



## Study of the Aurora Bridge with a FRP-deck instead of concrete

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### Summary

Exceptional and innovative Aurora Bridge originates from a bridge design competition in Helsinki. In competition the area footpath crossed a busy city junction diagonally, where the land area for bridge structures was strictly limited. The winning entry was a curved slender concrete deck pedestrian fly-over, which is suspended by sculptural "half arch". The design is built in 2012.

In this paper it is studied if FRP could provide a real alternative solution for the relative heavy concrete deck in this specific case with its strengths and weaknesses is studied for practical application. First the original design and execution is described followed by an alternative FRP-deck solution. Both designs results are compared together with the costs. Because of the lighter deck the dynamic behaviour is checked followed by our conclusion.

**Keywords:** Arch Bridge, Footbridge, Steel, Concrete, Fiber Reinforced Polymers (FRP)

### 1. Introduction

In 2010, the City of Helsinki arranged a design competition for a bridge to connect the last remaining parts of the Helsinki Central Park from South to North. The existing pedestrian network is equally important for refreshment and commutation, where the crossing over the Nordenskiöld Street was the last level crossing with traffic lights. The street to cross over, is a busy city cross link from East to West where also the city tram run on the street alongside the traffic.

The site is located in a built environment close to the Olympic Stadium, City Ice-hall, and to the Football stadium. The Bridge was to be a noticeable landmark frequently serving dense crowds of the nearby events. The built environment and the existing traffic network gave strict boundary conditions for the bridge location and geometry. The site has also several requirements for the traffic on the deck (accessibility, safety, ski-tracks on the bridge) as well as below the deck (collisions, free space and view requirements).