



Bridges and Quays maintenance optimization in a dense urban environment

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Problem description

Urban road networks are highly complex systems due to the number of nodes and links and the diverse user segments that have to travel through them every day. In the Netherlands, the system is even harder to analyse and manage given the existence of an extensive network of canals that have to be articulated with the road system thus allowing navigation as another travel means.

Bridges and quays are a natural part of the road system in such an environment. In the Netherlands many of these infrastructures are old and therefore they are in urgent need of repair. The problem is that it is not possible to deactivate them in random order since this would impose high costs on the road users such as cyclists, pedestrians, cars and public transport vehicles. The closing of these links for repair needs to obey a strict plan that allows minimizing costs for all of the urban stakeholders whilst not leading to high costs to the municipality that needs to pay for such maintenance plans.

Amsterdam is a city that has been facing this challenge at a higher scale, exacerbated by the great mobility demand and the very high-density network of canals. TNO has been collaborating with the city to model the impacts of different interventions but a systematic method to scan for optimized plans for maintenance is lacking. This will be the main goal of this thesis project.

Assignment

The assignment will consist of:

- Literature study on network design problems, global optimization methods and heuristic-based.
- Study of the multimodal model that TNO is using to explain network transport demand and supply.
- Propose a simulation-based optimization method to do multi-period optimization for the maintenance of bridges and quays.
- Run a sensitivity analysis and several meaningful scenarios for taking conclusions.

Background

A student who is willing to program. The project time span will be 6 months and will be guided by TNO and TU Delft (Department of Transport & Planning).

Research group

Chair: Prof. Serge Hoogendoorn. Daily supervisors: Dr.ir. Gonçalo Correia (g.correia@tudelft.nl) and Dr.ir. Maaike Snelder (m.snelder@tudelft.nl).

The project can be conducted as a final thesis project for MSc Civil Engineering –Traffic & Transport track or MSc in Transport Infrastructures and Logistics.

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