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Stabilizing of high-altitude position of the centrifuge’s foundation by compensation grouting technique during underground tunneling

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Abstract

The paper presents technique of regulated constructing elevation of buildings after their settlement because of tunneling under them. Control of buildings’ elevation is based on preliminary calculation of grouting zones positions, injection sequence and injection volumes. Special software complex performs control functions over compensation grouting process, co-ordinating pumps work according to permanent horizontal and vertical monitoring of fundaments and correcting technological parameters of compensation grouting. Examples provide practical view on proposed technique.

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1. Introduction

Special feature of modern construction of main line tunnels of Moscow Underground in the high-density city built areas consists of those lines often running directly under buildings in use.

Foundations of existing buildings often show additional vertical and/or horizontal movement during underground tunneling, even if you follow all rulings of technical guidelines for minimizing of settling, such as grouting through special ports just behind the rotor or consolidation of the bases and foundations. If foundations of buildings or equipment initially do not allow additional movements, restoration of their initial positions becomes a necessity.

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2. Main Issue

World practice in the recent years shows that compensation grouting technique is one of the most effective methods for restoring of high-altitude position of foundations and for eliminating its inclination. The builders accepted this technique after incident, when during underground tunneling under fundament of centrifuge (fig. 1) used for pilots' training slump c. 30mm appeared and, moreover, gradient of slump occurred which is unacceptable for this type of equipment.

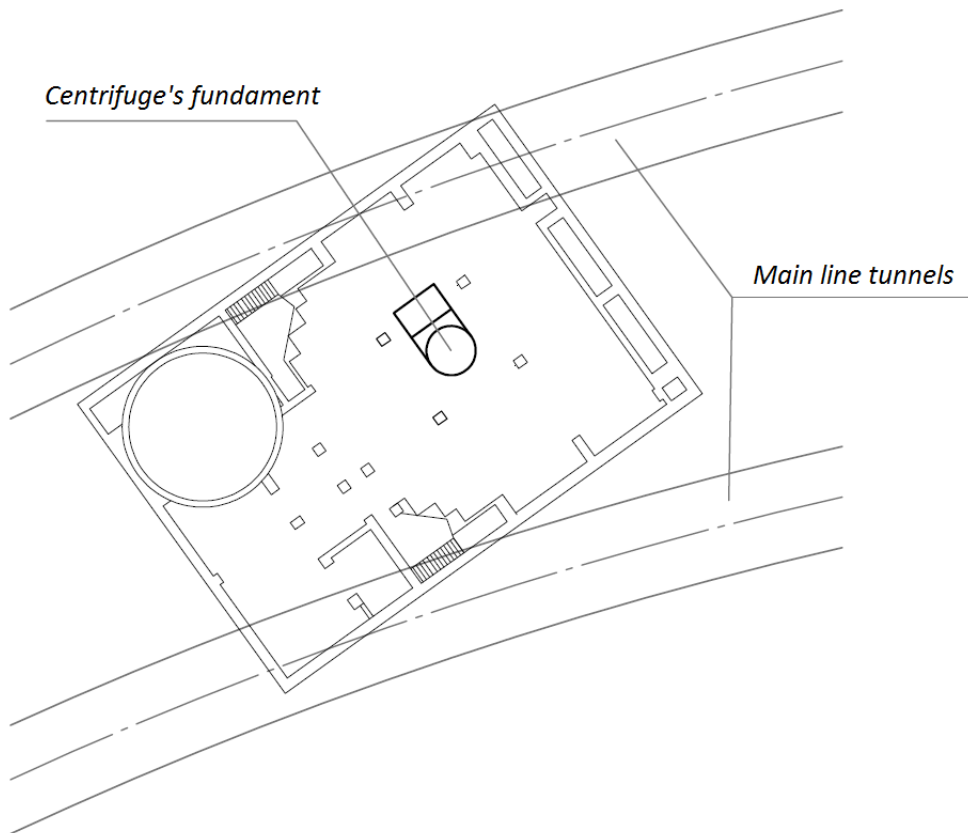


Fig. 1. Positions of main line tunnels and of centrifuge building.

The basic principle of this technique is grouting of injections into foundation base in determined points with determined sequence through gasket injectors (assembled beforehand) in order to achieve hogging (fig. 2) [1].

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