

本工事は、愛媛県上浮穴郡久万高原町内の国道440号において、延長422m、道路幅員6.5m(車道と路肩を含む)の小村トンネルをNATMにより施工するものである。工事においては、設計時の支保パターンが変化する手前もしくは地質が想定と異なるタイミングにおいて、切羽観察にもとづき、的確に支保パターンを選定しながら掘削作業を進めた。また、掘削に伴う重金属含有土の発生に備えて、掘削前の土壌調査による事前のリスク把握、リスクの顕在化に備えた掘削土仮置き場の環境対策を行いながら、工事を効率的に進めるよう取り組んだ。本稿では、事故や災害、掘削中のトラブルが発生することなく、2年半をかけて完成させた小村トンネルの施工状況について報告する。

Smooth Excavation through the Appropriate Selection of Support Patterns

—the National Route 440, the Komura Tunnel—

By Junichi Kurose, Ehime Prefecture

This project involves the construction of the Komura Tunnel using the NATM. The tunnel is 422 m long with a road width of 6.5 m (Includes the roadway and shoulders), and is located on National Route 440 in Kumakogen Town, Kamiukena District, Ehime Prefecture. During construction, excavation progressed by selecting appropriate support patterns based on continuous face observation at transition points where the planned support pattern was expected to change or where geological conditions differed from initial assumptions. In addition, to prepare for the potential occurrence of excavated soils containing heavy metals, pre-excavation soil surveys were conducted to identify risks, and environmental protection measures were implemented at temporary spoil storage sites to mitigate any potential impacts. The construction project proceeded efficiently through these efforts. The paper presents the construction of the Komura Tunnel, which was completed over a period of two and a half years without accidents, disasters, or problems during excavation.

空堀川上流雨水幹線工事は、浸水被害が頻発する東大和市・立川市・武蔵村山市の一部の地域における浸水対策として、掘削外径 ϕ 3,870mmのシールドで延長約2kmの流域下水道雨水幹線を築造する工事である。当該地域に厚く分布する武蔵野礫層は、その大部分が標準貫入試験の重錘が全く沈まないほどの硬質地盤であり、多くの巨礫の混入も想定された。そのためシールド掘進にあたり、巨礫取り込みによるスクリーコンベヤの閉塞や、硬質地盤掘進に伴うカッタービットの摩耗などで掘進不能となることも危惧され、各種対策を講じる必要があった。本稿では、硬質地盤中のシールド掘進における課題と実施した対策について報告する。

Tunneling in Hard Ground Containing Large Boulders with Muddy Soil Pressure Balanced Shield TBM

—Tokyo Metropolitan Government, Bureau of Sewerage, Upstream Karabori River Stormwater Trunk Sewer—

By Hiroshi Doi, Tokyo Metropolitan Government

The Upstream Karabori River stormwater trunk sewer project involves the construction of a 2 km-long stormwater main with an outer diameter of 3,870 mm using a shield TBM as an inundation control measure for areas of Higashiyamato City, Tachikawa City, and Musashimurayama City that frequently experience inundations. The Musashino gravel layer, which is widely distributed and thick in the project area, consists largely of extremely hard ground in which the hammer used in the standard penetration test shows virtually no penetration. In addition, the presence of numerous large boulders was anticipated. These conditions raised concerns that excavation could be halted by obstruction of the screw conveyor caused by the intake of large boulders, or by significant cutter bits during excavation in hard ground, thereby necessitating the implementation of various countermeasures. This paper presents the challenges encountered during shield tunneling in hard ground and the countermeasures implemented to address them.

なにわ筋線は、大阪市中心部を南北に縦貫し、大阪駅からJR難波駅および南海新今宮駅を結ぶ鉄道新線である。関西国際空港へのアクセス改善や都市機能強化を目的に、第三セクターの関西高速鉄道(株)が建設主体となっている。事業化の経緯や全体概要、技術課題については本誌2022年3月号で報告した。今回、共同営業区間(JR西日本と南海電鉄の共同運行区間)において、開削工事の土留め壁設計・施工や既設鉄道高架橋との交差点に関する検討が進展し、工事計画の具体化が図られた。本稿では、軟弱地盤における地盤変位や支障物への対応と工事計画を示し、とくに都市中心部の大深度掘削工事における安全性確保の取り組みについて報告する。

Construction Planning for the Naniwasuji Line, a New Railway Traversing Central Osaka (Osaka Station to Nishi-Honmachi Station)

By Naoki Hidaka, Kansai Rapid Railway Co., Ltd.

The Naniwasuji Line is a new railway project traversing central Osaka from north to south, connecting JR Osaka Station with JR Namba Station and Nankai Shin Imamiya Station. The project is primarily led by Kansai Rapid Railway Co., Ltd. (KRR), a third sector company, with the aim of improving access to Kansai International Airport (KIX) and enhancing the city's overall urban functions. In the March 2022 issue of this publication, we reported on the project's commercialization process, overall plan, and major technical challenges.

Since then, studies on the design and construction of earth retaining structures for cut and cover excavation, as well as evaluations concerning crossings with existing railway viaducts, have progressed within the shared operation section jointly served by JR West and Nankai Electric Railway. This paper outlines the updated construction planning together with the measures taken to address ground deformation in soft soils and interference with existing underground structures, with particular emphasis on ensuring safety during deep excavation works in the urban center.