

System behaviour in concrete T-beam bridges

In the Netherlands, approximately 66 prestressed concrete T-beam bridges with cast-in-between decks mainly built around the sixties are still in service. Upon assessment, the strength of these bridges is often too low. This is partly due to the increased traffic loads and partly due to the changes in codes, for example the Eurocode provisions for shear. However, for these types of bridges several mechanism could possibly contribute to a higher load bearing capacity that are usually not taken into account. One of the possible beneficial mechanism is compressive membrane action (CMA), in transverse direction, in the concrete deck slab. Another potential mechanism is arch action, in longitudinal direction, in the T-beam. To explore these mechanism, and the ultimate load capacity, an existing simply supported multi-span T-beam bridge was tested in full size collapse tests. In total seven experiments were carried out using a single point load placed on the T-beam. To analyse these tests a non-linear finite element model of the complete bridge is being developed using DIANA and Python code. For the assessment of existing bridges in the Netherlands with non-linear finite element models usually a single beam is modelled. However, with a full bridge model it becomes possible to analyse the so called 'system behaviour' of the bridge with the aforementioned mechanism. Ultimately, the goal of this research is to improve the calculation methods for the existing T-beam bridges in the Netherlands.