

# A Preliminary Study on Construction Survey Technology for Quasi-Rectangular Tunnels (Post-print)

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## Abstract

As a new form of tunnel cross-section, the rectangular-like tunnel features a single-tunnel double-track layout, which significantly saves underground space and demolition costs compared to traditional circular tunnels. Moreover, its unique structural and cross-sectional characteristics differentiate its construction surveying from that of conventional circular tunnels, necessitating the development of corresponding measurement methods tailored to these features to ensure breakthrough accuracy. This paper, taking the Ningbo S31KY project as a case study, elaborates in detail on the key technical challenges, targeted measures, and implementation outcomes of construction surveying for rectangular-like tunnels, while also clarifying the distinctions between surveying practices for rectangular-like and circular tunnels. The findings provide a valuable reference for construction surveying in future rectangular-like tunnel projects.

## Full Text

### Preamble

#### A Brief Discussion on Construction Surveying Technology for Quasi-Rectangular Tunnels

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**Abstract:** Quasi-rectangular tunnels represent a novel tunnel cross-section form featuring a single-cavern double-track layout, which significantly reduces underground space occupation and demolition and reconstruction costs compared to conventional circular tunnels. Their unique structural and cross-sectional characteristics also distinguish construction surveying requirements from those of traditional circular tunnels, necessitating tailored measurement

methodologies to ensure tunnel alignment precision. This paper examines the Ningbo S31KY project as a case study, systematically elaborating on the key technical challenges, targeted measures, and implementation outcomes of quasi-rectangular tunnel construction surveying, while highlighting the differences from circular tunnel surveying practices. The findings provide a valuable reference for future quasi-rectangular tunnel construction surveying projects.

**Keywords:** quasi-rectangular tunnel; connection survey; cross-section survey

*Note: Figure translations are in progress. See original paper for figures.*

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