

## **Geonumerical computations for the determination of critical deformations in shallow tunnelling**

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### **SUMMARY**

It is an essential part when planning inner urban tunnels to indicate expected deformations. Deformations on the surfaces and deformations within the tunnels do have the same importance.

Detailed investigations do usually include considerations of several loading conditions. Each loading condition does correspond with the specific deformation and contributes partially to the total deformation.

There are series of parameters influencing the development of deformations with respect to tendency and absolute value.

These are among others soil parameters, material parameters and specific assumptions with respect to the construction concept applied. Because of the results calculation, it would become necessary to change the construction method to be used even during planning stage.

Before such changes lead to satisfying calculation results, in many cases they are considered to be far away from reality. But in fact calculation is the only possibility in connection with experiences to give the designer a tool thus judging the structural design and the construction concept to be used. When calculating tunnels usually numerical methods are used; i.e. mainly FE-methods and more seldom analytical methods. Within this paper a very typical project of Metro section E-5 of Washington D. C. is analyzed using the two dimensional model. It has been shown that it is possible to define new criteria, based on geonumerical calculations, for critical deformations and more economical solutions, while the importance of geomechanical measurements during construction is unchanged.

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