

Crossing of Bjørnafjorden – Floating Bridge Solution

Bruno Villoria

Norwegian Public Roads Administration

Sverre Wiborg

COWI

Contact: bruno.villoria@vegvesen.no and swi@cowi.com

Abstract

The purpose of this paper is to present the different floating bridge solutions that have been evaluated for the crossing of Bjørnafjorden. It appears to be feasible to place the navigation channel either in the middle of the fjord or in the vicinity of the southern shore. In both scenarios a straight bridge alternative anchored to the seabed and a curved solution without mooring lines are evaluated.

Keywords: Floating bridge, cable-stayed bridge, environmental loads

1 Introduction

The Norwegian Public Roads Administration (NPRA) is planning to connect Kristiansand to Trondheim without ferry crossing. The present paper aims to describe the feasibility studies that have been conducted by a consortium consisting of COWI, Aas Jakobsen and Johs. Holt assisted by Global Maritime, Skanska, NGL and Teknisk Data regarding a floating bridge solution for the crossing of Bjørnafjorden.

The complex nature of a floating bridge has led the aforementioned companies to associate their competences and to form a multidisciplinary group.

The purpose of the feasibility study, summarized in this paper, is to provide the NPRA with the means to evaluate the relevance of a floating bridge alternative and to compare it with other concepts.

The length of the alternatives described in the present paper would exceed 4,000 m combined with a maximum depth of 550 m in the fjord, making a floating bridge over Bjørnafjorden one of the most ambitious bridge constructions ever built.

2 Navigation channel in the middle of the fjord

2.1 Straight bridge alternative

2.1.1 General description

The straight bridge alternative (see Fig. 1) consists of a unique steel girder resting on eighteen floating supports referred to as pontoons.



Fig. 1 Straight Bridge Alternative

The bridge is assisted with mooring lines anchored to the seabed to withstand the large side loads acting on the structure due to the harsh wind, waves and current conditions expected in the fjord.