

The replacement of the Uusi-Pitkälä underpass bridge

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Abstract

The goal of this paper is to present an example of the Finnish construction and designing methods of railway bridges on existing railway lines.

Keywords: railway; bridge; post-tensioning; construction method.

1 Introduction

The Uusi-Pitkälä underpass bridge, constructed in 1976, in Muurame Finland carries the Tampere-Jyväskylä single-track railway and flies over the Teollisuustie road. The total length of the post-tensioned concrete bridge is 102 m. Because of the box girders' top parts' frost damages, the rehabilitation of the existing bridge was considered to be too risky and the bridge was decided to be replaced with a new one.



Figure 1. The old box girder bridge

The contract type of the project was design and build. The effective width of the bridge had to be

over 7.2 m and the clearance more than 4.8 m. The client had given bidders a basic design with spans of 2+30+43+30+2 m (sum 107 m) but the design and build qualifications allowed to make some changes.

The tendering phase was carried out in the summer and autumn of 2019. Destia Ltd's tender with Sweco's bridge designs won the competition. The plan of the post-tensioned concrete underpass bridge was drawn with an H-shape superstructure section and 2.2+34.5+38+23+2.2 m spans (sum 99.9 m).

2 Engineering work

The bridge's designing work had to be matched with a lot of different initial data such as the terrain, the railway, the road, the municipal infrastructure, the temporary constructions and the old bridge's structures.

2.1 The bridge substructures

The construction work and the structural planning proceeded simultaneously with a very tight timetable. The rock socket pile drilling was carried out in the beginning of the year 2020. The steel pile sizes of support lines T1 and T4 are 610x14,2 mm. One of the four middle support's 1019x14,2 mm