Re-use of precast girders
Wietse de Jong

Projectmanager of the SBIR Circulair bridges and overpasses at Rijkswaterstaat

“Rijkswaterstaat is the executive agency of the Ministry of Infrastructure and Water Management, dedicated to promote safety, mobility and the quality of life in the Netherlands.”
Subjects

- Goals of the transition
- SBIR explained
- Proposals of the prototypes
- Reuse of precast materials
Goals of the transition

- Circular in 2030
- In this part we are searching for buyable circular object and products
- Transition ≠ Project
Why circular viaducts and overpasses

› 15.000
› 5.000
› 50
› 90% are prefabricated girders
› Relatively easy, as in interfaces
First circular viaduct – Kampen - 2019
Asking the right question, Select where to innovate

Result has to be a overpass over a minimal of 2x2 motorway and at least:
› Modular or
› Reused or
› Renewable (biobased) or
› A combination

› It may be a system innovation, process innovation but is also has to be a product innovation
Asking the right question, How to select and the mechanisms innovation

Evaluation criteria and not so measurable objectives

- **Impact**
  - 2030 (circular goal)
  - MKI (environmental cost indicator, CO2)
  - Consortia, pushing the transition

- **Feasibility**
  - Makeable
  - Anti fragile
  - Standardisation

- **Economic perspective**
  - (Circular) Business model
  - Intellectual property
Proposals

› 32 propositions
› Lots of “Wow!” factor
› Creative
› Some not very feasible

› 10 feasibility studies
› All of both consortia
› Mostly feasible
Innovative building system for circular viaducts

The building system consists of a modular concrete arch construction and a recoverable substructure.

The concrete arch construction ensures efficient power transfer and makes impact plates unnecessary. This ensures material reduction. Also, no joint transitions and laying blocks are required. This results in a low-maintenance system with low costs over the entire service life.

The elements are demountable and have standardized dimensions and connections. This makes the system reusable and interchangeable at the element level. The asphalt pavement, rainwater drainage and cable and pipes are located on and in the ground package on the arch construction and do not form an obstacle to reuse of the system.
Vici
Example: ‘Closing the loop’

We are: ‘Closing the Loop’. We go for viaducts of high-quality reused object parts! Our consortium aims to achieve a high-quality reuse of existing viaducts in the form of new circular viaducts.

With 'Closing the Loop' we realize the first new viaduct of existing viaduct parts (Lego blocks) in the Netherlands. With this we give substance to the ambition of Rijkswaterstaat to realize the replacement task fully circularly by 2030.

To achieve this, the realization of three sub-innovations is necessary, namely: The development of the tool "reusability scan" to determine the reusability of existing object parts. Development of widely applicable design concepts for viaducts based on existing object parts in the form of Lego blocks. Realization of a circular viaduct with existing object parts based on the above-mentioned process steps.
“Closing the loop” a Lego mindset
Combinatie Liggers 2.0 (girders 2.0)
Supplier as part of the consortia
Harvesting Girder in Groningen
Modification and freeing the Precast girders
Prove of concept - Appingedam.
Prototype - Motorway A1
Hoog Burlo
Motorway - A9 Badhoevedorp-Holendrecht

› Harvesting 900 girders?
Harvesting A9 – Overpass Keizer Karel
Motorway – A44 - supplying 240 re-used precast girders
› https://www.linkedin.com/in/wietsdejong/

› www.circulaireviaducten.nl