

# Implementation of Long Slurry Shield Method in Complex Soil and Vicinity of Important Constructions such as Shinkansen

— Osaka City Construction Bureau Osumi to 18-jo Sewage Waterway —

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## 1. Introduction

Osaka City is constructing a facility that can handle heavy rainfall of 60mm per hour, which generally occurs once in every 10 years in the northern part of the city. This facility is a sewage waterway with a maximum inner diameter of 7,500mm and a total length of 22.5km.

This project is a part of the trunk sewer, and a sewer culvert with outer diameter of 5.85m and inner diameter of 5.25m is constructed for the approx. 4,080m section by the slurry shield method.

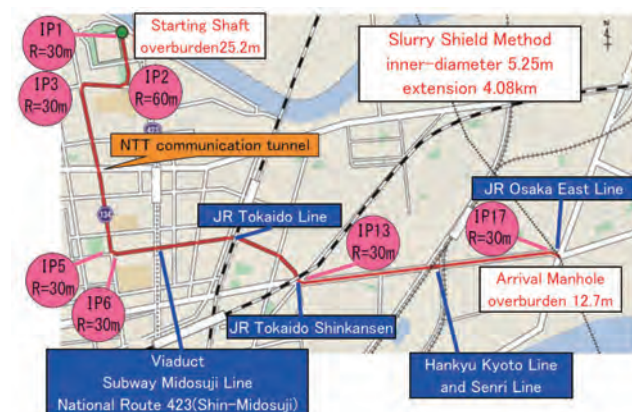


Fig. 1 Route Plan

## 2. Alignment

Figure-1 shows the plan view of the line. The line is a 4,080m long line that passes through a watershed which would be connected with existing sewer facilities, and there are a total of 17 curved sections ranging from R=30m to R=500m.

## 3. Geology and Response to Adjacent Structures

Figure 2 shows a vertical geological profile. The area is located at the source of river flooding and alluvium consisting of soft clay, sand, and gravel are distributed. The geology for the first half of the line is consisting of the Osaka Group (Oc, Os, Og) to Tenma Gravels (Tg maximum gravel diameter  $\phi$  150mm), which contains sand and gravel. The latter half of the line is Alluvium consisting of loose sand (As), sand and gravel (Asg) and clay (Ac) layers with N values of 3 to 7. Especially in the shield tunneling of the Alluvium in the latter half, the quality of the slurry was thoroughly controlled paying special attention to its gravity and viscosity to ensure the stability of the face.

In addition to railways, there are a number of roads and sewage processing facilities in the vicinity of the line. Figure-3 shows an example. As a countermeasure, a trial construction, automatic measurements, limiting the time of passage, and, on the Hankyu Line (Kyoto Line and Senri Line), protective improvements by inclined drilling from outside the track were implemented.

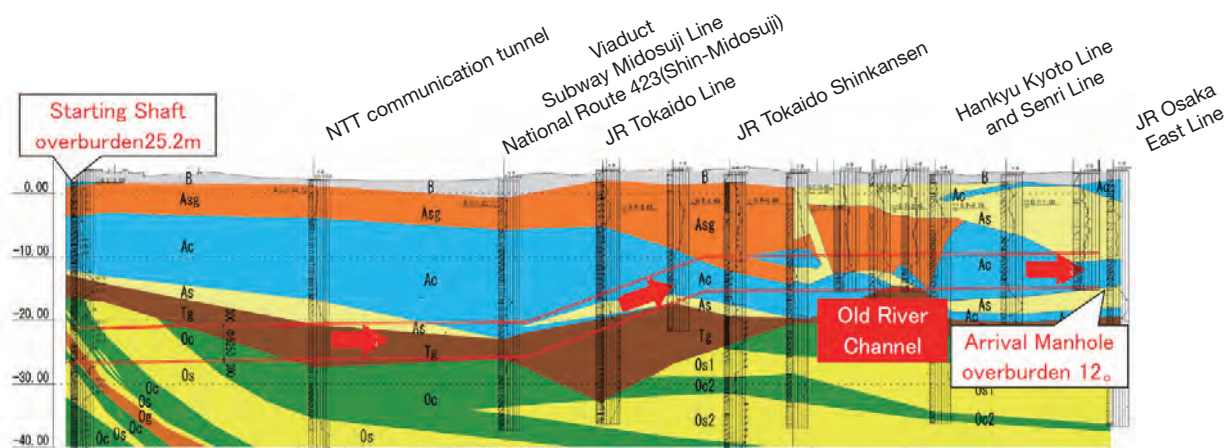


Fig. 2 Geological Longitudinal Map

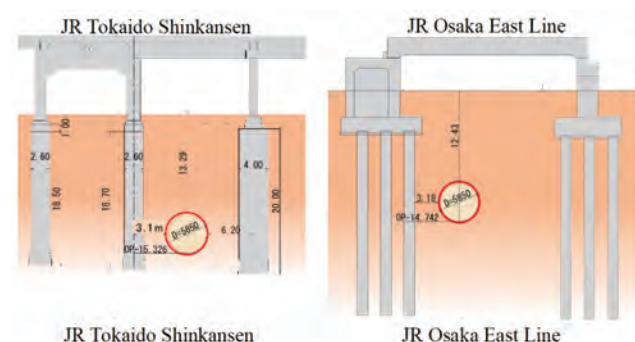


Fig. 3 Situation of Neighboring Construction

## 4. Summary

This project was a long construction project of approximately 4 km with many sharp curves. Because of the soft ground in the latter half of the line, measures to prevent ground deformation and ground settlement during shield excavation were taken, and detailed plan and measures were provided for construction close to existing structures in service, such as railroads. Although there were some problems during the construction, such as water inflow and lost circulation, measures had been taken flexibly to various events, and the construction has been completed successfully.