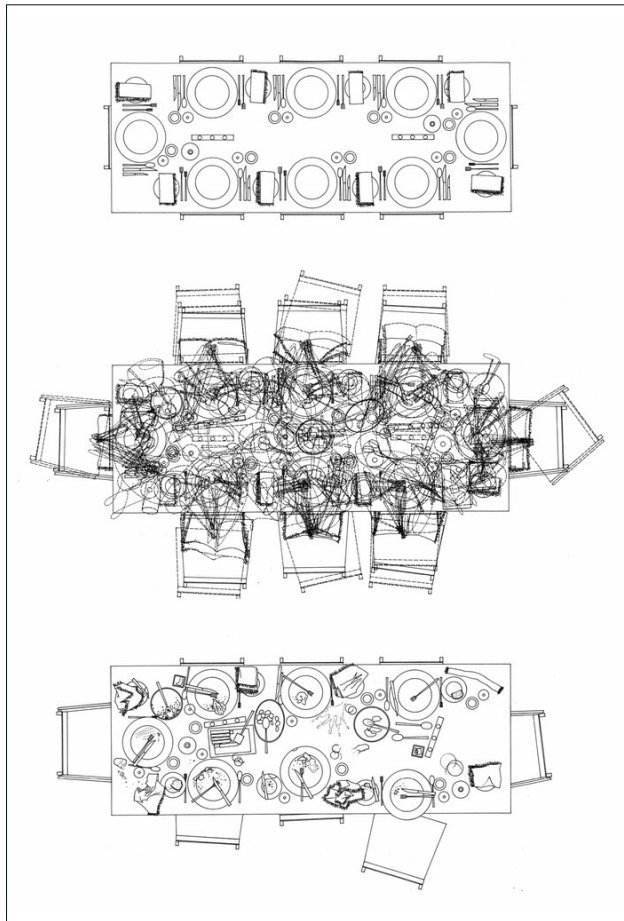


Msc3 | Project Journal
Graduation Studio
AR3AI100 Interiores Buildings Cities
P1 Exhibition

WEEK 1.2 DESK

Inspiration: Workspace



Mapping of a dinner table

Sarah Wigglesworth

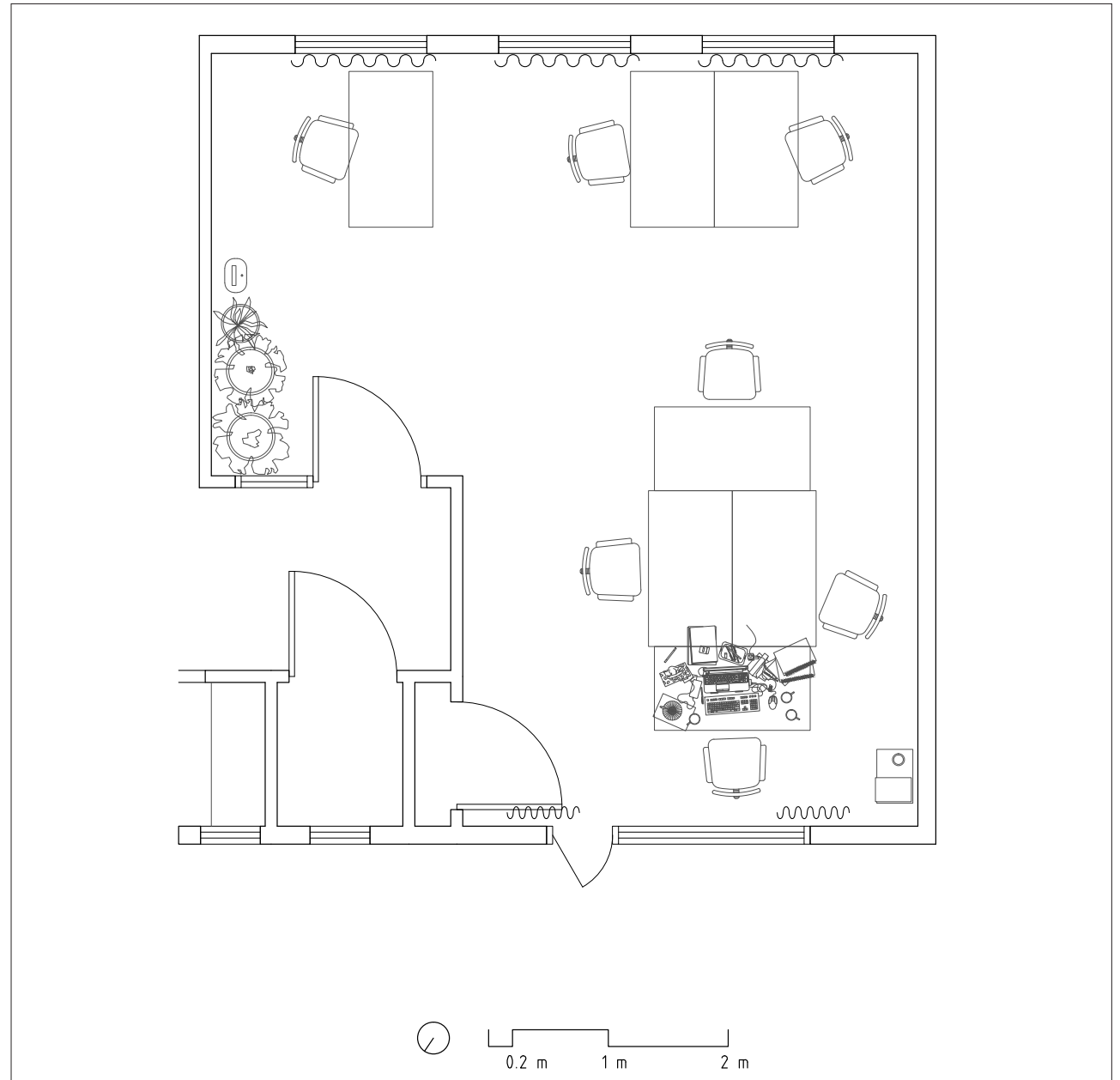
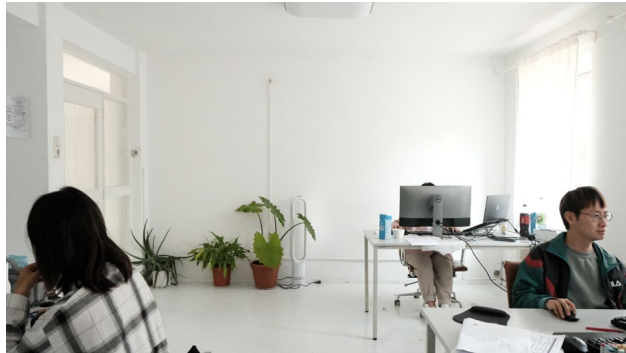
A parallel between the consumption of a meal and the production of space.

Scene & Storytelling

Pictures from the movie *Coffee and Cigarettes*.

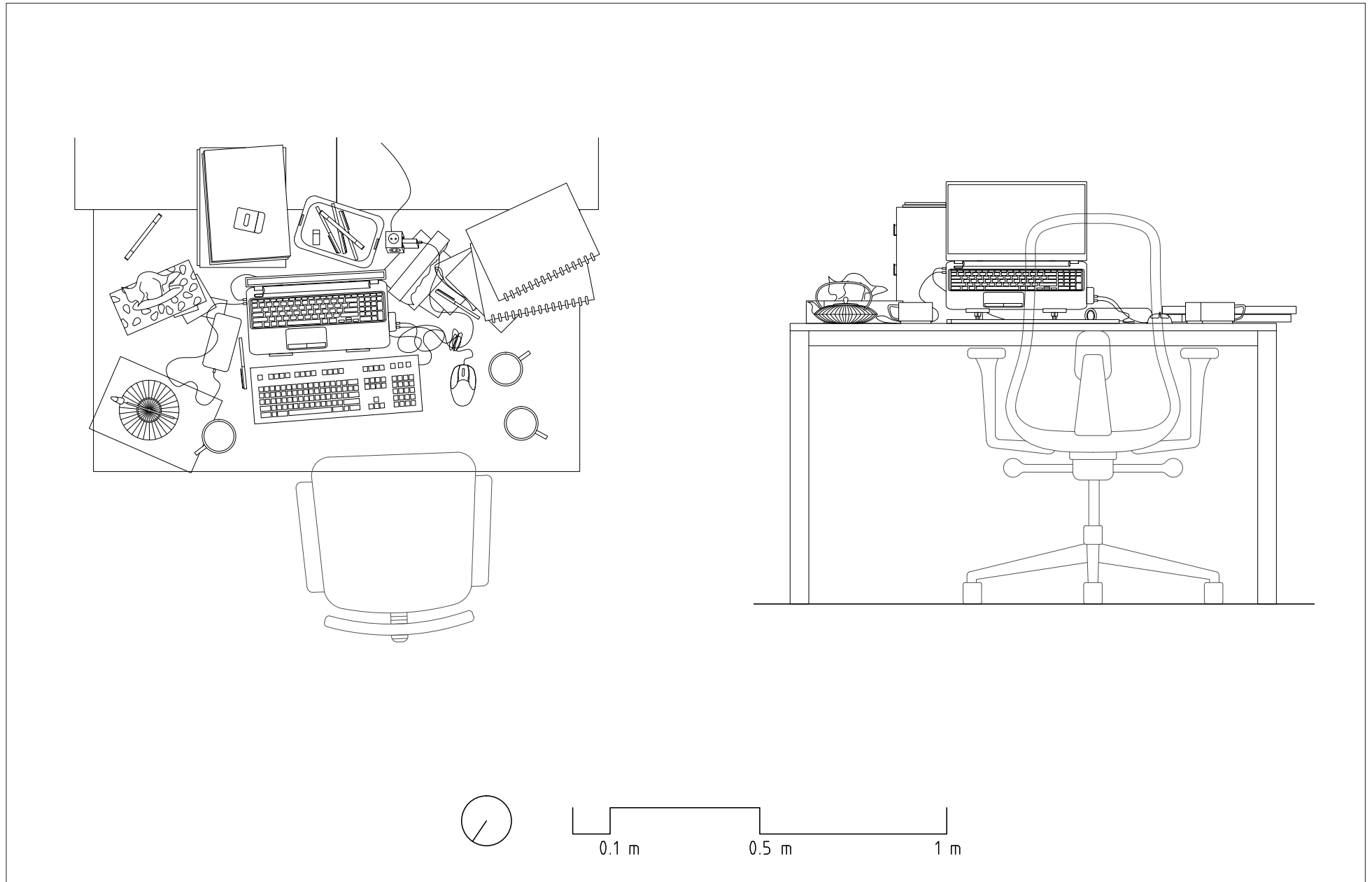
1 http://matslovesit.blogspot.com/2012_01_01_archive.html
2 *Coffee and Cigarettes* (2003)

Office Floorplan



Photos taken in BNP office by the author.

Desk Drawing



Response to Duffy's text 'Office Buildings and Organisational Change'

Francis Duffy is a British architect who is noted for his work on the flexible space-using and the future office¹. In his text, Duffy focused on the shifting of office building, interior arrangement, and office organization from the mid-19th century to the mid-20th century. The study involved the interpretation and comparison of six office buildings finished in different periods. Duffy identified four major factors in the office design. Two internal factors: office technology and office organization, and two external factors: building construction and real estate. The influence of these factors waves in different periods and is different in the United State and Europe. Nevertheless, the construction of organizational hierarchy and the pursuit of productivity are the two themes throughout the design of these offices.

The early office building, Oriel Chambers in Liverpool, was designed to provide small separated units for small enterprises and professional men. Another building finished earlier in London, the Sun insurance Office, also accommodated small, comfortable, and homie offices. The small rooms and furnishing indicate the size of the company and the high social position of the staffs sitting in those offices. The situation had changed when it came to the Larkin Building that was built for mail order company in 1904. The ordering and distribution process requires large amounts of cheap labor and highly efficient management. That is why the building was designed as a machine, with slogans on the walls, furniture that restricts the freedom of movement, and hardly any private enclosed spaces. *The employees were low in status, and the corporate owner was more dominant*².

The next two buildings, Guaranty Building finished in 1895 and the Seagram Building finished in 1953, show more influence from real estate practice and building technology. The Guaranty Building, one of the earliest Chicago skyscrapers, was benefited

from the development of elevator and steel frame construction. The more stories and the U shape floorplan provide more rooms with natural ventilation and light, in order to maximize the land value. Around 60 years later, the area of each floor in the Seagram Building was much larger, offering more rooms with a totally controlled artificial environment. However, the Seagram Building is considered *exactly the same product as the Guaranty Building*³, as their organizational principles were basically the same.

The last case chosen by Duffy, Ninoflax offices in Nordhorn, Germany, introduces the intervention of office landscaping. Its random low-density layout reflects the intention to break the hierarchy barriers and to create a friendly environment. The design of the layout was meant to show a flexible corporate style and the management principle that is structured by the way the firm works.

Started from small home-like offices for high-position professional men in Oriel Chambers and the Sun Insurance Building, the focus of office building design gradually shifted to create an owner-dominated, controlled environment in order to pursue productivity, such as the Larkin Building. Later in the Guaranty Building and the Seagram Building, measures were taken to improve the physical environment. But one of the motives of the improvement was still the request for productivity. And then in Ninoflax offices, the desire was hide beneath the flexible, friendly, free environment, but still there. Today, many companies encourage their employees to bring in personality and combine work and life, such as Centraal Beheer mentioned in the text, and the Google Headquarters complex. This advocacy, probably adds more enjoyment to work. On the other hand, to my point of view, the desire for productivity still hides behind it.

Hierarchy

Control

Productivity

1 [https://en.wikipedia.org/wiki/Frank_Duffy_\(architect\)](https://en.wikipedia.org/wiki/Frank_Duffy_(architect))

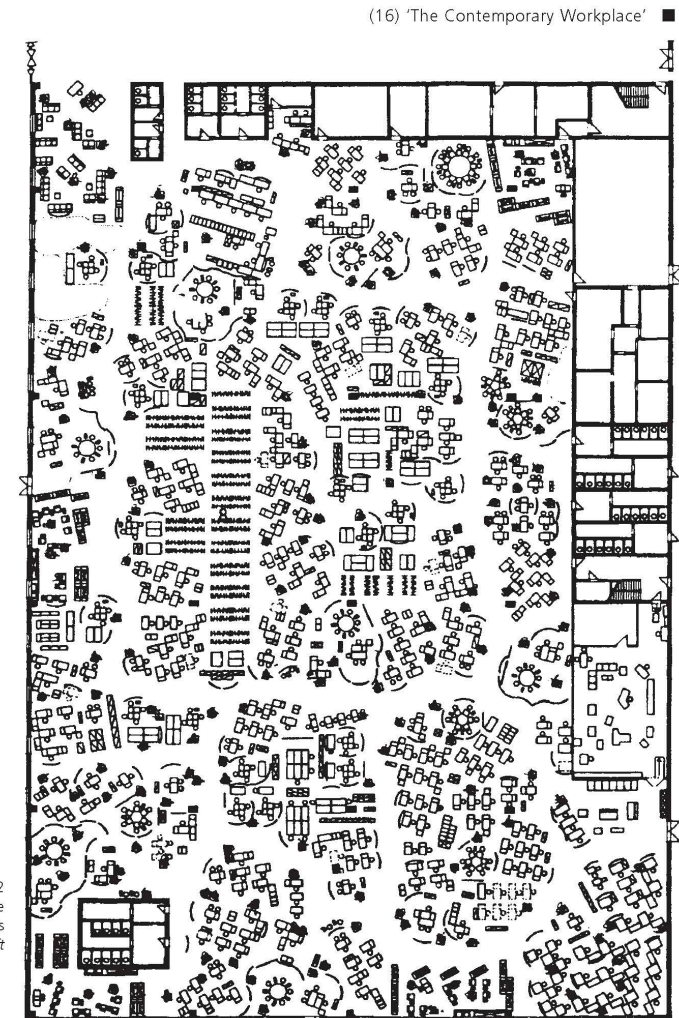
2 Duffy, F. (1980). *Office Buildings and Organisational Change* (1st ed.). Routledge.

3 Ibid

Power structure and hierarchy



Figure 16.2
This design represents the
German Quickborner Team's
approach to Bürolandschaft

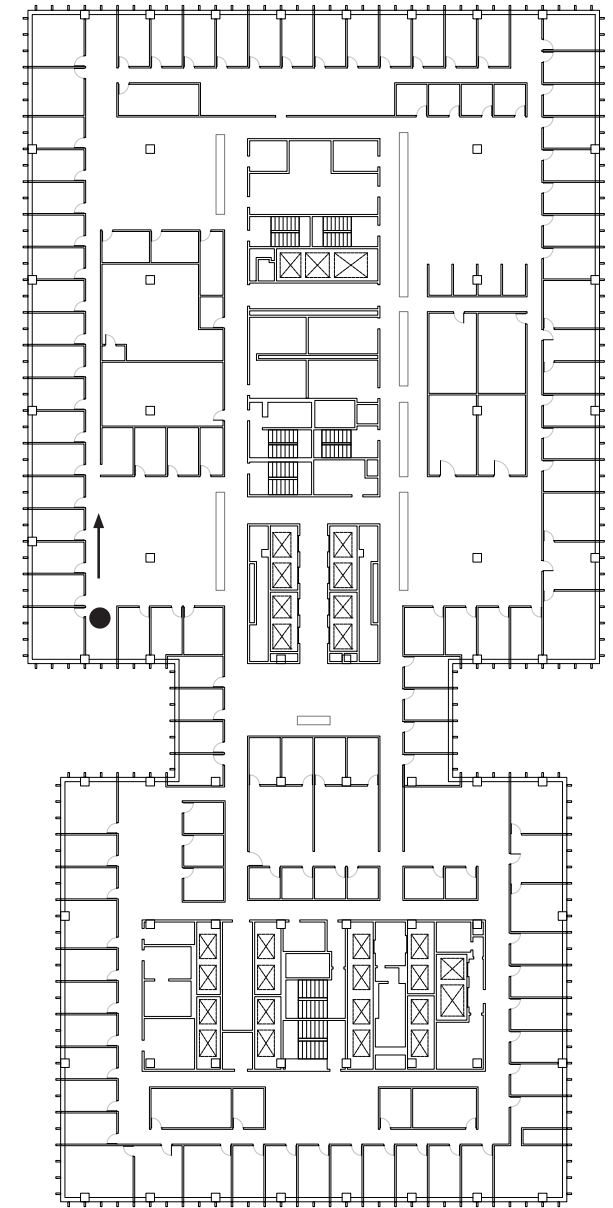


1981:59). The open office facilitates the ability of managers to supervise secretaries by creating greater enclosure for managers than for clerical staff. To the extent that there are fewer plants to provide **privacy** for secretaries, spatial segregation reinforces **women's lower status**.

What of the office of the future, characterized by advanced information technology and a reduced need for spatial proximity? These work arrangements appeal to a minority of employees as a way of controlling their own environments

WEEK 1.3 CITY

Precedence Study



Typical floorplan

Union Carbide Coeperation Headquarters

Location: New York

Project Completion: 1960

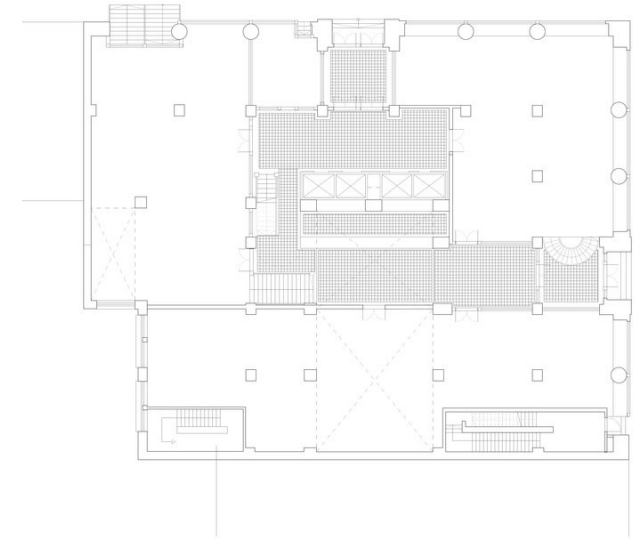
Architect: SOM

Site Area: 80,000 ft²

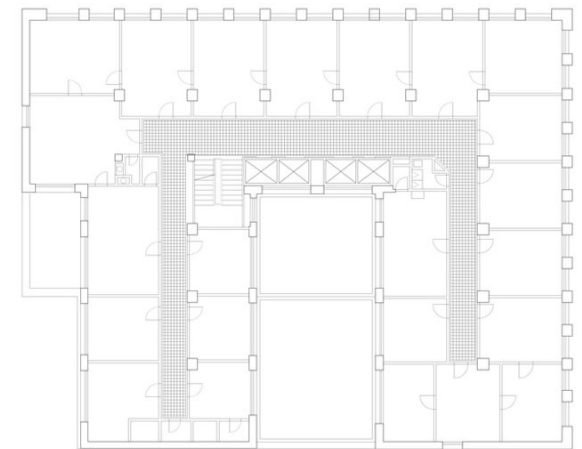
Project Area: 1,518,000 ft²

Number of Stories: 52

Precedence Study



Ground floorplan



Typical floorplan

Guaranty Building

Location: 28 Church Street, Buffalo, New York

Project Completion: 1896

Architect: Louis Sullivan

Height: 46 m

Number of Stories: 13

Response to Dovey's text 'Corporate towers and symbolic capital'

Summary

Dovey elaborated the production of symbolic capital with the interpretation of leasing advertisements for all major office towers constructed in Melbourne during the late 1980s. The symbolic capital of the towers mainly presents as power, which is generated from specific qualities such as distinction, authenticity, and timelessness. The copywriting and images were deconstructed in order to show the generation process through built form, including the location, the foyer, the view, and the interior settings.

Construction of value: power

The commercial value of the towers mentioned in the article, or the so-called symbolic capital, is not objective, but constructed intentionally. On the one hand, the advertisers carefully selected what to tell to the potential customers. For example, corporate towers located in businesses district could be described as having convenient and enjoyable life, and in harmony with its special and temporal context. While a tower in low-rise district or suburb

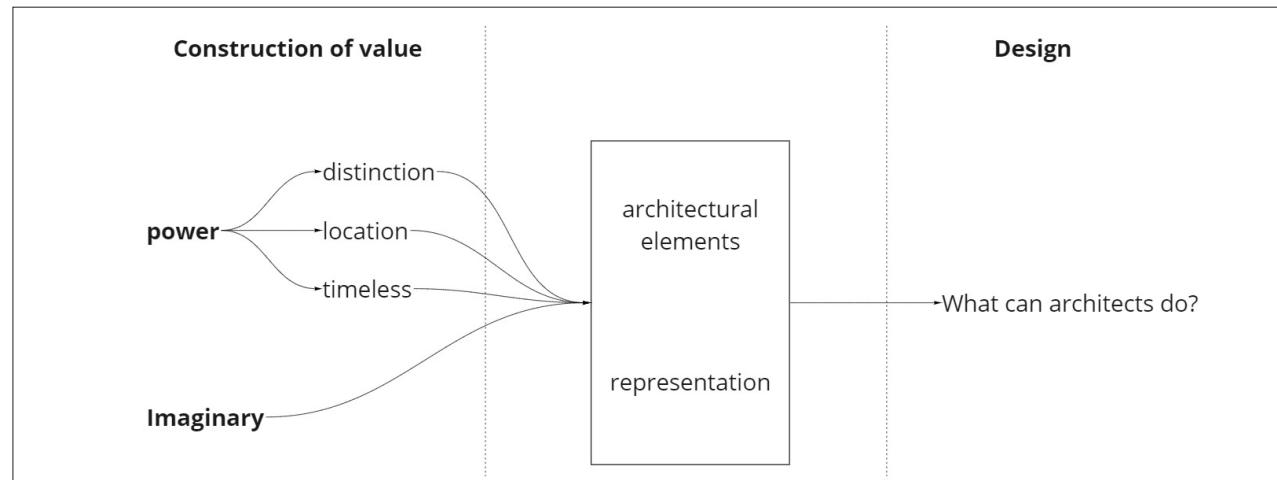
was praised for its distinction on the skyline and the long views of landscape. This selective story telling enhances the advantages, and thus build the impression. On the other hand, the images were beautified by various means. In many cases, the neighborhoods were erased, or the building looked unreasonably tall, or even the great masters appeared in the pictures and appreciate the building as an artwork. These dramatic pictures were not to convince audiences, but to create a feeling of extraordinary.

Imagery & Imaginary

Images are probably the most important and commonly used tool of architects and architecture students. We use renders and various illustrations for presentation, competitions, for selling the design. The pictures aim to create an imaginary of the dream building, which is not necessarily true. What is interesting is that images not only shape the imaginary of audiences, but also reflect on the value and preference of the producers. An example is the architectural photograph and the pictures from

corporations and users. The former one focuses more on the building, and looks clean and neat, usually with no human or only blurring shadows in it. One the contrary, in the pictures uploaded by users, people and activities are the center while buildings are the background.

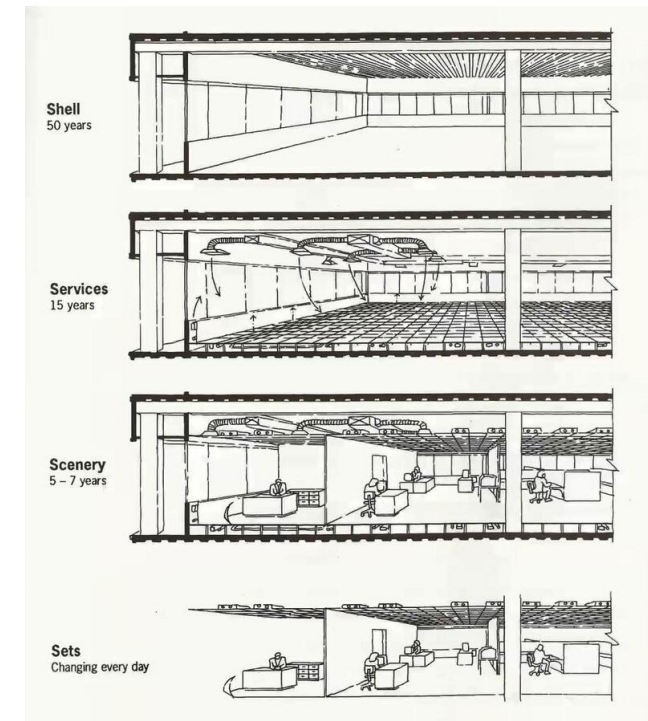
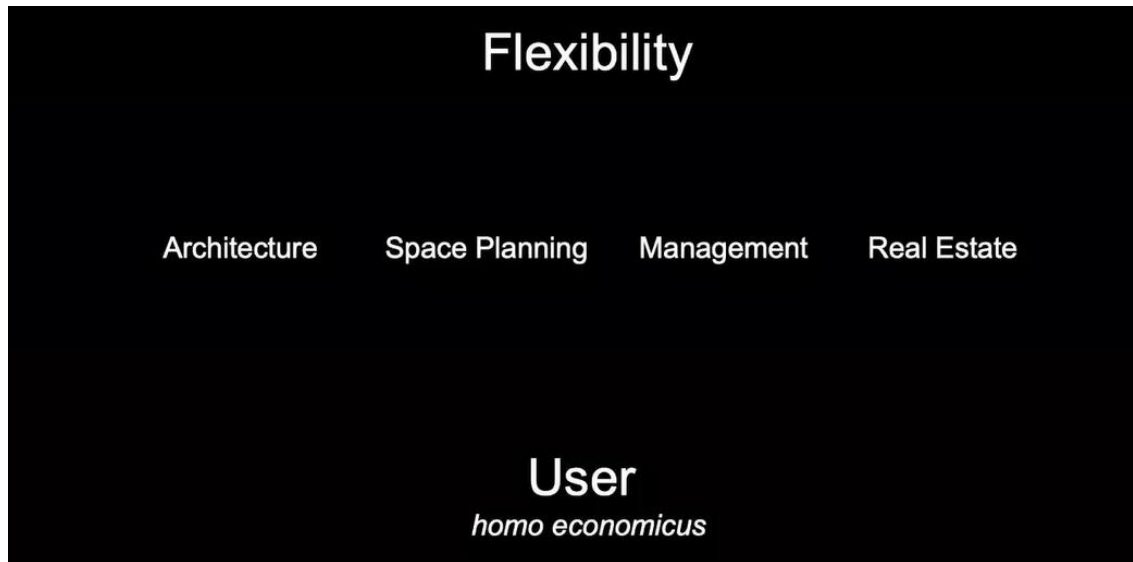
Project design process, in a sense, is construction of value. Control over the production of taste is a form of control over symbolic capital (Knox,1982). Except power, many other motifs such as sustainability, life-work balance, comfort, creativity are gaining popularity nowadays. As architects, we cannot just trap in the changing public taste. We need to take the responsibility to engage the users, the community, and the planners.



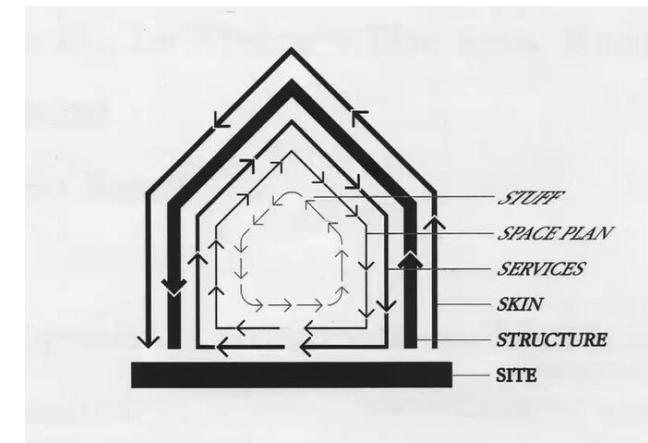
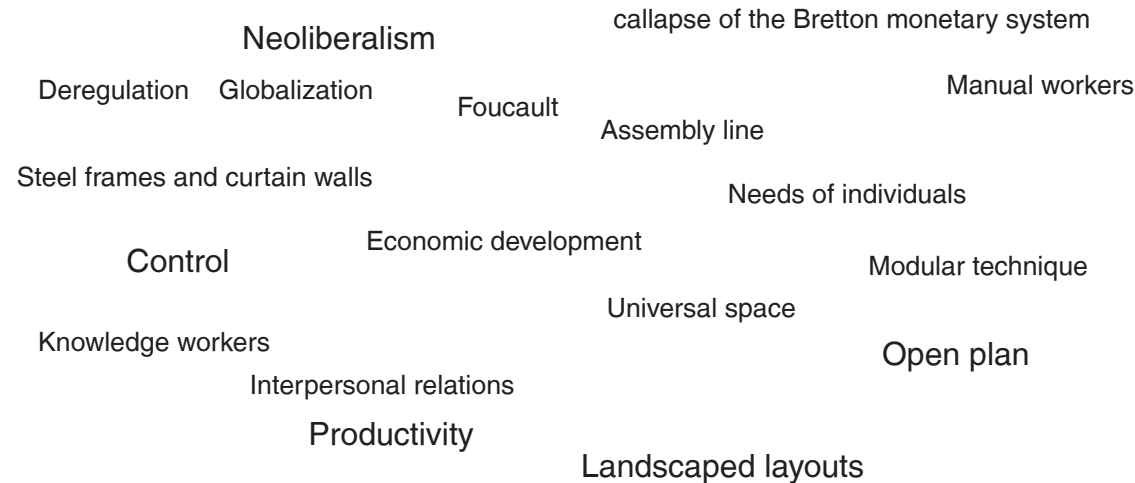
Reflection on Amy's lecture: THE CHANGING WORKPLACE, OR: THE POLITICAL ECONOMY OF FLEXIBILITY

Keywords

Flexibility in terms of building life span



State control economy -- Market economy

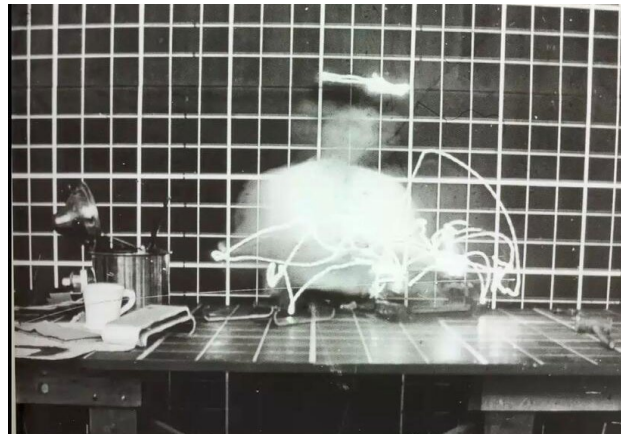


Reflection on Amy's lecture

Flexibility as management tool

Scientific Management

Manual workers
(Cost)



Frank and Lillian Gilbreth's Motion Study, 1914



The Crowd, King Vidor, 1928



Interpersonal Relationships

Knowledge workers
(Capital asset)



Centraal-Beheer, Apeldoorn, 1968-72



Osram Building, Quickborner

Reflection on Amy's lecture

Changing layouts

Cellular



Open plan

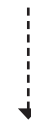
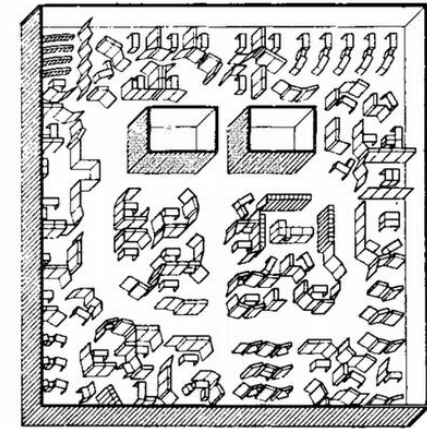
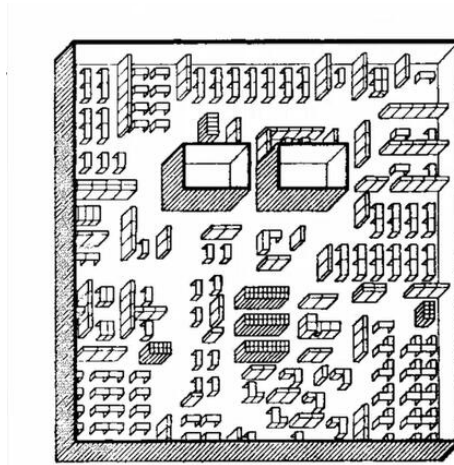
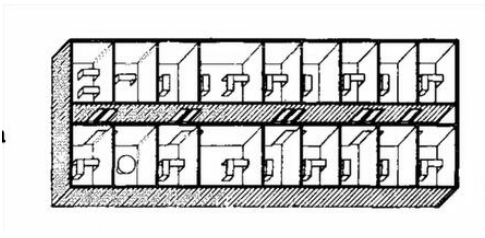


Landscaped

Highlight the hierarchy

Reorganize the assembly lines

Rethink the whole office as a system

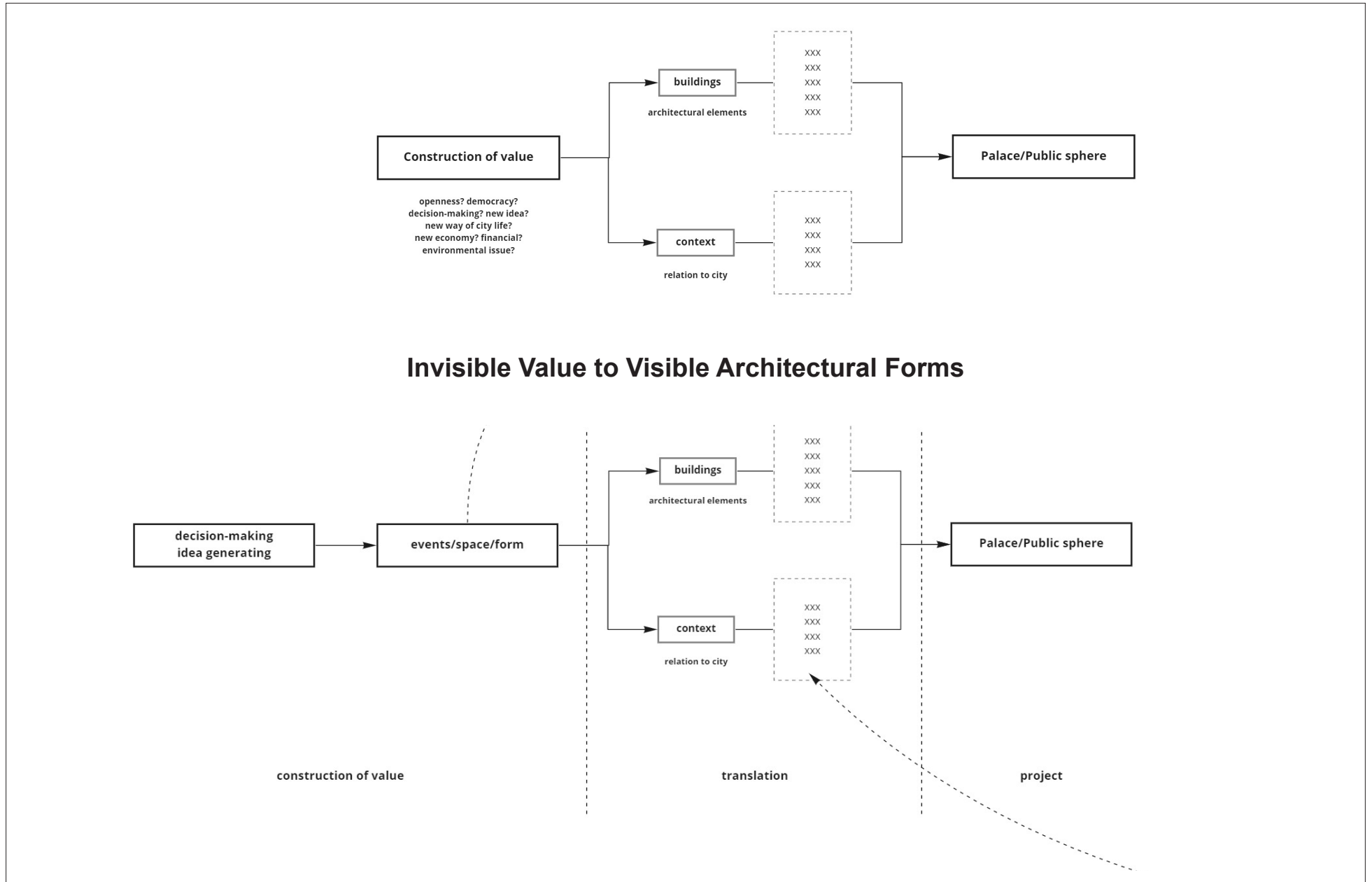


Recreate hierarchy on the layouts

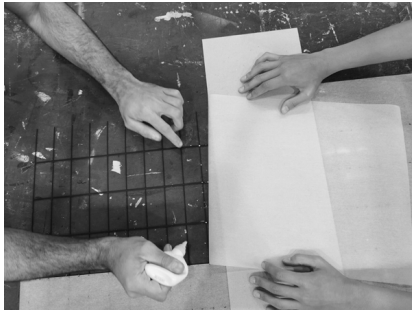
We can see the shifted way of management from a scientific one that focuses on productivity and individuals to human relations that focuses on productivity and social groups. The core of business management is always efficiency and productivity. But the employees' feelings and needs are recognized and emphasized over time.

WEEK 1.4 DEBATE

Interested topics



Precedence Study: Modeling Process



Week 1.3

Mock up for the illuminating ceiling, panels and furniture



Week 1.4

Mock up for the illuminating ceiling, panels and furniture

Final photograph

Because of the scale of the model (1:20), it is not possible to focus on the front table and the office area at the same time. Thus, we took two photos and combined them with Photoshop.

Final Image





WEEK 1.5 BANKING HALL

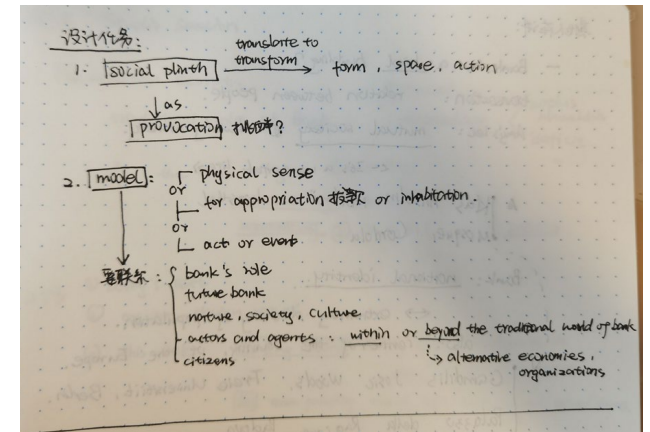
Future bank: Introduction

Change of function:

- not fortress any more
- the support of stability to the agent of changes
- key aim: provide new consolidated workspace
- reduced need for security
- new possibilities

Social plinth:

- temple-like solidity to openness
- invite the public in, engage people
- representative space in city



How bank works in the communication with society and people?

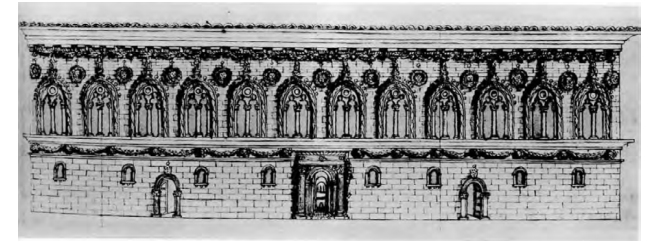
Response to Pevsner's text 'Exchanges and banks'

Change in bank building type

Pevsner started with the origins of banking and the early development of capitalism, and then related these to the change of building type. Banking activities first happened in houses, then in Palazzos and public buildings. One key moment is the emergence of cloister, which can be seen in some Exchanges in London and Amsterdam. The cloister later developed into courtyard. It was noticed that banking buildings bear many similarities with other building types such as temple and palace. Domes, rotunda, Palladio's Basilica layout, etc. were applied in exchanges and banks. Decoration of banks also changed over time, first moved from Grecian to Italianate, then to Baroque and Gothic, and finally, the so-called International Modern style appeared.

Meaning of trust

Another interesting discussion in the text is how architectural forms build people's trust in banks. Pevsner mentioned that the preference of Grecian for many years probably indented to express security (p204). Later, even many banks gave up the giant iconic columns, powerful colonnade and pediment, most of their facades remain solid and closed. When it comes to 20th century, transparent curtain wall was applied in bank buildings, such as the Manufactures' Hanover Trust Company in New York. In my opinion, the change in facades indicates the meaning of trust has changed. Security and stableness used to be the source of trust, while transparency and openness become more important today.



Precedence Study: Bank Buildings

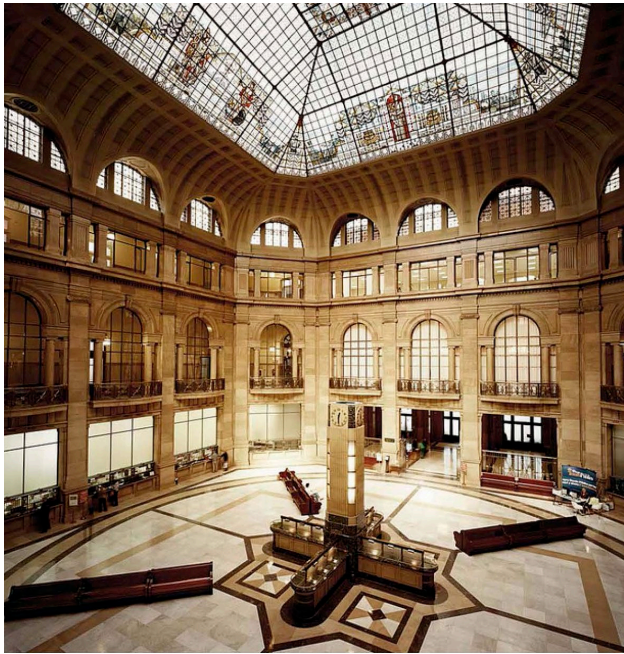
Closed solid facades



Transparent facades



Bank hall



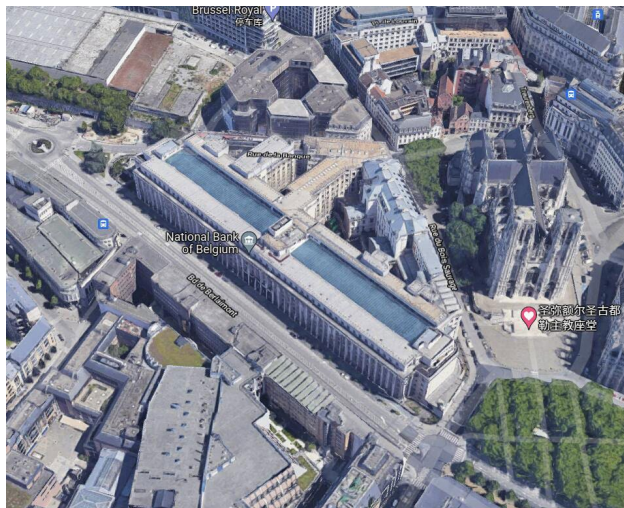
Skyscraper



WEEK 1.6 SOCIAL PLINTH

Site Information

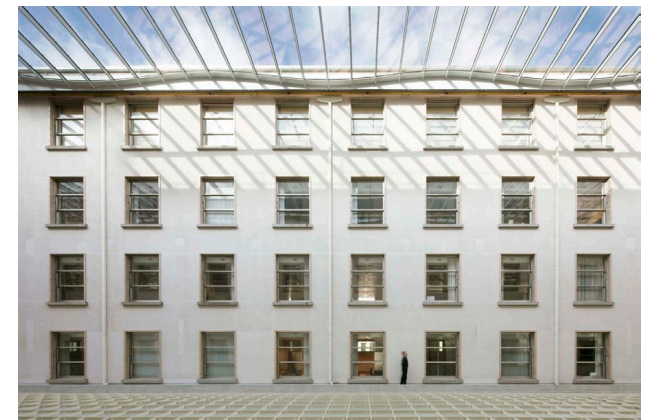
Belgian National Bank



Name: National Bank of Belgium
Address: Boulevard de Berlaimont
City: Brussels
Style: International
Original use: Official building
Year: 1948
Architect: Van Goethem Marcel



Monumental building, designed before World War II by architect Marcel Van Goethem, but built from 1948. The building, which is 200m long, has a remarkable Modernist facade, made up of a large regular colonnade, softened on both sides by two rotundas decorated with two bronze statues of women resting on square columns.



Reflection on Amy's lecture BANK ARCHITECTURE, OR: THE PARADOX OF VISIBILITY

Faces · Paper · Screens

Trust
Solid facades
Home-like banking building
self-conscious facades
financial crisis after WWII
women
transparency
paperworks
create specific experience
screens
big floor plan



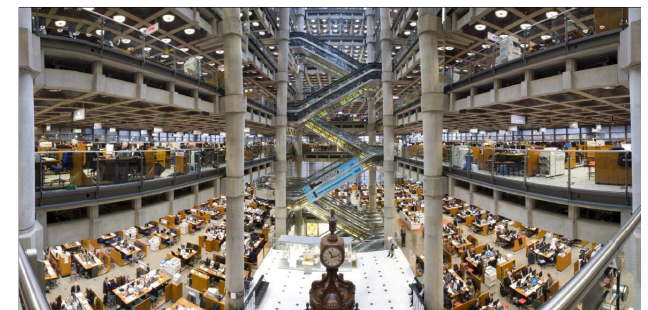
The Stock Exchange celebrating the relief of Mafeking, 1901



Messengers running from the Bank of England to the Stock Exchange with news concerning a change in the bank rate.



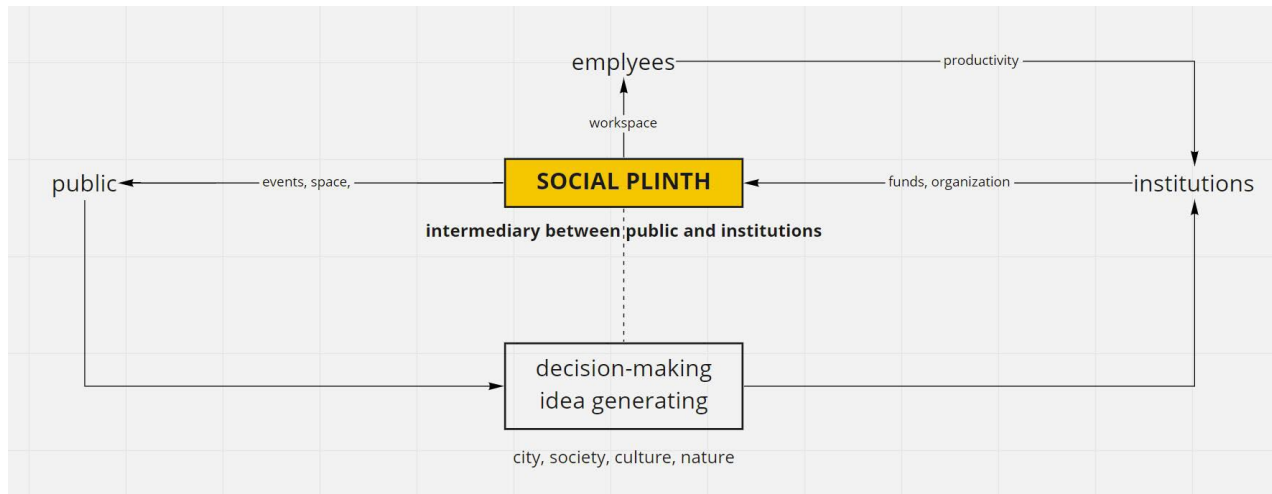
Dealing room of Chemical Bank in the City, 1990s



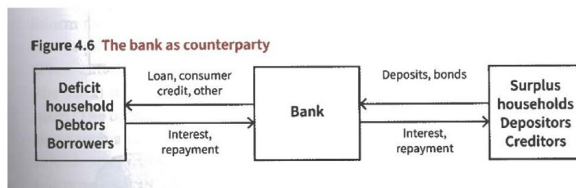
Lloyd's Underwriting Room, 1986 by Richard Rogers + Partners and Eva Jiricna

Definition of SOCIAL PLINTH

Intermediary between the public and institutions



Traditional role of bank ---- intermediary



Future bank ---- environment, new economic model

be completely transformed and indeed Brussels, the city in which the National Bank stands, has recently declared that it will adopt a **doughnut economic model** – moving towards a zero carbon, circular economy, the parameters of which are established by a *social foundation* at one end and an *environmental ceiling* at the other.

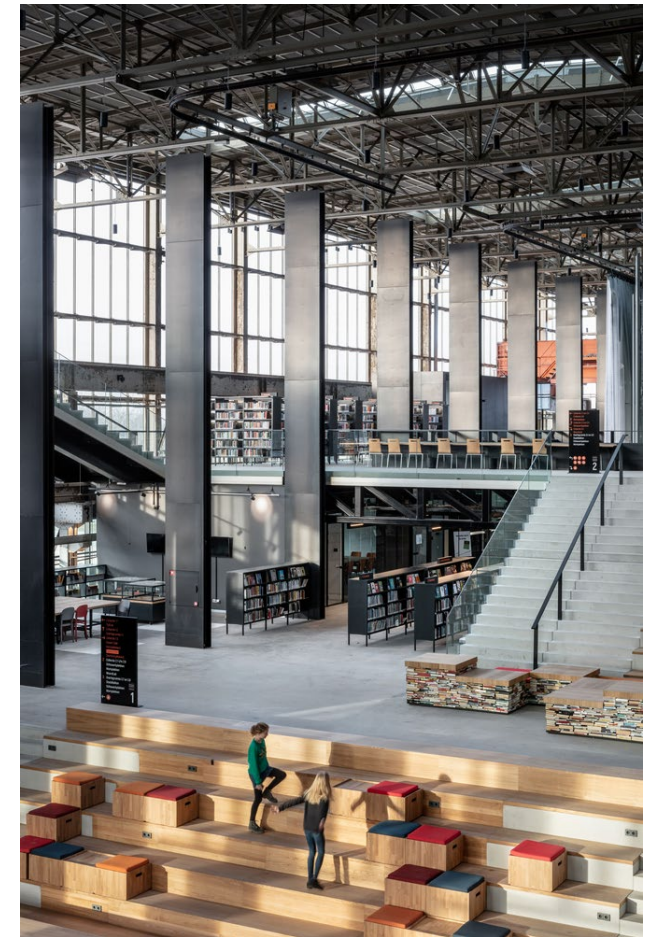
How to translate the social plinth to space and form?



1. decision making process ---- space?
2. atmosphere: democratic and open, making people more willing to express and share?
3. platform for flexible uses. within the banking hall of BNB maybe? connect the BNB with the street?

Reference

Lochall Library



role as social plinth:

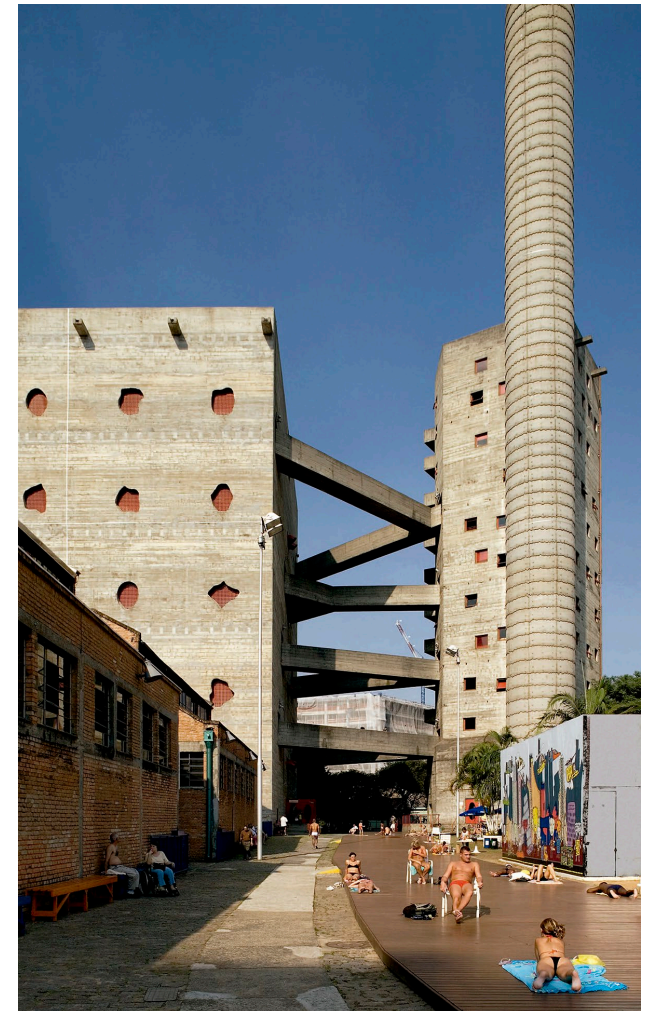
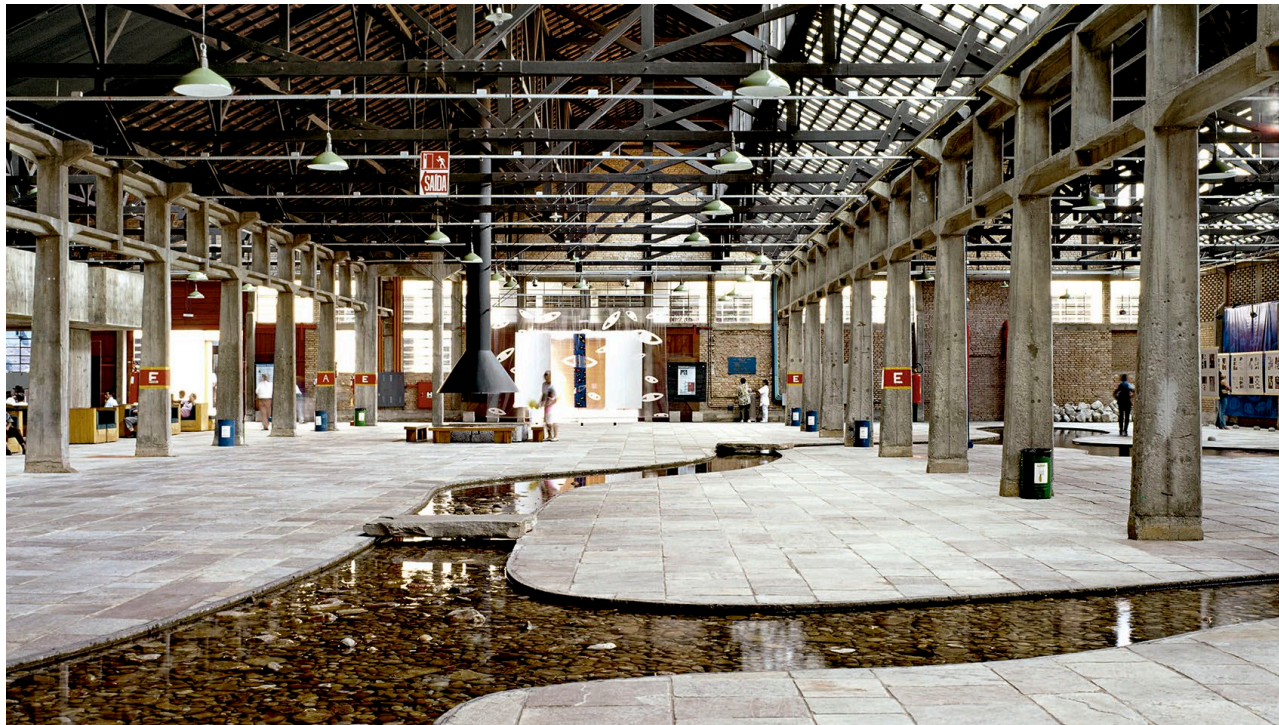
- changes to the public library typology
- create new knowledge: exhibit, share, interact with experts and other visitors
- invite the public in

physical forms:

- reading area, co-working area, exhibition, lecture, labs, cafe, shops

Reference

SESC Pompéia Factory



various activities

-- a library, swimming pool, courts, workshops, living and exhibition rooms, an auditorium, restaurant, and a terrace

fit into the context

-- connection to the communities
-- building entrance

the way to connect with the surroundings

-- forms of access and connection with the streets;
providing public space for diverse urban activities

WEEK 1.7 SOCIAL PLINTH-2

Film: The Big Shorts



The Debate



Introduction: the 'Food Window' in old communities in China

Transgress & Redefine

My theme is the food shops or 'food windows' opened on the ground floor of the old residential communities in China.

The starting point is the Chunli Cafe which is opened in an old neighborhood in the central business district of Beijing. By breaking the facades and adding commercial programs, the cafe redefined the space and stimulated new activities. Now the cafe has become a topic shop on Chinese social media.

When I continued searching, more food windows were founded in different cities. These shops normally make use of the original windows of the households, but sometimes they opened new holes on the facades of residential buildings. In most cases, the food windows only provide takeaway food, but the shop owner may offer tables and chairs in the open space of the community for the customers. Interestingly, a barbecue shop in Chengdu, which is shown in the last picture, has no door. So the foodies have to take the rough steps and go through the window in order to enter the shop.

I chose the food windows because they break the boundary and sorts of transgressed the ordinary life. By opening the facades, refurbishing the floor and walls, adding new programs and street furniture, the space near the windows was transformed from residential to commercial, from collective to public. The windows redefined the space and allowed something else to happen.

What I could do next:

Applied the principle of these food windows to the boundaries in the Belgium National Bank:

- the boundary between the bank hall & the space behind the counters.
- the boundary between public space & the staff-only space
- the boundary between the bank building & the streets

Image: the 'Food Window' in old communities in China

Transgress & Redefine



Chunli Cafe in Beijing, China

The coffee shop is opened in an old neighborhood in the central business district of Beijing. Before its open, the side facade of this residential building was facing a dull street that no one would stay.



Define the space

Tiles are applied on the added steps, building plinth, and the ground. Together with the furniture, the space near the window was turned into an attractive, stayable, and talkable space.



Image: the 'Food Window' in old communities in China

Transgress & Redefine



Wuji Traditional Pastries, Tianjin, China



Fengji Crepe, Tianjin, China

Tianjin, China (Left)

The pastry shop and crepe shop in Tianjin are both located in old residential areas. The shops only provide take-away food and has been opened for many years.



Anonymous Snack Shop, Xi'an, China

Xi'an, China (Right)

This snack shop makes use of the side facades of a residential building. There is no seat in the shop. Residents enjoy their food in the open space of the community.





Soup Shop, Guangzhou, China



Waffle Shop, Guangzhou, China

Guangzhou, China

(Left)

The two shops both take over the corner of residential buildings. Take-away food only.



Chengdu, China (Right)

The shop has no door. Customers need to take the steps through the window. Five tables are available inside.



Guoshi Barbecue, Chengdu, China

Process of the Chunli Cafe Modeling



WEEK 1.8 PRELIMINARY POSITION

Feedback of last week

Mark & Sam: The food window is an action of transgressing, which sorts of broke the rules to allow something else to happen. It needs to be identified what's kind of specific activities corresponding to the building type could attract people to participate. The barbecue shop using the window as an entrance is really interesting. Maybe you can apply it to some windows you find in Delft. Refinement and recreation of the cafe model could also be the next step for the following project.

Daniel: One thing I think about is how food makes one feel 'at home' or familiar. Brussels is culturally the second most diverse city in the world so the idea of eating is an important part of engaging with ones own community and in enjoying and integrating with others.

The second thing it makes me think about is eating – where do people go with the food they buy? Could you add something to your model to talk about a place to eat together? Could the street become a dining room where friends or strangers might share a meal? Could this idea of eating, and perhaps eating sustainably and eating the foods of a diverse culture become part of the social offer of the bank in the future?








Also think about the life cycles of food, where it comes from how it is grown, whether the bank might look after resources, like soil, as well as money.

Research Diagram: Office - Productivity - Future Workspace

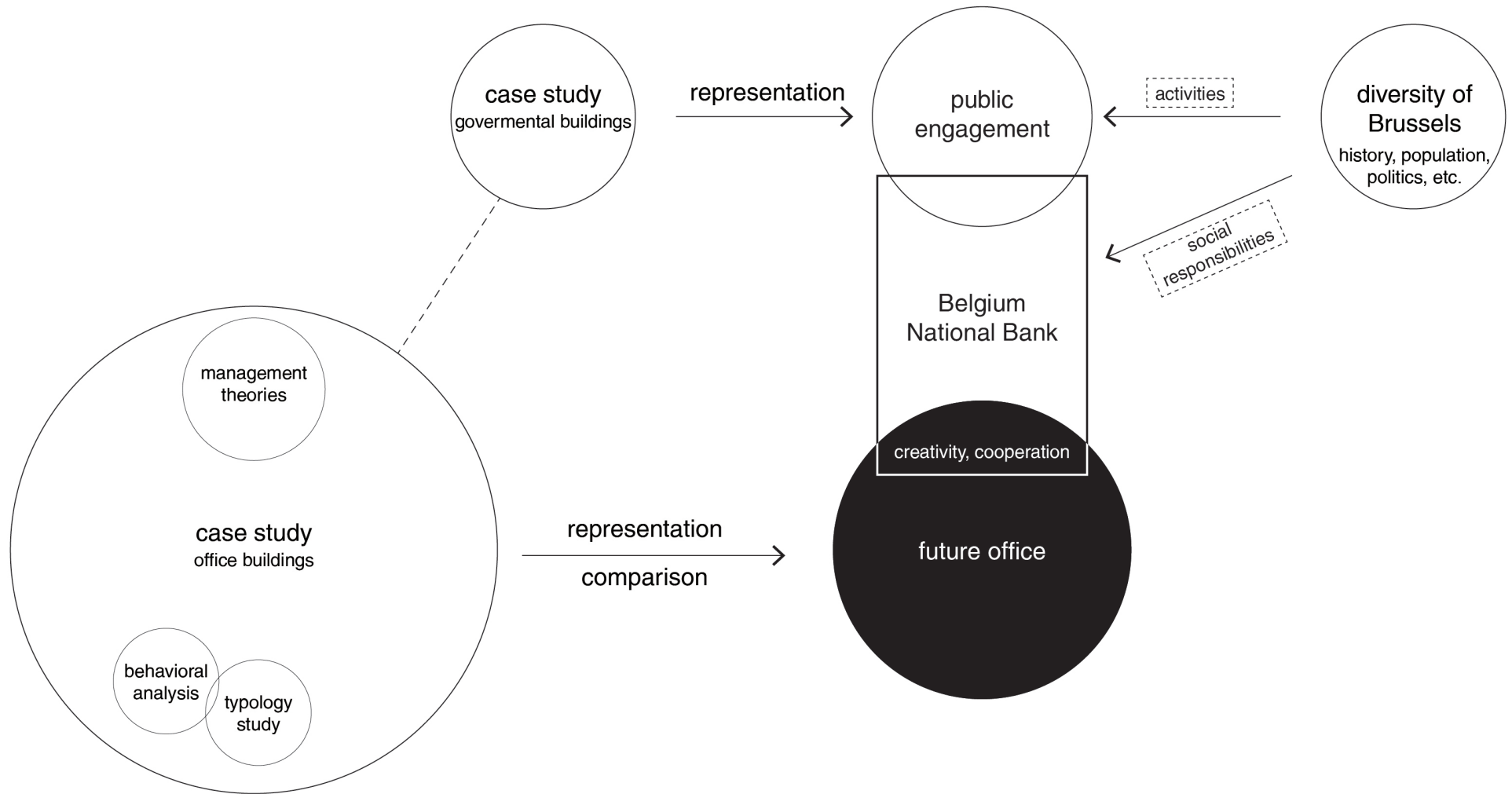
Productivity from individuals

Productivity from social groups

Productivity from creativity and public engagement

Home-like small offices	Scientific management	Open floor	Office landscape	Workspace + ?	Future workspace
 <p>The Sun Insurance Office, London, 1849</p>	<p>Taylorism efficiency 'time and motion' hierarchy, supervision</p>	 <p>Union Carbide HQ, New York, 1960</p>	<p>Bürolandschaft diverse non-hierarchical open-plan environment plants and partitions</p>	 <p>Economist Building, London, 1964</p>	<p>Institutions relate with cities social responsibility public engagement transparency</p>
 <p>Oriel Chambers, Liverpool, 1864</p>	 <p>Larkin Building, Buffalo, 1906</p>	<p>Profitability maximize the floor areas steel frames and curtain walls artificial ventilation and illuminating modular system</p>	 <p>Ninoflax offices, Nordhorn, 1963</p>	 <p>Ford Foundation, New York, 1968</p>	 <p>City Hall, The Hague, 1986</p>
 <p>Guaranty Building, Buffalo, 1896</p>	 <p>Johnson Wax, Racine, 1939</p>	 <p>Centraal Beheer, Apeldoorn, 1972</p>	 <p>OSRAM Office, München, 1965</p>	 <p>SAS building, Stockholm, 1988</p>	 <p>German parliament building, Berlin, 1999</p>
 <p>National Insurance Building, Stockholm, 1932</p>		 <p>Willis Faber Dumas, Ipswich, 1975</p>	<p>Blurring boundaries free architecture</p>	<p>Technology computer, network 'intelligent' building "hot-desking" portable devices, wireless, cloud-based storage teleworking</p>	<p>Work & Life work as an action rather than a place communication creativity and cooperation</p>
			 <p>KAIT Workshop, Kanagawa, 2013</p>	 <p>Googleplex, California, 2005</p>	<p>Future roles of banks engage the communities respond to the diversity of the city identity of the employees value of works public engagement and support to improve productivity</p>

Research Diagram: Methodology



Research on the Diversity of Brussels

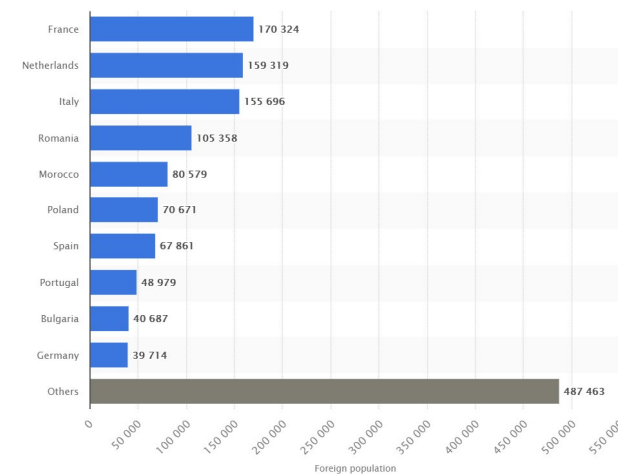


Population

Brussels is one of the most culturally diverse cities in the world with more than 150 different nationalities in one place¹. As the home to world's second most diverse population, more than six in ten Brussels residents were not born in Belgium, ranks second only to Dubai. The World Migration Report 2015, published by the International Organization for Migration (IOM), characterizes Brussels as a city with a highly mobile and international population².

As a result, Brussels is a deeply polyglot city. The presence of the European Union has made English a kind of lingua franca in some quarters, and immigrant communities speak many different languages alongside French or Flemish: Turkish, Moroccan, Kikongo, Lingala, and other Central African languages.³

Foreign population of Belgium in 2020, by origin



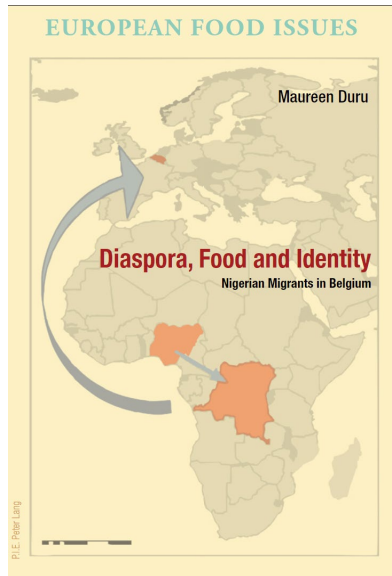
1 <https://www.solvay.edu/en/about/why-brussels/>

2 <https://www.thebulletin.be/brussels-home-worlds-second-most-diverse-population>

3 <https://slate.com/news-and-politics/2016/03/how-brussels-is-different-than-paris-the-history-of-a-diverse-city.html>

Chart from: <https://www.statista.com/statistics/517235/foreign-population-of-belgium-by-origin/>

Motifs of the Project



Food & Identity

BOOK: *Diaspora, Food and Identity*
Nigerian Migrants in Belgium

'The new generation of Nigerians, who see Belgium as home, also hang on to a Nigerian diet that remains not only an important part of who they are, but is also used in the creation of cultural boundaries and group identities... Skills such as language and social norms are indeed necessary to survive in the new environment. Yet, food plays a prominent role: on the one hand, it contributes to the affirmation of Nigerian feelings, and on the other hand, food serves as a means of communication with the host country.'¹

¹ <https://library.oapen.org/handle/20.500.12657/49749>



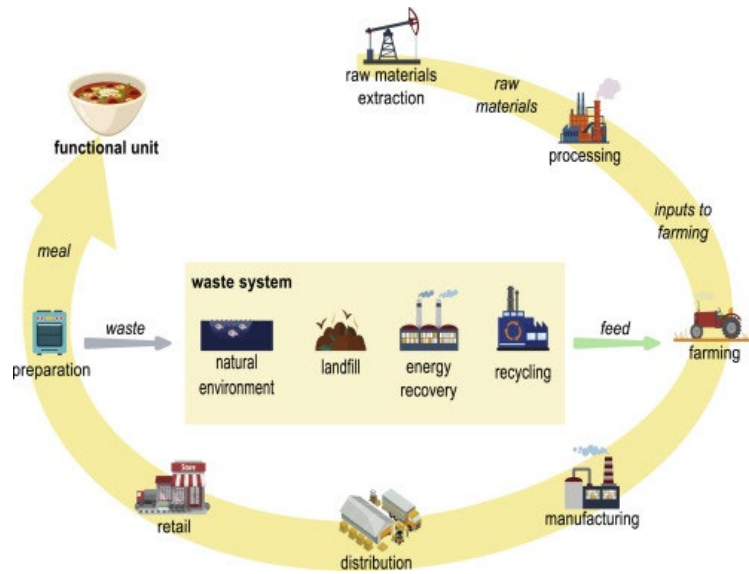
Social responsibility for the future bank

eating together, meeting with each other;
dining rooms for friends, families, and strangers;

food as a means of social and cultural communication;

life cycle of foods;
sustainably eating;
soil, plants, ecology

Further research Topics



Life circle of food¹

HOW DO I EAT MORE SUSTAINABLY?

8 STEPS TO A MORE SUSTAINABLE DIET:

<p>CHOOSE LOCAL PRODUCE</p>	<p>EAT PLANT BASED FOODS</p>	<p>BUY WHAT'S IN SEASON</p>	<p>EAT A VARIED DIET</p>
<p>LOOK FOR SUSTAINABLE FOOD LABELS</p>	<p>KEEP FOOD WASTE TO A MINIMUM</p>	<p>BUY PACKAGING-FREE FRUIT & VEG</p>	<p>GROW YOUR OWN FOOD</p>

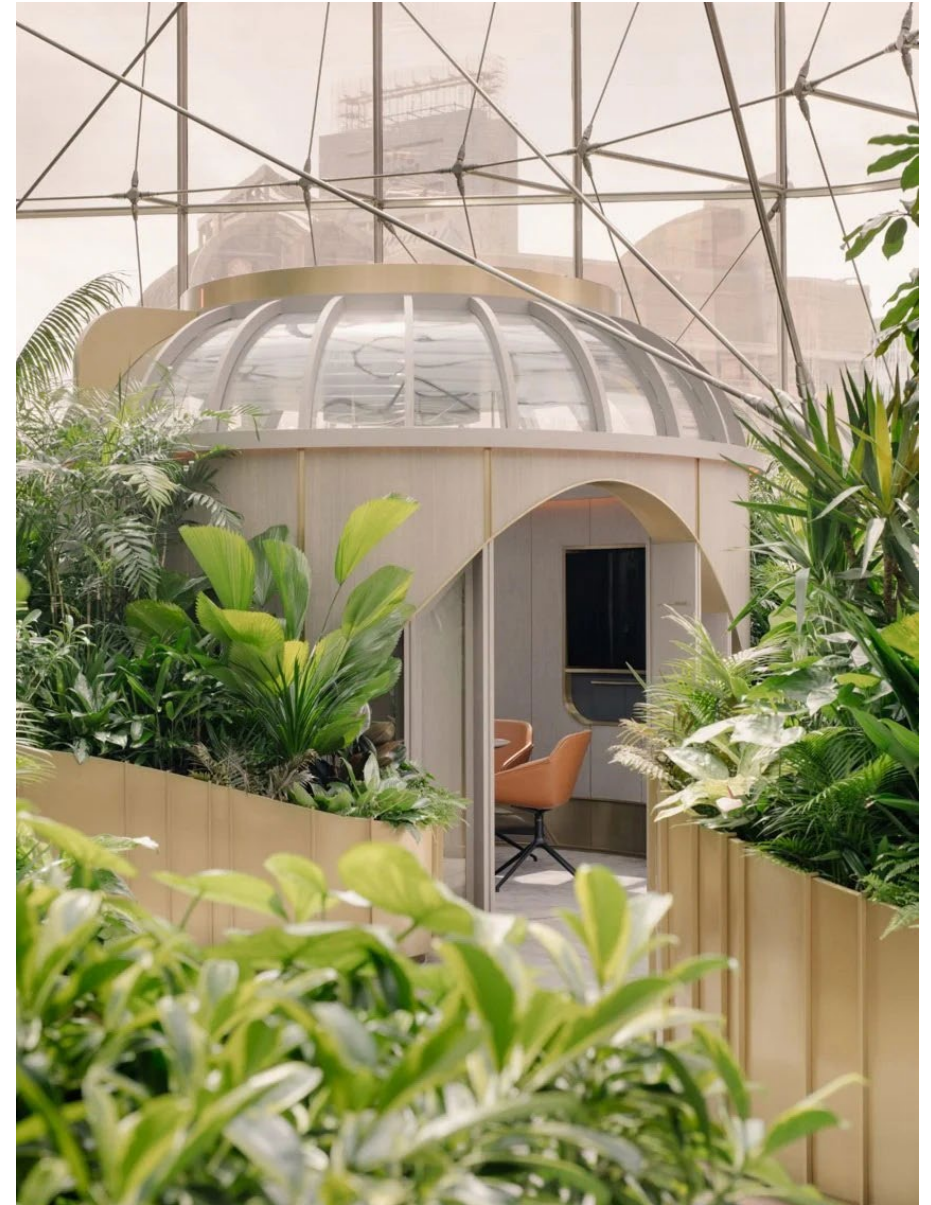
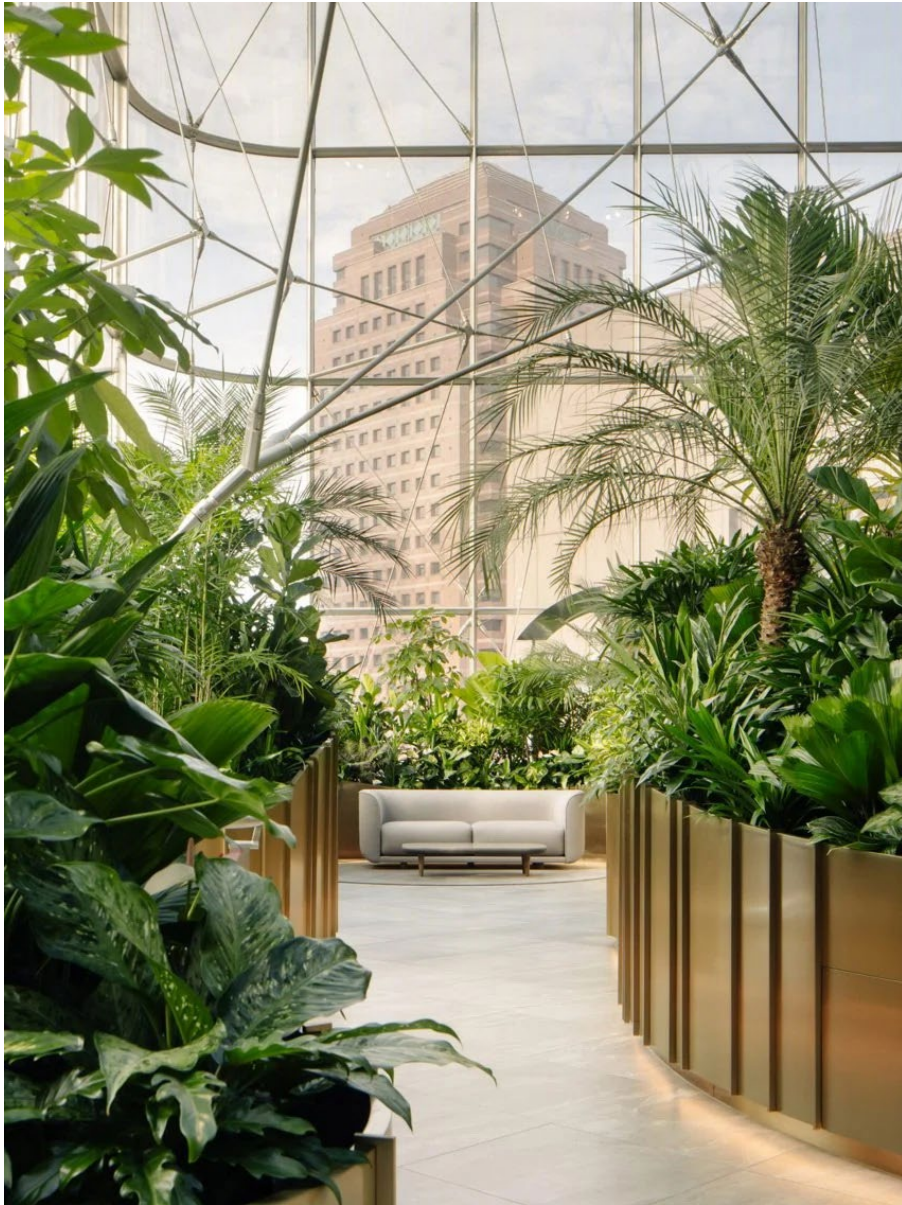
Sustainable diet²

¹ Life Cycle Assessment of Food Systems, <https://www.sciencedirect.com/science/article/pii/S2590332219301289>
² <https://thesportsedit.com/blogs/news/what-should-we-eat-the-future-of-sustainable-eating>
³ <https://kvtes.tumblr.com/post/173361694285/the-glory-of-gardening-hands-in-the-dirt-head>



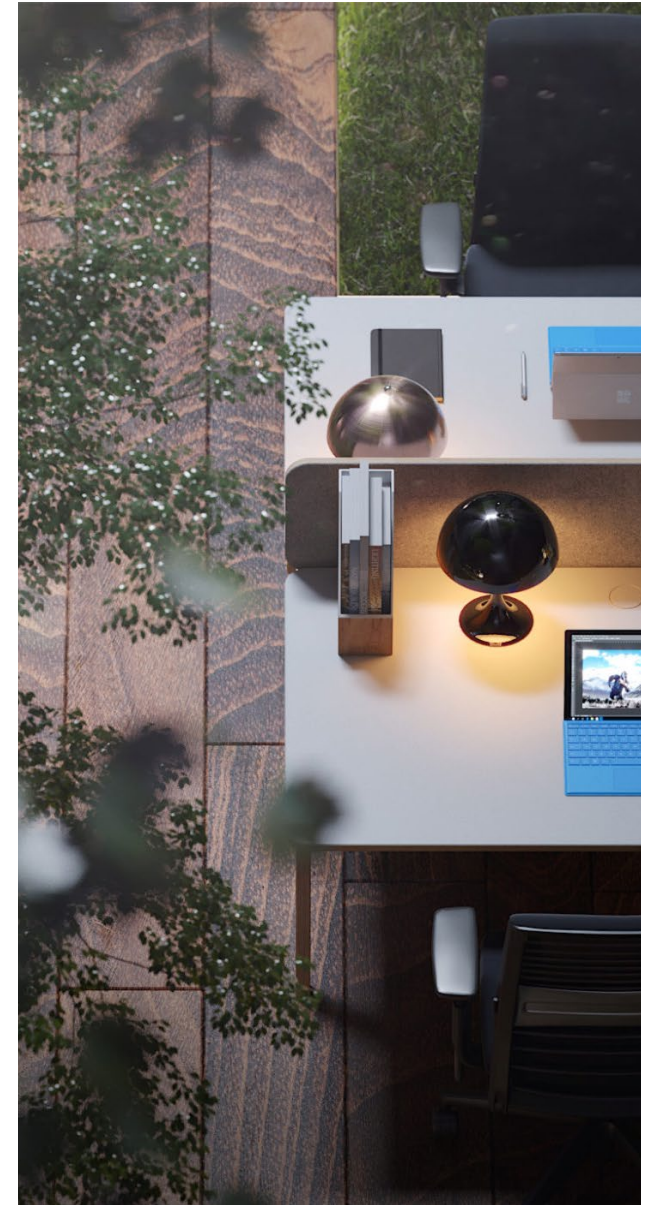
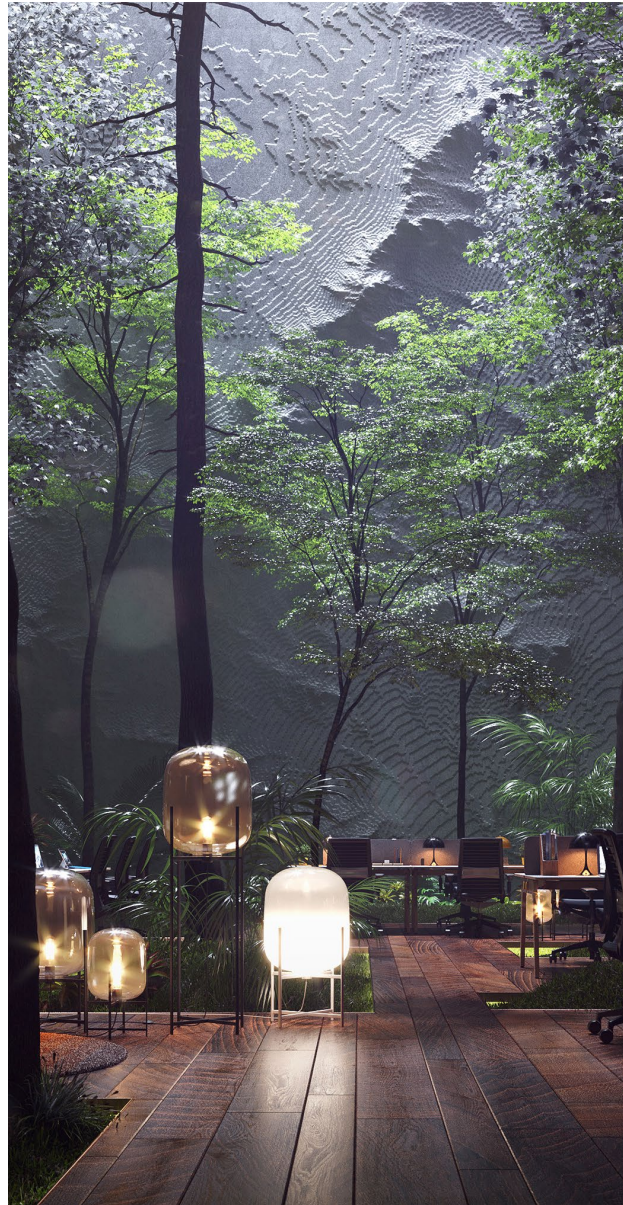
Soil, plants, vegetation³

References: 'Banking Conservatory' of Citibank Singapore



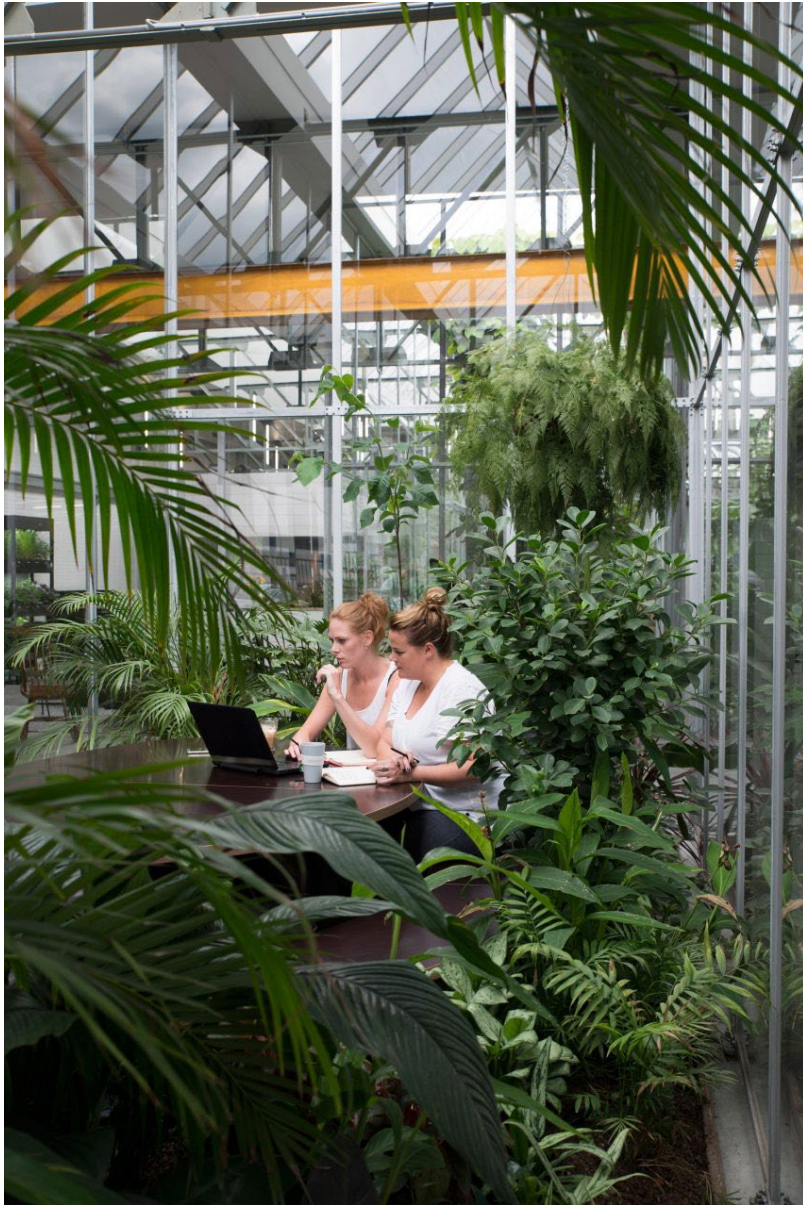
https://www.dezeen.com/2021/03/02/citibank-singapore-ministry-of-design-banking-conservatory/?i_source=L1&i_medium=bottom_block_1

References: Off Grid Office by Engraff Studio (Visualizations)



<http://www.engraff.ro/portfolio/off-grid-office/>

References: Space for Meeting



Left: https://www.dezeen.com/2016/10/28/glasshouses-joolz-offices-warehouse-conversion-architecture-space-encounters-plants-amsterdam-netherlands/?li_source=LI&li_medium=rhs_block_3
Right: https://worldlandscapearchitect.com/the-spheres-exploring-biophilia-in-the-modern-workplace/#.YW_5GRpBxPY

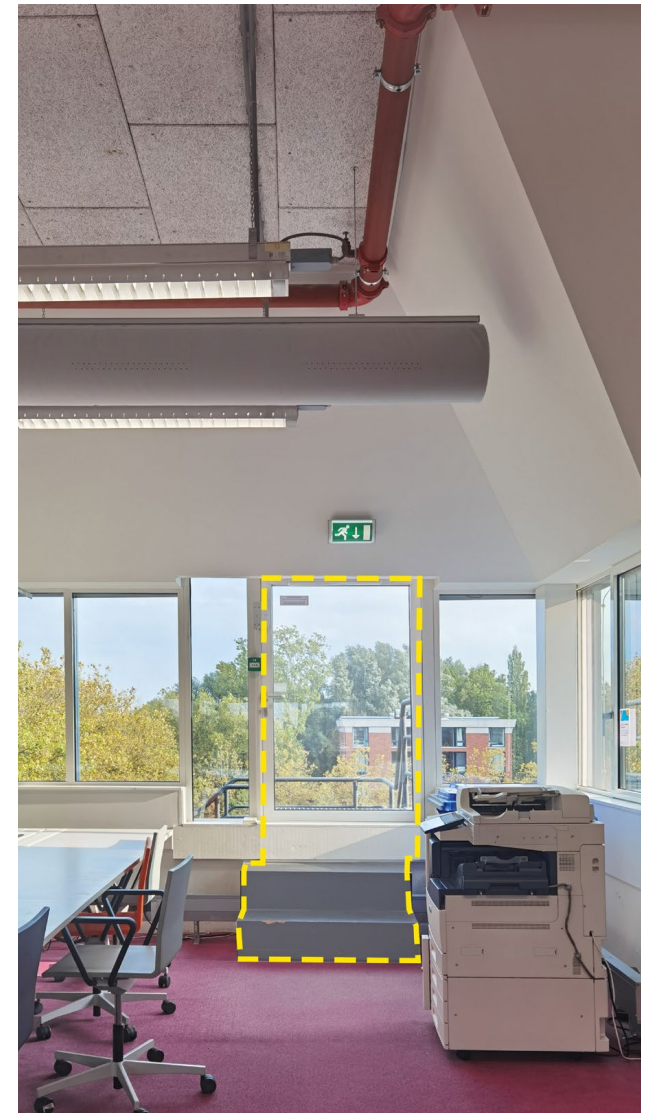
Delft-- Windows, Steps, Stairs



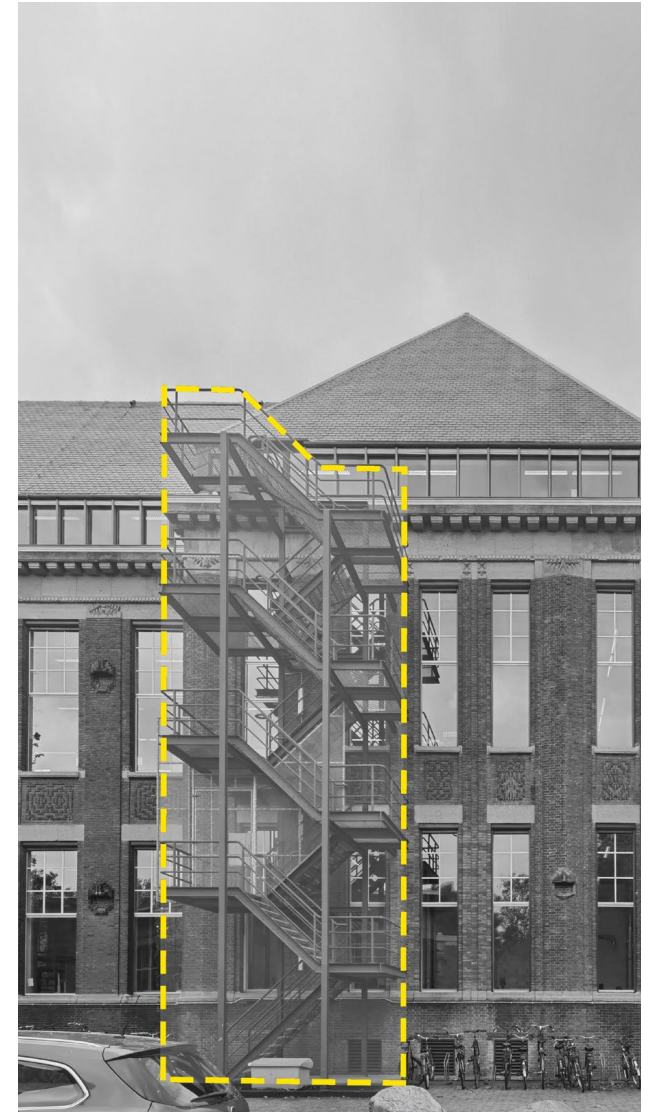
Delft-- Windows, Steps, Stairs



Delft-- Windows, Steps, Stairs



Steps & Stairs



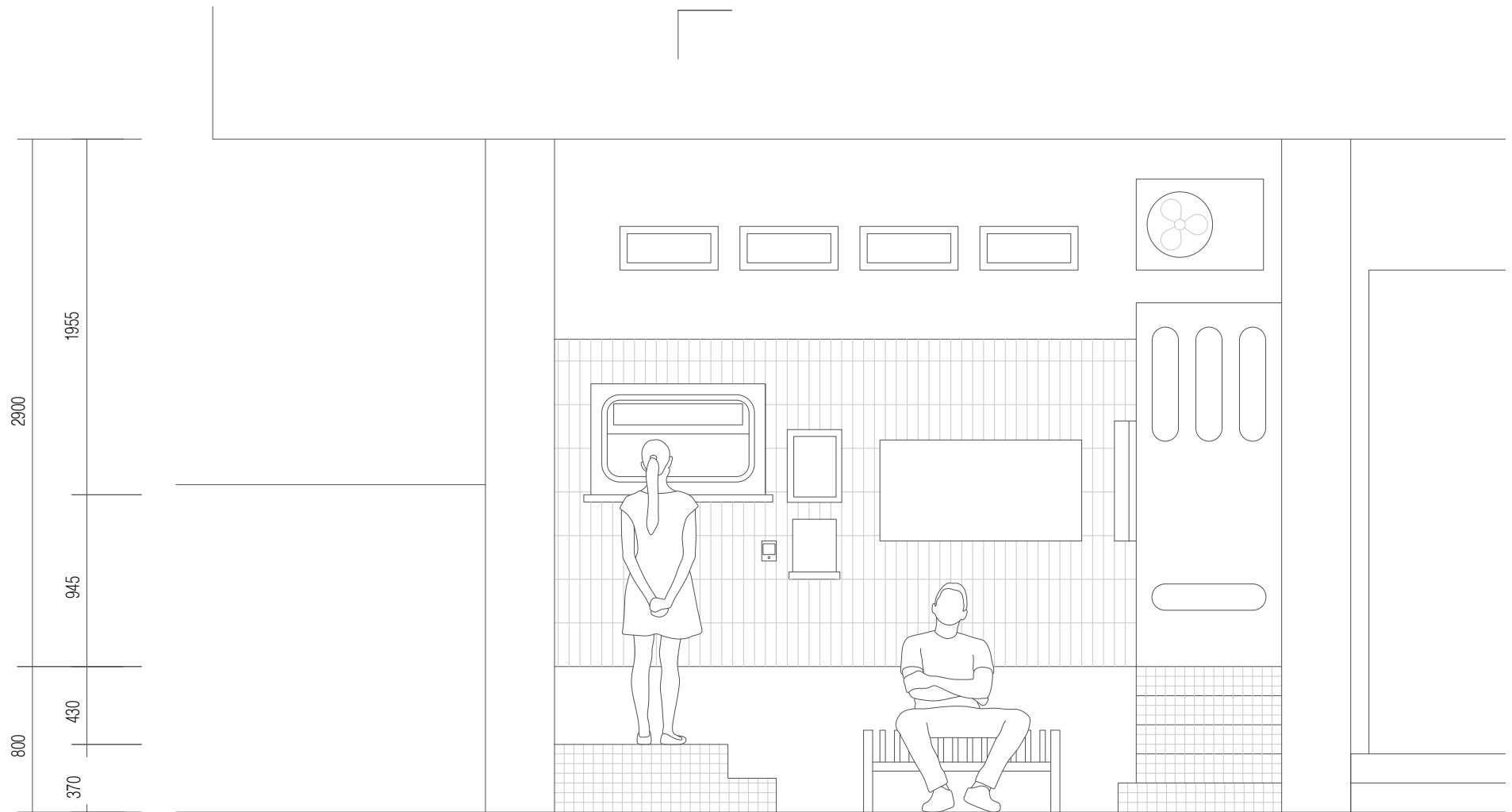
Collage -- Imaginery of the future bank



WEEK 1.9 PREPARATION FOR P1

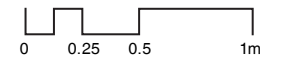
Feedback of last week

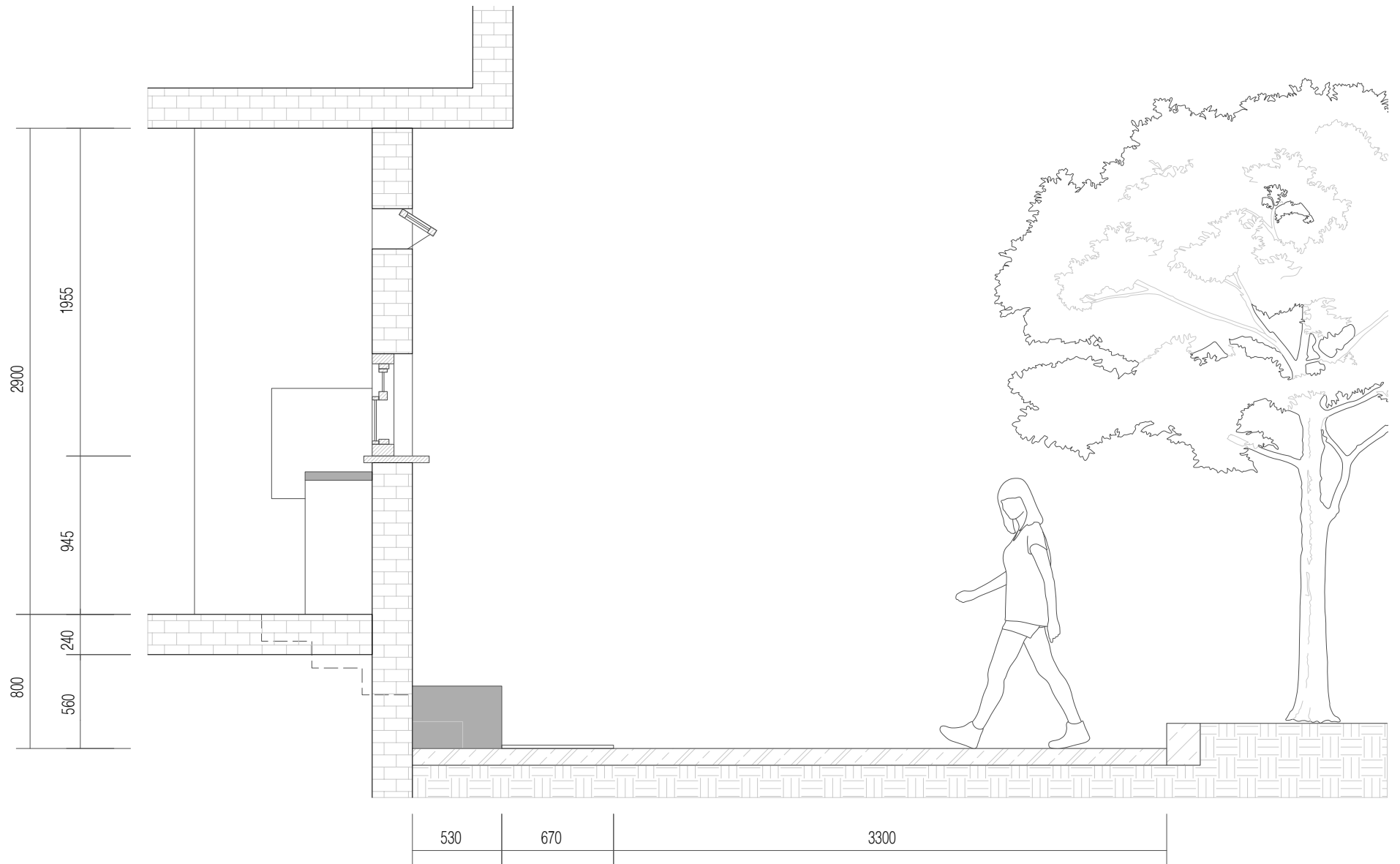
Daniel: Focus on the window image and model. The CHUNLI Cafe is a 3D setting of social plinth. Try to analyse and represent the elements for defining the space. Try to find the spacial principles and then add new layers in your model to make the space even more public. Not necessarily work on the bank yet.



Elevation

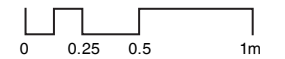
Scale 1:33
 CHUNLI Cafe
 Beijing, China





Section

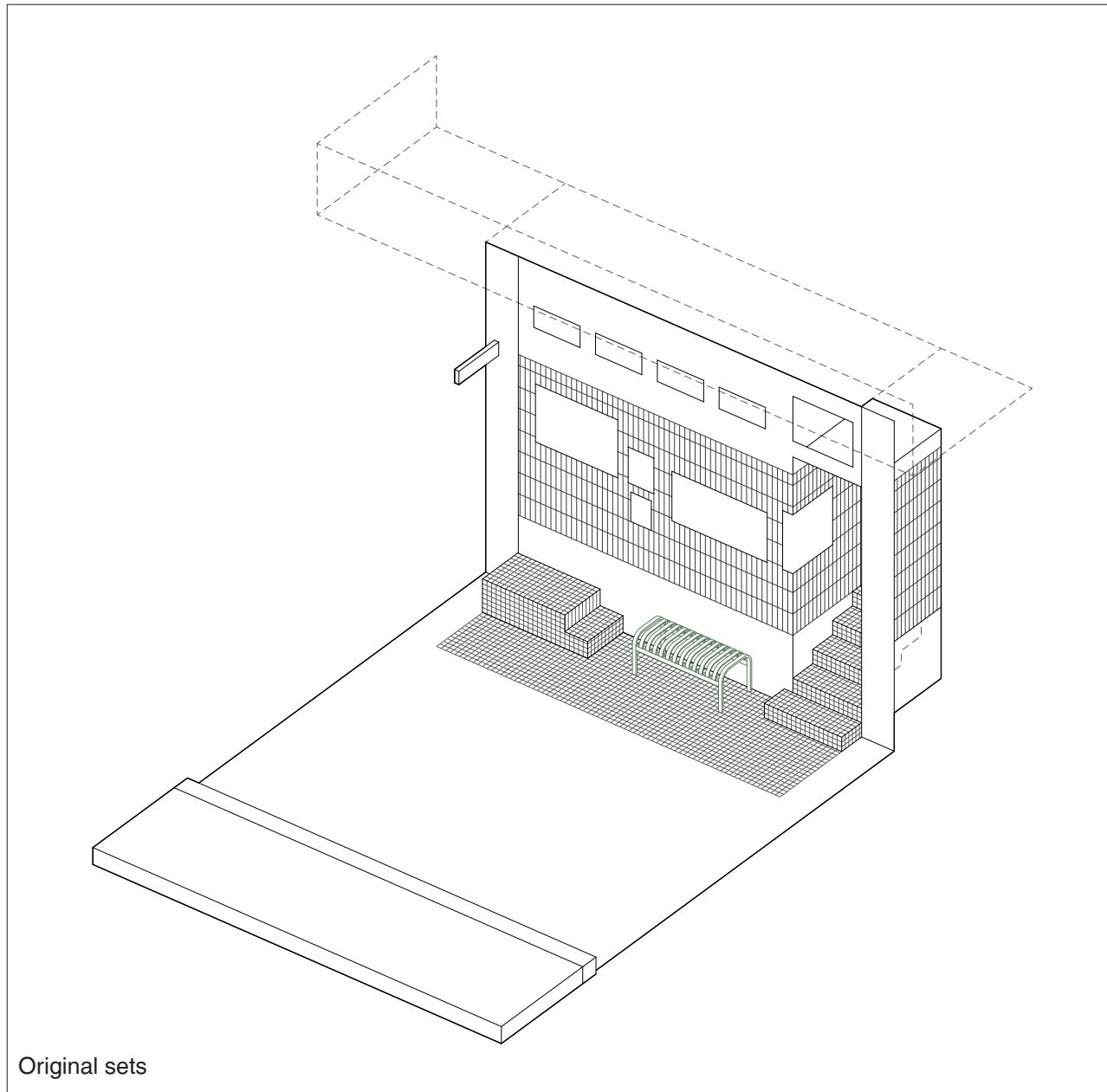
Scale 1:33
 CHUNLI Cafe
 Beijing, China



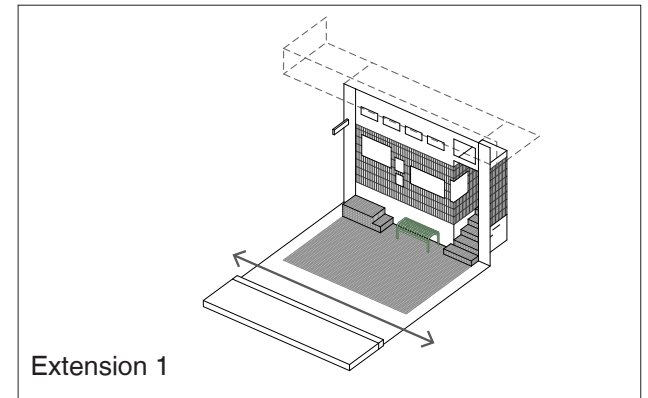
Model of CHUNLI Cafe



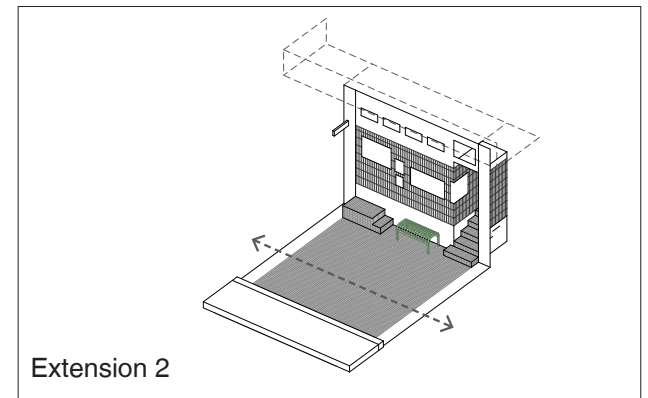
3D Set of Social Plinth



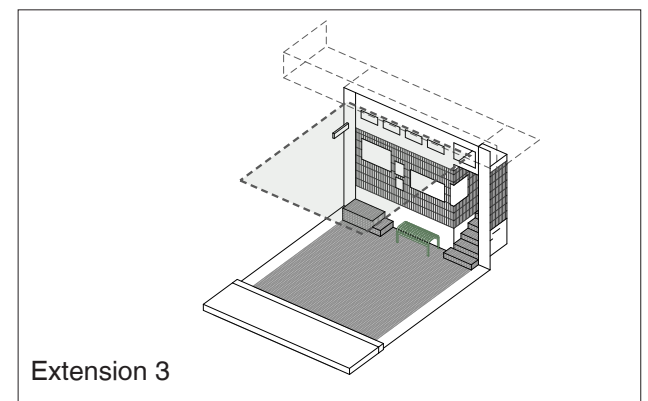
Original sets



Extension 1



Extension 2

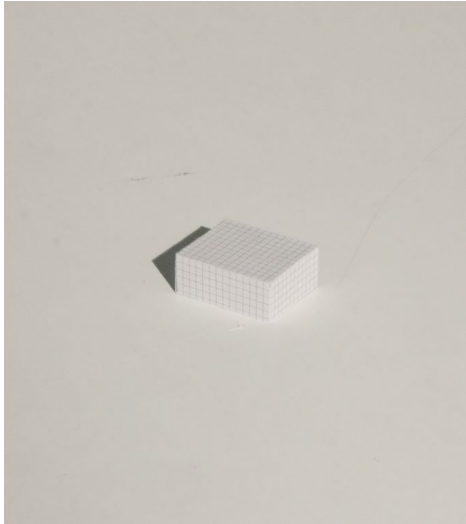


Extension 3

New Elements

Fixed / Permanent

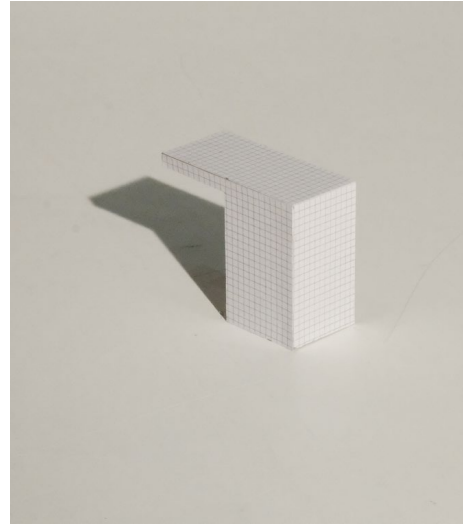
concrete structure with the same tiles as the plinth



30 cm table



75 cm table



105 cm table



flower bed

Movable / Temporary



105 cm folding table



folding chairs



bar stool



sofa



Original tiles pavement (1.2 m)





3 m tiles pavement

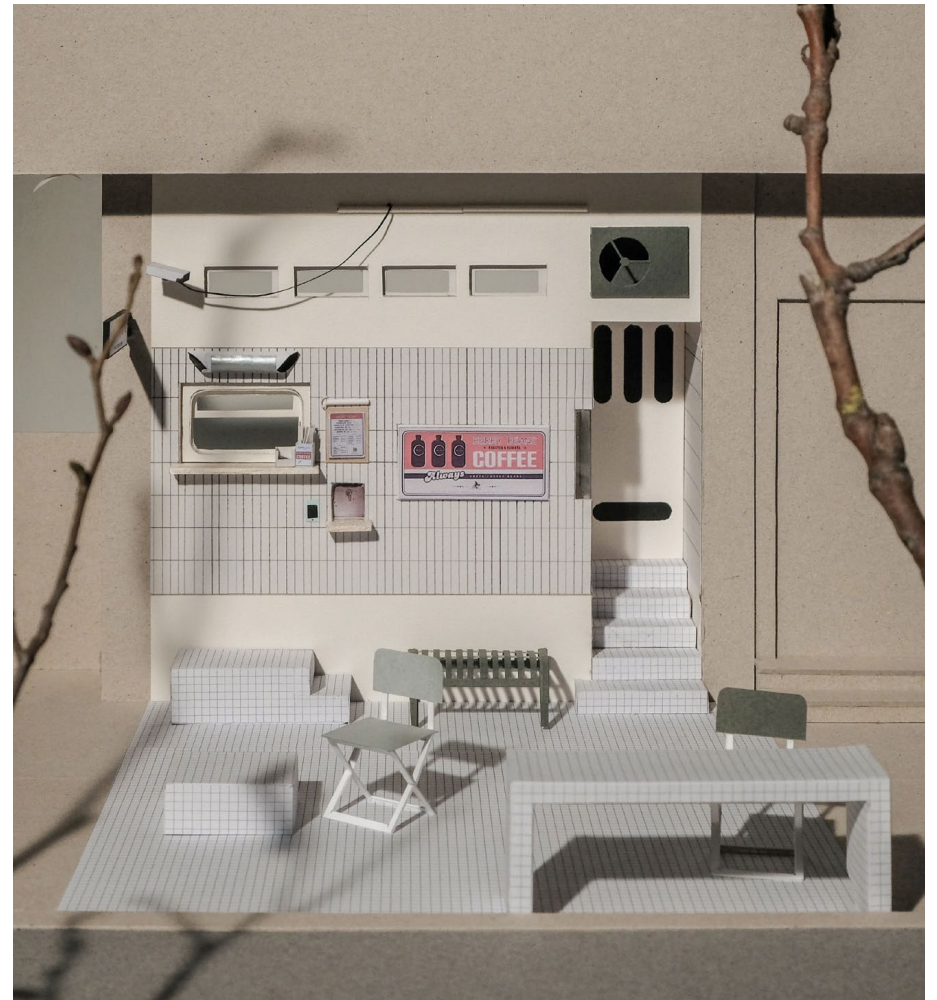


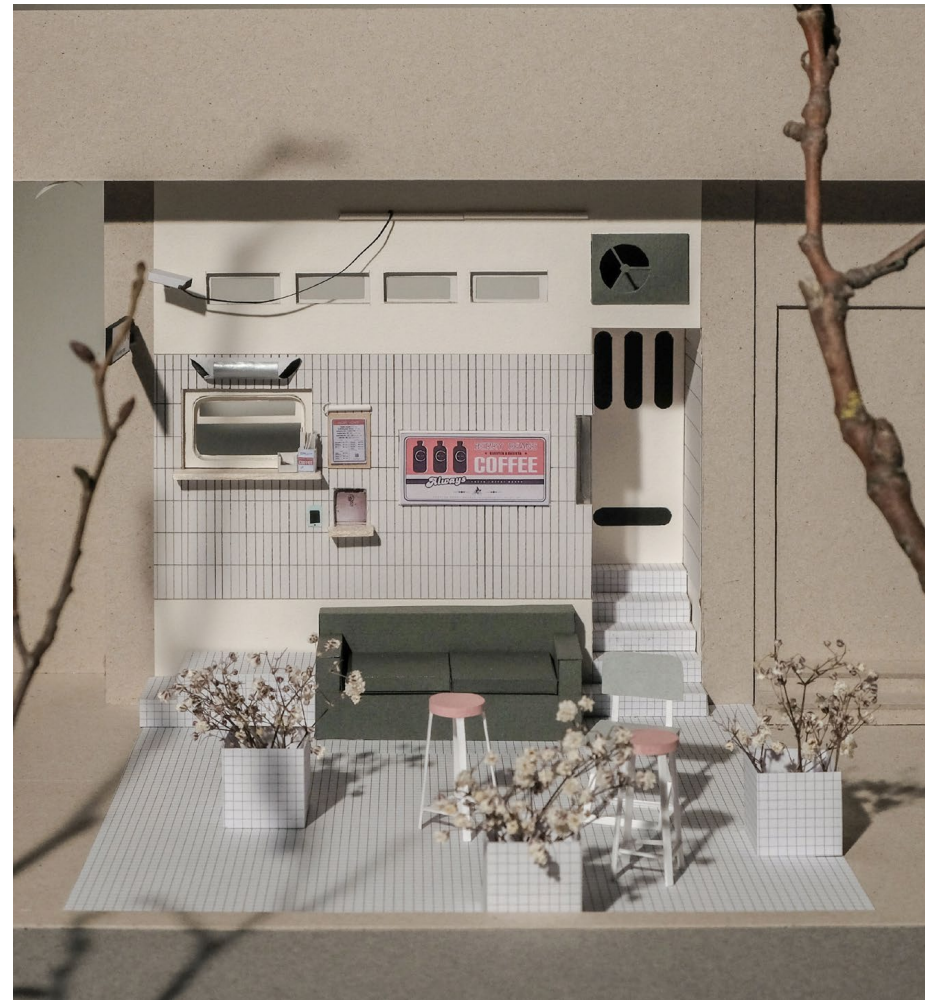




4.5 m tiles pavement

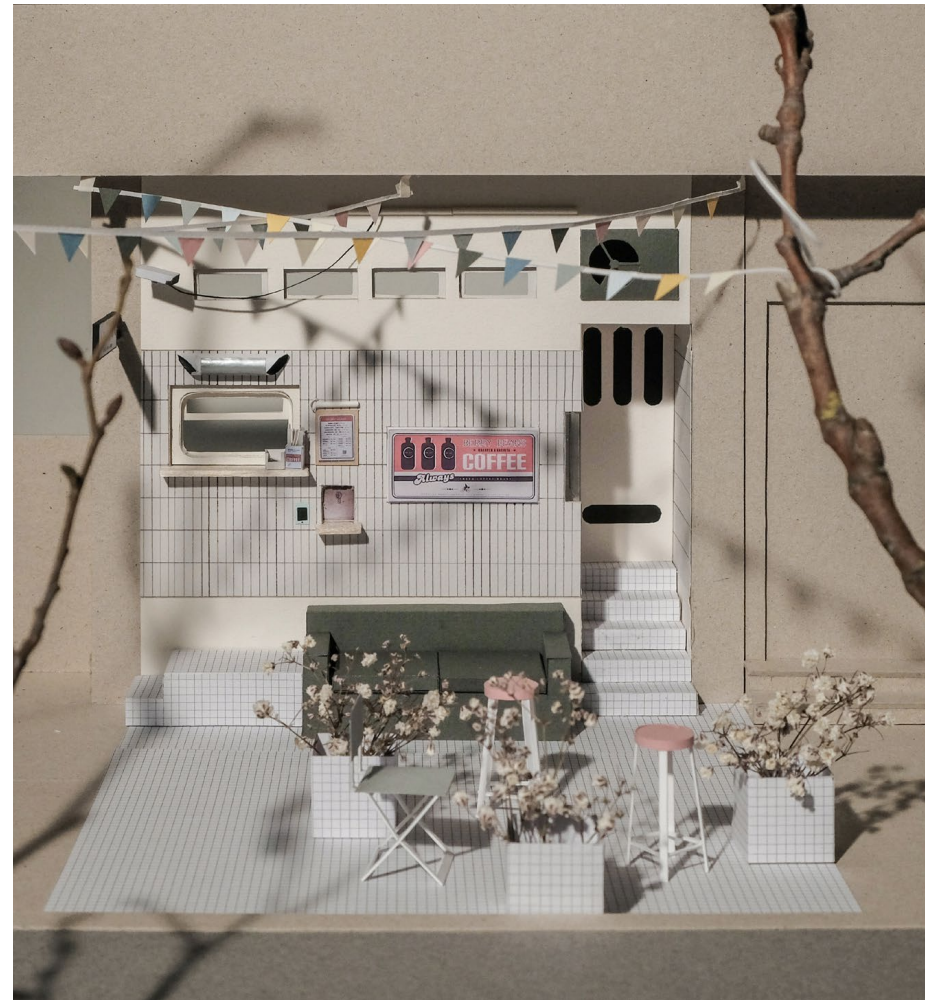








4.5 m tiles pavement with festoons



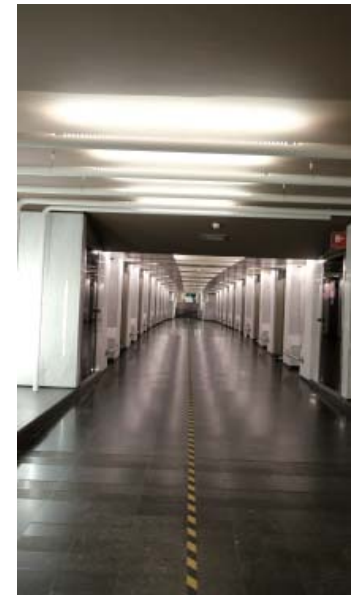
Msc3 | Project Journal
Graduation Studio
AR3AI100 Interiores Buildings Cities
P2

WEEK 2.2 Bank Tour

Documentation of the Bank Interior



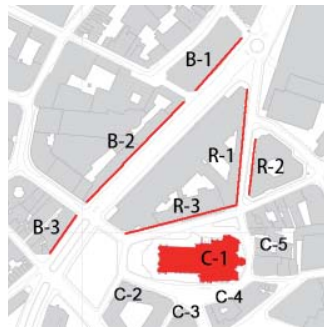
Documentation of the Bank Interior



Documentation of the Bank Exterior



Documentation of the Surrounding Facades (Details)



Site map (draft)



Details B-1



Details B-2

Documentation of the Surrounding Facades (Details)



Details B-3



Details C-2

Documentation of the Surrounding Facades (Details)



Details C-3



Details C-4

Documentation of the Surrounding Facades (Details)



Details C-5



Details R-2

Note during the excursion

Close the stairs of the hotel; turn the bridge to offices -- showing the bank's attitude to 'connection'

The definition of 'public' -- staffs

Floorplan: functional logic; only one entrance for the public; part of the bank hall is accessible for customers; entrance in the center with service cores.

The two terminal facades choose to close.

The front street: dominated by car scale

Positioning of the site: edge between the upper and lower town. But the site feels like not a piece of the city. Seperate, segregate. Many people in the church garden but few people on the back street. 'Dead district'

The hotel -- facing the church -- could take the role of connection but don't. Reason: no air conditioning. Bank: the future vip center

Number of staff and the area: 1,500 staff in the future. -- How big the project is?

Layout and organization: floorplans looks logical but the operation is in a mess. Reason? How to improve?

Daniel's project, the concert hall: let the public access. Draw a line and get the original core idea of the project.

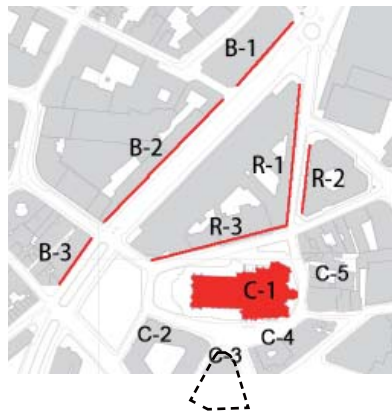
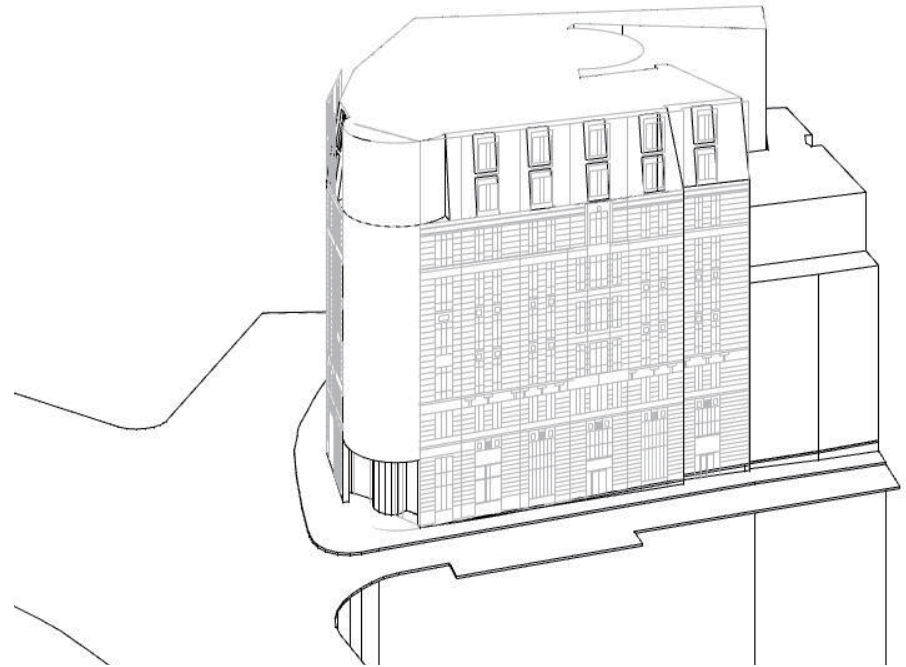
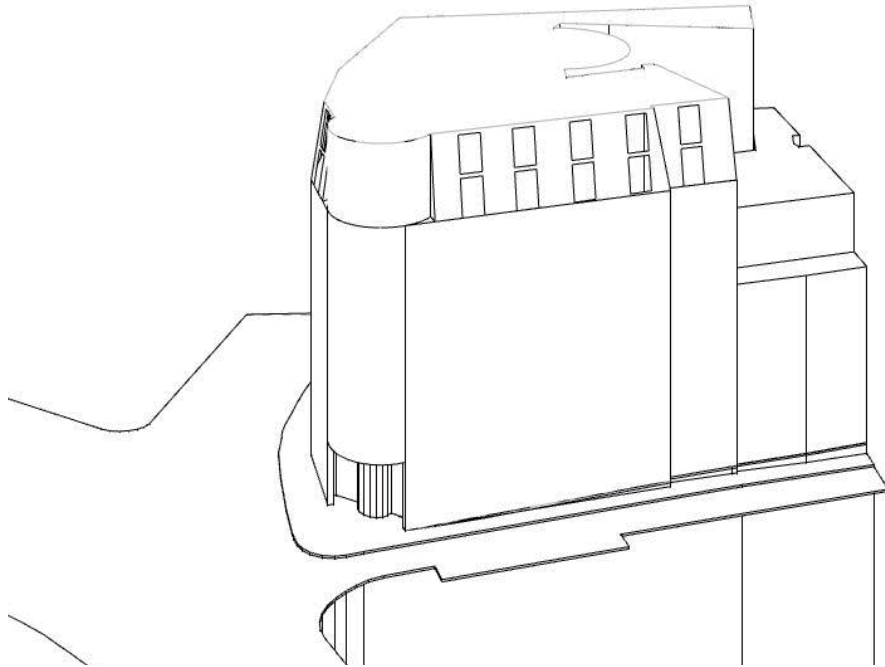
Think about: where could the intervention and connection happens.

If demolish a part, where does the materials go?

Buildings are responsible to the city -- make a better neighborhoods.

**WEEK 2.3-2.4 COLLECTIVE WORKS
SITE MODEL & DRAWINGS**

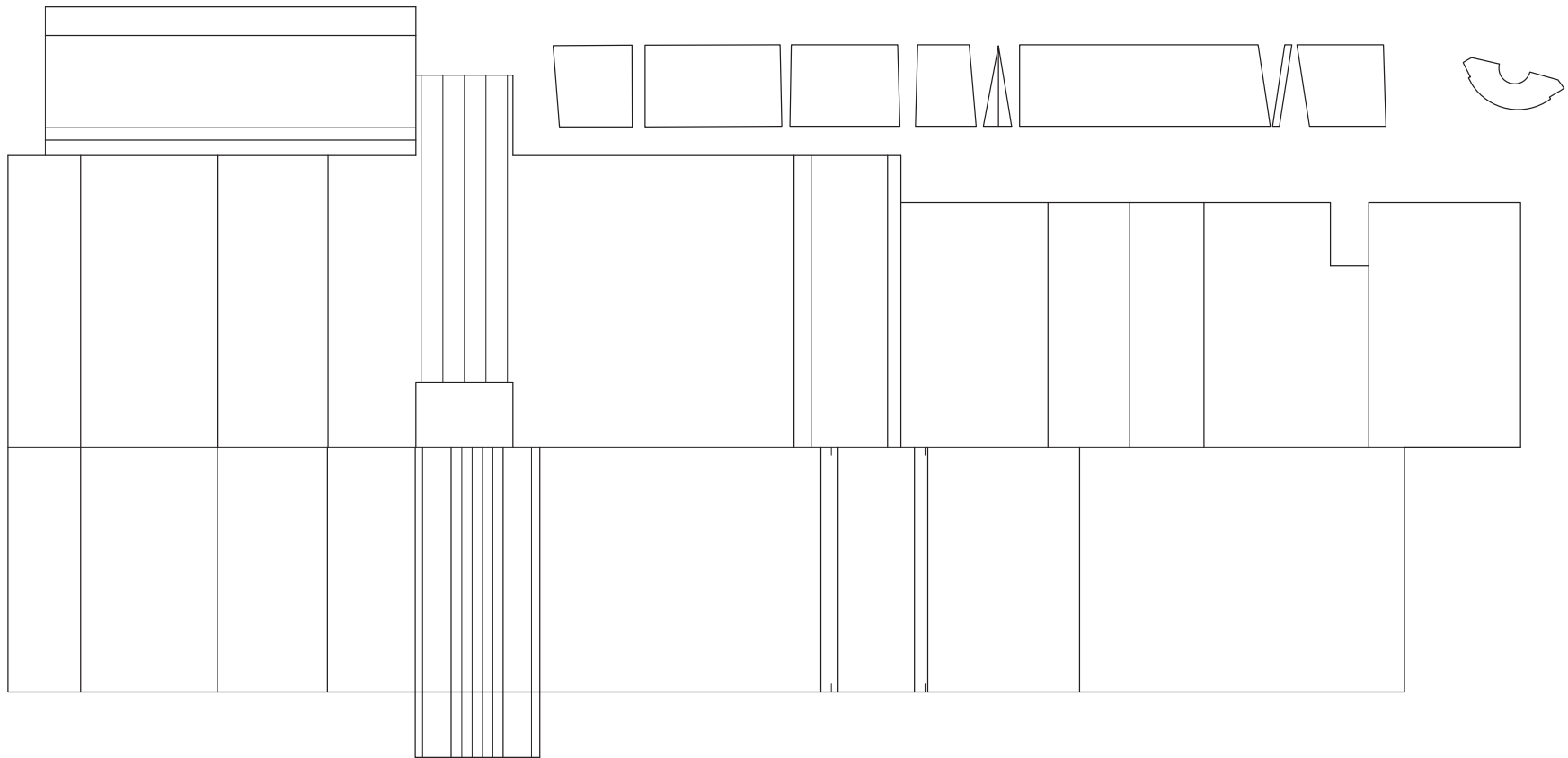
Rhino Model for Building C-3



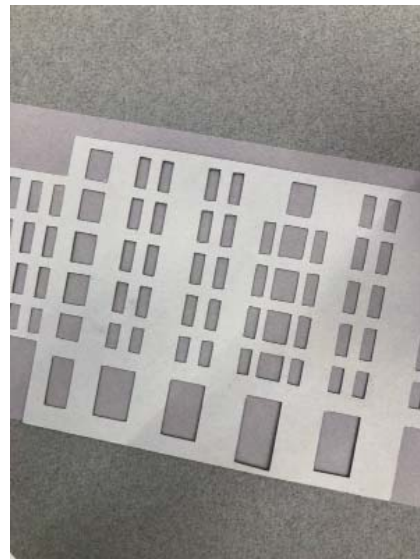
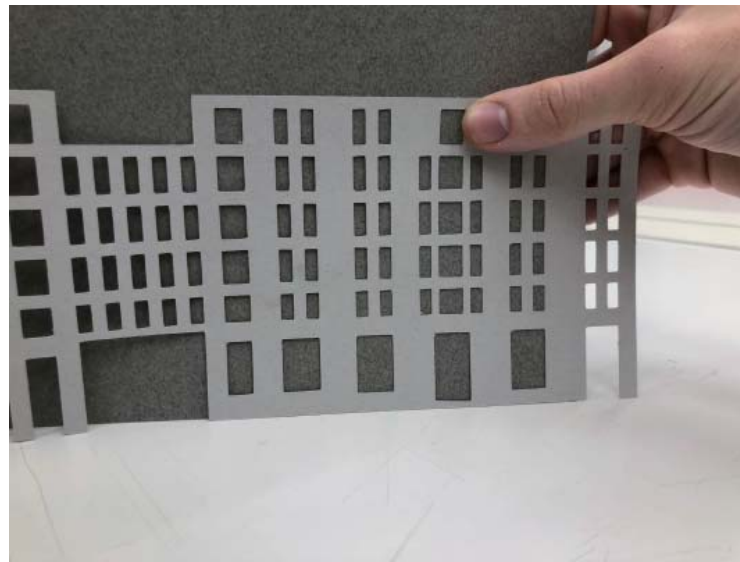
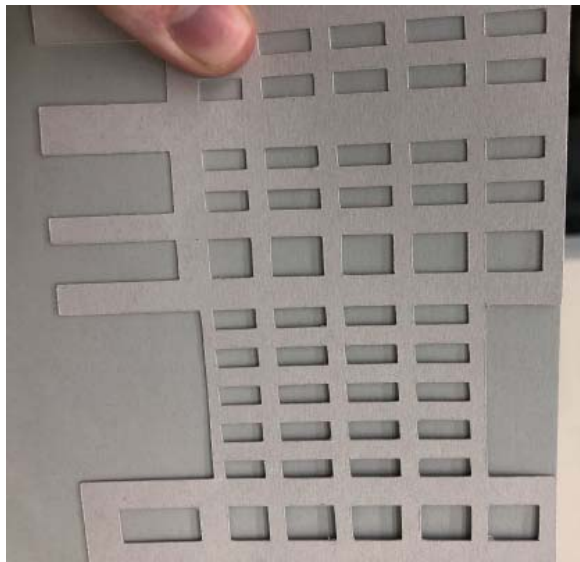
Facades of Building C-3



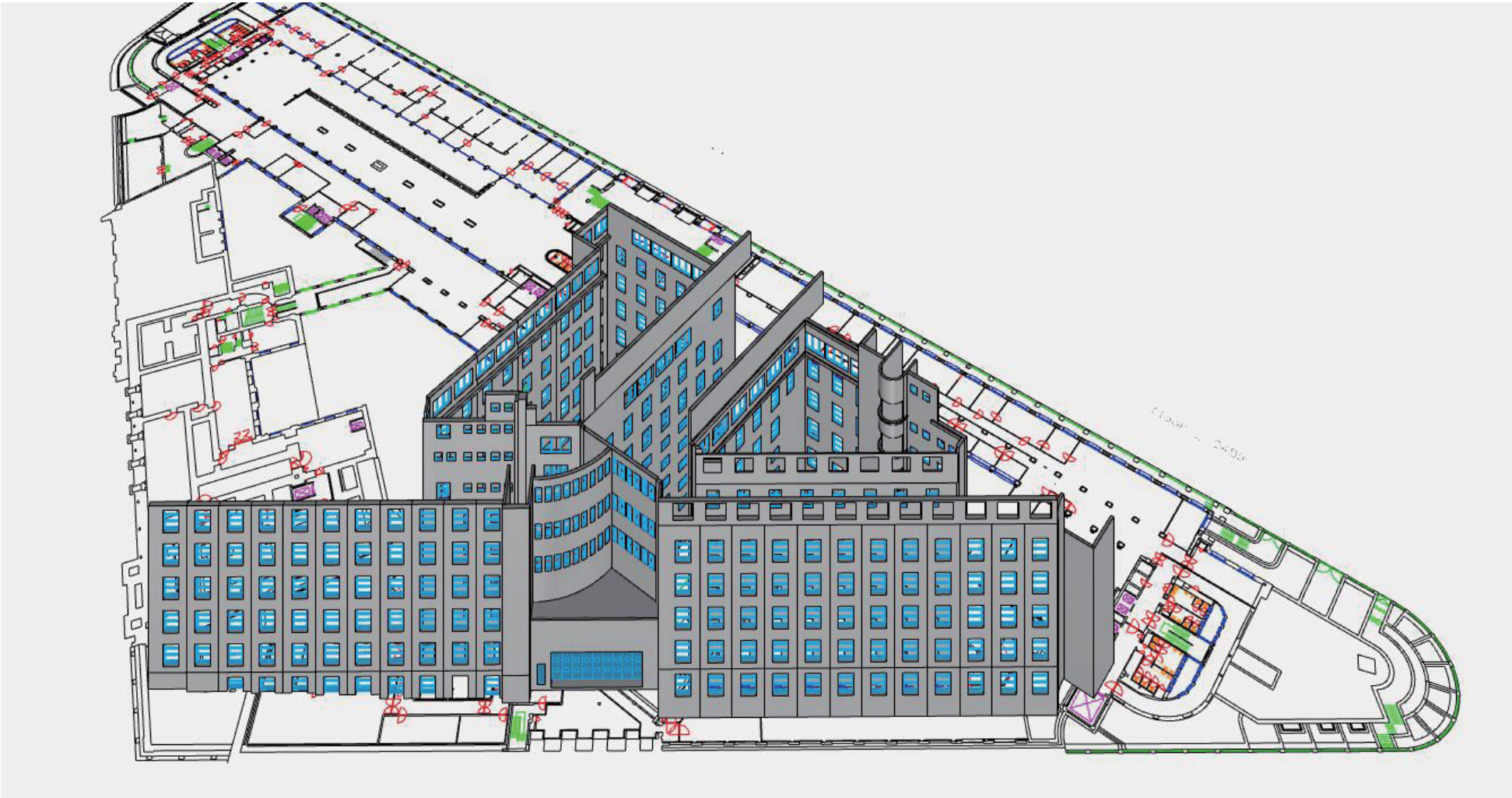
Simplify for Laser Cutting



Mockup of Building C-3



Rhino Model for the Facades: Courtyard 3 & 4



Drawing Tasks



Section: Floor to floor
Dimple
Scale: 1:500
Institution of Design
Students: Dimple



Longitudinal section
through courtyard
Scale: 1:500
Institution of Design
Students: Dimple



Drawing Tasks

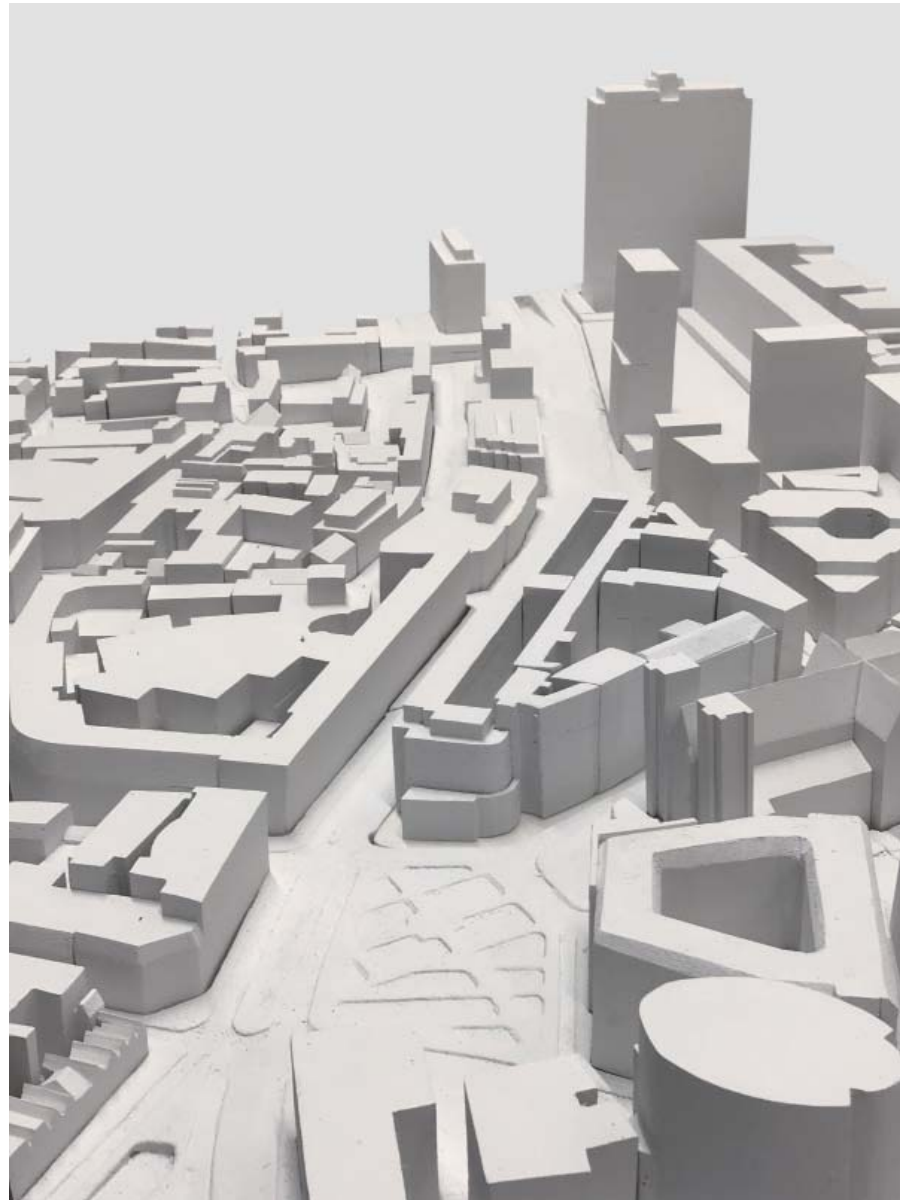


Transverse section through
typical blocks
Scale 1/8" = 1'-0"
Notes: Date of Design
Brassie Design

Site Model 1:500

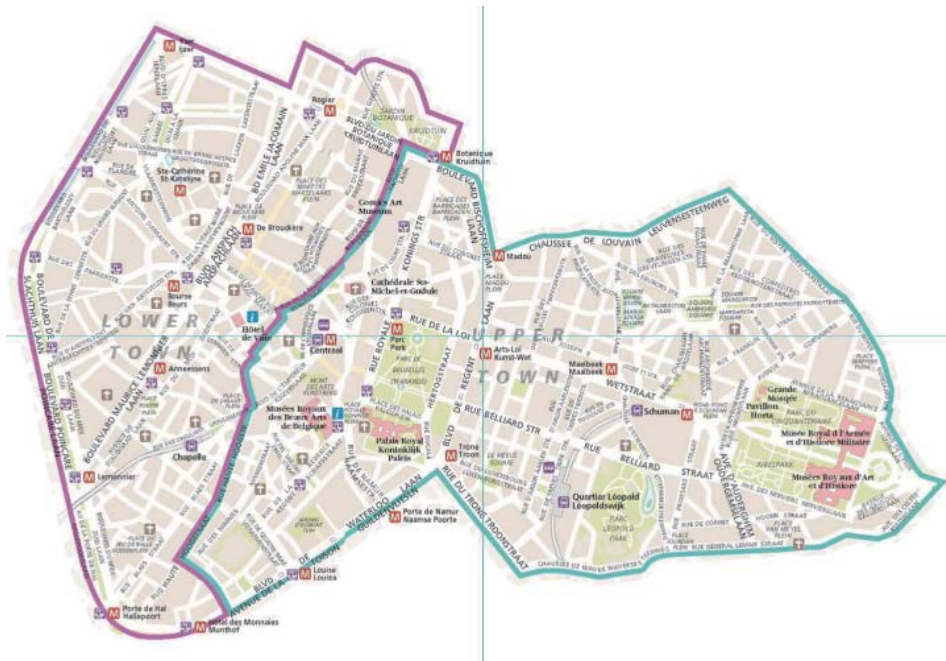


Site Model 1:500



WEEK 2.5 PRELIMINARY DESIGN

Brussels



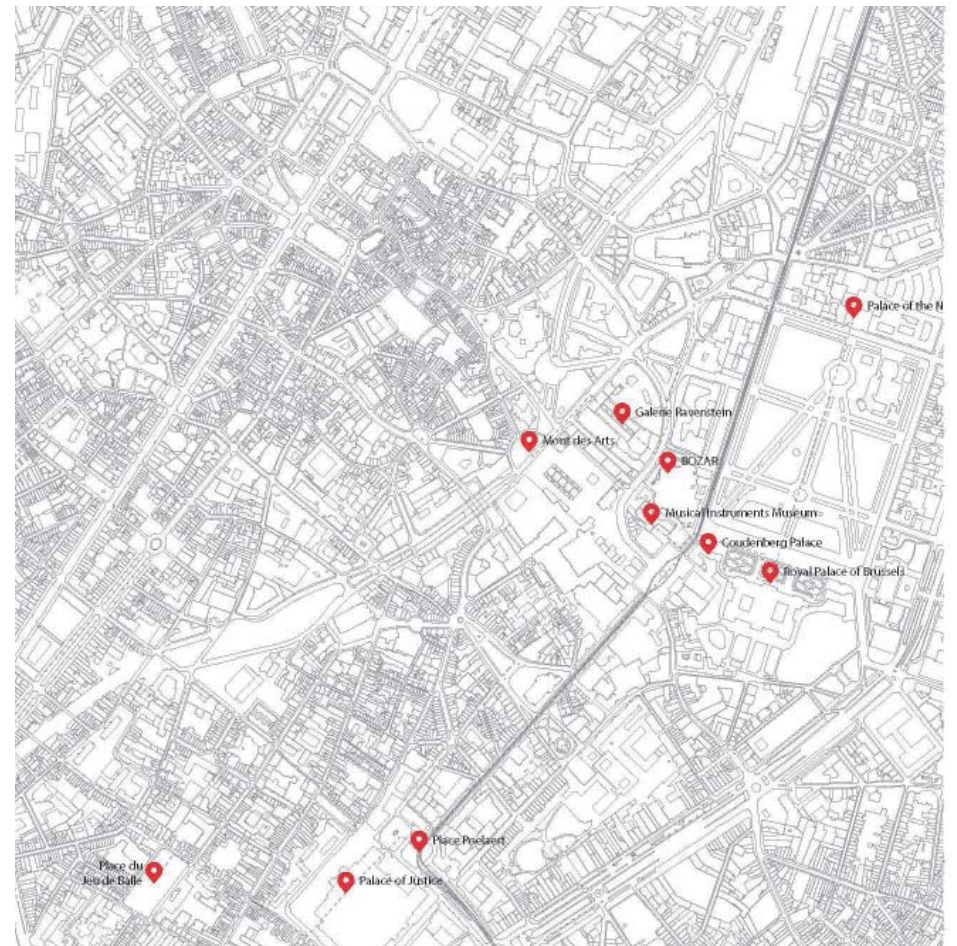
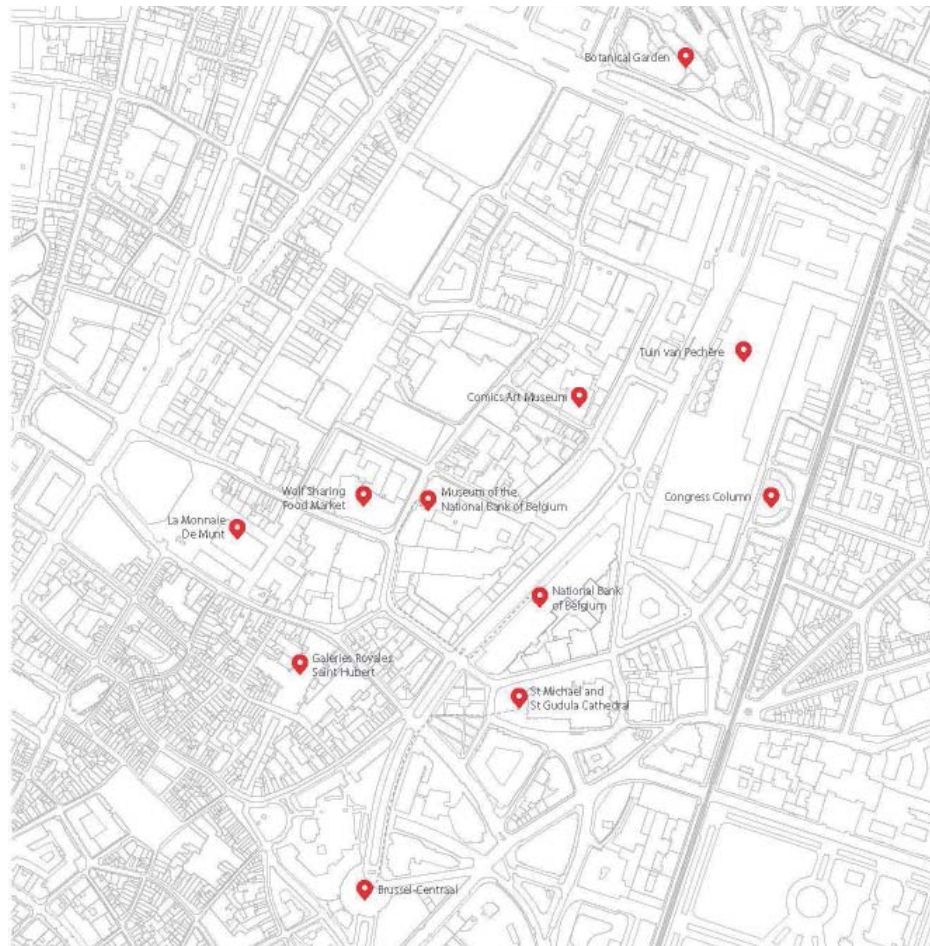
The city of Brussels is separated into two parts. **The Lower Town**, historically the poorer portions of the city where workers and immigrants lived, comprises the city's remarkable 17th-century heart, the Grand Place, as well as the cosmopolitan Place de Brouckère and the old worker's neighborhood, the Marolles. **The Upper Town** is an elegant district that encircles the city's green oasis, the Parc de Bruxelles, and traditionally the home of the aristocracy.



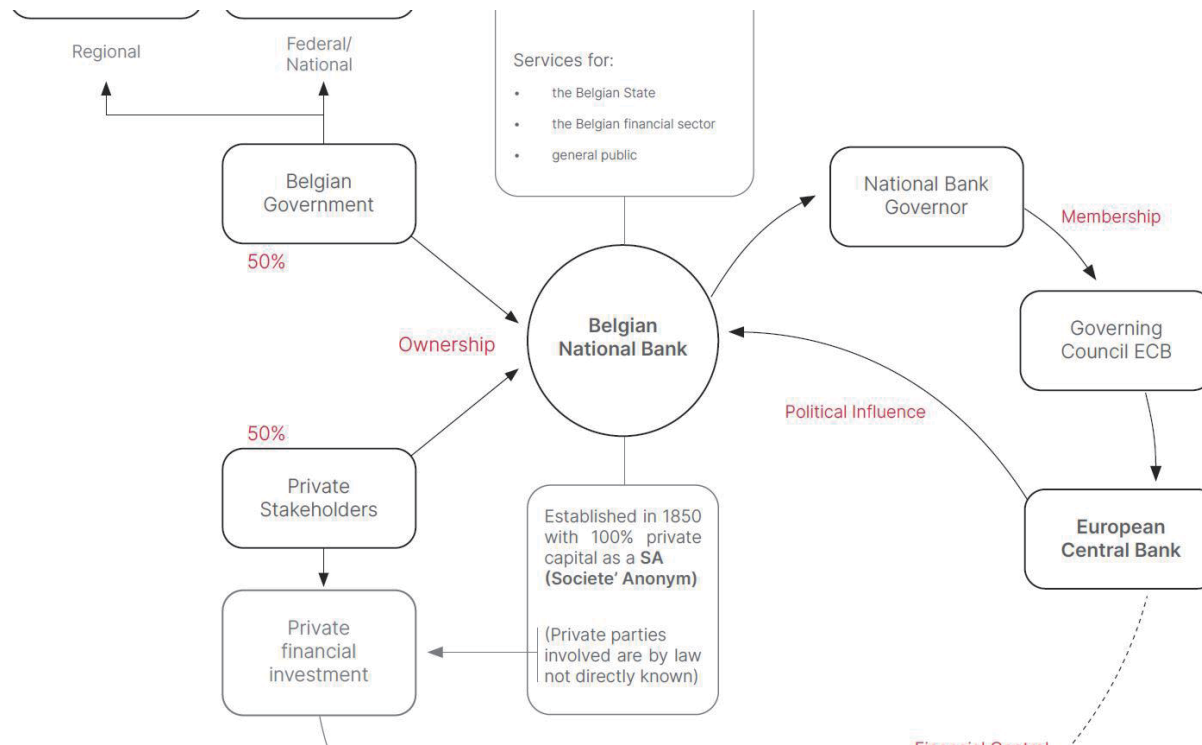
Urban lift

The city of Brussels is placed on a hilly terrain and has developed on two levels; the higher part was initially the administrative center where the political and monarchic power is still located and the lower part of the city where the population lived. Overtime the city developed in all directions.

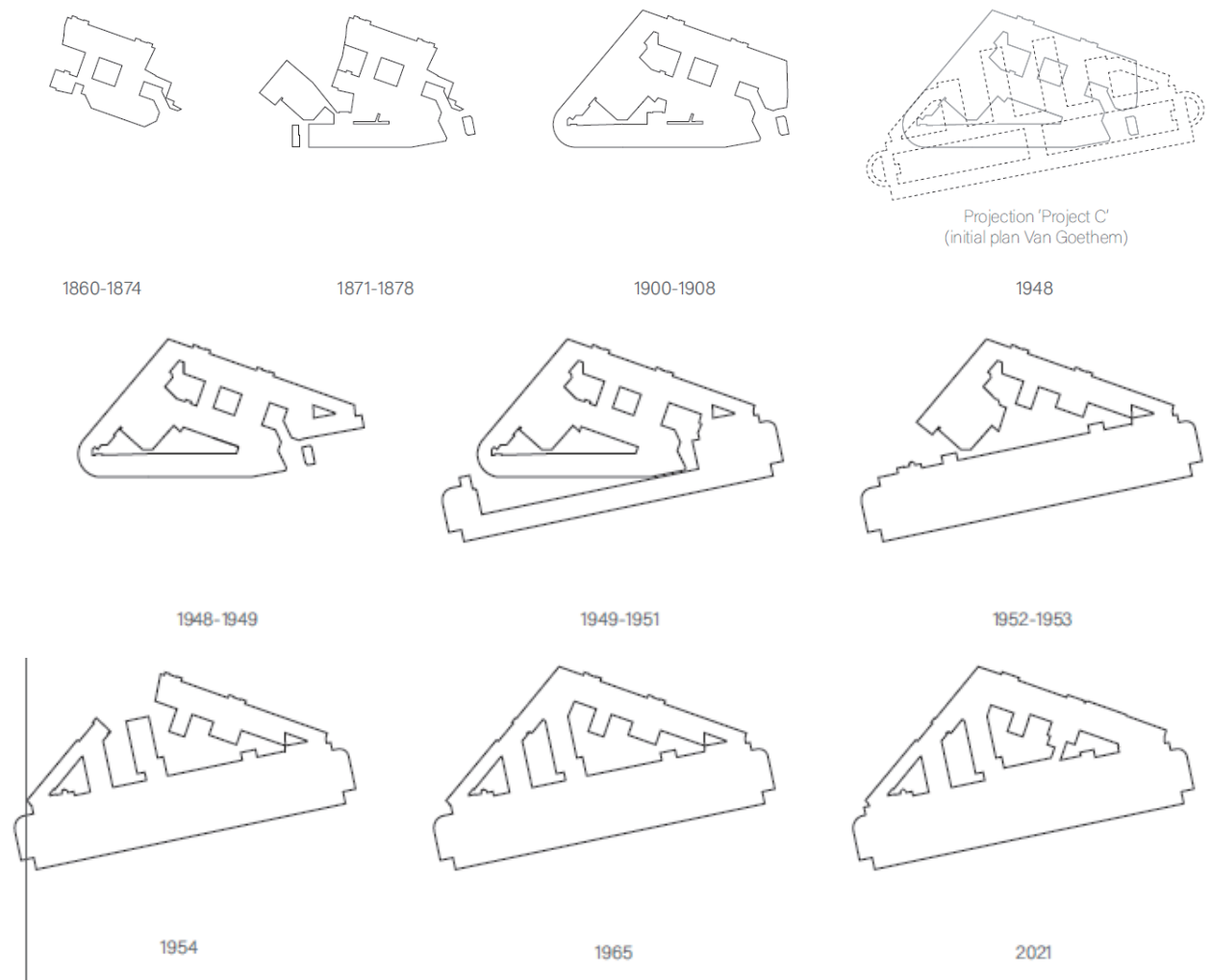
Brussels: Important Buildings



Belgium National Bank



Construction Phases



Henri Beyaert and Wynand Janssen: functional logic, monumentality to the Bank facade (today's hotel)

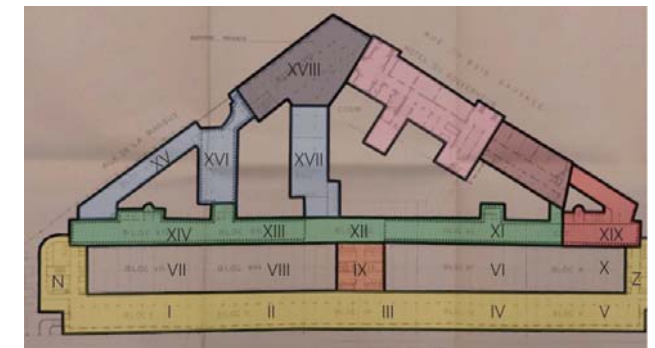
Between WWI and WWII, the number of workers and the demand for bank note's emissions grew fast, which demand more space.

1940, Marcel Van Goethem (architect)

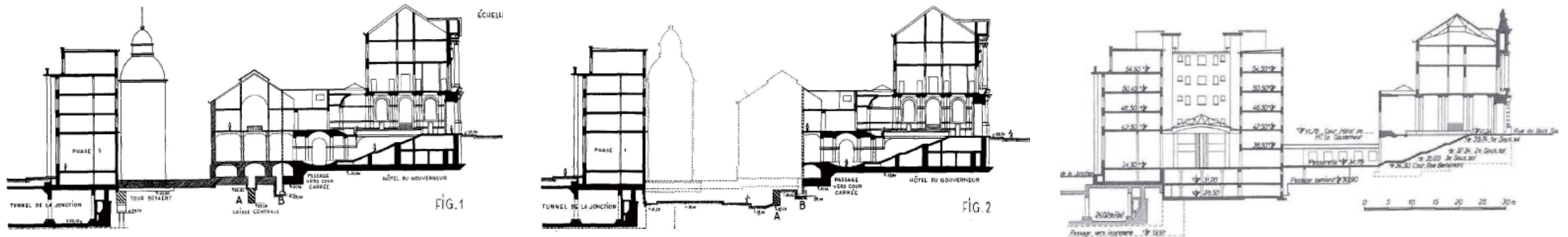
the requirement of security -- only one main entrance for the public.

the banknote printing factory is on the other side of the street.

'It should also be noted that the complex has never been considered as a single whole from a **technical and logistical** point of view. For example, it has a lot of **differences in level**, which means that the whole of the elevators is a complicated system which has not been installed efficiently. The complex has **dozens of substations that distribute energy, heating and ventilation to the various buildings**. The main boiler room and the primary gas and water supplies, electricity, etc. are located in the **BNB2 complex**.'



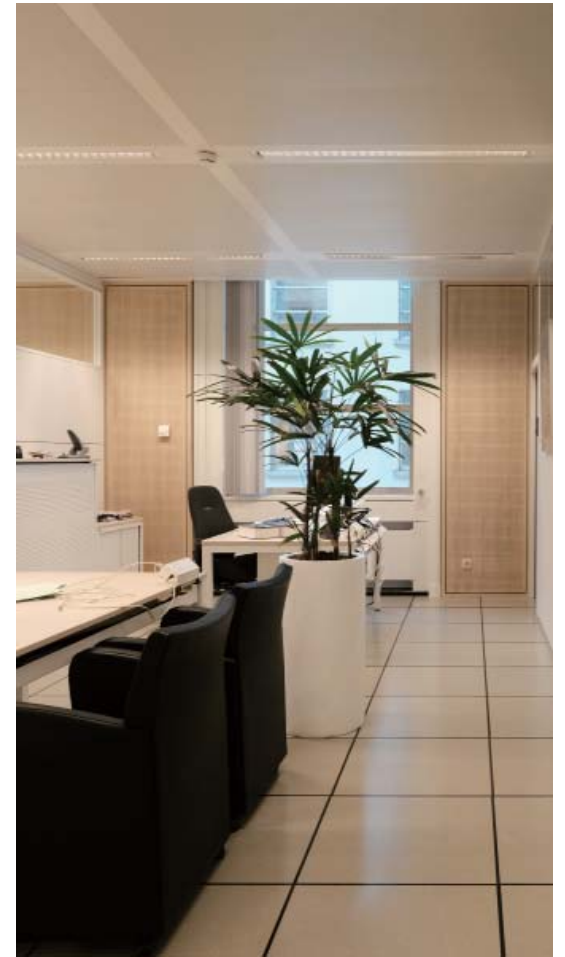
Site Section



Historical Interior of the Bank



Interior of the Bank

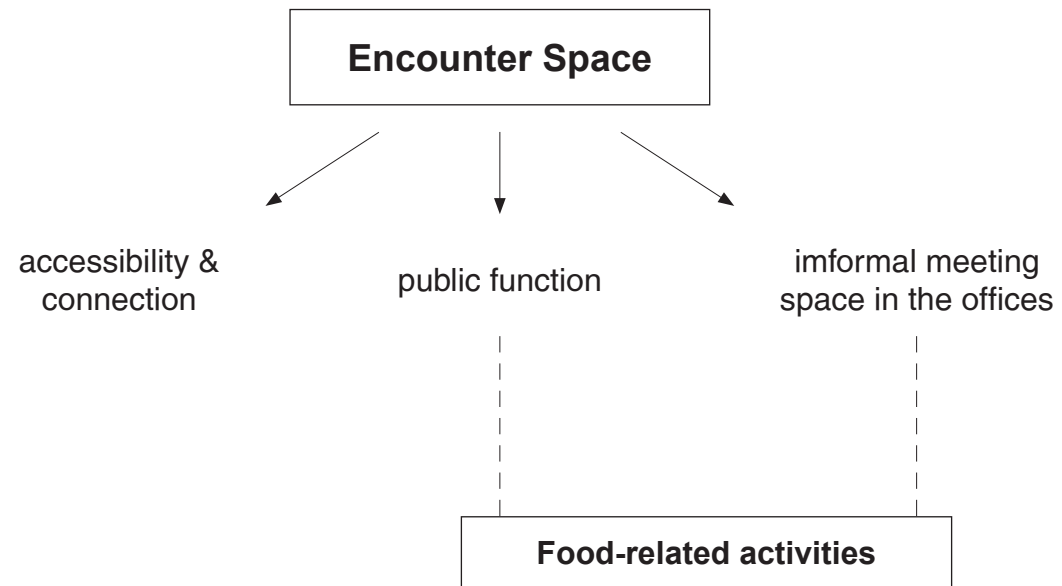


Future roles of the bank

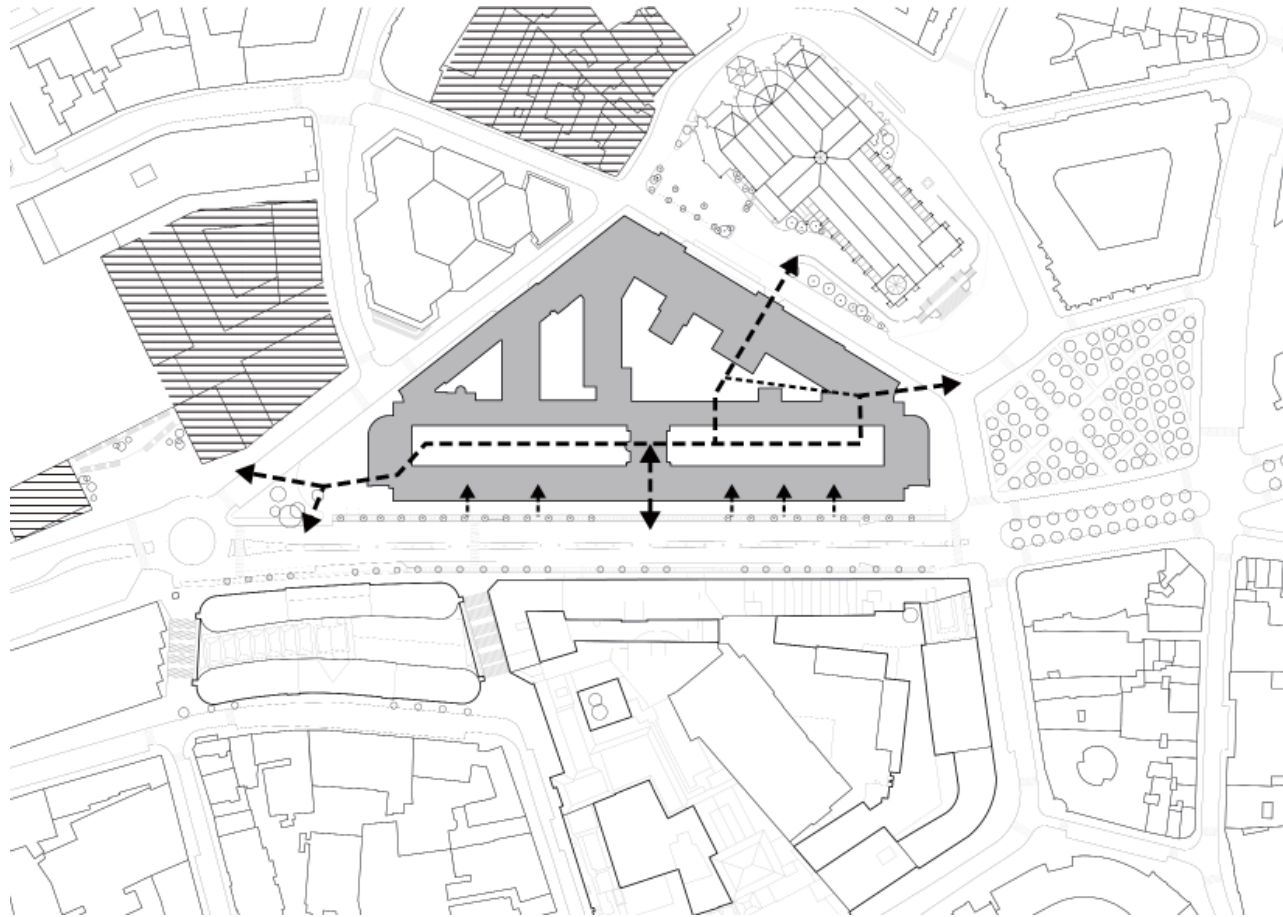
1. activate/connect the neighborhoods;
2. the bank as knowledge producer and commendation institution:
provides an opportunity to encounter people from different social
groups for both the public and employees;
3. take care of resources just like taking care of the economy,
including food, water, electricity, etc.

Starting Point

*** Food-related activities as a tool to create encountering among different social groups.**



Site



Location and neighbors

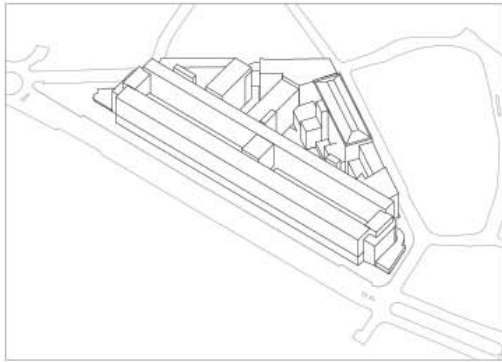
It is located at the edge between the upper and the lower town, built on a plot with a difference of more than 8 metres between the main entrance and its back side.

Future residential buildings;

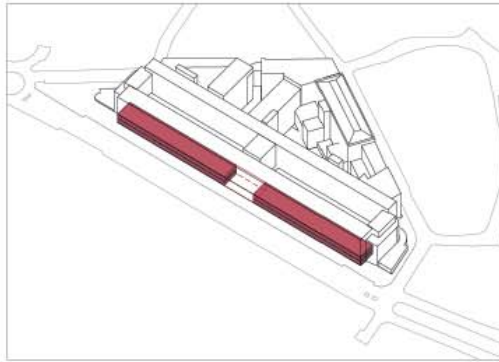
Next to the North - South Junction, the most important rail axis in the city of Brussels;

the Police of Brussels Capital - Ixelles; the SNCB at Boulevard de Berlaimont

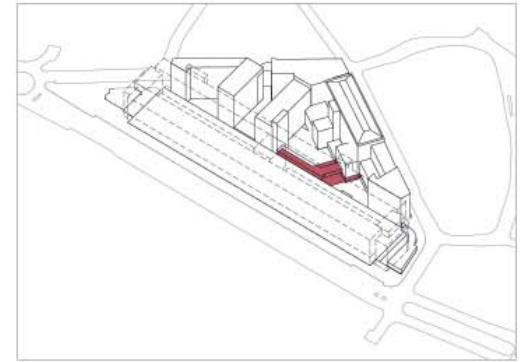
Interventions



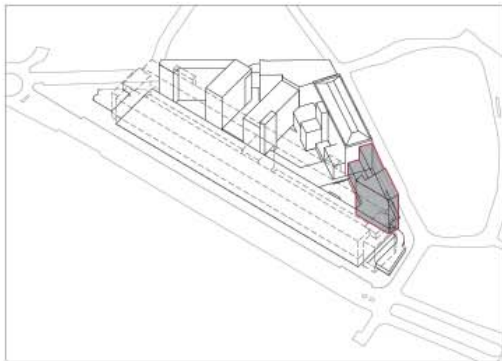
Existing buildings



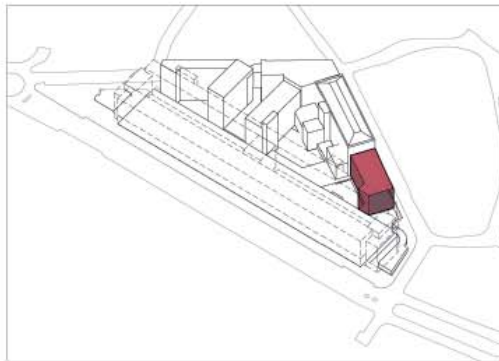
1 Front facades



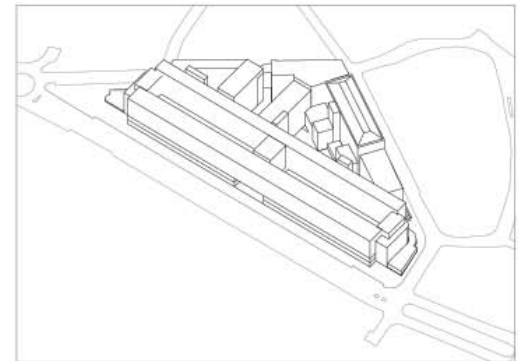
2 Courtyard



3 Demolishing

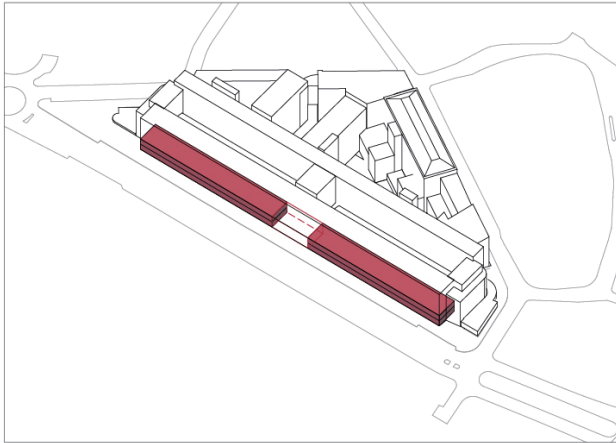


4 New volume



Result

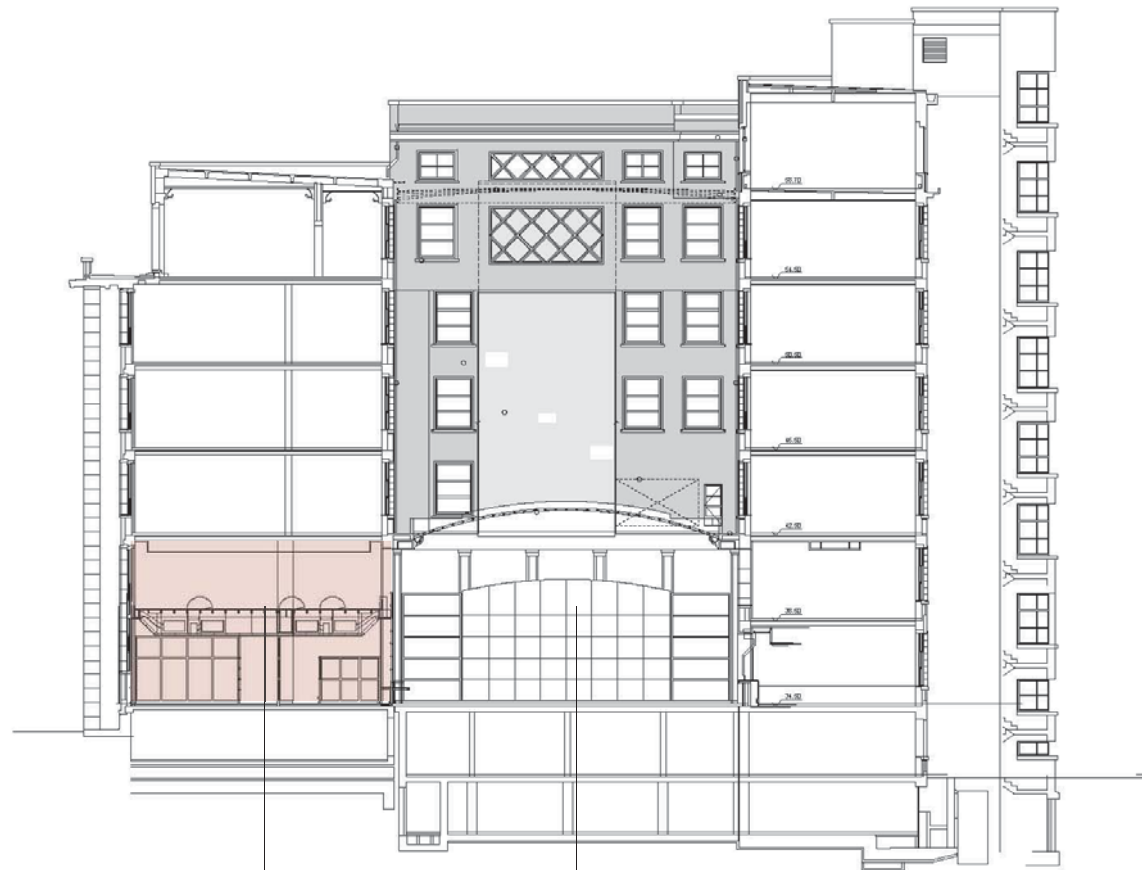
Front facades



1. open the volume in the center.

2. add food-related activities:

- restaurant
- seating area (free)
- community party space
- picnic?
- employee canteen

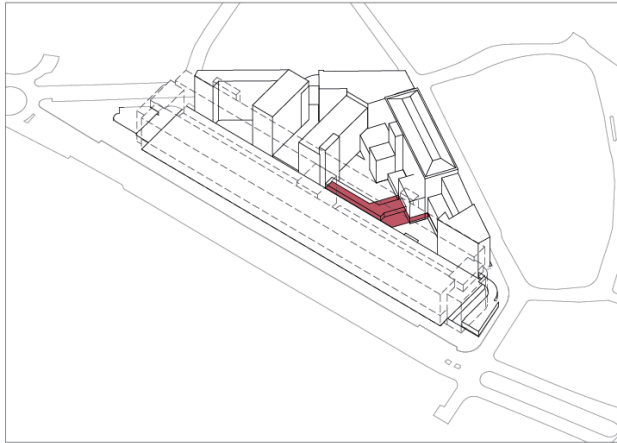


Food activities

Public function



Courtyard

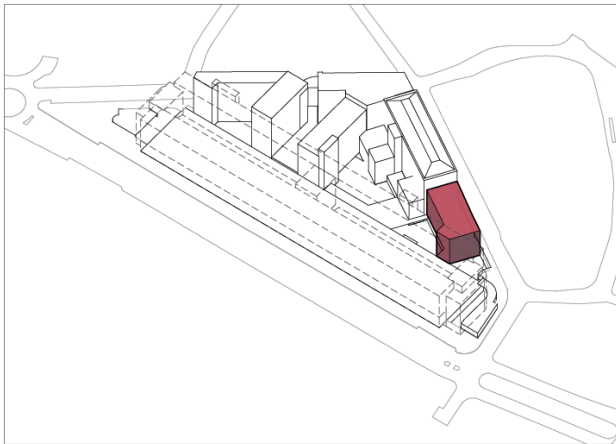
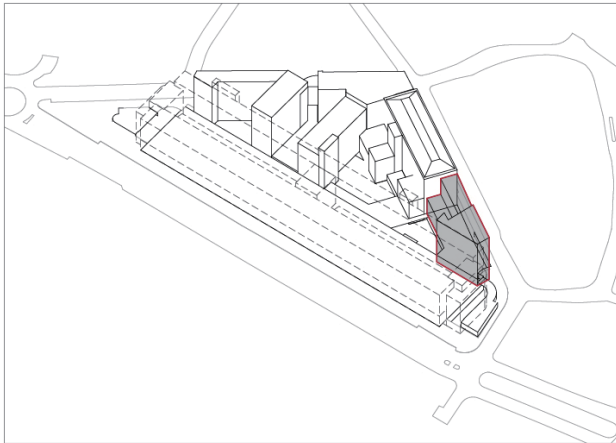


extend the bridge to a platform.

- create an inner garden/plaza: attract the public to come inside the bank
- add green/vegetation



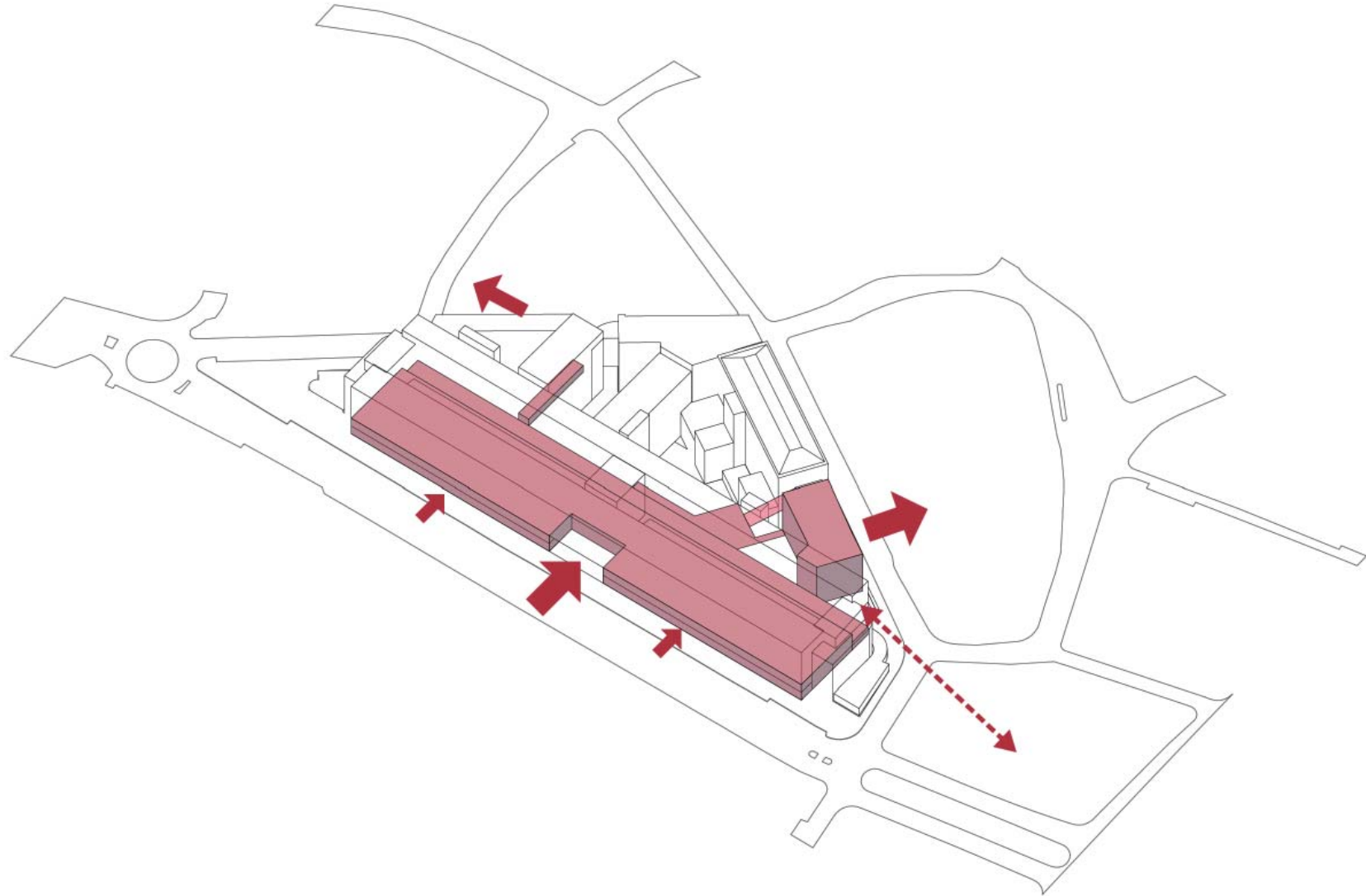
Demolishing & New volume



Urban vegetation/ Greenhouse

- transparent facades
- introduce greenery into the site
- taking care of the resources
- provide groceries to the restaurants

Encounter space



Accessibility & Connection



Further Research: Encounter Space & Food Activities

Theories

Hypothesis:

1. Eating activities make people more relaxed and more willing to share feelings and ideas with others.
2. Eating activities positively influence employees' interpersonal relationships / stimulate deep communication and knowledge exchange / improve productivity.

Case studies

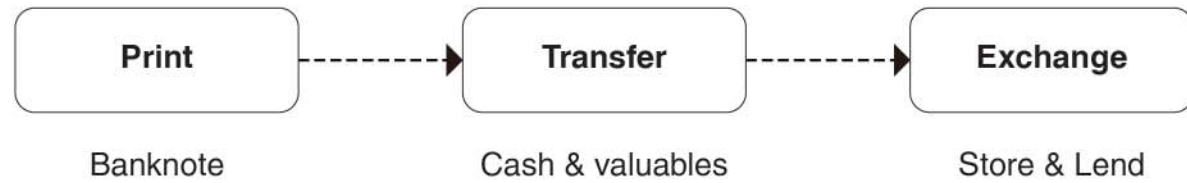
1. encounter space in public buildings and institutions that is related to food and eating.
2. informal meeting space in offices.

WEEK 2.6 PRELIMINARY DESIGN

Future Roles of the Bank

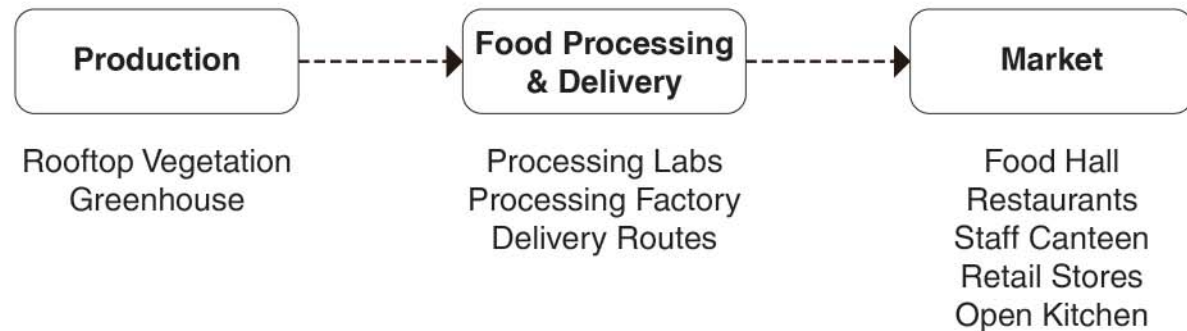
Traditional Bank

Take Care of the Economy

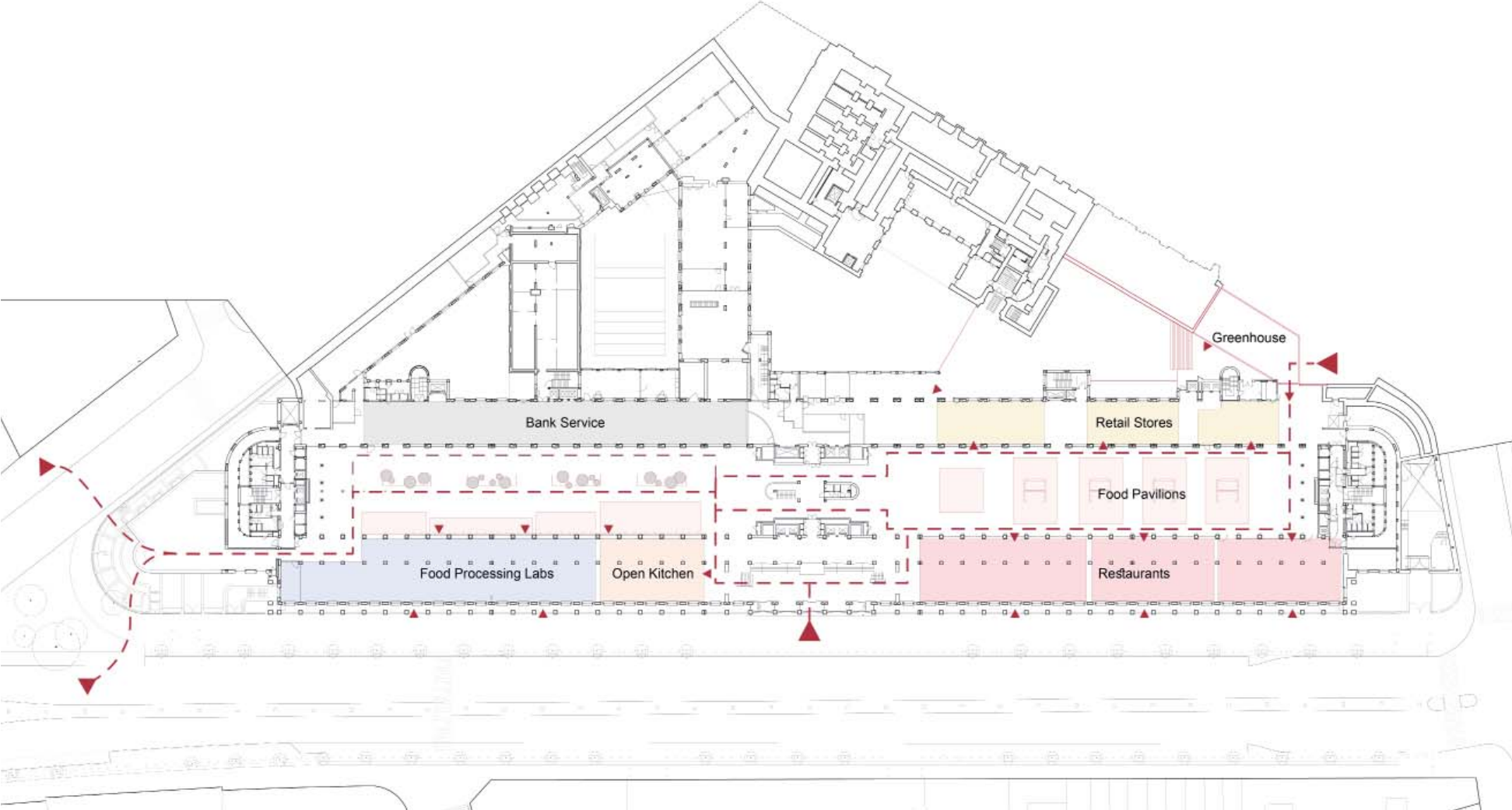


Future Bank

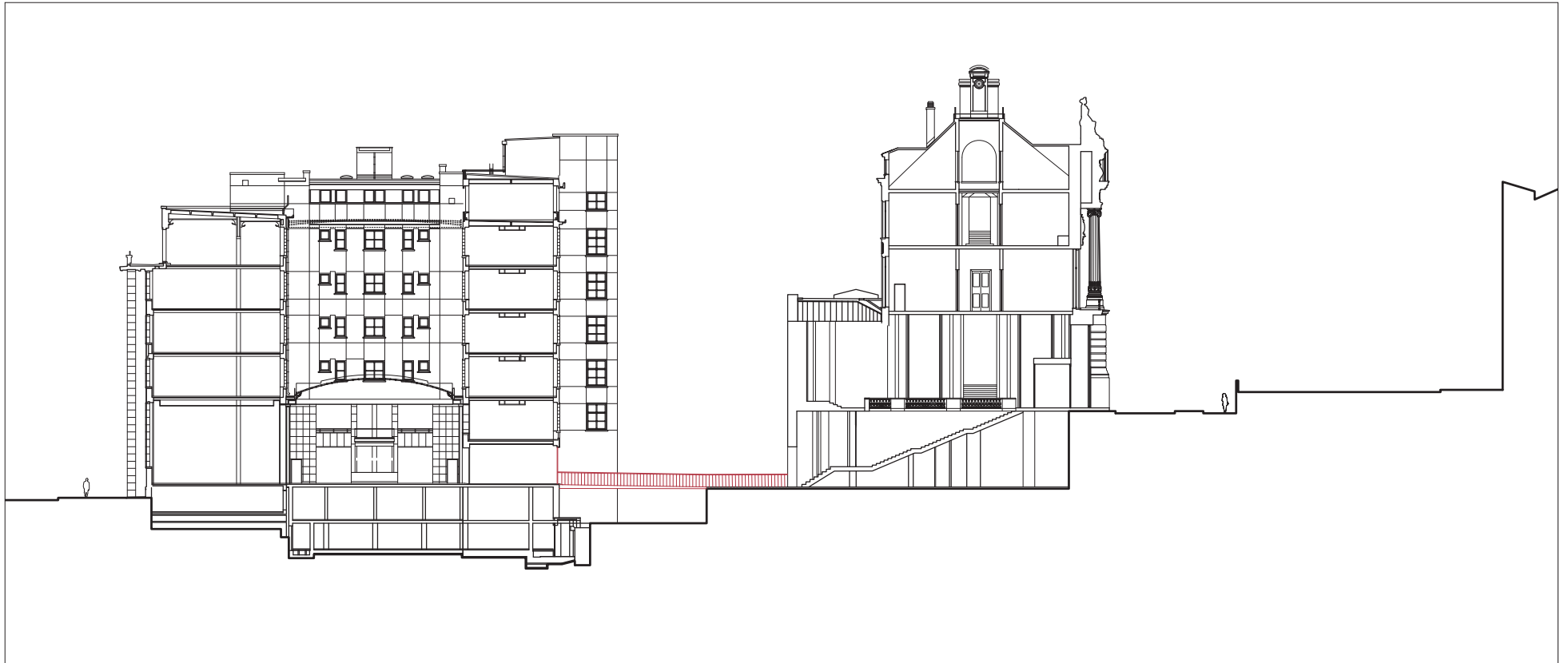
Take Care of the Resources



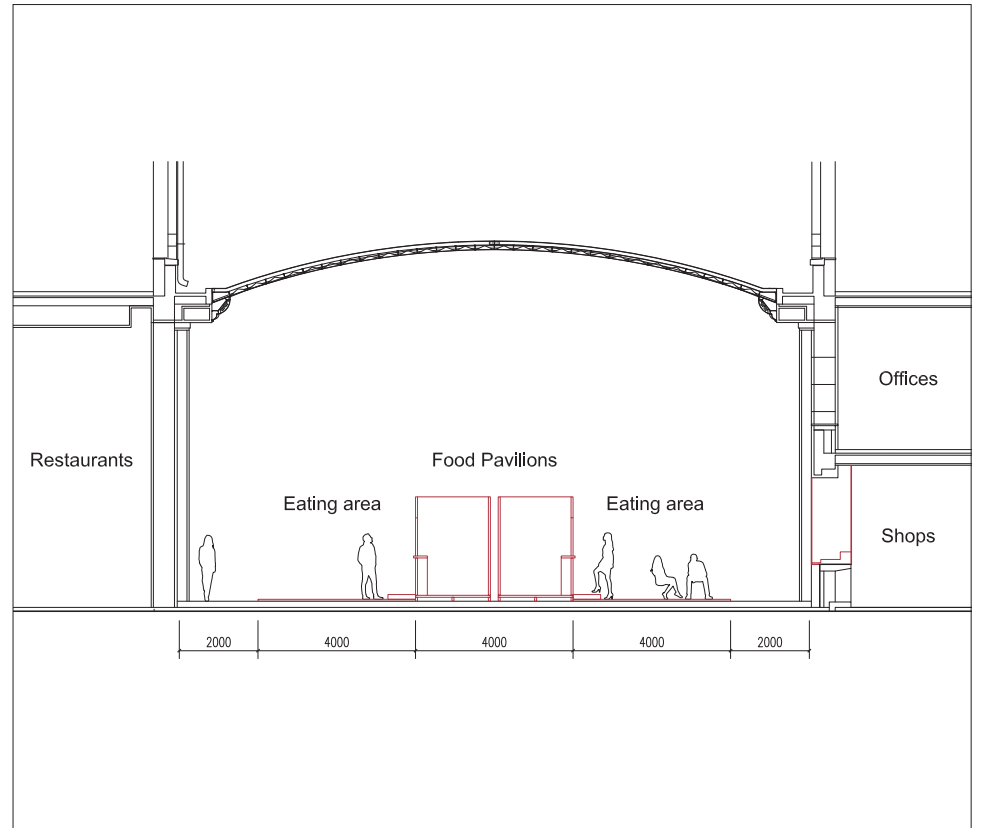
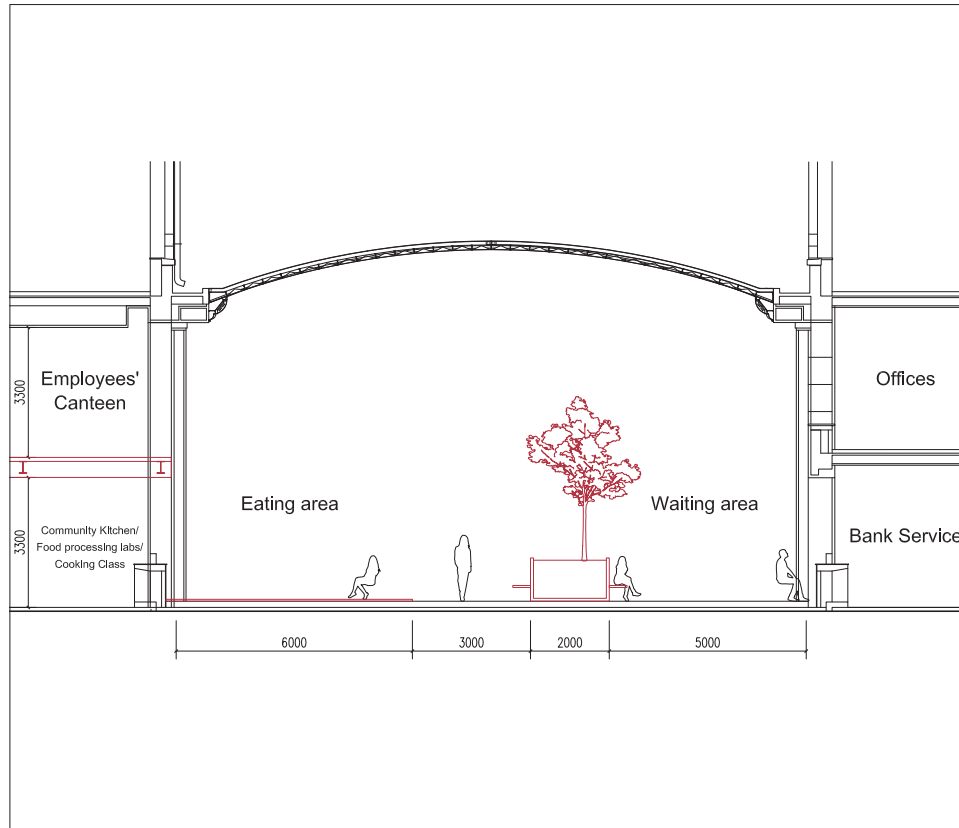
Ground Floor Plan



Section



The Main Hall



WEEK 2.7 PRELIMINARY DESIGN

Reflection on the Tutors' Feedback

Think in the urban scale/context.

--How can the bank contribute to the urban environment? What program will be provided to the city?

Story line: bank -- food

--

Definition of 'public'

1. general public: citizens

easily accessible, entertainments, restaurants, vegetable fields, etc.

2. staff of the institutions, people comes for environmental activities

3. staff of the bank

Future Belgium National Bank

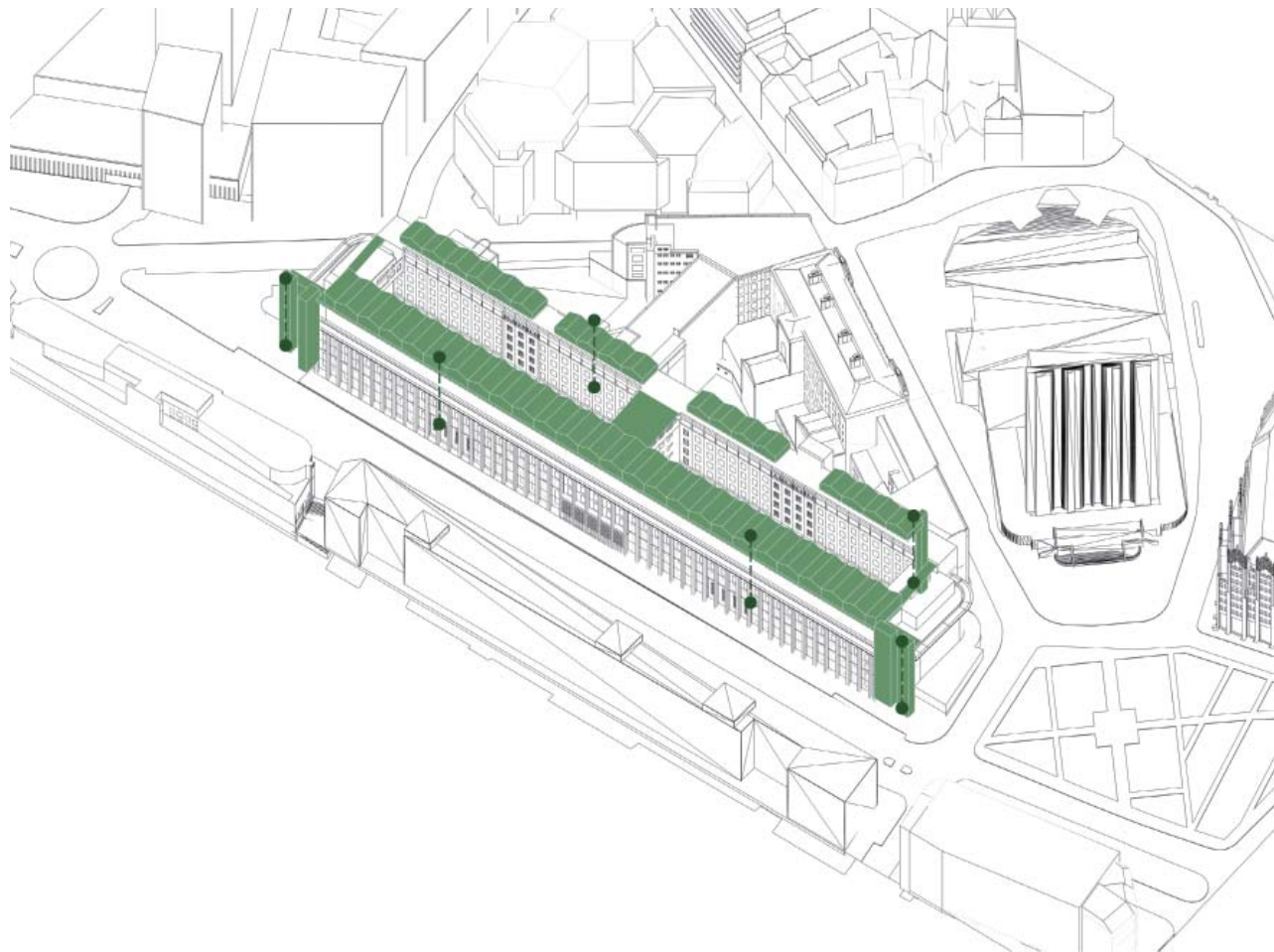
The reduction of cash transactions and the popularity of virtual currencies force the bank to rethink its traditional way of working.

Like many other businesses and organizations, the Belgium National Bank also sees the urgent need to tackle the climate problem and keep the planet habitable. Therefore, besides the economy, BNB can also take care of tangible things such as food, energy, and other resources. The new bank will be an example of sustainable, circular building, and cooperate with environmental institutions in Brussels to create a better future.

In the scale of a building, food is essential to the users and food-related activities are a potential way to engage employees and citizens.

Approaches:

1. Urban agriculture as the core element to engage citizens and employees. Create easily accessible public hub to attract people.
2. Cooperate with environmental institutions in Brussels and create meeting space for staff as well as the public.



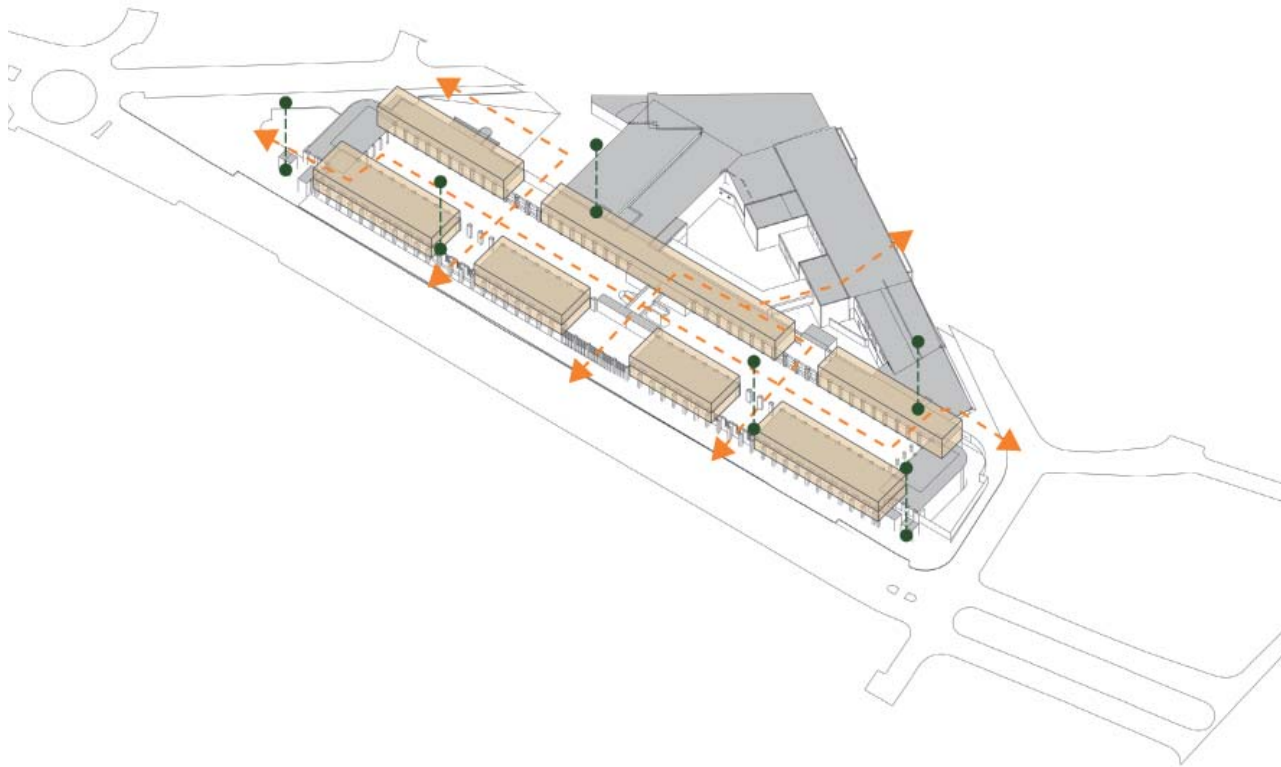
Rooftop:

Urban agriculture, attracts and engages citizens.

Greenhouses on the rooftop allow the bank to produce its own food all year long. The vegetables are sent to the kitchens, restaurants, as well as retail stores in the building. Furthermore, cooking classes and gardening classes are also available to the citizens.

The vegetations also contribute to a reduction of **the building's heating and cooling costs** and the capability to absorb rainwater. **Rainwater** will be stored in the basement and used for irrigation and toilet facilities. **Solar panels** will be installed to reduce electricity consumption.

In order to attract citizens, the rooftop also accommodates **public functions** such as restaurants, clubs, etc, and is **accessible directly from the city streets** via glass elevators. It provides a magnificent view of Brussels city.

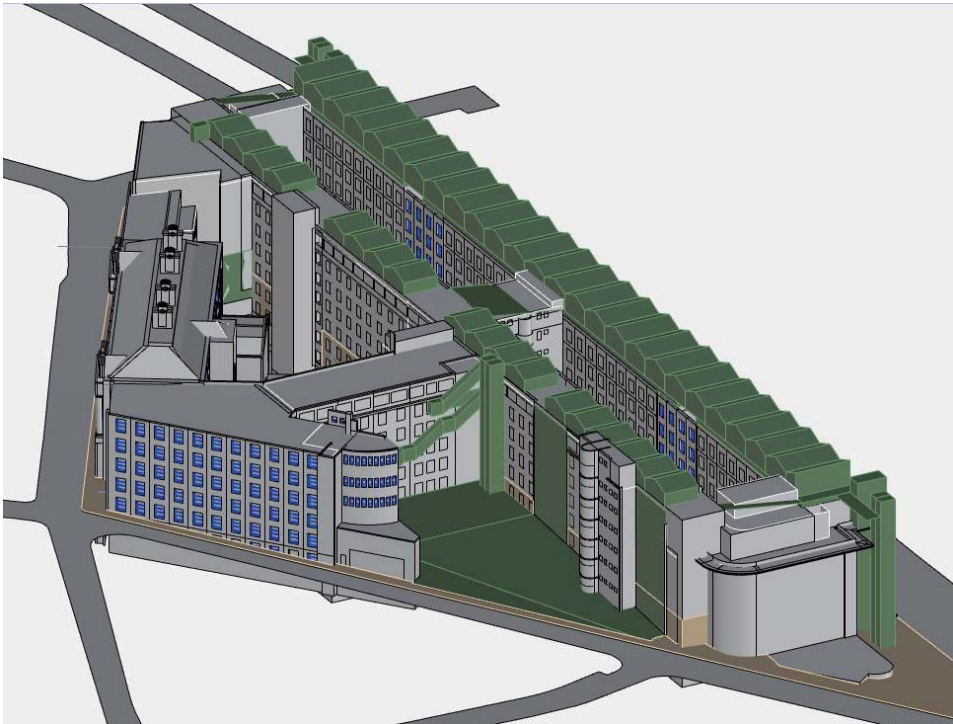
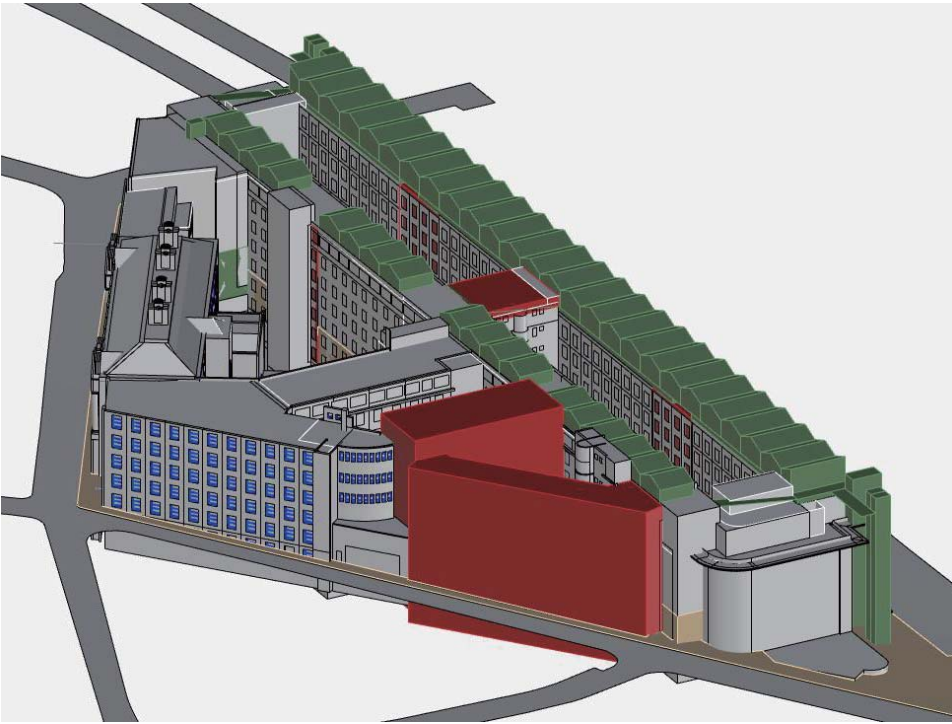


The main hall:

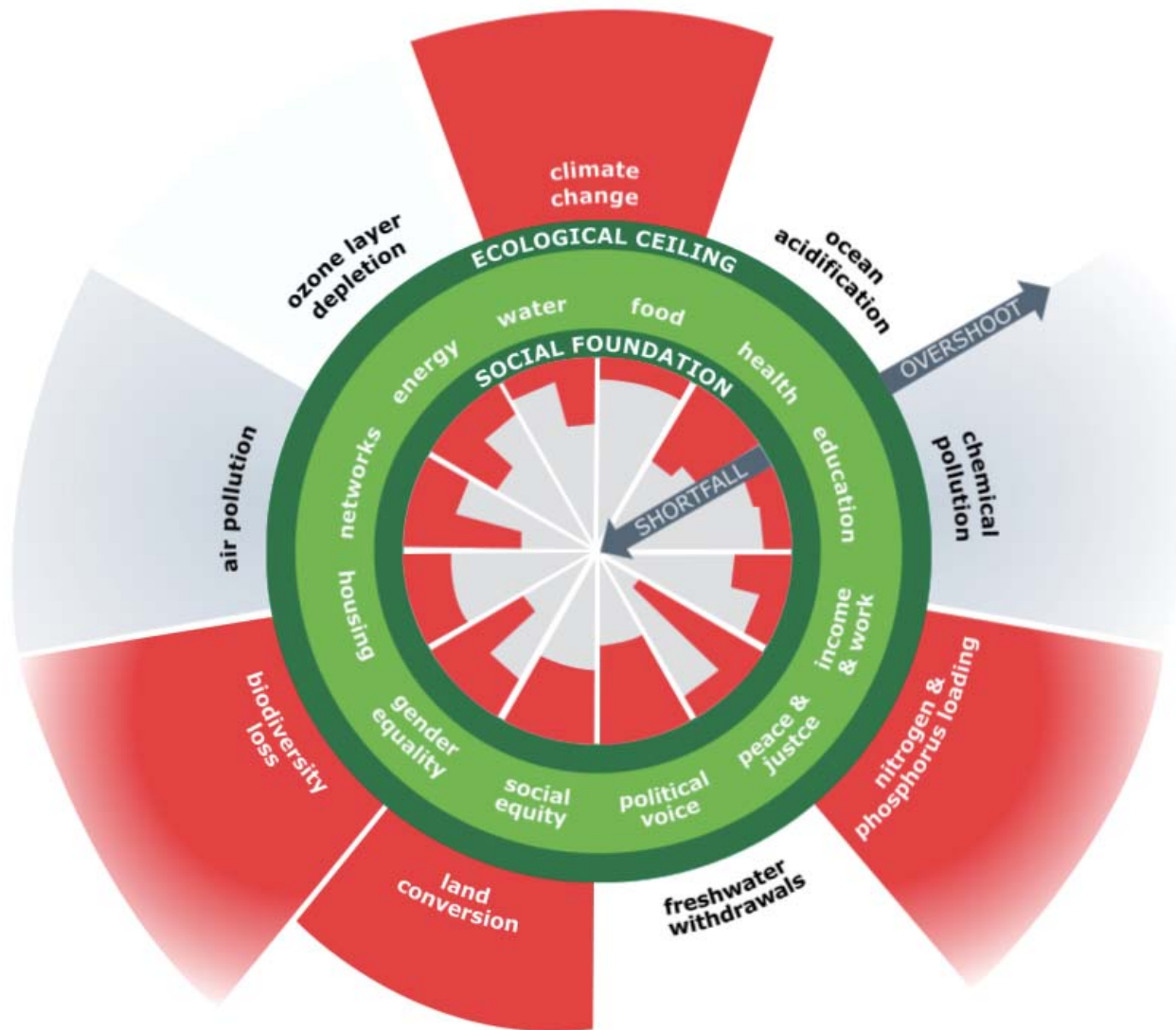
Free open to the public; Environmental institutions & bank service, combined with food facilities and stores.

The main hall will invite and accommodate environmental institutions. Meeting space is created for the staff to encounter, work together, and discuss with each other. Citizens are also welcome to this area, where exhibitions, lectures, etc. are held. Bank services also happen in the main hall.

Demolishing and adding in the courtyard



Doughnut Economic Model

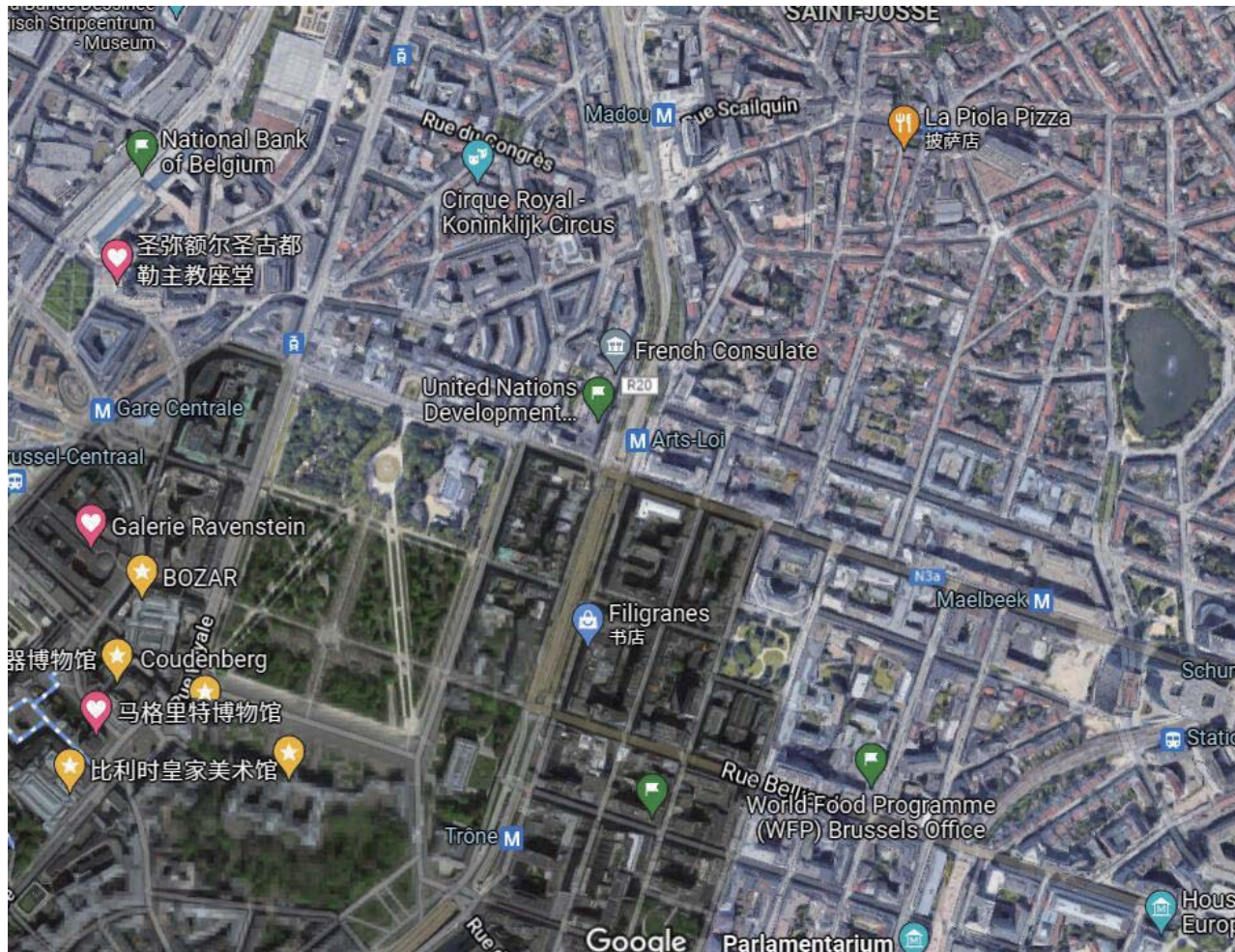


The Doughnut is a compass for human prosperity in the 21st century, **with the aim of meeting the needs of all people within the means of the living planet.**

The Doughnut consists of two concentric rings: a **social foundation**, to ensure that no one is left falling short on life's essentials, and an **ecological ceiling**, to ensure that humanity does not collectively overshoot the planetary boundaries that protect Earth's life-supporting systems. Between these two sets of boundaries lies a doughnut-shaped space that is both ecologically safe and socially just: a space in which humanity can thrive.

<https://www.kateraworth.com/doughnut/>

Environmental Institutions in Brussels



United Nations Environment Programme
United Nations Development Programme (UNDP)
World Food Programme (WFP) Brussels Office

Voedselbank Brussel-Brabant

<http://www.foodbank-brabant.be/>

--collect and distribute food to low-income people

--accept help from individuals or companies

Brussels Environment

<https://environment.brussels/>

--Cultivation on reconstituted soils on the roof (opinions & technical tips)

--impacts of greenroof

--advices on local and seasonal food

Case Study -- Sustainable Institution

The 'Circular' Pavilion Created by ABN AMRO, Amsterdam



Idea of 'circular'

--woods, dry connection, detachable

--thinking about where the raw materials comes and where will they go after this building.

--temporary kitchen, restaurants, interior, all possible to reuse in other places.

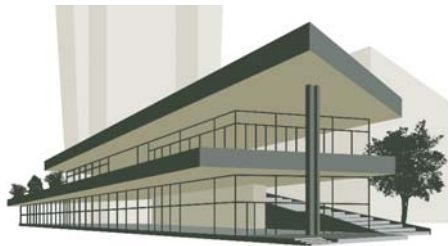
--reuse residual and raw materials from empty buildings on the demolition list.

--commercial function, profitable project: a meeting place to host events on the theme of urban sustainability and the future.

--social responsibility: stage for young artists, cooperate with primary schools

--reduce the energy consumption of the restaurants: change recipe, local and seasonal foods, buffet(connect with each other while enjoy meals; reduce food waste)

--green garden, green walls, reusable stones(Belgian cobblestone), Corten steel(tree containers), solar panels in the garden to charge the phones



CIRCL ROOFTOPBAR

On the top floor, next to the pavilion's roof garden.

EVENT SPACE

The place where Circl hosts lectures, debates, workshops and concerts.

THE ROOF GARDEN

Open to all – accessible via the stairs.

CIRCL RESTAURANT

Where head chef Rudolf Brand experiments with circular eating and drinking.

<https://circl.nl/themakingof/en/>

Essay -- Urban Agriculture

Urban Agriculture in Rotterdam: potentials for a liveable, low-carbon city and sustainable phosphorus flows

Developing urban agriculture in cities can have many benefits for the urban environment, not only in terms of **growing its own food**, but also issues such as **developing ecosystems, job creation, improving access to a healthy lifestyle**, as well as **local solutions to address municipal waste problems** (Mougeot, 2006).

improvement of liveability

Nowadays a lot of food is being processed at different locations travelling across continents, thus **adding food miles**.

“it is not its urban location which distinguishes UA from rural agriculture, but the fact that it is **embedded in and interacting with the urban ecosystem**.”

Phosphorus is an essential element of our food production (as fertilizer and necessary ingredient in soils). Since the Green Revolution, mineral fertilizers were used to solve this issue (Shiva, 2011). This in turn resulted in the oversupply of nutrients, leading to an eutrophication of waterways and the environment.

There are **three basics**, which can be used to **lower carbon emissions** (Carney et al., 2009): 1. Decrease the energy consumed (this can be consumption or demand) 2. Change the energy consumed (at home, office, factory) - for example, from gas to bio-energy or gas to electric for home heating 3. Change the way energy is generated (e.g. electricity): gas to nuclear or gas to solar.

Reducing food miles is a way of lowering energy consumed.

https://www.researchgate.net/publication/328791897_Urban_agriculture_in_Rotterdam_Potentials_for_a_liveable_low-carbon_city_and_sustainable_phosphorus_flows

Therefore, a recategorisation was done for the 11 studied urban farms, informed by their socio-economic role in the urban environment. As there are overlapping cases the focus was on the main activities.

- **Institutional garden** – De Enk and BuurtLab are both meant for children's education. Every kid has its own plot in the garden where they can learn to grow their own vegetables and take them home (or learn to cook collectively directly in the garden). They are considered institutional since these kinds of gardens are normally connected with kindergartens or schools in order to attract children in particular.
- **Commercial - Social peri-urban farm** – De Buytenhof, located just outside of the city limits in an peri-urban location, was the only real farm within this research. It was the only urban farm breeding cows and pigs. It is 'social' as it provides working places for disabled, socially isolated and people who have suffered from mental health or other related problems such as burn-outs and job-losses. This farm is a care community that people join to get a sense of belonging. The farm's objective is to bring benefit for both people and the planet. Besides, organically grown local food is delivered to several catering businesses within and around Rotterdam and as such contributes to the farmers' income.
- **Social community garden** – These urban farms contribute to the social well-being of people who work in the garden and at the same time grow food for Rotterdam Foodbanks. Foodbanks are voluntary organisations operating in several areas of the city that donate food to low-income people. In many of these farms, mentally disabled or people with other health problems living there, are paid for by the Dutch social services for their contribution (AWBZ Dutch health care law).
- **Community garden** – This type of UA is established on the city's vacant land in order to improve the neighbourhood and argument against the government's plans to build those areas up. The food production for (poor) people in those gardens is generally not the main purpose (although it is a benefit). Rather, it serves as an outdoor area for people in the neighbourhood, a place to create a close community and organise outdoor events, such as music evenings, outdoor cinemas, or educational workshops (permaculture, mushroom growing).
- **Commercial farm** – Uit je Eigen Stad is the only commercial urban agriculture type in the city of Rotterdam. Organically grown food is sold in several locations within and around the city and extra financial profit is made through the local restaurant. Thus, similarly to De Buytenhof, financial profit is an important aspect in terms of the farms' income.
- **Roof garden** – Dakakker is to some extent commercial: beside growing food for the people who work/volunteer there, it is also sold to nearby restaurants.

Case Study -- Urban Vegetation on Rooftop

DakAkker, Rotterdam

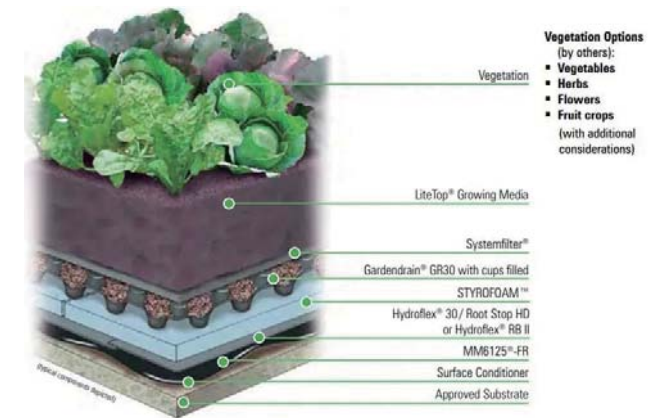


On top of the Schieblock, the first large harvestable rooftop in the Netherlands has been realised: the DakAkker. **Vegetables, fruit and herbs are grown there and honey bees are kept.** It is the largest rooftop farm in Europe where **the soil is put directly on the rooftop.** The advantage of growing at a height of 20 metres is that **the growing conditions are comparable to those of a Mediterranean climate: dry and windy.** This rooftop was constructed in 2012 by Binder Groenprojecten, according to the idea and design of Zones Urbaines Sensibles – an urban design agency – and was developed in collaboration with the Rotterdams Milieucentrum (Rotterdam Environmental Centre).

<https://rotterdamsedakendagen.nl/en/dak/dakakker/>

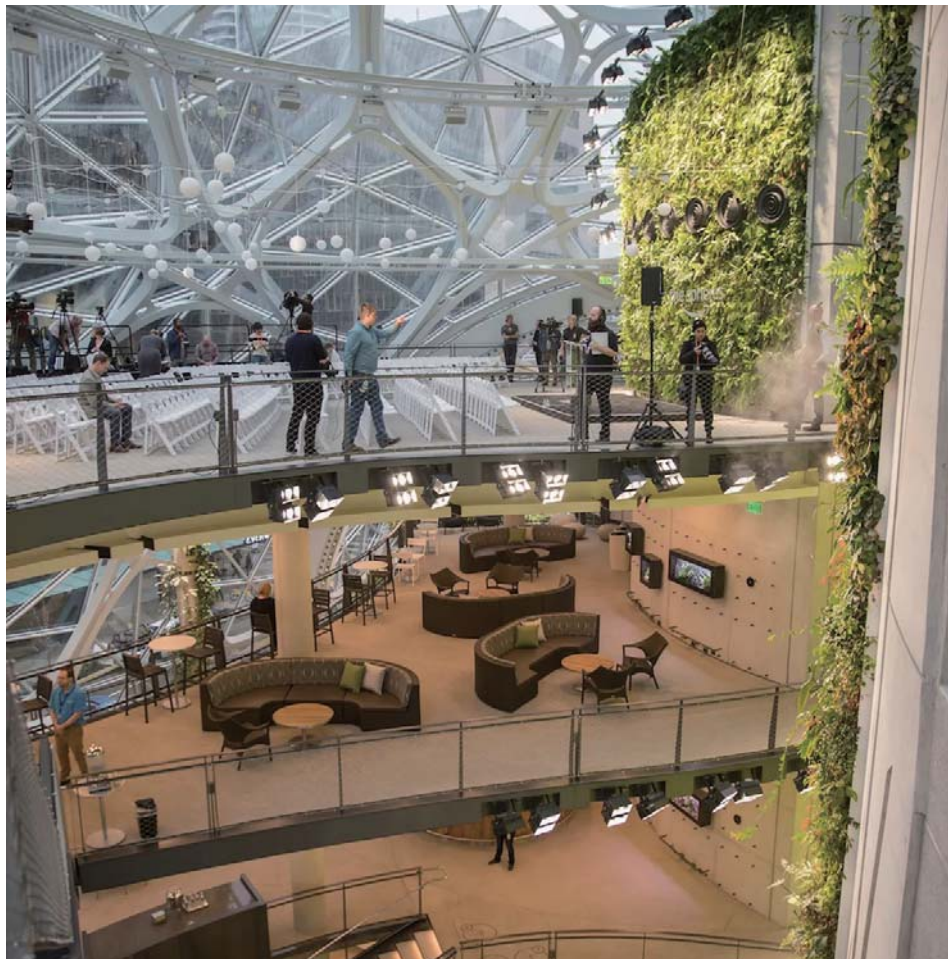
Case Study -- Urban Vegetation on Rooftop

Youth center in Chicago



<https://www.inexhibit.com/case-studies/youth-centers-vegetable-roof-garden-provides-food-for-children-in-chicago/>

Case Study -- Interior Greenery

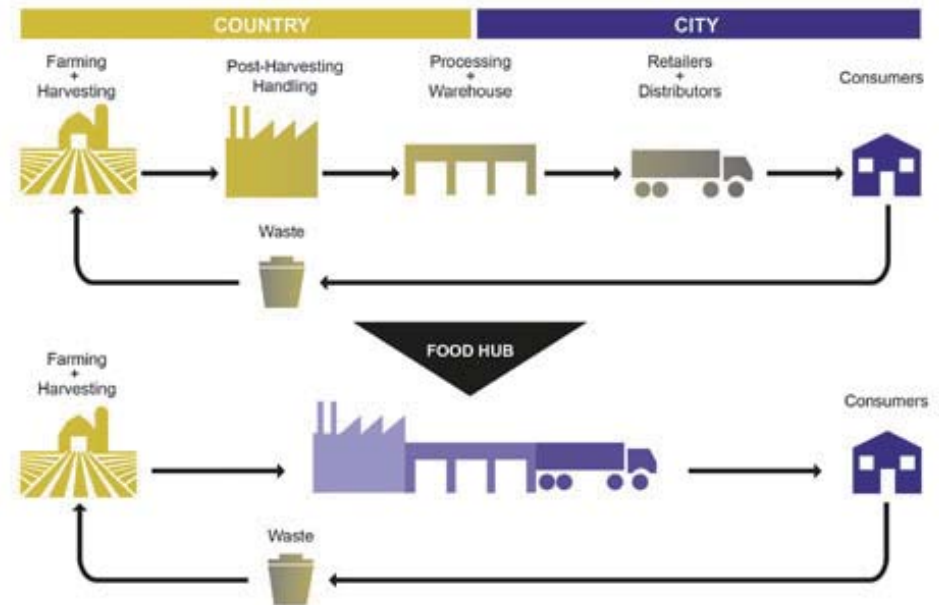


These spherical greenhouses may serve to improve productivity by providing a relaxing environment and a "change of pace" for Amazon employees.

<https://seattle.curbed.com/2018/1/30/16947838/amazon-spheres-seattle-architecture-photos>

Food Processing

West Louisville Food Port by OMA



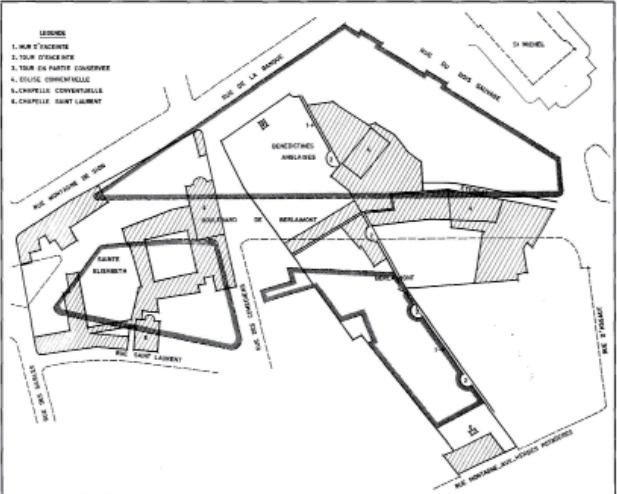
The direct relationship between producer and consumer is now separated by an ever-expanding line of middle-man entities including distributors, processors and retailers.

The program reflects **the full food chain**. More than than the typical food hub, the addition of several key programs that serve and provide for all stages of the food chain were added, from farming, to processing, shared community kitchen spaces, retail, and recycling.

<https://www.archdaily.com/601730/oma-designs-food-port-for-west-louisville>

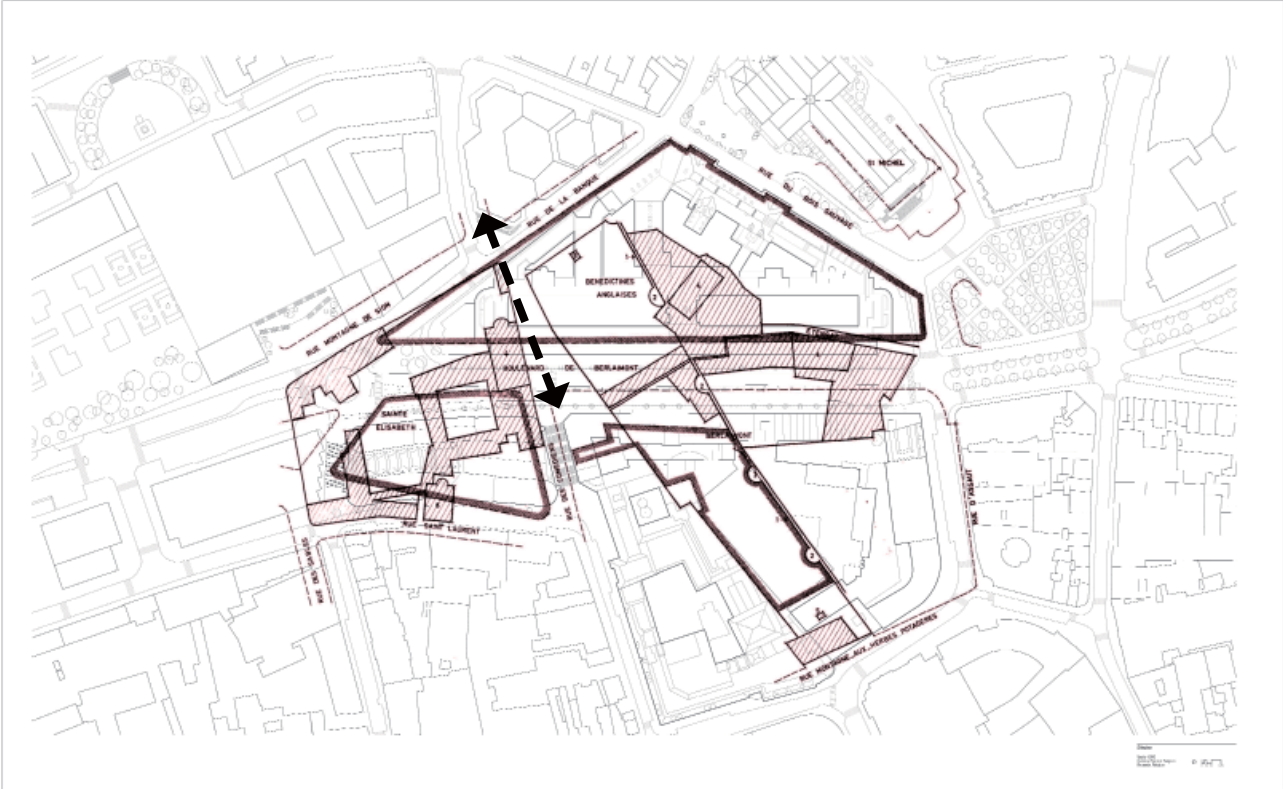
W2.8 Prefinal

Historical Connection

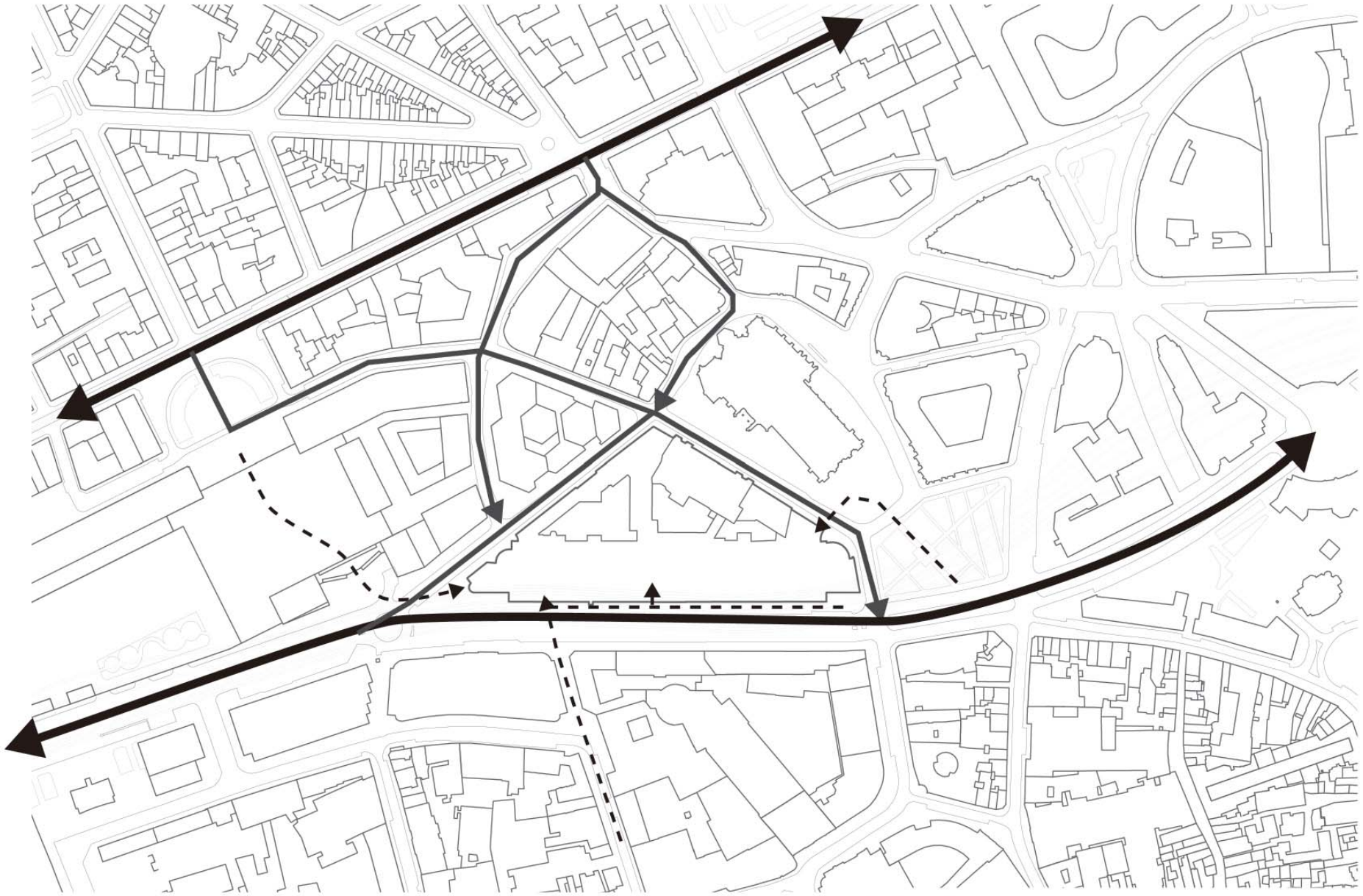


Plan montrant la position exacte des bâtiments actuels de la Banque par rapport à l'emplacement des couvents de Sainte-Elisabeth, des Bénédictines anglaises et des dames de Berlainmont.

Footprint of the National Bank of 1950 compared to the convents present before Beyaerts' bank



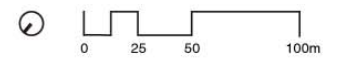
The historical map overlaps the site plan today

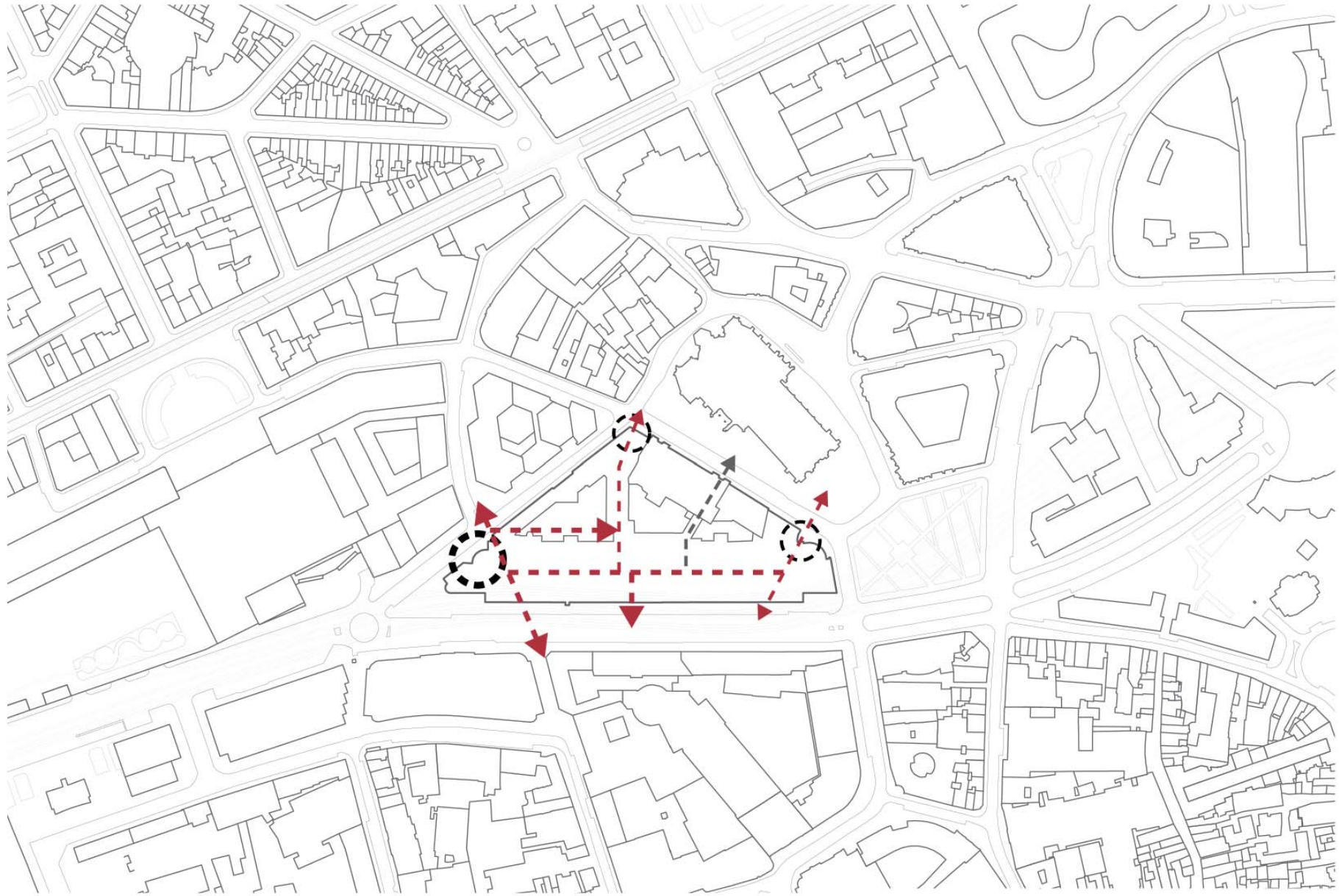


↔ Vehicle

⋯ Pedestrian

Context plan
Scale 1:3000



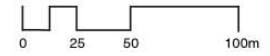


Valuable corner

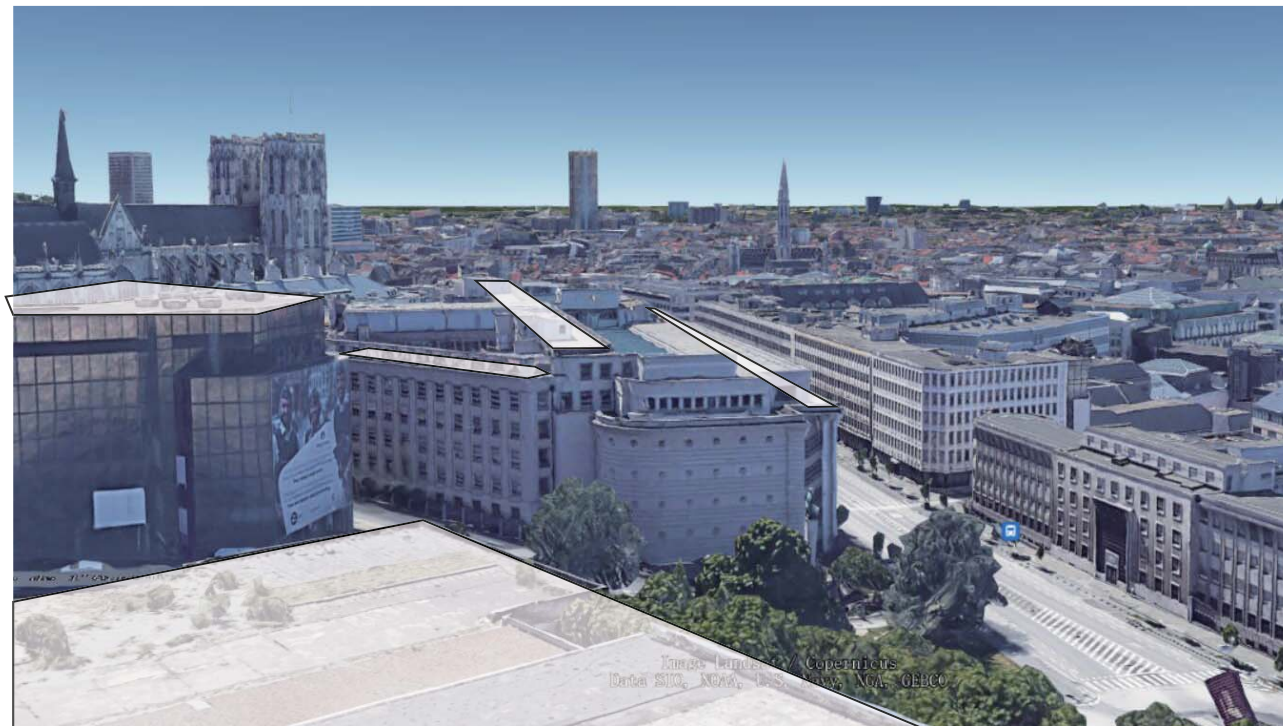


Connection

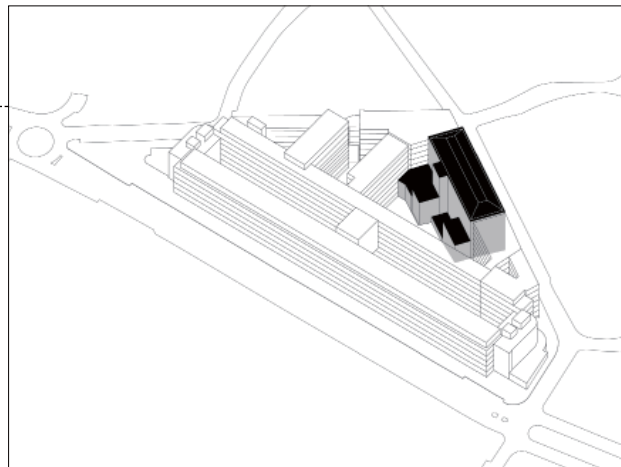
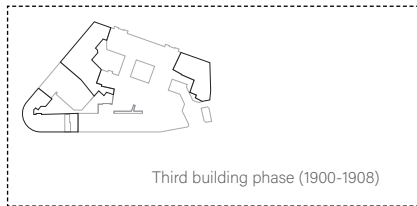
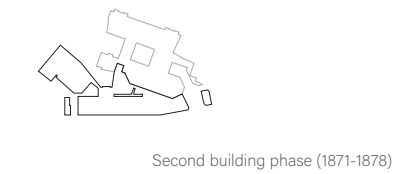
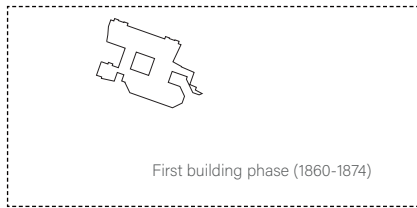
Context plan
Scale 1:3000



Roof Terraces



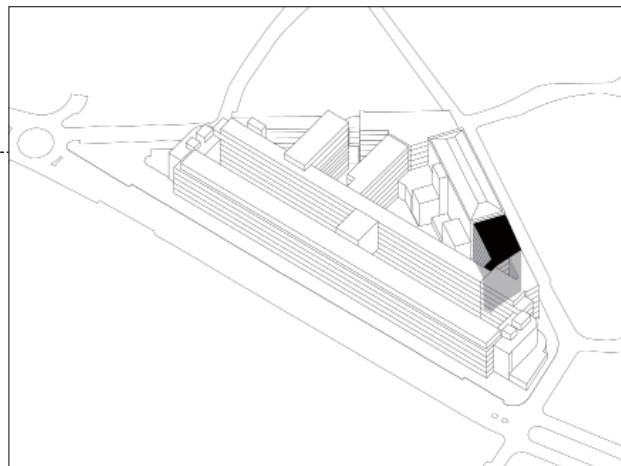
Construction Phases 1 - 3 (1860-1908)



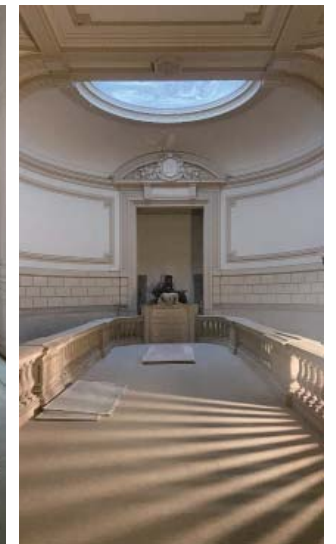
Governor's Hotel
Floors: -1 ~ 6



Facade of the Governor's Hotel of the National Bank of Belgium, 1870

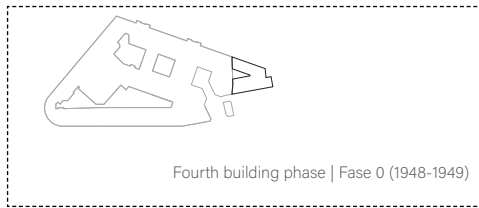


Extension of Governor's Hotel
Floors: 0 ~ 6

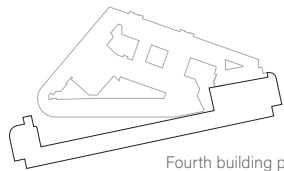


Current Situation: Abandoned

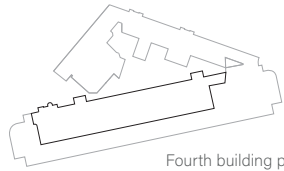
Construction Phases 4 (1948-1965)



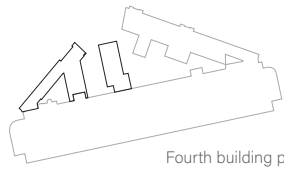
Fourth building phase | Fase 0 (1948-1949)



Fourth building phase | Fase I (1949-1951)



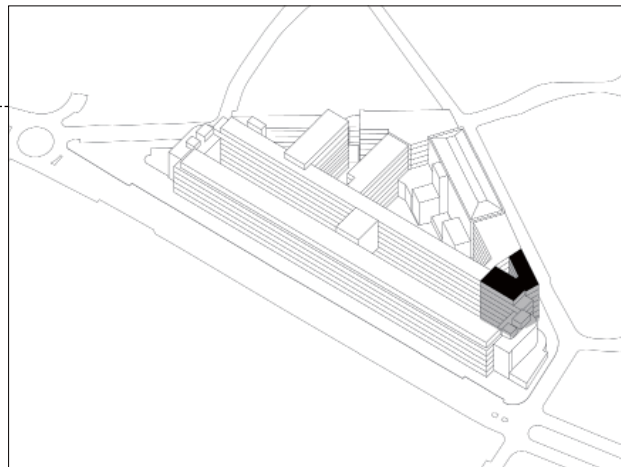
Fourth building phase | Fase II (1952-1953)



Fourth building phase | Fase II (1954)



Fourth building phase | Fase II (1965)



'Aile Extension' connects
Floors: 0 ~ 5

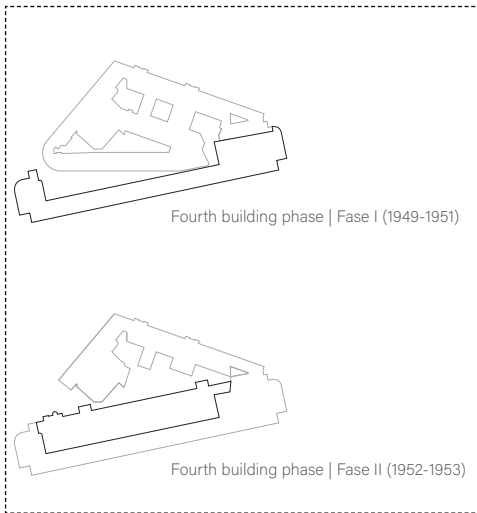


'Aile Extension' connects was designed as a temporary connection between the hotel and the new buildings.

Construction Phases 4 (1948-1965)



Fourth building phase | Fase 0 (1948-1949)

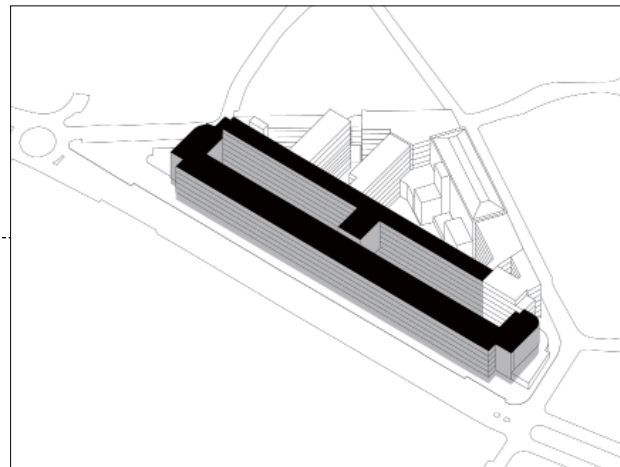


Fourth building phase | Fase I (1949-1951)

Fourth building phase | Fase II (1952-1953)

Fourth building phase | Fase II (1954)

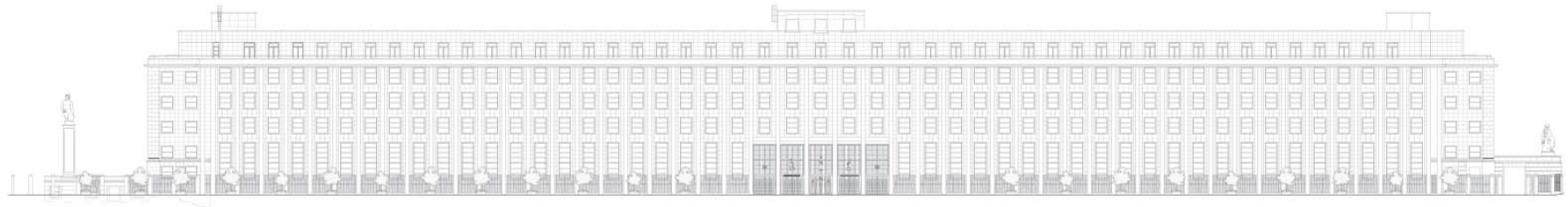
Fourth building phase | Fase II (1965)



The main building
Floors: -2 ~ 4(5)



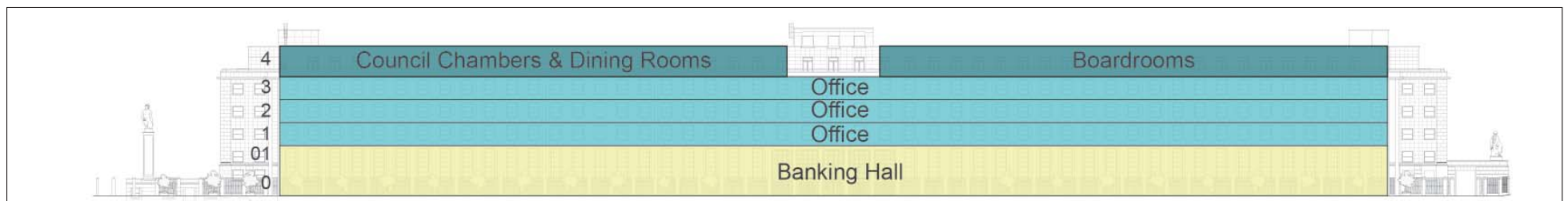
Grid Analysis



The Front Facades



Grids

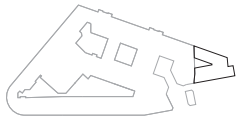


Original Function

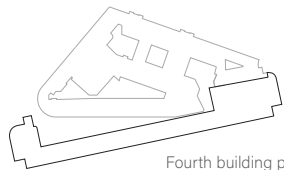
The horizontal division of functions and the long, dull hallway impede communication between management and employees,

employees in different departments, and bank staff and the public.

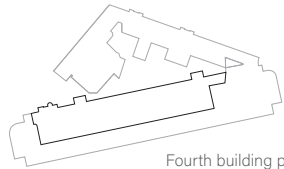
Construction Phases 4 (1948-1965)



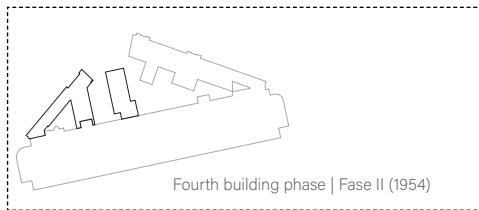
Fourth building phase | Fase 0 (1948-1949)



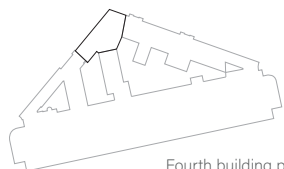
Fourth building phase | Fase I (1949-1951)



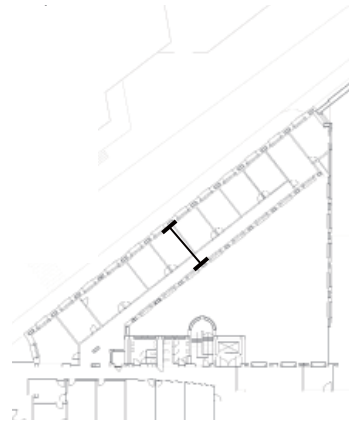
Fourth building phase | Fase II (1952-1953)



Fourth building phase | Fase II (1954)



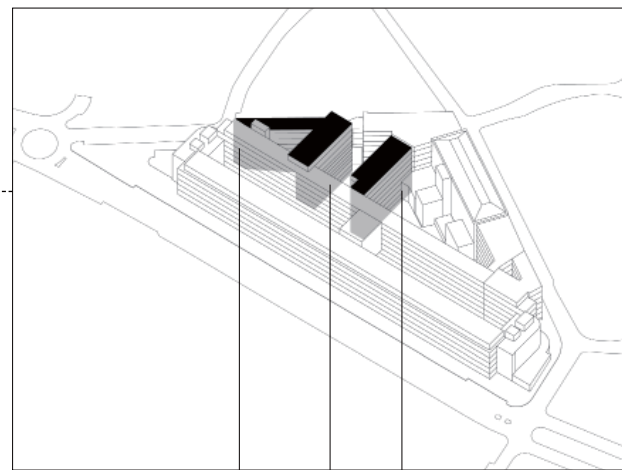
Fourth building phase | Fase II (1965)



2nd Floorplan of Block XV
Clear width: 6.5 m



Inner Elevation of Block XV
Roof Terrace on the 5th floor



Block XV XVI XVII



Inner Elevation of Block XVI
Low ceiling Height: 2.5 m

Courtyards



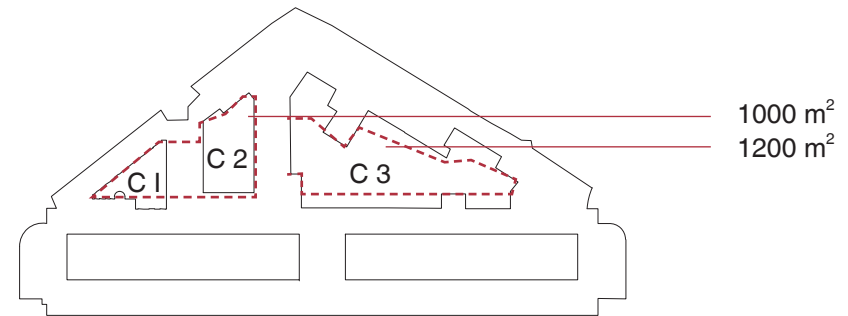
Courtyard 1 (Block XV & XVI)



Courtyard 3 (Block XVII & Hotel)



Courtyard 2 (Block XVI & XVII)



print shop	450		
workshop ?	450		
car parking	4500+	150cars, 20motorbikes	30m2per car
bike parking		Brussels standards	
building service			

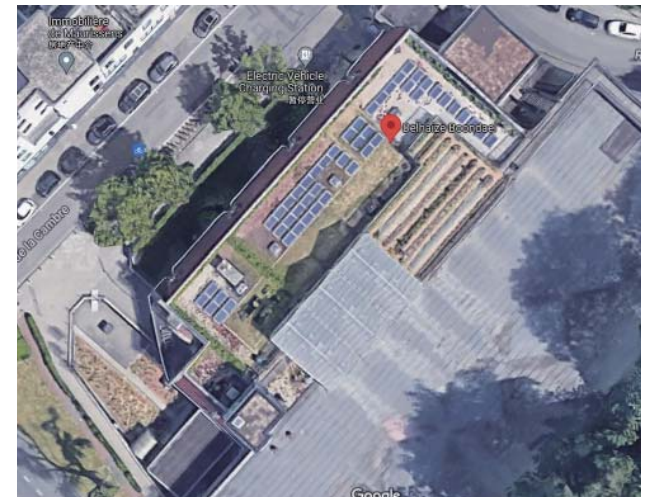
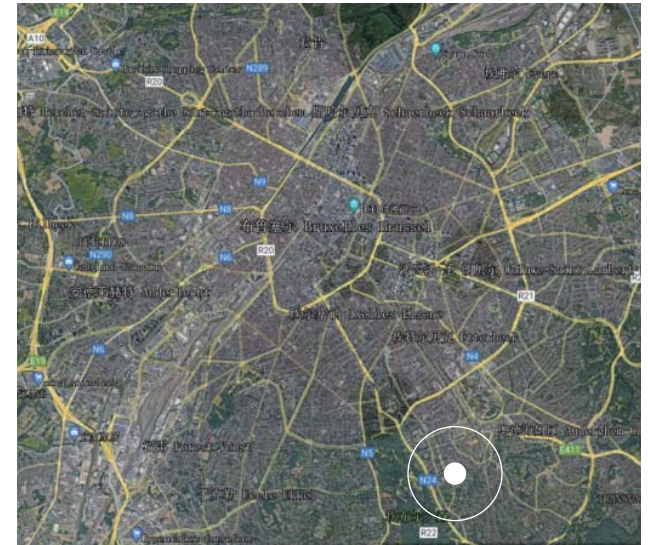
Green Network for Brussels (2040)



Urban Agriculture Project -- Farm Supermarket

One way to reduce the environmental impact of farming is to **reduce food miles**. This is the distance that food has to travel as it moves from farm to table. Transportation as a whole represents 11 percent of life-cycle greenhouse gas emissions. However, **delivery from producer to retail contributes to 4 percent of the total transportation emissions.**

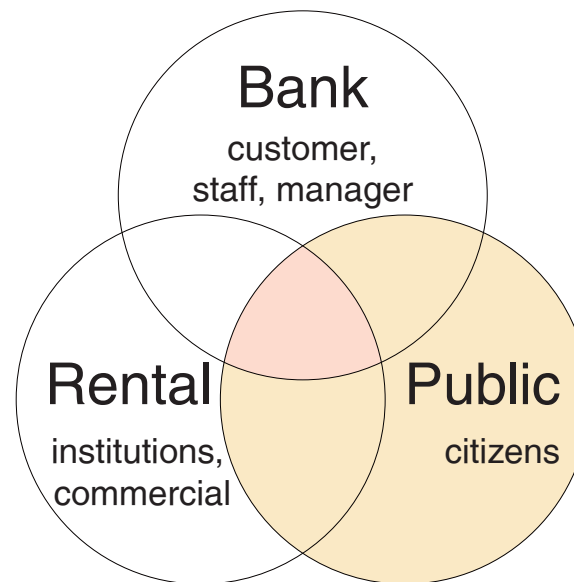
The Boondael branch of the Delhaize supermarket launched the urban farm project. The farm takes up around 320 square meters of rooftop space, which produces tomatoes, lettuces and strawberries, and operates year-round using a greenhouse.. **The products are harvested in the morning and reach store shelves around an hour later.**



Encounter space

Office		
typical	22500	
specific	300	85 W/P office ?
senior managers	400	6x20, 100, 40, 2x30, 20
HR	120	
trading hall ?	240	
crisis center high	150	
reception	25	
foyer		
auditorium	375+	250seats + projection room
finishing kitchen		for 300 people
VIP meeting		salon for 8 people
press room		20 seats
central meeting rooms		4x5p, 4x12p, 3x20p, 35p, 50p, 100p
Public functions		
for customers		
entrance hall		diff kinds of visitors ?
reception desk	60	back office for 3p
waiting area ?		for visitors
public meeting rooms		2x12p, 2x6p
counters		30office, 6x15m2 counters, 100m2safe
museum		可搬过来
Social functions		
restaurant ? For st	1000	500seats, buffet
VIPrestaurant	120	60seats, table service
kitchen		
recreation rooms	100	
club	20	office organizing
external recreation		
lounge		180seats
exhibition	0(300)	
coffee bar		30seats+standing
library	200(500)	
legal library	50	
innovation lab	50	?
changing/showers		
medical facilities	150	including lactation room
Service		
general circulation		
storage rooms	2000	
central archives		4500im? Of shelving
art storage	150	
security	40	
IT	400	200, 200 stock
server rooms		10m2each, per floor
data center		100m2each, per floor
refuse		

Public functions		
for citizens		
entrance hall		
exhibition	300	
museum	500	
library	300	
cooking studio		
bookable work rooms		
auditorium	375	
gym	500	
café		
restaurants		
roof terrace		
greenery		
workplaces		
lounge		
game rooms		
bookable workshop		
gardening		



Thoughts

a meeting place, a house of a diverse urban experience.

doughnut economic model.

be an example of a self-sufficient building, and an institution that cooperate with environmental organizations

welcoming the citizens. participate in gardening and food processing, cooking and eating with friends or strangers, and know more about the ecological impact of our eating behaviors and urban vegetation via various exhibition, lectures and reading materials. other public program are also provided in the bank such as gym, roof greenery, game rooms, studio, and informal meeting space.

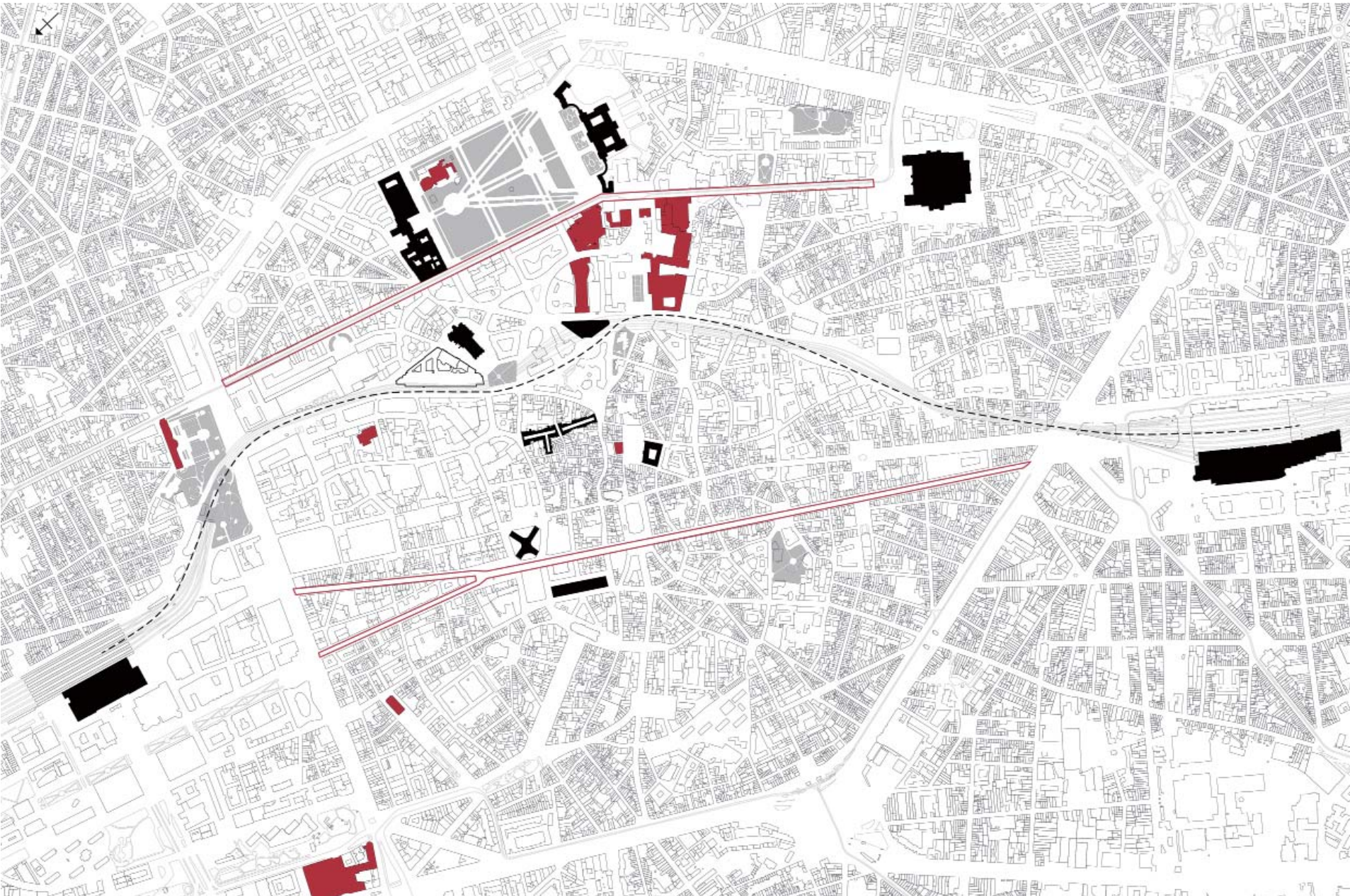
barriers between the bank and the public: only the bank hall is accessible for citizens.

the project aims to invite the citizens to go deeply into the institution, hanging out with others, enjoying their time, get some exercises, and even better -- get some exercises and food product.

center of the project is the so-called **ENCOUNTER passage?**, which offers opportunity for the bank employees, staff of the environmental institutions, as well as the public to encounter and chat with each other.

W2.9 Synthesize the Story

Cultural Network of Brussels

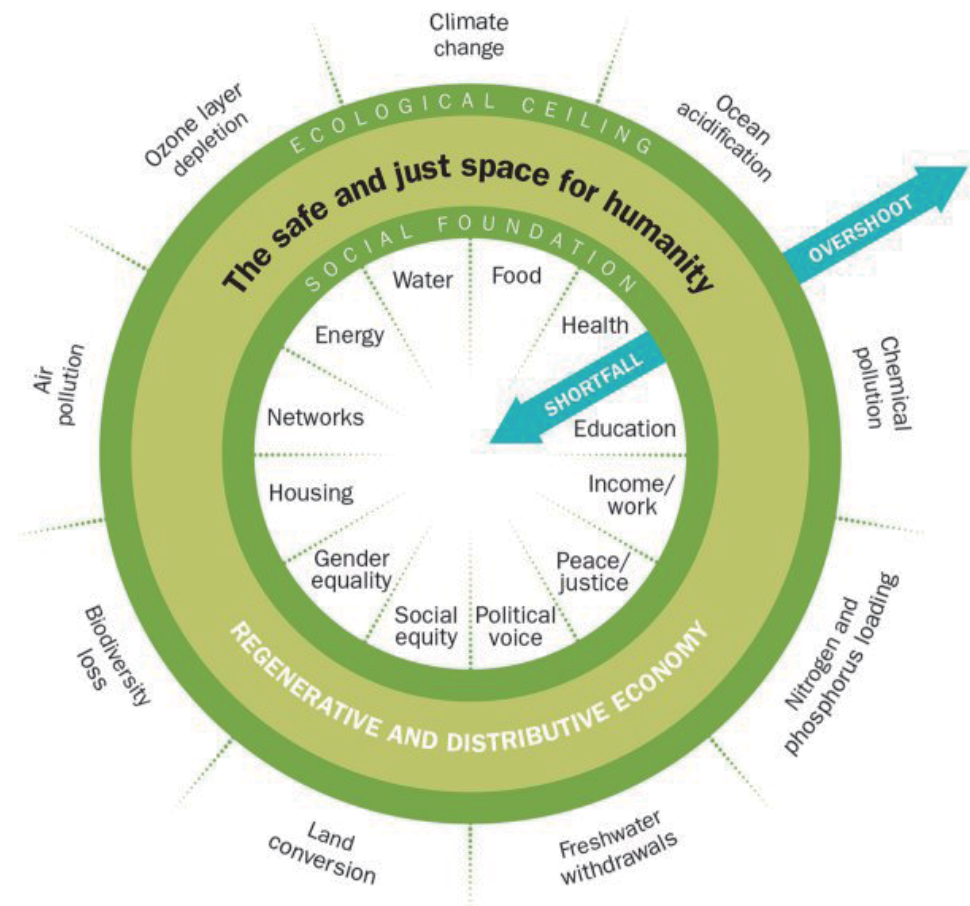


2050 Long-Term Strategy by the European Commission

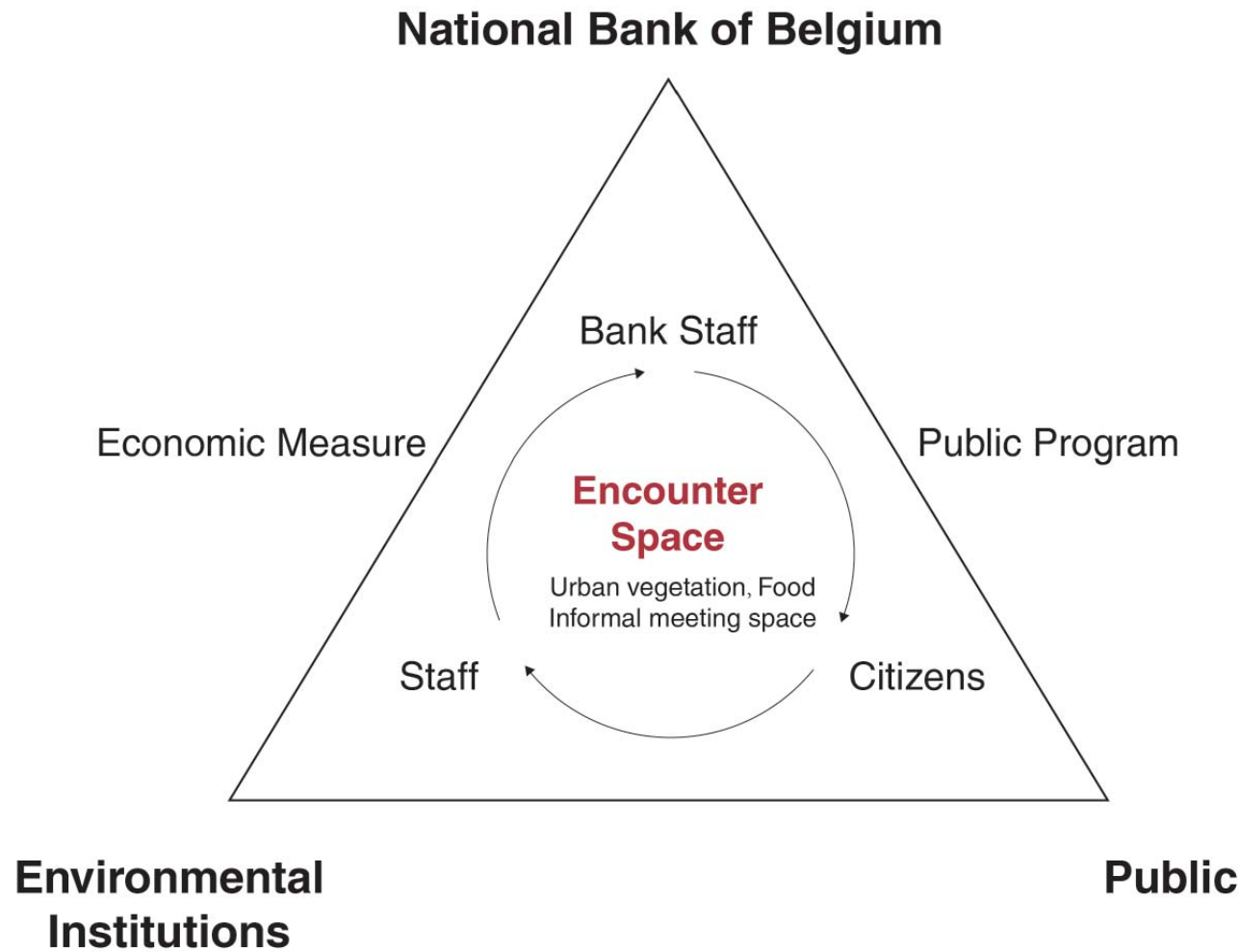
The EU can set an example by investing in technological solutions, education and empowering citizens and aligning industrial policies, finances and research. Its initiatives are:

- **Putting the financial sector at the service of the climate**
- Urban investment support for cities
- Structural support for coal and carbon intensive regions
- Empowering European youth for climate action
- Smart financing for smart buildings
- **Investing in energy performance of public buildings**
- Investing in clean industrial technologies
- **Investing in clean and competitive mobility**

Doughnut Economic Model



<https://time.com/5930093/amsterdam-doughnut-economics/>



The future bank is a meeting place for the city. It provides its users with diverse urban experience, new skills and knowledge, and is an easy place to access for work, relaxation, gardening and learning.

Urban Vegetation and Food-related Activities as A Tool to Engage People



Self-Sustaining Village, Almere, 2016



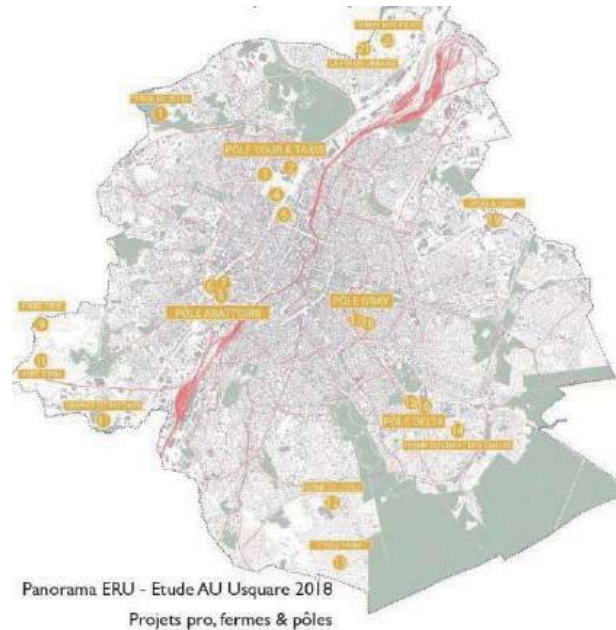
Greenhouse as a Home, Taiwan, 2018

Good Food Plan

In 2016, Brussels launched the Good Food plan, which sets a target of **achieving 30 percent of fruit and vegetable production from urban agriculture by 2035**.



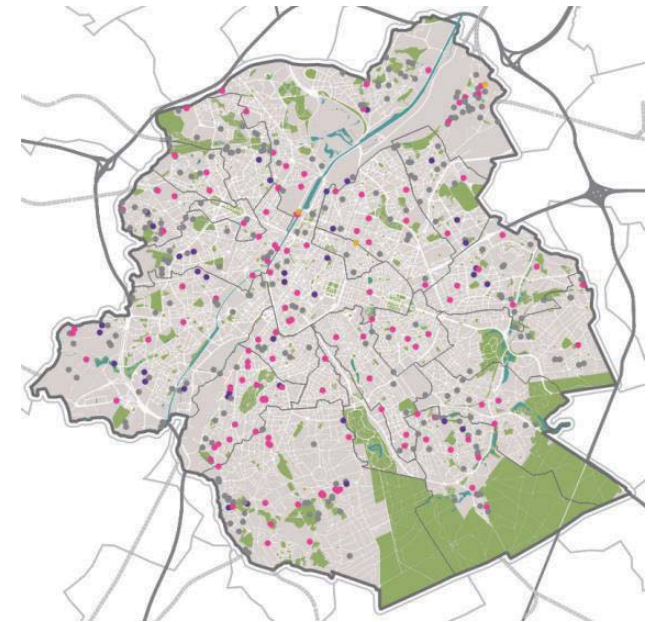
Urban Agriculture Projects (2018)



32 projects were launched in 2018. Main types of production:

- the cultivation of vegetables (market gardening)
- fruit
- aromatic plants

Collective Vegetable Gardens (2018)

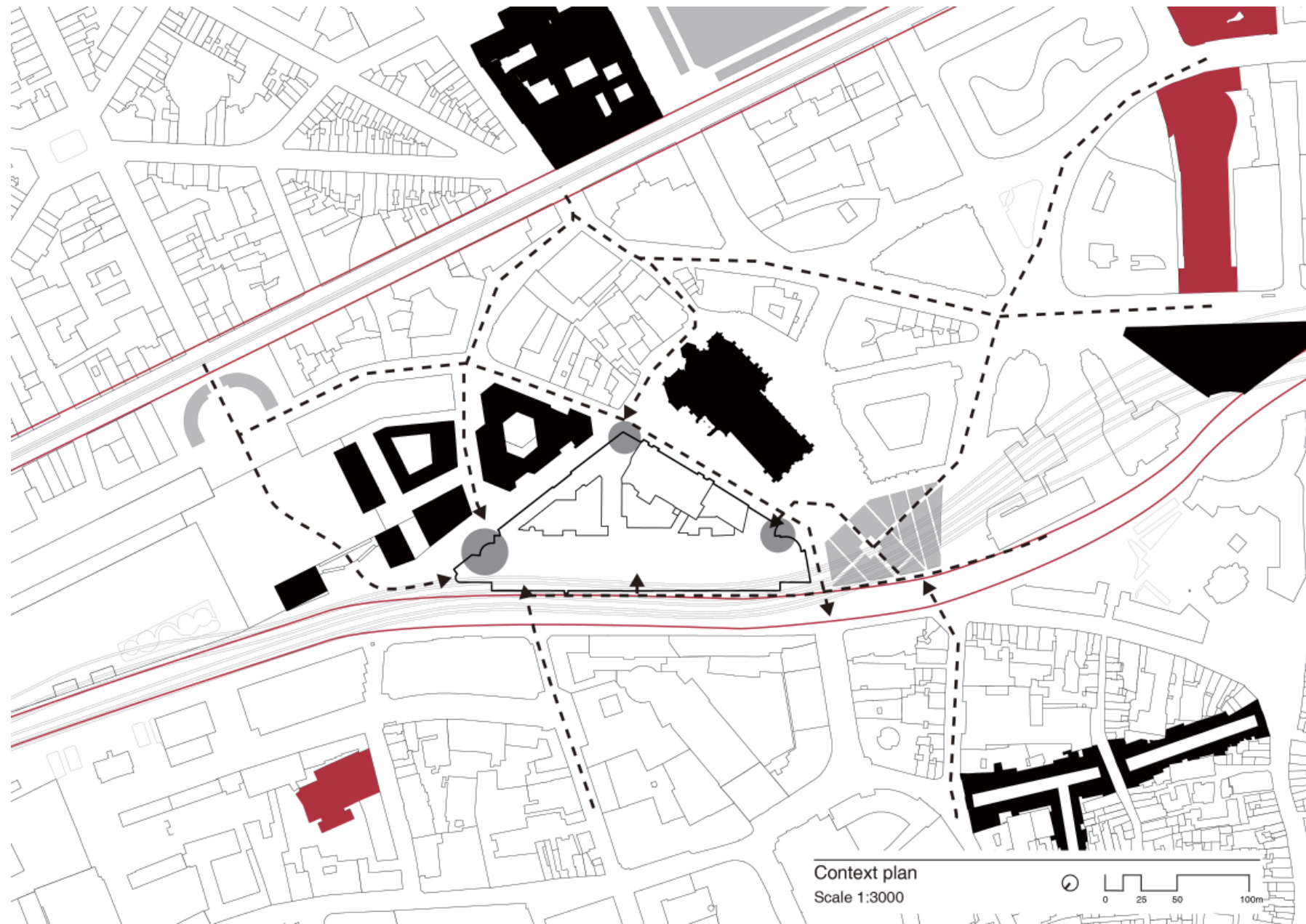


Sustainable and local food self-production is also included in the notion of Urban Agriculture.

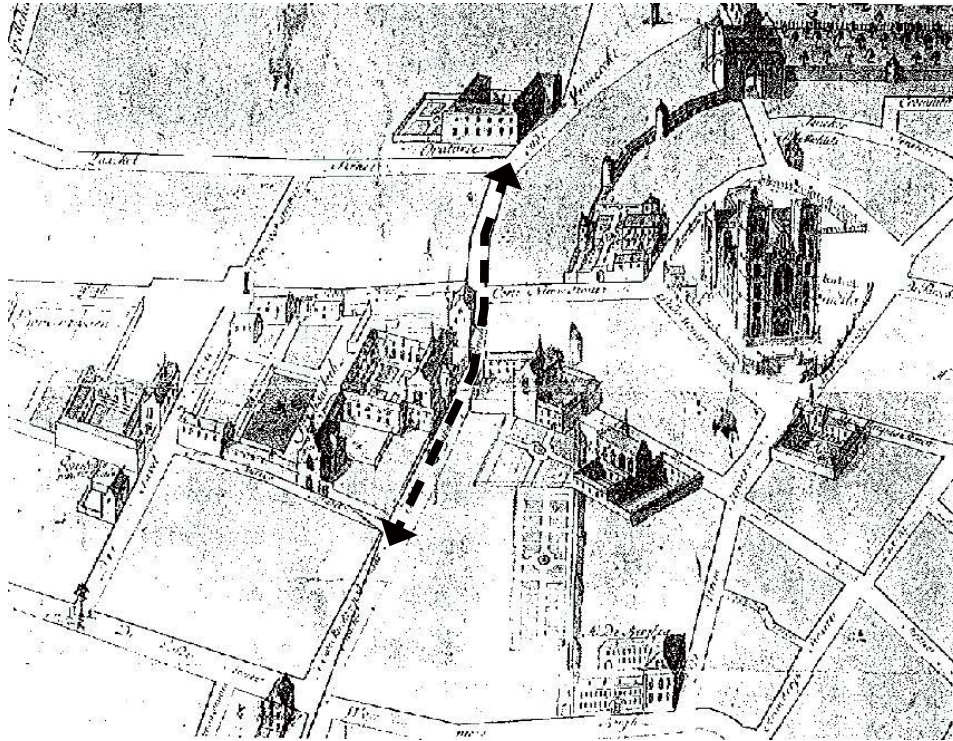
<https://www.springwise.com/belgian-supermarket-reduces-food-mile-for-fresh-produce/>

https://goodfood.brussels/sites/default/files/plan_daction_2020_cadre_juridique_et_urbanistique_agricultures_urbaines-min.pdf

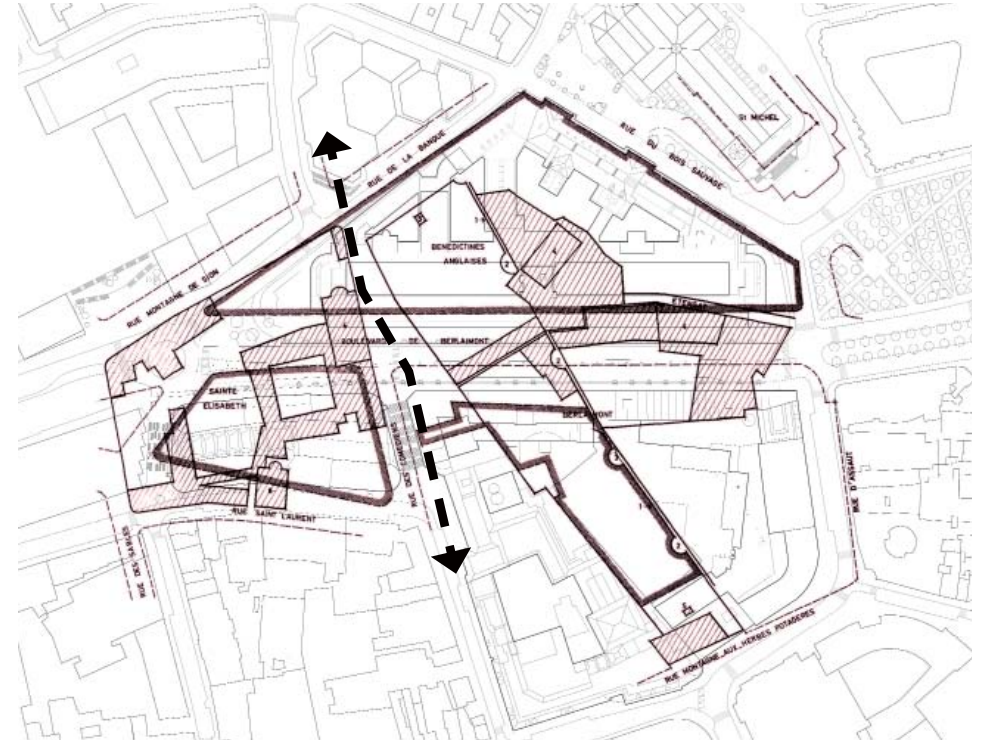
Site Map



Site History

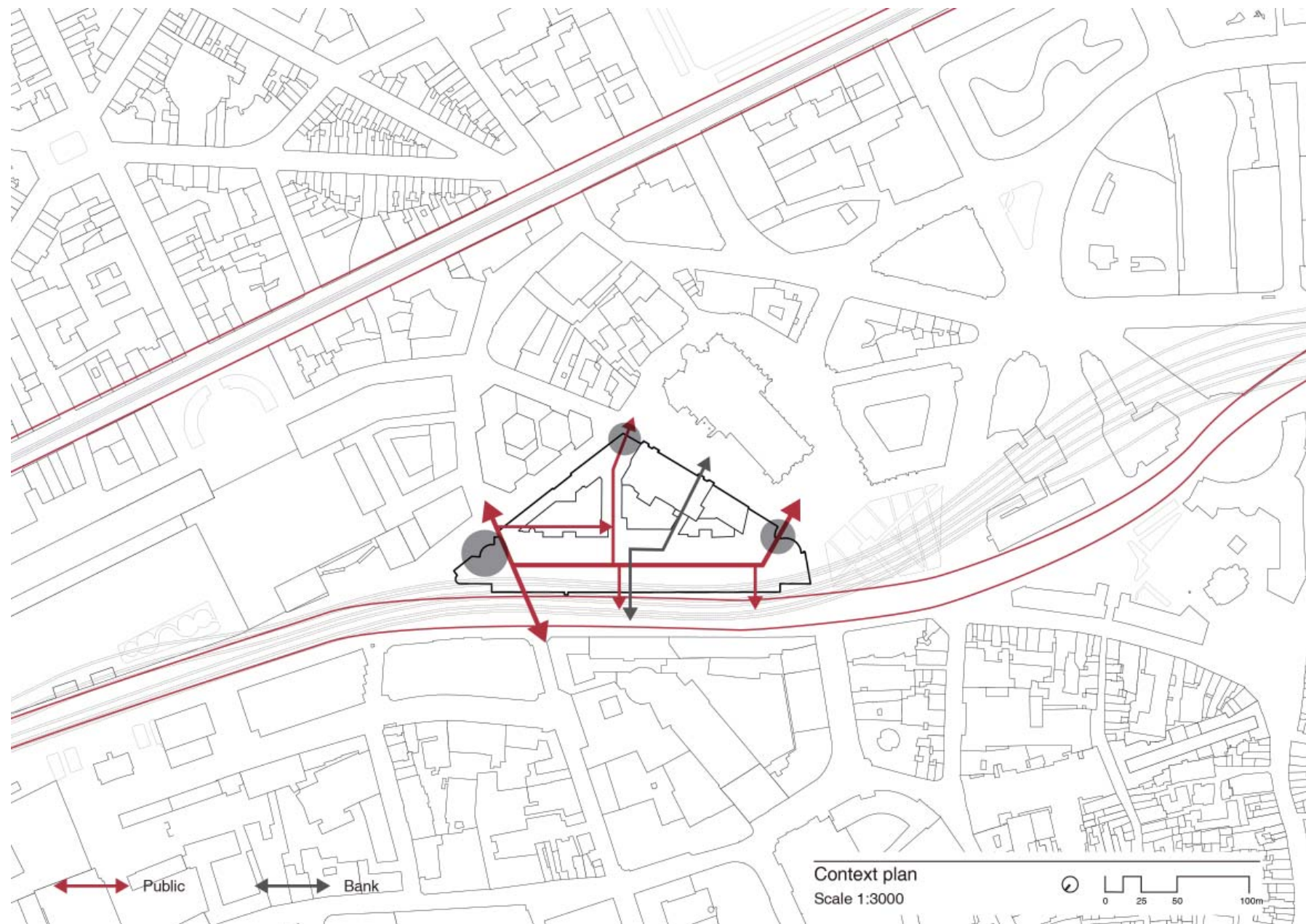


The three women's monasteries on the (current) site of the Bank, according to the plan of Karel van Lorraine (1770) Source: 'The three monasteries of the National Bank of Belgium', BNB, 18 (1962) 8, p. 5

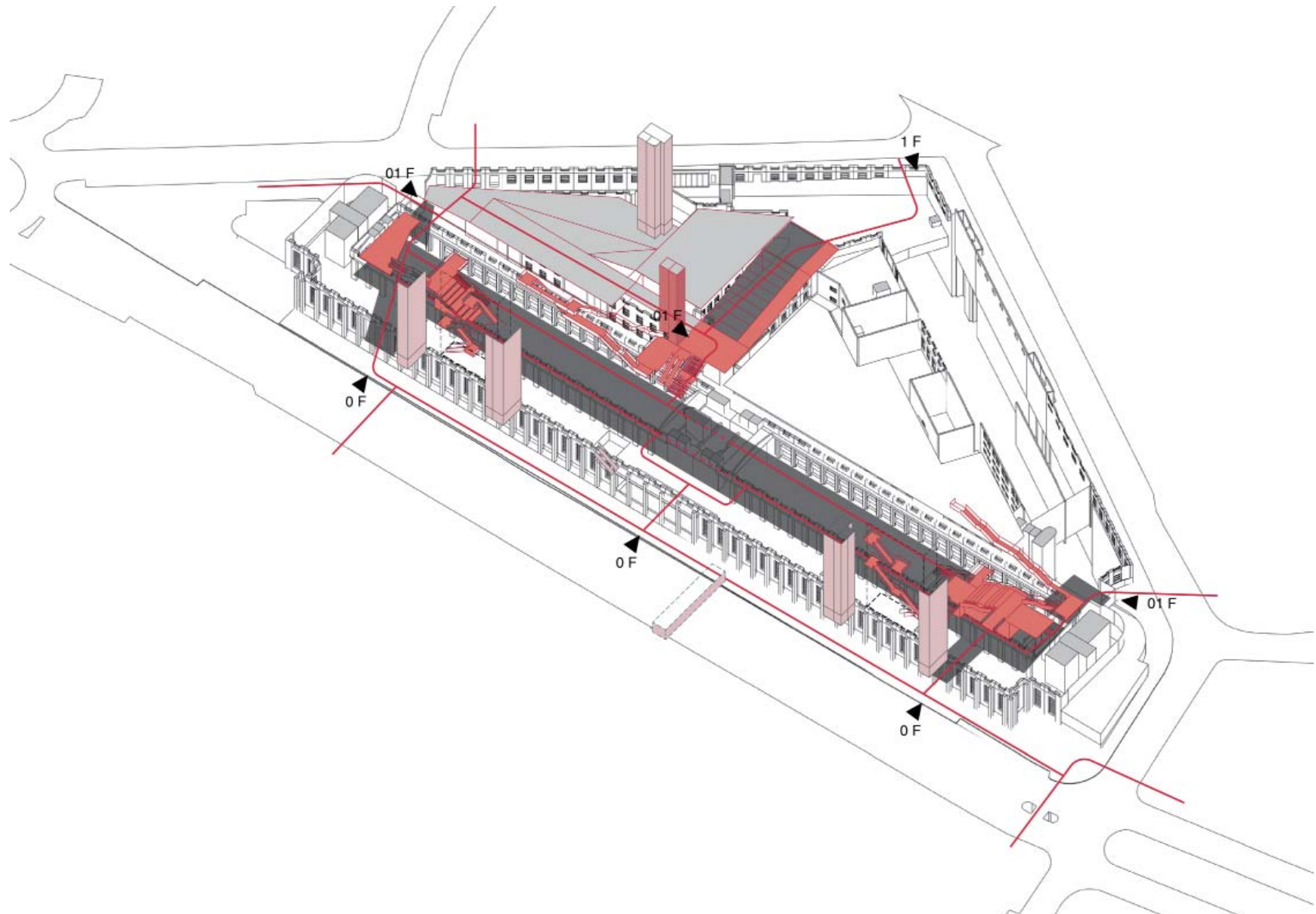


Plan of the three women's monasteries overlaps current site plan

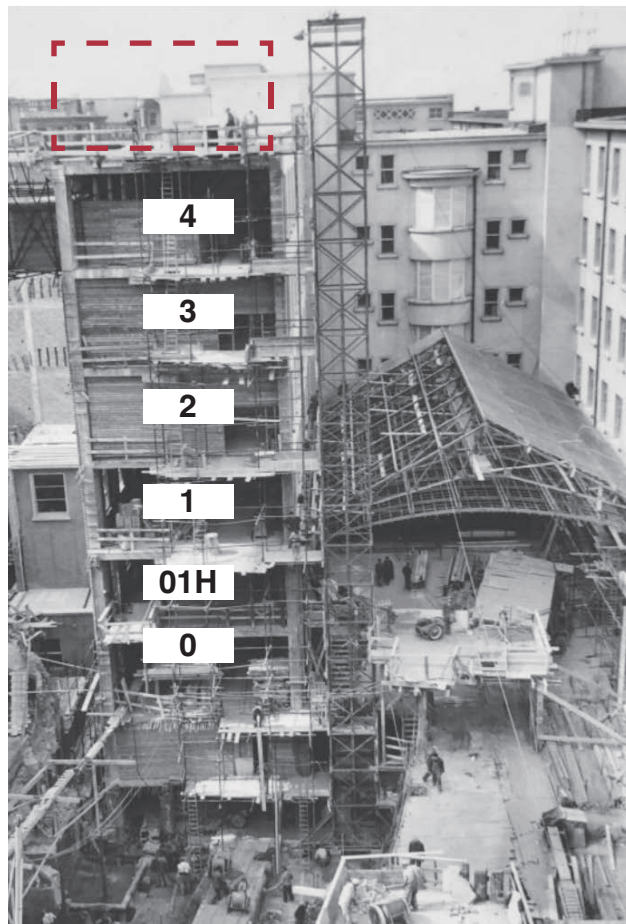
Ground Floor Connection



'Encounter Space'



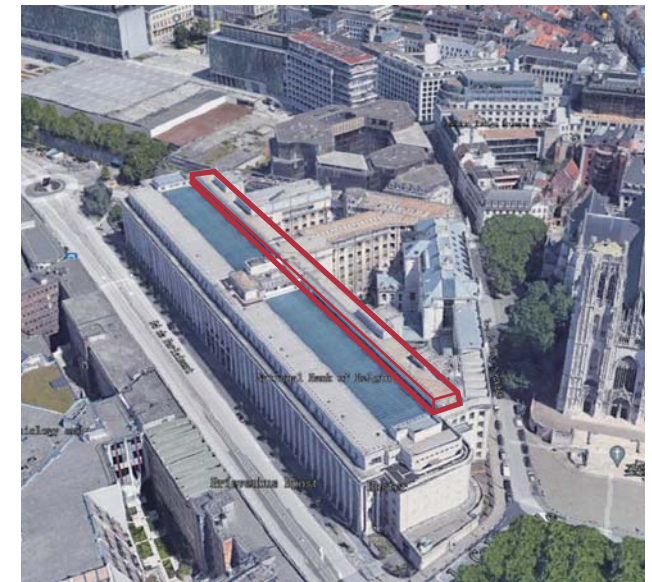
The Main Building



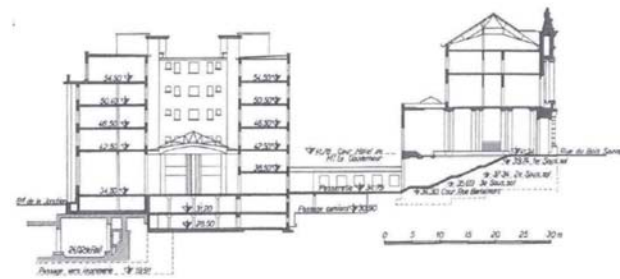
Construction work in the 1950s



The bank in the 1970s



The bank today



Section after phase 4



Section today

The 5th floor of the main building was built between 1965 - 1967, later than than the four building phases.

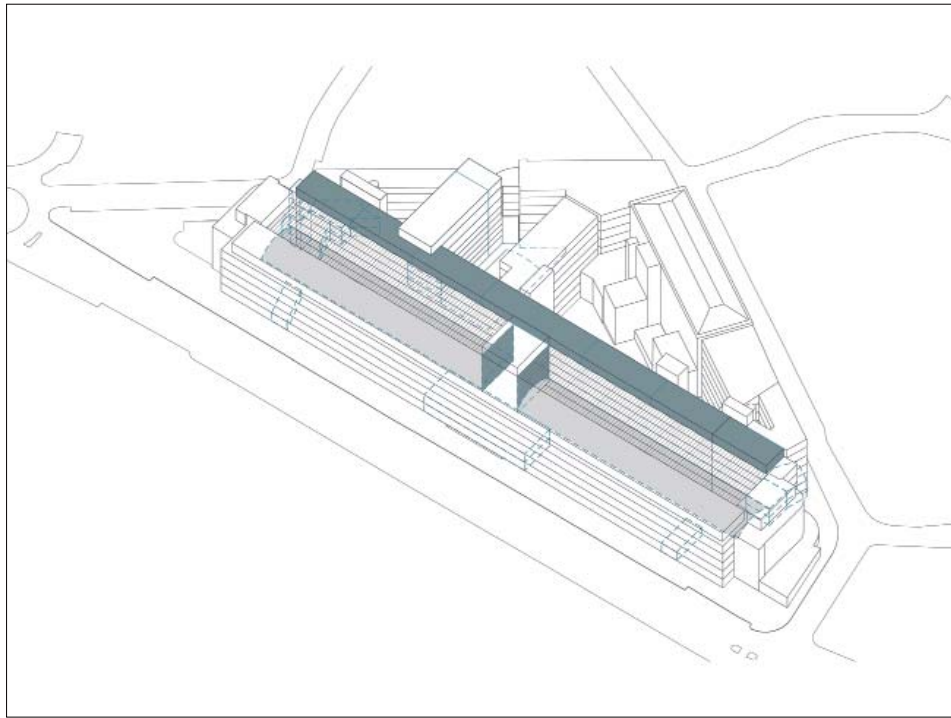
Horizontal Barrier



The banking hall is the only accessible area for citizens, which is segregated from other part of the bank by the arch glazing roof. The bank operates above the roof -- out of the public eyes. The arch roof has become a barrier between the bank and the public.

The horizontal division of functions and the long, dull hallway impede communication between management and employees, employees in different departments, and bank staff and the public.

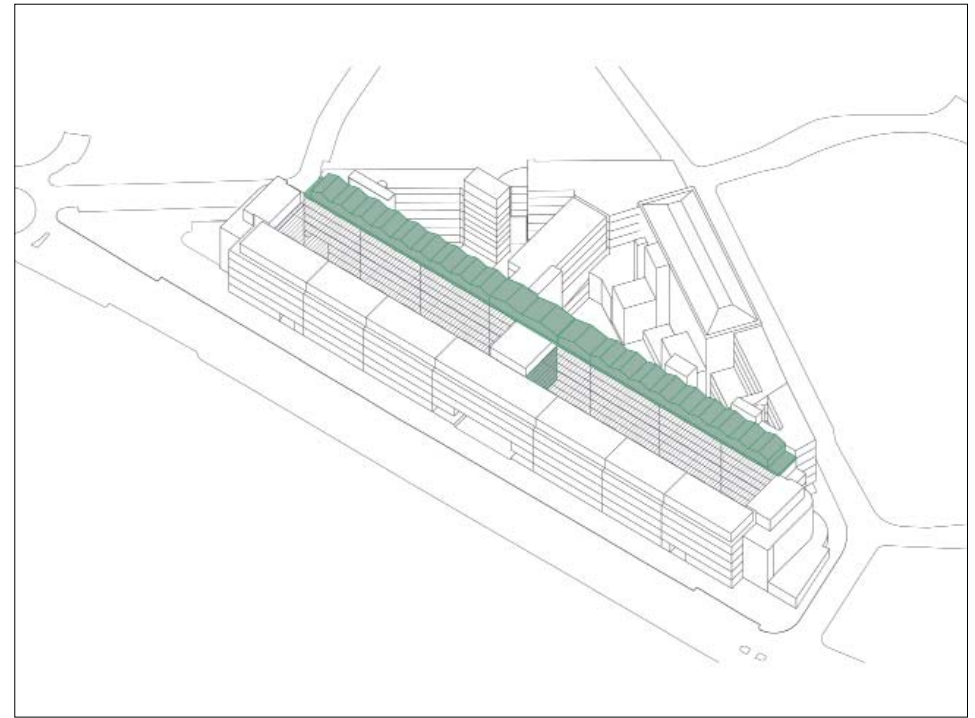
Demolish



Remove the arch glazing roof in the banking hall and the top floor of the back main building.

Remove the walls of on the central circulation core for vertical vegetation.

New Element



Replace the top floor with green houses, which accomodating gardening fields, greenery, informal meeting space, and a cafe.

Add vertical vegetation. The circulation core will work as lounge for the employees of the bank.

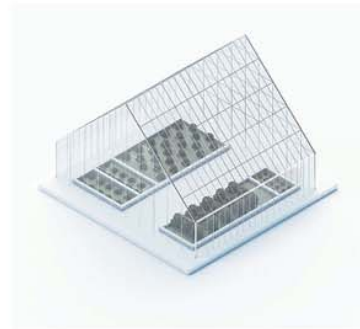
Reference for Greenhouse

FOOD PRODUCTION

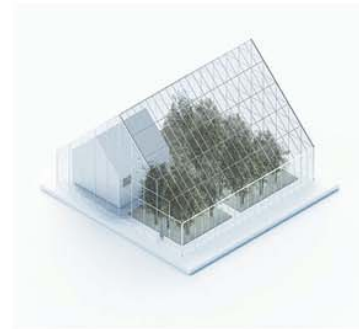
To ensure a year round yield



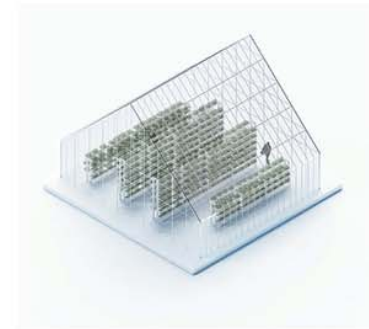
SEASONAL GARDEN



GREENHOUSE



HEATED GREENHOUSE

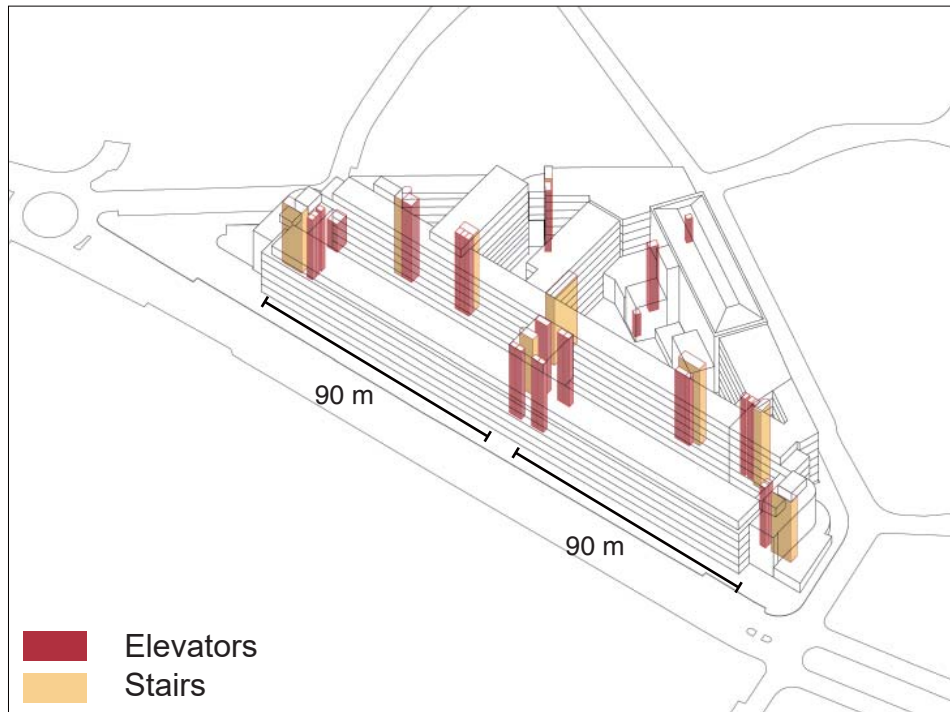


AQUAPONICS

The New Hall



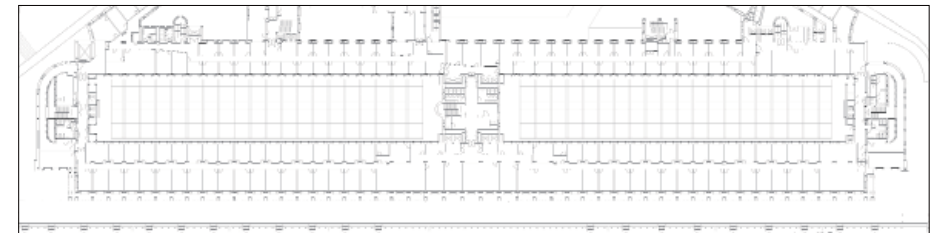
Existing Circulation



Location of the emergency stairs

- The **escape stairways** should go in **opposite areas** of the space.
- The **maximum distance from the escape route to the stairway** is fixed (not for technical rooms):

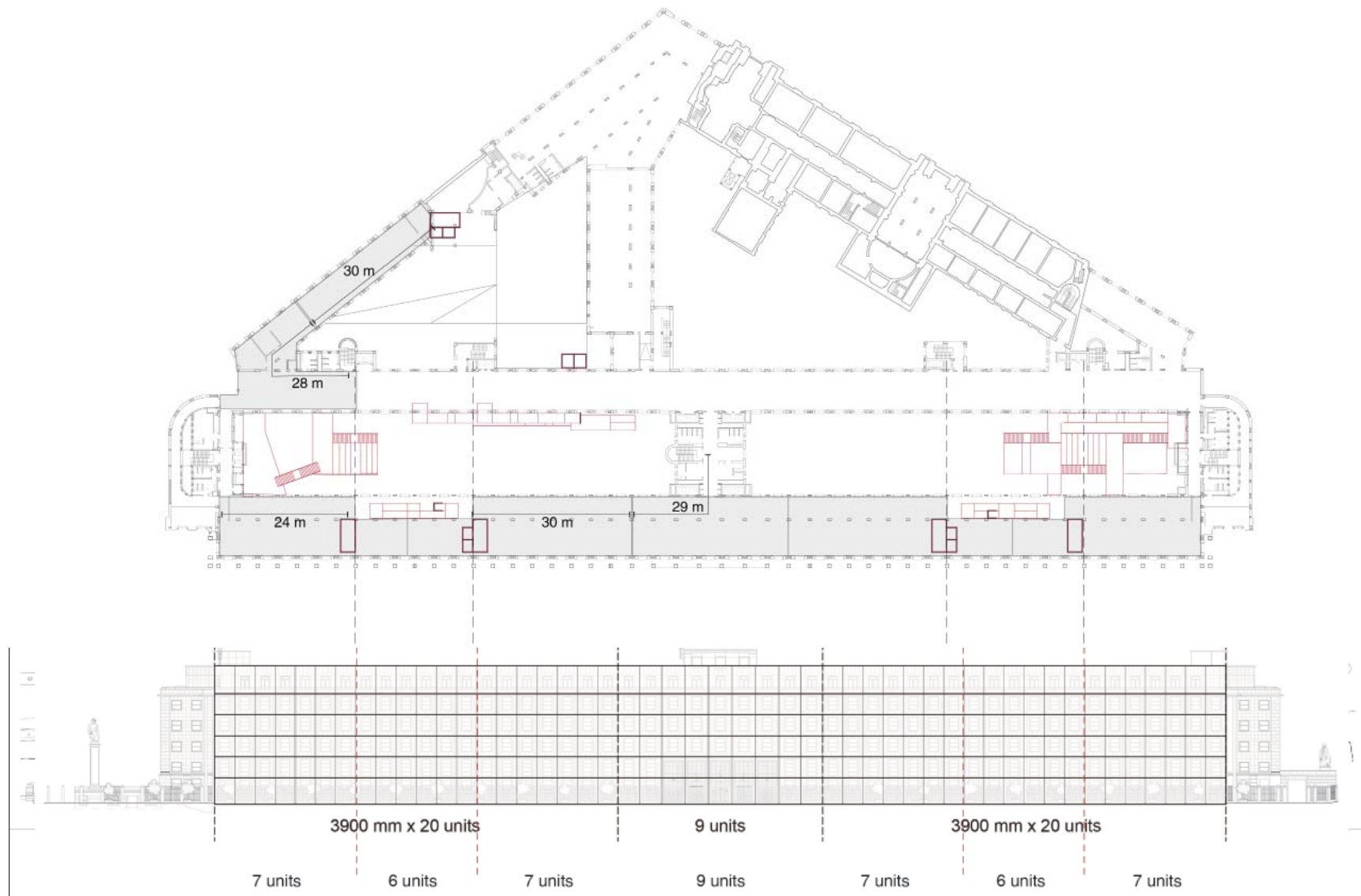
	Use of the building	
	By day	By night
To the road that connects the two stairs	≤ 30m	≤ 20m
To the nearest stair	≤ 45m	≤ 30m
To the other stair	≤ 80m	≤ 60m
Maximal distance for a dead-end evacuation road	≤ 15m	



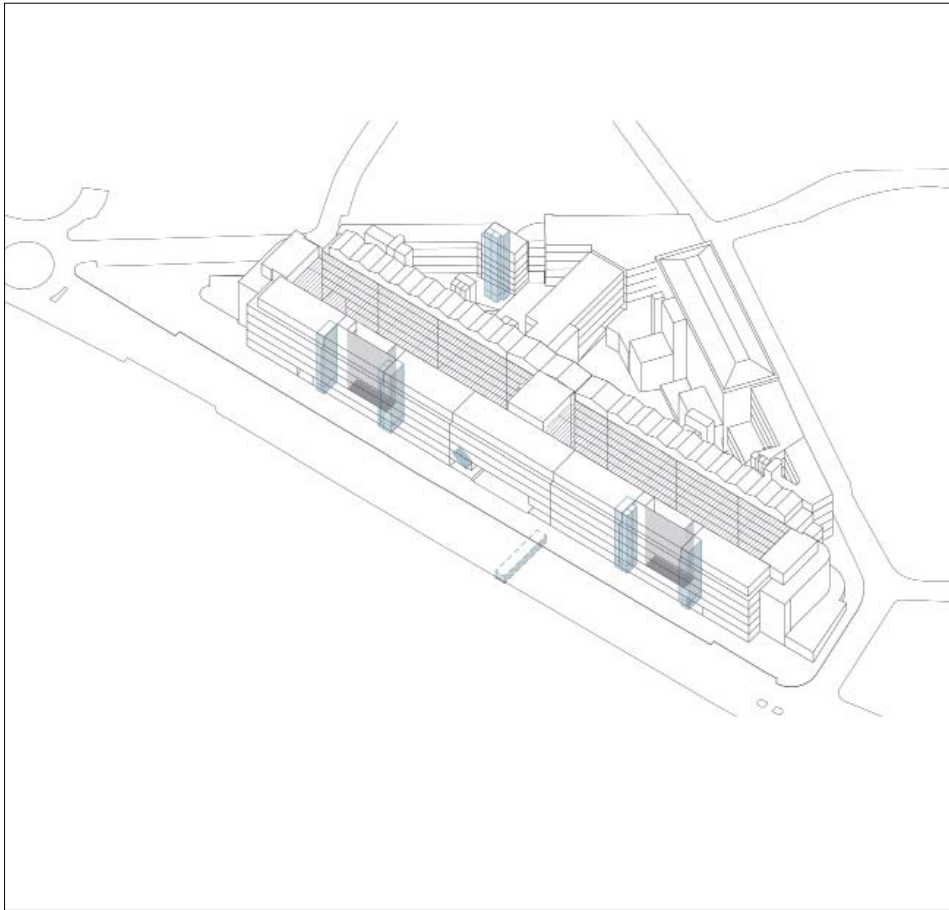
The front building is around 200 m long but there are only 3 circulation cores. The doorway is long and dull, with small offices and rooms on the both sides. The Belgium building regulation also calls for more stairs and elevators.

<https://www.jomy.com/en/solutions/fire-egress#regulatory-framework>

Escape Stairs

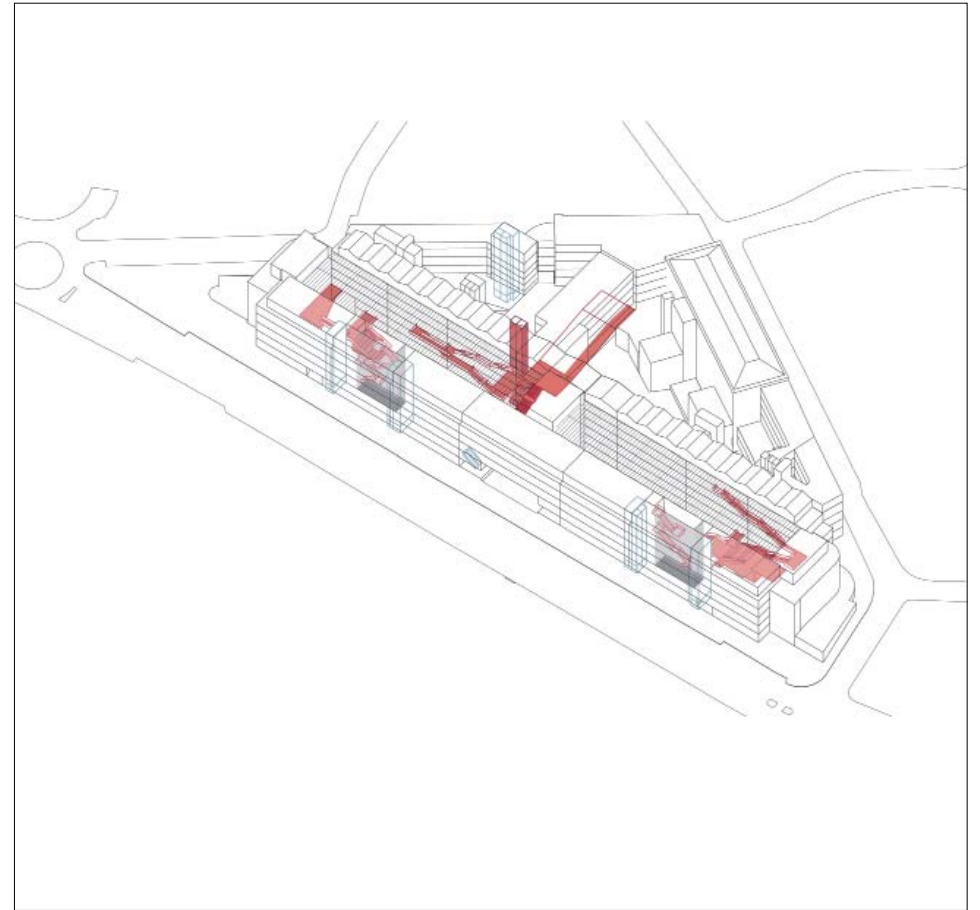


New Elements -- Escalators and Stairs



New staircases and elevators for the bank and rental areas.

Remove part of the floor slabs for escalators.

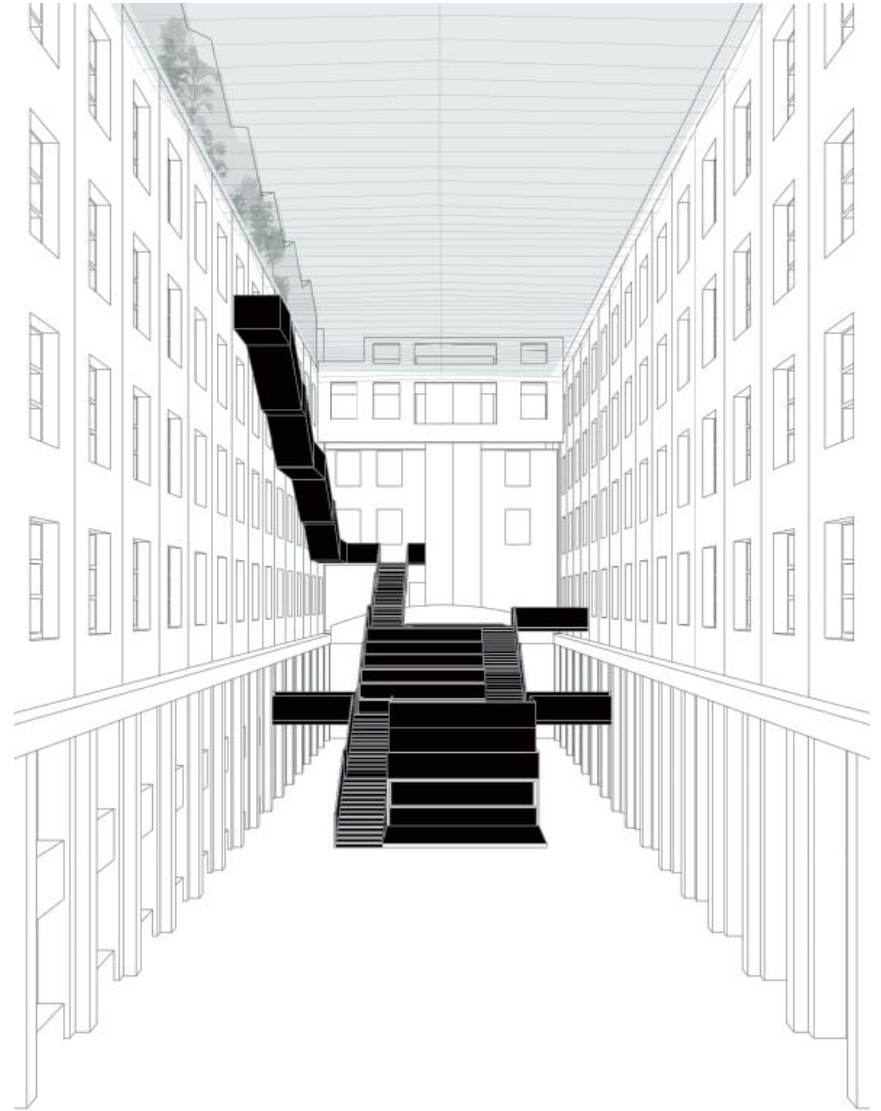


Add public circulation which also works as the 'encounter' space for all types of users.

Intervention
North Wing



South Wing

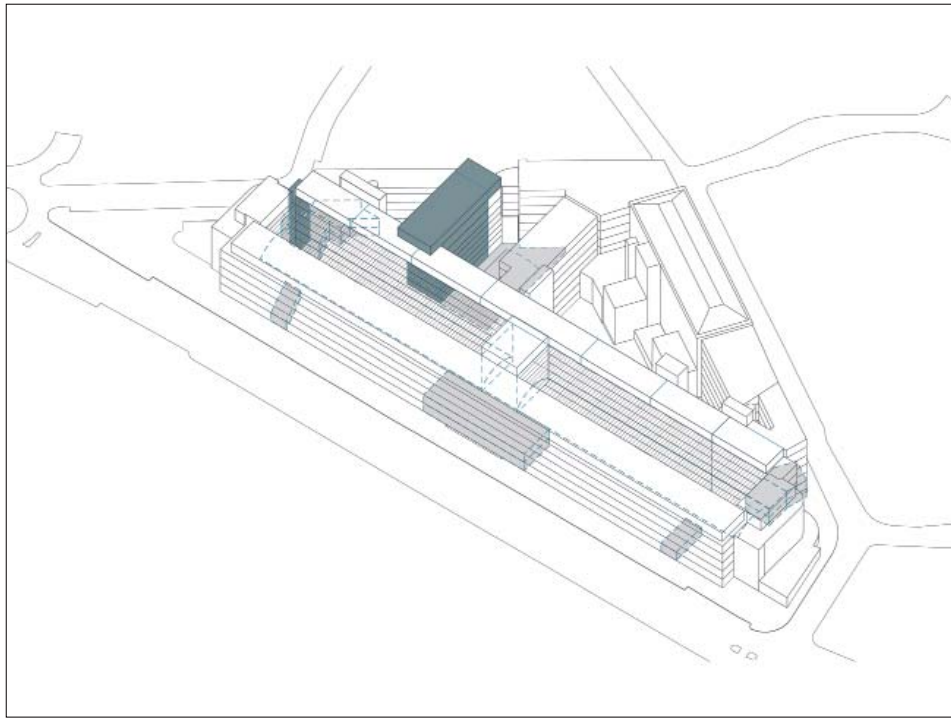


The New Hall



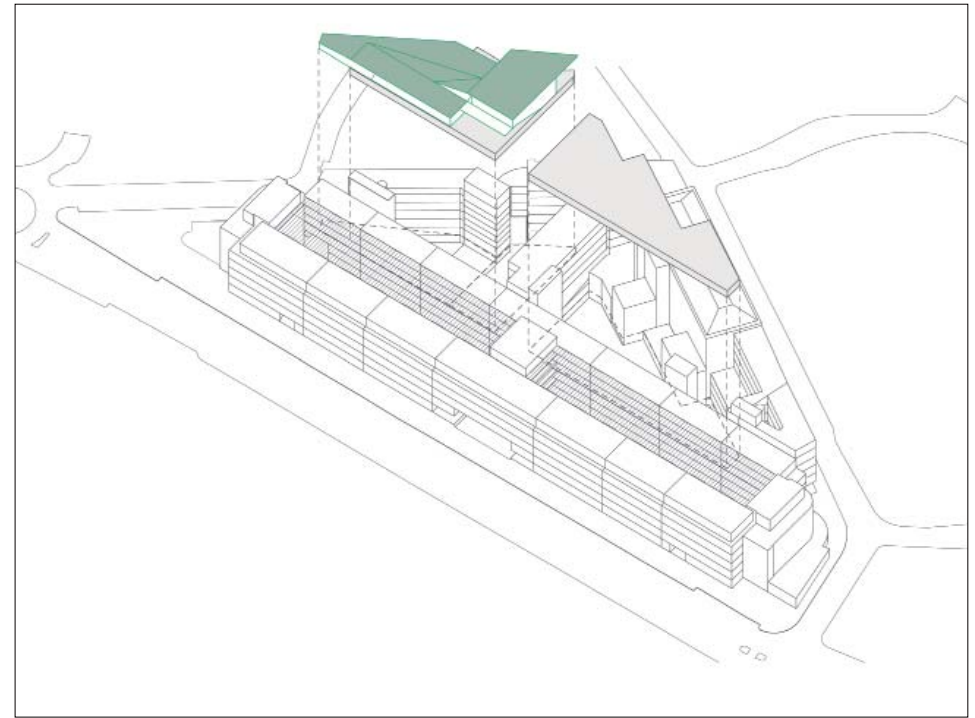


Demolish

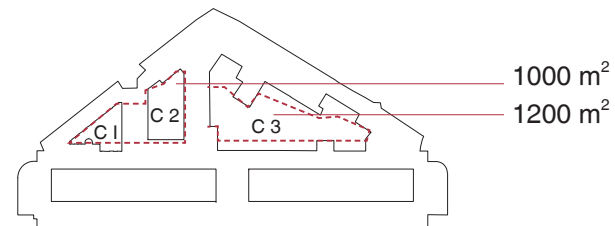


Remove the building block XVI and the roof of the courtyard 2,
Remove part of the ground floor and the elevator on the north end for new entrance.

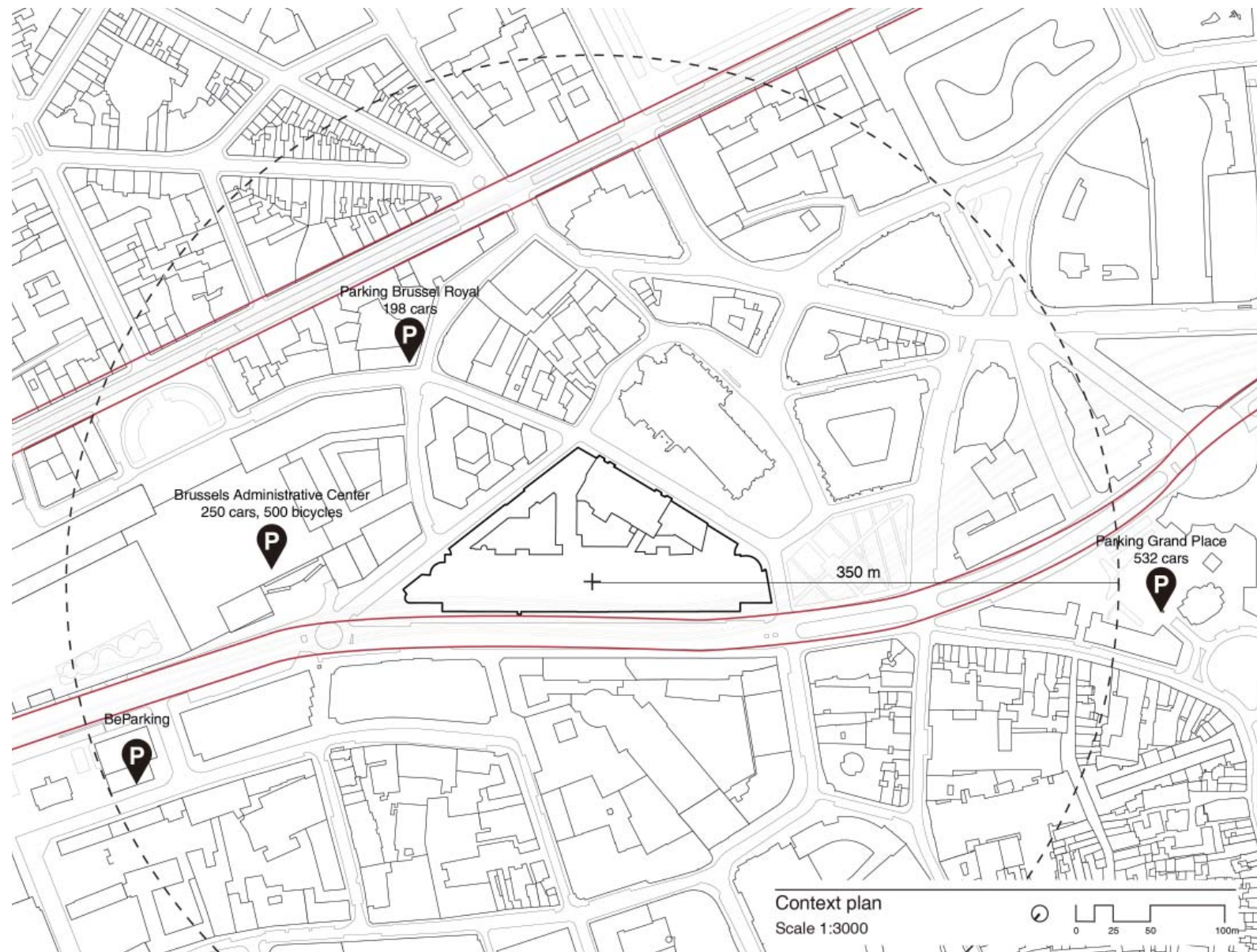
New Elements



Cover the two courtyards for car park and distribution (basement 1)
The north courtyard is for citizens and rental function. So the topography is reshaped to accommodate the auditorium, innovation labs, print shop, and group meeting rooms.



Car Park Close By



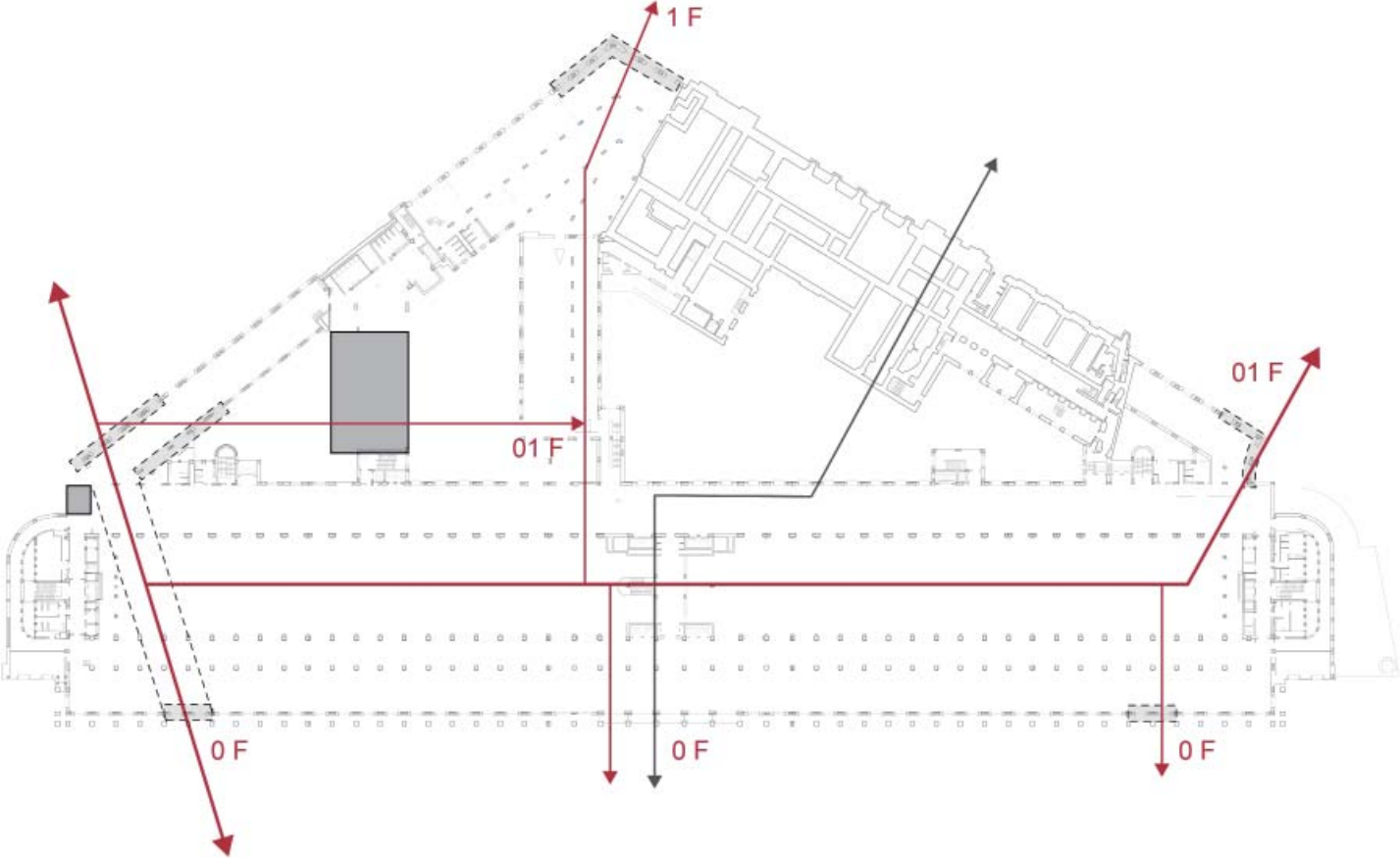
Within 350 m there are parking space for over 1000 cars.

Brief:
150 cars,
20 motorbikes

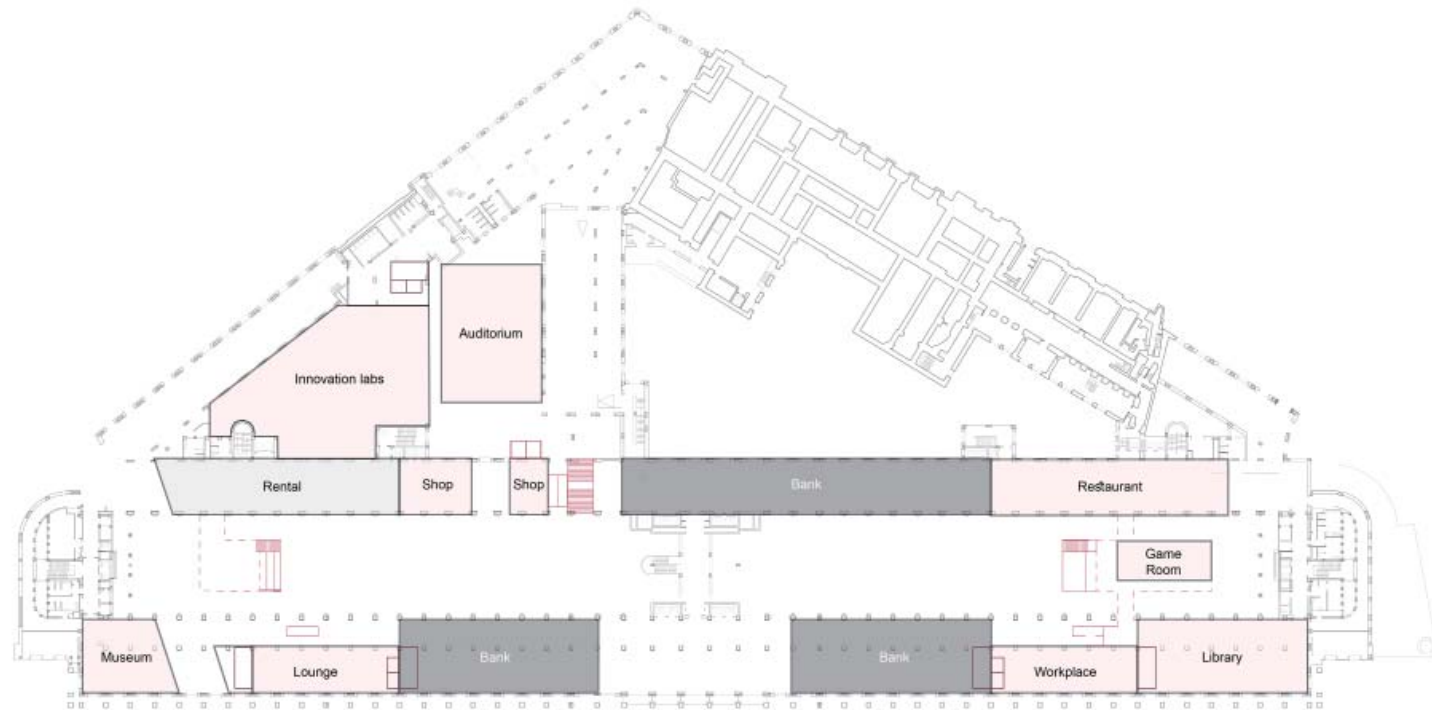


Parking of the bank:
30~40 cars
20 motorbikes
200 bicycles

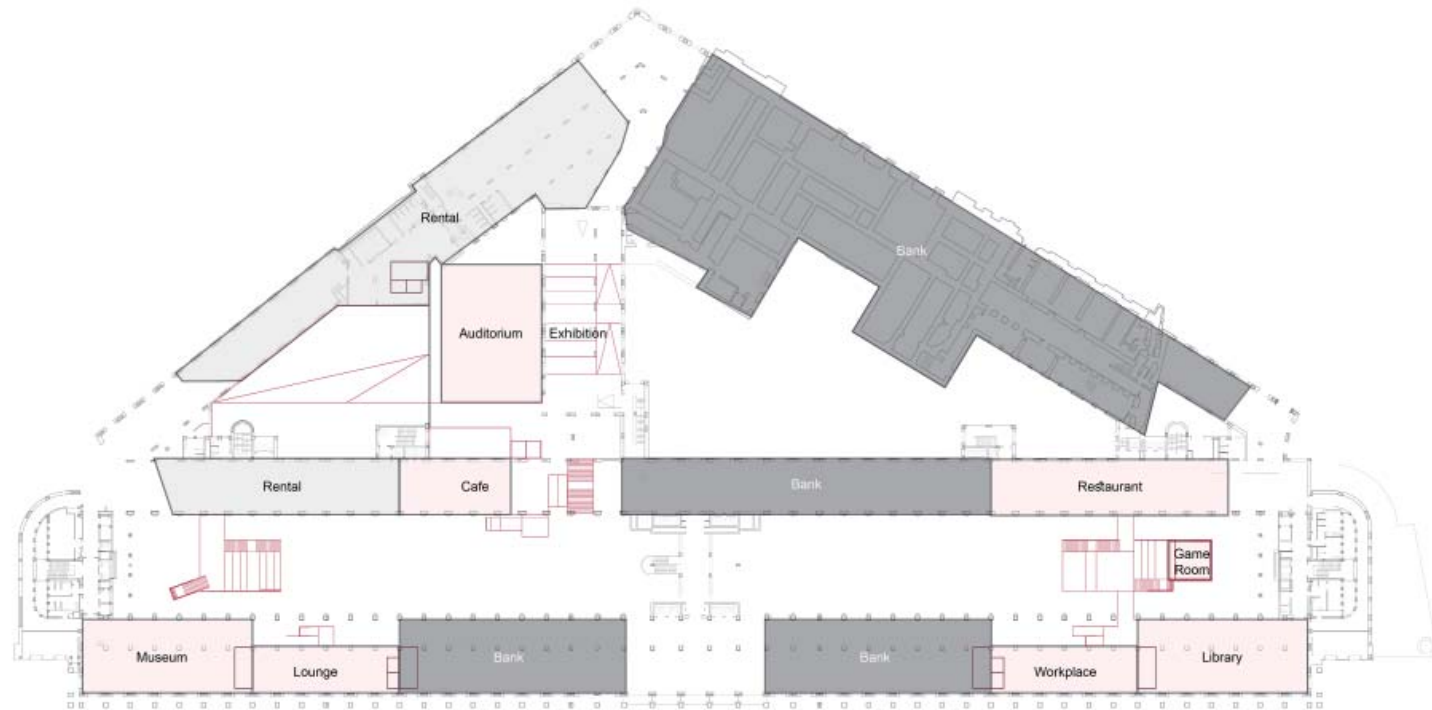
Demilishment and Connection on Ground Floor

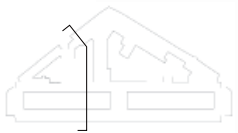
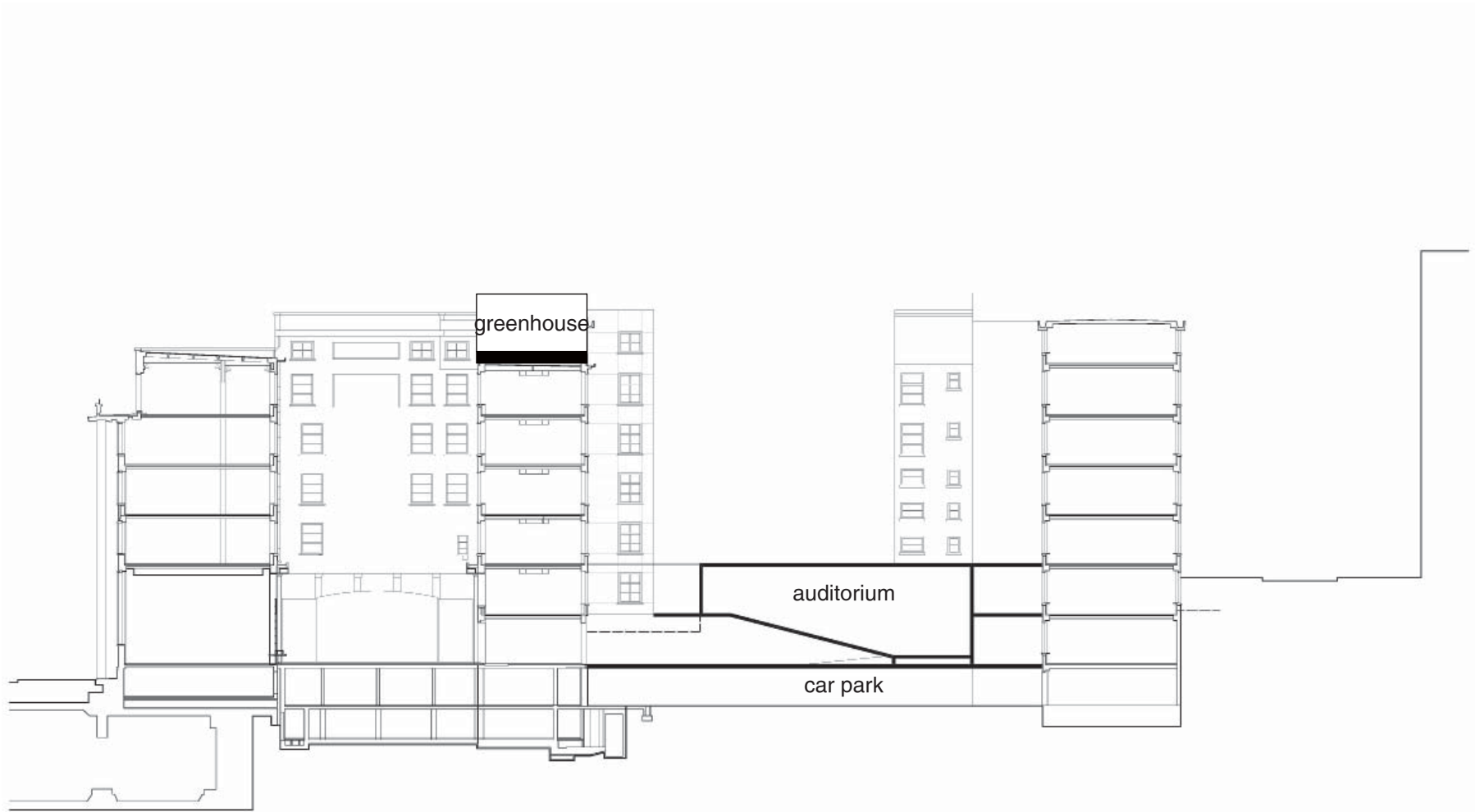


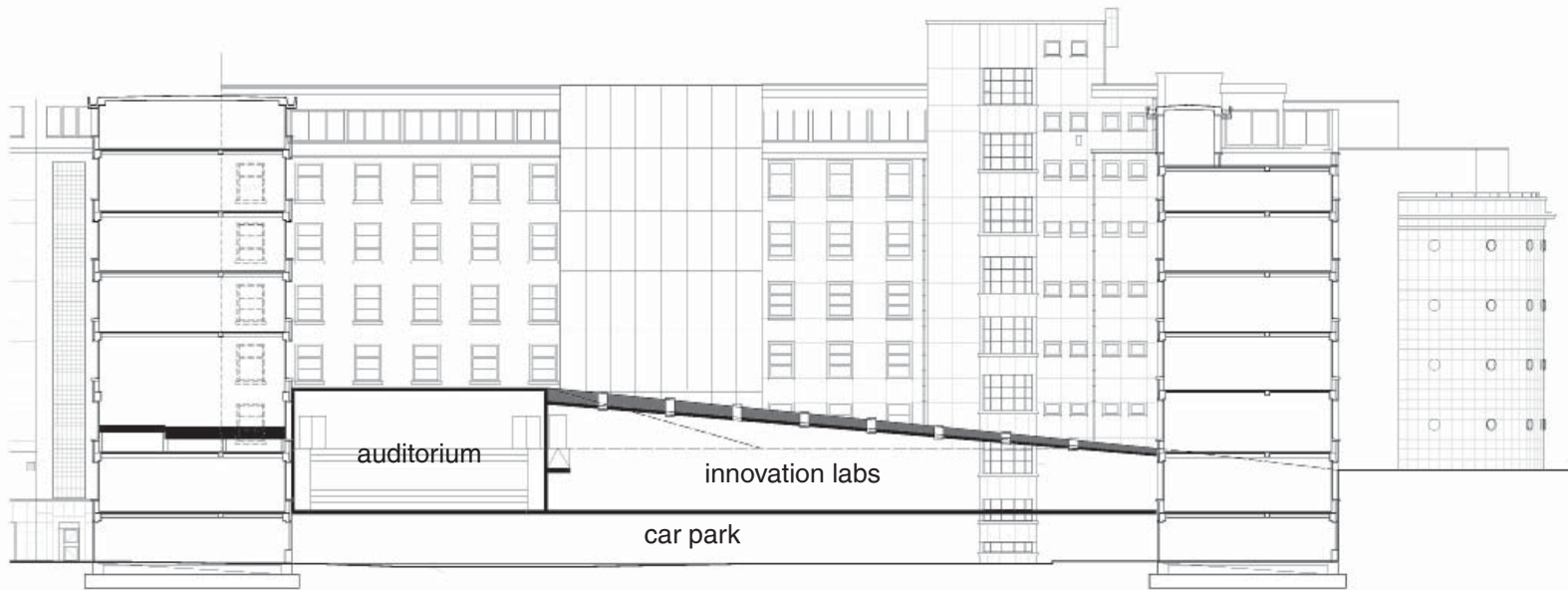
Ground Floorplan



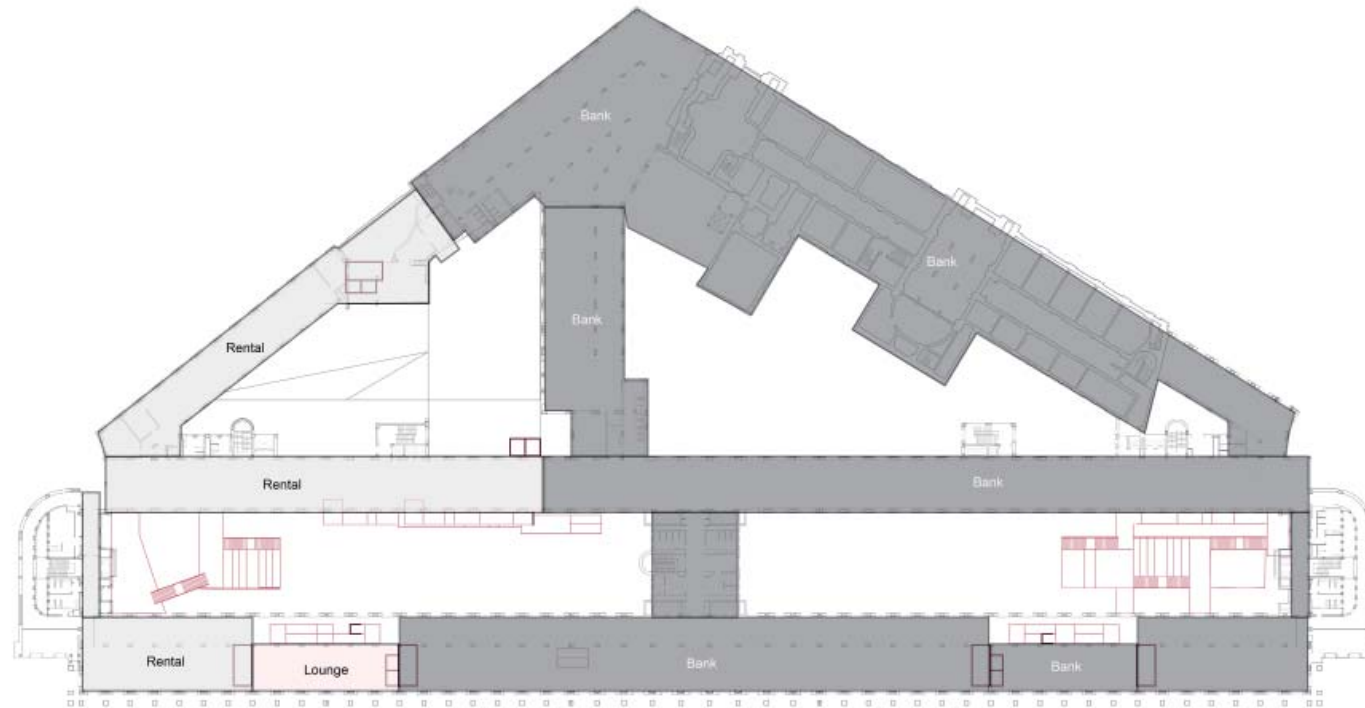
01 Floorplan



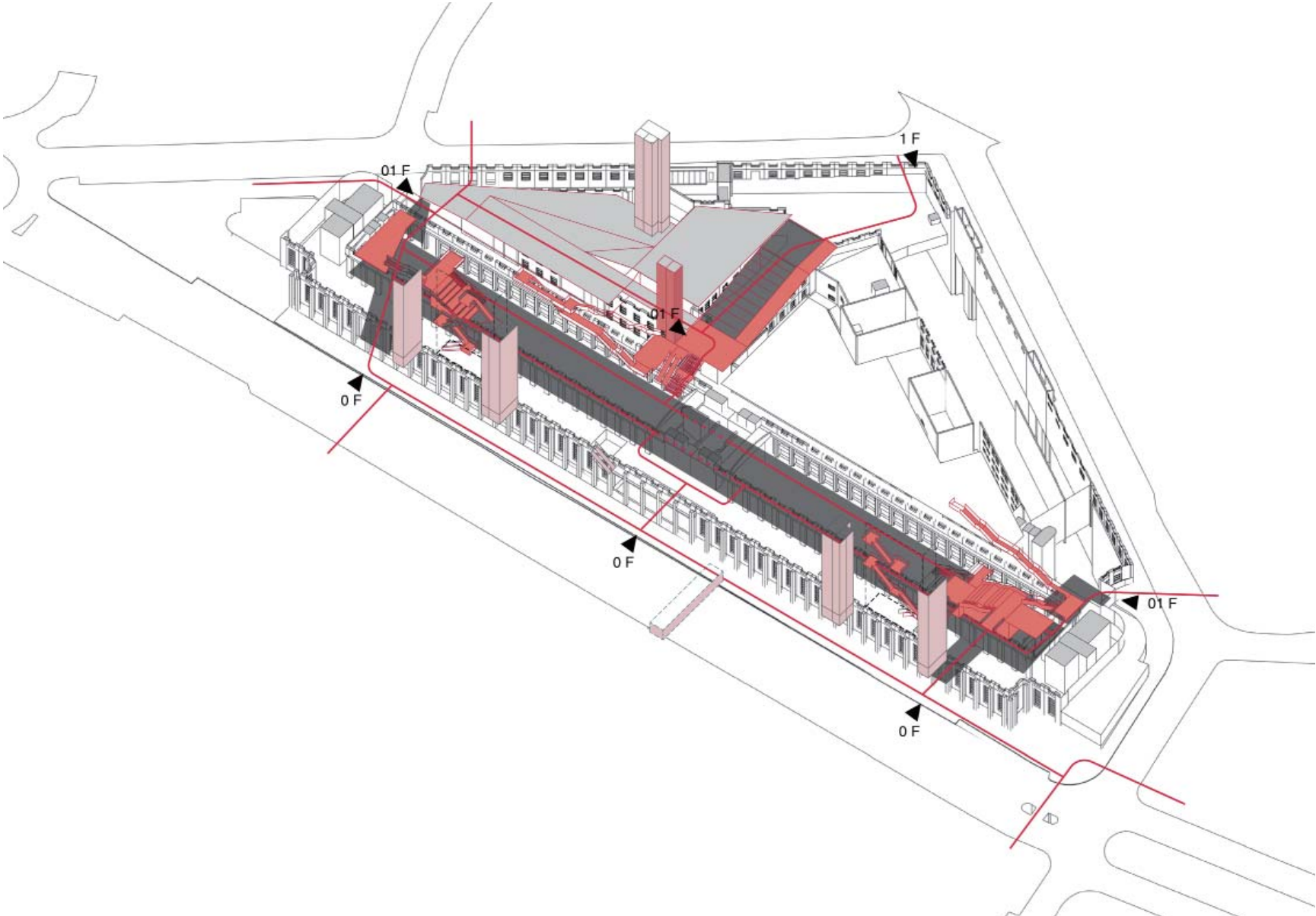




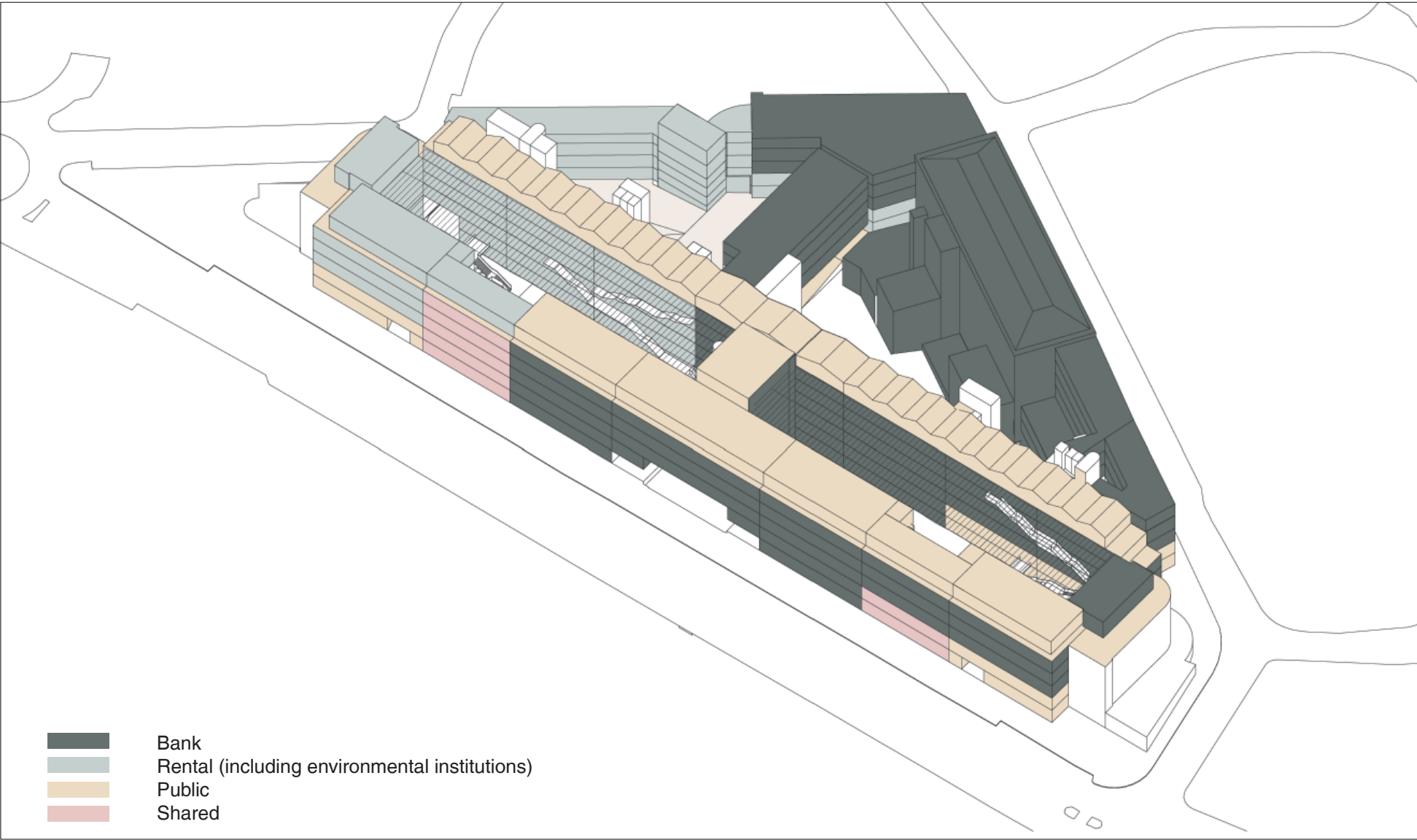
3 Floorplan



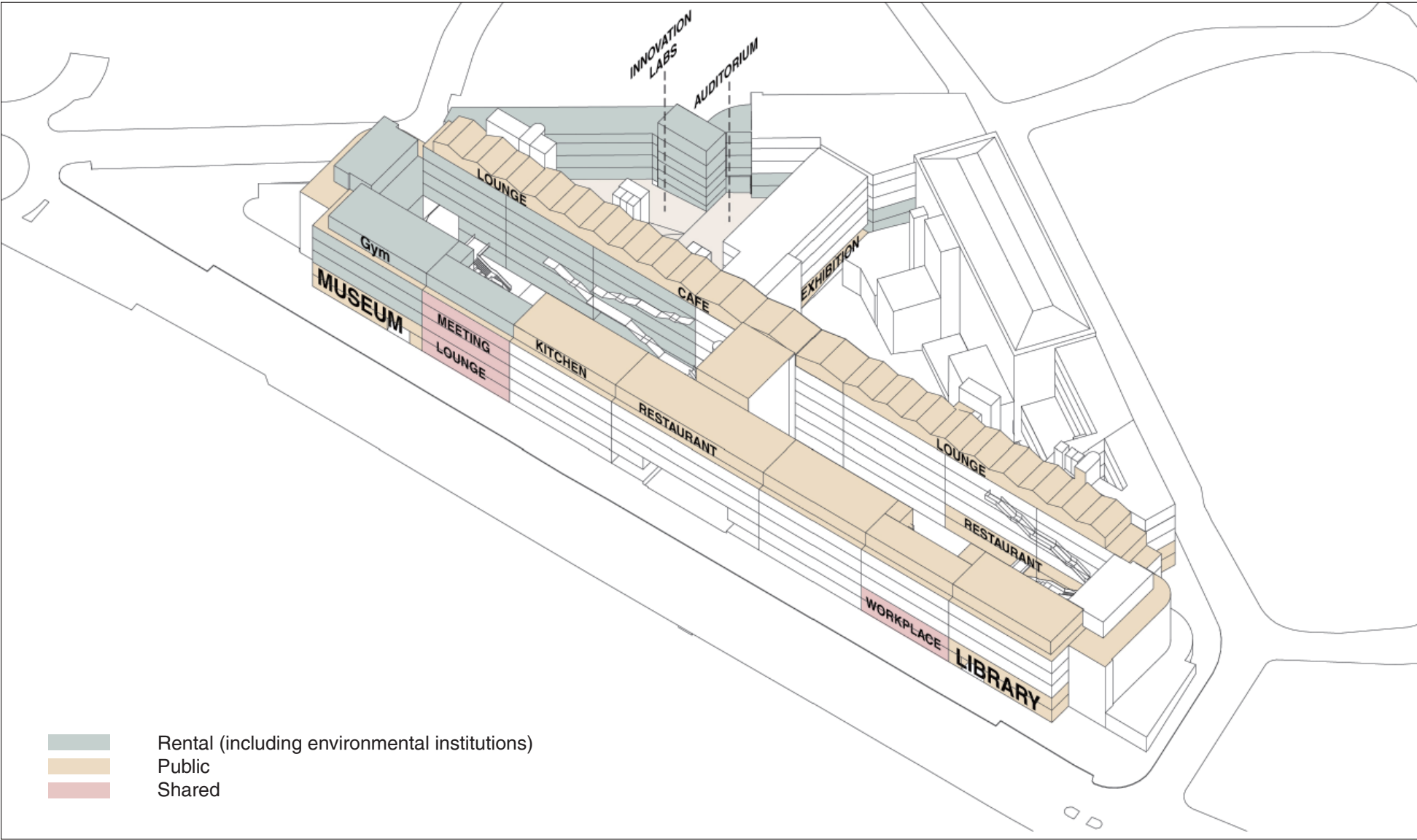
Circulation on Ground Floor



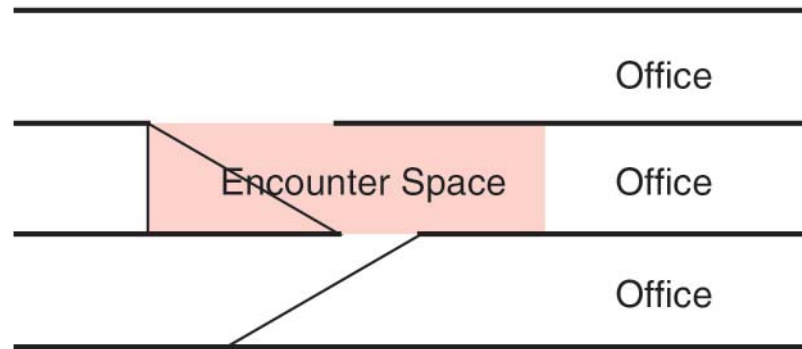
Bank-Rental-Public



Programmatic distribution

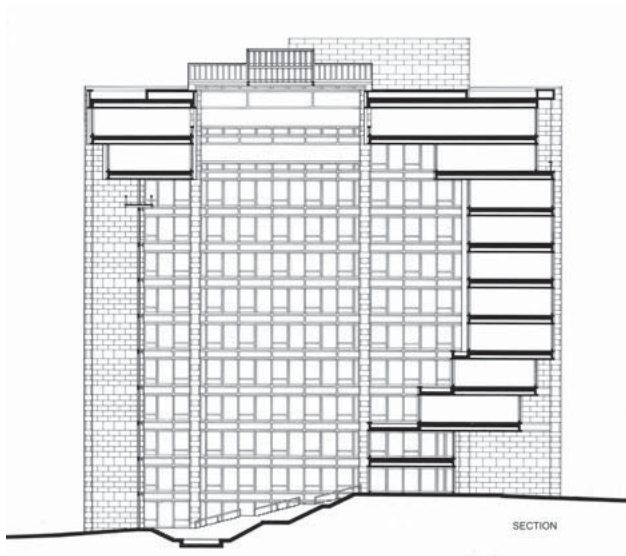
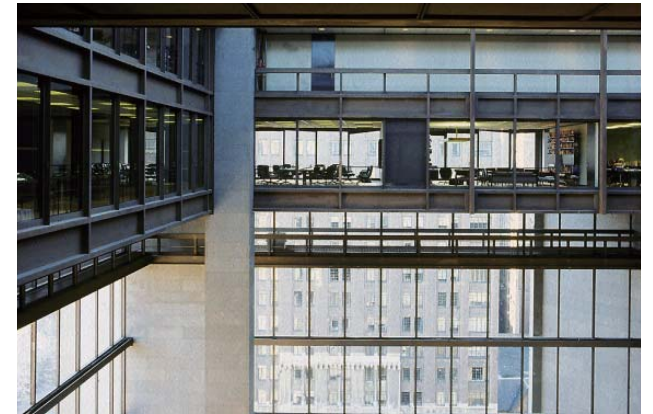


Encounter Space in Offices

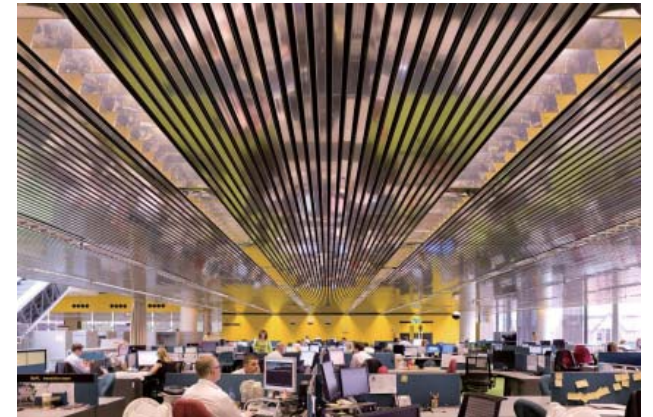


Office Precedent Who Proposes Public Interior As Their Image

Ford Foundation, New York, 1968, Kevin Roche John Dinkeloo and Associates



Willis Faber Dumas Building, Ipswich, 1975, Foster + Partners



Msc3 | Project Journal

Graduation Studio

AR3AI100 Interiores Buildings Cities

Msc 4

Chen YU

Student number: 5323045

January 2022

WEEK 3.1 - 3.2

P2 Feedback



Address from the mentor team:

You have made a very believable project, and we would like to see it develop over the coming months.

We find it a bold move to take away the ceiling. Also, the public interior is the bank's new image + a public roof on top.

We think you can 'grow' an atmosphere in the central banking hall: improving the visual and air quality of the environment (clean air, low blood pressure when looking at green etc.)

We think it is critical for you and your project to delve into the green aspects of the project. Urban farming needs a lot of backspaces: trucks arriving, rainwater that needs containment and reuse, how will you deal with manure (is this compost? Where does the compost come from? etc.)

We would like to encourage you to go much further than just stating all possible urban farming options (aquaponics etc.) and thoroughly investigating what urban farming entails, hence my question which plants you're going to grow.

As such, the green elements of your project could become a genuine drive for your project, one that stimulates and encourages the encounter of people, something you set as one of the measurements for the success of the project.

Further Research Questions

1. Combine the project with the bigger-scale ecological system.
2. Which vegetables and fruits can be grown?
 - Air pollution is measured in Belgium by growing strawberries on outside windowsills.
 - Food production. Plants selection and combination.
3. Greenery for employees.
 - Low blood pressure when looking at green
4. Improve indoor air quality.
 - Deal with air pollution, produce oxygen, use CO2
5. Backspaces for urban farming.
 - Trucks, rainwater collection and reuse, water supply system.
 - How to deal with manure? is it compost? where does it come from?

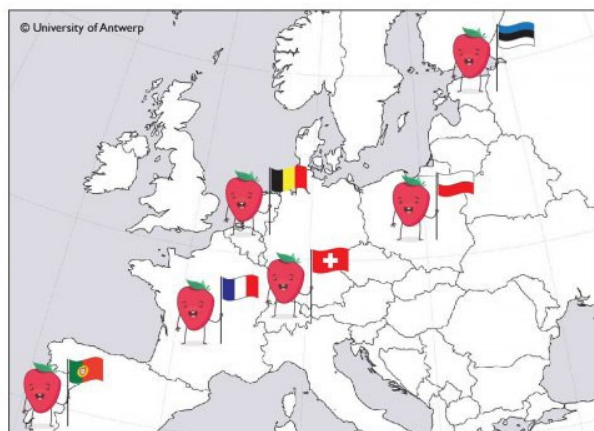
Research

Air quality

StrawbAIRies

to monitor traffic-related air quality in urban environments by means of the strawberry plant.

Plants: Strawberry and bird's-foot trefoil.



<https://www.uantwerpen.be/en/projects/strawbairies/about-strawbairies/>
<https://www.freshplaza.com/article/9094149/strawberry-plants-to-map-european-air-pollution/>
<https://www.uantwerpen.be/en/projects/strawbairies/strawbairies-europe/>

Review Article | Open Access | Published: 26 March 2020

Designing vegetation barriers for urban air pollution abatement: a practical review for appropriate plant species selection

Yendle Barwise & Prashant Kumar

<https://www.nature.com/articles/s41612-020-0115-3>

Effects of Urban Vegetation on Urban Air Quality

Dennis Y. C. Leung, Jeanie K. Y. Tsui, Feng Chen, Wing-Kin Yip, Lillian L. P. Vrijmoed & Chun-Ho Liu

Pages 173-188 | Published online: 17 Mar 2011

Download citation | <https://doi.org/10.1080/01426397.2010.547570>

https://www.tandfonline.com/doi/full/10.1080/01426397.2010.547570?casa_token=I29JqDLEvFAAAAAA%3A1oW-nMCFZrZzLTpYx0QFAD2ELUV8KS4FhD8U6YeGMFla49wop1pjo3Ci9Bk8CSgW64pLDlufEva3ug

Indoor plants and office environment

Foliage plants in offices

The results from this study suggest that **an improvement in health and a reduction in symptoms of discomfort** may be obtained after introduction of foliage plants into the office environment.

> The Effect of Indoor Foliage Plants on Health and Discomfort Symptoms among Office Workers

Fjeld T. · Veiersted B. · Sandvik L. · Riise G. · Levy F.

Author affiliations

<https://www.karger.com/article/Abstract/24583>

living plants' effect on humidification, temperature, noise levels, and perception

In practice the humidification effect of the plants was not discernible. The volume of water supplied to the plants over the investigation period, together with calculations of their typical transpiration rates based on the literature, suggests that during winter months, indoor plants offer the potential to reduce mechanical humidification power requirements by up to 75 per cent.

Changes in perception were shown to contrast those physical data measured in relation to indoor RH, temperature and background noise levels. This misperception probably results from optimism or acquiescence bias and suggests that future perception surveys of indoor planting need to account for this, in questionnaire design. The most marked improvement related to aesthetics in the experimental zone where the plants were located, supporting an argument that **office occupants appreciate the presence of natural elements such as plants.**

Indoor living plants' effects on an office environment

Andrew J. Smith, Andrew Fsadni, Gary Holt

Facilities

ISSN: 0263-2772

Article publication date: 4 July 2017

DOWNLOADS



ALTMETRICS



<https://www.emerald-com.tudelft.idm.oclc.org/insight/content/doi/10.1108/F-09-2016-0088/full/html>

Urban agriculture and rooftop greenhouses

Review Article | Published: 09 May 2013

Urban agriculture in the developing world: a review

Francesco Orsini, Remi Kahane, Remi Nono-Womdim & Giorgio Gianquinto

Agronomy for Sustainable Development 33, 695–720 (2013) | [Cite this article](#)

<https://link.springer.com/article/10.1007/s13593-013-0143-z>

Advances in greenhouse automation and controlled environment agriculture: A transition to plant factories and urban agriculture

R. Shamshiri, Redmond; Kalantari, Fatemeh; Ting, K. C.; Thorp, Kelly R.; Hameed, Ibrahim A.; Weltzien, Cornelia; Ahmad, Desa; Shad, Zahra Mojgan

v

Case Study | Published: 10 October 2014

Exploring the production capacity of rooftop gardens (RTGs) in urban agriculture: the potential impact on food and nutrition security, biodiversity and other ecosystem services in the city of Bologna

Francesco Orsini, Daniela Gasperi, Livia Marchetti, Chiara Piovene, Stefano Draghetti, Solange Ramazzotti, Giovanni Bazzocchi & Giorgio Gianquinto

<https://link.springer.com/article/10.1007/s12571-014-0389-6>

Analysis of urban agriculture solid waste in the frame of circular economy: Case study of tomato crop in integrated rooftop greenhouse

Ana Manríquez-Altamirano, Jorge Sierra-Pérez, Pere Muñoz, Xavier Gabarrell

https://www.sciencedirect.com/science/article/pii/S0048969720328928?casa_token=2IaKv6AHC9EAAAAA: AQ9mIQQPAlqSII9FJk1MOZ4evI5sai_w_PRRBytPiDvc1N78EqWero1NTNi1msZ_wsJv3ZHiKY4E

Research

Vertical farm and built environment



the carbon footprint of the practice can be many times greater than greenhouse horticulture and open field farming due to the energy demands of multi-spectra LED lamps, mechanical ventilation, and cooling systems used to create carefully controlled and optimised growing conditions.

'The environment is comfortable, there is a pleasant breeze, and you can hear the trickling of water as nutrients flow around the system. As you look up, the multiple growing layers are impressive, and it is amazing to see just how much food can be grown in such a small footprint.'

the symbiotic integration of vertical farms in the built environment, including circular use of water, heat and CO₂, has the potential to contribute to sustainability.

Approximately 50 percent of the energy used by LED lighting is converted into heat, which needs to be extracted to maintain optimum growing conditions. Capture as much of this heat as possible to reuse it in neighborhood heat grids to reduce the energy use of host buildings and adjacent buildings alike.

<https://www.tudelft.nl/en/stories/articles/resource-sharing-between-vertical-farms-and-the-built-environment>

Vedio: Plant flats with LEDs



<https://www.nwo.nl/en/researchprogrammes/perspectief/perspectief-programmes/sky-high-vertical-farming-revolution-plant>



<https://weburbanist.com/2019/12/11/fresh-greens-vertical-urban-farms-are-turning-global-consumers-into-localvores/>

Cases: Vertical Urban Farms



SOA Architects: The Vertical Farm

<https://www.urbanismo.com/arquitecturayurbanismo/the-vertical-farm/>



Mithun: centre for urban agriculture

<https://mithun.com/project/center-for-urban-agriculture/>

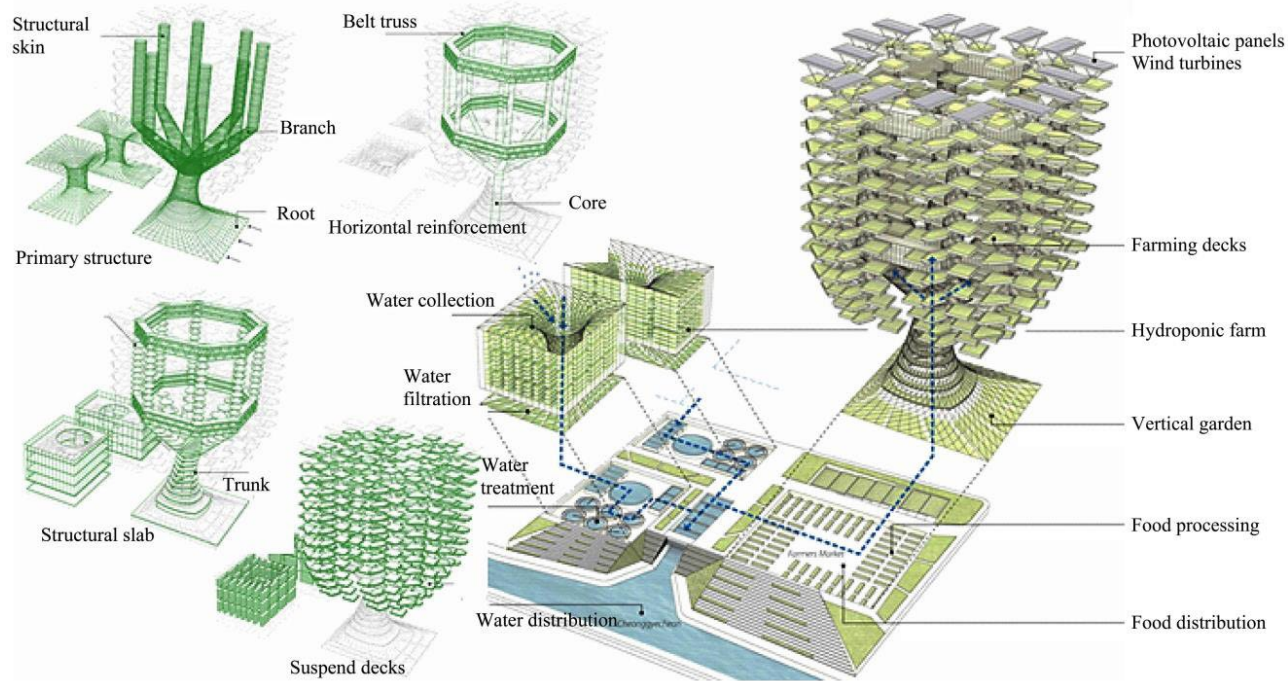


The living tower

<https://weburbanist.com/2008/03/30/5-urban-design-proposals-for-3d-city-farms-sustainable-ecological-and-agricultural-skyscrapers/>



The Urban Skyfarm



Vegetation for office environment



The Growroom: IKEA Flat-Pack Spherical Garden

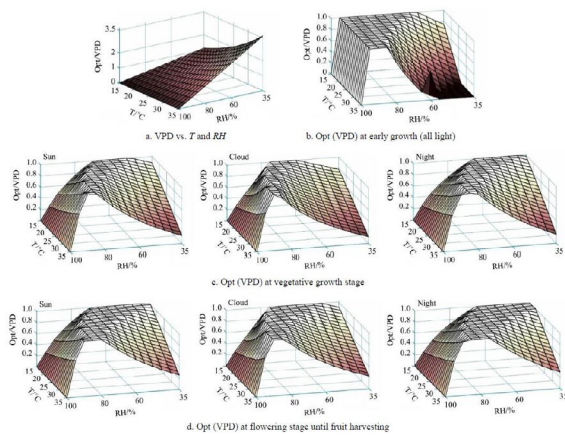
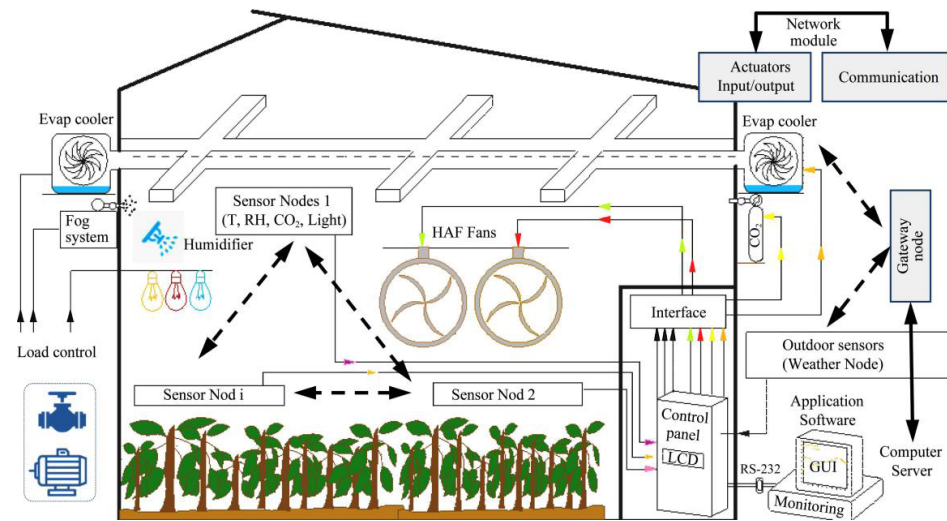


Recycled Cardboard Tube Garden

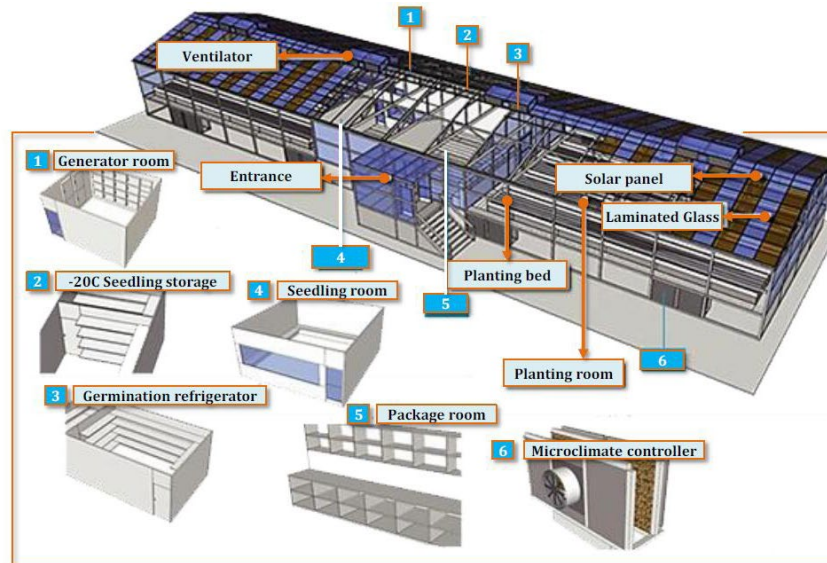
Greenhouses

Advances in greenhouse automation and controlled environment agriculture: A transition to plant factories and urban agriculture

Redmond Ramin Shamshiri^{1*}, Fatemeh Kalantari², K. C. Ting³, Kelly R. Thorp⁴, Ibrahim A. Hameed⁵, Cornelia Weltzien⁶, Desa Ahmad¹, Zahra Mojgan Shad⁷



different light conditions and growth stages in greenhouse tomato cultivation

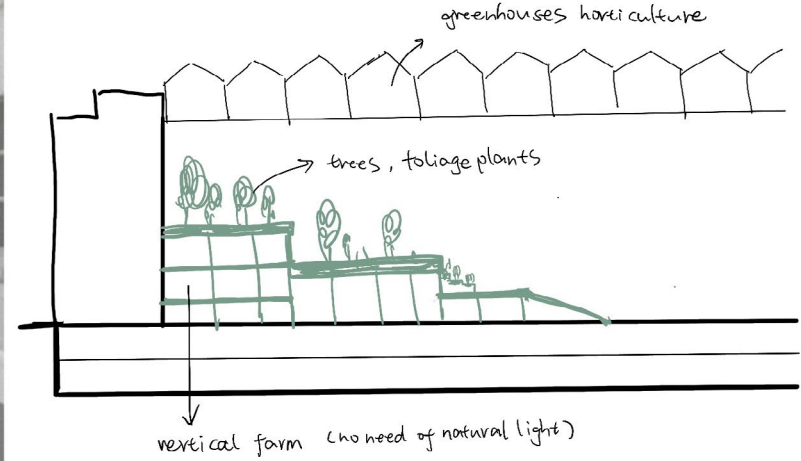
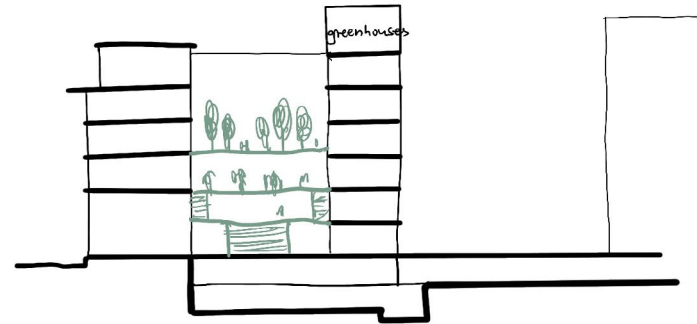


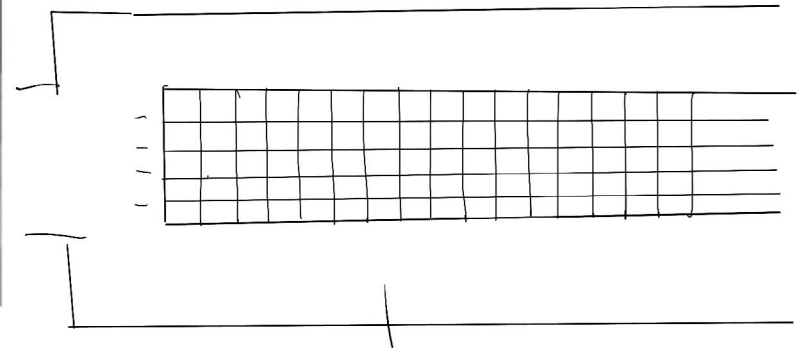
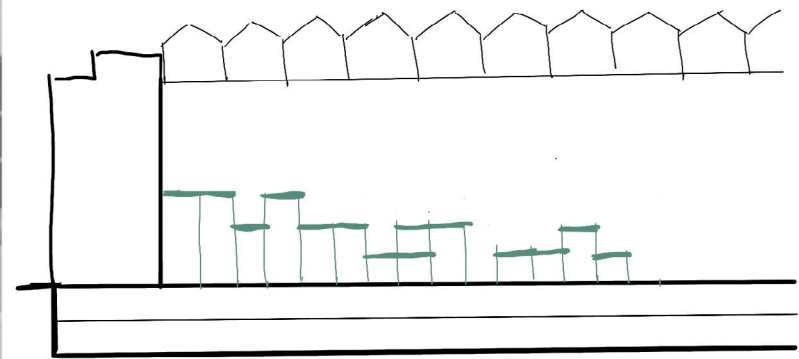
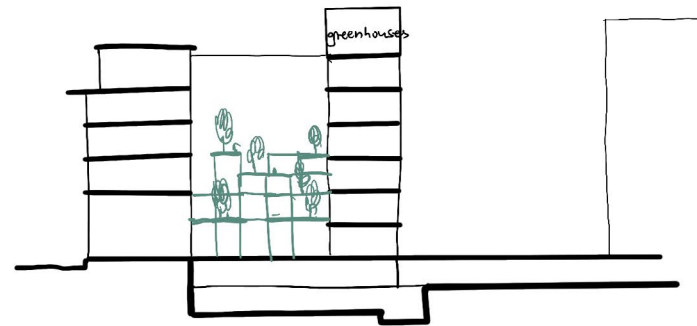
Source: Adapted from <http://www.richfarm.com.tw>.

Figure 11 General structure design of a plant factory

<https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2587902>









Mithun: centre for urban agriculture

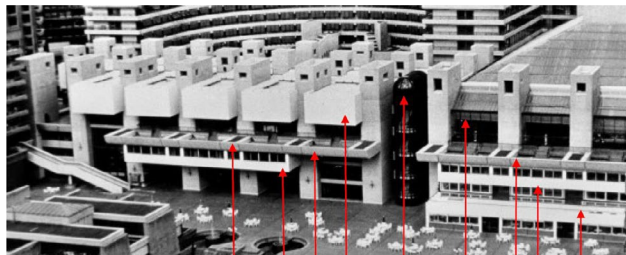
WEEK 3.3

Precedent: The Barbican Center

The Barbican Center



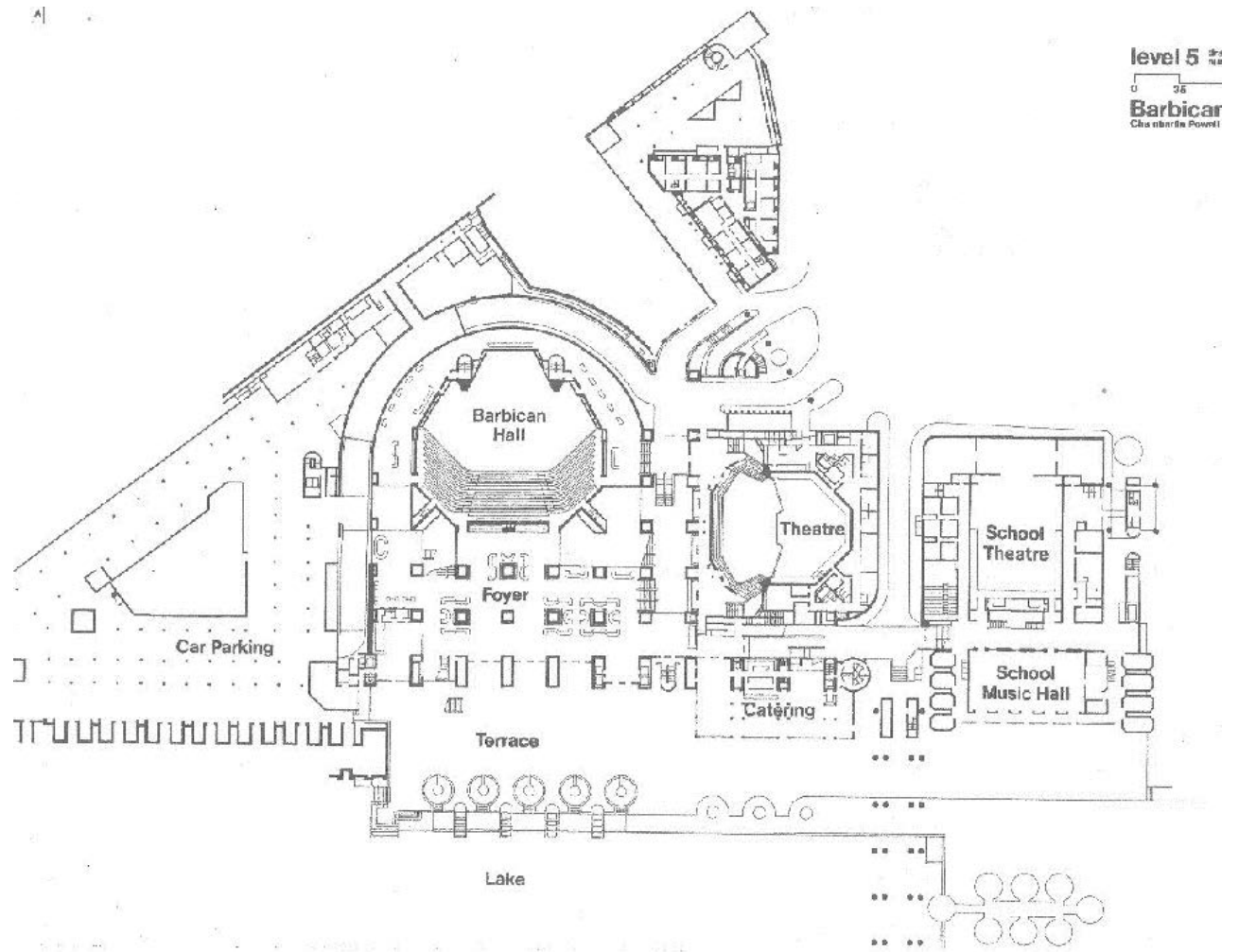
The Barbican Arts Centre in its context



South facade: principal features

- Planters
- Library
- Terrace with boat edge profile
- Art Gallery pods
- Glazed staircase
- Conservatory & Garden Room
- Restaurant
- Cafe

Ground floorplan



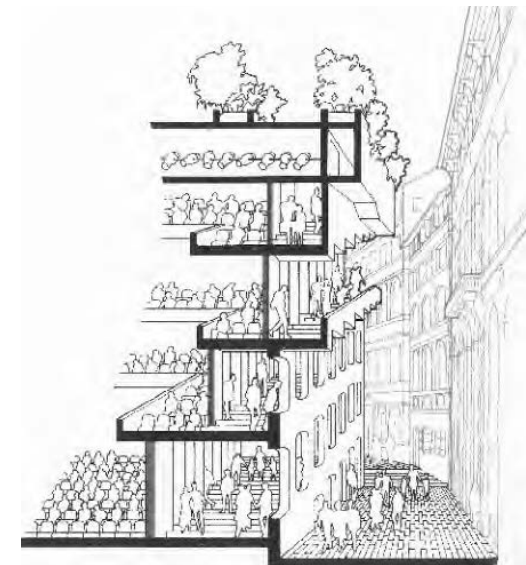
level 5
0 25
Barbican
Chris Charles Powell

<https://democracy.cityoflondon.gov.uk/documents/s144575/THE%20BARBICAN%20LBMG%20Volume%20III%20final%20Draft%20Whole%20document.pdf>

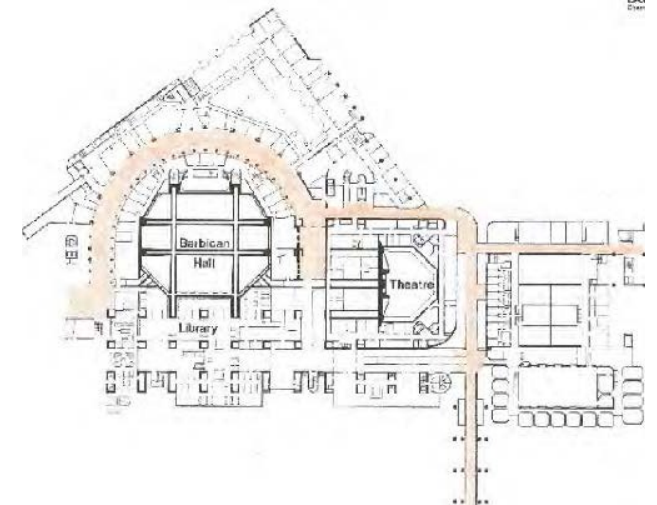
The Barbican Center

3. What is also unusual is that although the concentration of the various cultural facilities into a central location was a key intention of the scheme, the Arts Centre itself was not conceived with a conventional 'front door', but rather as a cluster of venues accessed from a variety of approaches and linked internally by a series of shared public spaces. In this respect the Centre might be seen as a microcosm of the Barbican estate itself, which has been compared to a small Medieval town, where routes are threaded between, under and through buildings, from multiple points of perimeter access.

4. The various entrance points to the Centre should accordingly be seen as a series of gateways leading both to and between the respective venues, and also beyond, across the wider estate and into the City. This confers a particular significance on the foyers and circulation areas – namely that they are to be understood primarily as open public realm, providing access around and between the separate 'buildings' – Concert Hall, Theatre, Art Gallery, etc – equivalent to the external public realm in a city centre, except that here they are indoors. Whilst the Silk Street entrance may dominate, the range of other access points should not be undervalued.



Early CPB drawing showing foyers as 'civic realm'



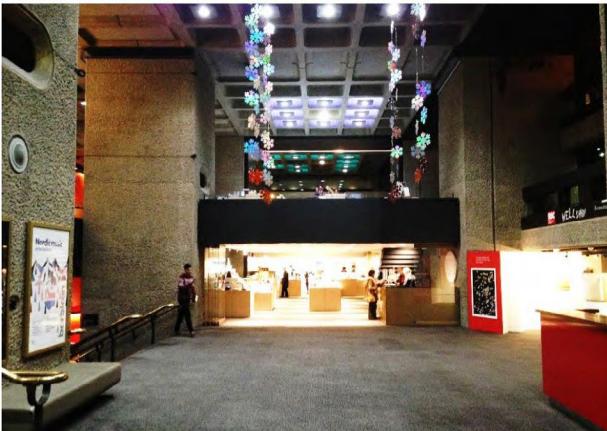
Plan over-marked to show alternative southern eastern and western approach routes

The Barbican Center

Foyers as public realm



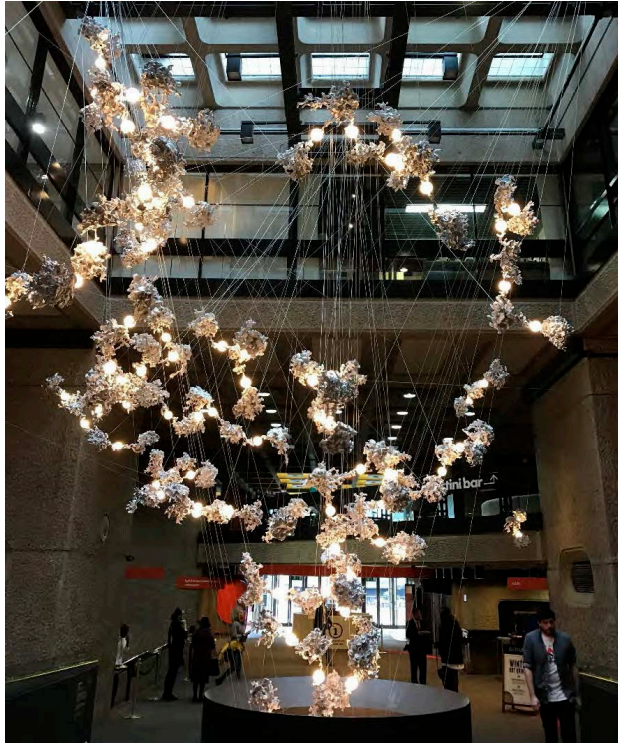
Original view across mezzanine looking north towards Silk Street entrance showing staircase now removed. Santry sculpture is visible, left. (Note alternating colour of carpet on stairs.)



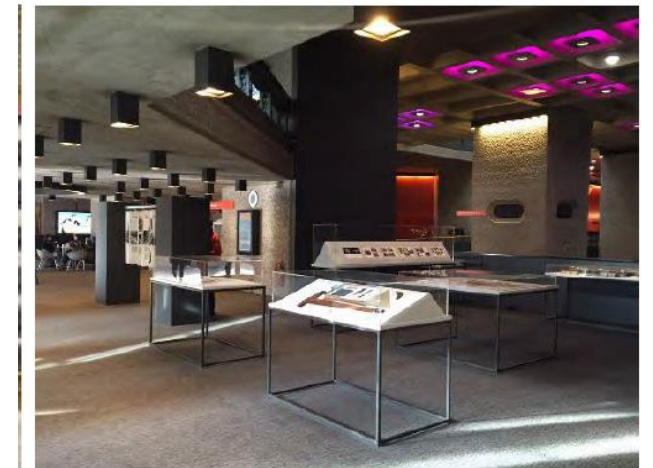
View of new retail floor inserted into foyer space. (Compare with original view above, p.41 top picture)



The gantry apparatus fixed below principal foyer rooflight



Foyer café (left), seasonal craft stalls (right)

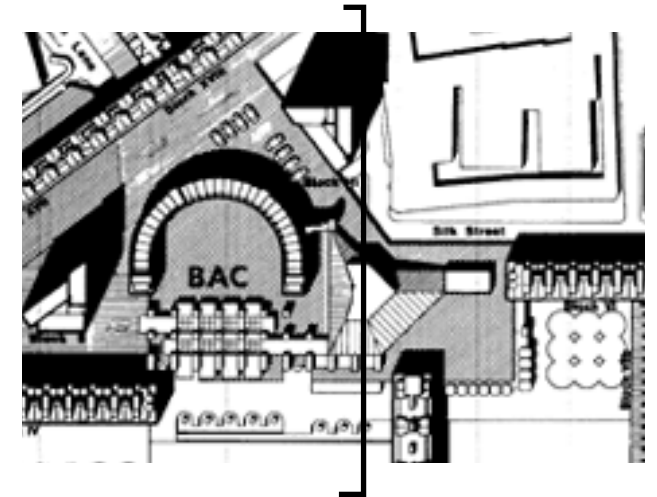
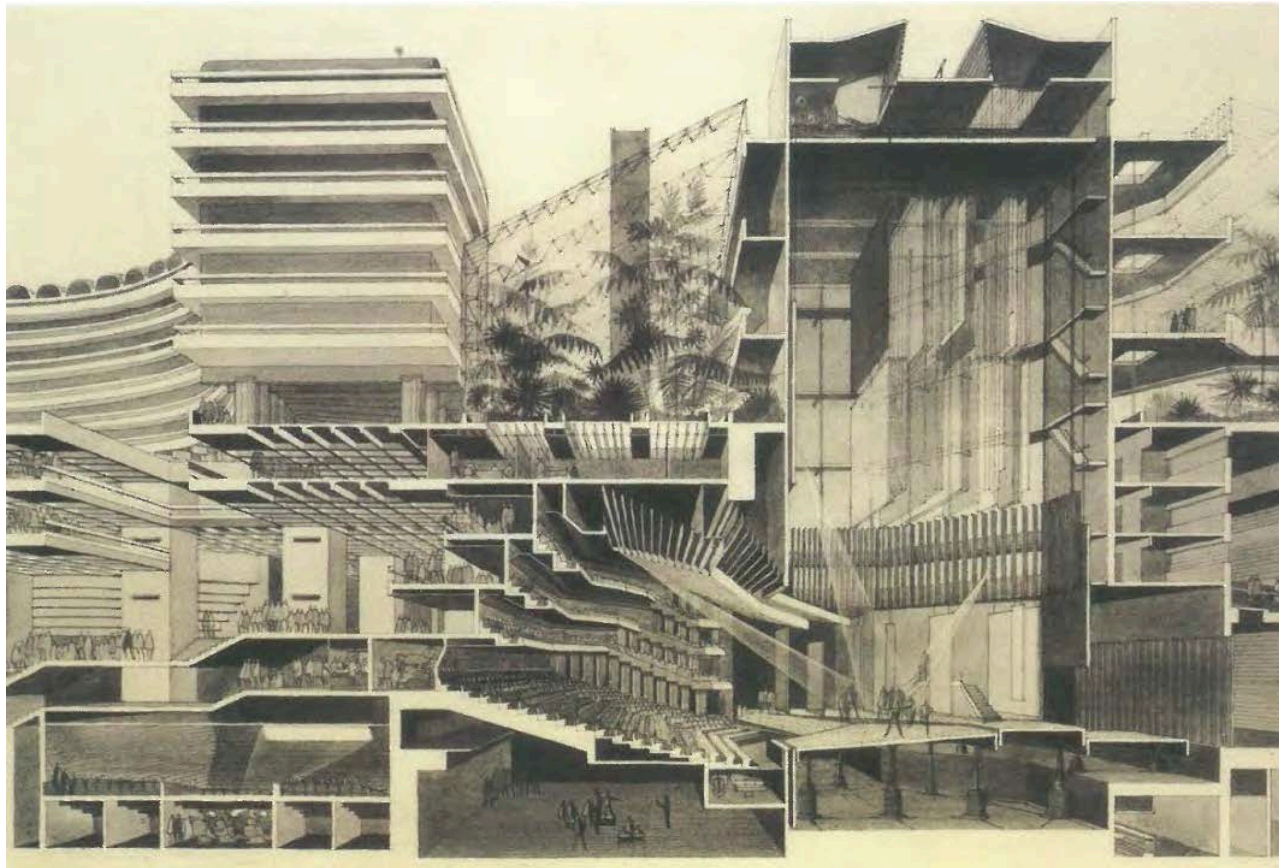


Temporary exhibition, foyer level G

The Barbican Center



The Barbican Center



Section showing the depth of the Barbican Arts Complex

Conservatory Level 3

Barbican Centre
 Silk Street
 London EC2Y 8DS
 Tel +44 (0) 7382 7043
 business.events@barbican.org.uk
 www.barbican.org.uk

Capacities

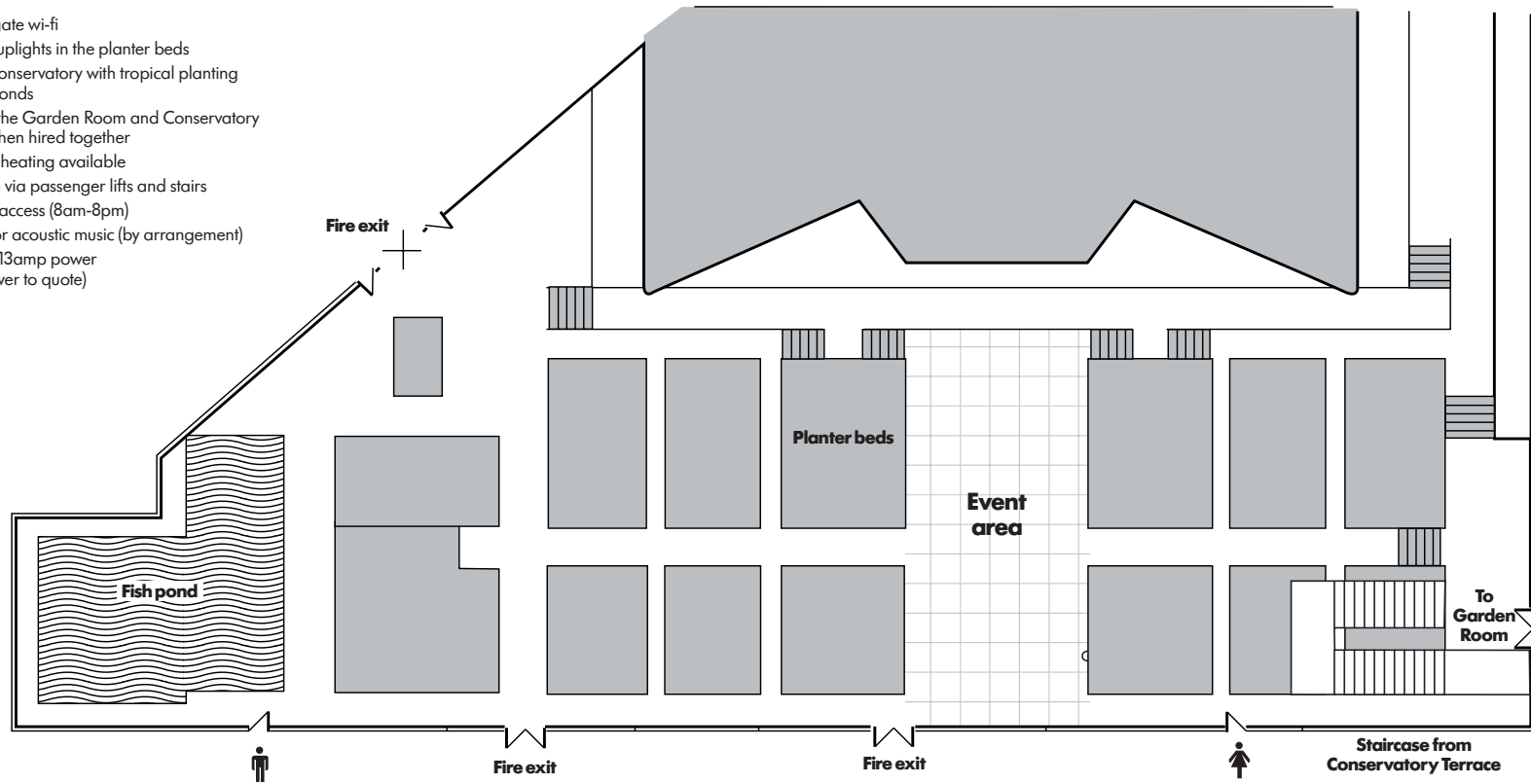
standing reception 150
 standing buffet 100
 seated buffet 48
 banquet 78
 civil ceremony 80

Dimensions of event area

available floor area 94m² (1,012 sq.ft)
 width 6.7m (22')
 length 14.5m (47'7")
 max height 15m (49'3")
 min height 2.5m (39'5")

Facilities

- free delegate wi-fi
- coloured uplights in the planter beds
- working conservatory with tropical planting and fish ponds
- access to the Garden Room and Conservatory Terrace when hired together
- overhead heating available
- accessible via passenger lifts and stairs
- goods lift access (8am-8pm)
- suitable for acoustic music (by arrangement)
- standard 13amp power (other power to quote)



Plan to be used as guide only.
 Each grid square represents 1m² approx.

The Barbican Conservatory

Then and Now



Looking down on the empty bed of the pond in the Conservatory (Nov 1979)

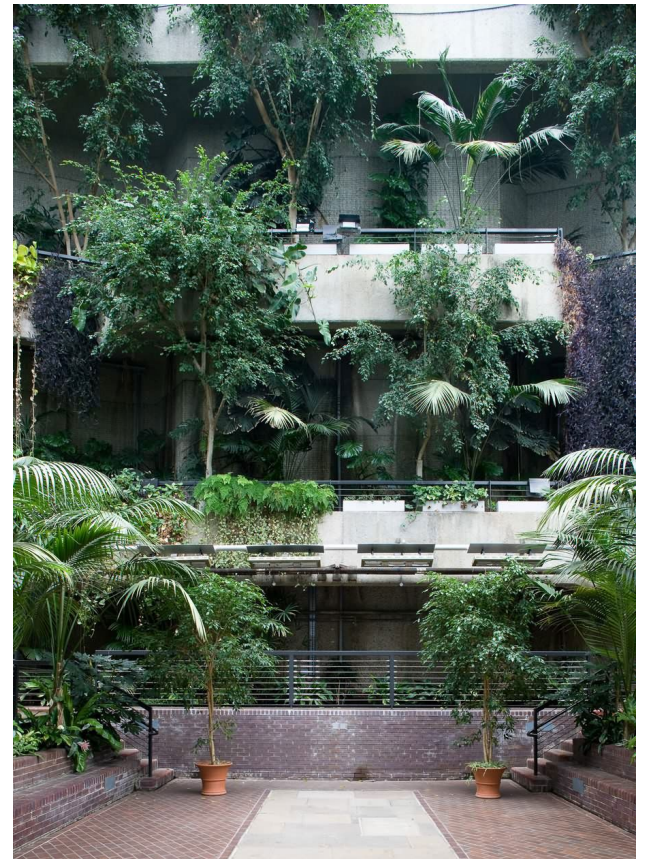
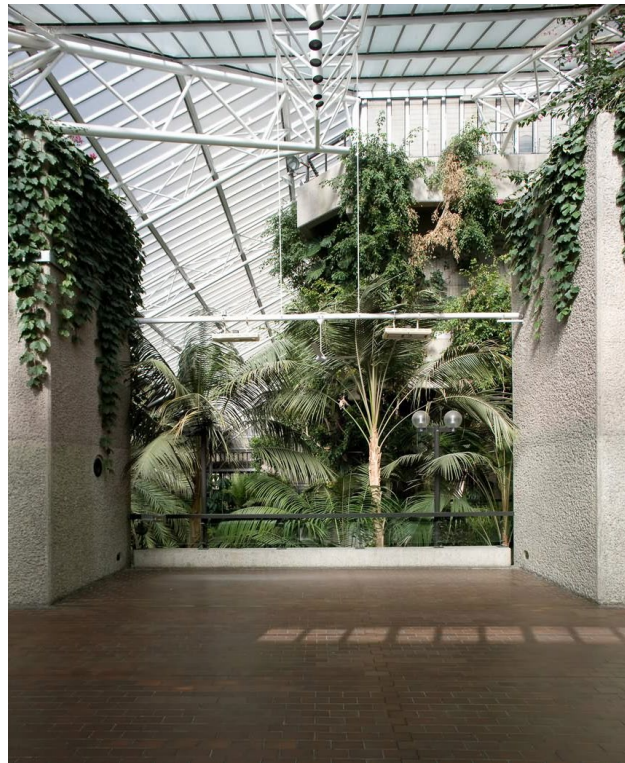


Planting begins to take place in the Conservatory (Mar 1980)



<https://www.barbican.org.uk/our-story/our-archive/design>

The Barbican Conservatory



The Barbican Conservatory

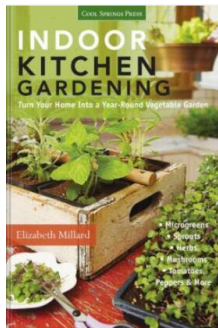
Activities



The Barbican Centre is a performing arts centre in the Barbican Estate of the City of London and the largest of its kind in Europe. Wide range of spaces that can be hired for conferences, AGMs, photoshoots, product launches, meetings, receptions and

weddings. When the Garden room is combined with the stunning Conservatory and Conservatory Terrace it provides one of the world's most unusual and flexible networking spaces.

Books for Indoor Gardens



Indoor kitchen gardening : turn your home into a year-round vegetable garden: microgreens - sprouts - herbs - mushrooms - tomatoes, peppers & more

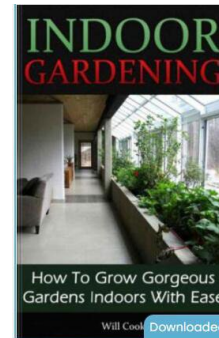
[Elizabeth Millard](#)

☆ 5.0 / 5.0 0 comments

It takes just a few dollars and a few days for you to start enjoying fresh, healthy produce grown indoors in your own home. Imagine serving a home-cooked meal highlighted with beet, arugula, and broccoli microgreens grown right in your kitchen, accompanied by sautéed winecap mushrooms grown in a box of sawdust in your basement. If you have never tasted microgreens, all you really need to do is envision all the flavor of an entire vegetable plant concentrated into a single tantalizing seedling. If you respond to the notion of nourishing your guests with amazing, fresh, organic produce that you've grown in your own house, condo, apartment, basement, or sunny downtown office, then you'll love exploring the expansive new world of growing and eating that can be discovered with the help of Indoor Kitchen Gardening. Inside, author and Bossy Acres CSA co-owner Elizabeth Millard teaches you how to grow microgreens, sprouts, herbs, mushrooms, tomatoes, peppers, and more-- all inside your

..... [点击了解更多](#)

种类:	Housekeeping & Leisure - Gardening	年:	2014
出版社:	Cool Springs Press	语言:	English
页:	224 / 227	ISBN 10:	1610589815
ISBN 13:	9781610589819	文件:	PDF, 42.94 MB



Indoor Gardening: How To Grow Gorgeous Gardens Indoors With Ease (Container Gardening, Aeroponics, Hydroponics, Vertical Tower Gardens, Window Gardens and House Plants) (Gardening Guidebooks)

[Cook, Will](#)

☆ 0 / 0 0 comments

You could be just a few days away from enjoying your beautiful new indoor garden.

Abstract: You could be just a few days away from enjoying your beautiful new indoor garden

年:	2012	出版:	Kindle ed
出版社:	Authentic Health Coaching : Sold by Amazon Digital Services;The Gardening Group	语言:	English
		文件:	EPUB, 939 KB



Urban Botany: An Indoor Plant Guide for Modern Gardeners

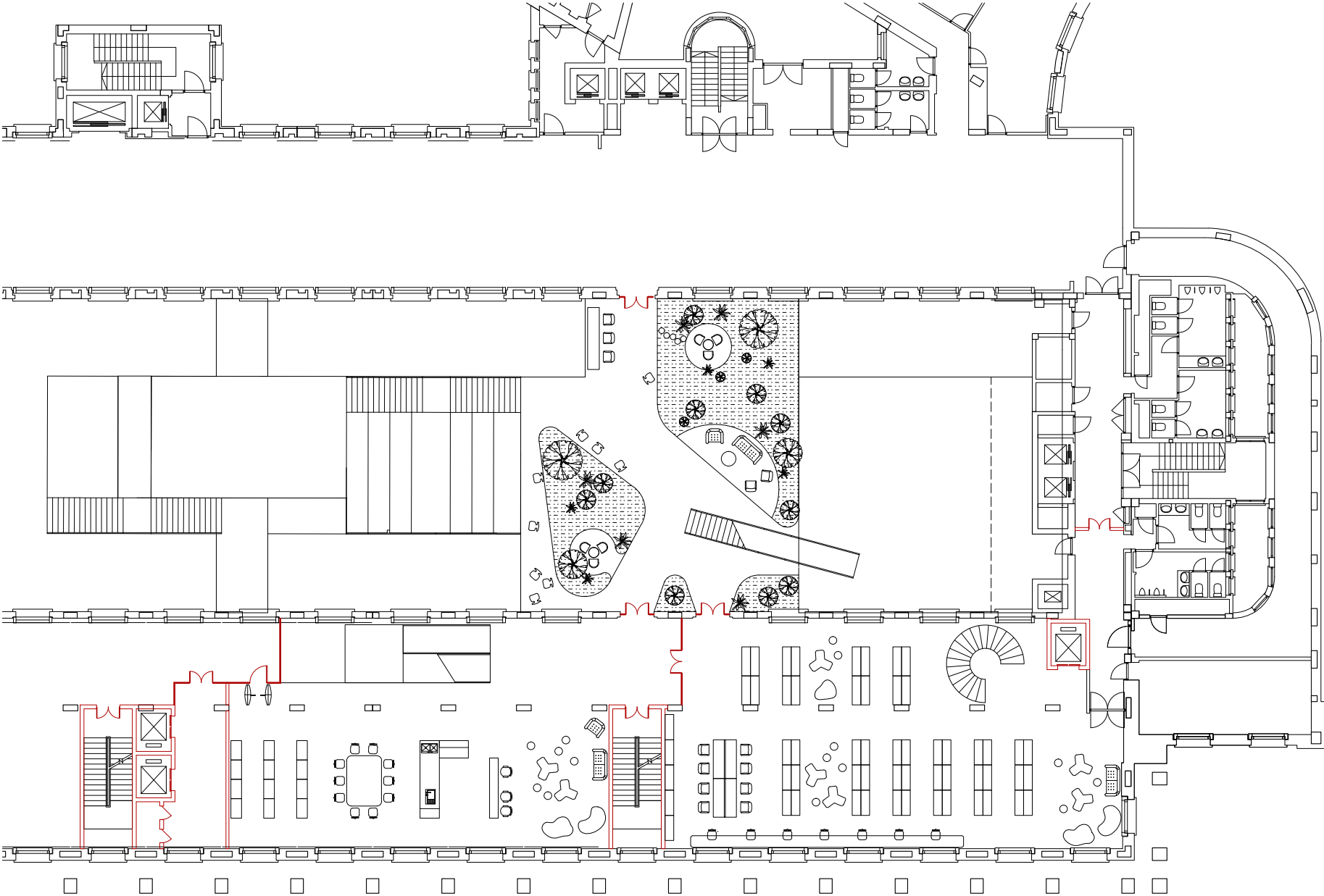
[Maaïke Koster](#), [Emma Sibley](#)

☆ 5.0 / 5.0 1 comment

Have trouble keeping house plants alive? Struggling to find your green fingers? Fear not! You can still have a beautiful plant-filled home with this stunning guide to indoor plants. Whether you are looking to cultivate an entire indoor garden, or simply wish to know more about your single cactus, you can be sure to find the right information for you amongst the seventy-five plants in this stylish guide. And the best bit? All the plants are easy to maintain so even the most timid of gardeners can enjoy turning their hand to this green-fingered pastime. Learn how to care for succulents, cacti, flowering and foliage plants even with a full-time job, with this unique gardening guide that is made to fit alongside our modern-day schedules. With endless inspiration to brighten up your home, desk or office, this beautiful book of plants from across the world is a must for lovers of art and design, as well as plants.

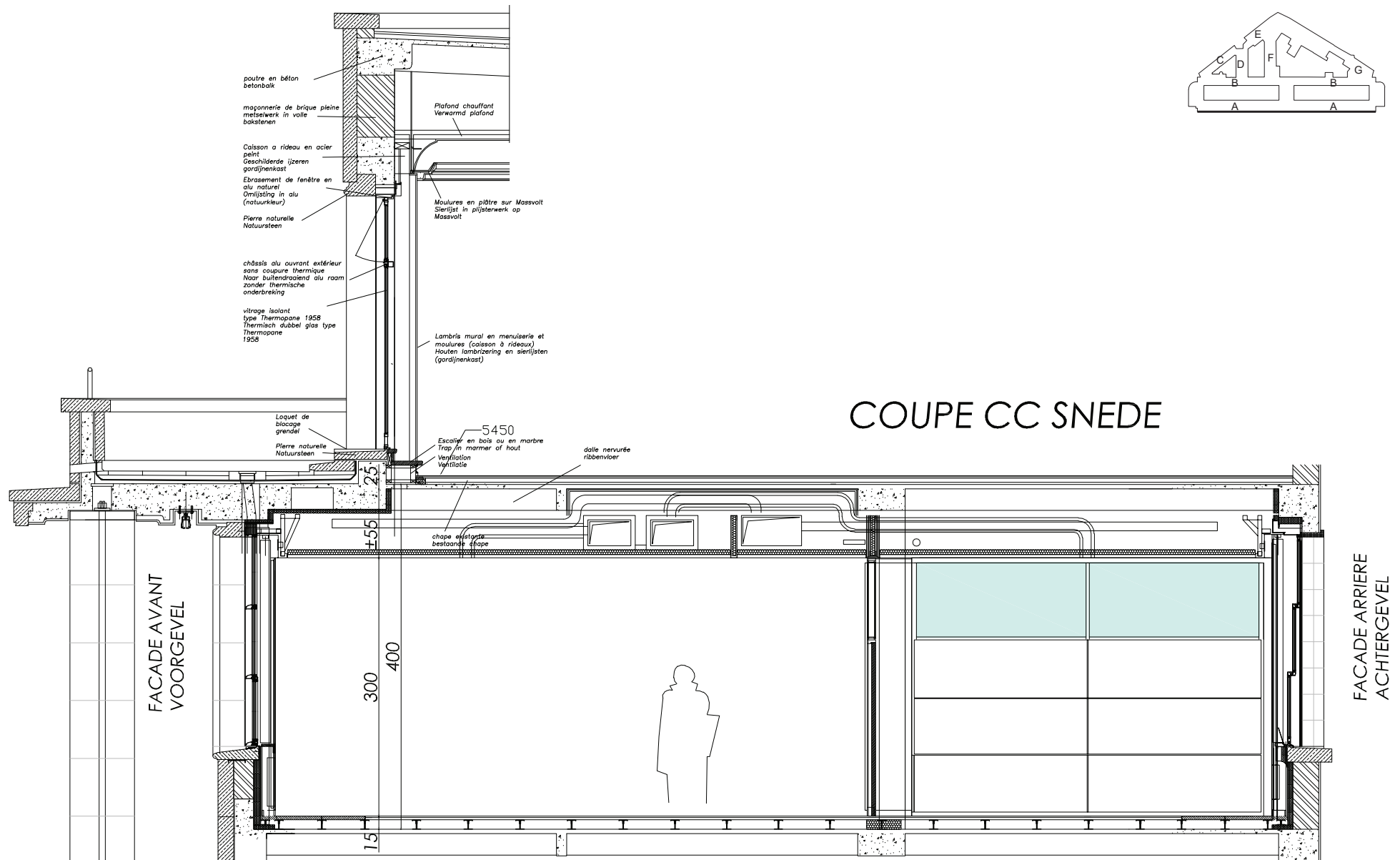
种类:	Arts - History & Criticism	年:	2017
出版社:	MBI	语言:	English
页:	160	ISBN 10:	1781316538
ISBN 13:	9781781316535	文件:	EPUB, 11.82 MB

1st Floorplan: Library and Greenery

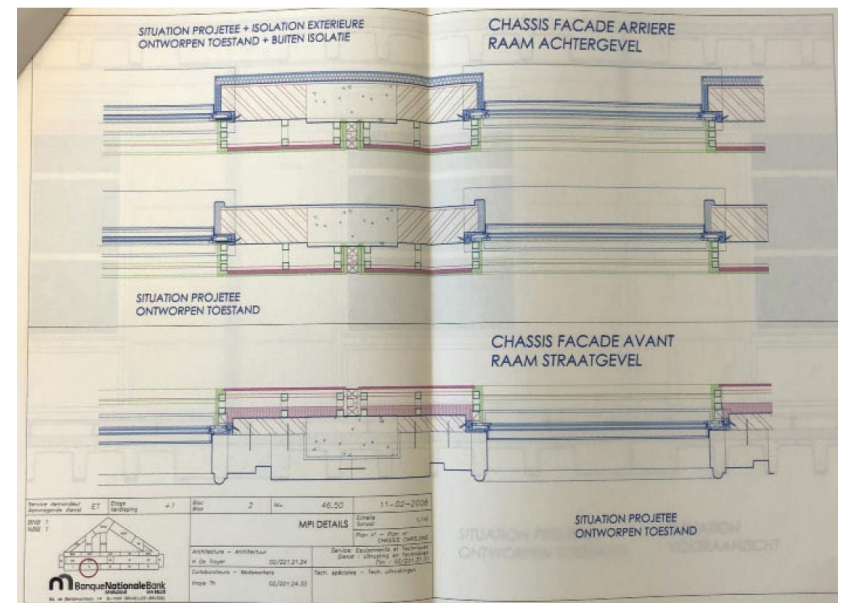
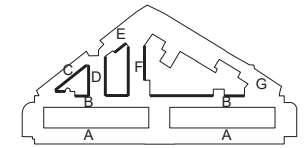
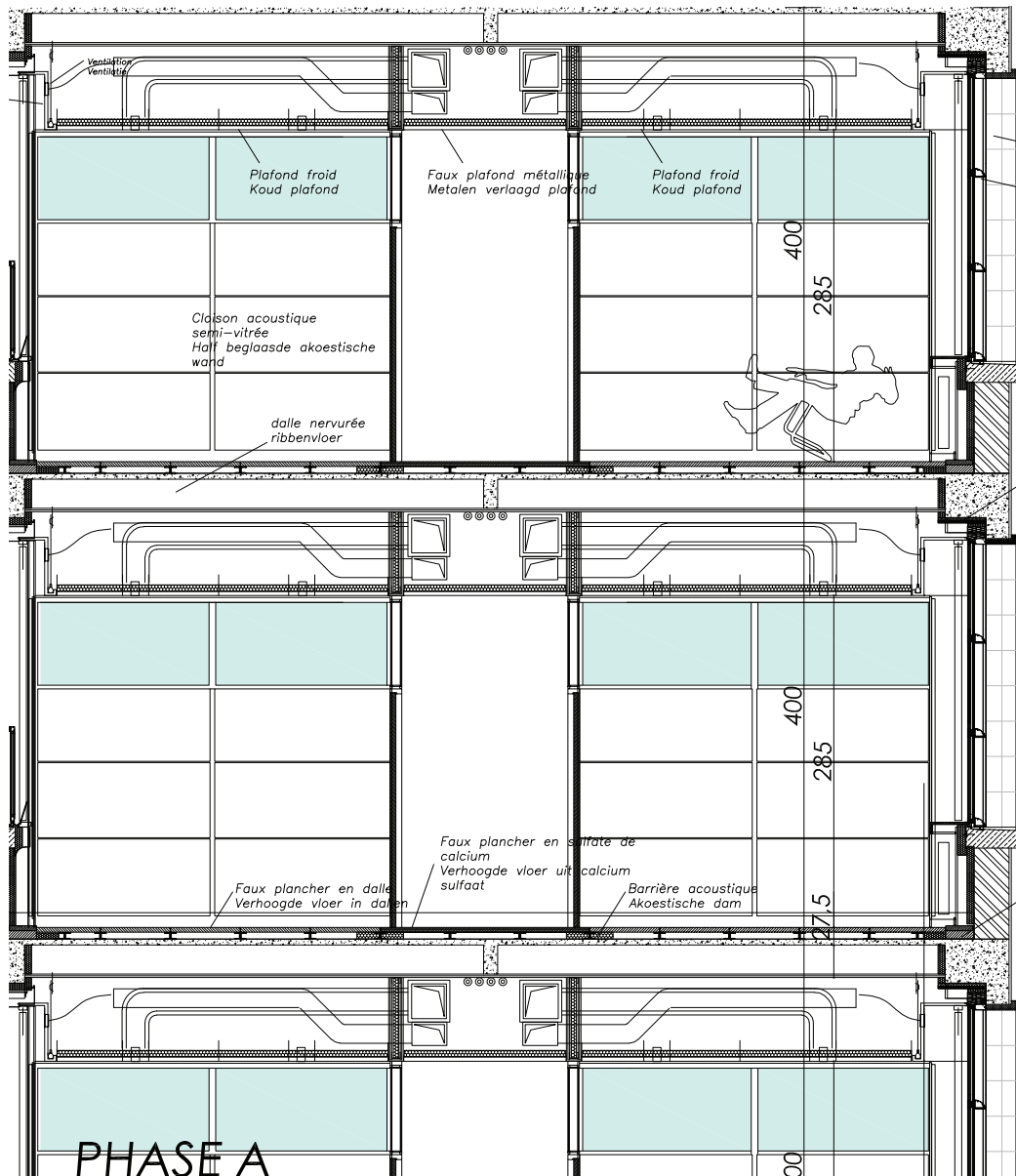


WEEK 3.4

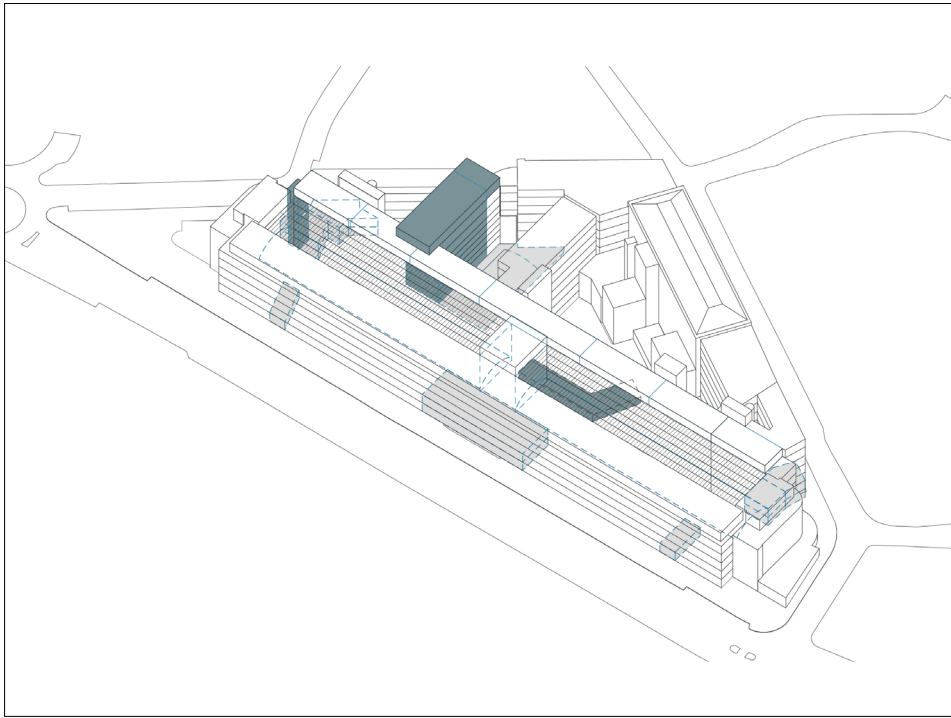
Detailed Section of Block 11, Module A



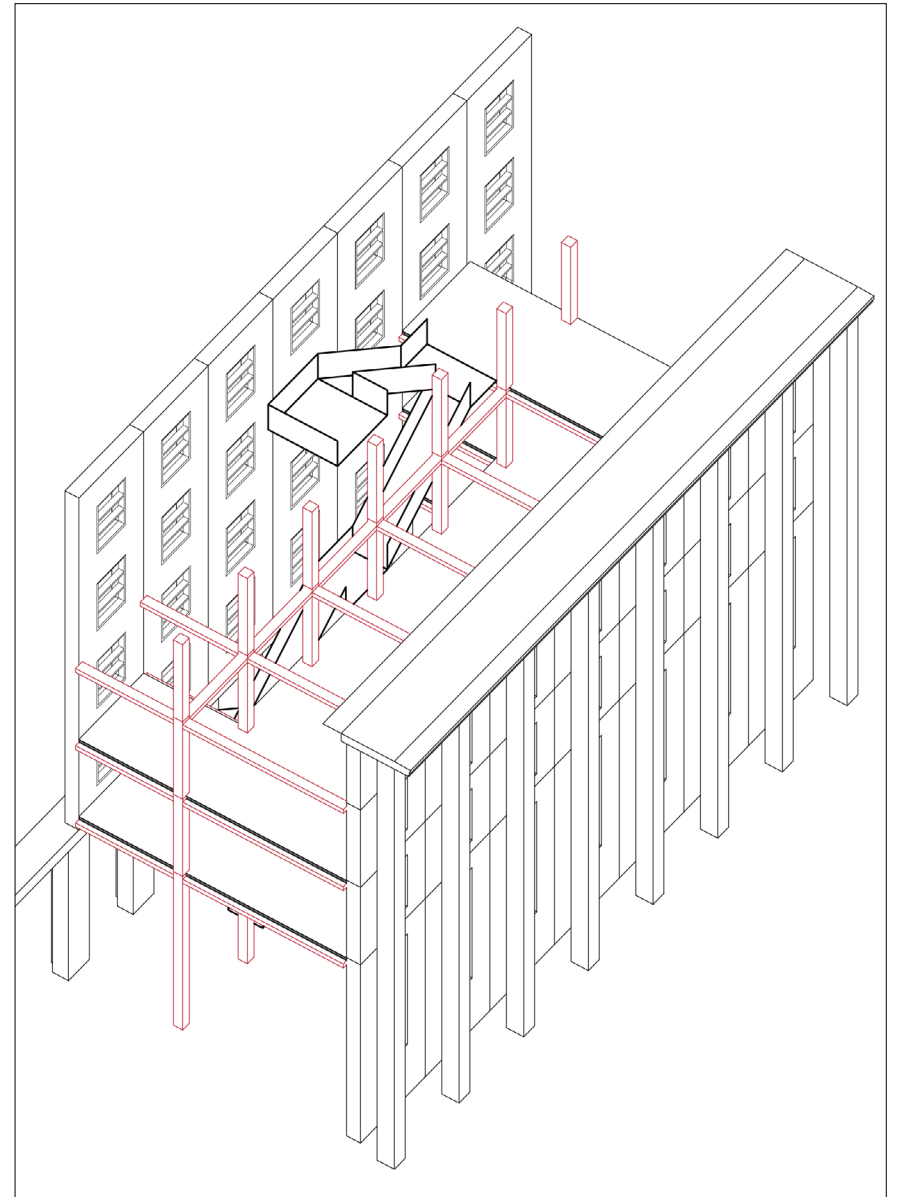
Detailed Section of Block 11, Module B



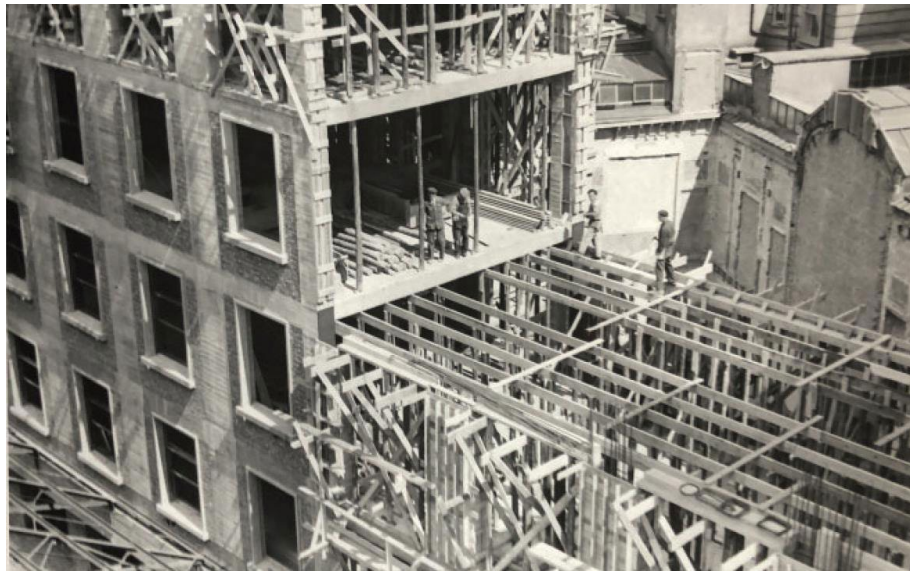
Removed Building Block



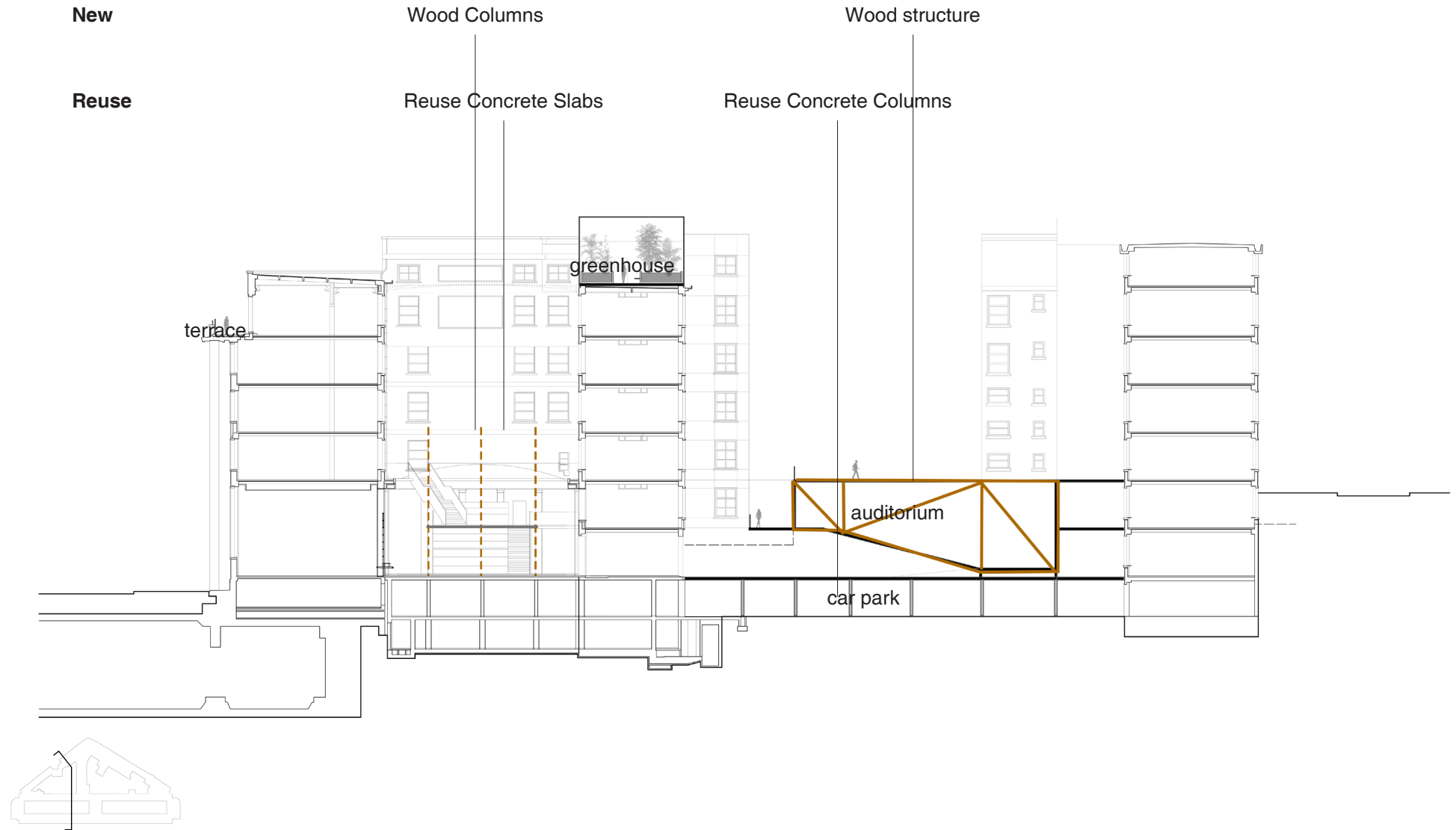
Remove the building block XVI and the roof of the courtyard 2,
Remove part of the ground floor and and the elevator on the north end for new
entrance.



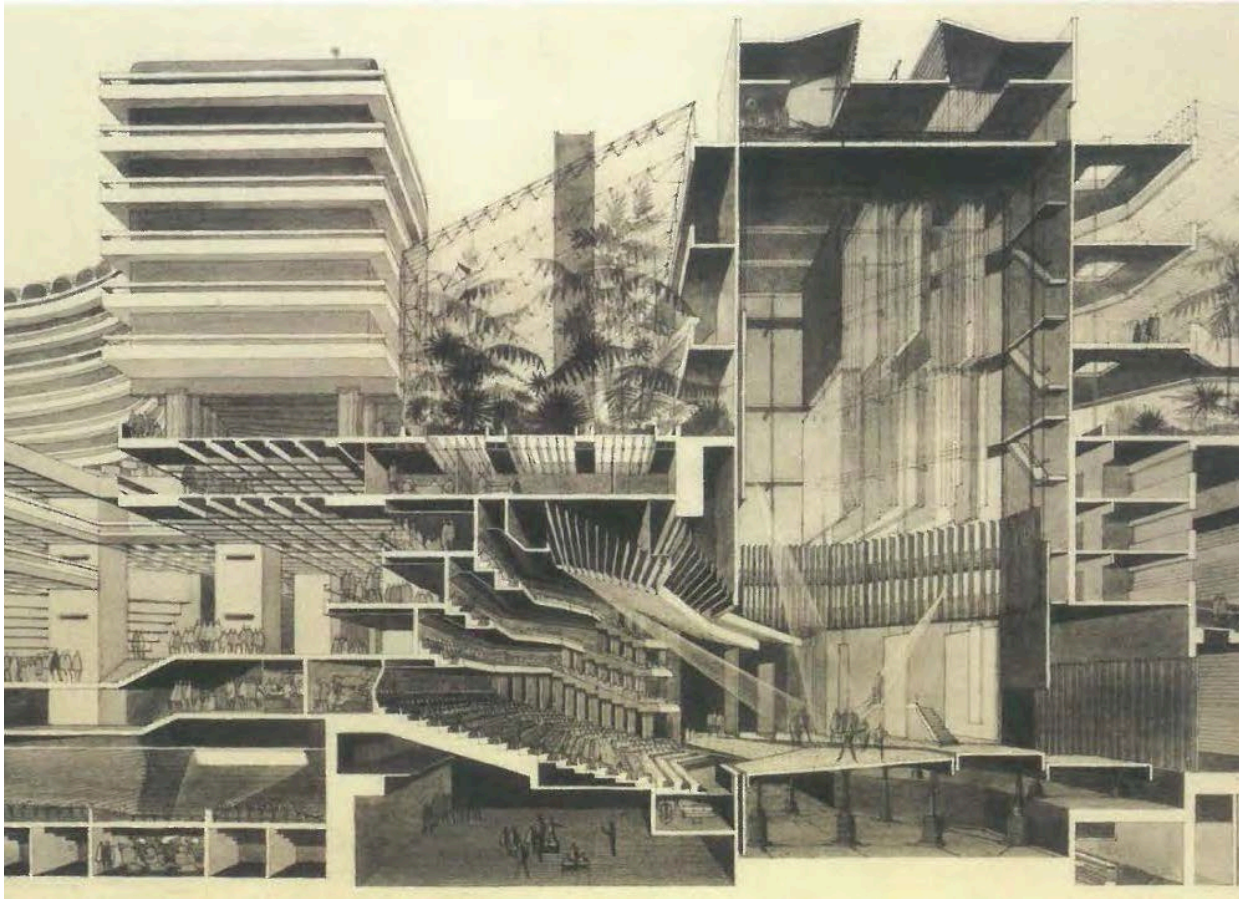
Materials



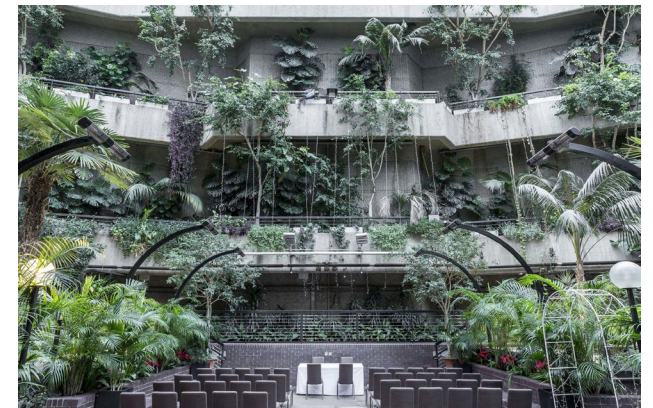
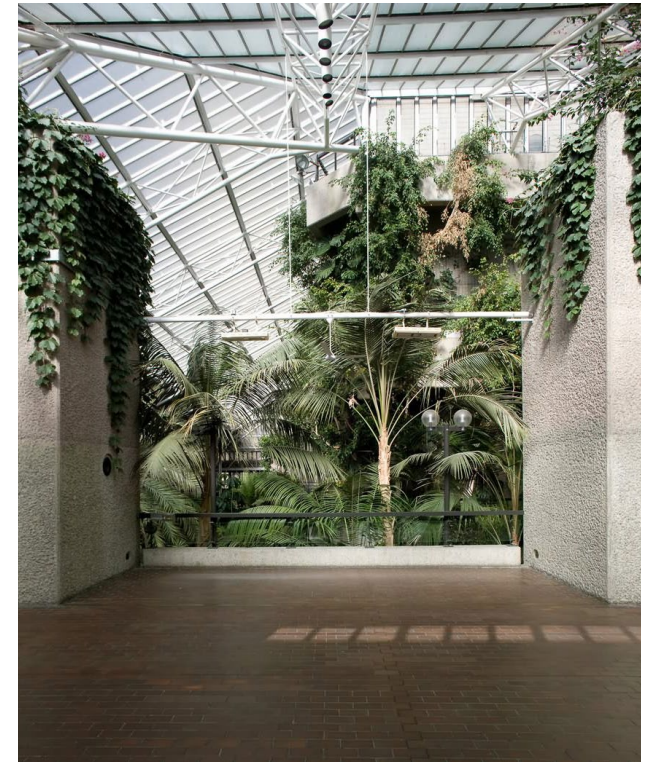
Construction Ideas



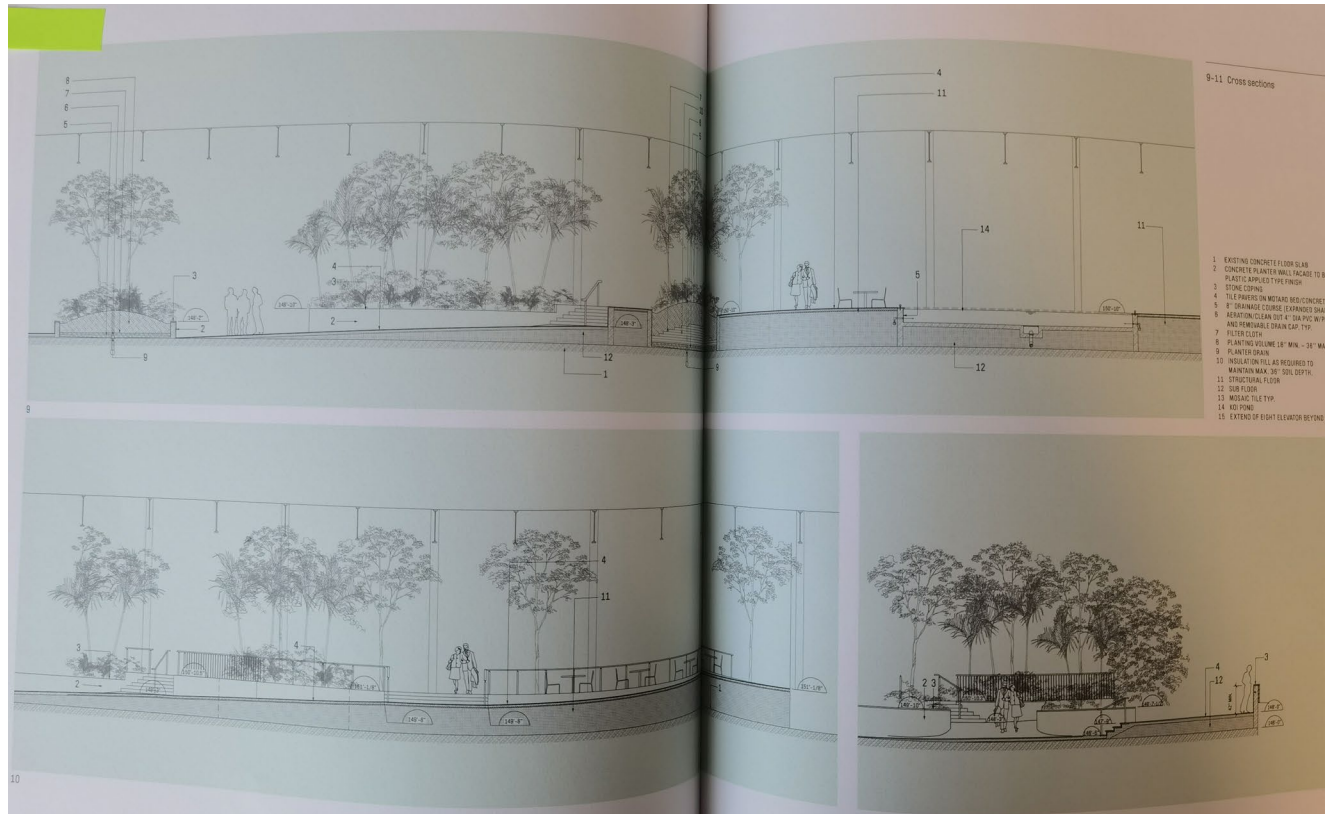
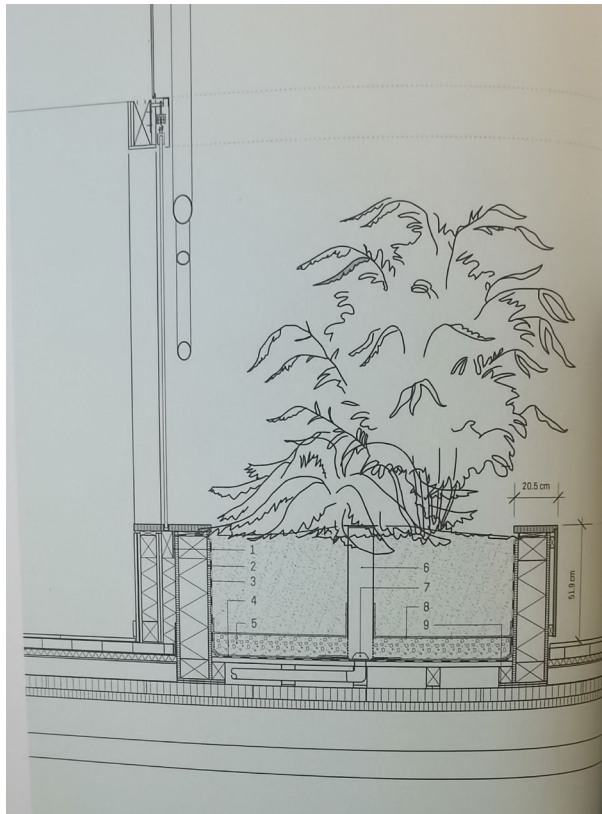
The Barbican Conservatory



Section showing the depth of the Barbican Arts Complex



References: Interior Gardens



North Wing

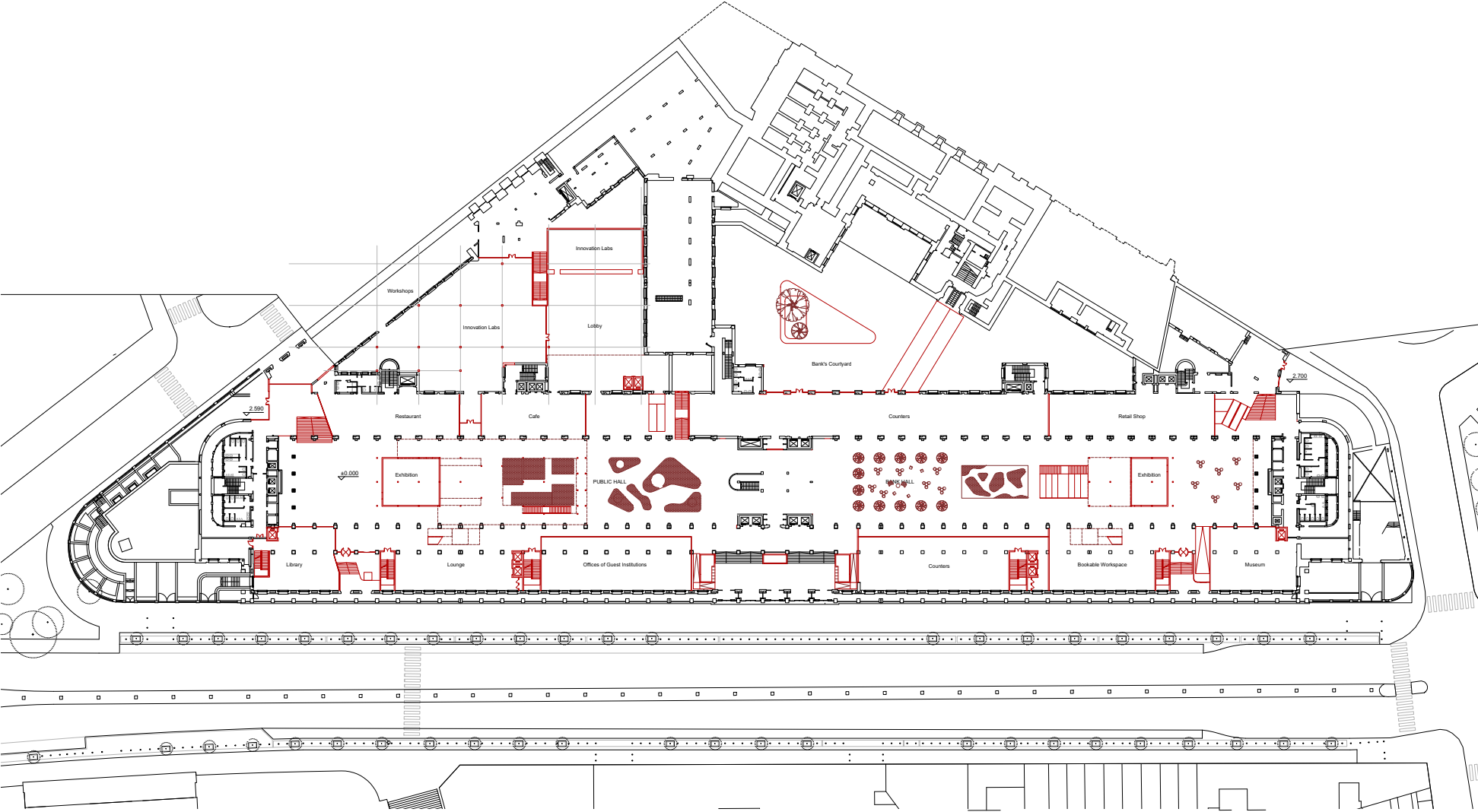


South Wing

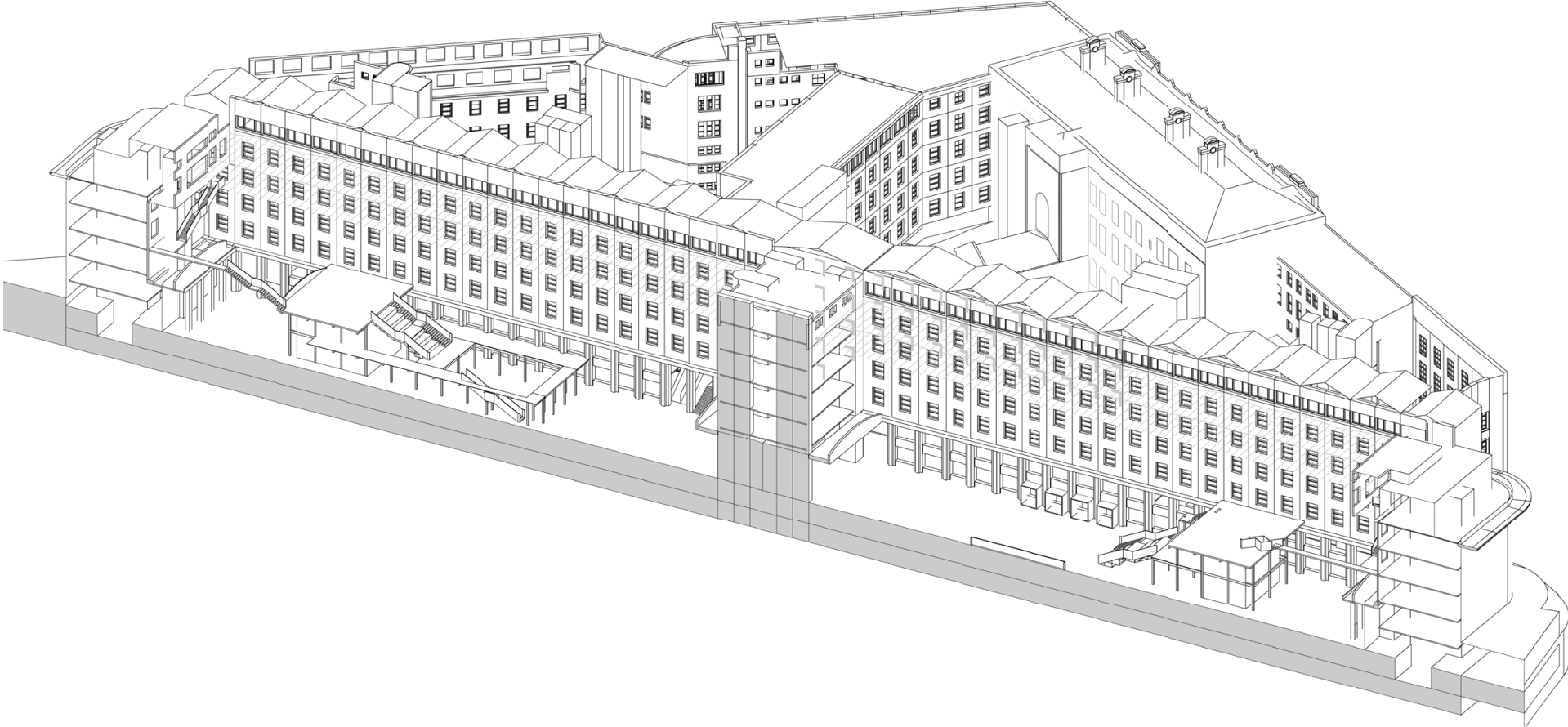


WEEK 3.5 Fragment

Ground Floorplan



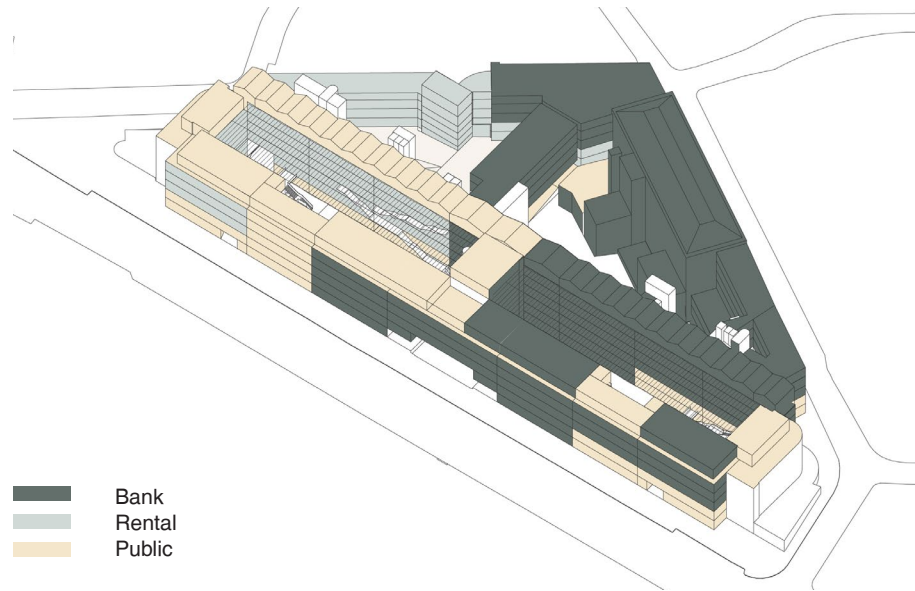
The Main Hall



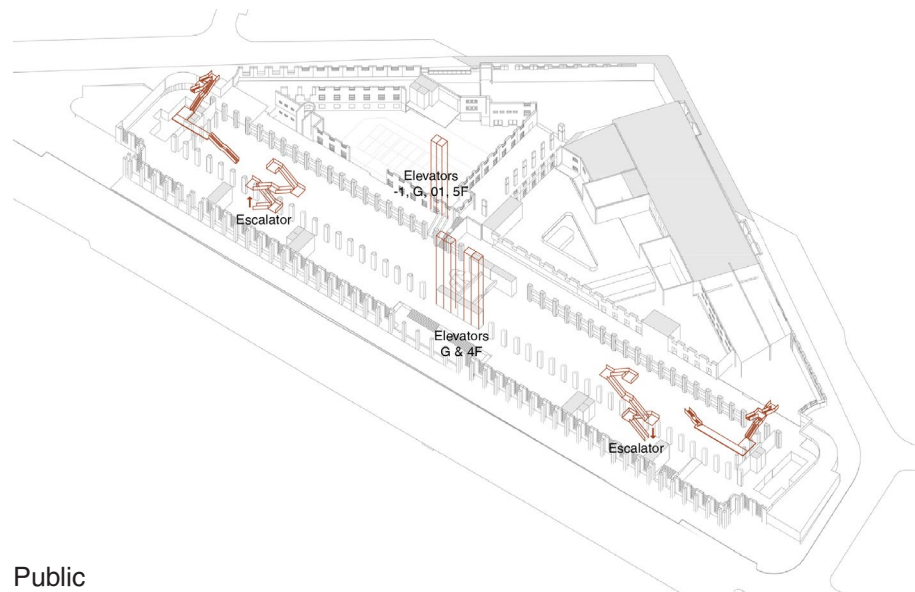
Main Hall - North Wing



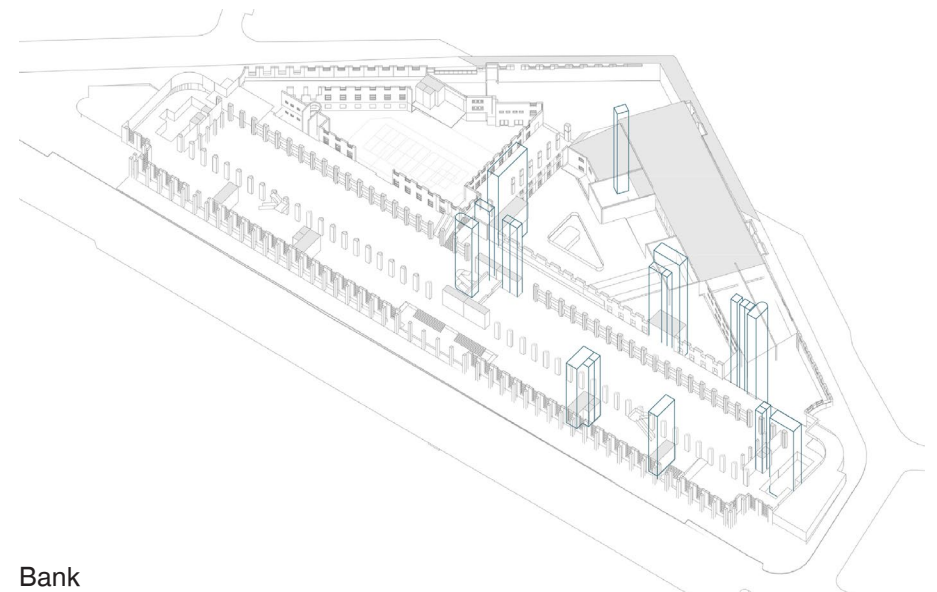
Circulation



- Bank
- Rental
- Public



Public



Bank

Leiden Botanical Garden



Leiden Botanical Garden



Brick works of plants bed

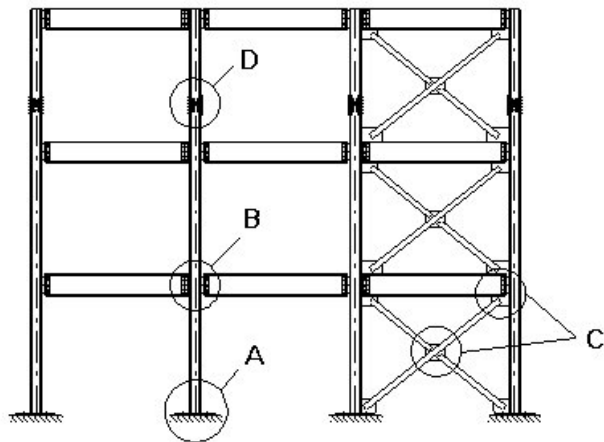


Water supply and drainage material

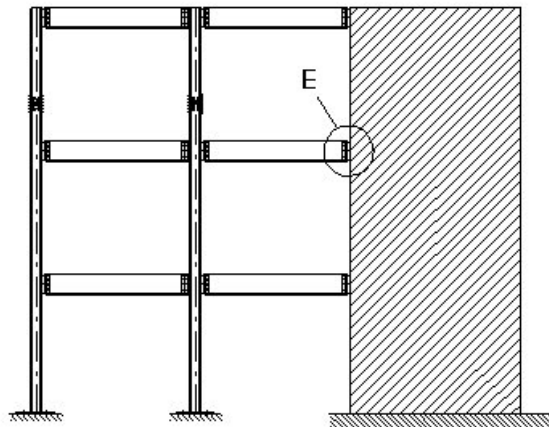


23 °C

Steel Connection



(a) Frame with bracing system



(b) Frame with shear wall

- A - Column base
- B - Beam-to-column connection
- C - Bracing connection
- D - Column splice
- E - Connection with the concrete core

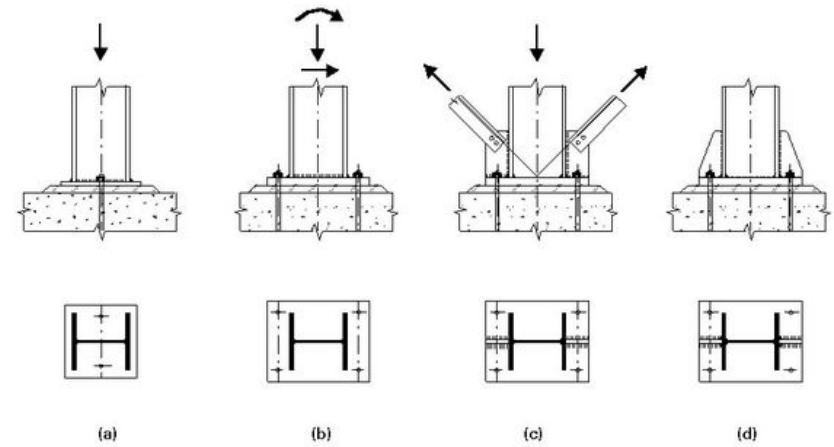
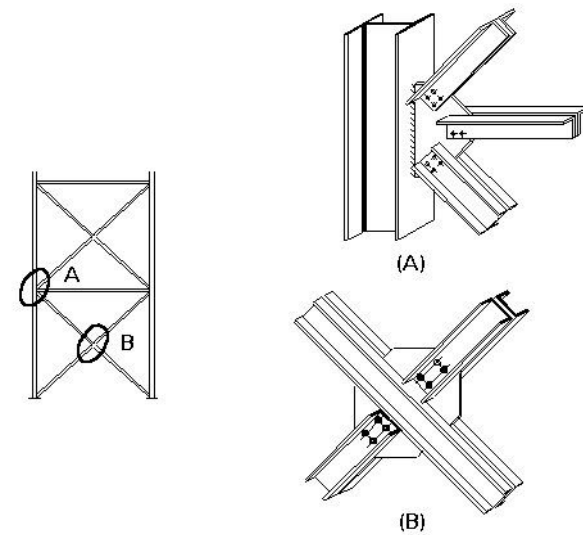
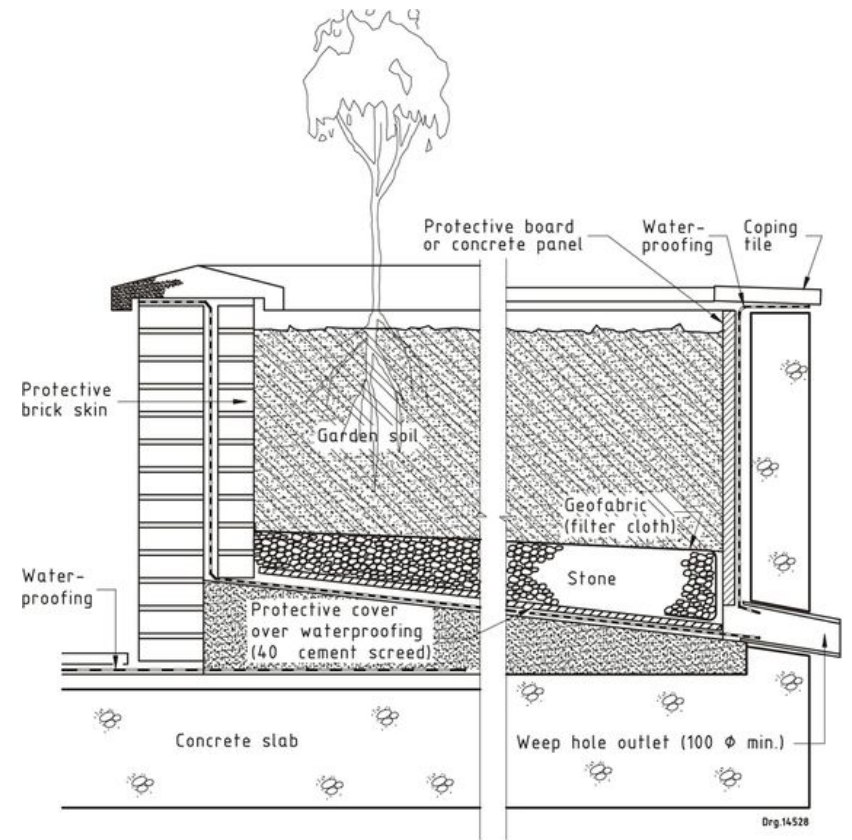
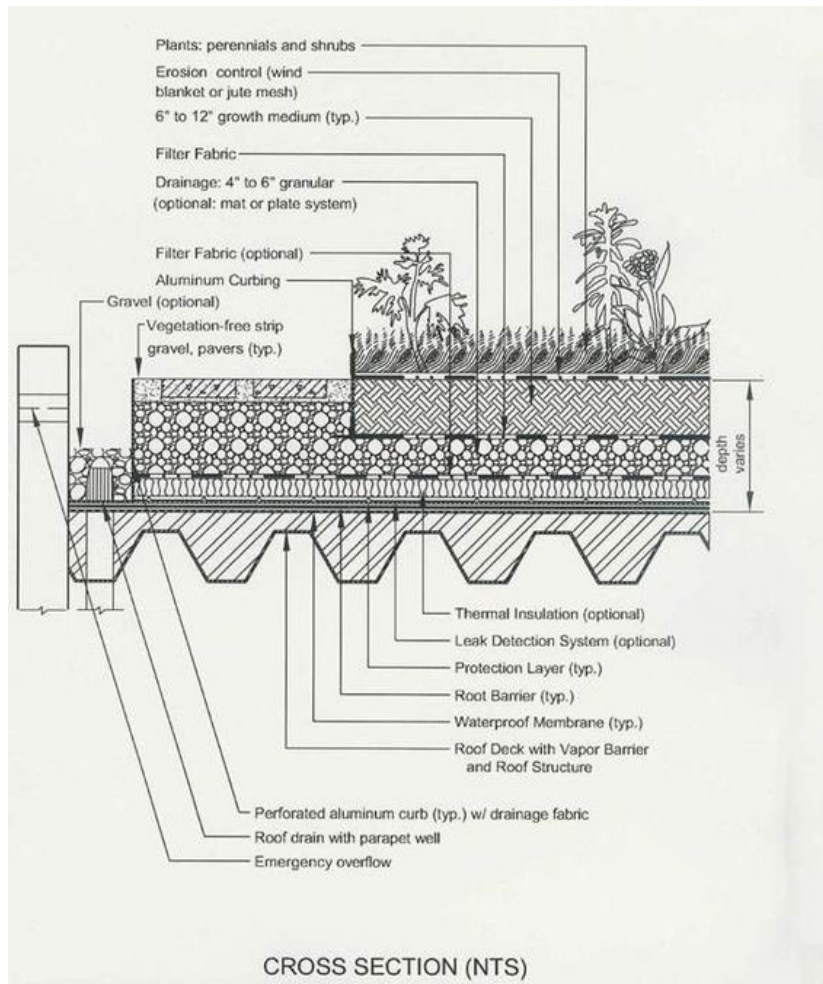


Figure 8 Column bases



Slabs and Plants Bed



Recycled Concrete Aggregates

Fig. 1



Recycled concrete aggregates (RCA).

Overall, even though RCA can be lower quality aggregate and have a negative influence on concrete material properties, the large scale testing showed that, when looking at a complete structural member, RCA can still be used to create a structural concrete. Since the performance of RCA concrete beams is still within standard specifications, it is likely a viable option for structural use. Since the qualities of RCA are still highly varied among different sources, there is room for more testing to make sure the conclusions that have been drawn in this paper are applicable in the broad sense of RCA concrete, regardless of the RCA source.

Reuse the Bricks from the demolished walls



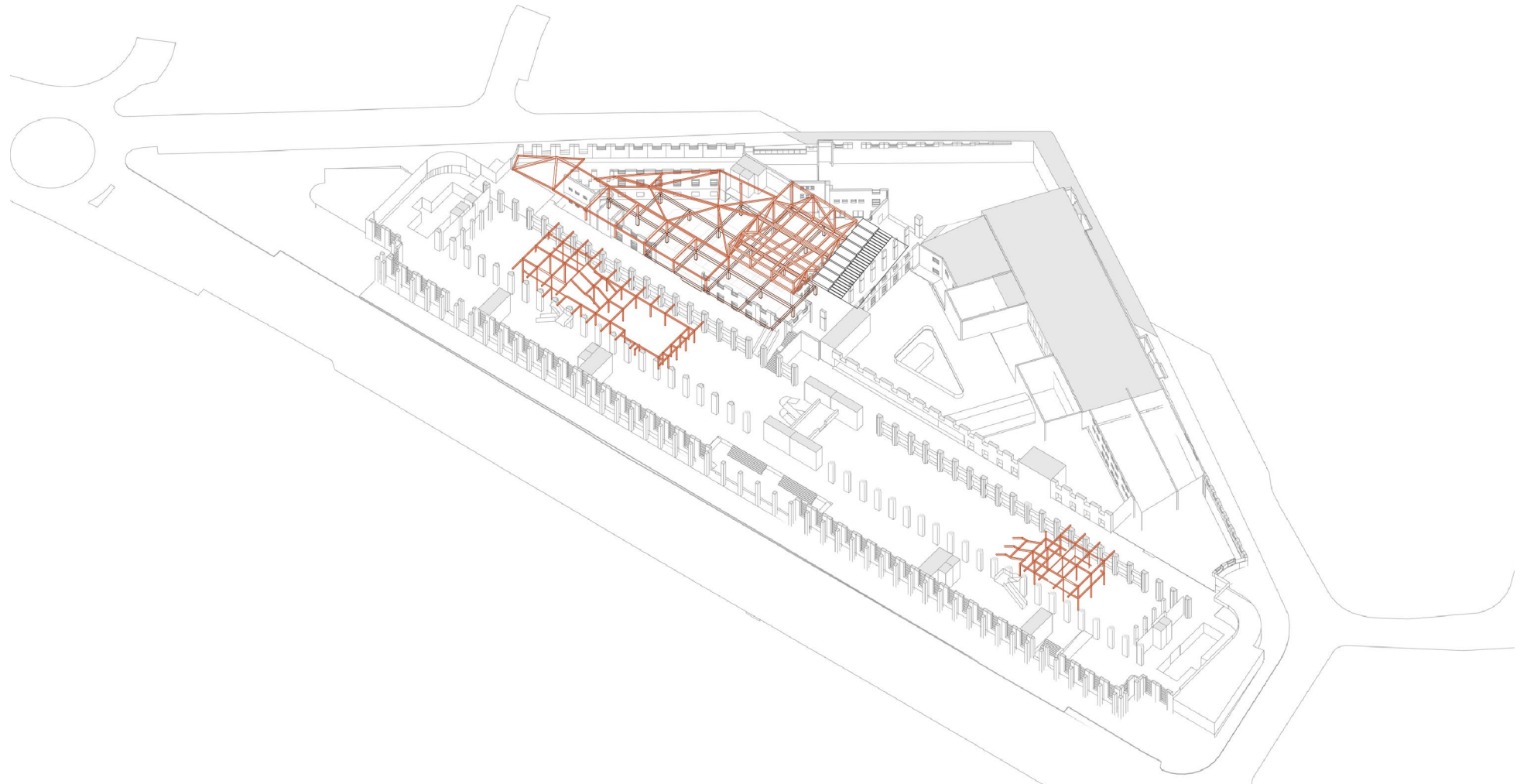
For the plant beds and the pavement in the bank courtyard.

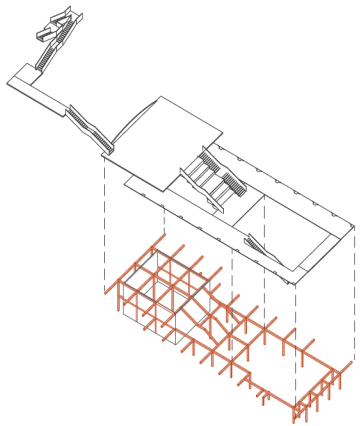
Reuse the Glass Blocks of the Removed Glazing Roof



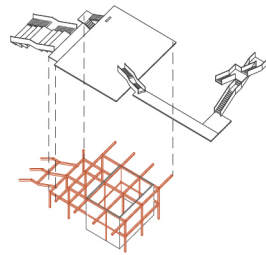
For the Walls in the Main Hall.

New Structures

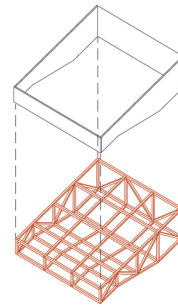




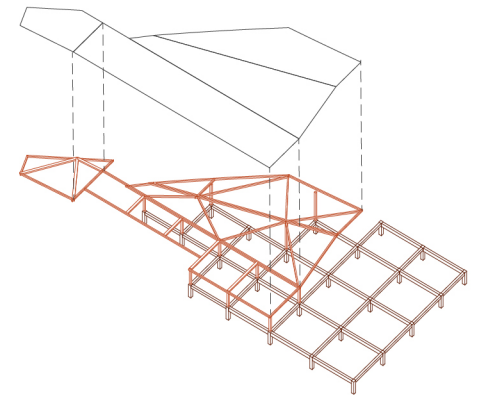
Platforms - North



Platforms - South

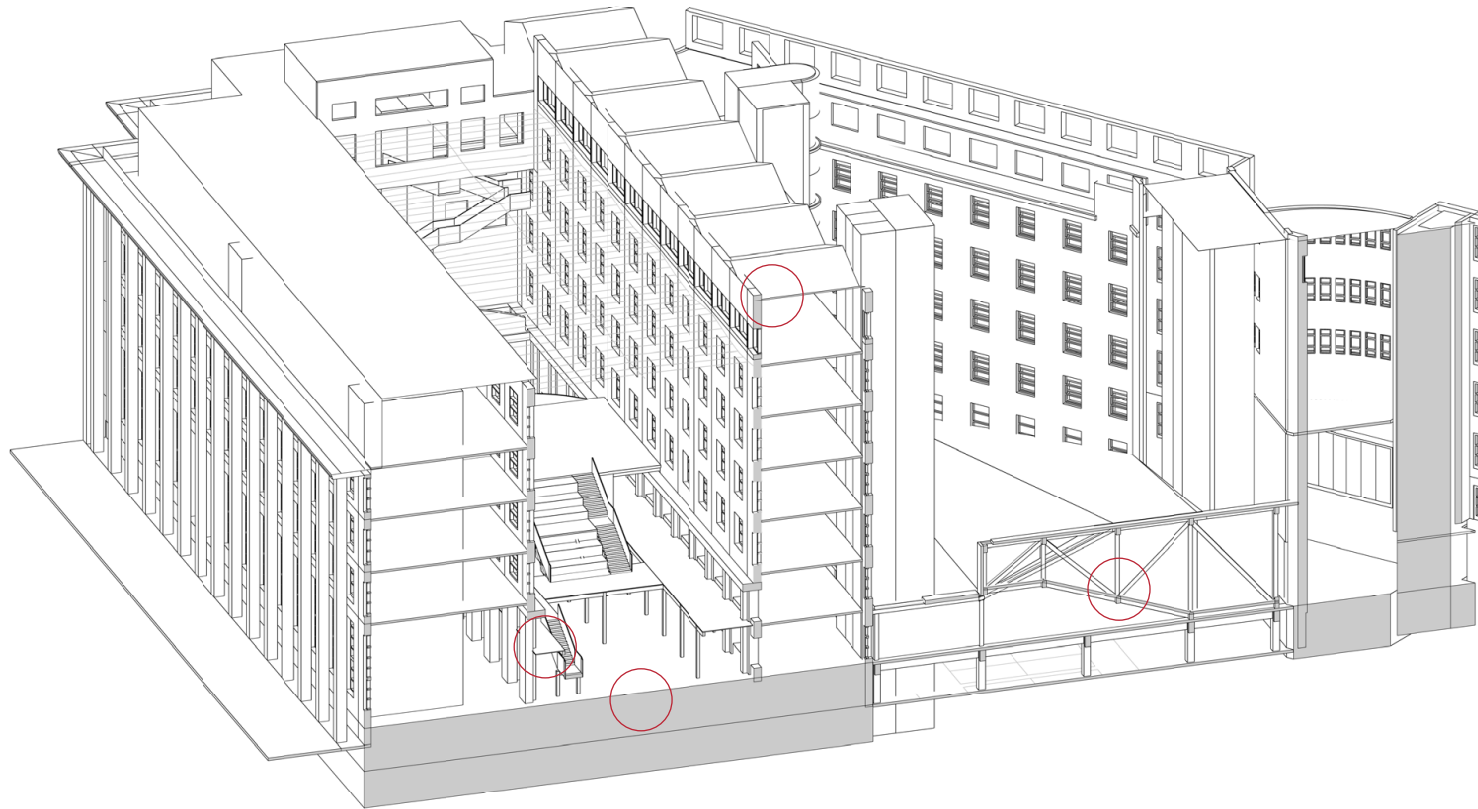


Theatre

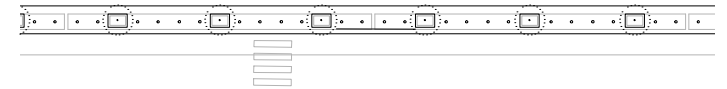
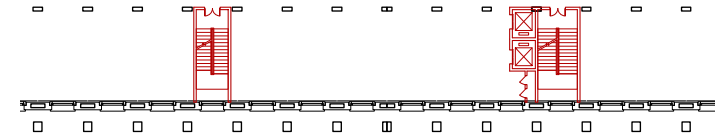
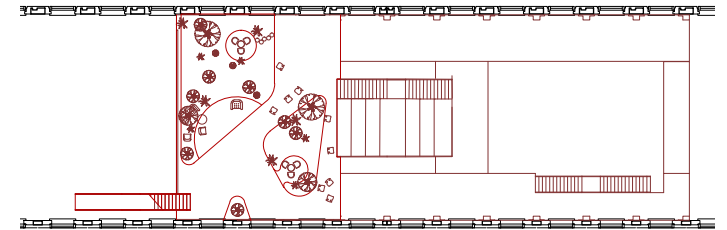
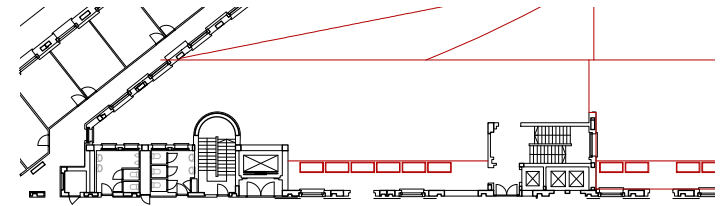
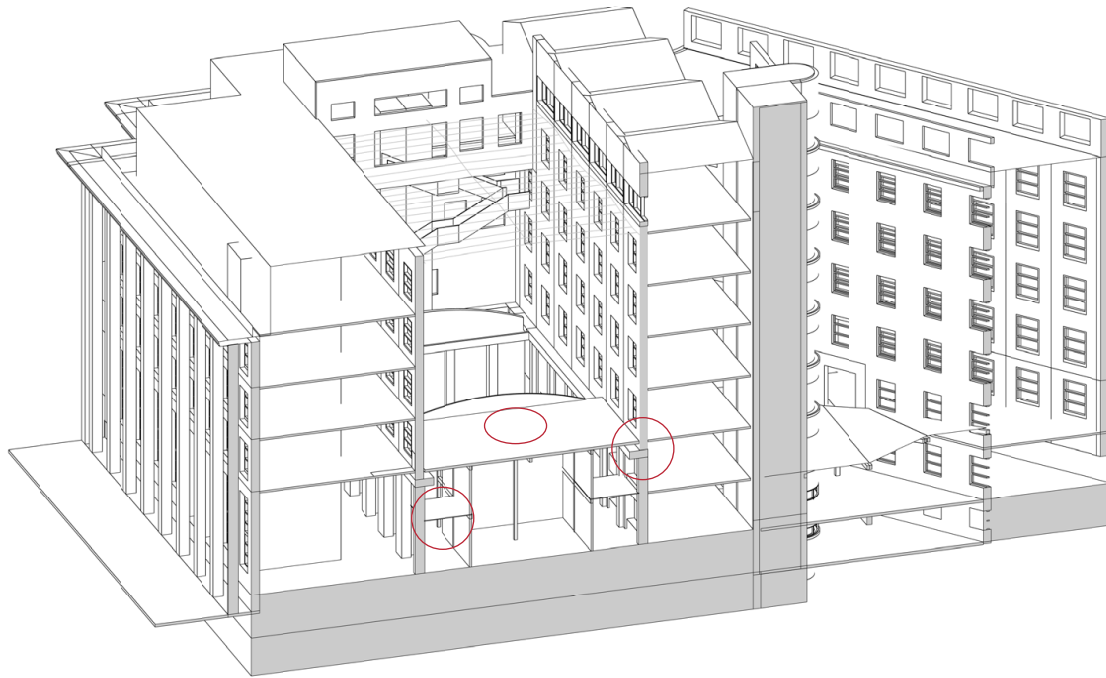


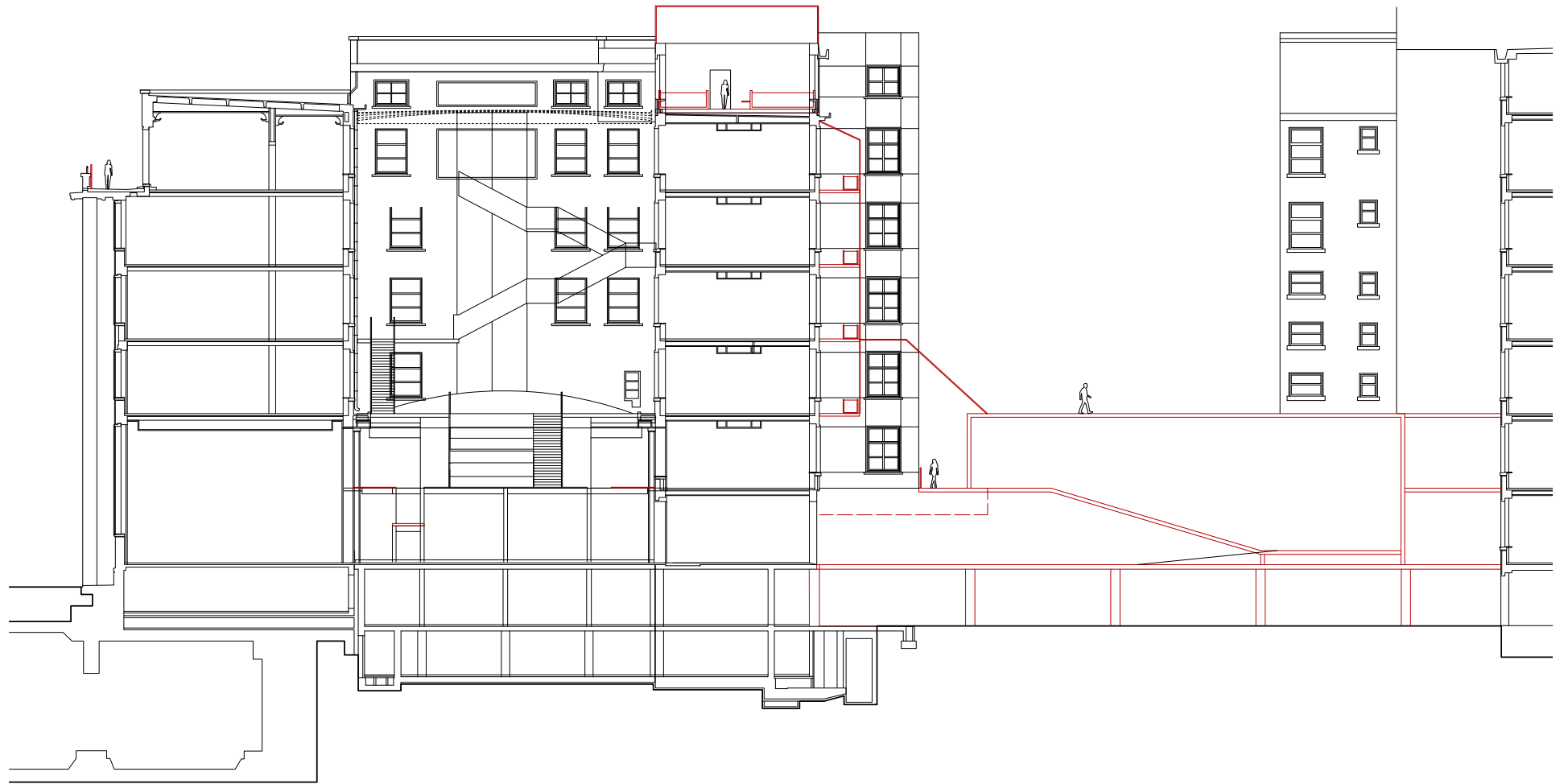
Underground Parking &
Innovation Labs

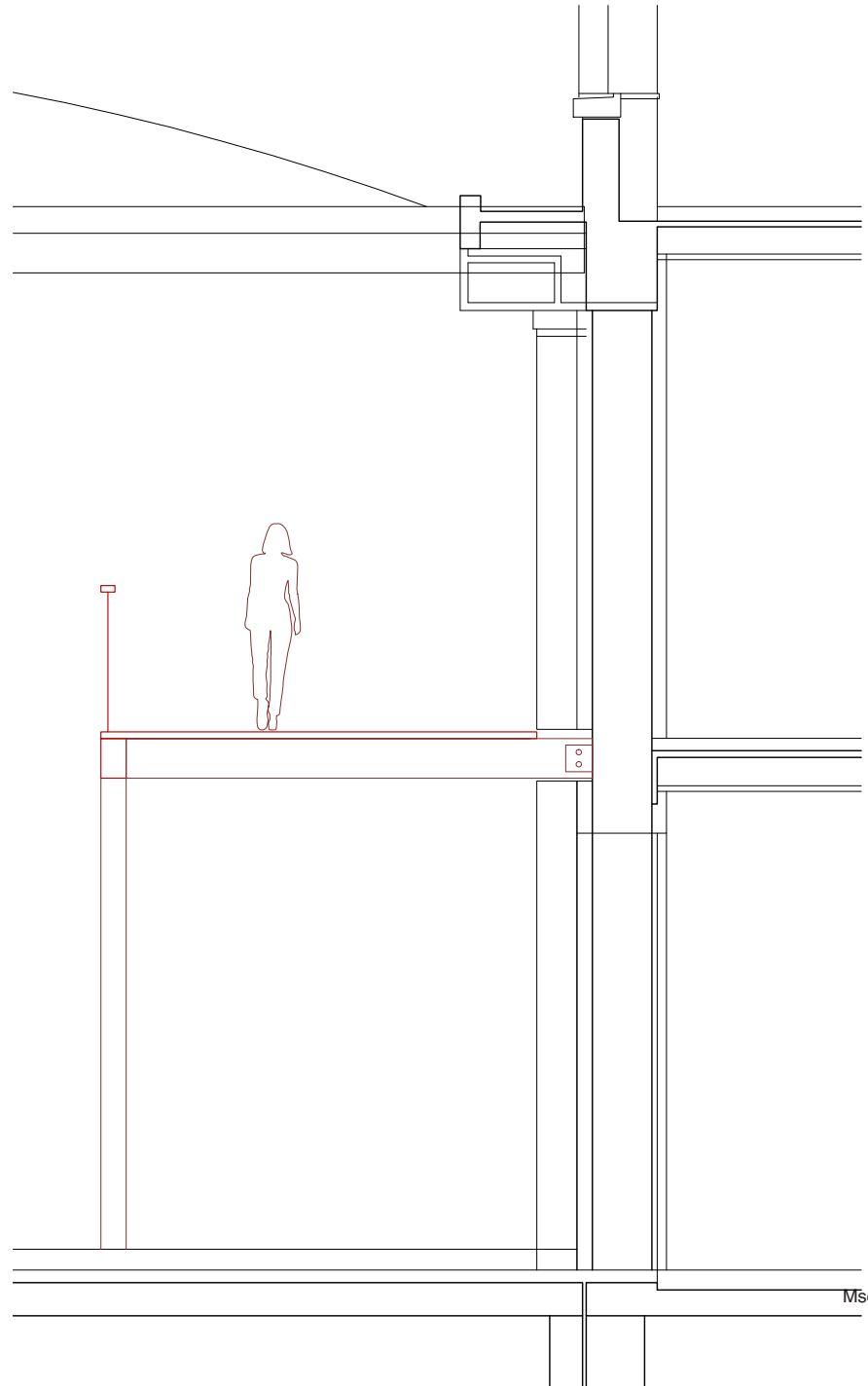
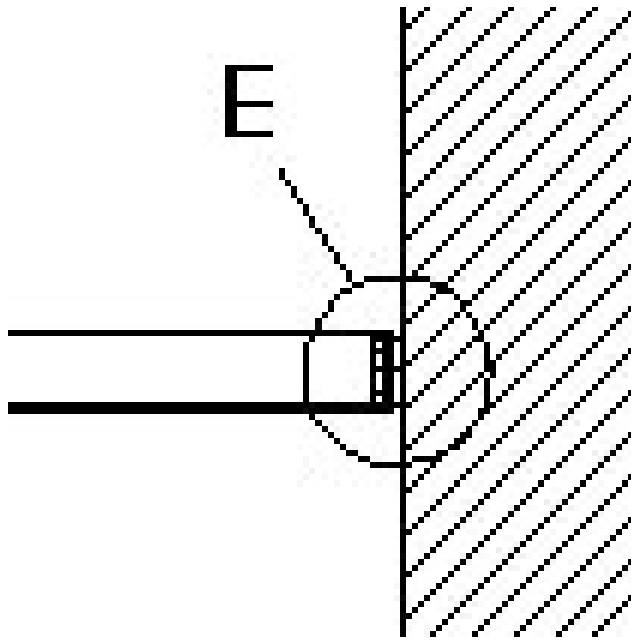
Fragment 01

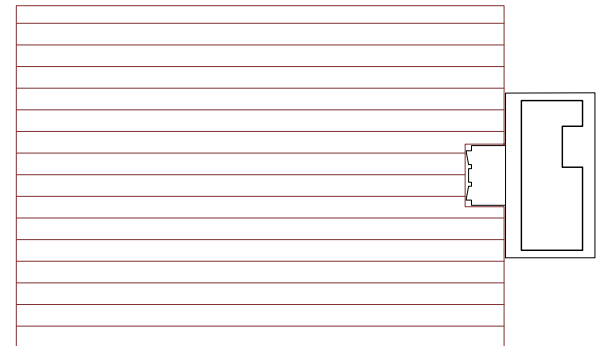


Fragment 02

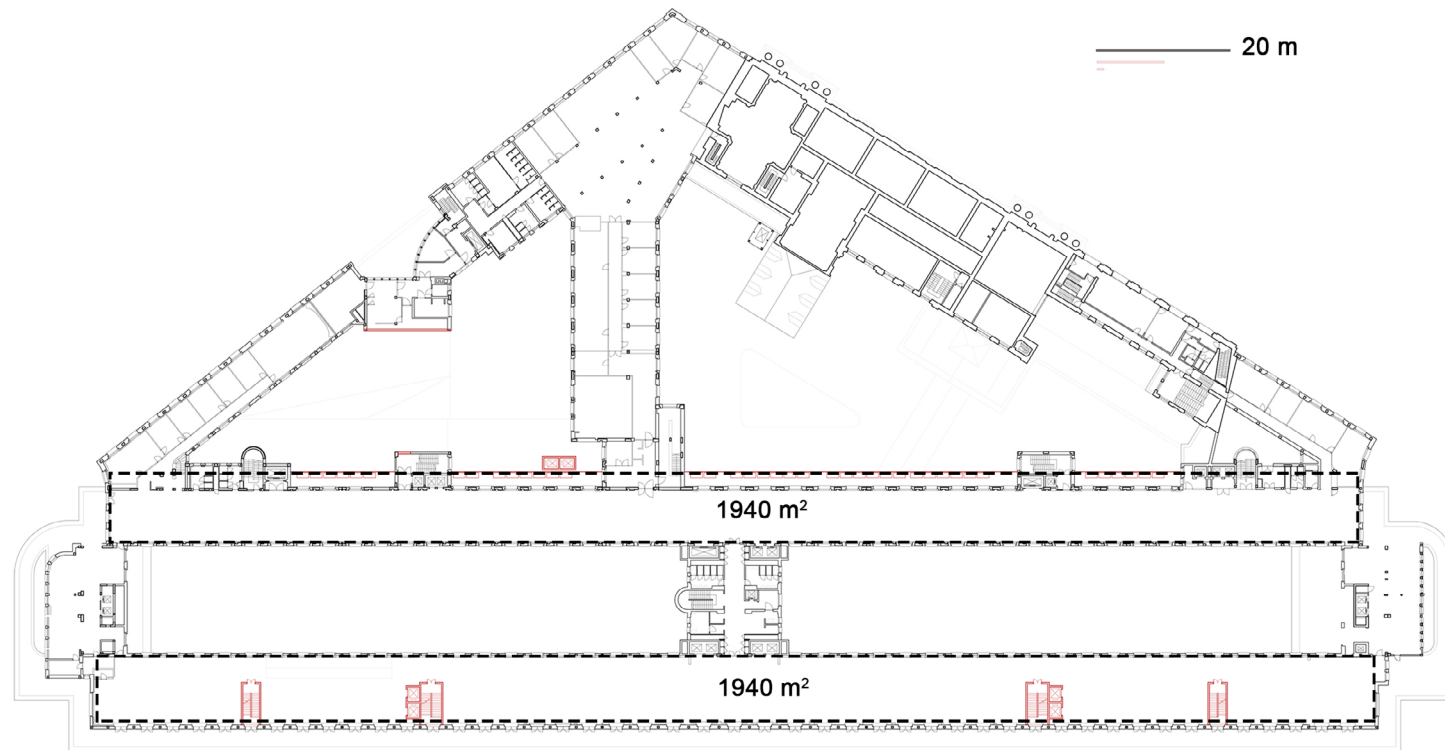




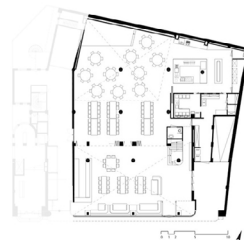




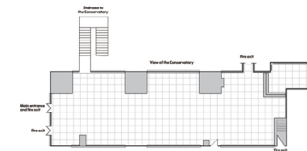
WEEK 3.6 Fragment



Restaurant Albert, Belgium
 Area: ~1300 m²
 Capacity: ?

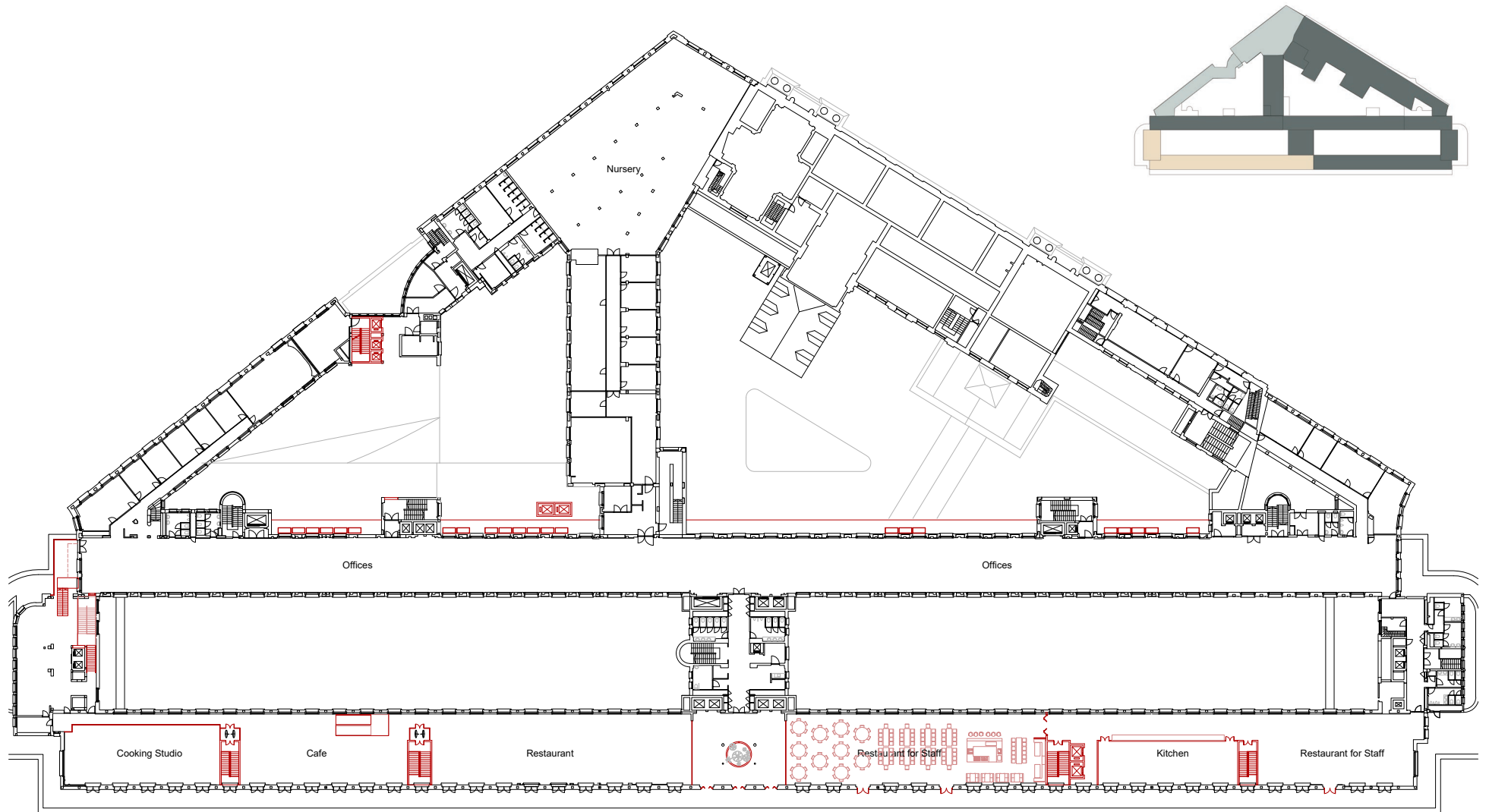


Tommy Hilfiger's Peoples Place, Amsterdam
 Area: 660 m²
 Capacity: 160

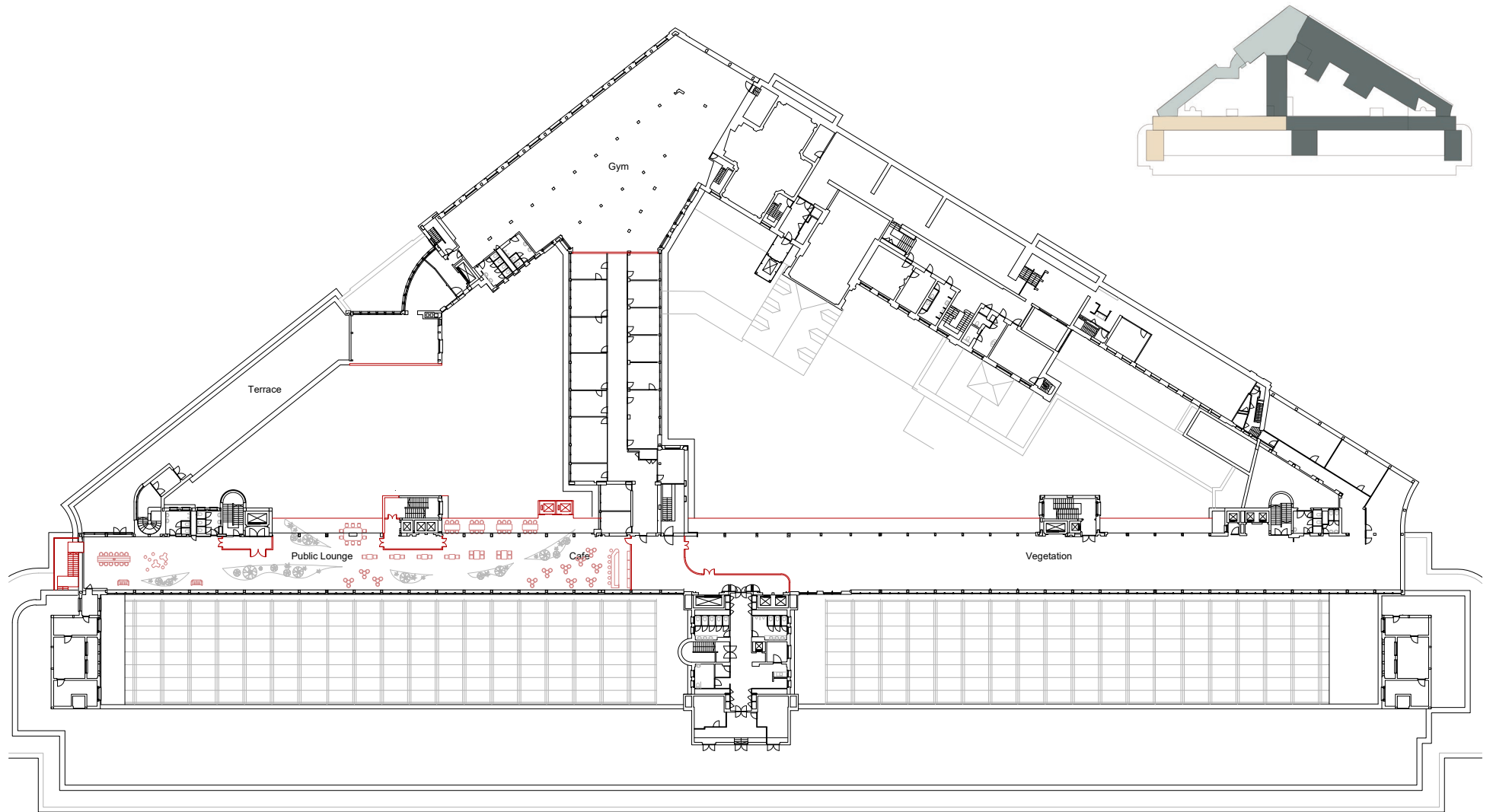


Barbican Conservatory Terrace, Lond
 Area: 326 m²
 standing reception 200
 standing buffet 180
 seated buffet 120
 banquet 120
 civil ceremony 150

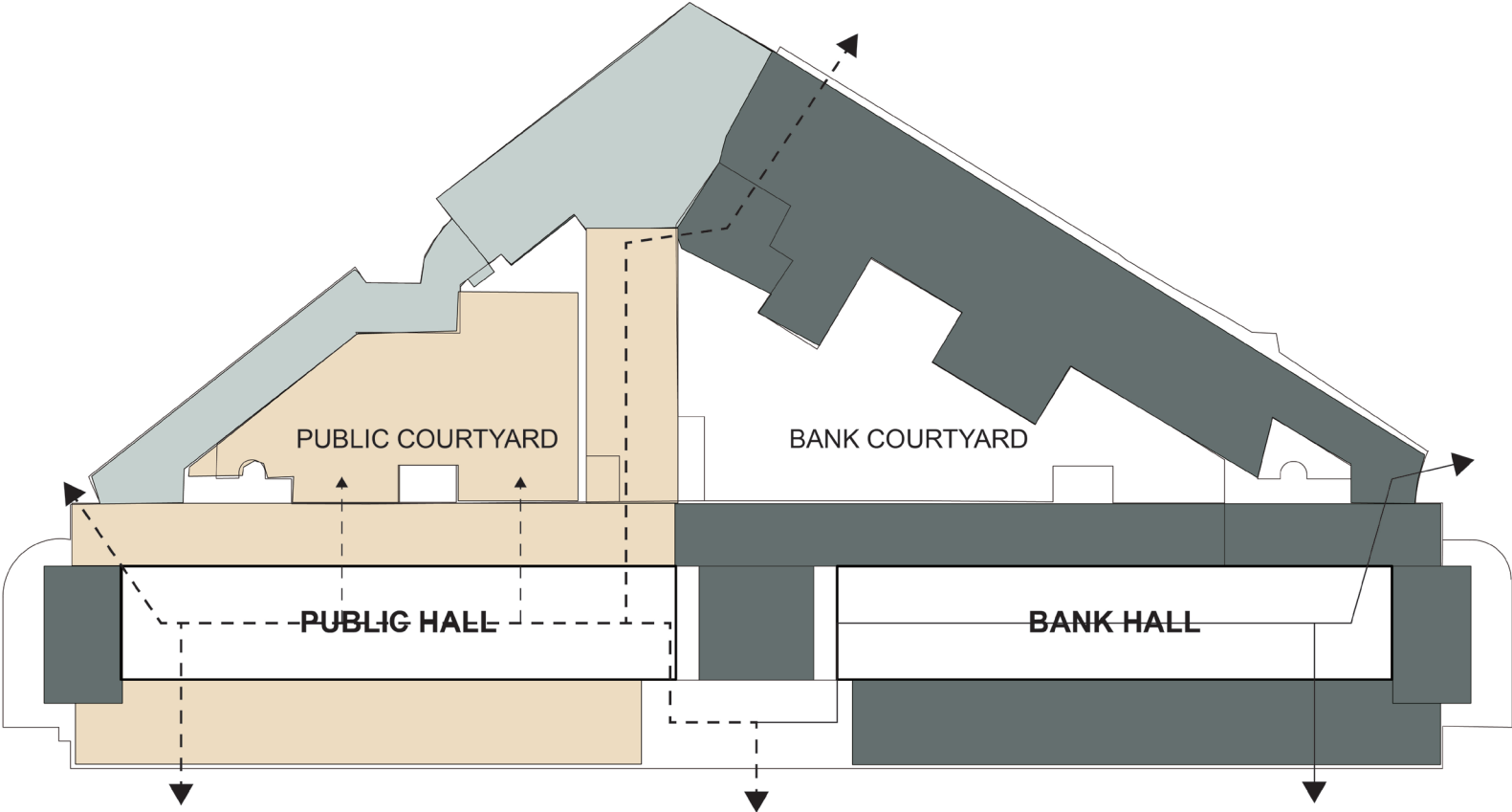
4th Floorplan



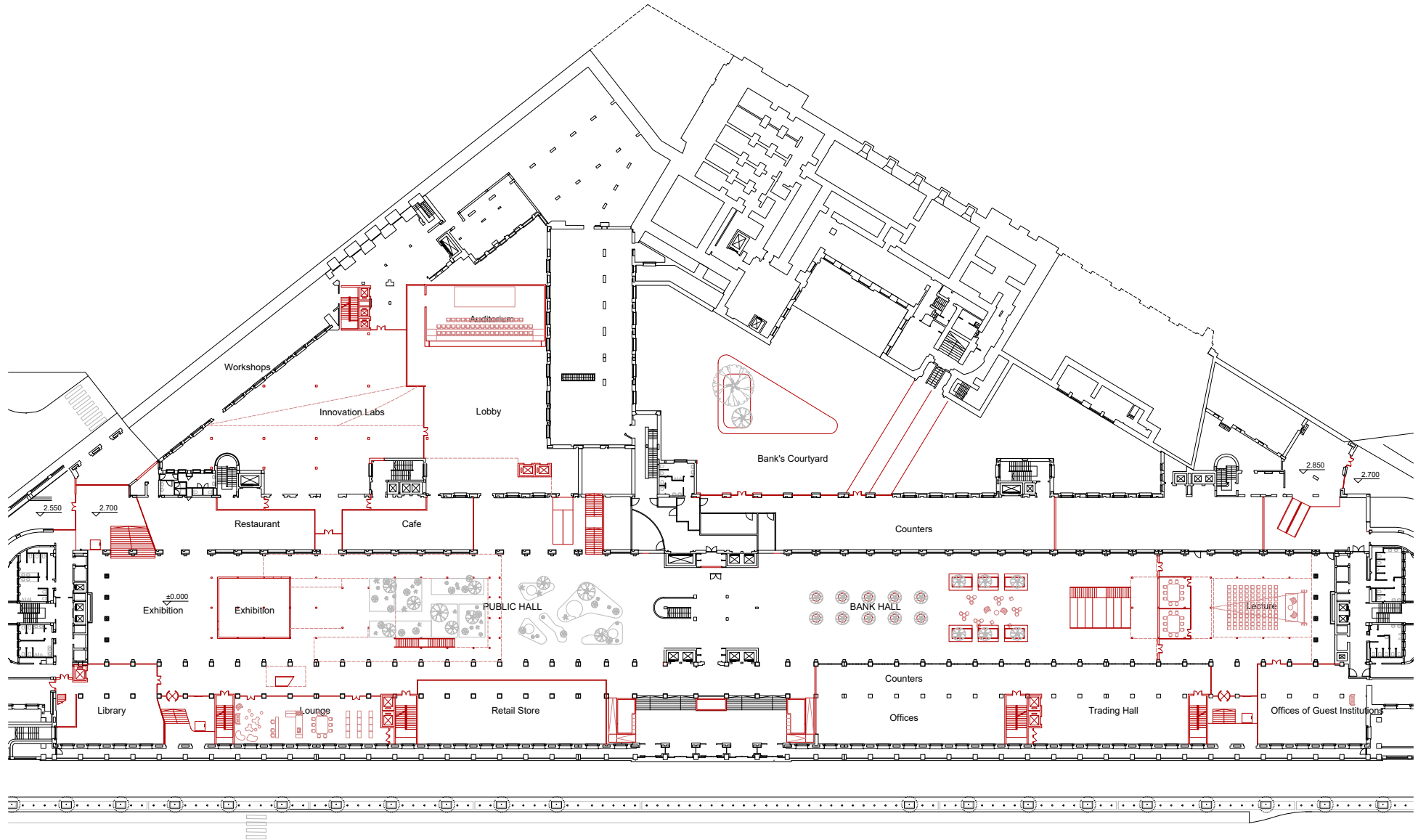
5th Floorplan



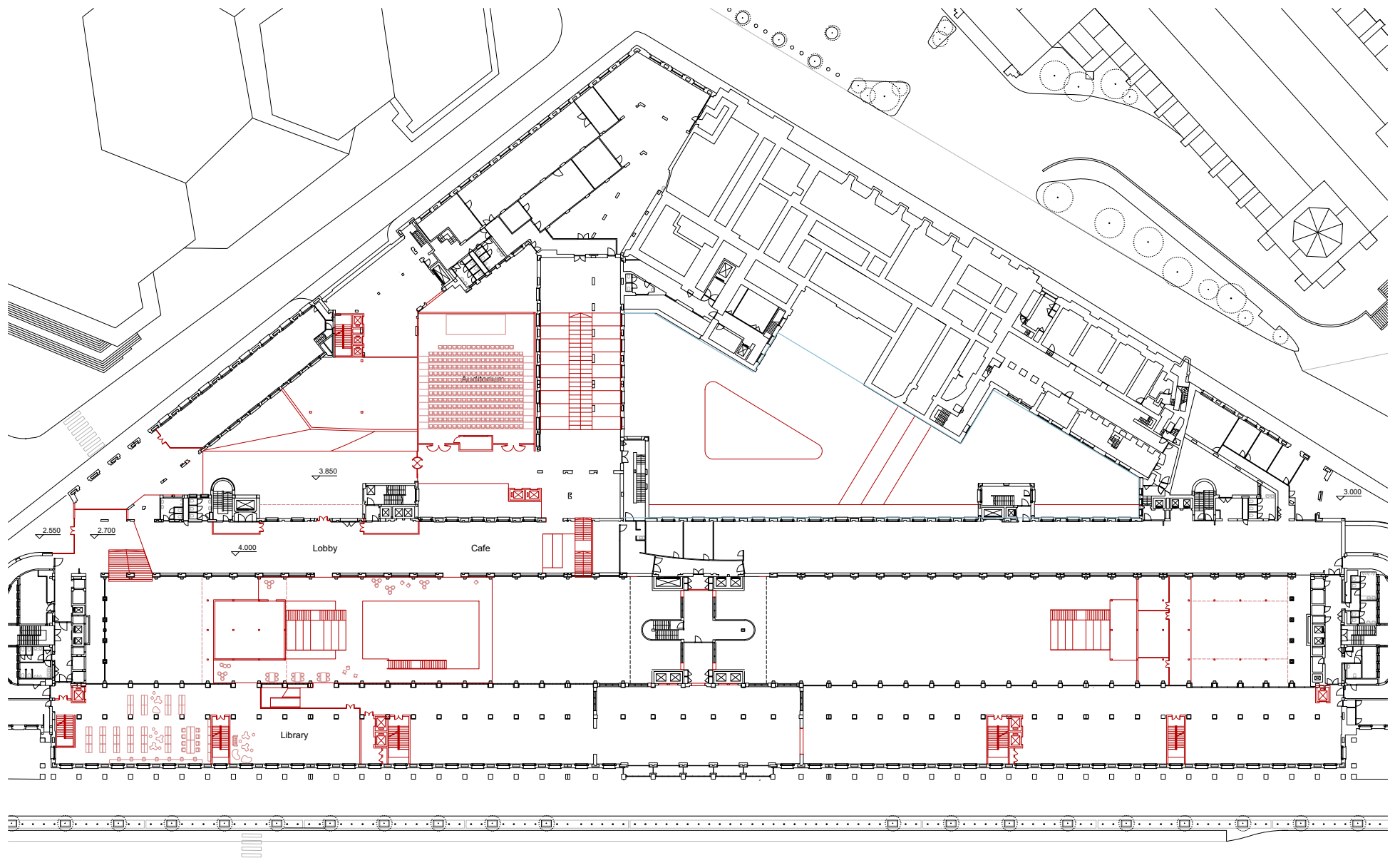
Ground Floor



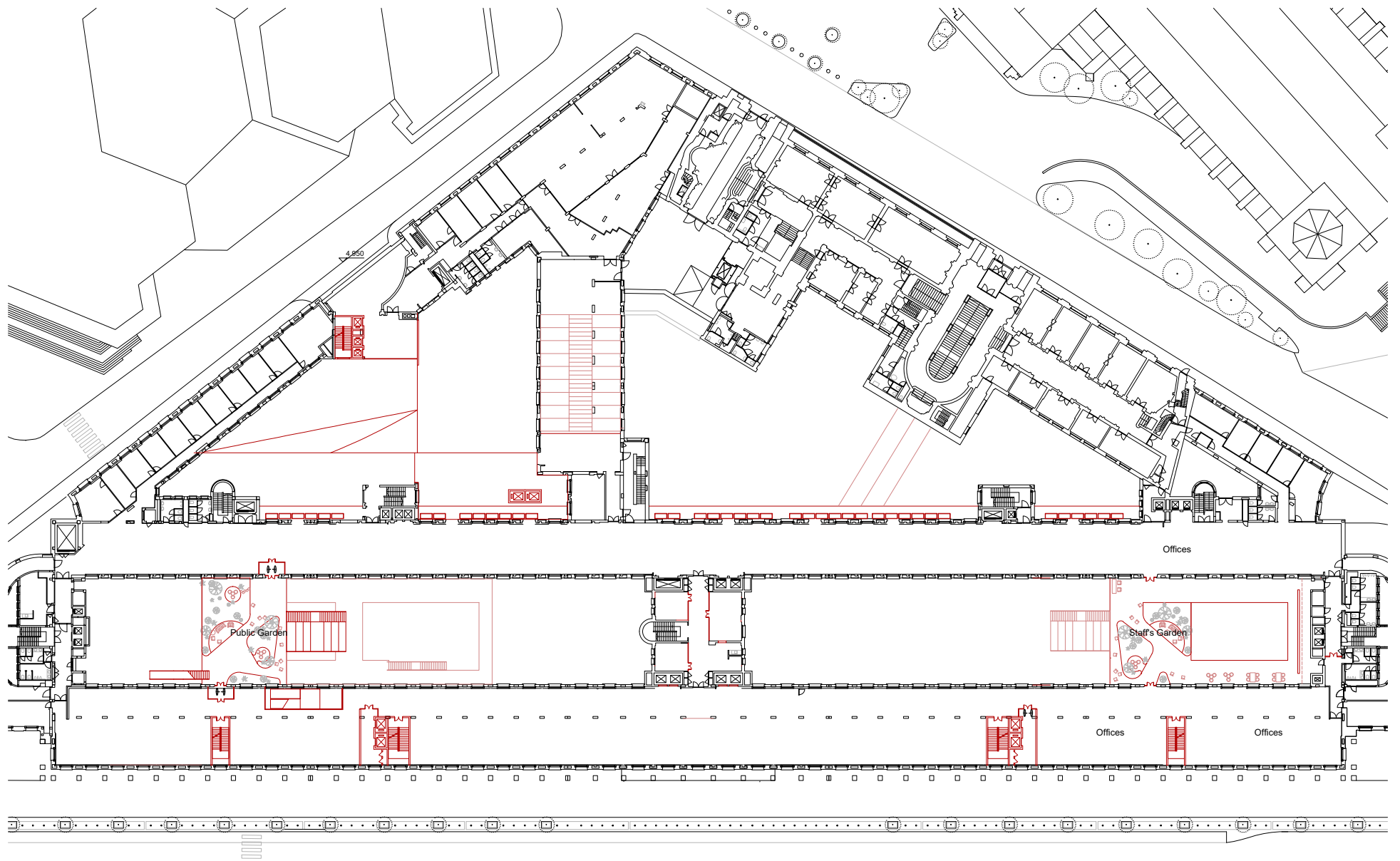
Ground Floorplan



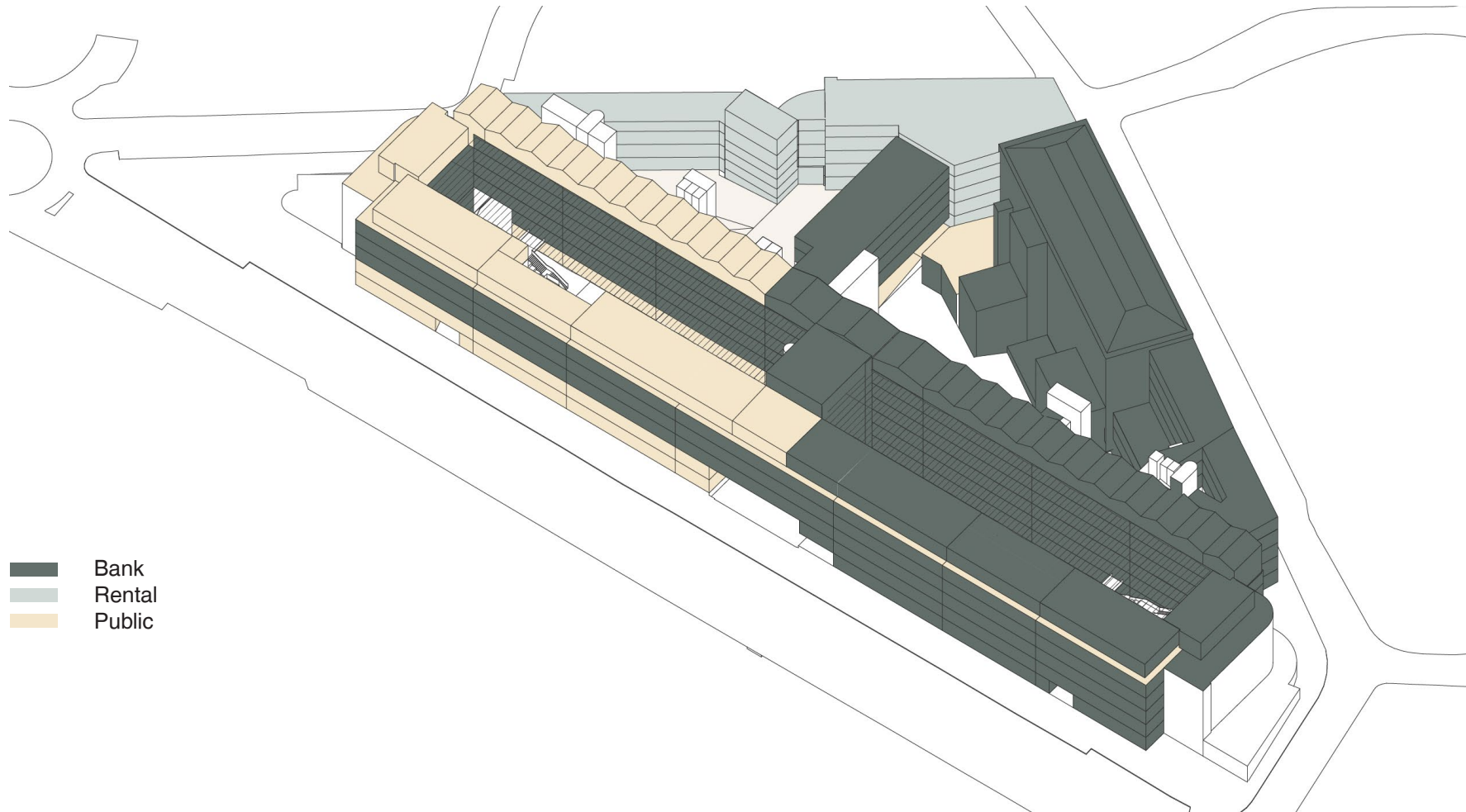
Mezzanine Floorplan



1F Floorplan



Program

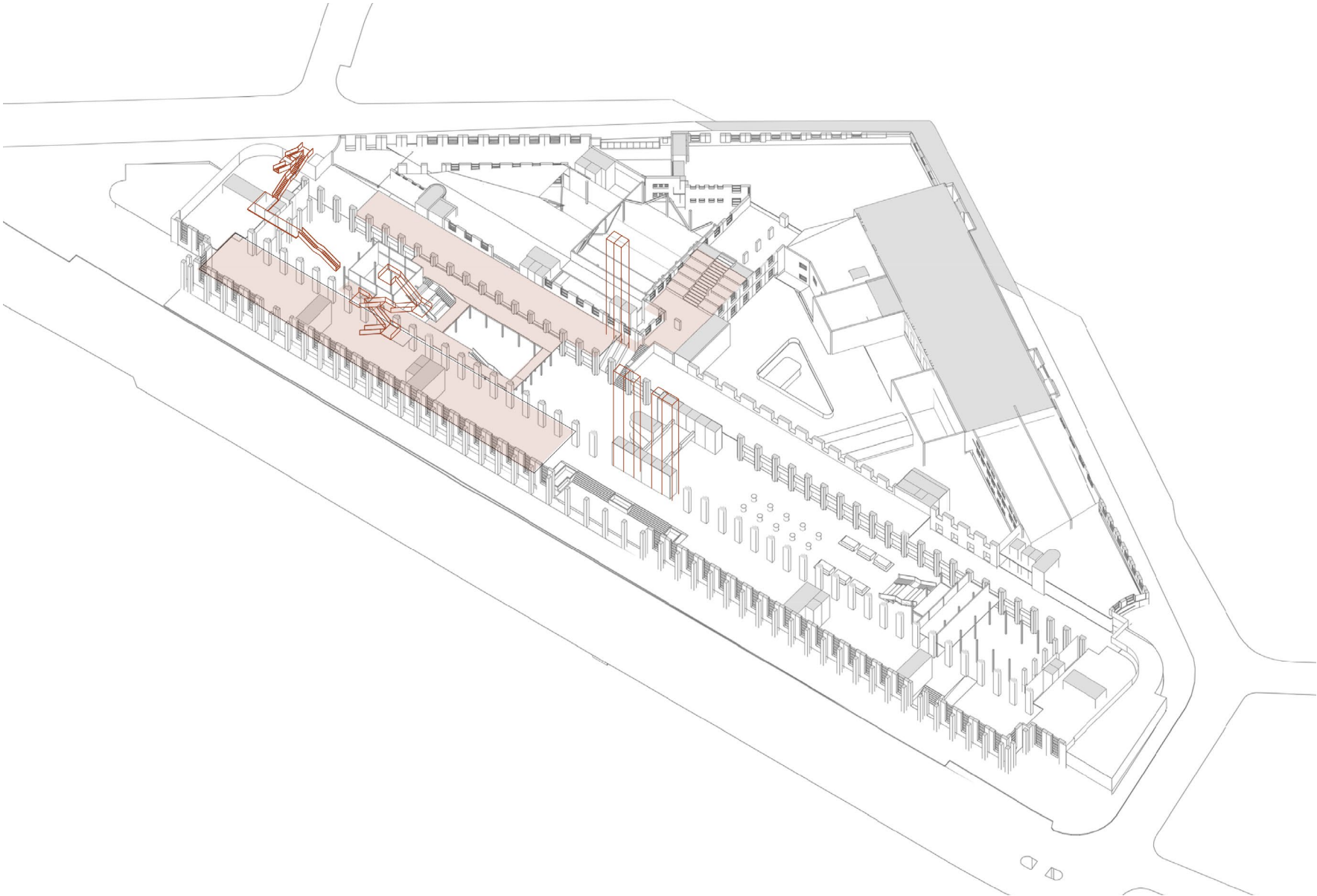


Bank: 30830 m² (not include basement)

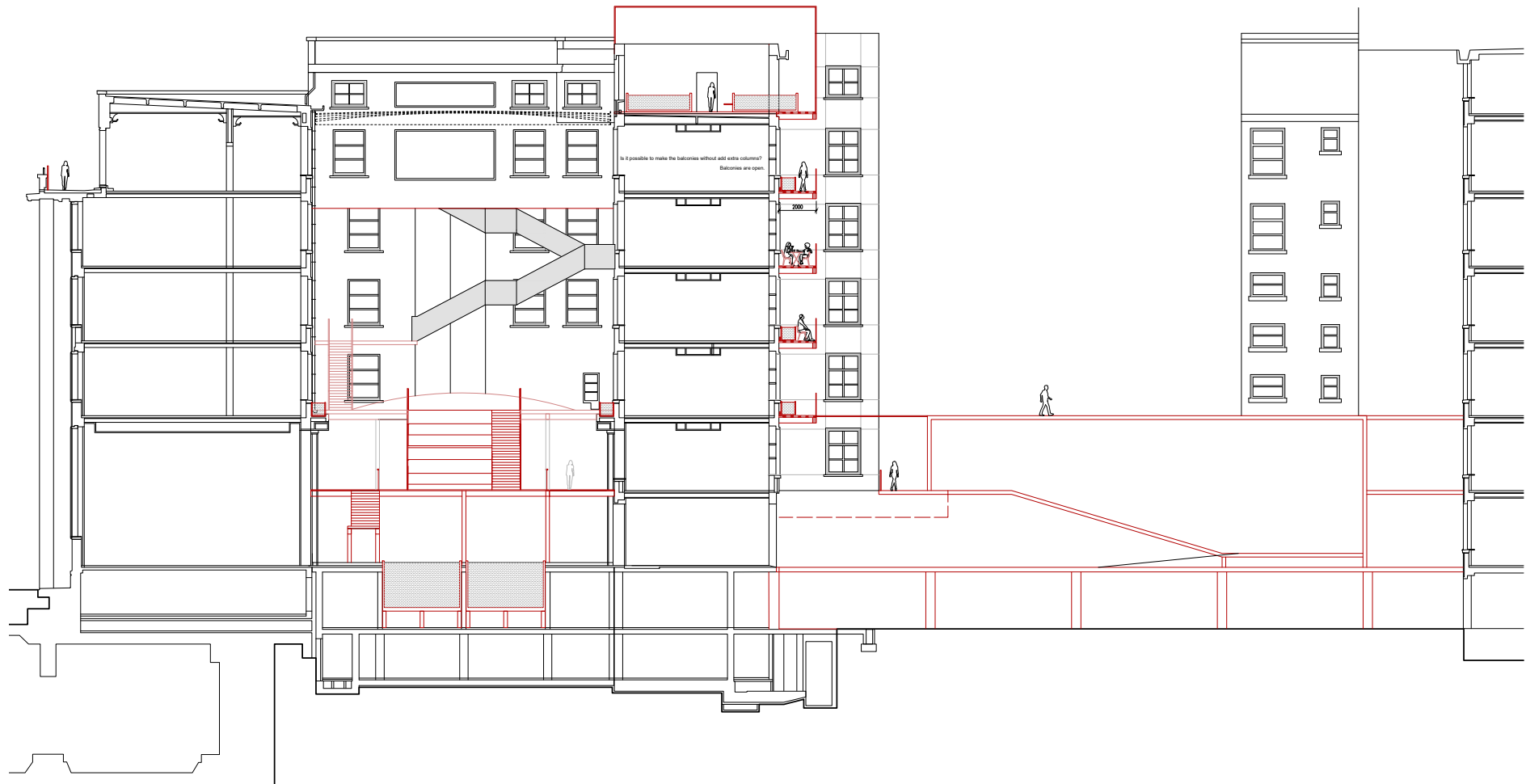
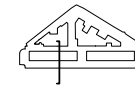
Rental: 7200 m²

Public: 6790 m²
5000 m² (Ground floor & Mezzanine) + 1790 m² (Roof Top)

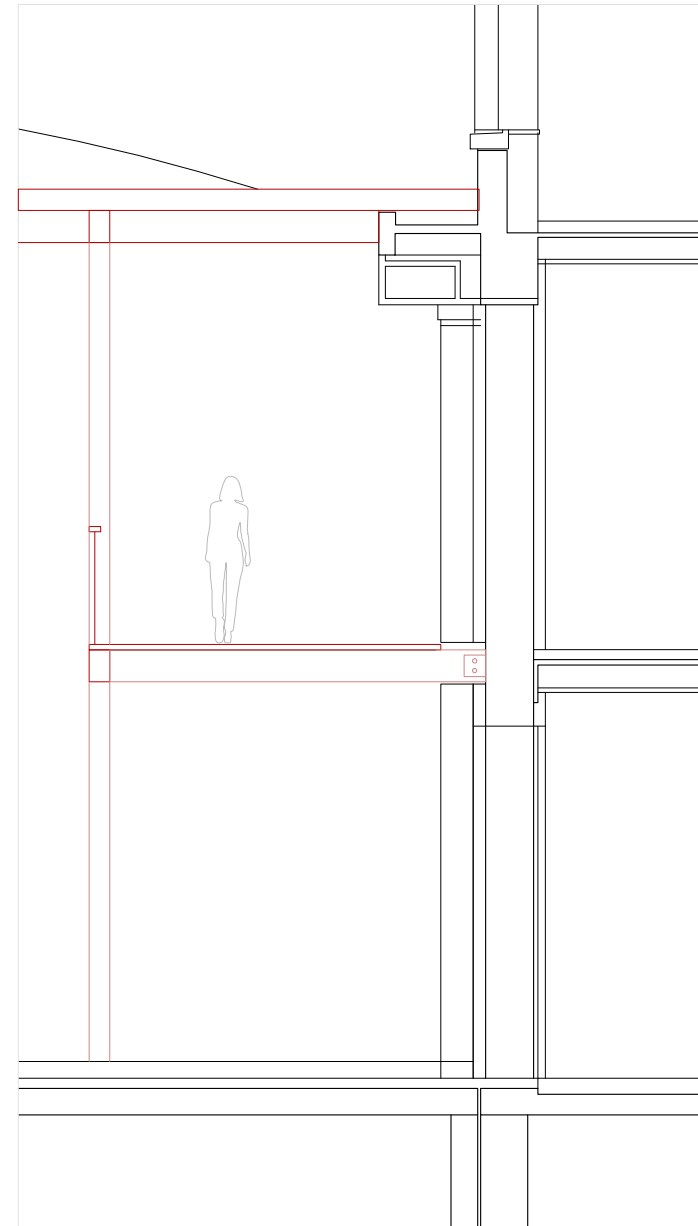
Public Circulation



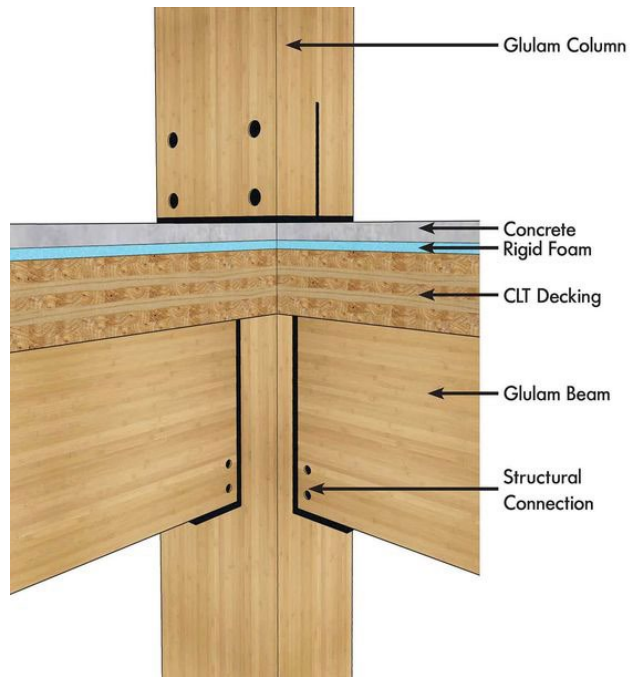
Section



Fragment



Structure References



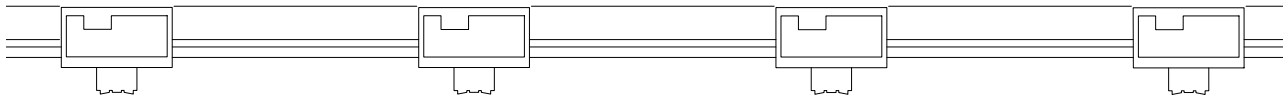
Cross-Laminated Wooden Floor



Junction



Connected with the concrete slab



WEEK 3.7 Fragment

Research Questions

1. How to create a public interior for the city with greenery?

case study: Ford Foundation, Barbican Conservatory, Urban farm precedents

Books: Interior Gardens, Evergreen Architecture

2. How does the greenery change the office environment?

For staff: - grow their own vegetables and fruits; cooking activities

- shared greenery / informal meeting space

- better air quality, low blood pressure, higher satisfaction

3. Grow plants on timber construction.

Main Ideas

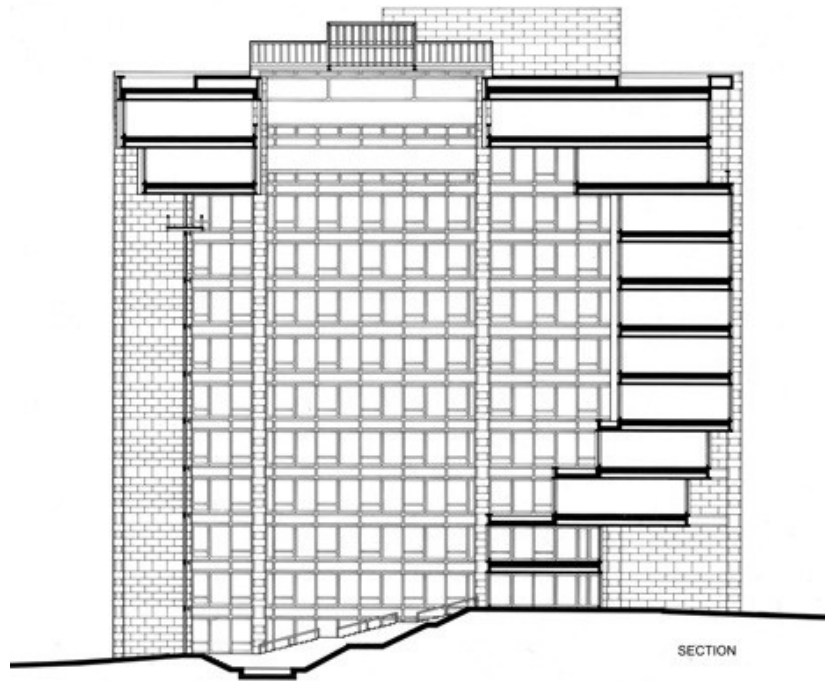
Greenery as public interior

Office Current Situation



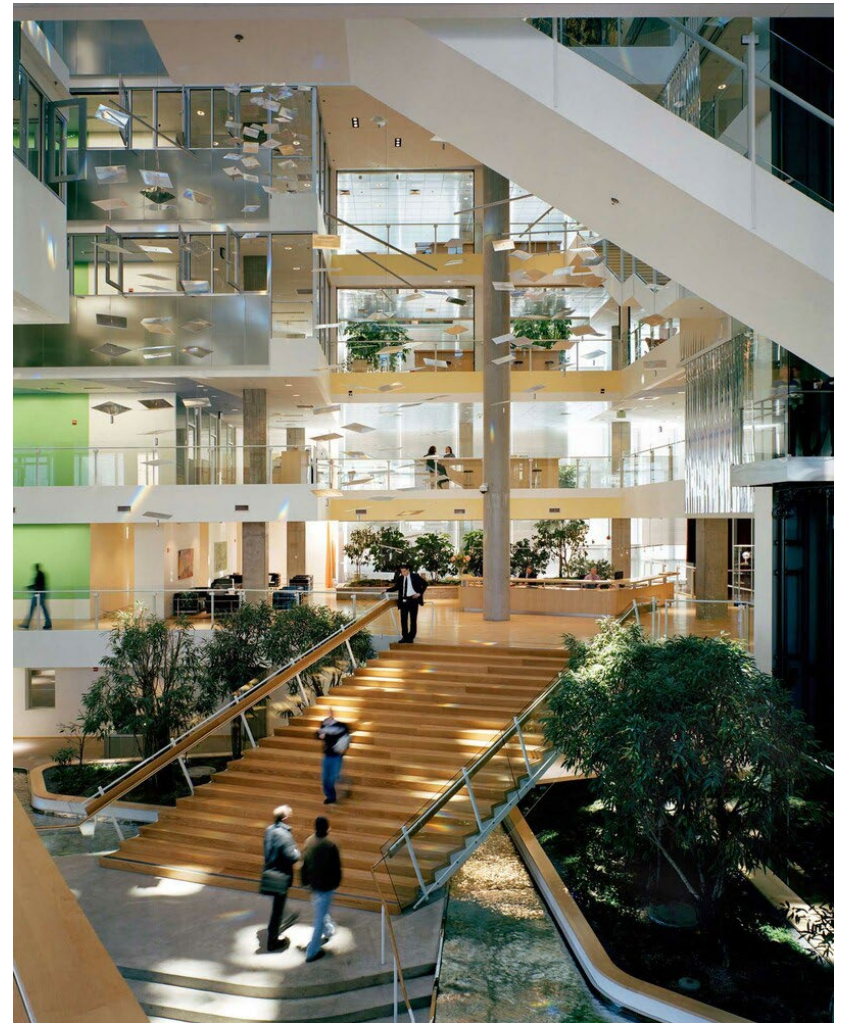
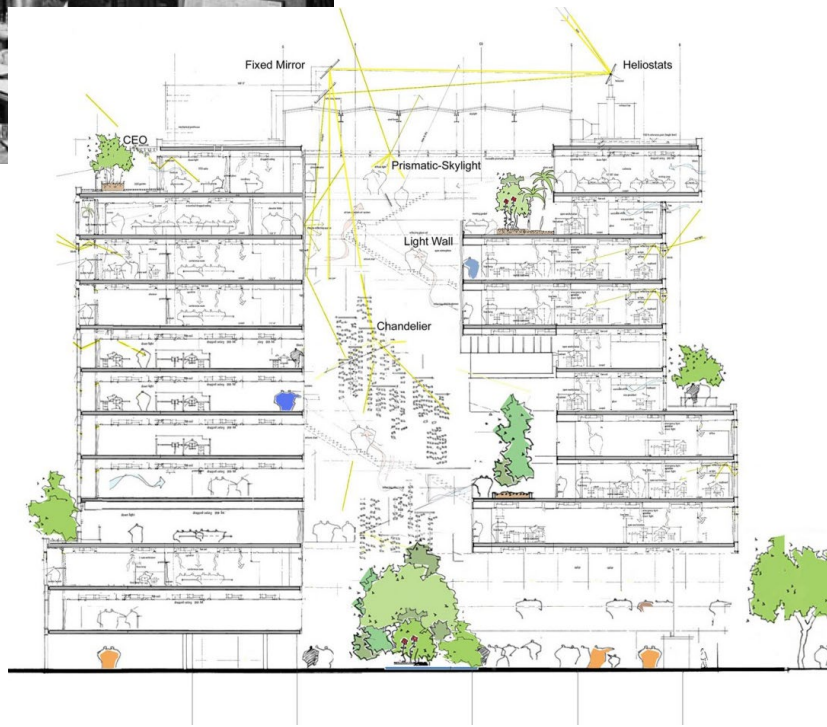
**ceiling, floor, partitions, furniture
photos, maintain or not, how to reuse?**

Office Greenery Approach



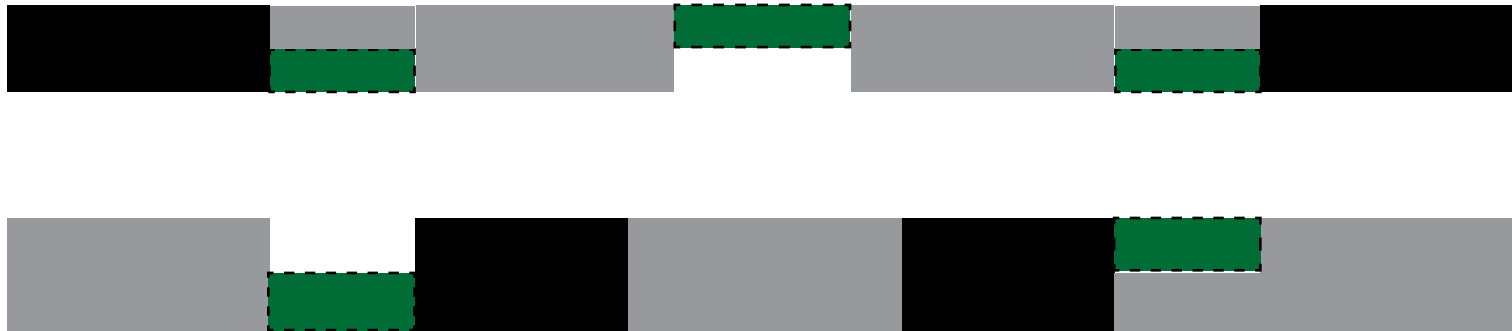


ach

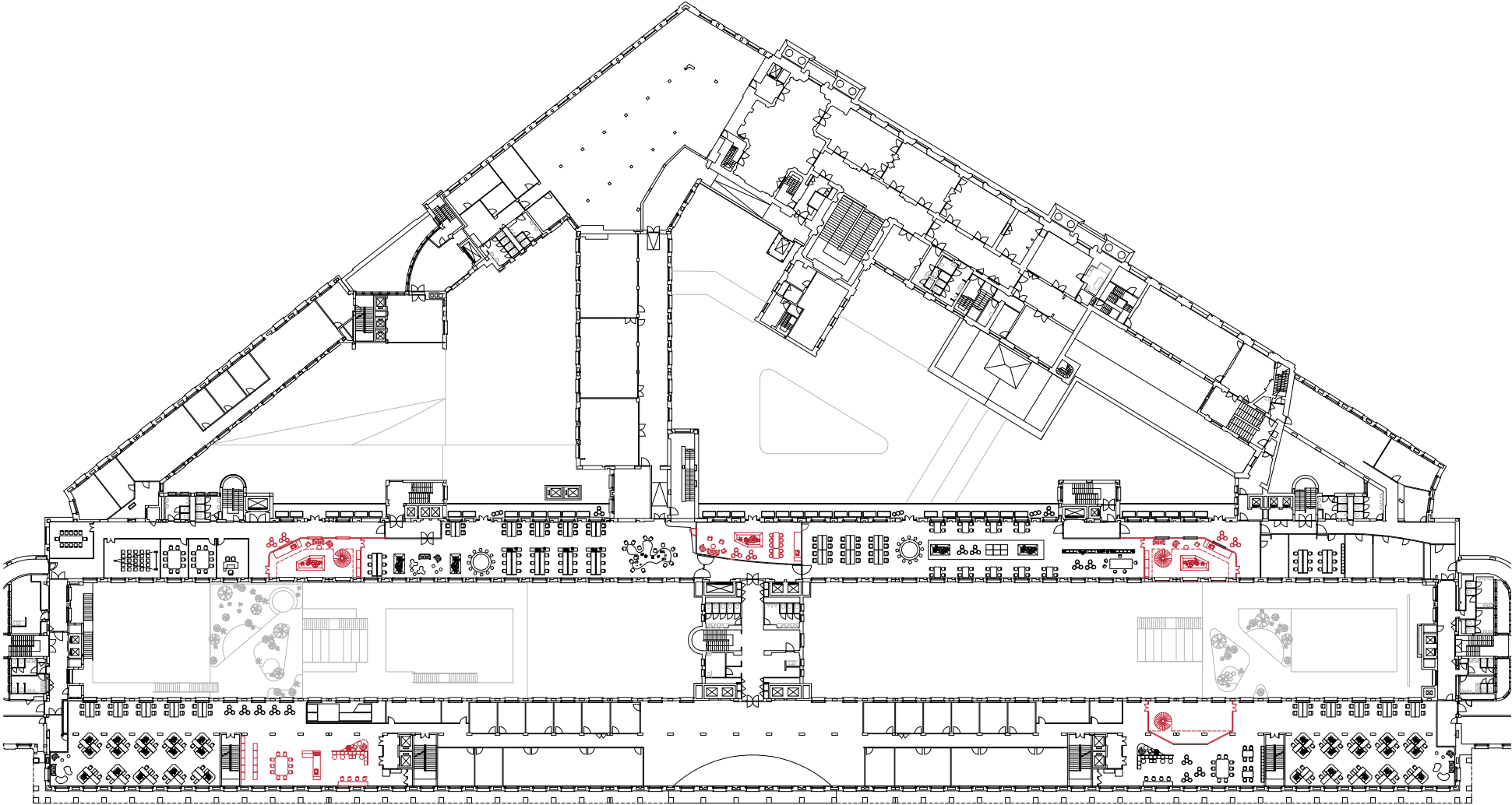


Office Layout

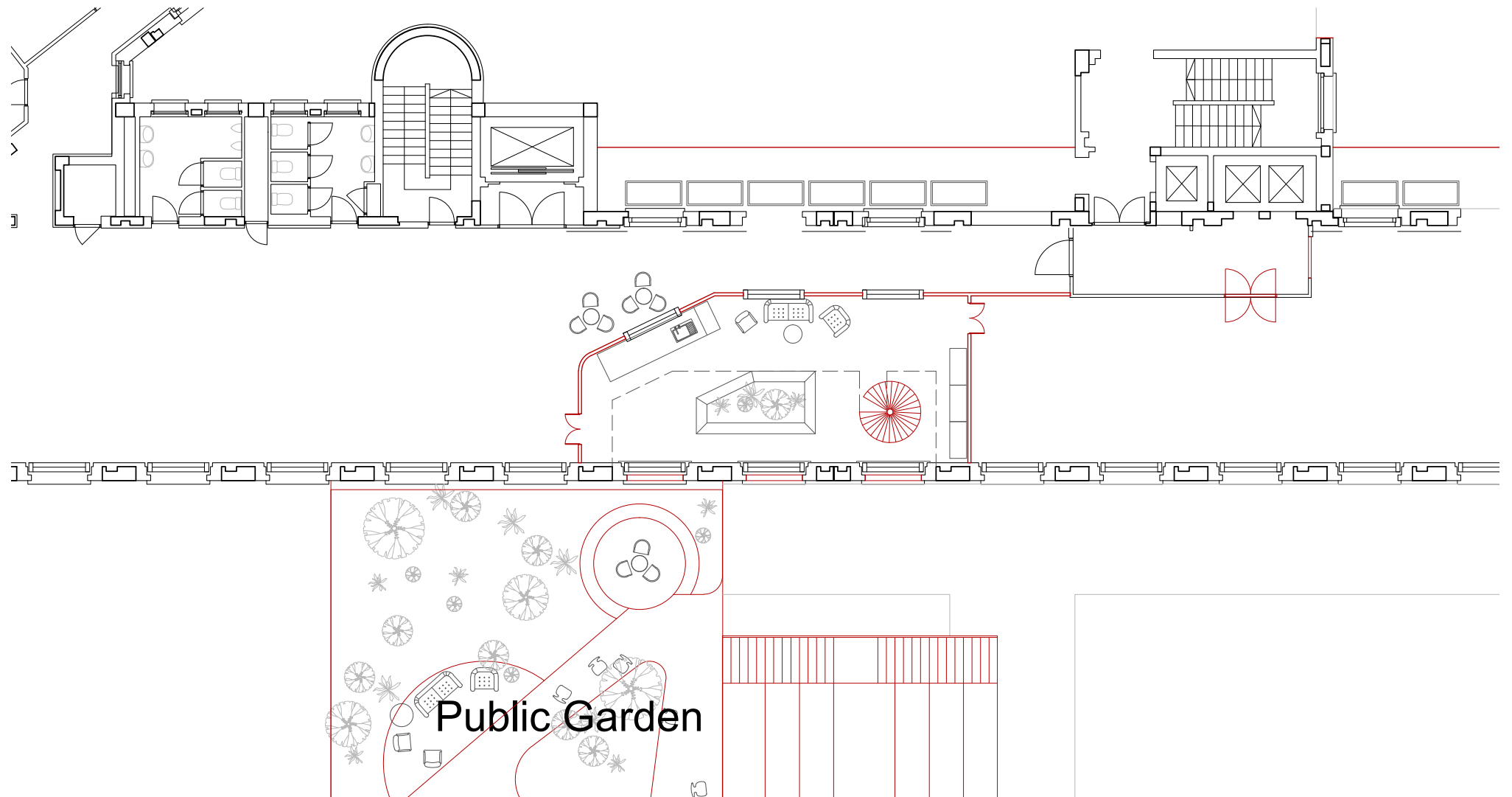
- open office
- shared lounges and kitchens, encourage communication



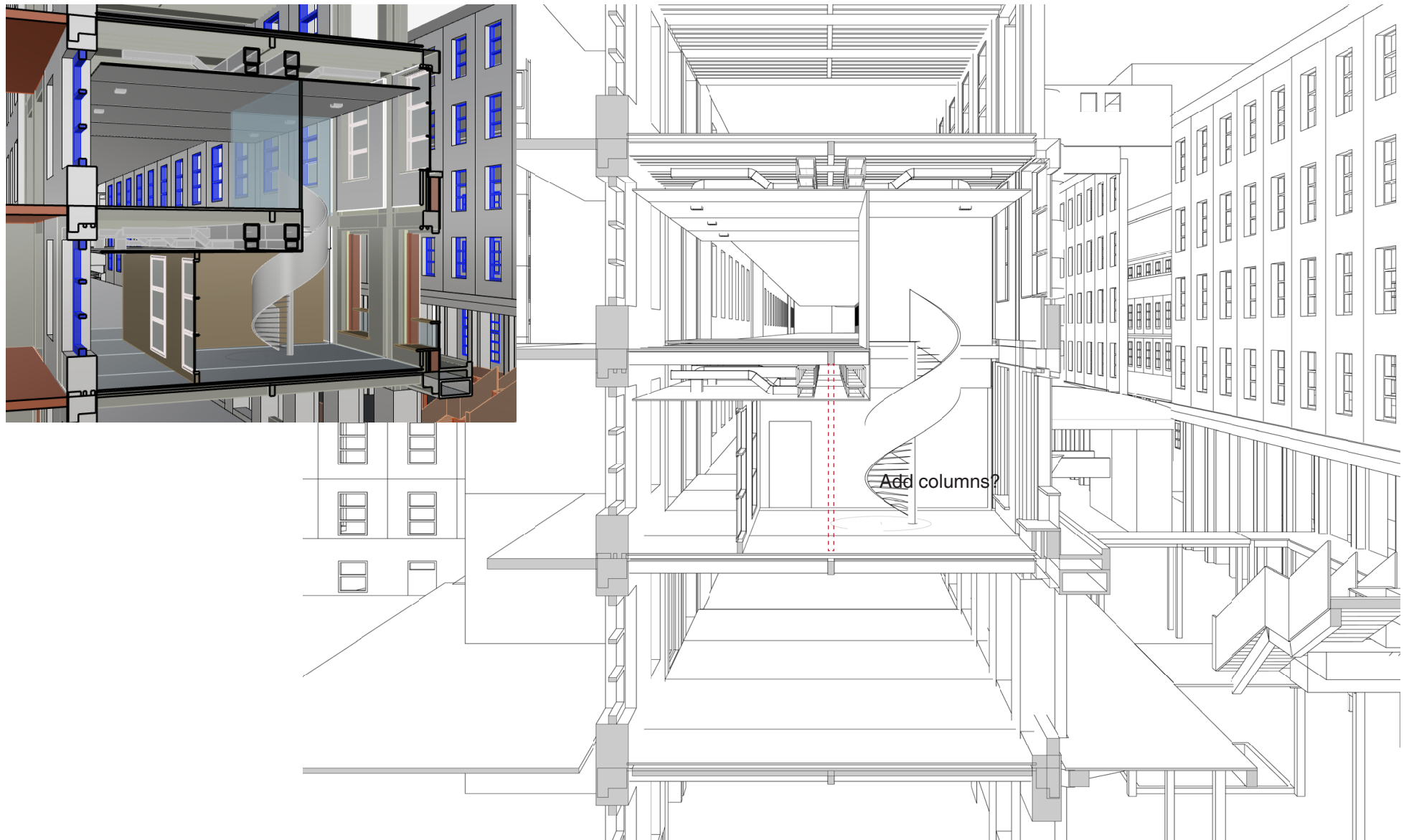
Office Layout: 3rd Floorplan



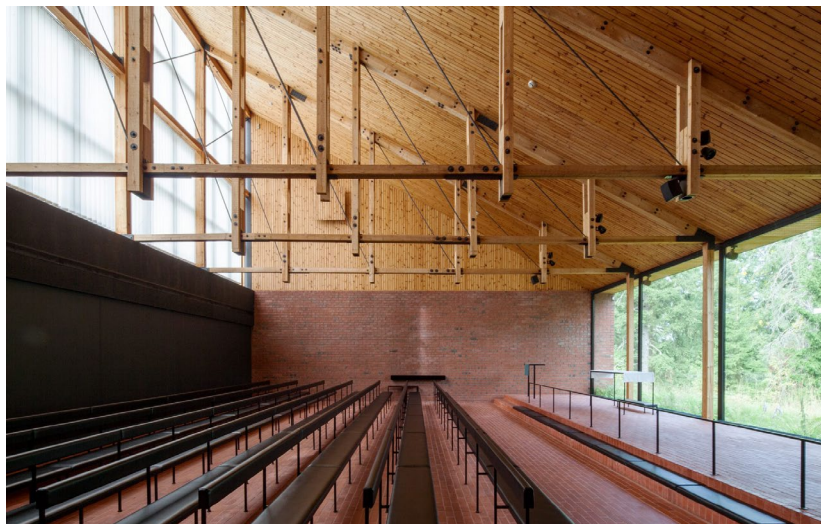
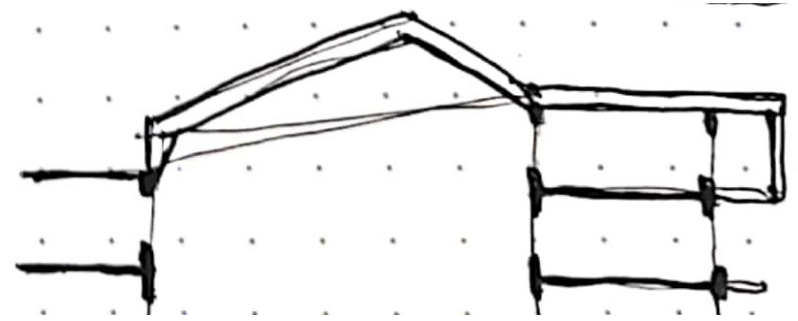
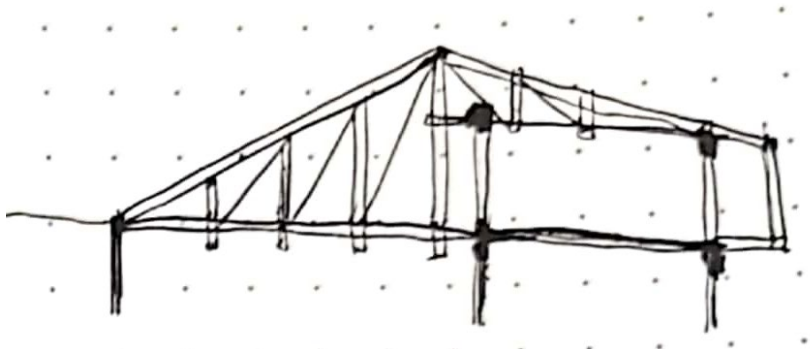
The Shared Lounges



The Shared Lounges



Roof - Timber Trusses

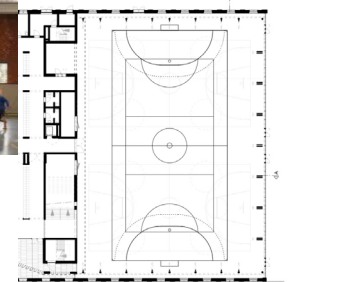


Otaniemi Chapel, Finland

<https://divisare.com/projects/329795-heikki-and-kaija-siren-federico-covre-otaniemi-chapel>

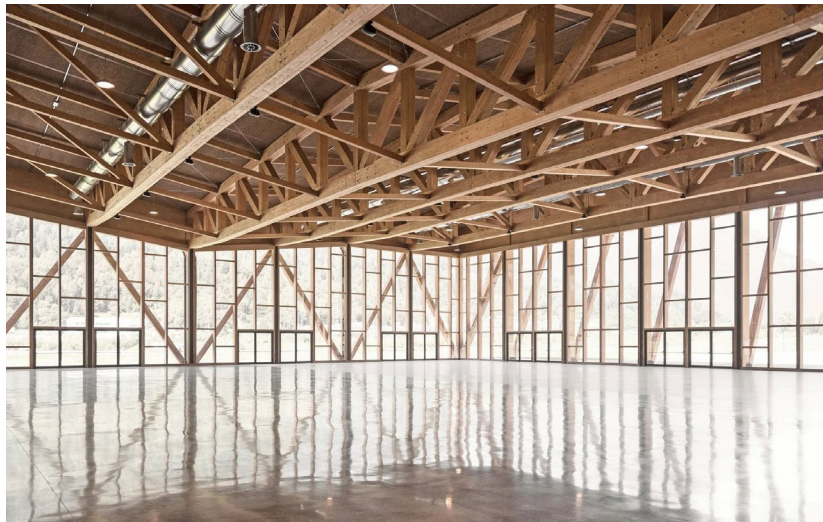
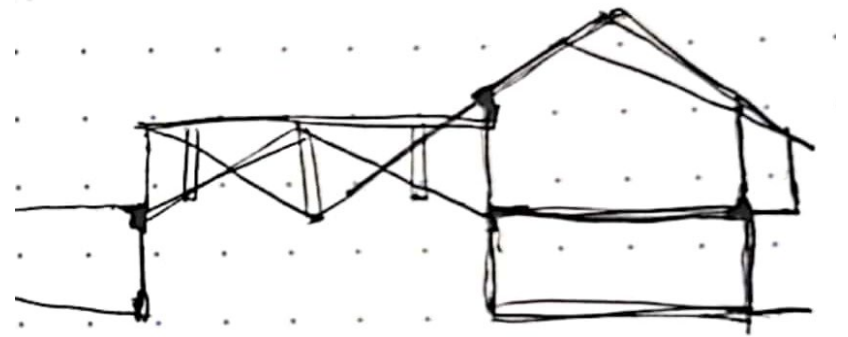
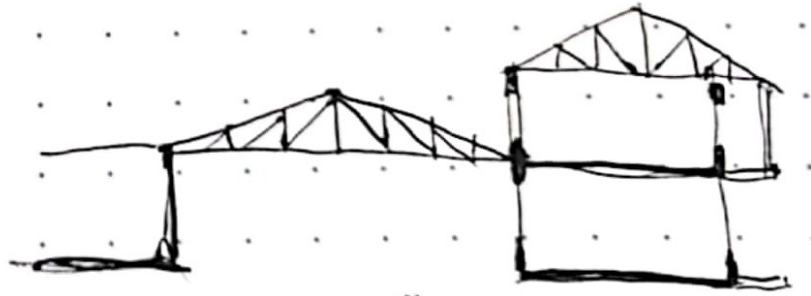


The WDT-Loods, Belgium



<https://divisare.com/projects/318666-verdick-verdickt-architecten-stijn-bollaert-reconversion-of-the-wdt-loods-park-spoor-noord>

Roof - Timber Trusses



Congress and Exhibition Centre, Italy
covered with grid-like geometric timber frames, and provides a completely column-free open space.

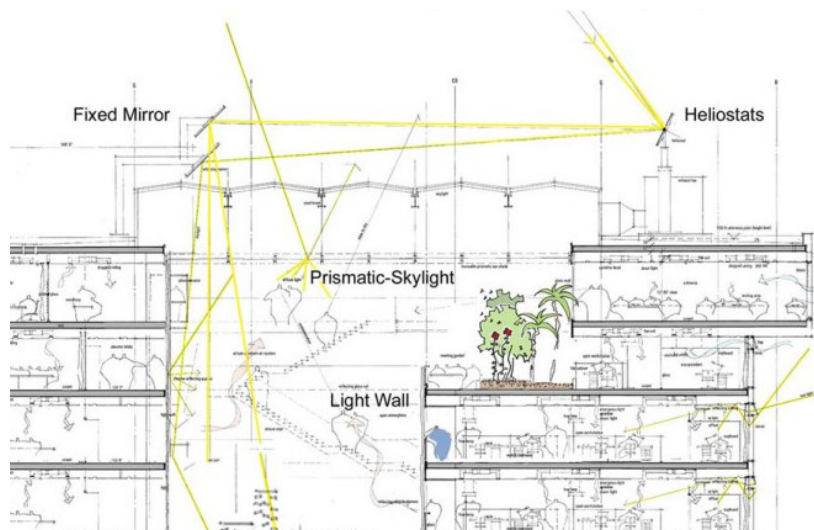
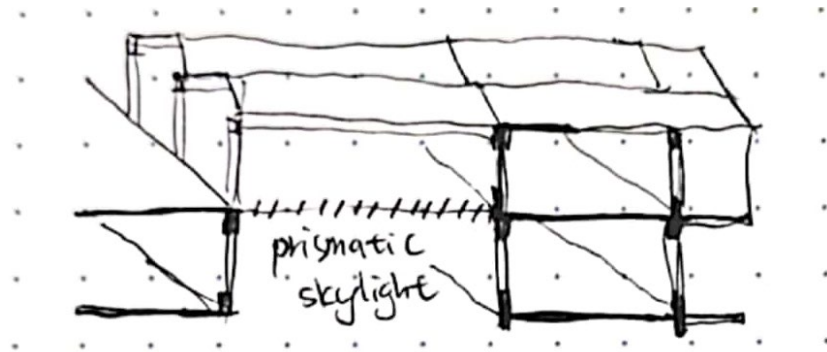
https://www.dezeen.com/2019/10/04/congress-and-exhibition-centre-bressan-botter-italy/?li_source=L1&li_medium=bottom_block_1



X
The span is only 5 m.

<https://www.archdaily.com/802313/the-inverted-truss-b-plus-p-architects>

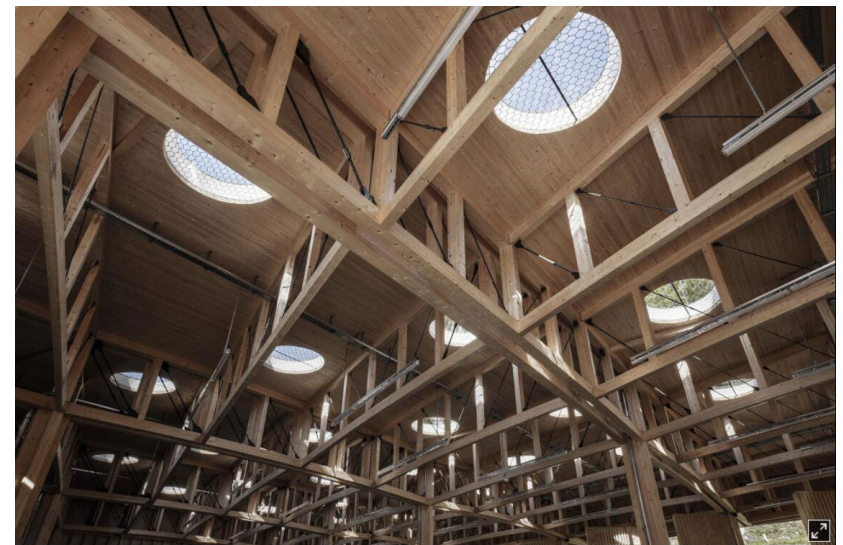
Roof - Timber Trusses



GENZYME CENTER, USA

A **prismatic ceiling** beneath the skylights carefully filters the light, then disperses it into the interior of the building through reflective objects such as the sparkling 'chandeliers' and the 'light-wall'. The atrium's role as a return air duct ensures that the chandeliers are, under the influence of thermal effects, constantly in motion, further enlivening the space.

<https://behisch.com/work/projects/0104>

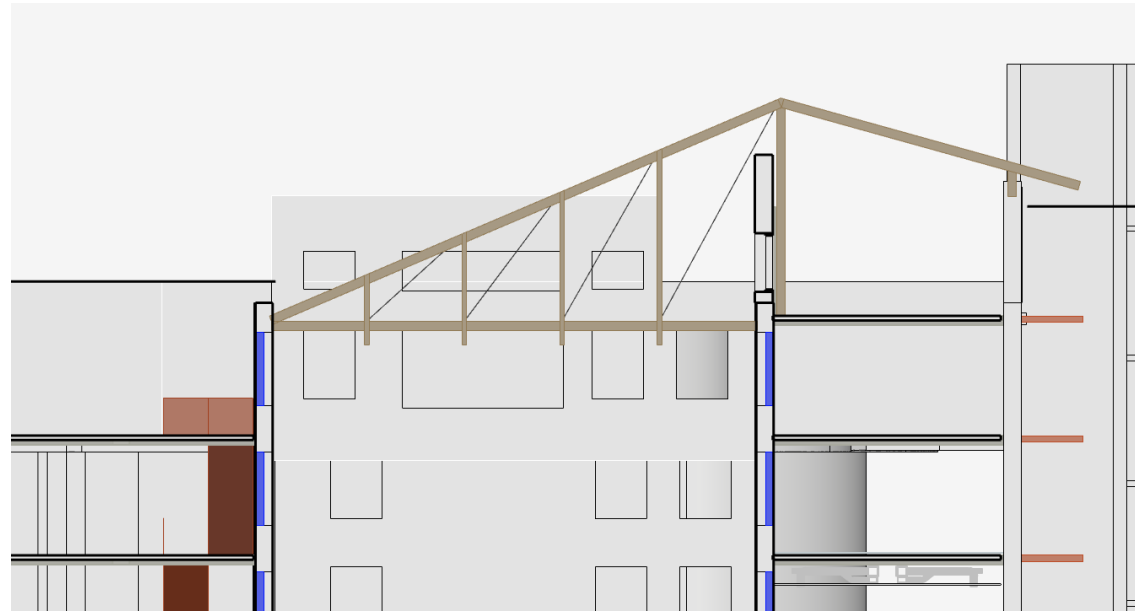


Recycled Center, Germany

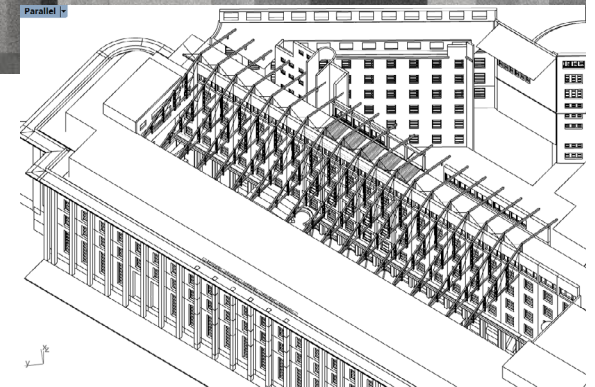
The roof of the hall is a half-timbered construction. In order to enable **spans of twelve meters**, the solid wood supports were glued in a cross shape and clamped in steel feet. The **nodes of the truss** are also made of steel and reinforced with **diagonal tension rods**.

https://www.baunetz.de/meldungen/Meldungen-Altstoffsammelzentrum_in_Vorarlberg_von_Marte.Marte_4447587.html

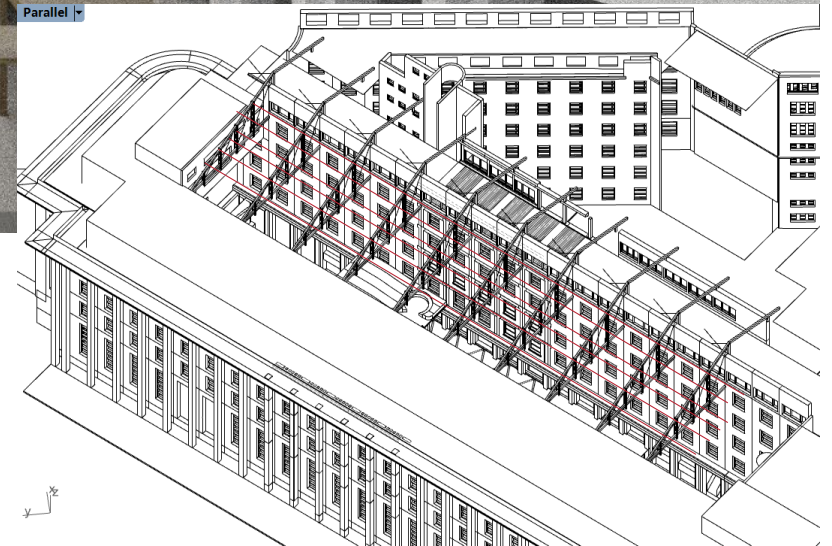
Roof 01



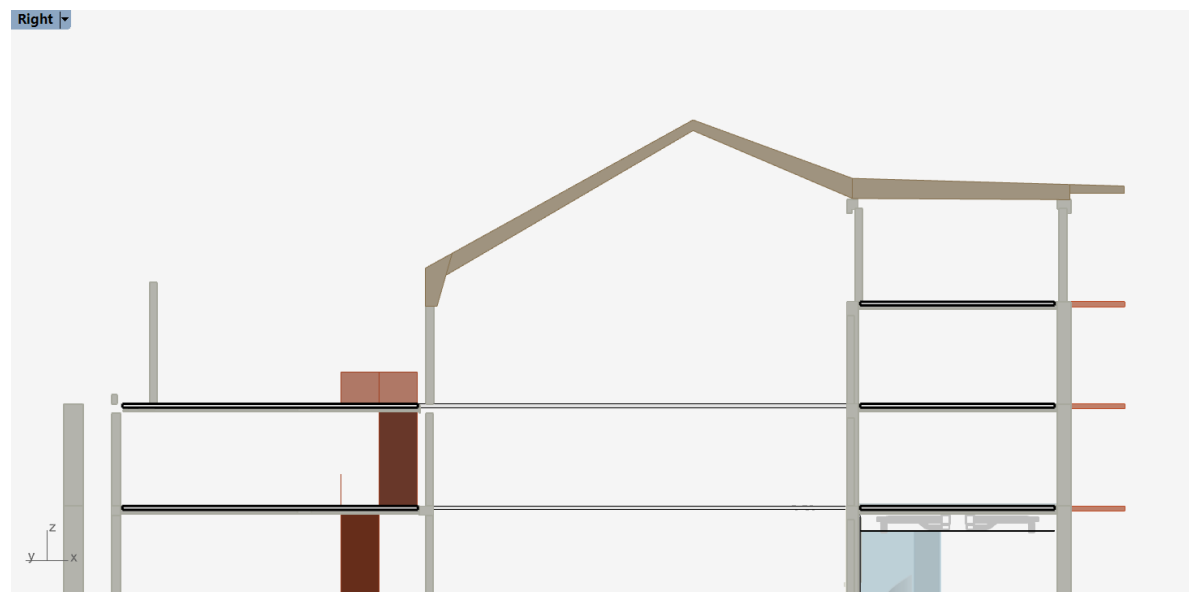
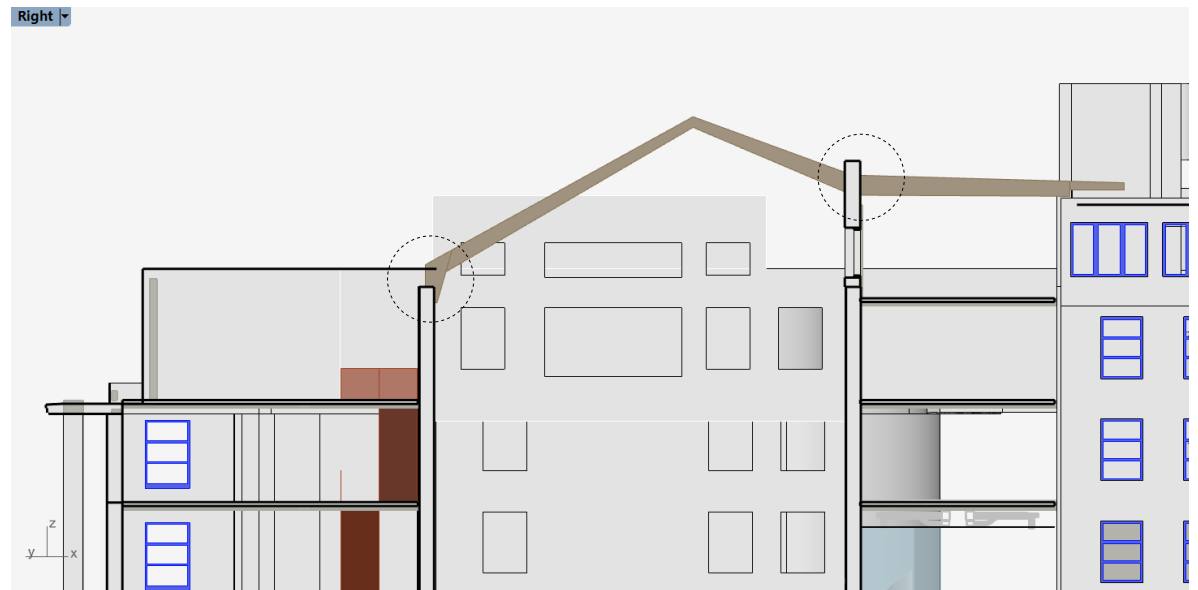
Roof 01 - 3.9 m span



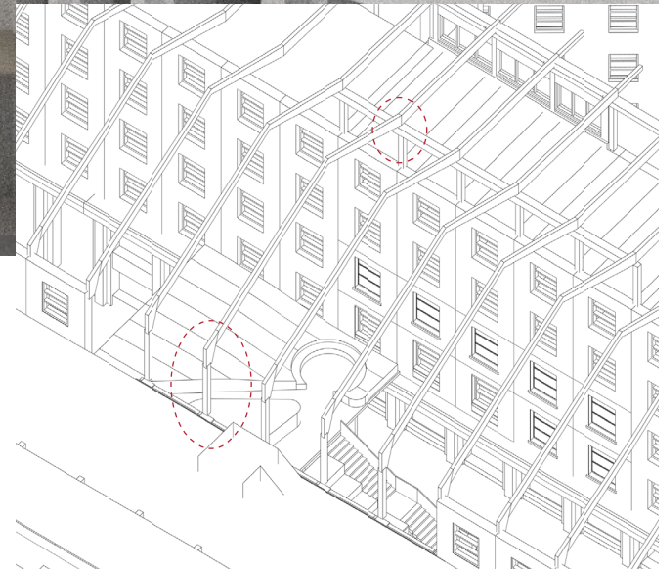
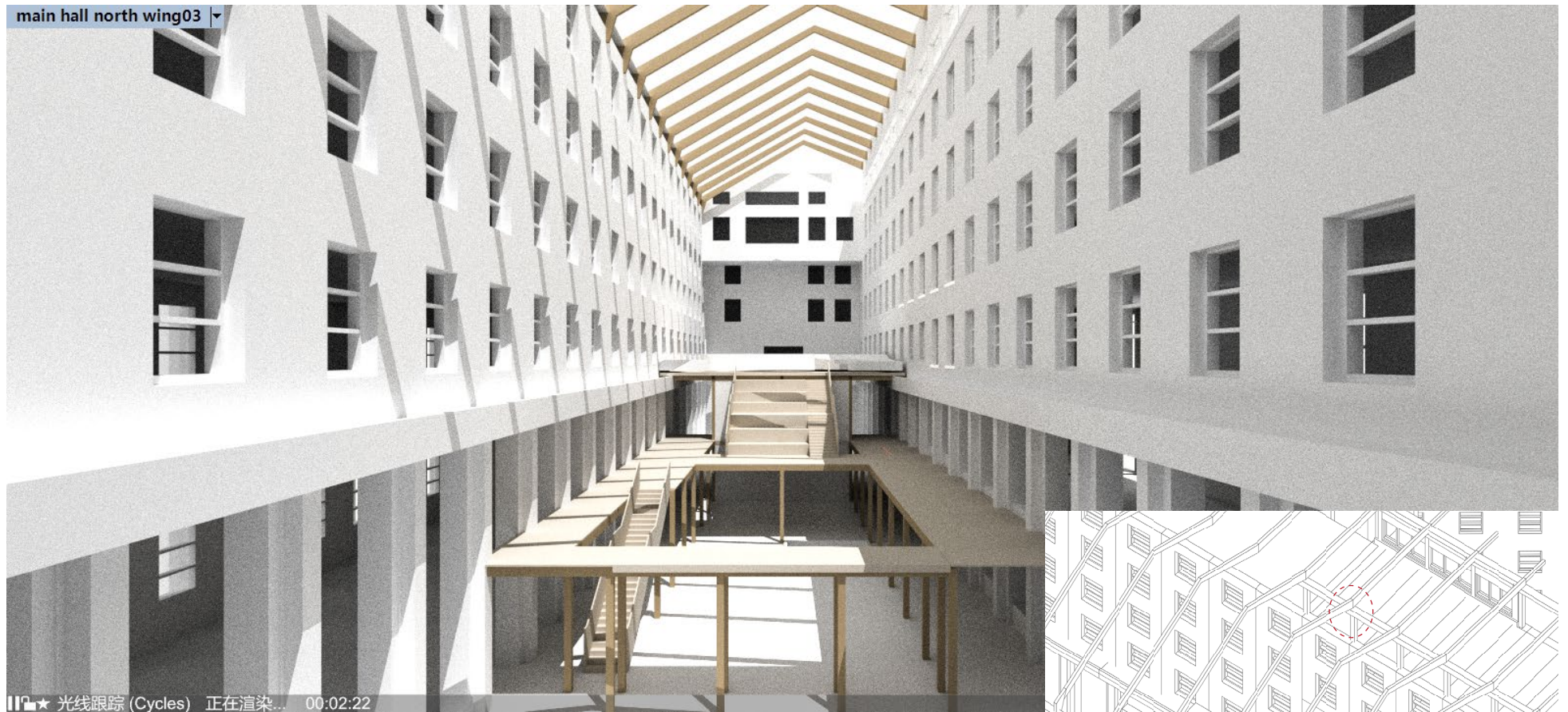
Roof 01 - 7.8 m span



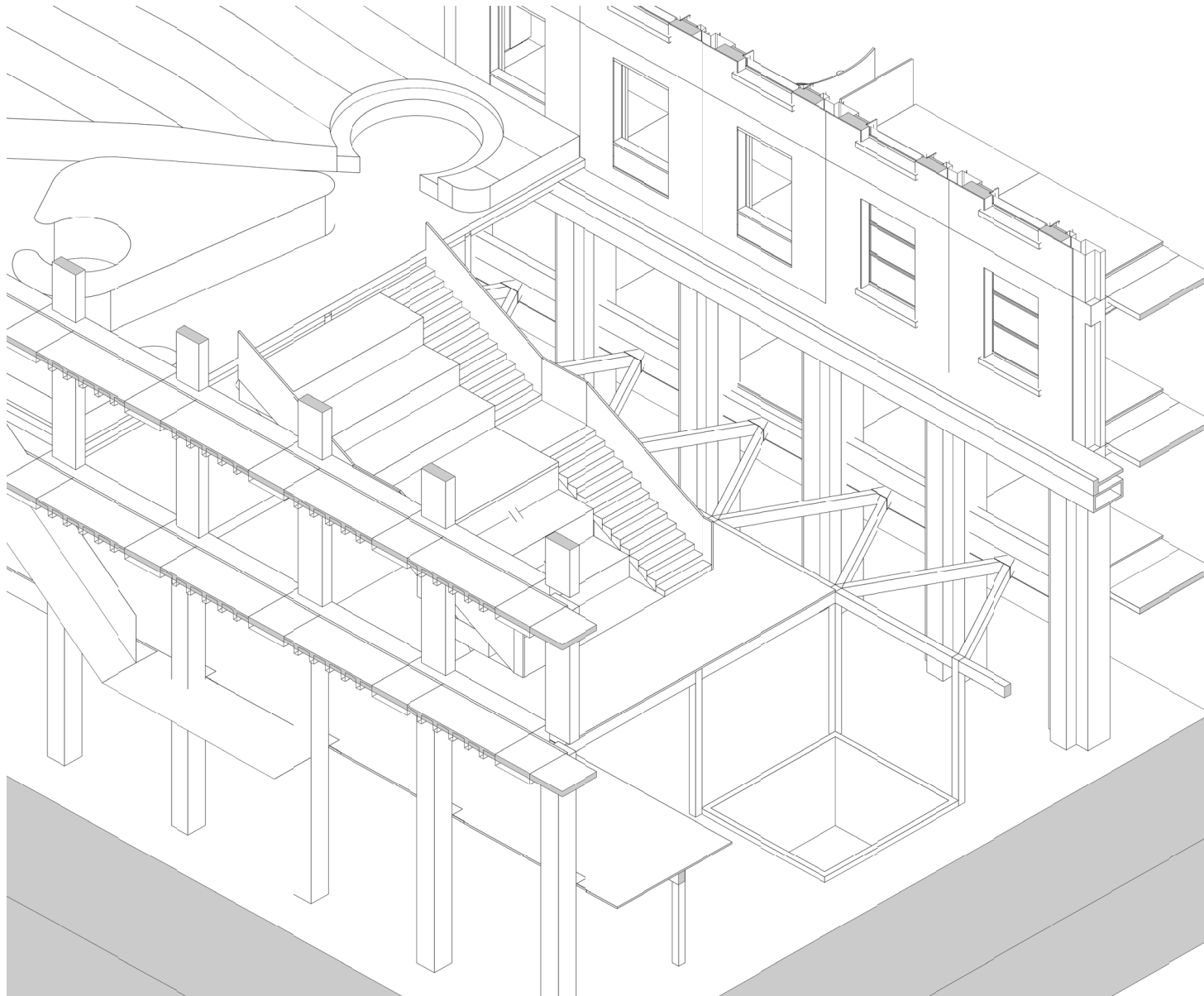
Roof 02



Roof 02 - 3.9 m span

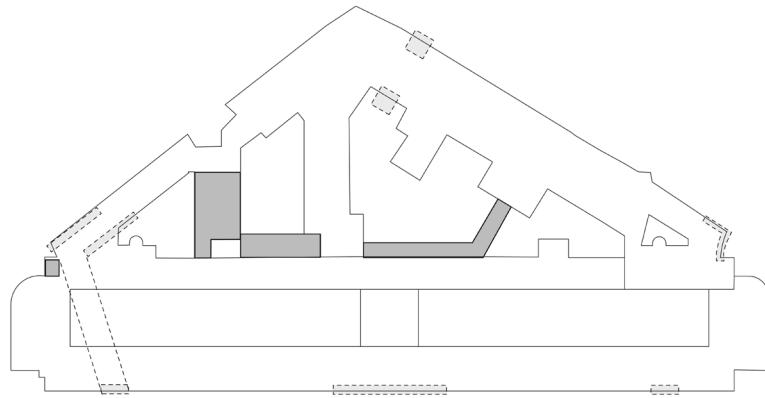


Bridge

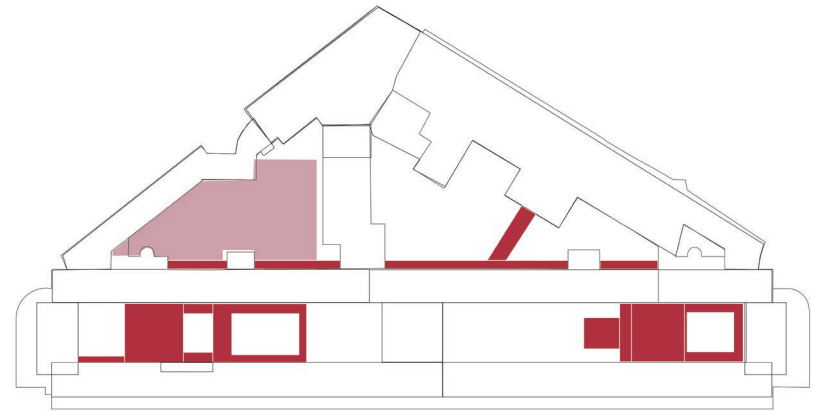


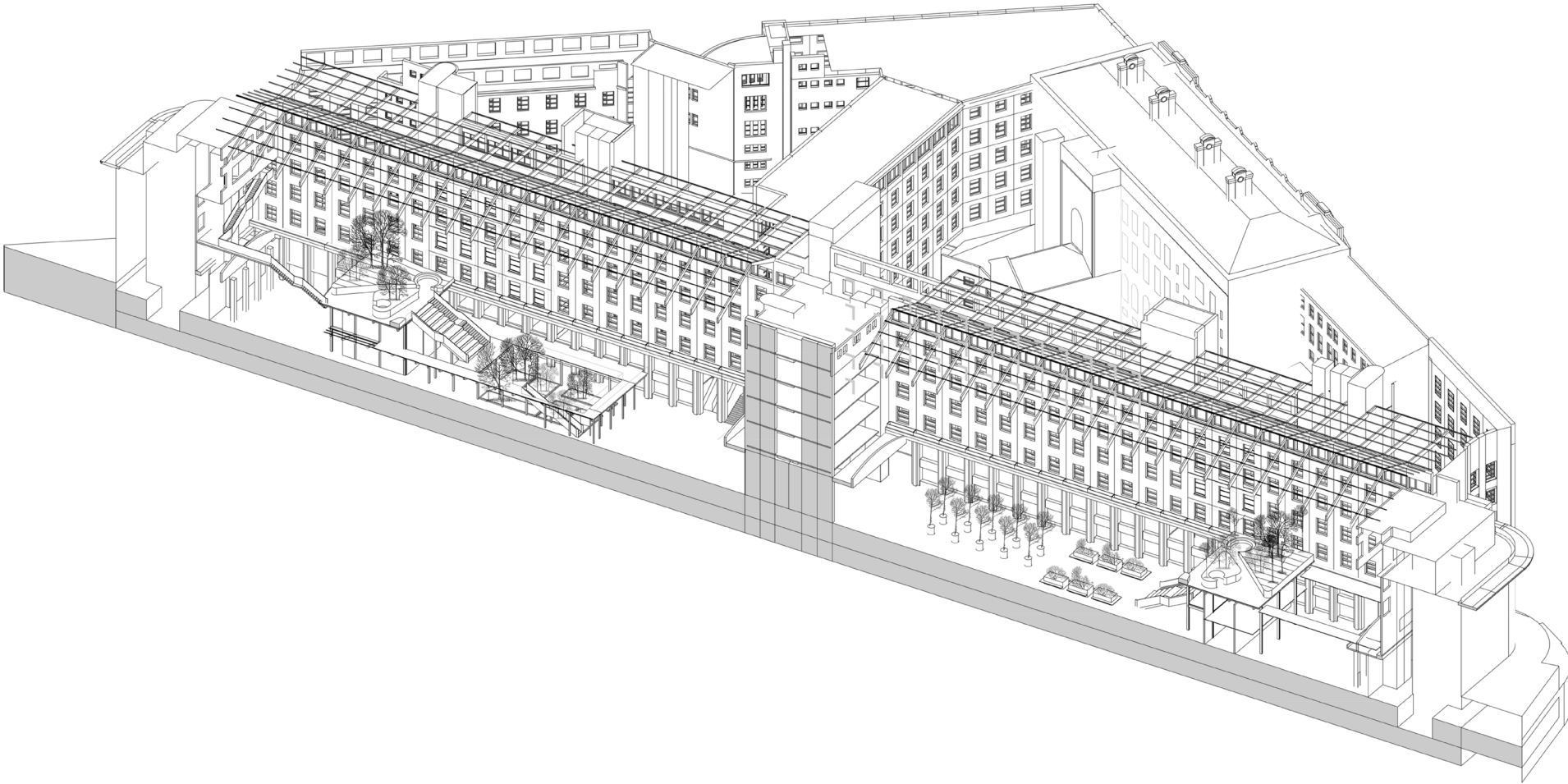
P3 Exhibition

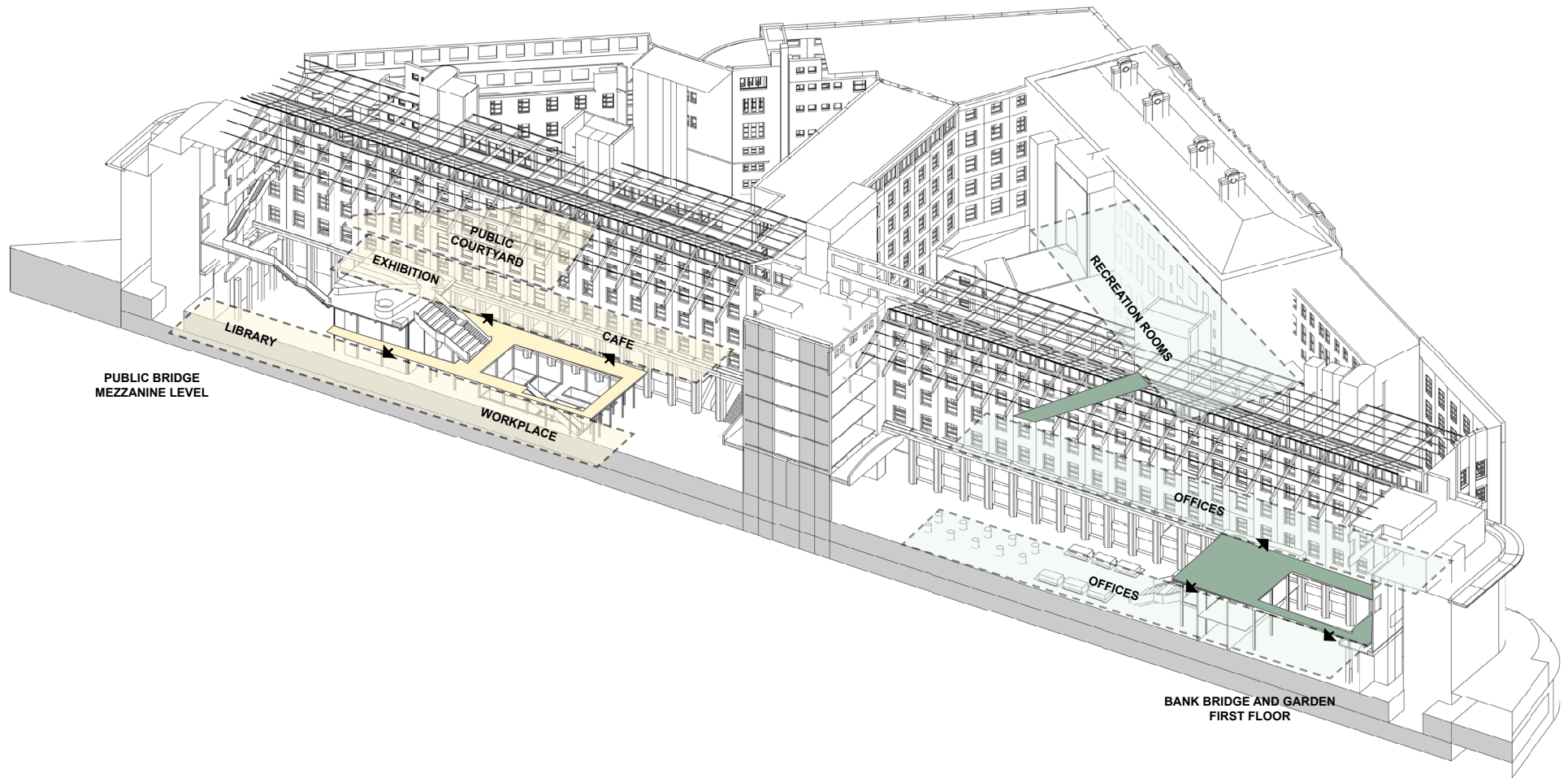
Demolishment



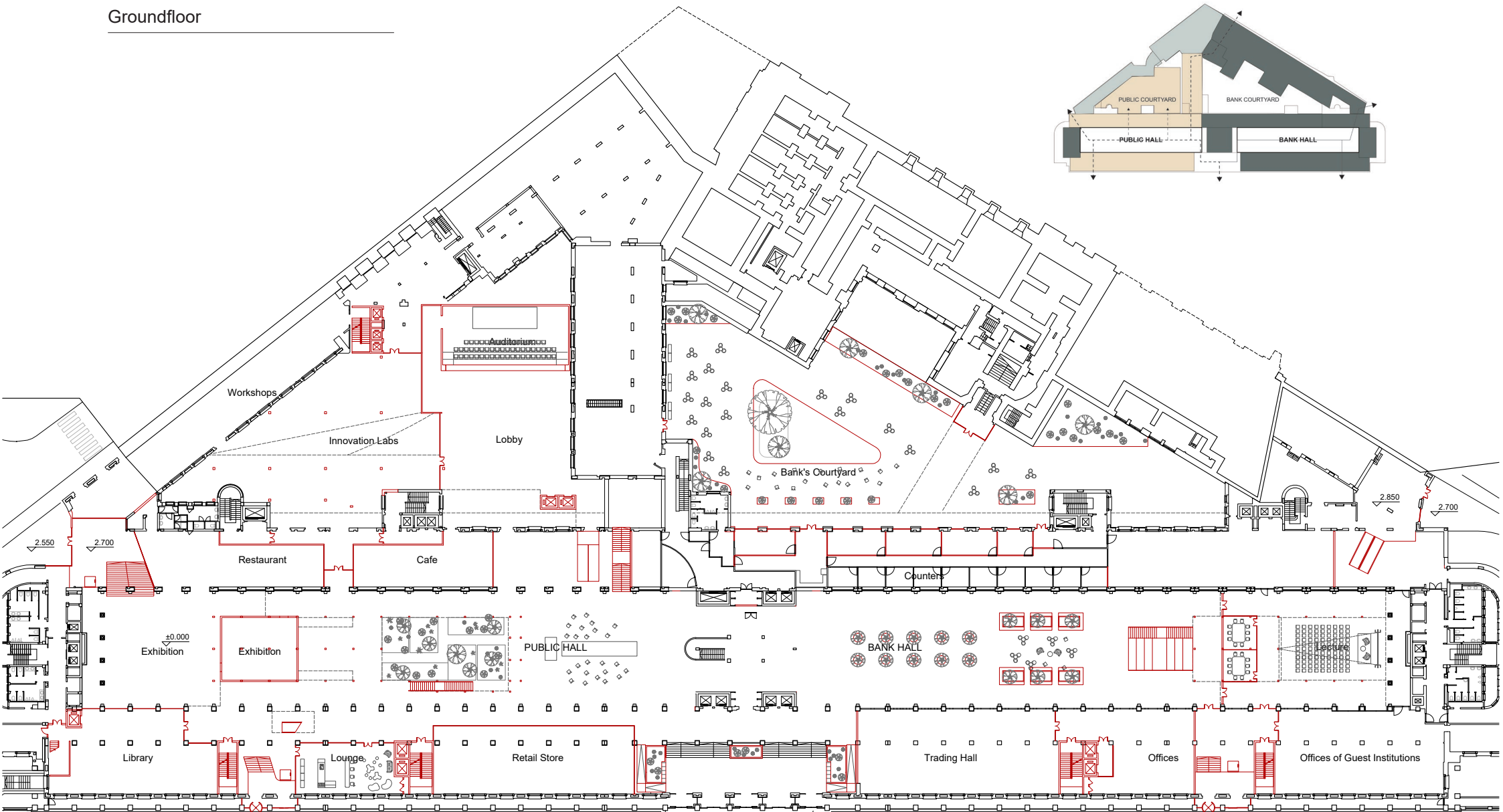
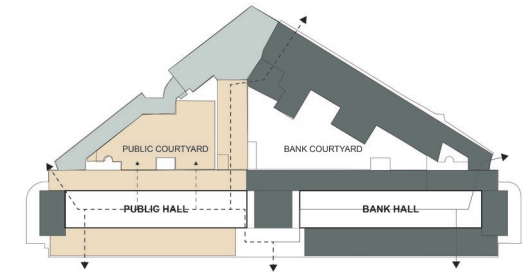
New

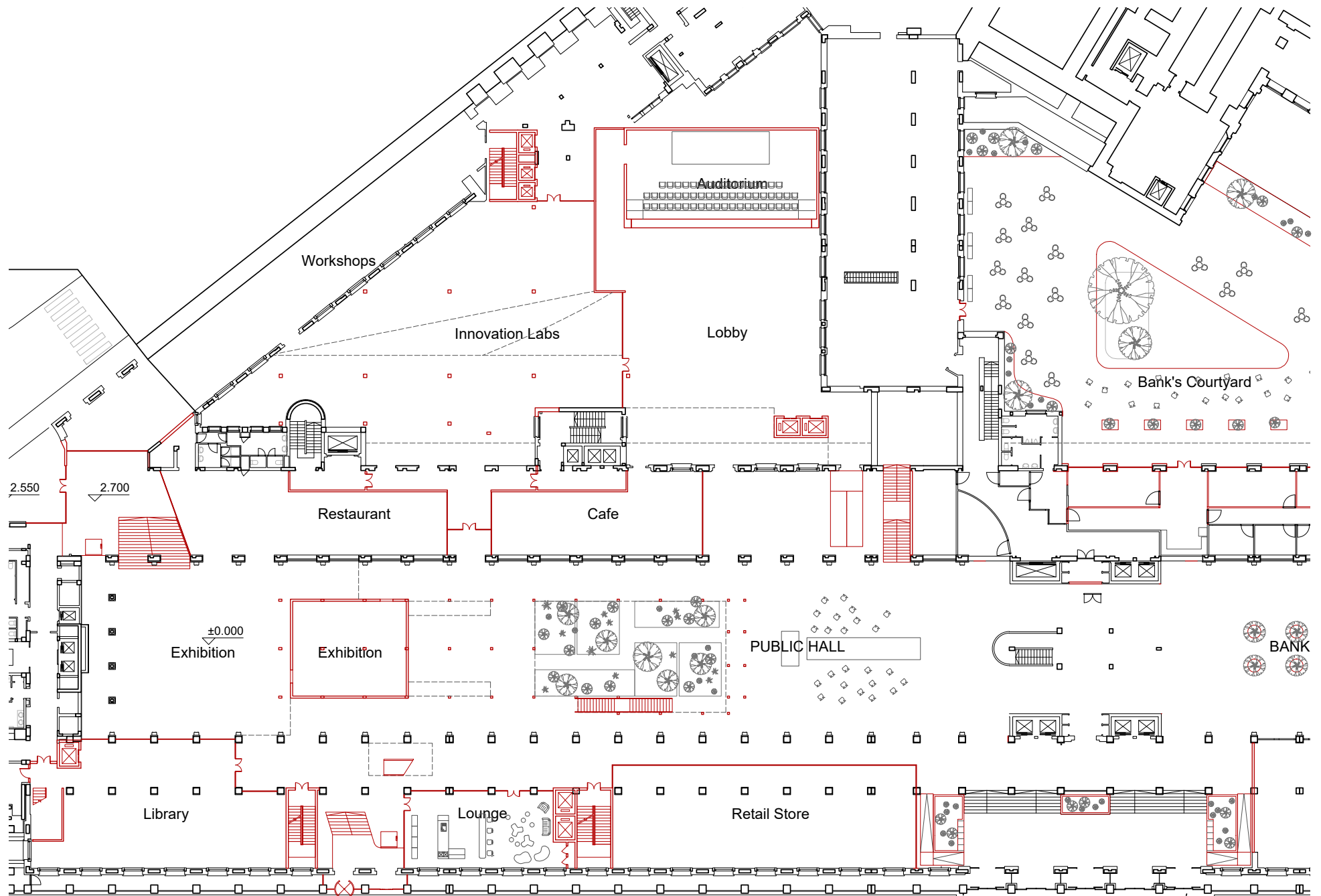


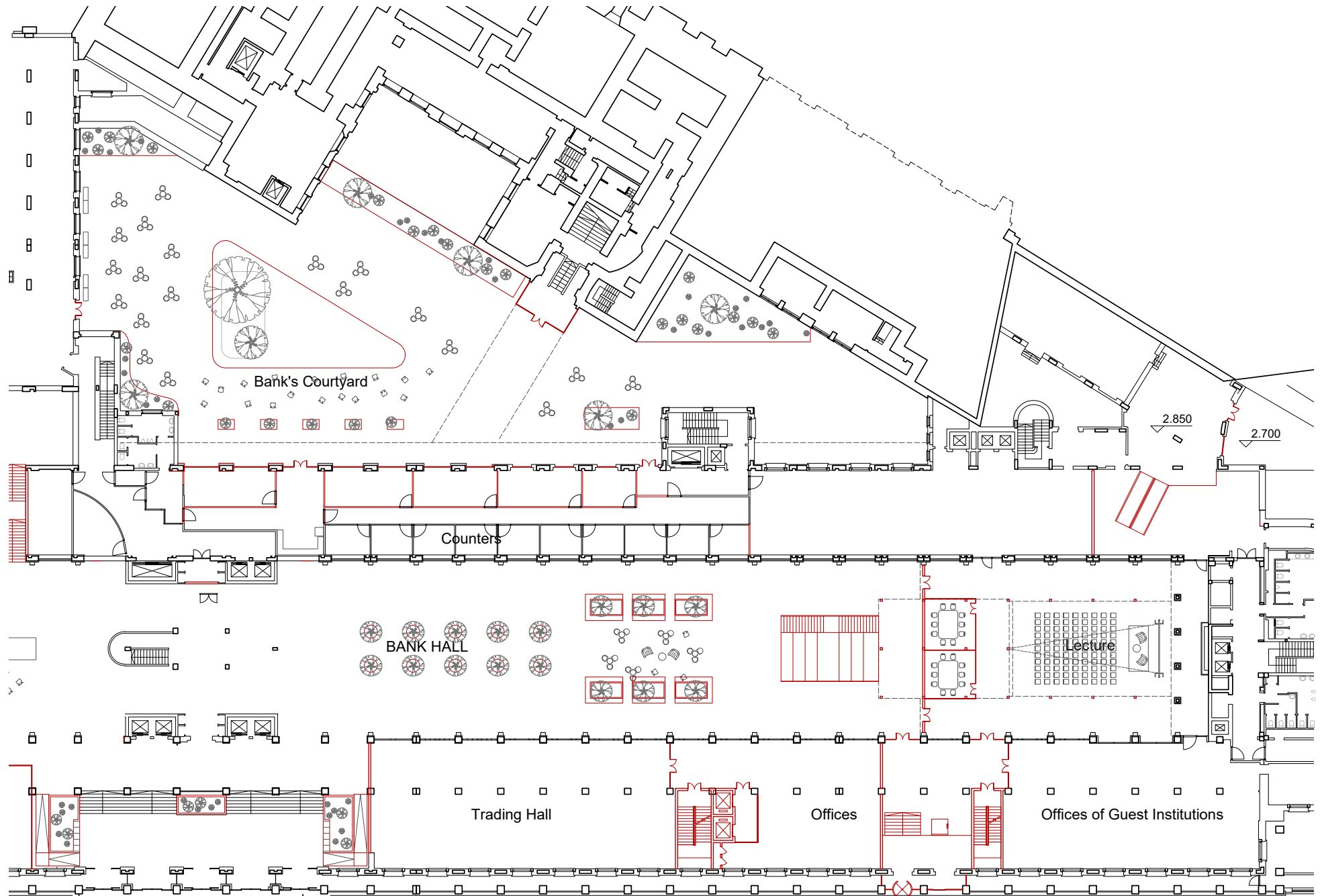


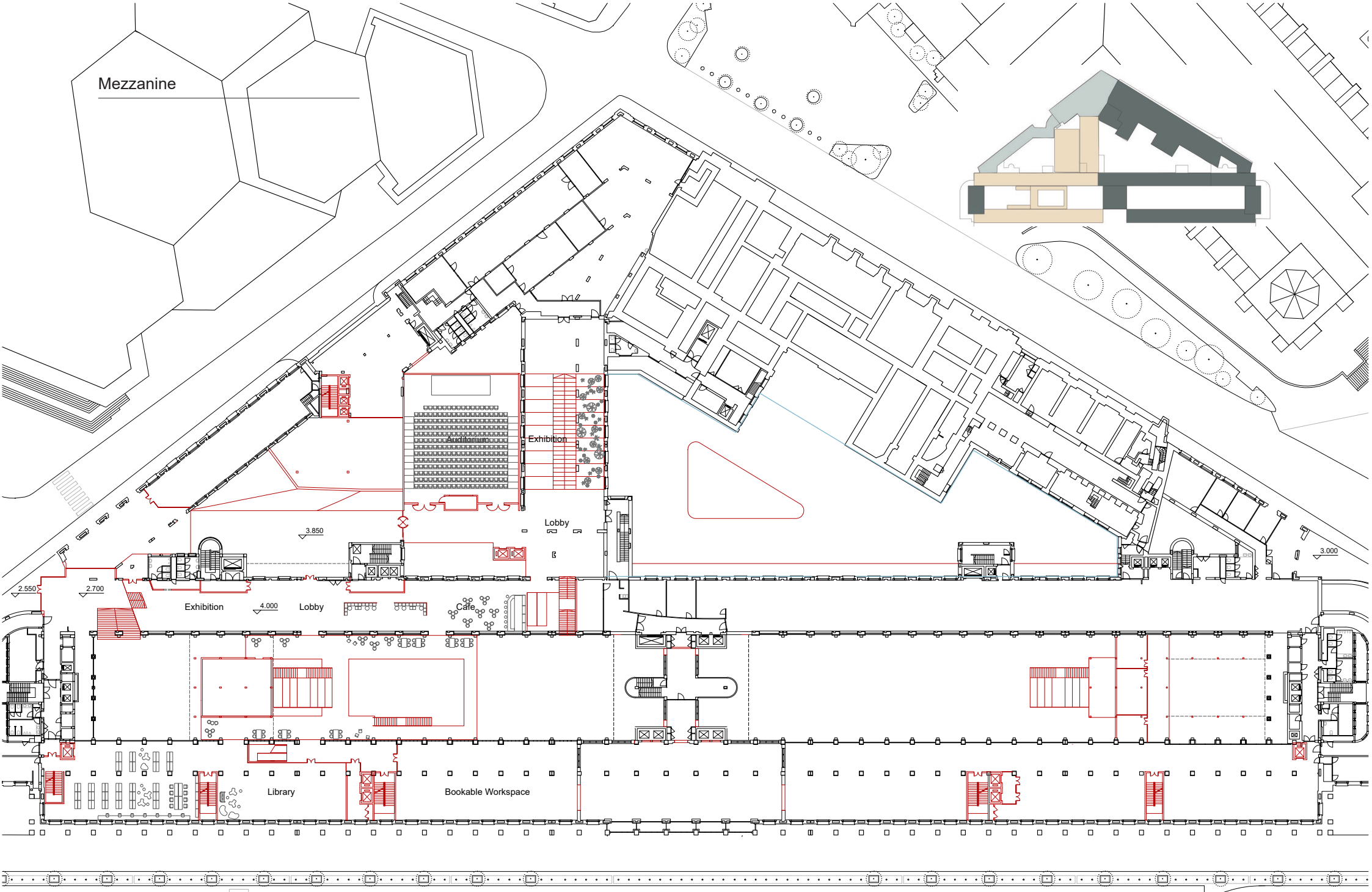


Groundfloor









Mezzanine

Exhibition

Lobby

Exhibition

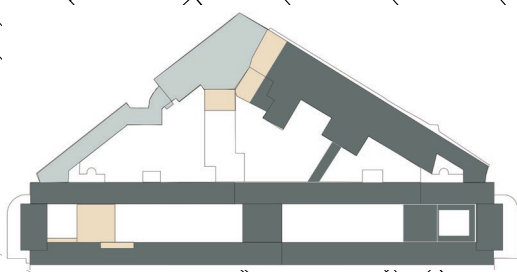
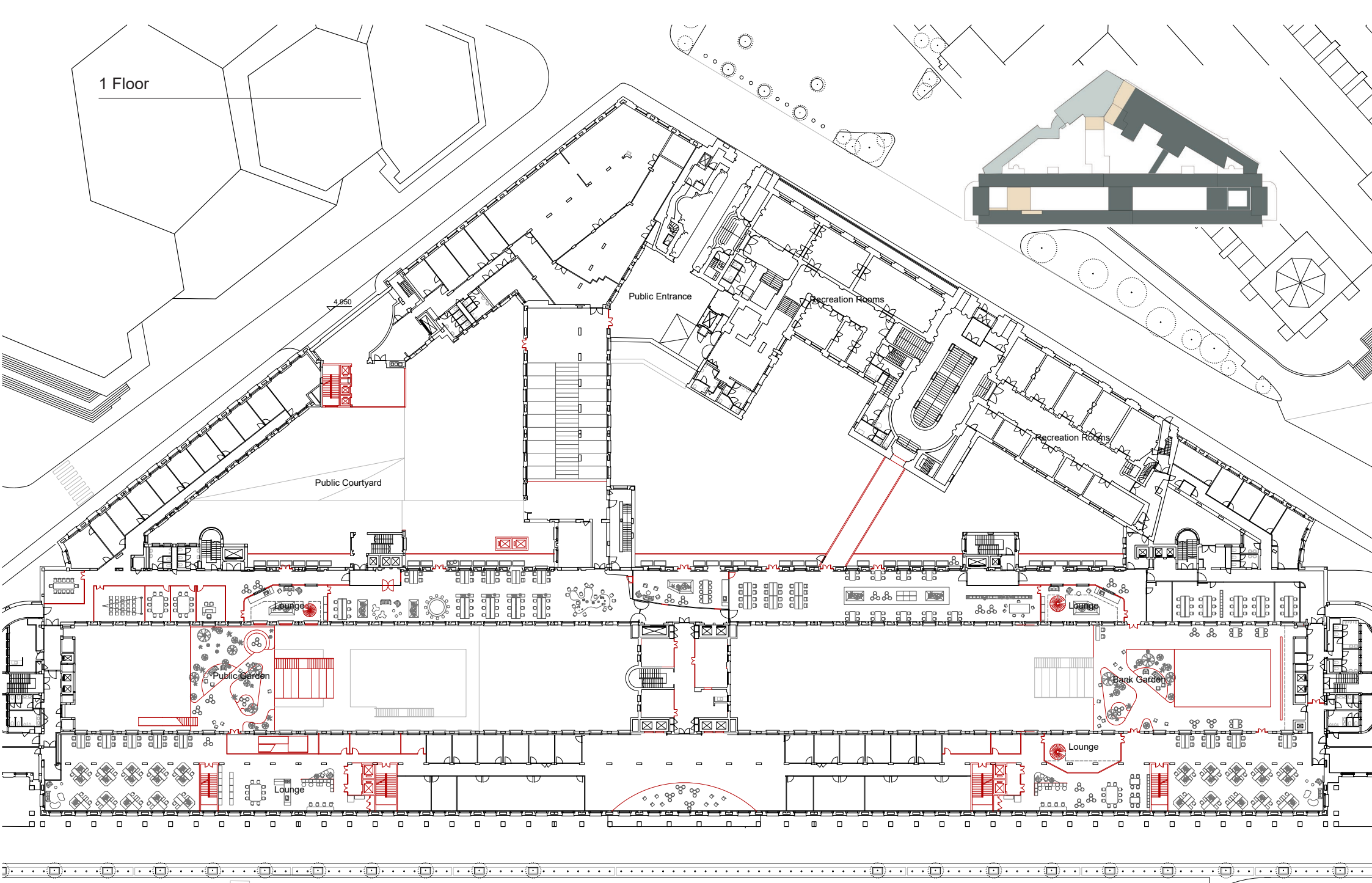
Lobby

Cafe

Library

Bookable Workspace

1 Floor



Development of the Hall



Original situation



P2

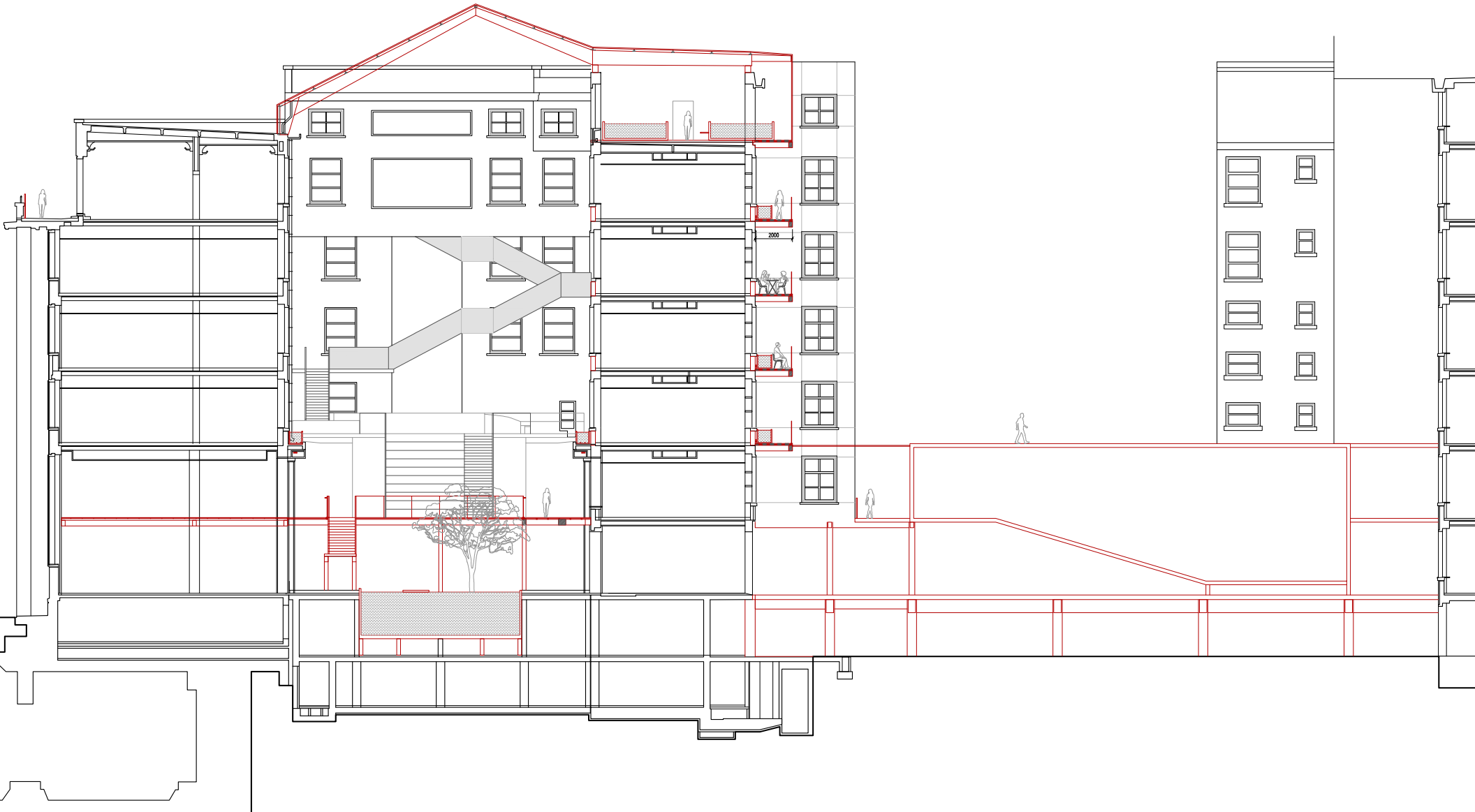
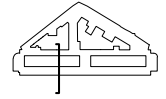


W3.5

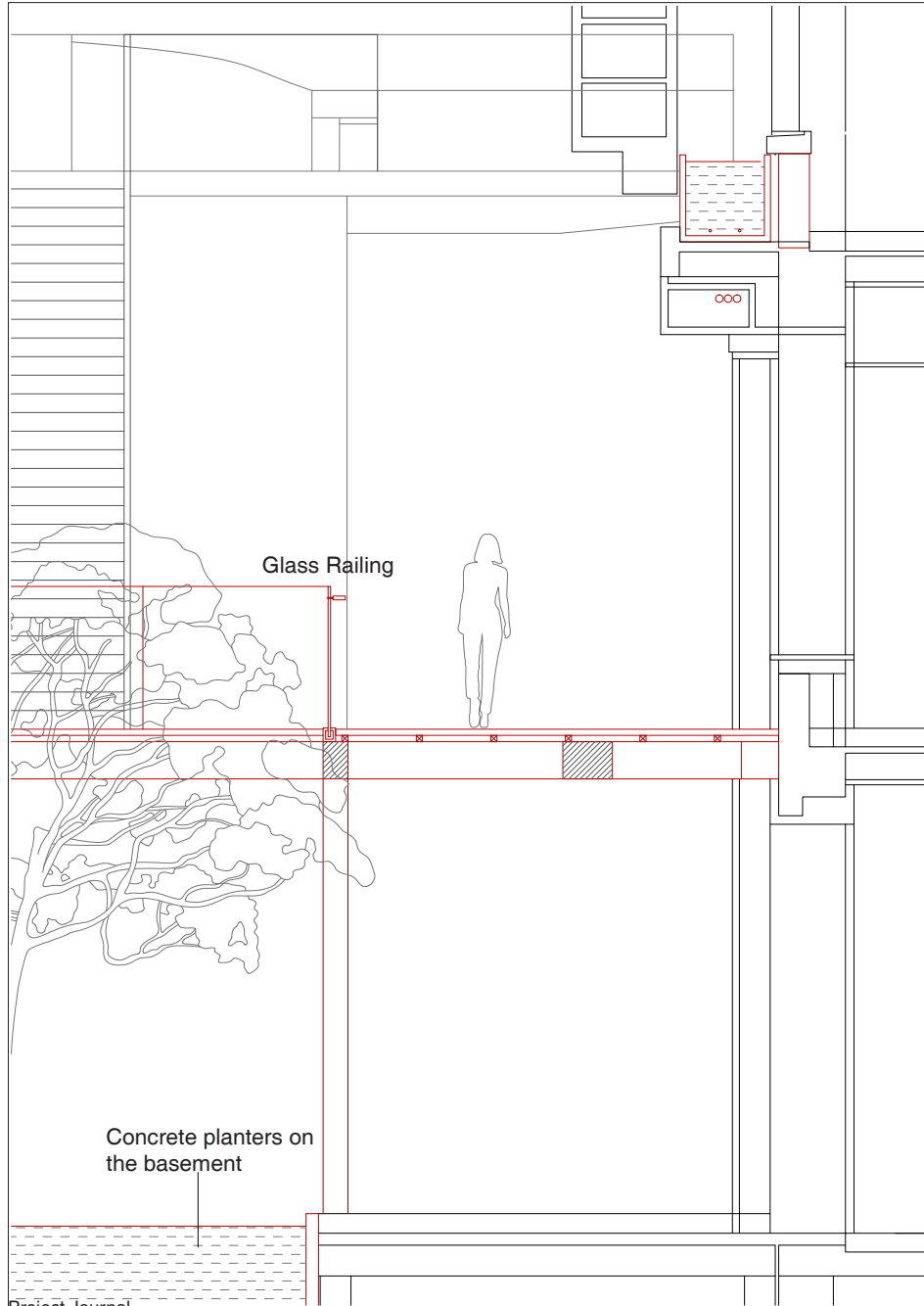
Public Hall



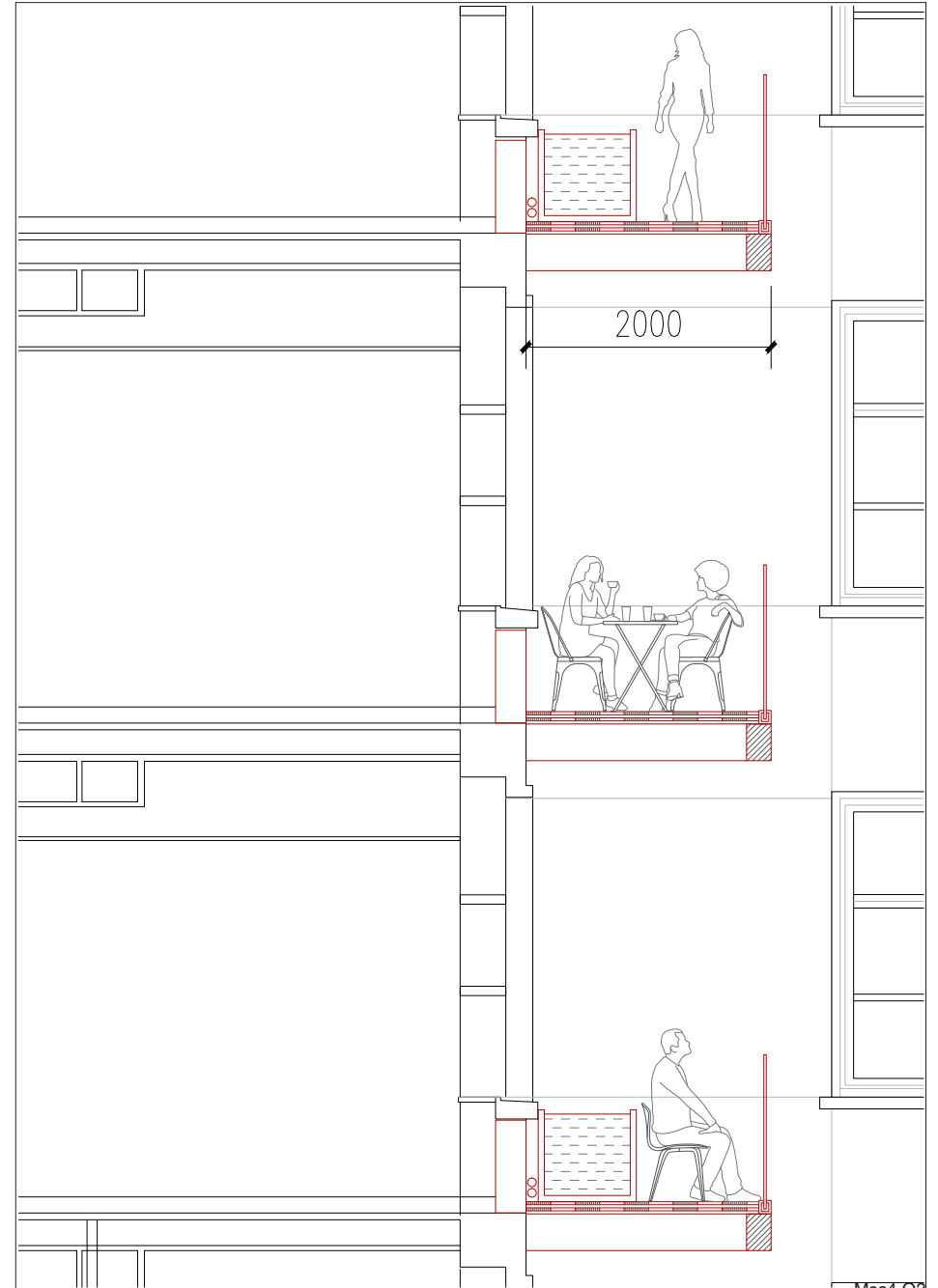
Section A 1:200



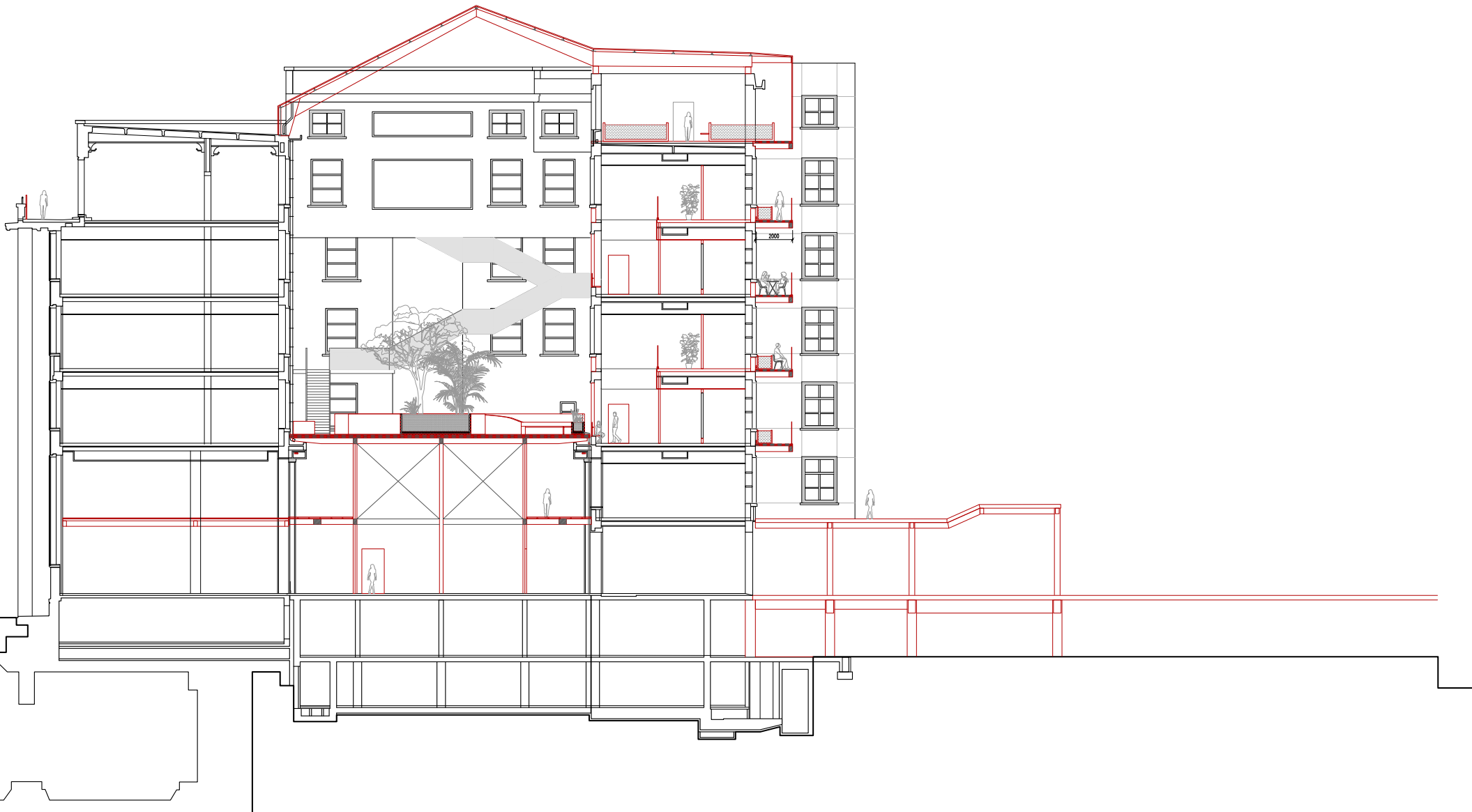
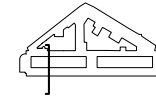
Section A Bridges

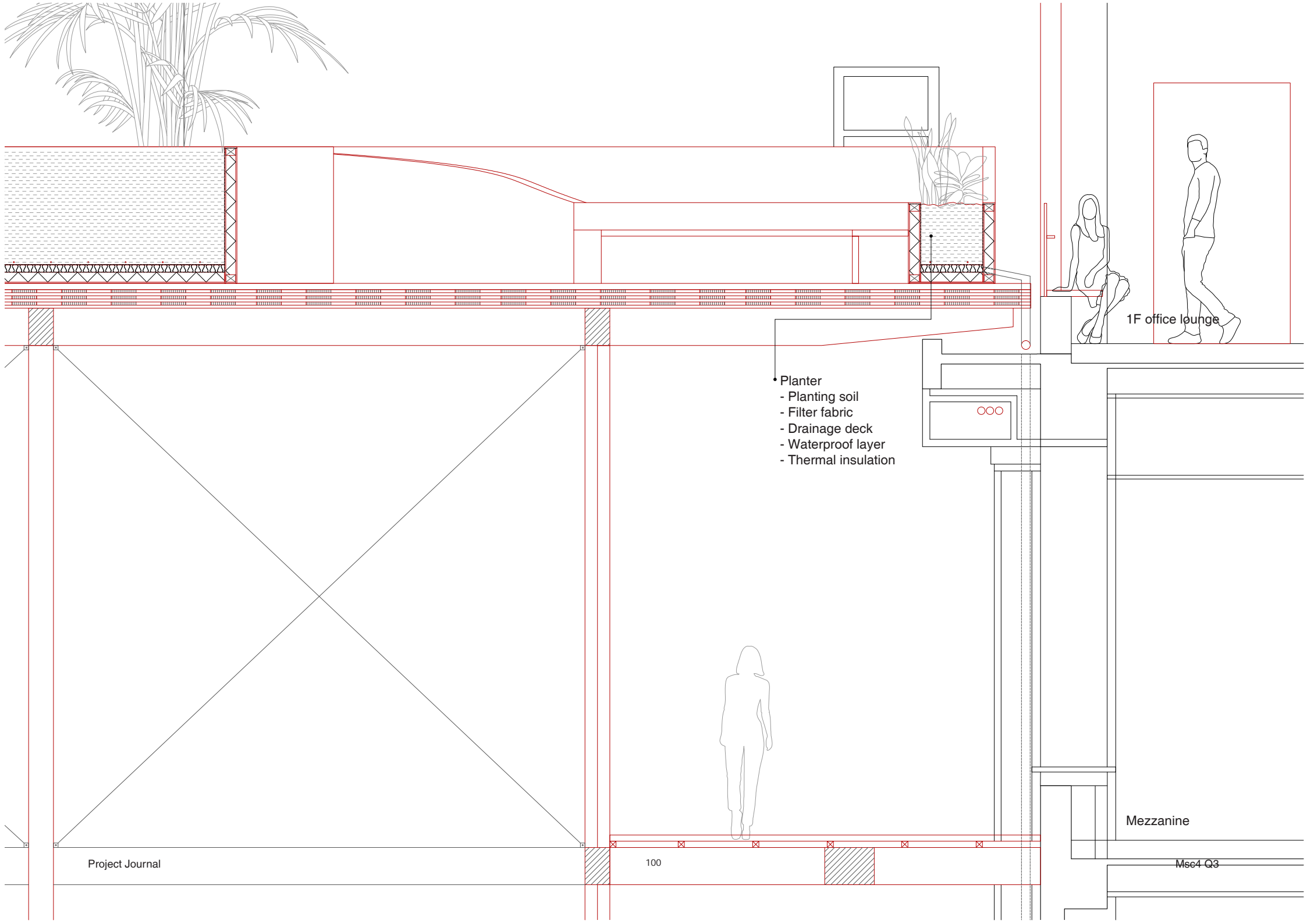


Section A Balconies



Section B 1:200





Project Journal

100

- Planter
- Planting soil
- Filter fabric
- Drainage deck
- Waterproof layer
- Thermal insulation

Mezzanine

1F office lounge

Msc4 Q3

Plants to be used in gardens

Woody plants:

1. Camellia japonica 'Mathotiana Alba'
2. Camellia japonica 'Swan Lake'
3. Camellia japonica
4. Citrus x limon
5. Choisya 'Aztec Pearl'
6. Choisya ternata
7. Cycas revoluta
8. Fatsia japonica
9. Magnolia grandiflora
10. Magnolia grandiflora 'Gallisonniere Nana'
11. Trachycarpus fortunei
12. Nandina domestica 'Firepower'
13. Nandina domestica 'Richmond'



W 2



W 4



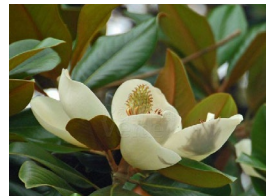
W 5



W 7



W 8



W 9



W 11



W 13



H&F 1



H&F 3

Herbaceous perennials & ferns:

1. Adiantum pedatum
2. Adiantum venustum
3. Asarum europaeum
4. Asarum maximum
5. Asarum splendens
6. Asplenium trichomanes
7. Asplenium bulbiferum
8. Cathea cooperii
9. Cyrtidium falcatum
10. Danae racemosa
11. Davallia mariesii
12. Helleborus corsicus
13. Helleborus x sternii
14. Ophiogon japonicus 'Minor'
15. Ophiogon planiscapus
16. Ophiogon planiscapus 'Nigescens'
17. Pellaea rotundifolia
18. Uncinia egmontiana



H&F 5



H&F 7



H&F 8



H&F 10



H&F 13



H&F 16



H&F 18



C 1



C 3



C 5

Climbing plants:

1. Clematis armandii
2. Hedera helix ssp. canariensis
3. Lapageria rosea
4. Tropaeolum speciosum
5. Trachelospermum jasminoides

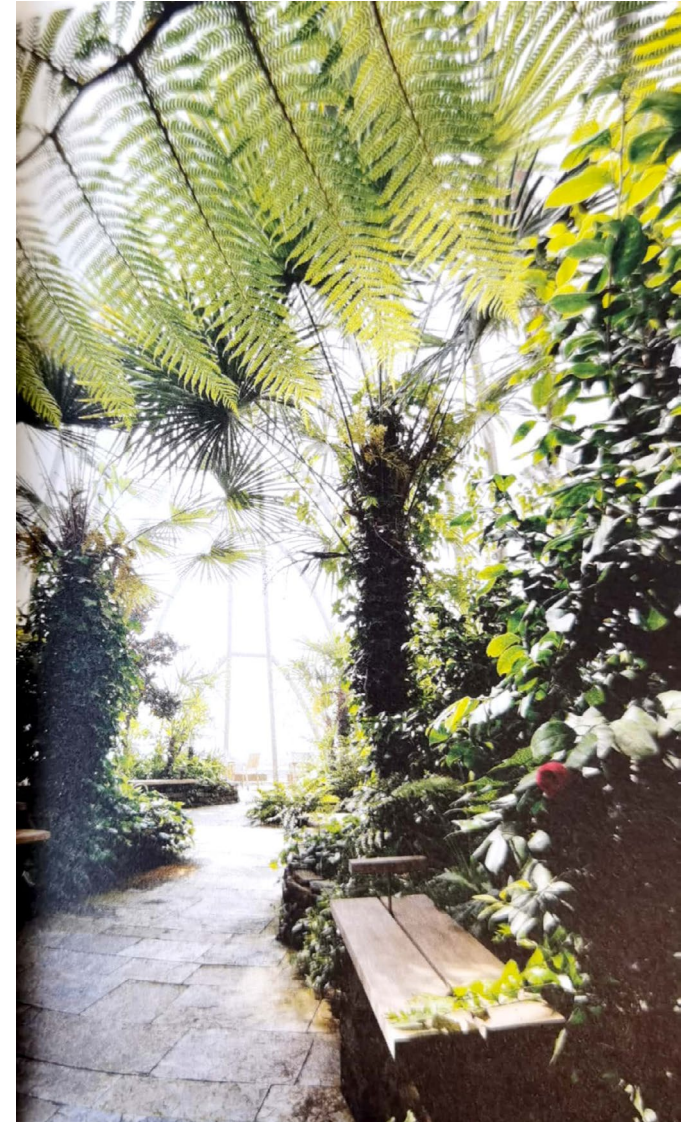
The plants list comes from The Glass Bubble Greenhouse in Sweden, designed by GORA.
Interior Gardens, Haike Falkenberg, P82.
ISBN 978-3-0346-0620-2

Precedent: Glass Bubble Greenhouse

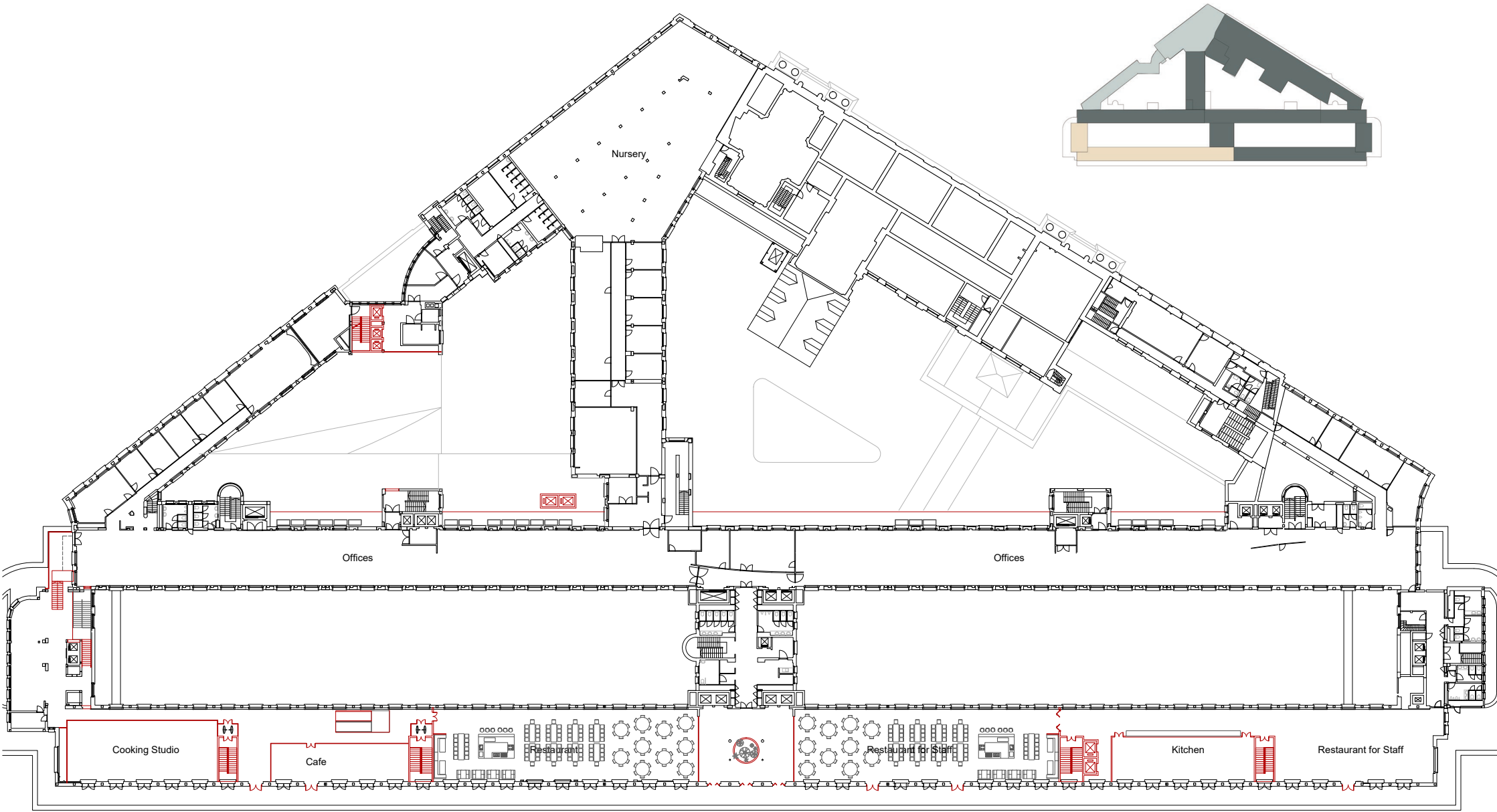
Architect: GORA

Location: Malmö, Sweden

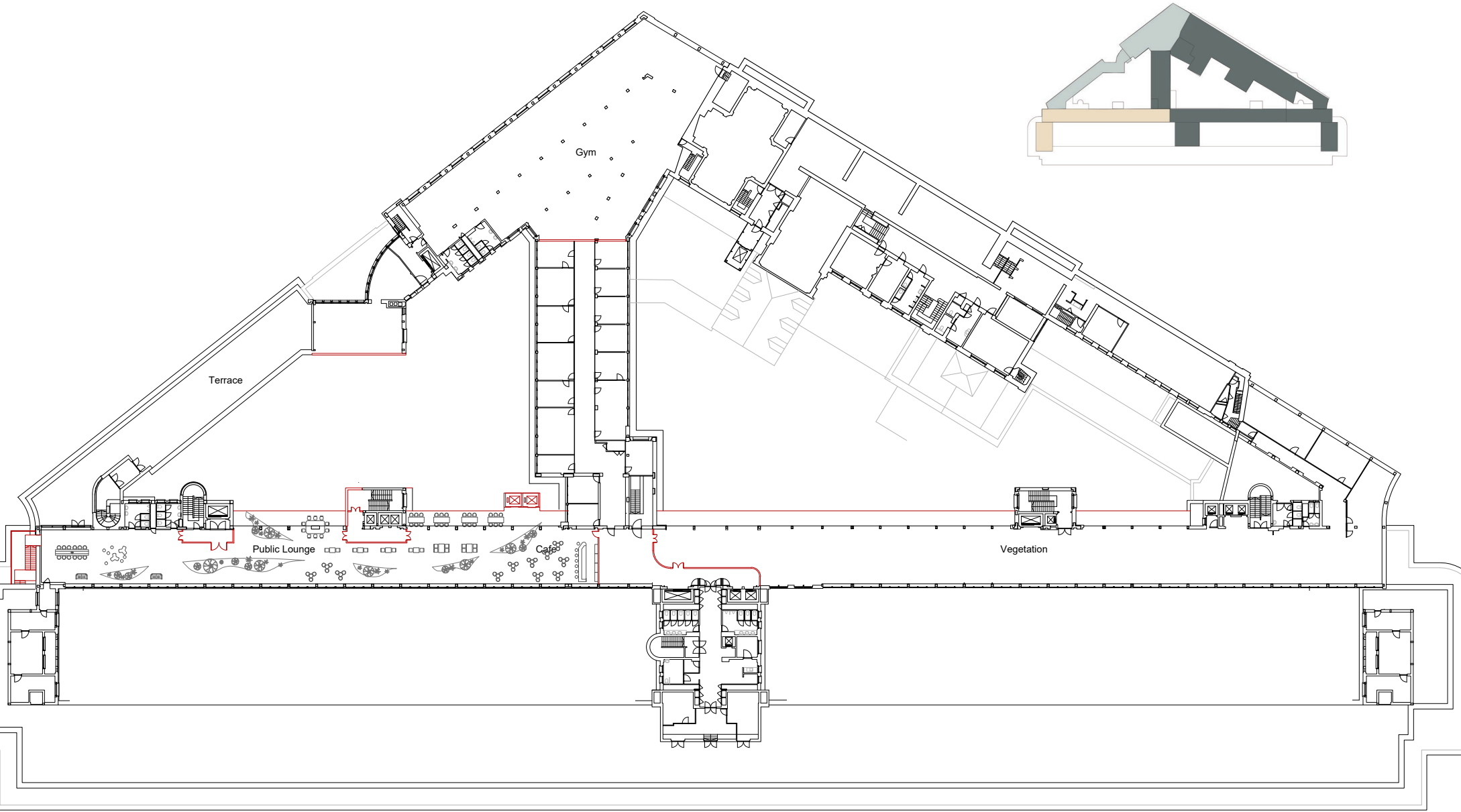
Time: 2006

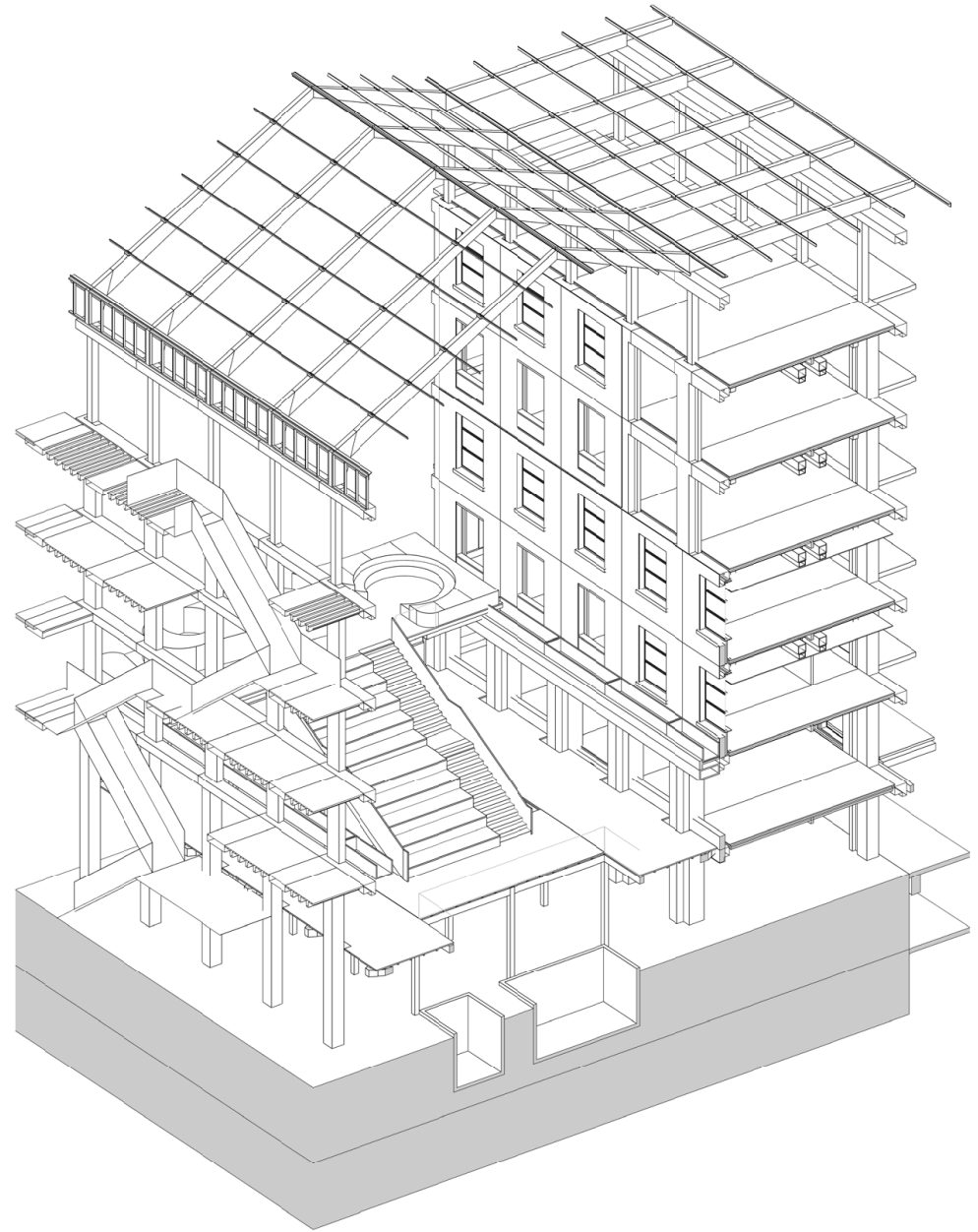


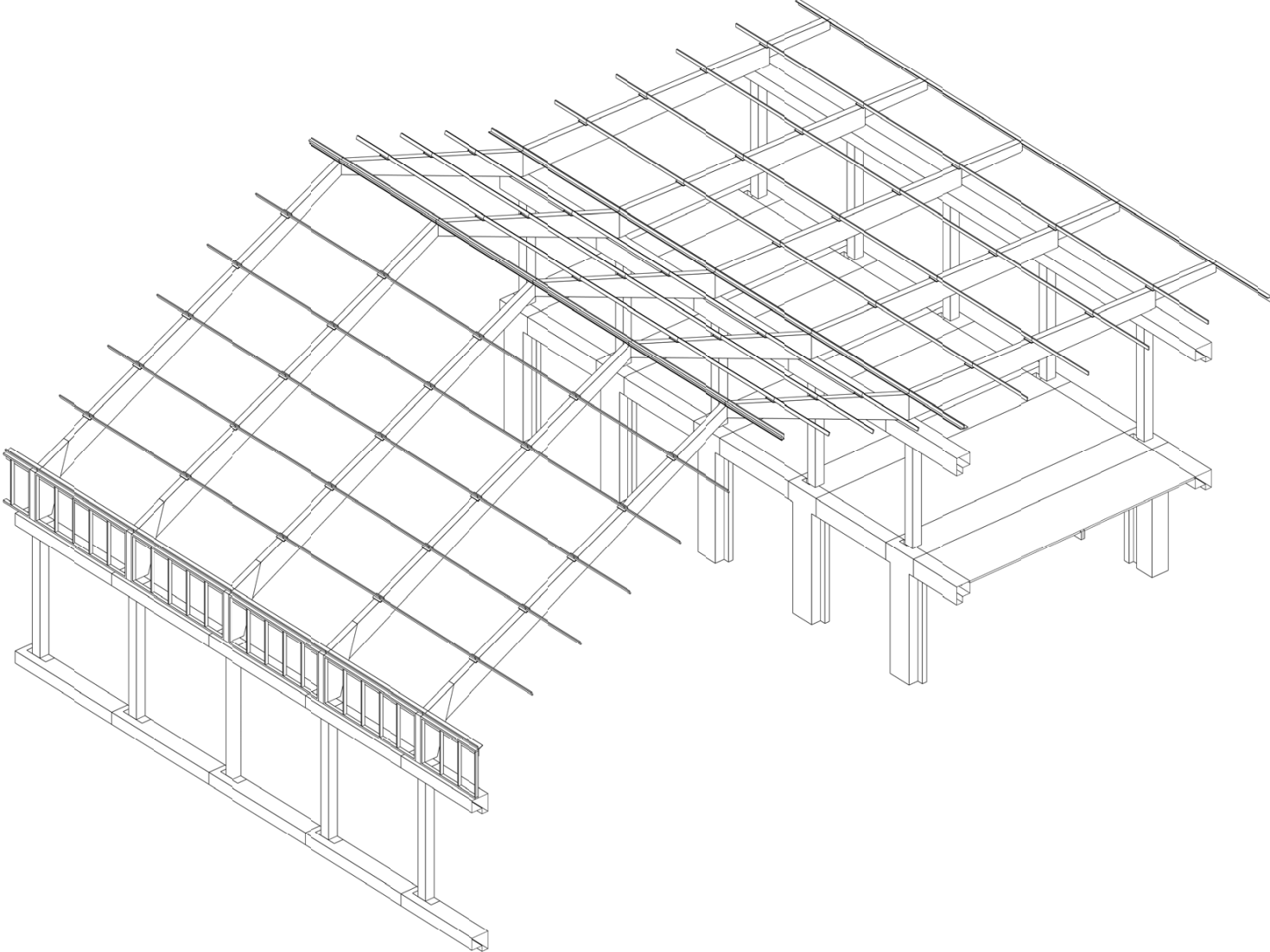
4F Plan



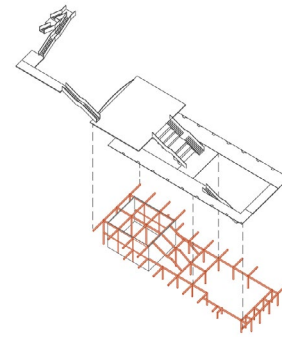
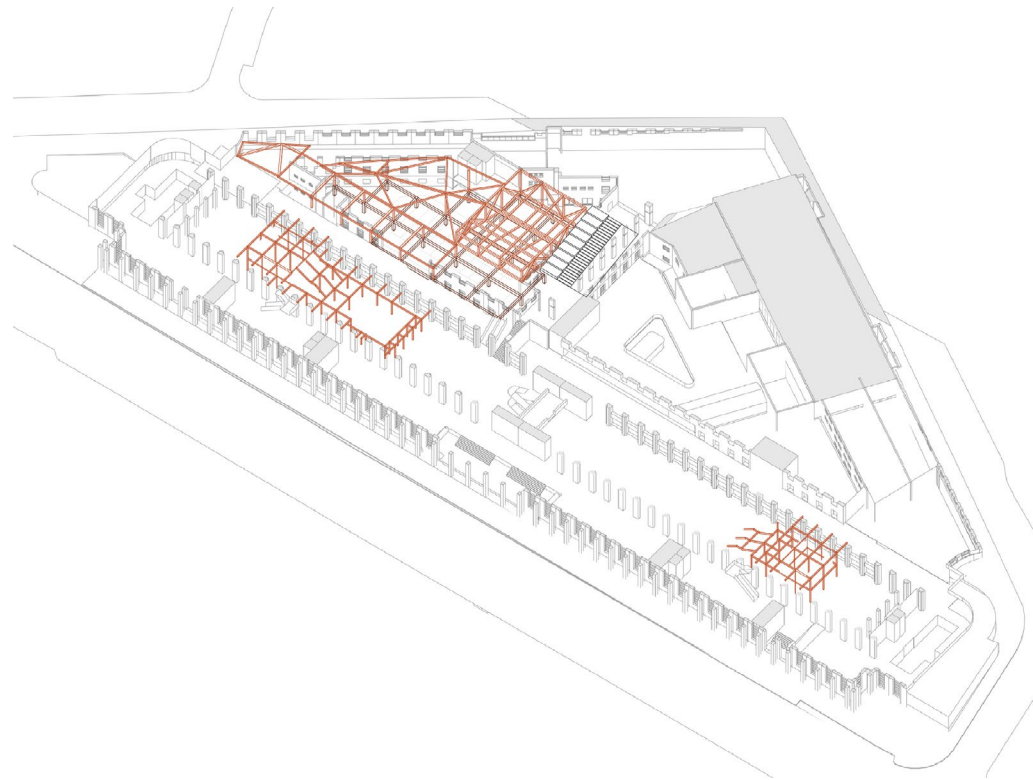
5F Plan



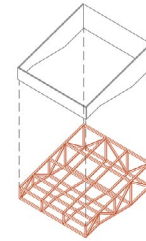




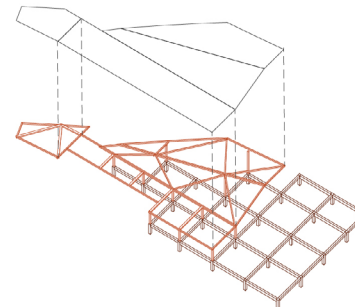
Timber Structure



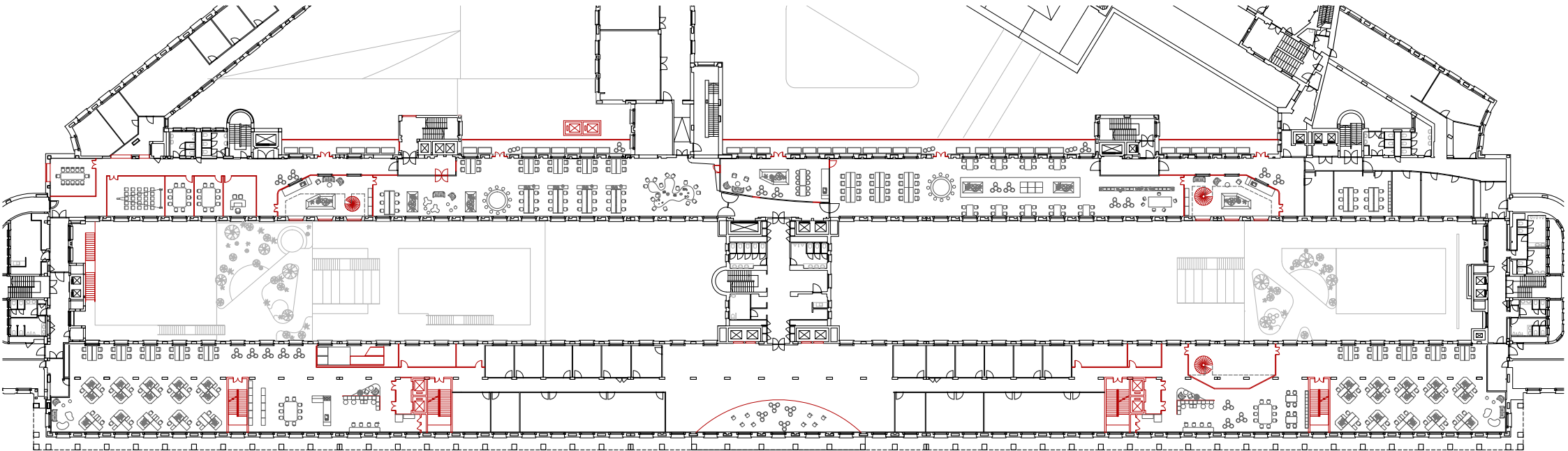
Platforms - North

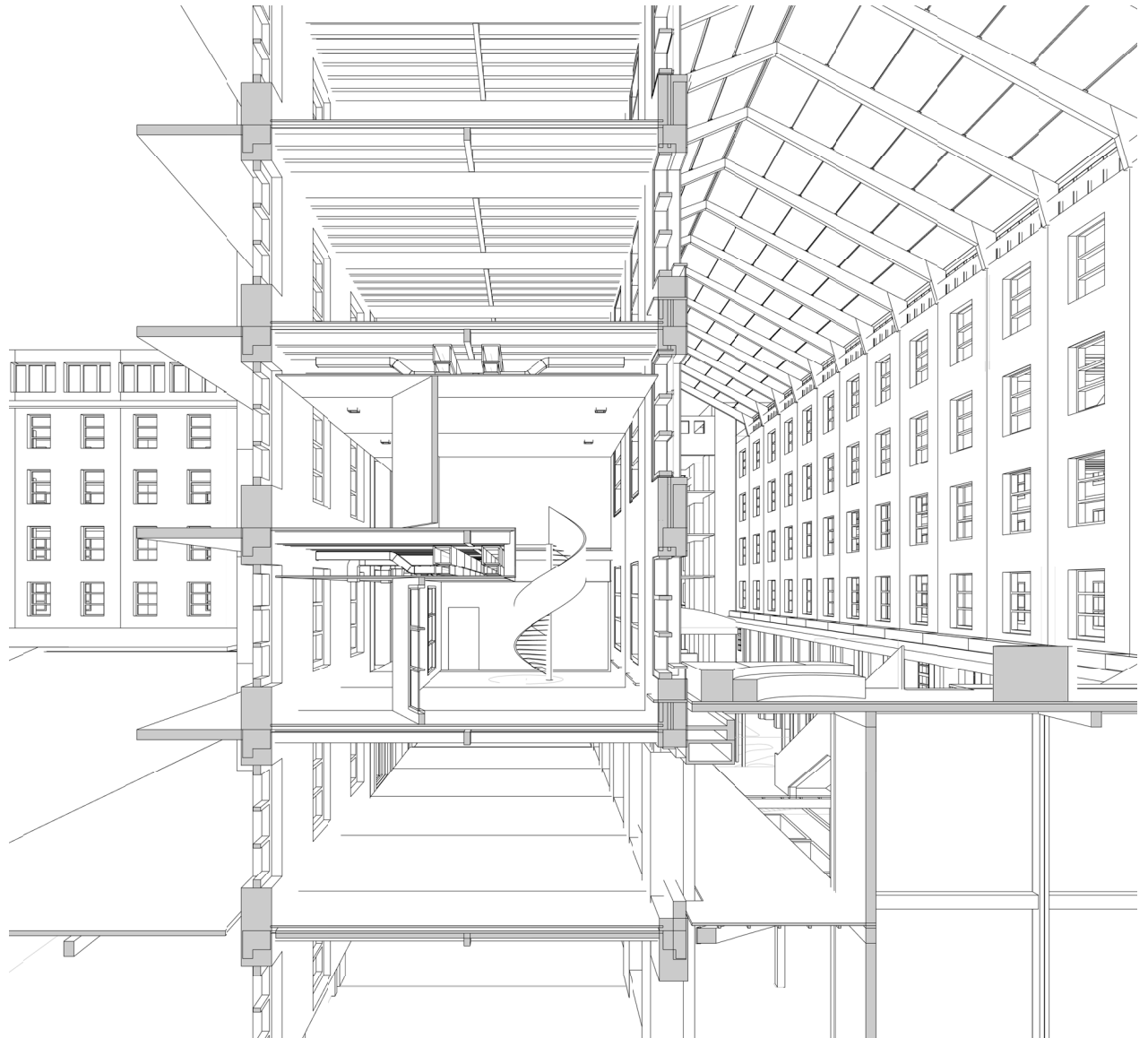


Theatre

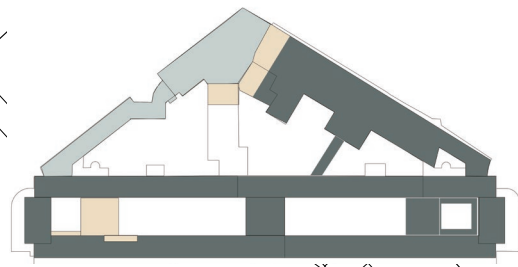
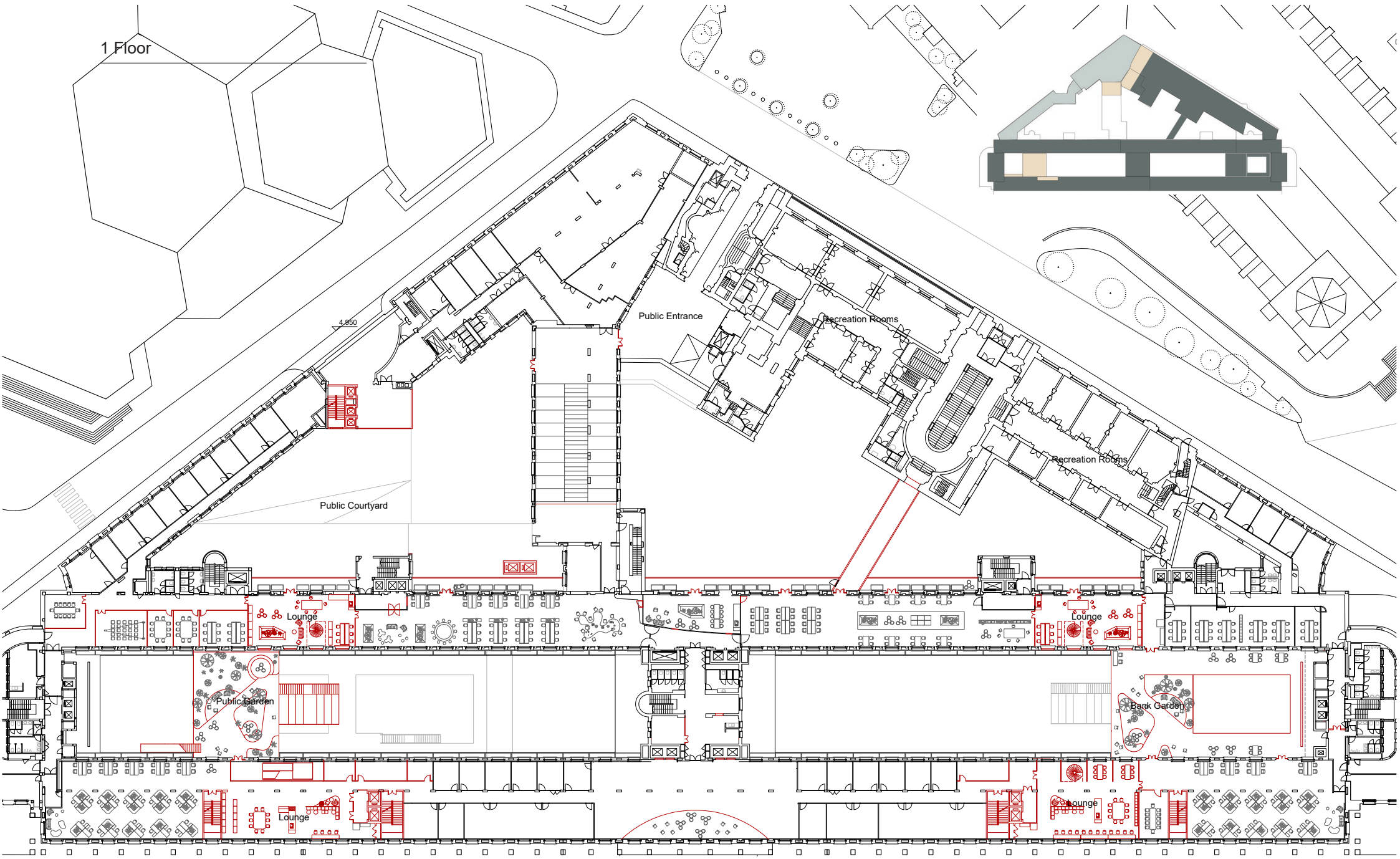


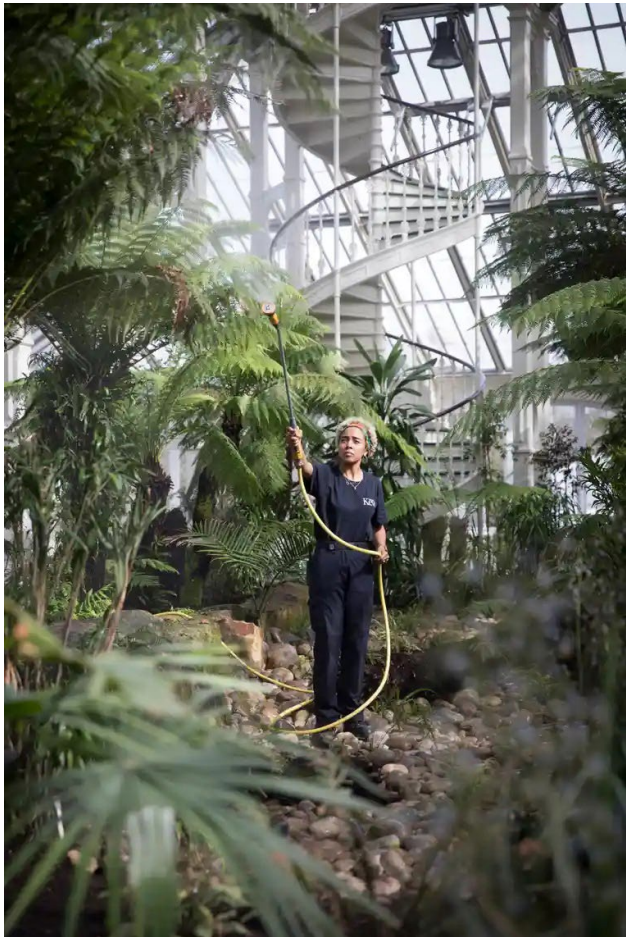
Underground Parking & Innovation Labs





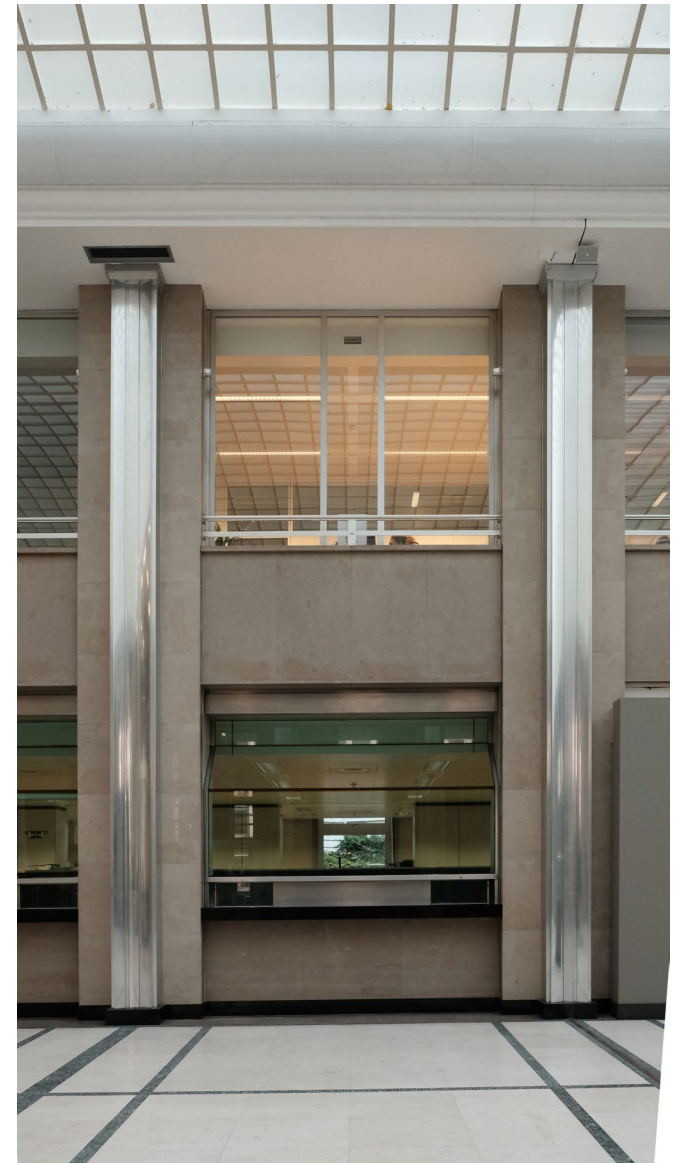
1 Floor



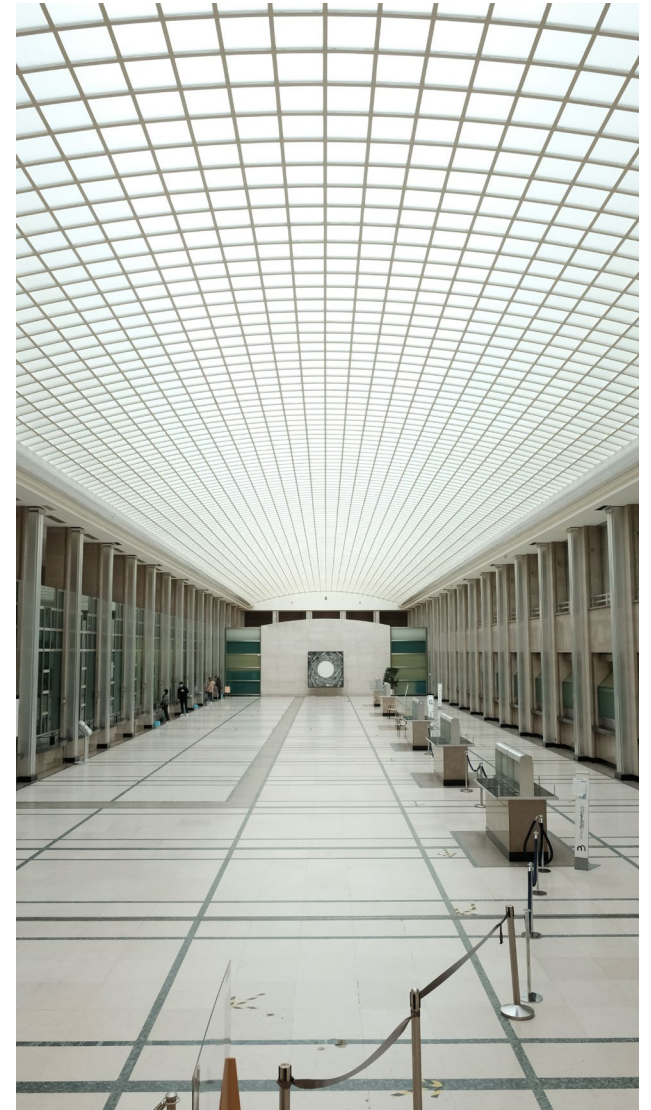


<https://www.theguardian.com/artanddesign/2018/may/03/temperate-house-kew-gardens-review-king-of-greenhouses-41m-restoration>

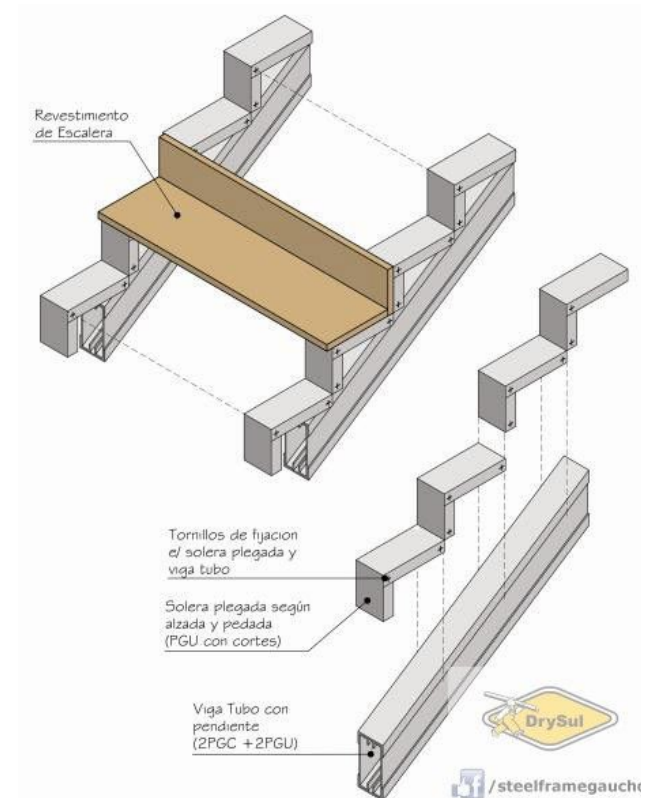
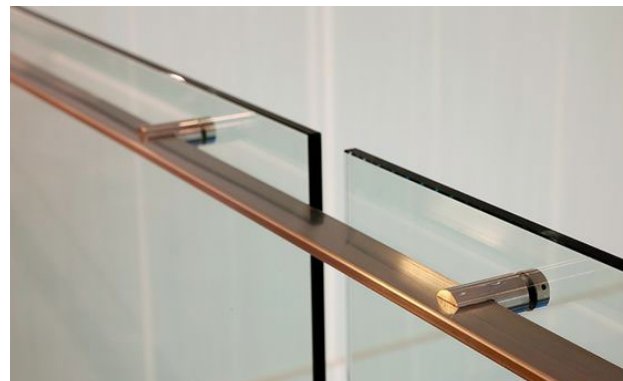
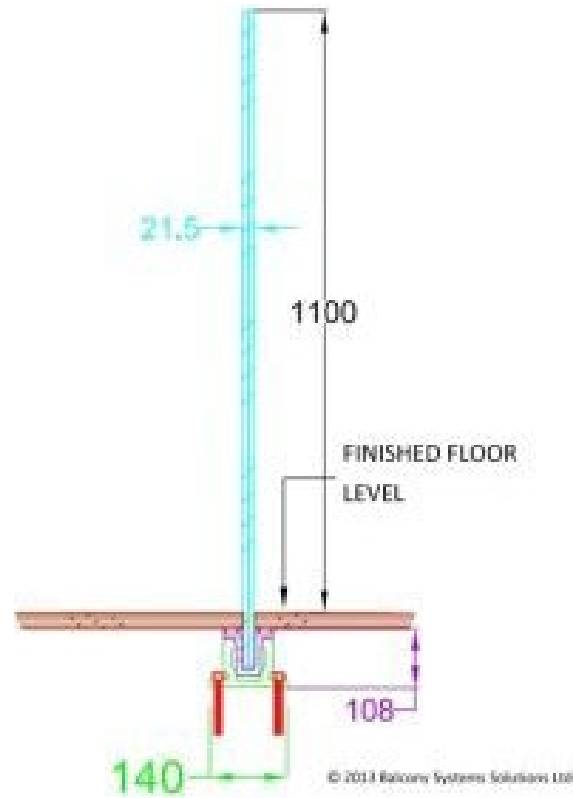
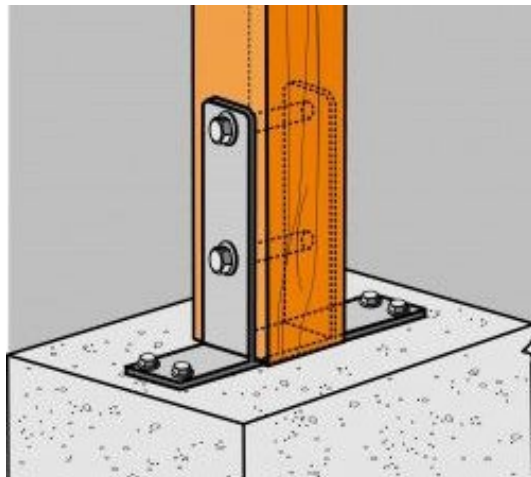
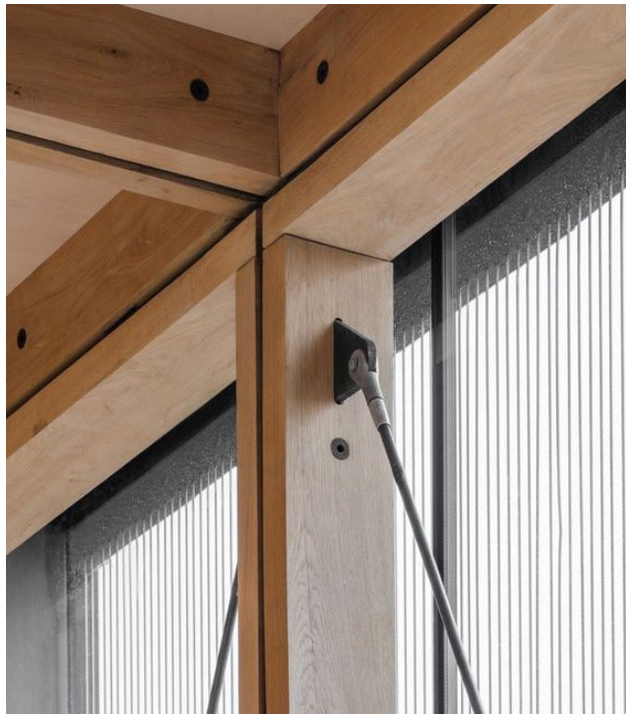
Current Situation



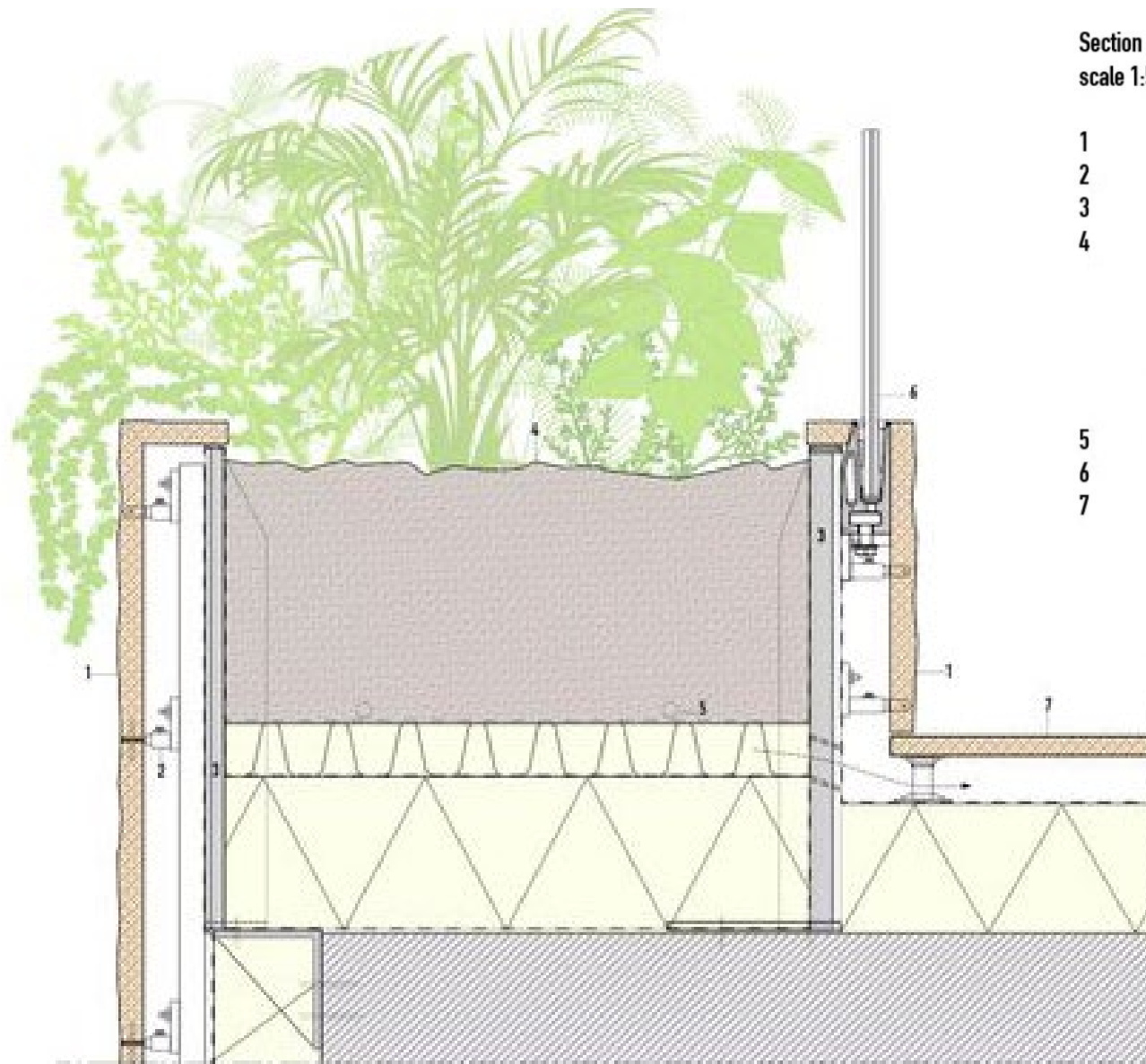
Current Situation



Precedents - Timber Construction



Precedents - Planter



Section planter
scale 1:5

- 1 Natural stone
- 2 Substructure
- 3 T-profile steel columns with cempanel in between
- 4 Planting soil
- Filter fabric
- Drainage deck
- Waterproof layer
- Thermal insulation
- Reinforced concrete floor slab
- 5 Irrigation system
- 6 Glass balustrade
- 7 Natural stone floor
- Terrace pedestals
- Waterproof layer
- Thermal insulation with inclination
- Reinforced concrete floor slab

W 3.9

Feedback

Sam:

Quite an evolution, could the central atrium be even more green?

How does one get to the greenhouse?

Mark:

All timber constructions?

How they come down to the ground is important for you. Look like pieces of thin building inserted into the atrium. Aesthetic is quite important.

Auditorium has a thin link with someone standing on the roof. Could you give it the same kind of importance?

Important public space and your interventions are very clearly recognizable.

Hard to tell what the quality of the office environment will be. Notion of intimacy and desire for softness provide by nature.

Proximity of people to the green environments in the central halls.

Atrium space as it exists doesn't really have any visual qualities to it. And I was wondering now its exposed, can you imagine any kind of different treatment of the surfaces of the atrium? Could you grow things onto those walls?

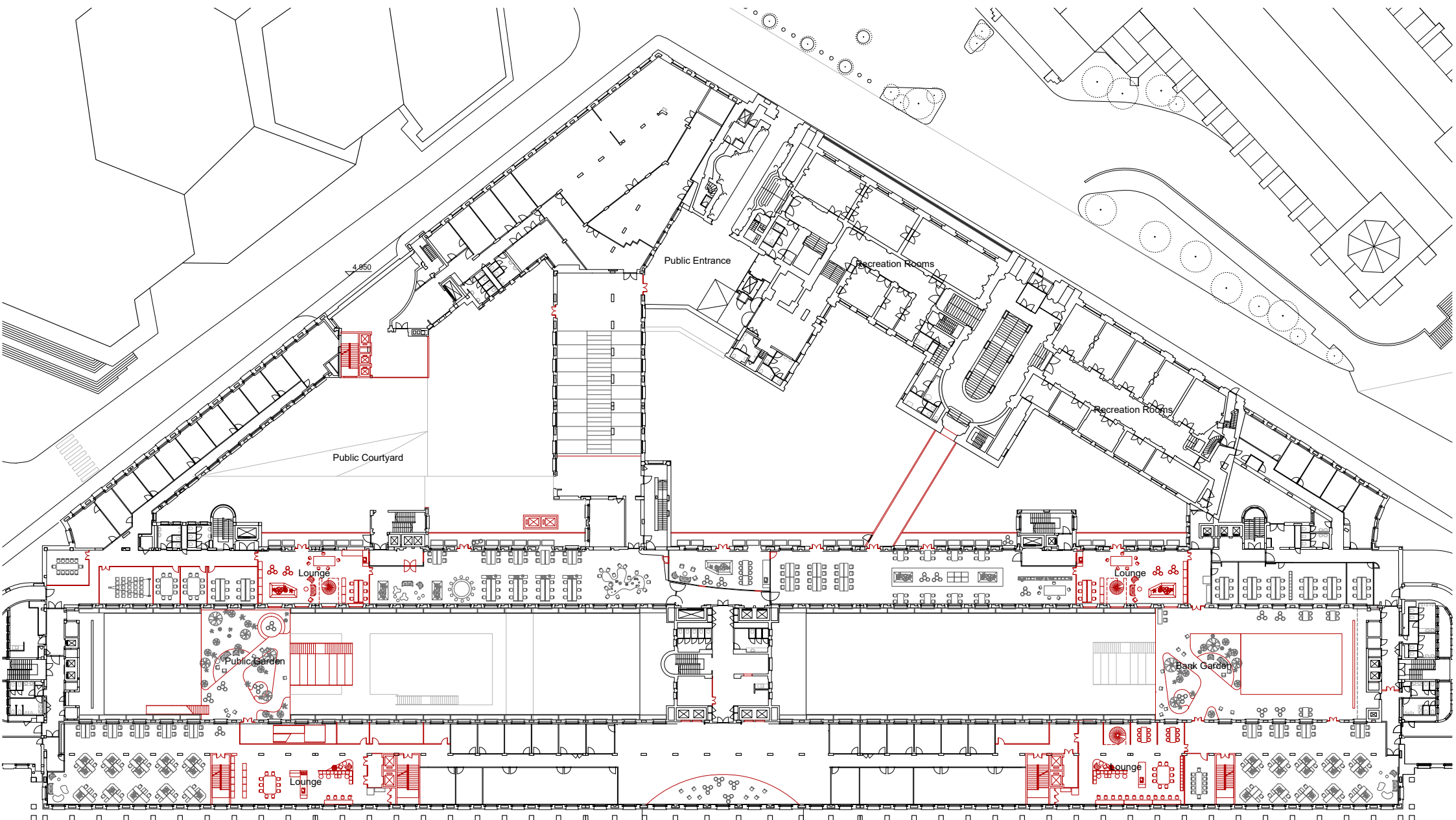
Matthijs:

Large planters: a lot of weight

When getting to the greenhouse: buildings like this are not built for green roofs. Using existing column and beam structure to deal with the weight of the green roof / planters in the greenhouse.

too many elevators in the buildings. probably remove some.

1 F - change of the officw lounges

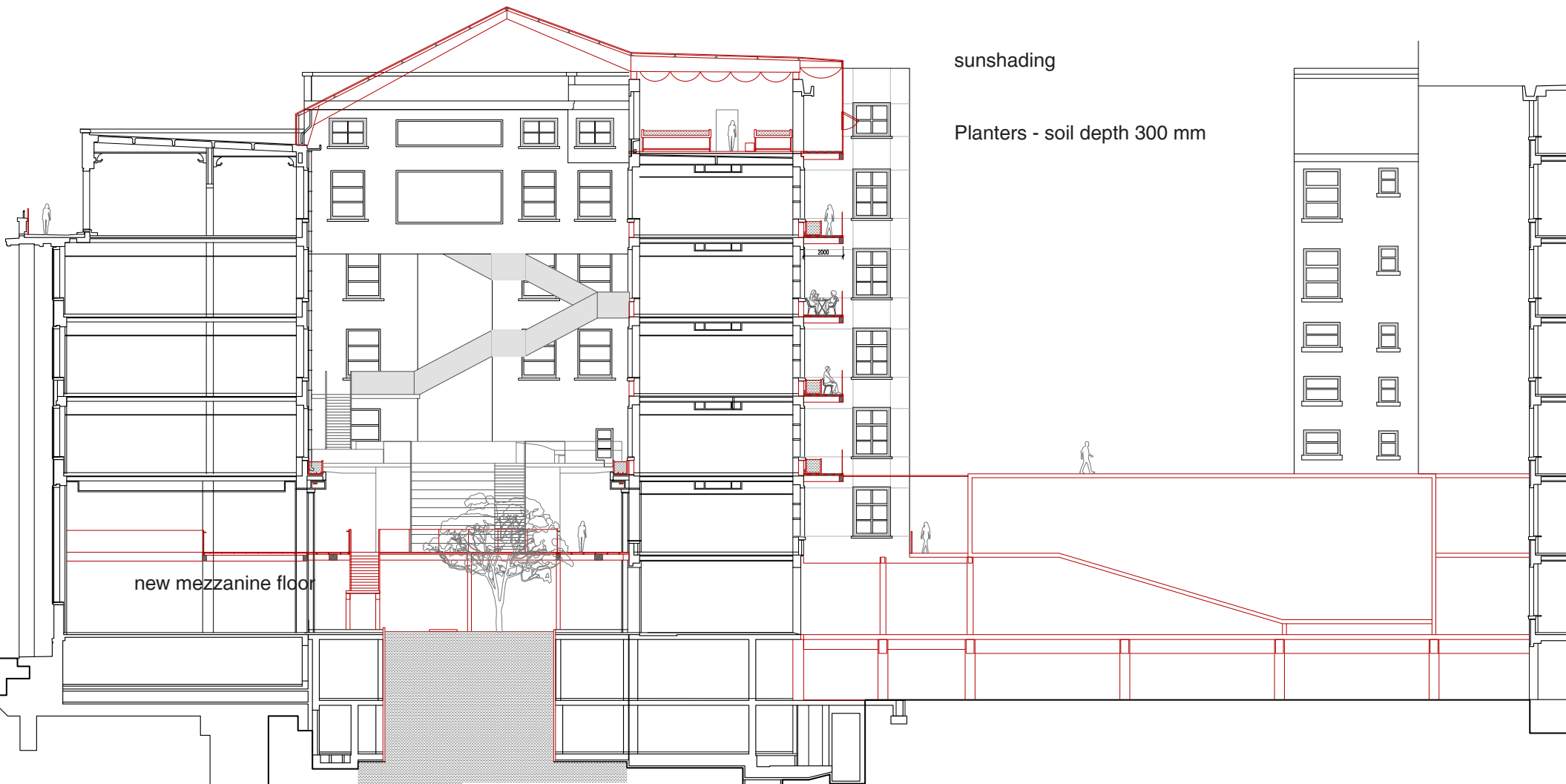
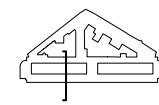


Interior Facades



Balconies of Office Lounges



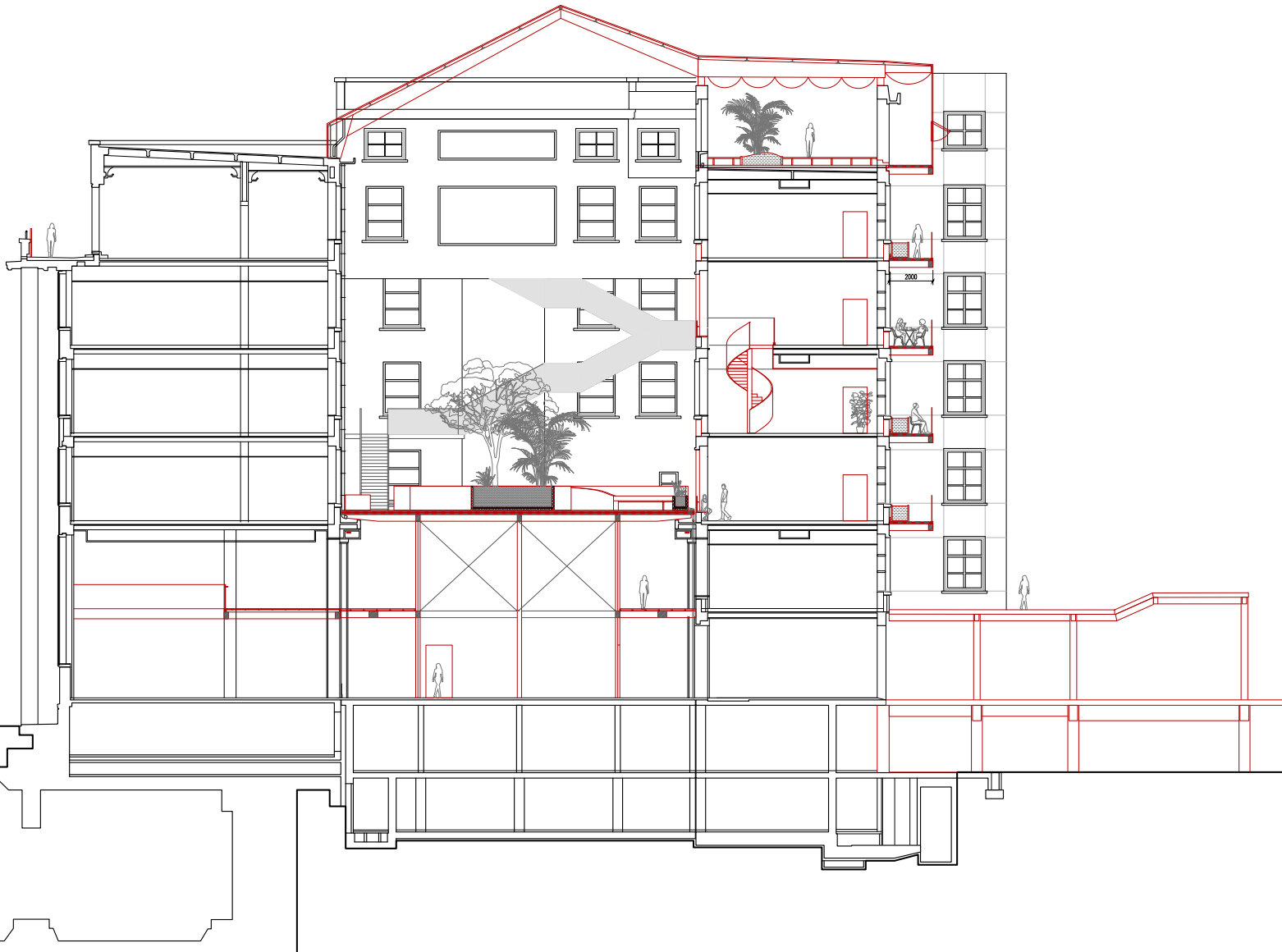
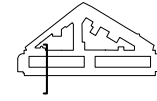


sunshading

Planters - soil depth 300 mm

new mezzanine floor

Planters - open to the earth?



Lightweight planting soil



Key Features

Scientifically verified
Bulk Density (At Field Capacity) 1.13 Mg/m³
Bulk Density (At Saturation) 1.28 Mg/m³
Balanced pH 7.0 to 8.0
Fully compliant to industry standards and beyond
Screened to 10mm
Free draining
Peat Free

a blend of clean, 10mm screened premium sandy loam blended with **4-10mm LECA, a Lightweight Expanded Clay Aggregate**, which when combined with soil **reduces the soils bulk density whilst increasing drainage**. The end result is a premium lightweight planting medium that is very similar in nutrient value and performance to that of a natural soil.

<https://premiumtopsoilsupplies.co.uk/shop/lightweight-intensive-roof-garden-planting-soil/>



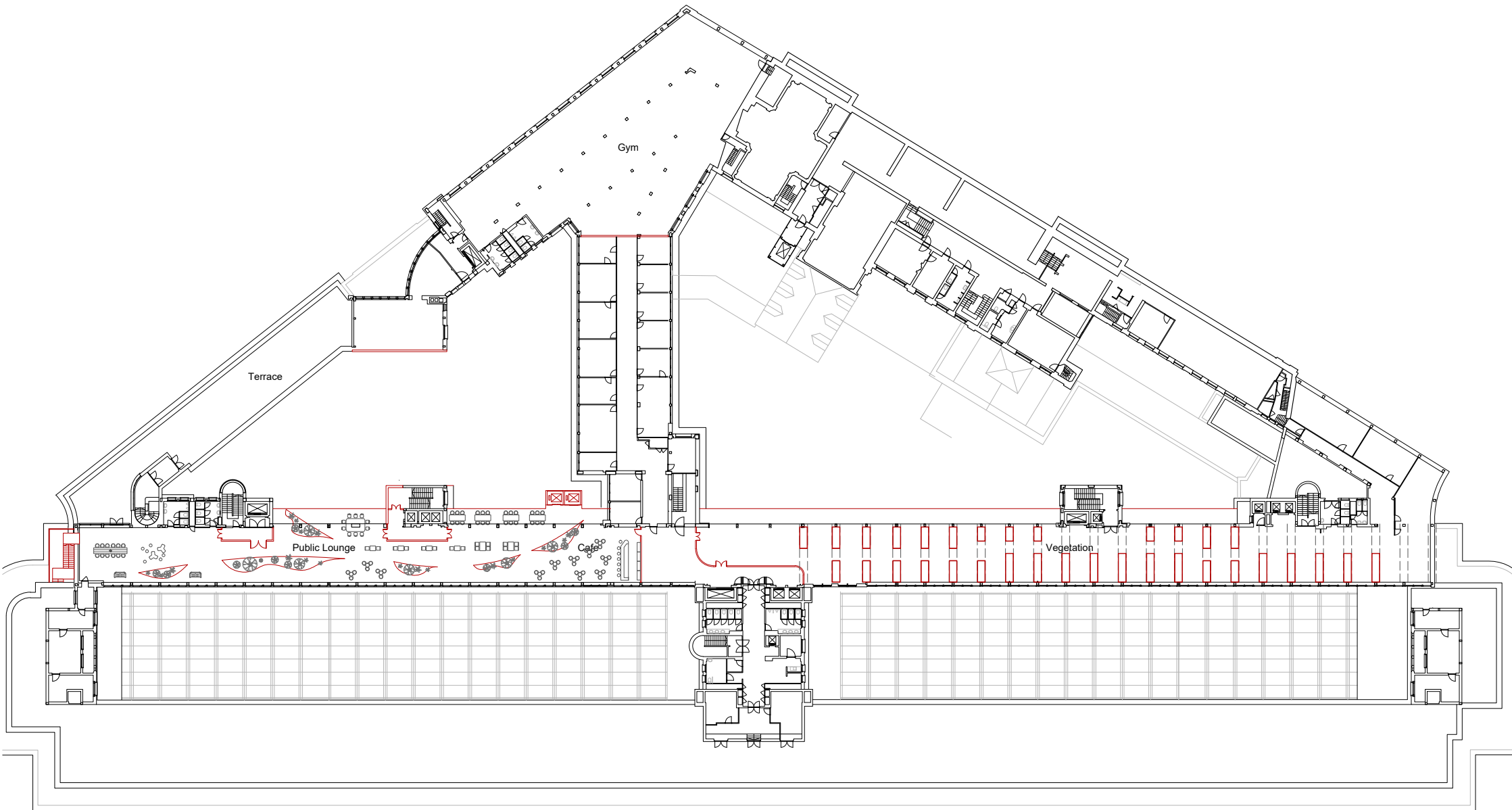
https://agritech.tnau.ac.in/horticulture/horti_Landscaping_roofgarden.html

References for Planters



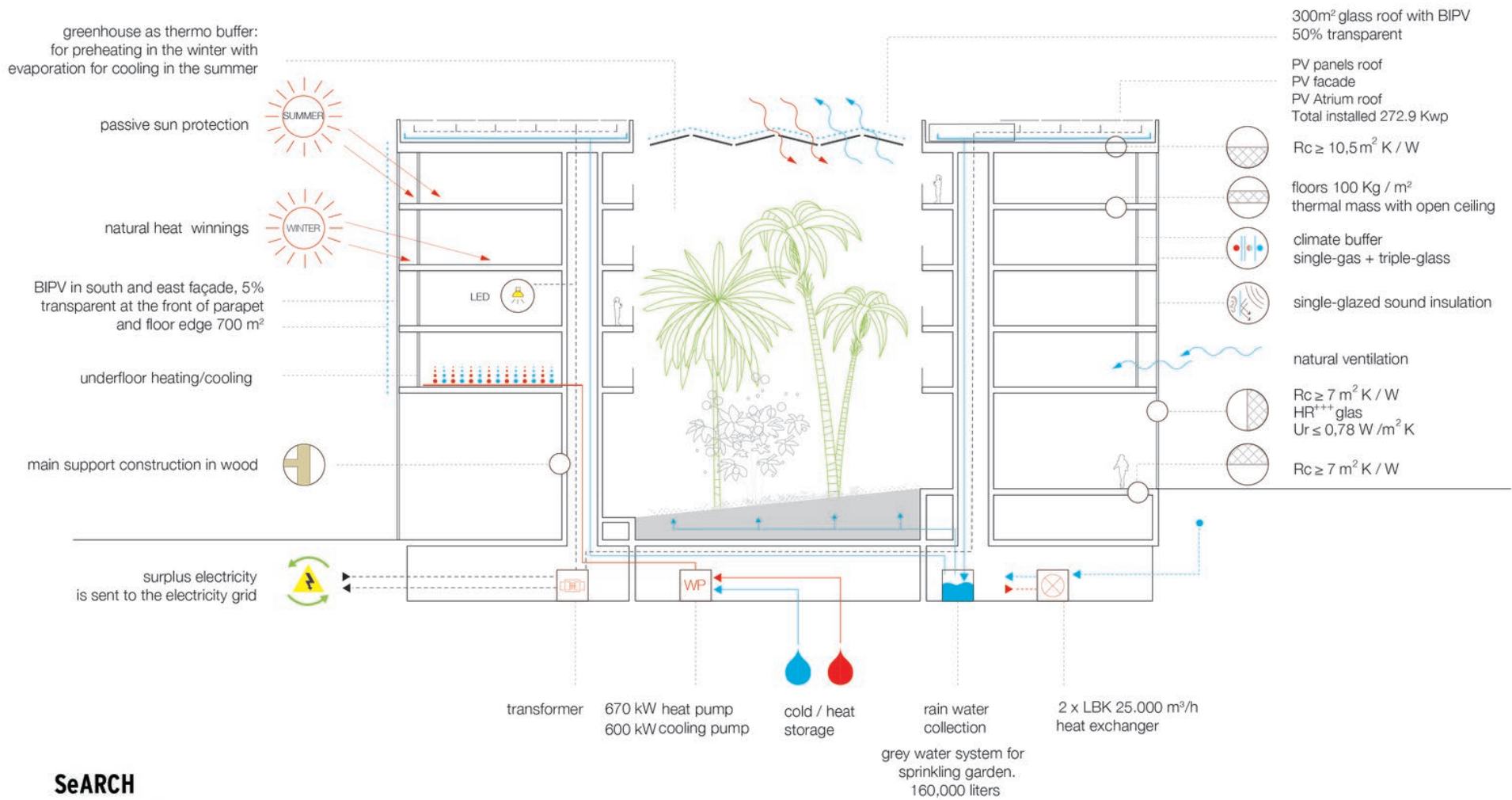
Planters

5 F - public lounge and vegetation greenhouses



W 4.1

Climate design reference: Hotel Jakarta



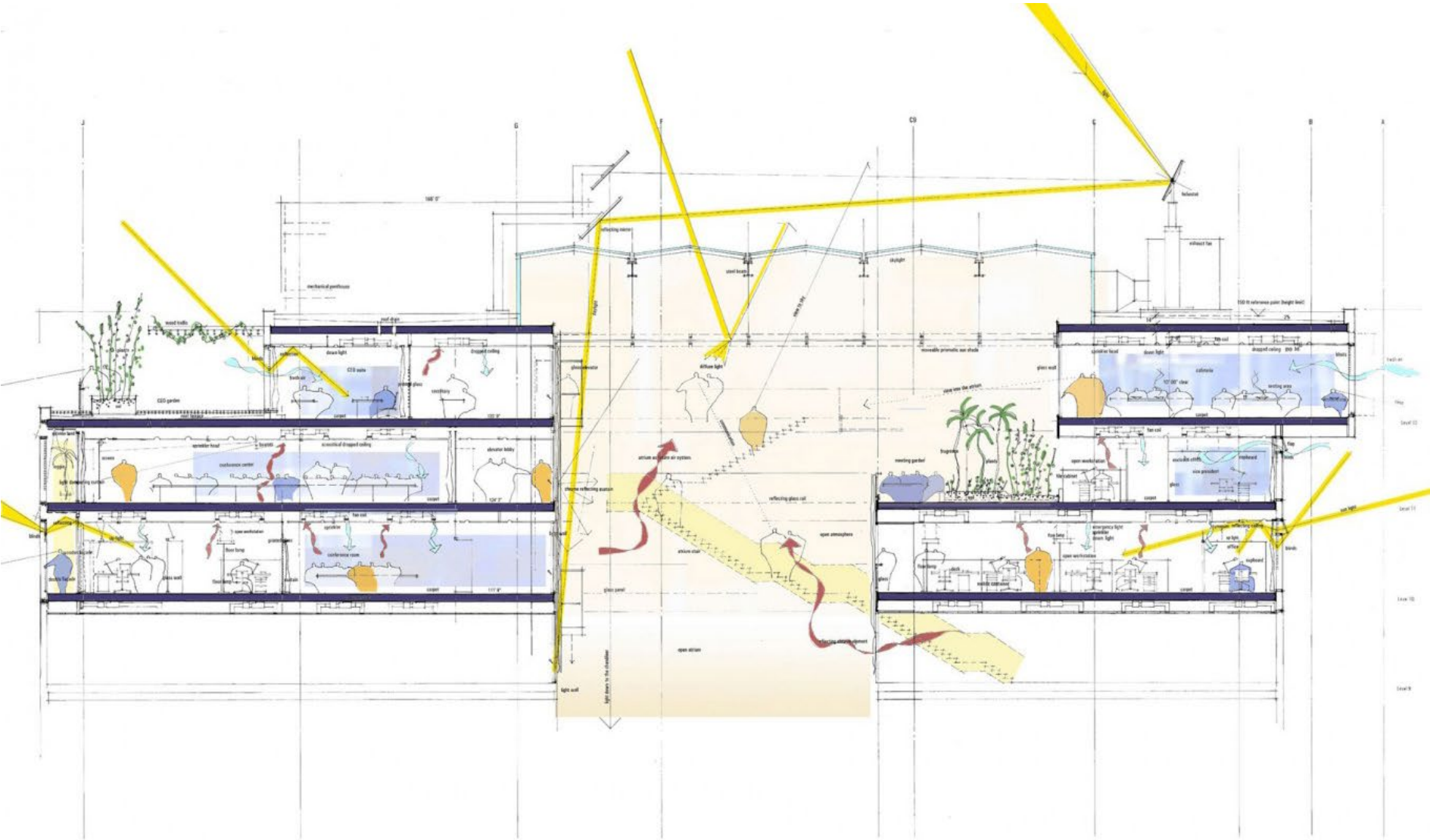
SeARCH
Hotel Jakarta

<https://www.archdaily.com/899081/hotel-jakarta-search>

Climate design reference: Hotel Jakarta

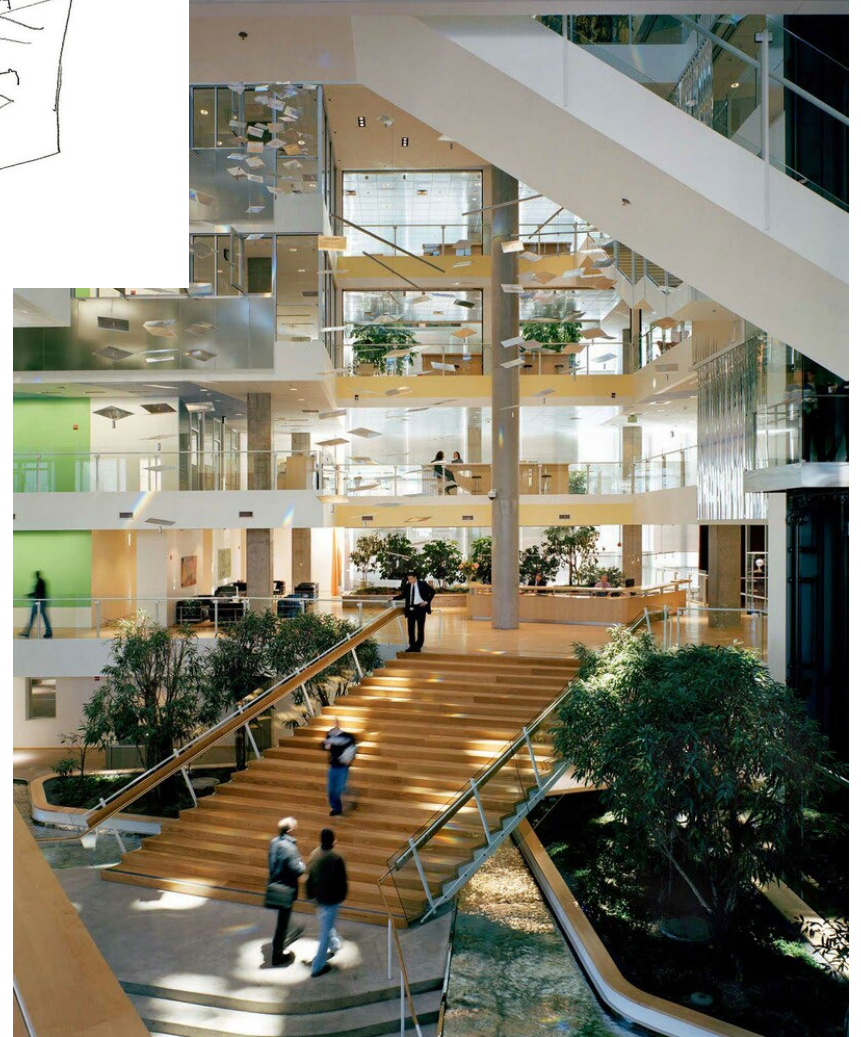
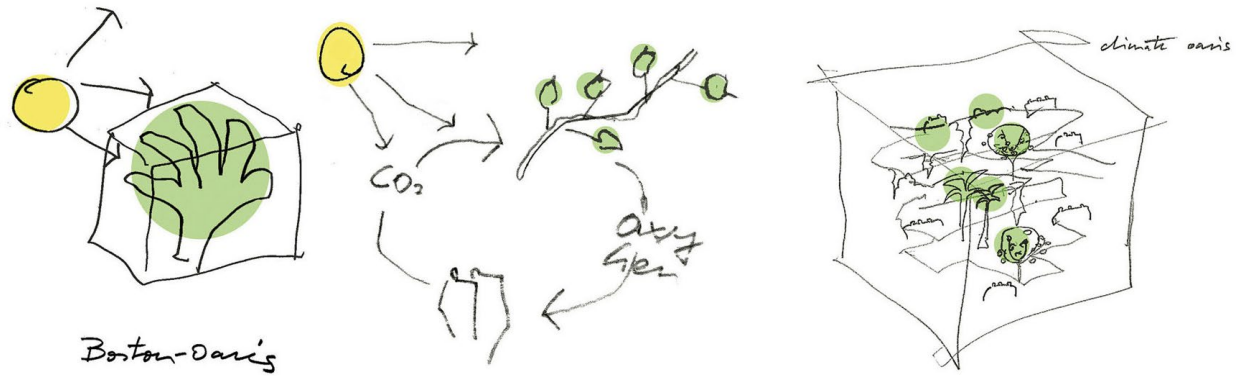


Climate design reference: Genzyme Center Office Building



<https://behnisch.com/work/projects/0104>

Climate design reference: Genzyme Center Office Building

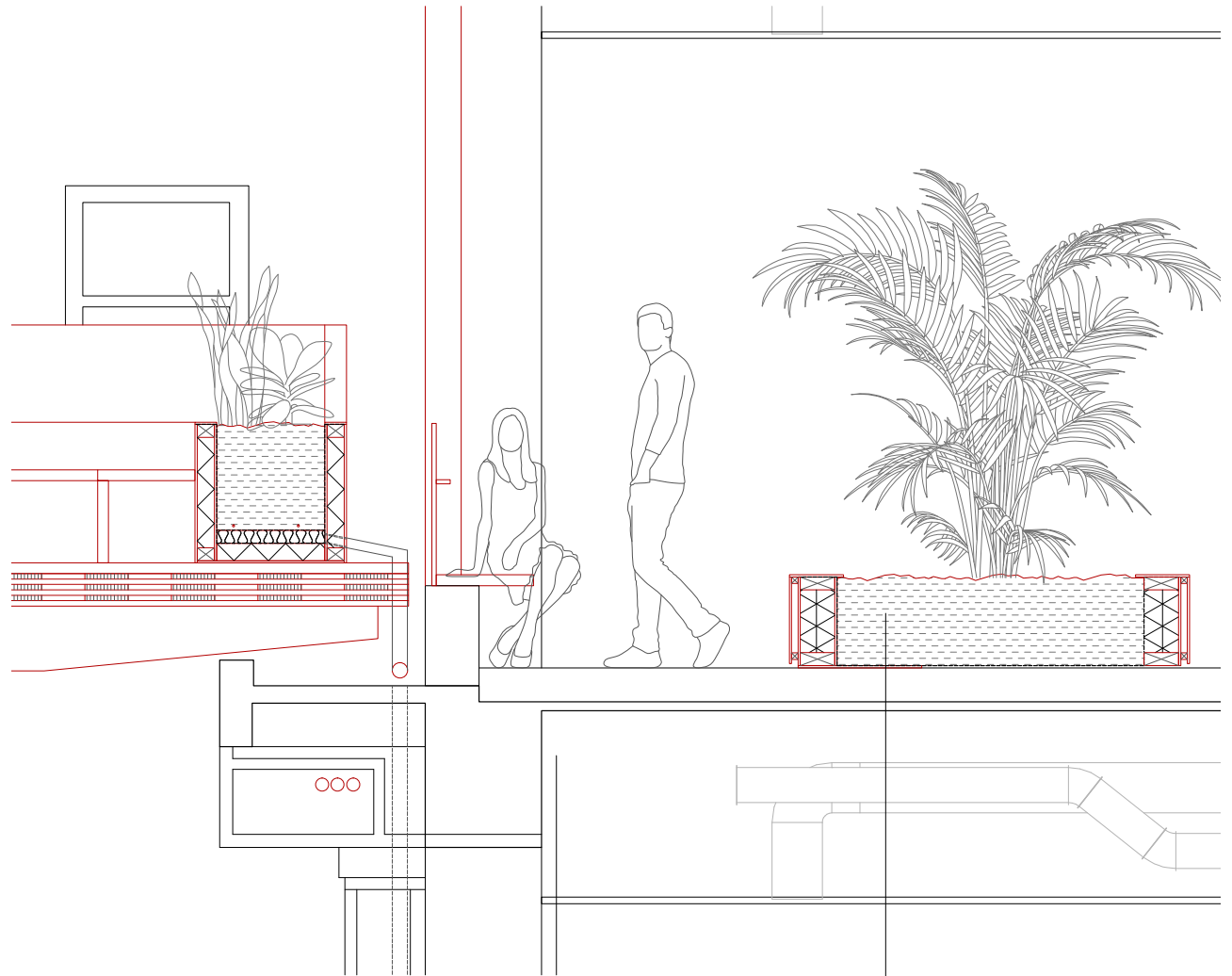


Irrigation

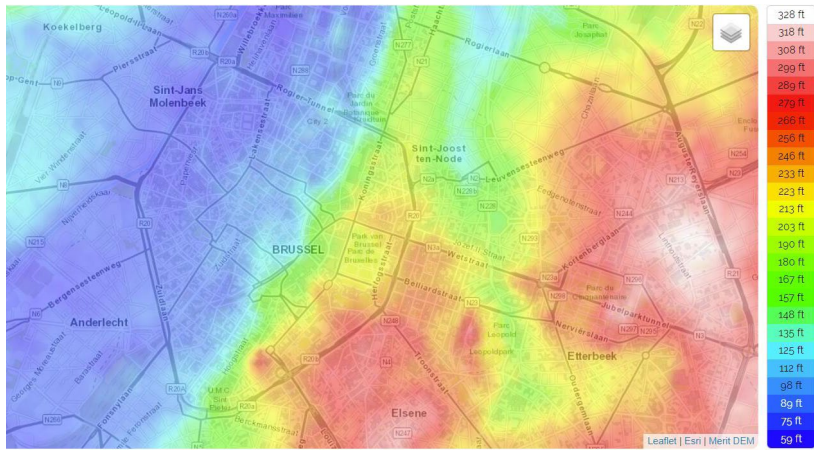


Drip Irrigation

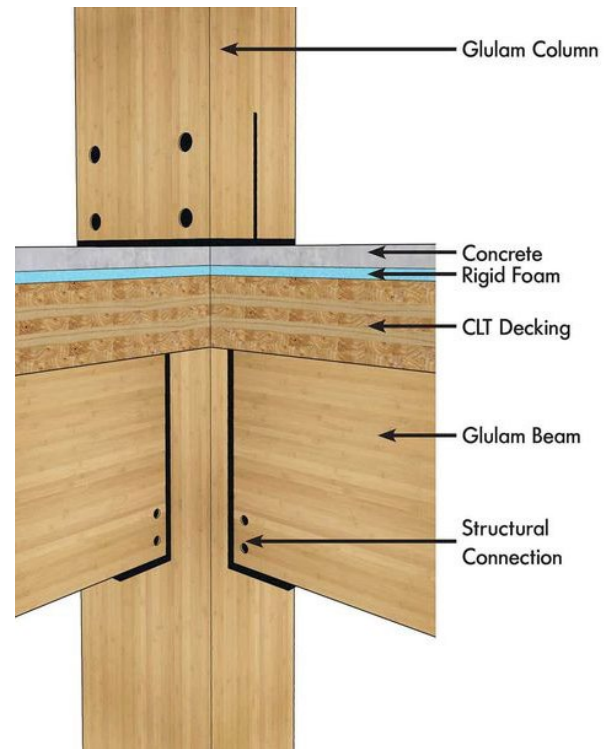
Drip irrigation or trickle irrigation is a type of micro-irrigation system that has the potential to save water and nutrients by allowing water to **drip slowly to the roots** of plants, either **from above the soil surface** or **buried below the surface**.



How about the indoor planters?

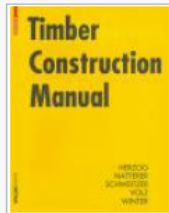


<https://en-us.topographic-map.com/maps/pjnt/Brussels/>



Glulam
 CLT
 Plywood
 Primary / Secondary beams

▼ Timber Construction Manual



by Thomas Herzog, , Julius Natterer, , Roland Schweitzer, , Michael Volz, , and Wolfgang Winter

PUBLISHING HOUSE
Walter de Gruyter GmbH

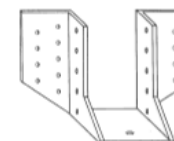
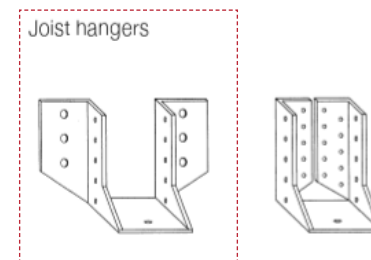
DATE
2004-01-12

Tender documentation for steel parts / degrees of difficulty

This table is intended to act as an aid when tendering.

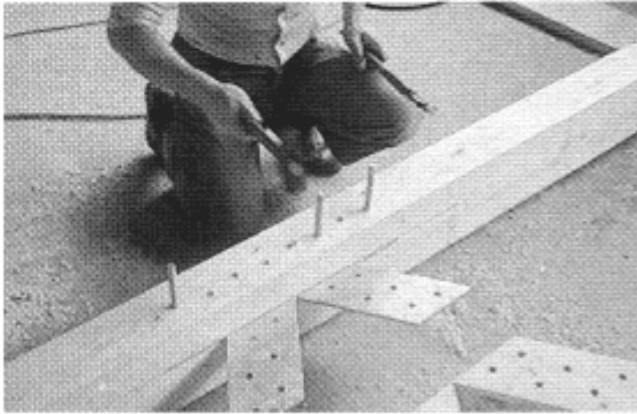
Flat steel parts not welded		
E1		
	rectangular	square
E2		
	trapezoidal	triangular
E3		
	polygonal	
E4		
	with 1-2 cut-outs	
E5		
	with ≥ 3 cut-outs or radii	

Welded flat steel parts		
VE1		
	made from 2 pieces of steel	
VE2		
	made from 3 pieces of steel	
VE3		
	made from > 3 pieces of steel	

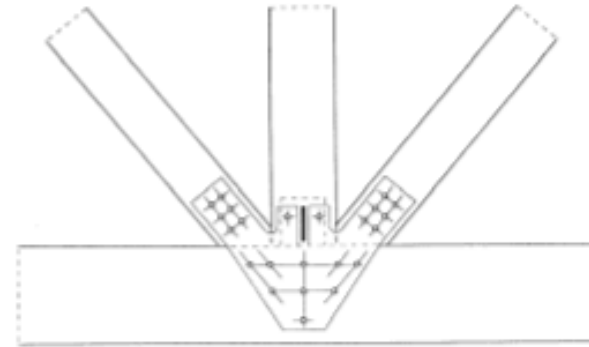


Welded steel parts		
V1		
	made from 2 pieces of steel	
V2		
	made from 3 pieces of steel	
V3		
	made from 4-6 pieces steel	
V4		
	made from ≥ 7 pieces of steel	

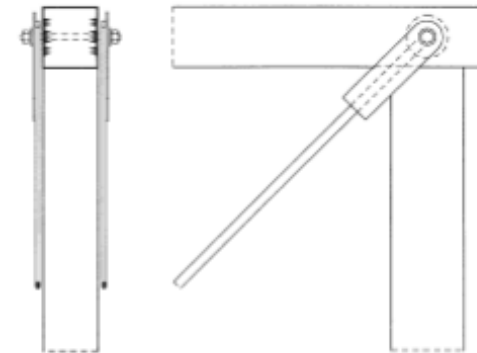
Reference: Garden Bridge Joint



Assembling a truss in the factory



Joint with steel plate let into slits and fixed with dowels



Tie connection with single-sided connectors

Reference: Corridor in the Courtyard

Reference: Floor

Structuring arrangements



Straight kneebraces



Curved kneebraces



V-form



Multiple struts



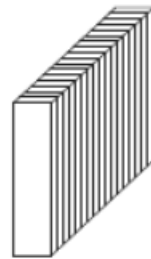
Propped beam



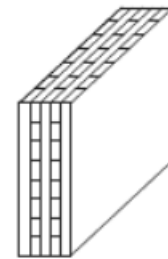
Strut frame



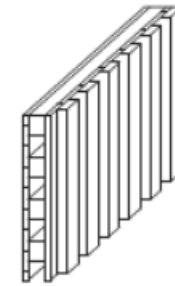
Kneebraced strut frame



Edge-glued timber wall



Cross-laminated timber wall



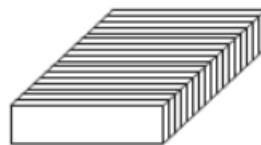
Board System wall



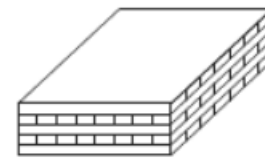
RIBBED wall



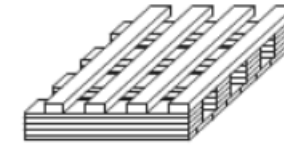
Channel-section wall



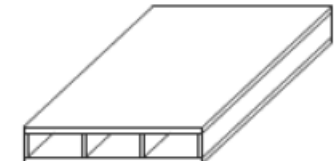
Edge-glued timber floor or roof



Cross-laminated timber floor or roof



Board System floor

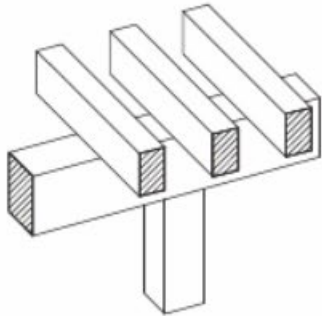


Box-section floor or roof

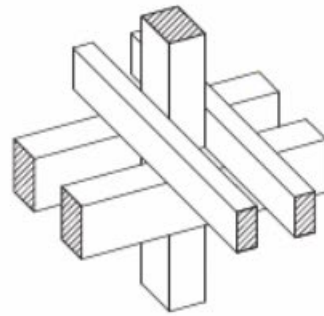
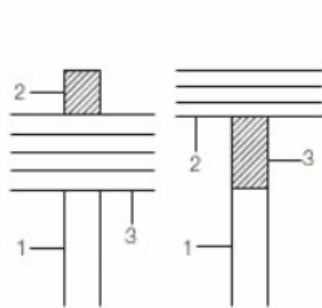


Fig. 1: The contribution to sustainable development made by forests and wood

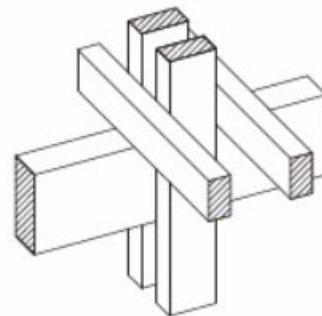
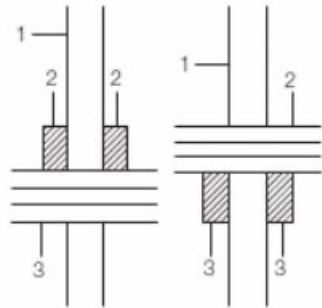
Reference: Columns and Beams



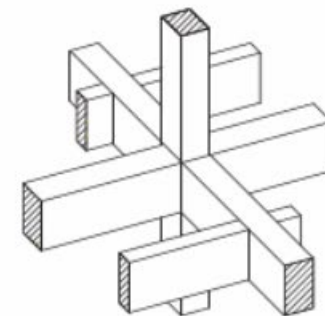
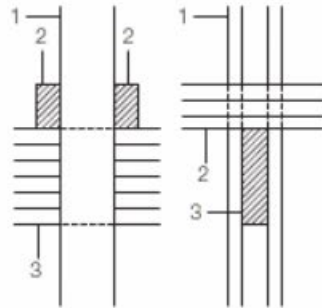
- Loadbearing junction requiring minimal connectors as beams are laid on top
- Simple geometry for facade and fitting-out
- Different structural depths and details at facade junctions and fitting-out around primary and secondary beams



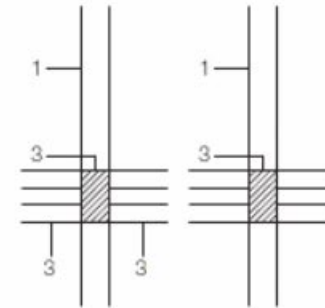
- Primary and secondary beams in pairs
- Junction between main beam and column more complicated
- Complex geometry for facade and fitting-out



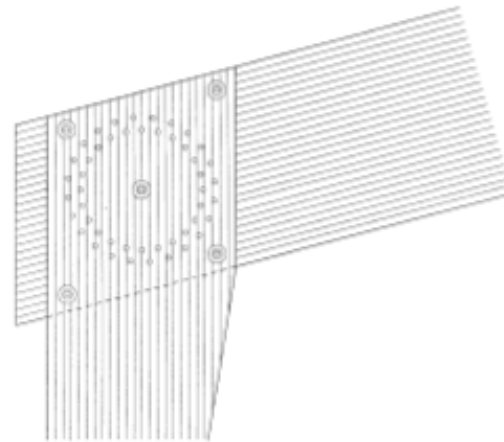
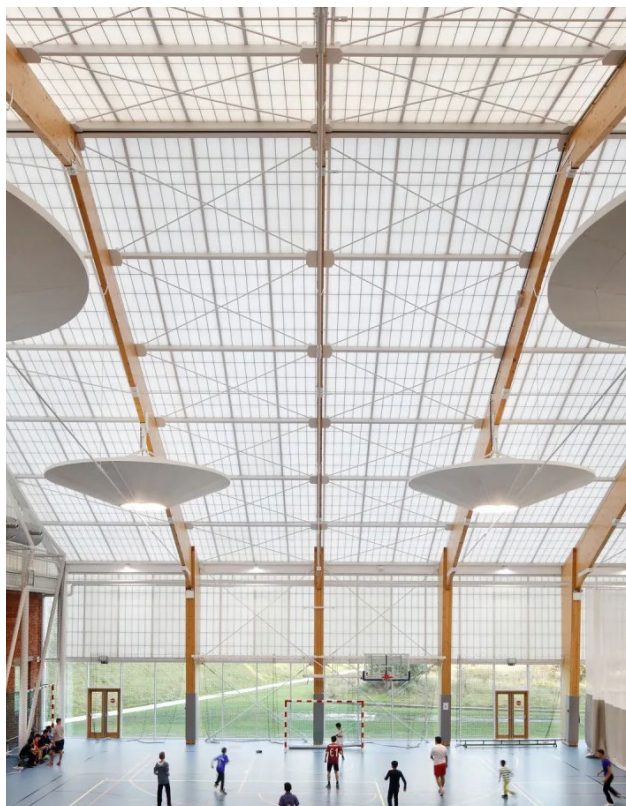
- Columns and secondary beams in pairs
- Junction between main beam and column more complicated
- Complex geometry for facade and fitting-out



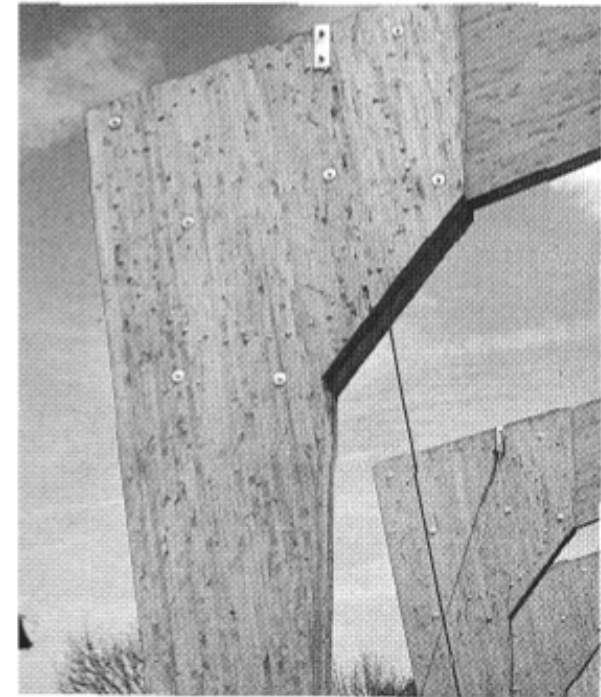
- More complicated junctions between primary beam and column, secondary beam and primary beam
- Simple geometry for fitting-out and facade



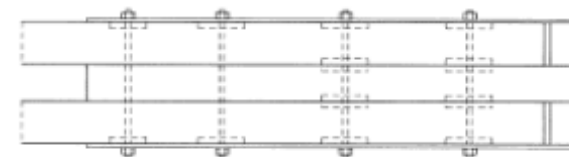
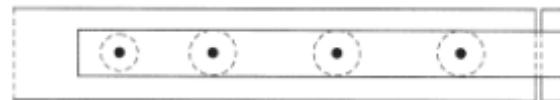
Reference: Roof Structure



Corner of frame with ring of dowels and clamping bolts

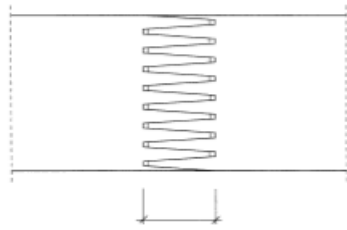


Corner of frame with ring of dowels

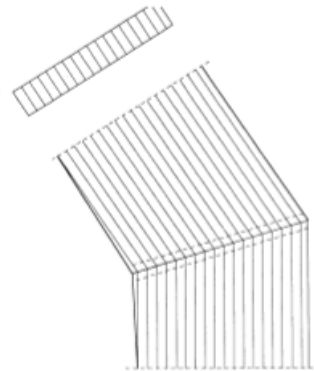


Tension connection with shear-plate and toothed-plate connectors

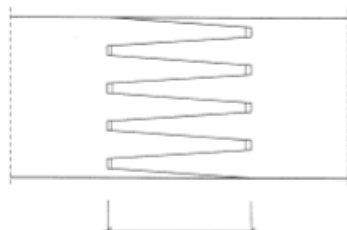
Reference: Roof Structure



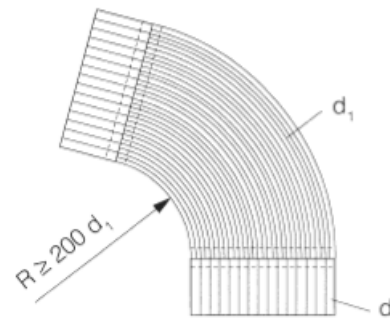
Small finger joint (15–20 mm)



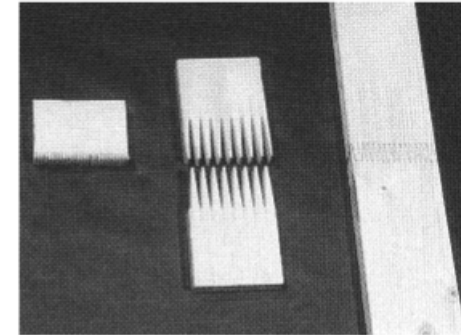
Finger-jointed frame corner



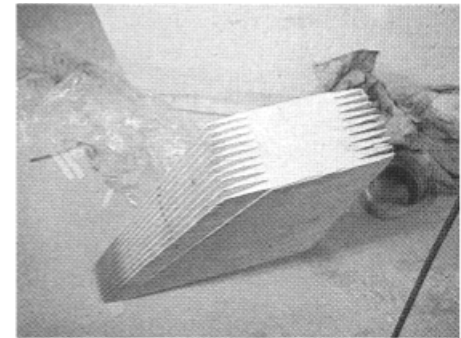
Large finger joint (approx. 50 mm)



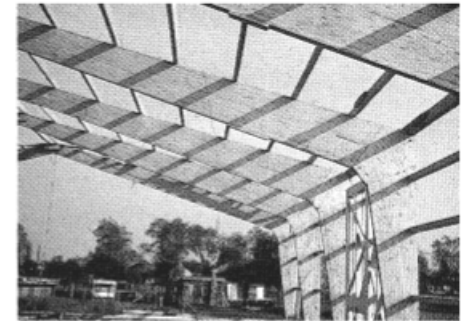
Finger-jointed frame corner with curved corner block



Finger joints

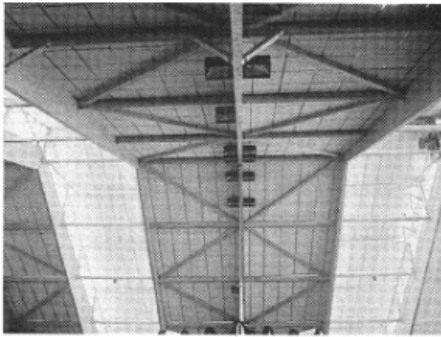


Finger-jointed hardwood block for frame corner

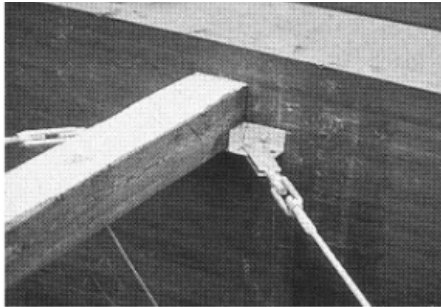


Three-pin frame made from glued laminated timber with finger-jointed frame corner

Reference: Roof Structure

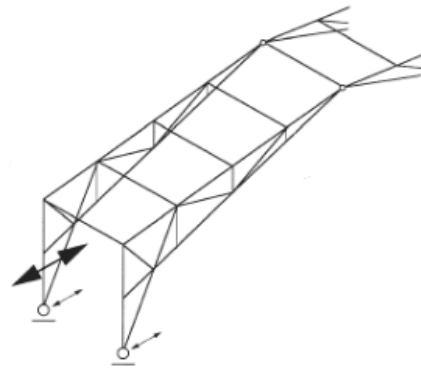


Girder with X-bracing over two bays

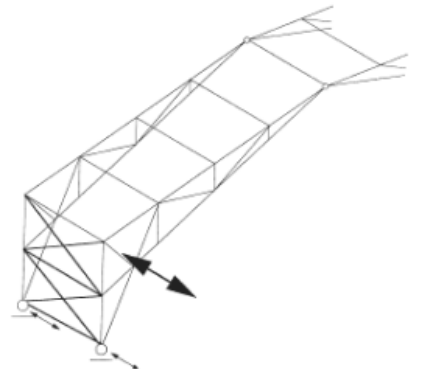


Detail of steel tie with turnbuckle

Three-pin frames

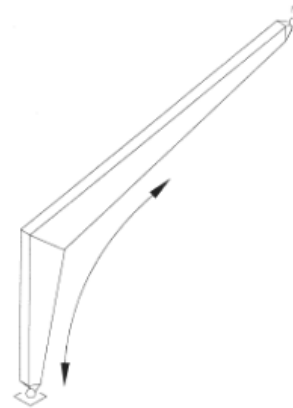


without bracing,
without restraint

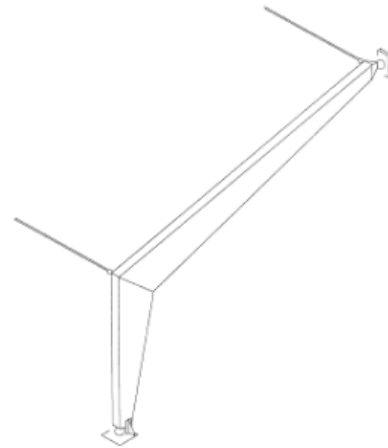


with girder in plane of wall

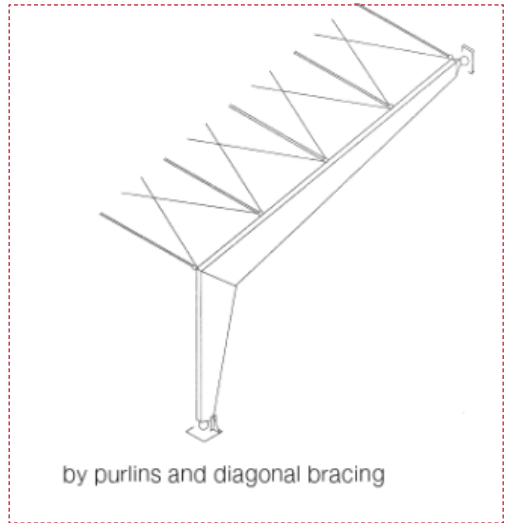
Measures to prevent buckling of a three-pin frame with solid web-section



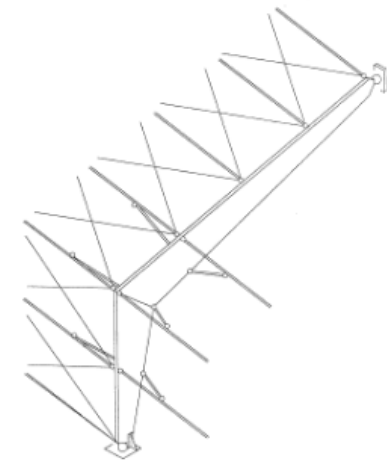
by cross-section width



by cross-section width and eaves purlin



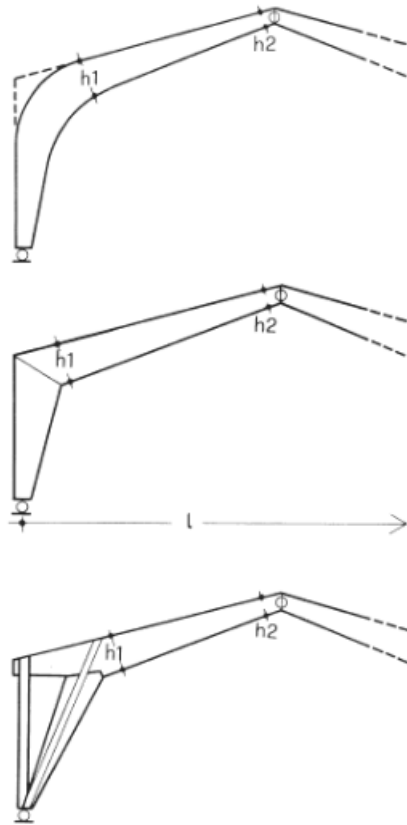
by purlins and diagonal bracing



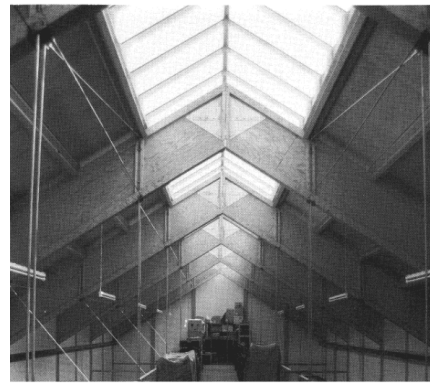
by purlins, diagonal bracing and knee-braces to the purlins at the corner

Reference: Roof Structure

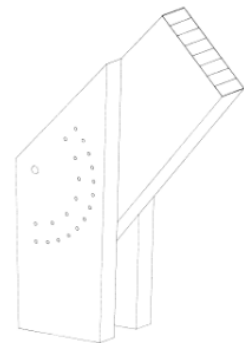
Three-pin frames



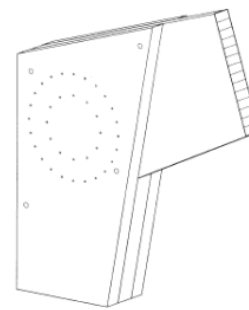
Glued laminated timber
 $a = 5-10 \text{ m}$
 $h_1 = 1/20 \text{ to } 1/40$
 $h_2 = 1/30 \text{ to } 1/60$
 $l = 10-50 \text{ m}$



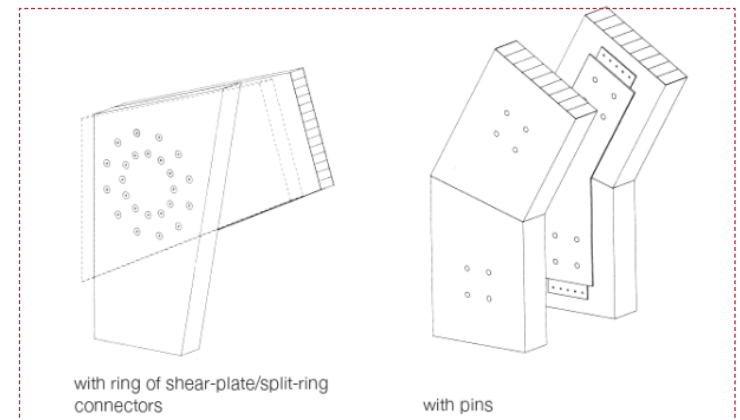
Rigid frame corners with multi-part members



with dowels arranged in an arc



with ring of dowels

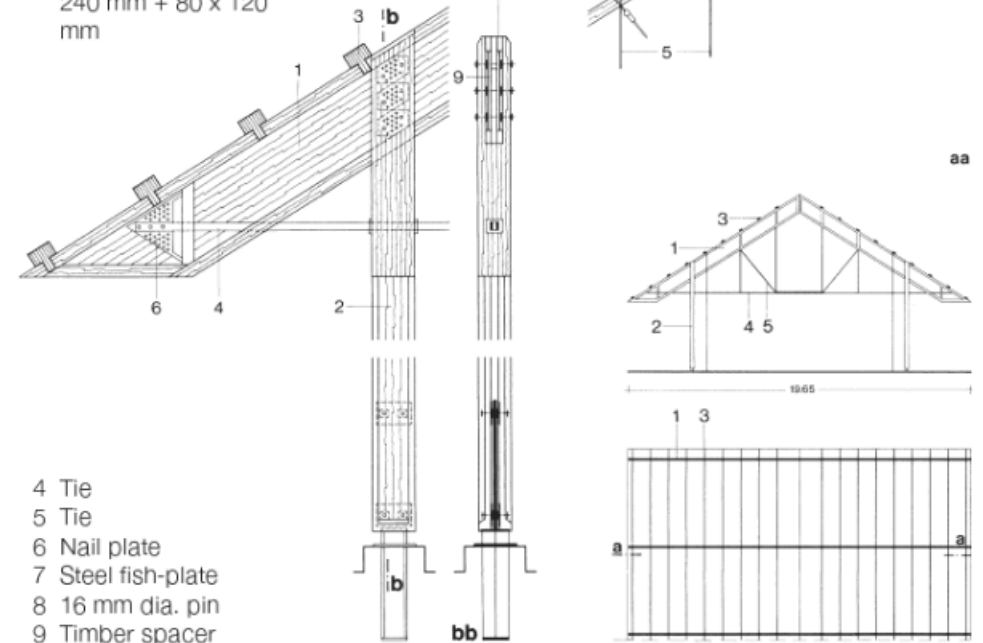


with ring of shear-plate/split-ring connectors

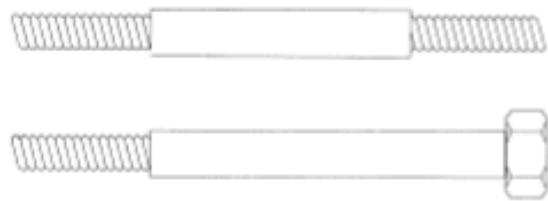
with pins

Roof covering omitted for clarity

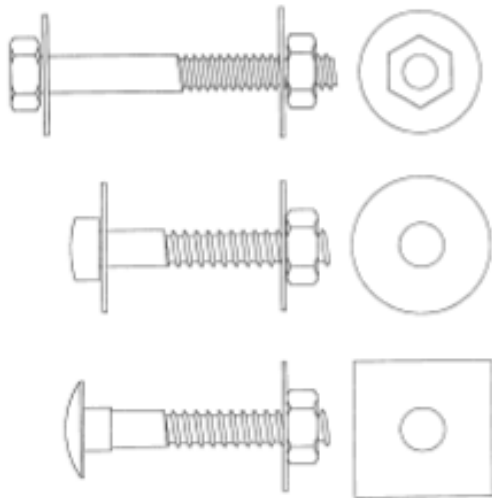
- 1 Rafter, 240 x 900 mm
- 2 I-section column, 320 x 420 mm
- 3 Glulam purlin, 140 x 240 mm + 80 x 120 mm



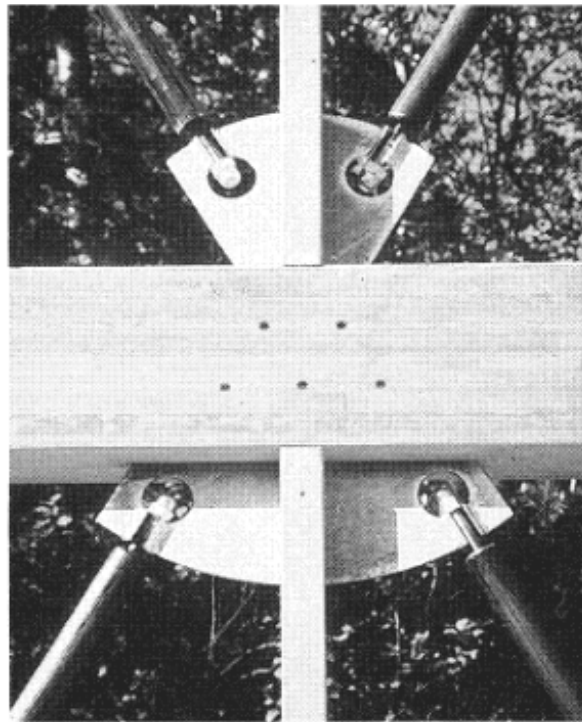
- 4 Tie
- 5 Tie
- 6 Nail plate
- 7 Steel fish-plate
- 8 16 mm dia. pin
- 9 Timber spacer



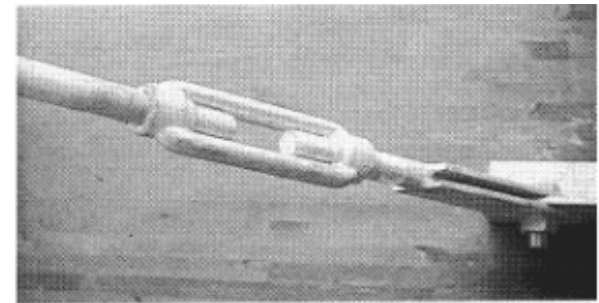
Close tolerance bolts



Bolts with nuts and various washers



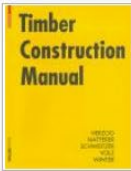
Hardwood ties with bonded-in threaded steel rods



Turnbuckles for wind X-bracing

Reference: Kinds of Wood

▼ Timber Construction Manual



由 Thomas Herzog, , Julius Natterer, , Roland Schweitzer, , Michael Volz, , and Wolfgang Winter

出版社
Walter de Gruyter GmbH

日期
2004-01-12

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目录

Intro

Contents

- ▶ Part 1 Cultural dimensions

- ▶ Part 2 Fundamentals

Softwoods

Common name, botanical name, DIN 4076 abbreviation

Douglas fir <i>Pseudotsuga menziesii</i>	Spruce <i>Picea abies</i>	Scots pine (European redwood) <i>Pinus sylvestris</i>	European larch <i>Larix decidua</i>
DGA	FI	KI	LA
			

Applications

Highly stressed internal uses, timber preservative required externally, floor coverings, shipbuilding, veneer for plywood, staves	Important European building timber, internal uses, timber preservative required externally, frames, core and veneer for plywood, poles, crates, industrial uses	Important European building timber, internal uses, timber preservative required externally, windows, furniture (solid and veneered), linings, mining uses, industrial uses, floor coverings	Highly stressed internal and external uses, furniture, linings, fittings
-----------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------

Softwoods

Pine <i>Pinus palustris</i> , <i>P. rigida</i> , <i>P. taeda</i> and 3 other <i>Pinus</i> species PIP	Fir <i>Abies alba</i>	Western hemlock <i>Tsuga heterophylla</i>	Western red cedar <i>Thuja plicata</i> Donn
	TA	HEM	RCW
			

As pitch pine (heartwood) for highly stressed internal and (with preservative) external uses, internal floor coverings, plywood; as red pine (sapwood) for internal uses	As for spruce: internal uses, timber preservative required externally, fittings, linings, inner plies of plywood, crates, poles, industrial uses	Moderately stressed internal uses, windows, linings, saunas, core and veneer for plywood	Low-stressed internal and external uses with good dimensional stability, linings, shakes and shingles
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------

Hardwoods

Common name, botanical name, DIN 4076 abbreviation

Maple <i>Acer pseudoplatanus/platanoides</i> L. AH	Ekki (azobé) <i>Lophira alata</i> AZO	Beech (European beech) <i>Fagus sylvatica</i> BU	Oak <i>Quercus robur, Q.petraea</i> EI
			

Applications

For fittings and wood turning, especially decorative with wavy grain, furniture, kitchen equipment, musical instruments, parquet flooring	Highly stressed uses in agriculture and hydraulic engineering, e.g. bridges, locks, ramps, underground railway sleepers, parquet flooring	Moderate to highly stressed internal uses, parquet flooring, sleepers (impregnated), for wood turning, veneer for plywood, industrial uses	Highly stressed, internal and external uses, parquet flooring, storage barrels; narrow ringed quality: high-quality veneers
-------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------

Hardwoods

Dark red meranti, <i>Shorea</i> spp. esp. <i>S. pauciflora</i> King MER	Merbau <i>Intsia bijuga</i> etc. MEB	Rubinia <i>Rubinia pseudacacia</i> L. ROB	Teak <i>Tectonia grandis</i> TEK
			

Its wide variation in properties makes it suitable for highly stressed internal and external uses, especially windows, doors, shipbuilding, park benches; light red meranti is suitable for linings, furniture and lightweight constructions	Highly stressed uses with good dimensional stability, floor coverings, laboratory and work benches, shipbuilding	Structural timber for highly stressed internal and external uses, stairs, floor coverings, piles (also without chemical timber preservative like the heartwood of oak)	In solid and veneered forms for furniture, floor coverings, linings, internal and external uses with high dimensional accuracy, not permitted for loadbearing constructions, shipbuilding, laboratory fittings
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Goals:

Roof structure: engineering timber?

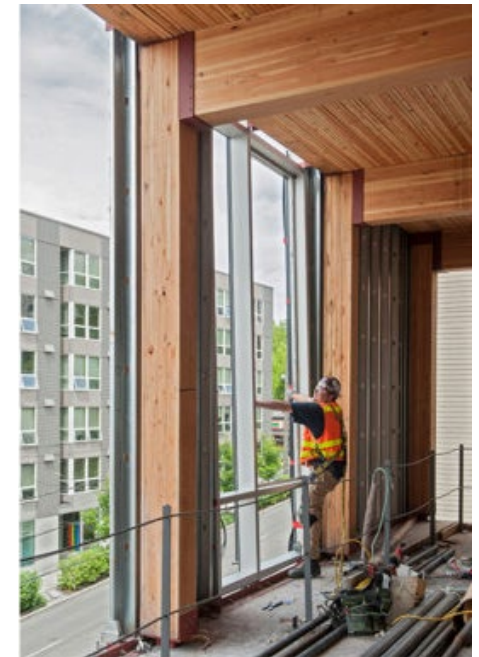
Load-bearing: natural color of the timber (light brownish)

Floor & Surface: lighter color, to reflect the sunlight and make the hall brighter.

Main species in the market

CLT is usually constructed from softwood species such as spruce, although it can be manufactured from larch, fir, douglas fir, pine or other timbers. Around the world, tests are carried out with other species (bamboo, iroko). Lumber is visually graded or machine stress rated and is kiln dried to 12%.

While C24-grade timber is often used, there has been an increase in the use of C16 timber. C16/C24 is the strength grade of the timber, which can be graded visually by a registered and qualified grader or by machine. Graders evaluate the timbers characteristics, taking into account any knots, fissures and the slope of the grain to determine its strength class.



The Miller Hull Partnership, photo John Stamets

<https://www.cbi.eu/market-information/timber-products/cross-laminated-timber/europe>

Spruce

Spruce is the most cost-effective and readily available timber for glulam manufacture. For any project where large quantities are required or the lowest price possible in glulam is wanted, Spruce will be the timber of choice for the glulam. Depending on the quantity required, it is likely that we would source this from German factories that specialise in mass production in this material.

Also called Whitewood, Spruce is widely distributed throughout continental Europe and is a species of major economic importance. The large, fully grown trees usually have a straight trunk and grow to a height of about thirty meters, (the largest examples up to 55-metres). On average it is felled when its diameter measures around sixty centimetres. If left it can grow up to 1.5 meters.

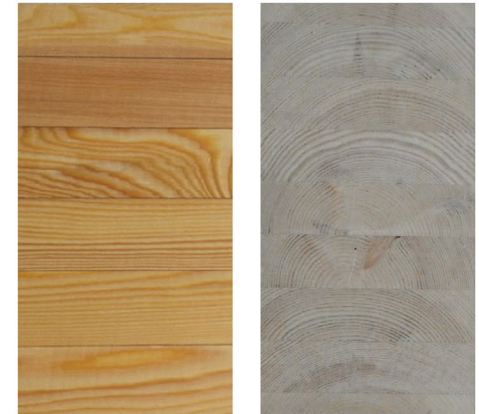
Its colour ranges from a creamy white, light yellow to a reddish-brown. The heartwood is not distinct from its sapwood. It is straight-grained with thin and regular texture. The timber can emit sap even after being seasoned and machined. The wood is soft, easy to manipulate and work, low in weight and has a medium density. The strength properties are good, it is most commonly used in construction for both structural and internal joinery (skirting boards, architraves, etc.). It is an ideal choice for machining and structural application.



Siberian Larch

Siberian Larch is usually fairly clear of knots and can provide a good option when something with a little more character than standard Spruce is required. All our Siberian Larch glulam is currently produced in house.

It is classed as moderately durable and can be used in locations exposed to weather conditions (if suitably treated). It is a heavy and hard coniferous wood. The fairly thin sapwood is light yellowish to reddish-yellow. The heartwood reddish-brown to glowing red when fresh, darkening to gold-brown. It has a clearly striped or grainy patterning. When exposed to natural light, Larch will eventually lose its natural colouring turning to a silver-grey. Siberian Larch is a frost-resistant tree native to Western Russia. It is very slow grown with dense growth rings. It can be factory coated in SIOO-X, a breakthrough water-based silicone technology, to provide a genuine silver lustre. The treatment creates a weathered appearance at an accelerated rate. Following application, regardless of protection and exposure, the timber takes on a consistent tone which provides a solution to differential weathering whilst strengthening the timber's surface and creating a water repellent layer.



<https://www.bucklandtimber.co.uk/timber-species/>

Reference: Color Wash



LEFT COLUMN: OPAQUE WASH

This finish, which is two parts paint to one part water, reveals only a few subtle hints of the grain.

MIDDLE COLUMN: MEDIUM WASH

Combining equal parts paint and water makes brushstrokes less apparent. The underlying pattern will come into view.

RIGHT COLUMN: LIGHT WASH

Mix two parts water with one part paint for a soft tint that showcases the wood's texture.

<https://www.marthastewart.com/1104511/how-make-your-own-colored-paint-washes-wooden-surfaces>

Reference: Flooring

Composite decking is made from **reclaimed plastic** and **wood materials**, manufacturing solid planks, and tongue-and-groove planks.

Less maintainance.



<https://www.thespruce.com/decking-brands-you-need-to-know-3993855>
<https://www.moistureshield.com/about/blog/wood-vs-composite-decking-lets-compare/>

<https://info.deckorators.com/deckorators-au>

