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Behavior of the upper ground during the tunnel excavation in the fragmental rocks

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ABSTRACT

When a tunnel is excavated, the ground around it deforms locally, and the ground characteristics, the tunnel size, and the excavating order can influence the shape of the deformation. Terzaghi (1954) demonstrated that the local uniform ground deformation in the trap door tests could develop the ground arching (Murayama 1968). However, the convex deformation would occur above a tunnel crown in case of a cave-in at the shoulder, side-drift, or punching failure at the side wall. In addition, when the cave-in or tension crack occurs at the tunnel crown or top-drift on tunneling, the ground deforms in a concave curve. In this case, load transfer and the local ground deformation would be developed differently. Furthermore, the ground arching would be developed depending on the dip of discontinuous when a tunnel deforms in rocks. As a result, it was found that the ground around a tunnel would be loosened, and the ground arching would develop in different shapes depending on the dip angle and the deformation shapes, which are uniform, convex, and concave.

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