Ultimately, it seems that no one is willing to take responsibility for creating new, valuable, and lasting architecture.

title page

Title
The New Paradigm

Aalborg University
Department of Architecture, Design and Media Techonology
Architecture & Design, Master in Architecture

Semester
Msc04 - Master Thesis Project

Project period
3rd of February 2025 - 2nd of June 2025

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Thesis pages
144

Appendix pages
28

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Reading guide

This report is structured as follows. First, the main challenges related to the investigated topic are outlined and discussed. This discussion is grounded in a theoretical framework and developed through a critical reflection that forms the project's position. Following this position, a problem statement and a vision are introduced. Chronologically, empirical data collection followed, establishing the baseline for the design and guiding the design process. However, in this report, the design will be presented immediately after the problem statement. The empirical findings are introduced thereafter, followed by a presentation of the design process. The report concludes with a conclusion and a reflection.

abstract

This master's thesis introduces The New Paradigm, a reimagined building culture for the Danish parcelhus. The project stems from a growing dissatisfaction with the lack of lasting value in contemporary architecture and a recognition of the disconnect between current environmental ideals and the dominant model of the parcelhus, a typology that holds deep cultural significance in Denmark. The New Paradigm challenges this model by redefining sustainability through the lens of affective sustainability, seeking to create homes that carry emotional depth and long-term relevance while aligning with today's societal values.

A critical assessment of sustainability-focused architectural practices and an exploration of how contemporary ideals intersect with the dream of the parcelhus led to the formulation of a central problem statement. In response, a new building culture was proposed, grounded in affective sustainability and aimed at addressing the challenges facing the typology today. This vision was articulated in a Manifesto that formed the foundation for the design process, where ideas were translated into form.

The process followed an integrated and iterative approach, drawing from Bryan Lawson's *How Designers Think* and principles of *The Integrated Design Process*. This dynamic, non-linear workflow is capable of addressing multiple challenges simultaneously in the pursuit of a cohesive, integrated solution.

The outcome is The New Paradigm; a flexible and future-oriented interpretation of the parcelhus. It accommodates values such as densification, environmental responsibility, shared living, and downsizing. Designed with spatial generality in mind, the proposal supports adaptability to shifting human needs and diverse contexts. Its lasting relevance is ensured through a strong connection to Danish building traditions and a focus on human experience, expressed through legibility, robustness, tectonic clarity, and material sensibility, all contributing to its lasting, affective qualities.

preface

preface

project description

In this master's thesis, various challenges in contemporary architecture are examined, culminating in a design proposal for a new building culture surrounding the Danish *Parcelhus* (single-family home). While we acknowledge the importance of renovation and transformation, the scope of this project is limited to cases where new construction is necessary.

The project was motivated by a critical question:

Why is contemporary architecture not designed to be lasting?

With an emphasis on circularity, cradle-to-grave approaches, and life cycle assessments typically limited to a 50-year timeframe (BR18, Ch. 11, Guid. 1.2), we find that such practices reduce the lasting value of contemporary architecture. The overarching aim, therefore, was to explore whether it is possible to design architecture that lasts.

In unfolding this investigation, the design came to be grounded in a critical reassessment of two key contemporary factors: the cultural and practical role of the Danish parcelhus, and the implications of contemporary sustainable architecture. The aim is to redefine the Danish parcelhus model through this reassessment of sustainability.

This reassessment has led to the adoption of the concept of affective sustainability, which emphasises creating architecture with lasting value, architecture that becomes sustainable by virtue of this enduring significance.

Accordingly, the design proposal introduces a new building culture aligned with this redefined understanding of the parcelhus. It integrates the principles of affective sustainability to foster homes that are both enduring and ecologically responsible. As the outcome is a new building culture rather than a singular solution, the design was not developed with a specific user group in mind. Instead, the proposed paradigm is intended to accommodate a diverse range of users and family structures across generations.

What is lasting architecture?

When we speak of lasting architecture, it should not be understood as architecture that must stand for a predetermined number of years. Rather, our focus is on the underlying intention behind the design. Today, buildings are often conceived with their demolition in mind, designed to ensure that the demolition process is sustainable. We argue that buildings should instead be designed with the intention of lasting as long as possible. Every design decision should therefore be made with the aim of ensuring the building's longevity. Thus, the building becomes sustainable through its enduring value, resonating with its residents.

methodology

Throughout the project, an integrated approach has been adopted, drawing inspiration from both Bryan Lawson's *How Designers Think* (Lawson, 2017) and *The Integrated Design Process* (Knudstrup, 2004). Both frameworks emphasise the iterative nature of design, challenging the traditional notion of a linear sequence of events. This holistic approach not only makes the complexity of the process more manageable, but also enables the development of cohesive solutions by combining architectural and engineering expertise into the design process.

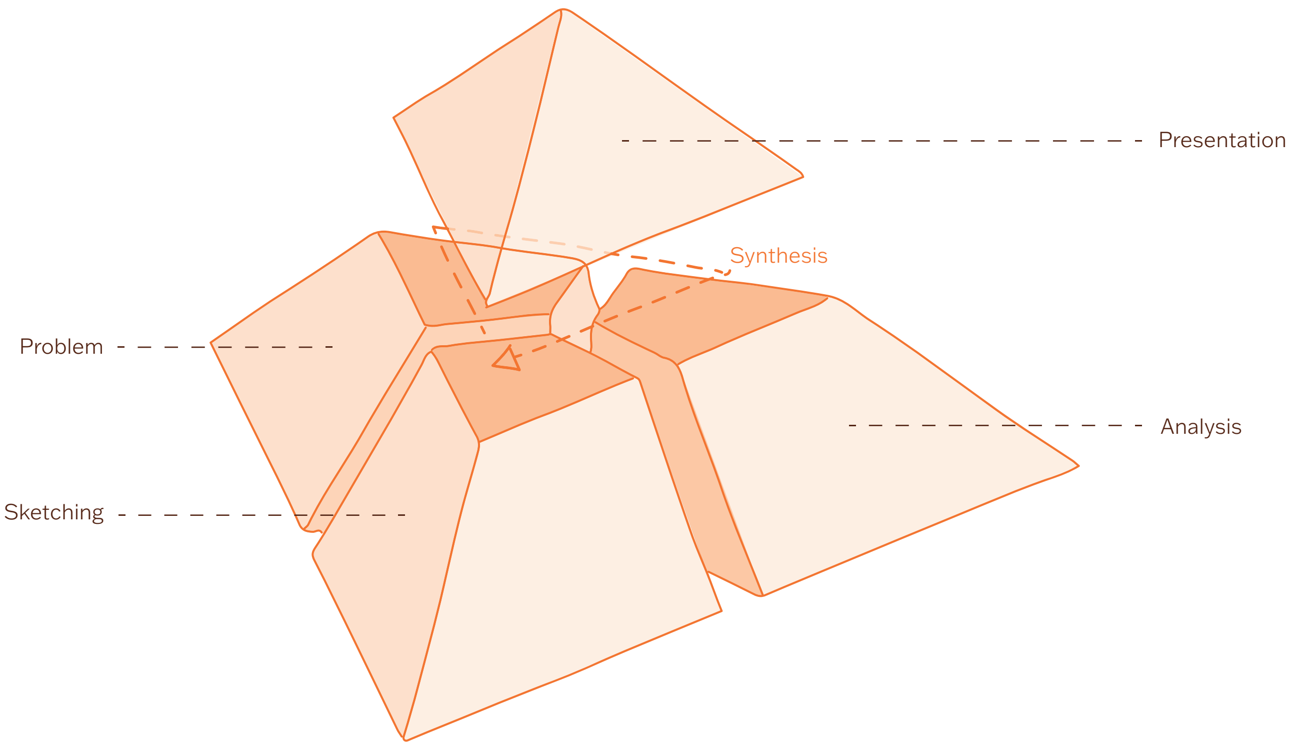

Figure 02. Methodology

The Integrated Design Process consists of five interconnected phases: Problem, Analysis, Sketching, Synthesis, and Presentation. However, in this project, the phase of Synthesis does not appear as a distinct step, but is instead embedded within the other four phases. Accordingly, the following pages will present each of these four phases as they occurred in our process, while also illustrating how Synthesis has been integrated throughout.

Problem – Theoretical framework

State of mind: Inquisitive, critical, reflective

In our project, the problem phase is framed through the *theoretical framework*. This phase begins with a general enquiry: *why is contemporary architecture not designed to last?* To explore this question, we start by reviewing historical architectural values and comparing them with those of contemporary architecture. This is followed by a critical reflection, identifying key issues in current architectural practice that contribute to its lack of longevity.

Through this process, another insight emerges: the significant implications of these issues for everyday architecture, particularly the mismatch between contemporary values and the model of the parcelhus. As a result, this typology is also examined, and its challenges are outlined.

The phase concludes with a synthesis, taking the form of the project's problem statement and vision. However, this phase has been revisited multiple times throughout the process, as the understanding of the problem evolved in dialogue with the subsequent phases.

Analysis – Towards a new culture

State of mind: Analytical, investigative, solution-oriented

Simultaneously with the identification of the problem in the problem phase, the analysis phase begins; taking shape in this project as *towards the new culture* . The aim of this phase is to unfold the problem statement and investigate how the identified challenges might be addressed. This phase is closely linked to both the problem and sketching phases, as it not only deepens the understanding of the problem but also reveals relevant design principles that can contribute to its resolution.

During this phase, various theories have been explored, ultimately leading to the identification of affective sustainability as the primary approach to addressing the problem. Following this, the focus shifts to how affective sustainability can be achieved in practice. In parallel with the problem statement, we also investigate the specific challenges facing the parcelhus and identify possible solutions.

The outcome of this phase is a Manifesto forming the foundation of The New Paradigm and constituting the synthesis of this phase. As with the previous phase, the analysis has been revisited multiple times throughout the process, as the understanding of the problem continued to develop in response to the subsequent phases.

Sketching – Realising the vision

State of mind: Creative, explorative, critical, open-minded, iterative

The sketching phase, which in this project emerges as *realising the vision* begins as early as the project itself and is closely interwoven with both the preceding and following phases. This phase is characterised by multiple syntheses and, in many ways, follows its own iterative process. Each design exploration, whether minor or major, consists of an analytical phase, followed by a creative, explorative, and open-ended phase, which then concludes with an evaluation and a synthesis. This process is continually informed by insights gained in the other phases.

These individual explorations build upon one another and are themselves synthesised through a similar iterative approach. In this way, the design gradually begins to take shape, with the final synthesis of this phase forming the foundation for the presentation phase.

Presentation - The New Paradigm

State of mind: Communicative, reflective, conclusive

During the final phase of the project, all the individual elements are brought together, contributing to the final synthesis and resulting in a holistic, coherent design. The design proposal, emerging as *The New Paradigm*, is then presented using a variety of tools to communicate the core ideas, spatial qualities, and technical performance.

This process of storytelling enhances the understanding of the project's overall scope. It is important to note that this phase does not stand alone; it remains closely connected to the previous phases. Any misalignments or unresolved aspects identified during this stage may prompt a return to earlier phases for further refinement.

The final synthesis takes shape as a reflection, offering a more critical review of the design and paving the way for further development.

introduction

In the past century, the Western world has undergone significant changes that have profoundly influenced how we build and how we define architectural value. This is discussed in a debate article for Byrummonitor by architect, Ph.D., and lector Nicolai Steinø. He argues that architecture has become increasingly commercialized and regulated. Likewise, the role of the architect has evolved, from the traditional Master Builder to a participant in a much larger and more complex system.

While the expanding regulatory framework is often driven by good intentions, it can restrict architects' creativity. As a result, many architects now opt for technological, standardized solutions rather than integrating tectonic approaches that align with the architectural expression.

Meanwhile, developments in construction methods and processed materials have made it possible to achieve a wide range of architectural expressions, regardless of context, function, and form. As a result, contemporary architecture often fails to convey a tectonic narrative, ultimately becoming meaningless. (Byrummonitor, 2021)

Energy requirements and the growing demand for sustainable architecture further limit the architect's role. Energy-efficient buildings increasingly rely on information and communication technologies and automated systems, gradually removing the human aspects from the equation. (Hellwig et al., 2022)

These trends are particularly pronounced in housing, where the challenge of ensuring architectural value while addressing economic, climate, and social sustainability is increasingly evident. Thus, the building sector struggles to respond adequately to the growing need for attractive, flexible housing solutions that can adapt to changing lifestyles and demographics. (Ekspertgruppen for National Arkitekturpolitik, 2024)

Ultimately, it seems that no one is willing to take responsibility for creating new, valuable, and lasting architecture. Instead, we construct buildings based on circularity principles, designing them to be dismantled and reused after 50 years. Architects seem to have lost their confidence, and as a result, we risk eroding our cultural identity. (Rønnow Arkitekter, 2020)

Designing architecture with lasting value is still possible. Some older buildings continue to resonate despite changing contexts, and occasionally, contemporary works also evoke strong emotional responses. These observations prompt critical reflection on architectural theory and whether sustainability-driven design overlooks key aspects of meaning and longevity.

theoretical framework

how have western architecture and aesthetics evolved to be defined by sustainability?

theoretical framework

how have western architecture and aesthetics evolved to be defined by sustainability?

sustainability

In 1987 sustainability was defined as *"meeting the needs of the present without compromising the ability of future generations to meet their own needs"* (World Commission on Environment and Development, 1987). It is further defined by the interplay of social, environmental, and economic factors (United Nations, 2015). In the building industry, the primary focus is often on environmental sustainability, particularly reducing CO_2 emissions. However, true sustainability requires considering all aspects, as they can sometimes contradict one another. Addressing environmental and economic factors does not inherently ensure social sustainability. Therefore, it is crucial to examine each aspect individually while also maintaining a holistic perspective. (Rønnow Arkitekter, 2020)

Economic sustainability: Creating long-term economic growth without harming the environment.

Environmental sustainability: Protecting natural resources, reducing waste and pollution, promoting renewable energy.

Social sustainability: Ensuring equal access to basic needs while fostering the well-being of people.

Figure 03. The three pillars of sustainable development

In practice, efforts to build sustainable architecture result in various solutions, each focusing on different aspects of the issue. Moreover, perceptions of sustainability differ widely between entities. While some perspectives align, others conflict. In essence, sustainability is not a singular concept; it varies depending on perspective, priorities, and context. In the paper *Reinterpreting Sustainable Architecture: The Place of Technology*, an analysis of buildings and literature related to sustainability identified six environmental logics. This framework helps clarify the differing views and perspectives on the issue. (Guy and Farmer, 2001)

six logics

The Eco-technic Logic

Focuses on solving environmental challenges through technology, emphasizing energy efficiency and global cooperation. Architectural solutions prioritize technological innovations to reduce energy consumption and environmental impact.

Figure 04. London City Hall. Photo by Wojtek Gurak (modified)

The Eco-cultural Logic

Emphasizes the importance of cultural identity and local context, advocating for sustainable solutions rooted in vernacular techniques and regional materials. It challenges globalized, standardized design practices.

Figure 05. Earthship Brighton. Photo by Dominic Alves (modified)

The Eco-centric Logic

Advocates for a value shift towards environmental stewardship, minimizing human impact, and promoting the use of renewable, low-impact materials. The approach questions whether building is necessary at all and advocates for designs that mimic natural systems.

Figure 06. Marika Alderton House

Figure 07. The Bullitt Center. Photo by Brad Kahn (modified)

The Eco-medical Logic

Prioritizes human well-being by focusing on health-promoting environments. It critiques technological dominance and calls for designs that support physical and mental well-being through natural light, air quality, and spaces that relate to a human-scale.

Figure 08. Findhorn Community. Photo by cowrin (modified)

The Eco-social Logic

Connects sustainability with social equity and community involvement, advocating for participatory design and decentralized systems. It prioritizes adaptive, flexible, and community-driven solutions.

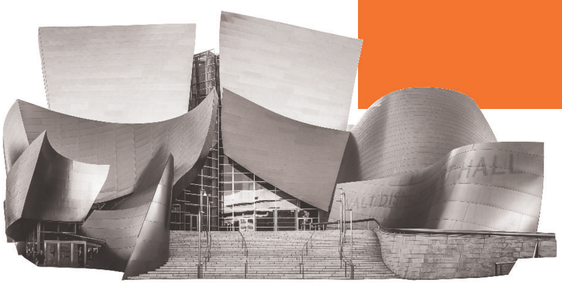

Figure 09. Walt Disney Concert Hall. Photo by Giuseppe Milo (modified)

The Eco-aesthetic Logic

Sees architecture as a symbolic expression of ecological awareness, blending creativity with sustainability. This logic values organic forms and innovative designs that evoke a connection with nature. (Guy and Farmer, 2001)

of sustainability

These often-contradictory logics push contemporary architecture in multiple directions, some prioritizing technology, others emphasizing cultural or social significance. While sustainability dominates contemporary discourse, architecture has historically been shaped by different priorities. By examining past architectural values, the impact of technological advancements, and the evolving role of the built environment, we can explore whether architecture is merely a response to human needs or a reflection of something greater.

architectural history

Throughout western history, architecture has continuously evolved in response to changing worldviews, societal structures and technological advancement. The primary focus has mainly shifted between cosmic order, human experience, rational organisation and functionality.

In early Greek architecture, the emphasis was on integrating built structures with nature and human experience, with an organic relationship between site and form. The Romans, in contrast, imposed a strict spatial hierarchy. This shift from a sculptural engagement with nature to a structured understanding of space marked a change in architectural thought.

The medieval period introduced a connection between faith and space, seen in Gothic architecture, where light and structure embodied religious meanings. The Renaissance then reinterpreted spatial organisation through mathematical precision, reflecting a belief in perfect order and symmetry. However, as the world became increasingly complex, Mannerism challenged these ideals, incorporating tension and contradiction into architectural expression.

The Baroque period sought to eliminate conflict by creating a unified spatial totality, where movement, theatrical effects, and structured hierarchy reinforced a cohesive worldview. Rather than dismantling this approach, the Enlightenment introduced a shift in priorities, emphasising new building tasks and urban expansion driven by industrialisation. While traditional settlement features were sometimes integrated with modern needs, historical forms were often applied arbitrarily, reflecting the uncertainty of the era.

Functionalism, emerging in the 20th century, was rooted in scientific analysis and aimed to bridge the gap between human needs and the built environment. It emphasised rational compositions, transparency, and efficiency, striving to create meaningful, structured spaces in harmony with modern life. However, its focus on standardisation often led to a mechanistic approach. In contrast, Pluralism marked a shift towards diversity and contextual awareness, prioritising cultural, historical, and environmental considerations.

Throughout history, architecture has often been a reaction to its previous tendencies. As worldviews and technologies evolved, so too did the role of architecture, giving rise to new building typologies while others lost significance. Yet architecture has always been more than a response to function or necessity, it has served as a means for humanity to communicate and concretise its values and challenges. In this way, architecture remains a reflection of who we are. (Norberg-Schulz, 1993)

Figure 10. Architectural history

different perspectives on aesthetics

Our perception of aesthetics and beauty has evolved through history, making the concept a dynamic phenomenon. Through a historical review of architectural theory, recurring tendencies are identified across different periods. Based on this analysis, six perspectives are outlined, illustrating how aesthetics has been viewed throughout history.

In general, aesthetic theory views aesthetics as either an objective or subjective quality. Originally, aesthetics was seen as an objective theory of beauty, while it has become a more subjective one in recent times. The question is whether a thing is beautiful due to inherent qualities it possesses or if its beauty exists merely in the mind of the observer. (Tatarkiewicz, 1963)

Objectivist aesthetics explains that among the properties of a thing there is one which constitutes beauty. Thus, beauty is objective. (Tatarkiewicz, 1963) Subjectivist aesthetics on the other hand explains that beauty is a matter of taste. It refers to the perceived pleasure derived from an experience and is therefore describing a subjective opinion. (Nygaard, 2011)

Figure 11. Lynn Public Library. Photo by Fletcher6 (modified)

Classical Aesthetics

Classical aesthetics is rooted in the idea that beauty emerges from nature's harmony, guided by rules of symmetry and order. It emphasises proportionality, aligning architectural elements with the human body's proportions. Harmony ensures that all parts correspond to the whole, while symmetry results from the proper arrangement and balance of elements. (Nygaard, 2011)

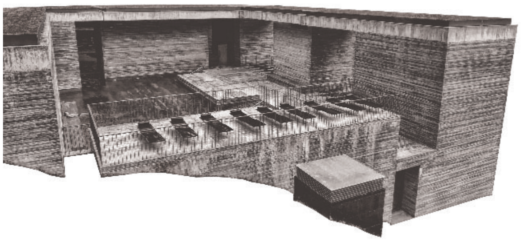

Figure 12. Therme Vals. Photo by Mariano Mantel (modified)

Experienced Aesthetics

Experienced aesthetics is based on the idea that beauty is subjective, relying on the perception of the beholder. We can instantly recognize and appreciate beauty when we encounter it, as our response is driven by a spontaneous emotional reaction to our senses. The main principle of aesthetics is that it must be experienced personally, engaging with the senses. (Zumthor, 2006)

Figure 13. Villa Savoye. Photo by Jean-Pierre Dalbéra (modified)

Functional Aesthetics

Functional aesthetics is the idea that beauty arises from functionality rather than ornamentation, where beauty becomes an inherent quality when the function and construction are aligned. The main principles of the aesthetics regard the simple, logical, and clear design allowing for the life that emerges within them. (Nygaard, 2011)

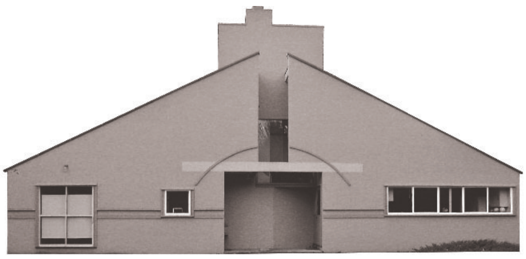

Figure 14. Vanna Venturi House. Photo by ali eminov (modified)

Semiotic Aesthetics

Semiotic aesthetics builds on the idea that beauty is a product of meaning. Architecture is recognized as part of a cultural context, where it should take part in the conversation, utilising the inherent cultural values, ideologies and historical narratives through its form and style. (Venturi, 1966)

Figure 15. Kløverbakken, Photo by author (modified)

Environmental Aesthetics

Environmental aesthetics sees beauty in nature while emphasising its preservation. Rooted in environmental ethics, it materialises through sustainability. This perspective calls for architecture that integrates with nature and considers non-human perspectives, including climate, ecosystems, and ecological balance. (Hosey, 2012)

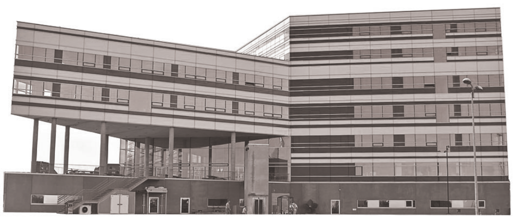

Figure 16. Navitas. Photo by Thomas Dahlstrøm Nielsen (modified)

Economical Aesthetics

Economical aesthetics seeks to balance beauty, functionality, and financial realities, driven by clients prioritising economic sustainability. By aligning aesthetics with budgets, it aims for visually striking yet cost-effective designs. This approach often leverages innovative construction techniques and technologies to optimise costs without compromising quality. (Future Thoughts, 2016)

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"Without architectural quality, the building will not generate appreciation and value for the user. Without appreciation, there is no longevity and no sustainability." (Rønnow, 2020)

The shifting priorities of aesthetics, and the dominance of sustainability in contemporary architecture raises important questions: What are we sacrificing in pursuit of sustainability? And how do these changes affect the quality and meaning of our built environment?

The following investigation begins by questioning the architectural implications of sustainability, before turning to the parcelhus, a typology deeply embedded in Danish culture. Through a critical lens, we explore how evolving values and environmental concerns are reshaping both architecture and the ideals it has long represented.

"Many hold on to the idea of 'the good life' by having a house with a garden, even though they live in a home that is not built for their needs." (Byrummonitor, 2024)

reassessing sustainability

Throughout Western history, architecture has responded to crises and societal shifts, expressing evolving worldviews and helping humanity find an existential foothold. Contemporary architecture, shaped by pluralism, reflects the diverse values of our time.

Since the late 20th century, we have become increasingly aware of the environmental crisis and climate change, both of which shape our contemporary era in certain ways. This awareness not only influences our physical environment but also affects our mental well-being and our understanding of our role on a global scale. (Cunsolo and Ellis, 2018)

In many ways, this awareness contributes to the contemporary existential crisis. The looming environmental challenges force humanity to question its future and our responsibility in shaping it. Many experience a sense of helplessness and guilt regarding their impact on the planet. (Cunsolo and Ellis, 2018)

Architecture responds to evolving worldviews and struggles. Thus, contemporary architecture often reflects our environmental concerns and the existential questions they raise. Rightfully so, as the building sector is responsible for approximately 40% of global energy-related carbon emissions (UNEP, 2022). Thus, sustainability has gained primary importance in present-day architecture.

This has led to a shift in aesthetic priorities, with contemporary projects focusing more on ecological and economical aesthetics. Ecological aesthetics align with contemporary social and philosophical values and are often expressed through Eco-centric Logic. In contrast, economic aesthetics may not offer immediate visual or sensory pleasure. However, they are crucial for the broader goal of improving the planet and are therefore justifiable.

This shift raises questions about the role of other aesthetic perspectives that have historically shaped architecture. While experienced and functional aesthetics are still valued, they are often overshadowed by sustainability-driven approaches. Semiotic aesthetics, once focused on cultural and historical narratives, now often incorporates themes of environmental responsibility, as seen in the Eco-aesthetic Logic. (Tatarkiewicz, 1963)

While some sustainability logics reflect aesthetic values, others prioritise technical solutions over aesthetics. Another pressing issue concerns the actual aesthetic value of sustainability-driven approaches, particularly in their execution, beyond their role in redeeming our environmental guilt. To put it simply:

Do we find lasting pleasure and value in contemporary sustainable architecture?

Circular design

The erosion of architectural identity

The term 'sustain' stems from the Latin word 'sustinere', meaning to allow something to continue over time (Borjesson, 2006). In practice, sustainability is often translated into efforts to reuse, redesign, reduce and recycle, but always with the aim of renewing. (Borjesson, 2009) Thus, our fascination with the new has led to the rising popularity of circular design. The focus on circularity is seen through the Eco-centric Logic, the Eco-cultural Logic and the Eco-social Logic. These are also the more phenomenological, human-centred, small-scale logics, aligning with residential architecture.

Circularity in buildings affects not only their sustainability but also their expression, often emphasising flexibility and disassembly (Bartolomei, n.d.A). While flexible spaces offer advantages, they risk losing their distinct identity, a concern heightened in designs for disassembly, where replaceable elements and joints lead to more universal buildings. Circular design, therefore, hinders pluralistic efforts to prioritise individual and regional character.

Sustainable architecture's focus on deconstructing and reconstructing buildings risks eroding cultural identity by prioritising temporary structures (Rønnow Arkitekter, 2020). While the Eco-centric and Eco-cultural logics aim to preserve cultural heritage and regional identity, their romanticised views, marked by reluctance to take responsibility for new buildings, do not align with contemporary needs, as new construction still make up a significant portion of the industry (www.statistikbanken.dk/BYGOMS2).

Environmental and economic sustainability

The loss of craftmanship and traditions

Environmental and economic sustainability can be quantified using methods such as LCA and LCC, which have influenced the integration of environmental and economic requirements into regulations. Meanwhile, architectural value accounts for only 3.6% of a DGNB certification (Rønnow Arkitekter, 2020). This imbalance misaligns with pluralistic efforts to regain cultural, historical and social contexts, ultimately leading to an architectural form which is once again driven primarily by technological considerations. This tendency is especially evident in the Ecotechnic Logic, which neglects human aspects and overlooks the importance of aesthetics and regionalism, critical elements in the context of residential architecture. Despite focusing on efficiency, it fails to align with functional aesthetics, often resulting in futuristic designs that prioritise innovation over a harmonious blend of function and beauty.

As environmental and economic priorities dominate architectural goals, the design process risks becoming a rigid checklist. This shift limits the creative process to the outcome of performance-based numerical analyses, leading to less integrated solutions. Moreover, sustainability-driven regulations often impose strict material requirements, making it difficult to incorporate diverse, locally sourced materials. Additionally, economic sustainability criteria favour cost-effective and standardised solutions, reducing the potential of craftsmanship and regional designs. As a result, sustainable architecture reduces the use of regional building traditions, leading to a loss of material richness and craftsmanship in contemporary architecture. (Byrummonitor, 2021)

Technology and regulations

The house becomes a machine

The social aspect of sustainability is not neglected in regulations; however, it is often translated into regulations concerning the indoor climate. This is manifested through systems that control airflow, temperature, and daylight (Hellwig et al., 2022). While a healthy indoor climate is crucial for well-being, achieving optimal conditions often limits the adaptability of spaces, effectively removing the human element from the equation. This issue is also critiqued by the Eco-medical Logic. However, Eco-medical Logic fails to provide an adequate, comprehensive solution, partially neglecting the importance of cultural and social dimensions as well as tectonic integration.

Another modern trend, often aligned with the Ecotechnic Logic, is the mechanisation of architectural elements and processes, typically aimed at improving energy efficiency. This is evident in the implementation of mechanical doors, automated lighting systems, and self-operating windows. As a result, the focus on the interaction between humans and architectural elements diminishes, leading to less detailed and more generalised architectural elements. Ultimately, minimising human interaction risks reducing the depth and richness of the architectural experience.

Conclusion

Although sustainability is a necessary response to environmental challenges, it is evident that its architectural implications raise concerns regarding the quality of contemporary architecture. The widespread implementation of circular design results in universal buildings that struggle to establish a connection with the perceiver or evoke an emotional response, ultimately making them less valuable. Furthermore, human interaction with spaces is reduced, limiting the depth of our spatial experiences.

Ultimately, contemporary sustainable design fails to provide us with pleasure seen from the perspective of experienced architecture. A failure which is further emphasised through the disappearing craftsmanship from architecture. Moreover, as sustainability is increasingly approached through quantifiable methods, technical solutions are often introduced as separate, add-on components rather than being fully integrated into the architectural design. As a result, contemporary architecture loses its coherence and becomes less meaningful.

This does not mean that sustainability should be disregarded, but rather rethought to address the challenges it presents. Since many of the beliefs and ambitions of early pluralism remain relevant, we may benefit from revisiting and reinterpreting pluralistic solutions while incorporating our growing understanding of sustainability's implications. Finally, we should reconsider what we define as architectural value, seeking an approach that fosters lasting pleasure and meaning within a changing human context.

Sustainability must be rethought to move beyond fragmented, efficiency-driven approaches, embracing a holistic architectural vision that fosters lasting pleasure, cultural identity, and meaningful human experiences.

challenging the danish parcelhus

If evolving worldviews significantly influence architectural practice, they must also affect how we live. However, in Denmark, the values associated with housing, the most personal of buildings, seem largely unchanged. Despite growing environmental awareness, the parcelhus remains the most popular living arrangement. In fact, two-thirds of Danes still aspire to own a house with a garden. (Byrummonitor, 2024)

If architecture is meant to respond to societal challenges and reflect contemporary values, how does this persistent preference for the parcelhus align with current sustainability goals?

The parcelhus, however, is not merely a reflection of values; it also needs to meet practical needs and provide comfort. This distinction recalls the 1982 debate between architects Peter Eisenman and Christopher Alexander. While Eisenman argued that architecture should provoke and challenge emotions, Alexander advocated for order, harmony, and comfort. (Pierluigi, 1983)

While we agree with Eisenman's argument that architecture plays a larger role in reflecting and informing us about the state of the world, we believe that this type of expression should be reserved for monumental structures such as museums and cultural institutions. These buildings, standing as landmarks, have the space to express larger ideas and challenge emotions. However, it is the surrounding, more anonymous buildings, the ones we engage with daily, that shape our everyday lives and define the identity of a place. This is what we consider *everyday architecture*, and it is within this context that we place the parcelhus.

Therefore, while the growing focus on sustainability may be appropriate for some building types, the parcelhus should not become a casualty of sustainability demands. Nonetheless, it would be naive to assume that the parcelhus is without issues. It remains essential to consider sustainability within this typology. This raises the question:

Can the parcelhus evolve to meet sustainability demands, or is it inherently an unsustainable dream?

Oversized and underutilised

Parcelhuse in Denmark average 155 m², with newly built houses regularly exceeding 200 m² since 2009 (see appendix 01). This reflects a clear trend toward oversized housing. Yet, a 2021 YouGov study shows residents consider 146 m² to be an appropriate size for a home (Videnscenteret Bolius, 2021). This raises a key question: do larger homes really equate to greater value?

The environmental implications of this trend are significant. Despite advancements in energy-efficient technology, the sheer size of these homes, combined with the growing number of household appliances and devices, results in high energy consumption (Del Hus, 2024). Thus, efficiency gains are often negated, making large parcelhuse a challenge for sustainability and the green transition.

This problem is further compounded by demographic realities: the average household size in parcelhuse is just 2.6 people (www.statistikbanken.dk/BOL106). Moreover, 40% of these homes are occupied by *empty nesters*, older adults whose children have moved out (Aalborg Universitet, 2025). As a result, many oversized homes are underutilised, calling into question the sustainability of the parcelhus as it currently exists.

The dream of self-realisation

Mette Mechlenborg, senior researcher at Aalborg University, describes the parcelhus as a "cultural phenomenon" embodying the idea of "the good life," with freedom at its core. This freedom is expressed through the personalisation of one's home, making it a space for self-realisation. (byrummonitor, 2024)

The parcelhus is traditionally linked to the nuclear family, shaping the childhood environment for many Danes. As children grow up and establish their own households, they often seek to recreate the same ideals; safety, community, and like-minded neighbours. When the existing housing stock does not meet these ideals, families often choose to demolish and rebuild. (Andersen, 2004)

In Denmark, around one thousand parcelhuse are demolished and replaced each year. Research by BUILD shows that demolished houses had an average lifespan of 85 years. Their survey found several reasons for demolition. Most homeowners value the location but dislike the existing building, others find the house unsuitable in size or layout for contemporary needs, some cite energy efficiency and sustainability concerns, while others simply want to build a new home themselves or avoid living in an old house. (Jensen et al., 2022)

Lack of quality and adaptability

When building new parcelhuse, many turn to standardised, mass-produced *typehus* models. These homes are designed to be cost-effective and efficient, offering some degree of customisation but fundamentally based on pre-designed templates.

Typehus companies market their products by emphasising personalised consultation tailored to individual needs. However, while these homes may fit one family's specific requirements, they often lack architectural quality and flexibility. This limited adaptability reduces their appeal to future residents, who may find the home unsuitable and opt to demolish and rebuild, thus continuing the cycle.

Conclusion

The Danish parcelhus remains a deeply ingrained cultural ideal, a symbol of freedom, self-realisation, and the "good life." Yet, this dream increasingly clashes with contemporary sustainability demands and practical realities. Oversized and underutilised, often occupied by smaller households or empty nesters, these homes consume excessive resources and energy. The widespread reliance on standardised typehus models further limits architectural quality and adaptability, contributing to a cycle of demolition and rebuilding rather than lasting, sustainable living environments.

Ultimately, the parcelhus no longer fully reflects the individuality of its inhabitants nor accommodates their evolving needs. This calls for a critical reconsideration of what the parcelhus represents and how it can evolve. Rather than abandoning this cherished typology, the challenge lies in reimagining it to better align with sustainable living, architectural quality, and genuine personal expression, ensuring the dream of the parcelhus remains both relevant and responsible for future generations.

The Danish parcelhus is a cherished cultural ideal but should be critically reconsidered and reimagined to balance sustainability, architectural quality, and personal expression, ensuring its relevance for future generations.

"how can lasting architecture be achieved within the context of the danish parcelhus?"

vision

Amid the pressing challenges of sustainable architecture and the growing limitations of the traditional Danish parcelhus model, we envision a design proposal that seeks not just to reform, but to reimagine. At its heart lies the ambition to cultivate a new building culture, one that redefines what the parcelhus can be in today's world.

Rather than seeing the parcelhus solely as a home for a single family, we propose a more generous understanding. This new culture embraces change, homes that can evolve with us over time, welcoming shifting household structures and changing ways of living. We imagine a spatial generality that lends the home both openness and coherence, ensuring it can gracefully accommodate life as it unfolds.

Sustainability, in this vision, extends beyond energy use and material performance. It is rooted in the emotional resonance of architecture, the ability of a space to touch something within us that is lasting and intuitive. This emotional durability should be cultivated through a return to construction methods and materials that are familiar, grounded, and contextually rooted in Danish traditions. These choices are not nostalgic, but forward-looking, bridging what we have known with what we now need.

In this way, we aim to reintroduce the human dimension to the home. Through clear architectural expression, material richness, and tactile depth, we seek to create spaces that feel lived-in from the moment they are inhabited. Structural elements are not hidden but celebrated, given aesthetic weight and presence, so they speak of both craft and endurance.

The home envisioned through this new culture is not static. It is a framework for life, emotionally engaging, architecturally clear, and resilient. A home that grows with us, reflects us, and, in its own quiet way, endures.

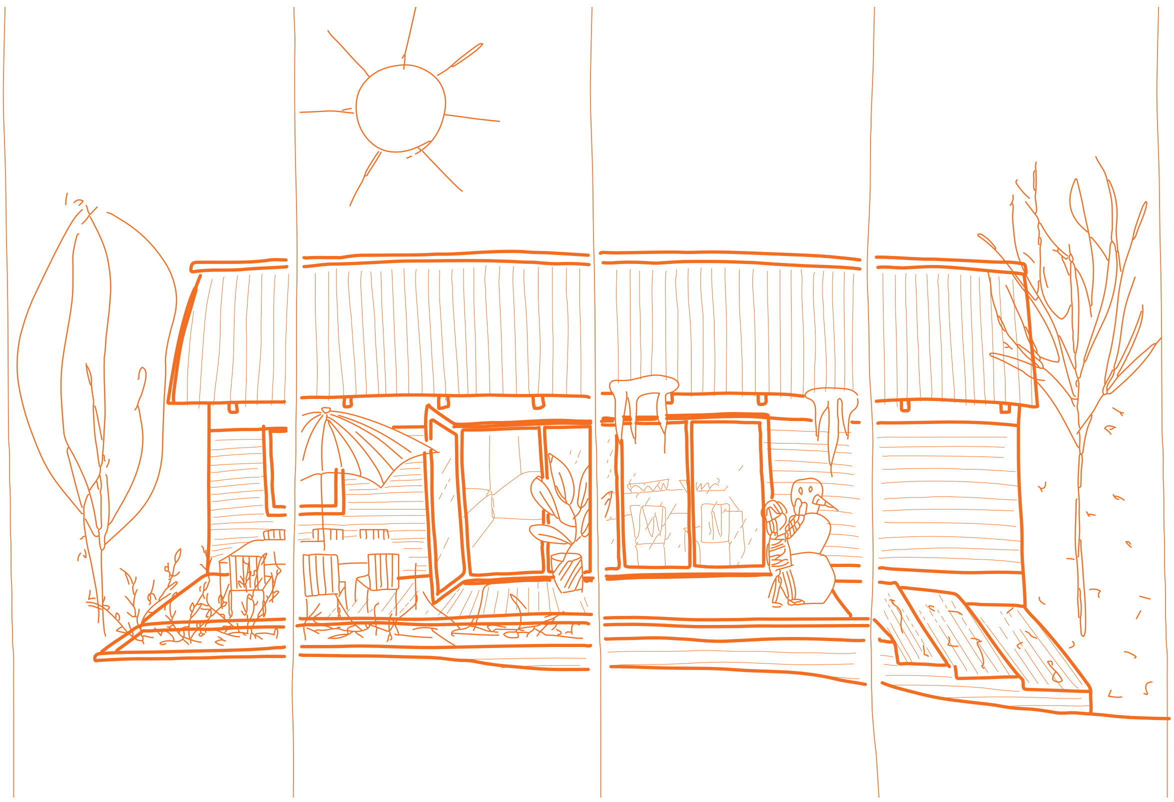
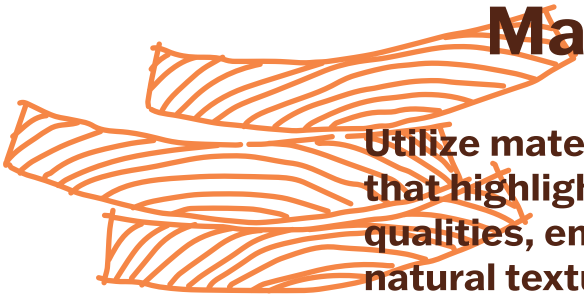


Figure 17. Vision

manifesto

The following manifesto emerges from a critical redefinition of both sustainability and the parcelhus itself. We reject outdated norms and short-sighted design practices. Instead, we establish a clear set of strategies that confront the realities of our time and point toward a necessary transformation. This manifesto defines The New Paradigm. It sets out the principles that must guide the design of future parcelhuse; principles that promote responsibility, adaptability, and lasting value in the way we build, all necessary steps towards a more meaningful and sustainable building culture.

Material Authenticity

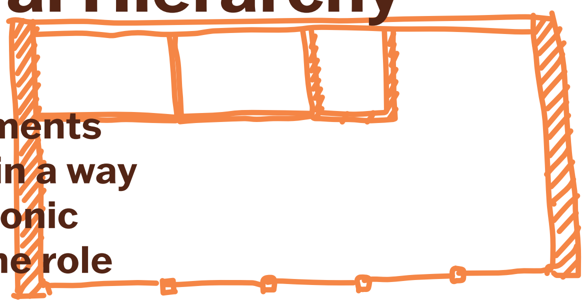


01

Utilize materials in a way that highlights their inherent qualities, emphasizing their natural textures, durability, and aging process.

Structural Hierarchy

02



Organize load-bearing elements and material composition in a way that expresses a clear tectonic logic and communicates the role of building elements.

Approach construction methods with sensitivity to local traditions, ensuring that techniques and materials reflect the cultural and environmental context.

03

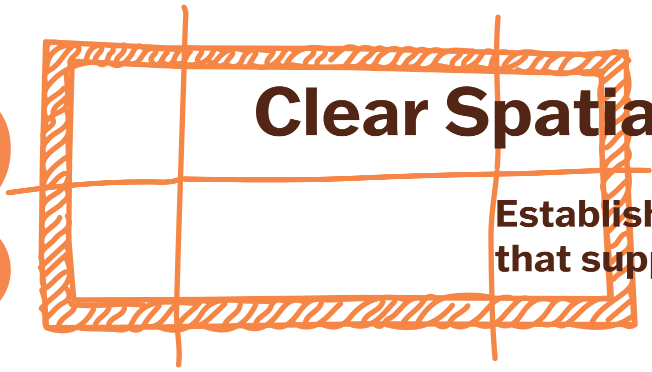
Cultural Building Practices

Spatial Sensory Experience

04

Composite materials to evoke a tactile and atmospheric quality that aligns with the function of each space.

05



Clear Spatial Logic

Establish an inherent spatial generality that supports an adaptable composition.

Ensure the house is perceived as a complete and cohesive whole both visually and functionally.

Cohesive Architectural Language

06

Figure 18. Manifesto strategies

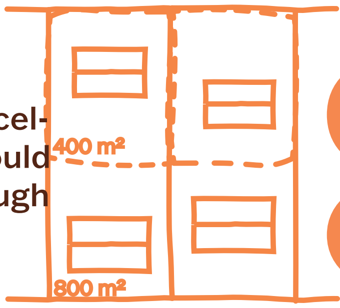
07 Smaller living

The average living space per person should be reduced through spatial efficiency.

08 Low energy

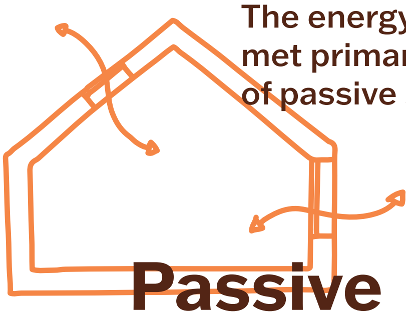
The energy consumption should not exceed 27 kWh/m² per year, in line with the energy frame for low-energy houses.

09 Denser living



The average parcelhus plot size should be reduced through densification.

10 Passive strategies



The energy frame should be met primarily through the use of passive strategies.

11 Shared living

The average household size in parcelhuse should be increased through shared living arrangements.

12 No vapour barrier

Construction elements should be simplified by the exclusion of a vapour barrier.

Figure 19. Manifesto strategies 02

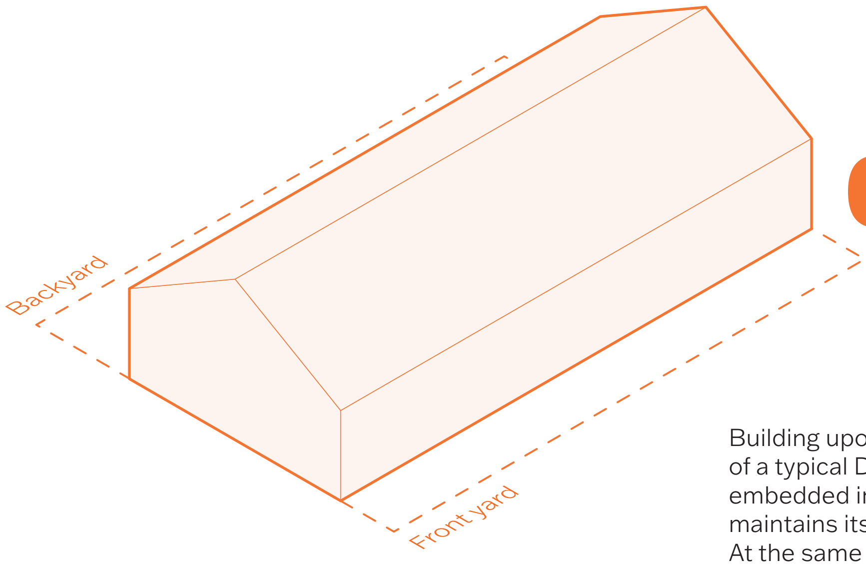
the new paradigm

the new paradigm

Figure 20. Visualisation, window reveal

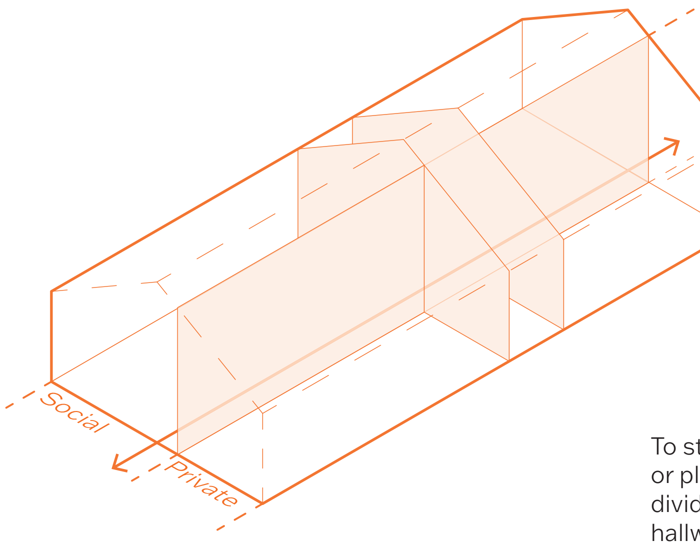
concept

In the following chapter, The New Paradigm for the Danish parcelhus is introduced. Grounded in affective sustainability, this paradigm builds upon Danish living and building traditions while aligning them with contemporary values. It ensures a home with affectionate qualities, ones that are embedded in us, and thus possess lasting value.



01

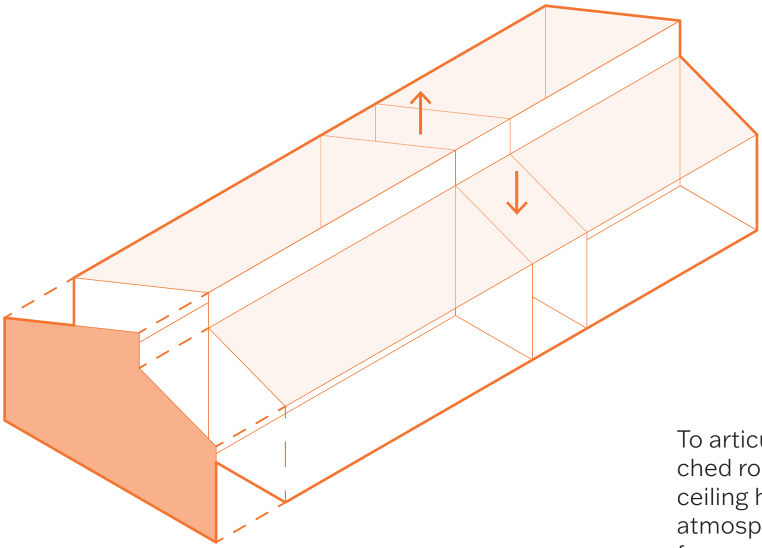
Building upon Danish traditions, the house adopts the form of a typical Danish longhouse with a pitched roof. Deeply embedded in our culture, this shape ensures the home maintains its relevance while evoking a sense of familiarity. At the same time, the simple, complete form makes the home legible and discourages alterations.



02

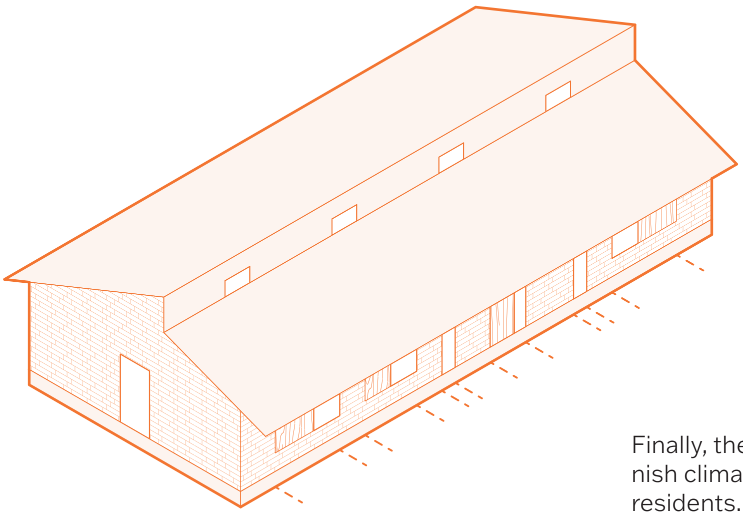
To strengthen the home's long-term relevance, the floor plan follows a clear spatial logic, with a structural wall dividing it into social and private zones. A long, open hallway connects the two, forming a continuous visual axis that supports graceful flow of movement. Two additional load-bearing walls define the entrance and link it to the backyard. Together, these structural elements prevent alterations and preserve the spatial concept over time.

Figure 21. The New Paradigm, concept



03

To articulate the difference between the two zones, the pitched roof is subtly modified, granting each space a distinct ceiling height and thereby shaping two contrasting spatial atmospheres. This variation is reflected in the exterior form, rendering the house legible both inside and out. In doing so, it forges a clear link between interior function and architectural expression.



04

Finally, the home is thoughtfully refined to suit the Danish climate, aligning with the contemporary values of its residents. This is expressed through carefully designed overhangs, skylights, the use of traditional brickwork, and a sturdy plinth. The facades are composed with a harmonious rhythm, once again emphasising affective qualities deeply embedded within us.

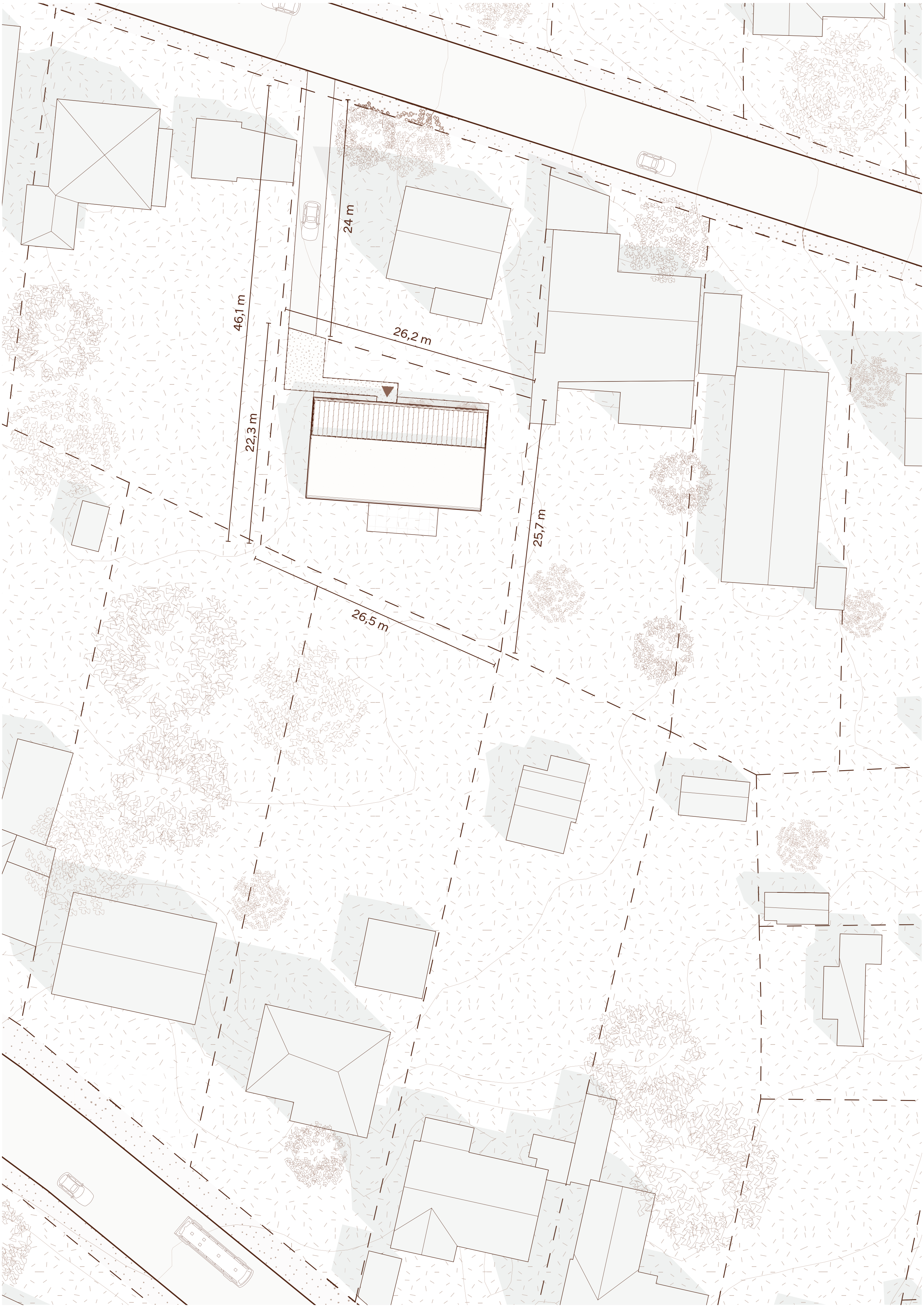


Figure 22. Site plan 1:500

The New Paradigm represents more than a single dwelling, it embodies a building culture, capable of adapting to diverse Danish contexts and ways of living. The first home to emerge from this approach is situated on Grundtvigsvej, a typical Danish suburban street. Here, the house is carefully placed between two existing plots, subtly contributing to the area's densification while preserving the core idea of the parcelhus, with its recognisable front and backyard configuration.

contextural integration

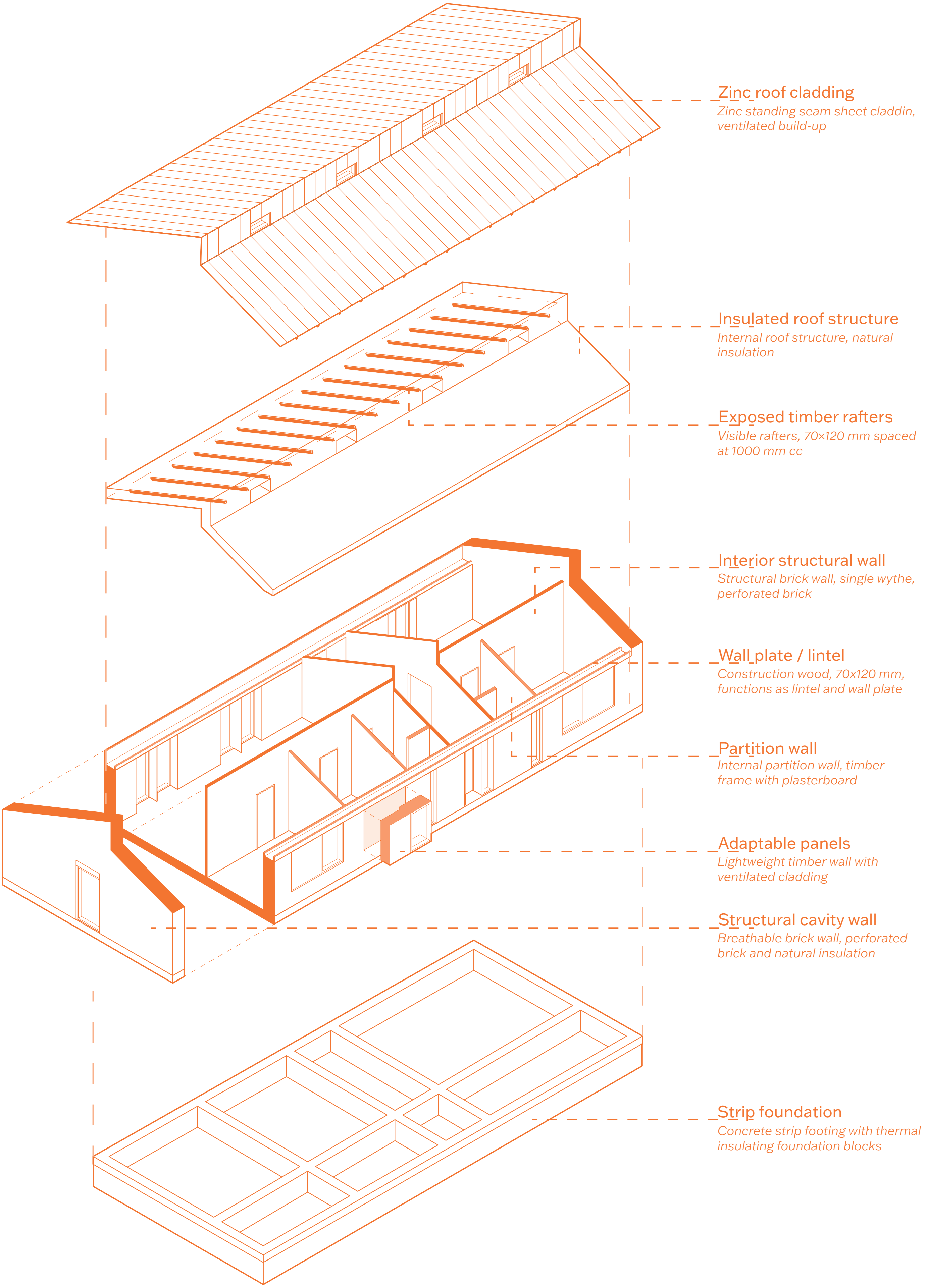


Figure 23. Exploded structural system

structural hierarchy

The structure of the house is based on a structural cavity wall construction, making the exterior walls the most stubborn elements. Inside, structural walls shape the spatial organisation, acting as the second most stubborn elements of the design. The roof is supported by timber rafters, which are left exposed in the social zone, enhancing the spatial experience and reinforcing the distinction between private and social spaces.

In this way, the structural hierarchy becomes more than just a system of support, it forms a series of architectural elements whose inherent resistance to change serves to uphold and strengthen the overall concept.

Figure 24. Visualisation, terrace

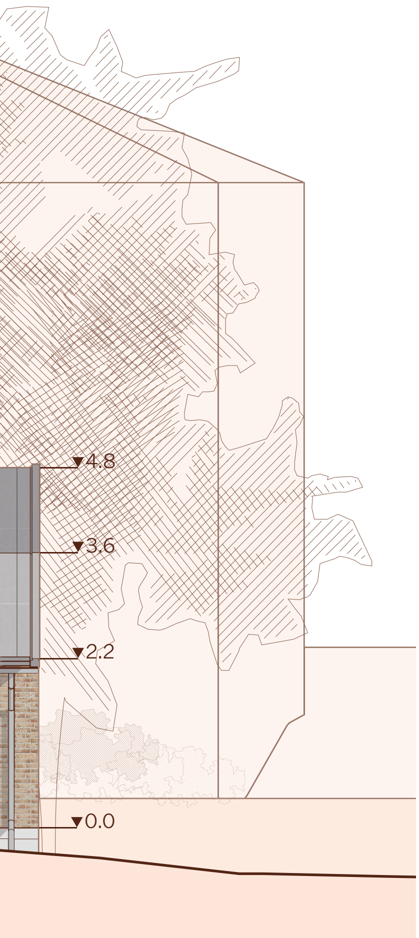


Figure 25. Elevation north 1:100

arriving home

Approaching the house, one is first met by a facade that appears traditional, evoking a sense of familiarity. Yet on closer inspection, subtle deviations emerge, elements that reveal the home as a contemporary reinterpretation of the classic parcelhus. These include the roof with its varying heights and carefully dimensioned overhangs, all thoughtfully designed in response to the Danish climate. The arrangement of windows and wooden facade panels creates a harmonious rhythm, while also reflecting the internal organisation. Smaller openings and a more enclosed expression mark this as the private facade, reinforcing the relationship between interior function and external form.

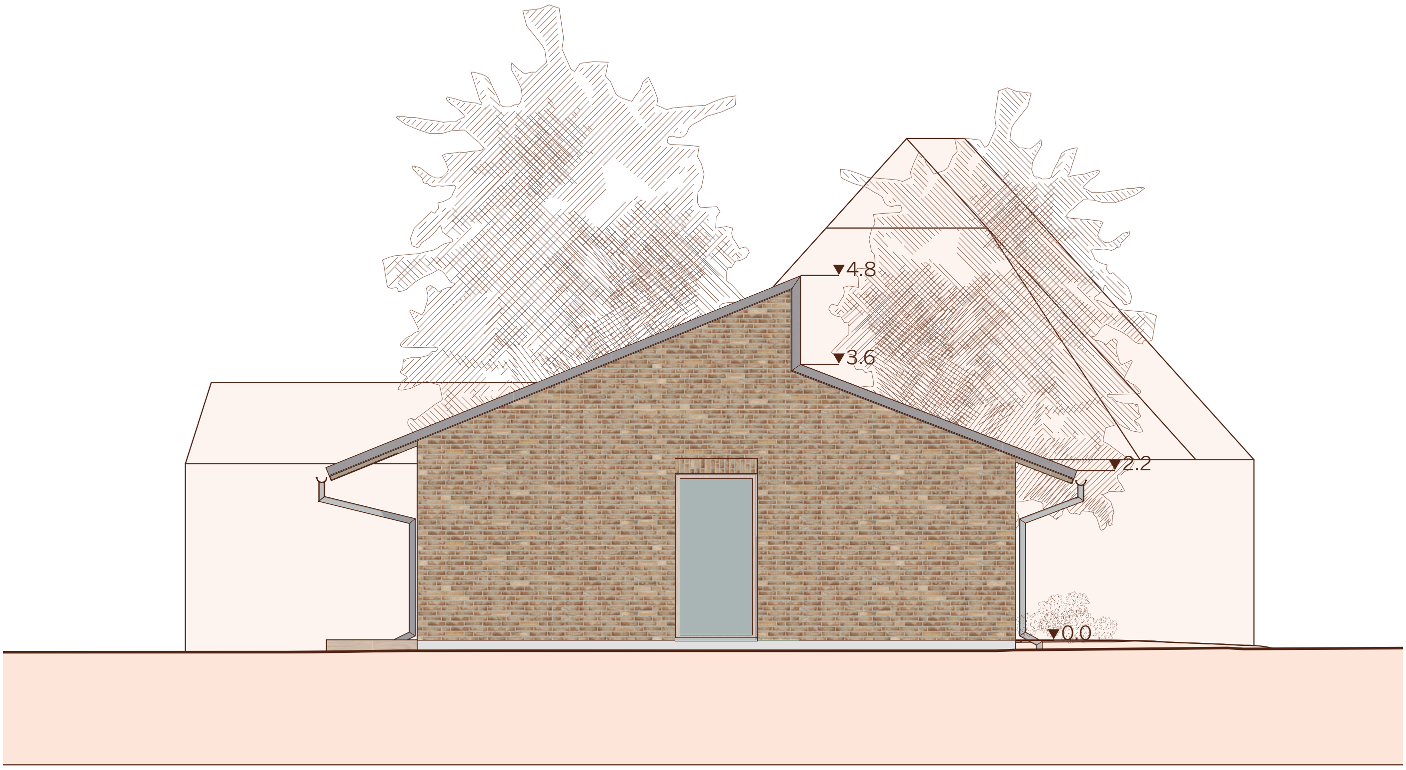


Figure 26. Elevation east 1:100

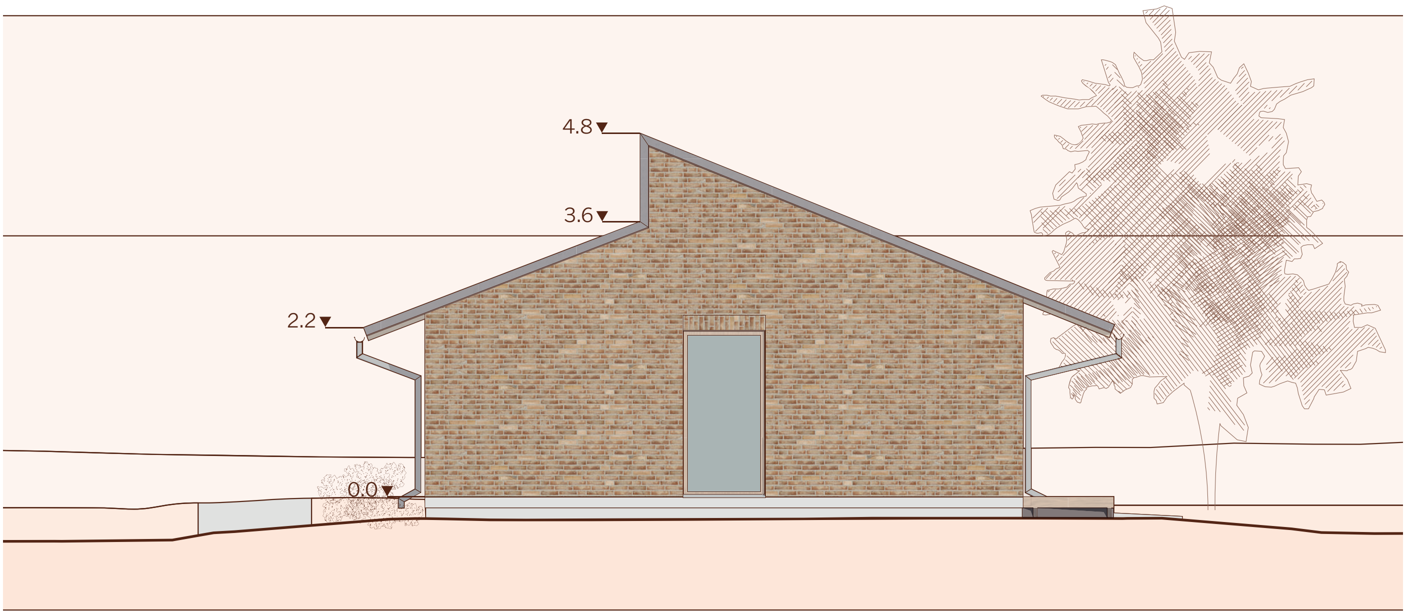


Figure 27. Elevation west 1:100

Figure 28. Visualisation, front yard

For a plan with additional measurements, see appendix 12.

grundtvigsvej 10

01	Bedroom 9.9 m²	06	Bedroom 9.9 m²
02	Bathroom 4.8 m²	07	Livingroom 23.9 m²
03	Entrance 6.6 m²	08	Utility room 6.6 m²
04	Bathroom 4.8 m²	09	Open plan kitchen 35.9 m²
05	Office 7.3 m²		

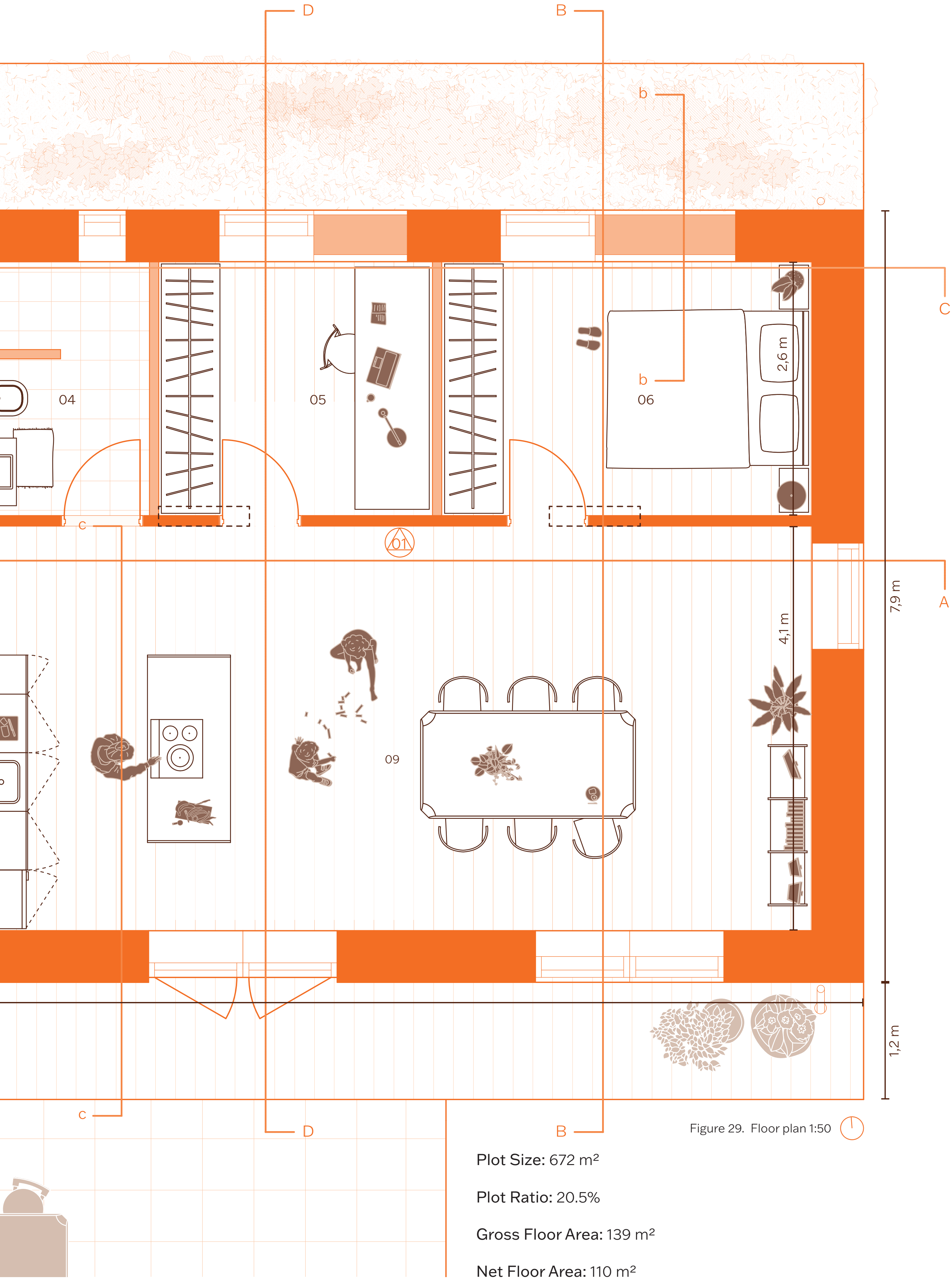


Figure 29. Floor plan 1:50

Plot Size: 672 m²

Plot Ratio: 20.5%

Gross Floor Area: 139 m²

Net Floor Area: 110 m²

inside the home

Upon entering, one is met with a direct sightline to the backyard, creating a bright, open arrival. Moving toward the social zone, the ceiling height rises, enhancing the spatial experience, a feeling further amplified by the exposed timber rafters and the visible brick structural wall. These elements not only enrich the atmosphere but also communicate the home's tectonic logic, making its construction legible.

Figure 30. Section AA 1:50


4.8
3.6
2,4 m
4 m

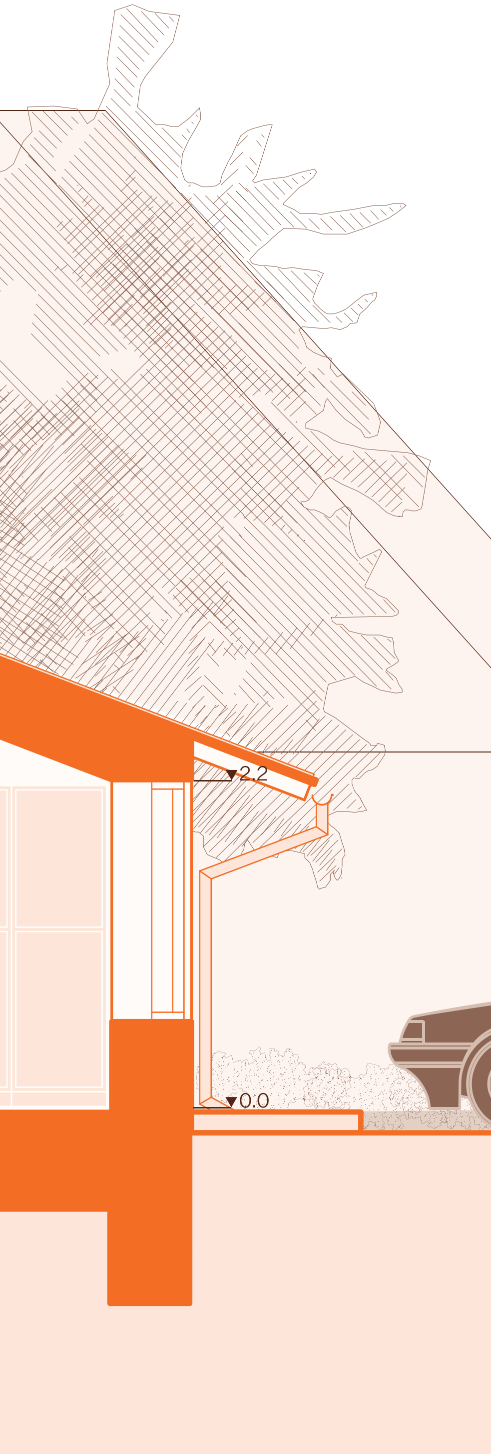


Figure 31. Section BB 1:50

the social zone

The social zone is defined by bright, open spaces, enhanced by floor-to-ceiling windows that blur the boundary between inside and out, allowing the terrace to feel like a natural extension of the interior. These are also the largest spaces in the home, further reinforcing the distinction between the social and private zones.

Figure 32. Visualisation, hallway

the connecting axis

Circulation through the house is organised along a central axis, positioned beside the wall dividing the private and social zones. This axis becomes an open hallway, creating a clear and elegant flow through the home, while also providing a direct sightline from one end to the other. The hallway acts as an extension of the social spaces, making them feel larger, yet it is clearly defined by the structural walls framing the entrance. To bring light into this centrally located space, a skylight is placed above. The wall beneath it transitions from timber to brick. Thus, the rafters span from timber to timber, marking the social zone and reinforcing a sense of completeness in the structure.

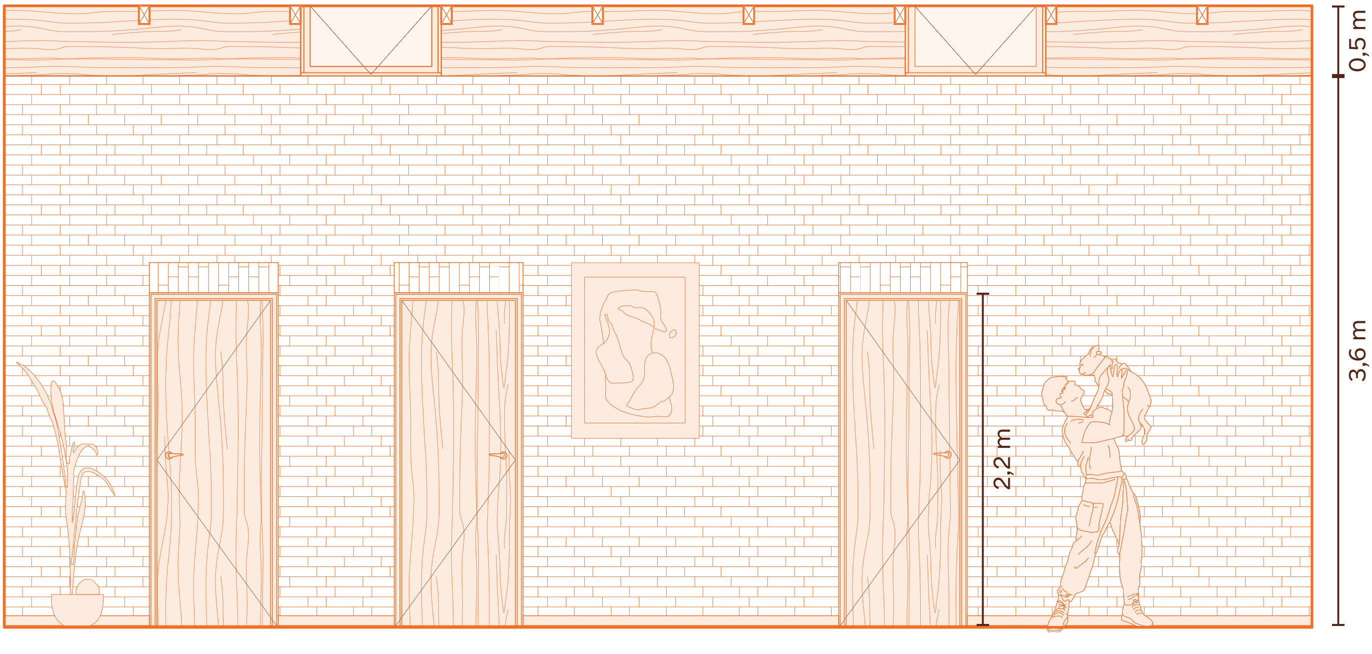


Figure 33. Interior elevation 01, 1:50

Figure 34. Visualisation, open plan kitchen

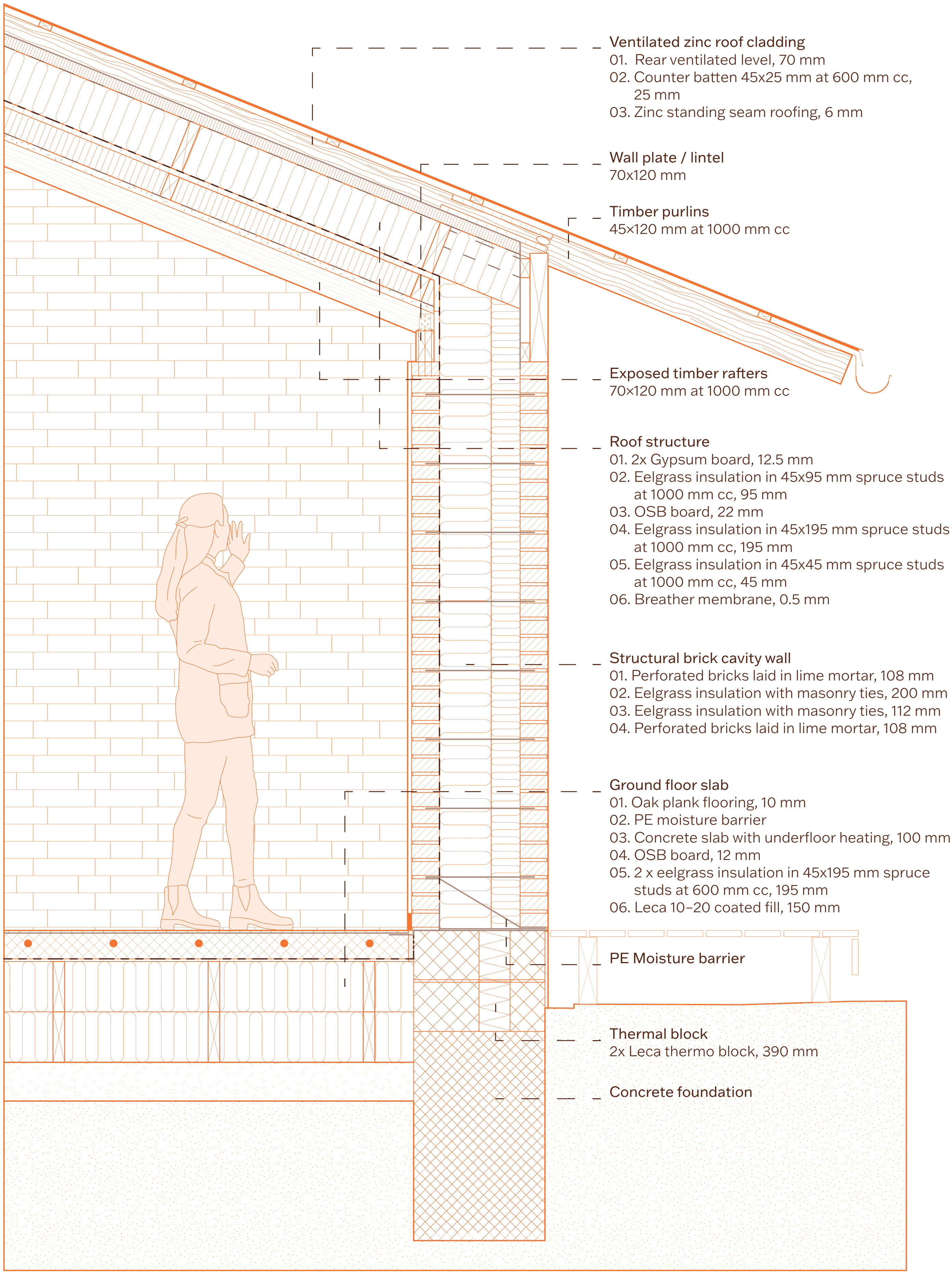


Figure 35. Vertical detail section aa, 1:20

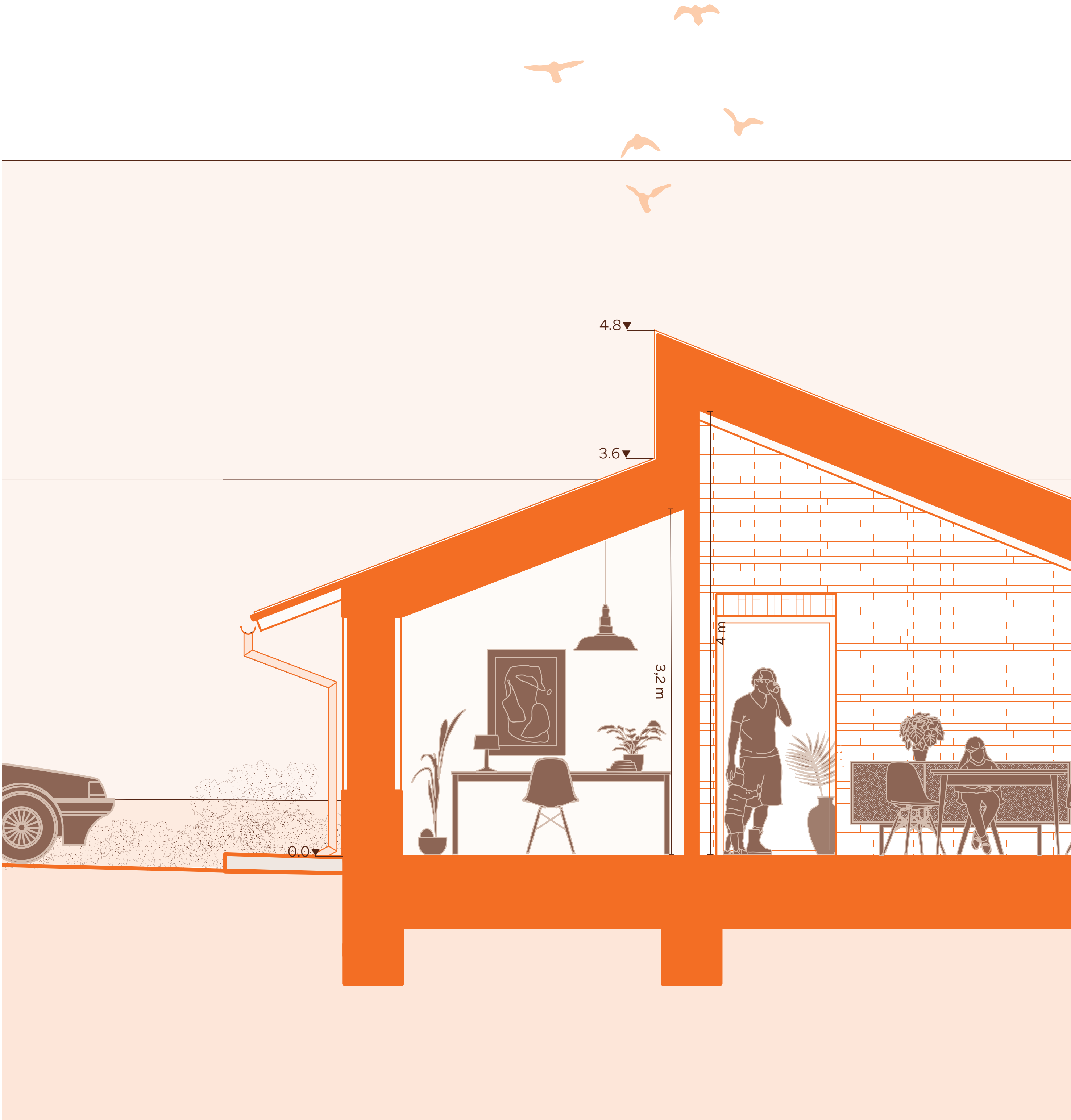
Figure 36. Visualisation, wall plate

the detail

The connection between the rafters and the southern exterior wall has been carefully detailed through the precise dimensioning of the wall plate, also acting as a lintel. Exposed along the entire span, the wall plate sits just below the rafters, creating a narrow gap that casts a subtle shadow and adds spatial depth. This enhances the sensory experience in the social zone. Floor-to-ceiling windows reinforce the coherence between structural and spatial elements, blending structure with atmosphere.

The construction avoids the use of a vapour barrier. Instead, the inherent properties of the brick are fully utilised, while airtightness is ensured through OSB boards within the additional structural elements. This approach simplifies the construction and allows the house to breathe, contributing to a healthy indoor climate.

Figure 37. Section CC 1:50


4.8
3.6
0.0
3,2 m
4 m

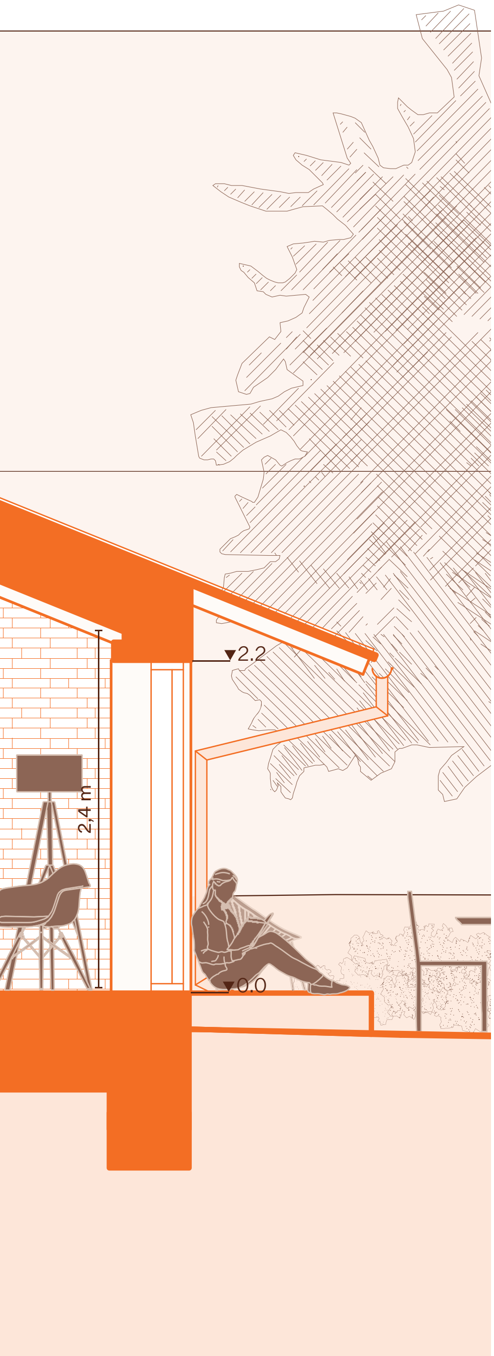


Figure 38. Section DD 1:50

the private zone

In the private zone of the home, the ceiling height is reduced, resulting in a different spatial sensory experience, creating simpler, more intimate spaces suited to calm, everyday activities. Each room is carefully tailored to its function, with integrated storage ensuring practicality without compromising spatial quality. Sightlines remain a key feature, with doors positioned opposite windows to allow for light and openness. Privacy is maintained through smaller window openings, while a degree of adaptability is built in; timber wall panels beside the windows allow their position to be adjusted across the homes lifespan and changing residents.

Ventilated zinc roof cladding

Timber purlins
45x120 mm at 1000 mm cc

Wall plate / lintel
70x120 mm

Roof structure
01. 2x Gypsum board, 12.5 mm
02. Eelgrass insulation with 70x120 mm timber rafters at 1000 mm cc, 120 mm
03. OSB board, 22 mm
04. Eelgrass insulation in 45x170 mm spruce studs at 1000 mm cc, 170 mm
05. Eelgrass insulation in 45x45 mm spruce studs at 1000 mm cc, 45 mm
06. Breather membrane, 0.5 mm

Wooden facade panels
01. 2x MDF, 12 mm
02. OSB, 12 mm
03. Eelgrass insulation in 45x200 mm spruce studs at 800 mm cc, 200 mm
04. Eelgrass insulation in 45x112 mm spruce studs at 800 mm cc, 112 mm
05. Rear ventilated level with counter batten 40x30 mm at 600 mm cc, 30 mm
06. Oak plank facade, 24 mm

Structural brick cavity wall

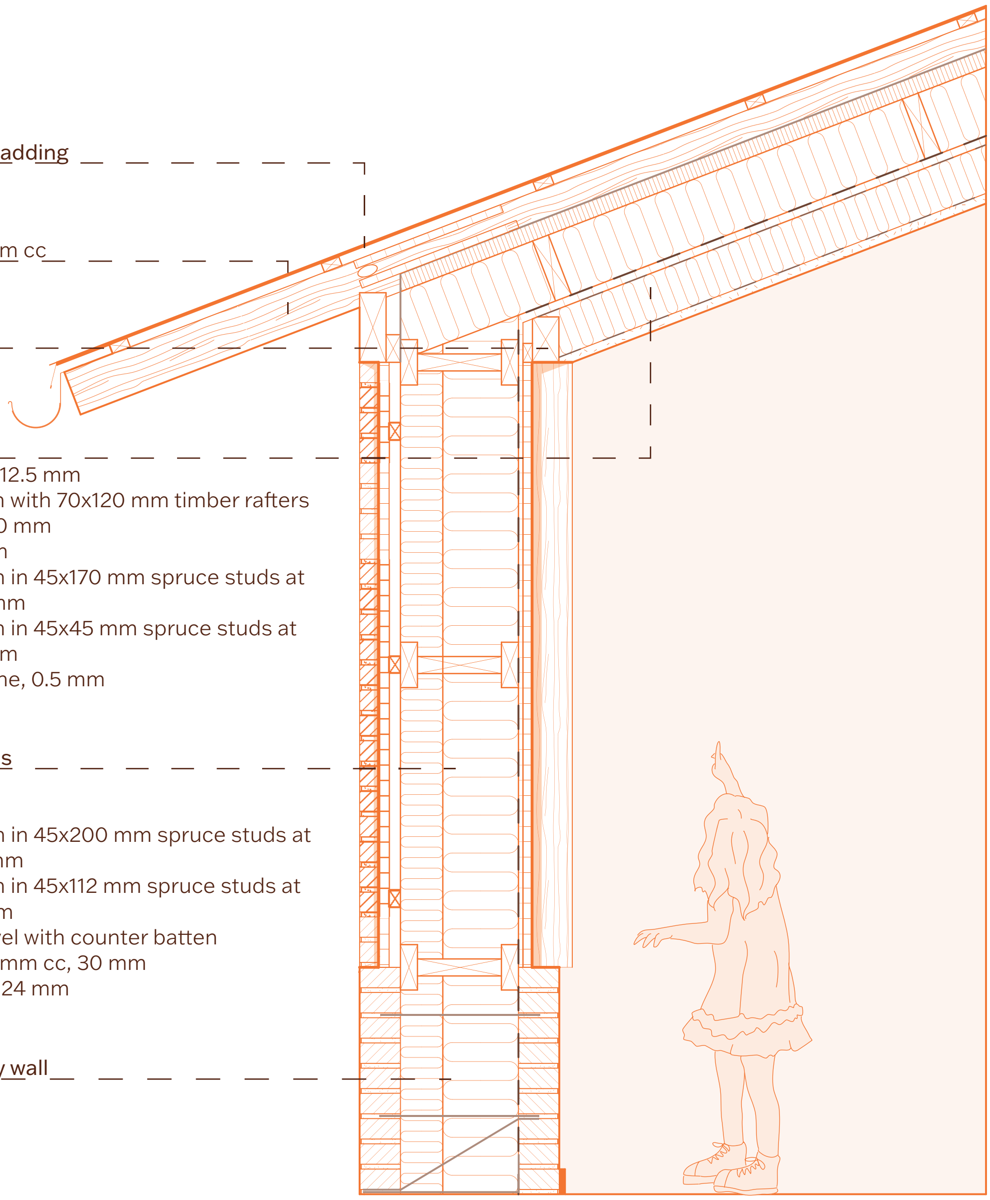


Figure 39. Vertical detail section bb, 1:20

the adaptable detail

To allow for the repositioning of windows, the wall plate along the private wall is dimensioned to support the span of both the openings and the adjacent timber wall panels. These panels not only enable adaptability but also contribute to the facade's rhythm. Internally, they add depth to the rooms and subtly define space, even forming small built-in shelves that enhance everyday functionality.

Figure 40. Visualisation, bedroom


A

Figure 41. Visualisation, livingroom

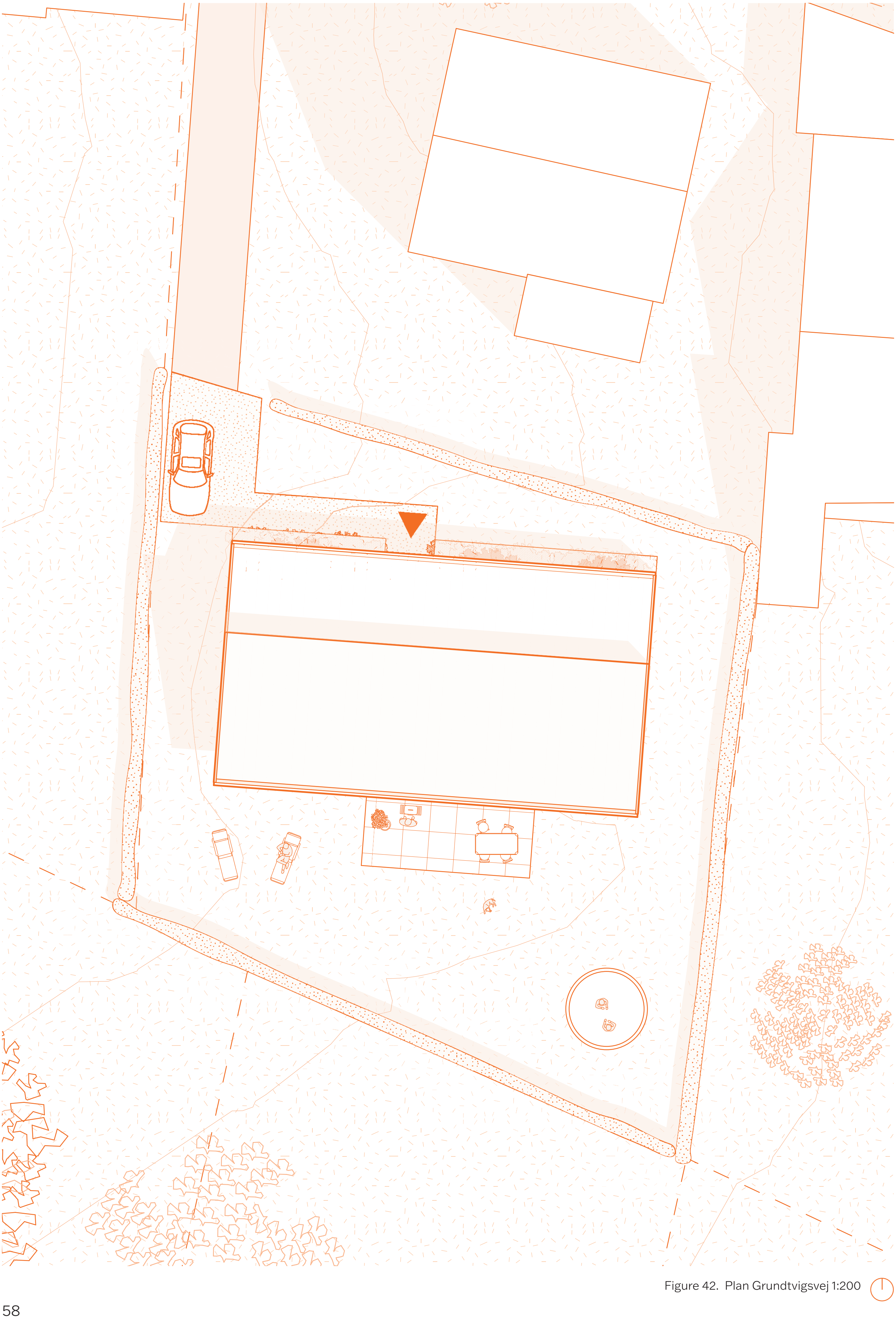
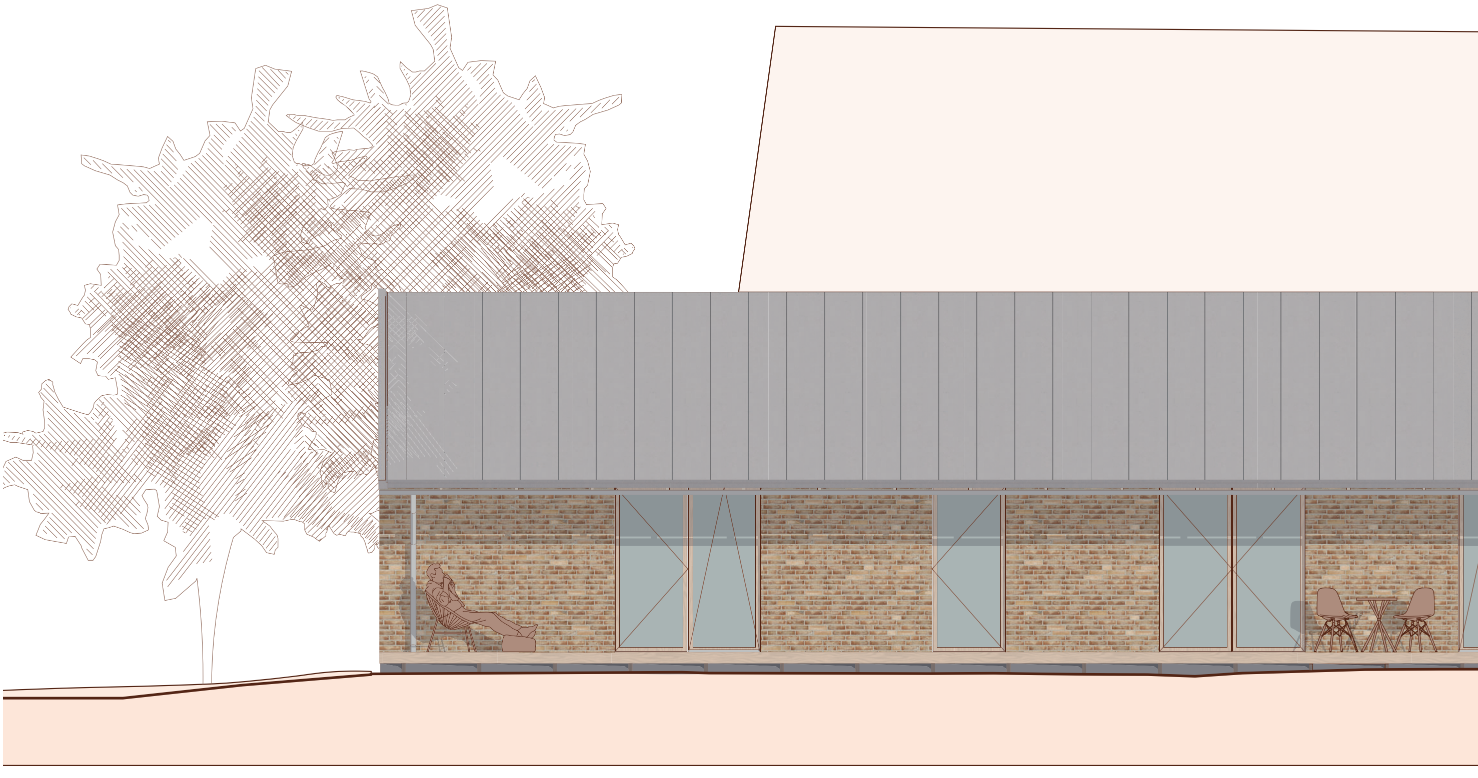


Figure 42. Plan Grundtvigsvej 1:200

the yards

Both the private and social facades are framed by overhangs, clearly defining outdoor zones on either side of the home. Along the social facade, a wooden terrace is placed beneath the overhang, offering an easily accessible and sheltered outdoor space. The terrace extends into the backyard, creating a more private area for retreat and activity. Despite the plot being smaller than typical suburban plots, the backyard still comfortably accommodates the daily outdoor routines that Danish families value.



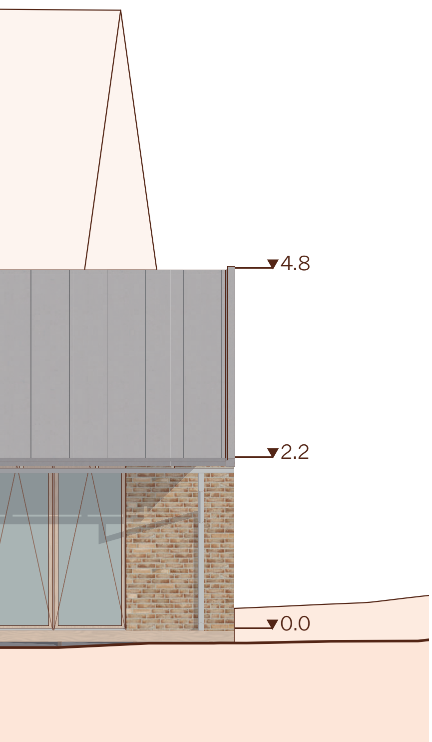


Figure 43. Elevation south 1:100

the social facade

Along the social facade, traditional associations and a harmonious rhythm are maintained through the careful placement of windows and the consistent use of brick. The window arrangement clearly reflects the organisation of the interior, making the spatial layout legible from the outside.

Figure 44. Visualisation, backyard

technical performance

To maintain energy performance and ensure a comfortable indoor climate, passive strategies are integrated into the home itself. These include low U-values, compactness, high thermal capacity, and carefully designed natural ventilation.

Window sizes and overhang lengths are dimensioned to optimise solar gain in winter while preventing overheating in summer.

To assess the daylight conditions in the house, a UDI analysis was carried out. This method looks at how often the daylight levels in a room fall within a comfortable and usable range, between 100 and 2000 lux.

The results show that 40% of the occupied hours, the daylight levels stay within this ideal range, which indicates good daylight comfort.

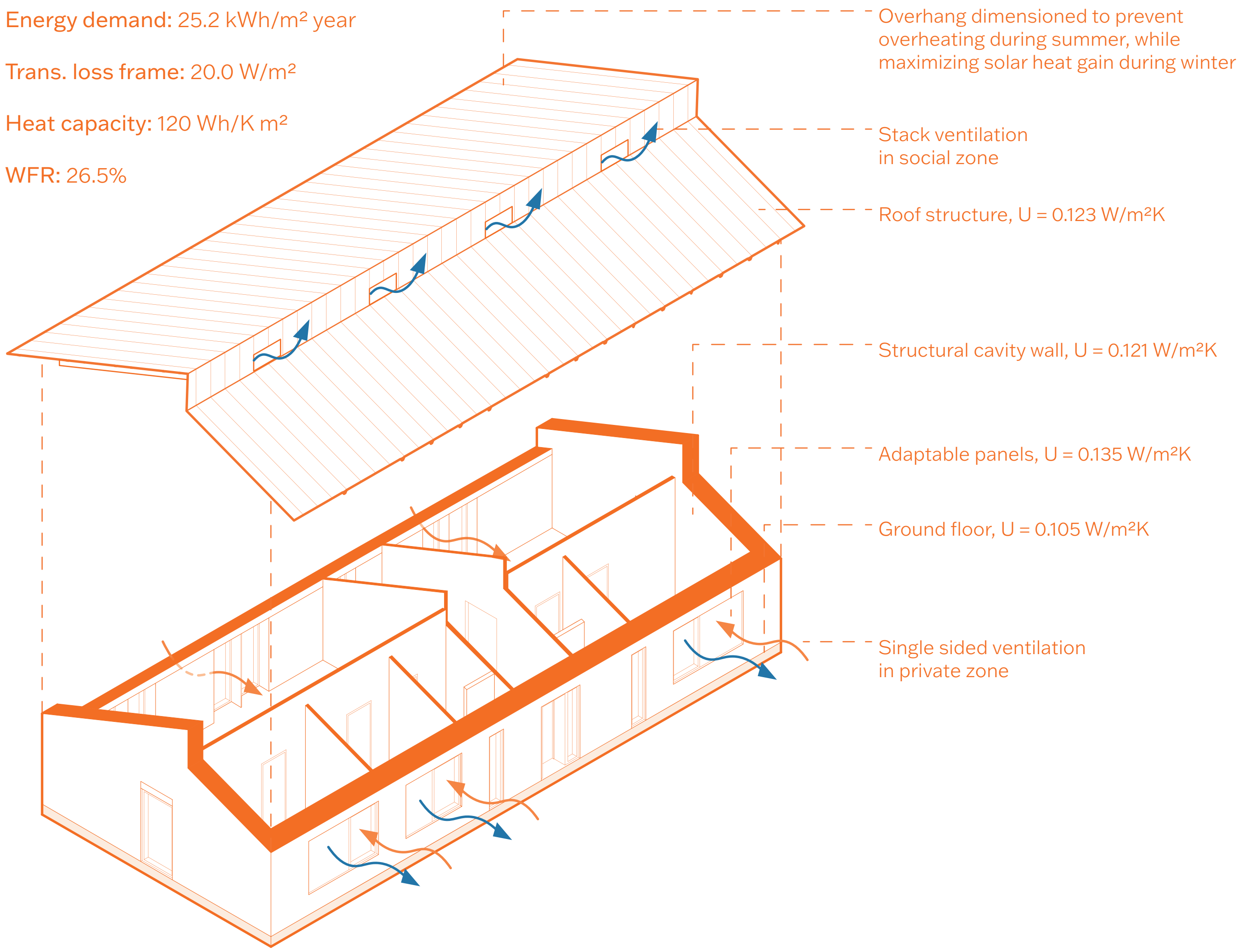


Figure 45. Technical principles

Facade	WWR
South	33.8%
North	15.0%
East	8.1%
West	8.1%

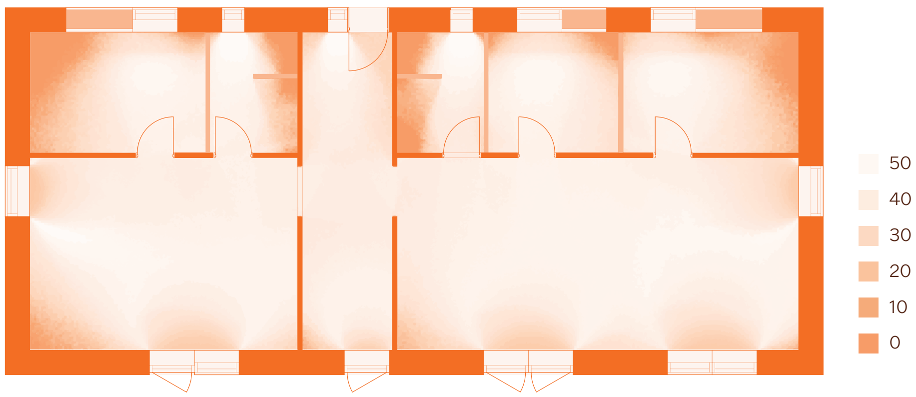


Figure 46. Useful Daylight Illuminance

a building culture

The New Paradigm is not merely a single home; it represents a dynamic building culture. The following pages present a collection of homes developed within the framework of The New Paradigm, situated across diverse sites, oriented in various ways, and composed of different module types. The section begins by exploring how the previously presented case, the home on Grundtvigsvej, can evolve over the course of its lifetime.

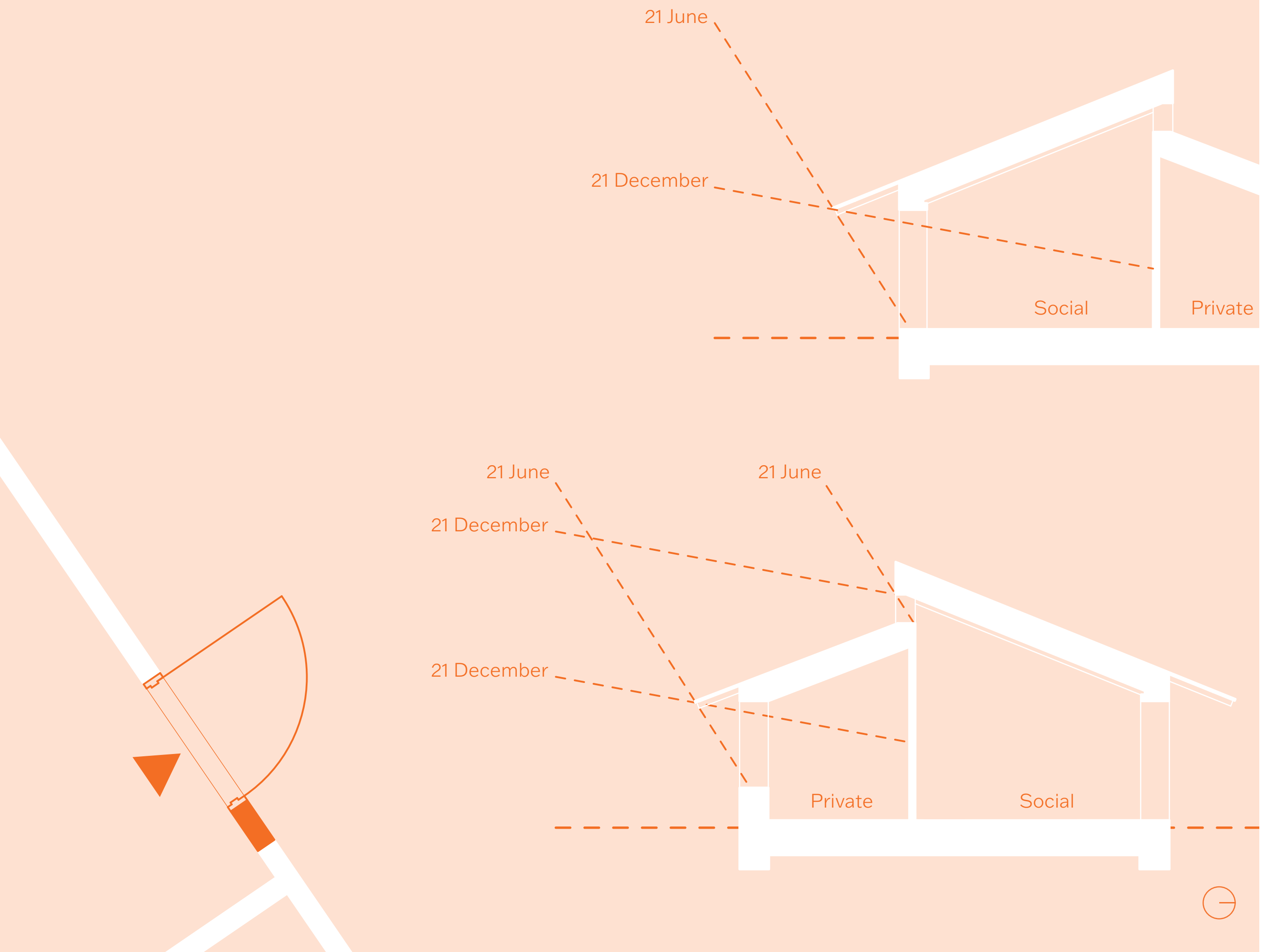
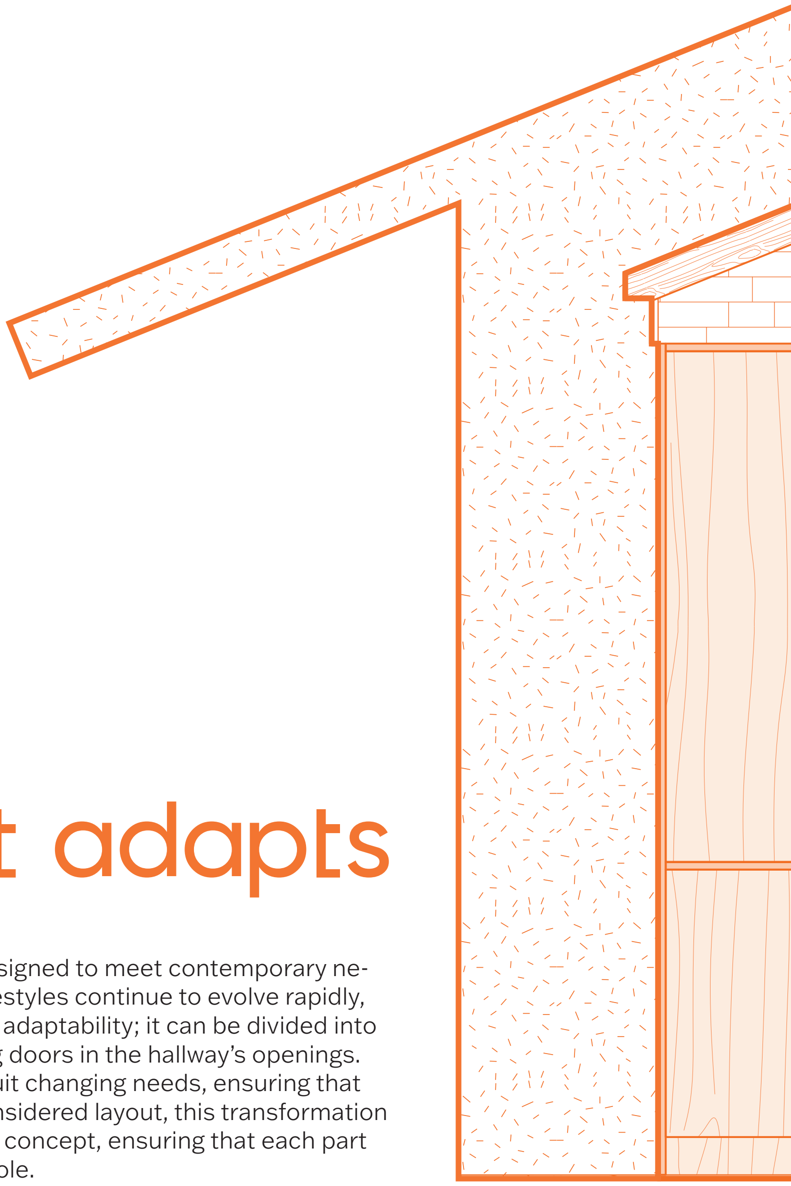


Figure 47. A building culture



a home that adapts

The home of The New Paradigm is thoughtfully designed to meet contemporary ne-eds and respond to present-day challenges. As lifestyles continue to evolve rapidly, so too must our homes. This home allows for easy adaptability; it can be divided into two units with a shared entrance, simply by adding doors in the hallway's openings. In this way, the spatial layout can be adjusted to suit changing needs, ensuring that no space goes unused. Thanks to the carefully considered layout, this transformation can occur without compromising the architectural concept, ensuring that each part of the home remains coherent, functional, and whole.

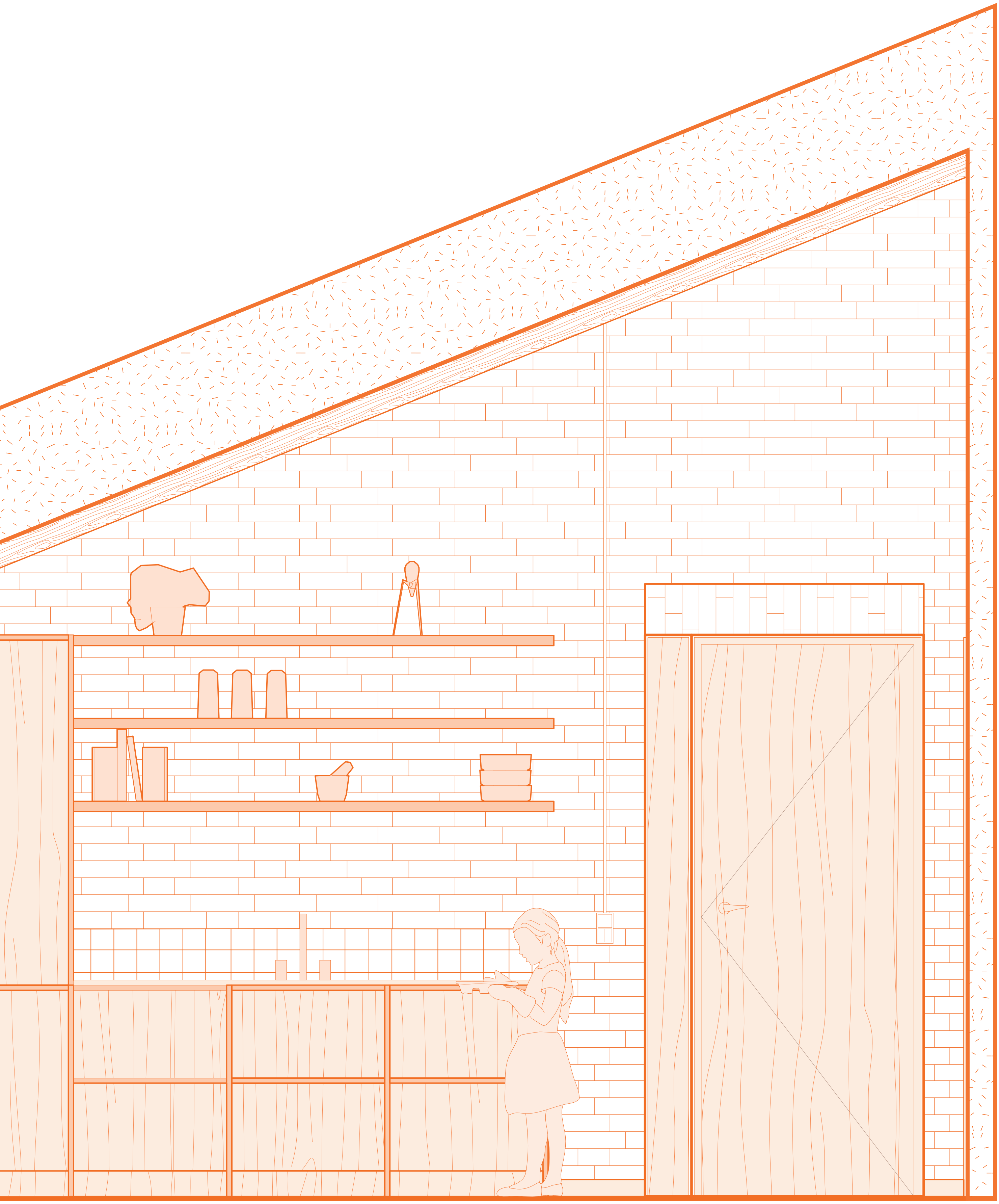


Figure 48. Section cc 1:20

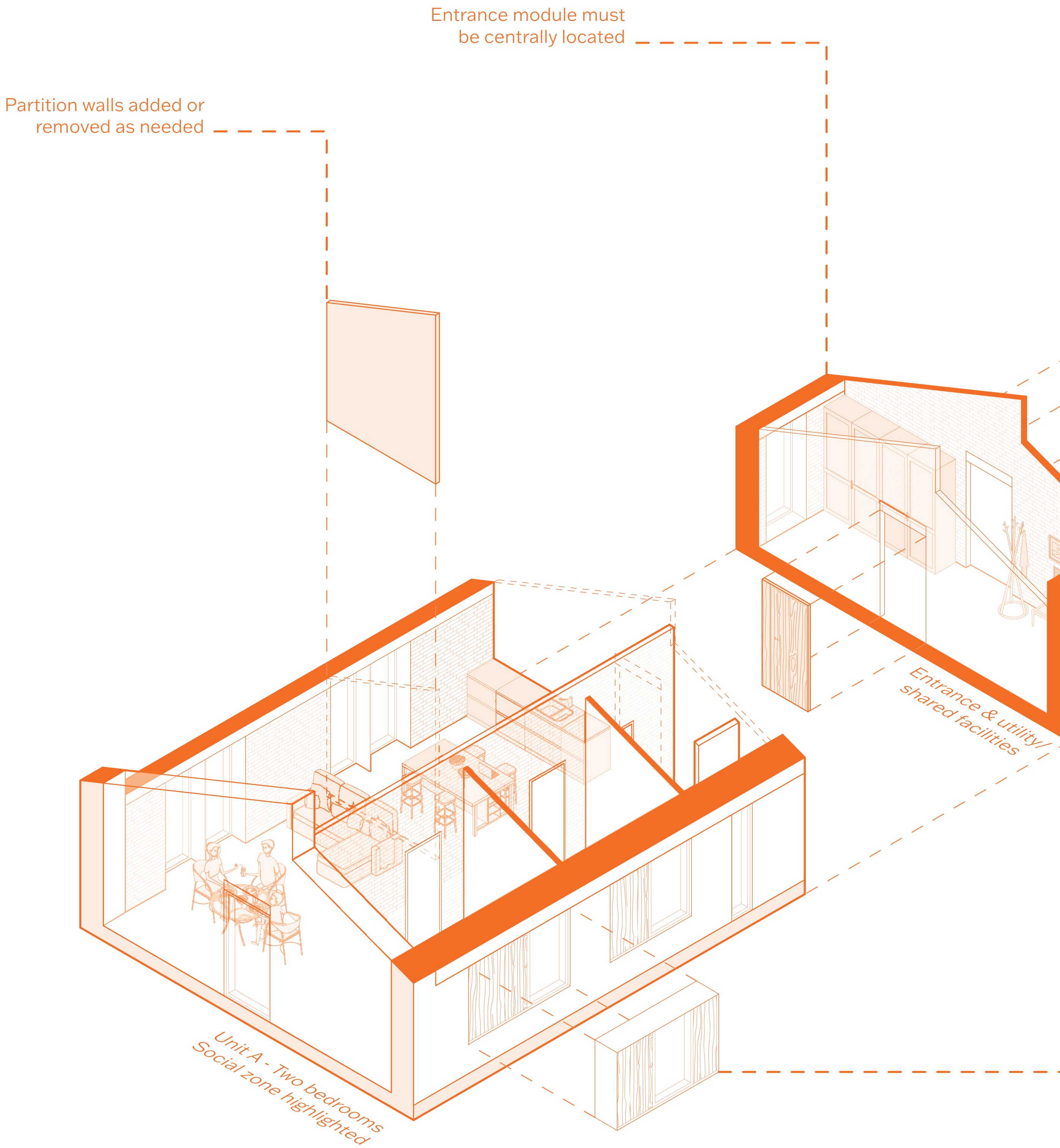
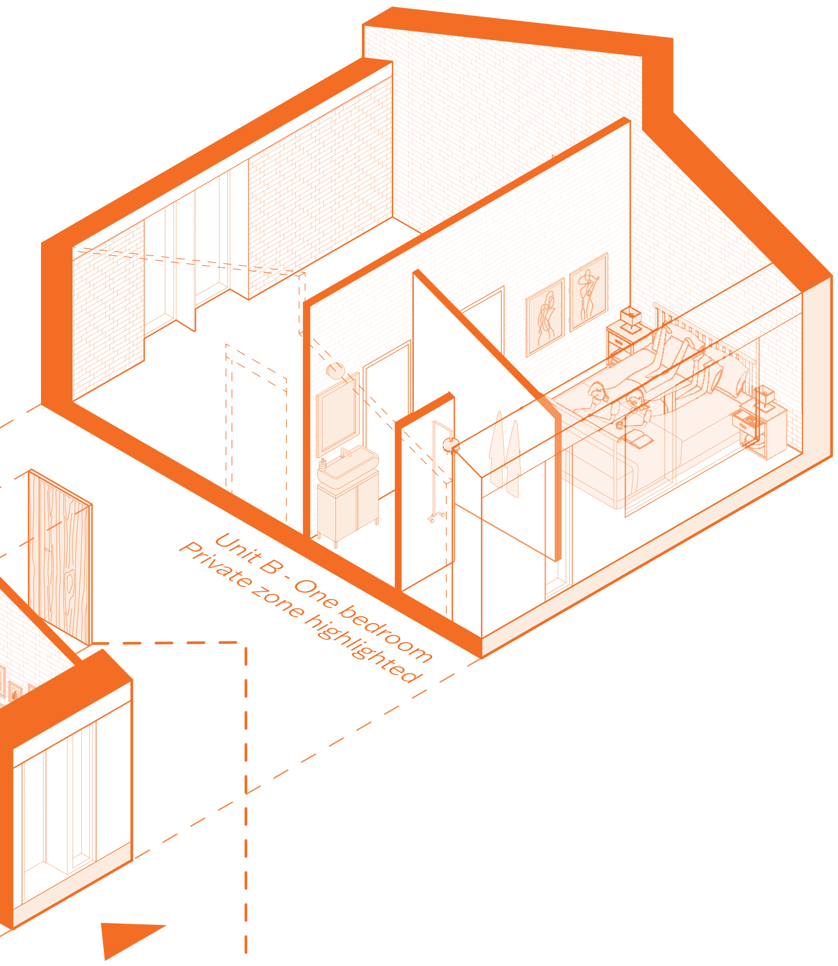


Figure 49. Modular system, isometric



The homes of The New Paradigm are built around a spatial generality, making them easily adaptable to a variety of contexts and plot sizes. Each home consists of three modules; a centrally placed entrance and utility module, flanked by two additional modules. The central module is defined by two structural walls, where doors can be added or removed depending on whether the house is to be used as a single unit or divided into two. On either side, the additional modules can vary in size and number of rooms, but all contain both social and private zones, ensuring that essential functions are always accommodated.

the spatial generality


01
02
04
03
05
6,8 m
17,6 m

Unit A

01 Bedroom 9.9 m²
02 Bathroom 4.8 m²
03 Kichen and living room 23.9 m²

Shared facilities

04 Entrance 6.6 m²
05 Utility room 6.6 m²

Unit B

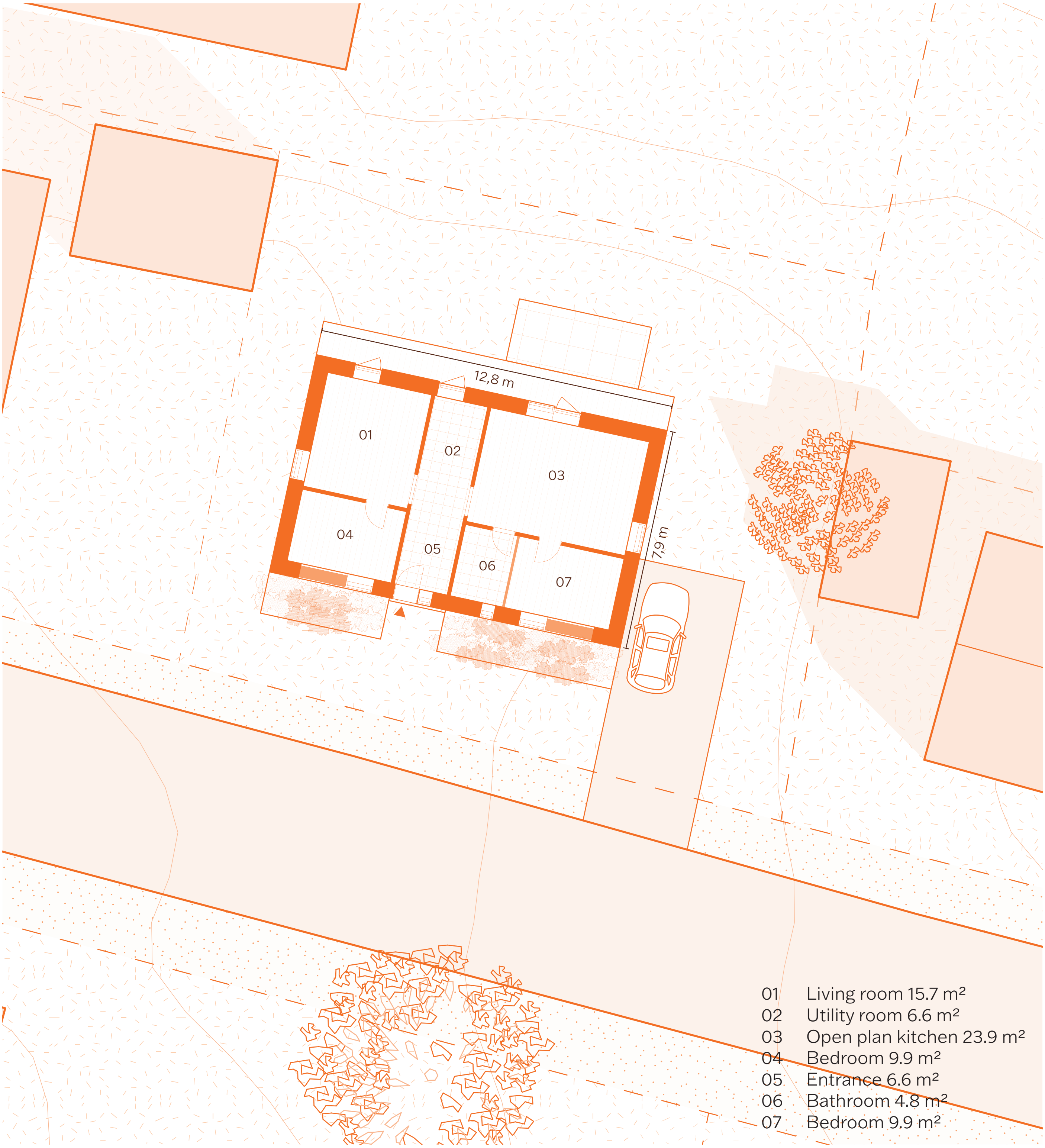
06 Bathroom 4.8 m²
07 Office 7.3 m²
08 Bedroom 9.9 m²
09 Kitchen and living room 35.9 m²

Figure 50. Grundtvigsvej, divided plan 1:50

kovhøjsvej 6, aalborg

Kovhøjsvej is a typical Danish suburban street, where a single large corner plot has been subdivided into two plots. The home of The New Paradigm is situated here. This is a compact two-bedroom house with a single bathroom, and as such, it cannot be divided into separate units. It represents the smallest scale within The New Paradigm, demonstrating that it is possible to live according to its principles even on limited plots. This housing type can also function as an annex in the spacious backyards of existing homes, an ideal solution for empty nesters wishing to remain in the neighbourhood they know, while occupying less space.

House size: 101 m²
Plot size: 432 m²
Plot ratio: 23%
Number of people: 2-3
Square meters per person: 40 m²



01 Living room 15.7 m²
02 Utility room 6.6 m²
03 Open plan kitchen 23.9 m²
04 Bedroom 9.9 m²
05 Entrance 6.6 m²
06 Bathroom 4.8 m²
07 Bedroom 9.9 m²

Figure 51. Kovhøjsvej 1:200

øster sundby vej 61, aalborg

On Øster Sundby Vej, another suburban area, two existing parcelhus plots have been subdivided into three. The home of The New Paradigm is situated on the newly created middle plot. This is a two-bedroom, two-bathroom house, which in the illustrated case is subdivided into two separate units. Due to the central placement between two existing plots, a shared driveway has been added. This demonstrates how even narrow or constrained plots can accommodate these homes.

House size: 116 m²
Plot size: 472 m²
Plot ratio: 24.5%
Number of people: 2-4
Square meters per person: 38.5 m²

Unit A
01 Kitchen and living room 23.9 m²
02 Bedroom 9.9 m²
03 Bathroom 4.8 m²

Shared facilities
04 Utility room 6.6 m²
05 Entrance 6.6 m²

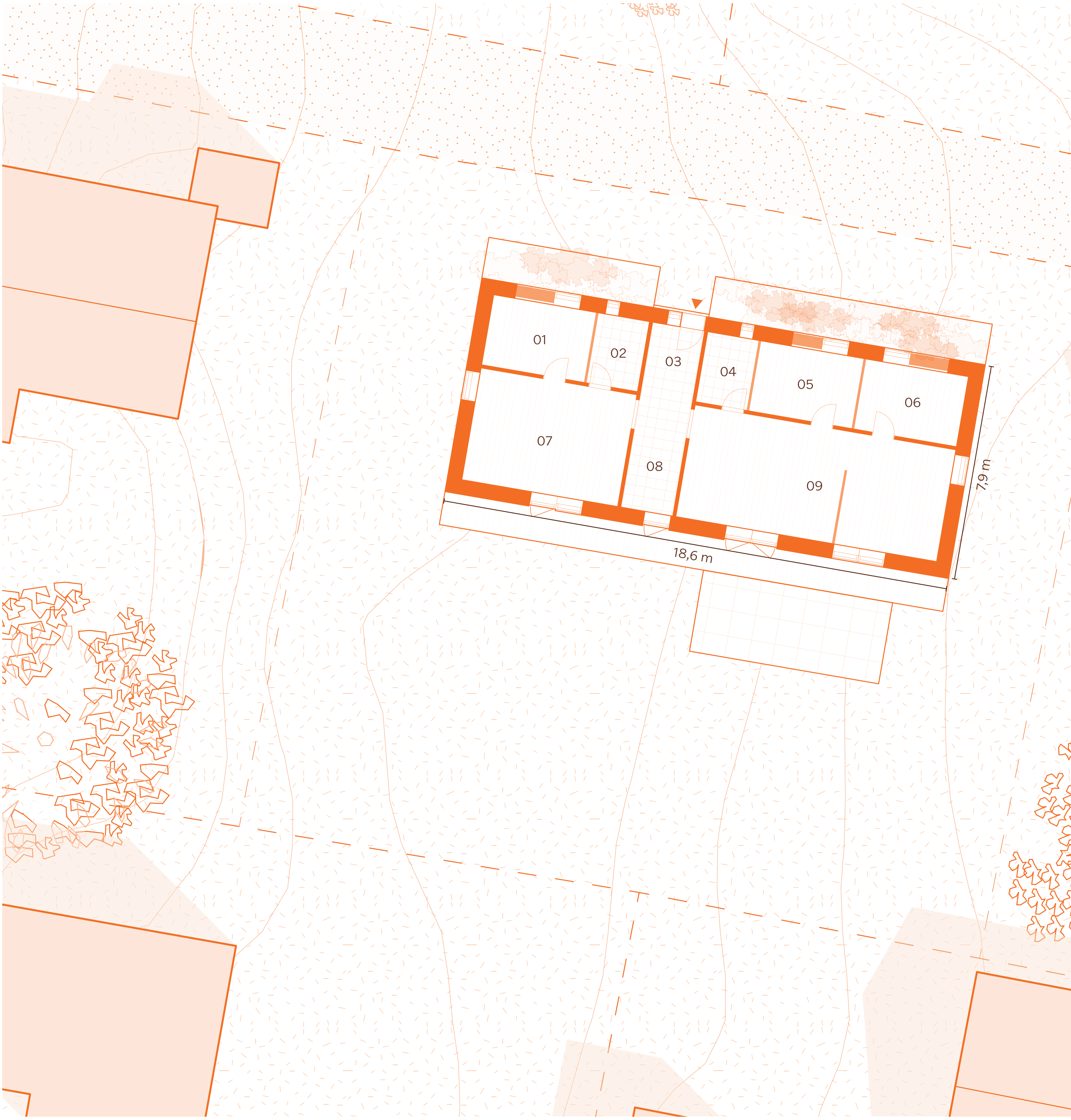
Unit B
06 Kitchen and livingroom 23.9 m²
07 Bathroom 4.8 m²
08 Bedroom 9.9 m²

Figure 52. Øster Sundby vej 1:200

martinus rørbyes vej 21, aalborg

On Martinus Rørbyes Vej, two additional existing plots have been subdivided into three, placing the home of The New Paradigm between the two original houses. This is a three-bedroom, two-bathroom home, where partition walls have been introduced in the social zone to create smaller spaces. Along this street, there are no private driveways leading to the houses; instead, cars are parked along the road. This situation is ideal, as it allows for minimal intervention on the plots and preserves more of the available outdoor space.

House size: 147 m²
Plot size: 696 m²
Plot ratio: 21%
Number of people: 3-5
Square meters per person: 37 m²



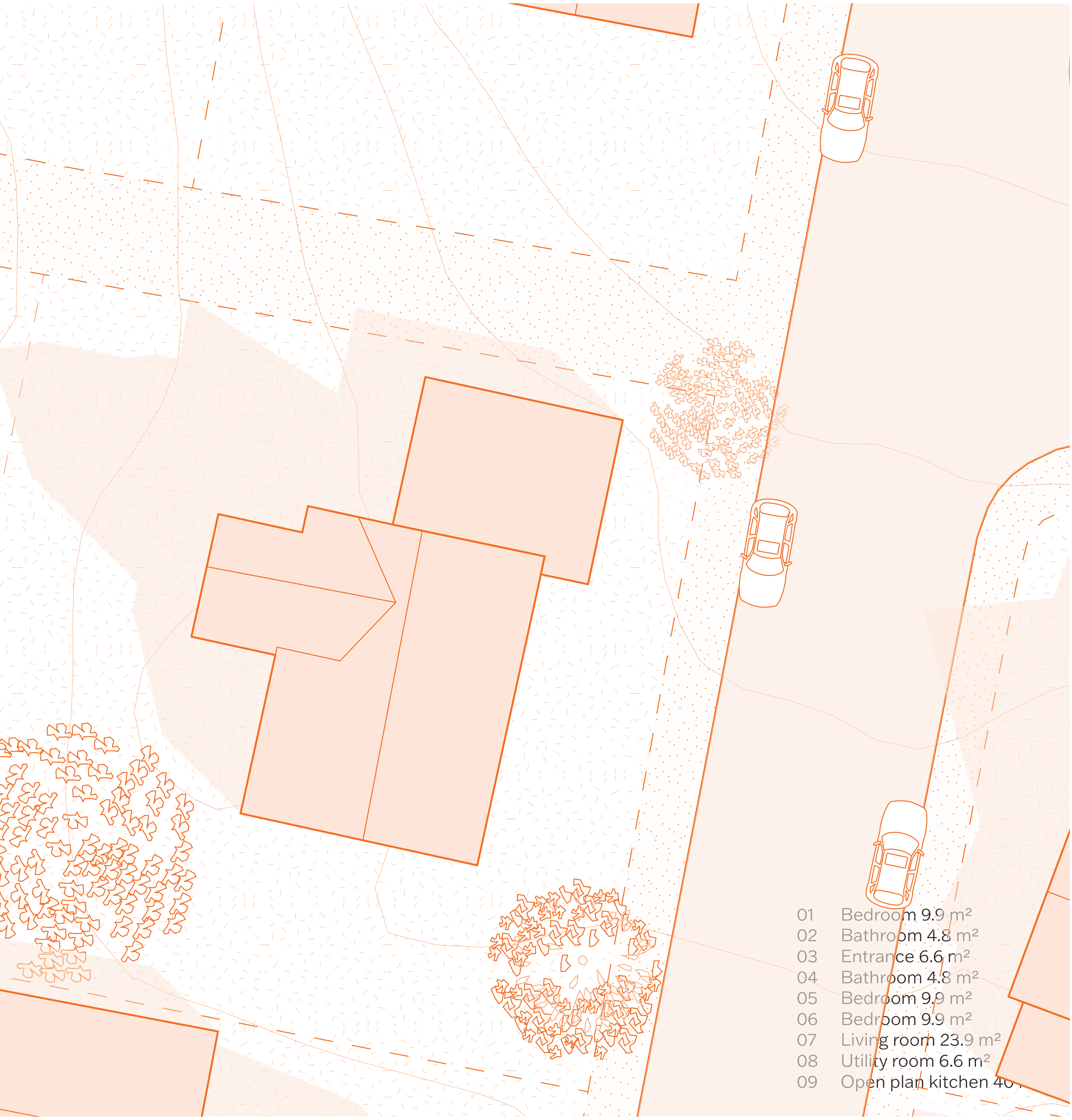


Figure 53. Martinus Rørbyes vej 1:200

langgade 36, aalborg

The home situated on Langgade is the largest within The New Paradigm and has therefore been placed on an existing plot without requiring any subdivision or major interventions. This is a four-bedroom, two-bathroom house, making it suitable for larger families who also wish to inhabit homes designed according to the principles of The New Paradigm. When subdivided into two units, as in the illustrated case, each unit retains a comfortable size, ensuring both spatial dignity and functional independence for multiple households.

House size: 178 m²
Plot size: 793 m²
Plot ratio: 22.5%
Number of people: 3-6
Square meters per person: 39.5 m²

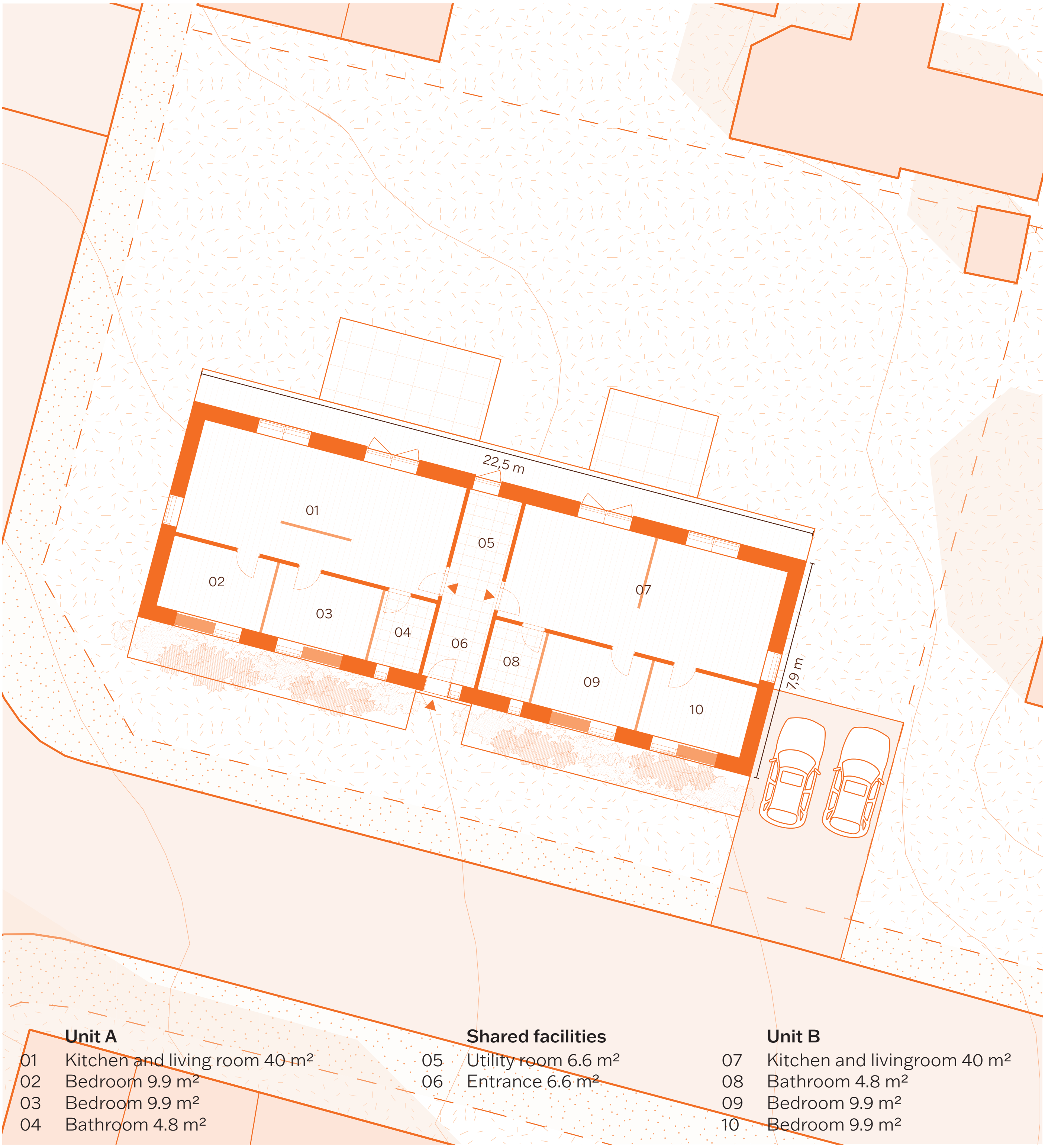


Figure 54. Langgade 1:200

the danish
parcelhus must be
redefined
through
the reassessment
of sustainability

towards a new culture

towards a new culture

the danish
parcelhus must be
redefined
through
the reassessment
of sustainability

Sustainability must be rethought to move beyond fragmented, efficiency-driven approaches, embracing a holistic architectural vision that fosters lasting pleasure, cultural identity, and meaningful human experiences.

The Danish parcelhus is a cherished cultural ideal but should be critically reconsidered and reimagined to balance sustainability, architectural quality, and personal expression, ensuring its relevance for future generations.

As seen from the project position, sustainability cannot be confined to technical efficiency or environmental metrics alone. It demands the reintegration of cultural, aesthetic and lasting values to create buildings that are meaningful, and thus become environmentally responsible. The parcelhus exemplifies this tension; it is deeply cherished, yet it faces significant challenges in sustainability and adaptability.

This calls for a reassessment of both aspects. Sustainability must be redefined beyond fragmented, efficiency-driven approaches to embrace a holistic architectural vision that nurtures lasting value, cultural identity, and meaningful human experiences. Likewise, the parcelhus must be reconsidered and reimagined to balance sustainability and architectural quality, ensuring its continued relevance for future generations.

The following chapter explores how this can be achieved, ultimately arriving at The New Paradigm and calling for a renewed building culture surrounding the Danish parcelhus. This has led to the developement of the Manifesto, which have formed the foundation of the design proposal.

Sustainability must be rethought to address the issues presented in the project position. The concepts of the *timeless* and the *affective* emerge as potential solutions. In her PhD thesis, Kristina Börjesson explores these concepts, ultimately introducing the term *affective sustainability*, which forms the basis of our definitions.

When we speak of the timeless in architecture, we refer to a building that has a defined time of origin yet continues to flow with time. A building that flows with time cannot be dependent on how we live, as this is ever-changing, but rather on how we are. Thus, the timeless relates to what is directly perceived, it is non-reflective.

Despite this, the timeless is often mistaken for the traditional or classical, implying a fixed form or shape. In reality, the timeless is an affective experience. Likewise, everything aesthetic is by default also perceived, an affective experience, whereas beauty is judged through cognition, making it a mental experience.

Thus, we differentiate between beauty and aesthetics. Beauty is guided by a cognitive reflection, while aesthetics are affective experiences that evoke pleasure. In order to achieve timeless, aesthetic architecture, we must therefore thrive for affective architecture.

Sustainability is often understood as the outcome of a cognitive process, as reflected in the way sustainability literature focuses on material characteristics rather than immaterial ones. Affection, on the other hand, is rooted in lived experience. Designing for affective sustainability, therefore, means a new interpretation of sustainability.

Affective sustainability is a lived experience that operates on an unconscious level and is fundamental to human ways of being. While ways of living continuously adapt to changing contexts, human ways of being remain constant. For an object to be truly sustainable, it must possess affective competence, the ability to engage with human ways of being despite their continuous adaptation. (Borjesson, 2006)

How, then, do we design for affective sustainability? In one study, a group of students analysed a selection of products based on their affective qualities. The participants subconsciously linked affectivity to meaning. It is argued that to create meaning, we must first understand, and understanding comes from recognising patterns. Our brains are constantly searching for patterns, automatically filling in gaps based on prior knowledge.

However, when something is overly simplified, as is often the case today, untrained eyes may struggle to recognise and understand patterns, rendering the object meaningless. Affection, therefore, is not merely about an object having meaning; rather, it arises when we immediately, without reflection, understand what we see. (Borjesson, 2009)

“There are strong reasons to believe that to design for affective sustainability, which was timelessness, is to design for human ways of being as opposed to living.”
(Borjesson, 2009)

In the following, three main themes are introduced that, in various ways, relate to the value of affection. By integrating these themes into the design process, alongside established methods for working with sustainability, it becomes possible to design for affective sustainability.

affective sustainability

stubborn architecture

Circular design is crucial for combating climate change in the building sector. The concept of circular economy offers an alternative to the linear economy model, which follows the “take-make-use-dispose” approach. This approach aims to minimise waste and pollution and ultimately argues that circular design fosters a new architectural approach where sustainability shapes both form and function. (Bartolomei, n.d.A)

In today’s world we often strive to design with circularity and adaptability in mind (Bech-Danielsen, Mechlenborg, and Stender, 2018) but can that always be the way of designing sustainable?

On the contrary, the term *stubbornness* can be seen as a way of designing sustainable. Stubbornness lowers the metabolism of buildings and as a result increases the longevity of them.

In relation to longevity, buildings should have inherent qualities that lower their metabolism. Elements can benefit from and get a lower metabolism when appearing as if they are structural and expressing an architectural order.

According to Tobias Hentzer Dausgaard’s paper *Stubborn Architecture*, six principles were identified to design for low metabolism. To identify these six principles, he analysed a preindustrial 200+ year-old building to have lower metabolism than an industrialised building of late Danish modernism. His analysis focuses on the facade wall since the building envelope accounts for most renovation activities in Denmark. (Dausgaard, 2024)

Out of these principles, we choose to outline four, which we aim to implement into our design.

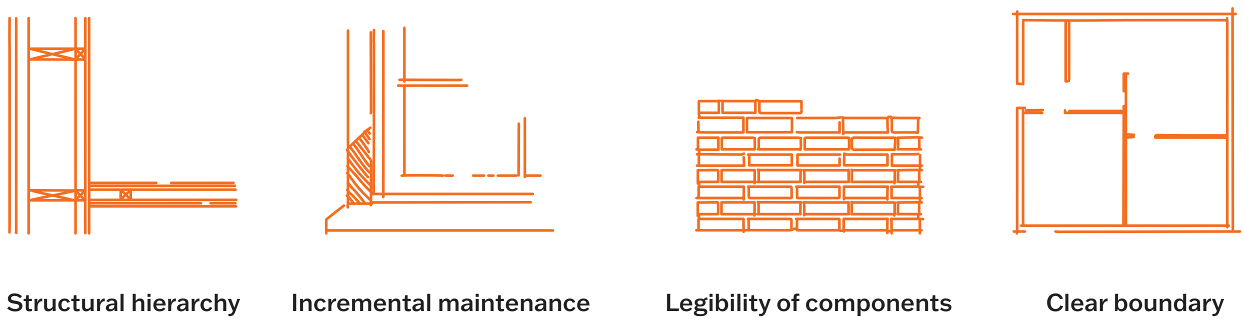


Figure 55. Stubborn architecture, principles

Low metabolism supports affective sustainability by fostering a deeper relationship between people and buildings. The principles of low metabolism favour singular, irreducible components, reinforcing an aesthetic that feels authentic and meaningful, in alignment with affective sustainability. Therefore, we believe that adopting this approach is crucial. We aim to implement key principles from Stubborn Architecture, specifically by using well-established, traditional materials that resonate with the occupants while being easy to maintain. Additionally, the design should incorporate a clear material and structural hierarchy. Finally, the architectural expression should appear cohesive, discouraging unnecessary changes and expansions.

cultural tectonics

As seen from the Ecotechnic Logic, contemporary architecture has become increasingly machine-dependent, prioritising optimisation in accordance with regulations on fire safety, structural integrity, and functional efficiency. The dominance of modular architecture and industrially produced elements is largely driven by economic and energy considerations, favouring cost-effective, mass-produced materials over handcrafted alternatives. (Guy and Farmer, 2001)

As contemporary architecture increasingly relies on machine precision, a disconnect has emerged between buildings and the human scale. Historically, architecture was shaped by the limitations and possibilities of materials that could be manipulated by human hand. Buildings were constructed with elements that naturally aligned with human proportions. Bricks serve as an example of this relationship. Their small size makes them suited for the manual labour of human hands, reinforcing a direct connection between material and maker. (Sennett, 2009)

Industrialisation has shifted this process, allowing for the creation and assembly of structures on a scale that no longer needs or prioritises human interaction, ultimately distancing humans from the act of making. Traditional hand-built houses, shaped by craftsmanship and tactile engagement, contrast sharply with modern machine-assembled structures that often feel impersonal and disconnected with human experience.

In the book *The craftsman*, Richard Sennett highlights this contrast, noting that craftmanship stands in opposition to the rigid perfection of the machine. He argues that:

"...the craftsman became an emblem of human individuality, this emblem composed concretely by the positive value placed on variations, flaws, and irregularities in handwork." (Sennett, 2009)

The imperfections found in handmade work describes objects with a distinctiveness and character, qualities that are often absent in mass-produced materials. (Sennett, 2009)

In his book, *Huse med sjæl*, Søren Vadstrup discusses traditional Danish building techniques. Here, he identifies several principles that, with their attention to the Danish climate and culture, successfully maintain a human scale in alignment with Danish values. Out of these principles, we choose to outline four, which we aim to implement into our design. (Vadstrup, 2007)

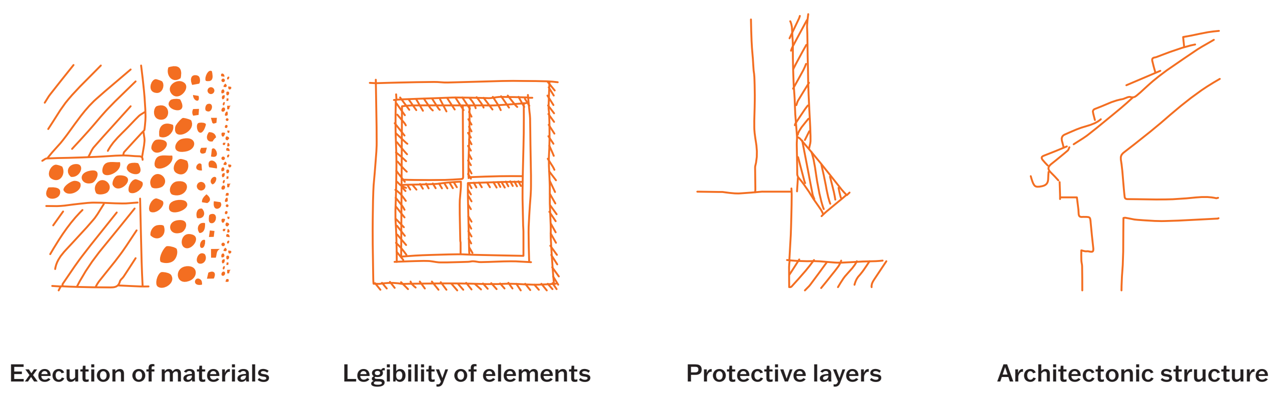


Figure 56. Cultural tectonics, principles

A tectonic approach has the potential to enhance a building's value of affection by improving its legibility. Tectonics relate to affective sustainability by enabling the perceiver to immediately and intuitively understand what they see. Therefore, we aim to enhance materials by understanding their inherent characteristics and optimising them for specific uses. Materials and building elements should be accompanied by protective layers, allowing for easy replacement and repair while also highlighting and refining the junctions between elements. Additionally, individual elements should reveal their construction process, making them legible and emphasising structural details. Finally, technical solutions should be seamlessly integrated into the design in a tectonic manner.

spatial interaction

In response to social sustainability requirements, contemporary buildings increasingly rely on automated systems to regulate the indoor environment. Similarly, the implementation of automation technologies is driven by energy regulations, as these systems can optimise energy efficiency (Guy and Farmer, 2001). However, this growing reliance on automation often reduces human interaction with architecture, raising the need for a more balanced approach.

Adaptive opportunities

Energy-efficient buildings often rely on automated environmental controls, which can limit occupants' ability to adjust their surroundings to suit their individual needs. This lack of behavioural control has been identified as a contributing factor to sick building syndrome. In contrast, providing adaptive opportunities, through which occupants can influence their thermal environment, can significantly improve comfort.

Adaptive opportunities include both conscious actions and unconscious physiological responses. Actions such as adjusting clothing, relocating within a space, or operating shading devices enable occupants to maintain comfort, though their effectiveness may be constrained by external factors.

Designing for adaptive comfort therefore involves not only offering appropriate opportunities for adaptation but also incorporating passive and active systems that support these strategies. To be effective, these systems must be tailored to the local climate, ensuring that both passive and active approaches are suited to the environmental conditions. (Hellwig et al., 2022)

Sensory experience

Home automation for private users has exponentially increased in the last decade. The smart home market includes devices that are connected to the internet and their purpose are to control, monitor or regulate functions in the household. Statistics show that the worldwide amount of users has increased from 200 million users in 2019 to more than 400 million in 2024. This data shows the recent tendency of implementing automatisation devices and systems in households. (Statista, 2023)

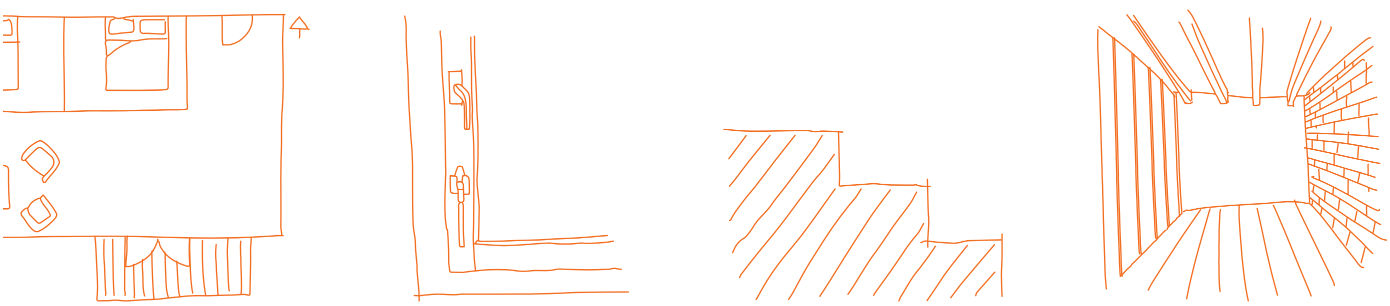
While smart homes enhance the optimisation of a house, they also have consequences on how we interact with our surroundings.

According to architect Juhani Pallasmaa, architecture is grounded in actively stimulating the senses. He emphasises that tactile interaction with our surroundings fosters a direct, personal relationship with space, viewing the world as an extension of our bodily movement through it.

The central concern that led Pallasmaa to write *The Eyes of the Skin* stemmed from his personal experience. He was troubled by the dominance of vision and the suppression of other senses, which led to a lack of sensory and sensual qualities in architecture. Pallasmaa argues that engaging multiple senses in architecture is essential for establishing a personal connection between the occupant and the space, thus fostering a sense of belonging. (Pallasmaa, 1996)

As we share these beliefs, we aim to incorporate principles of increasing spatial sensory experience into our design, in line with Pallasmaa's view.

"The world is reflected in our body, and the body is projected onto the world. We remember through our bodies as much as through our nervous system and brain."
(Pallasmaa, 1996)



Contextual programming **Personal control** **Bodily movement** **Tactile engagement**

Figure 57. Spatial interaction, principles

Buildings designed with behavioural opportunities encourage active participation, enhancing perceptual and sensory engagement essential for an affective architectural experience.

To achieve this, we focus on contextual programming, aligning the house's functionality with the way of life of its users.

Similarly, providing opportunities for personal control is crucial in fostering a relationship between occupants and buildings. Finally, designing with sensitivity to the senses means designing for the human experience. This is fundamental to achieving affective sustainability, as the value of affection is, at its core, an affective experience.

Rethinking sustainability into affective sustainability is only part of the solution. From the project position, the Danish parcelhus as a model raises its own concerns, particularly regarding its sustainability. While the introduction of affective sustainability addresses some of these issues, the model itself also needs reconsideration.

For a new building culture to succeed, the parcelhus must be rethought to align with contemporary values, balancing sustainability, architectural quality, and personal expression. Only then can this typology remain relevant for future generations.

To explore potential solutions to the challenges the current model faces, contemporary housing trends are examined. The book *Velkommen Hjem* identifies six key themes that characterise current housing developments. These themes reveal how social, environmental, and urban transformations shape the way homes are designed, built, and inhabited. (Bech-Danielsen, Mechlenborg, and Stender, 2018)

Out of these six themes, we have chosen to outline three as potential solutions, as they relate to the issues presented in the project position.

New Lifestyles and Communities

Currently, parcelhuse are oversized and underutilised. However, family structures are changing, and people seek new ways of living together. Homes now reflect individual family members rather than a strict hierarchy. This is seen in homes with separate areas for children and parents as well as a growing interest in communal living. (Bech-Danielsen, Mechlenborg and Stender, 2018)

This trend creates opportunities to reinterpret the home by introducing more shared facilities, reducing housing size, and ensuring more efficient use of space.

The Adaptable Home

Flexibility is valued, as change is seen as progress. Homes should adapt to residents, not vice versa. This is reflected in modular layouts and mobile lifestyles. Similarly, our homes are seen as a manifestation of our identity, able to evolve alongside us. (Bech-Danielsen, Mechlenborg and Stender, 2018)

To maintain the ideal of self-realisation, it is crucial to design with a degree of generality that accommodates changing needs, both within a single family and across generations.

Urbanity and Suburban Life

More people are moving to cities, emphasising historical layers to enhance authenticity and identity. Meanwhile, suburban areas seek urban qualities, while cities integrate suburban elements for better living conditions. This indicates a desire for more parcelhus plots without compromising the urban life. (Bech-Danielsen, Mechlenborg and Stender, 2018)

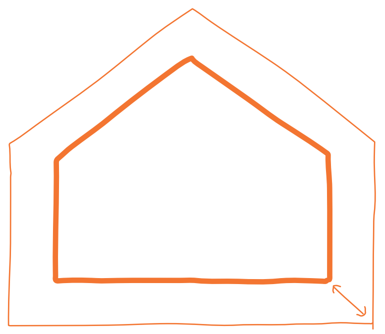
This trend highlights the need to densify parcelhuse by reducing plot sizes to accommodate the growing needs.

the lasting home

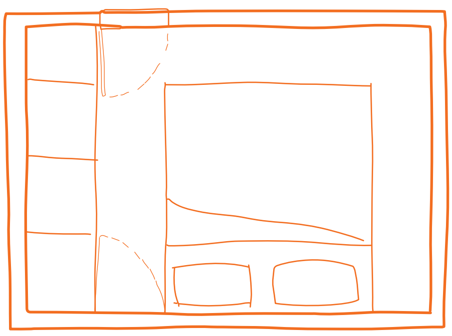
smaller living

The increasing size of parcelhuse is the primary reason why energy use for heating has not decreased over the past 30 years. Although homes are becoming more energy-efficient, research shows that improvements in efficiency often lead to increased usage, as reduced costs encourage greater consumption, thereby negating the intended energy savings. This indicates that merely improving energy efficiency is not necessarily a sustainable solution. Instead, reducing home size could have a more direct and lasting impact on sustainability, positioning it as a more effective strategy (Del Hus, 2024).

According to Danmarks Statistik, the average Living space in parcelhuse is 60.2 m² per person (see appendix 01) Research indicates that this number is expected to grow as more people live alone in larger houses. In contrast, another study suggests that 25-30 square metres per person is sufficient for a comfortable lifestyle (Del Hus, 2024).



Downsizing



Spatial efficiency

Figure 58. Smaller living, principles

To achieve genuine sustainability, it is essential to reconsider the size of parcelhuse rather than solely focusing on improving energy efficiency. Reducing spatial consumption could lead to more sustainable living environments, aligning housing design with contemporary environmental goals.

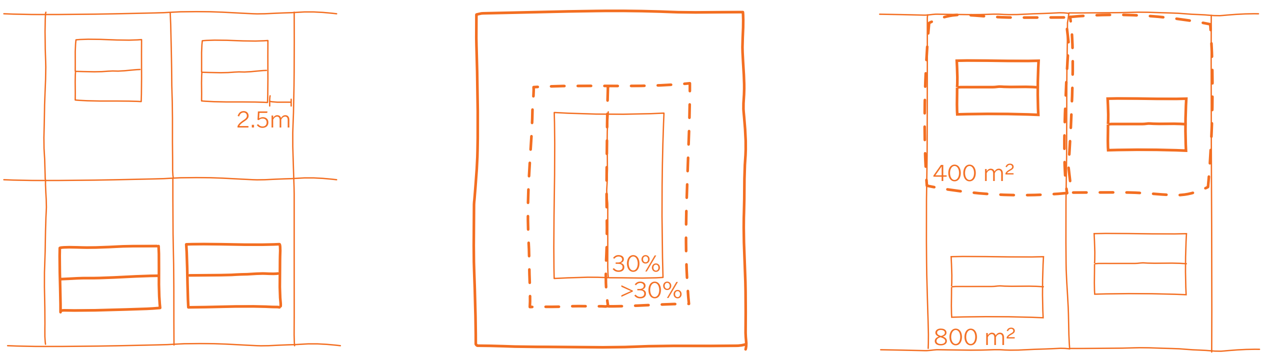
denser living

As the Danish population is expected to increase by 167,000 people by 2040, the existing housing stock will be insufficient to accommodate this growth. Additionally, urbanisation, driven by the migration of people from suburban areas to cities, and the trend towards smaller households will further increase the demand for housing in the coming years (Del Hus, 2024).

To accommodate population growth in cities and suburbs, it is essential to develop a strategy that maximises the use of existing land, promoting denser living arrangements. This approach may require revising laws and regulations governing parcelhus plots to facilitate more efficient land use and support closer living.

Back in 1986, the national mortgage fund LRF (Landsbankernes Reallånefond) published parcelhus, hvad nu? which addressed the issue of aging populations in suburban parcelhus neighborhoods. The publication highlighted the highly inefficient use of land and housing space in these suburban areas and advocated for densification. One approach was dividing existing houses into smaller units or building annexes in backyards. This method could transform a parcelhus plot into up to four dwellings, gradually increasing density without large-scale redevelopment. (Lind and Møller, 2014)

In light of that, densifying parcelhus areas is increasingly relevant. Currently, the average Danish parcelhus plot measures approximately 900 m², while the minimum plot size requirement is 700 m² (BR18, Ch. 8, §173), both of which do not align with the ongoing population growth and urbanisation. (Kristensen, 2019). Furthermore regulations for parcelhus plots prohibit building closer than 2.5 m (BR18, Ch. 1, Guid. 3.0) to the property boundary and limit the plot ratio to 30%(BR18, Ch. 8, §170).



Plot boundary **Plot ratio** **Plot subdivision**

Figure 59. Denser living, principles

Revisiting regulations, such as building proximity to property boundaries and plot ratios, can unlock the potential for more efficient and sustainable development. By subdividing existing plots, it is possible to gradually increase density while maintaining the character of these areas, thereby addressing housing shortages without large-scale redevelopment.

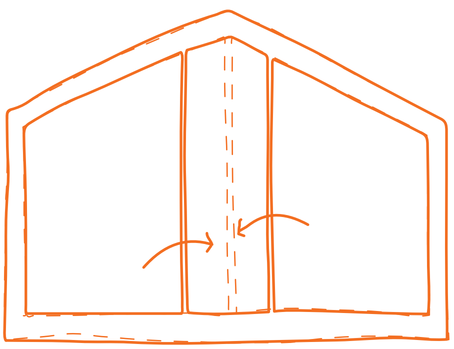
shared living

In Denmark, parcelhuse are increasingly inhabited by elderly residents. As a result, families with children make up only a small segment of the housing market. This trend is not only a result of demographic developments or the national ideal of "aging in place." The parcelhus is a deeply rooted form of living, one that people become emotionally attached to, making it difficult to leave.

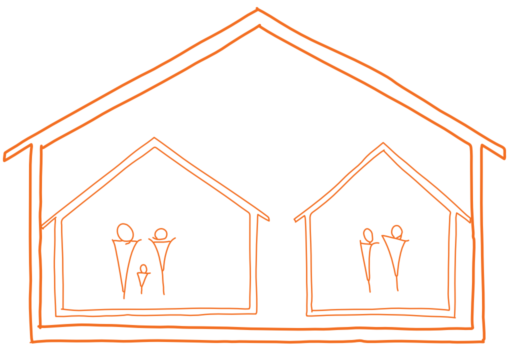
The knowledge project *Del Hus*, conducted by V!GØR ApS and EFFEKT Architects ApS, explored the subdivision of parcelhuse. The project aimed to build a foundation for future initiatives that increase housing units within the existing building stock. While primarily focused on renovation, the findings also have relevance for new construction.

To accommodate families without displacing elderly residents, strategies must support both demographic groups. One approach is to subdivide existing housing units, allowing multiple households to share a single structure. (Del Hus, 2024)

Additionally, designing new builds with a certain degree of spatial generality can ensure they adapt to evolving family structures over time. These strategies also align with current trends where more people live alone, either as singles or older adults, and average household sizes are decreasing.



Shared facilities



Shared living

Figure 60. Shared living, principles

When designing the homes of the future, prioritising spatial generality is essential to accommodate changing needs and family structures. Simultaneously, integrating shared facilities can enhance communal living and ensure a balanced coexistence between different demographic groups.

Through a reassessment of sustainability and the Danish parcelhus, several strategies have emerged as potential solutions. Consequently, we are one step closer to defining a new paradigm, where the Danish parcelhus is reimagined as an affective, enduring dwelling for the future.
To achieve this in practice, it is essential to examine existing solutions to determine whether any elements are missing from our reinterpretation.

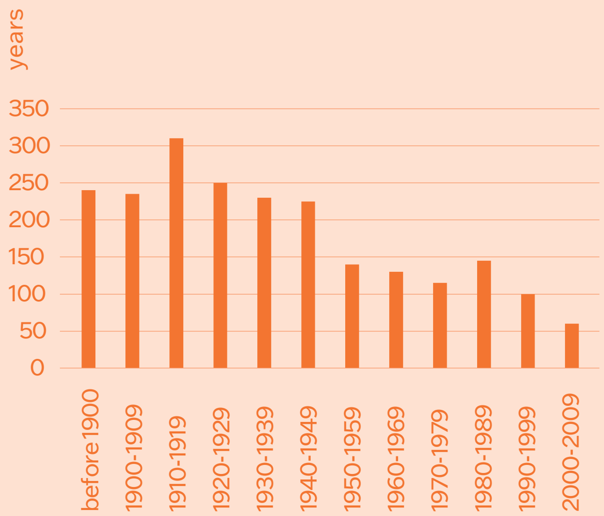


Figure 61. Lifespan predictions

One relevant study, *Lifespan prediction of existing building typologies*, evaluates a generalised logistic lifespan prediction model for existing building typologies. The predicted lifespans presented in this study are derived from data extracted from the Danish Building Register (BBR), encompassing 104,927 demolition cases from all Danish municipalities between 2010 and 2019.

The findings reveal that buildings from specific periods have longer predicted lifespans than others. Notably, buildings constructed between 1910 and 1919 stand out, with a predicted lifespan of approximately 300 years. This period is characterised by the *Bedre Byggeskik* movement. Therefore, an analysis will investigate what qualities make these building remain their significance over time. (Andersen and Negendahl, 2023)

Finally, an assessment of contemporary typehus models will be undertaken. Examining current building practices will offer a deeper understanding of the spatial configurations and functional flows that Danish families prioritise when buying or building a home. This insight will inform which aspects of the existing layout of Danish parcelhuse should be preserved and which should be reconsidered. This process will support the creation of the final room programme, which can be seen in appendix 02.

insights from practice

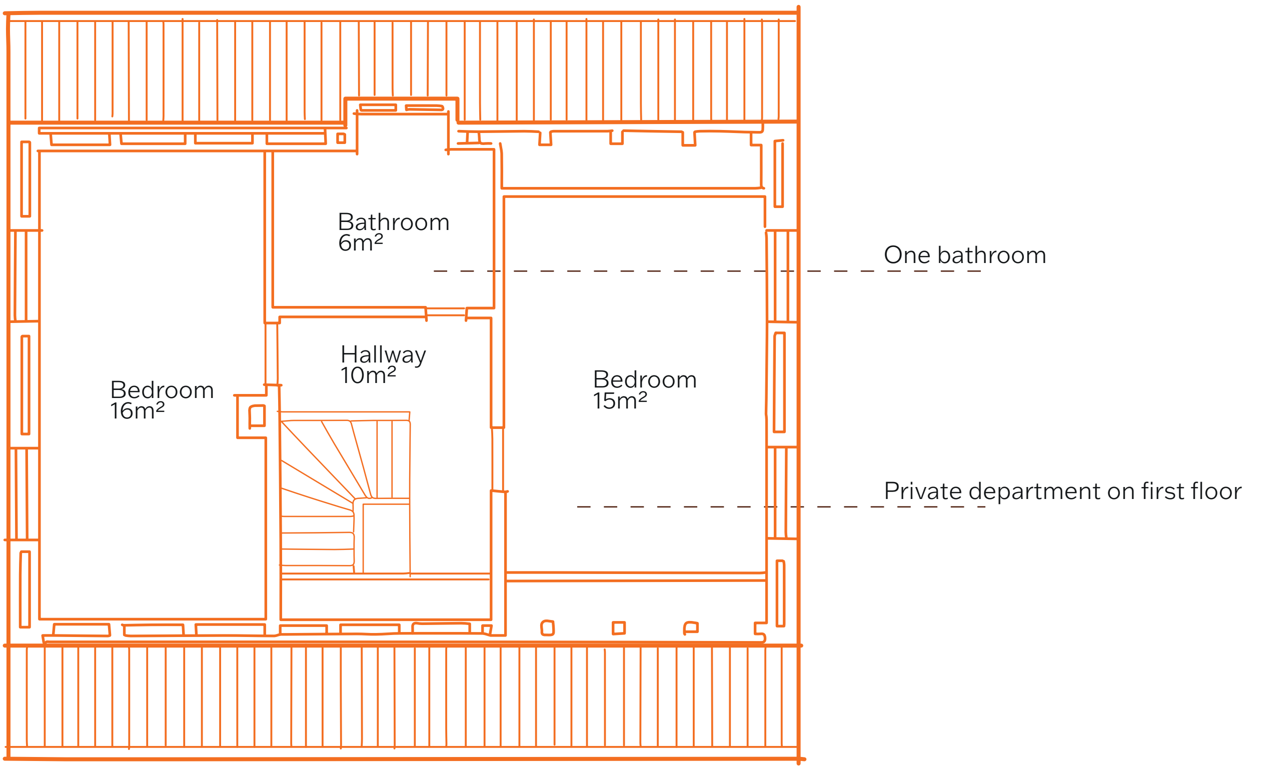
bedre byggeskik

As a part of the Nordic Classicism, Landsforeningen Bedre Byggeskik (The Danish Association for Better Building Practices) was established in 1915 as a criticism to the overly ornamented classicism. This movement had great influence on the design of Danish parcelhuse in the following decades and is to this day popular. (Bech-Danielsen, Mechlenborg and Stender, 2018)

The movement found a lack of architectural quality and durability in contemporary construction (Rønnow Arkitekter, 2020) and their goal was to create harmonious residential neighbourhoods with individually designed houses while also seeking to improve Danish construction in general. Their goal to create harmonious neighbourhoods aligns with the tendencies of this period. Furthermore, the association recognised the public's right to build but wished to educate on the responsibilities associated with building a house. (Fogh, 2008)

The movement largely focused on the disappearance of Danish building culture. In response, they analysed houses with qualities that characterised Danish architecture and used these to create guidelines for how to build without copying the old.

"The goal is not to imitate old buildings but to adopt the architectural logic that enables the builder to make sound judgments based on the conditions, techniques, and materials required by contemporary tasks." (Nielsen, 1941)



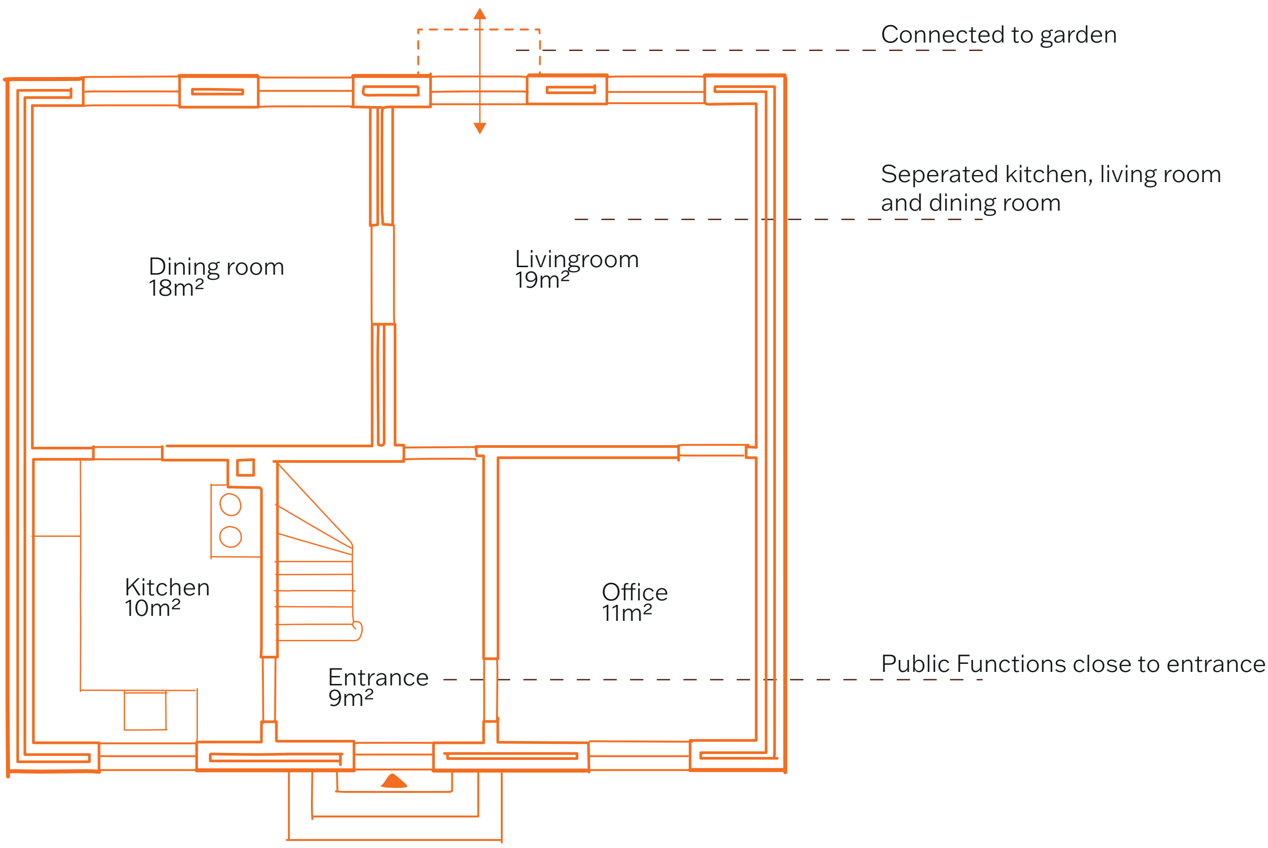


Figure 62. Bedre Byggeskik floor plan

bedre byggeskik

Bedre byggeskik houses have a strong primary form that creates a sense of calmness and solidity in their overall appearance, with a rhythmic repetition of elements. Because of this, they are particularly resistent to alterations or additions, as they are highly well composed, and such changes would disrupt the balance of the house as a whole. Furthermore, there are often details around openings which make the outer shell resistant to change.

The floor plan divides the house into distinct zones, with movement typically surrounding the tiled stove, creating a central flow through the space. This arrangement facilitates an elegantly organised circulation, reinforcing the house's cohesive and balanced design.

There is direct access to the backyard, and each room has two exterior walls, enhancing both natural ventilation and daylight. The rooms are generally similar in size, resulting in minimal spatial hierarchy. While this uniformity allows for versatility, enabling the spaces to accommodate a range of functions, it may not align with contemporary living patterns, where residents often prefer larger social spaces, such as open-plan kitchens.

Externally, the house's overall composition is well proportioned, with no elements in the facade or roof surface standing out or drawing excessive attention. This balanced approach results in a harmonious expression. The design also focuses on creating depth in the facade through detailing that generates dynamic light and shadow effects.

Moreover, these houses generally feature delicate details, with a clear coherence between design, structure, and construction. This integration creates an easily comprehensible structure, contributing to the house's visual and functional clarity. A more detailed analysis of these homes can be found in appendix 05.

Figure 63. Bedre byggeskik principles

From Bedre Byggeskik, we have gained a clearer understanding of what makes a building stand the test of time. Therefore, we aim to design for spatial generality, creating a home that can adapt over time. Additionally, a focus on details can create a sense of depth, adding value to the design. Lastly, the home should have a harmonious rhythm, strengthening its affective qualities.

typehuset

A typehus is a standardised home built from pre-designed models, offering customisation to suit individual needs while still relying on efficient, pre-established solutions. These homes are designed for cost-effective and efficient construction.

Today, typehuse are among the most commonly used solutions for building new parcelhuse. Typehus companies promote their products by emphasising personalised consultation and tailored solutions, focusing on each individual's unique needs and preferences.

In analysing typehus catalogues from two firms, common principles can be identified in the various layout options offered. (Hybelhuse.dk, 2024) (Eurodan-huse.dk, 2025)

Figure 65 outlines these principles, while figure 64 provides a more critical assessment of a typehus.

Typically, newly constructed typehuse are single-storey buildings containing three to five bedrooms. The layout often separates parent and children's areas, with a centrally located open-plan kitchen connected to a terrace. The living room is generally separate from the open-plan kitchen, and the entrance is usually linked to a utility room.

These are all elements we aim to preserve, as they reflect the preferences of Danes regarding their homes. However, there is room for reinterpretation within this framework.

Figure 64 illustrates the complex circulation often found in these homes. Additionally, the rooms tend to be oversized, resulting in a significant amount of unused space. Social and private zones are intertwined, causing frequent conflicts between the two and a lack of spaces for retreat. These are all aspects that we aim to avoid and improve upon.

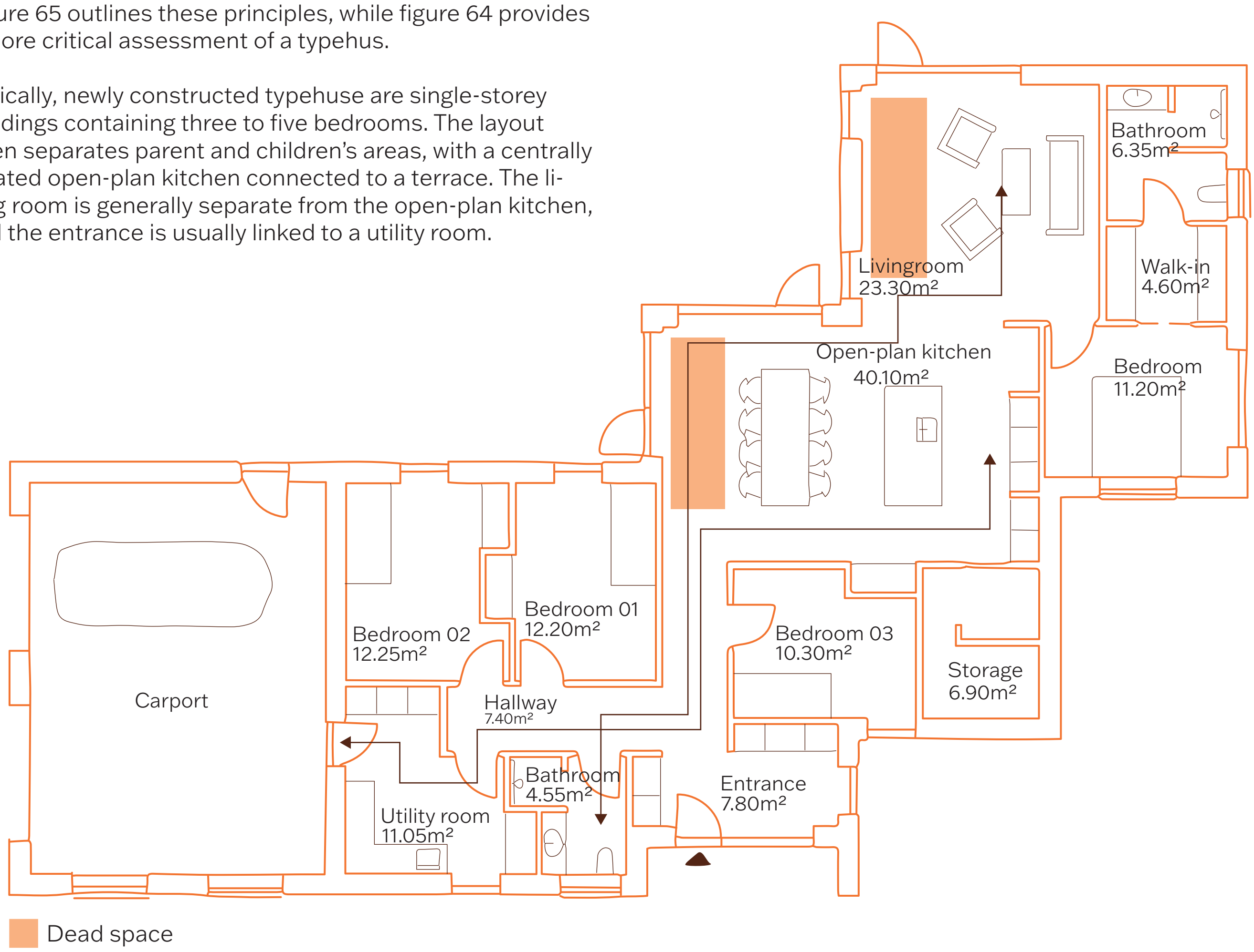


Figure 64. Hybel, F-189-B, 189 m² garage 54m², 1:125

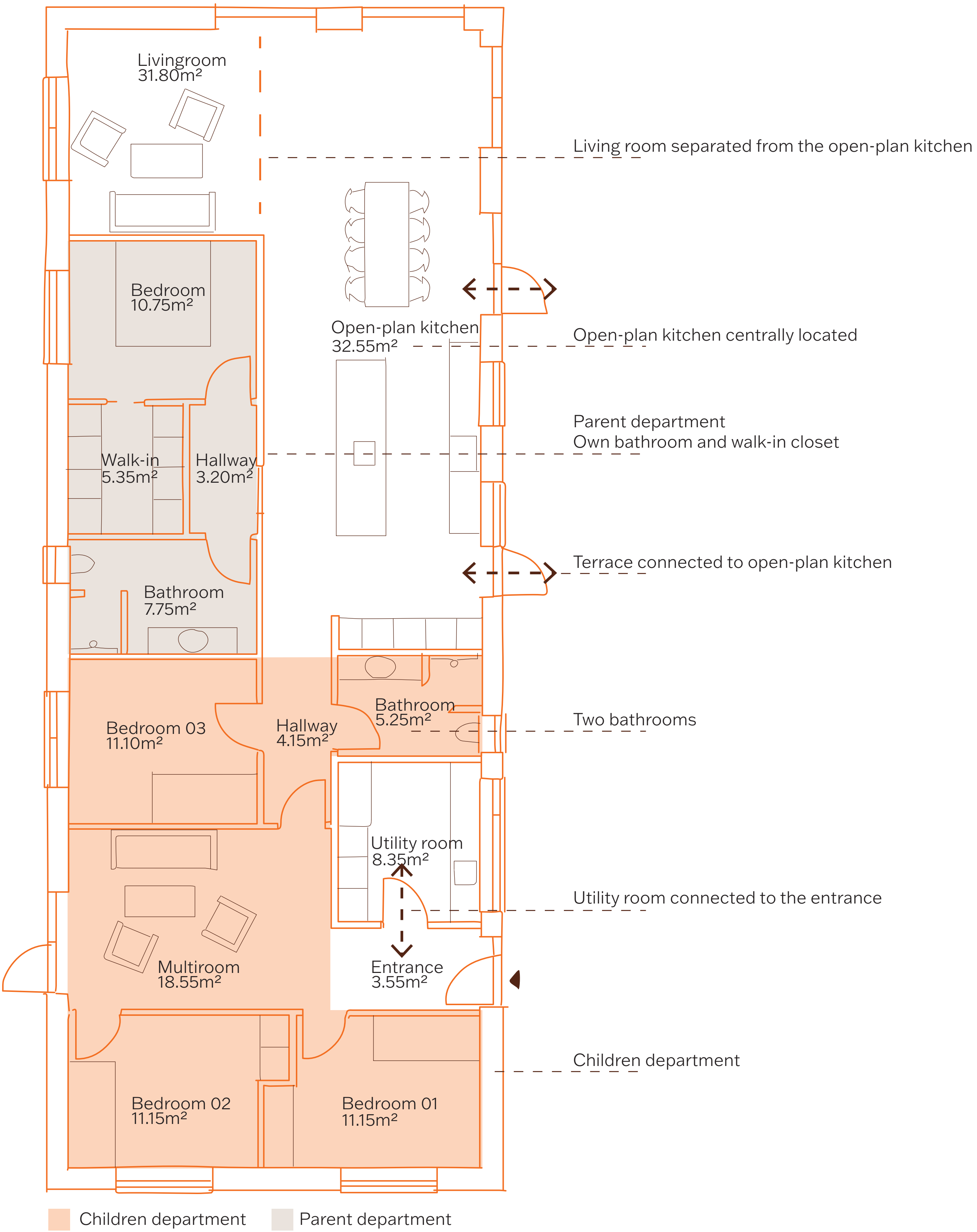


Figure 65. Hybel, L-193, 193m², 1:100

The ideas and principles presented in this section have shaped the backbone of the design, forming the foundation of The New Paradigm. Through careful consideration, various design principles have emerged, many of which overlap and complement one another. To create a cohesive approach, these principles have been consolidated into a Manifesto.

From this foundation, the room programme has taken shape, guiding the spatial organisation of the design. Ultimately, the concept has emerged, rooted in these fundamental ideas and serving as a blue-print for the future reinterpretation of the Danish parcelhus.

realising the vision

realising the vision

Figure 66. Skråfoto. (modified)

Figure 67. Øster sundby vej, site plan, 1:500

introduction and site

øster sundby vej

The design process began with the selection of a plot located on Øster Sundby Vej in Aalborg, a suburban area of the city. Figure 67 provides an overview of the site and its surrounding context. This plot was used during the initial phases of the design process, and a more detailed site analysis can be found in appendix 03.

As the design developed, it became too specific and tailored to this particular site. Consequently, the plot was discarded in favour of a more general solution, which was explored in the later stages of the process.

Nevertheless, valuable insights were gained while working with the original plot. Therefore, the initial part of the design process review will focus on this specific site.

Currently, typical suburban areas are subdivided as illustrated in figure 69, resulting in two adjacent plots between each road. To increase densification, the area between roads will instead be divided into three plots, as shown in figure 68. This strategy will optimise land use, however, several regulations concerning parcelhus plots must be considered.

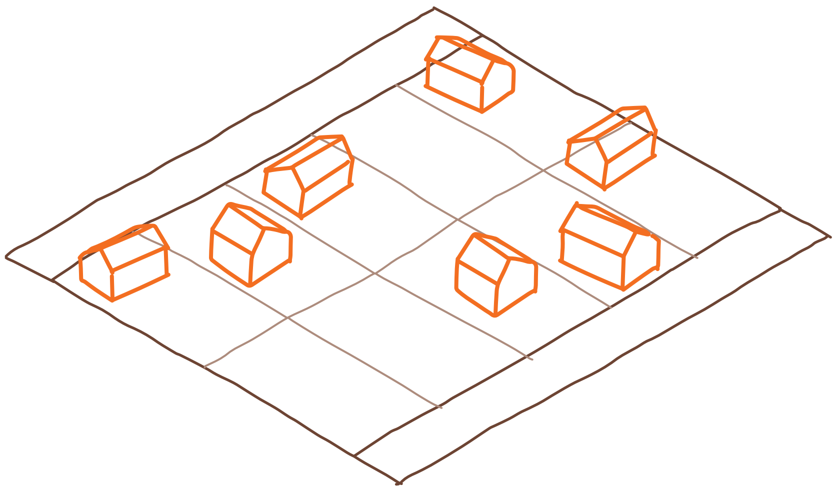


Figure 69. Suburban areas

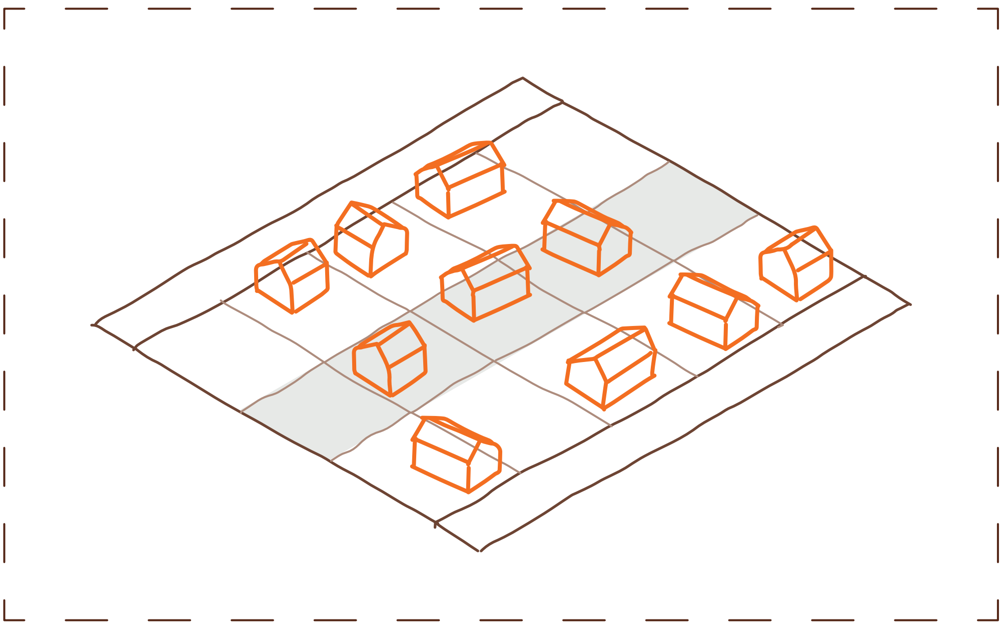


Figure 68. Suburban areas, division

introduction and site

general rules

According to Danish building regulations, there are several general rules that apply to parcelhus plots.

In residential neighbourhoods, the plot ratio is limited to 30%, which includes all indoor built areas as well as garages or sheds if their combined area exceeds 50 m² in total. (BR18, Ch. 8, §170)

Houses must be set back at least 2.5 metres from both the road and neighbouring property boundaries.

The maximum permitted building height is calculated as 1.4 times the distance to the nearest property boundary. (BR18, Ch. 8, §177)

Furthermore, to ensure access for emergency services, there must be a paved access road with a minimum width of 2.8 metres, allowing fire-fighting equipment to reach within 40 metres of each dwelling. (BR18, Ch. 5, Guid. 5.0)

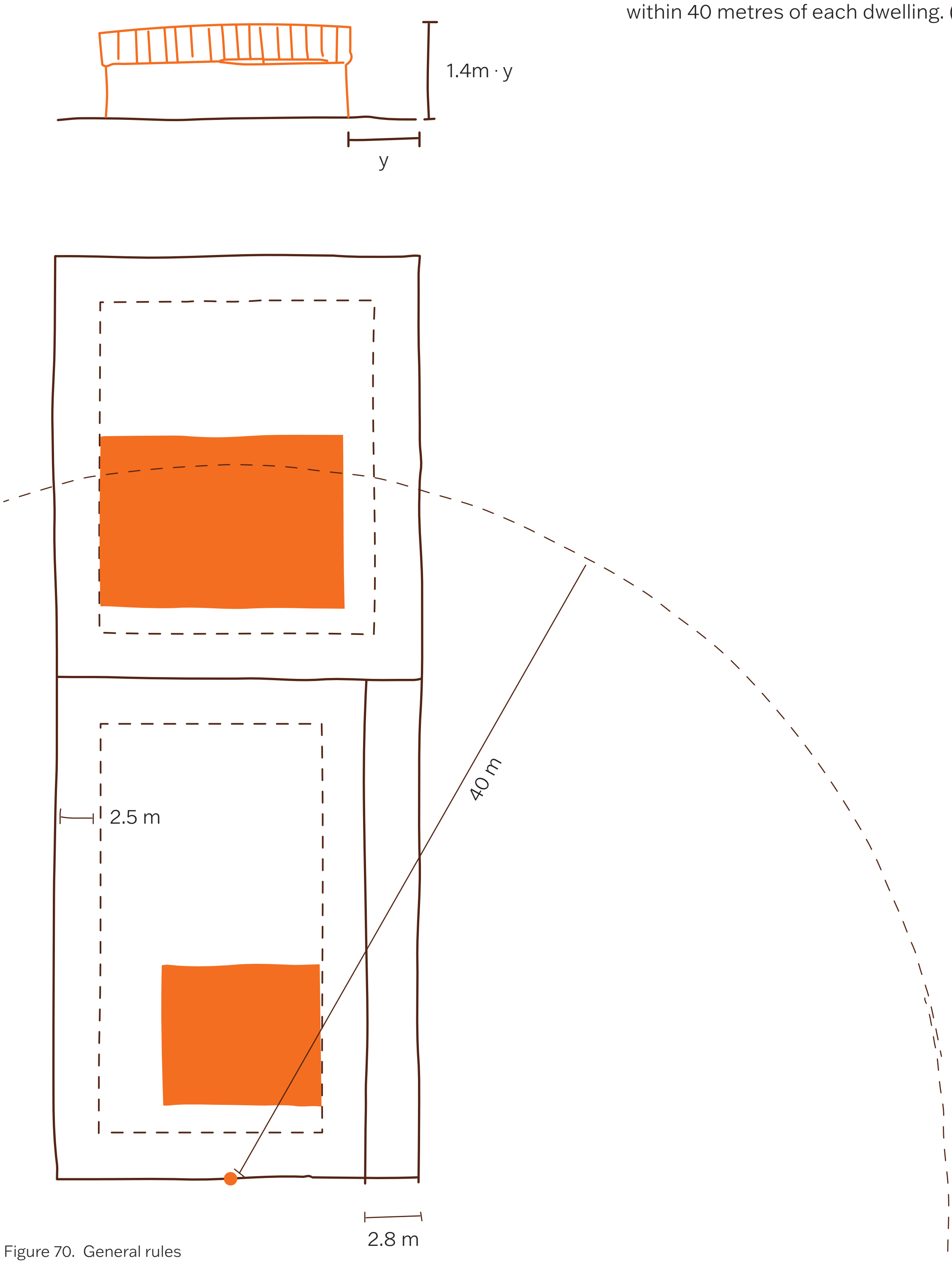


Figure 70. General rules

introduction and site

contextual placement

The site is divided into three plots, following the principle illustrated in figure 71. At present, a house is already located on the northern plot, leaving two vacant plots available for development. To gain an understanding of the urban spatiality, various combinations of one- and two-storey houses were explored on these two plots, along with different placements of carports. These configurations were developed with reference to the surrounding context, considering building heights, sizes and placement on plots. Further contextual analyses can be found in appendix 04.

The study resulted in a range of spatial layouts, producing variations in yard sizes and orientations.

Ultimately, a two-storey house was selected for the southern plot and a one-storey house for the central plot, each with its own carport. However, further detailing will focus solely on the one-storey house, as its position between two existing plots presents distinctive conditions.

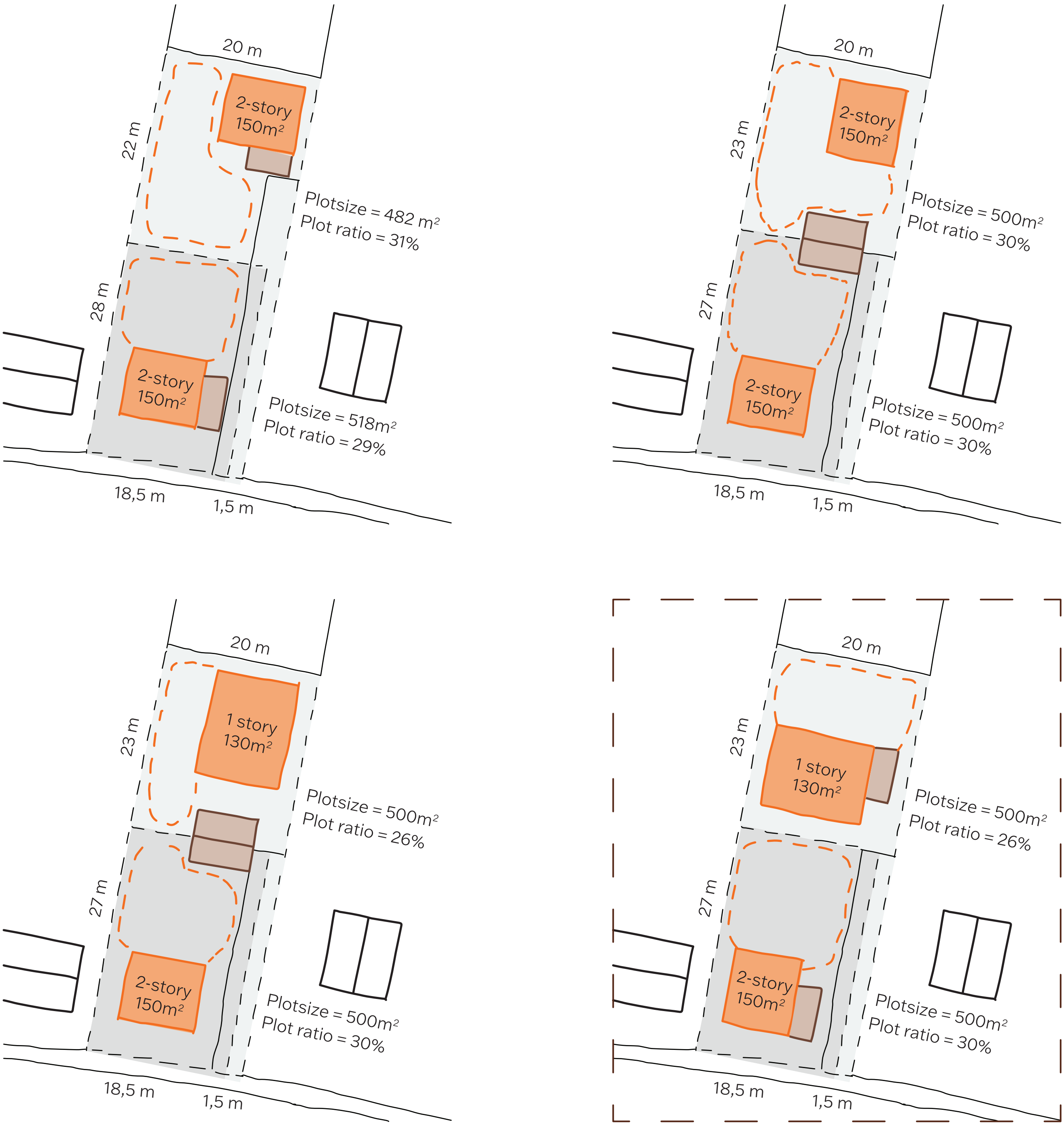


Figure 71. Contextual placement

introduction and site

plot division

To gain a deeper understanding of the centrally positioned plot, three different subdivisions were explored, as illustrated. These studies focused on the placement of the main entrance and the organisation of the front and backyard.

The option in which the front and backyard are clearly separated was selected, as it evokes the spatial qualities of a traditional parcelhus layout. This decision was further supported by simulations of direct sunlight hours to ensure sufficient sun exposure in the backyard (see appendix 06).

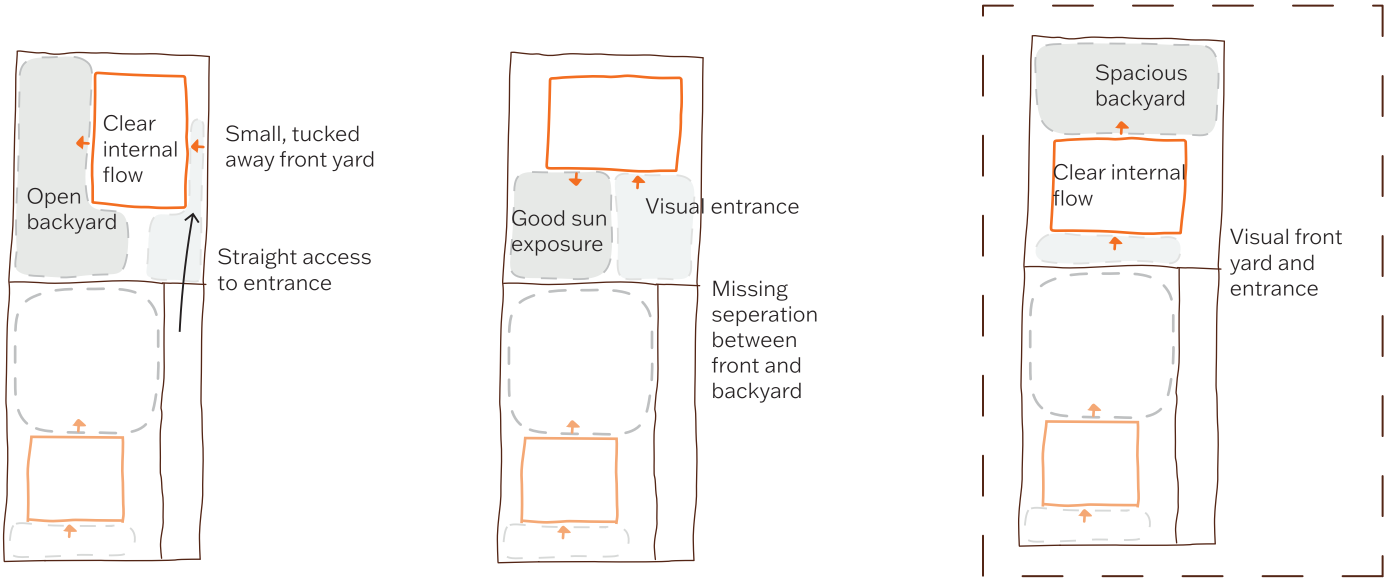
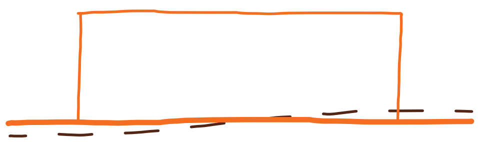


Figure 73. Plot division

terrain

As the site at Øster Sundby Vej features significant variation in terrain, several strategies were explored to address these level differences. To ensure the house can adapt to a variety of contexts, the only solution that was discarded was the addition of a basement, as it is considered somewhat outdated regardless of site conditions.

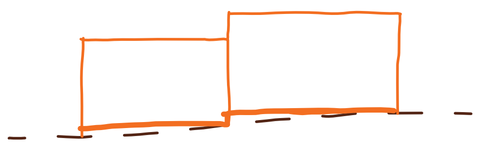


Levelling

Levelling the site, especially if it slopes towards a neighbour, can result in steep drops along the boundary, possibly creating visual and drainage issues.

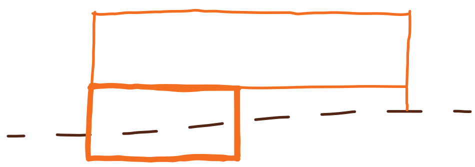
Plinth

Building on a plinth requires stepped foundations and may elevate the house relative to neighbouring plots, potentially leading to privacy concerns if adjacent homes are lower.



Levels

Adapting the building to the terrain by incorporating split levels allows the design to follow the natural contours of the site. However, this may reduce accessibility and complicate circulation.



Basement

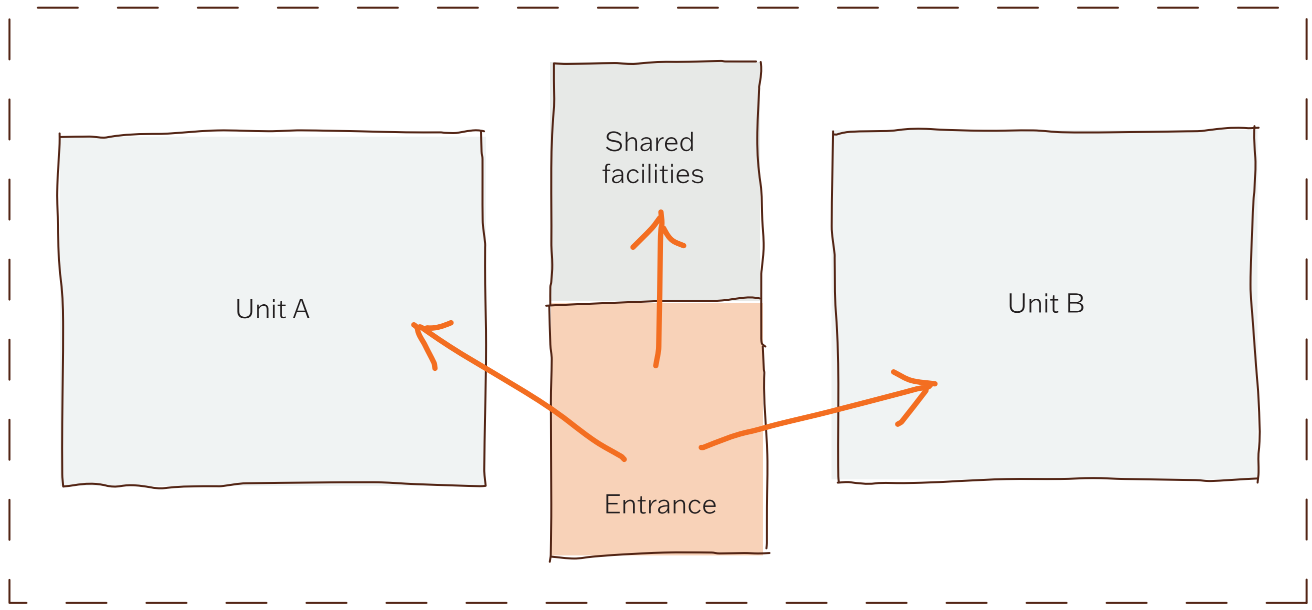
A basement may increase the risk of water issues and usually results in a raised ground floor, impacting accessibility and outdoor connections.

Figure 72. Terrain, strategies

floorplan
house division

As outlined in the Manifesto, the house should be adaptable for use by either a single family or two households. To achieve this, the entrance is positioned centrally, allowing separate access for each household. The area dividing the two sections functions as a shared space, accommodating common facilities such as a utility room.

The illustrations below present two possible solutions for this layout. These scenarios will be explored in more detail in the following pages, along with the overall organisation of the floor plan.



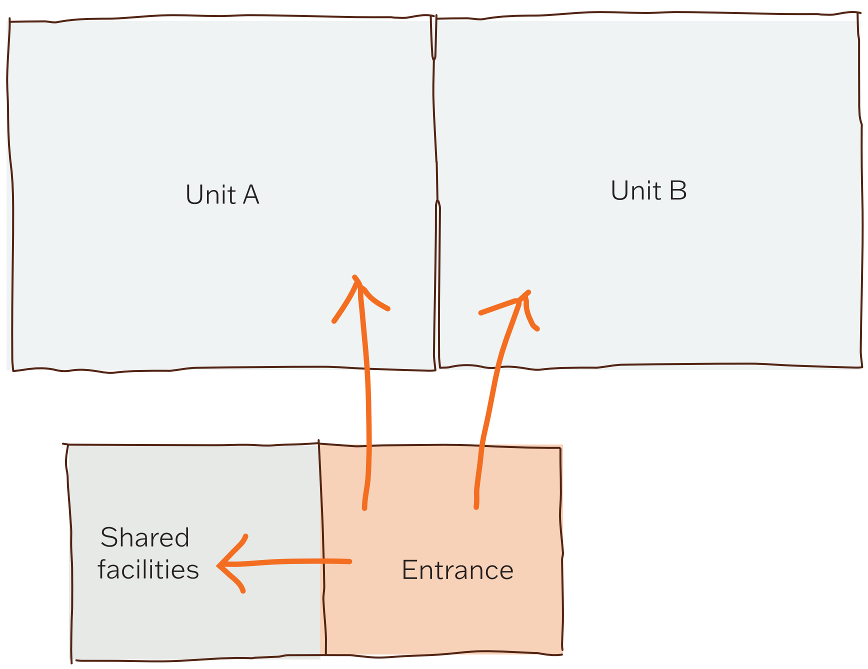


Figure 74. House division, strategies

floorplan
concept

The aim is to create a logical, well-proportioned floor plan that establishes a clear hierarchy between structural and non-structural elements. The structural components should define rational divisions, resulting in functional spaces. Additionally, the floor plan should accommodate the possibility of dividing the house between two households, as previously mentioned.

The initial layout is based on one horizontal central axis and two vertical axes, both representing structural walls. A service hallway is placed along the central axis, dividing the space into a social zone, a service zone, and a private zone.

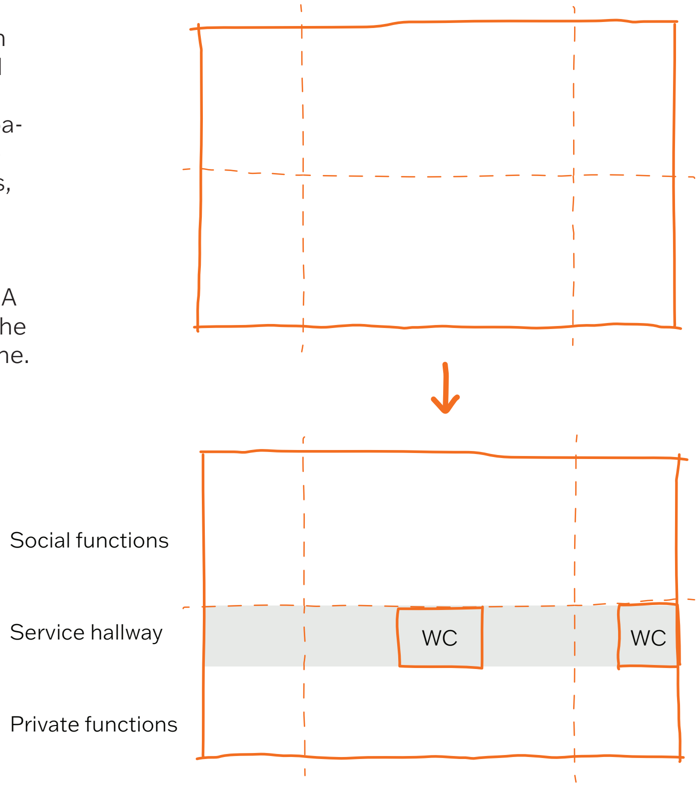


Figure 75. Floor plan concept, øster sundby vej

Following this principle, the floor plan was further detailed, with functions allocated according to the room programme. However, the service hallway created a barrier, complicating circulation within the house. Additionally, the size requirements of the functions resulted in excessive width, while the narrow site prevented any lengthening of the house.

These challenges proved to be site-specific. Given that the goal of this project is to create a new building culture, the design must remain adaptable to different Danish contexts. As a result, the decision was made to set aside this specific site and seek a more general solution.

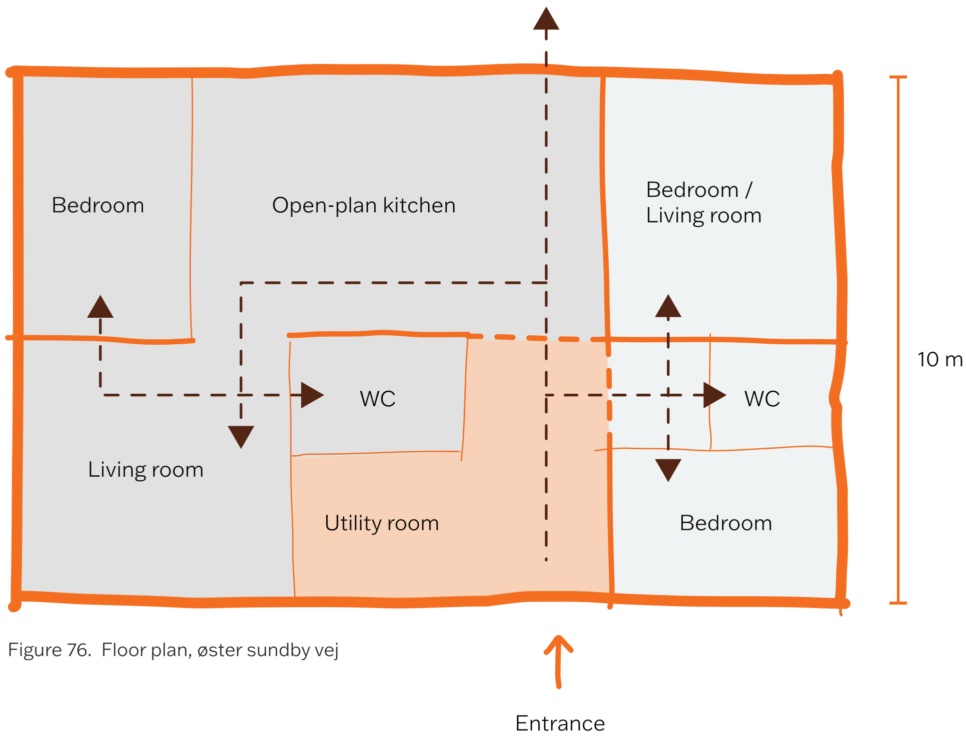


Figure 76. Floor plan, øster sundby vej

Without the site limitations, the house is elongated and narrowed, resembling a traditional longhouse with more appropriate proportions. The concept of dividing the house into private and social zones is maintained, with bathrooms now located within the private zone, while the space between the private and social zones is dedicated to circulation.

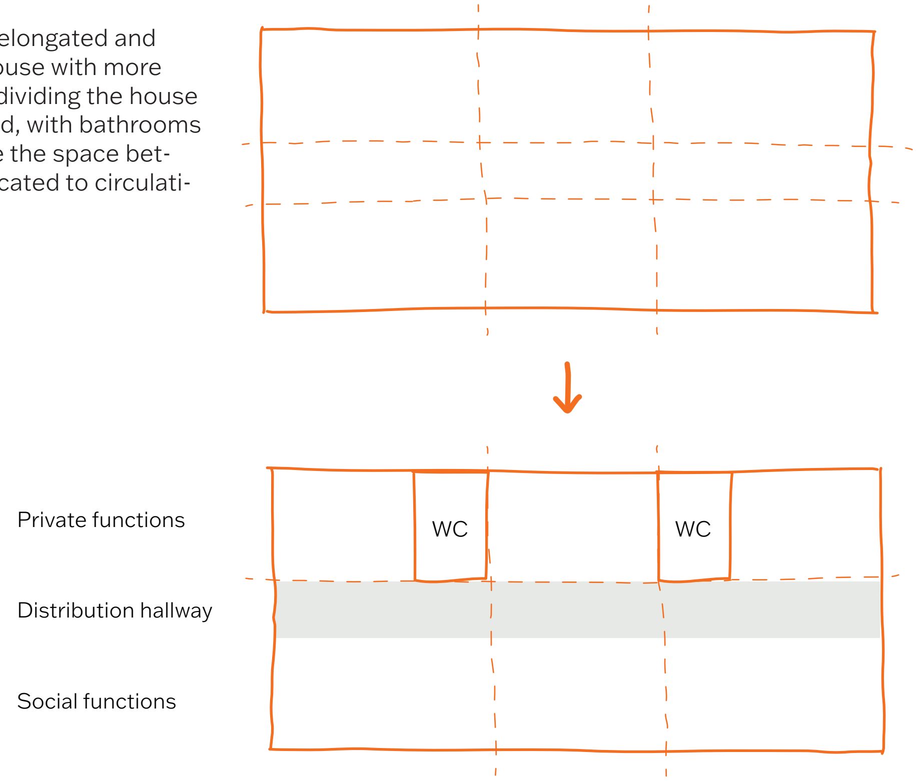


Figure 77. Floor plan concept, general solution

The plan is then further detailed, with functions allocated according to the room programme. This solution maintains the original programme while simplifying circulation. Meanwhile, the division between the public and private zones becomes more distinct, and the hallway creates attractive sightlines throughout the house.

The vertical lines around the entrance area and the wall dividing the public and private zones function as structural walls, as these areas must remain consistent over time to maintain the house's spatial concept.

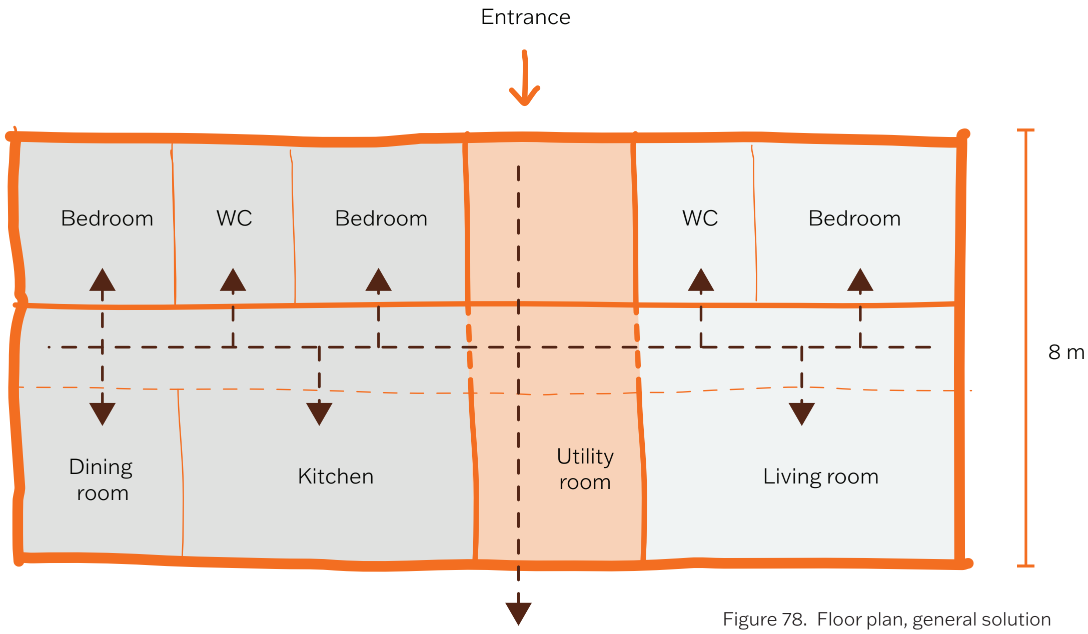


Figure 78. Floor plan, general solution

floorplan
modules

Based on the principles presented earlier, various modules are created. These modules can be combined in different ways, generating multiple floor plan solutions adaptable to various sites. This approach ensures a general and flexible solution without compromising the overall concept.

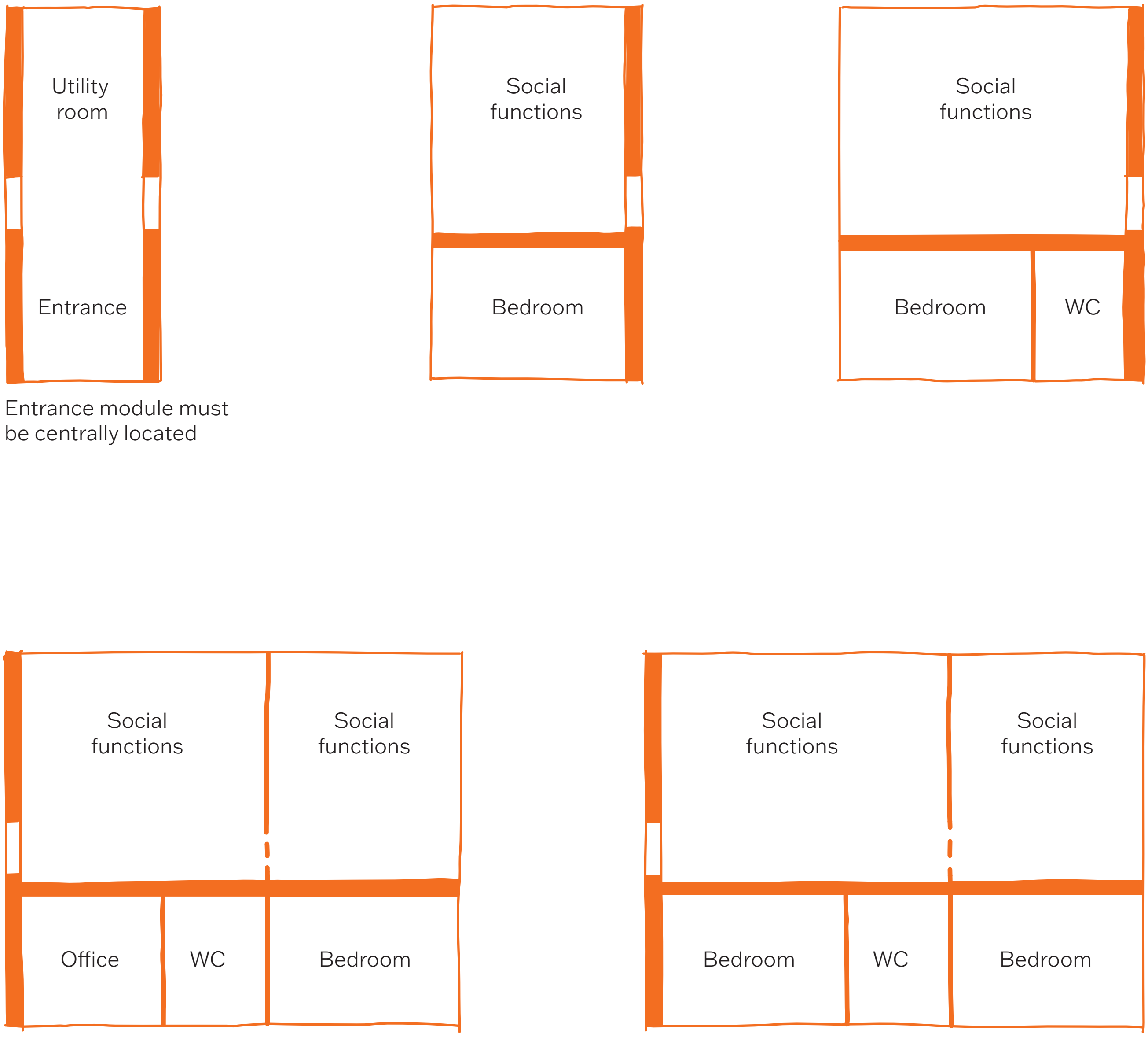


Figure 79. Floor plan concept, modules

floorplan
orientation

Since the house will be placed in different contexts, the orientation of the social spaces must be carefully considered. In some cases, the social spaces will face south or west, where large windows connecting these areas to the backyard may lead to overheating. In such situations, strategies to mitigate heat gain will be necessary.

In other cases, the social spaces may face north or east, resulting in significant heat loss through the windows with limited heat gain. This could increase energy consumption, making it important to implement energy-efficient solutions to maintain indoor comfort.

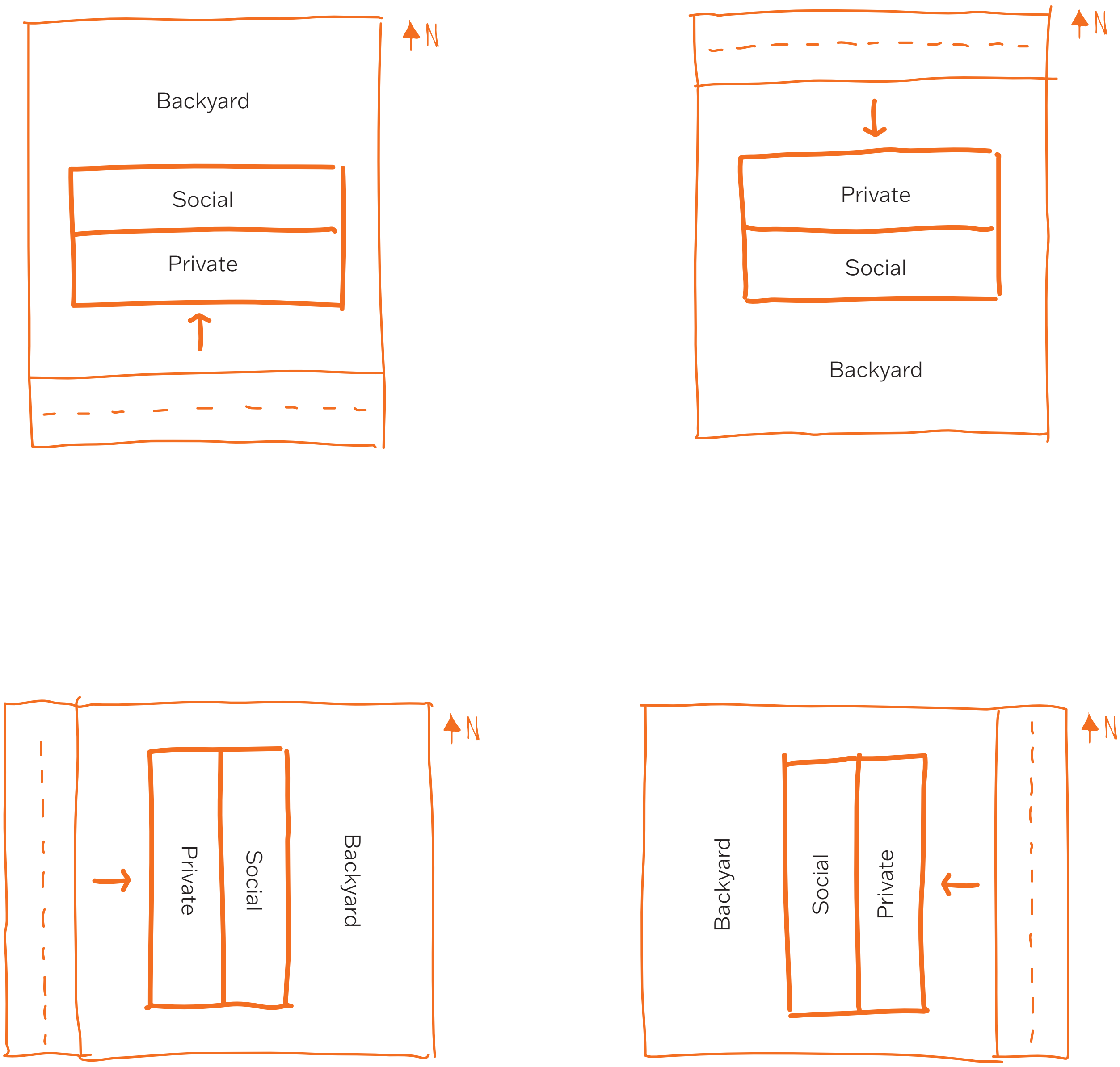


Figure 80. Floor plan concept, orientations

construction

structural principle

Simultaneously with developing the general floor plan principles, the structural principles of the house were also explored, as the load-bearing structure influences the spatial organisation.

Various construction methods are therefore being examined to assess the rigidity of the structure. The goal is to develop a robust structural system that resists modifications over time, while allowing non-load-bearing walls to be more flexible and adaptable.

Shear wall/load-bearing structure

Shear wall structures can be constructed using CLT, concrete, or brick, as these walls are capable of carrying and transferring the weight of the roof and other elements down to the foundation. This method is common in traditional masonry construction. Such structures are often seen as stubborn due to their rigidity, making them difficult and costly to modify or demolish. (Chicago Architecture Center, 2024)

Column/beam structure

Column and beam structures consist of a simple system of columns and beams, typically constructed from concrete, steel, or timber. The beams transfer the loads from the roof or other elements to the columns, which then carry the load down to the foundation. This method allows for larger spans and more flexible room layouts, offering greater potential for future modifications.

Timber frame structure

Timber frame structures is a simple system where the load of the building is supported by a framework of connected elements. This forms a skeleton that transfers the loads to the foundation. This allows for more flexible floorplans and open layout since the internal walls do not carry any loads. Even though this structure has flexibility internally it is more reluctant to extensions. Furthermore, the structure itself is made of light materials which seems less stubborn.

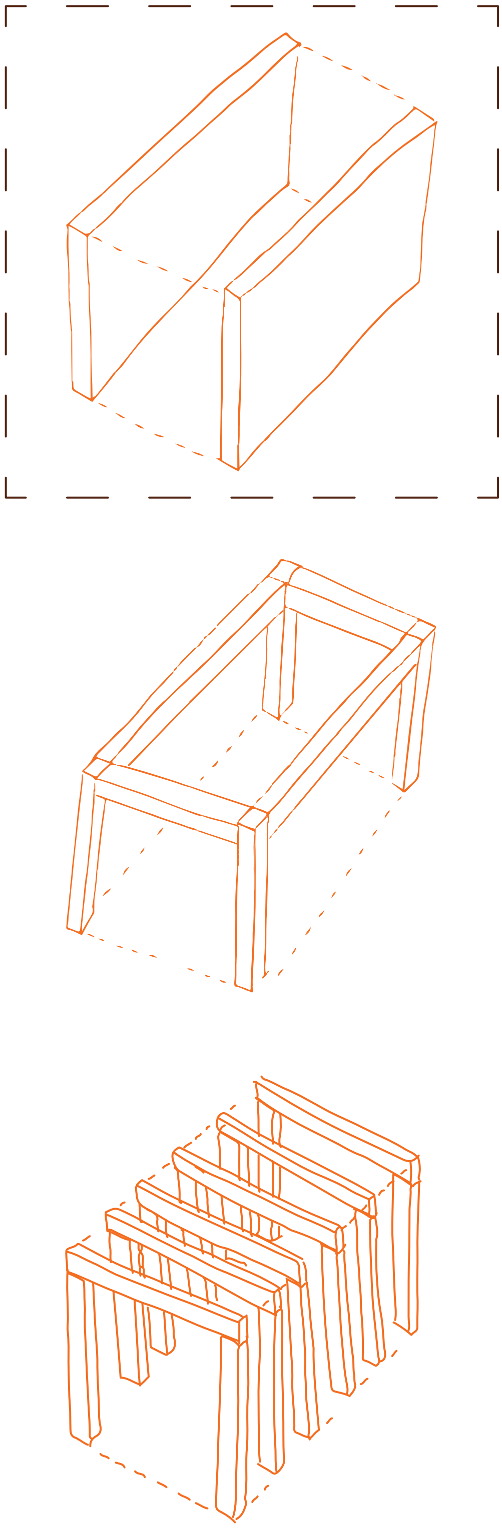


Figure 81. Structural principles

construction

contemporary exterior wall

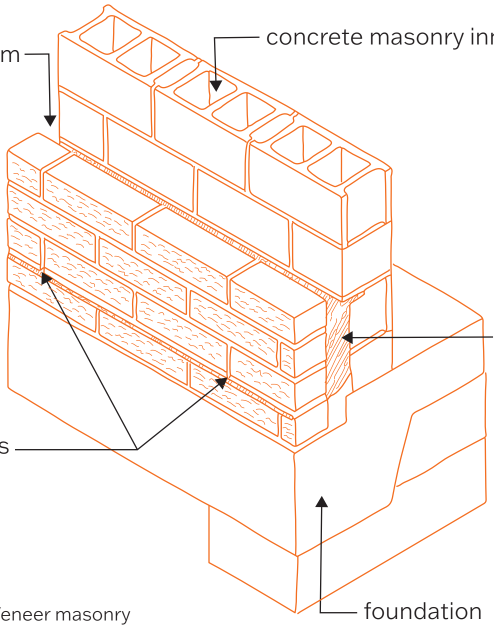


Figure 82. Veneer masonry

An anchored veneer masonry wall is defined as a facade wall that does not contribute structurally to the load-bearing capacity of the building; instead, this role is fulfilled by a separate inner leaf. In this configuration, the inner leaf carries the vertical loads from the roof, while the outer leaf transfers horizontal forces to the inner leaf. Furthermore, the outer leaf also serves as the primary barrier against rain and weather exposure. One of the key benefits of this system is that it allows for faster enclosure of the structure, since only the inner leaf needs to be completed to make the building weather-tight. (Madsen, n.d.)

Masonry homes

Danish residential neighbourhoods are largely defined by brick parcelhuse, making brick a material deeply rooted in Danish building tradition. Exploring different types of bricks for exterior walls allows the design to align with the existing building culture and create a house that fits seamlessly into the everyday architecture of these neighbourhoods.

To better understand load-bearing capacity, insulation options, and CO_2 footprint, various bricks with differing qualities and limitations will be examined.

Figure 83. Masonry homes

construction

vapour barrier

The building envelope is designed to protect against external and internal influences such as rain, wind, heat loss and moisture migration. To support this function, it is common practice to incorporate a vapor barrier that ensures a vapor and airtight construction, reducing thermal bridges and preventing moisture accumulation within the structure. (SBI 267) However, issues can arise if the vapor barrier is incorrectly designed in the construction or installed. Rather than preventing moisture accumulation, it may trap moisture inside the construction, leading to condensation, mold growth, material degradation, and reduced indoor air quality.

To explore these potential risks, an investigation was conducted into alternative constructions that avoid the use of vapor barriers. As part of this study, four wall assembly scenarios were analysed using the Ubakus calculation tool. These included both mineral and natural insulation materials, each tested with and without a ventilated cavity behind the facing brickwork. The results showed that condensation formed, regardless of insulation type, between the insulation and the facing brickwork. However, in scenarios where a rear ventilated cavity was included, no condensation occurred.

It is important to note, however, that the Ubakus model is based on the Glaser method, a simplified approach that does not account for capillary moisture transport or moisture buffering. Since organic insulation are typically capillary active, meaning they can adsorp and desorb moisture, it is likely that these materials would manage moisture more effectively in reality, than what the Ubakus model predicts. (Ubakus.de, 2018)

It is decided to design the building envelope without a vapor barrier, which may result in the need for a ventilated cavity depending on the choice of insulation material to ensure no condensation issues.

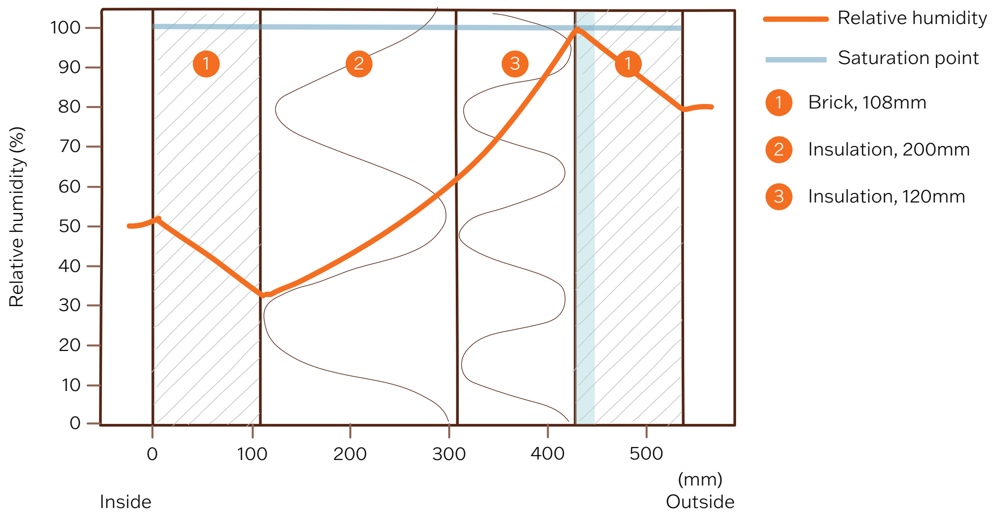


Figure 85. Relative humidity without cavity

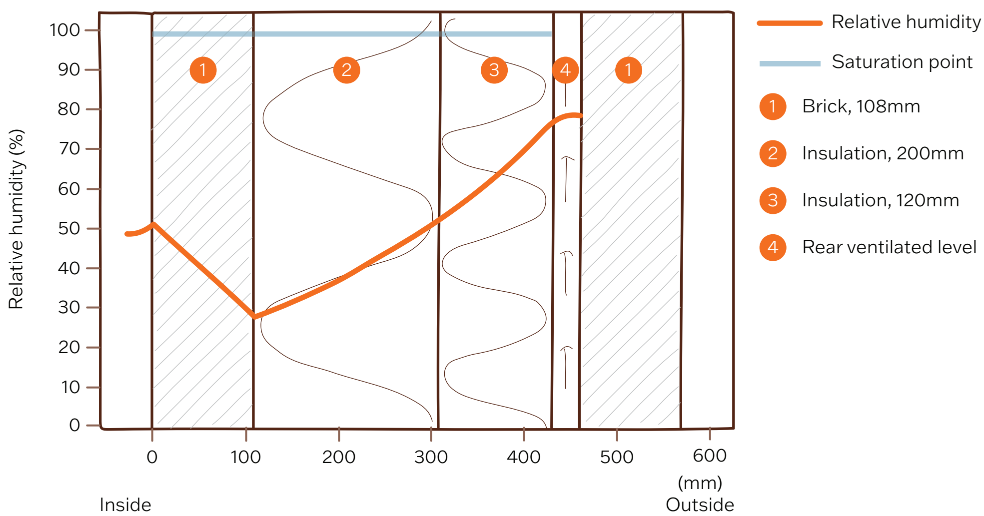


Figure 84. Relative humidity with cavity

Insulation

In designing a wall construction without a vapour barrier, natural insulation is expected to perform better due to its ability to manage moisture. However, natural insulation must also be compared with mineral wool, as other factors such as thermal conductivity and environmental impact play crucial roles. In this comparison, seagrass is chosen, as it offers thermal conductivity comparable to that of glass wool while having a lower GWP value.

Figure 87. Insulation material catalog

Hemp/flax	**Seagrass**	**Glass wool**	
-6.81 kg CO_2-eq	-3.64 kg CO_2-eq	3.51 kg CO_2-eq	**GWP A1 - A3 (kg pr. m^2 CO_2-eq)**
High	Very high	Very low	**Hygroscopicity**
0.042	0.037	0.037	**Thermal conductivity (W/(mK))**
Exterior walls, interior walls, roof structures, and floor decks	Exterior walls, ground slabs, and roof structures	All types	**Use**

The following figure illustrates the adsorption-desorption isotherms for eelgrass and mineral wool. The data reveal that eelgrass exhibits greater sorption dynamics compared to mineral wool insulation, indicating its capacity to function as a moisture buffer in response to fluctuations in relative humidity. (Frandsen et al., 2020)

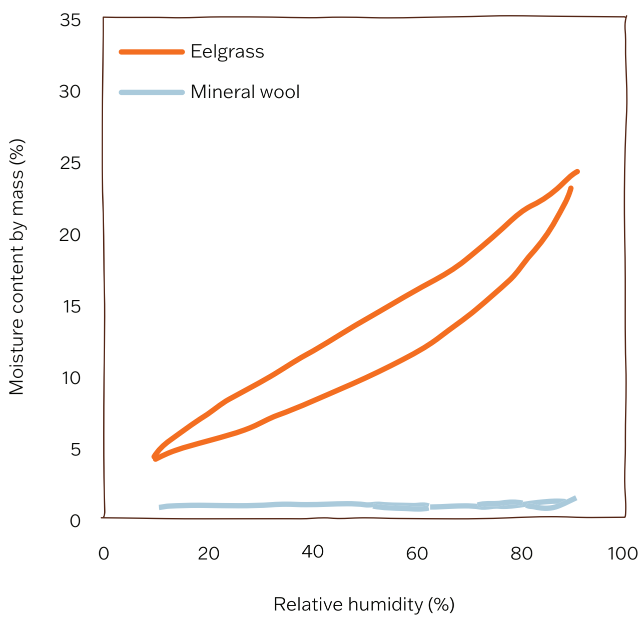
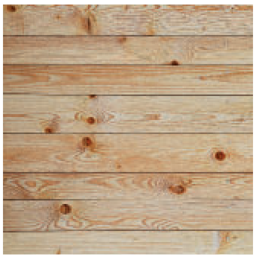
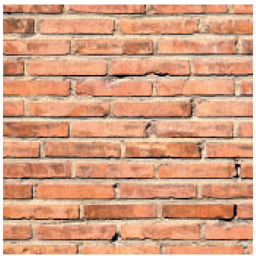


Figure 86. Water vapor sorption isotherms for Eelgrass and mineral wool

construction

exterior wall

				
Aerated concrete	**Construction wood**	**Clay bricks**	**Compressed bricks**	**Perforated bricks**
3,5 Mpa	21 Mpa along fibres 2,5 Mpa across fibres	20 Mpa	2 - 3 Mpa	18 Mpa
535 kg/m³	420 kg/m³	1900 kg/m³	1900 kg/m³	1450 kg/m³
0,14 W/mK	0,11 W/mK	0,75 W/mK	1,1 W/mK	0,60 W/mK
148 kg CO_2-eq	-1595 kg CO_2-eq	177 kg CO_2-eq	65 kg CO_2-eq	143 kg CO_2-eq
The bearing structure will likely be hidden, reducing visual expression. Likely covered in gypsum, giving a flat, less tactile finish		Tactile, robust, and heavy, conveying a classic and durable expression rooted in Danish building tradition, with associations of craftsmanship and longevity, while also offering a range of surface treatments		

				
Wood	**Reused bricks**	**Clay bricks**	**Compressed bricks**	**Perforated bricks**
Easy to replace or re-pair. Treatment every 5–10 years		Repointing and algae removal after 30 - 50 years		
30 - 50 years		100 + years		
				
-1050 kg CO_2-eq	18 kg CO_2-eq	177 kg CO_2-eq	65 kg CO_2-eq	143 kg CO_2-eq
Light, associated with summer houses, con-veying warmth and a connection to nature	Tactile, robust, and heavy, conveying a classic and durable expression rooted in Danish building tradition, with associations of craftsmanship and longevity, while also offering a range of surface treatments			

Inner leaf

The inner leaf will serve as the load-bearing element, making compressive strength a key consideration. A material with high density and low thermal conductivity is preferred to ensure thermal capacity and effective insulation. The aim is to expose the inner leaf, thereby utilising the material to enhance the sensory experience of the space. Based on these criteria, perforated bricks were chosen.

Figure 89. Inner leaf material catalog

Compressive strength (Mpa)

Density (kg/m³)

Thermal conductivity (W/mK)

GWP A1 - A3 (kg pr. ton CO_2-eq)

Associations (Experience)

Outer leaf

The outer leaf plays a key role in the house's expression, and bricks are preferred for their strong cultural connection. To link the interior and exterior, perforated bricks were chosen. Reused bricks were considered but discarded due to limited type and colour options. Since the house is intended to be long-lasting, selecting the right colour is essential, as it will ensure the desired aesthetic and contribute to the building's longevity.

Figure 90. Outer leaf material catalog

Maintenance

Lifetime

Patination

GWP A1 - A3 (kg pr. ton CO_2-eq)

Associations (Experience)

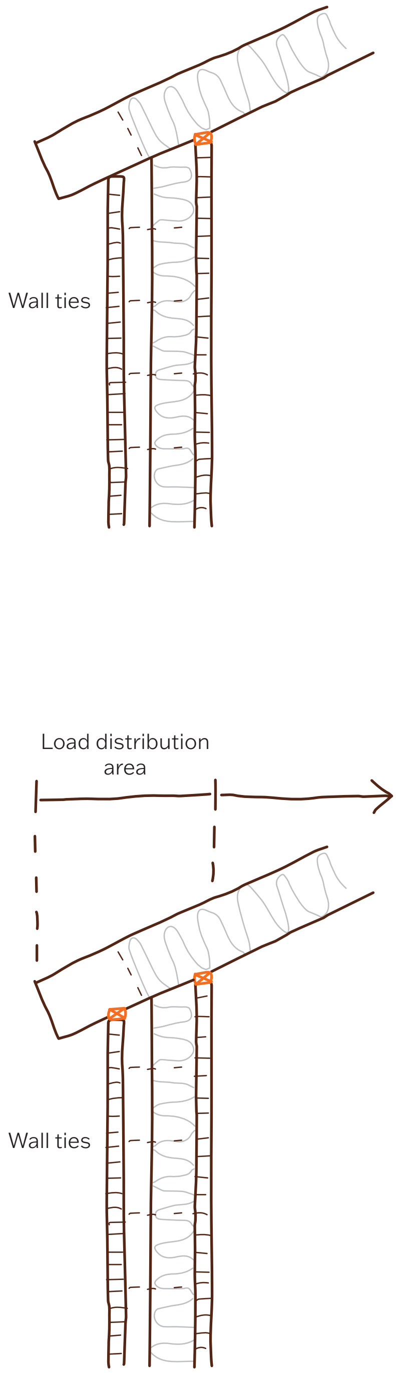


Figure 88. Exterior wall, principle

Initially, the intention was to use compressed bricks as the load-bearing element due to their low GWP value compared to other brick types. However, their low compressive strength proved to be a drawback. We then considered whether both the inner and outer leaf could function as load-bearing elements, thereby increasing structural strength, as illustrated in figure 88, rather than using a veneer wall. However, in this configuration, the outer leaf would only account for a small portion of the load distribution, making the solution ineffective.

construction

internal walls

After defining the construction of the structural cavity wall, it is essential to carefully determine the materials and construction of the internal walls to ensure that each wall clearly communicates its role and level of rigidity, maintaining a clear structural hierarchy.

The house will consist of three types of walls; structural cavity walls, interior structural walls, and partition walls. The partition walls, being the most flexible elements, will be constructed as lightweight gypsum elements, offering adaptability and ease of modification. In contrast, the interior structural walls play a crucial role in maintaining the floor plan's functionality and should convey a sense of stability.

Figure 91. Moodboard, social

The following mood board was created prior to selecting materials for the interior structural walls, to ensure that all materials work harmoniously and contribute to the desired aesthetic. It reflects the atmosphere the social spaces in the house.

Interior structural walls

The following material catalogue has been created to compare various options for the interior structural walls. Based on this comparison, clay bricks were selected for their stubborn character, clear structural expression, and strong properties in terms of sound insulation and fire resistance. Additionally, this material allows for a range of surface treatments, making it adaptable to the desired aesthetic in each room.

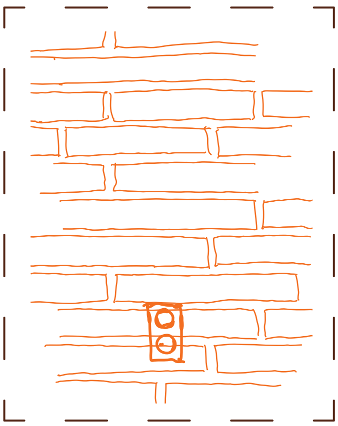
Figure 93. Interior structural walls material catalog

Clay blocks	Clay bricks	CLT	
45 - 55 dB	45 - 55 dB	35 - 50 dB	**Sound insulation (Rw, airborne sound)** ≥ 50 dB
REI 90	REI 90	REI 60	**Fire resistance (REI)** ≥ REI 30 cf. BR18
100 + years	100 + years	50 - 100 years	**Lifetime (Years)**
Medium-high – due to high density and wall thickness	High – due to density, legibility, and thickness	Low – timber is typically seen as lighter and less massive	**Stubbornness (Experience)**

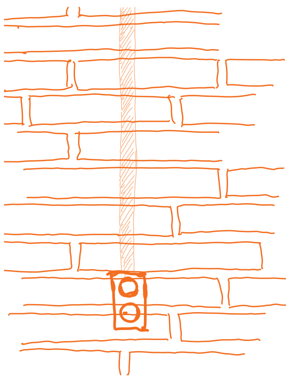
Installations

To accommodate installations within the walls, three methods of integration into a brick wall were examined, as shown below. For the exterior wall, installations will be concealed within the construction. The interior structural wall, however, consists of a single layer of brick and cannot support a hidden solution. Instead, installations along this wall will remain visible. While this results in a more industrial expression, it preserves the structural legibility of the wall, something that would be compromised if the installations were concealed.

Hidden



Milled



Visible

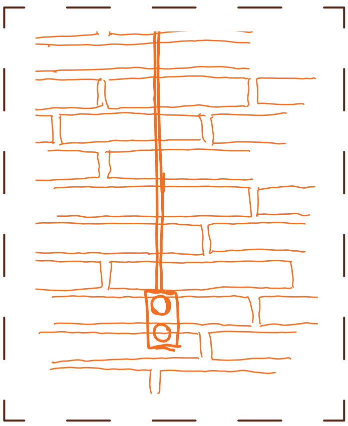


Figure 92. Installations

roof
principle

Since the house follows a traditional longhouse shape, a gable roof is chosen, based on analyses of parcelhuse (see appendix 03). Additionally, there is an aim to brighten the hallway through a skylight. The roof shape should ensure that when the social zone faces south, the skylight faces north to minimise solar gain and prevent overheating. Conversely, when the social zone faces north, the skylight should face south to provide necessary solar gain (see figure 95).

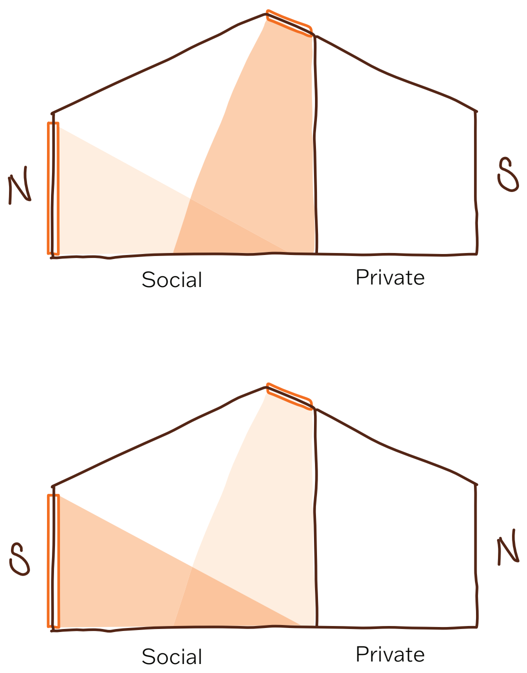


Figure 95. Skylight principle

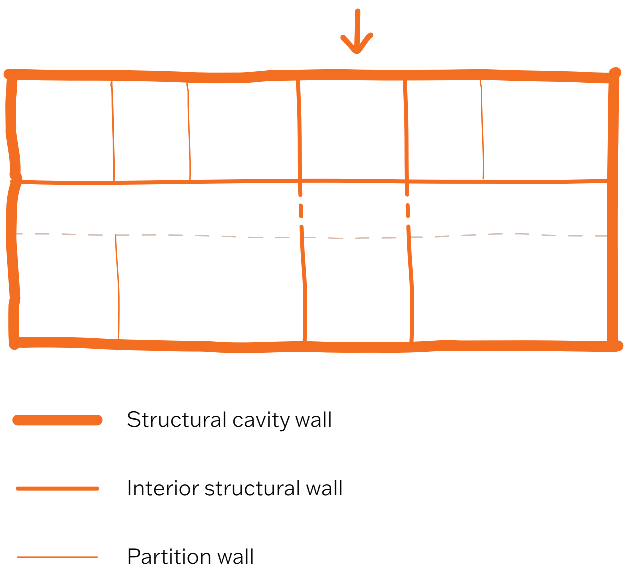
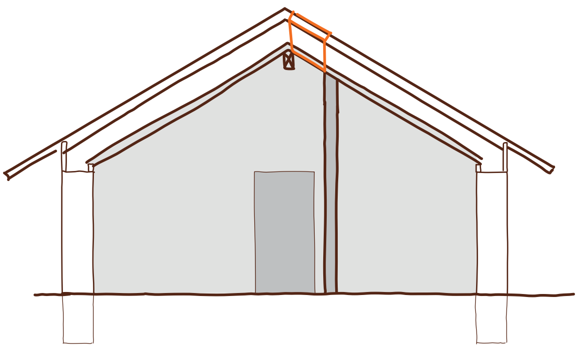


Figure 94. Floor plan, structural hierarchy

Another issue to address is the role of the interior structural walls. The vertical structural walls have a clear role as both stabilising and sound-insulating elements. However, the horizontal wall primarily functions as a zoning divider. To enhance its structural function, it should be made load-bearing to support the roof structure.

Lastly, there is an aim to expose the rafters to emphasise the structural logic and craftsmanship. Therefore, different types of roofs and roof structures are examined to determine which best accommodates these various requirements.

roof
structure



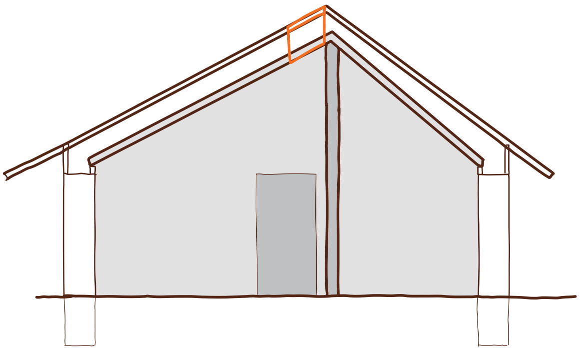
Beam rafter

Pros:

- Skylight brightens the wall
- Pitched rood design
- Visible roof ridge enhances structural legibility

Cons:

- Horizontal wall is not load-bearing
- Distance between wall and roof ridge is awkwardly small
- Less efficient use of materials



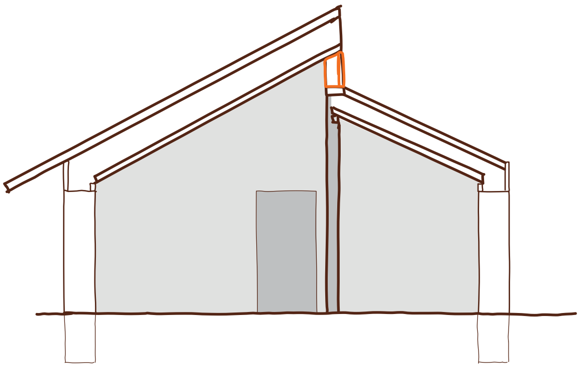
Asymmetrical beam rafter

Pros:

- Pitched roof design
- Horizontal wall is load-bearing
- Differentiation between zones is visible exteriorly

Cons:

- Skylight orientation
- Roof ridge is not visible
- Less efficient use of materials



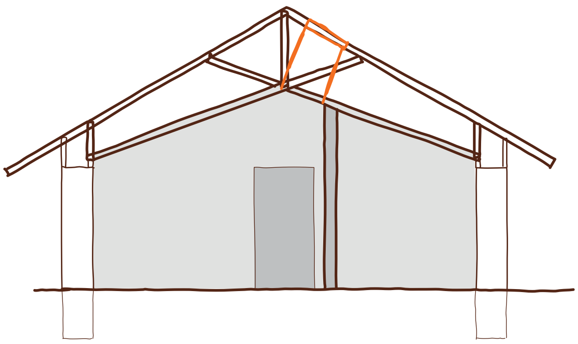
Clerestory roof

Pros:

- Ideal skylight orientation
- Horizontal wall is load-bearing
- Clear distinction between zones, inside and outside
- Independent slopes

Cons:

- Less efficient use of materials
- Complicated connection details



Scissor truss

Pros:

- Efficient use of materials
- Allows the ceiling slope to differ from the roof slope
- Pitched roof design
- Visible roof ridge enhances structural legibility

Cons:

- Horizontal wall is not load-bearing
- Skylight conflicts with the roof structure
- Part of the load-bearing structure remains concealed

Figure 96. Roof structure types

roof
structure

Since the clerestory roof structure has been chosen, various slopes for the two roof sections are examined and compared. The slope influences the room heights, the size of the skylight, and the facade's expression.

Although a greater difference between the slopes increases the skylight opening, a difference of 5 degrees or more creates an unbalanced elevation. Therefore, the slopes of 22 and 21 degrees are chosen, as they provide an appropriate skylight size while maintaining a balanced appearance.

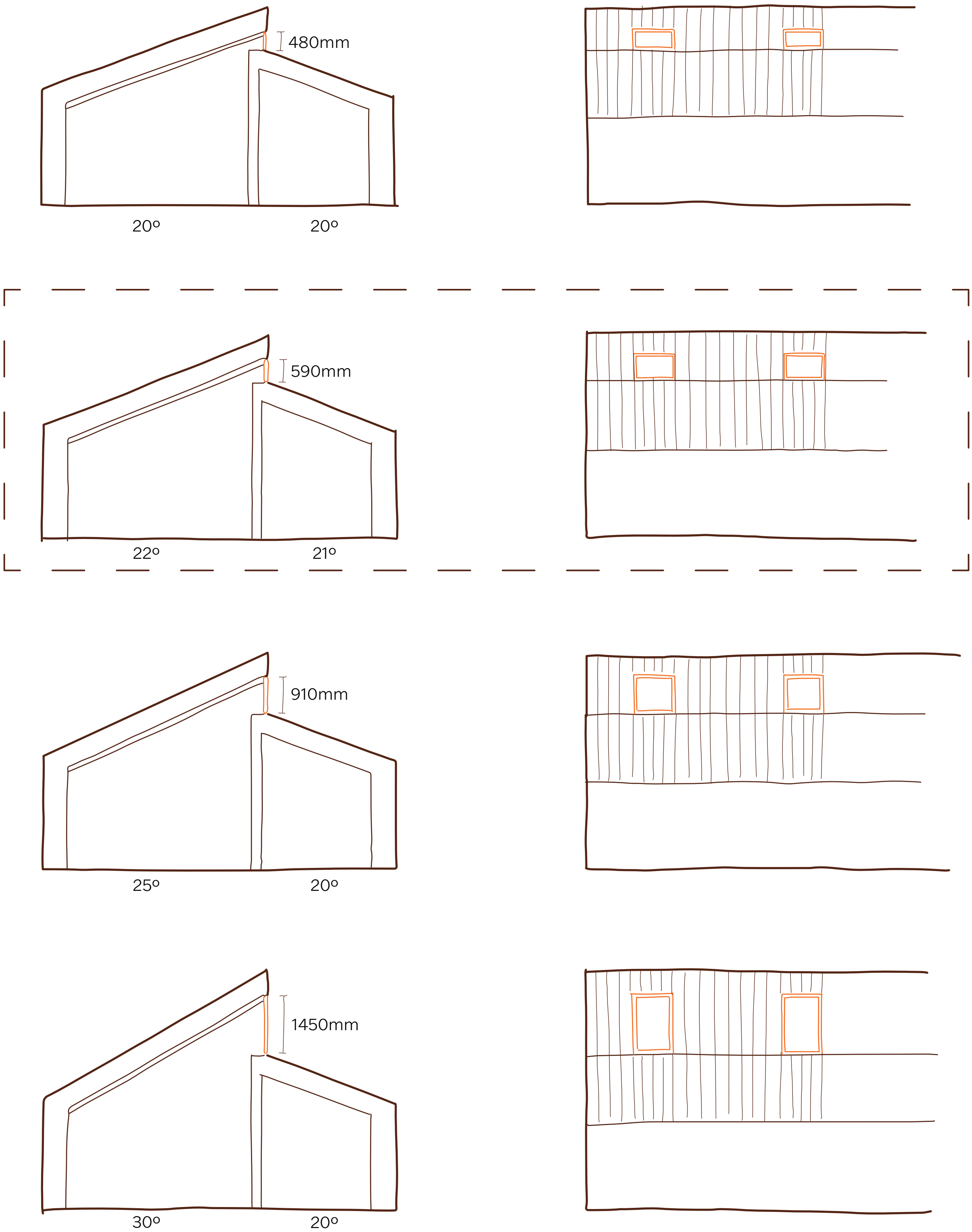


Figure 97. Clerestory roof, slopes

Next, various spans are investigated, as the chosen span will shape the spatial rhythm and complexity of the house. This is particularly significant, as we intend to expose the rafters in the social spaces. Determining the most aesthetically pleasing span is crucial, as it directly impacts the dimensioning of structural elements.

Three spans are examined: 0.5 m, 1 m, and 2 m. These variations are chosen to clearly highlight the differences. Based on this analysis, a span of around 1 m is selected, as it provides a balanced rhythm without being overly complex. Additionally, this span aligns with the dimensions of windows, doors, and openings, creating a cohesive connection between these elements.

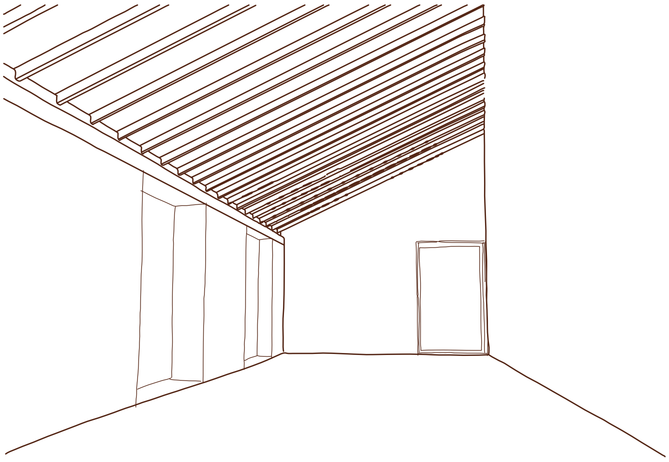


Figure 101. Rafter, 0.5 m span

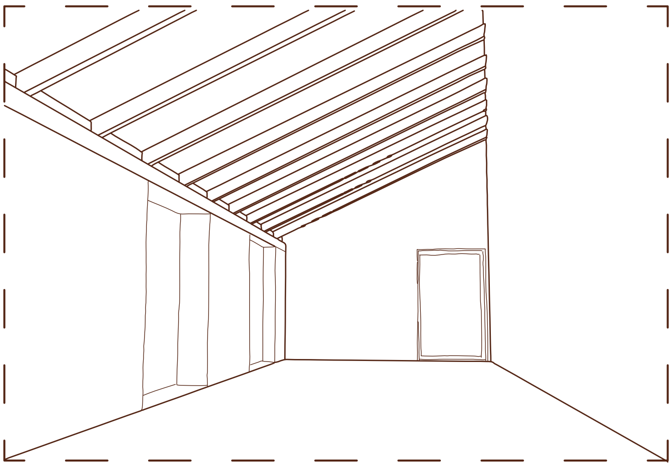


Figure 99. Rafter, 1 m span

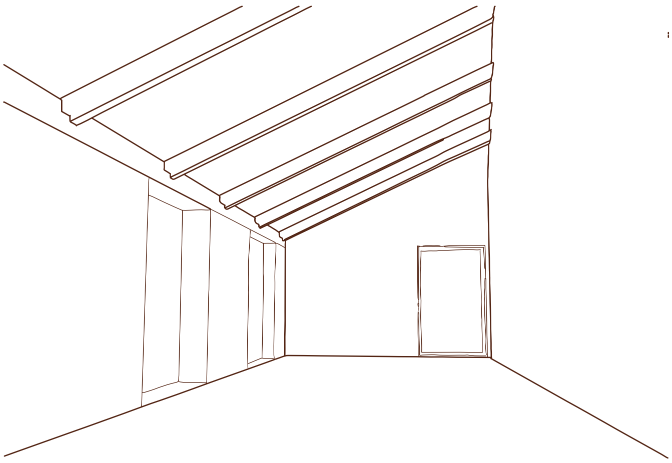


Figure 100. Rafter, 2 m span

Finally, the structural principle of the roof structure is established, enabling the dimensioning of the elements. However, calculations for the final structure have not been conducted. This is because earlier in the process, the elements were dimensioned based on a typical beam rafter.

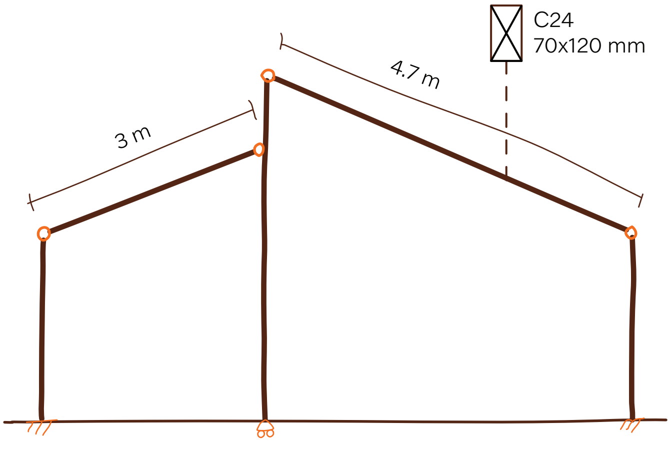


Figure 98. Clerestory roof, structural principle

The clerestory structure can be understood as two rafters from the beam rafter structure, merely separated. Therefore, the previously calculated dimensions are applied. The calculation for the beam rafter can be found in appendix 07.

DoF:

5 x 3 = 15

Reactions:

From hinges: 4 x 2 = 8
From supports: 3 + 3 + 1 = 7

DoF = R, thus statically determinate

roof
material

Roof cladding

The chosen roof cladding is zinc, as the roof slope does not accommodate other solutions. Zinc also allows the wall within the roof structure to be clad with the same material. Additionally, its light expression balances the heavy form of the roof, harmonising the roof and facade.

Figure 103. Roof cladding material catalog

Clay roof tiles	Zinc roof	Slate roof	
15.61 kg CO_2-eq	44.5 kg CO_2-eq	15.39 kg CO_2-eq	**GWP A1 - A3 (kg pr. m² CO_2-eq)**
60 - 75 years	60 - 80 years	100 + years	**Lifetime (Years)**
Inspections and cleaning	Inspections and cleaning	Inspections	**Maintenance**
Traditional home	Urban settings	Public buildings	**Associations (Experience)**
25 degrees	1-2 degrees	25 degrees	**Minimal roof slope**

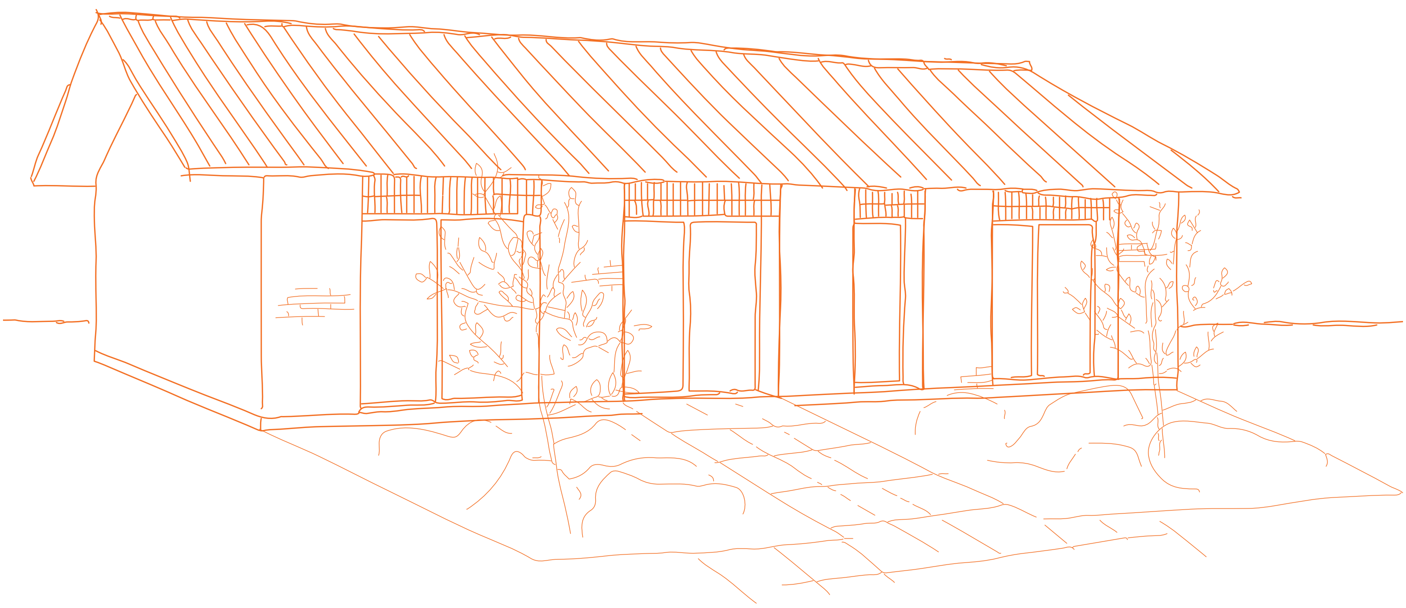


Figure 102. House, process

roof

wall plate

A wall plate will be placed on top of the outer walls to support and distribute the load from the rafters. It will also serve as a lintel over window and door openings and must be dimensioned accordingly. Before dimensioning the wall plate, the connection between the rafters, wall plate, and inner leaf was examined. Figures 104 – 106 illustrate three variations of this detail.

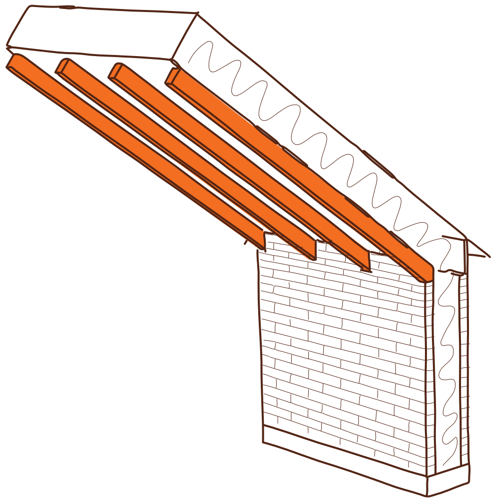


Figure 106. Wall plate detail 1

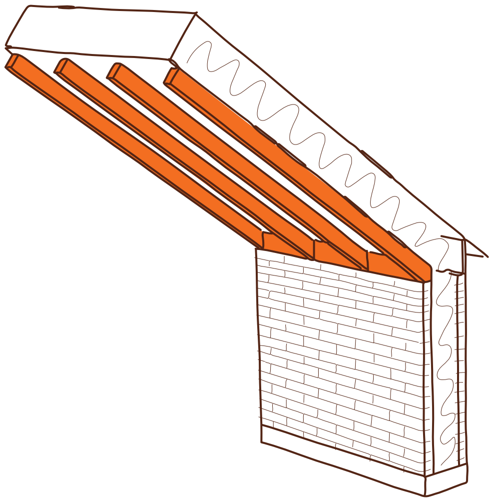


Figure 104. Wall plate detail 2

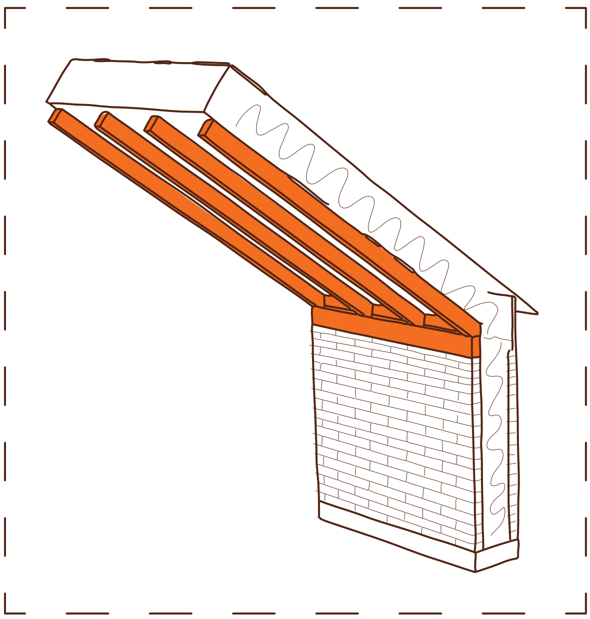


Figure 105. Wall plate detail 3

One of the project's aims is to highlight craftsmanship and use technical aspects to enrich the architectural experience. Therefore, the decision was made to expose this connection. Additionally, the rafters will be positioned on top of the wall plate, creating a small gap that accentuates the distinct structural elements (see figure 105).

Since the dimensioning of the wall plate depends on the size of the window openings, the next step is to investigate the placement and dimensions of the windows.

indoor climate

windows and daylight

The different rooms within the house are furnished with careful consideration of door and window placement, as well as daylight percentage. The following figures illustrate this investigation for the private rooms. The aim is to position doors opposite windows to enhance visual connections while maintaining privacy. Additionally, the arrangement should allow for flexible furnishing and optimal daylight conditions.

According to BR18, proper daylight conditions are met when the window to floor ratio is above 10% (BR18, Ch. 18, § 379).

In the bedrooms, a single window is chosen to preserve privacy while ensuring adequate daylight. The window is positioned away from the adjacent wall to make better use of the wall space. This central placement also improves the daylight factor.

In the bathrooms, privacy is achieved by widening the room, allowing all installations to be placed along one wall. The window is then positioned adjacent to the opposite wall, opposite the door, to maintain privacy and optimise natural light.

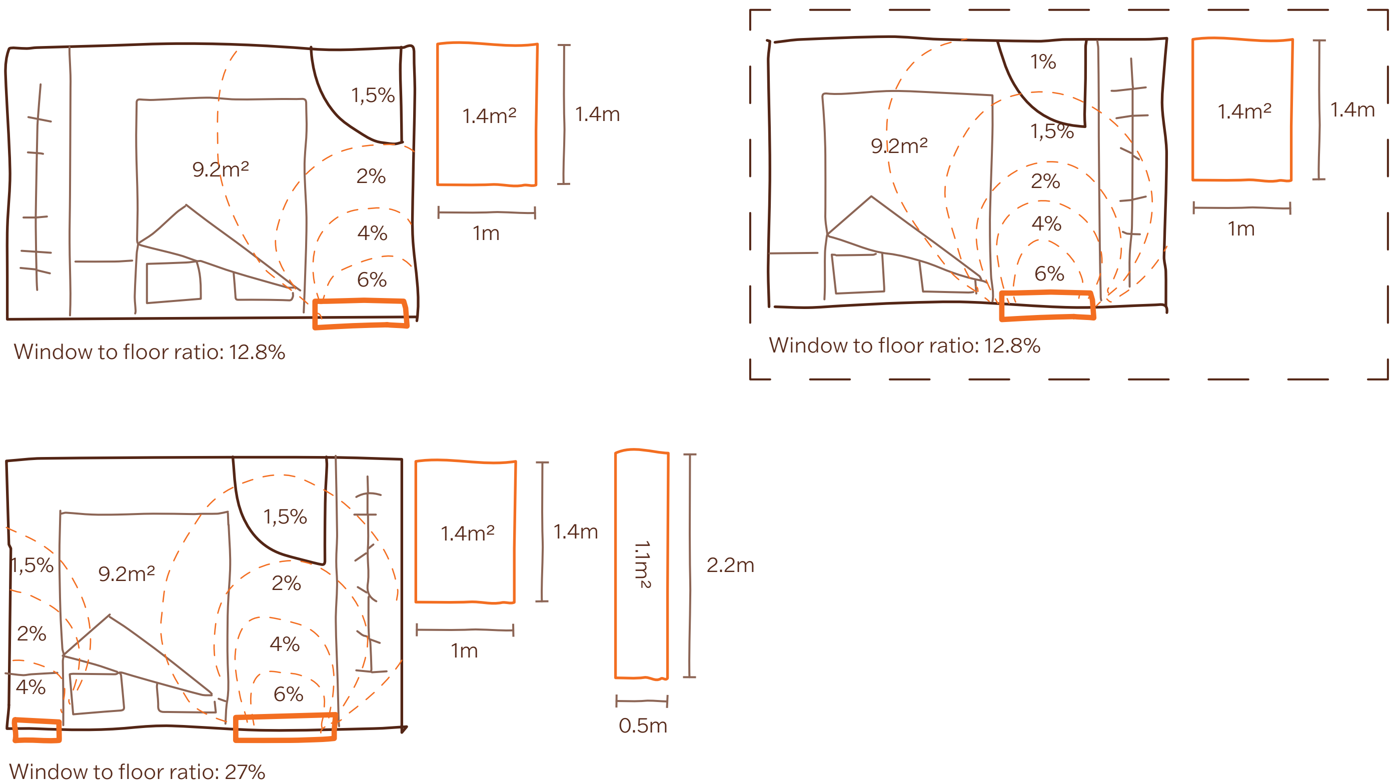


Figure 107. Bedrooms, windows and daylight

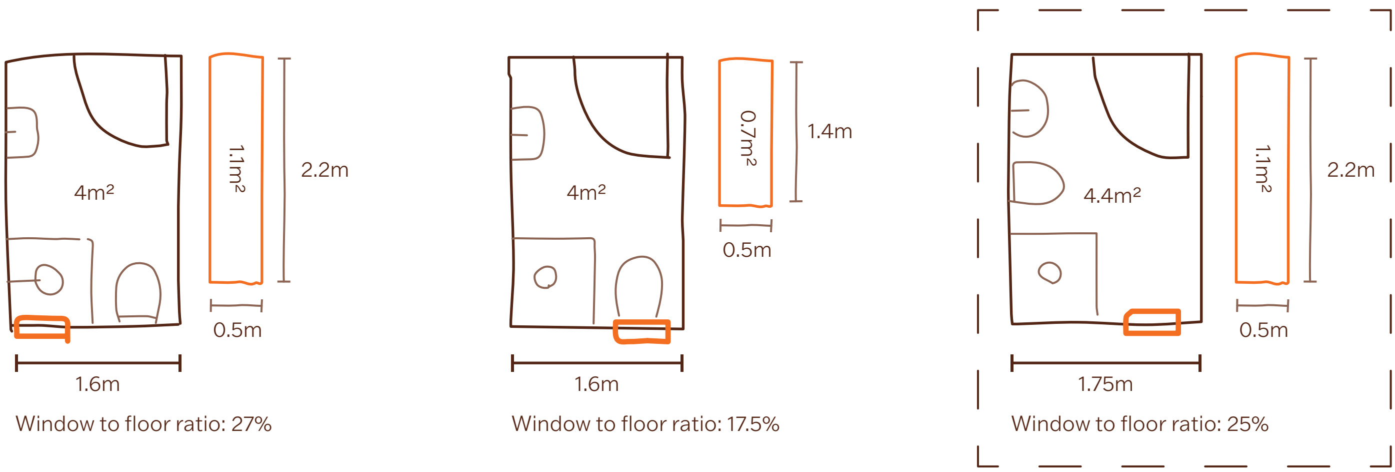


Figure 108. Bathrooms, windows and daylight

A similar investigation has been conducted to determine the optimal window placement in the social spaces. In this context, a floor-to-ceiling window is considered to blur the boundary between the interior and the exterior, where a terrace will be situated.

Another goal is to position windows at both ends of the hallway to enhance visual connections and create a sense of openness and lightness.

As shown in the illustrations below, achieving adequate daylight in these spaces does not appear to be a challenge. However, it is crucial to prevent overheating when the social areas face south, while also minimising heat loss when they are oriented north, where solar gain is limited.

Before making a final decision, ventilation calculations, indoor climate simulations, and energy demand analyses will be conducted.

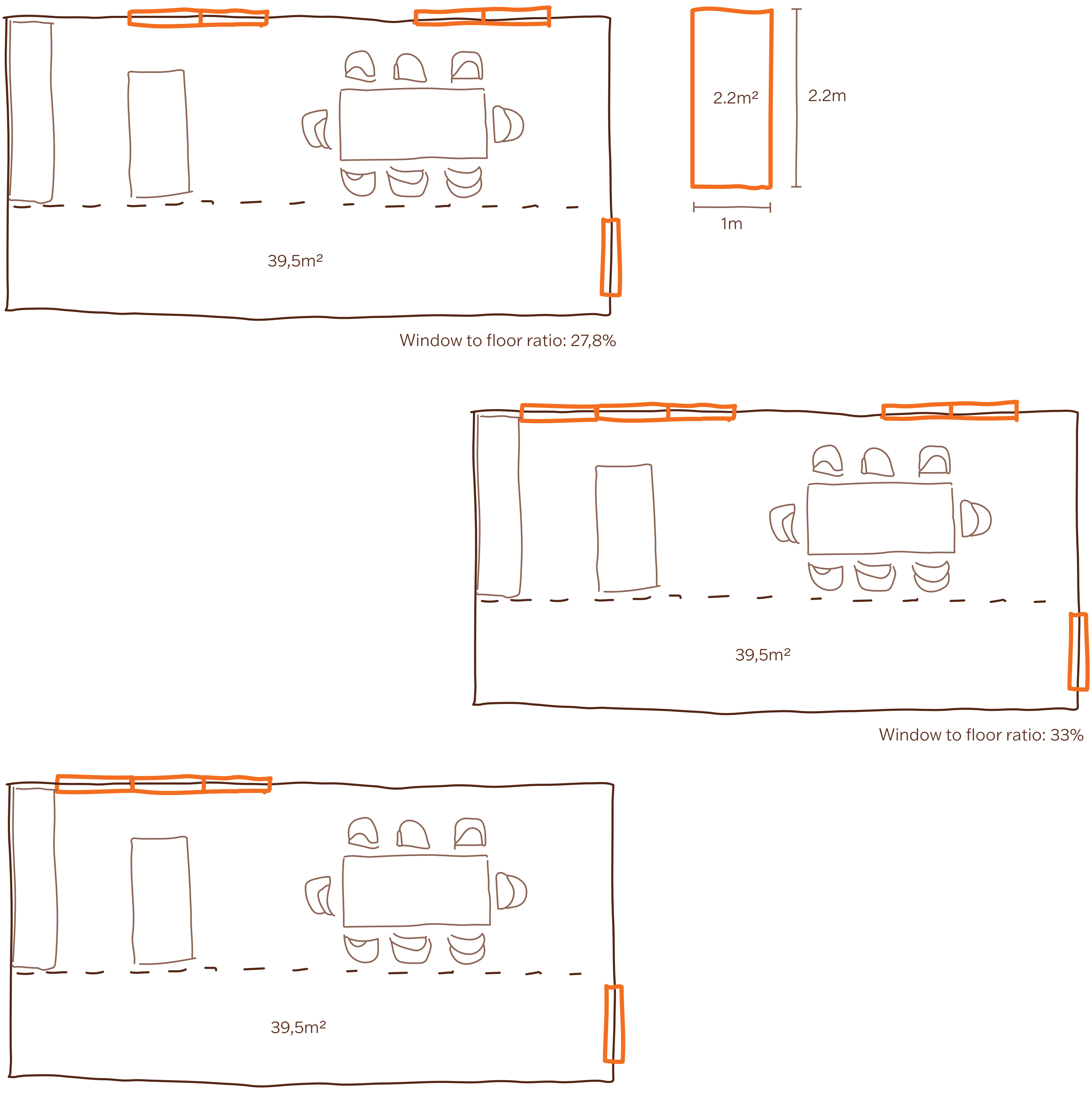


Figure 109. Social, windows and daylight

indoor climate

skylight

To brighten the hallway and make it feel light and open, a skylight is introduced above it. The roof structure ensures that when the social zone faces south, the skylight faces north, minimising solar gain and overheating. Conversely, when the social zone is oriented north, the skylight faces south, providing necessary solar gain.

Next, the distribution of the skylight along the hallway is examined. To determine the most optimal arrangement, indoor climate and energy demand analyses will be conducted.

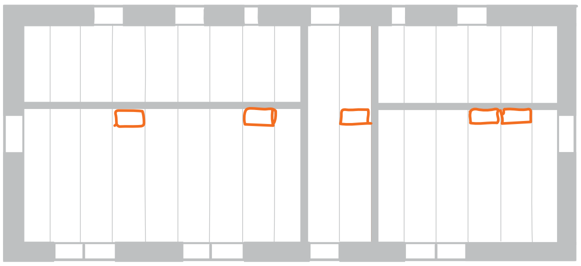


Figure 111. Skylight positioned opposite the facade windows

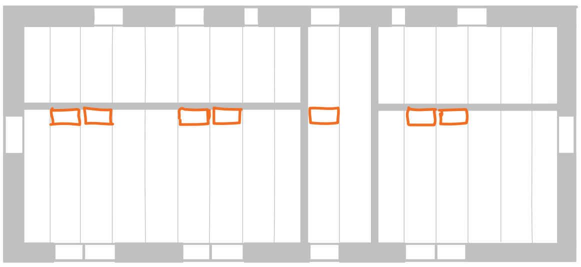


Figure 112. Skylight aligned with the facade windows

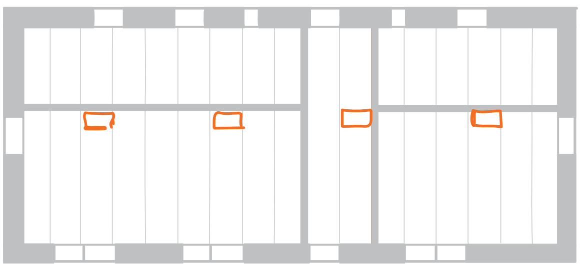


Figure 113. Skylight spaced with three sections between them

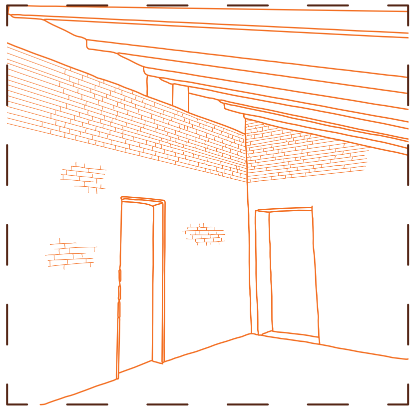


Figure 115. Wooden walls between window

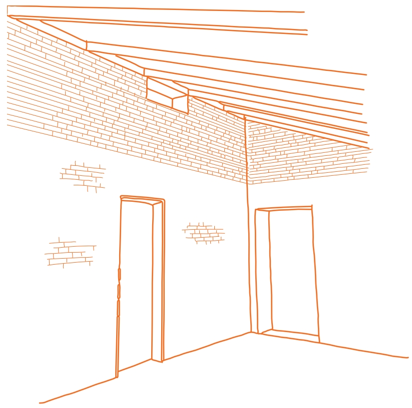


Figure 114. Continuous wall plate above window

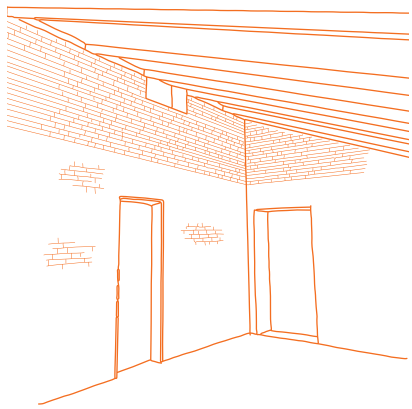


Figure 110. Discontinuing wall plate

To prevent overheating and minimise unnecessary heat loss, the skylight does not extend continuously along the ceiling. Instead, gaps are left between individual skylights. In these areas, the interior structural wall could continue up to the roof, either with the wall plate exposed or replaced by concealed vertical posts to support the roof. However, both options introduce a certain heaviness to the roof structure. As an alternative, these sections are constructed using a lighter timber framework, creating a more refined expression and allowing for future adjustments, such as the addition of extra windows.

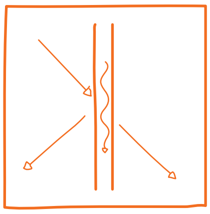
indoor climate

natural ventilation

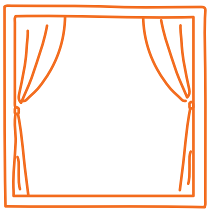
The type and amount of natural ventilation will significantly impact both the indoor climate and energy demand. Therefore, before conducting calculations, it is essential to explore the factors that can be adjusted when working with natural ventilation.

Firstly, the ventilation type plays a crucial role in determining the achievable airflow, with stack ventilation being the most effective. In our case, the skylight can facilitate stack ventilation.

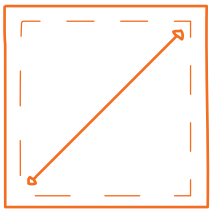
The required airflow for natural ventilation is influenced by the effective solar transmission area, which can be adjusted by manipulating the following parameters:



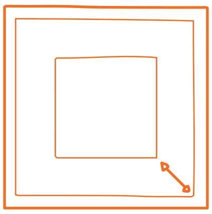
The g - value



Shading conditions



Area of the window



Glass to frame ratio

Figure 118. strategies for effective solar transmission area

Lastly, the type of window opening can be adjusted, as different opening types result in varying effective opening areas, which directly influence ventilation efficiency. Therefore, selecting appropriate window types can increase airflow as needed.

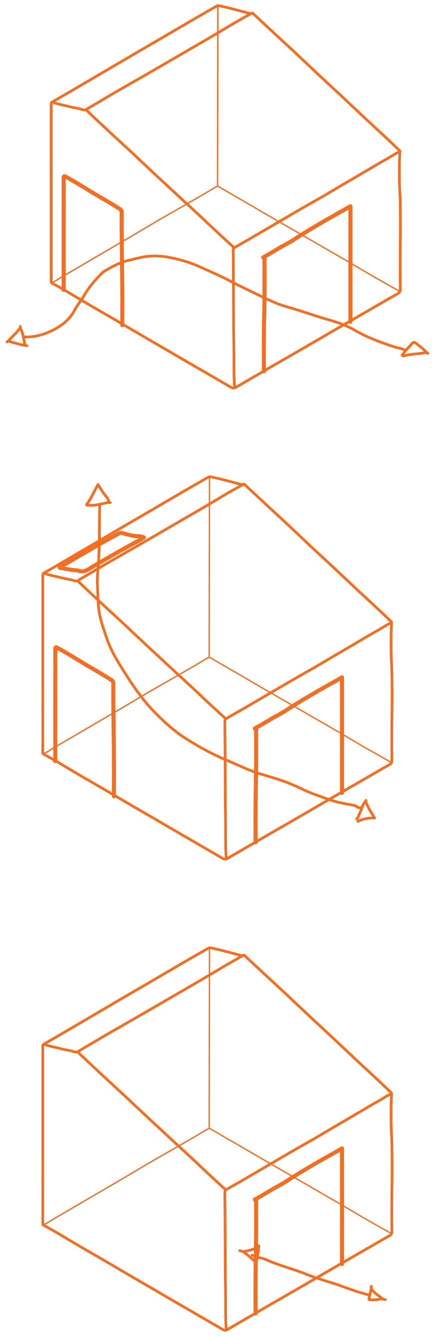


Figure 116. Natural ventilation, strategies

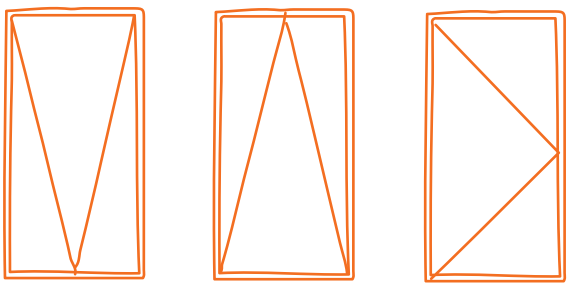


Figure 117. Window opening types

indoor climate

bsim

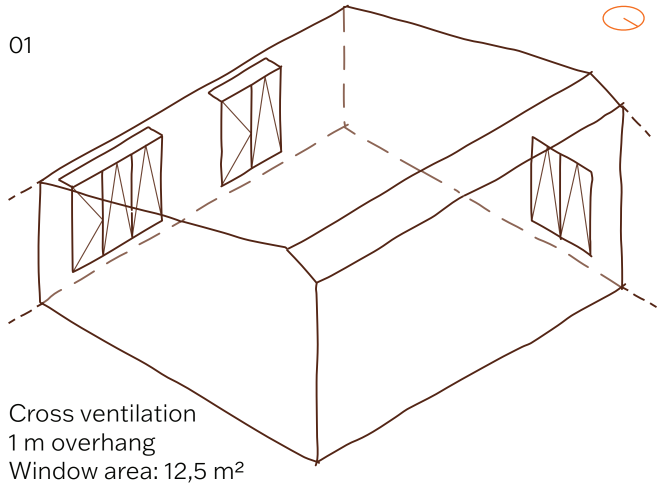


Figure 119. BSim iteration 01

To investigate the indoor climate, a series of simulations were conducted using BSim, exploring different design iterations. The open-plan kitchen was identified as a critical space in terms of overheating risk, particularly when oriented towards the south. A baseline scenario was established with natural cross ventilation through openings in the south and west walls. Further details on the simulation setup can be found in appendix 08.

Open-plan kitchen

Net volume	167 m³
Net floor area	58 m²
People	3
Equipment	0.35 kW
Ventilation	Natural ventilation

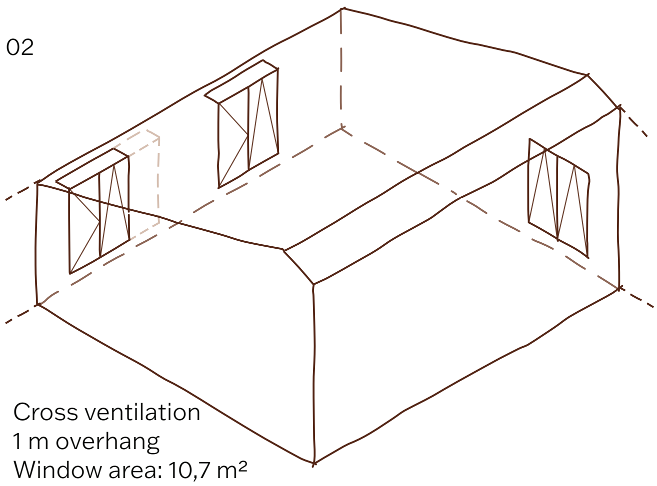


Figure 120. BSim iteration 02

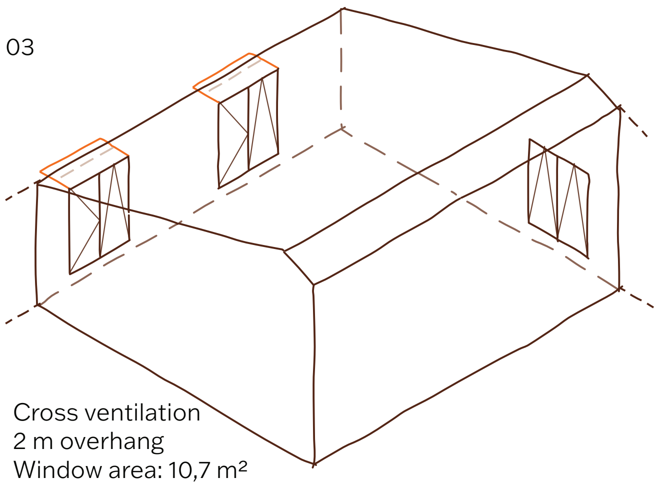
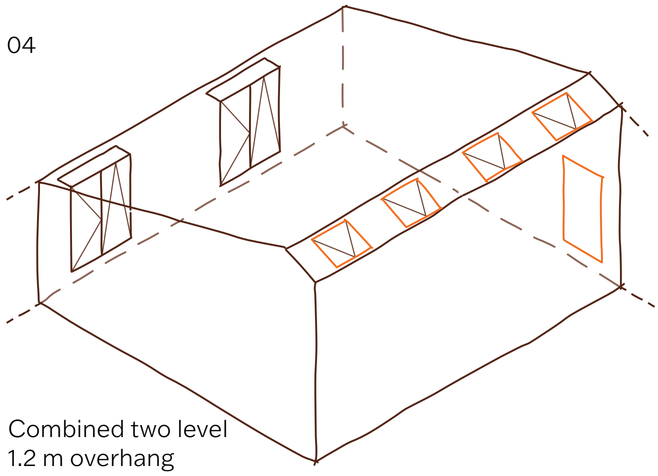


Figure 121. BSim iteration 03

The initial iterations focused solely on cross ventilation, testing configurations with fewer windows and an extended overhang. However, all three variations exhibited significant overheating, rendering cross ventilation insufficient.

To enhance ventilation, a skylight was introduced to enable stack ventilation (referred to as “combined two-level” in BSim). As previously mentioned, the skylight had to be positioned towards the north in this context. The results of two iterations with varying skylight areas can be seen simulated. The resulting indoor climate met the performance criteria, limiting overheating to under 100 hours above 26 °C and 25 hours above 27 °C.

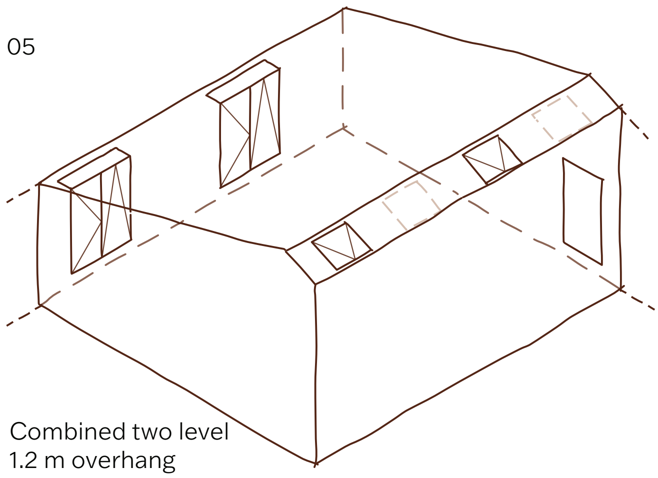
04



Combined two level
1.2 m overhang
Window area: 12,7 m²

Figure 123. BSim iteration 04

05



Combined two level
1.2 m overhang
Window area: 11.1 m²

Figure 124. BSim iteration 05

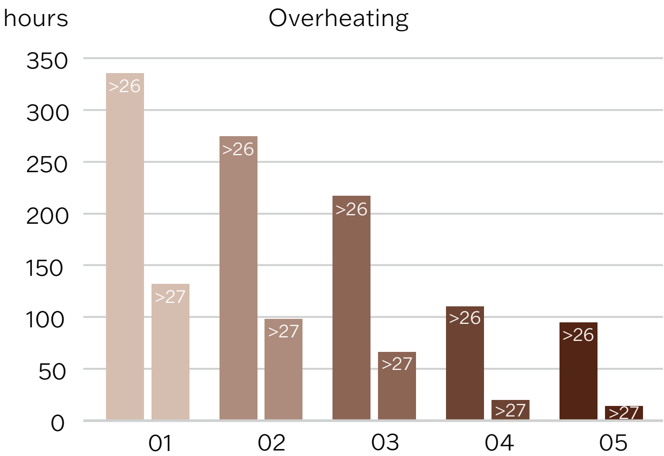


Figure 122. Overheating hours

Since the building is intended to function effectively in multiple orientations, an energy calculation was conducted in Be18 alongside the indoor climate simulations. To investigate the critical situation, the calculations was conducted on the rotated building, where the open-plan kitchen, with its large window area, faced north. The results of the energy calculations are presented in appendix 09.

interior details

wall plate dimensions

Since the windows have now been dimensioned, the cross section of the wall plate can be determined. Acting as a lintel over window and door openings, the wall plate must be capable of transferring the roof load down to the walls, considering the largest opening area in the wall.

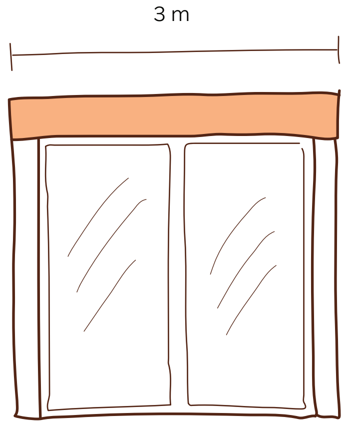


Figure 127. Wall plate span

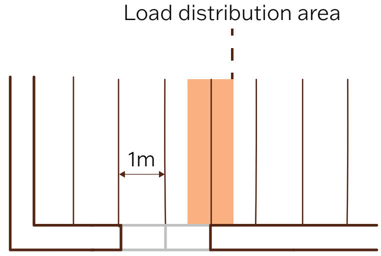


Figure 126. Rafter load distribution area

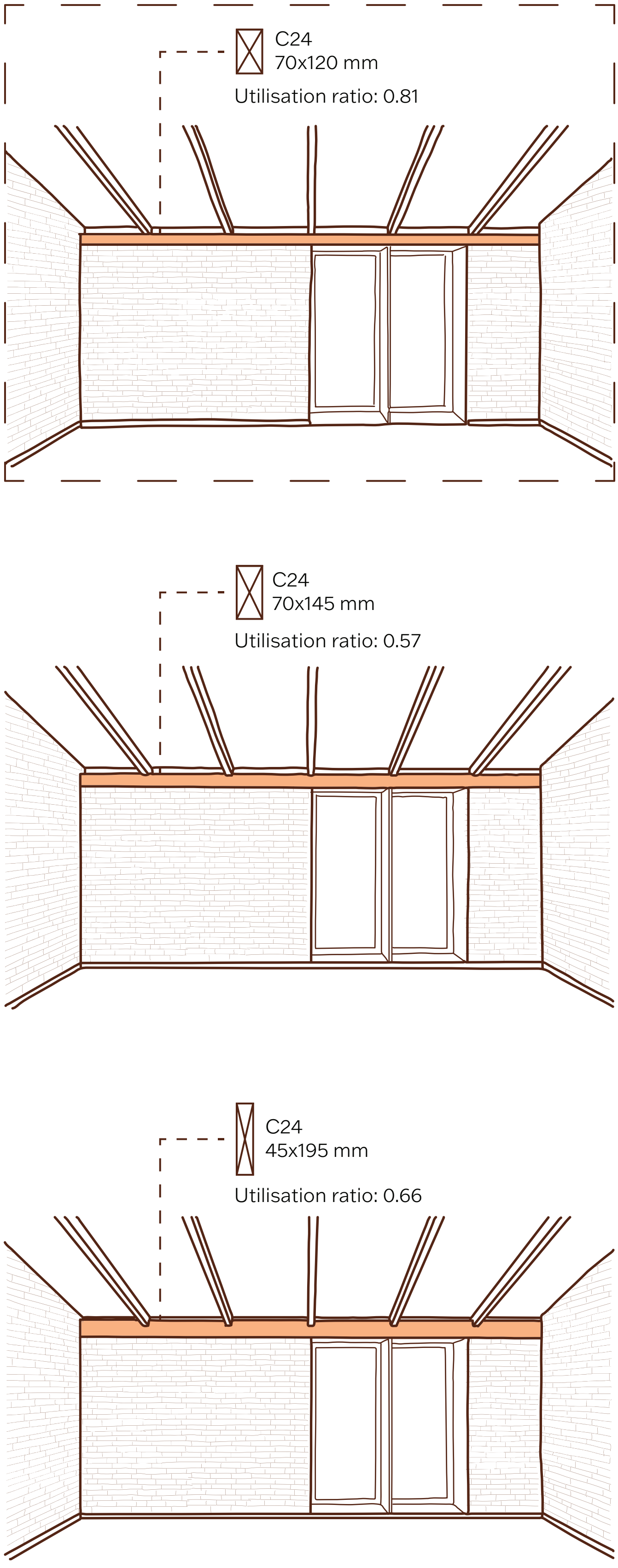


Figure 125. Wall plate dimensions

The largest opening area is 2 m, where two windows are positioned. This configuration occurs multiple times along the social facade. As the rafters distribute the load over a 1-metre area, a length of 3 m is considered.

Figures 125 illustrate the calculated cross sections along with their utilisation ratios. To minimise material use, a cross section of 70x120 mm is chosen. A more detailed discription of the calculation can be found i appendix 10.

interior details

adaptable facade elements

Along the private facade, adaptability is prioritised to accommodate changing needs, such as merging rooms, reducing their size, or relocating windows. To achieve this adaptability, lighter wall panels are introduced adjacent the windows, allowing for easy removal, repositioning, or addition. This approach maintains adaptability while ensuring that the house continues to function as intended, preventing major alterations.

These wall panels will also influence the interior expression of the rooms. Therefore, different integration methods are examined.

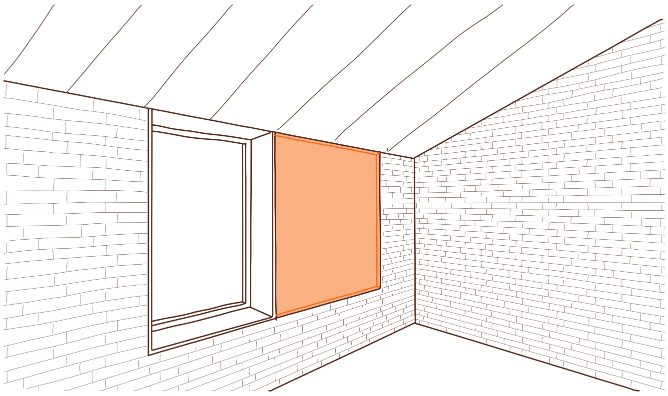


Figure 129. Wall panel, gypsum

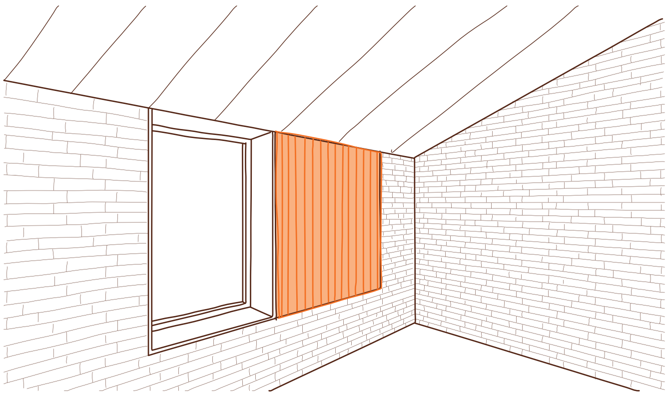


Figure 128. Wall panels, wooden panels

The wall panels create a space adjacent to the windows. To avoid a makeshift gypsum board solution, these panels are designed as recessed wooden panels, emphasising their adaptability. To strengthen the connection between the windows and the wall panel, a frame around the panel is introduced. This detail also allows the panels to function as small shelves.

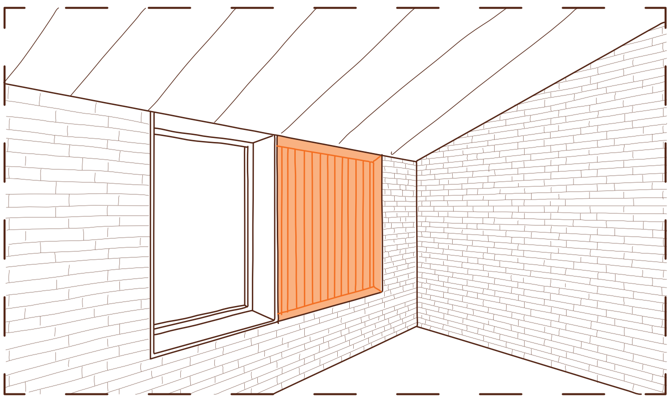


Figure 130. Wall panel, recessed wooden panels

interior details

openings

Along the hallway, multiple openings help define the space and create a visual connection throughout the house, ultimately leading to the gable windows. To maintain this spatial quality, the openings must be dimensioned to avoid appearing too narrow compared to the doors while still clearly marking the hallway and guiding the eye towards the window.

To achieve this, different opening sizes are examined, following modular brick dimensions. An opening width of 1092 mm is chosen, as it differentiates the openings from the door widths without making them overly wide, ensuring they still define the hallway. Additionally, the gable window will have the same width as the openings, allowing the entire window to remain visible.

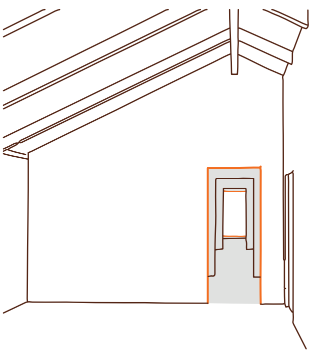


Figure 131. Opening, 852 mm

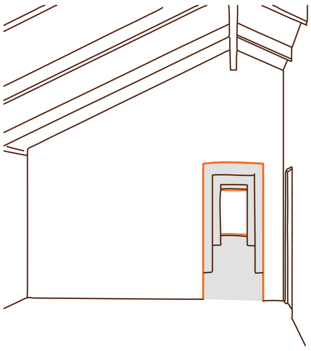


Figure 132. Opening, 972 mm

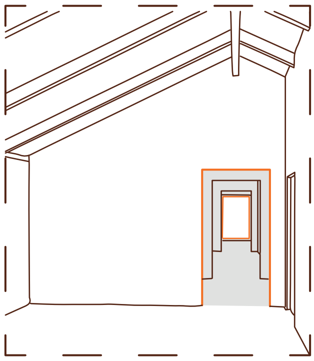


Figure 133. Opening, 1092 mm

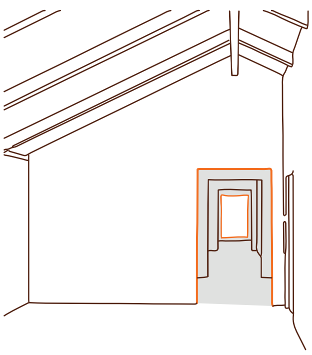


Figure 134. Opening, 1212 mm

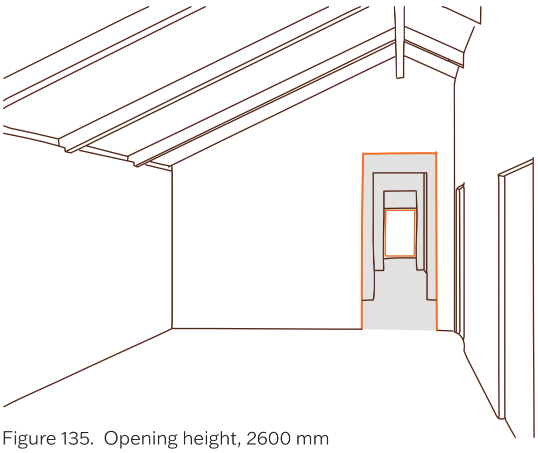


Figure 135. Opening height, 2600 mm

Next, the height of the openings is examined. A height of 2200 mm is chosen, as taller openings clash visually with the doors and make the openings feel disproportionately narrow. Additionally, this height aligns with that of the windows, creating a pleasing sightline through the hallway. Although a floor-to-ceiling opening has aesthetic appeal, it disrupts the hallway's visual flow.

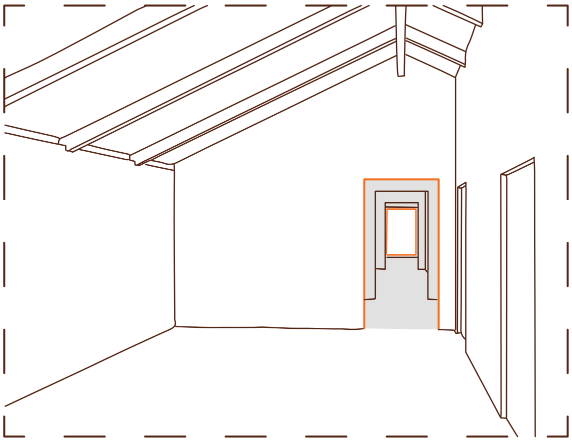


Figure 136. Opening height, 2200 mm

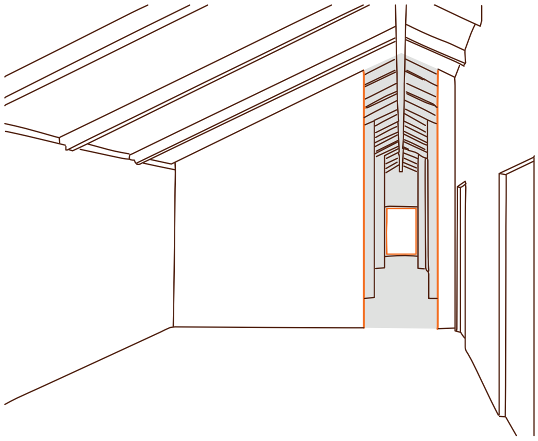


Figure 137. Floor-to-ceiling opening

interior details

lintel

Next, the lintel over these openings is examined. Both a wooden lintel and a brick jack arch are considered.

Although the wooden lintel creates a coherent connection between the hallway openings and the windows in the adjacent facade, it is discarded. This is because the lintel needs to extend beyond the opening on both sides. Due to the proximity of the opening to the wall, the resulting small overhang appears awkward and disproportionate. Thus, the brick jack arch is chosen.

Figure 138. Opening, wooden lintel

Figure 139. Opening, brick jack arch

Finally, the lintel over the gable windows is examined. Once again, the brick jack arch is chosen, as it creates a coherent expression throughout the hallway, unifying all elements.

Figure 140. Gable window, brick jack arch

Figure 141. Gable window, wooden lintel

elevations

facade elements

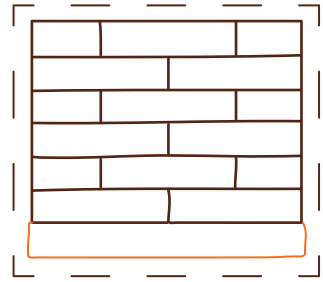


Figure 148. Plinth, extended

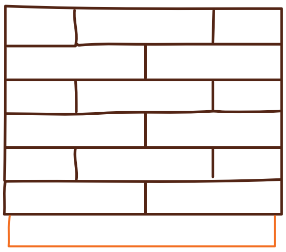


Figure 149. Plinth, aligned

Various facade elements are examined to ensure a cohesive expression, in line with the Manifesto.

Firstly, the connection between the house and the ground is investigated, considering whether the plinth should be visible to emphasise the foundation or concealed to create the impression that the facade sits directly on the ground. To convey a sense of stubbornness, exposing the plinth is preferred, giving the house a more resilient and permanent character. Additionally, the plinth will slightly extend along the facade, emphasising it as a distinct, robust element.

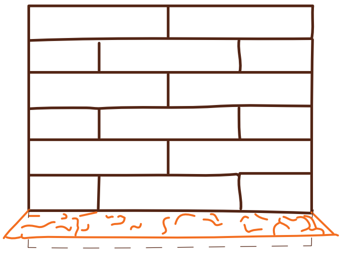


Figure 142. Filled gutter

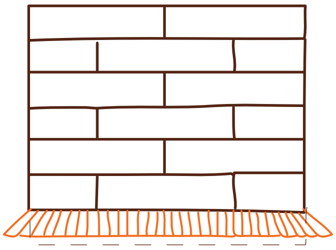


Figure 143. Trench drain

Next, the lintel over the windows is examined. The aim is to expose a continuous wooden lintel along the facade, establishing a connection with the interior continuous wooden wall plate, which also extends above all windows inside.

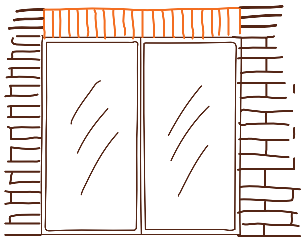


Figure 144. Lintel, jack arch

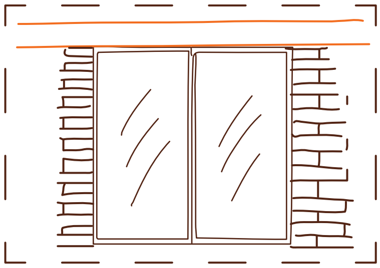


Figure 145. Continuous wood lintel

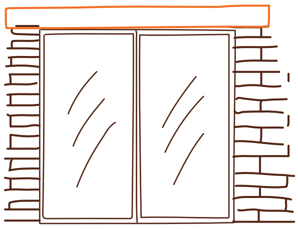


Figure 146. Wooden lintel

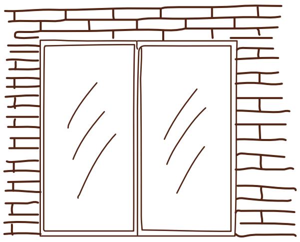


Figure 147. Lintel, hidden

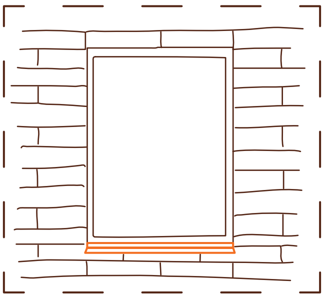


Figure 150. Window sill, metal

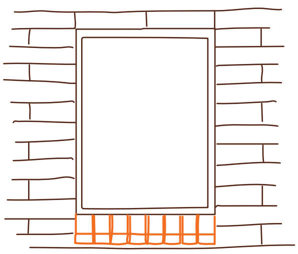


Figure 151. Window sill, brick

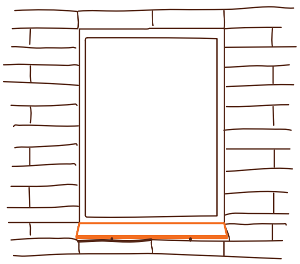


Figure 152. Window sill, tile

Lastly, the window sill is examined. A metal window sill is chosen due to its discreet appearance, helping to avoid cluttering the facade with too many distinct elements..

elevations

facade elements

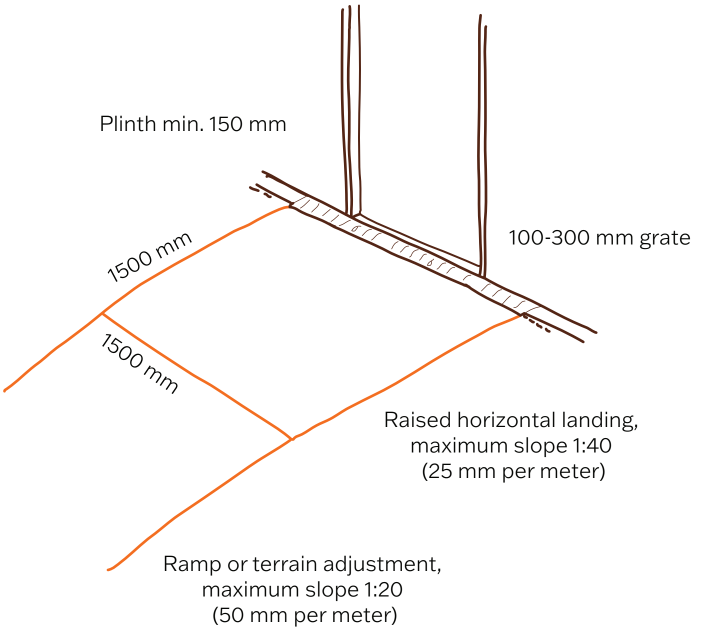


Figure 158. Accessibility requirements

In accordance with regulations, the brick facade must be raised 15 cm above ground level to protect the material and prevent moisture damage. This requires a 15 cm plinth. However, this conflicts with the requirement for barrier-free access. Therefore, a ramp complying with accessibility standards, as illustrated in figure 158, will be introduced. This detail will be further examined along with the front yard design in later pages.

Masonry

While working with the facade, aligning with the modular brick dimensions was a key focus. Therefore, all openings in the facade were dimensioned accordingly (see appendix 11). Next, different masonry bonds were examined. A random bond was chosen as it creates a lively and textured facade, giving the building a distinct character.

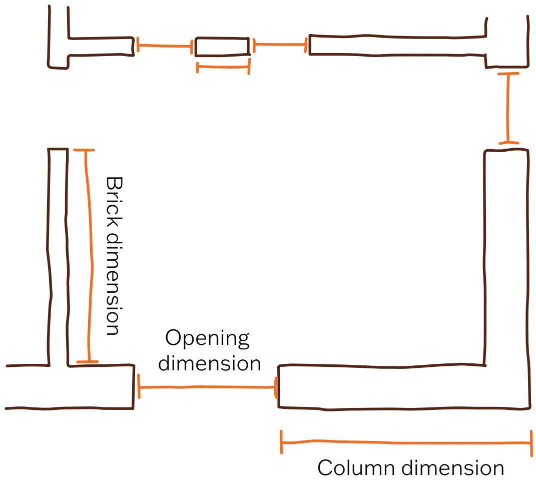


Figure 157. Modular brick dimensions

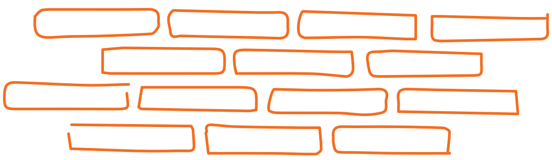


Figure 153. Quarter-brick bond

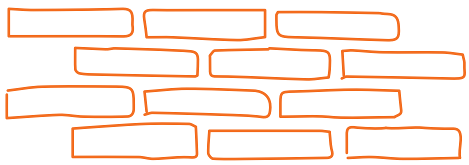


Figure 155. Half-brick bond

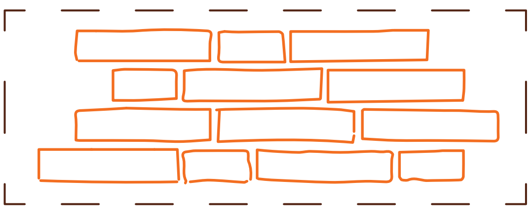


Figure 154. Random bond

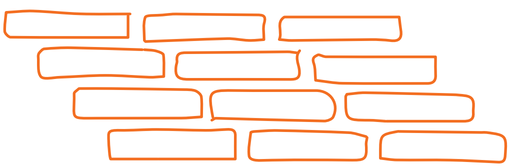


Figure 156. Stretcher bond

elevations

when social zone faces south

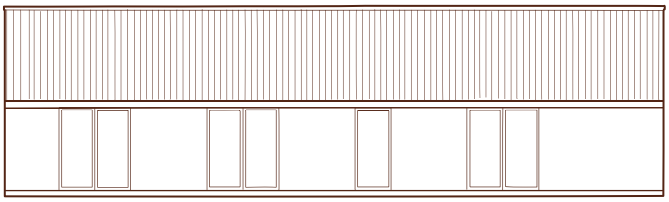
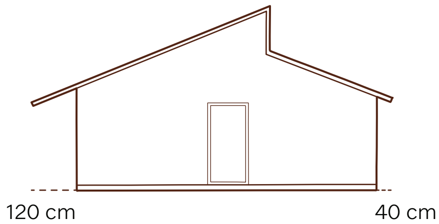


Figure 159. Social facade facing south, 120cm overhang

Following the exploration of the different facade elements, the final facades are being determined. This process incorporates indoor climate simulations, daylight analyses, and energy calculations to ensure an optimal window area. The final placement of the windows has been carefully considered both externally and internally, balancing furnishing opportunities with a rhythmic facade composition that accentuates the different modules.

According to the daylight simulations, the social facade requires a 120 cm overhang to prevent overheating when oriented southward. In contrast, no overhang is required for the northern facade. However, to maintain coherence between the two facades, overhangs of 40 cm and 80 cm are being tested.



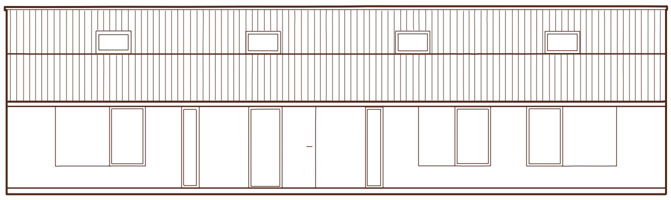
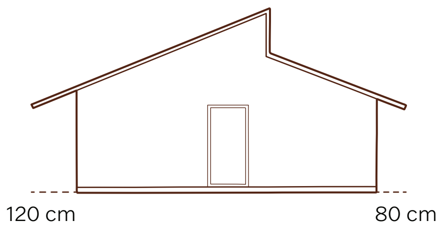


Figure 160. Private facade facing north, 40cm overhang



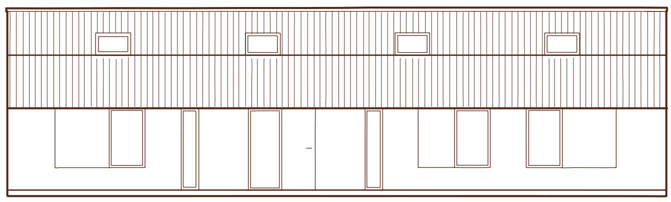


Figure 161. Private facade facing north, 80cm overhang

The 80 cm overhang is chosen as it provides coherence between the northern and southern facades while also creating a well-defined front yard area. This size ensures that the social facade does not appear too heavy compared to the northern facade while still offering practical shading.

elevations

when private zone faces south

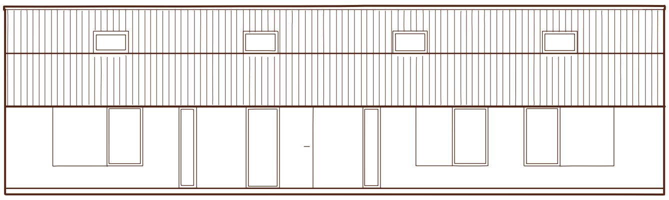
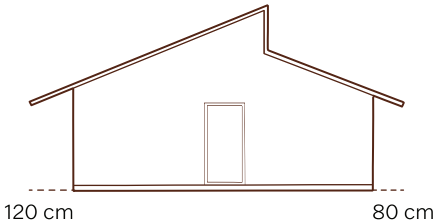


Figure 162. Private facade facing south, 80cm overhang

When the private facade faces south, an 80 cm overhang is required, aligning with the first scenario and still defining the front yard area. Similarly, when considering the social facade, various overhang lengths are examined. Ultimately, the 120 cm overhang is chosen, as it ensures coherence between the two facades while clearly defining the backyard area.



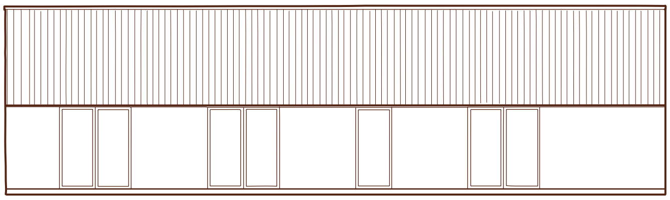
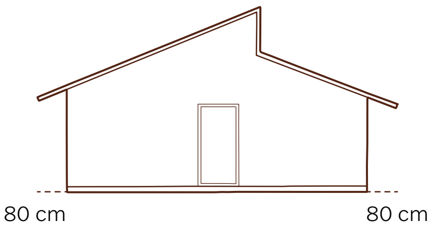


Figure 163. Social facade facing north, 120cm overhang



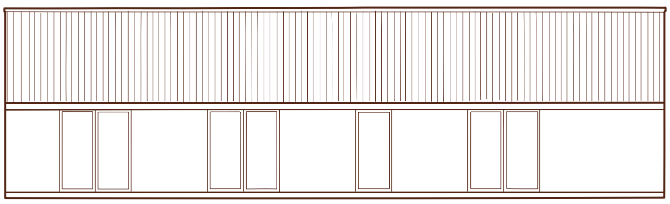
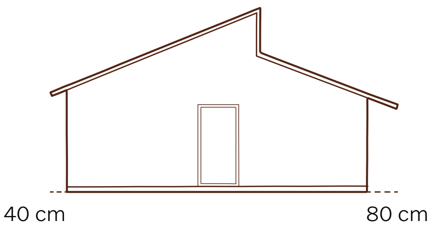


Figure 164. Social facade facing north, 80cm overhang



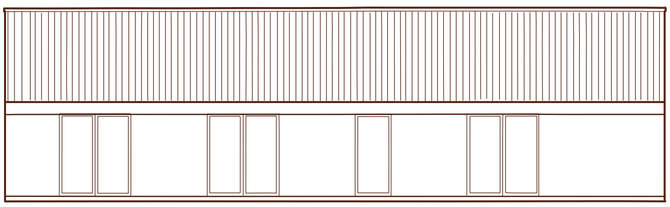


Figure 165. Social facade facing north ,40cm overhang

elevations
Front and backyard

A terrace will be constructed at the back of the house to strengthen the connection between interior and exterior spaces. It will extend into the backyard and play a key role in the social zone, where floor-to-ceiling windows and doors open directly onto it. When opened, these create the impression that the interior continues outward. To support this sense of continuity, the terrace will be built in wood, matching the material of the interior flooring.

Three types of wooden terraces are then explored; one with a thin wooden floor and fully visible support posts, one where the posts are partially visible, and one where they are completely concealed. The version with partially visible posts is chosen, as it gives the terrace a light appearance without appearing so delicate that it feels out of place in relation to the rest of the house.

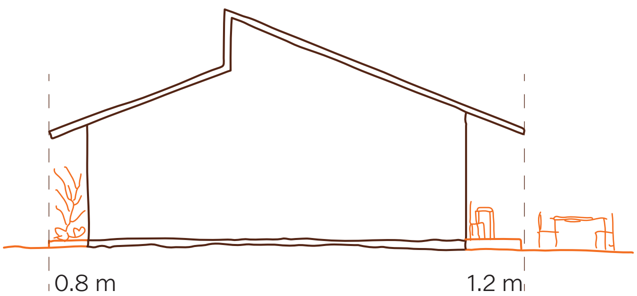


Figure 168. Terraces, section

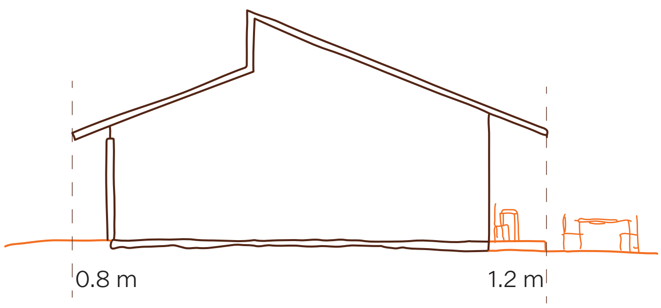


Figure 167. Terraces, section through entrance

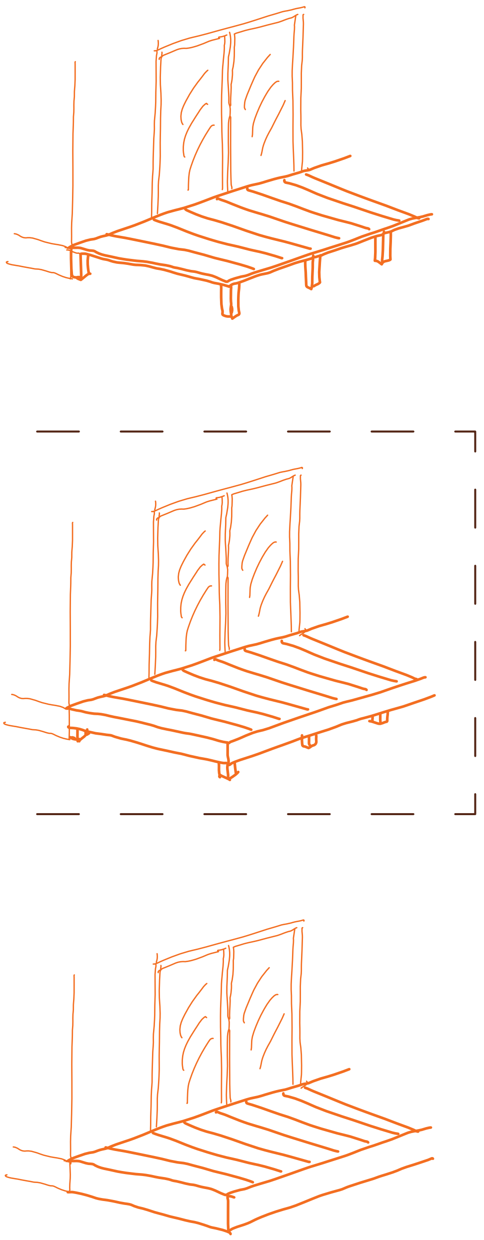


Figure 166. Wooden terraces, iterations

The width of the terrace will align with the length of the roof overhang, creating a clear connection between the two elements and defining the outdoor space as a coherent and unified area. In a similar way, the front yard will feature plant beds that also follow the length of the overhang, reinforcing the overall alignment and contributing to a cohesive expression. A tiled path will be introduced leading to the front door, both to comply with accessibility regulations and to emphasise the entrance.

Though the terrace connecting to the backyard is wide enough to accommodate a coffee table and a couple of chairs, additional paved surface will be needed to host a larger dining table and similar outdoor furniture. To address this, a paved area will be added in front of the terrace, set at ground level to maintain a direct connection with the backyard. This reinforces the continuity between the terrace and the garden.

The appropriate dimensions of this space are then examined to ensure it can comfortably accommodate the necessary garden furniture.

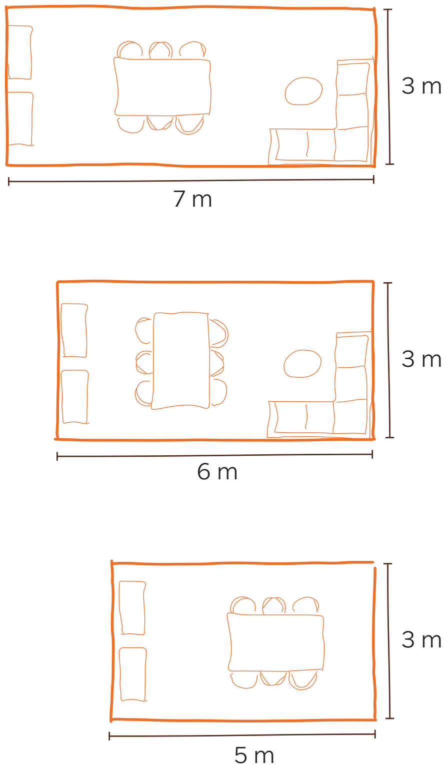


Figure 171. Paved areas, size

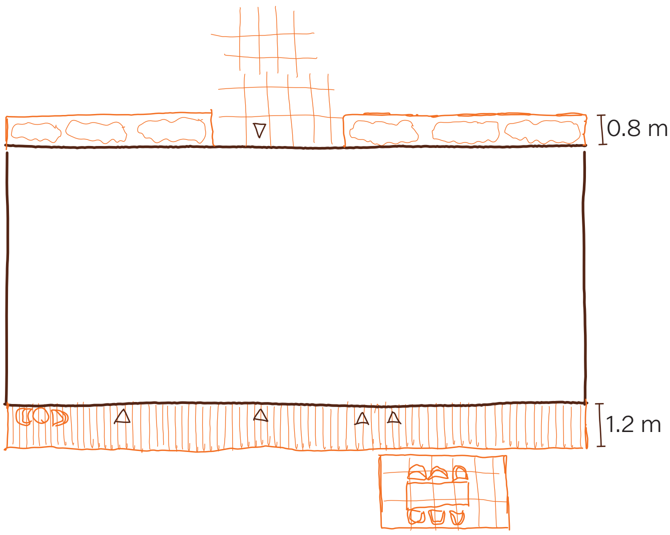


Figure 170. Terraces and pavement, single household

Lastly, the placement of these areas is tested in two scenarios: one where the house is shared between two households, and one where it is used by a single household. In both cases, the paved areas are treated as flexible elements that can be repositioned or extended as needed, allowing them to adapt to the way the house is inhabited.

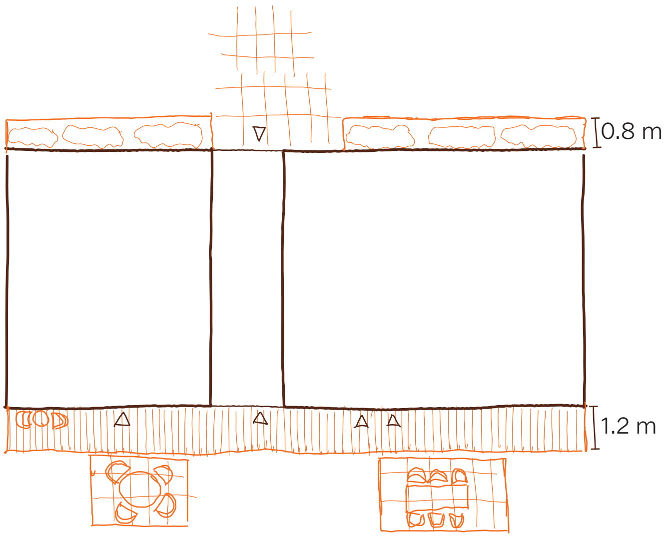


Figure 169. Terraces and pavement, two households

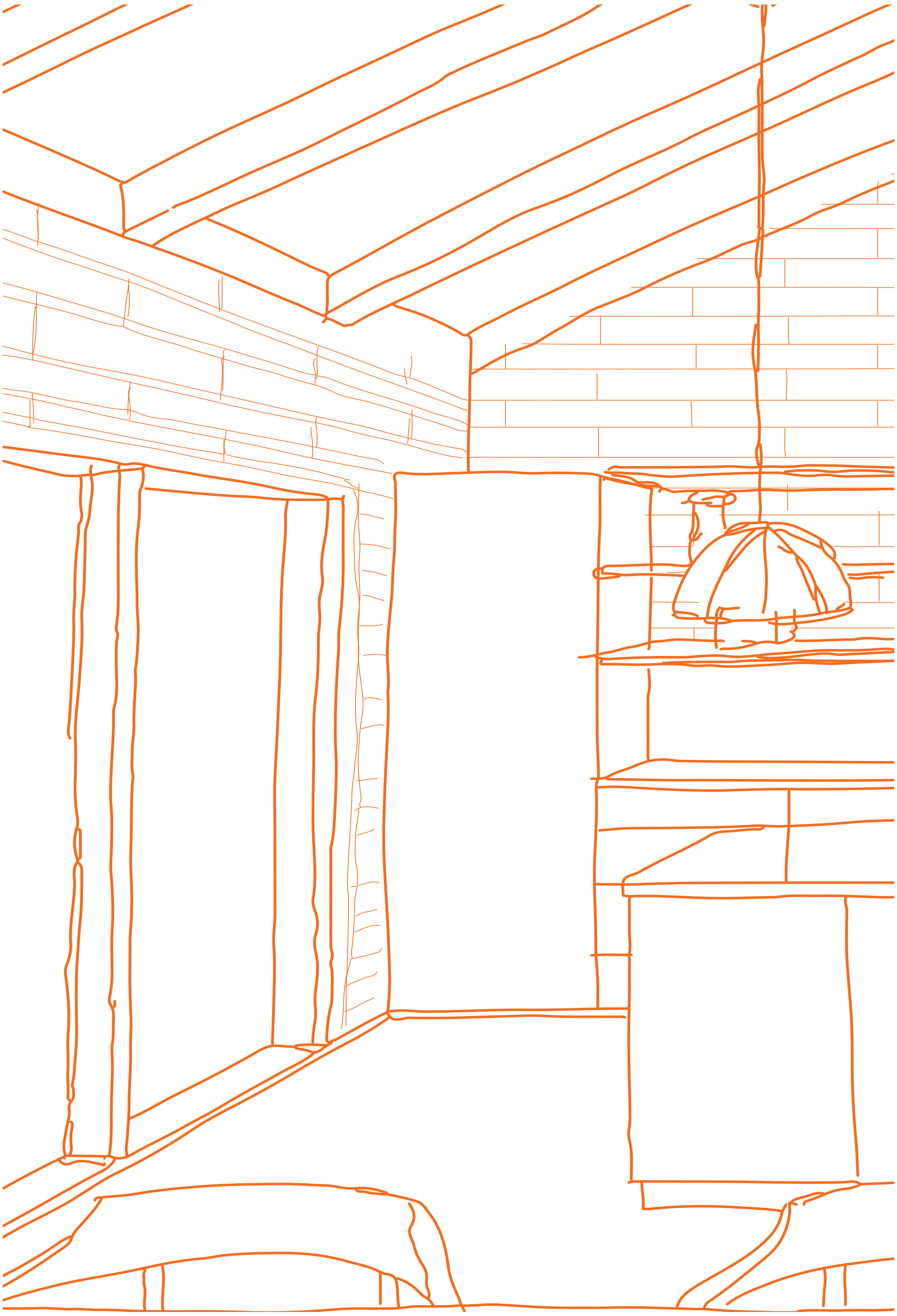


Figure 172. Interior sketch

outro

outro

conclusion

The design proposal introduces The New Paradigm, a renewed building culture for the Danish parcelhus. It is grounded in a sustainable redefinition of the typology and a shift from conventional sustainability efforts towards the principles of affective sustainability. This approach prioritises homes with affective qualities, aligning with contemporary values while remaining adaptable to our changing lives. In doing so, The New Paradigm fosters enduring relevance and long-term value.

Through a critical analysis of contemporary architecture and the challenges it presents, the following problem statement was formulated:

How can lasting architecture be achieved within the context of the Danish parcelhus?

By introducing a vision rooted in spatial generality, shared living, and sensory engagement, the project contributes to a more holistic and humanised building practice. Grounded in Danish building tradition, The New Paradigm does not idealise the past but reinterprets enduring practices for present and future use. The traditional longhouse form has been reimagined into a floor plan that can be divided along its longitudinal axis into distinct zones and further subdivided along the cross axis to allow the home to be shared by two households if needed. Similarly, the classic pitched roof has been rethought, not only to support passive strategies, but to express the internal spatial organisation through its varying heights. Thus, the home prioritises a tectonic clarity that enhances legibility and coherence.

The proposed building culture acknowledges the lasting value that arises not from style, but from resonance, an intuitive understanding of space, material, and meaning. Reflecting this, the home is constructed using materials that carry cultural significance, fostering a sense of familiarity. In doing so, it breathes new life into the Danish tradition of masonry homes, preserving its cultural relevance while adapting it to contemporary needs. It nurtures deeper engagement with buildings, promoting care, maintenance, and adaptation rather than demolition and replacement. This view sees architecture not as disposable, but as a cultural and emotional investment.

Thus, The New Paradigm invites a broader definition of sustainability, one that includes the experiential, the emotional, and the existential, ensuring that the parcelhus continues to hold relevance, identity, and architectural value in a rapidly changing world.

In this way, the problem statement is not only addressed, but The New Paradigm transcends being just a single, enduring home. It emerges as a building culture to be embraced whenever new construction is required. Its carefully detailed spatial concept and lasting qualities are embedded within the design, allowing it to be easily adapted to various plots, contexts, and living situations without losing significance. By responding thoughtfully to the societal challenges facing today's parcelhus model, The New Paradigm establishes itself as the responsible choice for future development.

reflection

This master's thesis began with a personal motivation to investigate how architecture can be designed to be lasting, prompted by frustrations with the quality of contemporary architecture. Throughout the project, the concept of lasting architecture has been further explored, with a particular focus on how it might be achieved. While we believe that the design proposal demonstrates qualities that support lasting architecture, there are nonetheless aspects of both the process and the final design that are worth reflecting upon.

Firstly, although the concept of lasting architecture has been central to the project, it presents significant limitations, particularly in terms of its definition. The absence of clear, quantifiable criteria has made the concept difficult to fully grasp, complicating the task of grounding design decisions in it, and making it even more challenging to evaluate whether the proposal can truly be described as lasting architecture.

In order to make the concept more tangible and measurable, we adopted the framework of affective sustainability; an approach associated with timelessness and, by extension, lasting qualities. While this concept has proven highly beneficial to the project, particularly in helping to define the project's Manifesto and thereby provide a way of quantifying lasting architecture, it also narrowed the scope of exploration. This raises the question of whether alternative paths to lasting architecture may exist that were not considered within the constraints of this framework.

The focus on affective sustainability also led the project in a different direction than initially anticipated. During the early stages, we expected the path to lasting architecture to be primarily through aesthetics. While we believe that affective sustainability is indeed closely connected to aesthetics, it took us some time to fully realise this relationship. As a result, the project's scope was unclear for a significant period and extended in multiple directions.

During this phase, the overall direction of the project was uncertain, oscillating between designing a single house, developing a typological catalogue, or addressing broader questions of building culture. This ambiguity caused frequent shifts between different sites, scales, and especially levels of generality: should the proposal be highly specific or more broadly applicable?

The absence of a clear direction was also evident in the early design process. Although certain elements were developed in detail, the project initially lacked a coherent spatial concept. This gradually emerged as the scope was refined, ultimately centring on two primary strategies for achieving lasting architecture; affective sustainability and a rethinking of the Danish parcelhus.

This refinement led to the formulation of a final Manifesto strategy based on clear spatial logic. In many ways, this helped establish a level of generality in the floor plan, which became central to the architectural concept. However, this generality introduces a tension with the principles of affective sustainability, which emphasise decisions tailored to particular situations. This is evident in the design of several social spaces, which, while adaptable, may not be fully optimised for specific uses. This observation highlights a broader question regarding the coherence between the two strategies: whether the pursuit of typological rethinking and spatial generality can fully align with the sensitivity that affective sustainability demands.

Another point of reflection concerns the strategy related to cultural building practices, the application of which remains somewhat unclear in the final design proposal. At times, such as in the use of brick, this strategy is fully embraced, serving as a central design driver. At other times, however, it appears to be compromised, for instance in the choice of zinc cladding for the roof, which diverges from traditional Danish material practices.

Throughout the process, we aimed to adhere to our Manifesto, even when doing so resulted in tensions or contradictions between strategies. In retrospect, the design could benefit from a more nuanced understanding of how these strategies interact and support one another.

Another aspect that could have strengthened the design is the inclusion of more phenomenological studies, descriptions, and spatial explorations of the different areas within the house. While we believe that the social and private zones exhibit distinct spatial and aesthetic qualities, these differences were primarily guided by intuition rather than grounded in deliberate, sensory or experiential investigations.

As a group, we initially set out to deepen our understanding of technical details, structural performance, and construction methods, with the intention of integrating these as architectural elements within the design. While we believe these aims were largely met, our ambitions may have been overly broad. This led us to explore aspects that, although technically grounded, did not directly support the architectural focus of the project, for example, the decision to design without a vapour barrier. Although meaningful from a constructional perspective, this choice did not clearly contribute to the project's main objective and, in hindsight, may have diverted time and attention from more relevant investigations.

Our decision to work with a small-scale project, such as the parcelhus, aligned with our ambition to focus on architectural detailing. At the same time, this choice was rooted in an awareness of the typology's cultural significance in Denmark. For that reason, we must also question whether the final design diverges too far from the traditional idea of the Danish parcelhus. After all, the parcelhus is defined as a dwelling for a single household, a condition we have not only reinterpreted, but fundamentally diminished. It is therefore debatable whether this departure is too radical, given the typology's cultural importance.

This concern also connects to a final point. One aspect that might be met with criticism is our decision to work with new build, particularly at a time when contemporary discourse increasingly centres on renovation and transformation. However, we believe this choice is not only defensible but necessary. By focusing on the new-build parcelhus, a typology that few architects are willing to take responsibility for, we hope to contribute to a renewed discussion around its value and potential for improvement. In doing so, we aim to challenge the neglect of this culturally and emotionally charged model and encourage greater architectural engagement with it.

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appendix

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illustrations

The New Paradigm

appendix

appendix

appendix

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THESIS TITLE PAGE

This form must be submitted for all theses written in programs under the Study Board of Architecture and Design, and it should be placed at the beginning of the appendix section of the assignment.

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Supervisor´s name: Lars Brorson Fich Jesper Thøger Christensen		
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External collaboration*	**Yes** ☐	**No** ☒
External collaboration partner (name of company/organization):		
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appendix 01

contemporary housing trends

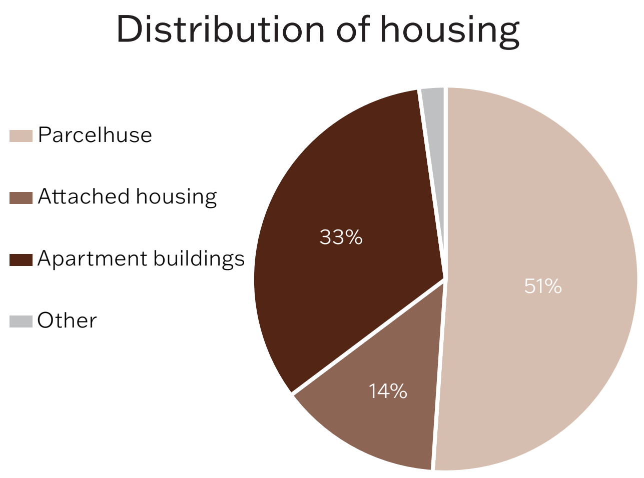


Figure 37. Persons in dwellings by type of housing, www.statistikbanken.dk/BOL201

As of 2024, there are 2.827.496 inhabited houses in Denmark (www.statistikbanken.dk/BOL101), spread across different typologies. 51 percent live in parcelhuse, 33 percent in apartments and 14 percent in attached housing, which account for terraced, semi-detached and linked housing.

The size of homes varies significantly. Parcelhuse have an average area of 155 m², while attached housing average 95 m2. Apartments are generally more compact at 79 m² (www.statistikbanken.dk/BOL106). This distribution has changed significantly over the past century, reflecting shifting lifestyles, urbanization, and evolving architectural trends. In the figure the average area of newly constructed houses is shown depicting the trends specific to the typology during the last century. Here it clearly shows the problematic trend of oversized housing, where the newly constructed parcelhuse exceeded the threshold of 200 m² in 2009.

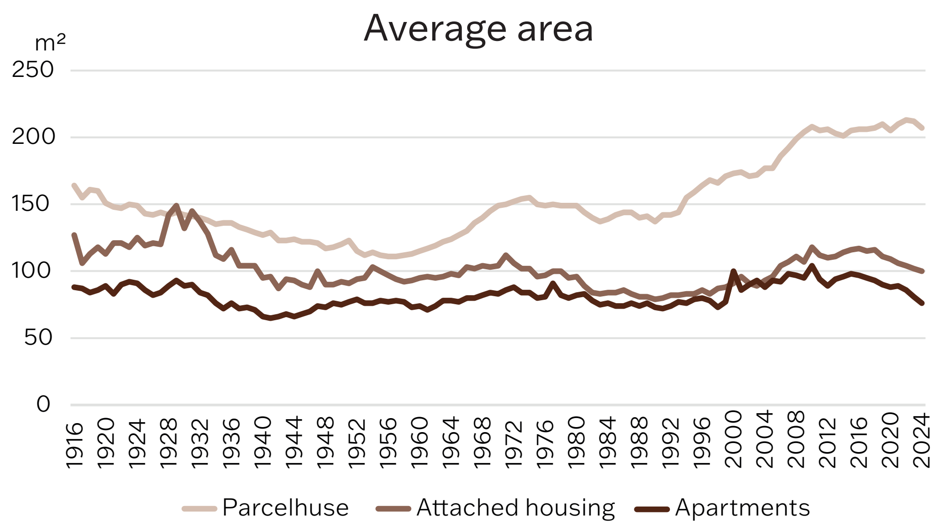
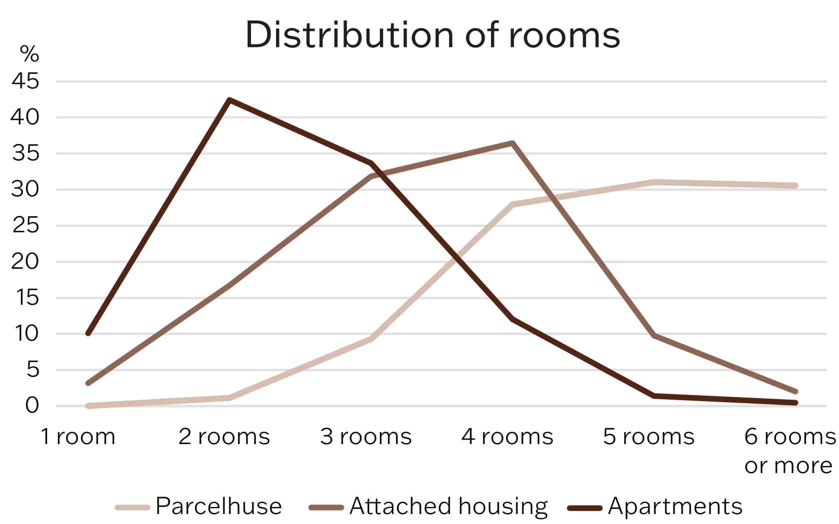


Figure 38. Average area of constructed housing, www.statistikbanken.dk/BYGV06



In relation, the following figure illustrates the number of rooms per house, distributed across the mentioned housing typologies. It is notable that parcelhuse generally have four, five or even six or more rooms. This raises questions when considering that the average household for parcelhuse is only 2.6 people. (www.statistikbanken.dk/BOL106)

Figure 39. Distribution of rooms by housing type, www.statistikbanken.dk/BOL103

Throughout the past century, there have been distinct periods of significantly increased construction activity. This trend is clearly illustrated in the figure which shows overall housing construction over time. Notably, peaks can be observed in the late 1960s, the first half of the 2010s and more recently, beginning around 2020.

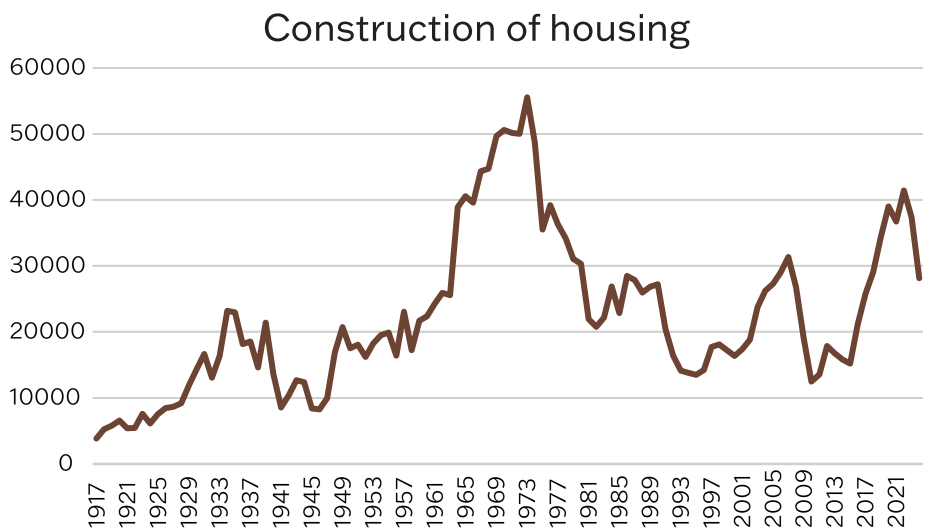


Figure 40. Construction of housing, www.statistikbanken.dk/BYGV05A

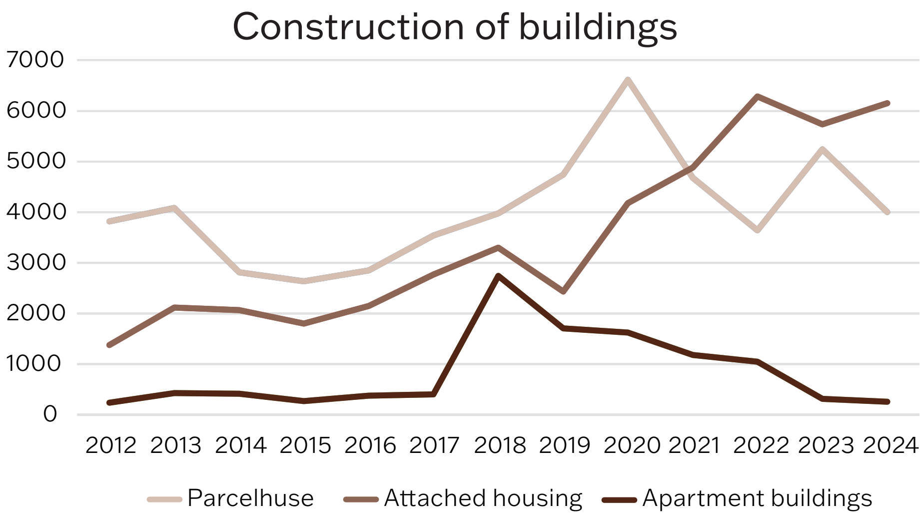


Figure 41. Construction of buildings by housing type, www.statistikbanken.dk/BYGB12

When looking at the building trend during the last decade, it is notable that the construction of parcelhuse and apartment buildings experience fluctuations but show no clear long-term growth. For instance, parcelhuse fluctuates around a relatively stable average of 4000 units per year, with periodic peaks and dips. In contrast, attached housing follows a steady upward trend, suggesting a growing preference or demand for this type of housing.

When comparing this with the following figure, an inconsistency appears regarding apartment housing. One graph shows the number of constructed buildings, while the other reflects the number of constructed units. This highlights a trend where newly built apartment buildings contain significantly more units than before, indicating a shift towards larger, higher-density developments.

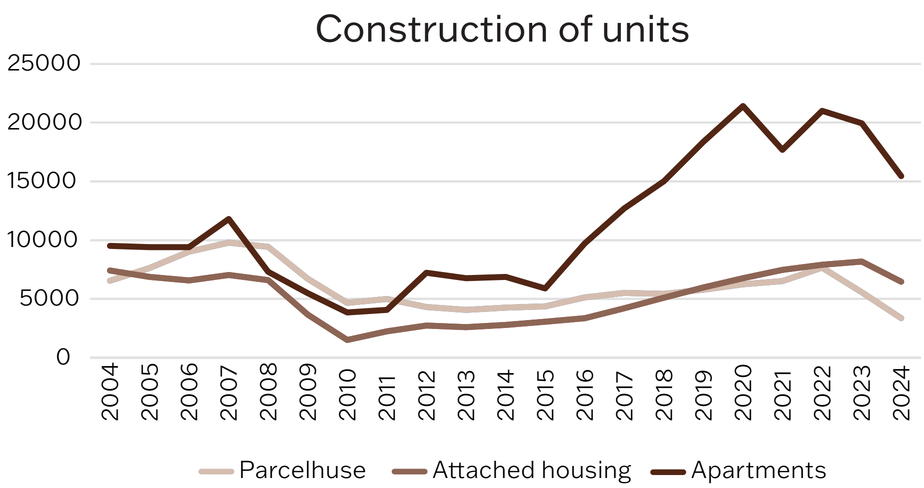


Figure 42. Construction of units by housing type, www.statistikbanken.dk/BYGV05A

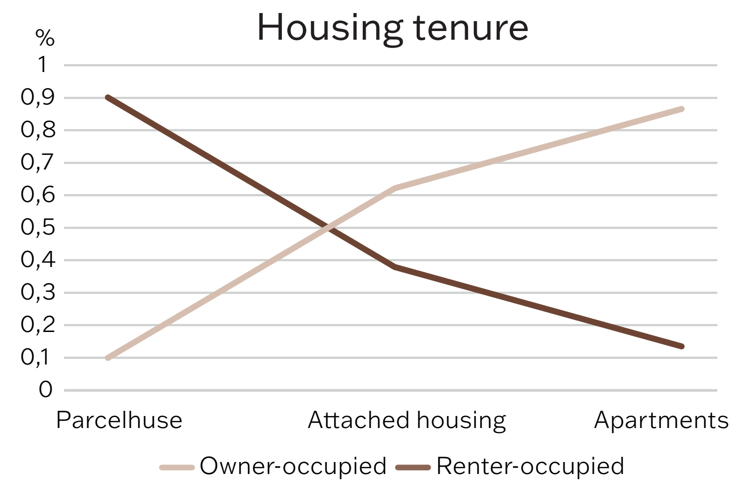


Figure 45. Distribution of housing type by occupancy status, www.statistikbanken.dk/BOL201

The following graph illustrates the relationship between housing typologies and occupancy status. It shows that the majority of people living in apartments are tenants, while parcelhuse are owner-occupied. Attached housing fall in between, with a more balanced mix of owners and renters.

The following graphs show the average number of people per dwelling and the average area per person, respectively. When comparing the two, it is evident that area per person and household size tend to correspond. Notably, parcelhuse provide about 15 m² more space per person than apartments.

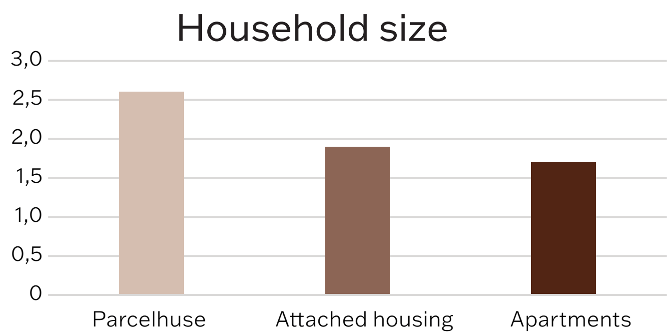


Figure 43. Average people per house by housing type , www.statistikbanken.dk/BOL106

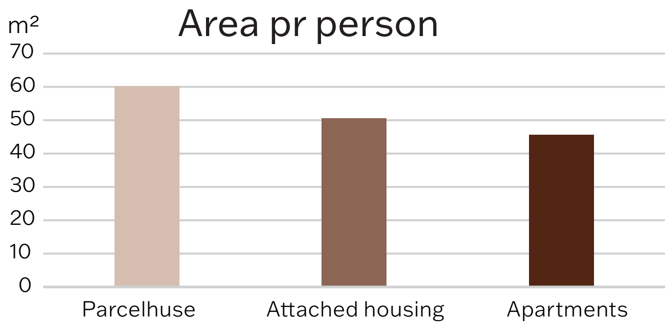


Figure 44. Average area per person by housing type , www.statistikbanken.dk/BOL106

choice of typology

From the statistics there are three notable situations. The growing size of parcelhuse, the growing demand for attached housing, and the higher density development of apartments buildings. Based on contemporary housing development trends and statistics, the following observations can be made regarding the three housing typologies analysed.

Apartments

Apartments are predominantly rented and designed for high-density living. Large-scale apartment developments are often commercially driven, with management and maintenance handled by property owners or cooperations rather than the residents themselves. As a result, tenants have minimal responsibility for the upkeep of their units, limiting their ability to engage in long-term sustainable practices. This limits resident involvement in affective sustainability, where interaction between people and their homes contributes to long-term environmental and social benefits. This also reduces opportunities for personalisation beyond furniture and minor adjustments. However, apartments provide excellent potential for new forms of communal living, fostering shared spaces and social interaction.

Attached housing

Attached housing is split between rental and ownership models, with only about 14% of the population residing in this type of housing. Many developments fall under public housing as can be seen in the following illustration, meaning they are commercially managed with maintenance responsibilities handled by property owners or cooperatives rather than individual residents.
However, attached housing offers a middle ground between apartments and parcelhuse, making it more adaptable to new lifestyles and communities. Some developments explore shared spaces and communal living, though these concepts are catered towards a limited user group. Additionally, compared to apartments, attached housing allows for slightly more adaptable housing solutions, as some units offer flexible layouts or expansion possibilities.

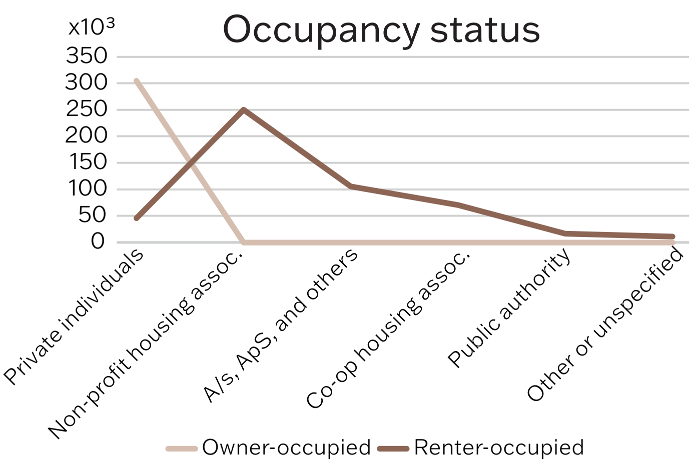


Figure 46. Occupancy status by ownership for attached housing, www.statistikbanken.dk/BOL201

Parcelhuse

Parcelhuse are typically owner-occupied, placing maintenance and upkeep in the hands of residents. This allows for greater personalisation and adaptability but also leads to challenges with excessive renovations and resource consumption. A key issue in the green transition is the prevalence of large homes exceeding 200 m², contributing to high energy use. Despite advancements in energy-efficient technology, overall consumption remains high due to the increasing number of appliances and devices, which offset efficiency gains. (Ekspertgruppen for National Arkitekturpolitik, 2024)

Conclusion

Based on the observations, the parcelhus holds the most potential for future development. Its owner-occupied model allows for greater personalisation, adaptability, and long-term sustainable practices. While challenges such as excessive energy consumption and over-renovation exist, these can be addressed through increased focus on affective sustainability.

appendix 02

room programme

As the design proposal does not present a singular solution but instead reflects a building culture, the room programme does not define a specific house. Rather, it sets out the spatial and functional limits that are permitted within each room.

Room type	Zone	Associations	Height m	Orientation
Bedroom	Private	Adaptable spaces, intimate atmosphere	2.2 > 3.2	Preferably north/ east
Bathroom				Preferably north
Office				Preferably north
Open plan kitchen	Social	Open and tactile atmosphere	2.4 > 4.1	Preferably south/ west
Livingroom				Preferably south/ west
Utility room	Shared	Practical function	2.4 > 4.1	Preferably south
Entrance	Shared	Practical function	2.2 > 3.2	Preferably north

Ventilation type	**Connections**	**Area** Netto, m²	**Amount** Per module	**Functional variations**
One sided natural ventilation	N/A	9.9 m²	1 - 2	N/A
Mechanical exhaust One sided natural ventilation	N/A	4.8 m²	1	N/A
One sided natural ventilation	N/A	7.3 m²	None - 1	Childrens bedroom
Stack ventilation and mechanical exhaust	Connected to terrace	23.9-40 m²	1	kitchen and livingroom
Stack ventilation	Connected to terrace	15.7-40 m²	1	kitchen and livingroom
Stack ventilation	Connected to terrace	6.6 m²	1	N/A
Stack ventilation	Front yard	6.6 m²	1	N/A

appendix 03
øster sundby vej, site analysis

Before working on the general plan, the design process focused on the site at Øster Sundby Vej. This appendix will present the site analyses conducted during this phase.

These analyses have been useful in understanding the characteristics and context of typical Danish suburban areas. Additionally, during site visits, surrounding parcelhuse were studied, helping us gain an understanding of various details that might also be relevant for our design.

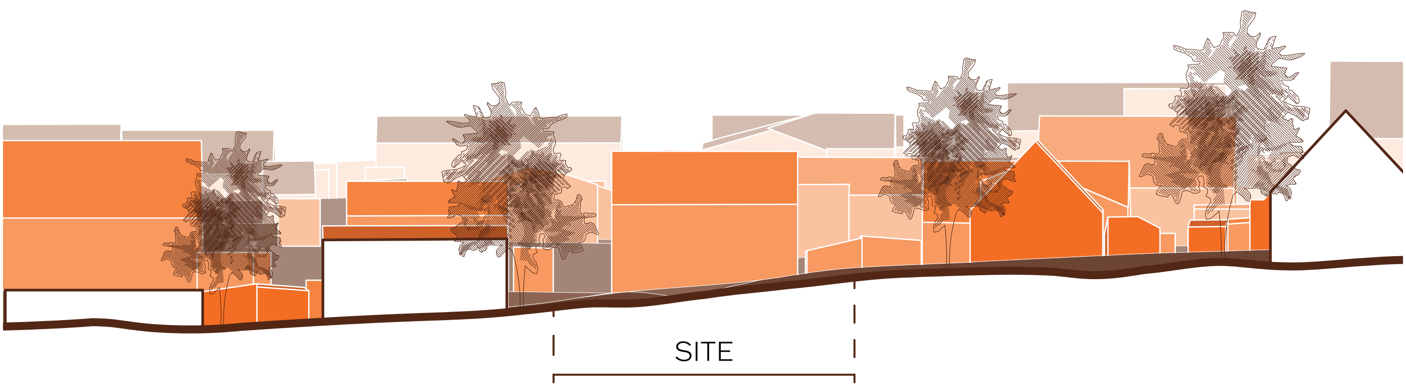


Figure 47. Øster Sundby Vej, section, 1:500

Figure 48. Øster Sundby Vej, site plan, 1:500

<1910 | 1910-1930 | 1930-1950 | 1950-1970 | 1970-1990 | 1990<

Figure 49. Øster Sundby Vej, contextual developments , 1:2000

Development and size

Examining the surrounding houses and their construction years has provided valuable insights into the evolution of the Danish parcelhus tradition. Additionally, analysing these aspects alongside house sizes has reinforced our understanding of the contemporary trend towards oversizing.

500-600m² | 600-700m² | 700-800m² | 800-900m² | 900-1000m² | 1000-1100m²

Figure 50. Øster Sundby Vej, plot sizes and ratios, 1:2000

Plot sizes and plot ratios

Studying existing plot sizes along with their plot ratio has confirmed the belief that contemporary parcelhus plots are underutilized. There is significant potential for densification, as very few plots approach the maximum allowed plot ratio of 30%.

Figure 51. Øster Sundby Vej, bluespot and topography, 1:2000

Bluespot and topography

In the case of Øster Sundby Vej, the topography varies significantly across the site, making us aware of the implications and opportunities such terrain can offer. These variations have proven useful during the design process, as they prompted us to explore different strategies for working with topography, ensuring that the design responds effectively to the site's natural conditions.

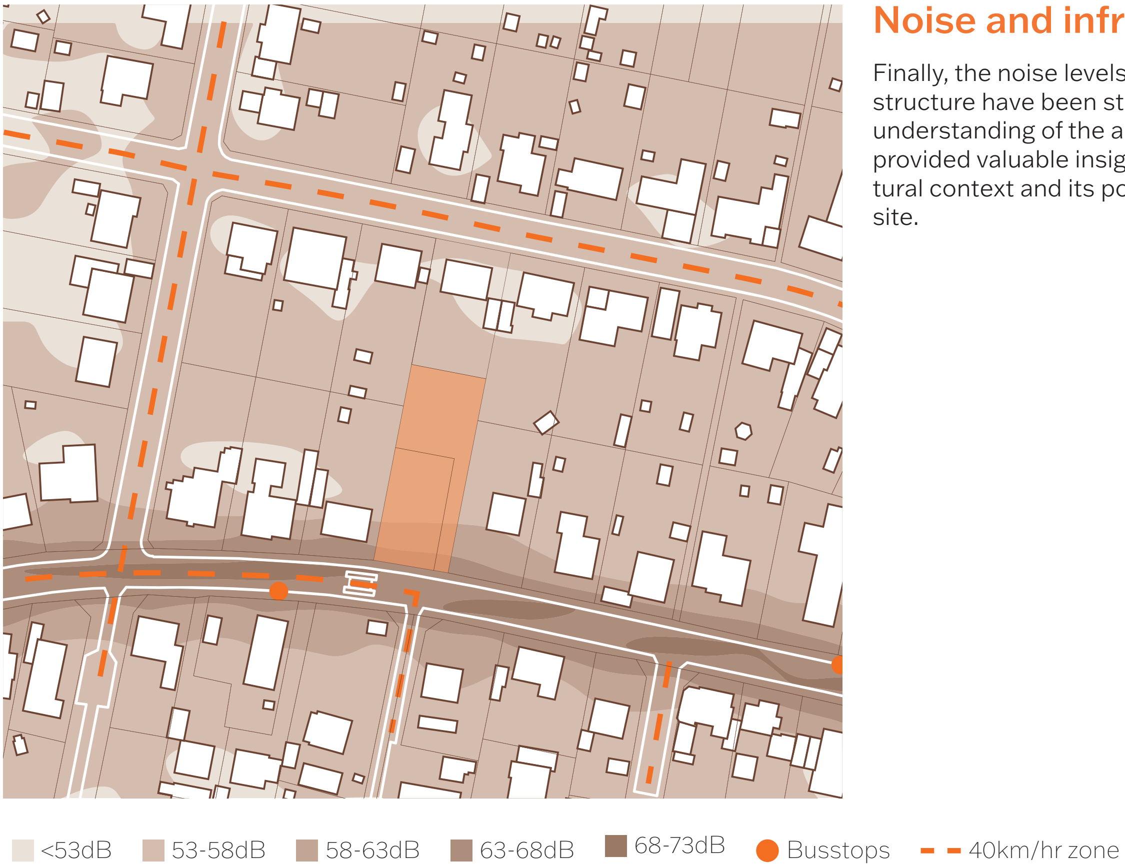


Figure 52. Øster Sundby Vej, noise and infrastructure, 1:2000

Noise and infrastructure

Finally, the noise levels and surrounding infrastructure have been studied to gain a better understanding of the area. This analysis has provided valuable insights into the infrastructural context and its potential impact on the site.

øster sundby vej, site analysis

Next, studying the surrounding houses has provided insights into common architectural details in parcelhuse and their impact on the overall expression.

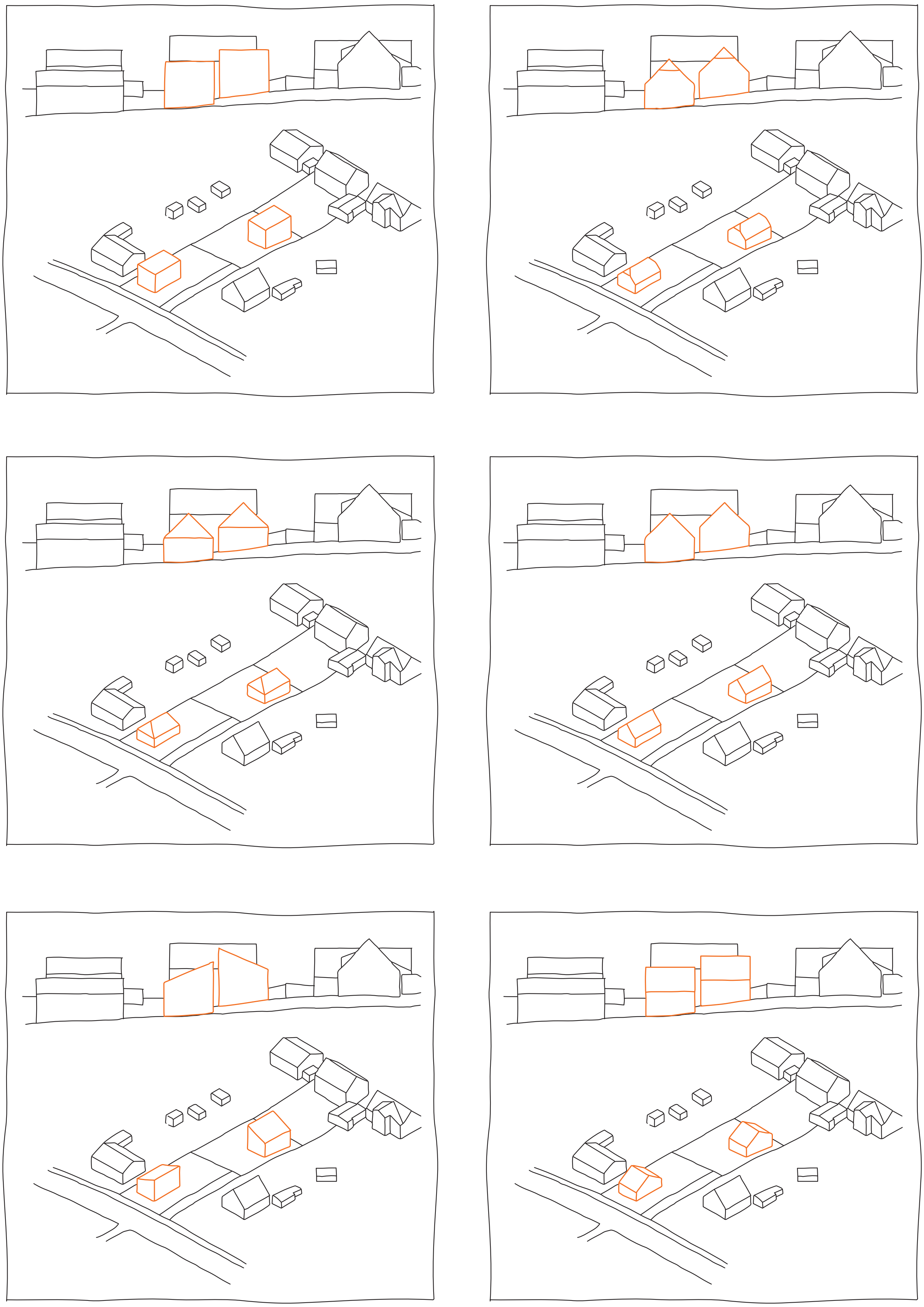
Finally, a phenomenological analysis of the site has highlighted key considerations for design, including levels of privacy, views, and other contextual factors.

Figure 53. Øster Sundby Vej, contextual details

Figure 54. Øster Sundby Vej, site registration

appendix 04

volume study



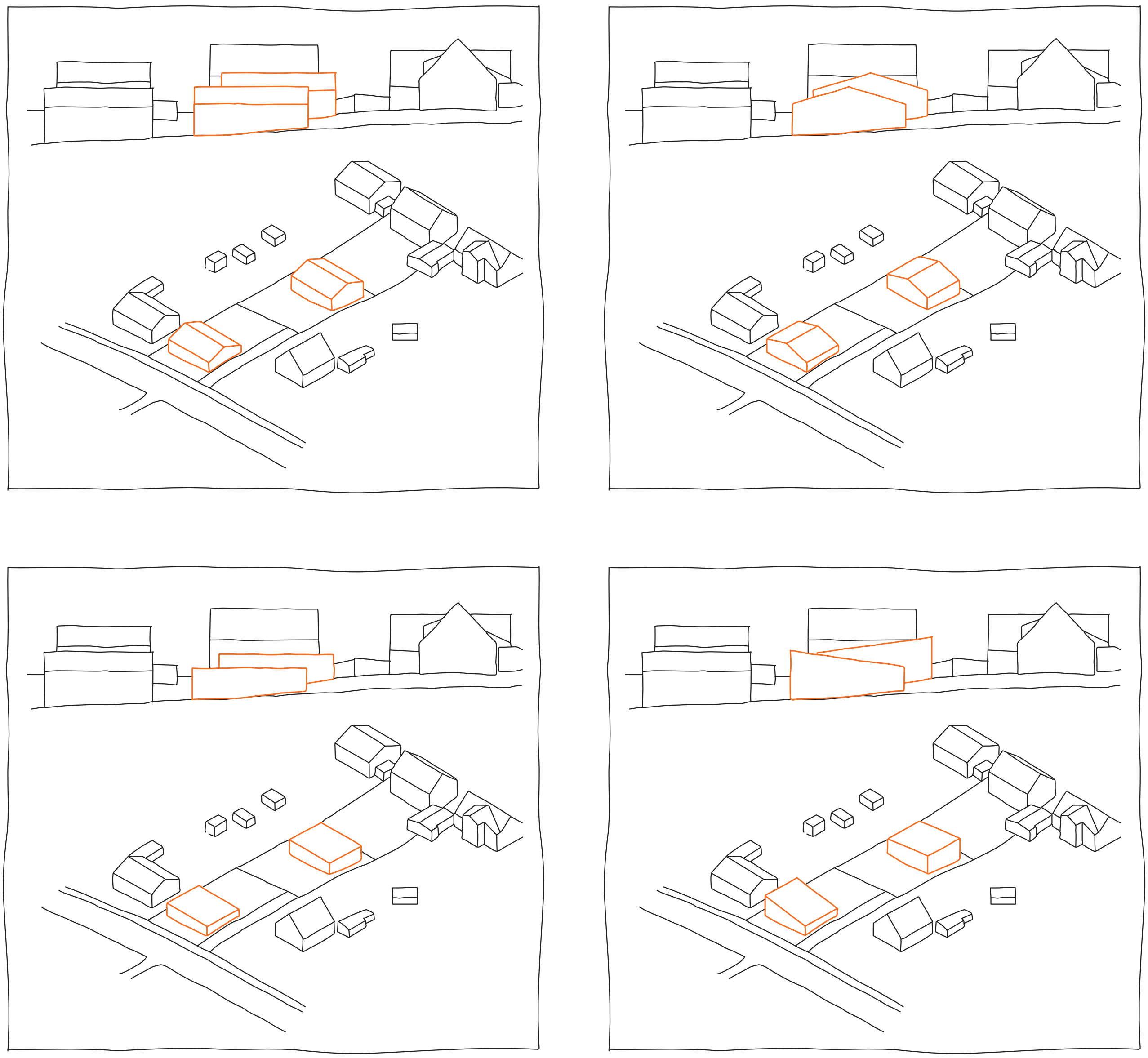


Figure 55. Øster Sundby Vej, volume study

To gain a general understanding of how the volume could be distributed across the sites, as well as how the building form and roof shape would relate to the surrounding context, several volumetric studies were carried out.

The following illustrates the general volume of two scenarios: one featuring a single-storey, 150 m² house on each cadastre, and the other featuring a two-storey house of the same total area.

Furthermore, it was determined that, in relation to the surrounding context, a gable roof was the most appropriate choice for the site. This prompted further consideration of the building orientation in relation to the roof shape, overall form, the practical use of front and back gardens, and the placement of the entrance, as well as more detailed explorations into the specific shape of the roof.

appendix 05

bedre byggeskik

An in-depth study of the building culture known as Bedre Byggeskik has been conducted to understand why this architectural approach remains attractive to this day.

These houses feature finely crafted brickwork with both inner and outer load-bearing walls, making the facade robust and difficult to alter. Built with lime mortar, the bricks are the strongest element, allowing for easy maintenance by replacing damaged mortar.

The foundation is typically plastered concrete, tarred black to protect against wear and provide a grounded, solid appearance (Brüel et al., 2011). The buildings often have two stories with dormers or skylights that support natural ventilation. Rooms usually have windows on two sides, ensuring good daylight and cross-ventilation.

Proportions are carefully considered throughout. Floorboards are sized to match room dimensions, wider planks in larger spaces and narrower in smaller ones, creating balanced interiors. Wooden floors add warmth, while detailed paneling introduces depth and character in contrast to the smooth walls and ceilings.

Underneath is a more in depth analysis of elements that are characteristic of bedre byggeskik houses.

Figure 56. Bedre byggeskik details, photos by authors

The Brickwork

Bedre byggeskik houses are built with soft-molded bricks (blødstrøgne), which characteristically have a slightly rustic appearance with an iconic slop edge that forms when the wet clay releases from the mold. The brickwork is laid with lime mortar, which is resistant to moisture. Additionally, lime mortar can be scraped out and maintained, as the mortar is the weakest link while the brick remains the strongest. (Egernsund Wienerberger A/S, 2022) (Redaktionen, 2025)

Facade Details

Bedre byggegskik houses feature distinct details that showcase their structural principles. These houses have brick lintels above facade openings, supporting the brickwork above window openings. The brick lintels can consist of either transverse bricks or have a convex shape to distribute forces effectively.

Furthermore, the houses are designed with cornices, including both ear cornices (øregesims) and dentil cornices (tandstensgesims). The ear cornice does not extend across the gable but is interrupted slightly within the gable. The dentil cornice is characteristic of the period and serves to protect the underlying brickwork from moisture. It is positioned beneath the roof overhang. (Slks.dk, 2025) (Dannebrog ApS, 2023)

Facade openings

The facade openings are fitted with finely detailed carpenter-crafted doors or windows. During this period, the front door was considered the most important element of the facade, as it is through this entrance that one first encounters the house. These doors are often beautifully designed and may feature glass panels or decorative carvings. (Historiske Huse, 2021)

The Roof

The roof is most often designed as a half-hipped or fully hipped roof with traditional Danish pantiles, with particular attention to proportions. Additionally, bedre byggeskik houses are often two-story structures, and the incorporation of front dormers enhances the sense of having gabled houses, though true gables were not feasible due to weather conditions. (Søren Vadstrup, 2007)

appendix 06
direct sunhours

The following simulations show the number of direct sunlight hours that will be present on the two sites depending on the placement of the homes. The sun simulation has been done to ensure that there is enough sun in the backyard. Other than the direct sunlight the placement of the homes is also influenced by the placement of the entrance and the wish for separate frontyard and backyard to evoke the traditional parcelhus experience.

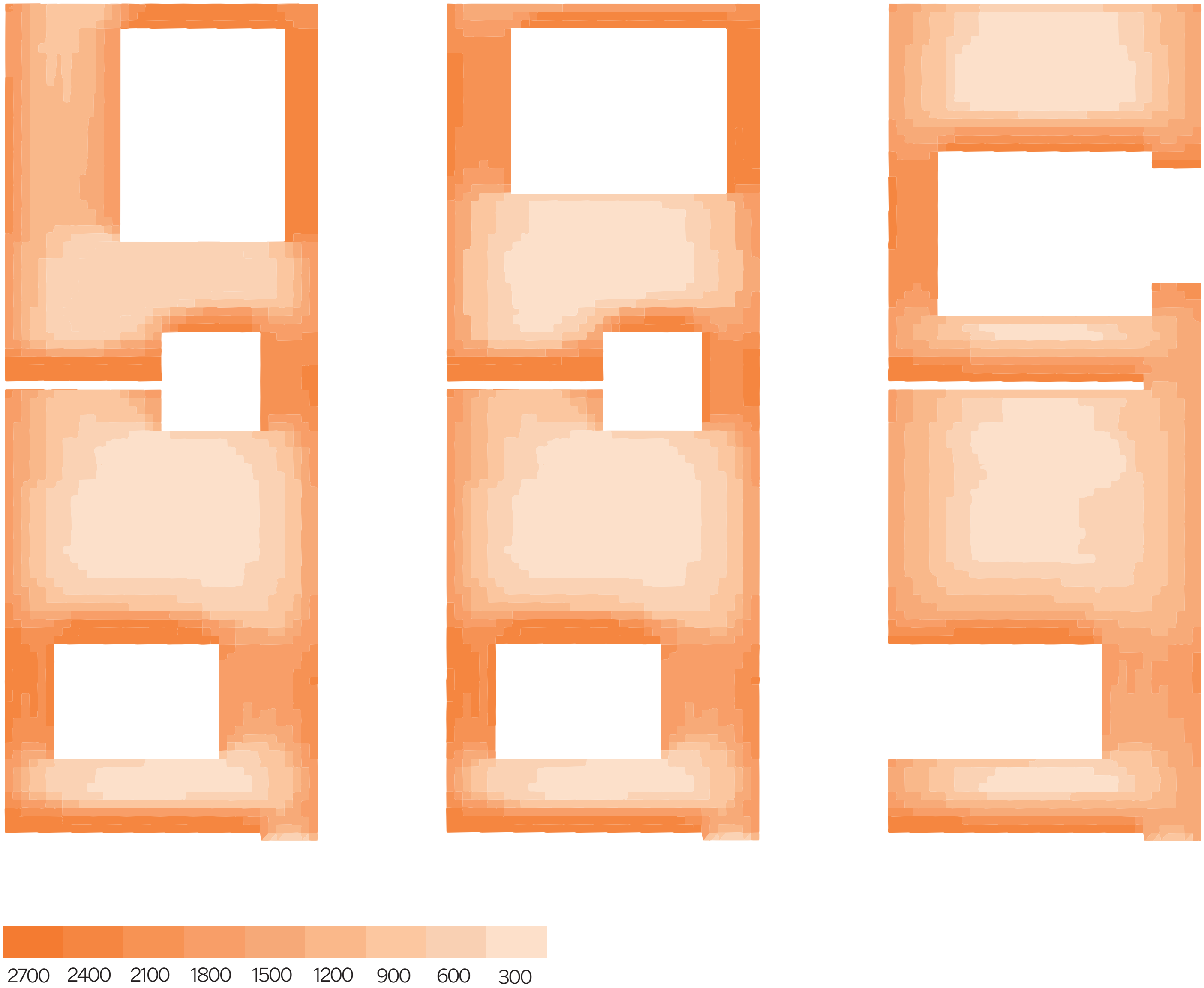


Figure 57. Direct sun hours from 20 march - 20 september in hours

appendix 07

roof shape

The roof structure underwent numerous iterations throughout the design process before the final decision to use a clerestory roof. The following appendix chronologically outlines the different variations and considerations.

Very early on in the process, the decision to work with a gable roof was made, as it best fitted the site at Øster Sundby Vej, and aligned with Danish traditions.

To investigate the pitch, various scenarios were analysed. We had a general ambition to create lofted ceilings, resulting in varying room heights throughout the house.

Through sectional studies and perspective views, it became clear that it made the most sense for the northern half of the house to have higher ceilings, as these spaces were generally larger, and housed both the kitchen-dining area and the flexible livingroom/bedroom.

Additionally, we appreciated how shifting the roof ridge helped to better articulate and emphasise the overall roof form when experienced indoors, and therefore scenario 01 was chosen.

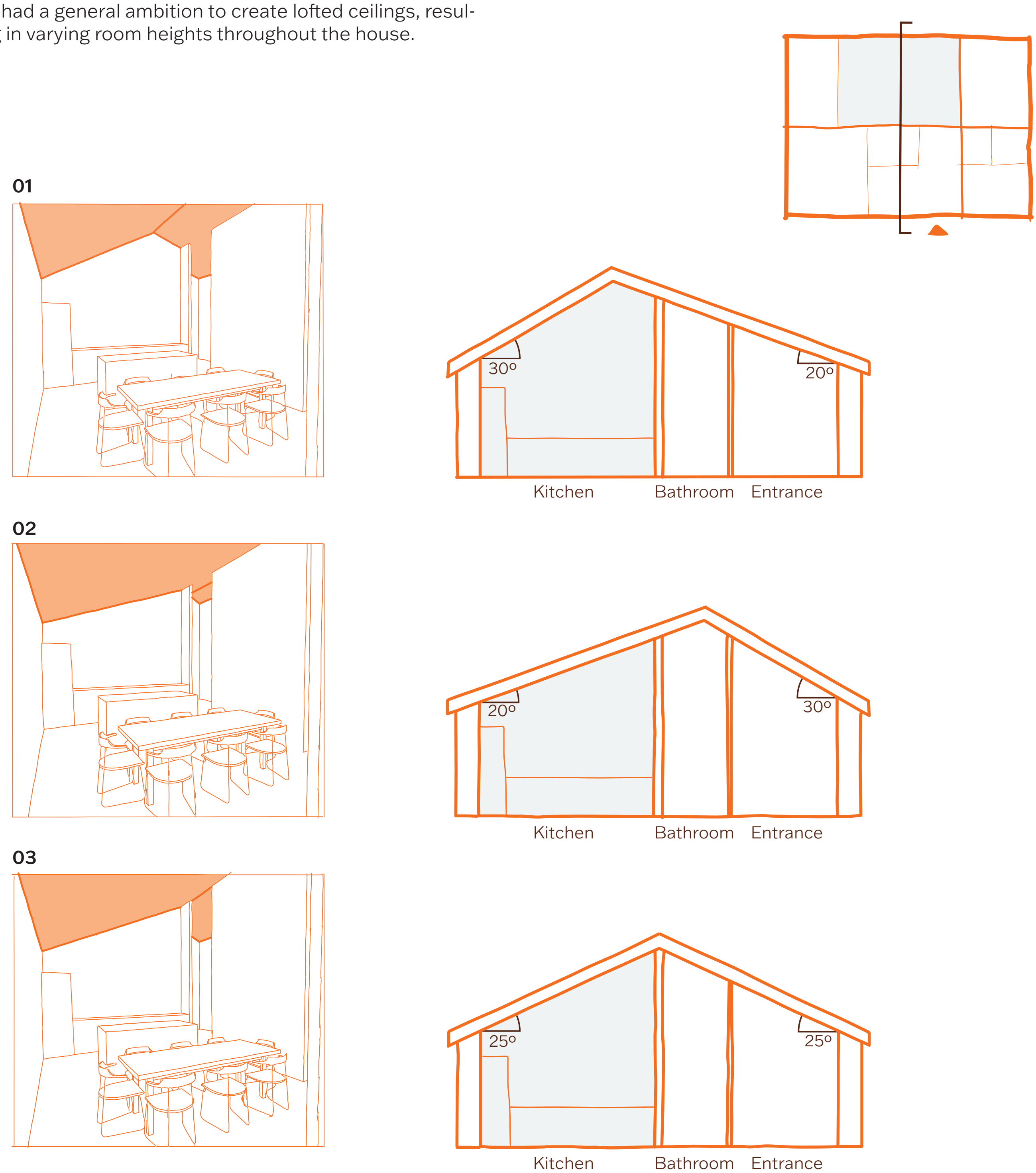


Figure 58. Roof shape explorations

However, this approach proved impractical during rafter dimensioning. Due to the asymmetrical shape, the rafters would vary in length, requiring additional support to maintain structural integrity without altering the cross-section (see figure 23).

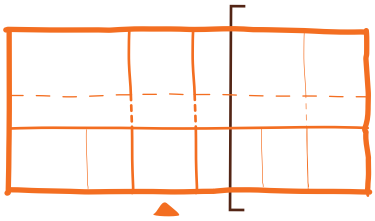


Figure 60. Floor plan general

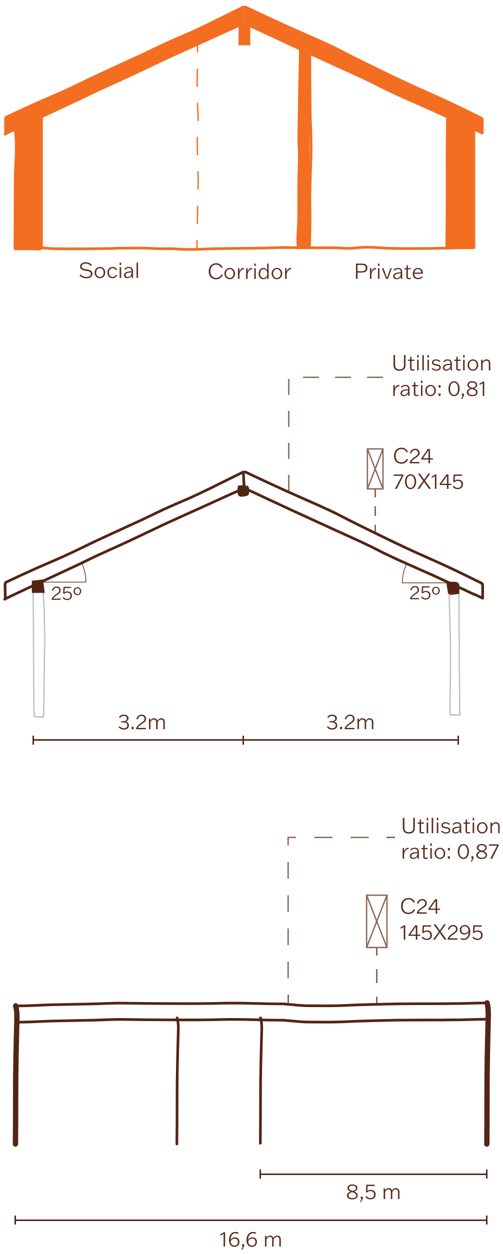


Figure 61. Beam rafter dimensioning, floor plan general

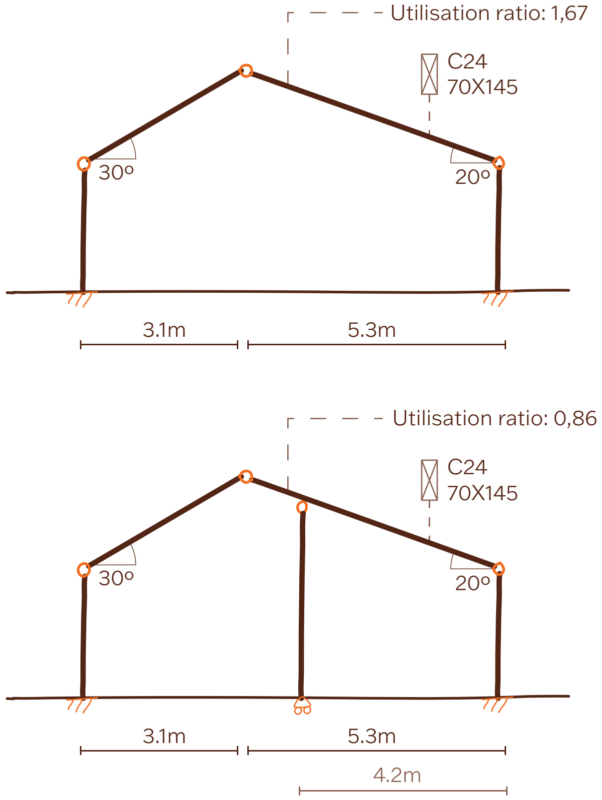


Figure 59. Beam rafter, dimensioning

After updating the floor plan to a more general version (see figure 24), a similar investigation was conducted. In this case, the same architectural expression could be achieved with a typical gable roof, as the social spaces and the centrally located corridor merge. This configuration allowed for straightforward rafter dimensioning without requiring additional support (see figure 25).

However, when dimensioning the ridge beam, a challenge arises due to the 8.5-meter unsupported span. To maintain structural integrity without adding extra supports, the ridge beam must have a cross section of 145 × 295 mm.

Then, a scissor truss was considered due to its structural integrity. In this configuration, the bottom chords serve as the visible structural elements, while the posts support the insulation, and the rafters accommodate the overhang (see figure 26). An additional advantage of the scissor truss is the ability to differentiate between the roof slope and the ceiling slope, allowing greater flexibility in room height.

However, the scissor truss proved impractical when introducing a skylight, and as a result, the clerestory roof was chosen.

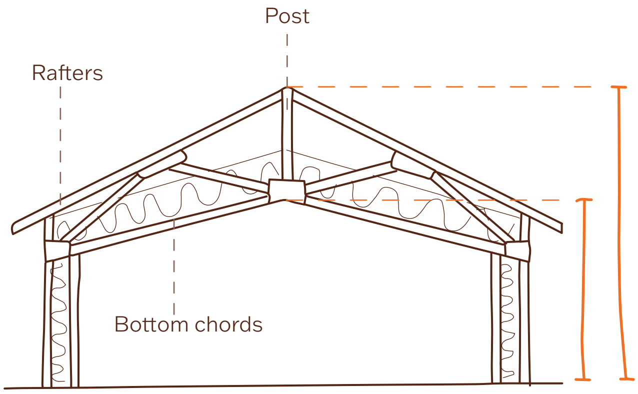


Figure 62. Scissor truss, dimensioning

appendix 08
indoor climate simulations

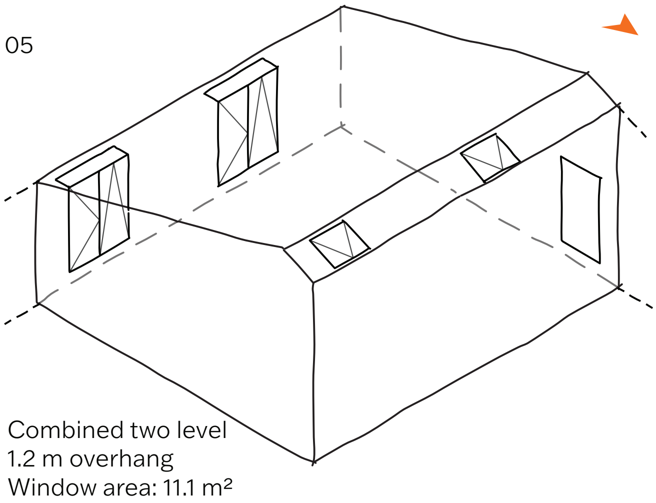


Figure 63. BSim iteration 05

To investigate the risk of overheating in the open-plan kitchen, several simulations were conducted using BSim. The results from the final iteration are presented here, while an account of the earlier iterations is provided in the design process.

Open-plan kitchen

Net volume	167 m³
Net floor area	58 m²
People	3
Equipment	0.35 kW
Ventilation	Natural ventilation

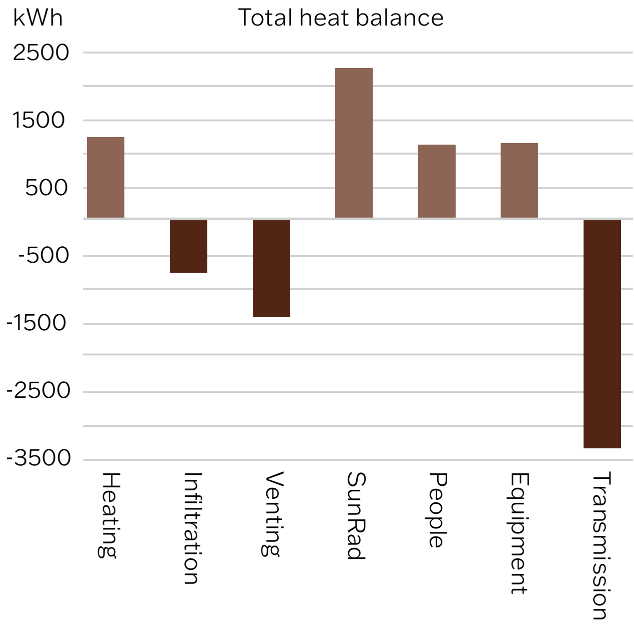
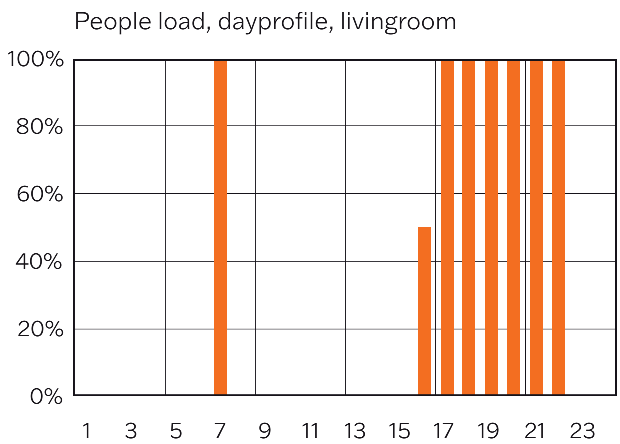


Figure 64. Total heat balance



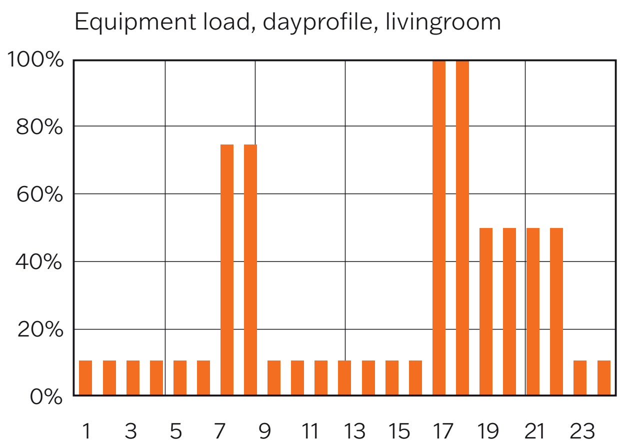


Figure 65. Schedules

A design goal was to rely exclusively on natural ventilation for cooling, which influenced both window design and placement. As shown in the graph illustrating monthly air quality, the room maintains CO2 levels around 1000 ppm during the winter months, with an air change just below the required amount. This was accepted as the kitchen exhaust, which should be in the kitchen, wasn't included in the simulations, and the actual air change is therefore anticipated to be higher.

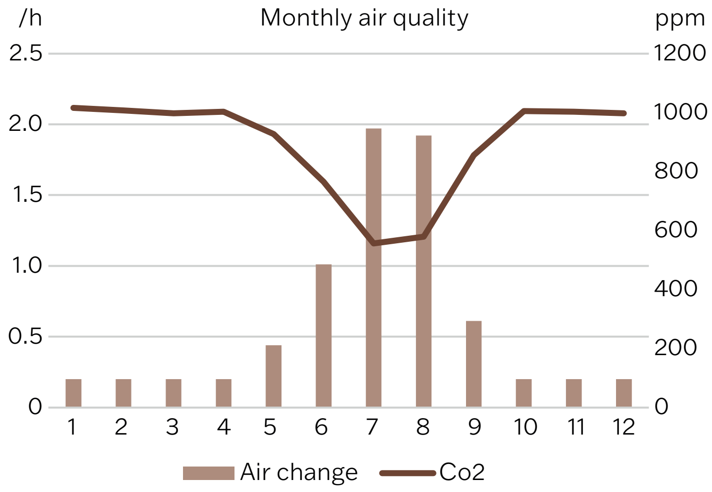


Figure 66. Monthly air quality

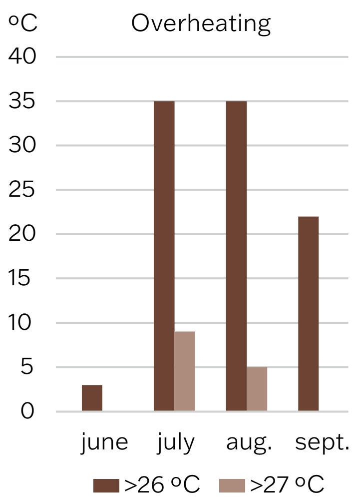


Figure 67. Overheating

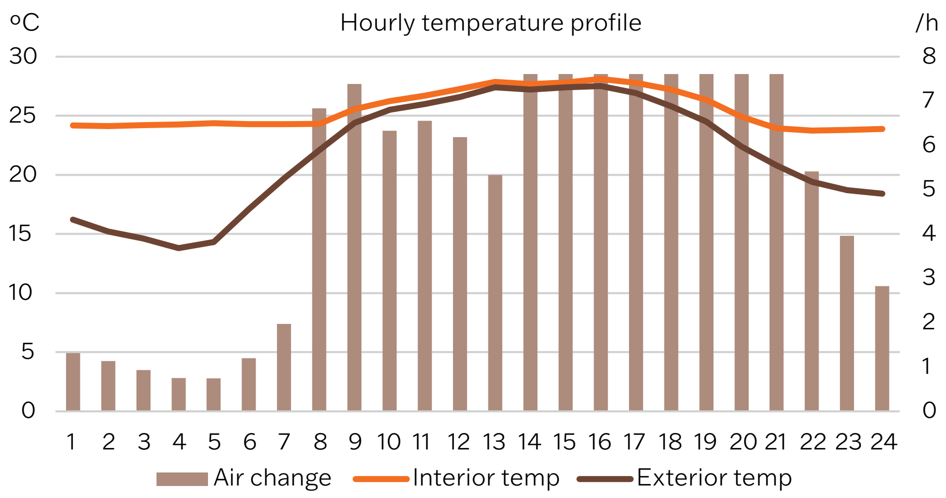


Figure 68. Hourly temperature profile

appendix 09

Be18

A Be18 calculation has been conducted to ensure the low-energy framework.

Alongside BSim iterations, a calculation for the critical situation was conducted on the case where the social zone faces towards north (02), effectively causing the least solar gain.

Furthermore, a calculation was done for the rotated case (01), as is the presented case in The New Paradigm, to verify that the passive strategies used throughout the project meet the low-energy framework.

To achieve low energy consumption, several strategies have been used, including constructions that are highly insulating, and with a high heat capacity. The building envelope has furthermore been designed to be very compact. In addition, natural ventilation has been used to cool the building, while passive solar gains have been dimensioned to warm it during the colder months.

Shown is the final energy balance for the presented case in The New Paradigm. As well as a comparison of the solar gain for the two cases of the social zone towards south (01) and towards north (02). The comparison shows a slight difference between the cases, where 01 has higher solar gains during the wintertime, and 02 have higher during summer, therefore aligning with our expectations from our passive strategies.

Energy demand
BR2018: 37.2 kWh/m² year
Low: 27 kWh/m² year

01 South:
25.2 kWh/m² year

02 North:
26,0 kWh/m² year

U values
Floor U: 0.105 W/m² K
Roof U: 0.123 W/m² K
Brick wall U: 0.121 W/m² K
Timber wall U: 0.135 W/m² K

Heated area
139 m²

Transmission loss frame
Standard: 20.2 W/m²
Low: 19.2 W/m²
20.0 W/m²

Heat capacity
120 Wh/K m²

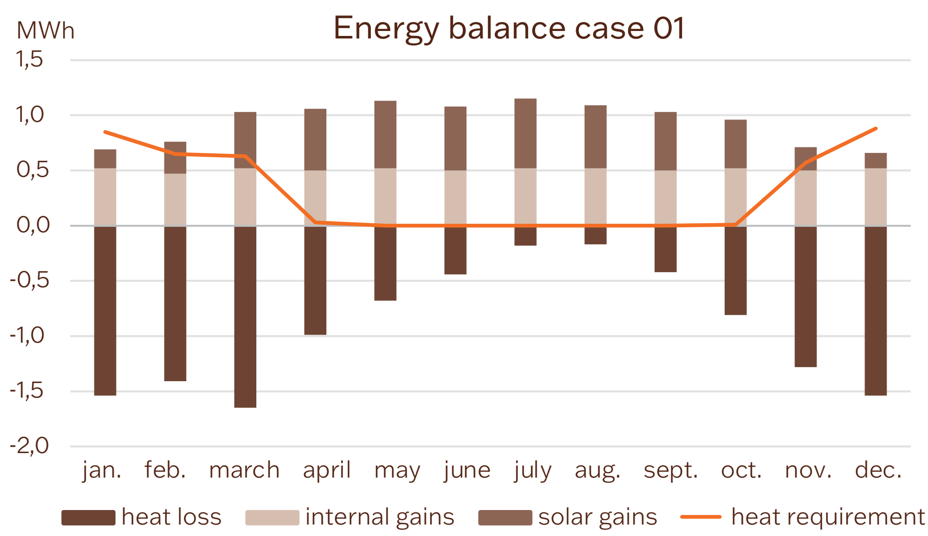


Figure 69. Final energy balance for presented case of social towards south (01)

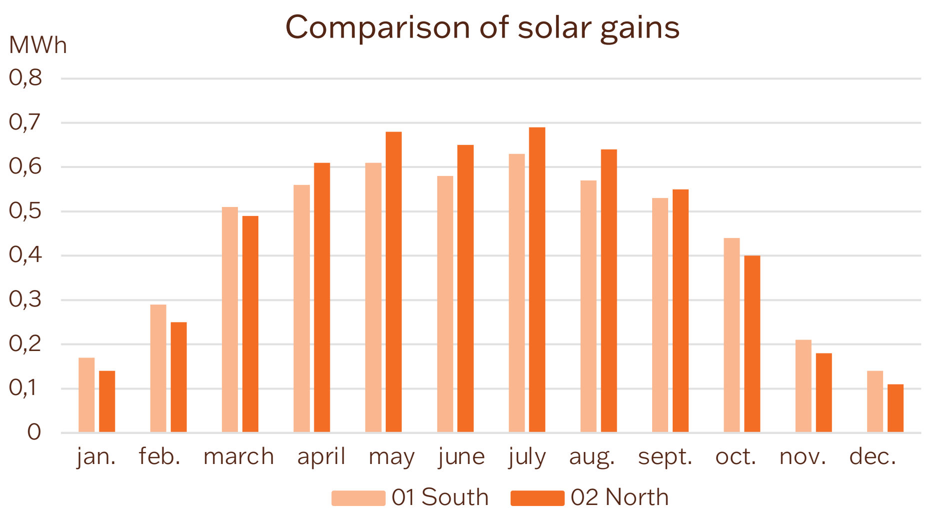
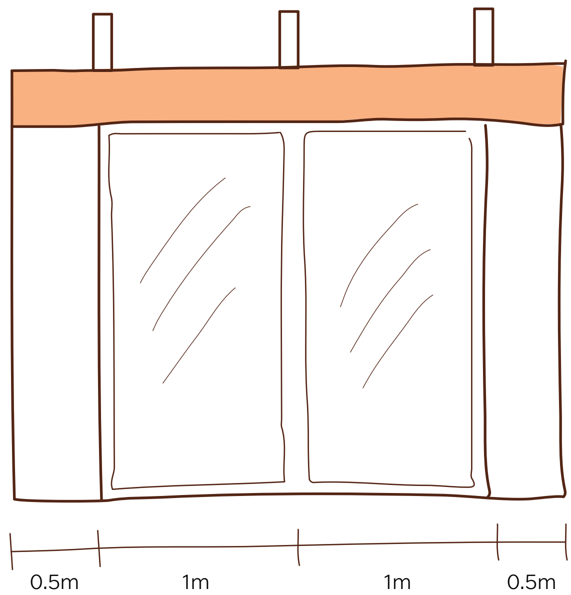


Figure 70. Comparison of solar gain for both cases

appendix 10

wall plate dimensioning

When dimensioning the wall plate, a span of 3 m is considered. This is because the largest opening in the outer wall measures 2 m, while the rafters have a load distribution area of 1 meter. Thus, considering a span of 3 m accounts for the load from the three rafters impacting the wall plate.



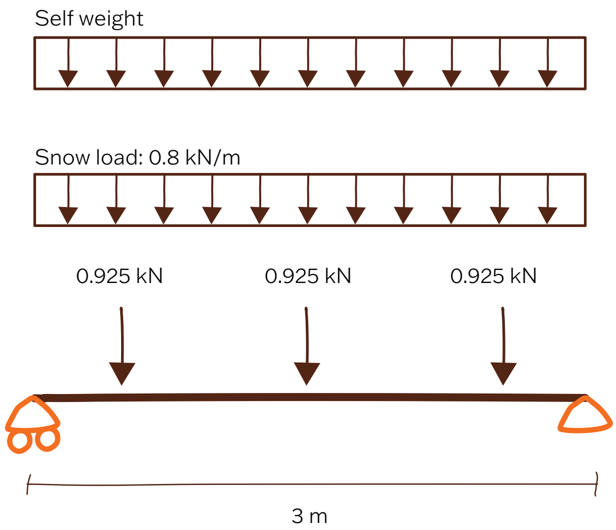
The roof has a surface load of 0.25 kN/m²
The rafters have a length of 3.7 m and a load distribution area of 1 m.
The line load acting on the rafters is calculated as:

0.25 kN/m² * 1m = 0.25kN/m

This is converted to a point load as follows:

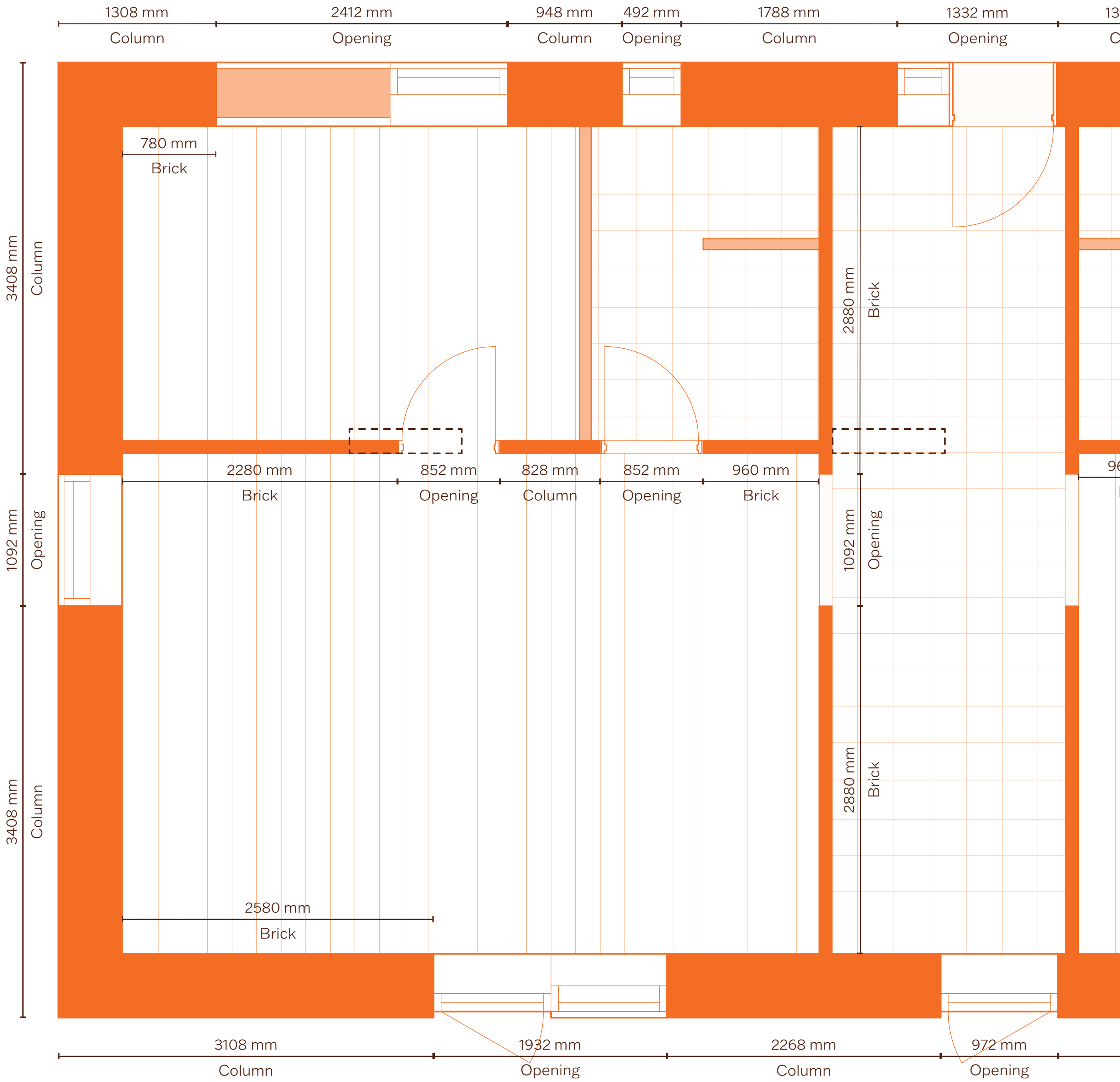
0.25kN/m * 3.7m = 0.925 kN

Next, load combinations were calculated. The most critical scenario is the load combination dominated by snow load, resulting in a utilisation ratio of 0.95 for the wall plate, with a cross-section of 70x120 mm.



appendix 11

horizontal masonry modular dimensions



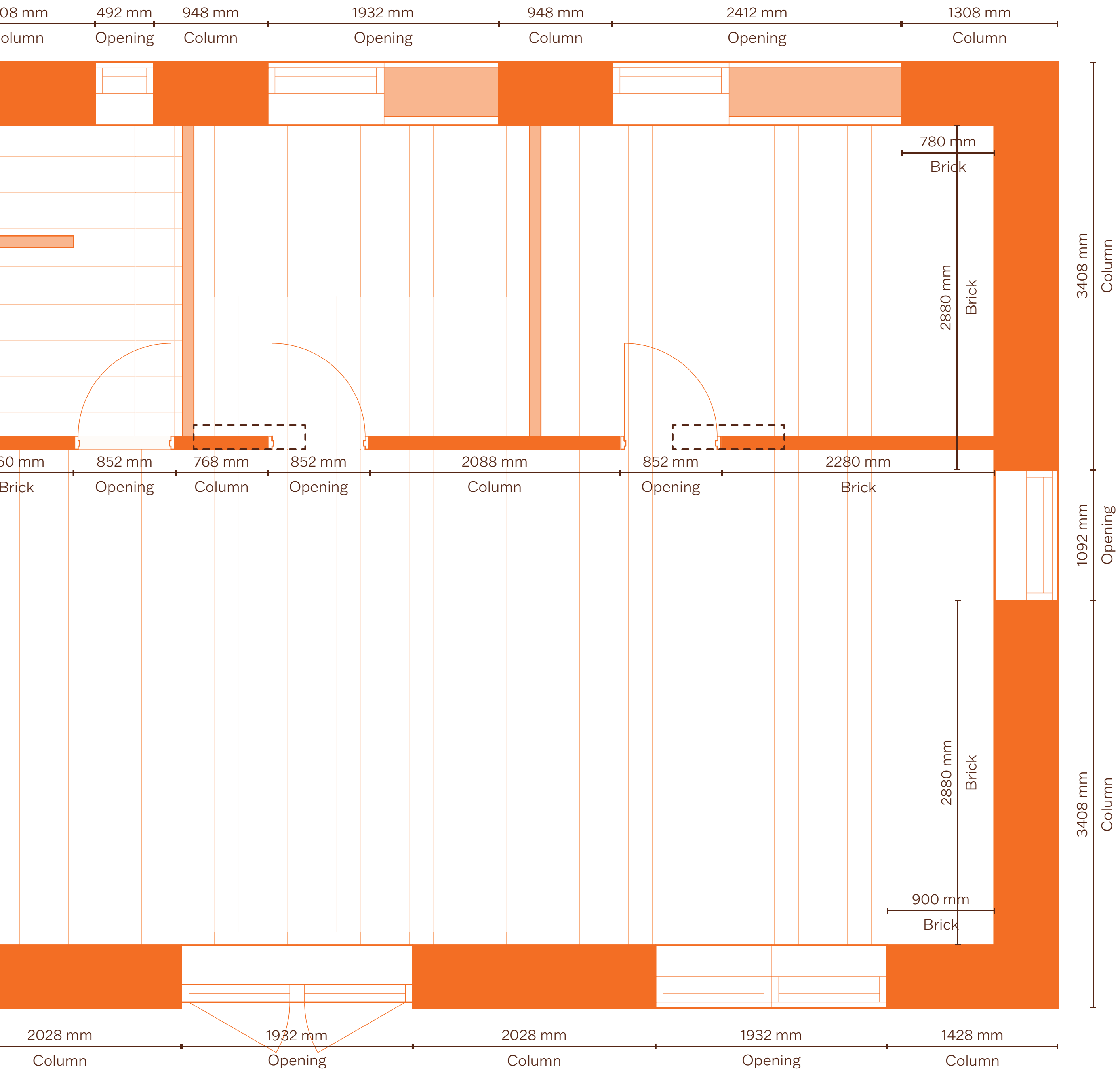


Figure 71. Masonry modular dimensions, 1:50

appendix 12

plan dimensions

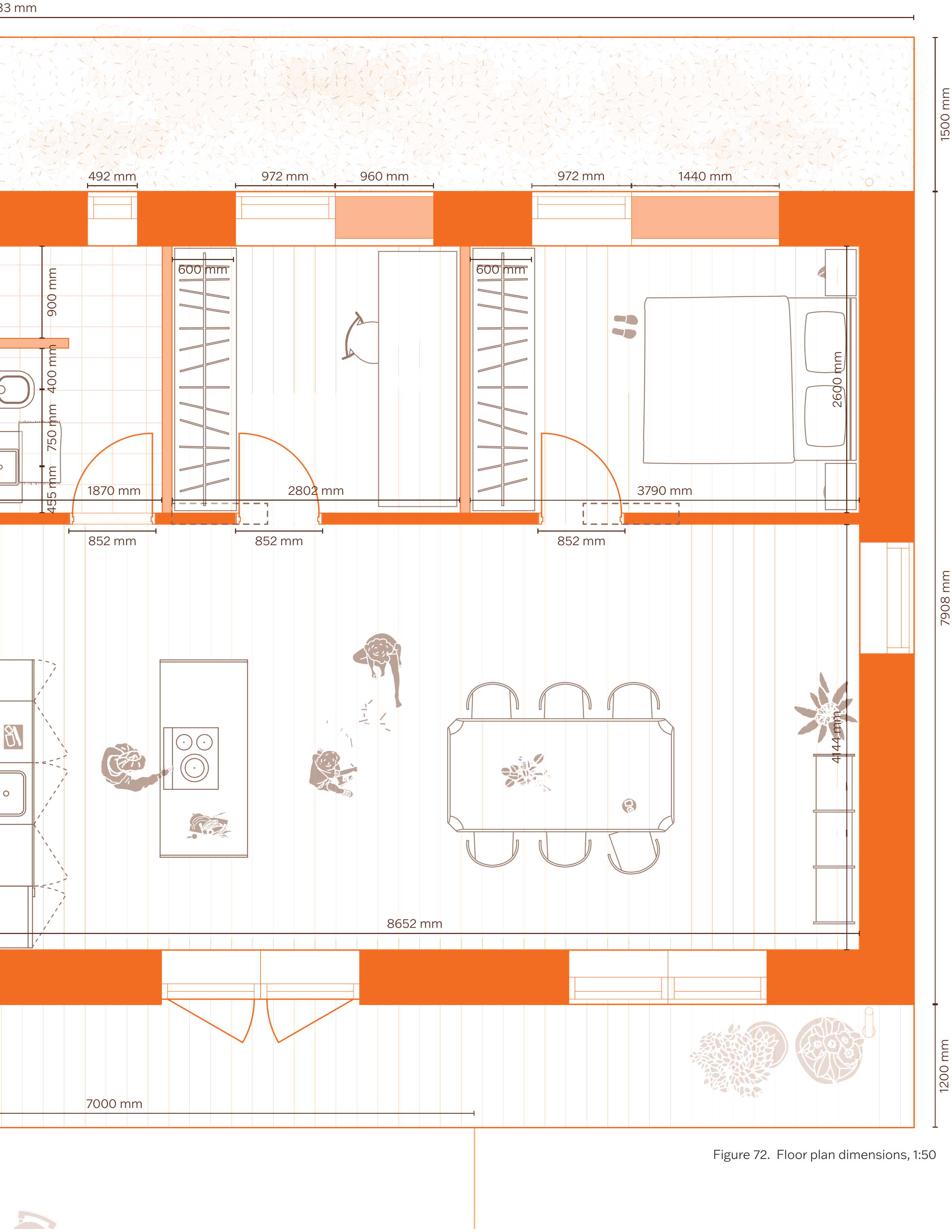


Figure 72. Floor plan dimensions, 1:50