

### 3. Development of Flat Type Section Shield Tunneling (Part1)

#### -Tunneling Method Intended for Boundary Area of Shield Tunneling and City Part Rock Tunneling Method-

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The tunnel section of the radiation and the orbital expressway where construction is scheduled to the metropolitan area outskirts is often planned to 'Boundary area of the shield tunneling and the city part rock tunneling method' in which everything from the soft ground in plains to the hill ground comparatively changes into the hard ground. In the shield tunneling, the construction expense is a problem. And, the influence etc. done by the change in the shape of the decrease in underground water and the ground are problems in the rock tunneling method. Therefore, the examination that considers the geological features situation of the plan route and the environmental impact in the surrounding enough is necessary for the selection of the tunneling method.

'Flat type section shield tunneling' is a city tunnel tunneling method to aim at 'The boundary area of the shield tunneling and the rock tunneling method is constructed fast by a low cost'. This tunneling method has the effect of controlling the subsidence of the function and the ground level where the flow of underground water is defended. And, it digs up the tunnel at almost the same speed as the shield tunneling, and the tunnel is constructed at almost the same cost as the city part rock tunneling method.

In this report, it reports on the result of the research of the basic structure of the flat type segment (lining structure to apply pin bearing and the internal reinforcement all-in-one design slab) and the changed beam cutter (shield machine cutter mechanism that enables digging up the hard ground and a flat section) in 'Flat type section shield tunneling'.

**Key words :** shield tunneling method,road tunnel,flat section,boundary area,low-cost