
Ground Deformation Due to Construction of Cross Passage and Shield Tunneling

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ABSTRACT

This paper studies ground settlement and heaving due to shield tunnel for Taipei MRT, Lot CB 420 the Sung-Shan. Excavate round settlement was offered at the initial stage of tunneling, and heaving was offered at the runway of airport. Relationships between 100-day ground settlement and construction parameters were investigated. The parameters studied include : chamber pressure coefficient, backfill grouting pressure, mud injection pressure, secondary grouting pressure, torque, to total jack thrust, and speed of shield. Based on the field data of Lot CB420, the following conclusions are drawn.

1. For this project, the controlling chamber coefficient (K_{ch}) used was between 1.3 ~ 1.4 K_o , where K_o is the coefficient of earth pressure at rest proposed by Jaky (1944) and Brooker & Ireland (1965).
2. The measured soil discharge rate (SDR) is less than 1.0. This is probably due to discharge-rate measuring error and volume reduction of normally consolidated clay during shearing.
3. High injection volume of backfill grout does not ensure a small settlement. For this project, 100~200 kPa over water pressure was used as backfill grouting

pressure.

4. Based on field data, it is found that the mud injecting pressure over $1.2 \sigma_v$ ($\sigma_v =$ over burden pressure) at the face caused hydraulic failure of the soil and runway heaving. It is suggested to control the mud injection pressure between $1.0 \sim 1.2 \sigma_v$.
5. The improvement of ground settlement with secondary grouting is not significant.
6. For this project, the total jack thrust F_{jack} was controlled between $1.5 \sim 2$ times of at rest, Soil thrust P_o acting at the face.
7. Low shield speed may improve the ground settlement due to tunneling.

