

6. Development of Isolated Joint between Shield Tunnel and Vertical Shaft

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The Metropolitan Area Outer Discharge Channel No.5 Work Section consists of the shield tunnel and the vertical shaft section. Although the shield tunnel runs mainly through diluvial deposit, it has to be designed safe enough against L2 earthquake so that the function of the discharge tunnel should be maintained even after experienced it. The seismic design is made by the response displacement method and the dynamic analysis.

At first the joint between the shield tunnel and the vertical shaft is modeled as the fixed joint. The dynamic analysis has revealed that the stress and joint space of segment near the vertical shaft are over the allowable level, because the behavior of tunnel under earthquake is different from one of shaft. At second the tunnel/shaft joint is modeled as the isolated joint offered by water stop plate and asphalt filler. The relative displacements to arise in between tunnel/shaft joint and the seismic strains can be controlled well below the allowable level.

In this paper, we will report on the results of dynamic analysis and the isolated tunnel/shaft joint to achieve high earthquake residence.

Key words : vertical shaft, Isolated shield-driven tunnel, earthquake response analysis
seismic design, three-dimensional finite element method