

# **Donaukanal 61**

## **Wood and the Public in the City**

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## Wood and the Public in the City

### 1. Introduction

The thesis Donaukanal 61 deals with the development and design of a hybrid wooden high-rise building at the Donaukanal in Vienna, putting special emphasis on wood and the public in connection with the architectural as well as social density of the surrounding intra-urban location.

This practical part of the thesis is based on theoretical research dealing with the term of sustainability, the history and status quo of multi-story timber construction systems as well as fire safety and the differences in national legislature concerning high-rise timber buildings.

In relation to the Donaukanal's high social and cultural diversity and density, the program of the proposed project is composed of different public and semi-public functions connected with (social) housing. This social and public functionality represents a decisive aspect of the project as a counterpart to the current dominance of non-public office, administration and hotel high-rises.

Despite the technological expertise and the unique potential of sustainability, multi-story timber construction systems still face a high amount of prejudices. To counter this and establish wood as a neutral and unprejudiced building material, it is necessary to bring timber construction especially to the city and the intra-urban space, which represents the dense center of our society. Moreover, it was not the aim to create architecture which defines itself by being made from wood but to produce *good* architecture which uses wood as a *neutral* construction material. With partly uncommon approaches and solutions the thesis Donaukanal 61 tries to contribute to these important developments.

### 2. Context

The project is located on the left bank of the Donaukanal at the crossing of the Obere Donaustraße 61 / Herminengasse. The surrounding area is formed from Gründerzeit buildings with a simple façade design in combination with newer buildings, mainly from the 1990s. The prominent character of the building site results from its location at the important urban edge of the Donaukanal, whose promenade is extremely busy with bars, cafés and restaurants in this area. In front of the building site there is also the Otto Wagner Schützenhaus, which is an important example of the Vienna Secession Style. In addition, the project is located on the same axis as the 74-meter-tall Ringturm, completed in 1955.

### 3. Design Goals

The Donaukanal represents not only a prominent historical and cultural but also socially dynamic and diverse intraurban axis of Vienna. As a result of its topographic character it also serves as an important architectural edge, corresponding well with high-rise buildings. However, the functionalities of the current high-rise buildings constitute a contrast to the Donaukanal's social and architectural diversity, as they are limited to non-public office, administration and hotel uses.

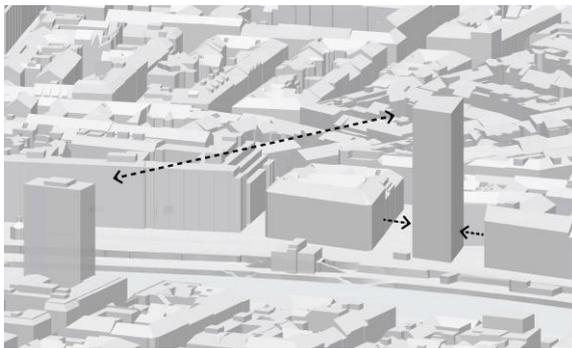
In contrast to that and in relation to the Donaukanal's high socio-cultural diversity and density, the program of the proposed project is composed of different public and semi-public functions connected with (social) housing. This social and public functionality represents a decisive aspect of the project as a counterpart to this dominance of non-public uses of the surrounding high-rise buildings.

Of course, it is also necessary to critically consider the high building density in the area. Therefore, the project's public character is strongly connected or rather defined by this urban density. As far as building laws are concerned, the thesis is based on the assumption, that the neighboring parties would waive part of their rights in favor of the added public value.

It is evident that the project's financial funding represents a strong contrast to the current real estate and investment market. It is rather the thesis' aim to provide an unconventional impulse as to where public authorities could guide project developments.

## 4. Design

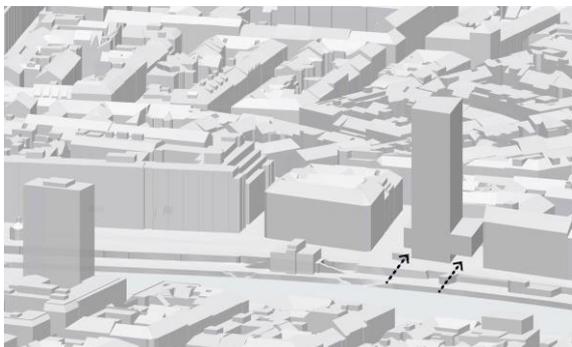
The project's design is, in a first step, based on distancing itself from the neighboring building façades and the building height's development according to the height of the Ringturm, in whose prominent axes the project is situated. At the same time this creates an opening of the urban perimeter block's introversion, which dominates the surrounding urban structure. Following the prominent hovering cantilever defines the inner and outer public space, but a small gap underlines the opening of the closed building façade along the Donaukanal. Moreover, a patio-like opening in the cantilever enables natural lighting of the interior and exterior. The project's two basic elements, the cantilever and the high-rise, are not separated from each other, but connected by the building's interior.



Axis Ringturm | Distancing



Contra urban perimeter Block | Opening the Inversion



Hovering cantilever | Definition of the public space



Atrium | Natural lighting for interior and exterior space

Figure 1: Design Concept

## 5. Organisation

The project's functions are organized in three zones (public, semipublic and private), which are connected to each other and correspond to the project's design. The different functional spaces are independent, but at the same time not strictly separated from each other, mixed uses are possible and intended.

- level 0 – level 2: public (forum, café/bar, art gallery, library)
- level 3 – level 4: semipublic (kindergarten)
- level 5 – level 20: private (housing)

In order to ensure independent use, the access and infrastructure are separated according to the zones. The northern infrastructure core with his two entries belongs to the semi-public and private area of the apartments, kindergarten and shared workspace, whereas the front core with its entries is part of the public area.

The two-storied forum, located in the center of the building, represents the heart of the public area. It has a strong connection to the public space outside, which opens to the

Donaukanal, but is at the same time sheltered by the hovering cantilever. Being a true public space, it is open to the public at any time and totally free in use. It can be used for markets, concerts, discussions as well as any kind of performances or festivities, but at the same time it also serves as a simple public place to spend time and meet.

The forum is multi-functional and has a gallery, which can be used as a separated area. The ground floor also hosts a café / bar, kitchen facilities for catering, toilets and a cloak room are located on level -1.

The public art gallery on level 1 is situated in the hovering cantilever, which has two-sided natural lighting and works as a multi-functional gallery space. Moreover, level 1 contains the semipublic area of the shared workspace. It offers work and rental space especially for the building's residents and extends to level 2.

There, the open library forms another part of the public space. Its book stockroom is located in the center of the building on top of the forum, whereas the work and reading spaces are situated in the cantilever.

On level 3 and 4 the semipublic kindergarten is located. Its two floors are both organized in two hips with a wide and two-sided open cloak area and facility rooms on the northern side. The group rooms have a functional storage/toilet module and are flexible in their size. Moreover, on level 3 there is a kitchen and dining space, as well as the wide outside playground on top of the cantilever.

Central aspects of the housing layout are flexibility and neutrality of use. The flats are organized in two hips with five flats of different sizes on each floor. The layout with an inner bathroom/storage room axes and a multi-functional internal corridor allows a flexible expansion of the rooms between the dwelling units. This tackles a highly topical issue due to the increasing flexibility of lifestyles and the shortage of inner-city housing. The second possible access on the façade side also allows the opening of the strict room layout and underlines the neutrality of use of the individual rooms themselves. The continuous surrounding balcony also contributes to this and at the same time provides shading during summer months. Exterior sliding elements made of expanded metal ensure additional shading and provide privacy.

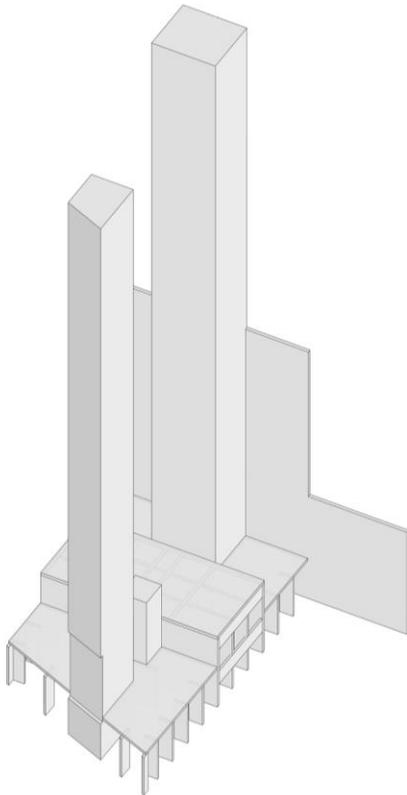
## 6. Construction

The project's construction system represents an integral part of the design itself. The system consists of a hybrid structure of two concrete cores and a concrete ground floor in connection with CLT ceilings and glulam pillars. The prominent cantilever is realized using LVL lattice trusses.

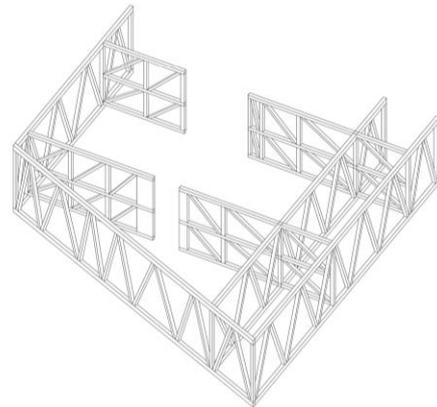
The vertical loads are transferred by the glulam pillars, whose positions are defined by one strict construction grid for the whole building. The CLT ceilings are supported by those glulam pillars punctually and without beams as single-span and two-span with cantilever or three-span two-way slabs. Their shifted layout and their shear connection make them a statically useable slab, which transfers the horizontal loads into the concrete cores. The punctual connection between slab and pillar is made with a special steel detail, which allows not only for a lateral pressure-free load transfer, but also for an easy and fast assembly. Of course, it is necessary to mention the Brock Commons – Tallwood House from Acton Ostry Architects and Hermann Kaufmann in Vancouver, Canada as reference for this system.

The prominent cantilever is realized using a system of two-story timber lattice trusses. Their position refers to the general pillar grid which allows a straight load transfer through the whole building. The connection detail is based on the standard detail, allowing for a lateral pressure-free load transfer through the upper and lower chords and fire protection for the detail's steel parts. Because of its higher strength values the lattice trusses and the pillars on level 1 and 2 are realized in laminated veneer lumber (LVL).

Besides the two infrastructure cores and the ground floor, also the forum is realized in concrete. Its ceiling consists of a concrete girder grid, which optimizes the use of material and transfers the load of the three pillar axes above.



Concrete | Level 0 | Cores | Firewall



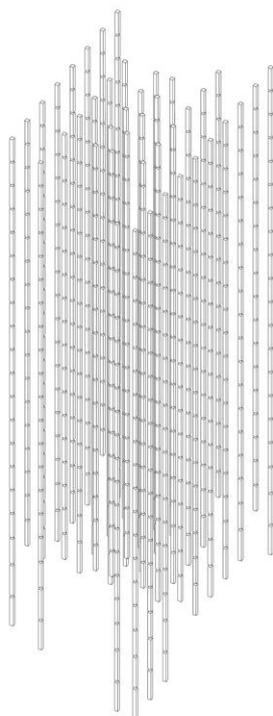
Cantilever | LVL lattice truss

## 7. Materials

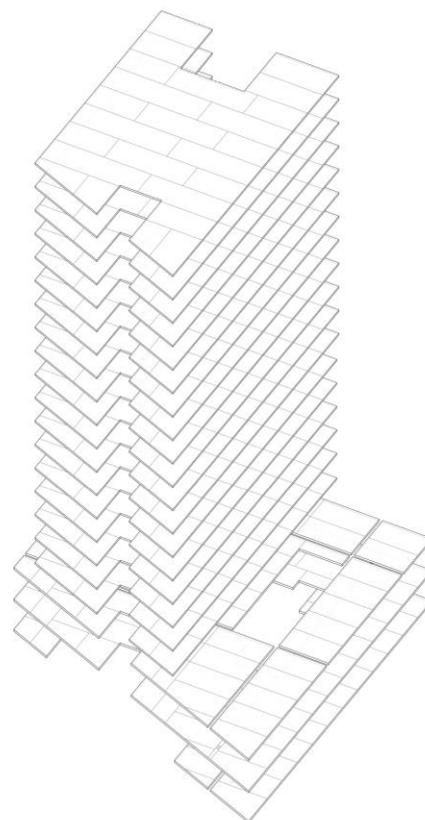
The used materials and appearance of the façade follows a clear division into three sections, the contrasts of which could also be described with the characteristic of a *Cadavre Exquis*. While the ground floor, contrary to its massiveness, appears as a light glass cube, the façade image of the cantilever is clearly dominated by the timber framework. The two-layered façade of the residential and kindergarten area consists of the sliding shading elements out of expanded metal on the outer level and the large windows in alternation with pre-grayed plywood façade panels. This results in a dynamic and transparent appearance that reflects the urban density of the environment.

The plywood façade panels by their planar structure also clearly distance themselves from the traditional wood façade image associated with rural areas.

Within the flats and the kindergarten, the cross laminated timber ceilings and glulam beams are left visible, only the supports in the corridor areas and wet rooms are covered with drywalls for reasons of building physics and to reduce the fire load in these areas.



Glulam | Pillars



CLT | Ceilings

Figure 2: Construction Concept

## 8. Fire Safety

The project's fire safety concept is directly connected to the design itself and based on following aspects:

- small fire sections and short escape routes for a fast evacuation in case of fire
- staircase cores in concrete, evacuation routes free of flammable materials
- load-bearing and non-covered timber elements (CLT ceilings, glulam pillars, LVL lattice trusses) in REI 90 (bigger profiles)
- pillars in public corridors are covered with drywalls for reduced fire load
- fire sprinkler systems in the whole building in order to compensate the flammable load-bearing building elements and to stop the spread of fire as fast as possible
- continuous floor screed as a fire- and smoke-proof horizontal barrier
- accurate connection details with covering of all steel parts
- balcony ceilings with fire-proof bottom side (fibre reinforced concrete panels) as barrier against the spread of fire over the façade
- good and easy access for fire brigades to the critical public areas of the cantilever



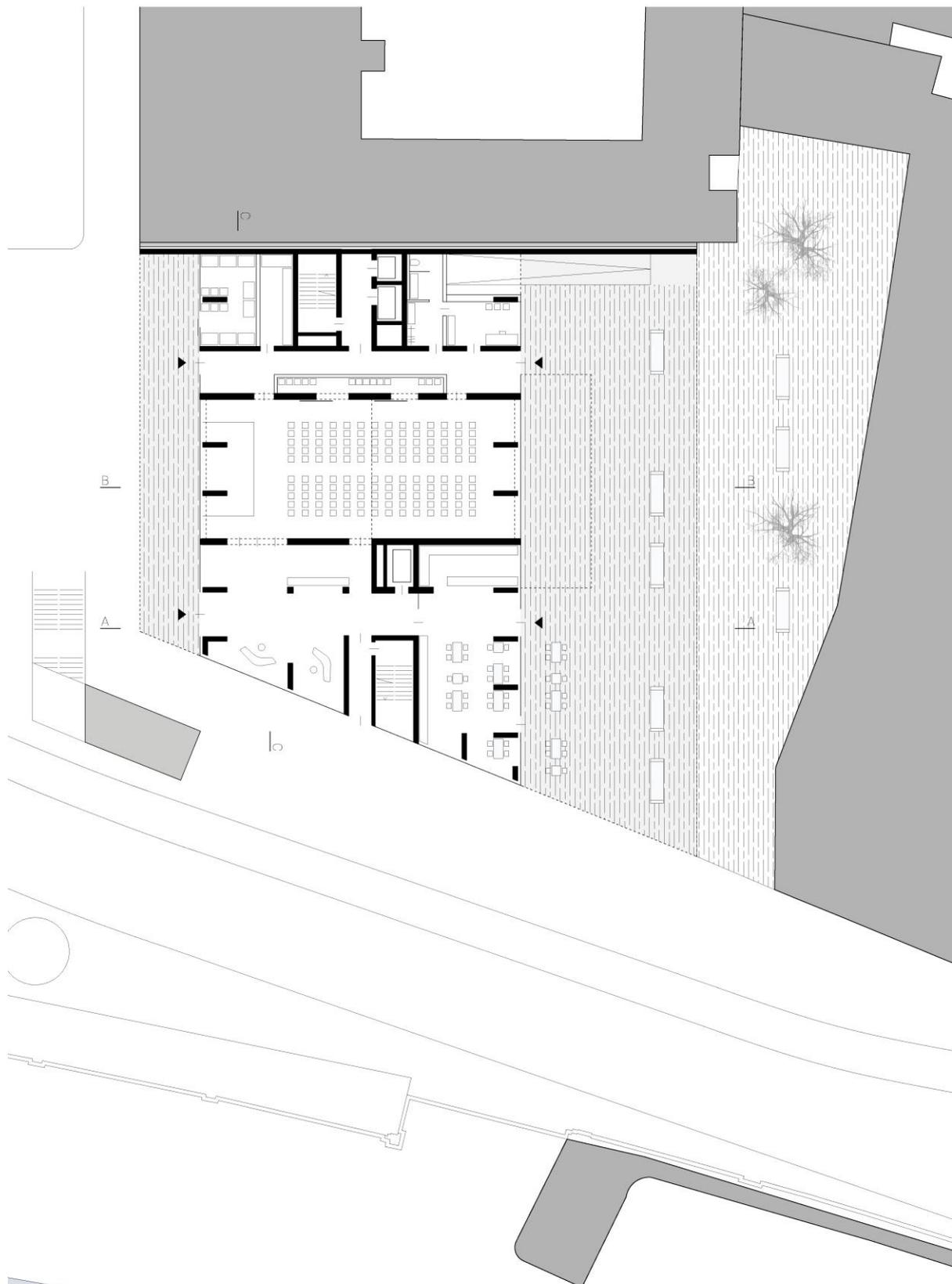
ELEVATION SOUTHWEST

0 50



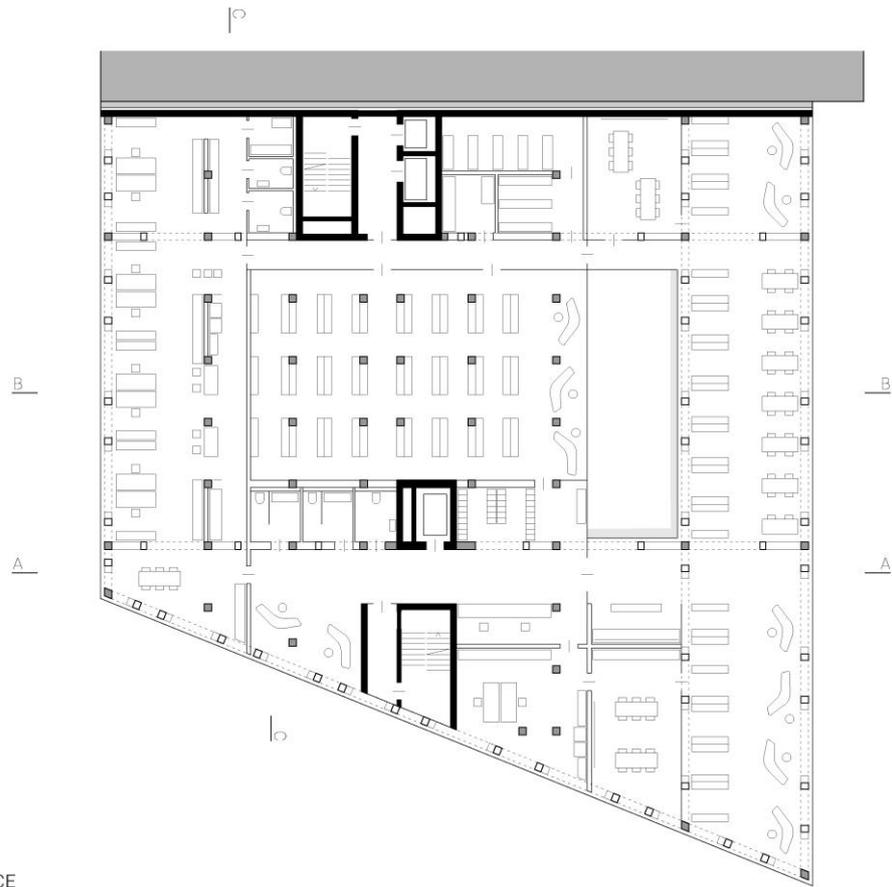
SITEPLAN

0 50

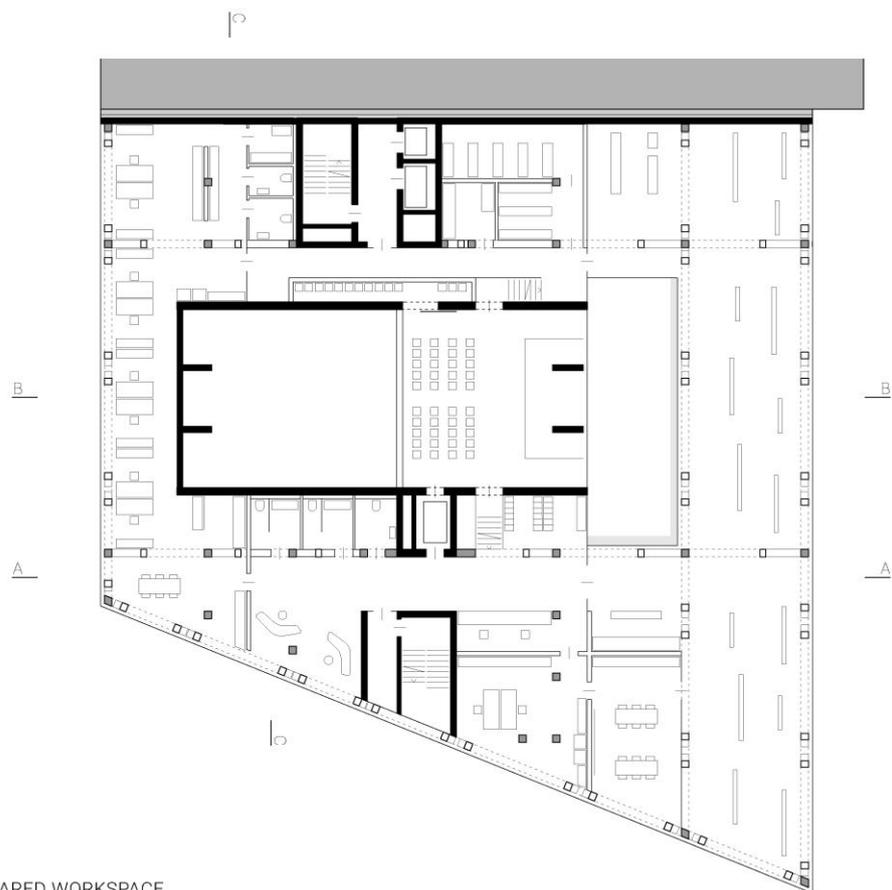


0 5

FLOORPLAN | LEVEL 0  
FORUM | FOYER | CAFE / BAR



FLOORPLAN | LEVEL 2  
LIBRARY | SHARED WORKSPACE



FLOORPLAN | LEVEL 1  
FORUM | ART GALLERY | SHARED WORKSPACE





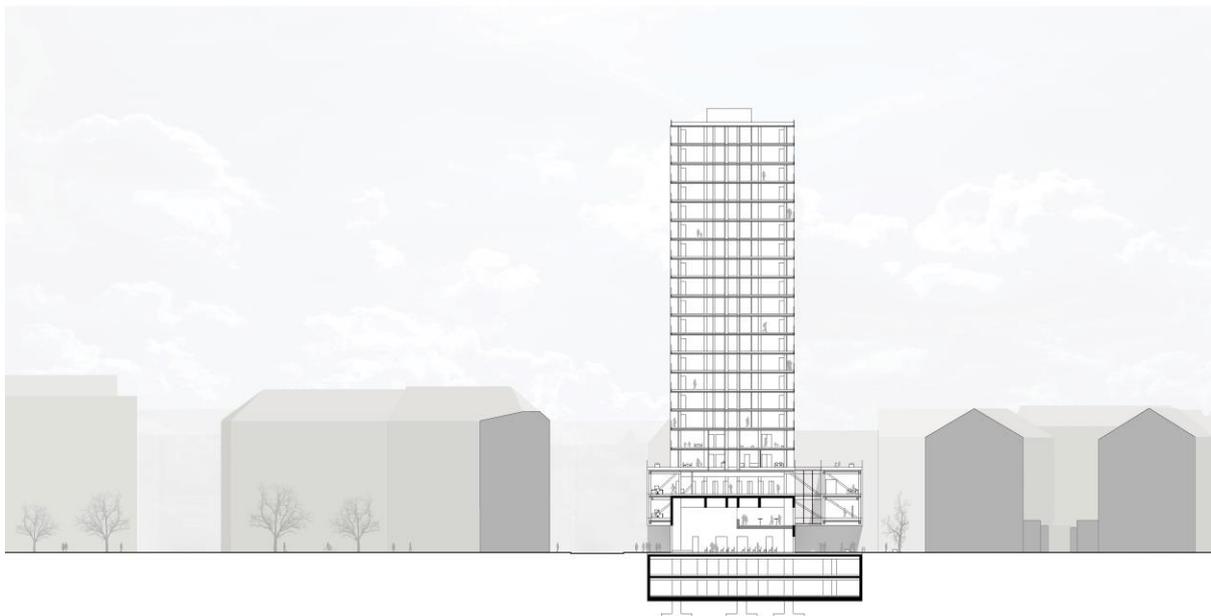
FLOORPLAN | LEVEL 8-20  
HOUSING



0 5  
FLOORPLAN | LEVEL 3  
KINDERGARTEN

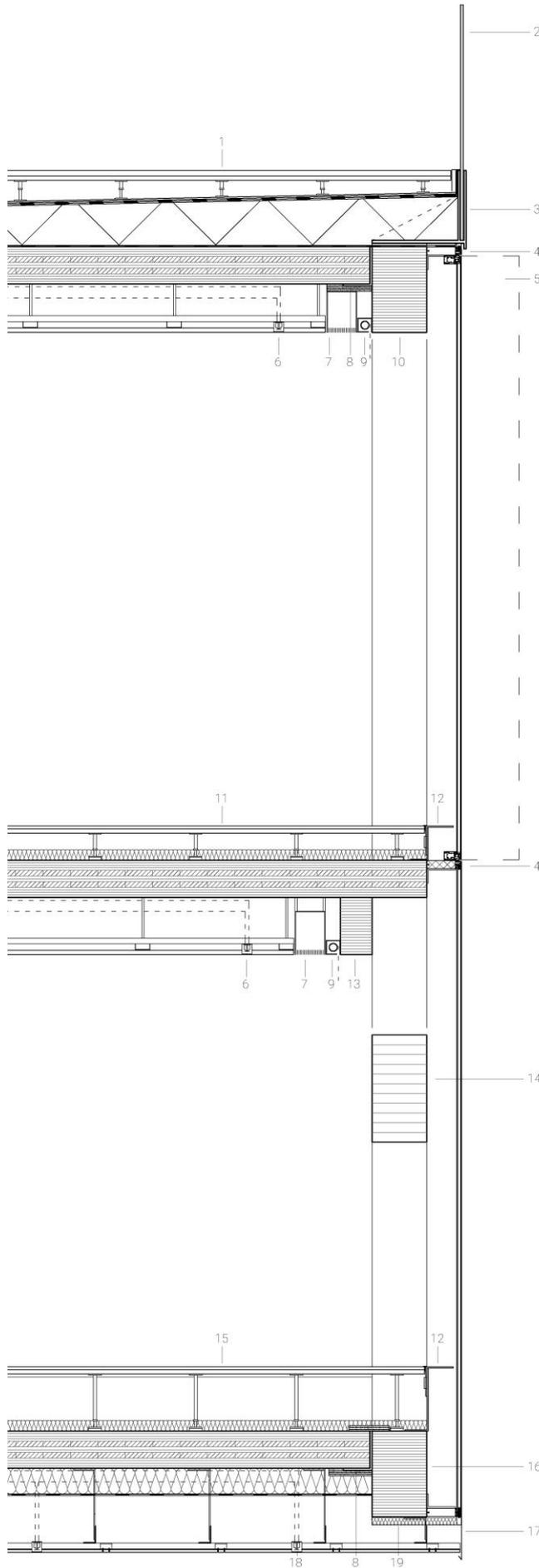


SECTION CC



SECTION BB

0 | | | | 50



### FACADE SECTION

- 1 Tartanplatten 40 mm  
Trägerplatten 30 mm  
Stellfüße 80-370 mm  
Bautenschutzmatte 10 mm  
Bitum. Abdichtung, 2-lagig 15 mm  
Gefälledämmung, XPS 60-350 mm  
Abdichtung  
Brettsper Holzdecke, 7ss DL 260 mm  
Abgehängte Decke 310 mm  
Gipsfaser Akustikplatten 30 mm
- 2 Absturzsicherung VSG
- 3 Stahlkonsole, verzinkt RAL 9006  
Einspannung Absturzsicherung  
Montage auf Elastomer-Dämmstreifen
- 4 Pfosten-Riegel-Fassade  
(Structural-Glazing)  
Brandschutz-Isolierverglasung  
Riegel brandschutzgedämmt
- 5 Parallel-Ausstellfenster,  
gegen Brandüberschlag  
geschossweise versetzt
- 6 Sprinklervollschutz, Vernebelung
- 7 Mechan. Be-/ Entlüftung
- 8 Stahlwinkel, Auflager Decken  
Kapselung 45 mm  
3 x Gipsfaserfeuerschutzplatten
- 9 Blendschutzrollo
- 10 Obergurt Furnierschichtholz Buche  
380 x 600 mm
- 11 Parkettboden 25 mm  
Trägerplatte 30 mm  
Stellfüße 190 mm  
(auf Trittschalldämmstreifen)  
dazw. Mineralwolle 50 mm  
Brettsper Holzdecke, 7ss DL 260 mm  
Abgehängte Decke 370 mm  
Gipsfaser Akustikplatten 30 mm
- 12 Stahl-Abschlusswinkel, offenbar
- 13 Nebenträger Furnierschichtholz Buche  
220 x 400 mm
- 14 Strebe Furnierschichtholz Buche  
320 x 380 mm
- 15 Parkettboden 25 mm  
Trägerplatte 30 mm  
Stellfüße 400 mm  
(auf Trittschalldämmstreifen)  
dazw. Mineralwolle 50 mm  
Brettsper Holzdecke, 7ss DL 260 mm  
Stahl-UK, verzinkt 570 mm  
dazw. Mineralwolle 160 mm  
Winddichtung  
Glasfaserbetonplatten 15 mm
- 16 Untergurt Furnierschichtholz Buche  
380 x 600 mm
- 17 Stahlblech verzinkt, RAL 9006  
mit Tropfnase
- 18 Sprinklervollschutz, Vernebelung  
glykolbefüllt
- 19 Dämmstreifen 60 mm

0 0,5

