Diaphragm Wall Construction Safety Technology and Application Research in Deep Foundation Pit Support: Postprint

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Date: 2025-07-29T19:11:14+00:00

Abstract

Deep foundation pit support constitutes a critical component for ensuring construction safety of underground engineering projects and stability of the surrounding environment, wherein the selection and application of appropriate technologies hold significant importance. Diaphragm walls, by virtue of their superior water-sealing performance, substantial wall stiffness, and minimal environmental impact, are extensively utilized in deep foundation pit support systems. Nevertheless, diaphragm wall construction encompasses multiple processes including trench excavation, steel cage hoisting, and underwater concrete placement, typically conducted under complex geological conditions (e.g., soft soils, water-saturated strata) and in densely populated urban settings, thereby predisposing to safety incidents such as trench wall collapse, mechanical injuries, and electrical hazards. This paper presents a comprehensive analysis of the construction technologies and safety risks associated with diaphragm walls in deep foundation pit support, and examines their application effectiveness through integration with actual engineering case studies, aiming to provide valuable references for pertinent engineering practice.

Full Text

Research on Construction Safety Technology and Application of Diaphragm Walls in Deep Foundation Pit Support

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Abstract

Deep foundation pit support is critical for ensuring construction safety in underground projects and maintaining stability of the surrounding environment. Diaphragm walls are widely adopted in deep foundation pit support systems due to their excellent water-sealing performance, high wall stiffness, and minimal impact on adjacent areas. However, diaphragm wall construction involves multiple complex procedures including trenching, reinforcement cage hoisting, and underwater concrete pouring. These operations are often conducted in complex geological conditions—such as soft soil and water-rich strata—and dense urban environments, which can easily lead to safety accidents including trench wall collapse, mechanical injuries, and electrical hazards.

This paper provides a detailed analysis of the construction technologies and safety risks associated with diaphragm walls in deep foundation pit support. Furthermore, it examines their application effectiveness through integration with actual engineering case studies, aiming to offer valuable references for relevant engineering practice.

Keywords: Diaphragm wall; Deep foundation pit support; Construction; Technology; Application

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