



Recalculating and strengthening of the girder bridges near Hagestein

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Abstract

A busy arterial road, the A27 motorway, runs through the heart of the Netherlands. In order to improve the traffic flow on the A27 between the Houten and Hooipolder intersections, the Directorate of Public Works and Water Management is having this motorway widened. Insofar as possible, the existing infrastructure will continue to be used. As well as three other major bridges along this section, the steel bridges near Hagestein form part of this infrastructure. With the aid of recalculations, Movares studied whether the Hagestein bridges have sufficient load bearing capacity to extend their service life until 2053. Finite element calculations were used to determine, among other things, the strength and fatigue resistance of the bridges.

Keywords: recalculation, lifetime extension, finite element modelling, fatigue, buckling stability, shingle connection.

1 Introduction

The bridges at Hagestein consist of two adjacent steel road bridges along the A27 motorway between Utrecht and Breda; they are referred to hereinafter singly as “the Hagestein bridge”. The bridge spans the river Lek. Construction of the bridge began in 1975 and it opened for traffic in 1981. With a traffic intensity of 111,900 motor vehicles per 24 hours [1] (as measured in 2014), the Hagestein bridge forms part of a busy traffic route through the heart of the Netherlands.

To improve the A27’s traffic flow and make it suitable for the future, a design alternative is being worked out in which the existing engineering works along the motorway section are retained as much as possible. A brand new

bridge is being created to supplement the Hagestein bridge. The existing bridges will also be reinforced to give them an extra 30 years of life, starting from 2023.

This paper deals with the recalculation methods and the results they have yielded. After a brief description of the project and the lane layout, we will speak about the employed calculation models in chapter 4. Chapter 5 explains the method behind the fatigue evaluations, together with the associated results. The static strength of the bridge is then assessed, and the paper ends with a conclusion.

2 Project description

The Hagestein bridge forms part of the A27 motorway and is located between Utrecht