

The circular arch viaduct: reduce, re-use & recycle in practice

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Abstract

This paper describes a proposal for a Circular Arch Viaduct. The proposal was submitted for a competition for innovation launched by Rijkswaterstaat, the Dutch Directorate-General for Public Works and Water Management, under the title 'SBIR (Small Business Innovation Research) Circular Viaducts and Bridges'. The authors of this paper are part of a consortium consisting of BESIX NL and Ney & Partners. They have currently rounded up the first phase of the competition (Figure 1).

Our society has become accustomed to the permanent availability of raw materials; our economy has been running on them for decades. At the same time, the demand for mobility and reliable infrastructure continues to grow. How do we transform the construction industry to use 50% less primary raw materials in 2030 on the way to full 100% circularity in 2050? To answer this question the Circular Arch Viaduct was developed, based on three principles: (1) the reduction of raw materials, (2) the differentiation of materials in function of required strength, and (3) the reduction of waste through re-use and recycling.



Figure 1. The current concept of the Circular Arch Viaduct.

Keywords: circularity; viaducts; compression arch; Ultra High Performance Fibre Reinforced Concrete; UHPFRC; form-finding; geopolymer concrete; sustainability