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TITLE OF DIPLOMA THESIS: Risk management of frame buildings due to opening up of tunnels

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ABSTRACT

In the present diplomatic work was studied the effect of opening up of two tunnels (twins) on a common frame building of length 20 m and height of 19,5m. Concretely, in the region of study, it was taken that two independent tunnels will be opened up, in a depth of 20 m until the axis of them. These tunnels will have diameter 6 m and axial distance from each other 12 m. The main work was to appear the effect that the opening up of tunnels will have in the selected building, in the level of displacements (vertical and horizontal) and the classification of the building as far as the potential damage is concerned, depending on its stiffness. In this way, it might be pronounced if crackings exist in the skeleton of building beforehand, functioning in this way preventively. Thus, the Empiric Method was initially used, is a method of free field (that is to say without the interaction with the frame building) and the displacements were calculated (vertical and horizontal), in order to exist a first sample for the prices of them. Afterwards, the software of Ansys was used, firstly in order to verify the results of Empiric Methods at some way (using one meter of elasticity for the finite elements that were found in the diameter of the tunnel, instead of supporting conditions) and secondly in order to embody the existing study and the building, because with this software, the integration of the building was possible in the system ground-tunnel as well. Therefore, new prices of displacements were resulted in this case too. Afterwards, the software SAP was used, which is program static and with this the resolution of frame became for various cases (with connective beams and without) giving diagrams M, Q, N. Its connection with the program Ansys became charging the displacements from Ansys to SAP (in the nodes of columns) and imposing the calculated vertical charges of SAP in Ansys, respectively, until convergence of results was achieved. The next stage was the finding of displacements with the method of equivalent stiffness (variant of method Potts - Addenbrooke), where the building was simulated with elements with different prices of stiffness, at its all length, height of 1 m (as apron slab) fixed from different each time modulus of elasticity E^* . Totally, 4 prices of E^* were received, therefore it resulted to 4 simulations. Its connection with the program SAP, as before it became charging the displacements from Ansys to SAP (in the nodes of columns) and imposing the calculated vertical charges of SAP in Ansys, respectively, until convergence of results was achieved. Finally, the influence of results of the simulations is impressed for all above solving methods. To this direction, certain parameters are calculated, such as the deflection ratio and the horizontal strain for various simulations, where with the prices of the vertical and horizontal displacements, their comparison is possible, as well as the classification as far as the damage is concerned that can be caused in the frame building under review, depending on its stiffness.



KEYWORDS

Green field, Volume Loss, Sap, Tunnels, Classification damage