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OSLO
June 7 - June 8 2018



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COASTAL HIGHWAY ROUTE E39 – EXTREME STRUCTURES

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Abstract

The Coastal Highway Route E39 runs 1100 km from Kristiansand to Trondheim on the West Coast of Norway. The Norwegian National Transport Plan expresses an ambition that the E39 should be developed into a continuous road, efficiently tying together people and work-areas by cutting travel time by 50%. Sixty percent of Norway's traditional industry is located in the counties surrounding the E39, and one third of Norway's population live there.

To make the E39 continuous, seven ferries crossing Norwegian fjords needed to be replaced by bridges/fixed crossings; however, fjords span from 1.6 to 4.5 km in width, and 400-1250 m in depth. This means the bridges need to be 2-5 km long and anchored to the seabed 400-1250 m below. World-record-breaking, extreme structures need to be developed.

Nine fixed crossings are needed to replace the 7 ferries. Two of the crossings will be made by drilling subsea tunnels (length 14 and 27 km, down to 360 and 392 m depth). New world records for longest road tunnel, longest subsea tunnel and deepest road tunnel will be set. Three crossings are approximately 2 km long, and will be built as suspension bridges with known technology (today's world record is 1991 m). Plans for the remaining 4 crossings are under development. Floating bridges, submerged floating tube bridges (SFTB, floating tunnels), suspension bridges on floating or fixed platforms, and combinations of the above-mentioned solutions are being considered.

The project has a total cost of NOK 340 billion (€37 billion), and is estimated to be finished by 2050. To solve all the challenges related to crossing fjords, environmental loads (wind, waves, current), energy efficiency, environmental issues, safety issues, construction issues and so on, an extensive research programme has been started and 55 PhDs are currently involved in this research.

Keywords: bridge, tunnel, submerged floating bridge, tension-leg platform, #ferjefrie39, floating tunnel, concrete structures, world records, environment friendly construction, research.