

Smart Green Bridge

Wildlife Crossing Bridges of New Generation

Jaroslav ŽÁK, Michal KRAUS, Petra MACHOVÁ & Jan PLACHÝ

Department of Civil Engineering, The Institute of Technology and Business in České Budějovice



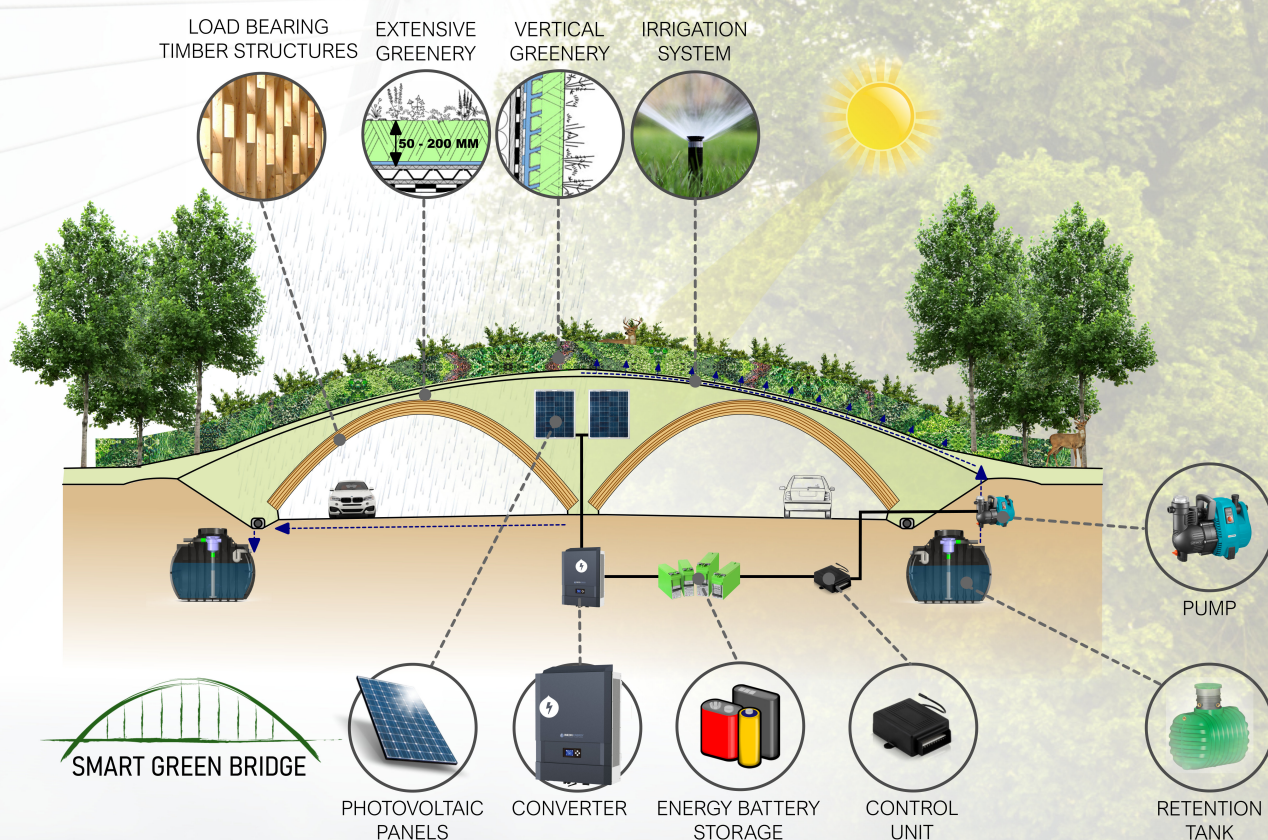
ABSTRACT

The contribution is focused on landscape-vegetation and technical-economic optimization of vegetation elements of buildings. The length of the motorway in the Czech Republic has increased approximately three times since 1995. Road transport infrastructure is constantly growing. Ensuring the passage of important transport structures for fauna is an objective requirement. The function of migration corridors is ensured by wildlife crossing bridge. These constructions are currently based on concrete and steel, which is not only environmentally friendly but also presents several other problems. The paper presents the idea of a new smart solution for wildlife crossing bridge. Smart Green Bridge is based on principles and technologies following the sustainable development such as the use of load-bearing timber structures, extensive greenery of about 100 mm thickness, vertical greenery, self-guiding vertical and horizontal irrigation systems, photovoltaic panels, energy storage and next.

CURRENT STATUS

Disadvantages and weaknesses of current structural and construction solutions of wildlife crossing bridges include:

- The major parameter of the negative biotic effect of the motorway under the wildlife crossing bridge is the wide width of current crossing structures.
- It is not possible to use standardized construction systems for the construction of current wildlife crossing bridges because these are individual projects.
- In order to ensure the growth of vegetation located on the surface of the wildlife crossing bridge, it is essential that the layer of soil is formed in a high thickness (mainly if it is a vaulted structure).
- Heavy and massive structures are the result of high loads.
- The retrofitting of existing wildlife crossing bridge cannot be achieved without the necessary restrictions on the traffic on the crossing road.



SMART GREEN BRIDGE

The new solution is illustrated above. The solution of the so-called light bridge construction is sufficient with a surface thickness of approx. 100 mm with a purposefully created water regime based on renewable energy sources. This solution means great relieving of the wildlife crossing bridges, drastically reduced material and energy demands, greater flexibility and economic efficiency. The secondary effect is the use of vertical - high greenery in the immediate vicinity of the wildlife crossing bridges, creating quiet places utilizing the use of the construction and thus its landscape and social meaningfulness. Efficient use of rainwater from the bridged road to ensure irrigation of vegetation is essential. Collecting water from the line structure (road or highway) will be collected into the retention tank and distributed to the horizontal and vertical vegetation using the soil moisture sensors and by own energy source (solar photovoltaic panels). The design of the new smart green crossing bridge solution means low demands on the technical solution, higher financial efficiency of the construction and minimal intervention in the construction and construction of the bridged road. From the landscape point of view, it is also possible to minimize the risks of anthropic impacts in the perimeter of the crossing bridge, and, for example, to increase the frequency of realized crossings on line constructions for economical sums.

CONCLUSIONS

Concerning the financial and technological demands of existing wildlife crossing bridge, it is necessary to demonstrate objectively the necessity of a wildlife crossing bridge under the given conditions, but also to examine all variants of the technical solution with an emphasis on the cost-optimal level and principles of sustainable development. The existing construction methods are very inefficient. Criticism of their construction is often justified. This contribution presents the new generation of wildlife crossing bridge, the so-called Smart Green Bridge. Smart Green Bridge is based on principles and technologies following the sustainable development such as the use of load-bearing timber structures, extensive greenery of about 100 mm thickness, vertical greenery, self-guiding vertical and horizontal irrigation systems, photovoltaic panels, battery energy storage and next.

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