



## Integral Bridges. First Integral Railway Bridge in the Czech Republic

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### Summary

Concept of integral bridges is a modern solution for short- and medium-span bridges, which enables design and construction of safe and economical structures with low requirements for maintenance during their life time. This concept is a way to built structures for long and efficient life, it means reliable structures with long durability and low maintenance costs.

The paper is divided into two parts – in the first part, some special problems of integral bridges are commented. Second part of the paper is devoted to the design, construction and monitoring of the first integral railway bridge in the Czech Republic, which is now built near Česká Třebová. The bridge is located on the main double-track railway line Prague – Olomouc.

**Keywords:** Integral; bridge; road; railway.

### 1. Introduction

Integral bridges are expected to have lower initial costs, longer durability, longer design life and lower needs and costs of maintenance. Because of these qualities, integral bridges are more widely used in many countries of the world for short- and medium-span bridges.

Integral bridges have usually rigidly connected superstructure with end abutments (and with intermediate supports in the case of multi-span bridges), founded on flexible piles. In some cases, superstructure is supported with bridge bearings. Due of this fact, integral bridges are used to be divided into two principal groups:

1. fully integral bridges, which have nor expansion joints, neither bridge bearings,
2. semi-integar bridges, which have expansion joints, but have no bearings.

The price which is supposed to be paid for advantages of integral bridges, is more difficult maintenance of the approach areas and its costs – [ 1 ], [ 2 ]. To improve these areas, some integral bridges are added with transition slabs. In the first part of this paper, a new arrangement of transition slabs, special for integral bridges, is proposed.

### 2. Approach area of integral bridges

At ballasted railway bridges, the problem of approach area is not as serious as at road bridges, because stresses and movements between end abutments and soil backfill are overtaken with the structure of railway tracks and ballast. At road bridges, these movements can cause cracks in the running surface and decrease its durability.

The word “integral” means something as “common, one common unit”. In the principle, it is necessary to ask a question:

**what we expect to be “integral”?**

The bridge itself, or the bridge structure with soil backfill and running surface behind end abutments? If we expect the bridge to be integral itself, it should have contain no bearings. In most