

# DIRECTIONS FOR DEVELOPMENT OF GEOTECHNICAL INFORMATION

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## ABSTRACT

*The Department of Engineering Geology of the Hanoi University of Mining and Geology has identified the following directions for development of geotechnical information technology:*

- *Classification and systematization of information and data and establishment of databases.*
- *Compilation of typical professional maps in digital form: geological, hydrogeological, engineering geological maps*
- *Developing methods of evaluating engineering geological conditions, analyzing the variation rules of engineering geological conditions and physico-mechanical properties of soils and rocks*
- *Developing methods of forecasting the changes of geological environment, forecasting the generation and development of engineering geodynamic processes and geologic hazards*
- *Solution of engineering geotechnical problems relating to stress, deformation, failure, permeability, etc.*

*With the above directions, the Department needs to purchase some software programs with transfer of technology, to coordinate with individual researchers and research organizations, to train young specialists with high qualification in geotechnical information technology.*

## 1. INTRODUCTION

The Department of Engineering Geology of the Hanoi University of Mining and Geology is assigned with the task to carry out regular and in-service graduate and post graduate training in the field of engineering geology and geotechnology, to carry out scientific and technological research projects, trial production, scientific cooperation contracts and projects with various institutions.

Therefore, development of information technology for the Department to implement the above tasks is indispensable and urgent. In this paper we would like to describe the present status of the geotechnical information technology in the Department and directions for its development in the coming period.

In the undergraduate level, the students are provided with a course of general information technology covering 75 periods in the first semester of the third year. In the second semester of the fourth year, the students are provided with 60 periods of applied information technology. In the course of applied information technology, the students are taught information technology to solve some statistical problems in geotechnology in Pascal language: the problem of calculating characteristic values of physico-mechanical indicators of soil and rocks and the problems of establishing correlative equations between them.

To supplement their knowledge, the students must learn the Excel software for calculating physico-mechanical indicators according to the data measured from the test instruments. The students also learn how to use AutoCAD. Combining the use of these software programs, the students can prepare borehole logs, CPT, SPT profiles, summary tables of physico-mechanical indicators, engineering geological cross sections.

The basic knowledge in geotechnical information technology helps the students to complete their graduation theses within a short time and increase the quality of their theses. However, this is still very primitive knowledge. It can only help to solve the most basic tasks and still cannot solve complicated problems in the practical production and especially in scientific researches.

For master and doctor degrees, the postgraduate students are trained to use the software program GEO - SLOPE OFFICE for saturated or non saturated soils (Version 4.21 - 8/1998 developed by GEO- SLOPE INTERNATIONAL - Canada with the following modules:

1. SLOPE/W: slope stability analysis
2. SEEP/W: analysis of seepage by finite element model
3. SIGMA/W analysis of stress and strain by finite element model

This is a software transferred by a Canadian company to the University of Water Resources. Every year we invite Prof. Nguyen Cong Man and MSc. Trinh Minh Thu from that University to give lectures to postgraduate students working for their master and doctor degrees in the Department.

Besides, the post graduate students before taking exams to the University have also made acquainted with other software programs such as MODFLOW, SURFER, etc. in the companies which have afforded to buy them.

Therefore, the postgraduate students working on their master and doctor degrees during three years of their study can make use of their knowledge in information technology to solve some more complicated problems of evaluating stability and predicting geo-environment changes. These are very important parts in their master and doctor theses, and also practical problems to be solved.

Thus, in terms of information technology, at present in the Department we still have nothing, in spite of very high practical requirements. Therefore, for long-term development, we need to work out the directions for development of information technology in our Department.

The geotechnical information technology is proposed to develop in the following directions:

- Classification and systematization of information and data and establishment of databases.
- Compilation of typical professional maps in digital form: Geological, hydrogeological, engineering geological maps.
- Developing methods of evaluating engineering geological conditions, analyzing the variation rules of engineering geological conditions and physico- mechanical properties of soils and rocks.
- Developing methods of forecasting the changes of geological environment, forecasting the generation and development of engineering geodynamic processes and geologic hazards.
- Solution of engineering geotechnical problems relating to stress, deformation, failure, permeability, *etc.*

With the above directions, the Department needs to purchase some software programs with transfer of technology, to coordinate with individual researchers and research organizations, to train young specialists with high qualification in geotechnical information technology.

For establishing a geotechnical information technology section, we will go step by step from preparing a project proposal for the University to request the Ministry of Education and Training for the permission to develop geotechnical information technology in the above directions. At the same time, it is necessary to train young information specialists with qualification meeting the requirements for solving the problems identified. On the other hand,

we would like to propose to the University to buy or provide funds to engage specialists to develop necessary software programs.

The above was a brief presentation about the present status and problems of geotechnical information technology in our Department. We wish to receive the supports from individuals and organizations specialized in information technology in Vietnam and abroad by means of financial assistance or experience in organization and operation of geotechnical information system at a University like the Hanoi University of Mining and Geology. In this respect, it would be appreciated if existing software programs could be given as presents or sold with low prices, training for young staff on various topics of information technology could be given, and joint researches in geotechnical issues of mutual interests could be carried out. We hope that with certain assistance, we will be able not only to enhance the quality of our education, but also to have many opportunities to win tenders for implementing scientific research projects of the Ministry of Science, Technology and Environment, of the Ministry of Education and Training, or of various cities and provinces in Vietnam.