ASPECT 01. THE RELATIONSHIP BETWEEN RESEARCH & DESIGN

This thesis deals with the design of a new bridge over the Maas in Rotterdam. Because of the preconditions on site, this comes with many challenges. These challenges are both in the structural feasibility of the bridge and in the integration of the bridge in the urban environment. Different analyses were needed to map these challenges and to investigate the technical possibilities. The research done into Rotterdam and bridge structures has proven to be a very useful ‘toolbox’ not only to start designing with, but also during the entire design process.

During the second part of graduation, further research was done on the structure of the bridge. Using structural calculations the feasibility of the designed bridge was continuously monitored. The research let to design changes taking place. These design changes had to be researched then again. In other words, design and research went hand in hand in this phase.

Research and design were in close relationship throughout the entire thesis, as the graduation topic is a complex design project, which should always be supported with necessary research.

ASPECT 02. THE RELATIONSHIP BETWEEN THE THEME OF THE GRADUATION LAB AND THE SUBJECT/CASE STUDY CHOSEN BY THE STUDENT WITHIN THIS FRAMEWORK (LOCATION/OBJECT)

The sustainable design graduation studio focusses on innovative technologies within the themes of façade design, climate design and structural design. The topic of this thesis clearly belongs to the section of structural design. The sustainable aspect can be both found in technical and social measures.

Looking at the small scale, the design of a bridge can be sustainable in efficient use of materials and low maintenance. The focus on optimising the structure to the structural behaviour helps to reduce the amount of material used. On a larger scale, a bridge is a such large investment, that it needs to fulfil its function for many years, automatically demanding it to be durable. In addition, by not only serving only as crossing but also as park, it has a social and environmental function that contributes to the wellbeing of the citizens of Rotterdam. Lastly, since Rotterdam is aiming to become a more sustainable city, the bridge allows the crossing of sustainable means of transport only: pedestrians, cyclists, public transport and electric cars.

ASPECT 03. THE RELATIONSHIP BETWEEN THE METHODICAL LINE OF APPROACH OF THE GRADUATION LAB AND THE METHOD CHOSEN BY THE STUDENT IN THIS FRAMEWORK

The methodical line of approach of this graduation lab is a technical-scientific study and design by research. The method chosen in this thesis is a different approach: research by design. There is a design oriented problem and research is needed to find the best solution to solve it. The findings from the research are used as an input for the design, but also the design process itself provides new findings to improve the design.
ASPECT 04. THE RELATIONSHIP BETWEEN THE PROJECT AND THE WIDER SOCIAL CONTEXT

A better connection between North and South with a new bridge is seen by the municipality of Rotterdam as an important catalyst to improve the districts at South. This research could help to explore new views on the design of such a city bridge. The combination of a park and crossing is worldwide introduced more and more and it proves to have added value. However, these kind of bridges on such a large scale has not been done before, and could provide new insights in the multifunctional use of a bridge within the city.

The methodology used in the design process is interesting for architects and engineers. By integrating design and structural analysis in every step of the design process, a better and more integrated design can be achieved. This is not only for structural calculations, but for all other themes, like climate design, as well. By optimizing these themes as part of the design, a more sustainable result can be achieved. Think hereby of a reduced amount of materials used, or a passively more energy neutral building. The early integration of these aspects also prevents these themes to clash in a later stage of the process.

ASPECT 05. TIME PLANNING

The graduation project went very smooth up till the P3 moment. After that, the real design and research of the main structure started. It is in this phase that I lost myself too much in the architectural design of the bridge, while neglecting the structural logics. I ended up therefore with an unsatisfying result at the P4 moment, which made me withdraw from this presentation. The extra time that I got gave me a moment to critically evaluate the design choices that I made, of which some were not logic. This evaluation helped a lot in improving the design.

Despite the extra time, the design was still hard to complete on the detailed level that was desired by myself. A bridge is such a complex structure and it has many details that need consideration. The perfectionist within me wanted to work out all these aspects, but this was obviously not possible. However, I think the end result is satisfying.

CONCLUSION

The graduation project has been very interesting and fun for me. Since this was my first experience with designing a bridge I have learned a lot. With focussing on the specific themes of green integration and structural optimisation, I have convinced myself more of the need for both in nowadays (architectural) world.

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