

Cite this article as:

Farrell, E.R, Orr, T.L.L. and O'Kelly B.C. 2005. Geotechnical research Trinity College Dublin, *The Irish Scientist Year Book 2005*, Vol. 13, pp. 90.

Geotechnical research

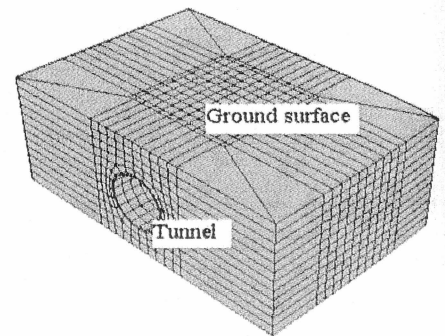
The Geotechnical Group at the Department of Civil, Structural and Environmental Engineering is actively researching solutions to some of the key issues that need to be addressed in the construction of civil engineering infrastructure on difficult ground conditions or in challenging design situations. Examples include:

- Development of methods to improve the engineering properties of very soft peat and organic soils such that roads and other engineering structures can be constructed on these deposits. The process, known as soil stabilisation, involves mixing the very soft soils *in-situ* with binders. The research was carried out as part of the multi-national EuroSoilStab programme and included large-scale field trials as well as laboratory tests, numerical analyses and, a feature unique to Trinity College, a large-scale test chamber.
- Development of new laboratory test methods to determine the strength and permeability of peat under low applied loads; studies of the stress-

strain-stiffness response of peaty ground under complex loading conditions; and the drying properties of organic soils.

- Research into the ground vibrations caused by tunnelling in Dublin. Numerical models have been developed and used to predict the transmission of vibrations from the tunnel boring machine to the ground surface (*see figure*). The magnitude and the distribution of the vibrations at the ground surface are related to the vibrations produced by the tunnel boring machine and the research is examining how these are affected by the ground conditions.
- Environmental geotechnics, including the numerical modelling of glacial aquifers during dewatering events, for example the effects of the recent construction works for the Kildare Bypass on the local groundwater regime. The dewatering and landfill disposal of municipal sludges that are being produced in increasing quantities at wastewater treatment plants has also been studied.

- The Geotechnical Group has a major interest in the application of the limit state philosophy and probabilistic methods in geotechnical design and the development of Eurocode 7, the new European Standard for geotechnical design, which is based on this philosophy.



Computer model of Dublin Port Tunnel for vibration analysis

Contact: Dr Brendan O'Kelly,
Department of Civil,
Structural and Environmental
Engineering, Trinity College, Dublin 2;
E-mail: bokelly@tcd.ie