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Data-driven operation and maintenance of the Normandy and Tancarville long-span bridges

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ABSTRACT

With main spans of 608m and 856m respectively, Pont de Tancarville and Pont de Normandie are the longest suspension and cable-stayed bridges in France. Both bridges are managed by CCI Seine Estuaire, with a concession granted until 2031. Pont de Tancarville was opened to traffic in 1959 at which time it was the longest suspended bridge in Europe. The composite deck comprises a Robinson slab with stiffening truss girders. The main suspension cables and hangers were replaced in 1999 after the failure of 1 out of 120 strands was discovered. Pont de Normandie was built in the late 1990s, to enhance the connection between the Le Havre, the second largest French harbour, and the western coastal area. Opened in 1995, it was once the world longest cable stayed bridge and drove a technological leap in bridge construction.

COWI and Setec tpi are currently assisting CCI with investigative and diagnostic activities on the two bridges, focusing on suspension systems, articulation, and the concrete structures. This work makes use of extensive, but targeted, structural health monitoring combined with an understanding of the structural systems to investigate the performance of key structural elements. The present paper describes the main activities being undertaken to enable CCI to plan corrective and preventive measures to extend the design lives of the structures and to ensure a safe passage for the users of both bridges.

Keywords: cable stayed bridge, suspension bridge, diagnosis, structural health monitoring, data science

1 INTRODUCTION

In January 2022, Setec tpi and COWI were jointly awarded a framework agreement with CCI Seine Estuaire (the Concessionaire) to help diagnose problems, advise on remediation measures and carry out external reviews of maintenance works carried out on Pont de Normandie and Pont de Tancarville. The framework agreement is valid for one year and may be renewed up to three times. It covers the cables, articulation systems, concrete structures, post-tensioning tendons and external reviews of maintenance works. Through the framework agreement, Setec tpi and COWI assist CCI through the use of sensor data, finite element (FE) modelling, and on-site investigative measures in order to assess the residual lifetime of the bridges' structural components and to provide recommendations for corresponding maintenance works. In addition, a Technical Committee of bridge experts supports CCI to validate the results interpretation and the conclusions of investigations, engage further diagnostic activities and take decisions regarding the bridge maintenance works.