

# A Comparative Study on Viaduct Structure around New High-speed Railway Stations

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## Summary

Based on study of three new viaducts in Wuhan, Guangzhou and Yueqing Station, a series of aspects have been compared, including structural system, cross-sectional form, force characteristics, construction methods and period, operation maintenance, appearance modelling and material consumption. Then, three representative bridge forms have been analyzed, including prestressed concrete beam bridge, steel bridge and hollow slab beam bridge. The railway station Viaducts are characterized by a series of unique designs. Part of the conclusions has certain reference significance to the choice of an elevated bridge structure. Some of the problems reflected should be a high priority during bridge design.

**Keywords:** Viaduct structure around railway stations, prestressed concrete beam bridge, steel beam bridge, hollow slab beam bridge

## 1. Introduction

The viaducts around newly-built high-speed railway stations are the infrastructure in the densely populated area. Due to restrictions on construction and existing lines, the curve radius is generally small. Being near the subway and close to the station house, the construction condition is complex. The bridge span arrangement should be coordinated with the station building. Besides, as bridges in the city, they require not only safety and economy but also attractive appearance.

Based on study of three newly-built viaducts in Wuhan, Guangzhou and Yueqing Station and from the aspects of structural system, cross-sectional form, force characteristics, construction methods and period, operation maintenance, appearance modeling and material consumption, three representative bridge forms applied around the railway stations have been analyzed and compared, including prestressed concrete beam bridge, steel beam bridge and hollow slab beam bridge. The railway station Viaducts are characterized by a series of unique designs, including adopting hollow slab beam to reduce weight, adjusting the layout of bridge span in order to cross the metro lines and avoid the doors and windows of the station house, using bracket structure to ensure the alignment with aesthetics, setting the vase-type piers to create a beautiful bridge environment.

## 2. Engineering background

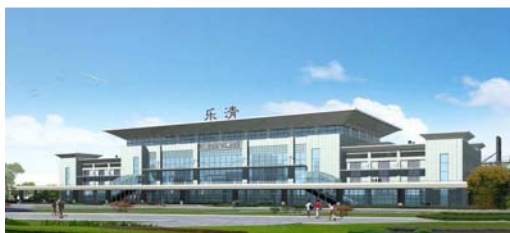


Fig. 1: Virtual Image of Yueqing Station

Ningbo-Taizhou-Wenzhou railway line is 282.38km, which is a part of the "Four Vertical and Four Horizontal" passenger railway lines in "Long-term Railway Network Plan". The design speed is 200km/h, which can be raised to 250~300km/h. Yueqing Station is located at Xiaruan Village. The building area of the station house is 17000 square meters.