Design and construction of the “Chaumény” footbridge in posttensioned UHPFRC

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Abstract

In 2020/21, the “Chaumény” footbridge was built in posttensioned UHPFRC over a railway line in the city of Montreux, Switzerland. UHPFRC stands for Ultra High Performance Fiber Reinforced Cementitious composite. UHPFRC shows high resistance both in tension and compression as well as excellent durability properties. The design and construction of the lightweight structure is described. The structure consists of a U-shaped trough girder with a span of 22.5m above the railway clearance, resting on one abutment and one pier, as well as a staircase leading from the pier down to the ground. The footbridge is composed of several precast elements that were assembled by posttensioning to achieve monolithically linked structure.

Keywords: UHPFRC, footbridges, design principles, dimensioning of UHPFRC structural elements, precast elements, mounting of structural elements.

1 Introduction

“UHPFRC” stands for Ultra-High Performance Fibre Reinforced Cementitious Composite materials. UHPFRC is composed of cement and other reactive powders, additions, hard fine particles, low amount of water, admixtures and very high amount of relatively short and slender steel fibres.

UHPFRC materials have been developed over the last 40 years. Today, the best UHPFRC have significant tensile strain hardening behaviour and relatively high resistance both in tension and compression. To enhance the structural behaviour and resistance, it is advantageous to complement UHPFRC with reinforcing bars and prestressing. UHPFRC is a very compact material and is thus waterproof and crack-free under service stresses