

Haven-Stad | Amsterdam

Alleviating the Amsterdam Housing Crisis
through Urban Densification using Circular
Mass Timber Structures

MOOR
WOOD



Architectural Wood: P4 Presentation

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Research tutor:	Anna Lisa McSweeney
Building technology:	Max Salzberger

Main Topics

Urban Densification
Urban Transformation
Doughnut Economics
Circular Economy
Engineered Wood Products
Post and beam construction
Pre fabrication
Circular Building strategies



Introduction of the Studio



Sustainable development
Housing crisis - General Urbanisation
Urban Densification



Amsterdam

Land Availability during the Housing crisis



175.900 new residences planned in Noord-Holland

Further Policies will intensify land use

We have to use our space more efficiently

Provincie	Raming woningtekort		Toename woningbehoefte			Opgave 2021 t/m 2030			Raming woningtekort	
	2021		2021 t/m 2025	2026 t/m 2030	Totaal	Bruto nieuwbouw*	Raming sloop*	Netto uitbreiding	2031	
Groningen	6.200	2,2%	7.600	2.600	10.200	16.500	4.500	12.000	5.400	1,8%
Friesland	4.400	1,4%	8.200	4.300	12.500	15.300	4.500	10.800	6.000	1,9%
Drenthe	4.200	1,9%	4.600	2.700	7.300	9.900	3.000	6.900	4.700	2,0%
Overijssel	11.700	2,3%	19.000	13.000	32.000	41.600	7.100	34.500	9.800	1,8%
Flevoland	9.400	5,4%	16.200	14.800	31.000	35.400	800	34.600	6.500	3,1%
Gelderland	34.900	3,8%	44.100	32.900	77.000	94.900	10.000	84.900	28.300	2,8%
Utrecht	26.600	4,5%	39.200	37.300	76.500	92.700	7.400	85.300	19.300	2,9%
Noord-Holland	65.000	4,8%	86.400	71.000	157.400	199.800	23.900	175.900	50.400	3,3%
Zuid-Holland	67.600	4,0%	96.500	81.900	178.400	230.200	36.900	193.300	56.700	3,0%
Zeeland	0	0,0%	3.700	1.400	5.100	7.100	2.600	4.500	800	0,4%
Noord-Brabant	40.500	3,5%	59.100	44.300	103.400	130.600	11.200	119.400	26.700	2,1%
Limburg	8.800	1,6%	6.100	-1.400	4.700	18.400	5.900	12.500	3.800	0,7%
Nederland	279.300	3,5%	390.700	304.800	695.500	892.400	117.800	774.600	218.400	2,5%

Figure 1. Table of urban growth in the Netherlands from Nationale Woon- en Bouwagenda

Ruimteverdeling als alle plannen doorgaan
grondoppervlakte van Nederland in procenten

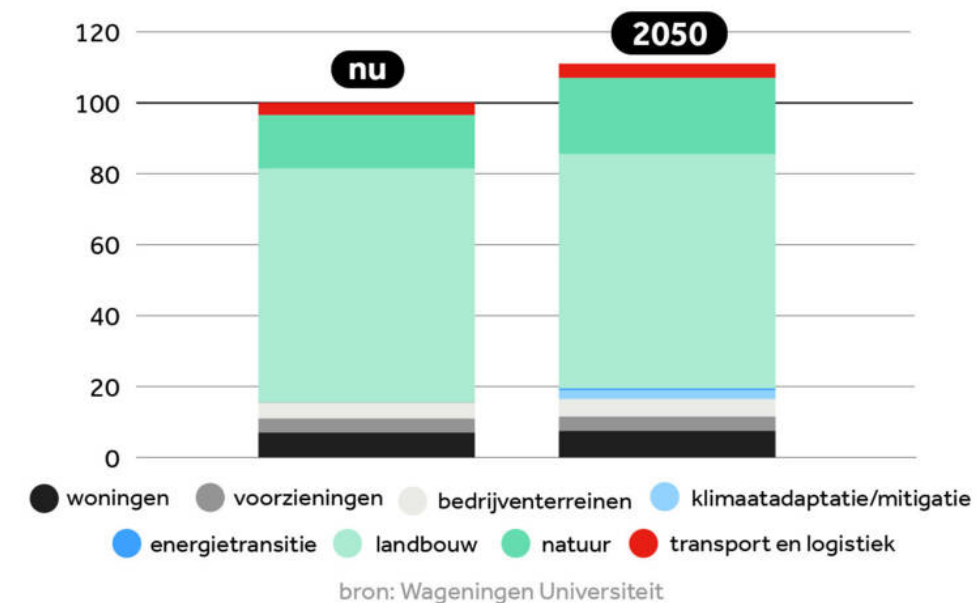
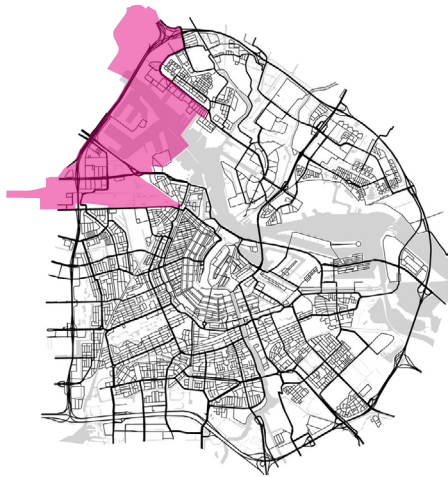


Figure 2. Planned use of land in graph, Wageningen University

Haven-Stad Development



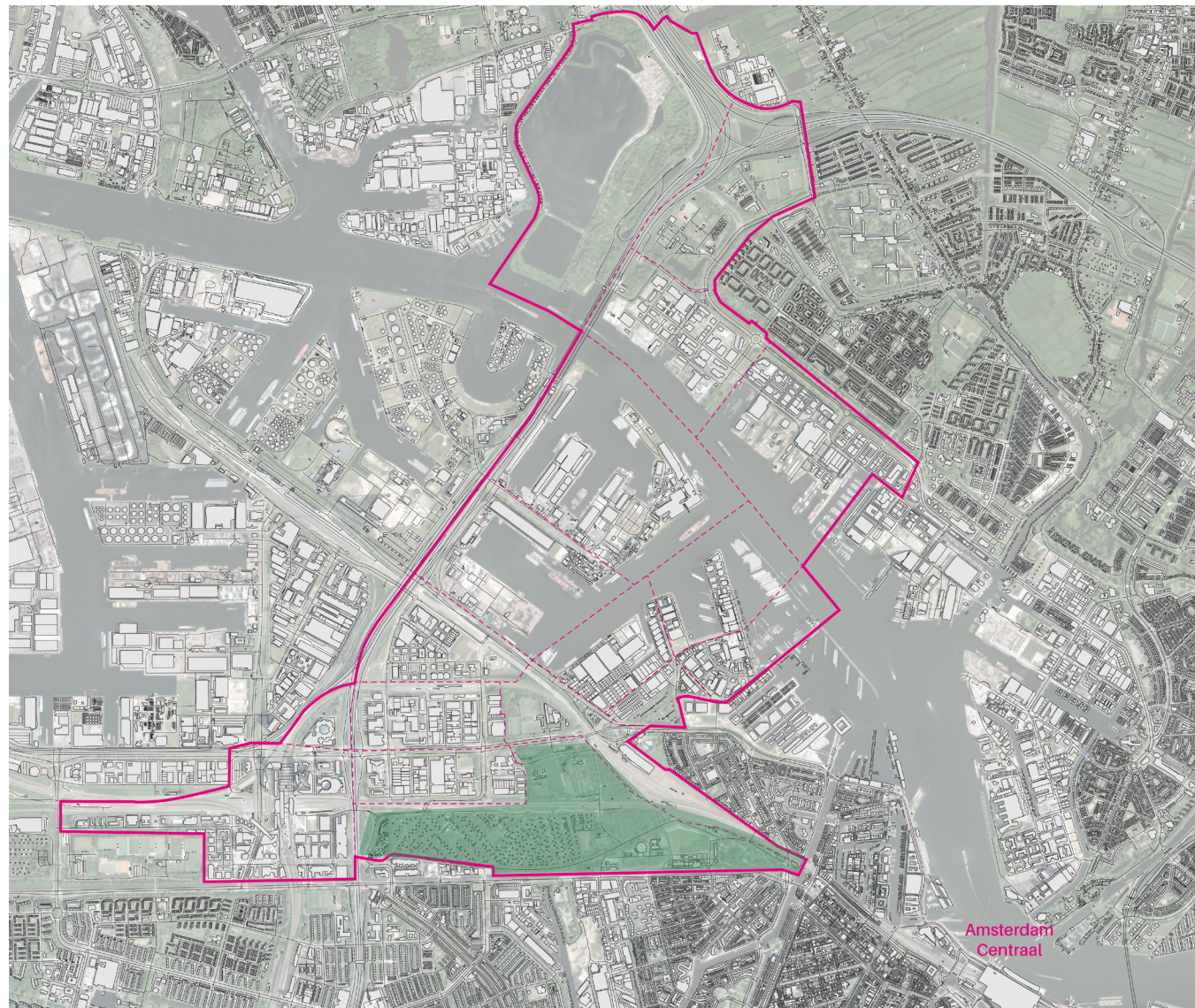
The city is expanding towards the harbor in West

Transition from:

low-rise
industrial functions



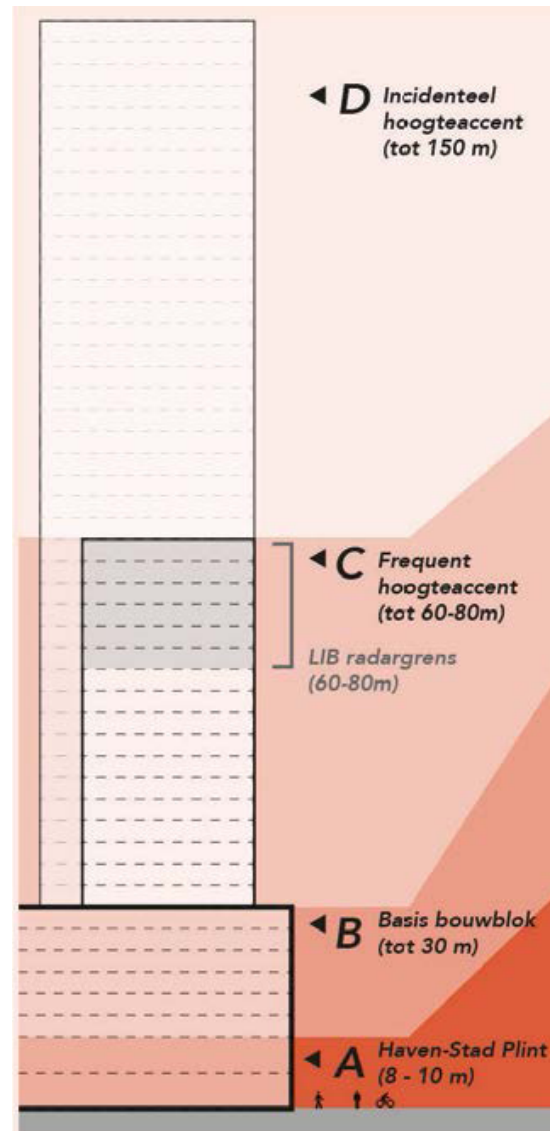
mid- and high rise
residential mixed use



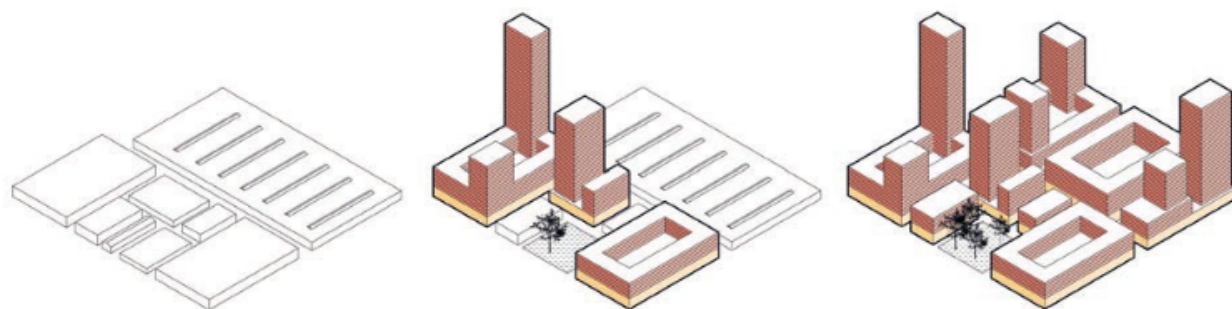
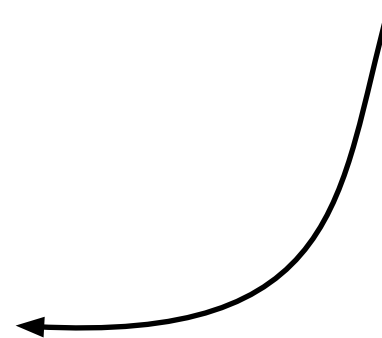
Haven-Stad Development



Unprecedented density for Amsterdam
40.000-70.000 new residences
80-20 Residence - Workplace ratio



Active plinth



Amsterdam's Societal context



Breaches of the Planetary boundaries

Amsterdam Doughnut economics

20 % Timber buildings - We need to scale up sustainably!

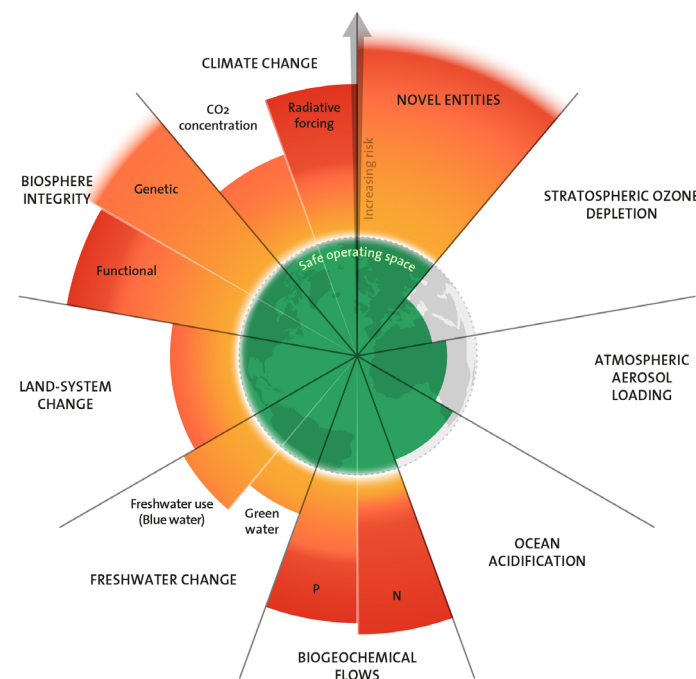


Figure 4. Contemporary Breaches of the Planetary boundaries

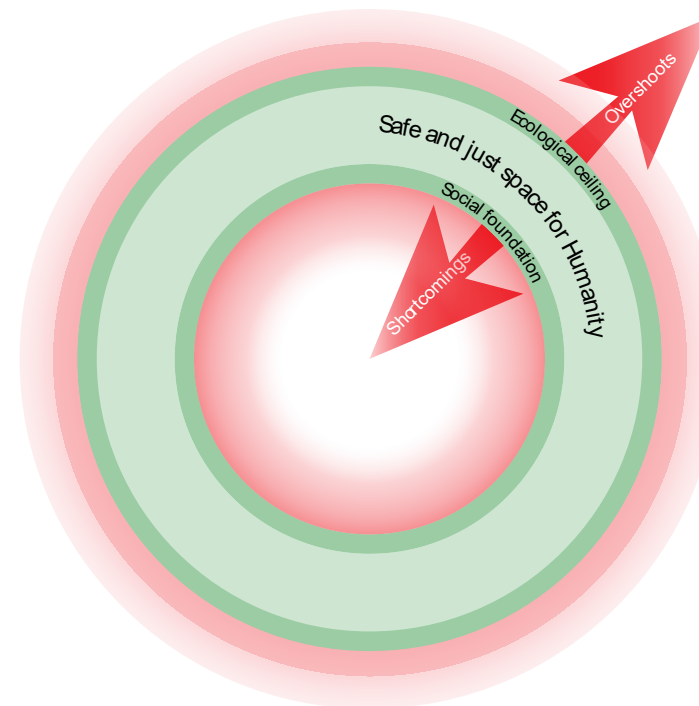


Figure 3. Figure of doughnut economics principle

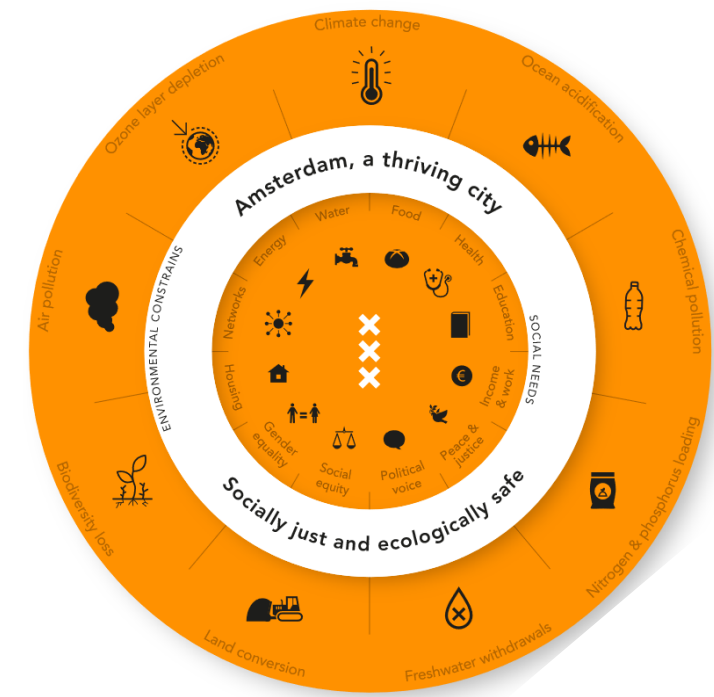


Figure 5. Amsterdam's adaptation of doughnut economics

Linear economic system



The Building industry is responsible for 60% of waste produced

Environmental consequences

Loss of economic potential



Figure 6. Linear economy, take, make, waste approach



Circular Economy

Fully Circular by 2050

Reclaimed + Renewable materials

Reuse of building stock

Optimising longevity of buildings and building products

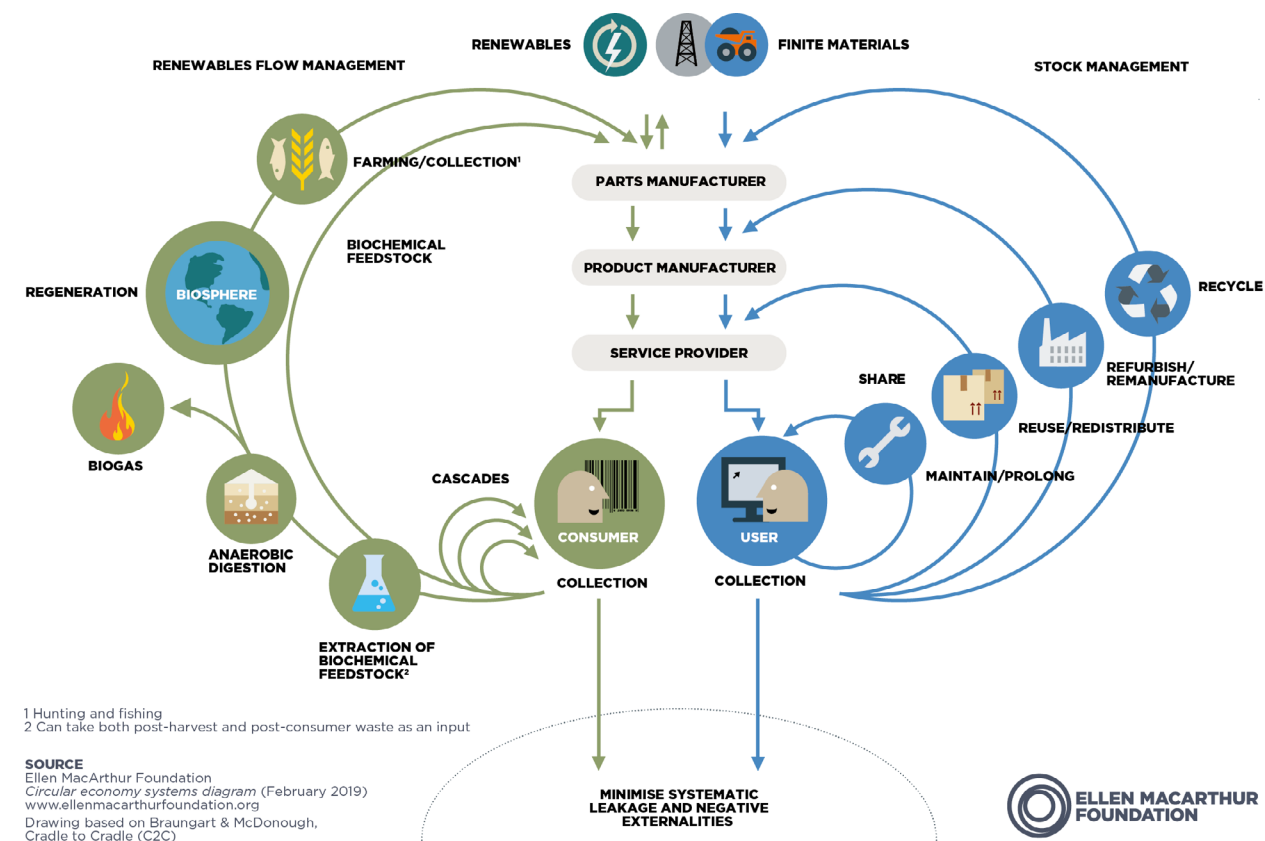


Figure 7. Butterfly diagram by Ellen MacArthur foundation

Circular Building strategies



Adaptive buildings

Shearing layers of brand - demountability

Conscious implementation of Materials

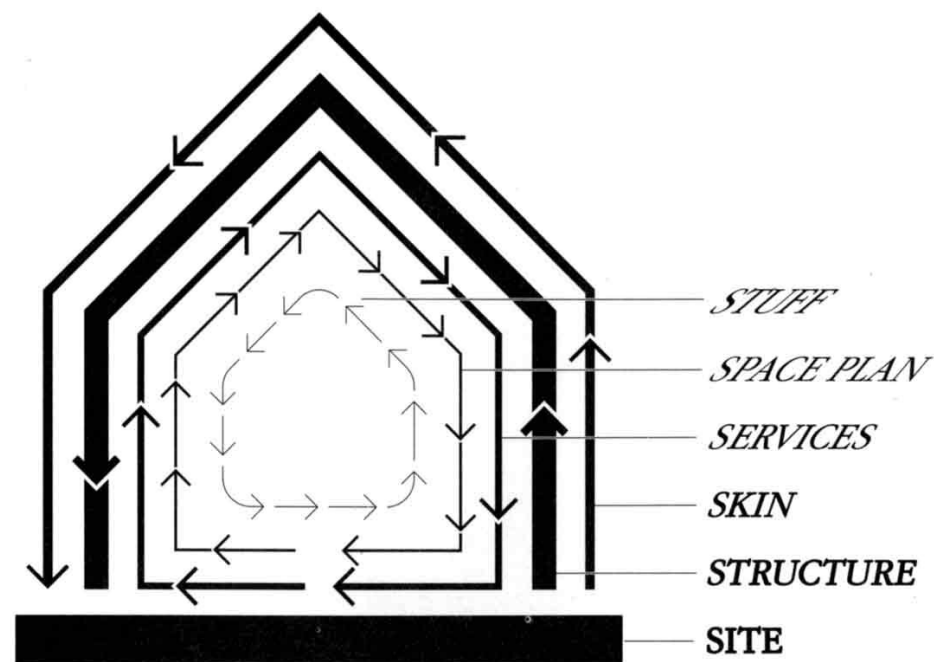


Figure 8. Donald Ryan, Diagram of Shearing layers from how buildings learn by Stewart Brand

R-ladder met strategieën van circulariteit

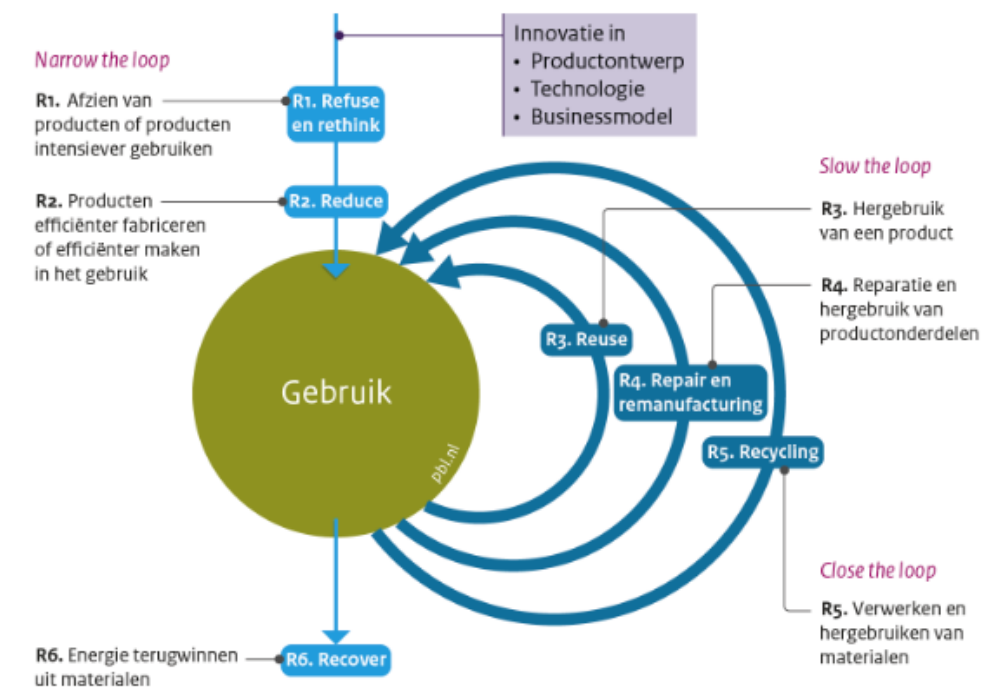


Figure 9. R-Ladder strategies for circularity, adopted from PBL

Circularity with imported products



Production is seldom done domestically
Complicated logistics for Circular use
Lower domestic material knowledge

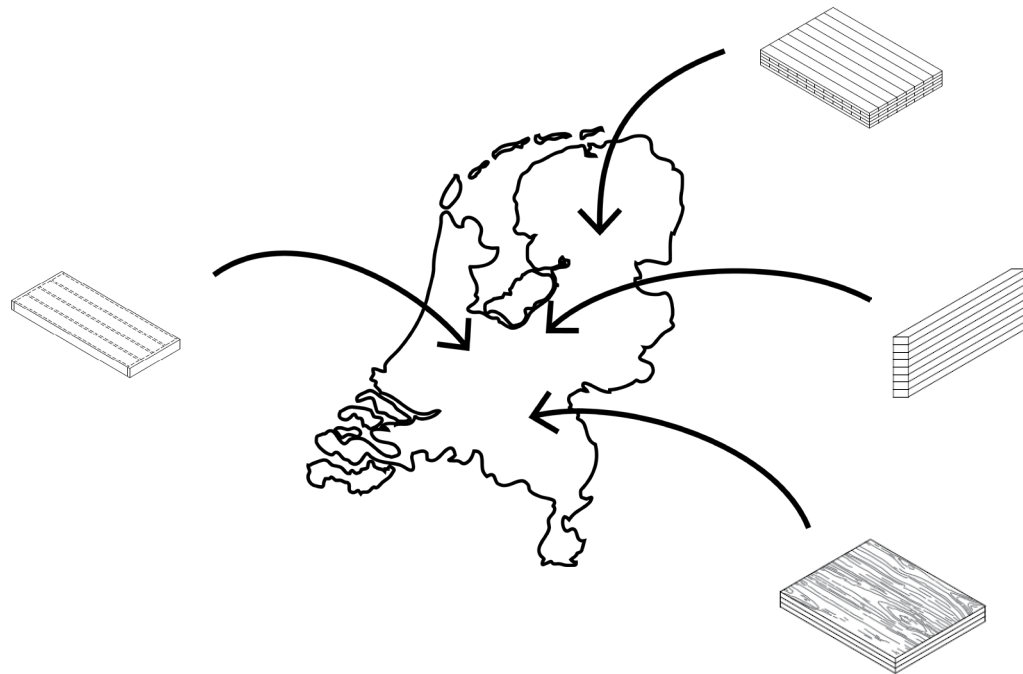
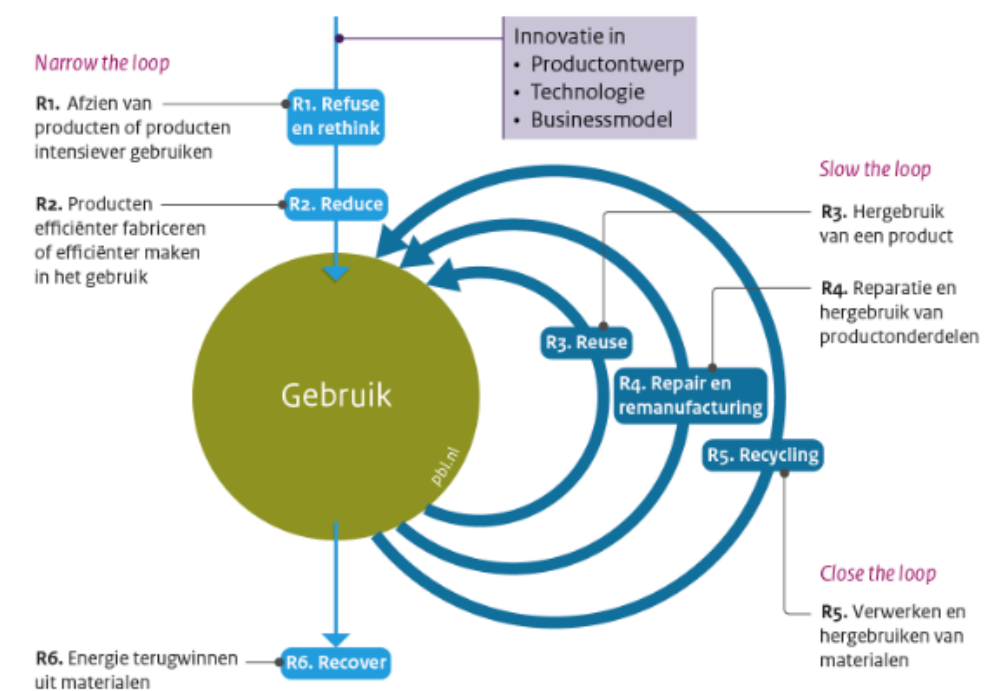


Figure 10. Import dependency in the Netherlands

R-ladder met strategieën van circulariteit



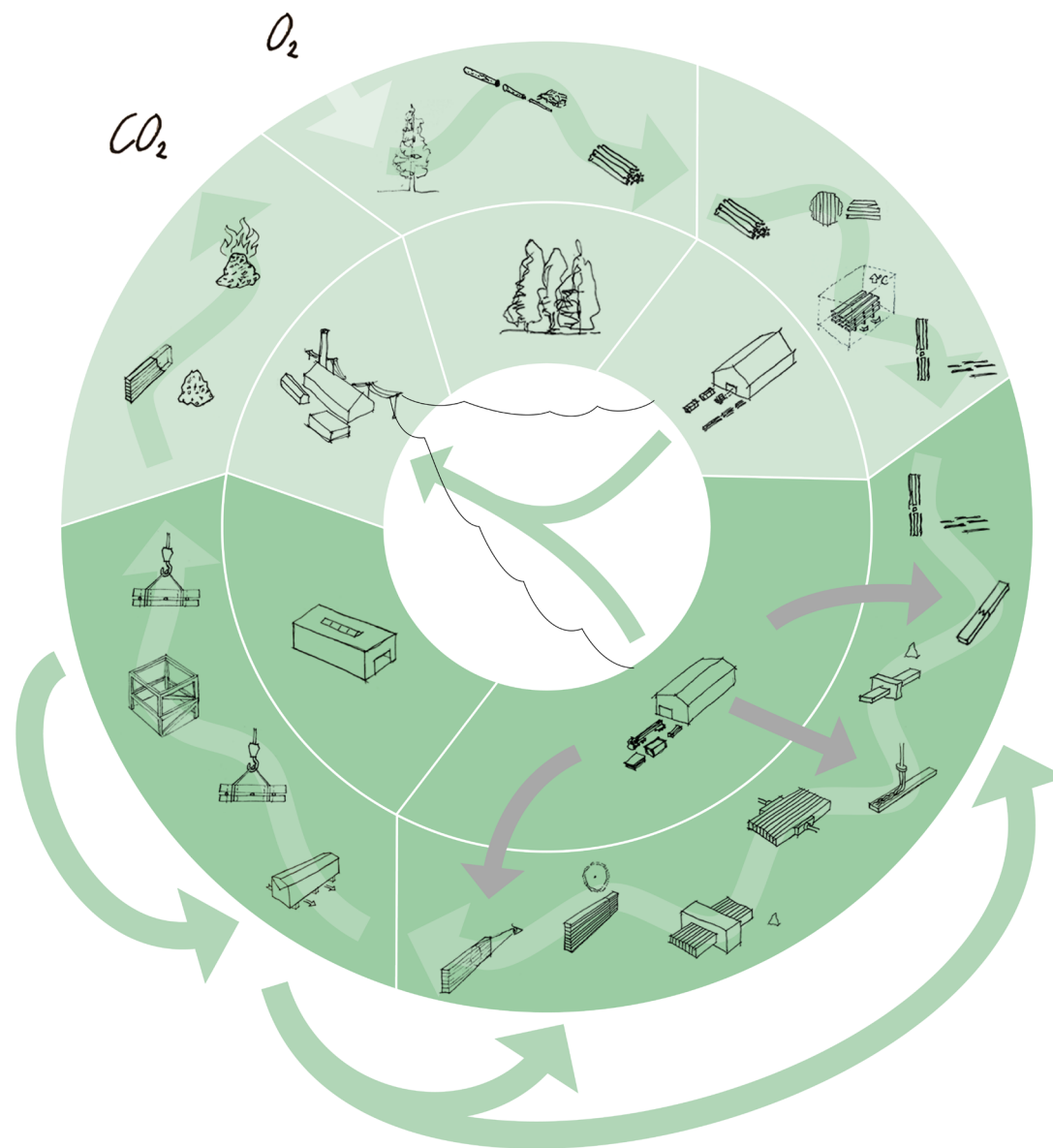
Localise production for Circular value chain



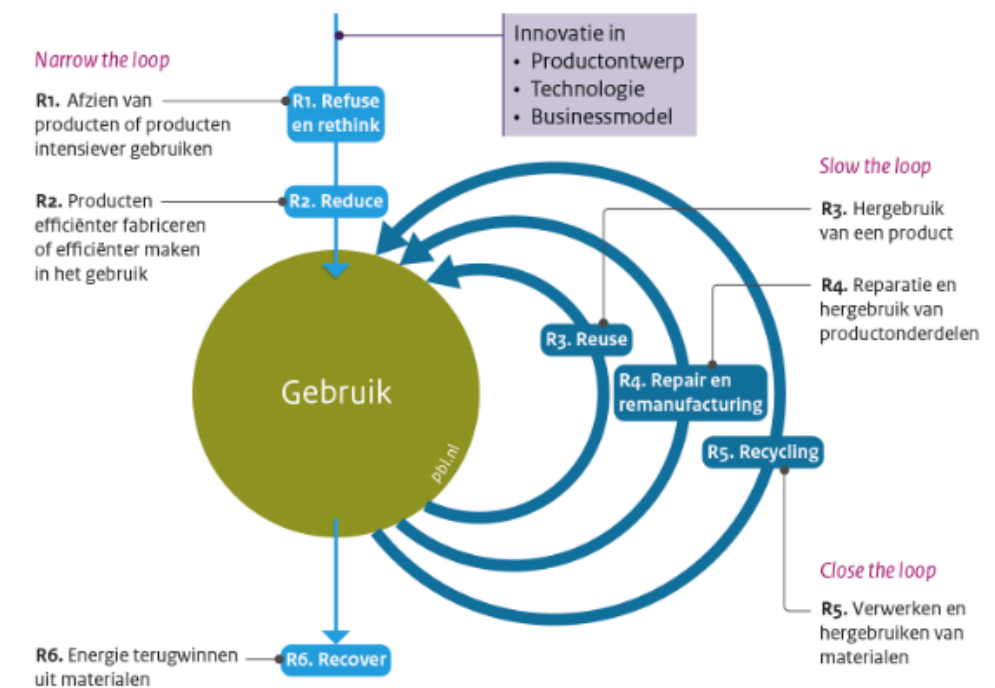
Scaling up the domestic timber building industry

Simplified logistics

Focus on 'Slowing the loop' strategies for Timber



R-ladder met strategieën van circulariteit



Sustainably Sourcing Timber



Domestic sourcing



Bron: WEnR

Figure 12. Dutch forest coverage, WUR

WUR/dec22
www.clo.nl/nl162001

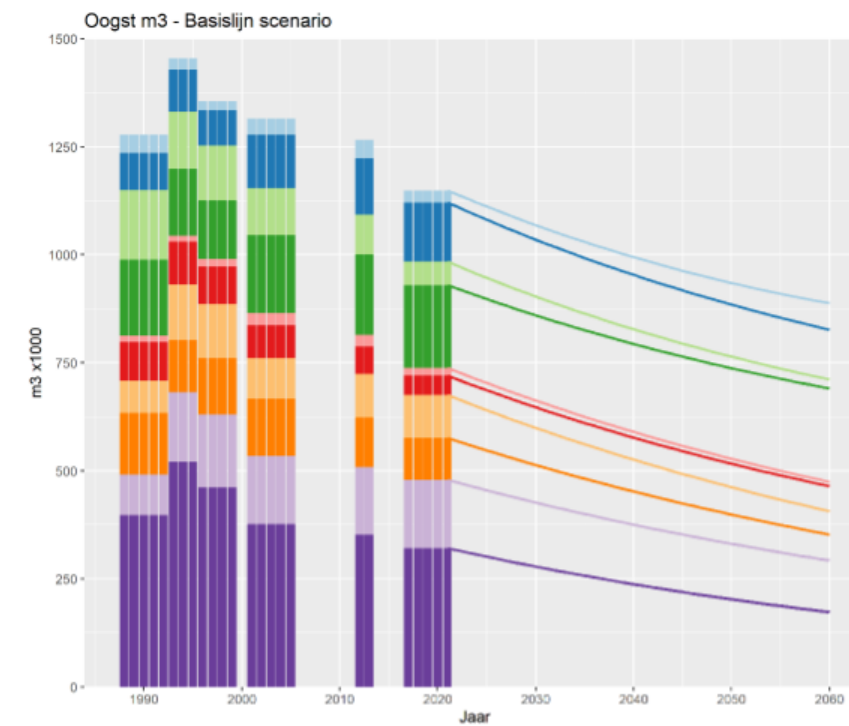


Figure 11. Harvest in m3 x 1000 per species, the lines represent the simulation of the baseline-scenario. - van bos tot bouw sytheserapport

Sustainably Sourcing Timber



Sourcing locally through inland waterways
Spruce and Beech sustainably available



Figure 13. Dutch forest coverage, WUR

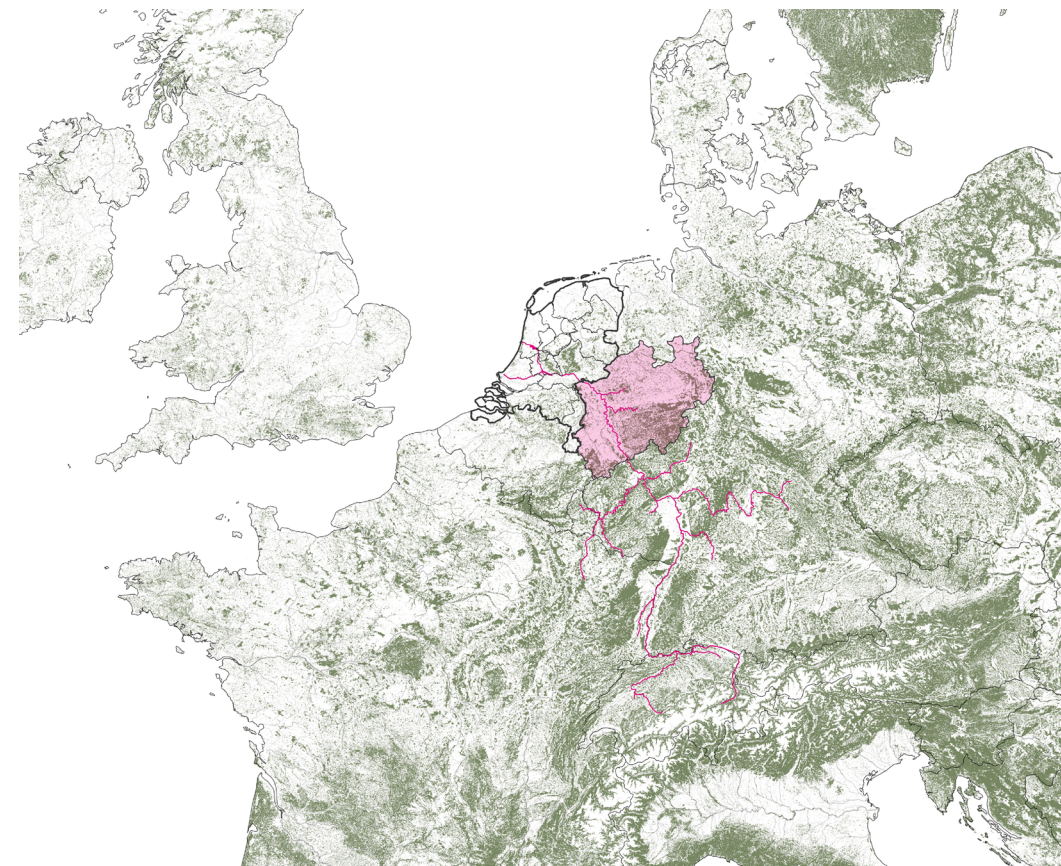


Figure 14. Forests in Europe -North Rhine Westphalia highlighted

Sustainably Sourcing Timber



Sourcing locally through inland waterways
Spruce and Beech sustainably available

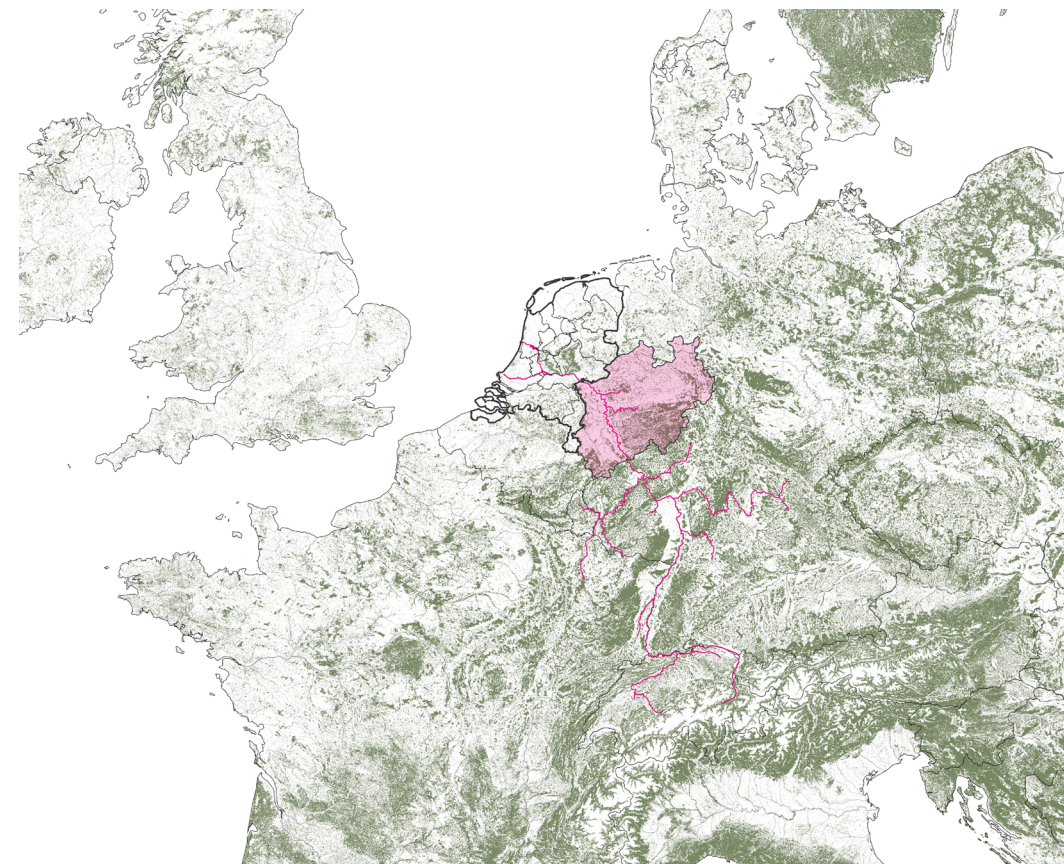
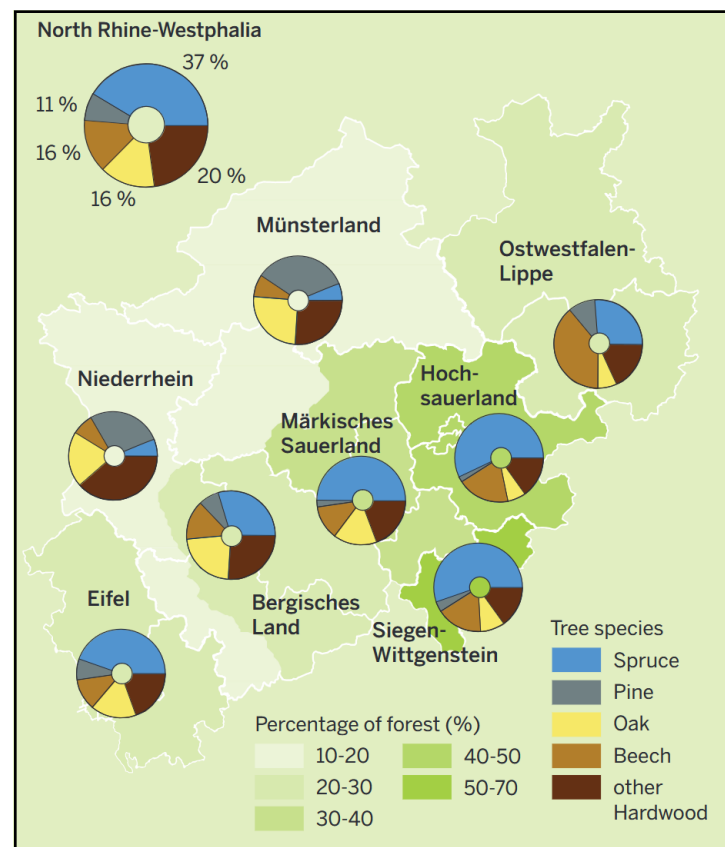


Figure 15. sources from Forestry and Timber North Rhine Westphalia for people and forest - Wald und Holz

Engineered products



Spruce GLT beams



Figure 16. Spruce Gluelam beams, Image taken from Kalesnikkof

Beech LVL beams

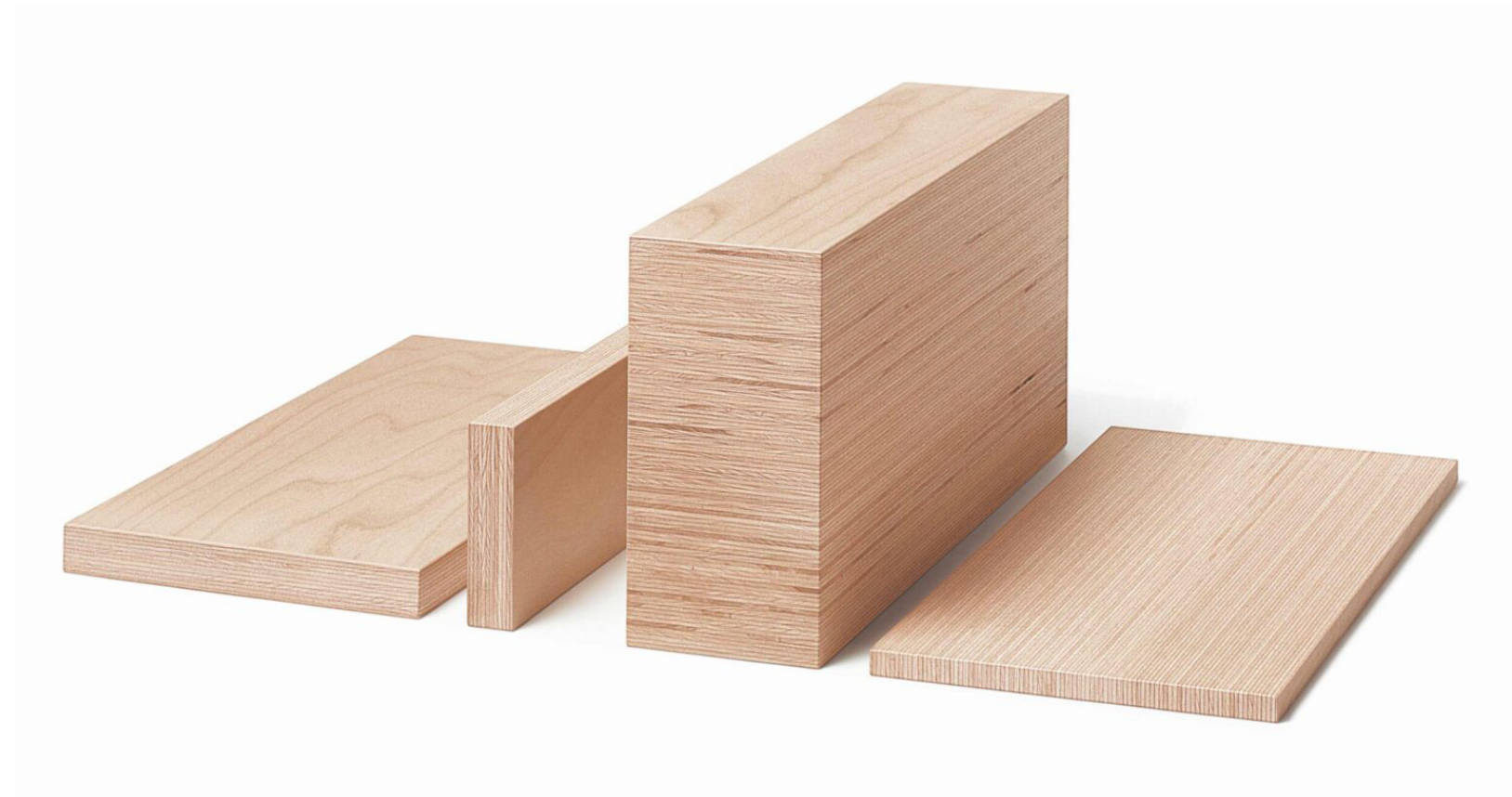
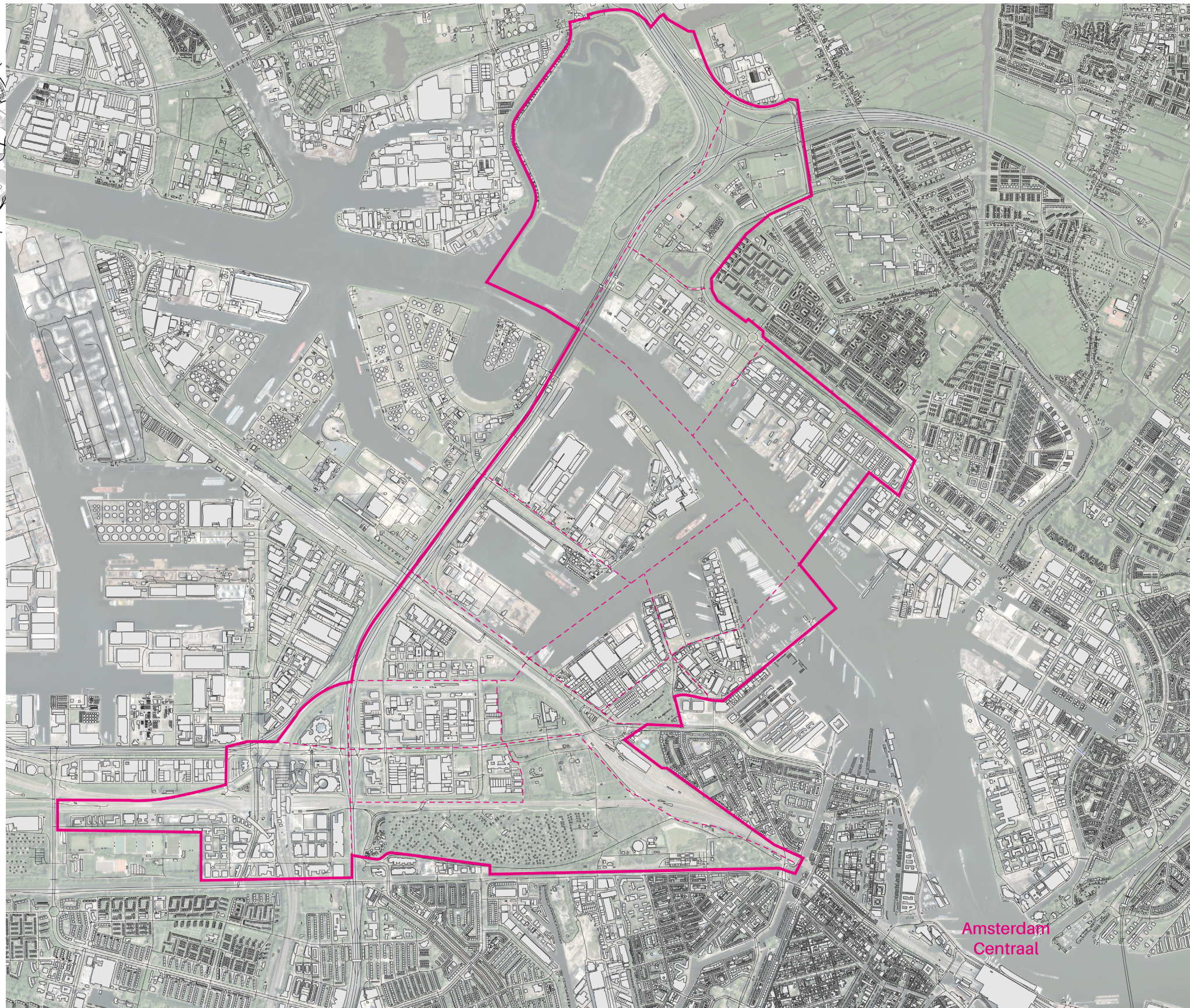
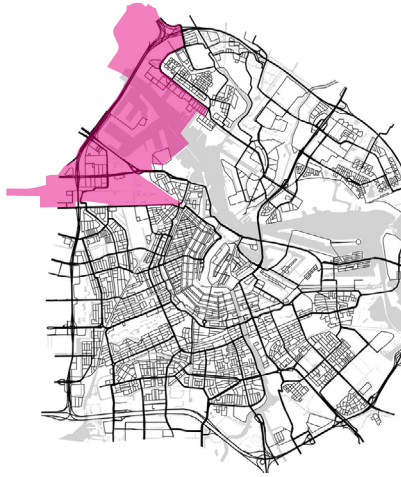
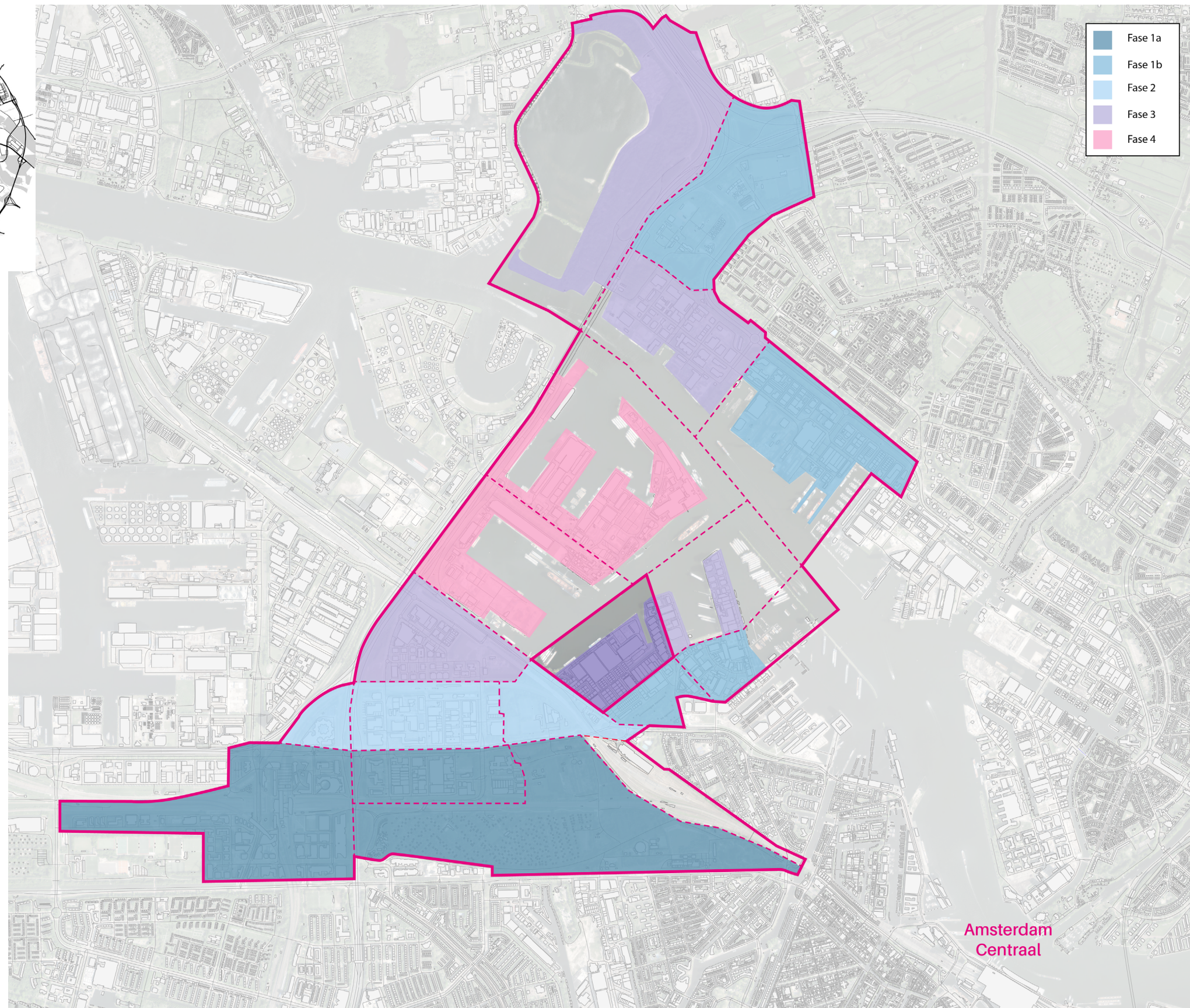
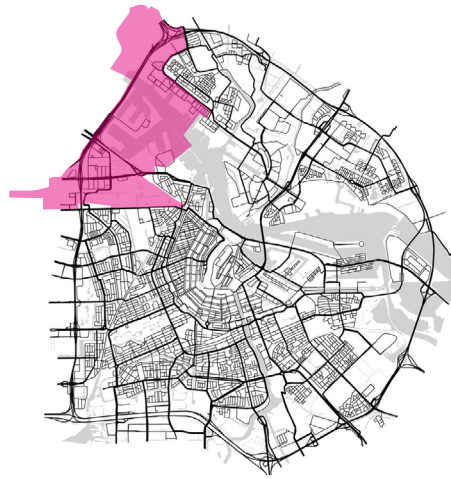


Figure 17. Beech LVL - image from bauBuche beam by Pollmeier

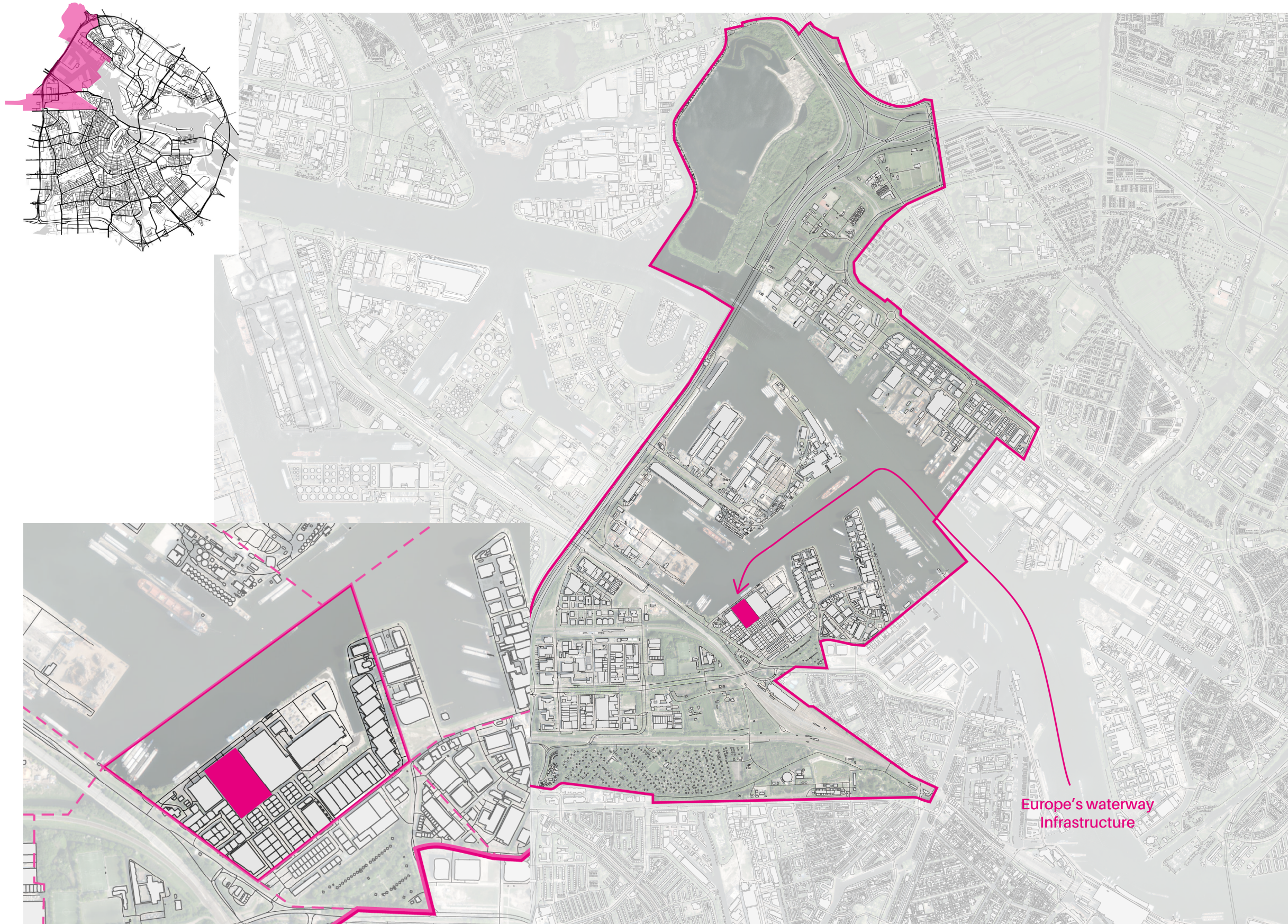
Haven-Stad



Haven-Stad development plan



Haven-Stad



Houtveemloods Circular Building hub

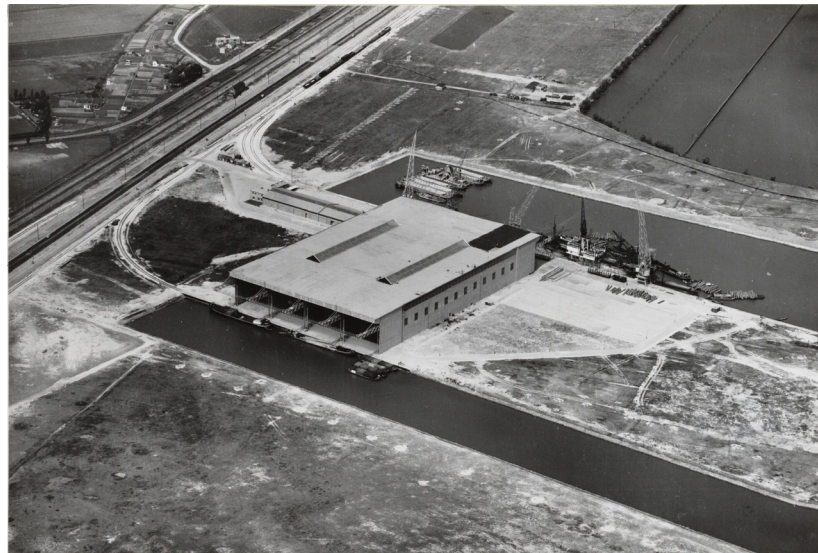
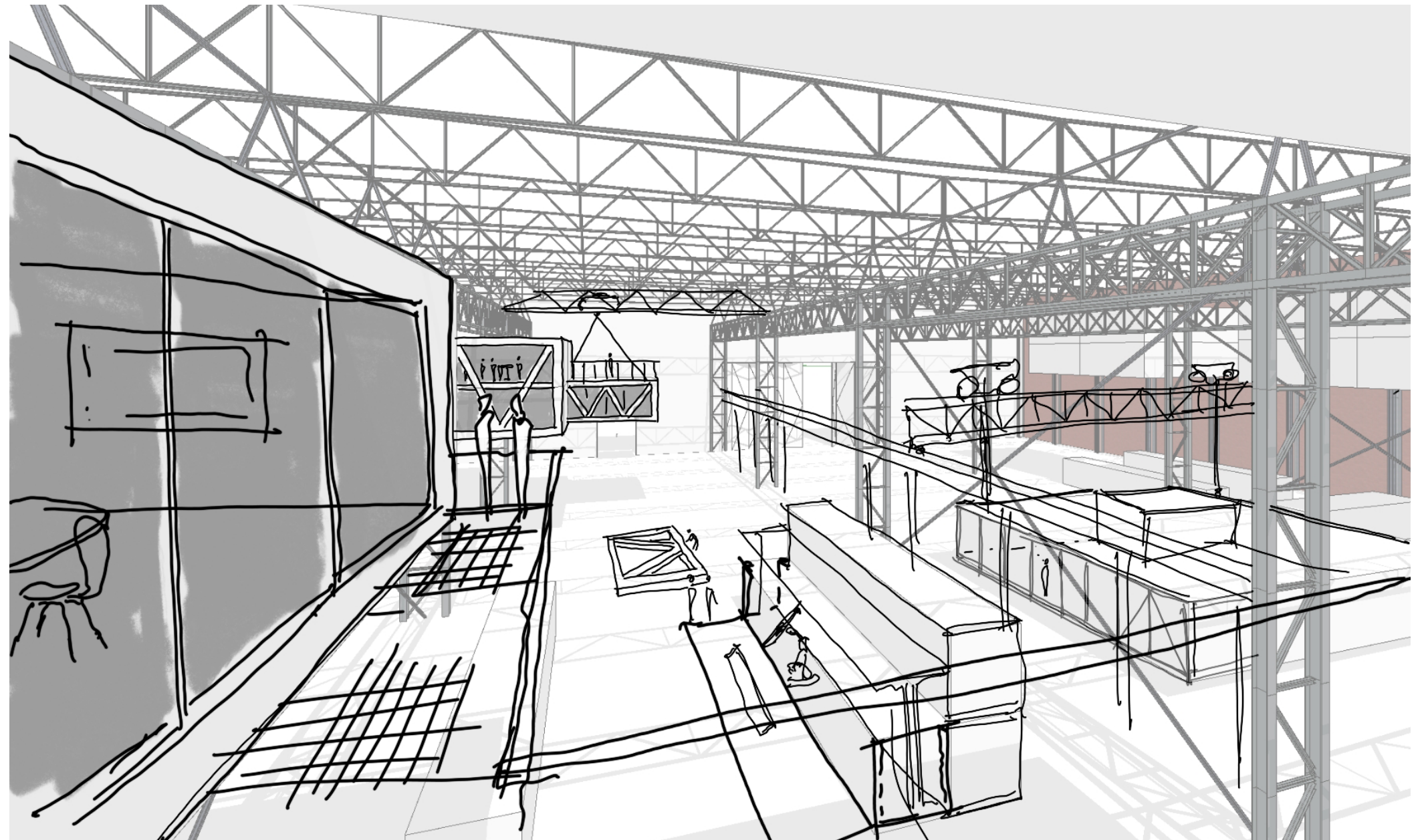
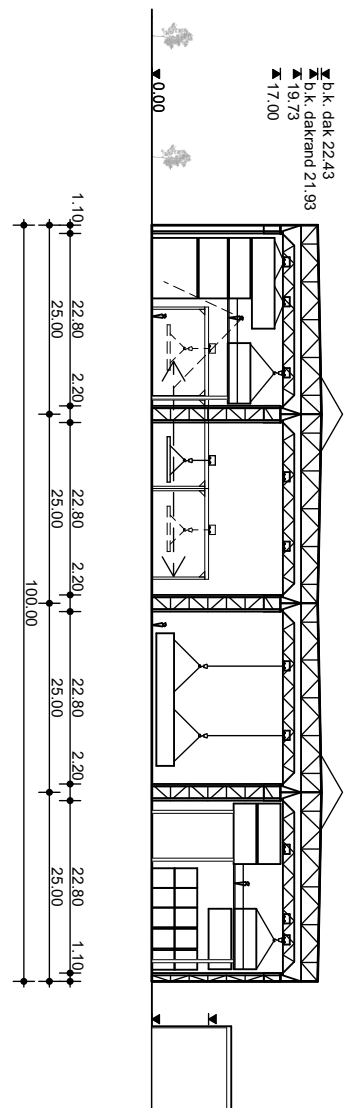
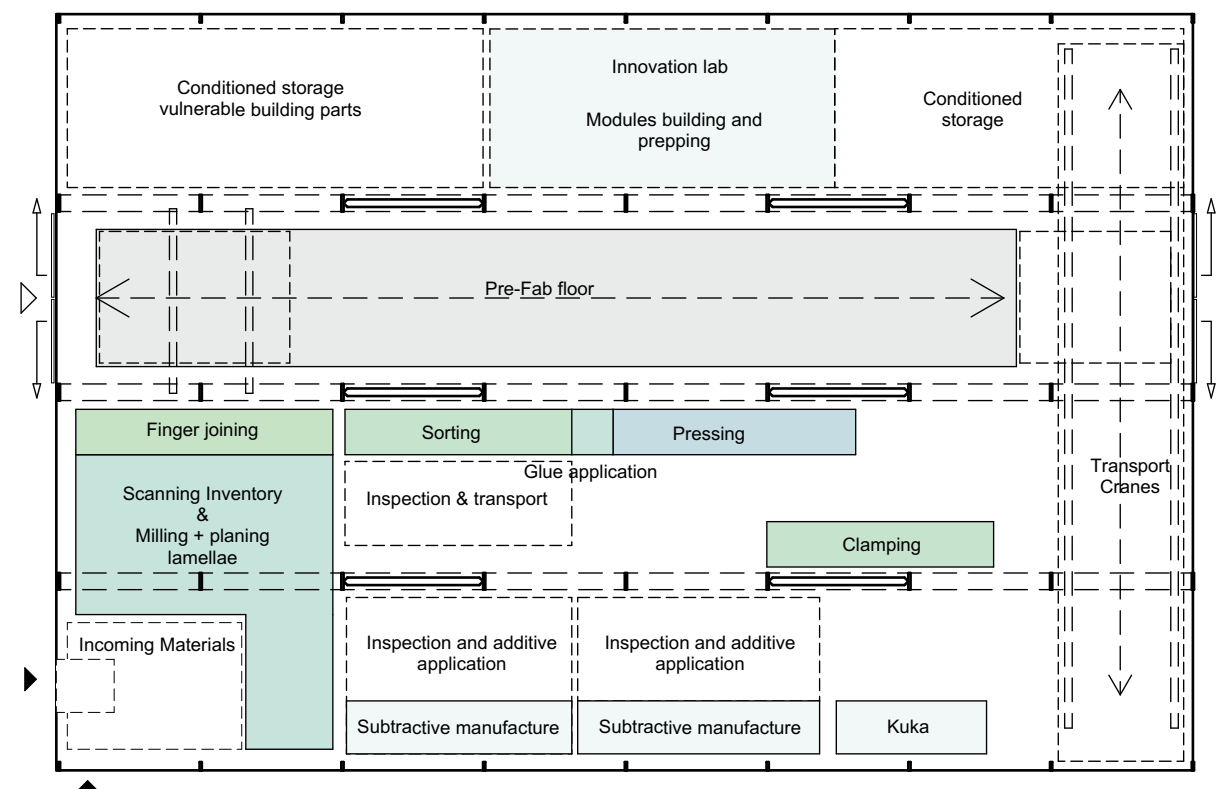
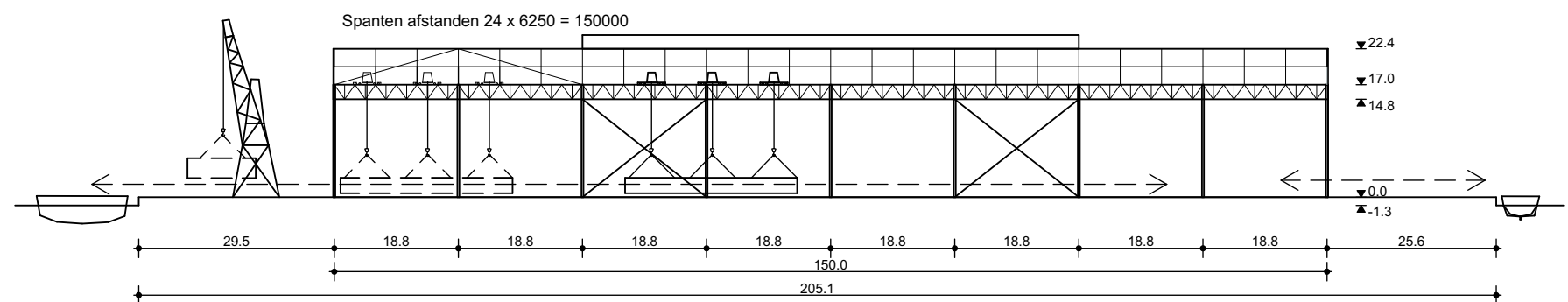


Figure 18. Houtveemloods - Stadsarchief



Houtveemloods Circular building hub



Distribution through waterway infrastructure



Minimizing pressure on Road and Rail Infrastructure

Allowing for a high degree of prefabrication

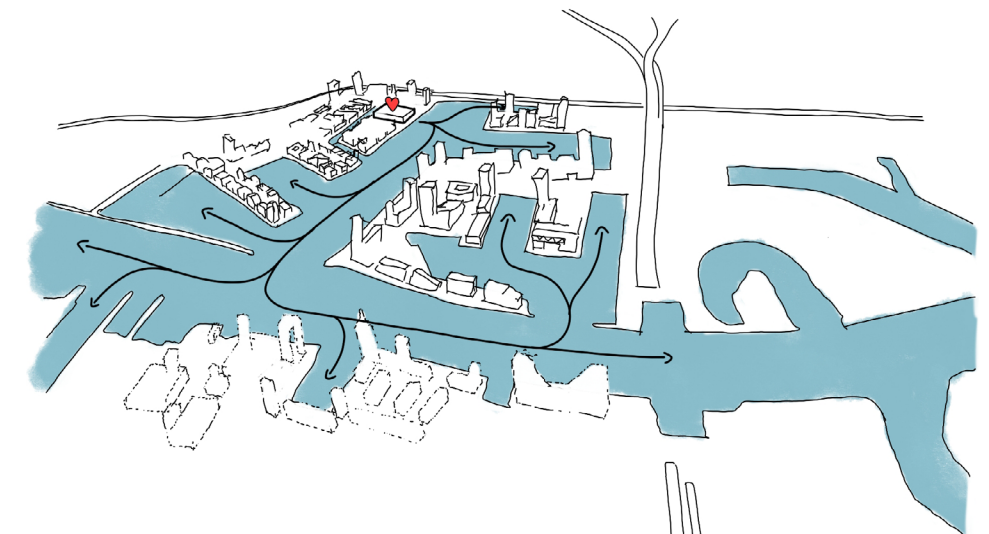
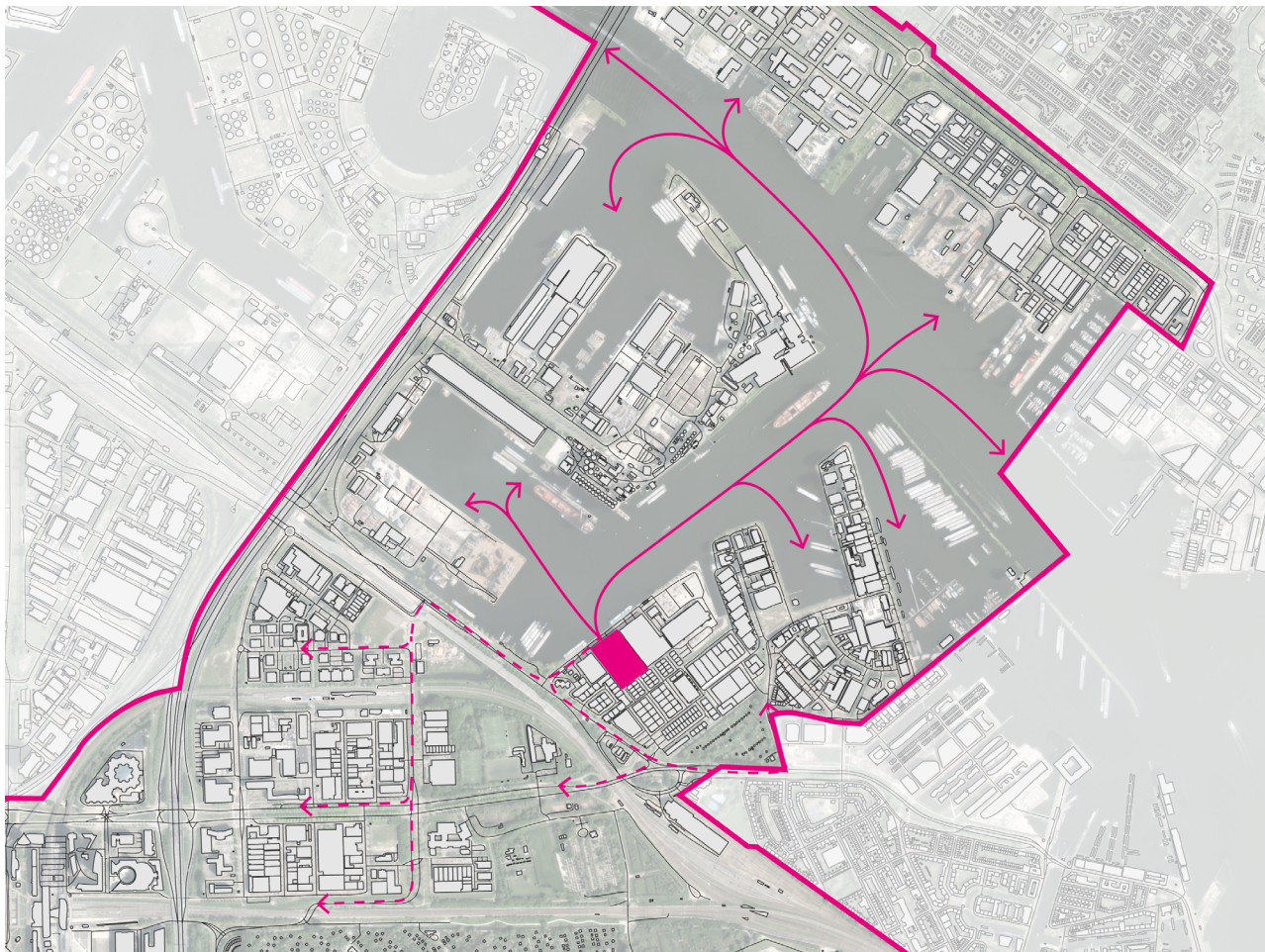
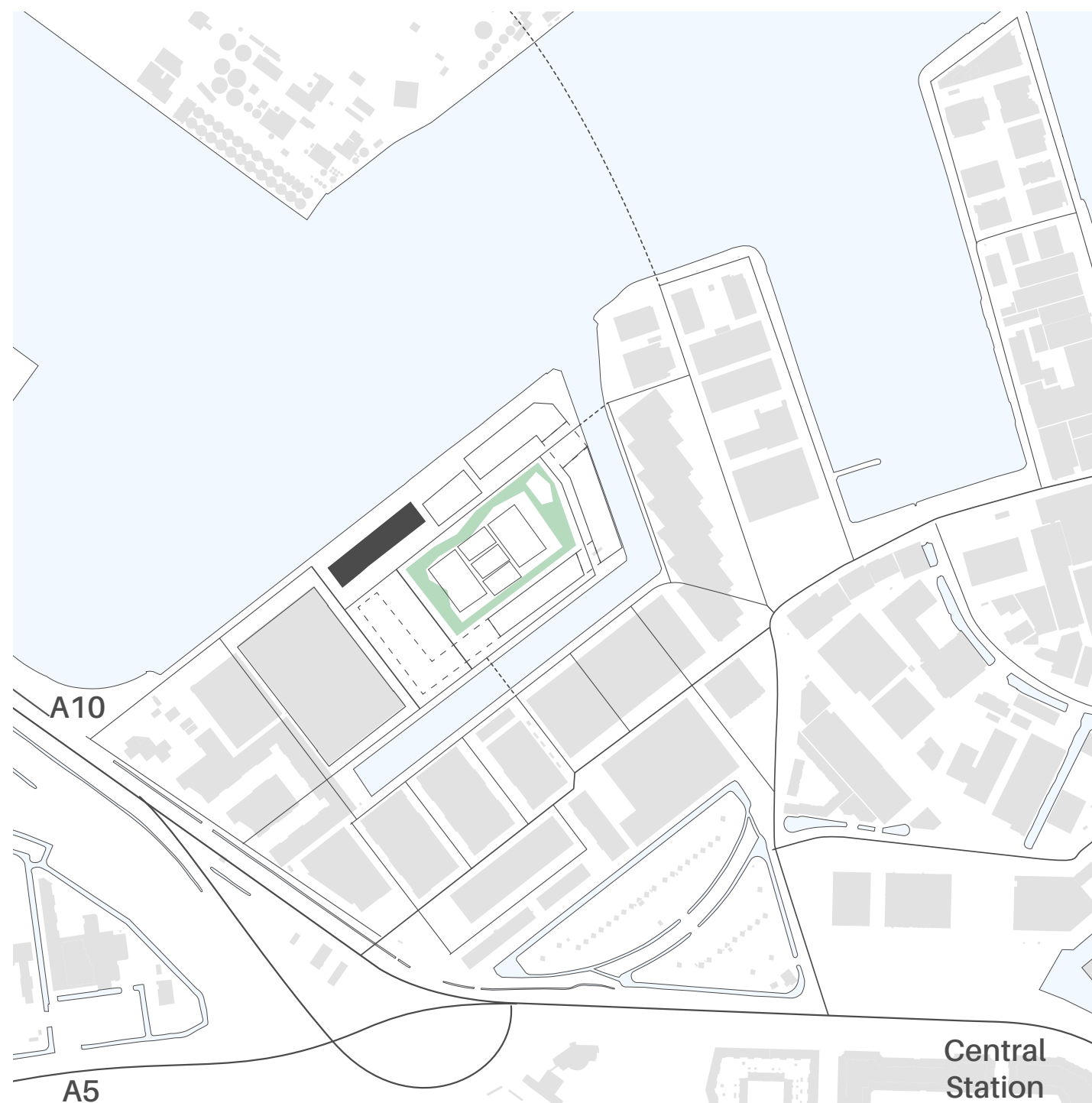


Figure 19. Image of a Heavy load Barge, the matador 3 picture by Erwin van Hassel

MoorWood Project



Principled architecture
Ideology prioritised



Pre-fabrication in Timber



High precision
Climate controlled environment
Less intrusive
Controlled waste flows
Fast assembly

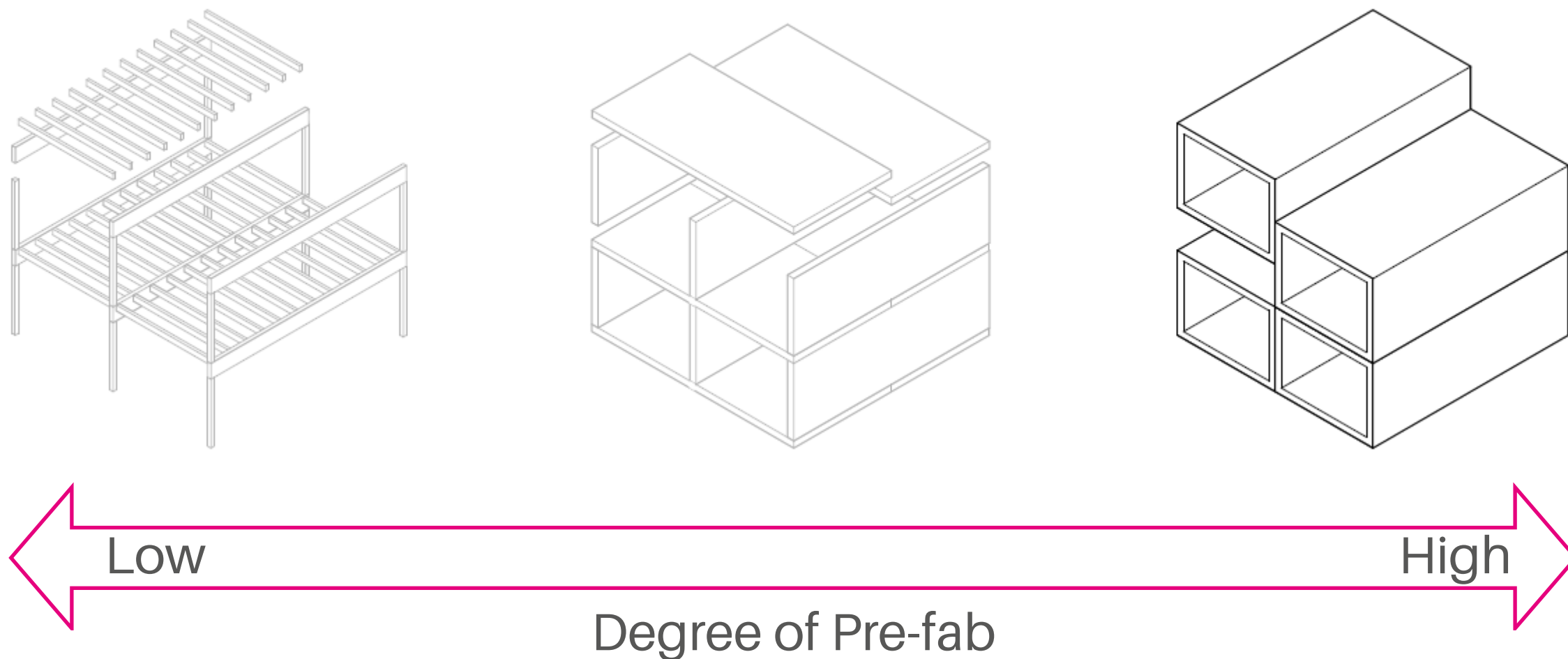


Figure 20. Diagrams levels of pre-fabrication from Manual of multi-storey Timber Construction

Post-and Beam construction

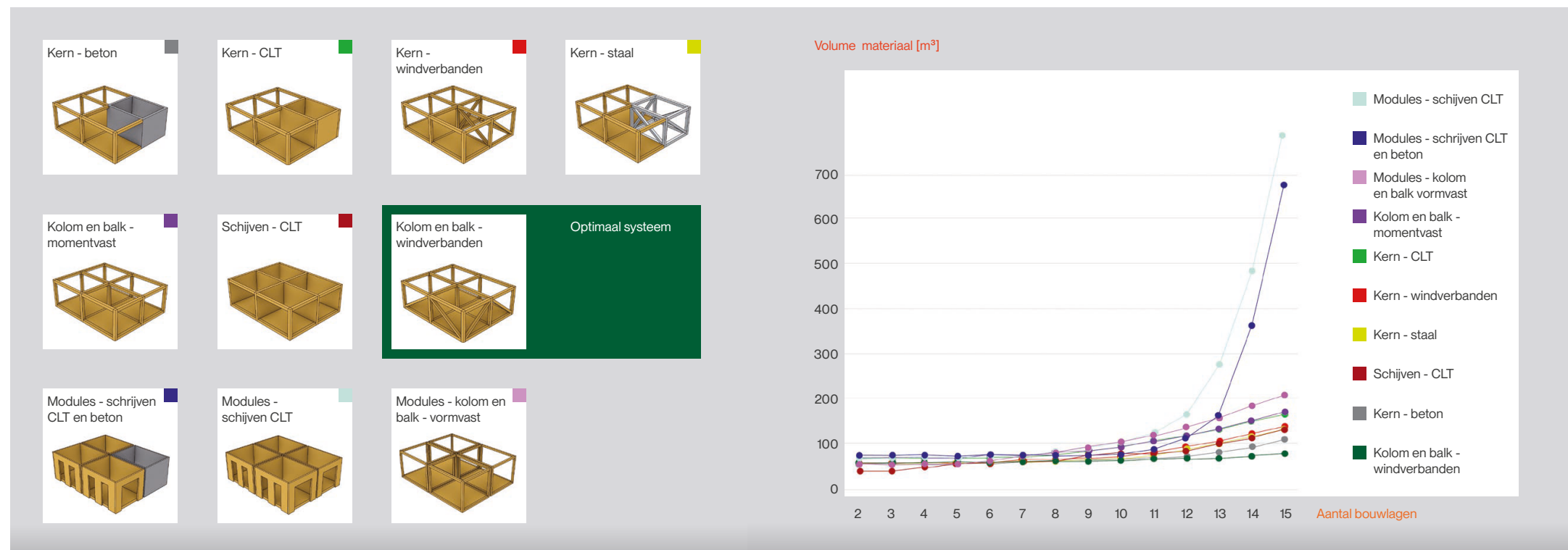


Figure 21. Material efficiency analysis in 'Hoog hout haalbaar' by LEVS architecten & research group

Design question



Material efficiency of
Post-and-Beam

High degree of pre-fab

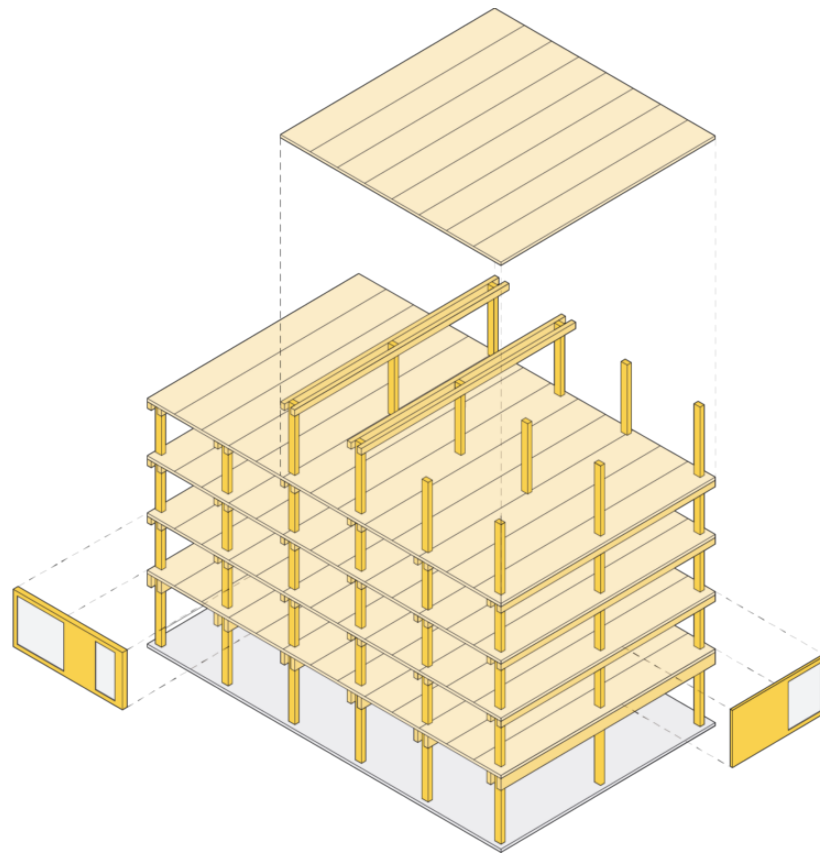


Figure 22. Post & Beam construction from Built in Wood - Design guide

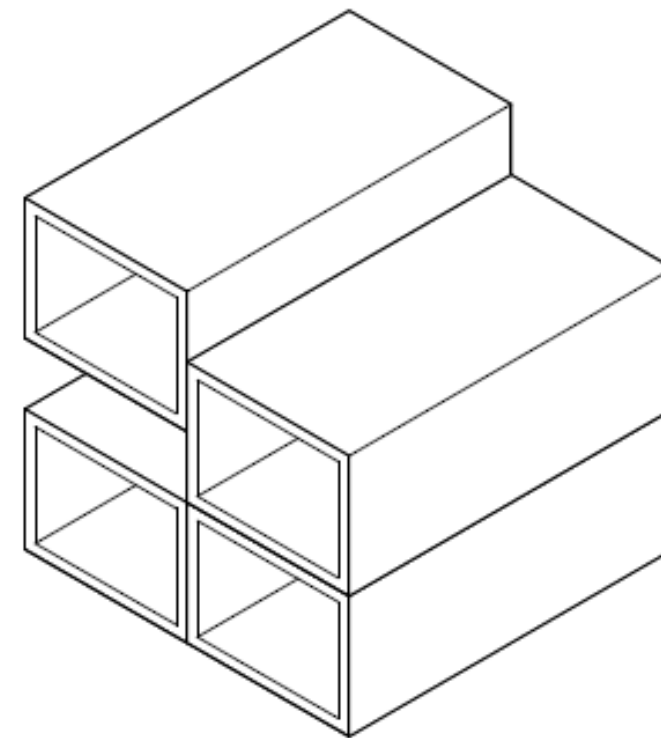


Figure 23. Room Modules diagram from Manual of Multi-Storey Timber Construction

MoorWood modules

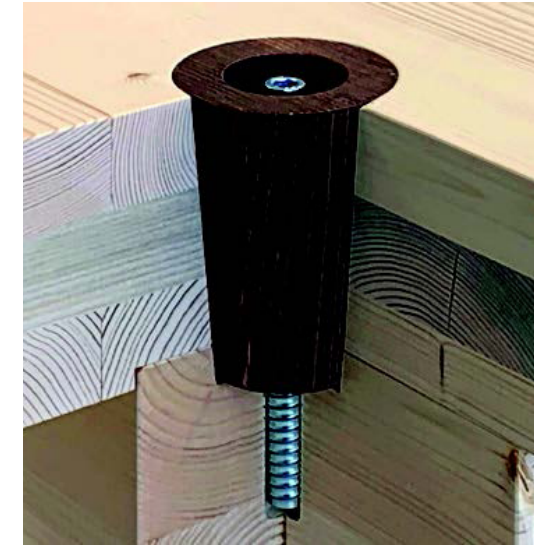
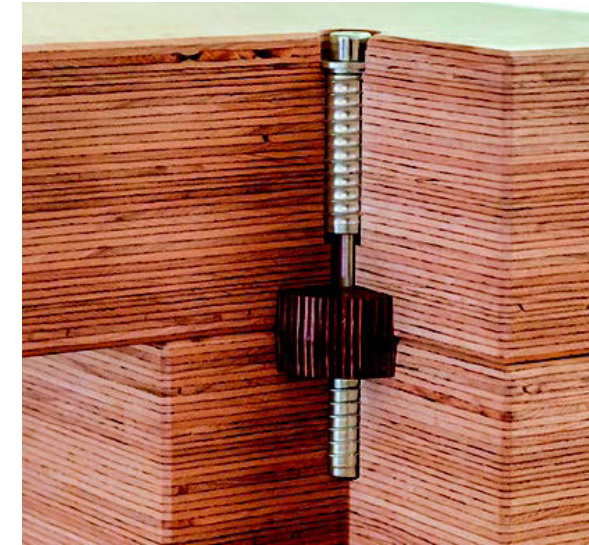
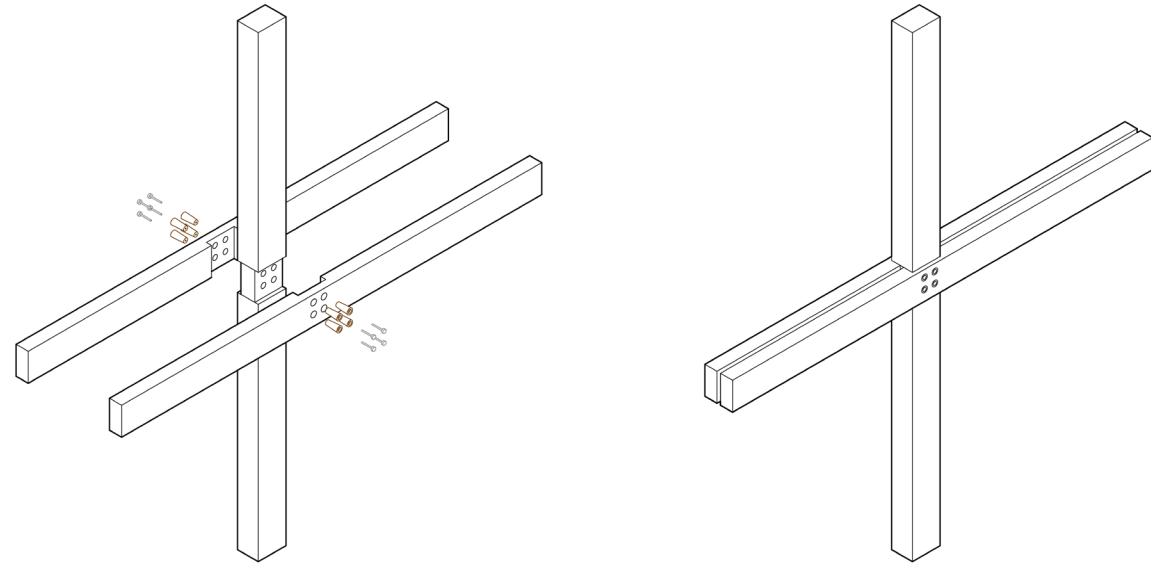
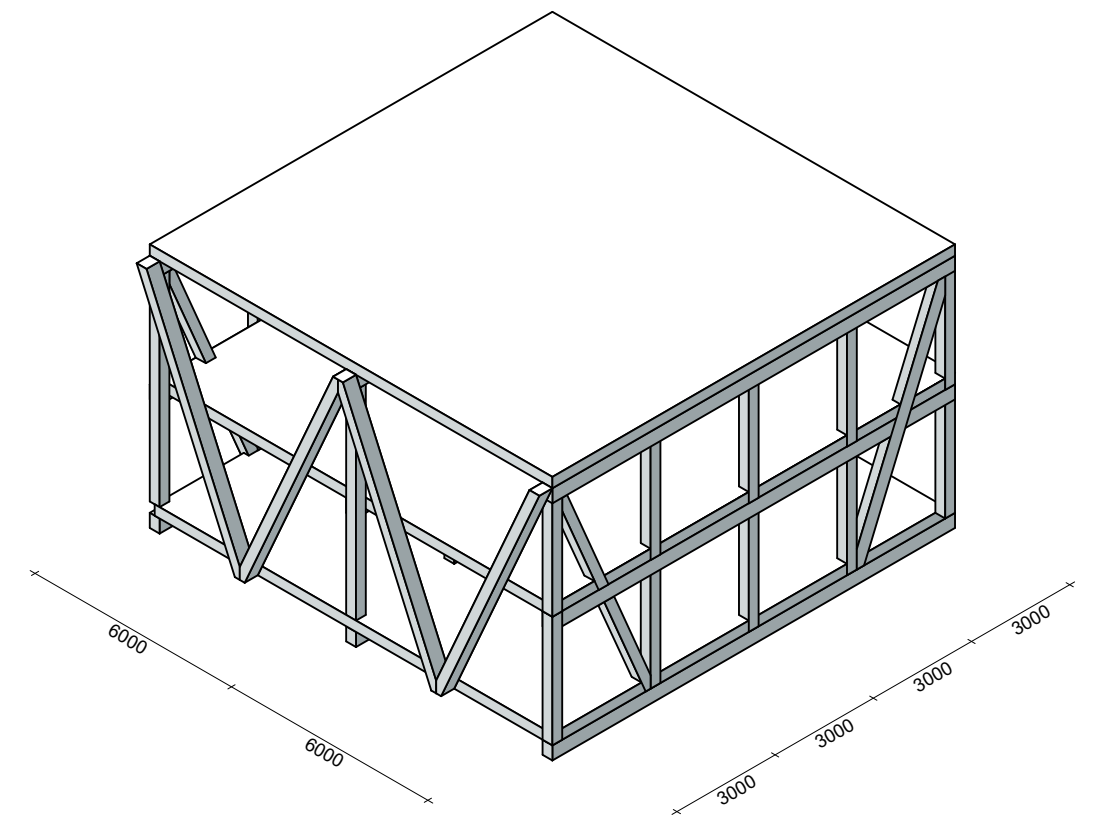
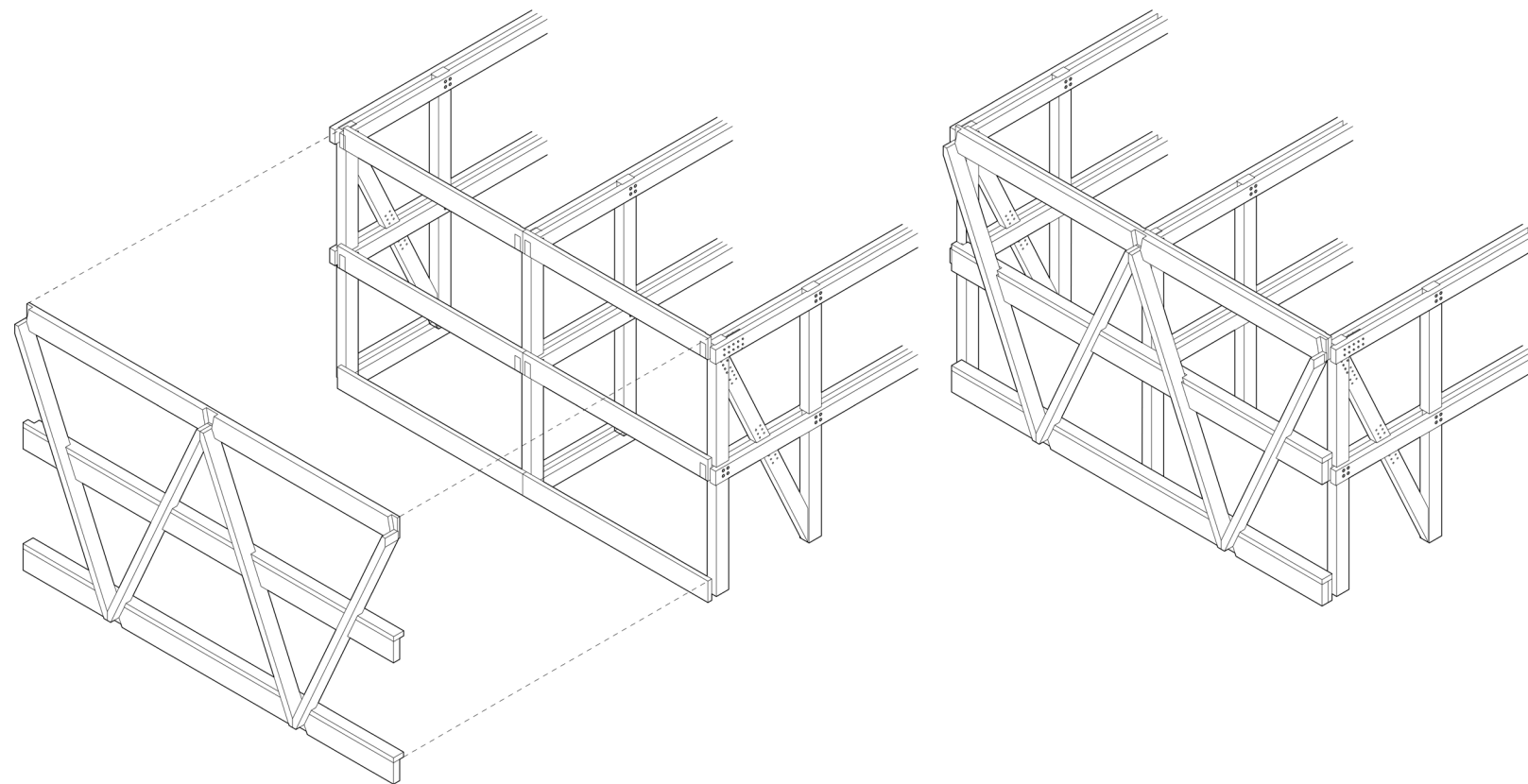


Figure 24. Densified Timber Cone Adapter system developed by T-Lab - pictures by RPTU Kaiserslautern



Details Demountability

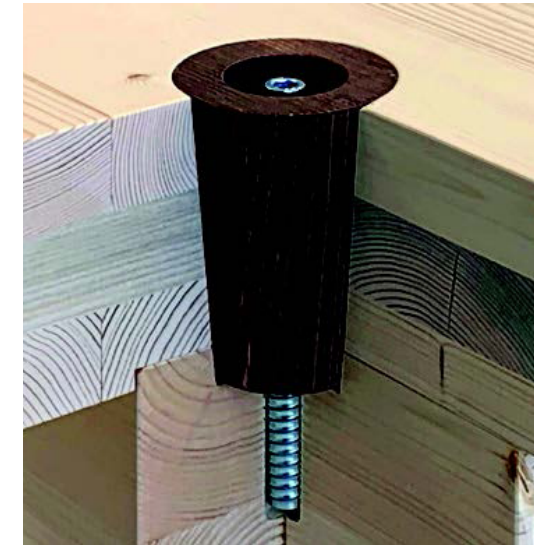
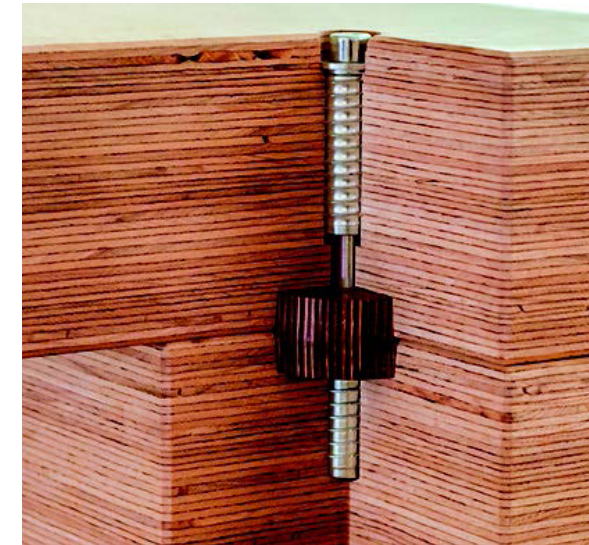
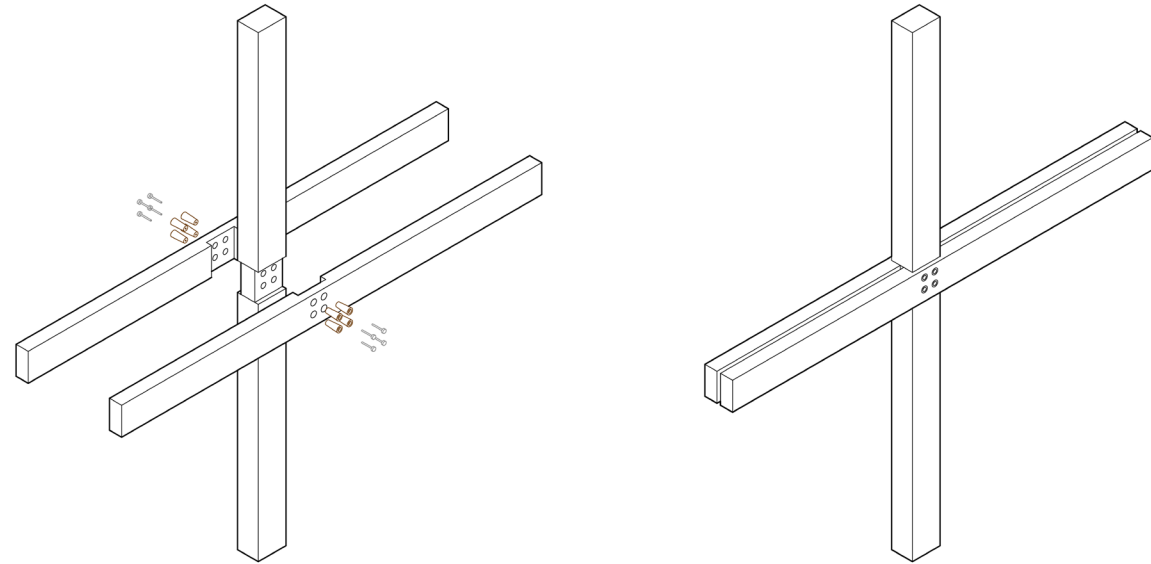
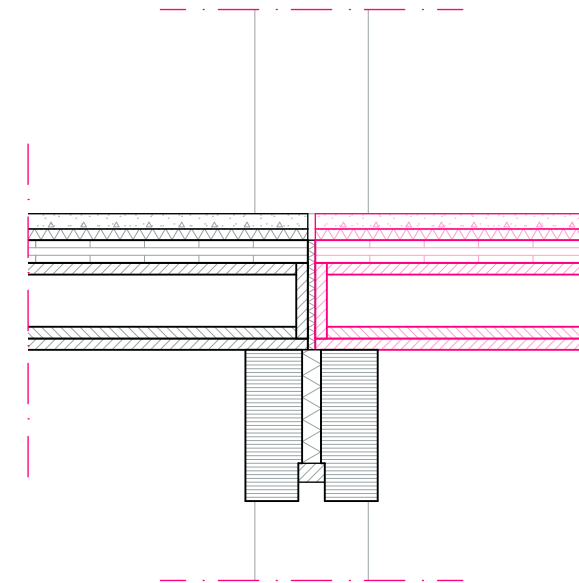
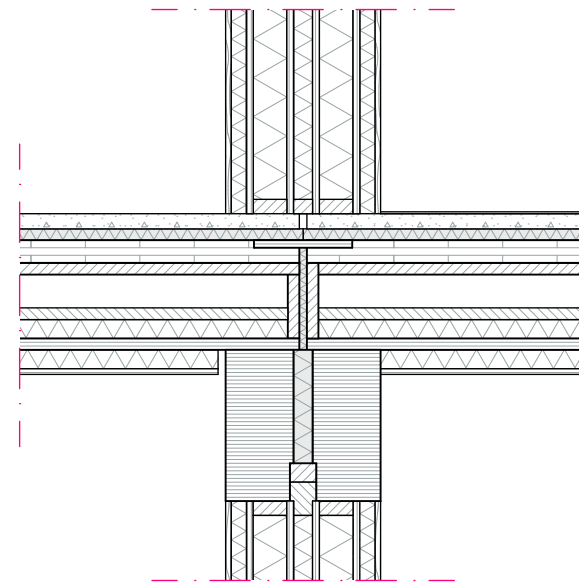
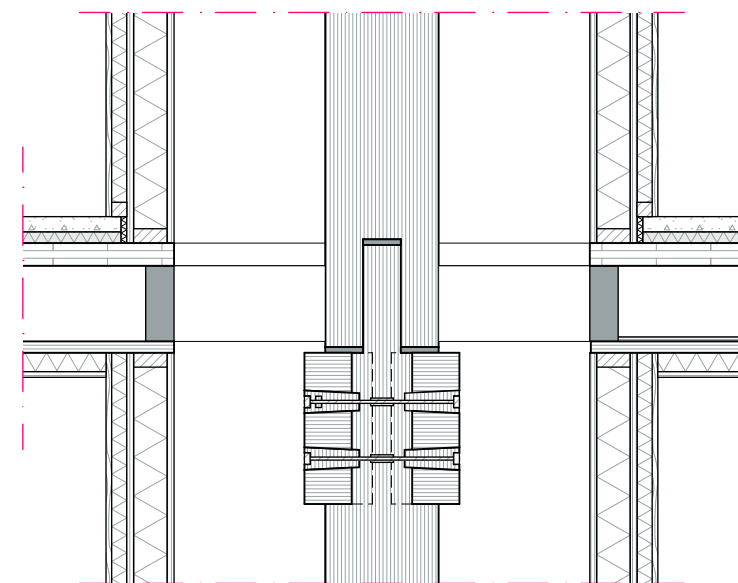
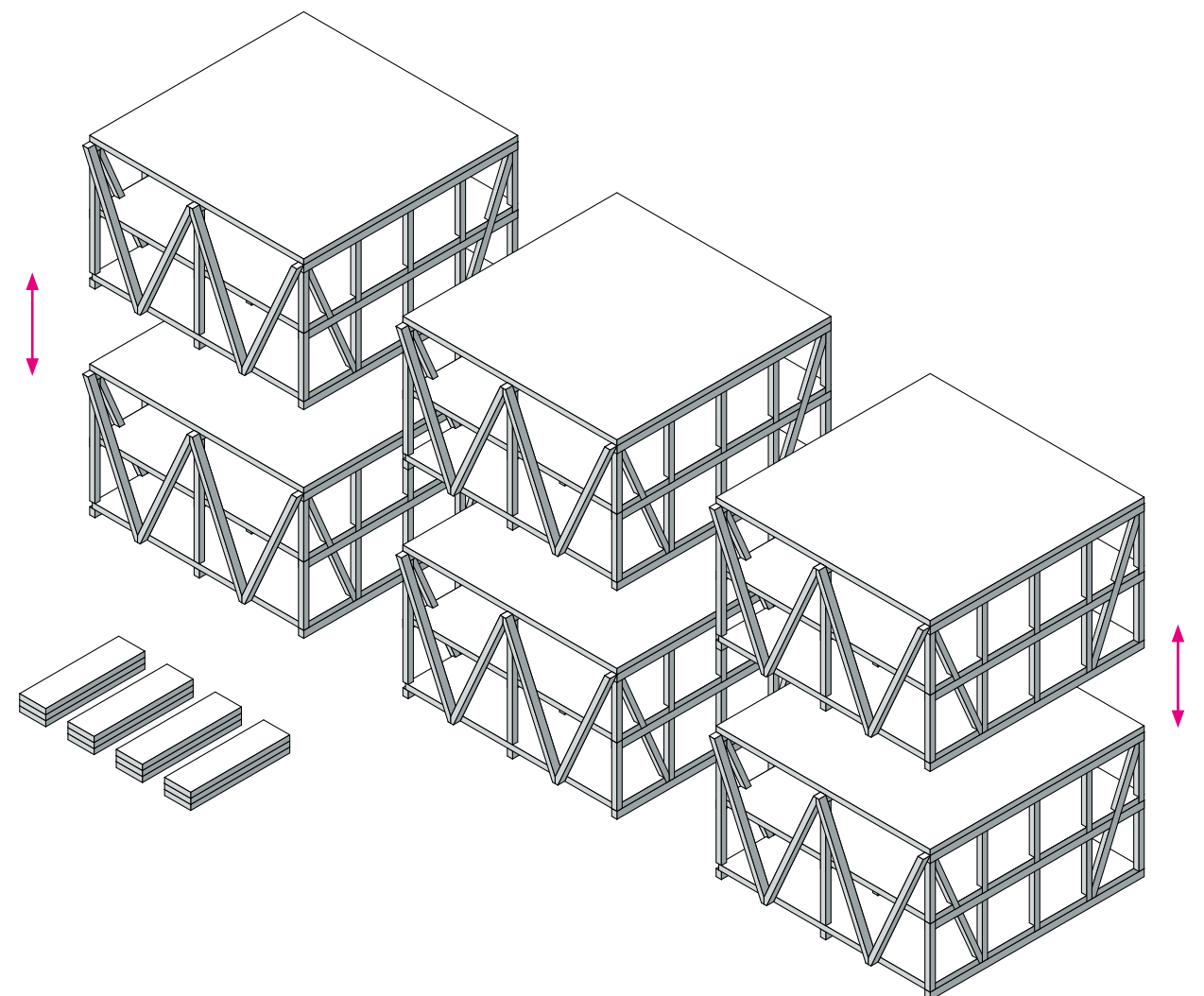
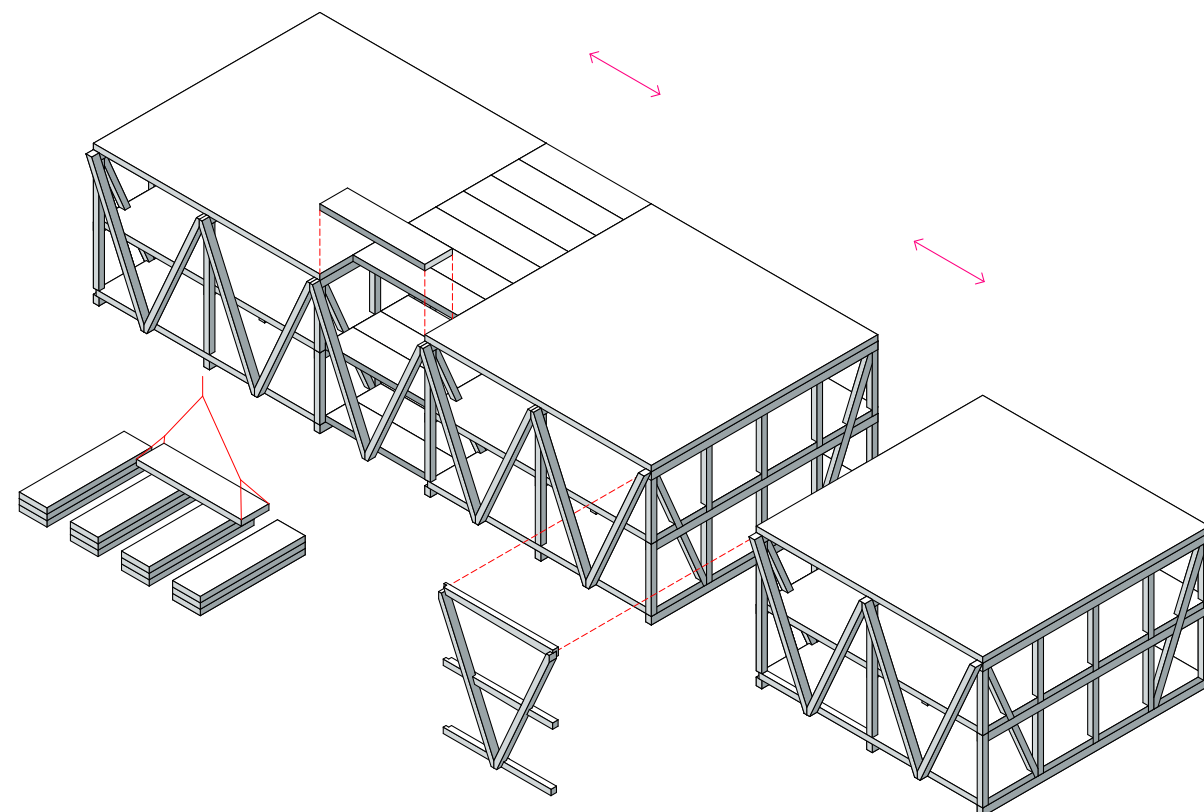
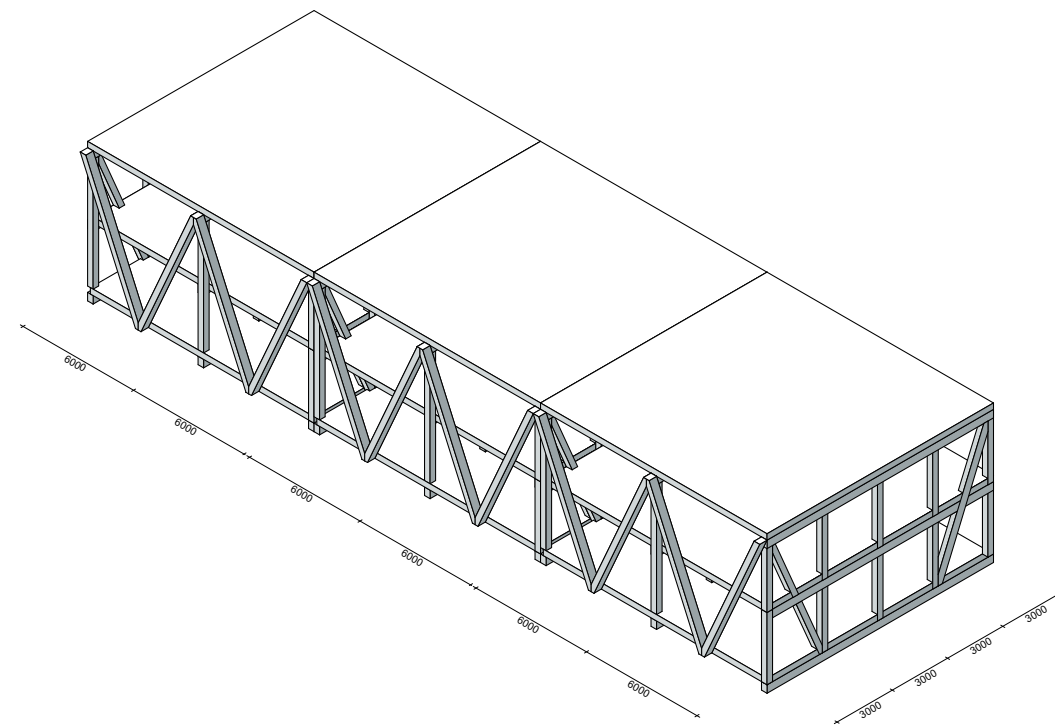


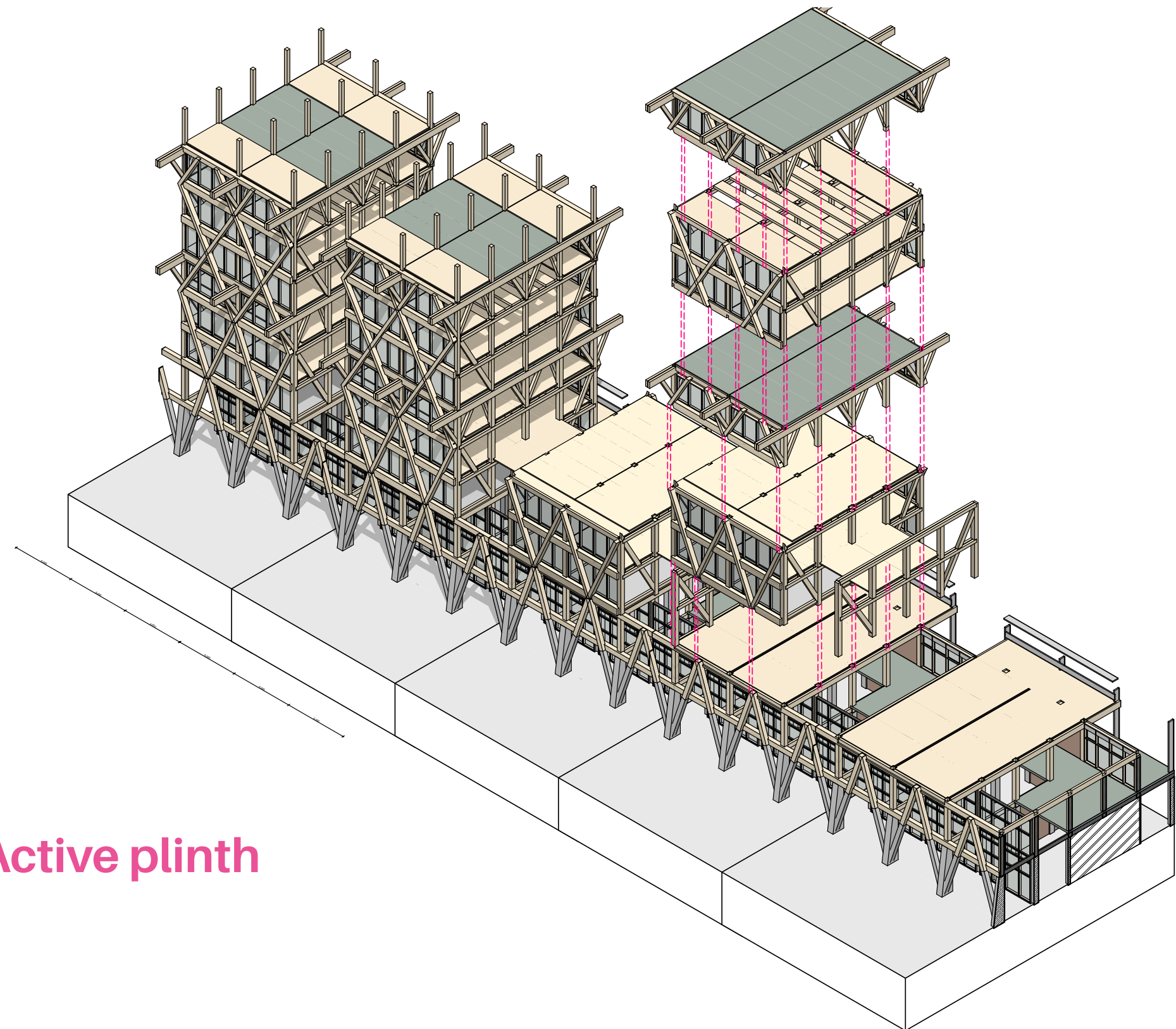
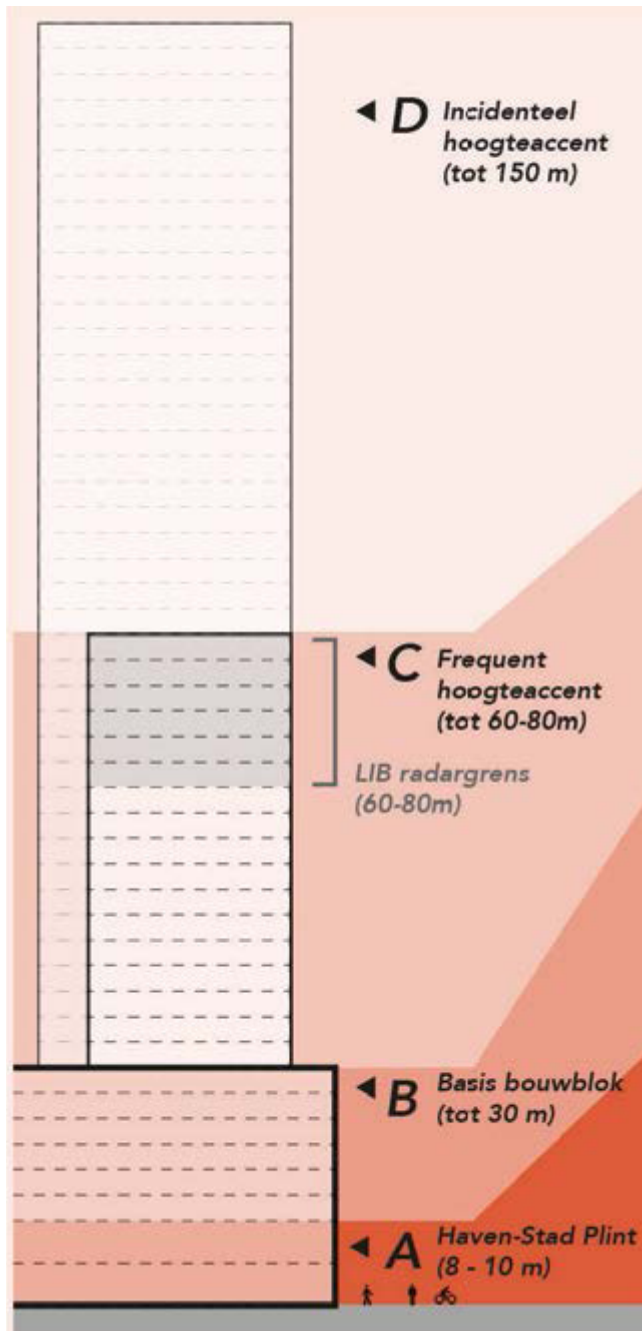
Figure 23. Densified Timber Cone Adapter system developed by T-Lab - pictures by RPTU Kaiserslautern



MoorWood modules

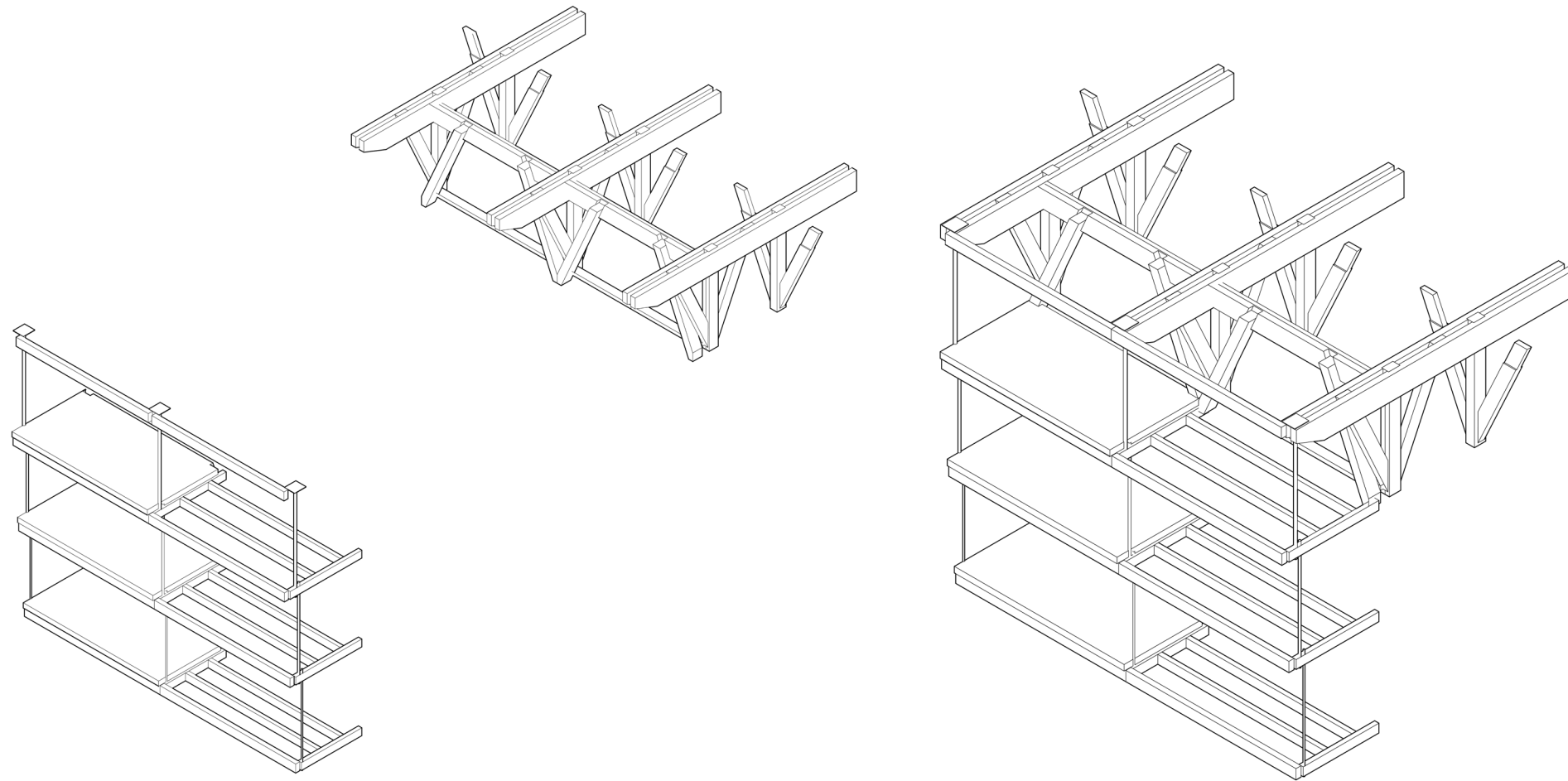


Building system

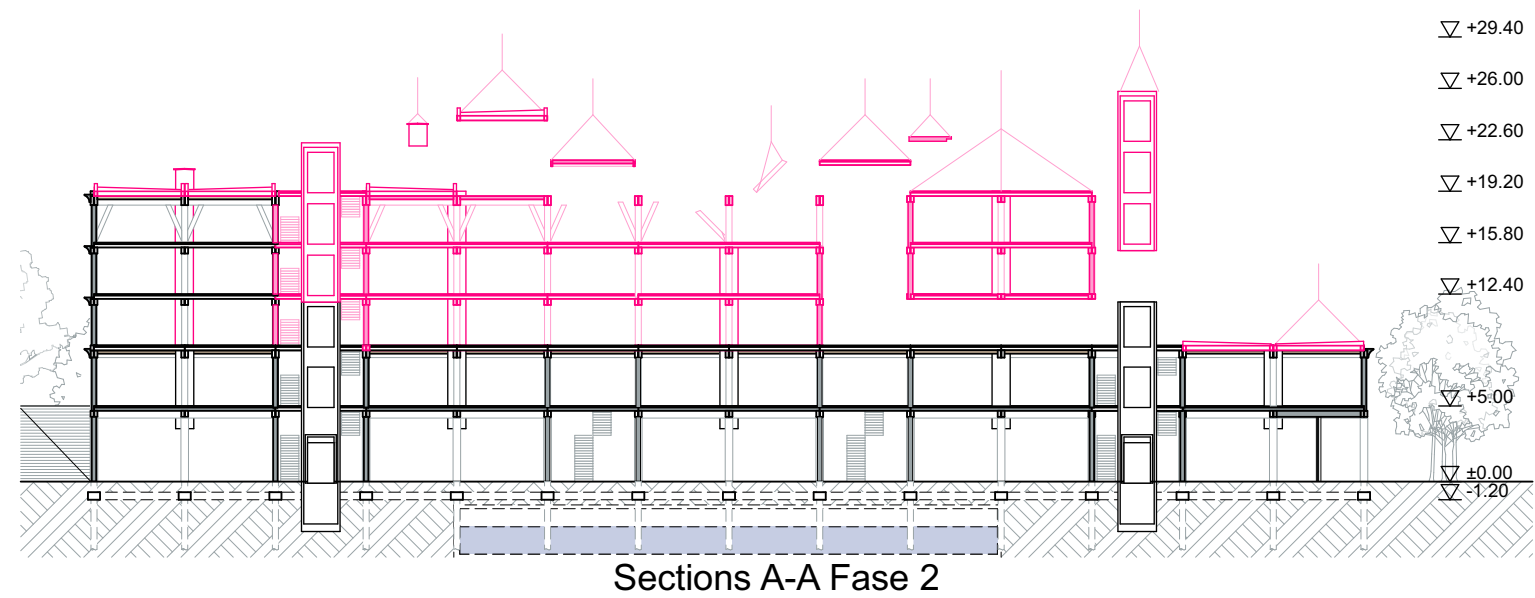


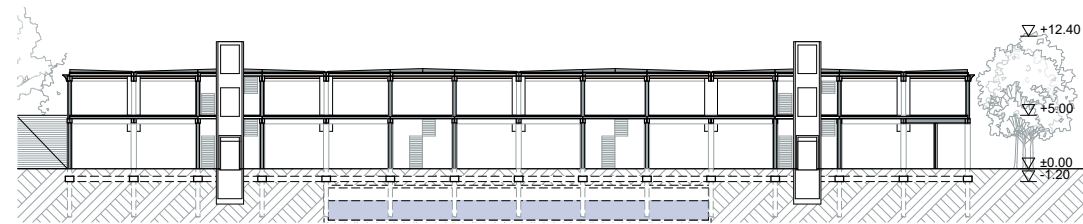
Active plinth

Suspended Balconies

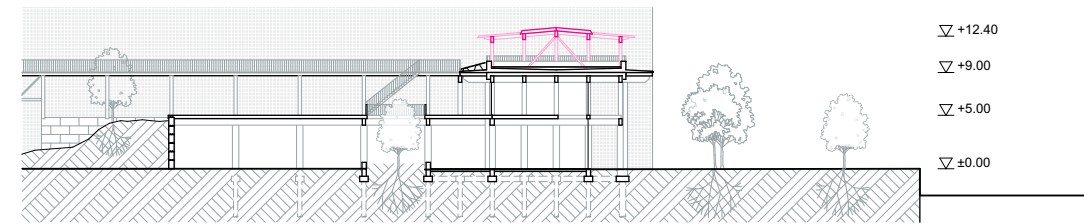


Building system

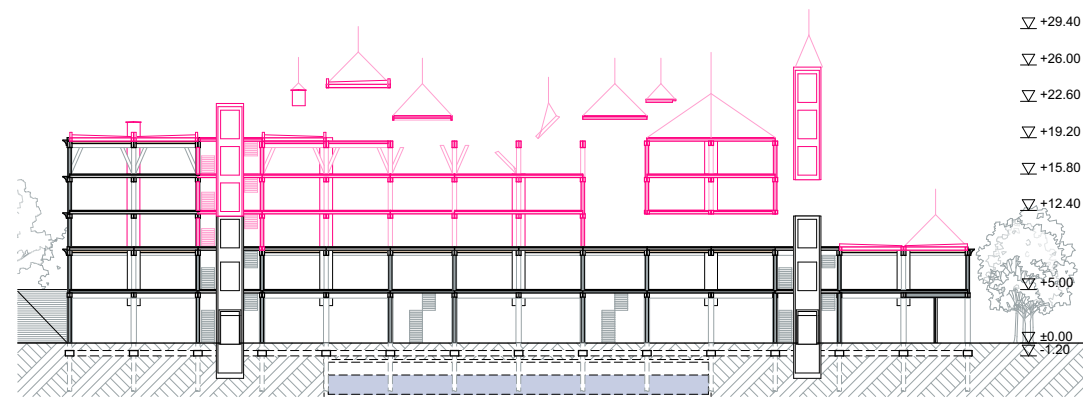




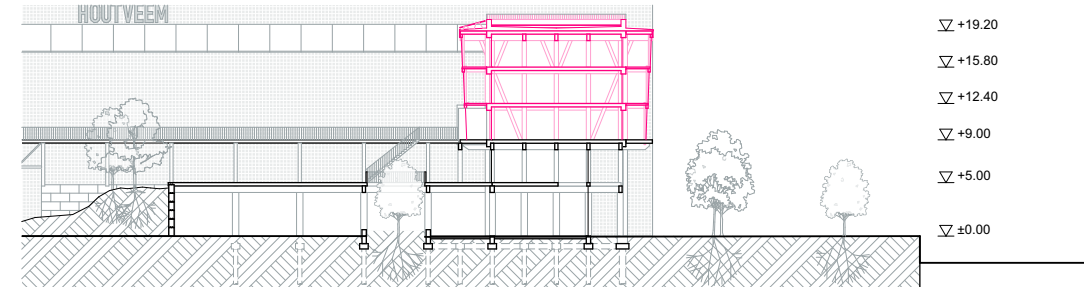
Sections A-A Fase 1



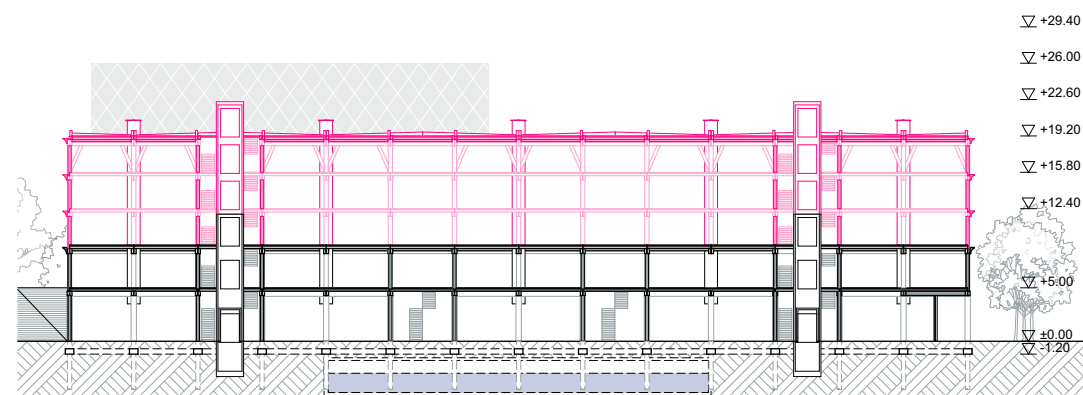
B-B Fase 1



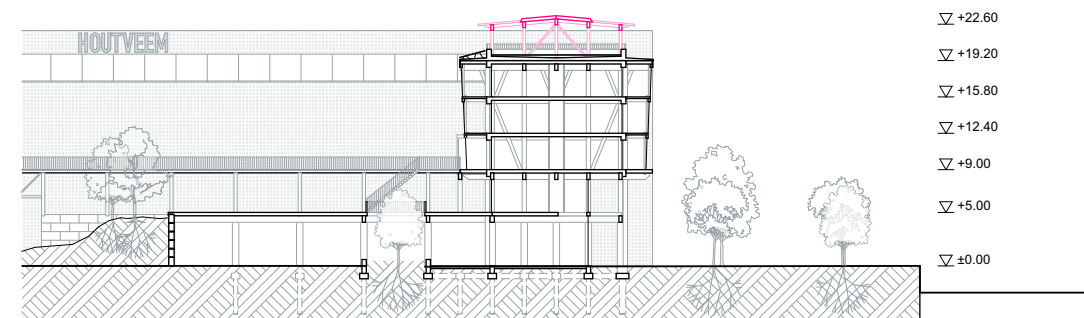
Sections A-A Fase 2



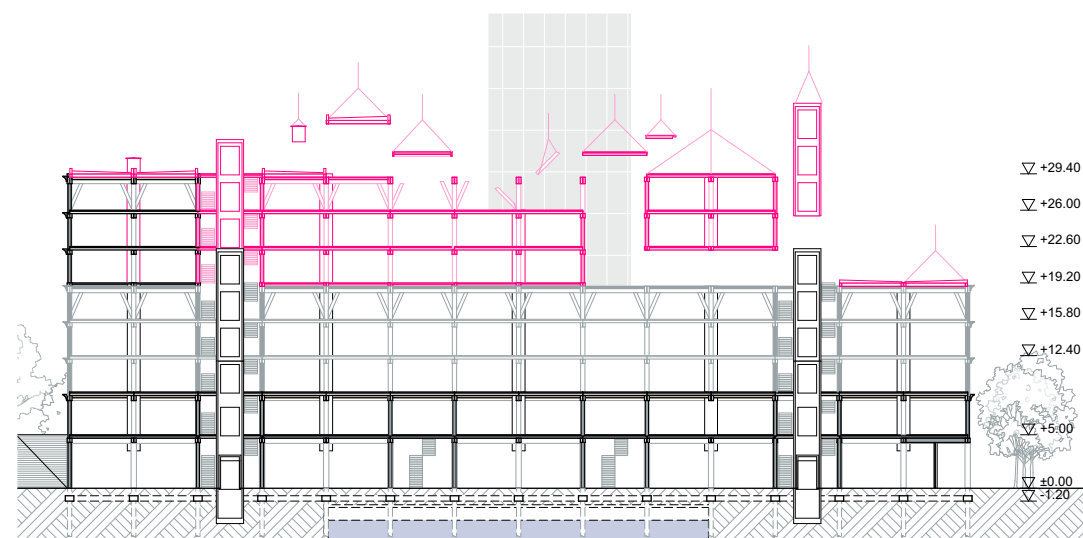
B-B Fase 2



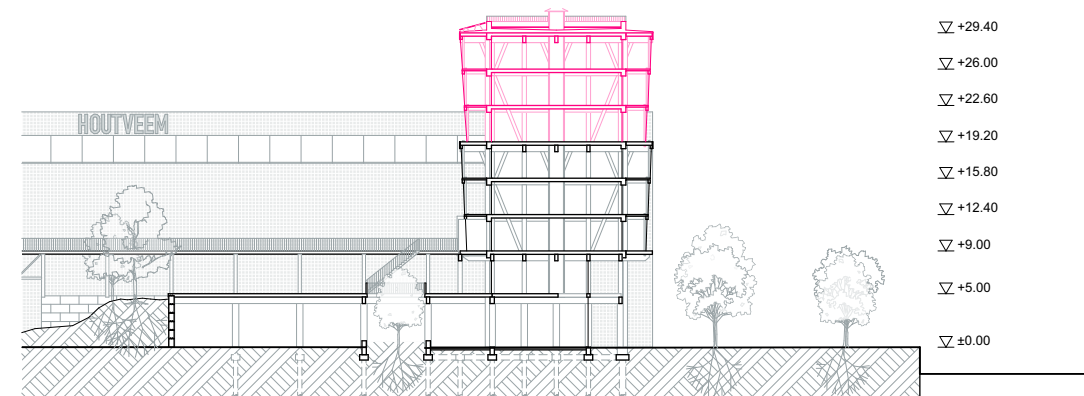
Sections A-A Fase 3



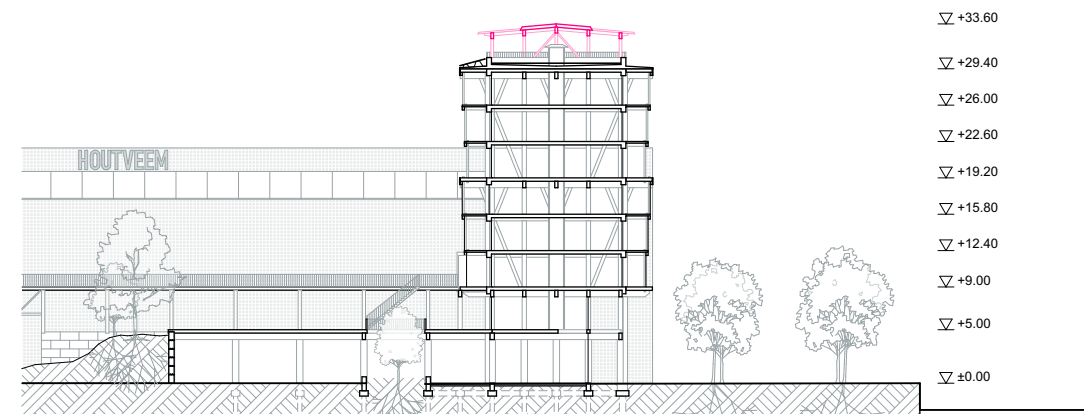
B-B Fase 3

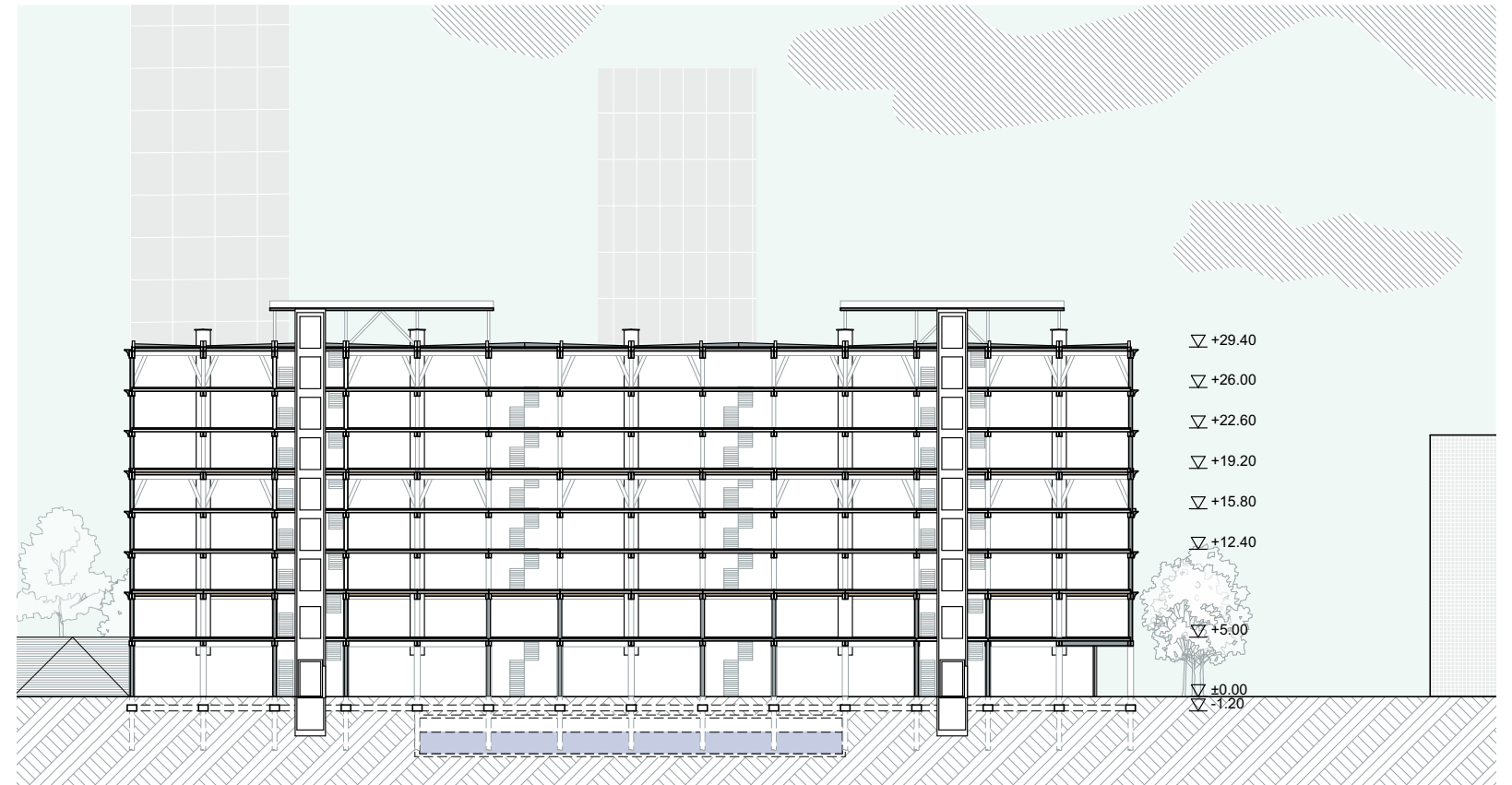


Sections A-A Fase 5

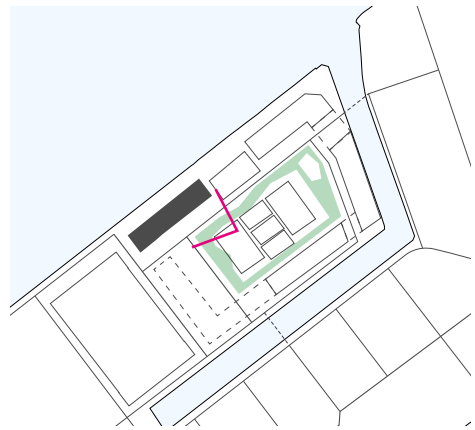


B-B Fase 4

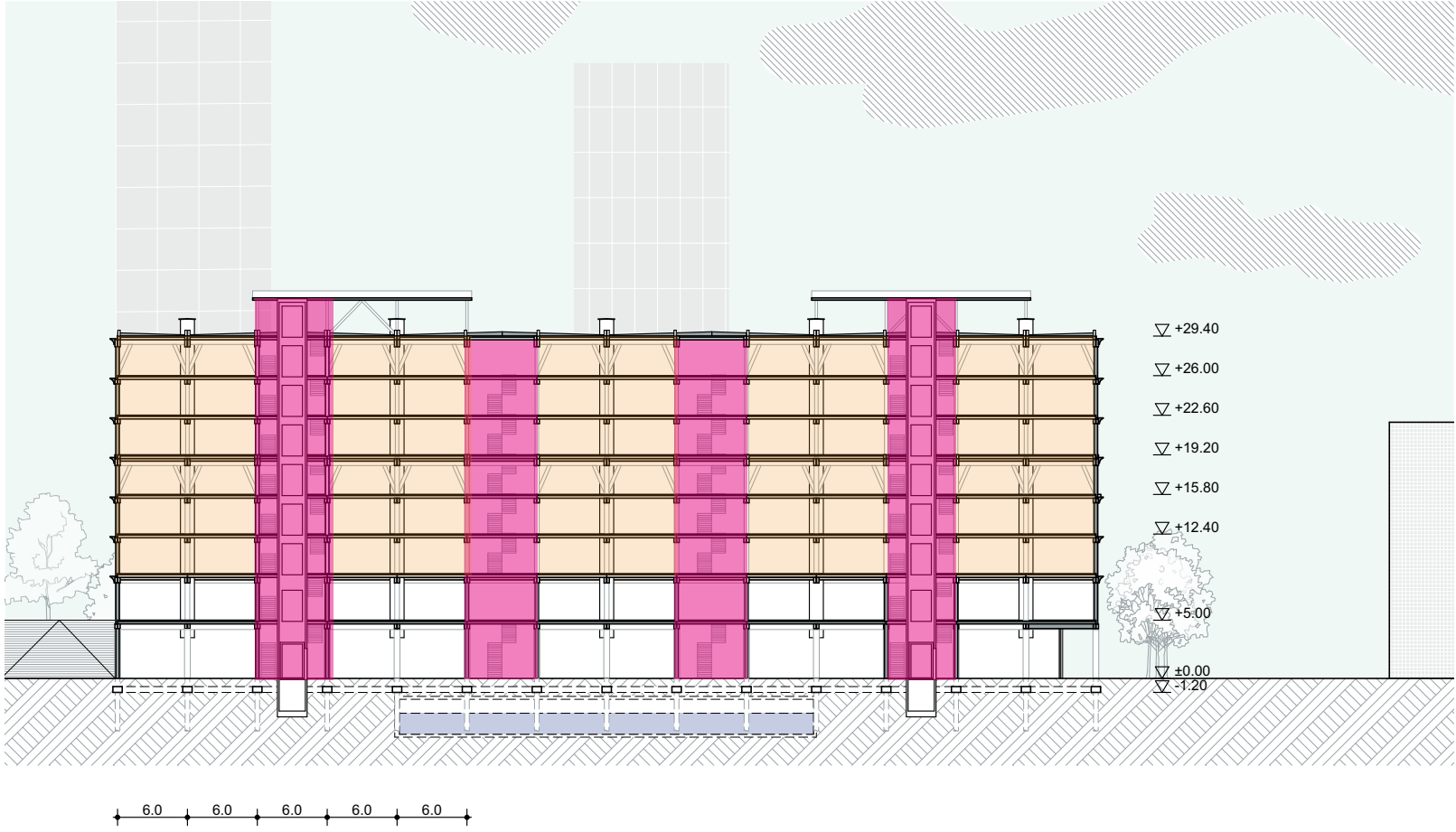
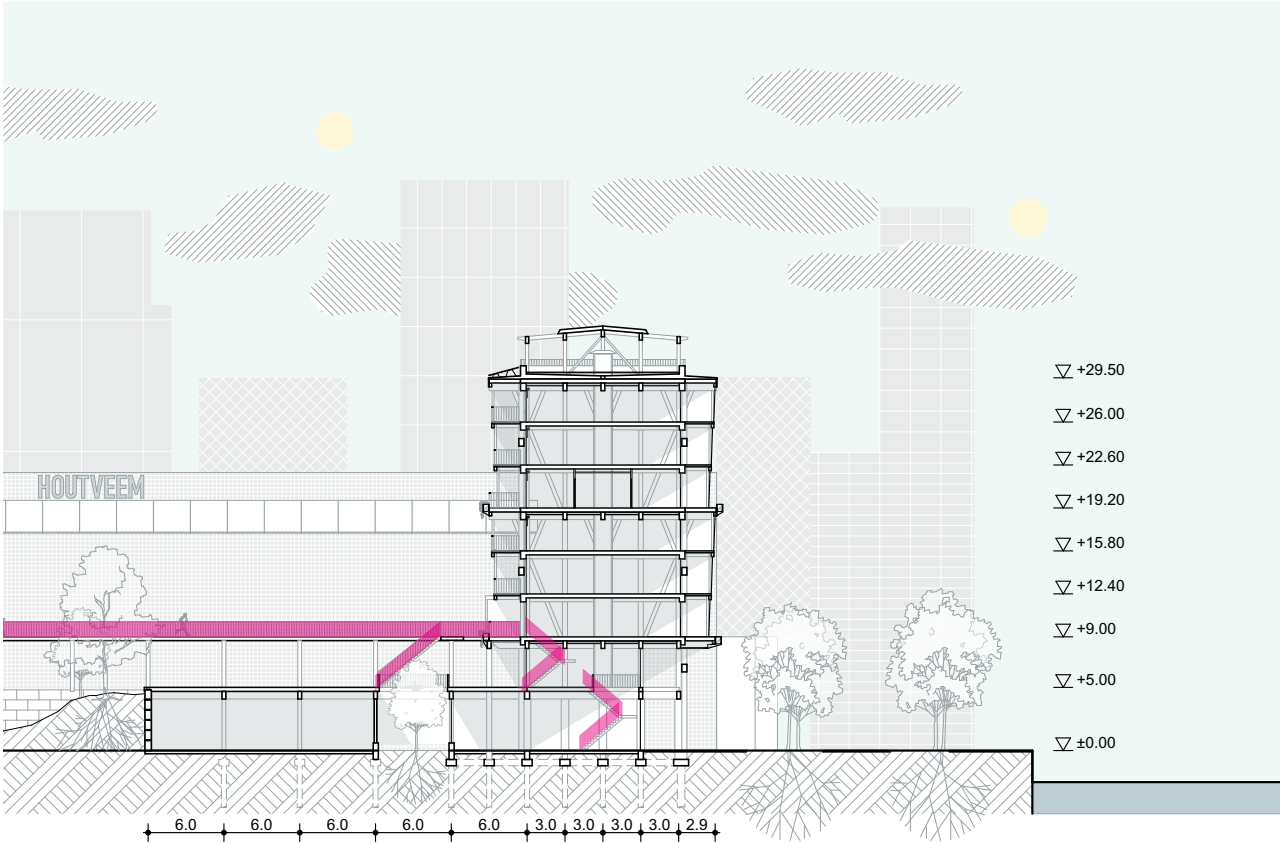




Proposal

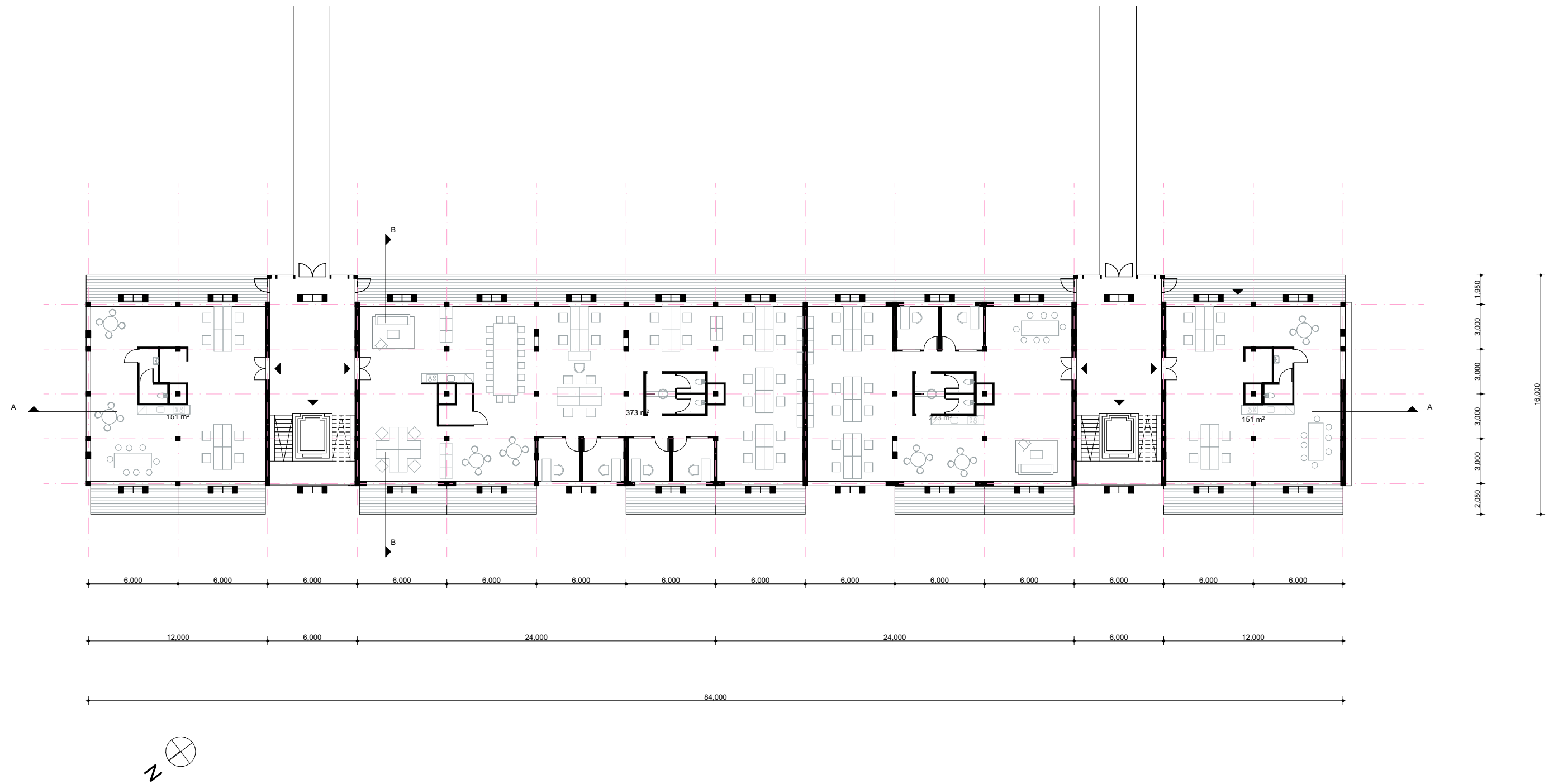


Circulation Office function



- Public
- Office space
- Residential
- Private

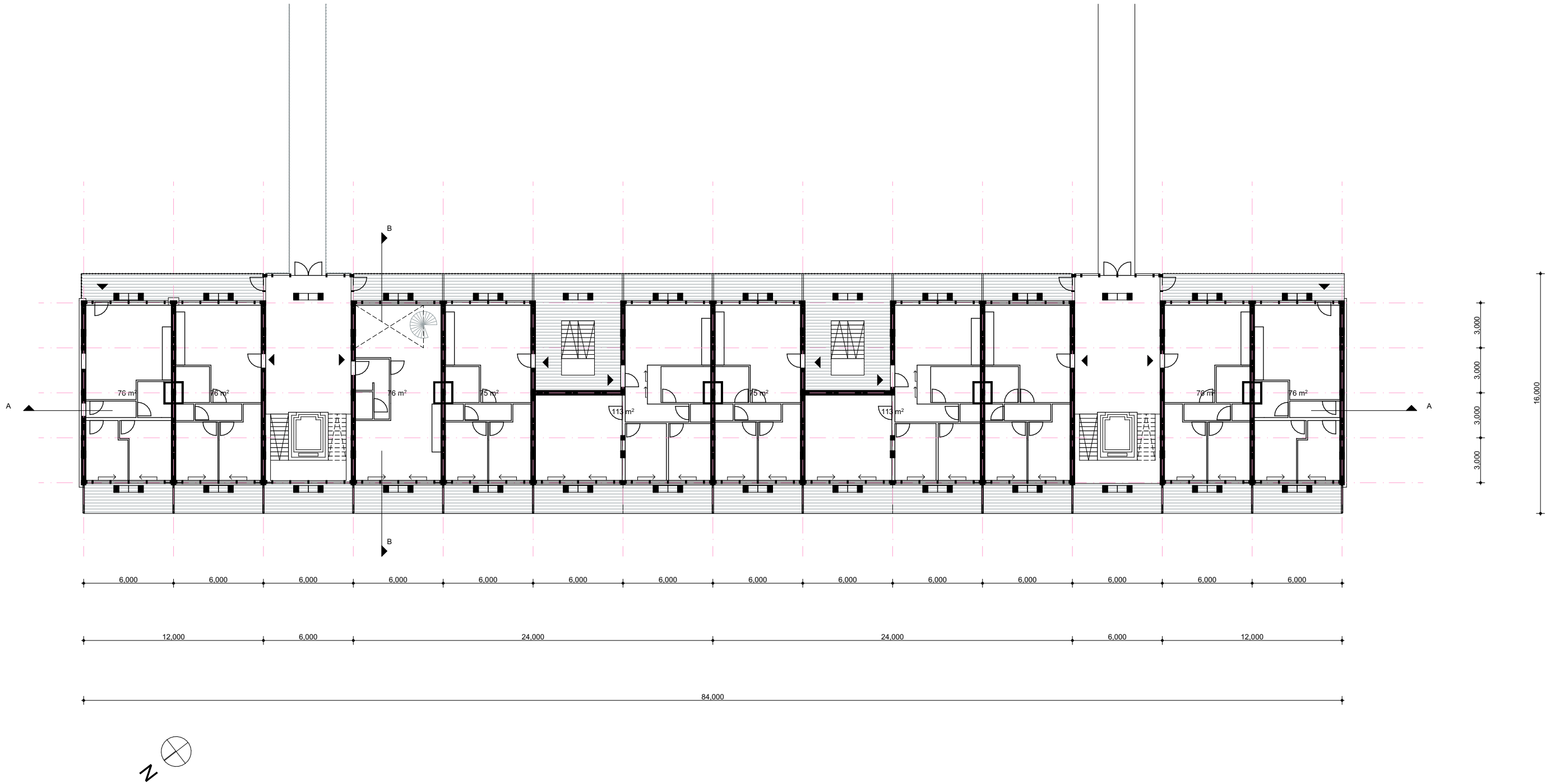
Office space floorplan



Plans 1:200 BG

01.1.3

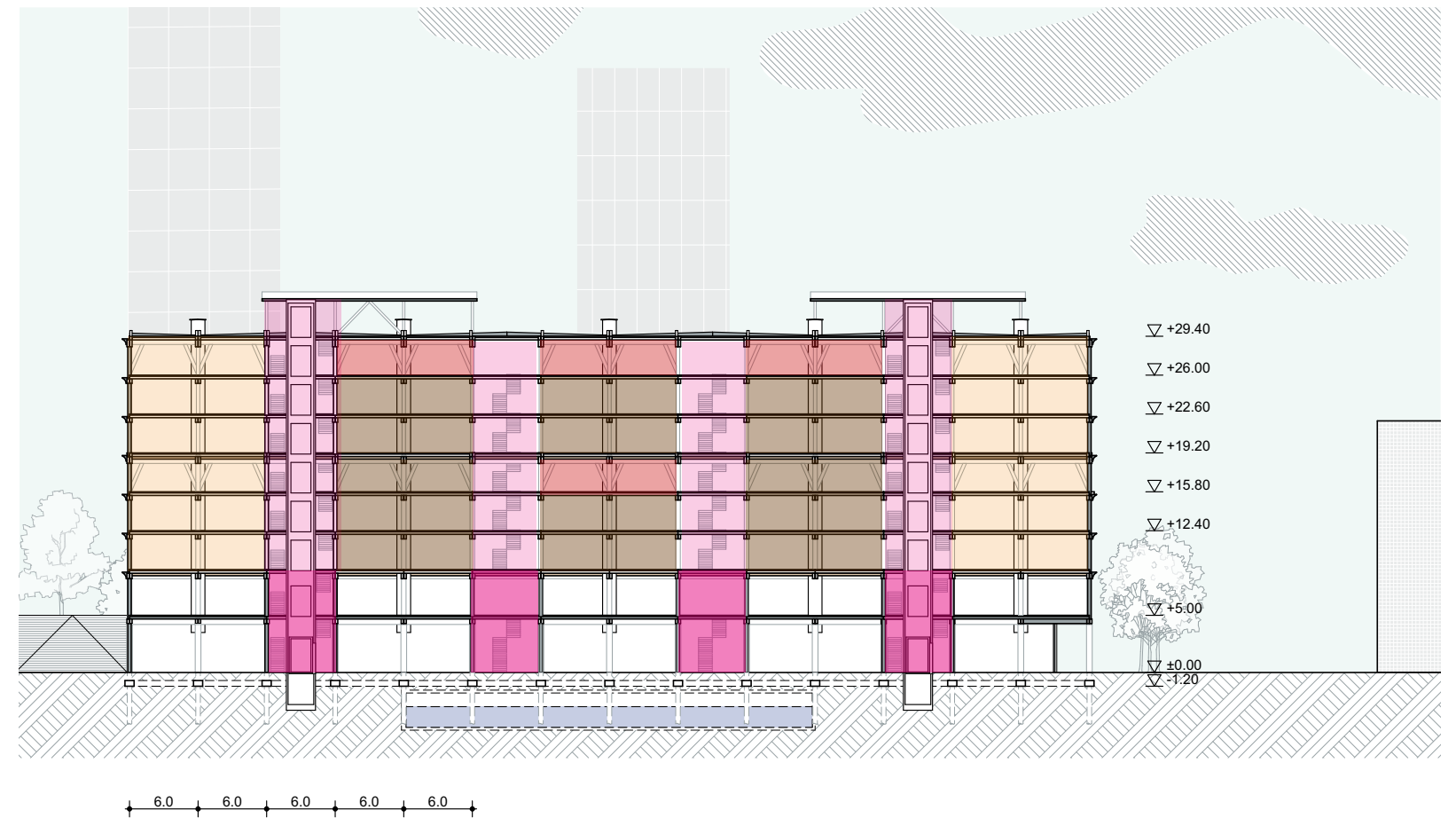
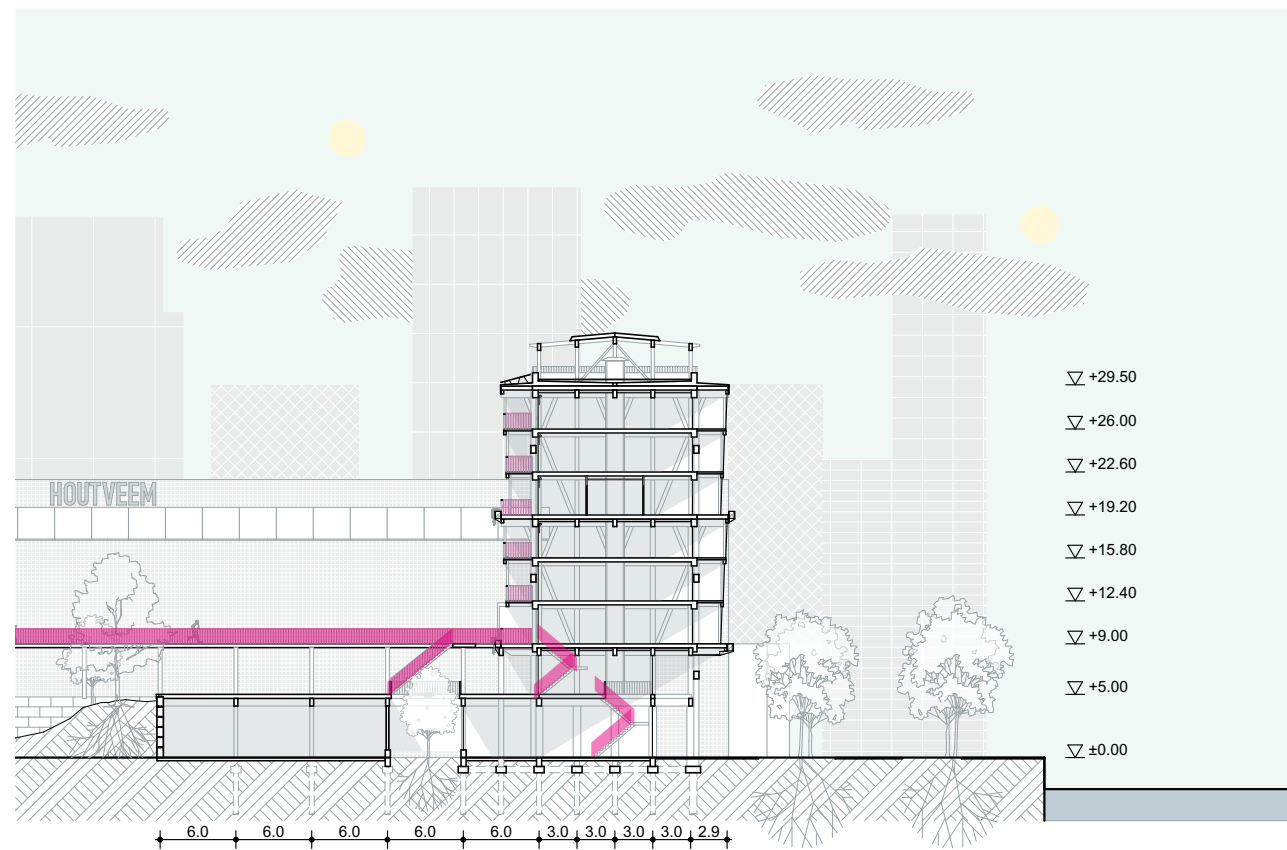
Residential floorplan



Plans 1:200 BG

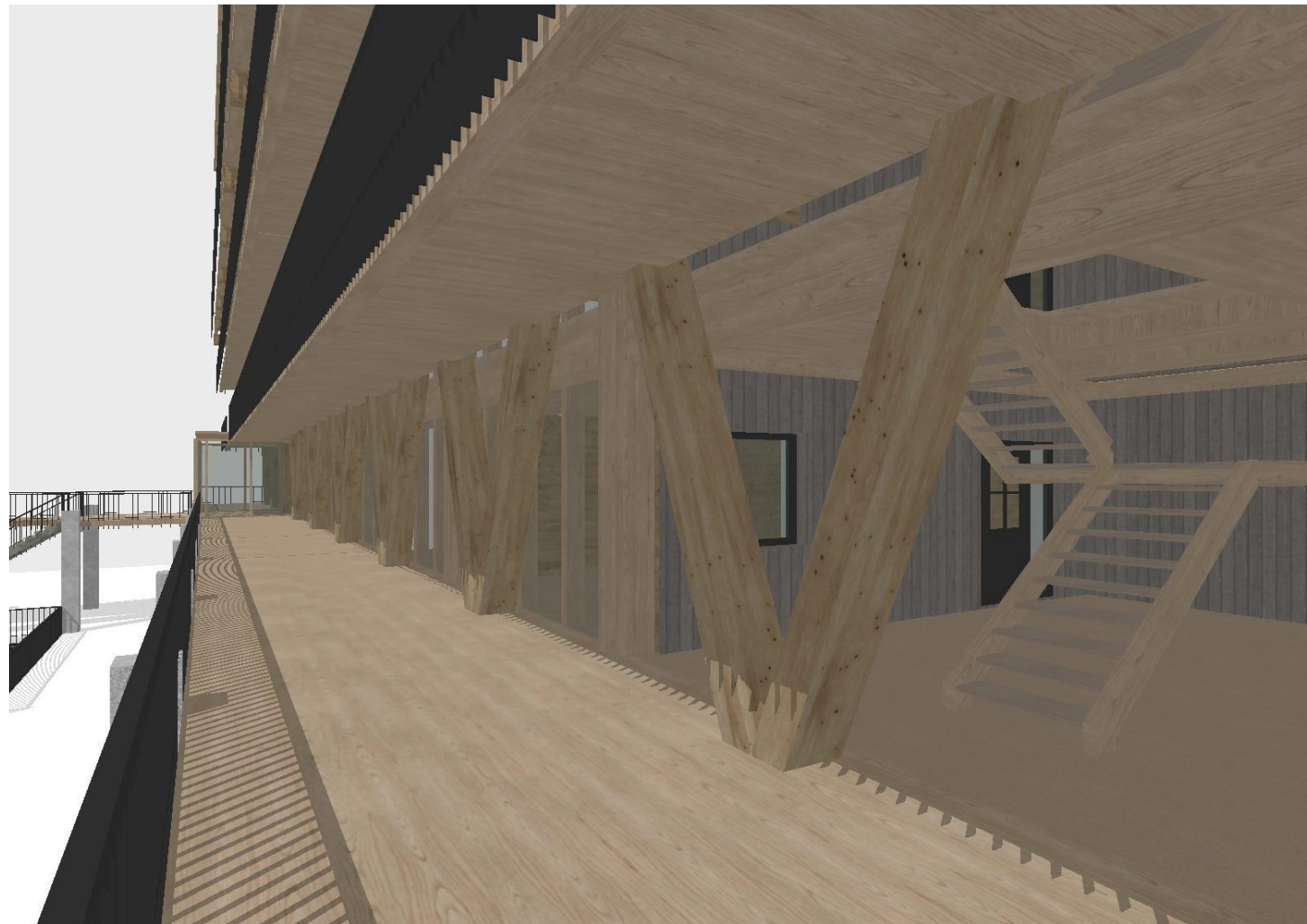
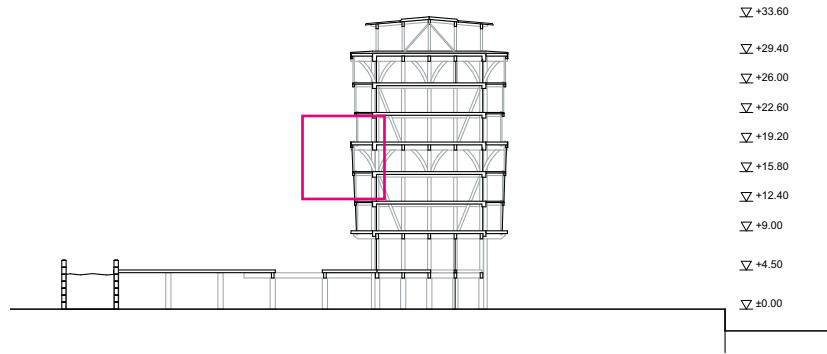
01.1.2

Circulation Residential Use building

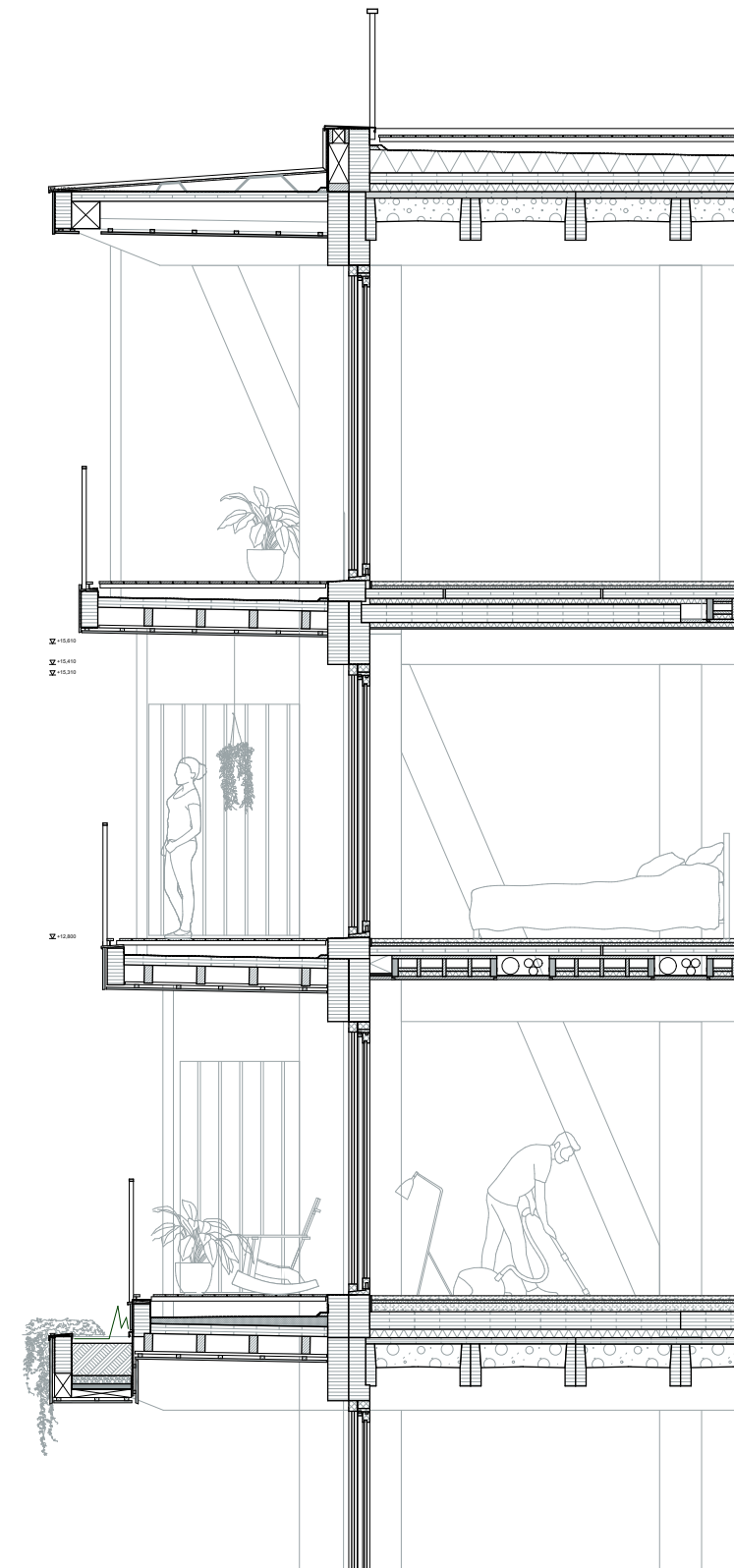
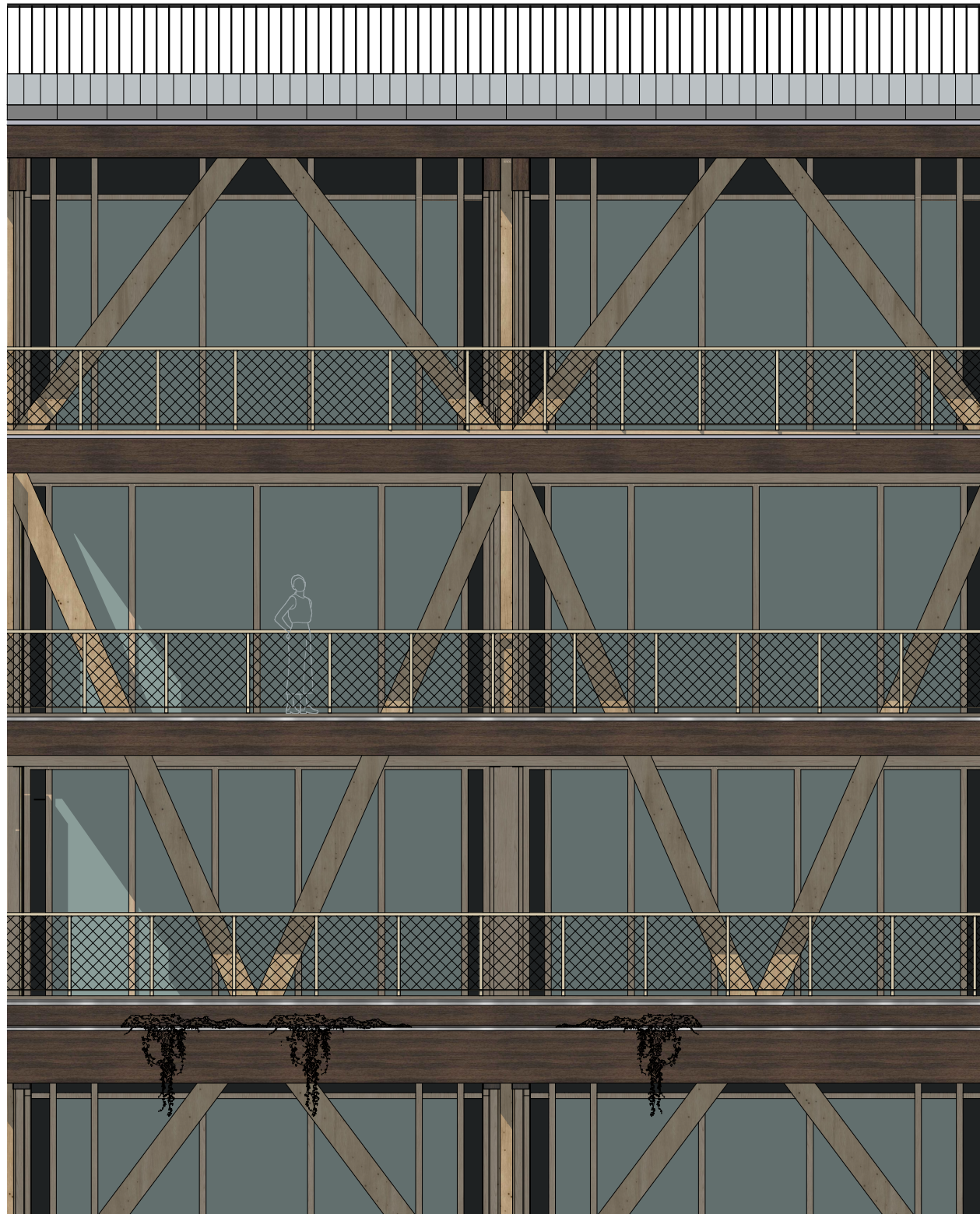


- Public
- Office space
- Residential
- Private

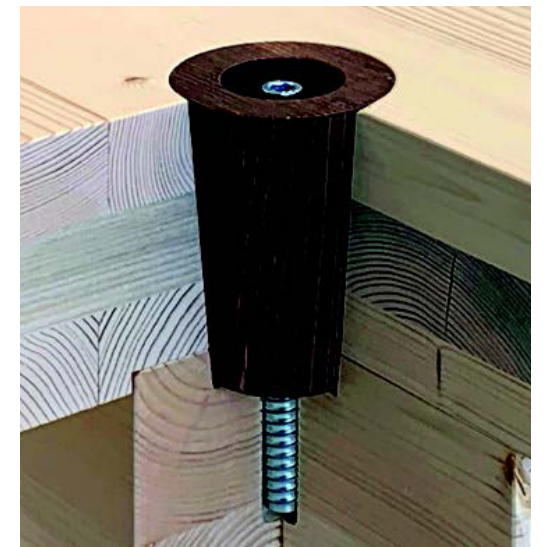
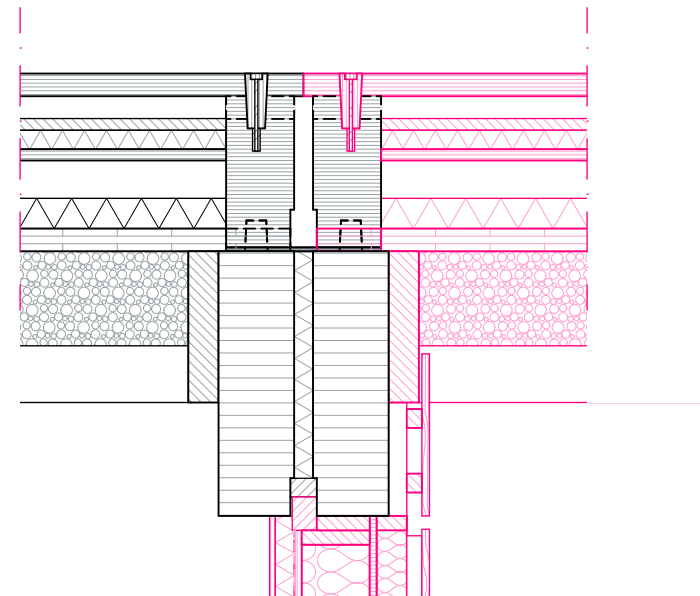
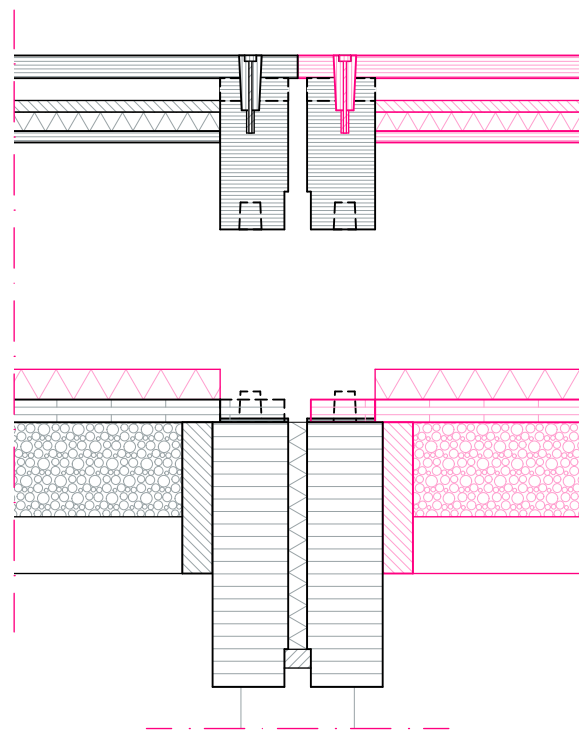
Impressions



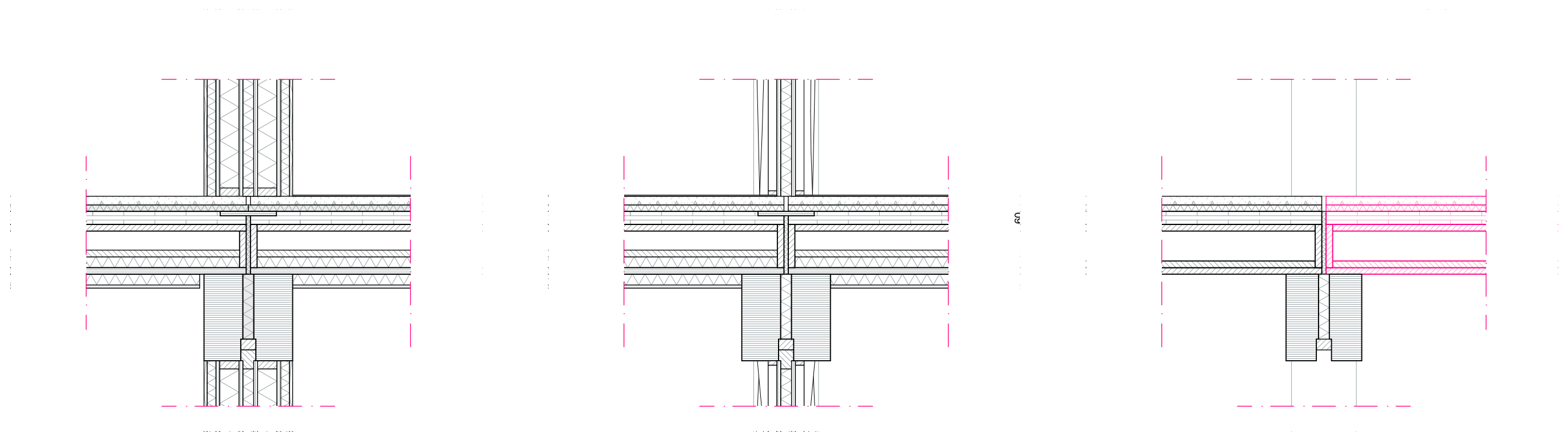
Balcony Fragment



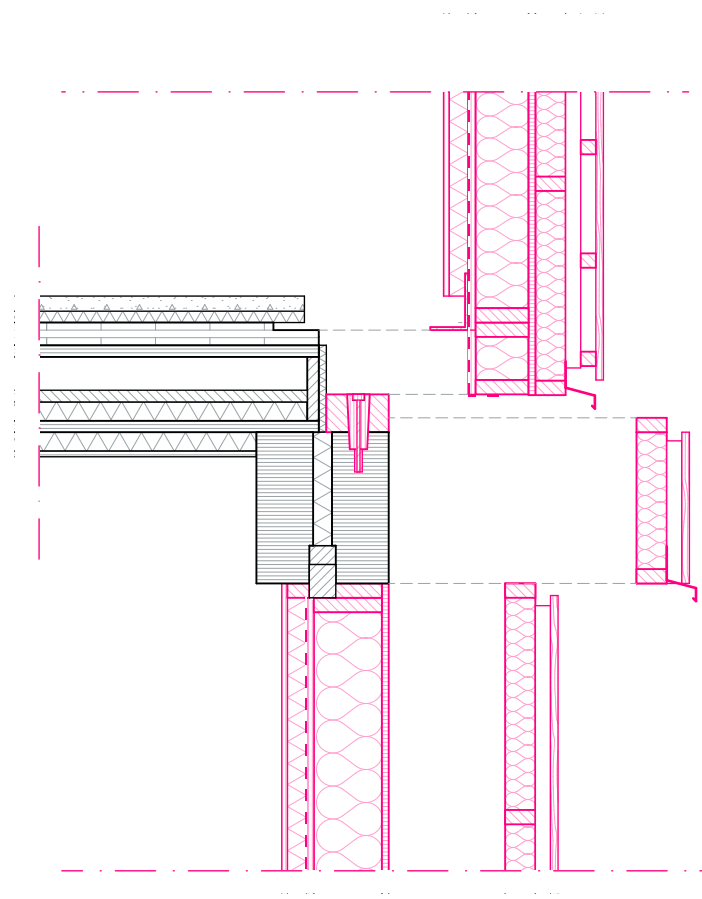
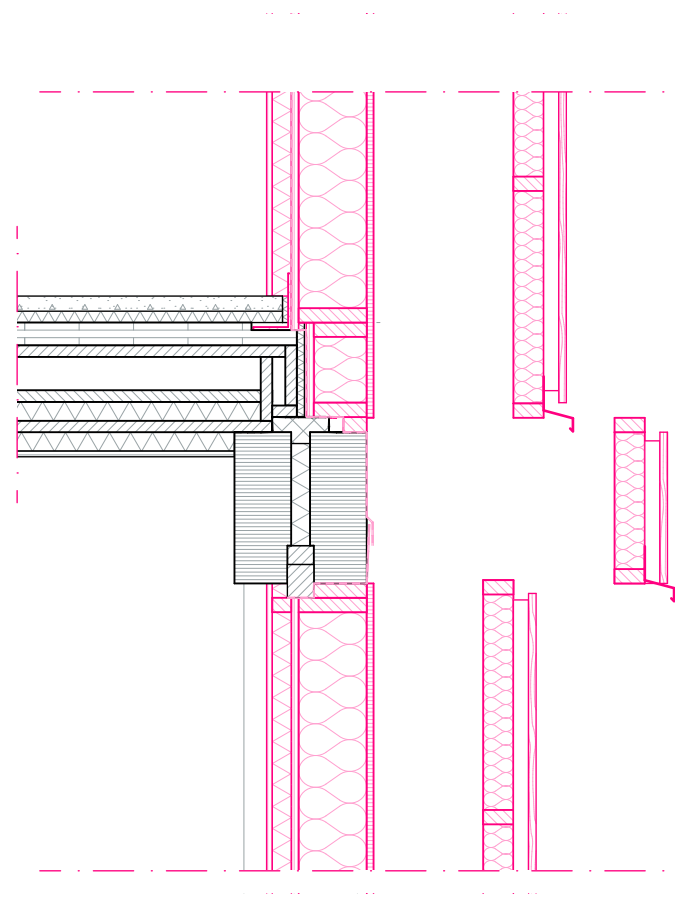
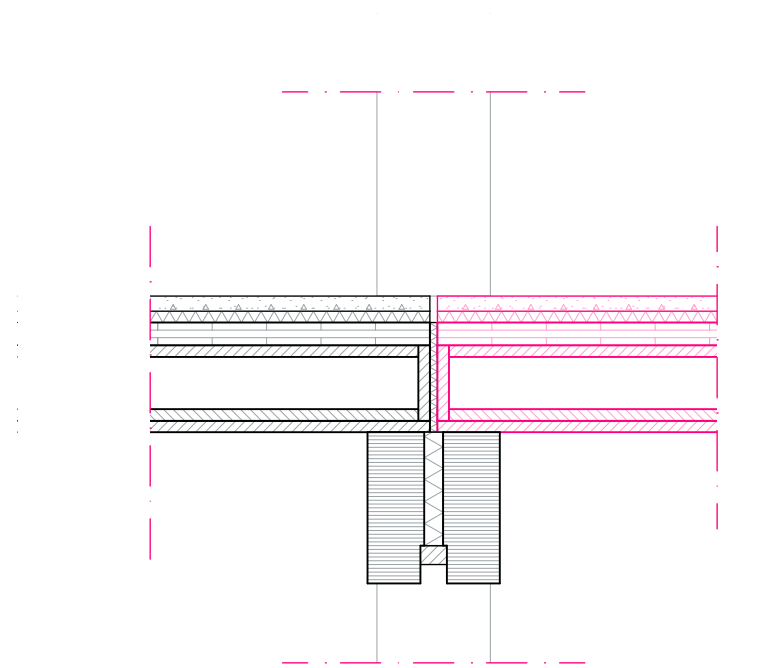
Details Demountability



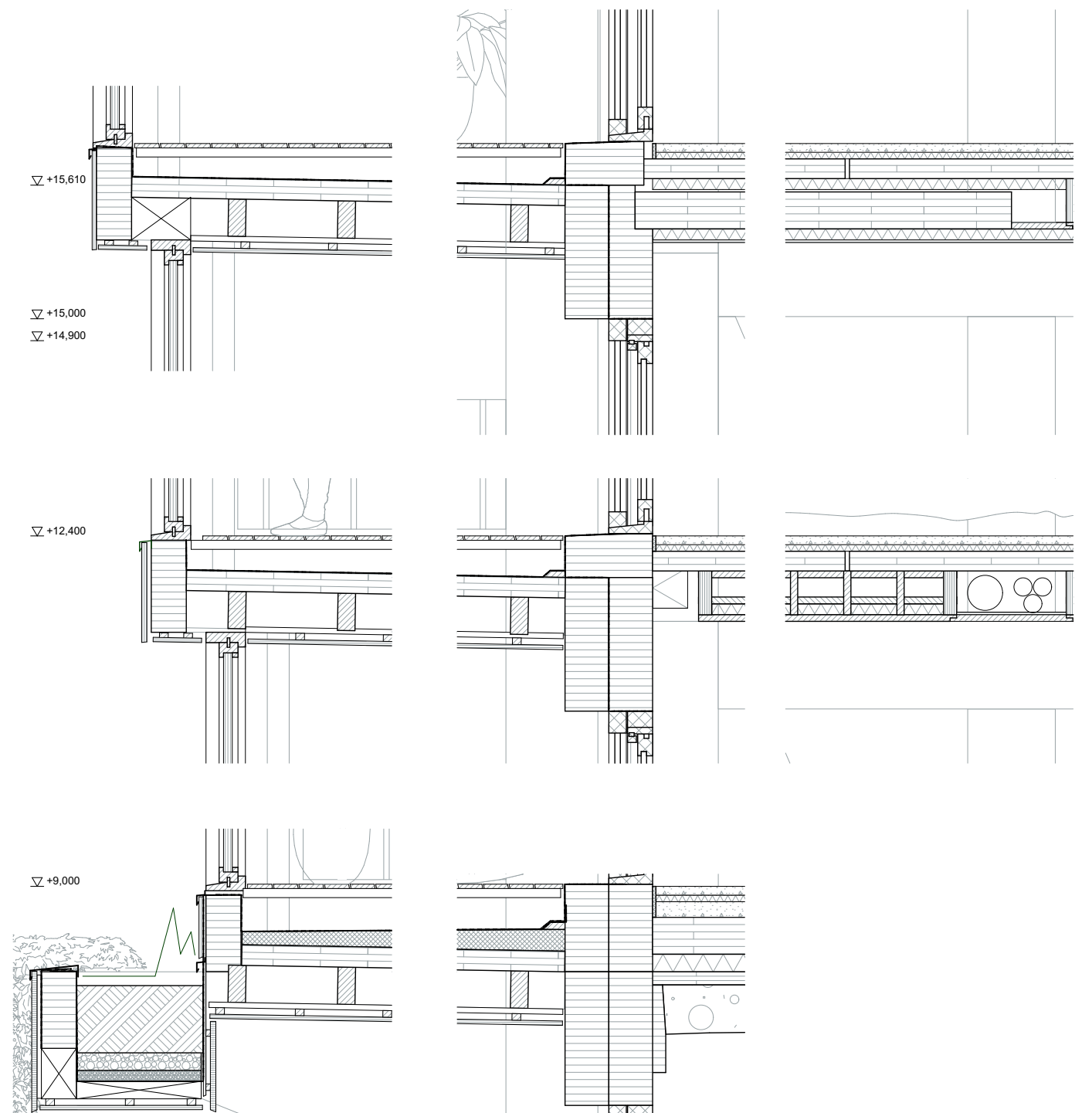
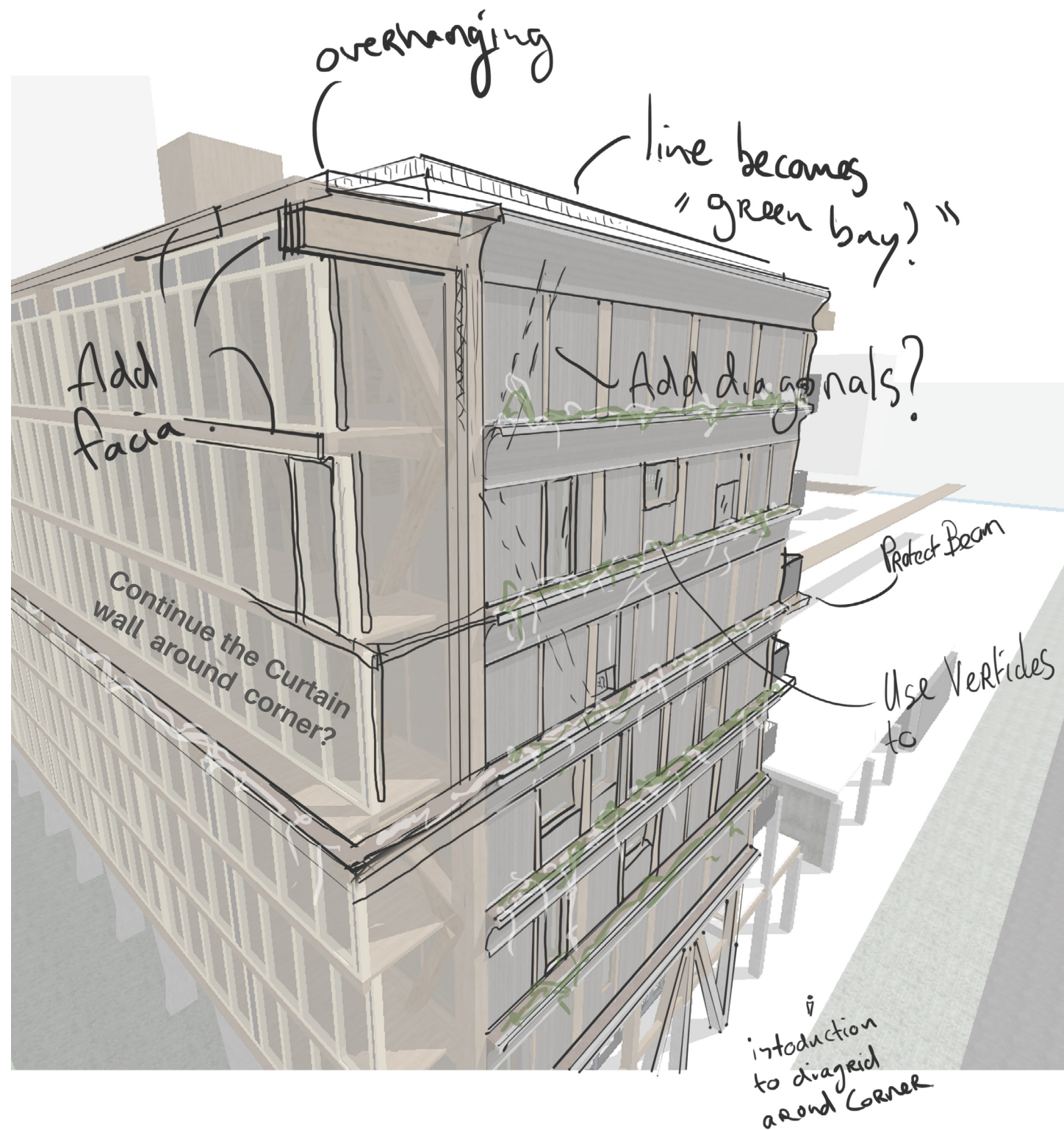
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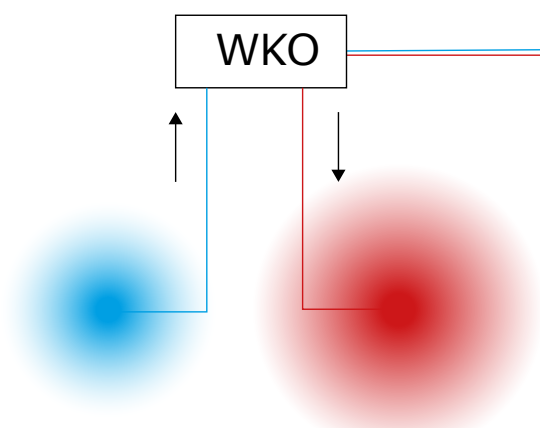


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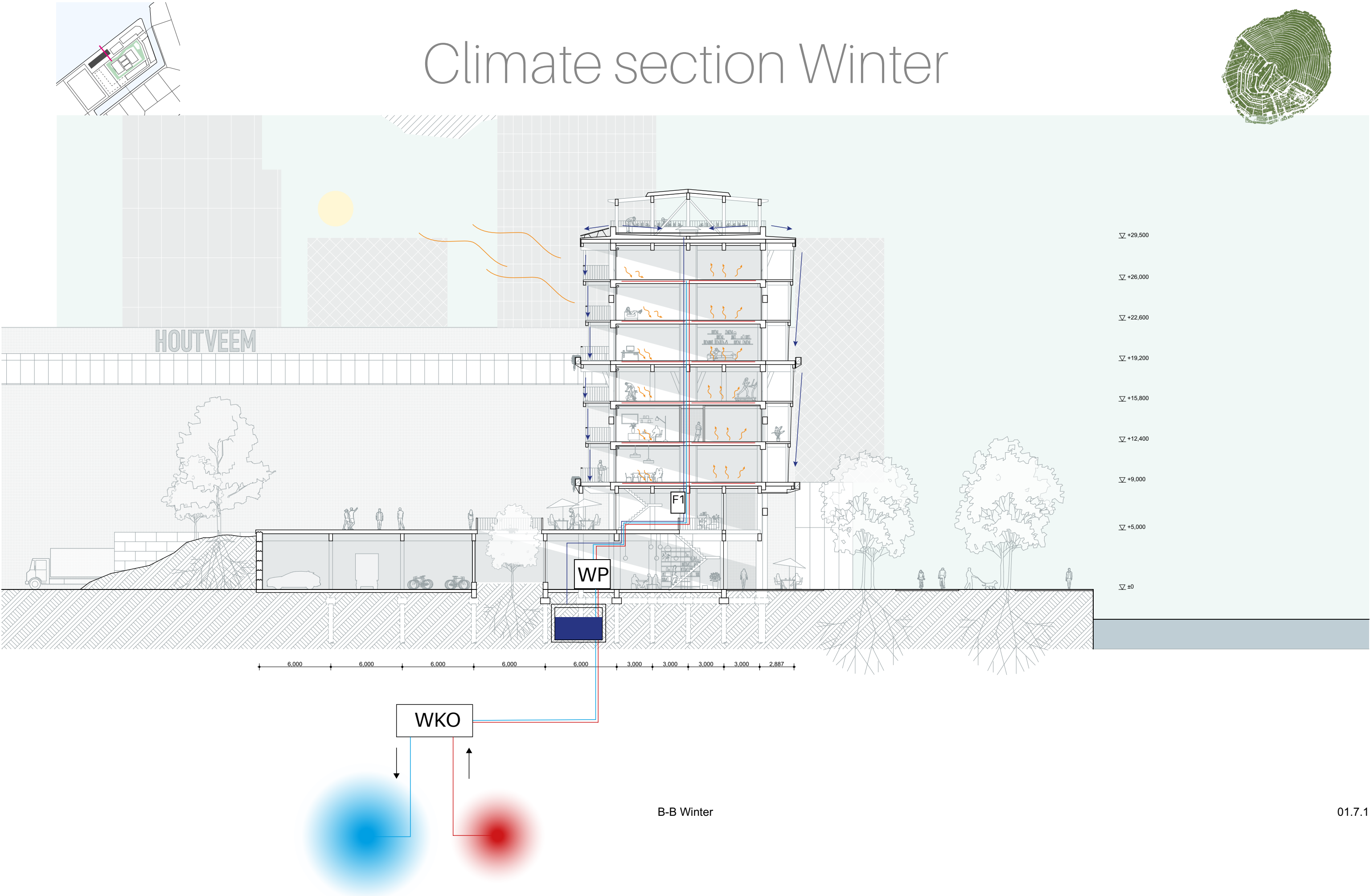


Balcony Details





Climate section Winter



Reflection

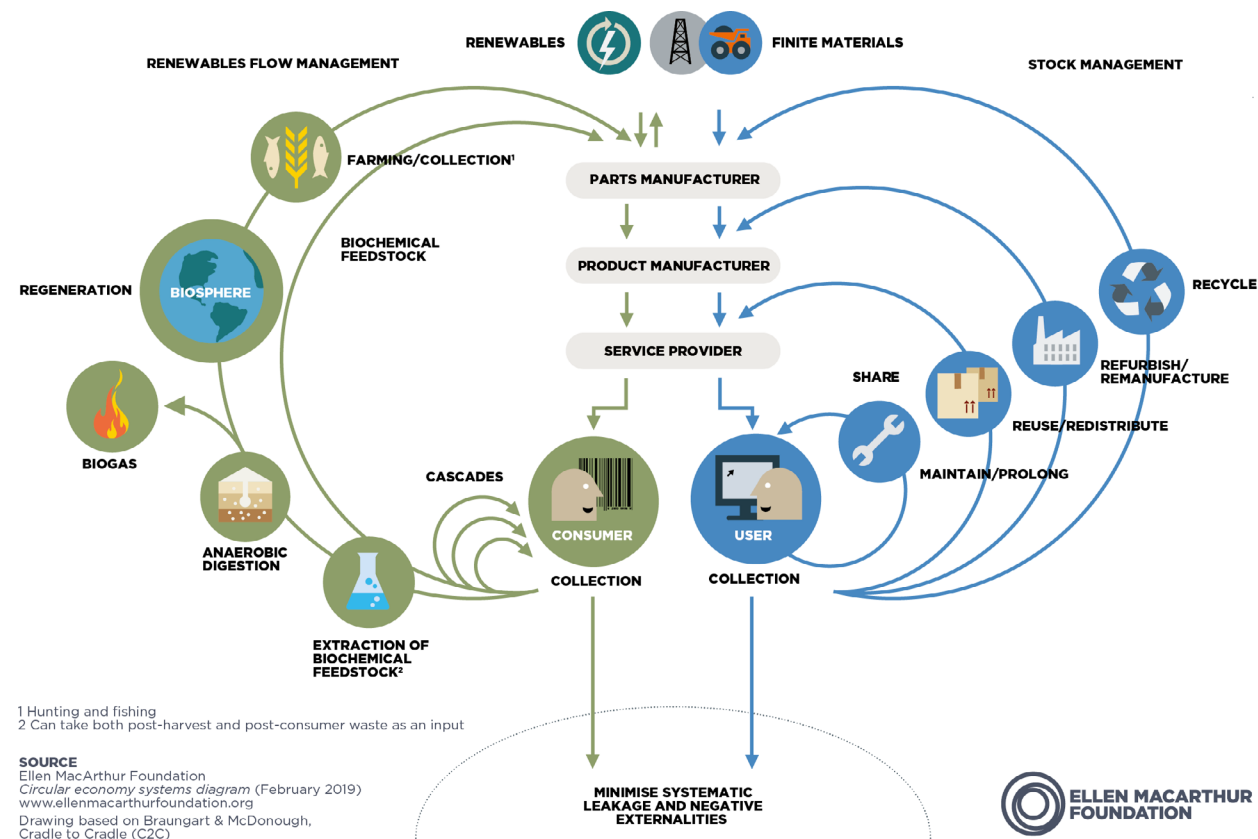


Figure 6. Butterfly diagram by Ellen MacArthur foundation

R-ladder met strategieën van circulariteit

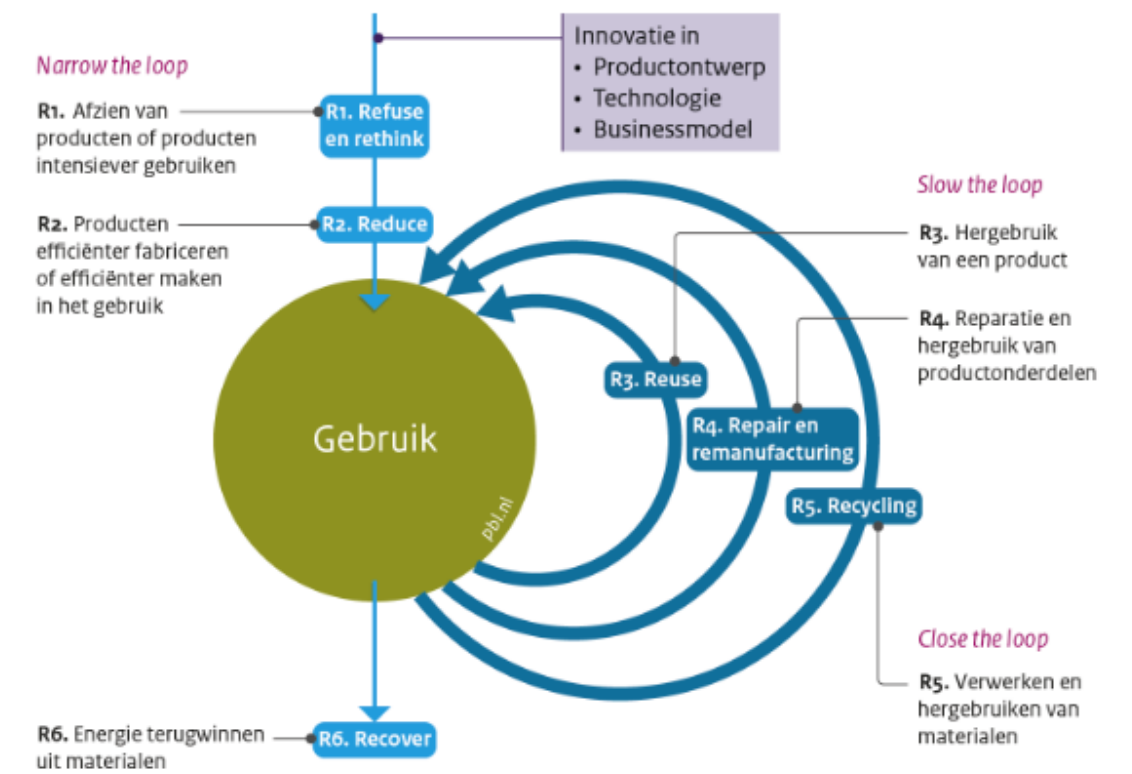


Figure 25. R-Ladder strategies for circularity, adopted from PBL

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P4 presentation for Graduation studio: Architectural Wood

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