

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Catharinus Veenema
Student number	5733871

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Anne Snijders	Architectural Engineering
Second mentor	Pieter Stoutjesdijk	Research Tutor
Third mentor	Gilbert Koskamp	Building Technology Tutor
Argumentation of choice of the studio	Architectural Engineering offered a chance to tackle the struggles of our time like the housing crises and the climate change effects, with the strengths of our time: technological developments, and industrial produce. All this is done within the architectural field, thus with the need to consider the societal, esthetical impacts of the solutions.	

Graduation project	
Title of the graduation project	The cornerstone for integration of prefabricated housing in the urban context.
Goal	
Location:	Rotterdam
The posed problem,	<p>The Netherlands finds itself entangled in a persistent housing crisis rooted in the aftermath of World War II. The urgent need for swift reconstruction collided with scarce resources, leading to the utilization of expedient and cost-effective building methods. Consequently, substandard housing was created, triggering a housing crisis that has endured for decades and continues to impact the nation today (NOS, 2021).</p> <p>Adding to the complexity, recent global events, including migration due to conflicts and uncertainties, have further strained the housing situation. The number of immigrants in the Netherlands has doubled, encompassing refugees, labor migrants, and students, all seeking accommodation in an already stressed housing market (CBS, n.d.).</p> <p>The perennial issue of space exacerbates the crisis. The Netherlands has long grappled with limited space and is ranked 21st among the</p>

	<p>world’s most densely populated countries (Ritchie & Mathieu, 2019). Competition for space intensifies as infrastructure, industry, and natural landscapes all vie for square kilometers. Stringent regulations demarcate each sector’s boundaries, further entangling the Netherlands in a convoluted puzzle (Bouwman & Vahl, 2020).</p> <p>The Netherlands addresses its housing crisis by utilizing industrial build houses from factories, providing sheltered and efficient production methods (Ministerie van Algemene Zaken, 2022). However, these advancements come with architectural limitations, leading to repetitive designs (Smith et al., n.d.). Urban planner Frits Palmboom, assigned by the Ministry of Internal Affairs, identifies five challenges for industrial building methods in housing. These include adapting to irregular urban fabrics, ensuring consistency with public spaces, accommodating different building flows, creating variation within a standardized form, and occasionally opting for traditional construction methods (Palmboom, n.d.).</p>
<p>research questions and</p>	<p>“Which existing industrial housing construction method is most suitable for creating corner buildings that can be designed to seamlessly integrate with existing urban spaces?”</p> <p>Sub Q1. What are the primary methods employed in industrial housing construction?</p> <p>Sub Q2. What architectural qualities do corner buildings possess that elevate their value within the urban landscape and which structural needs are connected to these qualities?</p> <p>Sub Q3. Which building method scores best when the methods from sub-question 1 are tested against the criteria from sub-question 2?</p> <p>Sub Q4: What are the specifications of the best scoring building method and which design rules apply?</p>
<p>design assignment in which these result.</p>	<p>How do we design industrially produced residential blocks that are connected by unique and industrially produced corner buildings, allowing them to integrate into the existing urban space of Rotterdam, densify it, and contribute to enriching the surroundings?</p>
<p>Process</p>	
<p>Method description</p> <p>The thematic research utilized literature reviews and case studies to gather and evaluate various industrial construction methods applied in the Netherlands. The research concluded by identifying the most suitable industrial construction method for designing the structure of unique corner houses.</p>	

The first step involves examining the location, considering the surroundings, existing plans, and other densification projects within Rotterdam. Based on this information, the specifications of the Program of Requirements (PVE) are established. This document clarifies the number of housing units, the ratio of residential to other public/commercial functions within the building, and identifies relevant urban planning aspects, such as connections between streets, water, and green spaces.

This PVE serves as the foundation for an initial design at an urban scale. The next phase explores how industrial construction methods can be integrated into this urban design, aligning with the previously described design task. Simultaneously, an in-depth investigation into applied industrial construction methods and architecture at an urban scale is conducted. The Plan Zuid in Amsterdam, a project by Berlage, is used as a case study for the latter.

The design process begins with an exploration of the urban design, followed by an examination of how industrial construction methods can be applied to meet the design challenge. The research draws inspiration from the Rivierenbuurt project, analyzing its architectural elements and urban integration. The design progresses through iterations, incorporating feedback and considerations from both the industrial construction methods and the (urban) architectural scale. This iterative process ensures a comprehensive and cohesive approach to the final design.

The design process will be done primarily through 3D modeling, sketching and detailing. Maquette making will be applied occasionally for design in a 'sketch model' manner but is mainly employed as a presentation tool in the final phase.

Literature and general practical preference

Berglage, de Normaal Woning.

Prefabrication, Industrial building, Timber building, Multistory Timber

Reflection

My thesis topic focuses on research into modern industrial techniques that make building cheaper and more efficient. The goal is to use these techniques to create better urban integration of prefabricated housing blocks and allow for architecture that can connect with the environment. Within the studio program, the subject relates to Open Building.

1. What is the relevance of your graduation work in the larger social, professional and scientific framework?

Although my research focuses primarily on the Netherlands, it is also of interest across borders. This is because not only the Netherlands is in a housing shortage, but many countries in Europe and also elsewhere in the world (Adhem, 2023). It is therefore important to contribute to research that addresses how to build good housing with architectural freedom using industrial construction methods that can speed up and reduce the cost of construction.

In addition, the world may not have a shortage of space for housing, but the vast majority of the world's population lives or moves to existing cities (Ritchie, 2023). Therefore, it is also important to research how to connect to or fit within the complex urban fabric with prefabricated construction.

This can help break the current image of monotony and repetition of industrial housing and give people a sense of recognition, individuality and coming home while arriving on "their" street.

Findings in the research based on case studies and literature review and the design itself will contribute to this within the prefabrication field of architecture and urbanism.