
郑州市二七广场站某暗挖段初期支护设计+施工方案

摘要

自 18 世纪六十年代第一条地铁在伦敦全线通车,目前世界上已有近 50 个国家修建了地铁。我国地铁建设起步虽较晚,近二十年来随着国家政策的鼓励,我国地铁建设迎来了高峰期,但在地铁建设过程中还面临着诸多问题,地铁施工技术尚需完善^[4]。

本文所写内容涉及郑州市地铁 1 号线二七广场站暗挖段的施工,主要目的是通过该地铁站暗挖段施工工艺的比选,对开挖段进行初期支护设计、施工方案的确定,分析施工中遇到的一些工程问题并提供解决方案。二七广场暗挖段采用 CRD 法开挖,支护采用复合式衬砌,隧道洞身范围内岩土层主要为砂土和粉质黏土,拱顶距地面高度为 16.31m,全段为直线,无上下坡。

本文根据《地铁设计规范》(GB50157-2013)、《铁路隧道设计规范》(TB10003-2016)及相关规定,选用复合式支护结构形式,包括初期支护和二次衬砌,本文主要针对初期支护进行相关支护设计和施工组织。初期支护采用 C25 喷射混凝土、钢格栅、钢筋网和锚杆,初支厚度为 300mm,拱顶 150°范围内设置 ϕ 108×6mm 超前大管棚,初期支护与二衬之间设置防水层。

(1) 首先针对工程场地条件进行本暗挖段施工方法的比选,考虑到该拟建场地地层均为松软土层,地下水发育,需严格控制变形及沉降,最终选用浅埋暗挖法进行暗挖段施工。

(2) 针对选取的开挖方法,综合地质条件、施工进度、安全、环境保护等因素并参考规范选取支护形式,确定采用复合式衬砌支护形式,进行初期支护设计。

(3) 先运用荷载-结构法进行荷载计算,再运用 ANSYS 软件进行衬砌结构计算,确定出最危险截面,通过半理论半经验的方法选取初期支护设计参数,进行截面检算,

(4) 针对初期支护设计成果结合相关规范、规程来设计施工方案。

对初期支护设计及施工方案进行验证,浅埋暗挖法适合本暗挖段的施工,初期支护设计满足要求,施工方案解决了暗挖段的施工难题。

关键词: 地铁暗挖; 复合式衬砌; 初期支护设计; ANSYS; 施工方案

Abstract

In the 1860s, the first subway opened in London, nearly 50 countries have built subways in the world. Although the Chinese construction of the subway was late, with the encouragement of national policies in the past 20 years, Chinese subway construction has ushered in the peak period. However, there are still many problems in the process of construction, we still needed to improve the construction technology.

The content of this article relate to the construction of the Non-excavation section of Erqi Square Station of Zhengzhou Metro Line 1. The main purpose is to compare the construction techniques of the Non-excavation section of the subway station, and to determine the initial support design and construction plan of the excavation section. Analyze the engineering problems encountered in construction and provide solutions. The Non-excavation section of “Erqi” Square is excavated by CRD method. Select the composite lining for support. The rock layer in the tunnel body is mainly made up of sandy soil and powdered clay, the vault height is 16.31 meters from the ground, the whole section is straight

According to the “code for Metro Design”(GB50157-2013)、 “code for Railway tunnel”(TB10003-2016) and the relevant regulations, the lining structure adopts to the form of composite support structure. It includes initial support and secondary lining. This article mainly focuses on the initial support design. The initial support uses C25, steel grille, steel mesh and anchor. The thickness of the initial branch is 300mm, and the ϕ 108×6mm tube shed is set within 150° of the vault. **An waterproof layer is set between the initial support and the second lining.**

(1) First of all, according to the site condition to select the method of construction of the Non-excavation section. Considering that the site strata are all soft soil layers, groundwater development, the deformation and settlement must be strictly controlled. Finally, shallow burying method was used to carry out the construction of Non-excavation section.

(2) According to the method of selected, the factors such as Geological

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