

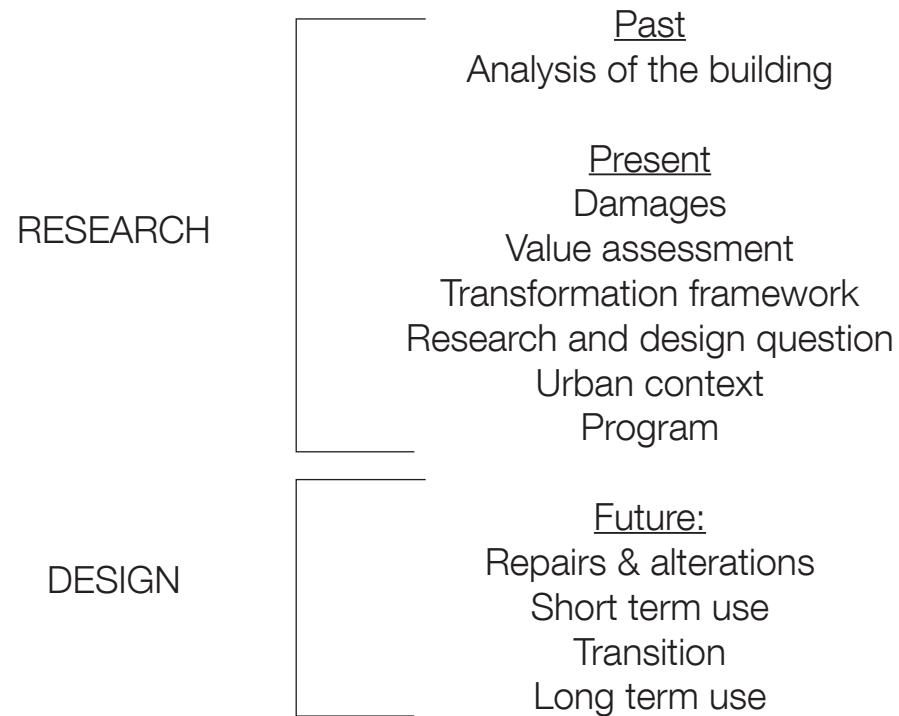
Katoenveem: from cotton warehouse to creative hub



P5 Presentation
H&A Graduation Studio 'Harbour Heritage'
15.04.2021
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4150082
Tutors: Lidy Meijers (A), Frank Koopman (BT)
Delegate: Marjolein Pijpers-van Esch

Presentation overview

Introduction
Graduation studio



Reflection

Heritage & Architecture Graduation Studio

Adapting 20th Century Heritage - Harbour Heritage



Fig. 1. IJzer-, Lek- and Keilehaven, 08.07.1939, photograph copyright AVIODROME Lelystad, source: aviodrome.info

Heritage & Design

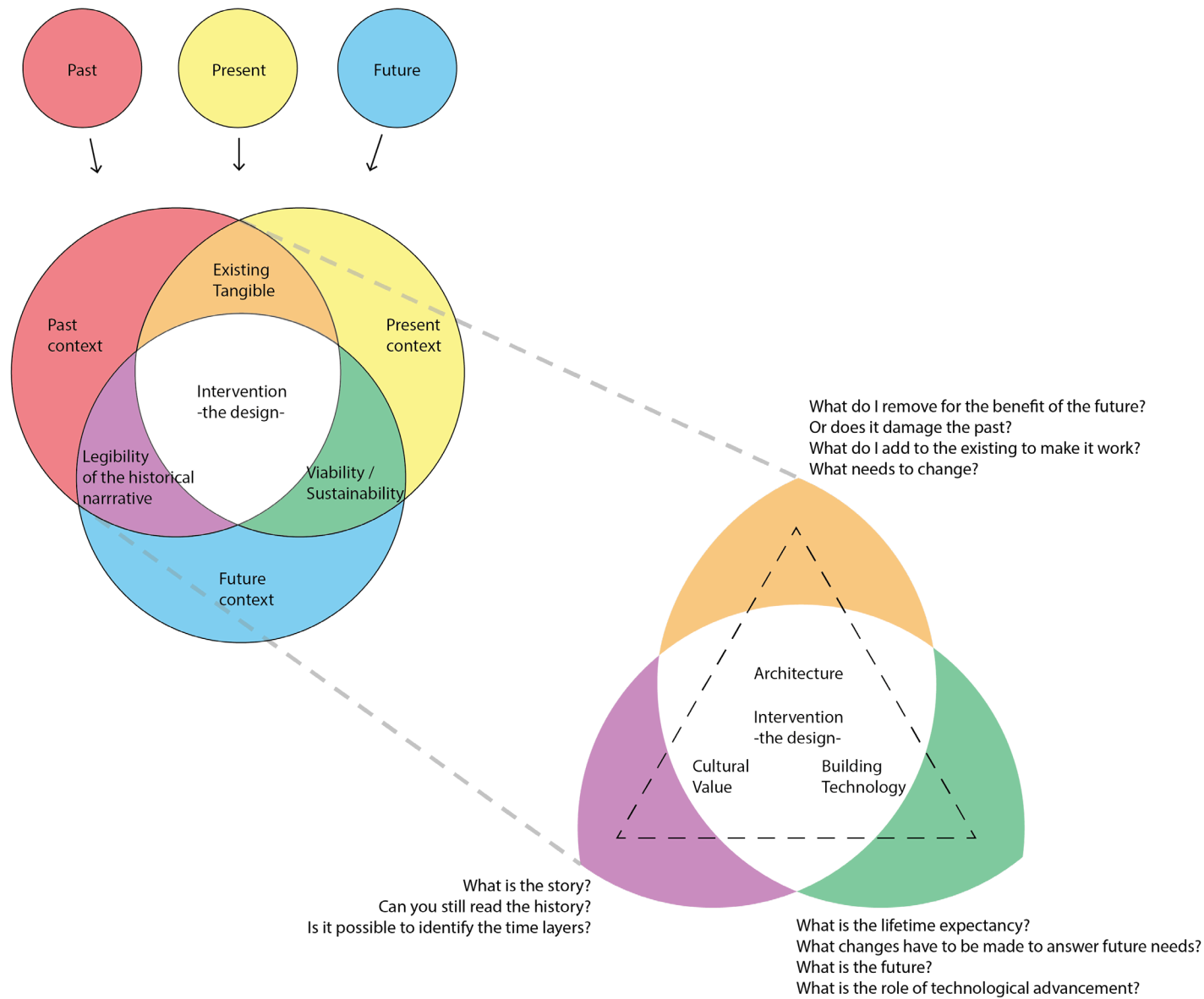


Fig. 2. Design within a heritage context and the different 'lenses', own image based on own interpretation of the H&A triangle, as presented in: Meurs, P. (2016). *Heritage-based Design*. Delft: TU Delft - Heritage & Architecture, p.8

THE PAST

Katoenveem: Cotton warehouse



Fig. 3. The interior of the building of Katoenveem at the Kellestraat number 13, 1952, photograph by F. H. van Dijk, source: stadsarchief.rotterdam.nl

Vierhavens



Fig. 4. IJzer-, Lek- and Keilehaven, 08.07.1939, photograph copyright AVIODROME Lelystad, source: aviodrome.info

Location

Rotterdam



Merwe-Vierhavens (M4H) area

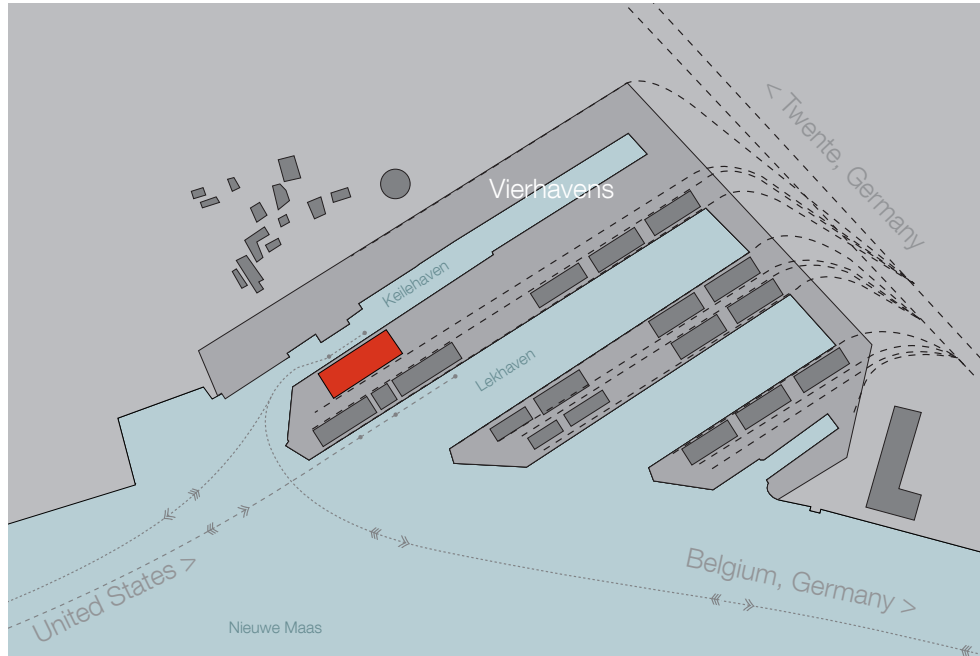


Fig. 5. Location of Katoenveem within the municipality of Rotterdam, source: own image

Fig. 6. Location of Katoenveem within Merwe-Vierhavens (M4H) area, source: own image

Connection with the water and the land

Vierhavens in 1920



Transshipment and storage

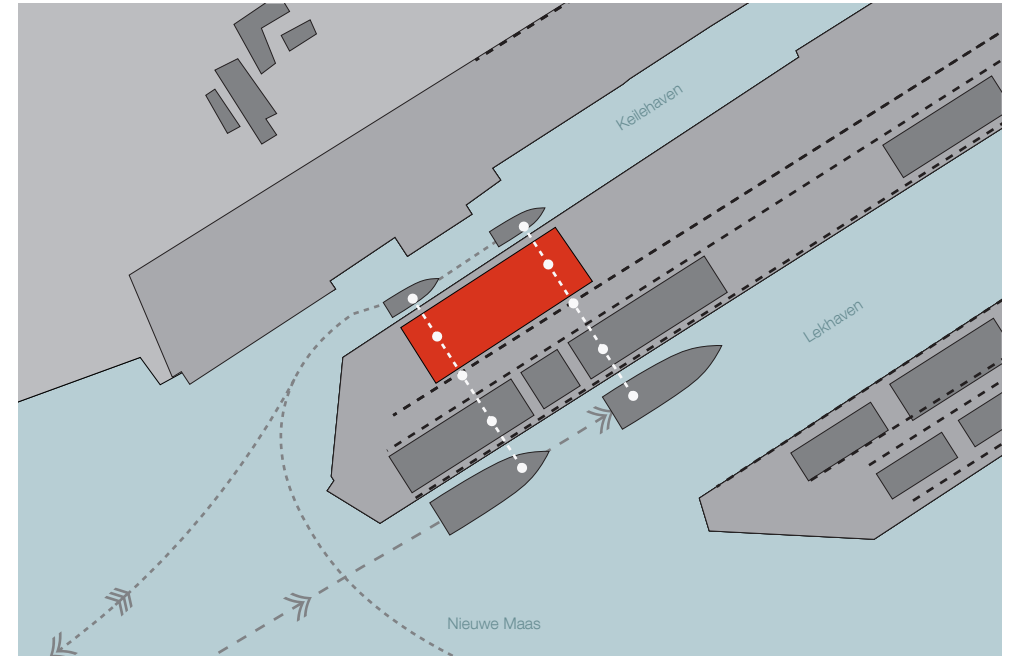


Fig. 7. Location of Katoenveem in Vierhavens around 1920, source: own image

Fig. 8. Transshipment and storage principle, source: own image

Conveyor system

Freight cranes at the Keilehaven



Fig. 9. Freight cranes for transshipment, 1937, source: stadsarchief.rotterdam.nl

Hoists and lifting hooks



Fig. 10. Katoenveem in operation, 1952, source: stadsarchief.rotterdam.nl

Network of transportation rails



Fig. 11. Interior of Katoenveem, 1952, source: stadsarchief.rotterdam.nl

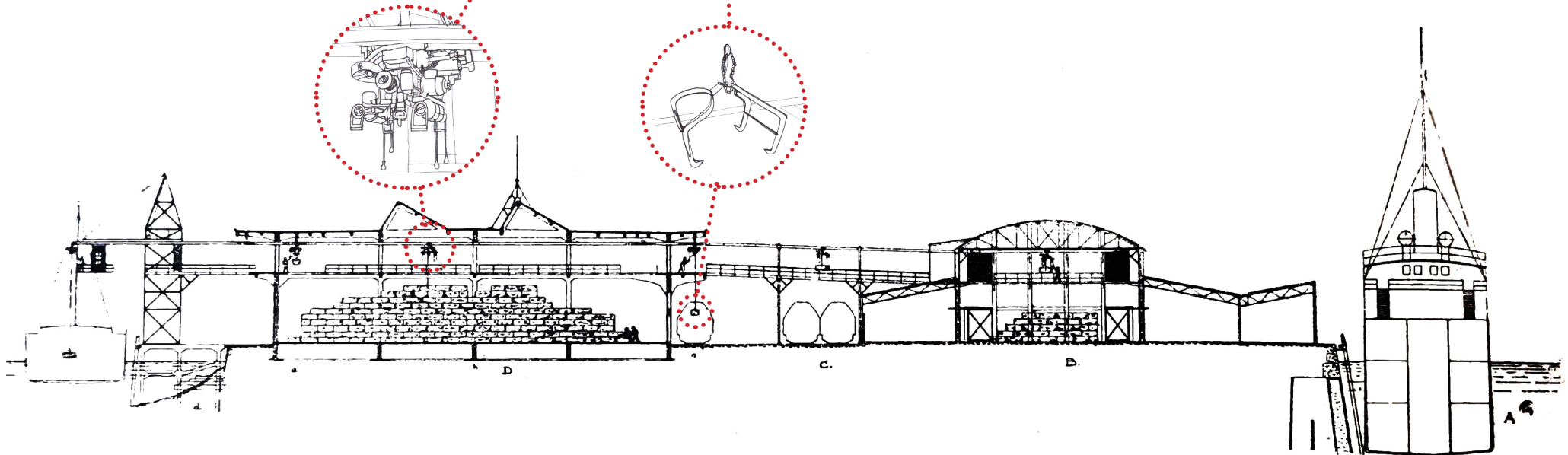
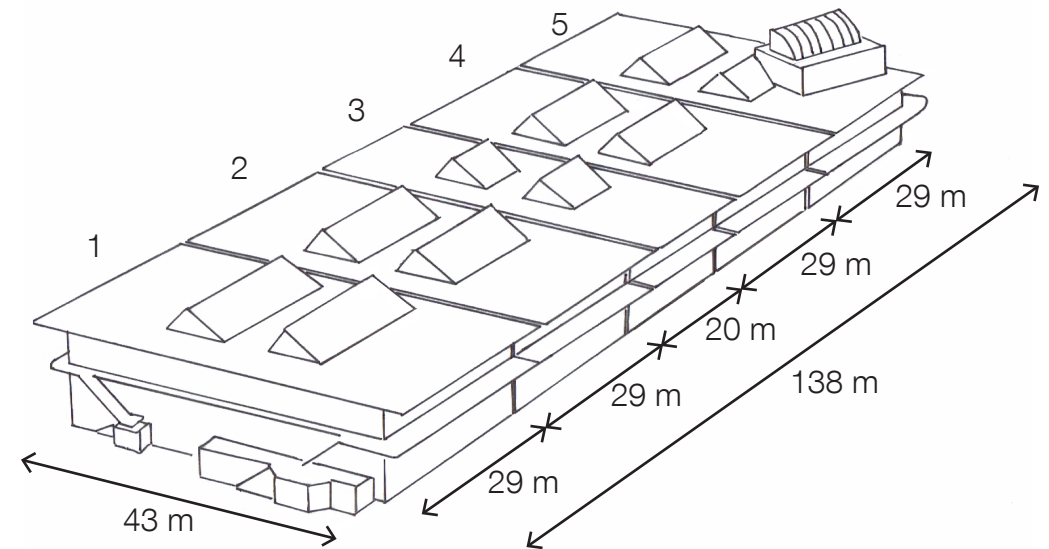


Fig. 12. The transshipment of cotton in Katoenveem, source: Van Dam, H. (1919). "The Cotton warehouse of Katoenveem", in: *The pioneer for the shipping industry and trade of the Netherlands and her colonies*, 3 (1919), p. 68

5 Compartments



Fig. 13. Katoenveem in its original context, source: repository.tudelft.nl



~6000 m²

Fig. 14. Compartments of Katoenveem, source: own image

Sample room ("Monsterkamer") and water tower

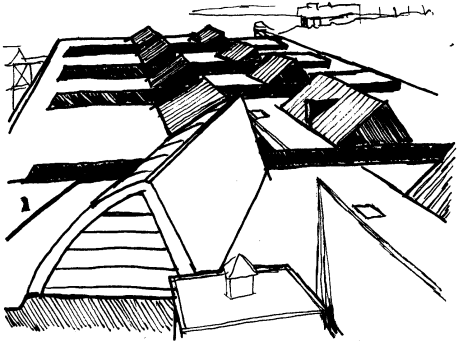


Fig. 15. Rooflights on the roof, own image

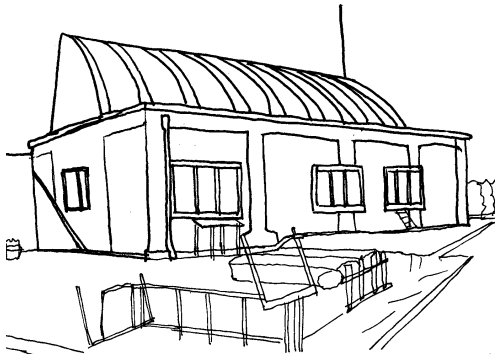


Fig. 16. The sample room ("Monsterkamer") on the roof, own image



Fig. 17. The building of Katoenveem at the Kellestraat number 13, 1952, photograph by F.H. van Dijk, source: stadsarchief.rotterdam.nl

Fire safety



Fig. 18. Fire at the warehouse of Katoenveem at the Keilehaven, 1963, source: stadsarchief.rotterdam.nl

Interior of a compartment



Fig. 19. Interior of the Katoenveem compartments, source: drawing by A. Kuiper, edited by I.Louer

Hennebique construction

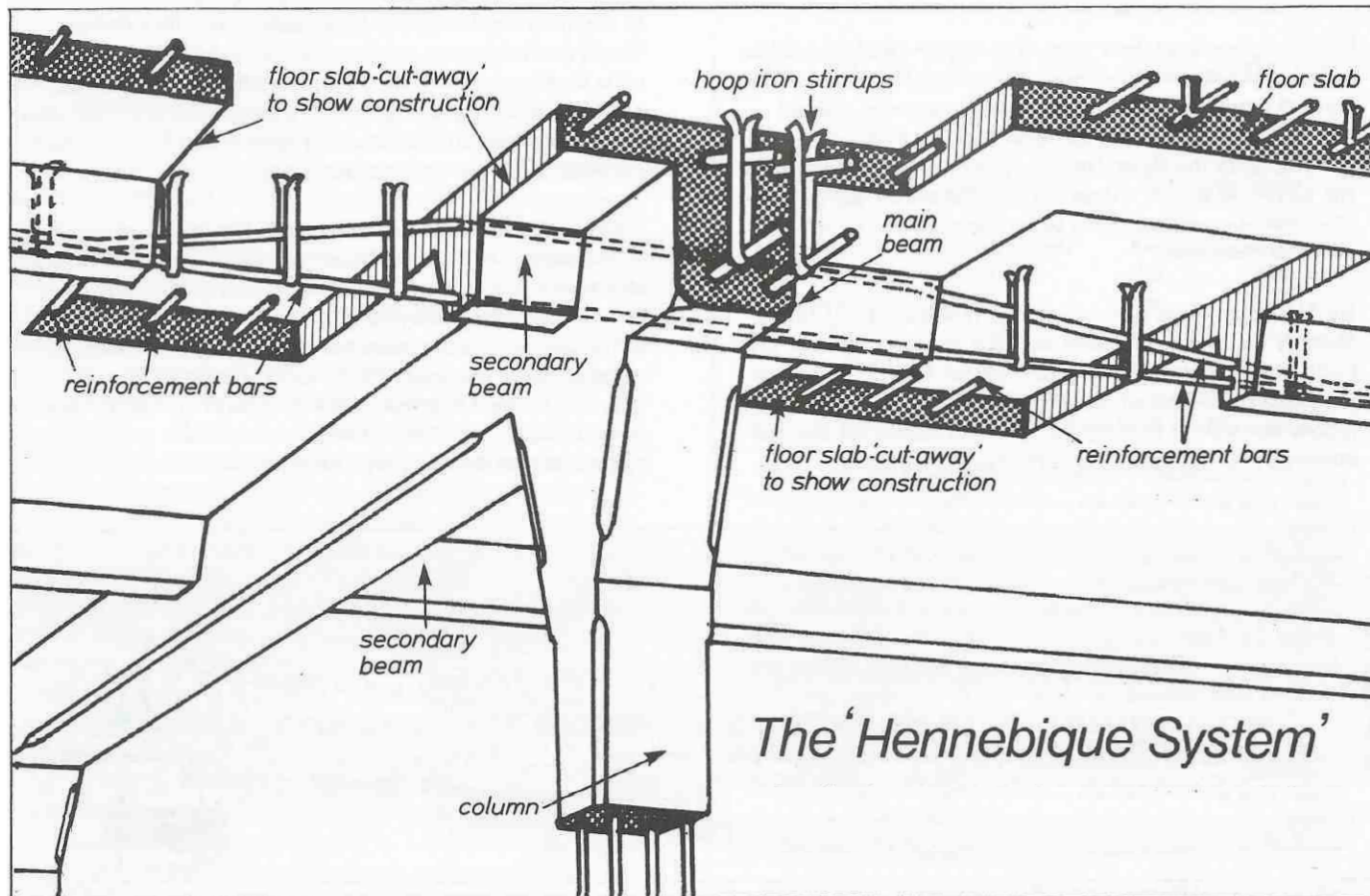


Fig. 20. The Hennebique system, source: b-i-a-s.org.uk

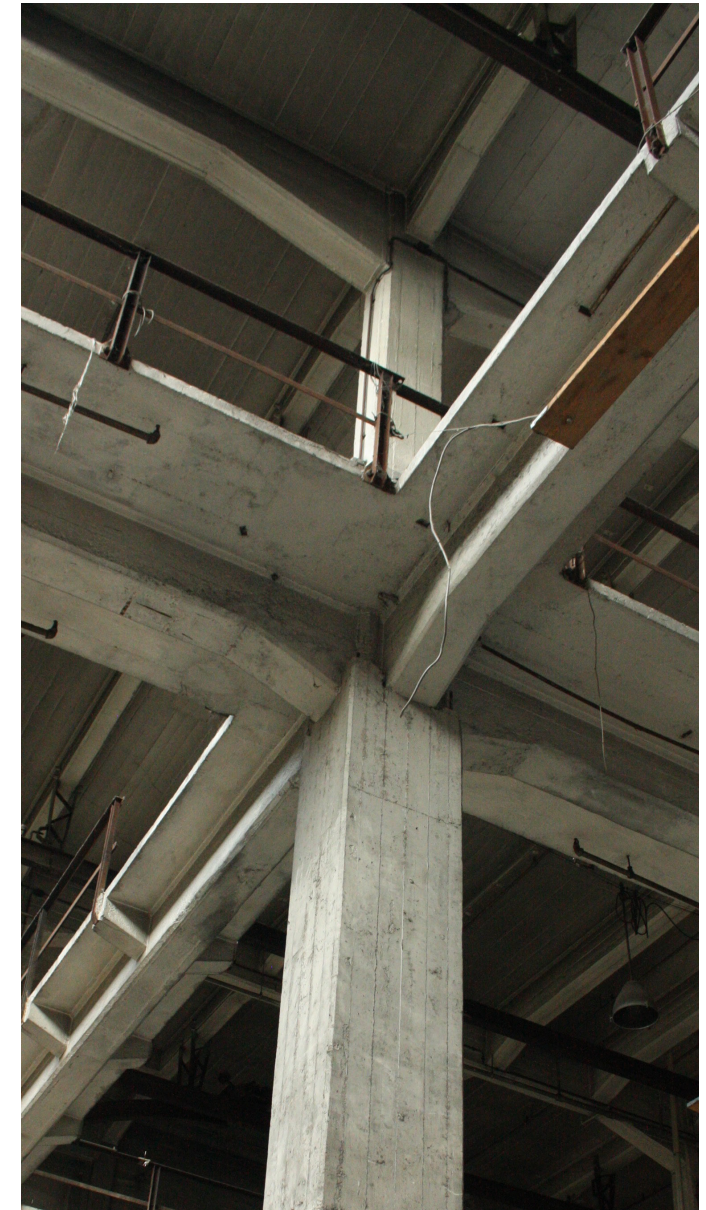
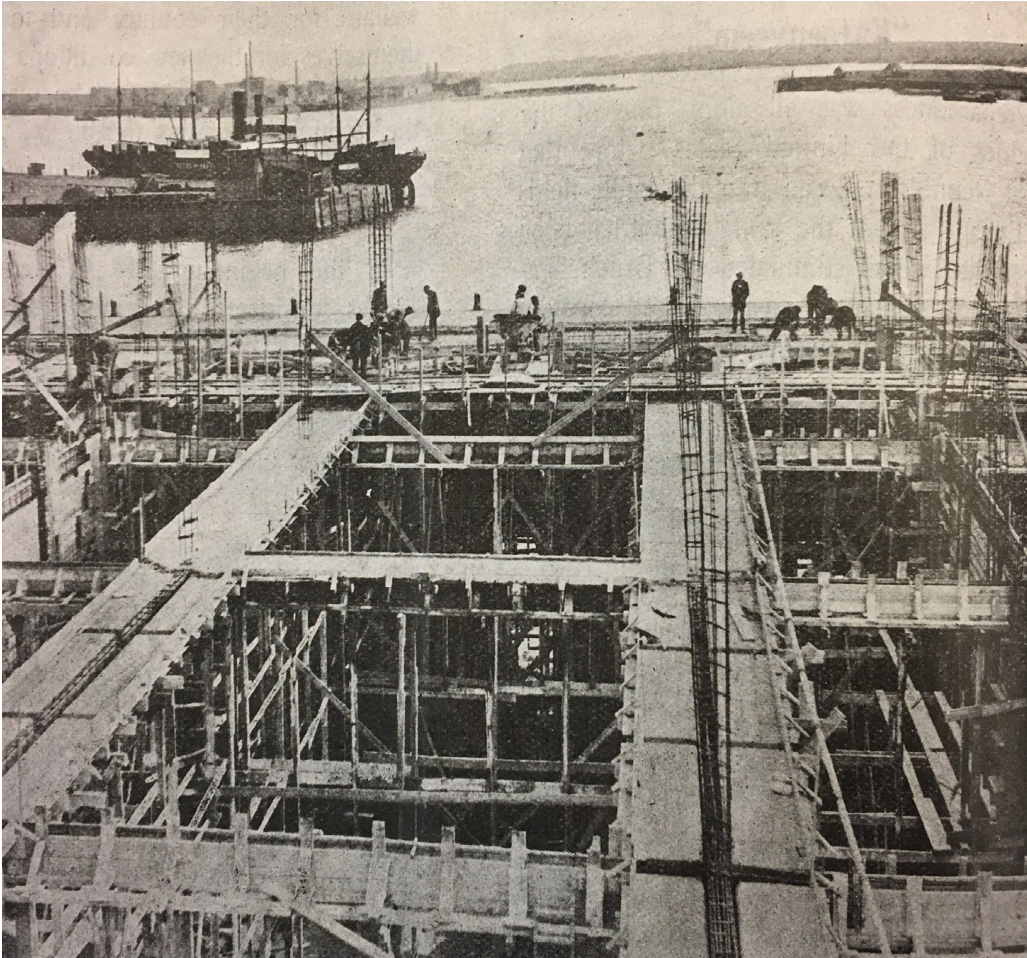


Fig. 21. Detail of column connection, source: photograph by C. de Boon

Materials

Cast-in-place concrete



Artificial sandstone render



Fig. 22. Building site of Katoenveem: formwork and reinforcement steel for concrete structure visible, source: Van Dam, H. (1919). "The Cotton warehouse of Katoenveem", in: The pioneer for the shipping industry and trade of the Netherlands and her colonies, 3 (1919), p. 66.

Fig. 23. Artificial sandstone render, source: photograph by C. de Boon

Architectural expression



Fig. 24. Katoenveem northwest facade, source: drawing by A. Kuiper

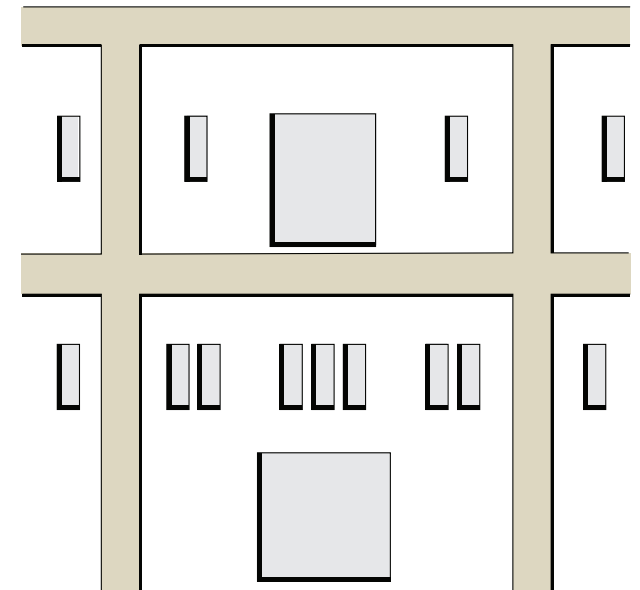
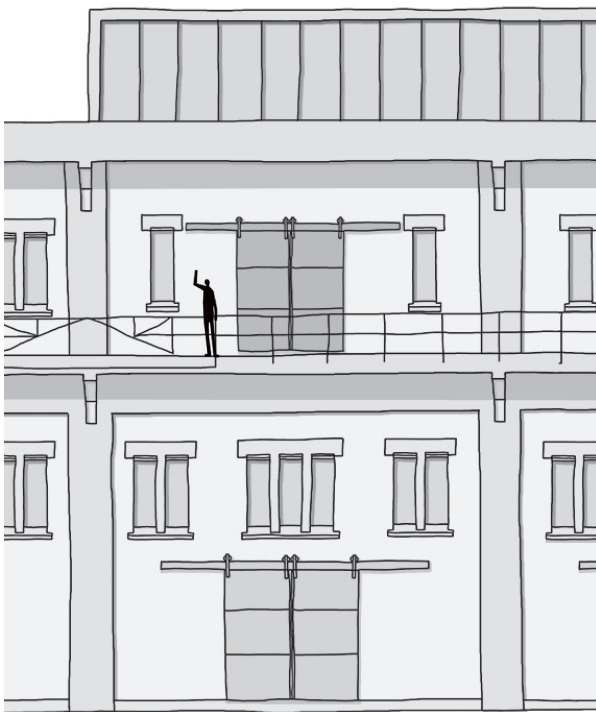


Fig. 25. Construction expressed in the facade, source: drawings by A. Kuiper

Ornaments



Fig. 26. Fake window trims, source: own image

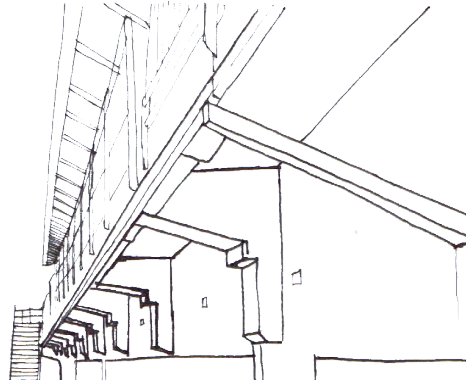


Fig. 27. Balcony cantilevers, source: own image

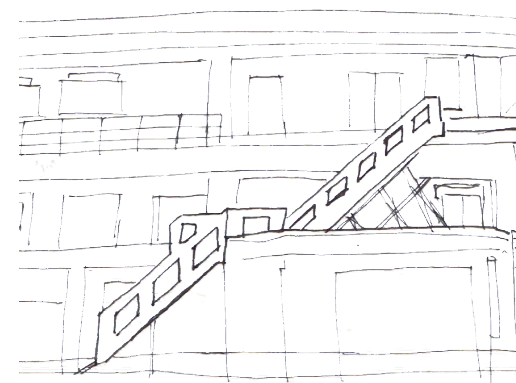


Fig. 28. Stairs railing at Katoenveem, source: own image

Spirit of place



Fig. 29. Visiting Katoenveem, source: motelmozaïque.nl

Attributes

Exterior

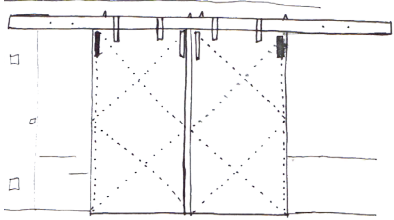


Fig. 30. Sliding doors

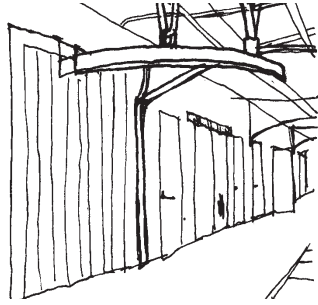


Fig. 31. Rails on top of the balconies

Interior

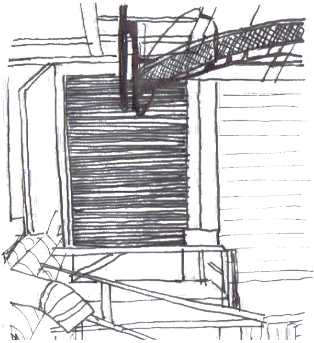


Fig. 32. Kinnear doors between compartments

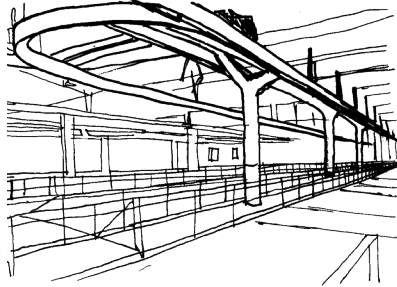


Fig. 33 Railing hanging from the roof construction

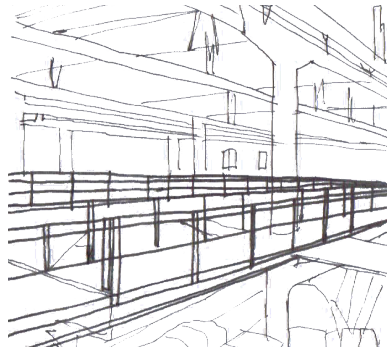


Fig. 34. Walkways with movable railing to operate the conveyor system

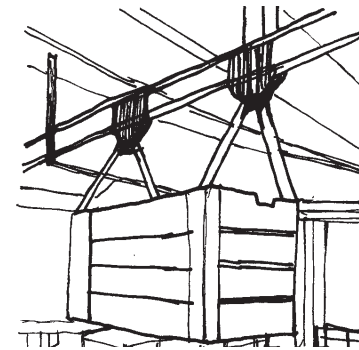


Fig. 35. Maintenance basket

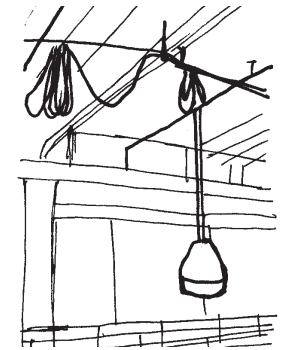


Fig. 36. Movable artificial lighting

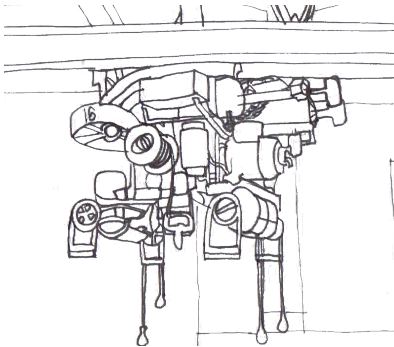


Fig. 37. The hoists

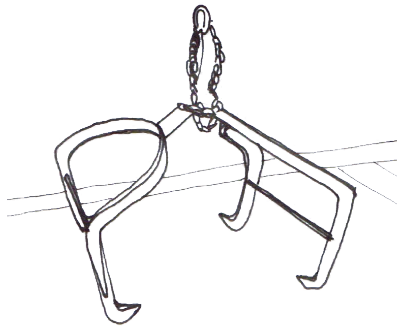


Fig. 38. The hooks



Fig. 39. The 'Forbidden to smoke'-signs

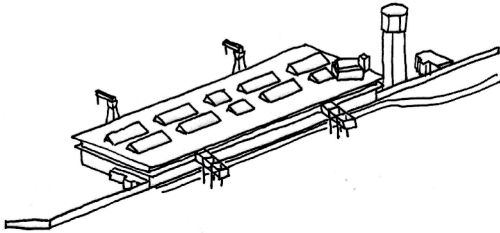


Fig. 40. Tiles in the flooring for guidance

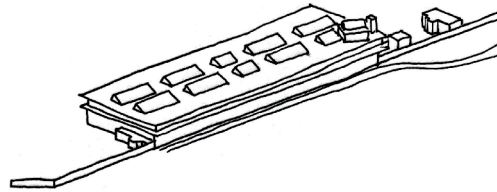
Fig. 27-34. Attributes of Katoenveem, source: own image

Development over time

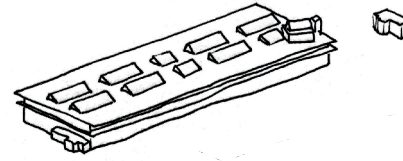
1920-1921



1931-1966



1966-1988



1988-2020

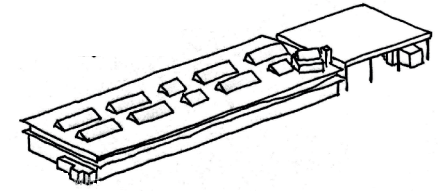


Fig. 41-44. Building Development 1920-2020, source: images by Z. Spook

Attributes lost over time

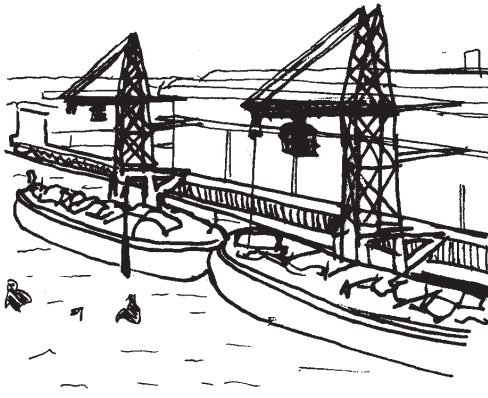


Fig. 45. Freight Cranes



Fig. 46. Water tower

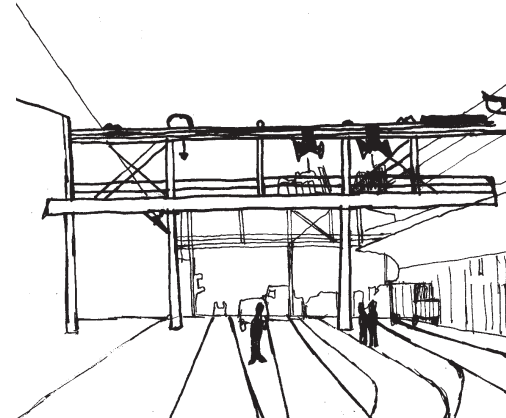


Fig. 47. Train tracks and transportation bridges

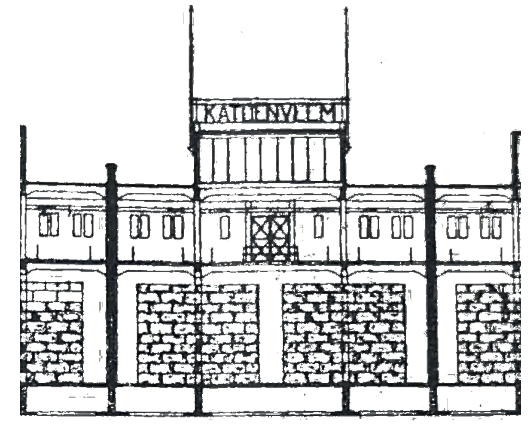


Fig. 48. Katoenveem sign on the roof

Fig. 45-48. Lost attributes of Katoenveem, source: own images

THE PRESENT

Katoenveem nowadays



Fig. 49. Katoenveem in 2018, photograph by Xihao Yi, source: repository.tudelft.nl

Deterioration



Fig. 50. Current state of the facade, source: photograph by A. Loef

Types and location of damages



1. Corrosion of the reinforcement



2. Spalling of render layer and concrete layer



3. Water damage



4. Corrosion of original sliding doors



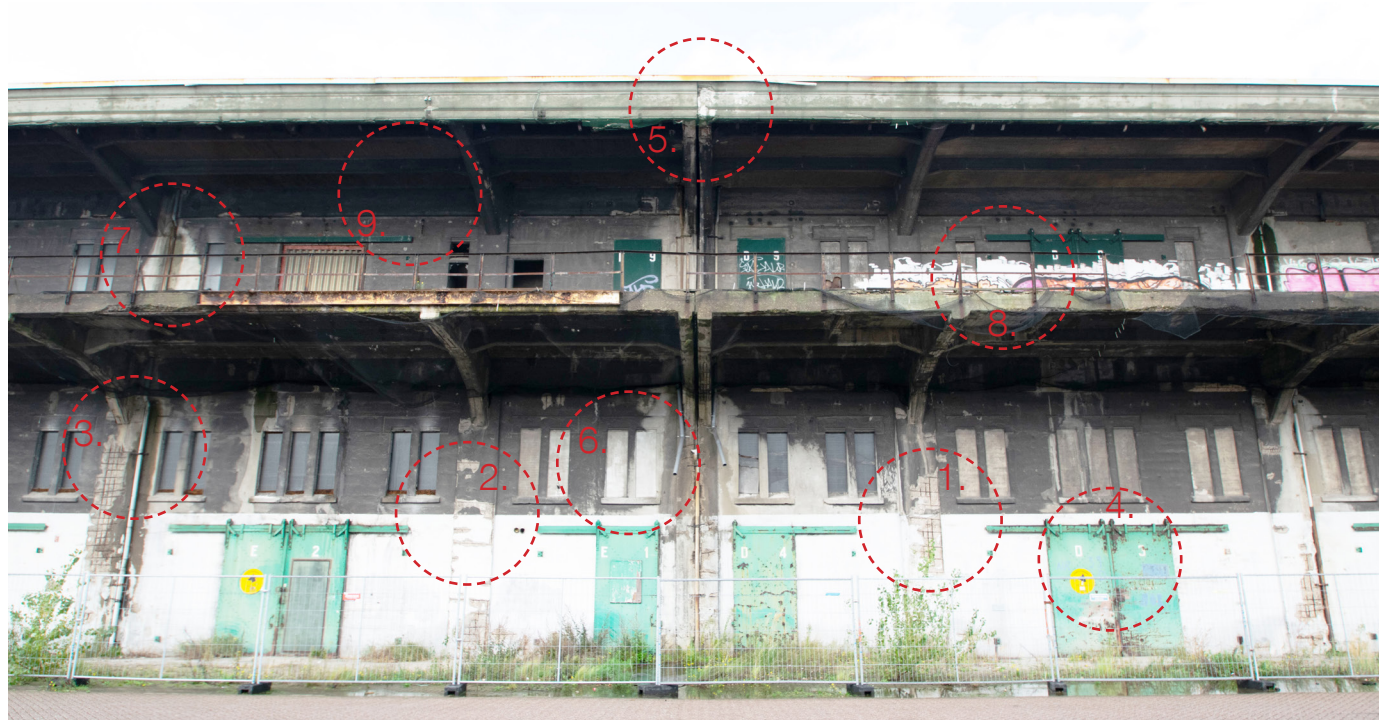
5. Chipped edges



6. Closed off or broken windows



7. Biological growth



9. Black surface, deposit of soot



8. Graffiti

Fig. 51. Damages observed on the facade of Katoenveem, source: own image

Types of damages and their cause



1. Corrosion of the reinforcement



2. Spalling of render layer and concrete layer



5. Chipped edges

Damage caused by mechanical action, environmental conditions or ageing of the material



6. Closed off or broken windows



3. Water damage



4. Corrosion of original sliding doors



7. Biological growth



8. Graffiti



9. Black surface, deposit of soot

Damages caused by frequent presence of water, most probably the effect of a poor drainage system

Damage through surface deposition caused by environmental conditions or human activity

Value assessment & value mapping

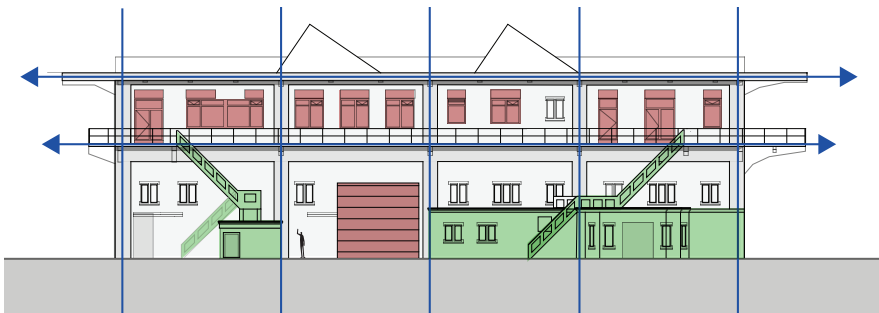
North - West Facade



South - East Facade



South - West Facade



North-East Facade



Fig. 53-56. Value mapping, source: images by L. van Stralen

Transformation framework



Preserve:

- symmetry and horizontal expression of the facade
- the attributes that are the direct link to the buildings history
- elements of ornamentation



Maintain if possible:

- the original footprint, roofline and building volume
- compartment walls
- original atmosphere of the interior



Improve:

- relation to the water and quays
- the accessibility for the public
- the attractiveness of the site



Repair or replace:

- repair damages that prevent the building from being safe for use

Alterations of facades, roof, compartment walls and construction are possible, as long as they leave intact most of the fabric, guaranteeing the overall recognizability of the original structure.

RESEARCH QUESTION & DESIGN QUESTION

Research question

How can Katoenveem be adapted in order to implement a cultural program,
while preserving the buildings' historical narrative,
as well as maintaining the possibility to adapt to future needs?

Design question

What are the architectural interventions needed to adapt Katoenveem,
while preserving the historical narrative and enabling adaptability towards
future needs?

URBAN CONTEXT

Current situation Merwe-Vierhavens



Fig. 61. Current situation of the Merwe-Vierhavens area, source: image by A. Kuiper

Future of Merwe-Vierhavens



Fig. 62. Vision Municipality Rotterdam Merwe-Vierhavens, source: image by A. Kuiper

M4H: Makers district



Fig. 63. The RDM and M4H areas, source: westpractice.squarespace.com

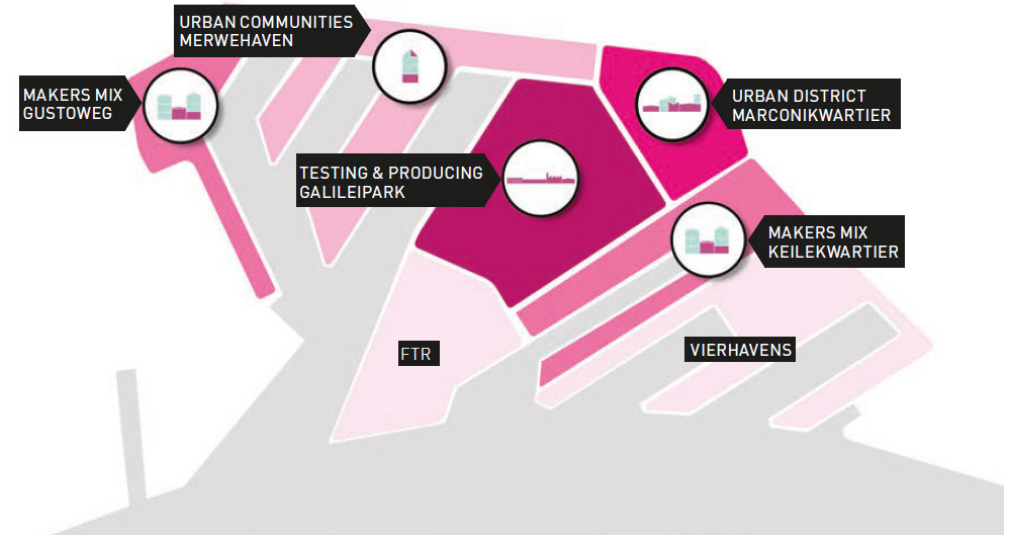


Fig. 64. The different program types foreseen in the area, source: m4hrotterdam.nl



Fig. 65. Visualisation of developments near Keilehaven, image by Plein 06, source: rotterdammakersdistrict.com

Keilewerf and Kunst & Complex, Rotterdam

Keilewerf



Fig. 66. Keilewerf exterior view, source: keilewerf.nl

Kunst & Complex



Fig. 67. Artist Charlotte Schleiffert in her atelier in Kunst & Complex, source: atelierlog.blogspot.com

Keilepand

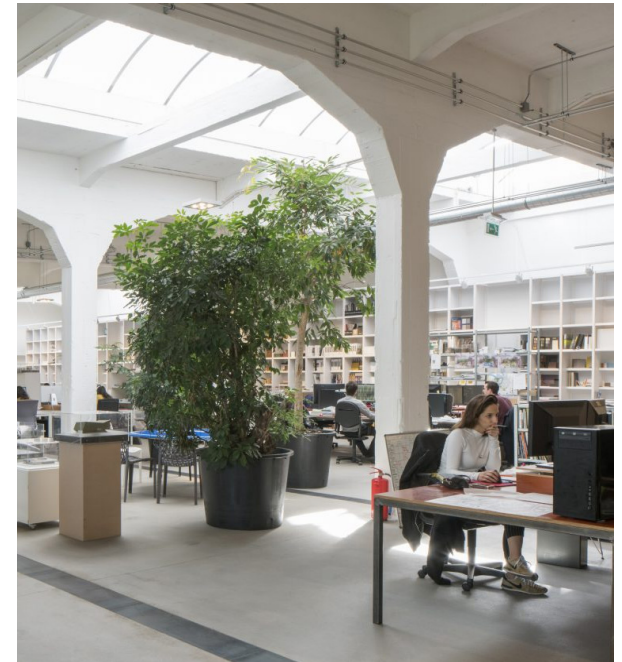


Fig. 68. Keilepand M4H, a place for working, making and meeting, source: groupa.nl/

PROGRAM

A fitting program:

Types of use

Make / Create
Collaborate
Share
Explore
Learn

Types of users

Maker/Innovators
Artists
Entrepreneurs
'Incubators'
Visitors

Types of spaces

Makerspace
Workshop
Atelier
Office
Meeting rooms
Informal meeting spaces

Characteristics of a fitting program:

Attracts the creative industry
Mix of users
Multifunctional
Open and accessible
Flexible

Starting points for the design

.
. .
.

However:
the whole district will be attracting mainly creatives
and other locations in the area have certain
advantages could enhance their succes.

The question therefore is also:

How to prevent Katoenveem from
becoming obsolete (again) in the future?

Starting points for the design:

Adaptability
Flexibility
Reversibility

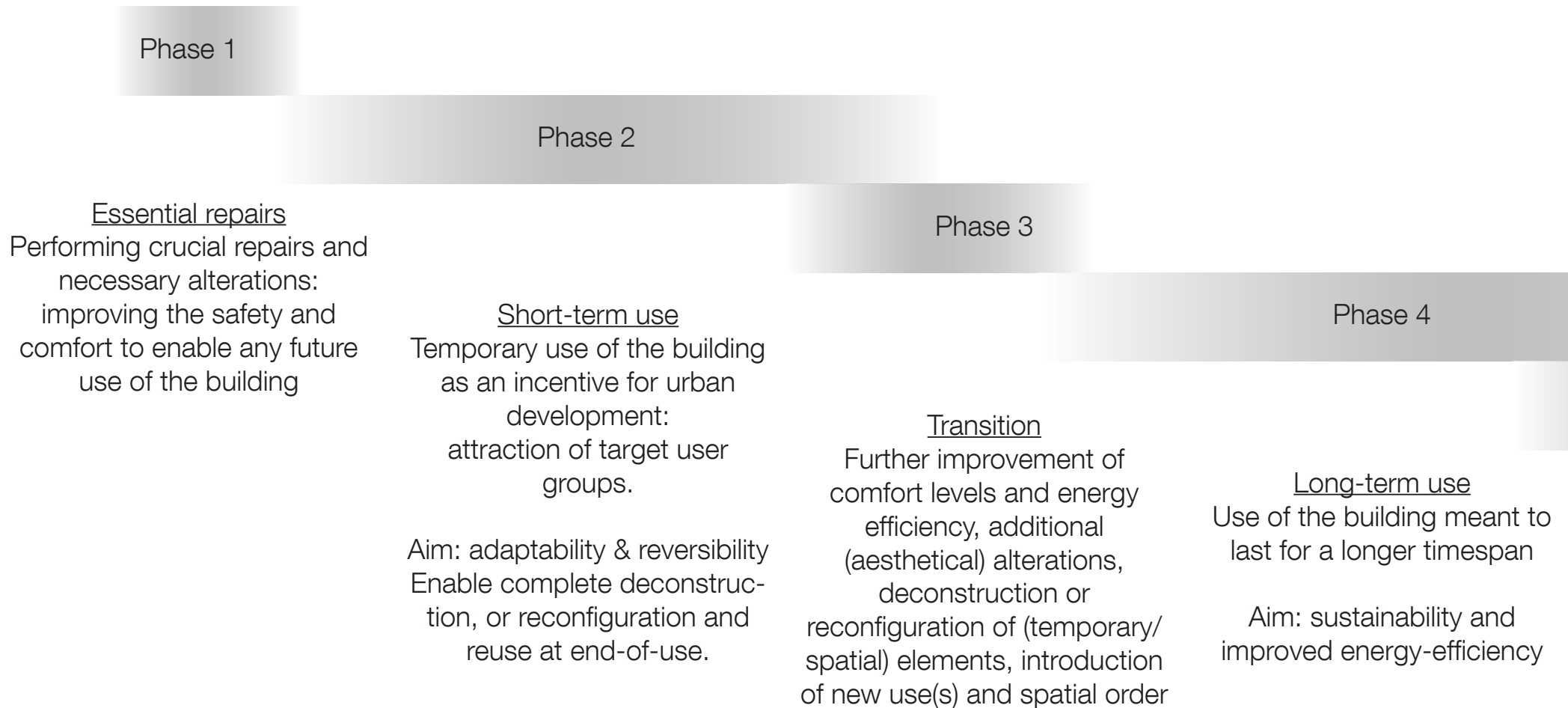
Ambition

Urban catalyst concept:
redevelopment strategies comprised of a series of projects
that drive and guide urban development.

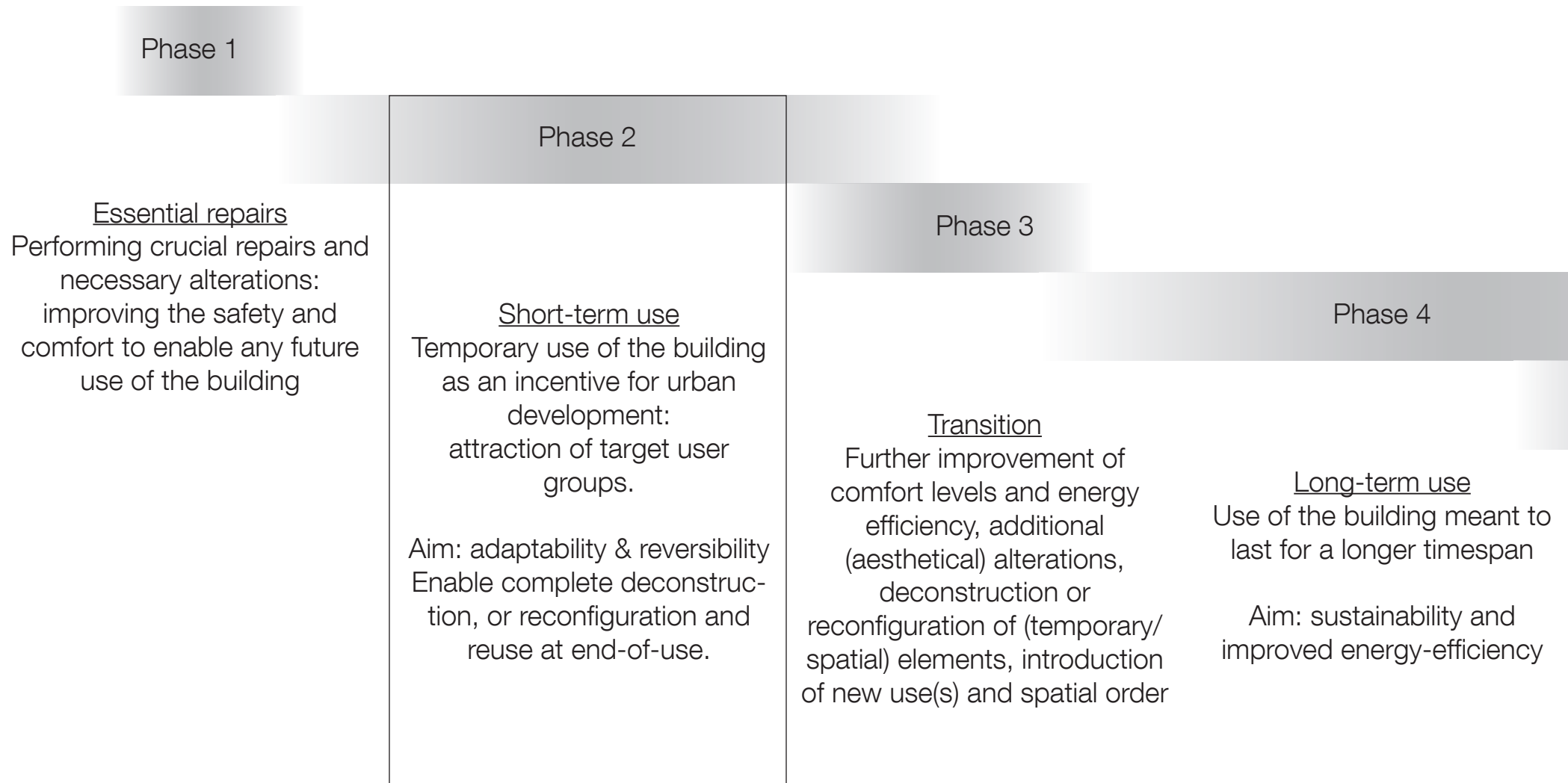
Ambition:
Katoenveem as a catalyst in the transition of the M4H-area

THE FUTURE

Approach: part of an ongoing process of urban development



Approach: part of an ongoing process of development



PHASE 1: ESSENTIAL REPAIRS

Performing crucial repairs and necessary alterations:
improving the safety and
comfort to enable any future use of the building

Categorization

Elements of the building:

Facade
Facade Openings
Roof
Roof Openings
Balconies

Aspects for improvement:

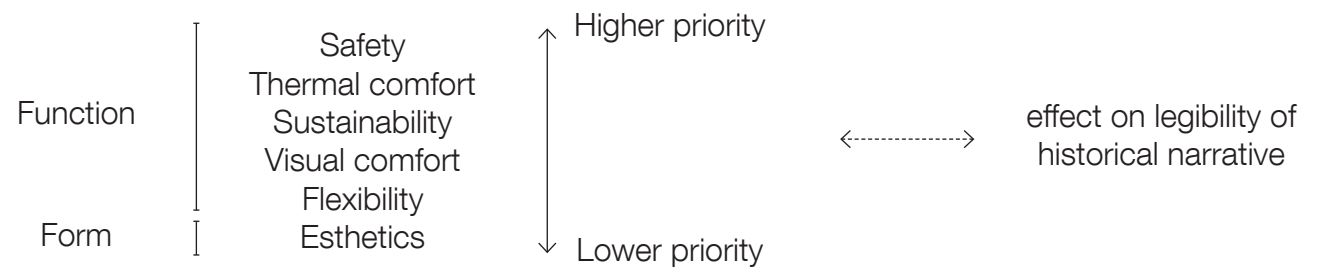
Safety
Thermal comfort
Sustainability
Visual comfort
Flexibility
Esthetics

Intervention types:

Repair
(overdue) Maintenance
Renovation
Subtraction
Addition
Reconstruction
Preservation
(etc.)

element	Facade		Facade openings		Balconies		Roof		Roof openings	
aspect	Safety	Functionality	Thermal Comfort		Sustainability	Visual comfort	Flexibility		Esthetics	
intervention	Repair	Maintenance	Renovation		Subtraction	Addition	Reconstruction		Preservation	

Prioritization of aspects



Phasing of interventions

Short term

Alterations necessary to enable a new type of use

- Safety
- Thermal comfort
- Sustainability
- Visual comfort
- Flexibility
- Esthetics

Long term

Additional alterations for further improvement

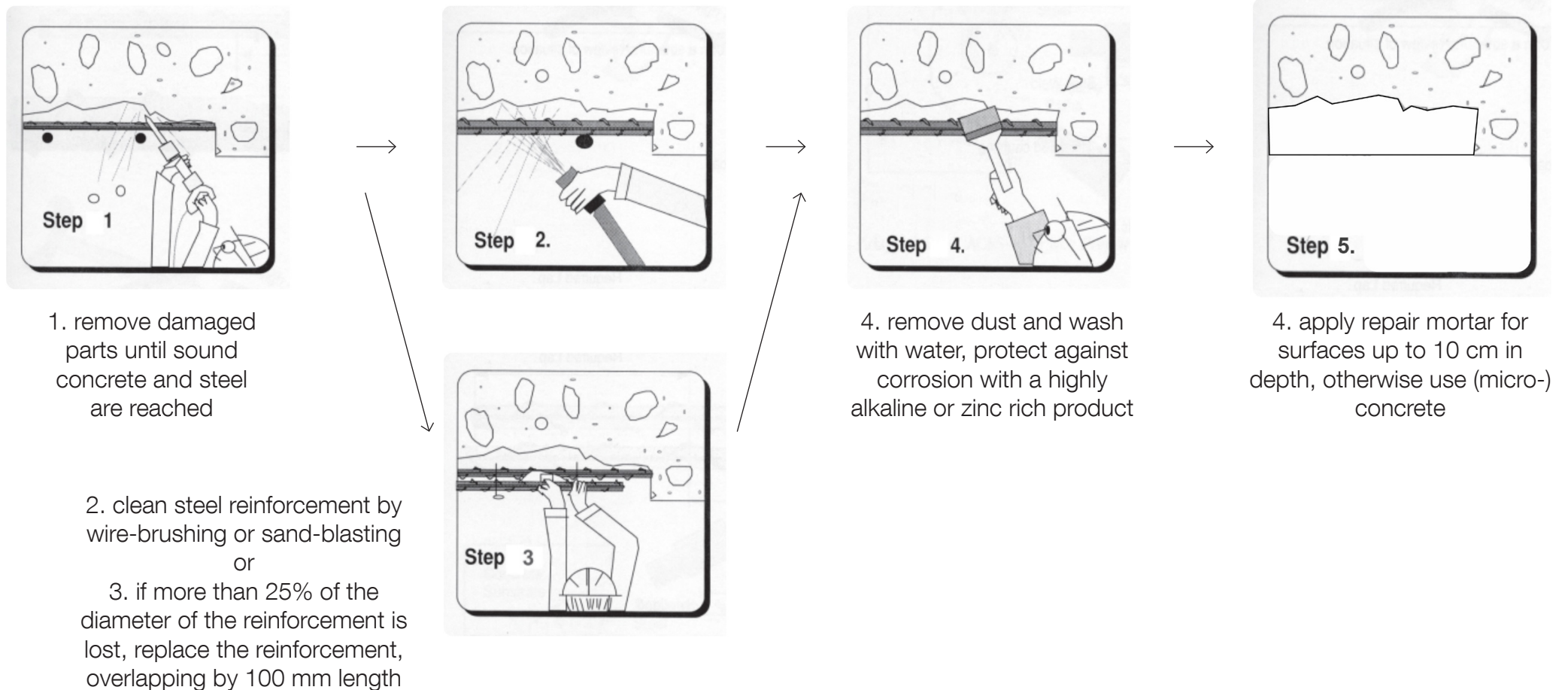
- Thermal comfort
- Sustainability
- Flexibility
- Esthetics

Repair of the damaged reinforcement



Fig. 70. Current state of the facade, source: photograph by A. Loef

Repair process of damaged concrete reinforcement



element	Facade	Facade openings		Balconies	Roof		Roof openings
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation

Fig. 71-75. Steps in the process of concrete repair, source: www.middleeast.weber

Visual impact of repairing the damaged reinforcement



Fig.76. Repaired state of the facade, source: photograph by A. Loeff, edited by I.Louer

Repair of the drainage system



Fig. 77. Drainage opening on the roof



Fig. 78. Drainage pipes from roof on balconies



Fig. 79. Connection of drainage system through balcony floors

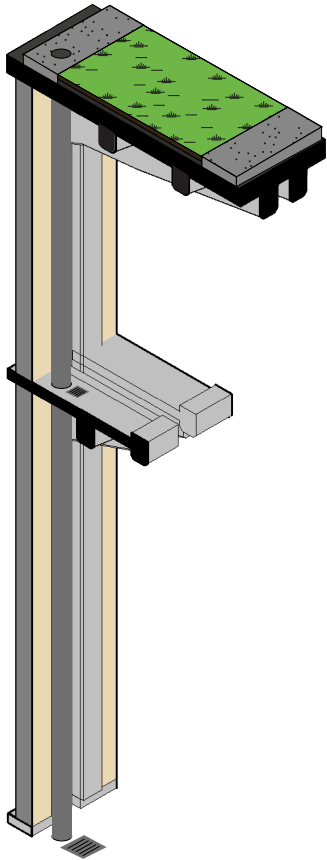
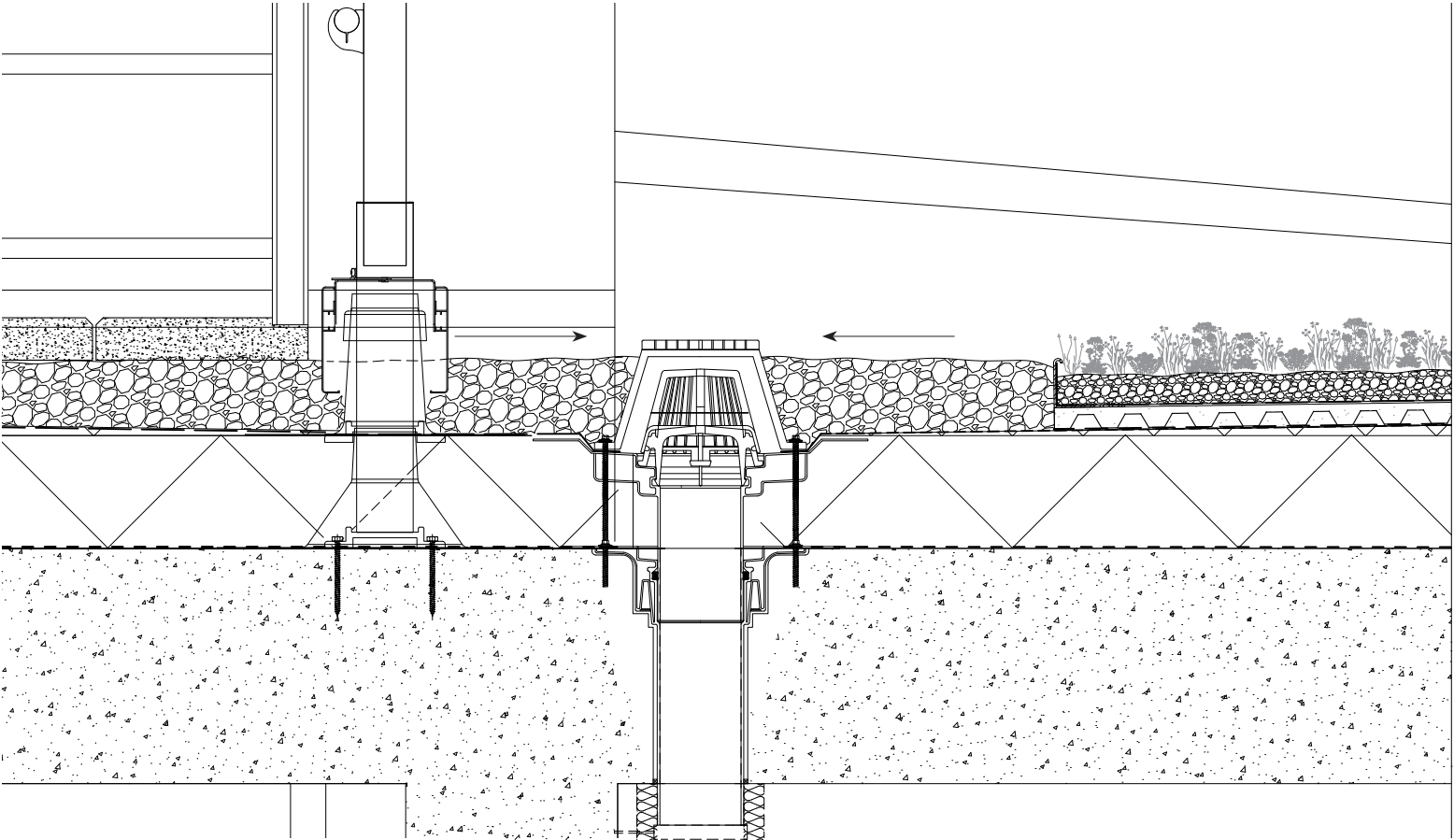


Fig. 80. Drainage pipes from the balconies

element	Facade		Facade openings		Balconies		Roof		Roof openings	
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics			
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation			

Fig 77-80 source: photographs by C. de Boon

Repair of the drainage system, 1:10



element	Facade		Facade openings		Balconies		Roof		Roof openings	
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics			
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation			

Fig. 81. Detail of the replacement of the drainage system, source: own image

Fig. 82. Schematic image of the replacement of the drainage system, source: own image

Replacement of original rooflight windows



Fig. 83. Current state of the rooflights, source: photograph by C. de Boon

Velux Northlight 25-90°
modular rooflight system

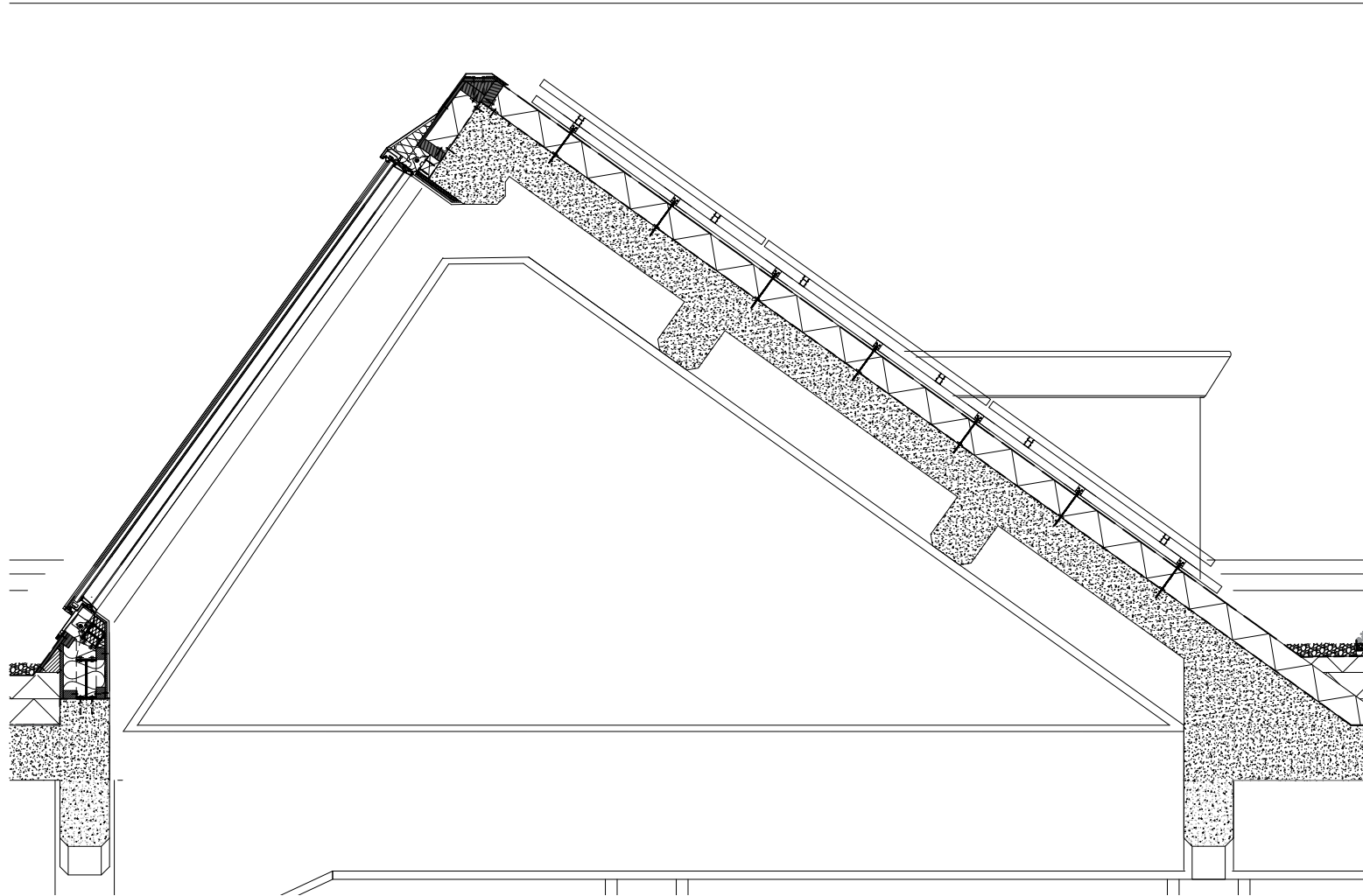


Fig. 84. Modular element of the Velux Northlight 25-90 system, source: commercial.velux.com



Fig. 85. Velux Northlight 25-90 visualisation, source: commercial.velux.com

Replacement of the original rooflights, detail 1:40



element	Facade		Facade openings	Balconies		Roof		Roof openings
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics	
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation	

Fig. 86. Detail of the replacement of the rooflight windows, source: own image

Visual effect of replacing the original rooflights



Fig. 87. Current situation on the roof, source: photograph by C. de Boon

Visual effect of replacing the original rooflights

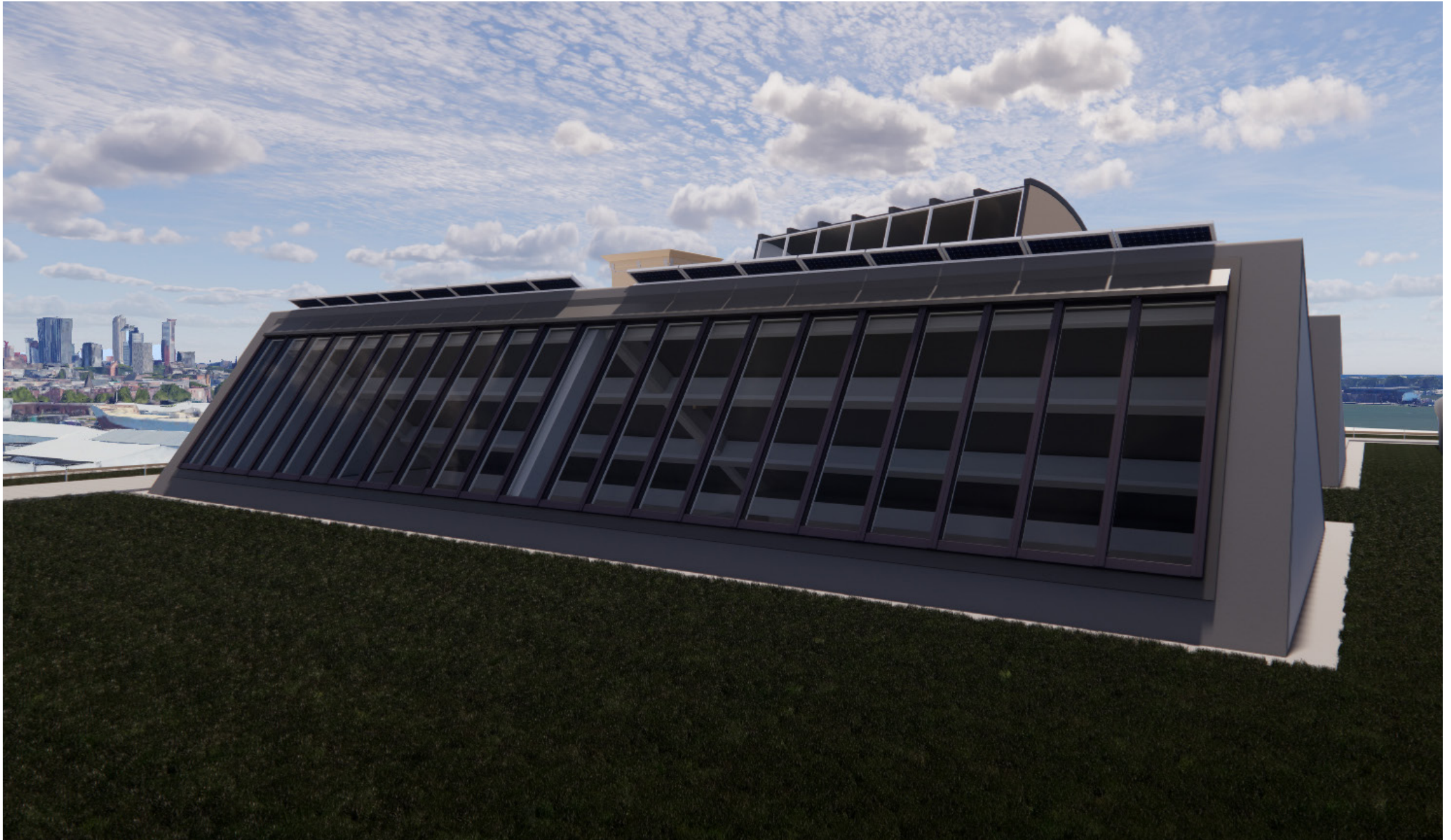


Fig. 88. Visualisation of the replaced rooflight windows, source: own image

Daylight

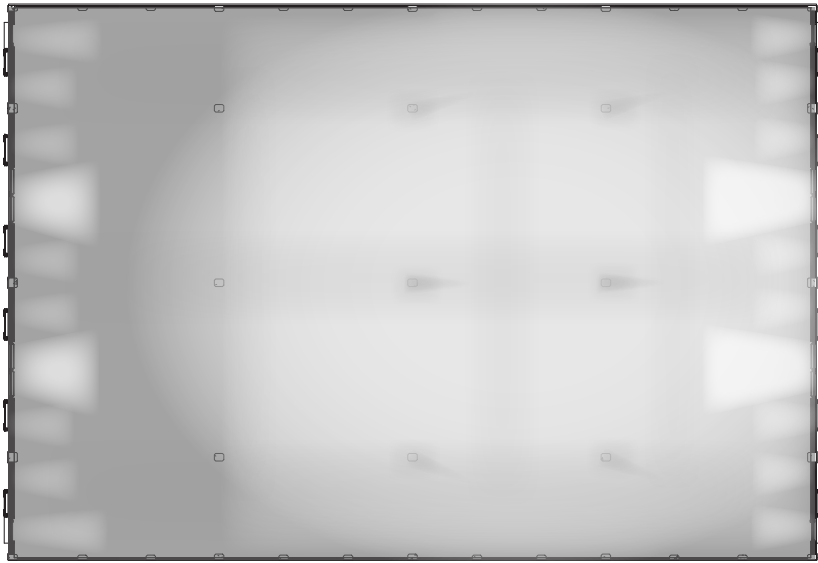


Fig. 89: Plan view of daylight in compartment in the current situation, source: own image

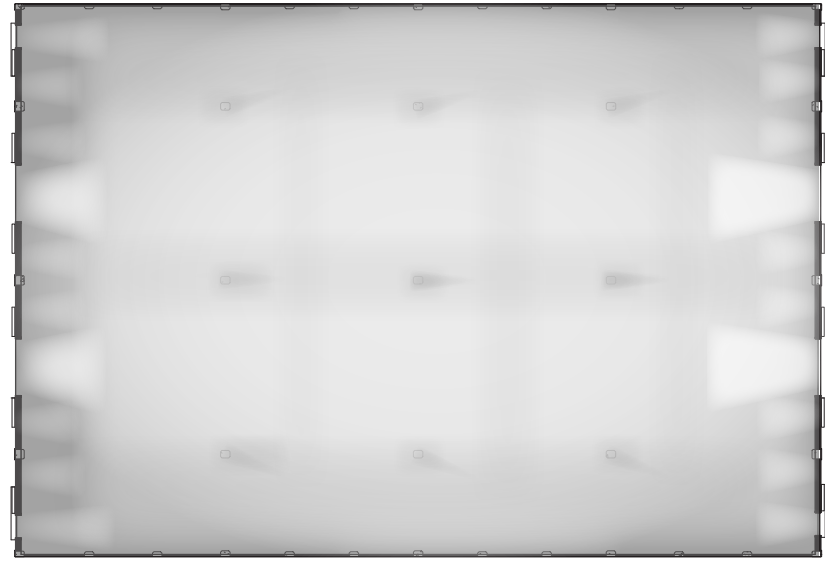


Fig. 90: Plan view of daylight in compartment after installing new rooflight, source: own image

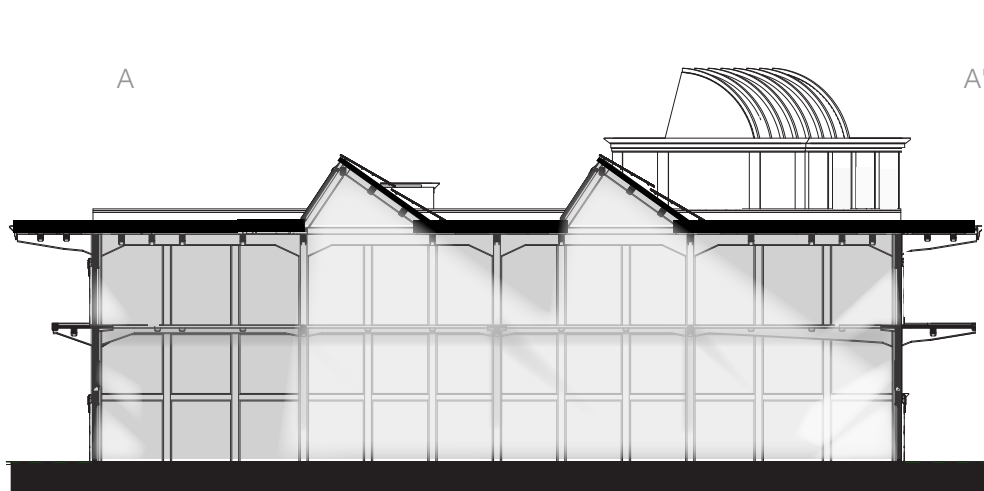


Fig. 91: Section A-A' showing daylight in compartment in the current situation, source: own image

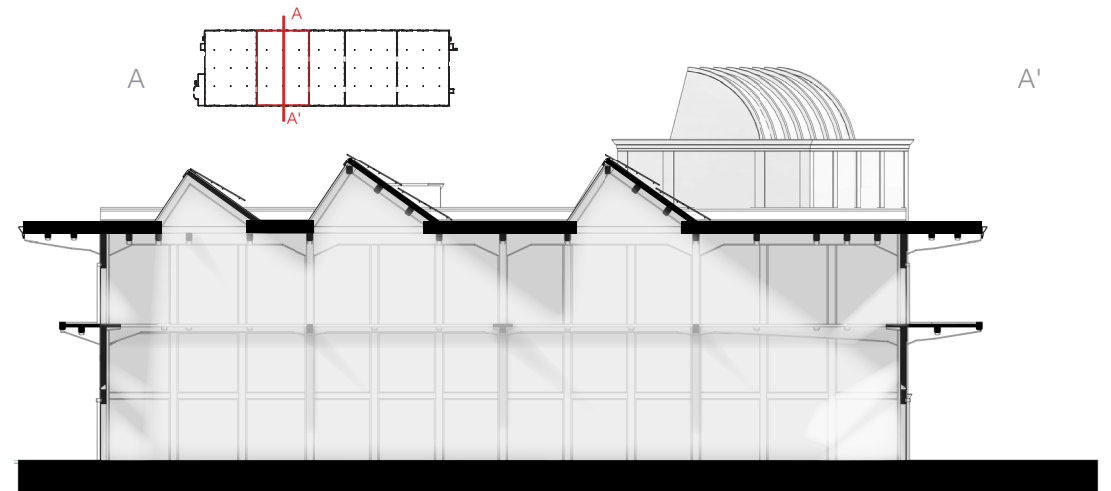
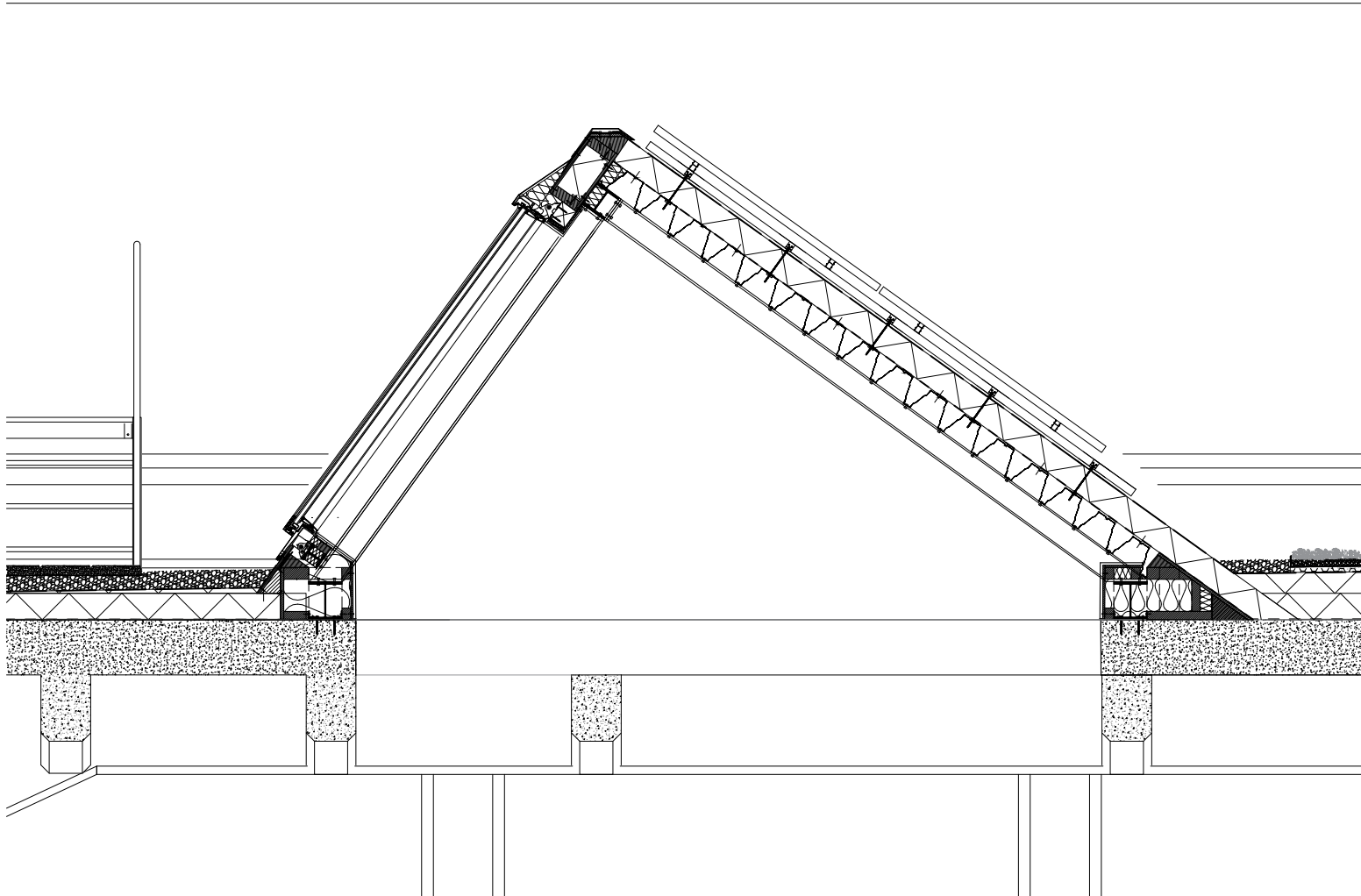


Fig. 92: Section A-A' showing daylight in compartment after installing new rooflight, source: own image



Addition of new rooflights, detail 1:40



element	Facade		Facade openings	Balconies		Roof		Roof openings
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics	
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation	

Fig. 93. Detail of the placement of a new rooflight, source: own image

Consequences of interventions on the roof



Fig. 94. Interior of a compartment, source: photograph by C. de Boon

Consequences of interventions on the roof



Fig. 95. Visualisation of the effect of the new rooflights, source: own image

Consequences of the interventions on the roof



Fig. 96. The current situation on the roof, source: photograph by C. de Boon

Consequences of the interventions on the roof

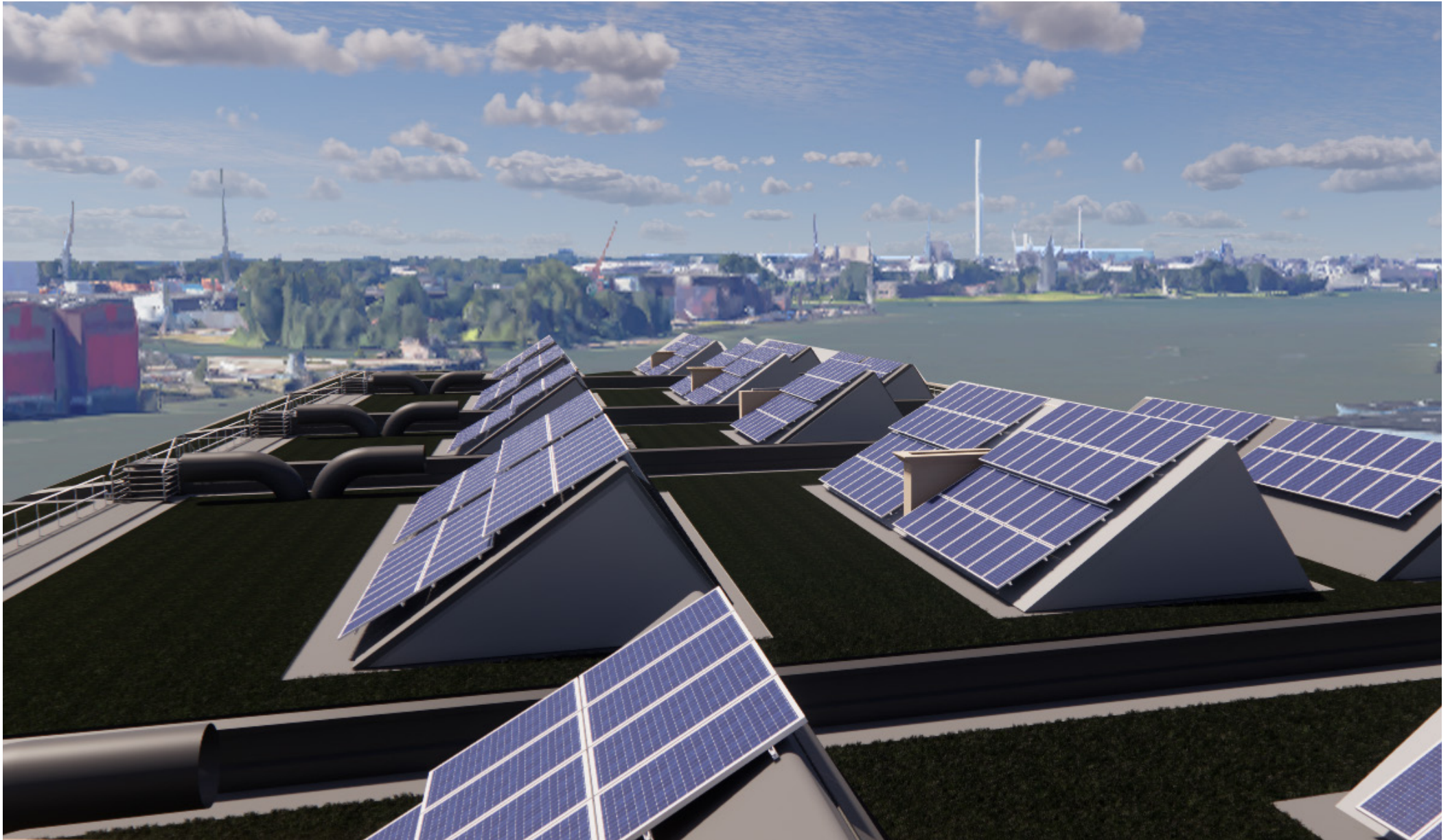


Fig. 97. Visualisation of the new roofscape, source: own image

Replacement of the original facade windows



Fig. 98. Current state of the windows in the facade of Katoenveem, source: photograph by C. de Boon

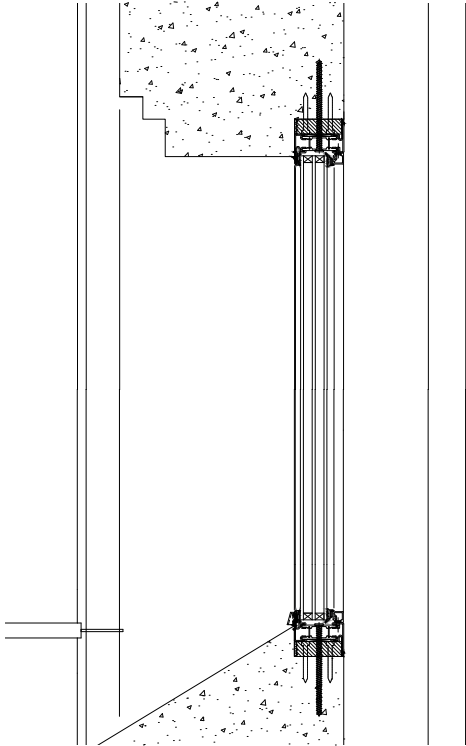


Fig. 99. Visualisation of the new facade windows, source: own image

Replacement of the original facade windows, detail 1:10

Outside

Inside



element	Facade		Facade openings	Balconies	Roof		Roof openings	
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics	
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation	

Fig. 100. Visualisation of the new facade windows on the exterior, source: own image

Fig. 101. Details of the new windows in the location of the old cement frame, source: own image

Fig. 102. Visualisation of the new facade windows on the interior, source: own image

Placement of new facade doors, details 1:10

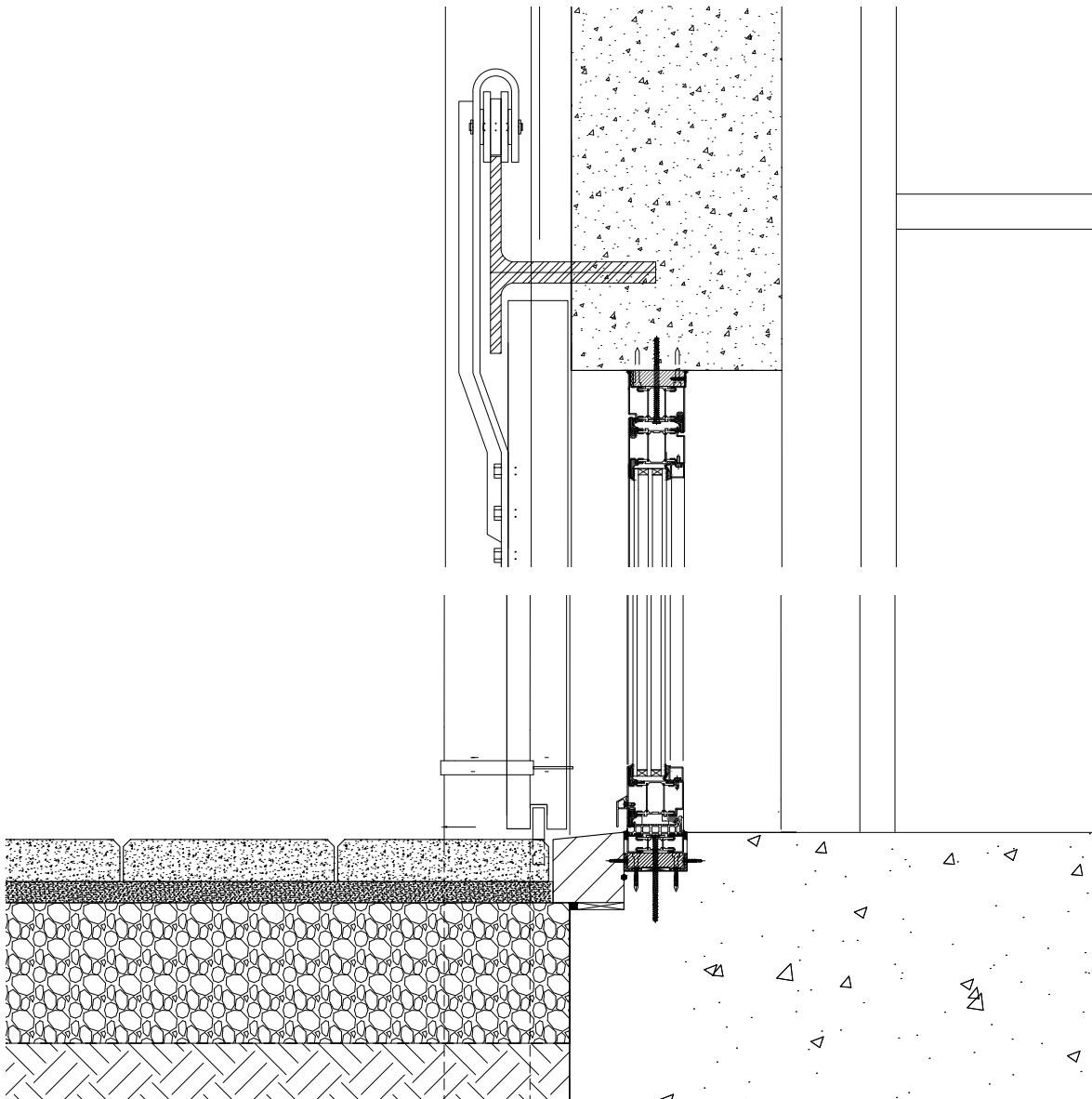


Fig. 103. Details of new door head and sill (threshold), source: own image

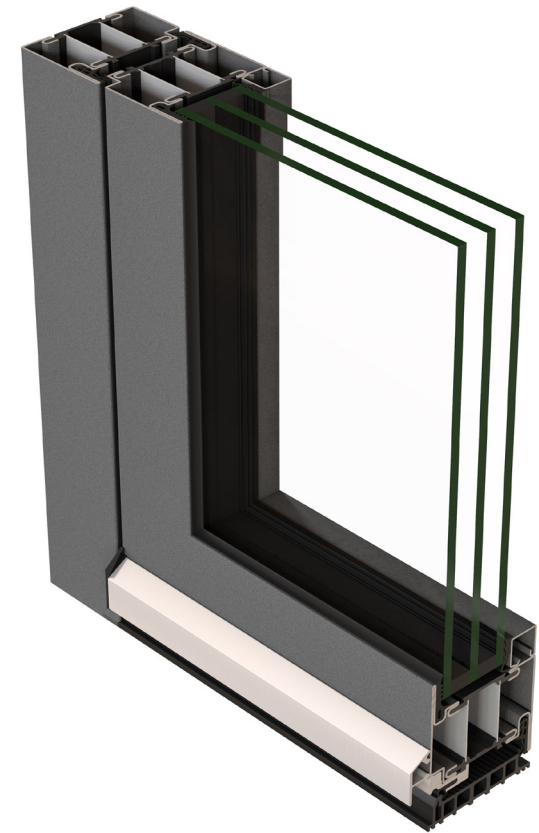


Fig. 104. Janisol HI steel profile door, source: jansen.com

Placement of new facade doors



element	Facade	Facade openings		Balconies	Roof		Roof openings
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation

Fig. 105. Visualisation of the new doors on the exterior, source: own image

Fig. 106. Current state of the steel hanging sliding doors at Katoenveem, source: photograph by A. Loef

Maintenance of the facade and doors



element	Facade		Facade openings		Balconies	Roof		Roof openings
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics	
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation	

Fig. 107. Current situation of the facade, source: photograph by C. de Boon

Fig. 108. Visualisation of the result of facade repairs, source: own image

Facade section 1:20

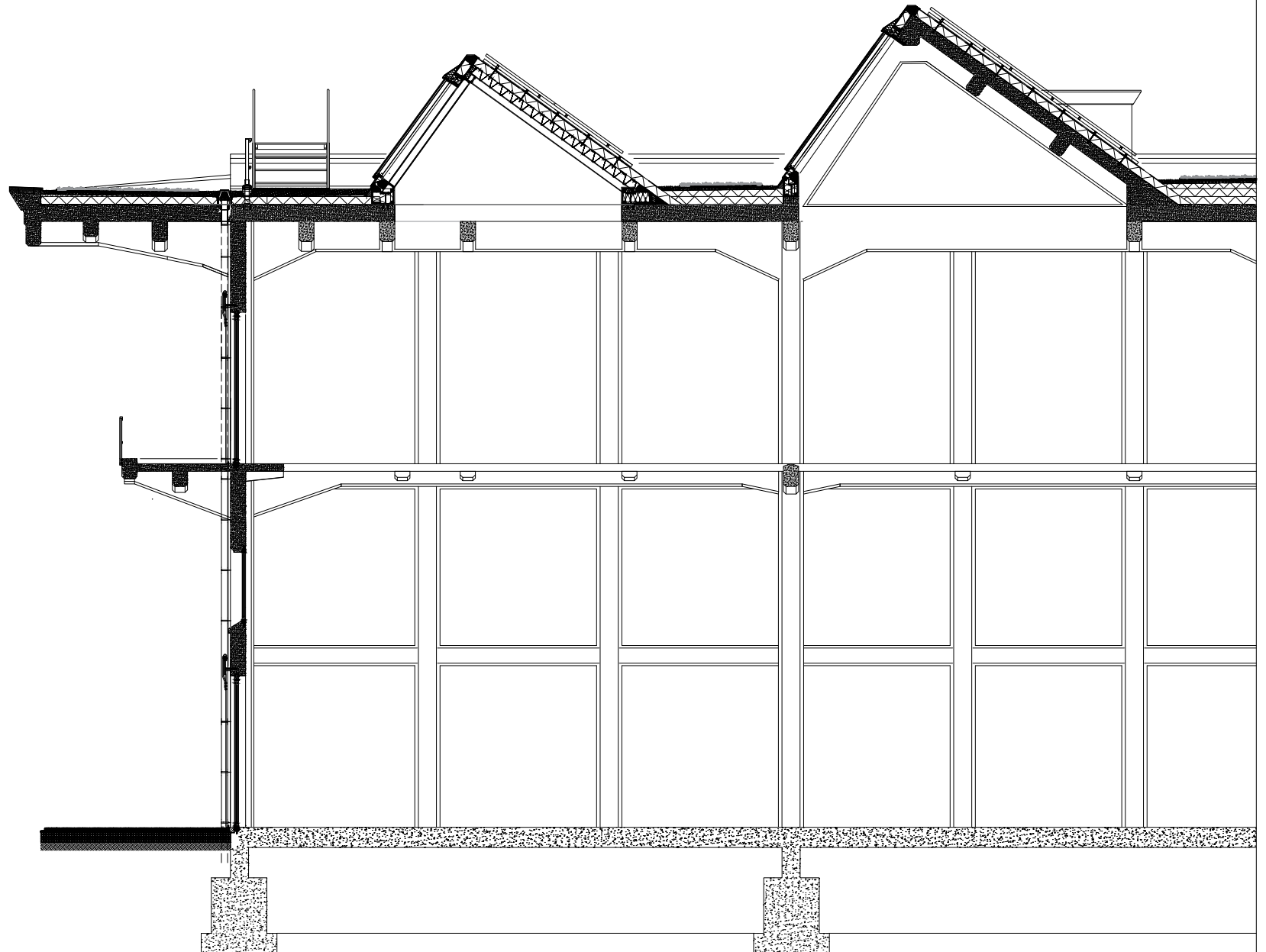


Fig. 109. Facade fragment section, source: own image

Visualisation of the north facade



Fig. 110. Visualisation of the north facade, source: own image

PHASE 2: SHORT TERM USE

Temporary use of the building
as an incentive for urban development:
attraction of target user groups.

Aim: adaptability & reversibility
Enable complete deconstruction, or reconfiguration and
reuse at end-of-use.

Final design visualisation



Fig. 111 Visualisation of the interior of a compartment, own image

Ground floor - Current situation

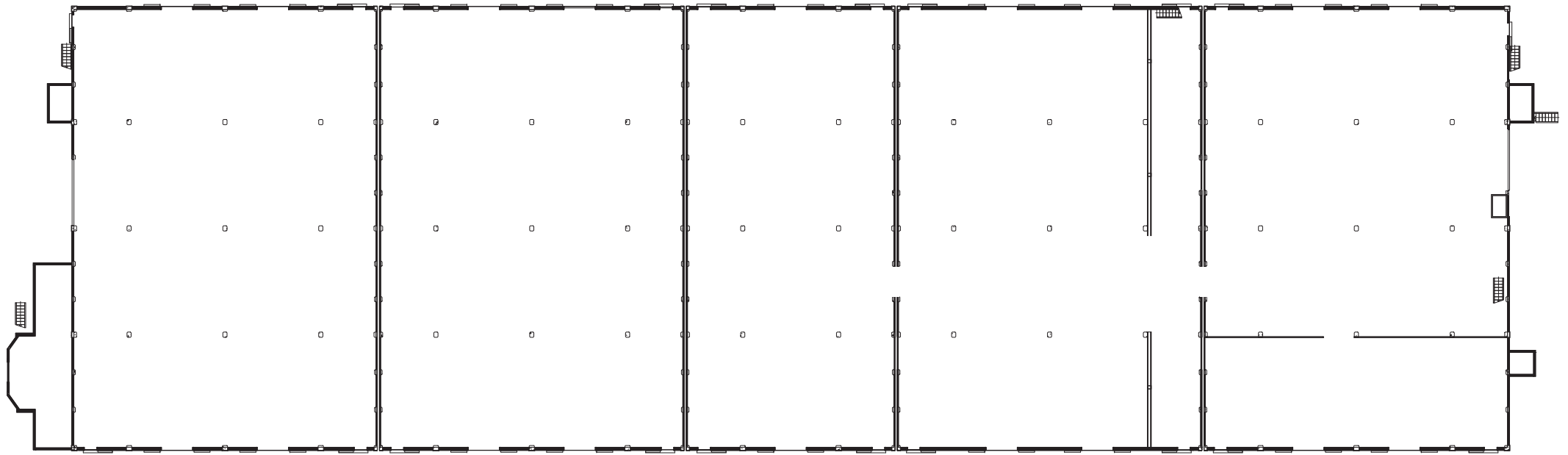


Fig. 112. Current ground floor plan, source: own image

Ground floor - Demolition plan (1)

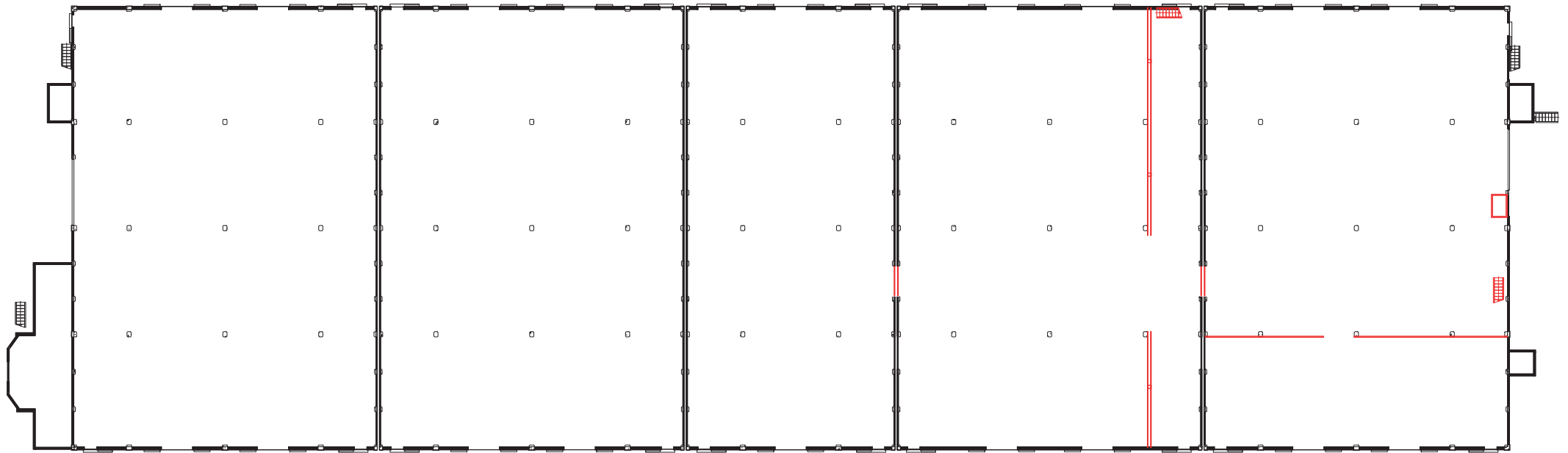


Fig. 113. Demolition plan, source: own image

Ground floor - Demolition plan (2) and circulation

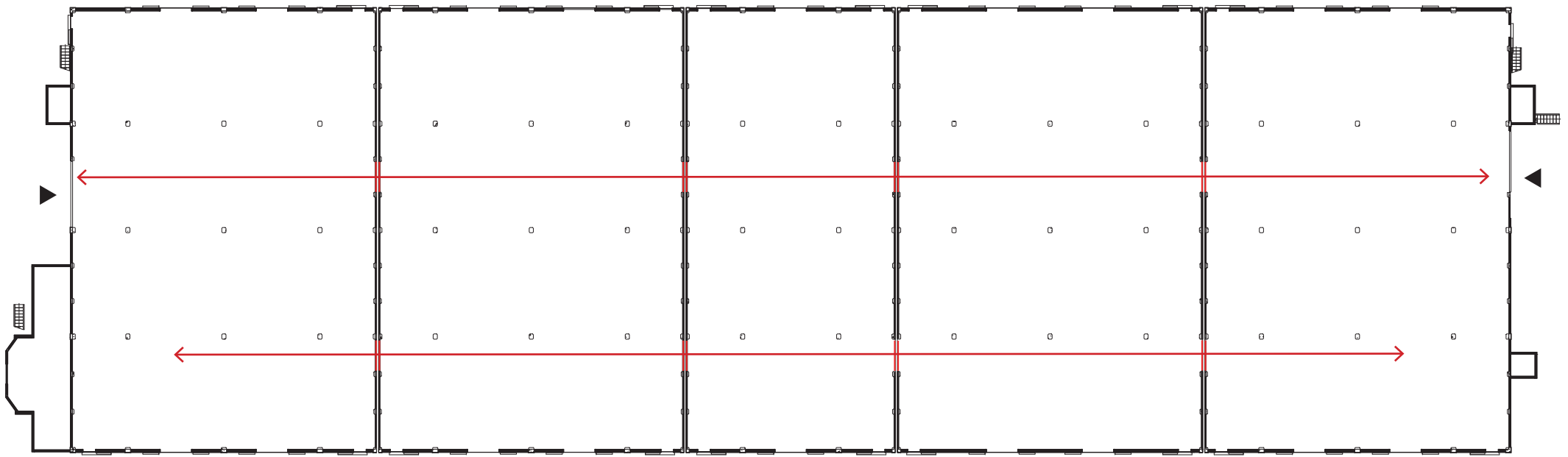


Fig. 114. Demolition plan (2), source: own image

Ground floor - circulation

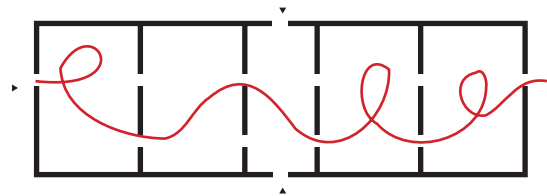
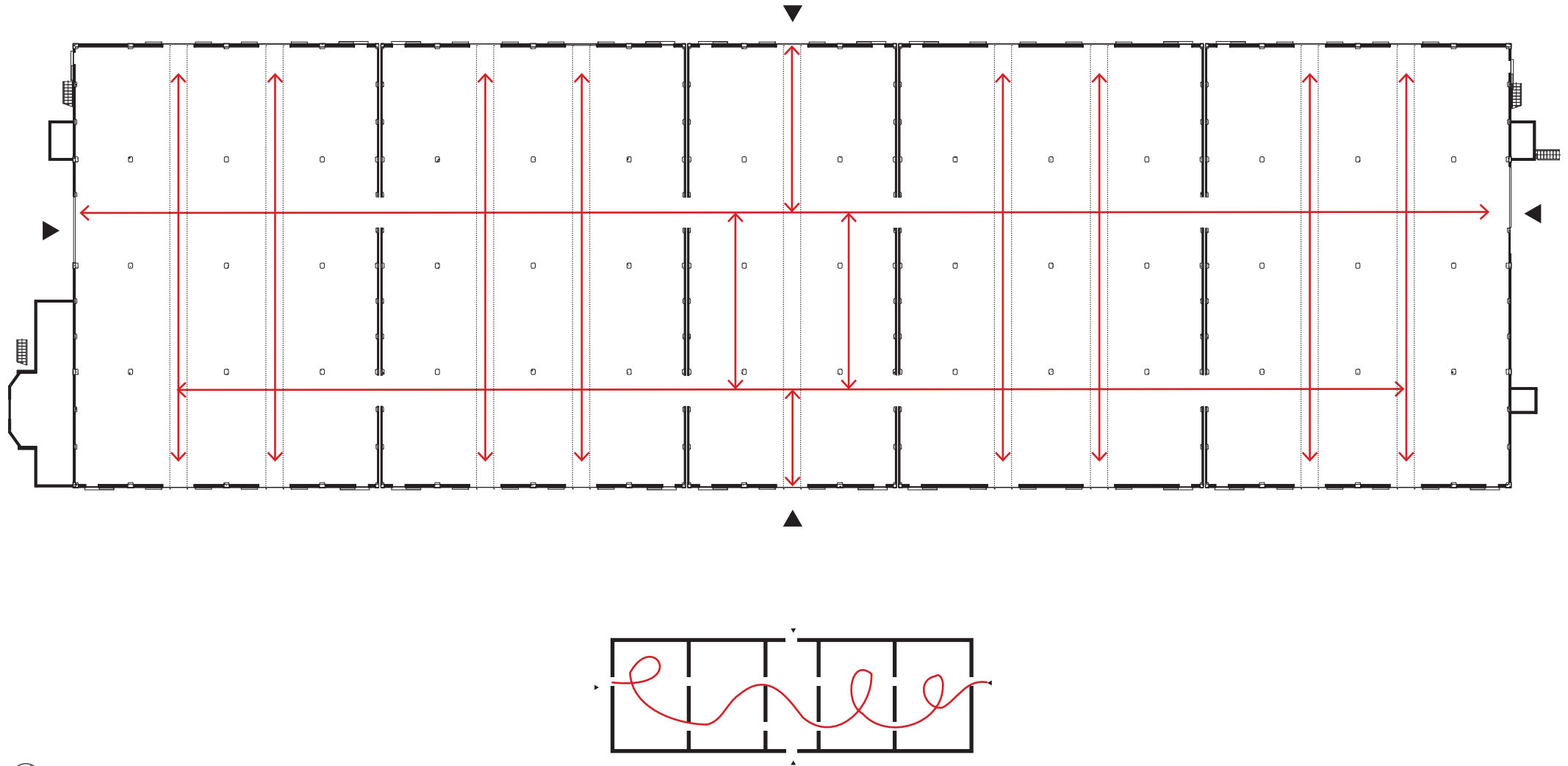


Fig. 115. Circulation, source: own image

Ground floor - zones

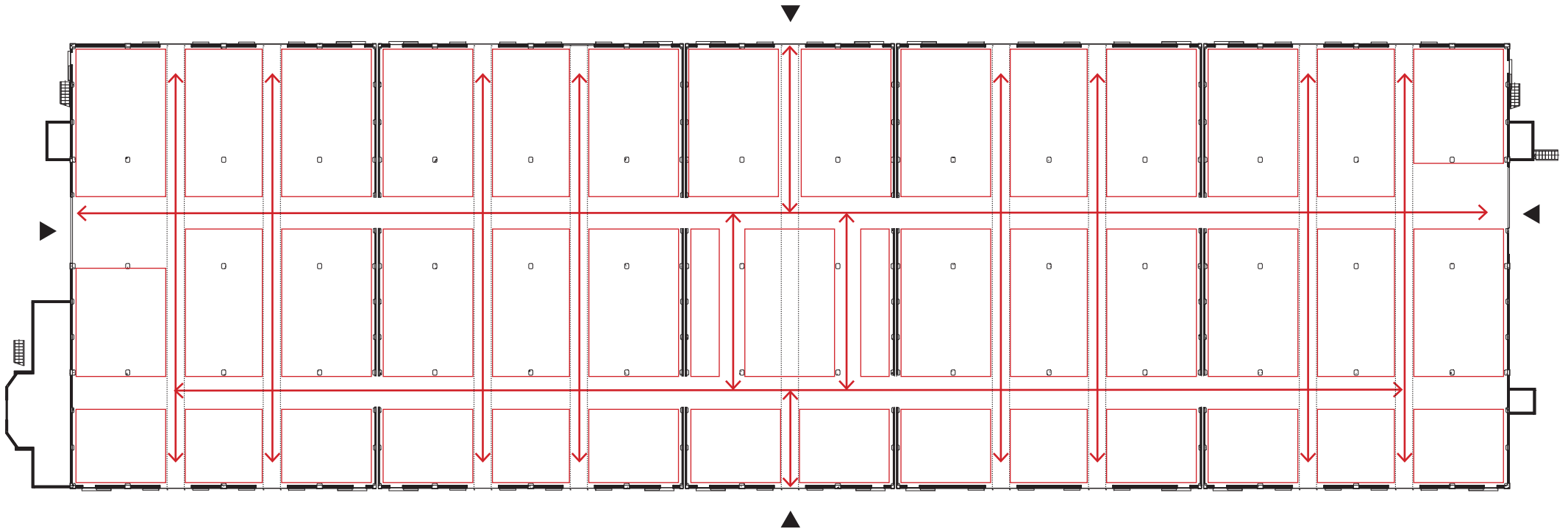


Fig. 116. Zones, source: own image

Ground floor - clustered services

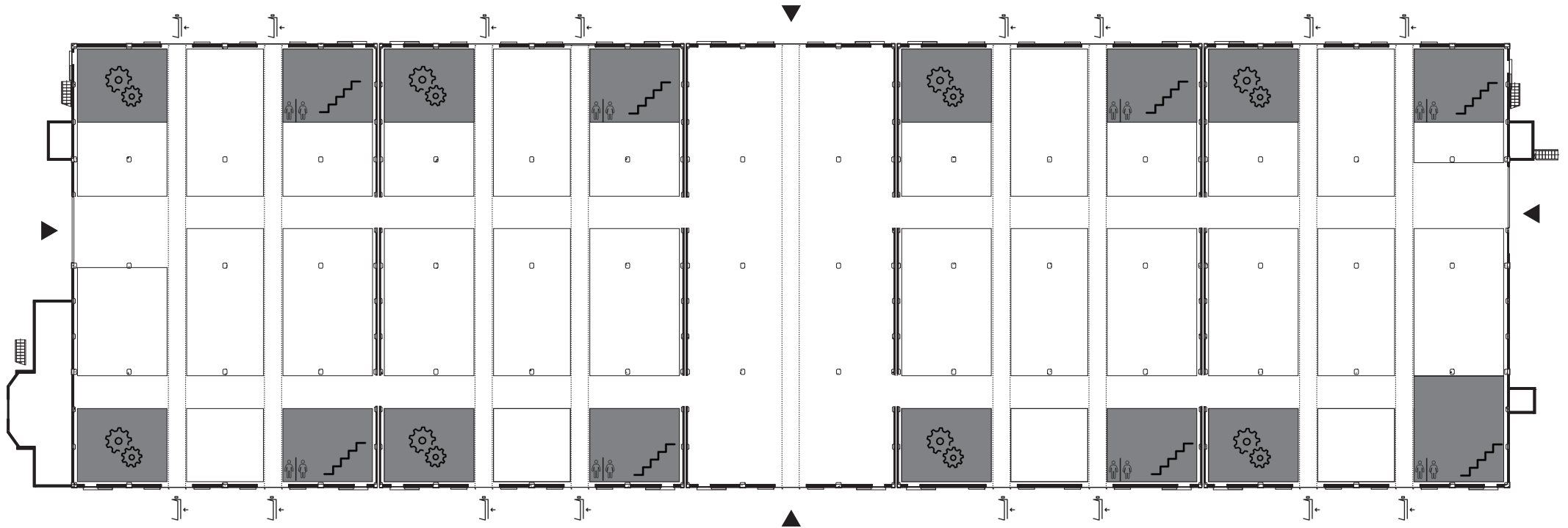


Fig. 117: Ground Floor clustered services, source: own image

Daylight

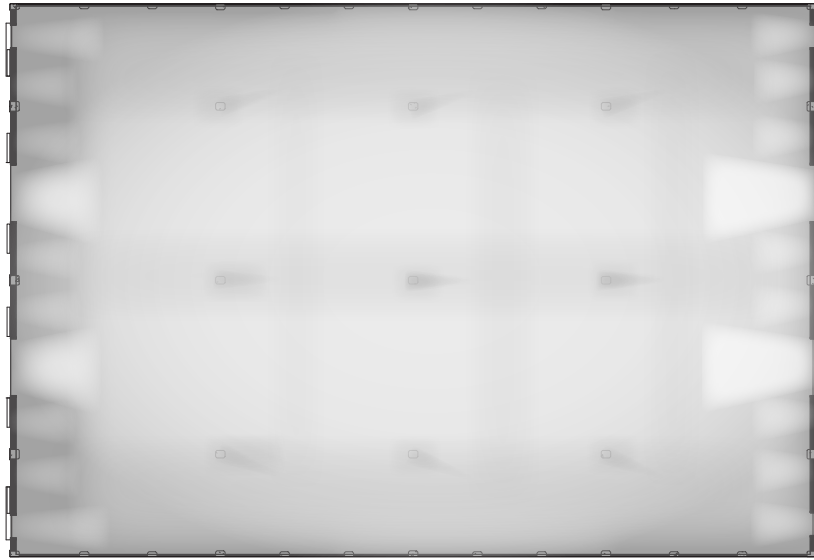


Fig. 118: Plan view of daylight in compartment, source: own image

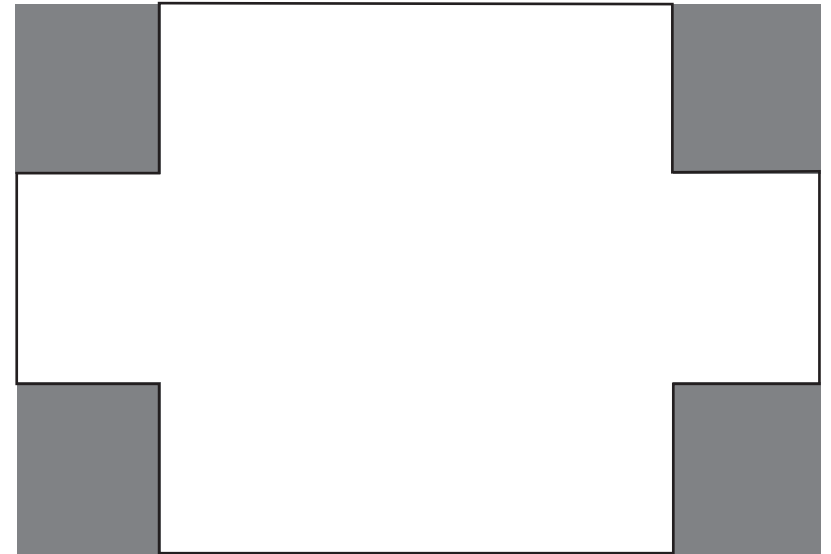


Fig. 119: Diagram of space occupied by services versus space left, source: own image

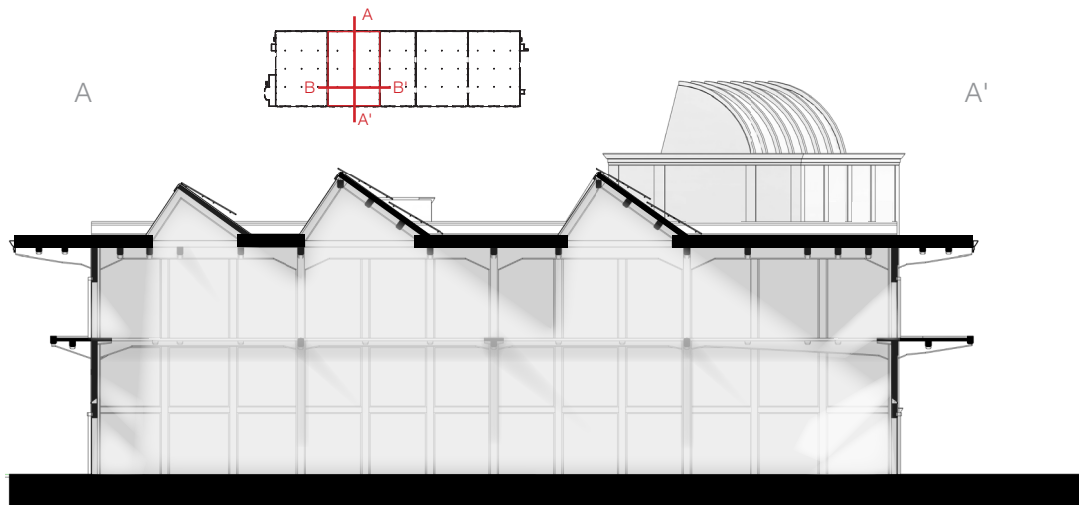


Fig. 120: Section A-A' showing daylight in compartment, source: own image

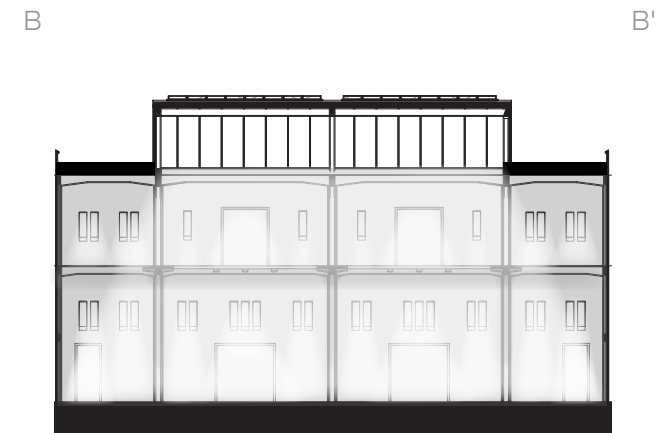


Fig. 121: Section B-B' showing daylight in compartment



Ground floor - Program

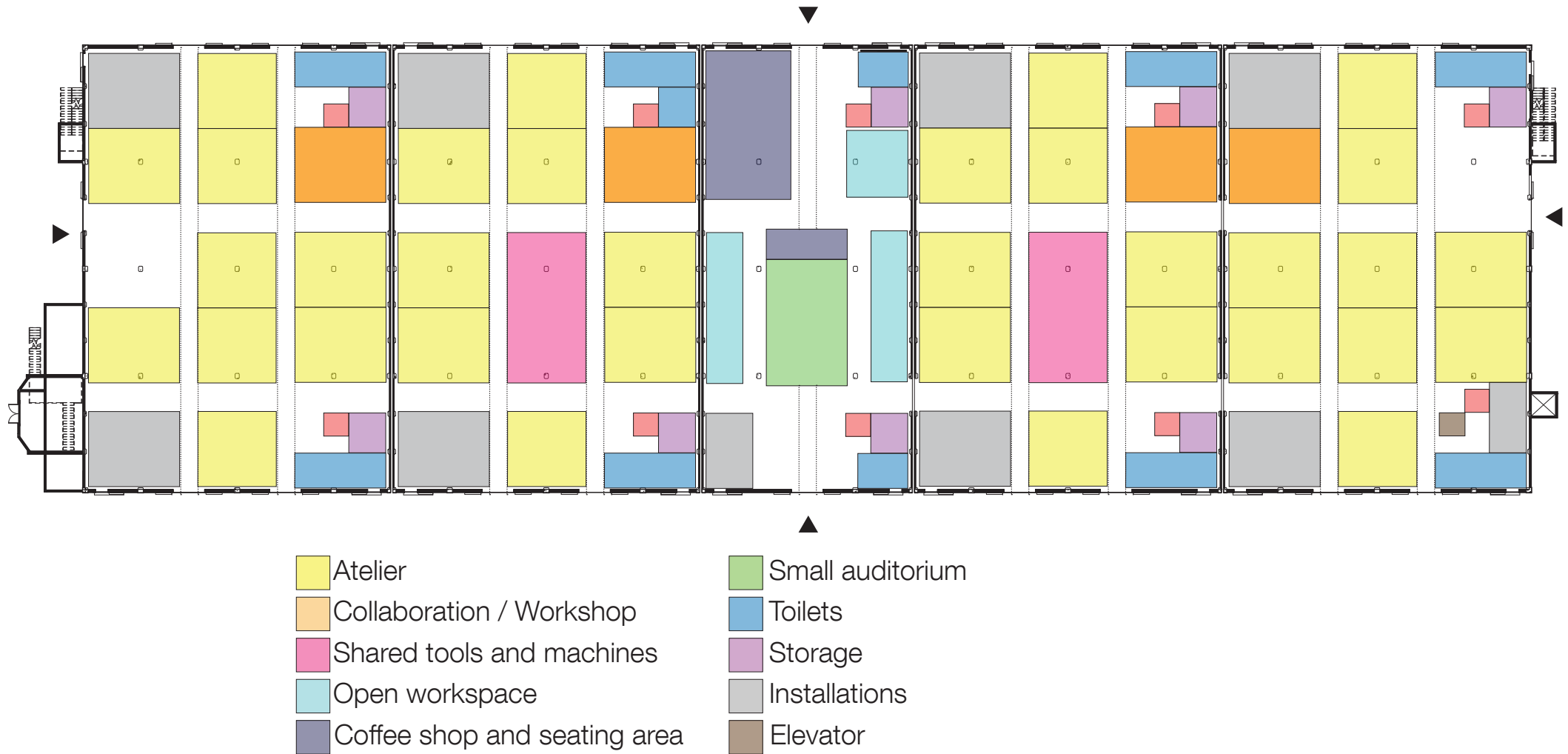


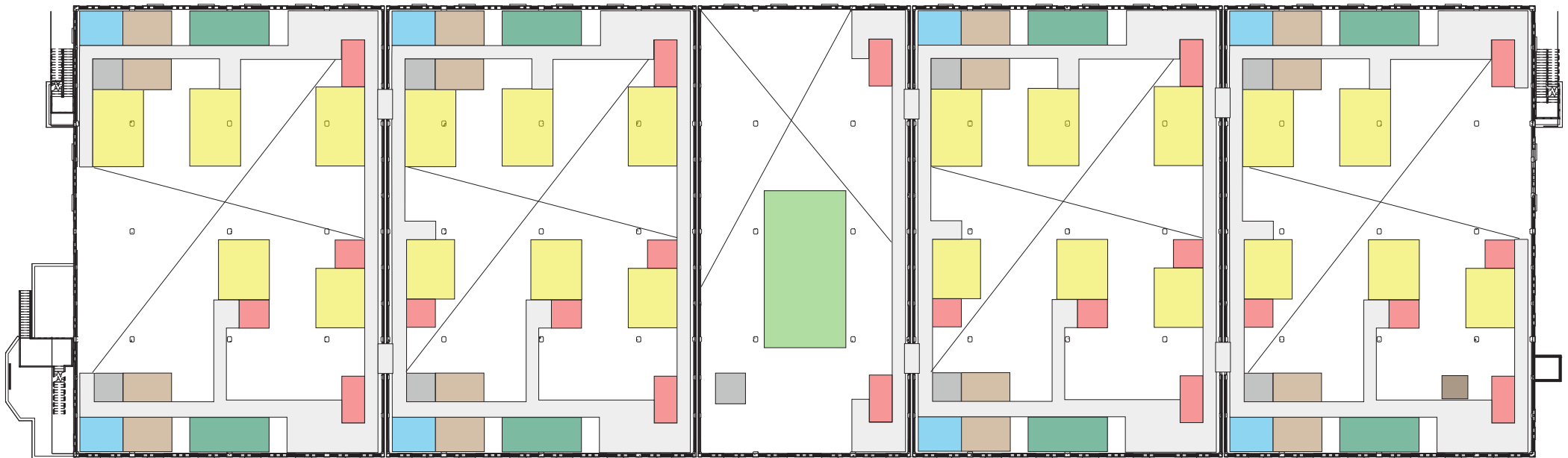
Fig. 122: Ground Floor program, source: own image

First floor - circulation



Fig. 123: First floor circulation, source: own image

First floor - program



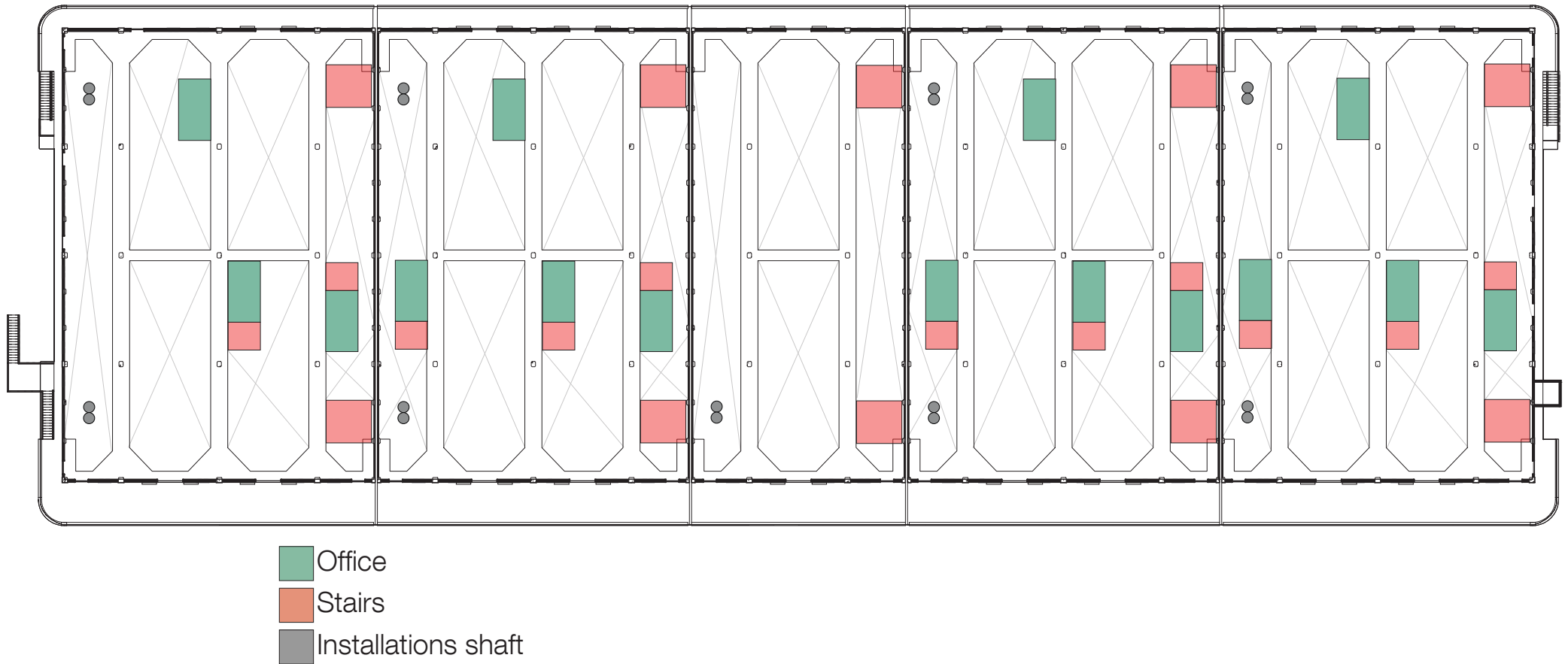
Atelier
 Office
 Meeting room

Small auditorium
 Toilets
 Stairs
 Installation shaft
 Elevator

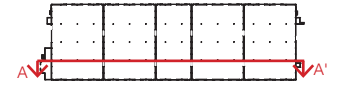


Fig. 124: First floor program, source: own image

Second floor - program



Section



0 10 m

Fig. 126. Section of Katoenveem Creative Hub, source: own image

Stacking of cotton bales

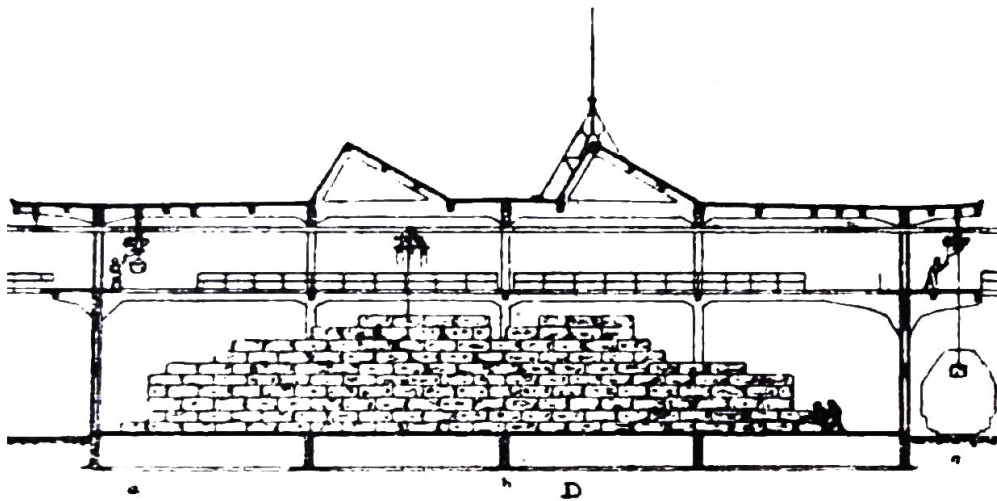


Fig. 127: Stacking of cotton bales inside the building, source: Van Dam, H. (1919). "The Cotton warehouse of Katoenveem", in: *The pioneer for the shipping industry and trade of the Netherlands and her colonies*, 3 (1919), p. 68

Fig. 128: Stacking of cotton bales inside the building, Katoenveem in operation, 1952, source: stadsarchief.rotterdam.nl

Volumes and daylight

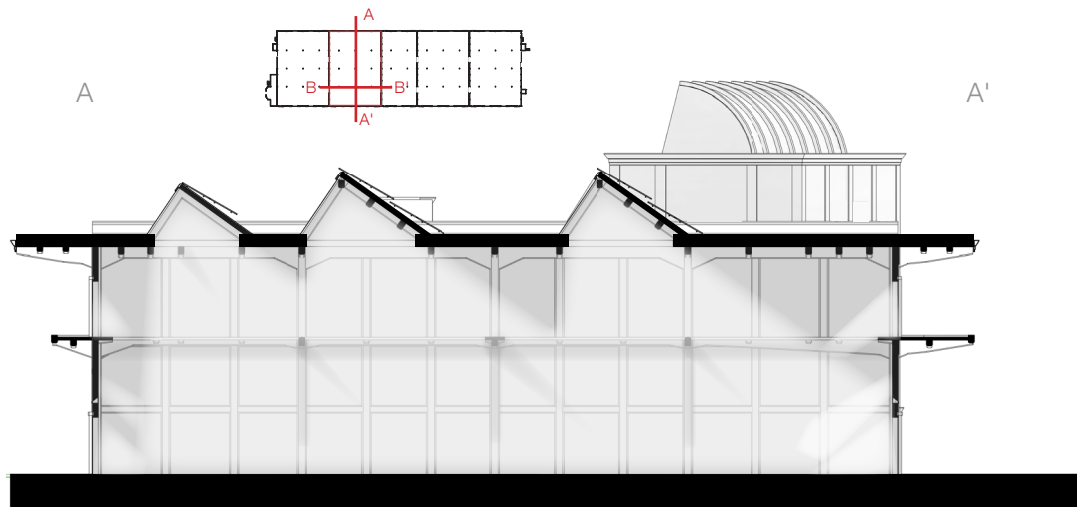


Fig. 129: Section A-A' showing daylight in a compartment, source: own image

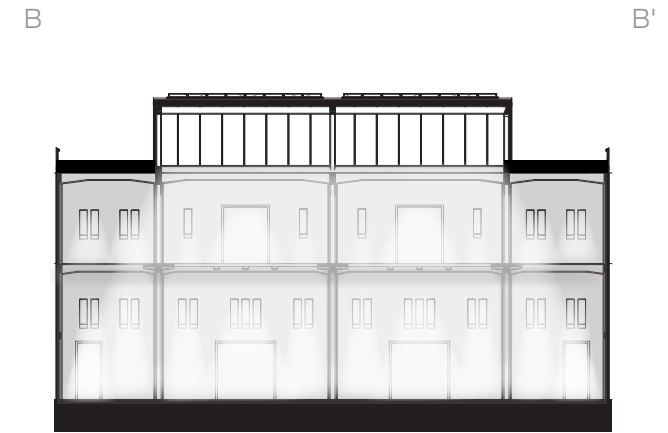


Fig. 130: Section B-B' showing daylight in a compartment



Fig. 131: Section C-C' showing daylight in a compartment, source: own image



Fig. 132: Section D-D' showing daylight in a compartment

0 10 m

Atelier types and stacking system

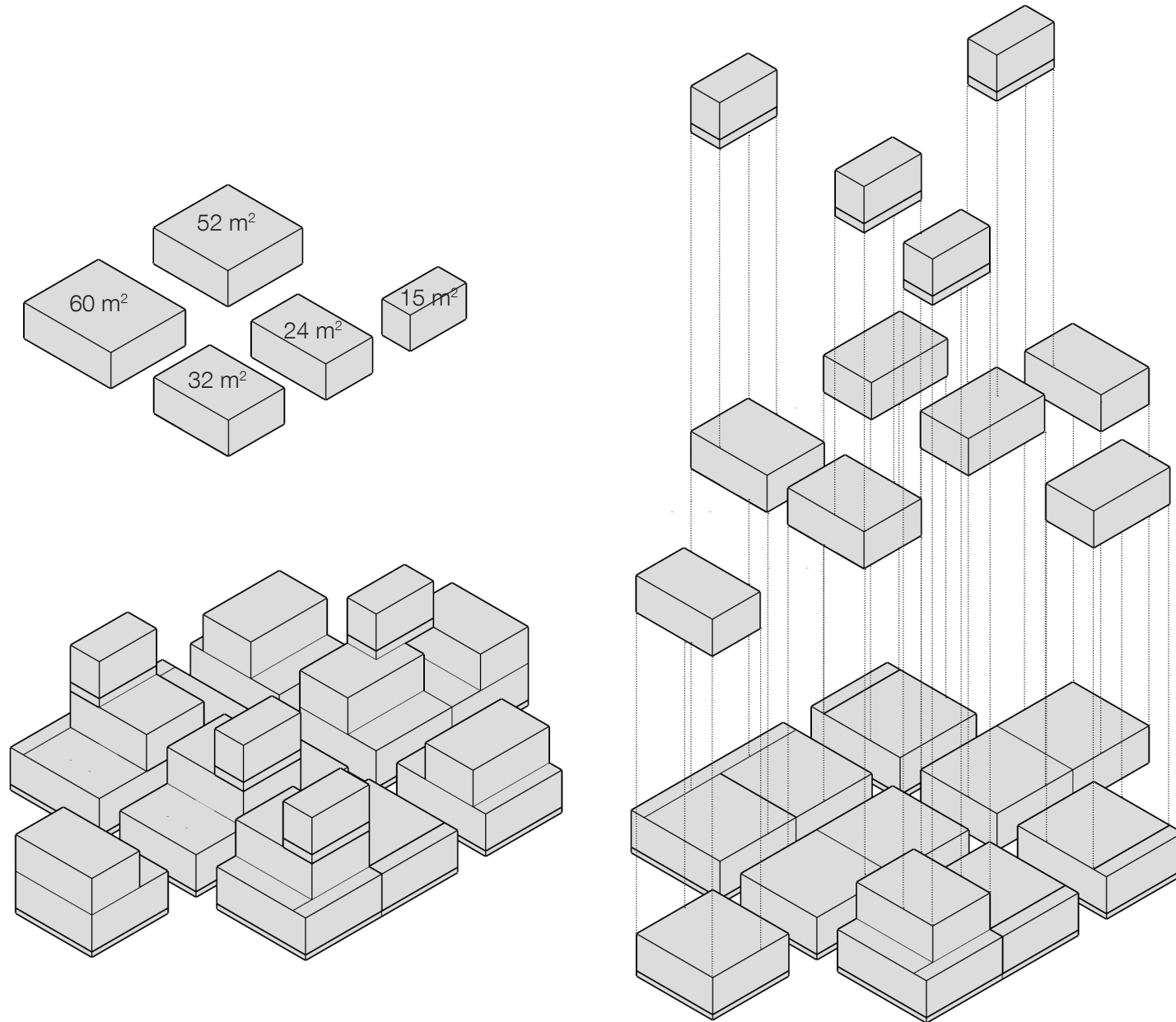
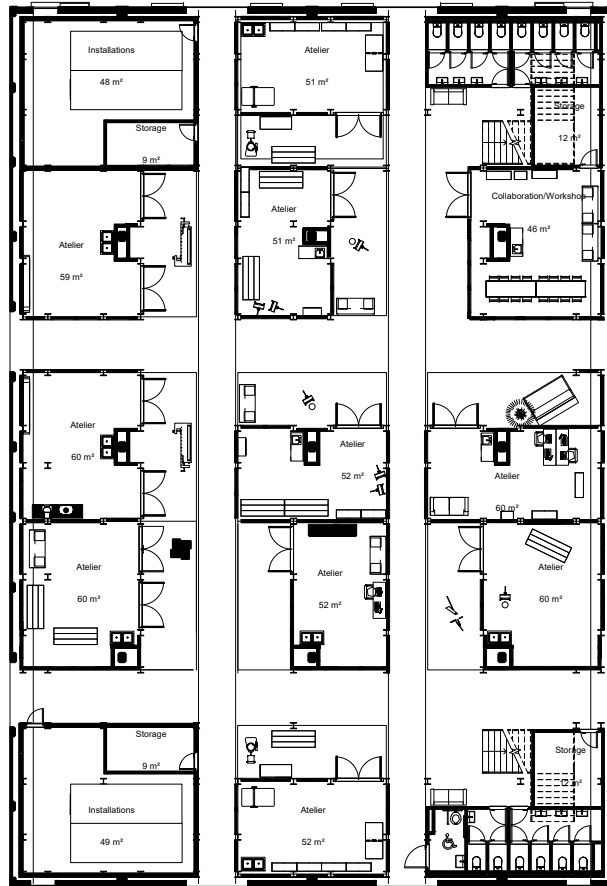


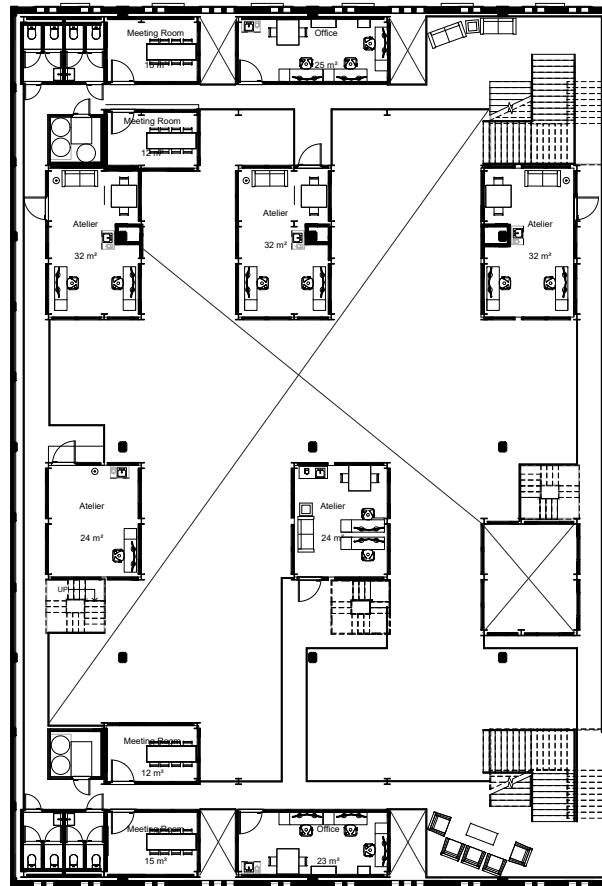
Fig. 133. Stacking of compartments, source: own image

Floor plans

Ground Floor



First floor



Second floor

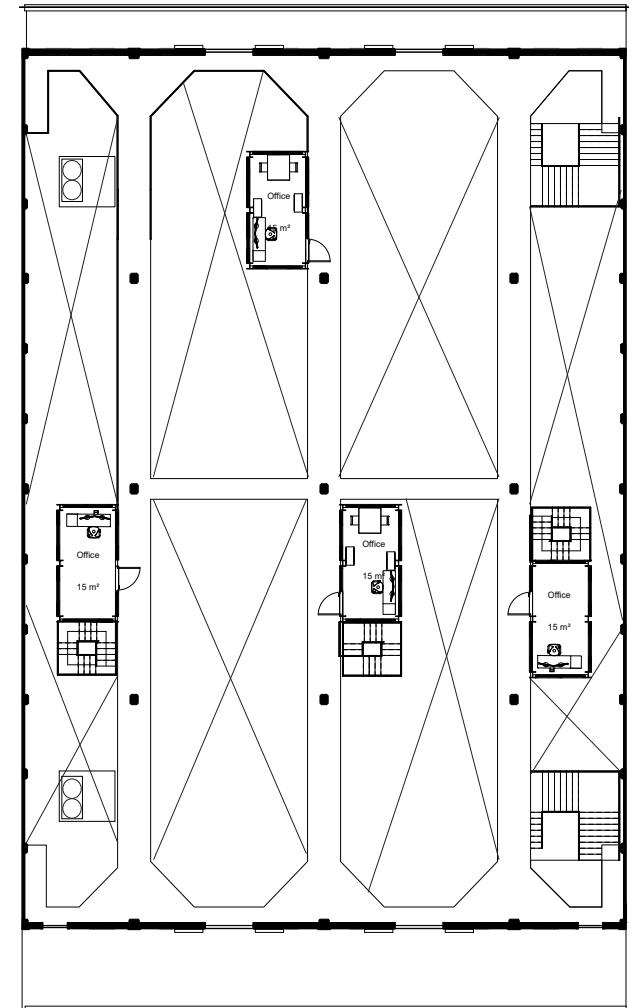


Fig. 134-136: Floor plans of a compartment, source: own image

Construction method

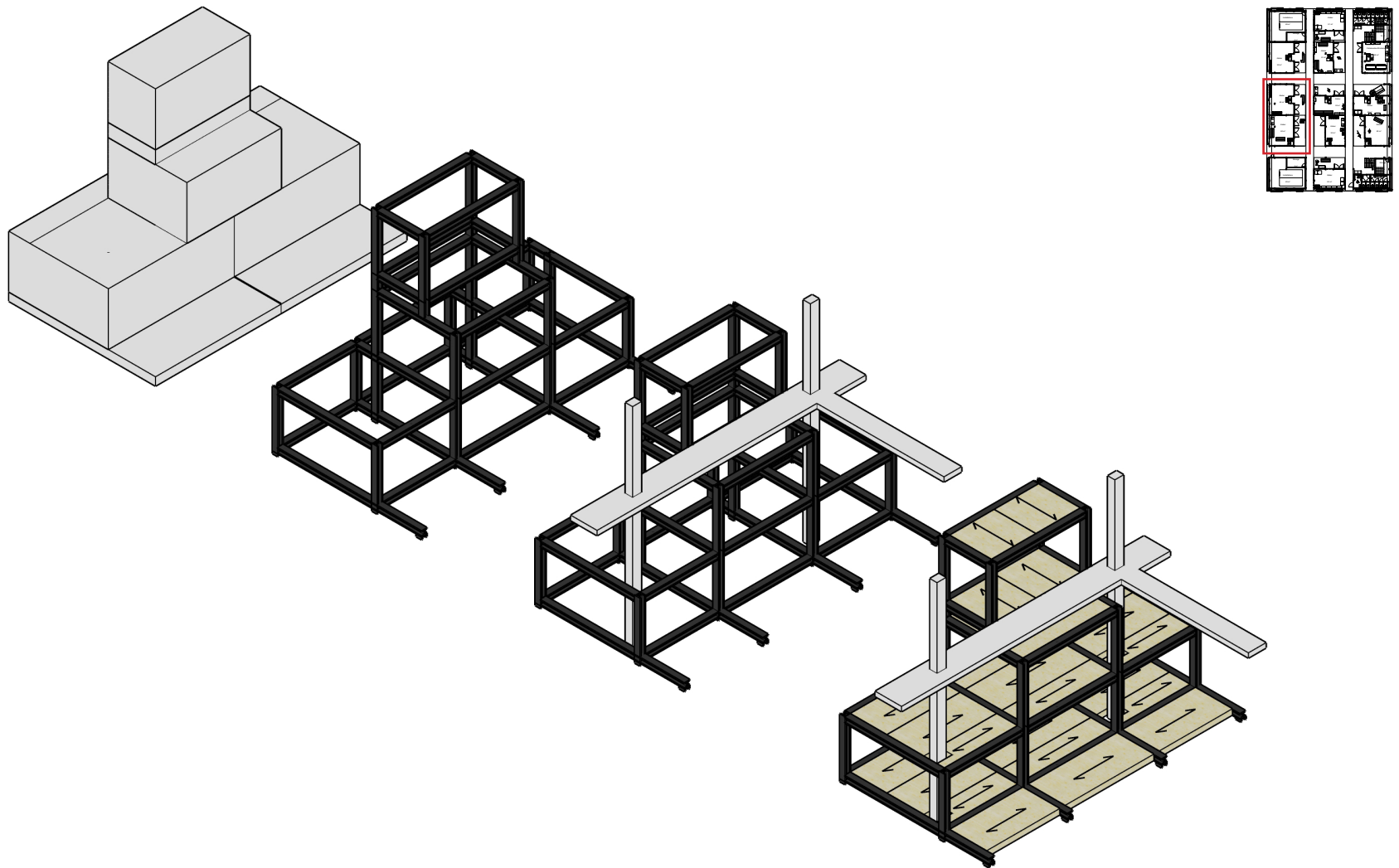


Fig. 137 : Constuction of stacked ateliers, source: own image

Modular design

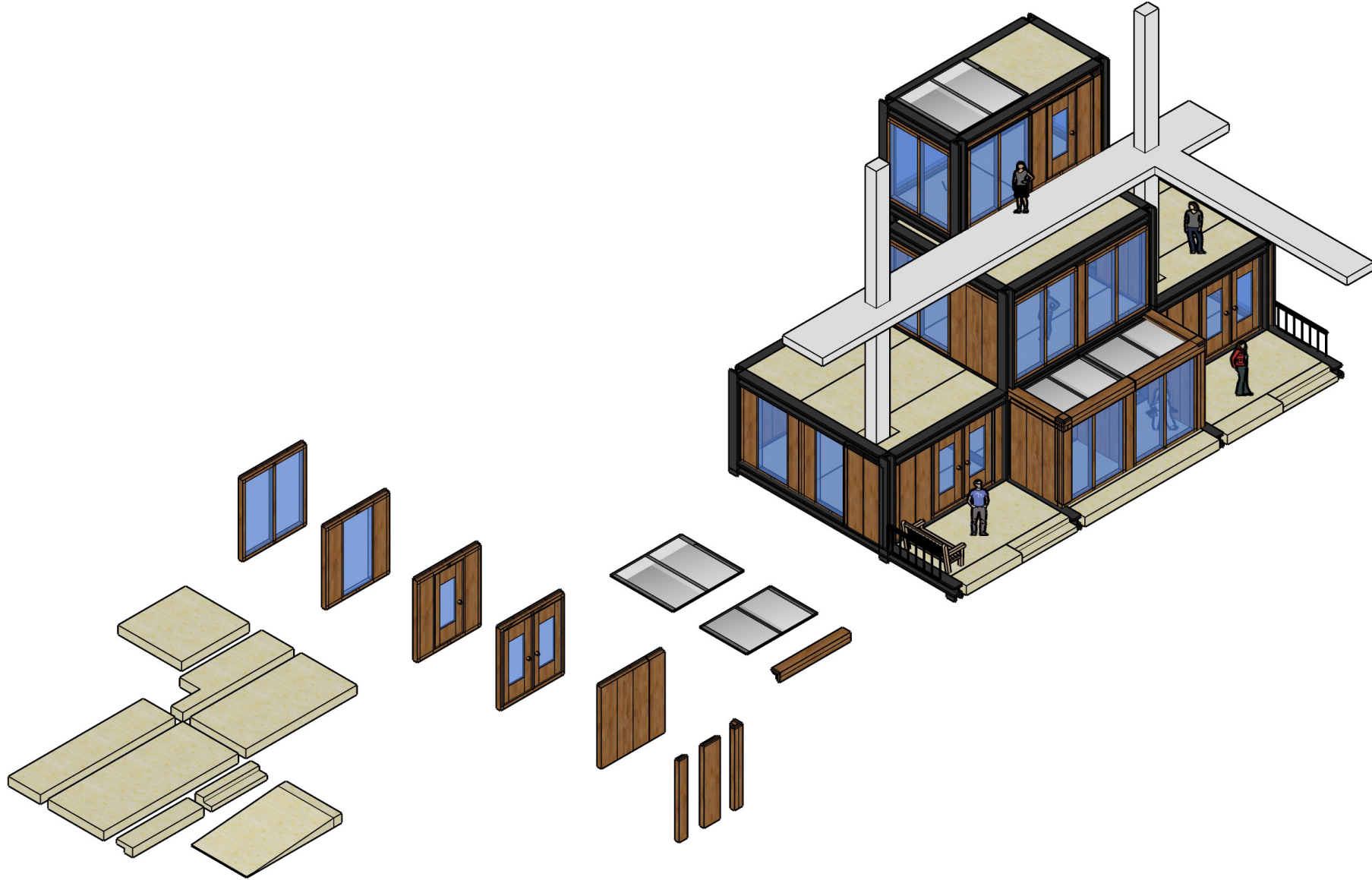


Fig. 138. Modular elements, source: own image

Transportation of modular elements



Fig. 139. Sketch of transportation of modular elements

Experience of space



Fig. 140. Experience of space and height, source: own image

Private/public, inside/outside



Fig. 141. Visualisation of the interior, source: own image

Visual lines



Fig. 142. Visualisation of the interior, source: own image

Visual lines



Fig. 143. Visualisation of the interior, source: own image

The second floor



Fig. 144. Visualisation of the interior, source: own image

Climate - winter situation



Fig. 145. Climate scheme winter, source: own image

Climate - Summer situation

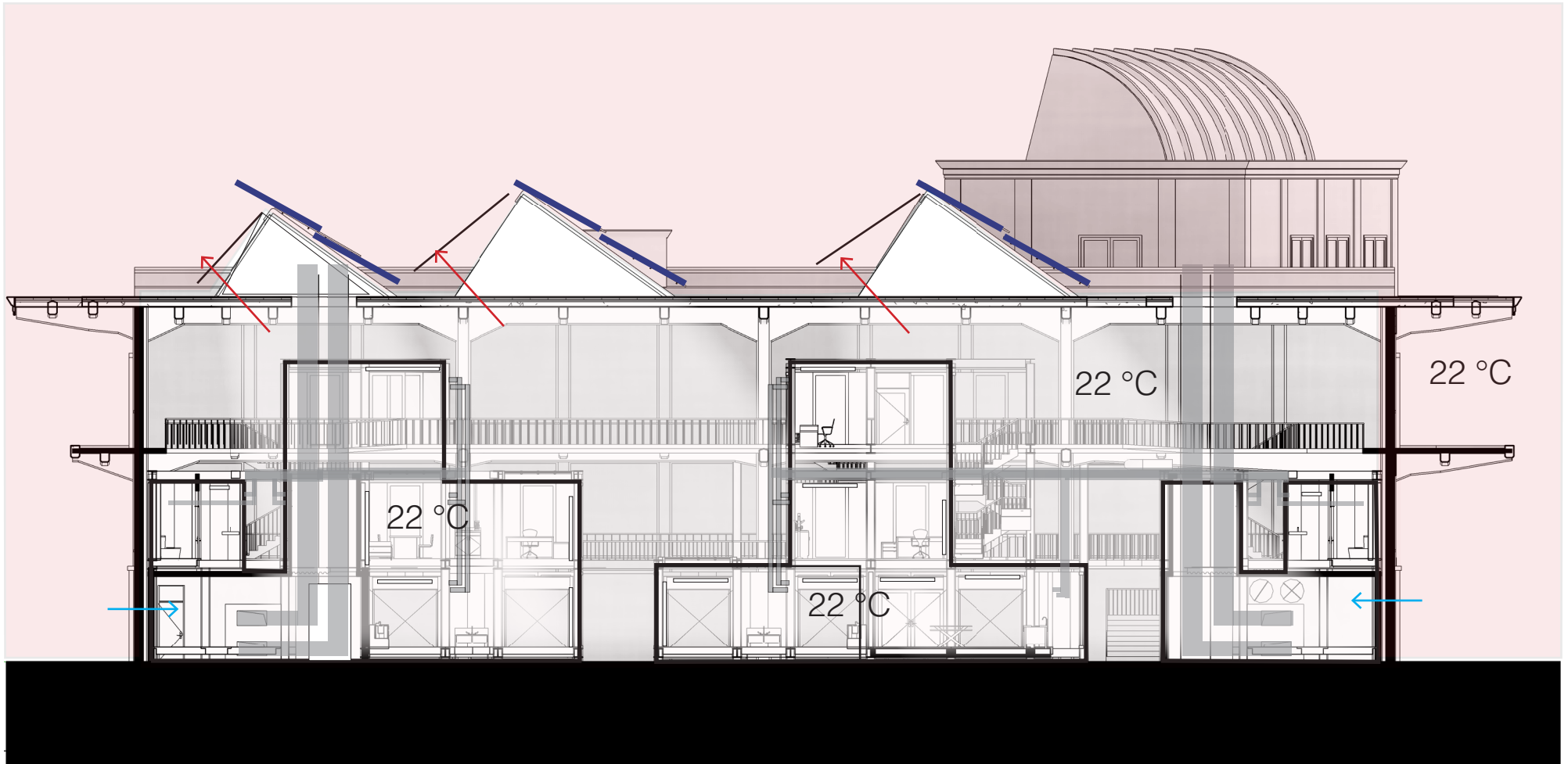


Fig. 146. Climate scheme summer, source: own image

Ventilation ducts

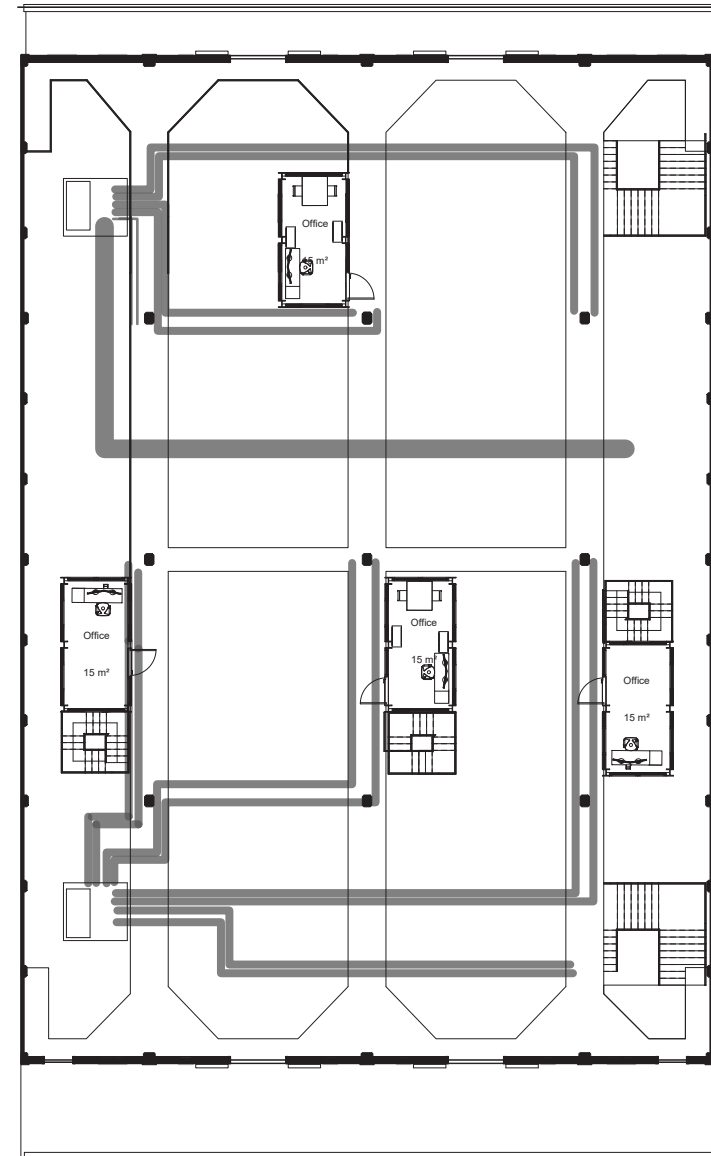
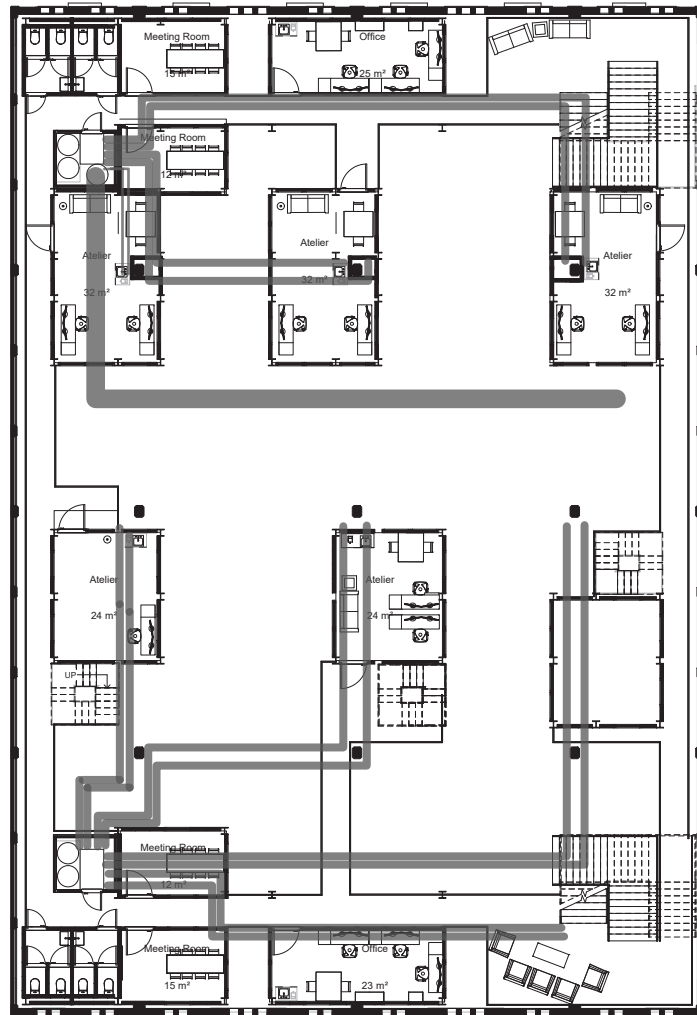


Fig.147. Ventilation ducts location, source: own image

Details

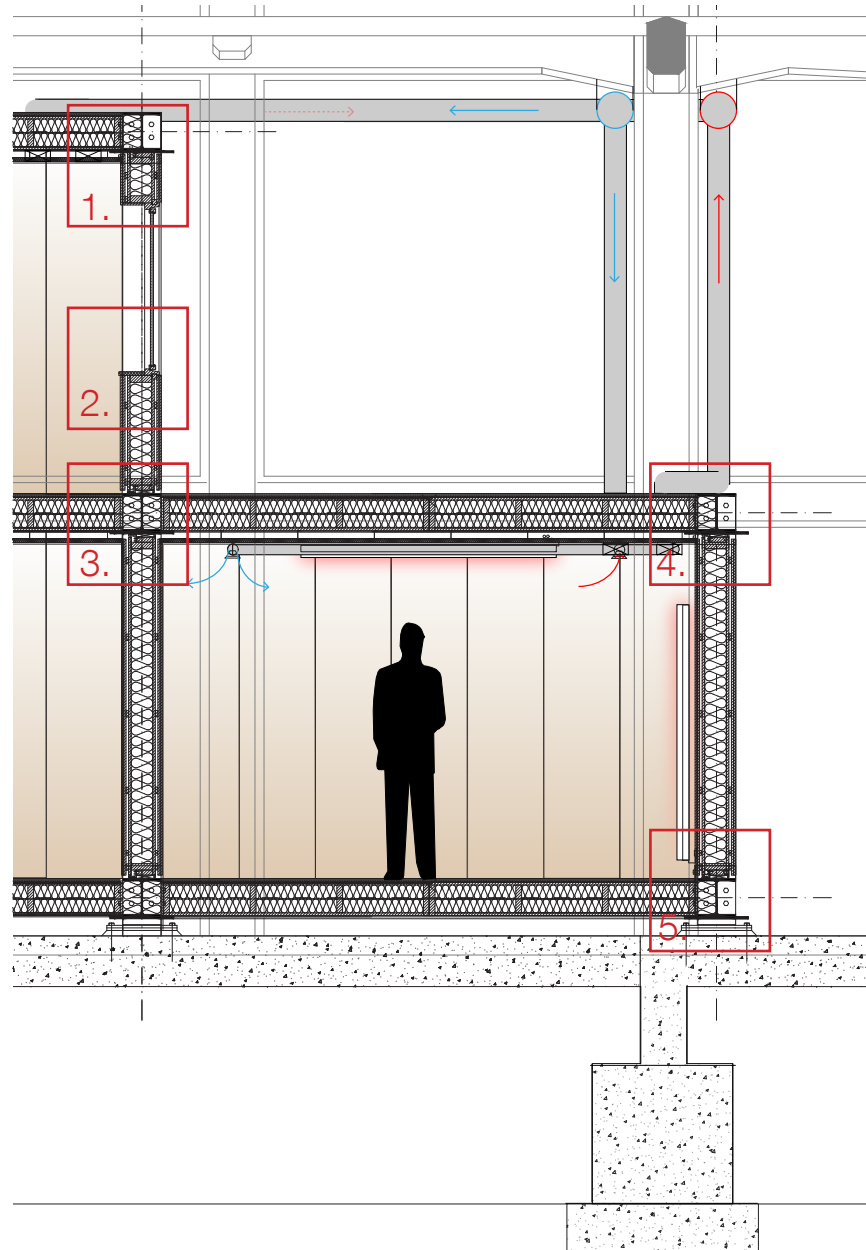


Fig. 148. : Detail of a fragment of an atelier, source: own image

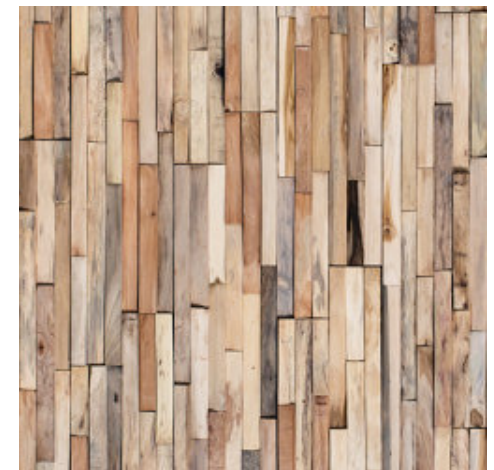
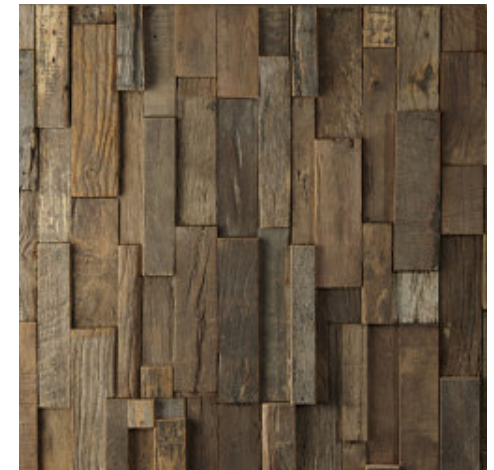
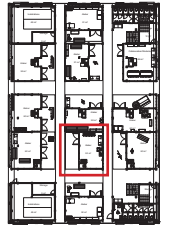
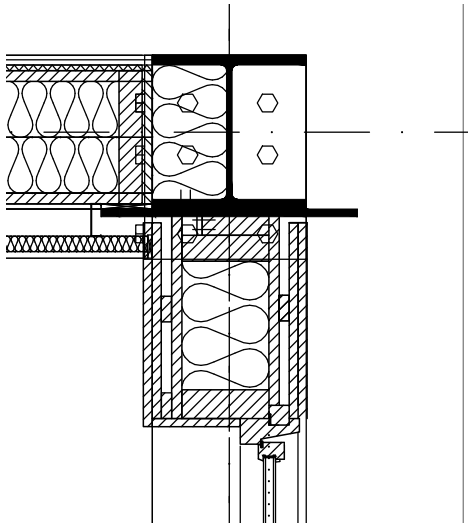


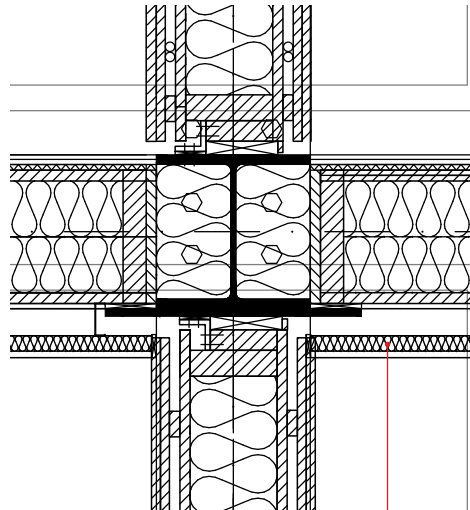
Fig. 149. : Examples of material, source: archtonic.com

Details (2)

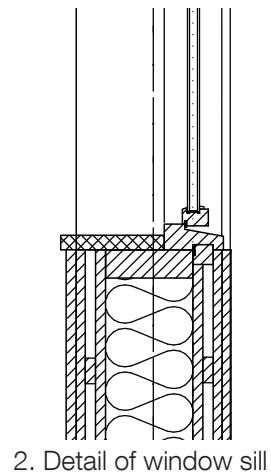
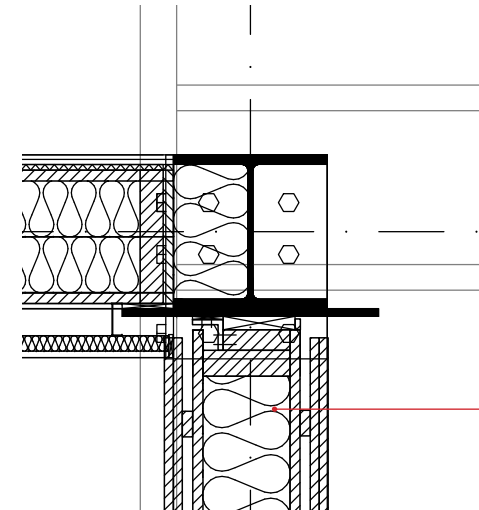
1. Detail of window head



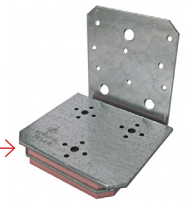
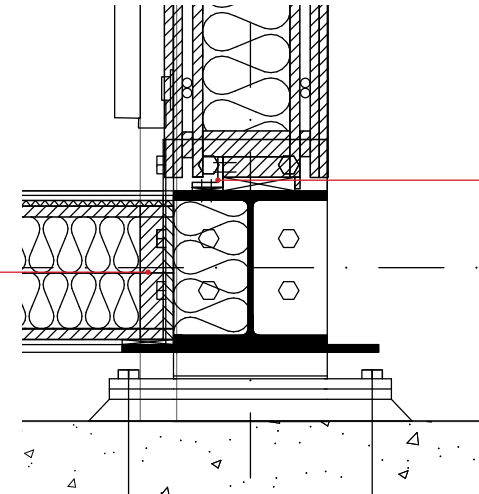
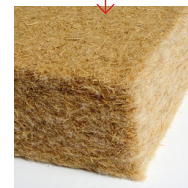
3. Detail of interior wall and floors



4. Detail of upper corner



2. Detail of window sill



5. Detail of lower corner

Fig. 150.: Details of the atelier construction, source: own image

TRANSITION

Further improvement of comfort levels and energy
efficiency,
additional (esthetical) alterations,
deconstruction or reconfiguration of (temporary/spatial) elements,
introduction of new use(s) and spatial order

Masterplan

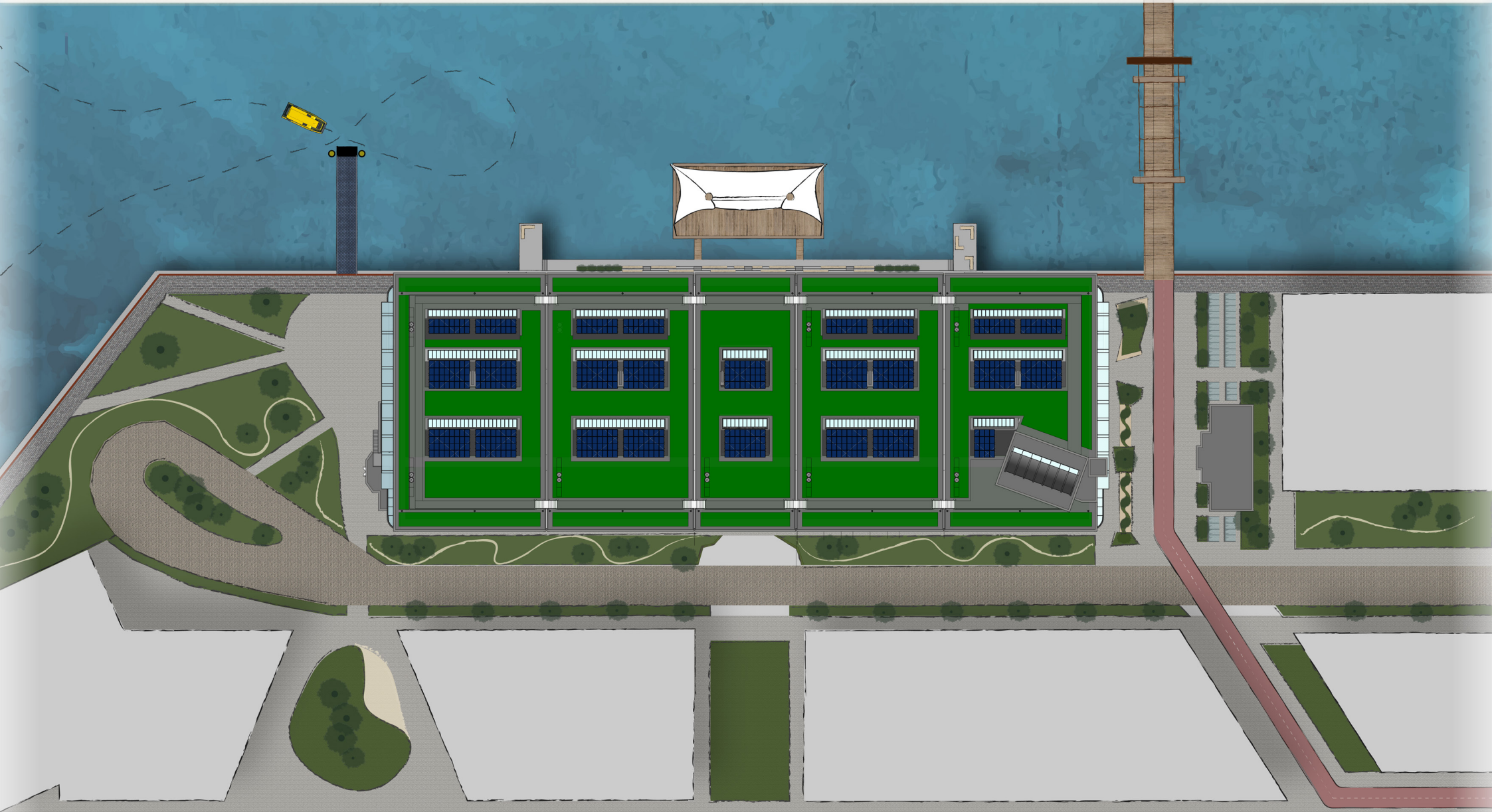


Fig. 151. Masterplan for the area, source: own image

Street profile 1



Fig. 152. Street profile, source: own image

Street profile 2

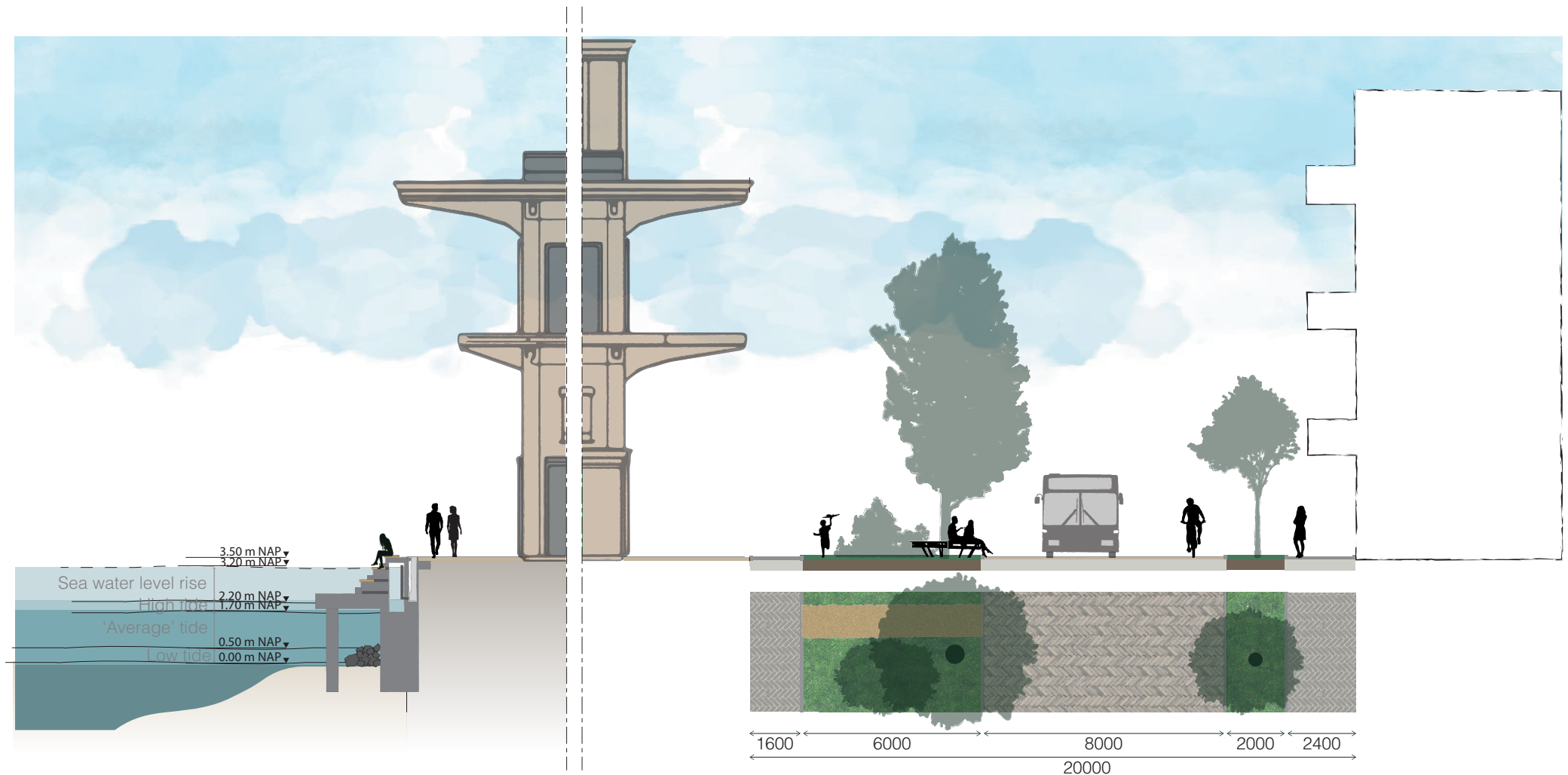


Fig. 153. Street profile, source: own image

Water management: flood defense wall

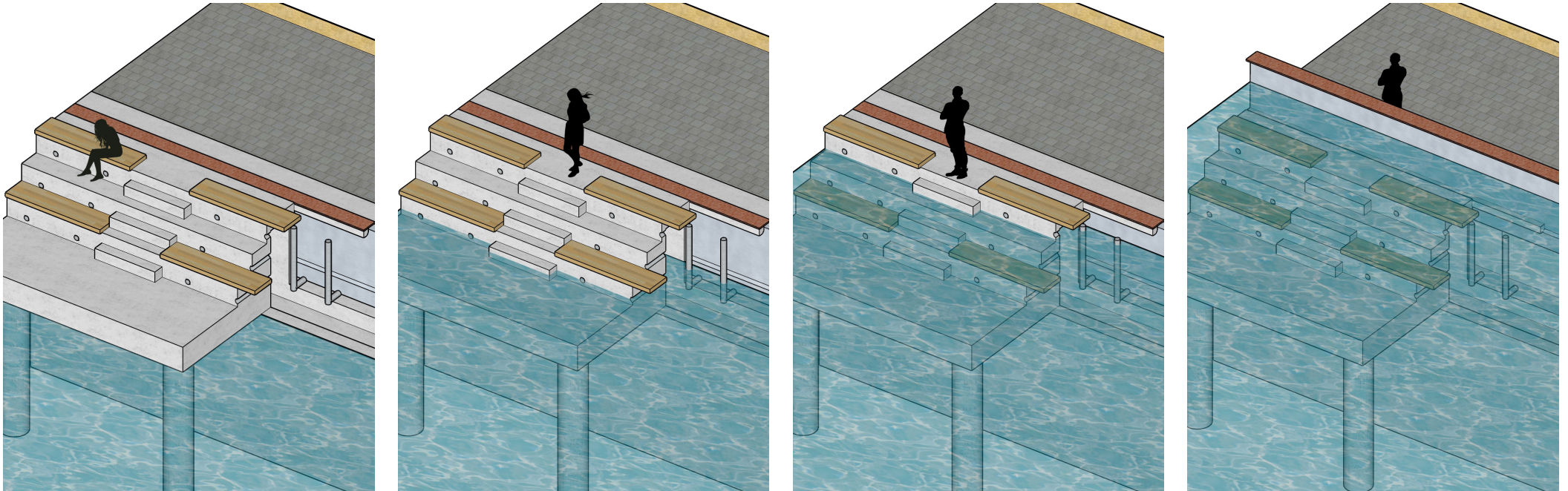


Fig. 154-157. Stages of water level rising against the flood defense mechanism, own images

LONG-TERM USE

Further improvement of comfort levels and energy
efficiency,
additional (esthetical) alterations,
deconstruction or reconfiguration of (temporary/spatial) elements,
introduction of new use(s) and spatial order

Use of the building meant to last for a longer timespan

Aim: sustainability and improved energy-efficiency

Reconstruction of original artificial sandstone render



element	Facade		Facade openings		Balconies	Roof		Roof openings
aspect	Safety	Functionality	Thermal Comfort	Sustainability	Visual comfort	Flexibility	Esthetics	
intervention	Repair	Maintenance	Renovation	Subtraction	Addition	Reconstruction	Preservation	

Fig. 158. Facade repair of St Jobsveem with new artificial sandstone render, source: Heinneman,(2013).Historic Concrete From Concrete Repair to Concrete Conservation, Delft, Nederland

Fig. 159. Current state of the Katoenveem facade, source: photograph by C. de Boon

Facade touch-up (esthetical): reconstruction of the artificial sandstone render



Fig. 160. Visualisation of the result of facade repairs, source: own image



Fig. 161. Visualisation of Katoenveem with a reconstructed artificial sandstone render layer on the facade, source: photograph by C. de Boon, edited by I. Louer

Future?

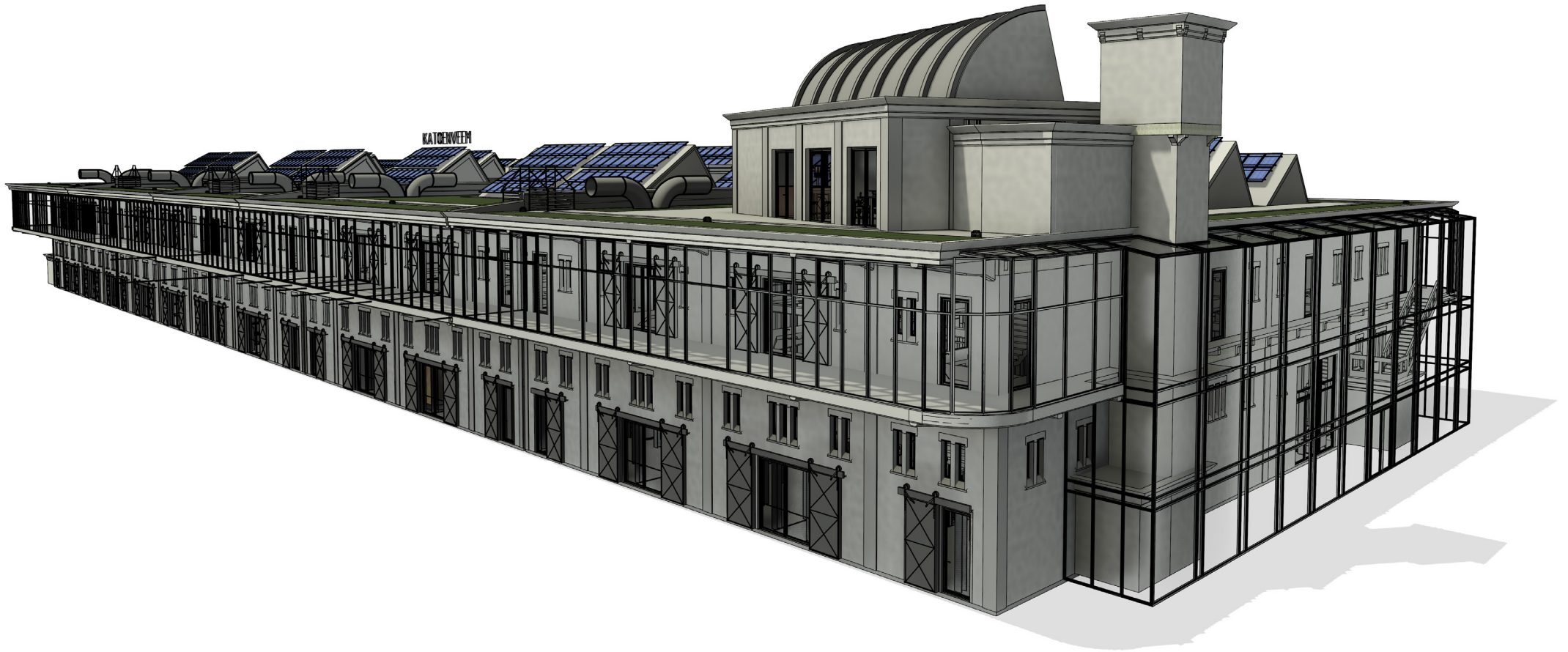


Fig. 162. Visualisation of the facade of Katoenveem after introducing windows on the balconies to incorporate them as inside space, source: own image

Reflection

Thank you!