

# A CHALLENGING SLENDERNESS NONNEKLOPPEN BRIDGE IN BERGEN

Authors: Kristján Uni ÓSKARSSON<sup>1</sup>, Magnús ARASON<sup>1</sup>

Affiliation: <sup>1</sup> EFLA Consulting Engineers, Reykjavík, Iceland

## Summary

Nonnekloppen ("the Nun's bridge") is a 72 m long steel footbridge that provides an important connection within a popular cycle- and footpath network around the Store Lungegårdsvann lake in central Bergen. The project is a part of Miljøløftet, a state- and municipality funded cooperation focused towards improving infrastructure for more environmentally sustainable transport in the area around Bergen and reduction of traffic and CO<sub>2</sub> emissions.

The cycle- and footbridge was inaugurated on December 14<sup>th</sup>, 2018. The Nygårdstangen area by the Store Lungegårdsvann lake has seen substantial development in the past years, a new swimming hall and secondary school have been built on the north side of the canal that the new bridge crosses and a helicopter platform serving the nearby Haukeland hospital is planned next to the municipality's main fire station at the south side of the canal. The bridge is a 72-meter-long stiffened steel box girder with variable cross section height. Two partially hidden end spans are anchored down to the pile foundations with post tensioned steel bars at the bridge ends to support the slender main span of 60 m. The structural section height at the bridge supports is 1,5 m and 1,9 m respectively while at mid span the height reduces to 89 cm, a ratio of only 1/67 of the span length. A 1500 kg tuned mass damper is built in at mid-span to reduce accelerations from pedestrian induced vibrations. The bridge abutments are supported on 25-30-meter-long pile foundations which are designed as moderately stiff pile groups that enable a certain degree of deformation to react to horizontal forces induced by thermal movements of the integrally connected superstructure.

The conceptual and structural design of the bridge was performed by EFLA Consulting Engineers with architectural consultancy provided by Studio Granda architects. Project owner is the Norwegian Public Road administration.

The paper addresses the main features of the bridge configuration and provides an overview of some of the challenges that were encountered during the construction of the bridge.



Figure 1: Aerial view of the bridge at Store Lungegårdsvann lake in Bergen. Photo: Veronika Stuksrud

**Keywords:** Footbridge; steel box girder; steel fabrication; bridge profile; transport; structural response; construction challenges; damping.