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DUTCH DESIGN GUIDE FOR BICYCLE AND PEDESTRIAN BRIDGE DESIGN

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Summary

As more and more people worldwide are living in densely populated urban areas the added value of cycling and walking as means to create more liveable cities is being increasingly recognized internationally.

The Netherlands has decades of experience building cycling and pedestrian bridges but there was no National Design Guide for this type of bridges. Therefore the Dutch technology platform for transport, infrastructure and public space asked ipv Delft to write the Dutch Design Guide for cycling and pedestrian bridges, which was published in 2014. An English Summary of the Guide (Fig. 2) was written in 2015.

To develop successful cycling and walking networks (today) we need to cross all kinds of natural and manmade barriers. Bridge design therefor often is more than only an engineering task. Bridge projects have many stakeholders whose interests need to be taken into account to develop an optimal solution for all.

To be able to take all interests into account designers and engineers need to thoroughly analyse the requirements of all involved parties and stakeholders. For this ipv Delft developed a method which forms the backbone of the Dutch Design Guide. The method subsequently analyses the requirements from the network, context and users which then form the starting point for the spatial integration and bridge design.

In this paper this method is explained.

Keywords: method for requirements analysis; design specifications; bridge engineer / designer's role

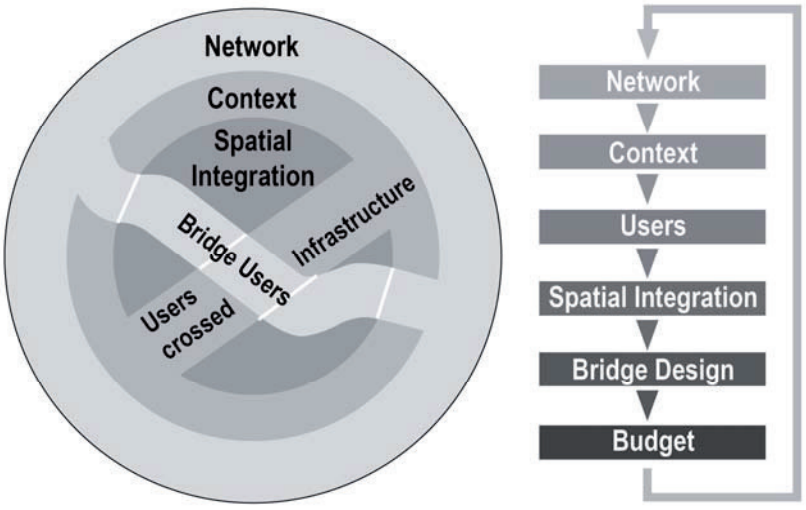

Fig. 1. Dutch Design Guide structure based on requirements analysis

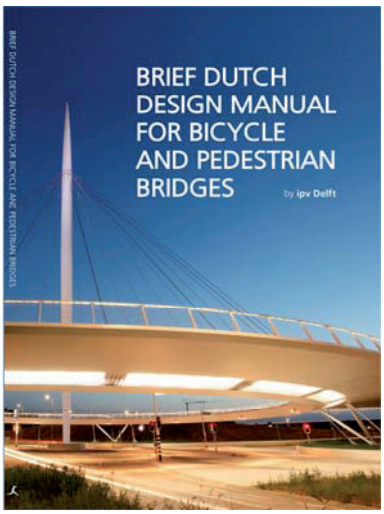

Fig. 2. English Summary

1. Network

The need for a new footbridge arises from the existing cycling and pedestrian network and urban developments. A good network is coherent, direct and safe. Knowing the basics of a good network enables bridge engineers to discuss alternative solutions for a new connection. Traffic engineers take the route as a starting point. Informed bridge engineers can advise on the best location for a bridge in relation to the route.

2. Context

The Network analysis provides the best location (the context) for a new bridge. Analysis of the context provides requirements like subsurface condition, underground infrastructure and existing and future development plans. But in our densely populated areas other requirements are also increasingly important. Urban planning requirements like sightlines, social safety and ecology. Or requirements of local entrepreneurs, and citizens. These requirements can be threats and opportunities for the feasibility of a project. Early involvement of all stakeholders in the context is crucial for a successful project.

3. Users

A new footbridge is designed for a particular user group like pedestrians or cyclists. But often the zone that is crossed also has users. Both the crossing and the crossed users have their own requirements and need to be offered safety and comfort while passing or otherwise using the new bridge. Both user groups consist of main, incidental and unintended users. Like for example for a bicycle bridge cyclists, maintenance people and vandals or trucks. Even owners of pipes and cables on, through or under the bridge can be users.

A good analysis of all expected crossing and crossed users in the present and future is essential for a comfortable and efficient usable bridge during its complete lifespan. In the design guide requirements for pedestrians and cyclists are covered. Like required clearances and restrictions for alignments.

4. Spatial Integration

The requirements found in the analysis of the network, context and the users define the possibilities for the spatial integration of the bridge. In the phase ‘Spatial Integration’ we research possible routes that offer a comfortable and direct route for the bridge users. While taking into account the requirements from stakeholders in the context. Open-mindedness to the interests of all stakeholders in this phase often can deliver win-win solutions like ramps that function as sound barriers or signage portals that double as anti-collision portals.

5. Bridge Design

The approved horizontal and vertical alignment found in the phase ‘Spatial Integration’ form the basis for the optimal bridge design for the expected users. Developing the bridge design aspects like loads, buildability, durability and maintainability are important. But in this phase urban requirements like the wished for character of the bridge are also integrated into the design.

6. Budget

Based on the design the most appropriate tender and contract format can be chosen and the needed budget can be estimated. When necessary the knowledge of the expected (lifecycle) costs and benefits of the interests of all stakeholders, forms the basis for a cost optimized alternative design.

7. Guide for a Process

In the Design Guide we emphasize that a good bridge design often is not only an engineering effort. It is the result of all disciplines and stakeholders being open to each other’s interests and requirements. Such a process often needs a mediator between the soft (social, economic, architectural) and hard (technical) requirements. As designers and engineers we can fulfil this role in our projects. Creating bridges that meet all their present and future expectations.

An English summary of the Dutch Design Guide is available for free download at ipvdelft.com/publications.