

1957

WOHLFAHRTSGEBÄUDE CIBA AG, BASEL

2020

DOCTORAND'S HOUSE, BASEL

Master Arbeit FS20 - Mathieu Bulliard

Thema C - RE-USE CIBA

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Begleitfach Konstruktion - Professur Adam Caruso

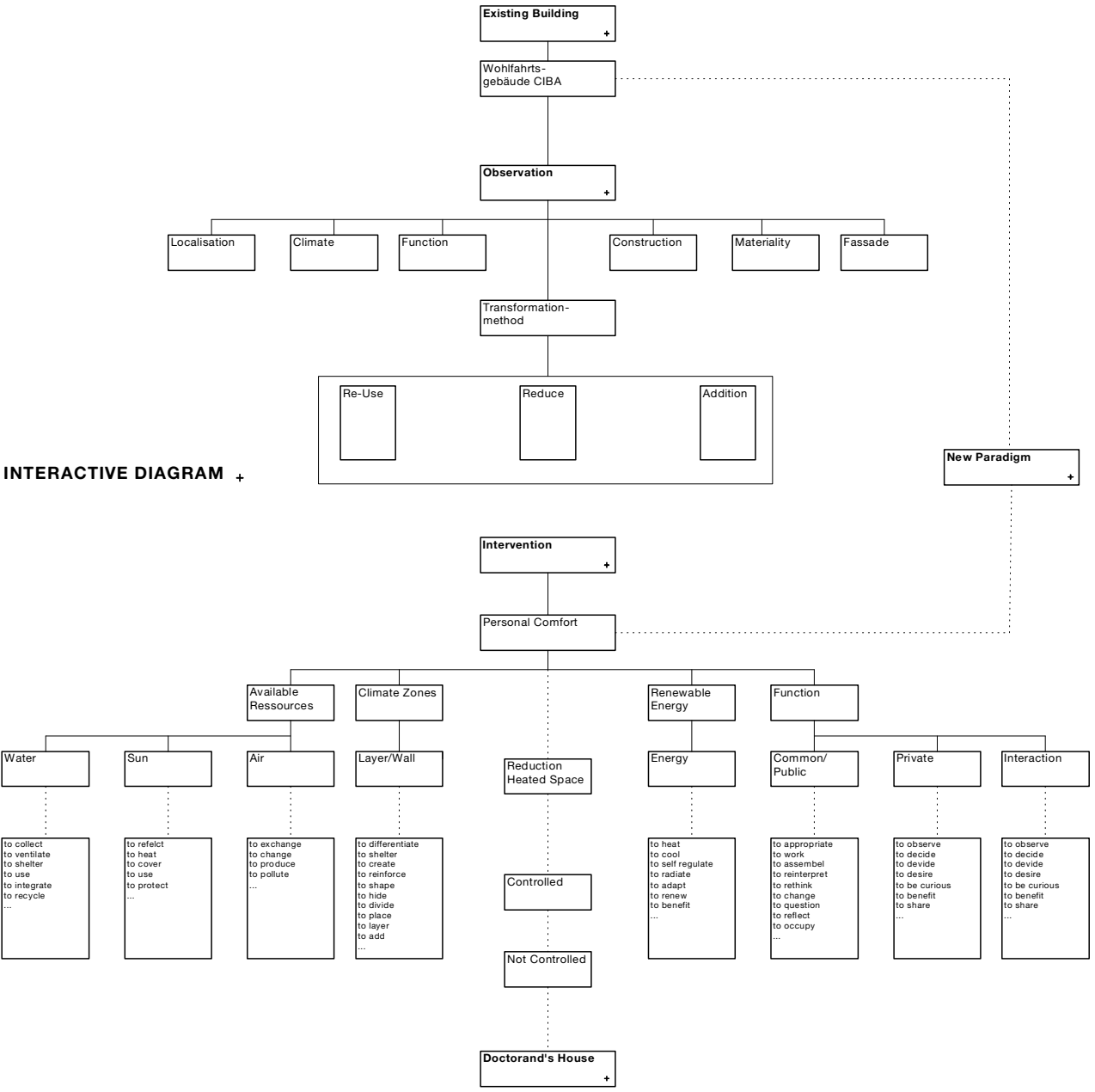
Begleitfach Architektur und Gebäudesysteme - Professur Dr. Arno Schlüter

HOW TO APPROACH A BUILDING

The environment of a building is under continuous social, economic and technological change. What role does the construction of a building play in the process of these environmental changes? Do new usage requirements inevitably lead to a complete replacement of the building, or can they be converted to make them suitable for the new environment? Can CIBA's existing welfare building from 1957 find a changed form even play an innovative, identity-creating role in a newly developed quarter?

In order to answer this question, I ask myself how to approach the building I want to transform. I realize that it is the thought process and the reflections that count most. The transformed object – the Doctorand's house - is the result of many subjective choices I have made during this process. However, the 3-step method I have developed and the skills I have acquired will be a guideline also for other projects. Hereunder, as well as in a more schematic way in my diagrams, I will illustrate my thought process step by step:

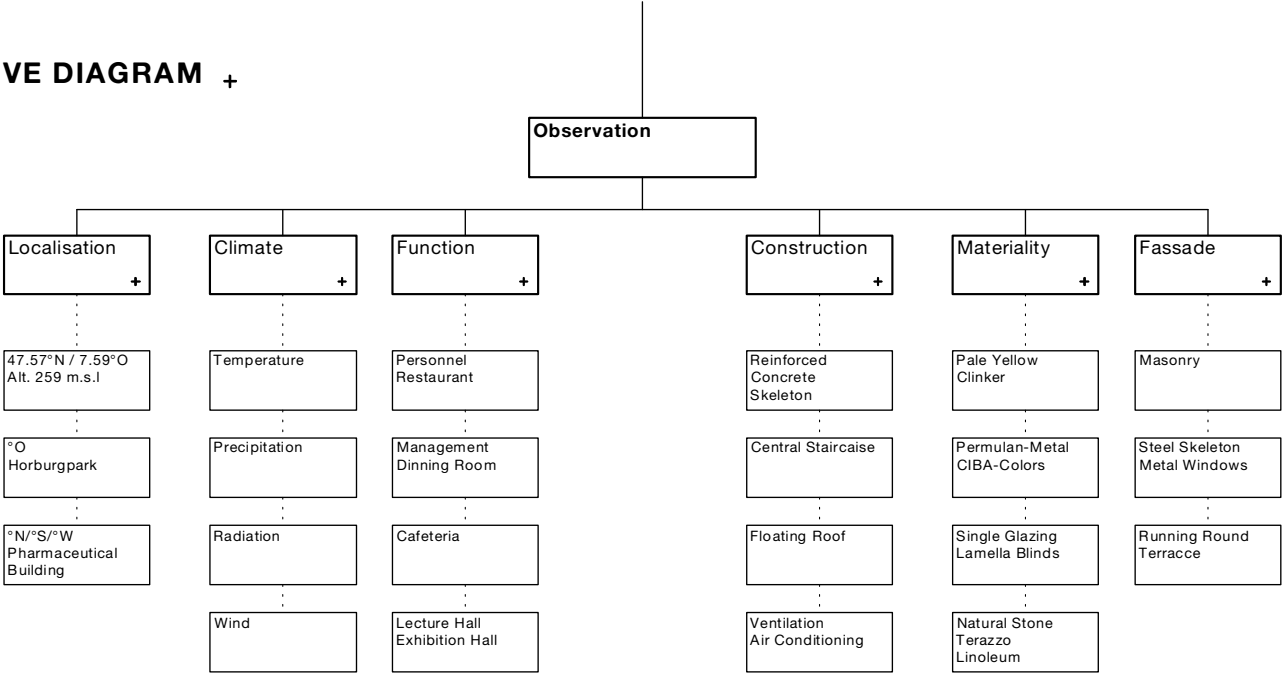
- Observe CIBA's existing welfare building
- Define the new paradigm
- Intervene.



OBSERVATION

The abbreviation CIBA means “Chemische Industrie Basel” (Chemical Industry Basel”). In order to revive its spirit, its soul, I need to develop an understanding for it. How was the welfare of the beneficiaries of the building insured? In a scientific approach, I carefully observe and document.

INTERACTIVE DIAGRAM +



LOCALISATION

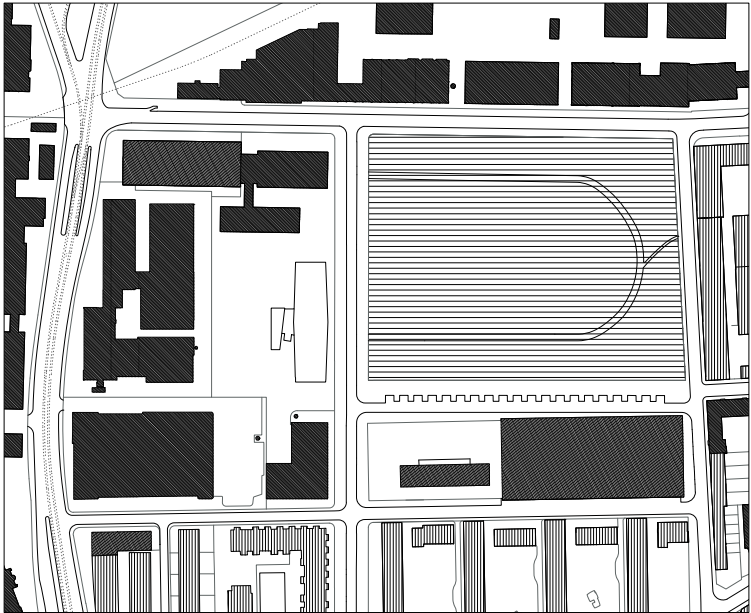
CIBA's welfare building is located on the right side of the Rhein in Kleinbasel, the former chemical Industry Quarter of Basel, former strategic trading point. It is a transition from the Pharmaceutical Industry to the family-neighborhood including a Kita and the Horburg school. The western side is enclosed by pharmaceutical research and production facilities.



Nachbarn

47.57 °N / 7.59 °O

Alt. 259 m.ü.M



Wohnen
Forschungsgebäude

Horburgpark
Öffentliche Bauten

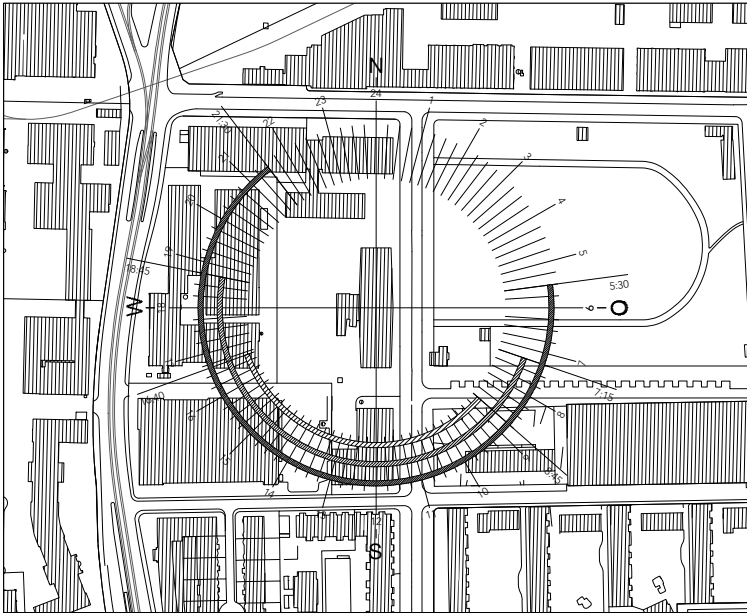


CLIMATE

The building is oriented towards the East/West. The heat island effect makes the temperature raise every year, in 2030 the Temperature will be 5°C higher than in the current time. In 2019, the sun was hitting the building during 322 more hours, that is 19% more than the average value between 1961-1990. At the same time, the average rain amount nowadays is lower but when it rains it usually does heavily. The wind mainly comes from the West and the North/East.

Sonnenstand [°]

47.57 °N / 7.59 °O Alt. 259 m.ü.M

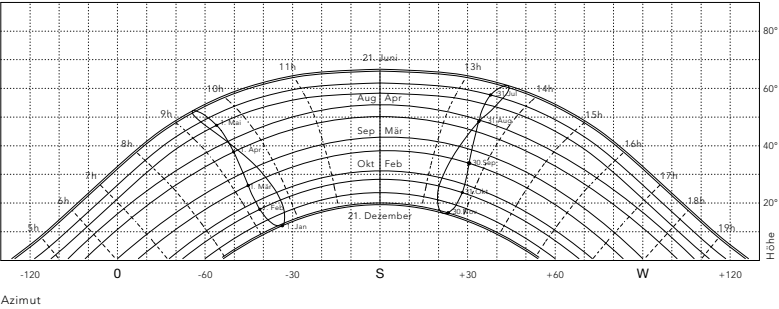


Dezember
März/September

Juni

Sonneneinstrahlung [°]

47.57 °N / 7.59 °O Alt. 259 m.ü.M



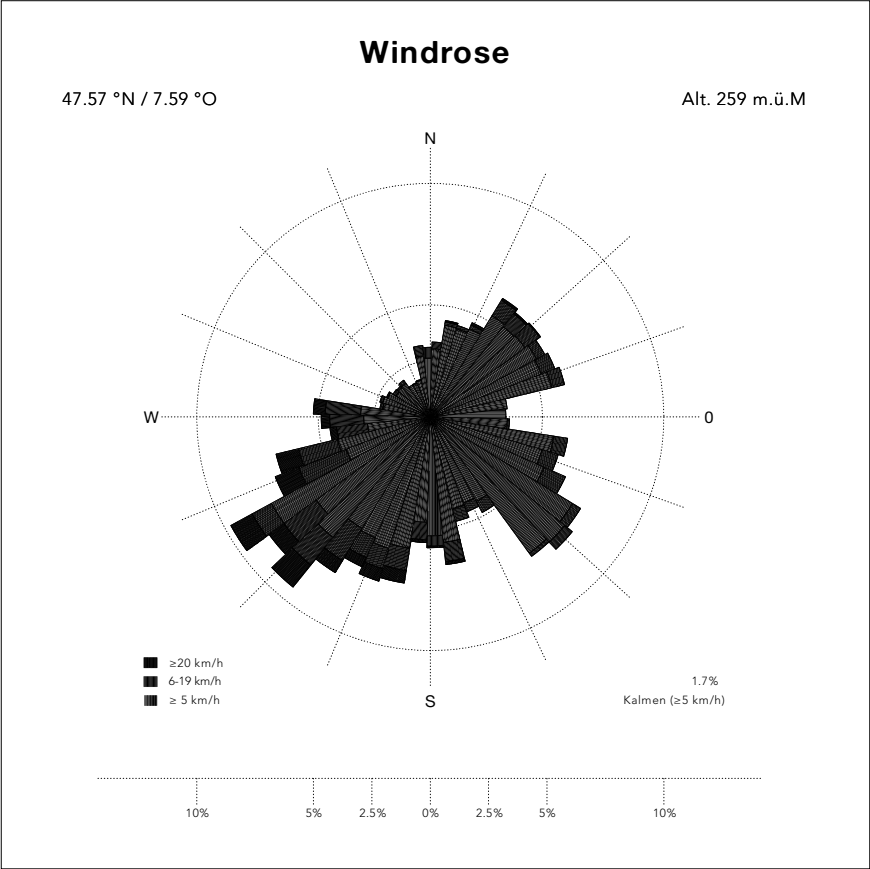
Azimut

Einfallswinkel [°]

21. März	09h00	23.96°
	12h00	42.32°
	15h00	33.55°
21. Juni	09h00	31.64°
	12h00	69.88°
	15h00	60.10°
21. September	09h00	16.74°
	12h00	39.89°
	15h00	38.22°
21. Dezember	09h00	5.31°
	12h00	18.78°
	15h00	11.18°

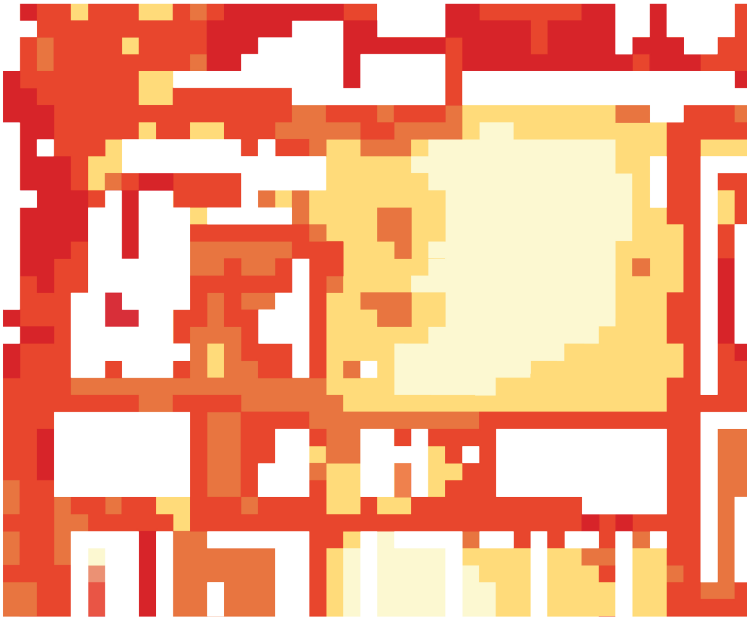
Globalstrahlung [MJ/m²]

Norden	Juli	185
	Dezember	32
Osten	Juli	332
	Dezember	59
Süden	Juli	303
	Dezember	150
Westen	Juli	346
	Dezember	54



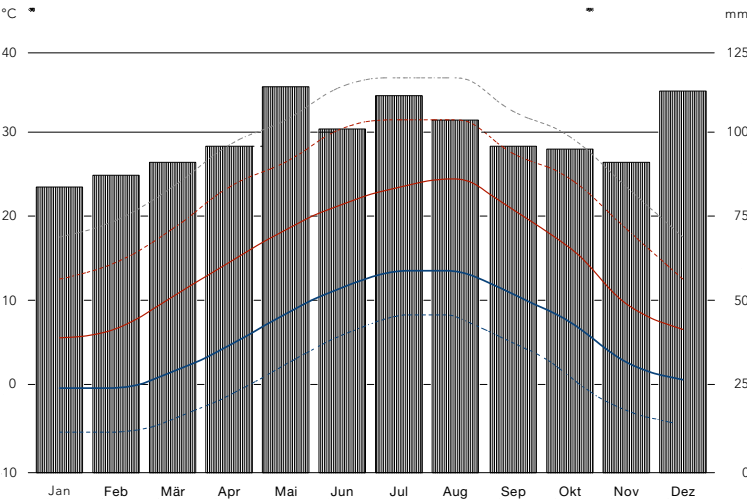
Wärmeinseleffekt [K]

47.57 °N / 7.59 °O Alt. 259 m.ü.M



Temperatur [°C] und Niederschlag [mm]

47.57 °N / 7.59 °O Alt. 259 m.ü.M



FUNCTION

The welfare building is dedicated to the wellbeing of the employees.

Each floor serves a specific function:

Ground floor: Kiosk + Breakfast room

First and second floor: 4 refectories (up to 1'400 meals) + Cafés

Third floor: Dining room + Exhibition space + Auditorium (300 people)

Roof: Terrace



Refectory



Buffet



Meeting Room



Dinning Room



Roof Terrace

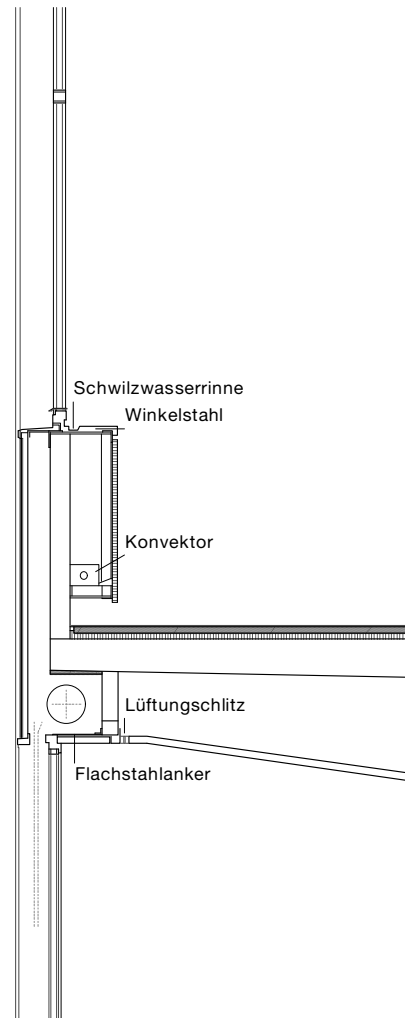
FACADE+CONSTRUCTION+MATERIALITY

The angled longitudinal sides and the well-proportioned facade windows give the building a very elegant look. The slim profiles and light grey balustrade fields with vertically permulan ribbed sheet metal cladding that are anodized with Ciba colors and the floating roof panel add lightness to it. The retracted ground floor made out of a pale-yellow exposed brick and the kiosk open the welfare building to the whole neighborhood.

Modern techniques

When constructing CIBA's welfare building in 1957, the architects Suter&Suter used many modern innovative techniques and got inspired by modern ideas such as:

- the separation of the world into a natural and an artificial sphere
- the idea of a homogeneous climate, a "man-made weather" as it is reported in "The Architecture of the Well-Tempered Environment" by Reyner Banham
- the integration of a heating and cooling system in the ceiling and behind the window
- the air-ventilation in the ceiling ensuring air cooling in Summer
- the creation of a world characterized by the complete absence of external environmental influences



U-VALUE

$$\frac{A_{\text{solid}} \times U_{\text{solid}} + A_{\text{Fenster}} \times U_{\text{Fenster}}}{A_{\text{Tot}}} = U_{\text{T}}$$

$$\frac{3.66\text{m}^2 \times 0.37 \text{ W}/(\text{m}^2\text{K}) + 9.03\text{m}^2 \times 5.30 \text{ W}/(\text{m}^2\text{K})}{12.68 \text{ m}^2} = 3.88 \text{ W}/(\text{m}^2\text{K})$$

WANDAFBAU

Peramulan-Blech	10mm
Hinterlüftung/Rolladenkasten	90mm
Dämmplatte	80mm
Heizsystem/Konvector	167mm
Holz-Bekleidung	20mm

Isolierverglasung/Alu-Profil	14mm
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BODENAUFBAU

Stahlbeton	130mm
Mineralwolle	25mm
Estrich	26mm
Bodenbelag	5mm





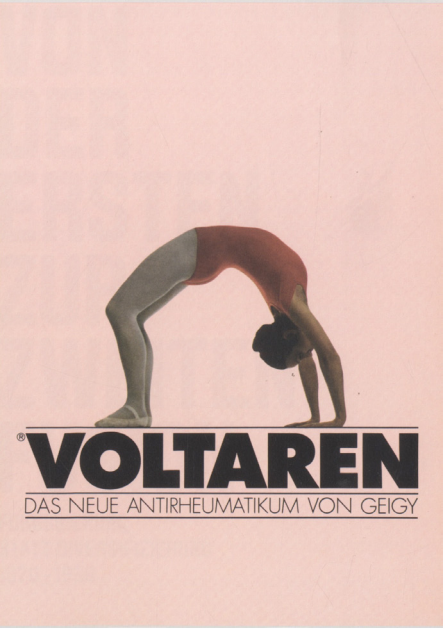
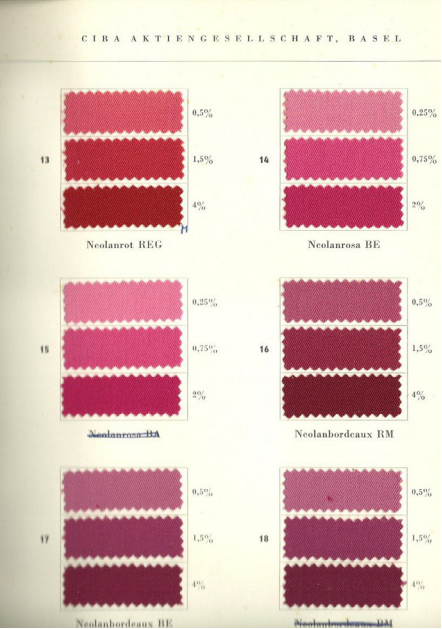




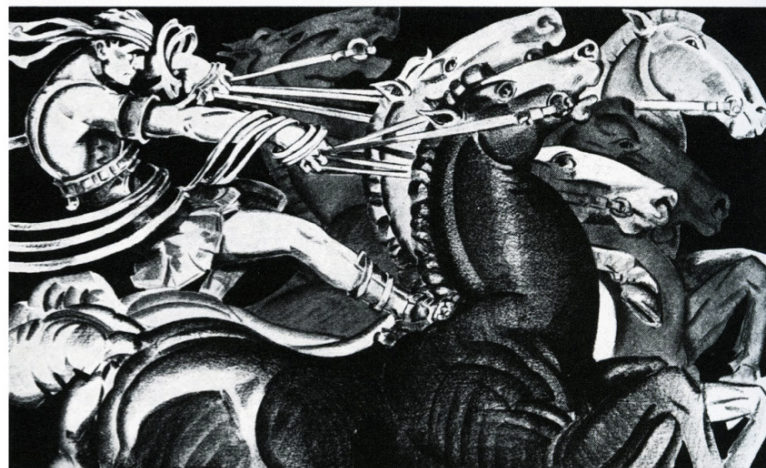
NEW PARADIGM

CIBA does not only stand for Chemische Industrie Basel, but also for a permanent search for renewal, improvement and innovation, a constant drive for research on the one hand and modern ideas that are characterized by a man-made control over things on the other hand. Through this process of careful observation of the existing a new paradigm emerges, almost as if the process in itself dictated the following questions and answers: Shall I re-use, re-create, re-duce or add?

I shall re-use the existing building and re-create a relation to its new environment, re-duce the heated surface and energy consumption and add functional layers and climate zones.



Controlled . . . IN ONE HARNESS . . .
THE SIX "CLIMATIC FACTORS"
OF TRUE AIR CONDITIONING



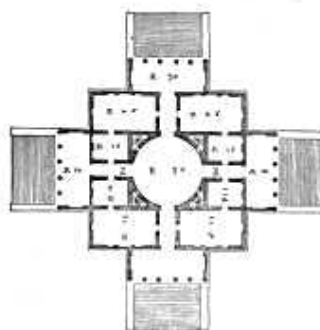
MINNEAPOLIS-HONEYWELL CONTROLLERS, VALVES, RELAYS, THERMOSTATS, AND OTHER UNITS PROVIDE FOR SIMULTANEOUS CONTROL OF



CLIMATE HAS ALWAYS PLAYED A CENTRAL ROLE

In fact, when looking back into the paradigms of the earlier days, climate has always played a central role. In the first Century BC, Vitruv already said that “climate is the most classical form of architecture”. This statement was later confirmed by Leon Battista Alberti who said that “there is no architecture without climate” in “L’art d’édifier”. Thus, architecture depends on the climate or differently put climate is the “raison d’être” for architecture.

Another fascinating example is the predominant structural reflection of Palladio’s Dome of the Villa Rotonda (1566-71) through the implementation of a ventilation system. The quadripartite plan of the space also reveals a search for shade and coolness and the alignment of the windows is conceived as a natural ventilation. Yet another inspiration comes from Bernhard Rudolfsky’s “Architecture without Architects”. Houses in the region of Engadin in the canton of Graubünden typically are equipped with local ventilation techniques using local materials. In other words, they were built by locals who made the best out of the environment and climate they were built in without the search to “fit” a certain and constant climate into a house and therewith to control it completely.



PERSONAL COMFORT-ADAPTIVE ARCHITECTURE

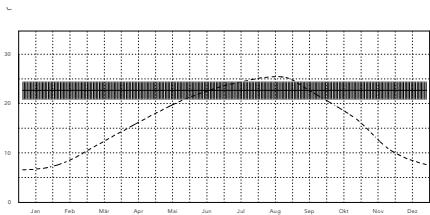
Looking back to history, it seems like the focus was not on control and standardization. After all, why would one put so much efforts in separating the inside from to the outside to keep a space at a constant temperature of 21 C°? Climate can provide the means to make architecture moving the architect's work from drawing the solid (walls, facades, etc.) to drawing the void (air, temperatures, light).

The way people use and occupy space plays a central role for me. Do they use the space at its full potential? How can the art of inhabitation for example minimize the use of energy and how can it foster the adaptiveness of space according to the various personal needs? My new paradigm therefore is a personal comfort-adaptive architecture.

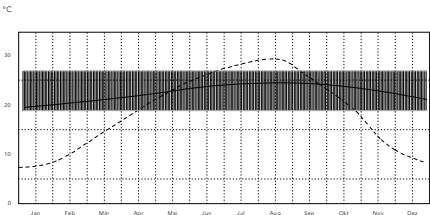
Thermische Behaglichkeit [°C]

47.57 °N / 7.59 °O

Alt. 259 m.ü.M



Moderne



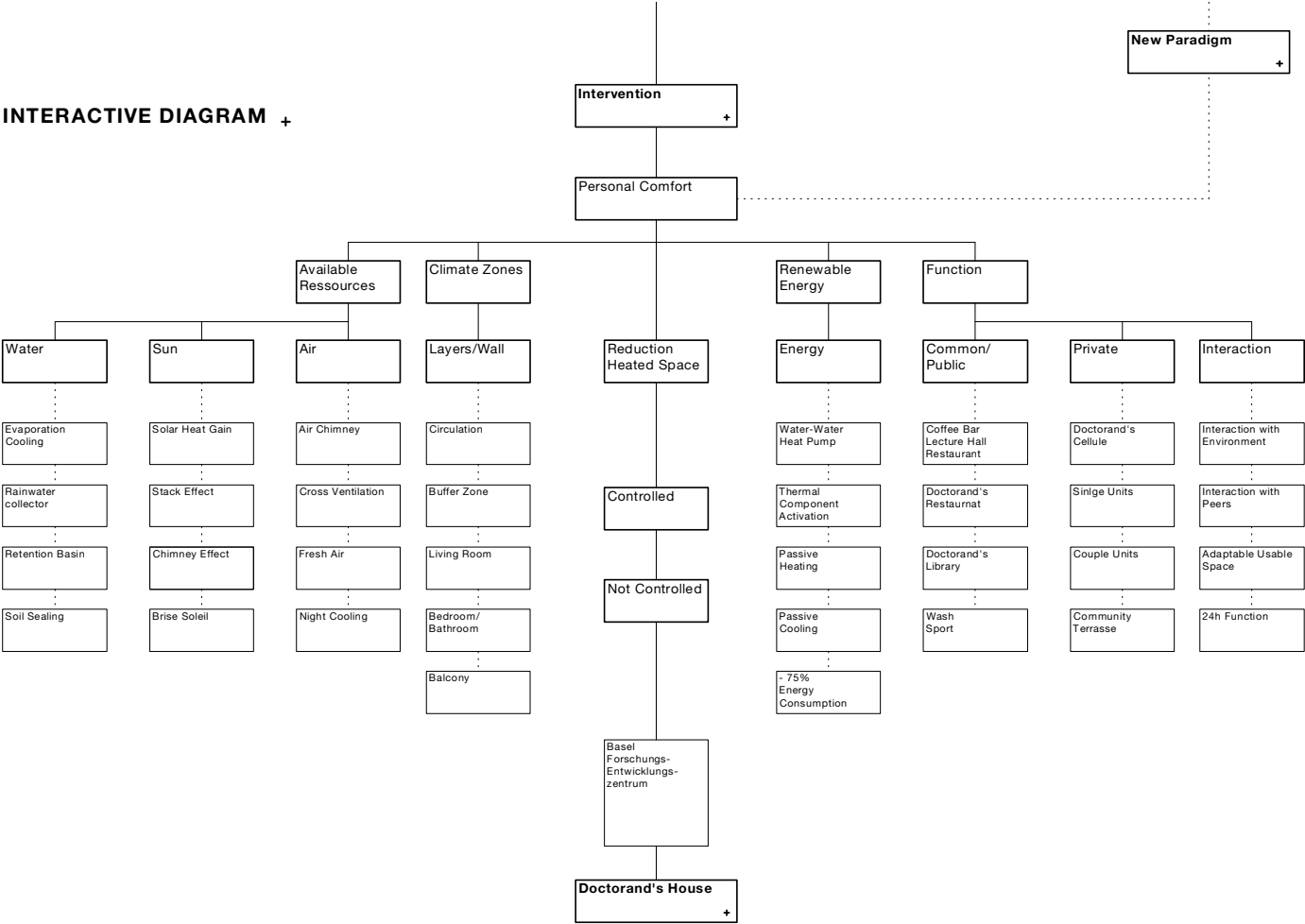
New Paradigma

- ▨ Komfortbereich
- Ø Innen Temperatur
- - - Ø Aussen Temperatur

INTERVENTION

Having set a new paradigm allows me to intervene in a targeted way. Through my two main interventions that are the addition of climate zones and functional layers as well as an air chimney I make the best use out of the available resources.

INTERACTIVE DIAGRAM +



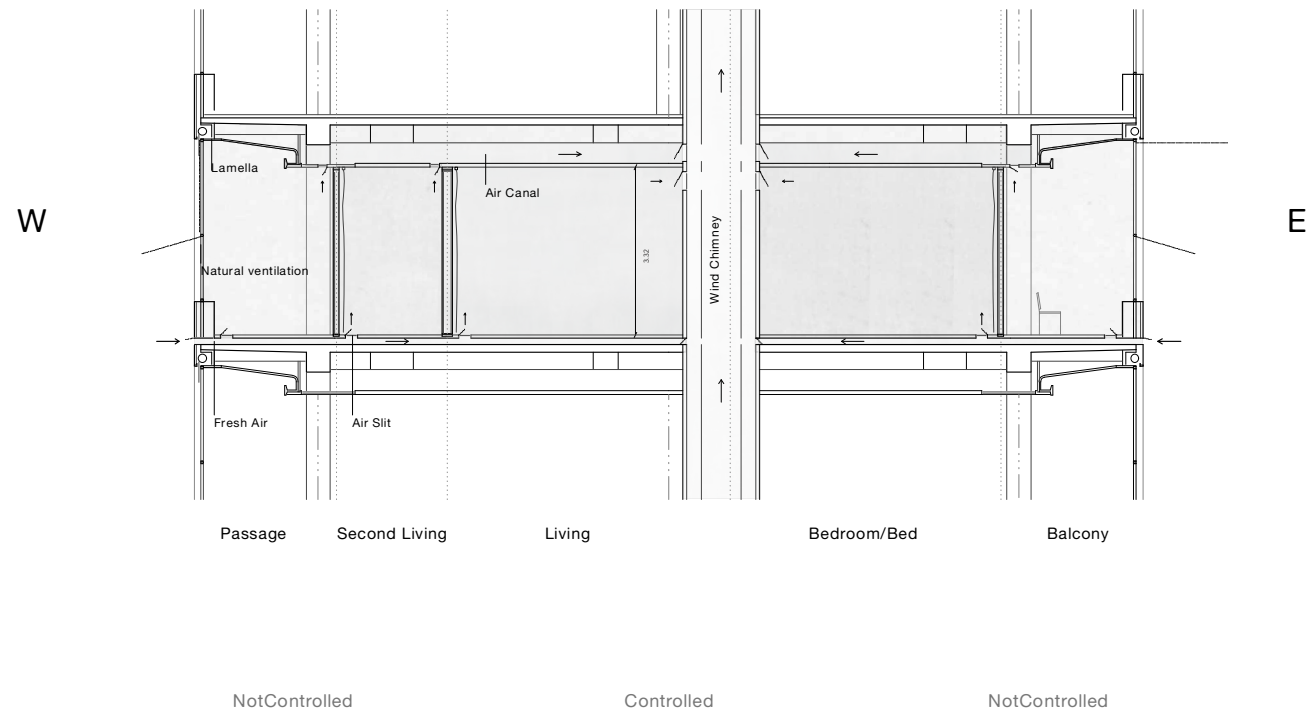
CLIMATE ZONES + FUNCTIONAL LAYERS

The added layers are different thermal conditions with different functions, they are adaptable and can be controlled according to personal needs.

The different layers are also used as technical elements, allowing heating through the wall as well as thermal activation, enabling targeted heating according to the individual needs compared to uniformed imposed heating of the whole building. In this way, they are like new layers added to the existing ones, creating a temperate climate landscape.

This allows for a transformative flexible space that can be divided into less climatic control and comfort levels on the one hand and more controlled areas on the other hand. These uncontrolled spaces offer users increased flexibility in deciding how to use the space.

CLIMATE ZONES



AIR CHIMNEY

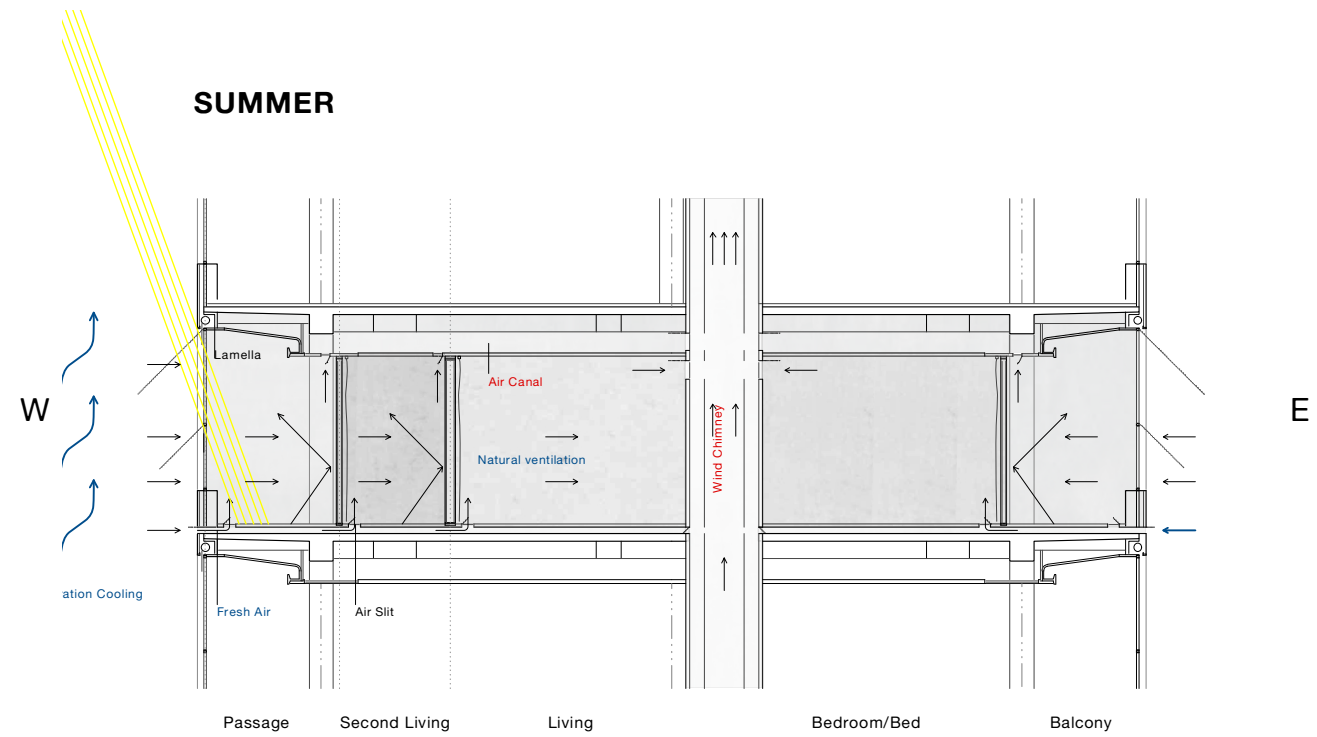
The air flow that goes through the air chimney is the backbone of the conditioned space. It is this natural convective air movement (stack effect) that makes it possible. Thanks to the air flow, depending on the season, it is possible to reduce up to 50-85% of the building's energy consumption.

The flexible facade with the movable glass panels and the operable windows allow for maximum natural ventilation. There is a constant air flow blowing through the building thanks to small openings in the existing facade. The air flow can be controlled through opening and closing the window according to one's needs.

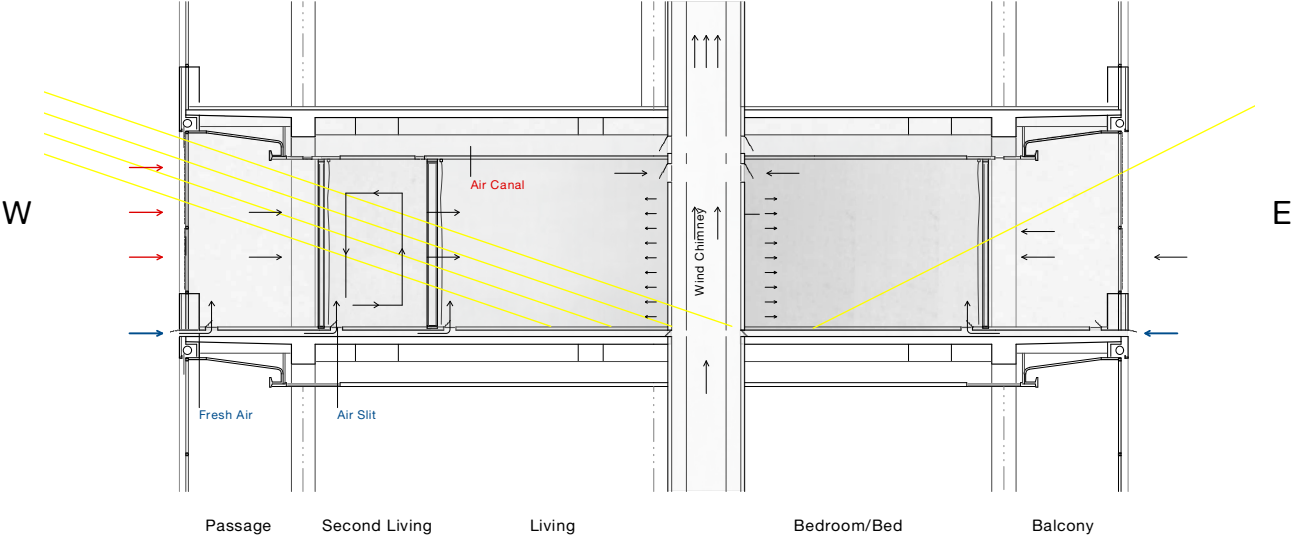
Heating as well as cooling are possible. Heating happens through the solar heat gain through buffer zones. Cooling happens through the natural cross ventilation, the sun protection through the various buffer zones and the thermal curtain. Heating and cooling, controlling and not controlling result in a hybrid system of a manual and automatic fresh air supply.

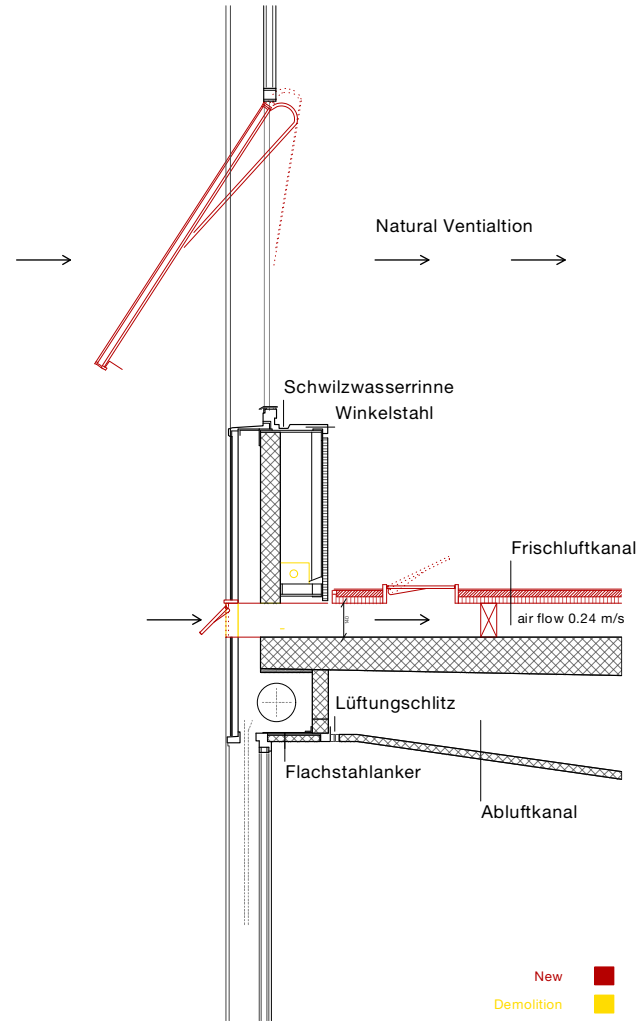
In addition, as I observe that the water cannot trickle away, I create a rainwater storage on the West side of the building. Water mainly serves the purpose of cooling through evaporation which also creates a new landscape.

These interventions fulfill the purpose of serving the personal needs of the residents of the Doctorand's house by being adaptable.



WINTER







2020

DOCTORAND'S HOUSE

Basel was and remains Switzerland's research and development center for the Pharmaceutical industry. CIBA can be seen as the pulsing heart of this chemical research area. Being inspired by the existing environment, I have transformed CIBA's welfare building into a house for doctorands that shall offer the best possible work and life conditions for doctorands. The personal comfort-adaptive architecture allows each one to create a house fulfilling one's own's and the community's needs.

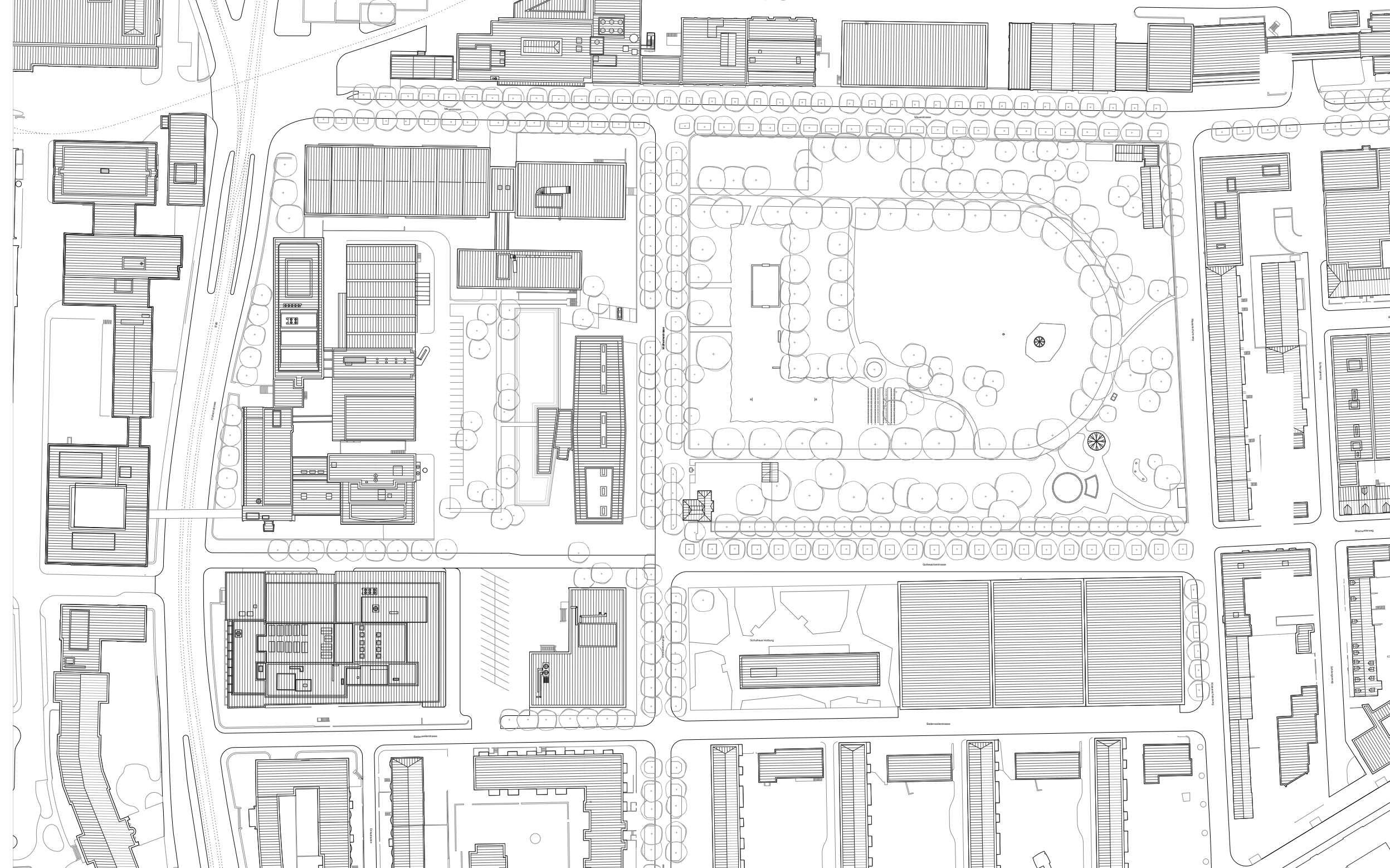
From the outside, CIBA's welfare building has barely changed. Small openings in the facade suggest what could be found inside. A few steps back are needed towards Horburg parc in order to view the silhouette of CIBA's welfare building and to relate its facade to the roofscape. The air chimneys slightly point their highest part over the treetops. A new silhouette awakens one's curiosity. It is like the resting part and at the same time an element of movement. The reason for this is the localized heating and cooling system that has several chimneys instead of only one central ventilation plant.

RE-USE

The beauty of re-using and re-creating an existing building is to re-vive its identity, allowing it to enter into a new stage of life, allowing it to fulfill new functions in a fresh way. Consciously establishing a relationship between the doctorands, nature and the environment of the building rather than isolating one from another, allows a living that goes beyond contemporary flat comfort and makes different temperatures and brightness levels, dense and less dense rooms, dull and reverberant acoustics possible.

The doctorand's house is passively in function during 24 hours per day allowing the doctorands to activate and control the different functionalities (e.g. control the temperature, the position of the study place depending on the position of the sun) according to their individual needs.





**GROUND FLOOR:
CONFERENCE HALL + COFFEE BAR + RESTAURANT**

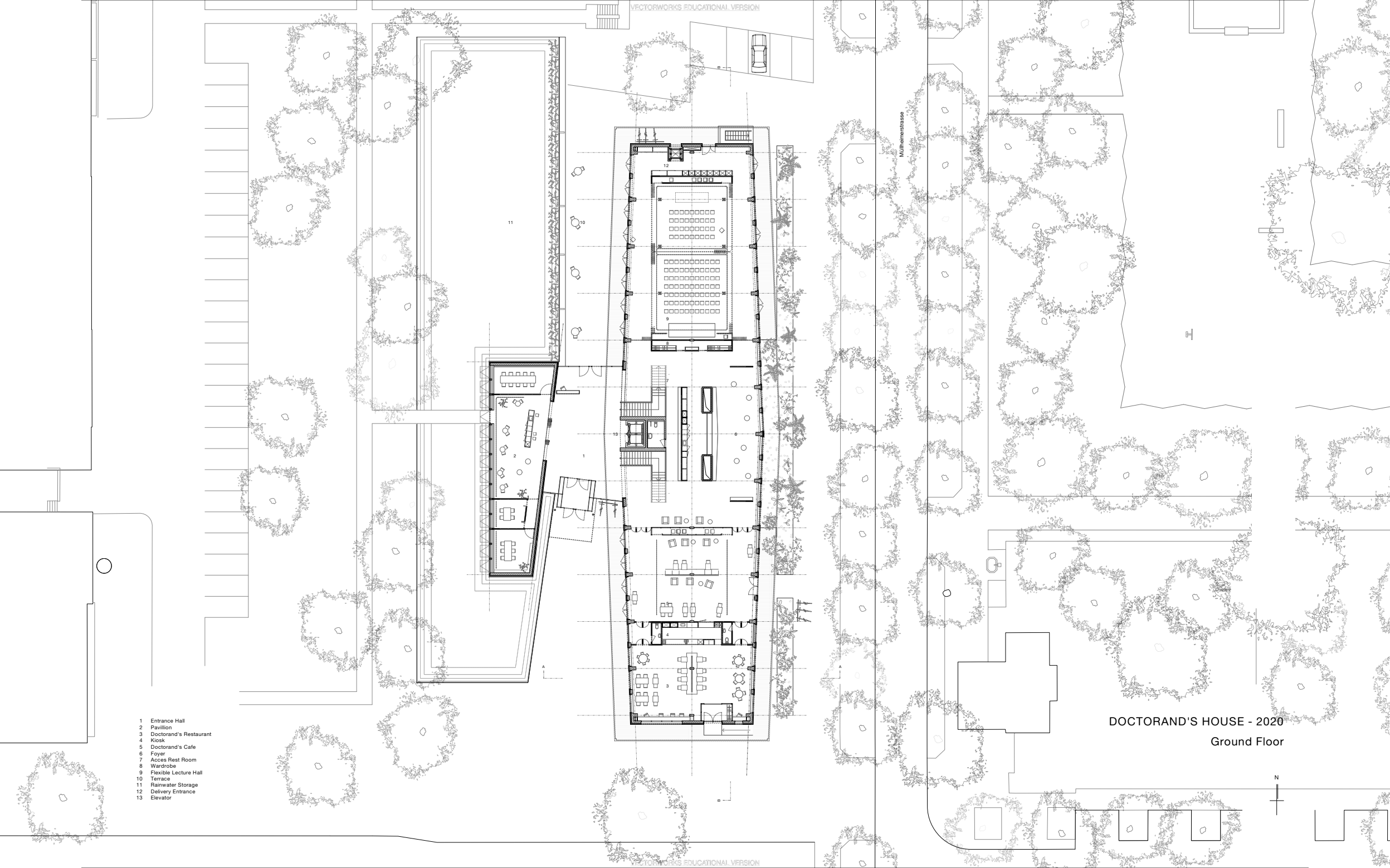
The interaction center has various roles. It is not a total open space – the idea is to be connected to the cellules (where the doctorands live) and common spaces. The semi-permanent furniture / walls / layers allow the space to be partitioned and modelled into two or three different spaces with a large range of functionalities such as a conference hall, small meeting rooms, a coffee bar and a foyer with a restaurant. Thus, the ground floor is flexible and the spaces extendable. During the day, people (doctorands and visitors from outside) meet for a coffee and informal exchange whereas during the evening they gather for drinks. There is a restaurant that is constantly available for everyone. The interaction center becomes a place where the doctorands work and where they socialize. A flexible place, where one wants to spend time in.

Multimediale Klasse



DOCTORAND'S HOUSE - 2020 Ground Floor

- 1 Entrance Hall
- 2 Pavilion
- 3 Doctorand's Restaurant
- 4 Kiosk
- 5 Doctorand's Cafe
- 6 Foyer
- 7 Access Rest Room
- 8 Wardrobe
- 9 Flexible Lecture Hall
- 10 Terrace
- 11 Rainwater Storage
- 12 Delivery Entrance
- 13 Elevator

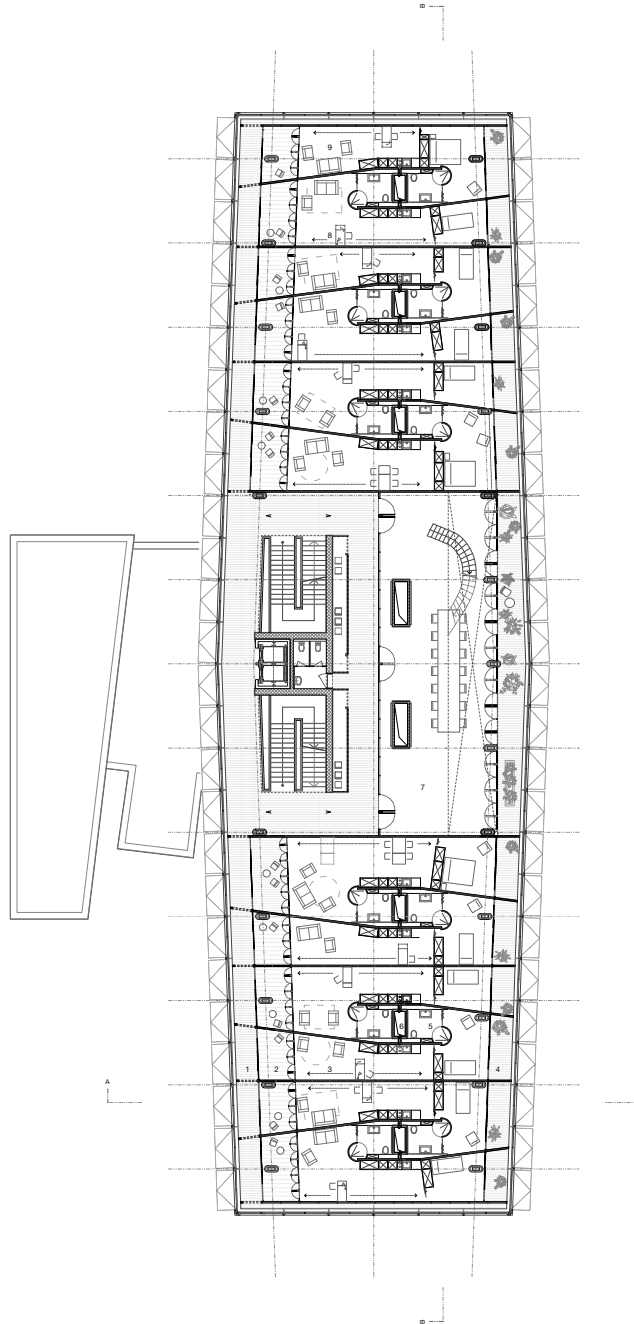




FIRST AND SECOND FLOOR: CELLULES THE PRIVATE SPACE

The cellules are dedicated to the private life of the doctorands and typically consist of a bed-and living room, a kitchen and a bathroom. There are sixteen cellules per floor on two floors (32 cellules in total), some of which are individual cellules and other are conceived for couples. They are built according to the sunrise and sunset in a way that the doctorand can naturally wake up with the sun light and end the day with the last sunshine. Movable furniture allows the doctorand to adapt the cellule to the personal needs and preferences.

As a contrast to the intimacy and privacy of the cellules, interaction and exchange is possible in the common space: one community hall on the two floors, connected through a staircase between the first and the second floor and reachable from the cellules on each floor.

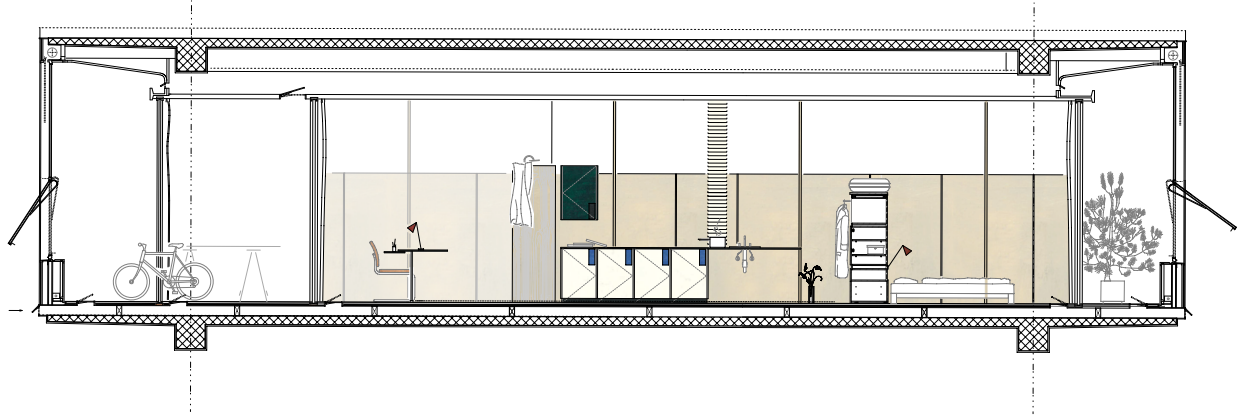
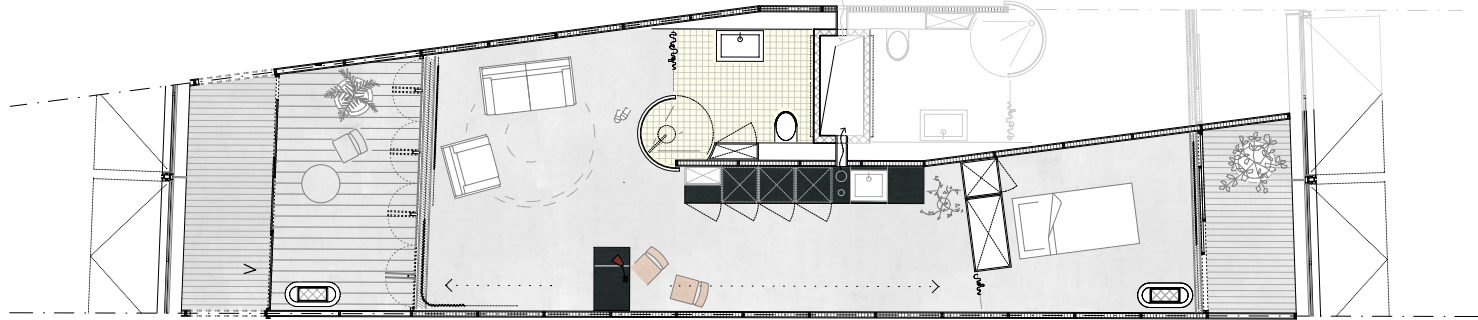
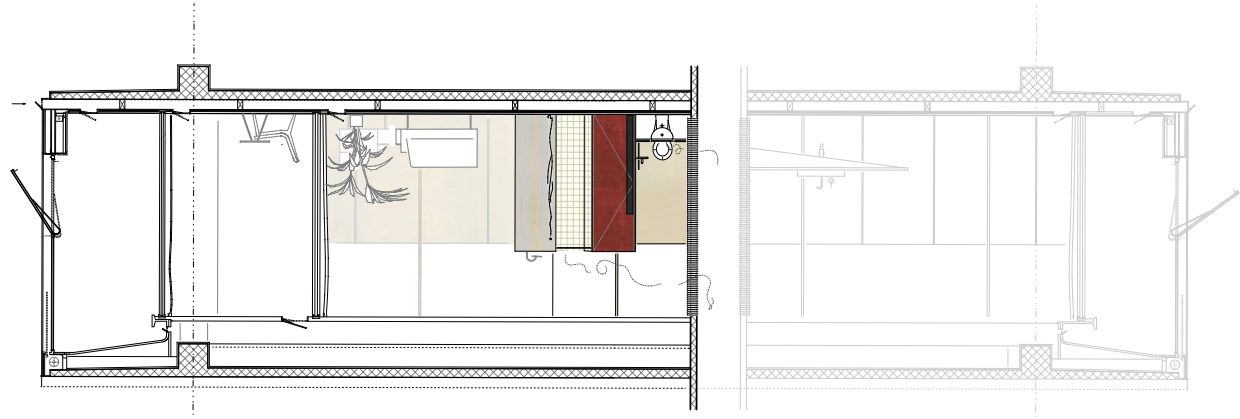


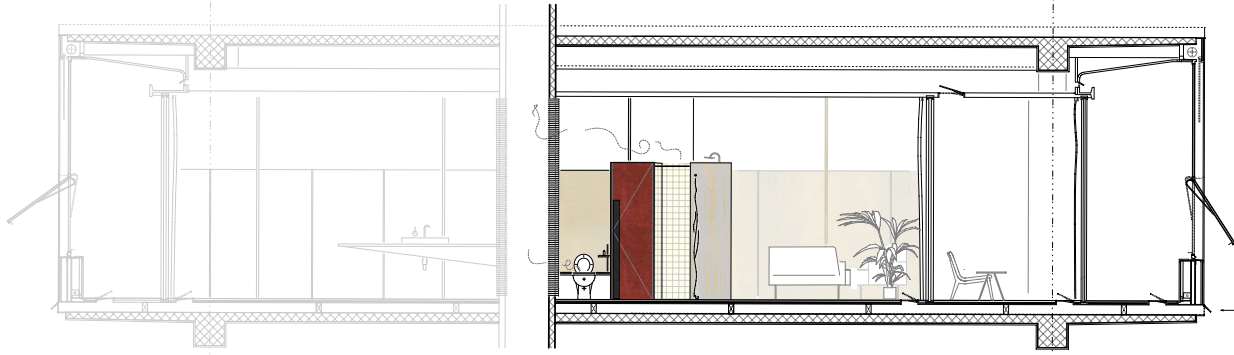
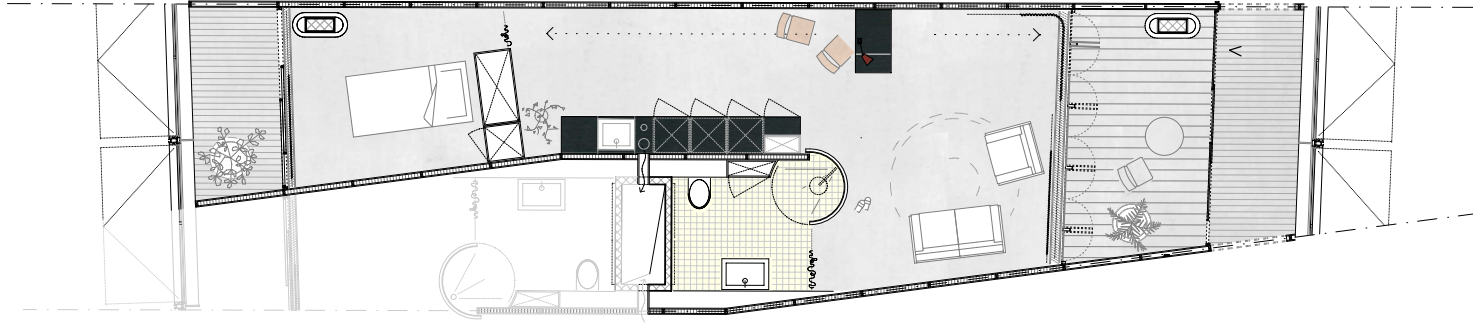
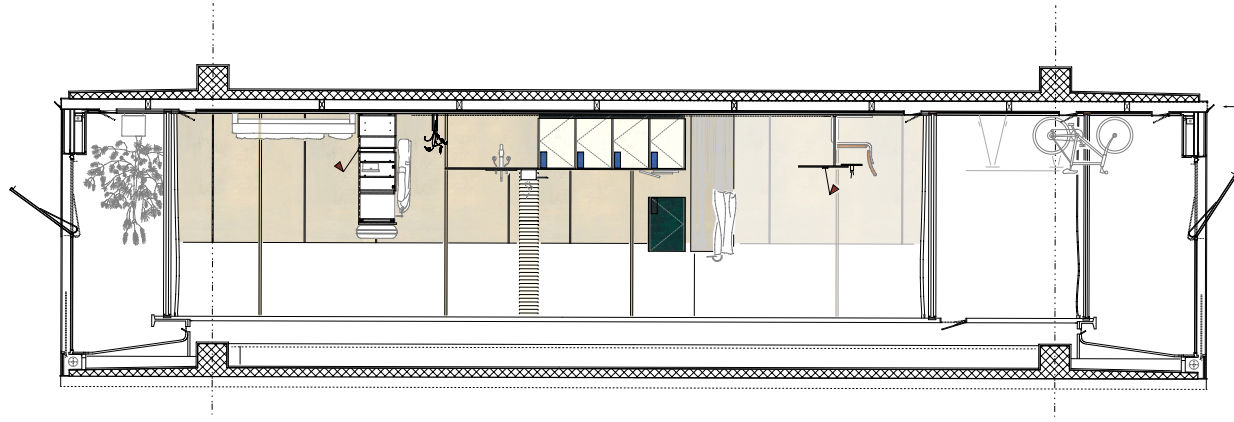
- 1 Passage
- 2 Second Living Room
- 3 Cellule
- 4 Balcony
- 5 Bathroom
- 6 Wind Chimney
- 7 Common Space
- 8 Single Cellule
- 9 Couple Cellule

DOCTORAND'S HOUSE - 2020
1.Floor

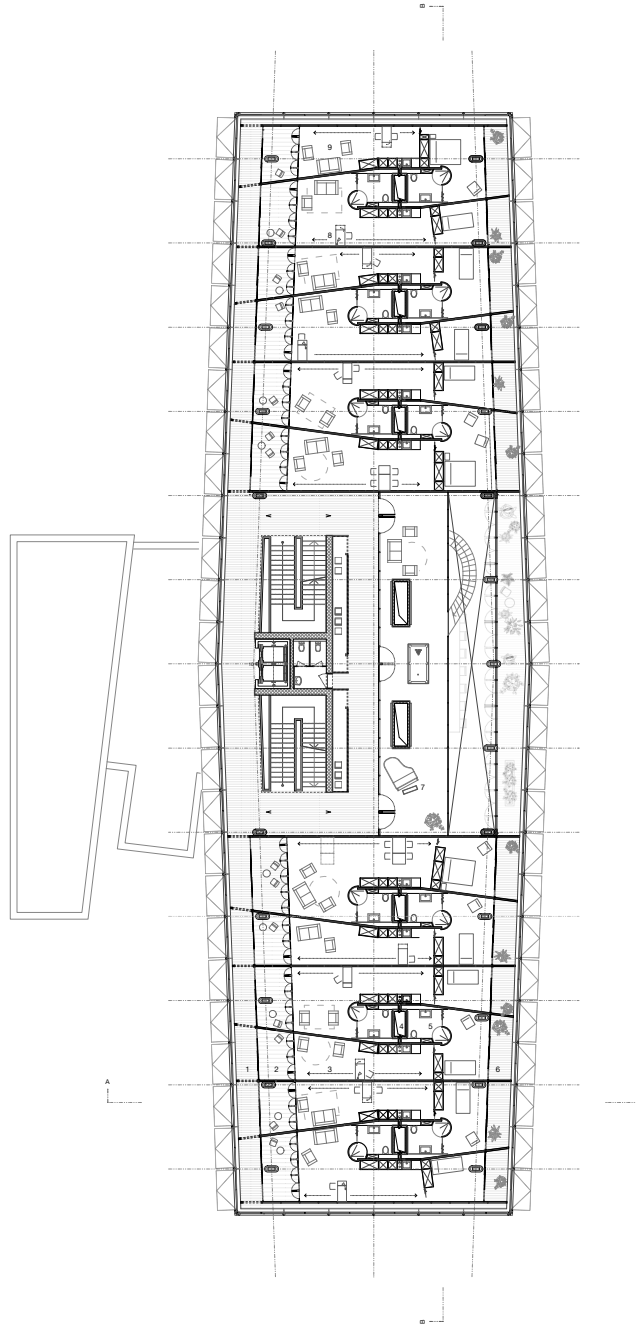












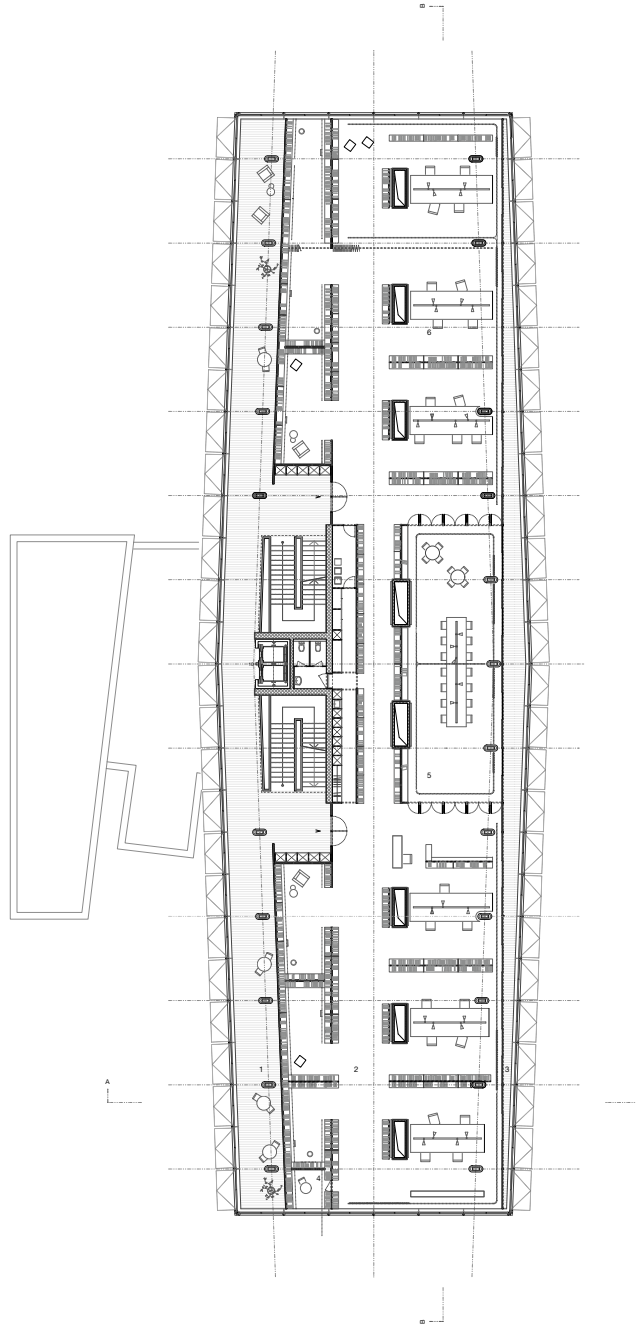
- 1 Passage
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- 6 Balcony
- 7 Common Space
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- 9 Couple Cellule

DOCTORAND'S HOUSE - 2020
2.Floor



THIRD FLOOR: DOCTORAND'S LIBRARY

The third floor of the doctorand's house is dedicated to research and study. There is a library as well as open spaces, silent and co-working spaces, all together offering a large variety of uses for the doctorands, ranging from the little private niche where one can focus and study hard to the more open spaces where one can pick and read books, exchange, walk around and get inspired.



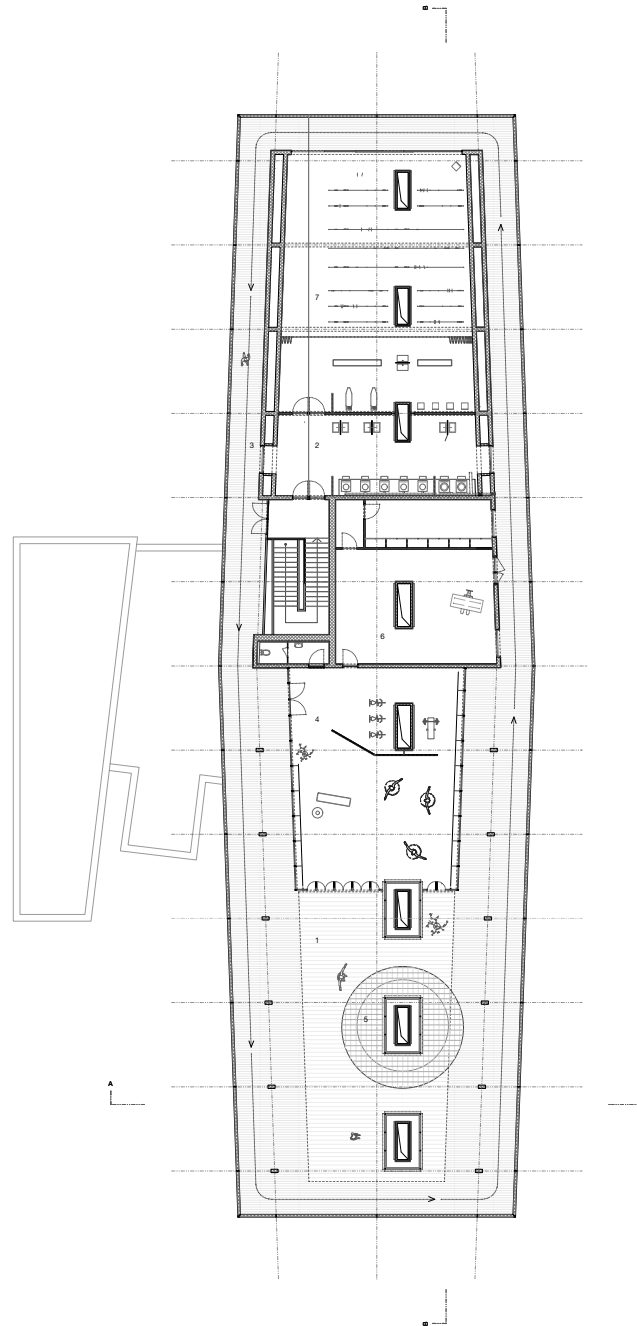
- 1 Vestibul
- 2 Library
- 3 Buffer Zone
- 4 Study Niche
- 5 Open Space
- 6 Work Space

DOCTORAND'S HOUSE - 2020
3.Floor



ROOFTOP: WASHING AND SPORTS FACILITY

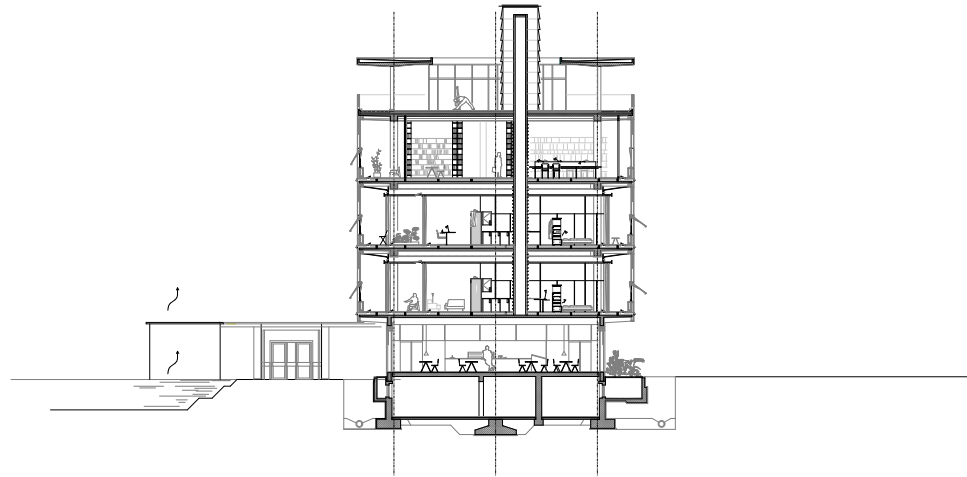
In the doctorand's house, washing is becoming a social activity. While its residents have their laundry washed in the washing space, the surrounding roof top in- and outdoor facilities invite them to practice physical exercise. The flexible infrastructure offers many options ranging from interval trainings around the circular lab to yoga and meditation sessions in the atrium.



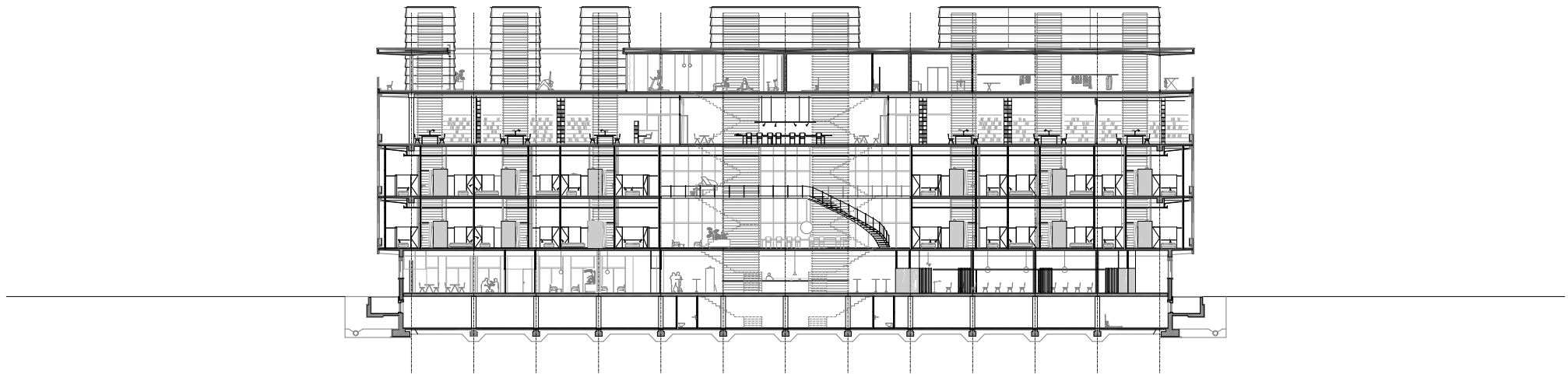
- 1 Washing Room
- 2 Sport Facilities
- 3 Circular Lab
- 4 Gymnastic Room
- 5 Solarium
- 6 Storage Room
- 7 Drying Room

DOCTORAND'S HOUSE - 2020
Roof





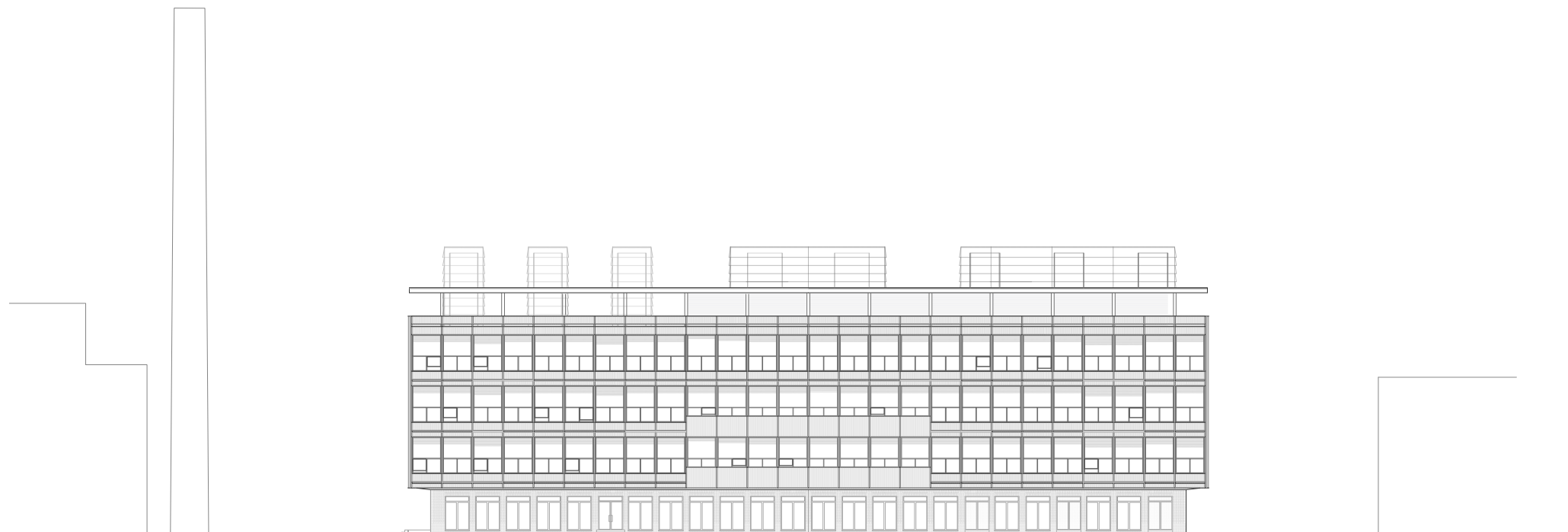
DOCTORAND'S HOUSE - 2020
Section AA



DOCTORAND'S HOUSE - 2020
Section BB



DOCTORAND'S HOUSE - 2020
South Facade

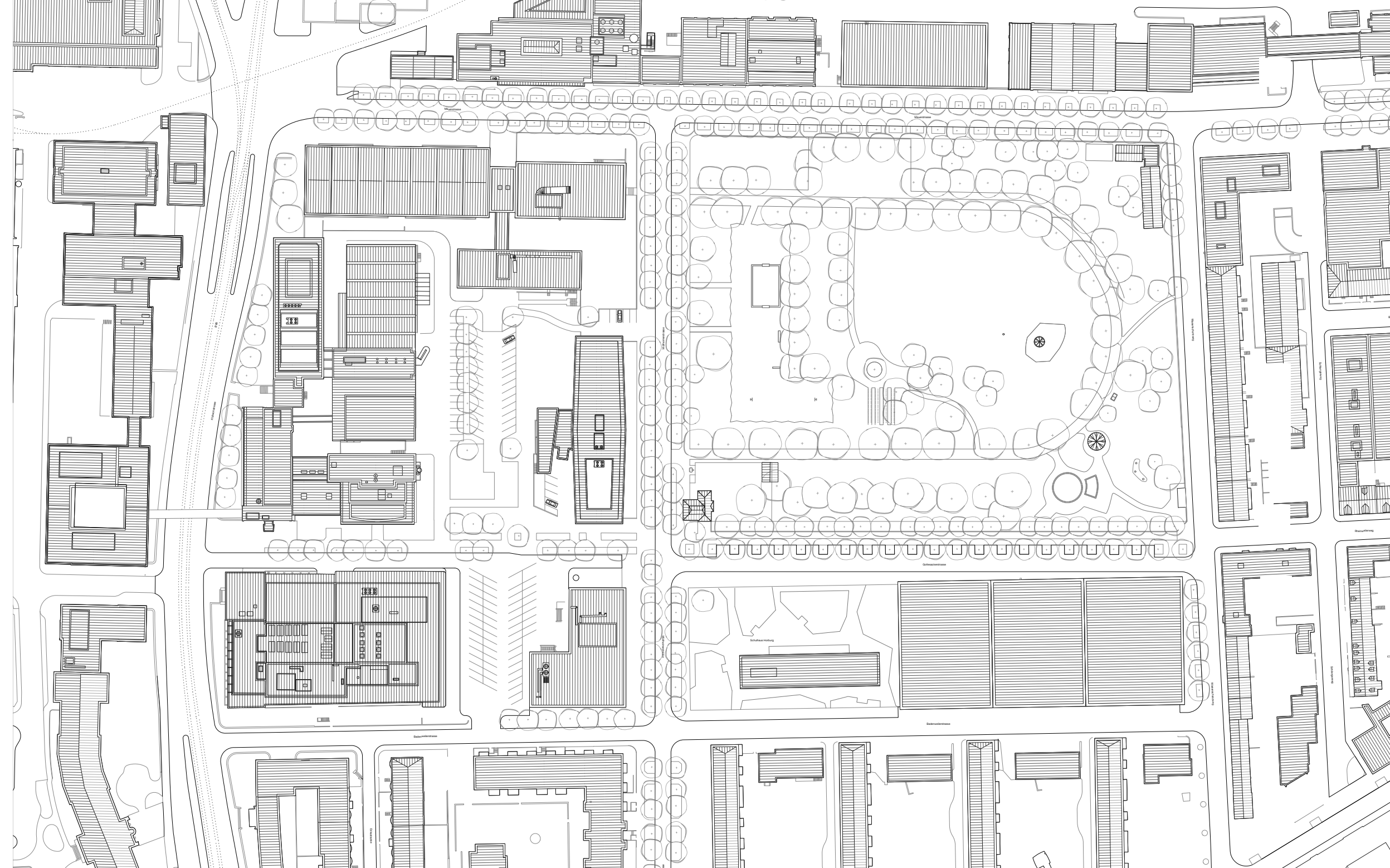


DOCTORAND'S HOUSE - 2020
East Facade

1957

WOHLFAHRTSGEBÄUDE CIBA

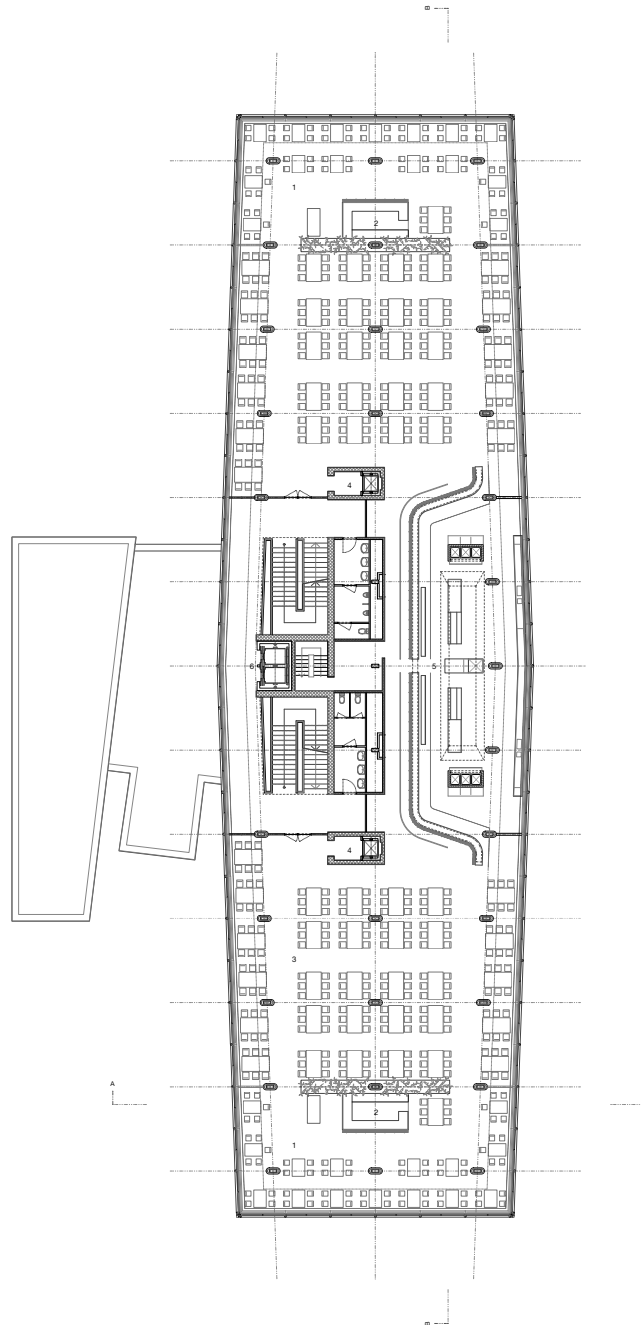




- 1 Entrance Hall
- 2 Wardrobe
- 3 Breakfast Room
- 4 Buffet
- 5 Kitchen
- 6 Dumb Waiter
- 7 Cold Room
- 8 Storage Room
- 9 Delivery Entrance
- 10 Personnel Space
- 11 Goods Lift
- 12 Elevator
- 13 Patisserie
- 14 Kiosk
- 15 Bureau

WOHLFAHRTSGEBÄUDE CIBA - 1957
Ground Floor

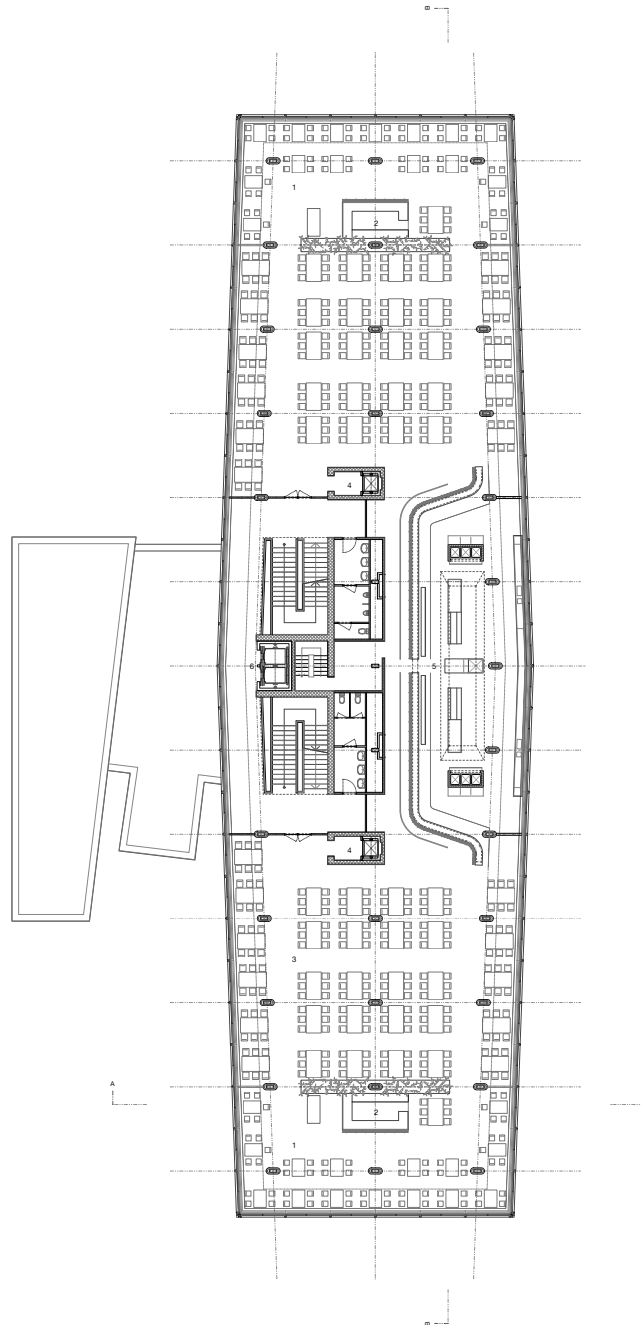
N



- 1 Cafe
- 2 Buffet
- 3 Canteen
- 4 Dumb Waiter
- 5 Serving Cabinet
- 6 Balcony
- 7 Elevator

WOHLFAHRTSGEBÄUDE CIBA - 1957
1.Floor

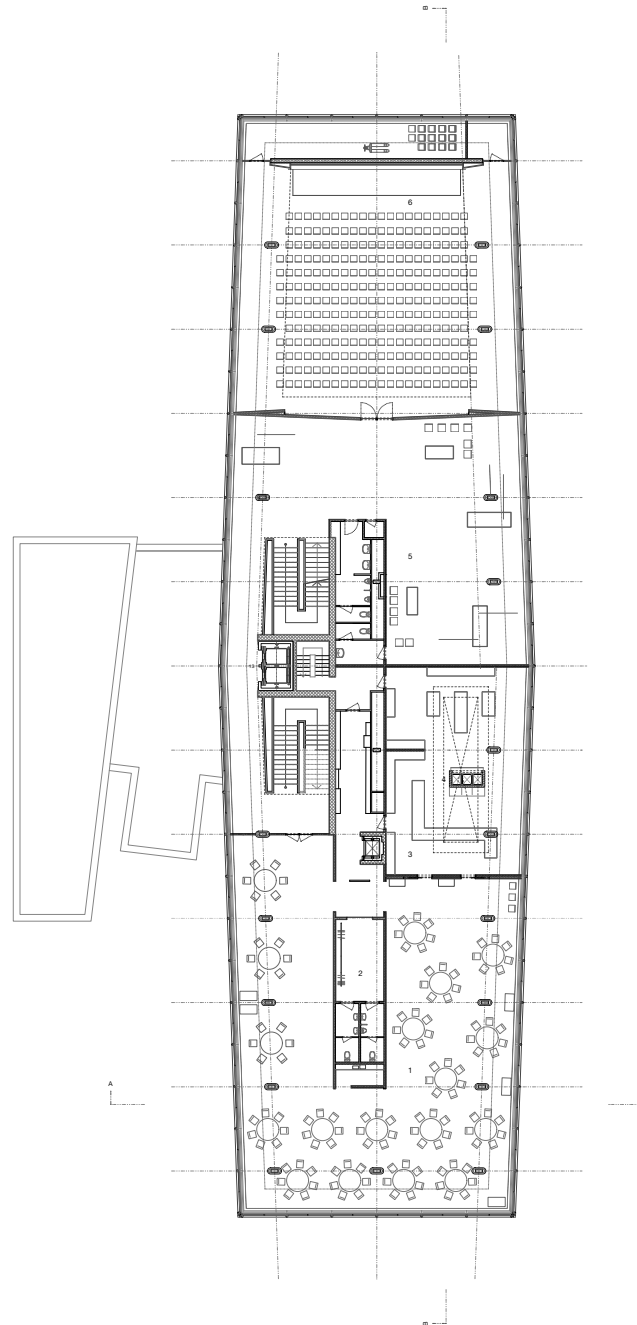




- 1 Cafe
- 2 Buffet
- 3 Canteen
- 4 Dumb Waiter
- 5 Serving Cabinet
- 6 Balcony
- 7 Elevator

WOHLFAHRTSGEBÄUDE CIBA - 1957
2.Floor

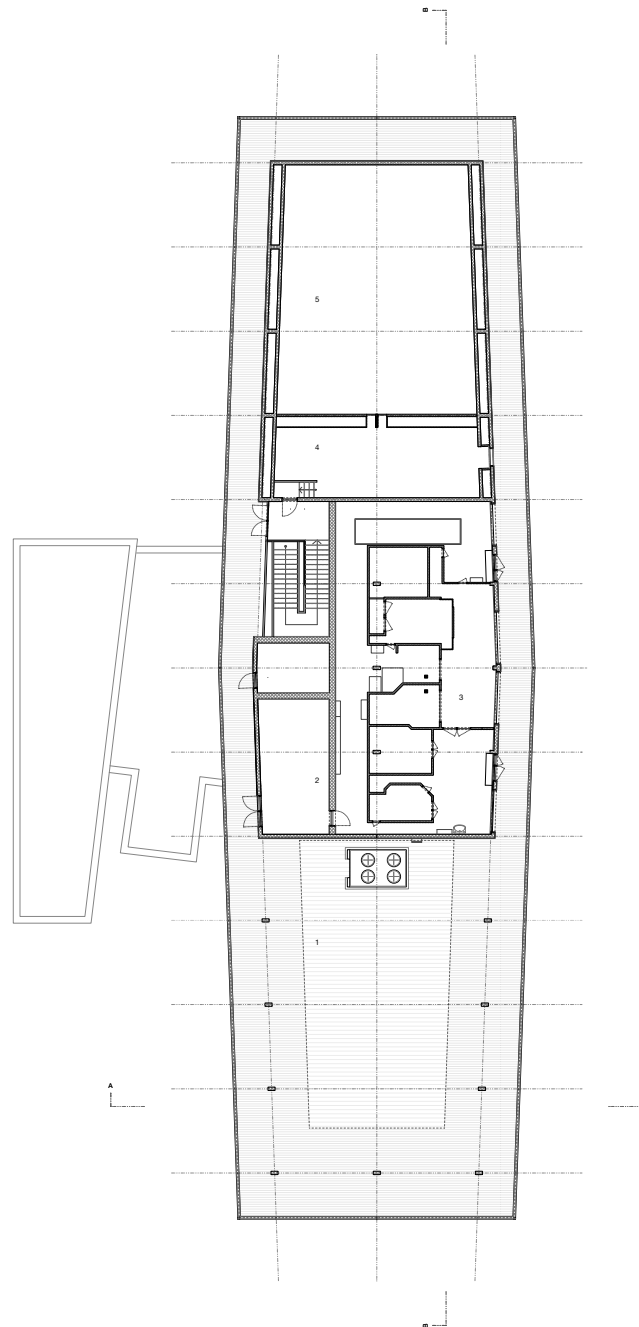




- 1 Dining Hall
- 2 Wardrobe
- 3 Kitchen
- 4 Dumb Waiter
- 5 Exhibition Space
- 6 Lecture Hall

WOHLFAHRTSGEBÄUDE CIBA - 1957
3. Floor

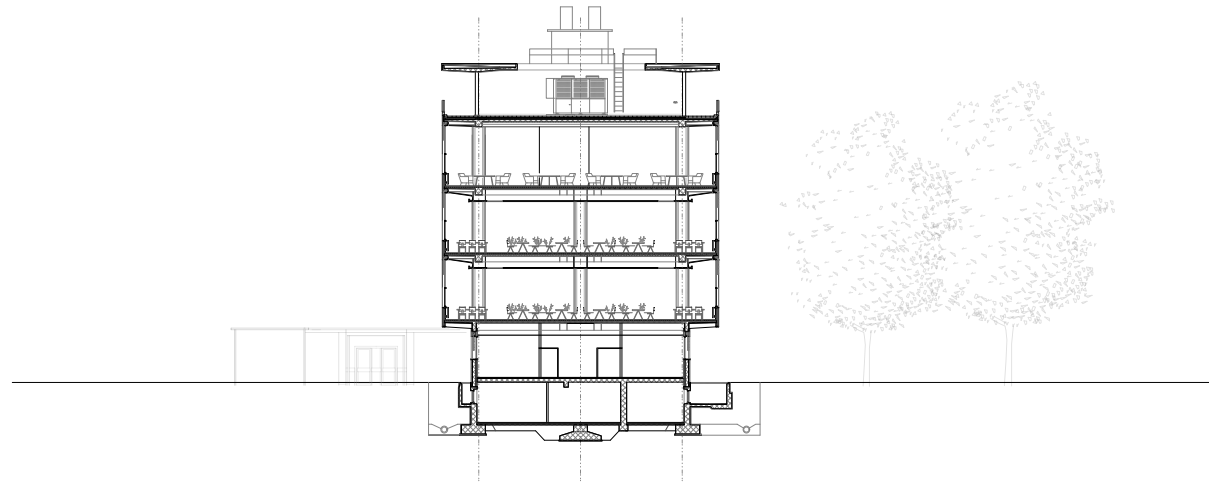




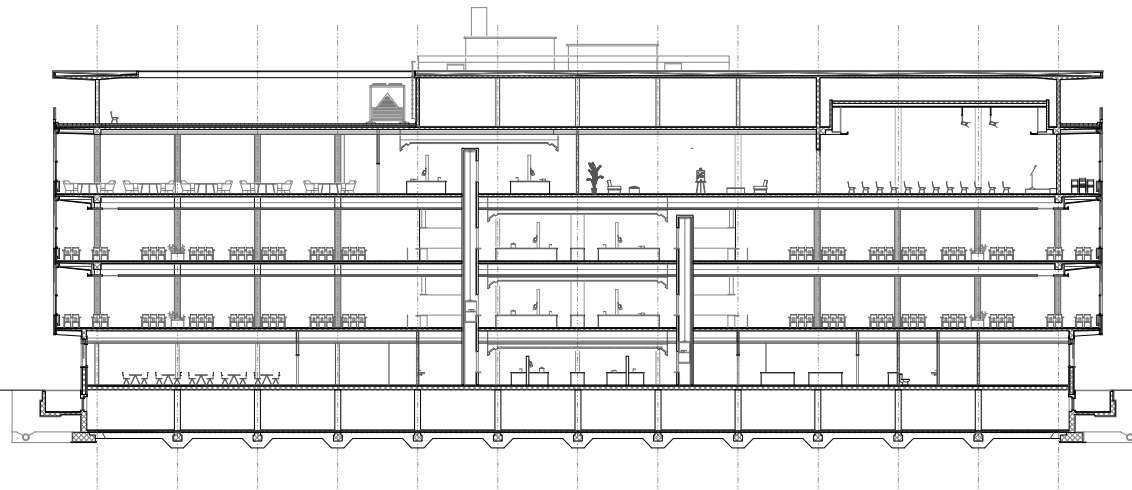
- 1 Terrace
- 2 Storage Room
- 3 Controlled Ventilation Station
- 4 Magazin
- 5 Technique Room

WOHLFAHRTSGEBÄUDE CIBA - 1957
Roof





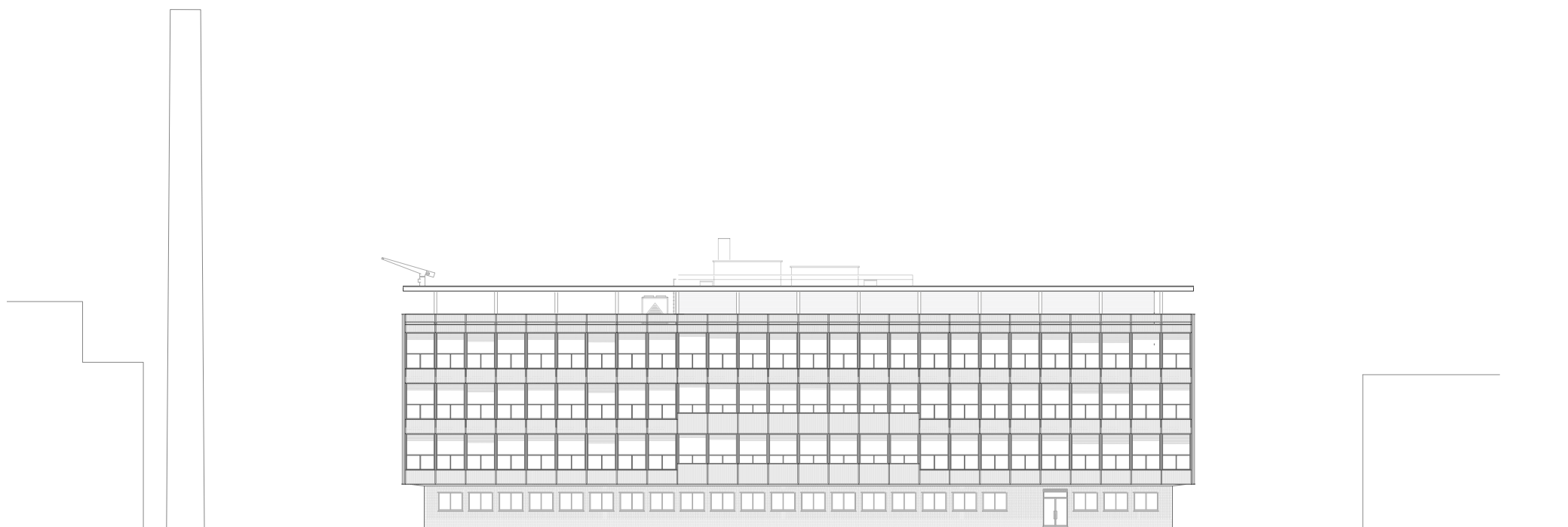
WOHLFAHRTSGEBÄUDE CIBA - 1957
Section AA



WOHLFAHRTSGEBÄUDE CIBA - 1957
Section BB



WOHLFAHRTSGEBÄUDE CIBA - 1957
South Facade



WOHLFAHRTSGEBÄUDE CIBA - 1957
East Facade



Refectory



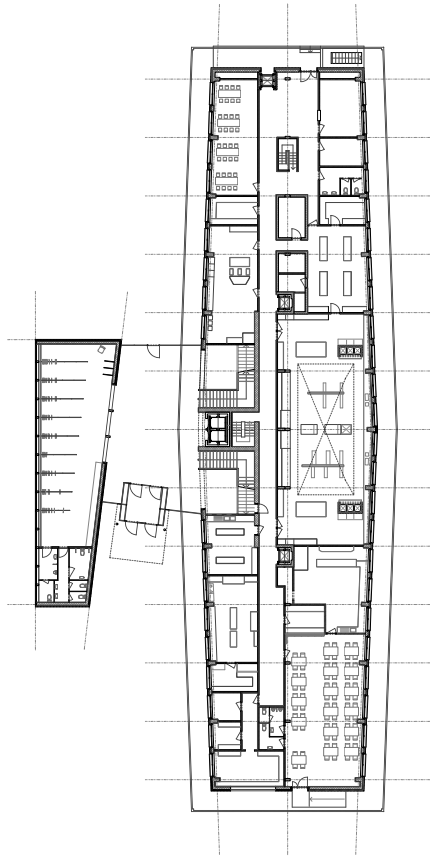
Meeting Room



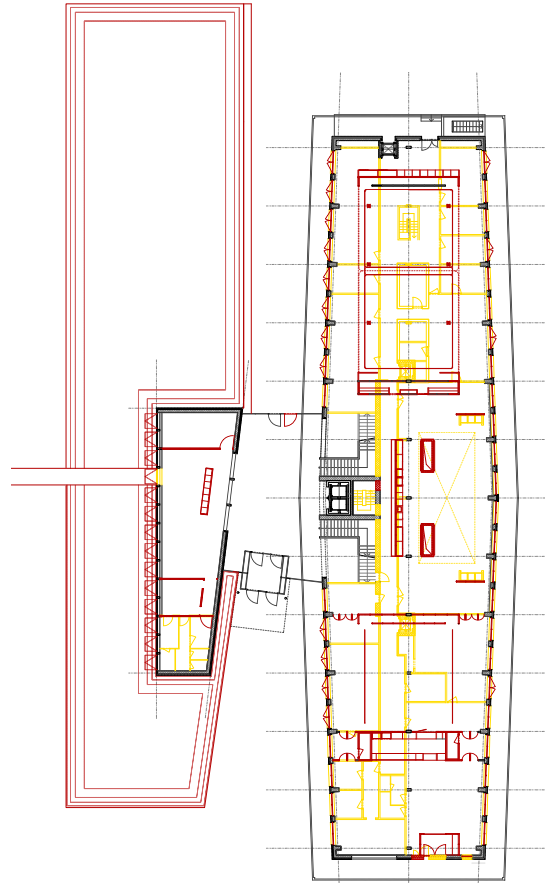
Dinning Room



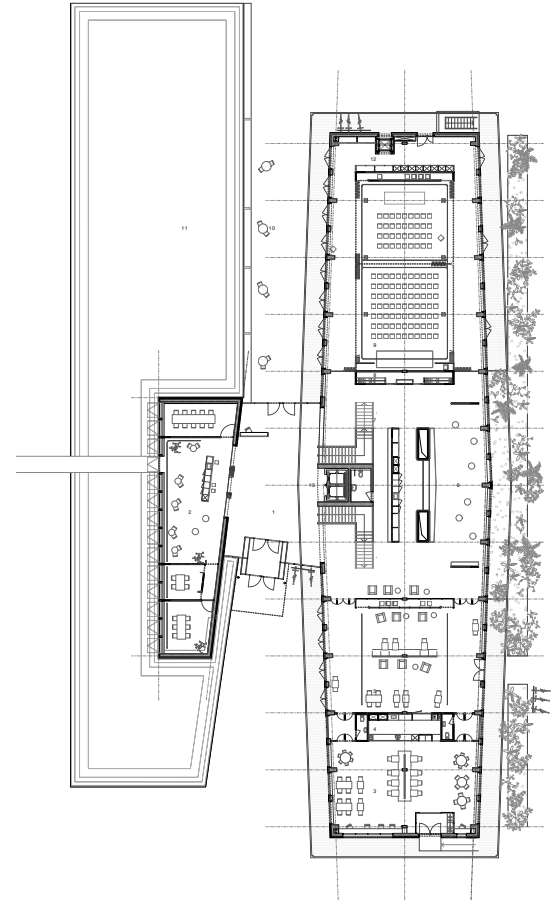
Roof Terrace



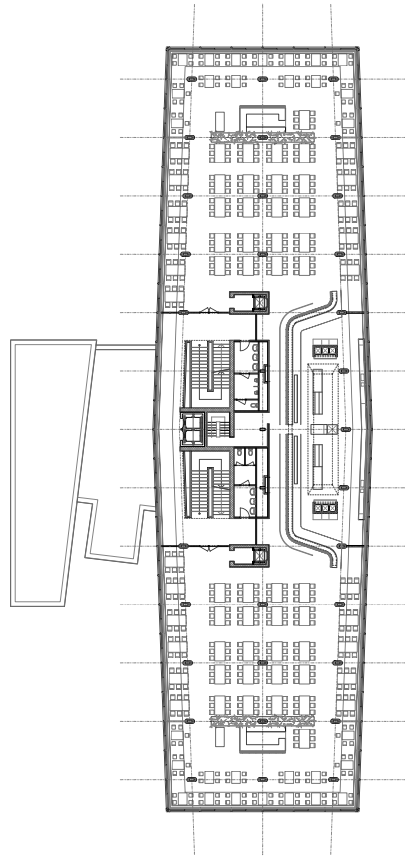
1957



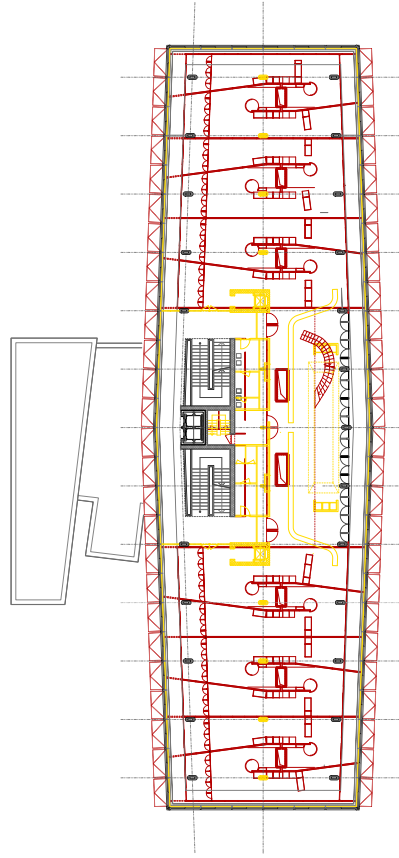
Demolition New



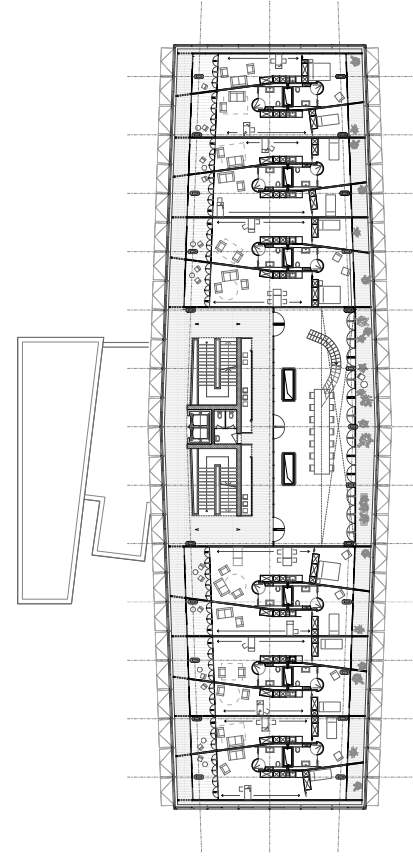
2020



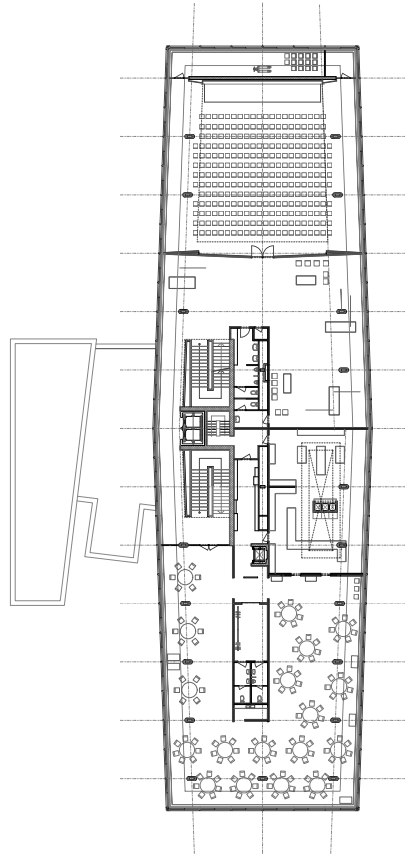
1957



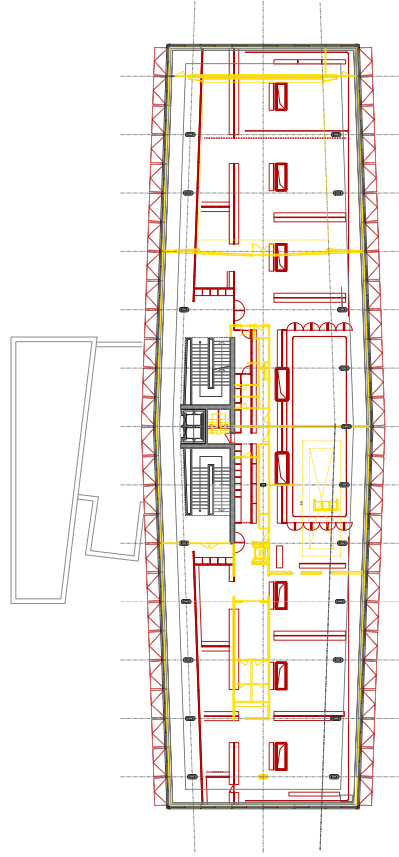
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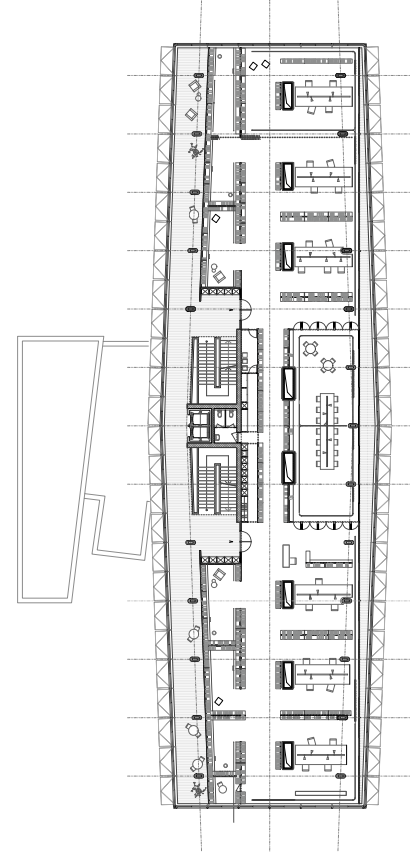
2020



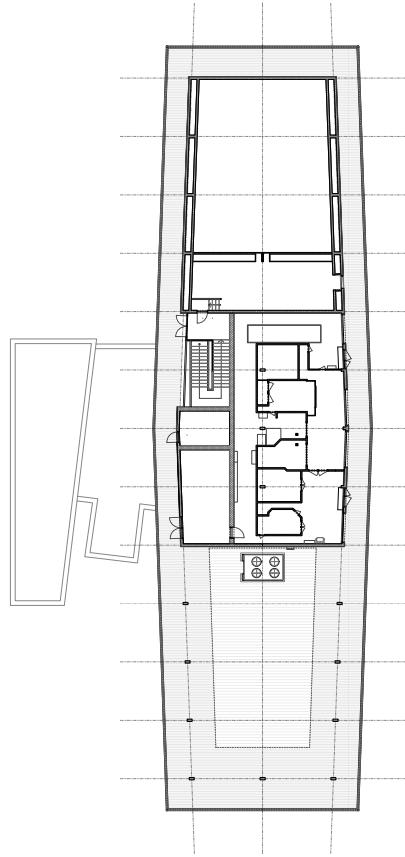
1957



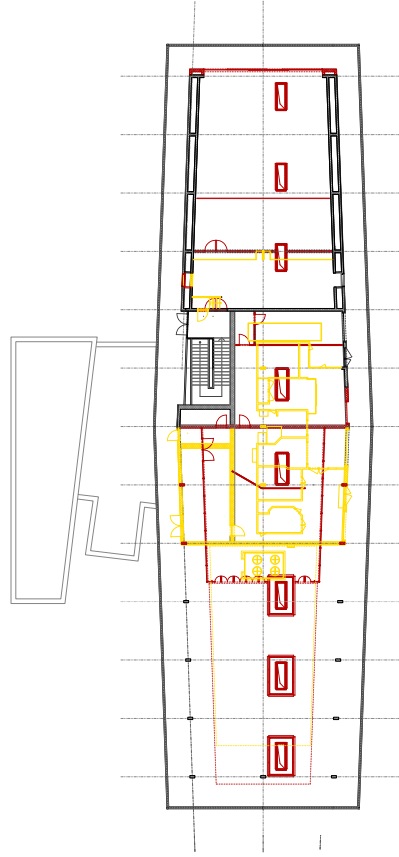
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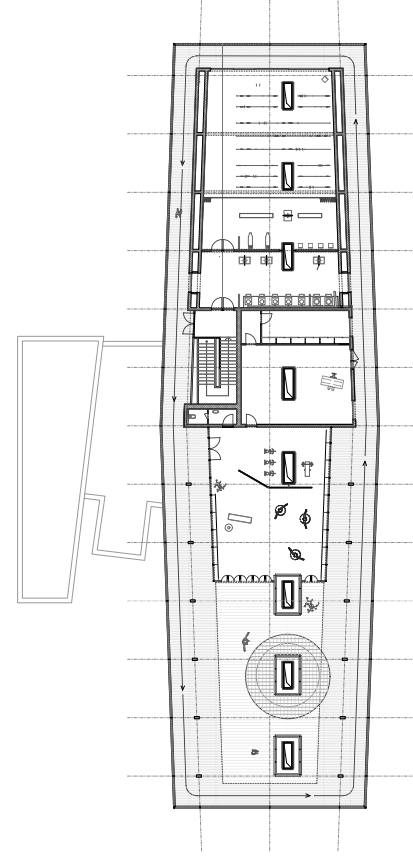
2020



1957



Demolition New



2020

CONCLUSION

After all, can the doctorand's house play an innovative, identity-creating role? My answer is yes.

Through this project, Renzo Piano's words now strongly resonate with me when he says that an architect is a poet in the morning, then a scientist, later on a humanist and at noon a builder. Observing the existing has pushed me to choose the new paradigm of a personal comfort-adaptive architecture thanks to which I have created a new art of participatory inhabitation. My project highlights the importance of adaptability and flexibility in design. The doctorands are free to shift, adjust and divide the spaces based on their personal needs through flexible partitions (i.e. layers and walls). In addition, the flexibility of the layers and the controlled / uncontrolled spaces allow the doctorands to regulate the thermal conditions within the entire building.

To a large extent, CIBA's welfare building built in 1957 is left close to its original state, with small-scale interventions and adaptations. In terms of the building components, most of the walls and structural elements are re-used, while other components are added to enhance the spatial and environmental quality.

Innovation and research are part of CIBA's welfare house's identity – they have always been and will remain. The doctorand's house aims to be a place where innovation and research can flourish, a doctorand's house that is perfectly adaptable to the needs of the individual as well as of the community.

TEXT

1957

WOHLFAHRTSGEBÄUDE CIBA AG

2020

DOCTORAND'S HOUSE

HOW TO APPROACH THE TRANSFORMATION OF AN EXISTING BUILDING

The environment of a building is under continuous social, economic and technological change. What role does the construction of a building play in the process of these environmental changes? Do new usage requirements inevitably lead to a complete replacement of the building, or can they be converted to make them suitable for the new environment? Can CIBA's existing welfare building from 1957 find a changed form even play an innovative, identity-creating role in a newly developed quarter?

In order to answer this question, I ask myself how to approach the building I want to transform. I realize that it is the thought process and the reflections that count most. The transformed object – the Doctorand's house - is the result of many subjective choices I have made during this process. However, the 3-step method I have developed and the skills I have acquired will be a guideline also for other projects. Hereunder, as well as in a more schematic way in my diagrams, I will illustrate my thought process step by step:

- Observe CIBA's existing welfare building
- Define the new paradigm
- Intervene.

OBSERVING CIBA'S EXISTING WELFARE BUILDING (1957)

The abbreviation CIBA means "Chemische Industrie Basel" (Chemical Industry Basel). In order to revive its spirit, its soul, I need to develop an understanding for it. How was the welfare of the beneficiaries of the building insured? In a scientific approach, I carefully observe and document.

Location

CIBA's welfare building is located on the right side of the Rhein in Kleinbasel, the former chemical Industry Quarter of Basel, former strategic trading point. It is a transition from the Pharmaceutical Industry to the family-neighborhood including a Kita and the Horburg school. The western side is enclosed by pharmaceutical research and production facilities.

Climate

The building is oriented towards the East/West. The heat island effect makes the temperature rise every year, in 2030 the Temperature will be 5°C higher than in the current time. In 2019, the sun was hitting the building during 322 more hours, that is 19% more than the average value between 1961-1990. At the same time, the average rain amount nowadays is lower but when it rains it usually does heavily. The wind mainly comes from the West and the North/East.

Function

The welfare building is dedicated to the wellbeing of the employees.

Each floor serves a specific function:

Ground floor: Kiosk and Breakfast room.

First and second floor: 4 refectories, cafés for the Employees (each 187 seats), altogether serving up to 1'400 meals.

Third floor: Dining room for the Management and the clients and guests, exhibition space, auditorium (300 people).

Roof: Terrace.

Facade, construction and materiality

The angled longitudinal sides and the well-proportioned facade windows give the building a very elegant look. The slim profiles and light grey balustrade fields with vertically permulan ribbed sheet metal cladding that are anodized with Ciba colors and the floating roof panel add lightness to it. The retracted ground floor made out of a pale-yellow exposed brick and the kiosk open the welfare building to the whole neighborhood.

Modern techniques

When constructing CIBA's welfare building in 1957, the architects Suter&Suter used many modern innovative techniques and got inspired by modern ideas such as:

- the separation of the world into a natural and an artificial sphere
- the idea of a homogeneous climate, a "man-made weather" as it is reported in "The Architecture of the Well-Tempered Environment" by Reyner Banham
- the integration of a heating and cooling system in the ceiling and behind the window
- the air-ventilation in the ceiling ensuring air cooling in Summer
- the creation of a world characterized by the complete absence of external environmental influences.

DEFINE THE NEW PARADIGM: PERSONAL COMFORT-ADAPTIVE ARCHITECTURE

CIBA does not only stand for Chemische Industrie Basel, but also for a permanent search for renewal, improvement and innovation, a constant drive for research on the one hand and modern ideas that are characterized by a man-made control over things on the other hand. Through this process of careful observation of the existing a new paradigm emerges, almost as if the process in itself dictated the following questions and answers: Shall I re-use, re-create, re-duce or add?

I shall re-use the existing building and re-create a relation to its new environment, re-duce the heated surface and energy consumption and add functional layers and climate zones.

Climate has always played a central role

In fact, when looking back into the paradigms of the earlier days, climate has always played a central role. In the first Century BC, Vitruv already said that "climate is the most classical form of architecture". This statement was later confirmed by Leon Battista Alberti who said that "there is no architecture without climate" in "L'art d'édifier". Thus, architecture depends on the climate or differently put climate is the "raison d'être" for architecture.

Another fascinating example is the predominant structural reflection of Palladio's Dome of the Villa Rotonda (1566-71) through the implementation of a ventilation system. The quadripartite plan of the space also reveals a search for shade and coolness and the alignment of the windows is conceived as a natural ventilation. Yet another inspiration comes from Bernhard Rudolfsky's "Architecture without Architects". Houses in the region of Engadin in the canton of Graubünden typically are equipped with local ventilation techniques using local materials. In other words, they were built by locals who made the best out of the environment and climate they were built in without the search to "fit" a certain and constant climate into a house and therewith to control it completely.

Personal Comfort-Adaptive Architecture

Looking back to history, it seems like the focus was not on control and standardization. After all, why would one put so much efforts in separating the inside from the outside to keep a space at a constant temperature of 21 C°? Climate can provide the means to make architecture moving the architect's work from drawing the solid (walls, facades, etc.) to drawing the void (air, temperatures, light).

The way people use and occupy space plays a central role for me. Do they use the space at its full potential? How can the art of inhabitation for example minimize the use of energy and how can it foster the adaptiveness of space according to the various personal needs? My new paradigm therefore is a personal comfort-adaptive architecture.

INTERVENE: ADD CLIMATE ZONES, FUNCTIONAL LAYERS AND AN AIR CHIMNEY

Having set a new paradigm allows me to intervene in a targeted way. Through my two main interventions that are the addition of climate zones and functional layers as well as an air chimney I make the best use out of the available resources.

Climate zones / functional layers

The added layers are different thermal conditions with different functions – they are adaptable and can be controlled according to personal needs.

The different layers are also used as technical elements, allowing heating through the wall as well as thermal activation, enabling targeted heating according to the individual needs compared to uniformed imposed heating of the whole building. In this way, they are like new layers added to the existing ones, creating a temperate climate landscape.

This allows for a transformative flexible space that can be divided into less climatic control and comfort levels on the one hand and more controlled areas on the other hand. These uncontrolled spaces offer users increased flexibility in deciding how to use the space.

Air Chimney

The air flow that goes through the air chimney is the backbone of the conditioned space. It is this natural convective air movement (stack effect) that makes it possible. Thanks to the air flow, depending on the season, it is possible to reduce up to 50-85% of the building's energy consumption.

The flexible facade with the movable glass panels and the operable windows allow for maximum natural ventilation. There is a constant air flow blowing through the building thanks to small openings in the existing facade. The air flow can be controlled through opening and closing the window according to one's needs.

Heating as well as cooling are possible. Heating happens through the solar heat gain through buffer zones. Cooling happens through the natural cross ventilation, the sun protection through the various buffer zones and the thermal curtain. Heating and cooling, controlling and not controlling result in a hybrid system of a manual and automatic fresh air supply.

In addition, as I observe that the water cannot trickle away, I create a rainwater storage on the West side of the building. Water mainly serves the purpose of cooling through evaporation which also creates a new landscape.

These interventions fulfill the purpose to serving the personal needs of the residents of the Doctorand's house by being adaptable.

DOCTORAND'S HOUSE

Basel was and remains Switzerland's research and development center for the Pharmaceutical industry. CIBA can be seen as the pulsing heart of this chemical research area. Being inspired by the existing environment, I have transformed CIBA's welfare building into a house for doctorands that shall offer the best possible work and life conditions for doctorands. The personal comfort-adaptive architecture allows each one to create a house fulfilling one's own's and the community's needs.

From the outside, CIBA's welfare building has barely changed. Small openings in the facade suggest what could be found inside. A few steps back are needed towards Horburg parc in order to view the silhouette of CIBA's welfare building and to relate its facade to the roofscape. The air chimneys slightly point their highest part over the treetops. A new silhouette awakens one's curiosity. It is like the resting part and at the same time an element of movement. The reason for this is the localized heating and cooling system that has several chimneys instead of only one central ventilation plant.

Re-Use

The beauty of re-using and re-creating an existing building is to re-vive its identity, allowing it to enter into a new stage of life, allowing it to fulfill new functions in a fresh way. Consciously establishing a relationship between the doctorands, nature and the environment of the building rather than isolating one from another, allows a living that goes beyond contemporary flat comfort and makes different temperatures and brightness levels, dense and less dense rooms, dull and reverberant acoustics possible.

The doctorand's house is passively in function during 24 hours per day allowing the doctorands to activate and control the different functionalities (e.g. control the temperature, the position of the study place depending on the position of the sun) according to their individual needs.

Ground floor: Conference Hall, Coffee bar, Restaurant

The interaction center has various roles. It is not a total open space – the idea is to be connected to the cellules (where the doctorands live) and common spaces. The semi-permanent furniture / walls / layers allow the space to be partitioned and modelled into two or three different spaces with a large range of functionalities such as a conference hall, small meeting rooms, a coffee bar and a foyer with a restaurant. Thus, the ground floor is flexible and the spaces extendable. During the day, people (doctorands and visitors from outside) meet for a coffee and informal exchange whereas during the evening they gather for drinks. There is a restaurant that is constantly available for everyone. The interaction center becomes a place where the doctorands work and where they socialize. A flexible place, where one wants to spend time in.

First and second floor: Cellules - the Private Space

The cellules are dedicated to the private life of the doctorands and typically consist of a bed-and living room, a kitchen and a bathroom. There are sixteen cellules per floor on two floors (32 cellules in total), some of which are individual cellules and other are conceived for couples. They are built according to the sunrise and sunset in a way that the doctorand can naturally wake up with the sun light and end the day with the last sunshine. Movable furniture allows the doctorand to adapt the cellule to the personal needs and preferences.

As a contrast to the intimacy and privacy of the cellules, interaction and exchange is possible in the common space: one community hall on the two floors, connected through a staircase between the first and the second floor and reachable from the cellules on each floor.

Third floor: Doctorand's Library

The third floor of the doctorand's house is dedicated to research and study. There is a library as well as open spaces, silent and co-working spaces, all together offering a large variety of uses for the doctorands, ranging from the little private niche where one can focus and study hard to the more open spaces where one can pick and read books, exchange, walk around and get inspired.

Rooftop: Washing and Sports facility

In the doctorand's house, washing is becoming a social activity. While its residents have their laundry washed in the washing space, the surrounding rooftop in- and outdoor facilities invite them to practice physical exercise. The flexible infrastructure offers many options ranging from interval trainings around the circular lab to yoga and meditation sessions in the atrium.

CONCLUSION

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ACKNOWLEDGEMENTS

I would like to thank Prof. Adam Caruso, Department of Architecture, ETH Zurich as well as his assistants Benjamin Groothuijse and Claudio Schneider, Department of Architecture, ETH Zurich and Prof. Dr. Arno Schlueter, Institute of Technology in Architecture (ITA), ETH Zurich for their continuous support throughout my project.

FLÄCHEN UND ENERGIEBERECHNUNGEN 1./2. GESHOSS

WOHLFAHRTSGEBÄUDE CIBA - 1957

[illegible]

- Die Energiequelle basiert auf beshenden Ressourcen (Wind/Sonne/Wasser)

- Der beheizte Raum wird von 97% auf 44% gesenkt

- Die Nutzungstage [d_N] werde von 220 auf 360 Tage erhöht.

ABKÜRZUNGEN

d	Nutzungstage	[d]
H_t	Transmissions-Wärmeüberkoeffizient	[W/K]
Q_a	Externer Wärmeeintragleistung	[W/m ²]
Q_s	Solar, Wärmeeintragleistung	[W/m ²]
Q_{int}	Interner Wärmeintragleistung	[W/m ²]
Q_{in}	(Personen, Geräte, Beleuchtung)	
Q_{in}	Jährliche Heizwärmebedarf	[kWh/m ²]
M	Aktivitätsgrad	[met]
I_{cl}	Wärmedämmwert Kleidung	[clo]
\bullet	Wärmeintragleistung Person	[W/m ²]
	(24°C - 70W)	
q_p	Wärmeintragleistung Person	[g/(h·m ²)]
	(24°C - 80g/h)	
	Raumlufttemperatur	[°C]
	Relative Raumluftfeuchtigkeit	[%]
V_{max}	Maximale Luftgeschwindigkeit	[m/s]

DOCTORAND'S HOUSE - 2020[illegible]

-Die Energiequelle basiert auf beshenden Ressourcen (Wind/Sonne/Wasser)

- Der beheizte Raum wird von 97% auf 44% gesenkt

- Die Nutzungstage $[d_i]$ werde von 220 auf 360 Tage erhöht.

NORMEN

Air Velocity:	0.15-0.28m/s
Room Air Humidity:	30-65%
Air Temperature Gradient:	2 K/m
Heat Transfer Coefficient:	8.5/m ² K

- Die Zahlen beziehen sich auf den Normalgebrauch der Räume.
- Die Flächenangaben beziehen sich auf die Hauptnutzflächen HNF [m²]

- Die Luft-Temperaturen [°C] sind die erstrebten Temperaturen während dem ganzen Jahr

- Die Energieleiber Werte basieren auf der Norm SIA 2024 "Raumnutzungsdaten für die Energie- und Gebäudetechnik".
Die Spalte Bestand enthält Parameter, welche typische Werte für bestehende, energetisch nicht erneuerte Gebäude mit Baujahr vor 1980 darstellen sollen.
Diese können in der Planung als Ausgangswerte für bestehende Gebäude verwendet werden, solange keine genaueren Angaben vorhanden sind- Bei Umbau Zielerwartung benutzt.