

Analysis of Dewatering and Deformation Characteristics of Deep Foundation Pit Excavation for a Cable Tunnel: Postprint

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Abstract

Taking the deep foundation pit excavation of a cable tunnel as the research object, a numerical calculation model was established based on Midas GTS NX software, and the constructed model was validated using measured results, further investigating the dewatering and deformation characteristics during deep foundation pit excavation. The results indicate that the hydraulic head around the foundation pit shows a spherical distribution pattern, with the hydraulic head outside the pit being higher than that at the pit bottom, resulting in seepage from outside to inside the pit; the diaphragm wall demonstrates excellent blocking effect on the hydraulic connection of groundwater; the displacement of the diaphragm wall shows a pattern of initially increasing and subsequently decreasing from top to bottom, with a maximum horizontal displacement of 8.54 mm; the embedded depth of the support structure decreases with excavation depth, the maximum ground surface settlement gradually moves closer to the foundation pit, and the foundation pit heave reaches a maximum value of 6 cm at an excavation depth of 22.8 m.

Full Text

Preamble

Dewatering and Deformation Characteristics of Deep Foundation Pit Excavation for a Cable Tunnel Project

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Abstract

This study investigates a deep foundation pit excavation for a cable tunnel. A numerical calculation model was established using Midas GTS NX software and validated against field measurements. The model was further employed to explore the dewatering and deformation characteristics during the excavation process. The results indicate that: (1) the water head around the foundation pit exhibits a spherical distribution, with the external water head higher than that at the pit bottom, causing groundwater to seep from outside to inside the pit—the diaphragm wall effectively blocks hydraulic connectivity; (2) the horizontal displacement of the diaphragm wall increases from top to middle then decreases, with a maximum horizontal displacement of 8.54mm; (3) as the embedded depth of the support structure decreases with excavation depth, the maximum surface settlement gradually shifts toward the pit, and the maximum pit heave of 6cm occurs at an excavation depth of 22.8m.

Keywords: cable tunnel; deep foundation pit; excavation process; dewatering; deformation characteristics

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

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