



The Design of the new Storstrøm Bridge: design philosophy, structural concepts, fundamental design and innovative construction methods.

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Abstract

This paper describes the structural design of the new Storstrøm Bridge under construction in Denmark, carried out by DMA - De Miranda Associati from the initial tender phase through development of basic design to the early phases of construction in 2021.

The bridge, the contracting entity for which is the Danish Road Directorate, is a prestressed concrete road and railway structure almost 4km long, including a central cable-stayed section with 160m spans and two approach viaducts.

The paper describes the design concepts, structural concepts, construction methods, static and dynamic analysis, as well as the wind analysis and the wind tunnel test campaign designed by DMA and carried out for assessing the structural response of the bridge to wind action.

Keywords: Long-sea-crossing-bridge; macro-prefabrication; ship-impact; aerodynamic design.

1 Introduction

The bridge is a 3.832 km road and railway link crossing the Storstrøm channel between Falster and Masedø, including two approach viaducts with 44 spans, 80m long, and a central cable-stayed bridge with two 160m spans.

This design was first developed by DMA during the Tender Phase in 2017, together with Geo Ltd (Dk) and Seteco Srl (I) for the foundations and Ekj Ltd (Dk) for landworks, as Structural Consultant of the JV formed by the Italian contractors Itinera, Condotte d'Acqua, and GLF. Work continued following the awarding of the project in partnership with Sgi Srl (I) for geotechnics and Andermann for landworks, with the Basic Design and Construction Method Design both approved by the Client. This was followed by Detailed Design of the prototype structures, which are the abutments, typical foundations and piers, cast-in-place girders, pre-cast girders and pylon foundation, which were also checked and approved, completing the fundamental design of

the bridge. DMA then accompanied the early phases of construction. After four years of design work, the baton was then passed on to local consultants for completion of detailing further and partially repetitive structures.

2 Design philosophy

The design of the structure and the conception of the construction methods are tightly linked in large bridges.

When De Miranda Associati began working on the design of the new Storstrøm Bridge, there were five main *challenges* to be faced and solved:

Logistics: building a four-kilometer-long bridge in the sea involves a need for transportation of vast quantities of materials and workers, and calls for optimization of the cost of transportation.

Weather: the northern European climate means low temperatures and frequent wind, requiring minimization of manpower working offshore.

Quality: the target of high concrete quality and