

Numerical Study to Prevent Ground Settlements Induced by Over-excavation with EPB Shield TBM

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ABSTRACT

The shield TBM is utilized in urban tunnel construction to minimize ground deformation. The earth pressure balanced (EPB) type is one of the shield TBM, which could stabilize the tunnel face with pressured former excavated materials gathered in the chamber. The muck, discharging beyond the chamber, is controlled for balancing face pressure by measuring weight or volume or changing angle and rotation of screw conveyor. However, for the over-excavation, only stabilizing face pressure cannot be a solution for ground settlements. It is required to control the amount of excavated materials in the chamber by muck discharging to prevent exceeding volume loss at face. In this study, the numerical analysis conducted with parameters of ground properties and face pressure without the effect of tapering or TBM geometry. Therefore in this study, the amount of volume loss at tunnel face and equivalent 3D movement ahead of the face with various conditions were derived, and also the optimum amount of muck was proposed.

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