



**Abstract (plain text)**

Designers often face difficulties selecting the most appropriate constitutive soil model for numerical modelling. The analysis type, kind of material and range of pressure/stress in addition to an in-depth understanding of the concepts of constitutive methods, are the main factors which direct the choice of model. This paper presents a case study testing a new design for manhole buried in the soil using three constitutive soil models. The new environmental regulations limit the use of the combined sewer system and separate sewer systems are currently used in all new developments. Constructing the traditional separate sewer system in some residential areas in the UK, most other European, and other countries which usually have narrow streets is challenging. Designers of new sewer systems must try to use the new technology available today to revisit traditional urban drainage management with an innovative outlook. This research investigates a new method to construct sewer system which is capable of overcoming this challenge, by using a new design of the manhole shape allows for setting storm pipe and sanitary pipe in one trench. The FE model has been established to test the manhole-soil correlation and the three constitutive models have been applied. A laboratory tests to determine the soil properties have been conducted using the triaxial and consolidation test, the results used to identify the parameters of three constitutive models in ABAQUS; Mohr-Coulomb plasticity, Extended Drucker-Prager models and Modified Drucker-Prager/Cap model. The elastic behaviour of soil is nonlinear and stress dependent, and FE is an adequate method to simulate soil elastoplasticity behaviour under load as it presents elastic moduli in incremental. The FE simulation results are compared with experimental outputs, showing acceptable match of the three models outputs with experimental results. Therefore selecting one of the constitutive model tested in this research for application in large structure behaviour such as a buried concrete manhole in the soil, has a significant effects on the results.

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Materials / geometry nonlinearities

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