A noval concept for lightweight green wildlife bridges

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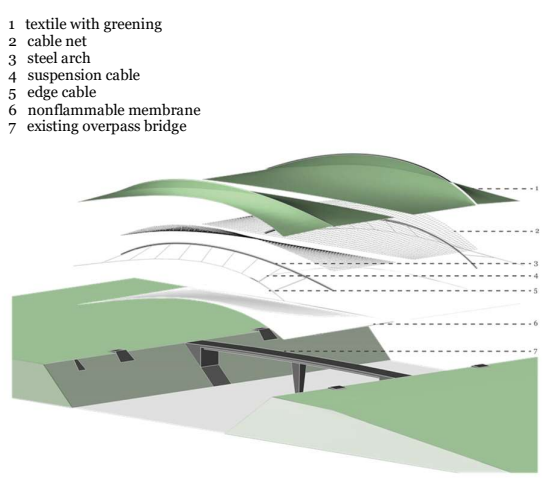

a) exploded view

b) view from crossing (top) and motorway (bottom)

Abstract

Approx. 70 existing wildlife overpasses span over the German Autobahn. The same number is currently in planning. These 50m wide bridges reconnect natural areas and prevent collisions between animals and motor vehicles. Typically, these bridges are built in a conventional way, most common as tunnels overcast with soil, costing around 4 Mio. € each.

The article is presenting a vision for a new lightweight green bridge, which could soon span the A 8 motorway near Stuttgart. The unique feature of the project is the expansion of an existing 5-meter wide agricultural overpass bridge through the sideway addition of two double curved cable nets to a total width of 50 meters. This design will allow a material reduction of up to 90% and save around 50% of costs compared to an entirely new built conventional bridge. For pedestrians, cyclists and even animals, it opens up a new green gate to the city. The full text will discuss the form finding and structural design of the cable nets, as well as the detailing of the textile and greening top layers.

The concept got awarded the ThinKing from the state agency for lightweight technology (Leichtbau BW) and the ministry of economy of the state Baden Württemberg currently funds further research.

The lightweight loadbearing structure is created out of steel arches and lateral support cables. A membrane will be laid across the mesh structure to provide a base for the extensive vegetation. An additional membrane will be stretched between the outer cable and the existing bridge for a uniform appearance when viewed from the motorway. The design selectively removes the motorway's interruption of nature by creating a natural zone for people and animals and offers a green gate into the city from the perspective of the motorists. The concept of the green bridge could also be used to cover inner-city busy roads and reduce the surface. In a current study of the authors, it is combined with living bridges to create a new residential area on top of an inner-city motorway, developing an unused prime location while reducing noise and pollution.