

Strengthening Solutions for the Extended Service Life of the Galecopperbridge in the Netherlands

Sander den BLANKEN

Associate Director
Managing Contractor / Arup
Amsterdam, Netherlands
Sander.den-blanken@arup.com

Sander den Blanken, born 1973, received his civil engineering degree from the Univ. of Delft

Gerland NAGTEGAAL

Technical Manager
Rijkswaterstaat
Utrecht, Netherlands
gerland.nagtegaal@rws.nl

Gerland Nagtegaal, born 1974, received his Aerospace engineering degree from the Univ. of Delft

Dimitri TUINSTRA

Lead Engineer
Managing Contractor / Arup
Amsterdam, Netherlands
Dimitri.tuinstra@arup.com

Dimitri Tuinstra, born 1970, received his civil engineering degree from the Univ. of Eindhoven

Summary

The Galecopperbridge consist of two separate Cable Stayed Steel Highway Bridges. It is situated in the heart of the Dutch dense trafficked Highway Network and spans the most densely used canal in the Netherlands. The bridges were built in the 1970's and designed to the Dutch national codes. They are currently suffering under extreme heavy tire loads, increasing number of heavy vehicles and an increased static live load. The bridges show fatigue failures in the orthotropic deck and the global structure is facing static safety issues. This has resulted in a close monitoring to date, and regular repairs. An extensive repair and strengthening scheme is developed to provide a more sustainable solution for another 30 years of service life.

The article will focus on the extensive strengthening scheme of the superstructure. The bridge is strengthened with a pair of high strength steel girders that relieve the existing structure in such a way that further strengthening of the severely overstressed steel deck, substructures and foundations can be avoided. At the same time the clearance over the canal is increased and the bridge is prepared (and strengthened) for future widening. Due to a great amount of prefabrication, work on site is reduced and the hindrance to the highway and shipping traffic is minimized.



The execution of the scheme is designed from the point of view to minimize traffic hindrance, construction time and life cycle costs. It also allows for potential future widening as part of the widening of the Arterial Road of the City of Utrecht. Therefore this is a sustainable solution for existing Infrastructure from the perspective of service life and service use.

Fig. 1: Side view of The Existing Galecopperbridge

Keywords: Steel bridges, assessment, refurbishment, strengthening, widening, jacking.

1. Introduction

The Galecopperbridge is one of eight landmark bridges that have been appointed for renovation by Rijkswaterstaat (RWS), the Dutch national transport authority. The reason for the renovation of these roughly 40 year old steel bridges is that they suffer from fatigue cracks in the orthotropic deck due to the increased number and weight of heavy vehicles on the highways. Numbers increased from 500,000 when the bridges were opened to 1,300,000 currently and expected 2,000,000 in 2040.