

THE CABLE NET BRIDGE

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ABSTRACT

This paper comprises a preliminary footbridge design concept, intended for the quay areas of Tønsberg and Kaldnes, in Vestfold, Norway. With an engineering approach, the paper investigates the usefulness of a cable-net concept using tension membrane technology, and includes simplified design analysis and natural frequency controls. The aim of the project is to create a bridge concept with a stable and light structure, as well as serve the city inhabitants a positive tectonic experience. The paper reports on its contextual background, inspirational sources, and present some structural outputs of the bridges superstructure.

The bridge concept involves a 200-meter-long and 12-meter-wide cable-net bridge, with a 6-meter-wide timber grid shell on top, as the pedestrian footpath. This is a quite novel concept, tension bridges usually use tall towers to hang the structure. This paper study the cable-net concept, and some structural concerns on the cable-net and and a timber grid. Other relevant issues such as a bascule tilt function, or design of substructure are not addressed in this paper. The project concludes this bridge concept to have some potential, but deemed unsuitable for the canal area in Tønsberg... The bridge deck is of academic interest, and deserve further exploration. Yet, the public of Tønsberg request for a bascule bridge with tilt function. The canal offer nothing but poor ground and anchorage conditions. Hence, this outlined cable-net bridge become impractical and overly complicated to its addressed location. On the other hand, for urban areas with accessible rock footings, this bridge concept may be ideal.

1 INTRODUCTION

Vestfold County published in September 2019 a new city transportation scheme, aiming to improve pedestrian mobility around Tønsberg and reduce the demand for driving through and around the city promenade. Their report recommends a new footbridge to be constructed 200 m west for the existing footbridge, making a 250 m wide crossing with tilting function and 6 m width for pedestrian traffic located in the quay areas, Kaldnes west and Tollboden in Tønsberg. The canal is about 250 meters wide and 7 meters deep, with soft ground conditions.

The proposed bridge is indicated in figure 5, furthest west (left). Yet, the current south-bank of Kaldnes West is still a industrial zone – likely to become a residential area within this decade.



Fig. 1: City plan, and current Kaldnes West [1]

Kaldnes has developed significantly over the last 25 years, from an old industrial seat. Today, the council hope a new link at the canal's west end will strengthen the pedestrian mobility along the bay with the possibility to cross the canal at both ends [2].