



D.A. Hordijk · M. Luković
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Comparison of Balanced Lift and Balanced Cantilever Method for the San Leonardo Viaduct

Georg Gaßner, Kerstin Fuchs and Johann Kollegger

Institute of Structural Engineering, TU Wien, Karlsplatz 13, 1040 Vienna, Austria

Abstract. In recent years a new bridge construction method has been developed at the Institute of Structural Engineering of TU Wien. The so called Balanced Lift Method can be seen as an alternative to the Balanced Cantilever Method.

To compare these two construction methods, an alternative design using the Balanced Lift Method for the 210 m long San Leonardo Viaduct was prepared. The original bridge is located in Sicily and spans a deep valley, which is the ideal case wherefore the Balanced Lift Method was primary invented. It was built in the 1960's with the Balanced Cantilever Method. For the alternative design using the Balanced Lift Method, a hollow box girder with compression struts next to the webs was elaborated to obtain a 20,5 m wide carriageway. The most important part of the Balanced Lift Method is the lifting process. Therefore, and for the static system of the final condition, compression struts are required, which are important load carrying members. The cross section of these compression struts as well as the cross section of the bridge girders are made out of thin wall precast elements. Starting with building the pier and the vertical installation of the prefabricated elements, the construction is ready for the lifting process.

To allow a realistic comparison between the two bridge construction methods, a redesign of the original San Leonardo Viaduct based on the Eurocodes was necessary. Finally, it can be said that for the evaluated bridge a reduction of up to 30% of the concrete mass would be possible by using the Balanced Lift Method. Cement production and therefore concrete production is a very CO₂-intense process. By saving concrete mass due to the advantages of the Balanced Lift Method a considerable CO₂-reduction can be achieved.

Keywords: Precast concrete elements, Bridge construction method, Alternative design study, Balanced cantilever method