

New formula to prevent settlement induced by EPB tunneling

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ABSTRACT

When we look at today's world, with the increasing population density, some problems have begun to arise in urban and intercity transportation. Subway systems, especially used for urban transportation, are an indispensable part of our lives. These systems are implemented with the multidisciplinary work of many engineering branches. There are many parameters we need to consider when opening underground tunnels in urbanized areas. Another important issue here is that the tunnel built underground must not damage the structures above ground. Because it is a huge risk that structures will be damaged during or after the tunneling process. To minimize this risk, Tunnel Boring Machines (TBM) are widely used, especially in areas with urbanization. The Earth Pressure Balance (EPB) method is generally used in weak and difficult ground conditions. Thanks to this method, a pressure is created that prevents the excavation face from flowing into the tunnel and settlements on the ground are taken under control. In this study, a new mathematical formula was developed. In this study, a mathematical formula was developed that calculates the pressure that the EPB should apply to the tunnel face, in order to prevent damage to a structure located on the tunnel route and that is affected by the tunnel excavation, and to prevent settlements on the surface. The face pressures calculated as a result of the formula were compared with real data.

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