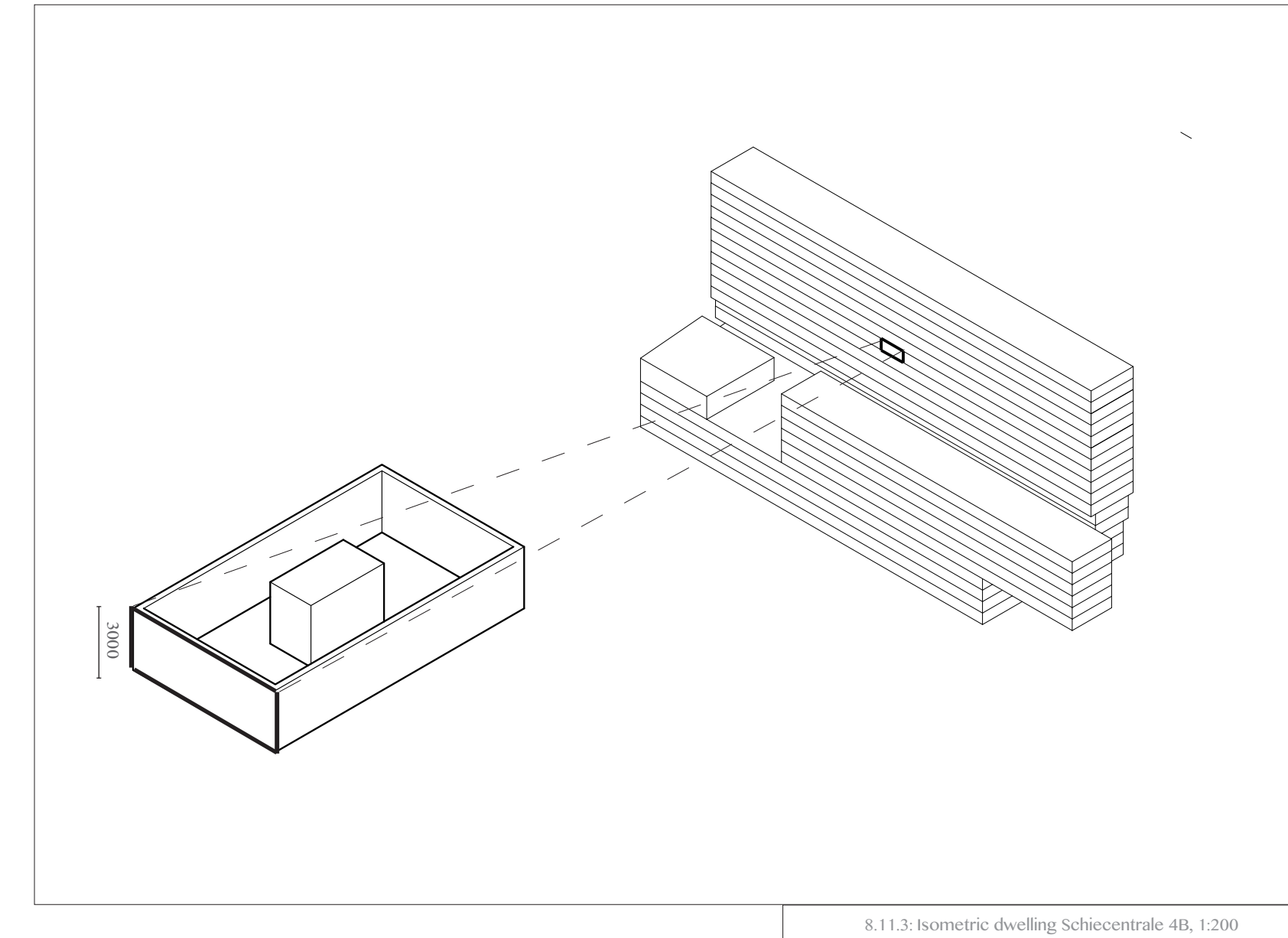


DWELLING TYPES

Apartment of variable width, with core holding the kitchen, bathroom, toilet and storage spaces. The floorspace around it can be used as wished for working and living.

All apartments have a double open-ended orientation, on the southeast and the north-west.

In reality, the apartments being sold on Funda are all listed as simple 1 or 2 bedroom apartments, where the work- part of the dwelling has been deleted. This could be due to the fact that apartments are not listed as suitable live-work typologies in the pattern book by Frances Holliss. In the Schiecentrale complex there are dwellings of 3,5 stories high, with two entrances. One on the waterfront and one from the parking garage. These would be more suitable live-work typologies, but are used for only dwelling in concept.

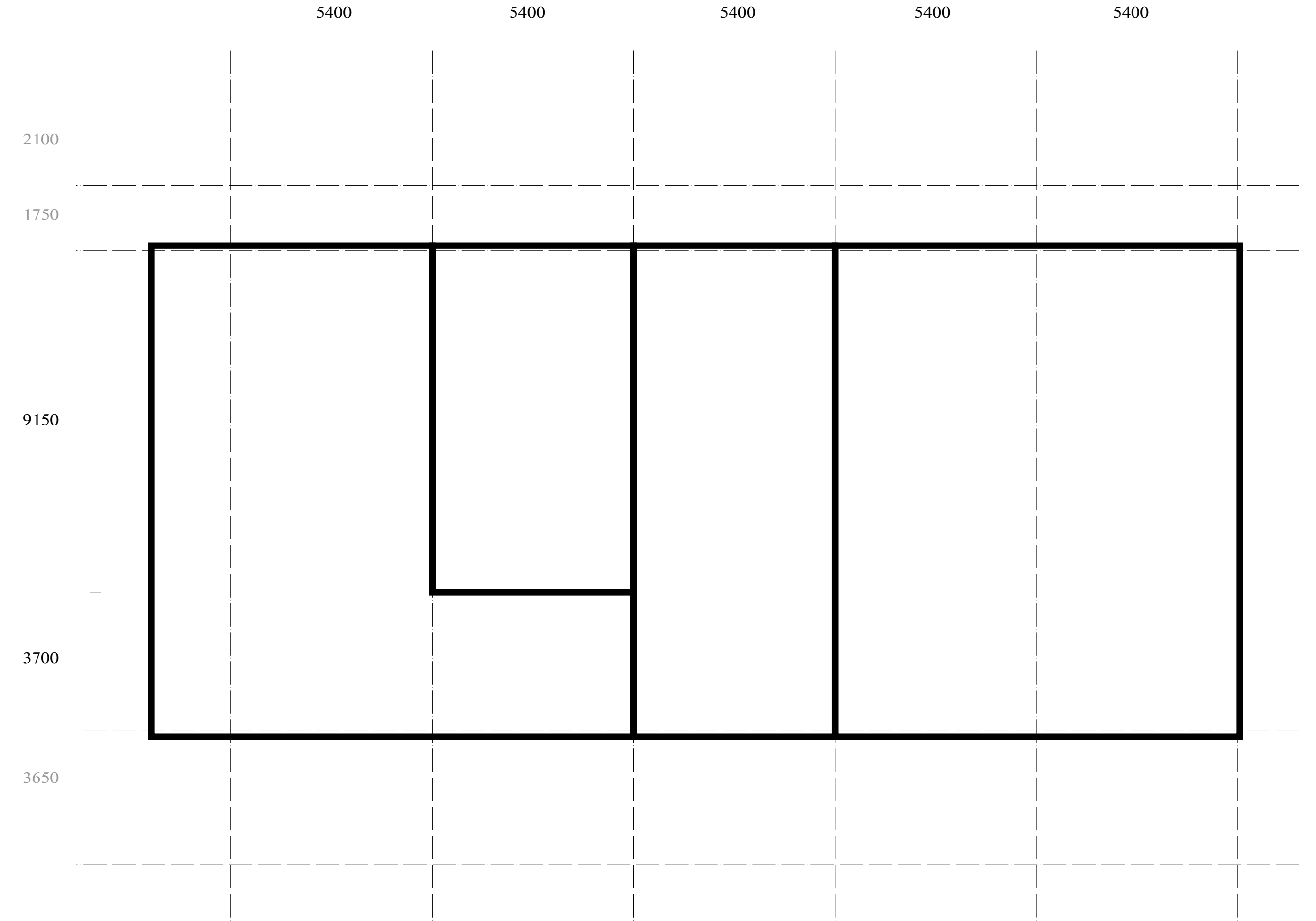


DWELLING GRID

As previously explained, the dimensions of the grid are always 5.4m or a multitude of this measurement. This is heart-to-heart measurement. The non-load-bearing walls are 300mm thick, leaving a net width of 5.1 m for the dwelling layout.

This measurement is closely related to the placement of the load-bearing construction such as the concrete columns and the circulation cores. Also, they are determined by the functional dwelling cores that are in the heart of each dwelling.

This all determines greatly the possibilities for flexibility, in the case of the moving of the non-load-bearing walls as well as the possibilities for the layout of the dwelling.



OUTSIDE SPACE STRATEGY

There are no actual private balconies in the apartments.

As a strategy, someone could sit in front of the apartment in the gallery. This is 1.75 m wide so it would only allow for a very small bench in front of the apartment.

The gallery is closed by a thin RVS woven cloth, providing protection while at the same time allowing the light and view to still be visible from the gallery and the interior of the dwelling.

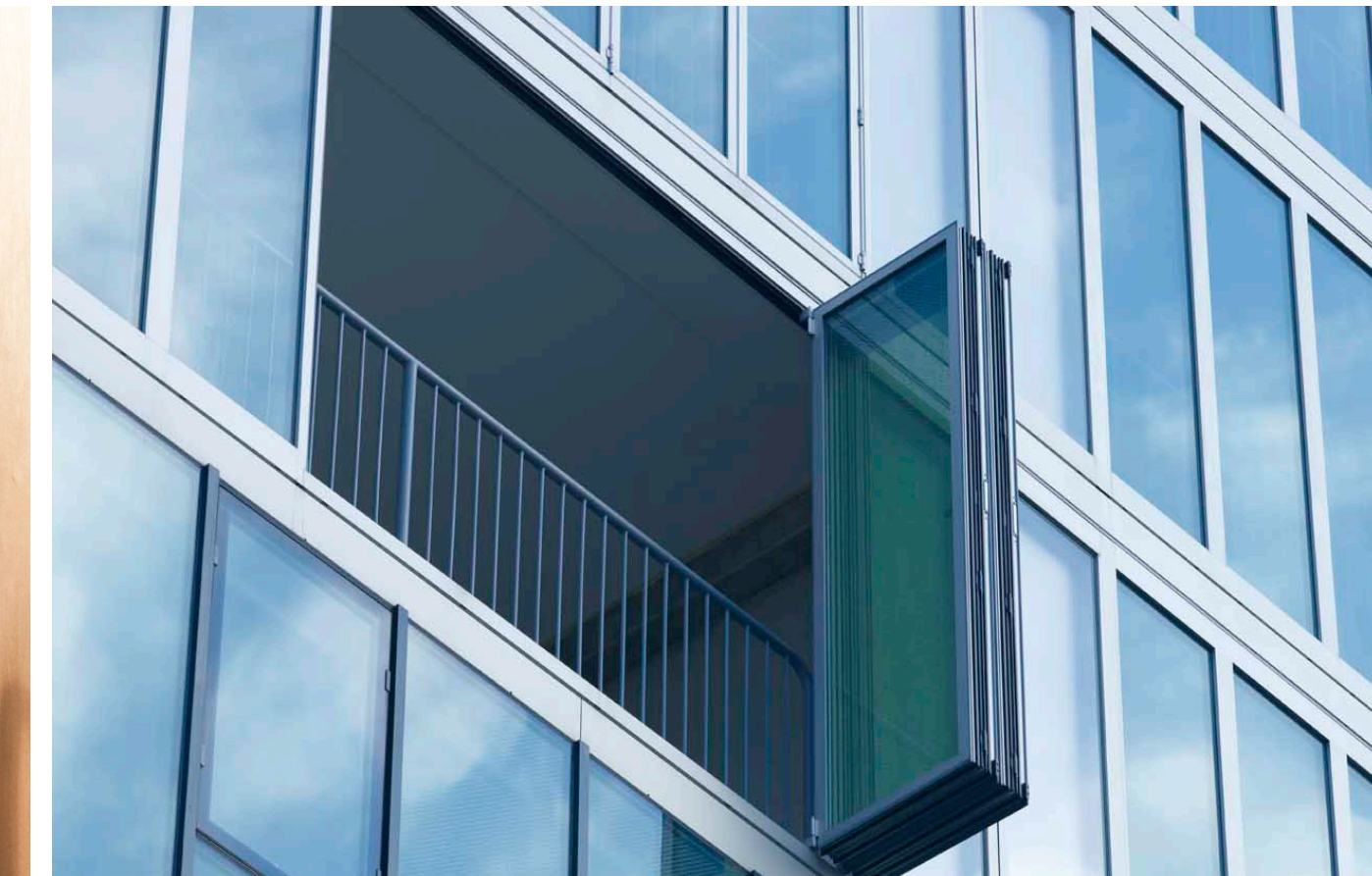
The other picture is showing the facade on the waterfront side, which is constructed as a 'harmonicapui', which creates the possibility of opening this side of the facade from floor to ceiling, creating an indoor outdoor space.

In all dwellings this results in the placement of a steel fence in the interior of the dwelling, because the architects did not want these on the outside, affecting the aesthetic value of the facade.



Top: South-east facade, with the gallery

Bottom: North-west facade, with the interior and exterior view of the 'harmonicapui'



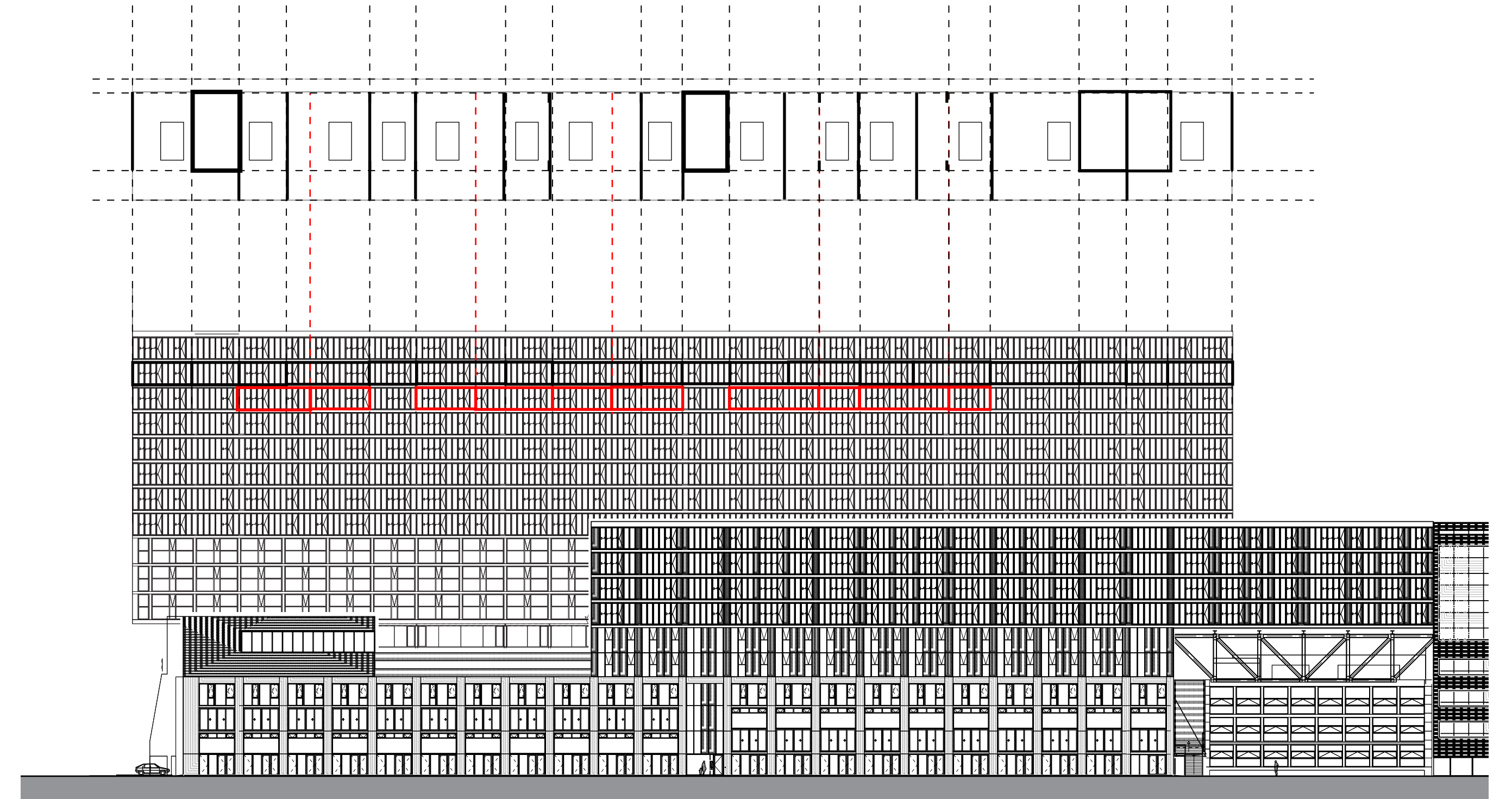
FLEXIBILITY AND FACADE

If the non-load-bearing walls might be moved, the facade needs to be able to accommodate this flexibility as well.

The windows need to be in relation to the width of the dwelling.

In this case, they opted for a modular system made of fold-able elements, called the 'harmonicapui'. Each grid size of 5,4 m holds 8 window elements.

There is the large fold-able window and the small fold-able window, and the rhythm of this is determined by the fact that each unit should always have 1 big folding window, also if the walls are moved 5.4m or $1/2 * 5.4m$



STORAGE SPACE

Every dwelling has access to an external storage space on the opposite side of the gallery. These storage units are hung on the south-east facade as prefabricated elements.

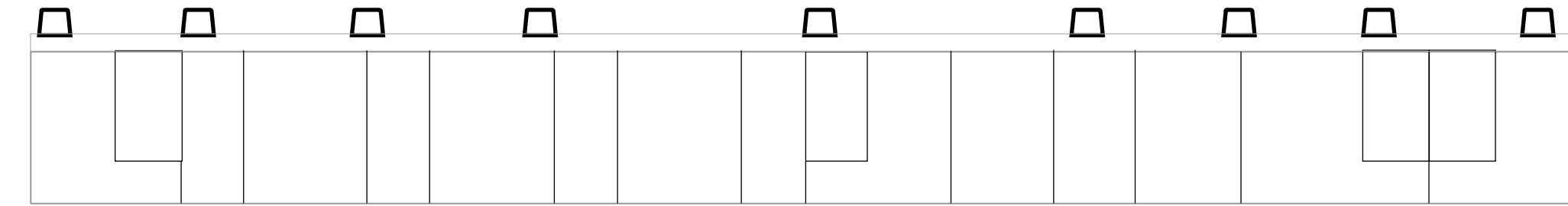
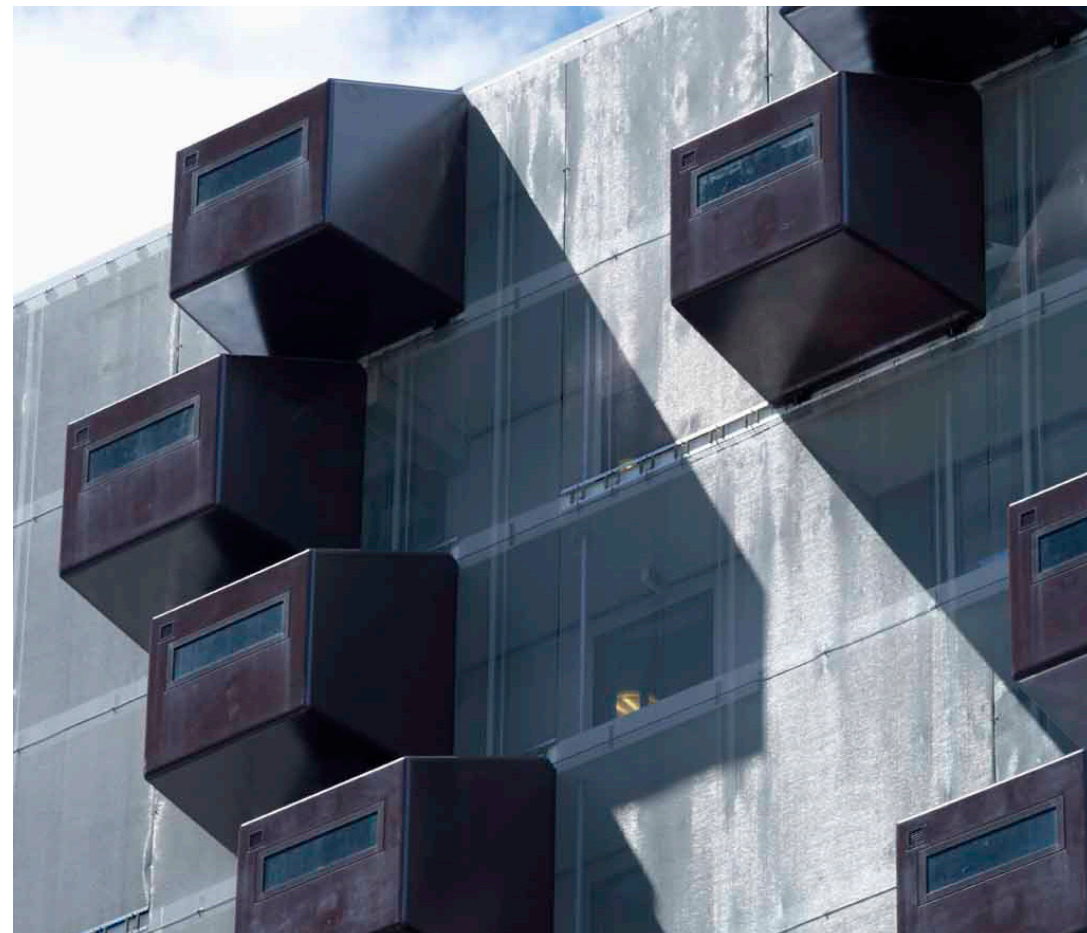
As a concept, according to the concept drawings by Mei Architects, they should resemble the backside of a caravan sticking out of the facade.

The storage units are accessible via the same gallery as the dwellings and offices.

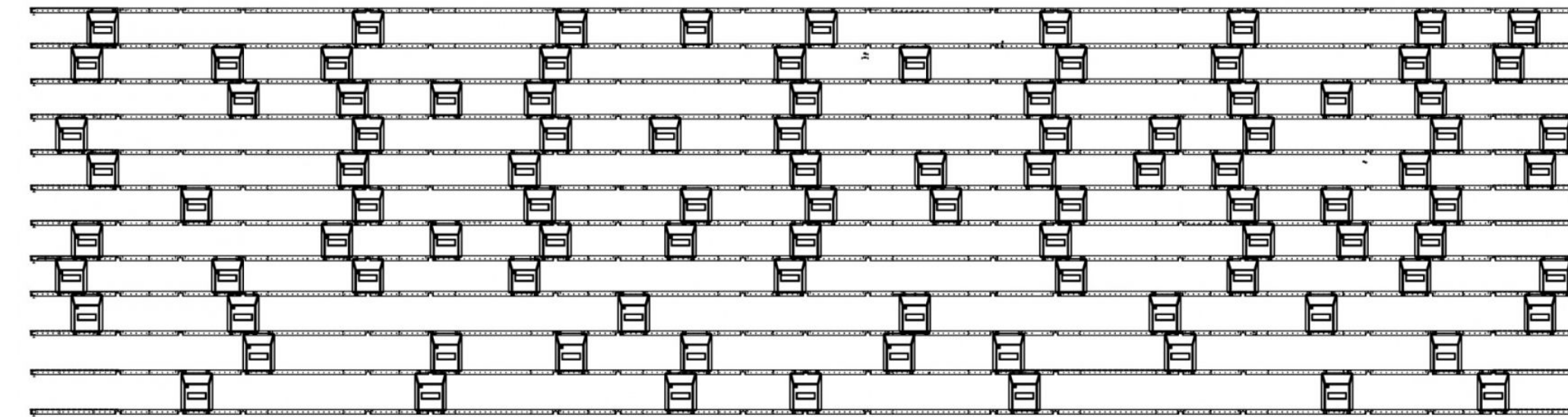
They are irregularly placed on the facade of the different floors, creating the look you see on the photograph.

The diagram under it shows the size, and placement on one of the floors (9th floor). These elements are also constructed as flexible, they can be taken out and placed again as a modular concept.

Measurements are 2.7 m wide, becoming 2.2m at the end, and 2.2 m deep, resulting in 5m² of external storage space per dwelling unit.



Floor plan
9th floor
N ←
Scale: 1 : 500



South-east
facade 1
Scale: 1 : 500