A feasibility study: Crossing of the Sognefjord with a fixed connection

Lidvard SKORPA
Civil Engineer
Norwegian Public Roads Administration
Stavanger, NORWAY
lidvard.skorpa@vegvesen.no

Lidvard Skorpa, born in 1944, received his civil engineering degree from the Norwegian University of Science and Technology at Trondheim, Norway. He has worked for the Norwegian Public Roads Administration, most of the time involved in road development, especially fjord crossing projects.

Summary

Based on the first phase of a feasibility study, it may be concluded that it is possible to cross the Sognefjord, the second longest and deepest fjord in the world, with a fixed connection. The use of floating, anchored pontoons as foundations, makes it possible to cross the 3,7 km wide, and 1250 m deep fjord with different crossing methods. Thus knowledge and experience from offshore technology turns out to be of great importance for how to solve extreme fjord crossing projects.

In addition, this might be vital to projects in scenic inland lake areas or urban waterfront areas. In these areas, a not visible, submerged floating tunnel will have great advantages compared to other crossing methods, as there will be no conflict to visual intrusion, free passage of ships traffic, and less traffic pollution.

Keywords: Fjord crossings; bridges; submerged floating tunnels; floating bridges; suspension bridges; floating pontoons; environmentally friendly

1. Introduction

Norwegian fjords offer spectacular scenic views, either seen from the deck of a cruise ship, or from the road along the fjord. They are, however, barriers to crossing traffic, and thus to industrial growth in the coastal regions. Many of the ferry connections have been replaced by sub sea rock tunnels, or bridges, during the last years. But there are still many ferry connections left. As an example, there are still 8 ferry connections along the coastal trunk route E39, linking the major cities on the western coast of Norway between Kristiansand and Trondheim.

These are the most “extreme” fjord crossing projects, where the depth and width are exceeding what is thought to be possible by means of existing technology. On this background, the Norwegian Public Roads Administration, Western Region, started a feasibility study of how to cross the Sognefjord.

2. The feasibility study

The aim of this study is to answer two questions: Is it reasonable to think that extreme fjord crossings like the Sognefjord can be built during the next 10-15 years, and which alternative crossing methods are the most realistic.

Construction cost has not been a major question in this phase of the study, but this and other aspects like safety, maintenance problems, visibility and energy consumption, have been kept in mind.

2.1 Site conditions

At the crossing site, the Sognefjord is 3,7 km wide and 1250 m deep. There is no island in the fjord, the shores going down to full depth at a steep gradient. The area is sheltered to ocean waves, but exposed to wind generated waves. Current speed is 1,5 m/s at the surface, and might have opposite

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