
Preface

Engineering geology, a relatively young field, emerged through recognition of the need for geologic input into engineering projects. Today, this primary field has expanded as the statutes of its learned society, the IAEG, define: “Engineering geology is the science devoted to the investigation, study and solution of the engineering and environmental problems which may arise as the result of the interaction between geology and the works and activities of man as well as to the development of measures for prevention or remediation of geological hazards.”

The role of engineering geology for major engineering projects and infrastructure construction is well represented in the papers included in this volume of the proceeding of the 12th IAEG congress, devoted to major engineering projects. The geologic input is not only confined to the initial stage of such projects but the contribution of engineering geology includes all stages for their completion, reflecting the present standing of engineering geology in geotechnical engineering.

A retrospective review of the development of engineering geology shows that in the early days, up to the 1950s or even the 1960s, what was understood as engineering geology was restricted to assessments, with general and qualitative engineering descriptions. Then this is followed by a second period of development until about the 1980s. The demands of the development of society required more knowledge for the behaviour of the ground. Now meaningful geological models could be provided. However, the quantitative component was weak, and contributions to the design of structures were limited. Although improved, the understanding of geology in the engineering milieu is not satisfactory. A third period starts from the 1980s but mainly from the 1990s. Engineering geology, keeping the core values so far developed, is now evolving towards geoengineering.

Indeed, today engineering geology not only offers services but is also a substantial and an integral component of geotechnical engineering in construction. It is present in all phases of investigation, design and construction:

1. Engineering geology defines the geological conditions, provides the geological model (formations, tectonics and structure), and translates it into engineering terms, providing suitable ground profiles at the appropriate scale. Its role is decisive for detecting the presence of geological hazards, in the selection of the site or the alignment of the engineering structure and for the basic principles of the construction method. It makes no sense to proceed without a sound knowledge of the geological model. Let us be a little dogmatic here: in the absence or misinterpretation of the geological model the construction or operation will almost certainly be associated with problems either small or large, as accidents, delays, cost over-runs or even failures may occur. On the contrary, if this model is known from the very beginning of the design, half the game has already been won ... *if at the very start the geological structure of the site is misinterpreted, then any subsequent ... calculation may be so much labour in vain.* (Glossop 1968, 8th Rankine Lecture). Therefore: start from the forest and then look at the trees.

2. After having understood the behaviour of the ground, engineering geology contributes to the definition of the properties of the geometrical, the selection of suitable design parameters and of the appropriate criteria. This a stage with a close synergy with engineering. An understanding of in situ stresses and groundwater conditions complete this stage.
3. Engineering geology is and should also be present at the design phase to ensure that calculations and simulations do not misinterpret the geological reality. John Knill in his first Hans Cloos lecture, in 2002, expressed strong concern that the *effectiveness of the integration of engineering geology within the geotechnical engineering remains to be improved*. This integration is a field of development in today's engineering geology, and papers in this volume contribute towards such advance.
4. Engineering geology is involved in construction in order to validate the assumptions of the design, to contribute in the application of measures in unforeseen or unforeseeable circumstances and to secure the implementation of the contract.

And, undoubtedly, geological and engineering judgement should never be neglected in this whole process of creating an engineering project. Next to knowledge, experience is needed for this judgment. Mark Twain said *Good judgment comes from experience. But where does experience come from? Experience comes from bad judgment*. However, the correct application of geological and engineering principles means that experience can also come from good judgement.

It is very satisfactory that this volume of proceedings of the 12th congress of IAEG embraces all the above mentioned, and a large variety of cases of engineering works is presented. Dams and tunnels are the majority of these cases but also foundations, offshore structures, roads, railroads, slope design, construction material, tailings, repositories are dealt with. Papers on engineering properties and geotechnical classifications, site investigation issues and influence of groundwater are present together with contributions on the behaviour of soft rocks and weak rock masses. Active tectonics also attract special attention.

The volume is expected to constitute a valuable and lasting source of reference in the field of engineering geology, in particular, and in geotechnical engineering, in general.

Engineering Geology for Society and Territory - Volume
6

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