A Preliminary Discussion on Construction Technology for Extra-Large Cross-Section Rectangular Pipe Jacking with Central Partition Wall (Postprint)

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Abstract

With the continuous advancement of trenchless technology, the application scope of rectangular pipe jacking construction has been continually expanding. This paper presents a case study of the super-large cross-section rectangular pipe jacking construction with a precast middle partition wall for Fuzhou Metro Line 4, elaborating in detail on the impacts on pipe jacking construction arising from the division of the tunnel into compartments by the middle partition wall within the pipe segments, as well as the corresponding mitigation measures. The external contour dimensions of the pipe jacking tunnel are 10.8m$×$7.5m, with a wall thickness of 700mm and a standard pipe segment length of 1.5m; a 400mm-thick vertical middle partition wall is installed within a 131.122m interval. To address issues such as obstructed surveying sightlines and constrained muck transportation resulting from the presence of the middle partition wall, the project implemented measures including separation of personnel and vehicles, and alternating dual muck boxes for spoil removal. This project marks the first domestic application of super-large cross-section rectangular pipe jacking construction in a metro interval, and the technical measures for pipe jacking described herein can provide valuable experience for future similar projects, including metro entrance/exit lines, single-tube double-track intervals, crossover sections, and multi-compartment utility tunnels constructed by the pipe jacking method.

Full Text

Preamble

A Brief Discussion on the Construction Technology of Ultra-Large Cross-Section Rectangular Pipe Jacking with Intermediate Walls

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Abstract

With the continuous advancement of trenchless technology, the application domain of rectangular pipe jacking construction has been steadily expanding. This paper examines the ultra-large cross-section rectangular pipe jacking project with intermediate walls for Fuzhou Metro Line 4 as a case study, providing a detailed account of the construction impacts and mitigation measures arising from the precast intermediate walls within pipe segments that partition the tunnel into multiple compartments.

The pipe jacking tunnel features an external profile of 10.8m$×$7.5m, a wall thickness of 700mm, and standard pipe segment lengths of 1.5m. A 400mm-thick vertical intermediate wall was installed within a 131.122m section of the tunnel. To address issues such as obstructed survey sightlines and restricted muck transportation caused by the presence of the intermediate wall, the project implemented measures including separation of personnel and vehicle traffic and alternating dual muck box removal.

As the first domestic application of ultra-large cross-section rectangular pipe jacking construction in a metro running tunnel, the technical measures introduced in this project can provide valuable experience for future similar projects, including metro access/departure lines, single-tunnel double-track sections, crossover sections, and multi-compartment utility tunnels constructed using the pipe jacking method.

Keywords: Trenchless technology; Metro running tunnel; Tunnel compartmentalization with intermediate walls; Rectangular pipe jacking; Construction technology

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