Key Technologies of Precast Segment Production for the 4th Ring Transportation Corridor in Zhengzhou, Henan, China

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Abstract

The 4th Ring Transportation Corridor in Zhengzhou, Henan, China (the Project) is implemented in accordance with the design scheme of integral bridge structures and the short-line match casting method. This paper focuses on key technologies of segment precasting used in the Project, involving the design and layout of precast yards, the formwork design for precast segments and the geometry control in the precast yards as well as the application of information technology in precast yards. It can be used as references for projects related to precast segment production in the industry.

Keywords: 4th ring; Zhengzhou; precast bridge; segment; precast yards; geometry control; match cast; short-line; small radius; information technology

1 Introduction

Located in Zhengzhou, Henan Province, the 4th Ring Transportation Corridor in Zhengzhou has a total length of 93.3km. It is an urban transportation mega project with enormous investment and the engineering dimensions are among China's largest urban expressway construction projects.

Situated in the main urban area of Zhengzhou, the 4th Ring Transportation Corridor passes through several administrative districts of the city. Approximately 70% of the total line are elevated viaducts. Both the government and local residents were in urgent need for a bridge construction plan featuring the shortest construction schedule, with minimal construction impact, most convenient transportation of raw material, lowest cost, and minimized maintenance for the future. The innovative design scheme of integral bridge structures and the short-line match-casting method are used for this project, ensuring environmental protection, energy conservation and emission reduction and optimizing economic factors to the greatest extent.

There are 27 interchanges and 39 pairs of on and off ramps along the 4th Ring Transportation Corridor. A challenge was the complicated alignment conditions along the 4th Ring Transportation Corridor, which influenced the layout of the elevated expressway significantly. The general design concept for the elevated expressway was to build the bridges in the center above the existing road with piers in the existing greenbelt. Where, due to space restrictions or utility line interference, it was not possible to build the bridge in the center, the elevated viaducts were constructed at the outsides of the existing road. This led to alignments with the elevated

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