
timber
knowledge
platform

abstract

This graduation project examines the gap between the contemporary capabilities of timber construction and its limited visibility in dense urban architecture. Despite advances in engineered timber products and durability strategies, timber is rarely used in exposed, public-facing applications in cities such as Amsterdam. This absence is shaped by historical experiences, regulatory frameworks, construction practices, and public perception, which together sustain persistent misconceptions about timber's durability and suitability at an urban scale.

The project explores how a **Timber Knowledge Platform**, positioned above an existing mixed-use building ensemble, can reintroduce visible timber into the urban fabric. By focusing on durability-driven architectural strategies and public-scale spatial conditions, the project investigates how timber can remain visibly present while performing reliably over time.

graduation report by
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TUD Timber for Urban Density

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01

part one

context, problem and position

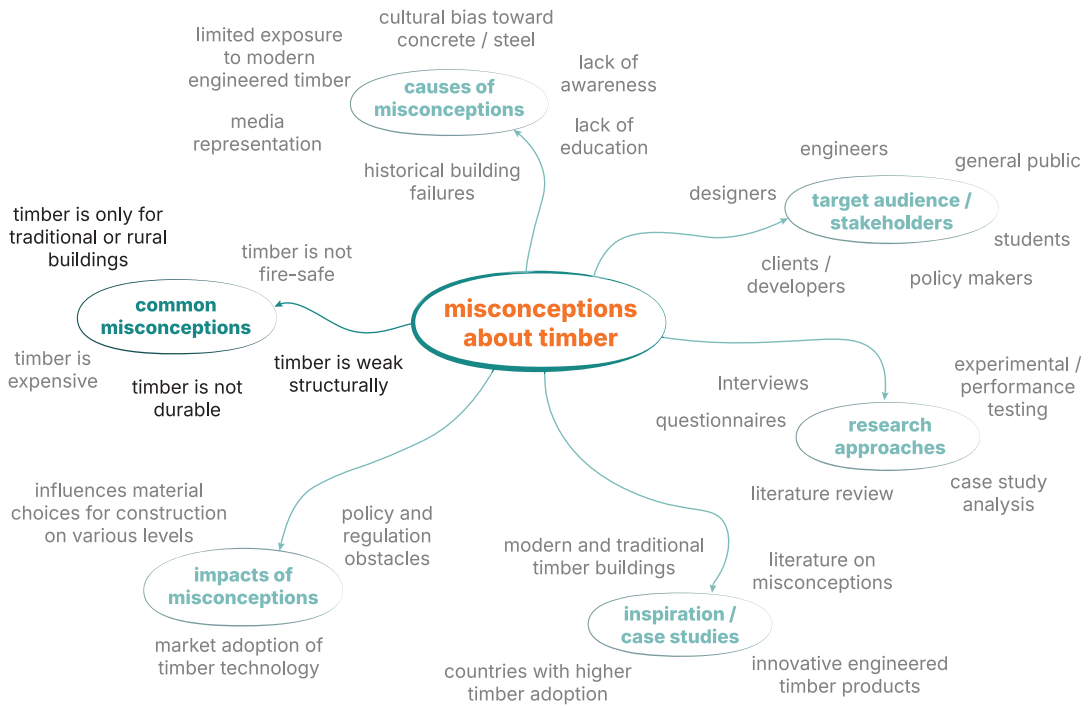


Figure 1: Conceptual map of misconceptions about timber and their broader context (own figure 2026).



Figure 2: In dense urban architecture, such as in Amsterdam, timber is largely absent from visible, public architecture (own figure 2026).

1.1. context and problem statement

Timber is re-emerging as a high-performance construction material in contemporary architecture. Advances in engineered timber products, refined detailing strategies, and improved material knowledge have expanded its applicability beyond low-rise construction, positioning timber as a viable alternative to conventional materials such as concrete and steel (Abed et al. 2022). Despite this, timber remains largely absent from visible, public-facing architecture in dense urban environments (Figure 2).

This absence has developed through a combination of historical experiences, regulatory frameworks, construction practices, and public perception. These conditions have given rise to persistent misconceptions surrounding timber (Figure 1). Long-standing associations with fire risk, decay, and temporary construction have contributed to persistent mistrust of exposed timber in urban settings. Over time, these concerns have been reinforced by building regulations and industry standards that favor concealment, further reducing opportunities for timber to be visibly present in the city (Bysheim and Nyrud 2008).

As a result, a gap has emerged between what timber is technically capable of today and how it is still perceived and applied in dense urban contexts (Figure 3). The perception of timber is shaped as much by what is visible in the built environment as by what remains concealed. This project takes this gap as its starting point and asks how architectural design can actively contribute to narrowing the divide between timber's demonstrated capabilities and its limited urban presence.

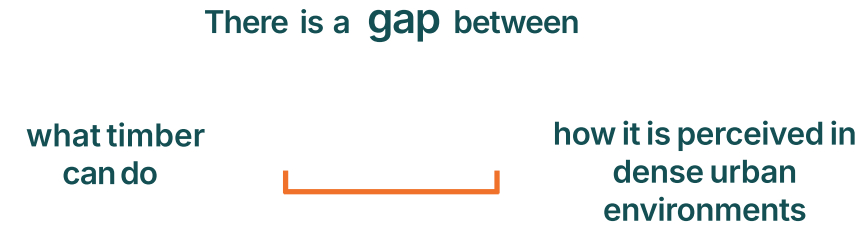


Figure 3: The project's starting point is the gap between what timber can do and how it is perceived (own figure 2026).

1.2 a gap built on misconceptions

Building on the identified gap between timber's capabilities and its urban presence, this project focuses on a set of persistent misconceptions that continue to limit its visible use in dense urban architecture (highlighted in Figure 1). These are understood not as isolated technical misunderstandings, but as embedded assumptions influencing decision-making across design practice, regulation, and public perception. The project situates these misconceptions within the category of building quality and performance, as defined in the *Timber Myths* booklet published by the AMS Institute (van der Lugt, Luque Martin, and Dufourmont 2023).

misconception 01

Timber is unsuitable for visible use in dense urban architecture because it cannot perform reliably under long-term urban exposure conditions.

This misconception treats exposure as an inherent material risk rather than as a condition that must and can be addressed through design and construction. Urban environments introduce challenges such as moisture, pollution, and limited drying potential, which require specific strategies and detailing to manage. Reliable long-term performance depends on appropriate detailing, controlled moisture management, and construction practices that respond to timber's material behavior, following principles of *constructive timber protection*. When these principles are applied correctly, exposure does not equate to reduced durability. In this context, durability is not defined by the absence of change, but by the ability of timber to perform reliably over time under varying exposure conditions.

At the same time, visible changes in timber are often misread as signs of failure. Phenomena such as the greying of timber due to UV exposure are frequently misunderstood as degradation, despite having no impact on structural performance or service life (van der Lugt et al. 2023). As a result, visible ageing is mistaken for loss of performance, and durability becomes associated with the need for concealment rather than the ability to perform over time.

This misinterpretation of durability extends beyond material performance and influences how timber is perceived at a structural level. If exposed timber is understood as vulnerable or short-lived, its capacity to perform reliably at larger spans or in public-scale applications is called into question. As a result, concerns about exposure contribute directly to the assumption that timber is unsuitable for urban, civic architecture.

misconception 02

Timber is unsuitable for accommodating public-scale architecture that engages with the city in dense contexts.

This misconception positions timber as incompatible with public and urban architectural roles, which are traditionally associated with materials such as concrete, steel, masonry and glass. Within this framing, timber is often perceived as lightweight, domestic, or temporary, and therefore unsuitable for spaces that project into the public realm or carry civic significance. These associations are not rooted in current structural capacity, but in historically embedded material narratives.

In many European contexts, timber construction became linked to provisional or secondary building during the post-war period, reinforcing its association with impermanence rather than durability or institutional presence (Bysheim and Nyrud 2008). As a result, structural capacity, durability, and architectural permanence are frequently conflated in public perception, leading to the assumption that timber lacks the spatial and symbolic weight required for public-scale architecture.

Together, these misconceptions contribute to the continued underrepresentation of timber in dense urban environments. Misinterpretations of durability under exposure undermine confidence in timber's long-term performance, which in turn limits its perceived suitability for larger spans and public-scale applications. As a result, timber is less frequently used in visible urban contexts, reducing opportunities for it to demonstrate its capabilities. These interconnected misconceptions form the basis for the project's research and design investigation.

1.3 why these misconceptions persist

The persistence of these misconceptions can be understood as the result of a reinforcing cycle between perception, regulation, and construction practice (Figure 4). Early experiences with fire risk, decay, and limited material knowledge shaped cautious regulatory frameworks for timber in urban contexts. Over time, these concerns became embedded in building regulations, standards, and assessment methods, many of which continue to rely on conservative assumptions about durability and service life that do not fully reflect contemporary timber technologies (Attia, Verdier, and Van Acker 2025).

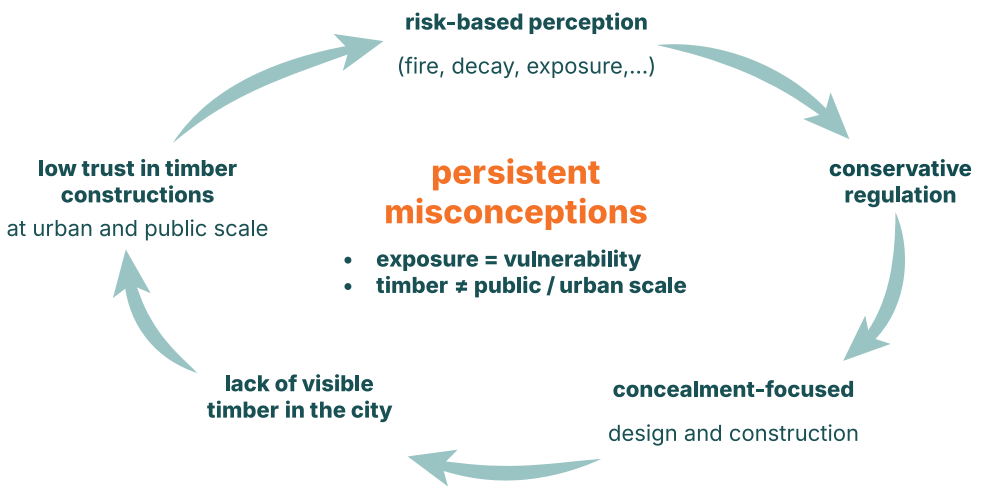


Figure 4: Diagram of the reinforcing cycle behind timber misconceptions (own figure 2026).

These regulatory frameworks influence industry standards and construction practices, encouraging systems that priorities concealment, encapsulation, and standardization over material legibility. As a result, timber becomes less visible in the urban environment, reducing opportunities for both professionals and the public to develop familiarity with its performance. What is no longer seen becomes less trusted, reinforcing the perception that timber is unsuitable for exposure or public-facing architectural roles.

This process is shaped as much by design decisions as by technical requirements. Decisions made by architects, engineers, policymakers, developers, and institutions shape what is built and how materials are represented within the city (Bysheim and Nyrud 2008). The resulting built environment then feeds back into public understanding and expectation, normalizing the absence of visible timber in cities. This project approaches these misconceptions not as isolated misunderstandings, but as outcomes of an interdependent system, one that architecture has the capacity to question and recalibrate.

1.4 position and design approach

Architectural design has the capacity to actively question and reframe how materials are perceived within the city. Materials are understood through how they are made visible, constructed, and encountered in built form.

Within this context, architects, designers, decision-makers, and institutions act as mediators between material knowledge, regulation, and public perception. This mediating role carries responsibility: to understand the implications of what is proposed, to communicate them with care, and to make architectural decisions that are legible to users. Legibility here does not imply full explanation, but the possibility for reading, interpretation, and curiosity. Architecture can invite engagement not only through instruction, but through exposure, encounter and questioning.

The project embraces this role by using design as a way to test assumptions about timber through spatial propositions. It explores how timber's performance, limitations, and potential can become perceptible through architectural form, organization, and material expression.

Building on the need for knowledge exchange identified in contemporary discussions on timber construction (van der Lugt et al. 2023), the proposal takes the form of a *Timber Knowledge Platform*: a public intervention positioned above an existing mixed-use building ensemble. The platform is conceived as a spatial framework that supports long-term accumulation and exchange of knowledge, while allowing timber to be directly experienced in use and over time. Through visibility, elevation within the urban fabric, and durability-driven design strategies, the project seeks to reintroduce timber as a credible and robust material presence within the contemporary city.

Position

The four positions form the conceptual foundation of the project and guide its development (Figure 5). They operate as interconnected principles rather than fixed rules, informing how timber is understood, detailed, and expressed. Their application is not uniform, but responds to different conditions and requirements. Together, they establish an approach that prioritizes constructive clarity, material knowledge, and long-term performance.

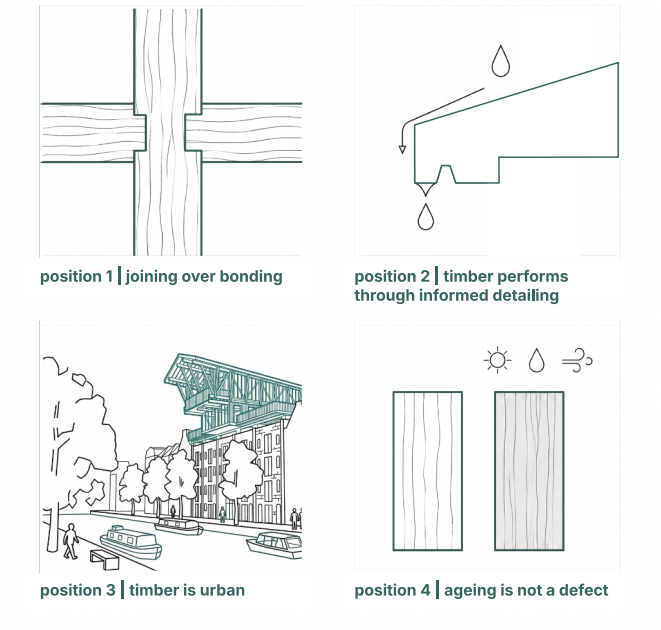


Figure 5: Visual representation of the four project positions informing the intervention (own figure 2026).

Position 1 Joining over bonding

Assemblies prioritize few, multifunctional layers that remain separable, enabling maintenance, replacement, and reuse, with connections that remain accessible and legible.

Position 2 Timber performs through informed detailing

With precise detailing and material knowledge, timber can meet demanding performance requirements without being concealed.

Position 3 Timber is urban

Timber is a viable and valuable material for contemporary urban architecture.

Position 4 - Ageing is not a defect

Ageing is enabled and understood as part of the architecture, allowing new material expressions to emerge over time.

Re-engaging material knowledge in contemporary architecture

The Timber Knowledge Platform draws on both traditional timber knowledge and contemporary construction practices (Figure 6). It makes use of engineered timber products, advanced fabrication processes, and a high degree of precision, while maintaining a design logic rooted in a traditional understanding of the material. This includes a focus on constructive protection and the relationship between design, exposure, and long-term behavior.

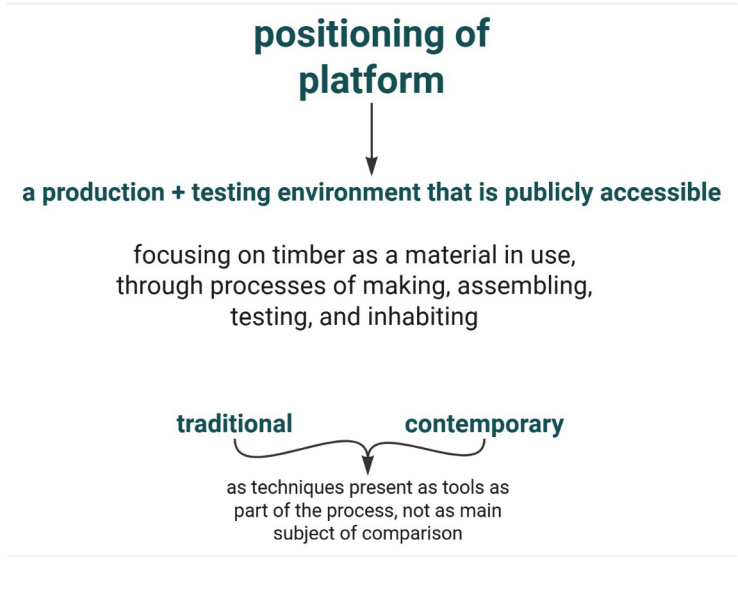


Figure 6: Conceptual positioning of the Timber Knowledge Platform (own figure 2026).

The project places emphasis on material legibility and simplicity, while recognizing that this knowledge has become less embedded in current construction practice. By re-engaging with these principles, it seeks to make timber's behavior and performance understandable through architectural design.

1.5 design question

The design question focuses on how architectural design can actively engage with material perception by making timber visible and performative within a dense urban context:

design question

How can a Timber Knowledge Platform reintroduce visible timber into a dense urban roofscape in order to challenge persistent misconceptions about its durability?

To further specify the design focus, the following sub-question addresses how durability can be achieved through architectural means rather than concealment.

Sub-question

How can durability-driven design enable timber to perform reliably while remaining visibly exposed within dense urban architecture?

In this project, durability is understood as the result of working with timber's material behavior over time (Figure 7). Rather than averting change, it requires understanding the material's properties and responding to them through design, supporting where necessary through detailing and construction. The terms "visible" and "exposed" refer both to the material's presence within the urban fabric and to its exposure to environmental conditions, rather than for example its concealment behind protective layers.

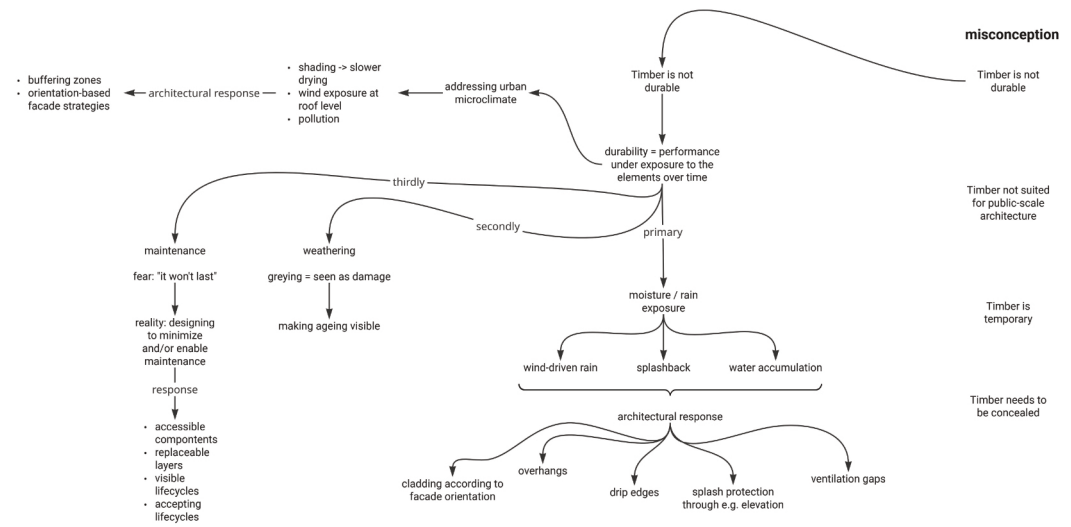


Figure 7: Diagram unpacking the misconception that timber is not durable through material behavior and design responses (own figure 2026).

1.6 research question

The research question situates the design inquiry within a broader historical, regulatory, and perceptual context. It seeks to understand why timber's contemporary capabilities are not reflected in its current urban visibility.

research question

Why has timber largely disappeared from public visibility in dense urban architecture, and how have regulations, construction practices, and public attitudes shaped its perceived suitability as an urban material?

To support this investigation, the sub-question focuses on identifying strategies that demonstrate how timber can perform durably while remaining exposed.

Sub-question

Which architectural and material strategies allow timber to remain visibly exposed while performing reliably over time in dense urban environments?



Figure 8: Het Houten Huys (c. 1528), one of the last remaining houses in Amsterdam where timber remains both structural and visible in the façade, demonstrating historical timber jettying, where upper levels project outward beyond the façade (own figure 2026).

1.7 scope

This project focuses on architectural strategies that make timber visible, legible, and credible within dense urban contexts. It investigates how exposure conditions relevant to urban timber architecture, including weather, orientation, wind, and adjacency to neighboring buildings, translate into architectural requirements that shape form and spatial organization.

The scope is defined by engaging with existing mixed-use conditions, where new public functions are introduced above an inhabited building ensemble. These functions, including spaces for making, testing, and exhibiting, are understood as part of a broader attempt to link architectural design with processes of knowledge production and exchange. The project therefore addresses questions of public access, spatial hierarchy, and the relationship between new and existing structures, with particular attention to how timber is perceived and experienced at an urban scale. Public access is understood not only as a functional requirement, but as a design strategy to enable direct engagement with timber and its performance over time, while allowing the building to actively engage the public realm through its visible timber construction.

Within this context, the project positions itself in relation to a network of actors involved in timber construction, including institutions, knowledge platforms, and industry stakeholders. This network is understood as fragmented and unevenly connected, with limited translation between technical knowledge and public perception (Figure 9). The Timber Knowledge Platform is proposed as an architectural intervention that operates within this field, aiming to make material performance accessible, visible, and experientially understandable.

While timber-related misconceptions are understood as interconnected, the project deliberately concentrates on a limited set, specifically those related to durability under exposure and public-scale architectural presence, in order to maintain focus and support a coherent design–research study.

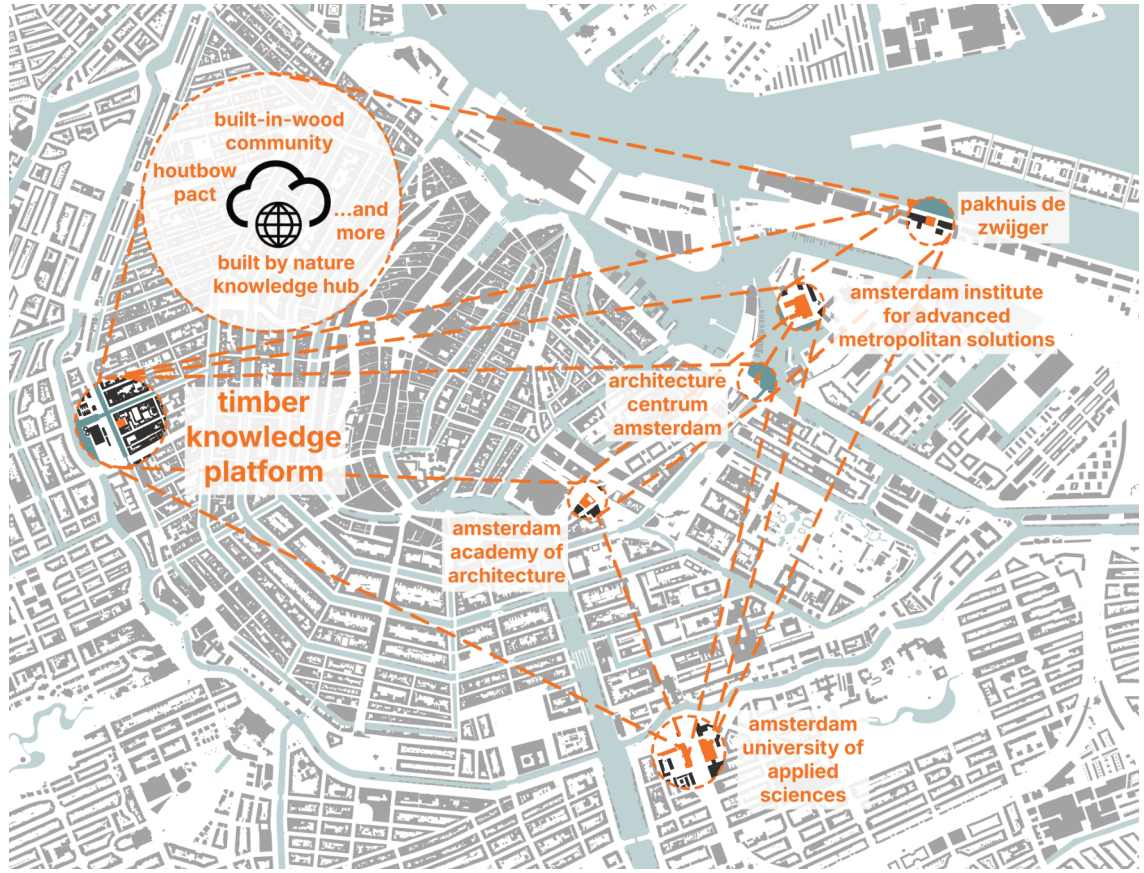


Figure 9: Exploratory mapping of selected physical institutions in Amsterdam and relevant digital actors within the project's context (own figure 2026).

02

part two

research and design approach

establishes the project's design–research framework. It situates the intervention within its urban and architectural context, translates site-specific conditions into design requirements, and describes how research, spatial testing, and iteration are used to develop architectural proposals. The section clarifies the project's working method and sets out the steps toward further design development.

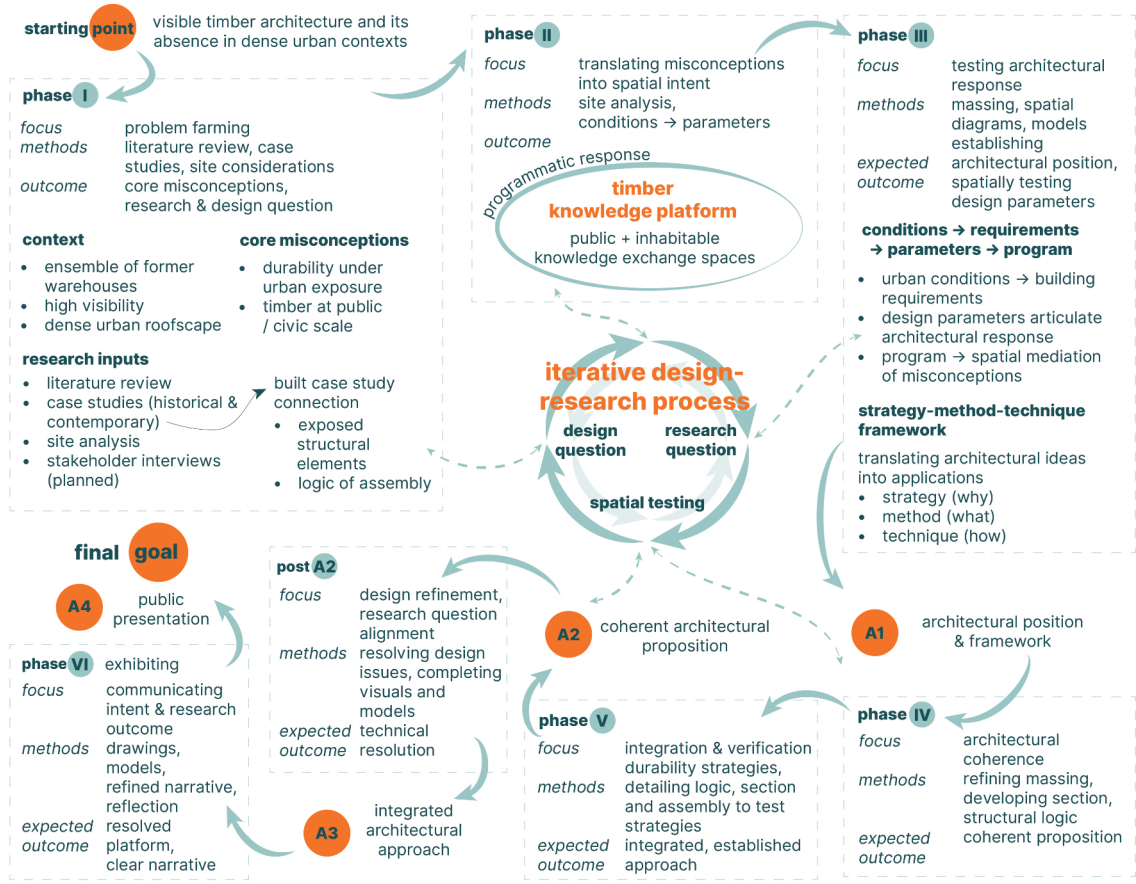


Figure 10: Overview of the phased design–research approach, illustrating how research, spatial testing, and architectural development iteratively inform one another throughout the project (own figure 2026).

2.1 design-research approach

This project uses an iterative design–research approach in which architectural questions are defined, tested through design, and refined through continuous feedback between research and spatial exploration (Figure 10).

Early design fascinations, such as visible structure, elevated public space, and exposed timber, formulate questions that are investigated through literature review, case studies analysis, and stakeholder input. Research is used to contextualize, challenge, and refine these initial intuitions by identifying relevant performance criteria, regulatory conditions, and historical patterns related to timber construction in urban contexts.

Findings from research are translated into spatial tests using drawings, sectional studies, physical models. Design functions as an investigative tool, allowing assumptions about durability, exposure, and public scale to be explored and challenged spatially. The outcomes of these tests reveal constraints and opportunities that guide further research and design refinement.

The project is structured around a set of persistent misconceptions about timber, which frame both the research inquiry and the design exploration. Research examines how these misconceptions are shaped by historical practice, regulation, construction culture, and public perception. Design responds by proposing spatial situations in which timber's durability and public presence can be observed, assessed, and questioned through architectural form, organization, and section.

2.2 framing

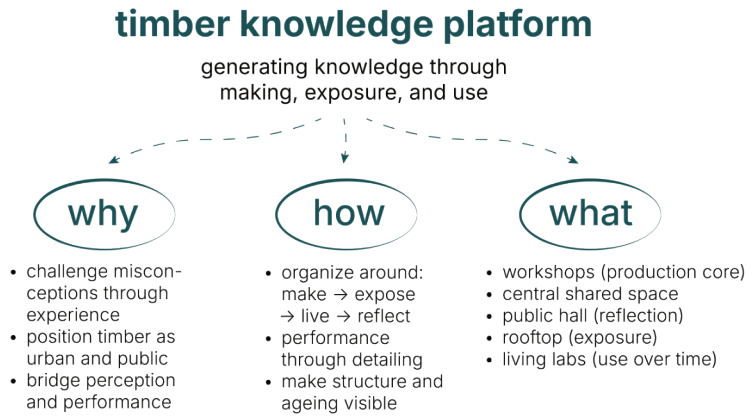


Figure 11: Diagram illustrating the conceptual structure of the Timber Knowledge Platform through the questions why, how, and what (own figure 2026).

Based on the misconceptions identified in part 01, the project understands the acceptance of timber construction as influenced not only by measurable performance, but also by cultural familiarity, direct experience, and the visibility of material behavior over time (Figure 11).

The project therefore investigates how architecture itself can operate as a mediator between technical knowledge and public perception. This demonstrative role of architecture is further developed in Chapter 3.1.

The intervention is developed as a topping-up strategy above an existing mixed-use ensemble in Amsterdam, combining public functions, fabrication spaces, exhibition areas, and inhabitation within a shared elevated platform. Through this combination, the project examines how visibility, exposure, public interaction, and material encounter can contribute to shifting perceptions surrounding contemporary timber architecture.

2.3 conditions and requirements

Timber elements exposed within urban environments are subject to a range of climatic and environmental influences affecting material performance and durability (Figure 12). As described in *Holz im Außenbereich (Timber in outdoor applications)*, the intensity of these influences depends on factors such as exposure conditions, construction detailing, timber species, and protective measures (Erler 2002).

In dense urban contexts, additional conditions such as pollution, wind acceleration around roof edges, limited drying potential, and public accessibility further influence architectural decision-making.

The site's roofscape and mixed-use context are translated into architectural requirements guiding early design decisions. Conditions are understood as given constraints, while requirements describe the spatial, material, and constructive responses necessary to address them.

Conditions	***Architectural requirements***
Rain and moisture exposure	*drainage, drying potential, avoidance of water traps*
Wind and roof-edge microclimate	*robust detailing, controlled exposure, structural clarity*
UV radiation and weathering	*replaceable layers, accessible maintenance, ageing strategies*
Pollution and urban dirt accumulation	*ventilated assemblies, visible maintenance logic*
Adjacency and shared boundaries	*buffering zones, careful edge conditions, privacy gradients*
Fire safety within dense urban context	*legible compartmentation, clear escape logic*
Public access above inhabited base	*readable circulation, hierarchy of publicness*
Exposure during construction	*protected assembly sequence, moisture control*

Figure 12: Translation of climatic, urban, and spatial site conditions into architectural requirements guiding the development of the intervention, adapted from Holz im Außenbereich (Erler 2002).

2.4 program

The program is conceived as a set of interconnected spaces supporting public engagement, knowledge exchange, material experimentation, and architectural mediation.

Production and making form the core of the platform (Figure 13). Workshops, assembly spaces, material transport systems, and prototype testing areas allow processes of fabrication, construction, exposure, maintenance, and adaptation to become part of the architectural experience.

The program is organized around a central covered space acting as a shared point of orientation, circulation, encounter, and material movement. Surrounding volumes address different aspects of timber construction, ranging from public discussion and fabrication to inhabitation and long-term testing.

Auditorium
A public lecture and event space supporting talks, discussions, demonstrations, and exhibitions related to timber architecture and construction. Its elevated and expressive structure addresses timber at a public and urban scale.

Workshops
Spaces dedicated to fabrication, prototyping, assembly, and experimentation. Workshop spaces surrounding the central platform allow making processes and structural systems to become observable. The Production Lab focuses on fabrication and prototyping processes, while the Material Lab accommodates smaller-scale experimentation, material studies, and educational courses related to timber construction and detailing.

Exhibition spaces
Indoor and outdoor exhibition areas allow timber construction principles, material behavior, weathering, and durability strategies to be observed, discussed, and tested over time. Outdoor exhibition spaces provide the possibility to expose prototypes directly to climatic conditions.

Living labs
Experimental living units allow timber inhabitation to be encountered directly through everyday use. As discussed by Peter Fraanje (Fraanje 2026), demand for timber housing increasingly exceeds the currently available supply, indicating growing public interest in timber living environments. The living labs respond to this by making timber living conditions, material expression, comfort, and ageing directly experienceable within the platform itself.

Central space
The central covered space functions as the social and spatial core of the project, connecting circulation, material movement, public gathering, and visual interaction between programs.

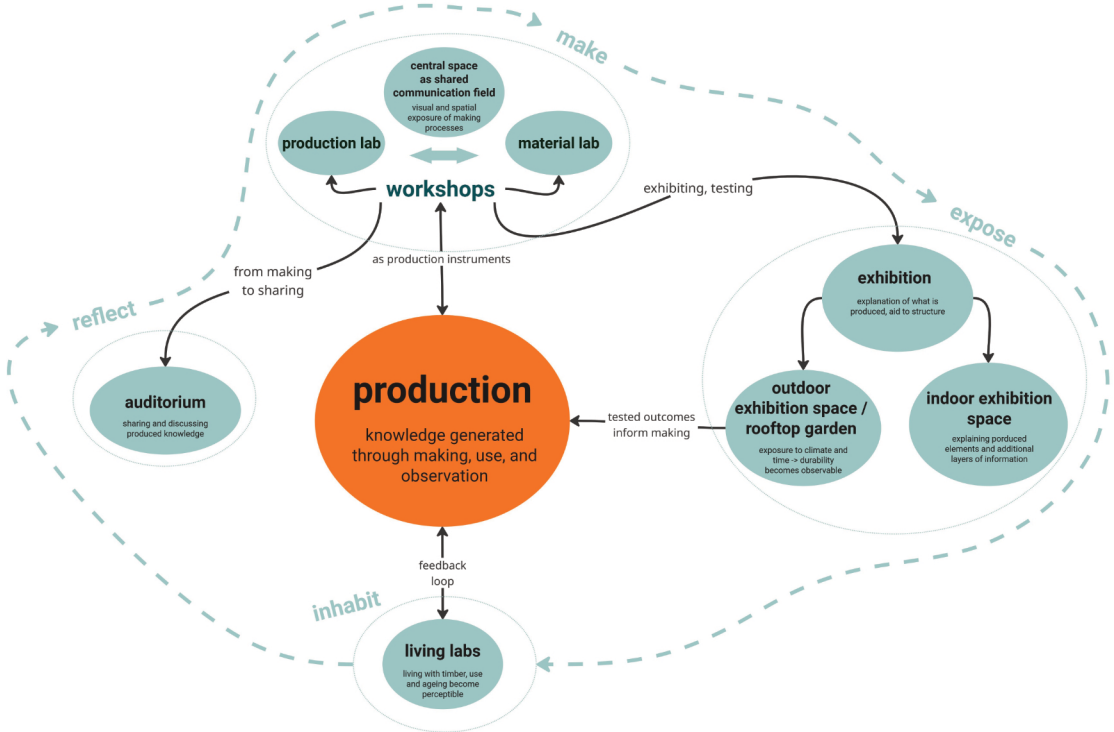


Figure 13: Program diagram showing the relationship between production, workshops, exhibition spaces, living labs, and the auditorium within the Timber Knowledge Platform (own figure 2026).

2.5 strategy-method-technique framework

To structure architectural decision-making in response to the identified misconceptions, the project applies a strategy–method–technique framework. It distinguishes between architectural intention (strategy), spatial action (method), and material or constructive resolution (technique) (Figure 14).

At the level of strategy, the framework translates the misconceptions identified in Chapter 1.2 into architectural intentions responding to visibility, durability, and public-scale timber construction. Methods translate these intentions into spatial actions such as elevation, buffering, controlled exposure, projection, and visible circulation. Techniques articulate these methods through constructive and material operations including detailing logic, joinery strategies, differentiated façade responses, and demountable assemblies.

This framework structures how visitors encounter timber construction throughout the platform and how architectural intent becomes spatially experienceable. In doing so, it connects questions of material performance to spatial sequence, visibility, and direct architectural experience rather than treating them as isolated technical considerations. Research on timber service life emphasizes that durability is not achieved through material choice alone, but through integrated design approaches managing moisture, weathering, and environmental stress over time (Attia et al. 2025).

The framework subsequently informed the development of the Timber Knowledge Matrix presented in part 03, through which strategies, methods, and techniques were comparatively translated across the different building volumes of the project.

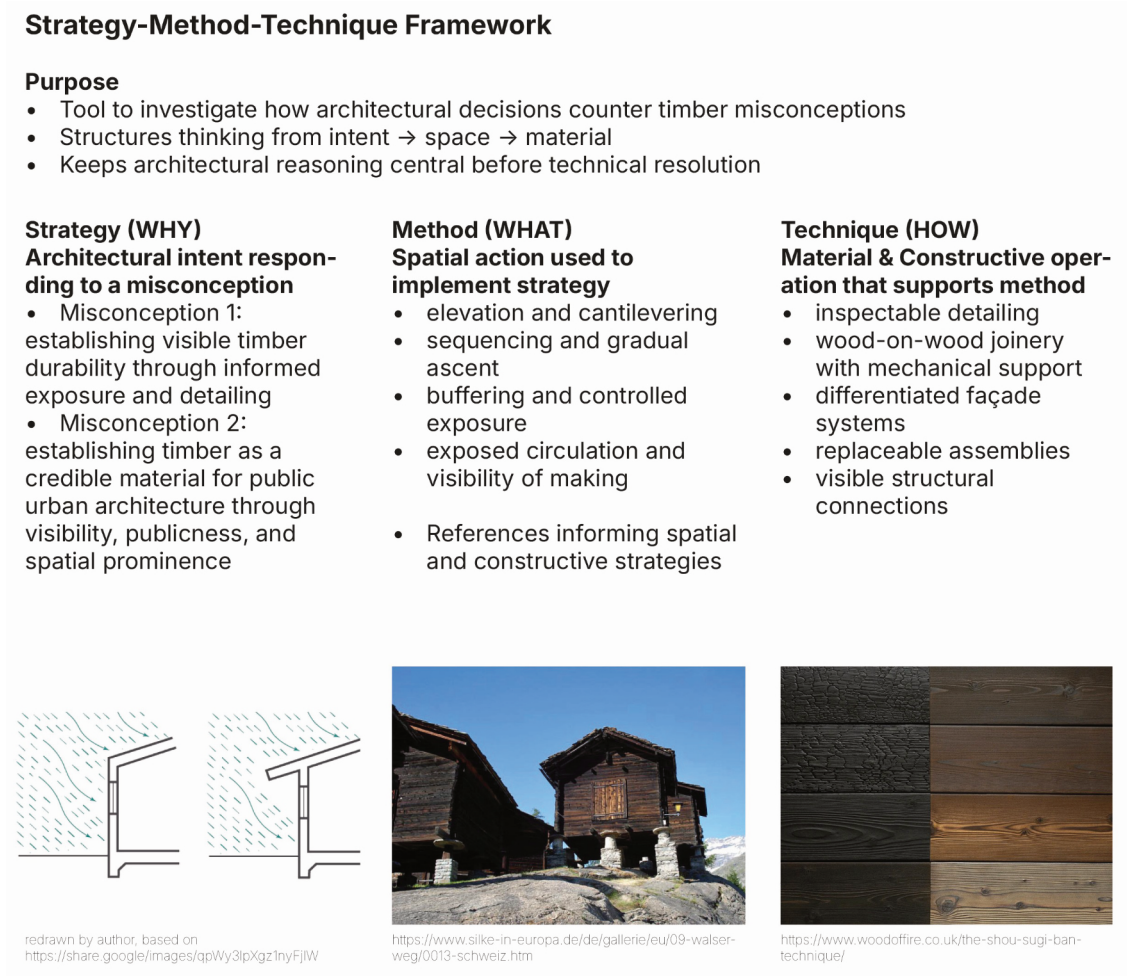


Figure 14: Application of the framework to explore architecturally how to address misconceptions (own figure 2026).

2.6 site conditions and architectural implications

The project is located at Lijnbaansgracht 161–165 in Amsterdam (Figure 15), comprising a row of adjacent buildings sharing a continuous roofscape. Originally constructed as warehouses between 1894 and 1897, the ensemble has undergone multiple adaptations over time and today accommodates a mix of residential, commercial, and service functions (Figure 16). Archival drawings and records from the Amsterdam municipal database (Gemeente Amsterdam n.d.) document a series of alterations and extensions throughout the building's lifespan, reflecting the site's long history of transformation within Amsterdam's dense urban fabric. The warehouse origins of the ensemble remain particularly relevant to the project due to their relationship to timber construction, load bearing capacities (Figure 17), material handling, storage, and canal-based logistics.

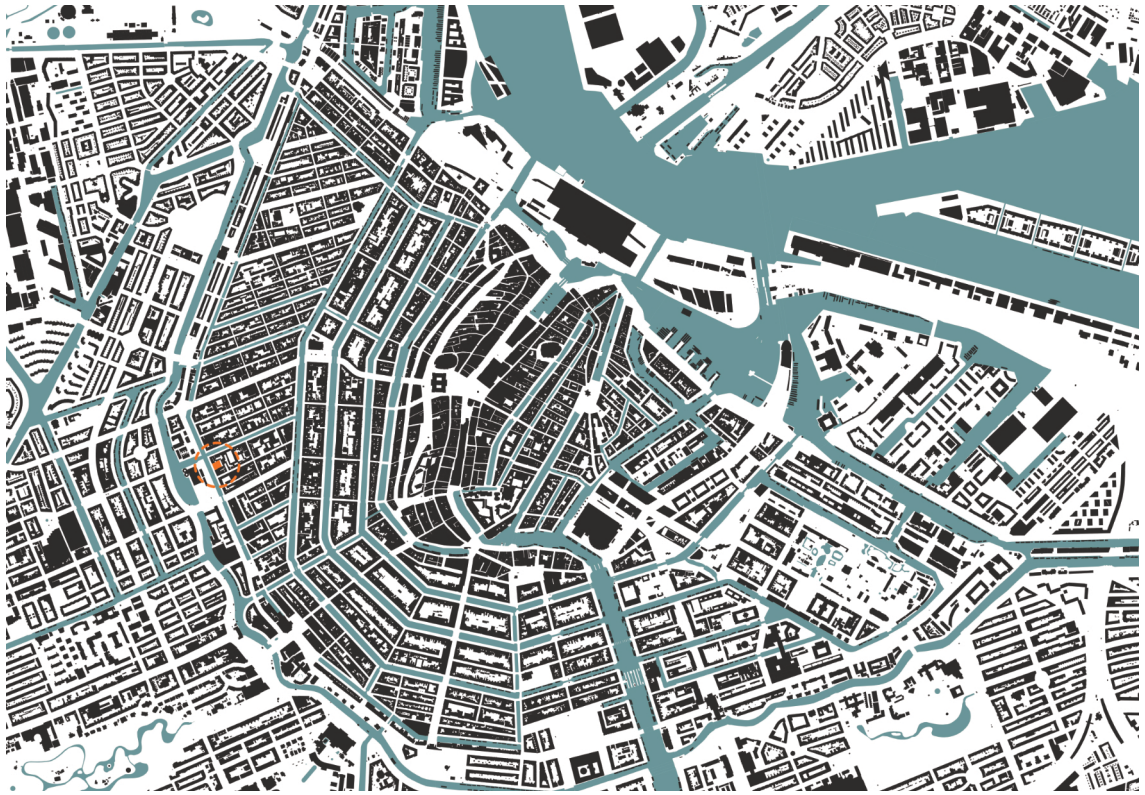


Figure 15: Location of the project site within Amsterdam and its surrounding urban context (own figure 2026).



Figure 16: Street elevation of the former warehouse ensemble along the Lijnbaansgracht in Amsterdam, showing the repetitive structural rhythm, loading openings, and canal-oriented industrial typology prior to later interventions (1976). Source: Stadsarchief Amsterdam (retrieved 2026).

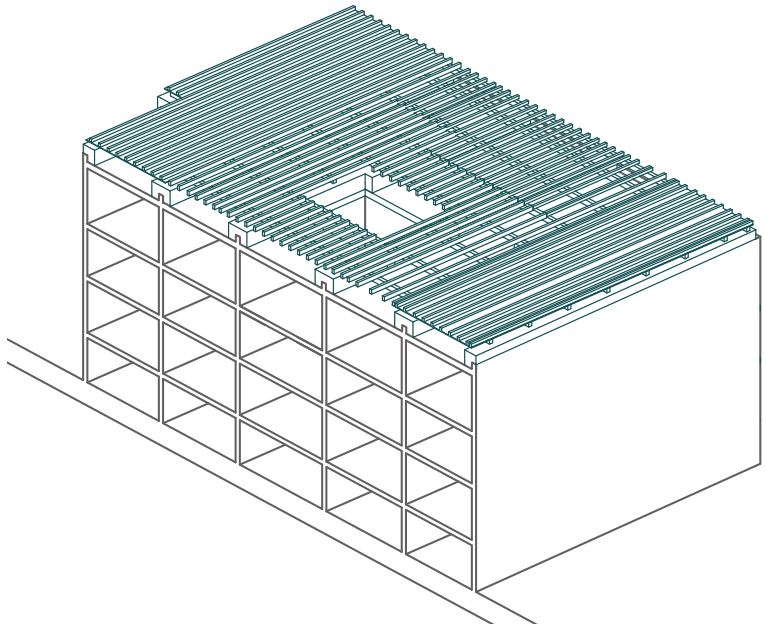


Figure 17: Existing structure with proposed addition of a load distributing layer for the platform volumes (own figure 2026).

The existing buildings are four stories high, reaching around 12.5 m in height (Figure 18). The combined footprint measures roughly 950 m², with dimensions of approximately 29 m along the street and 33 m in depth. Structurally, the ensemble is characterized by load-bearing brick masonry walls combined with timber floor and ceiling beams. This existing timber presence directly relates to the project's argument that timber has long existed within dense urban environments, despite often remaining concealed or visually secondary.

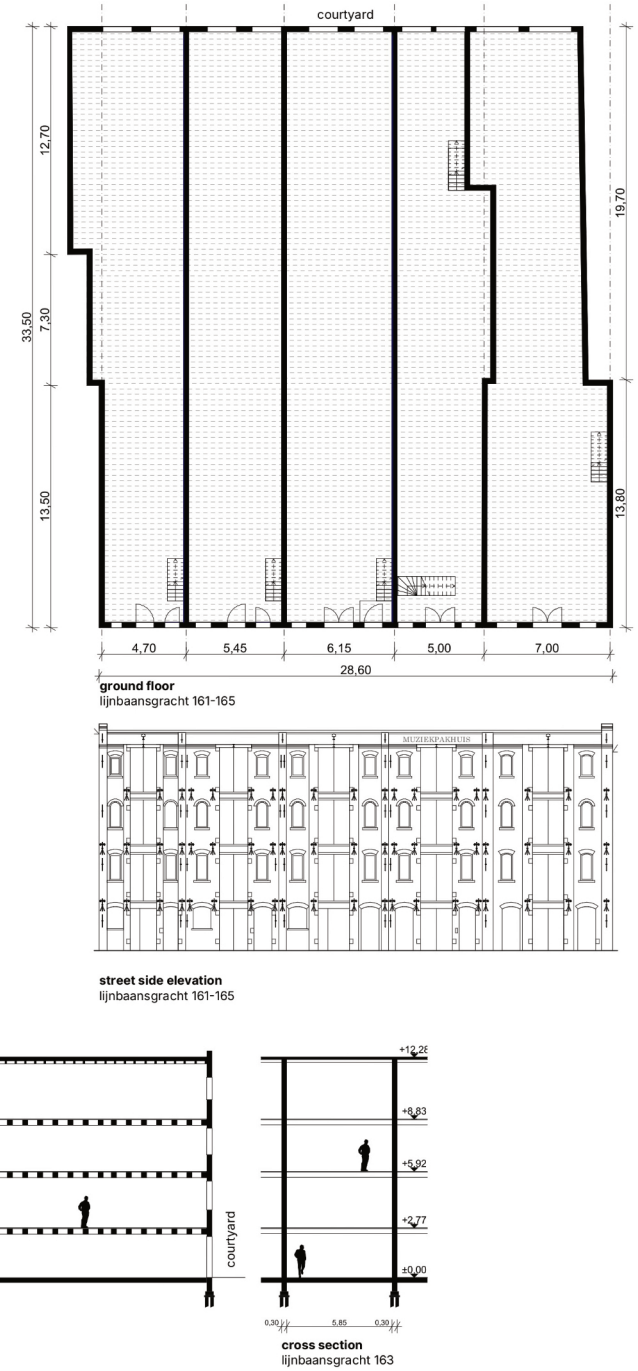


Figure 18: Schematic ground floor plan, street-side elevation, longitudinal and cross section of the existing building ensemble (own figure 2026).

The site was selected for its visibility, accessibility, and shared roof geometry (Figure 19). Located within a dense network of pedestrian and cycling routes, public transport, and nearby parking infrastructure, the site is continuously encountered through everyday urban movement (Figure 20). The canal-side position additionally introduces a logistical dimension through the potential transport of materials by water. Clear views along the Lijnbaansgracht and the visibility of the roofscape from surrounding streets and elevated viewpoints further support the site's suitability for a visible architectural intervention. The surrounding urban context, characterized by varying roof forms, building ages, heights, and uses, additionally provides a diverse architectural reference field informing the project's volumetric and spatial development (Figure 21).



Figure 19: Site conditions informing the selection of the project location (own figures 2026).

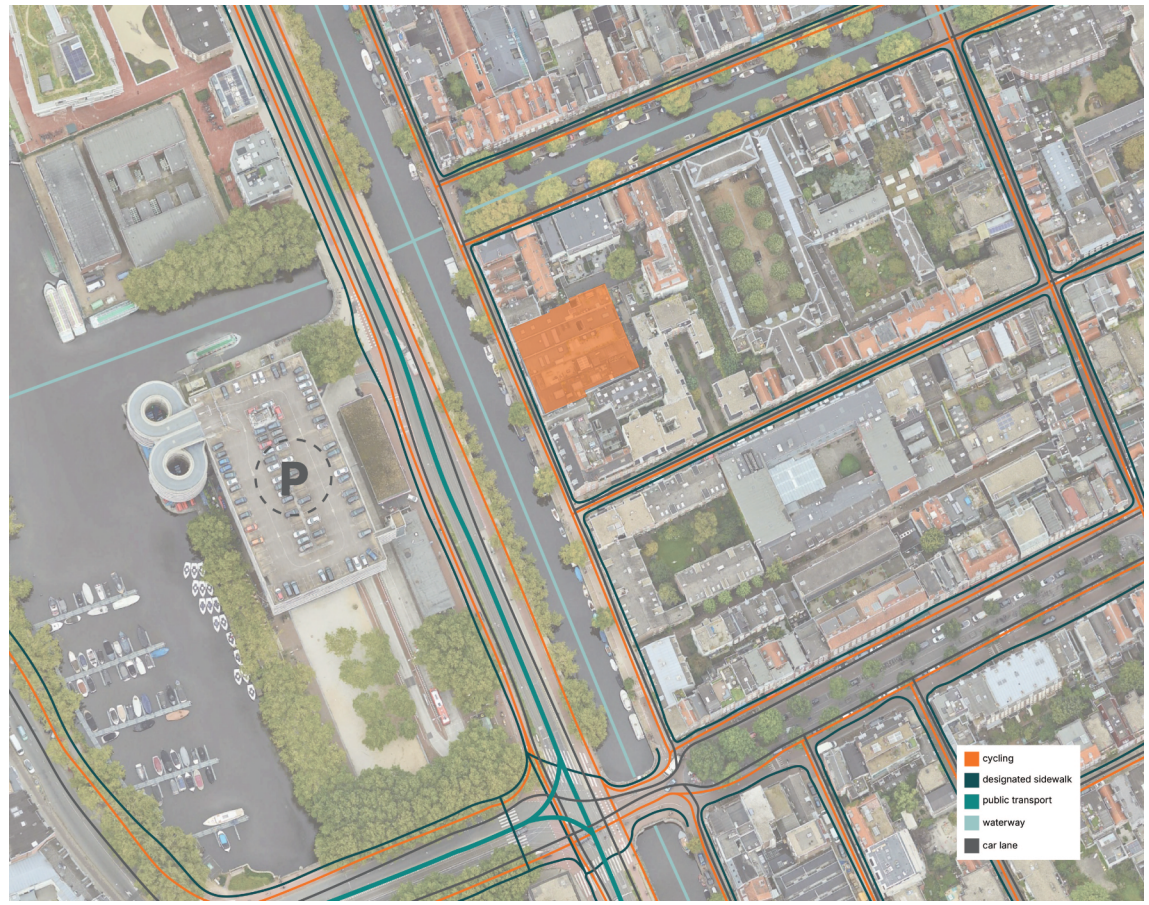


Figure 20: Traffic network map showing the site's integration within everyday urban movement routes (own figures 2026).

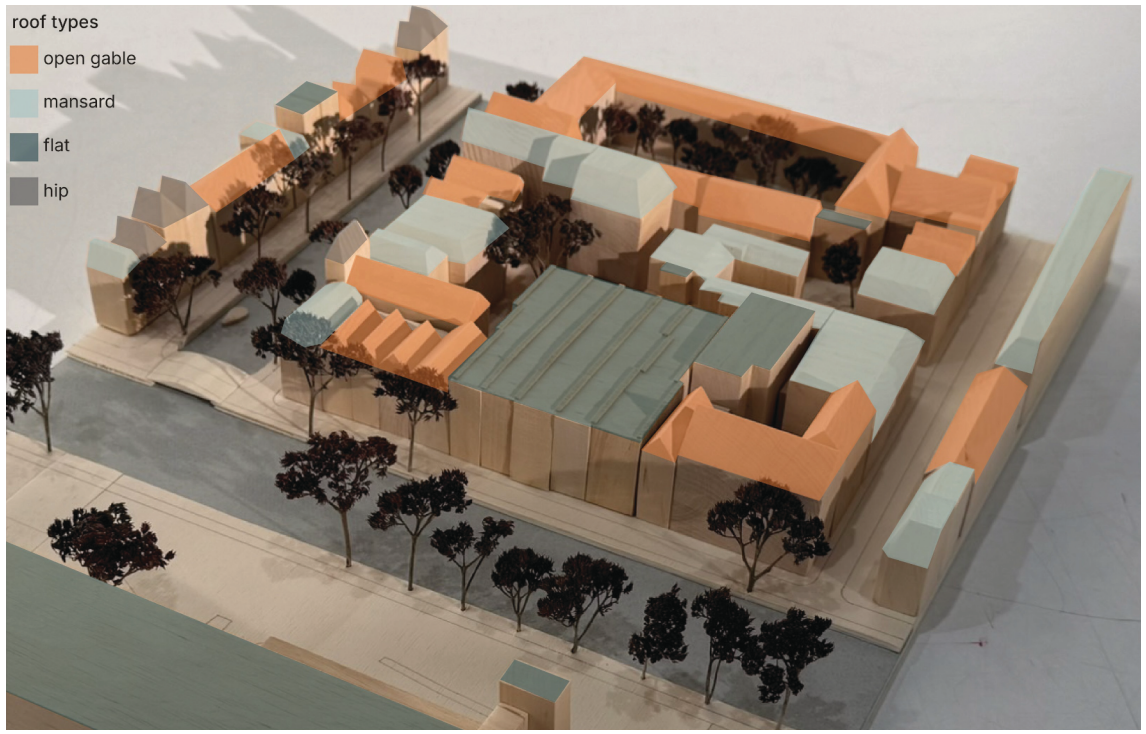


Figure 21: Variety of roof forms and building heights within the surrounding urban context (own figure 2026).

From the perspective of a SWOT analysis (Figure 22), constraints arise from the density of the urban context and the need to carefully manage interventions above inhabited buildings. Opportunities lie in activating the roofscape as an additional public layer while testing timber's capacity to perform visibly at an urban scale. Limitations primarily relate to regulatory conditions, fire safety requirements, and balancing public access with the existing residential context.

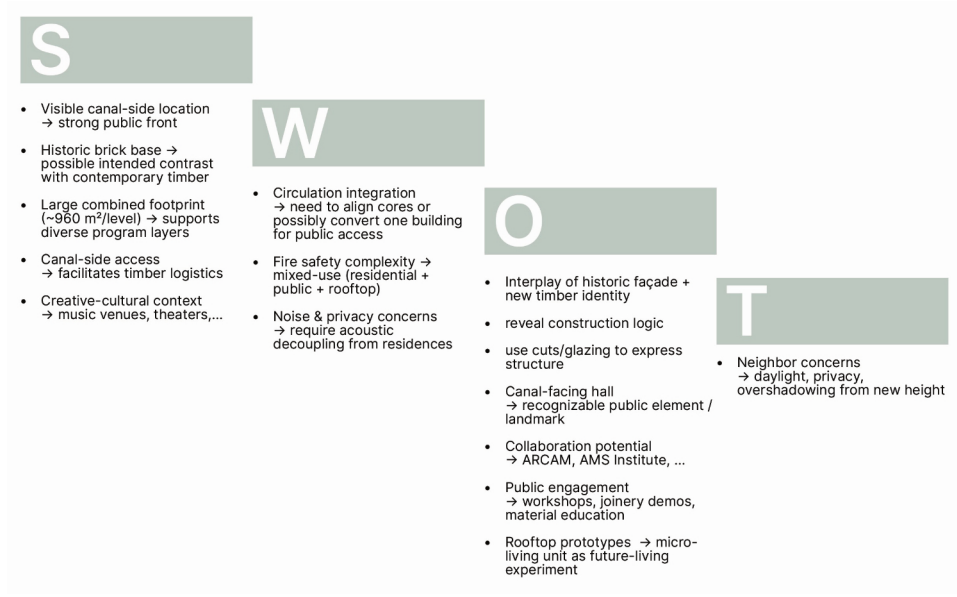


Figure 22: SWOT analysis of the site and its context (own figure 2026).

Shade studies of the surrounding context indicate that the intervention primarily needs to manage shading within its own volumes while remaining aware of impacts on neighboring buildings (Figure 23). Additional shadow cast onto adjacent roofs with limited openings is considered less critical than impacts on heavily inhabited façades, informing a cautious approach toward height, spacing, and massing relationships.

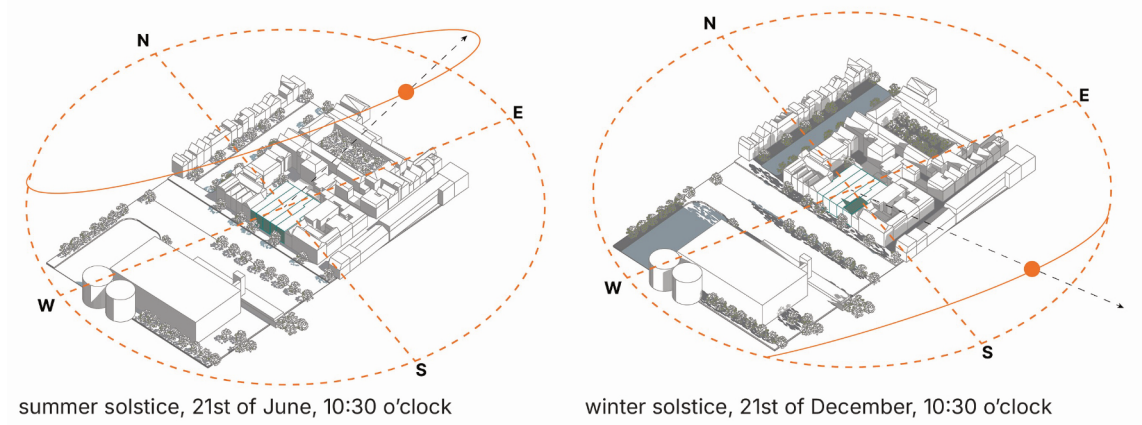


Figure 23: Shade analysis of the existing urban context and estimated impact of the topping-up intervention (own figure 2026).



Figure 24: Site model making process (own figure 2026).

2.7 spatial testing and early design tools

Spatial testing enabled exploring the configuration of the project's program and the relationship between new spaces and the existing and surrounding buildings. Early studies focused on the arrangement of public, semi-public, and supporting functions above the existing roofscape, including questions of access, circulation, visibility, and spatial hierarchy.

As an early-stage exercise, the concept models explore the idea of a topping-up intervention organized around a shared inner courtyard (Figure 25). By treating the existing flat roofs of the five adjacent buildings as a collective platform, the proposal seeks to connect what is currently fragmented through a new elevated layer. Inspired by surrounding courtyard typologies within the urban fabric, different volumetric configurations were tested to study the relationship between lecture spaces, workshops, prototype units, and supporting functions (Figure 26).

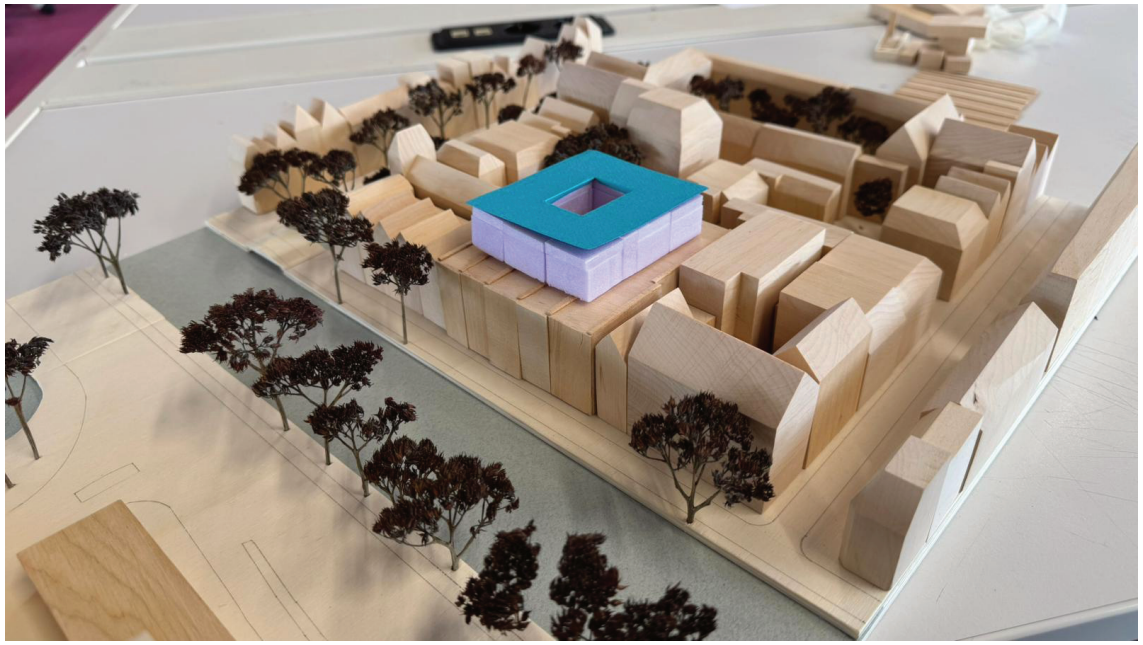
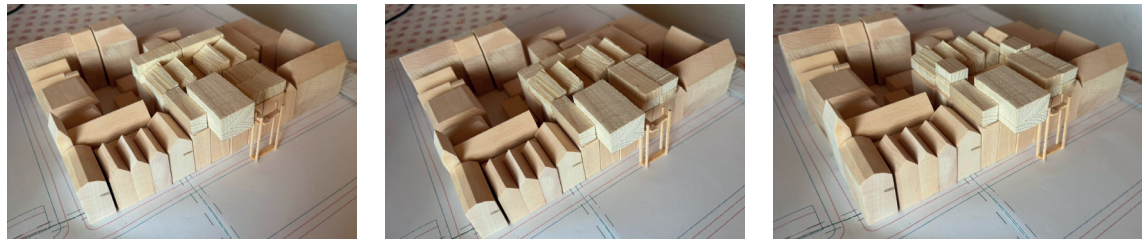


Figure 25: Early concept model exploring a topping-up intervention organized around a shared elevated courtyard above the existing buildings (own figure 2026).

Physical models, sketches, and drawings were used to test relationships such as openness, enclosure, projection, and proximity. These tools functioned primarily as instruments for exploration, allowing spatial assumptions and architectural strategies to be refined iteratively.

Model experiments



- street to back:

  public lecture hall and supporting spaces

  workshops

  prototype units

- street to back:

  public lecture hall and prototype units

  workshops

  supporting spaces / office spaces

- street to back:

  public lecture hall and prototype units

  supporting spaces / office spaces

  workshops

Figure 26: Volumetric studies testing spatial hierarchy and program distribution across the platform (own figure 2026).

2.8 research inputs and references

As outlined in the design-research approach (chapter 2.1), the project is informed by a combination of literature review, case study analysis, interviews, excursions, and site visits. Together, these research inputs support the investigation into how timber is perceived, detailed, and experienced within dense urban environments and consequently, how these perceptions can be addressed architecturally.

Literature review on durability of timber, exposure conditions, and public perception and the role of timber within public architecture establishes the theoretical basis for the project, particularly regarding misconceptions surrounding visible ageing, long-term performance, and timber's suitability for public architecture.



Figure 27: Petäjävesi Old Church in Finland as a historic example of timber architecture that has remained in use over long periods, visited by the report author in 2022 (Monto 2018).

Historic examples of timber architecture that have remained in use over long periods challenge assumptions regarding the durability of timber. Buildings such as the Petäjävesi Old Church in Finland, originally constructed between 1763 and 1765 (Figure 27), demonstrate how timber structures can remain functional over centuries through constructive protection and maintenance. At the same time, examples like this raise questions regarding which buildings societies choose to maintain and preserve over long periods, and how cultural value influences perceptions of permanence, care, and trust in materials.



Figure 28: Timber structure in Switzerland demonstrating constructive timber protection through elevation on a stone base and the application of different façade cladding strategies (own figure 2026).

Excursions and field visits further informed the project through hands-on observation. An excursion to Switzerland in January of 2026 demonstrated a vast variety of built examples (Figure 28) that apply long-established principles of constructive timber protection, such as elevation from the ground to improve ventilation and reduce moisture exposure, as well as orientation-specific façade responses. These insights later informed material and detailing decisions within the project.

A visit to the sawmill **Het Jonge Schaap** at the Zaanse Schans in April of 2026 further informed the project through witnessing of timber processing, construction, and material use. The current mill, reconstructed between 2005 and 2007 based on construction drawings of the original 1680 sawmill (admin n.d.), provided insight into historic timber processing techniques and the relationship between wood species, structural requirements, and exposure conditions, including the selective use of specific timber species for particular structural purposes (Figure 29). Observations additionally included the storage of timber logs in water prior to processing, highlighting the historical relationship between timber processing and waterways. The proximity of the project site to the canal consequently raised reflections on how water-based timber transport and storage could again become integrated within contemporary urban timber construction in a city such as Amsterdam.



Figure 29: Overview of timber species used within the reconstructed sawmill Het Jonge Schaap at the Zaanse Schans, illustrating the selective use of different wood species according to structural, mechanical, and exposure-related requirements (own figure 2026).

Studying contemporary timber precedents supported the investigation into how structural continuity, material expression, and connection detailing can shape architectural experience. The case study of Villa Heilooërbos by Natrufied Architecture focused on the relationship between structure, enclosure, and connection detailing within a contemporary timber house (Figure 30, Appendix C). Attention was given to a detail in which rafters extend through and beyond the building envelope, allowing structural elements to continue from the interior toward the exterior rather than functioning as applied additions. This later informed the development of projecting structural elements and roof overhangs within the project. The physical modelling of a connection detail at 1:5 scale allowed for the spatial exploration of connection logic, tolerances, and assembly. Drawings, plans, photographs, construction documentation, and the use of different timber species and engineered wood products within the case study project, were analyzed to better understand how structural continuity and architectural clarity were achieved within the built work.

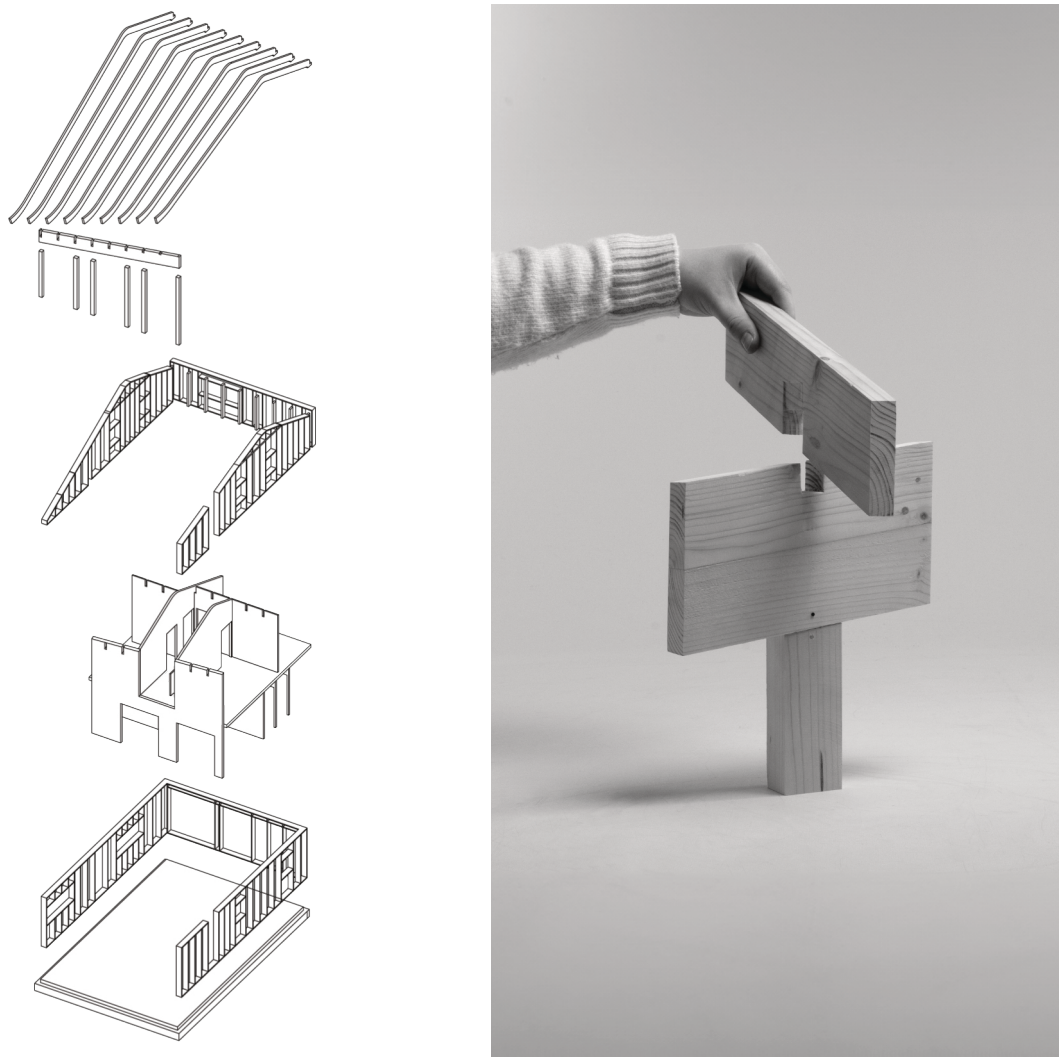
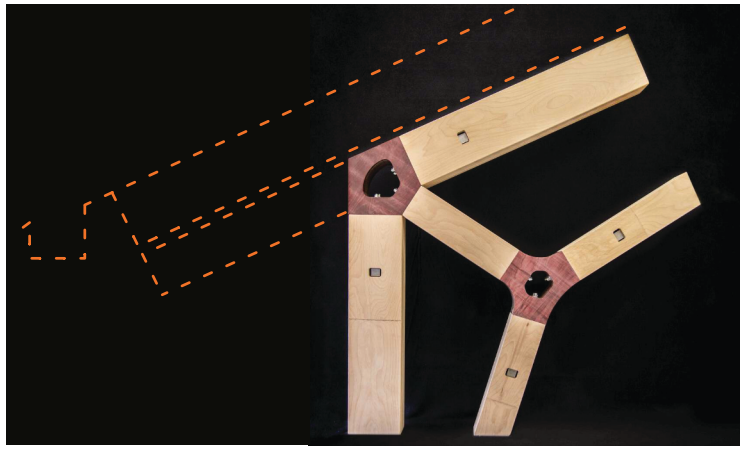
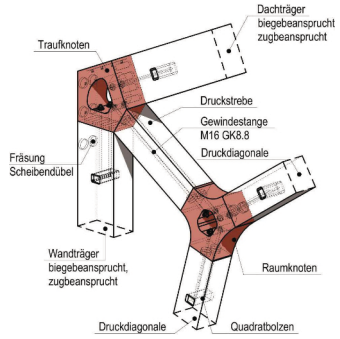


Figure 30: Assembly analysis study and physical model of contemporary timber precedent (own figure 2026).

This question of structural continuity versus applied additions reappeared in the study of the Diemerstein Timber Campus by RPTU Kaiserslautern (Figure 31). Initial interest in the project emerged from its wood-to-wood connection, a ring node piece made from resin-bonded wood that connects the beech laminated wood elements, again highlighting the selective use of specific timber products according to their structural role. The absence of roof overhangs, however, raised reflections on how constructive protection could be integrated within exploring a similar architectural language. Insights by second mentor Max Salzberger highlighted how roof overhangs traditionally emerge directly from the structural system itself rather than functioning as applied additions. This later informed the project's approach toward roof overhangs, where varying overhang depths respond to different exposure conditions while remaining structurally integrated.

Interviews with stakeholders from different disciplines within the world of timber construction became an essential part of the research process, offering practical and experience-based insights into current barriers surrounding timber construction. The conversations informed questions of public trust, durability perception, detailing strategies, maintenance, and knowledge exchange. Insights gained through these conversations directly informed the architectural strategies developed throughout the project. Selected interview material is included in Appendix A.







https://www.baunetz-campus.de/news/diemersteiner-holzbaucampus-werkstattgebaeude-feiert-richtfest-8111483#&gid=1&pid=2

Figure 31: Compilation of reference material of the Diemerstein Timber Campus with annotations reflecting on how roof overhangs and constructive protection can emerge directly from the structural system (BauNetz 2026).

The project is also informed by my own familiarity with timber architecture in Munich and the surrounding Alpine context. In alpine towns and ski environments, exposed timber is widely accepted and appreciated, while in dense urban settings it remains less visible and more cautiously perceived. This contrast points to a cultural association of timber with peripheral landscapes rather than with public urban architecture, a topic further discussed in relation to weathering and patina in chapter 3.8.

The project was additionally informed by a smaller hands-on exploration prompted through the course itself, in the form of the planting of a *Vereinsdechantsbirne* (pear tree) at the author's grandparents' house (Figure 32 and Appendix G). Considerations influencing the choice of tree included its suitability for the site, anticipated growth and seasonal appearance, as well as future pear production. During the planting process, attention was additionally given to suitable growth conditions, shaping the surrounding soil to guide water toward the tree, temporary protective measures to prevent damage by animals, and supporting the young tree during early development. These observations reinforced reflections on care, environmental response, and long-term material development in relation to timber architecture.



Figure 32: Watering of the newly planted Vereinsdechantsbirne pear tree by the report author, showing temporary protective measures against animals, the supporting stake used during early growth, and the shaping of the surrounding soil to guide water toward the tree roots (own figure 2026).

2.9 stakeholders and knowledge exchange

The project considers stakeholders involved in shaping timber architecture across Amsterdam and the wider Netherlands, including architects, engineers, researchers, policymakers, educators, contractors, developers, and end-users both within and outside the construction industry.

The platform addresses both professional stakeholders and the general public. While the program is primarily tailored toward decision-makers involved in shaping the built environment, the project remains publicly accessible and intentionally visible within the urban context. Spaces for learning, testing, discussion, fabrication, and observation are distributed across the project, creating opportunities for both professional exchange and public encounter.

As identified by sustainability consultant and project manager Imme Groet (Groet 2026), hesitation toward timber construction is not caused by a single limitation, but by a combination of regulatory, financial, technical, and perceptual factors distributed across multiple stakeholders. Environmental arguments such as CO_2 storage often remain abstract and insufficient to convince decision-makers on their own. This suggests that increasing acceptance of timber construction requires not only technical innovation, but also forms of communication and experience that make the material more tangible and understandable.

The project additionally responds to the collaborative nature of contemporary timber construction. Timber construction processes rely heavily on knowledge sharing and collaboration between multiple disciplines and stakeholders throughout the supply chain. Research on innovation adoption within timber construction further highlights that contemporary timber systems, particularly CLT construction, depend on complex interorganizational networks that facilitate the exchange of knowledge, best practices, and new technologies (Grobbelaar 2025). The Timber Knowledge Platform therefore operates not only as a building, but also as a space for exchange, where technical knowledge, material experimentation, public interaction, and professional discussion become interconnected through architecture itself.

part three 03

results

lays out the architectural outcome of the iterative research and design process. It demonstrates how insights from literature, interviews, precedents, and material studies are translated into spatial, structural, and material strategies.

The project is articulated as the Timber Knowledge Platform in which architecture itself operates as a demonstrative environment, making timber construction, performance, assembly, ageing, and lifecycle visible, accessible, and open to observation. Through a sequence of interconnected spaces and architectural encounters, the design addresses identified misconceptions by transforming abstract concerns surrounding durability, risk, exposure, and structural capacity into tangible spatial experience.



Figure 33: Bird eye view of model of the proposal

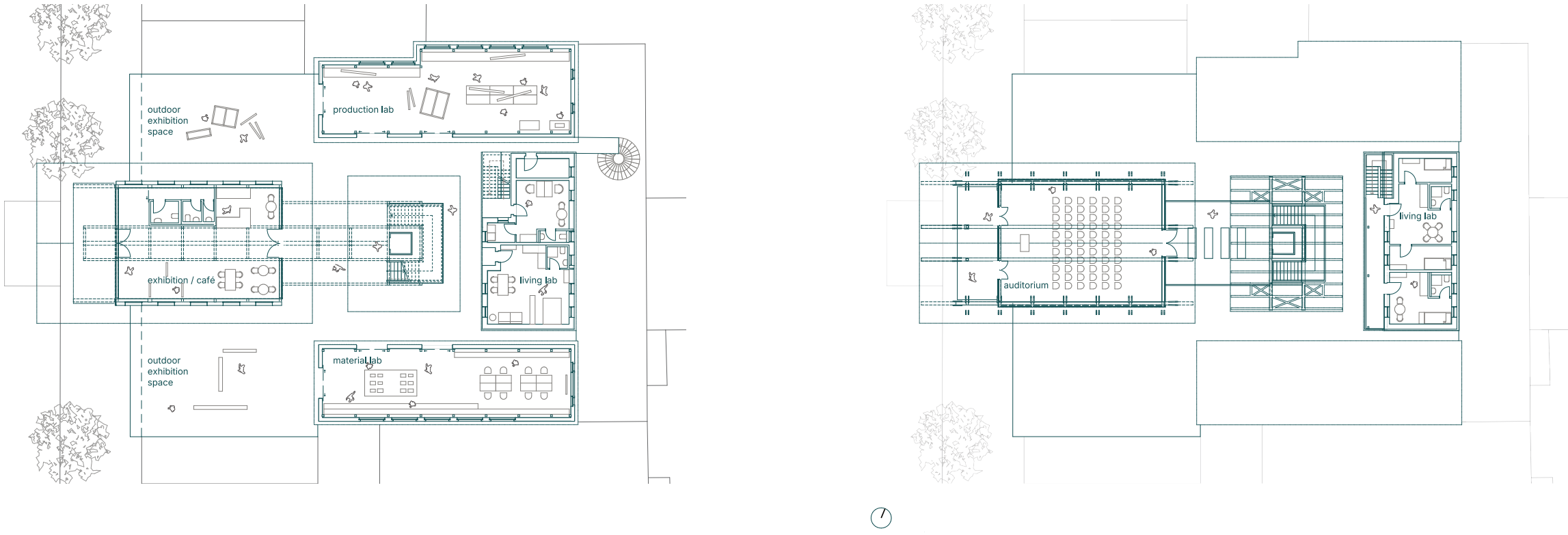


Figure 34: Floor plans of the intervention in 1:100 (own figure, 2026).

3.1 core design concept: seeing is believing

The Timber Knowledge Platform operates as a demonstrative environment. It aims to make timber directly observable, understandable, and experienceable through space, material, construction, and use.

This approach is informed by both research and interviews conducted throughout the project. As highlighted in *Unlocking the Potential of Timber Construction: An Innovation Adoption Perspective* (Grobbelaar 2025), the adoption of contemporary timber construction methods is strongly influenced by observability and trialability. Direct experience, physical exposure, and the ability to observe successful implementations help reduce perceived risks and uncertainties associated with timber construction. The research further identifies visibility, experimentation, and knowledge exchange as important factors in increasing confidence in engineered timber systems and contemporary timber architecture.

Similar observations emerged during interviews. Peter Fraanje emphasized the importance of direct spatial experience of precedents in building trust in timber construction, particularly among stakeholders involved in decision-making processes (Fraanje 2026). Rather than being convinced solely through environmental arguments or technical performance data (Groet 2026), acceptance often develops through repeated exposure to built examples and visible material performance.

Structural systems, material transitions, assembly processes, weathering, maintenance strategies, and fabrication spaces are therefore intentionally made visible and accessible throughout the platform (Figure 34). Workshops, prototypes, monitored outdoor exposure areas, visible material transport, and publicly accessible circulation routes allow visitors to encounter timber construction through direct observation.

Tactile experience additionally forms part of this approach. Façade systems are positioned in close relation to circulation routes and public spaces, allowing visitors to approach, observe, and physically engage with the material as part of the architectural experience.

The project consequently translates concerns regarding durability, fire safety, exposure, maintenance, and structural capacity into tangible architectural experience. The building communicates through what it does and exposes rather than through what it merely explains, positioning timber construction as something that can be observed, questioned, tested, and gradually understood within the urban environment.



Figure 35: 1:100 model of the proposed intervention above the existing warehouse ensemble (own figure 2026).

3.2 timber knowledge matrix

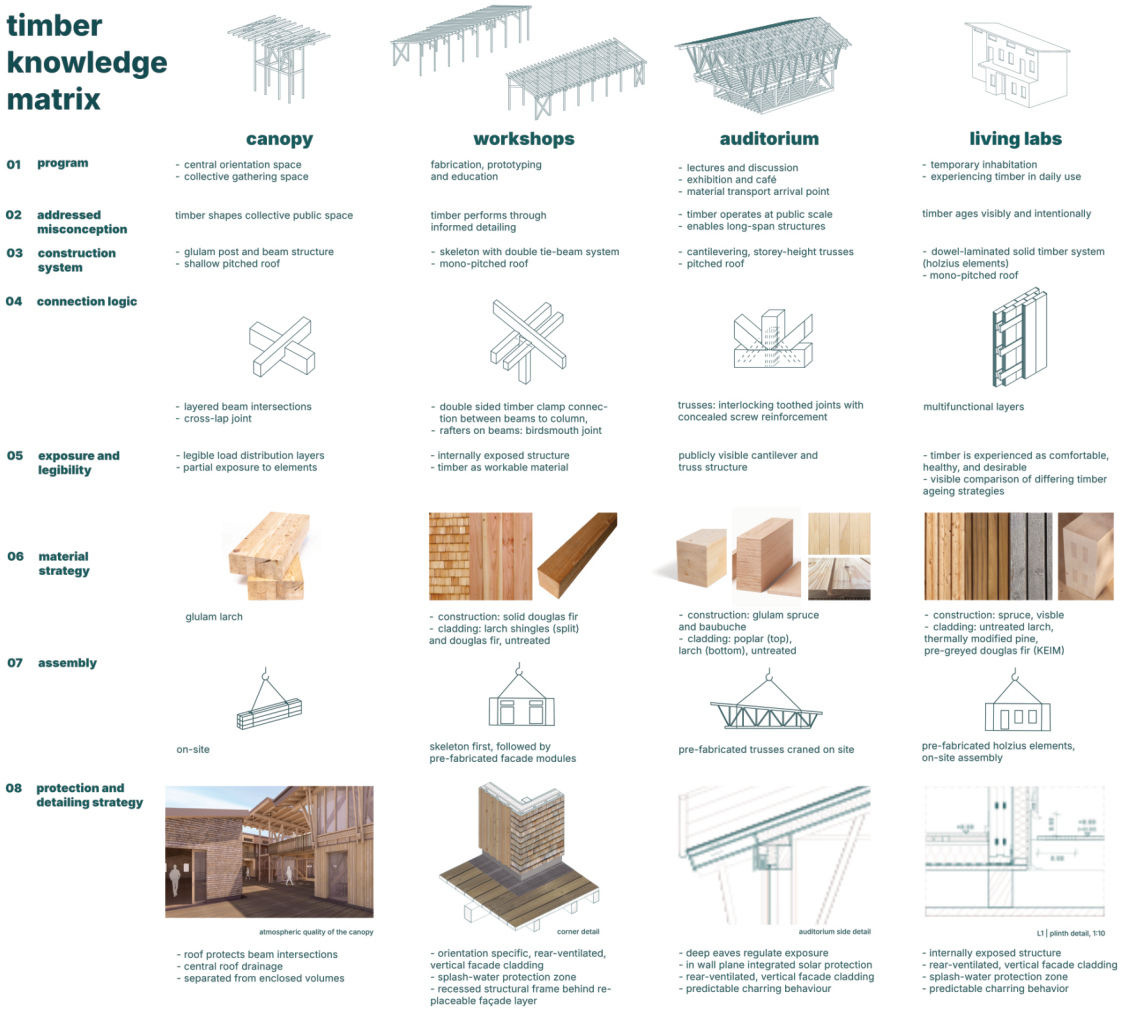
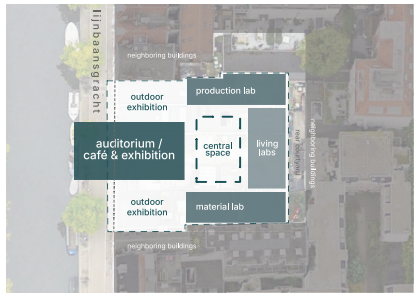


Figure 36: The Timber Knowledge Matrix, comparing how differing building volumes respond to programmatic requirements, structural systems, exposure conditions, material strategies, assembly methods, and constructive timber protection across the platform (own figure 2026).

The Timber Knowledge Matrix (Figure 36) translates the previously introduced framework of strategy, method, and technique (Chapter 2.5) into a comparative design tool across the different building volumes of the platform. While the broader strategies establish the architectural positions and intentions of the project, the matrix allows these to be tested and applied through specific construction systems, material applications, detailing approaches, and assembly methods.

The matrix organizes the relationships between program, structure, exposure, material behavior, durability, assembly, and architectural expression. Each building volume responds according to differing programmatic requirements, structural demands, exposure conditions, and misconceptions surrounding timber construction, resulting in varying construction systems, material strategies, connection logics, and detailing approaches. Together, the building volumes demonstrate the range of ways in which timber construction can respond to differing spatial, technical, and environmental conditions. These layers build upon one another, emphasizing how architectural, technical, and material decisions continuously influence one another throughout the project. The complete list of notes for the timber knowledge matrix are provided in Appendix F.

3.3 on the urban scale



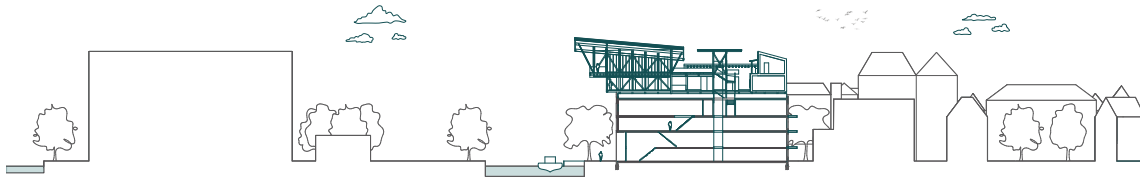


Figure 37: Spatial hierarchy diagram illustrating the organization of the intervention from public to semi-private zones (own figure 2026).

Figure 38: Urban section (own figure (2026).



Figure 39: Site model showing the intervention reaching into the public realm (own figure 2026).

The spatial organization of the project is structured as a gradient of publicness and visibility, rather than as a fixed separation of functions (Figure 37). Spaces are arranged to enable different degrees of access, exposure, and engagement with timber.

At the most public and visible end, facing the canal, the intervention addresses the urban context directly through spaces that project toward the street and canal (Figure 38 and 39). These areas are designed to maximize immediate engagement, allowing timber structure and material expression to be perceived without even having entered the building. The auditorium volume interprets historical timber jettying strategies visible in examples such as Het Houten Huys in Amsterdam (Figure 8, Chapter 1.6), where upper floors extend outward beyond the façade line. The volume projects in two stages, first together with the platform level and then through the upper auditorium volume itself, strengthening both protection of the existing façade and the building's public presence toward the canal. This condition is extended toward the canal through a platform-like intervention that acts as an extension of the street, creating a more generous spatial condition along the otherwise narrow canal edge for both visitors and residents while situating the project within the public realm and strengthening its accessibility and visibility.

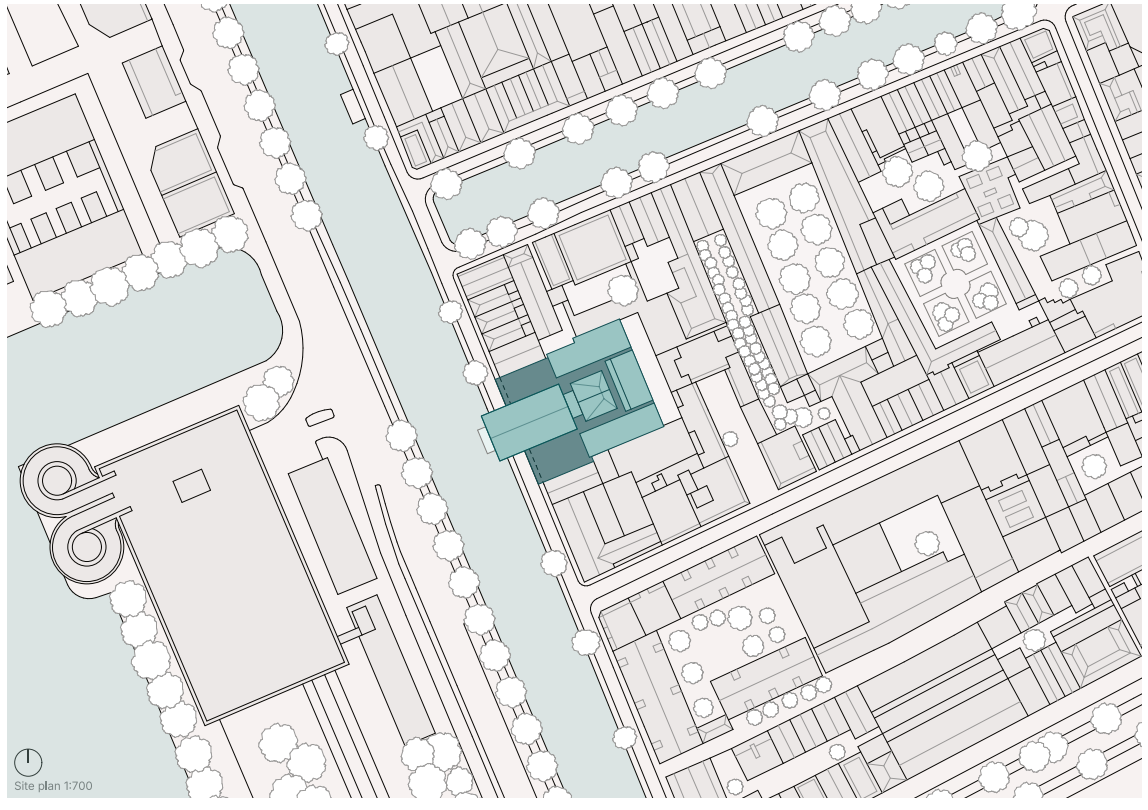


Figure 40: Site plan 1:700, scaled (own figure 2026).

Existing rooftop terraces affected by the intervention are partially compensated through newly integrated balconies along the rear façade, while residents additionally retain selective access to parts of the elevated platform for gatherings and shared use.

Moving towards the center of the intervention, workshops and exhibition spaces allow closer interaction with timber through making, testing, and observation.

The living labs form the more private or semi-private end of this sequence, introducing inhabitation as a form of extended engagement with the material. These spaces maintain a degree of visibility, but within a controlled framework that balances exposure in relation to comfort, use and privacy.

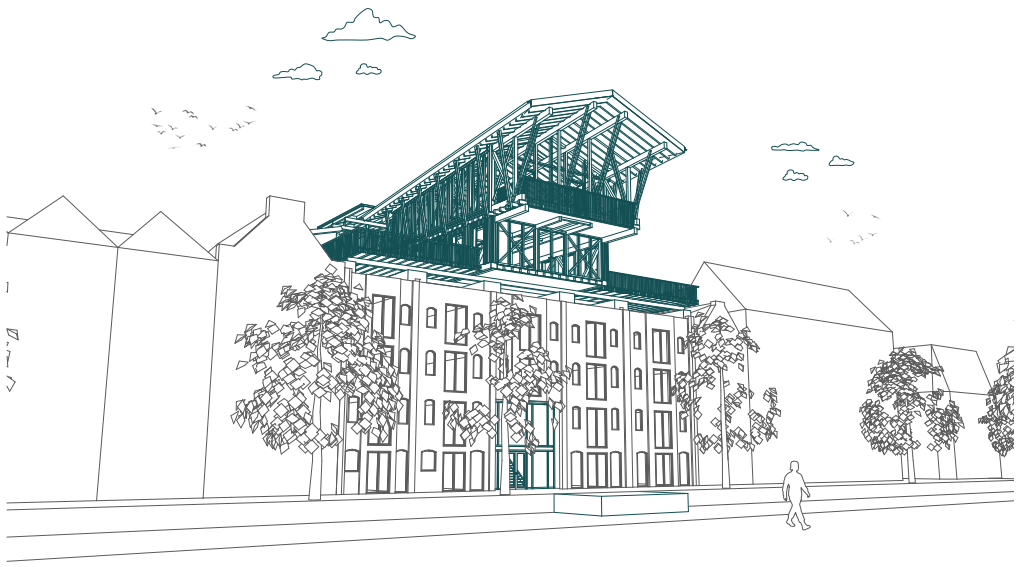


Figure 41: View at the intervention from the street across the canal (own figure 2026).

The decision to position public functions above the existing building emerges from the project's topping-up strategy, in which a new layer is added to an already inhabited, mixed-use structure. As ground-level spaces remain largely occupied and predefined, the added volume enables new forms of public use within the dense urban fabric.

As argued by Graham and Hewitt (2013), contemporary cities are increasingly understood as three-dimensional spatial conditions rather than purely planar organizations. Within this project, the elevated public program is therefore understood as an intentional extension of the urban realm. Ground-level interventions, such as the extension of the street toward the canal and a clearly articulated entry sequence, signal accessibility and invite engagement, making the elevated spaces readable as part of the public domain rather than detached from it.

The elevated public program is visible from different positions within the surrounding streetscape. Beyond street level, the parking garage across the street allows the intervention to be perceived across multiple levels (Figure 41), placing the lifted program and the canal-facing arrival in direct relation.

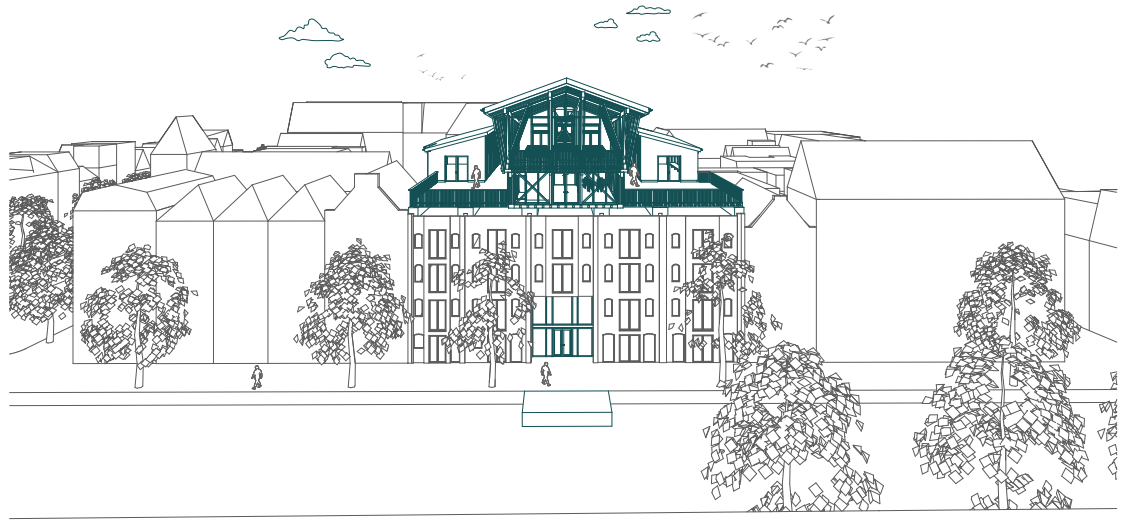


Figure 42: View from the roof of the parking lot across the canal, showing the intervention's canal-facing facade and the visibility of the elevated public layer within the urban context (own figure 2026).



Figure 43: Side elevation view of the 1:100 physical model (own figure 2026).

3.4 street level experience

At street level, the project is encountered through its cantilevered presence and the altered façade of the central existing building (Figure 44). The first two floors are opened through a post-and-beam façade, revealing glimpses of the interior and the upward movement within the building, acting as a welcoming gesture toward the public space. The cantilever introduces a strong spatial gesture within a densely built environment, where buildings, infrastructure, movement, and everyday activity compete for attention, bringing the intervention into view and into relation with its surroundings.

Its elevated presence is used deliberately to create curiosity and draw the attention of passersby. The visible timber structure allows its logic and material expression to be observed within the urban context.

In addition, processes typically minimized or kept out of view, such as material transport, are made transparent. Such elements of movement and handling become part of the spatial experience, making the building's operation observable and situating timber as a material that actively engages with its surroundings through use and transformation.



Figure 44: View from the street across the canal, emphasizing the cantilever as a visible structural gesture and the legibility of the timber system in the urban context (own figure 2026).



Figure 45: Section model illustrating the transformation of the existing warehouse ensemble (own figure 2026).

3.5 entry and movement through the existing

Scenario: A day of an insurance advisor at the Timber Knowledge Platform

On a weekday afternoon, an insurance advisor cycles across Amsterdam to attend a talk discussing recent developments in fire safety and timber construction. Surrounded by familiar urban fabric, the destination quickly becomes identifiable: an exposed timber structure projecting outward, its cantilever and material expression making it stand out as an unfamiliar yet fitting presence within the surrounding context.

The bike is left in the open space in front of the building, where the street widens toward the canal, offering a brief moment of pause before entering. Beneath the cantilever, the altered façade of the central building reveals movement within, making the entrance immediately legible. Inside, an information point introduces the platform, its activities, and the events taking place. With time remaining before the talk begins, the ascent through the building starts (Figures 46 and 47).

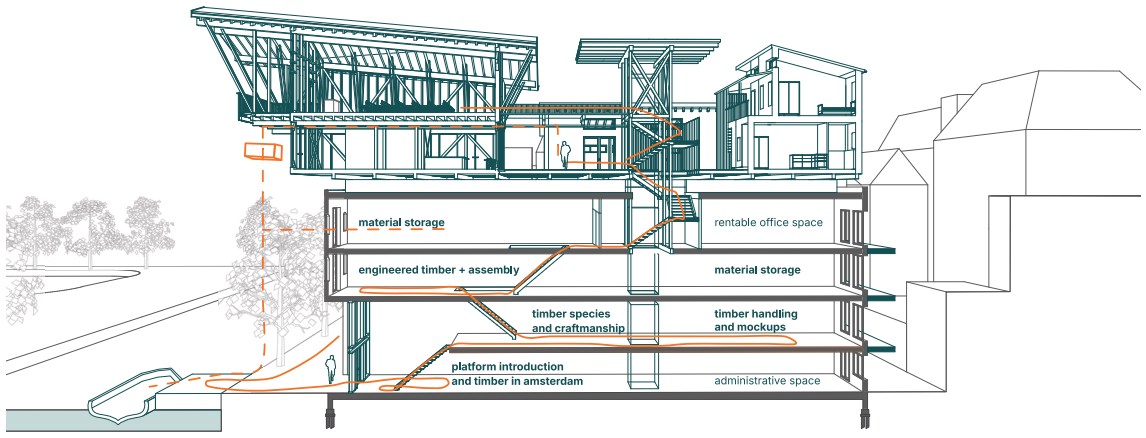


Figure 46: Step-by-step ascent through the building, where circulation passes exposed storage and logistics spaces, making them part of the experience (own figure 2026).

Moving upward level by level through the adapted existing structure, the route is accompanied by stored timber elements, material samples, and exhibition fragments addressing the relevance and connection between historical and contemporary timber construction. Early displays reference traditional timber techniques, joinery systems and material handling processes, emphasizing the importance of maintaining and reactivating forms of timber knowledge that are increasingly disappearing from contemporary construction culture. Further upward, the displayed themes focus more on contemporary timber construction through engineered timber products, façade systems, innovative wood-on-wood connections, and documentation of prefabrication methods. Areas reserved for material storage come into view, recalling the history of the building as a former warehouse.

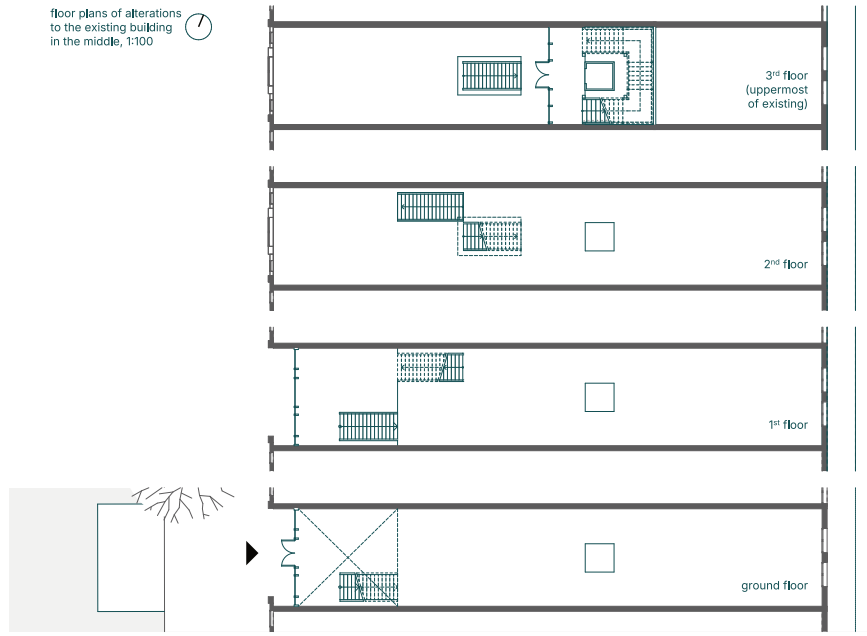


Figure 47: Floor plans of the alterations to the existing building in the middle (own figure 2026).

Reaching the platform beneath the timber canopy, activity becomes immediately observable. Into view comes the system used to move materials from the canal into the central space, making material processing tangible.

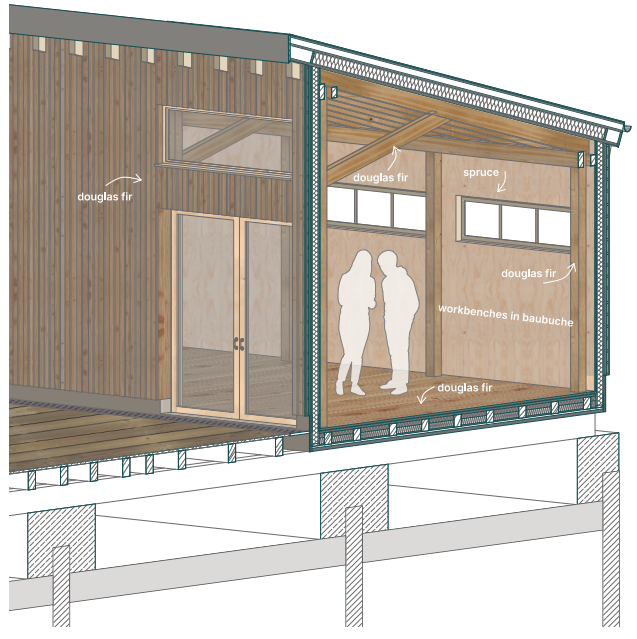


Figure 48: Section through the material lab, indicating material choice (own figure 2026).

Openings within the workshop façades on each side provide glimpses into ongoing fabrication processes. Out of curiosity, the advisor steps into one of the workshops, where a prototype is in development and the exposed structural system of the space itself remains fully legible (Figure 48). Located next to the workshop, an outdoor exhibition area come into view, displaying a prototype recognized from the material shared for the event, exposed directly to weather conditions as part of ongoing testing and observation.

At the corner of the workshop, the transition from one façade system to the other becomes visible, where shingles meet vertical timber cladding (Figure 49). What initially appeared as a purely aesthetic variation reveals itself as a response to façade orientation and weathering. Continuing across the platform, the advisor recognizes a familiar colleague from a previous project, closely observing the different façade cladding types applied to the living labs (Figure 50). The variety of expressions achievable through timber construction becomes evident, presenting the material not as a singular architectural language, but as an adaptable system capable of responding to different users, preferences, and living conditions.

As the talk approaches, they make their way toward the auditorium. Crossing the bridge from the central circulation core, glazed openings in the floor provide glimpses of top of the crane rail system previously observed upon arrival to the platform. Inside the auditorium, exposed connections, varying structural dimensions, and differing timber species become part of the discussion itself (Figure 51).

Stepping out of the auditorium space, onto the balcony overlooking the canal, the surrounding urban fabric becomes newly legible from above (Figure 52). Looking downward toward the street below, the bicycle left behind earlier in the visit comes back into view. The projecting timber structure first recognized from the street upon arrival is now the very structure from which the city is being observed (Figure 53).

During the guided tour following the lecture, researchers and workshop staff explain how conditions of exposure influence material selection and detailing decisions. Exterior timber elements are treated differently from protected interior structural components, while wood-on-wood connections supported by mechanical fasteners demonstrate how structural logic, exposure, maintenance, and assembly are addressed simultaneously. Questions regarding ageing, fire safety, moisture exposure, replacement, and long-term performance are therefore encountered not only through technical explanation, but through direct observation of built examples and monitored prototypes across the platform.

The visit concludes in the café and exhibition space overlooking the canal. Looking back across the platform, the exposed structure, visible workshop activity, weathering prototypes, and material transport systems increasingly read not as isolated architectural gestures, but as parts of a coherent and carefully considered approach toward timber construction (Figure 54). The advisor leaves with a more informed understanding of how timber can be detailed, maintained, monitored, and integrated into public architecture, influencing how similar projects may be assessed and discussed in future professional decisions.

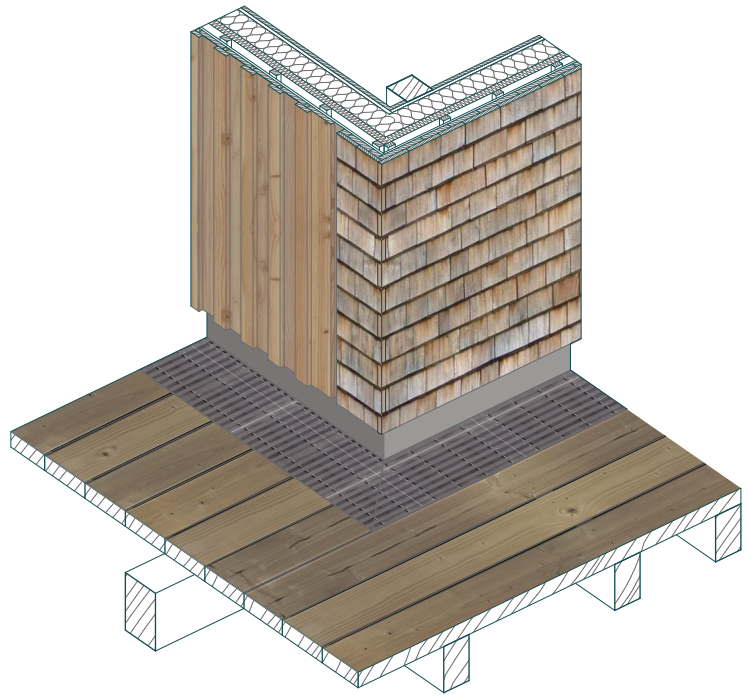


Figure 49: Workshop facade corner where larch shingles meet douglas fir boards (own figure 2026).



Figure 50: The living lab facade demonstrates three different types of façade cladding materials and treatments (own figure 2026).



Figure 51: The design of the auditorium celebrates the structural performance and visual expression of timber (own figure 2026).



Figure 52: Detail of the cantilevered balcony in the 1:100 physical model (own figure 2026).

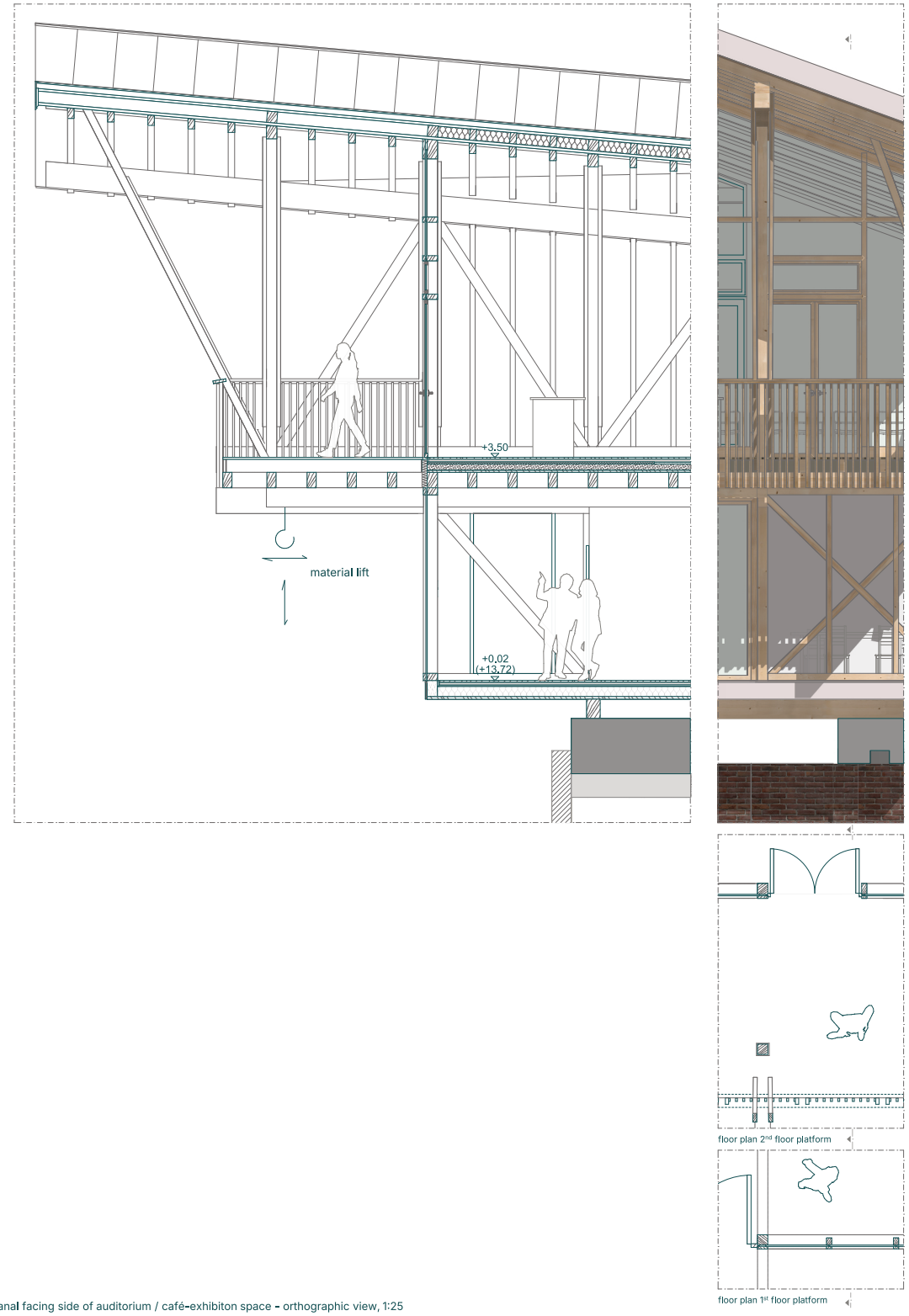


Figure 53: Orthographic view, 1:25, of the cantilever of the auditorium (own figure 2026).



Figure 54: The platform demonstrates a variety of timber species and products (own figure 2026).



Figure 55: Model view exposing the structural framework behind the architectural form (own figure 2026).

3.6 material movement and assembly

The project is structured as a continuous material and knowledge cycle, in which timber is not presented as a finished product, but as an evolving process. Material movement, fabrication, assembly, exposure, inhabitation, and renewal therefore become visible parts of the architectural experience.

Timber elements, ranging from structural beams and frame components to façade and interior elements, arrive at the site via the canal, referring to the historical logistics of Amsterdam's warehouse structures while supporting contemporary ambitions to increase transport over water and reduce pressure on the street network (Gemeente Amsterdam 2020). The canal location additionally allows the project to explore the reactivation of water-based material handling processes, informed by observations made during the visit to Het Jonge Schaap at the Zaanse Schans, where timber trunks were historically and still are stored and handled within the water prior to processing, partially to leach out sugars and reduce their attractiveness to fungi and insects. From the canal, materials are lifted into the building, temporarily stored within the adapted existing structure, and transported upward toward the platform and workshop spaces, where components can be processed, assembled, modified, or transported off site again (Figure 46).

The assembly sequence is understood as part of the architectural concept rather than a temporary construction phase. Documentation of the assembly process becomes part of the exhibition itself, enabling visitors to observe how the Timber Knowledge Platform was constructed and how timber elements are handled, joined, and assembled over time.

Construction (Figure 56) begins with the adaptation of the central existing building and the introduction of the vertical circulation core, establishing access to the future platform level. A temporary lifting infrastructure enables the erection of the canopy and workshop volumes, allowing parts of the platform to become operational during construction. The auditorium follows as a larger structural intervention with integrated permanent lifting infrastructure, while the living labs complete the platform as its inhabitation layer. In this way, the platform gradually contributes to its own build-up and transformation.

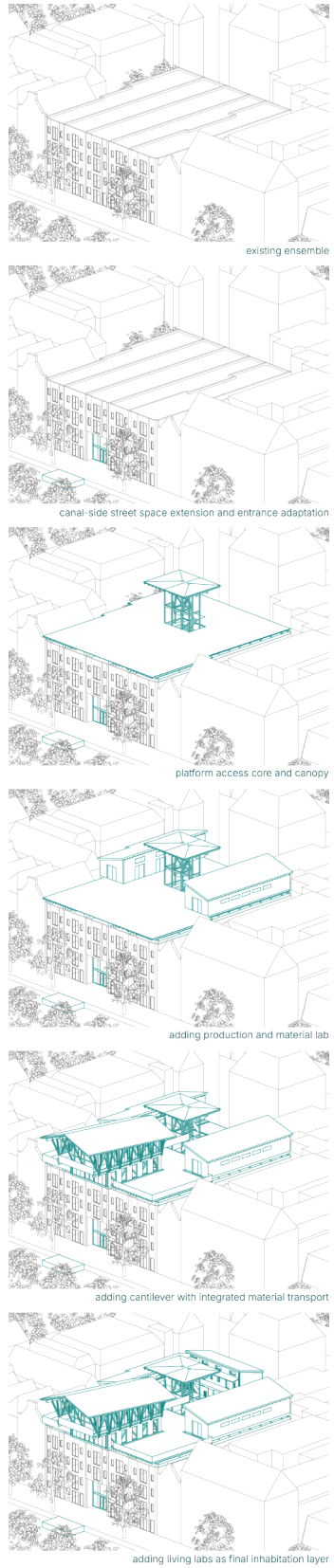


Figure 56: Assembly sequence of the platform and its volumes (own figure 2026).

Material movement and assembly directly influence detailing and dimensioning. Insights from the interview with Peter Fraanje (Fraanje 2026) highlighted that timber construction requires careful consideration during assembly, particularly regarding moisture protection and exposure during construction phases. The dowelled solid timber wall elements in the living labs roof build up, for example, require a protecting layer during construction (Figure 57). At the same time, prefabrication combined with rapid assembly on site can strengthen the argument for timber construction, reducing prolonged exposure to weather while limiting disturbance on site. This is reflected, for example, in the living lab roof where protective layers are integrated to shield timber elements during assembly and exposure phases.

The workshops allow fabrication and modification processes to remain visible as part of the visitor experience (Figure 58). Material handling, lifting, storage, and assembly are therefore not concealed, but become part of the spatial experience of the project, positioning timber as a material that actively engages with processes of making, transformation, maintenance, and renewal.

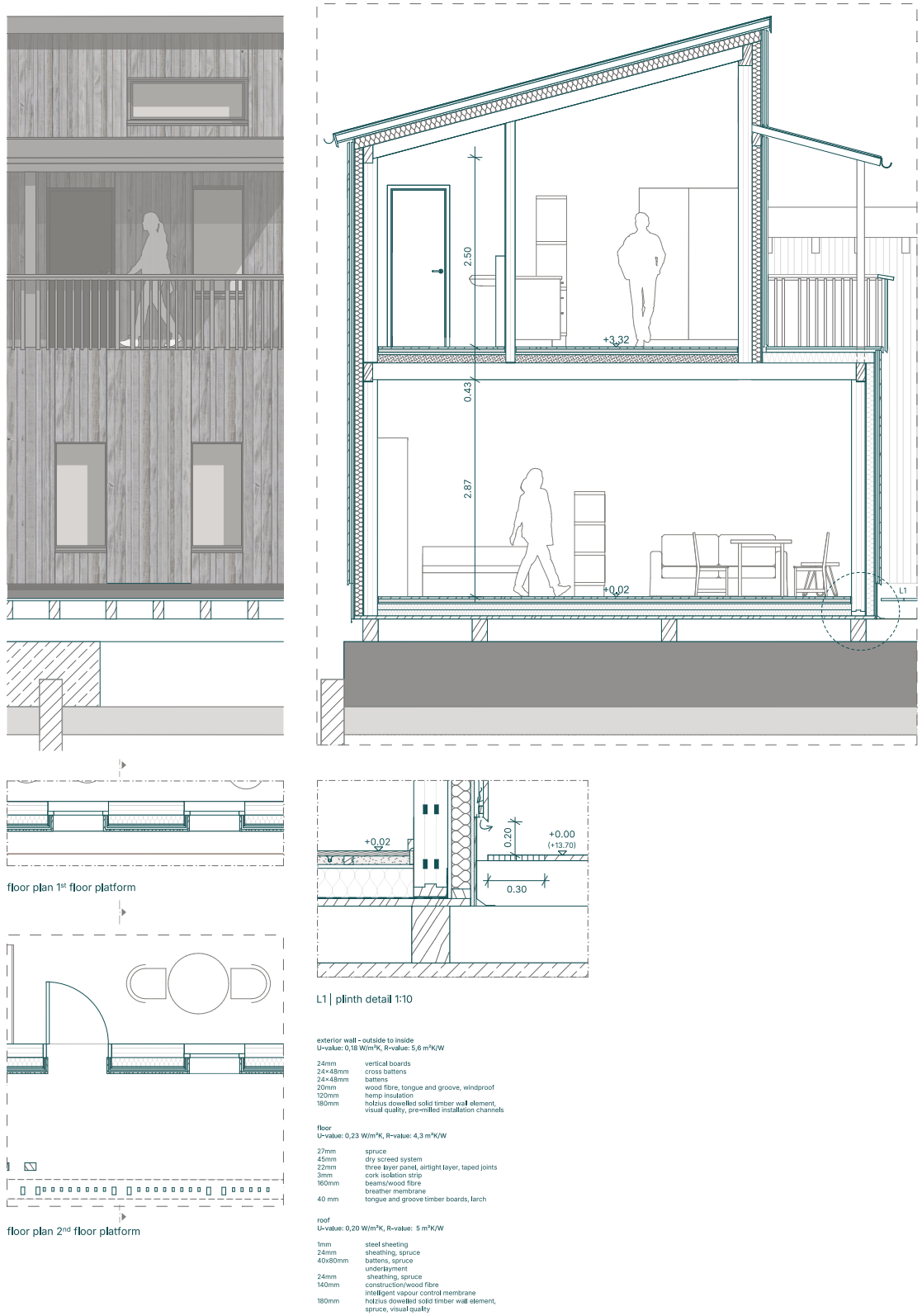


Figure 57: Orthographic view of the Living lab construction (own figure 2026).

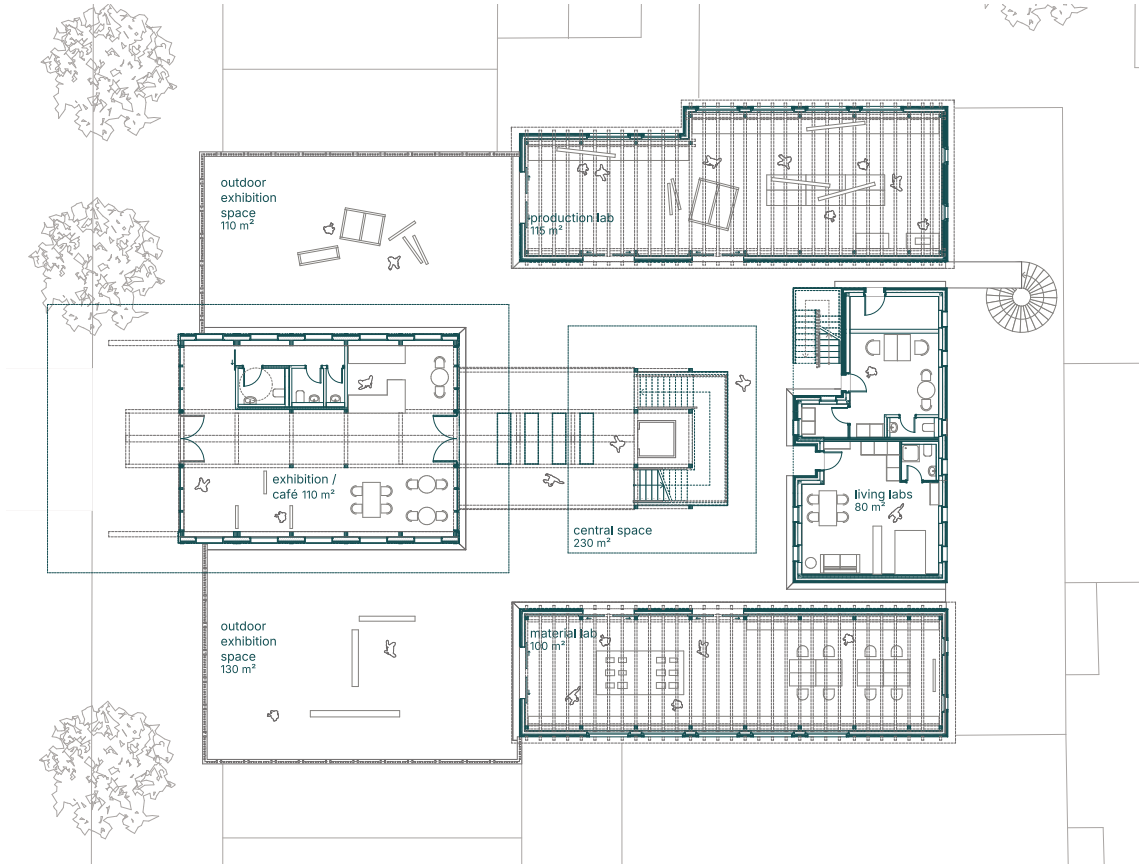


Figure 58: Floor plan of the platform, 1:50 (own figure 2026).

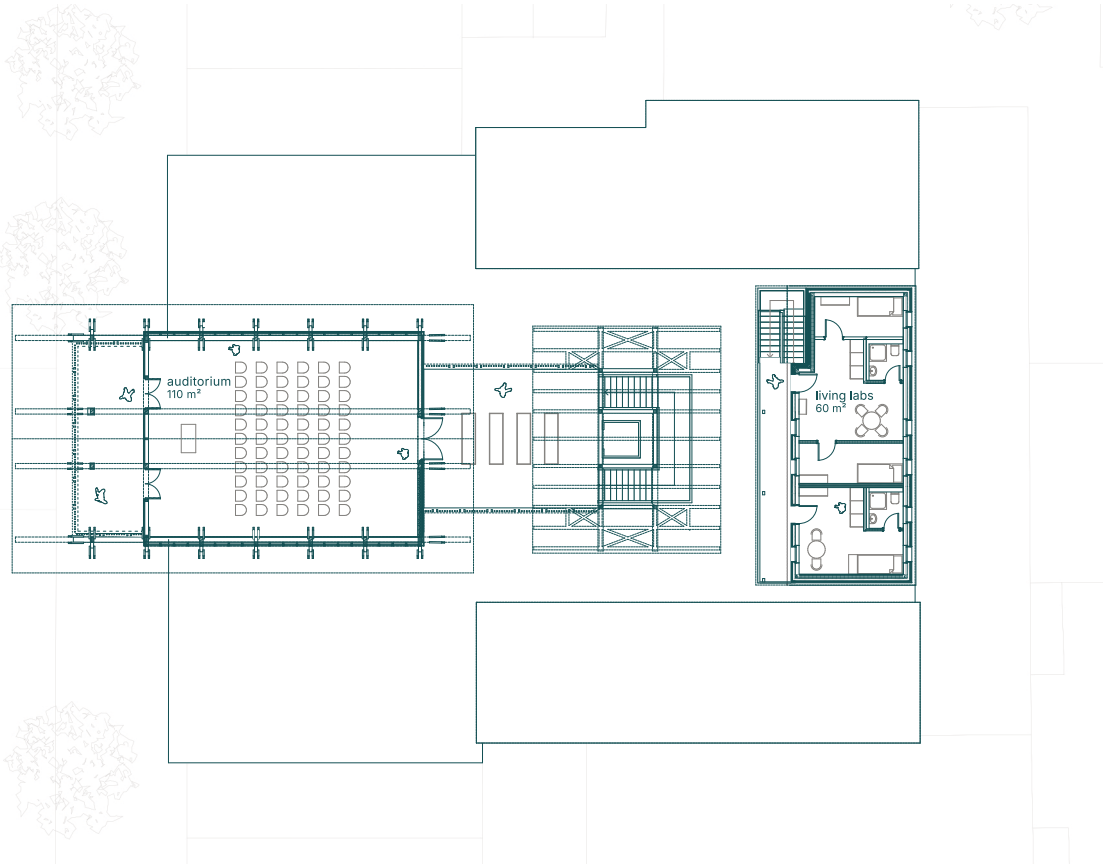


Figure 59: Floor plan of the second floor of the platform, 1:50 (own figure 2026).

3.7 climate strategies

The project integrates controlled drainage, solar protection, and natural ventilation directly into its spatial, material, and constructive organization (Figure 60).

Existing drainage systems within the building ensemble's roof are largely maintained, while water from the new roof surfaces is routed downward, within the newly introduced load distributing layer directed towards the center of the platform, and again downward along the circulation core toward a cistern integrated within the ground floor of the existing structure. The collected rainwater can subsequently be reused within the existing building and partially within the intervention itself, although the increased transport distance within the elevated addition raises questions regarding efficiency.

Solar control is achieved through controlled opening placement, roof overhangs, and integrated external shading systems. User-adjustable external blinds are integrated within the façade plane to reduce overheating while maintaining daylight access. Openings within the workshop volumes remain comparatively reduced in surface area, responding to the need for wall surfaces used for workbenches, storage, and fabrication-related activities while simultaneously supporting more controlled daylight conditions within the interior.

Natural ventilation is supported through openable façade elements and cross-ventilation conditions, with openings on opposing façade sides enabling airflow through the spaces. The positioning of the building volumes additionally creates favorable conditions for natural ventilation, with several façades oriented toward the prevailing south-western wind direction.

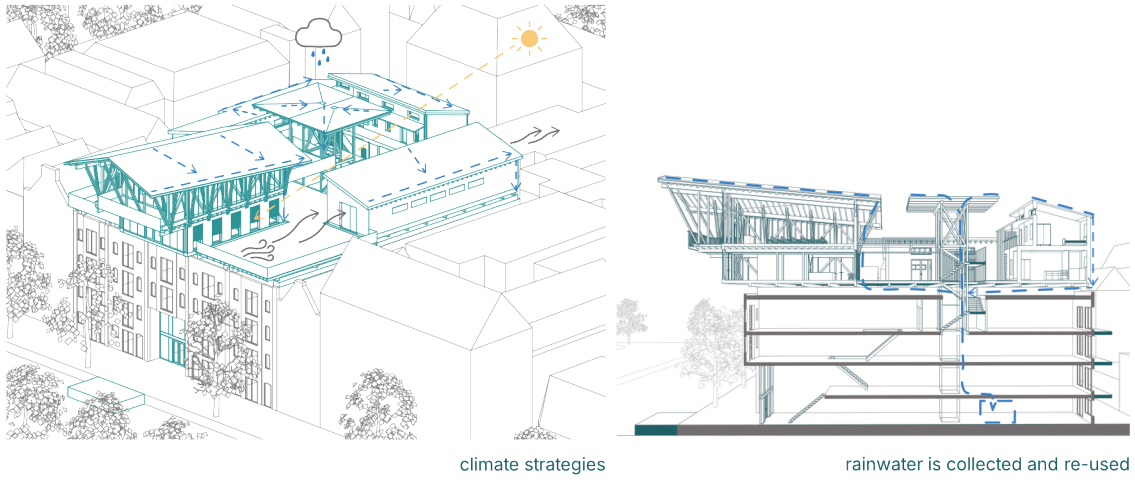


Figure 60: Diagram illustrating drainage, solar protection, and natural ventilation strategies integrated within the architectural organization of the intervention (own figure 2026).

3.8 weathering, patina, and perception



Figure 61: Comparison of ageing in a plastered façade and a naturally weathered timber façade (left: google street view, retrieved 2026, right: own figure 2026).

Position 4 of the project states that ageing is not understood as a failure, but as part of the material lifecycle and architectural expression of timber.

The perception of façade ageing is strongly shaped by aesthetic expectations within the urban environment. Smooth white plaster façades continue to represent an image of cleanliness and permanence, despite often discoloring, staining, or requiring renewal after relatively short periods of time (Figure 61). These signs of ageing are largely tolerated as part of the city.

Exposed timber façades, by contrast, confront a broader expectation that materials should remain visually controlled and unchanged over time. As a result, natural greying, surface variation, and traces of exposure are more quickly perceived as undesirable, despite representing a normal material process rather than a loss of performance (van der Lugt et al. 2023). The project intentionally retains visibly untreated timber in several façade applications, questioning contemporary tendencies within façade practice minimize visible weathering through controlled surface treatments. Acceptance of ageing is therefore shaped not only by technical performance, but also by aesthetic perception and the material approaches commonly promoted within contemporary construction practice.

As discussed in *Wendepunkt im Holzbau*, the perception of timber remains strongly tied to culturally embedded ideas of traditional and rustic architecture, reinforced through the "Alpenkitsch" imagery, a romanticized alpine rustic aesthetic, of alpine tourism architecture (Dangel 2017). Observations made during the excursion to Switzerland reinforced this argument. In contexts where timber remains visibly present in everyday architecture, weathering and patina are encountered more regularly and are therefore understood as a normal part of the built environment rather than as a sign of failure. A conversation with shingle maker Christian Koller further reflected this attitude, describing façade cladding as a sacrificial and replaceable layer rather than a permanent surface expected to remain unchanged indefinitely. Durability was therefore understood not as the maximization of lifespan, but as the ability of the material to weather, be maintained, and eventually be renewed over time.

3.9 material strategies

Material strategies within the project are understood as part of a broader approach toward constructive timber protection. As described in *Holz im Außenbereich*, timber protection strategies can generally be distinguished between constructive, chemical, and organizational measures (Erler 2002). The project primarily emphasizes constructive and organizational approaches, reducing reliance on chemical treatment wherever possible. Research emphasizes that timber durability depends not only on species selection, but also on exposure conditions, detailing, construction logic, and protective measures (Erler 2002), addressing aspects of Misconception 1. The project applies these principles through differentiated material application, assembly logic, and architectural detailing. Consequently, material strategies influence how timber can operate visibly and credibly as a material for public architecture, directly relating to Misconception 2. Differing timber species, textures, and ageing processes shape the atmospheric and tactile qualities associated with the presence of timber (Figure 62).

Organizational measures such as proper storage, drying, transport, and protected assembly sequences additionally influence long-term performance. Traditional timber construction culture understood and applied seasonal harvesting conditions, moisture content, drying behavior, and storing conditions as influential factors (Schickhofer 2002). This reinforces the need for platforms of knowledge exchange within timber construction, as long-term performance depends not only on design decisions, but also on the knowledge, supervision, and execution of those involved in the process from harvesting to application (Figure 63).



Figure 62: Material samples of selected timber species and treatments (own figure 2026).

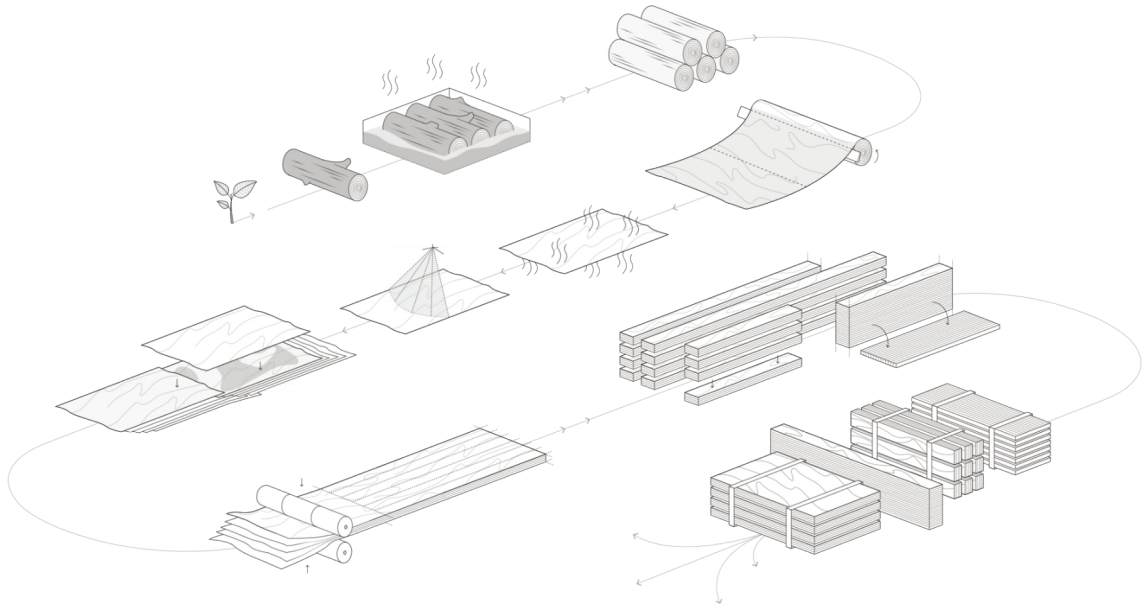
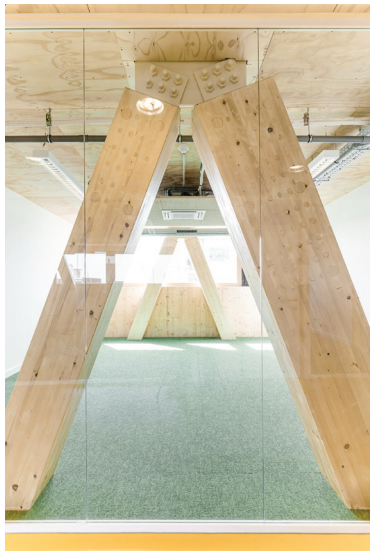


Figure 63: Illustration of the transformation of Baubuche from tree growth and harvesting to processing, engineered timber production, and architectural application (Blaß and Streib 2019).

The project differentiates façade systems according to orientation, exposure, and spatial conditions. The workshop façades combine untreated spruce shingles with vertically oriented Douglas fir cladding, allowing direct comparison between differing weathering and protection strategies. Spruce shingles are primarily applied on more exposed façade sides due to their long lifespan without requiring additional treatment (Figure 65). The shingles are split rather than sawn, allowing the wood fibers and longitudinal cell structure to remain intact, reducing surface moisture absorption and improve drainage behavior (Koller 2026). Untreated poplar cladding is selectively applied within more protected façade zones of the auditorium facing the central space, demonstrating how differing exposure conditions influence suitable timber application while intentionally testing the perceived boundaries of where visibly untreated timber can be applied.

Material selection additionally responds to differing structural, atmospheric, and tactile requirements throughout the platform. Structural systems vary according to differing exposure conditions, spans, and spatial requirements, including glulam larch within the canopy structure, solid Douglas fir within the workshop structures, glulam spruce and Baubuche within the auditorium, and visible spruce solid timber elements within the living labs.



The auditorium combines glulam spruce and Baubuche, allowing timber species and member dimensions to respond to differing structural requirements within the truss system. In this way, material selection becomes part of the structural legibility of the volume, making variations in load, span, and connection logic visible through the construction itself (Figure 64). The living labs make use of a visible solid timber system by Holzius with exposed spruce surfaces, reinforcing the project's emphasis on material legibility and inhabitation through timber. Exterior circulation areas across the platform use Accoya decking and thermally modified radiata pine railings due to their dimensional stability and suitability for highly exposed conditions.

Figure 64: Structural connection from the Mundo-A project by B-architecten, illustrating how differing timber member dimensions respond to varying structural requirements and load conditions. (B-architecten n.d.)

The living lab façade functions as comparative demonstrator for differing ageing and weathering strategies through the side-by-side application of untreated larch, thermally modified pine, and pre-greyed Douglas fir treated with KEIM Lignosil-Verano Figure 50). Unlike film-forming coatings, the breathable mineral silicate stain allows the timber to weather naturally and evenly over time while maintaining recyclability and reducing risks of peeling and trapped moisture (KEIM Lignosil-Verano: Vergrauungslasur für Holz n.d.). A complete overview of timber species and material applications is provided in Appendix D.

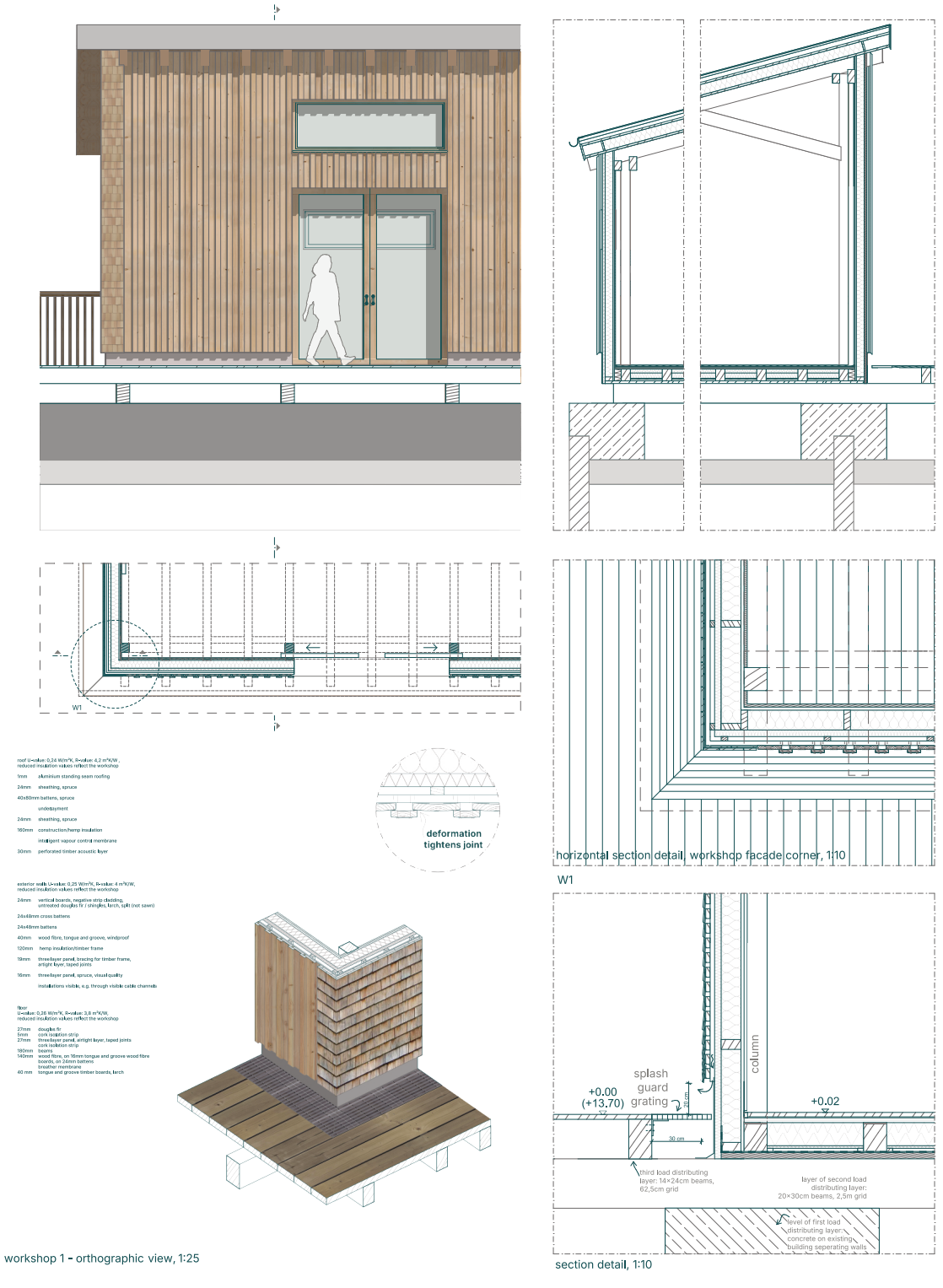


Figure 65: The cladding of the workshops responds to different orientations as well as making use of possible deformation of timber boards (own figure 2026).

3.10 detailing strategies

Building on the exposure conditions discussed in Chapter 2.3 and the material strategies outlined in Chapter 3.9, detailing strategies focus on enabling drying, ventilation, maintenance, and material movement over time through constructive timber protection. Exterior timber decking, for example, is distanced from the supporting structure below through spacer elements, reducing moisture accumulation between layers and allowing ventilation beneath the floorboards.

Façade systems are consistently detailed as ventilated constructions. Counter battens create continuous air cavities behind cladding systems, allowing moisture to dissipate and supporting drying behavior within Amsterdam's dense and moisture-prone urban conditions (See chapter 2.3) Vertically oriented timber cladding additionally supports drainage and rear ventilation, directly relating to observations also shared by Peter Fraanje (Fraanje 2026). Within the living labs, vertical façade cladding is horizontally subdivided between floors through aluminum drip edges, reducing continuous water runoff, as lower façade areas remain more exposed to runoff and splash water. Roof overhangs, drip edges, and elevated base conditions are designed to reduce water accumulation and protect timber end grain from prolonged moisture exposure through, for instance, splash water exposure (Figure 66).

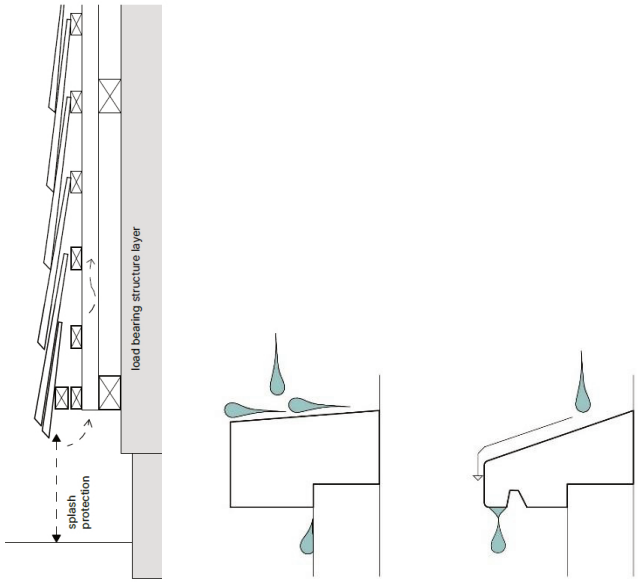


Figure 66: Principles of constructive timber protection such as splash water protection zones, rear ventilation and drip edges support long-term timber performance (own figure 2026).

The workshop façade system intentionally works with the possibility of natural movement and warping behavior of timber (Figure 67). Slight deformation of overlapping timber boards allows protective overlaps between boards to remain effective. Timber movement is therefore treated not as a defect to be avoided at all costs, but as a material behavior integrated into the constructive logic of the façade system.

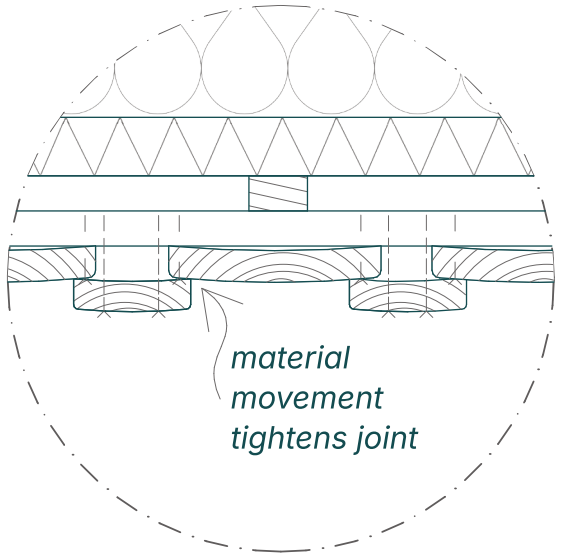


Figure 67: Warping behavior of overlapping timber boards maintaining protected overlaps and supporting constructive timber protection (modified from Scheiding et al. 2025).

Connections and structural assemblies are intentionally expressed. Exposed joints, visible load paths, and readable structural hierarchies allow visitors to understand how forces are transferred through the building. Structural dimensions vary according to differing requirements of tension, compression, span, and exposure conditions, making structural logic legible rather than concealed. This becomes particularly visible within the auditorium structure, where varying timber dimensions, exposed truss systems, and connection details become part of the architectural experience itself (Figure 68).

The project prioritizes wood-on-wood connections supported by mechanical fasteners wherever possible, reinforcing Position 1 of the project: Joining over bonding. Stainless steel screws are used exclusively in exposed exterior conditions to reduce corrosion risks and support long-term durability (Schickhofer 2002). Screwed connections are preferred over nailed assemblies due to their reversibility and suitability for replacement and maintenance.

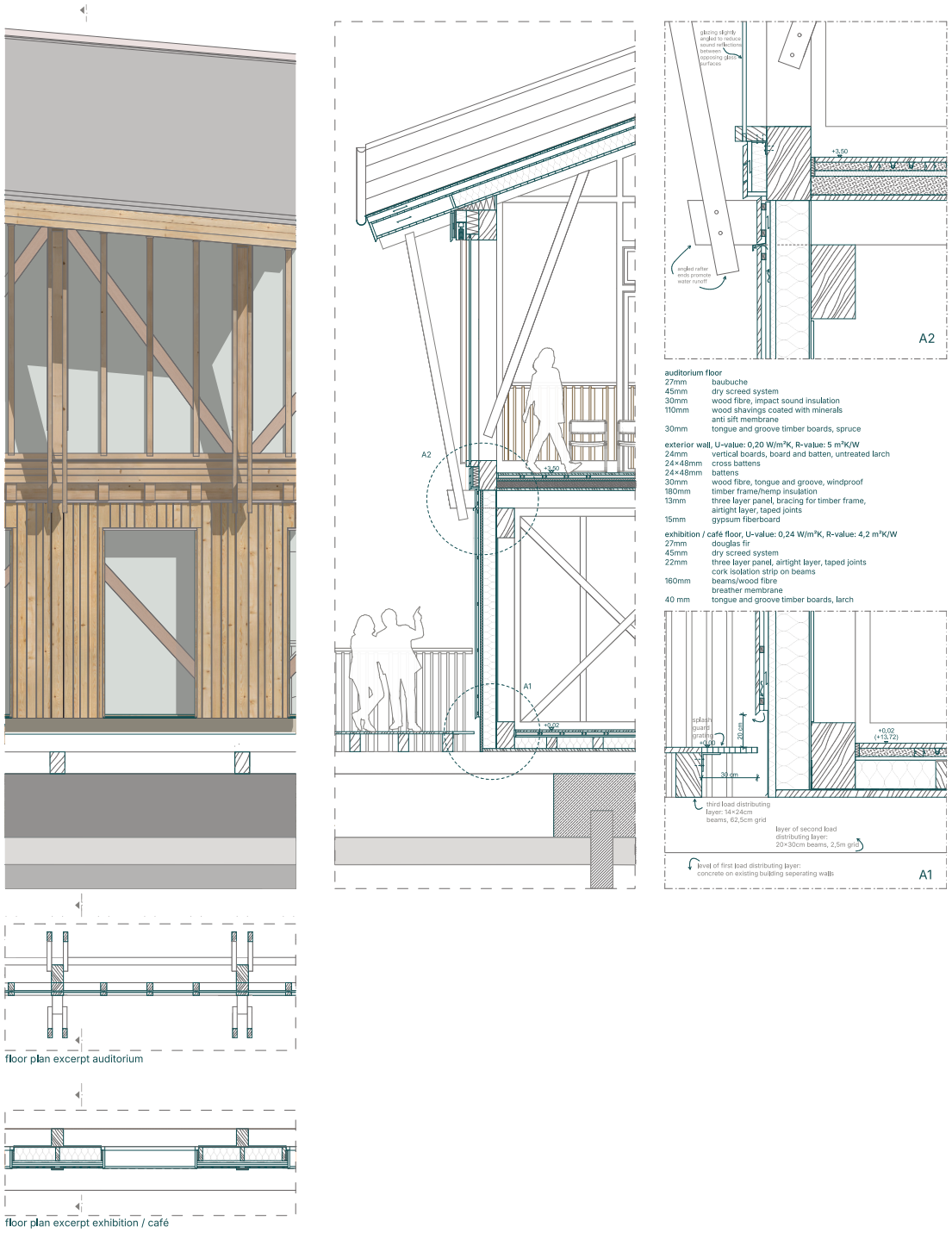


Figure 68: Orthographic view of the side façade of the auditorium, 1:25, details 1:10 (own figure 2026).

3.11 fire safety plan

Within the Dutch regulatory framework, the intervention is understood as a mixed-use special building, due to the combination of public assembly functions, workshops, exhibition spaces, and temporary inhabitation above an existing occupied structure. Fire safety is considered within the project as part of the broader protection strategies, as described in the Timber Knowledge Matrix.

The project addresses fire safety through separation of volumes, structural dimensioning, and evacuation strategies. The individual building volumes are spatially separated from one another, reducing direct fire spread between programs and allowing the intervention to operate as a series of distinct fire compartments.

Two independent escape routes are integrated into the intervention. The central circulation core connects the platform vertically to street level, while a secondary escape route is provided through an exterior circulation towards the rear courtyard on the street level of the building plot.

Structural timber elements are intended to be dimensioned according to required fire resistance performance through sacrificial charring layers and oversized timber sections.

Within the living labs, the application of solid timber construction serves as one example of a timber construction strategy whose fire behavior can be predicted through controlled charring behavior rather than concealment behind non-combustible layers. As described in *Fire Safety in Timber Buildings: Technical Guideline for Europe*, contemporary timber fire safety strategies increasingly rely on predictable charring behavior, structural dimensioning, compartmentation, and careful detailing to achieve required fire resistance performance (Östman et al. 2010).

04

part four

conclusion

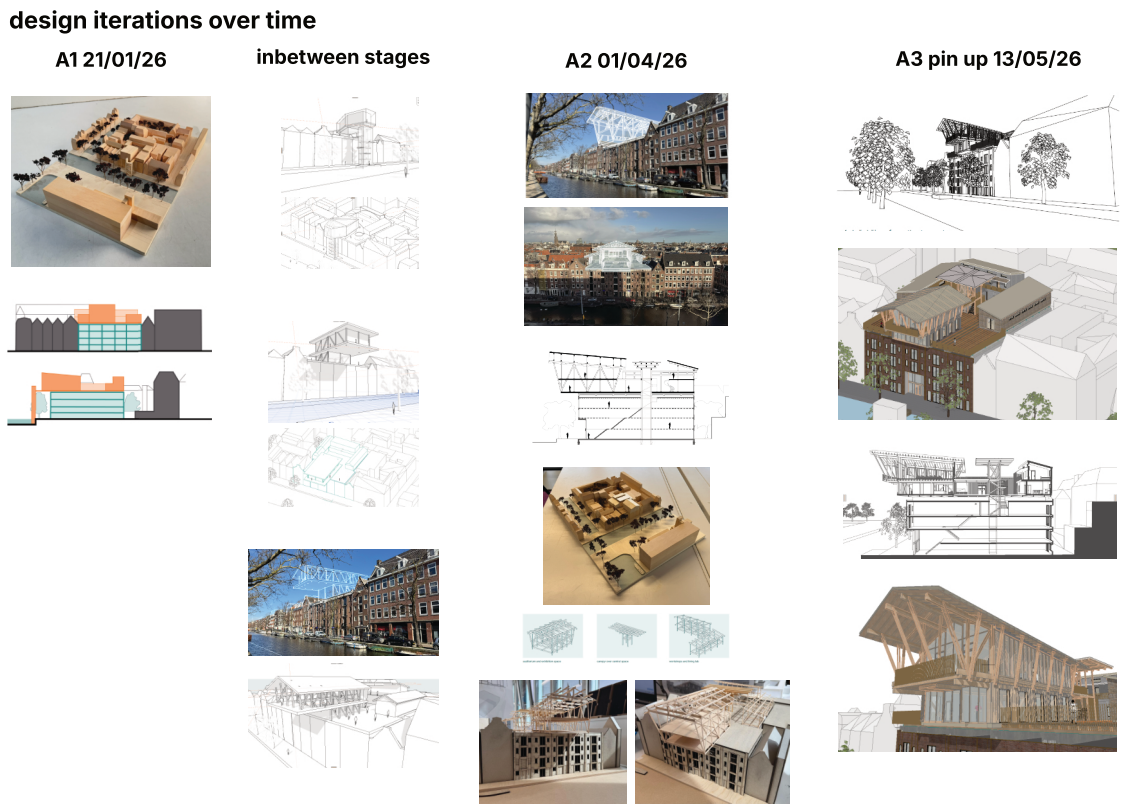


Figure 69: Overview of selected design iterations showing the development of the proposal, including changes to the auditorium cantilever and overall spatial organization (own figure 2026).

4.1 addressing misconceptions through design

This project investigated how architectural design can contribute to addressing persistent misconceptions surrounding contemporary timber construction within dense urban environments. The research focused on how visibility, exposure, publicness, and direct spatial experience influence the perception and acceptance of timber architecture.

In relation to the research question, the project suggests that timber's limited visibility within dense urban architecture is not primarily caused by a lack of technical capability, but by interconnected cycles of regulation, construction culture, perception, and limited public familiarity. Throughout the research process, the identified misconceptions increasingly revealed themselves as interconnected. Questions surrounding durability under exposure conditions became closely linked to broader assumptions regarding timber's suitability for public and urban architecture. The project therefore understands these misconceptions not simply as technical misunderstandings, but as culturally embedded perceptions reinforced through what is and is not visibly present within the city.

The resulting proposal, the Timber Knowledge Platform, translates these questions into an architectural intervention above an existing warehouse ensemble in Amsterdam. Through workshops, exhibition spaces, living labs, public gathering spaces, monitored exposure areas, and visible fabrication and assembly processes, the project positions architecture itself as a medium for knowledge exchange. Timber is presented as a material continuously undergoing processes of exposure, ageing, maintenance, and renewal.

In response to the design question, the project demonstrates how architectural strategies such as constructive timber protection, differentiated material application, visible assembly processes, exposed structural systems, and public accessibility can support timber's durable and credible presence within dense urban environments. The project explores how informed detailing, controlled weathering, replaceable layers, and visible maintenance strategies can enable timber to perform reliably over time within demanding urban conditions.

The research further highlighted how contemporary timber architecture may require a broader shift in architectural and cultural expectations. Roof overhangs, visible installations, replaceable façade layers, expressed structural systems, and material ageing often conflict with contemporary expectations of visually controlled and maintenance-free architecture. Influences such as Einfach Bauen and approaches prioritizing multifunctional layers, accessible systems, and constructive simplicity consequently became increasingly relevant throughout the project. In this sense, the project suggests that increasing acceptance of timber construction may depend not only on technical innovation, but also on a gradual adaptation of architectural aesthetics, expectations, and construction culture.

4.2 future potential and broader implications

Beyond the architectural proposal itself, the Timber Knowledge Platform raises broader questions regarding how cities may increasingly engage with timber construction in the future. The project suggests that the continued expansion of timber architecture will depend not only on technical development, but also on increasing public familiarity, visible built examples, and accessible forms of knowledge exchange.

Throughout the research and design process, it became apparent that misconceptions surrounding timber are not limited to the general public. Conversations with stakeholders occasionally revealed strongly preconceived assumptions regarding visible timber exposure, particularly concerning untreated façade applications and long-term durability. At the same time, these discussions also demonstrated the rapidly expanding range of products, systems, treatments, and detailing approaches currently available within contemporary timber construction. This growing diversity offers significant architectural potential, while simultaneously reinforcing the need for accessible expertise, interdisciplinary collaboration, and clearer guidance throughout design and construction processes.

The project additionally suggests that contemporary timber architecture should continue challenging established construction conventions and standardized material assumptions. Current construction practices often prioritize heavily layered assemblies, concealed technical systems, and extensive reliance on membranes, coatings, or chemically treated materials. Future timber construction may increasingly explore alternatives emphasizing constructive simplicity, multifunctional layers, accessible maintenance, replaceable components, and bio-based or low-processing material systems. Continued research into alternative, environmentally friendly materials, and reversible assemblies therefore remains highly relevant.

At the same time, broader implementation of timber architecture continues to depend on further technical testing, regulation development, and institutional acceptance. In particular, additional research and built examples related to fire safety, long-span public timber structures, ageing processes, and long-term durability may contribute to increasing confidence among municipalities, insurers, developers, and industry stakeholders. The project therefore suggests that demonstrative built environments capable of making timber performance directly observable may play an important role in supporting wider implementation.

The Timber Knowledge Platform itself is intentionally conceived not as a static architectural object, but as an evolving framework capable of changing over time. Displayed prototypes may be replaced, façade systems exchanged, monitored material tests expanded, and exposed timber surfaces continuously observed as they weather and age. Future additions or adaptations to the platform itself may further extend this process of ongoing experimentation and public engagement.



Figure 70: The project evolved through an iterative process of physical modelling, material exploration, and design development (own figure 2026).

Beyond Amsterdam, the project additionally raises the possibility of similar knowledge platforms emerging within other cities and regions where timber construction knowledge has become fragmented or less publicly visible over time. As many dense cities continue facing questions surrounding sustainable densification, material transitions, and land consumption, timber additionally presents significant potential for lightweight rooftop extensions and adaptive reuse strategies building upon existing structures rather than requiring further ground sealing.

Ultimately, the project suggests that timber architecture may play an increasingly important role within future processes of urban transformation, particularly in relation to adaptive reuse, rooftop densification, circular construction, and material-conscious forms of architecture. Rather than treating existing buildings as fixed endpoints, the project proposes that new layers of inhabitation, production, and public space can emerge through lightweight timber interventions building upon what already exists.

4.3 toward an architecture of exposure

Many architectural decisions developed through continuous feedback between research, testing, drawing, modelling, and material exploration, gradually transforming abstract questions surrounding durability, exposure, and publicness into spatial and constructive strategies.

The process (Figure 69) additionally reinforced the importance of architecture as a demonstrative environment. Rather than communicating timber construction primarily through technical explanation or environmental arguments, the project increasingly focused on how architectural experience itself can contribute to making timber construction more understandable, tangible, and relatable within the urban environment.

At the same time, the project highlighted the broad architectural potential of contemporary timber construction. The wide range of available timber species, structural systems, façade strategies, engineered wood products, and assembly methods demonstrated timber's capacity to respond to differing spatial, climatic, structural, and atmospheric requirements. Rather than leading toward one singular architectural language, this variety allows timber architecture to be adapted to highly diverse contexts and applications.

Certain architectural ideas gradually developed into recurring themes throughout the project and increasingly informed its identity. The cantilever emerged early on as a central spatial and structural gesture, eventually becoming one of the defining architectural elements of the intervention. Similarly, the decision to route circulation through the center of the existing building strengthened the relationship between the intervention and the warehouse ensemble below, allowing the project to engage more directly with the existing structure, history, and spatial logic already present on site rather than operating as an isolated addition above it.

The project additionally reinforced the understanding that timber architecture requires balancing architectural expression with technical responsibility. Strategies intended to maximize visibility and exposure simultaneously required careful consideration regarding detailing, weathering, maintenance, assembly, and fire safety.

Timber can remain visibly present within demanding urban conditions when its material behavior is understood and addressed through design. The Timber Knowledge Platform proposes an architecture that remains open to observation, adaptation, weathering, maintenance, and continued transformation over time.

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e List of building components

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6.1 appendix a: Interview summarized notes

Interview with Imme Groet

▼ Processed Interview notes

Interview Notes

Interviewee: Imme Groet

Role: Sustainability consultant / project manager

Organization: Houtbouwpact

Date: 2 March 2026

Format: Online interview, consent to use information and associated name given verbally

Research focus

- barriers and perceptions regarding timber construction in dense urban contexts
- relation to misconceptions about durability and public-scale timber architecture

1. Overview of Timber Adoption in Amsterdam

- timber construction increasing in the Netherlands
- driven by:
  - climate goals
  - environmental impact of concrete and steel
  - policy initiatives promoting bio-based construction
- initiatives such as the Houtbouwpact aim to accelerate adoption
- transition still **uneven across the construction sector**

2. Absence of a Single Barrier

Key insight:

- **no single dominant barrier** to timber construction

Instead, multiple factors interact:

- fire safety regulations
- financial feasibility / business case
- insurance requirements
- contractor capacity and experience
- municipal approval processes
- risk perception among developers

Implication:

- hesitation can emerge at **different stages of a project**

3. Fire Safety and Regulatory Challenges

Fire safety frequently raised in discussions about timber construction.

Implications for projects:

- additional fire protection measures required
- engineering complexity increases
- regulatory approval processes may become more demanding

These factors can influence:

- project costs
- feasibility assessments
- stakeholder confidence

4. Distributed Risk Across Stakeholders

Hesitation toward timber may arise from **different actors within the construction chain**.

Possible points of resistance:

- municipalities
  - uncertainty in permitting process
- developers
  - concerns about cost and financial risk
- contractors
  - limited experience with timber construction
- insurers
  - additional requirements or uncertainty about long-term performance

Observation:

- projects may initially be proposed as timber but later revert to conventional materials due to these concerns.

5. Changes in Perception Over Time

Interviewee notes a gradual shift toward greater acceptance of timber construction.

Drivers include:

- increased awareness of climate impact of construction materials
- growing political support for bio-based construction
- industry learning through projects and research

However:

- acceptance still varies significantly between different actors.

6. CO_2 Argument and Communication

CO_2 storage commonly used as an argument for timber construction.

However:

- described as **very abstract for many stakeholders**

Statements such as:

- “this building stores X amount of CO_2”

can be difficult to interpret in practical decision-making contexts.

CO_2 arguments tend to work best in:

- policy discussions
- sustainability reporting
- strategic planning

Less effective in convincing:

- developers
- contractors
- some municipal decision-makers

Environmental benefits are acknowledged, but **not always sufficient to drive adoption**.

Interpretation for Research

- carbon metrics alone may not build trust in timber construction
- stakeholders often rely more on:
  - precedents
  - proven performance
  - visible examples of timber buildings

Possible Architectural Implications

Architecture may help translate abstract sustainability arguments into **tangible spatial experience** through:

- visible timber structure
- tactile material surfaces
- direct public experience of timber spaces
- visible examples of timber buildings in the city

7. Visibility of Timber in Architecture

Observation from the interview:

- timber is sometimes used structurally

- but **not always visible externally**

Examples include projects where:

- structural systems are timber
- façade materials conceal the timber structure

Implication:

- visible timber expression in urban architecture remains limited.

This suggests:

- ongoing hesitation toward **exposed timber in prominent urban contexts**

8. Houtbouwpact Initiative

The Houtbouwpact initiative aims to increase timber construction in the Amsterdam metropolitan region.

Key elements:

- collaboration between:
  - municipalities
  - developers
  - contractors
  - investors
  - knowledge institutions
- ambition that **approximately 20% of new buildings** in the region should use timber or bio-based construction.

Activities include:

- research on timber business cases
- advising municipalities on timber projects
- organizing events and workshops
- knowledge exchange between stakeholders.

9. Knowledge Exchange and Learning

Knowledge exchange considered essential for accelerating timber adoption.

Examples of activities:

- site visits to timber projects
- workshops and conferences
- research publications
- collaborative learning programs.

Observation:

- physical visits to projects allow participants to **experience timber buildings directly**.

10. Relevance for Research

Key insight:

- timber adoption shaped by **multiple interacting factors**, including:
  - regulations
  - costs
  - insurance
  - contractor experience
  - municipal approval
  - risk perception

Hesitation toward timber is therefore:

- systemic
- distributed across the construction ecosystem.

Implication for Architectural Research

Architectural projects cannot remove all systemic barriers.

However, architecture can contribute to:

- increasing **visibility of timber construction**
- creating **built precedents**
- enabling **direct experience of timber buildings**

- demonstrating timber performance in dense urban contexts.

Connection to Project

The proposed **Timber Knowledge Platform** can function as:

- a demonstration environment for timber construction
- a place where timber structure and material behavior become visible
- a way to communicate timber capabilities through **experience rather than abstract information**.

▼ Prepared questions

1️⃣ Reality First

> From your experience, what is currently the biggest hesitation when timber is proposed in dense urban projects in Amsterdam?

2️⃣ Clarify the Nature of the Barrier (Merged Question)

> Would you describe that hesitation as primarily technical, regulatory, financial, or more cultural?
>
> And in the case of durability concerns specifically, are these typically grounded in technical evidence, or more in perceived risk and uncertainty?

Follow-up:

> Has this shifted in recent years?

3️⃣ Misunderstanding (Move It Here)

> From your perspective, what is currently most misunderstood about timber in Amsterdam's urban context?

Optional probe:

> Among professionals, or more broadly in the public and political sphere?

4️⃣ Housing vs Public Scale

> Do you observe a difference in acceptance between timber housing projects and more publicly visible or civic-scale buildings?

Follow-up:

> Does visibility increase perceived risk?

5️⃣ Trust

> What builds trust in timber proposals at municipal or developer level?

Follow-up:

> Is that trust built more through data (CO_2), precedent projects, or architectural clarity?

6️⃣ Exposure Specific

> When concerns about long-term exposure or weathering arise, who typically raises them — technical experts, decision-makers, or developers?

Interview with Peter Fraanje

Interview Notes

Interviewee: Peter Fraanje

Role: Networks Lead Netherlands

Organization: Built by Nature

Date: 05-03-2026

Format: in person

Consent form can be provided upon request

1. Background

- PhD at University of Amsterdam on **bio-based building materials**
- long-term focus on **timber in construction**
- currently working at Built by Nature

Key concept:

Cascading use of timber

- timber used multiple times across different applications
- sequence:
  - structural use (beam)
  - reuse as planks / boards
  - further downcycling

Purpose:

- extend material lifespan
- reduce resource pressure

Example mentioned:

- oak could theoretically be used over **hundreds of years** through cascading

NTA 6125

- focuses on fire spread along surfaces (e.g. CLT)
- recommendations to limit exposed timber inside

To look into:

- NTA 6125 full document
- how it relates to **BBL (Besluit Bouwwerken Leefomgeving)**
- criticism of NTA 6125 in Dutch timber sector

6. Insurance and Timber High-Rise

Example:

Amstelwood

- timber residential tower in **Amstelveen (Amsterdam region)**
- initially difficult to insure
- now completed and in use

Second example:

- timber tower project in **Zaanstreek (Zaandam region)**
- also facing insurance issues

To look into:

- insurers involved in Amstelwood
- construction method (CLT / hybrid?)
- timeline of insurance issue → solution

8. Demonstration and Experience

Event:

Dag van de Houtbouw

- linked to **Dag van de Bouw**
- public can visit timber construction sites

Timing:

2. Cultural Perception of Timber and Carbon Storage

Observation:

- understanding of timber as **carbon storage** differs culturally

Example:

- Germany:
  - higher awareness of carbon storage in wood
- Netherlands / Anglo-Saxon context:
  - less intuitive understanding

Possible reason:

- proximity to forests → stronger material awareness

Implication:

- CO_2 arguments for timber can feel **abstract**
- environmental benefits not always immediately convincing

3. Historic Timber Use in Amsterdam

- many historic buildings in Amsterdam use **timber structurally**
- timber hidden behind masonry façades

Example:

Begijnhof Amsterdam

→ one of the last remaining timber façades in the city

To look into:

- history of fire regulations in Amsterdam
- transition from timber to masonry façades

5. Current Fire Regulation Discussion

Guideline mentioned:

- typically **June**
- national event

Start:

- emerged around **2022–2023** (timber-specific focus)

To look into:

- official website / program
- which projects were open (case studies!)
- who organizes it (likely sector coalitions / companies / partners like Built by Nature)

9. Study on Willingness to Live in Timber Housing

Organization mentioned:

Landschapsbeheer Nederland

Survey result mentioned:

- **38% of respondents** would consider living in a timber house
- actual timber housing share: ~7%

Important:

Name of the study not clearly stated → likely paraphrased reference

To look into:

Search terms:

- “wonen in een houten huis onderzoek Nederland”
- “biobased bouwen draagvlak Nederland”
- Built by Nature / Houtbouwpact reports
- CBS or PBL housing preference studies

Interpretation

- clear gap between **interest (38%)** and **implementation (7%)**
- suggests:

- not a demand problem
- but a **system / perception / regulation problem**

→ fits your misconception loop very strongly

10. Timber Floor Performance

Reference mentioned:

Lignatur

- provides acoustic solutions for timber floors
- has configurators / performance data

To look into:

- Lignatur floor systems
- acoustic comparison CLT vs concrete
- possibility of using this as reference for **your mock-up idea**

11. Timber Facade Design in Dutch Climate

Example:

SAWA Rotterdam

- timber building in Rotterdam
- façade exposed to weathering
- observed early stage weathering still acceptable

Construction issue:

- wind-driven rain penetrated structure during construction

To look into:

- façade detailing of SAWA
- weathering strategy (pre-greying? untreated?)
- contractor / architect

12. Orientation of Facades

Key point:

- façade exposure differs strongly by orientation

Netherlands:

- **West façade → highest wind-driven rain**
- South → UV exposure
- North → slow drying / biological growth

To look into:

- wind-driven rain maps Netherlands
- façade exposure classes (EN standards)
- relation to timber durability classes

13. Structural Protection by Design

Reference type:

- Amsterdam School architecture

Features:

- large overhangs
- articulated façade geometry
- integrated protection strategies

To look into:

- Amsterdam School façade sections
- historical detailing for rain protection

15. Timber Board Orientation

Design recommendation:

- **vertical boards preferred**

Reason:

- better water drainage
- less moisture retention

Book mentioned:

- *Natuurlijk bouwen met hout* (Peter Fraanje)

To look into:

- key arguments from the book
- relation to Dutch timber construction discourse

Horizontal boards:

- trap water
- higher degradation risk

→ directly relevant for your façade system

17. Social Acceptance of Topping-Up

Key number:

- **70% resident approval** often required (housing corporations)

To look into:

- Dutch housing corporation rules
- participation requirements in redevelopment
- examples where topping-up failed due to resistance

18. Built by Nature

Organization:

Built by Nature

Approach:

- network-based
- connects frontrunners
- focuses on scaling timber construction

Concept mentioned:

- **“theory of change”**

To look into:

- Built by Nature reports
- funding programs
- knowledge hub / case studies

19. Additional References

6.2 appendix b: ethics committee approval

Date 07-Apr-2026
Correspondence hrec@tudelft.nl

TU Delft Delft University of Technology

•

Human Research Ethics Committee TU Delft
(http://hrec.tudelft.nl)

Visiting address
Jaffalaan 5 (building 31)
2628 BX Delft

Postal address
P.O. Box 5015 2600 GA Delft
The Netherlands

Ethics Approval Application: Timber Knowledge Platform
Applicant: Stutzenberger, Jennifer

Dear Jennifer Stutzenberger,

It is a pleasure to inform you that your application mentioned above has been approved.

Thanks very much for your submission to the HREC which has been approved.
•

In addition to any specific conditions or notes, the HREC•provides•the following standard advice to all applicants:•

••In light of•recent tax changes, we•advise that you confirm•any proposed•remuneration•of research subjects with your faculty contract manager before going ahead.•

• Please make sure when you carry out your research that you confirm contemporary covid protocols with your faculty HSE advisor, and that ongoing covid risks and precautions are flagged in the informed consent - with particular attention to this where there are physically vulnerable (eg: elderly or with underlying conditions) participants involved.•

• Our default advice is not to publish transcripts or transcript summaries, but to•retain•these privately for specific purposes/checking; and if they are to be made public then only if fully anonymised and the transcript/summary itself approved by participants for specific purpose.•

• Where there are collaborating (including funding) partners,•appropriate formal•agreements including clarity on responsibilities, including data ownership, responsibilities and access, should be in place and that relevant aspects of such agreements (such as access to raw or other data) are clear in the Informed Consent.

Good luck with your research!

Sincerely,

Dr. C. Shelley-Egan
Chair HREC
Faculty of Technology, Policy and Management

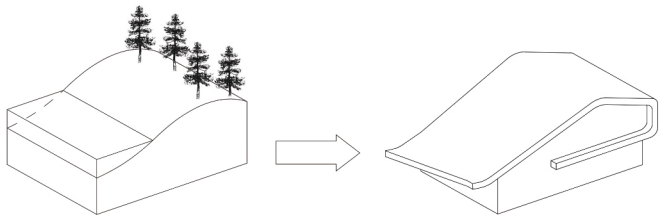
6.3 appendix c: Case study Villa Heilooërbos



ARCHITECT: Natrufied Architecture
ENGINEER: Step Engineering, Emmen
CLIENT: Private client
CONTRACTOR: Van der Hulst en Houtbouw 't Zand
WOOD SUPPLIER: PWN, from the Bergen aan Zee region

DATE OF COMPLETION: January 2025
LOCATION: Heiloo, Noord-Holland, Netherlands
TYPE: Single-family house
SIZE: 150 m² gross floor area

MAIN MATERIAL:
- Locally sourced dune pine (structural)
- Hybrid timber structure (CLT, laminated beams, HSB elements)



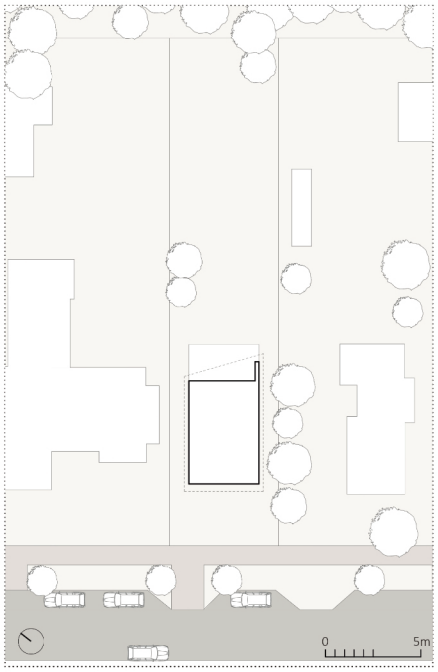
Local dune forest with pines as material and inspiration source

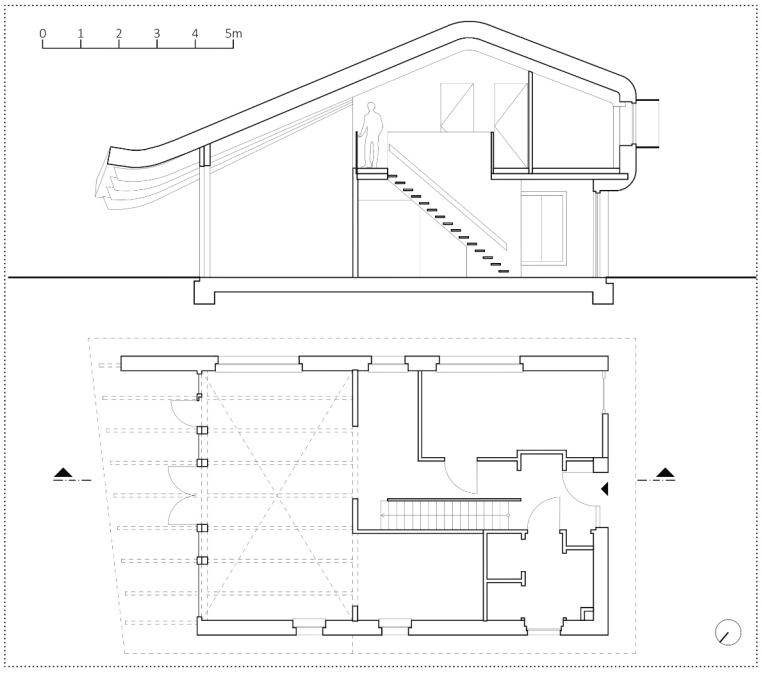
Villa Heilooërbos

Villa Heilooërbos is a biobased single family home embedded along the edge of the Heiloo forest in North Holland. Designed by Natrufied Architecture, the composition takes its inspiration directly from the surrounding dune landscape and the tall pine trees that define the site. Its gently curved roof and flowing façade lines mirror the natural shapes of the terrain, helping the building settle into the nearby forest while still standing out as a sculptural, contemporary form.

Built almost entirely from timber, the villa brings together CLT panels, laminated wooden beams, and prefabricated timber frame façade elements. A notable portion of the structure uses locally harvested dune pine, reinforcing the project's commitment to regional and renewable materials. The exterior is finished with FSC-certified iroko and bamboo cladding, giving the house a warm, tactile appearance. Large windows and openings frame views into the surrounding nature, allowing daylight to shift across the interior as the forest changes throughout the day.

Inside, the spaces flow smoothly from shared living areas to more private rooms, consistently oriented toward the surrounding nature. Low eaves and softened overhangs create sheltered outdoor spots and soften the boundary between inside and outside. Sustainability becomes a core principle of the project: wood-fibre insulation, a lightweight, renewable and demountable structure all contribute to reducing the home's environmental footprint.
Ultimately, Villa Heilooërbos reflects a clear, modern response to its forest context.





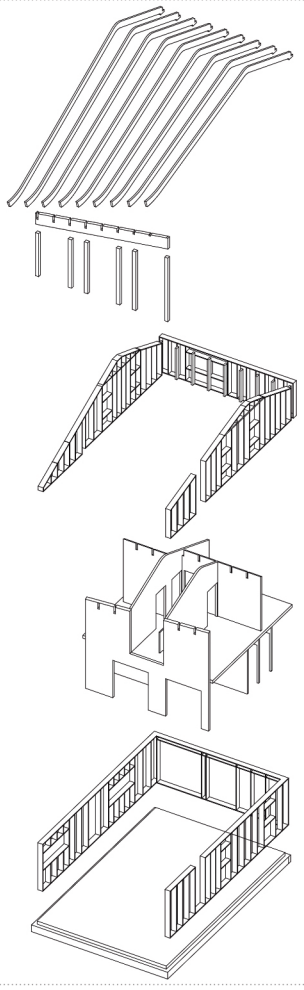
2025_NL_Heiloo_**Villa Heilooërbos**_Natrufied Architecture

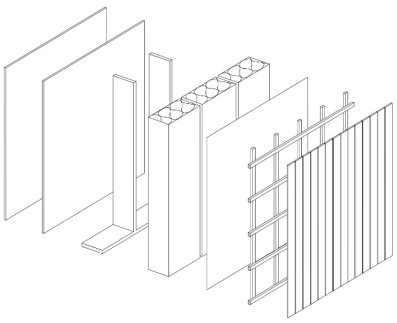
Case studies from Timber / NL

All drawings and pictures made by: Grytsje Rozema & Jennifer Stutzenberger

Order of assembly

1) Concrete foundation slab
2) Placing pre-fabricated timber frame elements on ground floor
3) Placing inner CLT walls and floor slab
4) Placing pre-fabricated timber frame elements on CLT floor slab
5) Placing columns
6) Mounting sloped beam onto columns
7) Placing curved pine beams onto sloped beam
8) Adding remaining layers onto facade and roof

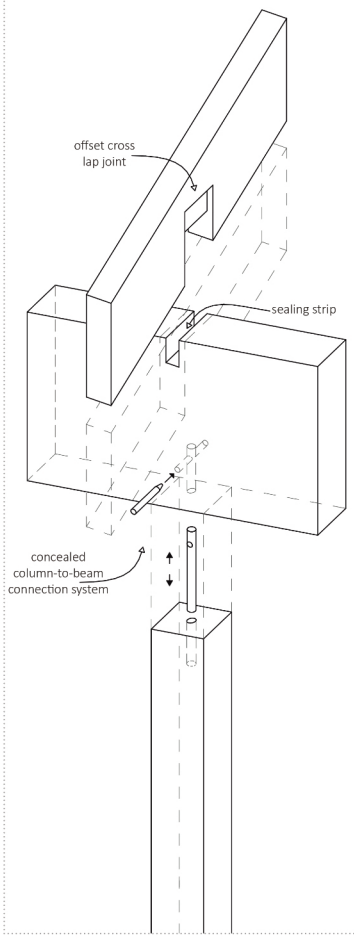




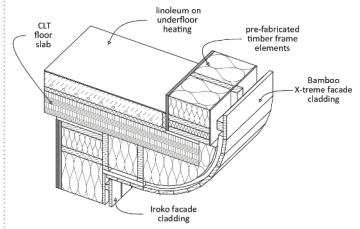
Facade layers of pre-fabricated timber frame elements (Interior - exterior)

1) Visible GSP board
2) OSB
3) Wooden frame wall
4) Wood wool insulation
5) Windproof membrane
6) Substructure
7) Iroko wood facade cladding

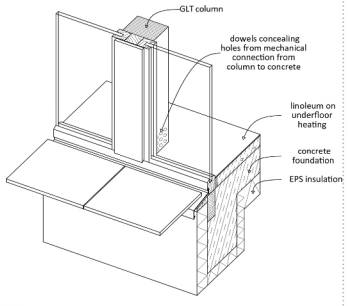
Exploded structural detail of a rafter-beam-column connection



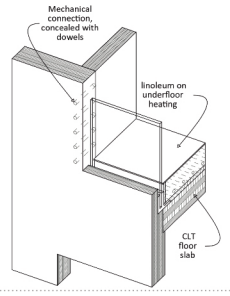
Detail 1
CLT floor slab cantilever



Detail 2
Post-beam facade foot point



Detail 3
CLT walls corner meeting point



2025_NL_Heiloo_**Villa Heilooërbos**_Natrufied Architecture

Case studies from Timber / NL

All drawings and pictures made by: Grytsje Rozema & Jennifer Stutzenberger

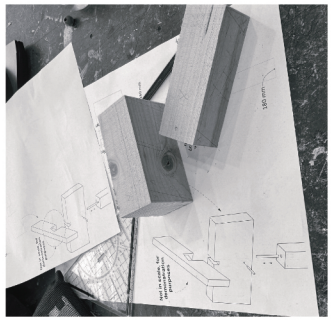
The house reads as a coherent idea in which material, form, and construction are closely linked. The use of regional pine from the nearby dune forest informs not only the material expression but also the overall volume, which subtly echoes the shape of a dune. Allowing the origin of the material to influence the form of the building gives the project a calm and grounded character.

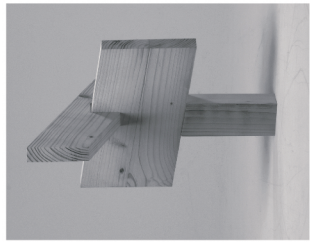
This attitude carries through into the way connections are handled throughout the house. Structural and architectural elements meet with a strong sense of continuity, and mechanical connections are deliberately kept out of sight. Where a connection can be assumed rather than directly seen, it is subtly concealed by wooden dowels that blend into the material language instead of reading as technical fixings.

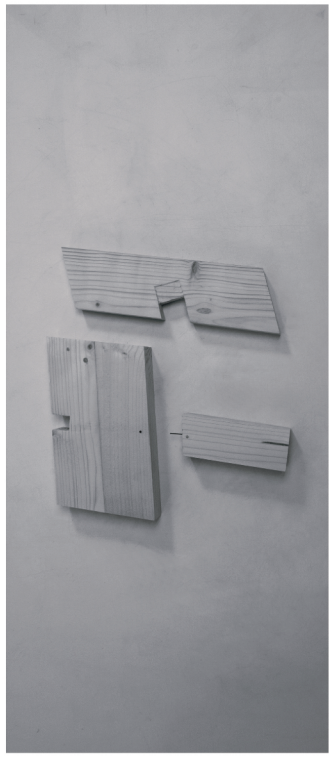
The detail explored through modelling raised questions about how this clarity was achieved in the built work. The lack of visible separation between elements suggested a continuity that extends beyond what can be immediately read from the interior. To better understand this, construction footage, technical material from the architects, and photographs of both the interior and exterior were studied alongside one another. Differences between drawings, details, and the executed building became apparent, making interpretation part of the process.

This understanding was further shaped through physical modelling. Working at a 1:5 scale required precision, but it made the connection logic, tolerances, and assembly sequence more tangible. The modelling helped bridge the gap between the apparent effortlessness of the finished interior and the complexity of the construction decisions behind it.

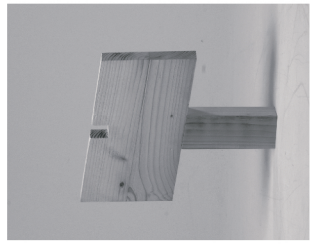


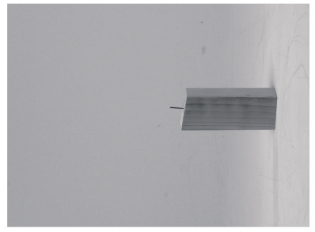












2025_NL_Heiloo_**Villa Heilooërbos**_Natrufied Architecture

Case studies from Timber / NL

All drawings and pictures made by: Grytsje Rozema & Jennifer Stutzenberger

6.4 appendix d: List of material choice and application

Types of wood used

Platform

- Flooring: accoya
- Spacer pads between decking and substructure ensure ventilation and drainage.

Railings: thermally modified radiata pine

Auditorium

- Construction
  - Interior: Baubuche und Glulam Spruce
  - Exposed to elements: Glulam Spruce
- Flooring: Baubuche
- Facade
  - Upper floor Facade to Central Space: Untreated poplar
  - Lower floor Facade Sides: profiled wood cladding, untreated larch

Workshops

- Construction
  - solid structural timber, Douglas Fir
- Walls: three layer panel, spruce
- Flooring: douglas fir
- Facade
  - Shingles, larch, untreated, split (not sawn)
  - Vertical boards, negative strip cladding, douglas fir, untreated

Living Labs

- Construction
  - Holzius, spruce, visible
- Flooring: spruce
- Facade

Vertical façade cladding is horizontally subdivided between floors. Horizontal façade subdivision with aluminium drip edge reduces continuous water runoff and allows differentiated weathering and replacement strategies, as lower façade areas remain more exposed to runoff and splash water

- 1 Untreated Larch, profiling: profiled wood cladding
- 2 Thermally modified Pine, strip cladding
- 3 Douglas fir, pre-greyed, KEIM Lignosil-Verano, negative strip cladding

Canopy

Construction: Glulam Larch

Types of wood used

2

Building components

Platform

Flooring: accoya, spacer pads between decking and substructure ensure ventilation and drainage.

Canopy

Canopy structure: glulam larch

Auditorium building

- Truss members (internal columns and diagonals): laminated veneer lumber LLVL, BauBuche)
- Top and bottom chords: glued laminated timber (glulam), spruce
- Columns with exterior exposure: glulam, spruce

Roof U-value: 0,22 W/m²K, R-value: 4,5 m²K/W

1mm aluminium standing seam roofing

24mm sheathing, spruce

80mm battens, spruce, 40□80mm

underlayment

24mm sheathing, spruce

180mm construction/hemp insulation

intelligent vapour control membrane

30mm perforated timber acoustic layer

Rafters

Upper level

Floor

27mm baubuche, tongue-and-groove joints

45mm dry screed system

30mm wood fibre, impact sound insulation

110mm wood shavings coated with minerals or mixed with clay

Building components

1

anti sift membrane

30mm tongue and groove timber boards, spruce

Side walls

- spruce glulam post and beam structure with Accoya cover caps

remark: slightly inclined glazing reduces direct sound reflection between opposing glass surfaces

Facade towards central space U-value: 0,23 W/m²K, R-value: 4,3 m²K/W

24mm vertical boards, profiled wood cladding, poplar, untreated

24□48mm cross battens

24□48mm battens

30mm wood fibre, tongue and groove, windproof

140mm timber frame/hemp insulation

13mm three layer panel, bracing for timber frame, airtight layer, taped joints

15mm gypsum fiberboard

Facade towards Canal

spruce glulam post and beam structure with Accoya cover caps

Lower level

Side walls U-value: 0,20 W/m²K, R-value: 5 m²K/W

24mm vertical boards, profiled wood cladding, untreated larch

24□48mm cross battens

24□48mm battens

30mm wood fibre, tongue and groove, windproof

180mm timber frame/hemp insulation

13mm three layer panel, bracing for timber frame, airtight layer, taped joints

15mm gypsum fiberboard

Facade towards center and canal

- spruce glulam post and beam structure with Accoya cover caps

remark: slightly inclined glazing reduces direct sound reflection between opposing glass surfaces

Floor U-value: 0,24 W/m²K, R-value: 4,2 m²K/W

27mm douglas fir

45mm dry screed system

22mm three layer panel, airtight layer, taped joints

cork isolation strip on beams

160mm beams/wood fibre

breather membrane

40 mm tongue and groove timber boards, larch

Plinth

Workshops

Furniture

work surfaces: BauBuche (beech) as a durable work surface

Construction in solid douglas fir

Roof U-value: 0,24 W/m²K, R-value: 4,2 m²K/W, reduced insulation values reflect the workshop

1mm aluminium standing seam roofing

24mm sheathing, spruce

40□80mm battens, spruce

underlayment

24mm sheathing, spruce

160mm construction/hemp insulation

intelligent vapour control membrane

30mm perforated timber acoustic layer

Rafters

Walls U-value: 0,25 W/m²K, R-value: 4 m²K/W, reduced insulation values reflect the workshop

24mm vertical boards, negative strip cladding, untreated douglas fir / shingles, larch, split (not sawn)

24□48mm cross battens

24□48mm battens

40mm wood fibre, tongue and groove, windproof

120mm hemp insulation/timber frame

19mm three layer panel, bracing for timber frame, airtight layer, taped joints

16mm three layer panel, spruce, visual quality

installations visible, e.g. through visible cable channels

Plinth

2mm steel plate

40mm wood fibre, tongue and groove, windproof

120mm wood fibre/timber frame

19mm three layer panel, bracing for timber frame, airtight layer, taped joints

16mm three layer panel, visual quality

installations visible, e.g. through visible cable channels

Floor, U-value: 0,26 W/m²K, R-value: 3,8 m²K/W, reduced insulation values reflect the workshop

27mm douglas fir

5mm cork isolation strip

27mm three layer panel, airtight layer, taped joints

cork isolation strip where panel lies on construction

180mm beams

140mm wood fibre, on 16mm tongue and groove wood fibre boards, on 24mm battens

breather membrane

40 mm tongue and groove timber boards, larch

Living labs

Stairs

- Remark: Timber stair stringer elevated from ground on steel shoe to avoid moisture exposure

Roof U-value: 0,20 W/m²K, R-value: 5 m²K/W

1mm steel sheeting

24mm sheathing, spruce

40□80mm battens, spruce

underlayment

24mm sheathing, spruce

140mm construction/wood fibre

intelligent vapour control membrane

180mm holzius dowelled solid timber wall element, spruce, visual quality

-

Walls U-value: 0,18 W/m²K, R-value: 5,6 m²K/W

24mm vertical boards, horizontally subdivided between floors

- 1 Untreated Larch, profiling: profiled wood cladding
- 2 Thermally modified Pine, strip cladding
- 3 Douglas fir, pre-greyed, KEIM Lignosil-Verano, negative strip cladding

24□48mm cross battens

24□48mm battens

20mm wood fibre, tongue and groove, windproof

120mm hemp insulation

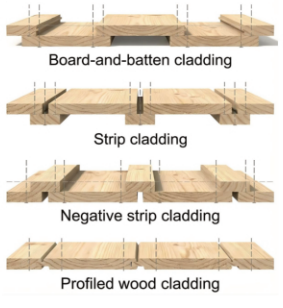
180mm holzius dowelled solid timber wall element, visual quality, pre-milled installation channels

Facade of Exterior (from left to right)

1 Untreated Larch, profiling: profiled wood cladding

2 Thermally modified Pine, strip cladding

3 Douglas fir, pre-greyed, KEIM Lignosil-Verano, negative strip cladding



Interior

Unit separating wall, Rw=56 dB

120mm holzius dowelled solid timber wall element, visual quality

40mm flexible wood fibre insulation

30mm air space

120mm holzius dowelled solid timber wall element, visual quality

Within unit

120mm holzius dowelled solid timber wall element, visual quality

Bathroom walls

120mm holzius dowelled solid timber wall element, visual quality

15mm gypsum fiberboard

Plinth

2mm steel plate

40mm wood fibre, tongue and groove, windproof

100mm wood fibre

180mm holzius dowelled solid timber wall element, visual quality

Floor U-value: 0,23 W/m²K, R-value: 4,3 m²K/W

27mm spruce

45mm dry screed system

22mm three layer panel, airtight layer, taped joints

cork isolation strip where panel lies on construction

160mm beams/wood fibre

breather membrane

40 mm tongue and groove timber boards, larch

Floor upper storey

27mm spruce

45mm dry screed system

30mm wood fibre, impact sound insulation

110mm wood shavings coated with minerals or mixed with clay

anti sift membrane

180 mm holzius dowelled solid timber floor element, visual quality

6.6 appendix f: Timber knowledge matrix notes

the timber knowledge matrix

The layers

- Program
  → *What role does this volume play within the platform?*
- Addressed misconceptions
  → *Which misconceptions surrounding timber construction are addressed through this volume?*
- Construction system
  → *What construction system is applied?*
- Connection logic
  → How are timber elements physically joined, connected, and structurally organized?
- Exposure & legibility
  → How do exposure conditions and spatial positioning make aspects of timber construction, processing, performance, or ageing visible and experienceable?
- Material strategy
  → *How do material selection and timber species respond to differing requirements of atmosphere, durability, structure, and ageing?*
- Assembly strategy
  → *How are timber elements transported, fabricated, assembled, maintained, or potentially replaced?*
- Protection and detailing strategy
  → *How are durability, exposure, fire performance, and architectural intentions resolved through constructive design and detailing?*

Per building

Canopy

- program
  - central orientation space
  - collective gathering space
- addressed misconception
  - timber shapes collective public space
- construction system
  - glulam post-and-beam structure
  - shallow pitched roof
- connection logic
  - layered beam intersections, cross-lap joint
- exposure and legibility
  - legible load distribution layers
  - partial exposure to elements
- material strategy
  - glulam larch
- assembly strategy
  - on-site
- protection and detailing strategy
  - roof protects beam intersections
  - central roof drainage
  - fire safety : separated from enclosed volumes

Workshops

- program
  - fabrication, prototyping, education on timber construction
- addressed misconception
  - timber performs through informed detailing
- construction system
  - skeleton with double tie-beam system, mono-pitched roof
- connection logic

- double sided timber clamp connection between beams to column
- rafters on beams: birdsmouth joint

>exposure and legibility

- internally exposed structure
- timber as workable material

>material strategy

- construction: solid douglas fir
- facade: larch shingles, untreated, split (not sawn) / douglas fir, untreated

>assembly strategy

- skeleton first, followed by pre-fabricated facade modules

>protection and detailing strategy

- orientation specific, rear-ventilated, vertical facade cladding
- splash-water protection zone
- recessed structural frame behind replaceable façade layer

Auditorium

>program

- lectures and discussions
- exhibition and café
- building material arrival spot at platform level

>addressed misconception

- timber operates at public scale
- enables long-span structures

>construction system

- cantilevering, storey-height timber trusses
- pitched roof

>connection logic

- trusses: interlocking toothed joints with concealed screw reinforcement

>exposure and legibility

- publicly visible cantilever and truss structure

>material strategy

- construction: glulam spruce and baubuche (combination allowing more slender members in highly loaded areas)
- facade cladding: poplar (top), larch (bottom), untreated

>assembly strategy

- pre-fabricated trusses craned on site

>protection and detailing strategy

- visibly exposed structure, material strategy responds to partial exposure to elements
- deep eaves regulating exposure and weathering
- integrated solar protection (in the wall plane)
- rear-ventilated, primarily vertical facade cladding
- splash-water protection zone
- accessibility (exemplary, given in all building volumes)
- exposed timber trusses designed for predictable charring behaviour

Living labs

>program

- temporary inhabitation, experiencing timber in daily use

>addressed misconception

- timber ages visibly and intentionally

>construction system

- dowel-laminated solid timber system (holzius)
- mono-pitched roof

>connection logic

- reduced use of adhesives
  - multifunctional layers

>exposure and legibility

- timber is experienced as comfortable, healthy, and desirable
- visible comparison of differing timber ageing strategies

>material strategy

- construction: spruce, visible quality
- cladding: 1) untreated larch 2) thermally modified pine 3) pre-greyed douglas fir (KEIM Lignosil Verano)

>assembly strategy

- pre-fabricated holzius elements, on-site assembly

>protection and detailing strategy

- internally exposed structure
- rear-ventilated, vertical facade cladding
- splash-water protection zone
- predictable charring of solid timber elements

6.7 appendix g: Tree planting session

Tree planting session
14.04.2026
in Forstern, Bavaria, Germany
species planted: Vereinsdechantsbirne (pear tree)

Choice and purchase of tree
→ preparing hole in the ground
→ placing tree in hole with supporting timber stake
→ filling and compacting soil
→ shaping surrounding soil to direct water toward the tree
→ adding protective measurement to avoid damage by animals
→ water, water water
→ borrow bees from a local farmer to support pollination
→ wait for tree to mature and produce pears













Tree update 24.05.2026

6.8 appendix h: Data management checklist

DATA MANAGEMENT CHECKLIST

Instruction

This checklist is relevant for all graduation projects of the Master AUBS. The form is intended to highlight common aspects of graduation projects that require particular attention with regard to planning the research and data management. Relevant information and supplementary sources regarding each question are provided below each question.

With this checklist, the faculty wants to avoid that students unexpectedly find themselves in complex and stressful situations, in which ethical or privacy matters and/or other laws and regulations become an issue. In projects involving humans, certain types of data processing increase the risks to the human participants: planning such projects requires additional evaluations and advice from university staff before ethical approval can be received and the project can begin. In the case of a graduation project, obtaining additional advice or permits may delay the project with an extra education period or semester. To avoid this, it is recommended that students set up a graduation project with a low level of risk. Therefore, all students have to check their risk, by completing this checklist before their A1.

The first section of the checklist (A) should be completed by all students, together with their supervisor, during the planning of the graduation project, before the A1. It does not need to be submitted to anyone for review or approval. Please consider questions 1 to 3 carefully in relation to the intended graduation project, and answer with 'yes' or 'no'.

The second section of the checklist (B) should only be completed if the graduation project involves working with data from human participants. In that case, the student and their supervisor must apply for and receive ethical approval from the Human Research Ethics Committee (HREC) before the project can begin (see the paragraph 'Explanation and follow-up' after the questions). The student can submit the application to the HREC, but the supervisor is responsible for making sure that the project is compliant with relevant privacy regulations and ethical policies.

Section A. General considerations	yes	no
1. Is the graduation project conducted as part of an internship (at a company), or as part of a research project at TU Delft? If a student's graduation project is conducted at a company or as part of a research project at the university, questions of data ownership and intellectual property rights need to be addressed in a written graduation or internship agreement before the project begins. Students and their supervisor should consult the Intellectual Property Rights of Students webpage. Additional information can also be found in the Extended Personal Research Data Workflow.		✓
2. Does the project involve conducting (part of) the research outside the Netherlands? Students who intend to travel abroad (even to other EU countries) for study, exchange, research, internship, or graduation project purposes need to follow the Travel Safety Protocol. This includes attending a mandatory Travel Safety Training Session: see the Disclaimer.		✓
3. Will the research involve processing data from humans, such as running a survey, conducting interviews or workshops, collecting data through social media or internet forums, or re-using existing datasets about humans provided by a third party? (If 'yes', see follow-up questions 4 to 13 in Checklist B.) Students who work with data from human participants must complete the next section and apply for and receive ethical approval from the Human Research Ethics Committee (HREC) before conducting the research.	✓	

Section B. Extended risk factors (only if question 3 has been answered with 'yes'.)	yes	no
4. Will the project involve participants who may be considered vulnerable, such as the elderly, refugees or asylum seekers, ethnic minorities, patients, or people with disabilities? Participants who may suffer very adverse consequences (for instance, due to discrimination) if their personal data became publicly available can be considered vulnerable.		✓
5. Will the project involve participants who cannot themselves give informed consent for taking part in the project, but for whom consent must be obtained from a legal guardian? Participants who cannot give informed consent can include, for instance, children or participants with intellectual disabilities, mental disorders, or dementia. Such participants are also considered vulnerable in the context of the General Data Protection Regulation (GDPR).		✓
6. Will the project involve processing any of the special categories of personal data below? - Race - Ethnicity - Criminal offence data - Political opinion - Union membership - Religious or philosophical beliefs - Sex life and/or sexual orientation - Health data (including measurements such as heart rate) - Biometric or genetic data (including fingerprints, iris scanning, facial recognition) The General Data Protection Regulation (GDPR) defines a stricter rules for processing special categories of personal data. If it is necessary to process these data in a project, it is it is important to provide additional safeguards.		✓
7. Will the project involve processing personal data that could be considered sensitive, such as the ones listed below? - Information about a person's income, debts, or other payments - Information about a person's (un-)employment status - Information about a person's performance at school or work - Information about relationship problems or (gambling) addiction - Information about poverty, domestic violence, or youth welfare/social work involvement Some types of personal data are considered sensitive, because they can have a high impact on the privacy of the data subject if other persons gain access to these data. Sensitive personal data should only be processed if necessary: in such cases, additional safeguards need to be put in place.		✓
8. Will the project involve processing video-recordings, or photographs of participants? TU Delft considers photographic and video-materials of research participants to be sensitive personal data. If such data need to be processed, additional safeguards must be put in place.		✓

Section B. Extended risk factors (only if question 3 has been answered with 'yes'.)	yes	no
9. Will the project involve sharing or transferring personal data between multiple partners or collaborating organisations involved, such as between TU Delft and an internship company? According to privacy law, sharing personal data between organisations requires a privacy agreement to be in place: setting this up takes time, and requires support from additional university staff. Furthermore, personal data sharing can potentially expose research participants to different types of risks: these risks must be considered in the ethical application.		✓
10. Will the project involve deception, or covert observation of participants? In some types of research, obtaining informed consent for processing participants' personal data is not an option: for instance, if the research involves deception, or the research is covert (conducted without participants knowing about it). In such situations, the steps to mitigate risks to participants are important, and an alternative legal basis for processing the participant's data needs to be established with the help of additional support staff.		✓
11. Will the project involve working with social media data? Social media data are personal data, but since it is usually not possible to ask for informed consent for processing social media data, another legal basis for processing the participant's data needs to be established. Processing of social media data also involves legal considerations related to terms of use of data from third-party platforms: therefore, research with social media data requires expert support on privacy, ethics, and legal matters.		✓
12. Will the project involve using learning algorithms or other AI to analyse, combine, or otherwise process data from participants? The use of AI in research involves many considerations in terms of data protection, ethics, security, and intellectual property: for more information, see TU Delft's Instructions for use of Generative AI.		✓
13. Will the project involve participants who are based in a country or countries outside of the EU? Students affiliated with TU Delft must comply with Dutch and EU regulations of personal data processing (GDPR). Furthermore, the student and their supervisor must make sure that the research complies with local (privacy) legislations of any foreign destinations. Additional support from an external (local) expert may be required.		✓

Explanation and follow-up

If you have answered 'no' to all questions 4 to 13, your project is likely to be considered low or minimal-risk: see the paragraph 'Projects with minimal or low-risk' on the next page.

If you have answered 'yes' to one or more of the questions 4 to 13, your research likely involves extended or high risks to participants, according to the General Data Protection Regulation (GDPR) and TU Delft's privacy and ethical policies: for information regarding such projects, see the paragraph 'Projects with extended or high-risk' on the next pages.

Projects with minimal or low-risk

If you have answered 'no' to questions 4 to 13, your project is likely to be considered low-risk. This does not mean that the project involves no risks at all, but suggests that these risks can likely be addressed by the student and supervisor in the application to the Human Research Ethics Committee (HREC) within the timeline for a graduation project and without need for additional support.

Compiling the HREC application:
An application to the HREC generally involves a Data Management Plan (DMP), a risk-identification and mitigation checklist, and informed consent materials. Master's students at ABE who intend to compile a HREC application are advised to make use of the following support documents:

- the student guide
- the Example Data Management Plan for MSc projects

The graduation supervisor is responsible for the student's project and ethical application, and must provide support for compiling the HREC application documents.

Additional support
For low-risk student graduation projects, compiling of the HREC application documents should be done by the student in consultation with the supervisor. The Faculty Data Steward can be contacted for individual questions at datasteward-BK@tudelft.nl: however, the Data Steward does not provide detailed feedback on student DMPs for low-risk HREC applications.

Additional resources
The HREC has guides available for completing the checklist and for compiling informed consent materials. Additionally, the Guide to the Extended Personal Research Data Workflow has been created to help researchers and students who work with human participants comply with both GDPR principles and TU Delft's policies on Data Management and Human Research Ethics.

Timeline
Minimal or low-risk HREC applications are generally processed faster than extended or high-risk applications (see the paragraph below). Nevertheless, the initial evaluation by the HREC usually takes approximately 2 weeks, and may take longer during busy periods or holiday: see the HREC website for up-to-date information. Additionally, the application may require revisions before final approval is granted. If you do not receive an initial response about your ethical application after 4 weeks from the time of submission, you may follow up with the HREC to enquire about an update.

Projects with extended or high-risk

If you have answered 'yes' to one or more of questions 4 to 13, there are potential increased risks related to how data from human participants will be processed in your project. These risks will need to be addressed in consultation with the Data Steward and other relevant support staff before submitting the ethical application to the Human Research Ethics Committee (HREC).

Compiling the HREC application
An application to the HREC generally involves a Data Management Plan (DMP), a risk-identification and mitigation checklist, and informed consent materials. Master's students at ABE who intend to compile a HREC application are advised to make use of the following support documents:

- the Ethical Approval & Data Management Planning Student Information
- the Example Data Management Plan for MSc projects

The graduation supervisor is responsible for the student's project and ethical application, and must provide support for compiling the HREC application documents.

Additional support
Once the DMP has been compiled and reviewed by the supervisor, feedback should be requested from the Data Steward via DMPonline. After this, any other necessary support staff will need to be contacted. Crucially, if the project involves one or multiple ways of personal data processing that could result in high-risk to the participants according to the GDPR, the TU Delft Privacy Team must be consulted to establish whether or not a Data Protection Impact Assessment (DPIA) is required.

Additional resources
The HREC has guides available for completing the checklist and for compiling informed consent materials. Additionally, the Guide to the Extended Personal Research Data Workflow has been created to help researchers and students who work with human participants comply with both GDPR principles and TU Delft's policies on Data Management and Human Research Ethics.

Timeline
It can take a long time to compile a complete research plan and HREC application for projects involving extended risks. DMP feedback from the Data Steward usually takes around 2 weeks, but can take longer during busy periods or holidays. Receiving additional support from other staff, such as the Privacy Team, can take anywhere from a few days to multiple weeks, depending on the project and capacity of university staff. If a DPIA is deemed necessary, it can take anywhere from 4 weeks to several months.

It is important to note that advice from the Privacy Team or other support staff, as well as any additional documents (such as necessary contracts, or a DPIA, if needed) must be in place before the application is submitted to the HREC. The initial evaluation by the HREC can be processed in 2 weeks, but may take longer during busy periods or holidays: see the HREC website for up-to-date information. Additionally, the application may require revisions before final approval is granted. If you do not receive an initial response about your ethical application after 4 weeks from the time of submission, you may follow up with the HREC to enquire about an update.

Considering the limited time available for students conducting their graduation projects, students working with data from human participants are strongly advised to prioritise low-risk research projects. If a student project necessitates processing data in ways that are considered extended or high-risk, both student and supervisor need to be aware of the extended processing times involved in obtaining ethical approval and beginning the graduation project.

5

acknowledgements

My sincere thanks go to my mentors, Loes Thijssen and Max Salzberger, for their guidance, critical feedback, and continuous encouragement throughout this graduation project. Their ability to bring clarity to complex discussions, while continuously challenging me to push ideas further, has been invaluable. Their encouragement to build upon my own interests and knowledge allowed me to further develop the confidence to trust my own abilities and judgement.

I am grateful to my fellow students and friends. Their support, generosity in sharing knowledge, and willingness to exchange ideas contributed greatly to this project. While designing a platform dedicated to knowledge exchange, I was fortunate to experience that same spirit every day within the studio. This graduation studio has been one of the most rewarding experiences of my studies.

My thanks also go to the interview participants for openly sharing their knowledge, experience, and expertise. Their perspectives contributed significantly to the development of this research.



