



## Research of Performance and Durability of long span prestress concrete box Girder Bridge of gravel concrete

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### Abstract

The Zemun-Borca Bridge Project as the basis, based on the nearest drawn, resource conservation and environmental protection principles, and effective use of the bridge located at the gravel resources. This paper carry out a comparative study with crushed stone concrete in the material properties of pebbles from the mix, durability, creep characteristics.

Studies have shown that, compared to the same mix, working performance of gravel concrete is better than rubble concrete, but the intensity is lower than rubble concrete, natural gravel can be formulated to meet the engineering application of concrete mix. In the same compression under the conditions of strength, creep coefficient is slightly larger than rubble concrete with 5d, 7d, 14d and 28d loading age. With the extension of age, the difference between the two is narrowing.

**Keywords:** gravel concrete; rubble concrete; working performance concrete mixture ratio; creep.

### 1 Project introduction

The Zemun - Bossa bridge across the Danube in Belgrade. The project construction can effectively improve the Belgrade city traffic, and produce positive effects on the development of the north shore of the Danube. To make full use of natural resources of gravel in the bridge site, the bridge utilized gravel concrete materials.

The Zemun-Borca bridge adopts an economical and practical construction of prestressed concrete continuous girder bridge with variable cross-section, with (95+172+95) m span layout (As shown in figure 1) . The girder is single-box, single-cell girder with variable cross-section.



Figure 1. Zemun-borca main bridge

### 2 Comparative study on the working performance

Fixed material usage and proportion of cementations systems, different water/cement ratio of concrete are selected. Made the slump of the gravel concrete close to the one of rubble concrete and then compared the extension degree of concrete, air content, density, and 7d and 28d compressive strength. Rubble concrete