P5

RELIGHT V&D HAARLEM: DAYLIGHTING IN A FORMER DEPARTMENT STORE

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AR3AH105 Graduation Studio Adapting 20th Century Heritage: Vacant Heritage
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Second mentor (BT): Frank Koopman
Research mentor: Hielkje Zijlstra
Examination committee member: Leo van den Burg

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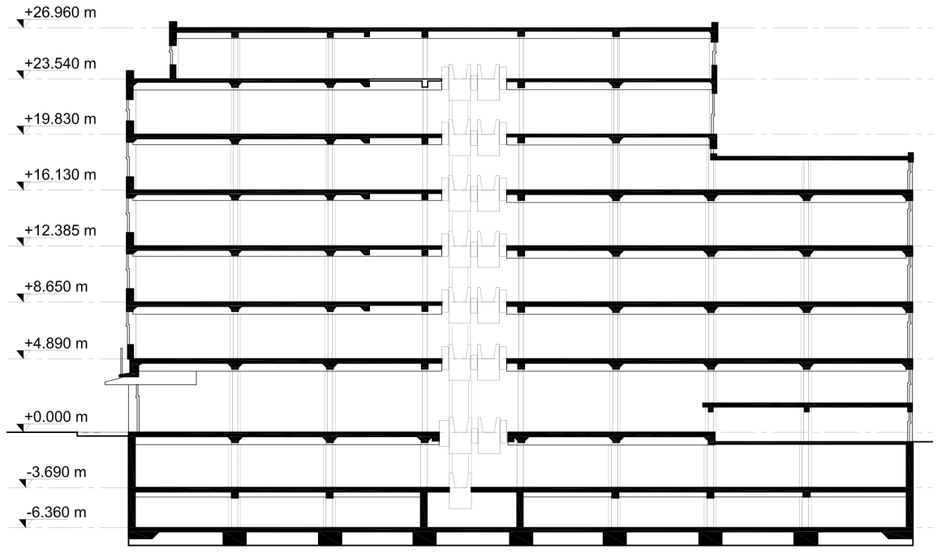
Introduction

Retrieved from V&D.nl. https://www.vd.nl/cultureel-erfgoed.html
Retrieved from pinterest.com. https://nl.pinterest.com/pin/259097784782780777/

Introduction

Retrieved from Omroep Brabant (2016). https://www.omroepbrabant.nl/nieuws/2404387/oud-vders-hebben-jaar-na-faillissement-draad-weer-opgepakt-ik-viel-in-een-diep-gat

Introduction



Large volume of building in Haarlem

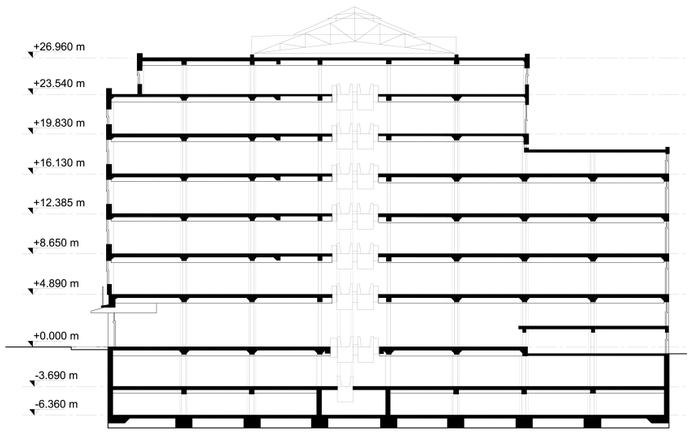
Representative fragment of facade Haarlem

Collective and Personal research

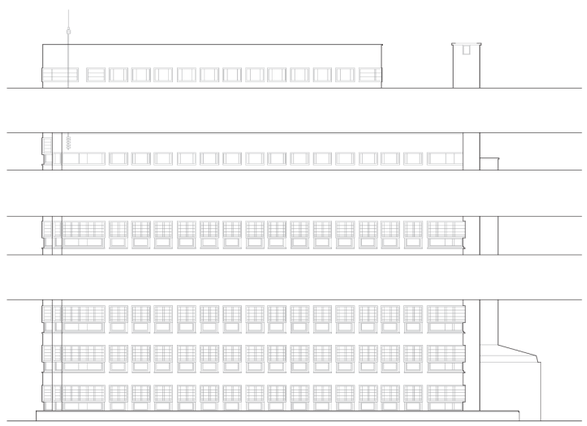
Collective SBT research

City scale: configuration desity

Urban block scale: configuration roofs



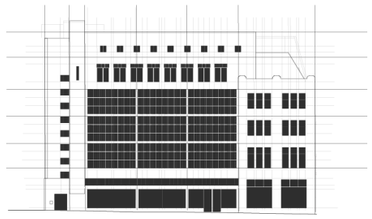
Building object scale: configuration



Facade&roof scale: composition

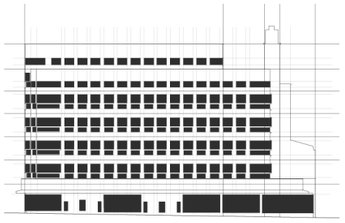
Drawings made by SBT research groups (2020).

Collective SBT research

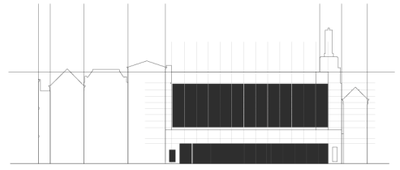


AMSTERDAM

ALKMAAR

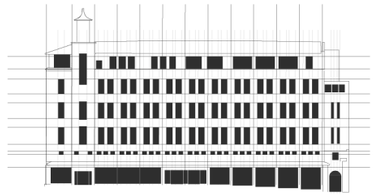


HAARLEM



DORDRECHT

MAASTRICHT



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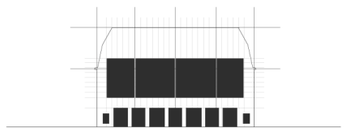
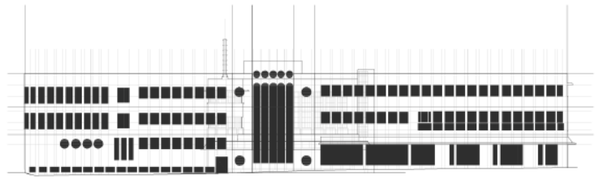


AMERSFOORT

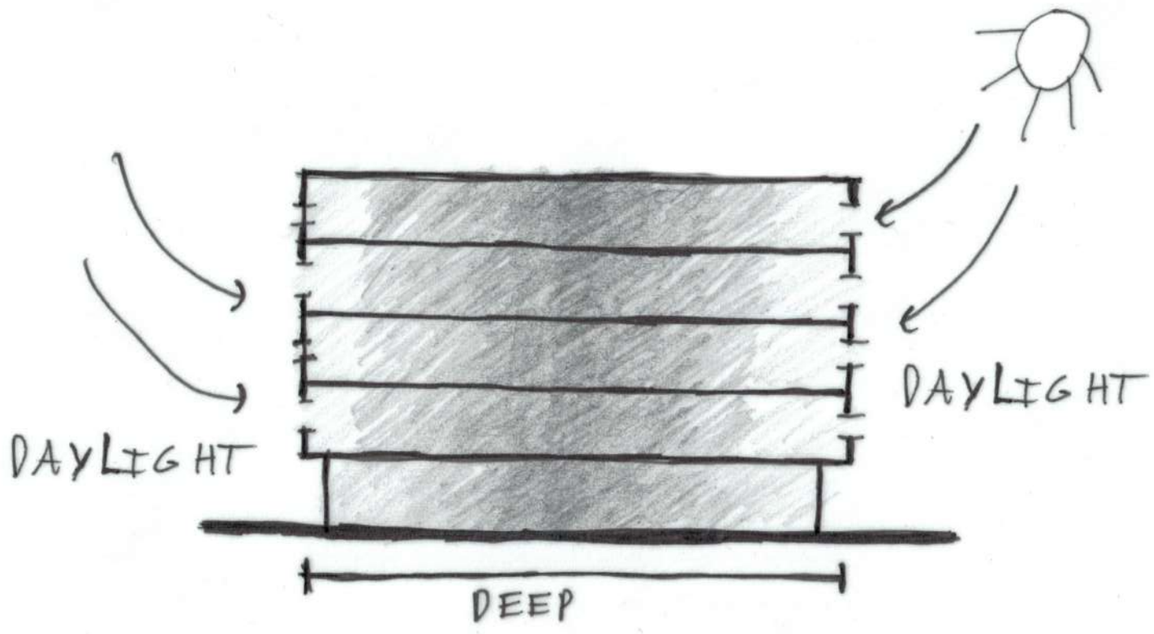


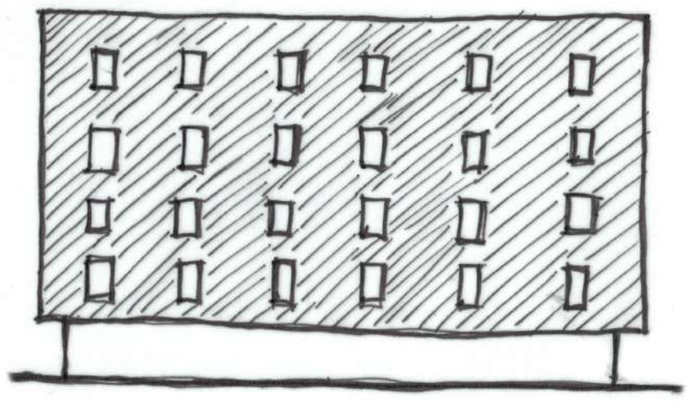
ENSCHEDE

Comparison of composition of main facades

Drawings made by SBT research groups (2020).

Personal research topic





LARGE CLOSED FAÇADE

Research question

What role does the ingress of daylight into a building play in the perception of the building and how does daylight ingress influence the possibilities for the transformation of a former V&D department store in a re-use?

Subquestions

1. How is the perception of a space influenced by daylight ingress and what role does the quality and quantity of daylight play in this?

2. How is daylighting in the eight former department stores now and how could daylight ingress be adjusted (increased or reduced) in the chosen location for the redesign?

Research results: daylight & perception

Schadow and daylight

‘‘To create effect of openness, you should employ diffuse light, not concentrated light. Diffuse light casts soft shadows, while direct light casts sharp shadows. Concentrated light shows the textures and form best.’’
(Rasmussen, 1959)
(Baker & Steemers, 2002)

Reflection and texture

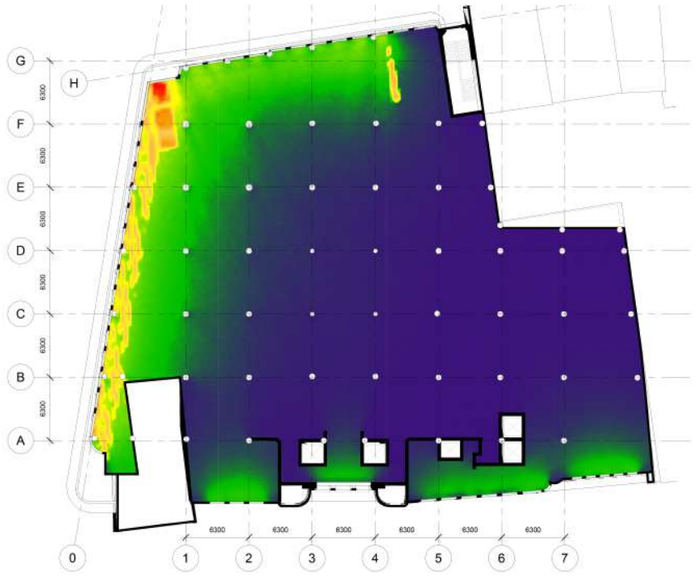
‘‘Surface textures affect the direction of reflected light, matte surfaces reflect light in all directions (surface will appear more bright when perceiving it) and specular surfaces reflect light in one direction only.’’ (Moore, 1985)
(Descottes & Ramos, 2011)

Concept of figure-background

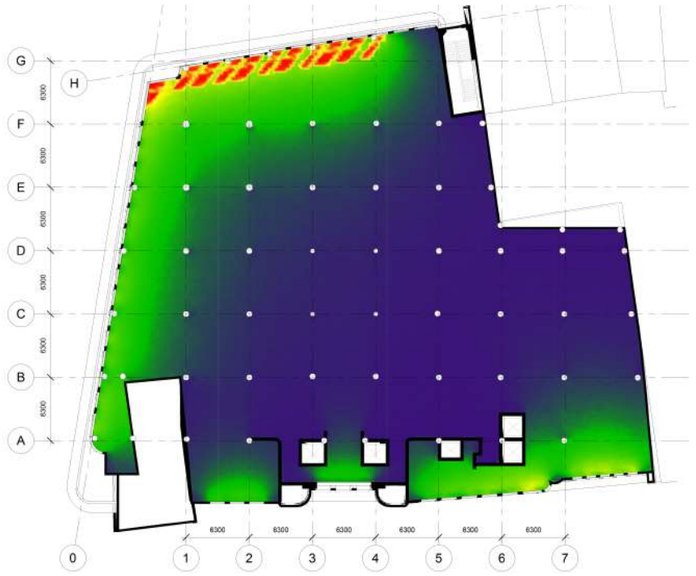
‘‘Figure objects attract our attention automatically when they are bright, are of high contrast or emphasize the absence of an expected element.’’
(Lam, 1977)

Baker, N. & Steemers, K. (2002). *Daylight design of buildings.* James & James.
Rasmussen, S. E. (1959). *Experiencing Architecture.* MIT Press.
Descottes, H. & Ramos, C. (2011). *Architectural Lighting: designing with light and space*. Princeton Architectural press.
Moore, F. (1985). *Concepts and practice of architectural daylighting.* Van Nostrand Reinhold.
Lam, W. (1977). *Perception and lighting as formgivers for architecture*. McGraw-Hill.

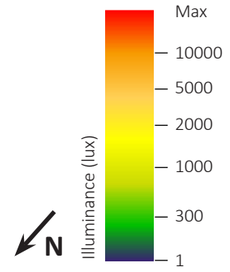
Research results: daylight simulation

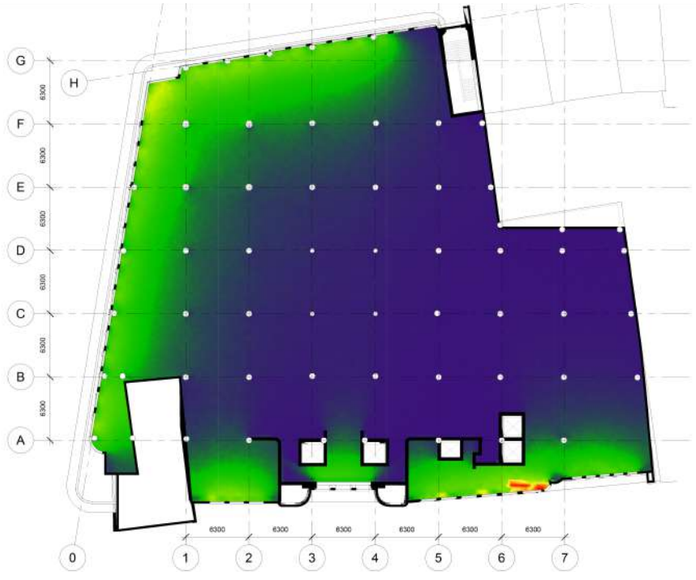


Daylight analysis 9:00 | 21-03-19 (1st floor)

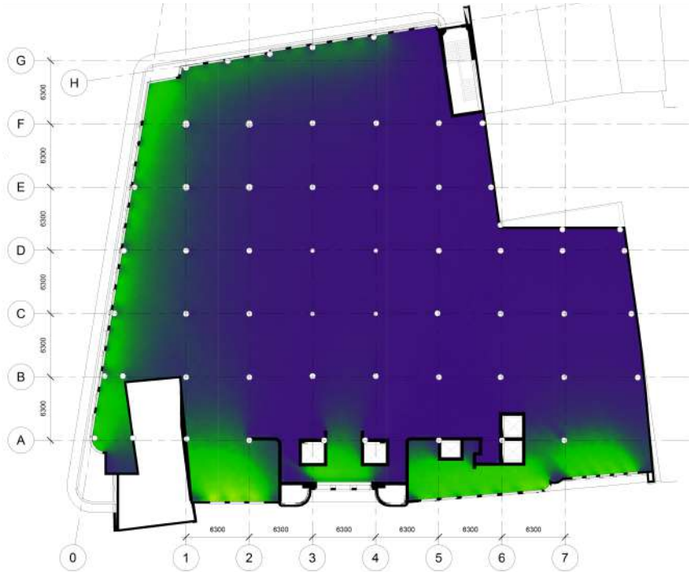


Daylight analysis 12:00 | 21-03-19 (1st floor)





Daylight analysis 15:00 | 21-03-19 (1st floor)



Daylight analysis 18:00 | 21-03-19 (1st floor)

Drawings are made with the program Revit and the insight plugin.

Research results: daylight simulation

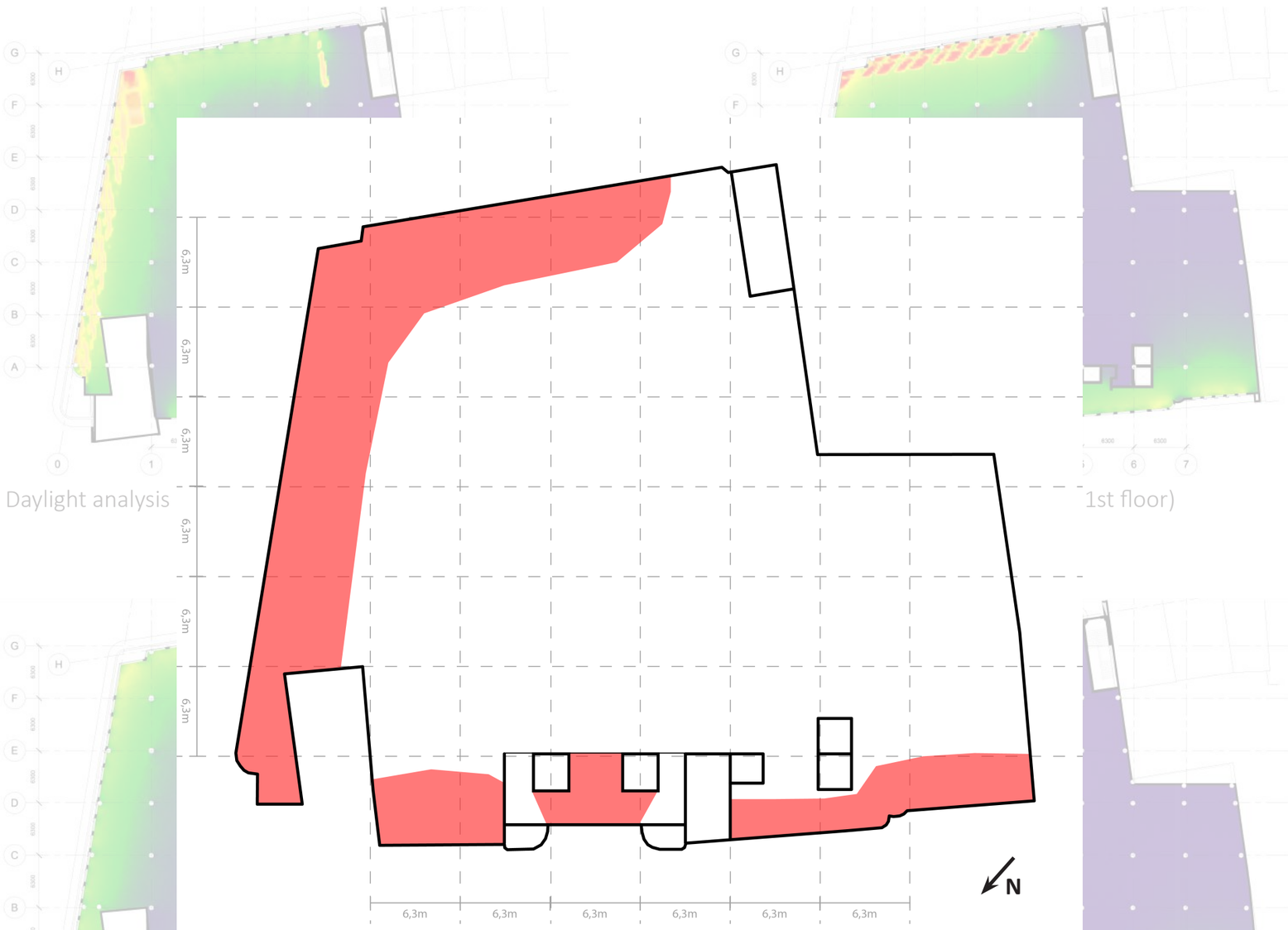
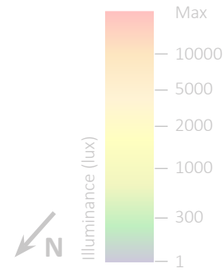


Diagram of generalised area of useable daylight ingress



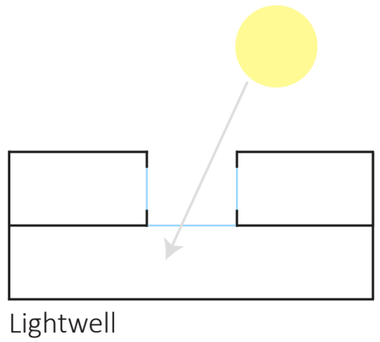
Daylight analysis 15:00 | 21-03-19 (1st floor)

Daylight analysis 18:00 | 21-03-19 (1st floor)

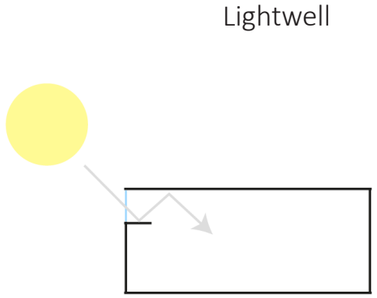
Drawings are made with the program Revit and the insight plugin.

Research results: daylight adjusting measures

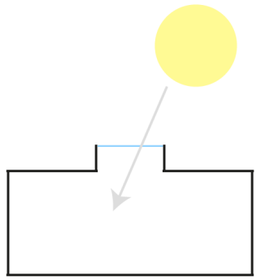
Daylight increasing measures



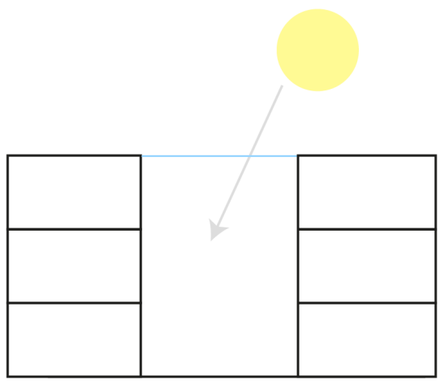
Lightwell



Lightshelf

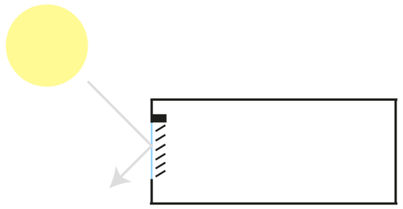


Built up rooflight

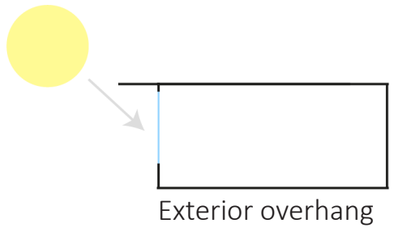


Atrium & Skylight

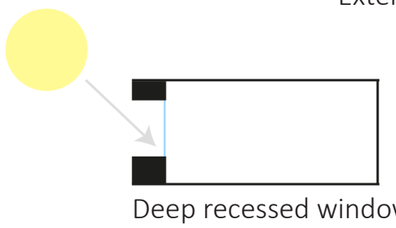
Daylight reducing measures



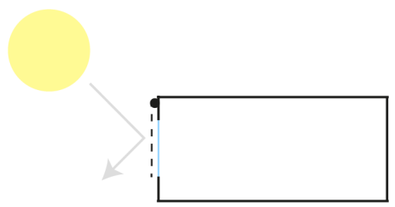
Interior blinds



Exterior overhang



Deep recessed window



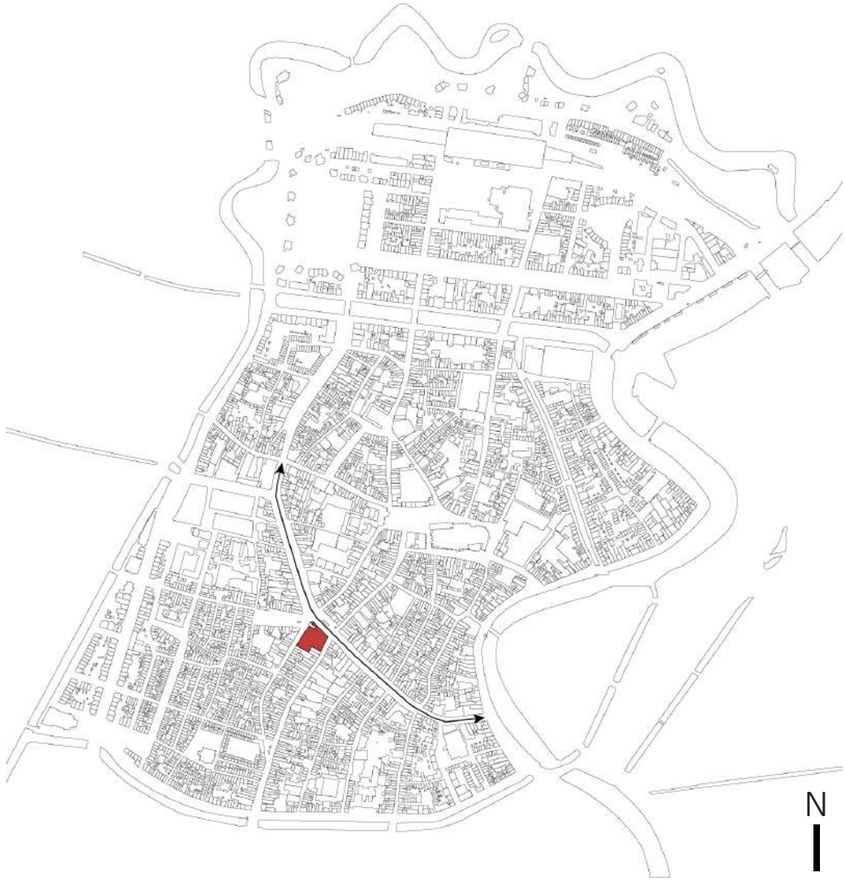
Reflective screen

Baker, N. & Steemers, K. (2002). *Daylight design of buildings*. James & James.
Barret, R. (2008). *Natural lighting of deep architectural space: the perception of New Zealand architects. International Journal of Architectural Research (Archnet-IJAR), 2(2), 103-124.*
Steffy, G. (1990). *Architectural lighting design*. Van Nostrand Reinhold.

Analysis and Values

The redesign location

Original V&D building in Haarlem



Location building in Haarlem

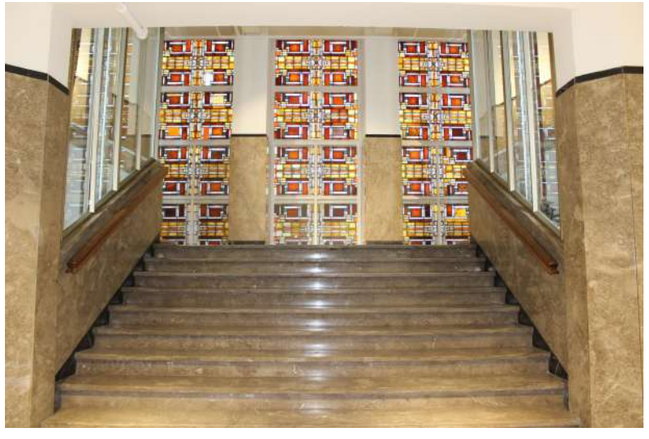
Noord-hollands archief. (2020). Beeldbank Vroom&Dreesmann Haarlem. Retrieved from https://noord-hollandsarchief.nl/beelden/beeldbank

The redesign location

The V&D building today

Model of landmark position

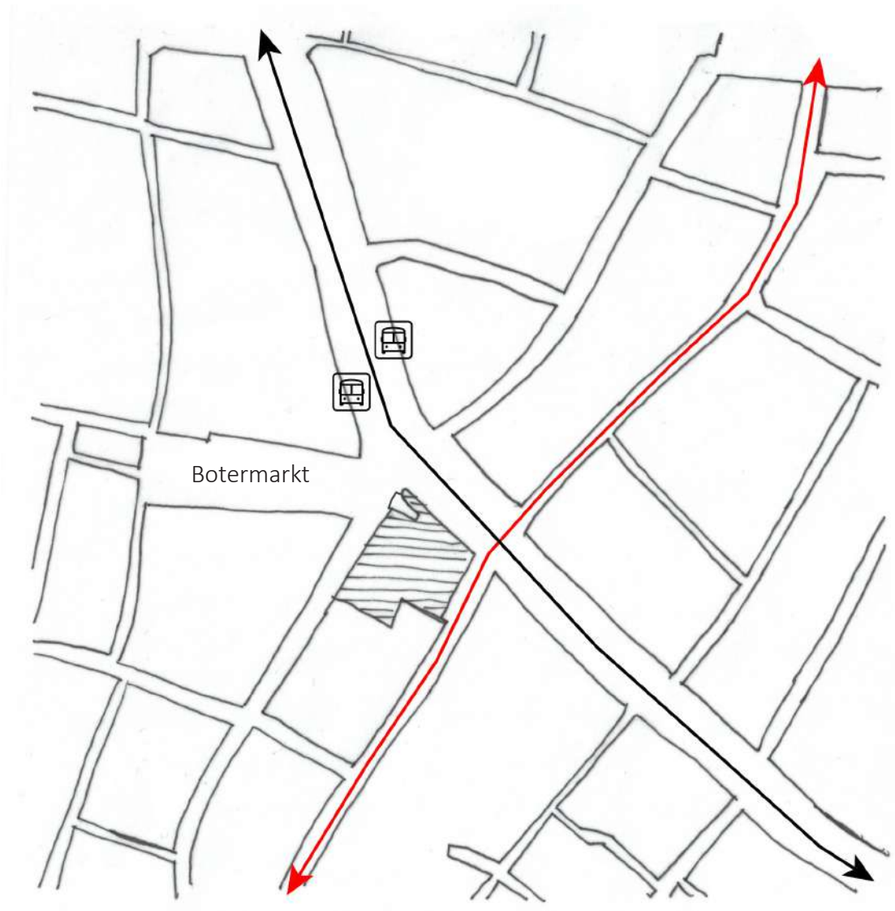
Materialisation and windows facade

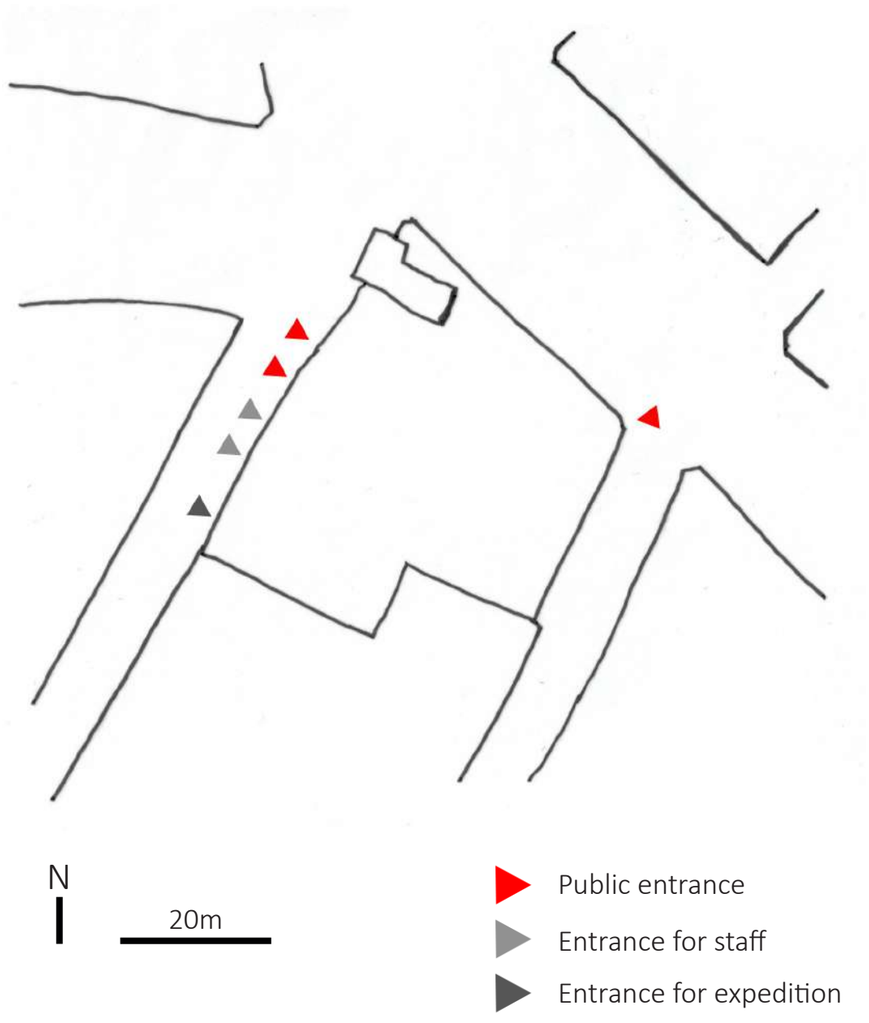


Monumental staircase

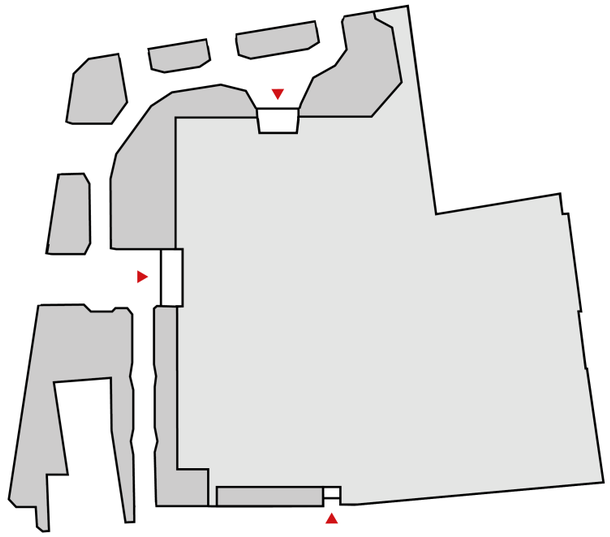
Model made in Q1 as result of essence assignment. (2020)

Spatial analysis: accessibility

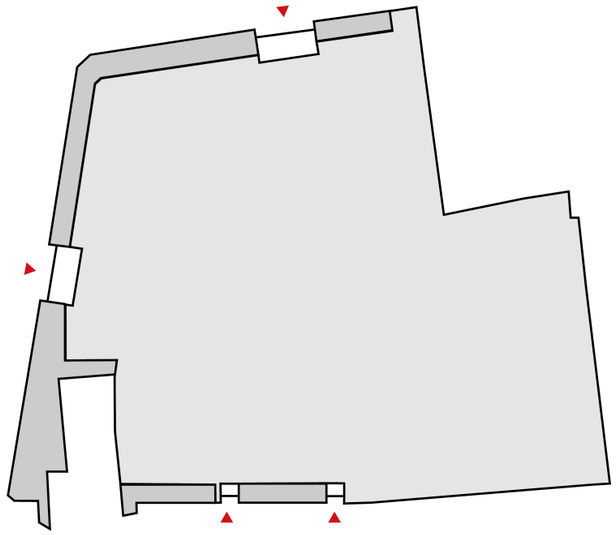




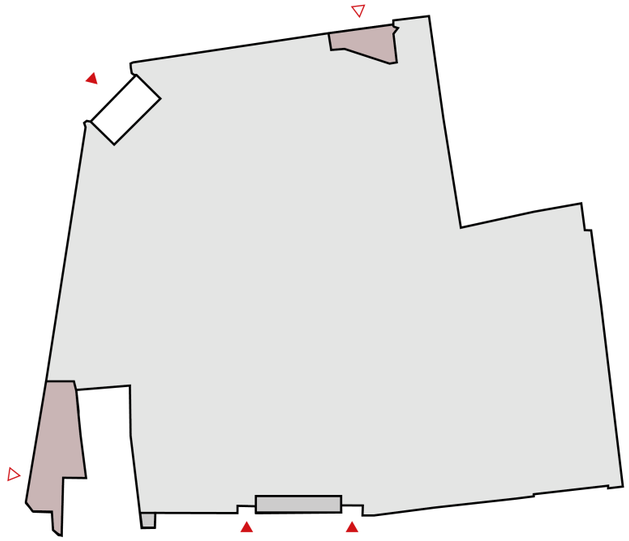
Historical analysis: interventions ground floor



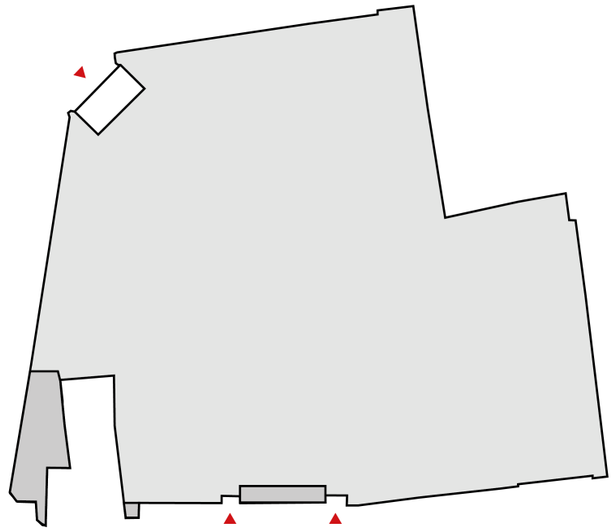
1931



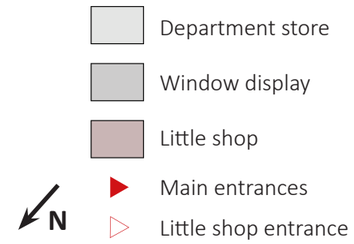
1967



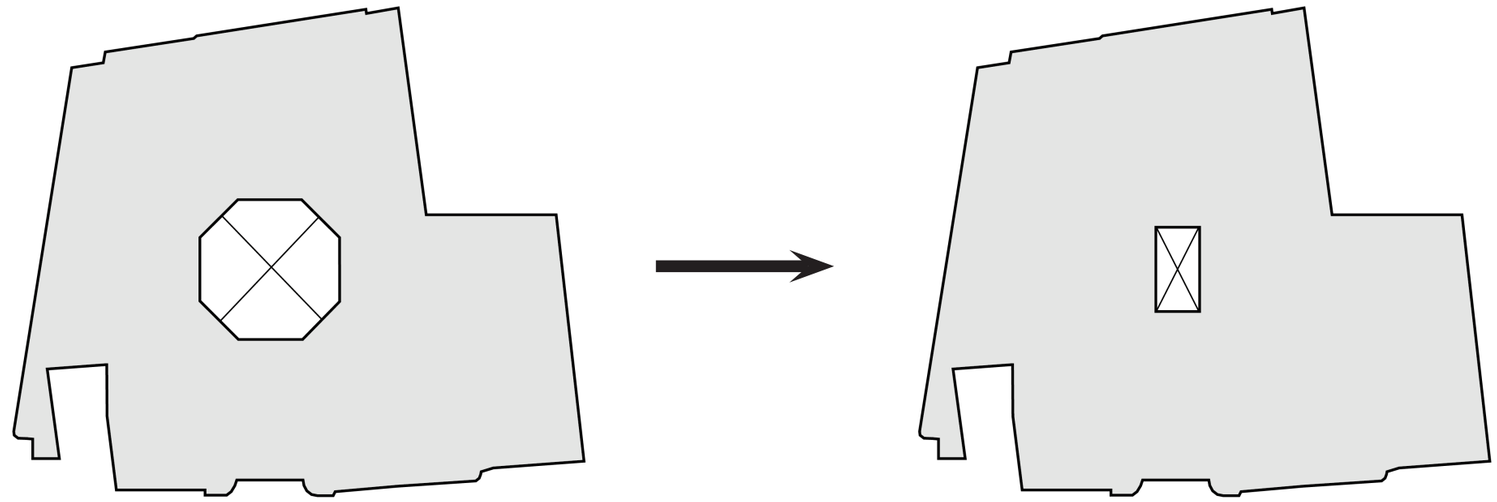
1997



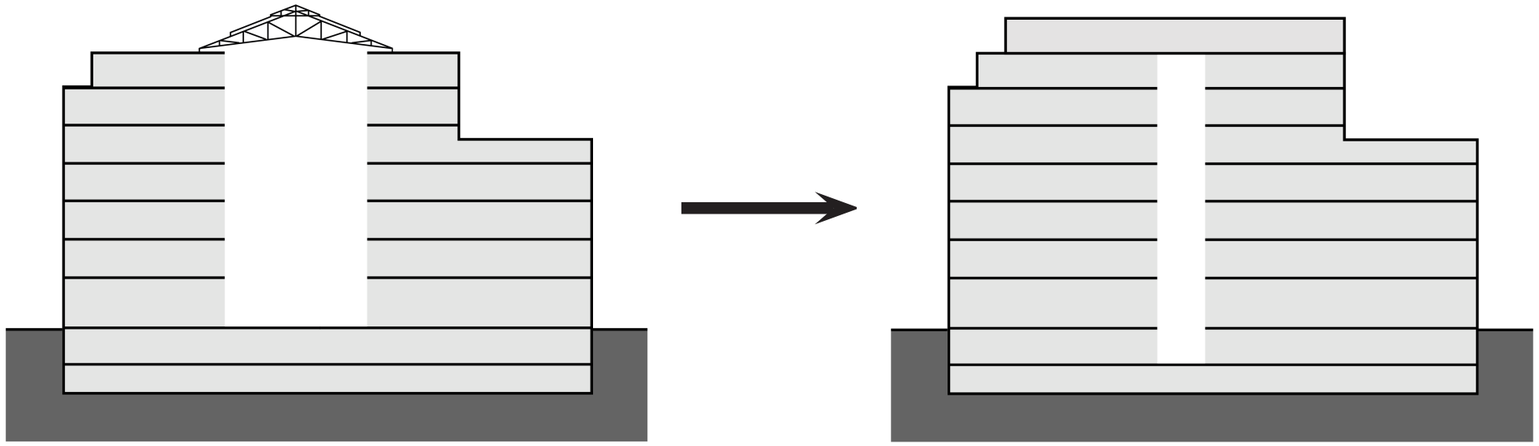
2021



Historical analysis: interventions atrium & skylight

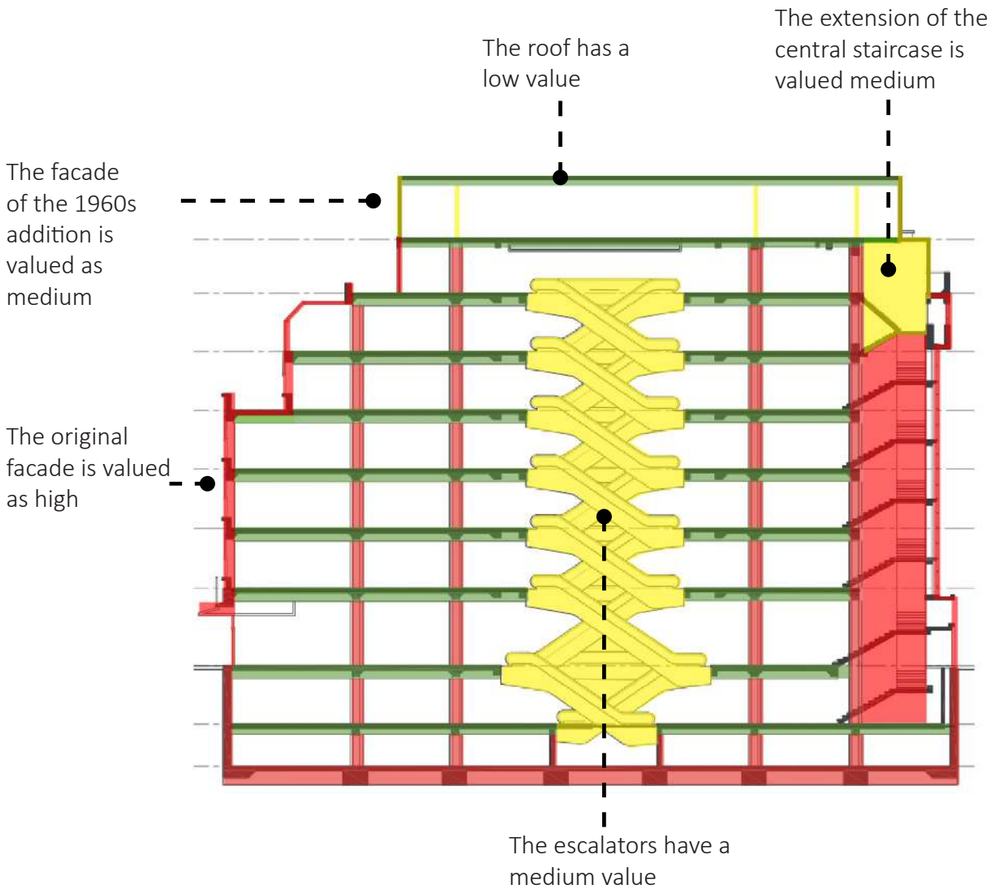


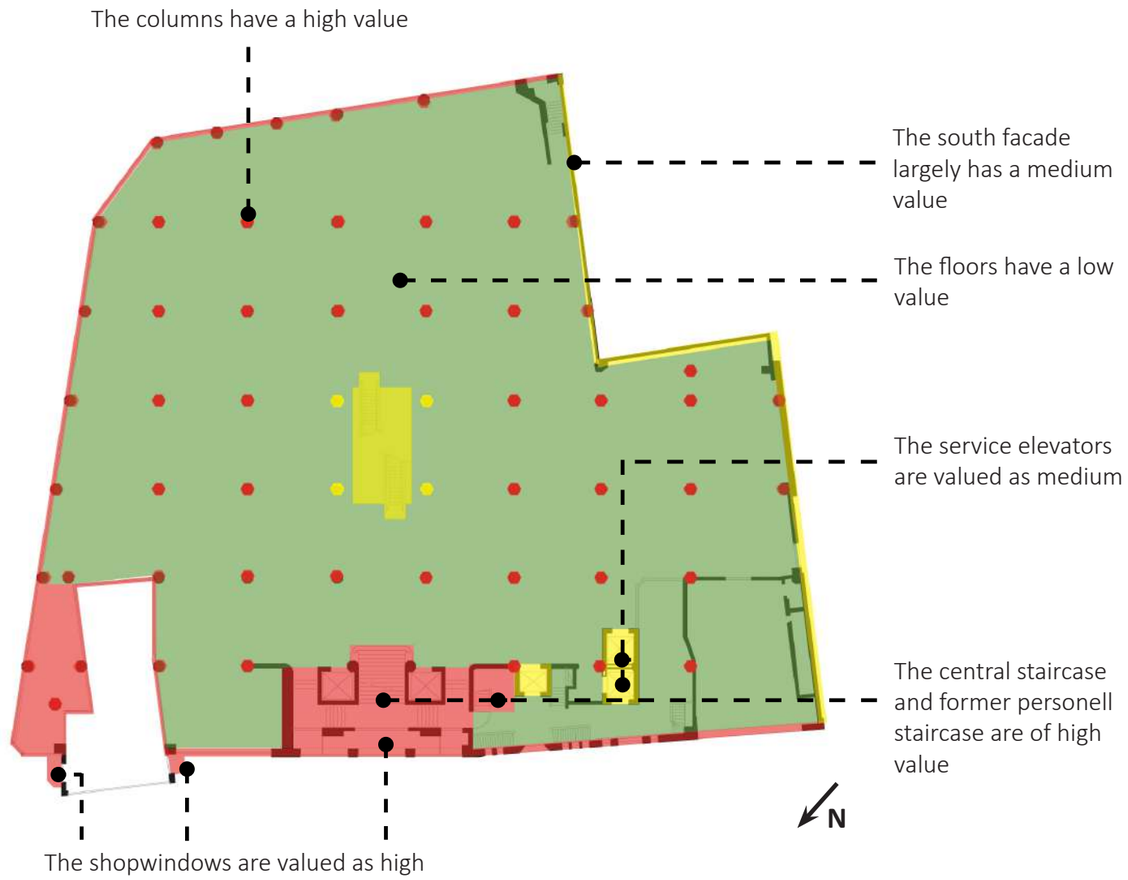
1933 1966



1933 1966

Value-assessment

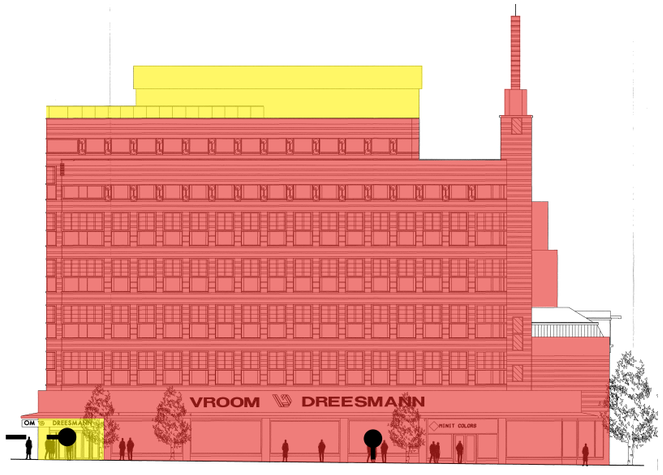




High value
Medium value
Low value

Value-assessment

The original facades are valued as high

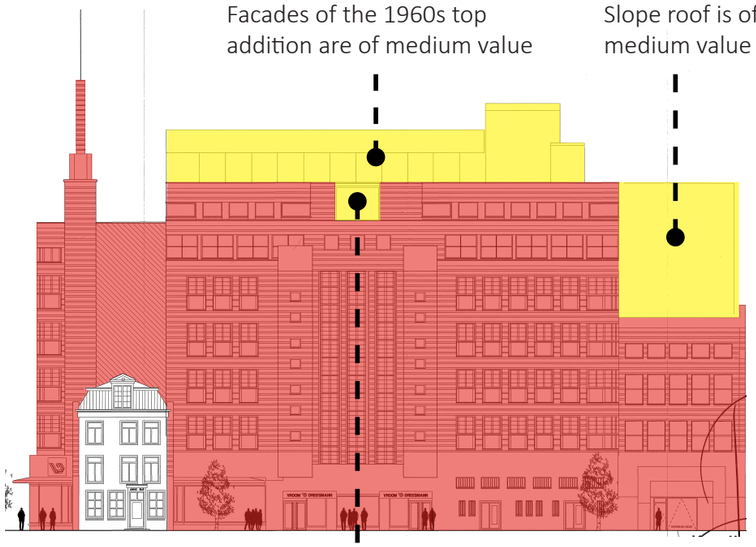


The position of the current main entrance is of medium value

The transparant plinth is valued high

Facades of the 1960s top addition are of medium value

Slope roof is of medium value



The facade of the extension of the central staircase is valued medium

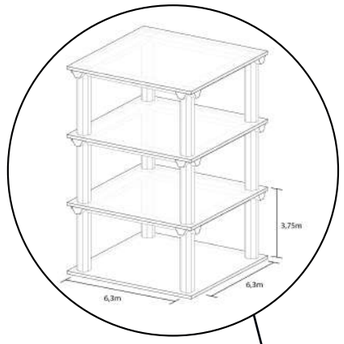
The south facade is valued as medium

High value

Medium value

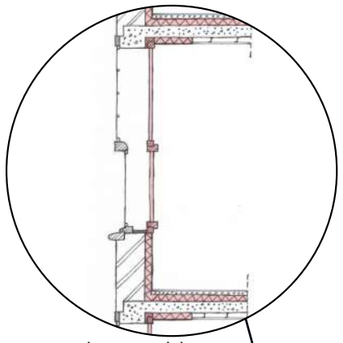
Low value

Heritage approach

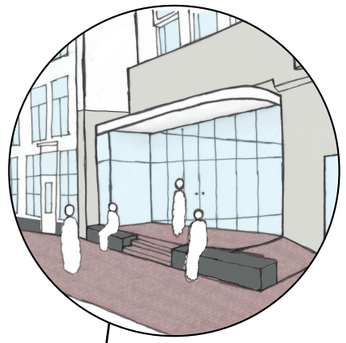


Structure

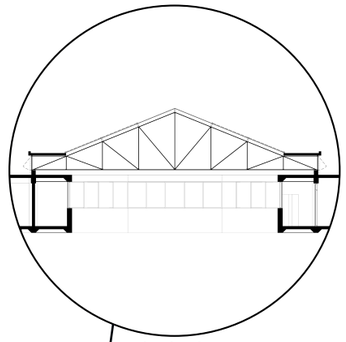
Facade



Thermal layer



Entrances

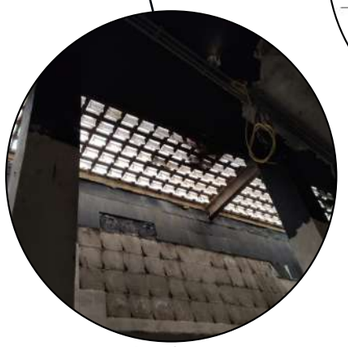


Skylight

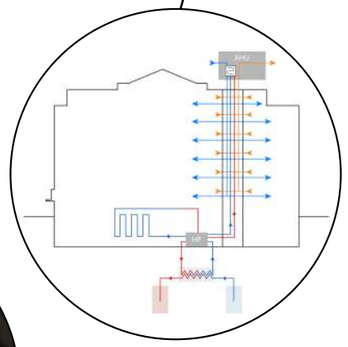
Preservation	Restoration	Renovation	Intervention	Redesign

Main staircase

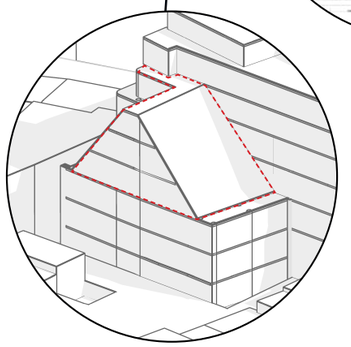
Staircase



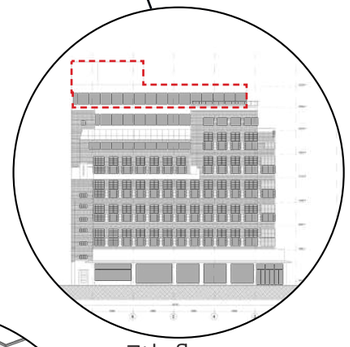
Cuckoo



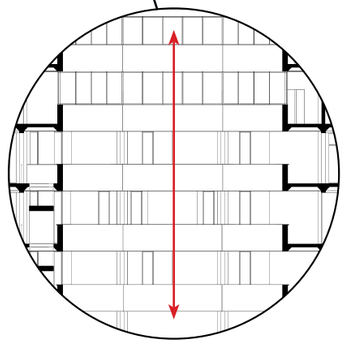
Installations



Slope roof

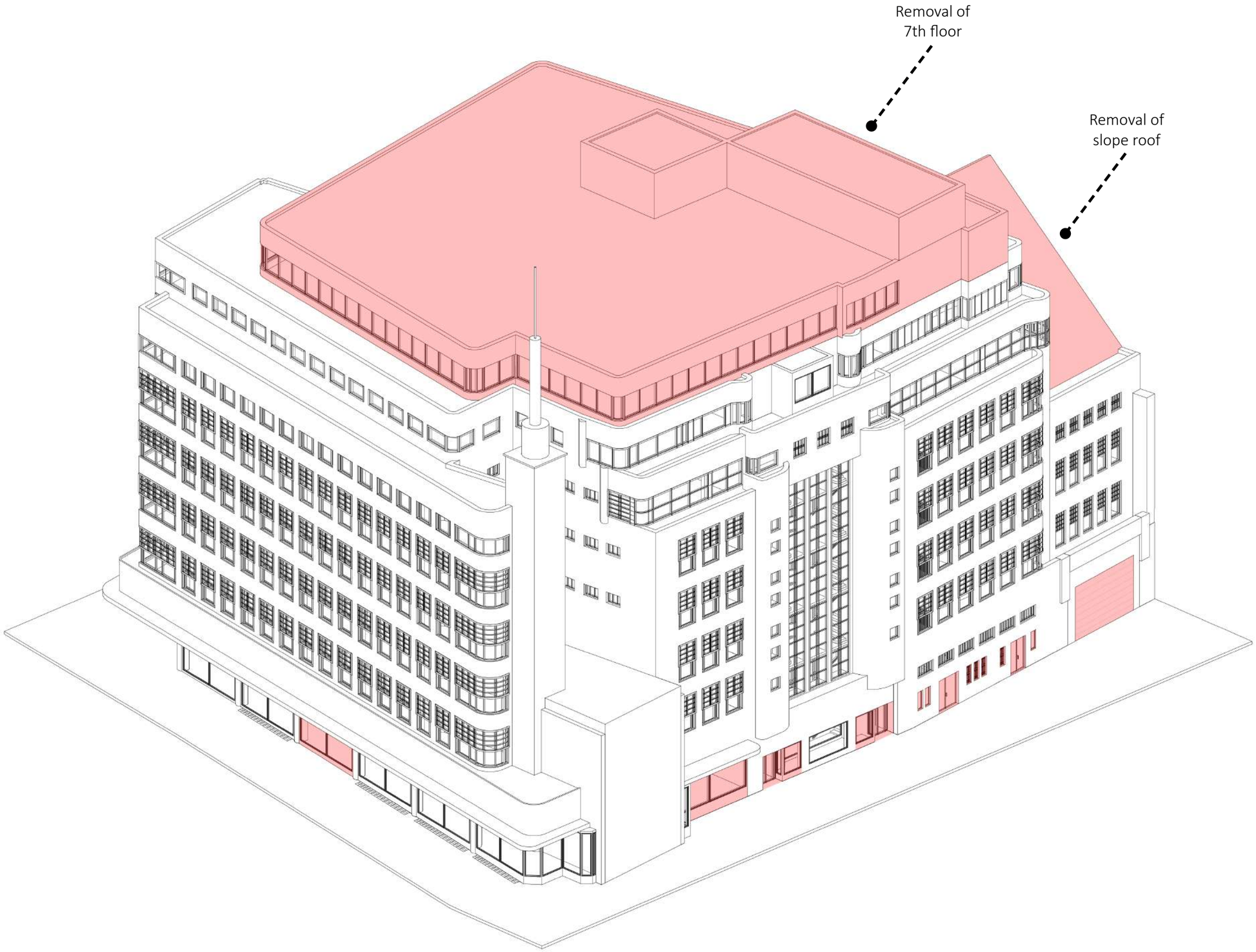


7th floor



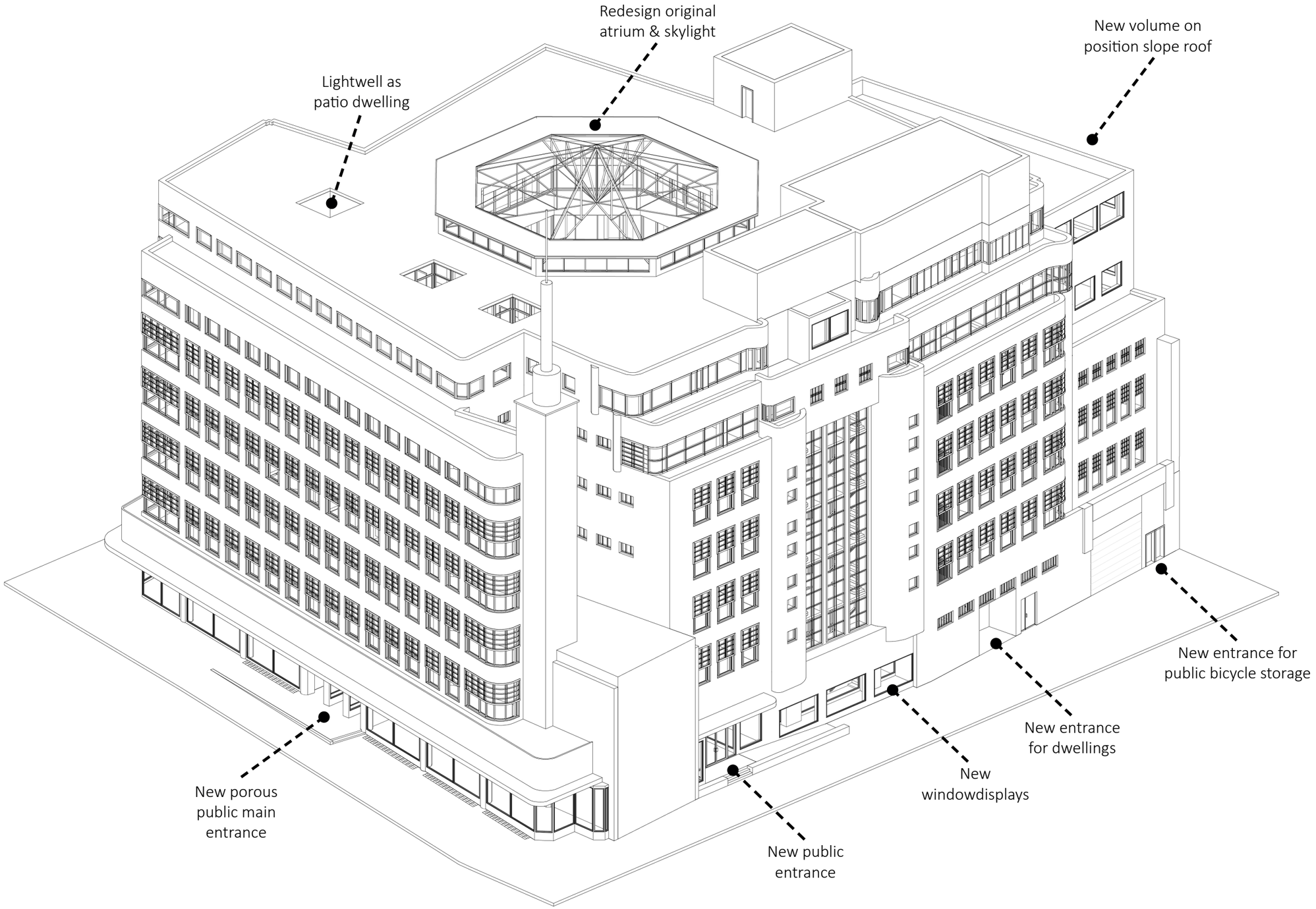
Atrium

Transformation framework



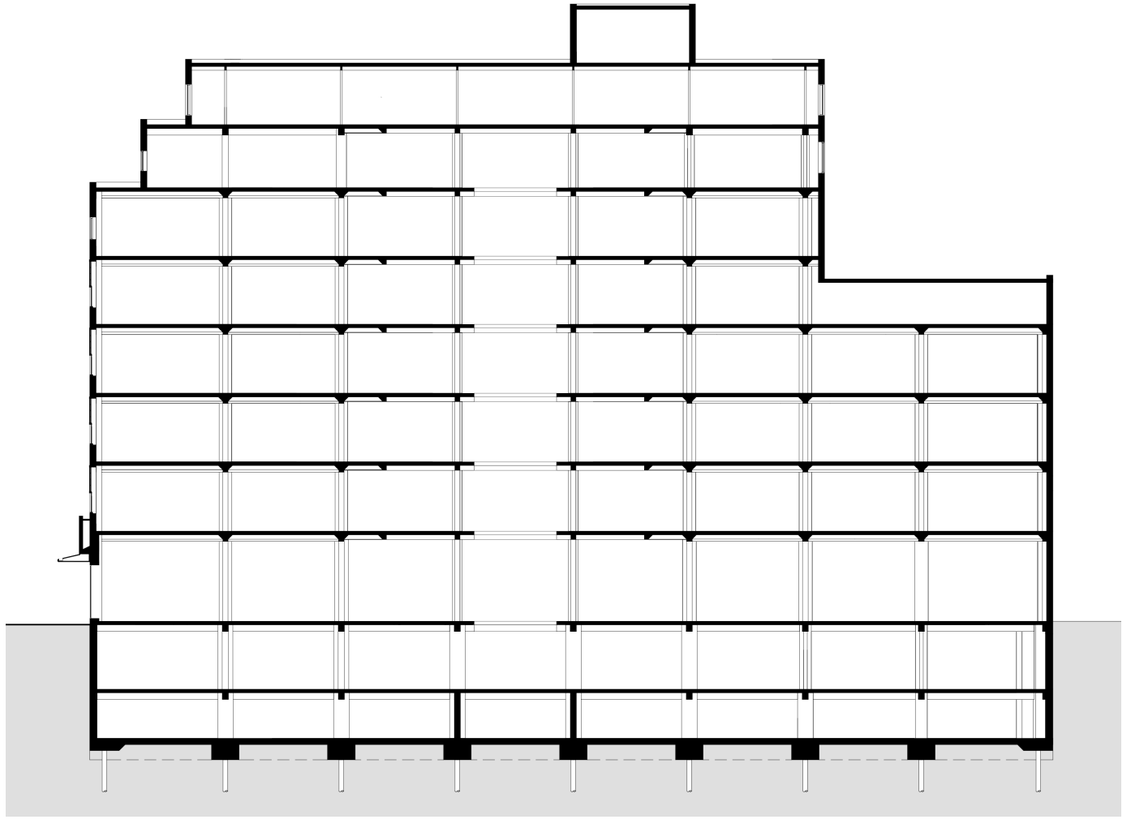
Existing situation with demolition

Transformation framework

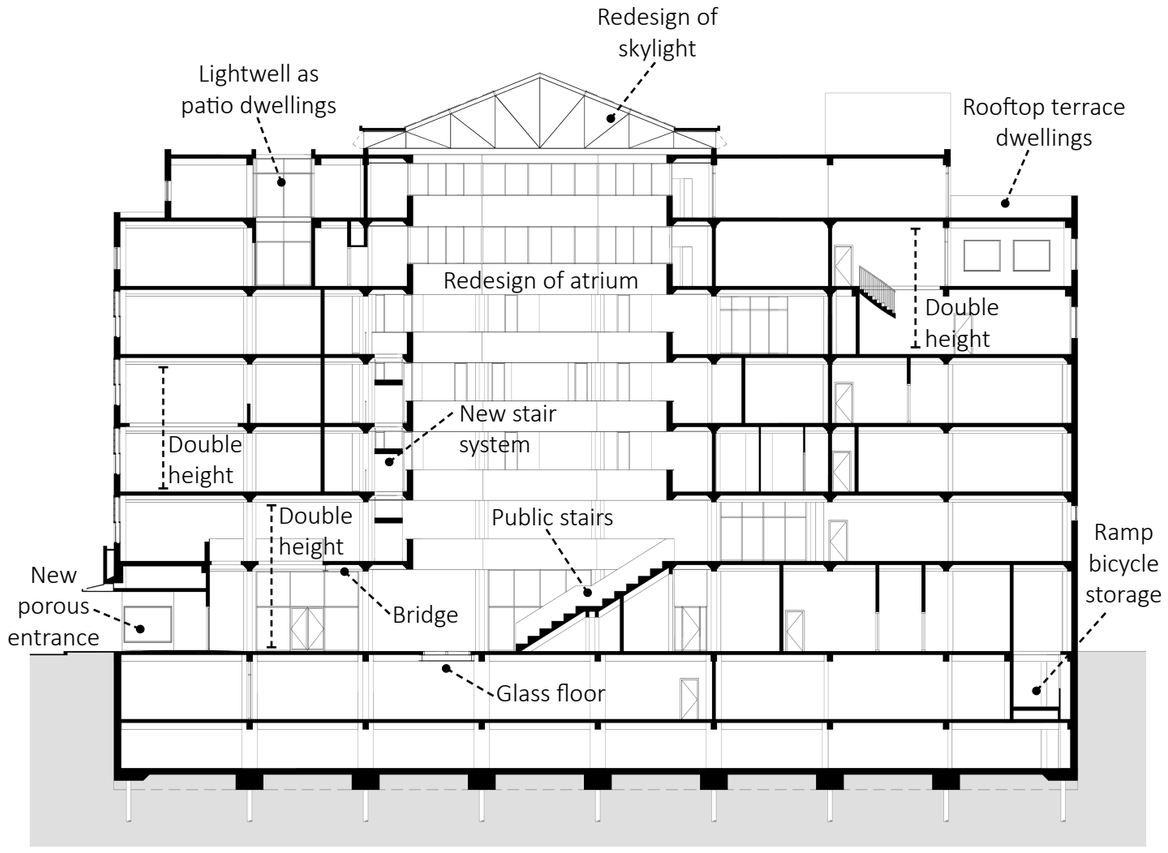


New situation with interventions

Transformation framework



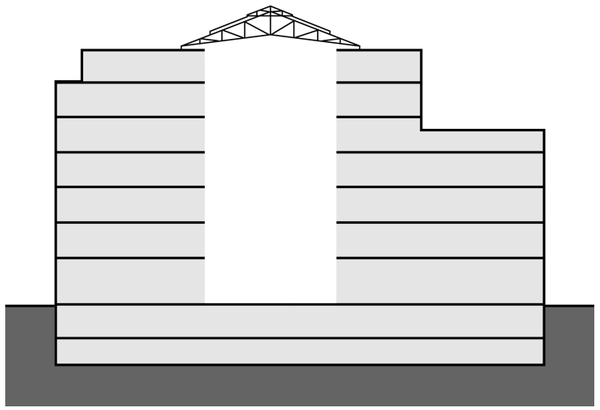
Existing situation



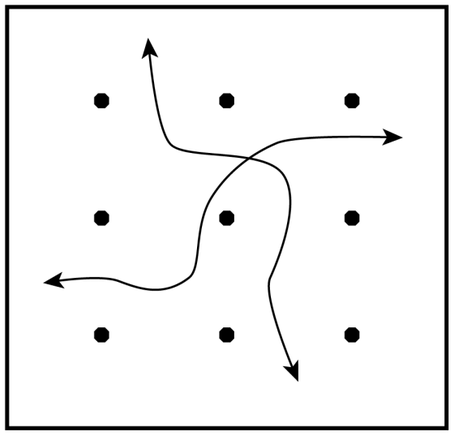
New situation with interventions

Program & Design

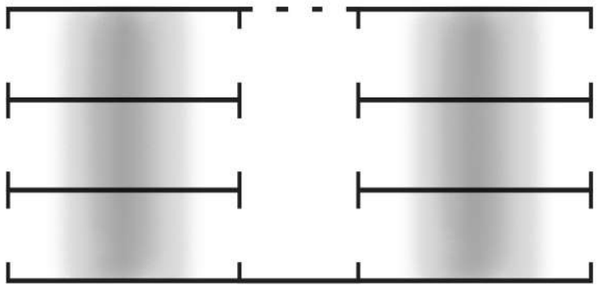
Design starting points



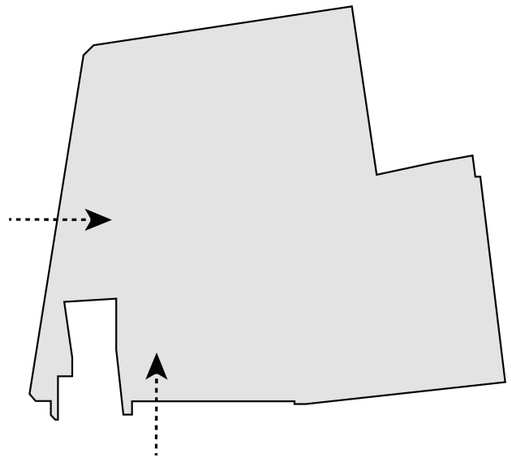
1. Retrieve the original atrium and put it at the centre of the building



2. Keep the open space plan as much as possible



3. Make variation in lighter and darker spaces to influence the perception (based on design goal)



4. Create new entrances to connect with all surroundings and make building easily accessible

Bibliotheek is veel meer dan boeken uitlenen

De tijd dat een bibliotheek een stil opslagpunt voor meterslange rijen boeken was en alleen bezocht werd om boeken te retourneren of te lenen, is voorgoed voorbij.

Redactie 23-05-17, 12:14 Laatste update: 23-05-17, 12:15

https://www.ad.nl/zoetermeer/bibliotheek-is-veel-meer-dan-boeken-uitlenen~aa2d55b6/

Nieuwe huiskamer in bibliotheek in Haarlem-Schalkwijk moet ontmoetingsplek worden voor wijkbewoners

Judy Nihof 02/11/2019 om 17:25

Het moet hét ontmoetingspunt worden van Haarlem-Schalkwijk. De bibliotheek in die wijk krijgt vanaf volgend jaar een huiskamer waar wijkbewoners, jong en oud, elkaar kunnen ontmoeten en waar ze zelf activiteiten kunnen organiseren.

https://www.haarlemsdagblad.nl/cnt/dmf20191102_82013985?utm_source=google&utm_medium=organic

De bibliotheek is zo'n beetje de enige plek waar je binnen kunt lopen en de hele dag kunt blijven zitten zonder dat iemand vraagt wat je wilt kopen - Dianne Timmers, Manager Bibliotheek Helmond-Peel

Twan Linders 19-05-21, 11:30 Laatste update: 19-05-21, 13:59 Bron: ED

https://www.ed.nl/helmond/van-uittrekselboeken-kopieren-tot-prentenboeken-swipen-dianne-timmers-zag-veel-veranderen-in-de-bieb~a143a71e/?referrer=https%3A%2F%2Fwww.google.com%2F

Meer studieplekken in bibliotheek Haarlem-centrum

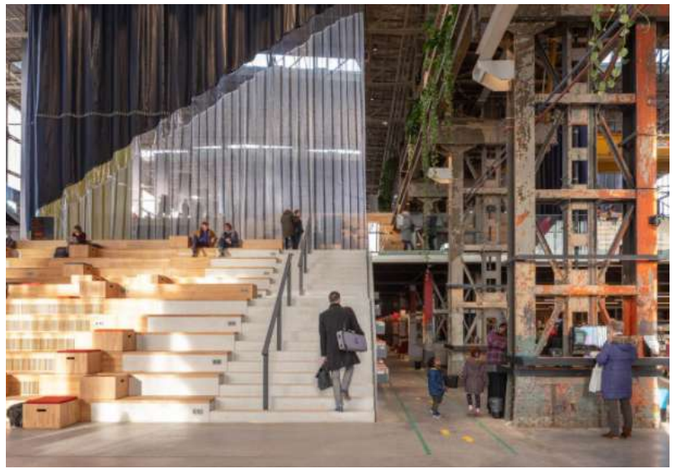
Wessel Mekking 20/04/2019 om 16:42

https://www.noordhollandsdagblad.nl/cnt/dmf20190420_25720438?utm_source=google&utm_medium=organic

Program

Martin Luther King Jr library, Mecanoo

CODA Cultuurhuis, Herman Hertzberger

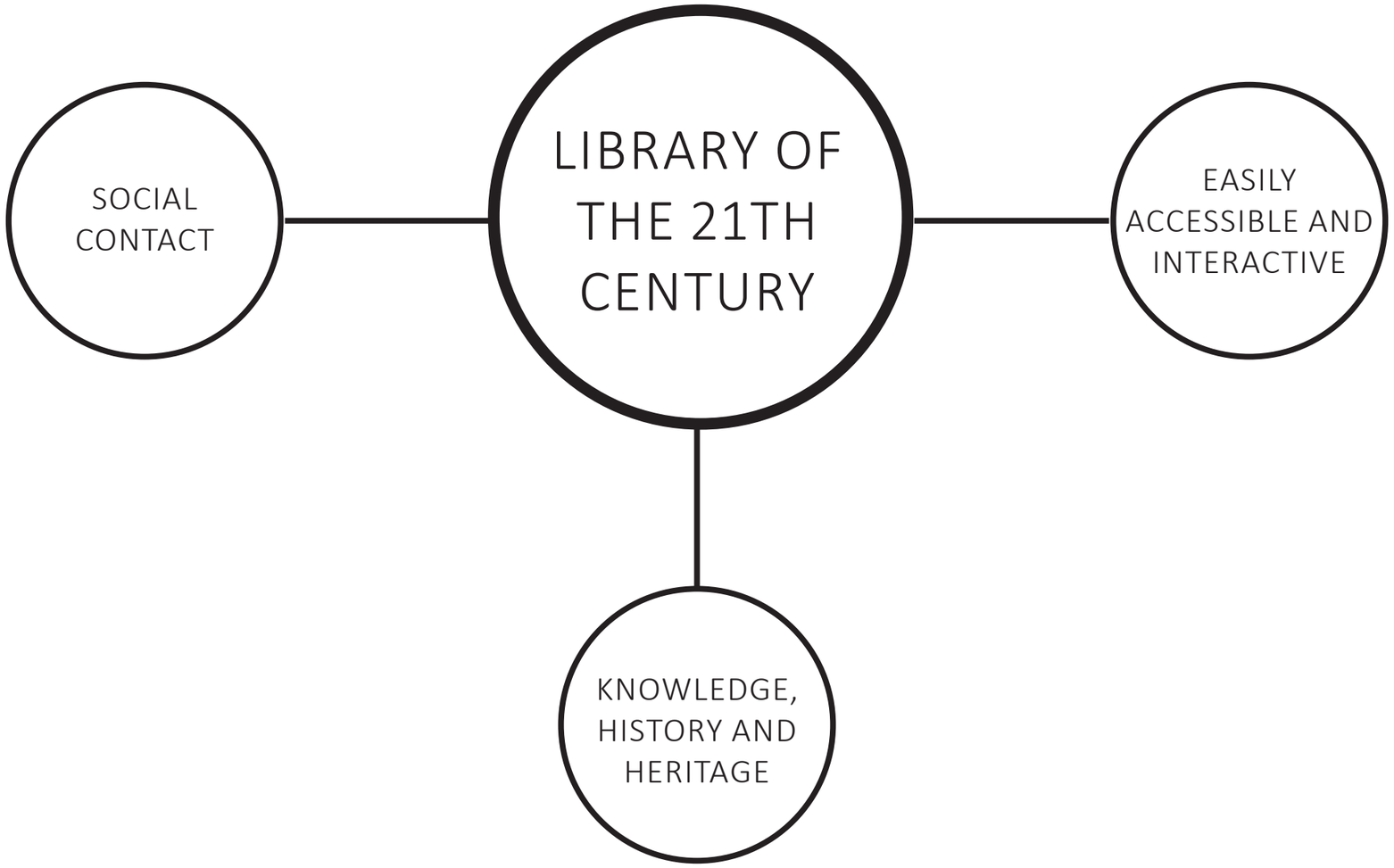


LocHal, multiple architects

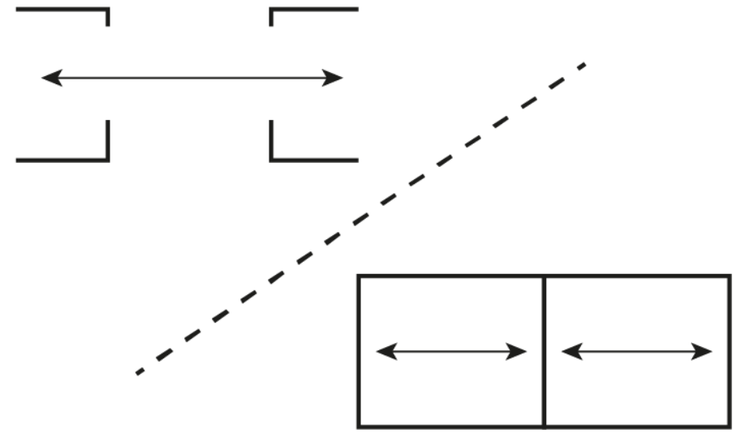
Het Forum, NL Architects

Library of congress (n.d.). https://www.loc.gov/item/2012630215/
Mecanoo (n.d.). https://www.mecanoo.nl/Projects/project/221/LocHal-Library?d=0&t=0
Van Venrooy (n.d.). https://www.vanvenrooy.nl/verduurzaming-coda-in-opdracht-van-gemeente-apeldoorn/
Omroep Groningen (n.d.) https://www.oogtv.nl/2020/03/forum-groningen-sluit-vanaf-vrijdag-de-deuren/

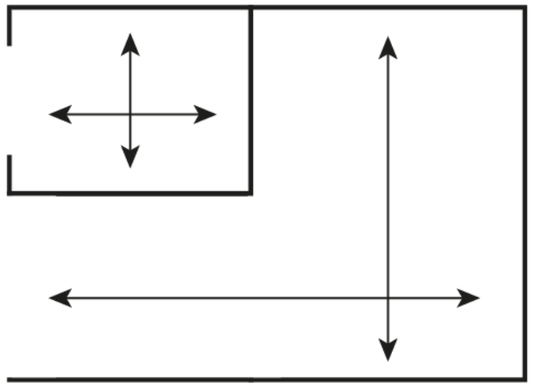
Programconcept



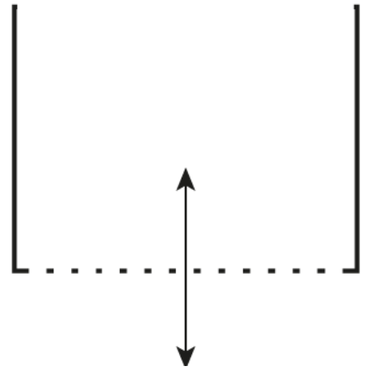
Programconcept: architectural principles



Balance in open and closed spaces



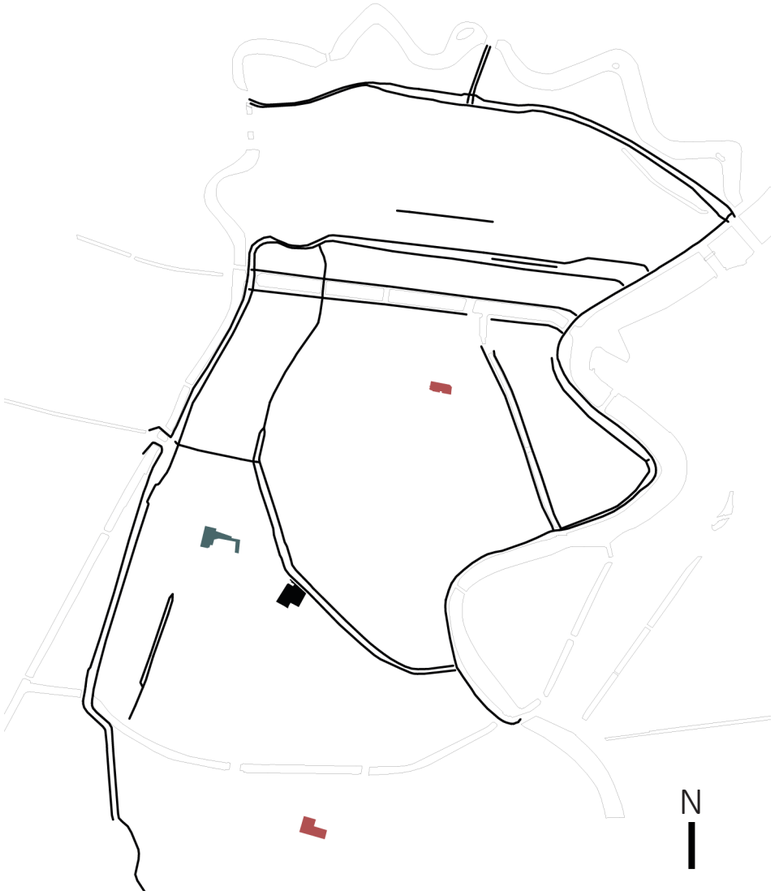
Spaces with different heights, widths and therefore daylight conditions



Porous and open entrances

Existing program in Haarlem

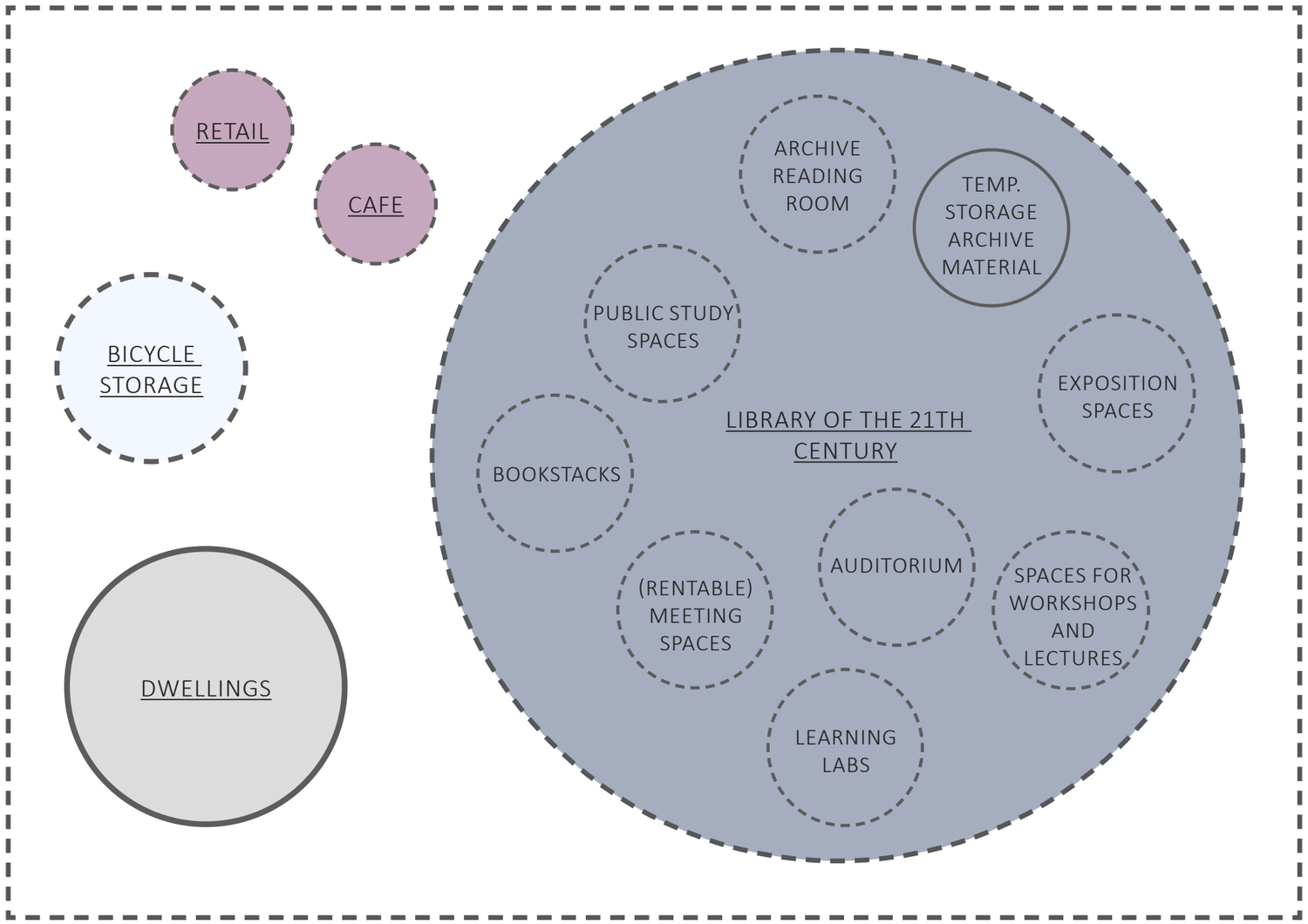
Location existing library and archive



Primary road networks i.r.t. location library and archive

Drawings are based on SBT drawings from city scale group (2020).

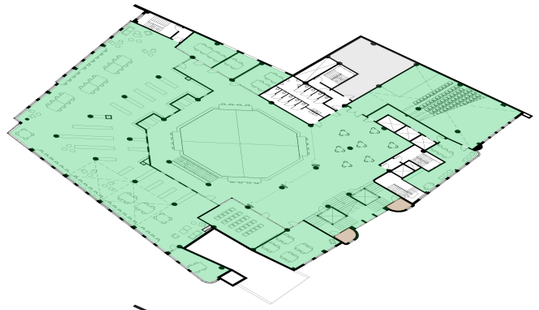
Programcomponents



THE BUILDING

Organisation program

2F



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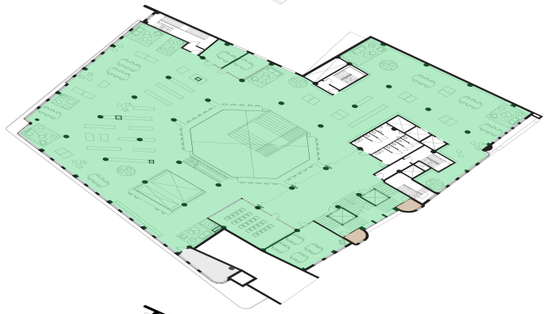
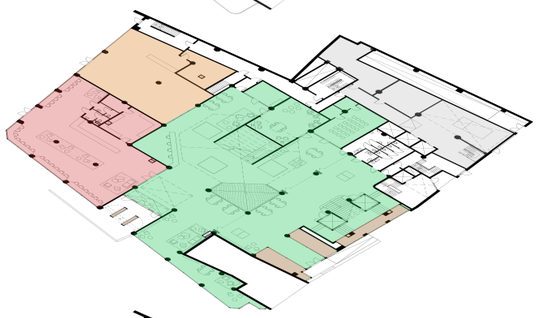
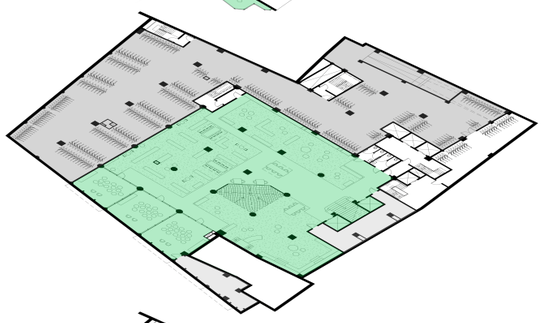


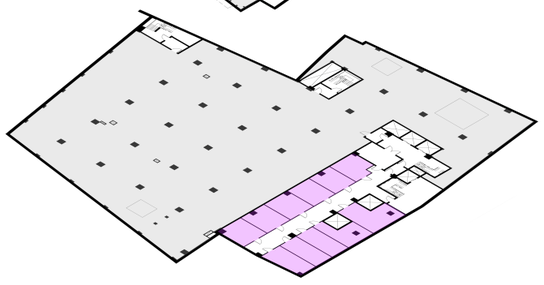
GF



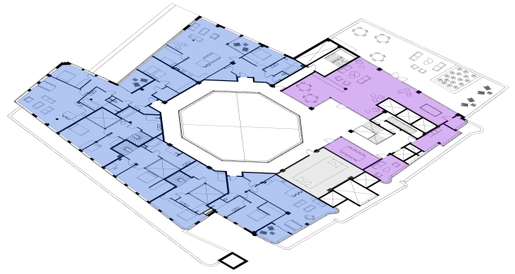
B1



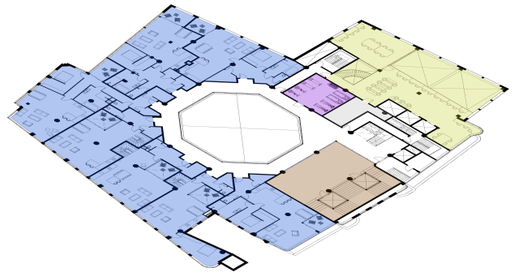
B2



6F



5F



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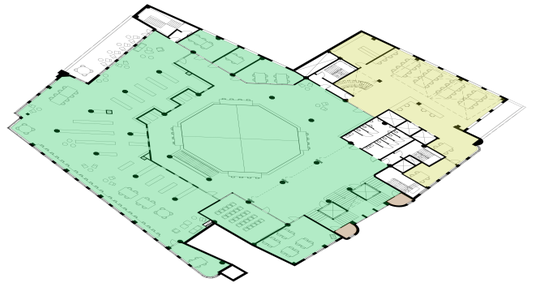

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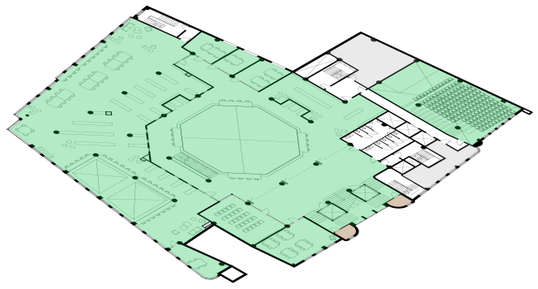


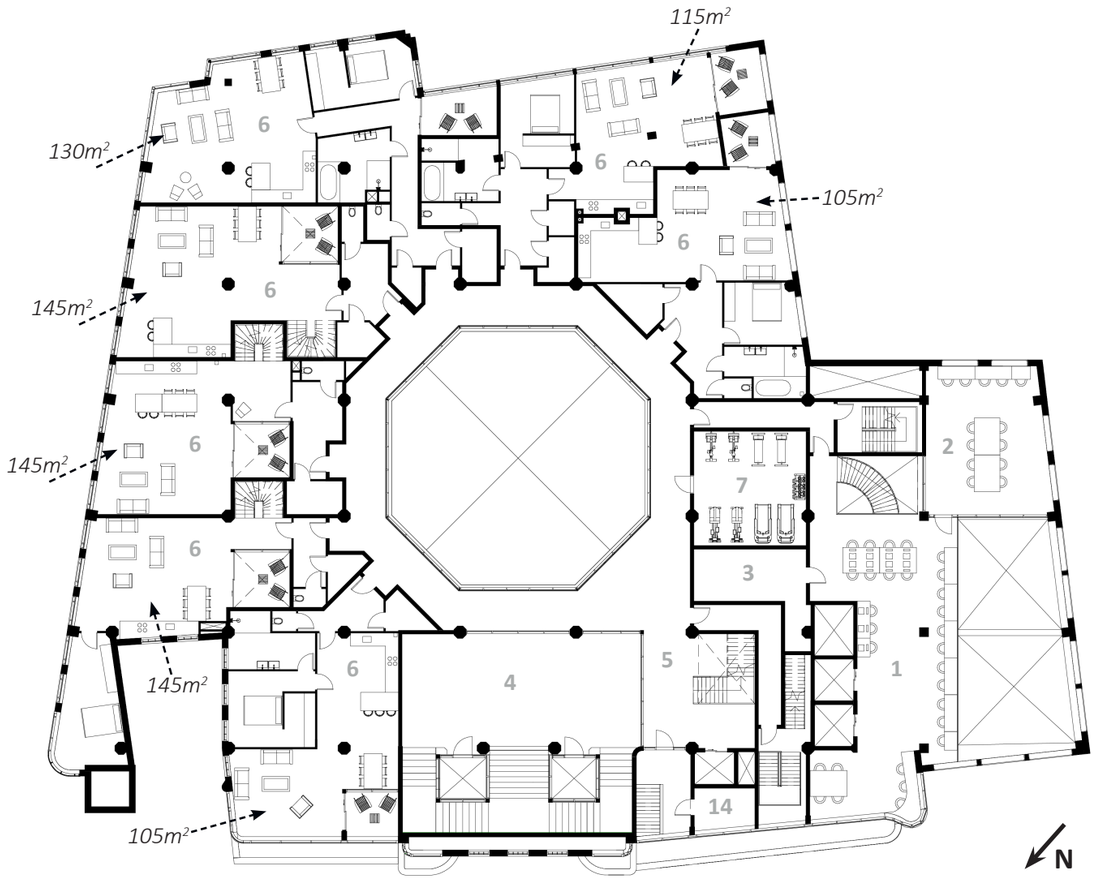
Library = 6800 m²
Archive reading room = 430 m²
Dwellings (10) + collec areas = 1400 m²
Café = 270 m²
Retail = 220 m²
Bicycle storage = 750 m² (500 places)

- Café
- Retail
- Library
- Archive reading room
- Exposition spaces
- Storage, technique & expedition
- Dwellings
- Dwellings, collective spaces
- Dwellings, external storage
- Public bicycle storage

Routing, accessibility & use (day)

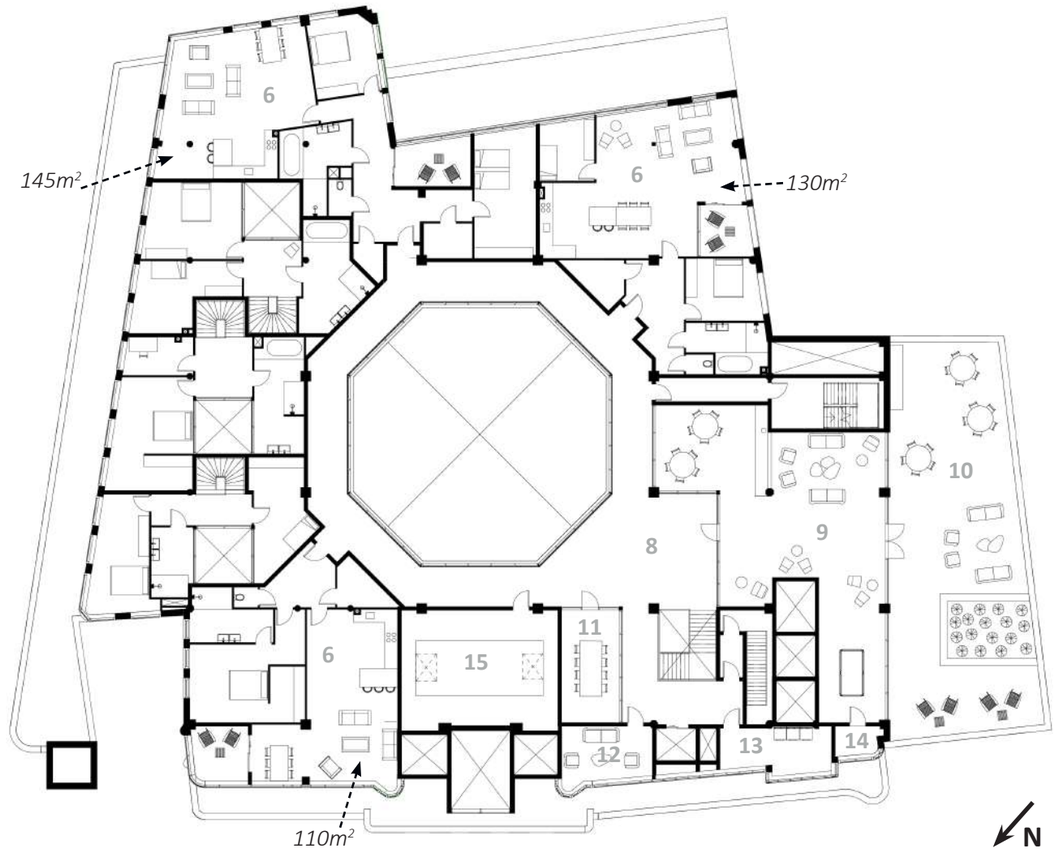
Routing, accessibility & use (evening)

Overview dwellingfloors



5th floor

6300

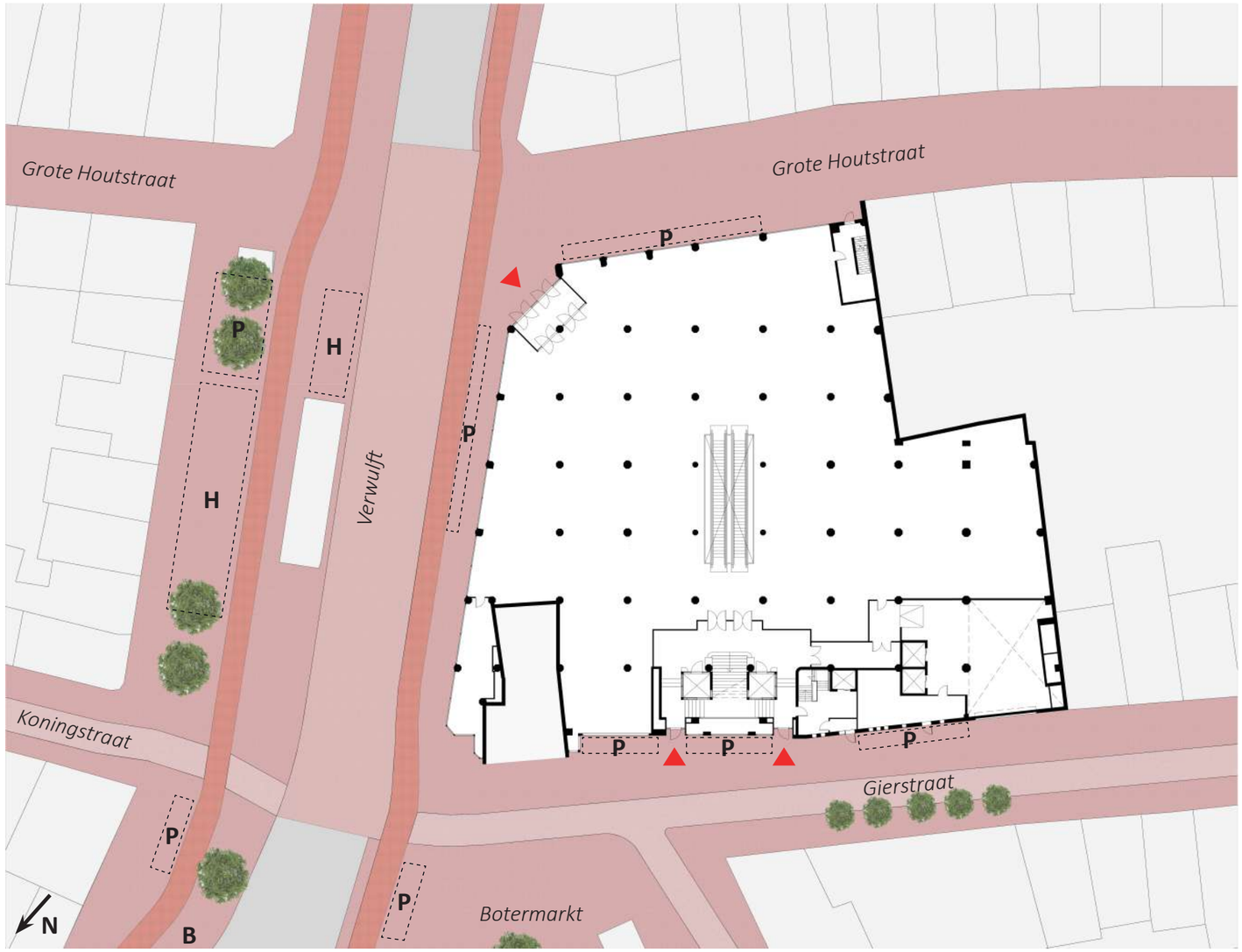


6th floor

6300

1. Archive reading room
2. Private study room
3. Storage archive
4. Exposition V&D
5. Entrance area dwellingfloor
6. Dwellings
7. Collective fitness space
8. Entrance area collective spaces dwelling floor
9. Collective living room
10. Collective rooftop terrace
11. VVE meeting room
12. Collective multi use room
13. Collective laundry space
14. Storage
15. Installations space

The existing context



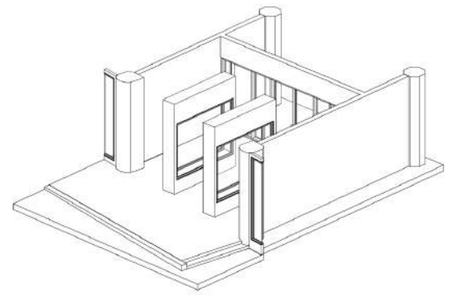
Existing context and public entrances

The new context

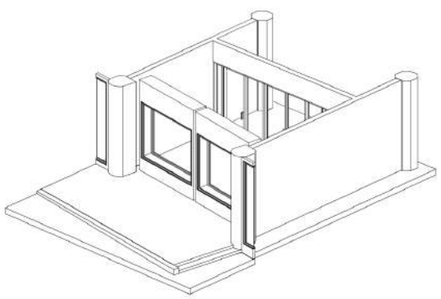
Pedestrian friendly zone
Bicycle path
Bicycle and car as guest road
Car road + bus (50km/h)
B Bus stop
P Parking spots for bicycles + scooters
H Area for terrace horeca
Public entrances
Entrance cafe
Entrance retail
Entrance bicycle storage
Dwellings' main entrance
Entrance expedition

New context and entrances

Main public entrance Verwulft

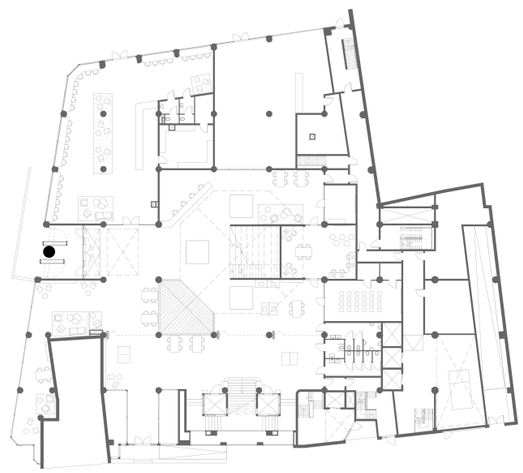


Day

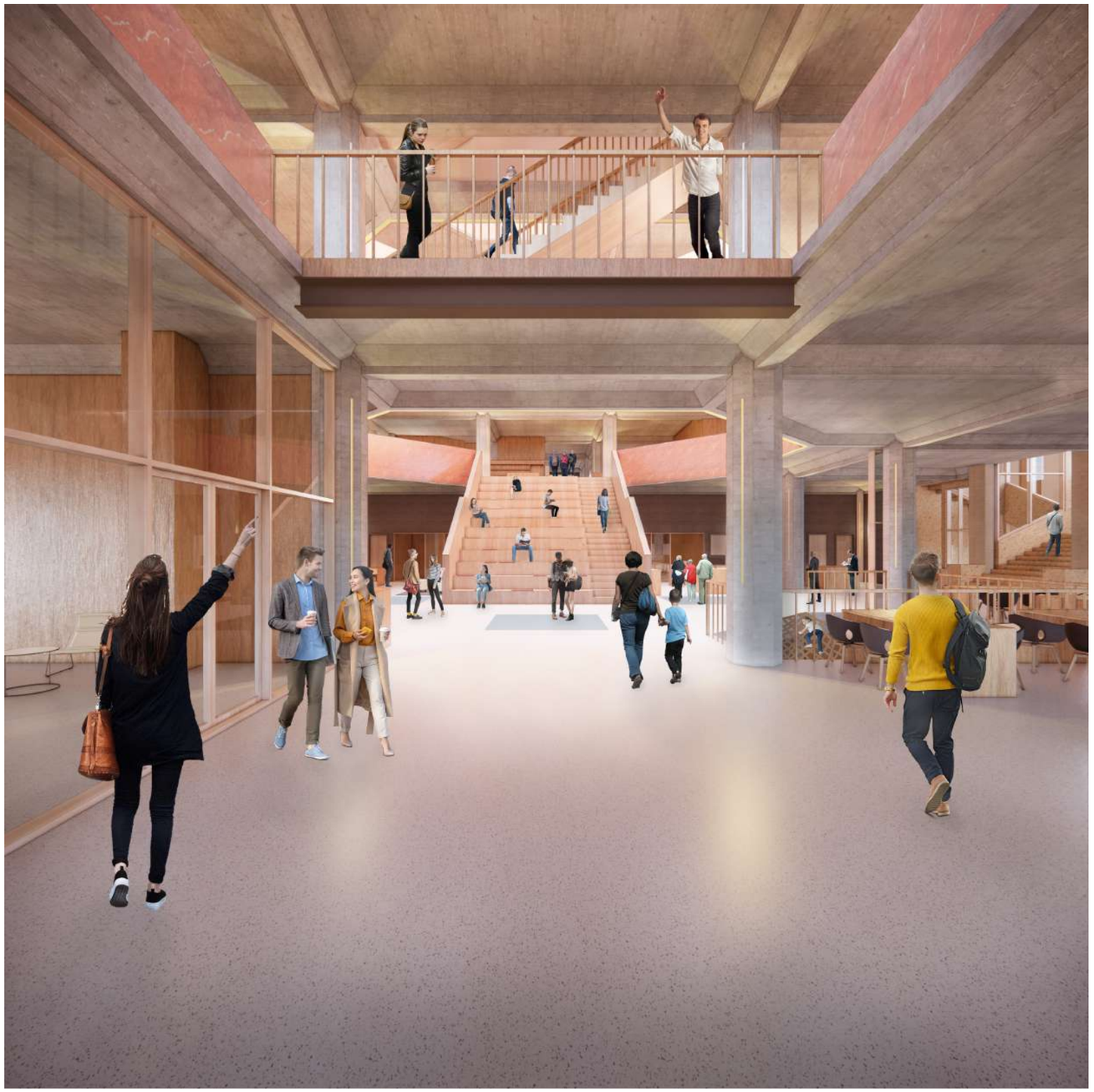


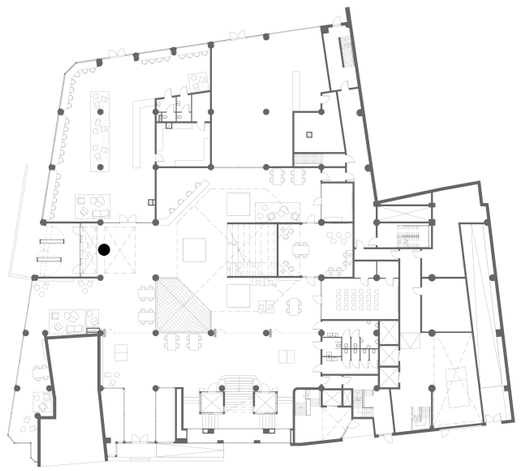
Evening

Spatial sequence main entrance

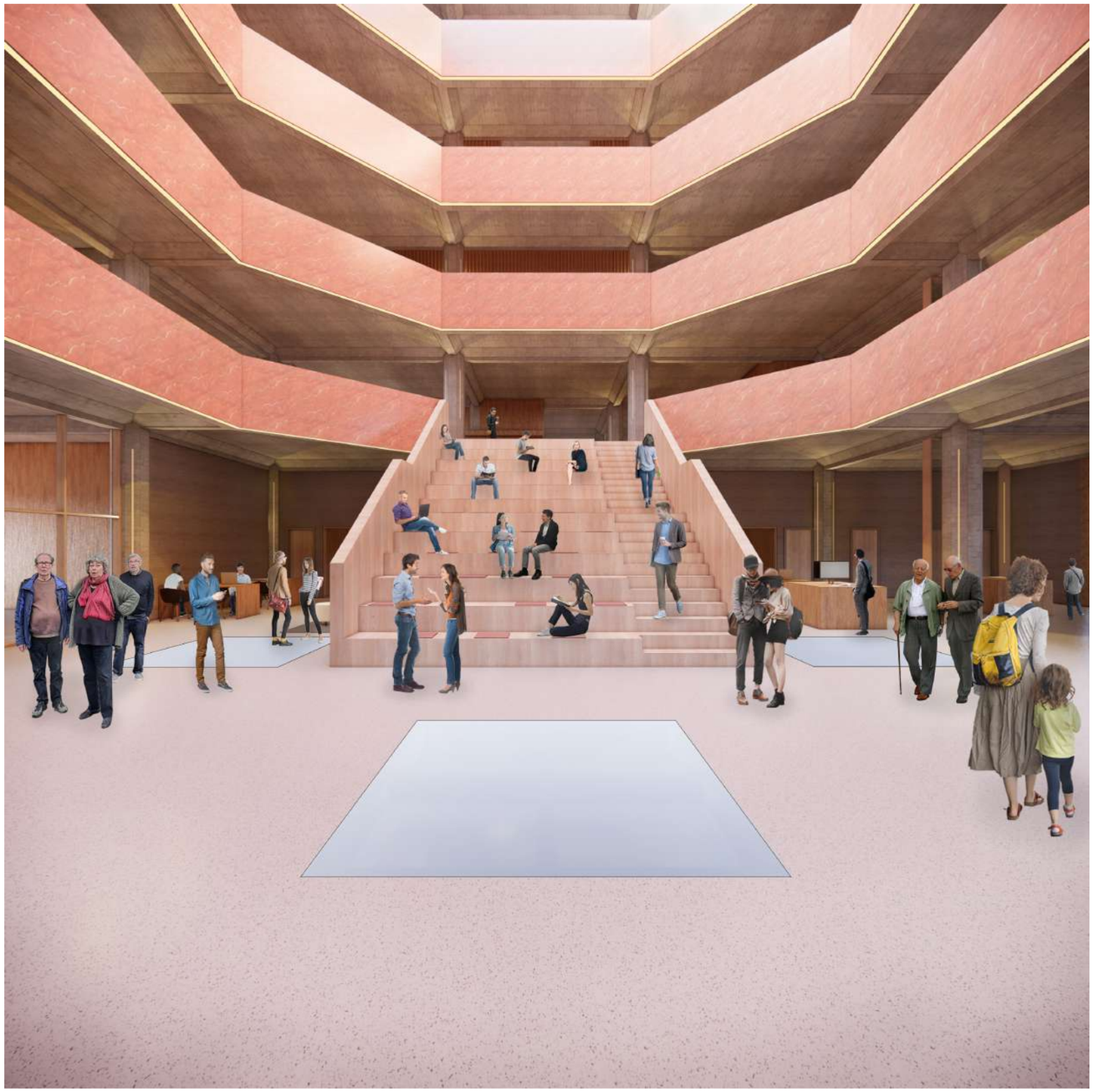


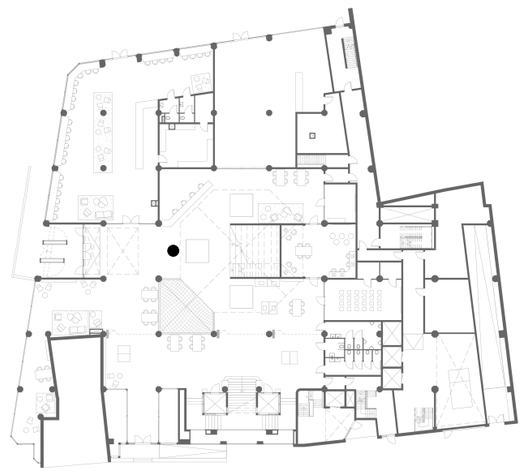
Spatial sequence main entrance



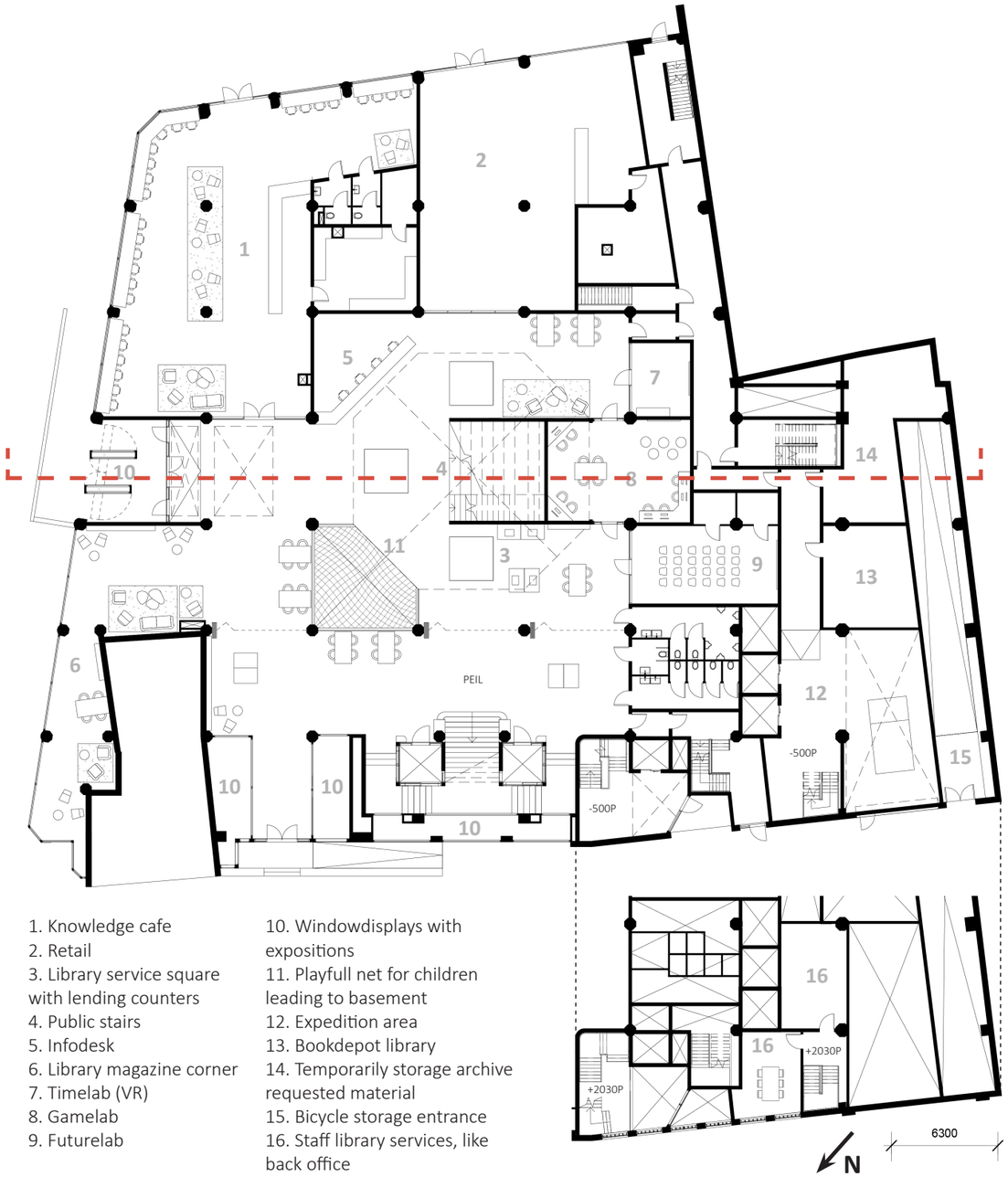


Spatial sequence main entrance

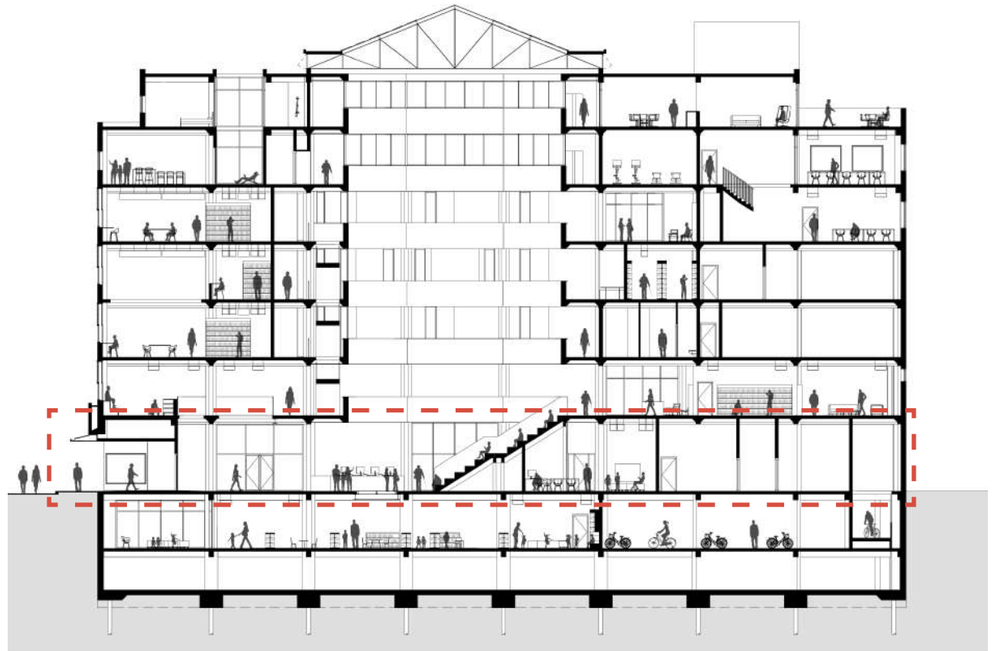




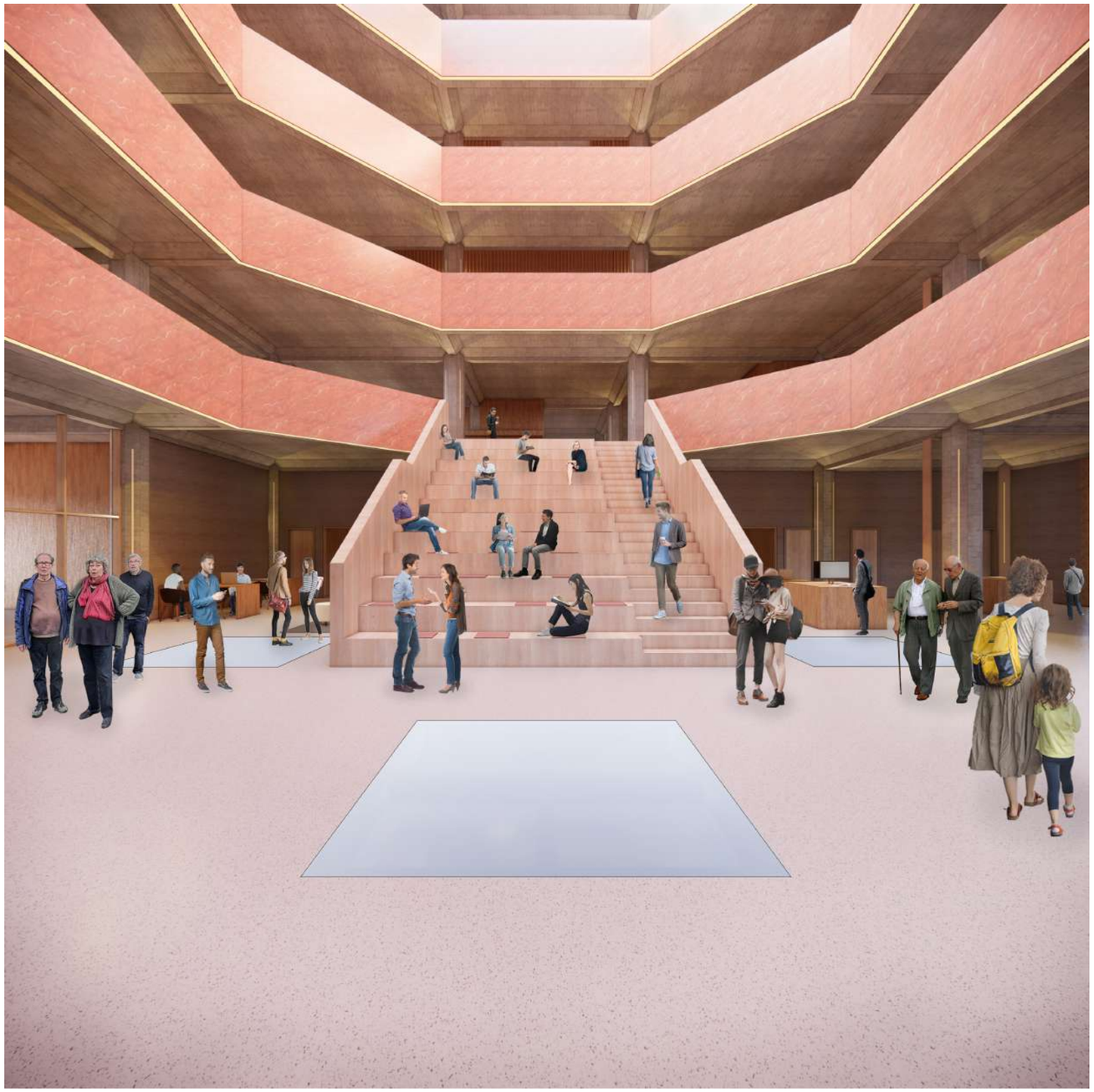
Ground floor

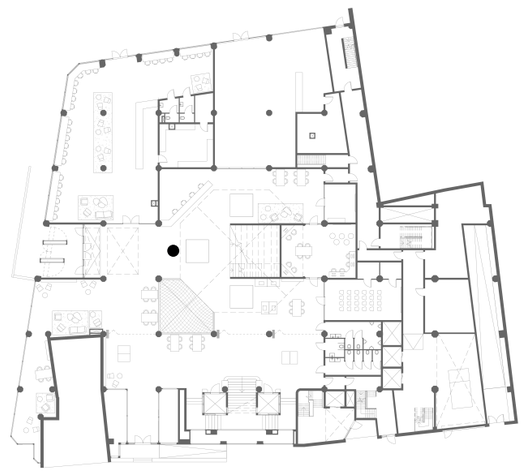


1. Knowledge cafe
2. Retail
3. Library service square with lending counters
4. Public stairs
5. Infodesk
6. Library magazine corner
7. Timelab (VR)
8. Gamelab
9. Futurelab
10. Windowdisplays with expositions
11. Playfull net for children leading to basement
12. Expedition area
13. Bookdepot library
14. Temporarily storage archive requested material
15. Bicycle storage entrance
16. Staff library services, like back office

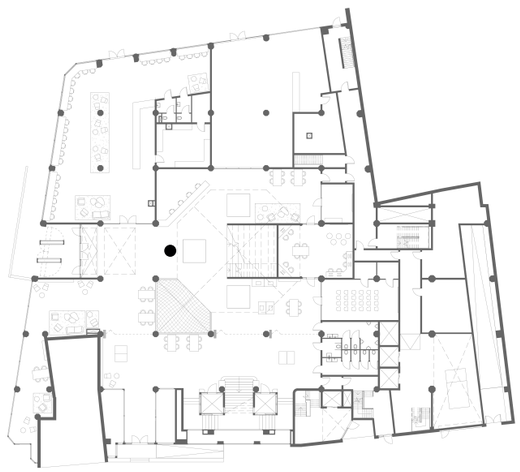


Materiality ground floor

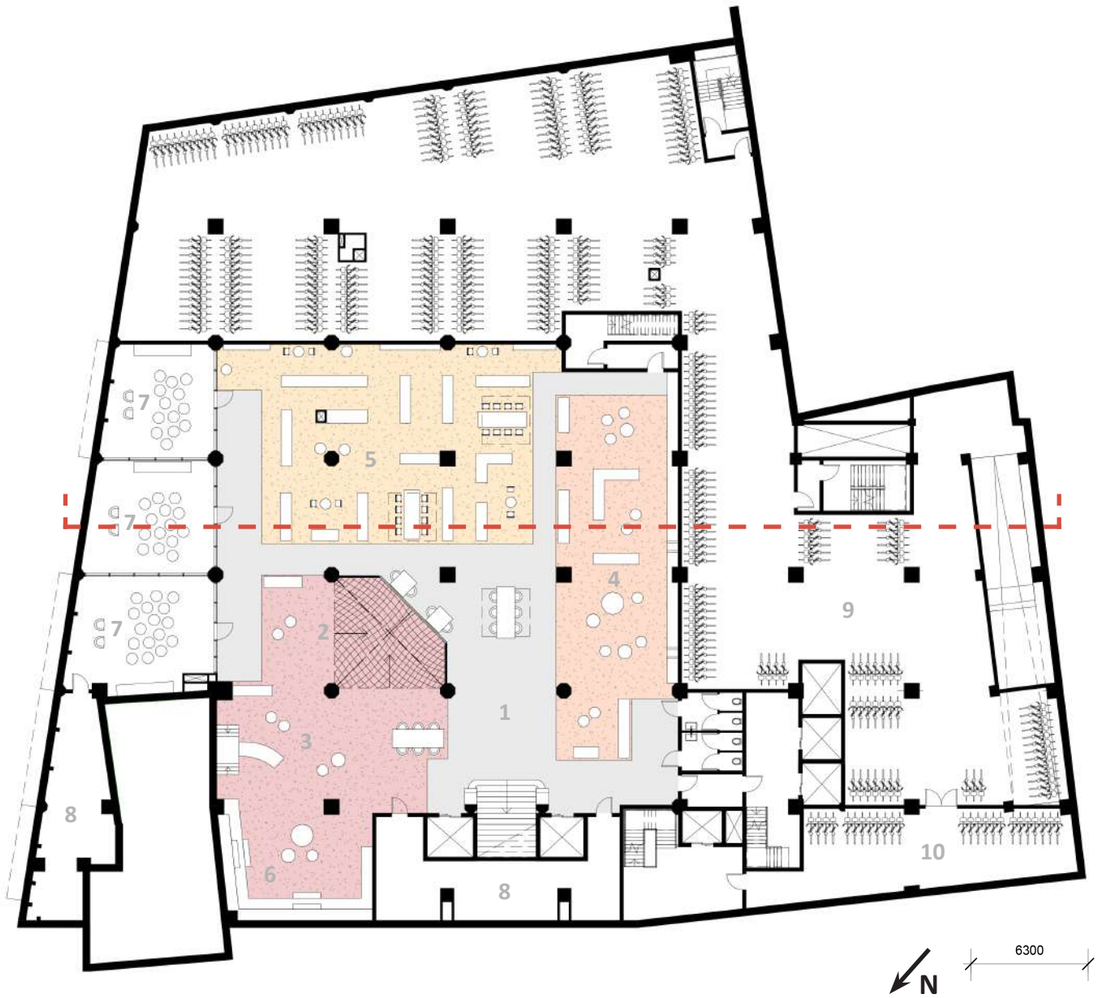


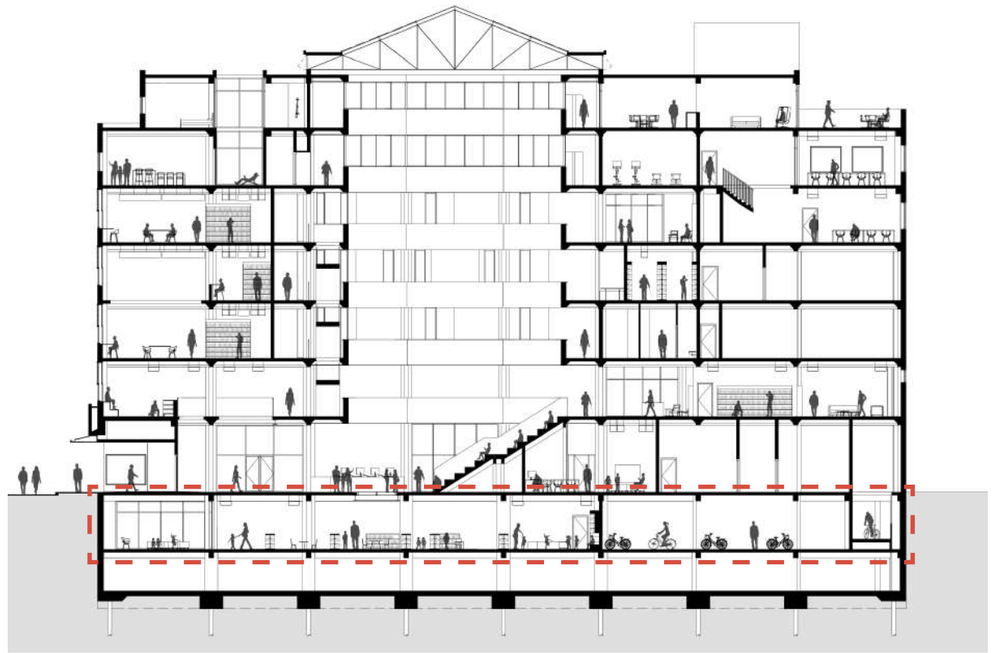


Influence of daylight



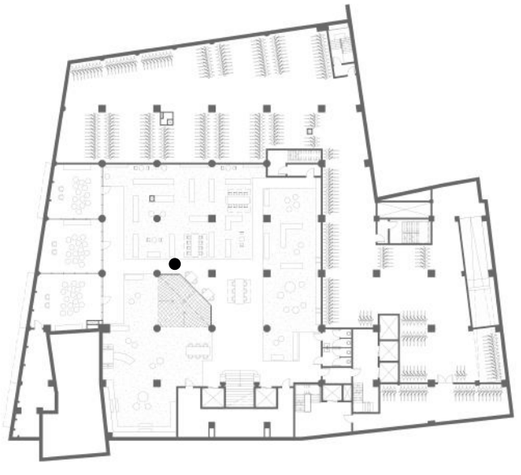
Upper basement floor



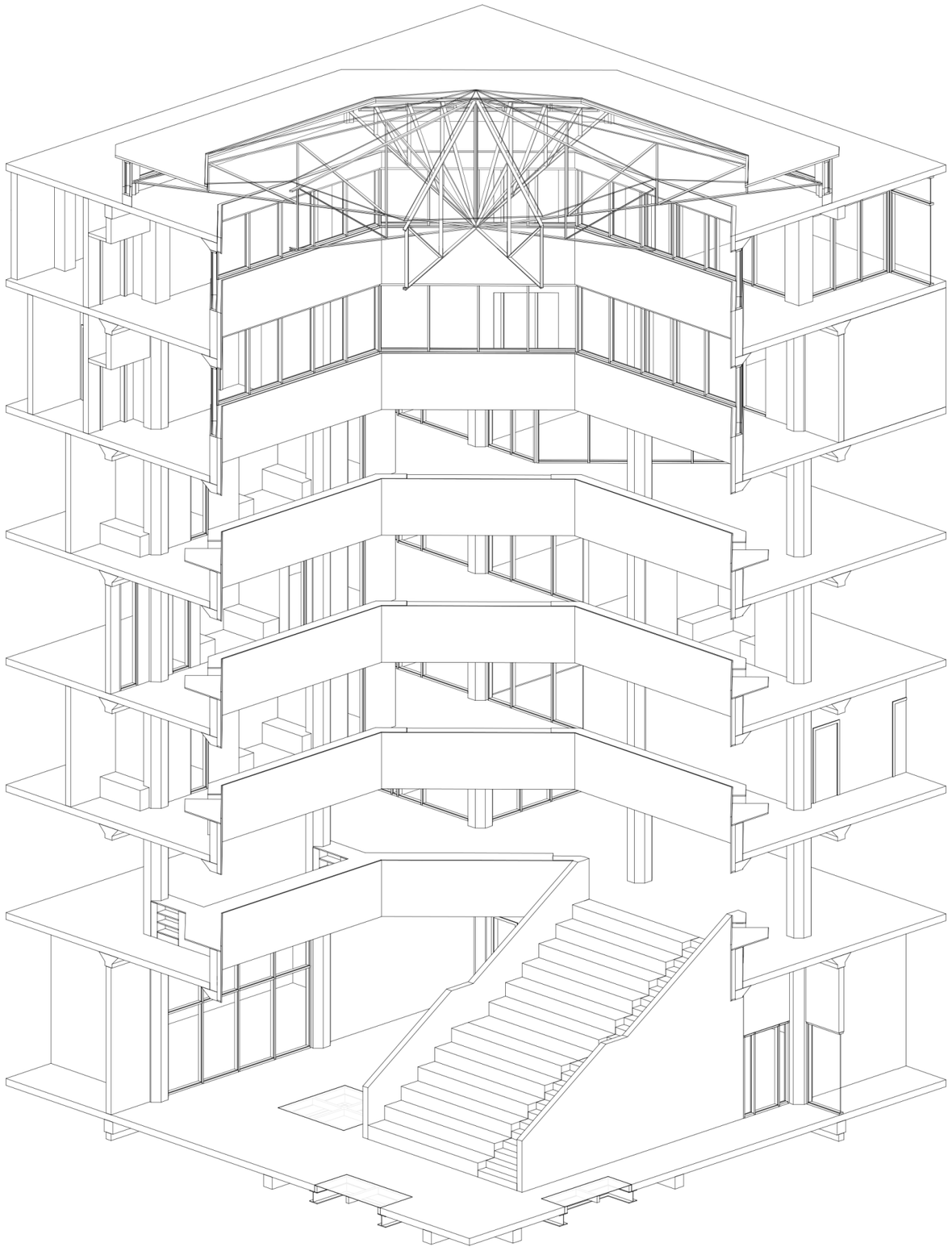


1. Children Library
2. Playfull net for children to enter basement
3. Part focussed on playing
4. Part focussed on reading
5. Part focussed on picking books
6. Flexible reading/event space
7. Rooms for readingsessions and workshops
8. Storage
9. Public bicycle storage
10. Bicycle storage for dwellings

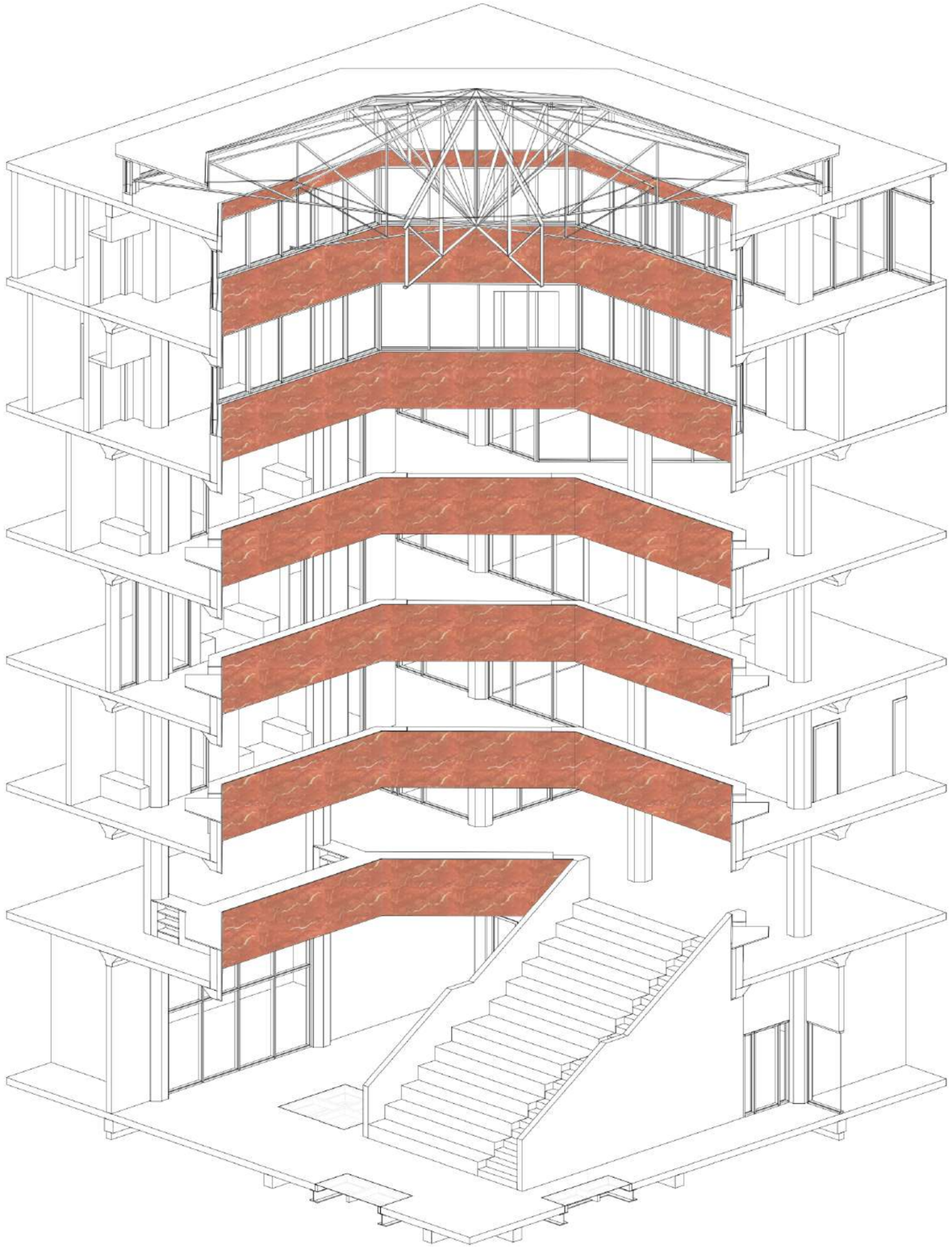
Upper basement floor



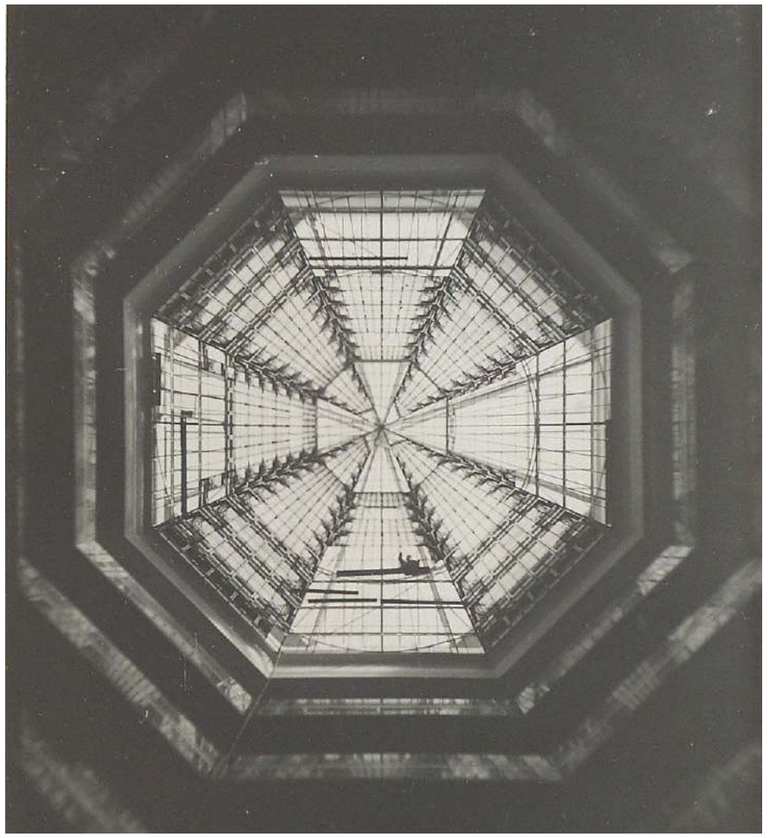
The new atrium



The new atrium

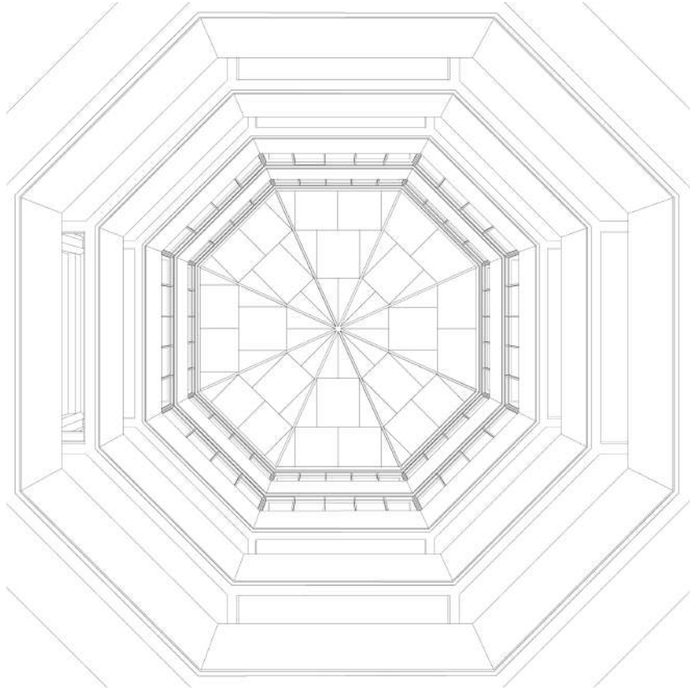


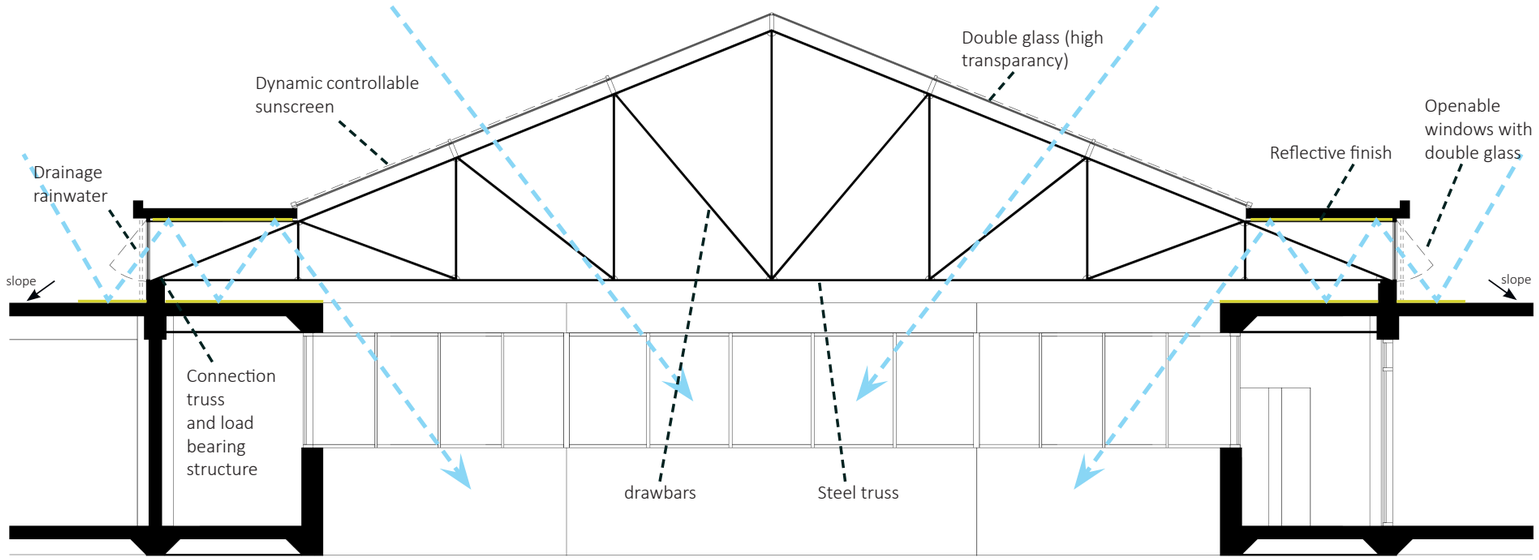
The original skylight



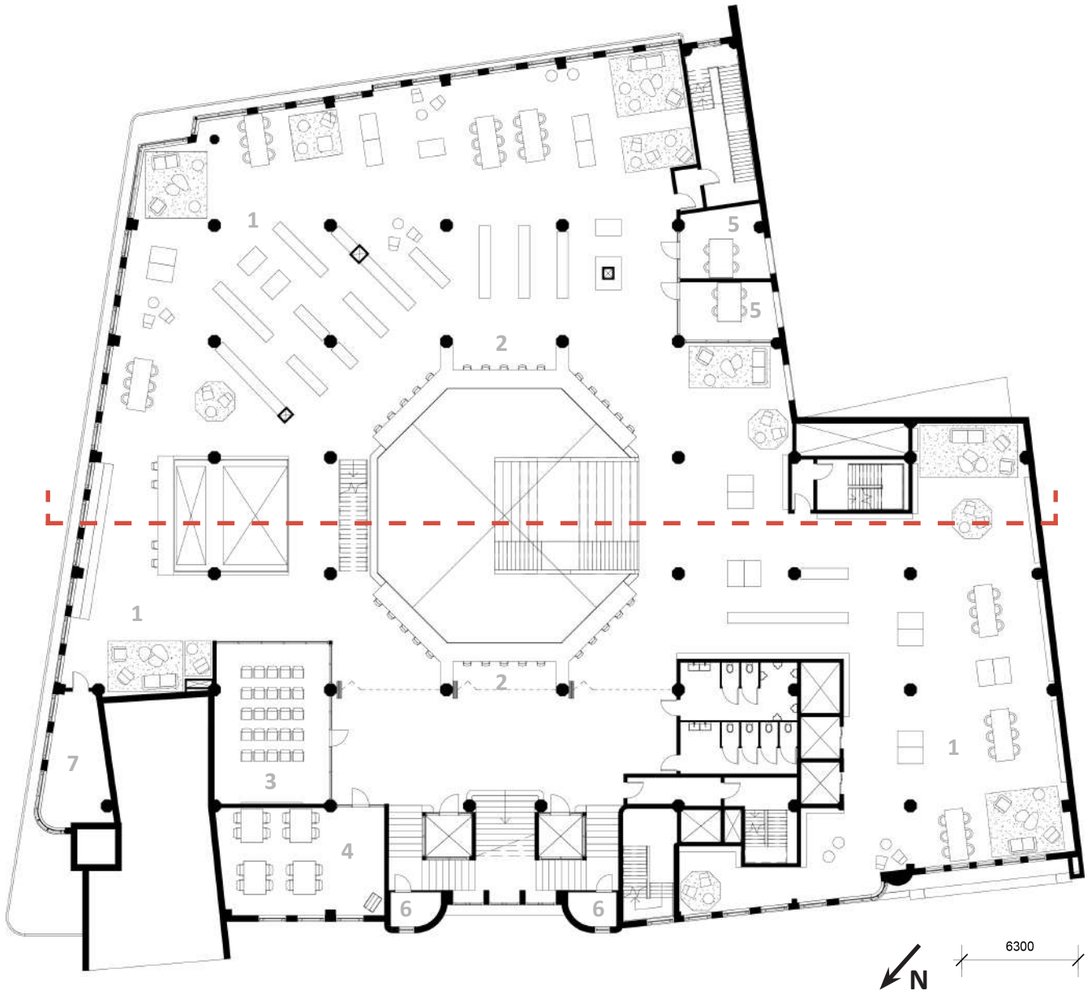
Noord-hollands archief. (2020). Beeldbank Vroom&Dreesmann Haarlem. Retrieved from https://noord-hollandsarchief.nl/beelden/beeldbank

The new skylight

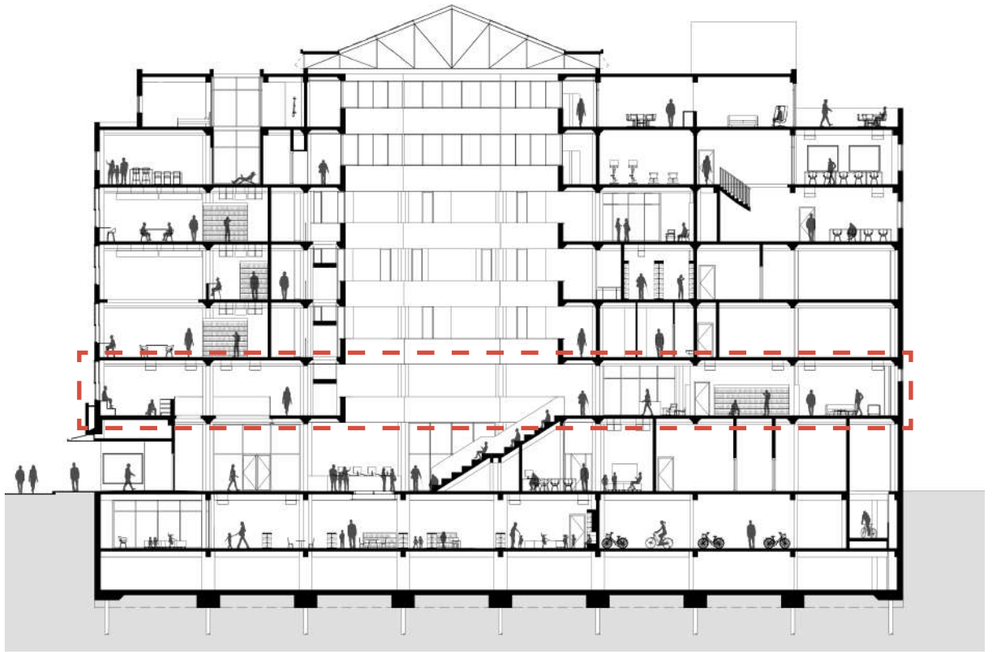


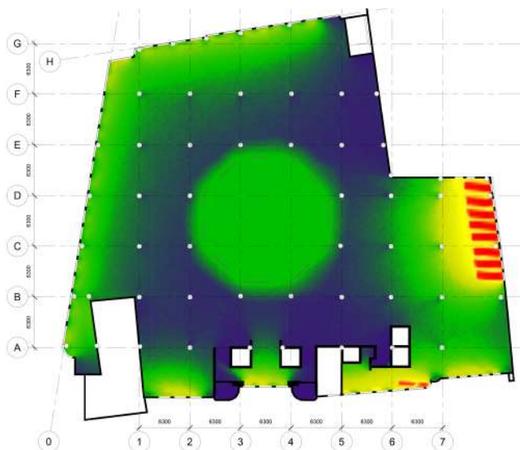


First floor



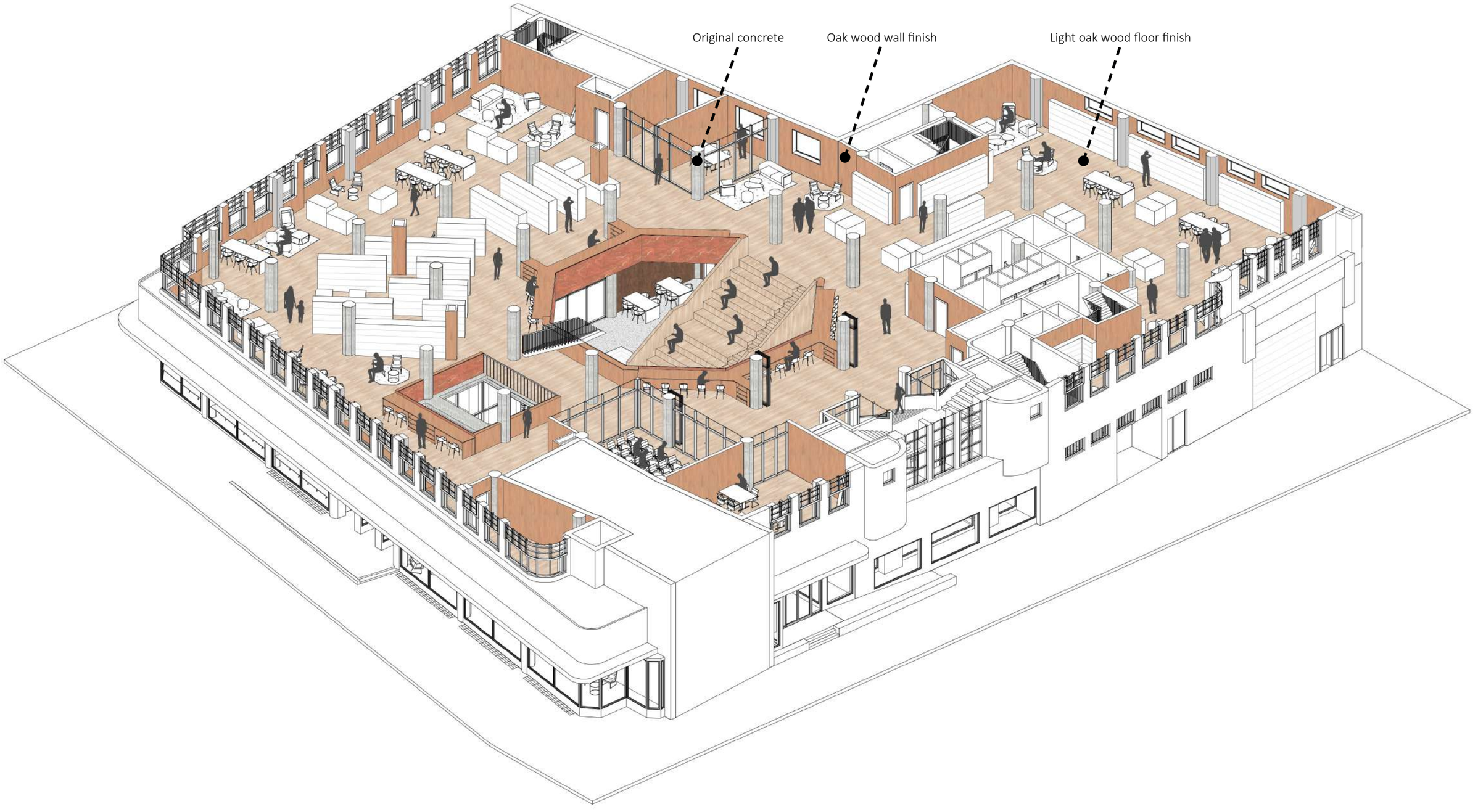
1. Mix of bookstacks and seats
(focussed on adult and teen books)
2. Seats around atrium
3. Lecture space
4. Workshop space
5. (rentable) Meeting rooms
6. Exposition V&D
7. Storage



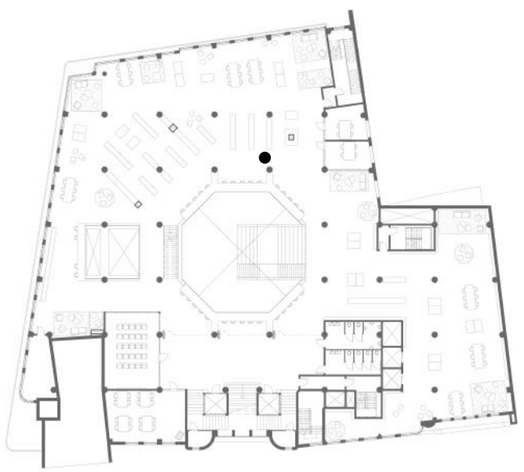


Daylight simulation with atrium

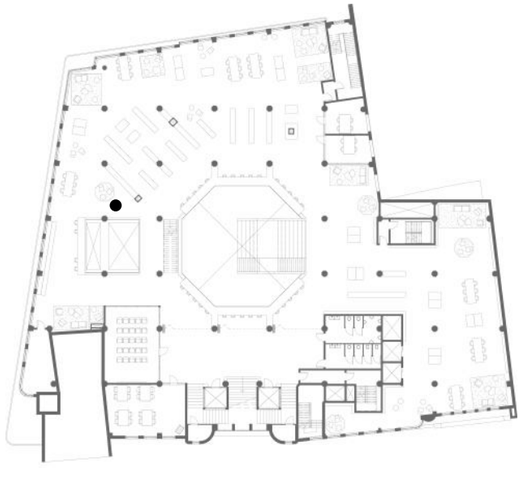
Materiality library



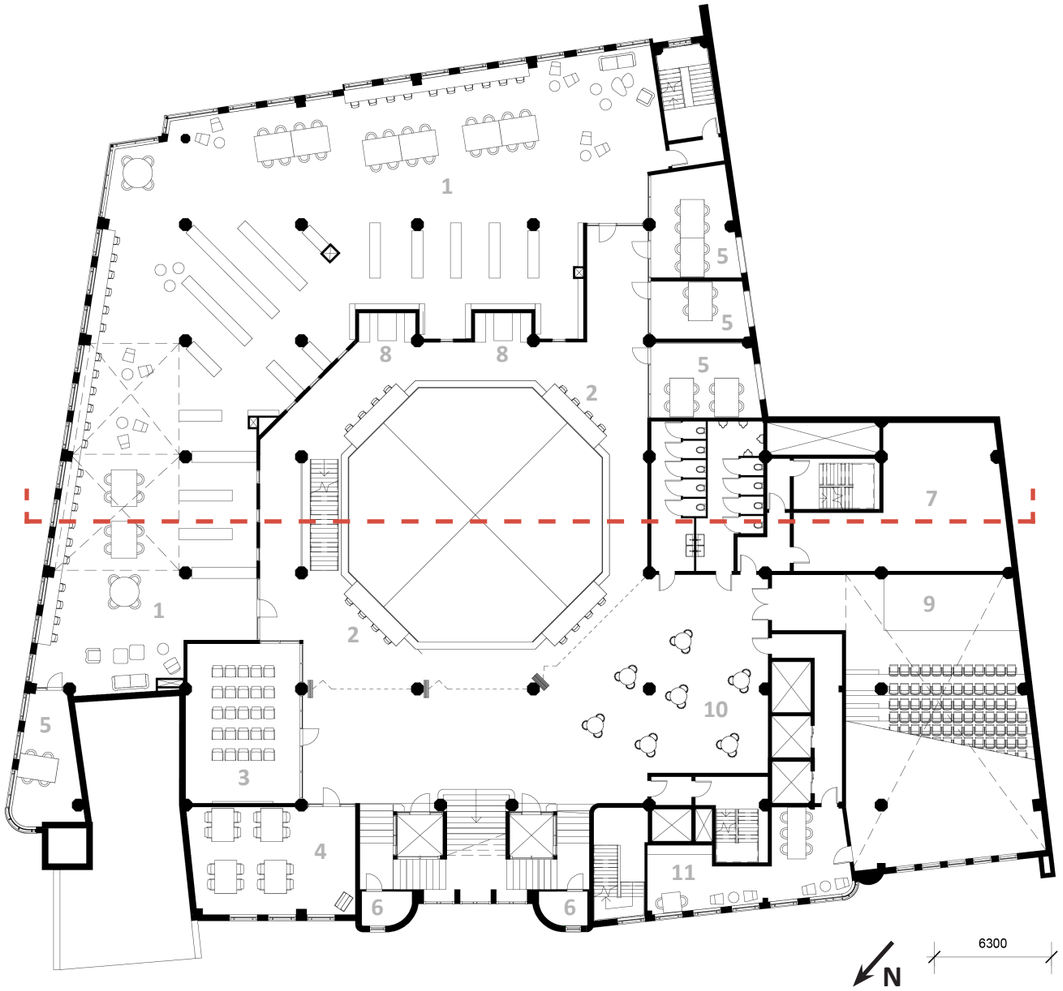
Impression space around atrium (1F)

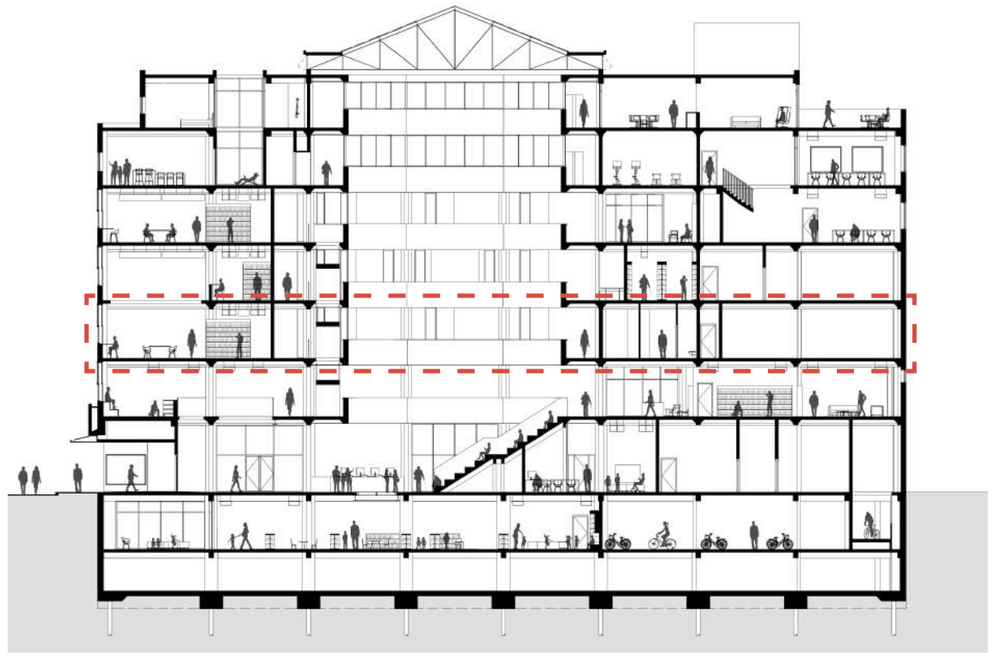


Impression space at facade (1F)



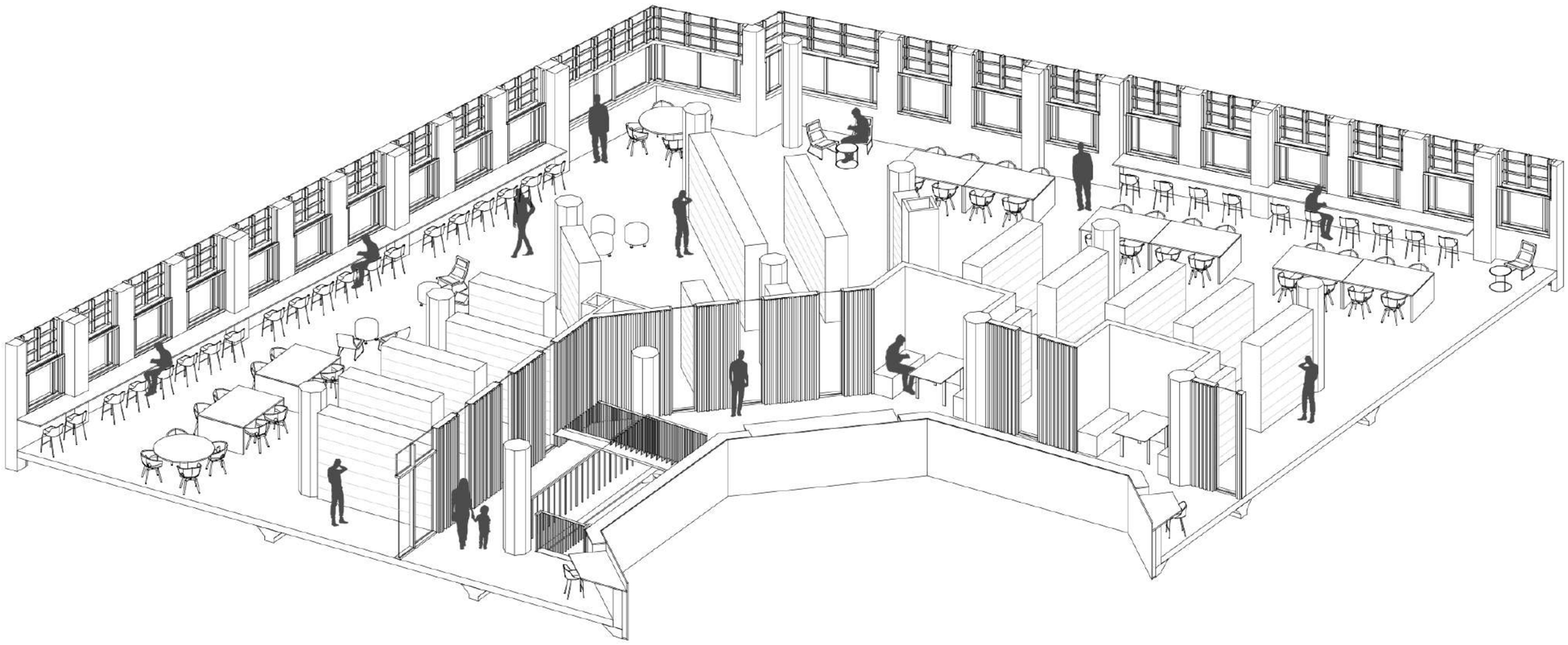
Second floor



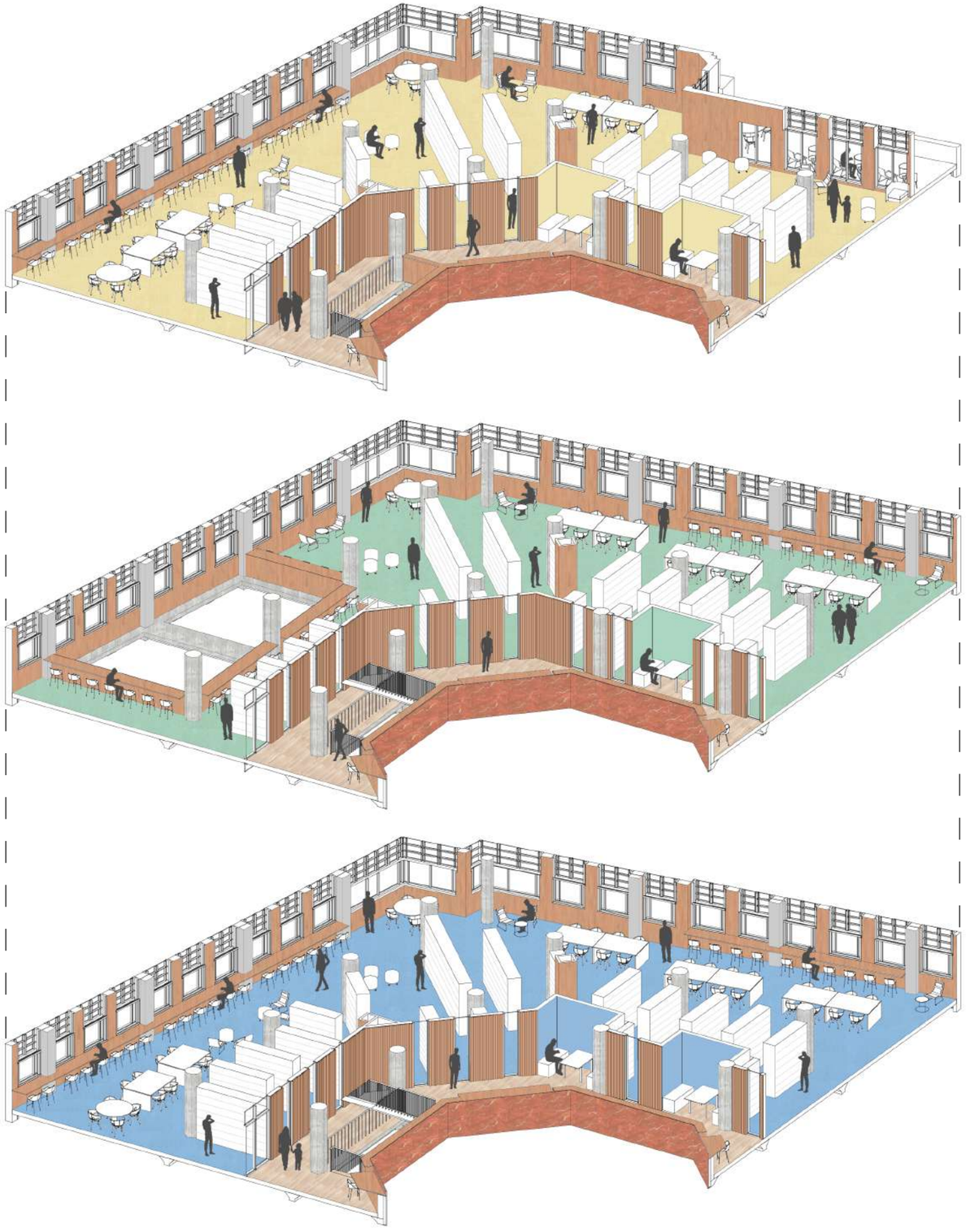


1. Mix of bookstacks and seats (focussed on studying)
2. Seats around atrium
3. Lecture space
4. Workshop space
5. (rentable) Meeting rooms
6. Exposition V&D
7. Storage
8. Pockets around atrium
9. Auditorium
10. Foyer auditorium
11. Cantine personnel

Spatial idea upper floors



Materiality upper floors

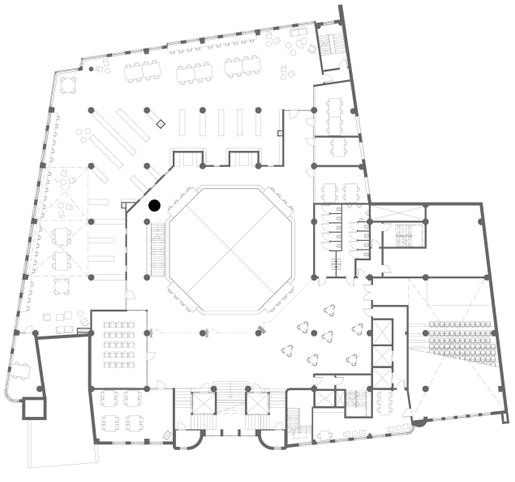


4F

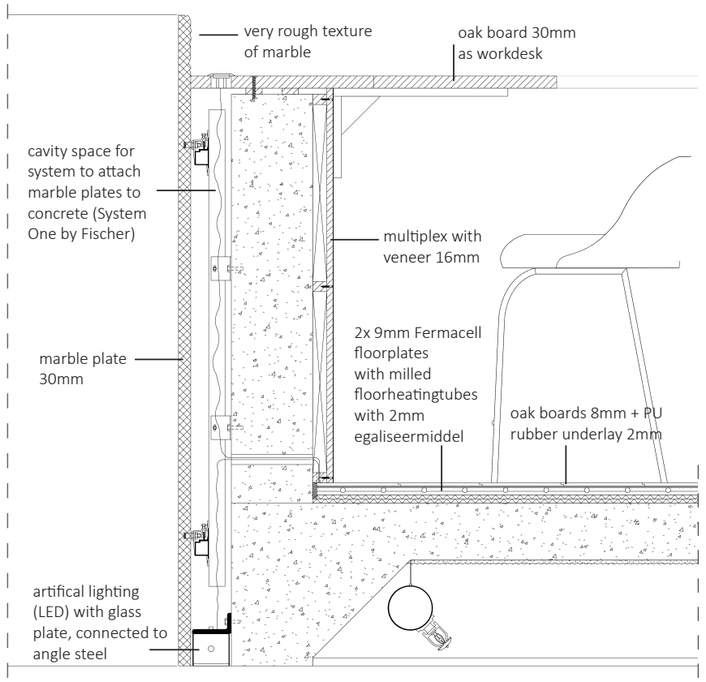
3F

2F

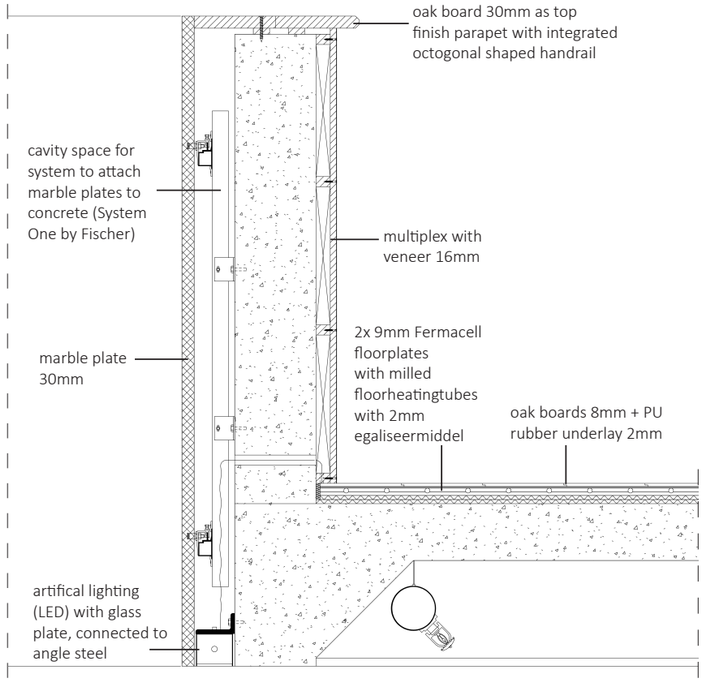
Impression space around atrium (2F)



The atrium’s parapet

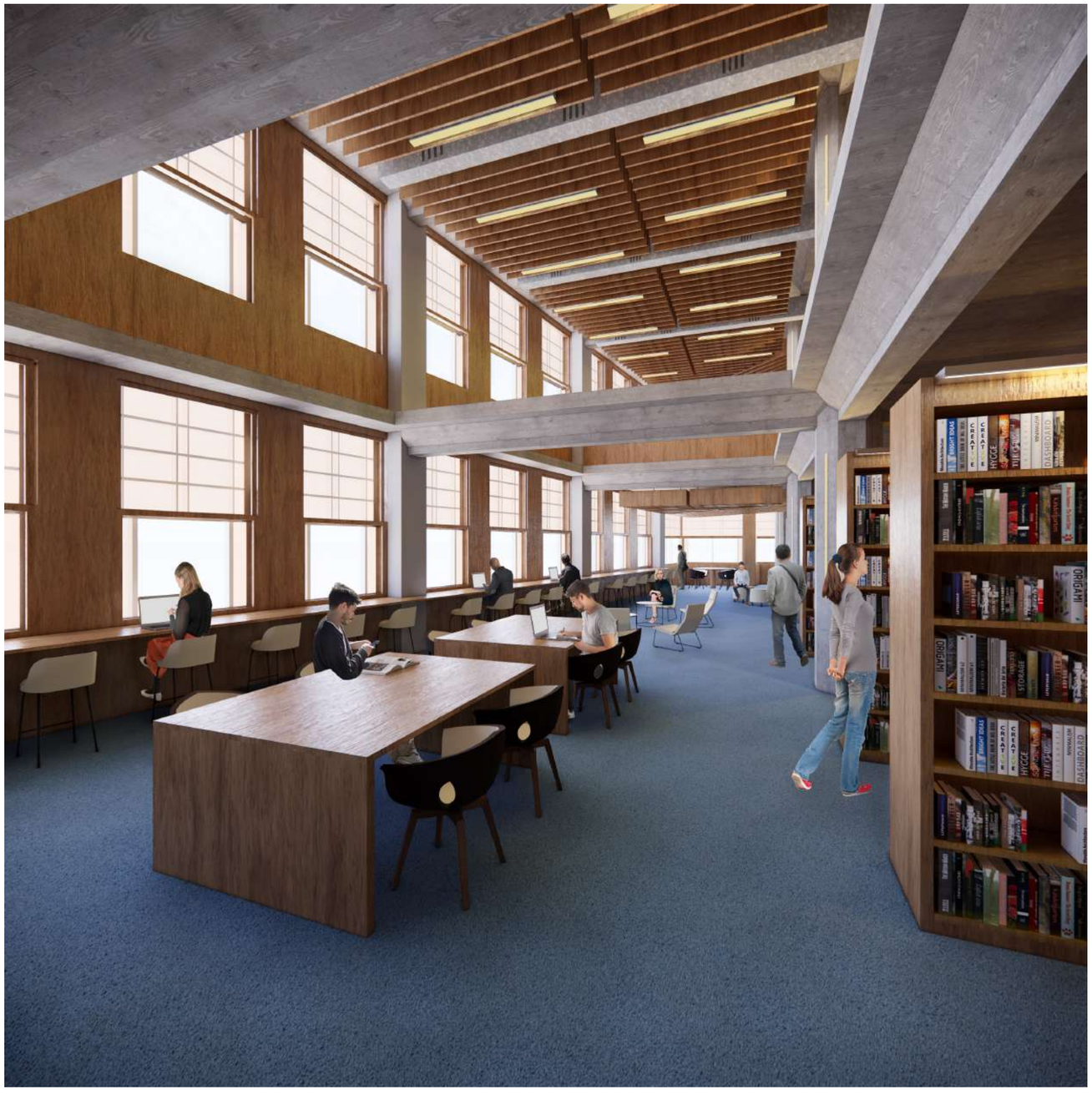


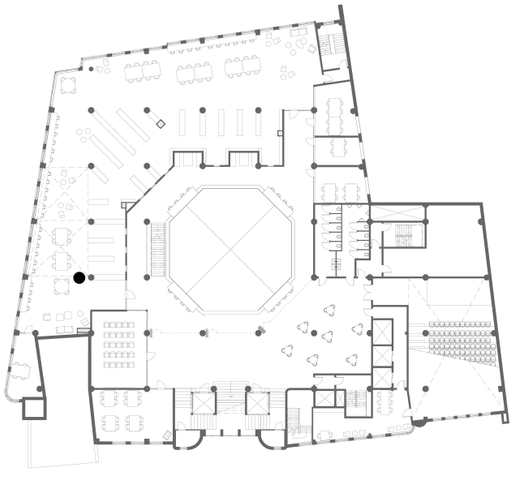
Vertical 1:5 detail, scaled



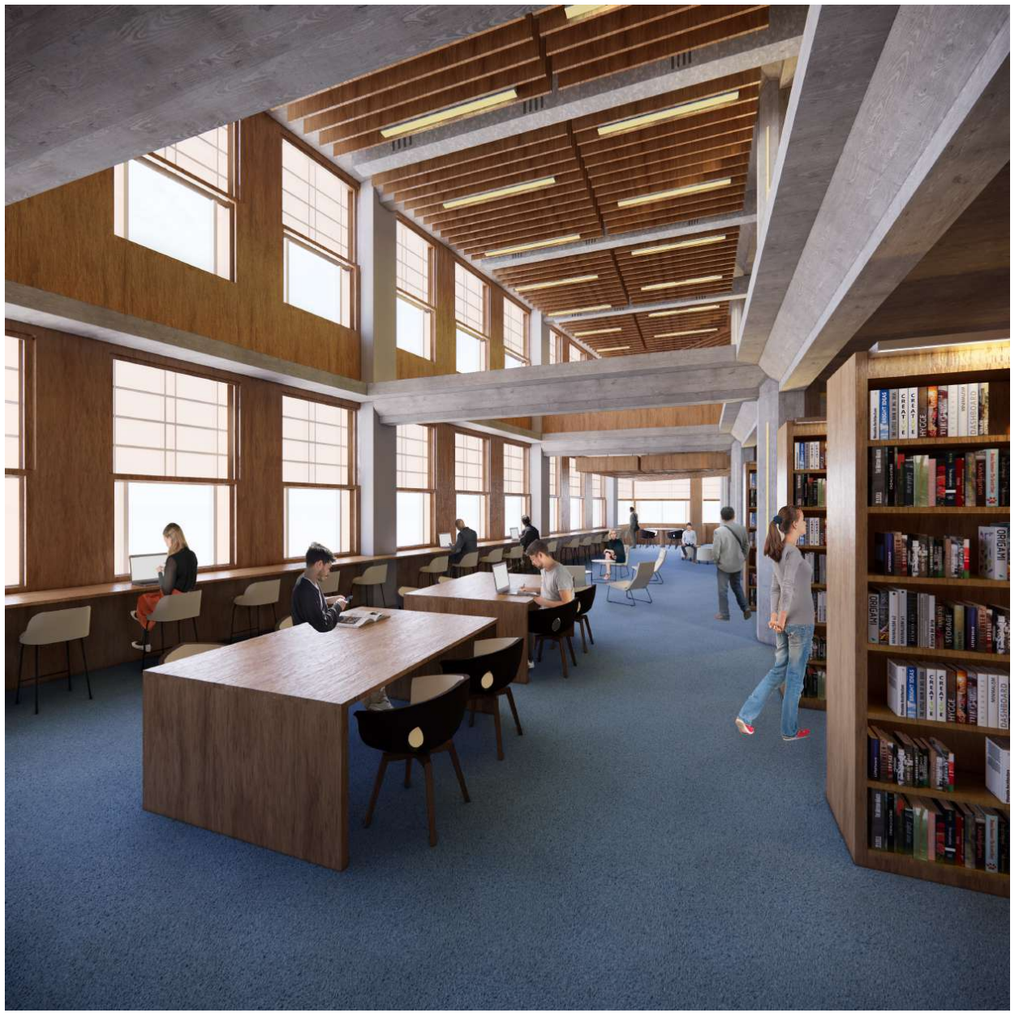
Vertical 1:5 detail, scaled

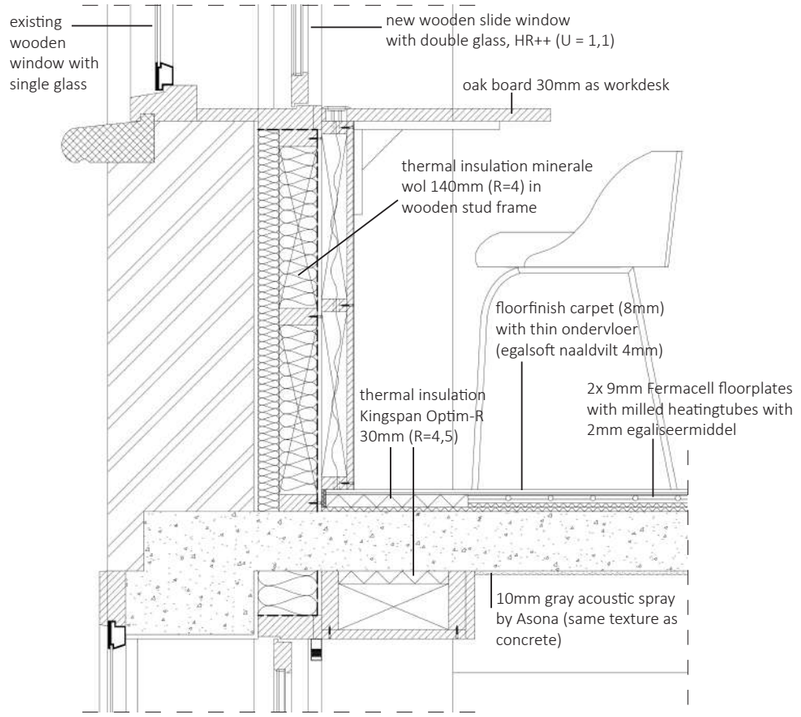
Impression space at facade (2F)



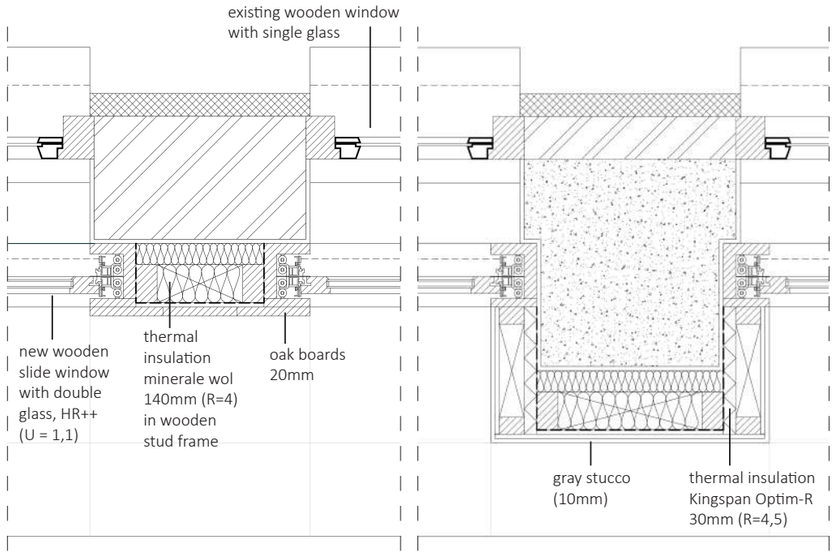


Facade details



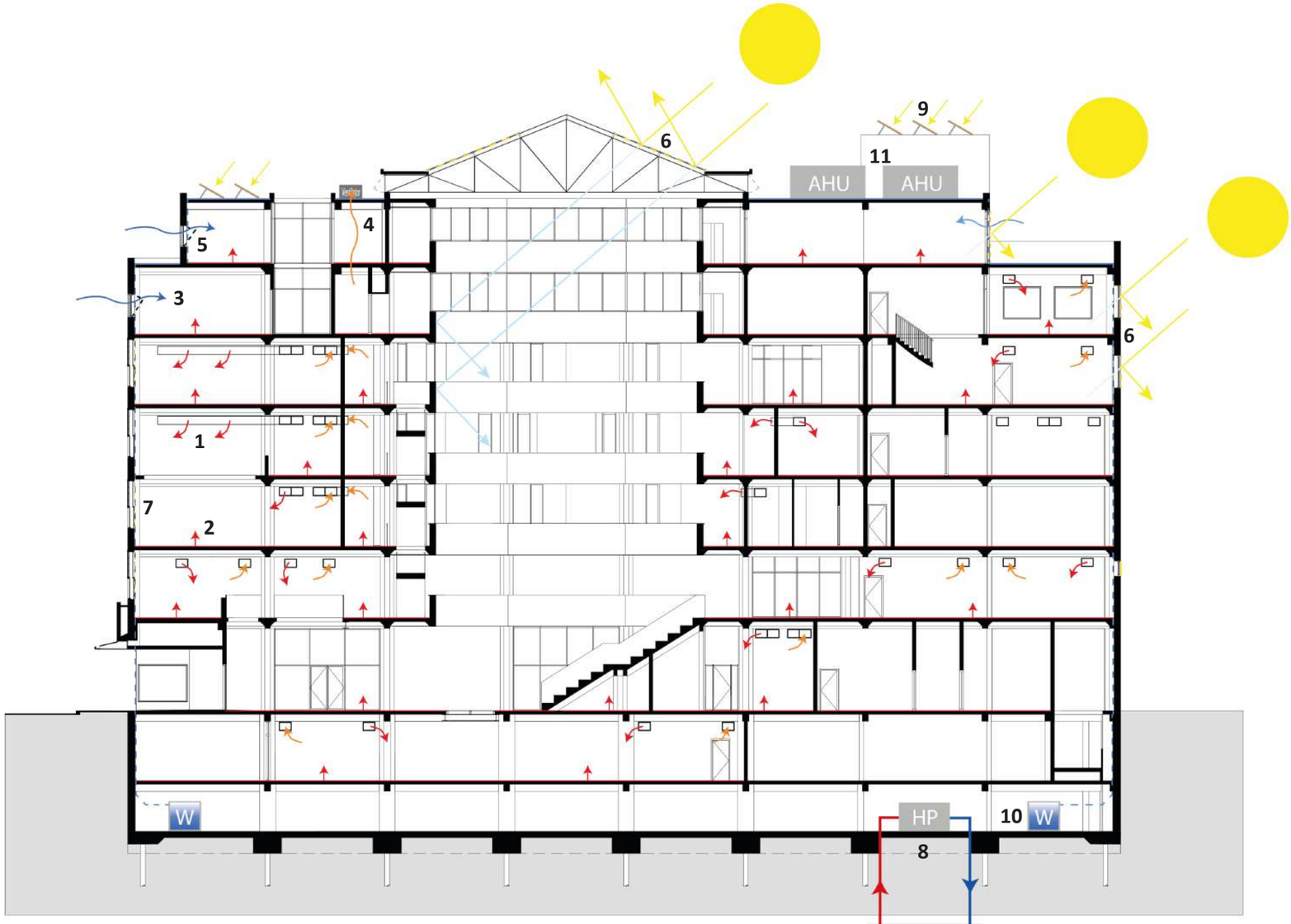


Vertical 1:5 detail, scaled



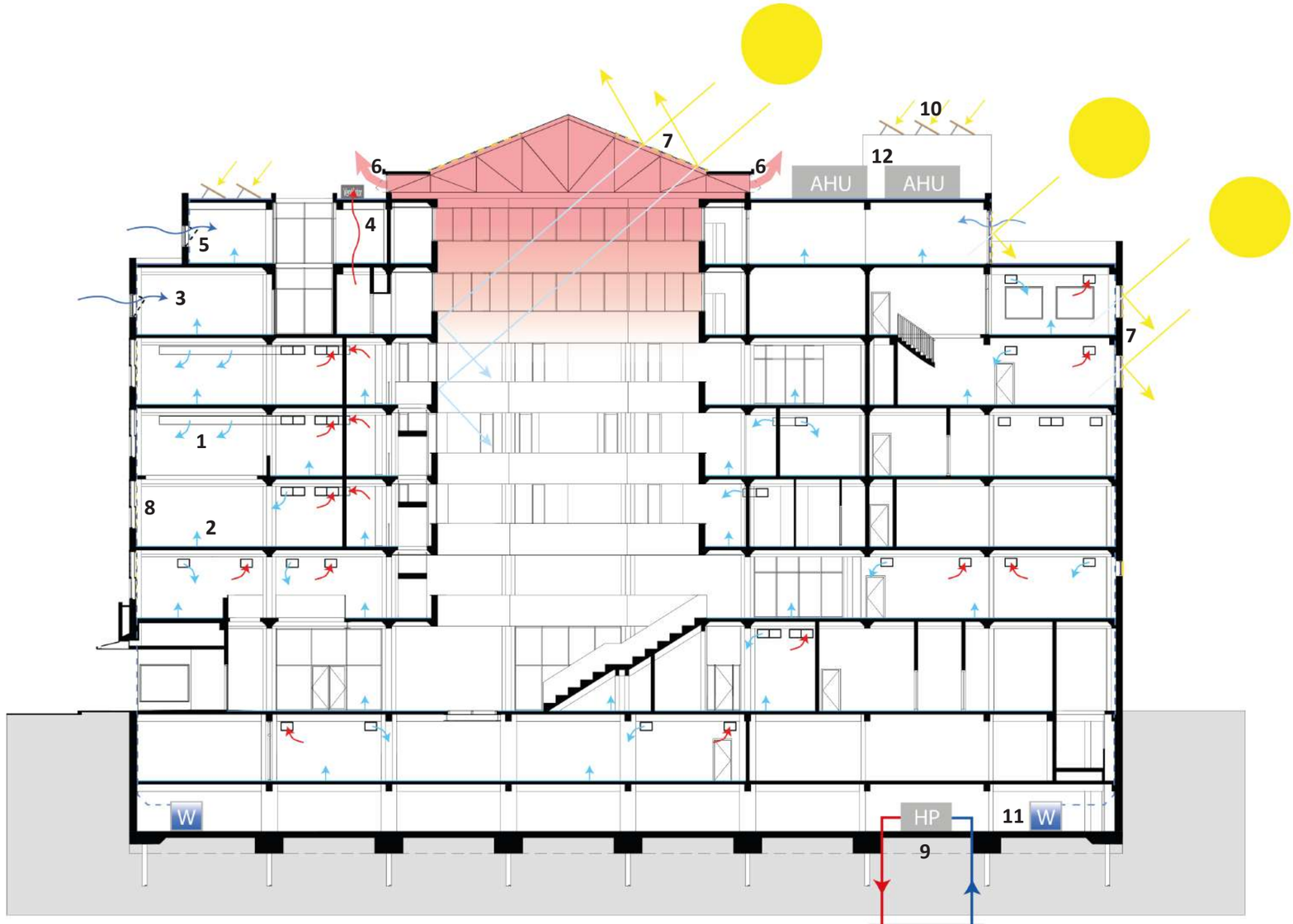
Horizontal 1:5 detail, scaled

Climate: winter situation



1. Mechanical ventilation, pre-heated
2. Floor heating for library and dwellings
3. Natural air inlet for by ventilation grille in new window (dwellings)
4. Mechanical air outlet by ventilatorunits on roof (dwellings)
5. Openable windows (dwellings)
6. Dynamic sunscreens to block sunlight, not daylight
7. Louvres as dynamic daylight reducing element
8. Heat pump with ground as source, open groundenergysystem (WKO) with two aquifers
9. South orientated solar panels for electricity
10. Water collection in basement to reuse for toilets and rooftop terrace dwellings
11. Air handling units placed on roof, provided with WTW by thermal wheel (n= 60-90%).

Climate: summer situation



1. Mechanical ventilation, pre-cooled
2. Floor cooling for library and dwellings
3. Natural air inlet by ventilation grille in new window (dwellings)
4. Mechanical air outlet by ventilatorunits on roof (dwellings)
5. Openable windows (dwellings)
6. Vertical openable window in skylight to let out heat of atrium
7. Dynamic sunscreens to block sunlight, not daylight
8. Louvres as dynamic daylight reducing element
9. Heat pump with ground as source, open groundenergysystem (WKO) with two aquifers
10. South orientated solar panels for electricity
11. Water collection in basement to reuse for toilets and rooftop terrace dwellings
12. Air handling units placed on roof, provided with WTW by thermal wheel (n= 60-90%).

Conclusion

Conclusion

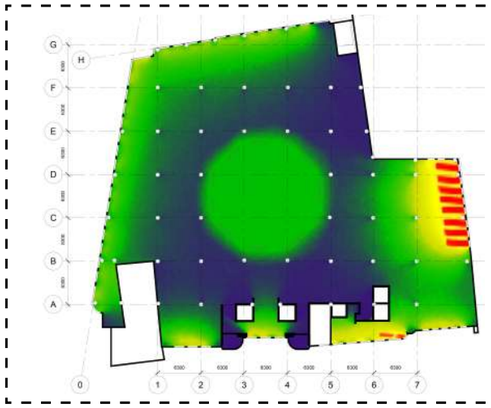
RESEARCH

Schadow and daylight

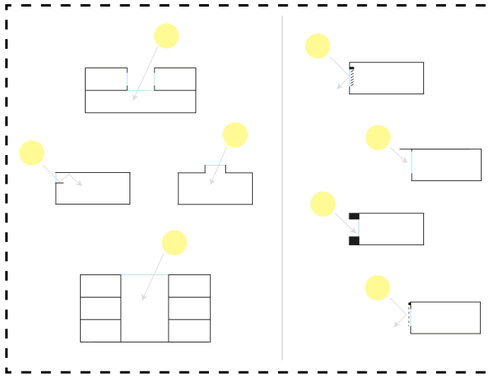
Reflection and texture

Concept of figure-background

Research perception & daylight

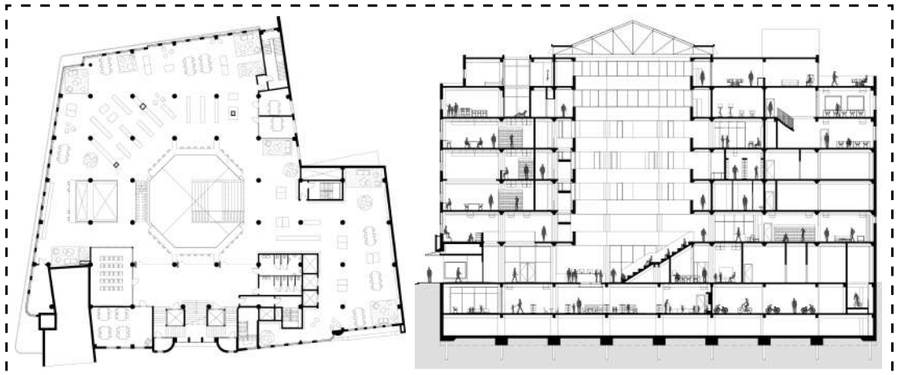


Daylightsimulations

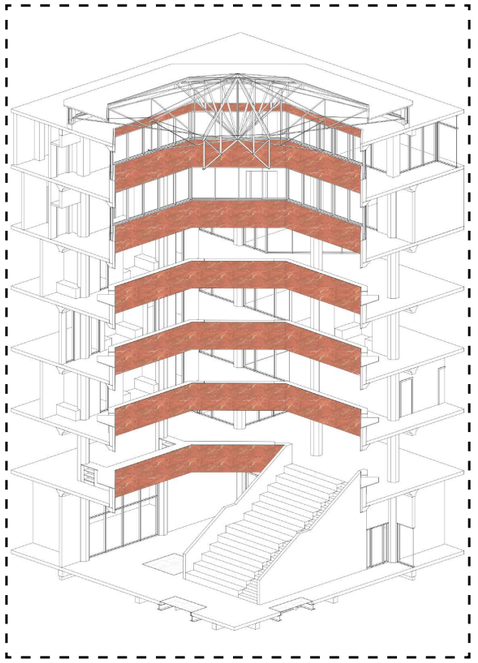


Daylight adjusting measures

DESIGN



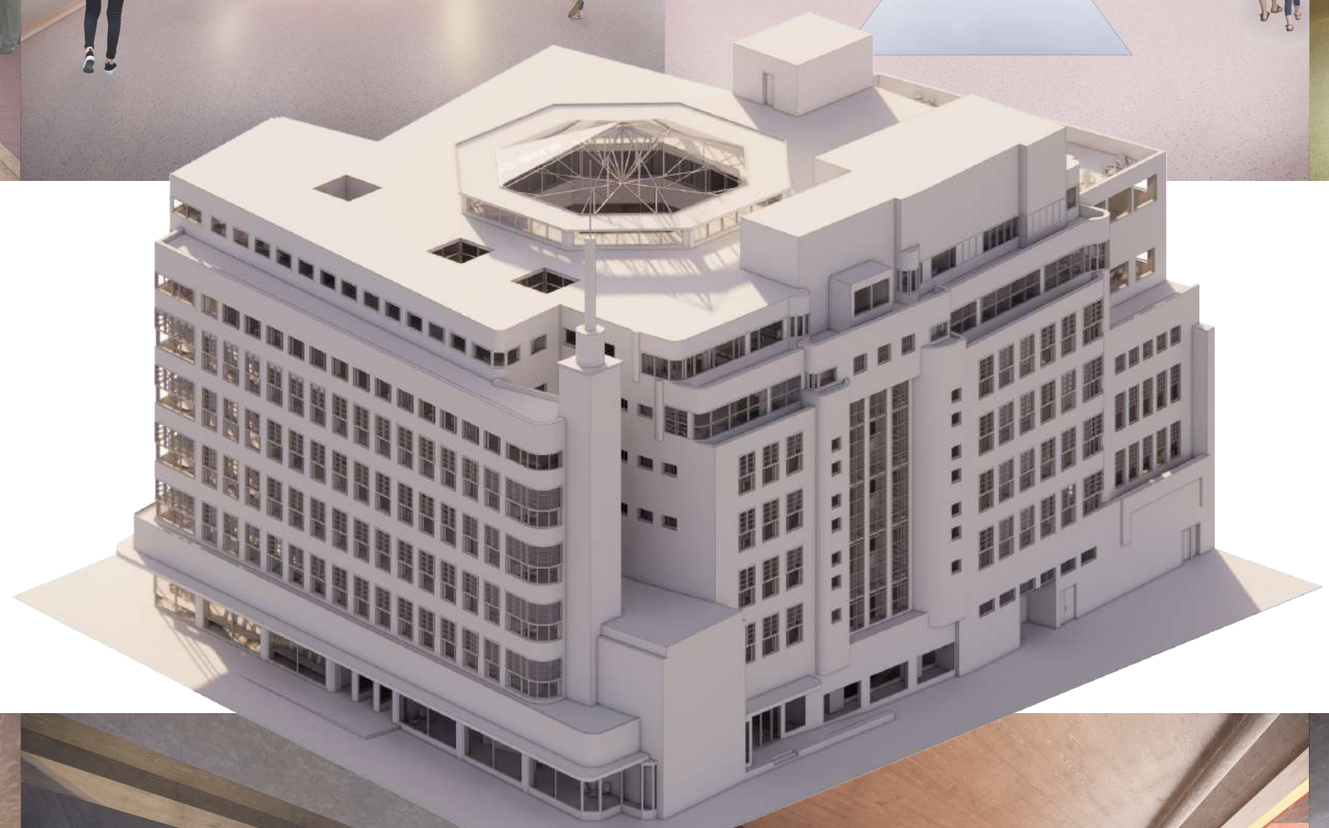
Layout program

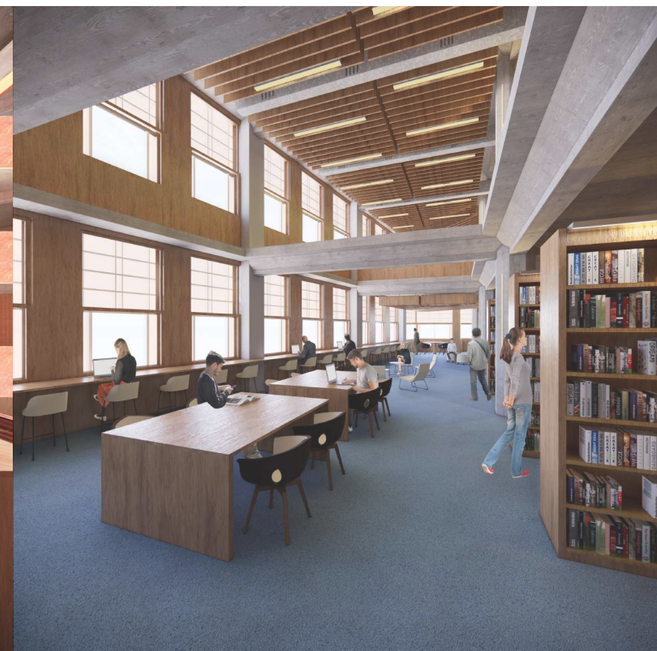


Atrium design

Perception of spaces

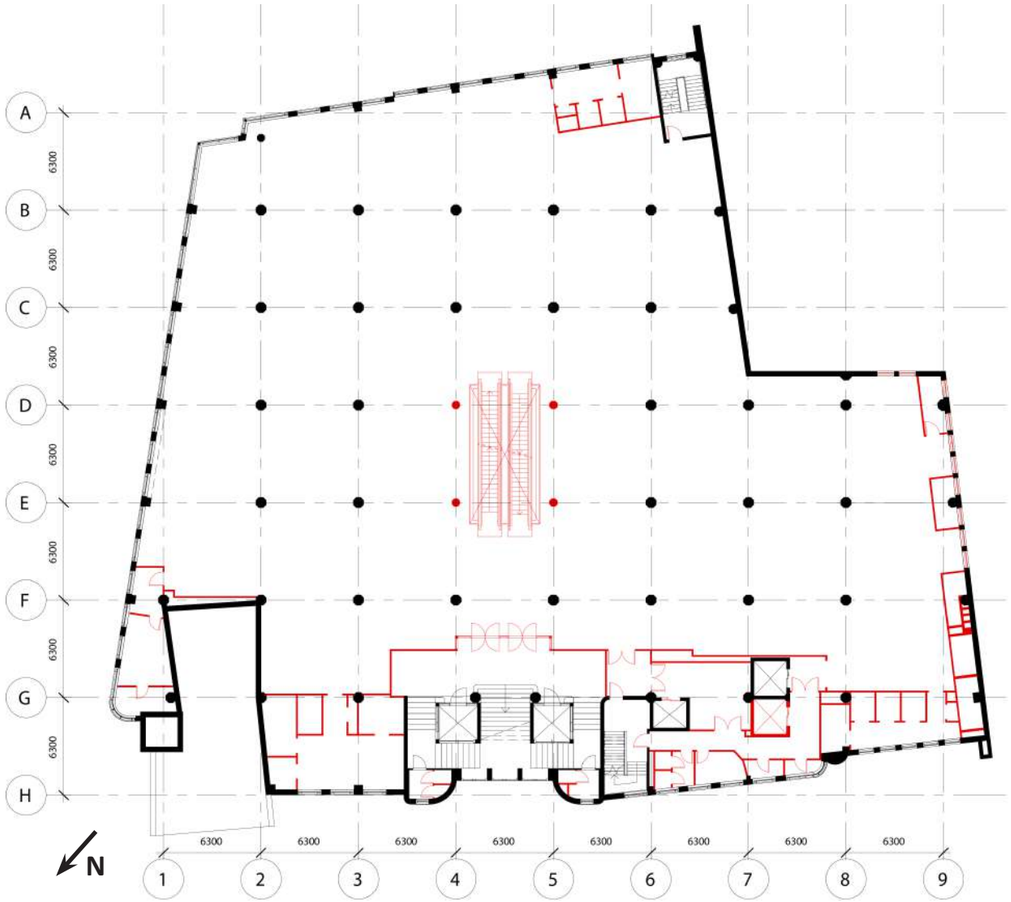

V&D



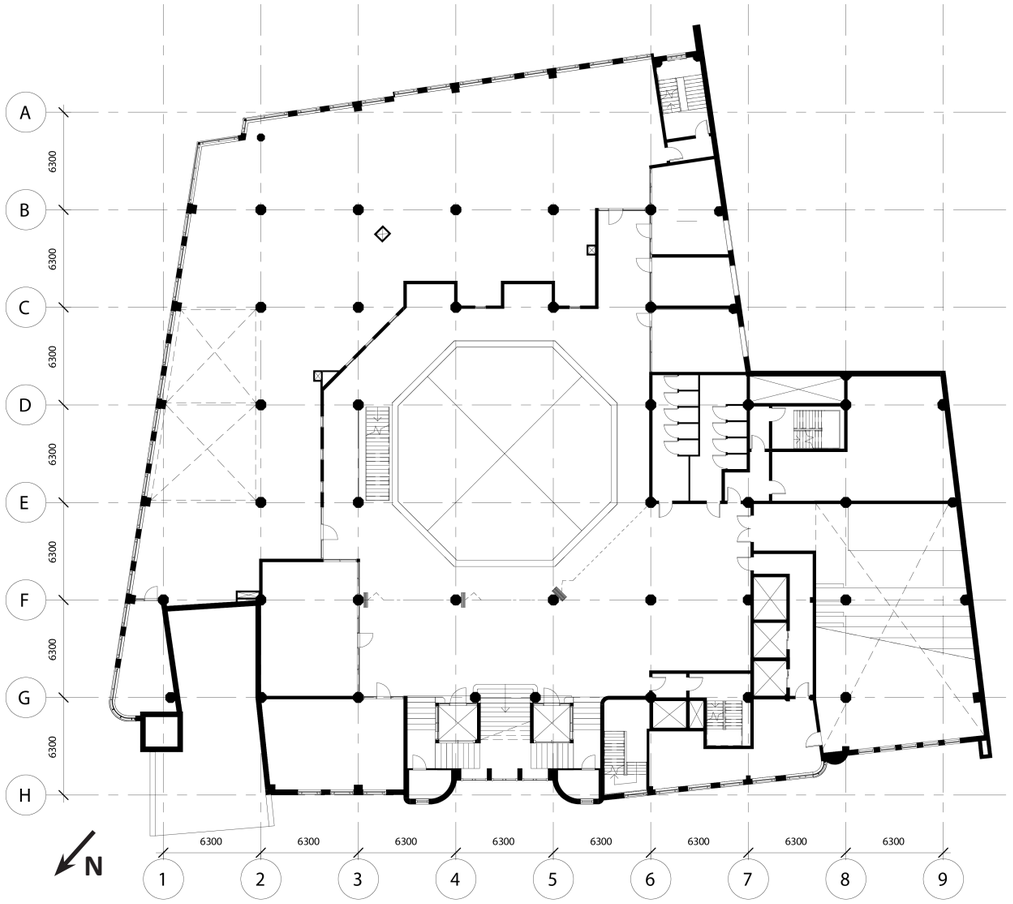


Extra slides

Demolition & redesign



Demolition drawing of typical floor

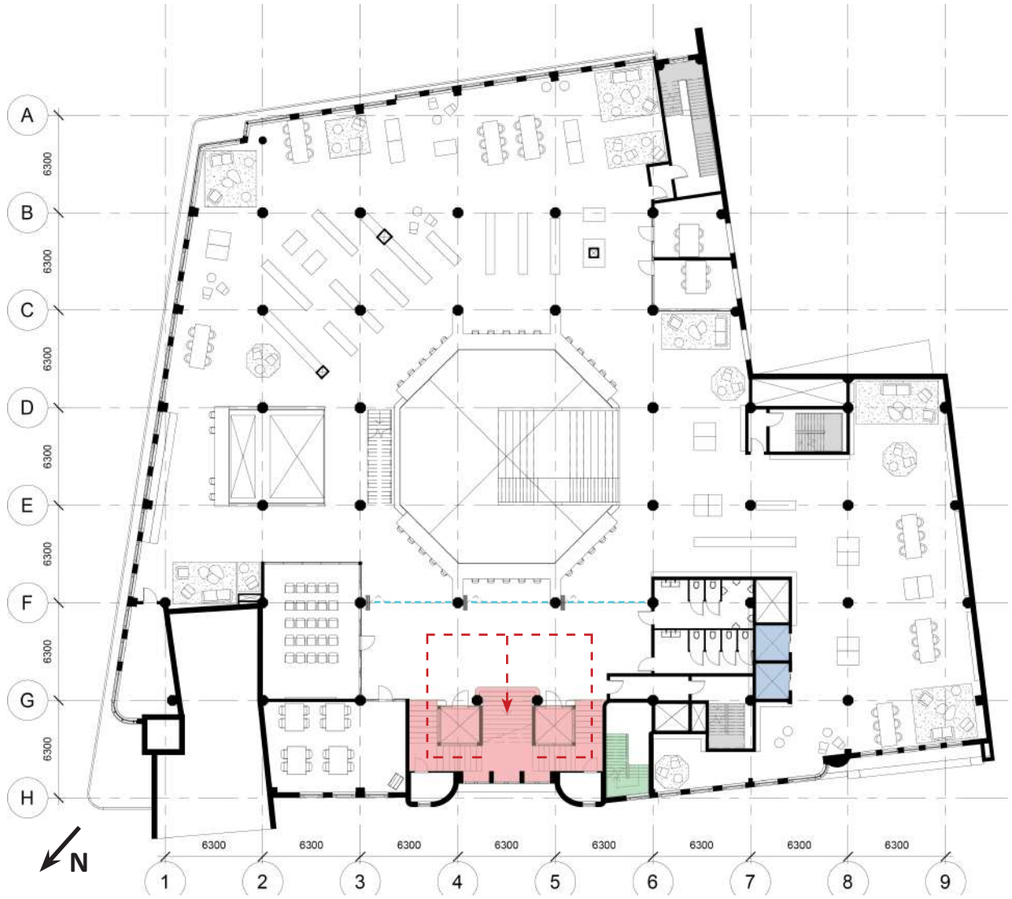


Redesign of typical floor

Availability of program during the day

Circulation and accessibility

Day circulation



Evening circulation

Public circulation library

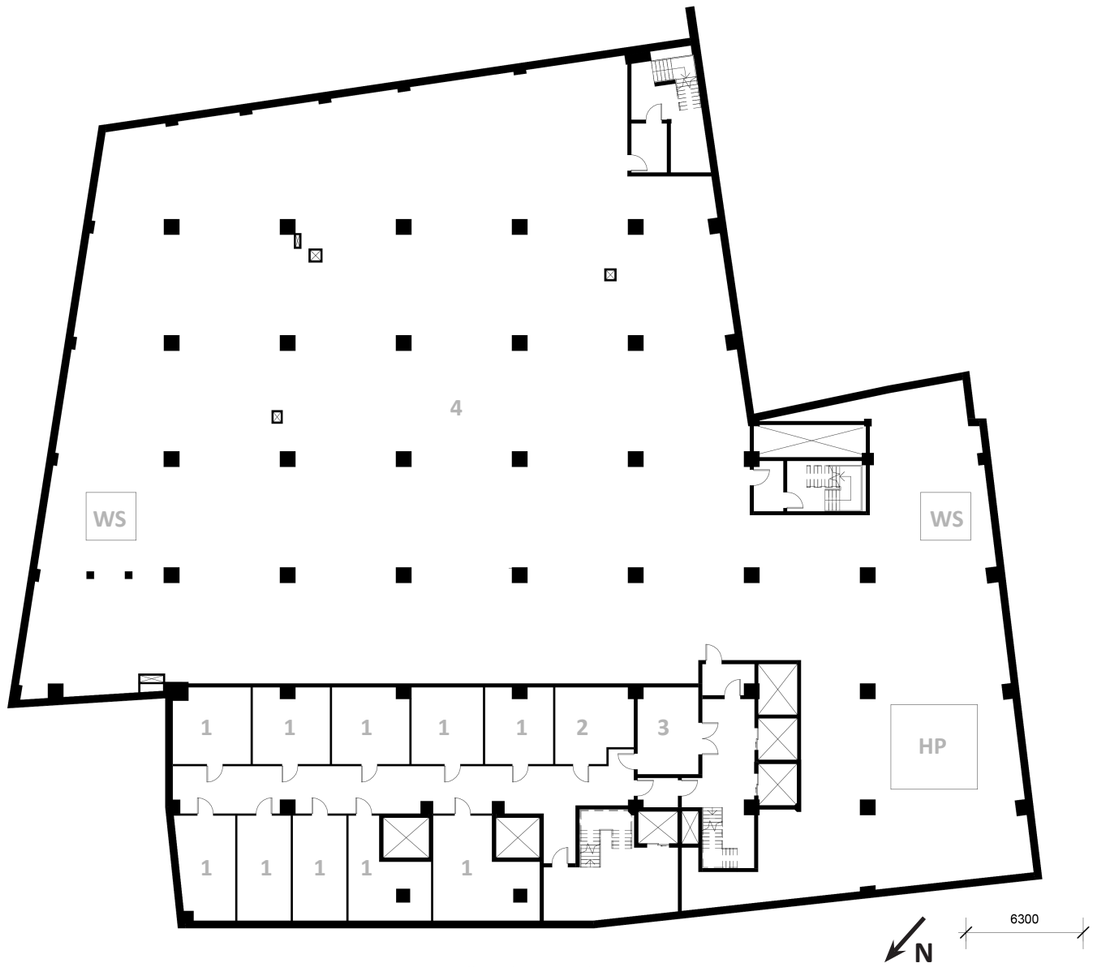
Circulation to dwellingfloors

Logistics library

Emergency staircases

Transparant pivot doors

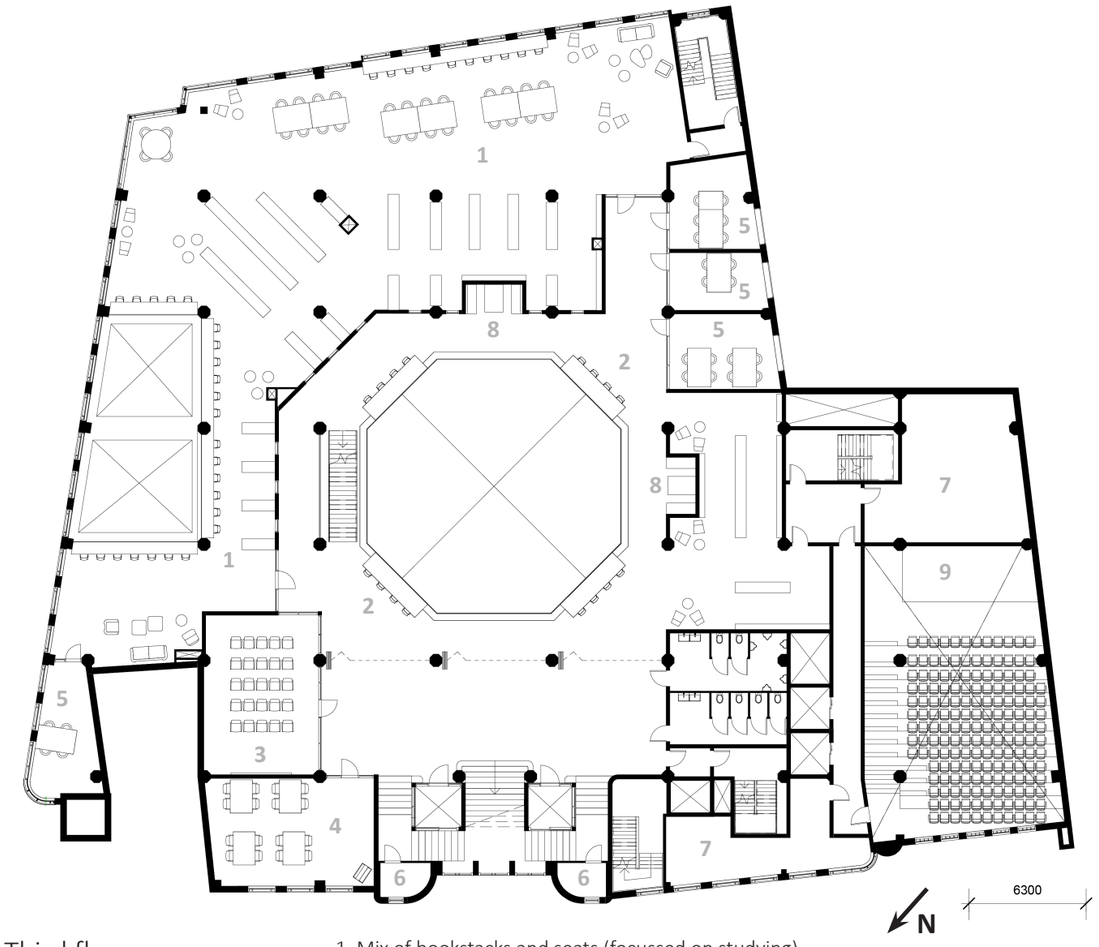
Lower basement



Basement B2

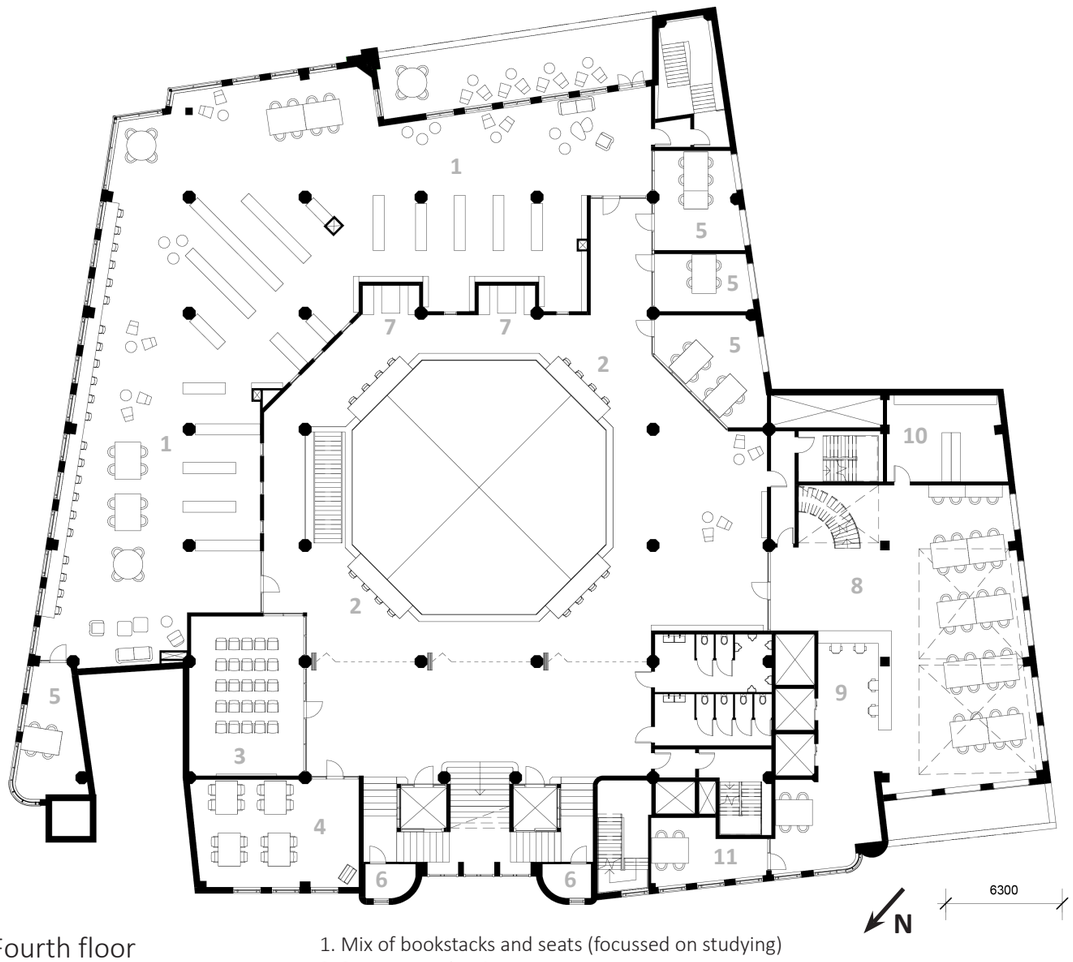
1. Dwellings' external storages
2. Dwellings' collective storage
3. Trashcans for dwellings
4. Installations space

Third and fourth floor



Third floor

1. Mix of bookstacks and seats (focussed on studying)
2. Seats around atrium
3. Lecture space
4. Workshop space
5. (rentable) Meeting rooms
6. Exposition V&D
7. Storage
8. Pockets around atrium
9. Auditorium

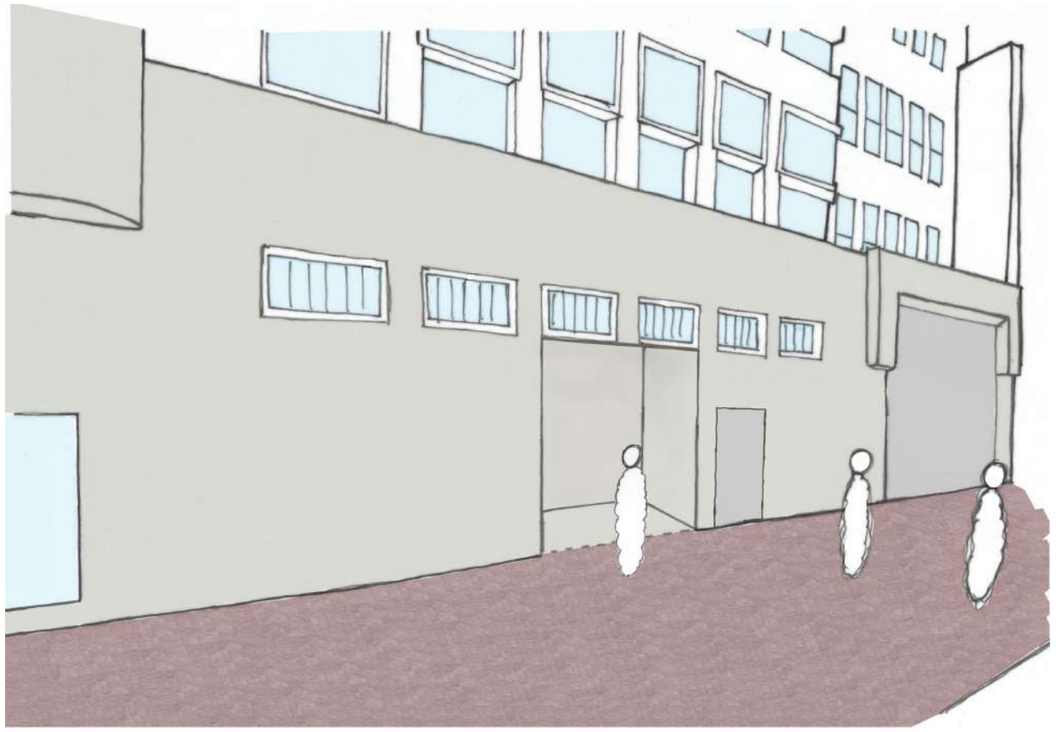


Fourth floor

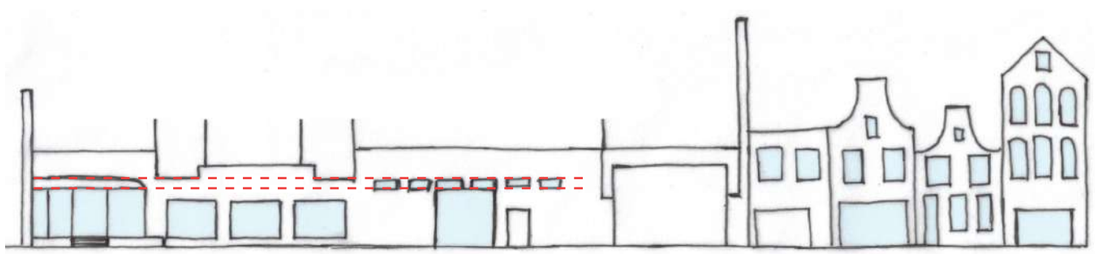
1. Mix of bookstacks and seats (focussed on studying)
2. Seats around atrium
3. Lecture space
4. Workshop space
5. (rentable) Meeting rooms
6. Exposition V&D
7. Pockets around atrium
8. Archive reading room
9. Info desk to request archive material
10. Lockers
11. Private study room

Public entrance Gierstraat

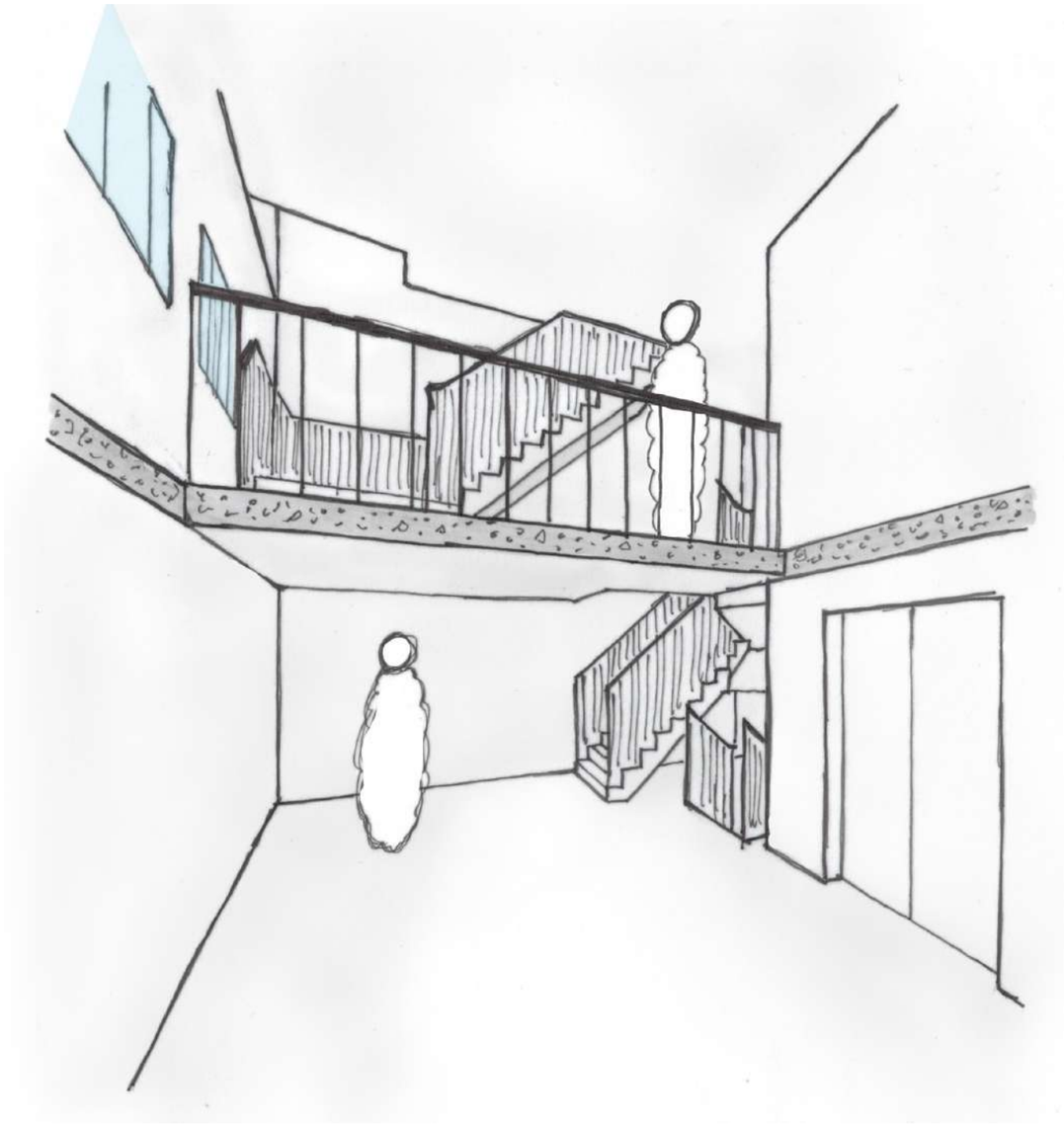
Dwellings’ entrance Gierstraat



New entrance dwellings in Gierstraat

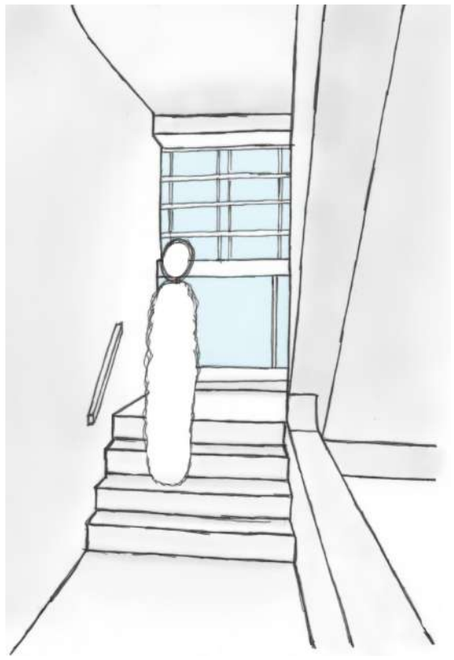


Schematic elevation facade Gierstraat with intervention new entrance dwellings

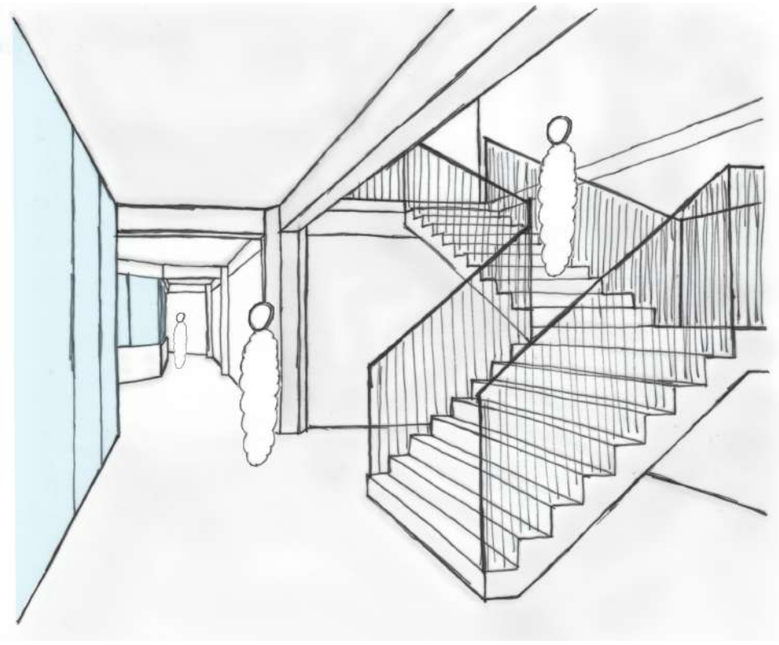


View on new double heigh space for entrance dwellings (ground floor)

Spatial sequence of routing towards dwellings

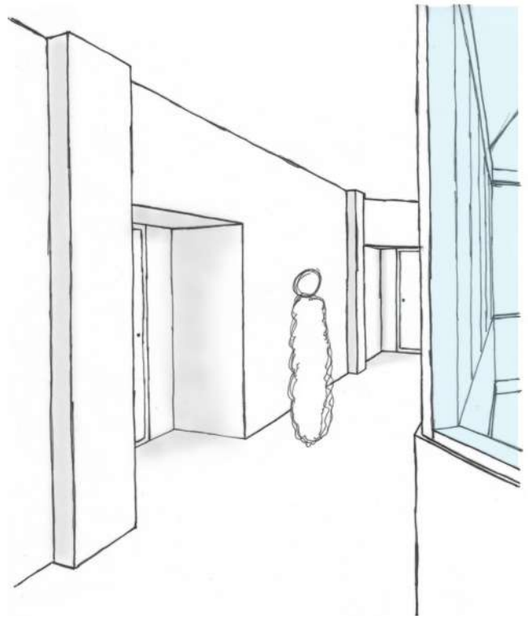


1. View on circulation in existing staircase leading to dwellingfloors



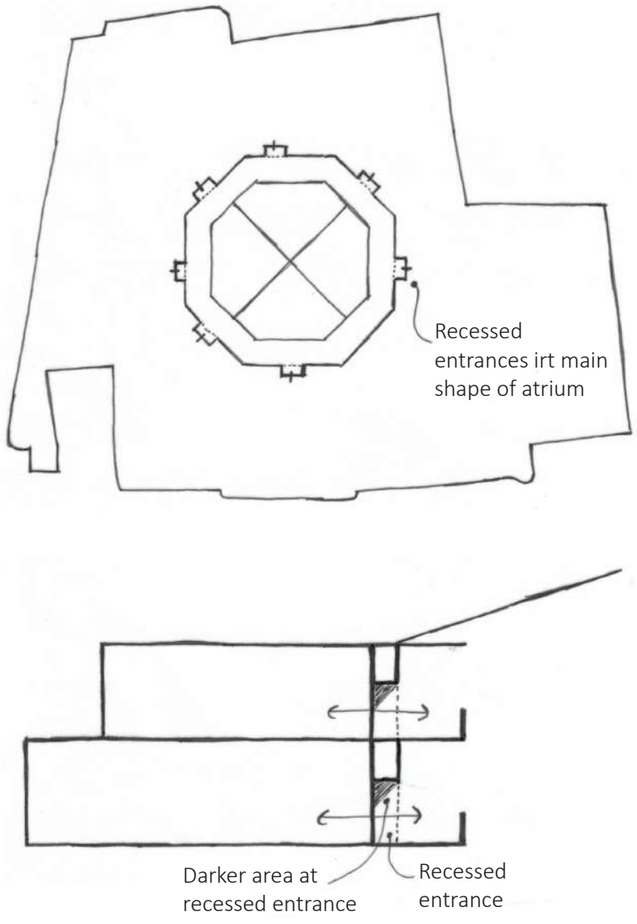
2. View on entrancearea 5th floor with a broad staircase leading towards the collective spaces and connecting the two dwellingfloors

3. View on entrancearea 6th floor with main collective living room and circulation to the dwellings around atrium

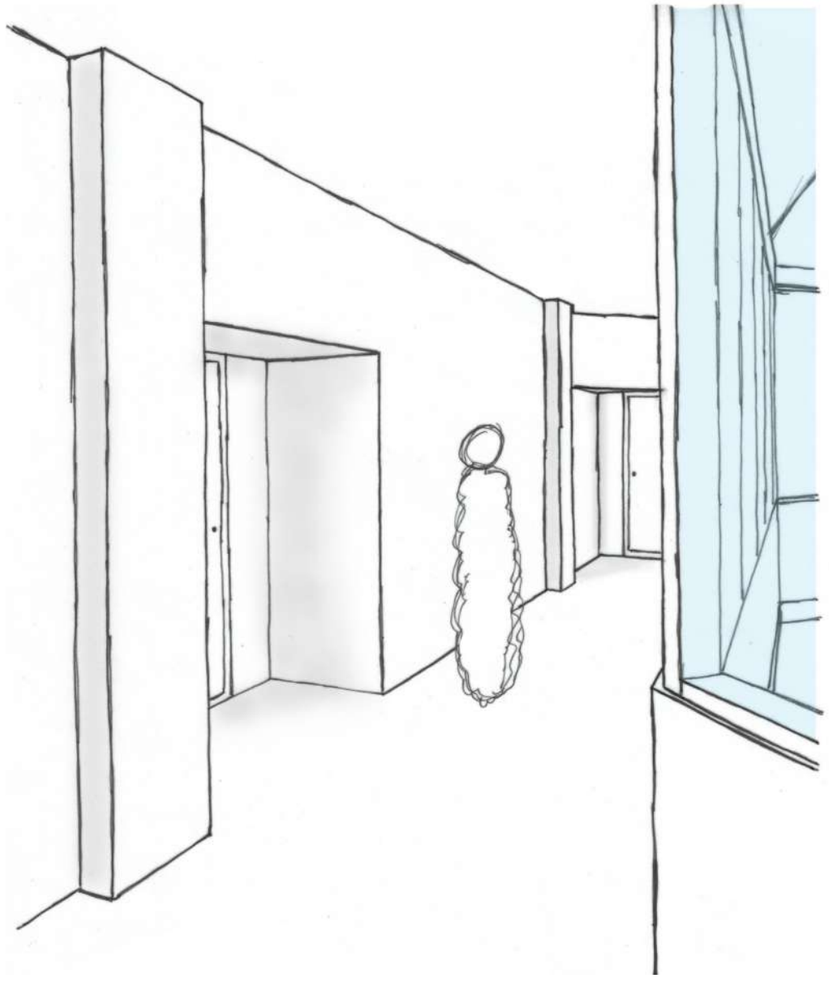


4. View on circulation around atrium with recessed entrances of dwellings

Transition atrium-dwelling

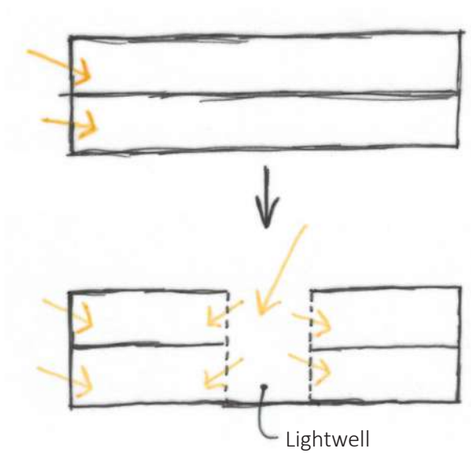


Front doors of dwellings irt circulation

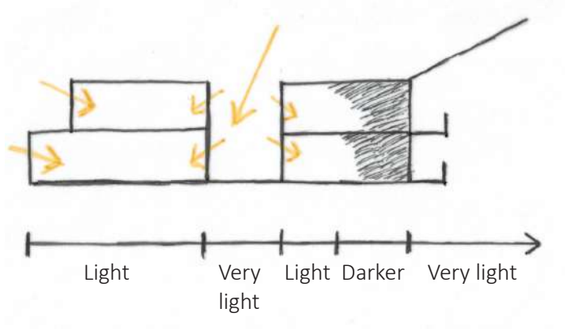


View on recessed dwelling entrances

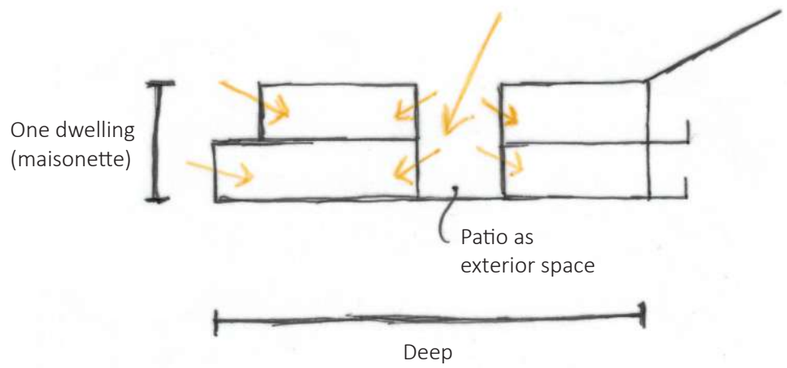
Daylight and types of dwellings



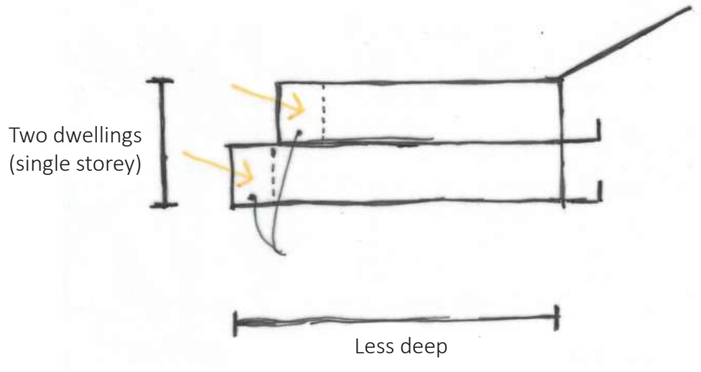
Intervention of lightwell in deep dwellings



Sequence of light/dark parts in patiodwelling



Lightwell in deep dwellings as private exterior space



Less deep dwellings have a loggia as as private exterior space

Daylightmodel of lightwell

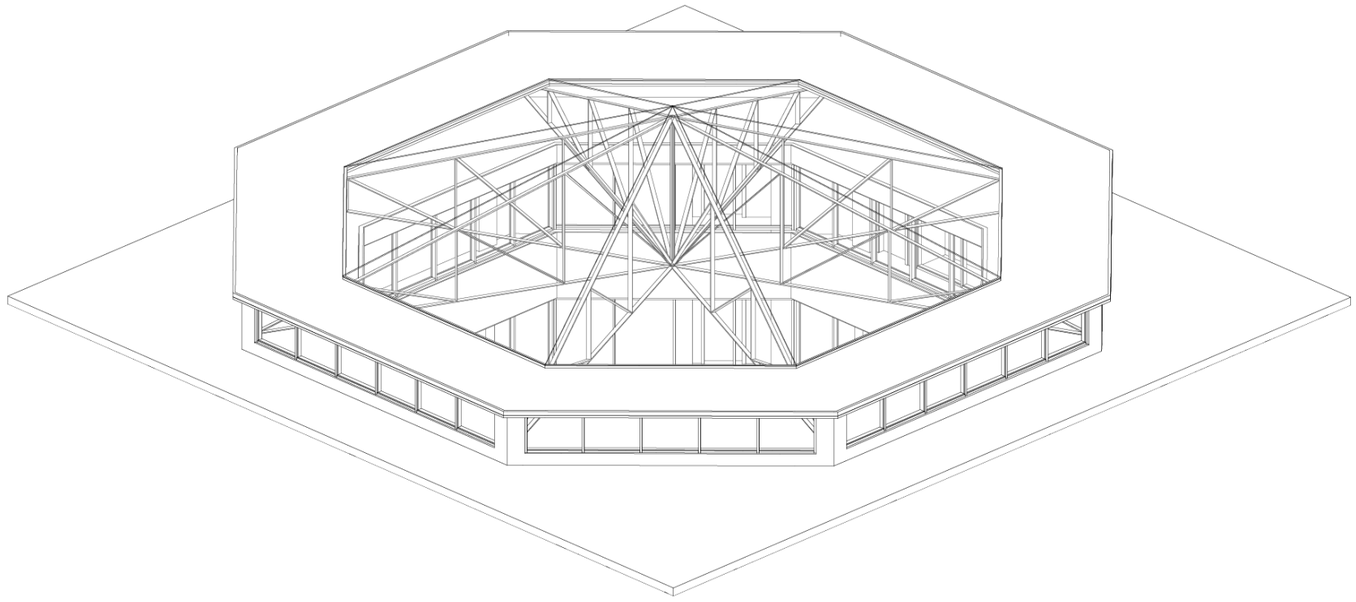
Daylight orientation 1: dwelling 5th floor view

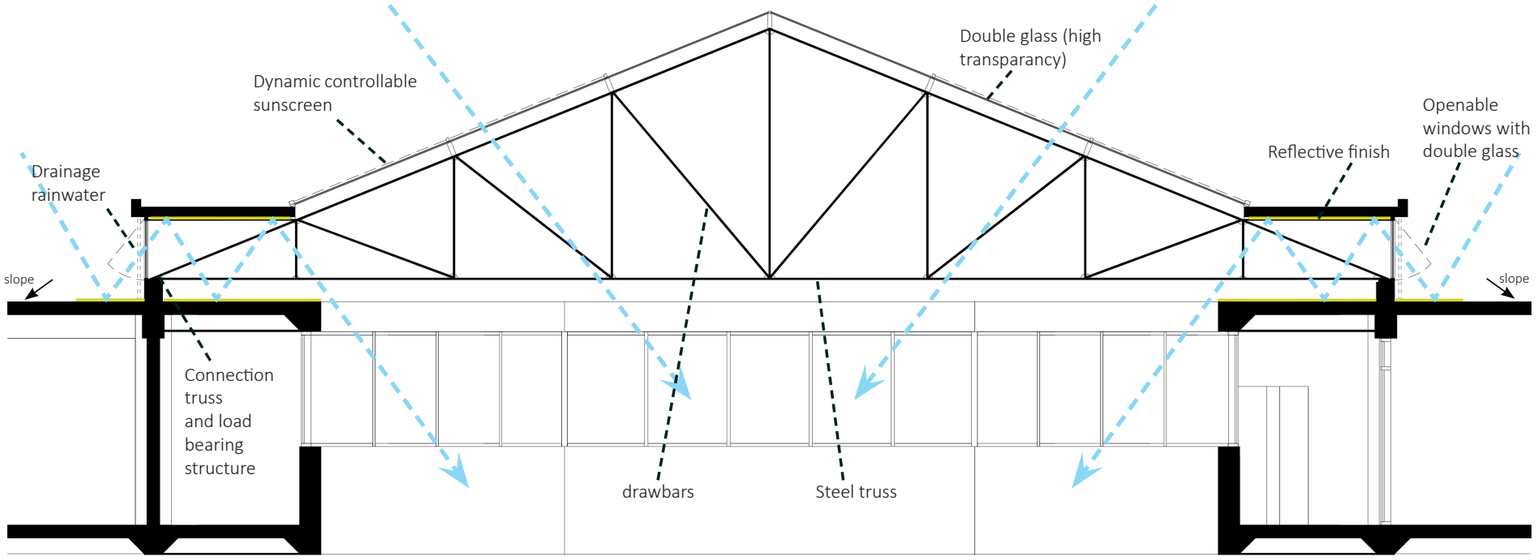
Daylight orientation 2: dwelling 5th floor view

Daylight orientation 1: dwelling 6th floor view

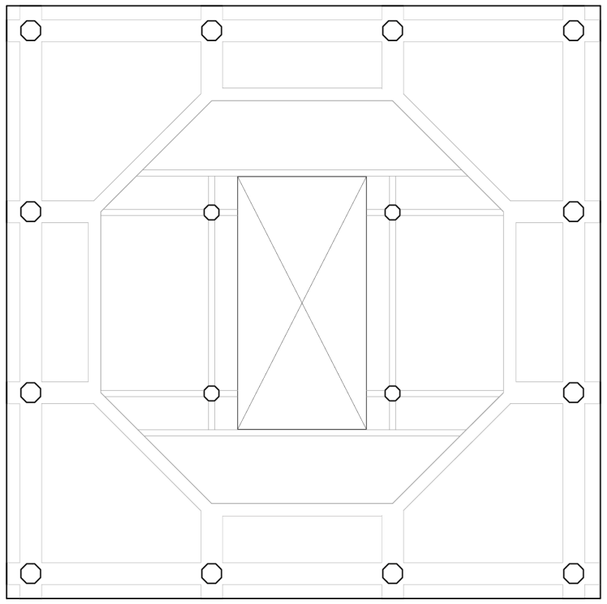
Daylight orientation 2: dwelling 6th floor view

The new skylight

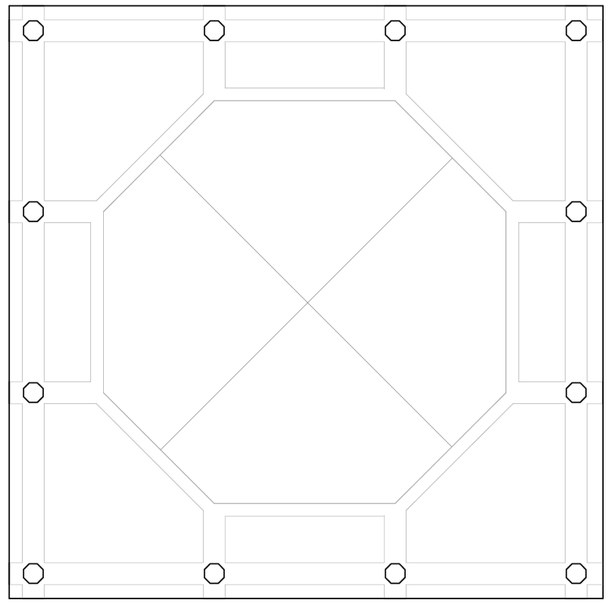




Structure atrium

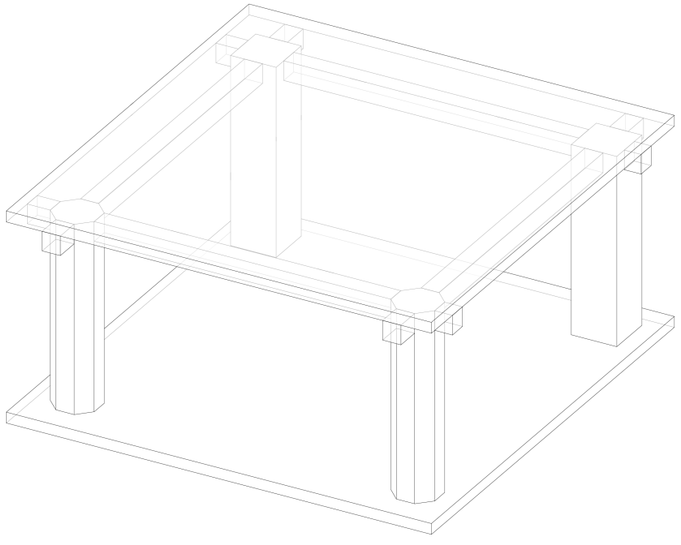


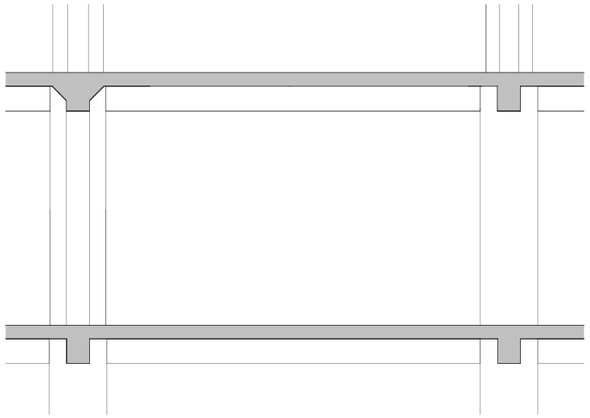
Structure existing



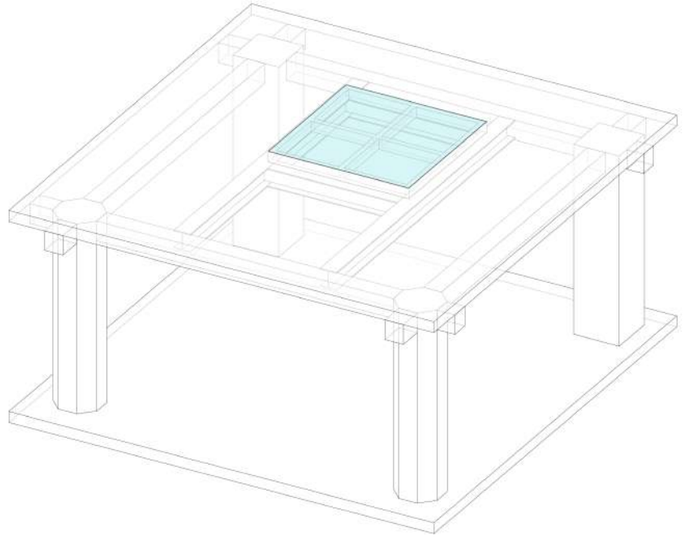
Structure new

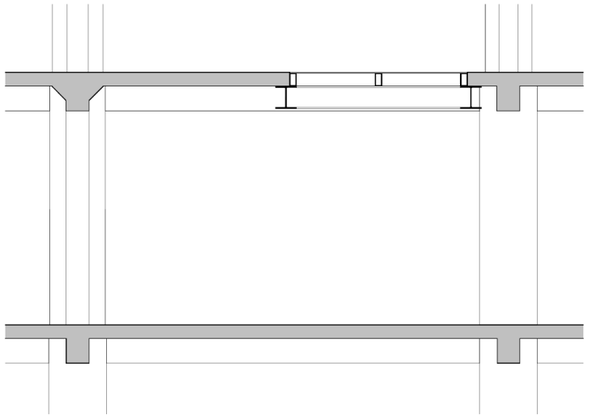
Structure glass floors





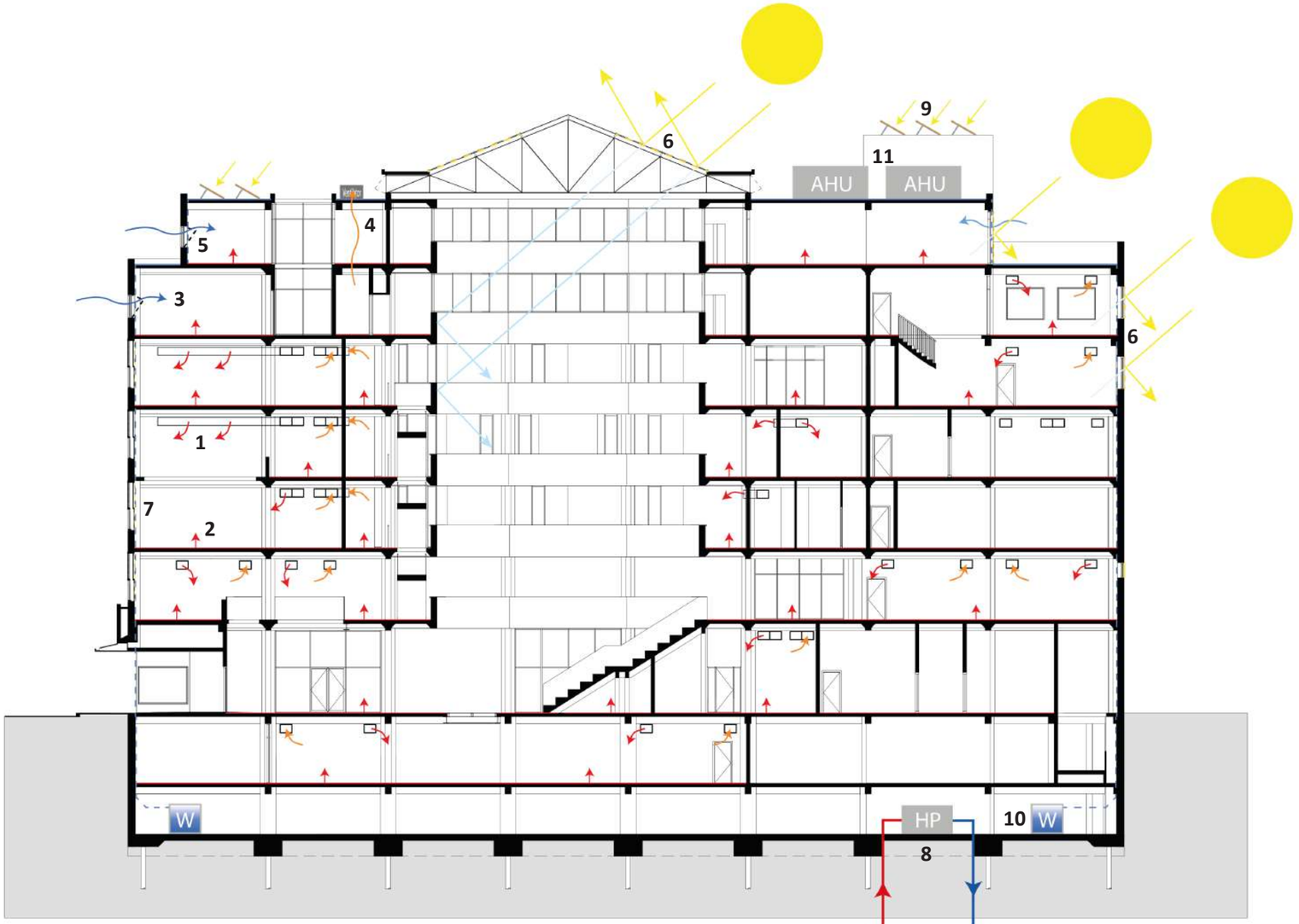
Structure existing





Structure with intervention glass floor

Climate: winter situation



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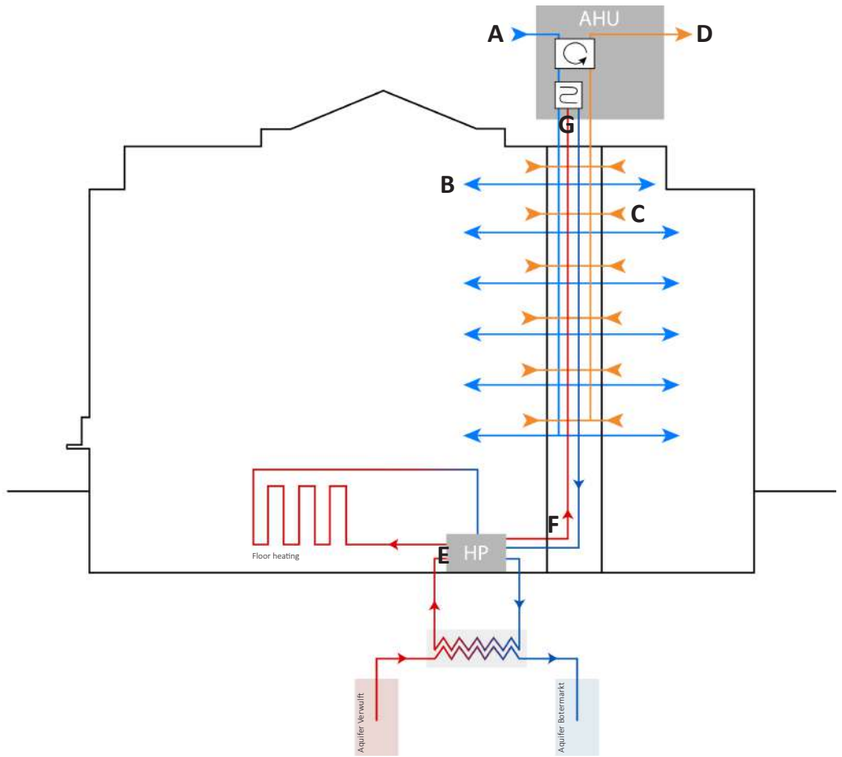
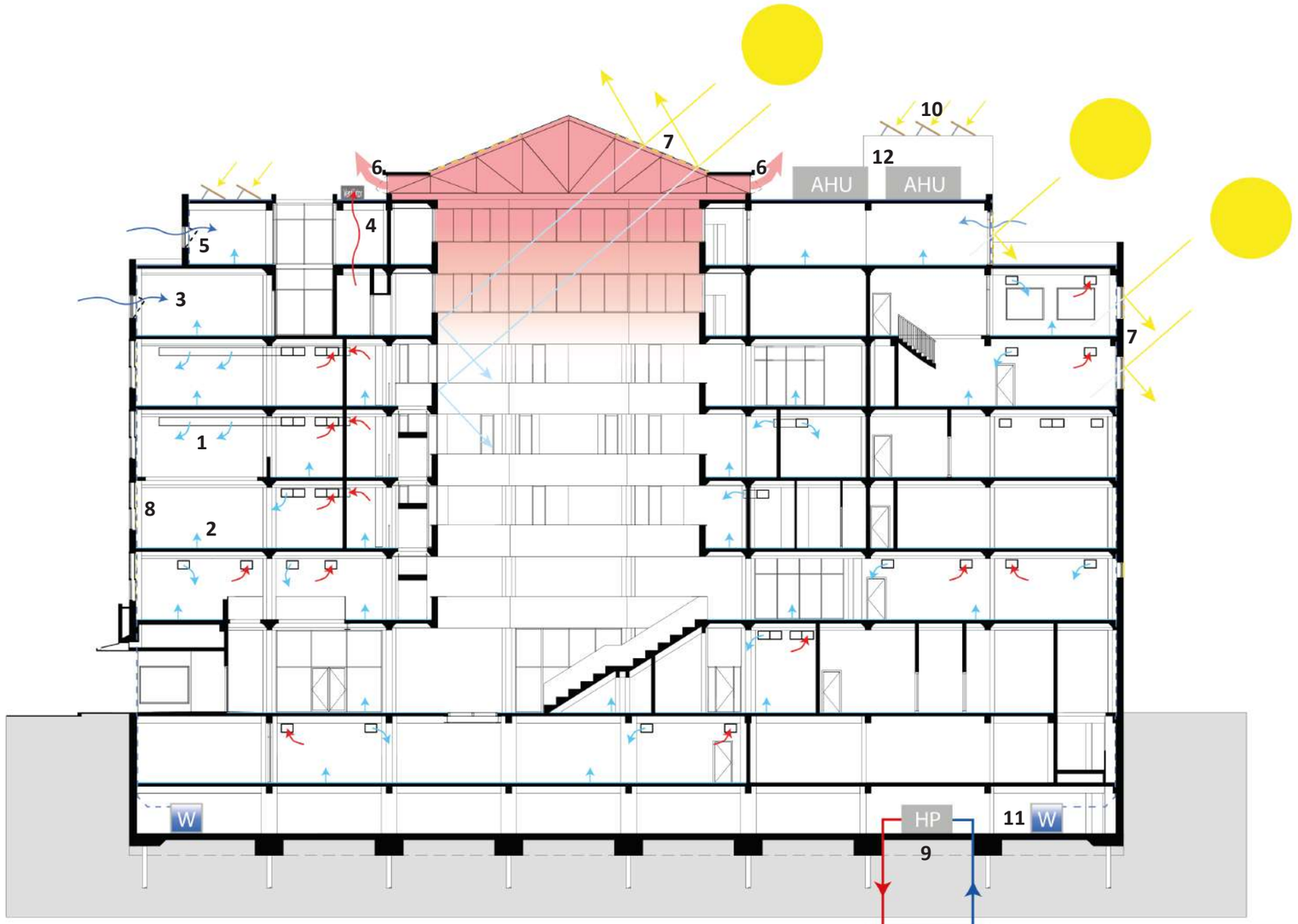
6. Dynamic sunscreens to block sunlight, not daylight
7. Louvres as dynamic daylight reducing element
8. Heat pump with ground as source, open groundenergysystem (WKO) with two aquifers
9. South orientated solar panels for electricity
10. Water collection in basement to reuse for toilets and rooftop terrace dwellings
11. Air handling units placed on roof, provided with WTW by thermal wheel (n= 60-90%).



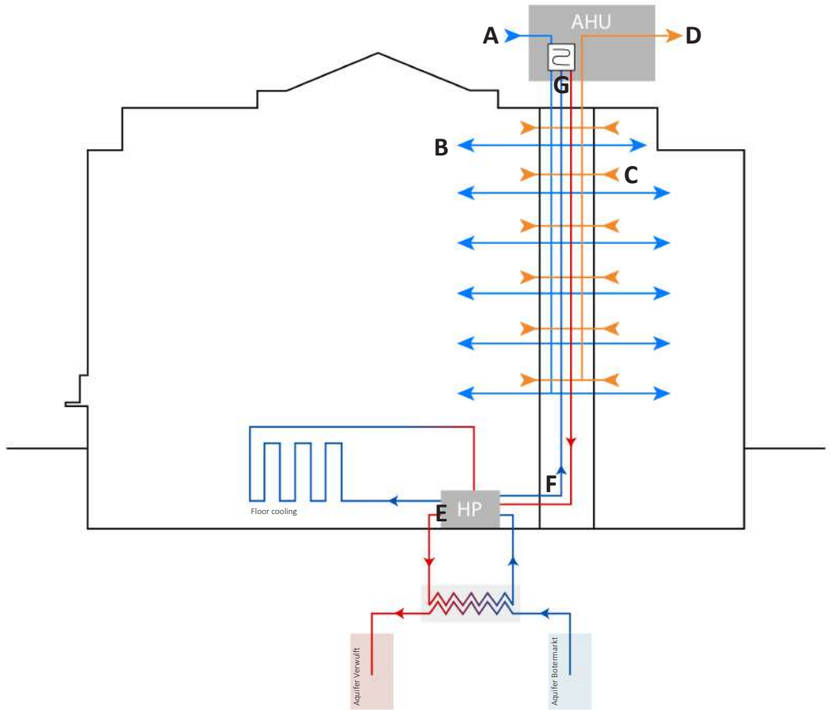
Principle heating in winter irt heatpump

A. Fresh inlet air
B. Fresh air comes into spaces
C. Exhaust air is sucked out of spaces
D. Expelled air out of building
E. Heat pump gets warm water from ground and flows to floor heating system in building
F. The warm water from the ground in the HP heats the pipe with water going up to the air handling unit
G. The warm water of the pipe is used in the heat exchanger of the AHU (fresh air/fluid medium) to heat up the fresh inlet air in combination with the residual heat from the exhaust air

Climate: summer situation



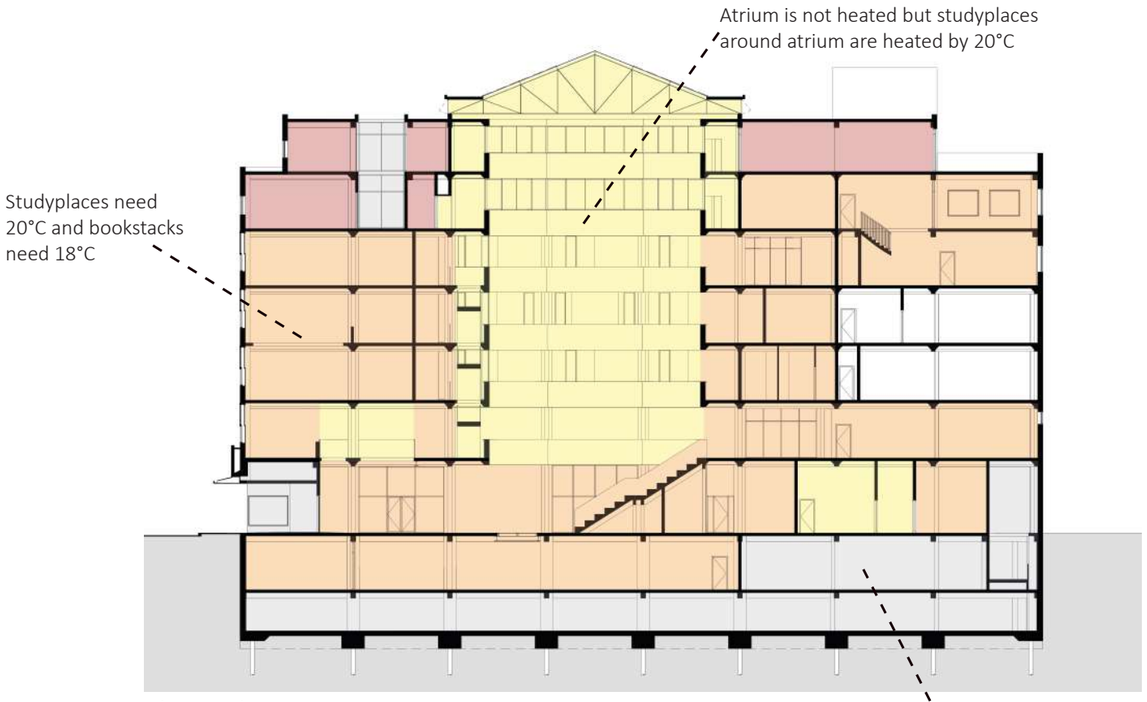
1. Mechanical ventilation, pre-cooled
2. Floor cooling for library and dwellings
3. Natural air inlet by ventilation grille in new window (dwellings)
4. Mechanical air outlet by ventilatorunits on roof (dwellings)
5. Openable windows (dwellings)
6. Vertical openable window in skylight to let out heat of atrium
7. Dynamic sunscreens to block sunlight, not daylight
8. Louvres as dynamic daylight reducing element
9. Heat pump with ground as source, open groundenergysystem (WKO) with two aquifers
10. South orientated solar panels for electricity
11. Water collection in basement to reuse for toilets and rooftop terrace dwellings
12. Air handling units placed on roof, provided with WTW by thermal wheel (n= 60-90%).



Principle cooling in summer irt heatpump

A. Fresh inlet air
B. Fresh air comes into spaces
C. Exhaust air is sucked out of spaces
D. Expelled air out of building
E. Heat pump gets cool water from ground and flows to floor cooling system in building
F. The cool water from the ground in the HP cools the pipe with water going up to the air handling unit
G. The cool water of the pipe is used in the heat exchanger of the AHU (fresh air/fluid medium) to cool down the fresh inlet air

Climate: thermal zones winter



Thermal zones in section

21 °C - these spaces are heated alltime due to constantly used during the day (floor heating)

20 °C - these spaces are seperately heated due to partly used during the day (heating by air + floor heating)

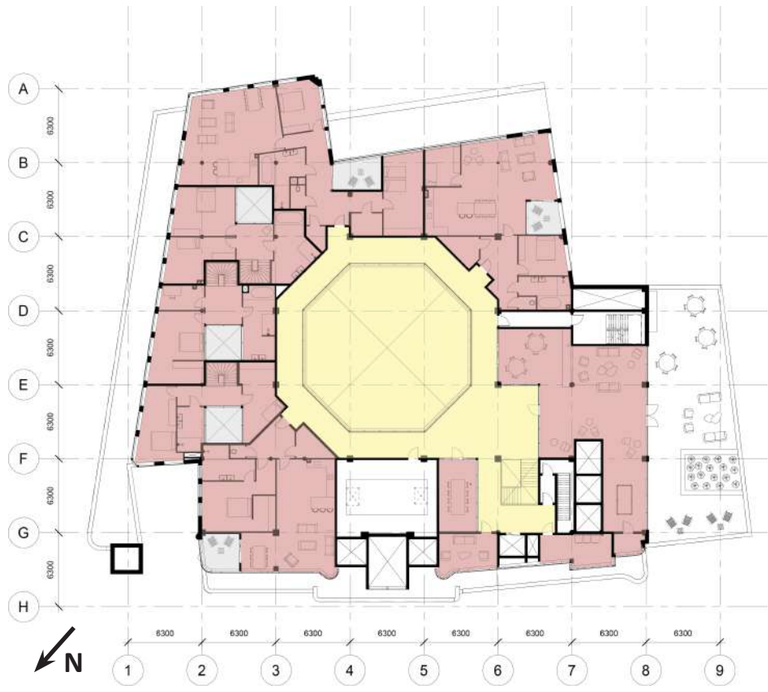
18 to 20°C - these spaces are heated alltime due to constantly used during the day within openinghours (heating by air + floor heating)

16 °C - no heating necessary due to function as atrium/void or circulation space, this space will be heated by residual heat from adjacent spaces

Exterior climate (instalation spaces have to be heated to be above 0 °C)

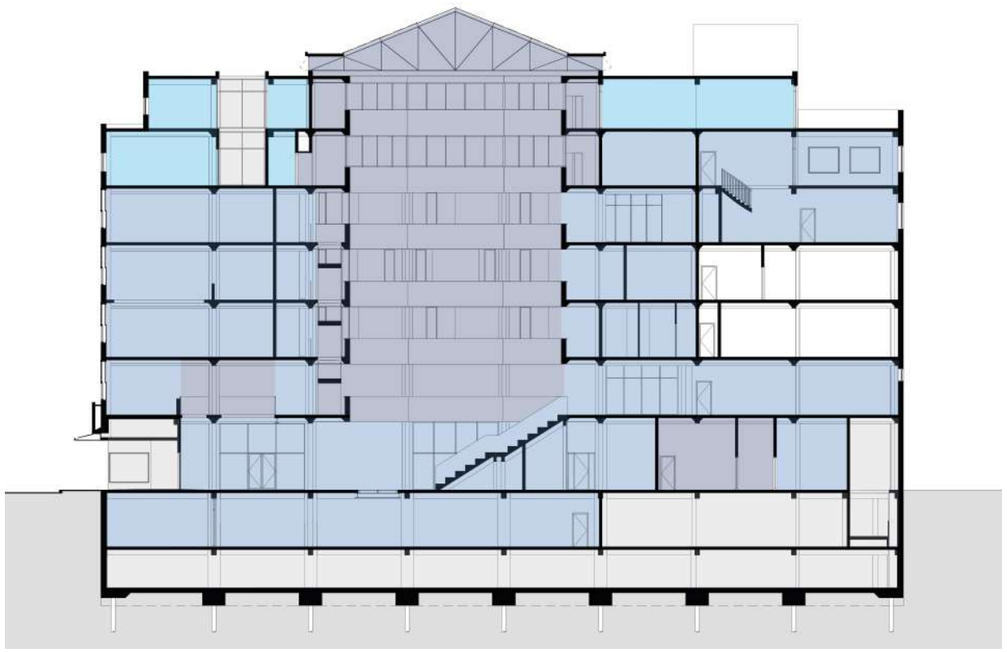
First floor

Second floor



Sixth floor

Climate: thermal zones summer



Thermal zones in section

20 to max 23 °C - these spaces are seperately cooled (when necessary) due to partly used during the day (cooling by air + floor cooling) (high occupancy, light activity)

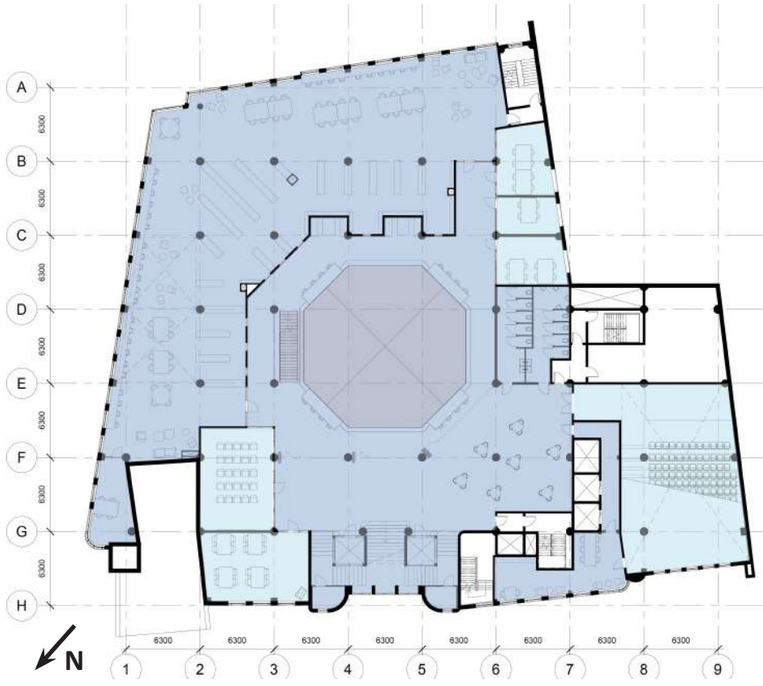
21 to max 25 °C - these spaces are cooled alltime (when necessary) due to constantly used during the day (floor cooling)

22 to max 25°C - these spaces are cooled alltime (when necessary) due to constantly used during the day within openinghours (cooling by air + floor cooling) (medium to low occupancy, light activity)

22 to max 28 °C - cooling is necessary if atrium/void or circulation space gets too warm (cooling by air + floor cooling)

Exterior climate

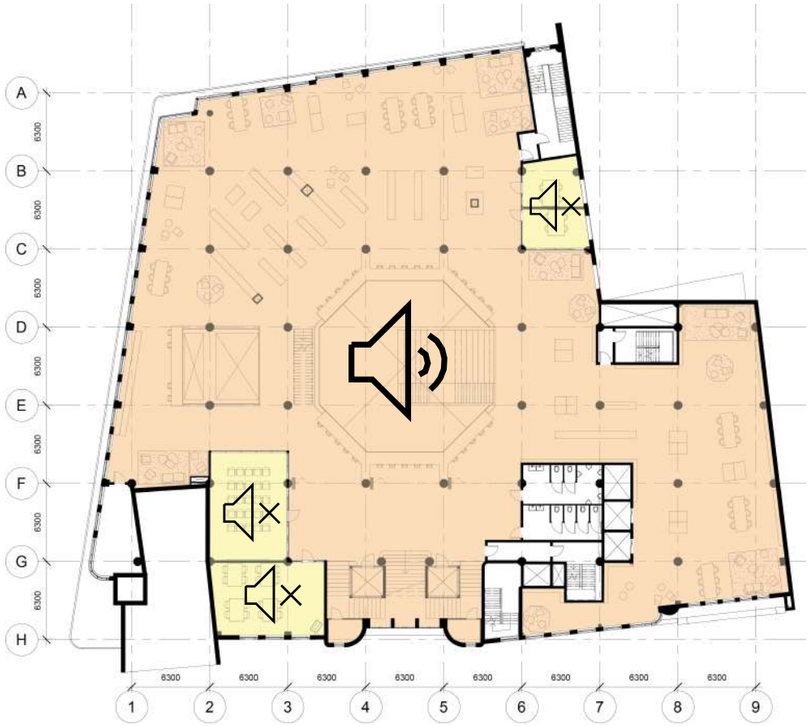
First floor



Second floor

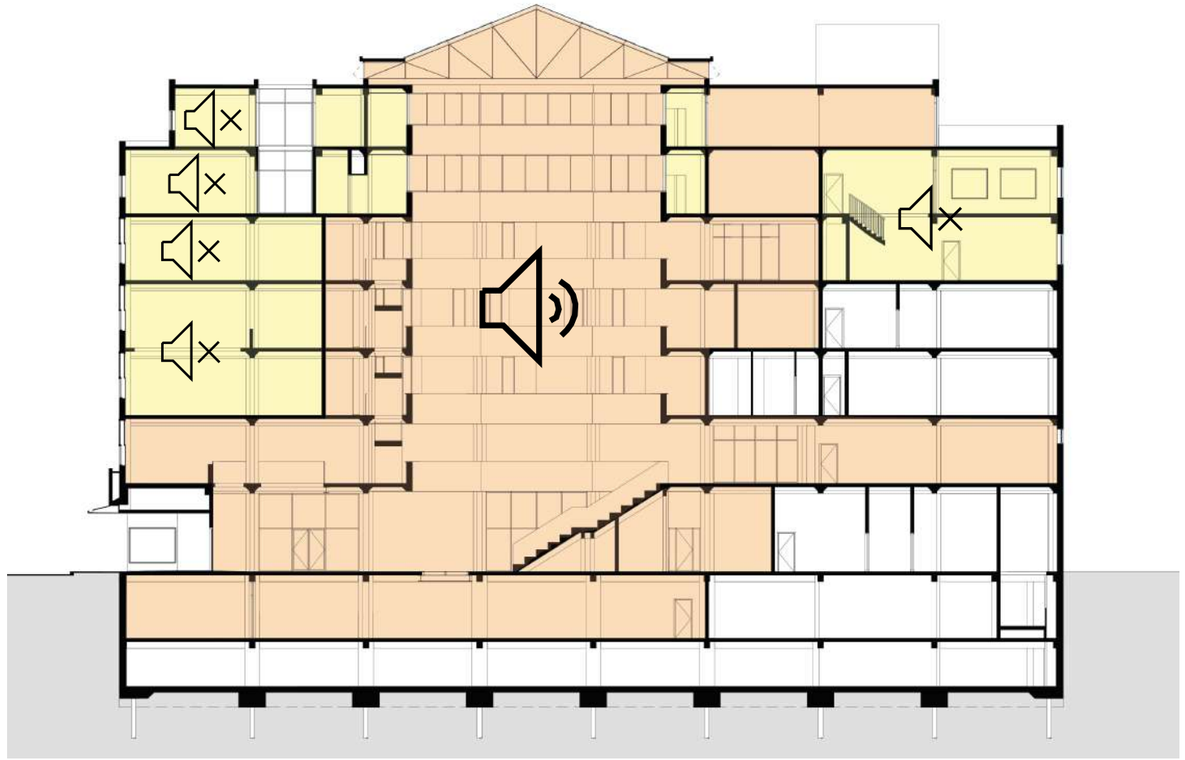
Sixth floor

Climate: acoustic zones



First floor

Second floor

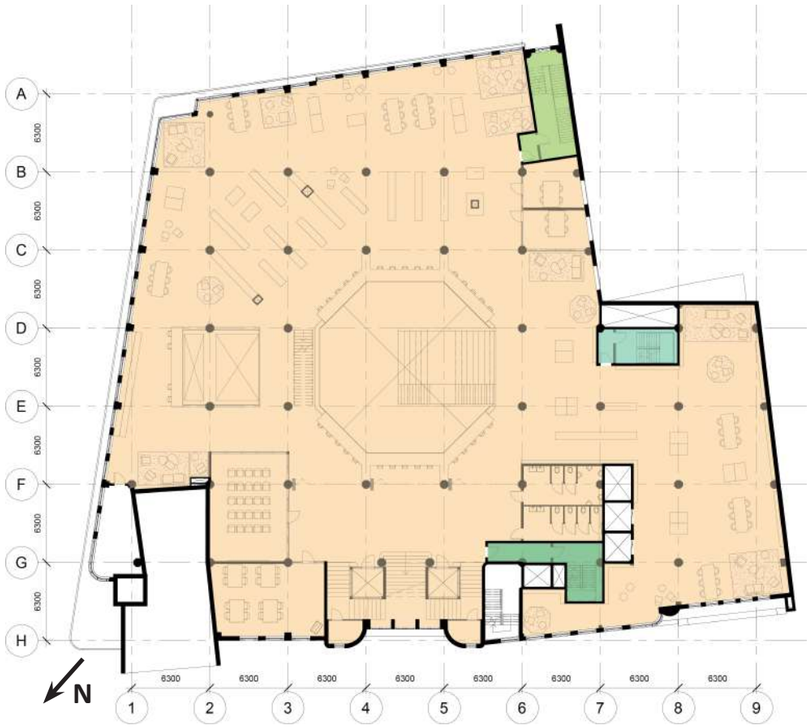


Acoustic zones in section

should be silent, no sound penetrating from adjacent spaces in different acoustic zone and vice versa

could be more noisy

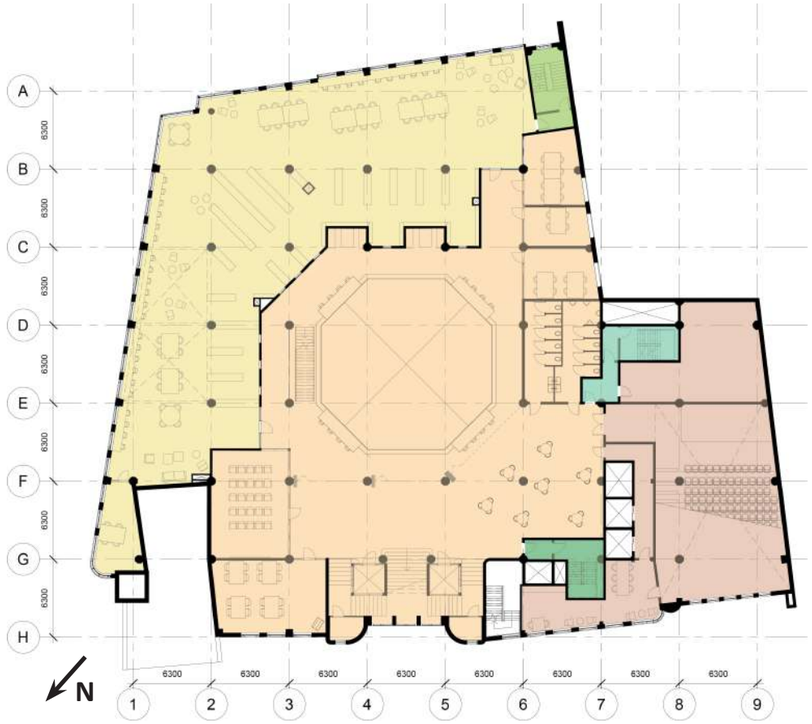
Firesafety in building



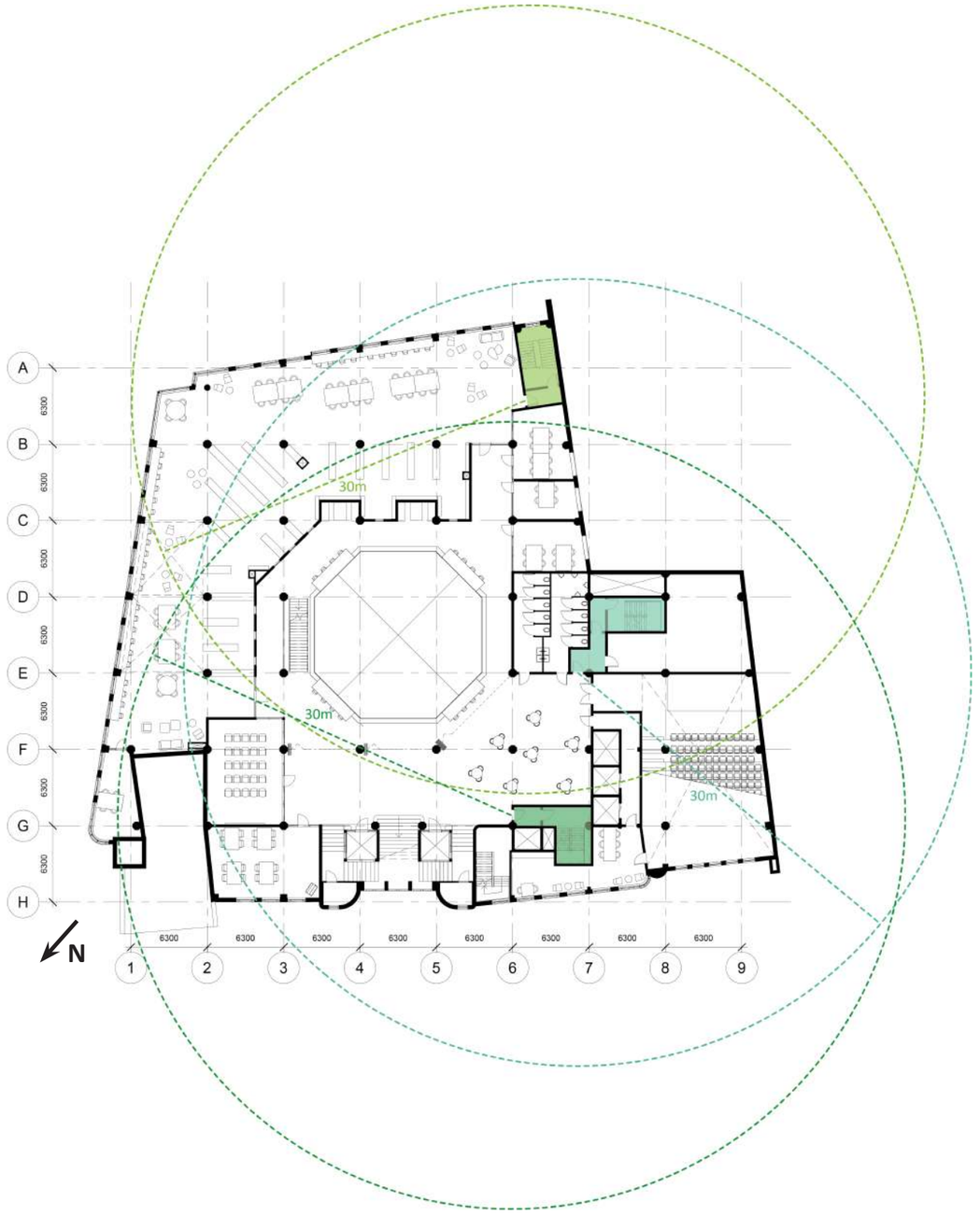
First floor plan, fire compartments

First floor plan, fleeingradius of 30m to emergency stairs

Firesafety in building

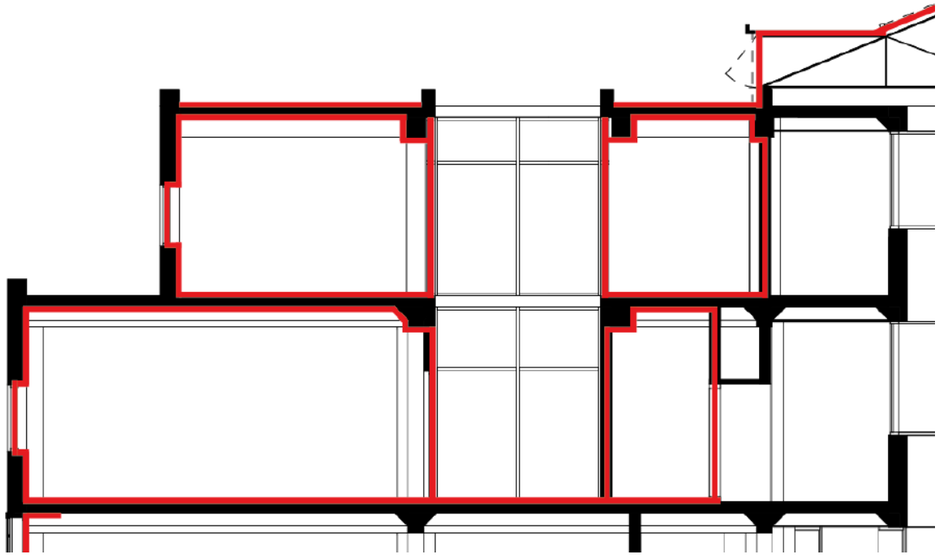


Second floor plan, fire compartments

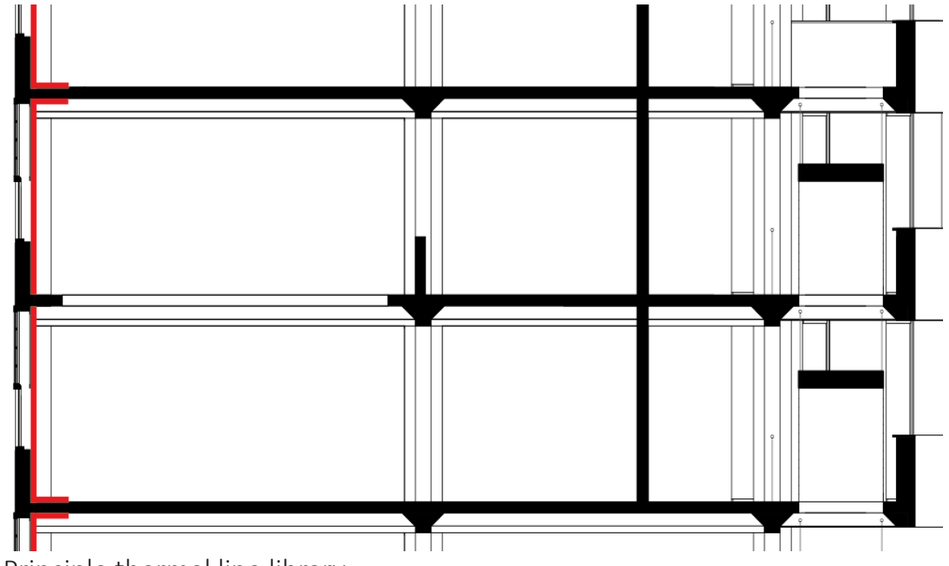


Second floor plan, fleeingradius of 30m to emergency stairs

Thermal line building



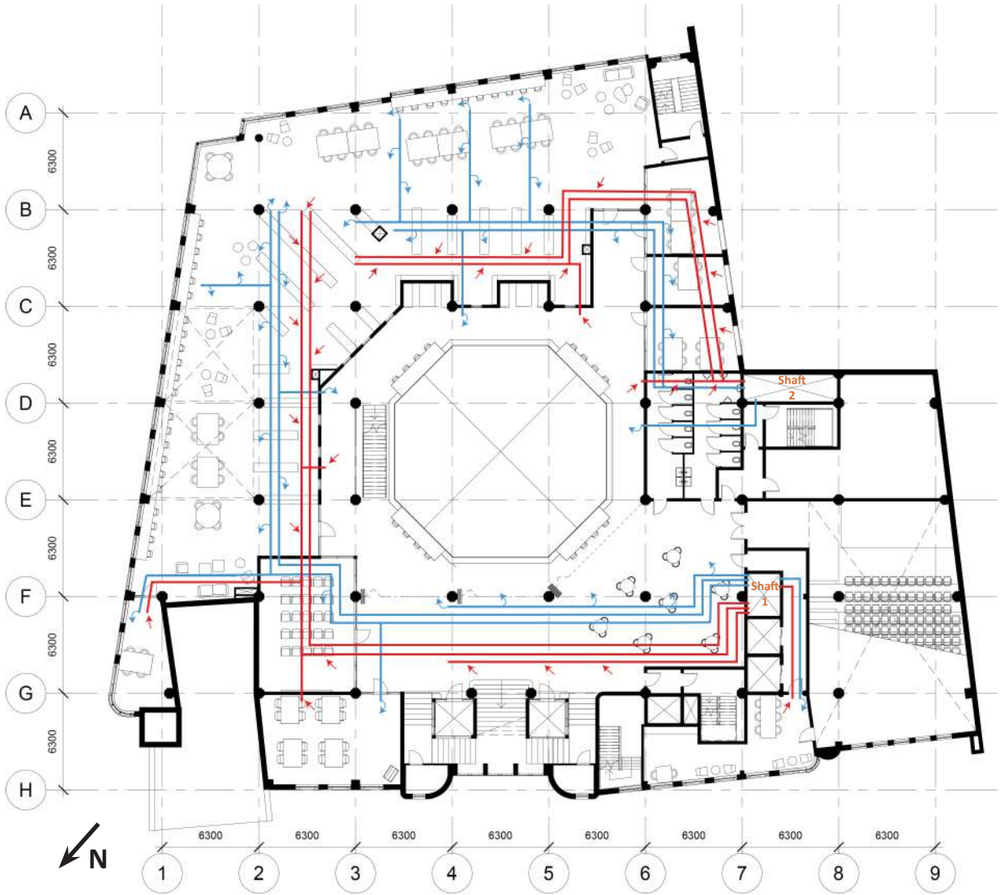
Principle thermal line dwellings



Principle thermal line library

Principle thermal line building

Horizontal ventilation distribution principle



Second floor plan

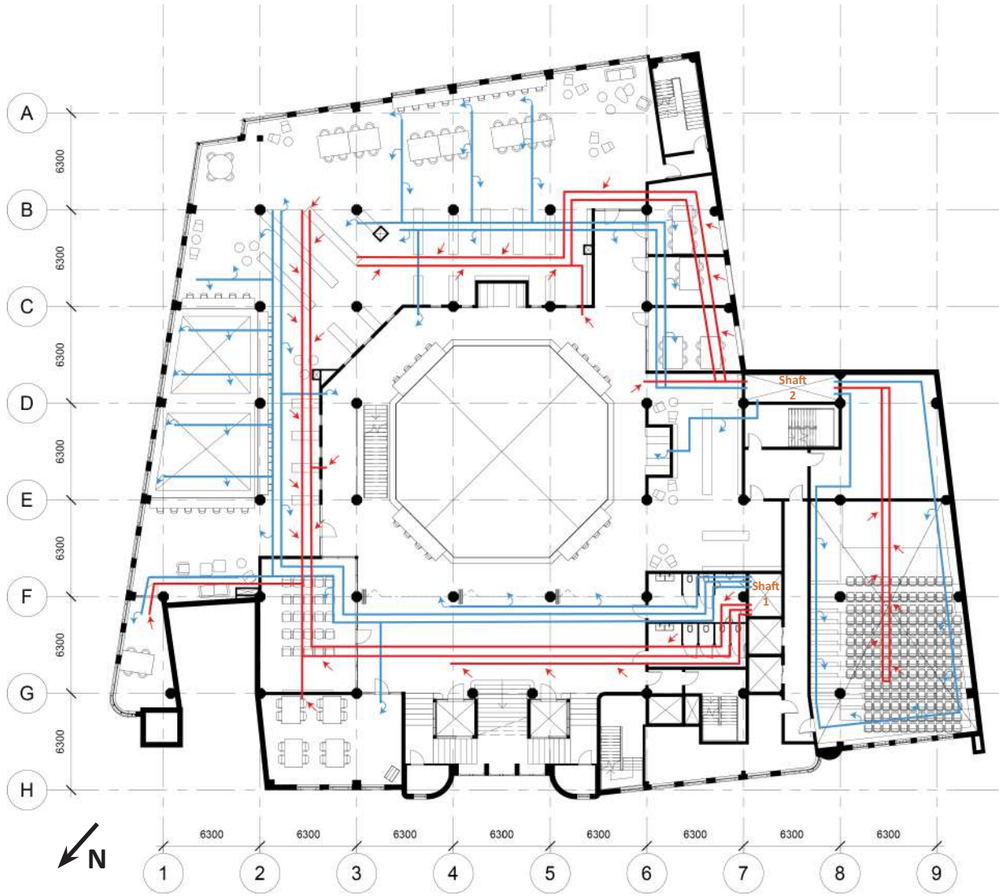
Ventilation calculation from shaft 1 to library spaces
Beginning of ventilation ducts:
677m2 * 3,5 m = 2370 m3
2370 * 5/h = 11848 m3/h = 3,29097 m3/s
3,29097 / 5m/s = 0,658 m2 = 6582 cm2
-> 3 ventilation ducts of 55x40cm (rectangular)

Ventilation ducts in study area:
348m2 * 3,5m = 1218 m3
1218 * 5/h = 6090 m3/h = 1,6917 m3/s
1,6917 / 5m/s = 0,3383 m2 = 3383 cm2
-> 2 ventilation ducts of 45x40cm (rectangular)

Ventilation calculation from shaft 2 to library spaces
Beginning of ventilation ducts:
481m2 * 3,5 m = 1684 m3
1684 * 5/h = 8418 m3/h = 2,3382 m3/s
2,3382 / 5m/s = 0,4676 m2 = 4676 cm2
-> 2 ventilation ducts of 60x40cm (rectangular)

Ventilation ducts in study area:
*354m2 * 3,5m = 1239 m3*
*1239 * 5/h = 6195 m3/h = 1,7208m3/s*
1,7208 / 5m/s = 0,3442 m2 = 3442 cm2
-> 2 ventilation ducts of 45x40cm (rectangular)

Ventilation calculation from shaft 2 to atrium
160m2 * 3,5 m = 560 m3
560 * 15/h = 8400 m3/h = 2,3333 m3/s
2,3333 / 5m/s = 0,4667 m2 = 4667 cm2
-> 1 ventilation duct of 120x40cm (rectangular)



Third floor plan

Ventilation calculation from shaft 1 to library spaces
Beginning of ventilation ducts:
677m2 * 3,5 m = 2370 m3
2370 * 5/h = 11848 m3/h = 3,29097 m3/s
3,29097 / 5m/s = 0,658 m2 = 6582 cm2
-> 3 ventilation ducts of 55x40cm (rectangular)

Ventilation ducts in study area:
348m2 * 3,5m = 1218 m3
1218 * 5/h = 6090 m3/h = 1,6917 m3/s
1,6917 / 5m/s = 0,3383 m2 = 3383 cm2
-> 2 ventilation ducts of 45x40cm (rectangular)

Ventilation calculation from shaft 2 to library spaces
Beginning of ventilation ducts:
476m2 * 3,5 m = 1666 m3
1666 * 5/h = 8330 m3/h = 2,3129 m3/s
2,3139 / 5m/s = 0,4628 m2 = 4628 cm2
-> 2 ventilation ducts of 60x40cm (rectangular)

Ventilation ducts in study area:
*354m2 * 3,5m = 1239 m3*
*1239 * 5/h = 6195 m3/h = 1,7208m3/s*
1,7208 / 5m/s = 0,3442 m2 = 3442 cm2
-> 2 ventilation ducts of 45x40cm (rectangular)

Ventilation calculation from shaft 2 to atrium
160m2 * 3,5 m = 560 m3
560 * 15/h = 8400 m3/h = 2,3333 m3/s
2,3333 / 5m/s = 0,4667 m2 = 4667 cm2
-> 1 ventilation duct of 120x40cm (rectangular)

Ventilation calculation from shaft 2 to auditorium
156m2 * 7,2m = 1123 m3
1123 * 7/h = 7861 m3/h = 2,184 m3/s
2,184 / 5m/s = 0,4368 m2 = 4368 cm2
-> 2 ventilation ducts of 55x40cm (rectangular)

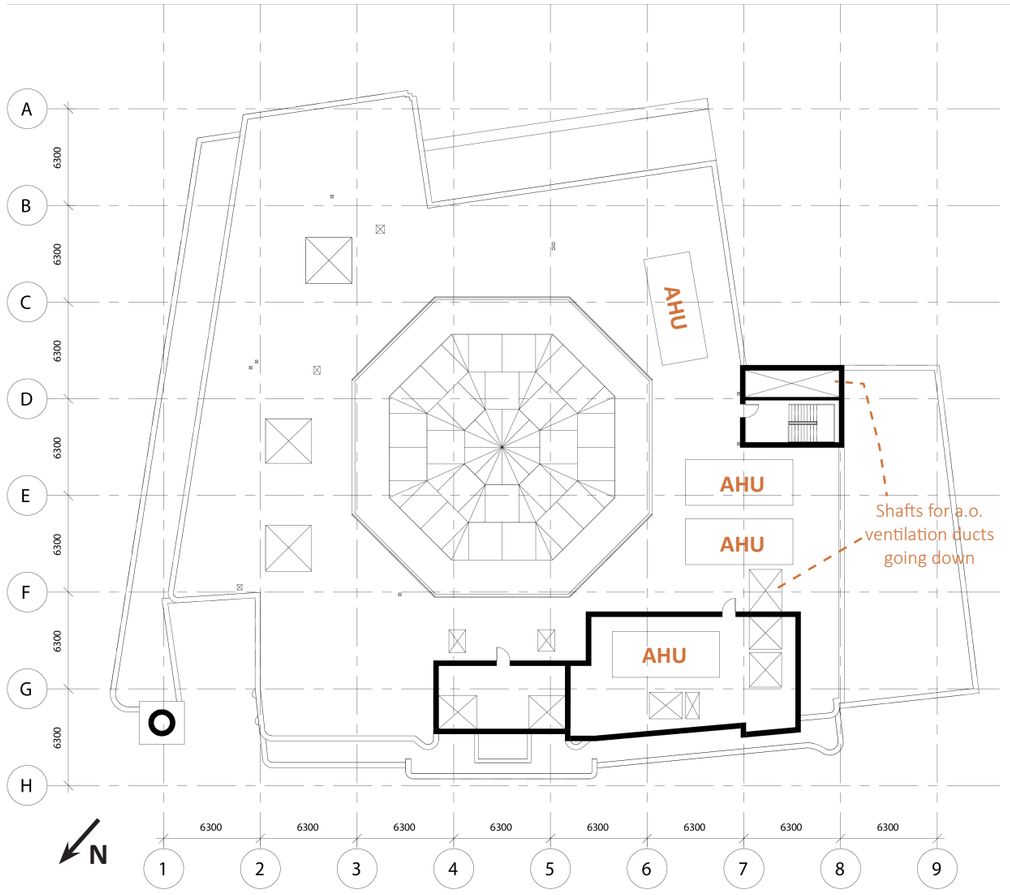
Ventilation calculation size shaft 1:
6^{1} * 2370 m3 * 5/h = 71100 m3/h = 19,75 m3/s
19,75 / 10 m/s = 1,974 m2 = 19750 cm2
-> vertical ventilation duct in shaft of 210x95cm (rectangular) (one for inlet and one for outlet)
-> So 2 AHU's of around 36000 m3/h needed

Ventilation calculation size shaft 2:
6^{1} * 1684 m3 * 5/h + 7^{2} * 560 m3 * 15/h + 1123 m3 * 7/h = 117181 m3/h = 32,550 m3/s
32,55 / 10 m/s = 3,255 m2 = 32550 cm2
-> vertical ventilation duct in shaft of 260x130cm (rectangular) (one for inlet and one for outlet)
-> So 3 AHU's of around 40000 m3/h needed

[1] amount of floors connected to this shaft for ventilation, volume of floor is estimated by taking one floor for example
[2] amount of floors where atrium is at (so ground floor till 6th floor)

Position and amount of AHU’s

Sixth floor plan



Seventh floor/roof plan

Installations dwellings

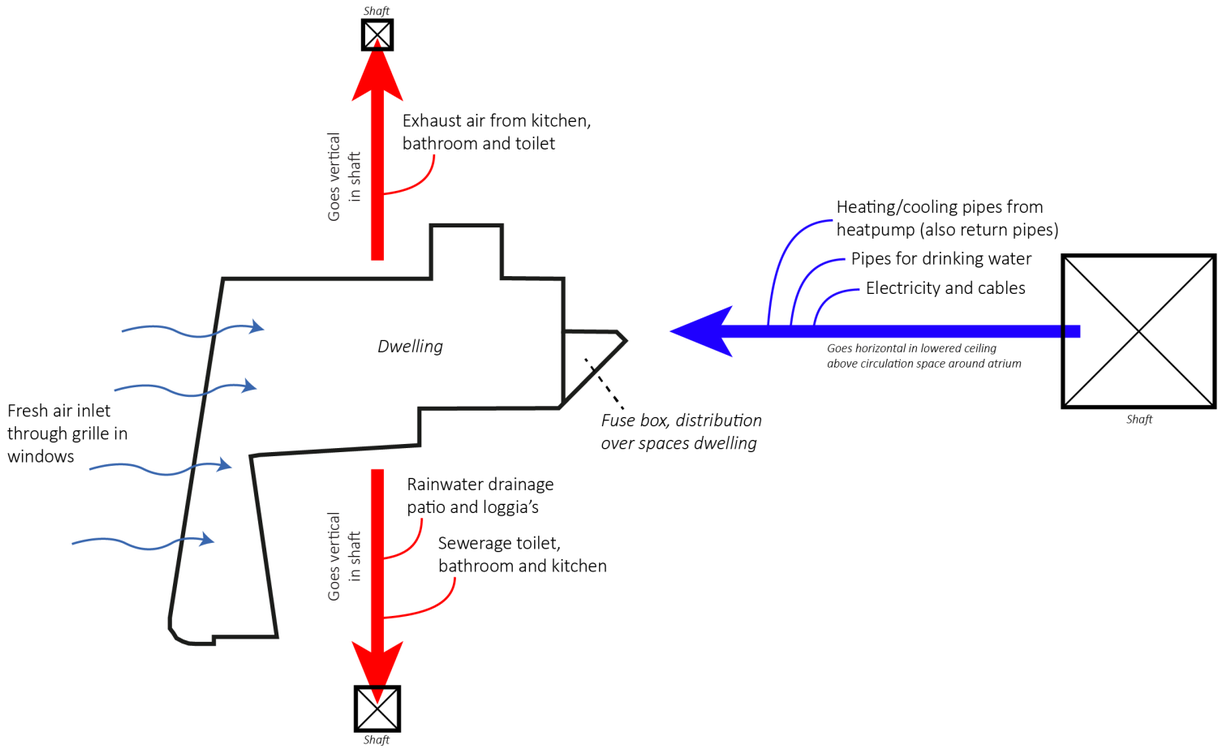
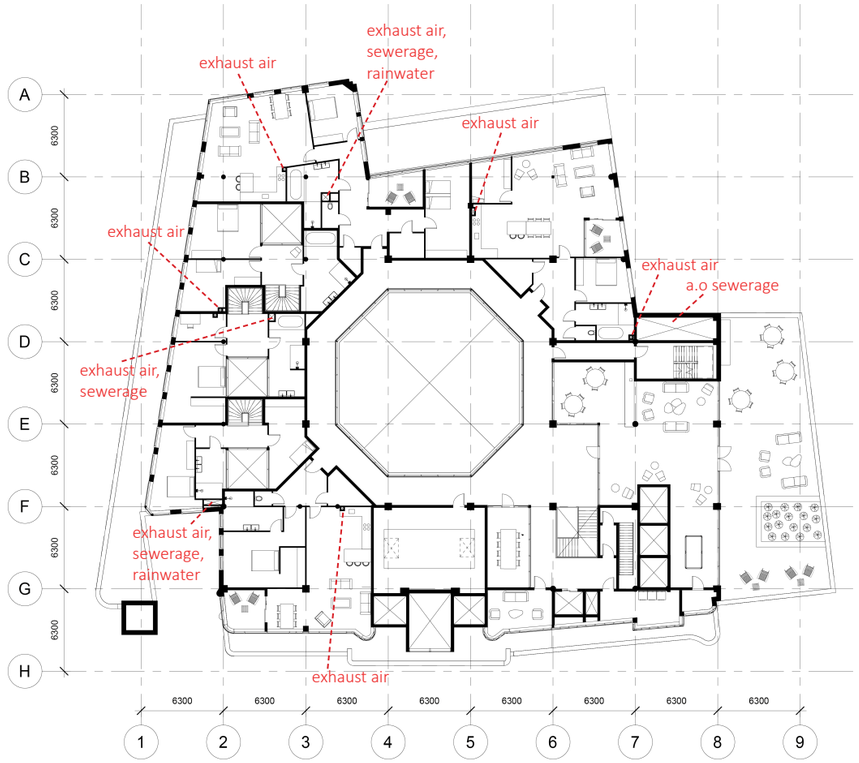
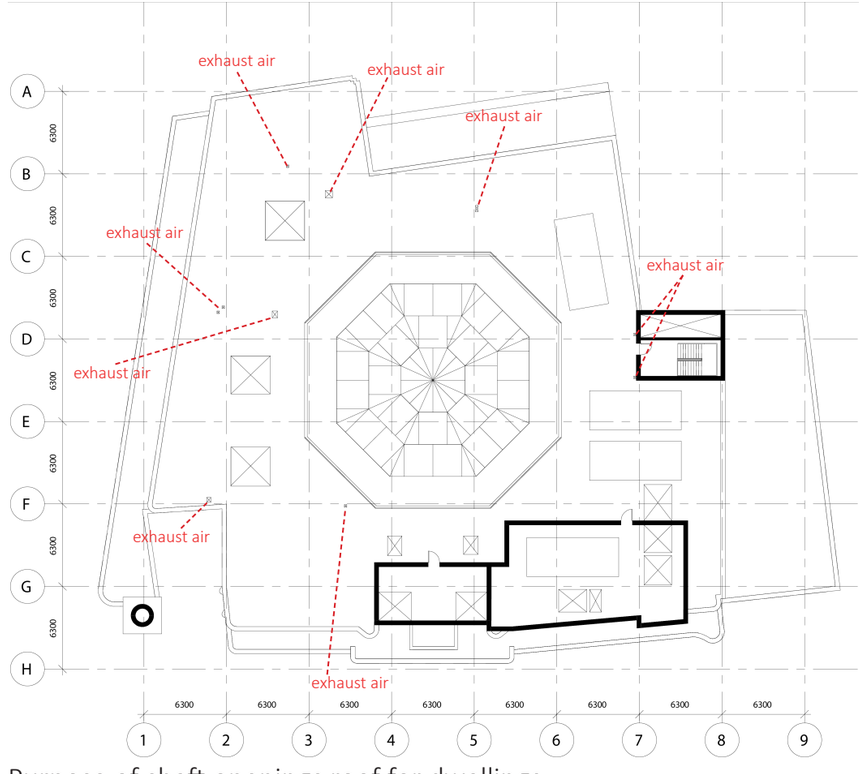


Diagram of installations to and from dwellings

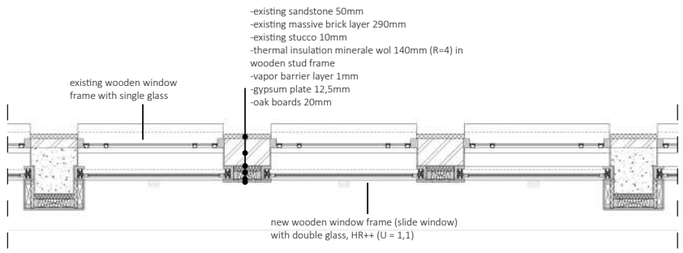


Purpose of shafts dwellings: sixth floor



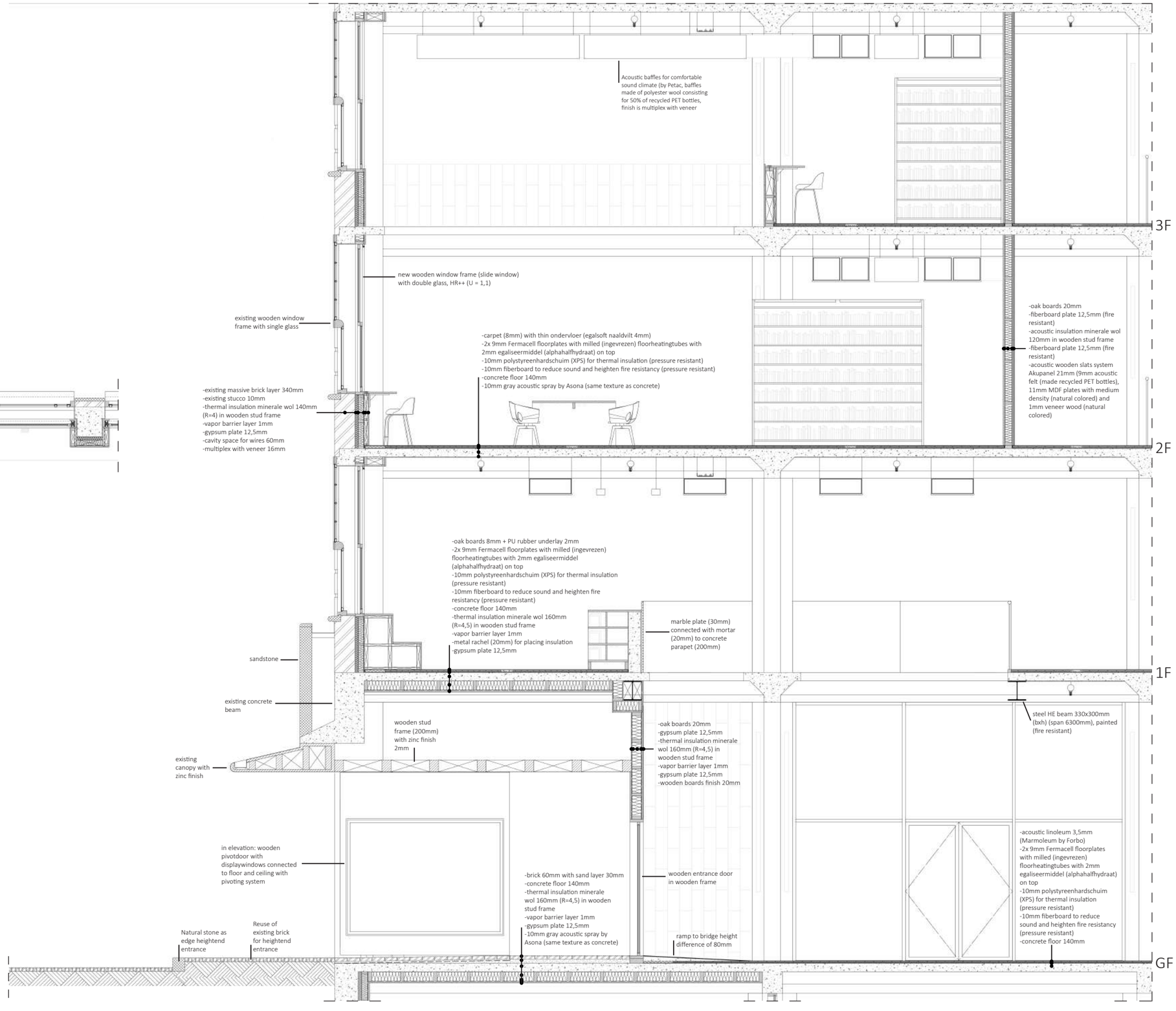
Purpose of shaft openings roof for dwellings

Facade 1:20 detail

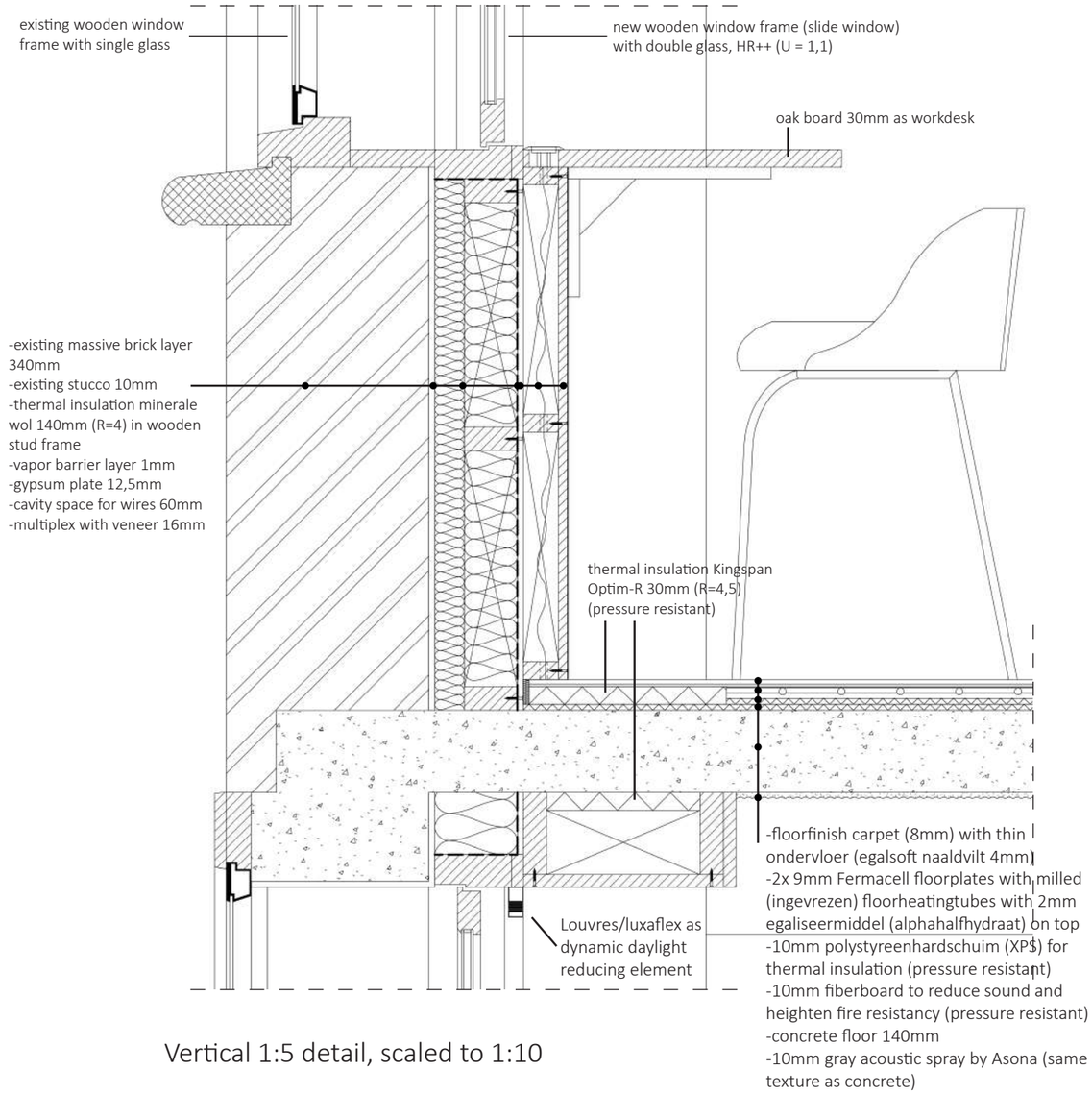


Horizontal 1:20 detail (scaled)

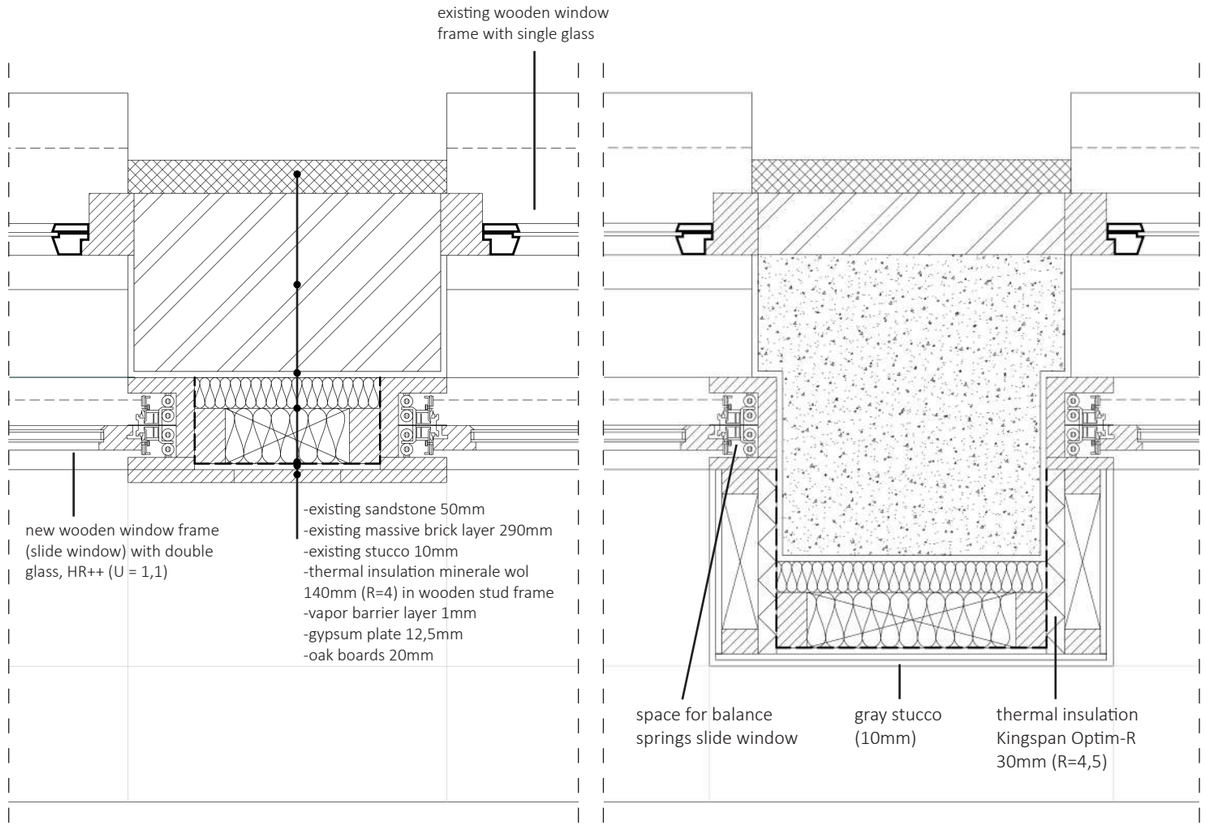
Vertical 1:20 detail (scaled)



Facade 1:5 details

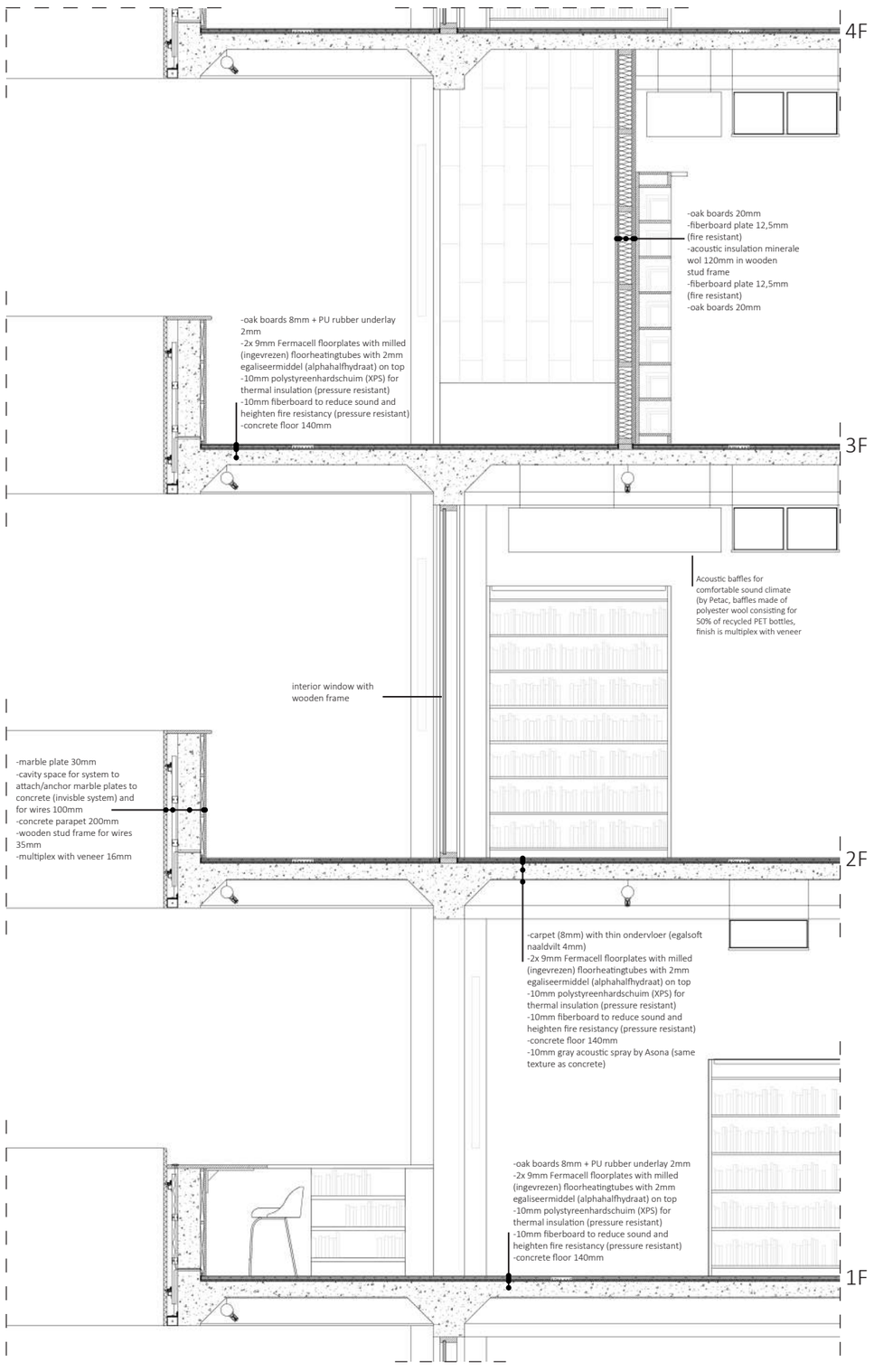


Vertical 1:5 detail, scaled to 1:10



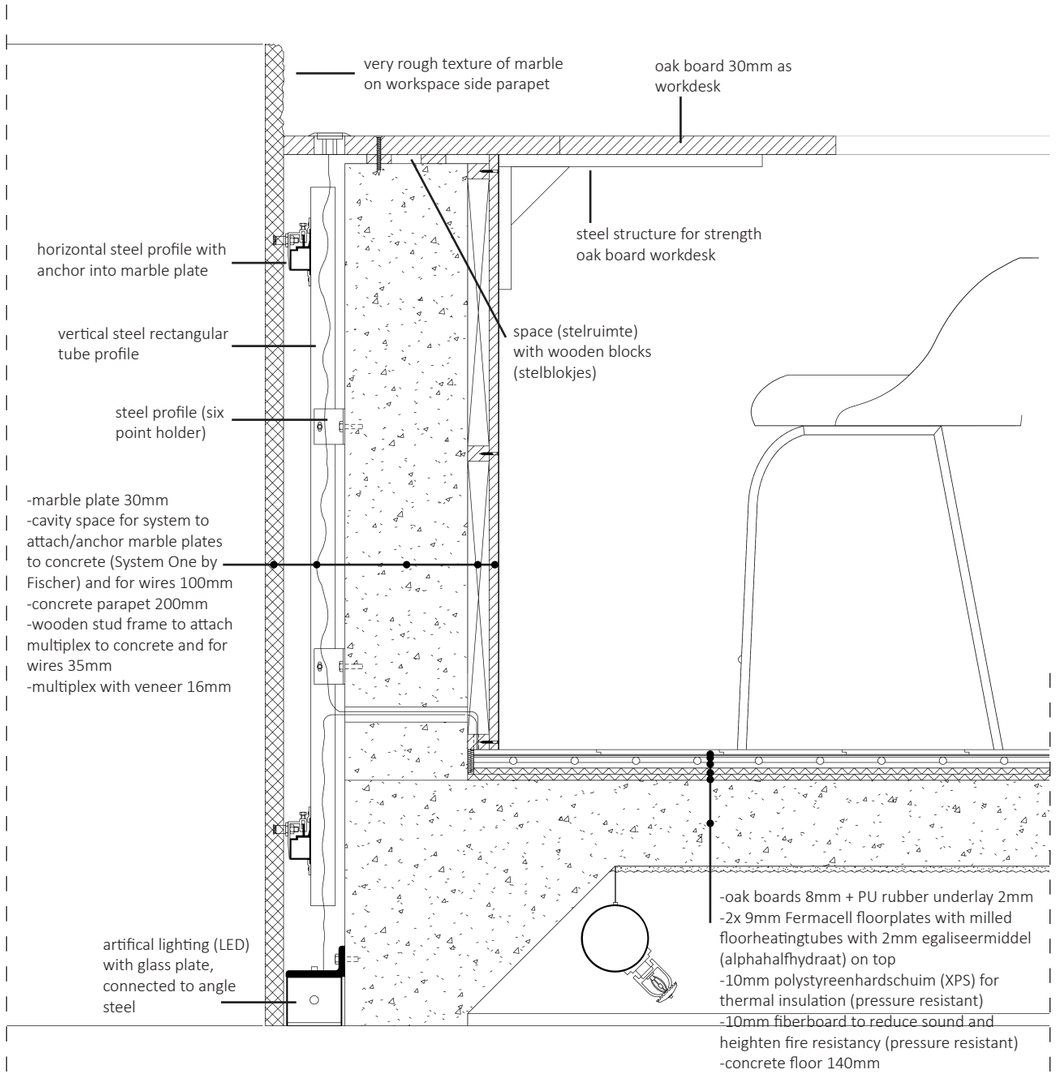
Horizontal 1:5 detail, scaled to 1:10

Atrium 1:20 detail

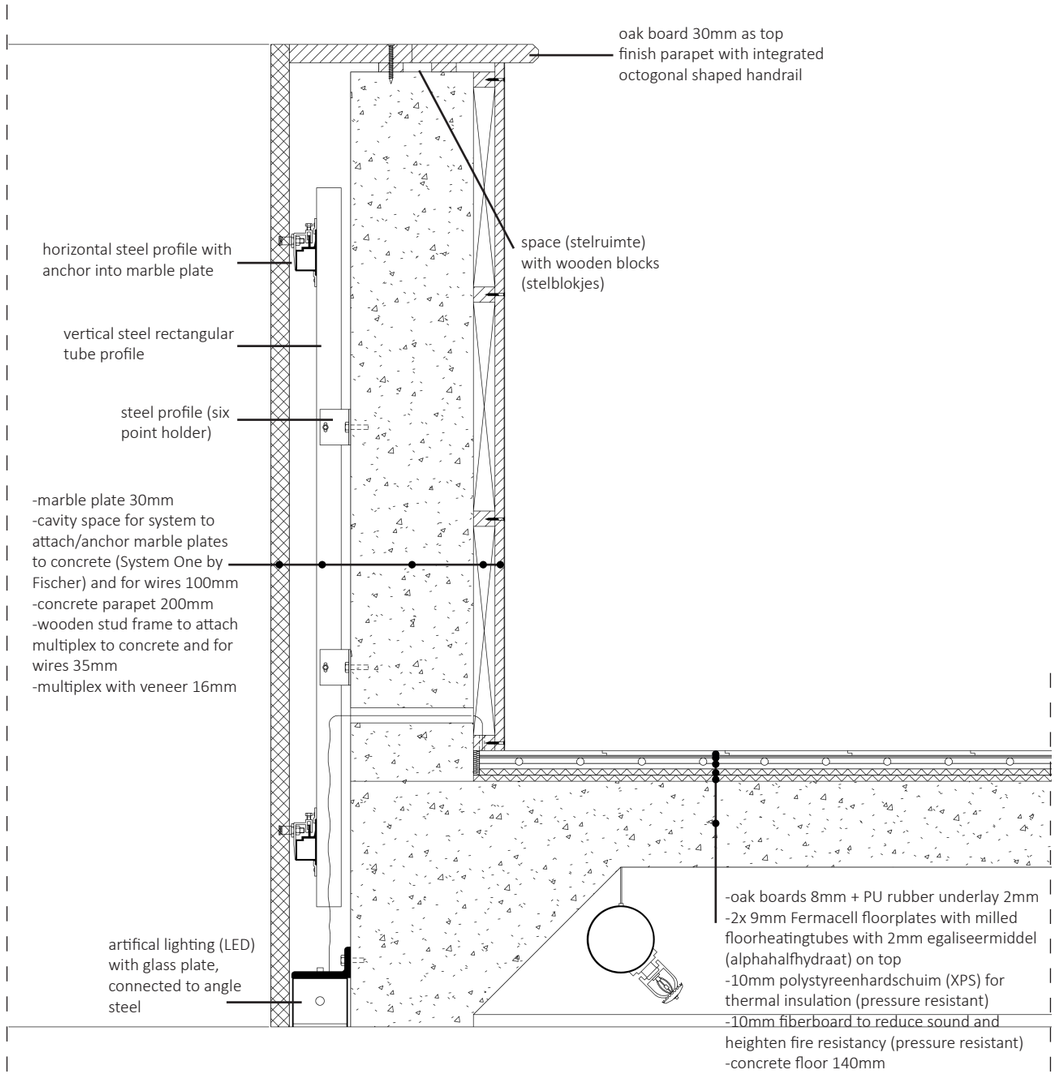


Vertical 1:20 detail, scaled to 1:50

Atrium 1:5 details

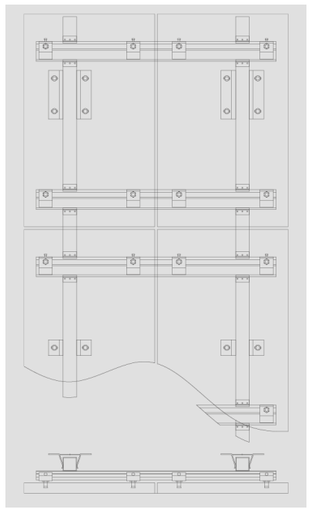


Vertical 1:5 detail, scaled to 1:10



Vertical 1:5 detail, scaled to 1:10

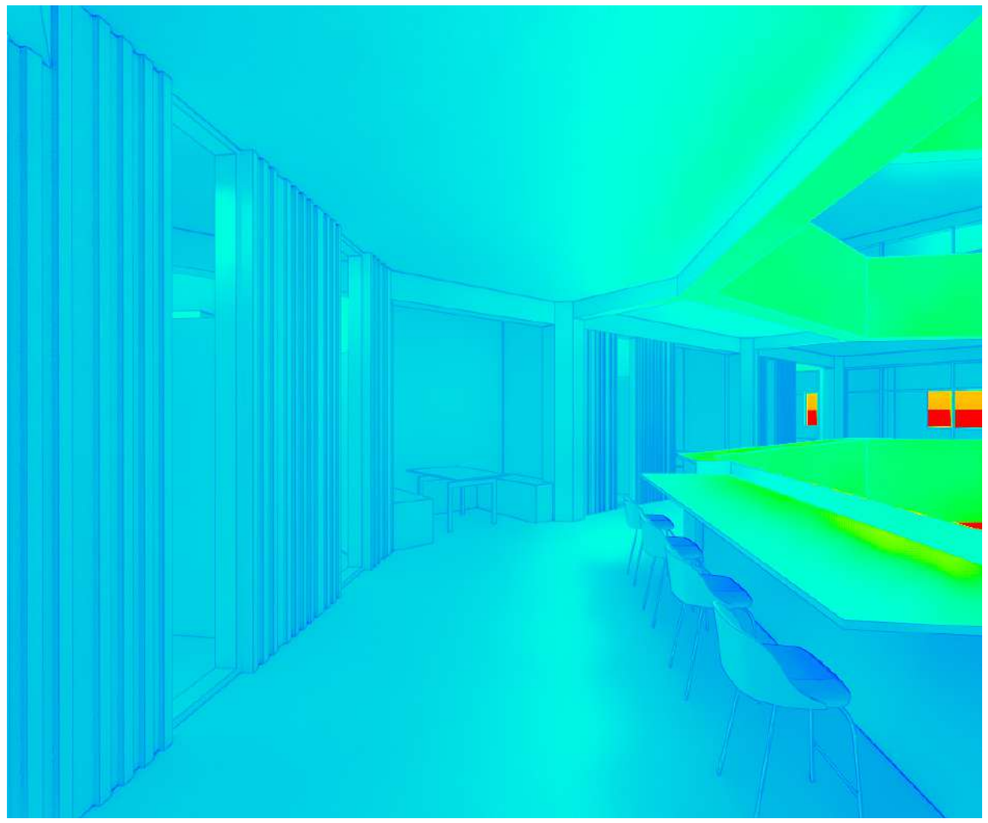
Technical systems: references



Reference system (Fischer system one) for invisibly attaching/anchoring natural stone to structure
(https://www.fischer.nl/nl-nl/oplossingen-voor/industrie/act + PDF fischer System ACT for fixing ventilated cladding)

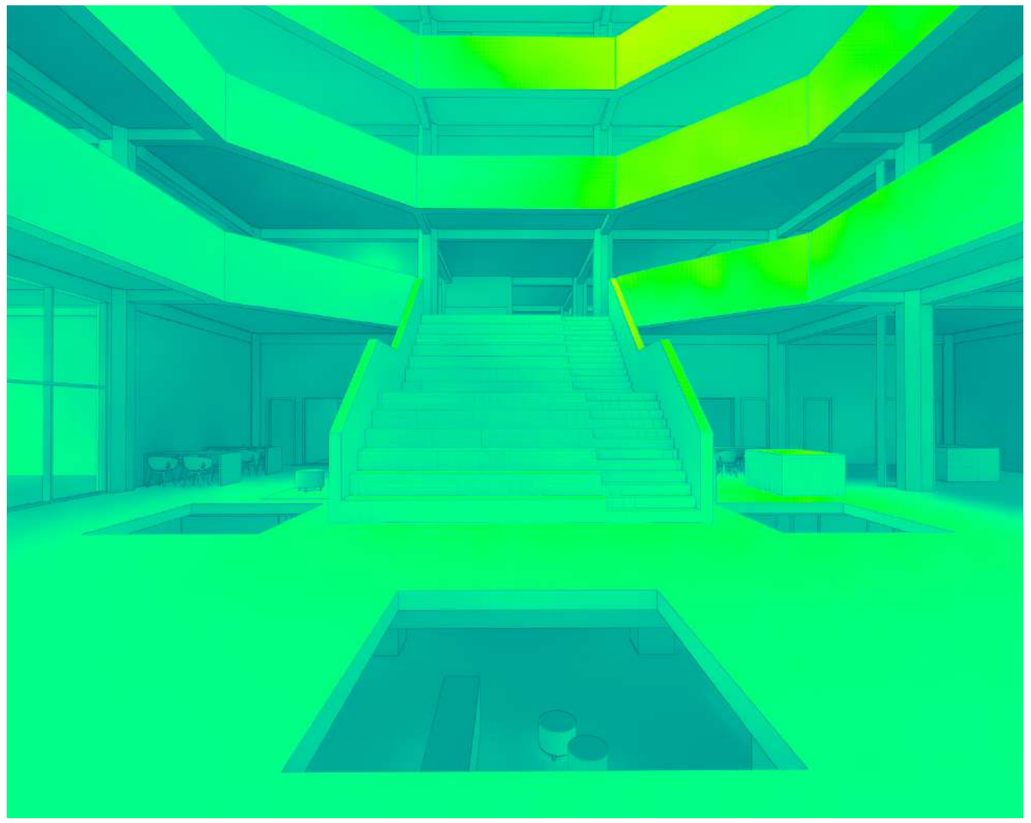
Reference system (system M by FritsJurgens) for attaching pivot door entrance to structure in ceiling and floor
(https://www.fritsjurgens.com/nl/taatsdeur-scharnieren/system-m#download)

Illuminancelevels in building



2nd floor: workspaces around atrium

50 lux  42000 lux



Ground floor atrium

50 lux  42000 lux