

# 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](mailto: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	Nicolette van den Bos
Student number	4868617

Studio		
Name / Theme	Architectural Engineering	
Main mentor	Yannick Warmerdam	Architecture
Second mentor	Fransje Hooimeijer	Research
Argumentation of choice of the studio	The primary reason for my AE choice is that the technical solution is strongly integrated into this Studio. I think an Architect must be able to propose technical solutions later on. Secondly, I am very interested in the flexibility and freedom offered by the Studio. This allows me to concentrate on my own architectural interests while still having the liberty to pursue my ideas. Thirdly, I strongly support the Studio's focus on sustainable, ecological, societal, and technical challenges. These are highly relevant issues that need to be addressed.	

Graduation project	
Title of the graduation project	The Expierience of Water
Goal	
Location:	Merwehaven Rotterdam
The posed problem,	[Problem Statement]
research questions and	[Research Question]
design assignment in which these result.	[Design Assignment]
<p>Problem Statement:</p> <p>The global impact of climate change is undeniable, and the Netherlands is no exception. One of the most urgent challenges facing our country is the rising sea level. As Figure 2 illustrates, the historical and projected sea level rise along the Dutch coast is influenced by factors such as overall global temperature increases, as outlined in the National Delta Programme for 2024. Approximately 26% of the Netherlands lies below sea level (Figure 3), with 59% of the country at risk of flooding from either the sea or rivers, according to the Planbureau voor de Leefomgeving (2007). These changes are also linked to shifts in the hydrological cycle, exceptional river discharge, heavy rainfall, erosion, sedimentation, and land subsidence.</p>	

Coastal settlements are among the most vulnerable areas due to the impacts of climate extreme events because are predominantly located in vulnerable areas such as coastlines, mouths of major rivers or low-lying areas of estuaries and deltas (Magnan et al., 2022). Rotterdam is one of those settlements in the Netherlands, which belongs to vulnerable areas. Rotterdam, founded around 1260 near the river Rotte, has a rich maritime history (Doolaar, 2022). A small port started at the dam, where goods were transhipped. The port provided trade, causing the city to grow. The city and harbour evolved together, resulting in a harmonious urban environment. However, during World War II, the city suffered significant damage due to the bombing (Doolaar, 2022). The post-war reconstruction introduced a new vision for Rotterdam: the clean, healthy city, planned according to modernist principles. High quays with sharp lines came back (Figure 5). Unfortunately, this modern movement caused the city to lose its curtain connection with people and the environment (Norberg-Schulz, 1980). Over time, the port has been more associated with industrial activity and shifted westward, distancing itself from the city. Thereby the connection between the city and the harbour.

Many houses and residential areas in the Netherlands today are not sufficiently resilient to rising sea levels. Therefore, it is crucial that designers focus on integrating the relationship with water into their designs to provide resilience against future water-related challenges. Peoples' perceptions about water and the notion of sense of place are sceptical. There has been common agreement that water is an important element for human lives (eating, drinking), and for everything on earth, and is summed up in the expression: "the bloodstream of the biosphere" (Ripl, 2003). About seventy percent of the earth's surface is covered by water (Herd, 2001), which means that it is intricately involved in chemical and biological interactions. The important examples of those interactions are the hydrological and geomorphic cycles, key aspects of the planet. However, there is much less discussion, about the meaning of water itself, and in particular the way it interconnects with such dimensions of humanity like economy, ecology, society, culture, and spirituality (Almond, 1995).

#### Objective:

Although significant research exists on how to build with the water, there is a gap in understanding the human perception of water. This research paper focuses on this gap. The goal of the research paper is to create design guidelines offering a framework for designers (architects, urban planners) to conceive and implement flood-resilient buildings that contribute positively to the waterfront environment and enhance the overall urban experience, particularly from a social perspective. This will be done by comparing case studies, which will showcase successful adaptation strategies, looking from certain social aspects and how it is practically addressed. These case studies could provide valuable insights. The design guidelines will cover aspects such as interaction with the water, closeness to the water, use of building materials, forms, urban structures, etc.

This lead to the research question: *"How can from a human perspective, where emotions and experiences play a role, architecture influence and enhance the perceived experience of buildings in port cities that interact with water?"*

To address the research, a literature review will be conducted from both a social perspective and a technical perspective. These perspectives will be categorized into two distinct lenses.

#### Human perception lens

1. Sense of Place: *What factors contribute to individuals' sense of connection and attachment to specific locations, particularly in waterfront areas?*
2. Emotional Engagement: *What emotional responses do architectural spaces evoke in individuals?*
3. Human-Water Relationship: *What cultural, historical, and socio-economic dynamics shape the relationship between people and water?*

#### Architectural engineering lens

4. Water typologies: *What are the different typologies of water-dwelling structures utilized in flood-prone regions, and what is the influence on human experience?*
5. Construction techniques: *What innovative construction techniques and foundation designs are suitable for building in flood-prone areas and what does this contribute to the human experience of water?*
6. Materials and water Interaction: *What materials and building technologies are best suited for withstanding the corrosive effects of water and thereby improving human interaction and experience?*
7. Case studies: *What lessons can be drawn from historically and contemporary case studies in terms of their connection to water and adaptation to rising sea levels? Including human interaction*

#### Design Assignment:

The aim is to develop innovative architectural solutions that address the dual challenge of future flood risks and enhance new living standards (new comfort with living standards), thereby creating a resilient and inclusive built environment.

When waterfronts were abandoned in the process of containerization, opportunities opened for port cities to reconnect to the water. Architecture can be used to signpost the return to the water. Rotterdam's city ports will be the ultimate location for this, to reshape the experience of the water and the port in the city. The connection between Rotterdam city and the harbour will be made stronger. The chosen city port is Merwe haven. This area is Dit gebied is aangewezen door de gemeente als transitiegebied voor wonen. Er ligt al een stedenbouwkundig Masterplan voor.

There will be an extra challenge because this area will fall outside the protected dike area.

Because of the lost connection in the past during the modern movement between humans and the environment, it is important that we design for today's society. Who is going to live there, how do people spend their time?

Aligned with the vision outlined by the municipality of Rotterdam (Omgevingsvisie Rotterdam, 2021), The program will fulfil the need for a community center of the new neighbourhood of Merwehaven housing, working space and recreation space in Rotterdam. Especially for this program, people need to have a certain connection with the place, to make it a meaningful project.

Design question: "How can architecture accommodate rising sea levels, ensuring human experience, sustainability and resilience in the context of the harbour of Rotterdam?"

## **Process**

### **Method description**

#### Literature research

The human perception lens will be created through literature research about the Sense of Place, Genius Loci, and emotional engagement. The book written by Norberg-Schulz: Genius Loci: Towards a Phenomenology of Architecture will form a good base. will form a good base for this.

The architectural engineering lens will be investigating books and research about the practical way of building with water. The book of Float! Building on the water to combat urban congestion and climate change, and Amphibious housing in the Netherlands: architecture and urbanism on the water. Books will help formulate and understand these principles.

#### Case studies

To address the main question and test the literature, different case studies will be examined through both the lens of human perception and architectural engineering. These case studies will involve comparing different elements including the utilization and integration of waterfront spaces, architectural materials, and design approaches To structure these case studies will be organized within a table format. This table will categorize different elements such as architecture elements, relationship to water, accessibility etc.

## **Literature and general practical preference**

References, see below.

## **Reflection**

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?
2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

My graduation project, within the Architectural Engineering track and my Architecture studies, focuses on developing innovative architectural solutions that address future flood risks, with a specific focus on Rotterdam's Merwehaven. This area, located outside the protected dike zone and designated as a residential transition area, presents unique challenges to restore the lost connection between people and their environment. My research focusses on the human perception of water, analysing case studies to create design guidelines for flood-resilient buildings that enhance the urban experience. The choice of this graduation track offers me the technical integration and flexibility to explore my architectural interests and ideas, with a strong emphasis on sustainable, ecological, societal, and technical challenges.

### **Relevance Research:**

The thematic research will be divided into two different lenses, to fill the research gap by combining these perspectives. This approach promises to be highly generative and applicable across various contexts involving human interaction and the development of water-resilient built environments. This research will become increasingly important in the future for both new construction and existing environments struggling with water-related challenges. The research of these two lenses will be applied within the specific context of the Rotterdam Harbour but will have wider relevance for other port cities facing similar conditions. Ethical? ethical part is about making design for everyone and design for the human individual.

### **Relevance Design:**

My goal is to create a prototype with my design that showcases how we should design for future living: flood resilient, sustainable, and with a human connection to the built environment. I think it is important to explore diverse ways of living to ensure future-proofing. While focusing on the context of Rotterdam Harbour, this project should also be adaptable to various port cities worldwide. It is ethically important to involve all stakeholders in the area in the design process. Therefore, I will create individual profiles for the future residents, outlining their daily activities and background. Additionally, it is crucial to respect and, if necessary, enhance the existing flora and fauna.

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