



Forces in Temporary Piers in Bridge Built using Balanced Cantilever Method

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Abstract

The paper concerns the construction of an extradosed bridge in Poland. The bridge has been designed as a four span structure and was erected using balanced cantilever method. The length of the main span is 206 m and it holds the record for extradosed bridges in Europe. In order to improve safety of the building during construction, each of the cantilevers was stabilized by a temporary pier. The values of normal forces in temporary piers were controlled by sensor gauges installed on temporary steel bearings. Based on the measured deformations, real-time charts of normal forces in the temporary piers were recorded. Normal forces in temporary piers changed when the arms of cantilevers were loaded asymmetrically. The increase in normal forces resulted from the movement of form travellers and segment casting. In this way theoretical changes of normal forces values in temporary piers could be compared with the real ones.

Keywords: extradosed bridge, balanced cantilever, temporary pier, post-tensioning, normal force

1 Introduction

There are many scientific publications with proposed construction loads values which should be checked for stability of the constructions built using balanced cantilever method [1] [2] [3] [4] [5]. However, there is no way to verify the real forces which act on the superstructure. Such verification is only possible by monitoring the real normal forces values in stabilizing temporary pier and comparing them with theoretical forces caused by known and quantified construction loads such as dead load (i.e. self-weight of concrete structure), form travellers etc. The

author of the paper is trying to answer what assumed values of random loads are correct for construction of the real bridge.

2 About the extradosed bridge

The paper describes the construction of extradosed bridge situated in Masuria - a region in northern Poland famous for its 2000 lakes. It is located within Polish national road No 16 (DK16) in the south of the town of Ostróda. The designer of the bridge is Tadeusz Stefanowski (Transprojekt Gdański Sp. z o.o.) and the unit responsible for the construction and maintenance is Budimex SA and Ferrovial Agroman consortium.