ROTTERDAM ON THE RISE

REFLECTION

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Bridge Design

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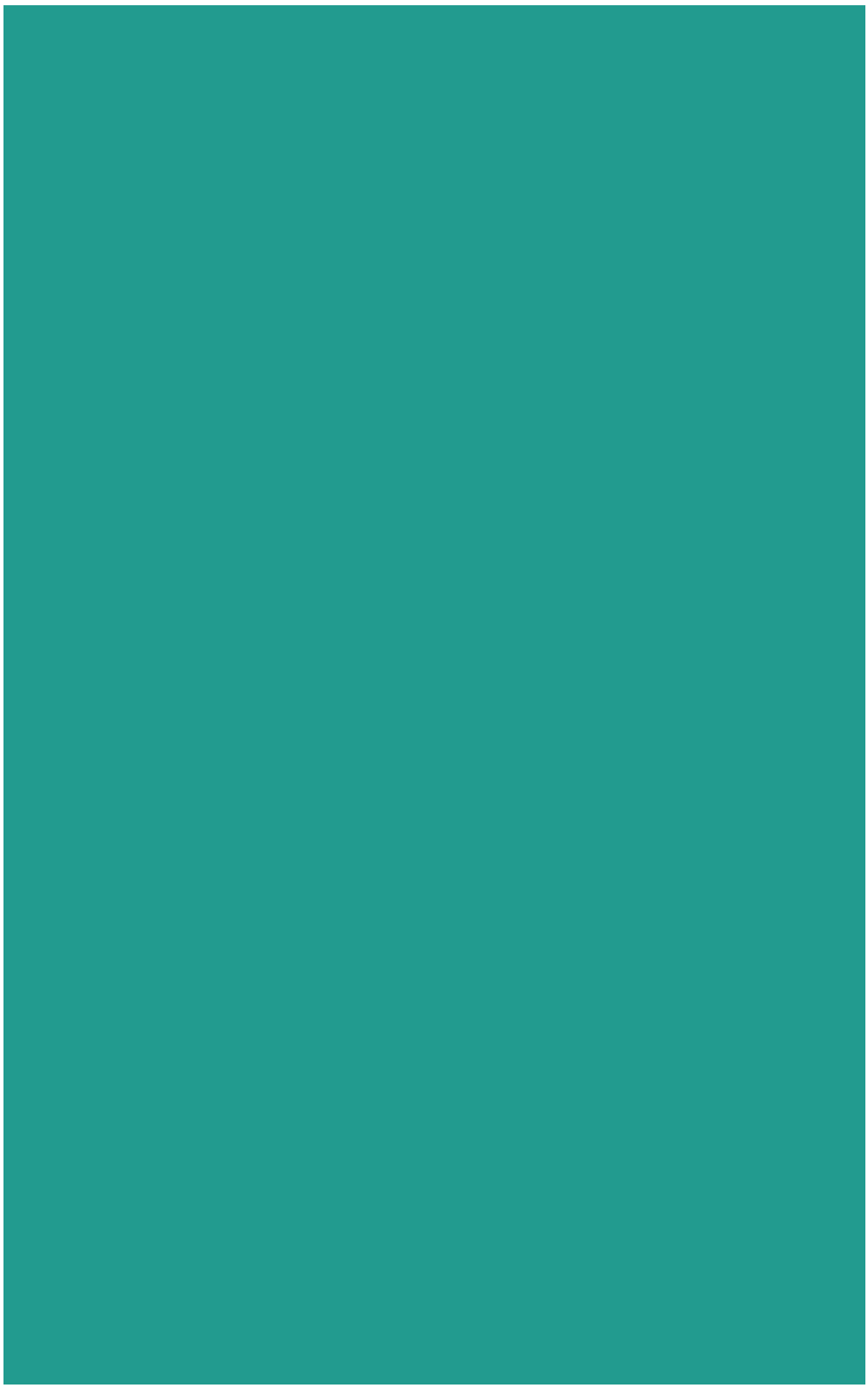


REFLECTION

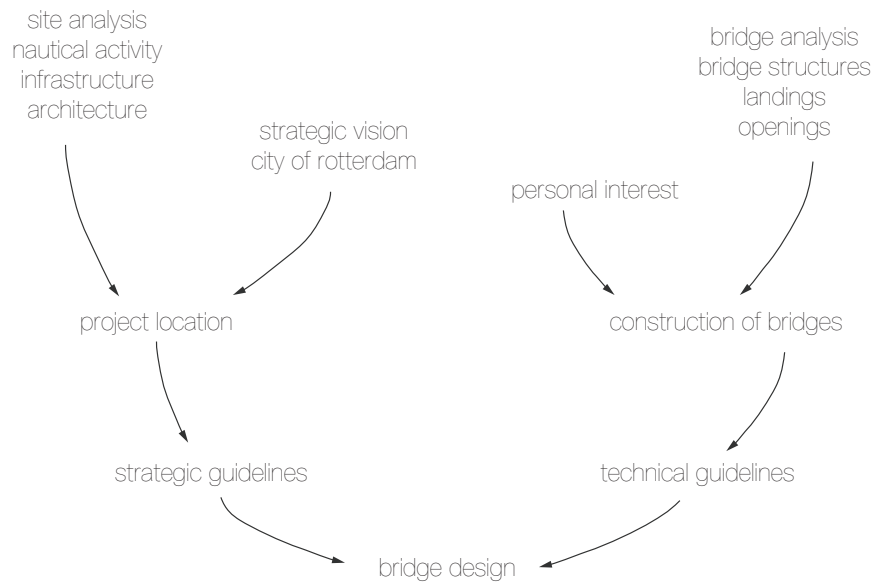
1.1 INTRODUCTION

This reflection will, in short, give an explanation on the results of the research design study within the Sustainable Design graduation studio of the mastertrack Building Technology at the faculty of Architecture and the Built Environment. These results will addressed and traced back to the point where decision were made in order to understand the most important steps in the research process. This way, the research and design process can be broken down in to the 'how' and 'why'. The 'how', meaning the methods used to come to a certain result and the 'why' meaning the argumentation for a certain decision. The reflection will conclude with an answer to the 'how' and 'why', and hopefully a conclusion on whether or not the approach worked for this particular design study.

2.1 RESEARCH AND DESIGN

During the process of developing a bridge for the city of Rotterdam, both the research and design part had great influences on each other. Steps which were taken in the design resulted in new insights for research and research into new subject led to new views on the developing design.

The process of developing a bridge across the Nieuwe Maas started with a thorough research into different fields. These different fields of research can be subdivided in two main directions. The first direction focuses on the location of the project. The research done in this field encompasses, among others, an analysis of the project site and the current infrastructure and architecture. Together with the strategic vision of the city of Rotterdam for this project location, this analysis led to the strategic guidelines for the design project.



The second main direction in terms of research is a comprehensive analysis into the possibilities of the construction of bridges. This research includes data about bridge structures, landings and openings. The research on the construction of bridges led to the technical guidelines for the design.

The knowledge gathered during the initial research was used during the first steps in the design process. The strategic and technical guidelines were used as boundary conditions for the design. The different outcomes and decisions during the design process were then tested against the set guidelines and boundaries. In case of a mismatch between the design and the boundaries this was then used as new material for research. This process is being repeated to create an optimal design solution within the set boundaries.

2.2 SUSTAINABLE DESIGN GRADUATION STUDIO

The design of a bridge is a very difficult one. As explained earlier, there are many different topics of research which each their own outcome which define the boundaries for a design. Not only does the design of a bridge happen in different fields of knowledge but also in different scales. The largest scale in which the design takes place the scale of the city of Rotterdam. A bridge crossing the Nieuwe Maas has an comprehensive effect on city as a whole. Zooming in on the bridge still leaves a massive structure which touches multiple parts of the city whilst making a connection between them. Again zooming in on these connections brings down the scale to a more humane scale. The bridge itself however also stretches from a large structural scale to a very detailed scale on how it operates. Bringing all these aspects together and finding an optimized design solution within the given boundaries is leading to an integrated design on all levels, which is in agreement with the core value of sustainable design.

2.3 METHODOLOGY

The methodology that was used during this project was a looping combination of research by design and design by research. The start of the project however was made by first making a leap in research on the different design aspects and elements. Research into the different elements created a basic knowledge which was then used for making the first design steps. The elements of the design were checked against the boundaries that were set during the research process which determined if a design solution was feasible or not. This way of working led to an iterative process of making design possibilities and checking them against the boundaries set by the research.
Of course the other way round is also true for the project. Not all design possibilities could be checked to the research as some aspects where not present in the research because they had not been foreseen or because the design decisions steered the design and research a slightly different way. This led to the need for further or more elaborate research into certain aspects. With this renewed knowledge the first design could be altered and improved. This method of designing also worked via an iterative process of making a draft design, checking the boundaries, researching optimal boundaries and, if needed, altering the boundaries. Most of the time however, research into the subject led to a solution which could be utilized within the current set of boundaries.

2.4 CONTEXT

The context in which this project can be placed consists of two parts. The first part is the potential

value in social context for the municipality of Rotterdam. The design project addresses an actual problem within the city of Rotterdam. The Nieuwe Maas river has brought a lot of prosperity to the city, but unfortunately also acts as a barrier between the northern and southern part of the city. Whilst the northern part is flourishing, the southern part of the city has higher unemployment rates, lower wages, poorer facilities and overall lower chances. This can all be traced back to the suboptimal connection with the northern part of Rotterdam. The main connection is across the Erasmus bridge, but this route is slowly filling up with traffic, much like the rest of the city center. In order to finding a solution for this problem the municipality of Rotterdam deliberated on plans on making an alternative routing across the Nieuwe Maas. By opening up new routes from the north to the south of the city the municipality is aiming for a revival and social stimulation of the southern areas.
The second part of the context is the addition to the knowledge and research about bridge design. By creating a solution for a problem, you are adding knowledge. For this bridge crossing, the choice was made to construct a vertical lift bridge. The vertical lift bridge is a type of bridge which is not very common in present time. By designing a bridge using this bridge type there could be a stimulant towards the use of this type of bridge.

3.1 PROCESS

The design project started before the P2 with a thorough research into the different aspects of bridge design on one hand and the location of Rotterdam on the other. This research was used as basic knowledge and understanding and was used for creating the guidelines and restrictions for the design of the bridge. At the P2 an early draft design was presented which complied with the stated guidelines and restrictions.
After the P2 the design process continued and different parts of the bridge design began to take shape. Using the knowledge from the research, different parts of the bridge were drafted and tested against the design guidelines and boundaries. The process of optimizing the different parts of the design was a difficult one. It proved very difficult to decide upon the best solution, because choosing a certain solution may lead to an unwanted outcome of the design. This led to many uncertainties in the design process and in practice, led to many aspects of the design not leaving the preliminary design phase. After restructuring the work-flow and forcing decisions to be made, the project started moving again. The fear for making decisions was tried to put aside as this was slowing down the process as a whole. After the P3 most decisions had been made, but due to losing a fair amount of time after the P2 the amount of produced products was still very low. Most of the design was still to be drawn, and with drawing, more problems needed to be solved. All in all, when comparing the actual process with the aimed planning, there seems to have spread out a bit in duration.
The aim for the period after the P4 is to finalize the different products needed to complete the design. There still is a lot of work that needs to been done, but I am fairly certain that there is enough time to complete the design and deliver a quality research.