

Non-Linear Numerical Modeling of the Interaction of Twin Tunnels- Structure

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Abstract : Structures on the ground surface bear impact from the tunneling-induced settlement, especially when twin tunnels are constructed. The tunneling influence on the structure is considered as a critical issue based on the construction procedure and relative position of tunnels. Lebanon is suffering from a traffic phenomenon caused by the lack of transportation systems. After several traffic counts and geotechnical investigations in Beirut city, efforts aim for the construction of tunneling systems. In this paper, we present a non-linear numerical modeling of the effect of the twin tunnels constructions on the structures located at soil surface for a particular site in Beirut. A parametric study, which concerns the geometric configuration of tunnels, the distance between their centers, the construction order, and the position of the structure, is performed. The tunnel-soil-structure interaction is analyzed by using the non-linear finite element modeling software PLAXIS 2D. The results of the surface settlement and the bending moment of the structure reveal significant influence when the structure is moved away, especially in vertical aligned tunnels.

Keywords : bending moment, elastic modulus, horizontal twin tunnels, soil, structure location, surface settlement, vertical twin tunnels

Conference Title : ICCEMTS 2016 : International Conference on Civil Engineering and Modelling Transportation System

Conference Location : Paris, France

Conference Dates : August 22-23, 2016