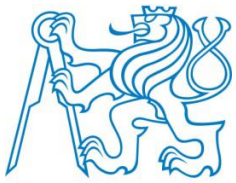

CZECH TECHNICAL UNIVERSITY IN PRAGUE

Faculty of Civil Engineering

Department of Concrete and Masonry Structures

STEEL – CONCRETE COMPOSITE FLYOVER

MASTER THESIS

Bc. SAMAL GUBASHEVA

2019

Statutory Declaration

I declare that I have developed and written the Master Thesis completely by myself and have not used sources or means without declaration in the text. Any thoughts from others or quotations are clearly marked. All the materials I have used for the Master thesis are listed in the references.

……

Signature

Abstract

The Master thesis deals with the design of the main supporting structure (superstructure) of the road bridge, made of four prefabricated composite girders, which simultaneously make formwork for the deck from in-situ concrete.

The bridge serves as a flyover above the highway D11. In the thesis will be represented three alternatives of the bridge, such as simply supported beam bridge with one span, simply supported beam bridge with two spans and integral bridge with one span. Because of the large span of 47,6m and limited clearance under the bridge of 5 m, the bridge is designed as an integral construction.

Keywords: Integral bridge, substructure, steel-concrete composite structure, precast concrete slab, single span bridge

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Introduction

The main subject of this Master thesis is the static design of the main supporting structure (substructure) of the new road bridge across the D11 highway.

The thesis consists from four parts:

Part A – Alternatives of the bridge

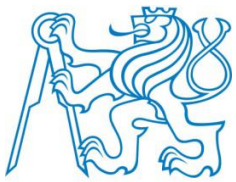
Part B – Technical report

Part C – Structural analysis

Part D – Drawings

The part A represents three different alternatives of the bridge, such as simply supported beam bridge with one span, simply supported beam bridge with two spans and integral bridge with one span. Because of the large span of 47,6m and limited clearance under the bridge of 5 m, the bridge will be designed as an integral construction.

After, in part C the structure will be modeled on SCIA Engineering program. The values of internal forces will be subtracted from two cross-sections of the main girder. The usage of materials will be checked at the end of the calculation.



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PART A: CONCEPTUAL ALTERNATIVES OF THE BRIDGE

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Content

1. The bridge alternatives

Figure 1. represents schemes of three different alternatives of the steel-concrete composite bridge. The bridges serve as a flyover above the highway. The width of the bridges is the same, 12,6 m. The height of the bridges is also the same, 8m. The total span of the bridge is 47.6 m. The height of the transit space is 5 m. Other dimensions of the bridges are designed only on the basis of experience.

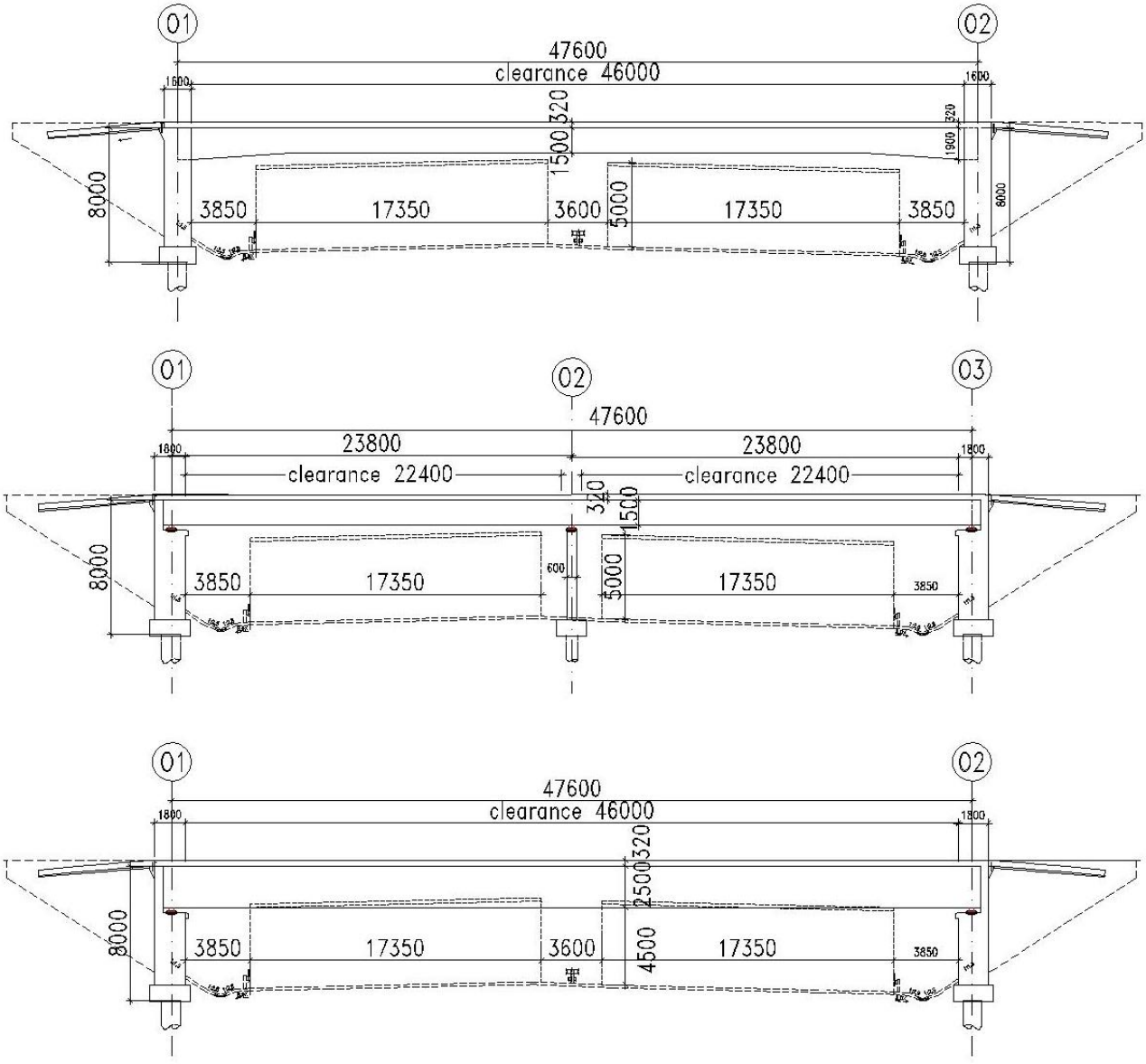

Figure 1. The longitudinal schemes of three different alternatives of the steel-concrete composite bridge

The first one is an integral bridge with a single span of 47.6 m. The total depth of the concrete deck and the composite beam is 1500 mm + 320mm in the middle span and 1900 mm + 320mm close to the supports. The clearance under the bridge is 5.5 m.

The second one is simply supported beam bridge with two spans, 23.8 + 23.8 m. The total depth of the concrete deck and the composite beam is 1500 mm + 320mm along the bridge. The clearance under the bridge is 5.5 m.

The third one is simply supported beam bridge with one span, 47.6 m. The total depth of the concrete deck and the composite beam is 2500 mm + 320mm along the bridge. The clearance under the bridge is 4.5 m.

2. Conclusion

The third bridge is certainly not suitable. Because of the large span, the height of the girders is too big, 2.5 m, which also not acceptable for the transit space. The second alternative of the bridge does not have problems like the third one, but the construction of the central pier will affect the traffic flow on the highway. Even though it is simple in construction and better adapts to displacement loads, it can not be designed for very big spans like the integral bridge. Also, the request from the client was to design one span bridge, so the final choice goes to Integral bridge.