

Bridges and Structures: Design Practice and New Trends

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Extended Abstract

Sustainable and innovative built environments require from structural engineers a broad knowledge from environmental and urban integration, architectural, hydraulics and geotechnical engineering, road and rail design. A variety of examples from our design practice along more than 45 years are presented.

Concept design of bridges and structures is a key stage for exploring ideas on new architectural and engineering thoughts. This should be developed from simple sketches and simplified calculations rather than detail drawings and complex computer models. In the following figure an example is given from a viaduct integrated in a urban space with a main span of 120 m axially suspended by stay cables. The back stays in a two plane arrangement and the mast with an opening at the base section allows pedestrian traffic in a 5m width walkway at the axis of the road platform



Figure 1. Viaduct over VCI in Oporto

Structural engineers face demands from Owners at very advanced design stages. In the design case of Figure 2 a sight view platform was asked in a steel box girder pedestrian bridge with a 77 m

main span over a channel. The platform is fixed to the deck that is moving with respect to the top pier section.



Figure 2. Bluewaters Bridge in Dubai

Structural engineers have to face increasing challenges from functional requirements in bridge design. In Figure 3, a pedestrian crossing of a large highway roundabout, with an underground highway crossing, should allow pedestrians to reach any point around the roundabout



Figure . 3 A design study for pedestrian elevated crossing over a large roundabout

Due to very large span lengths a mast has been inserted at the centre of the roundabout and a steel triangular deck, with cable stays from a central mast, has been adopted. The mast transfer the loads by four inclined struts to the retaining walls (Figure 4) of the underpass.