**Graduation Plan**

**Personal Information**
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**Graduation Studio**
Name: Sustainable Design Graduation  
Departments: Structural Design and Design Informatics  
Theme: Parametric Bridge Design  
Teachers: Joris Smits, Michela Turrin  
Argumentation: In a bridge design, the structure is also the main part of the aesthetics, this intrigues me.

**Graduation Project**
A parametrically optimised bridge design for a new connection over the Nieuwe Maas in Rotterdam.

**Goal**
Location: Rotterdam-West/Waalhaven - Schiemond

In the design of a bridge, a lot of different factors play a role. The main goal in this research is to determine these factors for Rotterdam-West and coming up with a way to tackle these challenges. A research into the determinative variables in a bridge design will lead to the optimization of the bridge. The main goal is to find a parametric solution to create an optimised connection between Schiemond and the Waalhaven in Rotterdam-West.

**Problem statement**
The New Maas forms a barrier between the north and south of Rotterdam. This causes social and economic differences between the city districts. The south of Rotterdam now contains deprived districts of the city. This problem is also a matter of mobility. People rarely leave the neighbourhood. The public transport is often too expensive or insufficiently available and there is no bicycle culture. Rotterdam is now a city of cars, both in and outside the city centre. The intention is to change this. To avert cars from the city centre and promote sustainable means of transport.

The new connection will have to deal with different traffic flows of shipping underneath, public transport, cars, cyclists and pedestrians. This will result in challenges regarding operability and landings etc..

**Research questions**
The main question to be answered is:
How can the current practical and social problems be solved using a bridge and how can this bridge be designed and optimized?

To answer this, some sub-questions will need to be answered first.
- How does the connection fit into the urban context?
- What are the aesthetic and functional demands for the connection?
- What is the ideal bridging type, regarding context and demands?
- What are the determinative variables to optimise?
Design assignment
A parametrically optimised design of a bridge over the Nieuwe Maas.

Methodology
The research, conducted for this project, consists of two main analysis parts and a final design study. The first part of the analysis focuses on the location itself and the actual need for the connection and its demands. This analysis forms the boundary conditions for the second part of the research, where bridging types and structures are analysed. Together, these two analyses will result in strategic guidelines from the location and technical/structural guidelines for the design study.

In the design study, a bridge type will be selected and the determinative variables can be determined. Here, some aesthetic choices will have to be made as well. Then finally the optimising and detailing can start to lead to a design.

Literature
The analyses and research conducted will mostly be based on literature studies and case studies. To set up the strategic guidelines, containing a visual quality plan, social intervention etc., mostly documents of the municipality will be consulted. This will be important literature to determine the actual problem and find a way to solve this problem. For the more technical problems, engineering literature about bridging will be consulted.

Reflection
Relevance
The demand for a new crossing over the Nieuwe Maas is an actual question the municipality has to deal with. It is of relevance to the development of Rotterdam south, the health of the city and mobility. By increasing the options of sustainable means of transport, like public transport or the bicycle, car usage can be decreased and air quality and general quality of life in the city can be improved.

The parametric optimisation of the design is also of sustainable relevance. By topologically optimising the design, material usage can be minimalised. Furthermore, with some tweaking, a developed script might be useful in other bridge designing questions as well.
### Graduation Plan

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**Notes:**
- Periods P1, P2, and P3 are linked to specific activities.
- Period P4 is dedicated to design and preparation.
- Activities are interspersed with specific tasks and milestones.
- The plan includes a section for holiday dates and other significant events.

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**Merijn de Leur**

Weekend plan:

- 1 week before: Design ofels
- 2 weeks before: Design optimisation

**Plan 1:**

Weekend: Period dated 3